第一版 2016
1st edition 2016

伺服传动系统
Servo Drive System

AEO-F
Authorized Economic Operator

传统 创新 发展

亚特兰传动系统以令人信服的高质量动力传动方案服务客户超过80年。作为一家中型企业，我们专注于研发、构造和生产高质量的驱动系统。

几乎可以在任何传动工程领域找到亚特兰的客户。主要客户集中在：机床、木工机械、机器人、食品加工、包装机械、装箱机和专用机床等。

我们是市场发展趋势的领导者。在德国，Bietgheim-Bissingen，我们有三个现代化的工厂生产亚特兰的所有产品。

在所有工业国家，我们建立了3个子公司和23家代理商，来服务全世界范围的客户。


ZERTIFIKAT

ATLANTA Antriebssysteme E. Seidensp nner GmbH & Co. KG

ISO 9001 : 2008

ISO 9001 : 2008

Tradition. Innovation. Progress.

ATLANTA Drive Systems has offered convincing high-quality power transmission solutions for more than 80 years. As a medium-sized company we have specialized in the development, construction and production of high quality drive systems.

ATLANTA customers are found in all areas of transmission engineering. The main focus however, lies in machine tool, woodworking machines, robotics and handlings, food machinery, packaging machines, boxing machines and special purpose machines.

We are market leaders in high quality racks and define market trends. All components of our products are produced exclusively in our three modern plants in Bietigheim-Bissingen, Germany.

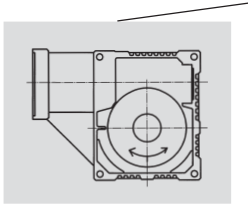
We have 3 subsidiary companies and 23 agents in all industrialized countries to serve our customers all over the world.

成员 / Member

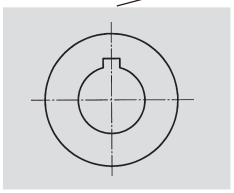
FVA Forschungsvereinigung Antriebstechnik e.V.

以高性能伺服减速箱为例
Example High-performance gear units

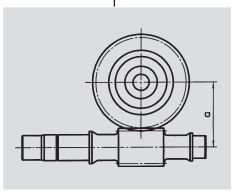
58 0 5 0 20



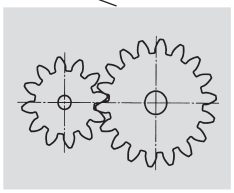
高性能伺服减速箱
High-performance gear units



键槽结构输出
Keyway design

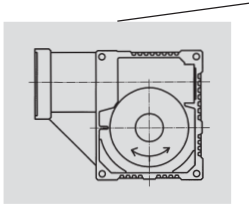


中心距
a_o = 80 mm
Centre distance



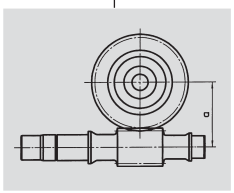
减速比
i = 19,5
Ratio

58 1 5 0 20

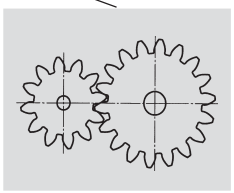


高性能伺服减速箱
High-performance gear units

胀紧盘结构
Shrink-disc design



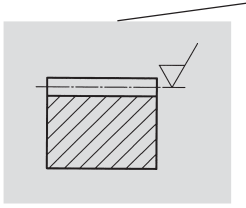
中心距
a_o = 80 mm
Centre distance



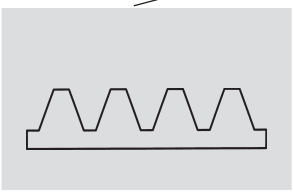
减速比
i = 19,5
Ratio

以可拼接齿条为例
Example Racks- for continuous linking

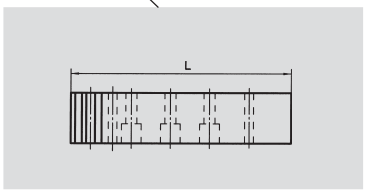
28 2 0 100



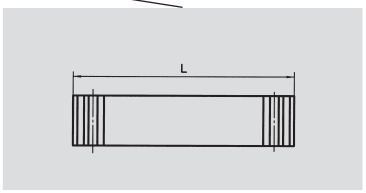
质量和精度
Design



模数
Module



有安装孔
with holes

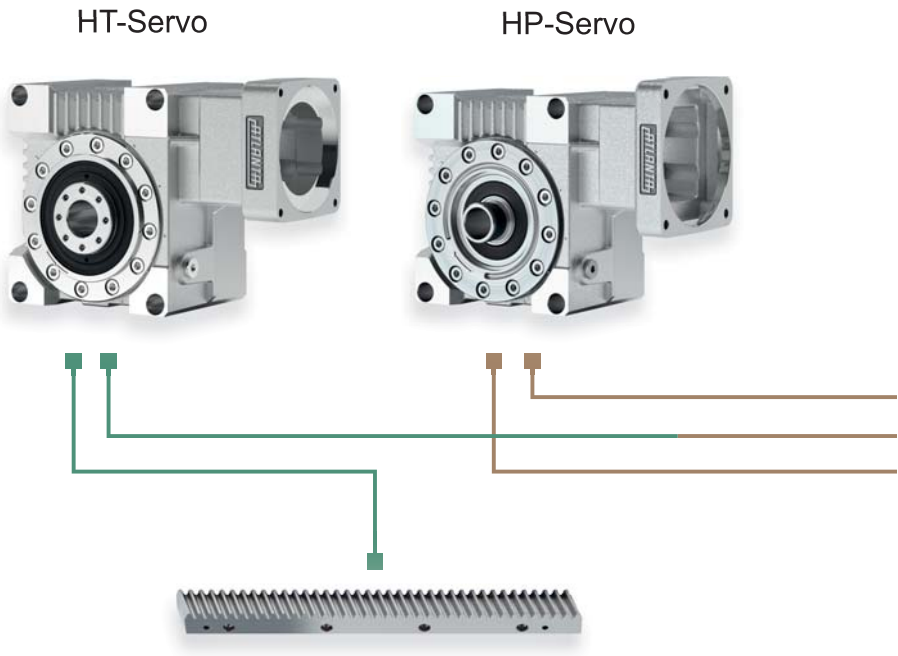


齿条长度
rack length

亚特兰伺服驱动系统：技术领先 引领行业标准

世界上最广泛的精密齿条系列配合完整的伺服减速箱系列，提供给您卓越的驱动组合，以完成您的所有应用解决方案。

The world‘s most extensive range of precision racks together with the complete family of servo gear units, provides an unmatched range of combinations to achieve the best solution to almost all possible applications.



UHPR
超高精度齿条
精度 / Quality 3 + 5

每种应用都能找到合适的方案
For each application the right solution

Photo: Vansichen Lineairtechniek Belgium

堆垛机器人的水平和垂直驱动轴应用
Driving and lifting axis of a robotic pallatizer

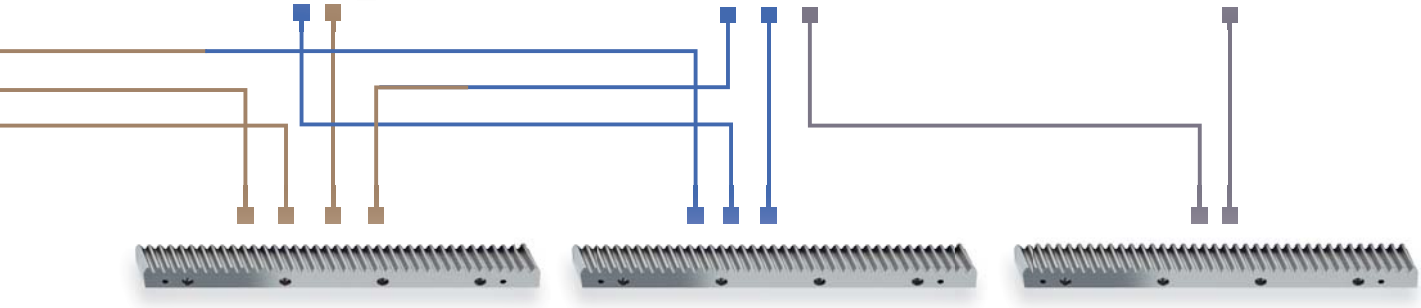
- 电控消隙结构的高精度机床
  High-precision machine tools with electrical preload
- 机床、升降轴
  多齿接触传动系统
  激光切割
  Machine tools, lifting axes, multiple pinion contact Laser cuttion machines

ATLANTA Servo Drive System: Setting Standards for Technological Leadership

E-Servo

BG-Servo

B-Servo



HPR
高精度齿条
精度 / Quality 7

- **木材、塑料，复合材料、铝材加工机床**
  Wood, plastic, composite aluminium working machines
- **机床、与导轨组合齿条 水切割设备 弯管系统 等离子切割机床**
  Machine tools, integratable rack, water cutting machines, tube bending systems plasma cuttin machines
- **木材加工机床 对平顺运行要求较高的 线性轴驱动**
  Wood working machines, linear axes with high requirement for a smooth running

PR
精密齿条
精度 / Quality 8

- **龙门搬运线性轴**
  Portals, handling, lifting axes
- **直线性轴**
  Linear axes

BR
基础齿条
精度 / Quality 9 + 10

- **用于低负载单元的直线性驱动**
  Linear axes with low load, feed units for adjustment
- **升降轴、搬运、焊接机器人**
  Lifting axes, handling, welding robots

Photo: Vansichen Lineairtechniek Belgium

安装有润滑系统的直线驱动轴
Linear axis with integrated lubrication system

HT 高扭矩减速箱
HT High-torque gear units

150 % 扭矩输出
背隙 < 1 弧分
最高钢性

150 % output torque
Backlash < 1 arcmin
Highest stiffness

HP 高性能减速箱
HP High-performance gear units

100 % 扭矩输出
背隙 < 2 弧分
最高钢性

100 % output torque
Backlash < 2 arcmin
Highest stiffness

E 经济型减速箱
E Economy gear units

100 % 扭矩输出
背隙 < 5 弧分
最高钢性

100 % output torque
Backlash < 5 arcmin
Highest stiffness

B 基础型减速箱
B Basic gear units

90 % 扭矩输出
背隙 < 12 弧分
高钢性

90 % output torque
Backlash < 12 arcmin
High stiffness

BG-伺服伞齿轮减速箱
BG-Servo bevel gear unit

100 % 扭矩输出
背隙 < 6 弧分
最高钢性

100 % output torque
Backlash < 6 arcmin
Highest stiffness

NEW•NEW•NEW•NEW•NEW•NEW

food safe

The new servo gear units with food safe lubricant

Picture apple: © atoss / Fotolia.com

Manufacturing of machinery for the food industry must comply with a set of rules for general safety requirements, including cleaning and disinfection for hygiene. While drive technology is used in food processing machines and systems, it is not technically possible to eliminate 100 % of the contact of food with lubricant, so food grade lubricants is a mandatory regulation in the food industry.

If needed, we supply our servo gear units filled with food safe lubricant for use it in the food industry. Due of the increasing demand, we have decided to offer all ATLANTA Servo Gear Units with food-grade lubricant. For this we have introduced a separate article number range, which you will find in our new catalog Servo Drive System edition 1/2016, chapter GA to GE.

Example for ordering of ATLANTA servo gear units with food safe lubricant:

	synthetic oil	food safe oil
HT-High Torque	98 03 005	98 03 105
HP-High Performance	58 03 005	58 03 105
E-Economy	59 03 005	59 03 105
B-Basic	57 03 005	57 03 105

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E-Mail: info@atlantagmbh.de
Web: www.atlantagmbh.de


< 1 arcmin

中心距 / Centre distance a_o = 50 mm

图1 符合 EN ISO9409-1-A-40 标准法兰型输出
Fig. 1 Output shaft with interface according analog EN ISO 9409-1-A-40

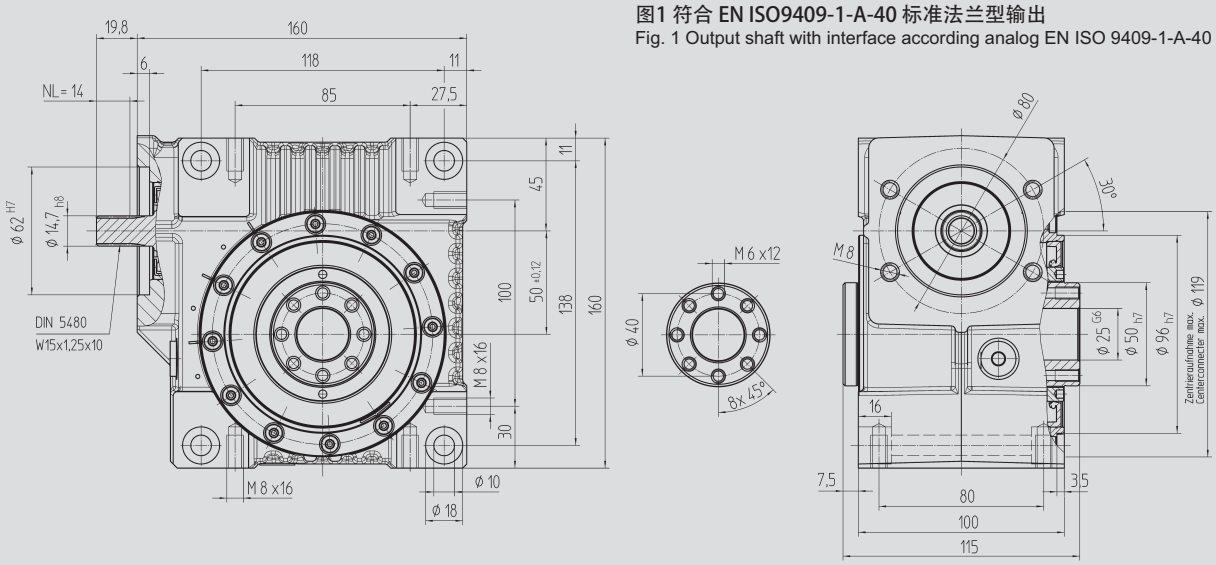
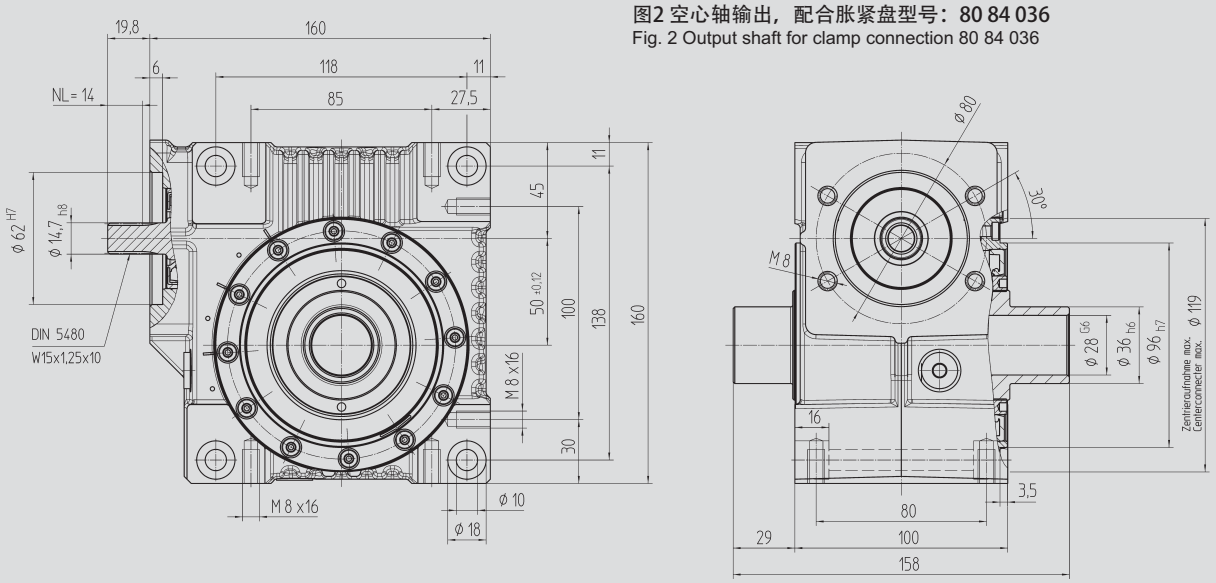


图2 空心轴输出，配合胀紧盘型号：80 84 036
Fig. 2 Output shaft for clamp connection 80 84 036



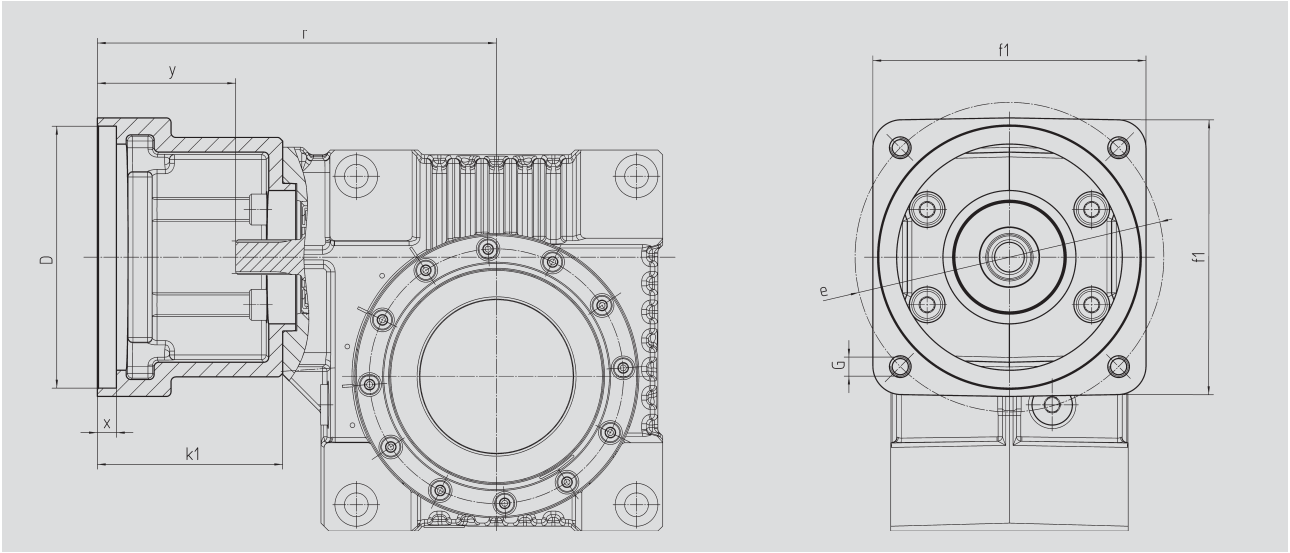
订购代码. / Order code 图 1 / Fig. 1	图 2 / Fig. 2	减速比 i Ratio i	kg	J_{red} 10^{-4} kg m²
98 03 005	98 13 005	4,75	7	0,8280
98 03 007	98 13 007	6,75	7	0,4140
98 03 009	98 13 009	9,25	7	0,3490
98 03 015	98 13 015	14,50	7	0,2800
98 03 020	98 13 020	19,50	7	0,1960
98 03 029	98 13 029	29,00	7	0,2694
98 03 039	98 13 039	39,00	7	0,2310
98 03 050	98 13 050	50,00	7	0,2140

润滑油来自食品行业用油
订购代码. 98 03 1xx / 98 13 1xx

With suitable oil for food
Order code 98 03 1xx / 98 13 1xx


< 1 arcmin

电机法兰 / Motor flange



中心距 / Centre distance a_o = 50 mm

订购代码. Order code	D^{G7}	k_1	r	x	y	f_1	e	G	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	58	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	58	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	58	140	165	M10	1,20
65 59 406	110,0	78	168	11,0	58	140	165	M10	1,15
65 59 407	130,0	78	168	11,0	58	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箱代码 98 03 0xx / 98 13 0xx 及法兰代码 65 59 3xx 或. 4xx.
The order should contain gear box 98 03 0xx / 98 13 0xx and flange 65 59 3xx or 4xx.


< 1 arcmin

中心距 / Centre distance a_o = 63 mm

图1 符合 EN ISO 9409-1-A-50 标准法兰型输出
Fig. 1 Output shaft with interface according analog EN ISO 9409-1-A-50

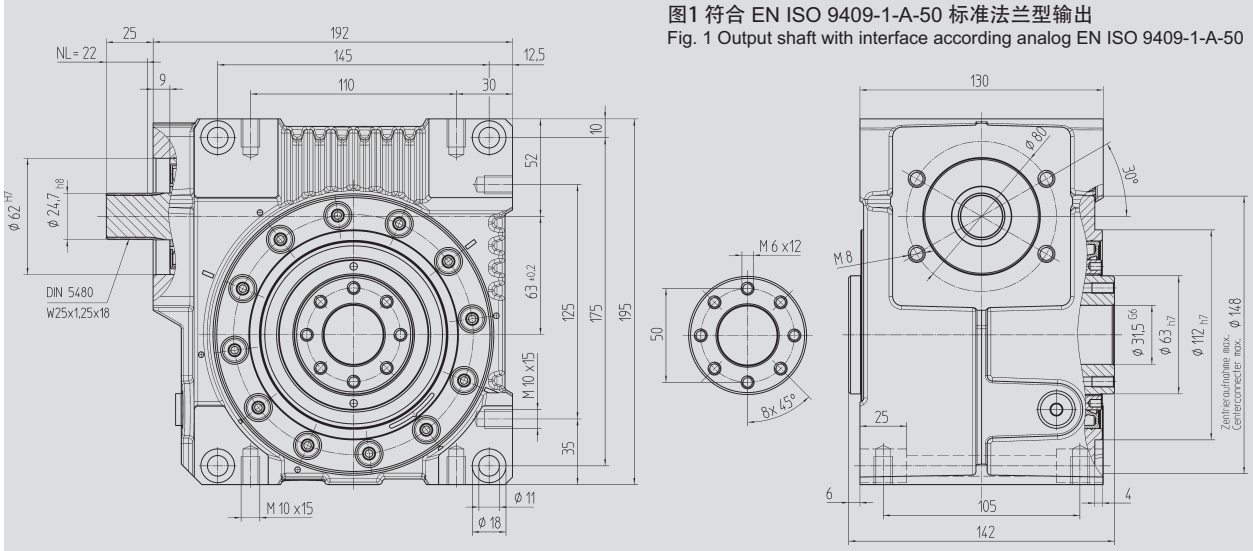
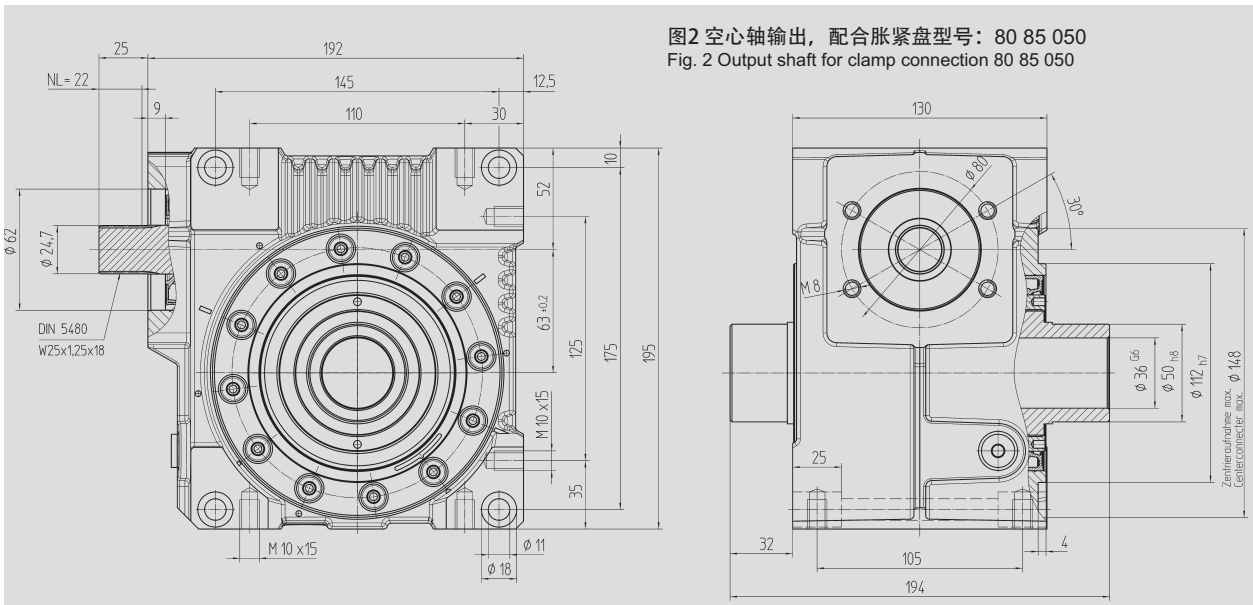


图2 空心轴输出，配合胀紧盘型号：80 85 050
Fig. 2 Output shaft for clamp connection 80 85 050



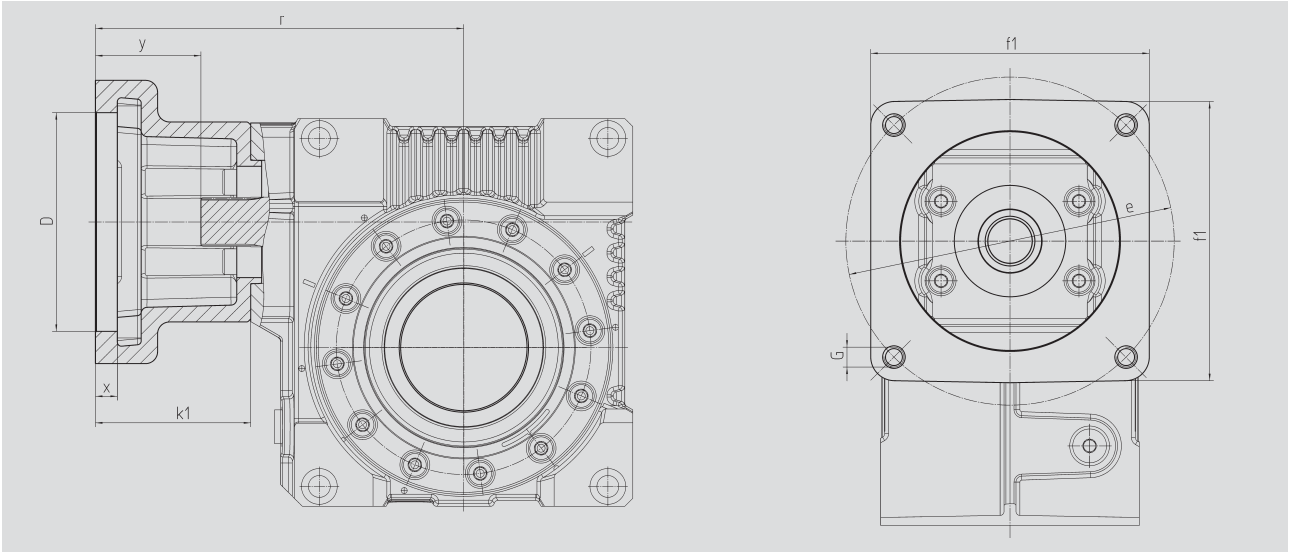
订购代码. / Order code 图 1 / Fig. 1	图 2 / Fig. 2	减速比 i Ratio i	kg	J_{red} 10^{-4} kg m²
98 04 005	98 14 005	4,75	12	2,5350
98 04 007	98 14 007	6,75	12	1,3720
98 04 009	98 14 009	9,25	12	0,9825
98 04 015	98 14 015	14,50	12	0,9590
98 04 020	98 14 020	19,50	12	0,6940
98 04 029	98 14 029	29,00	12	0,9966
98 04 039	98 14 039	39,00	12	1,0100
98 04 052	98 14 052	52,00	12	0,5305

润滑油来自食品行业用油
订购代码. 98 04 1xx / 98 14 1xx

With suitable oil for food
Order code 98 04 1xx / 98 14 1xx


< 1 arcmin

电机法兰 / Motor flange



中心距 / Centre distance a_o = 63 mm

订购代码. Order code	D^{G7}	k_1	r	x	y	f_1	e	G	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	58	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	58	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	58	140	165	M10	1,20
65 59 406	110,0	78	168	11,0	58	140	165	M10	1,15
65 59 407	130,0	78	168	11,0	58	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箱代码 98 04 0xx / 98 14 0xx 及法兰代码 65 59 3xx 或. 4xx.
The order should contain gear box 98 04 0xx / 98 14 0xx and flange 65 59 3xx or 4xx.


< 1 arcmin

中心距 / Centre distance a_o = 80 mm

图1 符合 EN ISO 9409-1-A-63 标准法兰型输出
Fig. 1 Output shaft with interface according analog EN ISO 9409-1-A-63

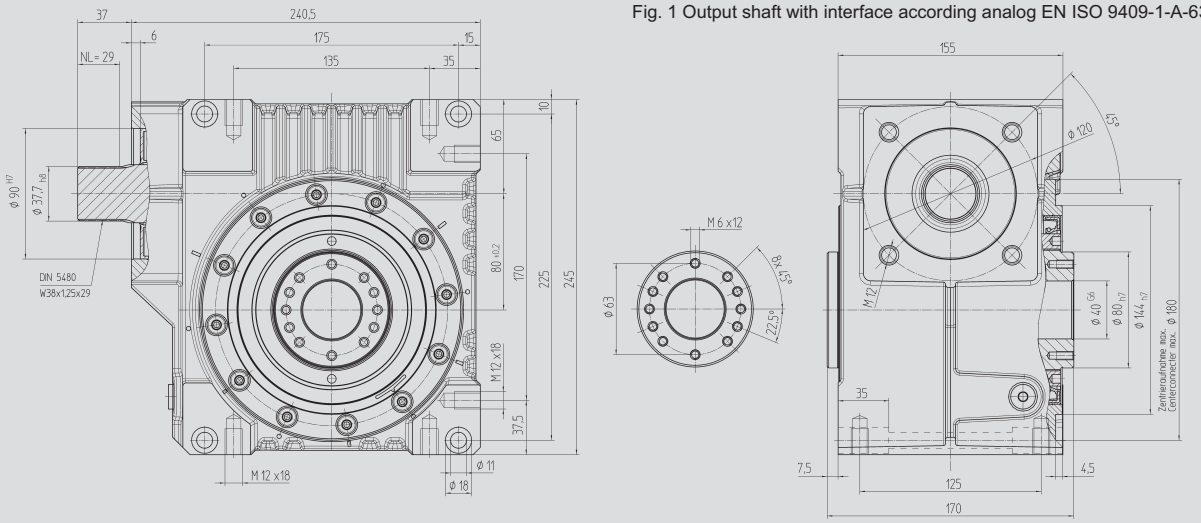
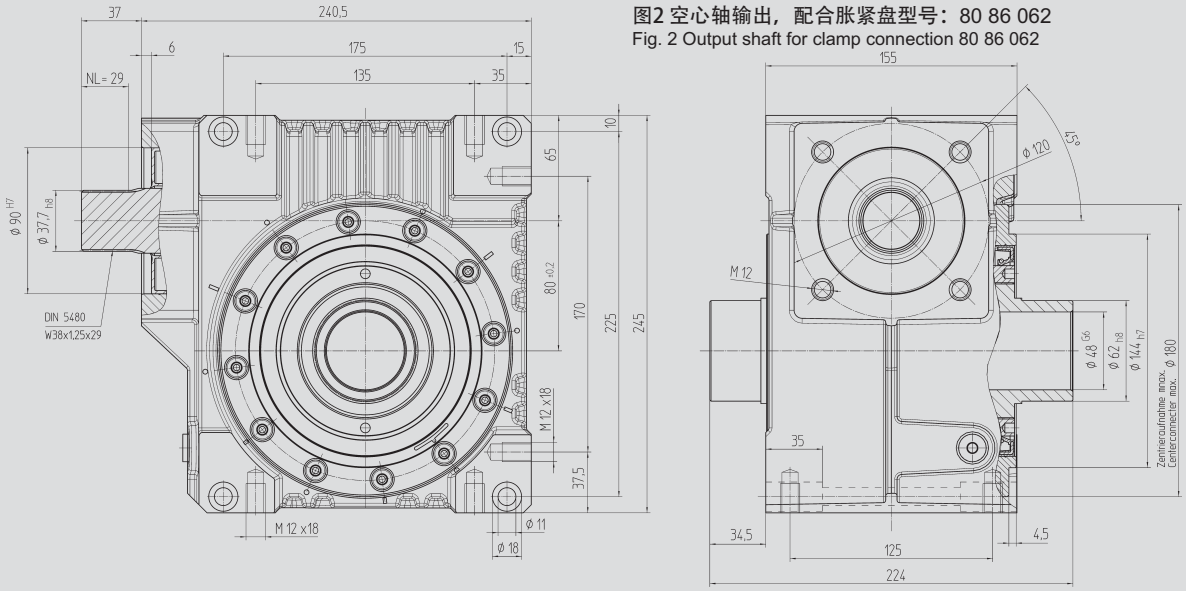


图2 空心轴输出，配合胀紧盘型号：80 86 062
Fig. 2 Output shaft for clamp connection 80 86 062



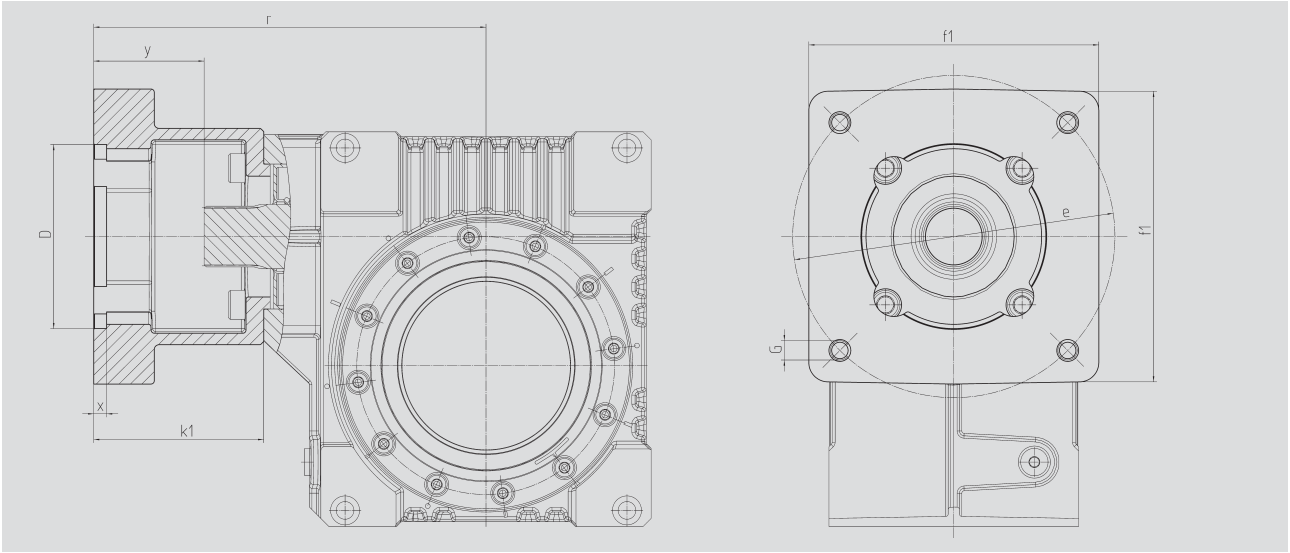
订购代码. / Order code 图 1 / Fig. 1	图 2 / Fig. 2	减速比 i Ratio i	kg	J_{red} 10^{-4} kg m²
98 05 005	98 15 005	4,75	23	9,6180
98 05 007	98 15 007	6,75	23	6,0910
98 05 009	98 15 009	9,25	23	4,7650
98 05 015	98 15 015	14,50	23	5,3080
98 05 020	98 15 020	19,50	23	3,9350
98 05 029	98 15 029	29,00	23	4,0500
98 05 039	98 15 039	39,00	23	4,1800
98 05 052	98 15 052	52,00	23	3,7140

润滑油来自食品行业用油
订购代码. 98 05 1xx / 98 15 1xx

With suitable oil for food
Order code 98 05 1xx / 98 15 1xx


< 1 arcmin

电机法兰 / Motor flange



中心距 / Centre distance a_o = 80 mm

订购代码. Order code	D^{G7}	k_1	r	x	y	f_1	e	G	kg
65 59 501	110,0	92,0	230,0	8,0	55,0	140	165	M10	2,00
65 59 502	130,0	92,0	230,0	8,0	55,0	140	165	M10	1,90
65 59 503	180,0	122,0	260,0	8,0	85,0	192	215	M12	3,40
65 59 504	180,0	127,0	265,0	8,0	90,0	192	215	M12	3,80
65 59 505	180,0	112,0	250,0	10,0	75,0	192	215	M12	2,70
65 59 506	130,0	112,0	250,0	10,0	75,0	192	215	M12	3,00
65 59 507	130,0	112,0	250,0	10,0	75,0	140	165	M10	2,50
65 59 508	110,0	90,0	228,0	8,0	53,0	140	145	M8	2,00
65 59 509	110,0	108,5	246,5	8,0	71,5	140	145	M8	2,50
65 59 510	114,3	129,5	267,5	8,0	92,5	180	200	M12	5,00
65 59 511	114,3	163,5	301,5	8,0	126,5	180	200	M12	4,20
65 59 512	114,3	105,5	243,5	8,0	68,5	180	200	M12	3,50
65 59 513	110,0	113,5	251,5	8,0	76,5	140	145	M8	2,70

订购代码需包括减速箱代码 98 05 0xx / 98 15 0xx 及法兰代码 65 59 5xx.
The order should contain gear box 98 05 0xx / 98 15 0xx and flange 65 59 5xx.


< 1 arcmin

中心距 / Centre distance a_o = 100 mm

图1 符合 EN ISO 9409-1-A-80 标准法兰型输出
Fig. 1 Output shaft with interface according analog EN ISO 9409-1-A-80

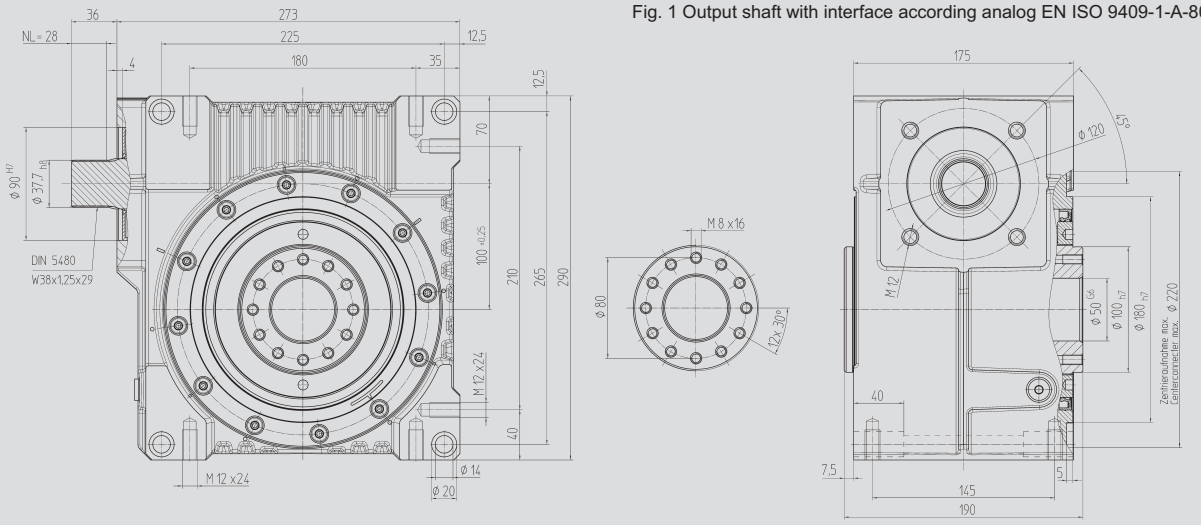
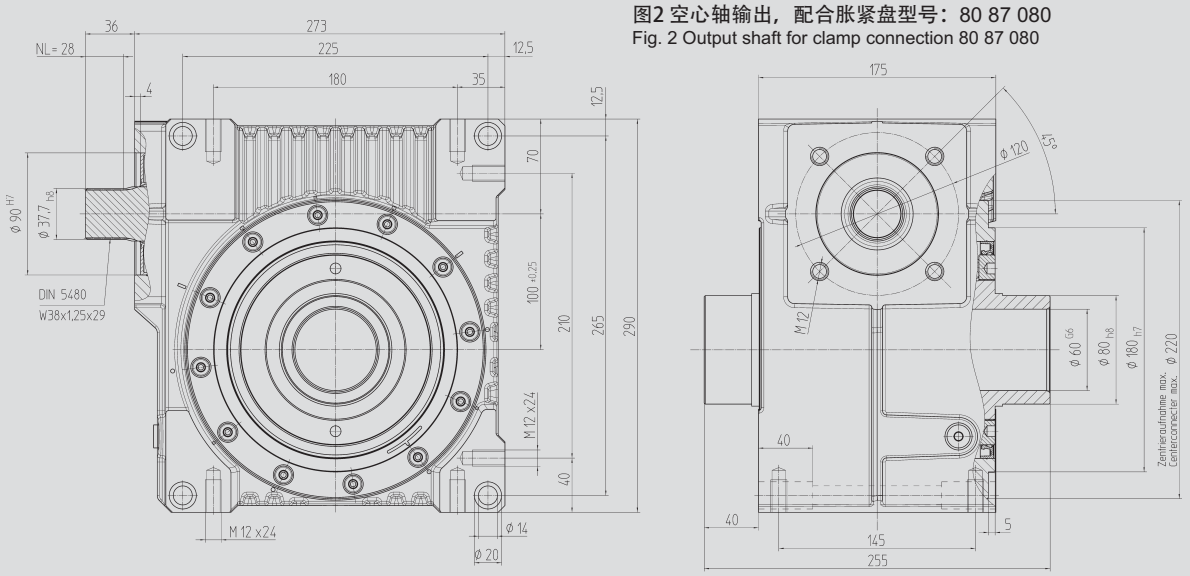


图2 空心轴输出，配合胀紧盘型号：80 87 080
Fig. 2 Output shaft for clamp connection 80 87 080



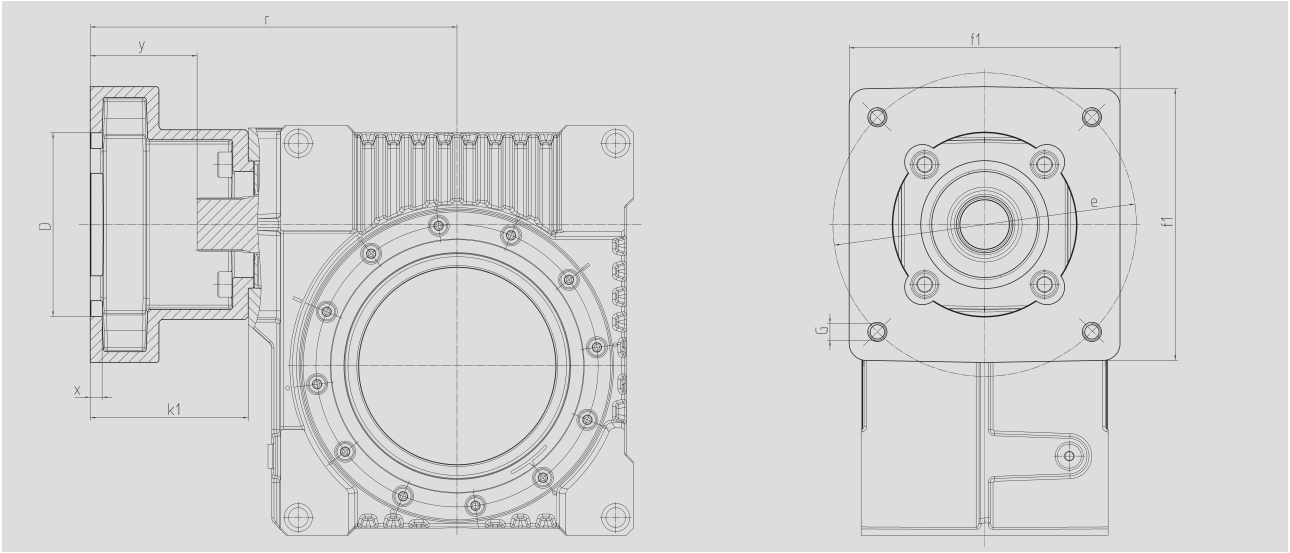
订购代码. / Order code 图 1 / Fig. 1	图 2 / Fig. 2	减速比 i Ratio i	kg	J_{red} 10^{-4} kg m²
98 06 005	98 16 005	4,75	38	22,9320
98 06 007	98 16 007	6,75	38	12,8835
98 06 009	98 16 009	9,25	38	8,0975
98 06 015	98 16 015	14,50	38	7,2190
98 06 020	98 16 020	19,50	38	5,4030
98 06 029	98 16 029	29,00	38	4,7207
98 06 039	98 16 039	39,00	38	8,4300
98 06 052	98 16 052	52,00	38	9,7400

润滑油来自食品行业用油
订购代码. 98 06 1xx / 98 16 1xx

With suitable oil for food
Order code 98 06 1xx / 98 16 1xx


< 1 arcmin

电机法兰 / Motor flange



中心距 / Centre distance a_o = 100 mm

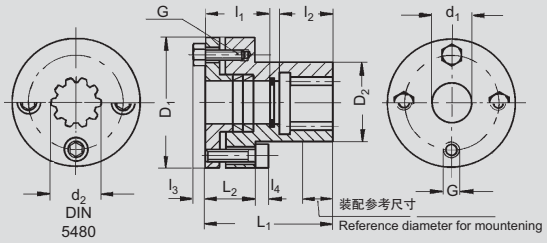
订购代码. Order code	D^{G7}	k_1	r	x	y	f_1	e	G	kg
65 59 501	110,0	92,0	230,0	8,0	55,0	140	165	M10	2,00
65 59 502	130,0	92,0	230,0	8,0	55,0	140	165	M10	1,90
65 59 503	180,0	122,0	260,0	8,0	85,0	192	215	M12	3,40
65 59 504	180,0	127,0	265,0	8,0	90,0	192	215	M12	3,80
65 59 505	180,0	112,0	250,0	10,0	75,0	192	215	M12	2,70
65 59 506	130,0	112,0	250,0	10,0	75,0	192	215	M12	3,00
65 59 507	130,0	112,0	250,0	10,0	75,0	140	165	M10	2,50
65 59 508	110,0	90,0	228,0	8,0	53,0	140	145	M8	2,00
65 59 509	110,0	108,5	246,5	8,0	71,5	140	145	M8	2,50
65 59 510	114,3	129,5	267,5	8,0	92,5	180	200	M12	5,00
65 59 511	114,3	163,5	301,5	8,0	126,5	180	200	M12	4,20
65 59 512	114,3	105,5	243,5	8,0	68,5	180	200	M12	3,50
65 59 513	110,0	113,5	251,5	8,0	76,5	140	145	M8	2,70

订购代码需包括减速箱代码 98 06 0xx / 98 16 0xx 及法兰代码 65 59 5xx.
The order should contain gear box 98 06 0xx / 98 16 0xx and flange 65 59 5xx.

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
Special couplings for motor/gear units, rigid model, nitrided, preassembled for motor shafts without key

减速箱输入轴侧采用 DIN 5480 标准的内花键结构

Bore on gear unit side low-clearance tooth-hub profile corresponding to DIN 5480 for push-fitting



电机输出轴侧
采用胀紧盘结构

Bore on motor side with locking elements as clamp connection

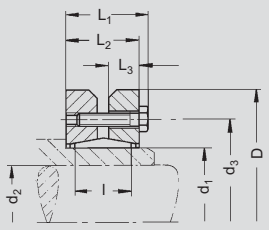
订购代码. / Order code 联轴器 Coupling	1)	d_1	d_2	D_1	D_2	l_1	l_2	l_3	l_4	L_1	L_2	G	J_{red} 10^{-4} kg m²	kg
65 43 110	9 71 80 010	10	15x1,25x10	48	29	22	17	-	5	44	18	4xM5	0,835	0,40
65 43 111	9 71 80 011	11	15x1,25x10	48	29	20,5	17	-	5	64	18	4xM5	0,976	0,50
65 43 114	9 71 80 014	14	15x1,25x10	48	29	24	19	-	5	50	18	4xM5	0,835	0,45
65 43 116	9 71 80 016	16	15x1,25x10	48	29	27	16	-	5	50	18	4xM5	0,824	0,45
65 43 119	9 71 80 019	19	15x1,25x10	48	29	24	16	-	5	40	18	4xM5	0,799	0,40
65 43 914	9 71 80 014	14	15x1,25x10	48	29	26	19	-	5	64	18	4xM5	0,985	0,50
65 43 916	9 71 80 016	16	15x1,25x10	48	29	27	15	-	5	64,3	18,3	4xM5	0,975	0,40
65 43 919	9 71 80 019	19	15x1,25x10	48	29	23	17	-	5	55	18	4xM5	0,853	0,45
65 43 924	9 71 80 024	24	15x1,25x10	50	29	34	22	-	6	56	40	4xM6	1,041	0,52
65 44 024	9 71 80 024	24	25x1,25x18	50	29	41,5	24	-	6	66,5	59,5	4xM6	2,628	0,75
65 44 114	9 71 80 014	14	25x1,25x18	55	32	24	23,5	-	6	64	21	4xM6	1,645	0,50
65 44 116	9 71 80 016	16	25x1,25x18	55	32	34	23,5	-	6	64	21	4xM6	1,622	0,50
65 44 119	9 71 80 019	19	25x1,25x18	55	32	33	26,5	-	6	63	21	4xM6	1,598	0,50
65 44 120	9 71 80 020	20	25x1,25x18	55	32	33,2	26,5	-	6	63	21	4xM6	1,550	0,50
65 44 219	9 71 80 019	19	25x1,25x18	55	32	27	26,5	-	6	74	21	4xM6	1,703	0,50
65 44 919	9 71 80 019	19	25x1,25x18	55	32	31	26,5	-	6	78	21	4xM6	1,757	0,55
65 44 928	9 71 80 028	28	25x1,25x18	70	48	48	26	-	6	83	25	5xM6	5,998	0,85
65 44 932	9 71 80 032	32	25x1,25x18	70	48	43	23	-	6	78	25	5xM6	5,921	0,80
65 44 935	9 71 81 035	35	25x1,25x18	70	48	52	26	-	6	78	25	5xM6	6,155	0,95
65 46 024	9 71 80 024	24	38x1,25x29	55	-	38,5	31	4	6	72,5	-	5xM6	4,452	0,90
65 46 834	9 71 81 035	1 3/8"	38x1,25x29	80	58	63	34	-	6	100	40	6xM6	16,320	1,95
65 46 928	9 71 80 028	28	38x1,25x29	70	48	47	34	-	6	90	25	5xM6	5,882	0,90
65 46 932	9 71 80 032	32	38x1,25x29	70	48	43	34	-	6	86	25	5xM6	5,784	0,85
65 46 935	9 71 81 035	35	38x1,25x29	80	58	65	34	-	6	100	40	6xM6	16,550	1,95
65 46 938	9 71 80 038	38	38x1,25x29	80	58	62	34	-	6	100	40	6xM6	16,240	1,88
65 47 948	9 71 80 048	48	38x1,25x29	95	66	58	31	-	8	92	42	6xM8	41,860	3,10

1) 胀紧环备件 / Spare part clamping element

98 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 98 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	l	G	J 10^{-4} kg m²	kg
80 84 036	50	540	36	28	52	72	27,5	23,50	10	18	5 x M6	4,029	0,4
80 85 050	63	1180	50	36	70	90	31,5	27,50	12	22	9 x M6	11,322	0,8
80 86 062	80	2300	62	48	86	110	34,5	30,50	13	23	10 x M6	27,137	1,3
80 87 080	100	3240	80	60	100	145	38,0	32,50	14	25	7 x M8	88,870	1,9


< 1 arcmin

表中所列数据 基于磨损和最大侧向负载 伺服电机操作 12000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.)

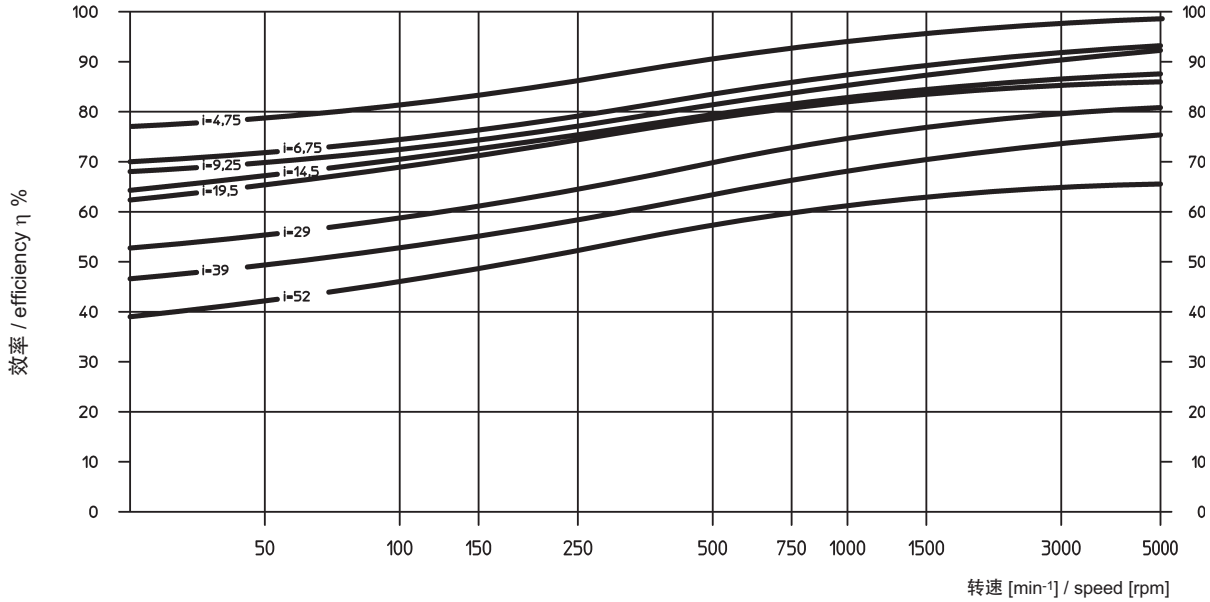
$T_{2max.}$ = static torque to avoid tooth fracture, P_1 = driving power in kW, T_2 = output torque in Nm.

订购代码. Order code		a_0	i	$T_{2\,max.}$	驱动速度 / Driving speed n_1 in min^{-1} 500		750		1000		1500		3000		4000		5000		η
		(mm)			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)	bei 1500
98 03 003	98 13 003	50	3,00*																
98 03 005	98 13 005		4,75	820	1,21	97	1,80	97	2,55	105	3,78	105	7,50	105	9,30	97	10,90	91	0,93
98 03 007	98 13 007		6,75	600	0,75	84	1,15	88	1,65	94	2,62	103	5,25	103	6,60	97	7,80	91	0,90
98 03 009	98 13 009		9,25	410	0,48	72	0,75	76	1,05	81	1,65	87	3,82	105	5,32	105	6,15	97	0,88
98 03 015	98 13 015		14,50	520	0,39	85	0,60	90	0,85	97	1,33	105	2,73	112	3,75	112	4,72	112	0,84
98 03 020	98 13 020		19,50	370	0,24	67	0,37	72	0,51	75	0,82	82	1,80	97	2,47	97	3,15	97	0,83
98 03 029	98 13 029		29,00	450	0,21	72	0,30	78	0,43	82	0,66	90	1,39	105	1,84	105	2,11	97	0,76
98 03 039	98 13 039		39,00	300	0,18	78	0,25	84	0,36	90	0,55	97	1,15	112	1,50	112	1,87	112	0,70
98 03 050	98 13 050		50,00	220	0,12	63	0,18	66	0,24	70	0,37	75	0,76	90	1,08	90	1,35	90	0,63
98 04 003	98 14 003	63	3,00*																
98 04 005	98 14 005		4,75	1500	3,15	255	4,95	270	6,60	270	9,16	255	15,45	217	19,80	202			0,93
98 04 007	98 14 007		6,75	1120	2,25	255	3,52	270	4,65	270	6,37	255	10,80	217	13,95	202			0,90
98 04 009	98 14 009		9,25	750	1,11	172	1,77	187	2,44	195	3,78	202	7,39	202	9,52	189			0,88
98 04 015	98 14 015		14,50	900	1,11	247	1,78	270	2,31	270	3,67	270	6,27	255	7,87	240			0,84
98 04 020	98 14 020		19,50	750	0,58	172	0,91	187	1,27	195	1,92	202	4,47	247	5,74	232			0,83
98 04 029	98 14 029		29,00	970	0,72	262	1,12	285	1,56	307	2,32	330	3,85	292	4,83	277			0,76
98 04 039	98 14 039		39,00	670	0,45	210	0,66	225	0,91	240	1,45	262	2,82	285	3,82	285			0,70
98 04 052	98 14 052		52,00	450	0,24	142	0,37	157	0,52	172	0,82	187	1,80	225	2,44	240			0,63
98 05 003	98 15 003	80	3,00*																
98 05 005	98 15 005		4,75	3000	7,80	630	10,35	570	12,79	540	17,40	495	29,25	420					0,93
98 05 007	98 15 007		6,75	2100	5,40	630	7,29	570	9,21	540	12,66	495	21,01	420					0,90
98 05 009	98 15 009		9,25	1650	3,57	555	5,29	555	6,79	540	9,33	495	15,45	420					0,88
98 05 015	98 15 015		14,50	1950	2,97	675	4,35	675	5,35	630	6,90	555	10,50	442					0,84
98 05 020	98 15 020		19,50	1500	1,86	555	3,00	600	3,90	600	5,40	540	8,59	480					0,83
98 05 029	98 15 029		29,00	1800	2,07	780	3,06	825	3,78	795	4,98	735	8,13	630					0,76
98 05 039	98 15 039		39,00	1270	1,30	645	2,02	690	2,77	735	3,76	720	6,04	615					0,70
98 05 052	98 15 052		52,00	900	0,57	360	0,85	390	1,20	412	1,83	450	3,69	495					0,63
98 06 005	98 16 005	100	4,75	4950	16,15	1320	21,33	1200	26,65	1125	36,15	1027	60,55	870					0,93
98 06 007	98 16 007		6,75	3450	10,84	1245	14,40	1125	18,15	1080	25,05	990	43,50	870					0,90
98 06 009	98 16 009		9,25	2850	8,01	1245	10,65	1125	13,65	1080	18,45	990	31,80	870					0,88
98 06 015	98 16 015		14,50	3070	6,30	1395	8,70	1320	10,20	1215	13,50	1080	21,45	930					0,84
98 06 020	98 16 020		19,50	2700	4,53	1350	6,40	1305	7,80	1215	10,00	1080	16,65	930					0,83
98 06 029	98 16 029		29,00	3450	4,44	1725	6,03	1605	7,00	1515	8,95	1275	15,46	1200					0,76
98 06 039	98 16 039		39,00	2470	3,10	1620	4,32	1545	5,44	1500	6,79	1350	11,22	1170					0,70
98 06 052	98 16 052		52,00	1650	1,74	1140	2,73	1230	3,61	1275	4,62	1177	7,50	1020					0,63

* 按照需求 / on request.

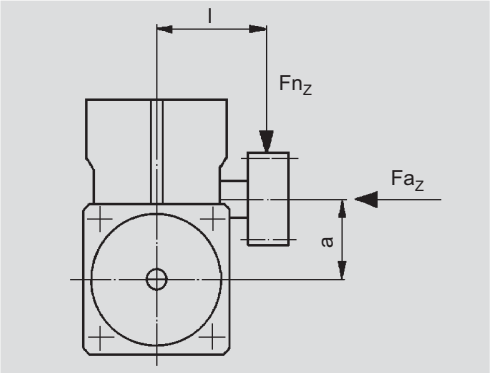
在满负荷情况下，伺服蜗轮蜗杆减速箱的传动效率.

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



作用在输出轴上的附件载荷
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		80		100		
减速箱中心到齿轮中心的距离 Dimensions centre casing/ centre teeth	EN ISO	空心轴 胀紧盘	EN ISO	空心轴 胀紧盘	EN ISO	空心轴 胀紧盘	EN ISO	空心轴 胀紧盘	
l (mm)	71	105	86	120	103	135	118	162	
最大附加载荷 Max. additional load									
径向 Fn_z [N]	6800	4600	9600	7000	15300	11700	17800	13200	
轴向 Fa_z [N]	2700	2700	3800	3800	6000	6000	7500	7500	
仅是轴向载荷 Fa_z [N] (Fn = 0) Only axial load	5000		8000		15000		35000		


< 1 arcmin

简述

亚特兰 HT 高扭矩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，或者很很短时间就可以发货。

HT 高扭矩减速箱的基本特征：

• 低背隙（背隙< 1'）,可调
• 高达150%负载能力
• 轻合金壳体结构具有很好的散热性能
• 坚固的滚柱轴承“O”型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。齿形进行了优化，以便能够简单地通过调整偏心法兰改变中心距的方法调整背隙。

使用经过磨削右旋的蜗杆，特制的铜合金蜗轮，并浸入特种润滑油中润滑，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。

减速箱和输出轴之间的联接要求绝对可靠，无扭转变形，对于间歇运行这点很重要。该些列减速箱使用新的符合DIN EN ISO 9409-1-A 的法兰型接口，与传统胀紧盘联接结构同样好用。

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。联轴器与电机轴之间通过胀紧结构也是同样的目的。

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。另外还有多种符合EN ISO 9409-1-A 标准的法兰型斜齿齿轮可以使用。

对于减速箱安全停止的最大传动扭矩（参考GA-11）和胀紧盘（GH-1）必须核对完毕。

Short description

ATLANTA HT-high-torque 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 HT-high-torque gear units:

- low-clearance gearing (back lash < 1'), adjustable
- up to 150 % higher loading values
- casing of light metal for optimal heat dissipation
- robust bevel roller bearings for the output drive hollow shaft in “O” arrangement permitting greater additional forces.

Centre distances, gear ratios and tooth systems have been chosen in accordance with DIN 3975/76. The tooth shape was optimised so as to permit the adjustment of the clearance simply by changing the centre distance by means of eccentric flanges.

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 fully machined casing with its many fixing bores and tapped holes permits mounting in any position.

The demand for an absolutely positive, and largely torsion-free connection between gear unit and output shaft, as it is especially important for intermittent operation, is fulfilled by our new gear-unit version with interface according to DIN EN ISO 9409-1-A as well as by our traditional version with shrink-plate coupling of the output shaft.

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. The use of annular spring elements firmly fixed to the motor shaft serves the same purpose.

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 gearwheel program which can be combined and used together with suitable special output drive shafts. In addition there is a large choice of gearwheels with helical tooth system for gear units with interface according to EN ISO 9409-1-A.

For safety-stop is the maximum transmittable torque of the gear unit (see page GA-11) and shrink disc (see page GH-1) has to be checked.


< 1 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GA-12），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。联轴器中的卡簧能够卡住电机轴，使联轴器不能轴向移动。加入第二个卡簧也是有可能的。
推荐安装顺序：
– 把联轴器放到电机输出轴上，向内推动，直至停止移动。（轴肩/卡簧）
– 轻轻锁紧胀紧螺栓，并检查联轴器的转动情况。
– 使用扭力扳手交叉锁紧胀紧螺栓，达到表中所列响应扭矩，确保联轴器与接触面间隙均匀。
– 建议最后做径向跳动检测。

安装指导请参考GI-1~GI-4页。

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 ISO 286).材料必须拥有385N/mm2以上的屈服点强度。
重新计算扭力是必要。

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 GA-12) 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 will be delivered pre-assembled. Before attaching it to the motor shaft all contact surfaces must be cleaned and protected by applying a thin oil film. A retaining ring inserted in the hub of the coupling locks it on the motor shaft preventing axial movement of the coupling. It may be necessary to insert this ring in the next recess. Recommended sequence:
– Slide the coupling onto the motor shaft until it clicks home (shoulder/retaining ring).
– Tighten the clamping screws slightly and check the coupling for true running.
– Tighten screws alternately crosswise using torque figures as shown in operation and maintenance instructions ensuring that the gap between coupling and contact face remains even.
– A final check of true running is recommended at the applicable reference diameter!

A mounting guide can be found on page GI-1 to GI-4

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.

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。

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.

维护

背隙的调整
减速箱在出厂前已经调整到最小背隙。经过长时间的运行，由于磨损，背隙可能会增加（参考值>15'）. 背隙可以通过调整装在减速箱两侧的偏心法兰盘再次调整（支撑蜗轮）。

Maintenance

Adjustment of the circumferential backlash
The units are set up in the factory with a minimal amount of backlash. After prolonged usage, backlash may increase due to wear (reference value >15'). It can be adjusted by moving the eccentrically supported output shaft (= worm wheel).

我们推荐按照如下步骤执行：
拧下两侧端盖上的内六角螺栓，为了避免漏油，不要取下两侧端盖。同时旋动两侧端盖，使箭头指向减速箱壳体上更高的数字。至少检测蜗轮旋转一周的背隙值，来评定调整背隙的结果。如果必要，再次调整。交叉锁紧螺栓达。通过以上调整，减速箱的中心距会变化，此时必须调整安装附件达到安装中心距的要求。

We recommend to proceed as follows:
Unscrew the hexagon socket head screw of the two end caps without removing the caps in order to avoid oil leakage. Turn both caps towards the next higher number marked on the casing ensuring that they are both moved by the same amount. Check the backlash by turning the worm gear at least one complete revolution. If necessary, adjust further by another step. Evenly retighten the hexagon socket head screws alternately crosswise. An alteration of the gear centre distance in relation to the overall operating conditions of the unit must be made up for by adjusting the attachment of the gear unit.

更换润滑油
减速箱出厂前已经充满合成润滑油，并进行了运行测试。可以直接安装。运行期间建议每个月检查一次液位，运行的第一周建议多次检查。 正常负载情况下，单班工作，我们建议每4年更换一次润滑油； 如果2到3班工作建议每年更换一次。更换润滑油必须将原有废油排空，并用新油冲洗干净，再次填充新的推荐的润滑油脂至减速箱中部。（重要：合成润滑油不可与矿物润滑油混用） 请参考下表填充油量。

Lubricant change
In the factory the gear units are filled with a synthetic lubricant and test run. They are delivered ready for use. A check of the lubricant level once a month - during the first weeks of operation more frequently - is recommended. Under normal load conditions and with single shift working it is recommended that the lubricant be changed every four years; with 2 or 3 shift working the lubricant should be changed annually. To do this, the unit must be emptied, flushed through and then refilled to the oil-level hole approximately in the middle of the gear unit using one of the lubricants recommended below. (Important: Synthetic lubricants must not be mixed with mineral oils.) For oil quantities see table.

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	0,3 l
a = 63 mm	0,5 l
a = 80 mm	1,2 l
a = 100 mm	2,0 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 ISO 20653
(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).

< 1 arcmin


<2 arcmin

中心距 / Centre distance a_o = 50 mm

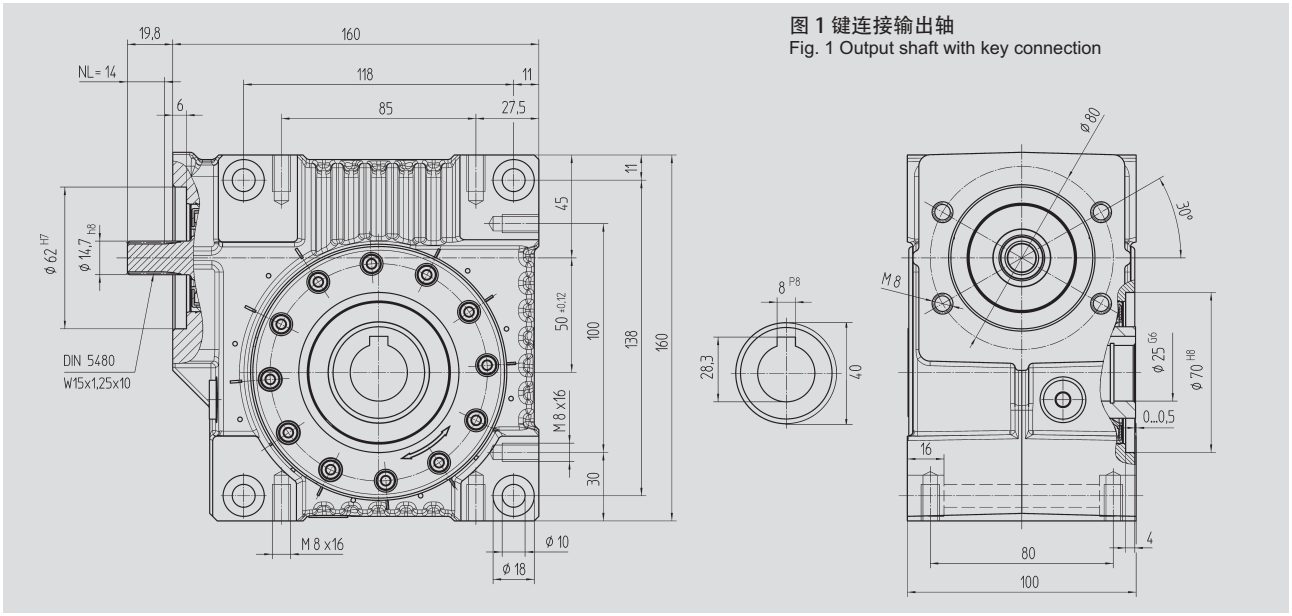


图 1 键连接输出轴
Fig. 1 Output shaft with key connection

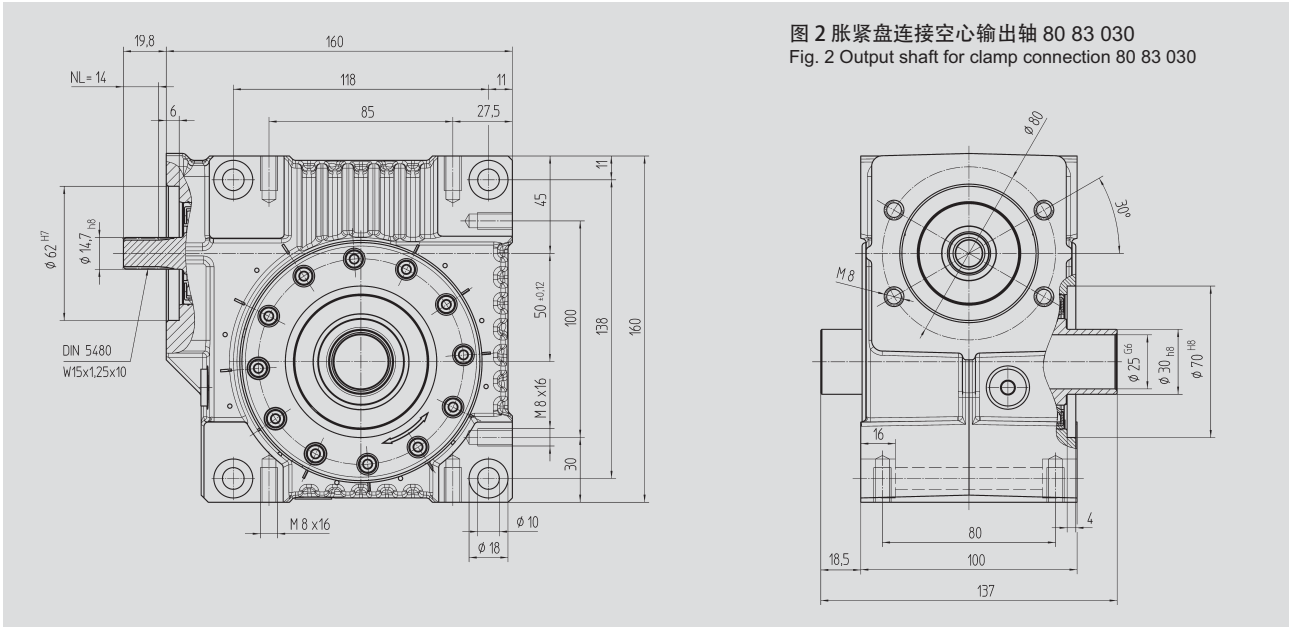


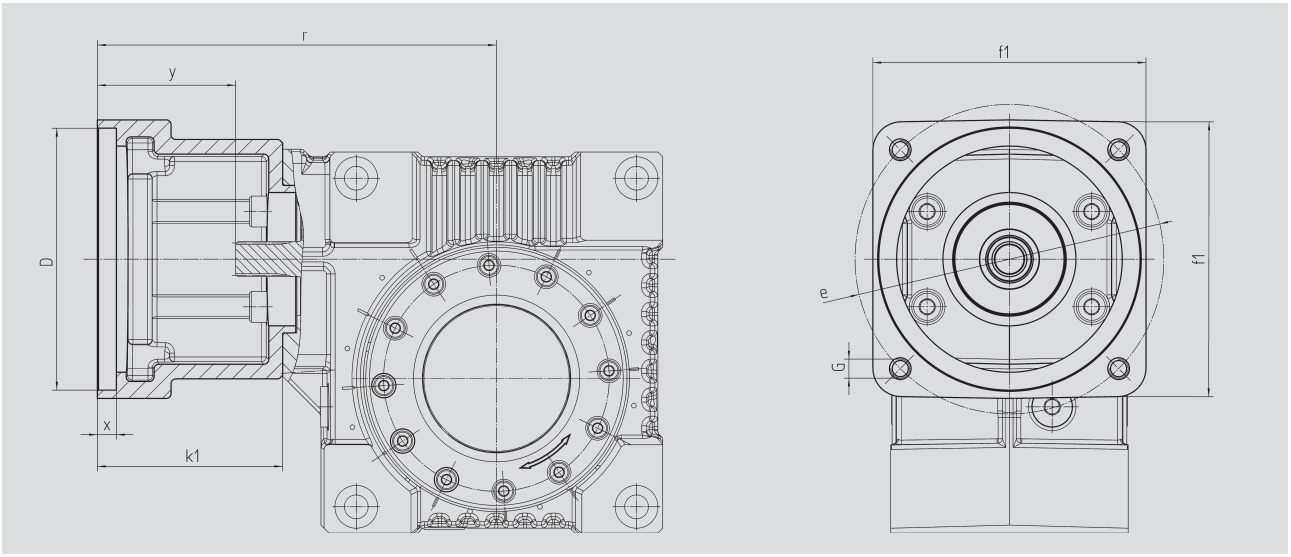
图 2 胀紧盘连接空心输出轴 80 83 030
Fig. 2 Output shaft for clamp connection 80 83 030

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 m^2
58 03 005	58 13 005	4,75	6,5	0,8280
58 03 007	58 13 007	6,75	6,5	0,4140
58 03 009	58 13 009	9,25	6,5	0,3490
58 03 015	58 13 015	14,50	6,5	0,2800
58 03 020	58 13 020	19,50	6,5	0,1960
58 03 029	58 13 029	29,00	6,5	0,2694
58 03 039	58 13 039	39,00	6,5	0,2310
58 03 050	58 13 050	50,00	6,5	0,2140

润滑油来自食品行业用油
订购代码. 58 03 1xx / 58 13 1xx

With suitable oil for food
Order code 58 03 1xx / 58 13 1xx

电机法兰 / Motor flange



中心距 / Centre distance a_o = 50 mm

订购代码. Order code	D^{G7}	k_1	r	x	y	f_1	e	G	
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	58	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	58	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	58	140	165	M10	1,20
65 59 406	110,0	78	168	11,0	58	140	165	M10	1,15
65 59 407	130,0	78	168	11,0	58	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箱代码 58 03 0xx / 58 13 0xx 及法兰代码 65 59 3xx 或. 4xx.
The order should contain gear box 58 03 0xx / 58 13 0xx and flange 65 59 3xx or 4xx.


<2 arcmin

中心距 / Centre distance a_o = 63 mm

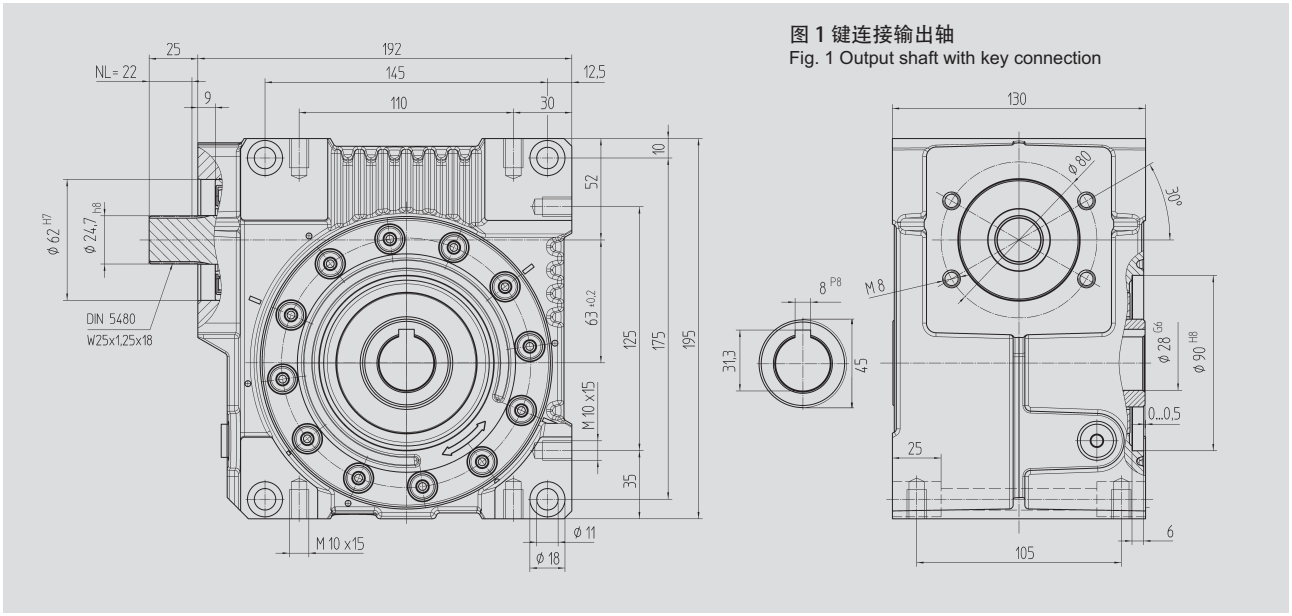


图 1 键连接输出轴
Fig. 1 Output shaft with key connection

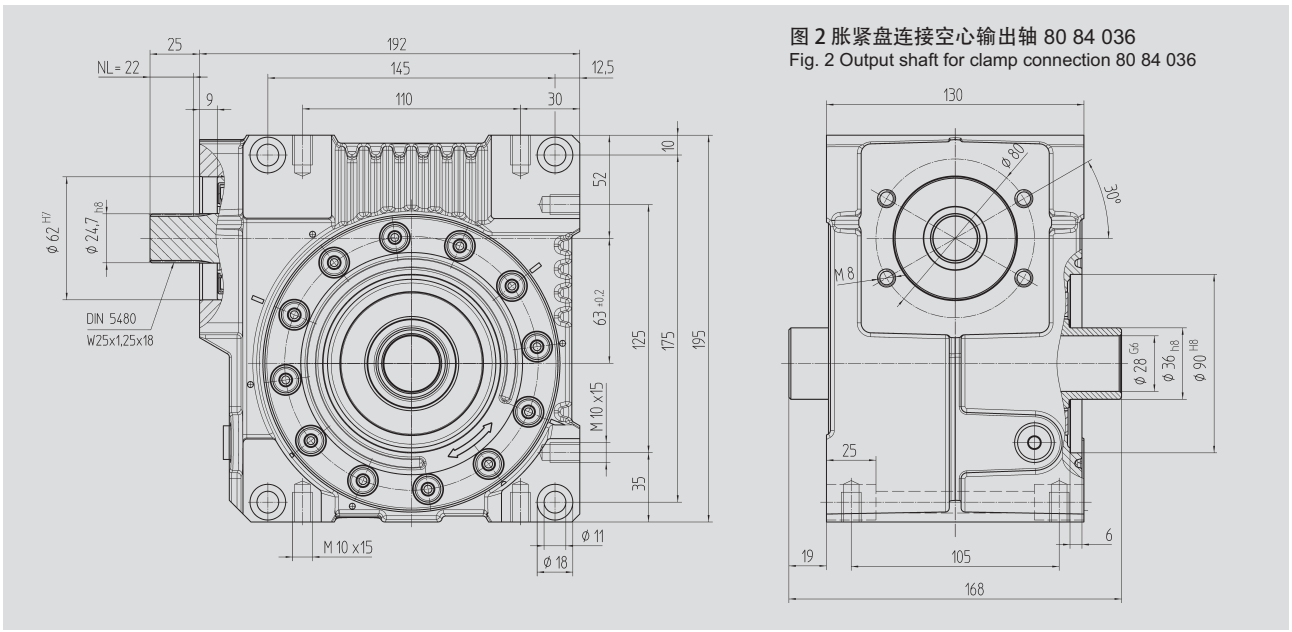


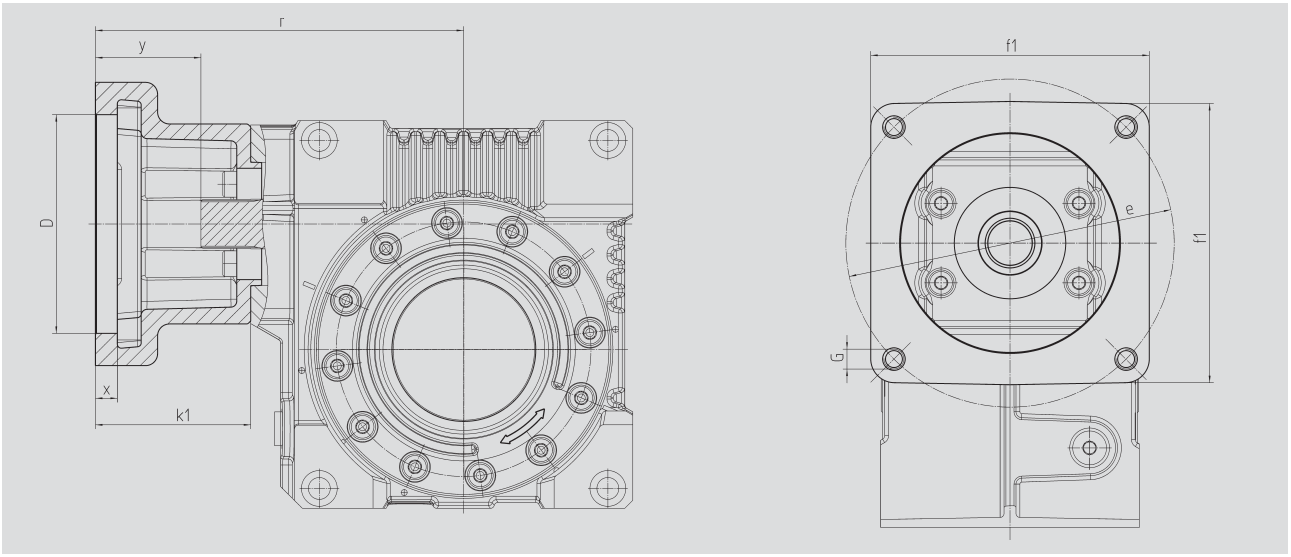
图 2 胀紧盘连接空心输出轴 80 84 036
Fig. 2 Output shaft for clamp connection 80 84 036

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 m^2
58 04 005	58 14 005	4,75	11,5	2,5350
58 04 007	58 14 007	6,75	11,5	1,3720
58 04 009	58 14 009	9,25	11,5	0,9825
58 04 015	58 14 015	14,50	11,5	0,9590
58 04 020	58 14 020	19,50	11,5	0,6940
58 04 029	58 14 029	29,00	11,5	0,9966
58 04 039	58 14 039	39,00	11,5	1,0100
58 04 052	58 14 052	52,00	11,5	0,5305

润滑油来自食品行业用油
订购代码. 58 04 1xx / 58 14 1xx

With suitable oil for food
Order code 58 04 1xx / 58 14 1xx

电机法兰 / Motor flange



中心距 / Centre distance a_o = 63 mm

订购代码. Order code	D^{G7}	k_1	r	x	y	f_1	e	G	
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	58	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	58	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	58	140	165	M10	1,20
65 59 406	110,0	78	168	11,0	58	140	165	M10	1,15
65 59 407	130,0	78	168	11,0	58	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箱代码 58 04 0xx / 58 14 0xx 及法兰代码 65 59 3xx 或. 4xx.
The order should contain gear box 58 04 0xx / 58 14 0xx and flange 65 59 3xx or 4xx.

中心距 / Centre distance a_o = 80 mm

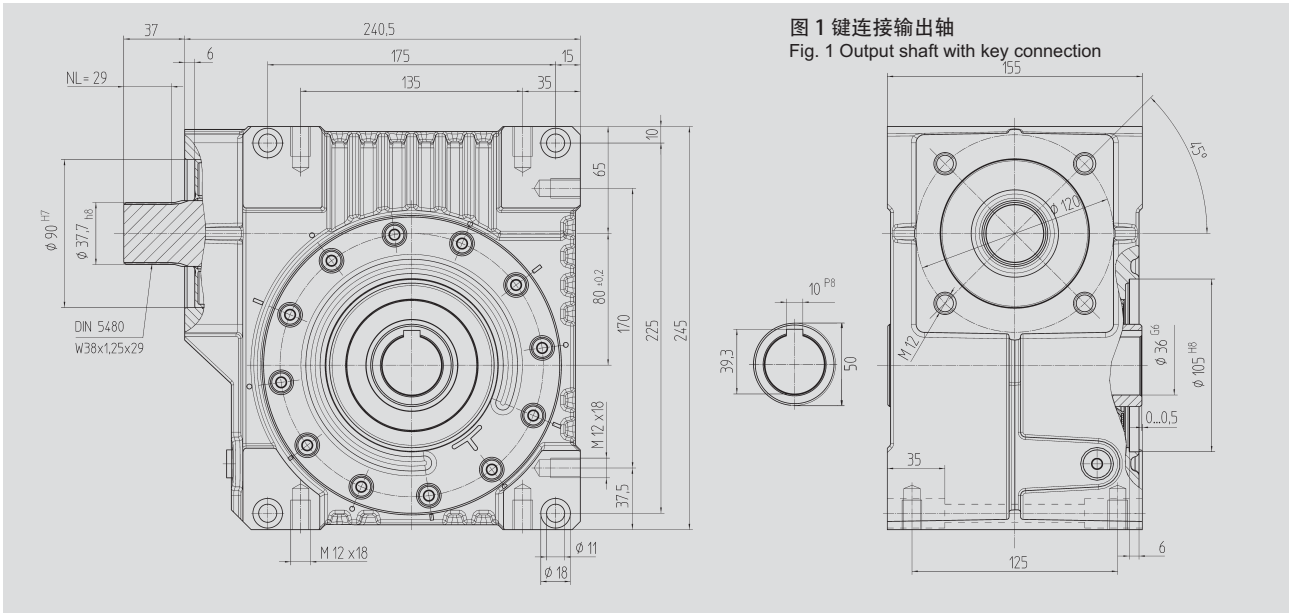


图 1 键连接输出轴
Fig. 1 Output shaft with key connection

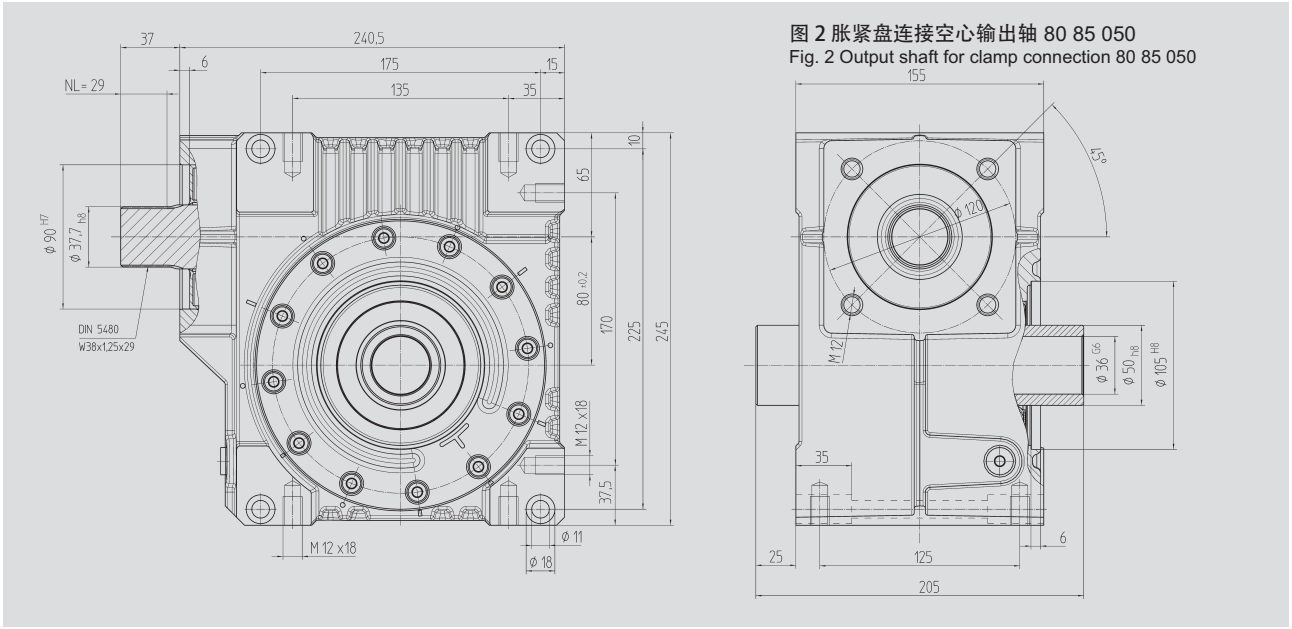


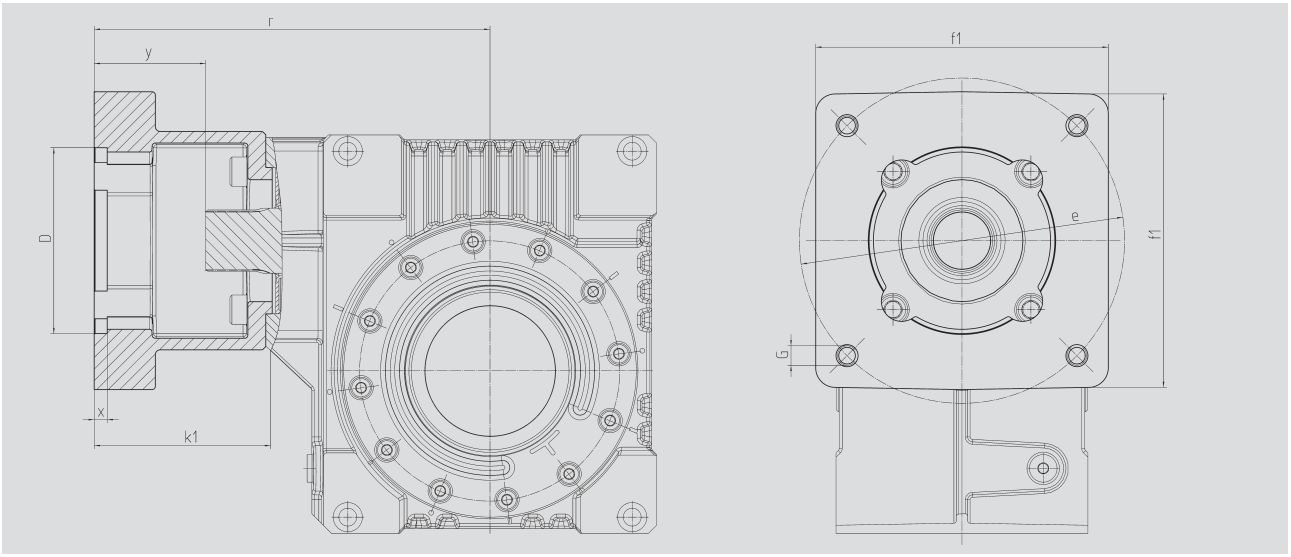
图 2 胀紧盘连接空心输出轴 80 85 050
Fig. 2 Output shaft for clamp connection 80 85 050

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 m^2
58 05 005	58 15 005	4,75	22	9,6180
58 05 007	58 15 007	6,75	22	6,0910
58 05 009	58 15 009	9,25	22	4,7650
58 05 015	58 15 015	14,50	22	5,3080
58 05 020	58 15 020	19,50	22	3,9350
58 05 029	58 15 029	29,00	22	4,0500
58 05 039	58 15 039	39,00	22	4,1800
58 05 052	58 15 052	52,00	22	3,7140

润滑油来自食品行业用油
订购代码. 58 05 1xx / 58 15 1xx

With suitable oil for food
Order code 58 05 1xx / 58 15 1xx

电机法兰 / Motor flange



中心距 / Centre distance a_o = 80 mm

订购代码. Order code	D^{G7}	k_1	r	x	y	f_1	e	G	
65 59 501	110,0	92,0	230,0	8,0	55,0	140	165	M10	2,00
65 59 502	130,0	92,0	230,0	8,0	55,0	140	165	M10	1,90
65 59 503	180,0	122,0	260,0	8,0	85,0	192	215	M12	3,40
65 59 504	180,0	127,0	265,0	8,0	90,0	192	215	M12	3,80
65 59 505	180,0	112,0	250,0	10,0	75,0	192	215	M12	2,70
65 59 506	130,0	112,0	250,0	10,0	75,0	192	215	M12	3,00
65 59 507	130,0	112,0	250,0	10,0	75,0	140	165	M10	2,50
65 59 508	110,0	90,0	228,0	8,0	53,0	140	145	M8	2,00
65 59 509	110,0	108,5	246,5	8,0	71,5	140	145	M8	2,50
65 59 510	114,3	129,5	267,5	8,0	92,5	180	200	M12	5,00
65 59 511	114,3	163,5	301,5	8,0	126,5	180	200	M12	4,20
65 59 512	114,3	105,5	243,5	8,0	68,5	180	200	M12	3,50
65 59 513	110,0	113,5	251,5	8,0	76,5	140	145	M8	2,70

订购代码需包括减速箱代码 58 05 0xx / 58 15 0xx 及法兰代码 65 59 5xx.
The order should contain gear box 58 05 0xx / 58 15 0xx and flange 65 59 5xx.


<2 arcmin

中心距 / Centre distance a_o = 100 mm

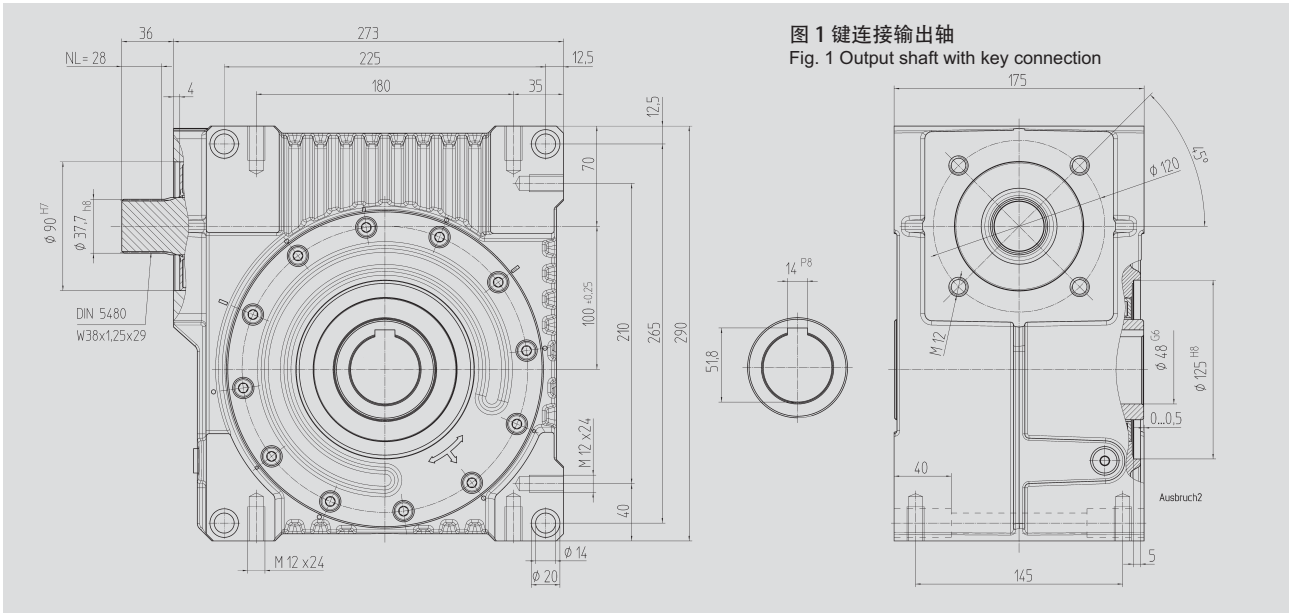


图 1 键连接输出轴
Fig. 1 Output shaft with key connection

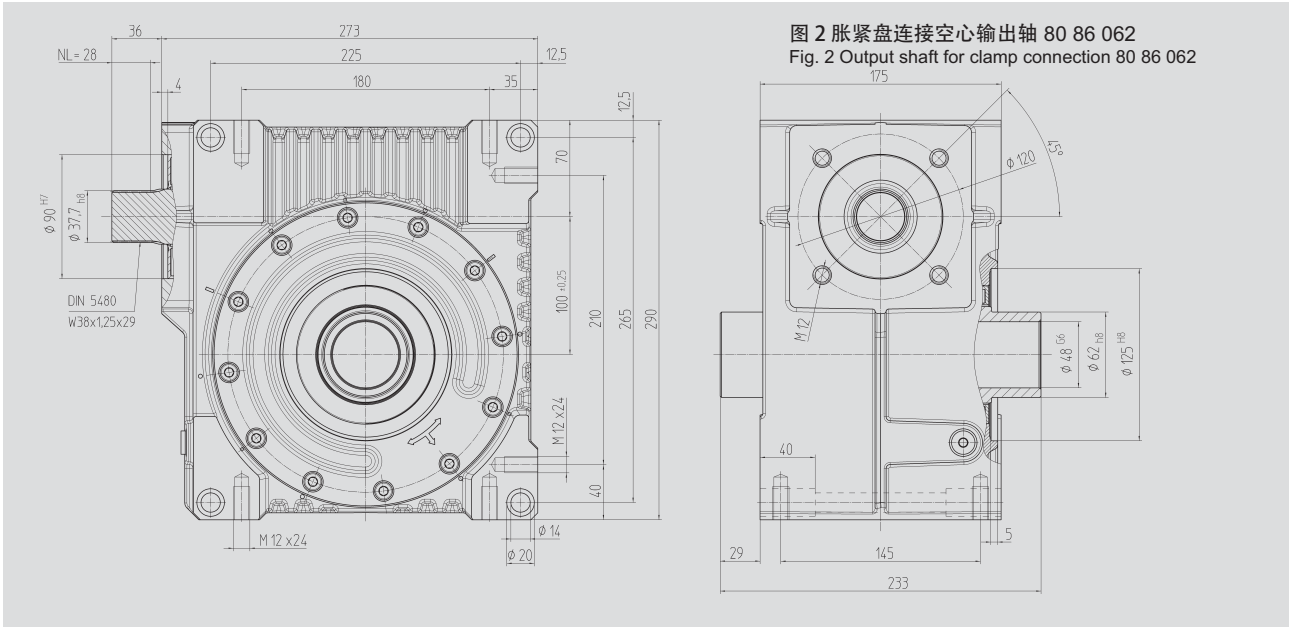


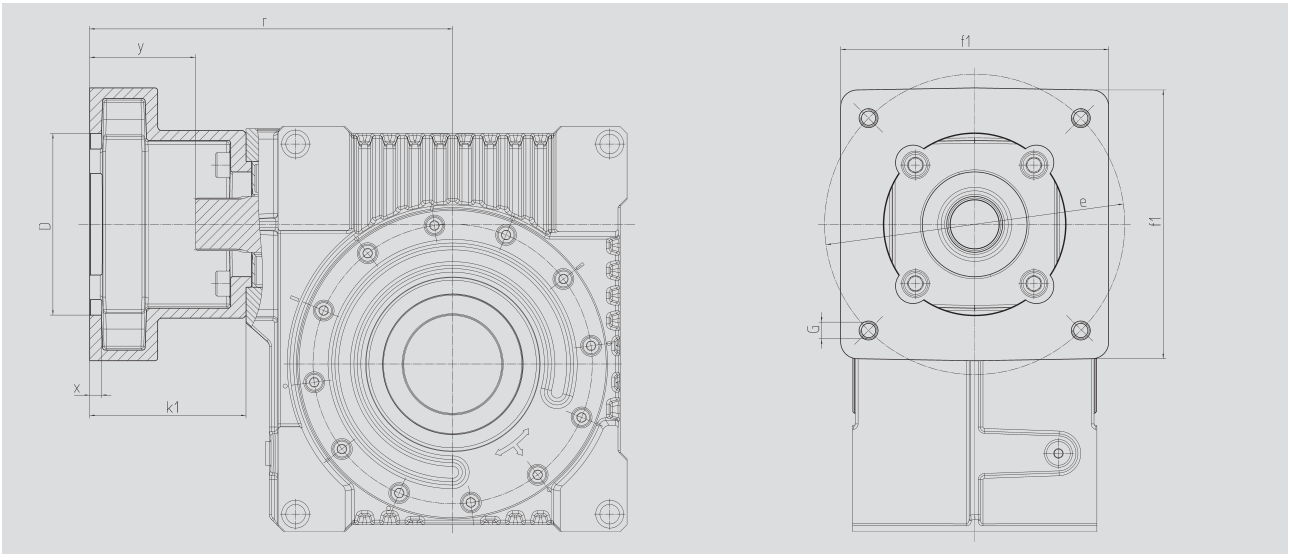
图 2 胀紧盘连接空心输出轴 80 86 062
Fig. 2 Output shaft for clamp connection 80 86 062

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
58 06 005	58 16 005	4,75	37	22,9320
58 06 007	58 16 007	6,75	37	12,8835
58 06 009	58 16 009	9,25	37	8,0975
58 06 015	58 16 015	14,50	37	7,2190
58 06 020	58 16 020	19,50	37	5,4030
58 06 029	58 16 029	29,00	37	4,7207
58 06 039	58 16 039	39,00	37	8,4300
58 06 052	58 16 052	52,00	37	9,7400

润滑油来自食品行业用油
订购代码. 58 06 1xx / 58 16 1xx

With suitable oil for food
Order code 58 06 1xx / 58 16 1xx

电机法兰 / Motor flange



中心距 / Centre distance a_o = 100 mm

订购代码. Order code	D^{G7}	k_1	r	x	y	f_1	e	G	
65 59 501	110,0	92,0	230,0	8,0	55,0	140	165	M10	2,00
65 59 502	130,0	92,0	230,0	8,0	55,0	140	165	M10	1,90
65 59 503	180,0	122,0	260,0	8,0	85,0	192	215	M12	3,40
65 59 504	180,0	127,0	265,0	8,0	90,0	192	215	M12	3,80
65 59 505	180,0	112,0	250,0	10,0	75,0	192	215	M12	2,70
65 59 506	130,0	112,0	250,0	10,0	75,0	192	215	M12	3,00
65 59 507	130,0	112,0	250,0	10,0	75,0	140	165	M10	2,50
65 59 508	110,0	90,0	228,0	8,0	53,0	140	145	M8	2,00
65 59 509	110,0	108,5	246,5	8,0	71,5	140	145	M8	2,50
65 59 510	114,3	129,5	267,5	8,0	92,5	180	200	M12	5,00
65 59 511	114,3	163,5	301,5	8,0	126,5	180	200	M12	4,20
65 59 512	114,3	105,5	243,5	8,0	68,5	180	200	M12	3,50
65 59 513	110,0	113,5	251,5	8,0	76,5	140	145	M8	2,70

订购代码需包括减速箱代码 58 06 0xx / 58 16 0xx 及法兰代码 65 59 5xx.
The order should contain gear box 58 06 0xx / 58 16 0xx and flange 65 59 5xx.0,

中心距 / Centre distance a_o = 125 mm


<2 arcmin

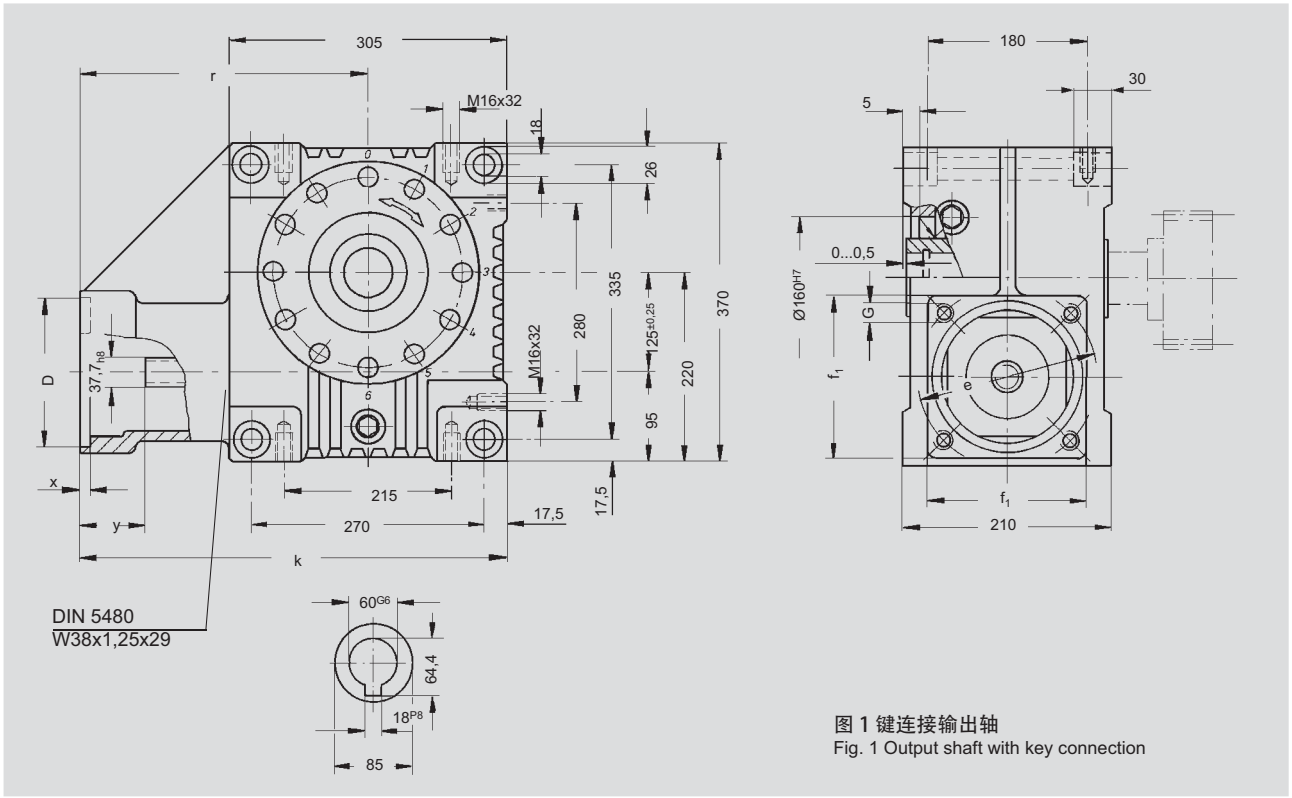


图 1 键连接输出轴
Fig. 1 Output shaft with key connection

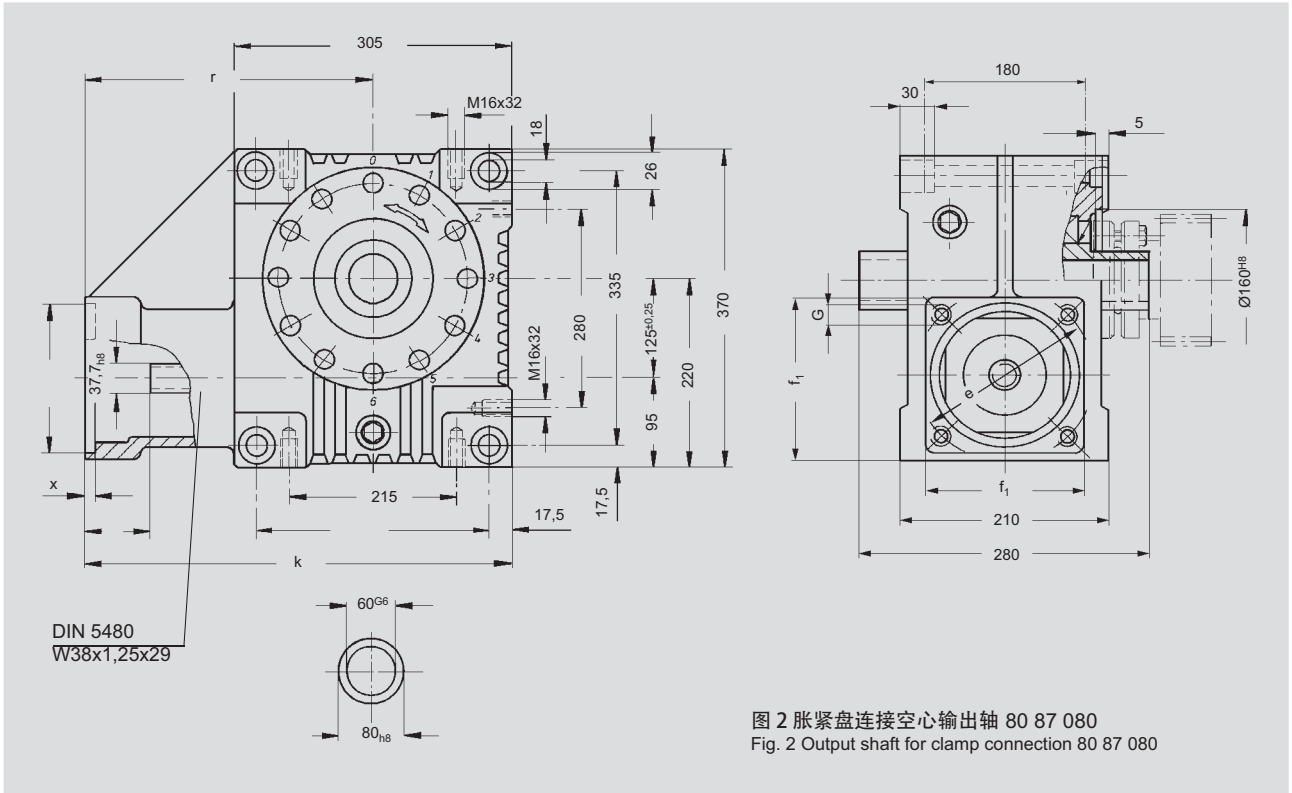


图 2 胀紧盘连接空心输出轴 80 87 080
Fig. 2 Output shaft for clamp connection 80 87 080


<2 arcmin

中心距 / Centre distance a_o = 125 mm

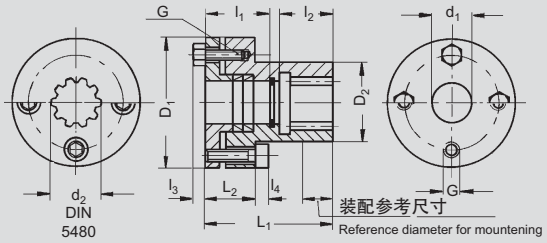
订购代码. / Order code 图 /Fig.1	图/Fig. 2	减速比 i Ratio i	D^{G7}	k	r	x	y	f_1	e	G	kg	J_{red} 10^{-4} kg m²
58 47 007	58 87 007	6,75										35,9192
58 47 009	58 87 009	9,25										23,3256
58 47 015	58 87 015	14,50	180	468	315,5	6	75	200	215	M12	68	25,5742
58 47 020	58 87 020	19,50										16,4748
58 47 029	58 87 029	29,00										23,4384
58 47 039	58 87 039	39,00										15,3588
58 47 052	58 87 052	52,00										11,2943
58 47 107	58 87 107	6,75										35,9192
58 47 109	58 87 109	9,25										23,3256
58 47 115	58 87 115	14,50	180	484	331,5	6	91	200	215	M12	68	25,5742
58 47 120	58 87 120	19,50										16,4748
58 47 129	58 87 129	29,00										23,4384
58 47 139	58 87 139	39,00										15,3588
58 47 152	58 87 152	52,00										11,2943

按照您的需求，可提供其他中心距和减速比的产品 / other centre distances and ratios on request.

