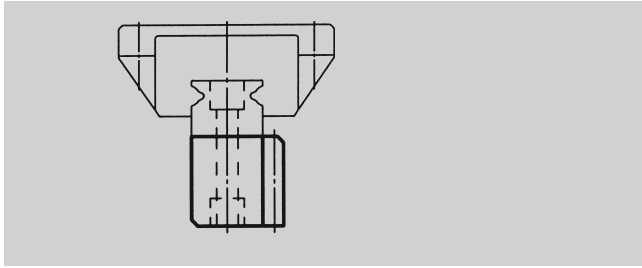
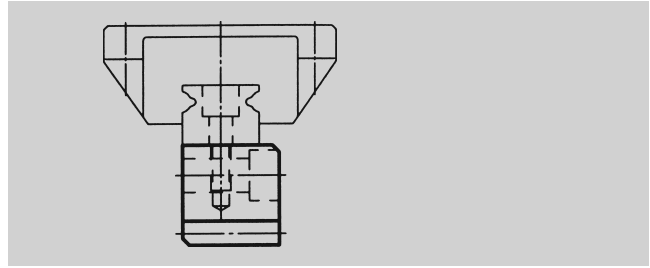




### 90° Arrangement



### 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 requirement: threads in the rail for the 90° arrangement

### Helical Integrated Rack





Class	Quality	Module	Total Pitch Error (µm/m)	Tooth Thickness Tolerance (µm)	Max. Length (mm)	Feed Force per Pinion Contact/ Tooth Wide (kN/width)	Applications (Examples)
<b>HPIR</b> High Precision Integrated Rack	6	2	34	-20	960	6.8/24	Machine Tools, Wood, Plastic Working Machines
		3	34	-20	960	12.0/29	
		4	34	-20	960	23.5/39	
<b>BIR</b> Basic Integrated Rack	9	2	150	-110	1920	1.8/25	Pick and Place Applications
		3	150	-110	1920	3.0/30	
		4	150	-110	1920	5.0/40	

### Straight Integrated Rack

Class	Quality	Module	Total Pitch Error (µm/m)	Tooth Thickness Tolerance (µm)	Max. Length (mm)	Feed Force per Pinion Contact/ Tooth Wide (kN/width)	Applications (Examples)
<b>HPIR</b> High Precision Integrated Rack	6	5	34	-20	960	5/24	Machine Tools, Wood, Plastic Working Machines
		10	34	-20	960	12/29	
		13.33	34	-20	960	23/39	
<b>BIR</b> Basic Integrated Rack	9	5	150	-110	1920	1.5/25	Pick and Place Applications
		10	150	-110	1920	5.5/30	
		13.33	150	-110	1920	6.5/40	











	Series	Straight/ Helical	Module	Heat-Treatment of Teeth		Page
<b>HPIR</b>	49 .. ...	Helical <sup>1)</sup>	2, 3, 4	Induction-Hardened	6 h 25	ZC-4/5
	49 .. ...	Straight	5, 10, 13.33 mm	Induction-Hardened	6 h 25	ZC-8/9
<b>BIR</b>	49 .. ...	Helical <sup>1)</sup>	2, 3, 4	Soft	9 e 27	ZC-6/7
	49 .. ...	Straight	5, 10, 13.33 mm	Soft	9 e 27	ZC-10/11
   	Mounting Guide for 90° Version					ZC-12
	Mounting Guide for 180° Version					ZC-13
	Selection and Load Tables					ZC-15-20
	Electronically Controlled Lubricators, Sliding-Type Lubricating Brushes and Hose-Connection Sets					ZE-2-6
	Felt Gear and Mounting Shaft					ZE-7-8
Mounting					ZF-9	

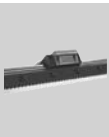
1) All our helical racks are right hand, except the companion racks, which are left hand!





