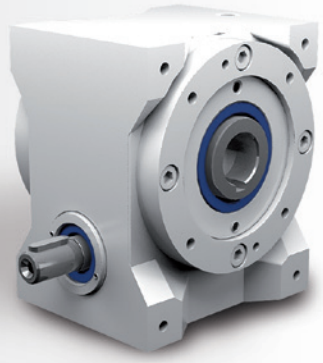
9.3 Type S – Standard worm gearboxes



9.3.1 Features

Nominal gear ratios: i = 10:1 to 83:1
Maximum output torque: 1765 Nm
8 sizes, centre-to-centre distance of 040 bis 100 mm
Low-backlash construction < 6 angular minutes possible
Housing made of grey cast iron

9.3.2 Models

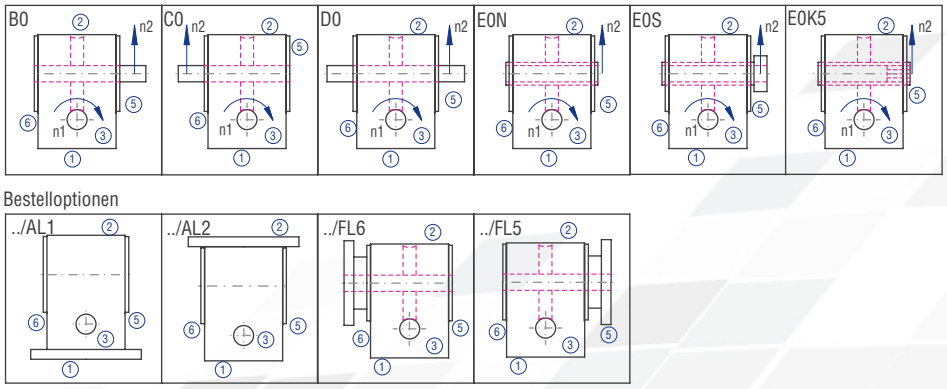


Figure **9.3.2-1; Models**

9.3.3 Gearbox sides

The example shows the Model B0

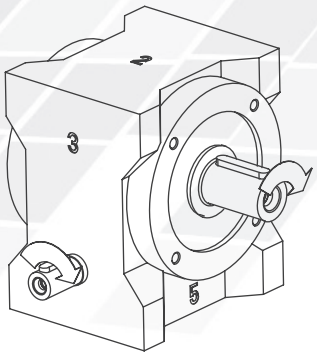


Figure **9.3.3-1; Gearbox sides**

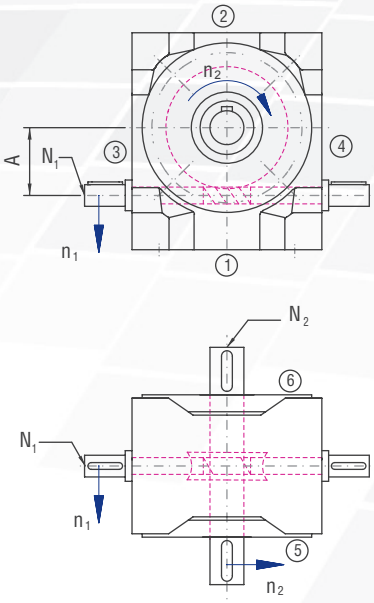


Figure **9.3.3-2; Shaft designations**

9.3.4 Order code

The order code reflects the customer specifications. Example:

Type	Size	Gear ratio	Model	Fixing side	Installation position	Speed n_2	Design
S	063	10:1	B0-	1.	1-	150	/0000
Description	Centre-to-centre distance A; Table 9.3.5-1	Table 9.3.5-1	Figure 9.3.2-1; Models	Gearbox side on which fixing is made Table 9.2.3-1 Figure 4.3.1-1; Gearbox sides	Side directed downwards Figure 4.3.1-1; Gearbox sides	Slowly rotating shaft; Table 9.3.5-1	Standard

Table **9.3.4-1**

9.3.5 Overview of performance data

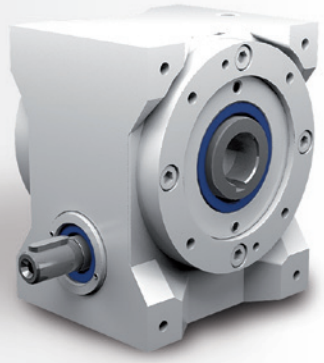
size	n_1 [1/min]	10:1					20:1					30:1					40:1				
		n_2 [1/min]	P_{1N} [kW]	T_{2N} [Nm]	P_{1NT} [kW]	η	n_2 [1/min]	P_{1N} [kW]	T_{2N} [Nm]	P_{1NT} [kW]	η	n_2 [1/min]	P_{1N} [kW]	T_{2N} [Nm]	P_{1NT} [kW]	η	n_2 [1/min]	P_{1N} [kW]	T_{2N} [Nm]	P_{1NT} [kW]	η
040	3000	300,0	1,39	39	1,28	0,91	150,0	0,82	43	0,77	0,84	100,0	0,53	36	0,51	0,75	75,0	0,48	44	0,46	0,72
	1500	150,0	0,77	43	0,83	0,90	75,0	0,49	50	0,49	0,82	50,0	0,37	50	0,33	0,73	37,0	0,32	56	0,30	0,70
	1000	100,0	0,55	45	0,69	0,88	50,0	0,36	53	0,42	0,80	33,0	0,29	57	0,28	0,70	25,0	0,25	63	0,25	0,67
	750	75,0	0,43	47	0,63	0,87	37,0	0,28	55	0,38	0,78	25,0	0,24	60	0,26	0,68	18,0	0,20	66	0,23	0,65
	500	50,0	0,32	50	0,87	0,85	25,0	0,21	58	0,34	0,76	16,0	0,18	65	0,23	0,64	12,0	0,15	71	0,21	0,62
	150	15,0	0,13	64	0,00	0,81	7,5	0,09	75	0,00	0,71	5,0	0,08	82	0,00	0,57	3,8	0,07	91	0,00	0,56
050	3000	300,0	3,02	85	2,82	0,93	150,0	1,54	81	1,70	0,87	100,0	1,12	82	1,14	0,79	75,0	0,87	80	1,02	0,76
	1500	150,0	1,64	91	1,88	0,92	75,0	1,03	106	1,12	0,85	50,0	0,79	113	0,76	0,77	37,0	0,65	118	0,68	0,75
	1000	100,0	1,15	94	1,56	0,90	50,0	0,73	110	0,93	0,83	33,0	0,59	121	0,63	0,74	25,0	0,52	134	0,57	0,71
	750	75,0	0,96	103	1,40	0,89	37,0	0,63	123	0,84	0,81	25,0	0,54	144	0,06	0,72	18,0	0,41	137	0,52	0,69
	500	50,0	0,71	112	1,23	0,87	25,0	0,47	133	0,74	0,78	16,0	0,42	157	0,50	0,68	12,0	0,31	147	0,46	0,65
	150	15,0	0,26	130	0,00	0,82	7,5	0,18	158	0,00	0,72	5,0	0,18	201	0,00	0,59	3,8	0,13	183	0,00	0,57
063	3000	300,0	4,15	121	4,16	0,94	150,0	2,95	161	2,52	0,88	100,0	1,94	143	1,66	0,80	75,0	1,54	149	1,50	0,78
	1500	150,0	2,94	170	2,89	0,93	75,0	1,70	186	1,73	0,88	50,0	1,38	204	1,15	0,80	37,0	1,08	207	1,04	0,77
	1000	100,0	2,26	194	2,41	0,92	50,0	1,32	212	1,44	0,86	33,0	1,11	237	0,97	0,77	25,0	0,85	237	0,87	0,75
	750	75,0	1,83	207	2,15	0,91	37,0	1,14	237	1,29	0,84	25,0	0,97	268	0,86	0,75	18,0	0,74	264	0,78	0,72
	500	50,0	1,30	216	1,86	0,89	25,0	0,86	259	1,12	0,81	16,0	0,75	296	0,75	0,71	12,0	0,57	288	0,69	0,68
	150	15,0	0,51	265	0,00	0,83	7,5	0,34	310	0,00	0,74	5,0	0,36	403	0,00	0,61	3,8	0,24	348	0,00	0,59
080	3000	300,0	6,58	197	5,92	0,94	150,0	4,24	240	3,59	0,89	100,0	3,47	272	2,41	0,82	75,0	2,62	267	2,14	0,80
	1500	150,0	4,96	297	4,47	0,94	75,0	3,04	344	2,67	0,89	50,0	2,52	395	1,81	0,82	37,0	1,87	381	1,58	0,80
	1000	100,0	3,79	340	3,79	0,94	50,0	2,37	399	2,26	0,88	33,0	2,03	456	1,54	0,80	25,0	1,49	443	1,35	0,78
	750	75,0	3,15	373	3,36	0,93	37,0	2,05	450	2,01	0,86	25,0	1,78	530	1,38	0,78	18,0	1,31	501	1,21	0,75
	500	50,0	2,35	408	2,86	0,91	25,0	1,57	498	1,72	0,83	16,0	1,38	593	1,18	0,75	12,0	1,02	553	1,05	0,71
	150	15,0	0,96	513	0,00	0,84	7,5	0,64	615	0,00	0,75	5,0	0,63	760	0,00	0,63	3,8	0,40	625	0,00	0,61
100	3000	300,0	18,55	555	8,57	0,94	150,0	10,84	614	5,44	0,89	100,0	7,53	590	3,50	0,82	75,0	6,33	645	3,32	0,80
	1500	150,0	11,75	703	6,35	0,94	75,0	6,87	778	3,99	0,89	50,0	4,78	748	2,60	0,82	37,0	4,01	817	2,42	0,80
	1000	100,0	8,95	803	5,49	0,94	50,0	5,28	888	3,44	0,88	33,0	3,60	825	2,27	0,80	25,0	3,13	933	2,09	0,78
	750	75,0	7,45	882	4,95	0,93	37,0	4,45	975	3,10	0,86	25,0	3,19	950	2,06	0,78	18,0	2,65	1025	1,90	0,76
	500	50,0	5,79	1006	4,30	0,91	25,0	3,47	1112	2,69	0,84	16,0	2,51	1080	1,81	0,75	12,0	2,13	1169	1,67	0,72
	150	15,0	2,02	1095	0,00	0,85	7,5	1,49	1441	0,00	0,76	5,0	1,18	1437	0,00	0,64	3,8	1,00	1581	0,00	0,62

