






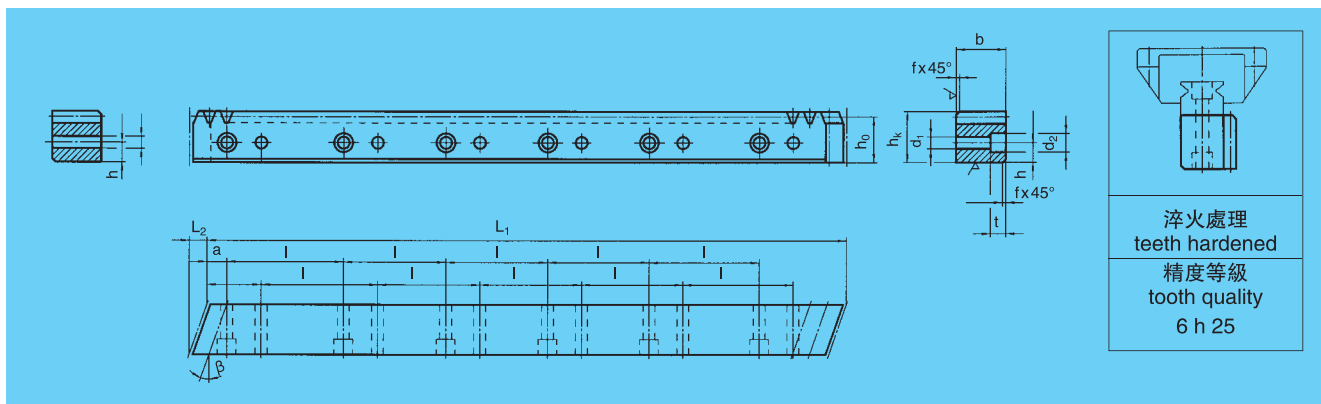
系列 Series	直齒/斜齒 straight/helical	模數 Module	齒面熱處理 heat-treatment of teeth	精度等級 Tolerance of teeth	頁碼 Page
49 .. ...	斜齒 helical	2; 3; 4	高頻淬火 induction-hardened	6 h 25	ZC-2
49 .. ...	斜齒 helical	2; 3; 4	軟材 soft	9 e 27	ZC-3
49 .. ...	直齒 straight	5, 10, 13,33 mm 節距	高頻淬火 induction-hardened	6 h 25	ZC-4
49 .. ...	直齒 straight	5, 10, 13,33 mm 節距	軟材 soft	9 e 27	ZC-5
90° 安裝型 Mounting guide for 90° version					ZC-6
180° 安裝型 Mounting guide for 180° version					ZC-7
齒條滑軌組合之優點 Advantages of rack end rail combination					ZC-8
	選型和負載參數表 Selection and load tables				ZH-7-8
	電控潤滑器、滑動毛刷和連接導管裝 Electronically controlled lubricators, sliding-type lubricating brushes and hose-connection sets				ZI-2-6
	毛氈齒輪和安裝軸 Felt gear and mounting shaft				ZI-5
	裝配 Mounting				ZJ-2





90° 安裝型, 斜齒類, 19° 31'42"右旋, 磨削齒, 20° 壓力角

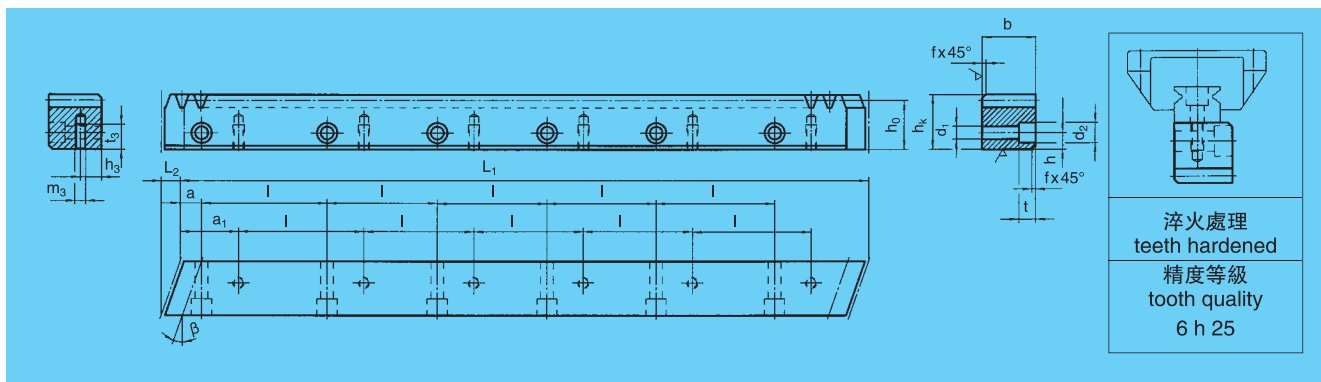
90° version, helical tooth system, 19° 31' 42" right-hand, ground teeth, 20° pressure angle



