

# Profile rail guides



## The SKF Group

The SKF Group is an international industrial corporation of AB SKF Sweden, founded in 1907, operating in 130 countries. The company has some 45000 employees and more than 80 manufacturing facilities throughout the world. Its international network is supported up by nearly 20000 distributors and retailers. SKF is the world leader in the rolling bearing business. Bearings, seals and special steels are SKF's main product areas. In addition, they also manufacture and sell, other industrial precision components and products.

## SKF Linear Motion

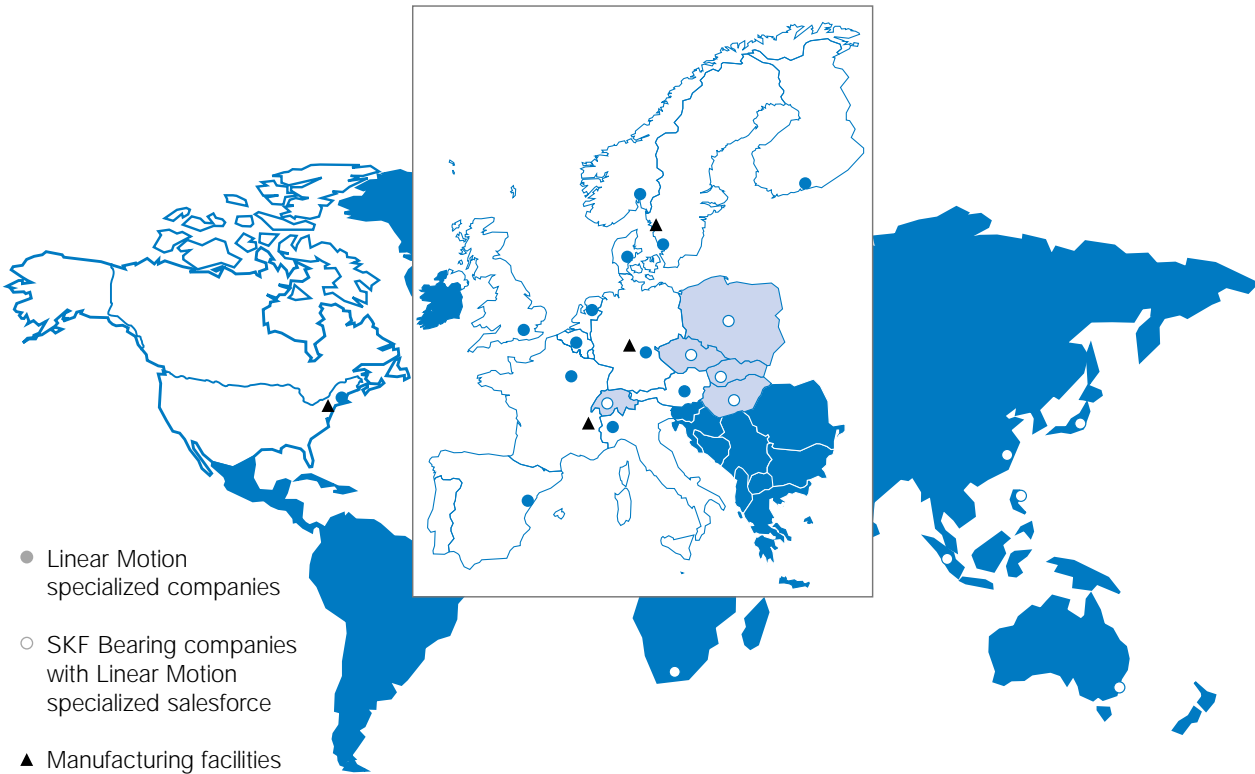
One of these industrial precision products assortment is manufactured and sold by the SKF Linear Motion Division. This unit has some 700 employees, 6 manufacturing facilities, 3 product lines. One of the division's strengths is its ability to serve the market through its organization based on 11 specialized Sales Companies located in Europe and North America; however product availability and product application support is provided world-wide by the SKF international network.

The Linear Motion product range covers:

- High Efficiency Screws
- Linear Guiding Systems
- Electromechanical Actuators

## CD-ROM "Designer"

All linear Motion products are available in this CD, in DWG and DXF files. Thanks to "Designer", you can easily copy the drawing of the product you need into your own design drawing. If you are interested, please do not hesitate to contact your local SKF sales organization. It is free of charge.



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**Product review** 4

**Technical data** 6

**High performance profile rail guides** 12

**Heavy duty profile rail guides** 20

**Bellows** 28

**Compact and Medium load profile rail guides** 29

**M-Type profile rail guides** 34

**Miniature profile rail guides** 38

**Accessories** 42

## Introduction

As the world leader in the production of rolling bearings, SKF supplies practically all kinds of rolling bearing for rotational and linear motion. SKF is therefore able to meet its customers' requirements both technically and economically. This catalogue covers the whole range of profile rail guides available from SKF. Profile rail guides from SKF are precision rolling bearings for linear motion systems and are therefore suitable for installation in a wide variety of machines. With the High Performance range of profile rail guides SKF is able to offer a linear guidance system with an optimum price/performance ratio for every application.

Profile rail guides are available from SKF in a wide choice of types and sizes and, because of their unlimited stroke, they are suitable for practically any linear motion installation. Their unitised design simplifies the making of any subsequent alterations to the equipment.

The catalogue includes all important data. For additional technical detail, please refer to the SKF Technical Handbook on linear bearing systems (4185 E) which provides information on application, selection, operational life, mounting and maintenance of profile rail guides. If further information is required, please contact your nearest SKF sales office.

This catalogue is based on current production. The right is reserved to make changes necessitated by technical developments of the products so that the benefits can be passed on to the user without delay. Earlier publications, the data in which deviate from those given here, are rendered invalid.

# Contents

<b>Product review</b> .....	4
Accuracy classes .....	6
Mounting accuracy .....	8
Preload and stiffness .....	10
Designation system .....	11
High performance profile rail guides .....	12
LLBHS..TA .....	14
LLBHS..TB .....	16
LLBHS..TR .....	18
Heavy duty profile rail guides .....	20
LLBHS..A/LA .....	22
LLBHS..B/LB .....	24
LLBHS..R/LR .....	26
Bellows .....	28
Compact and Medium load profile rail guides .....	29
LLBUS..R/SR .....	30
LLBNS..TR .....	32
M-Type profile rail guides .....	34
LLBMS..TW/TC .....	36
Miniature profile rail guides .....	38
LLBKS..TR .....	40
Accessories .....	42

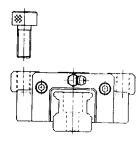
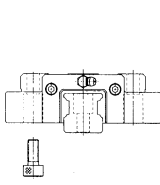
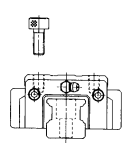
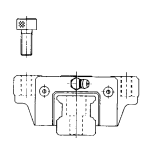
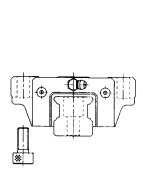
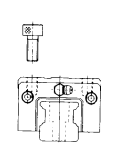
## Product review

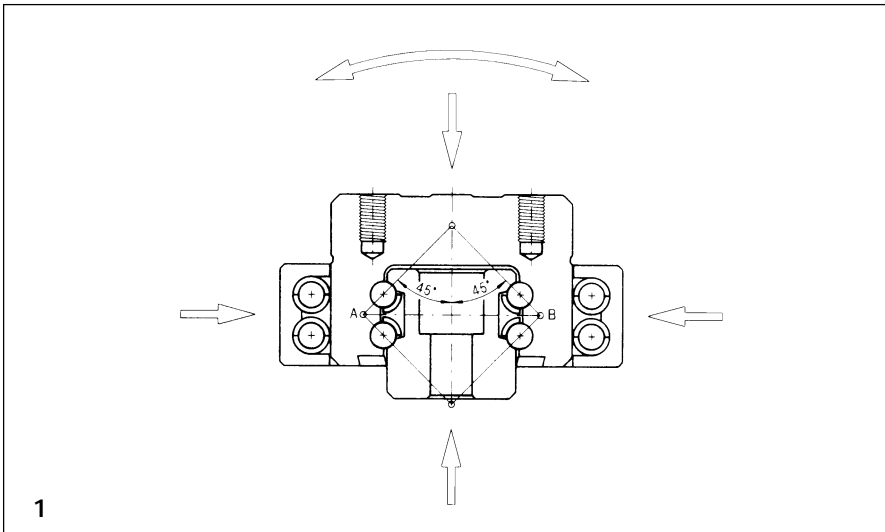
Profile rail guides from SKF are modern machine components used in the production of linear guidance systems with unlimited travel. They usually consist of a profile rail with four precision-ground raceways and a slide unit with four ball circulation paths. This design offers numerous benefits. The square configuration of the raceways results in a guidance system with good rigidity, capable of withstanding moment loads in all directions. The load carrying capacity is equal in all four directions (fig 1). Ready-to-mount units guarantee economy and simplicity of mounting. Installation and adjustment procedures are reduced

to a minimum. The design of the system is such that inaccuracies of the adjacent components can be accommodated. SKF profile rail guides are noted for their ease of maintenance and reliability. They are provided as standard with grease nipple and all-round seals. The two-point contact of the rolling elements with the raceways permit high operational speeds with quiet running and low coefficient of friction. Good running accuracy is assured throughout the operational life of the system. Guides with specific preload can be supplied for special requirements. This is achieved through selection. The

choice of preload is dependent on the load carrying and stiffness specifications.

To meet the widest possible range of customer demands, SKF offers seven different series of profile rail guides. Table 1 shows basic data for the various models.

<b>Table 1 Product review</b>						
<b>Classification</b>	<b>High performance profile rail guides</b>			<b>Heavy duty profile rail guides</b>		
<b>Type</b>	<b>LLBHS..TA</b>	<b>LLBHS..TB</b>	<b>LLBHS..TR</b>	<b>LLBHS..A</b>	<b>LLBHS..B</b>	<b>LLBHS..R</b>
Slide unit fixing						
Velocity m/min	200	200	200	120	120	120
Acceleration m/s <sup>2</sup>	100	100	100	80	80	80
Tolerances	P001-P5	P001-P5	P001-P5	P001-P5	P001-P5	P001-P5
Preload	T-T3	T-T3	T-T3	T-T3	T-T3	T-T3
Vibration	•	•	•	◦	◦	◦
Noise	•	•	•	◦	◦	◦
Coefficient of friction	0,003–0,005					
Heat resistance	Up to 80°C; with special insulation up to 100°C					
Corrosion resistance	Hard chrome coating; Raydent coating					
Lubrication	Lithium based grease, e.g. SKF LGMT 2, for each 100 km of travel or six-monthly					
Seals	In addition to standard seals, covers wipers and bellows are also available					
◦ low						
• very low						



High load profile rail guides (long slide unit)			Compact and Medium load profile rail guides			M-Type profile rail guides	Miniature profile rail guides
LLBHS..LA	LLBHS..LB	LLBHS..LR	LLBUS..R	LLBUS..SR	LLBNS..TR	LLBMS..TW/TC	LLBKS..TR
120	120	120	120	120	200	200	200
80	80	80	80	80	100	100	60
P001-P5	P001-P5	P001-P5	P001-P5	P001-P5	P001-P5	P001-P5	P1-5
T-T3	T-T3	T-T3	T-T3	T-T3	T-T3	-	T0, T1
o	o	o	o	o	•	•	•
o	o	o	o	o	•	•	•

## Accuracy classes

Profile rail guides from SKF are available in five tolerance classes. These are defined in the adjacent table and are applicable to all kinds of profile rail guides excluding the miniature range.