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
Special couplings for motor/gear units, rigid model, nitrided, preassembled for motor shafts without key

减速箱输入轴侧
采用符合DIN5480标准的
内花键结构

Bore on gear unit side
low-clearance tooth-hub
profile corresponding to
DIN 5480 for push-fitting



电机输出轴侧
采用胀紧盘结构

Bore on motor side with locking
elements as clamp connection

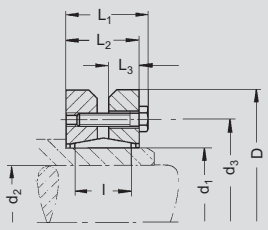
订购代码. / Order code 联轴器 Coupling	1)	d_1	d_2	D_1	D_2	l_1	l_2	l_3	l_4	L_1	L_2	G	J_{red} 10^{-4} kg m²	kg
65 43 110	9 71 80 010	10	15x1,25x10	48	29	22	17	-	5	44	18	4xM5	0,835	0,40
65 43 111	9 71 80 011	11	15x1,25x10	48	29	20,5	17	-	5	64	18	4xM5	0,976	0,50
65 43 114	9 71 80 014	14	15x1,25x10	48	29	24	19	-	5	50	18	4xM5	0,835	0,45
65 43 116	9 71 80 016	16	15x1,25x10	48	29	27	16	-	5	50	18	4xM5	0,824	0,45
65 43 119	9 71 80 019	19	15x1,25x10	48	29	24	16	-	5	40	18	4xM5	0,799	0,40
65 43 914	9 71 80 014	14	15x1,25x10	48	29	26	19	-	5	64	18	4xM5	0,985	0,50
65 43 916	9 71 80 016	16	15x1,25x10	48	29	27	15	-	5	64,3	18,3	4xM5	0,975	0,40
65 43 919	9 71 80 019	19	15x1,25x10	48	29	23	17	-	5	55	18	4xM5	0,853	0,45
65 43 924	9 71 80 024	24	15x1,25x10	50	29	34	22	-	6	56	40	4xM6	1,041	0,52
65 44 024	9 71 80 024	24	25x1,25x18	50	29	41,5	24	-	6	66,5	59,5	4xM6	2,628	0,75
65 44 114	9 71 80 014	14	25x1,25x18	55	32	24	23,5	-	6	64	21	4xM6	1,645	0,50
65 44 116	9 71 80 016	16	25x1,25x18	55	32	34	23,5	-	6	64	21	4xM6	1,622	0,50
65 44 119	9 71 80 019	19	25x1,25x18	55	32	33	26,5	-	6	63	21	4xM6	1,598	0,50
65 44 120	9 71 80 020	20	25x1,25x18	55	32	33,2	26,5	-	6	63	21	4xM6	1,550	0,50
65 44 219	9 71 80 019	19	25x1,25x18	55	32	27	26,5	-	6	74	21	4xM6	1,703	0,50
65 44 919	9 71 80 019	19	25x1,25x18	55	32	31	26,5	-	6	78	21	4xM6	1,757	0,55
65 44 928	9 71 80 028	28	25x1,25x18	70	48	48	26	-	6	83	25	5xM6	5,998	0,85
65 44 932	9 71 80 032	32	25x1,25x18	70	48	43	23	-	6	78	25	5xM6	5,921	0,80
65 44 935	9 71 81 035	35	25x1,25x18	70	48	52	26	-	6	78	25	5xM6	6,155	0,95
65 46 024	9 71 80 024	24	38x1,25x29	55	-	38,5	31	4	6	72,5	-	5xM6	4,452	0,90
65 46 834	9 71 81 035	1 3/8"	38x1,25x29	80	58	63	34	-	6	100	40	6xM6	16,320	1,95
65 46 928	9 71 80 028	28	38x1,25x29	70	48	47	34	-	6	90	25	5xM6	5,882	0,90
65 46 932	9 71 80 032	32	38x1,25x29	70	48	43	34	-	6	86	25	5xM6	5,784	0,85
65 46 935	9 71 81 035	35	38x1,25x29	80	58	65	34	-	6	100	40	6xM6	16,550	1,95
65 46 938	9 71 80 038	38	38x1,25x29	80	58	62	34	-	6	100	40	6xM6	16,240	1,88
65 47 948	9 71 80 048	48	38x1,25x29	95	66	58	31	-	8	92	42	6xM8	41,860	3,10

1) 胀紧环备件 / Spare part clamping element

98 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 98 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	l	G	J 10^{-4} kg m²	kg
80 83 030	50	400	30	25	44	60	25,0	21,50	9	16	7 x M5	1,756	0,3
80 84 036	50	540	36	28	52	72	27,5	23,50	10	18	5 x M6	4,029	0,4
80 85 050	63	1180	50	36	70	90	31,5	27,50	12	22	9 x M6	11,322	0,8
80 86 062	80	2300	62	48	86	110	34,5	30,50	13	23	10 x M6	27,137	1,3
80 87 080	100	3240	80	60	100	145	38,0	32,50	14	25	7 x M8	88,870	1,9

表中所列数据 基于磨损和最大侧向负载 伺服电机操作 12000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.

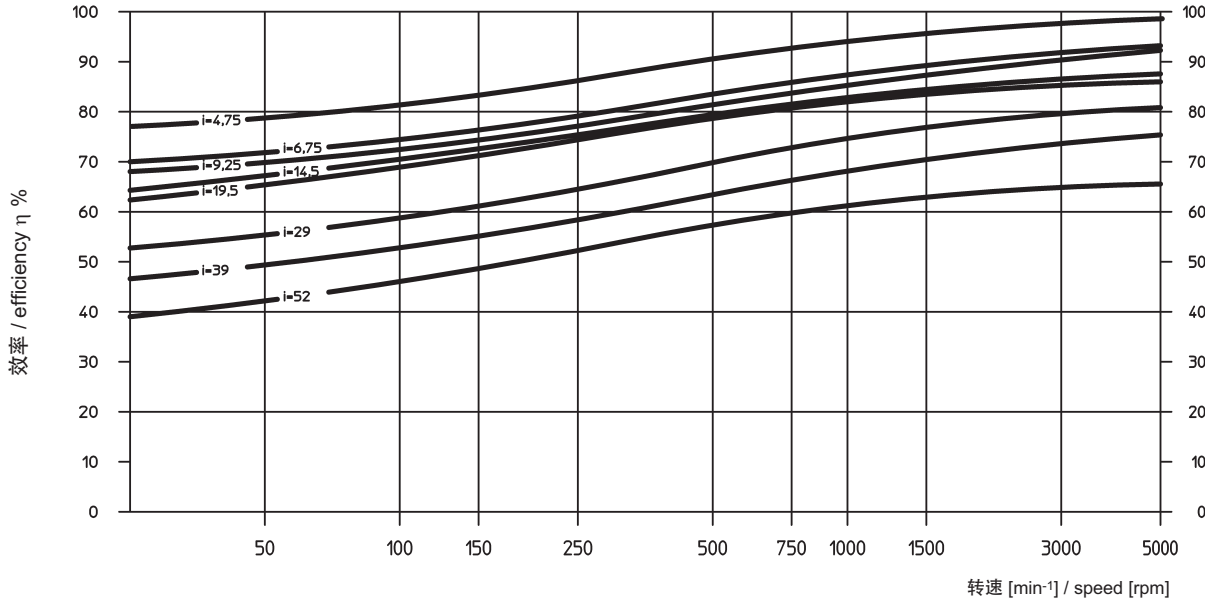
订购代码. Order code		a_0	i	$T_{2\,max.}$	驱动速度 / Driving speed n_1 in min^{-1} 500		750		1000		1500		3000		4000		5000		η
					P_1	T_2	P_1	T_2	P_1	T_2	P_1	T_2	P_1	T_2	P_1	T_2	P_1	T_2	bei
		(mm)			(kw)	(Nm)	(kw)	(Nm)	(kw)	(Nm)	(kw)	(Nm)	(kw)	(Nm)	(kw)	(Nm)	(kw)	(Nm)	1500
58 03 003	58 10 003	50	3,00*																
58 03 005	58 13 005		4,75	550	0,81	65	1,20	65	1,70	70	2,52	70	5,00	70	6,20	65	7,30	61	0,93
58 03 007	58 13 007		6,75	400	0,50	56	0,77	59	1,10	63	1,75	69	3,50	69	4,40	65	5,20	61	0,90
58 03 009	58 13 009		9,25	275	0,32	48	0,50	51	0,70	54	1,10	58	2,55	70	3,55	70	4,10	65	0,88
58 03 015	58 13 015		14,50	350	0,26	57	0,40	60	0,57	65	0,89	70	1,82	75	2,50	75	3,15	75	0,84
58 03 020	58 13 020		19,50	250	0,16	45	0,25	48	0,34	50	0,55	55	1,20	65	1,65	65	2,10	65	0,83
58 03 029	58 13 029		29,00	300	0,14	48	0,20	52	0,29	55	0,44	60	0,93	70	1,23	70	1,41	65	0,76
58 03 039	58 13 039		39,00	200	0,12	53	0,17	56	0,24	60	0,37	65	0,77	75	1,00	75	1,25	75	0,70
58 03 050	58 13 050		50,00	150	0,08	42	0,12	44	0,16	47	0,25	50	0,51	60	0,72	60	0,90	60	0,63
58 04 003	58 14 003	63	3,00*																
58 04 005	58 14 005		4,75	1000	2,10	170	3,30	180	4,40	180	6,11	170	10,30	145	13,20	135			0,93
58 04 007	58 14 007		6,75	750	1,50	170	2,35	180	3,10	180	4,25	170	7,20	145	9,30	135			0,90
58 04 009	58 14 009		9,25	500	0,74	115	1,18	125	1,63	130	2,52	135	4,93	135	6,35	126			0,88
58 04 015	58 14 015		14,50	600	0,74	165	1,19	180	1,54	180	2,45	180	4,18	170	5,25	160			0,84
58 04 020	58 14 020		19,50	500	0,39	115	0,61	125	0,85	130	1,28	135	2,98	165	3,83	155			0,83
58 04 029	58 14 029		29,00	650	0,48	175	0,75	190	1,04	205	1,55	220	2,57	195	3,22	185			0,76
58 04 039	58 14 039		39,00	450	0,30	140	0,44	150	0,61	160	0,97	175	1,88	190	2,55	190			0,70
58 04 052	58 14 052		52,00	300	0,16	95	0,25	105	0,35	115	0,55	125	1,20	150	1,63	160			0,63
58 05 003	58 15 003	80	3,00*																
58 05 005	58 15 005		4,75	2000	5,20	420	6,90	380	8,53	360	11,60	330	19,50	280					0,93
58 05 007	58 15 007		6,75	1400	3,60	420	4,86	380	6,14	360	8,44	330	14,01	280					0,90
58 05 009	58 15 009		9,25	1100	2,38	370	3,53	370	4,53	360	6,22	330	10,30	280					0,88
58 05 015	58 15 015		14,50	1300	1,98	450	2,90	450	3,57	420	4,60	370	7,00	295					0,84
58 05 020	58 15 020		19,50	1000	1,24	370	2,00	400	2,60	400	3,60	380	5,73	320					0,83
58 05 029	58 15 029		29,00	1200	1,38	520	2,04	550	2,52	530	3,32	490	5,42	420					0,76
58 05 039	58 15 039		39,00	850	0,87	430	1,35	460	1,85	490	2,51	480	4,03	410					0,70
58 05 052	58 15 052		52,00	600	0,38	240	0,57	260	0,80	275	1,22	300	2,46	330					0,63
58 06 005	58 16 005	100	4,75	3300	10,77	880	14,22	800	17,77	750	24,10	685	40,37	580					0,93
58 06 007	58 16 007		6,75	2300	7,23	830	9,60	750	12,10	720	16,70	660	29,00	580					0,90
58 06 009	58 16 009		9,25	1900	5,34	830	7,10	750	9,10	720	12,30	660	21,20	580					0,88
58 06 015	58 16 015		14,50	2050	4,20	930	5,80	880	6,80	810	9,00	720	14,30	620					0,84
58 06 020	58 16 020		19,50	1800	3,02	900	4,27	870	5,20	810	6,67	720	11,10	620					0,83
58 06 029	58 16 029		29,00	2300	2,96	1150	4,02	1070	4,67	1010	5,97	850	10,31	800					0,76
58 06 039	58 16 039		39,00	1650	2,07	1080	2,88	1030	3,63	1000	4,53	900	7,48	780					0,70
58 06 052	58 16 052		52,00	1100	1,16	760	1,82	820	2,41	850	3,08	785	5,00	680					0,63
58 47 _07	58 87 _07	125	6,75	6450	15,06	1650	19,83	1500	24,68	1400	33,99	1300	54,94	1150 [1)]					0,90
58 47 _09	58 87 _09		9,25	4400	10,78	1600	14,31	1450	17,38	1350	23,90	1200	39,62	1050					0,88
58 47 _15	58 87 _15		14,50	5850	8,22	1800	10,90	1650	15,23	1750	19,12	1500	32,37	1300					0,84
58 47 _20	58 87 _20		19,50	3900	6,02	1750	8,16	1600	9,70	1500	13,42	1400	22,48	1200					0,83
58 47 _29	58 87 _29		29,00	5700	5,93	2200	8,04	2050	9,38	1950	12,83	1800	20,90	1550					0,76
58 47 _39	58 87 _39		39,00	3800	4,34	2100	5,86	1950	6,80	1850	9,13	1700	15,29	1500					0,70
58 47 _52	58 87 _52		52,00	2500	2,79	1800	3,78	1700	4,67	1600	6,04	1500	9,94	1300					0,63

* 按需供货 /On request

功率和输出扭矩对应的转速
1) 最高输入转速 2800 min^{-1}

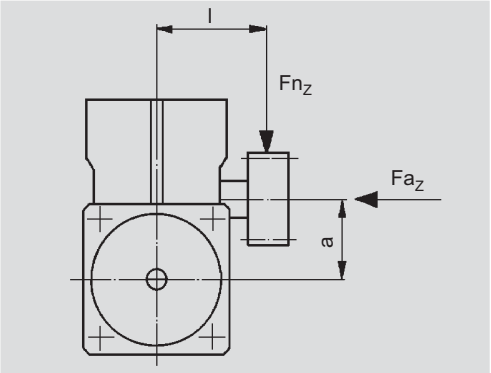
Power and driving torque corresponding to
1) max. input speed of 2800 min^{-1}

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		80		100		125	
减速箱中心到齿轮中心的距离 Dimensions centre casing/ centre teeth l (mm)	90	140	110	160	125	175	140	190	175	220
最大附加载荷 Max. additional load										
径向 radial Fn$_z$ [N]	3600	2300	5000	3500	8400	6000	10000	7500	21000	16000
轴向 axial Fa$_z$ [N]	1800	1800	2500	2500	4000	4000	5000	5000	10000	10000
仅是轴向载荷 Fa$_z$ [N] (Fn = 0) Only axial load	3000		5000		12000		15000		25000	

简述

亚特兰 HP 高性能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。

HP 高性能减速箱的基本特征：
- 低背隙（背隙< 2'）,可调
- 高达70％负载能力
- 轻合金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。齿形进行了优化，以便能够简单地通过调整偏心法兰改变中心距的方法调整背隙。

使用经过磨削右旋的蜗杆，特制的铜合金蜗轮，并浸入特种润滑油中润滑，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。

减速箱和输出轴之间的联接要求绝对可靠，无扭转变形，对于间歇运行这点很重要。该些列减速箱使用新的胀紧盘联接结构,保证以上需求。

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。联轴器与电机轴之间通过胀紧结构也是同样的目的。

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。所有驱动轴和我们的减速箱一致，可以用键形式和胀紧盘形式连接。

齿条是伺服驱动系统中理想的标准部件。齿条产品系列从相对简单的软材质齿条到淬火磨削的齿条等，有直齿和斜齿系统，所有表面磨削齿条，高精度类型等。

对于减速箱安全停止的最大传动扭矩（参考GB-13）和胀紧盘（GH-1）必须核对完毕。

Short description

ATLANTA HP-high-performance 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 high-performance gear units:

- low-clearance gearing (back lash < 2'), adjustable
- up to 70 % higher loading values
- casing of light metal for optimal heat dissipation
- robust bevel roller bearings for the output drive hollow shaft, permitting greater additional forces.

Centre distances, gear ratios and tooth systems have been chosen in accordance with DIN 3975/76. The tooth shape was optimised so as to permit the adjustment of the clearance simply by changing the centre distance by means of eccentric flanges.

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 fully machined casing with its many fixing bores and tapped holes permits mounting in any position.

The demand for an absolutely positive, and largely torsion-free connection between gear unit and output shaft, as it is especially important for intermittent operation, is fulfilled by our new gear units using shrink-plate coupling with the output drive shaft.

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. The use of annular spring elements firmly fixed to the motor shaft serves the same purpose.

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 gearwheel program which can be combined and used together with suitable special output drive shafts. The whole range of drive shafts, like our gear units, is of course available for key and shrink-fit connection.

Toothed racks ideally supplement our programme of standard elements for servo-assisted drive units. Our off-the shelf programme ranges from relatively simple, soft racks through hardened racks available with straight tooth system or with helical tooth system for smooth running, to the fully ground, low-tolerance types.

For safety-stop is the maximum transmittable torque of the gear unit (see page GB-13) and shrink disc (see page GH-1) has to be checked. The output keyway has to be calculated separately.

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GB-14），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。联轴器中的卡簧能够卡住电机轴，使联轴器不能轴向移动。加入第二个卡簧也是有可能的。
推荐安装顺序：
– 把联轴器放到电机输出轴上，向内推动，直至停止移动。（轴肩/卡簧）
– 轻轻锁紧胀紧螺栓，并检查联轴器的转动情况。
– 使用扭力扳手交叉锁紧胀紧螺栓，达到表中所列响应扭矩，确保联轴器与接触面间隙均匀。
– 建议最后做径向跳动检测。

安装指导请参考GI-1~GI-4页。

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。

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 GB-14) 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 will be delivered pre-assembled. Before attaching it to the motor shaft all contact surfaces must be cleaned and protected by applying a thin oil film. A retaining ring inserted in the hub of the coupling locks it on the motor shaft preventing axial movement of the coupling. It may be necessary to insert this ring in the next recess.
Recommended sequence:
– Slide the coupling onto the motor shaft until it clicks home (shoulder/retaining ring).
– Tighten the clamping screws slightly and check the coupling for true running.
– Tighten screws alternately crosswise using torque figures as shown in the operation and maintenance instructions ensuring that the gap between coupling and contact face remains even.
– A final check of true running is recommended at the applicable reference diameter!

A mounting guide can be found on page GI-1 to GI-4

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.

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。

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.


<2 arcmin

维护

背隙的调整
减速箱在出厂前已经调整到最小背隙。经过长时间的运行，由于磨损，背隙可能会增加（参考值>15'）.背隙可以通过调整装在减速箱两侧的偏心法兰盘再次调整（支撑蜗轮）。

我推荐按照如下步骤执行：
拧下两侧端盖上的内六角螺栓，为了避免漏油，不要取下两侧端盖。同时旋动两侧端盖，使箭头指向减速箱壳体上更高的数字。至少检测蜗轮旋转一周的背隙值，来评定调整背隙的结果。如果必要，再次调整。交叉锁紧螺栓达。通过以上调整，减速箱的中心距会变化，此时必须调整安装附件达到安装中心距的要求。

Maintenance

Adjustment of the circumferential backlash
The units are set up in the factory with a minimal amount of backlash. After prolonged usage, backlash may increase due to wear (reference value >15'). It can be adjusted by moving the eccentrically supported output shaft (= worm wheel).

We recommend to proceed as follows:
Unscrew the hexagon socket head screw of the two end caps without removing the caps in order to avoid oil leakage. Turn both caps towards the next higher number marked on the casing ensuring that they are both moved by the same amount. Check the backlash by turning the worm gear at least one complete revolution. If necessary, adjust further by another step. Evenly retighten the hexagon socket head screws alternately crosswise. An alteration of the gear centre distance in relation to the overall operating conditions of the unit must be made up for by adjusting the attachment of the gear unit.

更换润滑油
减速箱出厂前已经充满合成润滑油，并进行了运行测试。可以直接安装。运行期间建议每个月检查一次液位，运行的第一周建议多次检查。正常负载情况下，单班工作，我们建议每4年更换一次润滑油；如果2到3班工作建议每年更换一次。更换润滑油必须将原有废油排空，并用新油冲洗干净，再次填充新的推荐的润滑油脂至减速箱中部。
（重要：合成润滑油不可与矿物润滑油混用） 请参考下表填充油量。

Lubricant change
In the factory the gear units are filled with a synthetic lubricant and test run. They are delivered ready for use. A check of the lubricant level once a month - during the first weeks of operation more frequently - is recommended. Under normal load conditions and with single shift working it is recommended that the lubricant be changed every four years; with 2 or 3 shift working the lubricant should be changed annually. To do this, the unit must be emptied, flushed through and then refilled to the oil-level hole approximately in the middle of the gear unit using one of the lubricants recommended below. (Important: Synthetic lubricants must not be mixed with mineral oils.) For oil quantities see table.

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	0,3 l
a = 63 mm	0,5 l
a = 80 mm	1,2 l
a = 100 mm	2,0 l
a = 125 mm	4,0 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 ISO 20653
(腐蚀性已被单独验证)

Degree of protection

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

<2 arcmin

中心距 / Centre distance a_o = 32 mm

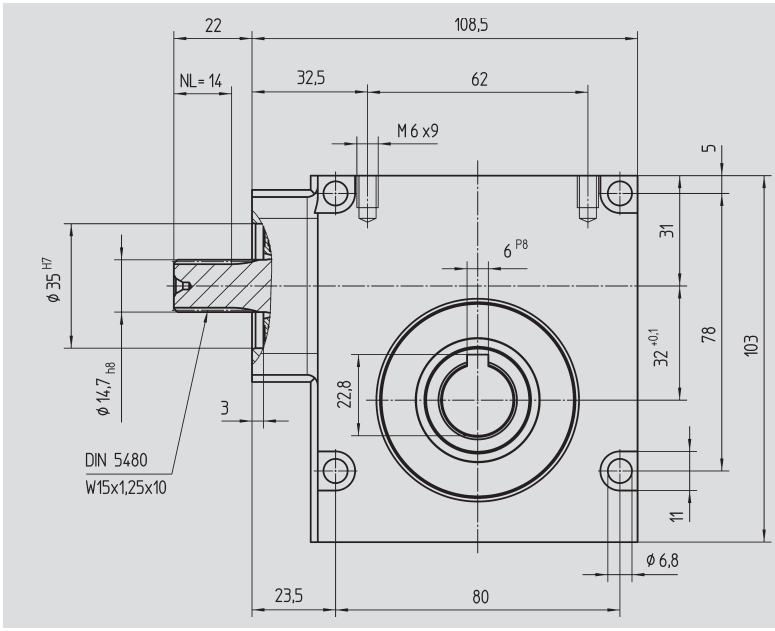
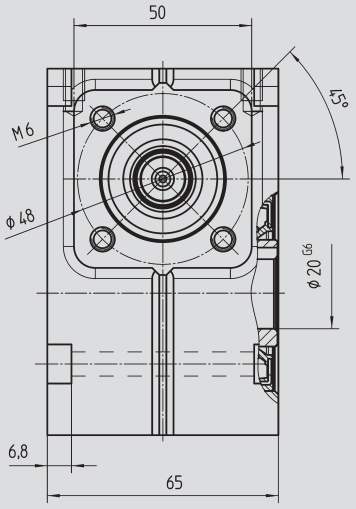


图1 键连接输出轴
Fig. 1 Output shaft with key connection



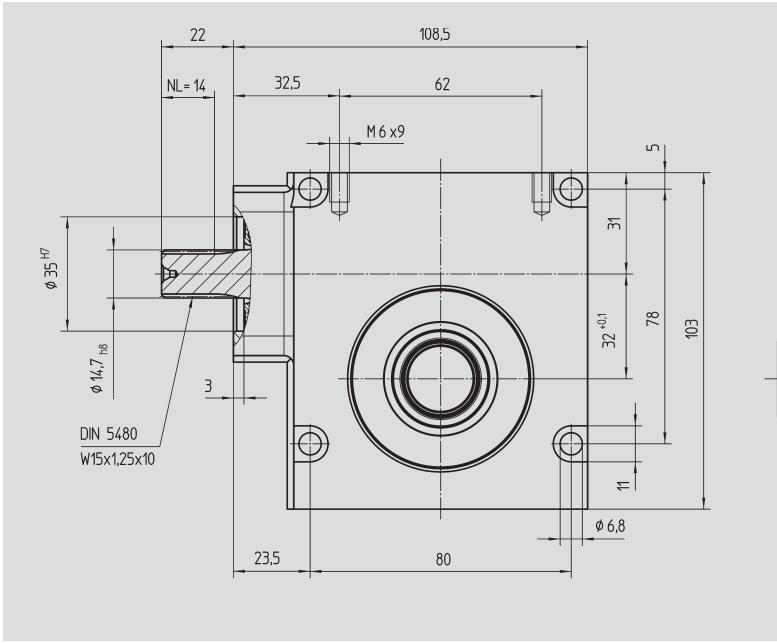
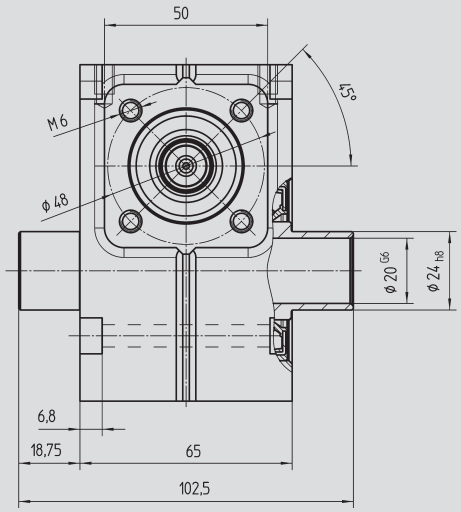


图2 胀紧盘型连接空心输出轴 80 81 024
Fig. 2 Output shaft for clamp connection 80 81 024

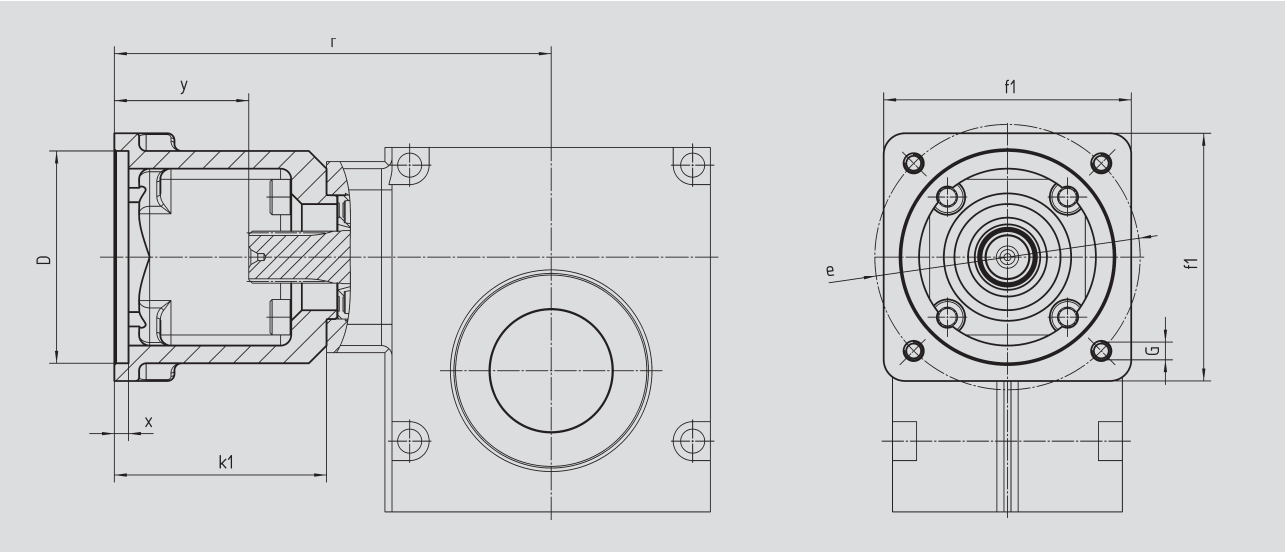


订购代码 / Order code 图 1 / Fig. 1	图 2 / Fig. 2	减速比 i Ratio i	kg	J_{red} 10^{-4} kg m²
59 01 005	59 11 005	4,75	2	0,8280
59 01 007	59 11 007	6,75	2	0,4140
59 01 009	59 11 009	9,25	2	0,3490
59 01 015	59 11 015	14,50	2	0,2800
59 01 020	59 11 020	19,50	2	0,1960
59 01 029	59 11 029	29,00	2	0,2694
59 01 019	59 11 019	39,00	2	0,2310
59 01 050	59 11 050	50,00	2	0,2140

润滑油来自食品行业用油
订购代码. 59 01 1xx / 59 11 1xx

With suitable oil for food
Order code 59 01 1xx / 59 11 1xx

电机法兰 / Motor flange



中心距 / Centre distance a_o = 32 mm

订购代码 Order code	D^{G7}	k_1	r	x	y	f_1	e	G	kg
65 59 101	40,0	56,5	120,0	2,5	34,5	60	63	M5	0,80
65 59 102	50,0	64,0	127,5	4,0	42,0	60	70	M5	0,80
65 59 103	60,0	60,0	123,5	3,5	38,0	70	75	M5	0,80
65 59 104	80,0	64,0	127,5	4,5	42,0	85	100	M6	0,80
65 59 105	60,0	64,0	127,5	4,5	42,0	85	90	M5	0,80
65 59 107	40,0	56,5	120,0	2,5	34,5	60	63	M4	0,80

订购代码需包括减速箱代码 59 01 0xx / 59 11 0xx 及法兰代码 65 59 1xx.
The order should contain gear box 59 01 0xx / 59 11 0xx and flange 65 59 1xx.

中心距 / Centre distance a_o = 50 mm

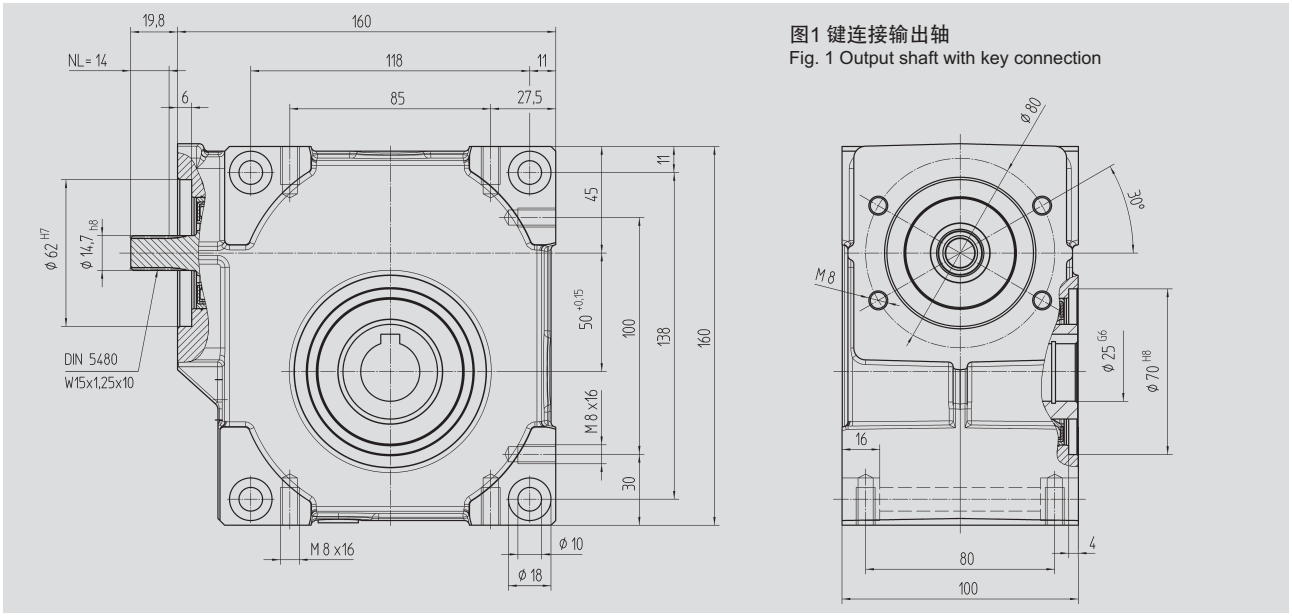


图1 键连接输出轴
Fig. 1 Output shaft with key connection

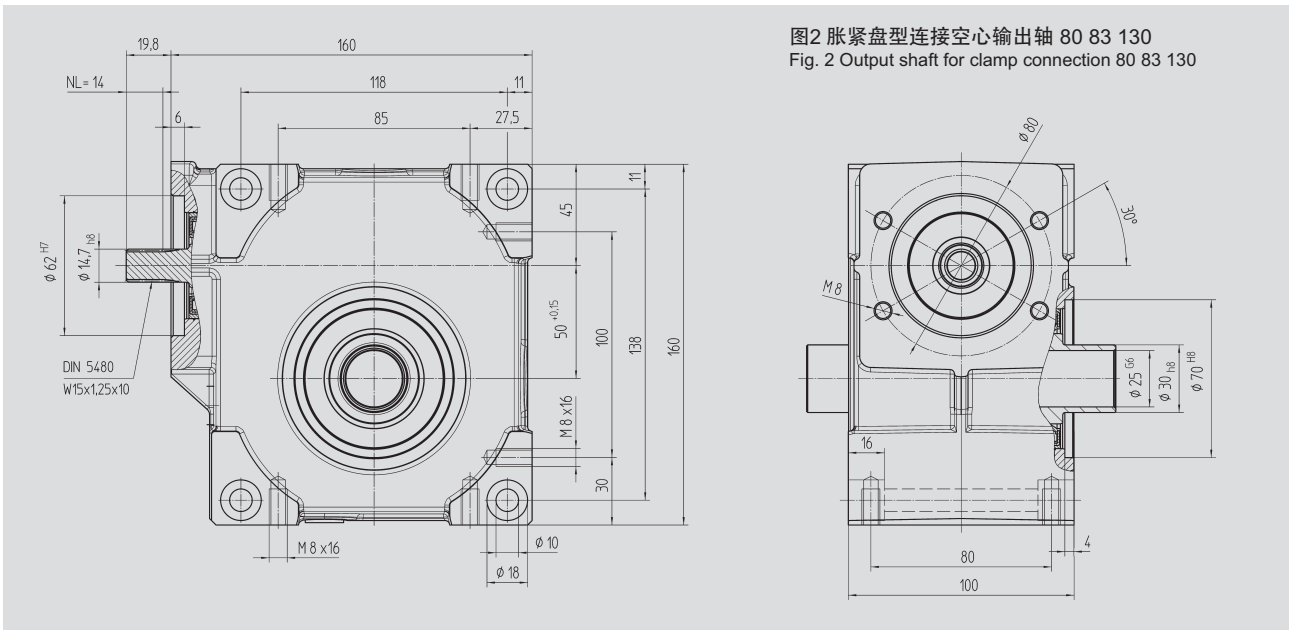


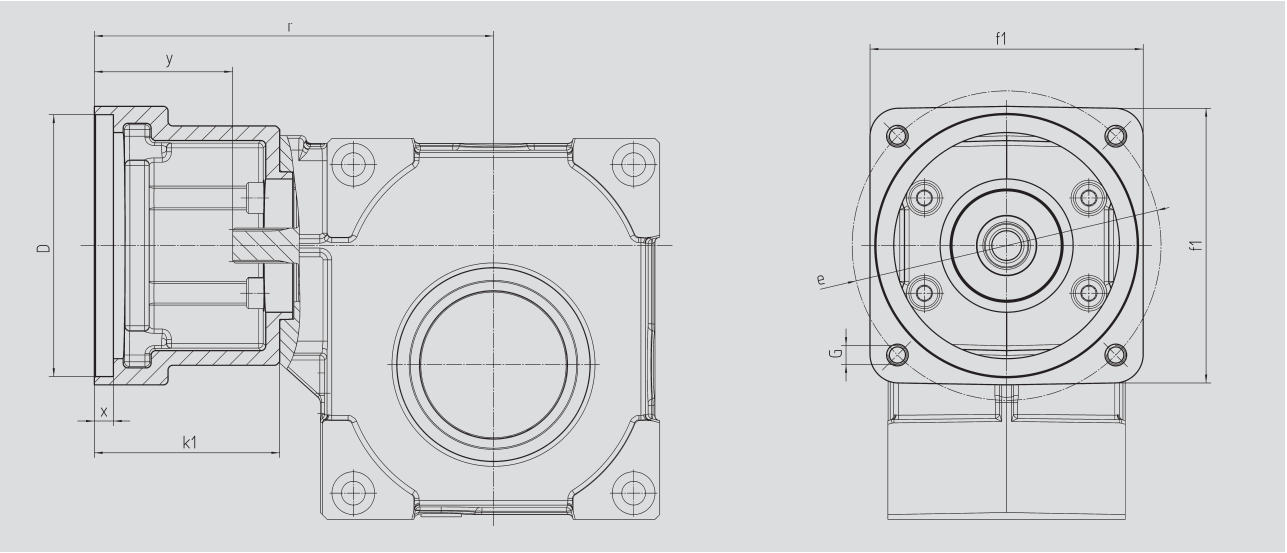
图2 胀紧盘型连接空心输出轴 80 83 130
Fig. 2 Output shaft for clamp connection 80 83 130

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 m^2
59 03 005	59 13 005	4,75	6,5	0,8280
59 03 007	59 13 007	6,75	6,5	0,4140
59 03 009	59 13 009	9,25	6,5	0,3490
59 03 015	59 13 015	14,50	6,5	0,2800
59 03 020	59 13 020	19,50	6,5	0,1960
59 03 029	59 13 029	29,00	6,5	0,2694
59 03 039	59 13 039	39,00	6,5	0,2310
59 03 050	59 13 050	50,00	6,5	0,2140

润滑油来自食品行业用油
订购代码. 59 03 1xx / 59 13 1xx

With suitable oil for food
Order code 59 03 1xx / 59 13 1xx

电机法兰 / Motor flange



中心距 / Centre distance a_o = 50 mm

订购代码 Order code	D^{G7}	k_1	r	x	y	f_1	e	G	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箱代码 59 03 0xx / 59 13 0xx 及法兰代码 65 59 3xx bzw. 4xx.
The order should contain gear box 59 03 0xx / 59 13 0xx and flange 65 59 3xx or 4xx.

中心距 / Centre distance a_o = 63 mm

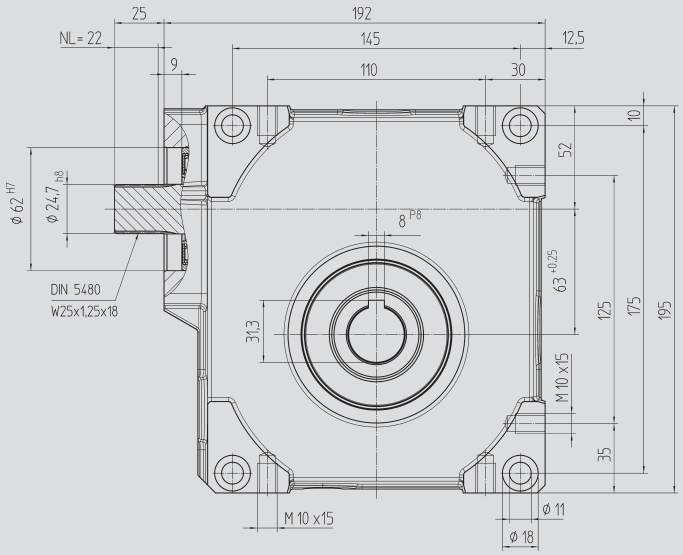
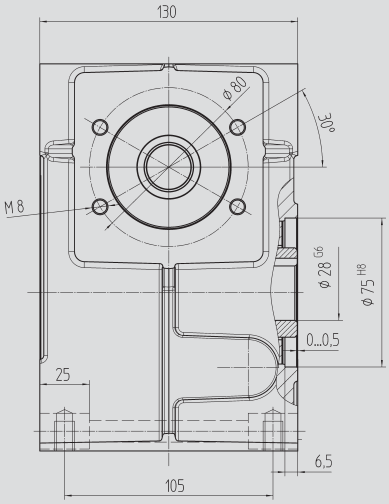


图1 键连接输出轴
Fig. 1 Output shaft with key connection



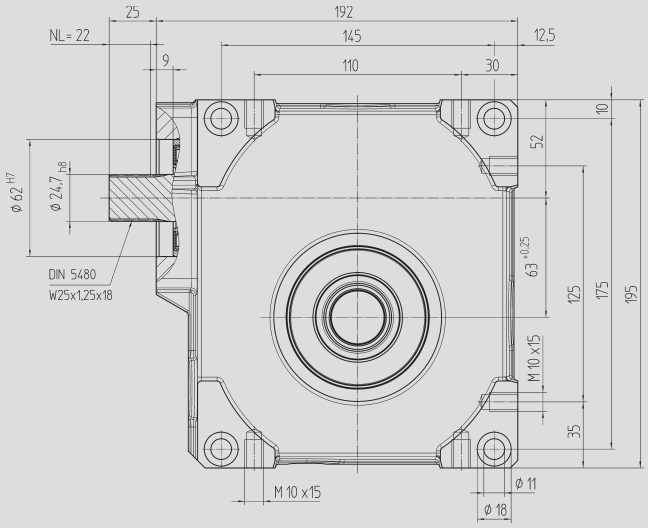
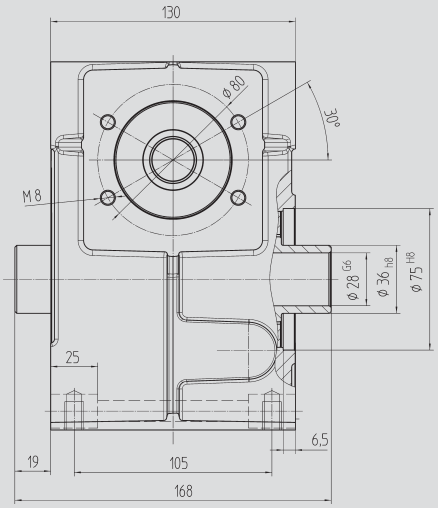


图2 胀紧盘型连接空心输出轴 80 84 136
Fig. 2 Output shaft for clamp connection 80 84 136

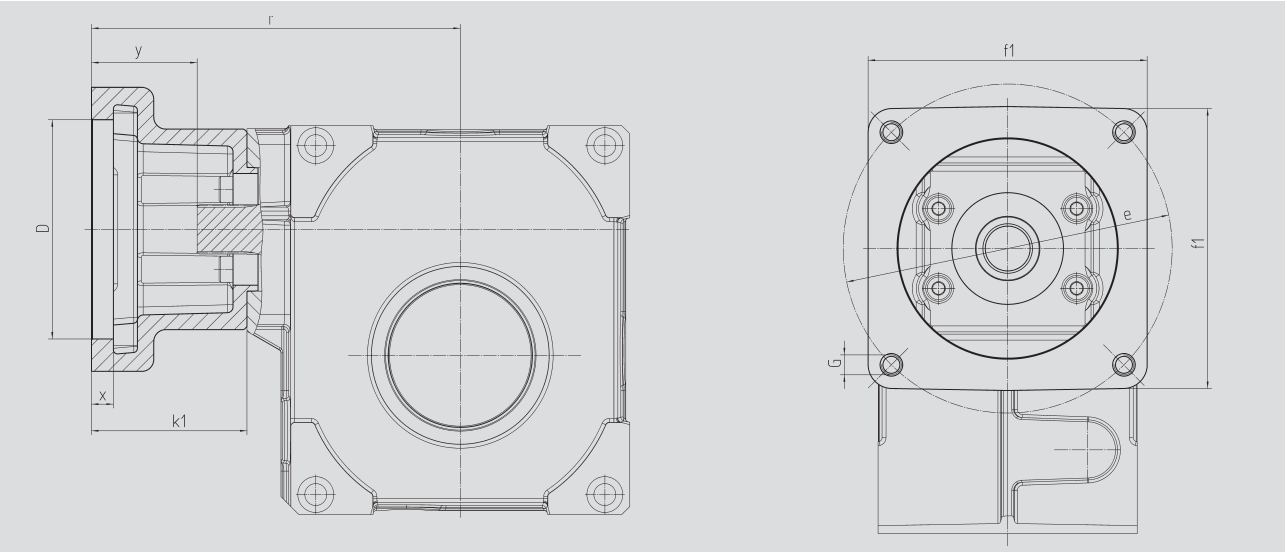


订购代码 / Order code 图 1 / Fig. 1	图 2 / Fig. 2	减速比 i Ratio i	kg	J_{red} 10^{-4} kg m^2
59 04 005	59 14 005	4,75	11,5	2,5350
59 04 007	59 14 007	6,75	11,5	1,3720
59 04 009	59 14 009	9,25	11,5	0,9825
59 04 015	59 14 015	14,50	11,5	0,9590
59 04 020	59 14 020	19,50	11,5	0,6940
59 04 029	59 14 029	29,00	11,5	0,9966
59 04 039	59 14 039	39,00	11,5	1,0100
59 04 052	59 14 052	52,00	11,5	0,5305

润滑油来自食品行业用油
订购代码. 59 04 1xx / 59 14 1xx

With suitable oil for food
Order code 59 04 1xx / 59 14 1xx

电机法兰 / Motor flange



中心距 / Centre distance a_o = 63 mm

订购代码 Order code	D^{G7}	k_1	r	x	y	f_1	e	G	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箱代码 59 04 0xx / 59 14 0xx 及法兰代码 65 59 3xx bzw. 4xx.
The order should contain gear box 59 04 0xx / 59 14 0xx and flange 65 59 3xx or 4xx.

中心距 / Centre distance a_o = 80 mm

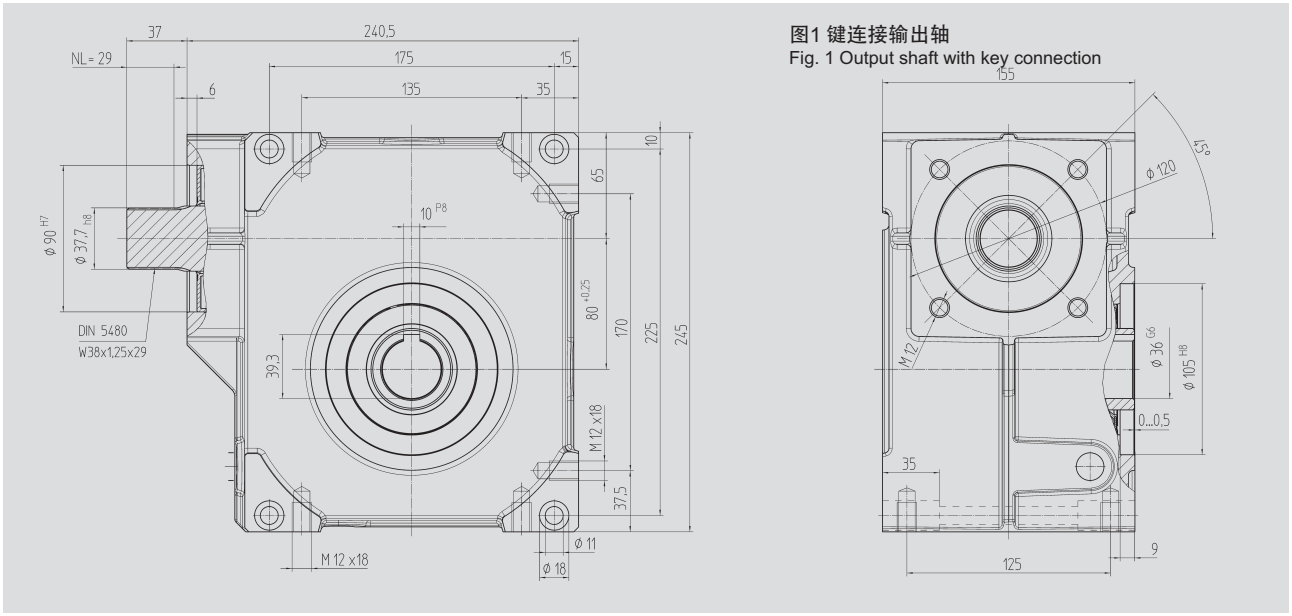


图1 键连接输出轴
Fig. 1 Output shaft with key connection

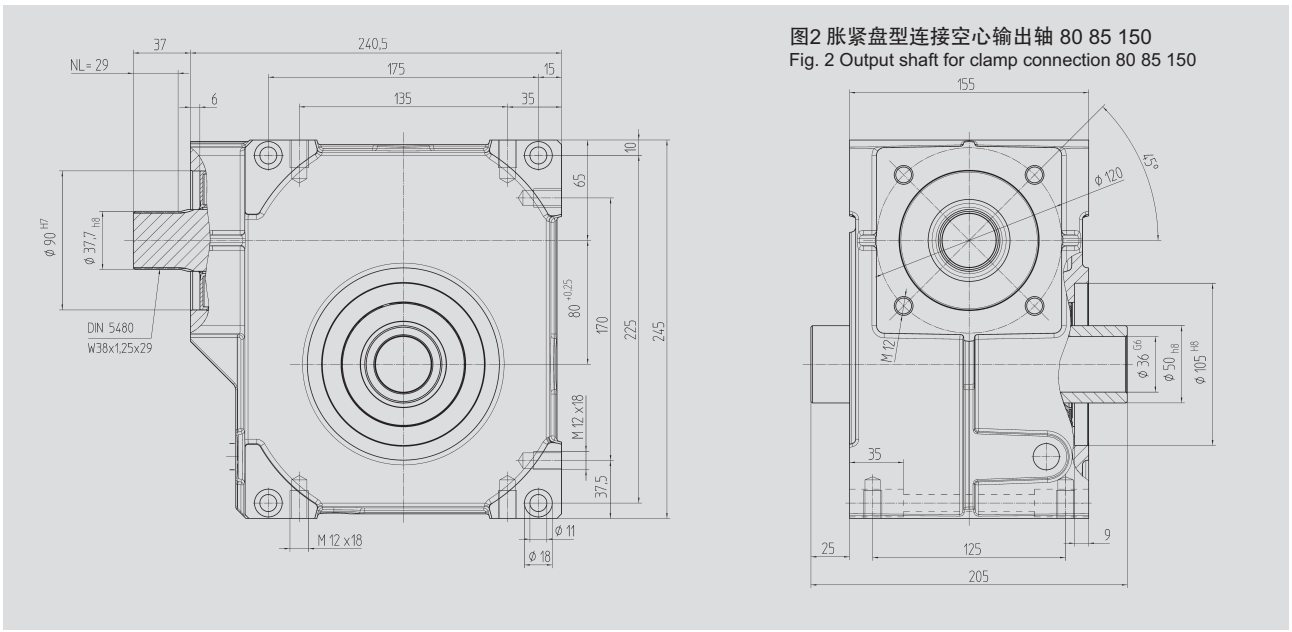


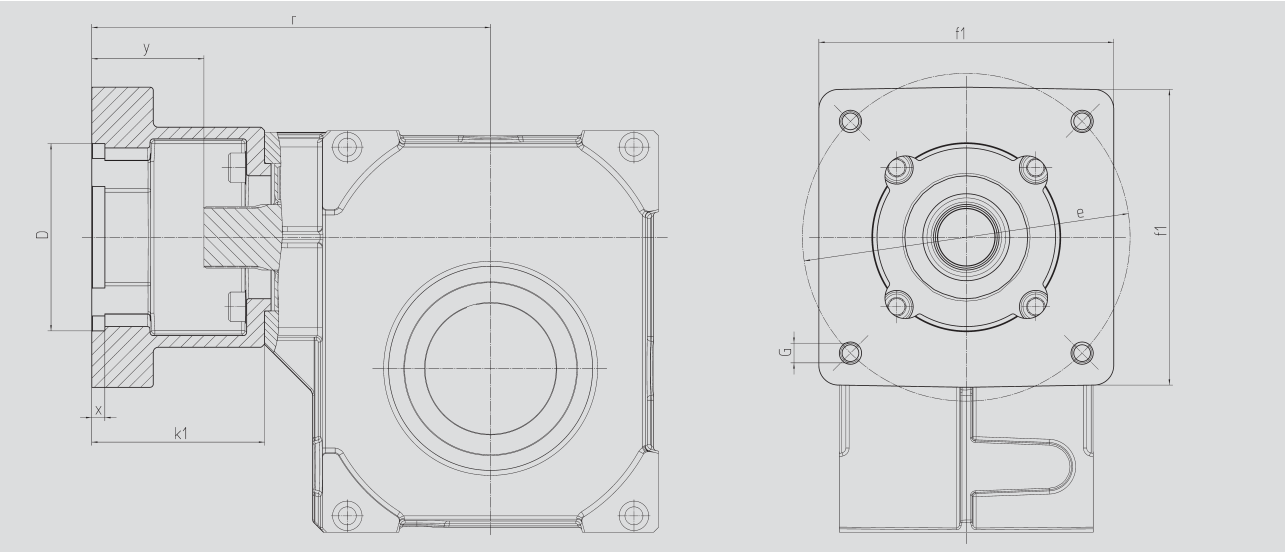
图2 胀紧盘型连接空心输出轴 80 85 150
Fig. 2 Output shaft for clamp connection 80 85 150

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 m^2
59 05 005	59 15 005	4,75	22	9,6180
59 05 007	59 15 007	6,75	22	6,0910
59 05 009	59 15 009	9,25	22	4,7650
59 05 015	59 15 015	14,50	22	5,3080
59 05 020	59 15 020	19,50	22	3,9350
59 05 029	59 15 029	29,00	22	4,0500
59 05 039	59 15 039	39,00	22	4,1800
59 05 052	59 15 052	52,00	22	3,7140

润滑油来自食品行业用油
订购代码. 59 05 1xx / 59 15 1xx

With suitable oil for food
Order code 59 05 1xx / 59 15 1xx

电机法兰 / Motor flange



中心距 / Centre distance a_o = 80 mm

订购代码 Order code	D^{G7}	k_1	r	x	y	f_1	e	G	kg
65 59 501	110,0	92,0	230,0	8,0	55,0	140	165	M10	2,00
65 59 502	130,0	92,0	230,0	8,0	55,0	140	165	M10	1,90
65 59 503	180,0	122,0	260,0	8,0	85,0	192	215	M12	3,40
65 59 504	180,0	127,0	265,0	8,0	90,0	192	215	M12	3,80
65 59 505	180,0	112,0	250,0	10,0	75,0	192	215	M12	2,70
65 59 506	130,0	112,0	250,0	10,0	75,0	192	215	M12	3,00
65 59 507	130,0	112,0	250,0	10,0	75,0	140	165	M10	2,50
65 59 508	110,0	90,0	228,0	8,0	53,0	140	145	M8	2,00
65 59 509	110,0	108,5	246,5	8,0	71,5	140	145	M8	2,50
65 59 510	114,3	129,5	267,5	8,0	92,5	180	200	M12	5,00
65 59 511	114,3	163,5	301,5	8,0	126,5	180	200	M12	4,20
65 59 512	114,3	105,5	243,5	8,0	68,5	180	200	M12	3,50
65 59 513	110,0	113,5	251,5	8,0	76,5	140	145	M8	2,70

订购代码需包括减速箱代码 59 05 0xx / 59 15 0xx 及法兰代码 65 59 5xx.
The order should contain gear box 59 05 0xx / 59 15 0xx and flange 65 59 5xx.

中心距 / Centre distance a_o = 100 mm

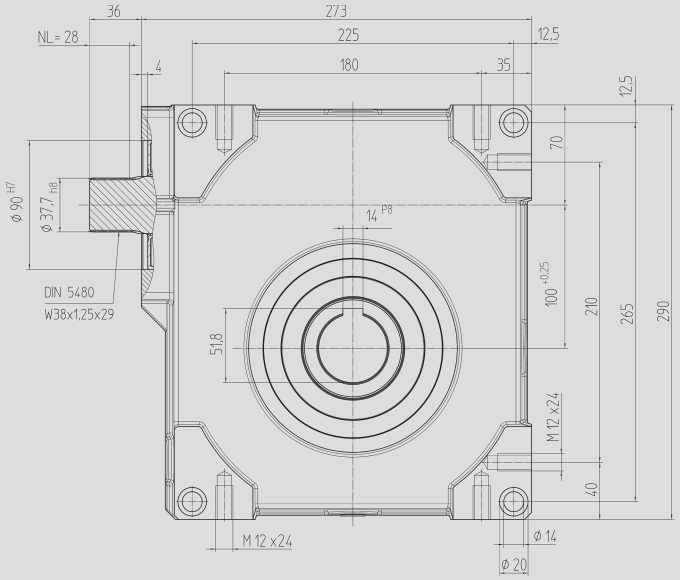
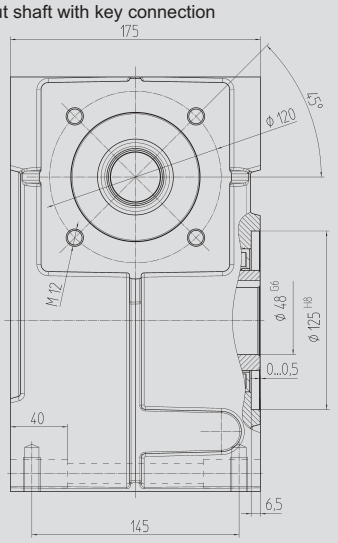


图1 键连接输出轴
Fig. 1 Output shaft with key connection



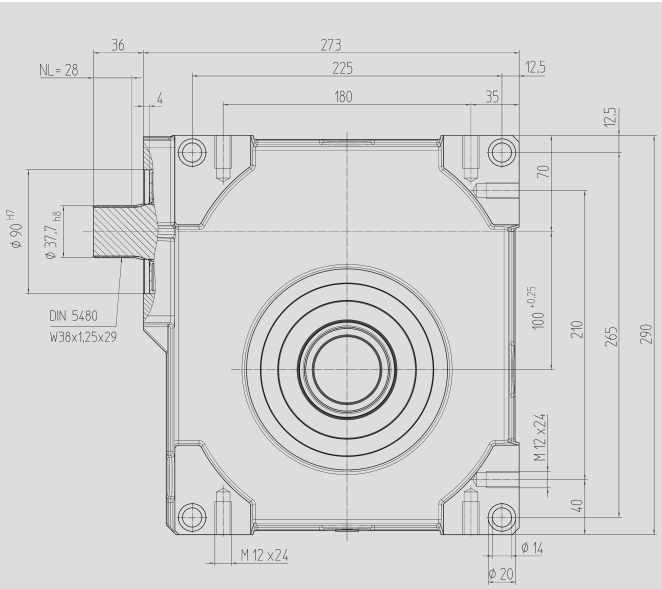
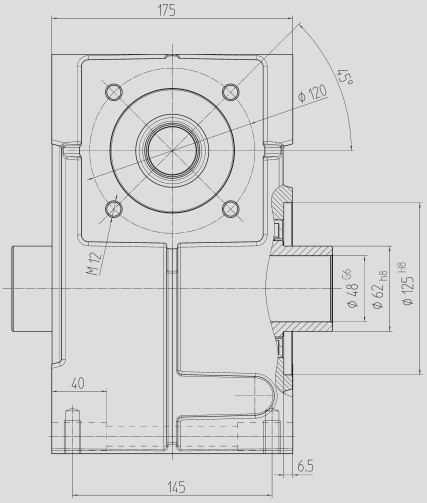


图2 胀紧盘型连接空心输出轴 80 86 062
Fig. 2 Output shaft for clamp connection 80 86 062

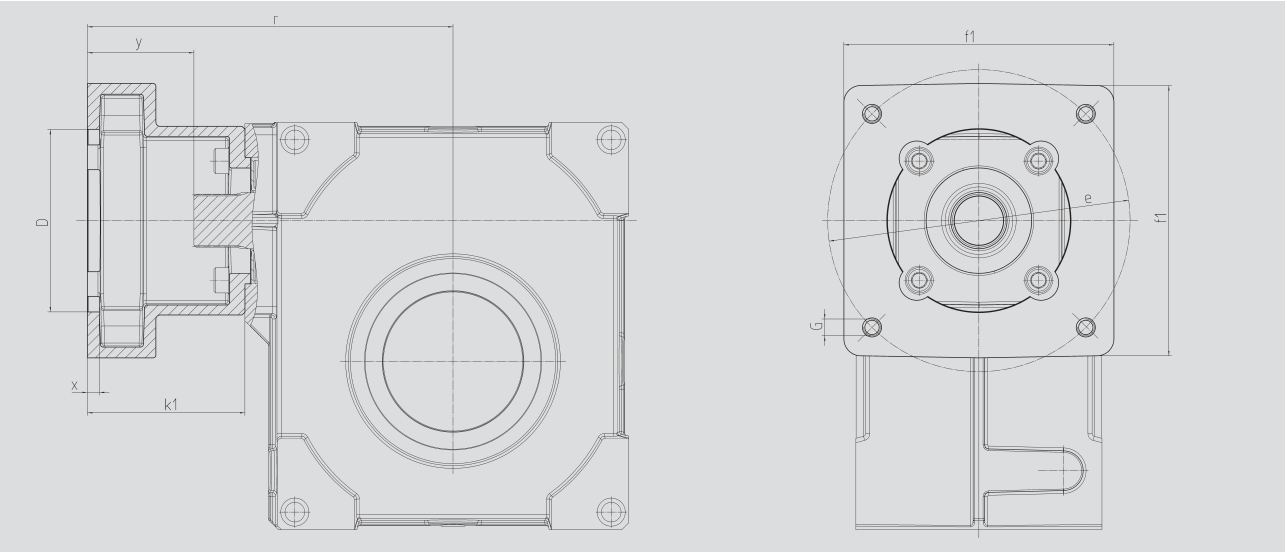


订购代码 / Order code 图 1 / Fig. 1	图 2 / Fig. 2	减速比 i Ratio i	kg	J_{red} 10^{-4} kg m^2
59 06 005	59 16 005	4,75	37	22,9320
59 06 007	59 16 007	6,75	37	12,8835
59 06 009	59 16 009	9,25	37	8,0975
59 06 015	59 16 015	14,50	37	7,2190
59 06 020	59 16 020	19,50	37	5,4030
59 06 029	59 16 029	29,00	37	4,7207
59 06 039	59 16 039	39,00	37	8,4300
59 06 052	59 16 052	52,00	37	9,7400

润滑油来自食品行业用油
订购代码. 59 06 1xx / 59 16 1xx

With suitable oil for food
Order code 59 06 1xx / 59 16 1xx

电机法兰 / Motor flange



中心距/ Centre distance a_o = 100 mm

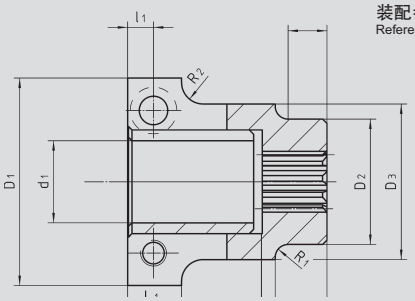
订购代码. Order code	D^{G7}	k_1	r	x	y	f_1	e	G	kg
65 59 501	110,0	92,0	230,0	8,0	55,0	140	165	M10	2,00
65 59 502	130,0	92,0	230,0	8,0	55,0	140	165	M10	1,90
65 59 503	180,0	122,0	260,0	8,0	85,0	192	215	M12	3,40
65 59 504	180,0	127,0	265,0	8,0	90,0	192	215	M12	3,80
65 59 505	180,0	112,0	250,0	10,0	75,0	192	215	M12	2,70
65 59 506	130,0	112,0	250,0	10,0	75,0	192	215	M12	3,00
65 59 507	130,0	112,0	250,0	10,0	75,0	140	165	M10	2,50
65 59 508	110,0	90,0	228,0	8,0	53,0	140	145	M8	2,00
65 59 509	110,0	108,5	246,5	8,0	71,5	140	145	M8	2,50
65 59 510	114,3	129,5	267,5	8,0	92,5	180	200	M12	5,00
65 59 511	114,3	163,5	301,5	8,0	126,5	180	200	M12	4,20
65 59 512	114,3	105,5	243,5	8,0	68,5	180	200	M12	3,50
65 59 513	110,0	113,5	251,5	8,0	76,5	140	145	M8	2,70

订购代码需包括减速箱代码 59 06 0xx / 59 16 0xx 及法兰代码 65 59 5xx.
The order should contain gear box 59 06 0xx / 59 16 0xx and flange 65 59 5xx.

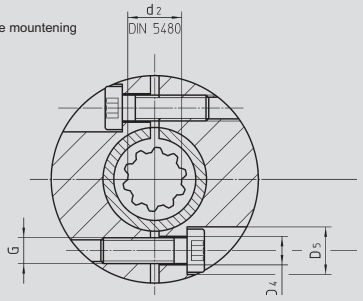
伺服电机与减速箱专用特制联轴器，刚性联接，渗氮，与伺服电机安装无键槽
Special couplings for motor/gear units, rigid model, nitrided, preassembled for motor shafts without key

减速箱输入轴侧
采用符合DIN 5480标准的
内花键结构

Bore on gear unit side
low-clearance tooth-hub
profile corresponding to
DIN 5480 for push-fitting



装配参考尺寸
Reference diameter for the mountening



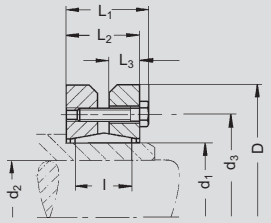
订购代码 / Order code 联轴器 Coupling	d_1	d_2	D_1	D_2	L_1	L_3	R_1	G	L_2	J_{red} 10^{-4} kg m²	kg
65 51 008	8	15x1,25x10	36	23	14,0	46,0	5	M5	31,2	0,236	0,2
65 51 009	9	15x1,25x10	36	23	14,0	46,0	5	M5	31,2	0,246	0,2
65 51 010	10	15x1,25x10	36	23	14,0	46,0	5	M5	31,2	0,244	0,2
65 51 011	11	15x1,25x10	36	23	14,0	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	M6	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	M6	31,2	0,704	0,3
65 53 024	24	15x1,25x10	48	33	16,5	46,0	5	M6	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
65 55 014	14	38x1,25x29	64	51	18,0	72,5	5	M8	41,5	8,056	1,2
65 55 016	16	38x1,25x29	64	51	18,0	72,5	5	M8	41,5	8,029	1,2
65 55 019	19	38x1,25x29	64	51	18,0	72,5	5	M8	41,5	7,978	1,2
65 55 020	20	38x1,25x29	64	51	18,0	72,5	5	M8	41,5	7,945	1,2
65 55 022	22	38x1,25x29	64	51	18,0	72,5	5	M8	41,5	7,911	1,2
65 55 024	24	38x1,25x29	64	51	18,0	72,5	5	M8	41,5	7,860	1,2
65 55 025	25	38x1,25x29	64	51	18,0	72,5	5	M8	41,5	7,818	1,1
65 55 028	28	38x1,25x29	64	51	18,0	72,5	5	M8	41,5	8,105	1,3
65 55 032	32	38x1,25x29	64	51	18,0	72,5	5	M8	41,5	7,863	1,2
65 55 035	35	38x1,25x29	78	51	18,0	72,5	5	M8	41,5	7,610	1,1
65 55 038	38	38x1,25x29	78	51	18,0	72,5	5	M8	41,5	7,284	1,0
65 55 042	42	38x1,25x29	78	51	18,0	70,5	5	M8	41,5	6,547	1,0

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

59 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 59 1. ...

整体供货

Supplied as complete set



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


<5 arcmin

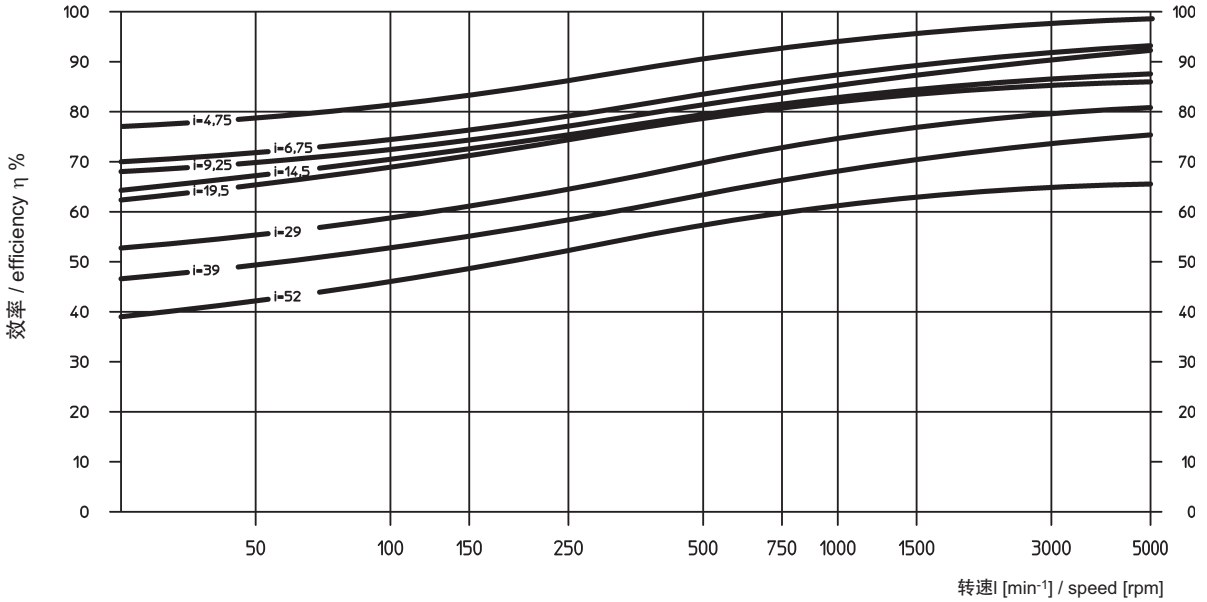
订购代码 Order code	a_0 mm	T_{2max} Nm	d_1	d_2	d_3	D	L_1	L_2	L_3	l	G	J 10^{-4} kg m²	kg
80 81 024	32	270	24	20	36	50	23,0	19,5	7,80	14,0	6 x M5	0,780	0,2
80 83 130	50	280	30	25	44	60	21,5	18,0	7,25	14,0	7 x M5	1,756	0,3
80 84 136	63	430	36	28	52	72	25,5	21,5	9,00	17,5	5 x M6	4,029	0,4
80 85 150	80	950	50	36	70	90	28,0	24,0	10,25	22,0	9 x M6	11,322	0,8
80 86 062	100	2300	62	48	86	110	34,5	30,5	14,00	23,0	10 x M6	27,137	1,3

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.

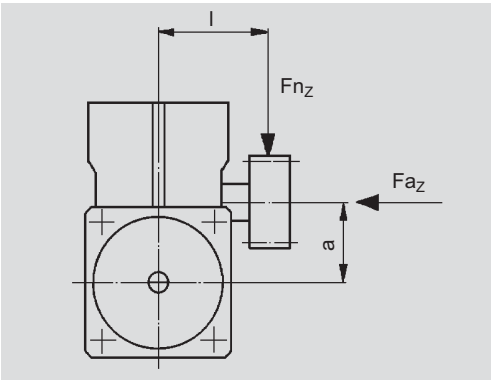
订购代码 Order code		a_0	i	$T_{2\,max.}$	驱动速度 / Driving speed n_1 in min^{-1} 500		750		1000		1500		3000		4000		5000		η
					P_1	T_2	P_1	T_2	P_1	T_2	P_1	T_2	P_1	T_2	P_1	T_2	P_1	T_2	bei
		(mm)			(kw)	(Nm)	(kw)	(Nm)	(kw)	(Nm)	(kw)	(Nm)	(kw)	(Nm)	(kw)	(Nm)	(kw)	(Nm)	1500
59 01 003	59 11 003	32	3,00																
59 01 005	59 11 005		4,75	135	0,17	16	0,28	16	0,40	17	0,61	17	1,21	17	1,72	18	2,15	18	0,93
59 01 007	59 11 007		6,75	100	0,13	14	0,19	15	0,28	16	0,43	17	0,85	17	1,21	18	1,52	18	0,90
59 01 009	59 11 009		9,25	65	0,08	12	0,13	13	0,18	14	0,28	15	0,63	17	0,89	18	1,12	18	0,88
59 01 015	59 11 015		14,50	85	0,07	14	0,10	15	0,14	16	0,21	17	0,42	18	0,58	18	0,72	18	0,84
59 01 020	59 11 020		19,50	55	0,04	12	0,06	12	0,09	13	0,13	14	0,29	16	0,40	16	0,50	16	0,83
59 01 029	59 11 029		29,00	70	0,03	12	0,05	13	0,07	14	0,10	15	0,21	17	0,29	17	0,37	17	0,76
59 01 039	59 11 039		39,00	50	0,03	13	0,04	14	0,06	15	0,09	16	0,18	18	0,24	18	0,29	18	0,70
59 01 050	59 11 050		50,00	35	0,02	11	0,03	11	0,04	12	0,06	13	0,12	15	0,17	16	0,23	18	0,63
59 03 003	59 13 003	50	3,00																
59 03 005	59 13 005		4,75	550	0,81	65	1,20	65	1,70	70	2,52	70	5,00	70	6,20	65	7,30	61	0,93
59 03 007	59 13 007		6,75	400	0,50	56	0,77	59	1,10	63	1,75	69	3,50	69	4,40	65	5,20	61	0,90
59 03 009	59 13 009		9,25	275	0,32	48	0,50	51	0,70	54	1,10	58	2,55	70	3,55	70	4,10	65	0,88
59 03 015	59 13 015		14,50	350	0,26	57	0,40	60	0,57	65	0,89	70	1,82	75	2,50	75	3,15	75	0,84
59 03 020	59 13 020		19,50	250	0,16	45	0,25	48	0,34	50	0,55	55	1,20	65	1,65	65	2,10	65	0,83
59 03 029	59 13 029		29,00	300	0,14	48	0,20	52	0,29	55	0,44	60	0,93	70	1,23	70	1,41	65	0,76
59 03 039	59 13 039		39,00	200	0,12	53	0,17	56	0,24	60	0,37	65	0,77	75	1,00	75	1,25	75	0,70
59 03 050	59 13 050		50,00	150	0,08	42	0,12	44	0,16	47	0,25	50	0,51	60	0,72	60	0,90	60	0,63
59 04 003	59 14 003	63	3,00																
59 04 005	59 14 005		4,75	1000	2,10	170	3,30	180	4,40	180	6,11	170	10,30	145	13,20	135			0,93
59 04 007	59 14 007		6,75	750	1,50	170	2,35	180	3,10	180	4,25	170	7,20	145	9,30	135			0,90
59 04 009	59 14 009		9,25	500	0,74	115	1,18	125	1,63	130	2,52	135	4,93	135	6,35	126			0,88
59 04 015	59 14 015		14,50	600	0,74	165	1,19	180	1,54	180	2,45	180	4,18	170	5,25	160			0,84
59 04 020	59 14 020		19,50	500	0,39	115	0,61	125	0,85	130	1,28	135	2,98	165	3,83	155			0,83
59 04 029	59 14 029		29,00	650	0,48	175	0,75	190	1,04	205	1,55	220	2,57	195	3,22	185			0,76
59 04 039	59 14 039		39,00	450	0,30	140	0,44	150	0,61	160	0,97	175	1,88	190	2,55	190			0,70
59 04 052	59 14 052		52,00	300	0,16	95	0,25	105	0,35	115	0,55	125	1,20	150	1,63	160			0,63
59 05 003	59 15 003	80	3,00																
59 05 005	59 15 005		4,75	2000	5,20	420	6,90	380	8,53	360	11,60	330	19,50	280					0,93
59 05 007	59 15 007		6,75	1400	3,60	420	4,86	380	6,14	360	8,44	330	14,01	280					0,90
59 05 009	59 15 009		9,25	1100	2,38	370	3,53	370	4,53	360	6,22	330	10,30	280					0,88
59 05 015	59 15 015		14,50	1300	1,98	450	2,90	450	3,57	420	4,60	370	7,00	295					0,84
59 05 020	59 15 020		19,50	1000	1,24	370	2,00	400	2,60	400	3,60	380	5,73	320					0,83
59 05 029	59 15 029		29,00	1200	1,38	520	2,04	550	2,52	530	3,32	490	5,42	420					0,76
59 05 039	59 15 039		39,00	850	0,87	430	1,35	460	1,85	490	2,51	480	4,03	410					0,70
59 05 052	59 15 052		52,00	600	0,38	240	0,57	260	0,80	275	1,22	300	2,46	330					0,63
59 06 005	59 16 005	100	4,75	3300	10,77	880	14,22	800	17,77	750	24,10	685	40,37	580					0,93
59 06 007	59 16 007		6,75	2300	7,23	830	9,60	750	12,10	720	16,70	660	29,00	580					0,90
59 06 009	59 16 009		9,25	1900	5,34	830	7,10	750	9,10	720	12,30	660	21,20	580					0,88
59 06 015	59 16 015		14,50	2050	4,20	930	5,80	880	6,80	810	9,00	720	14,30	620					0,84
59 06 020	59 16 020		19,50	1800	3,02	900	4,27	870	5,20	810	6,67	720	11,10	620					0,83
59 06 029	59 16 029		29,00	2300	2,96	1150	4,02	1070	4,67	1010	5,97	850	10,31	800					0,76
59 06 039	59 16 039		39,00	1650	2,07	1080	2,88	1030	3,63	1000	4,53	900	7,48	780					0,70
59 06 052	59 16 052		52,00	1100	1,16	760	1,82	820	2,41	850	3,08	785	5,00	680					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)		32		50		63		80		100	
减速箱中心到齿轮中心的距离 Dimensions centre casing/ centre teeth l (mm)		70	100	90	140	110	160	125	175	140	190
最大附加载荷 Max. additional load											
径向 radial Fn_z	[N]	2250	1600	3600	2300	5000	3500	8400	6000	10000	7500
轴向 axial Fa_z	[N]	1500	1500	1800	1800	2500	2500	4000	4000	5000	5000

简述

亚特兰E-伺服 经济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，或者很很短时间就可以发货。

E-伺服减速箱的基本特征：:

- 与58系列减速箱有相同的尺寸
- 低背隙(背隙 < 5')
- 与58系列减速箱有相同的负载能力
- 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GC-14）和胀紧盘（GH-1）必须核对完毕。

Short description

ATLANTA E-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 E-servo gear units:

- the same dimensions as our servo worm gear units serie 58
- low-clearance gearing (back lash < 5'),
- the same load values as our servo worm gear units serie 58
- casing of light metal for optimal heat dissipation
- robust bearings for the output drive hollow shaft, permitting greater 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 GC-14) and shrink disc (see page GH-1) has to be checked. The output keyway has to be calculated separately.

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GC-12）,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”是非常重要的数据（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；深度测量器具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。

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 GC-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。

Maintenance

Lubricant change
ATLANTA servo-assisted worm-gear units are filled with synthetic polyglycol oil.
Under the following conditions this means lifetime lubrication: The layout of the gear unit is made strictly in conformance with the guidelines specified in the ATLANTA catalogue and the gear unit is operated exclusively within the permissible characteristic values and limits. The operator checks the gear unit regularly (every 4 weeks) for oil leakage. The surface temperature does not exceed max. 80° C. Experience has shown that this temperature is not reached with servo-operation (intermittent operation).
In the case of an operation with mainly low input speeds (circumferential speed of the worm
v < 0.5 m/s) we recommend to change the lubricant every two years.

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 = 32 mm	0,07 l
a = 50 mm	0,40 l
a = 63 mm	0,70 l
a = 80 mm	1,70 l
a = 100 mm	2,00 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 ISO 20653
(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).

页码 / Page


< 12 arcmin

< 12 arcmin

中心距 / Centre distance a_o = 50 mm

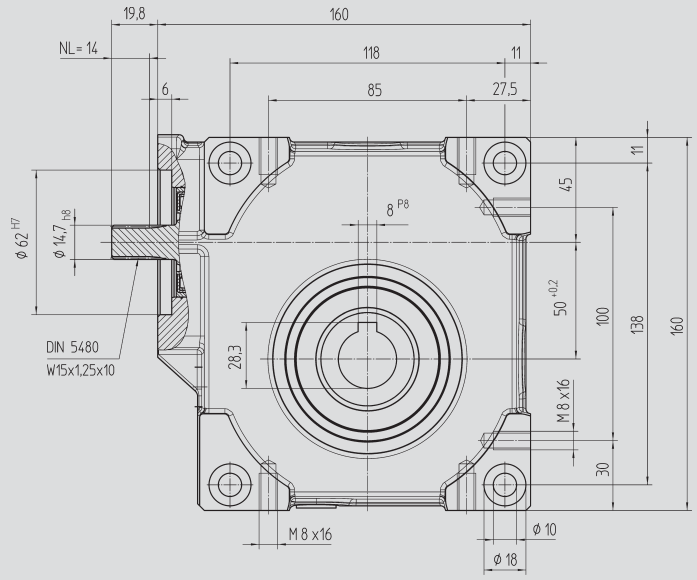
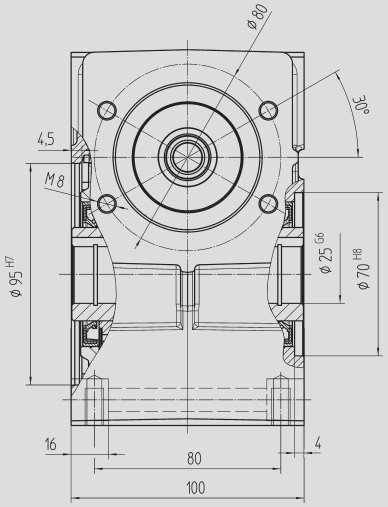


图1 键连接输出轴
Fig. 1 Output shaft with key connection



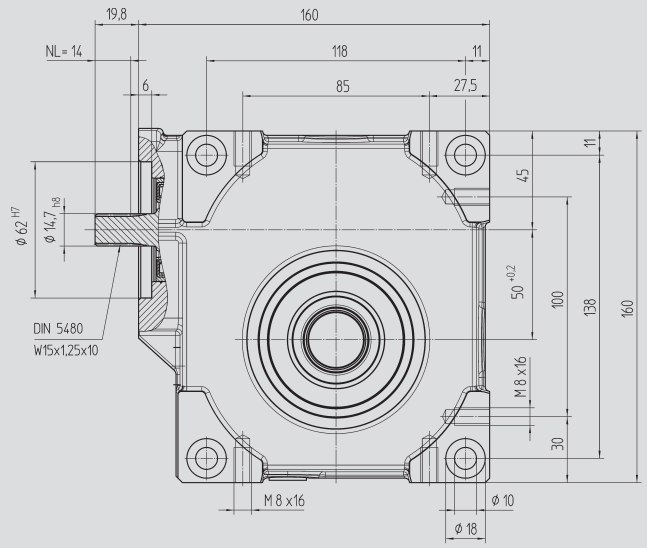
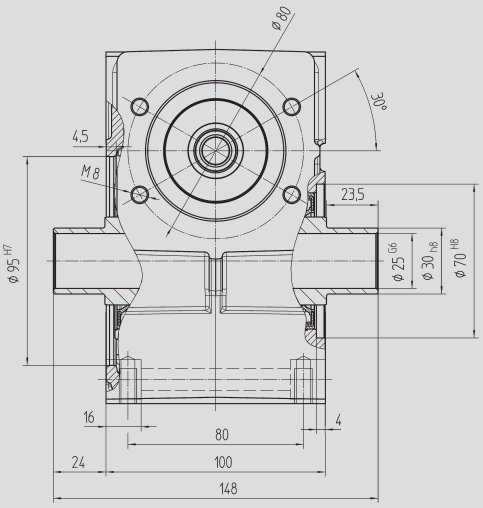


图2 胀紧盘型连接空心输出轴 80 83 030
Fig. 2 Output shaft for clamp connection 80 83 030

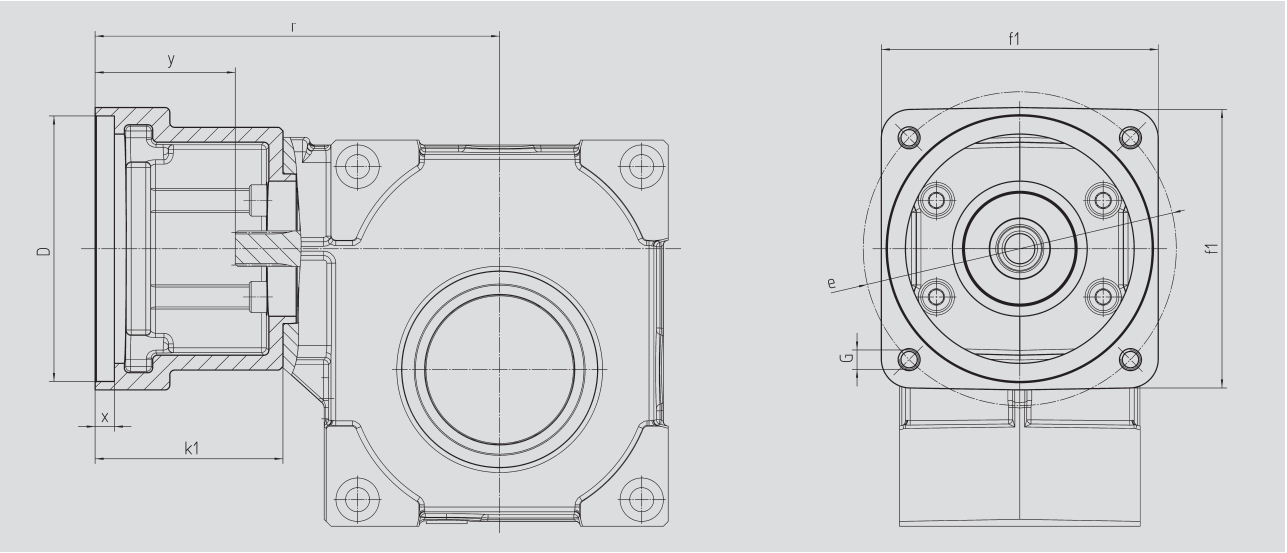


Best.-Nr. / Order code Bild 1 / Fig. 1	Bild 2 / Fig. 2	Übersetzung i	kg	J_{red} 10^{-4} kg m^2
57 03 005	57 13 005	4,75	6,5	0,8280
57 03 007	57 13 007	6,75	6,5	0,4140
57 03 009	57 13 009	9,25	6,5	0,3490
57 03 015	57 13 015	14,50	6,5	0,2800
57 03 020	57 13 020	19,50	6,5	0,1960
57 03 029	57 13 029	29,00	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_o = 50 mm

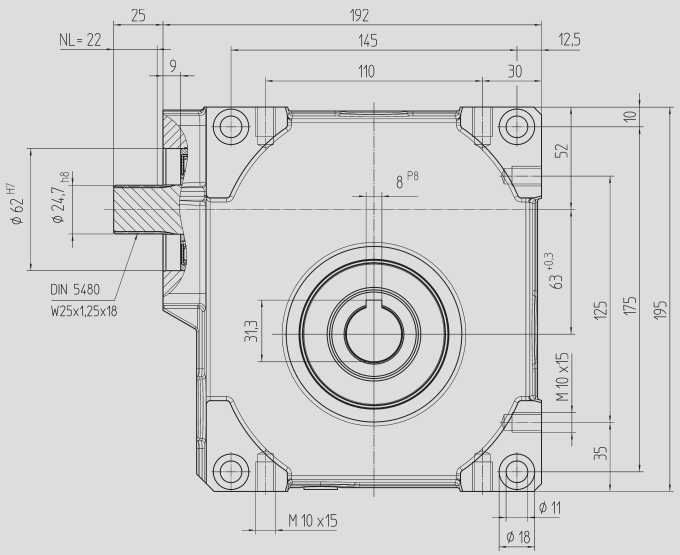
订购代码. Order code	D^{G7}	k_1	r	x	y	f_1	e	G	kg
65 59 301	95,0	62	152	12,5	42	100	115	M8	0,60
65 59 302	50,0	62	152	10,0	42	100	70; 95; 115	M4; M6; M8	0,70
65 59 303	80,0	62	152	10,0	42	100	100	M6	0,65
65 59 304	95,0	78	168	10,0	59	115	130	M8	0,80
65 59 305	95,0	72	162	8,0	52	100	115	M8	0,75
65 59 306	60,0	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箱代码 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.

< 12 arcmin

中心距 / Centre distance a_o = 63 mm

图1 键连接输出轴
Fig. 1 Output shaft with key connection



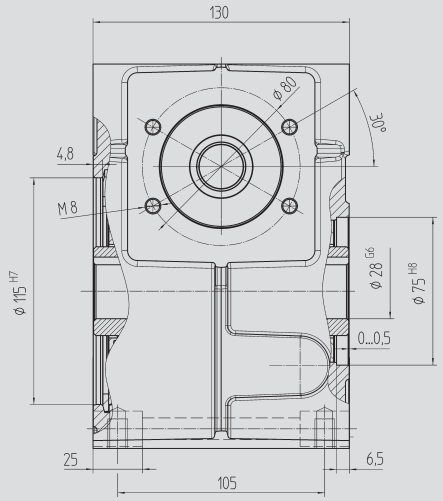
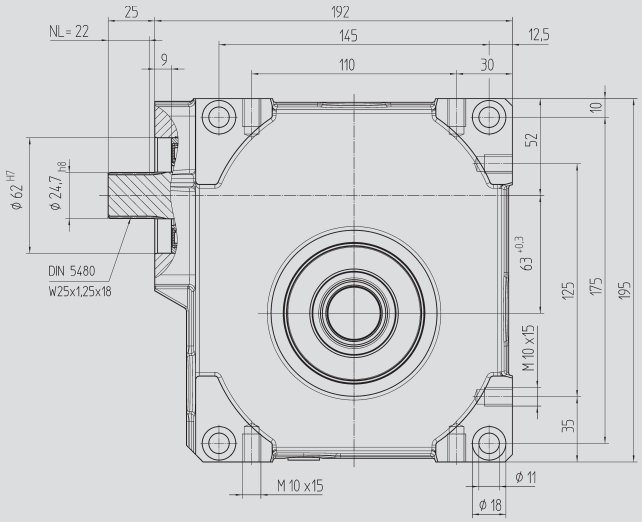
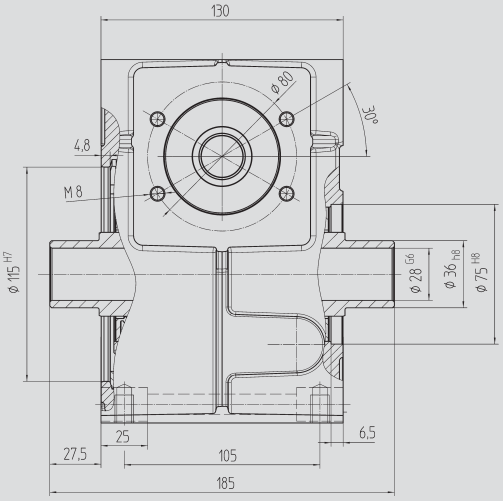


图2 胀紧盘型连接空心输出轴 80 84 036
Fig. 2 Output shaft for clamp connection 80 84 036



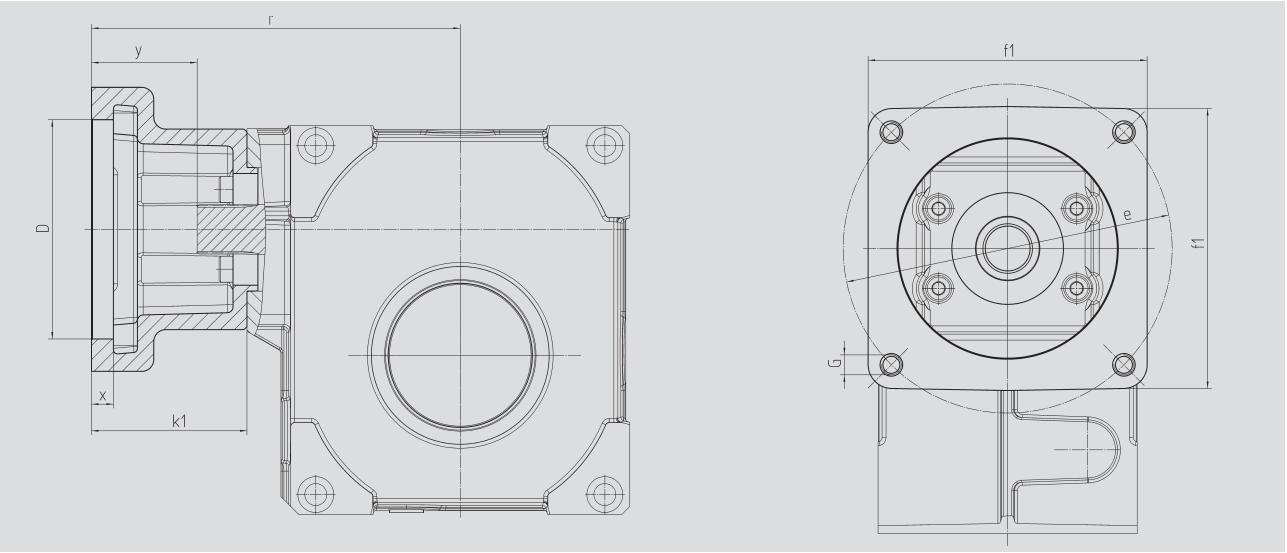


订购代码 / Order code 图 1 / Fig. 1	图 2 / Fig. 2	减速比 i Ratio i	kg	J_{red} 10^{-4} kg m²
57 04 005	57 14 005	4,75	11,5	2,5350
57 04 007	57 14 007	6,75	11,5	1,3720
57 04 009	57 14 009	9,25	11,5	0,9825
57 04 015	57 14 015	14,50	11,5	0,9570
57 04 020	57 14 020	19,50	11,5	0,6940
57 04 029	57 14 029	29,00	11,5	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_o = 63 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

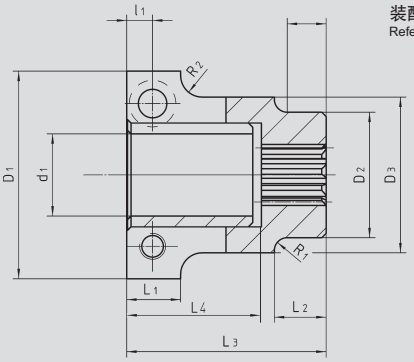
订购代码需包括减速箱代码 57 04 0xx / 57 14 0xx 及法兰代码 65 57 3xx bzw. 4xx.
The order should contain gear box 57 04 0xx / 57 14 0xx and flange 65 57 3xx or 4xx.

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

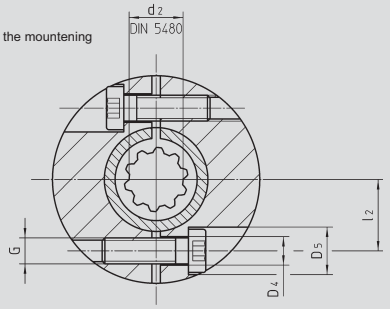

< 12 arcmin

减速箱输入轴侧
采用符合DIN5480标准的
内花键结构

Bore on gear unit side
low-clearance tooth-hub
profile corresponding to
DIN 5480 for push-fitting



装配参考尺寸
Reference diameter for the mountening



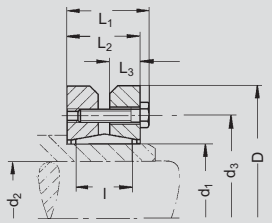
订购代码 / Order code 联轴器 Coupling	d_1	d_2	D_1	D_2	L_1	L_3	R_1	G	L_2	J_{red} 10^{-4} kg m²	kg
65 51 008	8	15x1,25x10	36	23	14,0	46,0	5	M5	31,2	0,236	0,2
65 51 009	9	15x1,25x10	36	23	14,0	46,0	5	M5	31,2	0,246	0,2
65 51 010	10	15x1,25x10	36	23	14,0	46,0	5	M5	31,2	0,244	0,2
65 51 011	11	15x1,25x10	36	23	14,0	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	l	G	J 10^{-4} kg m²	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

< 12 arcmin

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)

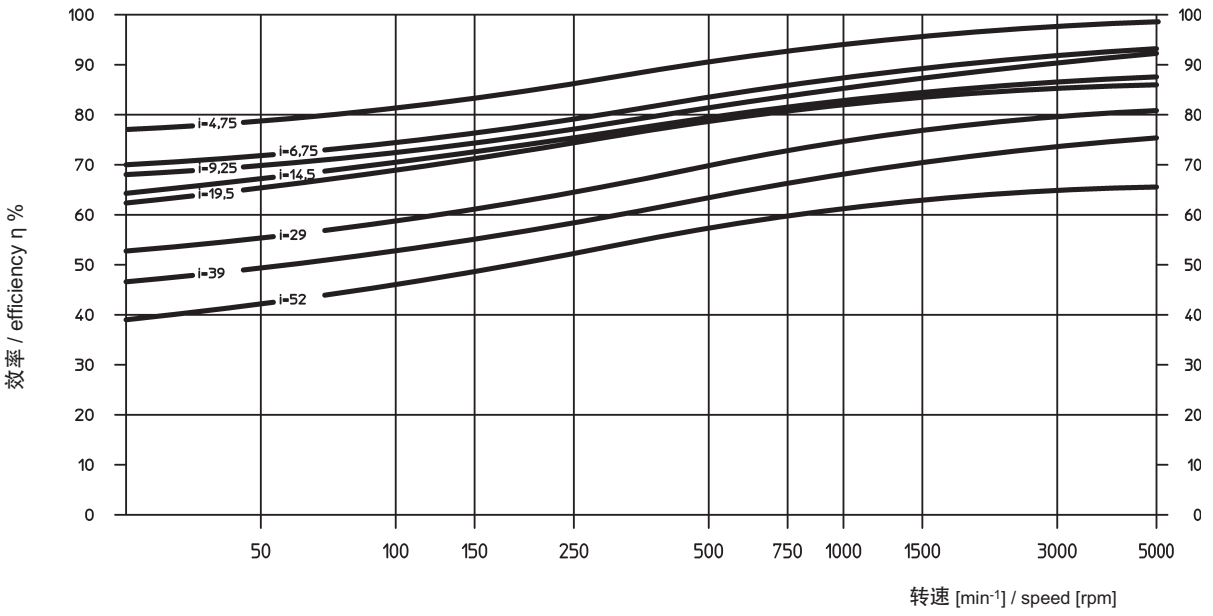
The values in the tables are based upon wear or maximum flank load at 12,000 h full load and on servo-operation. Please see here for also our manual on the internet page www.atlantagmbh.de. With continuous full-load operation it may be necessary to consider temperature limits! (Please ask us, if in doubt.)
$T_{2max.}$ = 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	i	$T_{2\,max.}$	驱动速度 / Driving speed n_1 in min^{-1} 500		750		1000		1500		3000		4000		5000		η
		(mm)			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)	bei 1500
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.

