



页码 / Page

B-伺服 基础型减速箱 背隙 < 12'	B-servo worm gear units < 12'	GD4 – GD7
中心距 50 mm	Centre distance 50 mm	GD4 – GD5
中心距 63 mm	Centre distance 63 mm	GD6 – GD7
联轴器 and 胀紧盘	Couplings and shrink-disc	GD12 – GD13
选型和负载表	Selection and load tables	GD14 – GD15
简述	Short description	GD16
安装和维护	Mounting and maintenance	GD17 – GD18
减速箱计算和选择	Gear units calculation and selection	GF1 – GF3
减速箱附件	Gear units accessories	GG1 – GG9
伺服电机选配表	Mounting guide for servo gears	GI5 – GI9





ATLANTA

B-伺服 基础型减速箱 < 12
B-servo worm gear units with < 12' backlash

中心距 / Centre distance

$a_0 = 50 \text{ mm}$

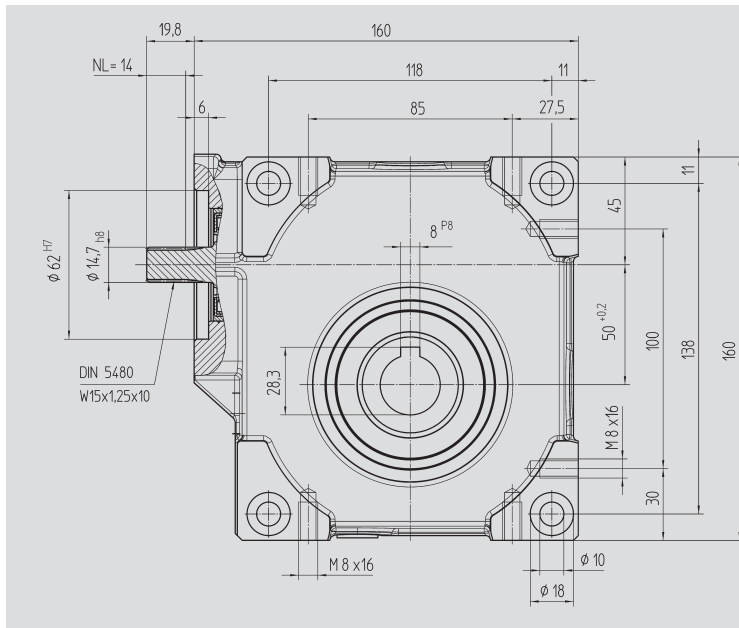


图1 键连接输出轴

Fig. 1 Output shaft with key connection

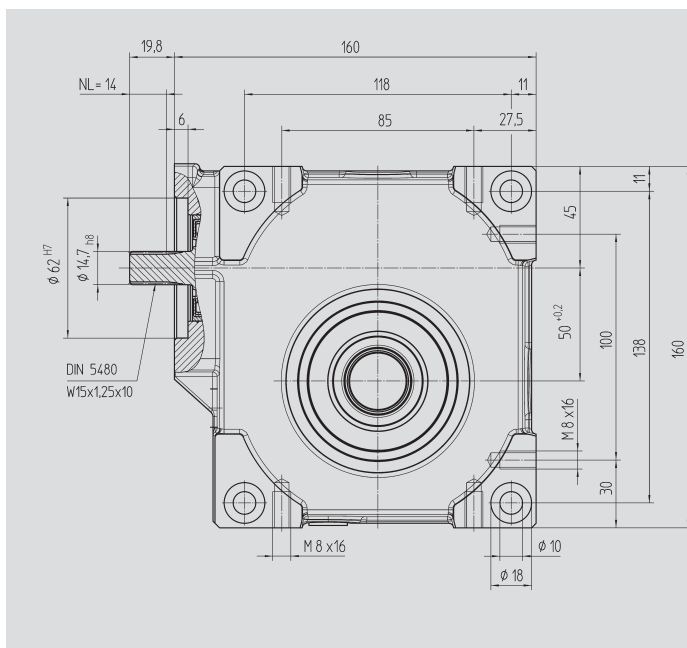
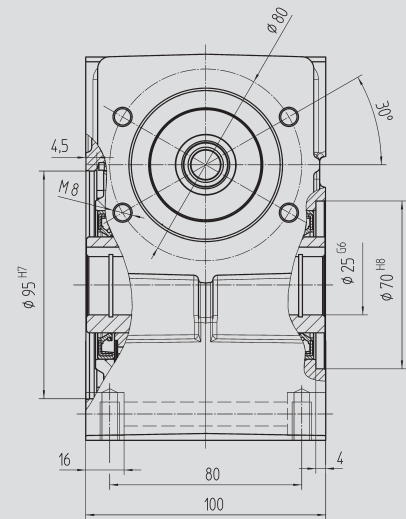
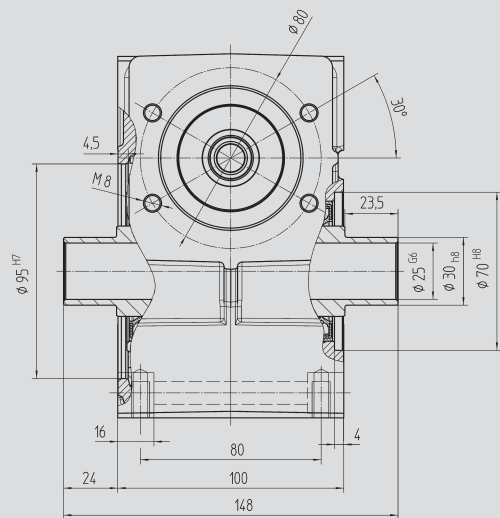