訂貨號 Order code	模數 Module	$L_1$	$L_2$	齒數 N° of teeth	$b$	$h_k$	$h_o$	$f$	$a$	孔數 N° of holes	$h$	$d_1$	$d_2$	$t$	$a_1$	$d_3$	GT <sub>f</sub> /300 <sup>1)</sup>	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	0,022	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	0,022	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	0,022	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	0,022	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	0,024	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	0,024	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	0,025	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	0,025	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	0,025	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	0,025	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	0,025	17,3

180° 安裝型, 斜齒類, 19° 31'42"右旋, 磨削齒, 20° 壓力角

180° version, helical tooth system, 19° 31' 42" right-hand, ground teeth, 20° pressure angle



訂貨號 Order code	模數 Module	$L_1$	$L_2$	齒數 N° of teeth	$b$	$h_k$	$h_o$	$f$	$a$	孔數 N° of holes	$h$	$d_1$	$d_2$	$t$	$a_1$	$m_3$	$h_3$	$t_3$	GT <sub>f</sub> /300 <sup>1)</sup>	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	0,022	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	0,022	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	0,024	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	0,025	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	0,025	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	0,025	17,3

材料C45, 材料編號NO.1.0504, 特殊處理的光亮鋼, 拉伸強度大約650N/mm<sup>2</sup>, 齒面高頻淬火硬度50~55HRC; 淬硬後磨削加工, 因為祇是齒形部分高頻淬火, 所以不影響打孔裝銷釘。

Material C 45, mat. no. 1.0504, of specially treated bright steel with a tensile strength of approx. 650 N/mm<sup>2</sup>. Teeth induction-hardened to 50 to 55 HRC; ground on all sides after hardening.

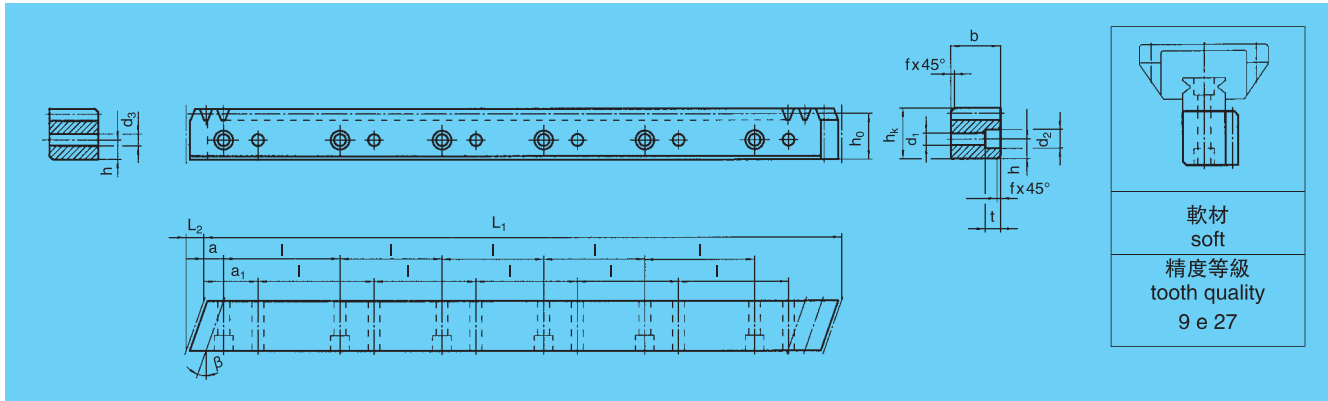
1) GT<sub>f</sub>/300 = 見 ZC - 3

1) GT<sub>f</sub>/300 = see page ZC-3.