### Dimensional tolerance of height "H"

This refers to the maximum variation of the dimension "H" for a slide unit on a profile rail guide (table 1).

### Dimensional tolerance of width "N"

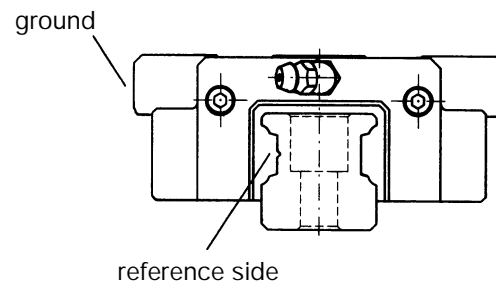
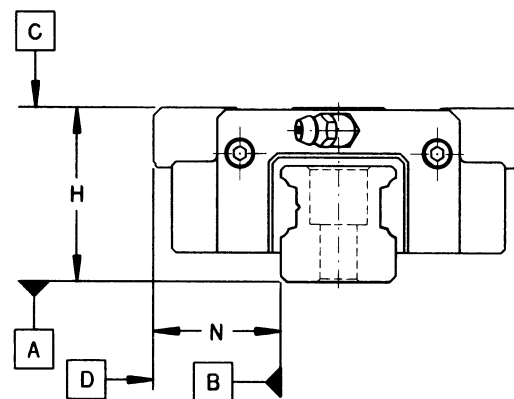
This refers to the maximum variation of the dimension "N" for a slide unit on a profile rail guide (table 1).

- Dimension "N" is defined as the distance between the ground datum face of the rail and the ground datum side of the slide unit. The datum side of the rail is marked with a groove.
- Tolerances listed here are average values measured at the middle point of the slide unit.
- Tolerances should be checked again after mounting the rail guide on the machine.
- With paired profile rail guides of P5 tolerance, only low values of preload should be used, depending on the rail length (fig 1).

**Table 1 System accuracy**

Units:  $\mu\text{m}$

Dimension \ Class		P001	P01	P1	P3	P5
Height H	Dimensional variation	$\pm 5$	$\pm 10$	$\pm 20$	$\pm 40$	$\pm 80$
	between paired rails	3	5	7	15	25
Width N	Dimensional variation	$\pm 8$	$\pm 15$	$\pm 25$	$\pm 50$	$\pm 100$
	between paired rails	3	7	10	20	30



1



## Parallelism

The running accuracy is defined as the variation in the dimensions H and N over the length of the rail (Fig 1, Table 2).

**Table 2 Parallelism**

Unit:  $\mu\text{m}$

Grades		Parallelism of plane C to datum plane A				
Rail track length (mm)		Parallelism of plane D to datum plane B				
over	up to	P001	P01	P1	P3	P5
–	315	1,5	2	2,5	8	16
315	400	2	2,5	3,5	10	20
400	500	2	3	4,5	11	24
500	630	2	3,5	6	14	27
630	800	2,5	4	8	16	32
800	1000	3	4,5	9	19	38
1000	1250	3	6	11	22	43
1250	1600	4	7	14	25	50
1600	2000	4,5	8	16	29	57
2000	2500	6	9	18	30	60
2500	3000	6	10	18	30	60

## Accuracy recommendations

The tolerance class should be selected according to the required positioning accuracy of the machine itself. Typical accuracies for various applications are shown in table 3.

**Table 3 Accuracy recommendations**

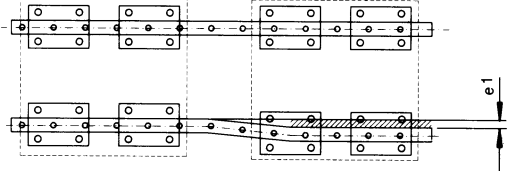
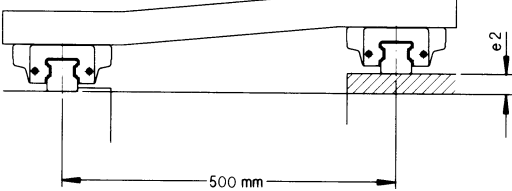
Accuracy		P001	P01	P1	P3	P5	
NC Machines	Lathes	x	o	o	o		
		z			o	o	
	Machining centres	x			o	o	
		y			o	o	
		z			o	o	o
	Grinding machines	x	o	o	o		
		z			o	o	
	EDM	x			o	o	
		y			o	o	
		z			o	o	
	Punching machines					o	o
	Semiconductor manufacture		o	o	o		
General industrial machinery				o	o		

# Mounting accuracy

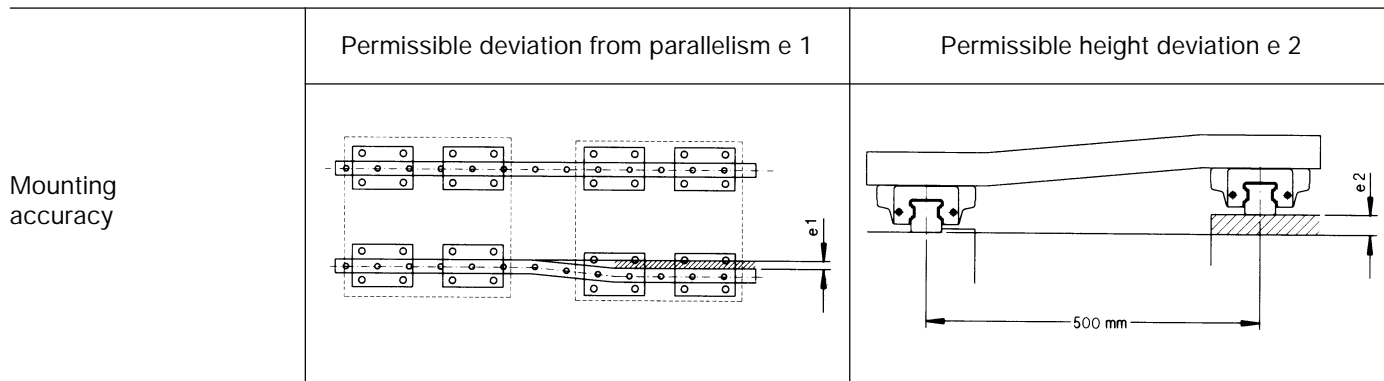
For the smooth running and long operational life of profile rail guides, the quality of the installation and of the mounting surfaces is of great

importance. The following tables show the tolerances for parallelism of the rails.

Unit:  $\mu\text{m}$

Mounting accuracy	Permissible deviation from parallelism e 1				Permissible height deviation e2			
								
Preload	T0	T1	T2	T3	T0	T1	T2	T3
Type								
LLBHS 15 TA/TB/TR	19	13	10	9				
LLBHS 20 TA/TB	23	17	14	11				
LLBHS 25 TA/TB/TR	29	21	1	14				
LLBHS 30 TA/TB/TR	35	25	20	16	150	75	50	40
LLBHS 35 TA/TB/TR	40	29	23	19				
LLBHS 45 TA/TB/TR	52	38	29	24				
LLBHS 55 TA/TB/TR	62	46	36	30				
LLBHS 65 TA/TB/TR	81	59	46	38				
LLBHS 15 A/B	19	13	10	9				
LLBHS 20 A/B/R	23	17	14	11				
LLBHS 25 A/B/R	29	21	17	14				
LLBHS 30 A/B/R	35	25	20	16				
LLBHS 35 A/B/R	40	29	23	19	150	75	50	40
LLBHS 45 A/B/R	52	38	29	24				
LLBHS 55 A/B/R	62	46	36	30				
LLBHS 65 A/B/R	81	59	46	38				
LLBHS 25 LA/LB/LR	27	20	16	13				
LLBHS 30 LA/LB/LR	32	24	19	15				
LLBHS 35 LA/LB/LR	37	27	21	18	150	75	50	40
LLBHS 45 LA/LB/LR	49	36	28	23				
LLBHS 55 LA/LB/LR	50	44	34	28				
LLBHS 65 LA/LB/LR	75	55	43	35				

Unit:  $\mu\text{m}$



Type	Preload							
	T0	T1	T2	T3	T0	T1	T2	T3
LLBNS 15 TR	13	10	8	6				
LLBNS 20 TR	18	13	11	9				
LLBNS 25 TR	24	17	13	11	120	55	40	30
LLBNS 30 TR	29	21	16	14				
LLBNS 40 TR	41	30	23	19				
LLBNS 50 TR	52	38	30	25				
LLBKS 7 TR	5	3	-	-				
LLBKS 9 TR	9	7	-	-	75	40	-	-
LLBKS 12 TR	11	8	-	-				
LLBUS 15 R	19	13	10	9				
LLBUS 20 R	23	17	14	11				
LLBUS 25 R	29	21	17	14				
LLBUS 30 R	35	25	20	16	150	75	50	40
LLBUS 35 R	40	29	23	19				
LLBUS 45 R	52	38	29	24				
LLBUS 55 R	62	46	36	30				
LLBUS 15 SR	21	16	13	10				
LLBUS 20 SR	27	20	16	13				
LLBUS 25 SR	33	24	19	16	150	75	50	40
LLBUS 30 SR	40	29	23	19				
LLBUS 35 SR	45	33	26	21				

## Preload and stiffness

For trouble-free operation under different and widely varying operational conditions, it is necessary to determine the appropriate preload. In most instances a light or moderate preload is recommended. For certain cases where high impact loads or vibrations occur, a higher preload is advisable. Tables 1 and 2 show the recommended preload classes for profile rail guides of SKF.

In order not to lose the effect of the preload, the magnitude of the load on the bearing should not exceed three times that of the preload.

The higher the preload, the greater the stiffness.

Diagram 1 shows the qualitative effect of preload on the relationship between load and deformation.

It will be seen that a preloaded system can have a stiffness 2,8 times

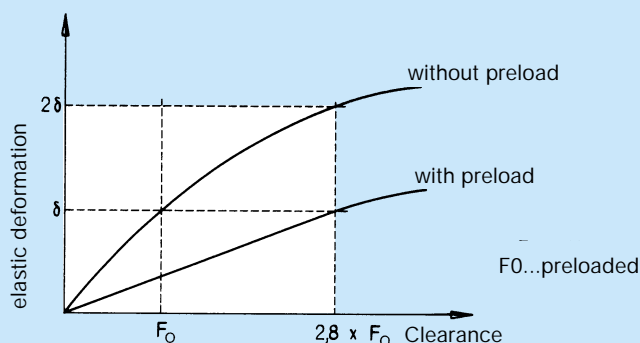
greater than that of a non-preloaded system, i.e. the elastic deformation can be reduced by at least one half.

In selecting a profile rail guide, it is of importance to know the exact preload value (see Linear Guidance Systems Handbook for calculation of operational life). Table 2 shows the preload values for each class.

**Table 1**

Type of preload		Conditions of use	Application
Heavy preload	T 3	Heavy cutting or forming work with heavy impact and vibration. Alternating load.	Machining centres Milling machines Vertical axes of machine tools
	T 2		
Medium preload	T 1	Medium cutting or forming work with medium impact and vibration. Light overhung load or alternate load applied.	Surface grinding machines. Robots. Laser Processing machines. Light-duty drilling machines. High speed punching machines.
Light preload	T 0	Precise movement with only light vibration and no alternating load.	Precision positioning tables. Tables for optical measuring equipment. Automatic tool changer for machining centres. Welding machines. Handling equipment.
Without preload	T	Extreme temperature variation; no need for high precision.	Tool changers. Feeding devices. Plasma cutting equipment.