Table **9.3.5-1**

size	n_1 [1/min]	53:1					62:1					83:1				
		n_2 [1/min]	P_{1N} [kW]	T_{2N} [Nm]	P_{1NT} [kW]	η	n_2 [1/min]	P_{1N} [kW]	T_{2N} [Nm]	P_{1NT} [kW]	η	n_2 [1/min]	P_{1N} [kW]	T_{2N} [Nm]	P_{1NT} [kW]	η
040	3000	57,0	0,39	44	0,42	0,68	48,0	0,36	45	0,35	0,63	36,0	0,25	36	0,32	0,56
	1500	28,0	0,21	46	0,28	0,65	24,0	0,20	48	0,23	0,59	18,0	0,14	37	0,21	0,52
	1000	18,0	0,15	48	0,24	0,63	16,0	0,15	51	0,20	0,56	12,0	0,10	38	0,18	0,50
	750	14,0	0,13	51	0,22	0,61	12,0	0,12	53	0,18	0,54	9,0	0,08	38	0,17	0,48
	500	9,4	0,09	55	0,20	0,59	8,1	0,09	56	0,16	0,51	6,0	0,05	38	0,15	0,46
	150	2,8	0,04	72	0,00	0,55	2,4	0,03	57	0,00	0,45	1,8	0,02	38	0,00	0,42
050	3000	57,0	0,65	77	0,92	0,73	48,0	0,61	81	0,75	0,67	36,0	0,39	59	0,70	0,58
	1500	28,0	0,38	85	0,62	0,69	24,0	0,42	105	0,50	0,64	18,0	0,21	63	0,47	0,56
	1000	18,0	0,27	88	0,52	0,67	16,0	0,31	109	0,43	0,60	12,0	0,15	64	0,41	0,54
	750	14,0	0,22	91	0,48	0,64	12,0	0,25	112	0,39	0,57	9,0	0,12	66	0,37	0,52
	500	9,4	0,16	95	0,43	0,61	8,1	0,18	113	0,36	0,53	6,0	0,09	69	0,34	0,49
	150	2,8	0,06	110	0,00	0,55	2,4	0,06	113	0,00	0,45	1,8	0,03	75	0,00	0,44
063	3000	57,0	1,16	143	1,34	0,76	48,0	0,82	110	1,10	0,69	36,0	0,75	129	0,99	0,66
	1500	28,0	0,80	191	0,96	0,74	24,0	0,66	175	0,76	0,68	18,0	0,46	152	0,69	0,63
	1000	18,0	0,58	200	0,78	0,71	16,0	0,53	202	0,65	0,65	12,0	0,33	152	0,59	0,59
	750	14,0	0,47	207	0,71	0,68	12,0	0,46	221	0,59	0,62	9,0	0,26	152	0,54	0,56
	500	9,4	0,34	217	0,63	0,65	8,1	0,34	226	0,52	0,57	6,0	0,19	152	0,49	0,52
	150	2,8	0,14	248	0,00	0,56	2,4	0,12	226	0,00	0,47	1,8	0,07	152	0,00	0,44
080	3000	57,0	1,78	234	1,93	0,78	48,0	1,40	194	1,55	0,70	36,0	1,10	196	1,43	0,68
	1500	28,0	1,04	271	1,41	0,77	24,0	1,01	279	1,15	0,70	18,0	0,90	304	1,04	0,65
	1000	18,0	0,76	284	1,20	0,74	16,0	0,81	325	0,98	0,68	12,0	0,64	304	0,90	0,61
	750	14,0	0,61	294	1,09	0,71	12,0	0,69	352	0,89	0,65	9,0	0,49	304	0,82	0,59
	500	9,4	0,45	308	0,96	0,68	8,1	0,54	393	0,78	0,61	6,0	0,35	304	0,73	0,55
	150	2,8	0,18	352	0,00	0,58	2,4	0,23	448	0,00	0,49	1,8	0,13	304	0,00	0,46
100	3000	57,0	4,76	615	3,04	0,78	48,0	4,59	645	2,39	0,70	36,0	3,33	591	2,24	0,68
	1500	28,0	2,63	670	2,19	0,77	24,0	2,91	817	1,74	0,70	18,0	1,74	599	1,61	0,66
	1000	18,0	1,92	704	1,88	0,74	16,0	2,17	886	1,52	0,68	12,0	1,23	599	1,40	0,62
	750	14,0	1,53	728	1,71	0,72	12,0	1,70	886	1,39	0,65	9,0	0,94	599	1,28	0,61
	500	9,4	1,11	762	1,51	0,69	8,1	1,21	886	1,24	0,61	6,0	0,67	599	1,15	0,57
	150	2,8	0,45	870	0,00	0,59	2,4	0,44	886	0,00	0,50	1,8	0,24	599	0,00	0,47

Table **9.3.5-1**

9.3.6 Type S 040 – Standard worm gearboxes



Characteristics

Characteristic	Standard	Option
Toothing	Hardened and ground worm shaft / bronze worm gear	See chapter 9.2.1
Gear ratio	10:1 to 83:1	
Housing / Flanges	Grey cast iron	
Threaded mounting hole	On gearbox side 1 and on the flanges	See chapter 9.2.3
Shaft	Material 1 C45, shaft ends greased Fit with ISO j6 tolerance with parallel keyway: according to DIN 6885 Sheet 1	See chapter 4.6.2
Hollow shaft	Material 1 C45, shafts greased Fit with ISO H7 tolerance with parallel keyway: according to DIN 6885 Sheet 1	See chapter 4.6.3
Radial shaft seal ring	NBR, form A	See chapter 4.8
Ambient temperature	- 10°C to +90°C. The values of the performance tables are valid for 20°C	See chapter 4.9.3
Circumferential backlash	< 30 arcmin	See chapter 9.2.10
Protection class	IP 54	See chapter 4.5
Corrosion protection	Prime coat; layer thickness > 40 µm	See chapter 4.4
Bearing life L10h	more than 15,000h	See chapter 4.9.1
Oil change intervals	Not required if the oil temperature is kept < 90°C The lifetime of the bearings can be increased by the factor 1.5 if the oil is changed after the first 500 service hours and then every 5000 service hours.	See chapter 9.2.8
Lubricant	Synthetic lubricants	See chapter 9.2.8

Performance data

i	i ist		n_1 [1/min]					
			3000	1500	1000	750	500	150
10:1	39:4	n_2 [1/min]	300,0	150,0	100,0	75,0	50,0	15,0
		P_{1N} [kW]	1,39	0,77	0,55	0,43	0,32	0,13
		T_{2N} [Nm]	39	43	45	47	50	64
		P_{1NT} [kW]	1,28	0,83	0,69	0,63	0,87	0,00
		Efficiency	0,91	0,90	0,88	0,87	0,85	0,81
20:1	39:2	n_2 [1/min]	150,0	75,0	50,0	37,0	25,0	7,5
		P_{1N} [kW]	0,82	0,49	0,36	0,28	0,21	0,09
		T_{2N} [Nm]	43	50	53	55	58	75
		P_{1NT} [kW]	0,77	0,49	0,42	0,38	0,34	0,00
		Efficiency	0,84	0,82	0,80	0,78	0,76	0,71
30:1	29:1	n_2 [1/min]	100,0	50,0	33,0	25,0	16,0	5,0
		P_{1N} [kW]	0,53	0,37	0,29	0,24	0,18	0,08
		T_{2N} [Nm]	36	50	57	60	65	82
		P_{1NT} [kW]	0,51	0,33	0,28	0,26	0,23	0,00
		Efficiency	0,75	0,73	0,70	0,68	0,64	0,57
40:1	39:1	n_2 [1/min]	75,0	37,0	25,0	18,0	12,0	3,8
		P_{1N} [kW]	0,48	0,32	0,25	0,20	0,15	0,07
		T_{2N} [Nm]	44	56	63	66	71	91
		P_{1NT} [kW]	0,46	0,30	0,25	0,23	0,21	0,00
		Efficiency	0,72	0,70	0,67	0,65	0,62	0,56

i	i ist		n_1 [1/min]					
			3000	1500	1000	750	500	150
53:1	52:1	n_2 [1/min]	57,0	28,0	18,0	14,0	9,4	2,8
		P_{1N} [kW]	0,39	0,21	0,15	0,13	0,09	0,04
		T_{2N} [Nm]	44	46	48	51	55	72
		P_{1NT} [kW]	0,42	0,28	0,24	0,22	0,20	0,00
		Efficiency	0,68	0,65	0,63	0,61	0,59	0,55
62:1	63:1	n_2 [1/min]	48,0	24,0	16,0	12,0	8,1	2,4
		P_{1N} [kW]	0,36	0,20	0,15	0,12	0,09	0,03
		T_{2N} [Nm]	45	48	51	53	56	57
		P_{1NT} [kW]	0,35	0,23	0,20	0,18	0,16	0,00
		Efficiency	0,63	0,59	0,56	0,54	0,51	0,45
83:1	82:1	n_2 [1/min]	36,0	18,0	12,0	9,0	6,0	1,8
		P_{1N} [kW]	0,25	0,14	0,10	0,08	0,05	0,02
		T_{2N} [Nm]	36	37	38	38	38	38
		P_{1NT} [kW]	0,32	0,21	0,18	0,17	0,15	0,00
		Efficiency	0,56	0,52	0,50	0,48	0,46	0,42

	5:1	7.5:1	10:1	13:1	15:1	20:1	26:1	30:1	40:1	53:1	62:1	83:1
T_{2max} [Nm]	73	83	77	59	97	90	77	107	99	87	72	64

Permissible radial force F_{r1} and axial force F_{a1} on shaft N_1

n_1 [rpm]	3000		1500		1000		750		500		150	
T_1 [Nm]	F_r [N]	F_a [N]	F_r [N]	F_a [N]	F_r [N]	F_a [N]	F_r [N]	F_a [N]	F_r [N]	F_a [N]	F_r [N]	F_a [N]
< 10	250	125	310	155	350	175	400	200	450	225	550	275

Permissible radial force F_{r2} and axial force F_{a2} on shaft N_2

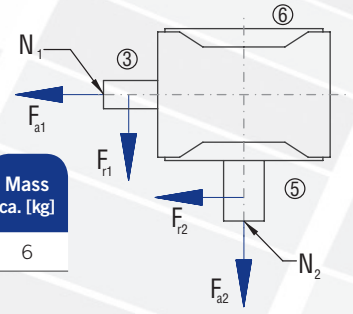
n_2 [rpm]	200		125		75		50		30		10	
T_2 [Nm]	F_r [N]	F_a [N]	F_r [N]	F_a [N]	F_r [N]	F_a [N]	F_r [N]	F_a [N]	F_r [N]	F_a [N]	F_r [N]	F_a [N]
< 80	970	485	1250	625	1380	690	1600	800	1800	900	2500	1250

Inertia moments/mass

Inertia moment J_1 related to the fast-rotating shaft (N_1)

	Inertia moment [kgcm^2]											
	5:1	7.5:1	10:1	13:1	15:1	20:1	26:1	30:1	40:1	53:1	62:1	83:1
J1	0.33	0.25	0.18	0.15	0.19	0.15	0.13	0.18	0.14	0.12	0.13	0.12

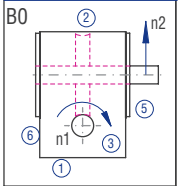
Mass ca. [kg]
6



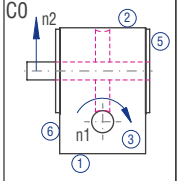
The mass of the gearbox may deviate depending on the gear ratio and the type.