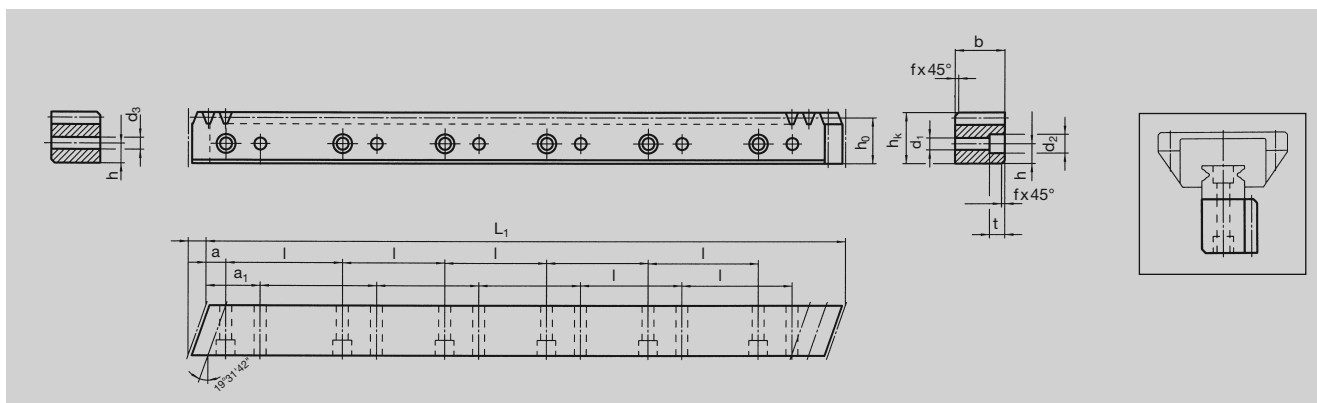
	Series	Pitch	Heat-Treatment of Teeth	Tolerance of Teeth	Page
	24 .. ...	5, 10, 13.33	Case-Hardened	6 e 25	ZC-14
	07 .. ...	5, 10	Soft	8 e 25	ZC-14
	Selection and Load Tables				ZC-15-20
	Electronically Controlled Lubricators, Sliding-Type Lubricating Brushes and Hose-Connection Sets				ZE-2-6
	Felt Gear and Mounting Shaft				ZE-7-8
	Mounting				ZF-9

Suitable helical pinions are shown at page ZA -14 and following pages.





**Quality 6 – 90° Version**



Order Code	Module	L <sub>1</sub>	L <sub>2</sub>	N° of Teeth	b	h <sub>k</sub>	h <sub>o</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>	<b>T</b> 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

**Total pitch error:  $GT_f/1000 \leq 0.034$  mm**

- Teeth induction-hardened and ground
- Material C45
- Ground on all sides after hardening

**Mounting racks, see page ZF-2.**

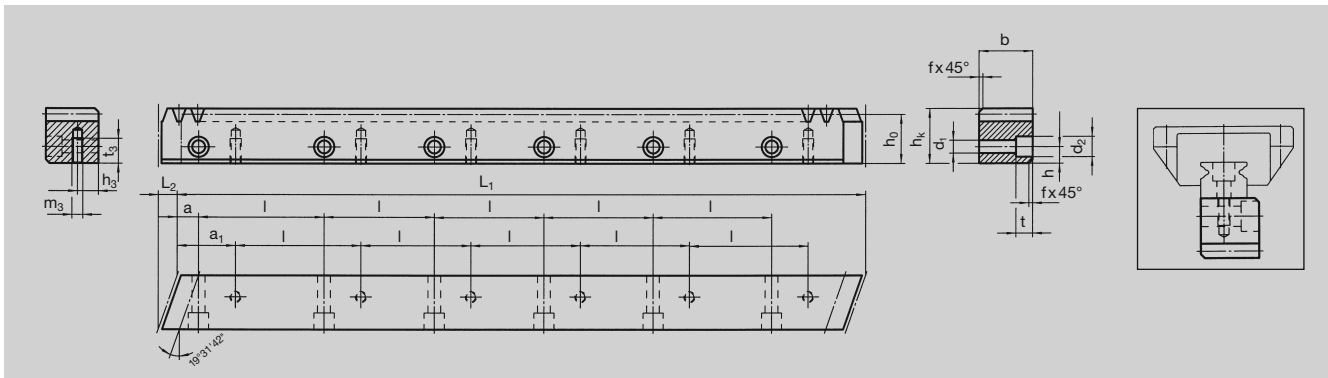
**To achieve precision rack joints, we recommend our patented rack assembly kit, see page ZF-4.**