**Diagram 1**



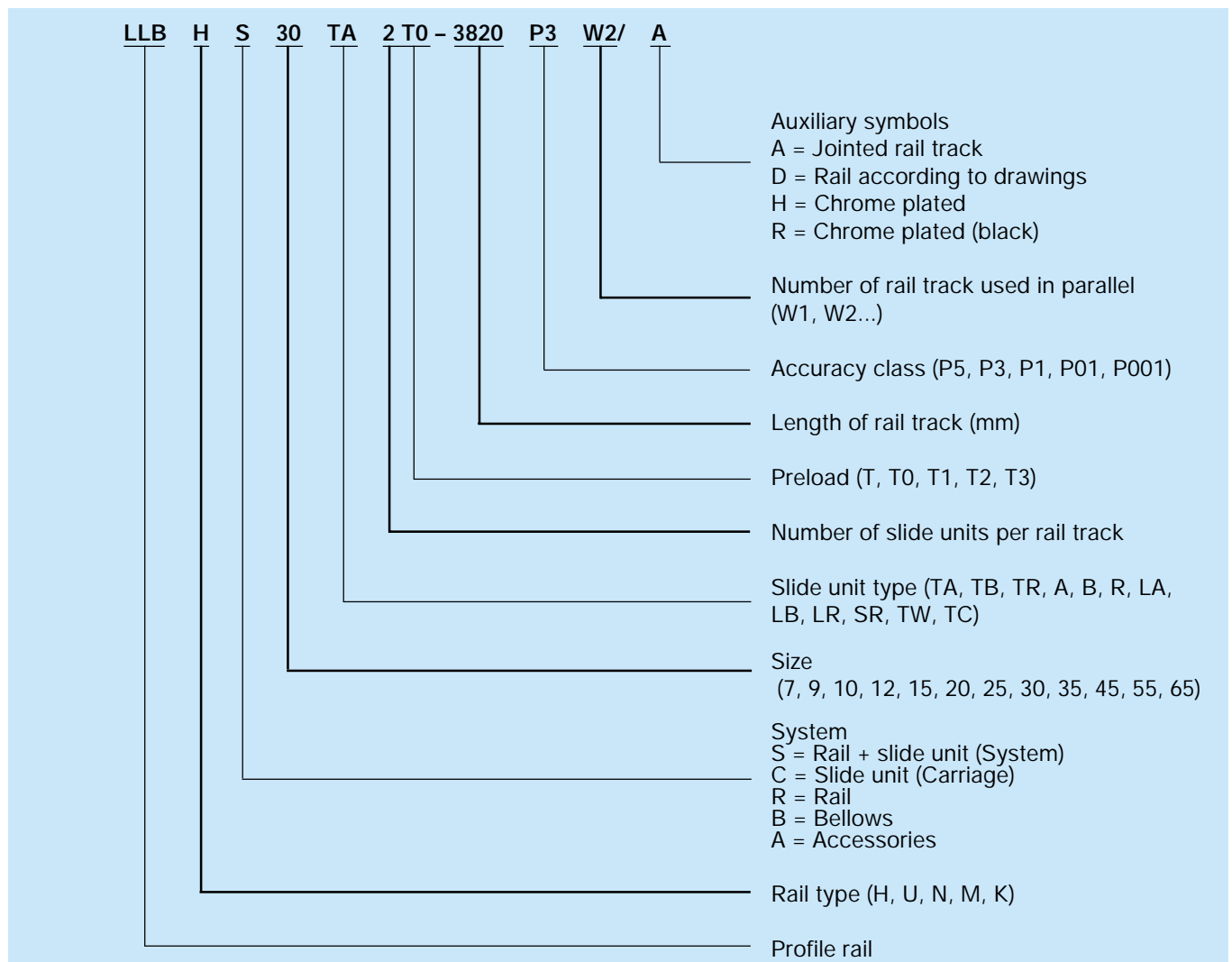
**Table 2 Preload**

T	0,02 mm Clearance
T 0	0
T 1	$0,04 \cdot C$
T 2	$0,08 \cdot C$
T 3	$0,12 \cdot C$

## Designations

Profile rail guides from SKF are manufactured in a variety of types and sizes to suit particular applications.

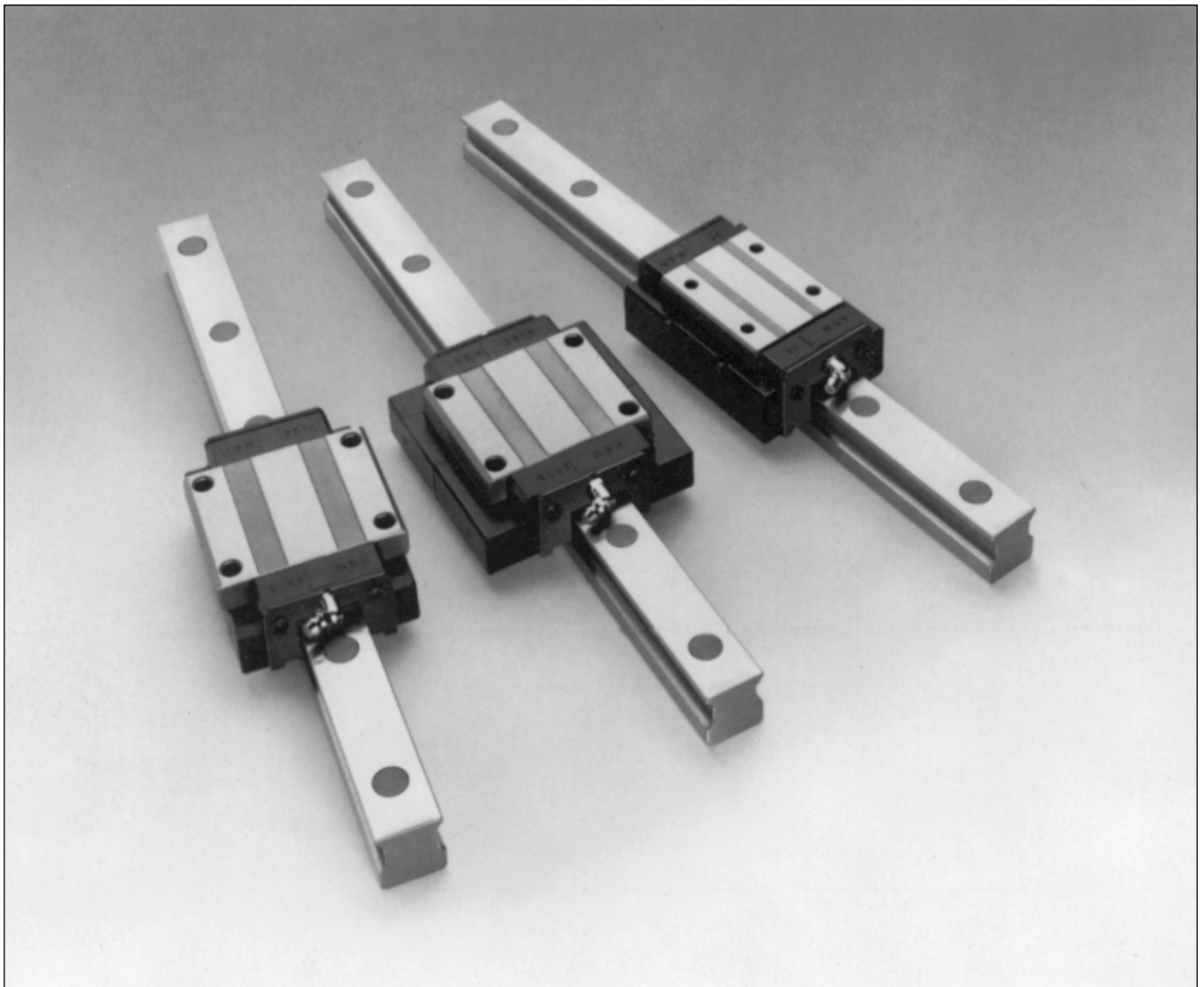
When ordering please specify requirements in accordance with the following chart.



## High performance profile rail guides

LLBHS..TA  
LLBHS..TB  
LLBHS..TR

The special design of the raceway and ball circulation unit of the SKF High Performance range of profile rail guides results in an optimised combination of high load carrying capacity, low friction and exceptionally quiet running at high speeds.



The use of four raceways set at 90° to each other results in a rigid system with equal load carrying capacity in all directions.

The exceptionally large radius of the ball recirculation path enables the achievement of high operational speeds at a particularly low noise level (see fig 2).

In contrast to other systems, profile rail guides from SKF use the principle of two-point contact which reduces differential slip or spin to a minimum. Even where there is high preload there is only a slight increase in friction (fig 1).

### Standard length

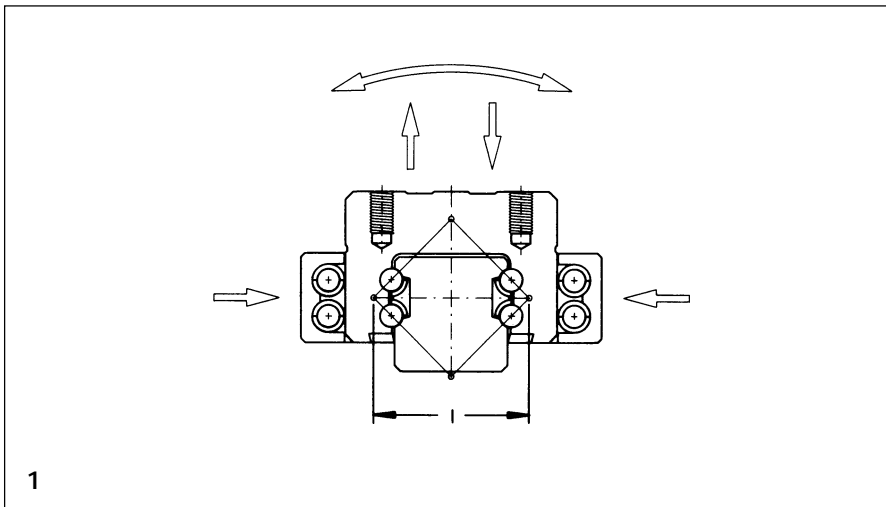
The rails high performance profile rail guides are produced in different maximum length (see Table 1).

Longer lengths can be achieved by putting together separate pieces.

