






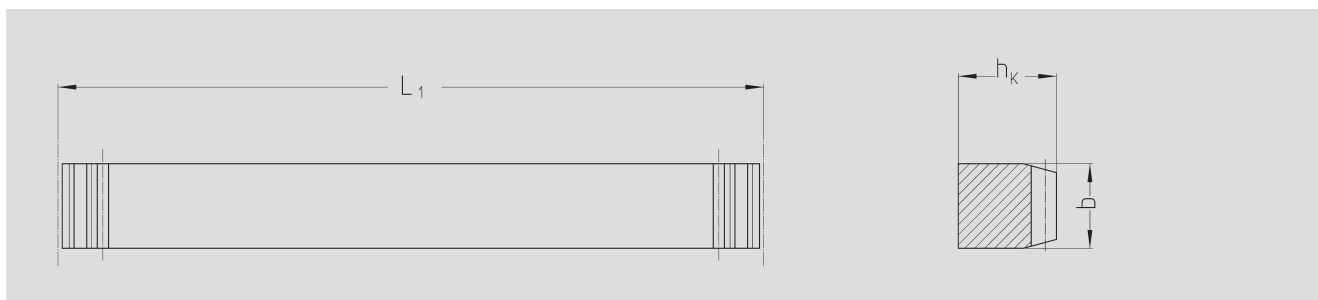
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### 直齿齿条安装块

Companion racks for straight tooth system



订购代码 Order code	模数 Module	节线 Pitch	L <sub>1</sub>	齿数 N° of teeth	b	h <sub>k</sub>	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.

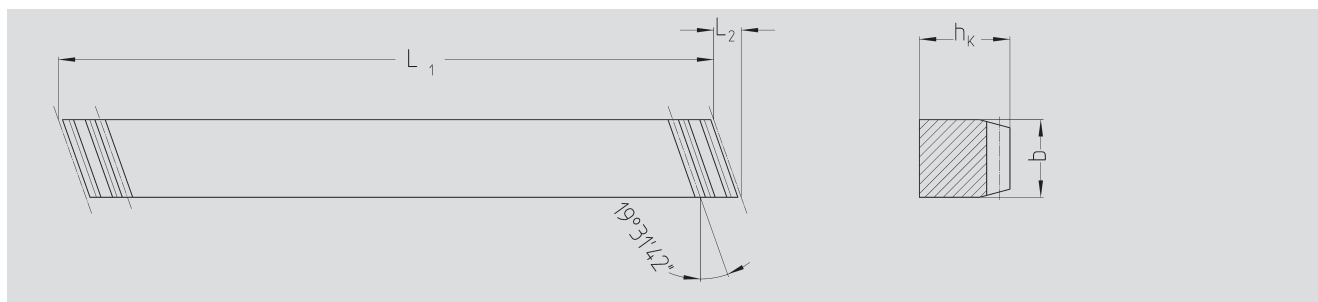
- Teeth induction-hardened and ground,
- material C45.

左旋齿条安装块配合右旋齿条.

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 <sub>1</sub>	L <sub>2</sub>	齿数 N° of teeth	b	h <sub>k</sub>	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

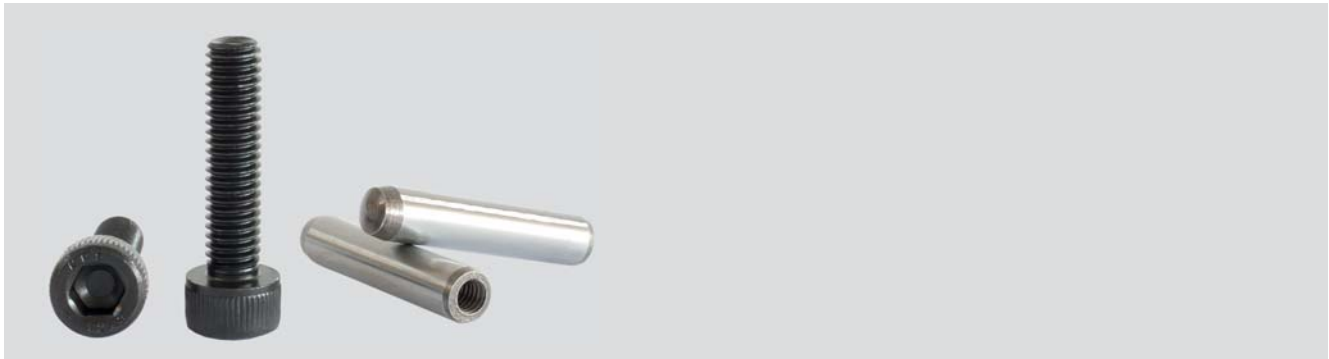
- 感应淬火并磨削,
- 材料 C45.