图2 胀紧盘型连接空心输出轴 80 83 030

Fig. 2 Output shaft for clamp connection 80 83 030



Best.-Nr. / Order code
Bild 1 / Fig. 1

Bild 2 / Fig. 2

Übersetzung i

kg

$J_{red} 10^{-4}$
kg m²

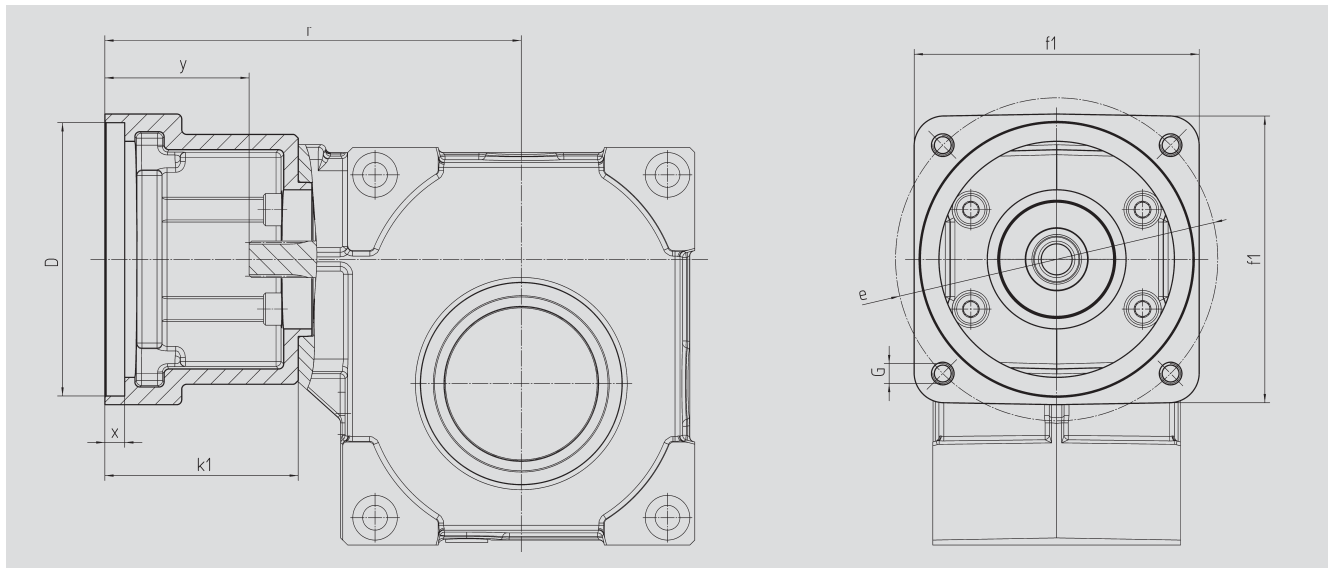
57 03 005	57 13 005	4,75	6,5	0,8280
57 03 007	57 13 007	6,75	6,5	0,4140
57 03 009	57 13 009	9,25	6,5	0,3490
57 03 015	57 13 015	14,50	6,5	0,2800
57 03 020	57 13 020	19,50	6,5	0,1960
57 03 029	57 13 029	29,00	6,5	0,2694
57 03 039	57 13 039	39,00	6,5	0,2310
57 03 050	57 13 050	50,00	6,5	0,2140

润滑油来自食品行业用油
订购代码 57 03 1xx / 57 13 1xx

With suitable oil for food
Order code 57 03 1xx / 57 13 1xx



电机法兰 / Motor flange



中心距 / Centre distance $a_0 = 50 \text{ mm}$

订购代码 Order code	D ^{G7}	k ₁	r	x	y	f ₁	e	G	T kg
65 59 301	95,0	62	152	12,5	42	100	115	M8	0,60
65 59 302	50,0	62	152	10,0	42	100	70; 95; 115	M4; M6; M8	0,70
65 59 303	80,0	62	152	10,0	42	100	100	M6	0,65
65 59 304	95,0	78	168	10,0	59	115	130	M8	0,80
65 59 305	95,0	72	162	8,0	52	100	115	M8	0,75
65 59 306	60,0	74	164	21,0	54	100	75; 90; 115	M5; M5; M8	0,90
65 59 307	70,0	70	160	21,0	50	100	90; 115	M6; M8	0,80
65 59 401	95,0	73	163	8,0	53	100	115	M8	0,75
65 59 402	110,0	78	168	8,0	59	115	130	M8	0,80
65 59 403	95,0	73	163	12,0	53	115	130	M8	0,75
65 59 404	110,0	73	163	12,0	53	115	130	M8	0,70
65 59 405	95,0	78	168	11,0	59	140	165	M10	1,20
65 59 406	110,0	78	168	11,0	59	140	165	M10	1,15
65 59 407	130,0	78	168	11,0	59	140	165	M10	1,00
65 59 409	130,0	98	188	14,0	78	140	165	M10	1,10
65 59 410	110,0	74	164	8,0	54	120	145	M8	1,00
65 59 411	110,0	84	174	8,0	64	120	145	M8	1,20
65 59 412	114,3	105	195	8,0	85	180	200	M12	3,70
65 59 413	114,3	139	229	8,0	119	180	200	M12	3,35
65 59 414	114,3	91	181	8,0	71	180	200	M12	2,65
65 59 415	110,0	89	179	8,0	69	120	145	M8	1,30

订购代码需包括减速机代码 57 03 0xx / 57 13 0xx 及法兰代码 65 59 3xx bzw. 4xx.
The order should contain gear box 57 03 0xx / 57 13 0xx and flange 65 59 3xx or 4xx.