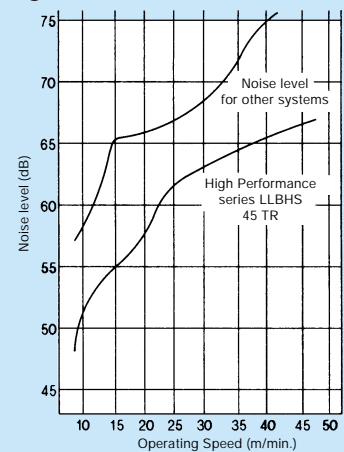
**Table 1**  
**Maximum rail length**

Size	Max. length (mm)
LLBHR 15	1500
LLBHR 20	3000
LLBHR 25	3000
LLBHR 30	3000
LLBHR 35	3000
LLBHR 45	3000
LLBHR 55	3000
LLBHR 65	3000

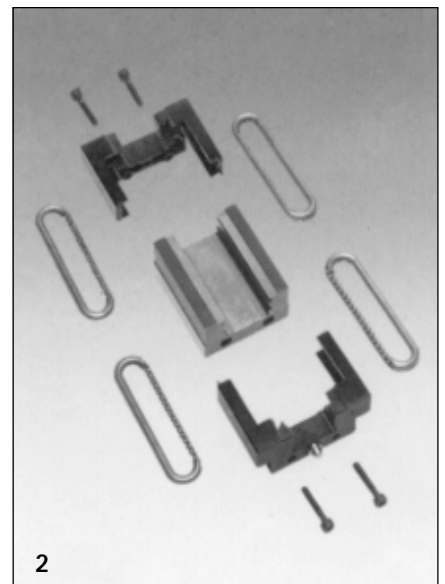
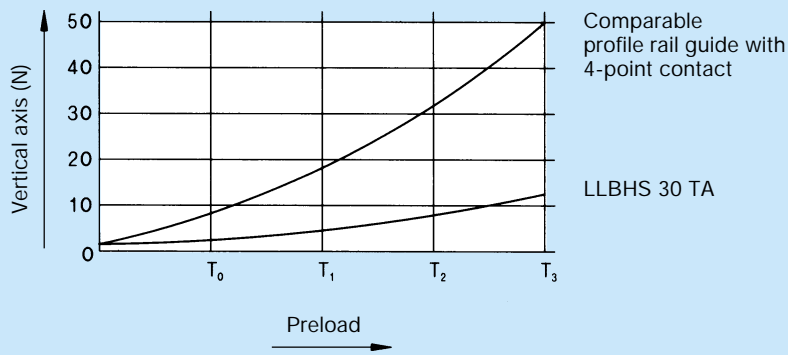
Rails are generally manufactured with a symmetrical hole pattern. Where this is not possible, dimension E is defined as the distance between the end of the rail and the center of the last mounting hole.



**Diagram 2**

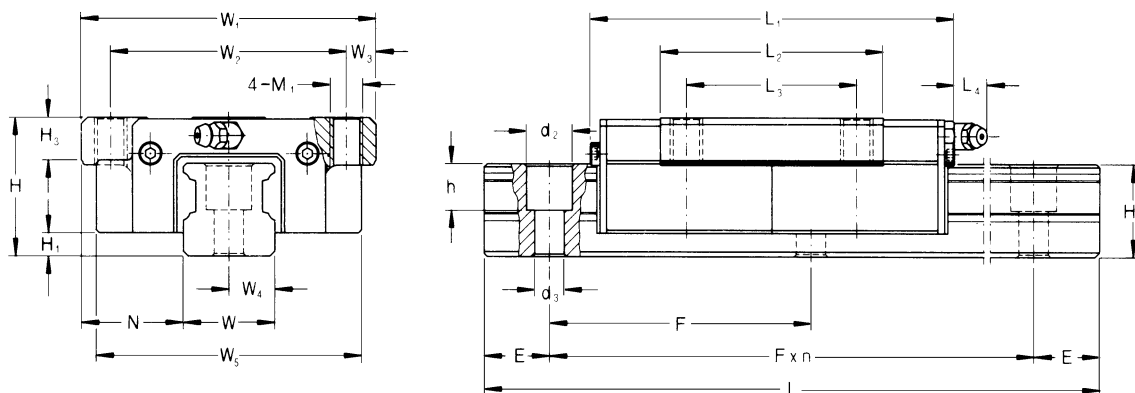


**Diagram 1**



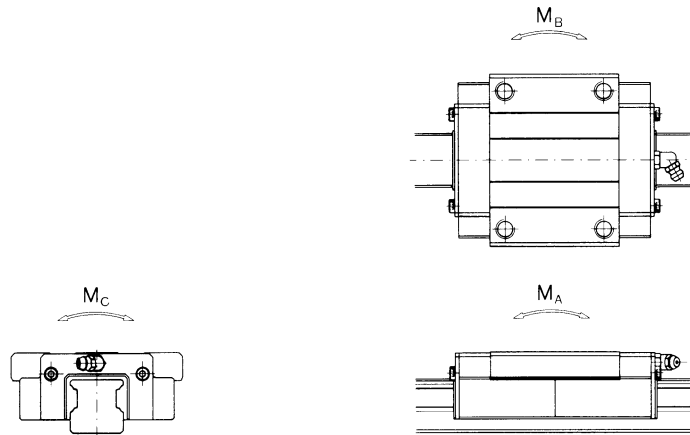
# High performance profile rail guides

LLBHS..TA



Model no.	System dimensions			Slide unit									
	H	H <sub>1</sub>	N	W <sub>1</sub>	W <sub>2</sub>	W <sub>3</sub>	W <sub>5</sub>	L <sub>1</sub>	L <sub>2</sub>	L <sub>3</sub>	L <sub>4</sub>	H <sub>3</sub>	M <sub>1</sub>
	mm			mm									
LLBHS 15 TA	24	4,6	16	47	38	4,5	46,5	71	41	30	0	7	M 5x7
LLBHS 20 TA	30	5	21,5	63	53	5	60	91	58	40	0	8	M 6x10
LLBHS 25 TA	36	6,5	23,5	70	57	6,5	66	97	59	45	10	10	M 8x12
LLBHS 30 TA	42	7	31	90	72	9	81	111	68	52	10	13	M 10x14
LLBHS 35 TA	48	8	33	100	82	9	92	128	80	62	10	13	M 10x16
LLBHS 45 TA	60	11	37,5	120	100	10	112	158	102	80	12	15	M 12x19
LLBHS 55 TA	70	14	43,5	140	116	12	130	189	124	95	12	17	M 14x23
LLBHS 65 TA	85	14	53,5	170	142	14	162	225	148	110	12	20	M 16x29



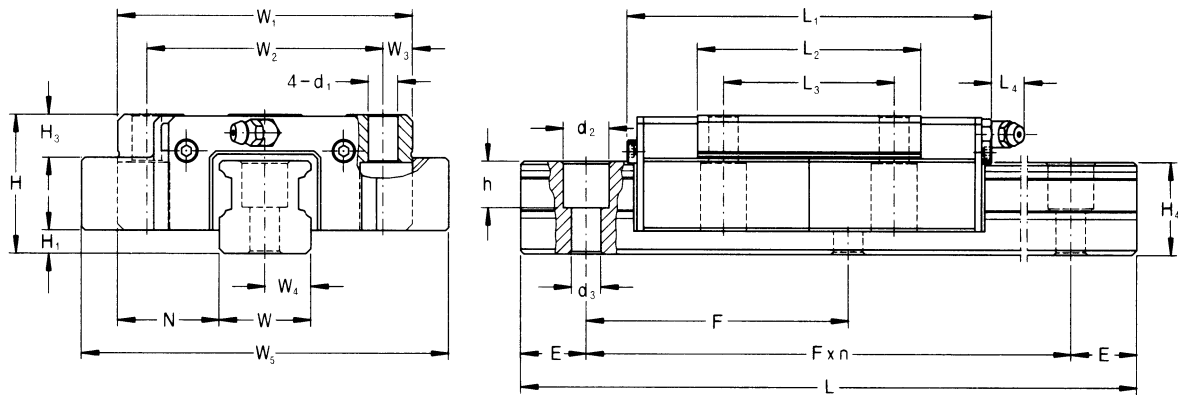


Rail							Load rating*)		Torque			Weight	
W	W <sub>4</sub>	H <sub>4</sub>	d <sub>2</sub>	d <sub>3</sub>	h	F	C	C <sub>0</sub>	M <sub>A</sub>	M <sub>B</sub>	M <sub>C</sub>	Slide unit	Rail
mm							N		Nm			kg	kg/m
15	7,5	17	7,5	4,5	7	60	7 350	11 600	70	70	110	0,2	1,7
20	10	21	9,5	6	11	60	12 900	20 800	190	190	260	0,4	2,8
23	11,5	24	11	7	11	60	17 000	26 000	240	240	380	0,6	3,7
28	14	28	14	9	14	80	23 600	35 500	390	390	610	1,0	5,3
34	17	32	14	9	15	80	31 500	46 500	580	580	960	1,5	7,5
45	22,5	42	20	14	21	105	48 000	72 000	1130	1130	1960	2,7	12,9
53	26,5	48	23	16	24	120	75 000	112 200	2240	2240	3570	4,4	17,3
63	31,5	58	26	18	25	150	114 000	162 800	3780	3780	6290	8,4	24,9

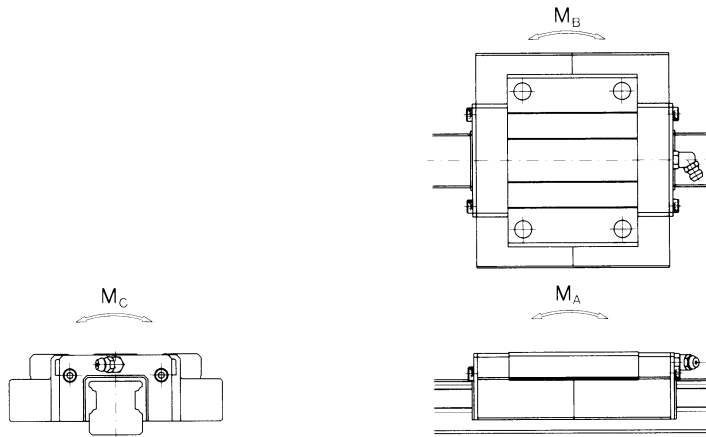
\* All SKF load ratings are based on a cumulative travel of 100.000 m in accordance with DIN 636, Part 2. The dynamic load rating must be multiplied by 1,26 for comparison with figures based on 50.000 m cumulative travel.

# High performance profile rail guides

LLBHS..TB



Model no.	System dimensions			Slide unit									
	H	H <sub>1</sub>	N	W <sub>1</sub>	W <sub>2</sub>	W <sub>3</sub>	W <sub>5</sub>	L <sub>1</sub>	L <sub>2</sub>	L <sub>3</sub>	L <sub>4</sub>	H <sub>3</sub>	d <sub>1</sub>
	mm			mm									
LLBHS 15 TB	24	4,6	16	47	38	4,5	60	71	41	30	0	5	4,5x7
LLBHS 20 TB	30	5	21,5	63	53	5	79	91	58	40	0	8	6x10
LLBHS 25 TB	36	6,5	23,5	70	57	6,5	89	97	59	45	10	10	7x12
LLBHS 30 TB	42	7	31	90	72	9	112	111	68	52	10	11	9x14
LLBHS 35 TB	48	8	33	100	82	9	123	128	80	62	10	13	9x16
LLBHS 45 TB	60	11	37,5	120	100	10	147	158	102	80	12	15	11x19
LLBHS 55 TB	70	14	43,5	140	116	12	171	189	124	95	12	17	14x23
LLBHS 65 TB	85	14	53,5	170	142	14	207	225	148	110	12	20	16x29