90° 安裝型, 斜齒類, 19° 31'42"右旋, 銑削齒, 20° 壓力角

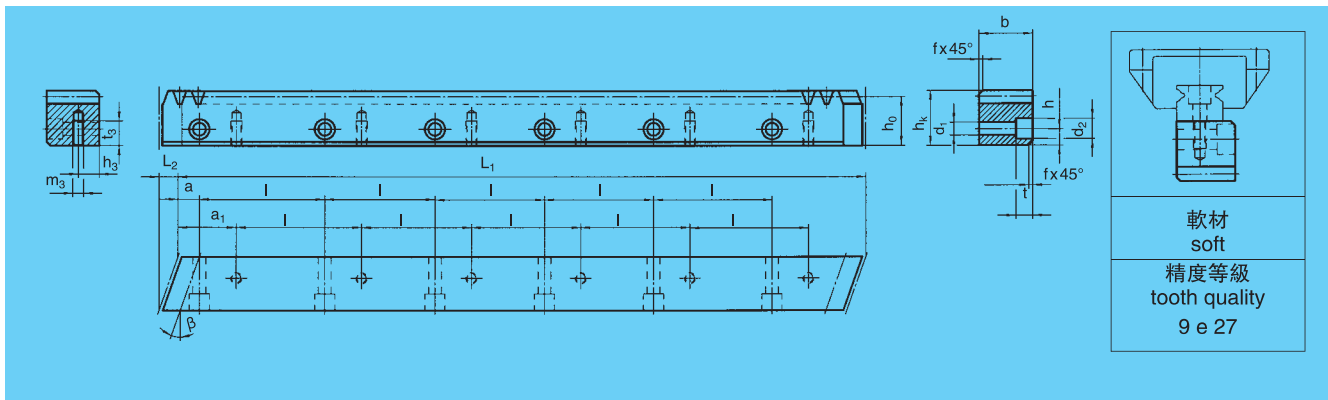
90° version, helical tooth system, 19° 31' 42" right-hand, milled teeth, 20° pressure angle



訂貨號	模數	齒數		孔數										GT <sub>f</sub>	kg				
Order code	Module	L <sub>1</sub>	L <sub>2</sub>	N° of teeth	b	h <sub>k</sub>	h <sub>0</sub>	f	a	l	N° of holes	h	d <sub>1</sub>	d <sub>2</sub>	t	a <sub>1</sub>	d <sub>3</sub>	/300 <sup>(1)</sup>	
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	0,061	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	0,061	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	0,065	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	0,068	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	0,068	29,9

180° 安裝型, 斜齒類, 19° 31'42"右旋, 銑削齒, 20° 壓力角

180° version, helical tooth system, 19° 31' 42" right-hand, milled teeth, 20° pressure angle



訂貨號	模數	齒數		孔數										GT <sub>f</sub>	kg						
Order code	Module	L <sub>1</sub>	L <sub>2</sub>	N° of teeth	b	h <sub>k</sub>	h <sub>0</sub>	f	a	l	N° of holes	h	d <sub>1</sub>	d <sub>2</sub>	t	a <sub>1</sub>	m <sub>3</sub>	h <sub>3</sub>	t <sub>3</sub>	/300 <sup>(1)</sup>	
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	0,061	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	0,061	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	0,065	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	0,068	21,5

材料C45, 材料編號NO.1.0503, 特殊處理的光亮鋼, 拉伸強度大約650N/mm<sup>2</sup>。

Material C 45, Mat.No. 1.0504, of specially treated bright steel with a tensile strength of approx. 650 N/mm<sup>2</sup>.