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

**For the calculation and selection of the rack & pinion drive, see page ZD-1.**



**Quality 6 – 180° Version**



Order Code	Module	L <sub>1</sub>	L <sub>2</sub>	N° of Teeth	b	h <sub>k</sub>	h <sub>o</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>	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

**Total pitch error:  $GT_f/1000 \leq 0.034$  mm**

- Teeth induction-hardened and ground
- Material C45
- Ground on all sides after hardening

**Mounting racks, see page ZF-2.**

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

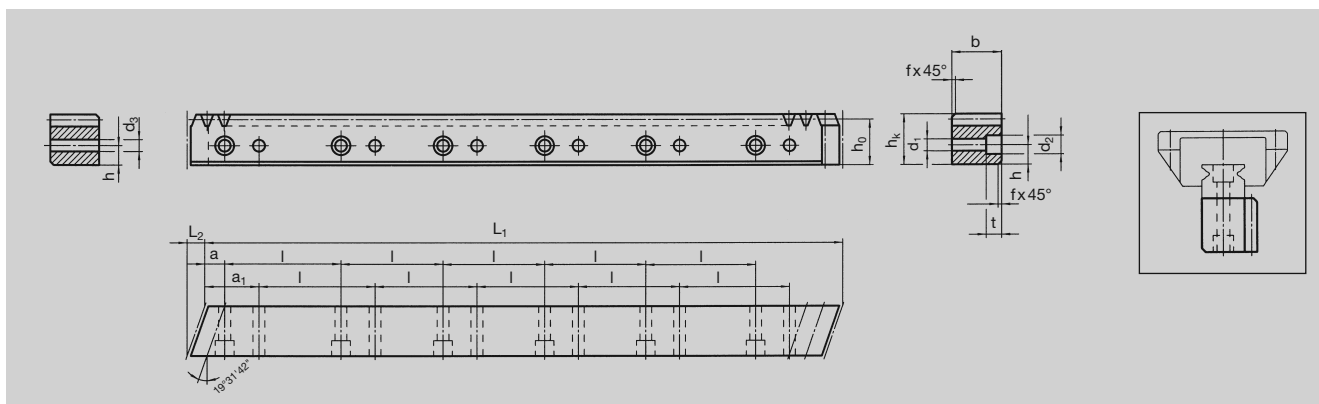
**For lubrication of racks & pinions, we recommend our automatic lubrication systems, see page ZE-1.**

**For the calculation and selection of the rack & pinion drive, see page ZD-1.**





### Quality 9 – 90° Version



Order Code	Module	L <sub>1</sub>	L <sub>2</sub>	N° of Teeth	b	h <sub>k</sub>	h <sub>o</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>	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

Total pitch error  $GT_f/1000 \leq 0.150$  mm.

- Milled teeth
- Material C45
- Bright steel

Mounting racks see page ZF-2.