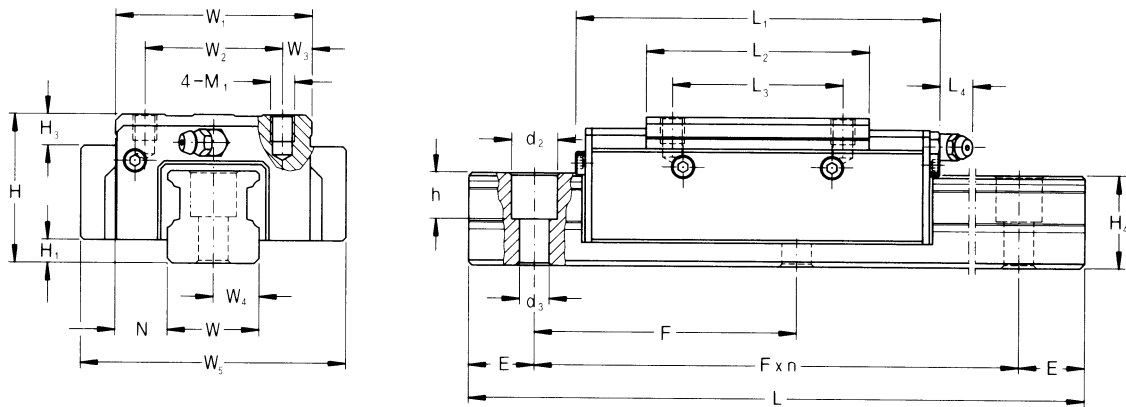


Rail							Load rating*)		Torque			Weight	
W	W <sub>4</sub>	H <sub>4</sub>	d <sub>2</sub>	d <sub>3</sub>	h	F	C	C <sub>0</sub>	M <sub>A</sub>	M <sub>B</sub>	M <sub>C</sub>	Slide unit	Rail
mm							N		Nm			kg	kg/m
15	7,5	17	7,5	4,5	7	60	7 350	11 600	70	70	110	0,2	1,7
20	10	21	9,5	6	11	60	12 900	20 800	190	190	260	0,4	2,8
23	11,5	24	11	7	11	60	17 000	26 000	240	240	380	0,6	3,7
28	14	28	14	9	14	80	23 600	35 500	390	390	610	1,0	5,3
34	17	32	14	9	15	80	31 500	46 500	580	580	960	1,5	7,5
45	22,5	42	20	14	21	105	48 000	72 000	1130	1130	1960	2,7	12,9
53	26,5	48	23	16	24	120	75 000	112 200	2240	2240	3570	4,4	17,3
63	31,5	58	26	18	25	150	114 000	162 800	3780	3780	6290	8,4	24,9

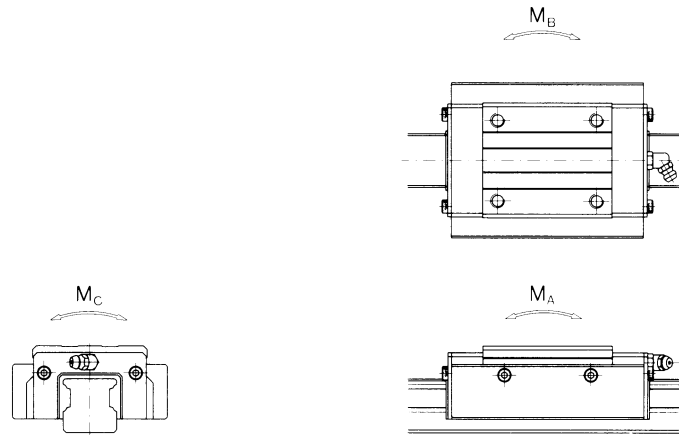
\* All SKF load ratings are based on a cumulative travel of 100.000 m in accordance with DIN 636, Part 2. The dynamic load rating must be multiplied by 1,26 for comparison with figures based on 50.000 m cumulative travel.

# High performance profile rail guides

LLBHS..TR



Model no.	System dimensions			Slide unit									
	H	H <sub>1</sub>	N	W <sub>1</sub>	W <sub>2</sub>	W <sub>3</sub>	W <sub>5</sub>	L <sub>1</sub>	L <sub>2</sub>	L <sub>3</sub>	L <sub>4</sub>	H <sub>3</sub>	M <sub>1</sub>
	mm			mm									
LLBHS 15 TR	28	4,6	9,5	34	26	4	48	71	41	26	3	6	M 4x5
LLBHS 25 TR	40	6,5	12,5	48	35	6,5	66	97	59	35	10	8	M 6x8
LLBHS 30 TR	45	7	16	60	40	10	81	102	59	40	10	8	M 8x10
LLBHS 35 TR	55	8	18	70	50	10	92	128	80	50	10	10	M 8x12
LLBHS 45 TR	70	11	20,5	86	60	13	112	158	102	60	12	15	M 10x17
LLBHS 55 TR	80	14	23,5	100	75	12,5	130	189	124	75	12	18	M 12x18
LLBHS 65 TR	90	14	31,5	126	90	18	162	225	148	70	12	23	M 16x20



Rail		Load rating*)							Torque			Weight	
		W	W <sub>4</sub>	H <sub>4</sub>	d <sub>2</sub>	d <sub>3</sub>	h	F	C	C <sub>0</sub>	M <sub>A</sub>	M <sub>B</sub>	M <sub>C</sub>
mm		N							Nm			kg	kg/m
15	7,5	17	7,5	4,5	7	60	7 350	11 600	70	70	110	0,19	1,7
23	11,5	24	11	7	11	60	17 000	26 000	240	240	380	0,54	3,7
28	14	28	14	9	14	80	23 600	35 500	390	390	610	0,75	5,3
34	17	32	14	9	15	80	31 500	46 500	580	580	960	1,5	7,5
45	22,5	42	20	14	21	105	48 000	72 000	1130	1130	1960	2,8	12,9
53	26,5	48	23	16	24	120	75 000	112 200	2240	2240	3570	4,5	17,3
63	31,5	58	26	18	25	150	114 000	162 800	3780	3780	6290	8,7	24,9

\* All SKF load ratings are based on a cumulative travel of 100.000 m in accordance with DIN 636, Part 2. The dynamic load rating must be multiplied by 1,26 for comparison with figures based on 50.000 m cumulative travel.

## Heavy duty profile rail guides

LLBHS..A  
LLBHS..B  
LLBHS..R  
LLBHS..LA  
LLBHS..LB  
LLBHS..LR

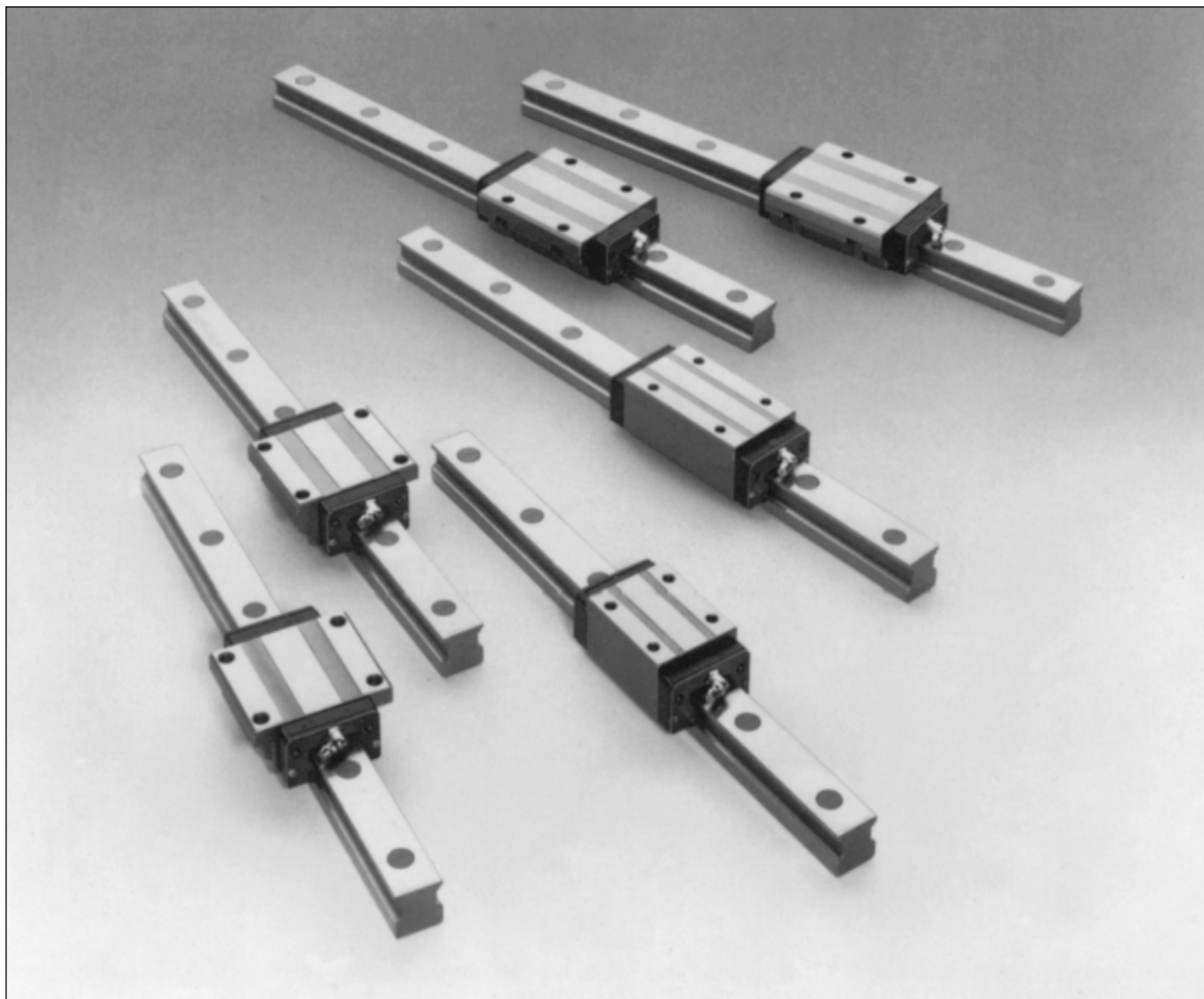
All four raceways are incorporated into the base unit. The ball return caps consist of particularly robust elements made of a tough plastic material which ensures quiet running even at high speeds.

All products in the heavy duty range are characterised by their especially compact and robust design without sacrificing any of the particular advantages of profile rail guides.

The use of hardened steel ensures good rigidity and insensitivity to rough treatment.

### Lubrication

Each slide unit is provided with a grease nipple on the front face. This provides simultaneous lubrication to all four ball return paths. To special order, the grease nipple can be positioned elsewhere.



### Compensation for mounting errors

The design of the high load series enables compensation for large mounting errors without undue increase in friction.

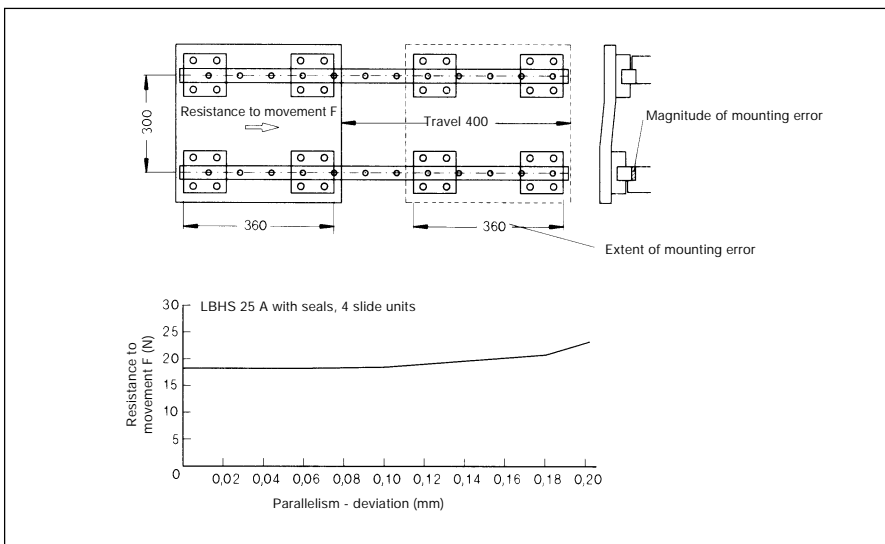
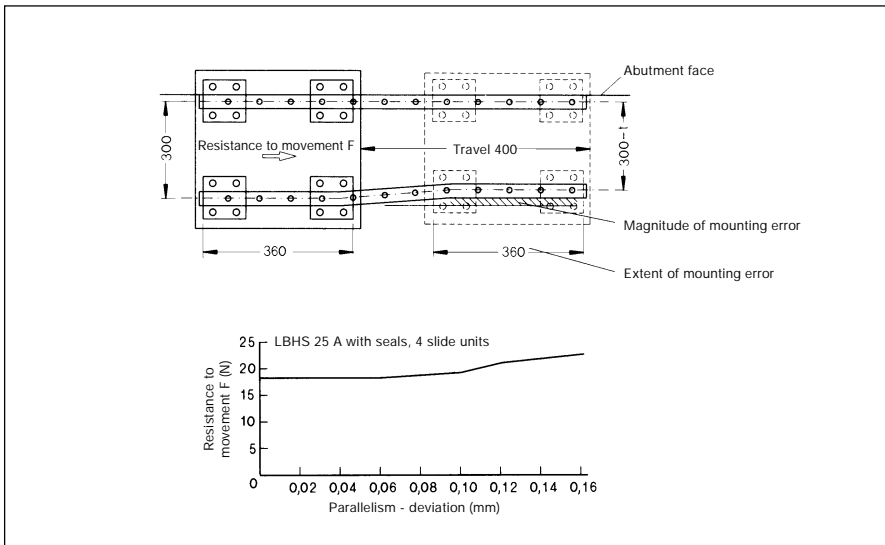
### Standard length

The rails for heavy duty profile rail guides are produced in different maximum length (see Table 1). Longer lengths can be achieved by putting together separate pieces.