Model

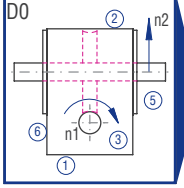
B0

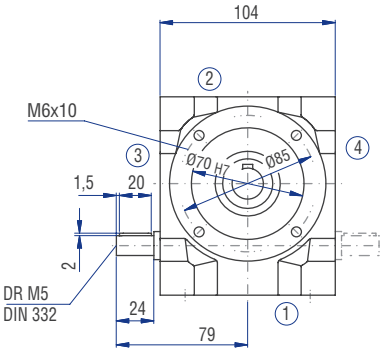


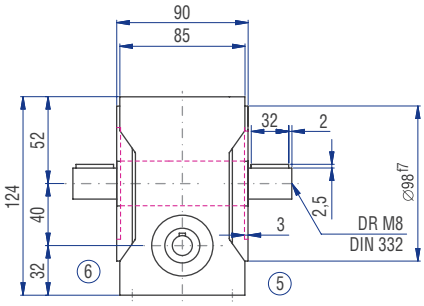
C0

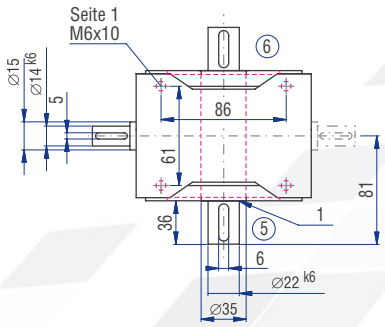


D0

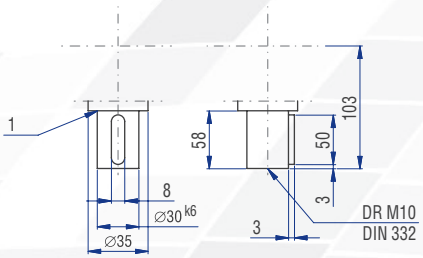








Implementation VV



Option

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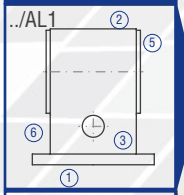

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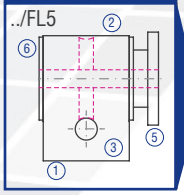
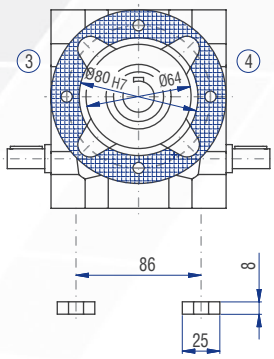
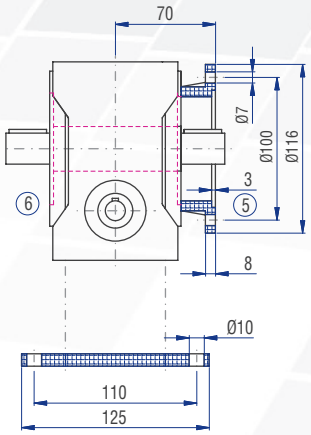
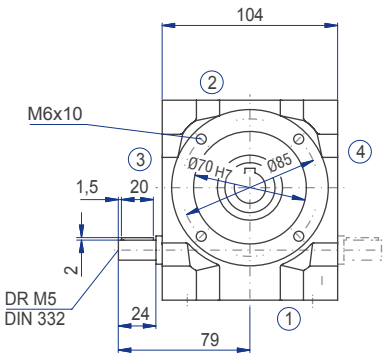
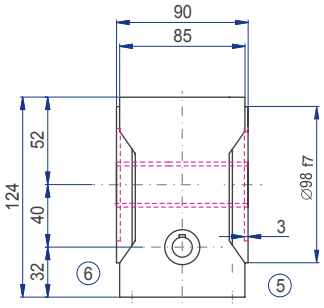


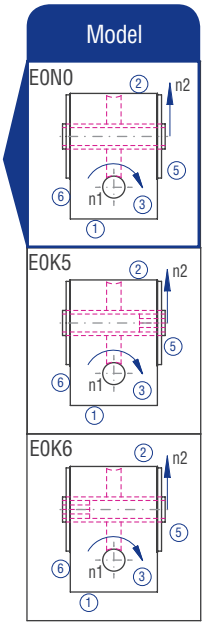


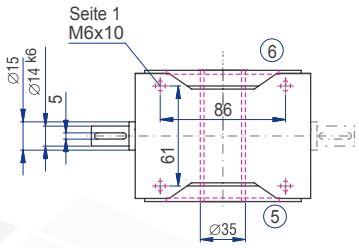


The dimensions of the Models not shown can be figured by mirroring available dimensions.









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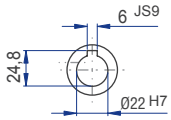
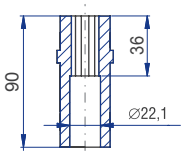
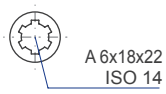
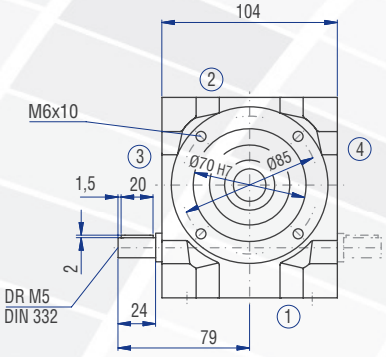
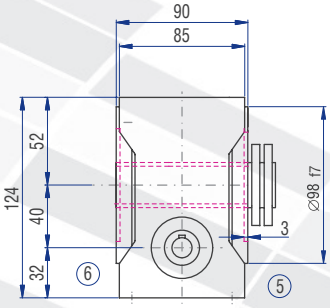


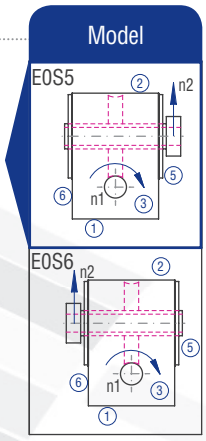
E0K5 / E0K6

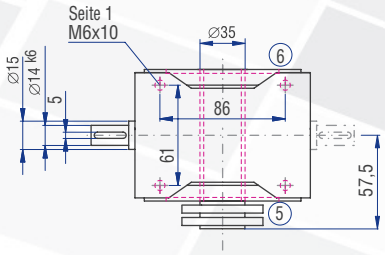


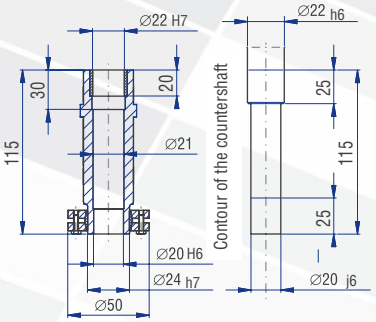




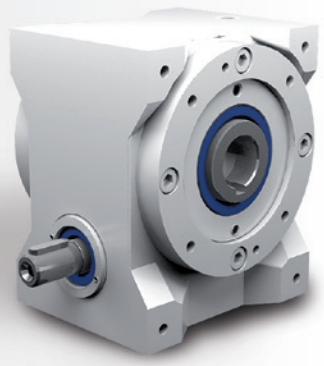








9.3.7 Type S 050 – Standard worm gearboxes



Characteristics

Characteristic	Standard	Option
Toothing	Hardened and ground worm shaft / bronze worm gear	See chapter 9.2.1
Gear ratio	10:1 to 83:1	
Housing / Flanges	Grey cast iron	
Threaded mounting hole	On gearbox side 1 and on the flanges	See chapter 9.2.3
Shaft	Material 1 C45, shaft ends greased Fit with ISO j6 tolerance with parallel keyway: according to DIN 6885 Sheet 1	See chapter 4.6.2
Hollow shaft	Material 1 C45, shafts greased Fit with ISO H7 tolerance with parallel keyway: according to DIN 6885 Sheet 1	See chapter 4.6.3
Radial shaft seal ring	NBR, form A	See chapter 4.8
Ambient temperature	- 10°C to +90°C. The values of the performance tables are valid for 20°C	See chapter 4.9.3
Circumferential backlash	< 30 arcmin	See chapter 9.2.10
Protection class	IP 54	See chapter 4.5
Corrosion protection	Prime coat; layer thickness > 40 µm	See chapter 4.4
Bearing life L10h	more than 15,000h	See chapter 4.9.1
Oil change intervals	Not required if the oil temperature is kept < 90°C The lifetime of the bearings can be increased by the factor 1.5 if the oil is changed after the first 500 service hours and then every 5000 service hours.	See chapter 9.2.8
Lubricant	Synthetic lubricants	See chapter 9.2.8