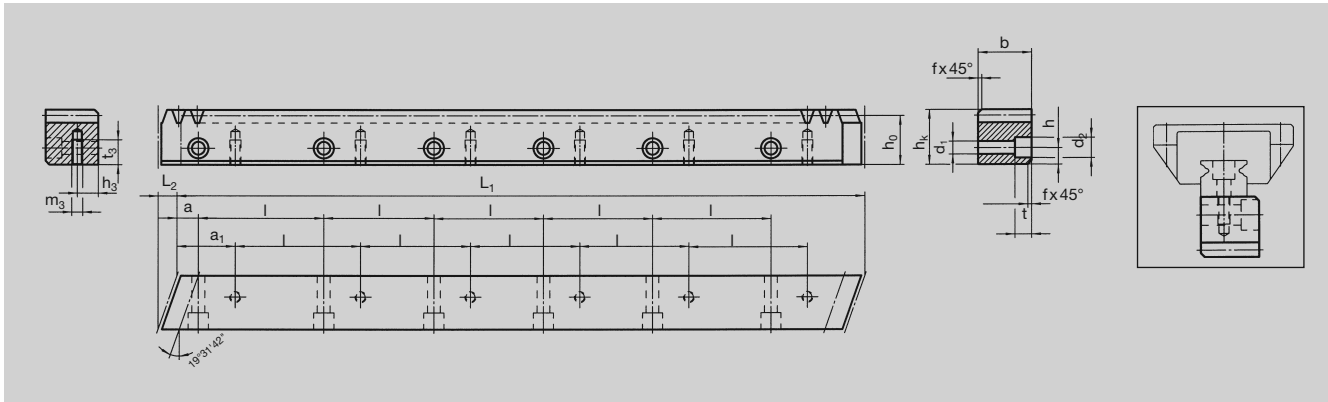
To achieve precision rack joints, we recommend our patented rack assembly kit, see page ZF-4.

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

For the calculation and selection of the rack & pinion drive, see page ZD-1.



**Quality 9 – 180° Version**



Order Code	Module	L <sub>1</sub>	L <sub>2</sub>	N° of Teeth	b	h <sub>k</sub>	h <sub>o</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>	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

**Total pitch error  $GT_f/1000 \leq 0.150$  mm.**

- Milled teeth
- Material C45
- Bright steel

**Mounting racks see page ZF-2.**

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

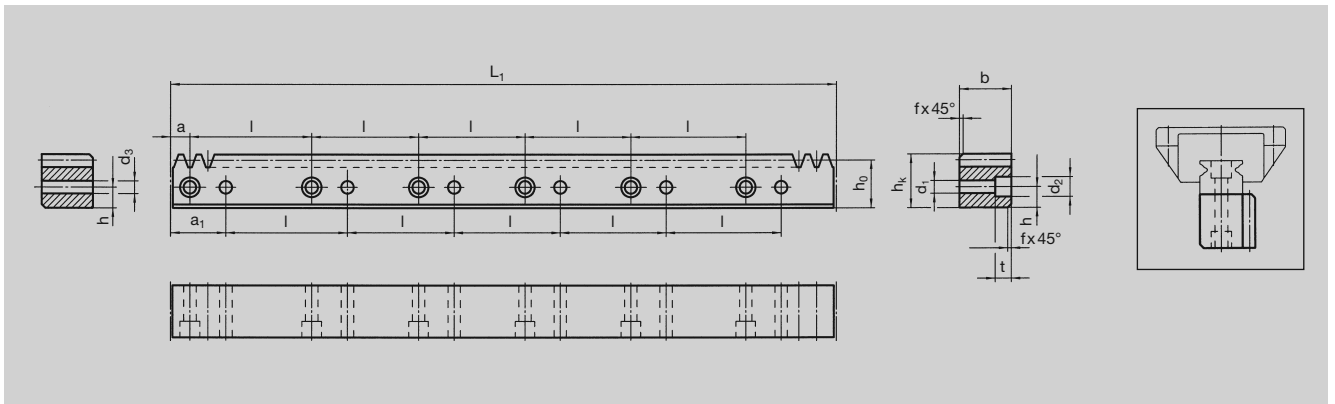
**For lubrication of racks & pinions, we recommend our automatic lubrication systems, see page ZE-1.**

**For the calculation and selection of the rack & pinion drive, see page ZD-1.**





**Quality 6 – 90° Version**



Order Code	Pitch	L <sub>1</sub>	N° of Teeth	b	h <sub>k</sub>	h <sub>o</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>	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

**Total pitch error:  $GT_f/1000 \leq 0.034$  mm**

- Teeth induction-hardened and ground
- Material C45
- Ground on all sides after hardening

