



		頁碼 Chapter
安裝說明 齒條，齒輪	Mounting instruction racks, pinions	ZJ-2
齒條安裝工具	Rack assembly kit	ZJ-3 – ZJ-6
鍵連接	Key connections	ZJ-7





裝配說明

Mounting instructions

齒條

爲了能把標準齒條拼接爲任意長度，必須把齒條的兩端加工半個齒隙，右圖表明了齒條1和齒條2如何構成準確的節距位置，對於斜齒齒條拼接可借助齒向相反的配合齒條來拼接（訂貨號請見相應的尺寸參數表）。爲了確保優化配合，我們建議齒條裝配時在角側面部分預開裝配孔，並在機座上確定孔的對應位置，用扭矩搬手擰緊12.9等級。對於長度爲0.5m的齒條必須加工銷孔。

齒輪與齒條裝配

兩條節綫或齒輪的兩軸必須平行，中心距和中心誤差要符合DIN3964標準的要求。運行模式和齒側間隙在DIN3967有說明。齒條傳動時，齒側面間隙可以通過兩個傳動元件之一分別調整。下列齒側面間隙的參數值適用於滾銑加工齒輪：對於長度爲0.5m的齒條必須加工銷孔。

小齒輪模數1-2.5 0.1mm

中等尺寸齒輪模數3-4 0.2mm

大齒輪模數5-12 0.3mm

如果是重負荷下工作，建議在加載條件下檢查接觸反應。

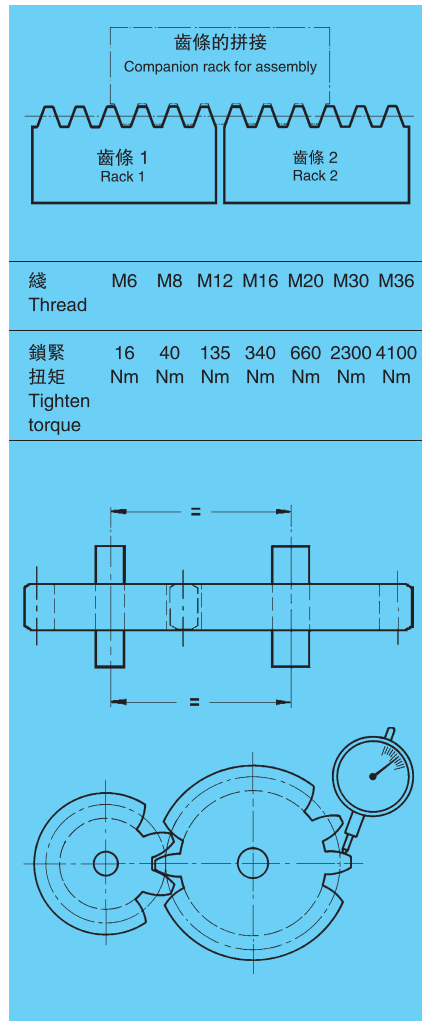
圓齒條的導套

我們所提供的導套理論上講是具有自潤滑功能的，因此適用於常規或低負荷下工作。（可用毛刷潤滑）如果是重負荷并沿軸向移動，可能有必要加入一些潤滑劑，請向我們諮詢，導套的孔制造誤差應符合H7的要求。壓入後（心軸誤差m5）在導套內得到符合H7要求的誤差範圍。

安全說明

下列安全措施是必須的：

決不能接觸轉動部件（例如輸出軸，齒輪，齒條），齒輪箱固定螺栓要緊固。避免接觸潤滑劑。參照說明操作。



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 (for order codes please see the respective tables of dimensions). In order to ensure an optimal fit we recommend the assembly of racks with predrilled mounting holes in angle-profile sections and to copy the holes on assembly. 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.

Gear and/or rack pairing

The two pitch lines, in the case of gears the two shafts, must be parallel. The centre distances and centre position tolerances are in conformity with the quality requirements of DIN 3964. The mode of operation and the determination of the flank backlash are described in DIN 3967. In the case of rack drives the flank backlash can be individually adjusted by adapting one of the two drive elements accordingly. The following reference values for the flank backlash are applicable to hobbed gears: For the 0,5 m long racks it is absolut necessary to use

the pin holes.