ATLANTA

B-伺服 基础型减速箱 < 12
B-servo worm gear units with < 12' backlash

中心距 / Centre distance

$a_0 = 63 \text{ mm}$

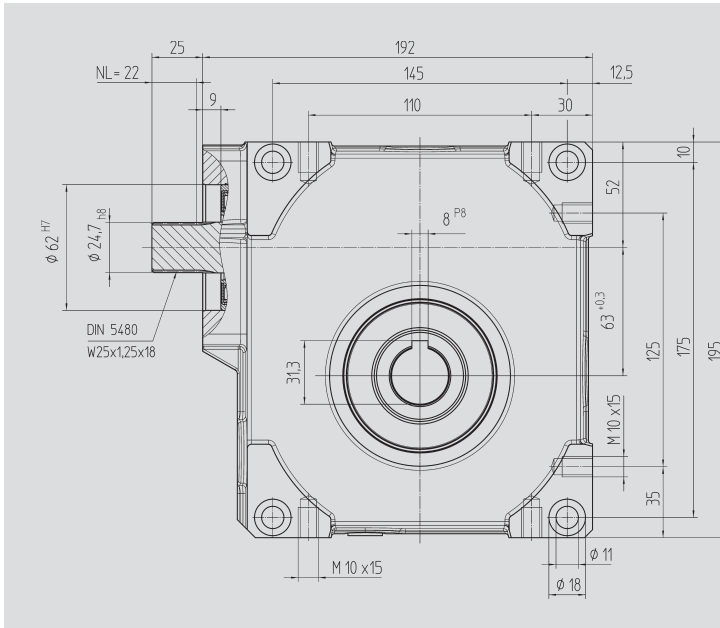


图1 键连接输出轴

Fig. 1 Output shaft with key connection

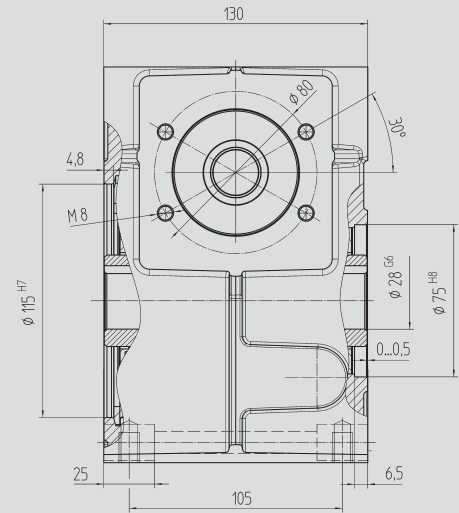
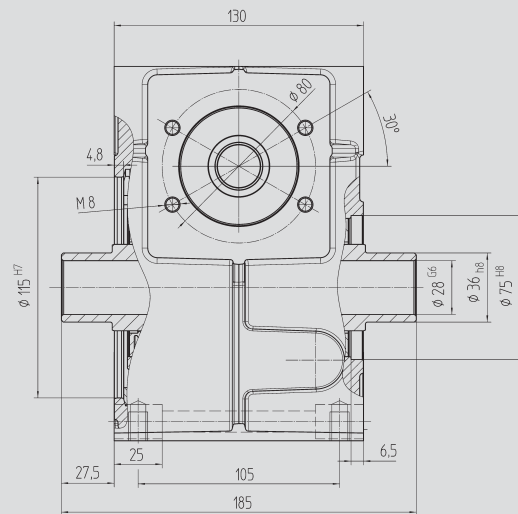
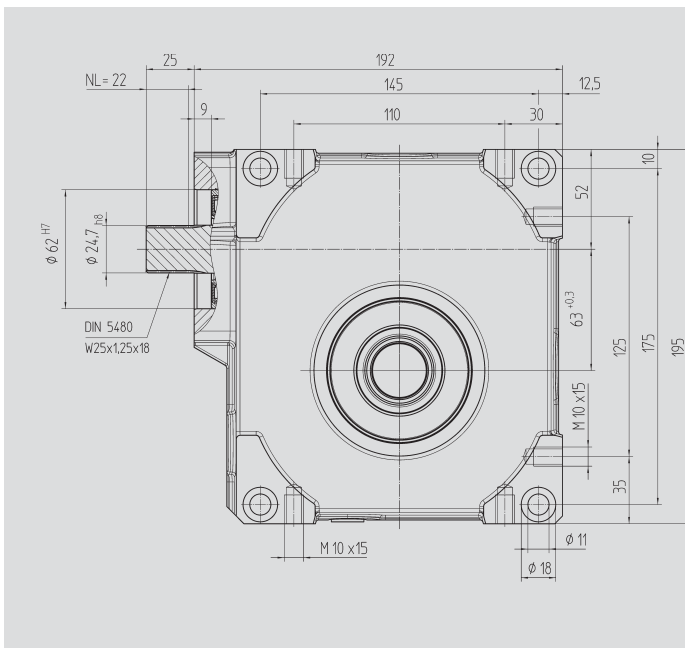