Performance data

i	i ist		n_1 [1/min]					
			3000	1500	1000	750	500	150
10:1	38:4	n_2 [1/min]	300,0	150,0	100,0	75,0	50,0	15,0
		P_{1N} [kW]	3,02	1,64	1,15	0,96	0,71	0,26
		T_{2N} [Nm]	85	91	94	103	112	130
		P_{1NT} [kW]	2,82	1,88	1,56	1,40	1,23	0,00
		Efficiency	0,93	0,92	0,90	0,89	0,87	0,82
20:1	38:2	n_2 [1/min]	150,0	75,0	50,0	37,0	25,0	7,5
		P_{1N} [kW]	1,54	1,03	0,73	0,63	0,47	0,18
		T_{2N} [Nm]	81	106	110	123	133	158
		P_{1NT} [kW]	1,70	1,12	0,93	0,84	0,74	0,00
		Efficiency	0,87	0,85	0,83	0,81	0,78	0,72
30:1	29:1	n_2 [1/min]	100,0	50,0	33,0	25,0	16,0	5,0
		P_{1N} [kW]	1,12	0,79	0,59	0,54	0,42	0,18
		T_{2N} [Nm]	82	113	121	144	157	201
		P_{1NT} [kW]	1,14	0,76	0,63	0,06	0,50	0,00
		Efficiency	0,79	0,77	0,74	0,72	0,68	0,59
40:1	38:1	n_2 [1/min]	75,0	37,0	25,0	18,0	12,0	3,8
		P_{1N} [kW]	0,87	0,65	0,52	0,41	0,31	0,13
		T_{2N} [Nm]	80	118	134	137	147	183
		P_{1NT} [kW]	1,02	0,68	0,57	0,52	0,46	0,00
		Efficiency	0,76	0,75	0,71	0,69	0,65	0,57

i	i ist		n_1 [1/min]					
			3000	1500	1000	750	500	150
53:1	51:1	n_2 [1/min]	57,0	28,0	18,0	14,0	9,4	2,8
		P_{1N} [kW]	0,65	0,38	0,27	0,22	0,16	0,06
		T_{2N} [Nm]	77	85	88	91	95	110
		P_{1NT} [kW]	0,92	0,62	0,52	0,48	0,43	0,00
		Efficiency	0,73	0,69	0,67	0,64	0,61	0,55
62:1	62:1	n_2 [1/min]	48,0	24,0	16,0	12,0	8,1	2,4
		P_{1N} [kW]	0,61	0,42	0,31	0,25	0,18	0,06
		T_{2N} [Nm]	81	105	109	112	113	113
		P_{1NT} [kW]	0,75	0,50	0,43	0,39	0,36	0,00
		Efficiency	0,67	0,64	0,60	0,57	0,53	0,45
83:1	83:1	n_2 [1/min]	36,0	18,0	12,0	9,0	6,0	1,8
		P_{1N} [kW]	0,39	0,21	0,15	0,12	0,09	0,03
		T_{2N} [Nm]	59	63	64	66	69	75
		P_{1NT} [kW]	0,70	0,47	0,41	0,37	0,34	0,00
		Efficiency	0,58	0,56	0,54	0,52	0,49	0,44

	5:1	7.5:1	10:1	13:1	15:1	20:1	26:1	30:1	40:1	53:1	62:1	83:1
T_{2max} [Nm]	150	167	152	100	195	179	137	219	197	145	120	112

Permissible radial force F_{r1} and axial force F_{a1} on shaft N_1

n_1 [rpm]	3000		1500		1000		750		500		150	
T_1 [Nm]	F_r [N]	F_a [N]	F_r [N]	F_a [N]	F_r [N]	F_a [N]	F_r [N]	F_a [N]	F_r [N]	F_a [N]	F_r [N]	F_a [N]
< 15	590	295	730	365	820	410	940	470	1050	525	1300	650
> 15	450	225	560	280	630	315	720	360	810	405	1000	500

Permissible radial force F_{r2} and axial force F_{a2} on shaft N_2

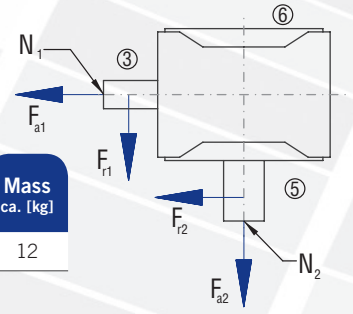
n_2 [rpm]	200		125		75		50		30		10	
T_2 [Nm]	F_r [N]	F_a [N]	F_r [N]	F_a [N]	F_r [N]	F_a [N]	F_r [N]	F_a [N]	F_r [N]	F_a [N]	F_r [N]	F_a [N]
< 120	2000	1000	2400	1200	2850	1425	3350	1675	4000	2000	4800	2400
> 120	1540	770	1850	925	2190	1095	2580	1290	3080	1540	3700	1850

Inertia moments/mass

Inertia moment J_1 related to the fast-rotating shaft (N_1)

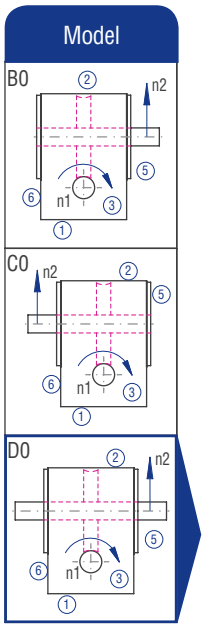
	Inertia moment [kgcm²]											
	5:1	7.5:1	10:1	13:1	15:1	20:1	26:1	30:1	40:1	53:1	62:1	83:1
J1	0.95	0.73	0.58	0.49	0.60	0.50	0.44	0.57	0.48	0.42	0.47	0.42

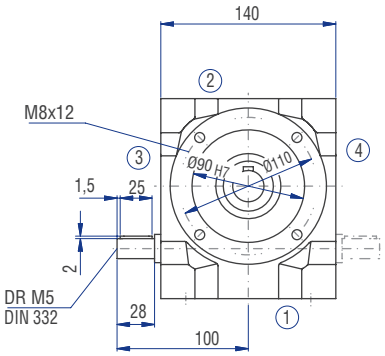
Mass ca. [kg]
12

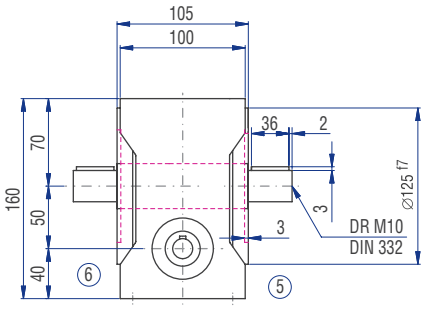


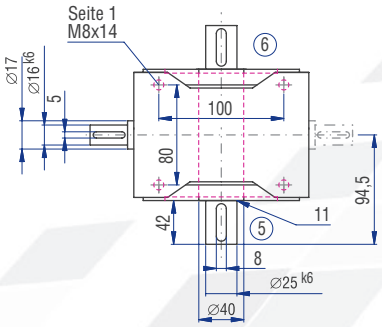
The mass of the gearbox may deviate depending on the gear ratio and the type.

9.3.7 Type S 050 – Standard worm gearboxes

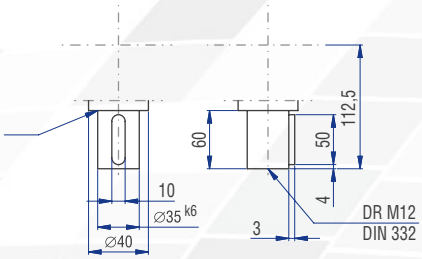


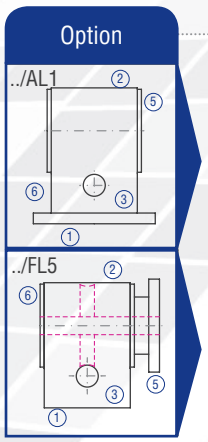


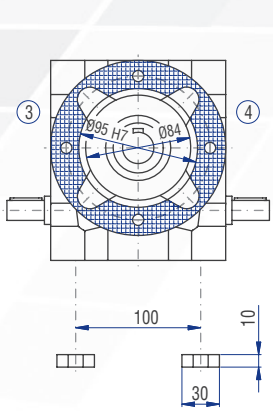


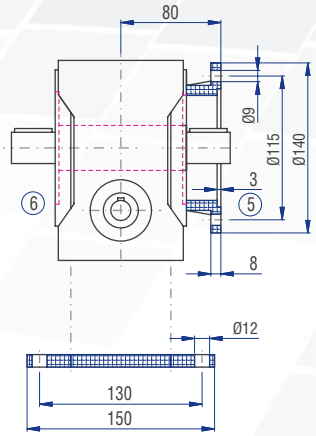


Implementation VV

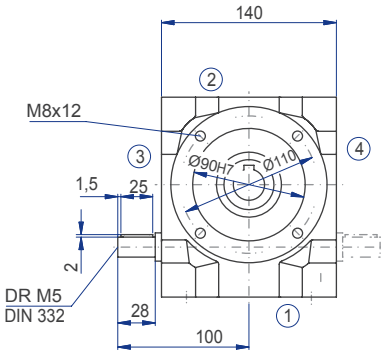


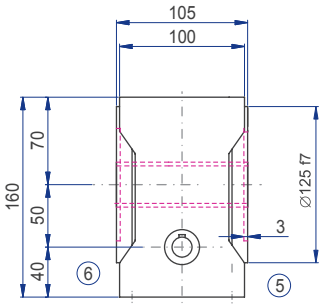


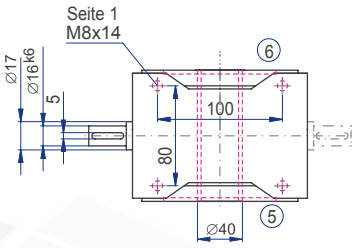




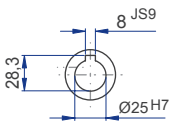
The dimensions of the Models not shown can be figured by mirroring available dimensions.