1) GT<sub>f</sub>/300 = 整體節距誤差, 即齒輪測量長度與理論長度 L<sub>300</sub> = (m / cos β) · π · Z<sub>300</sub> 相比的最大容許偏差 (每300mm)。

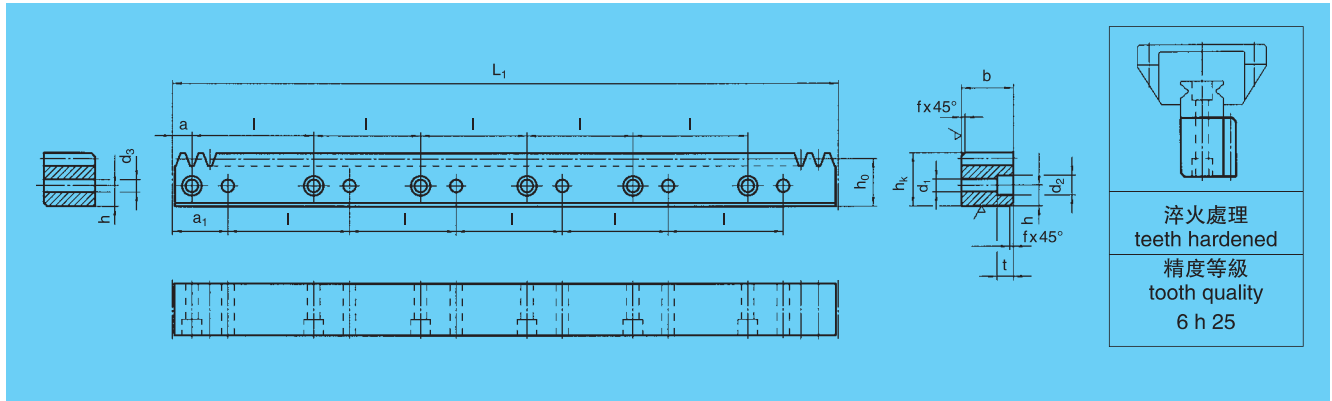
1) GT<sub>f</sub>/300 = total pitch error, i.e. the max. permissible deviation (per 300 mm) of the measured length of the rack compared to the theoretical length L<sub>300</sub>, with L<sub>300</sub> = (m / cos β) π Z<sub>300</sub>.

為確保齒條和齒輪傳動的連續潤滑, 建議選用ZI-2/3頁所介紹的電控潤滑器。

To ensure continuous lubrication of rack and pinion drives, we recommend to use electronic lubricators as described on page ZI-2/3.

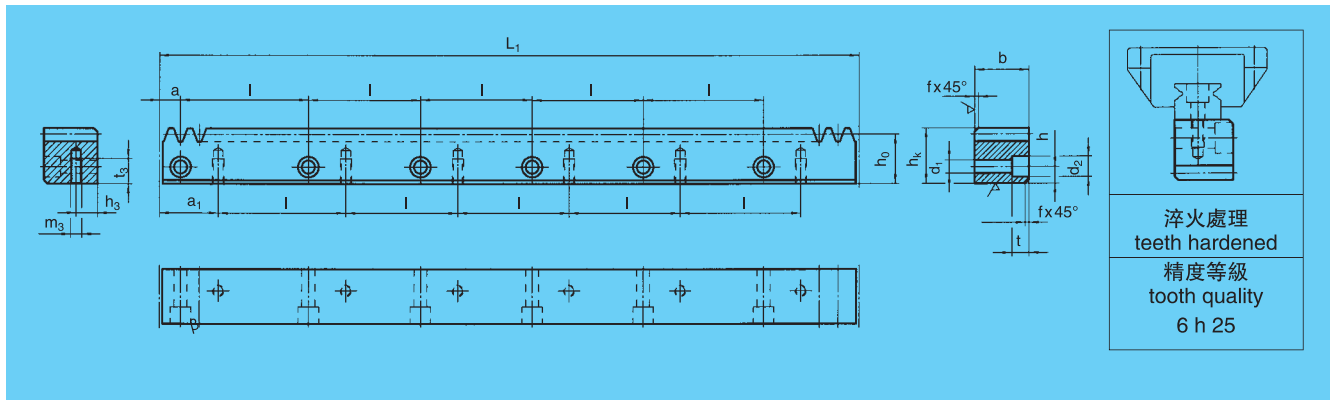


90° 安裝型, 直齒類, 磨削齒, 20° 壓力角  
90° version, straight tooth system, ground teeth, 20° pressure angle