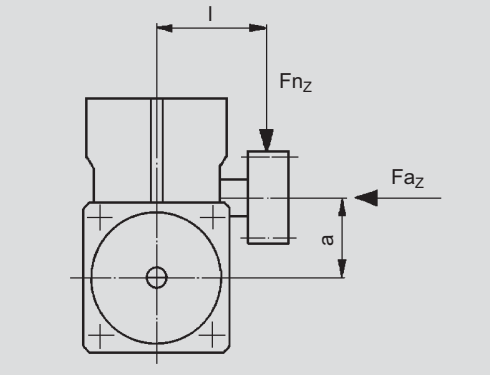


作用在输出轴上的附加载荷

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 Fn_z	[N]	2500	1600	3500	2450
轴向 axial Fa_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，或者很很短时间就可以发货。

B-伺服减速箱的基本特征：：


< 12 arcmin

- 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.

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；深度测量器具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 %.


< 12 arcmin

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。


< 12 arcmin

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

Maintenance

Lubricant change
ATLANTA B-servo-assisted worm-gear units are filled with synthetic polyglycol oil.
Under the following conditions this is a lifetime lubrication:
The layout of the gear unit is made strictly in conformance with the guidelines specified in the ATLANTA catalogue and the gear unit is operated exclusively within the permissible characteristic values and limits. The operator checks the gear unit regularly (every 4 weeks) for oil leakage. The surface temperature does not exceed max. 80° C. Experience has shown that this temperature is not reached with servo-operation (intermittent operation).
In the case of an operation with mainly low input speeds (circumferential speed of the worm v < 0.5 m/s) we recommend to change the lubricant every two years.

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).

页码 / Page

<6 arcmin


<6 arcmin

键式连接输出轴 / Key connection
结构尺寸 / Construction-size BG 50 5个安装面 / 5 Mounting surfaces

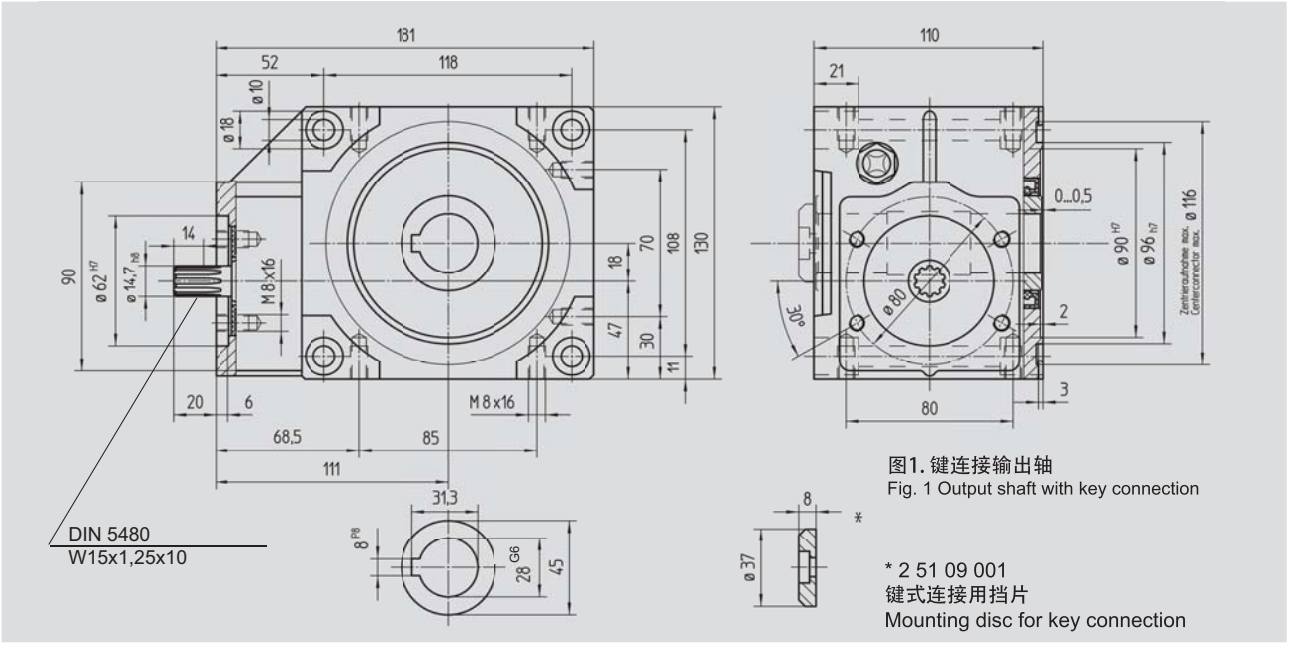


图1. 键连接输出轴
Fig. 1 Output shaft with key connection

* 2 51 09 001
键式连接用挡片
Mounting disc for key connection

胀紧盘型连接 / Shrink-disc connection
结构尺寸 / Construction-size BG 50 5个安装面 / 5 Mounting surfaces

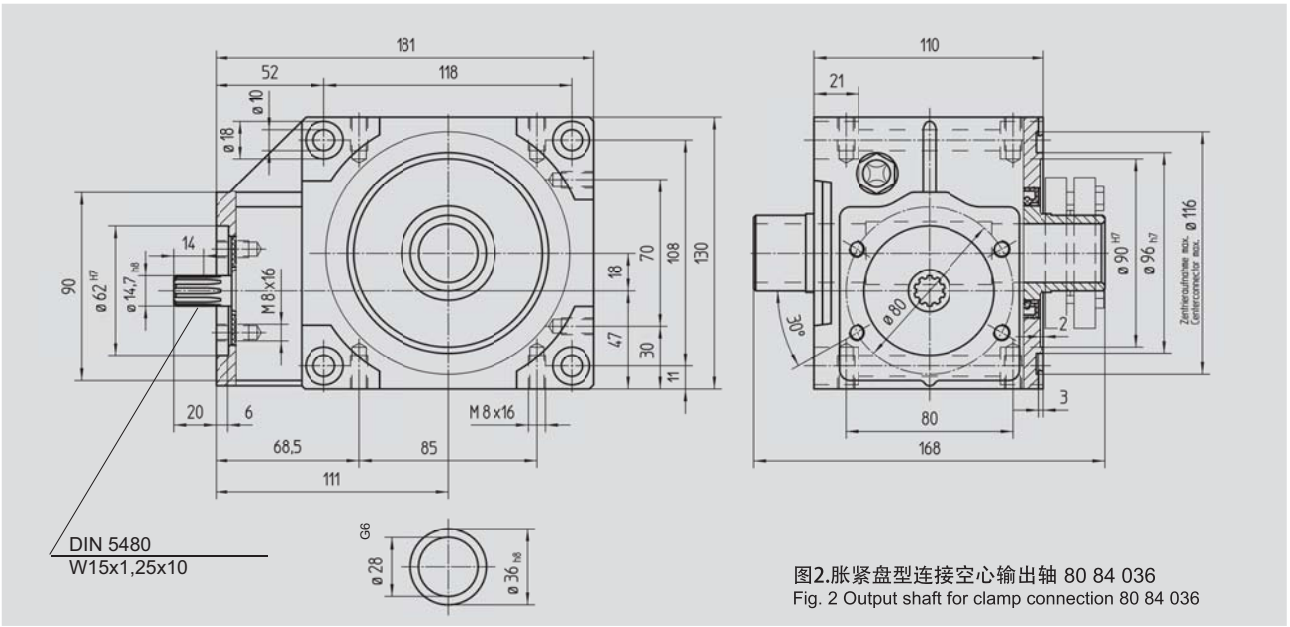
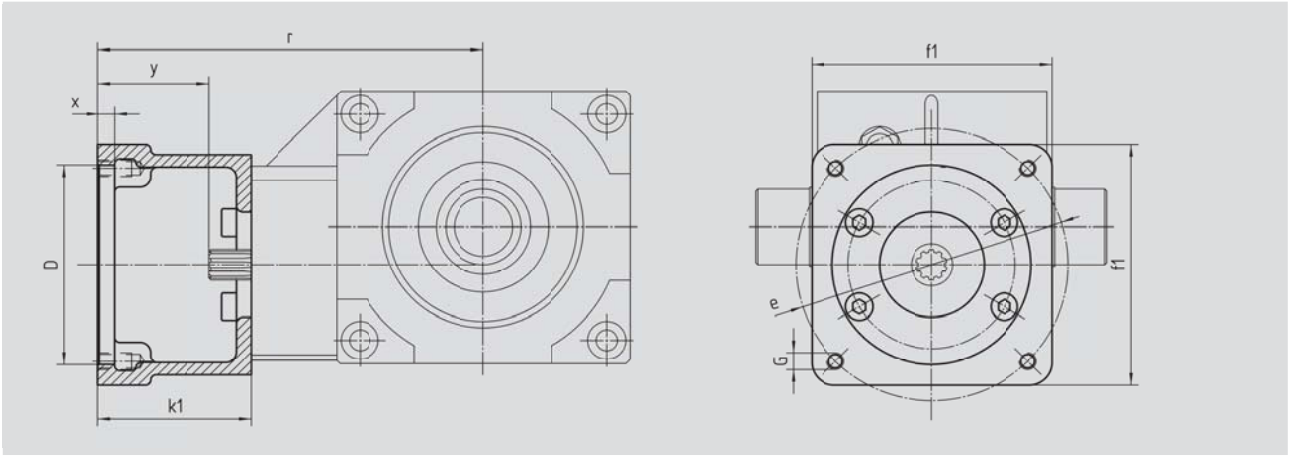


图2.胀紧盘型连接空心输出轴 80 84 036
Fig. 2 Output shaft for clamp connection 80 84 036

订购代码 5个安装面 Order-Code 5 Mounting surfaces 键式连接输出轴 Key connection	胀紧盘型连接 Shrink-disc connection	减速比 i Ratio i	kg	J_{red} 10^{-4} kg m^2
51 03 005	51 13 005	4,75	6,4	0,820
51 03 007	51 13 007	6,75	6,4	0,551
51 03 009	51 13 009	9,25	6,4	0,406

安装亚特兰 20 2x 4xx 的齿轮轴或 65 04 xxx 的输出轴是有必要的/ Necessary for mounting of ATLANTA Pinion 20 2x 4xx or Output drive shaft 65 04 xxx.

电机法兰 / Motor flange
结构尺寸 / Construction-size BG 50



结构尺寸 / Construction-size 50 mm

订购代码. Order code	D^{G7}	k_1	r	x	y	f_1	e	G	kg
65 59 301	95,0	62	173	6	42	100	115	M8	1,0
65 59 302	50,0	62	173	6	42	100	95	M6	1,0
65 59 303	80,0	62	173	6	42	100	100	M6	1,0
65 59 304	95,0	78	189	6	58	115	130	M8	1,0
65 59 305	95,0	72	183	5	52	105	115	M8	1,0
65 59 306	60,0	74	184	7	54	100	75; 90	M5	1,0
65 59 307	70,0	70	181	7	50	100	90	M6	1,0
65 59 401	95,0	73	184	7	53	100	115	M8	1,0
65 59 402	110,0	78	189	7	58	115	130	M8	1,0
65 59 403	95,0	73	184	7	53	115	130	M8	1,0
65 59 404	110,0	73	184	7	53	115	130	M8	1,0
65 59 405	95,0	78	189	7	58	140	165	M10	1,0
65 59 406	110,0	78	189	7	58	140	165	M10	1,0
65 59 407	130,0	78	189	7	58	140	165	M10	1,0
65 59 409	130,0	98	209	7	78	140	165	M10	1,5
65 59 410	110,0	74	185	7	54	120	145	M8	1,0
65 59 411	110,0	84	195	7	64	120	145	M8	1,5
65 59 412	114,3	105	216	7	85	180	200	M12	3,5
65 59 413	114,3	139	150	7	119	180	200	M12	6,0
65 59 414	114,3	91	202	7	71	180	200	M12	2,5
65 59 415	110,0	89	200	7	69	120	145	M8	1,5

订单中应该包括减速箱 51 03 0xx / 51 13 0xx 和法兰 65 59 3xx.
The order should contain gear box 51 03 0xx / 51 13 0xx and flange 65 59 3xx.

键式连接输出轴 / Key connection
结构尺寸 / Construction-size BG 63 5个安装面 / 5 Mounting surfaces

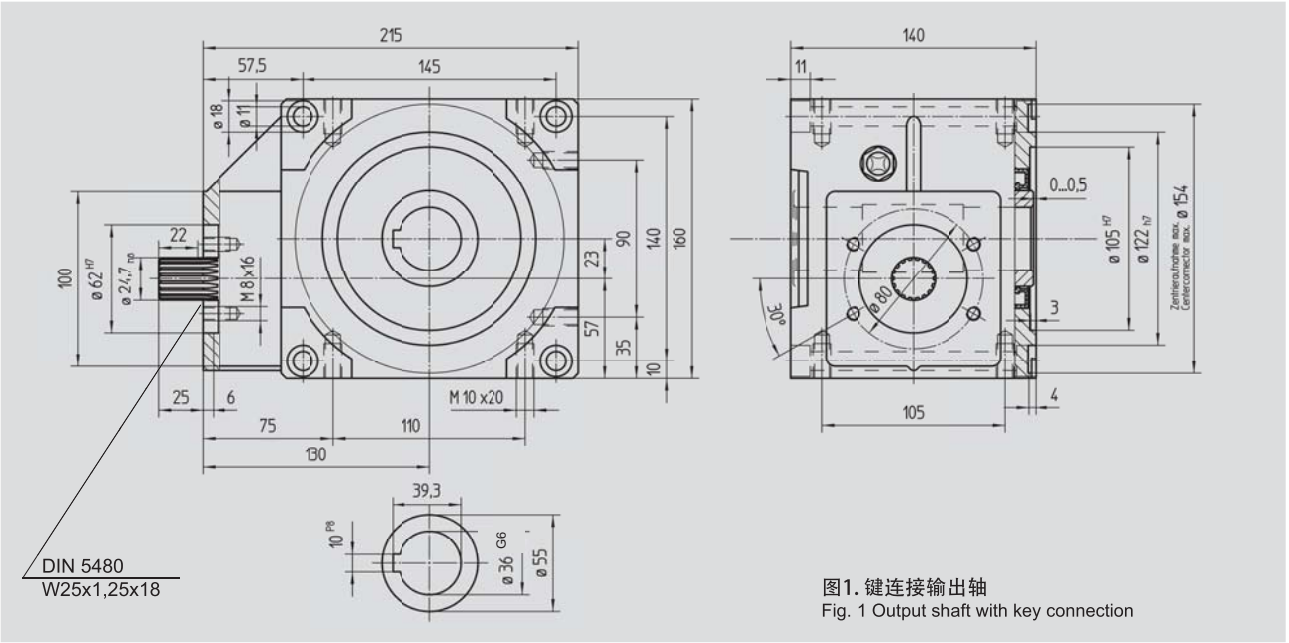


图1. 键连接输出轴
Fig. 1 Output shaft with key connection

胀紧盘型连接 / Shrink-disc connection
结构尺寸 / Construction-size BG 63 5个安装面 / 5 Mounting surfaces

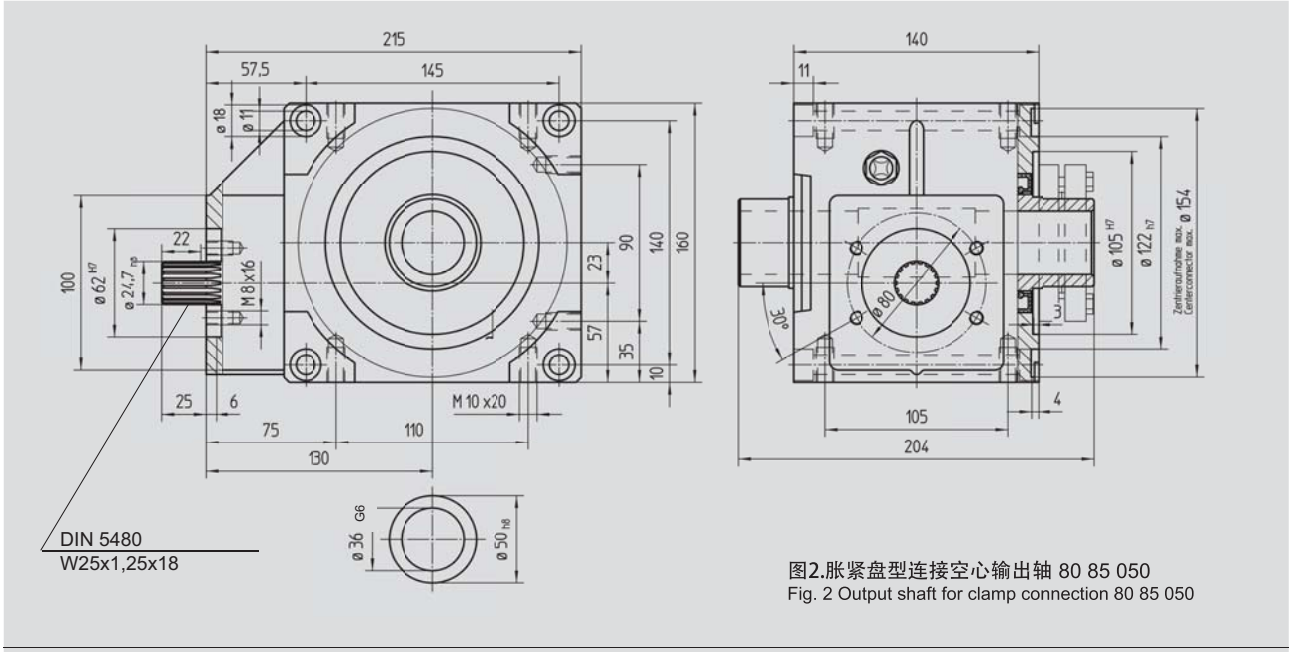
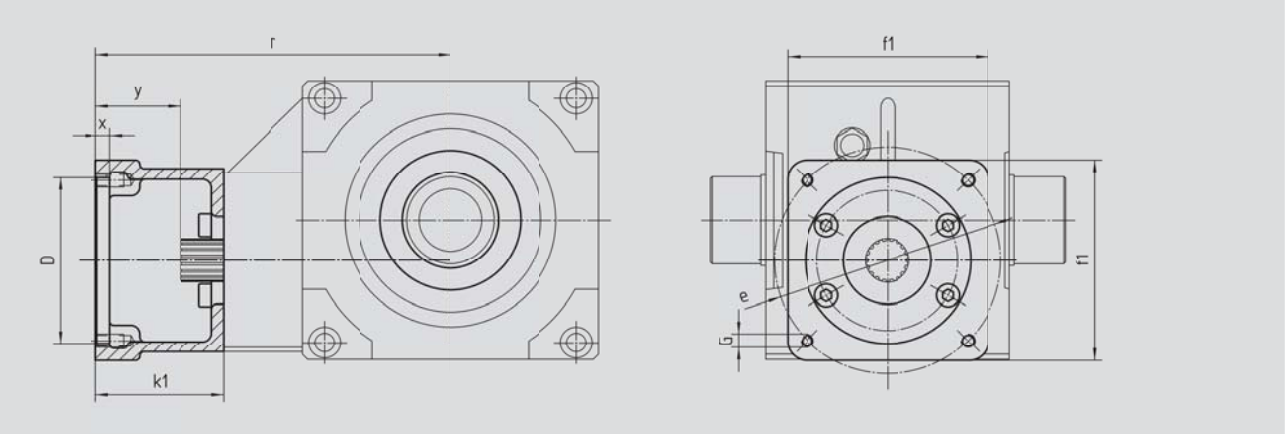


图2.胀紧盘型连接空心输出轴 80 85 050
Fig. 2 Output shaft for clamp connection 80 85 050

订购代码 5个安装面 Order-Code 5 Mounting surfaces 键式连接输出轴 Key connection	 胀紧盘型连接 Shrink-disc connection	减速比 i Ratio i	kg	J_{red} 10^{-4} kg m^2
51 04 005	51 14 005	4,75	11,8	3,234
51 04 007	51 14 007	6,75	11,8	2,148
51 04 009	51 14 009	9,25	11,7	1,595

电机法兰 / Motor flange
结构尺寸 / Construction-size BG 63



结构尺寸 / Construction-size 63 mm

订购代码. Order code	D^{G7}	k_1	r	x	y	f_1	e	G	kg
65 59 301	95,0	62	192	6	37	100	115	M8	1,0
65 59 302	50,0	62	192	6	37	100	95	M6	1,0
65 59 303	80,0	62	192	6	37	100	100	M6	1,0
65 59 304	95,0	78	208	6	53	115	130	M8	1,0
65 59 305	95,0	72	202	5	47	105	115	M8	1,0
65 59 306	60,0	74	204	7	49	100	75; 90	M5	1,0
65 59 307	70,0	70	200	7	45	100	90	M6	1,0
65 59 401	95,0	73	203	7	48	100	115	M8	1,0
65 59 402	110,0	78	208	7	53	115	130	M8	1,0
65 59 403	95,0	73	203	7	48	115	130	M8	1,0
65 59 404	110,0	73	203	7	48	115	130	M8	1,0
65 59 405	95,0	78	208	7	53	140	165	M10	1,0
65 59 406	110,0	78	208	7	53	140	165	M10	1,0
65 59 407	130,0	78	208	7	53	140	165	M10	1,0
65 59 409	130,0	98	228	7	73	140	165	M10	1,5
65 59 410	110,0	74	204	7	49	120	145	M8	1,0
65 59 411	110,0	84	214	7	59	120	145	M8	1,5
65 59 412	114,3	105	235	7	80	180	200	M12	3,5
65 59 413	114,3	139	269	7	114	180	200	M12	6,0
65 59 414	114,3	91	221	7	66	180	200	M12	2,5
65 59 415	110,0	89	219	7	64	120	145	M8	1,5

订单中应该包括减速箱 51 04 0xx / 51 14 0xx 和法兰 65 59 4xx.
The order should contain gear box 51 04 0xx / 51 14 0xx and flange 65 59 4xx.

键式连接输出轴 / Key connection
结构尺寸/ Construction-size BG 80 5个安装面 / 5 Mounting surfaces

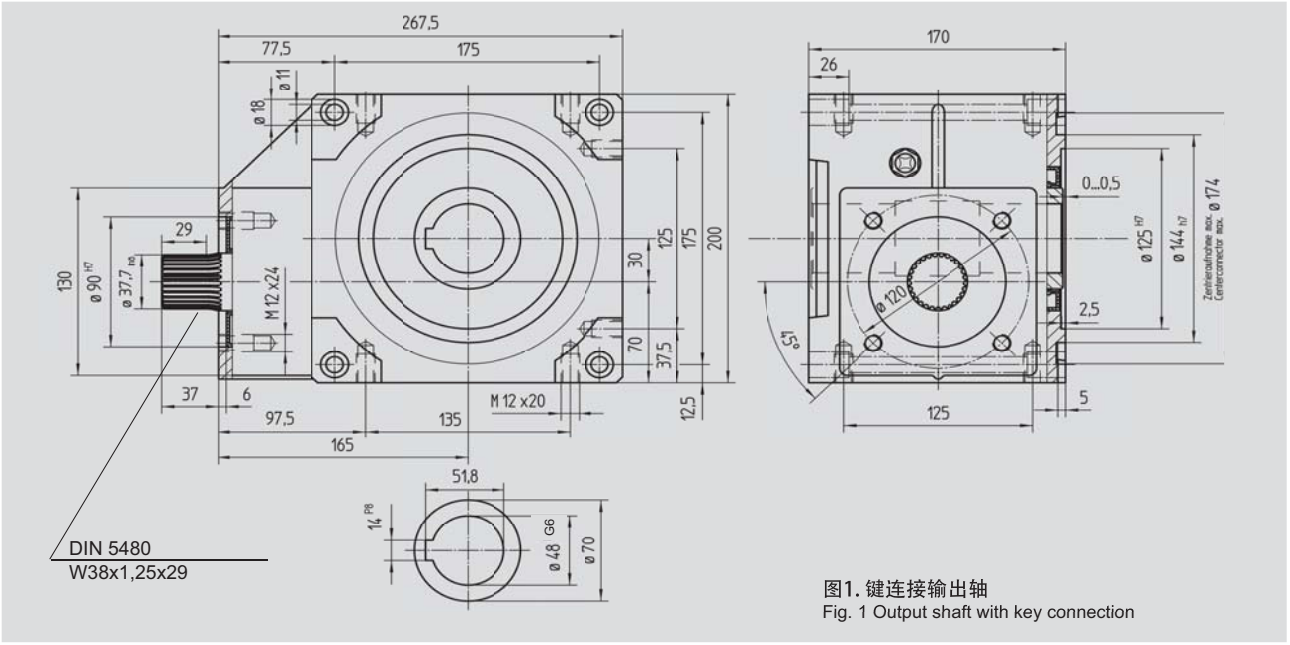


图1. 键连接输出轴
Fig. 1 Output shaft with key connection

胀紧盘型连接 / Shrink-disc connection
结构尺寸 / Construction-size BG 80 5个安装面 / 5 Mounting surfaces

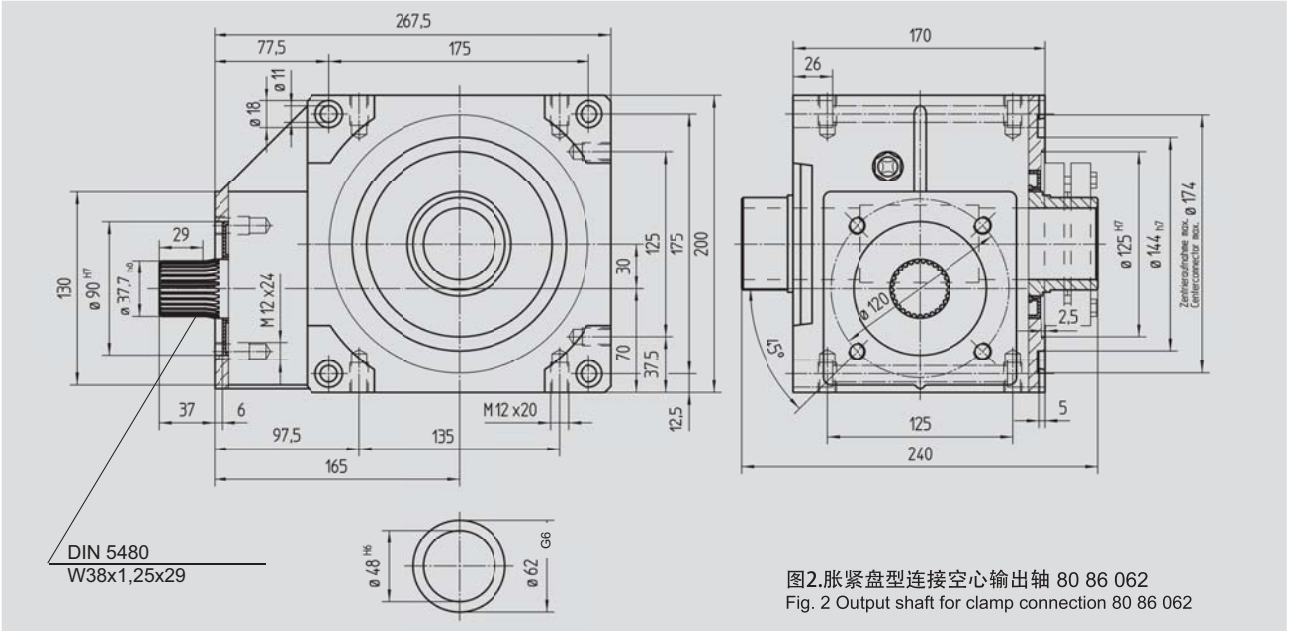
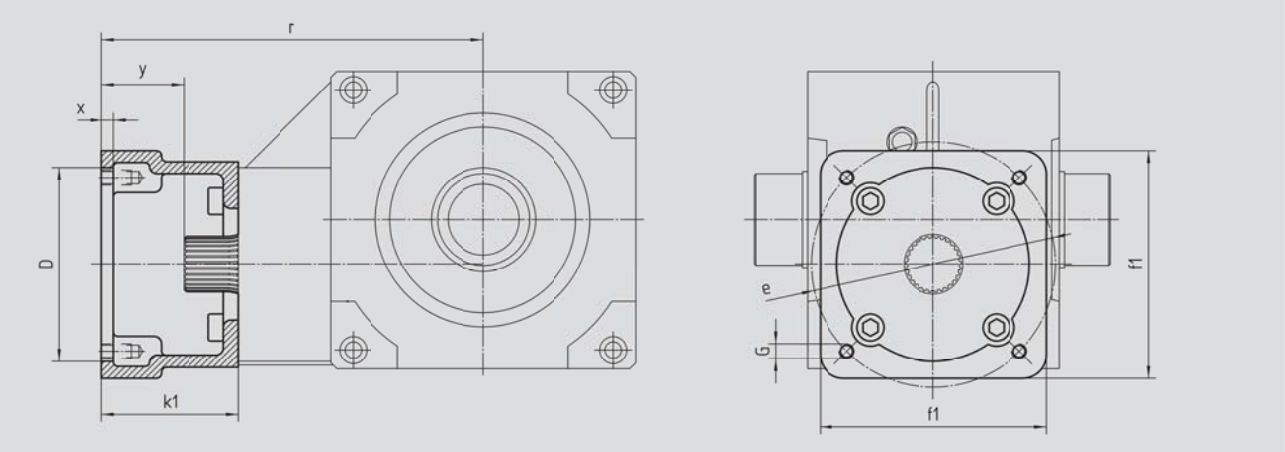


图2.胀紧盘型连接空心输出轴 80 86 062
Fig. 2 Output shaft for clamp connection 80 86 062

订购代码 5个安装面 Order-Code 5 Mounting surfaces 键式连接输出轴 Key connection	 胀紧盘型连接 Shrink-disc connection	减速比 i Ratio i	kg	J_{red} 10^{-4} kg m^2
51 05 005	51 15 005	4,75	23,0	14,04
51 05 007	51 15 007	6,75	23,0	10,25
51 05 009	51 15 009	9,25	23,0	8,51

电机法兰 / Motor flange
结构尺寸 / Construction-size BG 80



结构尺寸 / Construction-size 80 mm

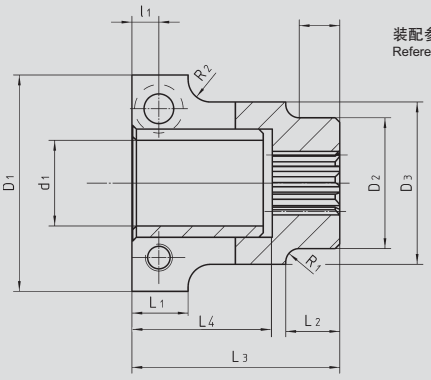
订购代码. Order code	D^{G7}	k_1	r	x	y	f_1	e	G	kg
65 59 501	110,0	92,0	257,0	7	55,0	153	165	M10	2,0
65 59 502	130,0	92,0	257,0	7	55,0	153	165	M10	3,0
65 59 503	180,0	122,0	287,0	7	85,0	192	215	M12	3,5
65 59 504	180,0	127,0	292,0	7	90,0	192	215	M12	3,5
65 59 505	180,0	112,0	277,0	7	75,0	192	215	M12	3,0
65 59 506	130,0	112,0	277,0	7	75,0	192	215	M12	3,0
65 59 507	130,0	112,0	277,0	7	75,0	155	165	M10	4,5
65 59 508	110,0	90,0	255,0	7	53,0	130	145	M8	2,0
65 59 509	110,0	108,5	273,5	7	71,5	130	145	M8	2,5
65 59 510	114,3	129,5	294,5	7	92,5	180	200	M12	5,5
65 59 511	114,3	163,5	328,5	7	126,5	180	200	M12	8,0
65 59 512	114,3	105,5	270,5	7	68,5	180	200	M12	4,0
65 59 513	110,0	113,5	278,5	7	76,5	130	145	M8	2,5

订单中应该包括减速箱 51 05 0xx / 51 15 0xx 和法兰 65 59 5xx.
The order should contain gear box 51 05 0xx / 51 15 0xx and flange 65 59 5xx.

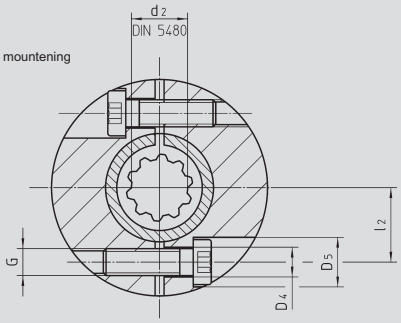
伺服电机与减速箱专用特制联轴器，刚性联接，渗氮，与伺服电机安装无键槽
Special couplings for motor/gear units, rigid model, nitrided, preassembled for motor shafts without key

减速箱输入轴侧
采用符合DIN 5480标准的
内花键结构

Bore on gear unit side
low-clearance tooth-hub
profile corresponding to
DIN 5480 for push-fitting



装配参考尺寸
Reference diameter for the mountening



<6 arcmin

订购代码. / Order code

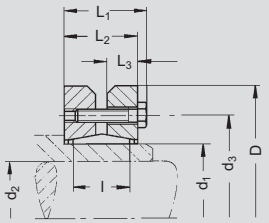
联轴器 Coupling	d_1	d_2	D_1	D_2	D_3	D_4	D_5	l_1	l_2	L_1	L_2	L_3	R_1	R_2	G	L_4	J_{red} 10^{-4} kg m²	kg
65 51 008	8	15x1,25x10	36	23	-	5,5	9,0	7,5	13,0	14,0	-	46,0	5	-	M5	31,2	0,236	0,2
65 51 009	9	15x1,25x10	36	23	-	5,5	9,0	7,5	13,0	14,0	-	46,0	5	-	M5	31,2	0,246	0,2
65 51 010	10	15x1,25x10	36	23	-	5,5	9,0	7,5	13,0	14,0	-	46,0	5	-	M5	31,2	0,244	0,2
65 51 011	11	15x1,25x10	36	23	-	5,5	9,0	7,5	13,0	14,0	-	46,0	5	-	M5	31,2	0,243	0,2
65 51 014	14	15x1,25x10	36	23	-	5,5	9,0	7,5	13,0	14,0	-	46,0	5	-	M5	31,2	0,234	0,2
65 51 016	16	15x1,25x10	36	23	-	5,5	9,0	7,5	13,0	14,0	-	46,0	5	-	M5	31,2	0,225	0,2
65 53 019	19	15x1,25x10	48	33	36	6,6	11,0	8,0	16,5	16,5	9	46,0	5	3	M6	31,2	0,704	0,3
65 53 020	20	15x1,25x10	48	33	36	6,6	11,0	8,0	16,5	16,5	9	46,0	5	3	M6	31,2	0,704	0,3
65 53 022	22	15x1,25x10	48	33	36	6,6	11,0	8,0	16,5	16,5	9	46,0	5	3	M6	31,2	0,704	0,3
65 53 024	24	15x1,25x10	48	33	36	6,6	11,0	8,0	16,5	16,5	9	46,0	5	3	M6	31,2	0,647	0,2
65 53 025	25	15x1,25x10	64	51	-	9,0	15,0	9,0	29,0	18,0	-	55,5	5	-	M8	41,5	5,946	1,1
65 53 028	28	15x1,25x10	64	51	-	9,0	15,0	9,0	29,0	18,0	-	55,5	5	-	M8	41,5	5,871	1,1
65 53 032	32	15x1,25x10	64	51	-	9,0	15,0	9,0	24,0	18,0	-	55,5	5	-	M8	41,5	4,158	0,8
65 53 035	35	15x1,25x10	78	51	-	9,0	15,0	9,0	29,0	18,0	-	55,5	5	-	M8	41,5	5,605	1,0
65 53 038	38	15x1,25x10	78	51	-	9,0	15,0	9,0	29,0	18,0	-	55,5	5	-	M8	41,5	5,432	0,9
65 54 009	9	25x1,25x18	49	35	-	6,6	11,0	8,5	18,0	17,0	-	68,0	5	-	M6	43,5	2,306	0,5
65 54 010	10	25x1,25x18	49	35	-	6,6	11,0	8,5	18,0	17,0	-	68,0	5	-	M6	43,5	2,300	0,5
65 54 011	11	25x1,25x18	49	35	-	6,6	11,0	8,5	18,0	17,0	-	68,0	5	-	M6	43,5	2,381	0,5
65 54 014	14	25x1,25x18	49	35	-	6,6	11,0	8,5	18,0	17,0	-	68,0	5	-	M6	43,5	1,161	0,5
65 54 015	15	25x1,25x18	49	35	-	6,6	11,0	8,5	18,0	17,0	-	68,0	5	-	M6	43,5	2,328	0,5
65 54 016	16	25x1,25x18	49	35	-	6,6	11,0	8,5	18,0	17,0	-	68,0	5	-	M6	43,5	1,161	0,5
65 54 019	19	25x1,25x18	49	35	-	6,6	11,0	8,5	18,0	17,0	-	68,0	5	-	M6	43,5	1,112	0,4
65 54 020	20	25x1,25x18	49	35	-	6,6	11,0	8,5	18,0	17,0	-	68,0	5	-	M6	43,5	2,268	0,5
65 54 022	22	25x1,25x18	49	35	-	6,6	11,0	8,5	18,0	17,0	-	68,0	5	-	M6	43,5	2,179	0,4
65 54 024	24	25x1,25x18	49	35	-	6,6	11,0	8,5	18,0	17,0	-	68,0	5	-	M6	43,5	1,007	0,4
65 54 025	25	25x1,25x18	64	51	-	9,0	15,0	9,0	29,0	18,0	-	68,0	5	-	M8	43,5	8,165	1,2
65 54 028	28	25x1,25x18	64	51	-	9,0	15,0	9,0	29,0	18,0	-	68,0	5	-	M8	43,5	8,061	1,2
65 54 032	32	25x1,25x18	64	51	-	9,0	15,0	9,0	29,0	18,0	-	68,0	5	-	M8	43,5	7,751	1,2
65 54 035	35	25x1,25x18	78	51	-	9,0	15,0	9,0	29,0	18,0	-	68,0	5	-	M8	43,5	7,690	1,1
65 54 038	38	25x1,25x18	78	51	-	9,0	15,0	9,0	29,0	18,0	-	68,0	5	-	M8	43,5	7,348	1,1
65 54 042	42	25x1,25x18	78	51	-	9,0	15,0	9,0	29,0	18,0	-	65,5	5	-	M8	43,5	6,595	1,1
65 55 014	14	38x1,25x29	64	51	-	9,0	15,0	9,0	29,0	18,0	-	72,5	5	-	M8	41,5	8,056	1,2
65 55 016	16	38x1,25x29	64	51	-	9,0	15,0	9,0	29,0	18,0	-	72,5	5	-	M8	41,5	8,029	1,2
65 55 019	19	38x1,25x29	64	51	-	9,0	15,0	9,0	29,0	18,0	-	72,5	5	-	M8	41,5	7,978	1,2
65 55 020	20	38x1,25x29	64	51	-	9,0	15,0	9,0	29,0	18,0	-	72,5	5	-	M8	41,5	7,945	1,2
65 55 022	22	38x1,25x29	64	51	-	9,0	15,0	9,0	29,0	18,0	-	72,5	5	-	M8	41,5	7,911	1,2
65 55 024	24	38x1,25x29	64	51	-	9,0	15,0	9,0	29,0	18,0	-	72,5	5	-	M8	41,5	7,860	1,2
65 55 025	25	38x1,25x29	64	51	-	9,0	15,0	9,0	29,0	18,0	-	72,5	5	-	M8	41,5	7,818	1,1
65 55 028	28	38x1,25x29	64	51	-	9,0	15,0	9,0	29,0	18,0	-	72,5	5	-	M8	41,5	8,105	1,3
65 55 032	32	38x1,25x29	64	51	-	9,0	15,0	9,0	29,0	18,0	-	72,5	5	-	M8	41,5	7,863	1,2
65 55 035	35	38x1,25x29	78	51	-	9,0	15,0	9,0	29,0	18,0	-	72,5	5	-	M8	41,5	7,610	1,1
65 55 038	38	38x1,25x29	78	51	-	9,0	15,0	9,0	29,0	18,0	-	72,5	5	-	M8	41,5	7,284	1,0
65 55 042	42	38x1,25x29	78	51	-	9,0	15,0	9,0	29,0	18,0	-	70,5	5	-	M8	41,5	6,547	1,0

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

51 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 51 1. ...

整体供货

Supplied as complete set



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

订购代码. Order code	BG	T_{2max} Nm	d_1	d_2	d_3	D	L_1	L_2	L_3	l	G	J 10^{-4} kg m²	kg
80 84 036	50	540	36	28	52	72	27,5	23,5	10	18	5 x M6	4,029	0,4
80 85 050	63	1180	50	36	70	90	31,5	27,5	12	22	9 x M6	11,322	0,8
80 86 062	80	2300	62	48	86	110	34,5	30,5	13	23	10 x M6	27,137	1,3

<6 arcmin

表中的值是根据齿根强度和锥齿轮侧面的承载能力，预计伺服驱动的满负荷运行和轴承的寿命是12000小时。如果是连续运行，温度限制必须考虑其中。（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.

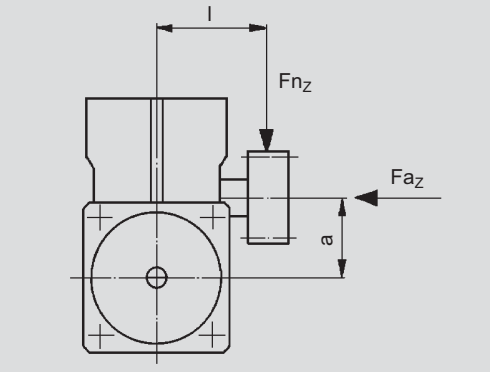
BG-伞齿轮型减速箱
BG-bevel gear units


<6 arcmin

订购代码. Order code		BG	i	$T_{2\,max.}$	驱动速度 / Driving speed n_1 in min^{-1} 500		750		1000		1500		3000		4000		5000		η
					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)	bei 1500
51 03 _05	51 13 _05	50	4,75	160	1,17	100	1,76	100	2,35	100	3,52	100	7,04	100	9,38	100	11,73	100	0,94
51 03 _07	51 13 _07		6,75	160	0,84	100	1,26	100	1,69	100	2,53	100	5,06	100	6,75	100	8,43	100	0,92
51 03 _09	51 13 _09		9,25	125	0,63	100	0,94	100	1,26	100	1,89	100	3,77	100	5,03	100	6,29	100	0,90
51 04 _05	51 14 _05	63	4,75	330	2,35	200	3,52	200	4,69	200	7,04	200	14,07	200	18,76	200	23,45	200	0,94
51 04 _07	51 14 _07		6,75	330	1,69	200	2,53	200	3,37	200	5,06	200	10,16	200	13,49	200	16,86	200	0,92
51 04 _09	51 14 _09		9,25	260	1,26	200	1,89	200	2,52	200	3,77	200	7,55	200	10,06	200	12,58	200	0,90
51 05 _05	51 15 _05	80	4,75	700	5,22	450	7,83	450	10,44	450	15,66	450	31,33	450	47,77	450	52,21	450	0,95
51 05 _07	51 15 _07		6,75	680	3,75	450	5,63	450	7,51	450	11,26	450	22,52	450	30,03	450	37,53	450	0,93
51 05 _09	51 15 _09		9,25	550	2,80	450	4,20	450	5,60	450	8,40	450	16,79	450	22,39	450	27,99	450	0,91

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.



结构尺寸 construction-size	BG	50		63		80	
减速箱中心到齿轮中心距离 Dimensions centre casing / centre teeth l (mm)		80	140	115	170	130	190
最大附加载荷 Max. additional load							
径向 Fr_z	[N]	5250	3000	9600	6500	19000	13000
轴向 Fa_z	[N]	2000	2000	3500	3500	6000	6000

简述

亚特兰BG-伞齿轮型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，或者很很短时间就可以发货。

BG-伺服减速箱的基本特征：
- 与98,58,59系列减速箱有相同的尺寸
- 与98,58,59系列减速箱的减速比类似，有些甚至一致
- 低背隙（背隙< 6′）
- 轻合金壳体结构具有很好的散热性能
- 坚固的滚锥轴承装配在空心输出轴上可承受更大的附加力
- 低惯量，高响应

外形尺寸和减速比与现有伺服蜗轮蜗杆减速箱相同。 伞齿轮在制造和安装过程中进行优化，并安装了合理的轴承支撑。优化的伞齿轮保证了双向旋转的顺滑性能。 壳体所有表面经过加工，并由合适的安装孔保证任何角度的安装要求。

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。

我们提供多种型号的减速箱输出轴，有直齿、斜齿系统和不同齿数的齿轮轴。除了齿轮轴之外，我们还可以提供多种齿轮与定制轴组合使用。 这些齿轮或者齿轮轴可以是键式连接或胀紧盘式连接与减速箱配合。

我们提供多种标准的伺服驱动部件配合齿条。从简单的软材质齿条到淬火磨削的直齿或斜齿高精度传动系统，都有现货供应。

对于减速箱安全停止的最大传动扭矩（参考GE-10）和胀紧盘（GH-1）必须核对完毕。

Short description

ATLANTA BG servo bevel gear units have been specially developed for use with new generation three-phase AC motors and DC motors. Like all other items in this catalogue they are usually available from stock or within very short time.

Our servo bevel gear units feature:

- gear ratios which are similar, sometimes identical with those of the series 98, 58, and 59
- low-clearance gearing (backlash < 6')
- light-alloy housing for optimal heat dissipation
- robust tapered-roller bearing of the output hollow shaft for high additional forces
- low moments of inertia for high dynamics

<6 arcmin

Sizes and gear ratios correspond with those of the existing servo worm-gear unit series. The bevel gears are manufactured and installed with optimal tooth bearing. The use of bevel gears end-lapped in sets guarantees smooth running in both directions of rotation. The housing is machined on all sides and provided with many fixing holes and threaded bores and can thus be installed in any mounting position desired.

The drive or the connection to the driving motor, is realized via a special clutch. The internal gearing of this clutch in combination with the barrelled profile of the driving shaft of our bevel gear units assures the flow of forces without play.

For the output drive we offer quite a number of output shafts with straight or helical tooth systems and with different numbers of teeth. Besides toothed pinion shafts it is possible to combine and use a large variety of other numbers of teeth from our gear-wheel program with matching special output shafts. It goes without saying that analogous to our gear units the complete range of output shafts is not only available for key fitting but also for shrink-disc fitting.

Our wide range of standard elements for servo drives is supplemented by toothed racks. The ex-stock program comprises many different types from rather simple, soft racks through hardened versions with straight tooth system or optionally with helical tooth system for smooth running, to racks ground on all sides to very narrow tolerances.

For safety-stop is the maximum transmittable torque of the gear unit (see page GE-10) and shrink disc (see page GH-1) has to be checked. The output keyway has to be calculated separately.

安装说明

伞齿轮减速箱
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GE-10），我们推荐最大接触面安装，就是带有输出轴的两个侧面。该系列减速箱无论如何安装，润滑情况是一样的。

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”是非常重要的数据（参考GI-5~GI-9）


<6 arcmin

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；深度测量器具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。

安装指导请查看 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 ISO 286).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。

Mounting Instructions

Bevel-gear unit
Five machined mounting surfaces with sufficiently dimensioned fixing holes and threaded bores are provided for tension-free installation in any mounting position. In order to make full use of the additional dynamic forces (see p. GE-10) we recommend to choose the largest available contact surfaces, i.e. on the side of the cover or on the opposite side. Lubrication conditions are almost the same in all mounting positions.

Coupling
The coupling is supplied pre-assembled. Before fixing it on the motor shaft carefully clean all contact surfaces and protect them with a thin oil film. An important dimension for mounting is ”X1” (compare pages GI – 5 to GI – 9)

We recommend to proceed as follows:
– Clean the contact surfaces and protect them with a thin oil film.
– Position the coupling on the motor shaft at the distance ”X1” (see pages GI – 5 to GI – 9) using a depth gauge for determining this dimension.
– Slightly tighten the screws alternately and check the coupling for true running
– Observe the tightening torque indicated in the operation and maintenance instructions bearing in mind that the width of the gap on both sides of the clutch must remain the same.
– It is advisable to make another final concentricity check at the reference collar.

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.

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。

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

Maintenance

更换润滑油
亚特兰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℃。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。

Lubricant change
ATLANTA servo-assisted bevel-gear units are filled with synthetic polyclycol oil.
Under the following conditions this means lifetime lubricacaton:
The layout of the gear unit is made strictly in conformance with the guidelines specified in the ATLANTA catalogue and the gear unit is operated exclusively within the permissible characteristic values and limits. The operator checks the gear regularly (every 4 weeks) for oil leakage. The surface temperature does not exceed max. 80° C. Experience has shown that this temperature is not reached with servo-operation (intermittent operation).

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

We recommend the following synthetic gear lubricant:

中心距 Construction size		润滑油量 Oil quantity
BG	50	0,3 l
BG	63	0,5 l
BG	80	1,2 l

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 ISO 20653
(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).

< 6 arcmin

页 / Page

负载表中给出的数据基于均匀平滑的伺服驱动给出。而实际应用中的情况是多种多样的，因此要考虑适当的系数：S, K_A 和 b_B（参看符号注释）来匹配相应的情况。润滑油的温度不能超过80℃。

用于确定功率和扭矩数据的公式：

$a = \frac{\nu}{t_b}$ [m/s²]

$F_u = m \cdot g + m \cdot a$ (垂直运行) [N]

$F_u = m \cdot g \cdot \mu + m \cdot a$ (水平运行) [N]

$T_{2erf.} = \frac{F_u \cdot d}{2000}$ [Nm]

$n_2 = \frac{\nu}{d \cdot \pi} \cdot 60000$ [min⁻¹]

$i_{Getr.} = \frac{n_1}{n_2}$

$T_{2zul.} = \frac{T_{2Tabelle}}{K_A \cdot S \cdot b_B}$ [Nm]

条件 $T_{2zul.} > T_{2erf.}$ 必须满足

$P_{1erf.} = \frac{T_{2erf.} \cdot n_2}{9550 \cdot \eta}$ [kW]

载荷系数 K_A

驱动	载荷类型取决于被驱动的部件		
	均匀	中等冲击	较大冲击
均匀	1,00	1,25	1,75
中等冲击	1,25	1,50	2,00
较大冲击	1,50	1,75	2,25

运行时间系数 b_B

运行时间	4–8 h	8–12 h	>12 h
运行时间系数	1,00	1,20	1,35

安全系数 S
安全系数允许根据经验数据计算 (S ≈ 1,1 ÷ 1,4)

符号

a	=	加速度或减速度	(m/s²)
b_B	=	运行时间系数	
d	=	齿轮节圆直径	(mm)
g	=	重力加速度	(9,81m /s²)
m	=	质量	(kg)
n_1	=	减速箱输入转速	(min⁻¹)
n_2	=	减速箱输出转速	(min⁻¹)
t_b	=	加速时间	(s)
i	=	减速比	(--)
ν	=	移动/升降 速度	(m/s)
F_u	=	齿轮上的外力	(N)
K_A	=	负载系数	(--)
P_1	=	减速箱输入功率	(kW)
S	=	安全系数	(--)
T_2	=	减速箱输出扭矩	(Nm)
η	=	减速箱效率	(--)
μ	=	摩擦系数	(--)
π	=	3,14159	

The values given in the load table are based on uniform, smooth servo-operation. Since, in practice, the applications are very diverse, it is essential to consider the given conditions by using the appropriate factors S, K_A and b_B (see symbols). The maximum oil-sump temperature of 80° C should not be exceeded.

Formulas for determining power and torque data:

$a = \frac{\nu}{t_b}$ [m/s²]

$F_u = m \cdot g + m \cdot a$ (for lifting axle) [N]

$F_u = m \cdot g \cdot \mu + m \cdot a$ (for driving axle) [N]

$T_{2req.} = \frac{F_u \cdot d}{2000}$ [Nm]

$n_2 = \frac{\nu}{d \cdot \pi} \cdot 60000$ (rpm) [min⁻¹]

$i_{gear} = \frac{n_1}{n_2}$

$T_{2perm.} = \frac{T_{2table}}{K_A \cdot S \cdot b_B}$ [Nm]

Condition $T_{2perm.} > T_{2req.}$ must be fulfilled.

$P_{1req.} = \frac{T_{2req.} \cdot n_2}{9550 \cdot \eta}$ [kW]

Load factor K_A

Drive	Type of load from the machines to be driven		
	uniform	medium shocks	heavy shocks
uniform	1,00	1,25	1,75
light shocks	1,25	1,50	2,00
medium shocks	1,50	1,75	2,25

Operating time factor b_B

Operating time	4–8 h	8–12 h	>12 h
Operating time factor	1,00	1,20	1,35

Safety coefficient S
The safety coefficient should be allowed for according to experience (S = 1.1 + 1.4).

Symbols

a	=	acceleration or retardation	(m/s²)
b_B	=	operating time factor	
d	=	pinion pitch-circle diameter	(mm)
g	=	acceleration due to gravity	(9,81m /s²)
m	=	mass	(kg)
n_1	=	gearbox input rpm	(min⁻¹)
n_2	=	gearbox output rpm	(min⁻¹)
t_b	=	acceleration time	(s)
i	=	gear ratios	(--)
ν	=	travelling/lifting speed	(m/s)
F_u	=	peripheral force at the pinion	(N)
K_A	=	load factor	(--)
P_1	=	gearbox input power	(kW)
S	=	safety coefficient	(--)
T_2	=	gearbox output torque	(Nm)
η	=	gearbox efficiency	(--)
μ	=	coefficient of friction	(--)
π	=	3,1459	

计算举例
Calculating example

已知条件
Values given

○ 水平运行 travelling operation	⊗ 垂直运行 lifting operation	
被移动质量 mass to be moved	m = 300	kg
速度 speed	v = 1,08	m/s
加速时间 acceleration time	t_b = 0,27	s
重力加速度 acceleration due to gravity	g = 9,81	m/s²
摩擦系数 coefficient of friction	μ = ___	
齿轮节圆直径 pitch-circle dia. of pinion	d = 63,66	mm
负载系数 load factor	K_A = 1,25	
运行时间系数 operation time factor	b_B = 1,2	
安全系数 safety coefficient	S = 1,2	
电机转速 motor rpm	n_1 = 3000	min^{-1}
电机类型 motor type		
电机品牌 motor manufacturer		

计算过程 Calculation process — 结果 Results

$a = \frac{v}{t_b}$ $a = \frac{1,08}{0,27}$ = 4 m/s²

$F_u = m \cdot g + m \cdot a$ $F_u = 300 \cdot 9,81 + 300 \cdot 4$ = 4143 N

$F_u = m \cdot g \cdot \mu + m \cdot a$ 仅适用于水平运行时/only travelling operation

$T_{2erf.} = \frac{F_u \cdot d}{2000}$ $T_{2erf.} = \frac{4143 \cdot 63,66}{2000}$ = 132 Nm

$n_2 = \frac{v}{d \cdot \pi} \cdot 60000$ $n_2 = \frac{1,08}{63,66 \cdot \pi} \cdot 60000$ = 324 min^{-1}

$i_{Getr.} = \frac{n_1}{n_2}$ $i_{Getr.} = \frac{3000}{325}$ ≅ 9,25

允许齿轮扭矩 $T_{2Tabelle}$ s. 参看 GB-13
permissible gear torque T_{2table} see page GB-13

假设 58_5_09 和 T_2=280 Nm 在 3000 min^{-1}
assumed with at

$T_{2zul.} = \frac{T_{2Tabelle}}{K_A \cdot S \cdot b_B}$ $T_{2zul.} = \frac{280}{1,25 \cdot 1,2 \cdot 1,2}$ = 155 Nm

条件
Condition

$T_{2zul.} > T_{2erf}$ = 155 Nm > 132 Nm = 满足 fulfilled

$P_{1erf} = \frac{T_{2erf} \cdot n_2}{9550 \cdot \eta}$ $P_{1erf} = \frac{132 \cdot 324}{9550 \cdot 0,90}$ = 4,98 KW

您的计算
Your calculation

已知条件
Values given

○ 水平运行 travelling operation	○ 垂直运行 lifting operation	
被移动质量 mass to be moved	m = _____	kg
速度 speed	v = _____	m/s
加速时间 acceleration time	t_b = _____	s
重力加速度 acceleration due to gravity	g = 9,81	m/s²
摩擦系数 coefficient of friction	μ = _____	
齿轮节圆直径 pitch-circle dia. of pinion	d = _____	mm
负载系数 load factor	K_A = _____	
运行时间系数 operation time factor	b_B = _____	
安全系数 safety coefficient	S = _____	
电机转速 motor rpm	n_1 = _____	min^{-1}
电机类型 motor type	_____	
电机品牌 motor manufacturer	_____	

计算过程 Calculation process — 结果 Results

$a = \frac{v}{t_b}$ a = _____ = _____ m/s²

$F_u = m \cdot g + m \cdot a$ F_u = _____ = _____ N

$F_u = m \cdot g \cdot \mu + m \cdot a$ F_u = _____ = _____ N

$T_{2erf.} = \frac{F_u \cdot d}{2000}$ $T_{2erf.}$ = _____ = _____ Nm

$n_2 = \frac{v}{d \cdot \pi} \cdot 60000$ n_2 = _____ · 60000 = _____ min^{-1}

$i_{Getr.} = \frac{n_1}{n_2}$ $i_{Getr.}$ = _____ ≅ _____

允许齿轮扭矩 $T_{2Tabelle}$ s. 参看 GB-13
permissible gear torque T_{2table} see page ...

$T_{2zul.} = \frac{T_{2Tabelle}}{K_A \cdot S \cdot b_B}$ $T_{2zul.}$ = _____ = _____ Nm

条件
Condition

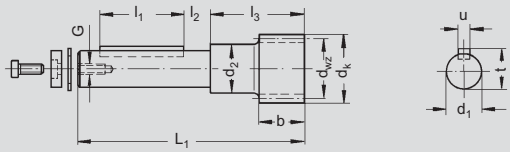
$T_{2zul.} > T_{2erf}$ = _____ Nm > _____ Nm = 满足 fulfilled

$P_{1erf} = \frac{T_{2erf} \cdot n_2}{9550 \cdot \eta}$ P_{1erf} = _____ = _____ KW

结果/Result: 减速箱/Gear 58_5_09 页/Page GB-6

页码 / Page

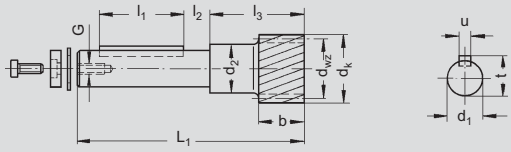
直齿系统，20°压力角，磨削齿，并进行齿冠优化，公差符合DIN 3962/63/67
straight tooth system, 20° pressure angle, teeth are ground and crowned, tolerances acc. to DIN 3962/63/67



16MnCr5, 1.7131 Case hardening steel
表面渗碳淬火 case-hardened
精度等级. / tooth. qual. 6 e 25

订货代码 Order code	减速箱中心距 Gearbox ao HP/E/B	模数 module	齿数. no. of teeth	x	d_{wz}	d_k	b	d_{1h6}	d_2	L_1	l_1	l_2	l_3	u	t	G	a	kg
20 28 115	32	2	15	0,375	31,50	35,5	25	20	24	105	28	13,5	50,0	6	22,5	M 5	37,75	0,50
20 28 021	50	2	21	–	42,00	46,0	25	25	35	141	63	13,0	53,0	8	28,0	M 8	43,00	1,21
20 28 332	50	2	32	–	64,00	68,0	25	25	38	141	63	13,0	53,0	8	28,0	M 8	54,00	1,25
20 28 321	50	3	21	–	63,00	69,0	30	25	38	143	63	13,0	55,0	8	28,0	M 8	57,50	1,33
20 28 432	63	2	32	–	64,00	68,0	25	28	42	166	80	14,5	57,5	8	31,0	M 8	54,00	1,50
20 28 421	63	3	21	–	63,00	69,0	30	28	42	168	80	14,5	60,0	8	31,0	M 8	57,50	1,60
20 28 417	63	4	17	–	68,00	76,0	40	28	42	173	80	14,5	65,0	8	31,0	M 8	69,00	2,00
20 28 532	80	2	32	–	64,00	68,0	25	36	48	181	100	12,5	57,0	10	39,0	M 12	54,00	2,35
20 28 521	80	3	21	–	63,00	69,0	30	36	48	186	100	12,5	62,0	10	39,0	M 12	57,50	2,50
20 28 517	80	4	17	–	68,00	76,0	40	36	48	191	100	12,5	67,0	10	39,0	M 12	69,00	2,65
20 28 617	100	4	17	–	68,00	76,0	40	48	57	216	125	9,0	72,0	14	51,5	M 12	69,00	4,05
20 28 630	100	4	30	–	120,00	128,0	40	48	57	216	125	9,0	72,0	14	51,5	M 12	95,00	6,40
20 28 613	100	5	13	0,500	70,00	80,0	50	48	57	226	125	9,0	82,0	14	51,5	M 12	69,00	4,20
20 28 715	125	5	15	0,500	80,00	90,0	50	60	68	272	150	10,0	90,0	18	64,0	M 16	74,00	6,94
20 28 713	125	6	13	0,500	84,00	96,0	60	60	68	282	150	10,0	100,0	18	64,0	M 16	85,00	7,45

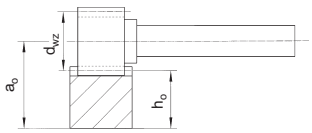
斜齿系统, 19° 31‘ 42" 左旋, 20° 压力角, 磨削齿，并进行齿冠优化，公差符合 DIN 3962/63/67
helical tooth system, 19°31’42" left, 20° pressure angle, teeth are ground and crowned, tolerances acc. to DIN 3962/63/67



16MnCr5, 1.7131 表面渗碳淬火
case-hardened 精度等级
tooth. qual. 6 e 25

订货代码 Order code	减速箱中心距 Gearbox ao HP/E/B	模数 module	齿数. no. of teeth	x	d_{wz}	d_k	b	d_{1h6}	d_2	L_1	l_1	l_2	l_3	u	t	G	a	kg
20 29 120	32	1,5	20	–	31,83	34,83	20	20	26	100	40	7,5	45,0	6	22,5	M 5	33,42	0,60
20 29 115	32	2	15	0,4172	33,50	37,50	25	20	24	105	28	13,5	50,0	6	22,5	M 5	39,75	0,50
20 29 020	50	2	20	–	42,44	46,44	25	25	35	141	63	13,0	53,0	8	28,0	M 8	43,22	1,21
20 29 330	50	2	30	–	63,66	67,70	25	25	38	141	63	13,0	53,0	8	28,0	M 8	53,83	1,25
20 29 320	50	3	20	–	63,66	69,70	30	25	38	143	63	13,0	55,0	8	28,0	M 8	57,83	1,33
20 29 430	63	2	30	–	63,66	67,70	25	28	42	166	80	14,5	57,5	8	31,0	M 8	53,83	1,50
20 29 420	63	3	20	–	63,66	69,70	30	28	42	168	80	14,5	60,0	8	31,0	M 8	57,83	1,60
20 29 415	63	4	15	–	63,66	71,70	40	28	42	173	80	14,5	65,0	8	31,0	M 8	66,83	1,85
20 29 530	80	2	30	–	63,66	69,70	25	36	48	181	100	12,5	57,0	10	39,0	M 12	53,83	2,40
20 29 520	80	3	20	–	63,66	69,70	30	36	48	186	100	12,5	62,0	10	39,0	M 12	57,87	2,40
20 29 515	80	4	15	–	63,66	71,70	40	36	48	191	100	12,5	67,0	10	39,0	M 12	66,83	2,50
20 29 615	100	4	15	–	63,66	71,70	40	48	57	216	125	9,0	72,0	14	51,5	M 12	66,83	3,90
20 29 630	100	4	30	–	127,32	135,30	40	48	57	216	125	9,0	72,0	14	51,5	M 12	98,66	6,90
20 29 612	100	5	12	0,434	68,00	78,00	50	48	57	226	125	9,0	82,0	14	51,5	M 12	68,00	4,20
20 29 715	125	5	15	0,500	84,58	94,50	50	60	68	272	150	10,0	90,0	18	64,0	M 16	76,29	7,24
20 29 713	125	6	13	0,500	88,76	100,70	60	60	70	282	150	10,0	100,0	18	64,0	M 16	87,38	7,89

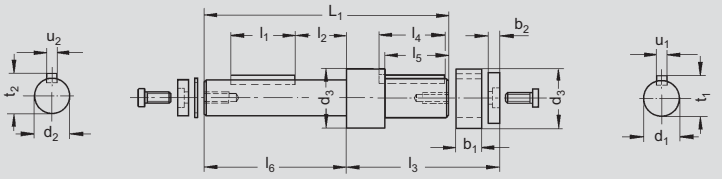
齿轮和齿条之间的中心距计算.
Calculation of centre distance a between pinion and rack.



$$a_o = \frac{d_{wz}}{2} + h_o$$

键连接输出驱动轴
Output drive shafts for key connection

无齿轮 16 MnCr 5, 材料编号 1.7131
without teeth, of 16 MnCr 5, Mat. No.1.7131



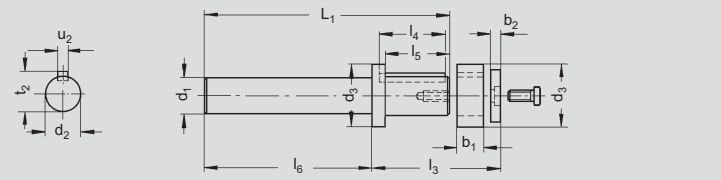
16MnCr5, 1.7131
表面渗碳淬火 case-hardened
有键槽 incl. keyway

订货代码 Order code	减速箱中心距 Gearbox ao HP/E/B	d_{1h6}	d_{2j6}	d_3	L_1	l_1	l_2	l_3	l_4	l_5	l_6	u_1	u_2	t_1	t_2	b_1	b_2	kg
65 02 001	32	20	20	-	119,0	40	-	Paarungs-	40	-	-	6	6	22,5	22,5	-	-	0,6
65 03 040	50	25	25	40	160,0	63	13,0	abhängig	50	48	87	8	8	28,0	28,0	20	8,0	0,9
65 03 140	50	25	25	40	210,0	63	13,0	dep. on	50	48	87	8	8	28,0	28,0	20	8,0	1,3
65 04 040	63	28	30	45	185,0	80	14,5	pairing	50	48	107	8	8	31,0	33,0	20	8,0	1,1
65 04 140	63	28	30	45	235,0	80	14,5		50	48	107	8	8	31,0	33,0	20	8,0	1,7
65 05 040	80	36	35	48	203,5	100	12,5		50	48	123	10	10	39,0	38,0	20	11,5	2,0
65 05 140	80	36	35	48	253,5	100	12,5		50	48	123	10	10	39,0	38,0	20	11,5	2,7
65 06 040	100	48	45	60	248,5	125	9,0		70	68	143	14	14	51,5	48,5	40	11,5	4,0
65 06 140	100	48	45	60	298,5	125	9,0		70	68	143	14	14	51,5	48,5	40	11,5	5,0
65 07 040	125	60	55	74	316,0	150	10,0		100	99	182	16	18	59,0	64,0	20	16,0	8,6

淬火的齿轮和胀紧盘安装，我们建议重新计算轴的受力
In the case of hardened gears and shrink-plate mounting of the gears we recommend to recalculate the shaft strength.

胀紧盘连接输出轴
Output drive for shrink-disc connection

无齿轮 16 MnCr 5, 材料编号 1.7131
without teeth, of 16 MnCr 5, Mat.No.1.7131

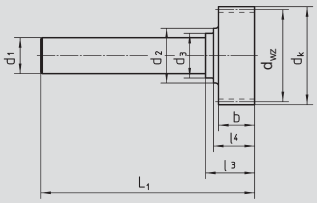


16MnCr5, 1.7131 Case hardening steel
表面渗碳淬火 case-hardened
有键槽 incl. keyway

订货代码 Order code	减速箱中心距 Gearbox ao HT/BG	HP/E/B	d_{1h6}	d_{2j6}	d_3	L_1	l_3	l_4	l_5	l_6	u_2	t_2	b_1	b_2	kg
65 03 080		50	25	25	40	168	Paarungs-	50	48	113,5	8	28	20	8	0,8
65 03 180		50	25	25	40	218	abhängig	50	48	113,5	8	28	20	8	1,2
65 04 080	50	63	28	30	45	200	dep. on	50	48	141	8	33	20	8	1,0
65 04 180	50	63	28	30	45	250	pairing	50	48	141	8	33	20	8	1,6
65 05 080	63	80	36	35	48	226		50	48	170,5	10	38	20	11,5	1,8
65 05 180	63	80	36	35	48	276		50	48	170,5	10	38	20	11,5	2,5
65 06 080	80	100	48	45	60	273		70	68	196,5	14	48,5	40	11,5	3,8
65 06 180	80	100	48	45	60	323		70	68	196,5	14	48,5	40	11,5	4,8
65 07 080	100	125	60	55	74	329		100	99	220	16	64	20	16	8,0

淬火的齿轮和胀紧盘安装，我们建议重新计算轴的受力.
In the case of hardened gears and shrink-plate mounting of the gears we recommend to recalculate the shaft strength.

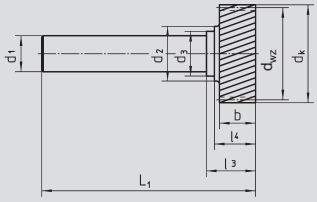
直齿系统，20°压力角，磨削齿，并进行齿冠优化，公差符合DIN 3962/63/67
straight tooth system, 20° pressure angle, teeth are ground and crowned, tolerances acc. to DIN 3962/63/67



16MnCr5, 1.7131 Case hardening steel
表面渗碳淬火 case-hardened
精度等级 tooth. qual. 6 e 25

订货代码 Order code	减速箱中心距 Gearbox size HT/BG	 HP/E/B	模数 module	齿数 no. of teeth	x	d_{wz}	d_k	b	d_{1h6}	d_2	d_3	L_1	l_3	l_4	a	kg
20 88 115		32	2	15	0,375	31,50	35,5	25	20	24	–	105	31,0	–	37,75	0,50
20 88 021		50	2	21	–	42,00	46,0	25	25	35	31	148	34,0	28,5	43,00	1,21
20 88 332		50	2	32	–	64,00	68,0	25	25	38	31	148	34,0	28,5	54,00	1,25
20 88 321		50	3	21	–	63,00	69,0	30	25	31	–	150	36,5	–	57,50	1,33
20 88 432	50	63	2	32	–	64,00	68,0	25	28	42	36	180	38,5	33,0	54,00	1,50
20 88 421	50	63	3	21	–	63,00	69,0	30	28	42	36	183	41,0	35,5	57,50	1,60
20 88 417	50	63	4	17	–	68,00	76,0	40	28	36	–	188	46,0	–	69,00	2,00
20 88 532	63	80	2	32	–	64,00	68,0	25	36	48	–	203	32,5	–	54,00	2,35
20 88 521	63	80	3	21	–	63,00	69,0	30	36	48	–	208	37,5	–	57,50	2,50
20 88 517	63	80	4	17	–	68,00	76,0	40	36	48	–	213	42,5	–	69,00	2,65
20 88 617	80	100	4	17	–	68,00	76,0	40	48	57	–	240	43,5	–	69,00	4,05
20 88 630	80	100	4	30	–	120,00	128,0	40	48	57	–	240	43,5	–	95,00	6,40
20 88 613	80	100	5	13	0,500	70,00	80,0	50	48	57	–	250	53,5	–	69,00	4,10
20 88 715	100	125	5	15	0,500	80,00	90,0	50	60	68	–	275	55,0	–	74,00	6,30
20 88 713	100	125	6	13	0,500	84,00	96,0	60	60	68	–	285	65,0	–	85,00	6,84

斜齿系统，19°31’42"左旋，20°压力角，磨削齿，并进行齿冠优化，公差符合DIN 3962/63/67
helical tooth system, 19°31’42" left, 20° pressure angle, teeth are ground and crowned, tolerances acc. to DIN 3962/63/67

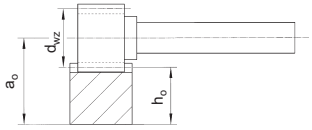


16MnCr5, 1.7131 Case hardening steel
表面渗碳淬火 case-hardened
精度等级 tooth. qual. 6 e 25

订货代码 Order code	减速箱中心距 Gearbox size HT/BG	 HP/E/B	模数 module	齿数 no. of teeth	x	d_{wz}	d_k	b	d_{1h6}	d_2	d_3	L_1	l_3	l_4	a	kg
20 89 120		32	1,5	20	–	31,83	34,83	20	20	26	–	100,25	26,0	–	33,40	0,50
20 89 115		32	2	15	0,4172	33,50	37,50	25	20	24	–	105	31,0	–	38,75	0,50
20 89 020		50	2	20	–	42,44	46,44	25	25	35	31	148	34,0	28,5	43,22	1,21
20 89 330		50	2	30	–	63,66	67,70	25	25	38	31	148	34,0	28,5	53,83	1,25
20 89 320		50	3	20	–	63,66	69,70	30	25	31	–	150	36,5	–	57,83	1,33
20 89 430	50	63	2	30	–	63,66	67,70	25	28	42	36	180	38,5	33,0	53,83	1,60
20 89 420	50	63	3	20	–	63,66	69,70	30	28	42	36	183	41,0	35,5	57,83	1,60
20 89 415	50	63	4	15	–	63,66	71,70	40	28	36	–	188	46,0	–	66,83	1,85
20 89 530	63	80	2	30	–	63,66	69,70	25	36	48	–	203	32,5	–	53,83	2,35
20 89 520	63	80	3	20	–	63,66	69,70	30	36	48	–	208	37,5	–	57,83	2,40
20 89 515	63	80	4	15	–	63,66	71,70	40	36	48	–	213	42,5	–	66,83	2,50
20 89 615	80	100	4	15	–	63,66	71,70	40	48	57	–	240	43,5	–	66,83	3,90
20 89 630	80	100	4	30	–	127,32	135,30	40	48	57	–	240	43,5	–	98,66	6,90
20 89 612	80	100	5	12	0,434	68,00	78,00	50	48	57	–	250	53,5	–	68,00	4,10
20 89 613	80	100	6	13	0,500	86,76	100,76	60	48	57	–	260	63,5	–	87,38	4,30
20 89 715	100	125	5	15	0,500	84,58	94,50	50	60	70	–	275	55,0	–	76,29	6,57
20 89 713	100	125	6	13	0,500	82,76	100,76	60	60	70	–	285	65,0	–	84,38	7,13
20 48 713*	100	125	6	13	0,500	88,76	100,76	60	60	70	–	285	65,0	–	87,38	7,13
20 48 715*	100	125	6	15	0,500	101,49	113,49	60	60	70	–	285	65,0	–	73,75	7,60

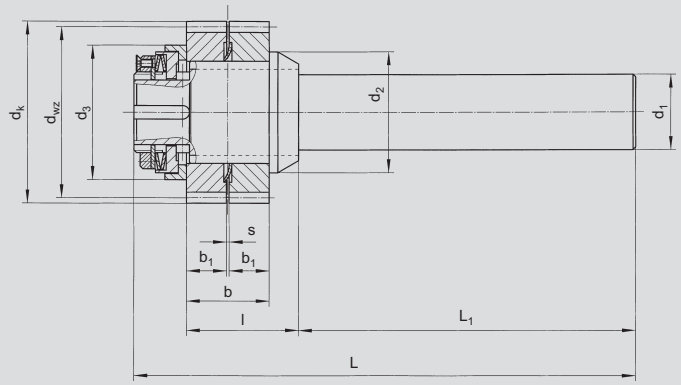
* 齿轮精度 4 e 22 / Gearing quality 4 e 22

齿轮和齿条之间的中心距计算
Calculation of centre distance a between pinion and rack.



$$a_o = \frac{d_{wz}}{2} + h_o$$

斜齿齿轮，19° 31 ‘42” 左旋，压力角20° 磨削齿，公差符合DIN 3962/63/67
with helical tooth system, 19°31‘42” left hand, 20° transverse pressure angle, ground teeth, tolerance acc. to DIN 3962/63/67



16MnCr5, 1.7131 Case hardening steel
表面渗碳淬火 case-hardened
精度等级 tooth. qual. 7 e 25

订货代码 Order Code	模数 Module	减速性中心距 Gearbox size HT	HP	胀紧盘 Shrink-disc	T_2 (Nm)* 无预加载荷 without pre-load	$T_{v\,max.}$ (Nm)* 最大预加载荷 with max. pre-load	z 齿数 No. of teeth	d_{wz}*	d_k	b	b_1	d_{1h6}	d_2	d_3	s	l	L_1	L	kg
74 92 330	2		50	80 83 030	135	67	30	63,66	67,7	31	15	25	45	50	1	37,5	114,0	171,5	1,41
74 92 430	2	50	63	80 84 036	135	67	30	63,66	67,7	31	15	28	45	50	1	42,0	141,5	203,5	1,75
74 93 320	3		50	80 83 030	250	125	20	63,66	69,7	31	15	25	45	50	1	37,5	114,0	171,5	1,45
74 93 420	3	50	63	80 84 036	250	125	20	63,66	69,7	31	15	28	45	50	1	42,0	141,5	203,5	1,70
74 93 520	3	63	80	80 85 050	250	125	20	63,66	69,7	31	15	36	48	50	1	41,0	170,5	237,5	2,45
74 94 515	4	63	80	80 85 050	385	192	15	63,66	71,7	41	20	36	48	50	1	46,0	170,5	237,5	2,50
74 95 615	5	80	100	80 86 062	650	325	15	84,58	94,5	52	25	48	57	70	2	57,0	196,5	284,5	5,50
74 96 613	6	80	100	80 86 062	975	487	13	88,76	100,7	62	30	48	57	68	2	67,0	196,5	284,5	6,00
74 96 713	6	100	125	80 87 080	975	487	13	88,76	100,7	62	30	60	72	68	2	67,0	220,0	308,0	9,00
74 98 712	8	100	125	80 87 080	2100	1050	12	109,86	125,8	82	40	60	80	88	2	88,0	220,0	332,0	9,50

* 扭矩基于淬火并磨削的齿条 / Torques based on using hardened and ground racks.

最大预加载荷

TVMAX/Max. pre-load torque Tv max

模数 Module	$T_{v\,max.}$	蝶形弹簧数量 Disc spring layers	旋紧调节螺母刻度 Tightening of adjusting nut
2	67 Nm	单层 / single	14 刻度 / 14 graduation marks
3	125 Nm	双层 / double	6 刻度 / 6 graduation marks
4	192 Nm	三层 / triple	7 刻度 / 7 graduation marks
5	325 Nm	双层 / double	3 刻度 / 3 graduation marks
6	487 Nm	双层 / double	5 刻度 / 5 graduation marks
8	550 Nm	双层 / double	3 刻度 / 3 graduation marks
8	1050 Nm	双层 / double	6 刻度 / 6 graduation marks

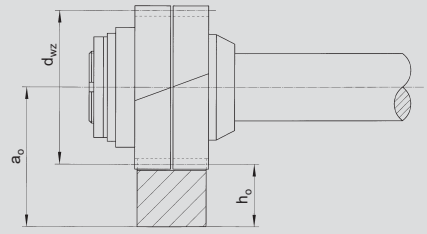
如何调整齿轮轴预载力，请参考 GG-6
How to adjust the pre-load pinion shaft, see page GG-6.

注意：多层蝶形弹簧可以增加预载力，但是TV max必须很小。蝶形弹簧片可以单独订购。

Note: Stronger pre-load is obtainable by means of multiple spring layers, but then Tv max. has to be smaller.Disc springs can also be ordered separately.

齿轮和齿条的中心距计算

Calculation of centre distance “a” between pinion and toothed rack.



$$a_o = \frac{d_{wz}}{2} + h_o$$

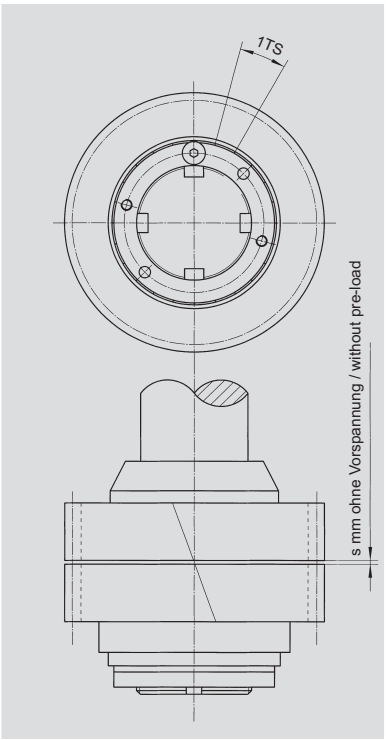
m	a_o	x	ho
2	53,83	–	22
3	57,83	–	26
4	66,83	–	35
5	76,29	0,5	34
6	87,38	0,5	43
8	125,93	0,5	71

安装说明
消隙齿轮轴由一个输出轴，一对斜齿齿轮和预加载系统组成。斜齿齿轮间有s=1mm（m=2…4）和s=2mm（m=5…8）的缝隙。通过减小两片齿轮间的缝隙（外侧齿轮沿轴向向内移动）来减小齿轮和齿条间的啮合背隙。齿轮和齿条的预载力可以通过预加载系统设置。

Description of operation
Pre-load pinion shafts consist of an output shaft, a helical split pinion and a pre-load unit. The split pinion is manufactured as a unit with an axial distance of s = 1 mm (m = 2...4) and s = 2 mm (m = 5...8). By reducing the distance between the pinions (axial displacement of the outer pinion) the backlash is reduced and pre-load initiated when teeth are in mesh with the rack. A defined pre-load torque between rack and split pinion can be produced by means of the pre-load unit.

调整说明
预加载系统构成：
- 调节螺帽，用安全垫圈和沉头螺钉保证调整结果。
- 蝶形弹簧部件
- 止退垫片

m=2…4的止退垫片背面有24个标记，m=5…8有12个标记，调节螺帽有4个标记（刻度）。
1.在无预加载情况下确定齿啮合的最佳接触。为了达到这个目的两个齿轮间的间隙应符合“s”（参考上面所述）。
2. 齿条和齿轮间的背隙应该<0.1mm.
3. 旋紧调节螺帽（先松开沉头螺栓）直至无、背隙。两片齿轮的侧面均与齿条相接触可以通过千分表检测齿轮的齿面测得。
4.通过调整调节螺帽到一定的标记（Ts），（参考调节图表）来产生相应的预载力（Tv）



Adjusting instructions
The pre-load unit consists of:
- an adjusting nut which is secured against turning by means of a safety washer and a countersunk screw
- a disc spring assembly
- a thrust plate.

The reverse side of the thrust plate is provided with 24 marks at m = 2...4 and 12 at m = 5...8, and the adjusting nut with 4 marks (graduations).
1. Determine the optimal tooth contact with non-preloaded split-pinion shaft. For this purpose mount the pinion shaft with gap „s“ (see above).
2. The backlash between rack and split pinion should be < 0.1 mm.
3. Tighten the adjusting nut (loosen the countersunk screw) until no backlash remains. The two flanks of the split pinion should be in mutual contact. This can be checked by scanning the tooth flanks with a dial indicator.
4. The specified degree of pre-load (T_v) can be produced by turning the adjusting nut by a definite number of graduation marks (TS) (see adjusting diagram).

预载力“T_v”是齿轮齿条系统传动过程中确保无背隙的一个扭矩。定位位置的驱动力矩$T_{2max.}$根据下面的公式计算：

$T_{2\,max.} = T_2 - T_v$
如果: $T_{v\,max.} = T_{2\,max.}$ 全行程，无背隙驱动功能。

注意：预加载荷是在装配状态下调整的。因此装配的齿轮轴前段要由足够的调整空间。 我们推荐的调整扳手，请参考GG-8页。

The pre-load torque „T_v“ is the torque which ensures backlash-free positioning of the rack and pinion drive. The transmissible torque outside the positioning points „$T_{2max.}$“ can be determined according to the following formula:

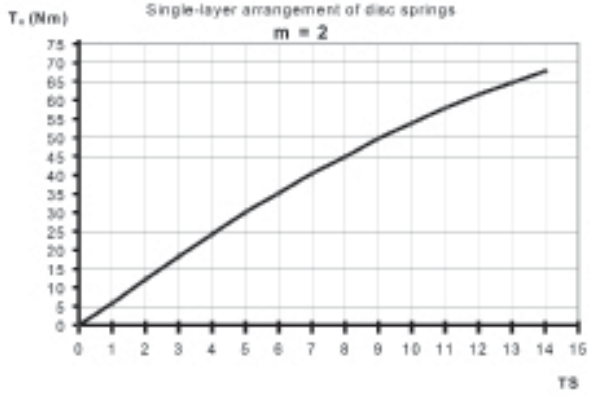
$$T_{2max.} = T_2 - T_v$$

If: $T_{v\,max.} = T_{2\,max.}$ the drive is free from play throughout the travelling distance.
Attention: The pre-load is adjusted in assembled condition; therefore the front side of the pinion shaft must be accessible.
To adjust the pre-load, we recommend our adjusting wrench (page GG-8).

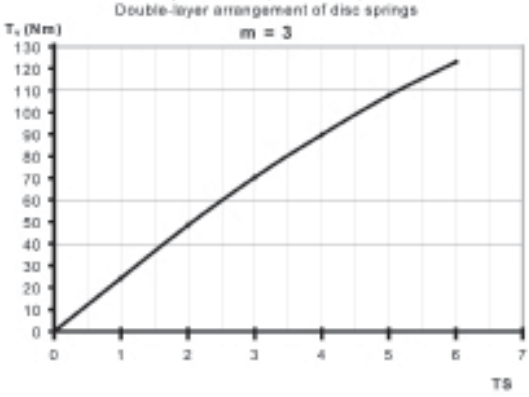
推荐润滑方式
毛毡齿轮和毛刷通过电子控制器供油润滑系统。毛毡齿轮的弹性，可以用于消隙齿轮最大消隙量的润滑。润滑油和齿轮齿条驱动的附件请参考伺服驱动目录ZE-2到ZE-9。

Lubrication recommendations
Felt gearwheel or sliding brush with grease supply by means of an electronically controlled lubricator. Due to the elasticity of the teeth, the felt gearwheels can be used even with maximum backlash compensation.
Lubricants see Servo-Catalogue page ZE-2 to ZE-9.

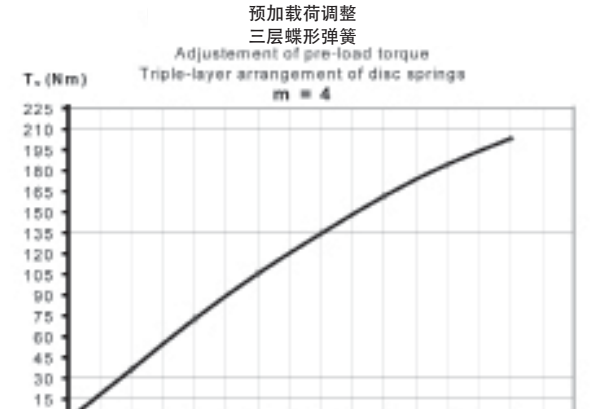
预加载荷调整
单层蝶形弹簧
Adjustement of pre-load torque
Single-layer arrangement of disc springs



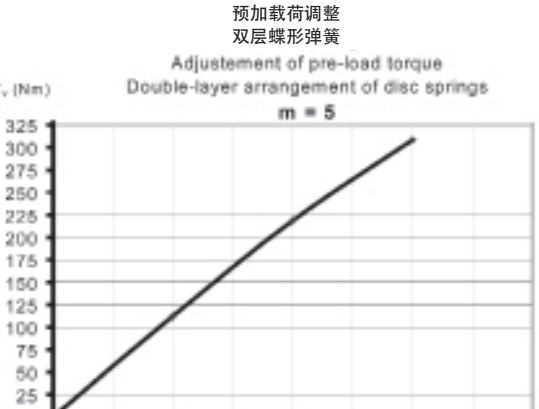
预加载荷调整
双层蝶形弹簧
Adjustement of pre-load torque
Double-layer arrangement of disc springs



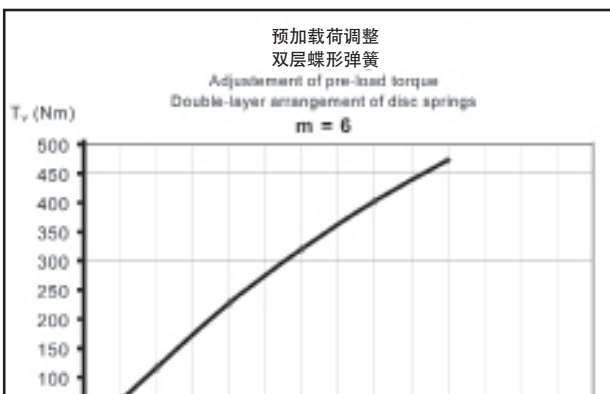
预加载荷调整
三层蝶形弹簧
Adjustement of pre-load torque
Triple-layer arrangement of disc springs



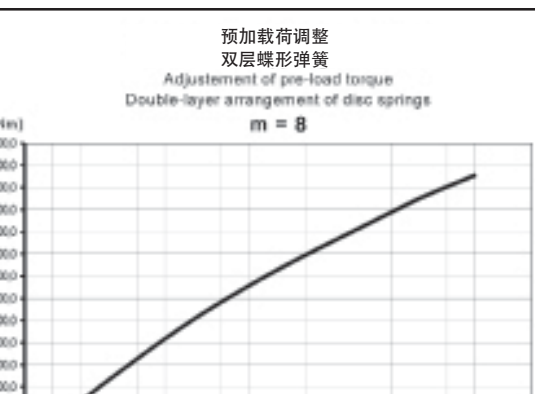
预加载荷调整
双层蝶形弹簧
Adjustement of pre-load torque
Double-layer arrangement of disc springs

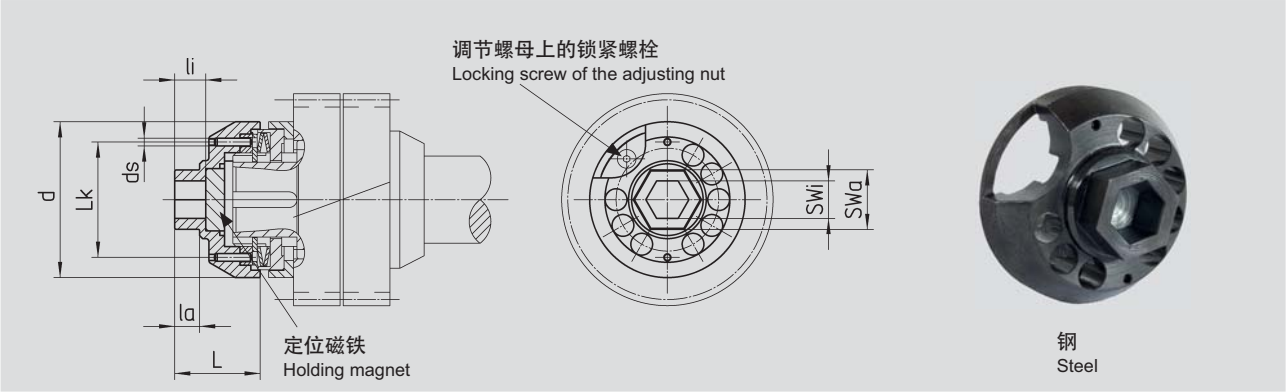


预加载荷调整
双层蝶形弹簧
Adjustement of pre-load torque
Double-layer arrangement of disc springs



预加载荷调整
双层蝶形弹簧
Adjustement of pre-load torque
Double-layer arrangement of disc springs





订购代码 Order code	消隙齿轮轴 Pre-load $T_{2\ max}$ pinion shafts	SWa	la	SWi	li	ds	Lk	d	L	kg
74 90 001	74 92 330 74 92 430 74 93 320 74 93 420 74 93 520 74 94 515	19	8	12	10,0	2,5	37	50	27,5	0,113
74 90 002	74 95 615 74 96 613 74 96 713	19	8	12	12,5	4,0	50	74	34,0	0,338
74 90 003	74 98 612 74 98 712	22	9	12	13,0	6,0	67	96	40,0	0,625

注意：

手动应用调节扳手。

仔细调节找到调节扳手和固定螺栓的正确位置。

销钉必须同调节螺母相匹配（不要敲打）。

定位磁铁保持调节扳手在某一位置。

松开调节螺母上的锁紧螺栓。

注意功能特性和调节说明来调节预载力。

在SWi位置使用合适的内六角扳手，SWa位置使用合适的扳手来旋动调节扳手。

通过锁紧定位螺栓来固定调节螺母。

Attention:

Apply the adjusting wrench by hand.

Be careful to position the adjusting wrench correctly in relation to the locking screw.

Pins must engage the adjusting nut (do not tap).

The holding magnet holds the adjusting wrench in position.

Loosen the locking screw by the adjusting nut.

Mind the functional characteristics and adjusting instructions for making the adjustment.

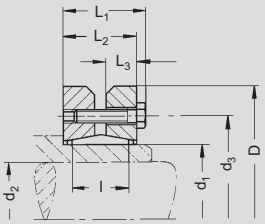
Use the Allen wrench with width over flats SWi or the fork wrench with width over flats SWa for turning the adjusting wrench.

Tighten the locking screw by the adjusting nut.

用于HT; HP; E; B; BG 系列减速箱输出轴与磨削齿轮的装配
For output drive shafts of gear series HT; HP; E; B; BG and gearwheels with ground teeth

整体供货

Supplied as complete set



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

订购代码 Order code	$T_{2\,max}$	d_2	d_1	d_3	D	L_1	L_2	L_3	l	G	锁紧扭矩 Torque	J 10^{-4} kg m²	kg
80 81 024	270	20	24	36	50,2	23,0	19,5	7,60	14,0	5 x M5	0,780	0,2
80 83 030	400	25	30	44	60,2	25,0	21,5	9,00	18,0	7 x M5	1,756	0,3
	200	19										
	130	16										
80 83 130	280	25	30	44	60,0	21,5	18,0	7,25	14,0	7 x M5	1,756	0,3
80 84 036	540	28	36	52	72,2	27,5	23,5	10,00	22,0	5 x M6	4,029	0,4
	270	22										
80 84 136	430	28	36	52	72,0	25,5	21,5	9,00	17,5	5 x M5	4,029	0,4
80 80 044	870	33	44	61	80,2	29,5	25,5	11,00	22,0	7 x M6	6,524	0,6
	810	32										
	490	25										
80 85 050	1350	38	50	72	90,2	31,5	27,5	12,00	22,0	9 x M6	11,322	0,8
	1180	36										
	870	32										
	730	30										
80 85 150	950	36	50	70	90,0	28,0	24,0	10,25	22,0	9 x M5	11,322	0,8
80 80 055	1480	44	55	75	100,2	34,5	30,5	13,00	23,0	8 x M6	18,729	1,1
	810	35										
	630	32										
80 86 062	2300	48	62	89	110,2	34,5	30,5	13,00	22,0	10 x M6	27,137	1,3
	1420	40										
80 80 068	1940	50	68	86	115,2	34,5	30,5	13,00	22,0	10 x M6	31,648	1,4
	1490	45										
80 87 080	3240	60	80	100	145,3	38,0	32,5	14,00	22,0	7 x M8	88,870	1,9
	2580	55										
80 80 110	7710	75	110	145	185,2	57,0	50,0	22,00	39,0	9 x M10	351,503	5,9
80 80 125	11080	85	125	160	215,3	61,0	54,6	23,00	42,0	12 x M10	664,000	8,3

描述
24系列齿轮（ZA-24至ZA-27页和ZB-21至ZB-27）可以安装在轴（公差h7）上，无论键连接还是胀紧盘连接，步骤如下：

Description
The series 24 cylindrical gears (pages ZA-24 to ZA-27 and ZB-21 to ZB-27) can be fitted on shafts (tolerance h7) either with key or with shrink plate fitting proceed as follows:

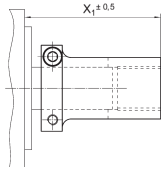
安装
将胀紧盘套在齿轮的空心轴肩上（不要锁紧螺栓），将齿轮装配在轴上，向内推至停止，或设计位置。然后均匀旋紧螺栓，是胀紧盘均匀的胀紧。然后依次锁紧螺栓达到表格中要求的扭矩（不是交叉锁紧）。用扭矩扳手锁到设定的扭矩。

Mounting
Slide shrink plate onto cylindrical gear hub (do not tighten the srews before). Push the cylindrical gear on the shaft up to a stop or the desired position. Now make the transverse pressure connection by uniformly tightening the clamping bolts. Tighten the bolts on after the other in several passes to the correct torque specified in the operation and maintenance instructions (do not tighten crosswise). Check the torque with an indicating torque wrench.

HT和HP系列伺服蜗轮蜗杆减速箱与伺服电机的装配指导
Servo motor mounting guide for HT- and HP-servo worm gear units

伺服电机和伺服减速箱的匹配除了电机轴和接口法兰的尺寸外，还需考虑伺服电机的性能和减速箱的性能匹配，针对不同的方案要求。特殊伺服电机厂商和型号，请参考GA-11/GB-13。

The pairing of servo-motors to servo-worm reducers only considers the servo shaft and flange dimensions; the servo-motor performance with the reducer must also be checked, as well as the individual application requirements. For specific servo-motor manufacturers and models, see page GA-11/GB-13.



* 联轴器向内至抵住 / coupling on block

中心距 / centre distance 50

马达尺寸 / Motor sizes						减速箱 / Gearbox						
轴径	轴长	子口	子口厚度	螺栓节圆	螺栓型号	联轴器	附加法兰	电机法兰	HT-系列伺服减速箱		HP-系列伺服减速		联轴器尺寸 x1
									符合EN ISO 9409	胀紧盘连接	键式连接	胀紧盘连接	
Shaft-Ø	Shaft length	Pilot-Ø	max. length of pilot	Bolt circle	Fixing srew	Coupling	add. flange	Motor flange	HT-Servo gearbox EN ISO 9409	Clamp connection	HP-Servo gearbox key way	Clamp connection	Dimension for coupling x1
10	32	80	6	100	M6	65 43 110		65 59 303	98 03 0xx	98 13 0xx	58 03 0xx	58 13 0xx	*
11	23	60	6	75	M8	65 43 111		65 59 306	98 03 0xx	98 13 0xx	58 03 0xx	58 13 0xx	*
11	23	60	6	90	M5	65 43 111	265 23 085	65 59 301	98 03 0xx	98 13 0xx	58 03 0xx	58 13 0xx	68
11	23	60	6	90	M5	65 43 111	265 23 085	65 59 301	98 03 0xx	98 13 0xx	58 03 0xx	58 13 0xx	*
11	25	60	4	75	M8	65 43 111		65 59 306	98 03 0xx	98 13 0xx	58 03 0xx	58 13 0xx	*
11	30	50	6	70	M4	65 43 111	265 23 084	65 59 301	98 03 0xx	98 13 0xx	58 03 0xx	58 13 0xx	*
11	30	80	4	100	M6	65 43 111	265 24 108	65 59 303	98 03 0xx	98 13 0xx	58 03 0xx	58 13 0xx	*
14	30	50	6	70	M5	65 43 914	265 23 087	65 59 301	98 03 0xx	98 13 0xx	58 03 0xx	58 13 0xx	*
14	30	50	4	95	M6	65 43 114		65 59 302	98 03 0xx	98 13 0xx	58 03 0xx	58 13 0xx	*
14	30	60	6	75	M8	65 43 914		65 59 306	98 03 0xx	98 13 0xx	58 03 0xx	58 13 0xx	*
14	30	70	4	90	M5	65 43 914	265 23 086	65 59 301	98 03 0xx	98 13 0xx	58 03 0xx	58 03 0xx	72
14	30	70	3,5	90	M6	65 43 914	265 23 096	65 59 301	98 03 0xx	98 13 0xx	58 03 0xx	58 13 0xx	*
14	30	80	6	100	M6	65 43 114		65 59 303	98 03 0xx	98 13 0xx	58 03 0xx	58 13 0xx	*
14	30	95	6	115	M8	65 43 114		65 59 301	98 03 0xx	98 13 0xx	58 03 0xx	58 13 0xx	*
16	40	60	6	75	M8	65 43 116		65 59 306	98 03 0xx	98 13 0xx	58 03 0xx	58 13 0xx	68
16	40	95	6	115	M8	65 43 116		65 59 301	98 03 0xx	98 13 0xx	58 03 0xx	58 13 0xx	*
16	40	70	6	90	M6	65 43 116	265 23 096	65 59 301	98 03 0xx	98 13 0xx	58 03 0xx	58 13 0xx	66
16	40	110	4	145	M8	65 43 916	265 23 081	65 59 305			58 03 0xx	58 13 0xx	*
16	43	95	4	115	M8	65 43 116	265 23 099	65 59 301	98 03 0xx	98 13 0xx	58 03 0xx	58 13 0xx	*
16	43	95	4	115	M8	65 43 116	265 23 099	65 59 305			58 03 0xx	58 13 0xx	*
19	35	70	6	90	M6	65 43 919	265 23 096	65 59 301	98 03 0xx	98 13 0xx	58 03 0xx	58 13 0xx	*
19	40	70	6	90	M5	65 43 919	265 23 086	65 59 301	98 03 0xx	98 13 0xx	58 03 0xx	58 13 0xx	*
19	40	80	6	100	M6	65 43 119		65 59 303	98 03 0xx	98 13 0xx	58 03 0xx	58 13 0xx	*
19	40	95	6	115	M8	65 43 119		65 59 301	98 03 0xx	98 13 0xx	58 03 0xx	58 13 0xx	*
19	40	95	6	130	M8	65 43 919		65 59 304	98 03 0xx	98 13 0xx	58 03 0xx	58 13 0xx	*
19	40	95	6	130	M8	65 43 919		65 59 304	98 03 0xx	98 13 0xx	58 03 0xx	58 13 0xx	*
19	40	95	6	115	M8	65 43 919	265 21 096	65 59 306	98 03 0xx	98 13 0xx	58 03 0xx	58 13 0xx	80
19	40	110	6	130	M8	65 43 919		65 59 402	98 03 0xx	98 13 0xx	58 03 0xx	58 13 0xx	*
19	50	95	6	115	M8	65 43 119		65 59 305			58 03 0xx	58 13 0xx	*
19	50	110	6	145	M8	65 43 119	265 23 095	65 59 301	98 03 0xx	98 13 0xx	58 03 0xx	58 13 0xx	*
19	55	80	6	100	M6	65 43 919	265 24 089	65 59 304	98 03 0xx	98 13 0xx	58 03 0xx	58 13 0xx	87
19	55	95	4	115	M8	65 43 119	265 23 088	65 59 301	98 03 0xx	98 13 0xx	58 03 0xx	58 13 0xx	*
24	50	95	3	115	M8	65 43 924	265 24 091	65 59 305	98 03 0xx	98 13 0xx	58 03 0xx	58 13 0xx	*
24	55	110	6	145	M8	65 43 924	265 24 084	65 59 301	98 03 0xx	98 13 0xx	58 03 0xx	58 13 0xx	82

HT和HP系列伺服蜗轮蜗杆减速箱与伺服电机的装配指导
Servo motor mounting guide for HT- and HP-servo worm gear units

更多信息请参考下页内容.

Further information see next page.