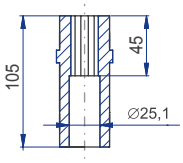


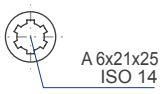


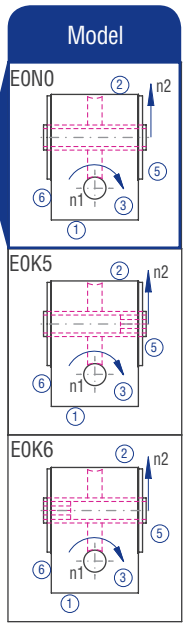
E0N0

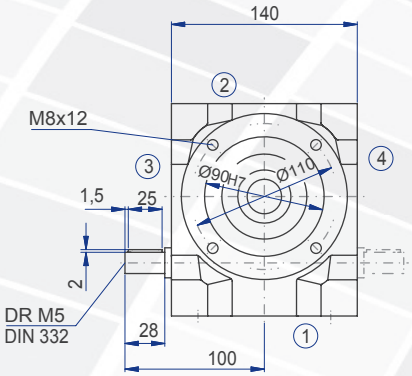


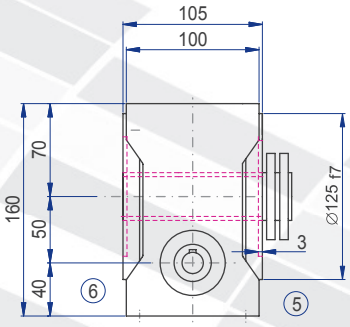
E0K5 / E0K6

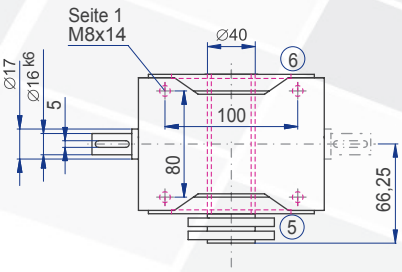


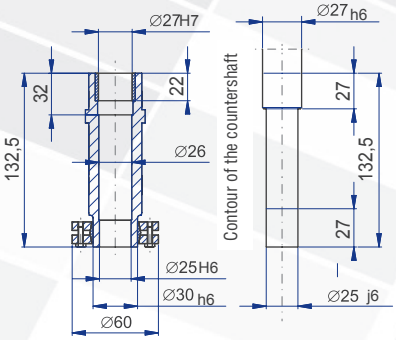


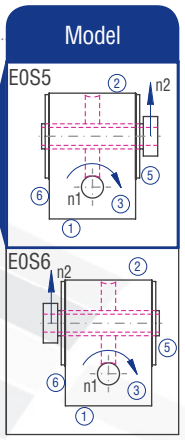




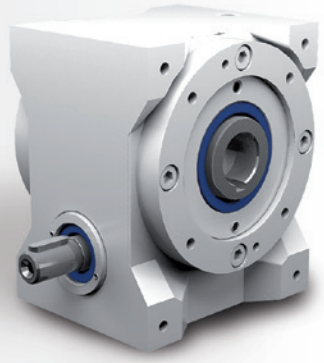








9.3.8 Type S 063 – Standard worm gearboxes



Characteristics

Characteristic	Standard	Option
Toothing	Hardened and ground worm shaft / bronze worm gear	See chapter 9.2.1
Gear ratio	10:1 to 83:1	
Housing / Flanges	Grey cast iron	
Threaded mounting hole	On gearbox side 1 and on the flanges	See chapter 9.2.3
Shaft	Material 1 C45, shaft ends greased Fit with ISO j6 tolerance with parallel keyway: according to DIN 6885 Sheet 1	See chapter 4.6.2
Hollow shaft	Material 1 C45, shafts greased Fit with ISO H7 tolerance with parallel keyway: according to DIN 6885 Sheet 1	See chapter 4.6.3
Radial shaft seal ring	NBR, form A	See chapter 4.8
Ambient temperature	- 10°C to +90°C. The values of the performance tables are valid for 20°C	See chapter 4.9.3
Circumferential backlash	< 30 arcmin	See chapter 9.2.10
Protection class	IP 54	See chapter 4.5
Corrosion protection	Prime coat; layer thickness > 40 µm	See chapter 4.4
Bearing life L10h	more than 15,000h	See chapter 4.9.1
Oil change intervals	Not required if the oil temperature is kept < 90°C The lifetime of the bearings can be increased by the factor 1.5 if the oil is changed after the first 500 service hours and then every 5000 service hours.	See chapter 9.2.8
Lubricant	Synthetic lubricants	See chapter 9.2.8

Performance data

i	i ist		n_1 [1/min]					
			3000	1500	1000	750	500	150
10:1	39:4	n_2 [1/min]	300,0	150,0	100,0	75,0	50,0	15,0
		P_{1N} [kW]	4,15	2,94	2,26	1,83	1,30	0,51
		T_{2N} [Nm]	121	170	194	207	216	265
		P_{1NT} [kW]	4,16	2,89	2,41	2,15	1,86	0,00
		Efficiency	0,94	0,93	0,92	0,91	0,89	0,83
20:1	39:2	n_2 [1/min]	150,0	75,0	50,0	37,0	25,0	7,5
		P_{1N} [kW]	2,95	1,70	1,32	1,14	0,86	0,34
		T_{2N} [Nm]	161	186	212	237	259	310
		P_{1NT} [kW]	2,52	1,73	1,44	1,29	1,12	0,00
		Efficiency	0,88	0,88	0,86	0,84	0,81	0,74
30:1	29:1	n_2 [1/min]	100,0	50,0	33,0	25,0	16,0	5,0
		P_{1N} [kW]	1,94	1,38	1,11	0,97	0,75	0,36
		T_{2N} [Nm]	143	204	237	268	296	403
		P_{1NT} [kW]	1,66	1,15	0,97	0,86	0,75	0,00
		Efficiency	0,80	0,80	0,77	0,75	0,71	0,61
40:1	39:1	n_2 [1/min]	75,0	37,0	25,0	18,0	12,0	3,8
		P_{1N} [kW]	1,54	1,08	0,85	0,74	0,57	0,24
		T_{2N} [Nm]	149	207	237	264	288	348
		P_{1NT} [kW]	1,50	1,04	0,87	0,78	0,69	0,00
		Efficiency	0,78	0,77	0,75	0,72	0,68	0,59

i	i ist		n_1 [1/min]					
			3000	1500	1000	750	500	150
53:1	51:1	n_2 [1/min]	57,0	28,0	18,0	14,0	9,4	2,8
		P_{1N} [kW]	1,16	0,80	0,58	0,47	0,34	0,14
		T_{2N} [Nm]	143	191	200	207	217	248
		P_{1NT} [kW]	1,34	0,96	0,78	0,71	0,63	0,00
		Efficiency	0,76	0,74	0,71	0,68	0,65	0,56
62:1	61:1	n_2 [1/min]	48,0	24,0	16,0	12,0	8,1	2,4
		P_{1N} [kW]	0,82	0,66	0,53	0,46	0,34	0,12
		T_{2N} [Nm]	110	175	202	221	226	226
		P_{1NT} [kW]	1,10	0,76	0,65	0,59	0,52	0,00
		Efficiency	0,69	0,68	0,65	0,62	0,57	0,47
83:1	82:1	n_2 [1/min]	36,0	18,0	12,0	9,0	6,0	1,8
		P_{1N} [kW]	0,75	0,46	0,33	0,26	0,19	0,07
		T_{2N} [Nm]	129	152	152	152	152	152
		P_{1NT} [kW]	0,99	0,69	0,59	0,54	0,49	0,00
		Efficiency	0,66	0,63	0,59	0,56	0,52	0,44

	5:1	7.5:1	10:1	13:1	15:1	20:1	26:1	30:1	40:1	53:1	62:1	83:1
T_{2max} [Nm]	295	334	306	222	395	355	295	437	360	310	240	246

Permissible radial force F_{r1} and axial force F_{a1} on shaft N_1

n_1 [rpm]	3000		1500		1000		750		500		150	
T_1 [Nm]	F_r [N]	F_a [N]	F_r [N]	F_a [N]	F_r [N]	F_a [N]	F_r [N]	F_a [N]	F_r [N]	F_a [N]	F_r [N]	F_a [N]
< 20	820	410	1000	500	1130	565	1320	660	1420	710	1850	925
> 20	630	315	770	385	870	435	1020	510	1090	545	1420	710

Permissible radial force F_{r2} and axial force F_{a2} on shaft N_2

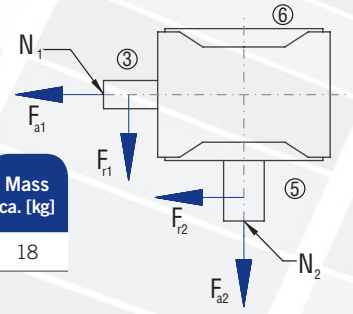
n_2 [rpm]	200		125		75		50		30		10	
T_2 [Nm]	F_r [N]	F_a [N]	F_r [N]	F_a [N]	F_r [N]	F_a [N]	F_r [N]	F_a [N]	F_r [N]	F_a [N]	F_r [N]	F_a [N]
< 220	2700	1350	3150	1575	3800	1900	4500	2250	5200	2600	5200	2600
> 220	2080	1040	2420	1210	2920	1460	3460	1730	4000	2000	4000	2000

Inertia moments/mass

Inertia moment J_1 related to the fast-rotating shaft (N_1)

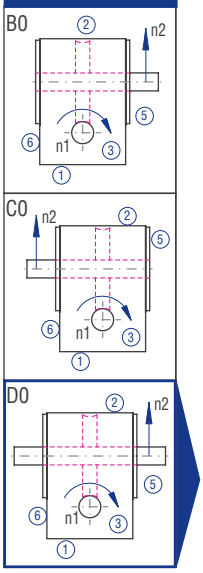
	Inertia moment [kgcm^2]											
	5:1	7.5:1	10:1	13:1	15:1	20:1	26:1	30:1	40:1	53:1	62:1	83:1
J1	2.17	1.64	1.14	0.94	1.33	0.94	0.82	1.25	0.90	0.79	0.97	0.80

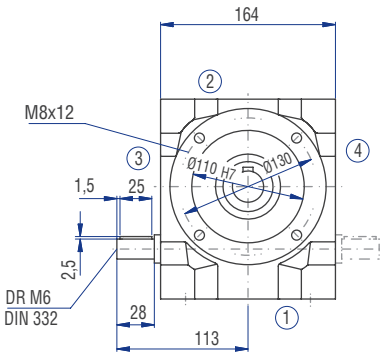
Mass ca. [kg]
18

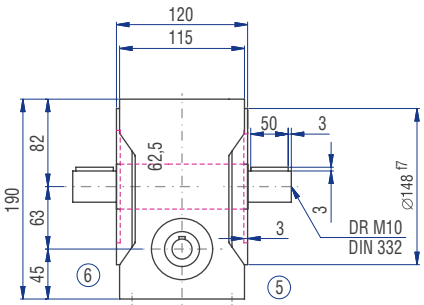


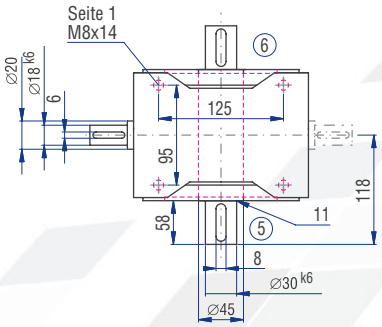
The mass of the gearbox may deviate depending on the gear ratio and the type.