- Teeth induction-hardened and ground,
- material C45.

左旋齿条安装块配合右旋齿条

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 m6 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  $\triangleq$  1 米齿条

螺栓: DIN EN ISO 4762 12.9

定位销: DIN 7979 (ISO 8735-A)

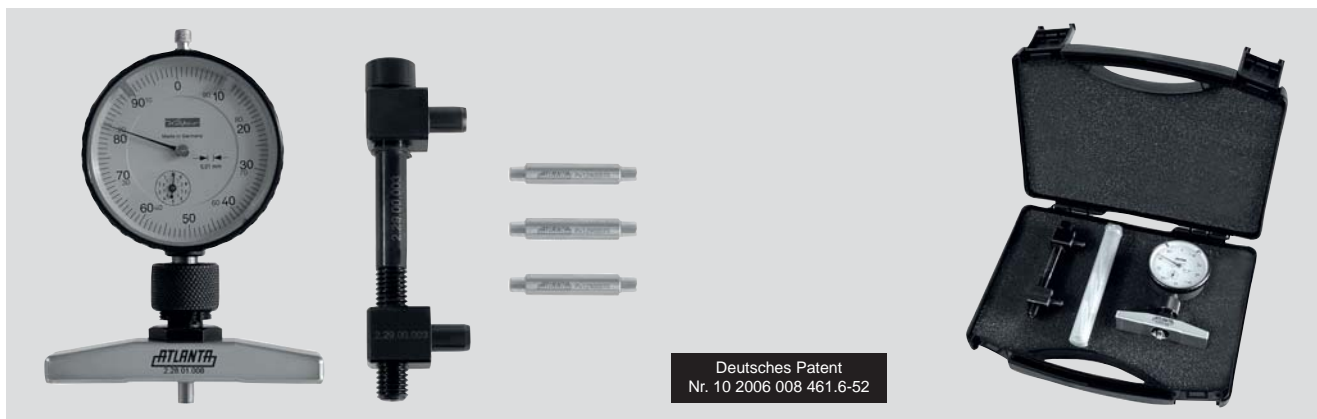
### Content of bag:

8 Screws + 2 pins  $\triangleq$  1 meter of rack

Screws: DIN EN ISO 4762 12.9

Pins: DIN 7979 (ISO 8735-A)