For small wheels and Modules 1 to 2,5	0.1 mm
For medium-sized wheels and Modules 3 to 4	0.2 mm
For large wheels and Modulees 5 to 12	0.3 mm

If high-load pairings are used, it is advisable to check the contact reflection under load.

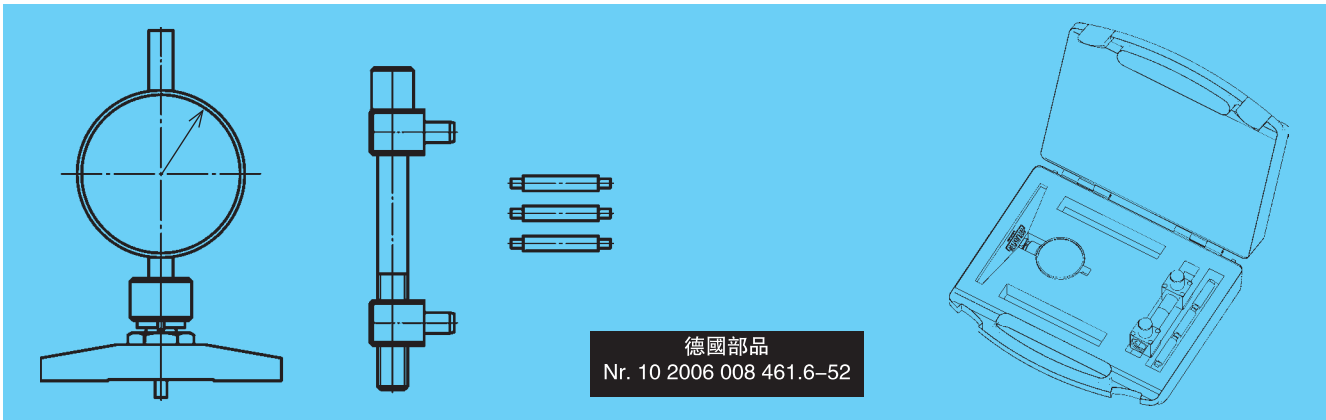
Guiding bushes for round racks

The guiding bushes we offer are theoretically self-lubricating and thus suitable for normal, low-stress service. It may be necessary to provide for a lubricant deposit (by mounting 2 collar bushings with space between them). If high loads and/or longitudinal movement are to be expected, please consult us. The bore in the housing should be manufactured to H7 tolerance. After pressing in (with mandrel tolerance m5) a tolerance field of likewise H7 can be expected inside the bush.

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.