Model

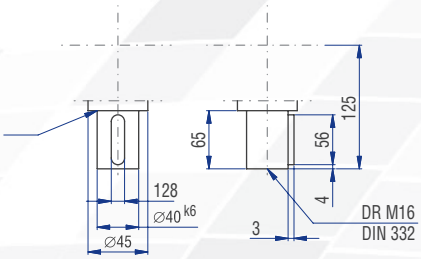




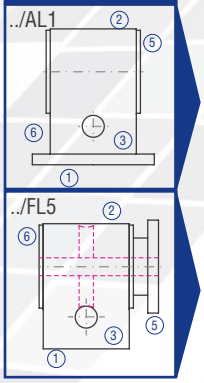


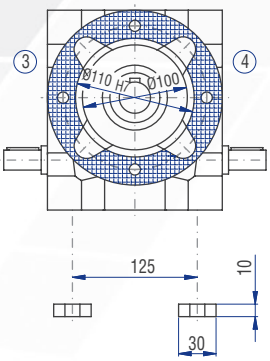


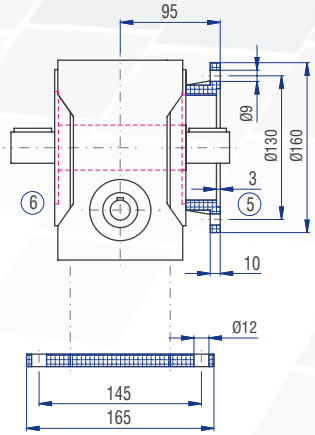
Implementation VV



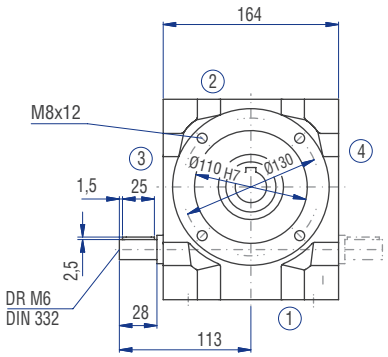
Option

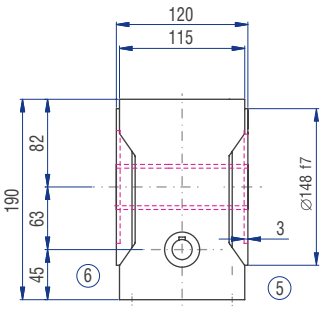


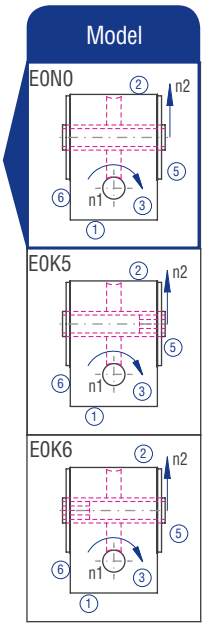


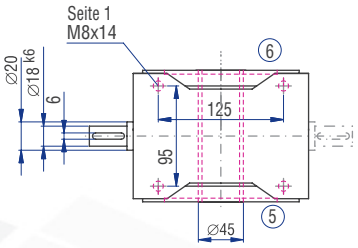


The dimensions of the Models not shown can be figured by mirroring available dimensions.

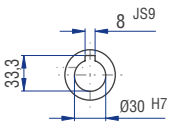




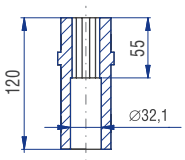


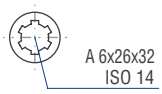


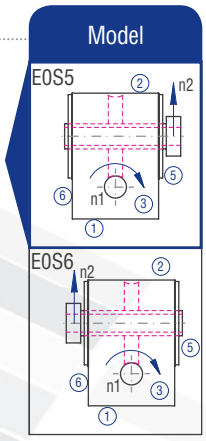
E0N0

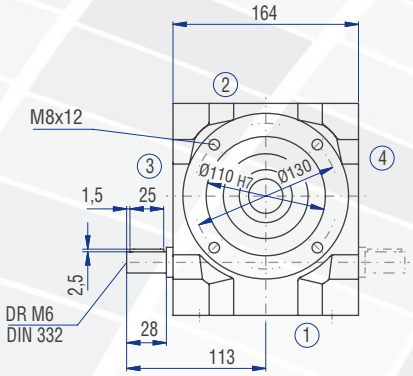


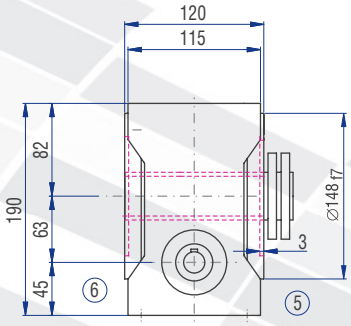
E0K5 / E0K6

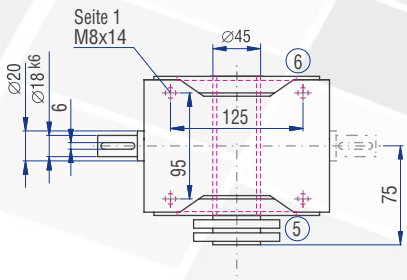


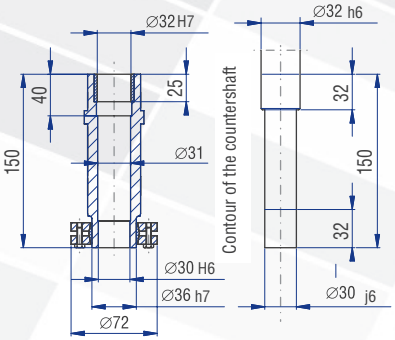




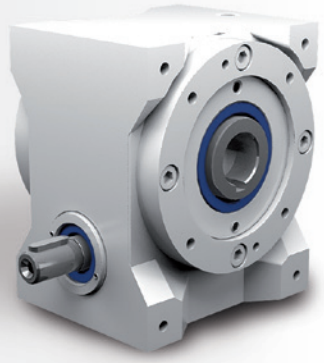








9.3.9 Type S 080 – Standard worm gearboxes



Characteristics

Characteristic	Standard	Option
Toothing	Hardened and ground worm shaft / bronze worm gear	See chapter 9.2.1
Gear ratio	10:1 to 83:1	
Housing / Flanges	Grey cast iron	
Threaded mounting hole	On gearbox side 1 and on the flanges	See chapter 9.2.3
Shaft	Material 1 C45, shaft ends greased Fit with ISO j6 tolerance with parallel keyway: according to DIN 6885 Sheet 1	See chapter 4.6.2
Hollow shaft	Material 1 C45, shafts greased Fit with ISO H7 tolerance with parallel keyway: according to DIN 6885 Sheet 1	See chapter 4.6.3
Radial shaft seal ring	NBR, form A	See chapter 4.8
Ambient temperature	- 10°C to +90°C. The values of the performance tables are valid for 20°C	See chapter 4.9.3
Circumferential backlash	< 30 arcmin	See chapter 9.2.10
Protection class	IP 54	See chapter 4.5
Corrosion protection	Prime coat; layer thickness > 40 µm	See chapter 4.4
Bearing life L10h	more than 15,000h	See chapter 4.9.1
Oil change intervals	Not required if the oil temperature is kept < 90°C The lifetime of the bearings can be increased by the factor 1.5 if the oil is changed after the first 500 service hours and then every 5000 service hours.	See chapter 9.2.8
Lubricant	Synthetic lubricants	See chapter 9.2.8

Performance data

i	i ist		n_1 [1/min]					
			3000	1500	1000	750	500	150
10:1	40:4	n_2 [1/min]	300,0	150,0	100,0	75,0	50,0	15,0
		P_{1N} [kW]	6,58	4,96	3,79	3,15	2,35	0,96
		T_{2N} [Nm]	197	297	340	373	408	513
		P_{1NT} [kW]	5,92	4,47	3,79	3,36	2,86	0,00
		Efficiency	0,94	0,94	0,94	0,93	0,91	0,84
20:1	40:2	n_2 [1/min]	150,0	75,0	50,0	37,0	25,0	7,5
		P_{1N} [kW]	4,24	3,04	2,37	2,05	1,57	0,64
		T_{2N} [Nm]	240	344	399	450	498	615
		P_{1NT} [kW]	3,59	2,67	2,26	2,01	1,72	0,00
		Efficiency	0,89	0,89	0,88	0,86	0,83	0,75
30:1	30:1	n_2 [1/min]	100,0	50,0	33,0	25,0	16,0	5,0
		P_{1N} [kW]	3,47	2,52	2,03	1,78	1,38	0,63
		T_{2N} [Nm]	272	395	456	530	593	760
		P_{1NT} [kW]	2,41	1,81	1,54	1,38	1,18	0,00
		Efficiency	0,82	0,82	0,80	0,78	0,75	0,63
40:1	40:1	n_2 [1/min]	75,0	37,0	25,0	18,0	12,0	3,8
		P_{1N} [kW]	2,62	1,87	1,49	1,31	1,02	0,40
		T_{2N} [Nm]	267	381	443	501	553	625
		P_{1NT} [kW]	2,14	1,58	1,35	1,21	1,05	0,00
		Efficiency	0,80	0,80	0,78	0,75	0,71	0,61

i	i ist		n_1 [1/min]					
			3000	1500	1000	750	500	150
53:1	53:1	n_2 [1/min]	57,0	28,0	18,0	14,0	9,4	2,8
		P_{1N} [kW]	1,78	1,04	0,76	0,61	0,45	0,18
		T_{2N} [Nm]	234	271	284	294	308	352
		P_{1NT} [kW]	1,93	1,41	1,20	1,09	0,96	0,00
		Efficiency	0,78	0,77	0,74	0,71	0,68	0,58
62:1	62:1	n_2 [1/min]	48,0	24,0	16,0	12,0	8,1	2,4
		P_{1N} [kW]	1,40	1,01	0,81	0,69	0,54	0,23
		T_{2N} [Nm]	194	279	325	352	393	448
		P_{1NT} [kW]	1,55	1,15	0,98	0,89	0,78	0,00
		Efficiency	0,70	0,70	0,68	0,65	0,61	0,49
83:1	82:1	n_2 [1/min]	36,0	18,0	12,0	9,0	6,0	1,8
		P_{1N} [kW]	1,10	0,90	0,64	0,49	0,35	0,13
		T_{2N} [Nm]	196	304	304	304	304	304
		P_{1NT} [kW]	1,43	1,04	0,90	0,82	0,73	0,00
		Efficiency	0,68	0,65	0,61	0,59	0,55	0,46

	5:1	7.5:1	10:1	13:1	15:1	20:1	26:1	30:1	40:1	53:1	62:1	83:1
T_{2max} [Nm]	610	695	625	321	826	725	432	920	780	480	480	510