中心距 / centre distance 63

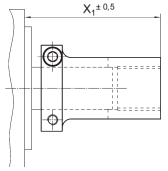
* 联轴器向内至抵住 / coupling on block

马达尺寸 / Motor sizes						减速箱 / Gearbox							
轴径	轴长	子口	子口厚度	螺栓节圆	螺栓型号	联轴器	附加法兰	电机法兰	HT-系列伺服减速箱		HP-系列伺服减速		联轴器尺寸 x1
									符合EN ISO 9409	胀紧盘连接	键式连接	胀紧盘连接	
Shaft-Ø	Shaft length	Pilot-Ø	max. length of pilot	Bolt circle	Fixing srew	Coupling	add. flange	Motor flange	HT-Servo gearbox EN ISO 9409	Clamp connection	HP-Servo gearbox key way	Clamp connection	Dimension for coupling x1
14	30	50	6	70	M5	535 72 075	265 23 087	65 59 401	98 04 0xx	98 14 0xx	58 04 0xx	58 14 0xx	*
14	30	50	6	95	M6	65 44 114	265 23 096	65 59 404	98 04 0xx	98 14 0xx	58 04 0xx	58 14 0xx	60
14	30	60	4	75	M5	535 72 075	265 23 094	65 59 401	98 04 0xx	98 14 0xx	58 04 0xx	58 14 0xx	*
14	30	80	6	100	M6	535 72 075	265 24 089	65 59 403	98 04 0xx	98 14 0xx	58 04 0xx	58 14 0xx	*
14	30	95	4	115	M8	65 44 114		65 59 401	98 04 0xx	98 14 0xx	58 04 0xx	58 14 0xx	*
19	28	130	4	165	M10	65 44 219		65 59 407	98 04 0xx	98 14 0xx	58 04 0xx	58 14 0xx	*
19	35	70	6	90	M6	65 44 219	265 23 096	65 59 401	98 04 0xx	98 14 0xx	58 04 0xx	58 14 0xx	*
19	37,5	95	4	100	M8	65 44 119		65 59 401	98 04 0xx	98 14 0xx	58 04 0xx	58 14 0xx	*
19	40	70	6	90	M6	65 44 119	265 23 096	65 59 401	98 04 0xx	98 14 0xx	58 04 0xx	58 14 0xx	72,5
19	40	80	6	100	M6	65 44 919	265 24 089	65 59 403	98 04 0xx	98 14 0xx	58 04 0xx	58 14 0xx	*
19	40	95	4	115	M8	65 44 119		65 59 401	98 04 0xx	98 14 0xx	58 04 0xx	58 14 0xx	*
19	40	95	4	130	M8	65 44 119		65 59 403	98 04 0xx	98 14 0xx	58 04 0xx	58 14 0xx	*
19	40	110	4	130	M8	65 44 119		65 59 404	98 04 0xx	98 14 0xx	58 04 0xx	58 14 0xx	*
19	40	110	6	145	M8	65 44 919	265 24 093	65 59 401	98 04 0xx	98 14 0xx	58 04 0xx	58 14 0xx	*
19	40	130	4	165	M10	65 44 119		65 59 407	98 04 0xx	98 14 0xx	58 04 0xx	58 14 0xx	*
19	40	110	5	215	M12	65 44 919	265 25 099	65 59 406	98 04 0xx	98 14 0xx	58 04 0xx	58 14 0xx	*
19	46	130	4	165	M10	65 44 119		65 59 407	98 04 0xx	98 14 0xx	58 04 0xx	58 14 0xx	*
19	50	110	6	145	M8	65 44 119	265 24 093	65 59 401	98 04 0xx	98 14 0xx	58 04 0xx	58 14 0xx	84
19	55	95	4	115	M8	65 44 119	265 23 088	65 59 401	98 04 0xx	98 14 0xx	58 04 0xx	58 14 0xx	*
19	58	110	6	145	M8	65 44 119	265 24 093	65 59 401	98 04 0xx	98 14 0xx	58 04 0xx	58 14 0xx	88
22	53,5	130	4	165	M10	581 24 001		65 59 409	98 04 0xx	98 14 0xx	58 04 0xx	58 14 0xx	91
22	55	110	6	145	M8	581 24 001	265 24 093	65 59 401	98 04 0xx	98 14 0xx	58 04 0xx	58 14 0xx	90
22	58	110	6	145	M8	581 24 001	265 24 093	65 59 401	98 04 0xx	98 14 0xx	58 04 0xx	58 14 0xx	97
24	50	95	3	115	M8	65 44 024	265 24 091	65 59 401	98 04 0xx	98 14 0xx	58 04 0xx	58 14 0xx	*
24	50	110	5	130	M8	65 44 024		65 59 402	98 04 0xx	98 14 0xx	58 04 0xx	58 14 0xx	*
24	50	110	5	165	M10	65 44 024		65 59 406	98 04 0xx	98 14 0xx	58 04 0xx	58 14 0xx	*
24	50	130	4	165	M10	65 44 024		65 59 407	98 04 0xx	98 14 0xx	58 04 0xx	58 14 0xx	*
24	55	110	6	145	M8	65 44 024	265 24 093	65 59 401	98 04 0xx	98 14 0xx	58 04 0xx	58 14 0xx	85
28	58	130	4	165	M10	65 44 928		65 59 409	98 04 0xx	98 14 0xx	58 04 0xx	58 14 0xx	*
28	60	130	4	165	M10	65 44 928		65 59 409	98 04 0xx	98 14 0xx	58 04 0xx	58 14 0xx	*
32	50	130	4	165	M10	65 44 932		65 59 409	98 04 0xx	98 14 0xx	58 04 0xx	58 14 0xx	*
32	58	130	4	165	M10	65 44 932		65 59 409	98 04 0xx	98 14 0xx	58 04 0xx	58 14 0xx	*
32	58	130	5	215	M12	65 44 932	265 25 099	65 59 406	98 04 0xx	98 14 0xx	58 04 0xx	58 14 0xx	*
32	58	180	6	215	M12	65 44 932	265 26 098	65 59 406	98 04 0xx	98 14 0xx	58 04 0xx	58 14 0xx	105
32	60	130	5	215	M12	65 44 932	265 25 099	65 59 406	98 04 0xx	98 14 0xx	58 04 0xx	58 14 0xx	*
32	60	180	6	215	M12	65 44 932	265 26 098	65 59 406	98 04 0xx	98 14 0xx	58 04 0xx	58 14 0xx	105
35	79	114,3	4	200	M12	65 44 935	265 26 089	65 59 406	98 04 0xx	98 14 0xx	58 04 0xx	58 14 0xx	*
35	80	114,3	4	200	M12	65 44 935	265 26 088	65 59 406	98 04 0xx	98 14 0xx	58 04 0xx	58 14 0xx	110

HT和HP系列伺服蜗轮蜗杆减速箱与伺服电机的装配指导
Servo motor mounting guide for HT- and HP-servo worm gear units

伺服电机和伺服减速箱的匹配除了电机轴和接口法兰的尺寸外，还需考虑伺服电机的性能和减速箱的性能匹配，针对不同的方案要求。特殊伺服电机厂商和型号，请参考GA-11/GB-13。

The pairing of servo-motors to servo-worm reducers only considers the servo shaft and flange dimensions; the servo-motor performance with the reducer must also be checked, as well as the individual application requirements. For specific servo-motor manufacturers and models, see page GA-11/GB-13.



* 联轴器向内至抵住 / coupling on block

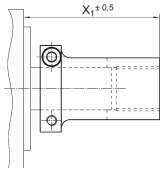
中心距 / centre distance 80

马达尺寸 / Motor sizes						减速箱 / Gearbox							
轴径	轴长	子口	子口厚度	螺栓节圆	螺栓型号	联轴器	附加法兰	电机法兰	HT-系列伺服减速箱		HP-系列伺服减速		联轴器尺寸 x1
									符合EN ISO 9409	胀紧盘连接	键式连接	胀紧盘连接	
Shaft-Ø	Shaft length	Pilot-Ø	max. length of pilot	Bolt circle	Fixing srew	Coupling	add. flange	Motor flange	HT-Servo gearbox EN ISO 9409	Clamp connection	HP-Servo gearbox key way	Clamp connection	Dimension for coupling x1
19	40	70	3	90	M6	581 20 002	265 25 104	65 59 501	98 05 0xx	98 15 0xx	58 05 0xx	58 15 0xx	*
19	40	80	4	100	M6	581 20 002	265 25 094	65 59 501	98 05 0xx	98 15 0xx	58 05 0xx	58 15 0xx	*
19	40	95	6	115	M8	581 20 002	265 25 092	65 59 501	98 05 0xx	98 15 0xx	58 05 0xx	58 15 0xx	*
19	40	95	6	130	M8	581 20 002	265 25 093	65 59 501	98 05 0xx	98 15 0xx	58 05 0xx	58 15 0xx	*
19	40	110	4	130	M8	581 20 002	265 25 090	65 59 501	98 05 0xx	98 15 0xx	58 05 0xx	58 15 0xx	*
19	46	130	5	165	M10	581 20 002		65 59 507	98 05 0xx	98 15 0xx	58 05 0xx	58 15 0xx	*
19	55	95	6	115	M8	581 20 002	265 24 099	65 59 507	98 05 0xx	98 15 0xx	58 05 0xx	58 15 0xx	*
22	53,5	130	5	165	M10	528 44 005		65 59 507	98 05 0xx	98 15 0xx	58 05 0xx	58 15 0xx	*
22	55	110	6	145	M8	502 27 047	265 25 081	65 59 505	98 05 0xx	98 15 0xx	58 05 0xx	58 15 0xx	117
22	58	110	6	145	M8	502 27 047	265 25 081	65 59 505	98 05 0xx	98 15 0xx	58 05 0xx	58 15 0xx	117
24	40	110	6	165	M10	65 46 024		65 59 501	98 05 0xx	98 15 0xx	58 05 0xx	58 15 0xx	82
24	50	110	6	165	M10	65 46 024		65 59 501	98 05 0xx	98 15 0xx	58 05 0xx	58 15 0xx	*
24	50	130	4	165	M10	65 46 024		65 59 502	98 05 0xx	98 15 0xx	58 05 0xx	58 15 0xx	*
28	42	180	5	215	M12	65 46 928		65 59 505	98 05 0xx	98 15 0xx	58 05 0xx	58 15 0xx	*
28	58	130	5	165	M10	65 46 928		65 59 507	98 05 0xx	98 05 0xx	58 05 0xx	58 15 0xx	*
28	58	180	5	215	M12	65 46 928		65 59 505	98 05 0xx	98 15 0xx	58 05 0xx	58 15 0xx	*
28	60	180	5	215	M12	65 46 928		65 59 505	98 05 0xx	98 15 0xx	58 05 0xx	58 15 0xx	*
32	50	130	5	165	M10	65 46 932		65 59 507	98 05 0xx	98 15 0xx	58 05 0xx	58 15 0xx	103
32	58	130	5	165	M10	65 46 932		65 59 507	98 05 0xx	98 15 0xx	58 05 0xx	58 15 0xx	*
32	58	130	5	215	M12	65 46 932		65 59 506	98 05 0xx	98 15 0xx	58 05 0xx	58 15 0xx	*
32	58	180	5	215	M12	65 46 932		65 59 505	98 05 0xx	98 15 0xx	58 05 0xx	58 15 0xx	*
32	60	130	5	215	M12	65 46 932		65 59 506	98 05 0xx	98 15 0xx	58 05 0xx	58 15 0xx	*
32	60	180	5	215	M12	65 46 932		65 59 505	98 05 0xx	98 15 0xx	58 05 0xx	58 15 0xx	*
35	79 – 80	114,3	4	200	M12	65 46 935	265 26 089	65 59 501	98 05 0xx	98 15 0xx	58 05 0xx	58 15 0xx	*
38	80	180	5	215	M12	65 46 938		65 59 504	98 05 0xx	98 15 0xx	58 05 0xx	58 15 0xx	*
42	110	250	6	300	M16	505 33 019	265 27 028	65 59 504	98 05 0xx	98 15 0xx	58 05 0xx	58 15 0xx	149

HT和HP系列伺服蜗轮蜗杆减速箱与伺服电机的装配指导
Servo motor mounting guide for HT- and HP-servo worm gear units

伺服电机和伺服减速箱的匹配除了电机轴和接口法兰的尺寸外，还需考虑伺服电机的性能和减速箱的性能匹配，针对不同的方案要求。特殊伺服电机厂商和型号，请参考GA-11/GB-13。

The pairing of servo-motors to servo-worm reducers only considers the servo shaft and flange dimensions; the servo-motor performance with the reducer must also be checked, as well as the individual application requirements. For specific servo-motor manufacturers and models, see page GA-11/GB-13.



* 联轴器向内至抵住 / coupling on block

中心距 / centre distance 100

马达尺寸 / Motor sizes						减速箱 / Gearbox							
轴径	轴长	子口	子口厚度	螺栓节圆	螺栓型号	联轴器	附加法兰	电机法兰	HT-系列伺服减速箱 符合EN ISO 9409	胀紧盘连接	HP-系列伺服减速 键式连接	胀紧盘连接	联轴器尺寸 x1
Shaft-Ø	Shaft length	Pilot-Ø	max. length of pilot	Bolt circle	Fixing srew	Coupling	add. flange	Motor flange	HT-Servo gearbox EN ISO 9409	Clamp connection	HP-Servo gearbox key way	Clamp connection	Dimension for coupling x1
19	40	80	5	100	M6	502 27 026	265 25 109	65 59 501	98 06 0xx	98 16 0xx	58 06 0xx	98 16 0xx	97
19	40	95	6	115	M8	581 20 002	265 25 092	65 59 501	98 06 0xx	98 16 0xx	58 06 0xx	58 16 0xx	*
19	40	95	6	130	M8	581 20 002	265 25 093	65 59 501	98 06 0xx	98 16 0xx	58 06 0xx	58 16 0xx	*
19	40	110	4	130	M8	581 20 002	265 25 090	65 59 501	98 06 0xx	98 16 0xx	58 06 0xx	58 16 0xx	*
19	58	110	6	145	M8	535 72 058	265 25 081	65 59 505	98 06 0xx	98 16 0xx	58 06 0xx	58 16 0xx	*
24	40	110	4	165	M10	65 46 024		65 59 501	98 06 0xx	98 16 0xx	58 06 0xx	58 16 0xx	82
24	50	110	6	165	M10	65 46 024		65 59 501	98 06 0xx	98 16 0xx	58 06 0xx	58 16 0xx	*
24	50	130	4	165	M10	65 46 024		65 59 502	98 06 0xx	98 16 0xx	58 06 0xx	58 16 0xx	*
28	58	180	4	215	M12	65 46 928		65 59 505	98 06 0xx	98 16 0xx	58 06 0xx	58 16 0xx	*
28	60	130	4	165	M10	65 46 928		65 59 507	98 06 0xx	98 16 0xx	58 06 0xx	58 16 0xx	*
28	60	180	4	215	M12	65 46 928		65 59 505	98 06 0xx	98 16 0xx	58 06 0xx	58 16 0xx	*
32	50	130	4	165	M10	65 46 932		65 59 507	98 06 0xx	98 16 0xx	58 06 0xx	58 16 0xx	100
32	58	130	4	165	M10	65 46 932		65 59 507	98 06 0xx	98 16 0xx	58 06 0xx	58 16 0xx	*
32	58	130	4	215	M12	65 46 932		65 59 506	98 06 0xx	98 16 0xx	58 06 0xx	58 16 0xx	*
32	58	180	4	215	M12	65 46 932		65 59 505	98 06 0xx	98 16 0xx	58 06 0xx	58 16 0xx	*
32	60	130	4	215	M12	65 46 932		65 59 506	98 06 0xx	98 16 0xx	58 06 0xx	58 16 0xx	*
32	60	180	4	215	M12	65 46 932		65 59 505	98 06 0xx	98 16 0xx	58 06 0xx	58 16 0xx	*
35	79 – 80	114,3	4	200	M12	65 46 935	265 26 089	65 59 501	98 06 0xx	98 16 0xx	58 06 0xx	58 16 0xx	*
38	80	180	6	215	M12	65 46 938		65 59 504	98 06 0xx	98 16 0xx	58 06 0xx	58 16 0xx	*
42	110	250	6	300	M16	505 33 019	265 27 028	65 59 504	98 06 0xx	98 16 0xx	58 06 0xx	58 16 0xx	149

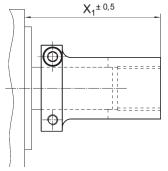
中心距 / centre distance 125

28	60	180	6	215	M12	65 46 928					58 47 0xx	58 87 0xx	*
32	60	180	6	215	M12	65 46 932					58 47 0xx	58 87 0xx	*
38	80	180	6	215	M12	65 46 938					58 47 1xx	58 87 1xx	*
48	58	180	6	215	M12	65 47 948					58 47 0xx	58 87 0xx	*
48	80 - 85	180	6	215	M12	65 47 948					58 47 1xx	58 87 1xx	*

E-, B- 和BG-系列伺服蜗轮蜗杆减速箱与伺服电机的装配指导
Servo motor mounting guide for E-, B- and BG-servo worm gear units

伺服电机和伺服减速箱的匹配除了电机轴和接口法兰的尺寸外，还需考虑伺服电机的性能和减速箱的性能匹配，针对不同的方案要求。特殊伺服电机厂商和型号，请参考 GC-14 / GD-11 / GE-14。

The pairing of servo-motors to servo worm gear units only considers the servo shaft and flange dimensions; the servo-motor performance with the gear units must also be checked, as well as the individual application requirements. For specific servo-motor manufacturers and models, see GC-14 / GD-14 / GE-10



* 联轴器向内至抵住 / coupling on block

中心距 / centre distance 32

马达尺寸/ Motor sizes						减速箱 / Gearbox							
轴径	轴长	子口	子口厚度	螺栓节圆	螺栓型号	联轴器	附加法兰	电机法兰	E-系列伺服减速箱		B-系列伺服减速箱		BG-系列伺服减速箱	联轴器尺寸 x1
									键式连接	胀紧盘连接.	键式连接	胀紧盘连接.	键式连接 胀紧盘连接.	
Shaft-Ø	Shaft length	Pilot-Ø	max. length of pilot	Bolt circle	Fixing srew	Coupling	add. flange	Motor flange	E-Servo gearbox key way	Clamp connection	B-Servo gearbox key way	Clamp connection	B-Servo gearbox Clamp connection	Dimen. for coupl. x1
8	25	30	2,5	46	M4	65 51 008	265 23 076	65 59 103	59 01 0xx	59 16 0xx	57 01 0xx	57 16 0xx		59
9	20	40	2,5	63	M5	65 51 009		65 59 101	59 01 0xx	59 11 0xx	57 01 0xx	57 11 0xx		49
9	24	40	2,5	63	M5	65 51 009		65 59 101	59 01 0xx	59 11 0xx	57 01 0xx	57 11 0xx		49
10	32	80	4	100	M6	65 51 010		65 59 104	59 01 0xx	59 11 0xx	57 01 0xx	57 11 0xx		56
11	23	60	3,5	75	M5	65 51 011		65 59 103	59 01 0xx	59 11 0xx	57 01 0xx	57 11 0xx		51
11	23	60	5	90	M5	65 51 011		5 02 99 001	59 01 0xx	59 11 0xx	57 01 0xx	57 11 0xx		50
11	30	50	4	70	M5	65 51 011		65 59 102	59 01 0xx	59 11 0xx	57 01 0xx	57 11 0xx		56
11	30	80	3	100	M6	65 51 011		65 59 104	59 01 0xx	59 11 0xx	57 01 0xx	57 11 0xx		56
14	30	50	4	70	M5	65 51 014		65 59 102	59 01 0xx	59 11 0xx	57 01 0xx	57 11 0xx		56
14	30	50	5	95	M6	65 51 014	265 21 078	65 59 103	59 01 0xx	59 11 0xx	57 01 0xx	57 11 0xx		62
14	30	60	3,5	75	M5	65 51 014		65 59 103	59 01 0xx	59 11 0xx	57 01 0xx	57 11 0xx		52
14	30	60	5	90	M5	65 51 014		5 02 99 001	59 01 0xx	59 11 0xx	57 01 0xx	57 11 0xx		52
14	30	70	4	90	M5	65 51 014	265 21 098	65 59 102	59 01 0xx	59 11 0xx	57 01 0xx	57 11 0xx		64
14	30	80	5	100	M6	65 51 014		65 59 104	59 01 0xx	59 11 0xx	57 01 0xx	57 11 0xx		56
16	35	80	5	100	M6	65 51 016		65 59 104	59 01 0xx	59 11 0xx	57 01 0xx	57 11 0xx		56
16	40	70	5	90	M6	65 51 016	265 21 097	65 59 102	59 01 0xx	59 11 0xx	57 01 0xx	57 11 0xx		71
16	40	80	5	100	M6	65 51 016		65 59 104	59 01 0xx	59 11 0xx	57 01 0xx	57 11 0xx		56
19	40	80	5	100	M6	65 53 019		65 59 104	59 01 0xx	59 11 0xx	57 01 0xx	57 11 0xx		56
19	40	95	5	115	M8	65 53 019	265 21 096	65 59 103	59 01 0xx	59 11 0xx	57 01 0xx	57 11 0xx		67

E-, B- 和BG-系列伺服蜗轮蜗杆减速箱与伺服电机的装配指导
Servo motor mounting guide for E-, B- and BG-servo worm gear units

更多信息请参考GI – 8页.

Further information see page GI – 8.

中心距 / centre distance 50

* 联轴器向内至抵住 / coupling on block

马达尺寸/ Motor sizes						减速箱 / Gearbox							
轴径	轴长	子口	子口厚度	螺栓节圆	螺栓型号	联轴器	附加法兰	电机法兰	E-系列伺服减速箱 键式连接	E-系列伺服减速箱 胀紧盘连接.	B-系列伺服减速箱 键式连接	B-系列伺服减速箱 胀紧盘连接.	BG-系列伺服减速箱 键式连接	BG-系列伺服减速箱 胀紧盘连接.	联轴器尺寸 x1
Shaft-Ø	Shaft length	Pilot-Ø	max. length of pilot	Bolt circle	Fixing srew	Coupling	add. flange	Motor flange	E-Servo gearbox key way	E-Servo gearbox Clamp connection	B-Servo gearbox key way	B-Servo gearbox Clamp connection	BG-Servo gearbox key way	BG-Servo gearbox Clamp connection	Dimen. for coupl. x1
10	32	80	6	100	M6	65 51 010		65 59 303	59 03 0xx	59 13 0xx	57 03 0xx	57 13 0xx	51 03 0xx	51 13 0xx	56
11	23	60	7	75	M5	65 43 111		65 59 306	59 03 0xx	59 13 0xx	57 03 0xx	57 13 0xx	51 03 0xx	51 13 0xx	*
11	23	60	6	90	M5	65 43 111	265 23 085	65 59 301	59 03 0xx	59 13 0xx	57 03 0xx	57 13 0xx	51 03 0xx	51 13 0xx	*
11	23	95	6	115	M8	65 51 011		65 59 301	59 03 0xx	59 13 0xx	57 03 0xx	57 13 0xx	51 03 0xx	51 13 0xx	51
11	25	60	6	75	M5	65 43 111		65 59 306	59 03 0xx	59 13 0xx	57 03 0xx	57 13 0xx	51 03 0xx	51 13 0xx	68,5
11	30	50	6	70	M4	65 43 111	265 23 084	65 59 301	59 03 0xx	59 13 0xx	57 03 0xx	57 13 0xx	51 03 0xx	51 13 0xx	*
11	30	80	6	100	M6	65 51 011		65 59 303	59 03 0xx	59 13 0xx	57 03 0xx	57 13 0xx	51 03 0xx	51 13 0xx	56
14	30	50	6	70	M5	65 43 914	265 23 087	65 59 301	59 03 0xx	59 13 0xx	57 03 0xx	57 13 0xx	51 03 0xx	51 13 0xx	*
14	30	50	6	95	M6	65 51 014		65 59 302	59 03 0xx	59 13 0xx	57 03 0xx	57 13 0xx	51 03 0xx	51 13 0xx	56
14	30	60	7	75	M5	65 43 914		65 59 306	59 03 0xx	59 13 0xx	57 03 0xx	57 13 0xx	51 03 0xx	51 13 0xx	*
14	30	70	6	90	M5	65 43 914	265 23 086	65 59 301	59 03 0xx	59 13 0xx	57 03 0xx	57 13 0xx	51 03 0xx	51 13 0xx	*
14	30	80	6	100	M6	65 51 014		65 59 303	59 03 0xx	59 13 0xx	57 03 0xx	57 13 0xx	51 03 0xx	51 13 0xx	56
14	30	95	6	115	M8	65 51 014		65 59 301	59 03 0xx	59 13 0xx	57 03 0xx	57 13 0xx	51 03 0xx	51 13 0xx	56
16	35	80	6	100	M6	65 51 016		65 59 303	59 03 0xx	59 13 0xx	57 03 0xx	57 13 0xx	51 03 0xx	51 13 0xx	56
16	40	60	7	75; 90	M5	65 51 016		65 59 306	59 03 0xx	59 13 0xx	57 03 0xx	57 13 0xx	51 03 0xx	51 13 0xx	68
16	40	70	7	90	M6	65 51 016		65 59 307	59 03 0xx	59 13 0xx	57 03 0xx	57 13 0xx	51 03 0xx	51 13 0xx	64
16	40	80	6	100	M6	65 51 016		65 59 303	59 03 0xx	59 13 0xx	57 03 0xx	57 13 0xx	51 03 0xx	51 13 0xx	56
16	40	110	7	145	M8	65 51 016		65 59 410	59 03 0xx	59 13 0xx	57 03 0xx	57 13 0xx	51 03 0xx	51 13 0xx	68
16	43	95	5	115	M8	65 51 016	265 23 099	65 59 301	59 03 0xx	59 13 0xx	57 03 0xx	57 13 0xx	51 03 0xx	51 13 0xx	66
19	35	70	7	90	M6	65 53 019		65 59 307	59 03 0xx	59 13 0xx	57 03 0xx	57 13 0xx	51 03 0xx	51 13 0xx	64
19	40	70	7	90	M6	65 53 019		65 59 307	59 03 0xx	59 13 0xx	57 03 0xx	57 13 0xx	51 03 0xx	51 13 0xx	64
19	40	80	6	100	M6	65 53 019		65 59 303	59 03 0xx	59 13 0xx	57 03 0xx	57 13 0xx	51 03 0xx	51 13 0xx	56
19	40	95	6	115	M8	65 53 019		65 59 301	59 03 0xx	59 13 0xx	57 03 0xx	57 13 0xx	51 03 0xx	51 13 0xx	56
19	40	95	6	130	M8	65 43 919		65 59 304	59 03 0xx	59 13 0xx	57 03 0xx	57 13 0xx	51 03 0xx	51 13 0xx	*
19	40	110	7	130	M8	65 53 019		65 59 402	59 03 0xx	59 13 0xx	57 03 0xx	57 13 0xx	51 03 0xx	51 13 0xx	72
19	40	110	7	145	M8	65 53 019		65 59 410	59 03 0xx	59 13 0xx	57 03 0xx	57 13 0xx	51 03 0xx	51 13 0xx	67
19	46	130	5	165	M10	65 53 019	265 23 097	65 59 301	59 03 0xx	59 13 0xx	57 03 0xx	57 13 0xx	51 03 0xx	51 13 0xx	72
19	50	110	6	145	M8	65 53 019	265 23 095	65 59 301	59 03 0xx	59 13 0xx	57 03 0xx	57 13 0xx	51 03 0xx	51 13 0xx	80
19	55	110	7	145	M8	65 53 019		65 59 411	59 03 0xx	59 13 0xx	57 03 0xx	57 13 0xx	51 03 0xx	51 13 0xx	78
19	58	110	7	145	M8	65 53 019		65 59 411	59 03 0xx	59 13 0xx	57 03 0xx	57 13 0xx	51 03 0xx	51 13 0xx	78
22	58	110	7	145	M8	65 53 022		65 59 411	59 03 0xx	59 13 0xx	57 03 0xx	57 13 0xx	51 03 0xx	51 13 0xx	78
22	55	114,3	7	200	M12	65 53 022		65 59 414	59 03 0xx	59 13 0xx	57 03 0xx	57 13 0xx	51 03 0xx	51 13 0xx	85
24	50	95	5	115	M8	65 53 024		65 59 305	59 03 0xx	59 13 0xx	57 03 0xx	57 13 0xx	51 03 0xx	51 13 0xx	72,5
24	55	110	7	145	M8	65 53 024		65 59 411	59 03 0xx	59 13 0xx	57 03 0xx	57 13 0xx	51 03 0xx	51 13 0xx	78
28	55	110	7	145	M8	65 53 028		65 59 411	59 03 0xx	59 13 0xx	57 03 0xx	57 13 0xx	51 03 0xx	51 13 0xx	78
28	55	114,3	7	200	M12	65 53 028		65 59 414	59 03 0xx	59 13 0xx	57 03 0xx	57 13 0xx	51 03 0xx	51 13 0xx	85
35	79	114,3	7	200	M12	65 53 035		65 59 412	59 03 0xx	59 13 0xx	57 03 0xx	57 13 0xx	51 03 0xx	51 13 0xx	98
35	80	114,3	7	200	M12	65 53 035		65 59 412	59 03 0xx	59 13 0xx	57 03 0xx	57 13 0xx	51 03 0xx	51 13 0xx	98

E-, B- 和BG-系列伺服蜗轮蜗杆减速箱与伺服电机的装配指导
Servo motor mounting guide for E-, B- and BG-servo worm gear units

更多信息请参考GI – 8页.

Further information see page GI – 8.

中心距 / centre distance 63

* 联轴器向内至抵住 / coupling on block

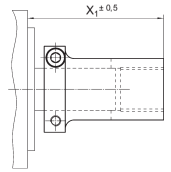
马达尺寸/ Motor sizes						减速箱 / Gearbox								
轴径	轴长	子口	子口厚度	螺栓节圆	螺栓型号	联轴器	附加法兰	电机法兰	E-系列伺服减速箱		B-系列伺服减速箱		BG-系列伺服减速箱		联轴器尺寸 x1
									键式连接	胀紧盘连接.	键式连接	胀紧盘连接.	键式连接	胀紧盘连接.	
Shaft-Ø	Shaft length	Pilot-Ø	max. length of pilot	Bolt circle	Fixing srew	Coupling	add. flange	Motor flange	E-Servo gearbox key way	E-Servo gearbox Clamp connection	B-Servo gearbox key way	B-Servo gearbox Clamp connection	BG-Servo gearbox key way	BG-Servo gearbox Clamp connection	Dimen. for coupl. x1
11	23	95	7	115	M8	65 54 011		65 59 401	59 04 0xx	59 14 0xx	57 04 0xx	57 14 0xx	51 04 0xx	51 14 0xx	71
14	30	50	7	70	M5	535 72 075	265 23 087	65 59 401	59 04 0xx	59 14 0xx	57 04 0xx	57 14 0xx	51 04 0xx	51 14 0xx	80
14	30	50	3	95	M6	65 44 114	265 24 080	65 59 404	59 04 0xx	59 14 0xx	57 04 0xx	57 14 0xx	51 04 0xx	51 14 0xx	70
14	30	60	4	75	M5	65 54 014	265 23 094	65 59 401	59 04 0xx	59 14 0xx	57 04 0xx	57 14 0xx	51 04 0xx	51 14 0xx	76
14	30	80	5	100	M8	65 54 014	265 24 089	65 59 403	59 04 0xx	59 14 0xx	57 04 0xx	57 14 0xx	51 04 0xx	51 14 0xx	80
14	30	95	3	115	M8	65 54 014		65 59 401	59 04 0xx	59 14 0xx	57 04 0xx	57 14 0xx	51 04 0xx	51 14 0xx	72
16	40	80	7	100	M6	65 54 016	265 24 089	65 59 403	59 04 0xx	59 14 0xx	57 04 0xx	57 14 0xx	51 04 0xx	51 14 0xx	87
16	43	95	7	115	M8	65 54 016		65 59 401	59 04 0xx	59 14 0xx	57 04 0xx	57 14 0xx	51 04 0xx	51 14 0xx	68
16	40	110	7	145	M8	65 54 016		65 59 410	59 04 0xx	59 14 0xx	57 04 0xx	57 14 0xx	51 04 0xx	51 14 0xx	70
19	35	70	7	90	M6	65 54 019	265 23 096	65 59 401	59 04 0xx	59 14 0xx	57 04 0xx	57 14 0xx	51 04 0xx	51 14 0xx	82
19	40	70	7	90	M6	65 54 019	265 23 096	65 59 401	59 04 0xx	59 14 0xx	57 04 0xx	57 14 0xx	51 04 0xx	51 14 0xx	82
19	40	95	7	115	M8	65 54 019		65 59 401	59 04 0xx	59 14 0xx	57 04 0xx	57 14 0xx	51 04 0xx	51 14 0xx	70
19	40	95	7	130	M8	65 54 019		65 59 403	59 04 0xx	59 14 0xx	57 04 0xx	57 14 0xx	51 04 0xx	51 14 0xx	70
19	40	110	7	130	M8	65 54 019		65 59 402	59 04 0xx	59 14 0xx	57 04 0xx	57 14 0xx	51 04 0xx	51 14 0xx	75
19	40	110	7	145	M8	65 54 019		65 59 410	59 04 0xx	59 14 0xx	57 04 0xx	57 14 0xx	51 04 0xx	51 14 0xx	70
19	40	130	7	165	M10	65 54 019		65 59 407	59 04 0xx	59 14 0xx	57 04 0xx	57 14 0xx	51 04 0xx	51 14 0xx	75
19	46	130	7	165	M10	65 54 019		65 59 407	59 04 0xx	59 14 0xx	57 04 0xx	57 14 0xx	51 04 0xx	51 14 0xx	75
19	55	95	7	115	M8	65 54 019	265 23 104	65 59 401	59 04 0xx	59 14 0xx	57 04 0xx	57 14 0xx	51 04 0xx	51 14 0xx	85
19	55	110	7	145	M8	65 54 019		65 59 411	59 04 0xx	59 14 0xx	57 04 0xx	57 14 0xx	51 04 0xx	51 14 0xx	81
19	58	110	7	145	M8	65 54 019		65 59 411	59 04 0xx	59 14 0xx	57 04 0xx	57 14 0xx	51 04 0xx	51 14 0xx	81
22	53,5	130	7	165	M10	65 54 022		65 59 409	59 04 0xx	59 14 0xx	57 04 0xx	57 14 0xx	51 04 0xx	51 14 0xx	95
22	55	110	7	145	M8	65 54 022		65 59 411	59 04 0xx	59 14 0xx	57 04 0xx	57 14 0xx	51 04 0xx	51 14 0xx	81
22	55	114,3	7	200	M12	65 54 022		65 59 414	59 04 0xx	59 14 0xx	57 04 0xx	57 14 0xx	51 04 0xx	51 14 0xx	88
22	58	110	7	145	M8	65 54 022		65 59 411	59 04 0xx	59 14 0xx	57 04 0xx	57 14 0xx	51 04 0xx	51 14 0xx	81
24	50	95	3,5	115	M8	65 54 024	265 24 091	65 59 401	59 04 0xx	59 14 0xx	57 04 0xx	57 14 0xx	51 04 0xx	51 14 0xx	77
24	55	110	7	145	M8	65 54 024		65 59 411	59 04 0xx	59 14 0xx	57 04 0xx	57 14 0xx	51 04 0xx	51 14 0xx	81
24	58	110	7	145	M8	65 54 024		65 59 415	59 04 0xx	59 14 0xx	57 04 0xx	57 14 0xx	51 04 0xx	51 14 0xx	86
28	60	130	7	165	M10	65 54 028		65 59 409	59 04 0xx	59 14 0xx	57 04 0xx	57 14 0xx	51 04 0xx	51 14 0xx	95
28	58	130	7	165	M10	65 54 028		65 59 409	59 04 0xx	59 14 0xx	57 04 0xx	57 14 0xx	51 04 0xx	51 14 0xx	95
28	55	114,3	7	200	M12	65 54 028		65 59 414	59 04 0xx	59 14 0xx	57 04 0xx	57 14 0xx	51 04 0xx	51 14 0xx	88
28	55	110	5	145	M8	65 54 028		65 59 411	59 04 0xx	59 14 0xx	57 04 0xx	57 14 0xx	51 04 0xx	51 14 0xx	78.2
32	50	130	7	165	M10	65 54 032		65 59 409	59 04 0xx	59 14 0xx	57 04 0xx	57 14 0xx	51 04 0xx	51 14 0xx	95
32	58	130	7	165	M10	65 54 032		65 59 409	59 04 0xx	59 14 0xx	57 04 0xx	57 14 0xx	51 04 0xx	51 14 0xx	95
32	58	130	4	215	M12	65 44 932	265 25 099	65 59 406	59 04 0xx	59 14 0xx	57 04 0xx	57 14 0xx	51 04 0xx	51 14 0xx	*
32	60	130	4	215	M12	65 44 932	265 25 099	65 59 406	59 04 0xx	59 14 0xx	57 04 0xx	57 14 0xx	51 04 0xx	51 14 0xx	*
35	79	114,3	7	200	M12	65 54 035		65 59 412	59 04 0xx	59 14 0xx	57 04 0xx	57 14 0xx	51 04 0xx	51 14 0xx	102
35	80	114,3	7	200	M12	65 54 035		65 59 412	59 04 0xx	59 14 0xx	57 04 0xx	57 14 0xx	51 04 0xx	51 14 0xx	102

ATLANTA

E-, B- 和BG-系列伺服蜗轮蜗杆减速箱与伺服电机的装配指导
Servo motor mounting guide for E-, B- and BG-servo worm gear units

伺服电机和伺服减速箱的匹配除了电机轴和接口法兰的尺寸外，还需考虑伺服电机的性能和减速箱的性能匹配，针对不同的方案要求。特殊伺服电机厂商和型号，请参考 GC-14 / GD-14 / GE-10。

The pairing of servo-motors to servo worm gear units only considers the servo shaft and flange dimensions; the servo-motor performance with the gear units must also be checked, as well as the individual application requirements. For specific servo-motor manufacturers and models, see GC-14 / GD-14 / GE-10



* 联轴器向内至抵住 / coupling on block

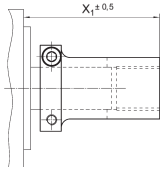
中心距 / centre distance 80

马达尺寸/ Motor sizes						减速箱 / Gearbox								
轴径	轴长	子口	子口厚度	螺栓节圆	螺栓型号	联轴器	附加法兰	电机法兰	E-系列伺服减速箱		B-系列伺服减速箱		BG-系列伺服减速箱		联轴器尺寸 x1
									键式连接	胀紧盘连接.	键式连接	胀紧盘连接.	键式连接	胀紧盘连接.	
Shaft-Ø	Shaft length	Pilot-Ø	max. length of pilot	Bolt circle	Fixing srew	Coupling	add. flange	Motor flange	E-Servo gearbox key way	E-Servo gearbox Clamp connection	B-Servo gearbox key way	B-Servo gearbox Clamp connection	BG-Servo gearbox key way	BG-Servo gearbox Clamp connection	Dimen. for coupl. x1
16	40	110	7	145	M8	65 55 016		65 59 508	59 05 0xx	59 15 0xx	57 05 0xx	57 15 0xx	51 05 0xx	51 15 0xx	80
19	40	80	4	100	M6	65 55 019	265 25 094	65 59 501	59 05 0xx	59 15 0xx	57 05 0xx	57 15 0xx	51 05 0xx	51 15 0xx	90
19	40	95	5	115	M8	581 20 002	265 25 092	65 59 501	59 05 0xx	59 15 0xx	57 05 0xx	57 15 0xx	51 05 0xx	51 15 0xx	*
19	40	95	5	130	M8	581 20 002	265 25 093	65 59 501	59 05 0xx	59 15 0xx	57 05 0xx	57 15 0xx	51 05 0xx	51 15 0xx	*
19	40	110	4	130	M8	65 55 019	265 25 090	65 59 501	59 05 0xx	59 15 0xx	57 05 0xx	57 15 0xx	51 05 0xx	51 15 0xx	89
19	40	110	7	145	M8	65 55 019		65 59 508	59 05 0xx	59 15 0xx	57 05 0xx	57 15 0xx	51 05 0xx	51 15 0xx	82
19	40	130	7	165	M10	65 55 019		65 59 507	59 05 0xx	59 15 0xx	57 05 0xx	57 15 0xx	51 05 0xx	51 15 0xx	85
19	40	130	7	165	M10	65 55 019		65 59 502	59 05 0xx	59 15 0xx	57 05 0xx	57 15 0xx	51 05 0xx	51 15 0xx	84
19	46	130	7	165	M10	581 20 002		65 59 507	59 05 0xx	59 15 0xx	57 05 0xx	57 15 0xx	51 05 0xx	51 15 0xx	95
19	55	80	7	100	M6	65 55 019	265 26 080	65 59 501	59 05 0xx	59 15 0xx	57 05 0xx	57 15 0xx	51 05 0xx	51 15 0xx	97,5
19	55	95	7	115	M8	65 55 019	265 25 092	65 59 501	59 05 0xx	59 15 0xx	57 05 0xx	57 15 0xx	51 05 0xx	51 15 0xx	80
19	55	110	7	145	M8	65 55 019		65 59 509	59 05 0xx	59 15 0xx	57 05 0xx	57 15 0xx	51 05 0xx	51 15 0xx	100
19	58	110	7	145	M8	65 55 019		65 59 509	59 05 0xx	59 15 0xx	57 05 0xx	57 15 0xx	51 05 0xx	51 15 0xx	100
22	53,5	130	4	165	M10	65 55 022	265 25 097	65 59 501	59 05 0xx	59 15 0xx	57 05 0xx	57 15 0xx	51 05 0xx	51 15 0xx	103.5
22	55	110	3	145	M8	502 27 047	265 25 081	65 59 505	59 05 0xx	59 15 0xx	57 05 0xx	57 15 0xx	51 05 0xx	51 15 0xx	117
22	55	110	7	145	M8	65 55 022		65 59 509	59 05 0xx	59 15 0xx	57 05 0xx	57 15 0xx	51 05 0xx	51 15 0xx	100
22	55	114,3	7	200	M12	65 55 022		65 59 512	59 05 0xx	59 15 0xx	57 05 0xx	57 15 0xx	51 05 0xx	51 15 0xx	97,5
22	58	110	7	145	M8	65 55 022		65 59 509	59 05 0xx	59 15 0xx	57 05 0xx	57 15 0xx	51 05 0xx	51 15 0xx	100
24	40	110	7	165	M10	65 55 024		65 59 501	59 05 0xx	59 15 0xx	57 05 0xx	57 15 0xx	51 05 0xx	51 15 0xx	77,5
24	58	110	7	145	M8	65 55 024		65 59 509	59 05 0xx	59 15 0xx	57 05 0xx	57 15 0xx	51 05 0xx	51 15 0xx	100
28	55	110	7	145	M8	65 55 028		65 59 509	59 05 0xx	59 15 0xx	57 05 0xx	57 15 0xx	51 05 0xx	51 15 0xx	82.5
28	55	114,3	7	200	M12	65 55 028		65 59 512	59 05 0xx	59 15 0xx	57 05 0xx	57 15 0xx	51 05 0xx	51 15 0xx	97,5
28	58	130	7	165	M10	65 55 028		65 59 507	59 05 0xx	59 15 0xx	57 05 0xx	57 15 0xx	51 05 0xx	51 15 0xx	104
28	58	180	7	215	M12	65 55 028		65 59 505	59 05 0xx	59 15 0xx	57 05 0xx	57 15 0xx	51 05 0xx	51 15 0xx	104
28	60	130	7	165	M10	65 55 028		65 59 507	59 05 0xx	59 15 0xx	57 05 0xx	57 15 0xx	51 05 0xx	51 15 0xx	104
28	60	180	7	215	M12	65 55 028		65 59 505	59 05 0xx	59 15 0xx	57 05 0xx	57 15 0xx	51 05 0xx	51 15 0xx	104
32	50	130	7	165	M10	65 46 932		65 59 507	59 05 0xx	59 15 0xx	57 05 0xx	57 15 0xx	51 05 0xx	51 15 0xx	*
32	58	130	7	165	M10	65 46 932		65 59 507	59 05 0xx	59 15 0xx	57 05 0xx	57 15 0xx	51 05 0xx	51 15 0xx	*
32	58	130	7	215	M12	65 55 032		65 59 506	59 05 0xx	59 15 0xx	57 05 0xx	57 15 0xx	51 05 0xx	51 15 0xx	104
32	58	180	7	215	M12	65 55 032		65 59 505	59 05 0xx	59 15 0xx	57 05 0xx	57 15 0xx	51 05 0xx	51 15 0xx	104
32	60	130	7	215	M12	65 55 032		65 59 506	59 05 0xx	59 15 0xx	57 05 0xx	57 15 0xx	51 05 0xx	51 15 0xx	104
32	60	180	7	215	M12	65 55 032		65 59 505	59 05 0xx	59 15 0xx	57 05 0xx	57 15 0xx	51 05 0xx	51 15 0xx	104
35	79 - 80	114,3	7	200	M12	65 55 035		65 59 510	59 05 0xx	59 15 0xx	57 05 0xx	57 15 0xx	51 05 0xx	51 15 0xx	118
38	80	180	6	215	M12	65 55 038		65 59 504	59 05 0xx	59 15 0xx	57 05 0xx	57 15 0xx	51 05 0xx	51 15 0xx	119
42	110	250	5	300	M16	505 33 019	265 27 025	65 59 503	59 05 0xx	59 15 0xx	57 05 0xx	57 15 0xx	51 05 0xx	51 15 0xx	*

E-, B- 和BG-系列伺服蜗轮蜗杆减速箱与伺服电机的装配指导
Servo motor mounting guide for E-, B- and BG-servo worm gear units

伺服电机和伺服减速箱的匹配除了电机轴和接口法兰的尺寸外，还需考虑伺服电机的性能和减速箱的性能匹配，针对不同的方案要求。特殊伺服电机厂商和型号，请参考 GC-14 / GD-14 / GE-10。

The pairing of servo-motors to servo worm gear units only considers the servo shaft and flange dimensions; the servo-motor performance with the gear units must also be checked, as well as the individual application requirements. For specific servo-motor manufacturers and models, see GC-14 / GD-14 / GE-10



* 联轴器向内至抵住 / coupling on block

中心距 / centre distance 100

马达尺寸/ Motor sizes						减速箱 / Gearbox						
轴径	轴长	子口	子口厚度	螺栓节圆	螺栓型号	联轴器	附加法兰	电机法兰	E-系列伺服减速箱		B-系列伺服减速箱		BG-系列伺服减速箱	联轴器尺寸 x1
									键式连接	胀紧盘连接.	键式连接	胀紧盘连接.	键式连接 胀紧盘连接.	
Shaft-Ø	Shaft length	Pilot-Ø	max. length of pilot	Bolt circle	Fixing srew	Coupling	add. flange	Motor flange	E-Servo gearbox key way	Clamp connection	B-Servo gearbox key way	Clamp connection	BG-Servo gearbox key way Clamp connection	Dimen. for coupl. x1
24	40	110	7	165	M10	65 55 024		65 59 501	59 06 0xx	59 16 0xx	57 06 0xx	57 16 0xx		84
24	50	110	7	165	M10	65 55 024		65 59 501	59 06 0xx	59 16 0xx	57 06 0xx	57 16 0xx		84
24	50	130	7	165	M10	65 55 024		65 59 502	59 06 0xx	59 16 0xx	57 06 0xx	57 16 0xx		84
28	42	180	7	215	M12	65 55 028		65 59 505	59 06 0xx	59 16 0xx	57 06 0xx	57 16 0xx		94
28	58	130	7	165	M10	65 55 028		65 59 507	59 06 0xx	59 16 0xx	57 06 0xx	57 16 0xx		104
28	58	180	7	215	M12	65 55 028		65 59 505	59 06 0xx	59 16 0xx	57 06 0xx	57 16 0xx		94
28	60	130	7	165	M10	65 55 028		65 59 507	59 06 0xx	59 16 0xx	57 06 0xx	57 16 0xx		104
28	60	180	7	215	M12	65 55 028		65 59 505	59 06 0xx	59 16 0xx	57 06 0xx	57 16 0xx		94
32	50	130	7	165	M10	65 55 032		65 59 502	59 06 0xx	59 16 0xx	57 06 0xx	57 16 0xx		84
32	58	130	7	165	M10	65 55 032		65 59 507	59 06 0xx	59 16 0xx	57 06 0xx	57 16 0xx		102
32	58	180	7	215	M12	65 55 032		65 59 505	59 06 0xx	59 16 0xx	57 06 0xx	57 16 0xx		104
32	60	130	7	215	M10	65 55 032	265 25 099	65 59 501	59 06 0xx	59 16 0xx	57 06 0xx	57 16 0xx		100
32	60	180	7	215	M12	65 55 032		65 59 505	59 06 0xx	59 16 0xx	57 06 0xx	57 16 0xx		104
35	79 - 80	114,3	7	200	M12	65 55 035		65 59 510	59 06 0xx	59 16 0xx	57 06 0xx	57 16 0xx		117
38	80	180	6	215	M12	65 55 038		65 59 504	59 06 0xx	59 16 0xx	57 06 0xx	57 16 0xx		115

亚特兰齿轮和齿条

拥有世界上最广泛产品线的高精度齿条。

亚特兰全新精度等级的磨削齿条，由于减小了摩擦损失，使齿轮齿条传动达到了节能的目的，这在之前是不能实现的。

配合亚特兰伺服减速箱系列，我们可以提供全系列齿条产品。一站式的传动系统解决方案，满足客户特殊的传动需求，包括减速箱，齿轮/齿轮轴和齿条。

ATLANTA racks and pinions

The Widest Range of High-Quality Racks on the World.

The new quality classes of ATLANTA racks with hardened & grounded teeth, reduce frictional losses and create high-efficiency rack & pinion drives at a level never achieved before.

With a complete ATLANTA servo gearbox family, ATLANTA can now offer a complete rack & pinion drive system family. This makes it possible to supply, from one source, complete rack & pinion drive systems perfectly tailored to meet the customers requirements including gearbox, pinion and rack.

TR-齿轮/齿条
TR-pinion / rack

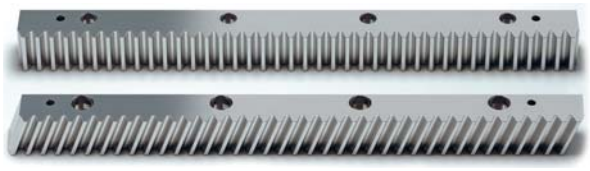
与直线导轨组合齿条
Integrated rack

全自动进料钣金加工机床
Sheet metal processing machine with full automatic loading

5 轴机床
5 axle machine tool

UHPR – 超高精度齿条

3 级精度 Quality 3
5 级精度 Quality 5



HPR – 高精度齿条

6 级精度 Quality 6
7 级精度 Quality 7

PR – 精密齿条

8 级精度 Quality 8

BR – 基础齿条

9 级精度 Quality 9
10 级精度 Quality 10

齿轮

5-8 级精度 Quality 5 – 8

这里列出的所有齿条和齿轮都是20° 压力角
All the racks and pinions here listed have a pressure angle 20°

使用亚特兰长齿条的优势

在齿条安装过程中，所得精度和安装时间是非常重要的两个因素。亚特兰1500毫米及2000毫米淬火齿条，每米的总节距误差显著降低，因此整个轴的总节距误差也很低。使用长齿条的话，齿条与齿条间的接头数变少，这样一来提高了整个轴精度，安装时间也大幅降低。

淬火齿条的优势包括：精度高、啮合均匀、小齿轮轴承压力减少。齿条在传动过程中摩擦力也相应变小，从而提高效率。

Advantage of long, ground racks of ATLANTA

For mounted racks, the obtained accuracy and required installation time are important. With ATLANTA ground racks with lengths of 1 500 mm and 2 000 mm, the total pitch error per meter is reduced dramatically. Thus, the pitch error of the entire axis is correspondingly lower. By using long racks, the number of rack joints is reduced, which improves the accuracy of the entire axis and significantly reduces the installation time at the same time.

Ground racks have the advantage that the complete rack is more precise, the meshing takes place evenly and the pinion bearing stress is reduced unlike a milled tooth. The ground rack drives have lower friction which increase energy efficiency.

示例 / Example:

模数 / Module: 4
精度 / Quality 6

组装长度 / Assembly length: 六米组合齿条 Q_{joint} = 25 µm
6 meter mounted with companion rack for assembly i.e. Q_{joint} = 25 µm

时间 / Time: 螺钉数 x 每个螺钉所需时间 + 接头数 x 每个接头所需时间 + 引脚数 x 每个引脚所需时间
Number of screws x t_{screw} + number of joints x t_{joint} + number of pins x t_{pin}

节距误差： GT_f: 47 µm 最大节距误差: 3 x 47 µm + 2 x 25 µm = 191 µm
Accuracy: Maximum pitch error:

时间: 2 米齿条:螺钉数： 3 x 16 = 48 接头数: 2 引脚: 0
Time: 2 meter racks: Number of screws: 3 x 16 = 48 screws Number of joints: 2 Number of pins: 0

节距误差： GT_f: 36 µm (1000 mm) 最大节距误差: 6 x 36 µm + 5 x 25 µm = 341 µm
Accuracy: Maximum pitch error:

时间: 1 米齿条:螺钉数： 6 x 8 = 48 接头数: 5 引脚: 0
Time: 1 meter racks: Number of screws: 6 x 8 = 48 screws Number of joints: 5 Number of pins: 0

节距误差： GT_f: 32 µm 最大节距误差: 12 x 32 µm + 11 x 25 µm = 659 µm
Accuracy: Maximum pitch error:

时间: 0.5 米齿条:螺钉数： 12 x 4 = 48 接头数: 11 引脚: 12 x 2 = 24
Time: 0,5 meter racks: Number of screws: 12 x 4 = 48 screws Number of joints: 11 Number of pins: 12 x 2 = 24

类别 Class	精度等级 Quality	模数 Module	节距误差 total pitch error (µm/m)	齿厚公差 Tooth thickness tolerance (µm)	长度 Länge max. length (mm)	单齿接触驱动力 Feed force per pinion contact kN	应用领域（案例） Applications (examples)
UHPR 超高精度齿条	3	5	12	-13	1000	76,5	电控消隙结构的高精度机床
		6	12	-13	1000	109,0	High precision machine tools
		8	12	-13	960	191,0	with electrical preload
		10	12	-13	1000	287,5	
		12	12	-13	1000	409,0	
UHPR Ultra High Precision Rack	5	3	26	-15	1000	31,0	机床，升降轴多齿轮接触， Machine tools, lifting axes,
		4	26	-15	1000	60,0	
		5	26	-15	1000	92,0	multiple pinion contact
		6	26	-15	1000	131,5	
	5	2	26	-15	1000	15.5	激光切割
		3	26	-15	1000	28.5	laser cutting
	6	2	36	-37	2000	19,5	木材，塑料，复合材料，铝材加工机床
		3	36	-37	2000	31,0	Wood, plastic, composite,
		4	36	-37	2000	60,0	aluminium working machines
HPR 高精度齿条	6	1,5	36	-37	1000	9,0	机床，与导轨组合齿条， 水切割设备， 弯管系统， 等离子切割机床，
		2	36	-37	2000	15,5	
		3	36	-37	2000	28,5	
		4	36	-37	2000	51,5	
		5	36	-22	2000	76,0	
HPR High Precision Rack		6	36	-22	2000	109,0	Machine tools, integratable racks,
		8	36	-22	1920	191,0	water cutting machines,
		10	36	-22	1500	287,0	tube bending systems,
		12	36	-22	1000	409,0	plasma cutting machines
	7	2	52	-51	2000	15,5	木材加工机床， 对平顺运行要求较高 的线性轴驱动
		3	52	-51	2000	28,5	
		4	52	-51	2000	51,5	
		5	52	-37	2000	76,0	Wood working machines,
		6	52	-37	2000	109,0	linear axes with high requirement
		8	52	-37	1920	191,0	for a smooth running
		10	52	-37	1500	287,0	
PR 精密齿条	8	2	60	-59	1000	13,5	龙门搬运线性轴
		3	60	-59	1000	24,5	Portals, handling
		4	60	-59	1000	44,0	linear axes
		5	60	-59	1000	64,5	
PR Precision Rack	8	2	100	-110	2000	8,0	直线性轴
		3	100	-110	2000	14,0	Linear axes
		4	100	-110	2000	27,0	
BR 基础齿条	9	1,5	150	-110	2000	1,5	用于低负载单元 的直线性驱动
		2	150	-110	2000	4,0	
		3	150	-110	2000	7,0	Linear axes with low load
		4	150	-110	2000	13,5	feed units for adjustment
		5	150	-110	2000	16,0	
		6	150	-110	2000	23,0	
		8	150	-110	1920	41,5	
		10	150	-110	1000	53,5	
BR Basic Rack	10	1,5	200	-110	1000	3,5	升降轴，搬运， 焊接机器人
		2	200	-110	2000	9,5	
		3	200	-110	2000	17,5	Lifting axes, handling,
		4	200	-110	2000	32,0	welding robots
		5	200	-110	2000	49,0	
		6	200	-110	2000	67,5	
		8	200	-110	1920	118,5	
		10	200	-110	1000	178,5	
		12	200	-110	1000	252,5	

当使用齿的最大驱动力，或者多齿轮传动时，固定螺栓的负载必须单独核对。
请征询亚特兰的专业建议！

When using the maximum capacity of the teeth, or multiple pinions in contact, the mounting screw loads must be checked separately! Please ask ATLANTA for advice!

类别 Class	系列 Series	模数 Module	热处理类型 heart treatment of teeth	精度等级 ATLANTA-Quality	页 Page
UHPR	48	5; 6; 8; 10; 12	感应淬火并磨削 induction-hardened	3	ZA-4
	29	3; 4; 5; 6	渗碳淬火并磨削 case-hardened	5	ZA-5
	501	2; 3;	感应淬火并磨削 induction-hardened	5	ZA-6
HPR	29	2; 3; 4	渗碳淬火并磨削 case-hardened	6	ZA-7
	29	1,5; 2; 3; 4; 5; 6; 8; 10; 12	感应淬火并磨削 induction-hardened	6	ZA-8
	29	2; 3; 4; 5; 6; 8; 10	感应淬火并磨削 induction-hardened	7	ZA-9
PR	39	2; 3; 4; 5	感应淬火并磨削 induction-hardened	8	ZA-10
	38	2; 3; 4	调质处理 铣削齿面 quenched and tempered	8	ZA-11
BR	47	1,5; 2; 3; 4; 5; 6; 8; 10	软材 铣削齿面 soft	9	ZA-12
	39	1,5; 2; 3; 4; 5; 6; 8; 10; 12	感应淬火 铣削齿面 induction-hardened	10	ZA-13–14

选型负载表
Selection and load tables — ZA-30–38

电控润滑器，滑动型润滑刷和壳体安装装置
Electronically controlled lubricators, sliding-type lubricating brushes and hose-connection sets — ZE-2 – 6

毛毡齿轮和安装轴
Felt gear and mounting shaft — ZE-7 – 8

装配
Mounting — ZF-9

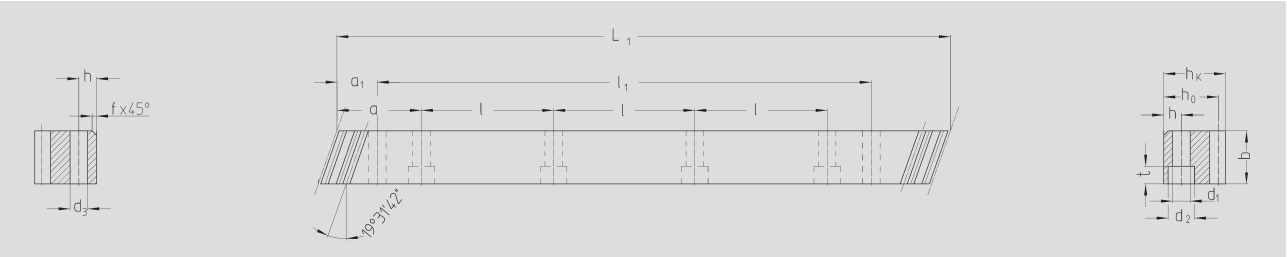
1) 我们的斜齿齿条都是右旋的，安装块是左旋的！
1) All our helical racks are right hand toothed, except the companion racks, which are left hand toothed!

	系列 Series	模数 Module	热处理类型 heart treatment of teeth	精度等级 Tolerance of teeth	页 Page
	78 .. 5..	2; 3; 4; 5	渗碳淬火 case-hardened	5 e 24	ZA-19 – 22
	79	1,5; 2; 3; 4	渗碳淬火 case-hardened	5 e 24	ZA-23
	24	1,5; 2; 3; 4; 5; 6; 8; 10	渗碳淬火 case-hardened	7 e 25	ZA-24 – 26
	24	2; 3; 4; 5; 6; 8	感应淬火 induction-hardened	6 e 25	ZA-27
	21 .. 5..	1,5; 2; 3; 4; 5; 6; 8; 10; 12	软材 soft	8 e 25	ZA-28 – 29
	TR-齿轮简述，安装说明 Short description TR-pinion, mounting instruction				ZF-11 – 13
	齿条驱动选型负载表 Selection and load tables for rack drives				ZH-2 – 6
	电控润滑器，滑动型润滑刷和壳体安装装置 Electronically controlled lubricators, sliding-type lubricating brushes and hose-connection sets				ZE-2 – 6

1) 我们的齿轮都是左旋的！
1) All our helical pionion are left hand toothed!

3 级精度

ATLANTA-Quality 3



订购代码 Order code	模数 Module	L_1	齿数 N° of teeth	b	h_k	h_0	f	a	l	孔数 N° of holes	h	d_1	d_2	t	a_1	l_1	d_3	kg
48 50 105	5	1000,00	60	49	39	34	2,5	62,5	125	8	12	13,5	20	13	37,5	925	11,7	12,15
48 60 105	6	1000,00	50	59	49	43	2,5	62,5	125	8	16	17,5	26	17	37,5	925	15,7	18,10
48 80 105	8	960,00	36	79	79	71	2,5	60,0	120	8	25	22,0	33	21	120,0	720	19,7	42,50
48 10 105	10	1000,00	30	99	99	89	2,5	62,5	125	8	32	33,0	48	32	125,0	750	19,7	68,70
48 12 105	12	1000,00	25	120	120	108	2,5	40,0	125	8	40	39,0	58	38	102,5	750	19,7	111,00

整体齿节线误差 $GT_f/1000 \leq 0{,}012$ mm.

Total pitch error $GT_f/1000 \leq 0{,}012$ mm.

- 齿面感应淬火并磨削
- 材料C45 钢
- 淬火后磨削各面
- 有效整体齿节线误差符号(20℃)

- Teeth induction-hardened and ground
- material C45E
- ground on all sides after hardening
- signed with effective total pitch error (20 °C)

可以提供相应的检测报告。

Inspection measurement data available as an option.

齿条安装参考ZF-2

Mounting racks, see page ZF-2.

为了达到齿条的高精度装配，我们推荐我们的专利安装工具，参考ZF-4

To achieve the precision of racks, also at the joint, we recommended our patented assembly kit, see page ZF-4

齿轮和齿条的润滑，我们建议使用我们的电控润滑系统，参考ZE-1

For lubrication of racks & pinions we recommend our automatic lubrication systems, see page ZE-1

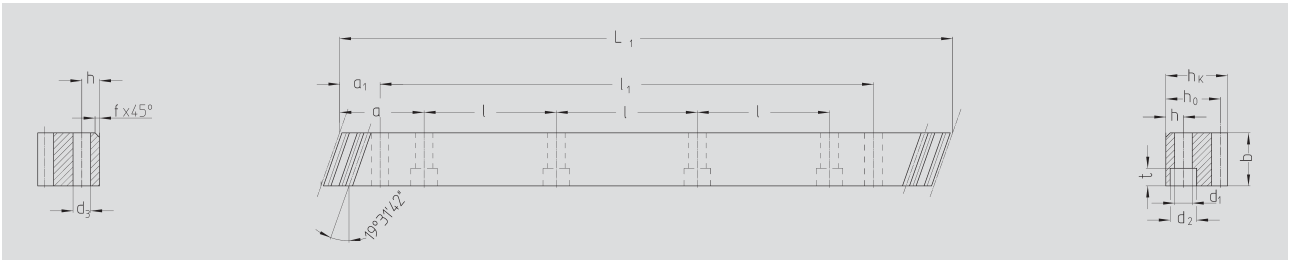
关于齿轮齿条传动系统的计算和选型的例子，参考ZD-1

For the calculation and selection of the rack and pinion drives see calculation sample page ZD-1

安装齿条的螺栓，参考ZF-3

Screws for rack mounting, see page ZF-3.

5 级精度 | ATLANTA-Quality 5 | StrongLine



订购代码 Order code	模数 Module	L_1	齿数 N° of teeth	b	h_k	h_0	f	a	l	孔数 N° of holes	h	d_1	d_2	t	a_1	l_1	d_3	kg
29 35 100	3	1000,00	100	29	29	26	2,0	62,5	125	8	10	12	17,5	11	27,5	945	11,7	5,9
29 45 100	4	1000,00	75	39	39	35	2,0	62,5	125	8	13	16	23,0	15	30,0	940	15,7	10,7
29 55 100	5	1000,00	60	49	49	44	2,5	62,5	125	8	15	18	26,0	17	34,5	931	15,7	16,3
29 65 100	6	1000,00	50	59	59	53	2,5	62,5	125	8	20	22	33,0	21	97,5	805	19,7	24,5

整体齿节线误差 $GT_f/1000 \leq 0{,}026$ mm.

Total pitch error $GT_f/1000 \leq 0{,}026$ mm.

- 深层渗碳淬火并磨削
- 材料 16MnCr5 合金钢
- 淬火后磨削各面
- 有效整体齿节线误差符号(20℃)

- Case hardened and teeth ground
- material 16MnCr5
- ground on all sides after hardening
- signed with effective total pitch error (20 °C)

可以提供相应的检测报告。

Inspection measurement data available as an option.

齿条安装参考ZF-2

Mounting racks, see page ZF-2.

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关于齿轮齿条传动系统的计算和选型的例子，参考ZD-1

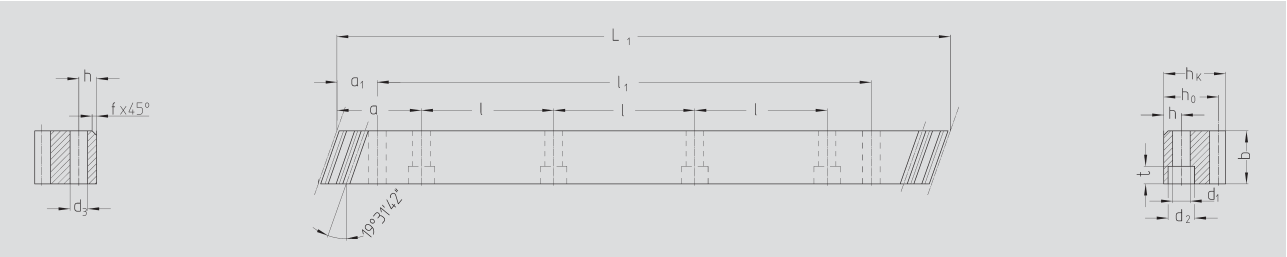
For the calculation and selection of the rack and pinion drives see calculation sample page ZD-1

安装齿条的螺栓，参考ZF-3

Screws for rack mounting, see page ZF-3.

5 级精度

ATLANTA-Quality 5



订购代码 Order code	模数 Module	L_1	齿数 N° of teeth	b	h_k	h_0	f	a	l	孔数 N° of holes	h	d_1	d_2	t	a_1	l_1	d_3	kg
50179004	2	1000,00	150	24	24	22	2,0	62,5	125	8	9	7	11,0	7	31,7	936.6	5,7	4,1
50179005	3	1000,00	100	29	29	26	2,0	62,5	125	8	9	10	15,0	9	35,0	930.0	7,7	6,2

可要求其它长度. / Other length on request.

整体齿节线误差 / Total pitch error

$GT_f/1000 \leq 0{,}026$ mm,
$GT_f/2000 \leq 0{,}034$ mm (≙ 0,017 mm/1000).

- 感应淬火并磨削
- 材料 C45 钢
- 淬火后磨削各面

- Teeth induction-hardened and ground
- material C45E
- ground on all sides after hardening

可以提供相应的检测报告。

Inspection measurement data available as an option.

齿条安装参考ZF-2

Mounting racks, see page ZF-2.

为了达到齿条的高精度装配，我们推荐我们的专利安装工具，参考ZF-4

To achieve the precision of racks, also at the joint, we recommended our patented assembly kit, see page ZF-4

齿轮和齿条的润滑，我们建议使用我们的电控润滑系统，参考ZE-1

For lubrication of racks & pinions we recommend our automatic lubrication systems, see page ZE-1

关于齿轮齿条传动系统的计算和选型的例子，参考ZD-1

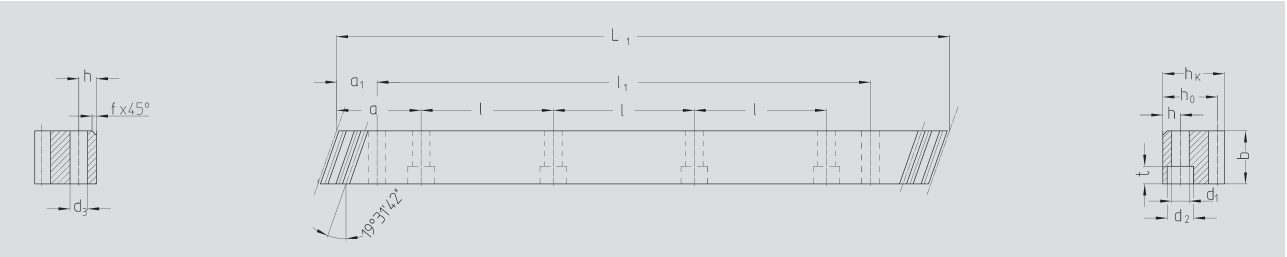
For the calculation and selection of the rack and pinion drives see calculation sample page ZD-1

安装齿条的螺栓，参考ZF-3

Screws for rack mounting, see page ZF-3.

6 级精度

ATLANTA-Quality 6



订购代码 Order code	模数 Module	L_1	齿数 N° of teeth	b	h_k	h_0	f	a	l	孔数 N° of holes	h	d_1	d_2	t	a_1	l_1	d_3	kg
29 20 100	2	1000,00	150	24	24	22	2	62,5	125	8	8	7	11	7	31,7	936,6	5,7	4,10
29 21 100	2	1000,00	150	24	24	22	2	无安装孔 / without mounting holes										4,10
29 20 150	2	1500,00	225	24	24	22	2	62,50	125	12	8	7	11	7	31,7	1436,6	5,7	6,15
29 21 150	2	1500,00	225	24	24	22	2	无安装孔 / without mounting holes										6,15
29 20 200	2	2000,00	300	24	24	22	2	62,50	125	16	8	7	11	7	31,7	1936,6	5,7	8,20
29 21 200	2	2000,00	300	24	24	22	2	无安装孔 / without mounting holes										8,20
29 30 100	3	1000,00	100	29	29	26	2	62,5	125	8	9	10	15	9	35,0	930,0	7,7	5,90
29 31 100	3	1000,00	100	29	29	26	2	无安装孔 / without mounting holes										5,90
29 30 150	3	1500,00	150	29	29	26	2	62,50	125	12	9	10	15	9	35,0	1430,0	7,7	8,85
29 31 150	3	1500,00	150	29	29	26	2	无安装孔 / without mounting holes										8,85
29 30 200	3	2000,00	200	29	29	26	2	62,50	125	16	9	10	15	9	35,0	1930,0	7,7	11,80
29 31 200	3	2000,00	200	29	29	26	2	无安装孔 / without mounting holes										11,80
29 40 100 2)	4	1000,00	75	39	39	35	2	62,5	125	8	12	10	15	9	33,3	933,4	7,7	10,70
29 41 100	4	1000,00	75	39	39	35	2	无安装孔 / without mounting holes										10,70
29 42 100	4	1000,00	75	39	39	35	2	62,5	125	8	12	14	20	13	33,3	933,4	11,7	10,70
29 41 150	4	1506,67	113	39	39	35	2	无安装孔 / without mounting holes										16,00
29 42 150 1)	4	1506,67	113	39	39	35	2	62,5	125	12	12	14	20	13	33,3	1433,4	11,7	16,00
29 41 200	4	2000,00	150	39	39	35	2	无安装孔 / without mounting holes										21,40
29 42 200	4	2000,00	150	39	39	35	2	62,5	125	16	12	14	20	13	33,3	1933,4	11,7	21,40

1) 该齿条只能使用左旋安装块拼接。
2) 螺栓连接限制了驱动力

1) This racks could be used for continous linking only with the left side (see sketch).
2) The screw joint limits the feed force.

500毫米及其它长度也可 . / 500 mm and other length on request.

整体齿节线误差 / Total pitch error

$GT_f/1000 \leq 0{,}036$ mm,
$GT_f/1500 \leq 0{,}043$ mm (≙ 0,029 mm/1000),
$GT_f/2000 \leq 0{,}047$ mm (≙ 0,024 mm/1000).

- 齿面淬火并磨削
- 材料 16MnCr5 合金钢渗碳处理
- 淬火后磨削各面

- Teeth induction-hardened and ground
- material 16MnCr5, carburized
- ground on all sides after hardening

齿条安装参考ZF-2

Mounting racks, see page ZF-2.

为了达到齿条的高精度装配，我们推荐我们的专利安装工具，参考ZF-4

To achieve the precision of racks, also at the joint, we recommended our patented assembly kit, see page ZF-4

齿轮和齿条的润滑，我们建议使用我们的电控润滑系统，参考ZE-1

For lubrication of racks & pinions we recommend our automatic lubrication systems, see page ZE-1

关于齿轮齿条传动系统的计算和选型的例子，参考ZD-1

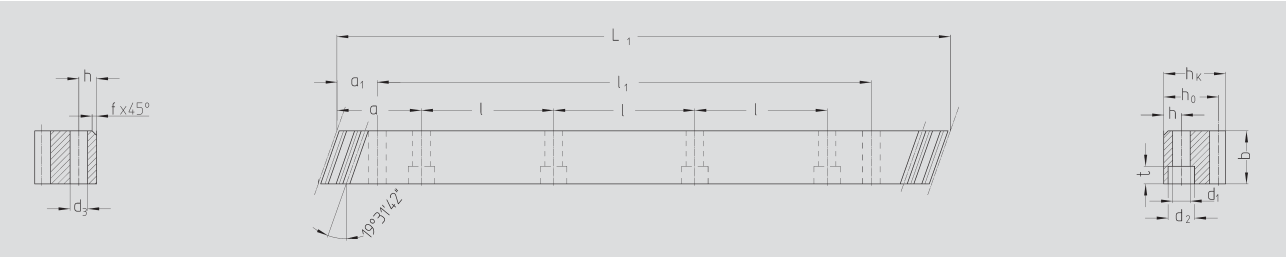
For the calculation and selection of the rack and pinion drives see calculation sample page ZD-1

安装齿条的螺栓，参考ZF-3

Screws for rack mounting, see page ZF-3.

6 级精度

ATLANTA-Quality 6



订购代码 Order code	模数 Module	L_1	齿数 N° of teeth	b	h_k	h_0	f	a	l	孔数 N° of holes	h	d_1	d_2	t	a_1	l_1	d_3	kg
29 15 105	1,5	1000,00	200	19	19	17,5	2	62,5	125	8	8	7	11	7	31,7	936,6	5,7	2,60
29 16 105	1,5	1000,00	200	19	19	17,5	2	无安装孔 / without mounting holes										2,60
29 20 105	2	1000,00	150	24	24	22	2	62,5	125	8	8	7	11	7	31,7	936,6	5,7	4,10
29 21 105	2	1000,00	150	24	24	22	2	无安装孔 / without mounting holes										4,10
29 20 155	2	1500,00	225	24	24	22	2	62,5	125	12	8	7	11	7	31,7	1436,6	5,7	6,15
29 21 155	2	1500,00	225	24	24	22	2	无安装孔 / without mounting holes										6,15
29 20 205	2	2000,00	300	24	24	22	2	62,5	125	16	8	7	11	7	31,7	1936,6	5,7	8,20
29 21 205	2	2000,00	300	24	24	22	2	无安装孔 / without mounting holes										8,20
29 30 105	3	1000,00	100	29	29	26	2	62,5	125	8	9	10	15	9	35,0	930,0	7,7	5,90
29 31 105	3	1000,00	100	29	29	26	2	无安装孔 / without mounting holes										5,90
29 30 155	3	1500,00	150	29	29	26	2	62,5	125	12	9	10	15	9	35,0	1430,0	7,7	8,85
29 31 155	3	1500,00	150	29	29	26	2	无安装孔 / without mounting holes										8,85
29 30 205	3	2000,00	200	29	29	26	2	62,5	125	16	9	10	15	9	35,0	1930,0	7,7	11,80
29 31 205	3	2000,00	200	29	29	26	2	无安装孔 / without mounting holes										11,80
29 40 105 [2]	4	1000,00	75	39	39	35	2	62,5	125	8	12	10	15	9	33,3	933,4	7,7	10,70
29 41 105	4	1000,00	75	39	39	35	2	无安装孔 / without mounting holes										10,70
29 42 105	4	1000,00	75	39	39	35	2	62,5	125	8	12	14	20	13	33,3	933,4	11,7	10,70
29 42 155 [1]	4	1506,67	113	39	39	35	2	62,5	125	12	12	14	20	13	33,3	1433,4	11,7	16,05
29 41 155	4	1506,67	113	39	39	35	2	无安装孔 / without mounting holes										16,05
29 40 205	4	2000,00	150	39	39	35	2	62,5	125	16	12	10	15	9	33,3	1933,4	7,7	21,40
29 41 205	4	2000,00	150	39	39	35	2	无安装孔 / without mounting holes										21,40
29 42 205	4	2000,00	150	39	39	35	2	62,5	125	16	12	14	20	13	33,3	1933,4	11,7	21,40
29 50 105	5	1000,00	60	49	39	34	2,5	62,5	125	8	12	14	20	13	37,5	925,0	11,7	13,00
29 51 105	5	1000,00	60	49	39	34	2,5	无安装孔 / without mounting holes										13,00
29 50 155	5	1500,00	90	49	39	34	2,5	62,5	125	12	12	14	20	13	37,5	1425,0	11,7	19,50
29 51 155	5	1500,00	90	49	39	34	2,5	无安装孔 / without mounting holes										19,50
29 50 205	5	2000,00	120	49	39	34	2,5	62,5	125	16	12	14	20	13	37,5	1925,0	11,7	26,00
29 51 205	5	2000,00	120	49	39	34	2,5	无安装孔 / without mounting holes										26,00
29 60 105	6	1000,00	50	59	49	43	2,5	62,5	125	8	16	18	26	17	37,5	925,0	15,7	18,10
29 61 105	6	1000,00	50	59	49	43	2,5	无安装孔/ without mounting holes										18,10
29 60 155	6	1500,00	75	59	49	43	2,5	62,5	125	12	16	18	26	17	37,5	1425,0	15,7	27,10
29 61 155	6	1500,00	75	59	49	43	2,5	无安装孔 / without mounting holes										27,10
29 60 205	6	2000,00	100	59	49	43	2,5	62,5	125	16	16	18	26	17	37,5	1925,0	15,7	36,20
29 61 205	6	2000,00	100	59	49	43	2,5	无安装孔 / without mounting holes										36,20
29 80 105	8	960,00	36	79	79	71	2,5	60,0	120	8	25	22	33	21	120,0	720,0	19,7	42,50
29 81 105	8	960,00	36	79	79	71	2,5	无安装孔 / without mounting holes										42,50
29 80 155	8	1440,00	54	79	79	71	2,5	60,0	120	12	25	22	33	21	120,0	1200,0	19,7	63,80
29 81 155	8	1440,00	54	79	79	71	2,5	无安装孔 / without mounting holes										63,80
29 80 205	8	1920,00	72	79	79	71	2,5	60,0	120	16	25	22	33	21	120,0	1680,0	19,7	85,00
29 81 205	8	1920,00	72	79	79	71	2,5	无安装孔 / without mounting holes										85,00
29 10 105	10	1000,00	30	99	99	89	2,5	62,5	125	8	32	33	48	32	125,0	750,0	19,7	68,72
29 11 105	10	1000,00	30	99	99	89	2,5	无安装孔 / without mounting holes										68,72
29 10 155	10	1500,00	45	99	99	89	2,5	62,5	125	12	32	33	48	32	125	1250,0	19,7	103,00
29 11 155	10	1500,00	45	99	99	89	2,5	无安装孔 / without mounting holes										103,00
29 12 105	12	1000,00	25	120	120	108	2,5	40,0	125	8	40	39	58	38	125,0	750,0	19,7	111,00
29 13 105	12	1000,00	25	120	120	108	2,5	无安装孔 / without mounting holes										111,00

1) 该齿条只能使用左旋安装块拼接。
2) 螺栓连接限制了驱动力

1) This racks could be used for continous linking only with the left side (see sketch).
2) The screw joint limits the feed force.

500毫米及其它长度也可. / 500 mm and other length on request.

整体齿节线误差 / Total pitch error

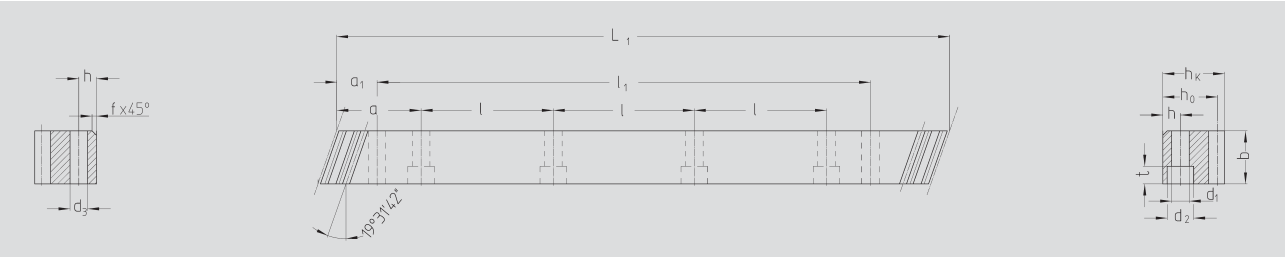
$GT_f/1000 \leq 0{,}036$ mm,
$GT_f/1500 \leq 0{,}043$ mm (≙ 0,029 mm/1000),
$GT_f/2000 \leq 0{,}047$ mm (≙ 0,024 mm/1000).

• 更多信息请参考下页。

• Further information see next page.

7 级精度

ATLANTA-Quality 7



订购代码 Order code	模数 Module	L_1	齿数 N° of teeth	b	h_k	h_0	f	a	l	孔数 N° of holes	h	d_1	d_2	t	a_1	l_1	d_3	kg
29 20 107	2	1000,00	150	24	24	22	2	62,5	125	8	8	7	11	7	31,7	936,6	5,7	4,10
29 20 157	2	1500,00	225	24	24	22	2	62,5	125	12	8	7	11	7	31,7	1436,6	5,7	6,15
29 20 207	2	2000,00	300	24	24	22	2	62,5	125	16	8	7	11	7	31,7	1936,6	5,7	8,20
29 30 107	3	1000,00	100	29	29	26	2	62,5	125	8	9	10	15	9	35,0	930,0	7,7	5,90
29 30 157	3	1500,00	150	29	29	26	2	62,5	125	12	9	10	15	9	35,0	1430,0	7,7	8,85
29 30 207	3	2000,00	200	29	29	26	2	62,5	125	16	9	10	15	9	35,0	1930,0	7,7	11,80
29 40 107	4	1000,00	75	39	39	35	2	62,5	125	8	12	14	20	13	33,3	933,4	11,7	10,70
29 40 157 1)	4	1506,67	113	39	39	35	2	62,5	125	12	12	14	20	13	33,3	1433,0	11,7	16,00
29 40 207	4	2000,00	150	39	39	35	2	62,5	125	16	12	14	20	13	33,3	1933,4	11,7	21,40
29 50 107	5	1000,00	60	49	39	34	2,5	62,5	125	8	12	14	20	13	37,5	925,0	11,7	13,00
29 50 157	5	1500,00	90	49	39	34	2,5	62,5	125	12	12	14	20	13	37,5	1425,0	11,7	19,50
29 50 207	5	2000,00	120	49	39	34	2,5	62,5	125	16	12	14	20	13	37,5	1925,0	11,7	26,00
29 60 107	6	1000,00	50	59	49	43	2,5	62,5	125	8	16	18	26	17	37,5	925,0	15,7	18,10
29 60 157	6	1500,00	75	59	49	43	2,5	62,5	125	12	16	18	26	17	37,5	1425,0	15,7	27,10
29 60 207	6	2000,00	100	59	49	43	2,5	62,5	125	16	16	18	26	17	37,5	1925,0	15,7	36,20
29 80 107	8	960,00	36	79	79	71	2,5	60,0	120	8	25	22	33	21	120,0	720,0	19,7	42,50
29 80 157	8	1440,00	54	79	79	71	2,5	60,0	120	12	25	22	33	21	120,0	1200,0	19,7	65,00
29 80 207	8	1920,00	72	79	79	71	2,5	60,0	120	16	25	22	33	21	120,0	1680,0	19,7	85,00
29 10 107	10	1000,00	30	99	99	89	2,5	62,5	125	8	32	33	48	32	125,0	750,0	19,7	68,72
29 10 157	10	1500,00	45	99	99	89	2,5	62,5	125	12	32	33	48	32	125,0	1250,0	19,7	104,00

1) 该齿条只能使用左旋安装块拼接。

1) This racks could be used for continous linking only with the left side (see sketch).

500毫米及其它长度也可. / 500 mm and other length on request.

整体齿节线误差 / Total pitch error

$GT_f/1000 \leq 0{,}052$ mm,
$GT_f/1500 \leq 0{,}062$ mm (≙ 0,042 mm/1000),
$GT_f/2000 \leq 0{,}068$ mm (≙ 0,034 mm/1000).

- 感应淬火并磨削
- 材料 C45 钢
- 淬火后磨削各面

- Teeth induction-hardened and ground
- material C45E
- ground on all sides after hardening

齿条安装参考ZF-2

Mounting racks, see page ZF-2.

为了达到齿条的高精度装配，我们推荐我们的专利安装工具，参考ZF-4

To achieve the precision of racks, also at the joint, we recommended our patented assembly kit, see page ZF-4

齿轮和齿条的润滑，我们建议使用我们的电控润滑系统，参考ZE-1

For lubrication of racks & pinions we recommend our automatic lubrication systems, see page ZE-1

关于齿轮齿条传动系统的计算和选型的例子，参考ZD-1

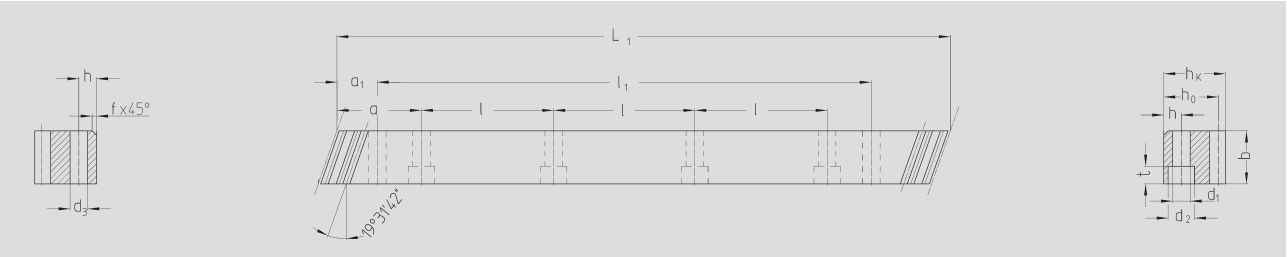
For the calculation and selection of the rack and pinion drives see calculation sample page ZD-1

安装齿条的螺栓，参考ZF-3

Screws for rack mounting, see page ZF-3.

8 级精度

ATLANTA-Quality 8



订购代码 Order code	模数 Module	L_1	齿数 N° of teeth	b	h_k	h_0	f	a	l	孔数 N° of holes	h	d_1	d_2	t	a_1	l_1	d_3	kg
39 20 108	2	1000,00	150	25	24	22	2	62,5	125	8	8	7	11	7	31,7	936,6	5,7	4,10
39 20 208	2	2000,00	300	25	24	22	2	62,5	125	16	8	7	11	7	31,7	1936,6	5,7	8,40
39 30 108	3	1000,00	100	30	29	26	2	62,5	125	8	9	10	15	9	35,0	930,0	7,7	5,90
39 30 208	3	2000,00	200	30	29	26	2	62,5	125	16	9	10	15	9	35,0	1930,0	7,7	12,00
39 40 108	4	1000,00	75	40	39	35	2	62,5	125	8	12	14	20	13	33,3	933,4	11,7	10,70
39 40 208	4	2000,00	150	40	39	35	2	62,5	125	16	12	14	20	13	33,3	1933,4	11,7	21,00
39 50 108	5	1000,00	60	50	39	34	2,5	62,5	125	8	12	14	20	13	37,5	925,0	11,7	13,00
39 50 208	5	2000,00	120	50	39	34	2,5	62,5	125	16	12	14	20	13	37,5	1925,0	11,7	26,00

500毫米及其它长度也可. / 500 mm and other length on request.

整体齿节线误差 / Total pitch error $GT_f/1000 \leq 0{,}060$ mm.

- 感应淬火并磨削
- 材料 C45 钢
- 冷拔钢材

- Teeth induction-hardened and ground
- material C45E
- bright steel, profile blasted

齿条安装参考ZF-2

Mounting racks, see page ZF-2.

为了达到齿条的高精度装配，我们推荐我们的专利安装工具，参考ZF-4

To achieve the precision of racks, also at the joint, we recommended our patented assembly kit, see page ZF-4

齿轮和齿条的润滑，我们建议使用我们的电控润滑系统，参考ZE-1

For lubrication of racks & pinions we recommend our automatic lubrication systems, see page ZE-1

关于齿轮齿条传动系统的计算和选型的例子，参考ZD-1

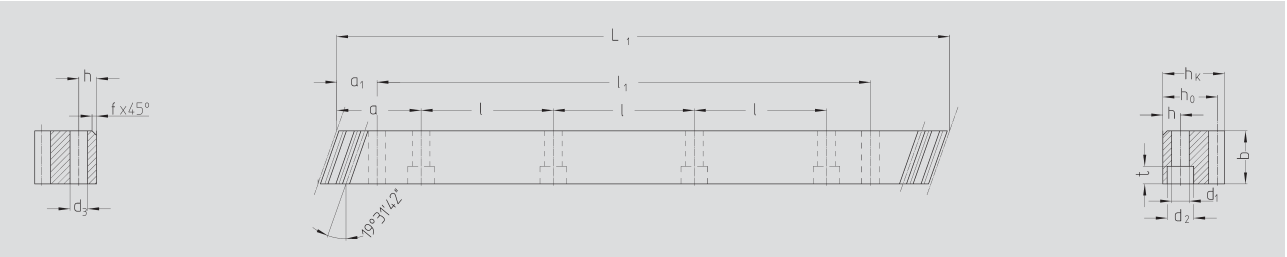
For the calculation and selection of the rack and pinion drives see calculation sample page ZD-1

安装齿条的螺栓，参考ZF-3

Screws for rack mounting, see page ZF-3.

8 级精度

ATLANTA-Quality 8



订购代码 Order code	模数 Module	L_1	齿数 N° of teeth	b	h_k	h_0	f	a	l	孔数 N° of holes	h	d_1	d_2	t	a_1	l_1	d_3	kg
38 21 100	2	1000,00	150	25	24	22	2	62,5	125	8	8	7	11	7	31,7	936,6	5,7	4,30
38 20 100	2	1000,00	150	25	24	22	2	无安装孔 / without mounting holes										4,30
38 21 200	2	2000,00	300	25	24	22	2	62,5	125	16	8	7	11	7	31,7	1936,6	5,7	8,60
38 20 200	2	2000,00	300	25	24	22	2	无安装孔 / without mounting holes										8,60
38 31 100	3	1000,00	100	30	29	26	2	62,5	125	8	9	10	15	9	35,0	930,0	7,7	6,10
38 30 100	3	1000,00	100	30	29	26	2	无安装孔 / without mounting holes										6,10
38 31 200	3	2000,00	200	30	29	26	2	62,5	125	16	9	10	15	9	35,0	1930,0	7,7	12,20
38 30 200	3	2000,00	200	30	29	26	2	无安装孔 / without mounting holes										12,20
38 41 100	4	1000,00	75	40	39	35	2	62,5	125	8	12	10	15	9	33,3	933,4	7,7	10,90
38 40 100	4	1000,00	75	40	39	35	2	无安装孔 / without mounting holes										10,90
38 41 200	4	2000,00	150	40	39	35	2	62,5	125	16	12	10	15	9	33,3	1933,4	7,7	21,80
38 40 200	4	2000,00	150	40	39	35	2	无安装孔 / without mounting holes										21,80

500毫米及其它长度也可. / 500 mm and other length on request.

整体齿节线误差 / Total pitch error

$GT_f/1000 \leq 0{,}100$ mm,
$GT_f/2000 \leq 0{,}200$ mm.

- 铣削齿面
- 材料42CrMo4冷拔钢，调质处理
- 冷拔钢材，底部加工

- Milled teeth
- material 42CrMo4, quenched and tempered
- bright steel, backside machined

齿条安装参考ZF-2

Mounting racks, see page ZF-2.

为了达到齿条的高精度装配，我们推荐我们的专利安装工具，参考ZF-4

To achieve the precision of racks, also at the joint, we recommended our patented assembly kit, see page ZF-4

齿轮和齿条的润滑，我们建议使用我们的电控润滑系统，参考ZE-1

For lubrication of racks & pinions we recommend our automatic lubrication systems, see page ZE-1

关于齿轮齿条传动系统的计算和选型的例子，参考ZD-1

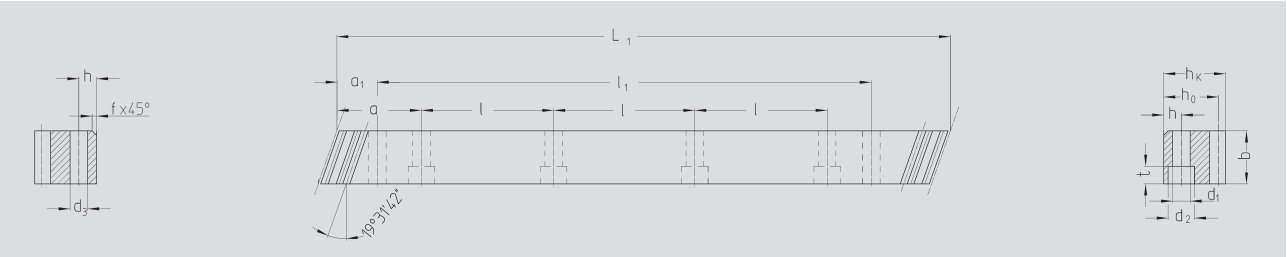
For the calculation and selection of the rack and pinion drives see calculation sample page ZD-1

安装齿条的螺栓，参考ZF-3

Screws for rack mounting, see page ZF-3.

9 级精度

ATLANTA-Quality 9



订购代码 Order code	模数 Module	L_1	齿数 N° of teeth	b	h_k	h_0	f	a	l	孔数 N° of holes	h	d_1	d_2	t	a_1	l_1	d_3	kg
47 15 100	1,5	1000,00	200	17	17	15,5		62,5	125	8	6	6	10	6	31,7	936,6	5,7	1,30
47 16 100	1,5	1000,00	200	17	17	15,5					无安装孔 / without mounting holes							1,30
47 15 150	1,5	1500,00	300	17	17	15,5		62,5	125	12	6	6	10	6	31,7	1436,6	5,7	1,95
47 16 150	1,5	1500,00	300	17	17	15,5					无安装孔 / without mounting holes							1,95
47 15 200	1,5	2000,00	400	17	17	15,5		62,5	125	16	6	6	10	6	31,7	1936,6	5,7	2,60
47 16 200	1,5	2000,00	400	17	17	15,5					无安装孔 / without mounting holes							2,60
47 20 100	2	1000,00	150	26	24	22		62,5	125	8	8	7	11	7	31,7	936,6	5,7	4,40
47 21 100	2	1000,00	150	26	24	22					无安装孔 / without mounting holes							4,40
47 20 200	2	2000,00	300	26	24	22		62,5	125	16	8	7	11	7	31,7	1936,6	5,7	8,80
47 21 200	2	2000,00	300	26	24	22					无安装孔 / without mounting holes							8,80
47 30 100	3	1000,00	100	31	29	26		62,5	125	8	9	10	15	9	35,0	930,0	7,7	6,20
47 31 100	3	1000,00	100	31	29	26					无安装孔 / without mounting holes							6,20
47 30 200	3	2000,00	200	31	29	26		62,5	125	16	9	10	15	9	35,0	1930,0	7,7	12,50
47 31 200	3	2000,00	200	31	29	26					无安装孔 / without mounting holes							12,50
47 30 300	3	3000,00	300	31	29	26		62,5	125	24	9	10	15	9	35,0	2930,0	7,7	18,60
47 31 300	3	3000,00	300	31	29	26					无安装孔 / without mounting holes							18,60
47 40 100	4	1000,00	75	41	39	35		62,5	125	8	12	10	15	9	33,3	933,4	7,7	11,10
47 41 100	4	1000,00	75	41	39	35					无安装孔 / without mounting holes							11,10
47 40 200	4	2000,00	150	41	39	35		62,5	125	16	12	10	15	9	33,3	1933,4	7,7	22,20
47 41 200	4	2000,00	150	41	39	35					无安装孔 / without mounting holes							22,20
47 50 100	5	1000,00	60	50	39	34		62,5	125	8	12	14	20	13	37,5	925,0	11,7	13,26
47 51 100	5	1000,00	60	50	39	34					无安装孔 / without mounting holes							13,26
47 50 200	5	2000,00	120	50	39	34		62,5	125	16	12	14	20	13	37,5	1925,0	11,7	26,52
47 51 200	5	2000,00	120	50	39	34					无安装孔 / without mounting holes							26,52
47 60 100	6	1000,00	50	60	49	43		62,5	125	8	16	18	26	17	37,5	925,0	15,7	20,12
47 61 100	6	1000,00	50	60	49	43					无安装孔 / without mounting holes							20,12
47 60 200	6	2000,00	100	60	49	43		62,5	125	16	16	18	26	17	37,5	1925,0	15,7	40,24
47 61 200	6	2000,00	100	60	49	43					无安装孔 / without mounting holes							40,24
47 80 100	8	960,00	36	81	79	71		60,0	120	8	25	22	33	21	120,0	720,0	19,7	44,85
47 81 100	8	960,00	36	81	79	71					无安装孔 / without mounting holes							44,85
47 80 200	8	1920,00	72	81	79	71		60,0	120	16	25	22	33	21	120,0	1680,0	19,7	89,71
47 81 200	8	1920,00	72	81	79	71					无安装孔 / without mounting holes							89,71
47 10 100	10	1000,00	30	100	99	89		62,5	125	8	32	33	48	32	125	750	19,7	69,80
47 11 100	10	1000,00	30	100	99	89					无安装孔 / without mounting holes							69,80

500毫米及其它长度也可. / 500 mm and other length on request.

整体齿节线误差 / Total pitch error

GT_f /1000 ≤ 0,150 mm,
GT_f /1500 ≤ 0,225 mm,
GT_f /2000 ≤ 0,300 mm.

- 铣削齿面
- 材料 C45 钢
- 冷拔钢材

- Milled teeth
- material C45E
- bright steel

齿条安装参考ZF-2

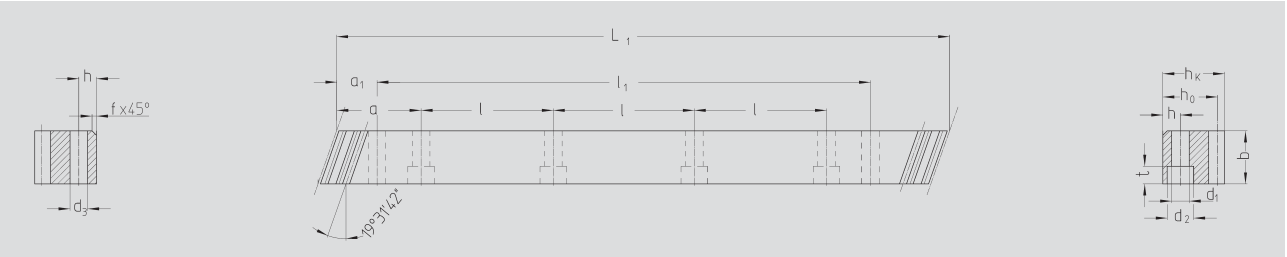
Mounting racks, see page ZF-2.

更多信息请参考ZA-10。

Further information see page ZA – 10.

10 级精度

ATLANTA-Quality 10



订购代码 Order code	模数 Module	L_1	齿数 N° of teeth	b	h_k	h_0	f	a	l	孔数 N° of holes	h	d_1	d_2	t	a_1	l_1	d_3	kg
39 15 100	1,5	1000,00	200	17	17	15,5	2	62,5	125	8	6	6	10	6	31,7	936,6	5,7	2,60
39 16 100	1,5	1000,00	200	17	17	15,5	2	无安装孔 / without mounting holes										2,60
39 20 100	2	1000,00	150	25	24	22	2	62,5	125	8	8	7	11	7	31,7	936,6	5,7	4,20
39 21 100	2	1000,00	150	25	24	22	2	无安装孔 / without mounting holes										4,20
39 20 200	2	2000,00	300	25	24	22	2	62,5	125	16	8	7	11	7	31,7	1936,6	5,7	8,40
39 21 200	2	2000,00	300	25	24	22	2	无安装孔 / without mounting holes										8,40
39 30 100	3	1000,00	100	30	29	26	2	62,5	125	8	9	10	15	9	35,0	930,0	7,7	6,00
39 31 100	3	1000,00	100	30	29	26	2	无安装孔 / without mounting holes										6,00
39 30 200	3	2000,00	200	30	29	26	2	62,5	125	16	9	10	15	9	35,0	1930,0	7,7	12,00
39 31 200	3	2000,00	200	30	29	26	2	无安装孔 / without mounting holes										12,00
39 40 100[2)]	4	1000,00	75	40	39	35	2	62,5	125	8	12	10	15	9	33,3	933,4	7,7	10,50
39 41 100	4	1000,00	75	40	39	35	2	无安装孔 / without mounting holes										10,50
39 42 100	4	1000,00	75	40	39	35	2	62,5	125	8	12	14	20	13	33,3	933,4	11,7	10,50
39 42 150[1)]	4	1506,67	113	40	39	35	2	62,5	125	12	12	14	20	13	33,3	1433,4	11,7	15,75
39 40 200	4	2000,00	150	40	39	35	2	62,5	125	16	12	10	15	9	33,3	1933,4	7,7	21,00
39 41 200	4	2000,00	150	40	39	35	2	无安装孔 / without mounting holes										21,00
39 42 200	4	2000,00	150	40	39	35	2	62,5	125	16	12	14	20	13	33,3	1933,4	11,7	21,00
39 50 100	5	1000,00	60	50	39	34	2,5	62,5	125	8	12	14	20	13	37,5	925,0	11,7	13,00
39 51 100	5	1000,00	60	50	39	34	2,5	无安装孔 / without mounting holes										13,00
39 50 200	5	2000,00	120	50	39	34	2,5	62,5	125	16	12	14	20	13	37,5	1925,0	11,7	26,00
39 51 200	5	2000,00	120	50	39	34	2,5	无安装孔 / without mounting holes										26,00
39 60 100	6	1000,00	50	60	49	43	2,5	62,5	125	8	16	18	26	17	37,5	925,0	15,7	19,80
39 61 100	6	1000,00	50	60	49	43	2,5	无安装孔 / without mounting holes										19,80
39 60 200	6	2000,00	100	60	49	43	2,5	62,5	125	16	16	18	26	17	37,5	1925,0	15,7	39,60
39 61 200	6	2000,00	100	60	49	43	2,5	无安装孔 / without mounting holes										39,60

1) 该齿条只能使用左旋安装块拼接。
2) 螺栓连接限制了驱动力

1) This racks could be used for continous linking only with the left side (see sketch).
2) The screw joint limits the feed force.

500毫米及其它长度也可. / 500 mm and other length on request.

整体齿节线误差 / Total pitch error

$GT_f/1000 \leq 0{,}200$ mm,
$GT_f/1500 \leq 0{,}300$ mm,
$GT_f/2000 \leq 0{,}400$ mm.

- 铣削齿面,感应淬火
- 材料 C45钢
- 齿条背面加工，表面喷砂处理

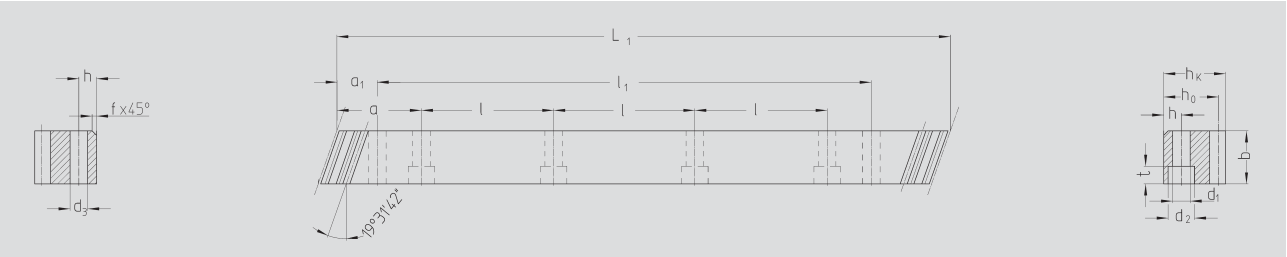
- Milled teeth and induction hardened
- material C45E
- backside machined, profile blasted.

更多信息请参考ZA-13。

Further information see page ZA–13

10 级精度

ATLANTA-Quality 10



订购代码 Order code	模数 Module	L_1	齿数 N° of teeth	b	h_k	h_0	f	a	l	孔数 N° of holes	h	d_1	d_2	t	a_1	l_1	d_3	kg
39 80 100	8	960,00	36	80	79	71	2,5	60,0	120	8	25	22	33	21	120,0	720	19,7	42,50
39 81 100	8	960,00	36	80	79	71	2,5	无安装孔 / without mounting holes										42,50
39 80 200	8	1920,00	72	80	79	71	2,5	60,0	120	16	25	22	33	21	120,0	1680	19,7	85,00
39 81 200	8	1920,00	72	80	79	71	2,5	无安装孔 / without mounting holes										85,00
39 10 100	10	1000,00	30	100	99	89	2,5	62,5	125	8	32	33	48	32	125,0	750	19,7	68,72
39 11 100	10	1000,00	30	100	99	89	2,5	无安装孔 / without mounting holes										68,72
39 12 100	12	1000,00	25	120	120	108	2,5	40,0	125	8	40	39	58	38	125,0	750	19,7	120,00
39 13 100	12	1000,00	25	120	120	108	2,5	无安装孔 / without mounting holes										120,00

500毫米及其它长度也可. / 500 mm and other length on request.