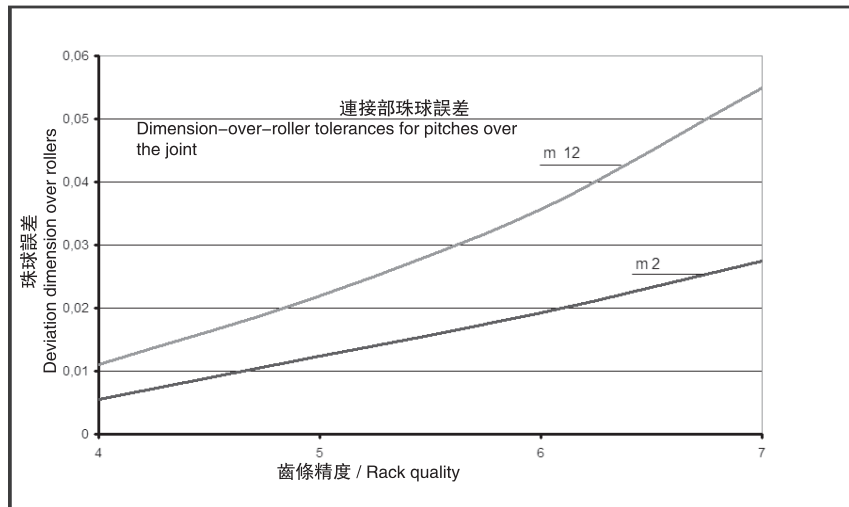
訂貨號 Order code	描述 Description	模數 Module	相關系列產品規格 / Relative item no.		kg
			斜齒 / helical	直齒 / straight	
29.01.002	安裝工具, 組件 / Assembly kit, comprising: 1 x 調整裝置 / Adjusting device 3 x 磁性量棒 / Gauging roller with magnet 1 x 帶刻度量具 / Measuring bridge with dial gauge	2	29.20.xxx 38.21.xxx 39.20.xxx 47.20.xxx	28.20.xxx 33.21.xxx 34.20.xxx 49.29.xxx	0,40
29.01.003	安裝工具, 組件 / Assembly kit, comprising: 1 x 調整裝置 / Adjusting device 3 x 磁性量棒 / Gauging roller with magnet 1 x 帶刻度量具 / 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	安裝工具, 組件 / Assembly kit, comprising: 1 x 調整裝置 / Adjusting device 3 x 磁性量棒 / Gauging roller with magnet 1 x 帶刻度量具 / 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
29.01.005	安裝工具, 組件 / Assembly kit, comprising: 1 x 調整裝置 / Adjusting device 3 x 磁性量棒 / Gauging roller with magnet 1 x 帶刻度量具 / 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	安裝工具, 組件 / Assembly kit, comprising: 1 x 調整裝置 / Adjusting device 3 x 磁性量棒 / Gauging roller with magnet 1 x 帶刻度量具 / 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	安裝工具, 組件 / Assembly kit, comprising: 1 x 調整裝置 / Adjusting device 3 x 磁性量棒 / Gauging roller with magnet 1 x 帶刻度量具 / Measuring bridge with dial gauge	8 斜齒 helical	29.80.xxx 47.80.xxx		1,35
28.01.008	安裝工具, 組件 / Assembly kit, comprising: 1 x 調整裝置 / Adjusting device 3 x 磁性量棒 / Gauging roller with magnet 1 x 帶刻度量具 / Measuring bridge with dial gauge	8 直齒 helical		28.80.xxx	1,15
29.01.010	安裝工具, 組件 / Assembly kit, comprising: 1 x 調整裝置 / Adjusting device 3 x 磁性量棒 / Gauging roller with magnet 1 x 帶刻度量具 / Measuring bridge with dial gauge	10	29.10.xxx 47.10.xxx	28.10.xxx	1,40
29.01.012	安裝工具, 組件 / Assembly kit, comprising: 1 x 調整裝置 / Adjusting device 3 x 磁性量棒 / Gauging roller with magnet 1 x 帶刻度量具 / Measuring bridge with dial gauge	12	29.12.xxx	29.13.xxx	1,50





描述

Description



通過裝配輔助工具，ATLANTA帶齒的齒條在拼接處可得到正確的節綫。在將齒條放在裝配位置後，在齒條安裝孔位置插入螺栓，輕輕用手擰緊。

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.

放置齒條調節裝置在現有齒條銷孔上，該裝置可以通過磁力保持在齒條上，任意安裝位置都可以。

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.

在齒條連接處和相鄰兩側放入量棒，它們也會因磁力的作用保持在齒中間，因而任意安裝位置都可以。由此確保它們永遠精確地放置在齒側，齒間必須保持清潔無異物。

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.

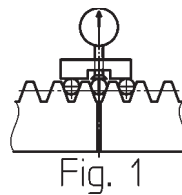


Fig. 1

在將測量橋在測量盤或另一水平面上調零後，就可以利用它來測量量棒上尺寸的變化了。通過調節齒條兩個方向的移動，連接處準確的節綫值可以被調節出。草圖顯示，基于齒條聯接處量棒上的測量尺寸，卓越的齒條拼接質量可以獲得。

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.

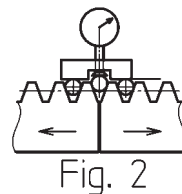


Fig. 2

因此齒條位置的調節不再需要用錘敲擊了，輕加預應力的齒條放在正確的位置後，保持在該位置直到擰緊螺栓。

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.