Permissible radial force F_{r1} and axial force F_{a1} on shaft N_1

n_1 [rpm]	3000		1500		1000		750		500		150	
T_1 [Nm]	F_r [N]	F_a [N]	F_r [N]	F_a [N]	F_r [N]	F_a [N]	F_r [N]	F_a [N]	F_r [N]	F_a [N]	F_r [N]	F_a [N]
< 35	1000	500	1250	625	1420	710	1600	800	1780	890	2200	1100
> 35	770	385	960	480	1090	545	1230	615	1470	735	1690	845

Permissible radial force F_{r2} and axial force F_{a2} on shaft N_2

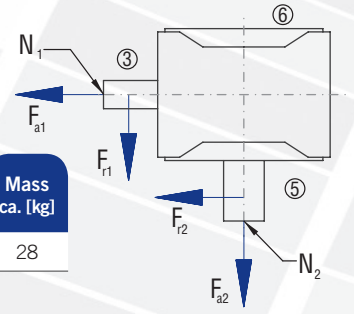
n_2 [rpm]	200		125		75		50		30		10	
T_2 [Nm]	F_r [N]	F_a [N]	F_r [N]	F_a [N]	F_r [N]	F_a [N]	F_r [N]	F_a [N]	F_r [N]	F_a [N]	F_r [N]	F_a [N]
< 430	3300	1650	3750	1875	4500	2250	5300	2650	6300	3150	7600	3800
> 430	2640	1320	3000	1500	3600	1800	4240	2120	5040	2520	6080	3040

Inertia moments/mass

Inertia moment J_1 related to the fast-rotating shaft (N_1)

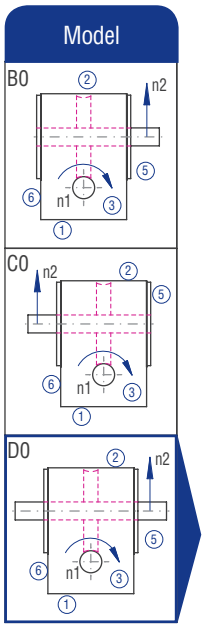
	Inertia moment [kgcm²]											
	5:1	7.5:1	10:1	13:1	15:1	20:1	26:1	30:1	40:1	53:1	62:1	83:1
J1	5.82	4.22	2.96	2.26	3.26	2.40	1.91	3.01	2.26	1.82	2.51	1.91

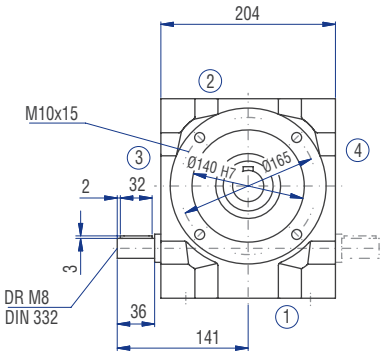
Mass ca. [kg]
28

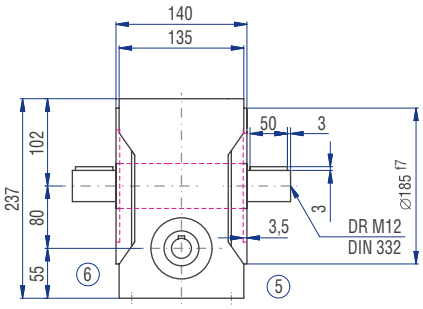


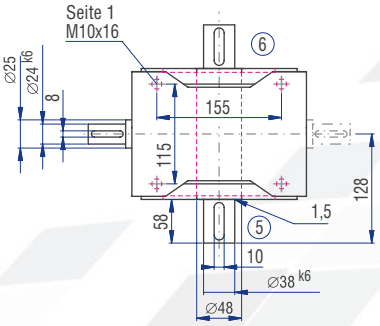
The mass of the gearbox may deviate depending on the gear ratio and the type.

9.3.9 Type S 080 – Standard worm gearboxes

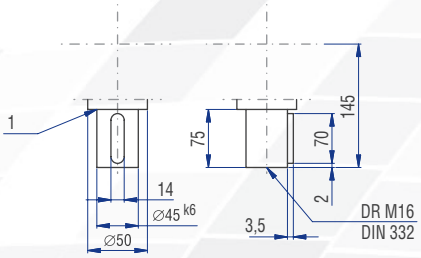


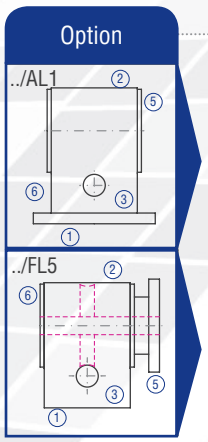


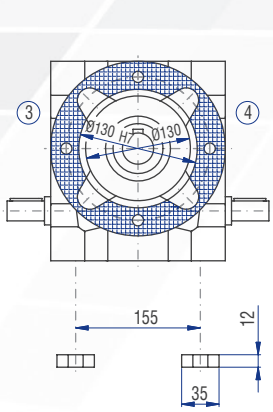


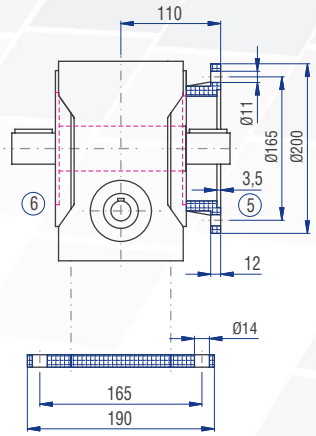


Implementation VV

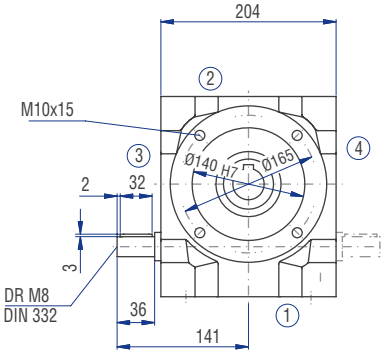


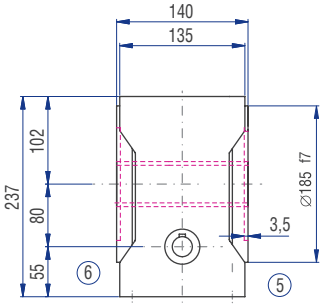


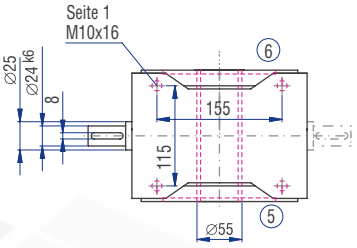




The dimensions of the Models not shown can be figured by mirroring available dimensions.







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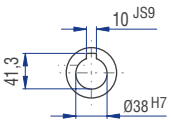

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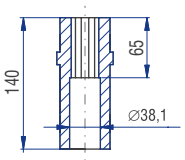
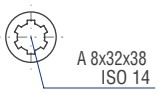
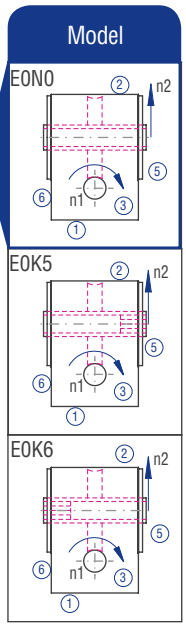
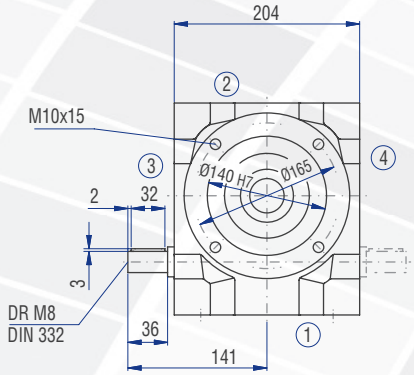
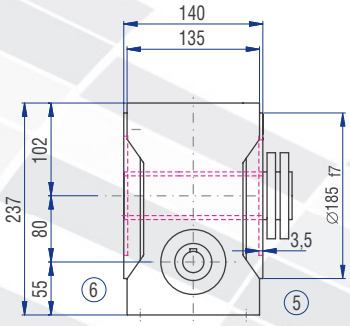
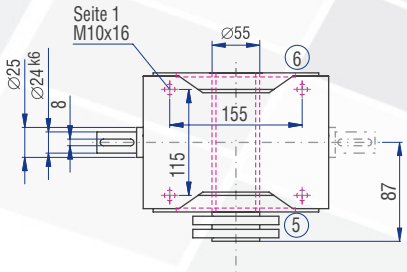


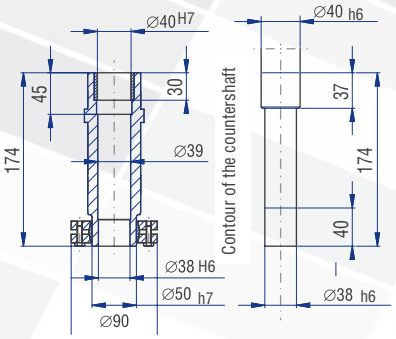


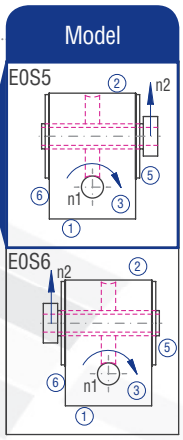




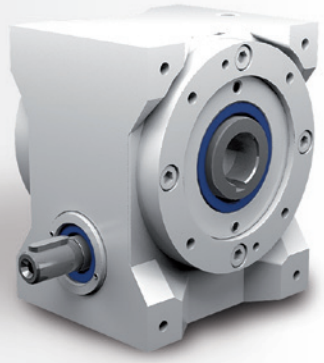








9.3.10 Type S 100 – Standard worm gearboxes



Characteristics

Characteristic	Standard	Option
Toothing	Hardened and ground worm shaft / bronze worm gear	See chapter 9.2.1
Gear ratio	10:1 to 83:1	
Housing / Flanges	Grey cast iron	
Threaded mounting hole	On gearbox side 1 and on the flanges	See chapter 9.2.3
Shaft	Material 1 C45, shaft ends greased Fit with ISO j6 tolerance with parallel keyway: according to DIN 6885 Sheet 1	See chapter 4.6.2
Hollow shaft	Material 1 C45, shafts greased Fit with ISO H7 tolerance with parallel keyway: according to DIN 6885 Sheet 1	See chapter 4.6.3
Radial shaft seal ring	NBR, form A	See chapter 4.8
Ambient temperature	- 10°C to +90°C. The values of the performance tables are valid for 20°C	See chapter 4.9.3
Circumferential backlash	< 30 arcmin	See chapter 9.2.10
Protection class	IP 54	See chapter 4.5
Corrosion protection	Prime coat; layer thickness > 40 µm	See chapter 4.4
Bearing life L10h	more than 15,000h	See chapter 4.9.1
Oil change intervals	Not required if the oil temperature is kept < 90°C The lifetime of the bearings can be increased by the factor 1.5 if the oil is changed after the first 500 service hours and then every 5000 service hours.	See chapter 9.2.8
Lubricant	Synthetic lubricants	See chapter 9.2.8