整体齿节线误差 / Total pitch error

GT_f /1000 ≤ 0,200 mm,
GT_f /2000 ≤ 0,400 mm.

- 铣削齿面,感应淬火
- 材料 C45钢
- 齿条背面加工，表面喷砂处理

- Milled teeth and induction hardened
- material C45E
- backside machined, profile blasted.

齿条安装参考ZF-2

Mounting racks, see page ZF-2.

为了达到齿条的高精度装配，我们推荐我们的专利安装工具，参考ZF-4

To achieve the precision of racks, also at the joint, we recommended our patented assembly kit, see page ZF-4

齿轮和齿条的润滑，我们建议使用我们的电控润滑系统，参考ZE-1

For lubrication of racks & pinions we recommend our automatic lubrication systems, see page ZE-1

关于齿轮齿条传动系统的计算和选型的例子，参考ZD-1

For the calculation and selection of the rack and pinion drives see calculation sample page ZD-1

安装齿条的螺栓，参考ZF-3

Screws for rack mounting, see page ZF-3.

斜齿，左旋， 19° 31' 42"
helical tooth system, 19° 31' 42" left-hand

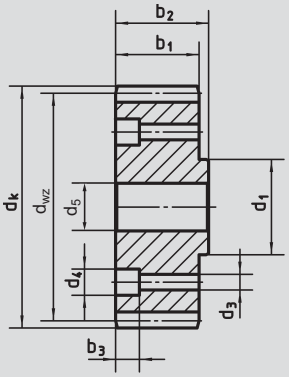


图 1 / Fig. 1

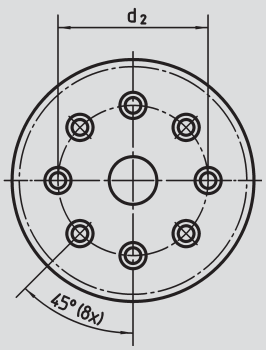
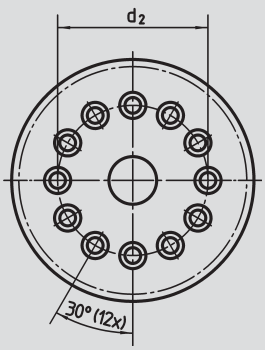


图 2 / Fig. 2

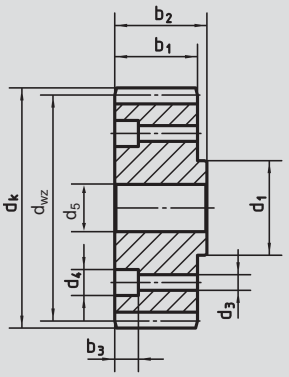


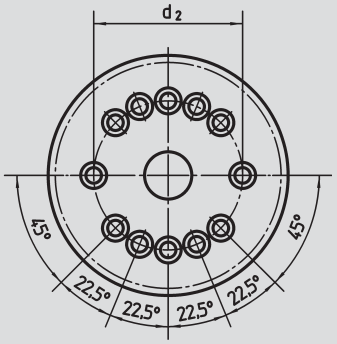
16MnCr5, 1.7131
渗碳淬火 case-hardened
精度等级 Gearing grade 5 e 24

带有12.9级螺栓（DIN912）
With Screws 12.9 DIN 912

订购代码 Order code	图 Fig.	模数 Module	齿数 N° of teeth z	x (1)	d_{wz}	d_k	d_{1h6}	d_2	d_3	d_4	d_5^{H6}	b_1	b_2	b_3	节圆周长 L=PI*d L	kg	接口ISO Interface ISO
78 20 526	1	2	26	0,4065	56,80	60,60	20,0	31,5	5,5	10	15	26	29,0	12	173,33	0,4	9409-1-A-31,5
78 20 527	1	2	27	0	57,30	61,29	20,0	31,5	5,5	10	15	30	33,5	11	180,00	0,5	9409-1-A-31,5
78 20 529	1	2	29	0,4150	63,20	67,00	20,0	31,5	5,5	10	15	26	29,0	12	193,33	0,5	9409-1-A-31,5
78 20 535	1	2	35	0,3819	75,80	79,60	20,0	31,5	5,5	10	15	26	29,0	12	233,33	0,8	9409-1-A-31,5
78 25 529	1	2	29	0,4150	63,20	67,00	25,0	40,0	6,6	11	20	26	30,0	14	193,33	0,5	9409-1-A-40
78 21 533	1	2	33	0,3928	71,60	75,30	31,5	50,0	6,6	11	20	26	30,0	14	220,00	0,7	9409-1-A-50
78 20 536	1	2	36	0	76,40	80,39	31,5	50,0	6,6	11	20	30	34,0	8	240,00	1,2	9409-1-A-50
78 21 537	1	2	37	0,4209	80,20	84,00	31,5	50,0	6,6	11	20	26	30,0	14	246,67	0,9	9409-1-A-50
78 31 531	1	3	31	0,3540	100,80	106,60	31,5	50,0	6,6	11	20	31	35,5	9	310,00	1,8	9409-1-A-50

(1) 轮廓修正系数 / Profile modification factor





16MnCr5, 1.7131
渗碳淬火 case-hardened
精度等级 Gearing grade 5 e 24

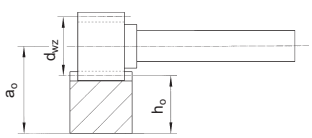
带有12.9级螺栓（DIN912）
With Screws 12.9 DIN 912

订购代码 Order code	模数 Module	齿数 N° of teeth z	x (1)	d_{wz}	d_k	d_{1h6}	d_2	d_3	d_4	d_5^{H6}	b_1	b_2	b_3	节圆周长 L=PI*d L	kg	接口ISO Interface ISO
78 22 540	2	40	0,3792	86,40	90,20	40,0	63,0	6,6	11	31,5	26	30	14	266,69	1,0	9409-1-A-63
78 22 545	2	45	0,3267	96,80	100,60	40,0	63,0	6,6	11	31,5	26	30	14	300,00	1,4	9409-1-A-63
78 30 530	3	30	0	95,49	101,49	40,0	63,0	6,6	11	20,0	35	39	10	300,00	2,2	9409-1-A-63

(1)轮廓修正系数 / Profile modification factor

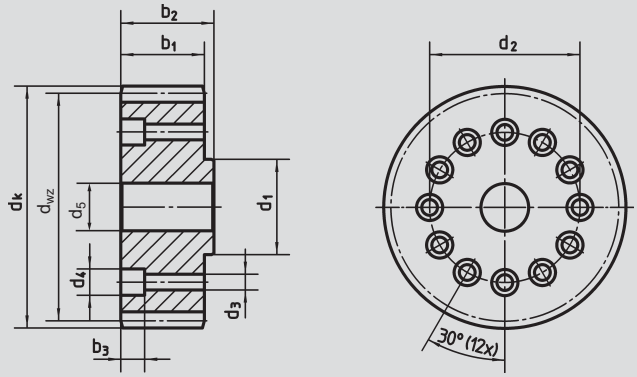
螺栓连接限制了最大扭矩 / The max. torque is limited by the threaded connection.

齿轮和齿条间中心距的计算
Calculation of centre distance a between gearwheel and rack.



$$a_o = \frac{d_{wz}}{2} + h_o$$

斜齿，左旋， 19° 31' 42"
helical tooth system, 19° 31’ 42" left-hand



16MnCr5, 1.7131
渗碳淬火 case-hardened
精度等级 Gearing grade 5 e 24

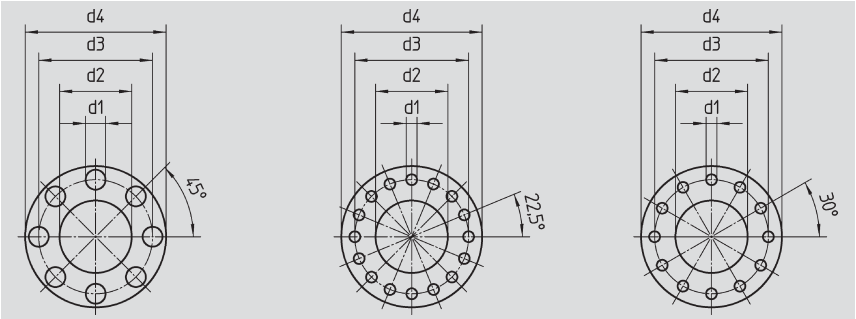
带有12.9级螺栓（DIN912）
With Screws 12.9 DIN 912

订购代码 Order code	模数 Module	齿数 N° of teeth z	x (1)	d_{wz}	d_k	d_{1h6}	d_2	d_3	d_4	$d_5{}^{H6}$	b_1	b_2	b_3	节圆周长 L=PI*d L	kg	接口ISO Interface ISO
78 33 535	3	35	0,3652	113,60	119,40	50	80	9	15	40	31	35,0	11	350,00	1,8	9409-1-A-80
78 33 540	3	40	0,3792	129,60	135,40	50	80	9	15	40	31	35,0	11	400,00	2,5	9409-1-A-80
78 40 530	4	30	0	127,32	135,32	50	80	9	15	40	45	49,0	11	400,00	3,5	9409-1-A-80
78 50 521	5	21	0	111,40	121,40	50	80	9	–	40	59	64,5	–	350,00	3,5	9409-1-A-80
78 50 536	5	36	0	190,99	200,98	80	125	11	18	60	55	61,0	13	600,00	8,0	9409-1-A-125

(1)轮廓修正系数 / Profile modification factor

螺栓连接限制了最大扭矩 / The max. torque is limited by the threaded connection.

金刚石涂层薄膜，用于增加摩擦
Foil coated with diamonds to increase the friction coefficient



订购代码. / Order code	图 / Fig. No.	法兰 / ISO Connection	d_1	d_2	d_3	d_4
78 01 001	图 1	A – 31,5	5,5	20,0	31,5	39
78 01 002	图 1	A – 50	6,6	31,5	50,0	62
78 01 003	图 2	A – 63	6,6	40,0	63,0	80
78 01 004	图 3	A – 80	9,0	50,0	80,0	100
78 01 005	图 3	A – 125	11,0	80,0	125,0	148

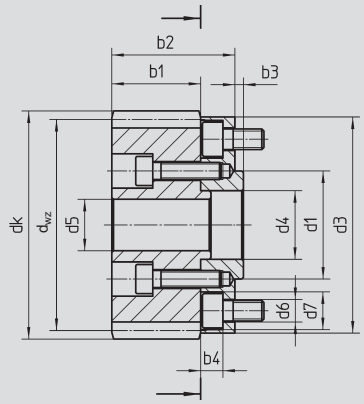
扭矩的传递是依靠摩擦力完成，但受限于所使用材料的摩擦系数。
改变结构有时是不可行的，所以需要传递更大的扭矩的方式是增加接触面的摩擦系数。金刚石涂层薄膜可以用来提高摩擦系数。

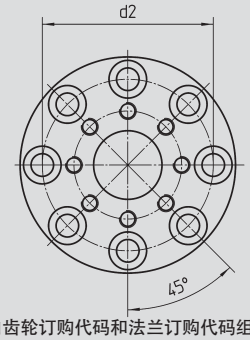
A transmission of the torque in connections based on friction is limited by the friction coefficient of the materials which are used.
The change of the size of a construction is sometimes not possible, so the only possibility to transmit a higher torque is to increase the coefficient of friction. The foil which is coated with diamonds is able to increase this friction coefficient.

材料 Material	Rz [µm]	p [Mpa]	摩擦系数 Coefficient of friction			
			静态 / Static		动态 / Dynamic	
			5 组数据平均结果 Average from 5 testresults	标准偏差 Standarddeviation	5 组数据平均结果 Average from 5 testresults	标准偏差 Standarddeviation
C45	1-3	50	0,38	0,16	–	-
(HV = 262)		100	0,45	0,07	0,41	0,05
16MnCr5	1-3	50	0,46	0,14	–	-
(HV = 735)		100	0,34	0,05	0,38	0,11

如果您需要更多信息，请联系我们. / If you need more information please contact us.

斜齿，左旋， 19° 31' 42"
helical tooth system, 19° 31’ 42" left-hand





A50连接面
Are interface A50

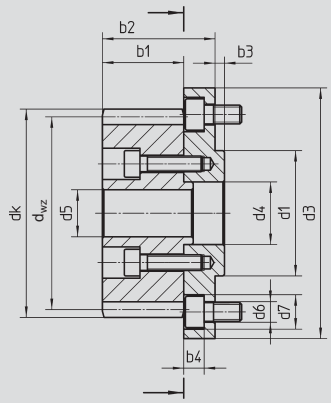
16MnCr5, 1.7131
渗碳淬火 case-hardened
精度等级 Gearing grade 5 e 24
法兰：软材 Flange: soft

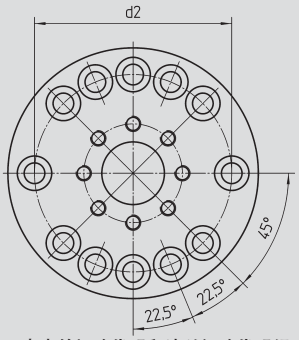
带有12.9级螺栓（DIN912）
With Screws 12.9 DIN 912

由齿轮订购代码和法兰订购代码组成一套
Set consists of order code gear and order code flange

齿轮订购代码 Order code Pinion	法兰订购代码 Order code Flange	模数 Module	齿数 N° of teeth z	x(1)	d_{wz}	d_k	d_{1h6}	d_2	d_3	d_4	d_5	d6	d7	b_1	b_2	b_3	b4	节圆周长 L=PI*d L	kg	接口ISO Interface ISO
78 20 526	26578001	2	26	0,4065	56,80	60,60	31,5	50	63	20	15	6,6	11	26	36	2,5	6,5	173,33	0,6	9409-1-A-31,5/50
78 20 527	26578001	2	27	0	57,30	61,29	31,5	50	63	20	15	6,6	11	30	40	2,5	6,5	180,00	0,7	9409-1-A-31,5/50
78 20 529	26578001	2	29	0,4150	63,20	67,00	31,5	50	63	20	15	6,6	11	26	36	2,5	6,5	193,33	0,7	9409-1-A-31,5/50
78 20 535	26578001	2	35	0,3819	75,80	79,60	31,5	50	63	20	15	6,6	11	26	36	2,5	6,5	233,33	1,0	9409-1-A-31,5/50

(1)轮廓修正系数 / Profile modification factor





A63连接面
Are interface A63

16MnCr5, 1.7131
渗碳淬火 case-hardened
精度等级 Gearing grade 5 e 24
法兰：软材 Flange: soft

带有12.9级螺栓（DIN912）
With Screws 12.9 DIN 912

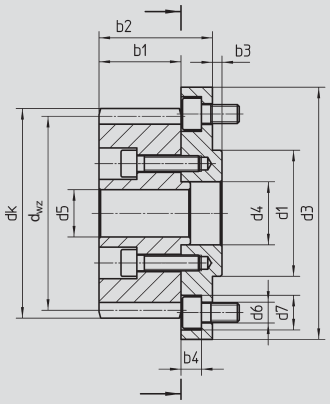
由齿轮订购代码和法兰订购代码组成一套
Set consists of order code gear and order code flange

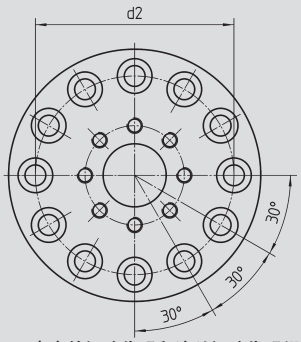
齿轮订购代码 Order code Pinion	法兰订购代码 Order code Flange	模数 Module	齿数 N° of teeth z	x(1)	d_{wz}	d_k	d_{1h6}	d_2	d_3	d_4	d_5	d6	d7	b_1	b_2	b_3	b4	节圆周长 L=PI*d L	kg	接口ISO Interface ISO
78 20 526	26578002	2	26	0,4065	56,80	60,60	40	63	80	20	15	6,6	11	26	36	3	6,5	173,33	0,7	9409-1-A-31,5/63
78 20 527	26578002	2	27	0	57,30	61,29	40	63	80	20	15	6,6	11	30	40	3	6,5	180,00	0,8	9409-1-A-31,5/63
78 20 529	26578002	2	29	0,4150	63,20	67,0	40	63	80	20	15	6,6	11	26	36	3	6,5	193,33	0,8	9409-1-A-31,5/63
78 20 535	26578002	2	35	0,3819	75,80	79,60	40	63	80	20	15	6,6	11	26	36	3	6,5	233,33	1,1	9409-1-A-31,5/63

(1)轮廓修正系数 / Profile modification factor

螺栓连接限制了最大扭矩 / The max. torque is limited by the threaded connection.

斜齿，左旋， 19° 31' 42"
helical tooth system, 19° 31’ 42" left-hand





A80连接面
Are interface A80

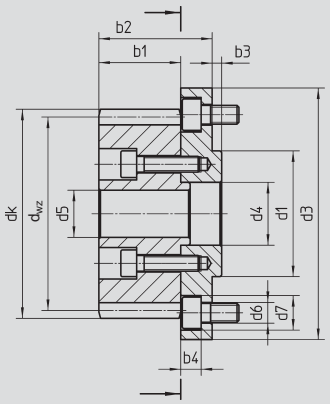
由齿轮订购代码和法兰订购代码组成一套
Set consists of order code gear and order code flange

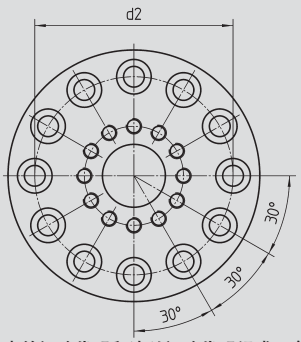
16MnCr5, 1.7131
渗碳淬火 case-hardened
精度等级 Gearing grade 5 e 24
法兰：软材 Flange: soft

带有12.9级螺栓（DIN912）
With Screws 12.9 DIN 912

齿轮订购代码 Order code Pinion	法兰订购代码 Order code Flange	模数 Module	齿数 N° of teeth z	x(1)	d_{wz}	d_k	d_{1h6}	d_2	d_3	d_4	d_5	d6	d7	b_1	b_2	b_3	b4	节圆周长 L=PI*d L	kg	接口ISO Interface ISO
78 20 526	26578001(2) 26578003(2)	2	26	0,4065	56,80	60,60	50	80	100	31,5	15	9	15	26	49	4	9	173,33	1,2	9409-1-A-31,5/50/80
78 20 527	26578001(2) 26578003(2)	2	27	0	57,30	61,29	50	80	100	31,5	15	9	15	30	53	4	9	180,00	1,3	9409-1-A-31,5/50/80
78 20 529	26578001(2) 26578003(2)	2	29	0,4150	63,20	67,00	50	80	100	31,5	15	9	15	26	49	4	9	193,33	1,3	9409-1-A-31,5/50/80
78 20 535	26578001(2) 26578003(2)	2	35	0,3819	75,80	79,60	50	80	100	31,5	15	9	15	26	49	4	9	233,33	1,6	9409-1-A-31,5/50/80
78 21 533	26578003	2	33	0,3928	71,60	75,30	50	80	100	31,5	20	9	15	26	39	4	9	220,00	1,3	9409-1-A-50/80
78 20 536	26578003	2	36	0	76,40	80,40	50	80	100	31,5	20	9	15	30	43	4	9	240,00	1,4	9409-1-A-50/80
78 21 537	26578003	2	37	0,4209	80,20	84,00	50	80	100	31,5	20	9	15	26	39	4	9	246,67	1,5	9409-1-A-50/80
78 31 531	26578003	3	31	0,3540	100,80	106,60	50	80	100	31,5	20	9	15	31	44	4	9	310,00	2,4	9409-1-A-50/80

(1) 轮廓修正系数 / Profile modification factor　　(2) 法兰 2 / 2 Flange





A125连接面
Are interface A125

由齿轮订购代码和法兰订购代码组成一套
Set consists of order code gear and order code flange

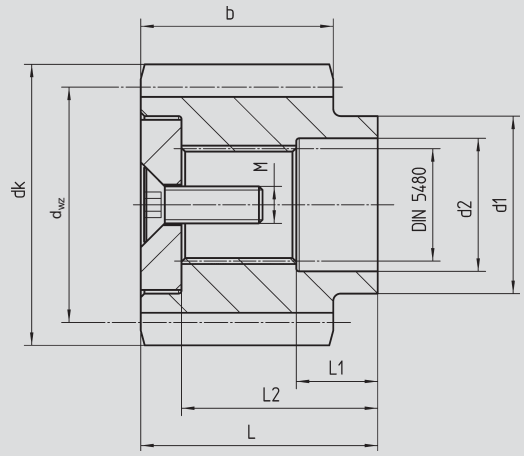
16MnCr5, 1.7131
渗碳淬火 case-hardened
精度等级 Gearing grade 5 e 24
法兰：软材 Flange: soft

带有12.9级螺栓（DIN912）
With Screws 12.9 DIN 912

齿轮订购代码 Order code Pinion	法兰订购代码 Order code Flange	模数 Module	齿数 N° of teeth z	x(1)	d_{wz}	d_k	d_{1h6}	d_2	d_3	d_4	d_5	d6	d7	b_1	b_2	b_3	b4	节圆周长 L=PI*d L	kg	接口ISO Interface ISO
78 31 531	26578003(2) 26578004(2)	3	31	0,3540	100,80	106,60	80	125	148	50	20	11	18	31	63	6	14	310,00	3,4	9409-1-A-50/80/125
78 33 535	26578004	3	35	0,3652	113,60	119,40	80	125	148	50	40	11	18	31	50	6	14	350,00	3,8	9409-1-A80/125
78 33 540	26578004	3	40	0,3792	129,60	135,40	80	125	148	50	40	11	18	31	50	6	14	400,00	4,5	9409-1-A80/125
78 40 530	26578004	4	30	0	127,32	135,32	80	125	148	50	40	11	18	45	64	6	14	400,00	5,5	9409-1-A80/125
78 50 521	26578004	5	21	0	111,40	121,40	80	125	148	50	40	11	18	59	78	6	14	350,00	5,5	9409-1-A80/125

(1) 轮廓修正系数 / Profile modification factor　　(2) 法兰 2 / 2 Flange
螺栓连接限制了最大扭矩 / The max. torque is limited by the threaded connection.

斜齿，左旋， 19° 31' 42"
helical tooth system, 19° 31' 42" left-hand



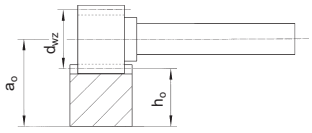
垫圈和螺栓8.8级(DIN7991)
With washer and Screws 8.8 DIN 7991

Senkschraube Countersunk	Festigkeitsklasse Strength class	Anzugsmoment Tightening torque
M5	10.9	7
M8	8.8	20
M12	8.8	68
M16	8.8	168
M20	8.8	340

16MnCr5, 1.7131
渗碳淬火 case-hardened
精度等级 Gearing grade
5 e 24

订购代码	齿数	模数	修正系数	F_u Tab.										
Order code	N° of teeth	Module	profile modific. factor	F_u tab.	d_{wz}	d_k	d_1	L	d_2	L_1	L_2	b	M	软材 / soft DIN 5480 *	kg
79 11 538	38	1,5	–	6,8	60,48	63,48	30	33	24	12	27,5	20	M8x25	N22x1,25x30x16x7H	0,1
79 20 515	15	2	0,5922	4,5	34,20	38,0	24	32	18	11	26,5	26	M5x16	N16x0,8x30x18x7H	0,2
79 20 516	16	2	0,6117	4,5	36,40	40,1	24	32	18	11	26,5	26	M5x16	N16x0,8x30x18x7H	0,2
79 20 518	18	2	0,5000	4,5	40,20	44,0	24	32	18	11	26,5	26	M5x16	N16x0,8x30x18x7H	0,3
79 21 518	18	2	0,5000	6,8	40,20	44,0	30	33	24	12	27,5	26	M8x25	N22x1,25x30x16x7H	0,3
79 21 520	20	2	0,4900	6,8	44,40	48,2	30	33	24	12	27,5	26	M8x25	N22x1,25x30x16x7H	0,3
79 21 522	22	2	0,4786	6,8	48,60	52,5	30	33	24	12	27,5	26	M8x25	N22x1,25x30x16x7H	0,4
79 21 525	25	2	–	6,8	53,05	57,05	30	33	24	12	27,5	26	M8x25	N22x1,25x30x16x7H	0,4
79 22 523	23	2	0,4981	19,0	50,80	54,6	40	34	35	13	27,0	26	M12x35	N32x1,25x30x24x7H	0,4
79 22 525	25	2	0,4871	20,0	55,00	59,0	40	34	35	13	27,0	26	M12x35	N32x1,25x30x24x7H	0,4
79 22 527	27	2	0,3760	20,0	58,80	62,6	40	34	35	13	27,0	26	M12x35	N32x1,25x30x24x7H	0,5
79 33 520	20	3	0,4563	28,5	66,40	72,2	50	51	41	20	41,0	31	M16x45	N40x2x30x18x7H	0,7
79 33 522	22	3	0,4620	29,5	72,80	78,6	50	51	41	20	41,0	31	M16x45	N40x2x30x18x7H	0,8
79 33 524	24	3	0,4676	29,5	79,20	85,0	50	51	41	20	41,0	31	M16x45	N40x2x30x18x7H	1,0
79 44 520	20	4	0,4000	54,0	88,08	96,1	75	54	56	20	44,0	41	M20x50	N55x2x30x26x7H	1,5
79 45 525	25	4	0,3400	57,5	108,82	116,8	90	65	72	24	55,0	41	M20x50	N70x2x30x34x7H	3,0

齿轮和齿条间中心距的计算
Calculation of centre distance a between gearwheel and rack.



$$a_o = \frac{d_{wz}}{2} + h_o$$

$$F_{u\ zul./perm.} = \frac{F_{u\ Tab}}{K_A \cdot S_B \cdot f_n \cdot L_{KHß}} \quad [kN]$$

系数请查看页面ZD-2.
Factors see page ZD – 2.

* 用二氧化wu钼粉或合适的油脂擦拭DIN 5480 (减少腐蚀)
* Rub the DIN 5480 profile with Mos2-powder or suitable grease (reduces micro corrosion)

斜齿，磨削，左旋 19° 31' 42", 孔公差 ØH6 键槽符合 DIN 6885标准
helical tooth system, ground teeth, 19° 31' 42" left-hand, with bore ØH6 and keyway acc. to DIN 6885

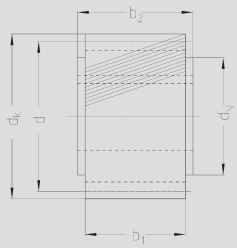


图 1
Fig. 1

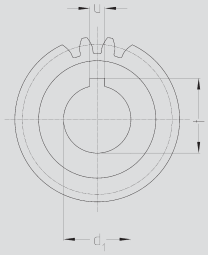


图1+图3 键槽在齿槽中间
Fig. 1 + 3 Keyway middle of tooth gap

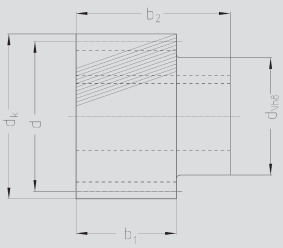


图 3
Fig. 3

16MnCr5, 1.7131
渗碳淬火 case-hardened
精度等级 Gearing grade 6 e 25

订购代码 Order code	图号 Fig.	齿数 N° of teeth z	d	d*PI	d_k	d_1H6	d_N	b_1	b_2	u	t	kg	胀紧盘 GH-1页 shrink-disc on page GH-1
模数 / Module 1,5													
24 11 520 1)	1	20	31,83	100,00	34,83	11	25	20	22	4	12,8	0,13	
24 14 520 1)	1	20	31,83	100,00	34,83	14	25	20	22	5	16,3	0,13	
24 16 520 1)	1	20	31,83	100,00	34,83	16	25	20	22	5	18,3	0,13	
24 16 321 1)	3	21	33,42	105,00	36,42	16	30	20	46	5	18,3	0,15	80 83 030
模数 / Module 2													
24 26 518	1	18	38,197	120,00	42,2	16	25	28	30	5	18,3	0,2	
24 29 520	1	20	42,44	133,33	46,4	19*	30	28	30	6	21,8	0,3	
24 29 320	3	20	42,44	133,33	46,4	19*	30	28	56	6	21,8	0,3	80 83 030
24 22 520	1	20	42,44	133,33	46,4	20	30	28	30	6	22,8	0,3	
24 20 320	3	20	42,44	133,33	46,4	22*	36	28	56	6	24,8	0,3	80 84 036
24 23 520	1	20	42,44	133,33	46,4	22	30	28	30	6	24,8	0,3	
24 26 521	1	21	44,56	140,00	48,6	16	25	28	30	5	18,3	0,3	
24 20 321	3	21	44,56	140,00	48,6	22	36	28	56	6	24,8	0,2	80 84 036
24 29 522	1	22	46,69	146,67	50,7	19*	30	28	30	6	21,8	0,2	
24 29 322	3	22	46,69	146,67	50,7	19*	30	28	56	6	21,8	0,4	80 83 030
24 20 522	1	22	46,69	146,67	50,7	22*	30	28	30	6	24,8	0,3	
24 20 322	3	22	46,69	146,67	50,7	22*	36	28	56	6	24,8	0,4	80 84 036
24 29 525	1	25	53,05	166,67	57,1	19*	30	28	30	6	21,8	0,4	
24 29 325	3	25	53,05	166,67	57,1	19*	30	28	56	6	21,8	0,5	80 83 030
24 22 525	1	25	53,05	166,67	57,1	20	30	28	30	6	22,8	0,4	
24 20 525	1	25	53,05	166,67	57,1	22*	30	28	30	6	24,8	0,3	
24 20 325	3	25	53,05	166,67	57,1	22*	36	28	56	6	24,8	0,5	80 84 036
24 23 525	1	25	53,05	166,67	57,1	25	36	28	30	8	28,3	0,4	
24 29 528	1	28	59,42	186,67	63,4	19*	30	28	30	6	21,8	0,4	
24 29 328	3	28	59,42	186,67	63,4	19*	30	28	56	6	21,8	0,6	80 83 030
24 20 528	1	28	59,42	186,67	63,4	22*	30	28	30	6	24,8	0,4	
24 20 328	3	28	59,42	186,67	63,4	22*	36	28	56	6	24,8	0,7	80 84 036
24 25 528	1	28	59,42	186,67	63,4	35	48	28	30	10	38,3	0,4	
24 26 530	1	30	63,66	200,00	67,7	16	25	28	30	5	18,3	0,7	
24 22 530	1	30	63,66	200,00	67,7	20	30	28	30	6	22,8	0,6	
24 20 330	3	30	63,66	200,00	67,7	22	36	28	56	6	24,8	0,6	80 84 036
24 23 530	1	30	63,66	200,00	67,7	25	36	28	30	8	28,3	0,8	
24 24 530	1	30	63,66	200,00	67,7	30*	45	28	30	8	33,3	0,6	
24 22 330	3	30	63,66	200,00	67,7	30	50	28	60	8	33,3	0,8	80 85 050
24 23 330	3	30	63,66	200,00	67,7	32	55	28	65	10	35,3	0,8	80 80 055
24 22 532	1	32	67,91	213,33	71,9	20	30	28	30	6	22,8	0,8	
24 20 532	1	32	67,91	213,33	71,9	22*	30	28	30	6	24,8	0,7	
24 20 332	3	32	67,91	213,33	71,9	22*	36	28	56	6	27,8	0,9	80 84 036
24 23 532	1	32	67,91	213,33	71,9	25	36	28	30	8	28,3	0,7	
24 25 532	1	32	67,91	213,33	71,9	35	48	28	30	10	38,3	0,6	
24 25 536	1	36	76,39	240,00	80,4	35	48	28	30	10	38,3	0,8	
24 23 339	3	39	82,76	260,00	86,8	32	55	28	65	10	35,3	1,3	80 80 055
24 25 540	1	40	84,88	266,67	88,9	35	48	28	30	10	38,3	1,1	

* G6 个别 /resp. H7
1) 精度等级/ Gearing grade 6 f 24

斜齿，磨削，左旋 19° 31' 42", 孔公差 Ø^{H6} 键槽符合 DIN 6885 标准

helical tooth system, ground teeth, 19° 31' 42" left-hand, with bore Ø^{H6} and keyway acc. to DIN 6885

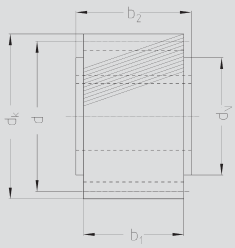


图 1
Fig. 1

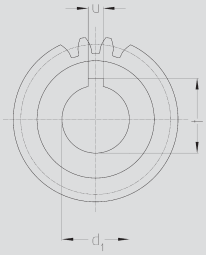


图1+图3 键槽在齿槽中间
Fig. 1 + 3 Keyway middle of tooth gap

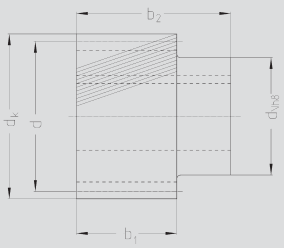


图 3
Fig. 3

16MnCr5, 1.7131
渗碳淬火 case-hardened
精度等级 Gearing grade
6 e 25

订购代码 Order code	图号 Fig.	齿数 N° of teeth z	d	d*PI	d_k	d_1^{H6}	d_N	b_1	b_2	u	t	kg	胀紧盘 GH-1页 shrink-disc on page GH-1
模数 / Module 3													
24 30 320	3	20	63,66	200,00	69,7	22	36	28	56	6	24,8	0,6	80 84 036
24 31 320	3	20	63,66	200,00	69,7	25	44	28	60	8	28,3	0,7	80 80 044
24 34 520	1	20	63,66	200,00	69,7	30	45	28	30	8	33,3	0,8	
24 32 320	3	20	63,66	200,00	69,7	30	50	28	60	8	33,3	0,8	80 85 050
24 33 320	3	20	63,66	200,00	69,7	32	55	28	65	10	35,3	0,8	80 80 055
24 35 520	1	20	63,66	200,00	69,7	35	48	28	30	10	38,3	0,7	
24 33 522	1	22	70,03	220,00	76,0	25	36	28	30	8	28,3	0,8	
24 34 522	1	22	70,03	220,00	76,0	30	45	28	30	8	33,3	0,7	
24 33 322	3	22	70,03	220,00	76,0	32*	55	28	65	10	35,3	1,0	80 80 055
24 35 522	1	22	70,03	220,00	76,0	35	48	28	30	10	38,3	0,7	
24 35 322	3	22	70,03	220,00	76,0	40*	62	28	65	12	43,3	1,0	80 86 062
24 30 325	3	25	79,58	250,00	85,6	22	36	28	56	6	24,8	1,0	80 84 036
24 33 525	1	25	79,58	250,00	85,6	25	36	28	30	8	28,3	1,0	
24 31 325	3	25	79,58	250,00	85,6	25	44	28	60	8	28,3	1,1	80 80 044
24 34 525	1	25	79,58	250,00	85,6	30	45	28	30	8	33,3	1,0	
24 32 325	3	25	79,58	250,00	85,6	30	50	28	60	8	33,3	1,2	80 85 050
24 33 325	3	25	79,58	250,00	85,6	32	55	28	65	10	35,3	1,2	80 80 055
24 35 525	1	25	79,58	250,00	85,6	35	48	28	30	10	38,3	0,9	
24 34 325	3	25	79,58	250,00	85,6	35	55	28	65	10	38,3	1,1	80 80 055
24 36 525	1	25	79,58	250,00	85,6	40	70	28	50	12	43,3	1,1	
24 35 325	3	25	79,58	250,00	85,6	40*	62	28	65	12	43,3	1,1	80 86 062
24 33 328	3	28	89,13	280,00	95,1	32*	55	28	65	10	35,3	1,1	80 80 055
24 35 328	3	28	89,13	280,00	95,1	40*	62	28	65	12	43,3	1,1	80 86 062
24 33 332	3	32	101,86	320,00	107,85	32*	55	28	65	10	35,3	2,1	80 80 055
24 35 332	3	32	101,86	320,00	107,85	40*	62	28	65	12	43,3	2,1	80 86 062

* G6 个别 /resp. H7

斜齿，磨削，左旋 19° 31' 42", 键槽符合 $Ø^{H6}$ und Passfedernut nach DIN 6885 标准
helical tooth system, ground teeth, 19° 31' 42" left-hand, with bore $Ø^{H6}$ and keyway acc. to DIN 6885

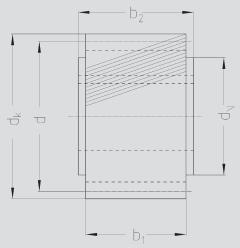


图 1
Fig. 1

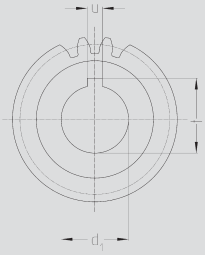


图1+图3 键槽在齿槽中间
Fig. 1 + 3 Keyway middle of tooth gap

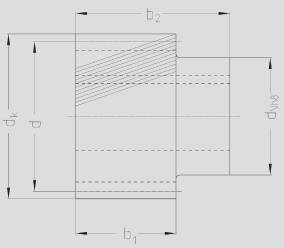


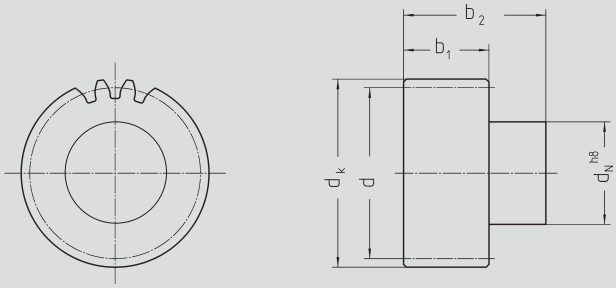
图 3
Fig. 3

16MnCr5, 1.7131
渗碳淬火 case-hardened
精度等级 Gearing grade 6 e 25

订购代码 Order code	图号 Fig.	齿数 N° of teeth z	d	d*PI	d_k	d_1^{H6}	d_N	b_1	b_2	u	t	kg	胀紧盘 GH-1页 shrink-disc on page GF-9
模数 / Module 4													
24 45 515	1	15	63,66	200,00	71,7	35	52	40	50	10	38,3	1,4	
24 43 318	3	18	76,39	240,00	84,4	32	55	40	75	10	35,3	1,5	80 80 055
24 45 520	1	20	84,88	266,67	92,9	35	52	40	50	10	38,3	1,9	
24 47 520	1	20	84,88	266,67	92,9	45	65	40	50	14	48,8	1,6	
24 43 321	3	21	89,13	280,00	97,1	32	55	40	75	10	35,3	2,0	80 80 055
24 44 321	3	21	89,13	280,00	97,1	35	55	40	75	10	38,3	1,9	80 80 055
24 45 321	3	21	89,13	280,00	97,1	40	62	40	75	12	43,3	1,9	80 86 062
24 46 321	3	21	89,13	280,00	97,1	45	68	40	75	14	48,8	1,7	80 80 068
24 45 522	1	22	93,37	293,33	101,4	35	52	40	50	10	38,3	2,3	
24 47 522	1	22	93,37	293,33	101,4	45	65	40	50	14	48,8	2,0	
24 43 324	3	24	101,86	320,00	109,9	32	55	40	75	10	35,3	2,6	80 80 055
24 44 324	3	24	101,86	320,00	109,9	35	55	40	75	10	38,3	2,5	80 80 055
24 45 324	3	24	101,86	320,00	109,9	40	62	40	75	12	43,3	2,5	80 86 062
24 46 324	3	24	101,86	320,00	109,9	45	68	40	75	14	48,8	2,3	80 80 068
24 47 324	3	24	101,86	320,00	109,9	55	80	40	80	16	59,3	2,4	80 87 080
24 45 525	1	25	106,10	333,33	114,1	35	52	40	50	10	38,3	3,1	
24 47 525	1	25	106,10	333,33	114,1	45	65	40	50	14	48,8	2,8	
24 47 325	3	25	106,10	333,33	114,1	55	80	40	80	16	59,3	2,9	80 87 080
模数 / Module 5													
24 56 318	3	18	95,49	300,00	105,5	45	68	50	85	14	48,8	2,7	80 80 068
24 56 324	3	24	127,32	400,00	137,3	45	68	50	85	14	48,8	4,9	80 80 068
24 57 324	3	24	127,32	400,00	137,3	55	80	50	90	16	59,3	4,9	80 87 080
24 58 324	3	24	127,32	400,00	137,3	75	110	50	110	20	79,9	5,6	80 80 110
模数 / Module 6													
24 67 320	3	20	127,32	400,00	139,3	55	80	60	100	16	59,3	5,7	80 87 080
24 68 320	3	20	127,32	400,00	139,3	75	110	60	120	20	79,9	6,3	80 80 110
24 67 325	3	25	159,16	500,00	171,2	55	80	60	100	16	59,3	9,0	80 87 080
24 68 325	3	25	159,16	500,00	171,2	75	110	60	120	20	79,9	9,6	80 80 110
模数 / Module 8													
24 88 318	3	18	152,79	480,00	168,8	75	110	80	140	20	79,9	10,8	80 80 110
24 89 320*	3	20	169,80	533,44	185,8	85	125	80	145	22	90,4	13,6	80 80 125
模数 / Module 10													
24 09 720*		20	212,21	666,68	232,2	85	125	100	165	22	90,4	26,2	80 80 125

1) 精度等级 / Gearing grade 5 f 23

斜齿，左旋 19° 31' 42", 无孔
helical tooth system, left-hand, 19° 31' 42", without bore



16MnCr5, 1.7131
渗碳，齿面感应淬火 carburized, teeth ind. hardened
精度等级 Gearing grade 6 e 25

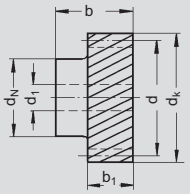
订购代码 Order code	模数 Module	齿数 N° of teeth	d	d*PI	d_k	d_N	b_1	b_2	kg	胀紧盘GH-1页 shrink-disc on page GF-1
24 99 218	2	18	38,20	120,00	42,2	30	28	56	0,3	80 83 030
24 99 220	2	20	42,44	133,33	46,4	30	28	56	0,4	80 83 030
24 99 222	2	22	46,69	146,67	50,7	36	28	56	0,5	80 84 036
24 99 225	2	25	53,05	166,67	57,1	44	28	60	0,8	80 80 044
24 99 228	2	28	59,42	186,67	63,4	50	28	60	1,0	80 85 050
24 99 230	2	30	63,66	200,00	67,7	50	28	60	1,1	80 85 050
24 99 232	2	32	67,91	213,33	71,9	55	28	65	1,4	80 80 055
24 99 318	3	18	57,30	180,00	63,3	44	28	60	0,8	80 80 044
24 99 320	3	20	63,66	200,00	69,7	50	28	60	1,0	80 85 050
24 99 322	3	22	70,03	220,00	76,0	55	28	65	1,4	80 80 055
24 99 325	3	25	79,58	250,00	85,6	62	28	65	1,8	80 86 062
24 99 328	3	28	89,13	280,00	95,1	68	28	65	2,3	80 80 068
24 99 418	4	18	76,39	240,00	84,4	62	40	77	2,0	80 86 062
24 99 420	4	20	84,88	266,67	92,9	62	40	77	2,4	80 86 062
24 99 421	4	21	89,13	280,00	97,1	68	40	77	2,8	80 80 068
24 99 422	4	22	93,37	293,33	101,4	68	40	77	2,9	80 80 068
24 99 424	4	24	101,86	320,00	109,9	80	40	80	3,9	80 87 080
24 99 425	4	25	106,10	333,33	114,1	80	40	80	4,0	80 87 080
24 99 522	5	22	116,71	366,67	126,7	80	50	90	5,5	80 87 080
24 99 524	5	24	127,32	400,00	137,3	110	50	110	9,6	80 80 110
24 99 525	5	25	132,63	416,67	142,6	110	50	110	9,1	80 80 110
24 99 620	6	20	127,32	400,00	139,3	110	60	120	9,7	80 80 110
24 99 820 [1)]	8	20	169,77	533,33	185,8	125	80	145	19,4	80 80 125

[1)] 带有孔 Ø40^{H7} / with bore Ø40^{H7}

该齿轮可以夹持在dk或是dN上进行二次加工。（参考ZF-11页）
The pinion could be fixed at dk or dN to be reworked (see page ZF-11).

齿轮最大的孔径请向我们询问。 / Maximum bore diameter of the pinion on request.

斜齿，左旋 19° 31' 42"
helical tooth system, left-hand,19° 31’ 42"

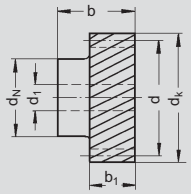


软材 / soft
Ck45 1.0503
精度等级 Gearing grade 8 e 25

订购代码 Order code	齿数 N° of teeth	b_1	b	d	d_k	d_1 (J8)	d_N	kg
模数 / Module 1,5								
21 15 520	20	17	30	31,83	34,8	9	25	0,14
21 15 525	25	17	30	39,79	42,8	9	30	0,22
模数 / Module 2								
21 20 520	20	28	35	42,44	46,4	9	30	0,35
21 20 525	25	28	35	53,05	57,1	12	35	0,54
21 20 530	30	28	35	63,66	67,7	12	40	0,76
模数 / Module 3								
21 30 520	20	30	50	63,66	69,7	14	45	0,99
21 30 525	25	30	50	79,58	85,6	14	60	1,60
模数 / Module 4								
21 40 515	15	40	60	63,66	71,7	16	50	1,10
21 40 520	20	40	60	84,88	92,9	16	60	2,21
21 40 525	25	40	60	106,10	114,1	16	75	3,45

二次打孔，开键槽，攻丝都可以在很短的时间内完成。
Further finishing (turning bores, keywaying, threading, etc.) is possible within short time.

斜齿，左旋 19° 31' 42"
helical tooth system, left-hand, 19° 31’ 42", prebored



软材 / soft
Ck45 1.0503
精度等级 Gearing grade
8 e 25

订购代码 Order code	齿数 N° of teeth	b_1	b	d	d_k	d_1 (J8)	d_N	kg
模数 / Module 5								
21 50 520	20	50	70	106,10	116,1	20	70	4,0
21 50 525	25	50	70	132,60	142,6	20	80	6,2
模数 / Module 6								
21 60 520	20	60	80	127,30	139,3	20	90	7,0
21 60 525	25	60	80	159,20	171,2	20	110	10,8
模数 / Module 8								
21 80 520	20	80	120	166,08	182,0	40	120	15,8
模数 / Module 10*								
21 10 518	18	100	150	190,99	211,0	40	150	32,7
模数 / Module 12*								
21 12 518	18	130	180	229,18	253,18	40	170	47,2

* 带有M8的吊装孔 / with threads for handling

二次打孔，开键槽，攻丝都可以在很短的时间内完成。
Further finishing (turning bores, keywaying, threading, etc.) is possible within short time.

齿轮齿条驱动-计算和选型-模数1.5-斜齿
Rack and pinion drive – calculation and selection – module 1,5 – helical tooth system

齿条 / Rack		HPR	BR	
ATLANTA精度等级/ATLANTA-Quality		6	9	10
齿条 Rack	材料 / material	C45	C45	C45
	热处理方式 Heat treatment	感应淬火 ind. hardened	软材 未淬火 soft	感应淬火 ind. hardened
齿轮 Pinion	材料 / material	16MnCr5	C45	C45
	热处理方式 Heat treatment	渗碳淬火 case hardened	软材 未淬火 soft	感应淬火 ind. hardened
齿轮齿数 1) No. of pinion teeth 1)	齿轮节圆 pitch circle dia.	最大驱动力 (只针对ATLANTA标准的材料) max. feed force (values are only valid for material according ATLANTA-Standard)		
12	19,10 mm	3,0 kN	0,4 kN	1,5 kN
13	20,69 mm	3,0 kN	0,4 kN	1,5 kN
14	22,28 mm	4,0 kN	0,5 kN	2,0 kN
15	23,87 mm	4,5 kN	0,5 kN	2,0 kN
16	25,46 mm	4,5 kN	0,6 kN	2,5 kN
17	27,06 mm	5,0 kN	0,6 kN	2,5 kN
18	28,65 mm	5,0 kN	0,6 kN	2,5 kN
19	30,24 mm	5,5 kN	0,7 kN	3,0 kN
20	31,83 mm	6,0 kN	0,7 kN	3,0 kN
21	33,42 mm	6,0 kN	0,8 kN	3,0 kN
22	35,01 mm	6,5 kN	0,8 kN	3,5 kN
23	36,61 mm	7,0 kN	0,8 kN	3,5 kN
24	38,20 mm	7,0 kN	0,9 kN	3,5 kN
25	39,79 mm	7,5 kN	0,9 kN	3,5 kN
26	41,38 mm	8,0 kN	1,0 kN	3,5 kN
27	42,97 mm	8,0 kN	1,0 kN	3,5 kN
28	44,56 mm	8,5 kN	1,0 kN	3,5 kN
29	46,16 mm	9,0 kN	1,0 kN	3,5 kN
30	47,75 mm	9,0 kN	1,0 kN	3,5 kN
31	49,34 mm	9,0 kN	1,0 kN	3,5 kN
32	50,93 mm	9,0 kN	1,0 kN	3,5 kN
33	52,52 mm	9,0 kN	1,0 kN	3,5 kN
34	54,11 mm	9,0 kN	1,0 kN	3,5 kN
35	55,70 mm	9,0 kN	1,0 kN	3,5 kN
36	57,30 mm	9,0 kN	1,0 kN	3,5 kN
37	58,89 mm	9,0 kN	1,0 kN	3,5 kN
38	60,48 mm	9,0 kN	1,0 kN	3,5 kN
39	62,07 mm	9,0 kN	1,5 kN	3,5 kN
40	63,66 mm	9,0 kN	1,5 kN	3,5 kN

核对可行性（ZA章节） / check availability (chapter ZA)

最大容许驱动力1)单位kN

该值是在很好的油脂润滑的情况下（例如：使用电子润滑系统在ZI-2/3页，或者每天手动涂抹润滑油脂），速度是1.5m/s，SB=1.0，以及线性负载分布系数为1.0 。表中给出的数据是在最佳条件下的最大推荐值。任何情况下的应用和配置都需要计算。计算过程和案例，请参考ZD-2页。

1）对于键式连接需要一个单独的计算，胀紧盘式传递扭矩请参考GH-1页。

当使用齿的最大驱动力，或者多齿轮传动时，固定螺栓的负载必须单独核对!

Maximum permissible feed forces 1) in kN
which are achieved with good grease lubrication (i.e. use of the electronic lubricator described on page ZE-2/3 or manual lubrication at least once a day) and v=1.5 m/s, S_B=1.0 as well as a linear load distribution factor of 1.0.
The values in the load tables are maximum values under perfect conditions, ATLANTA materials and is a guide value.
A calculation of the application and configuration is in any cases needed.
Calculation and example see page ZD-2.

1) For keyway transmission make a separate calculation, torque with shrink disc see on page GH-1.

When using the maximum capacity of the teeth, or multiple pinions in contact, the mounting screw loads must be checked separately!

齿轮齿条驱动-计算和选型-模数2-斜齿
Rack and pinion drive – calculation and selection – module 2 – helical tooth system

齿条 / Rack		HPR			PR			BR			
ATLANTA精度等级/ATLANTA-Quality		6		7	8			9		10	
齿条 Rack	材料 / material	16MnCr5	C45	C45	C45	42CrMo4		C45		C45	
	热处理方式 Heat treatment	感应淬火 ind. hardened		感应淬火 ind. hardened	感应淬火 ind. hardene	淬火+回火 quenched + tempered		软材 未淬火 soft		感应淬火 ind. hardene	
齿轮 Pinion	材料 / material	16MnCr5	16MnCr5	16MnCr5	16MnCr5	16MnCr5	C45	16MnCr5	C45	16MnCr5	C45
	热处理方式 Heat treatment	渗碳淬火 case hardened	渗碳淬火 case hardened	渗碳淬火 case hardened	渗碳淬火 case hardened	渗碳淬火 case hardened	感应淬火 ind. hardened	渗碳淬火 case hardened	软材 未淬火 soft	渗碳淬火 case hardened	感应淬火 ind. hardened
齿轮齿数 1) No. of pinion teeth 1)	齿轮节圆 pitch circle dia.	最大驱动力 (只针对ATLANTA标准的材料) max. feed force (values are only valid for material according ATLANTA-Standard)									
12	25,46 mm	8,0 kN	6,0 kN	6,0 kN	5,0 kN	2,0 kN	1,0 kN	1,0 kN	0,6 kN	3,5 kN	2,5 kN
13	27,59 mm	8,5 kN	6,0 kN	6,0 kN	5,5 kN	2,0 kN	1,0 kN	1,0 kN	0,6 kN	4,0 kN	2,5 kN
14	29,71 mm	10,0 kN	7,5 kN	7,5 kN	6,5 kN	2,5 kN	1,5 kN	1,0 kN	0,7 kN	4,5 kN	3,0 kN
15	31,83 mm	11,0 kN	8,0 kN	8,0 kN	7,0 kN	2,5 kN	1,5 kN	1,5 kN	0,8 kN	5,0 kN	3,5 kN
16	33,95 mm	12,0 kN	9,0 kN	9,0 kN	7,5 kN	3,0 kN	2,0 kN	1,5 kN	0,9 kN	5,5 kN	3,5 kN
17	36,08 mm	13,0 kN	9,5 kN	9,5 kN	8,0 kN	3,0 kN	2,0 kN	1,5 kN	1,0 kN	6,0 kN	4,0 kN
18	38,20 mm	13,5 kN	10,0 kN	10,0 kN	8,5 kN	3,5 kN	2,0 kN	1,5 kN	1,0 kN	6,5 kN	4,0 kN
19	40,32 mm	14,5 kN	10,5 kN	10,5 kN	9,0 kN	3,5 kN	2,0 kN	2,0 kN	1,0 kN	7,0 kN	4,5 kN
20	42,44 mm	15,5 kN	11,5 kN	11,5 kN	9,5 kN	4,0 kN	2,5 kN	2,0 kN	1,0 kN	7,0 kN	4,5 kN
21	44,56 mm	16,0 kN	12,0 kN	12,0 kN	10,5 kN	4,0 kN	2,5 kN	2,0 kN	1,0 kN	7,5 kN	5,0 kN
22	46,69 mm	17,0 kN	12,5 kN	12,5 kN	11,0 kN	4,0 kN	2,5 kN	2,0 kN	1,0 kN	8,0 kN	5,5 kN
23	48,81 mm	17,5 kN	13,0 kN	13,0 kN	11,5 kN	4,5 kN	3,0 kN	2,5 kN	1,0 kN	8,5 kN	5,5 kN
24	50,93 mm	18,0 kN	13,5 kN	13,5 kN	12,0 kN	4,5 kN	3,0 kN	2,5 kN	1,0 kN	8,5 kN	5,5 kN
25	53,05 mm	18,5 kN	14,5 kN	14,5 kN	12,5 kN	5,0 kN	3,0 kN	2,5 kN	1,5 kN	9,0 kN	5,5 kN
26	55,17 mm	18,5 kN	15,0 kN	15,0 kN	13,0 kN	5,0 kN	3,0 kN	2,5 kN	1,5 kN	9,0 kN	5,5 kN
27	57,30 mm	18,5 kN	15,0 kN	15,0 kN	13,0 kN	5,5 kN	3,5 kN	2,5 kN	1,5 kN	9,0 kN	5,5 kN
28	59,42 mm	18,5 kN	15,0 kN	15,0 kN	13,0 kN	5,5 kN	3,5 kN	3,0 kN	1,5 kN	9,5 kN	5,5 kN
29	61,54 mm	18,5 kN	15,0 kN	15,0 kN	13,0 kN	6,0 kN	3,5 kN	3,0 kN	1,5 kN	9,5 kN	5,5 kN
30	63,66 mm	18,5 kN	15,0 kN	15,0 kN	13,0 kN	6,0 kN	4,0 kN	3,0 kN	1,5 kN	9,5 kN	6,0 kN
31	65,78 mm	19,0 kN	15,5 kN	15,5 kN	13,0 kN	6,0 kN	4,0 kN	3,0 kN	1,5 kN	9,5 kN	6,0 kN
32	67,91 mm	19,0 kN	15,5 kN	15,5 kN	13,0 kN	6,5 kN	4,0 kN	3,5 kN	1,5 kN	9,5 kN	6,0 kN
33	70,03 mm	19,0 kN	15,5 kN	15,5 kN	13,5 kN	6,5 kN	4,0 kN	3,5 kN	2,0 kN	9,5 kN	6,0 kN
34	72,15 mm	19,0 kN	15,5 kN	15,5 kN	13,5 kN	7,0 kN	4,5 kN	3,5 kN	2,0 kN	9,5 kN	6,0 kN
35	74,27 mm	19,0 kN	15,5 kN	15,5 kN	13,5 kN	7,0 kN	4,5 kN	3,5 kN	2,0 kN	9,5 kN	6,0 kN
36	76,39 mm	19,0 kN	15,5 kN	15,5 kN	13,5 kN	7,5 kN	4,5 kN	4,0 kN	2,0 kN	9,5 kN	6,0 kN
37	78,52 mm	19,0 kN	15,5 kN	15,5 kN	13,5 kN	7,5 kN	5,0 kN	4,0 kN	2,0 kN	9,5 kN	6,0 kN
38	80,64 mm	19,0 kN	15,5 kN	15,5 kN	13,5 kN	7,5 kN	5,0 kN	4,0 kN	2,0 kN	9,5 kN	6,0 kN
39	82,76 mm	19,0 kN	15,5 kN	15,5 kN	13,5 kN	8,0 kN	5,0 kN	4,0 kN	2,0 kN	9,5 kN	6,0 kN
40	84,88 mm	19,5 kN	15,5 kN	15,5 kN	13,5 kN	8,0 kN	5,0 kN	4,0 kN	2,0 kN	9,5 kN	6,0 kN

1) 核对可行性（ZA章节） / check availability (chapter ZA)

最大允许进给力 - 说明请参阅第ZA-30 / Maximum permissible feed forces – description see page ZA-30

齿轮齿条驱动-计算和选型-模数3-斜齿
Rack and pinion drive – calculation and selection – module 3 – helical tooth system

齿条 / Rack		UHPR	HPR			PR			BR			
ATLANTA精度等级 / ATLANTA-Quality		5	6		7	8			9		10	
齿条 Rack	材料 / material	16MnCr5	16MnCr5	C45	C45	C45	42CrMo4		C45		C45	
	热处理方式 Heat treatment	渗碳淬火 case hardened	感应淬火 ind. hardened		感应淬火 ind. hardened	感应淬火 ind. hardened	淬火+回火 quenched + tempered		软材 未淬火 soft		感应淬火 ind. hardened	
齿轮 Pinion	材料 / material	16MnCr5	16MnCr5	16MnCr5	16MnCr5	16MnCr5	16MnCr5	C45	16MnCr5	C45	16MnCr5	C45
	热处理方式 Heat treatment	渗碳淬火 case hardened	渗碳淬火 case hardened	渗碳淬火 case hardened	渗碳淬火 case hardened	渗碳淬火 case hardened	渗碳淬火 case hardened	感应淬火 ind. hardened	渗碳淬火 case hardened	软材 未淬火 soft	渗碳淬火 case hardened	感应淬火 ind. hardened
齿轮齿数 1) No. of pinion teeth 1)	齿轮节圆 pitch circle dia.	最大驱动力 (只针对ATLANTA标准的材料) max. feed force (values are only valid for material according ATLANTA-Standard)										
12	38,20 mm	13,5 kN	13,0 kN	9,5 kN	9,5 kN	8,0 kN	3,0 kN	2,5 kN	1,5 kN	1,0 kN	5,5 kN	5,0 kN
13	41,38 mm	16,0 kN	15,0 kN	11,0 kN	11,0 kN	9,0 kN	3,5 kN	3,0 kN	1,5 kN	1,5 kN	6,5 kN	6,0 kN
14	44,56 mm	19,0 kN	18,0 kN	13,0 kN	13,0 kN	11,0 kN	4,5 kN	3,5 kN	2,0 kN	1,5 kN	8,0 kN	7,5 kN
15	47,75 mm	21,0 kN	19,5 kN	14,5 kN	14,5 kN	12,0 kN	5,0 kN	4,0 kN	2,5 kN	2,0 kN	9,0 kN	8,0 kN
16	50,93 mm	22,5 kN	21,0 kN	15,5 kN	15,5 kN	13,0 kN	5,0 kN	4,5 kN	2,5 kN	2,0 kN	9,5 kN	8,5 kN
17	54,11 mm	24,0 kN	22,5 kN	16,5 kN	16,5 kN	14,0 kN	5,5 kN	4,5 kN	2,5 kN	2,0 kN	10,0 kN	9,0 kN
18	57,30 mm	25,5 kN	24,0 kN	17,5 kN	17,5 kN	14,5 kN	6,0 kN	5,0 kN	3,0 kN	2,0 kN	11,0 kN	10,0 kN
19	60,48 mm	27,0 kN	25,5 kN	19,0 kN	19,0 kN	15,5 kN	6,0 kN	5,5 kN	3,0 kN	2,5 kN	11,5 kN	10,5 kN
20	63,66 mm	28,5 kN	27,0 kN	20,0 kN	20,0 kN	16,5 kN	6,5 kN	5,5 kN	3,0 kN	2,5 kN	12,0 kN	11,0 kN
21	66,85 mm	29,0 kN	28,5 kN	21,0 kN	21,0 kN	17,5 kN	7,0 kN	6,0 kN	3,5 kN	2,5 kN	13,0 kN	11,5 kN
22	70,03 mm	29,5 kN	29,5 kN	22,0 kN	22,0 kN	18,5 kN	7,5 kN	6,5 kN	3,5 kN	2,5 kN	13,5 kN	12,0 kN
23	73,21 mm	29,5 kN	29,5 kN	23,0 kN	23,0 kN	19,0 kN	7,5 kN	6,5 kN	4,0 kN	3,0 kN	14,0 kN	13,0 kN
24	76,39 mm	29,5 kN	29,5 kN	24,0 kN	24,0 kN	20,0 kN	8,0 kN	7,0 kN	4,0 kN	3,0 kN	15,0 kN	13,0 kN
25	79,58 mm	30,0 kN	30,0 kN	25,5 kN	25,0 kN	21,0 kN	8,5 kN	7,5 kN	4,0 kN	3,0 kN	15,5 kN	13,0 kN
26	82,76 mm	30,0 kN	30,0 kN	26,5 kN	26,5 kN	22,0 kN	8,5 kN	7,5 kN	4,5 kN	3,5 kN	16,0 kN	13,0 kN
27	85,94 mm	30,0 kN	30,0 kN	27,5 kN	27,5 kN	22,5 kN	9,0 kN	8,0 kN	4,5 kN	3,5 kN	17,0 kN	13,5 kN
28	89,13 mm	30,5 kN	30,5 kN	27,5 kN	27,5 kN	23,5 kN	9,5 kN	8,0 kN	4,5 kN	3,5 kN	17,0 kN	13,5 kN
29	92,31 mm	30,5 kN	30,5 kN	27,5 kN	27,5 kN	23,5 kN	10,0 kN	8,5 kN	5,0 kN	4,0 kN	17,0 kN	13,5 kN
30	95,49 mm	30,5 kN	30,5 kN	27,5 kN	27,5 kN	24,0 kN	10,0 kN	9,0 kN	5,0 kN	4,0 kN	17,5 kN	13,5 kN
31	98,68 mm	30,5 kN	30,5 kN	28,0 kN	28,0 kN	24,0 kN	10,5 kN	9,0 kN	5,5 kN	4,0 kN	17,5 kN	13,5 kN
32	101,86 mm	31,0 kN	30,5 kN	28,0 kN	28,0 kN	24,0 kN	11,0 kN	9,5 kN	5,5 kN	4,0 kN	17,5 kN	13,5 kN
33	105,04 mm	31,0 kN	31,0 kN	28,0 kN	28,0 kN	24,0 kN	11,5 kN	10,0 kN	5,5 kN	4,5 kN	17,5 kN	13,5 kN
34	108,23 mm	31,0 kN	31,0 kN	28,0 kN	28,0 kN	24,0 kN	11,5 kN	10,0 kN	6,0 kN	4,5 kN	17,5 kN	13,5 kN
35	111,41 mm	31,0 kN	31,0 kN	28,0 kN	28,0 kN	24,0 kN	12,0 kN	10,5 kN	6,0 kN	4,5 kN	17,5 kN	13,5 kN
36	114,59 mm	31,0 kN	31,0 kN	28,5 kN	28,5 kN	24,5 kN	12,5 kN	11,0 kN	6,0 kN	5,0 kN	17,5 kN	13,5 kN
37	117,77 mm	31,0 kN	31,0 kN	28,5 kN	28,5 kN	24,5 kN	13,0 kN	11,0 kN	6,5 kN	5,0 kN	17,5 kN	13,5 kN
38	120,96 mm	31,0 kN	31,0 kN	28,5 kN	28,5 kN	24,5 kN	13,0 kN	11,5 kN	6,5 kN	5,0 kN	17,5 kN	13,5 kN
39	124,14 mm	31,0 kN	31,0 kN	28,5 kN	28,5 kN	24,5 kN	13,5 kN	11,5 kN	7,0 kN	5,0 kN	17,5 kN	13,5 kN
40	127,32 mm	31,0 kN	31,0 kN	28,5 kN	28,5 kN	24,5 kN	14,0 kN	12,0 kN	7,0 kN	5,5 kN	17,5 kN	13,5 kN

1) 核对可行性（ZA章节） / check availability (chapter ZA)

最大允许进给力 - 说明请参阅第ZA-30 / Maximum permissible feed forces – description see page ZA-30

齿轮齿条驱动-计算和选型-模数4-斜齿
Rack and pinion drive – calculation and selection – module 4 – helical tooth system

齿条 / Rack		UHPR	HPR			PR			BR			
ATLANTA精度等级 / ATLANTA-Quality		5	6		7	8			9		10	
齿条 Rack	材料 / material	16MnCr5	16MnCr5	C45	C45	C45	42CrMo4		C45		C45	
	热处理方式 Heat treatment	渗碳淬火 case hardened	感应淬火 ind. hardened		感应淬火 ind. hardened	感应淬火 ind. hardened	淬火+回火 quenched + tempered		软材 未淬火 soft		感应淬火 ind. hardened	
齿轮 Pinion	材料 / material	16MnCr5	16MnCr5	16MnCr5	16MnCr5	16MnCr5	16MnCr5	C45	16MnCr5	C45	16MnCr5	C45
	热处理方式 Heat treatment	渗碳淬火 case hardened	渗碳淬火 case hardened	渗碳淬火 case hardened	渗碳淬火 case hardened	渗碳淬火 case hardened	渗碳淬火 case hardened	感应淬火 ind. hardened	渗碳淬火 case hardened	软材 未淬火 soft	渗碳淬火 case hardened	感应淬火 ind. hardened
齿轮齿数 1) No. of pinion teeth 1)	齿轮节圆 pitch circle dia.	最大驱动力 (只针对ATLANTA标准的材料) max. feed force (values are only valid for material according ATLANTA-Standard)										
12	50,93 mm	25,5 kN	24,0 kN	18,0 kN	17,5 kN	15,0 kN	6,0 kN	5,0 kN	3,0 kN	2,0 kN	11,0 kN	9,5 kN
13	55,17 mm	30,0 kN	28,0 kN	20,5 kN	20,5 kN	17,5 kN	7,0 kN	5,5 kN	3,5 kN	2,5 kN	13,0 kN	11,0 kN
14	59,42 mm	34,5 kN	32,5 kN	24,0 kN	24,0 kN	20,5 kN	8,0 kN	6,5 kN	4,0 kN	3,0 kN	15,0 kN	12,5 kN
15	63,66 mm	39,5 kN	37,0 kN	27,5 kN	27,5 kN	23,5 kN	9,5 kN	7,5 kN	4,5 kN	3,5 kN	17,0 kN	14,5 kN
16	67,91 mm	42,5 kN	39,5 kN	29,5 kN	29,5 kN	25,0 kN	10,0 kN	8,0 kN	5,0 kN	3,5 kN	18,5 kN	15,5 kN
17	72,15 mm	45,0 kN	42,0 kN	31,5 kN	31,0 kN	26,5 kN	10,5 kN	8,5 kN	5,5 kN	4,0 kN	19,5 kN	16,5 kN
18	76,39 mm	48,0 kN	45,0 kN	33,5 kN	33,0 kN	28,5 kN	11,5 kN	9,0 kN	5,5 kN	4,0 kN	21,0 kN	17,5 kN
19	80,64 mm	51,0 kN	47,5 kN	35,5 kN	35,0 kN	30,0 kN	12,0 kN	10,0 kN	6,0 kN	4,5 kN	22,5 kN	19,0 kN
20	84,88 mm	54,0 kN	50,0 kN	37,0 kN	37,0 kN	31,5 kN	13,0 kN	10,5 kN	6,5 kN	4,5 kN	23,5 kN	20,0 kN
21	89,13 mm	55,5 kN	53,0 kN	39,0 kN	39,0 kN	33,5 kN	13,5 kN	11,0 kN	7,0 kN	5,0 kN	25,0 kN	21,0 kN
22	93,37 mm	56,0 kN	55,5 kN	41,0 kN	41,0 kN	35,0 kN	14,0 kN	11,5 kN	7,0 kN	5,0 kN	26,0 kN	22,0 kN
23	97,62 mm	56,5 kN	56,5 kN	43,0 kN	43,0 kN	37,0 kN	15,0 kN	12,0 kN	7,5 kN	5,5 kN	27,5 kN	23,0 kN
24	101,86 mm	57,0 kN	57,0 kN	45,0 kN	45,0 kN	38,5 kN	15,5 kN	12,5 kN	8,0 kN	5,5 kN	28,5 kN	23,5 kN
25	106,10 mm	57,5 kN	57,5 kN	47,0 kN	47,0 kN	40,0 kN	16,0 kN	13,0 kN	8,0 kN	6,0 kN	30,0 kN	23,5 kN
26	110,35 mm	58,0 kN	57,5 kN	49,0 kN	49,0 kN	42,0 kN	17,0 kN	13,5 kN	8,5 kN	6,0 kN	30,5 kN	24,0 kN
27	114,59 mm	58,0 kN	58,0 kN	49,5 kN	49,5 kN	42,0 kN	17,5 kN	14,5 kN	9,0 kN	6,5 kN	31,0 kN	24,0 kN
28	118,84 mm	58,5 kN	58,5 kN	49,5 kN	49,5 kN	42,0 kN	18,5 kN	15,0 kN	9,5 kN	6,5 kN	31,0 kN	24,0 kN
29	123,08 mm	58,5 kN	58,5 kN	50,0 kN	50,0 kN	42,5 kN	19,0 kN	15,5 kN	9,5 kN	7,0 kN	31,0 kN	24,0 kN
30	127,32 mm	58,5 kN	58,5 kN	50,0 kN	50,0 kN	42,5 kN	19,5 kN	16,0 kN	10,0 kN	7,0 kN	31,0 kN	24,0 kN
31	131,57 mm	59,0 kN	59,0 kN	50,0 kN	50,0 kN	42,5 kN	20,5 kN	16,5 kN	10,5 kN	7,5 kN	31,0 kN	24,5 kN
32	135,81 mm	59,0 kN	59,0 kN	50,5 kN	50,5 kN	43,0 kN	21,0 kN	17,0 kN	11,0 kN	7,5 kN	31,5 kN	24,5 kN
33	140,06 mm	59,0 kN	59,0 kN	50,5 kN	50,5 kN	43,0 kN	22,0 kN	17,5 kN	11,0 kN	8,0 kN	31,5 kN	24,5 kN
34	144,30 mm	59,5 kN	59,5 kN	50,5 kN	50,5 kN	43,0 kN	22,5 kN	18,0 kN	11,5 kN	8,0 kN	31,5 kN	24,5 kN
35	148,54 mm	59,5 kN	59,5 kN	51,0 kN	51,0 kN	43,5 kN	23,0 kN	19,0 kN	12,0 kN	8,5 kN	31,5 kN	24,5 kN
36	152,79 mm	59,5 kN	59,5 kN	51,0 kN	51,0 kN	43,5 kN	24,0 kN	19,5 kN	12,0 kN	8,5 kN	31,5 kN	24,5 kN
37	157,03 mm	59,5 kN	59,5 kN	51,0 kN	51,0 kN	43,5 kN	24,5 kN	20,0 kN	12,5 kN	9,0 kN	31,5 kN	24,5 kN
38	161,28 mm	59,5 kN	59,5 kN	51,5 kN	51,5 kN	43,5 kN	25,5 kN	20,5 kN	13,0 kN	9,0 kN	32,0 kN	24,5 kN
39	165,52 mm	60,0 kN	59,5 kN	51,5 kN	51,5 kN	43,5 kN	26,0 kN	21,0 kN	13,5 kN	9,5 kN	32,0 kN	24,5 kN
40	169,77 mm	60,0 kN	60,0 kN	51,5 kN	51,5 kN	44,0 kN	27,0 kN	21,5 kN	13,5 kN	10,0 kN	32,0 kN	24,5 kN

1) 核对可行性（ZA章节） / check availability (chapter ZA)

最大允许进给力 - 说明请参阅第ZA-30 / Maximum permissible feed forces – description see page ZA-30

齿轮齿条驱动-计算和选型-模数5-斜齿
Rack and pinion drive – calculation and selection – module 5 – helical tooth system

齿条 / Rack		UHPR		HPR		PR			BR			
精度等级/Quality		3	5	6	7	8			9		10	
齿条 / Rack	材料 / material	C45	16MnCr5	C45	C45	C45	42CrMo4		C45		C45	
	热处理方式 Heat Treatment	感应淬火 ind. hardened	渗碳淬火 case hardened	感应淬火 ind. hardened		感应淬火 ind. hardened	淬火+回火 quenched + tempered		未淬火 soft		感应淬火 induction hardened	
齿轮 / Pinion	材料 / material	16MnCr5	16MnCr5	16MnCr5	16MnCr5	16MnCr5	16MnCr5	C45	16MnCr5	C45	16MnCr5	C45
	热处理方式 Heat Treatment	渗碳淬火 case hardened	渗碳淬火 case hardened	渗碳淬火 case hardened	渗碳淬火 case hardened	渗碳淬火 case hardened	渗碳淬火 case hardened	感应淬火 ind. hardened	渗碳淬火 case hardened	未淬火 soft	渗碳淬火 case hardened	感应淬火 ind. hardened
齿轮齿数 1) No. of pinion teeth 1)	齿轮节圆 pitch circle dia.	最大驱动力 Maximum Feed Force										
12	63,66 mm	28,0 kN	40,5 kN	28,0 kN	28,0 kN	23,5 kN	5,0 kN	3,5 kN	17,5 kN	15,0 kN		
13	68,97 mm	32,5 kN	47,0 kN	32,5 kN	32,5 kN	27,5 kN	5,5 kN	4,0 kN	20,5 kN	17,5 kN		
14	74,27 mm	37,5 kN	54,5 kN	37,5 kN	37,5 kN	32,0 kN	6,5 kN	4,5 kN	23,5 kN	20,0 kN		
15	79,58 mm	43,0 kN	62,0 kN	43,0 kN	43,0 kN	36,5 kN	7,5 kN	5,5 kN	27,0 kN	23,0 kN		
16	84,88 mm	46,0 kN	66,5 kN	46,0 kN	46,0 kN	39,0 kN	8,0 kN	5,5 kN	29,0 kN	24,5 kN		
17	90,19 mm	49,5 kN	71,0 kN	49,5 kN	49,5 kN	42,0 kN	8,5 kN	6,0 kN	31,0 kN	26,0 kN		
18	95,49 mm	52,5 kN	75,5 kN	52,5 kN	52,5 kN	44,5 kN	9,0 kN	6,5 kN	33,0 kN	28,0 kN		
19	100,80 mm	55,5 kN	80,0 kN	55,5 kN	55,5 kN	47,0 kN	9,5 kN	7,0 kN	35,0 kN	29,5 kN		
20	106,10 mm	58,5 kN	84,5 kN	58,5 kN	58,5 kN	49,5 kN	10,5 kN	7,5 kN	37,0 kN	31,0 kN		
21	111,41 mm	62,0 kN	87,0 kN	61,5 kN	61,5 kN	52,5 kN	11,0 kN	7,5 kN	39,0 kN	33,0 kN		
22	116,71 mm	65,0 kN	88,0 kN	65,0 kN	65,0 kN	55,0 kN	11,5 kN	8,0 kN	41,0 kN	34,5 kN		
23	122,02 mm	68,0 kN	88,5 kN	68,0 kN	68,0 kN	57,5 kN	12,0 kN	8,5 kN	43,0 kN	36,5 kN		
24	127,32 mm	71,0 kN	89,5 kN	71,0 kN	71,0 kN	60,5 kN	12,5 kN	9,0 kN	45,0 kN	37,0 kN		
25	132,63 mm	74,5 kN	90,0 kN	74,5 kN	74,5 kN	63,0 kN	13,0 kN	9,5 kN	47,0 kN	37,0 kN		
26	137,93 mm	75,0 kN	90,5 kN	75,0 kN	75,0 kN	63,5 kN	13,5 kN	10,0 kN	48,0 kN	37,5 kN		
27	143,24 mm	75,5 kN	91,0 kN	75,5 kN	75,5 kN	64,0 kN	14,0 kN	10,0 kN	48,0 kN	37,5 kN		
28	148,54 mm	75,5 kN	91,0 kN	75,5 kN	75,5 kN	64,0 kN	15,0 kN	10,5 kN	48,5 kN	38,0 kN		
29	153,85 mm	76,0 kN	91,5 kN	76,0 kN	76,0 kN	64,5 kN	15,5 kN	11,0 kN	48,5 kN	38,0 kN		
30	159,16 mm	76,5 kN	92,0 kN	76,0 kN	76,0 kN	64,5 kN	16,0 kN	11,5 kN	49,0 kN	38,0 kN		

1) 核对可行性（ZA章节） / check availability (chapter ZA)

最大允许进给力 - 说明请参阅第ZA-30 / Maximum permissible feed forces – description see page ZA-30

齿轮齿条驱动-计算和选型-模数6-斜齿
Rack and pinion drive – calculation and selection – module 6 – helical tooth system

齿条 / Rack		UHPR		HPR		BR			
ATLANTA-精度等级 / ATLANTA-Quality		3	5	6	7	9		10	
齿条 Rack	材料 / material	C45	16MnCr5	C45	C45	C45		C45	
	热处理方式 Heat treatment	感应淬火 ind. hardened	渗碳淬火 case hardened	感应淬火 ind. hardened		软齿 未淬火 soft		感应淬火 ind. hardened	
齿轮 Pinion	材料 / material	16MnCr5	16MnCr5	16MnCr5	16MnCr5	16MnCr5	C45	16MnCr5	C45
	热处理方式 Heat treatment	渗碳淬火 case hardened	渗碳淬火 case hardened	渗碳淬火 case hardened	渗碳淬火 case hardened	渗碳淬火 case hardened	软齿 未淬火 soft	渗碳淬火 case hardened	感应淬火 ind. hardened
齿轮齿数 1) No. of pinion teeth	齿轮节圆 1) pitch circle dia.	最大驱动力 (只针对ATLANTA标准的材料) max. feed force (values are only valid for material according ATLANTA-Standard)							
12	76,39 mm	40,5 kN	58,5 kN	40,5 kN	40,5 kN	7,0 kN	5,0 kN	25,5 kN	21,5 kN
13	82,76 mm	47,5 kN	68,0 kN	47,0 kN	47,0 kN	8,0 kN	6,0 kN	29,5 kN	25,0 kN
14	89,13 mm	54,5 kN	79,0 kN	54,5 kN	54,5 kN	9,5 kN	7,0 kN	34,5 kN	29,0 kN
15	95,49 mm	62,5 kN	90,0 kN	62,5 kN	62,5 kN	11,0 kN	8,0 kN	39,0 kN	33,0 kN
16	101,86 mm	67,0 kN	96,5 kN	67,0 kN	67,0 kN	11,5 kN	8,5 kN	42,0 kN	35,5 kN
17	108,23 mm	71,5 kN	103,0 kN	71,5 kN	71,5 kN	12,5 kN	9,0 kN	45,0 kN	38,0 kN
18	114,59 mm	76,0 kN	109,5 kN	76,0 kN	76,0 kN	13,5 kN	9,5 kN	47,5 kN	40,5 kN
19	120,96 mm	80,5 kN	116,0 kN	80,5 kN	80,5 kN	14,0 kN	10,0 kN	50,5 kN	43,0 kN
20	127,32 mm	85,0 kN	122,5 kN	85,0 kN	85,0 kN	15,0 kN	10,5 kN	53,5 kN	45,0 kN
21	133,69 mm	89,5 kN	124,5 kN	89,5 kN	89,5 kN	15,5 kN	11,5 kN	56,5 kN	47,5 kN
22	140,06 mm	94,0 kN	126,0 kN	94,0 kN	94,0 kN	16,5 kN	12,0 kN	59,0 kN	50,0 kN
23	146,42 mm	98,5 kN	126,5 kN	98,5 kN	98,5 kN	17,5 kN	12,5 kN	62,0 kN	52,5 kN
24	152,79 mm	103,0 kN	127,5 kN	103,0 kN	103,0 kN	18,0 kN	13,0 kN	65,0 kN	53,0 kN
25	159,16 mm	107,0 kN	128,5 kN	107,0 kN	107,0 kN	19,0 kN	13,5 kN	66,5 kN	53,5 kN
26	165,52 mm	107,5 kN	129,0 kN	107,5 kN	107,5 kN	20,0 kN	14,0 kN	66,5 kN	53,5 kN
27	171,89 mm	108,0 kN	129,5 kN	108,0 kN	108,0 kN	20,5 kN	15,0 kN	67,0 kN	54,0 kN
28	178,25 mm	108,5 kN	130,5 kN	108,0 kN	108,0 kN	21,5 kN	15,5 kN	67,0 kN	54,0 kN
29	184,62 mm	109,0 kN	131,0 kN	108,5 kN	108,5 kN	22,0 kN	16,0 kN	67,5 kN	54,5 kN
30	190,99 mm	109,0 kN	131,5 kN	109,0 kN	109,0 kN	23,0 kN	16,5 kN	67,5 kN	54,5 kN

1) 核对可行性（ZA章节） / check availability (chapter ZA)

最大允许进给力 - 说明请参阅第ZA-30 / Maximum permissible feed forces – description see page ZA-30

齿轮齿条驱动-计算和选型-模数8-斜齿
Rack and pinion drive – calculation and selection – module 8 – helical tooth system

齿条 / Rack		UHPR	HPR		BR			
ATLANTA-精度等级 / ATLANTA-Quality		3	6	7	9		10	
齿条 Rack	材料 / material	C45	C45	C45	C45		C45	
	热处理方式 Heat treatment	感应淬火 ind. hardened	感应淬火 ind. hardened		软齿 未淬火 soft		感应淬火 ind. hardened	
齿轮 Pinion	材料 / material	16MnCr5	16MnCr5	16MnCr5	16MnCr5	C45	16MnCr5	C45
	热处理方式 Heat treatment	渗碳淬火 case hardened	渗碳淬火 case hardened	渗碳淬火 case hardened	渗碳淬火 case hardened	软齿 未淬火 soft	渗碳淬火 case hardened	感应淬火t ind. hardened
齿轮齿数 1) No. of pinion teeth 1)	齿轮节圆 pitch circle dia.	最大驱动力 (只针对ATLANTA标准的材料) max. feed force (values are only valid for material according ATLANTA-Standard)						
12	101,86 mm	73,0 kN	72,5 kN	72,5 kN	12,5 kN	9,0 kN	45,5 kN	38,5 kN
13	110,35 mm	84,5 kN	84,5 kN	84,5 kN	15,0 kN	10,5 kN	53,0 kN	44,5 kN
14	118,84 mm	98,0 kN	97,5 kN	97,5 kN	17,0 kN	12,5 kN	61,5 kN	52,0 kN
15	127,32 mm	111,5 kN	111,5 kN	111,5 kN	19,5 kN	14,0 kN	70,0 kN	59,5 kN
16	135,81 mm	119,5 kN	119,5 kN	119,5 kN	21,0 kN	15,0 kN	75,0 kN	63,5 kN
17	144,30 mm	127,5 kN	127,5 kN	127,5 kN	22,5 kN	16,0 kN	80,0 kN	67,5 kN
18	152,79 mm	135,5 kN	135,5 kN	135,5 kN	24,0 kN	17,0 kN	85,0 kN	72,0 kN
19	161,28 mm	143,5 kN	143,5 kN	143,5 kN	25,5 kN	18,0 kN	90,0 kN	76,5 kN
20	169,77 mm	151,5 kN	151,5 kN	151,5 kN	27,0 kN	19,5 kN	95,5 kN	80,5 kN
21	178,25 mm	160,0 kN	160,0 kN	159,5 kN	28,5 kN	20,5 kN	100,5 kN	85,0 kN
22	186,74 mm	168,0 kN	168,0 kN	167,5 kN	29,5 kN	21,5 kN	105,5 kN	89,0 kN
23	195,23 mm	176,0 kN	176,0 kN	176,0 kN	31,0 kN	22,5 kN	110,5 kN	92,5 kN
24	203,72 mm	184,0 kN	184,0 kN	184,0 kN	32,5 kN	23,5 kN	115,5 kN	93,0 kN
25	212,21 mm	187,0 kN	187,0 kN	187,0 kN	34,0 kN	24,5 kN	116,5 kN	93,5 kN
26	220,70 mm	188,0 kN	188,0 kN	188,0 kN	35,5 kN	25,5 kN	117,0 kN	94,0 kN
27	229,18 mm	189,0 kN	189,0 kN	188,5 kN	37,0 kN	26,5 kN	117,5 kN	94,5 kN
28	237,67 mm	189,5 kN	189,5 kN	189,5 kN	38,5 kN	27,5 kN	117,5 kN	95,0 kN
29	246,16 mm	190,5 kN	190,5 kN	190,5 kN	40,0 kN	28,5 kN	118,0 kN	95,0 kN
30	254,65 mm	191,0 kN	191,0 kN	191,0 kN	41,5 kN	29,5 kN	118,5 kN	95,5 kN

1) 核对可行性（ZA章节） / check availability (chapter ZA)

最大允许进给力 - 说明请参阅第ZA-30 / Maximum permissible feed forces – description see page ZA-30

齿条 / Rack		UHPR	HPR		BR			
ATLANTA-精度等级 / ATLANTA-Quality		3	6	7	9		10	
齿条 Rack	材料 / material	C45	C45	C45	C45		C45	
	热处理方式 Heat treatment	感应淬火 ind. hardened	感应淬火 ind. hardened		软齿 未淬火 soft		感应淬火 ind. hardened	
齿轮 Pinion	材料 / material	16MnCr5	16MnCr5	16MnCr5	16MnCr5	C45	16MnCr5	C45
	热处理方式 Heat treatment	渗碳淬火 case hardened	渗碳淬火 case hardened	渗碳淬火 case hardened	渗碳淬火 case hardened	软齿 未淬火 soft	渗碳淬火 case hardened	感应淬火t ind. hardened
齿轮齿数 1) No. of pinion teeth 1)	齿轮节圆 pitch circle dia.	最大驱动力 (只针对ATLANTA标准的材料) max. feed force (values are only valid for material according ATLANTA-Standard)						
12	127,32 mm	114,5 kN	114,0 kN	114,0 kN	20,0 kN	14,5 kN	71,5 kN	60,5 kN
13	137,93 mm	132,5 kN	132,5 kN	132,5 kN	23,5 kN	16,5 kN	83,0 kN	70,0 kN
14	148,54 mm	153,5 kN	153,5 kN	153,5 kN	27,0 kN	19,5 kN	96,0 kN	81,5 kN
15	159,16 mm	175,0 kN	175,0 kN	175,0 kN	31,0 kN	22,0 kN	109,5 kN	93,0 kN
16	169,77 mm	187,5 kN	187,5 kN	187,5 kN	33,0 kN	24,0 kN	117,5 kN	99,5 kN
17	180,38 mm	200,0 kN	200,0 kN	200,0 kN	35,5 kN	25,5 kN	125,5 kN	106,0 kN
18	190,99 mm	212,5 kN	212,5 kN	212,5 kN	37,5 kN	27,0 kN	133,5 kN	113,0 kN
19	201,60 mm	225,5 kN	225,5 kN	225,0 kN	40,0 kN	28,5 kN	141,5 kN	119,5 kN
20	212,21 mm	238,0 kN	238,0 kN	237,5 kN	42,0 kN	30,5 kN	149,5 kN	126,0 kN
21	222,82 mm	250,5 kN	250,5 kN	250,5 kN	44,5 kN	32,0 kN	157,0 kN	133,0 kN
22	233,43 mm	263,0 kN	263,0 kN	263,0 kN	46,5 kN	33,5 kN	165,0 kN	140,0 kN
23	244,04 mm	276,0 kN	276,0 kN	276,0 kN	49,0 kN	35,0 kN	173,0 kN	142,0 kN
24	254,65 mm	286,0 kN	285,5 kN	285,5 kN	51,0 kN	37,0 kN	178,0 kN	143,0 kN
25	265,26 mm	287,5 kN	287,0 kN	287,0 kN	53,5 kN	38,5 kN	178,5 kN	143,5 kN

1) 核对可行性（ZA章节） / check availability (chapter ZA)

最大允许进给力 - 说明请参阅第ZA-30 / Maximum permissible feed forces – description see page ZA-30

齿轮齿条驱动-计算和选型-模数12-斜齿
Rack and pinion drive – calculation and selection – module 12 – helical tooth system

齿条 / Rack		UHPR	HPR	BR	
ATLANTA精度等级 / ATLANTA-Quality		3	6	10	
Rack	材料 / material	C45	C45	C45	
	热处理方式 Heat treatment	感应淬火 ind. hardened	感应淬火 ind. hardened	感应淬火 ind. hardened	
齿轮 Pinion	材料 / material	16MnCr5	16MnCr5	16MnCr5	C45
	热处理方式 Heat treatment	渗碳淬火 case hardened	渗碳淬火 case hardened	渗碳淬火 case hardened	感应淬火 ind. hardened
齿轮齿数[1)] No. of pinion teeth[1)]	齿轮节圆 pitch circle dia.	最大驱动力 (只针对ATLANTA标准的材料) max. feed force (values are only valid for material accordingATLANTA-Standard)			
12	152,79 mm	163,0 kN	163,0 kN	101,0 kN	85,5 kN
13	165,52 mm	189,5 kN	189,5 kN	117,5 kN	99,0 kN
14	178,25 mm	219,0 kN	219,0 kN	136,0 kN	115,0 kN
15	190,99 mm	249,5 kN	249,5 kN	155,0 kN	131,0 kN
16	203,72 mm	267,5 kN	267,0 kN	166,0 kN	140,5 kN
17	216,45 mm	285,5 kN	285,5 kN	177,0 kN	150,0 kN
18	229,18 mm	303,0 kN	303,0 kN	188,5 kN	159,5 kN
19	241,92 mm	321,5 kN	321,0 kN	199,5 kN	169,0 kN
20	254,65 mm	339,5 kN	339,0 kN	210,5 kN	178,5 kN
21	267,38 mm	357,5 kN	357,0 kN	222,0 kN	187,5 kN
22	280,11 mm	375,5 kN	375,0 kN	233,0 kN	197,5 kN
23	292,85 mm	394,0 kN	393,5 kN	244,5 kN	200,0 kN
24	305,58 mm	407,5 kN	407,5 kN	251,0 kN	201,5 kN
25	318,31 mm	409,0 kN	409,0 kN	252,5 kN	202,5 kN

1) 核对可行性（ZA章节） / check availability (chapter ZA)

最大允许进给力 - 说明请参阅第ZA-30 / Maximum permissible feed forces – description see page ZA-30

直齿齿条综述
Overview of straight toothed racks

类别 Class	精度等级 Quality	模数 Module	节距误差 total pitch error (µm/m)	齿厚公差 Tooth thickness tolerance (µm)	长度 max. length (mm)	单齿接触驱动力 feed force per pinion contact kN	应用领域（案例） Applications (examples)
UHPR Ultra High Precision Rack	3	5	12	-13	1005	62,0	电控消隙结构的高精度机床 High precision machine tools with electrical preload
		6	12	-13	1018	89,0	
		8	12	-13	1005	156,0	
		10	12	-13	1005	234,0	
		12	12	-13	1018	333,5	
	5	3	26	-15	1018	25,5	零背隙电控消隙驱动结构 机床，升降轴 多齿接触传动系统 Backlash free drives with electronical preload, machine tools, lifting axes, multiple pinion contact
		4	26	-15	1005	49,0	
		5	26	-15	1005	75,0	
		6	26	-15	1018	107,0	
	5	2	26	-15	1005	12,5	激光切割 laseer cutting
		3	26	-15	1018	23,5	
HPR High Precision Rack	6	2	36	-37	1005	15,5	木材，塑料 符合材料，铝材加工机床 Wood, plastic, composite, aluminium working machines
		3	36	-37	1018	25,5	
		4	36	-37	1005	49,0	
	6	2	36	-37	2011	12,5	机床，与导轨组合齿条 水切割设备，弯管系统 等离子切割机床 Machine tools, integratable racks, water cutting machines tube bending systems, plasma cutting machines
		3	36	-37	2036	23,5	
		4	36	-37	2011	42,0	
		5	36	-22	2011	62,0	
		6	36	-22	2036	89,0	
		8	36	-22	2011	155,5	
		10	36	-22	1005	234,0	
		12	36	-22	1018	333,0	
PR Precision Rack	7	2	52	-51	1005	12,5	木材加工机床， 对平顺运行要求 较高的线性轴驱动 Wood working machines, linear axes with high requirement for a smooth running
		3	52	-51	1018	23,0	
		4	52	-51	1005	42,0	
		5	52	-37	1005	62,0	
		6	52	-37	1018	89,0	
		8	52	-37	1005	155,5	
	8	2	60	-59	1005	12,0	龙门搬运线性轴 Portals, handling linear axes
		3	60	-59	1018	22,0	
		4	60	-59	1005	39,0	
		5	60	-59	1005	57,5	
	8	2	100	-110	2011	7,0	直线性轴 Linear axes
		3	100	-110	2036	12,0	
		4	100	-110	2011	23,0	
BR Basic Rack	9	1	150	-110	999	0,7	用于低负载单元的直线性驱动 Linear axes with low load feed units for adjustment
		1,5	150	-110	1998	1,0	
		2	150	-110	3016	3,0	
		2,5	150	-110	2003	3,0	
		3	150	-110	3054	6,5	
		4	150	-110	3016	12,5	
		5	150	-110	2011	14,5	
		6	150	-110	2036	21,5	
		8	150	-110	2011	38,5	
		10	150	-110	1005	49,5	
	10	1	200	-110	999	2,0	更高负载的驱动轴、升降轴 对精度没有太大要求 Driving and lifting axes for higher loads but without special accuracy
		1,5	200	-110	1998	3,5	
		2	200	-110	3016	7,0	
		3	200	-110	3054	16,5	
		4	200	-110	3016	29,5	
		5	200	-110	2011	45,5	
		6	200	-110	2036	63,0	
		8	200	-110	2011	110,0	
		10	200	-110	1005	166,0	

当使用齿的最大驱动力，或者多齿轮传动时，固定螺栓的负载必须单独核对。
请征询亚特兰的专业建议！

When using the maximum capacity of the teeth,or multiple pinions in contact,the mounting screw loads must be checked separately.
Please ask ATLANTA for advice!

类别 Class	系列 Series	模数 Module	热处理类型 heat-treatment of teeth	精度等级 ATLANTA-Quality	页 Page
UHPR	46	5; 6; 8; 10; 12	感应淬火并磨削 induction-hardened	3	ZB-4
	28	3; 4; 5; 6	渗碳淬火并磨削 case-hardened	5	ZB-5
	501	2; 3	感应淬火并磨削 induction-hardened	5	ZB-6
HPR	28	2; 3; 4	渗碳淬火并磨削 case-hardened	6	ZB-7
	28	2; 3; 4; 5; 6; 8; 10; 12	感应淬火并磨削 induction-hardened	6	ZB-8
	28	2; 3; 4; 5; 6; 8	感应淬火并磨削 induction-hardened	7	ZB-9
PR	34	2; 3; 4; 5	感应淬火并磨削 induction-hardened	8	ZB-10
	33	2; 3; 4	调质处理 铣削齿面 quenched and tempered	8	ZB-11
BR	25	1; 1,5; 2; 2,5; 3; 4; 5; 6; 8; 10	软材 铣削齿面 soft	9	ZB-12–13
	34	1; 1,5; 2; 3; 4; 5; 6; 8; 10	感应淬火铣削齿面 induction-hardened	10	ZB-14

选型负载
Selection and load tables — ZB-36 – 46

电控润滑器，滑动型润滑刷和壳体安装装置
Electronically controlled lubricators, sliding-type lubricating brushes and hose-connection sets — ZE-2 – 6

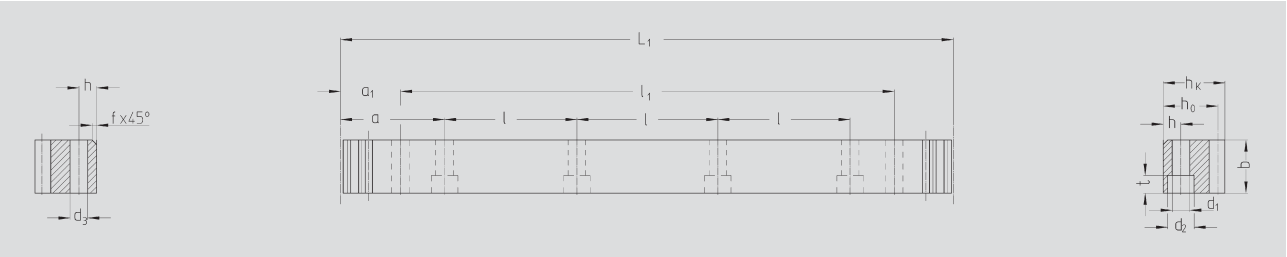
毛毡齿轮和安装轴
Felt gear and mounting shaft — ZE-7 – 8

装配
Mounting — ZF-9

	系列 Series	模数 Module	热处理类型 heat-treatment of teeth	精度等级 Tolerance of teeth	页 Page
	24	2; 3; 4; 5; 6; 8; 10	渗碳淬火 case-hardened	6 e 25	ZB-21 – 26
	24	2; 3; 4; 5; 6	感应淬火 induction-hardened	6 e 25	ZB-27
	21/23.. ...	1; 1,5; 2; 2,5; 3; 4; 5; 6; 8; 10; 12	软材 soft	8 e 25	ZB-28 – 35
	**TR齿轮简述，安装说明** Short description TR-pinion, mounting instruction				ZF-11 – 13
	**齿条传动的选型负载表** Selection and load tables for rack drives				ZD-2 – 4
	**电控润滑器，滑动型润滑刷和壳体安装装置** Electronically controlled lubricators, sliding-type lubricating brushes and hose-connection sets				ZE-2 – 6

3 级精度

ATLANTA-Quality 3



订购代码 Order code	模数 Module	L_1	齿数 N° of teeth	b	$h_{k\,-0,018}^{\ 0}$	$h_{0\,-0,018}^{\ 0}$	f	a	l	孔数 N° of holes	h	d_1	d_2	t	a_1	l_1	d_3	kg
46 50 105	5	1005,3	64	49	39	34	2,5	62,8	125,66	8	12	13,5	20	13	30,10	945,0	11,7	12,2
46 60 105	6	1017,9	54	59	49	43	2,5	63,6	127,23	8	16	17,5	26	17	31,40	955,0	15,7	18,5
46 80 105	8	1005,3	40	79	79	71	2,5	62,8	125,66	8	25	22,0	33	21	26,60	952,0	19,7	22,0
46 10 105	10	1005,3	32	99	99	89	2,5	62,8	125,66	8	32	33,0	48	32	125,66	753,9	19,7	68,0
46 12 105	12	1017,9	27	120	120	108	2,5	63,6	127,23	8	40	39,0	58	38	127,23	763,4	19,7	111,0

整体齿节线误差 / Total pitch error $GT_f/1000 \le 0{,}012$ mm

- 齿面感应淬火并磨削
- 材料 C45 钢
- 淬火后磨削各面
- 有效整体齿节线误差符号(20℃)

- Teeth induction-hardened and ground
- material C45E
- ground on all sides after hardening
- signed with effective total pitch error (20 °C)

作为选型提供相应的测量条款

Inspection measurement data available as an option.

齿条安装参考ZF-2页

Mounting racks, see page ZF-2.

为了达到齿条的高精度装配，我们推荐我们的专利安装工具，参考ZF-4

To achieve the precision of racks, also at the joint, we recommended our patented assembly kit, see page ZF-4

齿轮和齿条的润滑，我们建议使用我们的电控润滑系统，参考ZE-1

For lubrication of racks & pinions we recommend our automatic lubrication systems, see page ZE-1

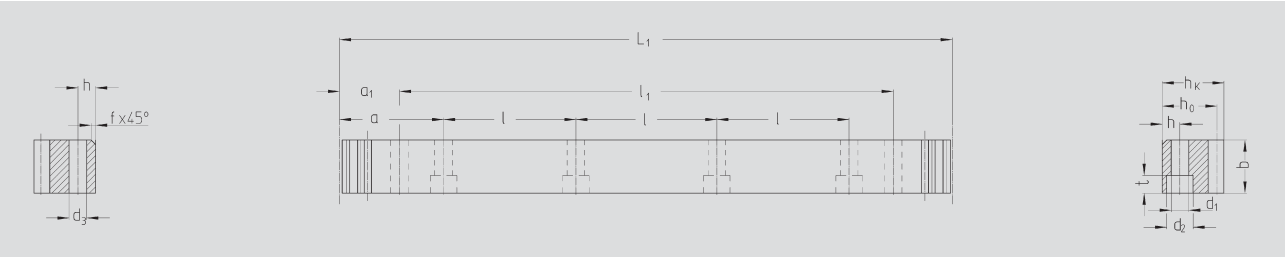
关于齿轮齿条传动系统的计算和选型的例子，参考ZD-1

For the calculation and selection of the rack and pinion drives see calculation sample pageZD-1

安装齿条的螺栓，参考ZF-3

Screws for rack mounting, see page ZF-3.

5 级精度 | ATLANTA-Quality 5 | Strong Line



订购代码 Order code	模数 Module	L_1	齿数 N° of teeth	b	$h_{k\,-0,018}^{\ 0}$	$h_{0\,-0,018}^{\ 0}$	f	a	l	孔数 N° of holes	h	d_1	d_2	t	a_1	l_1	d_3	kg
28 35 100	3	1017,88	108	29	29	26	2,0	63,61	127,23	8	10	12	17,5	11	28,6	960,6	11,7	5,9
28 45 100	4	1005,31	80	39	39	35	2,0	62,83	125,66	8	13	16	23,0	15	30,3	944,7	15,7	10,7
28 55 100	5	1005,31	64	49	49	44	2,5	62,83	125,66	8	15	18	26,0	17	34,8	935,7	15,7	16,3
28 65 100	6	1017,88	54	59	59	53	2,5	63,62	127,23	8	20	22	33,0	21	98,6	820,6	19,7	24,5

整体齿节线误差 $GT_f/1000 \leq 0{,}026$ mm.

Total pitch error $GT_f/1000 \leq 0{,}026$ mm.

- 深层渗碳淬火并磨削
- 材料 16MnCr5 合金钢
- 淬火后磨削各面
- 有效整体齿节线误差符号(20℃)

- Case hardened and teeth ground
- material 16MnCr5
- ground on all sides after hardening
- signed with effective total pitch error (20 °C)

可以提供相应的检测报告。

Inspection measurement data available as an option.

齿条安装参考ZF-2

Mounting racks, see page ZF-2.

为了达到齿条的高精度装配，我们推荐我们的专利安装工具，参考ZF-4

To achieve the precision of racks, also at the joint, we recommended our patented assembly kit, see page ZF-4

齿轮和齿条的润滑，我们建议使用我们的电控润滑系统，参考ZE-1

For lubrication of racks & pinions we recommend our automatic lubrication systems, see page ZE-1

关于齿轮齿条传动系统的计算和选型的例子，参考ZD-1

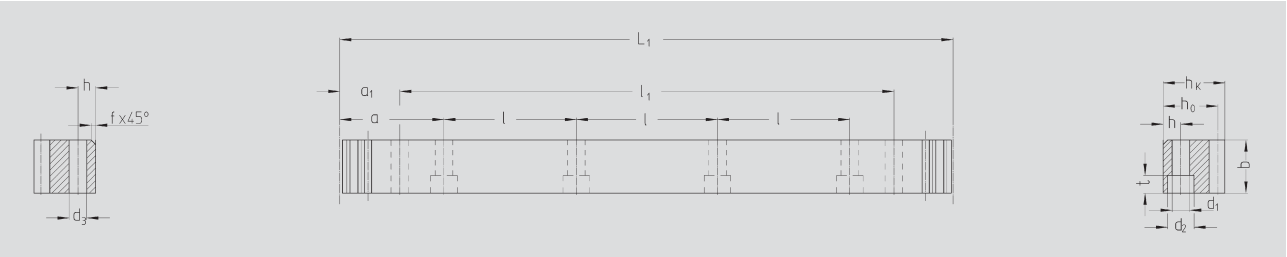
For the calculation and selection of the rack and pinion drives see calculation sample page ZD-1

安装齿条的螺栓，参考ZF-3

Screws for rack mounting, see page ZF-3.