訂貨號 Order code	節距 Pitch	L <sub>1</sub>	齒數 N° of teeth	b	h <sub>k</sub>	h <sub>0</sub>	f	a	l	N° of holes	h	d <sub>1</sub>	d <sub>2</sub>	t	a <sub>1</sub>	d <sub>3</sub>	GT <sub>f</sub> /300 <sup>1)</sup>	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	0,022	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	0,022	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	0,024	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	0,024	10,5	
49 47 999	13,33	240	18	39	39,00	34,75												安裝架 / Mounting rack	2,5

180° 安裝型, 直齒類, 磨削齒, 20° 壓力角  
180° version, straight tooth system, ground teeth, 20° pressure angle



訂貨號 Order code	節距 Pitch	L <sub>1</sub>	齒數 N° of teeth	b	h <sub>k</sub>	h <sub>0</sub>	f	a	l	N° of holes	h	d <sub>1</sub>	d <sub>2</sub>	t	a <sub>1</sub>	m <sub>3</sub>	h <sub>3</sub>	t <sub>3</sub>	GT <sub>f</sub> /300 <sup>1)</sup>	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	0,022	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	0,022	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	0,024	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	0,024	10,5

材料C45, 材料編號NO.1.0504, 特殊處理的光亮鋼, 拉伸強度大約650N/mm<sup>2</sup>, 齒面高頻淬火硬度50~55HRC; 淬硬後磨削加工, 因為祇是齒形部分高頻淬火, 所以不影響打孔裝銷釘。

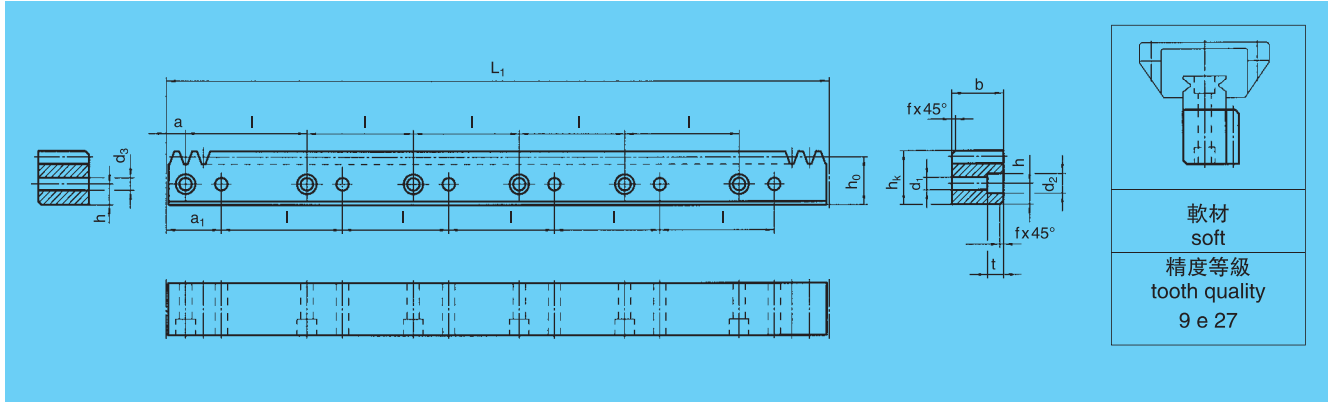
Material C 45, mat. no. 1.0504, of specially treated bright steel with a tensile strength of approx. 650 N/mm<sup>2</sup>. Teeth induction-hardened to 50 to 55 HRC; ground on all sides after hardening.