图2 胀紧盘型连接空心输出轴 80 84 036

Fig. 2 Output shaft for clamp connection 80 84 036



订购代码 / Order code
图 1 / Fig. 1

图 2 / Fig. 2

减速比 i
Ratio i

kg

$J_{red} 10^{-4}$
kg m²

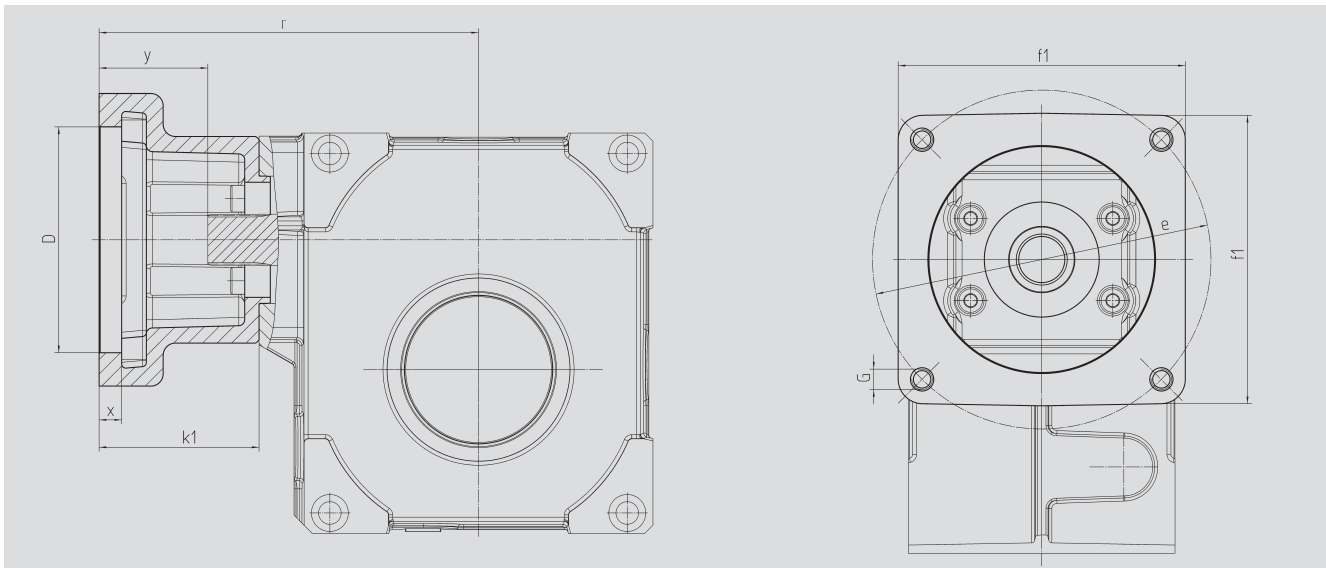
57 04 005	57 14 005	4,75	11,5	2,5350
57 04 007	57 14 007	6,75	11,5	1,3720
57 04 009	57 14 009	9,25	11,5	0,9825
57 04 015	57 14 015	14,50	11,5	0,9570
57 04 020	57 14 020	19,50	11,5	0,6940
57 04 029	57 14 029	29,00	11,5	0,9966
57 04 039	57 14 039	39,00	11,5	1,0100
57 04 052	57 14 052	52,00	11,5	0,5305

润滑油来自食品行业用油
订购代码 57 04 1xx / 57 14 1xx

With suitable oil for food
Order code 57 04 1xx / 57 14 1xx



电机法兰 / Motor flange



中心距 / Centre distance

$a_0 = 63 \text{ mm}$

订购代码.

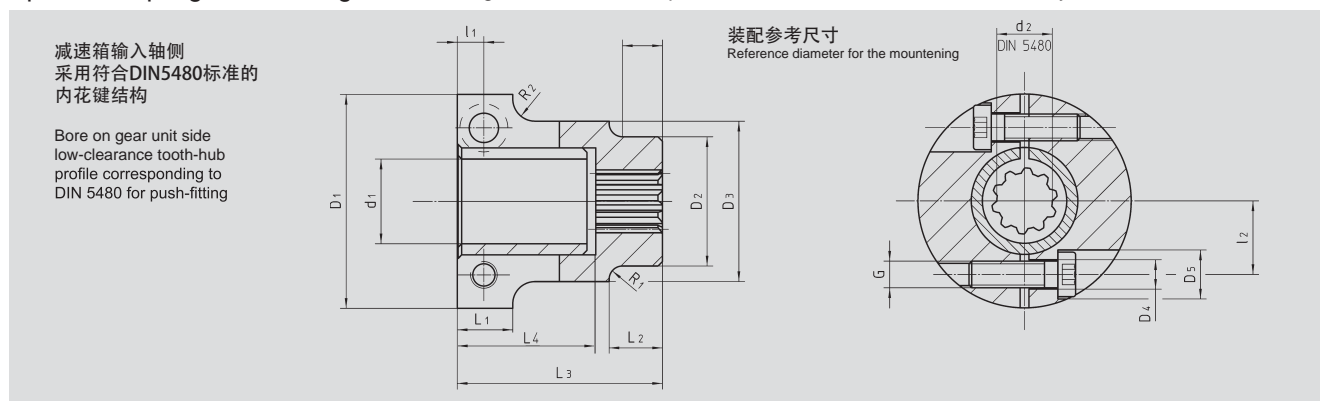
Order code	D ^{G7}	k ₁	r	x	y	f ₁	e	G	kg
65 57 301	95,0	62	152	12,5	42	100	115	M8	0,60
65 57 302	50,0	62	152	10,0	42	100	70; 95; 115	M4; M6; M8	0,70
65 57 303	80,0	62	152	10,0	42	100	100	M6	0,65
65 57 304	95,0	78	168	10,0	57	115	130	M8	0,80
65 57 305	95,0	72	162	8,0	52	100	115	M8	0,75
65 57 306	60,0	74	164	21,0	54	100	75; 90; 115	M5; M5; M8	0,90
65 57 307	70,0	70	160	21,0	50	100	90; 115	M6; M8	0,80
65 57 401	95,0	73	163	8,0	53	100	115	M8	0,75
65 57 402	110,0	78	168	8,0	57	115	130	M8	0,80
65 57 403	95,0	73	163	12,0	53	115	130	M8	0,75
65 57 404	110,0	73	163	12,0	53	115	130	M8	0,70
65 57 405	95,0	78	168	11,0	57	140	165	M10	1,20
65 57 406	110,0	78	168	11,0	57	140	165	M10	1,15
65 57 407	130,0	78	168	11,0	57	140	165	M10	1,00
65 57 409	130,0	98	188	14,0	78	140	165	M10	1,10
65 57 410	110,0	74	164	8,0	54	120	145	M8	1,00
65 57 411	110,0	84	174	8,0	64	120	145	M8	1,20
65 57 412	114,3	105	195	8,0	85	180	200	M12	3,70
65 57 413	114,3	139	229	8,0	119	180	200	M12	3,35
65 57 414	114,3	91	181	8,0	71	180	200	M12	2,65
65 57 415	110,0	89	179	8,0	69	120	145	M8	1,30

订购代码需包括减速箱代码 57 04 0xx / 57 14 0xx 及法兰代码 65 57 3xx bzw. 4xx.