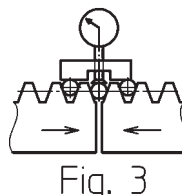
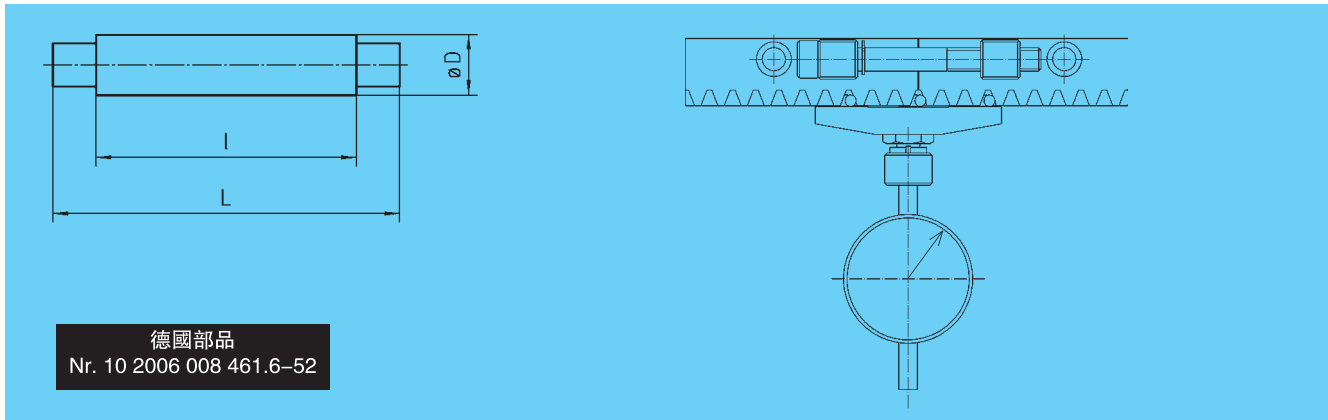


Fig. 3



德國部品
Nr. 10 2006 008 461.6-52

訂貨號 Order code	描述 Description	模數 Module	L	l	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：熱處理鋼

Material: Hardened steel.

描述：

對已安裝好的齒條，磁性量棒放在齒間就可以，對於未安裝好的齒條，磁性量棒要放在拼接處。

Description:

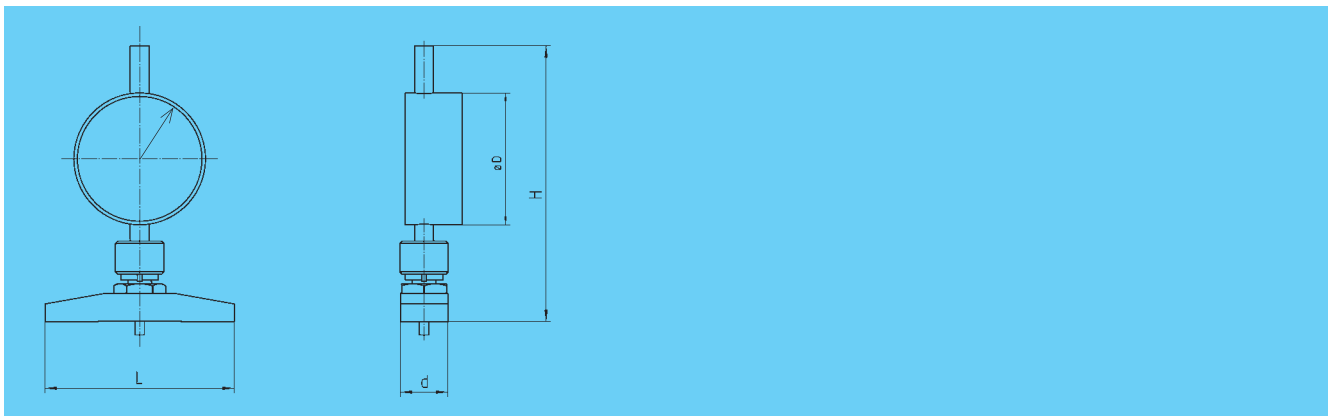
The gauging rollers (patent) are placed in the tooth gaps of the already mounted rack, of the rack to be mounted, and in the gap at the joint.

將測量橋在測量盤或其它水平面上調零，安裝調節裝置，通過測量橋和調節裝置，移動待裝配的齒條，可得到理想的拼接節綫，可能的話，刻度盤上的數值最好能達到預先設置的零數值。

Adjust the measuring bridge on a measuring plate or other level surface to zero. Mount the adjusting device.