1) GT<sub>f</sub>/300 = 整體節距誤差, 即齒輪測量長度與理論長度 L<sub>300</sub> = (m / cos β) · π · Z<sub>300</sub> 相比的最大容許偏差 (每300mm)。為確保齒條和齒輪傳動的連續潤滑, 建議選用ZI-2/3頁所介紹的電控潤滑器。

1) GT<sub>f</sub>/300 = total pitch error, i.e. the max. permissible deviation (per 300 mm) of the measured length of the rack compared to the theoretical length L<sub>300</sub>, with L<sub>300</sub> = (m / cos β) π Z<sub>300</sub>. To ensure continuous lubrication of rack and pinion drives, we recommend to use electronic lubricators as described on page ZI-2/3.

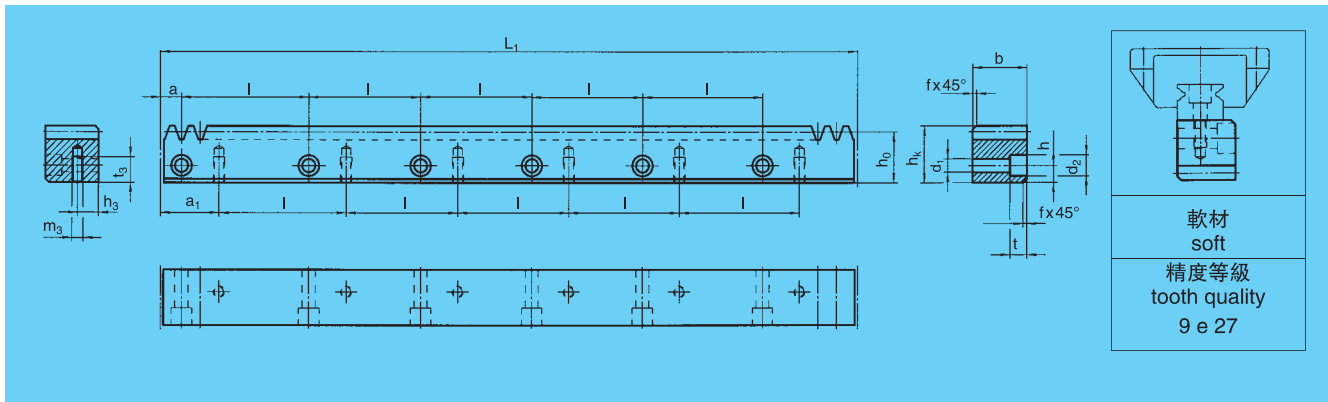


90° 安裝型, 直齒類, 銑削齒, 20° 壓力角  
90° version, straight tooth system, milled teeth, 20° pressure angle



訂貨號 Order code	節距 Pitch	$L_1$	齒數 N° of teeth	$b$	$h_k$	$h_0$	$f$	$a$	$l$	孔數 N° of holes	$h$	$d_1$	$d_2$	$t$	$a_1$	$d_3$	$GT_f$ /300 <sup>1)</sup>	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	0,061	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	0,061	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	0,065	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	0,068	21,5

180° 安裝型, 直齒類, 銑削齒, 20° 壓力角  
180° version, straight tooth system, milled teeth, 20° pressure angle



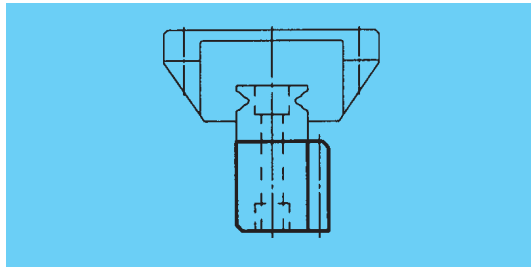
訂貨號 Order code	節距 Pitch	$L_1$	齒數 N° of teeth	$b$	$h_k$	$h_0$	$f$	$a$	$l$	孔數 N° of holes	$h$	$d_1$	$d_2$	$t$	$a_1$	$m_3$	$h_3$	$t_3$	$GT_f$ /300 <sup>1)</sup>	kg
49 77 202	5	1920	384	20	19,50	17,91	1	10	60	32	7,5	5,8	10	6	30	M4	7,5	8,0	0,061	5,4
49 77 212	5	1920	384	25	24,50	22,91	1	10	60	32	10,0	7,0	11	7	30	M5	10,0	11,0	0,061	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	0,065	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	0,068	21,5

材料C45, 材料編號NO.1.0503, 特殊處理的光亮鋼, 拉伸強度大約650N/mm<sup>2</sup>。

Material C 45, Mat.No. 1.0504, of specially treated bright steel with a tensile strength of approx. 650 N/mm<sup>2</sup>.