The order should contain gear box 57 04 0xx / 57 14 0xx and flange 65 57 3xx or 4xx.



伺服电机与减速箱专用特制联轴器，刚性联接，渗氮，与伺服电机安装无键槽r
Special couplings for motor/gear units, rigid model, nitrided, preassembled for motor shafts without key



订购代码 / Order code
联轴器

Coupling	d ₁	d ₂	D ₁	D ₂	L ₁	L ₃	R ₁	G	L ₂	J _{red} 10 ⁻⁴ kg m ²	kg
65 51 008	8	15x1,25x10	36	23	14,0	46,0	5	M5	31,2	0,236	0,2
65 51 009	9	15x1,25x10	36	23	14,0	46,0	5	M5	31,2	0,246	0,2
65 51 010	10	15x1,25x10	36	23	14,0	46,0	5	M5	31,2	0,244	0,2
65 51 011	11	15x1,25x10	36	23	14,0	46,0	5	M5	31,2	0,243	0,2
65 51 014	14	15x1,25x10	36	23	14,0	46,0	5	M5	31,2	0,234	0,2
65 51 016	16	15x1,25x10	36	23	14,0	46,0	5	M5	31,2	0,225	0,2
65 53 019	19	15x1,25x10	48	33	16,5	46,0	5	M5	31,2	0,704	0,3
65 53 020	20	15x1,25x10	48	33	16,5	46,0	5	M6	31,2	0,704	0,3
65 53 022	22	15x1,25x10	48	33	16,5	46,0	5	M5	31,2	0,704	0,3
65 53 024	24	15x1,25x10	48	33	16,5	46,0	5	M5	31,2	0,647	0,2
65 53 025	25	15x1,25x10	64	51	18,0	55,5	5	M8	41,5	5,946	1,1
65 53 028	28	15x1,25x10	64	51	18,0	55,5	5	M8	41,5	5,871	1,1
65 53 032	32	15x1,25x10	64	51	18,0	55,5	5	M8	41,5	4,158	0,8
65 53 035	35	15x1,25x10	78	51	18,0	55,5	5	M8	41,5	5,605	1,0
65 53 038	38	15x1,25x10	78	51	18,0	55,5	5	M8	41,5	5,432	0,9
65 54 009	9	25x1,25x18	49	35	17,0	68,0	5	M6	43,5	2,306	0,5
65 54 010	10	25x1,25x18	49	35	17,0	68,0	5	M6	43,5	2,300	0,5
65 54 011	11	25x1,25x18	49	35	17,0	68,0	5	M6	43,5	2,381	0,5
65 54 014	14	25x1,25x18	49	35	17,0	68,0	5	M6	43,5	1,161	0,5
65 54 015	15	25x1,25x18	49	35	17,0	68,0	5	M6	43,5	2,328	0,5
65 54 016	16	25x1,25x18	49	35	17,0	68,0	5	M6	43,5	1,161	0,5
65 54 019	19	25x1,25x18	49	35	17,0	68,0	5	M6	43,5	1,112	0,4
65 54 020	20	25x1,25x18	49	35	17,0	68,0	5	M6	43,5	2,268	0,5
65 54 022	22	25x1,25x18	49	35	17,0	68,0	5	M6	43,5	2,179	0,4
65 54 024	24	25x1,25x18	49	35	17,0	68,0	5	M6	43,5	1,007	0,4
65 54 025	25	25x1,25x18	64	51	18,0	68,0	5	M8	43,5	8,165	1,2
65 54 028	28	25x1,25x18	64	51	18,0	68,0	5	M8	43,5	8,061	1,2
65 54 032	32	25x1,25x18	64	51	18,0	68,0	5	M8	43,5	7,751	1,2
65 54 035	35	25x1,25x18	78	51	18,0	68,0	5	M8	43,5	7,690	1,1
65 54 038	38	25x1,25x18	78	51	18,0	68,0	5	M8	43,5	7,348	1,1
65 54 042	42	25x1,25x18	78	51	18,0	65,5	5	M8	43,5	6,595	1,1

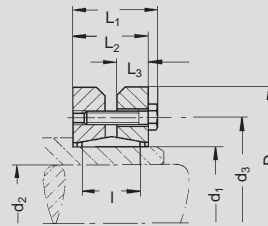
GA-10页中所列联轴器也可以应用。
Couplings on page GA-10 can be used as well.



57 1 ...系列减速箱空心输出轴用胀紧盘 Shrink-disc clamping sets for output drive shafts of gear series 57 1. ...