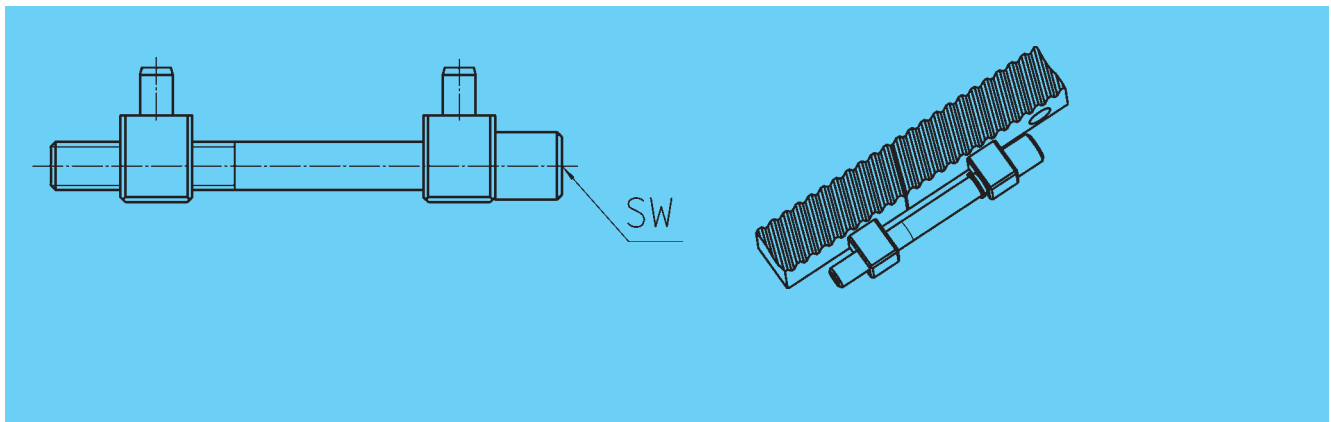
By means of the measuring bridge and the adjusting device it is now possible to adjust the optimal pitch by moving the racks to be assembled. The pointer of the dial gauge should, if possible, reach the pre-set zero value.

測量橋 / Measuring bridge



訂貨號 Order code	描述 Description	模數 / Module	L	b	H	D	
2.28.01.008	測量橋 / Measuring bridge	2 - 4	80	20	115	58	310
2.28.01.015	測量橋 / Measuring bridge	5 - 12	150	20	120	58	420





訂貨號 Order code	描述 Description	SW	模數 Module	相系列產品規格 / Relative item no.		kg
				斜齒 / helical	直齒 / straight	
2.29.00.002	調整裝置 / 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 49.29.xxx	0,12
2.29.00.003	調整裝置 / 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 49.39.xxx 28.40.xxx 33.41.xxx 34.40.xxx 49.49.xxx	0,14
2.29.00.005	調整裝置 / 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	調整裝置 / 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	調整裝置 / 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	調整裝置 / Adjusting device	14	8 直齒/straight		28.80.xxx	0,46

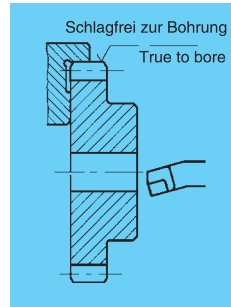
將調整裝置裝在齒條銷孔中，通過調節調整裝置螺母，齒條可以軸向兩個方向移動。這可以保證在齒條拼接處，在量棒上調出正確的尺寸和獲得正確的拼接節綫，調整裝置通過磁力作用保持在齒條上，可以在任意位置安裝。一直到齒條模數為6，扳手的尺寸規格一直同齒條的安裝螺栓相匹配。

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.



進一步加工

我們所提供的06/07/21/22/23系列的半成品齒輪，都有預開孔，因此，可以按照要求的安裝尺寸，由我們或者客戶做進一步加工（車內圓、鏜孔，開鍵槽，淬火等），為了確保加工後的齒輪工作可靠，不僅要考慮齒的質量，還要考慮裝配孔的同心度。在選擇加工工藝時必須予以認真對待。由於標準齒輪的外圓是按配合孔一次裝卡車出來的，或者滾銑切削齒牙得到的，所以我們建議按圖加工。



Finishing

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 hobbled when cutting the teeth, we recommend to proceed as shown on the opposite sketch.