5 级精度

ATLANTA-Quality 5



订购代码 Order code	模数 Module	L_1	齿数 N° of teeth	b	h_k	h_0	f	a	l	孔数 N° of holes	h	d_1	d_2	t	a_1	l_1	d_3	kg
50179002	2	1005,31	160	24	24	22	2,0	62,83	125,66	8	8	7	11,0	7	31,3	942.20	5,7	4,1
50179003	3	1017,88	108	29	29	26	2,0	63,61	127,23	8	9	10	15,0	9	34,4	949,10	7,7	6,0

其它长度也可. / Other length on request.

整体齿节线误差 / Total pitch error

$GT_f/1000 \leq 0{,}026$ mm,
$GT_f/2000 \leq 0{,}034$ mm (≙ 0,017 mm/1000).

- 齿面感应淬火并磨削
- 材料C45钢
- 淬火后磨削各面

- Teeth induction-hardened and ground
- material C45E
- ground on all sides after hardening

作为选型提供相应的测量条款

Inspection measurement data available as an option.

齿条安装参考ZF-2页

Mounting racks, see page ZF-2.

为了达到齿条的高精度装配，我们推荐我们的专利安装工具，参考ZF-4

To achieve the precision of racks, also at the joint, we recommended our patented assembly kit, see page ZF-4

齿轮和齿条的润滑，我们建议使用我们的电控润滑系统，参考ZE-1

For lubrication of racks & pinions we recommend our automatic lubrication systems, see page ZE-1

关于齿轮齿条传动系统的计算和选型的例子，参考ZD-1

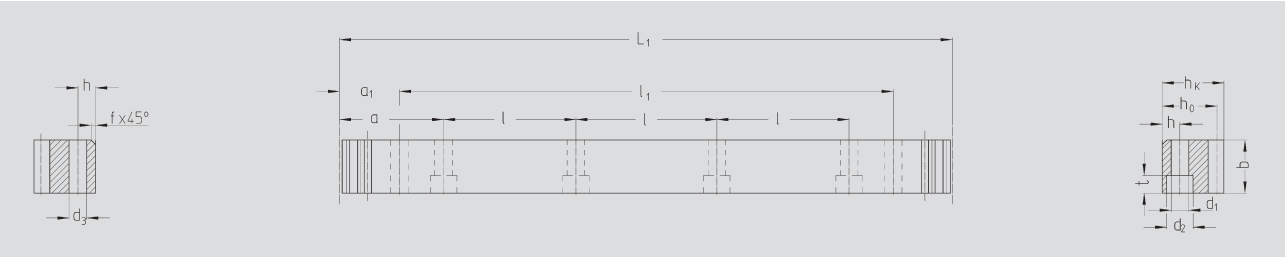
For the calculation and selection of the rack and pinion drives see calculation sample pageZD-1

安装齿条的螺栓，参考ZF-3

Screws for rack mounting, see page ZF-3.

6 级精度

ATLANTA-Quality 6



订购代码 Order code	模数 Module	L_1	齿数 N° of teeth	b	$h_{k\,-0,018}^{\ 0}$	$h_{0\,-0,018}^{\ 0}$	f	a	l	孔数 N° of holes	h	d_1	d_2	t	a_1	l_1	d_3	kg
28 20 100	2	1005,30	160	24	24	22,0	2	62,8	125,66	8	8	7	11	7	31,4	942,7	5,7	4,20
28 21 100	2	1005,30	160	24	24	22,0	2				无安装孔 / without mounting holes							4,20
28 30 100	3	1017,90	108	29	29	26,0	2	63,6	127,23	8	9	10	15	9	34,4	949,1	7,7	6,00
28 31 100	3	1017,90	108	29	29	26,0	2				无安装孔 / without mounting holes							6,00
28 40 100 [1)]	4	1005,30	80	39	39	35,0	2	62,8	125,66	8	12	10	15	9	37,5	930,3	7,7	10,50
28 41 100	4	1005,30	80	39	39	35,0	2				无安装孔 / without mounting holes							10,50
28 42 100	4	1005,30	80	39	39	35,0	2	62,8	125,66	8	12	14	20	13	37,5	930,3	11,7	10,50
28 42 150	4	1507,90	120	39	39	35,0	2	62,8	125,66	12	12	14	20	13	37,5	1432,9	11,7	16,00
28 42 200	4	2010,62	160	39	39	35,0	2	62,8	125,66	16	12	14	20	13	37,5	1935,6	11,7	21,00

500毫米及其它长度也可. / 500 mm and other length on request.

整体齿节线误差/ Total pitch error

$GT_f/1000 \leq 0{,}036$ mm,
$GT_f/1500 \leq 0{,}043$ mm (≙ 0,029 mm/1000),
$GT_f/2000 \leq 0{,}047$ mm (≙ 0,024 mm/1000).

- 齿面感应淬火并磨削
- 材料16MnCr5合金钢渗碳处理
- 淬火后磨削各面

- Teeth induction-hardened and ground
- material 16MnCr5, carburized
- ground on all sides after hardening

齿条安装参考ZF-2页

Mounting racks, see page ZF-2.

为了达到齿条的高精度装配，我们推荐我们的专利安装工具，参考ZF-4

To achieve the precision of racks, also at the joint, we recommended our patented assembly kit, see page ZF-4

齿轮和齿条的润滑，我们建议使用我们的电控润滑系统，参考ZE-1

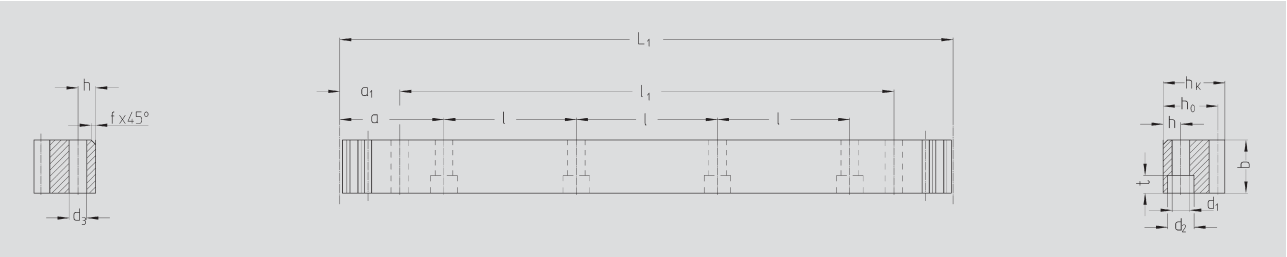
For lubrication of racks & pinions we recommend our automatic lubrication systems, see page ZE-1

关于齿轮齿条传动系统的计算和选型的例子，参考ZD-1

For the calculation and selection of the rack and pinion drives see calculation sample pageZD-1

6 级精度

ATLANTA-Quality 6



订购代码 Order code	模数 Module	L_1	齿数 N° of teeth	b	h_k $^{0}_{-0,018}$	h_0 $^{0}_{-0,018}$	f	a	l	孔数 N° of holes	h	d_1	d_2	t	a_1	l_1	d_3	kg
28 20 105	2	1005,30	160	24	24	22,0	2	62,8	125,66	8	8	7	11	7	31,4	942,70	5,7	4,20
28 21 105	2	1005,30	160	24	24	22,0	2	无安装孔 / without mounting holes										4,20
28 20 205	2	2010,62	320	24	24	22,0	2	62,8	125,66	16	8	7	11	7	31,	1948,00	5,7	8,40
28 21 205	2	2010,62	320	24	24	22,0	2	无安装孔 / without mounting holes										8,40
28 30 105	3	1017,90	108	29	29	26,0	2	63,6	127,23	8	9	10	15	9	34,4	949,10	7,7	6,00
28 31 105	3	1017,90	108	29	29	26,0	2	无安装孔 / without mounting holes										6,00
28 30 205	3	2035,75	216	29	29	26,0	2	63,6	127,23	16	9	10	15	9	34,4	1967,00	7,7	12,00
28 31 205	3	2035,75	216	29	29	26,0	2	无安装孔 / without mounting holes										12,00
28 40 105[1)]	4	1005,30	80	39	39	35,0	2	62,8	125,66	8	12	10	15	9	37,5	930,30	7,7	10,50
28 41 105	4	1005,30	80	39	39	35,0	2	无安装孔/ without mounting holes										10,50
28 42 105	4	1005,30	80	39	39	35,0	2	62,8	125,66	8	12	14	20	13	37,5	930,3	11,7	10,50
28 42 155	4	1507,90	120	39	39	35,0	2	62,8	125,66	12	12	14	20	13	37,5	1432,9	11,7	16,00
28 40 205	4	2010,62	160	39	39	35,0	2	62,8	125,66	16	12	10	15	9	37,5	1935,60	7,7	21,00
28 41 205	4	2010,62	160	39	39	35,0	2	无安装孔 / without mounting holes										21,00
28 42 205	4	2010,62	160	39	39	35,0	2	62,8	125,66	16	12	14	20	13	37,5	1935,6	11,7	21,00
28 50 105	5	1005,30	64	49	39	34	2,5	62,8	125,66	8	12	14	20	13	30,1	945,00	11,7	13,40
28 51 105	5	1005,30	64	49	39	34	2,5	无安装孔/ without mounting holes										13,40
28 50 155	5	1507,96	96	49	39	34	2,5	62,8	125,66	12	12	14	20	13	30,1	1447,70	11,7	20,10
28 51 155	5	1507,96	96	49	39	34	2,5	无安装孔 / without mounting holes										20,10
28 50 205	5	2010,62	128	49	39	34	2,5	62,8	125,66	16	12	14	20	13	30,1	1950,40	11,7	26,80
28 51 205	5	2010,62	128	49	39	34	2,5	无安装孔 / without mounting holes										26,80
28 60 105	6	1017,88	54	59	49	43	2,5	63,6	127,23	8	16	18	26	17	31,4	955,00	15,7	18,50
28 61 105	6	1017,88	54	59	49	43	2,5	无安装孔 / without mounting holes										18,50
28 60 155	6	1526,81	81	59	49	43	2,5	63,6	127,23	12	16	18	26	17	31,4	1464,00	15,7	27,80
28 61 155	6	1526,81	81	59	49	43	2,5	无安装孔 / without mounting holes										27,80
28 60 205	6	2035,75	108	59	49	43	2,5	63,6	127,23	16	16	18	26	17	31,4	1973,00	15,7	37,00
28 61 205	6	2035,75	108	59	49	43	2,5	无安装孔 / without mounting holes										37,00
28 80 105	8	1005,30	40	79	79	71	2,5	62,8	125,66	8	25	22	33	21	26,6	952,00	19,7	44,76
28 81 105	8	1005,30	40	79	79	71	2,5	无安装孔/ without mounting holes										44,76
28 80 205	8	2010,61	80	79	79	71	2,5	62,8	125,66	16	25	22	33	21	26,6	1957,30	19,7	89,50
28 81 205	8	2010,61	80	79	79	71	2,5	无安装孔 / without mounting holes										89,50
28 10 105	10	1005,30	32	99	99	89	2,5	62,83	125,66	8	32	33	48	32	125,66	753,96	19,7	68,72
28 11 105	10	1005,30	32	99	99	89	2,5	无安装孔 / without mounting holes										68,72
28 12 105	12	1017,90	27	120	120	108	2,5	63,60	127,23	8	40	39	58	38	127,23	763,40	19,7	111,00
28 13 105	12	1017,90	27	120	120	108	2,5	无安装孔 / without mounting holes										120,00

1) 螺纹孔连接限制了力矩

1) The screw joint limits the feed force.

500毫米及其它长度也可. / 500 mm and other length on request.

整体齿节线误差 / Total pitch error

GT_f/1000 ≤ 0,036 mm,
GT_f/1500 ≤ 0,043 mm (≙ 0,029 mm/1000),
GT_f/2000 ≤ 0,047 mm (≙ 0,024 mm/1000).

- 齿面感应淬火并磨削
- 材料 C45 钢
- 淬火后磨削各面

- Teeth induction-hardened and ground
- material C45E
- ground on all sides after hardening

齿条安装参考ZF-2

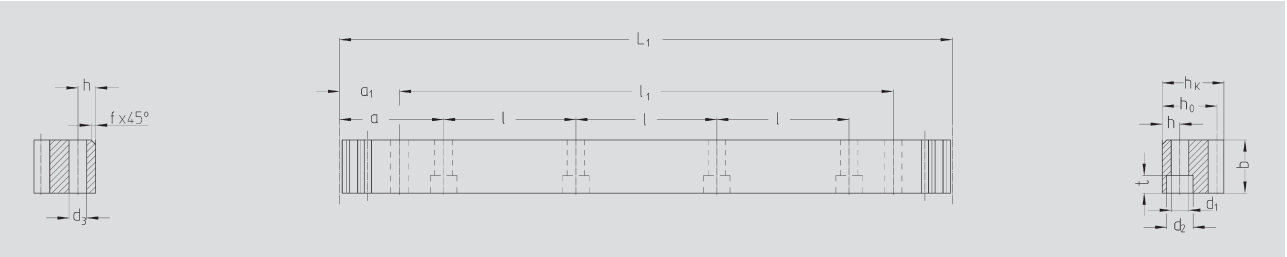
Mounting racks, see page ZF-2.

更多信息请参考下页ZB-4

Further information see page ZB–4.

7 级精度

ATLANTA-Quality 7



订购代码 Order code	模数 Module	L_1	齿数 N° of teeth	b	$h_{k\,-0,018}^{\ 0}$	$h_{0\,-0,018}^{\ 0}$	f	a	l	孔数 N° of holes	h	d_1	d_2	t	a_1	l_1	d_3	kg
28 20 107	2	1005,30	160	24	24	22	2	62,8	125,66	8	8	7	11	7	31,4	942,7	5,7	4,2
28 30 107	3	1017,90	108	29	29	26	2	63,6	127,23	8	9	10	15	9	34,4	949,1	7,7	6,0
28 40 107	4	1005,30	80	39	39	35	2	62,8	125,66	8	12	14	20	13	37,5	930,3	11,7	10,5
28 50 107	5	1005,30	64	49	39	34	2,5	62,8	125,66	8	12	14	20	13	30,1	945,0	11,7	13,4
28 60 107	6	1017,88	54	59	49	43	2,5	63,6	127,23	8	16	18	26	17	31,4	955,00	15,7	20,20
28 80 107	8	1005,30	40	79	79	71	2,5	62,8	125,66	8	25	22	33	21	26,6	952,00	19,7	44,76

其它长度也可. / other length on request.

整体齿节线误差 / Total pitch error

$GT_f/1000 \leq 0{,}052$ mm.

- 齿面感应淬火并磨削
- 材料 C45 钢
- 淬火后磨削各面

- Teeth induction-hardened and ground
- material C45E
- ground on all sides after hardening

齿条安装参考ZF-2页

Mounting racks see page ZF-2.

为了达到齿条的高精度装配，我们推荐我们的专利安装工具，参考ZF-4

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关于齿轮齿条传动系统的计算和选型的例子，参考ZD-1

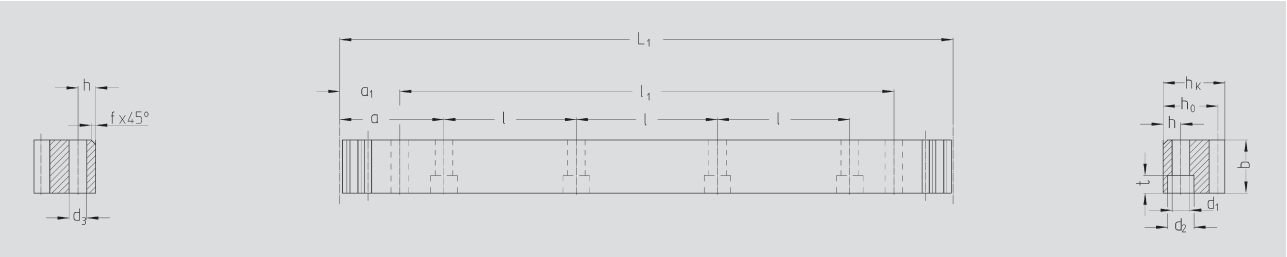
For the calculation and selection of the rack and pinion drives see calculation sample pageZD-1

安装齿条的螺栓，参考ZF-3

Screws for rack mounting, see page ZF-3.

8 级精度

ATLANTA-Quality 8



订购代码 Order code	模数 Module	L_1	齿数 N° of teeth	b	$h_{k\,-0,018}^{\ 0}$	$h_{0\,-0,018}^{\ 0}$	f	a	l	孔数 N° of holes	h	d_1	d_2	t	a_1	l_1	d_3	kg
34 20 108	2	1005,30	160	25	24	22	2	62,80	125,66	8	8	7	11	7	31,4	942,7	5,7	4,2
34 20 208	2	2010,62	320	25	24	22	2	62,83	125,66	16	8	7	44	7	31,3	1948,0	5,7	8,4
34 30 108	3	1017,90	108	30	29	26	2	63,60	127,23	8	9	10	15	9	34,4	949,1	7,7	6,0
34 30 208	3	2035,75	216	30	29	26	2	63,62	127,23	16	9	10	15	9	34,4	1967,0	7,7	12,0
34 40 108	4	1005,30	80	40	39	35	2	62,80	125,66	8	12	14	20	13	37,5	930,3	11,7	10,5
34 40 208	4	2010,62	160	40	39	35	2	62,83	125,66	16	12	14	20	13	37,5	1935,6	11,7	20,4
34 50 108	5	1005,30	64	50	39	34	2,5	62,80	125,66	8	12	14	20	13	30,2	945,0	11,7	13,4
34 50 208	5	2010,62	128	50	39	34	2,5	62,83	125,66	16	12	14	20	13	30,2	1950,4	11,7	27,6

其它长度也可./ other length on request.

整体齿节线误差 / Total pitch error

$GT_f/1000 \leq 0{,}060$ mm.

- 齿面感应淬火并磨削
- 材料 C45 钢
- 冷拔钢材

- Teeth induction-hardened and ground
- material C45E
- bright steel, profile blasted

齿条安装参考ZF-2页

Mounting racks see page ZF-2.

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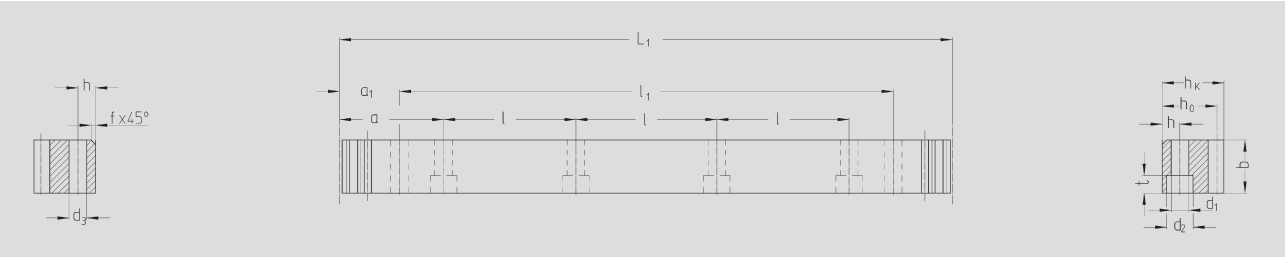
For the calculation and selection of the rack and pinion drives see calculation sample pageZD-1

安装齿条的螺栓，参考ZF-3

Screws for rack mounting, see page ZF-3.

8 级精度

ATLANTA-Quality 8



订购代码 Order code	模数 Module	L_1	齿数 N° of teeth	b	$h_{k\,-0,018}^{\ 0}$	$h_{0\,-0,018}^{\ 0}$	f	a	l	孔数 N° of holes	h	d_1	d_2	t	a_1	l_1	d_3	kg
33 21 100	2	1005,31	160	25	24	22	2	62,83	125,66	8	8	7	11	7	31,3	942,7	5,7	4,30
33 20 100	2	1005,31	160	25	24	22	2	无安装孔 / without mounting holes										4,30
33 21 200	2	2010,62	320	25	24	22	2	62,83	125,66	16	8	7	11	7	31,3	1948,0	5,7	8,60
33 20 200	2	2010,62	320	25	24	22	2	无安装孔 / without mounting holes										8,60
33 31 100	3	1017,88	108	30	29	26	2	63,62	127,23	8	9	10	15	9	34,4	949,1	7,7	6,20
33 30 100	3	1017,88	108	30	29	26	2	无安装孔 / without mounting holes										6,20
33 31 200	3	2035,75	216	30	29	26	2	63,62	127,23	16	9	10	15	9	34,4	1967,0	7,7	12,40
33 30 200	3	2035,75	216	30	29	26	2	无安装孔 / without mounting holes										12,40
33 41 100	4	1005,31	80	40	39	35	2	62,83	125,66	8	12	10	15	9	37,5	930,3	7,7	11,00
33 40 100	4	1005,31	80	40	39	35	2	无安装孔 / without mounting holes										11,00
33 41 200	4	2010,62	160	40	39	35	2	62,83	125,66	16	12	10	15	9	37,5	1935,6	7,7	22,00
33 40 200	4	2010,62	160	40	39	35	2	无安装孔 / without mounting holes										22,00

500毫米及其它长度也可. / 500 mm and other length on request.

整体齿节线误差 / Total pitch error

$GT_f/1000 \leq 0{,}100$ mm,
$GT_f/2000 \leq 0{,}200$ mm.

- 铣削齿面
- 材料42CrMo4冷拔钢，调质处理
- 冷拔钢材，底部加工

- Teeth milled
- material 42CrMo4, quenched and tempered
- bright steel, backside machined

齿条安装参考ZF-2页

Mounting racks see page ZF-2.

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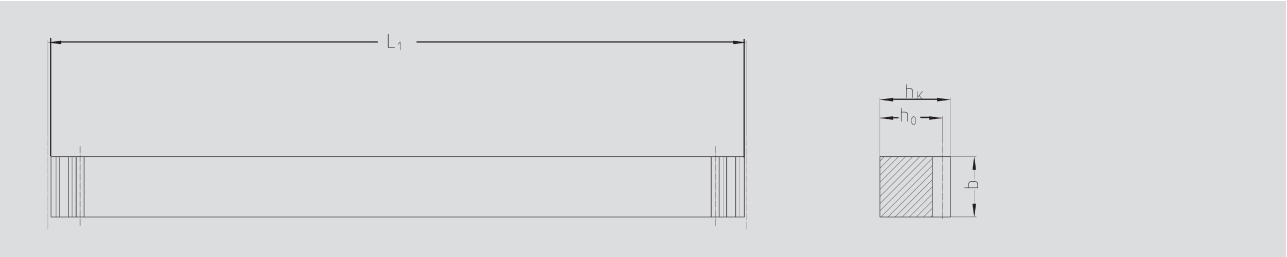
安装齿条的螺栓，参考ZF-3

Screws for rack mounting, see page ZF-3.

9 级精度

ATLANTA-Quality 9



订购代码 Order code	模数 Module	L_1	齿数 N° of teeth	b	h_k	h_0	孔数 Remarks	kg
25 10 025	1	251,33	80	15	15	14	正方形截面 / Square dimension	0,41
25 10 050	1	499,51	159	15	15	14	正方形截面/ Square dimension	0,82
25 10 100	1	999,03	318	15	15	14	正方形截面 / Square dimension	1,64
25 15 025	1,5	249,76	53	17	17	15,5	正方形截面 / Square dimension	0,51
25 15 050	1,5	499,51	106	17	17	15,5	正方形截面 / Square dimension	1,03
25 15 100	1,5	999,03	212	17	17	15,5	正方形截面 / Square dimension	2,06
25 15 200	1,5	1998,05	424	17	17	15,5	正方形截面 / Square dimension	4,11
25 20 025	2	251,33	40	20	20	18	正方形截面 / Square dimension	0,71
25 20 050	2	502,65	80	20	20	18	正方形截面 / Square dimension	1,41
25 20 100	2	999,03	159	20	20	18	正方形截面 / Square dimension	2,81
25 20 150	2	1507,96	240	20	20	18	正方形截面 / Square dimension	4,25
25 20 200	2	1998,05	318	20	20	18	正方形截面 / Square dimension	5,62
25 20 300	2	3015,93	480	20	20	18	正方形截面 / Square dimension	8,49
25 25 025	2,5	251,33	32	25	25	22,5	正方形截面 / Square dimension	1,10
25 25 050	2,5	502,65	64	25	25	22,5	正方形截面 / Square dimension	2,21
25 25 100	2,5	997,46	127	25	25	22,5	正方形截面 / Square dimension	4,38
25 25 200	2,5	2002,77	255	25	25	22,5	正方形截面 / Square dimension	8,80
25 30 025	3	254,47	27	30	30	27	正方形截面 / Square dimension	1,61
25 30 051	3	508,94	54	30	30	27	正方形截面 / Square dimension	3,22
25 30 101	3	1017,88	108	30	30	27	正方形截面 / Square dimension	6,44
25 30 150	3	1526,81	162	30	30	27	正方形截面 / Square dimension	9,66
25 30 201	3	2035,75	216	30	30	27	正方形截面 / Square dimension	12,88
25 30 300	3	3053,63	324	30	30	27	正方形截面 / Square dimension	19,32
25 40 025	4	251,33	20	40	40	36	正方形截面 / Square dimension	2,83
25 40 050	4	502,65	40	40	40	36	正方形截面 / Square dimension	5,65
25 40 100	4	1005,31	80	40	40	36	正方形截面 / Square dimension	11,31
25 40 150	4	1507,96	120	40	40	36	正方形截面 / Square dimension	19,97
25 40 201	4	2010,62	160	40	40	36	正方形截面 / Square dimension	22,61
25 40 300	4	3015,93	240	40	40	36	正方形截面 / Square dimension	33,93

其它长度也可. / other length on request.

整体齿节线误差 / Total pitch error

$GT_f/1000 \le 0{,}150$ mm,
$GT_f/1500 \le 0{,}225$ mm,
$GT_f/2000 \le 0{,}300$ mm.

- 铣削齿面
- 材料 C45 钢
- 冷拔钢材

- Milled teeth
- material C45E
- bright steel

齿条安装参考ZF-2页

Mounting racks see page ZF-2.

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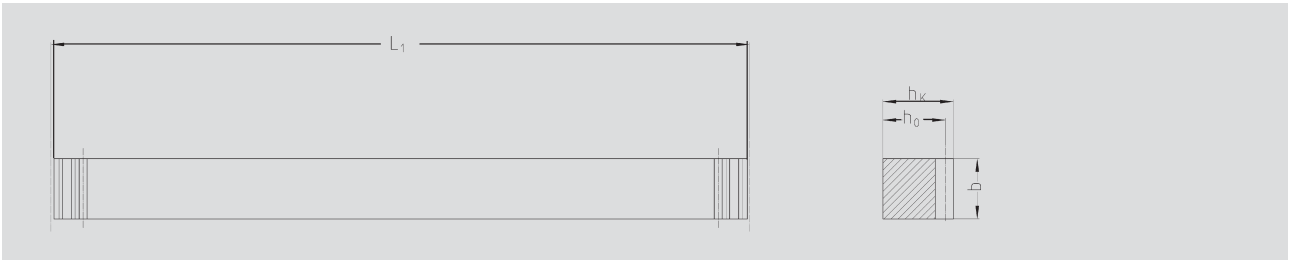
For the calculation and selection of the rack and pinion drives see calculation sample pageZD-1

安装齿条的螺栓，参考ZF-3

Screws for rack mounting, see page ZF-3.

9 级精度

ATLANTA-Quality 9



订购代码 Order code	模数 Module	L_1	齿数 N° of teeth	b	h_k	h_0	孔数 Remarks	kg
25 50 025	5	251,33	16	50	40	35	非正方形截面 / Not square dimension	3,44
25 50 050	5	502,65	32	50	40	35	非正方形截面 / Not square dimension	6,87
25 50 100	5	1005,31	64	50	40	35	非正方形截面 / Not square dimension	13,74
25 50 150	5	1507,96	96	50	40	35	非正方形截面 / Not square dimension	20,40
25 50 200	5	2010,62	128	50	40	35	非正方形截面 / Not square dimension	27,48
25 52 100	5	1005,31	64	50	50	45	正方形截面 / Square dimension	17,10
25 52 200	5	2010,62	128	50	50	45	正方形截面 / Square dimension	34,20
25 60 051	6	508,94	27	60	50	44	非正方形截面 / Not square dimension	10,49
25 60 101	6	1017,88	54	60	50	44	非正方形截面 / Not square dimension	20,99
25 60 201	6	2035,75	108	60	50	44	非正方形截面 / Not square dimension	41,97
25 62 101	6	1017,88	54	60	60	54	正方形截面 / Square dimension	25,00
25 62 201	6	2035,75	108	60	60	54	正方形截面 / Square dimension	50,00
25 80 100	8	1005,31	40	80	79,5	71,5	正方形截面 / Square dimension	44,63
25 80 200	8	2010,62	80	80	79,5	71,5	正方形截面 / Square dimension	89,26
25 11 100	10	1005,30	32	100	100	90	正方形截面 / Square dimension	70,60

其它长度也可. / other length on request.

整体齿节线误差 / Total pitch error

$GT_f/1000 \leq 0{,}150$ mm,
$GT_f/1500 \leq 0{,}225$ mm,
$GT_f/2000 \leq 0{,}300$ mm.

- 铣削齿面
- 材料 C45 钢
- 冷拔钢材

- Milled teeth
- material C45E
- bright steel

齿条安装参考ZF-2页

Mounting racks see page ZF-2.

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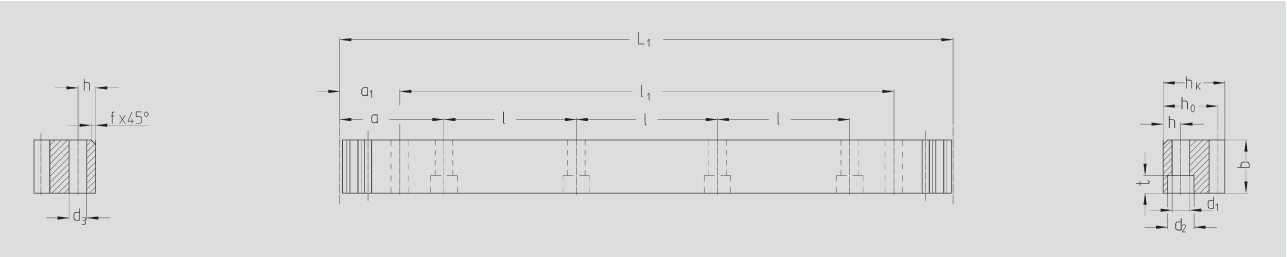
For the calculation and selection of the rack and pinion drives see calculation sample pageZD-1

安装齿条的螺栓，参考ZF-3

Screws for rack mounting, see page ZF-3.

10 级精度

ATLANTA-Quality 10



订购代码 Order code	模数 Module	L_1	齿数 N° of teeth	b	$h_k{}^{0}_{-0,018}$	$h_0{}^{0}_{-0,018}$	f	a	l	孔数 N° of holes	h	d_1	d_2	t	a_1	l_1	d_3	kg
34 93 100	1	999,06	318	15	15	14	2			无安装孔 / without mounting holes							1,64	
34 93 200	1	1998,05	636	15	15	14	2			无安装孔 / without mounting holes							3,28	
34 16 100	1,5	999,03	212	17	17	15,5	2			无安装孔 / without mounting holes							2,06	
34 16 200	1,5	1998,05	424	17	17	15,5	2			无安装孔 / without mounting holes							4,12	
34 20 100	2	1005,31	160	25	24	22	2	62,83	125,66	8	8	7	11	7	31,3	942,7	5,7	4,20
34 21 100	2	1005,31	160	25	24	22	2			无安装孔/ without mounting holes							4,20	
34 20 200	2	2010,62	320	25	24	22	2	62,83	125,66	16	8	7	11	7	31,3	1948,0	5,7	8,40
34 21 200	2	2010,62	320	25	24	22	2			无安装孔 / without mounting holes							8,40	
34 30 100	3	1017,88	108	30	29	26	2	63,62	127,23	8	9	10	15	9	34,4	949,1	7,7	6,00
34 31 100	3	1017,88	108	30	29	26	2			无安装孔 / without mounting holes							6,00	
34 30 200	3	2035,75	216	30	29	26	2	63,62	127,23	16	9	10	15	9	34,4	1967	7,7	12,00
34 31 200	3	2035,75	216	30	29	26	2			无安装孔 / without mounting holes							12,00	
34 40 100 1)	4	1005,31	80	40	39	35	2	62,83	125,66	8	12	10	15	9	37,5	930,3	7,7	10,20
34 41 100	4	1005,31	80	40	39	35	2			无安装孔 / without mounting holes							10,20	
34 42 100	4	1005,31	80	40	39	35	2	62,83	125,66	8	12	14	20	13	37,5	930,3	11,7	10,20
34 40 200 1)	4	2010,62	160	40	39	35	2	62,83	125,66	16	12	10	15	9	37,5	1935,6	7,7	20,50
34 41 200	4	2010,62	160	40	39	35	2			无安装孔 / without mounting holes							20,50	
34 42 200	4	2010,62	160	40	39	35	2	62,83	125,66	16	12	14	20	13	37,5	1935,6	11,7	20,50
34 50 100	5	1005,31	64	50	39	34	2,5	62,83	125,66	8	12	14	20	13	30,2	945,0	11,7	13,80
34 51 100	5	1005,31	64	50	39	34	2,5			无安装孔 / without mounting holes							13,80	
34 50 200	5	2010,62	128	50	39	34	2,5	62,83	125,66	16	12	14	20	13	30,2	1950,3	11,7	27,50
34 51 200	5	2010,62	128	50	39	34	2,5			无安装孔 / without mounting holes							27,50	
34 60 100	6	1017,88	54	60	49	43	2,5	63,62	127,23	8	16	18	26	17	31,4	955,0	15,7	21,00
34 61 100	6	1017,88	54	60	49	43	2,5			无安装孔 / without mounting holes							21,00	
34 60 200	6	2035,75	108	60	49	43	2,5	63,62	127,23	16	16	18	26	17	31,4	1972,9	15,7	42,00
34 61 200	6	2035,75	108	60	49	43	2,5			无安装孔 / without mounting holes							42,00	
34 81 100	8	1005,31	40	80	79	71	2,5			无安装孔 / without mounting holes							44,63	
34 81 200	8	2010,61	80	80	79	71	2,5			无安装孔 / without mounting holes							82,26	
34 11 100	10	1005,30	32	100	99	89	2,5			无安装孔 / without mounting holes							70,60	

1) 螺纹孔连接限制了力矩 /1) The screw joint limits the feed force.

500毫米及其它长度也可. / 500 mm and other length on request.

整体齿节线误差 / Total pitch error

GT_f /1000 ≤ 0,200 mm,
GT_f /1500 ≤ 0,300 mm
GT_f /2000 ≤ 0,400 mm

- 铣削齿面,感应淬火
- 材料 C45 钢
- 冷拔钢材

- Teeth hardened with the ATLANTA high performance hardening process
- heat-treatable steel according ATLANTA-Standard
- bright steel

齿条安装参考ZF-2页

Mounting racks see page ZF-2.

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安装齿条的螺栓，参考ZF-3

Screws for rack mounting, see page ZF-3.

直齿，孔公差 Ø^{H6} 键槽符合 DIN 6885标准
Straight tooth system, with bore Ø^{H6} and keyway acc. to DIN 6885

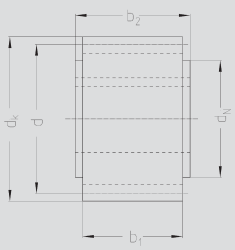


图 1
Fig. 1

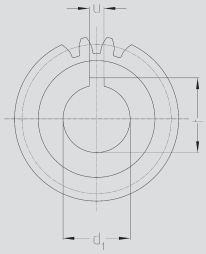


图 1 + 3 键槽在齿槽中间
Fig. 1 + 3 Keyway middle of tooth gap

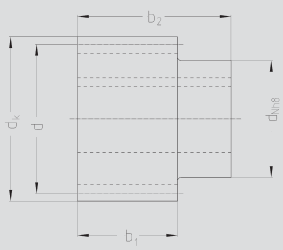


图 3
Fig. 3

16MnCr5, 1.7131
渗碳淬火 case-hardened
精度等级 Gearing grade
6 e 25

订购代码 Order code	图号 Fig.	齿数 N° of teeth z	d	d_k	d_1^{H6}	d_N	b_1	b_2	u	t	kg	胀紧盘 GH-1页 shrink-disc on page GH-1
模数 / Module 2												
24 21 216	1	16	32	36	15	25	28	30,0	5	17,3	0,1	
24 21 218	1	18	36	40	15	28	28	30,0	5	17,3	0,2	
24 22 218	1	18	36	40	20	28	28	30,0	6	22,8	0,2	
24 21 220	1	20	40	44	15	25	28	30,0	5	17,3	0,2	
24 29 420	3	20	40	44	19*	30	28	56,0	6	21,8	0,2	80 83 030
24 29 220	1	20	40	44	19*	30	28	30,0	6	21,8	0,2	
24 22 220	1	20	40	44	20*	30	28	30,0	6	22,8	0,2	
24 20 120	3	20	40	44	22*	36	28	56,0	6	24,8	0,3	80 84 036
24 20 220	1	20	40	44	22*	30	28	30,0	6	24,8	0,2	
24 21 222	1	22	44	48	15	25	28	30,0	5	17,3	0,3	
24 29 222	1	22	44	48	19*	30	28	30,0	6	21,8	0,3	
24 29 422	3	22	44	48	19*	30	28	56,0	6	21,8	0,3	80 83 030
24 22 222	1	22	44	48	20	30	28	30,0	6	22,8	0,3	
24 20 222	1	22	44	48	22*	30	28	30,0	6	24,8	0,2	
24 20 122	3	22	44	48	22	36	28	56,0	6	27,8	0,2	80 84 036
24 23 222	1	22	44	48	25	36	28	30,0	8	28,3	0,2	
24 21 225	1	25	50	54	15	25	28	30,0	5	17,3	0,4	
24 26 225	3	25	50	54	16	30	28	54,0	5	18,3	0,3	80 83 030
24 29 225	1	25	50	54	19*	30	28	30,0	6	21,8	0,3	
24 29 425	3	25	50	54	19*	30	28	56,0	6	21,8	0,3	80 83 030
24 22 225	1	25	50	54	20	30	28	30,0	6	22,8	0,4	
24 20 225	1	25	50	54	22	30	28	30,0	6	24,8	0,3	
24 20 425	3	25	50	54	22*	36	28	56,0	6	24,8	0,4	80 84 036
24 23 225	1	25	50	54	25	36	28	30,0	8	28,3	0,3	
24 24 225	1	25	50	54	30	45	28	30,0	8	33,3	0,3	
24 21 228	1	28	56	60	15	25	28	30,0	5	17,3	0,5	
24 29 228	1	28	56	60	19*	30	28	30,0	6	21,8	0,5	
24 29 428	3	28	56	60	19*	30	28	56,0	6	21,8	0,5	80 83 030
24 22 228	1	28	56	60	20	30	28	30,0	6	22,8	0,5	
24 20 128	3	28	56	60	22*	36	28	56,0	6	24,8	0,3	80 84 036
24 20 228	1	28	56	60	22*	30	28	30,0	6	24,8	0,3	
24 23 228	1	28	56	60	25	36	28	30,0	8	28,3	0,4	
24 22 428	3	28	56	60	30	50	28	60,0	8	33,3	0,4	80 85 050
24 24 228	1	28	56	60	30	45	28	30,0	8	33,3	0,4	
24 25 228	1	28	56	60	35	48	28	30,0	10	38,3	0,3	
24 21 232	1	32	64	68	15	36	28	30,0	5	17,3	0,6	
24 26 232	3	32	64	68	16	30	28	54,0	5	18,3	0,6	80 83 030
24 22 232	1	32	64	68	20	30	28	30,0	6	22,8	0,6	
24 20 232	1	32	64	68	22*	30	28	30,0	6	24,8	0,4	
24 20 432	3	32	64	68	22	36	28	56,0	6	24,8	0,6	80 84 036
24 23 232	1	32	64	68	25	36	28	30,0	8	28,3	0,6	
24 22 432	3	32	64	68	30	50	28	60,0	8	33,3	0,6	80 85 050
24 24 232	1	32	64	68	30	45	28	30,0	8	33,3	0,6	
24 23 432	3	32	64	68	32	55	28	65,0	10	35,3	0,5	80 80 055
24 25 232	1	32	64	68	35	48	28	30,0	10	38,3	0,5	
24 22 236	1	36	72	76	20	30	28	30,0	6	22,8	0,8	
24 23 236	1	36	72	76	25	36	28	30,0	8	28,3	0,8	
24 24 236	1	36	72	76	30	45	28	30,0	8	33,3	0,7	
24 25 236	1	36	72	76	35	48	28	30,0	10	38,3	0,7	
24 25 436	3	36	72	76	40	62	28	65,0	12	43,3	0,5	80 86 062
24 27 236	1	36	72	76	45	58	28	30,0	14	48,8	0,6	

* G6 个别./resp. H7

直齿，孔公差 Ø^{H6} 键槽符合 DIN 6885标准
Straight tooth system, with bore Ø^{H6} and keyway acc. to DIN 6885

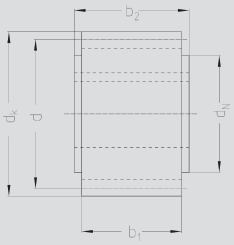


图 1
Fig. 1

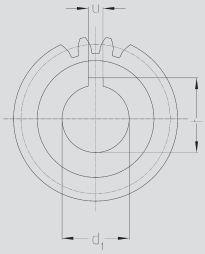


图 1 + 3 键槽在齿槽中间
Fig. 1 + 3 Keyway middle of tooth gap

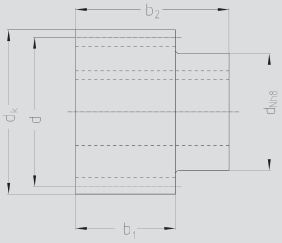


图 3
Fig. 3

16MnCr5, 1.7131
渗碳淬火 case-hardened
精度等级 Gearing grade
6 e 25

订购代码 Order code	图号 Fig.	齿数 N° of teeth z	d	d_k	d_1^{H6}	d_N	b_1	b_2	u	t	kg	胀紧盘 GH-1页 shrink-disc on page GH-1
模数 / Module 2												
24 21 240	1	40	80	84	15	36	28	30,0	5	17,3	1,0	
24 22 240	1	40	80	84	20	30	28	30,0	6	22,8	1,0	
24 23 240	1	40	80	84	25	36	28	30,0	8	28,3	1,0	
24 24 240	1	40	80	84	30	45	28	30,0	8	33,3	1,0	
24 23 440	3	40	80	84	32	55	28	65,0	10	35,3	0,9	80 80 055
24 25 240	1	40	80	84	35	48	28	30,0	10	38,3	0,9	
24 25 440	3	40	80	84	40	62	28	65,0	12	43,3	0,7	80 86 062
24 26 440	3	40	80	84	45	68	28	65,0	14	48,8	1,3	80 80 068
24 27 240	1	40	80	84	45	58	28	30,0	14	48,8	0,8	
24 22 245	1	45	90	94	20	30	28	30,0	6	22,8	1,3	
24 23 245	1	45	90	94	25	36	28	30,0	8	28,3	1,2	
24 25 245	1	45	90	94	35	48	28	30,0	10	38,3	1,2	
24 27 245	1	45	90	94	45	58	28	30,0	14	48,8	1,1	
24 22 250	1	50	100	104	20	30	28	30,0	6	22,8	1,6	
24 23 250	1	50	100	104	25	36	28	30,0	8	28,3	1,5	
24 25 250	1	50	100	104	35	48	28	30,0	10	38,3	1,5	
24 27 250	1	50	100	104	45	58	28	30,0	14	48,8	1,4	
24 26 450	3	50	100	104	45	68	28	65,0	14	48,8	2,0	80 80 068
24 23 256	1	56	112	116	25	36	28	30,0	8	28,3	1,9	
24 25 256	1	56	112	116	35	48	28	30,0	10	38,3	1,8	
24 23 263	1	63	126	130	25	36	28	30,0	8	28,3	2,5	
24 25 271	1	71	142	146	35	48	28	30,0	10	38,3	3,15	
24 25 280	1	80	160	164	35	48	28	30,0	10	38,3	4,2	
24 27 290	1	90	180	184	45	58	28	30,0	14	48,8	5,7	

直齿，孔公差 Ø^{H6} 键槽符合 DIN 6885标准
Straight tooth system, with bore Ø^{H6} and keyway acc. to DIN 6885

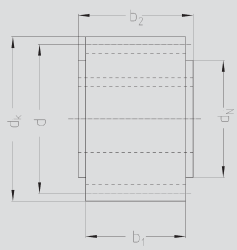


图 1
Fig. 1

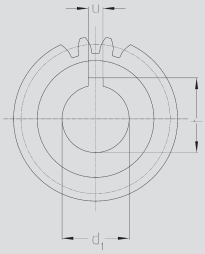


图 1 + 3 键槽在齿槽中间
Fig. 1 + 3 Keyway middle of tooth gap

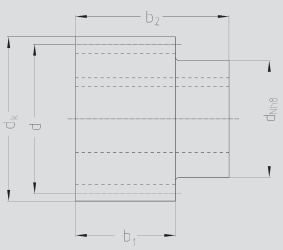


图 3
Fig. 3

16MnCr5, 1.7131
渗碳淬火 case-hardened
精度等级 Gearing grade
6 e 25

订购代码 Order code	图号 Fig.	齿数 N° of teeth z	d	d_k	d_1^{H6}	d_N	b_1	b_2	u	t	kg	胀紧盘 GH-1页 shrink-disc on page GH-1
模数 / Module 3												
24 33 218	1	18	54	60	25	36	28	30,0	8	28,3	0,4	
24 33 220	1	20	60	66	25	36	28	30,0	8	28,3	0,5	
24 34 220	1	20	60	66	30	45	28	30,0	8	33,3	0,5	
24 35 220	1	20	60	66	35	48	28	30,0	10	38,3	0,4	
24 30 422	3	22	66	72	22	36	28	56,0	6	24,8	0,8	80 84 036
24 31 422	3	22	66	72	25	44	28	60,0	8	28,3	0,9	80 80 044
24 33 222	1	22	66	72	25	36	28	30,0	8	28,3	0,6	
24 32 422	3	22	66	72	30	50	28	60,0	8	33,3	0,9	80 85 050
24 34 222	1	22	66	72	30	45	28	30,0	8	33,3	0,6	
24 33 422	3	22	66	72	32	55	28	65,0	10	35,3	1,0	80 80 055
24 34 422	3	22	66	72	35	55	28	65,0	10	38,3	0,9	80 80 055
24 35 222	1	22	66	72	35	48	28	30,0	10	38,3	0,6	
24 35 422	3	22	66	72	40*	62	28	65	12	43,3	1,0	80 86 062
24 33 225	1	25	75	81	25	36	28	30,0	8	28,3	0,9	
24 34 225	1	25	75	81	30	45	28	30,0	8	33,3	0,8	
24 33 425	3	25	75	81	32*	55	28	65	10	35,3	1,2	80 80 055
24 35 225	1	25	75	81	35	48	28	30,0	10	38,3	0,8	
24 35 425	3	25	75	81	40	62	28	65,0	12	43,3	1,2	80 86 062
24 37 225	1	25	75	81	45	58	28	30,0	14	48,8	0,6	
24 30 428	3	28	84	90	22	36	28	56,0	6	24,8	1,3	80 84 036
24 31 428	3	28	84	90	25	44	28	60,0	8	28,3	1,4	80 80 044
24 33 228	1	28	84	90	25	36	28	30,0	8	28,3	1,1	
24 32 428	3	28	84	90	30	50	28	60,0	8	33,3	1,4	80 85 050
24 34 228	1	28	84	90	30	45	28	30,0	8	33,3	1,1	
24 33 428	3	28	84	90	32	55	28	65,0	10	35,3	1,5	80 80 055
24 34 428	3	28	84	90	35	55	28	65,0	10	38,3	1,4	80 80 055
24 35 228	1	28	84	90	35	48	28	30,0	10	38,3	1,0	
24 35 428	3	28	84	90	40*	62	28	65	12	43,3	1,4	80 86 062
24 36 428	3	28	84	90	45	68	28	65,0	14	48,8	1,5	80 80 068
24 37 228	1	28	84	90	45	58	28	30,0	14	48,8	0,9	
24 33 232	1	32	96	102	25	36	28	30,0	8	28,3	1,5	
24 34 232	1	32	96	102	30	45	28	30,0	8	33,3	1,4	
24 33 432	3	32	96	102	32*	55	28	65	10	35,3	1,8	80 80 055
24 35 232	1	32	96	102	35	48	28	30,0	10	38,3	1,4	
24 35 432	3	32	96	102	40	62	28	65,0	12	43,3	1,8	80 86 062
24 37 232	1	32	96	102	45	58	28	30,0	14	48,8	1,3	
24 39 232	1	32	96	102	60	80	28	30,0	18	64,4	1,1	
24 33 236	1	36	108	114	25	36	28	30,0	8	28,3	1,9	
24 35 236	1	36	108	114	35	48	28	30,0	10	38,3	1,8	
24 36 436	3	36	108	114	45	68	28	65,0	14	48,8	2,2	80 80 068
24 37 236	1	36	108	114	45	58	28	30,0	14	48,8	1,7	
24 39 236	1	36	108	114	60	80	28	30,0	18	64,4	1,4	
24 33 240	1	40	120	126	25	36	28	30	8	28,3	2,3	
24 35 240	1	40	120	126	35	48	28	30,0	10	38,3	2,3	
24 37 240	1	40	120	126	45	58	28	30,0	14	48,8	2,1	
24 39 240	1	40	120	126	60	80	28	30,0	18	64,4	1,9	
24 33 245	1	45	135	141	25	36	28	30,0	8	28,3	3,0	
24 35 245	1	45	135	141	35	48	28	30,0	10	38,3	2,7	
24 37 245	1	45	135	141	45	58	28	30,0	14	48,8	2,4	

* G6 个别./resp. H7

直齿，孔公差 Ø^{H6} 键槽符合 DIN 6885标准
Straight tooth system, with bore Ø^{H6} and keyway acc. to DIN 6885

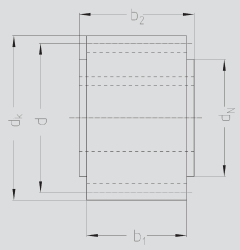


图 1
Fig. 1

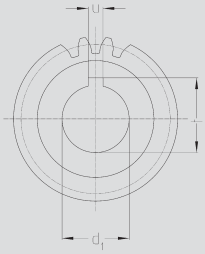


图 1 + 3 键槽在齿槽中间
Fig. 1 + 3 Keyway middle of tooth gap

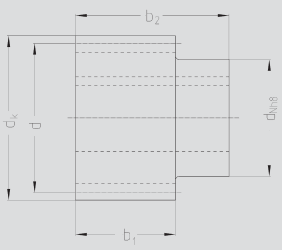


图 3
Fig. 3

16MnCr5, 1.7131
渗碳淬火 case-hardened
精度等级 Gearing grade 6 e 25

订购代码 Order code	图号 Fig.	齿数 N° of teeth z	d	d_k	d_1^{H6}	d_N	b_1	b_2	u	t	kg	胀紧盘 GH-1页 shrink-disc on page GH-1
模数 / Module 3												
24 39 245	1	45	135	141	60	80	28	30,0	18	64,4	2,4	
24 35 250	1	50	150	156	35	48	28	30,0	10	38,3	3,6	
24 37 250	1	50	150	156	45	58	28	30	14	48,8	3,5	
24 37 256	1	56	168	174	45	58	28	30,0	14	48,8	4,4	
24 37 263	1	63	189	195	45	58	28	30,0	14	48,8	5,4	
24 39 263	1	63	189	195	60	80	28	30,0	18	64,4	5,4	

直齿，孔公差 Ø^{H6} 键槽符合 DIN 6885标准
Straight tooth system, with bore Ø^{H6} and keyway acc. to DIN 6885

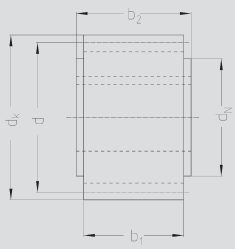


图 1
Fig. 1

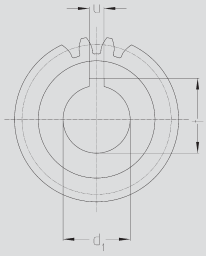


图 1 + 3 键槽在齿槽中间
Fig. 1 + 3 Keyway middle of tooth gap

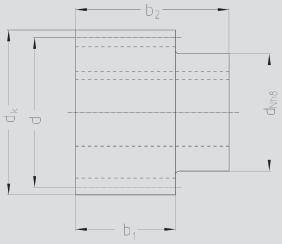
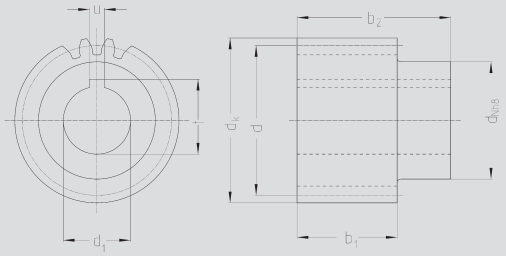


图 3
Fig. 3

16MnCr5, 1.7131
渗碳淬火 case-hardened
精度等级 Gearing grade 6 e 25

订购代码 Order code	图号 Fig.	齿数 N° of teeth z	d	d_k	d_1^{H6}	d_N	b_1	b_2	u	t	kg	胀紧盘 GH-1页 shrink-disc on page GH-1
模数 / Module 4												
24 43 420	3	20	80	88	32	55	40	75,0	10	35,3	1,7	80 80 055
24 45 220	1	20	80	88	35	52	40	50,0	10	38,3	1,3	
24 44 420	3	20	80	88	35	55	40	75,0	10	38,3	1,7	80 80 055
24 45 420	3	20	80	88	40	62	40	75,0	12	43,3	1,7	80 86 062
24 47 220	1	20	80	88	45	65	40	50,0	14	48,8	1,2	
24 45 222	1	22	88	96	35	52	40	50,0	10	38,3	1,7	
24 47 222	1	22	88	96	45	65	40	50,0	14	48,8	1,5	
24 46 422	3	22	88	96	45	68	40	75,0	14	48,8	2,0	80 80 068
24 43 425	3	25	100	108	32	55	40	75,0	10	35,3	2,6	80 80 055
24 45 225	1	25	100	108	35	52	40	50,0	10	38,3	2,2	
24 44 425	3	25	100	108	35	55	40	75,0	10	38,3	2,5	80 80 055
24 45 425	3	25	100	108	40	62	40	75,0	12	43,3	2,5	80 86 062
24 47 225	1	25	100	108	45	65	40	50,0	14	48,8	2,0	
24 47 425	3	25	100	108	55	80	40	80,0	16	59,3	2,5	80 87 080
24 45 228	1	28	112	120	35	52	40	50,0	10	38,3	2,9	
24 47 228	1	28	112	120	45	65	40	50,0	14	48,8	2,7	
24 46 428	3	28	112	120	45	68	40	75,0	14	48,8	3,1	80 80 068
24 45 232	1	32	128	136	35	52	40	50,0	10	38,3	3,8	
24 47 232	1	32	128	136	45	65	40	50,0	14	48,8	3,7	
24 47 432	3	32	128	136	55	80	40	80,0	16	59,3	4,1	80 87 080
24 48 432	3	32	128	136	75	110	40	100,0	20	79,9	5,0	80 80 110
24 47 240	1	40	160	168	45	65	40	50,0	14	48,8	5,9	
24 49 240	1	40	160	168	60	80	40	50,0	18	64,4	5,6	
24 48 440	3	40	160	168	75	110	40	100,0	20	79,9	7,3	80 80 110

直齿，孔公差 Ø^{H6} 键槽符合 DIN 6885标准
Straight tooth system, with bore Ø^{H6} and keyway acc. to DIN 6885



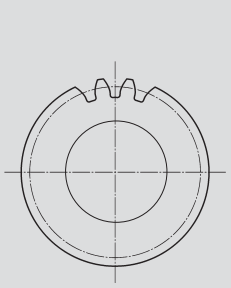
键槽在齿槽中间
Keyway middle of tooth gap

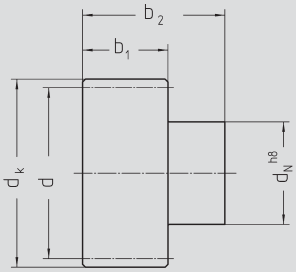
16MnCr5, 1.7131
渗碳淬火 case-hardened
精度等级 Gearing grade 6 e 25

订购代码 Order code	图号 Fig.	齿数 N° of teeth z	d	d_k	d_1^{H6}	d_N	b_1	b_2	u	t	kg	胀紧盘 GH-1页 shrink-disc on page GH-1
模数 / Module 5												
24 56 421		21	105	115	45	68	50	85,0	14	48,8	3,7	80 80 068
24 57 421		21	105	115	55	80	50	90,0	16	59,3	3,7	80 87 080
24 56 425		25	125	135	45	68	50	85,0	14	48,8	5,2	80 80 068
24 57 425		25	125	135	55	80	50	90,0	16	59,3	5,1	80 87 080
24 58 425		25	125	135	75	110	50	110,0	20	80,4	4,7	80 80 110
模数 / Module 6												
24 67 421		21	126	138	55	80	60	100,0	16	59,3	5,6	80 87 080
24 68 421		21	126	138	75	110	60	120,0	20	79,9	4,7	80 80 110
24 67 425		25	150	162	55	80	60	100,0	16	59,3	8,0	80 87 080
24 68 425		25	150	162	75	110	60	120,0	20	79,9	7,1	80 80 110
模数 / Module 8												
24 88 420*		20	160	176	75	110	80	140	20	79,9	12,0	80 80 110
24 89 420*		20	160	176	85	125	80	145	22	90,4	12,1	80 80 125
模数 / Module 10												
24 09 620*		20	200	220	85	125	100	165	22	90,4	23	80 80 125

* 精度等级 5 f 23 / Gearing quality 5 f 23

直齿，20° 压力角，无孔
Straight tooth system, 20° pressure angle, without bore





16MnCr5, 1.7131
渗碳，齿面感应淬火 carburized, teeth ind. hardened
精度等级 Gearing grade 6 e 25

订购代码 Order code	图号 Fig.	齿数 N° of teeth z	d	d_k	d_1^{H6}	d_N	b_1	b_2	u	t	kg	胀紧盘 GH-1页 shrink-disc on page GH-1
24 98 218	2	18		36	40	30	28	56			0,3	80 83 030
24 98 220	2	20		40	44	30	28	56			0,4	80 83 030
24 98 222	2	22		44	48	36	28	56			0,5	80 84 036
24 98 225	2	25		50	54	44	28	60			0,7	80 80 044
24 98 228	2	28		56	60	50	28	60			0,9	80 85 050
24 98 230	2	30		60	64	50	28	60			1,0	80 85 050
24 98 232	2	32		64	68	55	28	65			1,3	80 80 055
24 98 236	2	36		72	76	62	28	65			1,6	80 86 062
24 98 240	2	40		80	84	68	28	65			2,0	80 80 068
24 98 318	3	18		54	60	44	28	60			0,8	80 80 044
24 98 320	3	20		60	66	50	28	60			1,0	80 85 050
24 98 322	3	22		66	72	55	28	65			1,3	80 80 055
24 98 325	3	25		75	81	62	28	65			1,7	80 86 062
24 98 328	3	28		84	90	68	28	65			2,1	80 80 068
24 98 330	3	30		90	96	68	28	65			2,2	80 80 068
24 98 332	3	32		96	102	68	28	65			2,4	80 80 068
24 98 336	3	36		108	114	68	28	65			2,8	80 80 068
24 98 340	3	40		120	126	68	28	65			3,3	80 80 068
24 98 418	4	18		72	80	55	40	77			1,7	80 80 055
24 98 420	4	20		80	88	62	40	77			2,2	80 86 062
24 98 422	4	22		88	96	68	40	77			2,7	80 80 068
24 98 425	4	25		100	108	80	40	80			3,7	80 87 080
24 98 428	4	28		112	120	80	40	80			4,4	80 87 080
24 98 430	4	30		120	128	80	40	80			4,6	80 87 080
24 98 432	4	32		128	136	110	40	100			7,9	80 80 110
24 98 436	4	36		144	152	110	40	100			8,9	80 80 110
24 98 440	4	40		160	168	110	40	100			9,9	80 80 110
24 98 521	5	21		105	115	80	50	90			4,9	80 87 080
24 98 522	5	22		110	120	80	50	90			5,0	80 87 080
24 98 525	5	25		125	135	110	50	110			9,0	80 80 110
24 98 528	5	28		140	150	110	50	110			10,2	80 80 110
24 98 530	5	30		150	160	110	50	110			10,9	80 80 110
24 98 621	6	21		126	138	110	60	120			5,9	80 80 110
24 98 625	6	25		150	162	110	60	120			8,9	80 80 110

该齿轮可以夹持在dk或是dN上进行二次加工。（参考ZF-11页）
The pinion could be fixed at dk or dN to be reworked (see page ZF-11.

齿轮加工最大的孔径请向我们询问 / Maximum bore diameter of the pinion on request.

直齿，预钻孔
Straight tooth system, prebored

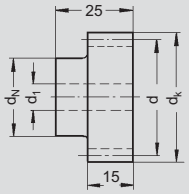


图 / Fig. 1

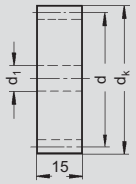


图 / Fig. 2

软材 / soft
C45, 1.0503
精度等级 Gearing grade 8 e 25

订购代码 Order code	图 Fig.	齿数 N° of teeth z	d	d_k	d_1	d_N	d_3	s	kg
21 10 012	1	12	12,0	14,0	6	9	–	–	0,01
21 10 013	1	13	13,0	15,0	6	9	–	–	0,01
21 10 014	1	14	14,0	16,0	6	11	–	–	0,02
21 10 015	1	15	15,0	17,0	6	12	–	–	0,02
21 10 016	1	16	16,0	18,0	6	12	–	–	0,03
21 10 017	1	17	17,0	19,0	6	14	–	–	0,03
21 10 018	1	18	18,0	20,0	6	15	–	–	0,04
21 10 019	1	19	19,0	21,0	6	15	–	–	0,04
21 10 020	1	20	20,0	22,0	6	16	–	–	0,05
21 10 021	1	21	21,0	23,0	6	16	–	–	0,05
21 10 022	1	22	22,0	24,0	6	18	–	–	0,06
21 10 023	1	23	23,0	25,0	6	18	–	–	0,06
21 10 024	1	24	24,0	26,0	9	20	–	–	0,07
21 10 025	1	25	25,0	27,0	9	20	–	–	0,07
21 10 030	1	30	30,0	32,0	9	20	–	–	0,10
21 10 035	1	35	35,0	37,0	9	25	–	–	0,14
21 10 038	1	38	38,0	40,0	9	25	–	–	0,17
21 10 040	1	40	40,0	42,0	9	25	–	–	0,18
21 10 045	1	45	45,0	47,0	9	30	–	–	0,25
21 10 048	1	48	48,0	50,0	9	30	–	–	0,26
21 10 050	1	50	50,0	52,0	9	30	–	–	0,28
21 10 057	1	57	57,0	59,0	9	40	–	–	0,37
21 10 060	1	60	60,0	62,0	9	40	–	–	0,40
23 10 076	2	76	76,0	78,0	10	–	–	–	0,55
23 10 080	2	80	80,0	82,0	10	–	–	–	0,60
23 10 095	2	95	95,0	97,0	10	–	–	–	0,85
23 10 100	2	100	100,0	102,0	10	–	–	–	0,95
23 10 114	2	114	114,0	116,0	10	–	–	–	1,20

二次打孔，开键槽，攻丝都可以在很短的时间内完成。
Further finishing (turning bores, keywaying, threading, etc.) is possible within short time.

直齿，预钻孔
Straight tooth system, prebored

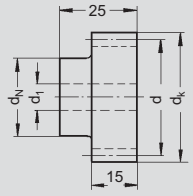


图 / Fig. 1

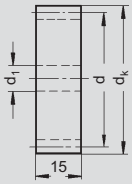


图 / Fig. 2

软材 / soft
C45, 1.0503
精度等级 Gearing grade 8 e 25

订购代码 Order code	图 Fig.	齿数 N° of teeth z	d	d_k	d_1	d_N	d_3	s	kg
21 15 012	1	12	18,0	21,0	6	14	–	–	0,03
21 15 013	1	13	19,5	22,5	6	14	–	–	0,03
21 15 014	1	14	21,0	24,0	6	16	–	–	0,04
21 15 015	1	15	22,5	25,5	6	18	–	–	0,05
21 15 016	1	16	24,0	27,0	6	18	–	–	0,07
21 15 017	1	17	25,5	28,5	9	20	–	–	0,08
21 15 018	1	18	27,0	30,0	9	20	–	–	0,09
21 15 019	1	19	28,5	31,5	9	20	–	–	0,10
21 15 020	1	20	30,0	33,0	9	25	–	–	0,13
21 15 021	1	21	31,5	34,5	9	25	–	–	0,14
21 15 022	1	22	33,0	36,0	9	25	–	–	0,15
21 15 023	1	23	34,5	37,5	9	25	–	–	0,16
21 15 024	1	24	36,0	39,0	9	25	–	–	0,17
21 15 025	1	25	37,5	40,5	9	25	–	–	0,18
21 15 030	1	30	45,0	48,0	9	30	–	–	0,23
21 15 035	1	35	52,5	55,5	9	40	–	–	0,40
21 15 038	1	38	57,0	60,0	9	40	–	–	0,40
21 15 040	1	40	60,0	63,0	9	40	–	–	0,46
21 15 045	1	45	67,5	70,5	12	50	–	–	0,61
21 15 048	1	48	72,0	75,0	12	50	–	–	0,70
21 15 050	1	50	75,0	78,0	12	50	–	–	0,75
21 15 057	1	57	85,5	88,5	12	60	–	–	1,00
21 15 060	1	60	90,0	93,0	12	60	–	–	1,16
23 15 076	2	76	114,0	117,0	16	–	–	–	1,40
23 15 080	2	80	120,0	123,0	16	–	–	–	1,50
23 15 595	2	95	142,5	145,5	20	–	–	–	2,10

二次打孔，开键槽，攻丝都可以在很短的时间内完成。
Further finishing (turning bores, keywaying, threading, etc.) is possible within short time.

直齿，预钻孔
Straight tooth system, prebored

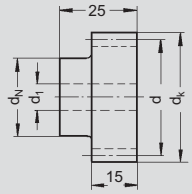


图 / Fig. 1

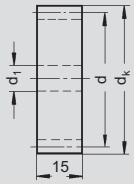


图 / Fig. 2

软材 / soft
C45, 1.0503
精度等级 Gearing grade 8 e 25

订购代码 Order code	图 Fig.	齿数 N° of teeth z	d	d_k	d_1	d_N	d_3	s	kg
21 20 012	1	12	24,0	28,0	9	18,0	–	–	0,07
21 20 013	1	13	26,0	30,0	9	19,0	–	–	0,12
21 20 014	1	14	28,0	32,0	9	19,0	–	–	0,14
21 20 015	1	15	30,0	34,0	9	24,5	–	–	0,15
21 20 016	1	16	32,0	36,0	9	25,0	–	–	0,17
21 20 017	1	17	34,0	38,0	9	25,0	–	–	0,18
21 20 018	1	18	36,0	40,0	9	25,0	–	–	0,19
21 20 019	1	19	38,0	42,0	9	25,0	–	–	0,20
21 20 020	1	20	40,0	44,0	9	30,0	–	–	0,22
21 20 021	1	21	42,0	46,0	9	30,0	–	–	0,26
21 20 022	1	22	44,0	48,0	9	30,0	–	–	0,27
21 20 023	1	23	46,0	50,0	9	30,0	–	–	0,28
21 20 024	1	24	48,0	52,0	12	35,0	–	–	0,36
21 20 025	1	25	50,0	54,0	12	35,0	–	–	0,39
21 20 028	1	28	56,0	60,0	12	40,0	–	–	0,45
21 20 030	1	30	60,0	64,0	12	40,0	–	–	0,50
21 20 032	1	32	64,0	68,0	12	40,0	–	–	0,60
21 20 035	1	35	70,0	74,0	12	50,0	–	–	0,67
21 20 036	1	36	72,0	76,0	12	50,0	–	–	0,85
21 20 038	1	38	76,0	80,0	12	50,0	–	–	0,90
21 20 040	1	40	80,0	84,0	12	50,0	–	–	0,95
21 20 045	1	45	90,0	94,0	12	60,0	–	–	1,25
21 20 048	1	48	96,0	100,0	15	70,0	–	–	1,50
21 20 050	1	50	100,0	104,0	15	70,0	–	–	1,60
21 20 056	1	56	112,0	116,0	15	70,0	–	–	1,90
21 20 057	1	57	114,0	118,0	15	70,0	–	–	2,00
21 20 060	1	60	120,0	124,0	15	70,0	–	–	2,40
23 20 576	2	76	152,0	156,0	20	–	–	–	2,80
23 20 580	2	80	160,0	164,0	20	–	–	–	3,10
23 20 595	2	95	190,0	194,0	20	–	–	–	4,40

二次打孔，开键槽，攻丝都可以在很短的时间内完成。
Further finishing (turning bores, keywaying, threading, etc.) is possible within short time.

直齿，预钻孔
Straight tooth system, prebored

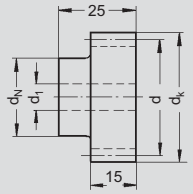


图 / Fig. 1

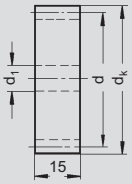


图 / Fig. 2

软材 / soft
C45, 1.0503
精度等级 Gearing grade 8 e 25

订购代码 Order code	图 Fig.	齿数 N° of teeth z	d	d_k	d_1	d_N	d_3	s	kg
21 25 012	1	12	30,0	35,0	9	20,0	–	–	0,16
21 25 013	1	13	32,5	37,5	9	20,0	–	–	0,18
21 25 014	1	14	35,0	40,0	9	25,0	–	–	0,22
21 25 015	1	15	37,5	42,5	9	25,0	–	–	0,25
21 25 016	1	16	40,0	45,0	9	30,0	–	–	0,31
21 25 017	1	17	42,5	47,5	9	30,0	–	–	0,35
21 25 018	1	18	45,0	50,0	9	35,0	–	–	0,41
21 25 019	1	19	47,5	52,5	12	35,0	–	–	0,43
21 25 020	1	20	50,0	55,0	12	35,0	–	–	0,47
21 25 021	1	21	52,5	57,5	12	35,0	–	–	0,50
21 25 022	1	22	55,0	60,0	12	40,0	–	–	0,53
21 25 023	1	23	57,5	62,5	12	40,0	–	–	0,62
21 25 024	1	24	60,0	65,0	12	40,0	–	–	0,66
21 25 025	1	25	62,5	67,5	12	45,0	–	–	0,75
21 25 030	1	30	75,0	80,0	12	50,0	–	–	0,97
21 25 035	1	35	87,5	92,5	12	60,0	–	–	1,49
21 25 038	1	38	95,0	100,0	12	60,0	–	–	1,72
21 25 040	1	40	100,0	105,0	12	70,0	–	–	1,84
21 25 045	1	45	112,5	117,5	15	70,0	–	–	2,36
21 25 048	1	48	120,0	125,0	15	80,0	–	–	2,75
21 25 050	1	50	125,0	130,0	15	80,0	–	–	2,94
21 25 057	1	57	142,5	147,5	15	90,0	–	–	3,67
21 25 060	1	60	150,0	155,0	15	90,0	–	–	4,00
23 25 580	2	80	200,0	205,0	25	–	–	–	6,10

二次打孔，开键槽，攻丝都可以在很短的时间内完成。
Further finishing (turning bores, keywaying, threading, etc.) is possible within short time.

直齿，预钻孔
Straight tooth system, prebored

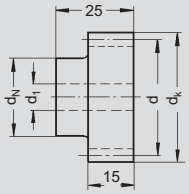


图 / Fig. 1

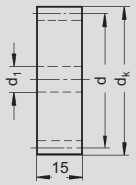


图 / Fig. 2

软材 / soft
C45, 1.0503
精度等级 Gearing grade
8 e 25

订购代码 Order code	图 Fig.	齿数 N° of teeth z	d	d_k	d_1	d_N	d_3	s	kg
21 30 012	1	12	36	42	14	25	–	–	0,25
21 30 013	1	13	39	45	14	25	–	–	0,30
21 30 014	1	14	42	48	14	25	–	–	0,34
21 30 015	1	15	45	51	14	35	–	–	0,41
21 30 016	1	16	48	54	14	35	–	–	0,51
21 30 017	1	17	51	57	14	42	–	–	0,67
21 30 018	1	18	54	60	14	45	–	–	0,70
21 30 019	1	19	57	63	14	45	–	–	0,75
21 30 020	1	20	60	66	14	45	–	–	0,82
21 30 021	1	21	63	69	14	45	–	–	0,89
21 30 022	1	22	66	72	14	50	–	–	1,05
21 30 023	1	23	69	75	14	50	–	–	1,10
21 30 024	1	24	72	78	14	50	–	–	1,20
21 30 025	1	25	75	81	14	60	–	–	1,35
21 30 027	1	27	81	87	14	60	–	–	1,60
21 30 028	1	28	84	90	14	60	–	–	1,70
21 30 030	1	30	90	96	14	60	–	–	1,80
21 30 032	1	32	96	102	14	60	–	–	2,00
21 30 035	1	35	105	111	14	80	–	–	2,70
21 30 036	1	36	108	114	14	80	–	–	2,80
21 30 038	1	38	114	120	14	80	–	–	3,00
21 30 040	1	40	120	126	14	80	–	–	3,30
23 30 545	2	45	135	141	20	–	–	–	3,30
23 30 548	2	48	144	150	20	–	–	–	3,80
23 30 550	2	50	150	156	25	–	–	–	4,10
23 30 552	2	52	156	162	25	–	–	–	4,50
23 30 556	2	56	168	174	25	–	–	–	5,20
23 30 560	2	60	180	186	25	–	–	–	6,00
23 30 576	2	76	228	234	25	–	–	–	9,60
23 30 595	2	95	285	291	25	–	–	–	15,00

二次打孔，开键槽，攻丝都可以在很短的时间内完成。
Further finishing (turning bores, keywaying, threading, etc.) is possible within short time.

直齿，预钻孔
Straight tooth system, prebored

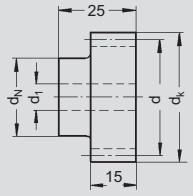


图 / Fig. 1

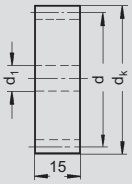


图 / Fig. 2

软材 / soft
C45, 1.0503
精度等级 Gearing grade 8 e 25

订购代码 Order code	图 Fig.	齿数 N° of teeth z	d	d_k	d_1	d_N	d_3	s	kg
21 40 012	1	12	48	56	16	35	–	–	0,58
21 40 013	1	13	52	60	16	35	–	–	0,72
21 40 014	1	14	56	64	16	45	–	–	0,90
21 40 015	1	15	60	68	16	45	–	–	1,00
21 40 016	1	16	64	72	16	45	–	–	1,10
21 40 017	1	17	68	76	16	50	–	–	1,30
21 40 018	1	18	72	80	16	50	–	–	1,40
21 40 019	1	19	76	84	16	60	–	–	1,70
21 40 020	1	20	80	88	16	60	–	–	1,80
21 40 021	1	21	84	92	16	70	–	–	2,20
21 40 022	1	22	88	96	16	70	–	–	2,50
21 40 023	1	23	92	100	16	75	–	–	2,60
21 40 024	1	24	96	104	16	75	–	–	2,75
21 40 025	1	25	100	108	16	75	–	–	2,90
21 40 030	1	30	120	128	16	75	–	–	4,00
23 40 538	2	38	152	160	25	–	–	–	5,70
23 40 540	2	40	160	168	25	–	–	–	6,30
23 40 545	2	45	180	188	25	–	–	–	8,00
23 40 550	2	50	200	208	25	–	–	–	9,80
23 40 556	2	56	224	232	25	–	–	–	12,30
23 40 560	2	60	240	248	25	–	–	–	14,20
23 40 580	2	80	320	328	25	–	–	–	25,20
23 40 595	2	95	380	388	25	–	–	–	35,60

二次打孔，开键槽，攻丝都可以在很短的时间内完成。
Further finishing (turning bores, keywaying, threading, etc.) is possible within short time.

直齿，预钻孔
Straight tooth system, prebored

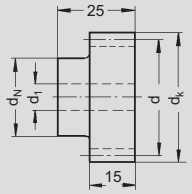


图 / Fig. 1

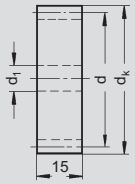


图 / Fig. 2

软材 / soft
C45, 1.0503
精度等级 Gearing grade 8 e 25

订购代码 Order code	图 Fig.	齿数 N° of teeth z	d	d_k	d_1	d_N	d_3	s	kg
21 50 012	1	12	60	70	20	45	–	–	1,20
21 50 013	1	13	65	75	20	45	–	–	1,38
21 50 014	1	14	70	80	20	55	–	–	1,78
21 50 015	1	15	75	85	20	60	–	–	2,00
21 50 016	1	16	80	90	20	60	–	–	2,10
21 50 017	1	17	85	95	20	70	–	–	2,20
21 50 018	1	18	90	100	20	70	–	–	2,58
21 50 019	1	19	95	105	20	70	–	–	2,80
21 50 020	1	20	100	110	20	70	–	–	3,10
21 50 021	1	21	105	115	20	70	–	–	3,80
21 50 022	1	22	110	120	20	80	–	–	4,30
21 50 023	1	23	115	125	20	80	–	–	4,70
21 50 024	1	24	120	130	20	80	–	–	5,00
21 50 025	1	25	125	135	20	80	–	–	5,40
21 50 030	1	30	150	160	20	90	–	–	7,70
23 50 536	2	36	180	190	30	–	–	–	9,90
23 50 540	2	40	200	210	30	–	–	–	12,30
23 50 550	2	50	250	260	30	–	–	–	19,20
23 50 595	2	95	475	485	30	–	–	–	69,50

二次打孔，开键槽，攻丝都可以在很短的时间内完成。
Further finishing (turning bores, keywaying, threading, etc.) is possible within short time.

直齿，预钻孔
Straight tooth system, prebored

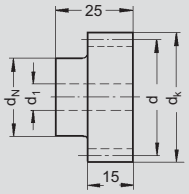


图 / Fig. 1

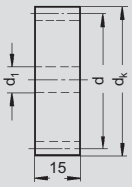


图 / Fig. 2

软材 / soft
C45, 1.0503
精度等级 Gearing grade 8 e 25

订购代码 Order code	图 Fig.	齿数 N° of teeth z	d	d_k	d_1	d_N	d_3	s	kg
21 60 015	1	15	90	102	20	60	–	–	3,20
21 60 019	1	19	114	126	20	80	–	–	5,40
21 60 020	1	20	120	132	20	90	–	–	6,00
21 60 021	1	21	126	138	20	90	–	–	6,70
21 60 022	1	22	132	144	20	100	–	–	7,40
21 60 025	1	25	150	162	20	110	–	–	9,60
23 60 530	2	30	180	192	30	–	–	–	11,90
23 60 536	2	36	216	228	30	–	–	–	17,20

二次打孔，开键槽，攻丝都可以在很短的时间内完成。
Further finishing (turning bores, keywaying, threading, etc.) is possible within short time.

模数 8,10和12，直齿，预钻孔
Module 8, 10 and 12, straight tooth system, prebored

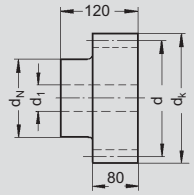


图 / Fig. 1

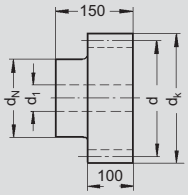


图 / Fig. 2

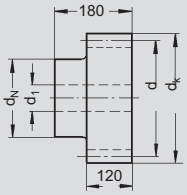


图 / Fig. 3

软材 / soft
C45, 1.0503
精度等级 Gearing grade 8 e 25

订购代码 Order code	图 Fig.	齿数 N° of teeth z	d	d_k	d_1	d_N	d_3	s	kg
模数 / Module 8									
21 80 015	1	15	120	136	40	90	–	–	7,70
21 80 018	1	18	144	160	40	100	–	–	9,90
21 80 020	1	20	160	176	40	120	–	–	14,80
21 80 024	1	24	192	208	40	150	–	–	22,00
21 80 025	1	25	200	216	40	150	–	–	23,80
21 80 030	1	30	240	256	40	190	–	–	32,00
模数 / Module 10*									
21 11 020	2	20	200	220	40	150	–	–	35,00
模数 / Module 12*									
21 12 020	3	20	240	264	40	170	–	–	51,33

* 带有M8的吊装孔 / with threads for handling

二次打孔，开键槽，攻丝都可以在很短的时间内完成。
Further finishing (turning bores, keywaying, threading, etc.) is possible within short time.

齿轮齿条驱动-计算和选型-模数1-直齿
Rack and pinion drive – calculation and selection – module 1 – straight tooth system

齿条 / Rack		BR	
ATLANTA精度等级/ATLANTA-Quality		9	10
齿条 / Rack	材料 / material	C45	C45
	热处理方式 Heat Treatment	软材 未淬火 soft	感应淬火 inductive
齿轮 / Pinion	材料 / material	C45	C45
	热处理方式 Heat Treatment	软材 未淬火 soft	感应淬火 inductive
齿轮齿数 1) No.of pinion teeth1)	齿轮节圆 pitch circle dia.	最大进给力2) Maximum Feed Force2)	
12	12 mm	0,1 kN	0,6 kN
13	13 mm	0,1 kN	0,7 kN
14	14 mm	0,1 kN	0,8 kN
15	15 mm	0,2 kN	0,9 kN
16	16 mm	0,2 kN	1,0 kN
17	17 mm	0,2 kN	1,0 kN
18	18 mm	0,2 kN	1,0 kN
19	19 mm	0,3 kN	1,0 kN
20	20 mm	0,3 kN	1,0 kN
21	21 mm	0,3 kN	1,0 kN
22	22 mm	0,3 kN	1,5 kN
23	23 mm	0,4 kN	1,5 kN
24	24 mm	0,4 kN	1,5 kN
25	25 mm	0,4 kN	1,5 kN
26	26 mm	0,4 kN	1,5 kN
27	27 mm	0,4 kN	1,5 kN
28	28 mm	0,5 kN	1,5 kN
29	29 mm	0,5 kN	1,5 kN
30	30 mm	0,5 kN	1,5 kN
31	31 mm	0,5 kN	2,0 kN
32	32 mm	0,6 kN	2,0 kN
33	33 mm	0,6 kN	2,0 kN
34	34 mm	0,6 kN	2,0 kN
35	35 mm	0,6 kN	2,0 kN
36	36 mm	0,6 kN	2,0 kN
37	37 mm	0,7 kN	2,0 kN
38	38 mm	0,7 kN	2,0 kN
39	39 mm	0,7 kN	2,0 kN
40	40 mm	0,7 kN	2,0 kN

1) 核对可行性（ZB章节） / check availability (chapter ZB)
2) 力值只适用于亚特兰标准材料 / force values are only valid for material according ATLANTA-Standard

最大容许驱动力1)单位kN

该值是在很好的油脂润滑的情况下（例如：使用电子润滑系统在ZI-2/3页，或者每天手动涂抹润滑油脂），速度是1.5m/s，SB=1.0，以及线性负载分布系数为1.0。表中给出的数据是在最佳条件下的最大推荐值。任何情况下的应用和配置都需要计算。计算过程和案例，请参考ZD-2页。

1）对于键式连接需要一个单独的计算，胀紧盘式传递扭矩请参考GH-1页。

当使用齿的最大驱动力，或者多齿轮传动时，固定螺栓的负载必须单独核对!

Maximum permissible feed forces 1) in kN
which are achieved with good grease lubrication (i.e. use of the electronic lubricator described on page ZE-2/3 or manual lubrication at least once a day) and v = 1.5 m/s, S_B = 1.0 as well as a linear load distribution factor of 1.0. The values in the load tables are maximum values under perfect conditions, ATLANTA materials and is a guide value.
A calculation of the application and configuration is in any cases needed.
Calculation and example see page ZD-2.

1) For keyway transmission make a separate calculation, torque with shrink disc see on page GH-1

When using the maximum capacity of the teeth, or multiple pinions in contact, the mounting screw loads must be checked separately!

齿条 / Rack		BR	
ATLANTA精度等级/ATLANTA-Quality		9	10
齿条 / Rack	材料 / material	C45	C45
	热处理方式 Heat Treatment	软材 未淬火 soft	感应淬火 inductive
齿轮 / Pinion	材料 / material	C45	C45
	热处理方式 Heat Treatment	软材 未淬火 soft	感应淬火 inductive
齿轮齿数 1) No.of pinion teeth 1)	齿轮节圆 pitch circle dia.	最大驱动力 2) Maximum Feed Force 2)	
12	18,0 mm	0,2 kN	1,0 kN
13	19,5 mm	0,2 kN	1,0 kN
14	21,0 mm	0,3 kN	1,0 kN
15	22,5 mm	0,3 kN	1,5 kN
16	24,0 mm	0,3 kN	1,5 kN
17	25,5 mm	0,4 kN	1,5 kN
18	27,0 mm	0,4 kN	2,0 kN
19	28,5 mm	0,5 kN	2,0 kN
20	30,0 mm	0,5 kN	2,0 kN
21	31,5 mm	0,6 kN	2,5 kN
22	33,0 mm	0,6 kN	2,5 kN
23	34,5 mm	0,6 kN	2,5 kN
24	36,0 mm	0,7 kN	3,0 kN
25	37,5 mm	0,7 kN	3,0 kN
26	39,0 mm	0,8 kN	3,0 kN
27	40,5 mm	0,8 kN	3,0 kN
28	42,0 mm	0,8 kN	3,0 kN
29	43,5 mm	0,9 kN	3,0 kN
30	45,0 mm	0,9 kN	3,0 kN
31	46,5 mm	1,0 kN	3,5 kN
32	48,0 mm	1,0 kN	3,5 kN
33	49,5 mm	1,0 kN	3,5 kN
34	51,0 mm	1,0 kN	3,5 kN
35	52,5 mm	1,0 kN	3,5 kN
36	54,0 mm	1,0 kN	3,5 kN
37	55,5 mm	1,0 kN	3,5 kN
38	57,0 mm	1,0 kN	3,5 kN
39	58,5 mm	1,0 kN	3,5 kN
40	60,0 mm	1,0 kN	3,5 kN

1) 核对可行性（ZB章节） / check availability (chapter ZB)
2) 力值只适用于亚特兰标准材料 / force values are only valid for material according ATLANTA-Standard

最大允许进给力 - 说明请参阅第ZB-36 / Maximum permissible feed forces – description see page ZB-36

齿轮齿条驱动-计算和选型-模数2-直齿
Rack and pinion drive – calculation and selection – module 2 – straight tooth system

齿条 / Rack		HPR			PR			BR			
ATLANTA精度等级/ATLANTA-Quality		6		7	8			9		10	
齿条 Rack	材料 / materia	16MnCr5	C45	C45	C45	42CrMo4		C45		C45	
	热处理方式 Heat treatment	感应淬火 ind. hardened		感应淬火 ind. hardened	感应淬火 ind. hardened	淬火+回火 quenched + tempered		软材 未淬火 soft		感应淬火 ind. hardened	
齿轮 Pinion	材料 / material	16MnCr5	16MnCr5	16MnCr5	16MnCr5	16MnCr5	C45	16MnCr5	C45	16MnCr5	C45
	热处理方式 Heat treatment	渗碳淬火 case hardened	渗碳淬火 case hardened	渗碳淬火 case hardened	渗碳淬火 case hardened	渗碳淬火 case hardened	感应淬火 ind. hardened	渗碳淬火 case hardened	软材 未淬火 soft	渗碳淬火 case hardened	感应淬火 ind. hardened
齿轮齿数 1) No. of pinion teeth 1)	齿轮节圆 pitch circle dia.	最大驱动力 (只针对ATLANTA标准的材料) max. feed force (values are only valid for material according ATLANTA-Standard)									
12	24 mm	3,5 kN	3,5 kN	3,5 kN	3,5 kN	1,5 kN	1,0 kN	0,8 kN	0,3 kN	2,5 kN	1,5 kN
13	26 mm	4,5 kN	4,5 kN	4,5 kN	4,0 kN	1,5 kN	1,0 kN	0,9 kN	0,4 kN	3,0 kN	1,5 kN
14	28 mm	5,5 kN	5,5 kN	5,5 kN	5,0 kN	2,0 kN	1,0 kN	0,9 kN	0,4 kN	3,5 kN	2,0 kN
15	30 mm	6,5 kN	6,0 kN	6,0 kN	6,0 kN	2,0 kN	1,5 kN	1,0 kN	0,5 kN	4,0 kN	2,0 kN
16	32 mm	7,0 kN	7,0 kN	7,0 kN	6,5 kN	2,5 kN	1,5 kN	1,0 kN	0,6 kN	4,5 kN	2,5 kN
17	34 mm	8,0 kN	7,5 kN	7,5 kN	7,0 kN	2,5 kN	1,5 kN	1,0 kN	0,7 kN	4,5 kN	3,0 kN
18	36 mm	9,0 kN	8,0 kN	8,0 kN	7,5 kN	3,0 kN	2,0 kN	1,0 kN	0,7 kN	5,0 kN	3,0 kN
19	38 mm	10,0 kN	8,5 kN	8,5 kN	8,0 kN	3,0 kN	2,0 kN	1,0 kN	0,8 kN	5,0 kN	3,5 kN
20	40 mm	10,5 kN	9,0 kN	9,0 kN	8,5 kN	3,5 kN	2,0 kN	1,5 kN	0,8 kN	5,5 kN	3,5 kN
21	42 mm	11,5 kN	9,5 kN	9,5 kN	9,0 kN	3,5 kN	2,0 kN	1,5 kN	0,9 kN	5,5 kN	4,0 kN
22	44 mm	12,0 kN	10,0 kN	10,0 kN	9,5 kN	3,5 kN	2,5 kN	1,5 kN	1,0 kN	6,0 kN	4,0 kN
23	46 mm	13,0 kN	10,5 kN	10,5 kN	10,0 kN	4,0 kN	2,5 kN	1,5 kN	1,0 kN	6,0 kN	4,5 kN
24	48 mm	13,5 kN	11,0 kN	11,0 kN	10,5 kN	4,0 kN	2,5 kN	1,5 kN	1,0 kN	6,5 kN	4,5 kN
25	50 mm	14,5 kN	11,5 kN	11,5 kN	11,0 kN	4,0 kN	2,5 kN	1,5 kN	1,0 kN	6,5 kN	5,0 kN
26	52 mm	15,0 kN	12,0 kN	12,0 kN	11,0 kN	4,5 kN	3,0 kN	2,0 kN	1,0 kN	7,0 kN	5,0 kN
27	54 mm	15,0 kN	12,0 kN	12,0 kN	11,5 kN	4,5 kN	3,0 kN	2,0 kN	1,0 kN	7,0 kN	5,0 kN
28	56 mm	15,0 kN	12,0 kN	12,0 kN	11,5 kN	5,0 kN	3,0 kN	2,0 kN	1,0 kN	7,0 kN	5,5 kN
29	58 mm	15,0 kN	12,5 kN	12,5 kN	11,5 kN	5,0 kN	3,0 kN	2,0 kN	1,0 kN	7,0 kN	5,5 kN
30	60 mm	15,0 kN	12,5 kN	12,5 kN	11,5 kN	5,0 kN	3,5 kN	2,0 kN	1,5 kN	7,0 kN	5,5 kN
31	62 mm	15,0 kN	12,5 kN	12,5 kN	11,5 kN	5,5 kN	3,5 kN	2,0 kN	1,5 kN	7,0 kN	5,5 kN
32	64 mm	15,5 kN	12,5 kN	12,5 kN	11,5 kN	5,5 kN	3,5 kN	2,5 kN	1,5 kN	7,0 kN	5,5 kN
33	66 mm	15,5 kN	12,5 kN	12,5 kN	11,5 kN	5,5 kN	3,5 kN	2,5 kN	1,5 kN	7,0 kN	5,5 kN
34	68 mm	15,5 kN	12,5 kN	12,5 kN	12,0 kN	6,0 kN	3,5 kN	2,5 kN	1,5 kN	7,0 kN	5,5 kN
35	70 mm	15,5 kN	12,5 kN	12,5 kN	12,0 kN	6,0 kN	4,0 kN	2,5 kN	1,5 kN	7,0 kN	5,5 kN
36	72 mm	15,5 kN	12,5 kN	12,5 kN	12,0 kN	6,5 kN	4,0 kN	2,5 kN	1,5 kN	7,0 kN	5,5 kN
37	74 mm	15,5 kN	12,5 kN	12,5 kN	12,0 kN	6,5 kN	4,0 kN	2,5 kN	1,5 kN	7,0 kN	5,5 kN
38	76 mm	15,5 kN	12,5 kN	12,5 kN	12,0 kN	6,5 kN	4,0 kN	3,0 kN	2,0 kN	7,0 kN	5,5 kN
39	78 mm	15,5 kN	12,5 kN	12,5 kN	12,0 kN	7,0 kN	4,5 kN	3,0 kN	2,0 kN	7,0 kN	5,5 kN
40	80 mm	15,5 kN	12,5 kN	12,5 kN	12,0 kN	7,0 kN	4,5 kN	3,0 kN	2,0 kN	7,0 kN	5,5 kN

1) 核对可行性（ZB章节） / check availability (chapter ZB)
2) 力值只适用于亚特兰标准材料 / force values are only valid for material according ATLANTA-Standard

最大允许进给力 - 说明请参阅第ZB-36 / Maximum permissible feed forces – description see page ZB-36

齿轮齿条驱动-计算和选型-模数2,5-直齿
Rack and pinion drive – calculation and selection – module 2,5 – straight tooth system

齿条 / Rack		BR
ATLANTA精度等级/ATLANTA-Quality		9
齿条 / Rack	材料 / material	C45
	热处理方式 Heat treatment	软材 未淬火 soft
齿轮 Pinion	材料 / material	C45
	热处理方式 Heat treatment	软材 未淬火 soft
齿轮齿数 1) No.of pinion teeth 1)	齿轮节圆 pitch circle dia.	最大驱动力 2) Maximum Feed Force 2)
12	30,0 mm	0,5 kN
13	32,5 mm	0,6 kN
14	35,0 mm	0,7 kN
15	37,5 mm	0,8 kN
16	40,0 mm	0,9 kN
17	42,5 mm	1,0 kN
18	45,0 mm	1,0 kN
19	47,5 mm	1,0 kN
20	50,0 mm	1,0 kN
21	52,5 mm	1,5 kN
22	55,0 mm	1,5 kN
23	57,5 mm	1,5 kN
24	60,0 mm	1,5 kN
25	62,5 mm	1,5 kN
26	65,0 mm	1,5 kN
27	67,5 mm	2,0 kN
28	70,0 mm	2,0 kN
29	72,5 mm	2,0 kN
30	75,0 mm	2,0 kN
31	77,5 mm	2,0 kN
32	80,0 mm	2,5 kN
33	82,5 mm	2,5 kN
34	85,0 mm	2,5 kN
35	87,5 mm	2,5 kN
36	90,0 mm	2,5 kN
37	92,5 mm	3,0 kN
38	95,0 mm	3,0 kN
39	97,5 mm	3,0 kN
40	100,0 mm	3,0 kN

1) 核对可行性（ZB章节） / check availability (chapter ZB)
2) 力值只适用于亚特兰标准材料 / force values are only valid for material according ATLANTA-Standard

最大允许进给力 - 说明请参阅第ZB-36 / Maximum permissible feed forces – description see page ZB-36

齿轮齿条驱动-计算和选型-模数3-直齿
Rack and pinion drive – calculation and selection – module 3 – straight tooth system

齿条 / Rack		UHPR	HPR			PR			BR			
ATLANTA精度等级/ATLANTA-Quality		5	6		7	8			9		10	
齿条 / Rack	材料 / material	16MnCr5	16MnCr5	C45	C45	C45	42CrMo4		C45		C45	
	热处理方式 Heat Treatment	渗碳淬火 case hardened	感应淬火 induction hardened		感应淬火 ind. hardened	感应淬火 ind. hardened	淬火+回火 quenched + tempered		软材 未淬火 soft		感应淬火 induction hardened	
齿轮 / Pinion	材料 / material	16MnCr5	16MnCr5	16MnCr5	16MnCr5	16MnCr5	16MnCr5	C45	16MnCr5	C45	16MnCr5	C45
	热处理方式 Heat Treatment	渗碳淬火 case hardened	渗碳淬火 case hardened	渗碳淬火 case hardened	渗碳淬火 case hardened	渗碳淬火 case hardened	渗碳淬火 case hardened	感应淬火 ind. hardened	渗碳淬火 case hardened	软材 未淬火 soft	渗碳淬火 case hardened	感应淬火 ind. hardened
齿轮齿数 1) No. of pinion teeth 1)	齿轮节圆 pitch circle dia.	最大驱动力 (只针对ATLANTA标准的材料) max. feed force (values are only valid for material according ATLANTA-Standard)										
12	36 mm	6,5 kN	6,5 kN	6,5 kN	6,5 kN	6,0 kN	2,5 kN	2,5 kN	1,5 kN	0,7 kN	5,5 kN	3,5 kN
13	39 mm	7,5 kN	7,5 kN	7,5 kN	7,5 kN	7,0 kN	3,0 kN	2,5 kN	1,5 kN	0,9 kN	6,5 kN	4,0 kN
14	42 mm	9,5 kN	9,5 kN	9,5 kN	9,5 kN	8,5 kN	3,5 kN	3,0 kN	2,0 kN	1,0 kN	8,0 kN	4,5 kN
15	45 mm	11,0 kN	11,0 kN	10,5 kN	10,5 kN	9,5 kN	4,0 kN	3,0 kN	2,0 kN	1,0 kN	8,5 kN	5,5 kN
16	48 mm	12,5 kN	12,5 kN	12,0 kN	11,5 kN	10,5 kN	4,0 kN	3,5 kN	2,0 kN	1,0 kN	9,5 kN	6,0 kN
17	51 mm	14,5 kN	14,5 kN	13,5 kN	13,5 kN	12,0 kN	5,0 kN	4,0 kN	2,5 kN	1,5 kN	10,0 kN	6,5 kN
18	54 mm	16,0 kN	16,0 kN	14,0 kN	14,0 kN	13,0 kN	5,0 kN	4,5 kN	2,5 kN	1,5 kN	10,5 kN	7,0 kN
19	57 mm	17,5 kN	17,5 kN	15,0 kN	15,0 kN	13,5 kN	5,5 kN	4,5 kN	3,0 kN	1,5 kN	11,0 kN	8,0 kN
20	60 mm	18,5 kN	18,5 kN	16,0 kN	16,0 kN	14,5 kN	5,5 kN	5,0 kN	3,0 kN	2,0 kN	11,5 kN	8,5 kN
21	63 mm	20,0 kN	20,0 kN	17,0 kN	17,0 kN	15,0 kN	6,0 kN	5,0 kN	3,0 kN	2,0 kN	12,0 kN	9,0 kN
22	66 mm	21,5 kN	21,5 kN	17,5 kN	17,5 kN	16,0 kN	6,5 kN	5,5 kN	3,5 kN	2,0 kN	13,0 kN	9,5 kN
23	69 mm	22,5 kN	22,5 kN	18,5 kN	18,5 kN	16,5 kN	6,5 kN	5,5 kN	3,5 kN	2,0 kN	13,5 kN	10,0 kN
24	72 mm	24,0 kN	24,0 kN	19,5 kN	19,5 kN	17,5 kN	7,0 kN	6,0 kN	3,5 kN	2,5 kN	14,0 kN	10,5 kN
25	75 mm	24,0 kN	24,0 kN	20,0 kN	20,0 kN	18,5 kN	7,5 kN	6,5 kN	4,0 kN	2,5 kN	14,5 kN	11,5 kN
26	78 mm	24,5 kN	24,5 kN	21,0 kN	21,0 kN	19,0 kN	7,5 kN	6,5 kN	4,0 kN	2,5 kN	15,0 kN	12,0 kN
27	81 mm	24,5 kN	24,5 kN	22,0 kN	22,0 kN	20,0 kN	8,0 kN	7,0 kN	4,0 kN	3,0 kN	15,5 kN	12,0 kN
28	84 mm	24,5 kN	24,5 kN	22,5 kN	22,5 kN	20,5 kN	8,0 kN	7,0 kN	4,5 kN	3,0 kN	16,0 kN	12,5 kN
29	87 mm	25,0 kN	25,0 kN	22,5 kN	22,5 kN	21,0 kN	8,5 kN	7,5 kN	4,5 kN	3,0 kN	16,0 kN	12,5 kN
30	90 mm	25,0 kN	25,0 kN	22,5 kN	22,5 kN	21,0 kN	9,0 kN	7,5 kN	4,5 kN	3,0 kN	16,0 kN	12,5 kN
31	93 mm	25,0 kN	25,0 kN	22,5 kN	22,5 kN	21,0 kN	9,0 kN	8,0 kN	5,0 kN	3,5 kN	16,0 kN	12,5 kN
32	96 mm	25,0 kN	25,0 kN	22,5 kN	22,5 kN	21,5 kN	9,5 kN	8,0 kN	5,0 kN	3,5 kN	16,0 kN	12,5 kN
33	99 mm	25,0 kN	25,0 kN	23,0 kN	23,0 kN	21,5 kN	10,0 kN	8,5 kN	5,5 kN	3,5 kN	16,0 kN	12,5 kN
34	102 mm	25,5 kN	25,5 kN	23,0 kN	23,0 kN	21,5 kN	10,0 kN	9,0 kN	5,5 kN	4,0 kN	16,0 kN	12,5 kN
35	105 mm	25,5 kN	25,5 kN	23,0 kN	23,0 kN	21,5 kN	10,5 kN	9,0 kN	5,5 kN	4,0 kN	16,0 kN	12,5 kN
36	108 mm	25,5 kN	25,5 kN	23,0 kN	23,0 kN	21,5 kN	11,0 kN	9,5 kN	6,0 kN	4,0 kN	16,5 kN	12,5 kN
37	111 mm	25,5 kN	25,5 kN	23,0 kN	23,0 kN	21,5 kN	11,0 kN	9,5 kN	6,0 kN	4,0 kN	16,5 kN	12,5 kN
38	114 mm	25,5 kN	25,5 kN	23,0 kN	23,0 kN	21,5 kN	11,5 kN	10,0 kN	6,0 kN	4,5 kN	16,5 kN	12,5 kN
39	117 mm	25,5 kN	25,5 kN	23,0 kN	23,0 kN	21,5 kN	11,5 kN	10,0 kN	6,5 kN	4,5 kN	16,5 kN	12,5 kN
40	120 mm	25,5 kN	25,5 kN	23,5 kN	23,0 kN	22,0 kN	12,0 kN	10,5 kN	6,5 kN	4,5 kN	16,5 kN	12,5 kN

齿轮齿条驱动-计算和选型-模数4-直齿
Rack and pinion drive – calculation and selection – module 4 – straight tooth system