整体供货

Supplied as complete set



$$J_{red} = \frac{J}{i^2}$$

订购代码 Order code	a ₀ mm	T _{2max} Nm	d ₁	d ₂	d ₃	D	L ₁	L ₂	L ₃	I	G	J 10 ⁻⁴ kg m ²	kg
80 83 030	50	400	30	25	44	60	25,0	16,0	9	16	7 x M5	1,756	0,3
80 84 036	63	540	36	28	52	72	27,5	23,5	10	18	5 x M6	4,029	0,4





表中所列数据基于磨损和最大侧向负载伺服电机操作12 000 小时的满负荷运行。连续的满负荷运行，必须考虑温度限制！
(如有疑问，请与我们联系。)

T_{2max} = 避免齿断裂的静态扭矩，
 P_1 = 驱动功率(kW)，
 T_2 = 输出扭矩(Nm)

The values in the tables are based upon wear or maximum flank load at 12,000 h full load and on servo-operation. Please see here for also our manual on the internet page www.atlantagmbh.de. With continuous full-load operation it may be necessary to consider temperature limits! (Please ask us, if in doubt.)

T_{2max} = static torque to avoid tooth fracture, P_1 = driving power in kW, T_2 = output torque in Nm.



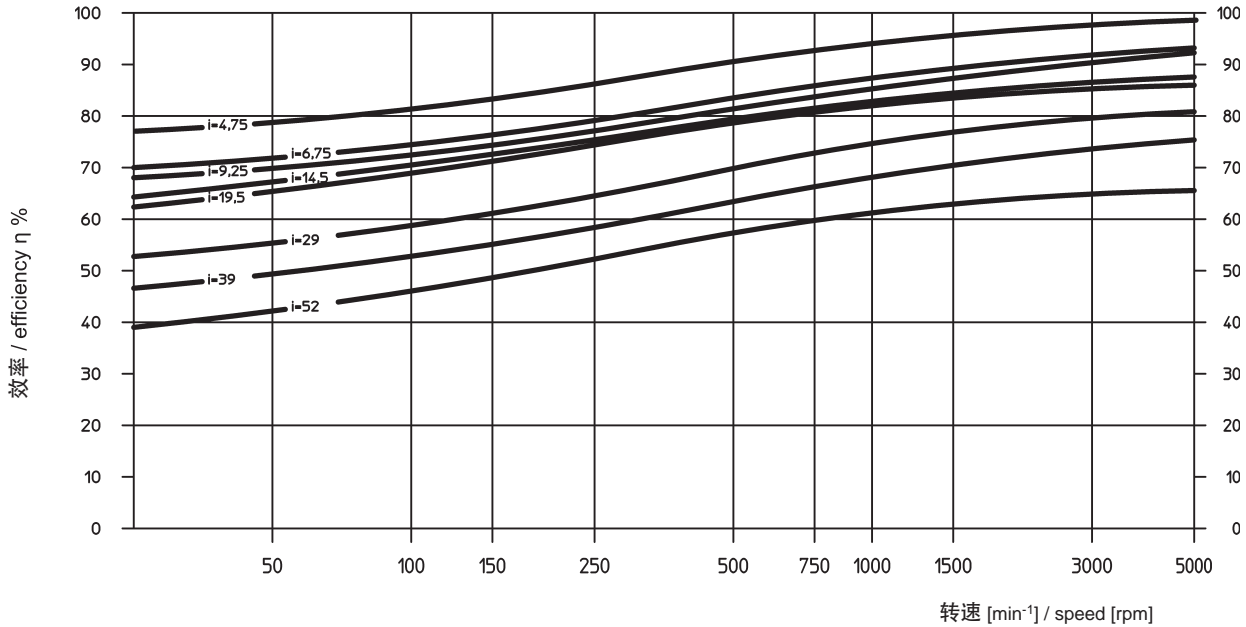
< 12 arcmin

订购代码 Order code	a_0 (mm)	i	T_{2max}	驱动速度 / Driving speed n_1 in min^{-1}														η bei 1500
				500		750		1000		1500		3000		4000		5000		
				P_1 (kW)	T_2 (Nm)	P_1 (kW)	T_2 (Nm)	P_1 (kW)	T_2 (Nm)	P_1 (kW)	T_2 (Nm)	P_1 (kW)	T_2 (Nm)	P_1 (kW)	T_2 (Nm)	P_1 (kW)	T_2 (Nm)	
57 03 003 57 13 003	50	3,00																
57 03 005 57 13 005		4,75	495	0,73	59	1,08	59	1,53	63	2,27	63	4,50	63	5,58	59	6,57	55	0,93
57 03 007 57 13 007		6,75	360	0,45	50	0,69	53	0,99	57	1,58	62	3,15	62	3,96	59	4,68	55	0,90
57 03 009 57 13 009		9,25	248	0,29	43	0,45	46	0,63	49	0,99	52	2,30	63	3,20	63	3,69	59	0,88
57 03 015 57 13 015		14,50	315	0,23	51	0,36	54	0,51	59	0,80	63	1,64	68	2,25	68	2,84	68	0,84
57 03 020 57 13 020		19,50	225	0,14	41	0,23	43	0,36	45	0,50	50	1,08	59	1,49	59	1,89	59	0,83
57 03 029 57 13 029		29,00	270	0,13	43	0,18	47	0,26	50	0,40	54	0,84	63	1,11	63	1,27	59	0,76
57 03 039 57 13 039		39,00	180	0,11	48	0,15	50	0,22	54	0,33	59	0,69	68	0,90	68	1,13	68	0,70
57 03 052 57 13 052		52,00	135	0,07	38	0,11	40	0,14	42	0,23	45	0,46	54	0,65	54	0,81	54	0,63
57 04 003 57 14 003	63	3,00																
57 04 005 57 14 005		4,75	900	1,89	153	2,97	162	3,96	162	5,50	153	9,27	131	11,88	122			0,93
57 04 007 57 14 007		6,75	675	1,35	153	2,12	162	2,79	162	3,83	153	6,48	131	8,37	122			0,90
57 04 009 57 14 009		9,25	450	0,67	104	1,06	113	1,47	117	2,27	122	4,44	122	5,72	113			0,88
57 04 015 57 14 015		14,50	540	0,67	149	1,07	162	1,39	162	2,21	162	3,76	153	4,73	144			0,84
57 04 020 57 14 020		19,50	450	0,35	104	0,55	113	0,77	117	1,15	122	2,68	149	3,45	140			0,83
57 04 029 57 14 029		29,00	585	0,43	158	0,68	171	0,94	185	1,40	198	2,31	176	2,90	167			0,76
57 04 039 57 14 039		39,00	405	0,27	126	0,40	135	0,55	144	0,87	158	1,69	171	2,30	171			0,70
57 04 051 57 14 051		51,00	270	0,14	86	0,23	95	0,32	104	0,50	113	1,08	135	1,47	144			0,63