Rails are generally manufactured with a symmetrical hole pattern. Where this is not possible, dimension E is defined as the distance between the end of the rail and the center of the last mounting hole.

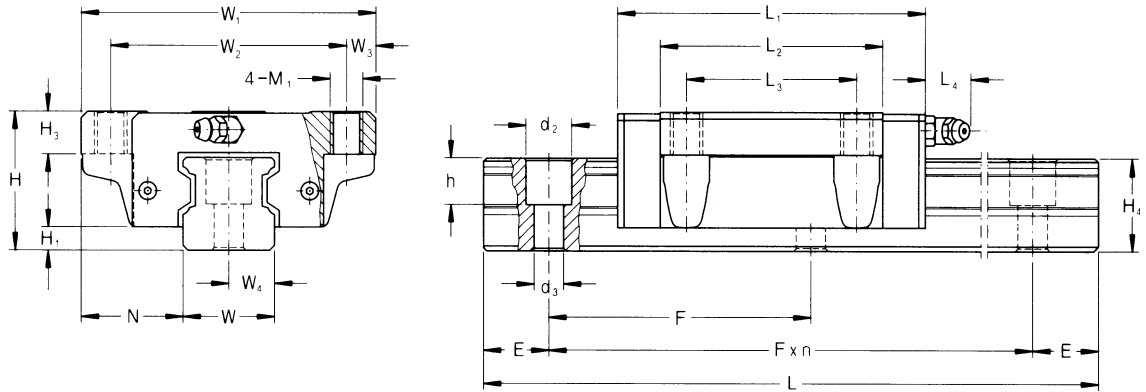
#### Maximum rail length

Size	Max. length mm
LLBHR 15	1500
LLBHR 20	3000
LLBHR 25	3000
LLBHR 30	3000
LLBHR 35	3000
LLBHR 45	3000
LLBHR 55	3000
LLBHR 65	3000



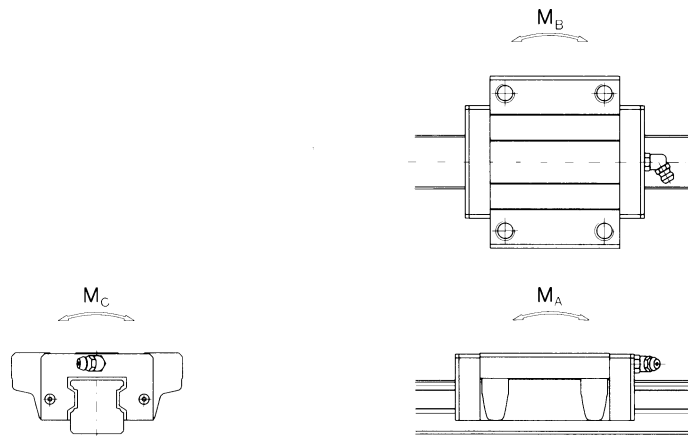
# Heavy duty profile rail guides

LLBHS..A  
LLBHS..LA



Model no.	System dimension			Slide unit								
	H	H <sub>1</sub>	N	W <sub>1</sub>	W <sub>2</sub>	W <sub>3</sub>	L <sub>1</sub>	L <sub>2</sub>	L <sub>3</sub>	L <sub>4</sub>	H <sub>3</sub>	M <sub>1</sub>
	mm			mm								
LLBHS 15 A	24	4,6	16	47	38	4,5	58,5	38,5	30	-	7	M 5x7
LLBHS 20 A	30	5	21,5	63	53	5	73	50	40	-	9,5	M 6x9
LLBHS 25 A	36	6,5	23,5	70	57	6,5	83	59	45	12	10	M 8x10
LLBHS 25 LA	36	6,5	23,5	70	57	6,5	107	83	45	12	10	M 8x10
LLBHS 30 A	42	7	31	90	72	9	97	68	52	12	13	M 10x13
LLBHS 30 LA	42	7	31	90	72	9	123	94	52	12	13	M 10x13
LLBHS 35 A	48	8	33	100	82	9	112	80	62	12	13	M 10x13
LLBHS 35 LA	48	8	33	100	82	9	141	109	62	12	13	M 10x13
LLBHS 45 A	60	11	37,5	120	100	10	139	102	80	14	15	M 12x15
LLBHS 45 LA	60	11	37,5	120	100	10	167	130	80	14	15	M 12x15
LLBHS 55 A	70	14	43,5	140	116	12	159	124	95	16	17	M 14x17
LLBHS 55 LA	70	14	43,5	140	116	12	191	156	95	16	17	M 14x17
LLBHS 65 A	85	14	53,5	170	142	14	188	148	110	16	20	M 16x20
LLBHS 65 LA	85	14	53,5	170	142	14	247	207	110	16	20	M 16x20



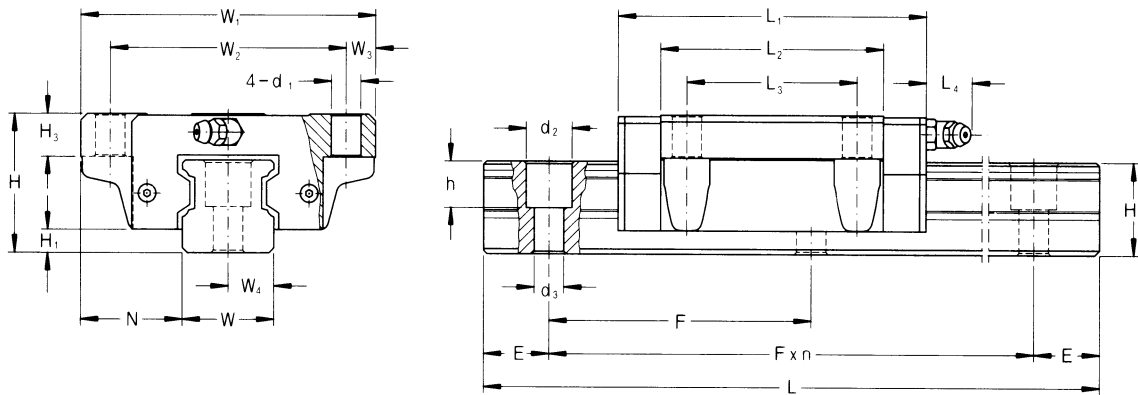


Rail							Load rating*)			Torque			Weight	
W	W <sub>4</sub>	H <sub>4</sub>	d <sub>2</sub>	d <sub>3</sub>	h	F	C	C <sub>0</sub>	M <sub>A</sub>	M <sub>B</sub>	M <sub>C</sub>	Slide unit	Rail	
mm							N			Nm			kg	kg/m
15	7,5	17	7,5	4,5	7	60	7 350	11 600	70	70	110	0,19	1,7	
20	10	21	9,5	6	11	60	12 900	20 800	190	190	260	0,4	2,8	
23	11,5	24	11	7	11	60	17 000	26 000	240	240	380	0,69	3,7	
23	11,5	24	11	7	11	60	22 000	36 000	470	470	520	0,97	3,7	
28	14	28	14	9	14	80	23 600	35 500	390	390	610	1,3	5,3	
28	14	28	14	9	14	80	29 000	46 500	660	660	800	1,8	5,3	
34	17	32	14	9	15	80	31 500	46 500	580	580	960	1,8	7,5	
34	17	32	14	9	15	80	40 000	64 000	1100	1100	1330	2,5	7,5	
45	22,5	42	20	14	21	105	48 000	72 000	1130	1130	1960	3,1	12,9	
45	22,5	42	20	14	21	105	61 000	95 000	1920	1920	2570	4,0	12,9	
53	26,5	48	23	16	24	120	75 000	112 200	2240	2240	3570	5,1	17,3	
53	26,5	48	23	16	24	120	90 000	136 000	3300	3300	4330	6,5	17,3	
63	31,5	58	26	18	25	150	114 000	162 800	3780	3780	6290	9,1	24,9	
63	31,5	58	26	18	25	150	150 000	225 000	7240	7240	8690	13,1	24,9	

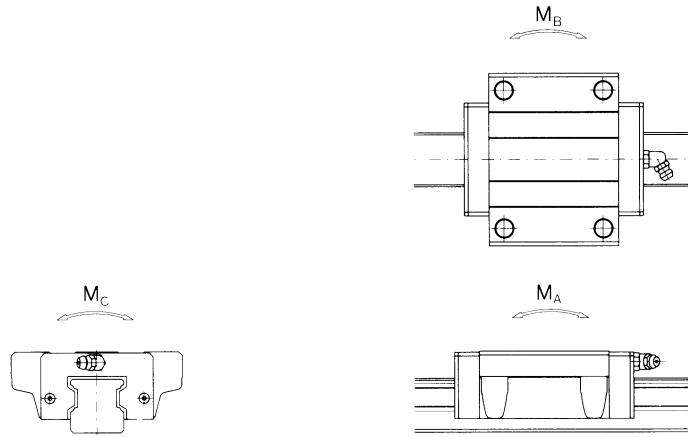
\*) All SKF load ratings are based on a cumulative travel of 100.000 m in accordance with DIN 636, Part 2. The dynamic load rating must be multiplied by 1,26 for comparison with figures based on 50.000 m cumulative travel.