齿条 / Rack		UHPR	HPR			PR			BR			
ATLANTA精度等级/ATLANTA-Quality		5	6		7	8			9		10	
齿条 / Rack	材料 / material	16MnCr5	16MnCr5	C45	C45	C45	42CrMo4		C45		C45	
	热处理方式 Heat Treatment	渗碳淬火 case hardened	感应淬火 induction hardened		感应淬火 ind. hardened	感应淬火 ind. hardened	淬火+回火 quenched + tempered		软材 未淬火 soft		感应淬火 induction hardened	
齿轮 / Pinion	材料 / material	16MnCr5	16MnCr5	16MnCr5	16MnCr5	16MnCr5	16MnCr5	C45	16MnCr5	C45	16MnCr5	C45
	热处理方式 Heat Treatment	渗碳淬火 case hardened	渗碳淬火 case hardened	渗碳淬火 case hardened	渗碳淬火 case hardened	渗碳淬火 case hardened	渗碳淬火 case hardened	感应淬火 ind. hardened	渗碳淬火 case hardened	软材 未淬火 soft	渗碳淬火 case hardened	感应淬火 ind. hardened
齿轮齿数 1) No. of pinion teeth 1)	齿轮节圆 pitch circle dia.	最大驱动力 (只针对ATLANTA标准的材料) max. feed force (values are only valid for material according ATLANTA-Standard)										
12	48 mm	12,0 kN	12,0 kN	12,0 kN	12,0 kN	11,5 kN	5,5 kN	4,5 kN	3,0 kN	1,0 kN	11,0 kN	6,5 kN
13	52 mm	14,5 kN	14,5 kN	14,5 kN	14,5 kN	13,5 kN	6,0 kN	4,5 kN	3,5 kN	1,5 kN	13,0 kN	7,5 kN
14	56 mm	18,0 kN	18,0 kN	18,0 kN	18,0 kN	17,0 kN	7,0 kN	5,5 kN	3,5 kN	1,5 kN	15,0 kN	8,5 kN
15	60 mm	20,5 kN	20,0 kN	20,0 kN	20,0 kN	18,5 kN	7,5 kN	6,0 kN	4,0 kN	2,0 kN	17,0 kN	10,0 kN
16	64 mm	23,0 kN	23,0 kN	22,0 kN	22,0 kN	20,5 kN	8,0 kN	6,5 kN	4,5 kN	2,0 kN	18,0 kN	11,0 kN
17	68 mm	27,0 kN	27,0 kN	24,5 kN	24,5 kN	23,0 kN	9,0 kN	7,5 kN	5,0 kN	2,5 kN	19,0 kN	12,0 kN
18	72 mm	30,0 kN	30,0 kN	26,5 kN	26,5 kN	25,0 kN	10,0 kN	8,0 kN	5,5 kN	3,0 kN	20,0 kN	13,0 kN
19	76 mm	32,5 kN	32,5 kN	28,0 kN	28,0 kN	26,0 kN	10,5 kN	8,5 kN	5,5 kN	3,0 kN	21,5 kN	14,0 kN
20	80 mm	35,0 kN	35,0 kN	30,0 kN	30,0 kN	27,5 kN	11,0 kN	9,0 kN	6,0 kN	3,5 kN	22,5 kN	15,0 kN
21	84 mm	37,5 kN	37,5 kN	31,5 kN	31,5 kN	29,0 kN	11,5 kN	9,5 kN	6,5 kN	3,5 kN	23,5 kN	16,5 kN
22	88 mm	40,0 kN	39,5 kN	33,0 kN	33,0 kN	30,5 kN	12,5 kN	10,0 kN	6,5 kN	4,0 kN	24,5 kN	17,5 kN
23	92 mm	42,5 kN	42,0 kN	34,5 kN	34,5 kN	32,0 kN	13,0 kN	10,5 kN	7,0 kN	4,0 kN	26,0 kN	18,5 kN
24	96 mm	44,5 kN	44,5 kN	36,0 kN	36,0 kN	33,5 kN	13,5 kN	11,0 kN	7,5 kN	4,5 kN	27,0 kN	19,5 kN
25	100 mm	46,5 kN	46,5 kN	37,5 kN	37,5 kN	35,0 kN	14,0 kN	11,5 kN	7,5 kN	4,5 kN	28,0 kN	20,5 kN
26	104 mm	47,0 kN	47,0 kN	39,5 kN	39,5 kN	36,5 kN	14,5 kN	12,0 kN	8,0 kN	5,0 kN	28,5 kN	21,5 kN
27	108 mm	47,0 kN	47,0 kN	40,0 kN	40,0 kN	37,5 kN	15,5 kN	12,5 kN	8,5 kN	5,0 kN	28,5 kN	22,0 kN
28	112 mm	47,5 kN	47,5 kN	40,5 kN	40,5 kN	37,5 kN	16,0 kN	13,0 kN	8,5 kN	5,5 kN	28,5 kN	22,0 kN
29	116 mm	47,5 kN	47,5 kN	40,5 kN	40,5 kN	37,5 kN	16,5 kN	13,5 kN	9,0 kN	5,5 kN	29,0 kN	22,5 kN
30	120 mm	48,0 kN	48,0 kN	40,5 kN	40,5 kN	38,0 kN	17,0 kN	14,0 kN	9,5 kN	6,0 kN	29,0 kN	22,5 kN
31	124 mm	48,0 kN	48,0 kN	41,0 kN	41,0 kN	38,0 kN	17,5 kN	14,5 kN	9,5 kN	6,0 kN	29,0 kN	22,5 kN
32	128 mm	48,0 kN	48,0 kN	41,0 kN	41,0 kN	38,0 kN	18,5 kN	15,0 kN	10,0 kN	6,5 kN	29,0 kN	22,5 kN
33	132 mm	48,5 kN	48,5 kN	41,0 kN	41,0 kN	38,0 kN	19,0 kN	15,5 kN	10,5 kN	6,5 kN	29,0 kN	22,5 kN
34	136 mm	48,5 kN	48,5 kN	41,5 kN	41,0 kN	38,5 kN	19,5 kN	16,0 kN	10,5 kN	7,0 kN	29,0 kN	22,5 kN
35	140 mm	48,5 kN	48,5 kN	41,5 kN	41,5 kN	38,5 kN	20,0 kN	16,5 kN	11,0 kN	7,0 kN	29,5 kN	23,0 kN
36	144 mm	49,0 kN	49,0 kN	41,5 kN	41,5 kN	38,5 kN	21,0 kN	17,0 kN	11,5 kN	7,5 kN	29,5 kN	23,0 kN
37	148 mm	49,0 kN	49,0 kN	41,5 kN	41,5 kN	38,5 kN	21,5 kN	17,5 kN	11,5 kN	7,5 kN	29,5 kN	23,0 kN
38	152 mm	49,0 kN	49,0 kN	42,0 kN	41,5 kN	38,5 kN	22,0 kN	18,0 kN	12,0 kN	8,0 kN	29,5 kN	23,0 kN
39	156 mm	49,0 kN	49,0 kN	42,0 kN	42,0 kN	39,0 kN	22,5 kN	18,0 kN	12,5 kN	8,0 kN	29,5 kN	23,0 kN
40	160 mm	49,0 kN	49,0 kN	42,0 kN	42,0 kN	39,0 kN	23,0 kN	18,5 kN	12,5 kN	8,5 kN	29,5 kN	23,0 kN

1) 核对可行性（ZB章节） / check availability (chapter ZB)
2) 力值只适用于亚特兰标准材料 / force values are only valid for material according ATLANTA-Standard

最大允许进给力 - 说明请参阅第ZB-36 / Maximum permissible feed forces – description see page ZB-36

齿轮齿条驱动-计算和选型-模数5-直齿
Rack and pinion drive – calculation and selection – module 5 – straight tooth system

齿条 / Rack		UHPR	HPR	PR			BR			
ATLANTA精度等级/ATLANTA-Quality		3	5	6	7	8	9		10	
齿条 Rack	材料 / material	C45	16MnCr5	C45	C45	C45	C45		C45	
	热处理方式 Heat treatment	感应淬火 ind. hardened	渗碳淬火 case hardened	感应淬火 ind. hardened		感应淬火 ind. hardened	软材 未淬火 soft		感应淬火 ind. hardened	
齿轮 Pinion	材料 / material	16MnCr5	16MnCr5	16MnCr5	16MnCr5	16MnCr5	16MnCr5	C45	16MnCr5	C45
	热处理方式 Heat treatment	渗碳淬火 case hardened	渗碳淬火 case hardened	渗碳淬火 case hardened	渗碳淬火 case hardened	渗碳淬火 case hardened	渗碳淬火 case hardened	软材 未淬火 soft	渗碳淬火 case hardened	感应淬火 ind. hardened
齿轮齿数[1] No. of pinion teeth[1]	齿轮节圆 pitch circle dia.	最大驱动力 (只针对ATLANTA标准的材料) max. feed force (values are only valid for material according ATLANTA-Standard)								
12	60 mm	19,0 kN	19,0 kN	19,0 kN	19,0 kN	18,0 kN	5,0 kN	2,0 kN	17,5 kN	10,0 kN
13	65 mm	23,0 kN	23,0 kN	23,0 kN	23,0 kN	21,5 kN	5,5 kN	2,5 kN	20,5 kN	12,0 kN
14	70 mm	29,0 kN	29,0 kN	28,5 kN	28,5 kN	26,5 kN	6,0 kN	2,5 kN	23,5 kN	13,5 kN
15	75 mm	31,5 kN	32,0 kN	31,5 kN	31,5 kN	29,0 kN	6,5 kN	3,0 kN	26,5 kN	15,5 kN
16	80 mm	35,0 kN	37,0 kN	35,0 kN	35,0 kN	32,5 kN	7,0 kN	3,5 kN	28,0 kN	17,0 kN
17	85 mm	39,5 kN	42,5 kN	39,5 kN	39,0 kN	36,5 kN	8,0 kN	4,0 kN	30,0 kN	19,0 kN
18	90 mm	42,0 kN	47,0 kN	42,0 kN	42,0 kN	39,0 kN	8,5 kN	4,5 kN	31,5 kN	20,5 kN
19	95 mm	44,5 kN	51,0 kN	44,5 kN	44,5 kN	41,0 kN	9,0 kN	5,0 kN	33,5 kN	22,5 kN
20	100 mm	47,0 kN	55,0 kN	47,0 kN	47,0 kN	43,5 kN	9,5 kN	5,5 kN	35,0 kN	24,0 kN
21	105 mm	49,5 kN	58,5 kN	49,5 kN	49,5 kN	45,5 kN	10,0 kN	6,0 kN	37,0 kN	25,5 kN
22	110 mm	52,0 kN	62,5 kN	52,0 kN	52,0 kN	48,0 kN	10,5 kN	6,0 kN	39,0 kN	27,0 kN
23	115 mm	54,5 kN	66,5 kN	54,5 kN	54,5 kN	50,5 kN	11,0 kN	6,5 kN	40,5 kN	29,0 kN
24	120 mm	57,0 kN	70,5 kN	57,0 kN	57,0 kN	52,5 kN	11,5 kN	7,0 kN	42,5 kN	30,5 kN
25	125 mm	59,5 kN	72,5 kN	59,5 kN	59,5 kN	55,0 kN	12,0 kN	7,5 kN	44,0 kN	32,0 kN
26	130 mm	61,0 kN	73,0 kN	61,0 kN	61,0 kN	56,5 kN	12,5 kN	8,0 kN	44,5 kN	33,5 kN
27	135 mm	61,5 kN	73,5 kN	61,0 kN	61,0 kN	56,5 kN	13,0 kN	8,0 kN	45,0 kN	35,0 kN
28	140 mm	61,5 kN	74,0 kN	61,5 kN	61,5 kN	57,0 kN	13,5 kN	8,5 kN	45,0 kN	35,0 kN
29	145 mm	62,0 kN	74,5 kN	61,5 kN	61,5 kN	57,0 kN	14,0 kN	9,0 kN	45,0 kN	35,0 kN
30	150 mm	62,0 kN	75,0 kN	62,0 kN	62,0 kN	57,5 kN	14,5 kN	9,5 kN	45,5 kN	35,5 kN

1) 核对可行性（ZB章节） / check availability (chapter ZB)
2) 力值只适用于亚特兰标准材料 / force values are only valid for material according ATLANTA-Standard

最大允许进给力 - 说明请参阅第ZB-36 / Maximum permissible feed forces – description see page ZB-36

齿轮齿条驱动-计算和选型-模数6-直齿
Rack and pinion drive – calculation and selection – module 6 – straight tooth system

齿条 / Rack		UHPR		HPR		BR			
ATLANTA精度等级/ATLANTA-Quality		4	5	6	7	9		10	
齿 Rack	材料 / material	C45	16MnCr5	C45	C45	C45		C45	
	热处理方式 Heat treatment	感应淬火 ind. hardened	渗碳淬火 case hardened	感应淬火 ind. hardened		软材 未淬火 soft		感应淬火 ind. hardened	
齿轮 Pinion	材料 / material	16MnCr5	16MnCr5	16MnCr5	16MnCr5	16MnCr5	C45	16MnCr5	C45
	热处理方式 Heat treatment	渗碳淬火 case hardened	渗碳淬火 case hardened	渗碳淬火 case hardened	渗碳淬火 case hardened	渗碳淬火 case hardened	软材 未淬火 soft	渗碳淬火 case hardened	感应淬火 ind. hardened
齿轮齿数 1) No. of pinion teeth 1)	齿轮节圆 pitch circle dia.	最大驱动力 (只针对ATLANTA标准的材料) max. feed force (values are only valid for material according ATLANTA-Standard)							
12	72 mm	27,5 kN	27,5 kN	27,5 kN	27,5 kN	7,5 kN	3,0 kN	25,5 kN	15,0 kN
13	78 mm	33,5 kN	33,5 kN	33,5 kN	33,5 kN	8,0 kN	3,5 kN	30,0 kN	17,5 kN
14	84 mm	41,5 kN	41,5 kN	41,5 kN	41,5 kN	8,5 kN	4,0 kN	34,5 kN	20,0 kN
15	90 mm	46,0 kN	46,0 kN	45,5 kN	45,5 kN	9,0 kN	4,5 kN	38,0 kN	22,5 kN
16	96 mm	50,5 kN	53,0 kN	50,5 kN	50,5 kN	10,0 kN	5,0 kN	40,5 kN	25,0 kN
17	102 mm	56,5 kN	61,5 kN	56,5 kN	56,5 kN	11,5 kN	6,0 kN	43,5 kN	27,5 kN
18	108 mm	61,0 kN	68,0 kN	61,0 kN	61,0 kN	12,5 kN	7,0 kN	46,0 kN	30,0 kN
19	114 mm	64,5 kN	73,5 kN	64,5 kN	64,5 kN	13,0 kN	7,5 kN	48,5 kN	32,5 kN
20	120 mm	68,0 kN	79,5 kN	68,0 kN	68,0 kN	14,0 kN	8,0 kN	51,0 kN	34,5 kN
21	126 mm	71,5 kN	85,0 kN	71,5 kN	71,5 kN	14,5 kN	8,5 kN	53,5 kN	37,0 kN
22	132 mm	75,5 kN	90,5 kN	75,0 kN	75,0 kN	15,5 kN	9,0 kN	56,0 kN	39,5 kN
23	138 mm	79,0 kN	96,0 kN	79,0 kN	78,5 kN	16,0 kN	9,5 kN	58,5 kN	42,0 kN
24	144 mm	82,5 kN	102,0 kN	82,5 kN	82,5 kN	17,0 kN	10,5 kN	61,0 kN	44,0 kN
25	150 mm	86,0 kN	104,0 kN	86,0 kN	86,0 kN	17,5 kN	11,0 kN	61,5 kN	46,5 kN
26	156 mm	87,5 kN	104,5 kN	87,5 kN	87,5 kN	18,5 kN	11,5 kN	62,0 kN	49,0 kN
27	162 mm	88,0 kN	105,5 kN	87,5 kN	87,5 kN	19,0 kN	12,0 kN	62,0 kN	50,0 kN
28	168 mm	88,5 kN	106,0 kN	88,0 kN	88,0 kN	20,0 kN	12,5 kN	62,5 kN	50,0 kN
29	174 mm	88,5 kN	106,5 kN	88,5 kN	88,5 kN	20,5 kN	13,0 kN	62,5 kN	50,5 kN
30	180 mm	89,0 kN	107,0 kN	89,0 kN	89,0 kN	21,5 kN	13,5 kN	63,0 kN	50,5 kN

1) 核对可行性（ZB章节） / check availability (chapter ZB)
2) 力值只适用于亚特兰标准材料 / force values are only valid for material according ATLANTA-Standard

最大允许进给力 - 说明请参阅第ZB-36 / Maximum permissible feed forces – description see page ZB-36

齿轮齿条驱动-计算和选型-模数8-直齿
Rack and pinion drive – calculation and selection – module 8 – straight tooth system

齿条 / Rack		UHPR	HPR		BR			
ATLANTA精度等级/ATLANTA-Qualit		3	6	7	9		10	
齿条 / Rack	材料 / material	C45	C45	C45	C45		C45	
	热处理方式 Heat Treatment	感应淬火 ind. hardened	感应淬火 induction hardened		软材 未淬火 soft		感应淬火 induction hardened	
齿轮 / Pinion	材料 / material	16MnCr5	16MnCr5	16MnCr5	16MnCr5	C45	16MnCr5	C45
	热处理方式 Heat Treatment	渗碳淬火 case hardened	渗碳淬火 case hardened	渗碳淬火 case hardened	渗碳淬火 case hardened	软材 未淬火 soft	渗碳淬火 case hardened	感应淬火 ind. hardened
齿轮齿数[1] No. of pinion teeth[1]	齿轮节圆 pitch circle dia.	最大驱动力 (只针对ATLANTA标准的材料) max. feed force (values are only valid for material according ATLANTA-Standard)						
12	96 mm	49,5 kN	49,5 kN	49,5 kN	13,0 kN	5,5 kN	45,5 kN	26,5 kN
13	104 mm	60,0 kN	60,0 kN	60,0 kN	14,5 kN	6,5 kN	53,5 kN	31,0 kN
14	112 mm	74,5 kN	74,5 kN	74,5 kN	16,0 kN	7,5 kN	61,5 kN	35,5 kN
15	120 mm	82,0 kN	82,0 kN	82,0 kN	16,5 kN	8,0 kN	68,0 kN	40,0 kN
16	128 mm	90,5 kN	90,0 kN	90,0 kN	18,5 kN	9,5 kN	72,5 kN	44,5 kN
17	136 mm	101,5 kN	101,5 kN	101,5 kN	21,0 kN	11,0 kN	77,5 kN	49,0 kN
18	144 mm	109,0 kN	109,0 kN	109,0 kN	22,5 kN	12,5 kN	82,0 kN	53,5 kN
19	152 mm	115,5 kN	115,5 kN	115,5 kN	23,5 kN	13,5 kN	86,5 kN	57,5 kN
20	160 mm	121,5 kN	121,5 kN	121,5 kN	25,0 kN	14,5 kN	91,0 kN	62,0 kN
21	168 mm	128,0 kN	128,0 kN	128,0 kN	26,5 kN	15,5 kN	95,5 kN	66,0 kN
22	176 mm	134,5 kN	134,5 kN	134,5 kN	27,5 kN	16,5 kN	100,0 kN	70,5 kN
23	184 mm	141,0 kN	141,0 kN	141,0 kN	29,0 kN	17,5 kN	104,5 kN	74,5 kN
24	192 mm	147,5 kN	147,5 kN	147,5 kN	30,5 kN	18,5 kN	107,5 kN	79,0 kN
25	200 mm	152,5 kN	152,5 kN	152,5 kN	31,5 kN	19,5 kN	108,0 kN	83,0 kN
26	208 mm	153,5 kN	153,0 kN	153,0 kN	33,0 kN	20,5 kN	108,5 kN	87,0 kN
27	216 mm	154,0 kN	154,0 kN	153,5 kN	34,5 kN	21,5 kN	109,0 kN	87,5 kN
28	224 mm	154,5 kN	154,5 kN	154,5 kN	35,5 kN	22,5 kN	109,5 kN	88,0 kN
29	232 mm	155,0 kN	155,0 kN	155,0 kN	37,0 kN	23,5 kN	110,0 kN	88,5 kN
30	240 mm	156,0 kN	155,5 kN	155,5 kN	38,5 kN	24,5 kN	110,0 kN	88,5 kN

1) 核对可行性（ZB章节） / check availability (chapter ZB)
2) 力值只适用于亚特兰标准材料 / force values are only valid for material according ATLANTA-Standard

最大允许进给力 - 说明请参阅第ZB-36 / Maximum permissible feed forces – description see page ZB-36

齿轮齿条驱动-计算和选型-模数10-直齿
Rack and pinion drive – calculation and selection – module 10 – straight tooth system

齿条 / Rack		UHPR	HPR	BR			
ATLANTA精度等级/ATLANTA-Qualit		3	6	9		10	
齿条 / Rack	材料 / material	C45	C45	C45		C45	
	热处理方式 Heat Treatment	感应淬火 ind. hardened	感应淬火 ind. hardened	软材 未淬火 soft		感应淬火 induction hardened	
齿轮 / Pinion	材料 / material	16MnCr5	16MnCr5	16MnCr5	C45	16MnCr5	C45
	热处理方式 Heat Treatment	渗碳淬火 case hardened	渗碳淬火 case hardened	渗碳淬火 case hardened	软材 未淬火 soft	渗碳淬火 case hardened	感应淬火 ind. hardened
齿轮齿数[1] No. of pinion teeth[1]	齿轮节圆 pitch circle dia.	最大驱动力 (只针对ATLANTA标准的材料) max. feed force (values are only valid for material according ATLANTA-Standard)					
12	120 mm	78,0 kN	77,5 kN	21,0 kN	8,5 kN	71,5 kN	41,5 kN
13	130 mm	94,0 kN	94,0 kN	22,5 kN	10,0 kN	84,0 kN	49,0 kN
14	140 mm	117,0 kN	117,0 kN	25,0 kN	11,5 kN	96,0 kN	56,0 kN
15	150 mm	128,5 kN	128,5 kN	26,5 kN	13,0 kN	107,0 kN	63,0 kN
16	160 mm	141,5 kN	141,5 kN	29,0 kN	15,0 kN	114,0 kN	70,0 kN
17	170 mm	159,5 kN	159,5 kN	33,0 kN	17,5 kN	121,0 kN	77,0 kN
18	180 mm	171,0 kN	171,0 kN	35,0 kN	19,5 kN	128,0 kN	83,5 kN
19	190 mm	181,0 kN	180,5 kN	37,0 kN	21,0 kN	135,5 kN	90,5 kN
20	200 mm	191,0 kN	191,0 kN	39,5 kN	22,5 kN	142,5 kN	97,0 kN
21	210 mm	201,0 kN	201,0 kN	41,5 kN	24,5 kN	149,5 kN	104,0 kN
22	220 mm	211,0 kN	211,0 kN	43,5 kN	26,0 kN	156,5 kN	110,5 kN
23	230 mm	221,0 kN	221,0 kN	45,5 kN	27,5 kN	163,5 kN	117,0 kN
24	240 mm	231,0 kN	231,0 kN	47,5 kN	29,0 kN	165,0 kN	123,5 kN
25	250 mm	234,0 kN	234,0 kN	49,5 kN	31,0 kN	166,0 kN	130,0 kN

1) 核对可行性（ZB章节） / check availability (chapter ZB)
2) 力值只适用于亚特兰标准材料 / force values are only valid for material according ATLANTA-Standard

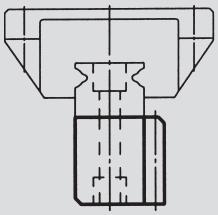
最大允许进给力 - 说明请参阅第ZB-36 / Maximum permissible feed forces – description see page ZB-36

齿条 / Rack		UHPR	HPR
ATLANTA精度等级/ATLANTA-Qualit		3	6
齿条 / Rack	材料 / material	C45	C45
	热处理方式 Heat Treatment	感应淬火 ind. hardened	感应淬火 ind. hardened
齿轮 / Pinion	材料 / material	16MnCr5	16MnCr5
	热处理方式 Heat Treatment	渗碳淬火 case hardened	渗碳淬火 case hardened
齿轮齿数 1) No.of pinion teeth 1)	齿轮节圆 pitch circle dia.	最大驱动力 2) Maximum Feed Force 2)	
12	144 mm	111,0 kN	111,0 kN
13	156 mm	134,5 kN	134,0 kN
14	168 mm	167,0 kN	167,0 kN
15	180 mm	183,5 kN	183,5 kN
16	192 mm	204,0 kN	203,5 kN
17	204 mm	225,5 kN	225,5 kN
18	216 mm	244,0 kN	243,5 kN
19	228 mm	258,0 kN	258,0 kN
20	240 mm	272,5 kN	272,0 kN
21	252 mm	286,5 kN	286,5 kN
22	264 mm	301,0 kN	300,5 kN
23	276 mm	315,5 kN	315,0 kN
24	288 mm	329,5 kN	329,5 kN
25	300 mm	333,5 kN	333,0 kN

1) 核对可行性（ZB章节） / check availability (chapter ZB)
2) 力值只适用于亚特兰标准材料 / force values are only valid for material according ATLANTA-Standard

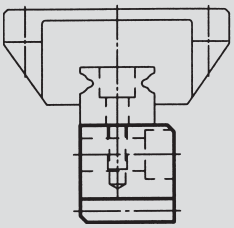
最大允许进给力 - 说明请参阅第ZB-36 / Maximum permissible feed forces – description see page ZB-36

90°-安装 / 90° arrangement



- 不必再调整齿条和导轨
- 节省空间和最佳性能的设计可以实现
- 不同型号的组合齿条达到最优的性价比
- 可以在装机前装配齿条和导轨
- 现场安装组合齿条和导轨相应的建议
- 组合齿条沿着导轨连续拼接
- 额外需求：90° 安装导轨上要有螺纹安装孔。

180°-安装 / 180° arrangement



- Adjusting between rack and rail not necessary
- Space-saving and performance-optimized design can be realized
- Different types of integrated racks allows best price-performance-ratio
- Allows assembling of integrated rack and rail outside the machine
- On-site mounting of integrated rack and rail with corresponding device
- Continuous linking of the integrated rack with rails
- Additional demand: threads in the rail for the 90° arrangement

斜齿齿条和导轨组合概述/ Survey of helical integrated rack to rail

类别 Class	精度等级 Quality	模数 Module	节距误差 total pitch error (µm/m)	齿厚公差 Tooth thickness tolerance (µm)	长度 max. length (mm)	单齿接触驱动力/尺宽 Feed force per pinion contact/ tooth wide kN/(宽/width)	应用领域（案例） Applications (examples)
HPIR-高精度组合齿条 High Precision Integrated Rack	6	2 3 4	36 36 36	-37 -37 -37	960 960 960	6,8/24 12,0/29 23,5/39	机床，木材，塑料加工机床 Machine tools, wood, plasticworking machines
BIR-基础精度组合齿条 Basic Integrated Rack	9	2 3 4	150 150 150	-110 -110 -110	1920 1920 1920	1,8/25 3,0/30 5,0/40	拾取应用 Pick and place applicaions

直齿组合齿条安装导轨概述 / Survey of straight integrated rack to rail

类别 Class	精度等级 Quality	模数 Module	节距误差 total pitch error (µm/m)	齿厚公差 Tooth thickness tolerance (µm)	长度 max. length (mm)	单齿接触驱动力/尺宽 Feed force per pinion contact/ tooth wide kN/(宽/width)	应用领域（案例） Applications (examples)
HPIR-高精度组合齿条 High Precision Integrated Rack	6	5 10 13,33	36 36 36	-37 -37 -37	960 960 960	5/24 12/29 23/39	机床，木材，塑料加工机床 Machine tools, wood, plasticworking machines
BIR-基础精度组合齿条 Basic Integrated Rack	9	5 10 13,33	150 150 150	-110 -110 -110	1920 1920 1920	1,5/25 5,5/30 6,5/40	拾取应用 Pick and place applications

	系列 Series	直齿/斜齿 straight/helical	模数 Module	精度等级 Quality	页 Page
HPIR	49	斜齿 1) helical 1)	2; 3; 4	6	ZC-4/5
	49	直齿 straight	5, 10, 13,33 mm 节距系列	6	ZC-8/9
BIR	49	斜齿 1) helical 1)	2; 3; 4	9	ZC-6/7
	49	直齿 straight	5, 10, 13,33 mm 节距系列	9	ZC-10/11

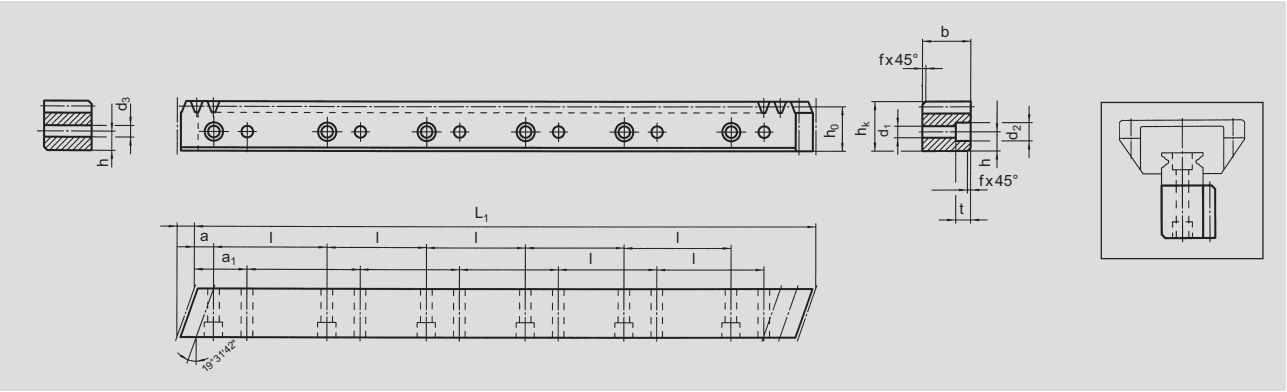
1) 我们所有的斜齿齿条都是右旋的，齿条安装块是左旋的！
1) All our helical racks are right hand toothed, except the companion racks, which are left hand toothed!

	系列 Series	节距 Pitch	精度等级 Tolerance of teeth	页 Page
	24	5, 10, 13,33	6 e 25	ZC-14
	07	5, 10	8 e 25	ZC-14
	选型负载表 Selection and load tables			ZC-15–20
	电控润滑器，润滑油刷和连接软管 Electronically controlled lubricators, sliding-type lubricating brushes and hose-connection sets			ZE-2–6
	毛毡齿轮和安装轴 Felt gear and mounting shaft			ZE-7–8
	安装 Mounting			ZF-9

合适的斜齿齿轮在ZA-14页.
Suitable helical pinions are shown at page ZA –14 and following pages.

精度 6 – 90° 安装

Quality 6 – 90° version



订购代码 Order code	模数 Module	L_1	L_2	齿数 N° of teeth	b	h_k	h_o	f	a	l	孔数 N° of holes	h	d_1	d_2	t	a_1	d_3	kg
49 29 197	2	960	6,70	144	19	19,50	17,50	1	10	60	16	7,5	4,5	7,5	5,3	30	4,5	2,7
49 29 397	2	480	6,70	72	19	19,50	17,50	1	10	60	8	7,5	4,5	7,5	5,3	30	4,5	1,3
49 29 187	2	960	8,50	144	24	24,50	22,50	1	10	60	16	10,0	6,0	9,5	8,5	30	6,0	4,2
49 29 387	2	480	8,50	72	24	24,50	22,50	1	10	60	8	10,0	6,0	9,5	8,5	30	6,0	2,1
49 39 197	3	960	10,30	96	29	29,75	26,75	2	10	60	16	11,5	7,0	11,0	9,0	30	7,0	5,6
49 39 397	3	480	10,30	48	29	29,75	26,75	2	10	60	8	11,5	7,0	11,0	9,0	30	7,0	2,8
49 49 197	4	960	13,83	72	39	39,75	35,75	2	20	80	12	14,0	10,0	15,0	9,0	40	10,0	10,5
49 49 397	4	480	13,83	36	39	39,75	35,75	2	20	80	6	14,0	10,0	15,0	9,0	40	10,0	5,2
49 49 177	4	960	13,83	72	39	48,75	44,75	2	20	80	12	17,0	10,0	15,0	9,0	40	10,0	13,0
49 49 377	4	480	13,83	36	39	48,75	44,75	2	20	80	6	17,0	10,0	15,0	9,0	40	10,0	6,5
49 49 887	4	840	17,38	63	49	58,00	54,00	2	30	105	8	22,5	14,0	20,0	13,0	60	14,0	17,3

整体齿节线误差 $GT_f/1000 \le 0{,}036$ mm.

Total pitch error $GT_f/1000 \le 0{,}036$ mm

- 感应淬火并磨削
- 材料C45钢
- 淬火后磨削各面

- Teeth induction-hardened and ground
- material C45E
- ground on all sides after hardening

齿条安装参考ZF-2.

Mounting racks, see page ZF-2.

为了达到齿条的高精度装配，我们推荐我们的专利安装工具，参考ZF-4.

To achieve precision rack joints, we recommend our patented rack assembly kit, see page ZF-4.

齿轮和齿条的润滑，我们建议使用我们的电控润滑系统，参考ZE-1

.

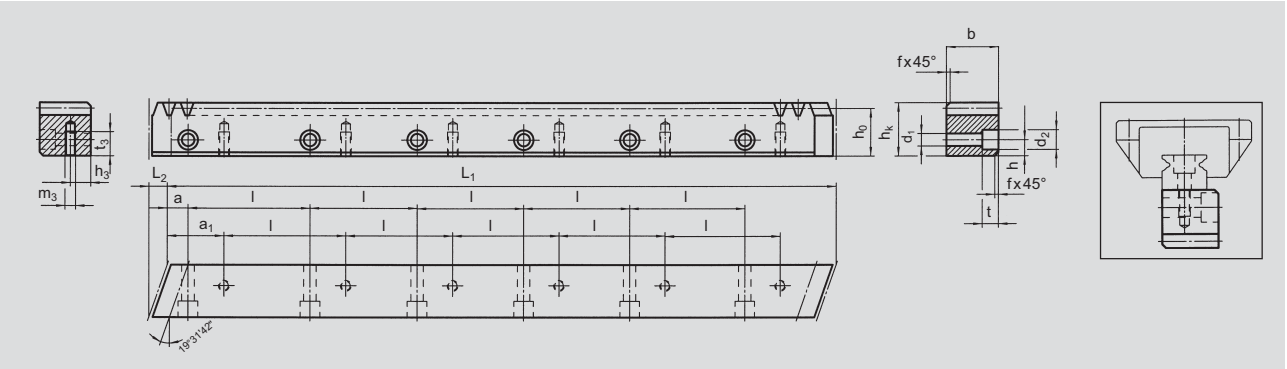
For lubrication of racks & pinions, we recommend our automatic lubrication systems, see page ZE-1.

关于齿轮齿条传动系统的计算和选型的例子，参考ZD-1.

For the calculation and selection of the rack & pinion drive, see page ZD-1.

精度 6 – 180° 安装

Quality 6 – 180° version



订购代码. Order code	模数 Module	L_1	L_2	齿数 N° of teeth	b	h_k	h_o	f	a	l	孔数 N° of holes	h	d_1	d_2	t	a_1	m_3	h_3	t_3	kg
49 29 107	2	960	6,70	144	19	19,50	17,50	1	10	60	16	7,5	5,8	10	6	30	M4	7,5	8,0	2,7
49 29 117	2	960	8,50	144	24	24,50	22,50	1	10	60	16	10,0	7,0	11	7	30	M5	10,0	11,0	4,2
49 39 107	3	960	10,30	96	29	29,75	26,75	2	10	60	16	11,5	10,0	15	9	30	M6	11,5	13,5	5,6
49 49 107	4	960	13,83	72	39	39,75	35,75	2	20	80	12	14,0	12,0	18	12	40	M8	14,0	16,0	10,5
49 49 127	4	960	13,83	72	39	48,75	44,75	2	20	80	12	17,0	12,0	18	12	40	M8	17,0	16,0	13,0
49 49 807	4	840	17,38	63	49	58,00	54,00	2	30	105	8	22,5	14,0	20	13	60	M12	22,5	25,0	17,3

整体齿节线误差 $GT_f/1000 \leq 0{,}036$ mm.

Total pitch error $GT_f/1000 \leq 0{,}036$ mm

- 感应淬火并磨削
- 材料C45钢
- 淬火后磨削各面

- Teeth induction-hardened and ground
- material C45E
- ground on all sides after hardening

齿条安装参考ZF-2

Mounting racks, see page ZF-2.

为了达到齿条的高精度装配，我们推荐我们的专利安装工具，参考ZF-4

To achieve precision rack joints, we recommend our patented rack assembly kit, see page ZF-4.

齿轮和齿条的润滑，我们建议使用我们的电控润滑系统，参考ZE-1

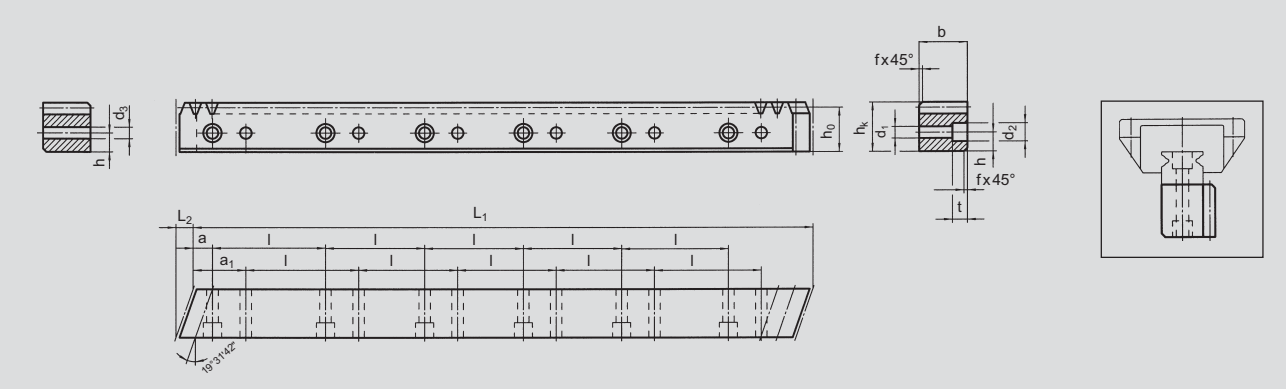
For lubrication of racks & pinions, we recommend our automatic lubrication systems, see page ZE-1.

关于齿轮齿条传动系统的计算和选型的例子，参考ZD-1

For the calculation and selection of the rack & pinion drive, see page ZD-1.

精度 9 – 90° 安装

Quality 9 – 90° version



订购代码. Order code	模数 Module	L_1	L_2	齿数 N° of teeth	b	h_k	h_o	f	a	孔数 l	N° of holes	h	d_1	d_2	t	a_1	d_3	kg
49 29 292	2	1920	7,10	288	20	19,50	17,50	1	10	60	32	7,5	4,5	7,5	5,3	30	4,5	5,4
49 29 282	2	1920	8,90	288	25	24,50	22,50	1	10	60	32	10,0	6,0	9,5	8,5	30	6,0	8,4
49 39 292	3	1920	10,60	192	30	29,75	26,75	2	10	60	32	11,5	7,0	11,0	9,0	30	7,0	11,2
49 49 292	4	1920	14,20	144	40	39,75	35,75	2	20	80	24	14,0	10,0	15,0	9,0	40	10,0	21,5
49 49 272	4	1920	14,54	144	41	48,75	44,75	2	20	80	24	17,0	10,0	15,0	9,0	40	10,0	29,9

整体齿节线误差 $GT_f/1000 \leq 0{,}150$ mm.

Total pitch error $GT_f/1000 \leq 0{,}150$ mm

- 铣削齿面
- 材料C45钢
- 冷拔钢材

- Milled teeth
- material C45E
- bright steel

齿条安装参考ZF-2

Mounting racks see page ZF-2.

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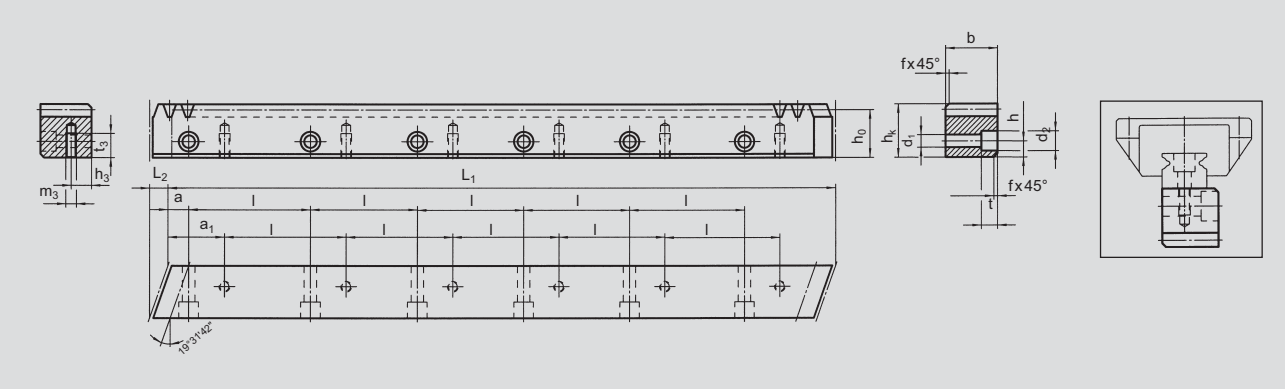
关于齿轮齿条传动系统的计算和选型的例子，参考ZD-1

For the calculation and selection of the rack & pinion drive, see page ZD-1.

精度 9 – 180° 安装

Quality 9 – 180° version



订购代码. Order code	模数 Module	L_1	L_2	齿数 N° of teeth	b	h_k	h_o	f	a	孔数. l	N° of holes	h	d_1	d_2	t	a_1	m_3	h_3	t_3	kg
49 29 202	2	1920	7,1	288	20	19,50	17,50	1	10	60	32	7,5	5,8	10	6	30	M4	7,5	8,0	5,4
49 29 212	2	1920	8,9	288	25	24,50	22,50	1	10	60	32	10,0	7,0	11	7	30	M5	10,0	11,0	8,4
49 39 202	3	1920	10,6	192	30	29,75	26,75	2	10	60	32	11,5	10,0	15	9	30	M6	11,5	13,5	11,2
49 49 202	4	1920	14,2	144	40	39,75	35,75	2	20	80	24	14,0	12,0	18	12	40	M8	14,0	16,0	21,5

整体齿节线误差 $GT_f/1000 \le 0{,}150$ mm.

Total pitch error $GT_f/1000 \le 0{,}150$ mm

- 铣削齿面
- 材料C45钢
- 冷拔钢材

- Milled teeth
- material C45E
- bright steel

齿条安装参考ZF-2

Mounting racks see page ZF-2.

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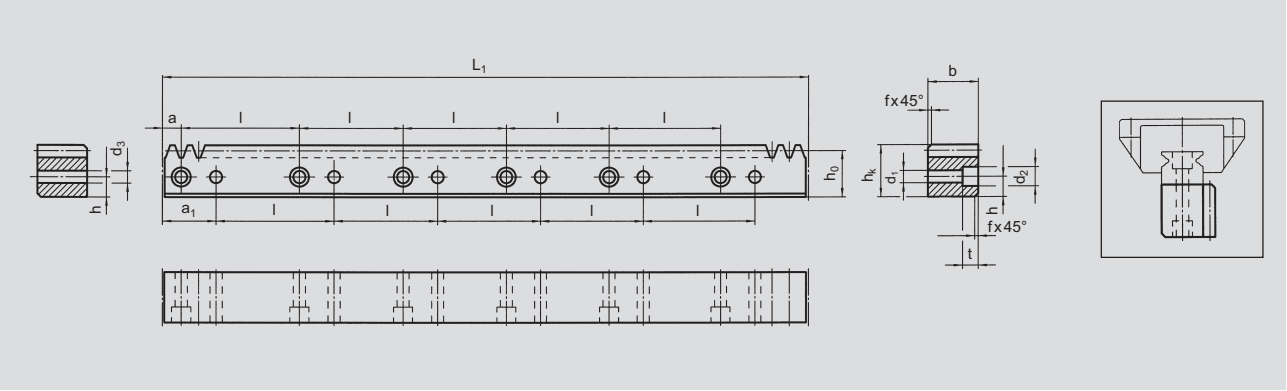
关于齿轮齿条传动系统的计算和选型的例子，参考ZD-1

For the calculation and selection of the rack & pinion drive, see page ZD-1.

精度 6 – 90° 安装

Quality 6 – 90° version



订购代码 Order code	节距 Pitch	L_1	齿数 N° of teeth	b	h_k	h_o	f	a	l	孔数 N° of holes	h	d_1	d_2	t	a_1	d_3	kg
49 77 197	5	960	192	19	19,50	17,91	1	10	60	16	7,5	4,5	7,5	5,3	30	4,5	2,7
49 77 187	5	960	192	24	24,50	22,91	1	10	60	16	10,0	6,0	9,5	8,5	30	6,0	4,2
49 97 197	10	960	96	29	29,75	26,57	2	10	60	16	11,5	7,0	11,0	9,0	30	7,0	5,6
49 47 197	13,33	960	72	39	39,75	35,50	2	20	80	12	14,0	10,0	15,0	9,0	40	10,0	10,5

整体齿节线误差 $GT_f/1000 \leq 0{,}036$ mm.

Total pitch error $GT_f/1000 \leq 0{,}036$ mm.

- 感应淬火并磨削
- 材料C45钢
- 淬火后磨削各面

- Teeth induction-hardened and ground
- material C45E
- ground on all sides after hardening

齿条安装参考ZF-2和ZF-4~5

Mounting racks see page ZF-2 and ZF-4-5.

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To achieve the precision of racks, also at the joint, we recommended our patented assembly kit, see page ZF-4

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For lubrication of racks & pinions we recommend our automatic lubrication systems, see page ZE-1

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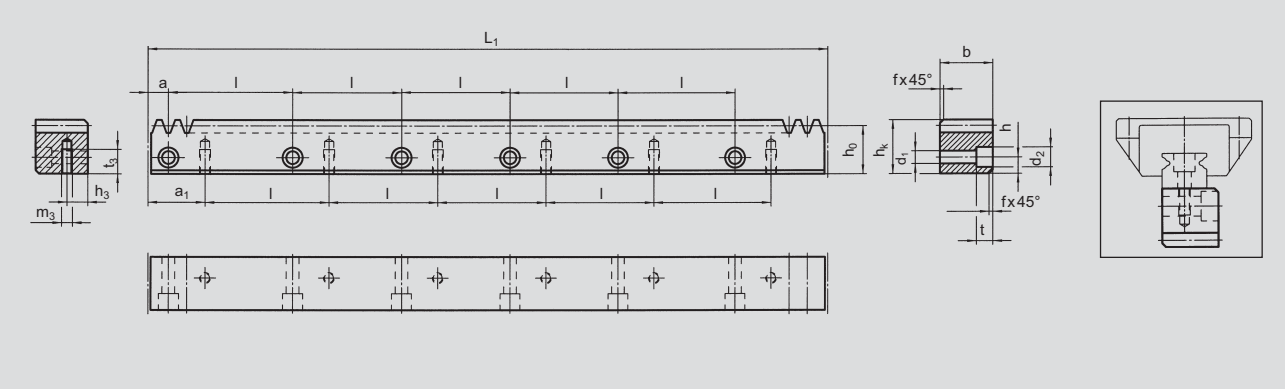
For the calculation and selection of the rack and pinion drives see calculation sample page ZD-1

精度 6 – 180° 安装

Quality 6 – 180° version



订购代码 Order code	节距 Pitch	L_1	齿数 N° of teeth	b	h_k	h_o	f	a	l	孔数 N° of holes	h	d_1	d_2	t	a_1	d_3	kg
49 77 107	5	960	192	19	19,50	17,91	1	10	60	16	7,5	5,8	10	6	30	M4	7,5	8,0	2,7
49 77 117	5	960	192	24	24,50	22,91	1	10	60	16	10,0	7,0	11	7	30	M5	10,0	11,0	4,2
49 97 107	10	960	96	29	29,75	26,57	2	10	60	16	11,5	10,0	15	9	30	M6	11,5	13,5	5,6
49 47 107	13,33	960	72	39	39,75	35,50	2	20	80	12	14,0	12,0	18	12	40	M8	14,0	16,0	10,5

整体齿节线误差 $GT_f/1000 \leq 0{,}036$ mm.

Total pitch error $GT_f/1000 \leq 0{,}036$ mm.

- 感应淬火并磨削
- 材料C45钢
- 淬火后磨削各面

- Teeth induction-hardened and ground
- material C45E
- ground on all sides after hardening

齿条安装参考ZF-2和ZF-4~5

Mounting racks see page ZF-2 and ZF-4-5.

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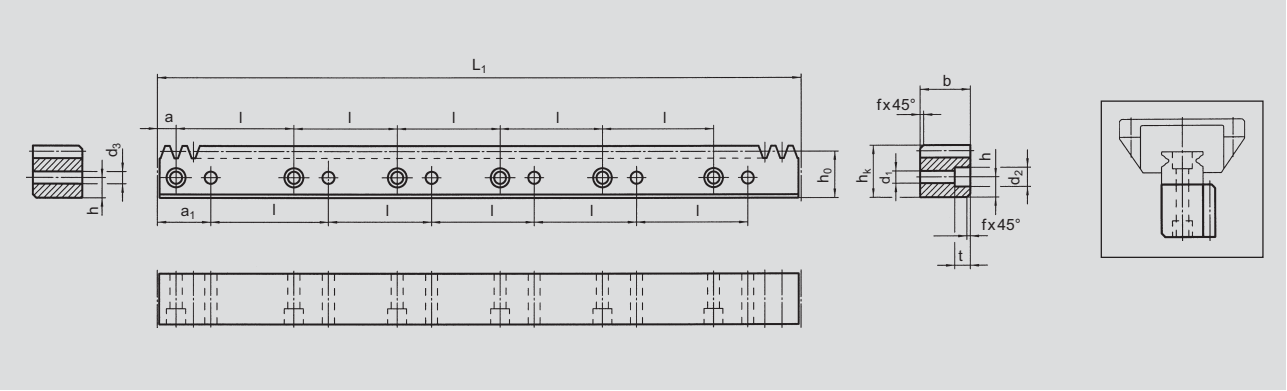
For the calculation and selection of the rack and pinion drives see calculation sample page ZD-1

精度 9 – 90° 安装

Quality 9 – 90° version



订购代码 Order code	节距 Pitch	L_1	齿数 N° of teeth	b	h_k	h_o	f	a	l	孔数 N° of holes	h	d_1	d_2	t	a_1	d_3	kg
49 77 292	5	1920	384	20	19,50	17,91	1	10	60	32	7,5	4,5	7,5	5,3	30	4,5	5,4
49 77 282	5	1920	384	25	24,50	22,91	1	10	60	32	10,0	6,0	9,5	8,5	30	6,0	8,4
49 97 292	10	1920	192	30	29,75	26,57	2	10	60	32	11,5	7,0	11,0	9,0	30	7,0	11,2
49 47 292	13,33	1920	144	40	39,75	35,50	2	20	80	24	14,0	10,0	15,0	9,0	40	10,0	21,5

整体齿节线误差 $GT_f/1000 \leq 0{,}150$ mm.

Total pitch error $GT_f/1000 \leq 0{,}150$ mm.

- 铣削齿面
- 材料C45钢
- 冷拔钢材

- Milled teeth
- material C45E
- bright steel

齿条安装参考ZF-2和ZF-4~5

Mounting racks see page ZF-2 and ZF-4-5.

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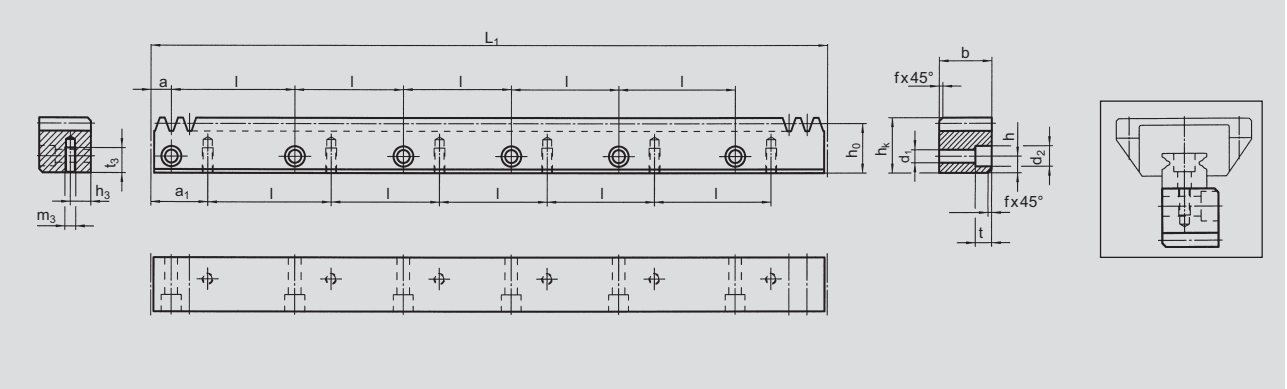
For the calculation and selection of the rack & pinion drive, see page ZD-1.

精度 9 – 180° 安装

Quality 9 – 180° version



订购代码 Order code	节距 Pitch	L_1	齿数 N° of teeth	b	h_k	h_o	f	a	l	孔数 N° of holes	h	d_1	d_2	t	a_1	d_3	kg
49 77 202	5	1920	384	20	19,50	17,91	1	10	60	32	7,5	5,8	10	6	30	M4	7,5	8,0	5,4
49 77 212	5	1920	384	25	24,50	22,91	1	10	60	32	10,0	7,0	11	7	30	M5	10,0	11,0	8,4
49 97 202	10	1920	192	30	29,75	26,57	2	10	60	32	11,5	10,0	15	9	30	M6	11,5	13,5	11,2
49 47 202	13,33	1920	144	40	39,75	35,50	2	20	80	24	14,0	12,0	18	12	40	M8	14,0	16,0	21,5

整体齿节线误差 $GT_f/1000 \leq 0{,}150$ mm.

Total pitch error $GT_f/1000 \leq 0{,}150$ mm.

- 铣削齿面
- 材料C45钢
- 冷拔钢材

- Milled teeth
- material C45E
- bright steel

齿条安装参考ZF-2和ZF-4~5

Mounting racks see page ZF-2 and ZF-4-5.

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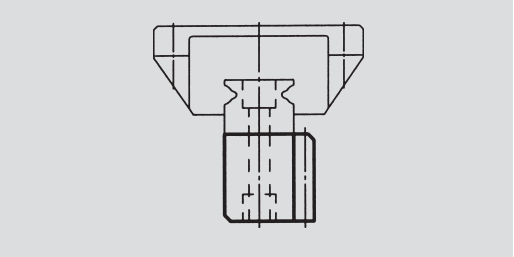
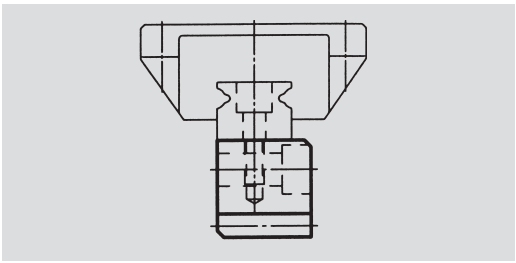
For the calculation and selection of the rack & pinion drive, see page ZD-1.



下表列出了常用的导轨型号，您可以选择合适的组合齿条。齿条的容许扭矩需要再次校核。导轨的选型请依照供应商的规格参数。

This table with the most usual rails enables (you) to select the rack suitable for the rail. The permissible feed force of the rack has to be checked, too. The rail has to be selected according to the supplier's specifications.

供应商 Racks from	90°装配（导轨上有额外的螺纹孔） 90° assembly (Additional threads required in the rail)					
Atlanta	49 29 197	49 29 187	49 39 197	49 49 197	49 49 177	49 49 887
	49 29 292	49 29 282	49 39 292	49 49 292	49 49 377	
	49 77 197	49 77 187	49 97 197	49 47 197		
	49 77 292	49 77 282	49 97 292	49 47 292		
HIWIN	LGR 15R	LGR 20R	LGR 25R	LGR 30R	LGR 35R	LGR 45R
	AGR 15U	AGR 20R	AGR 25R	AGR 30U		
	HGR 15Z	HGR 20Z	HGR 25Z	HGR 30Z	HGR 35Z	HGR 45Z
IKO		LWL 20				
	LWH 15	LWH 20	LWH 25	LWH 30	LWH 35	LWH 45
	LRX 15	LRX 20	LRX 25	LRX 30	LRX 35	LRX 45
INA		KUSE 20	KUSE 25	KUSE 30	KUSE 35	KUSE 45
	KUVE 15	KUVE 20	KUVE 25	KUVE 30	KUVE 35	KUVE 45
	KUE 15	KUE 20	KUE 25	KUE 30	KUE 35	
NSK	L1H 15	L1H 20	L1H 25	L1H 30	L1H 35	L1H 45
	L1S 15T	L1S 20	L1S 25	L1S 30	L1S 35	
	LY 15	LY 20	LY 25	LY 30	LY 35	LY 45
			LA 25	LA 30	LA 35	LA 45
Schneeberger	BM 15	BM 20	BM 25	BM 30	BM 35	BM 45
SKF	LLBHS 15	LLBHS 20	LLBHS 25	LLBHS 30	LLBHS 35	LLBHS 45
		LLBUS 20	LLBUS 25		LLBUS 35	
Bosch Rexroth	1605-G15	1605-G20	1605-G25	1605-G30	1605-G35	1605-G45
	1646-G15	1646-G20	1646-G25	1646-G30	1646-G35	1646-G45
	1645-G15	1645-G20	1645-G25	1645-G30	1645-G35	1645-G45
THK	SSR15	SSR20	SSR25	SSR30	SSR35	
	SHS15	SHS20	SHS25	SHS30	SHS35	SHS45
	SR15	SR20	SR25	SR30	SR35	SR45
	HSR15	HSR20	HSR25	HSR30	HSR35	HSR45
	CSR15	CSR20	CSR25	CSR30	CSR35	CSR45
	GSR15	GSR20	GSR25	GSR30		
			NSR20TBC			



下表列出了常用的导轨型号，您可以选择合适的组合齿条。齿条的容许扭矩需要再次校核。导轨的选型请依照供应商的规格参数。

This table with the most usual rails enables (you) to select the rack suitable for the rail. The permissible feed force of the rack has to be checked, too. The rail has to be selected according to the supplier's specifications.

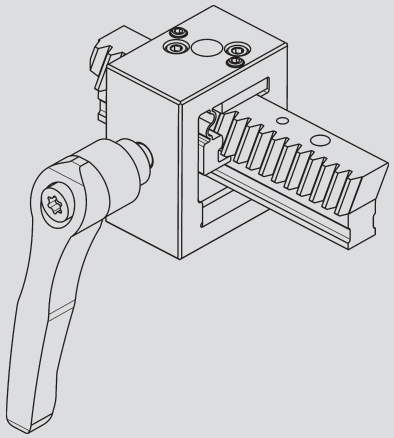
供应商 Racks from	180°装配（导轨上有额外的螺纹孔） 180° assembly					
Atlanta	49 29 107	49 29 117	49 39 107	49 49 107	49 49 127	49 49 807
	49 29 202	49 29 212	49 39 202	49 49 202		
	49 77 107	49 77 117	49 97 107	49 47 107		
	49 77 202	49 77 212	49 97 202	49 47 202		
HIWIN	LGR 15R	LGR 20R	LGR 25R	LGR 30R	LGR 35R	LGR 45R
	AGR 15U	AGR 20R	AGR 25R	AGR 30U		
	HGR 15R	HGR 20R	HGR 25R	HGR 30R	HGR 35R	HGR 45R
IKO		LWL 20				
	LWH 15	LWH 20	LWH 25	LWH 30	LWH 35	LWH 45
	LRX 15	LRX 20	LRX 25	LRX 30	LRX 35	LRX 45
INA		KUSE 20	KUSE 25	KUSE 30	KUSE 35	KUSE 45
	KUVE 15	KUVE 20	KUVE 25	KUVE 30	KUVE 35	KUVE 45
	KUE 15	KUE 20	KUE 25	KUE 30	KUE 35	
NSK	L1H 15	L1H 20	L1H 25	L1H 30	L1H 35	L1H 45
	L1S 15T	L1S 20	L1S 25		L1S 35	
	LY 15	LY 20	LY 25	LY 30	LY 35	LY 45
			LA 25	LA 30	LA 35	LA 45
Schneeberger	BM 15	BM 20	BM 25	BM 30	BM 35	BM 45
SKF	LLBHS 15	LLBHS 20	LLBHS 25	LLBHS 30	LLBHS 35	LLBHS 45
		LLBUS 20	LLBUS 25		LLBUS 35	
Bosch Rexroth	1605-G15	1605-G20	1605-G25	1605-G30	1605-G35	1605-G45
	1646-G15	1646-G20	1646-G25	1646-G30	1646-G35	1646-G45
	1645-G15	1645-G20	1645-G25	1645-G30	1645-G35	1645-G45
THK	SSR15	SSR20	SSR25		SSR35	
	SHS15	SHS20	SHS25	SHS30	SHS35	SHS45
		SR20	SR25		SR35	SR45
	HSR15	HSR20	HSR25	HSR30	HSR35	HSR45
	CSR15	CSR20	CSR25	CSR30	CSR35	CSR45
	GSR15	GSR20	GSR25	GSR30		
		RSR20				

安装工具的选择分以下三个步骤:
1. 选择工具
2. 根据齿条选择板架
3. 根据导轨选择板架

The selection of the mountingtool is done in 3 steps:
1. Selection of the tool
2. Selection of the plates according to the rack
3. Selection of the plates according to the guide

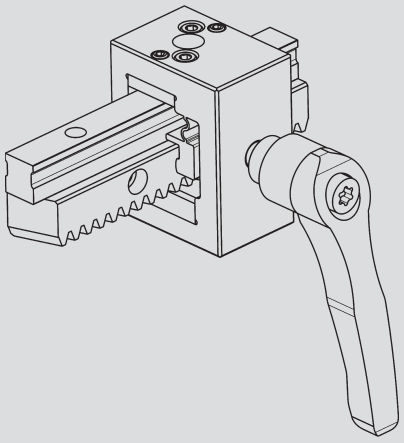
1. 工具的选择 / Selection of the tool

90°-装配



订购代码 / Order code
49.01.1_
9 轨道尺寸 / Rail size:
(15, 20, 25, 30, 35, 40, 45)

180°-装配



订购代码 / Order code
49.01.2_
9 轨道尺寸 / Rail size:
(15, 20, 25, 30, 35, 40, 45)

2. 根据齿条选板架 / Selection of the plate according to the rack

90°-装配

根据齿条的精度选择
Selection is according to the quality of rack

6级精度 / Qualtity 6　　9级精度 / Qualtity 9

尺寸 / Size 15–25
2.49.01.106　　2.49.01.105

尺寸 / Size 30–45
2.49.01.206　　2.49.01.205

180°-装配

与齿条无关
Independet of the rack

尺寸 / Size 15–25
2.49.01.310

尺寸 / Size 30–45
2.49.01.410

3. 根据导轨选择板架 / Selection of the plate according to the rail

90° 装配.-支撑架的高度由桌子高度决定。插入的高度要看齿条的宽度。

In the 90 ° version, the height of the support plate must be selected from the table, the height of the insert depends on the width of the rack.

180° 装配.-插入的高度取决于桌面高度，支撑架基本在**10**毫米 (05/09)

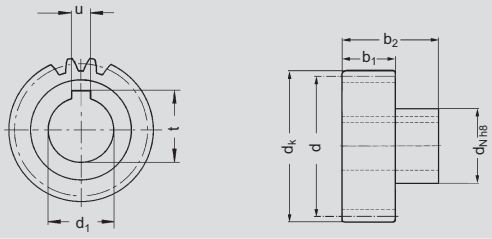
In the 180 ° version, the height of the insert must be selected from the table, the height of the support plate is always 10 mm (05/09)

生产 Producer	尺寸/Size 15 Bez./Descr.	高度/Hight in mm	高度/Hight in mm 90°-支撑板 plate 2.49.01.3_	180°-支撑板 Plate 2.49.01.1_	尺寸/Size 20 Bez./Descr.	高度/Hight in mm	高度/Hight in mm 90°-支撑板 plate 2.49.01.3_	180°-支撑板 Plate 2.49.01.1_	尺寸/Size 25 Bez./Descr.	高度/Hight in mm	高度/Hight in mm 90°-支撑板 plate 2.49.01.3_	180°-支撑板 Plate 2.49.01.1_
HIWIN	LGR 15R	14	12	07	LGR 20R	15	16	11	LGR 25R	20	14	09
	AGR 15U	13,5	13	08	AGR 20R	15,5	15	10	AGR 25R	18,5	16	11
	HGR152	15	11	06	HGR 202	17,5	13	08	HGR 252	22	12	07
IKO					LWL 20	11	20	15				
	LWH 15	15	11	06	LWH 20	18	13	08	LWH 25	22	12	07
	LRX 15	16,5	10	05	LRX 20	21	10	05	LRX 25	24,5	10	05
INA					KUSE 20	18	13	08	KUSE 25	21,7	12	07
	KUVE 15	15,1	11	06	KUVE 20	17	14	09	KUVE 25	18,7	15	10
	KUE 15	15	11	06	KUE 20	16,5	14	09	KUE 25	18	16	11
NSK	L1H 15	15	11	06	L1H 20	18	13	08	L1H 25	22	12	07
	L1S 15T	12,5	14	09	L1S 20	15,5	15	10	L1S 25	18	16	11
	LY 15	14	12	07	LY 20	19	12	07	LY 25	22,5	12	07
									LA 25	22	12	07
Schneeberger	BM 15	15,7	10	05	BM 20	19	12	07	BM 25	22,7	11	06
SKF	LLRHS 15	16,3	10	05	LLRHS 20	20,75	10	05	LLRHS 25	24,45	10	05
					LLRUS 20	------			LLRUS 25	------		
Bosch Rexroth	1605-G15	16,3	10	05	1605-G20	20,75	10	05	1605-G25	24,45	10	05
	1646-G15	------			1646-G20	------			1646-G25	------		
	1645-G15	16,2	10	05	1645-G20	20,55	10	05	1645-G25	24,25	10	05
THK	SSR15	12,5	14	09	SSR20	15,5	15	10	SSR25	18	16	11
	SHS15	13	13	08	SHS20	16,5	14	09	SHS25	20	14	09
	SR15	12,5	14	09	SR20	15,5	15	10	SR25	18	16	11
	HSR15	15	11	06	HSR20	18	13	08	HSR25	23,5	11	06
	CSR15	15	11	06	CSR20	18	13	08	CSR25	22	12	07
	GSR15	11,5	15	10	GSR20	13	18	13	GSR25	16,5	18	13
									NSR20TBC	23	11	06
min./max		11,5/16,5				11/21				16,5/24,5		

生产 Producer	尺寸/Size 30 Bez./Descr.	高度/Hight in mm	高度/Hight in mm 90°-支撑板 plate 2.49.01.4_	180°-支撑板 Plate 2.49.01.2_	尺寸/Size 35 Bez./Descr.	高度/Hight in mm	高度/Hight in mm 90°-支撑板 plate 2.49.01.4_	180°-支撑板 Plate 2.49.01.2_	尺寸/Size 40 Bez./Descr.	高度/Hight in mm	高度/Hight in mm 90°-支撑板 plate 2.49.01.4_	180°-支撑板 Plate 2.49.01.2_
HIWIN	LGR 30R	23	15	10	LGR 35R	25	17	12	LGR 45R	32	18	13
	AGR 30U	24	14	09								
	HGR 302	26	12	07	HGR 302	29	13	08	HGR 452	38	12	07
IKO	LWH 30	25	13	08	LWH 35	28	14	09	LWH 45	34	16	11
	LRX 30	28	10	05	LRX 35	32	10	05	LRX 45	38	12	07
INA	KUSE 30	25	13	08	KUSE 35	29,7	12	07	KUSE 45	37,2	12	07
	KUVE 30	23,5	15	10	KUVE 35	27	15	10	KUVE 45	34,2	15	10
	KUE 30	21,5	17	12	KUE 35	23	19	14				
NSK	L1H 30	26	12	07	L1H 35	29	13	08	L1H 45	38	12	07
	L1S 30	23	15	10	L1S 35	27,5	14	09				
	LY 30	27,5	11	06	LY 35	31	11	06	LY 45	37,5	12	07
	LA 30	28	10	05	LA 35	30,8	11	06	LA 45	36	14	09
Schneeberger	BM 30	26	12	07	BM 35	29,5	12	07	BM 45	37	13	08
SKF	LLRHS 30	28,55	10	05	LLRHS 35	32,15	10	05	LLRHS 45	40,15	10	05
					LLRUS 35	------				------		
Bosch Rexroth	1605-G30	28,55	10	05	1605-G35	32,15	10	05	1605-G45	40,15	10	05
	1646-G30	------			1646-G35	------			1646-G45	------		
	1645-G30	28,35	10	05	1645-G35	31,85	10	05	1645-G45	39,85	10	05
THK	SSR30	23	15	10	SSR35	27,5	14	09				
	SHS30	23	15	10	SHS35	26	16	11	SHS45	32	18	13
	SR30	23	15	10	SR35	27,5	14	09	SR45	35,5	14	09
	HSR30	26	12	07	HSR35	29	13	08	HSR45	38	12	07
	CSR30	26	12	07	CSR35	29	13	08	CSR45	38	12	07
	GSR30	19	19	14								
min./max		19/28,55				23/32,15				32/40,15		

4. 通过这三步后订购 / Ordering via 3 numbers

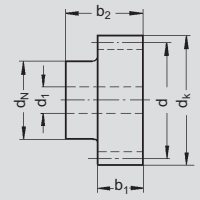
直齿，磨削
Straight tooth system,ground teeth



16MnCr5, 1.7131
渗碳淬火 case-hardened
精度等级 Gearing grade 6 e 25

订购代码 Order code	模数 Module	齿数 N° of teeth z	d	d_k	d_1^{H6}	d_N	b_1	b_2	u	t	kg	胀紧盘 GH-1页 shrink-disc on page GH-1
节距 / Pitch 5 mm												
24 06 425	1,591	25	39,79	42,9	16	30	25	51	5	18,3	0,31	80 83 030
24 00 430	1,591	30	47,75	50,9	22	36	25	54	6	24,8	0,43	80 84 036
24 03 440	1,591	40	63,66	66,8	25	44	25	56	8	28,3	0,78	80 80 044
节距 / Pitch 10 mm												
24 70 420	3,183	20	63,66	70,0	22	36	31	60	6	24,8	0,83	80 84 036
24 71 425	3,183	25	79,58	85,9	25	44	31	62	8	28,3	1,40	80 80 044
24 73 425	3,183	25	79,58	85,9	32	55	31	68	10	35,3	1,50	80 80 055
节距 / Pitch 13,33 mm												
24 93 420	4,244	20	84,89	93,3	32	55	40	77	10	35,3	2,00	80 80 055
24 95 425	4,244	25	106,10	114,6	40	62	40	77	12	43,3	2,90	80 86 062

直齿，铣削
Straight tooth system, milled teeth



软材 / soft
Ck45 1.0503
精度等级 Gearing grade 8 e 25

订购代码 Order code	模数 Module m	齿数 N° of teeth z	d	d_k	d_1	d_N	b_1	b_2	kg
节距 / Pitch 5 mm									
07 06 012	1,591	12	19,1	22,3	6	14	12	25	0,03
07 06 015	1,591	15	23,9	27,0	6	18	12	25	0,06
07 06 018	1,591	18	28,6	31,8	8	20	12	25	0,07
07 06 020	1,591	20	31,8	35,0	8	20	12	25	0,10
07 06 025	1,591	25	39,8	43,0	8	25	12	25	0,14
07 06 030	1,591	30	47,7	50,9	10	30	12	25	0,20
07 06 040	1,591	40	63,6	66,8	10	40	12	25	0,36
07 06 050	1,591	50	79,6	82,7	12	50	12	25	0,56
07 06 060	1,591	60	95,5	98,6	12	60	12	25	0,82
节距 / Pitch 10 mm									
07 08 012	3,183	12	38,2	44,6	10	25	25	40	0,22
07 08 015	3,183	15	47,7	54,1	12	30	25	40	0,38
07 08 018	3,183	18	57,3	63,7	15	40	25	40	0,50
07 08 020	3,183	20	63,7	70,0	15	40	25	40	0,60
07 08 025	3,183	25	79,6	85,9	15	50	25	40	0,96
07 08 030	3,183	30	95,5	101,9	20	60	25	40	1,46
07 08 040	3,183	40	127,3	133,7	20	80	25	40	2,68

二次打孔，开键槽，攻丝都可以在很短的时间内完成。
Further finishing (turning bores, keywaying, threading, etc.) is possible within short time.

组合齿条和齿轮驱动-计算和选型-模数 2-斜齿
Integrated rack and pinion drive – calculation and selection – module 2 – helical tooth system

齿条 / Rack		HPIR	HPIR	BIR			BIR		
精度等级 Quality		6 宽 / width 19 mm	6 宽 / width 24 mm	9 宽 / width 20 mm			9 宽 / width 25 mm		
齿条 Rack	材料 / material	16MnCr5	16MnCr5	C45			C45		
	热处理方式 heat treatment	感应淬火 ind. hardened	感应淬火 ind. hardened	软材 未淬火 soft			软材 未淬火 soft		
齿轮 Pinion	材料 / material	16MnCr5	16MnCr5	16MnCr5	C45		16MnCr5	C45	
	热处理方式 heat treatment	渗碳淬火 case hardened	渗碳淬火 case hardened	渗碳淬火 case hardened	感应淬火 ind. hardened		渗碳淬火 case hardened	感应淬火 ind. hardened	
齿轮齿数I 1) No. of pinion teeth 1)	齿轮节圆 pitch circle dia.	最大驱动力 maximum feed force							
20	42,44	5,0 kN	6,0 kN	1,0 kN	0,8 kN		1,25 kN	1,00 kN	
25	53,05	5,4 kN	6,7 kN	1,0 kN	0,9 kN		1,25 kN	1,10 kN	
28	59,42	5,4 kN	6,7 kN	1,0 kN	1,0 kN		1,25 kN	1,25 kN	
32	67,91	5,5 kN	6,8 kN	1,5 kN	1,0 kN		1,80 kN	1,25 kN	
36	76,39	5,5 kN	6,8 kN	1,5 kN	1,0 kN		1,80 kN	1,25 kN	

1) 核对可行性（参考ZA章节） / check availability (chapter ZA)

最大容许驱动力1)单位kN

该值是在很好的油脂润滑的情况下（例如：使用电子润滑系统在ZE-2/3页，或者每天手动涂抹润滑油脂），速度是1.5m/s，SB=1.0，以及线性负载分布系数为1.0。表中给出的数据是在最佳条件下的最大推荐值。任何情况下的应用和配置都需要计算。计算过程和案例，请参考ZD-1页。

1）对于键式连接需要一个单独的计算，胀紧盘式传递扭矩请参考GH-1页。

Maximum permissible feed forces 1) in kN
which are achieved with good grease lubrication (i.e. use of the electronic lubricator described on page ZE-2/3 or manual lubrication at least once a day) and v=1.5 m/s, S_B=1.0 as well as a linear load distribution factor $L_{KH\beta}$ of 1.0.
The values in the load tables are maximum values under perfect conditions and is a guide value.
A calculation of the application and configuration is in any cases needed.
Calculation and example see page ZD-1.

1) For keyway transmission make a separate calculation, torque with shrink disc see on page GH-1.

组合齿条和齿轮驱动-计算和选型-模数 3-斜齿
Integrated rack and pinion drive – calculation and selection – module 3 – helical tooth system

齿条 / Rack		HPIR		BIR					
精度等级 Quality		6 宽 / width 29 mm		9 宽 / width 30 mm					
Zahnstange 齿条	材料 / material	C45		C45					
	热处理方式 heat treatment	感应淬火 induction hardened		软材 未淬火 soft					
齿轮 Pinion	材料 / material	16MnCr5		16MnCr5	C45				
	热处理方式 heat treatment	渗碳淬火 case hardened		渗碳淬火 case hardened	感应淬火 induction hardened				
齿轮齿数I 1) No. of pinion teeth 1)	齿轮节圆 pitch circle dia.	最大驱动力 maximum feed force							
20	63,66	12,0 kN		1,5 kN	1,5 kN				
22	70,03	12,0 kN		1,5 kN	1,5 kN				
25	79,58	12,0 kN		2,5 kN	1,5 kN				
30	95,49	12,0 kN		3,0 kN	2,0 kN				

1) 核对可行性（参考ZA章节） / check availability (chapter ZA)

最大容许驱动力-请参看ZC-15页说明 / Maximum permissible feed forces – description see page ZC-15

组合齿条和齿轮驱动-计算和选型-模数 4-斜齿
Integrated rack and pinion drive – calculation and selection – module 4 – helical tooth system

齿条 / Rack		HPIR		BIR					
精度等级 Quality		6 宽 / width 39 mm		9 宽 / width 40/41 mm					
齿条 Rack	材料 / material	C45		C45					
	热处理方式 heat treatment	感应淬火 induction hardened		软材 未淬火 soft					
齿轮 Pinion	材料 / material	16MnCr5		16MnCr5	C45				
	热处理方式 heat treatment	渗碳淬火 case hardened		渗碳淬火 case hardened	感应淬火 induction hardened				
齿轮齿数 1) No. of pinion teeth 1)	齿轮节圆 pitch circle dia.	最大驱动力 maximum feed force							
15	63,66	21,0 kN		2,5 kN	1,4 kN				
20	84,88	21,0 kN		3,5 kN	2,5 kN				
21	89,13	22,0 kN		3,5 kN	2,5 kN				
24	101,86	22,5 kN		4,5 kN	3,0 kN				
25	106,10	23,5 kN		5,0 kN	4,0 kN				

1) 核对可行性（参考ZA章节） / check availability (chapter ZA)

最大容许驱动力-请参看ZC-15页说明 / Maximum permissible feed forces – description see page ZC-15

组合齿条和齿轮驱动-计算和选型-节距 5-直齿
Integrated rack and pinion drive – calculation and selection – pitch 5 – straight tooth system

齿条 / Rack		HPIR	HPIR	BIR			BIR		
精度等级 Quality		6 宽 / width 19 mm	6 宽 / width 24 mm	9 宽 / width 20 mm			9 宽 / width 25 mm		
齿条 Rack	材料 / material	C45	C45	C45			C45		
	热处理方式 heat treatment	感应淬火 induction hardened	感应淬火 induction hardened	软材 未淬火 soft			软材 未淬火 soft		
齿轮 Pinion	材料 / material	16MnCr5	16MnCr5		C45			C45	
	热处理方式 heat treatment	渗碳淬火 case hardened	渗碳淬火 case hardened		感应淬火 induction hardened			感应淬火 induction hardened	
齿轮齿数 1) No. of pinion teeth 1)	齿轮节圆 pitch circle dia.	最大驱动力 maximum feed force							
15	23,87	0,8 kN	0,9 kN		0,25 kN			0,3 kN	
20	31,83	2,6 kN	2,9 kN		0,5 kN			0,6 kN	
25	39,79	3,5 kN	4,0 kN		0,6 kN			0,7 kN	
30	47,75	3,7 kN	4,3 kN		0,8 kN			0,9 kN	
40	63,66	4,4 kN	5,0 kN		1,0 kN			1,2 kN	

1) 核对可行性（参考ZA章节） / check availability (chapter ZA)

最大容许驱动力-请参看ZC-15页说明 / Maximum permissible feed forces – description see page ZC-15

组合齿条和齿轮驱动-计算和选型-节距 10-直齿
Integrated rack and pinion drive – calculation and selection – pitch 10 – straight tooth system

齿条 / Rack		HPIR		BIR					
精度等级 Quality		6 宽 / width 29 mm		9 宽 / width 30 mm					
齿条 Rack	材料 / material	C45		C45					
	热处理方式 heat treatment	感应淬火 induction hardened		软材 未淬火 soft					
齿轮 Pinion	材料 / material	16MnCr5		16MnCr5	C45	C45			
	热处理方式 heat treatment	渗碳淬火 case hardened		渗碳淬火 case hardened	感应淬火 induction hardened	软材 未淬火 soft			
齿轮齿数 1) No. of pinion teeth 1)	齿轮节圆 pitch circle dia.	最大驱动力 maximum feed force							
15	47,75	3,6 kN		2,0 kN	1,5 kN	0,5 kN			
20	63,66	6,7 kN		2,4 kN	2,0 kN	1,4 kN			
25	79,58	11,0 kN		3,5 kN	2,5 kN	2,0 kN			
30	95,49	11,0 kN		4,0 kN	3,0 kN	2,5 kN			
40	127,32	12,0 kN		5,5 kN	4,0 kN	4,0 kN			

1) 核对可行性（参考ZA章节） / check availability (chapter ZA)

最大容许驱动力-请参看ZC-15页说明 / Maximum permissible feed forces – description see page ZC-15

组合齿条和齿轮驱动-计算和选型-节距 13,33 -直齿
Integrated rack and pinion drive – calculation and selection – pitch 13,33 – straight tooth system

齿条 / Rack		HPIR		BIR					
精度等级 Quality		6 宽 / width 39 mm		9 宽 / width 40 mm					
齿条 Rack	材料 / material	C45		C45					
	热处理方式 heat treatment	感应淬火 induction hardened		软材 未淬火 soft					
齿轮 Pinion	材料 / material	16MnCr5		16MnCr5	C45	C45			
	热处理方式 heat treatment	渗碳淬火 case hardened		渗碳淬火 case hardened	感应淬火 induction hardened	软材 未淬火 soft			
齿轮齿数[1] No. of pinion teeth[1]	齿轮节圆 pitch circle dia.	最大驱动力 maximum feed force							
20	84,88	23,0 kN		5,0 kN	3,5 kN	3,0 kN			
25	106,10	23,0 kN		6,5 kN	4,5 kN	4,0 kN			

1) 核对可行性（参考ZA章节） / check availability (chapter ZA)

最大容许驱动力-请参看ZC-15页说明 / Maximum permissible feed forces – description see page ZC-15




负载表中给出的数据基于均匀平滑的油脂充分润滑情况下给出的。而实际应用中的情况是多种多样的，因此要考虑适当的系数：SB,KA,LKHB 和Fn（参看符号注释）来匹配响应的工况。

切向力计算公式

$$a = \frac{v}{t_b} \quad [m/s^2]$$

$$F_u = \frac{m \cdot g + m \cdot a}{1000} \text{ (用于垂直轴)} \quad [kN]$$

$$F_u = \frac{m \cdot g \cdot \mu + m \cdot a}{1000} \text{ (用于水平轴)} \quad [kN]$$

$$F_{u\,zul.} = \frac{F_{u\,Tab}}{K_A \cdot S_B \cdot f_n \cdot L_{KH\beta}} \quad [kN]$$

维数公式请参考 ZD-3 页

条件 $F_u < F_{u\,zul.}$ 必须满足

载荷系数 K_A

驱动	载荷类型取决于被驱动的部件		
	均匀	中等冲击	较大冲击
均匀	1,00	1,25	1,75
轻微冲击	1,25	1,50	2,00
中等冲击	1,50	1,75	2,25

安全系数S_B

安全系数允许根据经验数据计算（S_B=1.1 ~ 1.4）

使用寿命系数 f_n

考虑齿轮线速度和润滑情况。

润滑		kontin.	每日.	每月
齿轮线速度				
m/sec	m/min			
0,5	30	0,85	0,95	
1,0	60	0,95	1,10	von
1,5	90	1,00	1,20	3
2,0	120	1,05	1,30	bis
3,0	180	1,10	1,50	10
5,0	300	1,25	1,90	

线性负载分布系数 $L_{KH\beta}$

线性负载分布系数考虑接触压力，同时描述齿宽范围内的负载分布。
($L_{KH\beta} = \sqrt{K_{H\beta}}$).
$L_{KH\beta}$ = 1,1 轴承支撑，例如：扭力支架
= 1,2 输出轴端是预载轴承
例如;亚特兰HT,HP,E系列蜗轮蜗杆减速箱。
= 1,5 输出轴为普通轴承
例如：亚特兰B系列蜗轮蜗杆减速箱。

The values given in the load table are based upon uniform, smooth operation, $K_{H\beta}$=1,0 and reliable grease lubrication. Since, in practice, the applications are very diverse, it is important to consider the given conditions by using appropriate factors S_B, K_A, $L_{KH\beta}$ and f_n (see below).

Formulas for determining the tangential force

$$a = \frac{v}{t_b} \quad [m/s^2]$$

$$F_u = \frac{m \cdot g + m \cdot a}{1000} \text{ (for lifting axle)} \quad [kN]$$

$$F_u = \frac{m \cdot g \cdot \mu + m \cdot a}{1000} \text{ (for driving axle)} \quad [kN]$$

$$F_{u\,perm.} = \frac{F_{u\,tab}}{K_A \cdot S_B \cdot f_n \cdot L_{KH\beta}} \quad [kN]$$

Formula dimensions see page ZD-3

The condition $F_u < F_{u\,perm.}$ must be fulfilled.

Load factor K_A

Drive	Type of load from the machines to be driven		
	uniform	medium shocks	heavy shocks
uniform	1,00	1,25	1,75
light shocks	1,25	1,50	2,00
medium shocks	1,50	1,75	2,25

Safety coefficient S_B

The safety coefficient should be allowed for according to experience (S_B = 1.1 ÷ 1.4).

Life-time factor f_n

considering of the peripheral speed of the pinion and lubrication.

Lubrication		contin.	daily	monthly
Peripheral speed of gearing				
m/sec	m/min			
0,5	30	0,85	0,95	
1,0	60	0,95	1,10	from
1,5	90	1,00	1,20	3
2,0	120	1,05	1,30	to
3,0	180	1,10	1,50	10
5,0	300	1,25	1,90	

Linear load distribution factor $L_{KH\beta}$

The linear load distribution factor considers the contact stress, while it describes unintegrated load distribution over the tooth width ($L_{KH\beta} = \sqrt{K_{H\beta}}$).
$L_{KH\beta}$ = 1,1 for counter bearing, e.g. Torque Supporter
= 1,2 for preloaded bearings on the output shaft
e.g. Atlanta Ht-, HP- and E-servo worm gear unit, BG-bevel gear unit
= 1,5 for unpreloaded bearings on the output shaft
e.g. Atlanta B-servo worm gear unit

计算举例
Calculation example

已知条件
Values given

⊗ 垂直运行
travelling operation

被移动质量 mass to be moved	m	= 820 kg
速度 speed	v	= 2 m/s
加速时间 acceleration time	t_b	= 1 s
重力加速度 acceleration due to gravity	g	= 9,81 m/s²
摩擦系数 coefficient of friction	μ	= 0,1
负载系数 load factor	K_A	= 1,5
使用寿命系数 life-time factor	f_n	= 1,05 (kont. Schmierung) (daily. lubrication)
安全系数 safety coefficient	S_B	= 1,2
线性负载分布系数 linear load distribution factor	L_{KHb}	= 1,5

计算过程
Calculation process

结果
Results

$a = \frac{v}{t_b} \quad a = \frac{2}{1} = 2\ m/s^2$

$F_u = \frac{m \cdot g \cdot \mu + m \cdot a}{1000}$

$F_u = \frac{820 \cdot 9{,}81 \cdot 0{,}1 + 820 \cdot 2}{1000} = 2{,}44\ kN$

假设进给力：齿条,C45 感应淬火，直齿，模数3，齿轮，16MnCr5 渗碳淬火，20齿，ZB-40页容许进给力 F_{uTab} = 9 kN
assumed feed force: rack C45, ind. hardened, straight tooth, module 3, pinion 16MnCr5, case hardened, 20 teeth, page ZB-40 with F_{utab} = 9 kN

$F_{u\ zul./per.} = \frac{F_{uTab}}{K_A \cdot S_B \cdot f_n \cdot L_{KHb}}$;

$F_{u\ zul./per.} = \frac{11{,}5\ kN}{1{,}5 \cdot 1{,}2 \cdot 1{,}05 \cdot 1{,}5} = 4{,}05\ kN$

条件
Condition

$F_{u\ zul./per.} > F_u$; 4,05 kN > 2,44 kN => 满足
fulfilled

结果: 齿条 27 30 101 页码 ZB-13
Result Rack Page ZB-13

齿轮 24 35 220 页码 ZB-23 渗碳淬火
Pinion Page ZB-23 case hardened

您的计算
Your calculation

已知条件
Values given

⊗ 垂直运行
travelling operation

被移动质量 mass to be moved	m	= _____ kg
速度 speed	v	= _____ m/s
加速时间 acceleration time	t_b	= _____ s
重力加速度 acceleration due to gravity	g	= 9,81 m/s²
摩擦系数 coefficient of friction	μ	= _____
负载系数 load factor	K_A	= _____
使用寿命系数 life-time factor	f_n	= _____
安全系数 safety coefficient	S_B	= _____
线性负载分布系数 linear load distribution factor	L_{KHb}	= _____

计算过程
Calculation process

结果
Results

$a = \frac{v}{t_b}$ a = _____ = _____ m/s²

$F_u = \frac{m \cdot g \cdot \mu + m \cdot a}{1000}$; F_u = _____ = _____ kN
1000

容许进给力 $F_{u\ Tab}$
permissible feed force $F_{u\ Tab}$

$F_{u\ zul./per.} = \frac{F_{u\ Tab}}{K_A \cdot S_B \cdot f_n \cdot L_{KHb}}$;

$F_{u\ zul./per.}$ = _____ = _____ kN

条件
Condition

$F_{u\ zul./per.} > F_u$; _____ kN > _____ kN => 满足
fulfilled

计算举例
Calculation example

已知条件
Values given

⊗ 水平运行
lifting operation

被移动质量 mass to be moved	m	= 300 kg
速度 speed	v	= 1,08 m/s
加速时间 acceleration time	t_b	= 0,27 s
摩擦系数 acceleration due to gravity	g	= 9,81 m/s²
负载系数 load factor	K_A	= 1,2
使用寿命系数 life-time factor	f_n	= 1,1 (连续润滑) (cont. lubrication)
Sicherheitsbeiwert safety coefficient	S_B	= 1,2
安全系数 linear load distribution factor	L_{KHb}	= 1,2

计算过程
Calculation process

结果
Results

$a = \frac{v}{t_b}$ $a = \frac{1,08}{0,27}$ = 4 m/s²

$F_u = \frac{m \cdot g + m \cdot a}{1000}$ $F_u = \frac{300 \cdot 9,81 + 300 \cdot 4}{1000}$ = 4,1 kN

假设驱动力：齿条,C45 感应淬火，直齿，模数2，齿轮，16MnCr5 渗碳淬火，20齿，ZA-31页容许进给力 $F_{u\,Tab}$ = 11,3 kN
assumed feed force: rack C45, ind. hardened, helical, module 2, pinion 16MnCr5, case hardened, 20 teeth, page ZA-31 with F_{utab} = 9 kN

$F_{u\,zul./per.} = \frac{F_{u\,Tab}}{K_A \cdot S_B \cdot f_n \cdot L_{KHb}}$; $F_{u\,zul./per.} = \frac{11,5\ kN}{1,2 \cdot 1,2 \cdot 1,1 \cdot 1,2}$ = 5,9 kN

条件
Condition

$F_{u\,zul./per.} > F_u$ ； 6,0 kN > 4,1 kN => 满足
fulfilled

结果: 齿条 29 20 105 页码 ZA-7
Result Rack Page ZA-7

齿轮 24 29 520 页码 ZA-24
Pinion Page ZA-24

您的计算
Your calculation

已知条件
Values given

⊗ 水平运行
lifting operation

被移动质量 mass to be moved	m	= _____ kg
速度 speed	v	= _____ m/s
加速时间 acceleration time	t_b	= _____ s
摩擦系数 acceleration due to gravity	g	= 9,81 m/s²
负载系数 load factor	K_A	= _____
使用寿命系数 life-time factor	f_n	= _____
Sicherheitsbeiwert safety coefficient	S_B	= _____
安全系数 linear load distribution factor	L_{KHb}	= _____

计算过程
Calculation process

结果
Results

$a = \frac{v}{t_b}$ a = _____ = ____ m/s²

$F_u = \frac{m \cdot g + m \cdot a}{1000}$ $F_{u\,erf./req.} = \frac{\_\_\_\_\_}{1000}$ = ____ kN

容许驱动力 $F_{u\,Tabelle}$
permissible feed force $F_{u\,tab}$

$F_{u\,zul./per.} = \frac{F_{u\,Tab}}{K_A \cdot S_B \cdot f_n \cdot L_{KHb}}$; $F_{u\,zul./per.}$ = _____ = ____ kN

条件
Condition

$F_{u\,zul./per.} > F_u$; _____ kN > _____ kN => 满足
fulfilled

模数 / Module 1,0

模数 / Module 1,25

模数 / Module 1,5

模数 / Module 2,0

模数 / Module 2,5

模数 / Module 3,0

模数 / Module 4,0

模数 / Module 5,0

模数 / Module 6,0

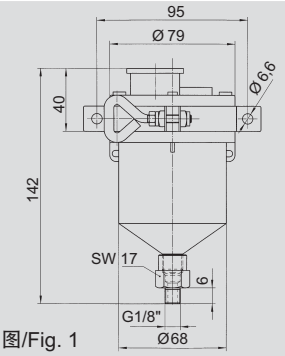
模数 / Module 8,0

模数 / Module 10,0

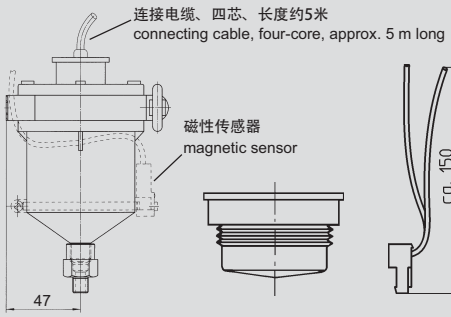
模数 / Module 12,0

电控润滑器 – 125 cm³

Electronically controlled lubricators – 125 cm³



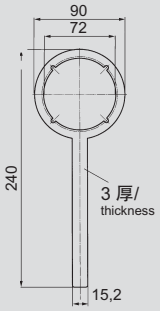
图/Fig. 1



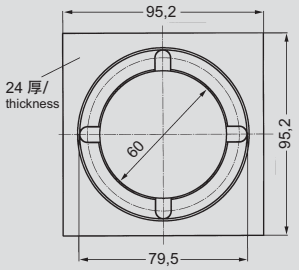
图/Fig. 2

图/Fig. 3

图/Fig. 4



图/Fig. 5



图/Fig. 6

订购代码. Order code	图 Fig.	Klüber Microlube GB 0	Klüber Structivis AHD	无润滑油 Witout grease	管夹 Pipe clamp	减压器 G1/4" - G1/8" Reducer G1/4" to G1/8"	同步 Synchronisation	终端位置检测 Detection of end position	2节电池 1,5 伏 2 batteris 1,5 V	外部电源 External power supply	Atex	氮气压力舱 Nitrogen pressure chamber	接触线 65 91 003 / 图.4 Contact cable 65 91 003 / Fig.4	电缆，四芯 Coonnecting cable, four-core	磁性传感器 65 91 026 Magnetic sensor	安装扳手 65 91 030 / 图.5 Assembly wrench 65 91 030 / Fig.5	安装插入 65 91 031 / 图.6 mounting insert 65 91 031 / Fig.6	kg
65 91 000	1	•			•	•	o		•			⊙	o			🛠	🛠	0,50
65 91 004 [1)]	1		•		•	•	o		•			⊙	o			🛠	🛠	0,50
65 91 006	1	•			•	•					•	⊙				🛠	🛠	0,40
65 91 009	1			•	•	•	o		•			⊙	o			🛠	🛠	0,50
65 91 050	2	•			•	•	•	•	•			⊙	•		•	🛠	🛠	0,60
65 91 053 [1)]	2		•		•	•	o	•	•			⊙	o		•	🛠	🛠	0,60
65 91 054 [1)]	2		•		•	•	•	•	•			⊙	•		•	🛠	🛠	0,60
65 91 059	2			•	•	•	•	•	•			⊙	•		•	🛠	🛠	0,40
65 91 061	2	•			•	•	•	•		•		⊙		•	•	🛠	🛠	0,60
65 91 001	3								•									0,08

• 润滑设备
Equipment of the lubricator

o 升级选项
Upgrading option

⊙ 备件
Spare parts

🛠 装配工具
Assembly tool

[1)]当使用Structovis AHD油脂时，建议润滑器安装位置低于润滑点，或者使用单向阀65 91 025

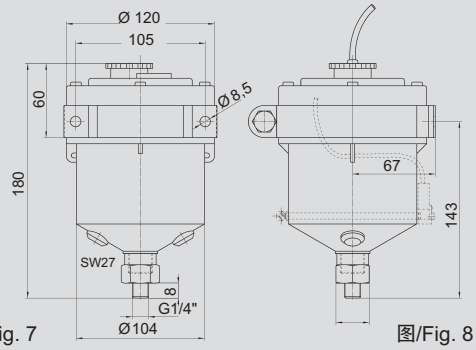
润滑器的功能基础是油枪原理。开始运行后，电控装置产生氮气推动装在润滑器（125cm³或者475cm³）内的油脂均匀地按照设定计量推出。调整指拨开关，根据不同情况的需要，设定排空时间，1-2-3-12或者18个月排空全部油脂。甚至启动后，也可再次根据实际情况调整指拨开关，调整供油量。每批次出货都有安装和操作说明书。

透明的外壳，可以安装在任意位置，随时查看润滑器内的油脂量。当油脂用完，可以再次填充油脂使用。但是氮气压力筒（图3-125cm³，图9-475cm³）和电池需要重新更换。125cm³，475cm³润滑器分别使用2节，4节1.5V干电池驱动上面的永久信号灯，以显示润滑器是否工作正常。接触线缆 - 连接到一个自由限位开关或接触器（无需外接电源） -使润滑器与机器运行时间同步。当使用65 91 061或者65 91 057的润滑器时，提供一个额外的3V DC的供电接触线缆。通过给电磁传感器（图.2）供应30V DC 最大200mA电源,在润滑器排空，润滑油耗尽时，传感器发出黄色的光，或者传递信号给控制单元。

补充润滑剂时可考虑以下几点：
- 氮气腔 65 91 001 与电池一起更换
- 充满润滑剂 65 90 002 Microlube GB 0 或 65 90 003 Structovis AHD
- 使用组装工具 65 91 030 和 65 91 031 关闭或打开润滑器

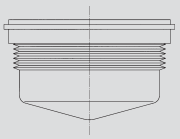
电控润滑器 – 475 cm³

Electronically controlled lubricators – 475 cm³

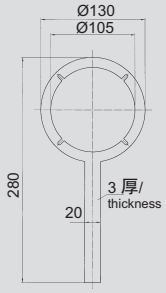


图/Fig. 7

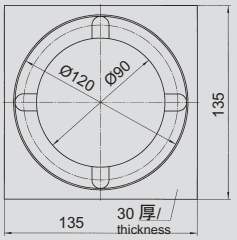
图/Fig. 8



图/Fig. 9



图/Fig. 10



图/Fig. 11

订购代码. Order code	图 Fig.	Klüber Microlube GB 0	Klüber Structivis AHD	无润滑油 Witout grease	管夹 Pipe clamp	减压器 G1/2" auf G1/4" Reducer G1/2" to G1/4"	同步 Synchronisation	终端位置检测 Detection of end position	4 节电池 1,5 V 4 batteris 1,5 V	外部电源 External power supply	Atex	氮气压力舱 65 91 017 / 图 9 Nitrogen pressure chamber / fig. 9	电缆，四芯- Connecting cable, four-core	磁性传感器-65 91 026 Magnetic sensor	安装扳手 65 91 032 / 图 10 Assembly wrench 65 91 032 / Fig. 10	安装插入 65 91 033 / 图 11 mounting insert 65 91 033 / Fig. 11	kg
65 91 007	7	•			•	•			•			⊙			🛠	🛠	0,9
65 91 014 [1)]	7		•		•	•			•			⊙			🛠	🛠	0,9
65 91 069	7			•	•	•			•			⊙			🛠	🛠	0,5
65 91 067	8	•			•	•	•		•			⊙	•		🛠	🛠	1,0
65 91 056	8	•			•	•	•	•	•			⊙	•	•	🛠	🛠	1,1
65 91 057	8	•			•	•	•	•		•		⊙	•	•	🛠	🛠	1,1
65 91 068	8		•		•	•	•	•		•		⊙	•	•	🛠	🛠	0,6
65 91 058	8			•	•	•	•	•		•		⊙	•	•	🛠	🛠	1,1

• 润滑设备
Equipment of the lubricator

o 升级选项
Upgrading option

⊙ 备件
Spare parts

🛠 装配工具
Assembly tool

[1)]当使用Structovis AHD油脂时，建议润滑器安装位置低于润滑点，或者使用单向阀65 91 025

润滑器的功能基础是油枪原理。开始运行后，电控装置产生氮气推动装在润滑器（125cm³或者475cm³）内的油脂均匀地按照设定计量推出。调整指拨开关，根据不同情况的需要，设定排空时间，1-2-3-12或者18个月排空全部油脂。甚至启动后，也可再次根据实际情况调整指拨开关，调整供油量。每批次出货都有安装和操作说明书。

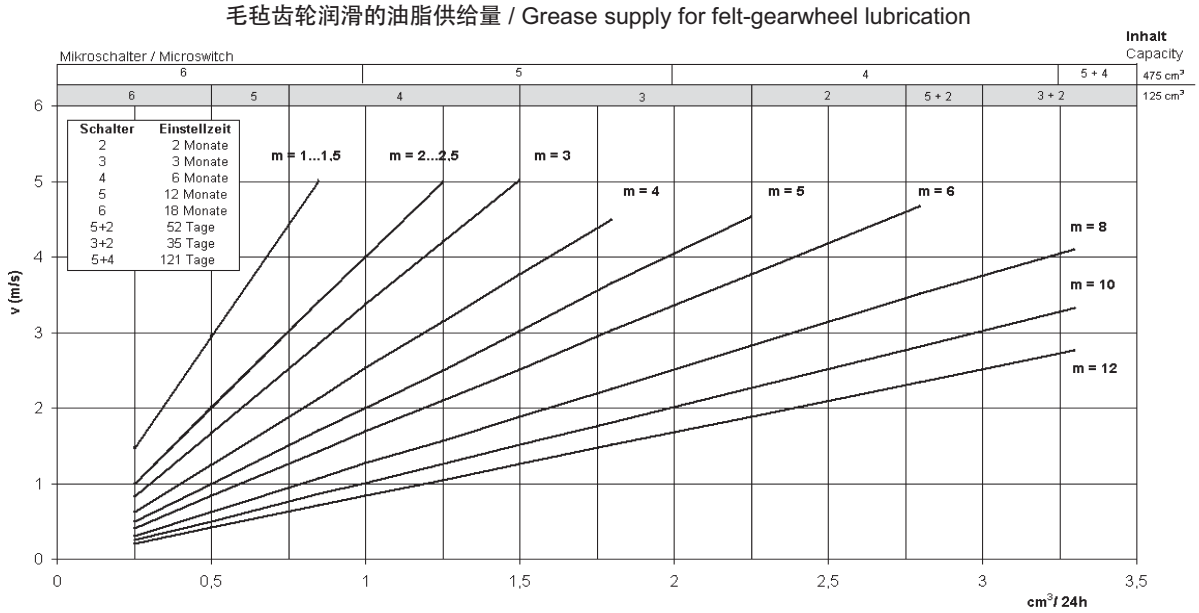
透明的外壳，可以安装在任意位置，随时查看润滑器内的油脂量。当油脂用完，可以再次填充油脂使用。但是氮气压力筒（图3-125cm³，图9-475cm³）和电池需要重新更换。125cm³，475cm³润滑器分别使用2节，4节1.5V干电池驱动上面的永久信号灯，以显示润滑器是否工作正常。接触线缆 - 连接到一个自由限位开关或接触器（无需外接电源） -使润滑器与机器运行时间同步。当使用65 91 061或者65 91 057的润滑器时，提供一个额外的3V DC的供电接触线缆。通过给电磁传感器（图.2）供应30V DC 最大200mA电源,在润滑器排空，润滑油耗尽时，传感器发出黄色的光，或者传递信号给控制单元。

补充润滑剂时可考虑以下几点：
- 氮气腔 65 91 001 与电池一起更换
- 充满润滑剂 65 90 002 Microlube GB 0 或 65 90 003 Structovis AHD
- 使用组装工具 65 91 030 和 65 91 031 关闭或打开润滑器

齿轮齿条传动的润滑
当使用毛毡齿轮和电控润滑器润滑齿轮齿条传动系统时，油脂的最佳供给量请参考下表。

Lubrication of rack and pinion drives
When lubricating rack and pinion drives by means of a felt gearwheel and electronically controlled lubricator the optimal grease supply can be seen from the diagram below.

毛毡齿轮润滑的油脂供给量 / Grease supply for felt-gearwheel lubrication



使用润滑毛刷时，请用下一个更高的开关位置。例如，如果选择毛毡齿轮润滑微动开关的位置4，则选择相同的速度和模数的润滑毛刷位置3。

For lubrication with sliding brush use the next higher switch position. If, for example, micro-switch position 4 is chosen for felt-gearwheel lubrication, choose 3 for sliding-brush lubrication at the same speed and with the same module.

压力建立
所有开关拨至“ON”位置，压力需要6~8小时产生。然后设置需要的时间。开关7必须始终打开。在启动润滑器之前，油管内应填满油脂，毛毡齿轮必须浸满油。

Pressure build-up
Set all micro-switches to „ON“. Pressure build-up time 6–8 hours. Then set the desired time. The micro-switch 7 must be always on. Before starting up the lubricator the connecting hose between felt wheel and lubricator should be filled and the felt wheel soaked with grease.

更换电池
电池的使用寿命应为1年，之后需要更换。即使润滑器的指示灯仍然闪烁，但是电池电量已经下降了。润滑器也可以通过中间继电器使用外部电源供电。

Battery exchange
The guaranteed service life of the battery is 1 year. Then the battery should be replaced. Although the control lamp may still flash it is possible that the battery capacity has already decreased. The lubricator can also be operated by means of external power supply via an intermediate relay.