**Mounting racks see page ZF-2 and ZF-4-5.**

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

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

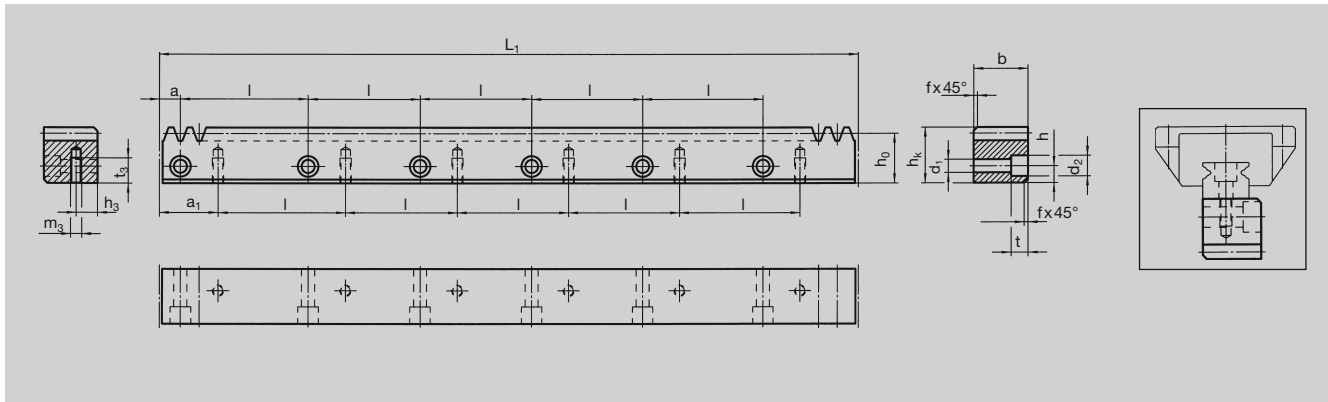
**For the calculation and selection of the rack & pinion drive, see page ZD-1.**







**Quality 6 – 180° Version**



Order Code	Pitch	L <sub>1</sub>	N° of Teeth	b	h <sub>k</sub>	h <sub>o</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>	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

**Total Pitch Error:**  $GT_f/1000 \leq 0.034 \text{ mm}$

- Teeth induction-hardened and ground
- Material C45
- Ground on all sides after hardening

**Mounting racks see page ZF-2 and ZF-4-5.**

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

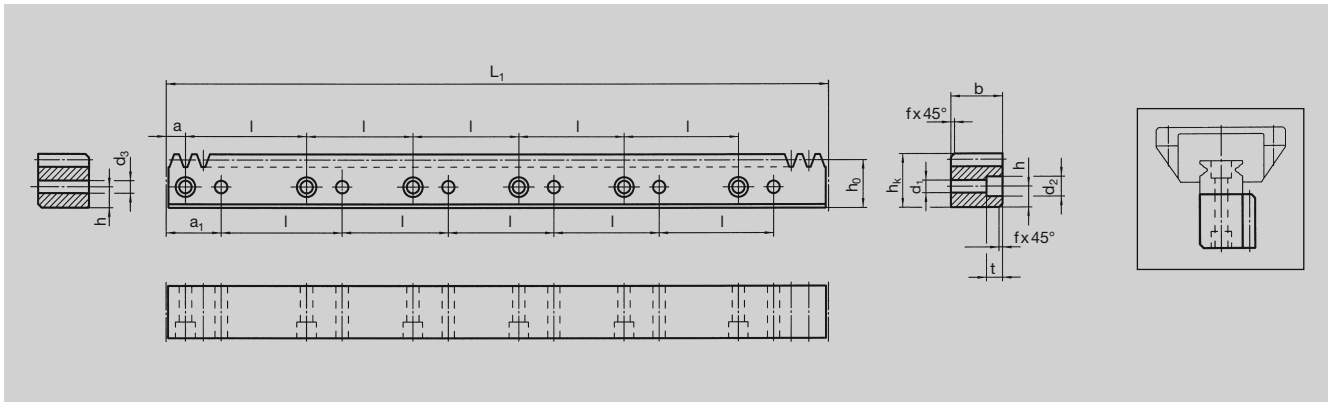
**For lubrication of racks & pinions, we recommend our automatic lubrication systems, see page ZE-1.**