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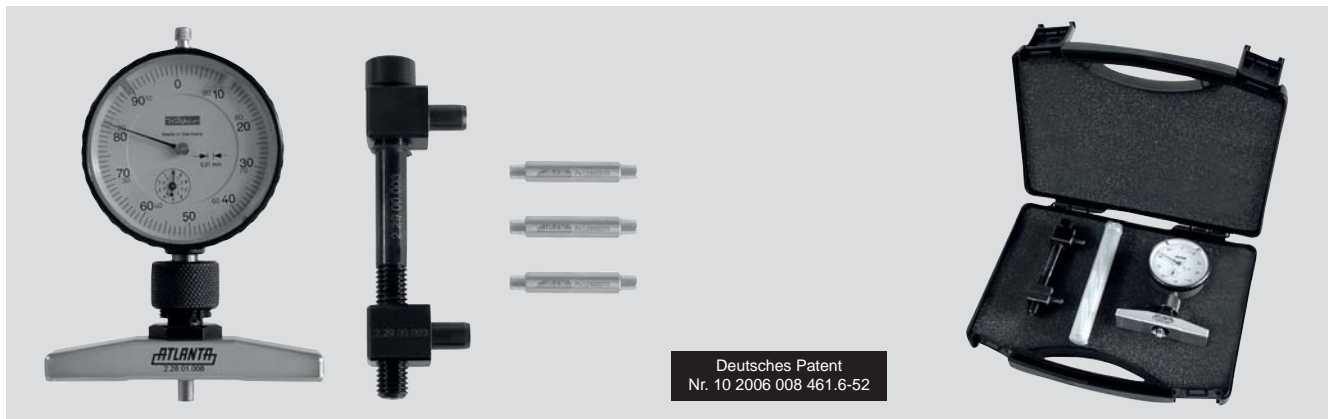
订购代码 Order code	描述 Description	模数 Module	相对应的项目 / Relative item no.		kg
			斜齿 / helical	直齿 / straight	
29.01.001	安装工具, 包含 / Assembly kit, comprising: 1 x 调整装置 / Adjusting device 3 x 磁性量棒 / Gauging roller with magnet 1 x 桥式测量千分表 / Measuring bridge with dial gauge	1,5	29.15.xxx 39.15.xxx 47.15.xxx		
29.01.002	安装工具, 包含 / Assembly kit, comprising: 1 x 调整装置 / Adjusting device 3 x 磁性量棒 / Gauging roller with magnet 1 x 桥式测量千分表 / Measuring bridge with dial gauge	2	29.20.xxx 38.21.xxx 39.20.xxx 47.20.xxx	28.20.xxx 33.21.xxx 34.20.xxx 49.29.xxx	0,40
29.01.003	安装工具, 包含 / Assembly kit, comprising: 1 x 调整装置 / Adjusting device 3 x 磁性量棒 / Gauging roller with magnet 1 x 桥式测量千分表 / Measuring bridge with dial gauge	3	29.30.xxx 38.31.xxx 39.30.xxx 47.30.xxx	28.30.xxx 33.31.xxx 34.30.xxx 49.39.xxx	0,44
29.01.004	安装工具, 包含 / Assembly kit, comprising: 1 x 调整装置 / Adjusting device 3 x 磁性量棒 / Gauging roller with magnet 1 x 桥式测量千分表 / Measuring bridge with dial gauge	4	29.40.xxx 38.41.xxx 39.40.xxx 47.40.xxx	28.40.xxx 33.41.xxx 34.40.xxx 49.49.xxx	0,55
29.01.024	安装工具, 包含 / Assembly kit, comprising: 1 x 调整装置 / Adjusting device 3 x 磁性量棒 / Gauging roller with magnet 1 x 桥式测量千分表 / Measuring bridge with dial gauge	4	29.42.xxx 29.xx.xx7 39.42.xxx 39.40.xx8	28.42.xxx 28.xx.xx7 34.42.xxx 34.40.xx8	0,55
29.01.005	安装工具, 包含 / Assembly kit, comprising: 1 x 调整装置 / Adjusting device 3 x 磁性量棒 / Gauging roller with magnet 1 x 桥式测量千分表 / Measuring bridge with dial gauge	5	29.50.xxx 38.51.xxx 39.50.xxx 47.50.xxx	28.50.xxx 33.51.xxx 34.50.xxx	0,8
29.01.006	安装工具, 包含 / Assembly kit, comprising: 1 x 调整装置 / Adjusting device 3 x 磁性量棒 / Gauging roller with magnet 1 x 桥式测量千分表 / Measuring bridge with dial gauge	6	29.60.xxx 39.60.xxx 47.60.xxx	28.60.xxx 34.60.xxx	0,90
29.01.008	安装工具, 包含 / Assembly kit, comprising: 1 x 调整装置 / Adjusting device 3 x 磁性量棒 / Gauging roller with magnet 1 x 桥式测量千分表 / Measuring bridge with dial gauge	8 斜齿 helical	29.80.xxx 47.80.xxx		1,35
28.01.008	安装工具, 包含 / Assembly kit, comprising: 1 x 调整装置 / Adjusting device 3 x 磁性量棒 / Gauging roller with magnet 1 x 桥式测量千分表 / Measuring bridge with dial gauge	8 直齿 straight		28.80.xxx	1,15
29.01.010	安装工具, 包含 / Assembly kit, comprising: 1 x 调整装置 / Adjusting device 3 x 磁性量棒 / Gauging roller with magnet 1 x 桥式测量千分表 / Measuring bridge with dial gauge	10	29.10.xxx 47.10.xxx	28.10.xxx	1,40
29.01.012	安装工具, 包含 / Assembly kit, comprising: 1 x 调整装置 / Adjusting device 3 x 磁性量棒 / Gauging roller with magnet 1 x 桥式测量千分表 / Measuring bridge with dial gauge	12	29.12.xxx	29.13.xxx	1,50