在满负荷情况下，伺服蜗轮蜗杆减速箱的传动效率。

Gearing efficiency of servo worm gear units with driving worm and under full load.

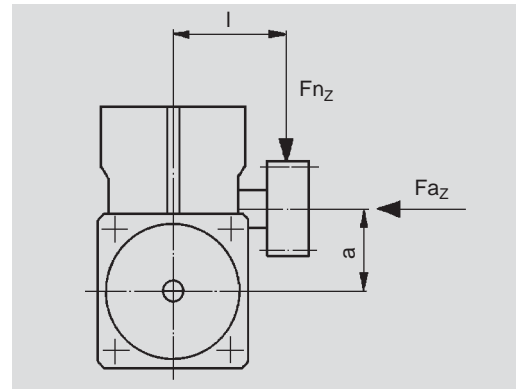


作用在输出轴上的附加载荷

给出的数据仅作参考。还应该考虑齿条系统选择时的数值。假设作用力的施力点在轴的中间位置。如果有额外的轴向力，或者高侧向力的情况，请与我们联系。

Additional loads on output drive

The data given are reference values. You should consider the values arising from the choice of the tooth system. It is assumed that the point of action of the force is the centre of the shaft. In cases where additional axial forces occur, over and above high transverse forces, please ask for advice.



中心距 Centre distance	a (mm)	50		63	
减速箱中心到齿轮中心的距离 Dimensions centre casing/ centre teeth	l (mm)	90	140	110	160
最大附加载荷 Max. additional load					
径向 radial	F_{n_z} [N]	2500	1600	3500	2450
轴向 axial	F_{a_z} [N]	1250	1250	1750	1750



简述

亚特兰B-伺服 基础型蜗轮蜗杆减速箱是特殊开发用于最新的交流和直流伺服电机。同本目录中其他产品一样，都有常备库存，或者很短时间就可以发货。

B-伺服减速箱的基本特征：

- 与59系列减速箱有相同的尺寸
- 低背隙(背隙 < 12')
- 轻合金而壳体结构具有很好的散热性能
- 坚固的滚柱轴承装配在空心输出轴上，可承受更大的附加力

中心距，减速比和齿轮系统根据DIN 3975/76标准选取。

使用经过磨削右旋的蜗杆，特制的铜合金蜗轮，并浸入特种润滑油种润滑，来保证较高的效率，平顺的运行和长效寿命。加工过的壳体上留有很多安装孔和攻丝孔，方便安装。

减速箱和伺服电机的连接采用了特殊的联轴器。减速箱的输入轴为外花键结构，联轴器为内花键结构，完全吻合，达到无背隙传动。

对于动力的输出，有多种输出驱动轴可供选择，如不同齿数的直齿和斜齿驱动系统。除了齿轮轴外，还有很多不同的齿轮和输出轴配合使用。

对于减速箱安全停止的最大传动扭矩（参考GD-14）和胀紧盘（GH-1）必须核对完毕。

Short description

ATLANTA B-servo worm gear units have been specially developed for use with the latest three-phase and DC servo-motors. Like all other components in this catalogue, they are usually available ex stock or, at least, within a very short time.

The following are typical features of our B-servo gear units:

- the same dimensions as our servo worm gear units serie 59
- low-clearance gearing (back lash < 12'),
- casing of light metal for optimal heat dissipation
- robust bearings for the output drive hollow shaft, permitting additional forces.

Centre distances, gear ratios and tooth systems have been chosen in accordance with DIN 3975/76.

The use of ground, right-hand worms, a worm gear of special worm-gear bronze and dip-feed lubrication (synthetic special oil) ensures a high degree of efficiency and also smooth running in both directions and a long service life. The casing with its many fixing bores and tapped holes permits mounting in any position.

The drive, i.e. the connection with the driving motor, is achieved with a special clutch. Its internal gearing, together with the barrelled profile of the driving shaft of our worm gear unit ensures transmission of the power with no free play.

For the output drive you can choose from quite a number of output drive shafts with straight and helical tooth systems and various numbers of teeth. Apart from toothed pinion shafts there is a multitude of gearwheels with different numbers of teeth from our S & L gearwheel program which can be combined and used together with suitable special output drive shafts.

For safety-stop is the maximum transmittable torque of the gear unit (see page GD-14) and shrink disc (see page GH-1) has to be checked. The output keyway has to be calculated separately.