**For the calculation and selection of the rack & pinion drive, see page ZD-1.**





**Quality 9 – 90° Version**



Order Code	Pitch	L <sub>1</sub>	N° of Teeth	b	h <sub>k</sub>	h <sub>o</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>	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

**Total pitch error  $GT_f/1000 \leq 0.150$  mm.**

- Milled teeth
- Material C45
- Bright steel

**Mounting racks see page ZF-2 and ZF-4-5.**

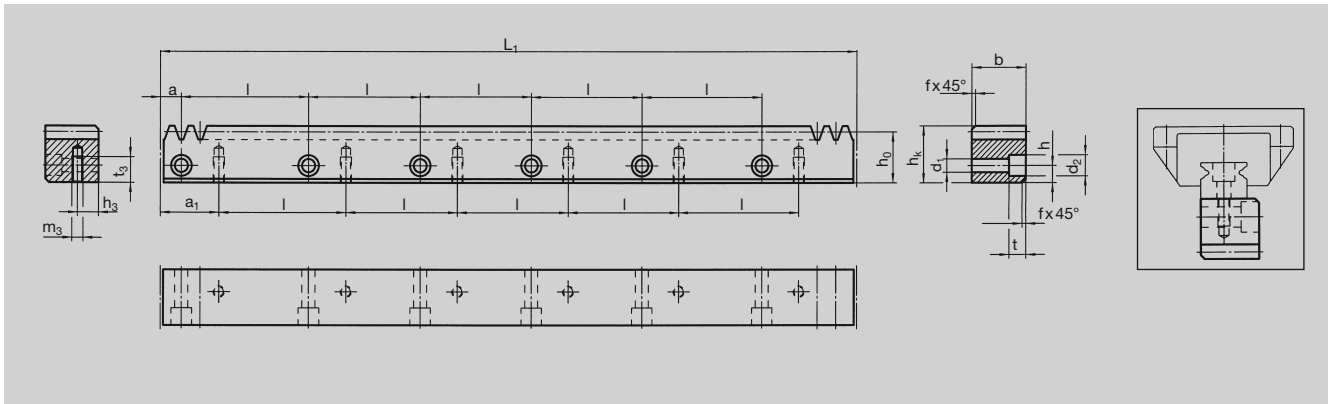
**To achieve precision rack joints, we recommend our patented rack assembly kit, see page ZF-4.**

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

**For the calculation and selection of the rack & pinion drive, see page ZD-1.**



**Quality 9 – 180° Version**



Order Code	Pitch	L <sub>1</sub>	N° of Teeth	b	h <sub>k</sub>	h <sub>o</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>	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

Total Pitch error  $GT_f/1000 \leq 0.150$  mm.

- Milled teeth
- Material C45
- Bright steel

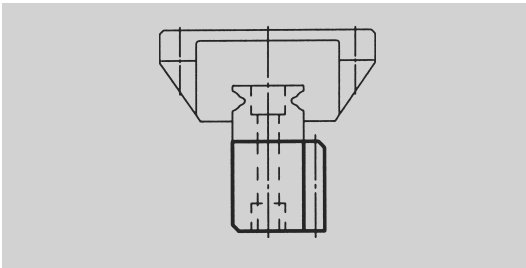
Mounting racks see page ZF-2 and ZF-4-5.

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

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

For the calculation and selection of the rack & pinion drive, see page ZD-1.





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.