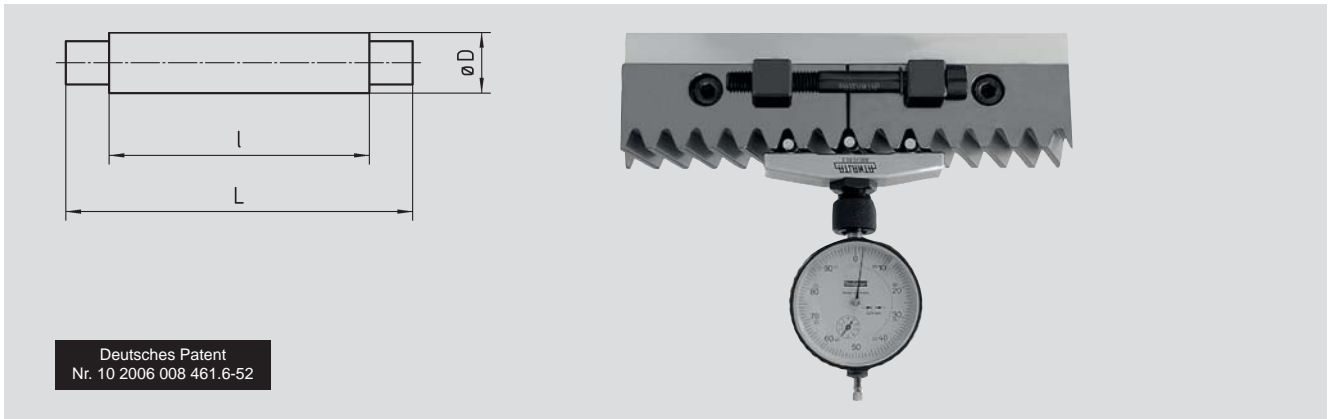
# ATLANTA

## StrongLine 安装工具 Assembly kit for StrongLine



订购代码. Order code	描述 Description	模数 Module	相对应的项目 / Relative item no.		kg
			斜齿 / helical	直齿 / straight	
29.01.102	安装工具, 包含 / Assembly kit, comprising: 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	2	29.25.xxx	28.25.xxx	0,40
29.01.103	安装工具, 包含 / Assembly kit, comprising: 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	3	29.35.xxx	28.35.xxx	0,44
29.01.104	安装工具, 包含 / Assembly kit, comprising: 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	4	29.45.xxx	28.45.xxx	0,55
29.01.105	安装工具, 包含 / Assembly kit, comprising: 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	5	29.55.xxx	28.55.xxx	0,8





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订购代码. Order code	描述 Description	模数 Module	L	I	D	
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

Material: Hardened steel.