所有的標準齒輪中：一面有凸輪轂與兩面都平的齒輪（所用材料請見尺寸表）都由經過熱處理的C45k（材料編號NO.1.0503）所製造。如果需要高強度，這些C45k製造的傳動元件可以作調質處理，或者，輪齒部分火焰淬火或高頻淬火（硬度約50HRC），配合面應該高頻淬火後精加工。請注意遵守相關規範來火焰或淬火硬化。

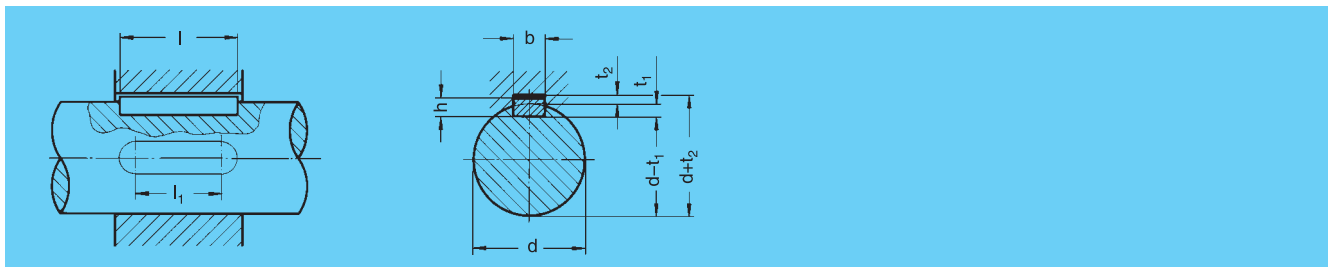
All standard spur gears with one-sided hub as well as certain plate wheels (for material, see the dimension tables) are manufactured from normalized heat treatable steel C45 (Material No. 1.0503). If a higher strength is required, these drive elements of C 45 can be quenched and tempered or optionally 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.

鍵連接（摘自DIN6885 sheet 1）

表中的尺寸是建立在最大容許表面壓力 $P_{perm}=100N/mm^2$ 及接觸面長度 l_1 基礎上的。

Key connections (excerpt from DIN 6885 sheet 1)

The values in the table are based on a max. permissible surface pressure $P_{perm.} = 100 N/mm^2$ and a bearing length l_1 .



鍵 Key	軸直徑-Ø Shaft dia. d	軸槽 Shaft groove b x t ₁	套槽 Hub groove b x t ₂	傳達扭矩 T_t Nm, 鍵長度 l mm Transmissible torque T_t in Nm, length of key l in mm								
				10	16	20	28	40	50	70	100	140
3 x 3	8 ... 10	3 x 1,8	3 x 1,4	5	9	12						
4 x 4	10 ... 12	4 x 2,5	4 x 1,8	9	13	17						
5 x 5	12 ... 17	5 x 3,0	5 x 2,3	15	24	30	42					
6 x 6	17 ... 22	6 x 3,5	6 x 2,8	25	40	50	70	100				
8 x 7	22 ... 30	8 x 4,0	8 x 3,3	39	63	78	109	157	195			
10 x 8	30 ... 38	10 x 5,0	10 x 3,3	50	82	102	143	204	255	357		
12 x 8	38 ... 44	12 x 5,0	12 x 3,3	62	98	123	173	247	308	432		
14 x 9	44 ... 50	14 x 5,5	14 x 3,8	82	132	164	230	330	412	575		
16 x 10	50 ... 58	16 x 6,0	16 x 4,3	108	173	215	302	430	539	754	1078	
18 x 11	58 ... 65	18 x 7,0	18 x 4,4	124	198	248	347	495	620	868	1240	
20 x 12	65 ... 75	20 x 7,5	20 x 4,9	158	252	315	440	630	788	1105	1580	
22 x 14	75 ... 85	22 x 9,0	22 x 5,4				560	800	1000	1400	2000	2800