### Racks from

### 90° Assembly (Additional threads required in the rail)

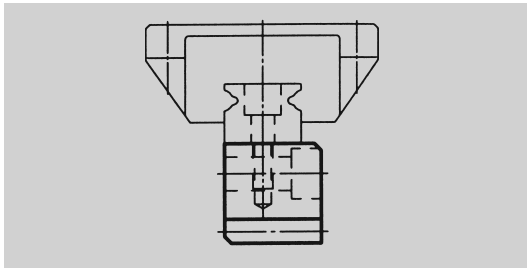
<b>ATLANTA</b>	49 29 197	49 29 187	49 39 197	49 49 197	49 49 177	49 49 887
	49 29 292	49 29 282	49 39 292	49 49 292	49 49 377	
	49 77 197	49 77 187	49 97 197	49 47 197		
	49 77 292	49 77 282	49 97 292	49 47 292		
<b>HIWIN</b>	LGR 15R	LGR 20R	LGR 25R	LGR 30R	LGR 35R	LGR 45R
	AGR 15U	AGR 20R	AGR 25R	AGR 30U		
	HGR 15Z	HGR 20Z	HGR 25Z	HGR 30Z	HGR 35Z	HGR 45Z
<b>IKO</b>		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
<b>INA</b>		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	
<b>NSK</b>	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
<b>Schneeberger</b>	BM 15	BM 20	BM 25	BM 30	BM 35	BM 45
<b>SKF</b>	LLBHS 15	LLBHS 20	LLBHS 25	LLBHS 30	LLBHS 35	LLBHS 45
		LLBUS 20	LLBUS 25		LLBUS 35	
<b>Star</b>	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
<b>THK</b>	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		

### Mounting Device

<b>Order Code</b>	<b>49 01 115</b>	<b>49 01 120</b>	<b>49 01 125</b>	<b>49 01 130</b>	<b>49 01 135</b>	<b>49 01 145</b>
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The device for mounting racks on rails (patented), is available upon request.





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.

Racks from	180° Assembly					
<b>ATLANTA</b>	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		
<b>HIWIN</b>	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
<b>IKO</b>		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
<b>INA</b>		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	
<b>NSK</b>	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
<b>Schneeberger</b>	BM 15	BM 20	BM 25	BM 30	BM 35	BM 45
<b>SKF</b>	LLBHS 15	LLBHS 20	LLBHS 25	LLBHS 30	LLBHS 35	LLBHS 45
		LLBUS 20	LLBUS 25		LLBUS 35	
<b>Star</b>	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
<b>THK</b>	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				



### Mounting Device

Order Code	49 01 215	49 01 220	49 01 225	49 01 230	49 01 235	49 01 245
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The device for mounting racks on rails (patented), is available upon request.



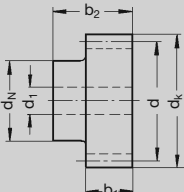
### Straight Tooth System, Ground Teeth



16MnCr5, 1.7131
Case-Hardened
Gearing Grade <b>6 e 25</b>

Order Code	Module	N° of Teeth z	d	d <sub>k</sub>	d <sub>1</sub> <sup>H6</sup>	d <sub>N</sub>	b <sub>1</sub>	b <sub>2</sub>	u	t	kg	Shrink-Disk on page GH-1
<b>Pitch 5 mm</b>												
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
<b>Pitch 10 mm</b>												
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
<b>Pitch 13.33 mm</b>												
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

### Straight Tooth System, milled teeth



<b>Soft</b>
Ck45 1.0503
Gearing Grade <b>8 e 25</b>

Order Code	Module m	N° of Teeth z	d	d <sub>k</sub>	d <sub>1</sub>	d <sub>N</sub>	b <sub>1</sub>	b <sub>2</sub>	kg
<b>Pitch 5 mm</b>									
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
<b>Pitch 10 mm</b>									
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

Further finishing (turning bores, keywaying, threading, etc.) is possible within short time.