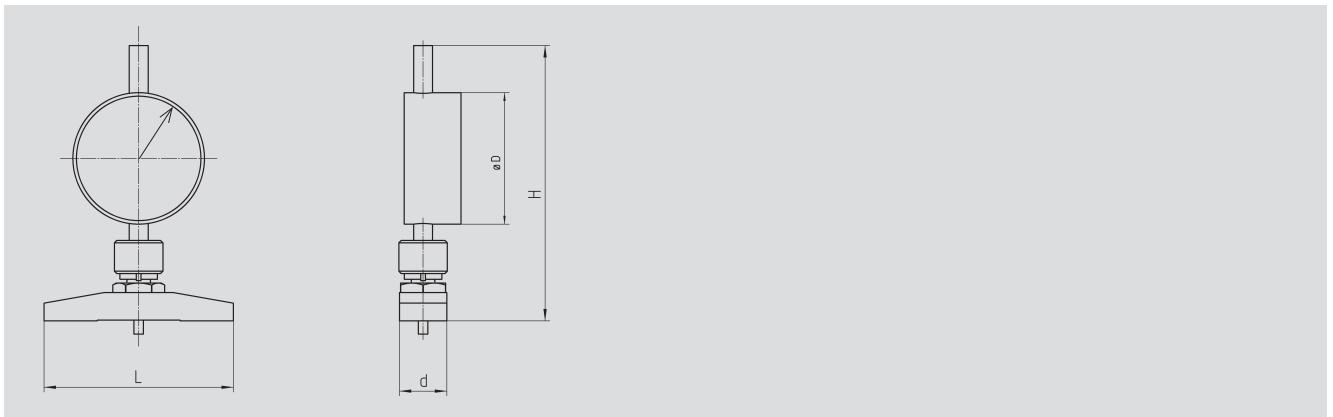
**描述:**

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。

**Description:**

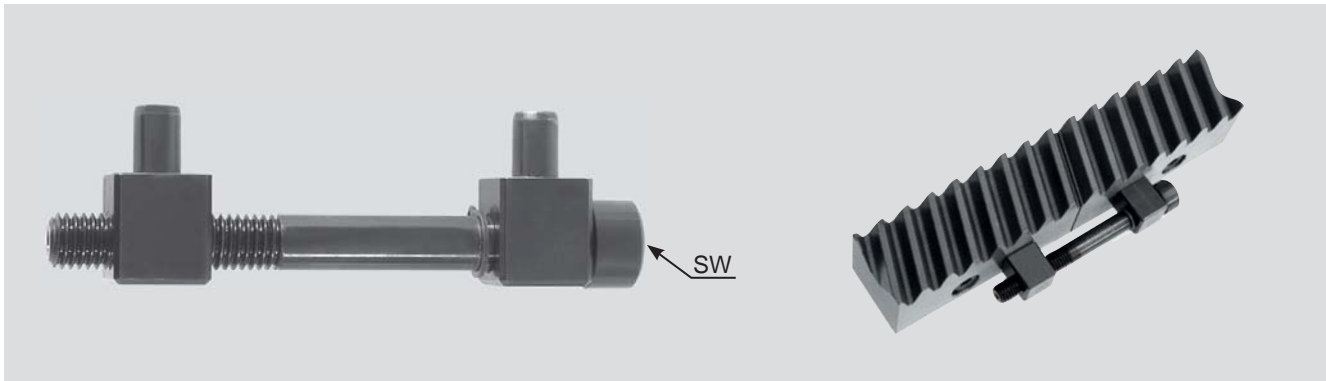
The gauging rollers (patent) are placed in the tooth gaps of the already mounted rack, of the rack to be mounted, and in the gap at the joint.  
Adjust the measuring bridge on a measuring plate or other level surface to zero. Mount the adjusting device.  
By means of the measuring bridge and the adjusting 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 Module	L	b	H	D	
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.		kg
				斜齿 / helical	直齿 / straight	
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
<b>StrongLine</b>						
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	0,14
<b>StrongLine</b>						
2.29.00.103	调整装置 / Adjusting device	6	3	29.35.xxx	28.35.xxx	0,14
<b>StrongLine</b>						
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.

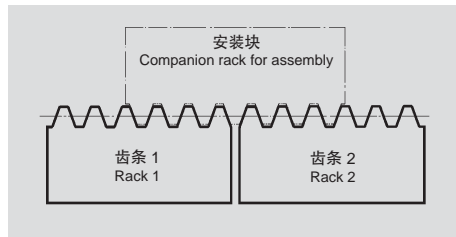




### 装配说明

#### 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- Tighten torque	9	16	40	76	135	210	340	660	2300	4100
	Nm	Nm	Nm	Nm	Nm	Nm	Nm	Nm	Nm	Nm