# Heavy duty profile rail guides

LLBHS..B  
LLBHS..LB



Model no.	System dimensions			slide unit								
	H	H <sub>1</sub>	N	W <sub>1</sub>	W <sub>2</sub>	W <sub>3</sub>	L <sub>1</sub>	L <sub>2</sub>	L <sub>3</sub>	L <sub>4</sub>	H <sub>3</sub>	d <sub>1</sub>
	mm			mm								
LLBHS 15 B	24	4,6	16	47	38	4,5	58,5	38,5	30	-	7	4,5
LLBHS 20 B	30	5	21,5	63	53	5	73	50	40	-	9,5	6
LLBHS 25 B	36	6,5	23,5	70	57	6,5	83	59	45	12	10	7
LLBHS 25 LB	36	6,5	23,5	70	57	6,5	107	83	45	12	10	7
LLBHS 30 B	42	7	31	90	72	9	97	68	52	12	13	9
LLBHS 30 LB	42	7	31	90	72	9	123	94	52	12	13	9
LLBHS 35 B	48	8	33	100	82	9	112	80	62	12	13	9
LLBHS 35 LB	48	8	33	100	82	9	141	109	62	12	13	9
LLBHS 45 B	60	11	37,5	120	100	10	139	102	80	14	15	11
LLBHS 45 LB	60	11	37,5	120	100	10	167	130	80	14	15	11
LLBHS 55 B	70	14	43,5	140	116	12	159	124	95	16	17	14
LLBHS 55 LB	70	14	43,5	140	116	12	191	156	95	16	17	14
LLBHS 65 B	85	14	53,5	170	142	14	188	148	110	16	20	16
LLBHS 65 LB	85	14	53,5	170	142	14	247	207	110	16	20	16

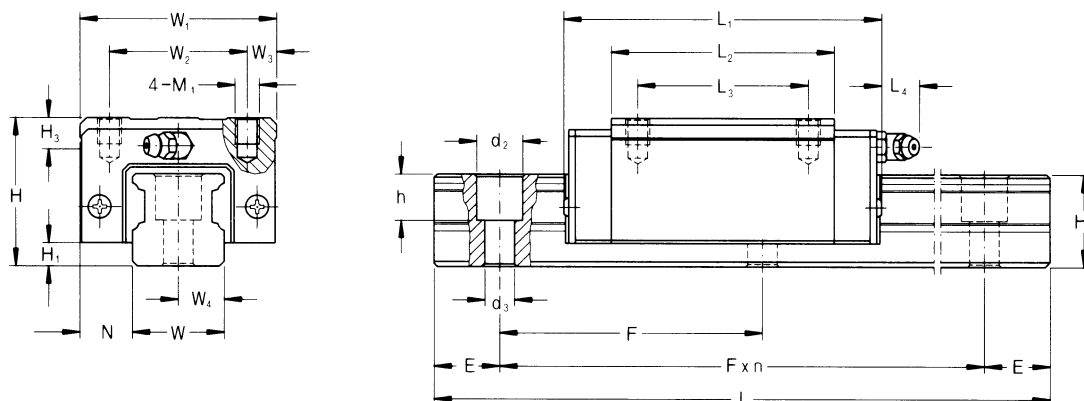


Rail		Load rating*)							Torque			Weight	
W	W <sub>4</sub>	H <sub>4</sub>	d <sub>2</sub>	d <sub>3</sub>	h	F	C	C <sub>0</sub>	M <sub>A</sub>	M <sub>B</sub>	M <sub>C</sub>	Slide unit	Rail
mm							N	Nm			kg	kg/m	
15	7,5	17	7,5	4,5	7	60	7 350	11 600	70	70	110	0,19	1,7
20	10	21	9,5	6	11	60	12 900	20 800	190	190	260	0,4	2,8
23	11,5	24	11	7	11	60	17 000	26 000	240	240	380	0,69	3,7
23	11,5	24	11	7	11	60	22 000	36 000	470	470	520	0,97	3,7
28	14	28	14	9	14	80	23 600	35 500	390	390	610	1,3	5,3
28	14	28	14	9	14	80	29 000	46 500	660	660	800	1,8	5,3
34	17	32	14	9	15	80	31 500	46 500	580	580	960	1,8	7,5
34	17	32	14	9	15	80	40 000	64 000	1100	1100	1330	2,5	7,5
45	22,5	42	20	14	21	105	48 000	72 000	1130	1130	1960	3,1	12,9
45	22,5	42	20	14	21	105	61 000	95 000	1920	1920	2570	4,0	12,9
53	26,5	48	23	16	24	120	75 000	112 200	2240	2240	3570	5,1	17,3
53	26,5	48	23	16	24	120	90 000	136 000	3300	3300	4330	6,5	17,3
63	31,5	58	26	18	25	150	114 000	162 800	3780	3780	6290	9,1	24,9
63	31,5	58	26	18	25	150	150 000	225 000	7240	7240	8690	13,1	24,9

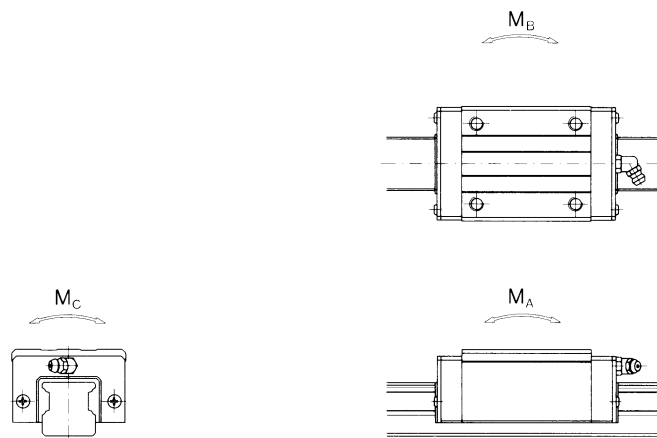
\*) All SKF load ratings are based on a cumulative travel of 100.000 m in accordance with DIN 636, Part 2. The dynamic load rating must be multiplied by 1,26 for comparison with figures based on 50.000 m cumulative travel.

## Heavy duty profile rail guides

LLBHS..R  
LLBHS..LR



Model no.	System dimensions			slide unit								
	H	H <sub>1</sub>	N	W <sub>1</sub>	W <sub>2</sub>	W <sub>3</sub>	L <sub>1</sub>	L <sub>2</sub>	L <sub>3</sub>	L <sub>4</sub>	H <sub>3</sub>	M <sub>1</sub>
	mm			mm								
LLBHS 20 R	30	5	12	44	32	6	73	5	36	-	8	M 5x8
LLBHS 25 R	40	6,5	12,5	48	35	6,5	83	59	35	12	8	M 6x8
LLBHS 25 LR	40	6,5	12,5	48	35	6,5	107	83	50	12	8	M 6x8
LLBHS 30 R	45	7	16	60	40	10	97	68	40	12	8	M 8x10
LLBHS 30 LR	45	7	16	60	40	10	123	94	60	12	8	M 8x10
LLBHS 35 R	55	8	18	70	50	10	112	80	50	12	10	M 8x12
LLBHS 35 LR	55	8	18	70	50	10	141	109	72	12	10	M 8x12
LLBHS 45 R	70	11	20,5	86	60	13	139	102	60	16	15	M 10x17
LLBHS 45 LR	70	11	20,5	86	60	13	167	130	80	16	15	M 10x17
LLBHS 55 R	80	14	23,5	100	75	12,5	168	124	75	16	18	M 12x18
LLBHS 55 LR	80	14	23,5	100	75	12,5	200	156	95	16	18	M 12x18
LLBHS 65 R	90	14	31,5	126	90	18	198	148	70	16	23	M 16x20
LLBHS 65 LR	90	14	31,5	126	90	18	257	207	120	16	23	M 16x20



Rail							Load rating*)		Torque Moment			Weight	
W	W <sub>4</sub>	H <sub>4</sub>	d <sub>2</sub>	d <sub>3</sub>	h	F	C	C <sub>0</sub>	M <sub>A</sub>	M <sub>B</sub>	M <sub>C</sub>	Slide unit	Rail
mm							N		Nm			kg	kg/m
20	10	21	9,5	6	11	60	12 900	20 800	190	190	260	0,3	2,8
23	11,5	24	11	7	11	60	17 000	26 000	240	240	380	0,57	3,7
23	11,5	24	11	7	11	60	22 000	36 000	470	470	520	0,8	3,7
28	14	28	14	9	14	80	23 600	35 500	390	390	610	0,99	5,3
28	14	28	14	9	14	80	29 000	46 500	660	660	800	1,4	5,3
34	17	32	14	9	15	80	31 500	46 500	580	580	960	1,6	7,5
34	17	32	14	9	15	80	40 000	64 000	1100	1100	1330	2,2	7,5
45	22,5	42	20	14	21	105	48 000	72 000	1130	1130	1960	2,9	12,9
45	22,5	42	20	14	21	105	61 000	95 000	1920	1920	2570	3,7	12,9
53	26,5	48	23	16	24	120	75 000	112 200	2240	2240	3570	4,5	17,3
53	26,5	48	23	16	24	120	90 000	136 000	3300	3300	4330	5,8	17,3
63	31,5	58	26	18	25	150	114 000	162 800	3780	3780	6290	7,2	24,9
63	31,5	58	26	18	25	150	150 000	225 000	7240	7240	8690	10,5	24,9

\*) All SKF load ratings are based on a cumulative travel of 100.000 m in accordance with DIN 636, Part 2. The dynamic load rating must be multiplied by 1,26 for comparison with figures based on 50.000 m cumulative travel.

# Bellows

LLBHB..

Where extra protection of a profile rail guide is required, SKF recommends the use of bellows, made of polyester coated on both sides with polyurethane.

- Bellows protect the guidance system against the ingress of dirt which not only increases friction but also shortens the life of the system.
- Bellows protect the operator from accidental injury.

Material:

polyester fabric coated on both sides with polyurethane.

Material thickness: 0,22 or 0,4 mm

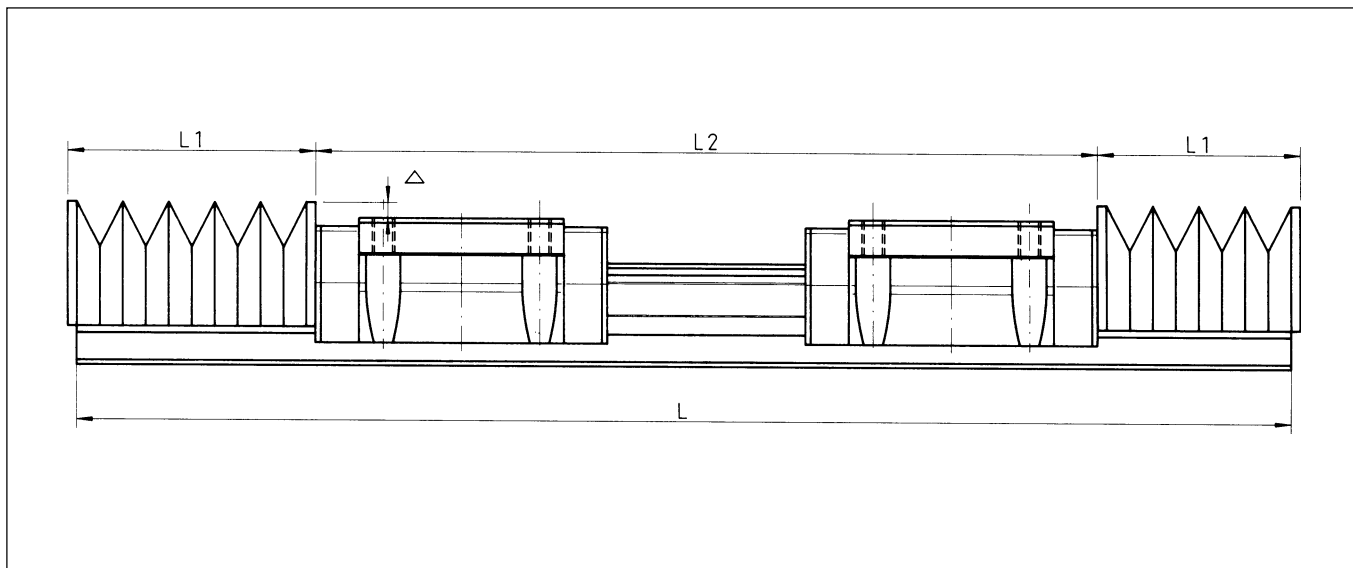
Standard colour: black

Recommended operating temperature: -30° to + 110°C

Resistance: Good resistance to oil and coolants

Special designs:

SKF bellows are based on a plastic frame which can be combined with various other materials. At relatively short notice, special bellows can be supplied to withstand specific extreme environmental conditions (dirt, temperature, radiation, acids, alkalis, etc.)