# ATLANTA

## Integrated Rack and Pinion Drive – Calculation and Selection – Module 2 – Helical Tooth System

Rack		HPIR	HPIR	BIR			BIR		
Quality		6 Width 19 mm	6 Width 24 mm	9 Width 20 mm			9 Width 25 mm		
Rack	Material	16MnCr5	16MnCr5	C45			C45		
	Heat Treatment	Induction Hardened	Induction Hardened	Soft			Soft		
Pinion	Material	16MnCr5	16MnCr5	16MnCr5	C45		16MnCr5	C45	
	Heat Treatment	Case Hardened	Case Hardened	Case Hardened	Ind. Hardened		Case Hardened	Ind. Hardened	
No. of Pinion Teeth <sup>1)</sup>	Pitch Circle Dia.	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) Check availability (chapter ZA)

### Maximum permissible Feed Forces <sup>1)</sup> 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 disk see on page GH-1.





**ATLANTA**

**Integrated Rack and Pinion Drive – Calculation and Selection – Module 3 – Helical Tooth System**

Rack		HPIR		BIR					
Quality		6 Width 29 mm		9 Width 30 mm					
Rack	Material	16MnCr5		C45					
	Heat Treatment	Induction Hardened		Soft					
Pinion	Material	16MnCr5		16MnCr5	C45				
	Heat Treatment	Case Hardened		Case Hardened	Induction Hardened				
No. of Pinion Teeth <sup>1)</sup>	Pitch Circle Dia.	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) Check availability (chapter ZA)

**Maximum permissible feed forces – description see page ZC-15**




**ATLANTA**
**Integrated Rack and Pinion Drive – Calculation and Selection – Module 4 – Helical Tooth System**

Rack		HPIR		BIR				
Quality		6 Width 39 mm		9 Width 40/41 mm				
Rack	Material	16MnCr5		C45				
	Heat Treatment	Induction Hardened		Soft				
Pinion	Material	16MnCr5		16MnCr5	C45			
	Heat Treatment	Case Hardened		Case Hardened	Induction Hardened			
No. of Pinion Teeth <sup>1)</sup>	Pitch Circle Dia.	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) Check availability (chapter ZA)

Maximum permissible feed forces – description see page ZC-15





**ATLANTA**

**Integrated Rack and Pinion Drive – Calculation and Selection – Pitch 5 – Straight Tooth System**

Rack		HPIR	HPIR	BIR			BIR		
Quality		6 Width 19 mm	6 Width 24 mm	9 Width 20 mm			9 Width 25 mm		
Rack	Material	16MnCr5	16MnCr5	C45			C45		
	Heat Treatment	Induction Hardened	Induction Hardened	Soft			Soft		
Pinion	Material	16MnCr5	16MnCr5		C45			C45	
	Heat Treatment	Case Hardened	Case Hardened		Induction Hardened			Induction Hardened	
No. of Pinion Teeth <sup>1)</sup>	Pitch Circle Dia.	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) Check availability (chapter ZC)

Maximum permissible feed forces – description see page ZC-15


**ATLANTA**
**Integrated Rack And Pinion Drive – Calculation And Selection – Pitch 10 – Straight Tooth System**

Rack		HPIR		BIR						
Quality		6 Width 29 mm		9 Width 30 mm						
Rack		16MnCr5		C45						
	Heat Treatment	Induction Hardened		Soft						
Pinion	Material	16MnCr5		16MnCr5	C45	C45				
	Heat Treatment	Case Hardened		Case Hardened	Induction Hardened	Soft				
No. of Pinion Teeth <sup>1)</sup>	Pitch Circle Dia.	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) Check availability (chapter ZC)

Maximum permissible feed forces – description see page ZC-15





**ATLANTA**

**Integrated Rack and Pinion Drive – Calculation and Selection – Pitch 13.33 – Straight Tooth System**

Rack		HPIR		BIR					
Quality		6 Width 39 mm		9 Width 40 mm					
Rack	Material	16MnCr5		C45					
	Heat Treatment	Induction Hardened		Soft					
Pinion	Material	16MnCr5		16MnCr5	C45	C45			
	Heat Treatment	Case Hardened		Case Hardened	Induction Hardened	Soft			
No. of Pinion Teeth <sup>1)</sup>	Pitch Circle Dia.	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) Check availability (chapter ZC)

Maximum permissible feed forces – description see page ZC-15