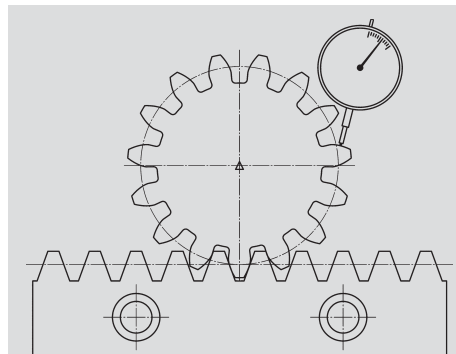
### Mounting instructions

#### 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 of the 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.

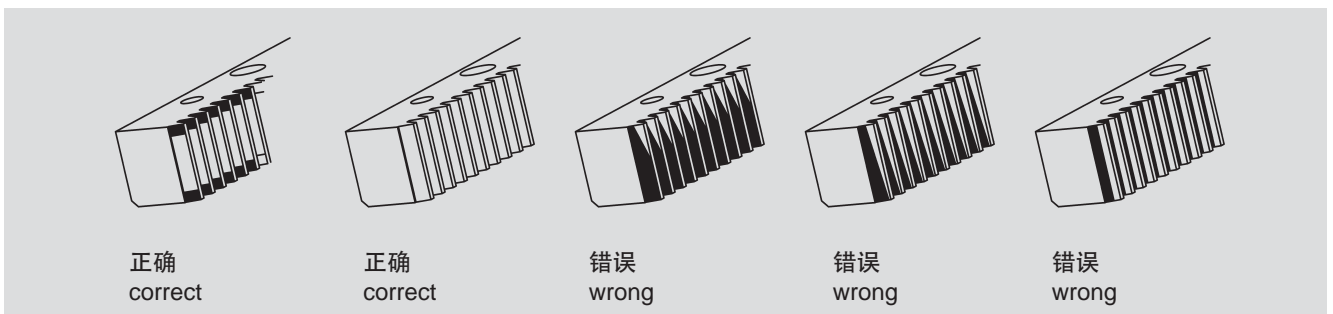
在传动系统中，齿轮和齿条的齿节线必须保持平行。我们建议使用蓝色网格线，载荷的情况下检查轴承模式。齿轮和齿条间的背隙需在高点进行调整，并参照表格调整。



背隙 / recommendation 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

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:

Relation in between tooth thickness and roller ball measurement:

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。

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.

所以齿厚公差可以通过滚珠测量的重复计算而测得。

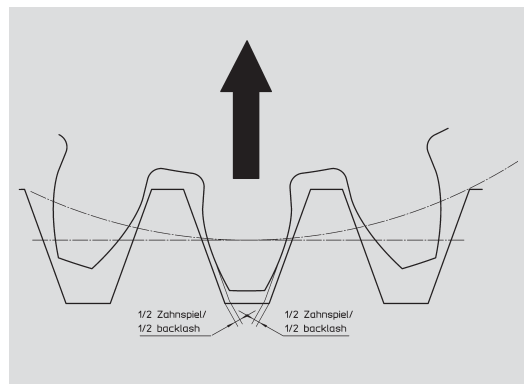
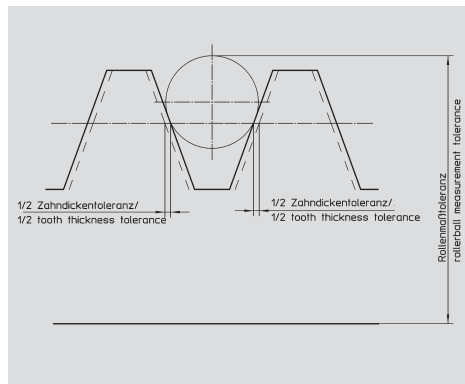
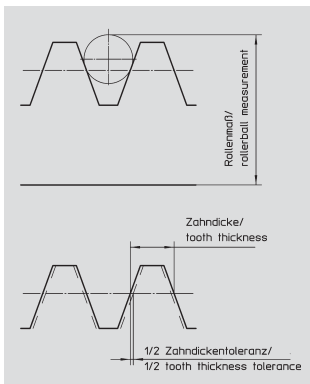
So tooth thickness tolerances could be measured by recalculating of the roller ball measurement.

更多齿条信息请登录:

<http://www.atlantagmbh.de/en/products/racks-and-pinions/>

Further information about racks under

<http://www.atlantagmbh.de/en/products/racks-and-pinions/>



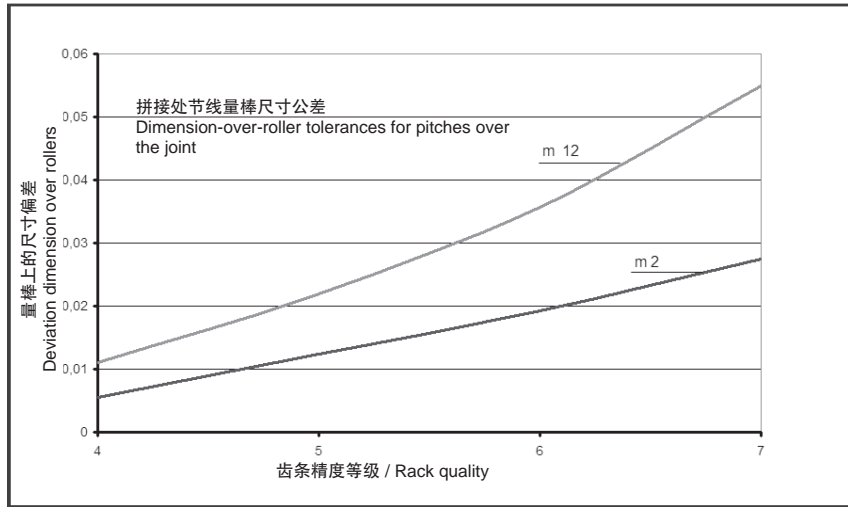
齿厚公差 Tooth thickness tolerance	滚珠测量公差 Roller ball measurement tolerance	背隙 backlash	径向方式 radial way
0,01	0,014	0,01	0,014
0,02	0,027	0,02	0,027
0,03	0,041	0,03	0,041
0,04	0,055	0,04	0,055
0,05	0,069	0,05	0,069
0,06	0,082	0,06	0,082
0,07	0,096	0,07	0,096
0,08	0,110	0,08	0,110
0,09	0,124	0,09	0,124
0,10	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。