1)  $GT_f/300$  = 整體節距誤差, 即齒輪測量長度與理論長度  $L_{300} = (m / \cos \beta) \cdot \pi \cdot Z_{300}$  相比的最大容許偏差 (每300mm)。為確保齒條和齒輪傳動的連續潤滑, 建議選用ZI-2/3頁所介紹的電控潤滑器。

1)  $GT_f/300$  = total pitch error, i.e. the max. permissible deviation (per 300 mm) of the measured length of the rack compared to the theoretical length  $L_{300}$ , with  $L_{300} = (m / \cos \beta) \cdot \pi \cdot Z_{300}$ . To ensure continuous lubrication of rack and pinion drives, we recommend to use electronic lubricators as described on page ZI-2/3.



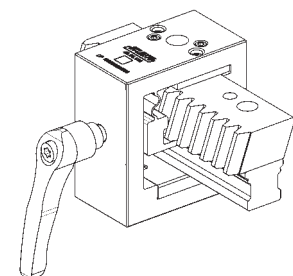
根據此表選擇適配的齒條和直綫滑軌，齒條的允許扭矩也必須經過校核，根據供應商技術規格選擇直綫導軌。

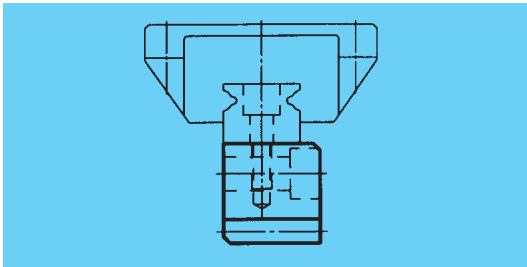
This table with the most usual rails enables (you) to select the rack suitable for the rail. The permissible torque of the rack has to be checked, too. The rail has to be selected according to the supplier's specifications.

供應商 Racks from	供應商90° 安裝型 (安裝螺紋孔在導軌上) 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	
Star	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			

齒條與軌道安裝工具 (專利申請中)，可以按需求供貨。

The device for mounting racks on rails (patent pending), is available upon request.





根據此表選擇適配的齒條和直綫滑軌，齒條的允許扭矩也必須經過校核，根據供應商技術規格選擇直綫導軌。

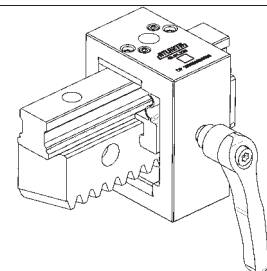
This table with the most usual rails enables (you) to select the rack suitable for the rail. The permissible torque of the rack has to be checked, too. The rail has to be selected according to the supplier's specifications.

供應商 Racks from	180° 安裝型 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	
Star	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				



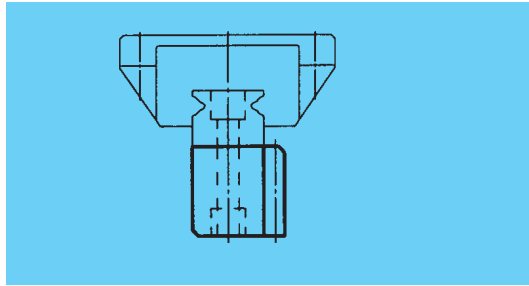
齒條與軌道安裝工具（專利申請中），可以按需求供貨。

The device for mounting racks on rails (patent pending), is available upon request.