< 12 arcmin



安装说明

蜗轮蜗杆减速箱

5个安装面都有合适尺寸的安装孔, 方便任何角度安装。为了提供足够的侧向力支撑(参看GD-15), 我们推荐最大接触面安装, 就是带有输出轴的两个侧面。把输入轴置于输出轴的侧方或者下方, 将有利于润滑。如果输入轴置于输出轴上方, 将降低10%的驱动能力。

联轴器

联轴器在出厂前已经装配好。在安装之前请擦拭干净所有接触面, 并涂抹一小层油膜。装配尺寸“X1”是非常中的数据(参考GI-5~GI-9)

推荐安装顺序:

- 仔细清理接触面, 并在表面涂抹一层薄油脂进行保护。
- 参考书册GI-5~GI-9页面中的尺寸, 将联轴器装配到伺服电机的轴上; 深度测量器有助于保证安装精确。
- 预紧螺栓, 检测联轴器的运行情况。
- 锁紧扭矩请参考表格中相应数值, 联轴器两侧的间隙必须是均匀一致的。
- 建议最后做径向跳动检测。

安装指导可查询页面GI-5至GI-9

电机

将装有联轴器的电机对准减速箱输入轴轴心装入, 并锁紧螺栓。

输出轴 (齿轮轴)

除非输出齿轮轴已经装配完毕, 否则我们推荐如下安装步骤: 清理齿轮轴和减速箱空心输出轴孔, 然后涂抹一些油脂。对于特殊齿轮轴我们推荐轴径公差为h6 (DIN ISO286)。材料必须拥有385 N/mm²以上的屈服点强度。重新计算扭力是必要。

减速箱输出轴为胀紧盘式结构

将胀紧盘安装到减速箱空心输出轴上(切勿在未安装状态下锁紧胀紧盘螺栓!)。将齿轮轴插入减速箱空心输出轴希望安装的一侧, 直至停止。均匀的锁紧胀紧盘上的螺栓。按照依次的顺序锁紧螺栓(不是交叉锁紧)达到表格中所需求的扭矩。

减速箱输出轴为键连接形式

通过卡簧, 挡片和螺栓固定住齿轮轴的轴向方向。为了达到这个目的, 先将卡簧卡在空心输出轴的卡簧槽内, 再将齿轮轴插入减速箱空心输出轴另一侧, 直至停止。挡片和螺栓从齿轮轴的另一侧拉住齿轮轴锁紧。卡簧必须卡住齿轮轴不令其移动。

Mounting instructions

Worm gear units

Five mounting faces with sufficiently dimensioned tapped holes are provided for mounting in any position. In order to accommodate all supplementary forces (see page GD-15) we recommend mounting at the largest contact faces., i.e. at one of the two cap sides. Putting the worm shaft (input shaft) in a lateral or inferior position is ideal for lubrication. Mounting the shaft in a top position will reduce the driving capacity by about 10%.

Coupling

The coupling is supplied pre-assembled. All contact surfaces must be cleaned and protected by a thin oil film before attaching it to the motor shaft. An important dimension for mounting is the value „X1” (compare pages GI – 5 to GI – 9).

Recommended procedure:

- Carefully clean the contact surfaces and protect them with a thin oil film.
- Place the coupling onto the motor shaft at the distance given by the measurement “X1” (see pages GI – 5 to GI – 9); a depth gauge is helpful for determining the measurement.
- Slightly tighten the clamping screws and check the clutch for true running
- Tighten the screws alternately and uniformly.
- The correct tightening torque can be seen from the operation and maintenance instructions. The gap in the coupling must be equally wide on both sides.
- It is recommended to make another final check for true running at the appropriate reference diameter!

A mounting guide can be found on page GI-5 to GI-9.

Motor

Insert the motor with coupling mounted into the gear centering piece and bolt it to the gearbox.

Output drive (pinion) shaft

Unless the output pinion shaft comes already fully assembled, we recommend to proceed as follows: Clean pinion shaft and hollow shaft extension and then oil them. For the special output drive shaft we recommend tolerance h6 (DIN ISO286). the material must have a minimum yield point of 385 N/mm². A recalculation of the strength is necessary.

Output drive shaft for shrink-disc connection

Slide shrink disc onto the hollow shaft extension of the gear unit (please do not tighten the screws beforehand!). Insert the output shaft from the desired side into the hollow shaft fully up to the stop. Make the transverse pressure connection by evenly tightening the clamping screws. Tighten the screws one after the other (not crosswise) in several passes to the torque indicated in the operation and maintenance instructions.

Output drive shaft for key connection

The retaining ring, the disc and the screw supplied with the output drive shaft serve for locking the output shaft in axial direction. For this purpose insert the retaining ring in the applicable recess of the hollow shaft and slide the output drive shaft from the desired side into the hollow shaft up to the stop. Disc and screw are screwed to the output shaft from the other side of the gear unit. The retaining ring must be clamped between disc and pinion shaft.





维护

更换润滑油

亚特兰B-伺服减速箱充满了合成润滑油。

在如下条件下使用，减速箱终生免维护：

减速箱严格遵照亚特兰目录和减速箱操作手册中的要求进行安装和使用，减速箱的实际工作情况完全在目录中所列的性能数值和极限范围内。操作者定期进行漏油检查（每4周）。

减速箱表面温度不得高于80°C。以往的经验显示伺服电机操作（间歇运行）减速箱温度不会超过该值。如果减速箱主要在低速状态（蜗杆的圆周速度<0.5m/s）运行，建议每两年更换一次润滑油。



我们推荐如下合成润滑油：

Klübersynth GH 6 - 220

订购代码: 65 90 010 (1 升)

替代品：

SHELL Tivela S 220, BP Enersyn SG-XP 220,
ARAL Degol GS 220

中心距 Centre distance	润滑油量 Oil quantity
a = 50 mm	0,25 l
a = 63 mm	0,60 l

We recommend the following synthetic gear lubricant:

Klübersynth GH 6 - 220

Order code: 65 90 010 (1 litre)

alternative:

SHELL Tivela S 220, BP Enersyn SG-XP 220,
ARAL Degol GS 220

防护等级

防护等级：IP65/67 符合 DIN ISO20653
(腐蚀性已被单独验证)

Degree of protection

Degree of protection: IP65/67 according to ISO 20653
(Corrosion has to be verified separately).