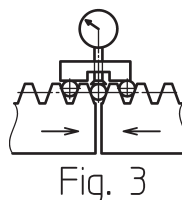
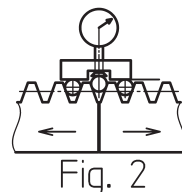
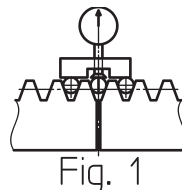
The gauging rollers are inserted in the two adjacent racks and in the gap at the joint. They, too, are held in place in the tooth space by magnetic force and can therefore be used in any mounting position of the racks. It is thus ensured that they are always accurately positioned on the tooth flanks. 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。

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 moving 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。

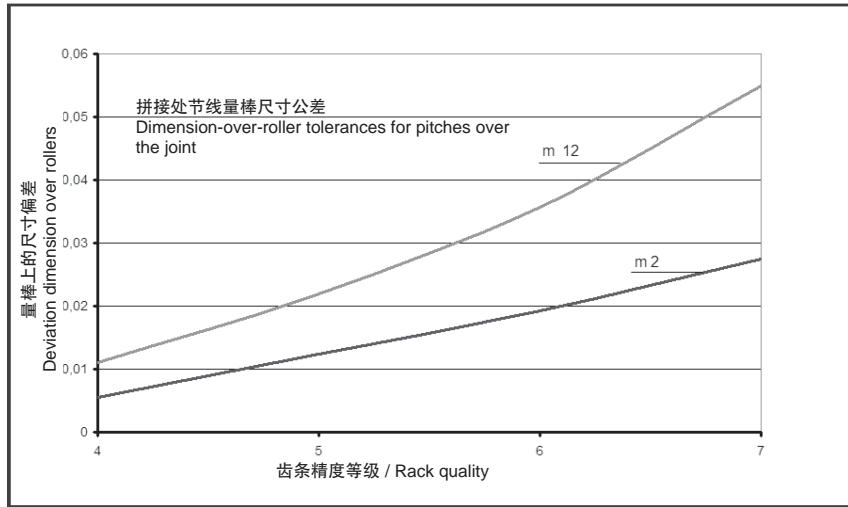
It is therefore no longer necessary to adjust the rack by tapping with a hammer. The slightly pre-stressed rack is put in the correct position and held in this position until it is screwed together.





## 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。

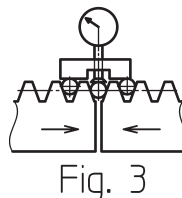
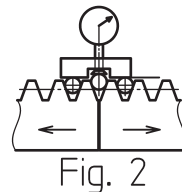
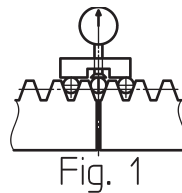
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使用在测量平台或是其他平面上调零后的桥式测量千分尺在量棒上测量变化。准确拼接处节线可以通过调整齿条来达到。草图显示了良好的拼接质量的获得基于拼接处量棒位置的变化。

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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。

It is therefore no longer necessary to adjust the rack by tapping with a hammer. The slightly pre-stressed rack is put in the correct position and held in this position until it is screwed together.





**ATLANTA**





#### 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。

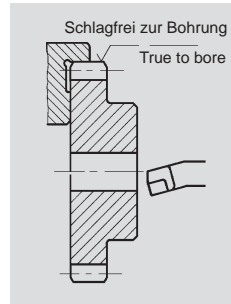
我们提供的06/07/21/22和23系列未淬火齿轮有盲孔, 客户可以自行加工, 也可以我们按照客户要求加工 (车削内圆, 镗孔, 开键槽, 淬火等)。

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。

#### 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.

最大孔径请向我们询问

Maximum bore diameter of the pinion on request.