推荐润滑油脂：

毛毡齿轮润滑：
Klüber Microlube GB 0
订货号 65 90 002 (1 kg)
Klüber Structovis AHD
订货号 65 90 003 (1 kg)

Klüber Microlube GB 0
订货号 65 90 002 (1 kg)

另外，下面的油脂也经过测试，效果良好：
Oest Langzeitfett LT 200
BP Energrease LS EP 00
DEA Glissando 6833 EP 00
Fuchs Lubritech Gearmaster ZSA
Molykote G-Rapid plus 3694

Recommended lubricants for rack drives:

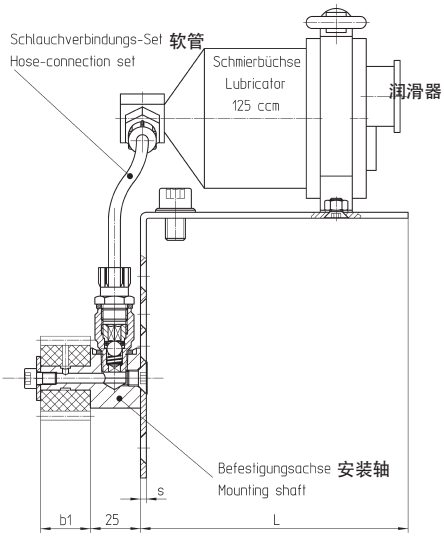
Felt-gear lubrication:
Klüber Microlube GB 0
Order code 65 90 002 (1 kg)
Klüber Structovis AHD
Order code 65 90 003 (1 kg)

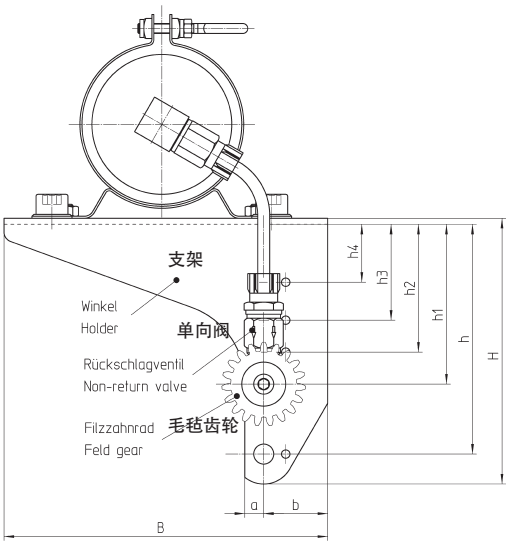
Sliding brush lubrication:
Klüber Microlube GB 0
Order code 65 90 002 (1 kg)

Furthermore the following lubricants have been tested with good results.
Oest Langzeitfett LT 200
BP Energrease LS EP 00
DEA Glissando 6833 EP 00
Fuchs Lubritech Gearmaster ZSA
Molykote G-Rapid plus 3694

HT 系列伺服驱动系统专用输出轴润滑套件
Lubrication unit for HT-Servo Drive System with output shaft for clamp connection

图/Fig. 1





图/Fig. 2

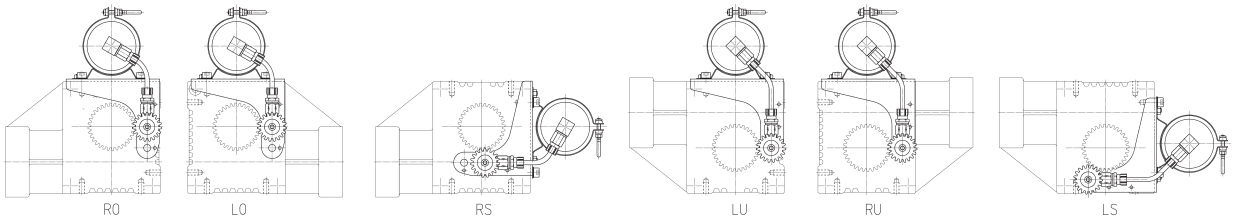
订购代码 Order code 图 1 Fig. 1	图 2 Fig. 2	齿系统 Tooth system	m	z	h	h_1	h_2	h_3	h_4	b_1	b_2	s	b	H	B	L	kg
a_o = 50					95	96	49	33	17			3	30	113	140	104	
65 83 19265 93 012		|	2	32	LU;RU	RO;LO;RS;LS				25	37						1,40
65 83 18265 93 012		/	2	30	LU;RU	RO;LO;RS;LS				25	37						1,40
65 83 19365 93 013		|	3	21	RS	LU;RU		RO;LO;LS		30	36						1,44
65 83 18365 93 013		/	3	20	RS	LU;RU		RO;LO;LS		30	36						1,44
65 83 19465 93 014		|	4	17			LU;RU	RS	RO;LO;LS	40	32						1,54
65 83 18465 93 014		/	4	15			LU;RU	RS	RO;LO;LS	40	32						1,54
a_o = 63					115	80	64	48	29			3	41	133	162	134	
65 84 19265 94 012		|	2	32		LU;RU		RO;LO;RS;LS		25	37						2,00
65 84 18265 94 012		/	2	30		LU;RU		RO;LO;RS;LS		25	37						2,00
65 84 19365 94 013		|	3	21	LU;RU	RO;LO;RS	LS			30	36						1,90
65 84 18365 94 013		/	3	20	LU;RU	RO;LO;RS	LS			30	36						1,90
65 84 19465 94 014		|	4	17		LU;RU;RS		RO;LO;LS		40	32						2,00
65 84 18465 94 014		/	4	15		LU;RU;RS		RO;LO;LS		40	32						2,00
a_o = 80					130	103	85	57	36			3	51	148	198	159	
65 85 19465 95 014		|	4	17;30*	LU;RU	LU*;RU*	RO;LO;RS;LS		RO*;LO*;RS*;LS*	40	32						2,50
65 85 18465 95 014		/	4	15;30*	LU;RU	LU*;RU*	RO;LO;RS;LS		RO*;LO*;RS*;LS*	40	32						2,50
65 85 18565 95 015		|	5	13		LU;RU		RO;LO;RS;LS		50	35						2,70
65 85 17565 95 015		/	5	12		LU;RU		RO;LO;RS;LS		50	35						2,70
65 85 18665 95 016		|	6	–						60	37						2,80
65 85 17665 95 016		/	6	13		LU;RU			RO;LO;RS;LS	60	37						2,80
a_o = 100					140	102	84	52	32			4	54	169	230	182	
65 86 18565 96 015 1)		|	5	15	LU;RU	RO;LO;RS;LS				50	35						3,30
65 86 17565 96 015 1)		/	5	15	LU;RU	RO;LO;RS;LS				50	35						3,30
65 86 18665 96 016 1)		|	6	13	LU;RU		RO;LO;RS;LS			60	37						3,50
65 86 17665 96 016 1)		/	6	13;15*	LU;RU;LU*;RU*		RO;LO;RS;LS;RO*;LO*;RS*;LS*				60	37					3,50
65 86 18865 96 018 1)		|	8	–						80	38						4,30
65 86 17865 96 018 1)		/	8	12			LU;RU	RS	RO;LO;LS	80	38						4,30

图2. ZE-2润滑，ZE-7毛毡齿轮
for fig.2, lubricator of ZE-2 and felt gear of ZE-7

| - 直齿 / straight
/ - 斜齿 / helical

1) auch Schmierbüchse 475 cm³ von ZE-3 verwendbar / also lubricator 475 cm³ of ZE-3 usable

安装形式 / Units mounting possibilities

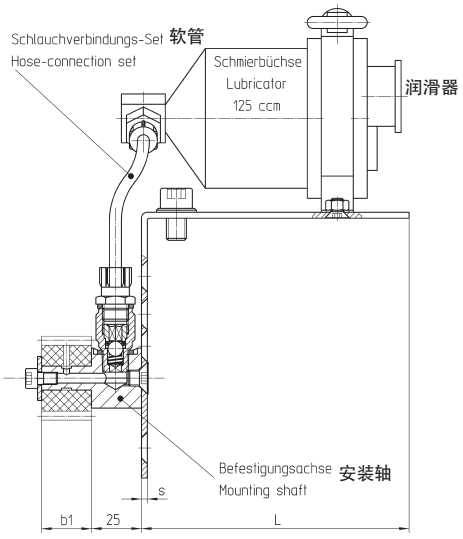


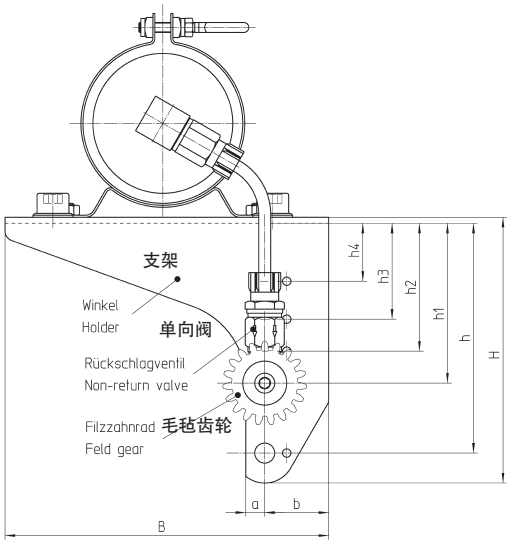
订购举例: a = 80; m = 4 斜齿，如图 LO　65 85 184 (毛毡齿轮距安装面的距离符合h2=85mm)

Ordering example: a = 80; m = 4 helical tooth system, Fig. LO 65 85 184 (Felt gear assembled according to the dimension „h2 = 85" of the mounting surface).

HP-/E-/B-系列伺服驱动系统专用输出轴润滑套件

Lubrication Unit for HP-/E-/B-Servo Drive System





图/Fig. 1

图/Fig. 2

订购代码 Order code 图 1 Fig. 1	图 2 Fig. 2	齿系统 Tooth system	m	z	h	h_1	h_2	h_3	h_4	b_1	b_2	s	b	H	B	L	kg
a_o = 50					95	65	49	33	17		25	3	30	113	134	104	
65 93 19065 93 002		|	2	21		LU; RU	RO; LO; RS	LS		25							1,42
65 93 18065 93 002		/	2	20		LU; RU	RO; LO; RS	LS		25							1,42
65 93 19265 93 002		|	2	32	LU; RU; LS	RO; LO; RS				25							1,40
65 93 18265 93 002		/	2	30	LU; RU; LS	RO; LO; RS				25							1,40
65 93 19365 93 003		|	3	21	RS	LU; RU	RO; LO; LS			30							1,44
65 93 18365 93 003		/	3	20	RS	LU; RU	RO; LO; LS			30							1,44
a_o = 63					115	80	64	48	29		25	3	41	133	162	134	
65 94 19265 94 002		|	2	32	LU; RU	RO; LO; LS	LS			25							1,72
65 94 18265 94 002		/	2	30	LU; RU	RO; LO; LS	LS			25							1,72
65 94 19365 94 003		|	3	21	RS	LU; RU		RO; LO; LS		30							1,79
65 94 18365 94 003		/	3	20	RS	LU; RU		RO; LO; LS		30							1,79
65 94 19465 94 004		|	4	17			LU; RU	RS	RO; LO; LS	40							1,90
65 94 18465 94 004		/	4	15			LU; RU	RS	RO; LO; LS	40							1,90
a_o = 80					130	103	85	57	36		25	3	51	148	198	159	
65 95 19265 95 002		|	2	32	LU; RU		RO; LO; RS; LS			25							2,40
65 95 18265 95 002		/	2	30	LU; RU		RO; LO; RS; LS			25							2,40
65 95 19365 95 003		|	3	21	LU; RU		RO; LO; RS; LS			30							2,39
65 95 18365 95 003		/	3	20	LU; RU		RO; LO; RS; LS			30							2,39
65 95 19465 95 004		|	4	17		LU; RU	RS	RO; LO; RS		40							2,50
65 95 18465 95 004		/	4	15		LU; RU	RS	RO; LO; RS		40							2,50
a_o = 100					140	102	84	52	32		25	4	54	169	230	182	
65 96 19465 96 004 1)		|	4	17; 30*	LU; RU; RS	RO; LO; LS; LU*; RU*		RO*; LO*; LS*		40							2,60
65 96 18465 96 004 1)		/	4	15; 30*	LU; RU; RS	RO; LO; LS; LU*; RU*		RO*; LO*; LS*		40							2,60
65 96 18565 96 005 1)		|	5	13	LU; RU	RS	RO; LO; LS			50							3,30
65 96 17565 96 005 1)		/	5	12	LU; RU	RS	RO; LO; LS			50							3,30
65 96 18665 96 006 1)		|	6	–						60							3,50
65 96 17665 96 006 1)		/	6	13		LU; RU; RS	LS	RO; LO		60							3,50
a_o = 125					198	171	128	102	–		25	4	78	227	290	225	
65 97 18565 97 005 1)		|	5	15	LU; RU		RO; LO; RS; LS			50							3,73
65 97 17565 97 005 1)		/	5	15	LU; RU		RO; LO; RS; LS			50							3,73
65 97 18665 97 006 1)		|	6	13	RS	LU; RU	RO; LO	LS		60							3,88
65 97 17665 97 006 1)		/	6	13; 15*	RS	LU; RU; LU*;RU*	RO; LOLS; RO*; LO*; LS*; RS*			60							3,88
65 97 18865 97 008 1)		|	8	–						80							4,50
65 97 17865 97 008 1)		/	8	12			LU; RU		RO; LO; LS; RS	80							4,50

\| - 直齿 / straight
/ - 斜齿 / helical

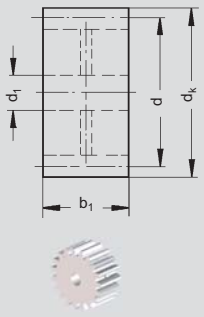
图2. ZE-2润滑，ZE-7毛毡齿轮
for fig.2, lubricator of ZE-2 and felt gear of ZE-7

1) 同样适用于 475 cm³ ZE-3 / also lubricator 475 cm³ of ZE-3 usable

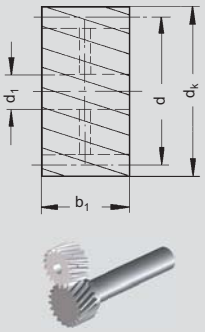
安装可能性见0-5
Units mounting possibilities – see page O – 5

毛毡齿轮 / Felt gear

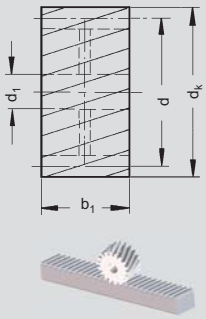
图/Fig. 1
| 直齿系统
| straight tooth system



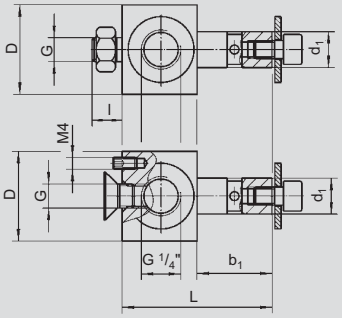
图/Fig. 2
/ 斜齿系统 RH
/ helical tooth system RH



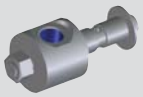
图/Fig. 3
\ 斜齿系统 LH
\ helical tooth system LH



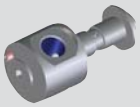
安装轴 / Mounting shaft



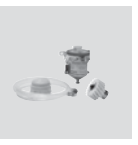
图/Fig. 4



图/Fig. 5



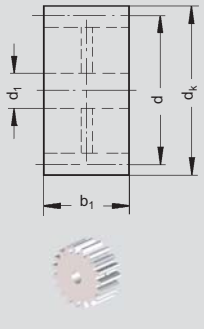
订购代码 Order code	图 Fig.	模数 Module	节距 Pitch	方向 Flank direction	齿数 Nr. of teeth	d	d_k	d_1	b_1	D	L	l	G	g
65 91 140	1	1		I	40	40,0	42,0	12	15					7,5
65 91 100	4	1						12	15	30	40	10	M8	135,0
65 91 126	1	1,5		I	26	39,0	42,0	12	15					7,2
65 91 116	2	1,5		/	24	38,2	42,0	12	15					7,0
65 91 106	3	1,5		\	24	38,2	42,0	12	15					7,0
65 91 100	4	1,5						12	15	30	40	10	M8	135,0
65 91 024	1	1,591	5	I	24	38,2	41,4	12	15					6,8
65 91 100	4	1,591	5					12	15	30	40	10	M8	135,0
65 91 228	1	2		I	19	38,0	42,0	12	25					11,0
65 91 229	2	2		/	18	38,2	42,0	12	25					11,0
65 91 218	3	2		\	18	38,2	42,0	12	25					11,0
65 91 236	1	2		I	36	72,0	76,0	12	25					22,0
65 91 234	2	2		/	34	72,2	76,2	12	25					22,0
65 91 200	4	2						12	25	30	50	10	M8	143,0
65 91 210*	5	2						12	25	30	50		M8	140,0
65 91 220**	5	2						12	25	30	62		M8	150,0
65 91 222	1	2,5		I	22	55,0	60,0	12	25					25,0
65 91 200	4	2,5						12	25	30	50	10	M8	143,0
65 91 210	5	2,5						12	25	30	50		M8	140,0
65 91 220	5	2						12	25	30	62		M8	150,0
65 91 328	1	3		I	19	57,0	63,0	12	30					37,0
65 91 329	2	3		/	18	57,3	63,0	12	30					36,0
65 91 318	3	3		\	18	57,3	63,0	12	30					36,0
65 91 300	4	3						12	30	30	55	10	M8	147,0
65 91 310*	5	3						12	30	30	55		M8	145,0
65 91 320**	5	3						12	30	30	66		M8	155,0
65 91 018	1	3,183	10	I	18	57,3	63,6	12	30					36,0
65 91 300	4	3,183	10					12	30	30	55	10	M8	147,0
65 91 310	5	3,183	10					12	30	30	55		M8	145,0
65 91 320	5	3						12	30	30	66		M8	155,0
65 91 428	1	4		I	19	76,0	84,0	12	40					98,0
65 91 429	2	4		/	18	76,5	84,0	12	40					97,0
65 91 418	3	4		\	18	76,5	84,0	12	40					97,0
65 91 400	4	4						12	40	30	65	10	M8	154,0
65 91 410*	5	4						12	40	30	65		M8	150,0
65 91 420**	5	4						12	40	30	72		M8	160,0
65 91 517	3	5		\	17	90,2	100,0	20	50					133,0
65 91 518	1	5		I	18	90,0	100,0	20	50					133,0
65 91 529	2	5		/	17	90,2	100,0	20	50					133,0
65 91 500	4	5						20	50	50	75	15	M12	520,0
65 91 510	5	5						20	50	40	75		M8	510,0
65 91 520	5	5						20	50	40	85		M8	520,0



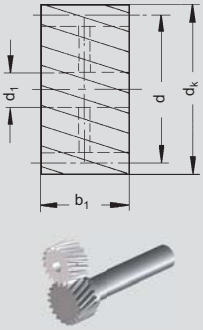
润滑设备 / Lubrication Unit
* 高性能-/经济型-/ 基础型伺服传动系统/ HP-/E-/B-Servo Drive System
** 高扭矩伺服传动系统 / HT-Servo Drive System

毛毡齿轮/ Felt gear

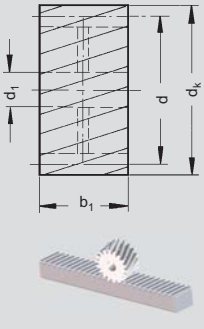
图/Fig. 1
| 直齿系统
| straight tooth system



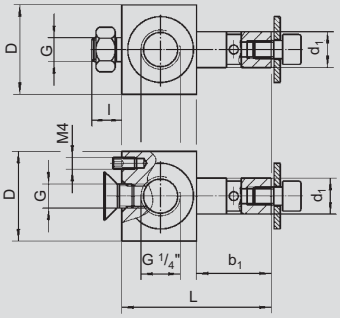
图/Fig. 2
/ 斜齿系统 RH
/ helical tooth system RH



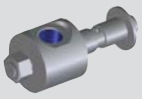
图/Fig. 3
\ 斜齿系统 LH
\ helical tooth system LH



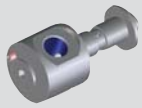
安装轴 / Mounting shaft



图/Fig. 4



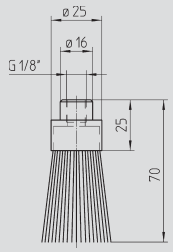
图/Fig. 5



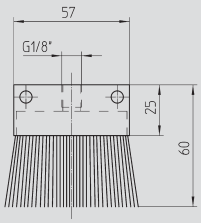
订购代码. Order code	图 Fig.	模数 Module	节距 Pitch	方向 Flank direction	齿数 Nr. of teeth	d	d_k	d_1	b_1	D	L	l	G	g
65 91 617	3	6		\	17	108,2	120,0	20	60					234,0
65 91 618	1	6		I	18	108,0	120,0	20	60					234,0
65 91 629	2	6		/	17	108,2	120,0	20	60					234,0
65 91 600	4	6						20	60	50	85	15	M12	545,0
65 91 610*	5	6						20	60	40	85		M8	535,0
65 91 620**	5	6						20	60	40	97		M8	550,0
65 91 817	3	8		\	17	144,3	160,0	20	80					562,0
65 91 818	1	8		I	18	144,0	160,0	20	80					562,0
65 91 829	2	8		/	17	144,3	160,0	20	80					562,0
65 91 800	4	8						20	80	50	105	15	M12	595,0
65 91 810*	5	8						20	80	50	105		M8	280,0
65 91 820**	5	8						20	80	50	118		M8	600,0
65 91 117	3	10		\	17	180,4	200,0	25	100					750,0
65 91 118	1	10		I	18	180,0	200,0	25	100					750,0
65 91 129	2	10		/	17	180,4	200,0	25	100					750,0
65 91 101	4	10						25	100	50	125	15	M12	650,0
65 91 111	5	10						25	100	50	125		M8	645,0
65 91 114	3	12		\	14	178,3	202,0	25	100					800,0
65 91 115	1	12		I	15	180,0	204,0	25	100					800,0
65 91 124	2	12		/	14	178,3	202,0	25	100					800,0
65 91 102	4	12						25	100	50	145	15	M12	830,0
65 91 112	5	12						25	100	50	145		M8	810,0

润滑设备 / Lubrication Unit
* 高性能-/经济型-/ 基础型伺服传动系统/ HP-/E-/B-Servo Drive System
** 高扭矩伺服传动系统 / HT-Servo Drive System

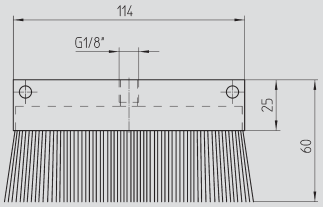
滑动润滑毛刷
Sliding brush lubrication



图/Fig. 1

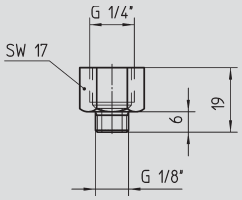


图/Fig. 2



图/Fig. 3

限流阀
Reducer



图/Fig. 4

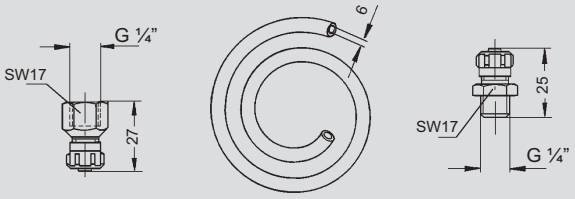
订购代码. Order code	图 Fig.	描述 Description		g 模数 for module	g
65 91 010	1	滑动型润滑毛刷 圆的有螺纹孔	Sliding -type lubricating brush, round, with internal thread	1; 1,5; 2; 3; 4	17
65 91 011	2	滑动型润滑毛刷 平的有螺纹孔	Sliding -type lubricating brush, flat, with internal thread	5; 6; 8	20
65 91 012	3	滑动型润滑毛刷 平的有螺纹孔	Sliding -type lubricating brush, flat, with internal thread	10; 12	40
9 08 05 003	4	限流阀 G $^1/_4$" 转 G $^1/_8$"	Reducer		8

滑动润滑毛刷（使用耐磨的尼龙毛）可以配合润滑器润滑齿轮和齿条。如果毛刷和125 cm³的润滑器连接，必须使用限流阀（图.4）.如果毛刷和475 cm³润滑器连接，必须使用图.4之外的限流阀。

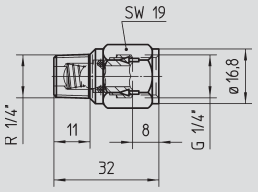
The sliding brush (of M_S with sturdy Nylon bristles) can be used in combination with our lubricators for lubricating either the rack or the pinion. During the assembly of the sliding brush onto the lubricator with 125 cm³ or the house-connection set, the existing lubricator reducer (Fig. 4) must be used. Using the lubricator with 475 cm³ the existing lubricator reducer must be used in combination with the reducer out of Fig. 4.

软管连接装置
Hose-connection set

单向阀
Non-return valve



图/Fig. 5



图/Fig. 6

订购代码 Order code	图 Fig.	描述 Description		g
65 91 020	5	软管连接装置组件: 2 米长塑料软管, 带有内螺纹的导管连接接头, 带有外螺纹的导管连接接头	Hose-connection set comprising: 2 m plastic hose Alumin. hose coupling with inside thread Alumin. hose coupling with outside thread	25
65 91 021	5	软管连接装置组件: 2 米长充满GB0油脂的塑料软管, 带有内螺纹的导管连接接头, 带有外螺纹的导管连接接头	Hose-connection set comprising: 2 m plastic hose filled with GB0 Alumin. hose coupling with inside thread Alumin. hose coupling with outside thread	25
65 91 025	6	止回阀 0,2 bar	Non-return valve 0.2 bar	

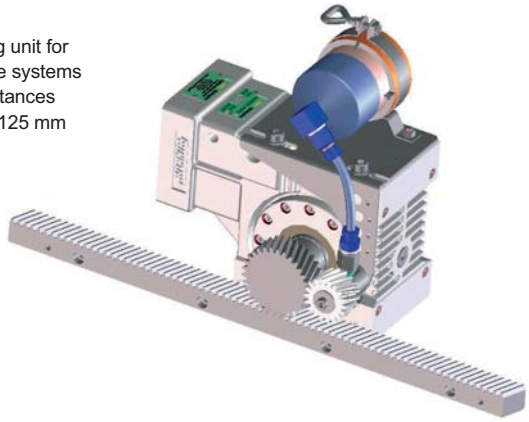
备注:
在安装软管连接装置之前，软管内必须充满油脂。
润滑器参考ZE-4页.

Remark:
Before starting the hose-connection set must be filled up with lubricant. Lubrication see on page ZE-4.

润滑系统 / Lubrication information

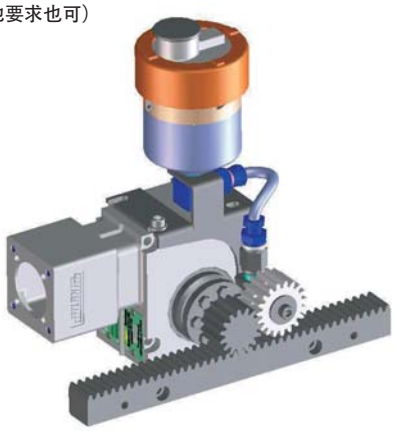
伺服传动系统的润滑装置
中心距50mm至125mm

Lubricating unit for servo-drive systems
Center distances 50 mm to 125 mm



伺服传动系统的润滑装置
中心距32mm（其他要求也可）

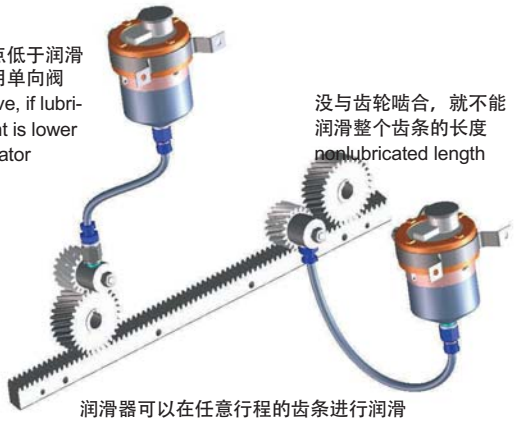
Lubricating unit for servo-drive systems
Center distances 32 m (available on request)



用毛毡齿轮润滑
Lubrication by means of felt gearwheel

如果润滑点低于润滑器，请使用单向阀
Check-valve, if lubricating point is lower than lubricator

没与齿轮啮合，就不能润滑整个齿条的长度
nonlubricated length



润滑器可以在任意行程的齿条进行润滑
Lubrication over the full length

用滑动刷润滑
Lubrication by means of sliding brush

1/4转1/8需要过渡接头和单向阀
Reducer ¼“ to 1/8“ required and check valve

没与齿轮啮合，就不能润滑整个齿条的长度
nonlubricated length

润滑器可以在任意行程的齿条进行润滑
Lubrication over the full length

一个润滑器可以进行两点润滑
Lubrication of 2 lubrication points

同样长度润滑油管连接475毫升润滑器时，建议在两个润滑点间各加一个单向阀。
Lube lines equally long lubricator type 475 cm^3 recommended
Check-valve recommended at both lubrication points

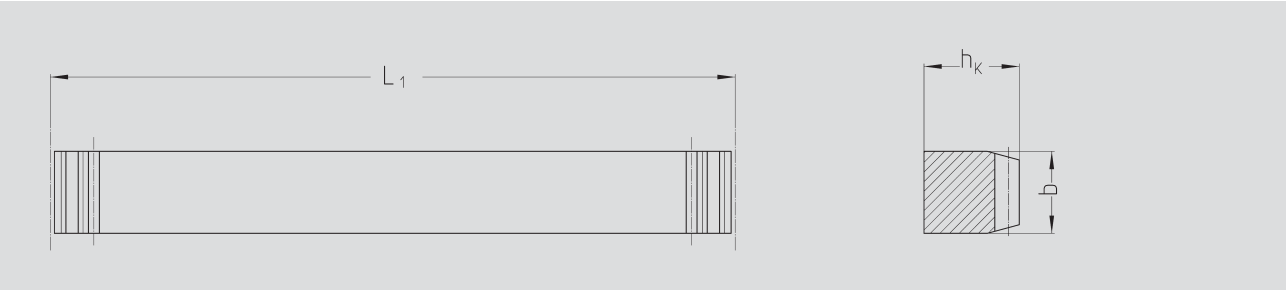
毛毡齿轮可以对任何地方进行润滑
Lubrication by means of felt gearwheel is possible in any position

用滑动刷润滑保持60° 倾斜
Lubrication with sliding brush limited to max. 60° tilt

润滑的重要信息:
– 润滑油要充足
– 毛毡齿轮或者滑动刷浸在润滑油中
– 润滑油剂量装置可有一定压力
– 正确设置润滑油用量

Important information for optimum lubrication:
– Lube lines filled with lubricant
– Felt gearwheel or sliding brush soaked with lubricant
– Pressure available in lubricant metering device
– Dosage properly set at lubricant metering device

直齿齿条安装块
Companion racks for straight tooth system



订购代码 Order code	模数 Module	节线 Pitch	L_1	齿数 Nº of teeth	b	h_k	kg
28 11 999	1		141,37	45	15	15	0,25
28 15 999	1,5		141,37	30	17	17	0,29
28 16 999		5	140,00	28	17	17	0,32
28 20 999	2		188,49	30	25	24	0,80
28 30 999	3		188,49	20	30	29	1,15
28 32 999		10	180,00	18	30	29	1,23
28 40 999	4		188,49	15	40	39	2,07
28 42 999		13,33	186,62	18	40	39	2,28
28 50 999	5		188,49	12	50	39	2,49
28 60 999	6		188,49	10	60	49	3,78
28 80 999	8		201,06	10	80	79	8,90
28 10 999	10		219,91	7	80	79	9,43
28 12 999	12		263,90	7	100	99	17,64

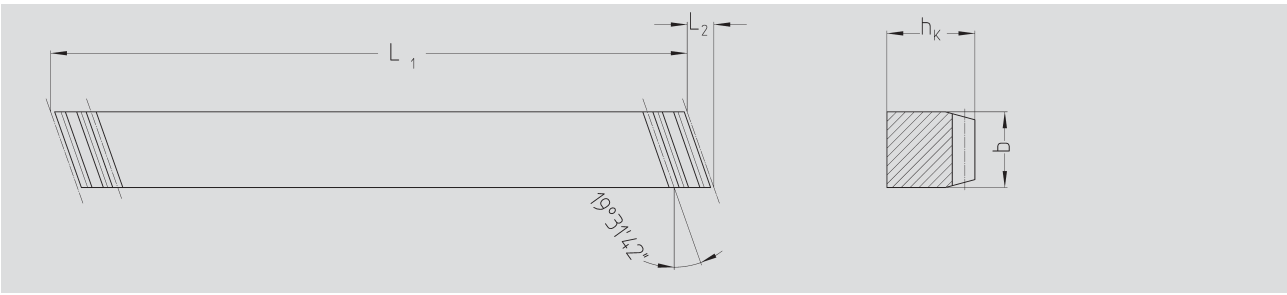
- 感应淬火并磨削,
- 材料 C45.

左旋齿条安装块配合右旋齿条.

- Teeth induction-hardened and ground,
- material C45.

Companion racks left-hand for right-hand racks.

斜齿齿条安装块
Companion racks for helical tooth system



订购代码 Order code	模数 Module	L_1	L_2	齿数 Nº of teeth	b	h_k	kg
29 15 999	1,5	150,00	4,90	30	17	17	0,31
29 20 999	2	200,00	8,87	30	25	24	0,85
29 30 999	3	200,00	10,64	20	30	29	1,20
29 40 999	4	200,00	14,19	15	40	39	2,18
29 50 999	5	200,00	17,73	12	50	39	2,65
29 60 999	6	200,00	21,28	10	60	49	4,02
29 80 999	8	213,33	28,37	8	80	79	9,43
29 10 999	10	233,33	28,37	7	80	79	10,03
29 12 999	12	280,00	35,50	7	100	99	18,78

- 感应淬火并磨削,
- 材料 C45.

左旋齿条安装块配合右旋齿条

- Teeth induction-hardened and ground,
- material C45.

Companion racks left-hand for right-hand racks.

订购代码 Order code	螺栓 Screws	销 Pin	齿条 Rack
28.02.151	M5 x 20	D6 m6 x 24	模数/module 1,5/47.15.xxx
28.02.152	M6 x 20	D6 m6 x 28	模数/module 1,5
28.02.202	M6 x 25	D6 m6 x 30	模数/module 2
28.02.203	M8 x 25	D10 m6 x 36	模数/module 2/Strongline
28.02.302	M8 x 30	D8 m6 x 40	模数/module 3
28.02.303	M10 x 35	D12 m6 x 45	模数/module 3/Strongline
28.02.402	M8 x 40	D8 m6 x 50	模数/module 4/xx.40.xxx
28.02.403	M14 x 45	D16 m 6 x 60	模数/module 4/Strongline
28.02.404	M12 x 45	D12 m6 x 55	模数/module 4/xx.42.xxx
28.02.502	M12 x 55	D12 m6 x 70	模数/module 5
28.02.503	M16 x 55	D16 m6 x 70	模数/module 5/Strongline
28.02.602	M16 x 65	D16 m6 x 80	模数/module 6
28.02.802	M20 x 90	D20 m6 x 100	模数/module 8
28.02.112	M30 x 110	D20 m6 x 120	模数/module 10
28.02.122	M36 x 130	D20 m6 x 140	模数/module 12

配件包：
8 颗螺栓 + 2 颗定位销 ≙ 1 米齿条
螺栓： DIN EN ISO 4762 12.9
定位销：DIN 7979 (ISO 8735-A)

Content of bag:
8 Screws + 2 pins ≙ 1 meter of rack
Screws: DIN EN ISO 4762 12.9
Pins: DIN 7979 (ISO 8735-A)

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订购代码 Order code	描述 Description		模数 Module	相对应的项目. / Relative item no. 斜齿 / helical	 直齿 / straight	kg
29.01.001	安装工具，包含 / Assembly kit, comprising:		1,5			
	1 x 调整装置 / Adjusting device	2.29.00.002		29.15.xxx		
	3 x 磁性量棒 / Gauging roller with magnet	1.29.00.032		39.15.xxx		
	1 x 桥式测量千分表 / Measuring bridge with dial gauge	2.28.01.008		47.15.xxx		
29.01.002	安装工具，包含 / Assembly kit, comprising:		2	29.20.xxx	28.20.xxx	0,40
	1 x 调整装置 / Adjusting device	2.29.00.002		38.21.xxx	33.21.xxx	
	3 x 磁性量棒 / Gauging roller with magnet	1.29.00.042		39.20.xxx	34.20.xxx	
	1 x 桥式测量千分表 / Measuring bridge with dial gauge	2.28.01.008		47.20.xxx	49.29.xxx	
29.01.003	安装工具，包含 / Assembly kit, comprising:		3	29.30.xxx	28.30.xxx	0,44
	1 x 调整装置 / Adjusting device	2.29.00.003		38.31.xxx	33.31.xxx	
	3 x 磁性量棒 / Gauging roller with magnet	1.29.00.050		39.30.xxx	34.30.xxx	
	1 x 桥式测量千分表 / Measuring bridge with dial gauge	2.28.01.008		47.30.xxx	49.39.xxx	
29.01.004	安装工具，包含 / Assembly kit, comprising:		4	29.40.xxx	28.40.xxx	0,55
	1 x 调整装置 / Adjusting device	2.29.00.003		38.41.xxx	33.41.xxx	
	3 x 磁性量棒 / Gauging roller with magnet	1.29.00.070		39.40.xxx	34.40.xxx	
	1 x 桥式测量千分表 / Measuring bridge with dial gauge	2.28.01.008		47.40.xxx	49.49.xxx	
29.01.024	安装工具，包含 / Assembly kit, comprising:		4	29.42.xxx	28.42.xxx	0,55
	1 x 调整装置 / Adjusting device	2.29.00.005		29.xx.xx7	28.xx.xx7	
	3 x 磁性量棒 / Gauging roller with magnet	1.29.00.070		39.42.xxx	34.42.xxx	
	1 x 桥式测量千分表 / Measuring bridge with dial gauge	2.28.01.008		39.40.xx8	34.40.xx8	
29.01.005	安装工具，包含/ Assembly kit, comprising:		5	29.50.xxx	28.50.xxx	0,8
	1 x 调整装置 / Adjusting device	2.29.00.005		38.51.xxx	33.51.xxx	
	3 x 磁性量棒 / Gauging roller with magnet	1.29.00.090		39.50.xxx	34.50.xxx	
	1 x 桥式测量千分表 / Measuring bridge with dial gauge	2.28.01.015		47.50.xxx		
29.01.006	安装工具，包含 / Assembly kit, comprising:		6	29.60.xxx	28.60.xxx	0,90
	1 x 调整装置 / Adjusting device	2.29.00.006		39.60.xxx	34.60.xxx	
	3 x 磁性量棒 / Gauging roller with magnet	1.29.00.100		47.60.xxx		
	1 x 桥式测量千分表 / Measuring bridge with dial gauge	2.28.01.015				
29.01.008	安装工具，包含/ Assembly kit, comprising:		8	29.80.xxx		1,35
	1 x 调整装置 / Adjusting device	2.29.00.008	斜齿	47.80.xxx		
	3 x 磁性量棒 / Gauging roller with magnet	1.29.00.140	helical			
	1 x 桥式测量千分表 / Measuring bridge with dial gauge	2.28.01.015				
28.01.008	安装工具，包含 / Assembly kit, comprising:		8		28.80.xxx	1,15
	1 x 调整装置 / Adjusting device	2.28.00.008	直齿			
	3 x 磁性量棒 / Gauging roller with magnet	1.29.00.140	straight			
	1 x 桥式测量千分表 / Measuring bridge with dial gauge	2.28.01.015				
29.01.010	安装工具，包含 / Assembly kit, comprising:		10	29.10.xxx	28.10.xxx	1,40
	1 x 调整装置 / Adjusting device	2.29.00.008		47.10.xxx		
	3 x 磁性量棒 / Gauging roller with magnet	1.29.00.180				
	1 x 桥式测量千分表 / Measuring bridge with dial gauge	2.28.01.015				
29.01.012	安装工具，包含 / Assembly kit, comprising:		12	29.12.xxx	29.13.xxx	1,50
	1 x 调整装置 / Adjusting device	2.29.00.008				
	3 x 磁性量棒 / Gauging roller with magnet	1.29.00.200				
	1 x 桥式测量千分表 / Measuring bridge with dial gauge	2.28.01.015				



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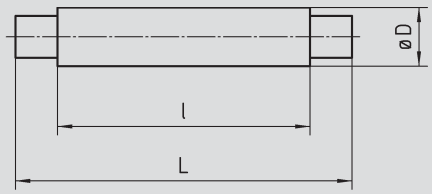
订购代码. Order code	描述 Description		模数 Module	相对应的项目. / Relative item no. 斜齿 / helical	 直齿 / straight	kg
29.01.102	安装工具，包含 / Assembly kit, comprising:		2	29.25.xxx	28.25.xxx	0,40
	1 x 调整装置 / Adjusting device	2.29.00.102				
	3 x 磁性量棒 / Gauging roller with magnet	1.29.00.042				
	1 x 桥式测量千分表 / Measuring bridge with dial gauge	2.28.01.008				
29.01.103	安装工具，包含 / Assembly kit, comprising:		3	29.35.xxx	28.35.xxx	0,44
	1 x 调整装置 / Adjusting device	2.29.00.103				
	3 x 磁性量棒 / Gauging roller with magnet	1.29.00.050				
	1 x 桥式测量千分表 / Measuring bridge with dial gauge	2.28.01.008				
29.01.104	安装工具，包含 / Assembly kit, comprising:		4	29.45.xxx	28.45.xxx	0,55
	1 x 调整装置 / Adjusting device	2.29.00.104				
	3 x 磁性量棒 / Gauging roller with magnet	1.29.00.070				
	1 x 桥式测量千分表 / Measuring bridge with dial gauge	2.28.01.008				
29.01.105	安装工具，包含/ Assembly kit, comprising:		5	29.55.xxx	28.55.xxx	0,8
	1 x 调整装置 / Adjusting device	2.29.00.105				
	3 x 磁性量棒 / Gauging roller with magnet	1.29.00.090				
	1 x 桥式测量千分表 / Measuring bridge with dial gauge	2.28.01.015				



Deutsches Patent
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订购代码. Order code	描述 Description	模数 Module	L	l	D	g
1.29.00.042	3 x 磁性量棒 / 3 x gauging roller with magnet	2	28	20	4,2	2
1.29.00.050	3 x 磁性量棒 / 3 x gauging roller with magnet	3	33	25	5	5
1.29.00.070	3 x 磁性量棒 / 3 x gauging roller with magnet	4	40	30	7	15
1.29.00.090	3 x 磁性量棒 / 3 x gauging roller with magnet	5	42	34	9	20
1.29.00.100	3 x 磁性量棒 / 3 x gauging roller with magnet	6	43	35	10	25
1.29.00.140	3 x 磁性量棒 / 3 x gauging roller with magnet	8	45	35	14	45
1.29.00.180	3 x 磁性量棒 / 3 x gauging roller with magnet	10	42	35	18	75
1.29.00.200	3 x 磁性量棒 / 3 x gauging roller with magnet	12	50	43	20	75

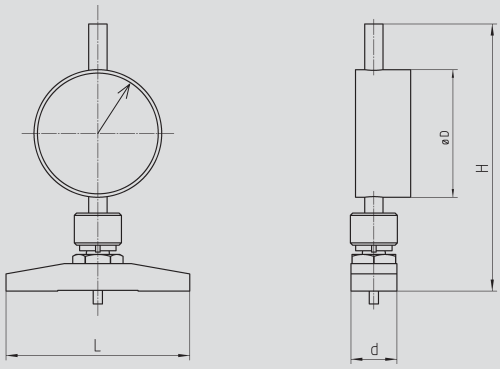
材料:热处理钢

描述:
量棒放在安装好的齿条的齿隙内，和拼接处。
在测量台上或其他平面上调整桥式千分表为0。安装调整装置。
通过调整桥式千分表和调整装置，移动待安装齿条，从而得到最佳的节线。千分表上的指针应该达到，如果可以，预期设置好的0位置。

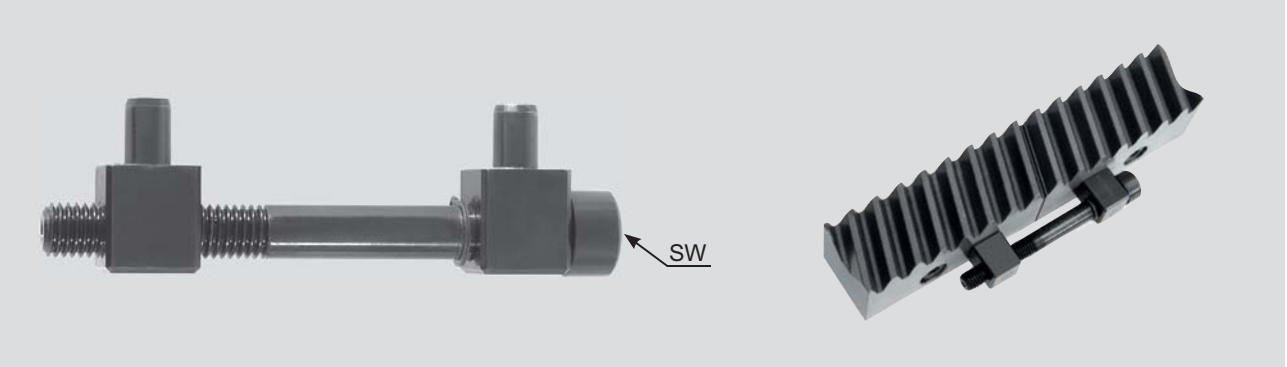
Material: Hardened steel.

Description:
The gauging rollers (patent) are placed in the tooth gaps of the already mounted rack, of the rack to be mounted, and in the gap at the joint.
Adjust the measuring bridge on a measuring plate or other level surface to zero. Mount the adjusting device.
By means of the measuring bridge and the adjusting device it is now possible to adjust the optimal pitch by moving the racks to be assembled. The pointer of the dial gauge should, if possible, reach the pre-set zero value.

桥式测量千分表 / Measuring bridge



订购代码. Order code	描述 Description	模数 Modulde	L	b	H	D	g
2.28.01.008	桥式测量千分表 / Measuring bridge	2 – 4	80	20	115	58	310
2.28.01.015	桥式测量千分表 / Measuring bridge	5 – 12	150	20	120	58	420



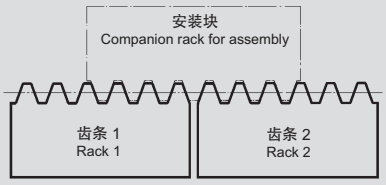
订购代码 Order code	描述 Description	SW	模数 Module	相对应的项目 / Relative item no. 斜齿 / helical	 直齿 / straight	kg
2.29.00.002	调整装置 / Adjusting device	5	2	29.20.xxx 38.21.xxx 39.20.xxx 47.20.xxx	28.20.xxx 33.21.xxx 34.20.xxx	0,12
StrongLine 2.29.00.102	调整装置 / Adjusting device	5	2	29.25.xxx	28.25.xxx	0,12
2.29.00.003	调整装置 / Adjusting device	6	3 + 4	29.30.xxx 38.31.xxx 39.30.xxx 47.30.xxx 29.40.xxx 38.41.xxx 39.40.xxx 47.40.xxx	28.30.xxx 33.31.xxx 34.30.xxx 28.40.xxx 33.41.xxx 34.40.xxx	0,14
StrongLine 2.29.00.103	调整装置 / Adjusting device	6	3	29.35.xxx	28.35.xxx	0,14
StrongLine 2.29.00.104	调整装置/ Adjusting device	6	4 + 5	29.45.xxx 29.55.xxx	28.45.xxx 28.55.xxx	0,03
2.29.00.005	调整装置 / Adjusting device	10	5	29.50.xxx 38.51.xxx 39.50.xxx 47.50.xxx	28.50.xxx 33.51.xxx 34.50.xxx	0,3
2.29.00.006	调整装置 / Adjusting device	14	6	29.60.xxx 39.60.xxx 47.60.xxx	28.60.xxx 34.60.xxx	0,44
2.29.00.008	调整装置 / Adjusting device	14	8 – 12	29.80.xxx 47.80.xxx 29.10.xxx 47.10.xxx	28.10.xxx	0,82
2.28.00.008	调整装置 / Adjusting device	14	8 直齿/straight		28.80.xxx	0,46

将调整装置装入齿条定位销孔中，通过旋转装置上的螺栓，调整齿条轴向移动。这可以调整拼接处的量棒到正确的位置，从而达到准确的拼接处节线。调整装置可以保持在齿条上，因为磁力可以保证在任意安装位置使用。一直到模数6，扳手的螺栓的尺寸和齿条安装螺栓一致。

By fitting the adjusting device (patent pending) in the pinholes of the toothed rack it is possible to move the rack to be assembled axially in both directions by turning the screw. This permits to adjust the correct dimension over rollers and the accurate pitch at the rack joint. The adjusting device is held in place on the rack by means of magnetic force and can be used in any mounting position. Up to module 6 the wrench sizes correspond to the rack mounting screws.

装配说明

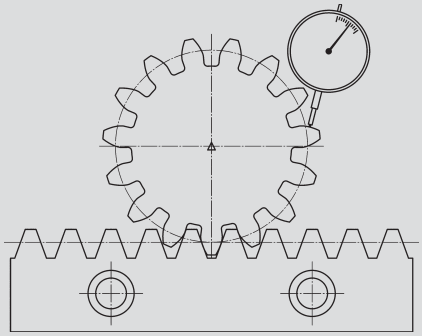
齿条
为了能把标准长度齿条拼接成任意所需的长度，在每根齿条的两端都是半个齿节距。右侧的图片显示了齿条1和齿条2是如何拼接成正确极限位置。对于斜齿齿条可以使用相反方向的齿条安装块拼接（订购代码请参考相关齿条页面）。



为了确保优化的齿条安装，如果齿条安装孔要之前准备好，我们推荐在机架的中端开始往左和右端确定孔的尺寸来打孔。用扭矩扳手和12.9等级螺丝，锁紧齿条。对于长度为0.5米的齿条，是必要加工销孔。

螺纹 Thread	M5	M6	M8	M10	M12	M14	M16	M20	M30	M36
锁紧扭矩- moment Tighten torque	9 Nm	16 Nm	40 Nm	76 Nm	135 Nm	210 Nm	340 Nm	660 Nm	2300 Nm	4100 Nm

在传动系统中，齿轮和齿条的齿节线必须保持平行。我们建议使用蓝色网格线，载荷的情况下检查轴承模式。齿轮和齿条间的背隙需在高点进行调整，并参照表格调整。



背隙 / recomendation for backlash:

Q3: min. 0,010
Q5: min. 0,011
Q6: min. 0,027 (m= 1,5 – 4) / min.0,020 (m= 5 – 6)
Q7: min. 0,037 (m= 1,5 – 4) / min.0,028 (m= 5 – 6)
Q8: min. 0,043 (xx.xx.xx8) / 0,080 (xx.xx.xx0)
Q9: min. 0,080
Q10: min. 0,080

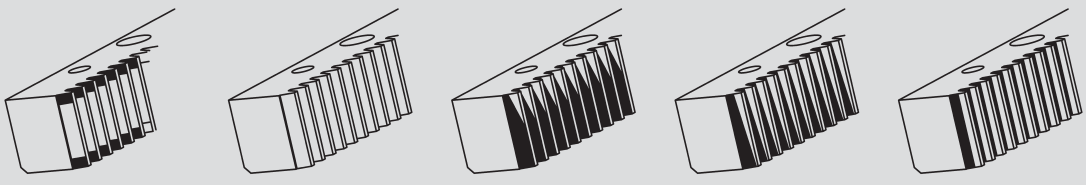
Max: 0,05 x Modul 2–12 / module 2–12
Max: 0,1 x Modul 1,5 / module 1,5

Mounting instructions

Racks
To make it possible to link our standard racks to form any desired length, the teeth are cut so that there is half a tooth gap at each end of the rack. The opposite diagram shows how rack 1 and rack 2 can be brought into the correct pitch position. Fitting aids with teeth cut in the opposite direction are available for linking helical-tooth systems. See page ZF-2. A better mounting result could be reached with the help oft he Assembly kit. Description see page ZF 10.

The mounting screws are to be tightened to the torque of socket head cap screws 12.9 using a torque wrench and table. For the 0.5 m long racks it is absolute necessary to use the pin holes.

At rack and pinion drives, the pitch lines of pinion and rack has to be parallel. To check this matter, we recommend to use blue mesh colour and to check the bearing pattern under load conditions. The backlash in between rack and pinion has to be adjusted at the high point. The backlash should be according to the table.



正确 correct　正确 correct　错误 wrong　错误 wrong　错误 wrong

齿厚公差和滚珠间的测量关系:

齿条的齿厚公差通常可以通过滚珠的测量而计算出来，它不可以直接测得。待测的滚珠被放置在齿与齿间，通过齿条背面测得。

所以齿厚公差可以通过滚珠测量的重复计算而测得。

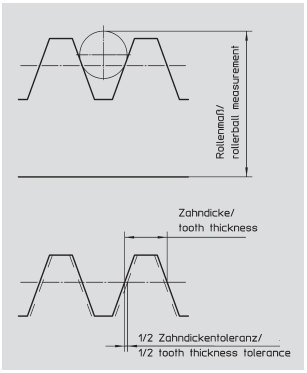
更多齿条信息请登录：
http://www.atlantagmbh.de/en/products/racks-and-pinions/

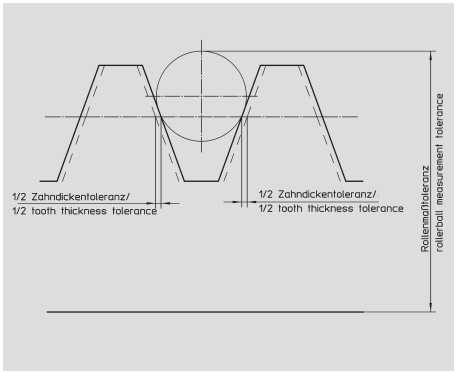
Relation in between tooth thickness and roller ball measurement:

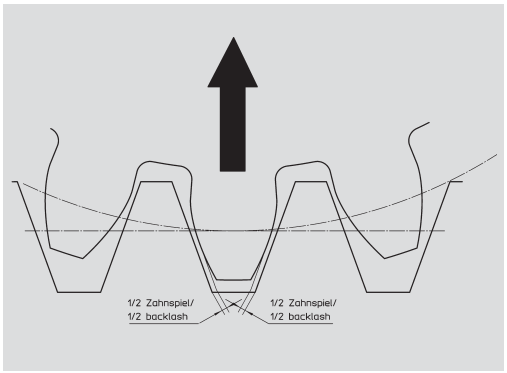
The tooth thickness of racks is usually measured via the roller ball measurement as the tooth thickness could not be measured directly. A measuring roller is put into the teeth and measured to the back of the rack.

So tooth thickness tolerances could be measured by recalculating of the roller ball measurement.

Furter Information about racks under
http://www.atlantagmbh.de/en/products/racks-and-pinions/



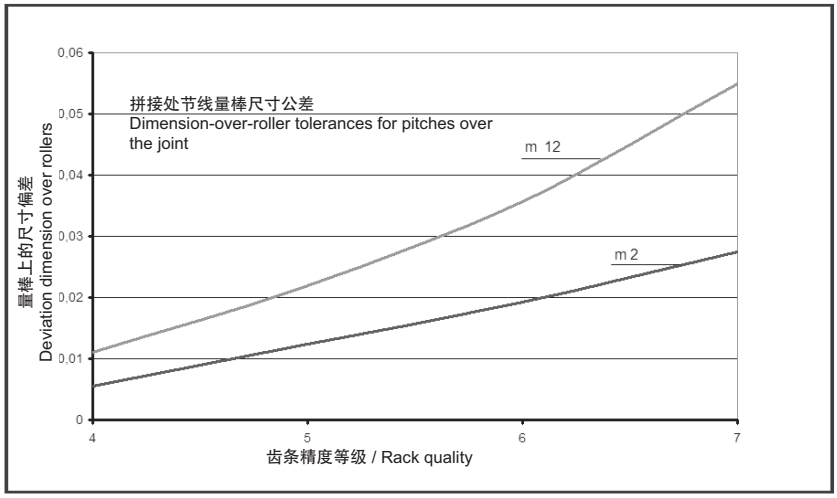




齿厚公差 Tooth thickness tolerance	滚珠测量公差 Roller ball measurement tolerance	背隙 backlash	径向方式 radial way
0,01	0,014	0,01	0,014
0,02	0,027	0,02	0,027
0,03	0,041	0,03	0,041
0,04	0,055	0,04	0,055
0,05	0,069	0,05	0,069
0,06	0,082	0,06	0,082
0,07	0,096	0,07	0,096
0,08	0,110	0,08	0,110
0,09	0,124	0,09	0,124
0,10	0,137	0,10	0,137
0,11	0,151	0,11	0,151

描述

Description



亚特兰齿条的安装可以通过安装工具得到理想的节线公差。布置好待安装齿条后，装入固定螺栓，轻轻将螺栓旋入。

Atlanta toothed racks can be assembled to the correct pitch by means of assembly aids. After positioning the racks for assembly insert the fixing screws of the rack and slightly turn them in by hand.

放好调整装置在齿条的已有销孔上。调整装置因为磁力作用与齿条贴合。任意方位均可安装。

Arrange the rack adjusting device in the existing pinholes of the racks. The device is held in position on the racks by magnetic force. Any mounting position is possible.

量棒放入相邻的两根齿条的齿谷内和拼接处内。量棒会在磁力作用下与齿条贴合，因此量棒可以在任何方位应用。也因为有磁力作用，量棒总是准确的贴合齿面。齿面和拼接处必须清除残留物和其他任何异物。

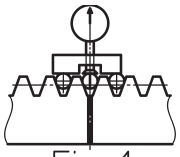


Fig. 1

The gauging rollers are inserted in the two adjacent racks and in the gap at the joint. They, too, are held in place in the tooth space by magnetic force and can therefore be used in any mounting position of the racks. It is thus ensured that they are always accurately positioned on the tooth flanks. The tooth gaps must be free from residues or any other foreign matter.

使用在测量平台或是其他平面上调零后的桥式测量千分尺在量棒上测量变化。准确拼接处节线可以通过调整齿条来达到。草图显示了良好的拼接质量的获得基于拼接处量棒位置的变化。

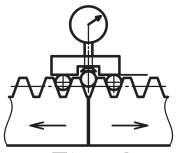


Fig. 2

With the measuring bridge set to zero on a measuring plate or another level surface it is now possible to measure the variation of the dimension over the roller. The exact pitch at the joint can then be adjusted by movingg the rack with utmost precision in either direction. The sketch shows the excellent toothing quality obtained based on the variation of the dimension over rollers at the joint of the racks.

因此齿条位置的调节不再需要用锤子敲击了。有轻微预应力的齿条被放在正确的位置保持在该位置直至拧紧螺栓。

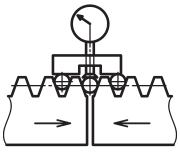


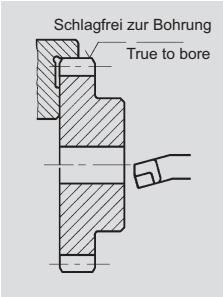
Fig. 3

It is therefore no longer necessary to adjust the rack by tapping with a hammer. The slightly prestressed rack is put in the correct position and held in this position until it is screwed together.

安全说明：
下面的预防措施是必须的：
确保不会接触到旋转部件（例如输出轴，齿轮，齿条），减速箱固定螺栓要紧固。避免接触的润滑油脂。参考相关说明。

Safety instructions
The following preventive measures are necessary:
Ensure there can be no contact with rotating parts (for example output shaft, spur wheel, rack) and gearbox-bolts are tight. Contact with lubricant must be avoided. Refer to data sheet.

二次加工：
24.98.xxx/24.99.xxx系列齿轮渗碳处理并且齿面淬火。可以根据客户要求加工。
我们提供的06/07/21/22和23系列未淬火齿轮有盲孔，客户可以自行加工，也可以我们按照客户要求加工（车削内圆，镗孔，开键槽，淬火等）。为了保证二次加工后的齿轮工作可靠，不仅要考虑齿轮的精度等级，还要考虑孔的同心度。选择加工工艺时必须认真确认。由于我们的齿轮的齿顶圆和齿的加工是一次装卡加工的或者滚铣刀切削齿得到，所以我们推荐装卡齿轮齿顶圆加工，如右图。
带有轮毂的标准齿轮和某些侧面平齿轮（所使用的材料参考尺寸页面）是使用常规热处理的C45钢（材料编号：No. 1.0503）加工而成。如果更高的强度要求，这些元件可以调质处理，齿面可以火焰或者感应淬火（硬度大约50HRC）。装配面必须感应淬火后加工。在火焰或者感应淬火处理我们的齿轮时，必须遵守相关规定。



最大孔径请向我们询问

Finishing
Gears serial no. 24.98.xxx/24.99.xxx are carburized and the teeth induction hardened. Finishing according to customers request is possible.
All soft spur gears of our off-the-shelf program range with order code series 06/07/21/22 and 23 are prebored and thus can be finished by us or by the customer to the required mounting dimensions (turning of inside diameter, boring, keyseating, hardening, etc.). In order to ensure proper functioning of the finished spur gears it is important to consider not only the toothing quality but also the concentricity in relation to the mounting bore. This should be born in mind when choosing the appropriate machining process. Since the outside diameter of our standard gears is turned in one operation true to the mounting bore and/or hobbed when cutting the teeth, we recommend to proceed as shown on the opposite sketch.
All standard spur gears with one-sided hub as well as certain plate wheels (for material, see the dimension tables) are manufactured from normalized heat treatable steel C45 (Material No. 1.0503). If a higher strength is required, these drive elements of C 45 can be quenched and tempered or optionally the teeth can be flame or induction hardened (approx. 50 HRC). Fitting surfaces should be finished only after induction-hardening. Be sure to observe the relevant regulations when flame-or induction-hardening our off-the-shelf standard gears.

Maximum bore diameter of the pinion on request.

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N Norway

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SGP Singapore

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E Spain

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CH Switzerland

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TR Turkey

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1. Allgemeine Bestimmungen

I. Diese Bedingungen gelten für alle Lieferungen und Leistungen von uns, der Atlanta Antriebssysteme E. Seidenspinner GmbH & Co. KG, an Unternehmer (Besteller).

II. Entgegenstehende, zusätzliche oder abweichende Einkaufsbedingungen des Bestellers werden nicht Vertragsinhalt, es sei denn, wir hätten ihrer Geltung ausdrücklich schriftlich zugestimmt. Dieses Zustimmungserfordernis gilt auch dann, wenn wir eine Lieferung an den Besteller in Kenntnis seiner entgegenstehenden oder abweichenden Bedingungen vorbehaltlos ausführen.

2. Vertragsschluss und Vertragsdurchführung

I. Unsere Angebote sind freibleibend und unverbindlich.

II. Verträge kommen nur durch unsere schriftliche Auftragsbestätigung oder Rechnung zustande. Unser Schweigen auf Angebote, Bestellungen, Aufforderungen oder sonstige Erklärungen des Bestellers gilt nur als Zustimmung, sofern dies ausdrücklich schriftlich vereinbart wurde.

III. Abbildungen, Zeichnungen, Gewichts-, Maß-, Farb- und Leistungsangaben sowie sonstige Beschreibungen der Ware aus den zu dem Angebot gehörenden Unterlagen sind nur annähernd maßgebend, soweit sie nicht ausdrücklich als verbindlich bezeichnet sind. Sie stellen keine Vereinbarung oder Garantie einer entsprechenden Beschaffenheit der Ware dar.

IV. Wir behalten uns an unseren Mustern, Skizzen, Schablonen, Kostenvoranschlägen, Gesenken, Werkzeugen, Zeichnungen u.ä., Informationen körperlicher und nicht körperlicher Art (auch in elektronischer Form) das Eigentum und/oder sämtliche Urheber- und sonstige Schutzrechte vor. Sie dürfen Dritten nur nach unserer vorherigen schriftlichen Zustimmung zugänglich gemacht werden und sind uns auf Verlangen unverzüglich kostenfrei nebst sämtlichen etwa angefertigten Vervielfältigungen zurückzugeben; elektronisch gespeicherte Unterlagen müssen gelöscht werden.

V. Bei Sonderanfertigungen gelten Mehr- oder Minderlieferungen bis zu 10% der bestellten Menge als vertragsgemäße Erfüllung.

VI. Mangels besonderer Vereinbarung müssen Bestellungen auf Abruf innerhalb eines Jahres, beginnend mit dem Tag der Bestellung, abgerufen werden. Anderenfalls sind wir nach fruchtlosem Ablauf einer angemessenen Nachfrist berechtigt, die Ware zu liefern und in Rechnung zu stellen, vom Vertrag zurückzutreten oder, falls der Besteller schuldhaft gehandelt hat, Schadensersatz statt der Leistung zu verlangen. Wir sind auch berechtigt, dem Besteller den für die tatsächlich abgerufenen Mengen gültigen Preis zu berechnen.

VII. Von uns für den Besteller hergestellte Werkzeuge bleiben auch dann unser Eigentum, wenn wir dem Besteller einen Teil der Kosten für die Herstellung des Werkzeuges berechnen.

VIII. Werden uns vom Besteller zur Bearbeitung Teile beigestellt („Beistellteile"), gilt Folgendes: Der Lieferung der Beistellteile muss ein Lieferschein beigefügt werden. Im Lieferschein müssen uns die Anzahl und der Werkstoff dieser Teile mitgeteilt werden. Zum Einrichten unserer Maschinen benötigen wir Einstellstücke. Wenn wir keine andere Information vom Besteller erhalten, können wir die benötigten Einstellstücke aus der Menge der vom Besteller gelieferten Beistellteilen verwenden. Dies ist mindestens 1 Stück, jedoch max. 10% der angelieferten Menge an Beistellteilen. Fehlmengen aufgrund nicht ausreichend gelieferter Beistellteile können nicht beanstanden werden. Der Werkstoff muss bestmögliche Bearbeitung gewährleisten. Vorgearbeitete Teile müssen maßhaltig und mit den erforderlichen Toleranzen angeliefert werden, anderenfalls sind wir zur Rückgabe auf Kosten des Bestellers berechtigt. Wir haften nicht für Mängel, die auf der Beschaffenheit der gelieferten Teile, insbesondere ihres Werkstoffes beruhen. Werden Teile durch Materialfehler oder Mängel, die wir nicht zu vertreten haben, unbrauchbar, sind wir berechtigt, die in diesem Zusammenhang aufgewandten Bearbeitungskosten dem Besteller in Rechnung zu stellen. Die Geltendmachung eines weiteren Schadens bleibt uns vorbehalten.

3. Fristen für Lieferung; Verzug

I. Die Einhaltung von Lieferfristen setzt voraus, dass alle kaufmännischen und technischen Fragen geklärt und sämtliche vom Besteller zu liefernden Unterlagen, erforderlichen Genehmigungen und Freigaben sowie etwa zu liefernde Beistellteile gem. Ziff. 2. VIII. rechtzeitig bei uns eingegangen sind und vereinbarte Zahlungsbedingungen und sonstige Pflichten durch den Besteller eingehalten werden. Die Lieferfrist verlängert sich angemessen, wenn die Voraussetzungen nach Satz 1 nicht rechtzeitig erfüllt werden; dies gilt nicht, wenn wir die Verzögerung zu vertreten haben.

II. Die Lieferung steht unter dem Vorbehalt rechtzeitiger und ordnungsgemäßer Selbstbelieferung. Sich abzeichnende Verzögerungen teilen wir dem Besteller sobald als möglich mit.

III. Nachträglich vom Besteller gewünschte Änderungen der Bestellung unterbrechen die Lieferfrist bis zur Verständigung über die gewünschte Änderung. Anschließend beginnt eine neue, angemessene Lieferfrist zu laufen.

IV. Der Rücktritt vom Vertrag aufgrund unseres Lieferverzuges setzt in jedem Fall den fruchtlosen Ablauf einer angemessenen Nachfrist voraus.

V. Können Lieferfristen wegen höherer Gewalt z.B. Mobilmachung, Krieg, Aufruhr, oder ähnlichen Ereignissen z.B. Arbeitskämpfen, die außerhalb unseres Einflussbereiches liegen, nicht eingehalten werden, verlängern sie sich angemessen.

1. General Provisions

I. These General Terms shall apply to all deliveries and services which we, Atlanta Antriebssysteme E. Seidenspinner GmbH & Co. KG, provide or make to business owners (purchasers).

II. Purchase conditions of the purchaser which conflict with, supplement the scope of, or deviate from these General Terms shall not become part of the contract unless we explicitly agree to their application in writing. This approval requirement shall also apply if we carry out a delivery to the purchaser without reservations while being aware of the purchaser's conflicting or deviating conditions.

2. Conclusion of Contract and Implementation

I. All our offers are without engagement and non-binding.

II. A contract does not exist until we issue a written confirmation of the order or an invoice. If we do not reply to offers, orders, requests, or other declarations of the purchaser, this shall only be deemed consent if an express written agreement to this effect has been made.

III. Pictures, drawings, information as to weights, measures, colors and performance, and any other descriptions of the goods in the documents which form part of the offer are approximations only unless they are expressly stated to be binding. They do not constitute any agreement on or guarantee of a corresponding quality of the goods.

IV. We retain our ownership of and/or our copyrights and other property rights in all our samples, sketches, patterns, cost estimates, dies, tools, drawings, and similar items, as well as in any information, whether tangible or intangible (including in electronic form). Such items or information may only be made available to third parties with our prior written consent and, at our request, must be returned to us without undue delay and free of charge along with any copies made; documents which have been stored electronically must be deleted.

V. In the case of custom-made products, deliveries which exceed or fall short of the quantity ordered by up to 10% shall be deemed to be as agreed.

VI. In the absence of a separate agreement, requests for delivery within the scope of orders for delivery upon request must be made within one year of the order date. Otherwise, we may deliver and issue an invoice for the goods, withdraw from the contract or, if the purchaser has acted culpably, claim damages in lieu of performance after setting a reasonable additional time period for performance to no avail. In addition, we may charge the purchaser for the quantities actually requested at the applicable prices.

VII. Tools manufactured by us on behalf of the purchaser will remain our property even if we charge the purchaser for part of the cost of manufacturing the tools.

VIII. If the purchaser provides us with parts for processing ("parts to be provided"), the following rules shall apply: The parts to be provided must be delivered along with a delivery note. In this delivery note, we must be informed of the number and material of these parts. We need gauge pieces for setting our machines. If we do not receive any other information from the purchaser, we may take the required number of gauge pieces from the quantity of the parts to be provided which the purchaser has supplied to us. This will be a minimum of 1 piece and a maximum of 10% of the supplied quantity of parts to be provided. Complaints about shortfalls which result from the purchaser's failure to supply a sufficient quantity of the parts to be provided shall be excluded. The material used must allow optimal processing. All prefabricated parts supplied must be true to size and have the required tolerances; otherwise, we may return them at the purchaser's expense. We are not liable for defects which are due to the quality and, in particular, the material of the parts supplied. If parts become unusable as a result of faults in the material or defects for which we are not responsible, we may charge the purchaser for the processing costs incurred in this connection. We reserve the right to assert further claims for damages.

3. Delivery Periods; Default

I. As a prerequisite for adherence to delivery periods, all commercial and technical issues must have been clarified, all documents and all required permits and approvals which need to be supplied by the purchaser and any parts to be provided pursuant to Sec. 2., subsection VIII above must have been timely received by us, and the purchaser must comply with the terms of payment and any other obligations agreed upon. The delivery period shall be reasonably extended if the prerequisites stipulated in the first sentence of this subsection I are not met in due time, unless we are responsible for the delay.

II. Delivery by us shall be subject to the timely and proper receipt of the deliveries from our own suppliers. We will inform the purchaser as soon as possible if it becomes apparent that there will be a delay.

III. Subsequent requests of the purchaser for changes to the order will result in an interruption of the delivery period until the desired change has been agreed upon. Thereafter, a reasonable new delivery period shall commence.

IV. As a prerequisite for the purchaser's withdrawal from the contract following late delivery by us, we must have been given a reasonable additional period of time for performance which has expired to no avail.

V. If delivery periods cannot be adhered to because of events of force majeure, e.g., mobilization, war, civil unrest, or similar events on which we have no influence, such as industrial action, the delivery periods shall be reasonably extended.

VI. Die Lieferfrist ist eingehalten, wenn die Ware bis zum Ablauf der Lieferfrist unser Werk verlassen hat oder dem Besteller die Versandbereitschaft angezeigt wurde. Für den Fall, dass ein Werk abgenommen werden muss, ist, sofern die Abnahme nicht berechtigt verweigert wird, der Abnahmetermin maßgebend, hilfsweise die Mitteilung der Abnahmebereitschaft.

VII. Entsteht im Falle unseres Verzugs dem Besteller ein Schaden, ist er berechtigt, eine pauschale Verzugsentschädigung zu verlangen. Die pauschale Verzugsentschädigung beträgt für jede volle Woche der Verspätung 0,5%, im Ganzen aber höchstens 5% vom Wert der Teile der Gesamtlieferung, die infolge der Verspätung nicht rechtzeitig oder nicht vertragsgemäß verwendet werden können. Uns bleibt der Nachweis vorbehalten, dass dem Besteller gar kein Schaden oder nur ein wesentlich geringerer Schaden als vorstehende Pauschale entstanden ist.

VIII. Schadensersatzansprüche wegen Verzögerung der Leistung und Schadensersatzansprüche statt der Leistung, die über die in Abs. VII genannten Grenzen hinausgehen, sind in allen Fällen verzögerter Lieferung, auch nach einer uns etwa gesetzten Frist zur Lieferung, ausgeschlossen. Dies gilt nicht in Fällen des Vorsatzes, der groben Fahrlässigkeit oder wegen Verletzung des Lebens, des Körpers oder der Gesundheit. Vom Vertrag kann der Besteller im Rahmen der gesetzlichen Bestimmungen nur zurücktreten, soweit wir die Verzögerung der Lieferung zu vertreten haben. Eine Änderung der Beweislast zum Nachteil des Bestellers ist mit den vorstehenden Regelungen nicht verbunden.

IX. Der Besteller ist nach Aufforderung durch uns verpflichtet, innerhalb einer angemessenen Frist zu erklären, ob er wegen der Verzögerung der Lieferung vom Vertrag zurücktritt oder auf der Lieferung besteht.

X. Wir sind zu Teillieferungen berechtigt, soweit Sie dem Besteller zumutbar sind. Etwa dadurch entstehende Liefermehrkosten gehen zu unseren Lasten, wenn nicht der Besteller die Teillieferung veranlasst hat.

XI. Wir versenden auf Kosten und Gefahr des Bestellers; auch im Falle unseres Verzugs.

4. Gefahrübergang

I. Die Gefahr geht auf den Besteller über, sobald die Ware an die den Transport ausführende Person übergeben oder zum Zwecke der Versendung unser Lager verlassen hat. Dies gilt auch, wenn Teillieferungen erfolgen oder wir weitere Leistungen, etwa die Transportkosten oder die Aufstellung der Ware beim Besteller, übernommen haben. Wir werden die Ware auf Wunsch des Bestellers auf seine Kosten durch eine Transportversicherung gegen die vom Besteller zu bezeichnenden Risiken versichern.

II. Kommt der Besteller in Annahmeverzug oder verletzt er sonstige Mitwirkungspflichten, so können wir den Ersatz des entstandenen Schadens einschließlich etwaiger Mehr-aufwendungen verlangen. Die Gefahr eines zufälligen Unterganges oder einer zufälligen Verschlechterung der Ware geht in dem Zeitpunkt auf den Besteller über, in dem er in Annahmeverzug gerät. Wir sind berechtigt, nach fruchtlosem Ablauf einer angemessenen Frist anderweitig über die Ware zu verfügen und den Besteller mit einer angemessen verlängerten Frist zu beliefern.

5. Eigentumsvorbehalt

I. Wir behalten uns das Eigentum an den Gegenständen unserer Lieferungen bis zur vollständigen Erfüllung sämtlicher uns gegen den Besteller aus der Geschäftsverbindung zustehenden Ansprüche vor.

II. Wir sind berechtigt (nicht verpflichtet), die Vorbehaltsware auf Kosten des Bestellers gegen Diebstahl, Bruch, Feuer, Wasser, Transport- und sonstige Schäden zu versichern, sofern nicht der Besteller selbst eine entsprechende Versicherung abgeschlossen oder ausdrücklich seinen gegenteiligen Willen geäußert hat.

III. Der Besteller darf Vorbehaltsware im ordnungsgemäßen Geschäftsgang für uns als Hersteller im Sinne des § 950 BGB, ohne dass uns hieraus irgendwelche Verpflichtungen entstehen, be- und verarbeiten, solange er sich nicht in Zahlungsverzug befindet. In diesem Fall gilt Folgendes: Die Verarbeitung oder Umbildung der Vorbehaltsware durch den Besteller wird stets für uns vorgenommen. Das Anwartschaftsrecht des Bestellers an der Vorbehaltsware setzt sich an der verarbeiteten oder umgebildeten Sache fort. Wird die Ware mit anderen, uns nicht gehörenden Sachen verarbeitet, verbunden oder vermischt, erwerben wir das Miteigentum an der neuen Sache im Verhältnis des Werts der gelieferten Ware zu den anderen verarbeiteten Sachen zur Zeit der Verarbeitung. Der Besteller verwahrt die neuen Sachen für uns. Soweit Dritte unmittelbaren Besitz an der Sache erlangen, tritt der Besteller bereits jetzt seine bestehenden oder künftigen Herausgabeansprüche an uns ab. Für die durch Verarbeitung oder Umbildung entstehende Sache gelten im Übrigen dieselben Bestimmungen wie für die unter Eigentumsvorbehalt stehende Ware.

IV. Der Besteller ist widerruflich berechtigt, die Vorbehaltsware im ordnungsgemäßen Geschäftsgang zu veräußern., sofern er von seinem Kunden Bezahlung erhält oder er seinerseits unter dem Vorbehalt liefert, dass das Eigentum auf den Kunden erst übergeht, wenn dieser seine Zahlungsverpflichtungen erfüllt hat.

V. Verpfändungen und Sicherungsübereignungen der Vorbehaltsware sind unzulässig.

VI. Aus dem Weiterverkauf oder einem sonstigen Rechtsgrund (insbesondere auch aus einem Versicherungsvertrag oder einer unerlaubten Handlung) bezüglich der Vorbehaltsware entstehende Forderungen (einschließlich sämtlicher Saldoforderungen aus Kontokorrent) tritt der Besteller bereits jetzt sicherungshalber an uns ab.

VI. The delivery period will be deemed met if the goods have left our works or the purchaser has been given notice that the goods are ready for dispatch by the time the delivery period expires. In the event that a work must be accepted, the date for acceptance or, alternatively, the time of notice that the work is ready for acceptance shall be decisive unless acceptance is legitimately refused.

VII. If the purchaser suffers any damage or loss as a result of late delivery by us, the purchaser may demand lump-sum compensation for default. This lump-sum compensation shall for each entire week of default amount to 0.5%, but at maximum to a total of 5% of the value of such parts of the overall delivery as cannot be used in due time or as agreed as a result of the delay. We reserve the right to prove that the purchaser has not incurred any damage, or that the damage actually incurred is much smaller than the aforesaid lump-sum compensation.

VIII. Claims for damages for late performance and claims for damages in lieu of performance which exceed the limits stipulated in subsection VII above shall be excluded in all cases of late delivery, even after the expiry of a deadline set to us by the purchaser for delivery. This shall not apply in cases of willful misconduct, gross negligence, or death, bodily injury or damage to health. The purchaser may only withdraw from the contract within the scope of the statutory provisions if we are responsible for the late delivery. The preceding provisions do not involve a reversal of the burden of proof to the purchaser's detriment.

IX. If so requested by us, the purchaser shall be obligated to state within a reasonable time period whether it withdraws from the contract due to the late delivery or whether it insists upon delivery.

X. We shall have the right to make partial deliveries unless this is unreasonable for the purchaser. The additional delivery costs incurred through such partial deliveries, if any, will be borne by us unless the partial delivery was requested by the purchaser.

XI. All goods will be dispatched at the purchaser's expense and risk, even if we are late with a delivery.

4. Passing of Risk

I. The risk shall pass to the purchaser as soon as the goods have been delivered to the person in charge of carrying out the transport or as soon as the goods have left our warehouses for shipping purposes. This shall also apply if we make partial deliveries or if we have assumed further obligations, for example, the obligation to pay the transport costs or to install the goods at the purchaser's place of business. If so requested by the purchaser, we will take out a transport insurance policy and insure the goods at the purchaser's expense against the risks specified by the purchaser.

II. If the purchaser defaults on acceptance or violates other cooperation duties, we may demand compensation for the damage sustained including our additional costs, if any. The risks of accidental loss or destruction or accidental deterioration of the goods shall pass to the purchaser as soon as the purchaser defaults on acceptance. After a reasonable time period set for acceptance has expired to no avail, we will have the right to otherwise dispose of the goods and carry out the delivery to the purchaser within a reasonably extended time period.

5. Retention of Title

I. We retain title to all items delivered by us until all of our claims against the purchaser which arise from the business relationship have been fully settled.

II. We have the right (but no obligation) to insure the goods to which title is retained at the purchaser's expense against theft, breakage, fire, water, damage in transit and any other damage unless the purchaser takes out a corresponding insurance policy itself or expressly objects to such insurance.

III. For as long as the purchaser is not in default of payment, the purchaser may machine and process the goods to which title is retained in the ordinary course of its business on behalf of us as manufacturer within the meaning of Sec. 950 German Civil Code without such machining or processing giving rise to any obligations on our part. In such case, the following rules shall apply: any processing or alteration by the purchaser of the goods to which title is retained shall always be carried out on our behalf. The purchaser's right to acquire ownership of the goods to which title is retained shall continue to exist with respect to the processed or altered items. If the goods are processed, combined, or mingled with other items which are not our property, we will acquire a co-ownership interest in the new item pro rata to the value of the goods supplied as compared to the other processed items at the time of processing. The purchaser shall store the new items on our behalf. In the event that any third party obtains direct possession of the items, the purchaser assigns to us already now its existing or future claims for surrender. In all other respects, the items resulting from processing or alteration shall be governed by the same rules as the goods to which title is retained.

IV. The purchaser is authorized, subject to revocation, to sell the goods to which title is retained in the ordinary course of its business, provided that the purchaser receives payment from its own customer or makes its own deliveries subject to retention of title so that ownership will not pass to the purchaser's customer until after the latter has performed its obligations to pay.

V. The purchaser is not authorized to pledge or transfer the goods to which title is retained by way of security.

VI. The purchaser assigns to us already now, by way of security, any and all receivables (including any current account balance claims) which may arise from resale or on any other legal grounds (in particular, from insurance contracts or tort) with respect to the goods to which title is retained.

VII. Der Bestseller ist widerruflich ermächtigt, die an uns abgetretenen Forderungen für unsere Rechnung im eigenen Namen einzuziehen. Diese Ermächtigung kann nur widerrufen werden, wenn der Besteller seinen Zahlungsverpflichtungen nicht ordnungsgemäß nachkommt.

VIII. Greifen Dritte auf die Vorbehaltsware zu, ist der Besteller verpflichtet, diese (im Falle der Veräußerung seinen Käufer) auf unser Eigentum hinzuweisen und uns unverzüglich zu benachrichtigen.

IX. Im Falle des Zahlungsverzugs des Bestellers sind wir unbeschadet unserer sonstigen Rechte berechtigt, ohne vorherige Fristsetzung vom Vertrag zurückzutreten. Der Besteller hat uns oder unseren Beauftragten sofort Zugang zu der unter Eigentumsvorbehalt stehenden Ware zu gewähren und sie herauszugeben. Nach entsprechender rechtzeitiger Androhung können wir die unter Eigentumsvorbehalt stehende Ware zur Befriedigung unserer fälligen Forderungen gegen den Besteller anderweitig verwerten.

X. Übersteigt der Wert aller uns zustehenden Sicherungsrechte die Höhe aller gesicherten Ansprüche um mehr als 20%, sind wir verpflichtet, auf Wunsch des Bestellers einen entsprechenden Teil der Sicherungsrechte frei zu geben.

6. Vertragsanpassung – Rücktritt

I. Verändern unvorhersehbare Ereignisse im Sinne der Ziff. 3 Abs. II und Abs. V die wirtschaftliche Bedeutung oder den Inhalt der Lieferung erheblich oder wirken solche Ereignisse auf unseren Betrieb erheblich ein, wird der Vertrag unter Beachtung von Treu und Glauben angemessen angepasst.

II. Ist eine Anpassung wirtschaftlich nicht zu vertreten, sind wir berechtigt, vom Vertrag zurückzutreten. Wollen wir von diesem Rücktrittsrecht Gebrauch machen, teilen wir dies dem Besteller nach Erkenntnis der Tragweite des Ereignisses unverzüglich mit.

III. Absatz II gilt auch dann, wenn mit dem Besteller zunächst eine Verlängerung der Lieferzeit vereinbart war. Das Recht zum Rücktritt ist ausgeschlossen, wenn die Gründe für den Rücktritt bereits bei Vertragsschluss erkennbar waren. Der Besteller wird über die Gründe unverzüglich informiert.

IV. Wir sind zum Rücktritt und zur Rücknahme darüber hinaus berechtigt,
a. wenn der Besteller eine ihm obliegende Pflicht verletzt, er sich insbesondere in Zahlungsverzug befindet und eine – nicht entbehrliche –, ihm gesetzte, angemessene Frist zur Leistung erfolglos abgelaufen ist.
b. wenn uns berechtigte Zweifel an der Kreditwürdigkeit des Bestellers bekannt werden.

V. Im Falle der Ausübung eines uns zustehenden Rücktrittrechts sind wir zum Schadensersatz nicht verpflichtet.

VI. Bereits erbrachte Gegenleistungen sind unverzüglich zu erstatten. Unsere Herausgabeverpflichtung beschränkt sich auf die empfangenen Leistungen.

7. Preise und Zahlungen

I. Alle Preise verstehen sich in EURO ab Werk ausschließlich Verpackung, zuzüglich der jeweils geltenden gesetzlichen Umsatzsteuer.

II. Übernehmen wir die Aufstellung oder Montage, trägt der Besteller, sofern nicht anders vereinbart, neben der vereinbarten Vergütung alle erforderlichen Nebenkosten wie z.B. Reisekosten, Kosten für Transport des Handwerkzeugs und des persönlichen Gepäcks, Auslösungen.

III. Bei Dauerschuldverhältnissen wird mangels Vereinbarung über den Preis der am Tag der vereinbarten Lieferung gültige Listen-, Katalog- oder Tagespreis berechnet. Gewährte Rabatte oder Boni bleiben unberührt.

IV. Zahlungen sind frei unserer Zahlstelle zu leisten.

V. Bestehen begründete Zweifel an der Kreditwürdigkeit des Bestellers, sind wir berechtigt, offene Forderungen zur sofortigen Barzahlung fällig zu stellen. Dies gilt auch für den Fall, dass bereits Wechsel oder Schecks akzeptiert wurden.

VI. Der Besteller kann nur mit unbestrittenen oder rechtskräftig festgestellten Forderungen aufrechnen.

8. Sachmängel

I. Die Mängelrechte des Bestellers setzen voraus, dass er die gelieferte Ware bei Erhalt überprüft und uns Mängel unverzüglich, spätestens zwei Wochen nach Erhalt der Ware, schriftlich mitteilt. Verborgene Mängel sind uns unverzüglich nach ihrer Entdeckung schriftlich anzuzeigen. Der Besteller hat die Mängel bei ihrer Mitteilung an uns schriftlich zu beschreiben.

II. Mangelhafte Teile bessern wir nach unserer Wahl unentgeltlich nach oder ersetzen sie durch mangelfreie Teile, wenn der Mangel auf einem vor Gefahrübergang liegenden Umstand beruht. Im Übrigen gilt § 439 Abs. 3 BGB.

III. Keine Haftung wird insbesondere in folgenden Fällen übernommen: Natürliche Abnutzung, ungeeignete oder unsachgemäße Verwendung, fehlerhafte Montage bzw. Inbetriebsetzung durch den Besteller oder Dritte, fehlerhafte oder nachlässige Behandlung, nicht ordnungsgemäßer Wartung, Verwendung ungeeigneter Betriebsmittel, mangelhafte Bauarbeiten, ungeeigneter Baugrund, chemischen, elektrische oder elektrochemische Einflüsse, sofern sie nicht von uns zu verantworten sind.

IV. Der Besteller muss uns nach Absprache die zur Nachbesserung oder Ersatzlieferung erforderliche Zeit und Gelegenheit geben. In dringenden Fällen der Gefährdung der Betriebssicherheit bzw. zur Abwehr unverhältnismäßig großer Schäden, wobei wir sofort zu verständigen sind, ist der Besteller

VII. The purchaser is authorized, subject to revocation, to collect the receivables which have been assigned to us on our account in the purchaser's own name. This authorization may only be revoked if the purchaser fails to properly perform its obligations to pay.

VIII. Should any third party seize the goods to which title is retained, the purchaser shall be obligated to point out to the third party (or, in the event of resale, to its customer) that we are the owners of the goods and notify us without undue delay.

IX. Without prejudice to any other rights we may have, we may withdraw from the contract without first setting a deadline for performance if the purchaser is in default of payment. The purchaser must immediately grant us or our agents access to the goods to which title is retained and surrender these goods. After a timely warning to this effect, we may use the goods to which title is retained otherwise with a view to achieving the settlement of our due claims against the purchaser.

X. If the value of all security interests to which we are entitled exceeds the value of all secured claims by more than 20%, we will be obligated to release a corresponding portion of the security interests if so requested by the purchaser.

6. Adjustments – Withdrawal

I. If unforeseeable events, as defined in Sec. 3., subsections II and V above, materially affect the economic importance or contents of the delivery or have a significant impact on our business, the contract shall be appropriately adjusted, due regard being had to the principle of loyalty and good faith.

II. If adjusting the contract is unreasonable from an economic point of view, we shall have the right to withdraw from the contract. If we wish to make use of this right to withdraw, we will so advice the purchaser without undue delay after becoming aware of the implications of the event.

III. The preceding subsection II shall also apply if an extension of the delivery period was initially agreed upon with the purchaser. The right to withdraw from the contract shall be excluded if the reasons for the withdrawal were already identifiable at the time of conclusion of the contract. We will inform the purchaser without undue delay of the reasons for our withdrawal.

IV. We shall additionally have the right to withdraw from the contract and take back our goods if
a. the purchaser violates any of its obligations, in particular, if the purchaser defaults on payment and an – indispensible – reasonable deadline set by us for payment by the purchaser has expired to no avail or
b. we become aware of legitimate doubts about the purchaser's creditworthiness.

V. In the event that we exercise a right to withdraw to which we are entitled, we will not be liable for damages.

VI. Any consideration already paid shall be refunded without undue delay. Our obligation to surrender possession shall be limited to the payments and/or items received.

7. Prices and Payments

I. All our prices are in EURO, ex works, and exclusive of packaging. In addition, all our prices are exclusive of value added tax, which will be billed additionally at the statutory rate applicable from time to time.

II. If we undertake to install or assemble the goods, the purchaser shall bear all necessary incidental costs, such as travel expenses, the cost of transporting tools and personal luggage, daily allowances, etc., in addition to the agreed-upon remuneration, unless otherwise agreed.

III. With permanent obligations, the list price, catalog price, or daily price which is applicable on the day of the agreed-upon delivery shall be charged in the absence of an agreement concerning prices. This shall not affect any discounts or premiums granted.

IV. All payments shall be made free of transaction charges to our designated bank account.

V. If we have legitimate doubts about the purchaser's creditworthiness, we may demand that all outstanding receivables be paid immediately in cash. This shall also apply in the event that we already accepted bills or checks.

VI. The purchaser may only make a set-off if its counterclaims are undisputed or have been finally established by declaratory judgment.

8. Defects of Quality

I. As a prerequisite for the purchaser's rights resulting from defects, the purchaser must examine the goods supplied upon receipt and inform us of defects, if any, in writing without undue delay, but no later than within two weeks of the receipt of the goods. Hidden defects must be reported to us in writing without undue delay after they have been discovered. When notifying us of defects, the purchaser must provide a written description of such defects.

II. We will, at our option, repair defective parts free of charge or replace them with parts that are free of defects, provided the defect is due to circumstances which occurred before the passing of risk. In all other respects, Sec. 439 (3) German Civil Code shall apply.

III. We assume no liability especially (but not only) in the following cases: natural wear and tear, unsuitable or improper use, incorrect installation or initial operation by the purchaser or a third party, incorrect or negligent treatment, improper maintenance, use of unsuitable operating materials, deficient construction work, unsuitable building ground, and chemical, electrical or electro-chemical influences, unless we are responsible for any such case.

IV. Upon consultation with us, the purchaser must give us the time and opportunity required to carry out repairs or make a replacement delivery. In

berechtigt, den Mangel selbst zu beseitigen oder durch Dritte beseitigen zu lassen und von uns Ersatz der erforderlichen Aufwendungen zu verlangen.

V. Ansprüche des Bestellers wegen der zum Zwecke der Nacherfüllung erforderlichen Aufwendungen, insbesondere Transport-, Wege-, Arbeits- und Materialkosten sind ausgeschlossen, soweit sich die Aufwendungen erhöhen, weil der Gegenstand der Lieferung nachträglich an einen anderen Ort als den Ort der Niederlassung des Bestellers verbracht worden ist, es sei denn, die Verbringung entspricht dem bestimmungsgemäßen Gebrauch. Dies gilt entsprechend für den Umfang des Rückgriffsanspruchs des Bestellers gegen uns in Fällen des § 478 Abs. 2 BGB.

VI. Mangels besonderer Vereinbarung sind Mängelansprüche ausgeschlossen bei nur unerheblicher Abweichung von der vereinbarten Beschaffenheit oder unerheblicher Beeinträchtigung der Brauchbarkeit, sowie bei nicht reproduzierbaren Softwarefehlern.

VII. Eine Haftung ist darüber hinaus ausgeschlossen, wenn der Besteller oder ein Dritter unsachgemäß nachbessert oder wenn Änderungen am Liefergegenstand vorgenommen werden, denen wir nicht zuvor zugestimmt haben.

VIII. Zahlungen dürfen nur für unbestrittene Mängel zurückgehalten werden; ihr Umfang darf den doppelten Wert der (mangelhaften) Teile nicht übersteigen.

IX. Erfolgt eine Mängelrüge zu Unrecht, sind wir berechtigt, die uns entstandenen Aufwendungen ersetzt zu verlangen.

9. Rechtsmängel – Schutzrechte

I. Mangels anderer Vereinbarung sind wir verpflichtet, die Lieferung lediglich im Land des Lieferorts frei von Urheber- und gewerblichen Schutzrechten Dritter (Schutzrechte) zu erbringen. Erhebt ein Dritter berechtigte Ansprüche gegen den Besteller wegen der Verletzung von Schutzrechten durch von uns erbrachte, vertragsgemäß genutzte Liefergegenstände, haften wir, sofern der Besteller uns über die vom Dritten geltend gemachten Ansprüche unverzüglich schriftlich verständigt, eine Verletzung nicht anerkennt und uns alle Abwehrmaßnahmen und Vergleichsverhandlungen vorbehalten bleiben.

II. Haften wir, werden wir nach unserer Wahl und auf unsere Kosten für die betroffenen Liefergegenstände ein Nutzungsrecht erwirken, sie so ändern, dass die Schutzrecht nicht verletzt wird oder sie austauschen. § 439 Abs.3 BGB gilt entsprechend.

III. Stellt der Besteller die Nutzung ein, ist er verpflichtet, den Dritten darauf hinzuweisen, dass mit der Einstellung kein Anerkenntnis einer Schutzrechtsverletzung verbunden ist.

IV. Ansprüche sind ausgeschlossen, soweit der Besteller die Schutzrechtsverletzung zu vertreten hat oder sie durch spezielle Vorgaben des Bestellers, durch von uns nicht voraussehbare Anwendung oder dadurch verursacht wird, dass der Besteller die Lieferung verändert oder zusammen mit nicht von uns gelieferten Produkten einsetzt.

V. Im Übrigen gilt Ziff. 8 entsprechend.

10. Haftung

Für Schäden aus der Verletzung einer Garantie oder aus der Verletzung von Leben, Körper oder Gesundheit haften wir unbeschränkt. Dasselbe gilt für Vorsatz und grobe Fahrlässigkeit. Für leichte Fahrlässigkeit haften wir nur, sofern wesentliche Pflichten verletzt werden, die sich aus der Natur des Vertrages ergeben und die für die Erreichung des Vertragszwecks von besonderer Bedeutung sind. Bei Verletzung solcher Pflichten ist unsere Haftung auf solche Schäden begrenzt, mit deren Entstehung im Rahmen dieses Vertrages typischerweise gerechnet werden muss. Eine zwingende gesetzliche Haftung für Produktfehler bleibt unberührt.

11. Verjährung

Alle Ansprüche des Bestellers verjähren unabhängig vom Rechtsgrund in 12 Monaten. Dies gilt nicht, sofern mangelhafte Ware entsprechend ihrer üblichen Verwendungsweise für ein Bauwerk verwendet worden ist und dessen Mangelhaftigkeit verursacht hat sowie in Fällen des § 479 Abs. 1 BGB. Unsere unbeschränkte Haftung für Schäden aus der Verletzung einer Garantie oder aus der Verletzung von Leben, Körper oder Gesundheit, für Vorsatz und grobe Fahrlässigkeit sowie für Produktfehler bleibt unberührt.

12. Anwendbares Recht und Gerichtsstand

I. Für alle Rechtsbeziehungen aus der Geschäftsverbindung gilt ausschließlich das Recht der Bundesrepublik Deutschland, unter Ausschluss des Übereinkommens der Vereinten Nationen über Verträge über den internationalen Warenkauf (CISG).

II. Alleiniger Gerichtsstand für alle aus der Rechtsbeziehung sich ergebenden Rechte und Pflichten ist nach unserer Wahl das Amtsgericht Besigheim oder das Landgericht Heilbronn. Wir sind auch berechtigt bei dem für den Hauptsitz des Bestellers zuständigen Amts- oder Landgericht zu klagen.

III. Die Unwirksamkeit einzelner Bestimmungen dieser Bedingungen lässt die übrigen Regelungen unberührt.

urgent cases where the operational safety is at risk or where the purchaser must prevent disproportionate damage – of which we must immediately be notified – the purchaser shall have the right to remedy the defect itself or have it remedied by a third party and demand from us reimbursement of the necessary expenses.

V. Claims of the purchaser concerning expenses which are required for subsequent performance, in particular, the cost of transportation, travel expenses, and the cost of material and labor, shall be excluded to the extent they rise as a result of the fact that the item delivered has subsequently been transferred to a place other than the purchaser's place of business, unless such transfer is in accordance with the agreed use. This shall apply correspondingly with respect to the extent of the purchaser's right of recourse against us in the cases stipulated in Sec. 478 (2) German Civil Code.

VI. In the absence of a separate agreement stating otherwise, claims for defects shall be excluded if the actual quality of the goods supplied deviates only immaterially from the agreed-upon quality or if the usability of the goods is affected only immaterially, as well as in the case of software errors which cannot be reproduced.

VII. Moreover, our liability shall be excluded if the purchaser or any third party carries out repairs improperly or if changes are made to the delivery item which have not been agreed to by us in advance.

VIII. Payments may only be retained with respect to undisputed defects; the amount of the payments retained may not exceed twice the value of the (defective) parts.

IX. If the purchaser reports defects and this is unjustified, we may demand to be reimbursed for any expenses incurred.

9. Defects of Title – Property Rights

I. Unless otherwise agreed, we are obligated to deliver goods which are free of third-party copyrights and industrial property rights ("property rights") merely in the country where the place of delivery is located. If a third party asserts legitimate claims against the purchaser due to a property right infringement caused by goods that were delivered by us and have been used as agreed, we will be liable if the purchaser informs us of the claims asserted by the third party without undue delay in writing, refrains from acknowledging any infringement, and allows us to take control of the entire defense and negotiations concerning a settlement by compromise.

II. If we are liable, we will, at our option and at our expense, procure the right to use the delivery items concerned, modify them so that they no longer infringe the third-party property right, or replace them. Sec. 439 (3) German Civil Code shall apply correspondingly.

III. If the purchaser discontinues the use of the items concerned, the purchaser shall be obligated to inform the third party that such discontinuation does not constitute an acknowledgement of any property right infringement.

IV. Claims shall be excluded if and to the extent that the purchaser is responsible for the property right infringement or such infringement was caused by special requirements of the purchaser, by any application that could not be foreseen by us, or by the purchaser modifying the items delivered or using them in combination with products not supplied by us.

V. In all other respects, Sec. 8 above shall apply correspondingly.

10. Liability

We are liable without limitation for damage or losses resulting from breach of guarantee or from death, bodily injury, or damage to health. The same shall apply in the event of willful misconduct or gross negligence. We are liable for ordinary negligence only if material obligations which result from the nature of the contract and are of particular importance in achieving the purpose of the contract have been violated. Should any such obligations be violated, our liability shall be limited to the damage or losses the occurrence of which must typically be expected with this type of contract. This shall not affect our mandatory statutory liability for product defects.

11. Lapse of Time

All claims of the purchaser shall become time-barred within 12 months, irrespective of their legal basis. This does not apply if defective goods have been used for a building in accordance with their customary use and have resulted in the deficiency of this building, nor in the cases stipulated in Sec. 479 (1) German Civil Code. These provisions do not affect our unlimited liability for damage or losses resulting from breach of guarantee or from death, bodily injury, or damage to health, for willful misconduct and gross negligence, as well as for product defects.

12. Applicable Law and Place of Jurisdiction

I. All legal relationships resulting from the business relationship shall be governed exclusively by the laws of the Federal Republic of Germany without regard to the United Nations Convention on Contracts for the International Sale of Goods (CISG).

II. The exclusive place of jurisdiction for all rights and obligations resulting from the legal relationship shall be the Local Court (Amtsgericht) of Besigheim or, at our option, the Regional Court (Landgericht) of Heilbronn. We may additionally sue the purchaser before the local or regional court of competent jurisdiction over the purchaser's principal place of business.

III. Should single provisions of these General Terms be or become invalid, this shall not affect the remaining provisions hereof.

标准产品总目录

目录

传动部件
蜗轮蜗杆减速箱，蜗轮蜗杆套件，伞齿轮减速箱，伞齿轮套件，齿轮轴，齿条，螺纹轴和螺母，齿形皮带传动，链传动，离合器，摩擦轴套，花键轴，键式花键轴，联轴器。

伺服驱动系统
伺服蜗轮蜗杆减速箱：
- HT-高扭矩蜗轮蜗杆减速箱 <1'
- HP-高性能蜗轮蜗杆减速箱 <2'
- E-经济型蜗轮蜗杆减速箱 <5'
- B-基础型蜗轮蜗杆减速箱 <12'
- BG-伞齿轮减速箱 <6'

特殊齿条
线形导轨同齿条的组合体
齿轮
润滑系统

TS-标准丝杆升降器
梯形丝杆为标准版本
2 kN - 100 kN

HS-高性能螺旋升降器
高性能含滚珠丝杆版本
5 kN – 100 kN

EH-高推动力直线驱动器
含滚珠丝杆和梯形丝杆版本
直线驱动器负载力从 30 – 160 kN

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Complete Program Range
Standard

Catalogues

Driving Elements
Worm gear units, worm gear sets, bevel gear units, bevel gear sets, gear wheels, racks, thread
spindles and nuts, toothed belt drives, chain drives, clutches, fiction hubs, splined shafts and involute spline shafts, shaft joints

Servo Drive System
Servo worm gear units:
- HT-High-torque gear units <1'
- HP-High-performance gear untis <2'
- E-servo worm gear units <5'
- B-servo worm gear units <12'
- BG-Servo bevel gear unit <6'

Special racks
Integratable racks for linear guides
Gear wheels
Lubrication systems

TS-Standard Screw Jack Gearbox
Standard with trapezoidal thread-spindle
2 kN to 100 kN

HS-Screw Jack Gearbox
High-Performance with ball-screw spindle
5 kN – 100 kN

EH-High Thrust Linear Actuator
With ball-screw and trapezoidal thread-spindle
Force of spindle from 30 to 160 kN

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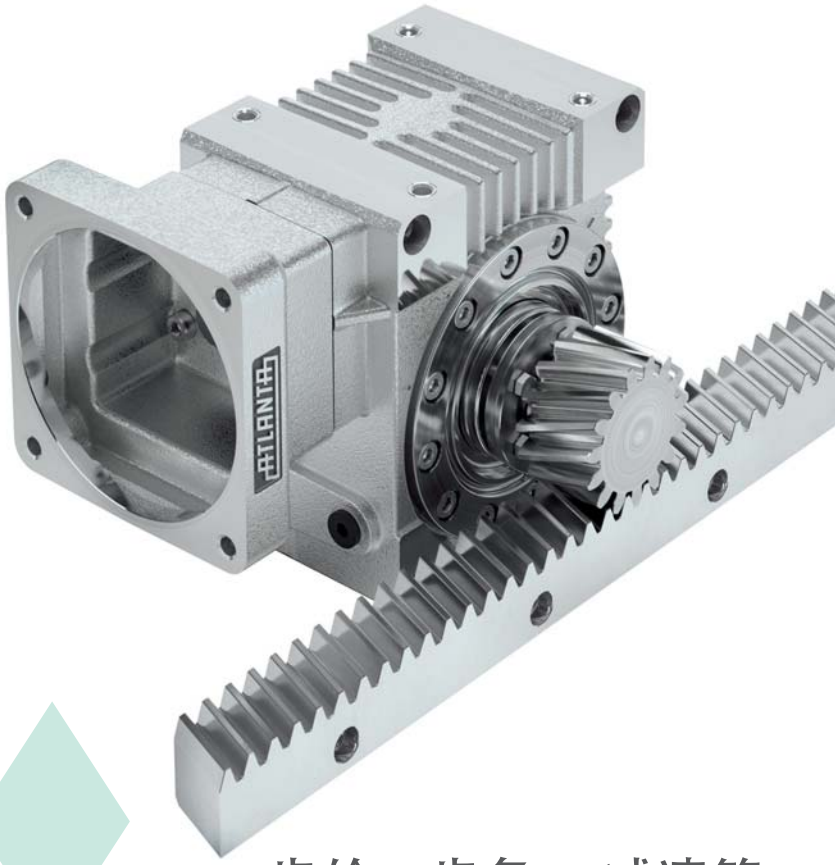

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