Performance data

i	i ist		n_1 [1/min]					
			3000	1500	1000	750	500	150
10:1	40:4	n_2 [1/min]	300,0	150,0	100,0	75,0	50,0	15,0
		P_{1N} [kW]	18,55	11,75	8,95	7,45	5,79	2,02
		T_{2N} [Nm]	555	703	803	882	1.006	1.095
		P_{1NT} [kW]	8,57	6,35	5,49	4,95	4,30	0,00
		Efficiency	0,94	0,94	0,94	0,93	0,91	0,85
20:1	40:2	n_2 [1/min]	150,0	75,0	50,0	37,0	25,0	7,5
		P_{1N} [kW]	10,84	6,87	5,28	4,45	3,47	1,49
		T_{2N} [Nm]	614	778	888	975	1.112	1.441
		P_{1NT} [kW]	5,44	3,99	3,44	3,10	2,69	0,00
		Efficiency	0,89	0,89	0,88	0,86	0,84	0,76
30:1	30:1	n_2 [1/min]	100,0	50,0	33,0	25,0	16,0	5,0
		P_{1N} [kW]	7,53	4,78	3,60	3,19	2,51	1,18
		T_{2N} [Nm]	590	748	825	950	1.080	1.437
		P_{1NT} [kW]	3,50	2,60	2,27	2,06	1,81	0,00
		Efficiency	0,82	0,82	0,80	0,78	0,75	0,64
40:1	40:1	n_2 [1/min]	75,0	37,0	25,0	18,0	12,0	3,8
		P_{1N} [kW]	6,33	4,01	3,13	2,65	2,13	1,00
		T_{2N} [Nm]	645	817	933	1.025	1.169	1.581
		P_{1NT} [kW]	3,32	2,42	2,09	1,90	1,67	0,00
		Efficiency	0,80	0,80	0,78	0,76	0,72	0,62

i	i ist		n_1 [1/min]					
			3000	1500	1000	750	500	150
53:1	52:1	n_2 [1/min]	57,0	28,0	18,0	14,0	9,4	2,8
		P_{1N} [kW]	4,76	2,63	1,92	1,53	1,11	0,45
		T_{2N} [Nm]	615	670	704	728	762	870
		P_{1NT} [kW]	3,04	2,19	1,88	1,71	1,51	0,00
		Efficiency	0,78	0,77	0,74	0,72	0,69	0,59
62:1	63:1	n_2 [1/min]	48,0	24,0	16,0	12,0	8,1	2,4
		P_{1N} [kW]	4,59	2,91	2,17	1,70	1,21	0,44
		T_{2N} [Nm]	645	817	886	886	886	886
		P_{1NT} [kW]	2,39	1,74	1,52	1,39	1,24	0,00
		Efficiency	0,70	0,70	0,68	0,65	0,61	0,50
83:1	82:1	n_2 [1/min]	36,0	18,0	12,0	9,0	6,0	1,8
		P_{1N} [kW]	3,33	1,74	1,23	0,94	0,67	0,24
		T_{2N} [Nm]	591	599	599	599	599	599
		P_{1NT} [kW]	2,24	1,61	1,40	1,28	1,15	0,00
		Efficiency	0,68	0,66	0,62	0,61	0,57	0,47

	5:1	7.5:1	10:1	13:1	15:1	20:1	26:1	30:1	40:1	53:1	62:1	83:1
T_{2max} [Nm]	1190	1360	1090	736	1610	1440	980	1765	1582	1080	1040	1000

Permissible radial force F_{r1} and axial force F_{a1} on shaft N_1

n_1 [rpm]	3000		1500		1000		750		500		150	
T_1 [Nm]	F_r [N]	F_a [N]	F_r [N]	F_a [N]	F_r [N]	F_a [N]	F_r [N]	F_a [N]	F_r [N]	F_a [N]	F_r [N]	F_a [N]
< 80	1250	625	1600	800	1800	900	2000	1000	2250	1125	2650	1325
> 80	960	480	1230	615	1380	690	1540	770	1730	865	2040	1020

Permissible radial force F_{r2} and axial force F_{a2} on shaft N_2

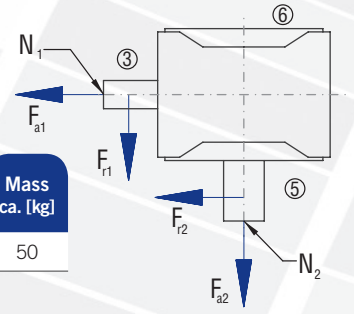
n_2 [rpm]	200		125		75		50		30		10	
T_2 [Nm]	F_r [N]	F_a [N]	F_r [N]	F_a [N]	F_r [N]	F_a [N]	F_r [N]	F_a [N]	F_r [N]	F_a [N]	F_r [N]	F_a [N]
< 800	3650	1825	4000	2000	4750	2375	5600	2800	6700	3350	9500	4750
> 800	2920	1460	3200	1600	3800	1900	4480	2240	5360	2680	7600	3800

Inertia moments/mass

Inertia moment J_1 related to the fast-rotating shaft (N_1)

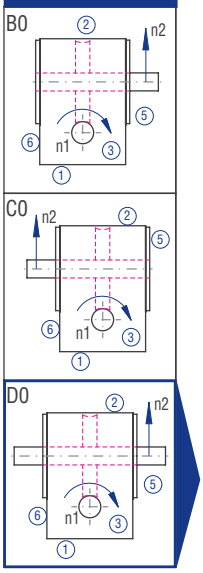
	Inertia moment [kgcm²]											
	5:1	7.5:1	10:1	13:1	15:1	20:1	26:1	30:1	40:1	53:1	62:1	83:1
J1	22.38	17.88	14.03	12.28	15.17	12.37	11.34	14.50	11.96	11.10	12.56	11.34

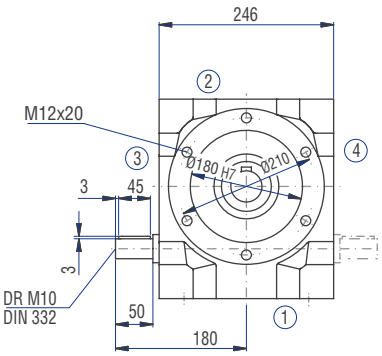
Mass ca. [kg]
50

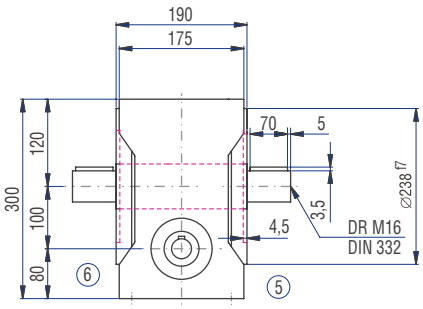


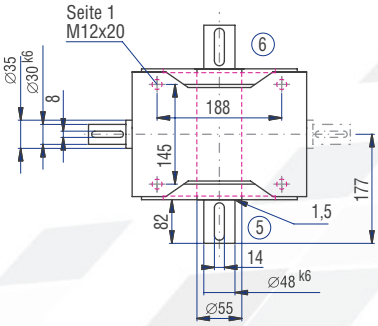
The mass of the gearbox may deviate depending on the gear ratio and the type.

Model

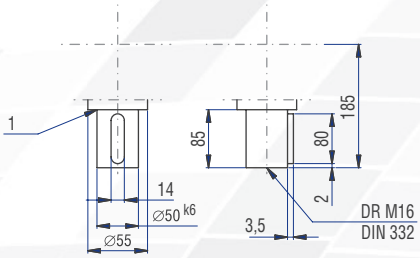




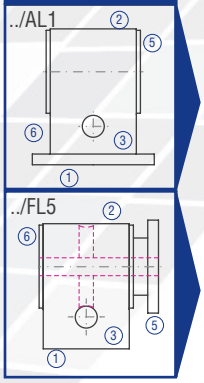


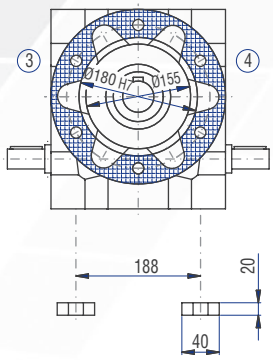


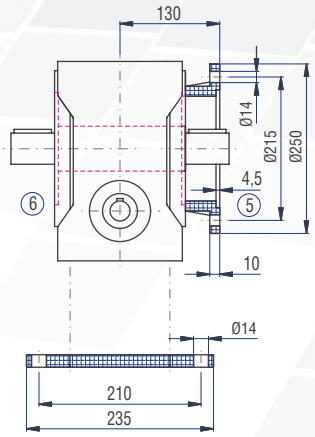
Implementation VV



Option







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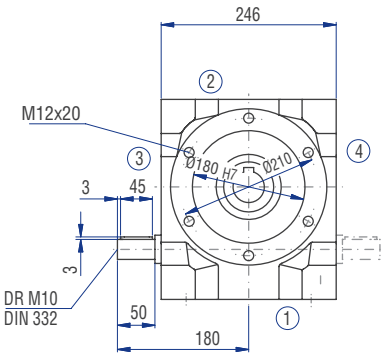

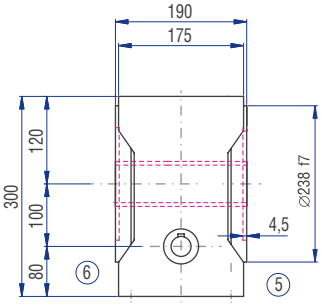

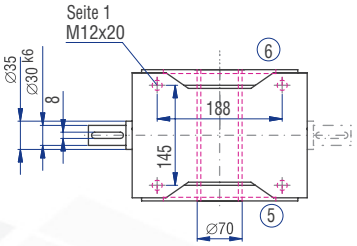

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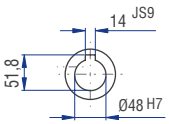

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