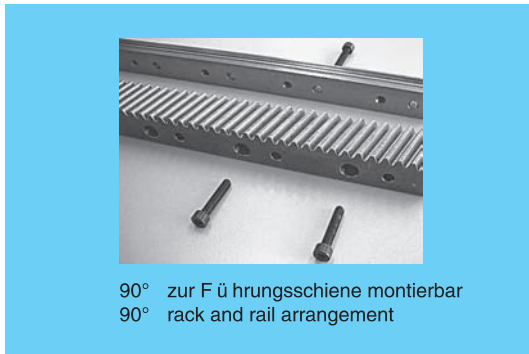


### 90° 安裝型 / 90° arrangement

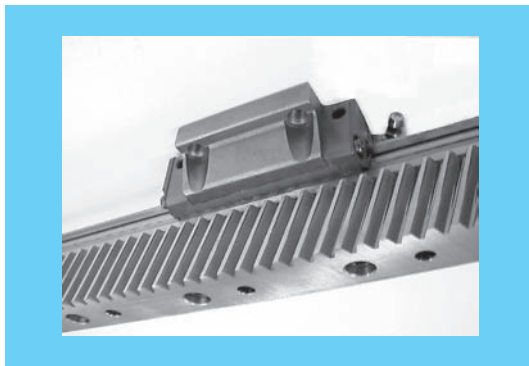


#### 優點

- 僅僅需要兩個安裝面，取代了三個面
- 不必再需調整齒條與導軌的平行
- 節約空間并可實現更優設計理念
- 多種規格齒條可選擇，實現最優性價比
- 可實現齒條與導軌組合在設備外部組裝

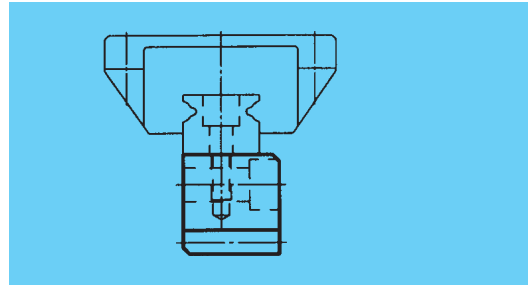


- 可提供直齒和斜齒兩種類型
- 軟齒面應用在輕載接觸
- 硬齒面應用在重載接觸
- 磨削齒，精度可達6級，齒條長度960mm
- 銑削齒精度可達9級，齒條長度1920mm



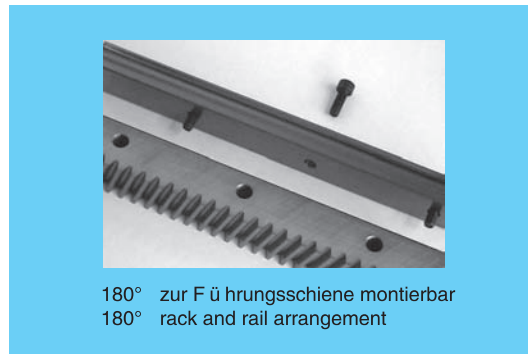
- 可拼接齒條允許最長的導軌并可降低運行振動。

### 180° 安裝型 / 180° arrangement

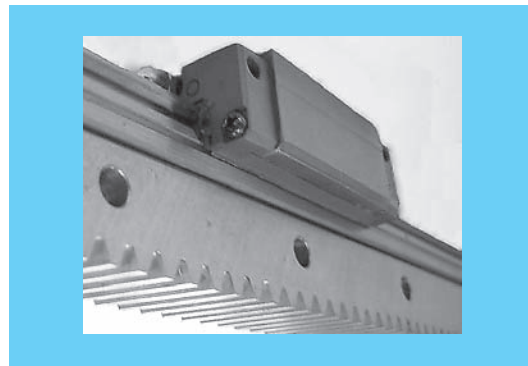


#### Advantages

- Requires only two mounting surfaces, instead of three
- Adjusting between rack and rail not necessary
- Space-saving and performance-optimized design can be realized
- Different types of racks allows best price-performance-ratio
- Allows assembling of rack and rail outside the machine



- Racks with helical and straight tooth-system available
- Soft teeth with non-machined contact surfaces
- Hardened teeth with machined contact surfaces
- Ground teeth, quality 6, rack length 960 mm
- Milled teeth, quality 9, rack length 1920 mm



- Continuous linking of the rack permits maximum length of the rails and a reduction of shocks at the joints.