Calculation:

For a given stroke and  $L_1$ :

$$L_{\min} = \frac{S}{X - 1}$$

$$L_{\max} = S + L_{\min}$$

$$L = L_{\max} + L_{\min} + L_2$$

Number of folds:

$$n = \frac{L_{\max}}{Y} + 1$$

For given L and  $L_1$ :

$$L_{\min} = \frac{L - L_2}{X + 1}$$

$$L_{\max} = L_{\min} \times X$$

$$S = L_{\max} - L_{\min}$$

Number of folds:

$$n = \frac{L_{\max}}{Y} + 1$$

Bellows designation	Factors		$\Delta$	$L_{\min}/\text{fold}$
	X	Y $L_{\max}/\text{fold}$		
<b>LLBHB 15</b>	9,64	21,2	9	2,2
<b>LLBHB 20</b>	9,64	21,2	7	2,2
<b>LLBHB 25</b>	6,45	14,2	-	2,2
<b>LLBHB 30</b>	8,27	18,2	-	2,2
<b>LLBHB 35</b>	9,64	21,2	-	2,2
<b>LLBHB 45</b>	11,45	25,2	-	2,2
<b>LLBHB 55</b>	11,11	30	-	2,7
<b>LLBHB 65</b>	11,11	30	-	2,7

## Compact and Medium load profile rail guides

LLBUS..R  
LLBUS..SR  
LLBNS..TR

To complete the range of profile rail guides SKF also offers various additional series which differ mainly in their external dimensions.

### LLBUS..R and LLBUS..SR

These compact series are characterised by the optimisation of the concept of profile rail guides. The assembled cross section is reduced when compared with the standard range. The LLBUS..SR range has a shorter slide unit which can be an advantage where there is no call for high load carrying capacity. On each

of these series, the slide unit can only be attached from above. They are only supplied as 'end cap type' units.

### LLBNS—TR

Profile rail guides of this type have a greater height and lower load rating than the other ranges. The slide units, of the "tube type" with external ball return paths, are suitable for high speed operation and are also for attachment from above.

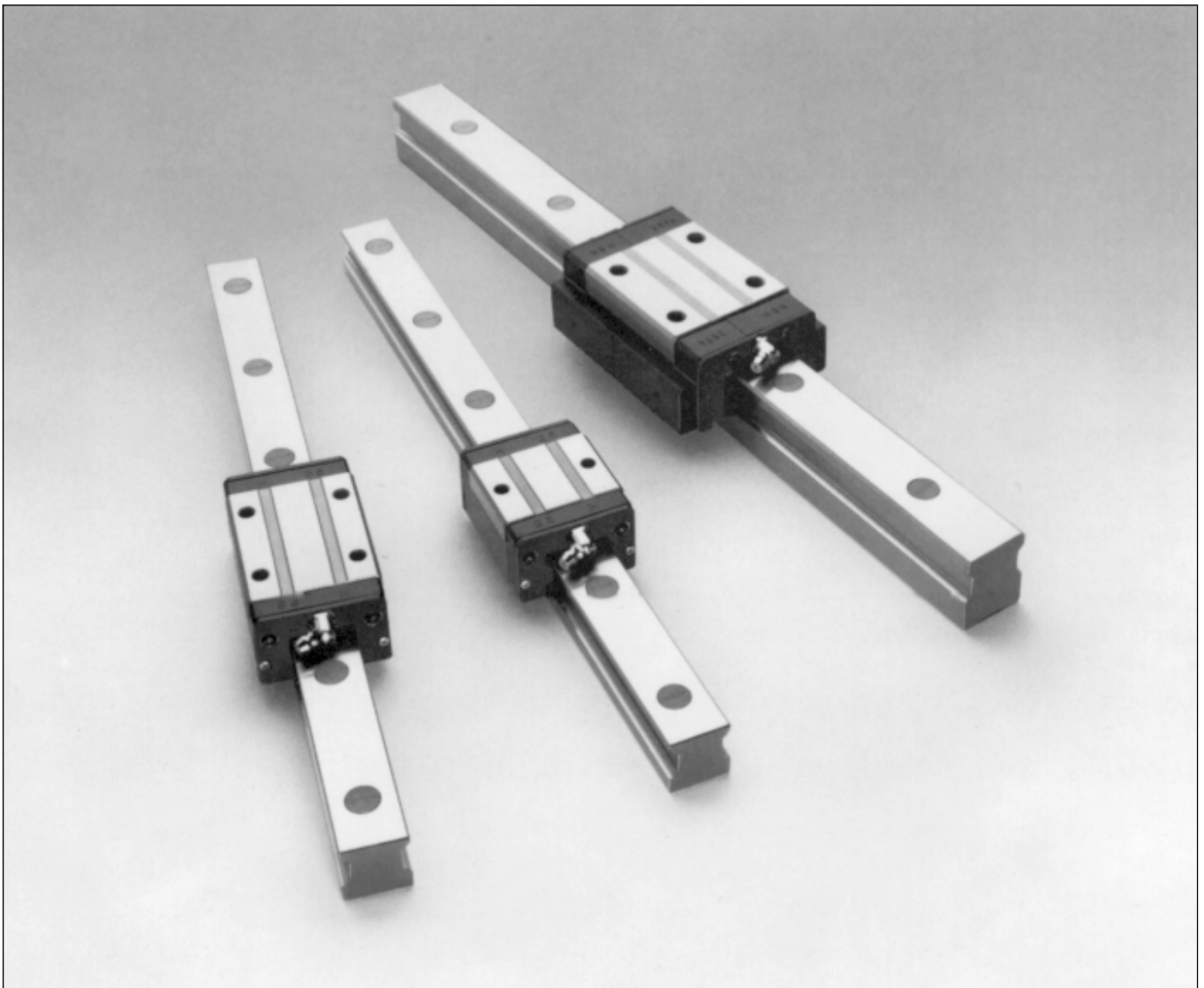
### Standard length

The rails for high performance profile rail guides are produced in different maximum length (see Table 1). Longer lengths can be achieved by putting together separate pieces.

Rails are generally manufactured with a symmetrical hole pattern. Where this is not possible, dimension

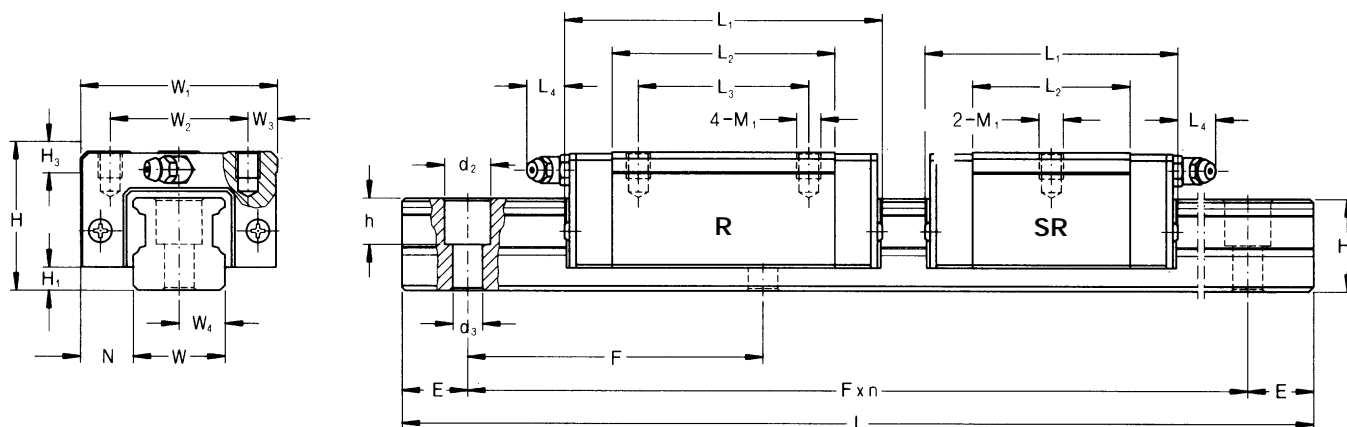
Maximum rail length Size		Max. length (mm)
LLBUR 15	LLBNR 15	1500
LLBUR 20	LLBNR 20	3000
LLBUR 25	LLBNR 25	3000
LLBUR 30	LLBNR 30	3000
LLBUR 35	-	3000
-	LLBNR 40	3000
LLBUR 45	-	3000
-	LLBNR 50	3000
LLBUR 55	-	3000

E is defined as the distance between the end of the rail and the center of the last mounting hole.



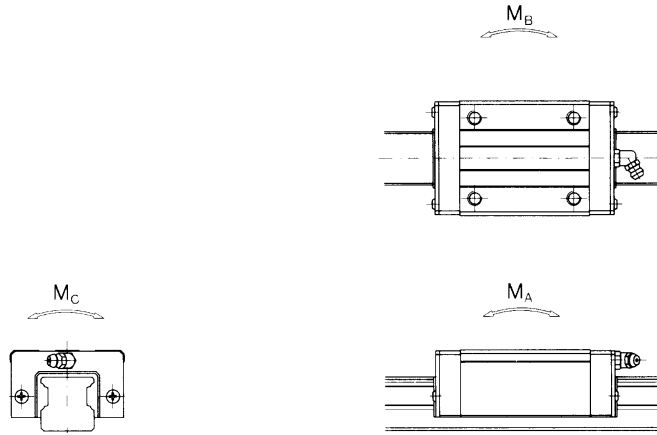
# Compact profile rail guides

LLBUS..R  
LLBUS..SR



Model no.	System dimensions			slide unit								
	H	H <sub>1</sub>	N	W <sub>1</sub>	W <sub>2</sub>	W <sub>3</sub>	L <sub>1</sub>	L <sub>2</sub>	L <sub>3</sub>	L <sub>4</sub>	H <sub>3</sub>	M <sub>1</sub>
	mm			mm								
LLBUS 15 R	24	4,6	9,5	34	26	4	58,5	38,5	26	0	6	M 4x5
LLBUS 15 SR	24	4,6	9,5	34	26	4	45	25	-	0	6	M 4x5
LLBUS 20 R	28	4	11	42	32	5	72	50	32	0	7,5	M 5x7
LLBUS 20 SR	28	4	11	42	32	5	52	30	-	0	7,5	M 5x7
LLBUS 25 R	33	4	12,5	48	35	6,5	83	59	35	12	8	M 6x8
LLBUS 25 SR	33	4	12,5	48	35	6,5	60	36	-	12	8	M 6x8
LLBUS 30 R	42	7	16	60	40	10	97	68	40	12	8	M 8x10
LLBUS 30 SR	42	7	16	60	40	10	73	44	-	12	8	M 8x10
LLBUS 35 R	48	8	18	70	50	10	112	80	50	12	10	M 8x12
LLBUS 35 SR	48	8	18	70	50	10	84	52	-	12	10	M 8x12
LLBUS 45 R	60	11	20,5	86	60	13	139	102	60	14	15	M 10x16
LLBUS 55 R	68	12	26	100	75	12,5	168	124	75	14	18	M 12x18



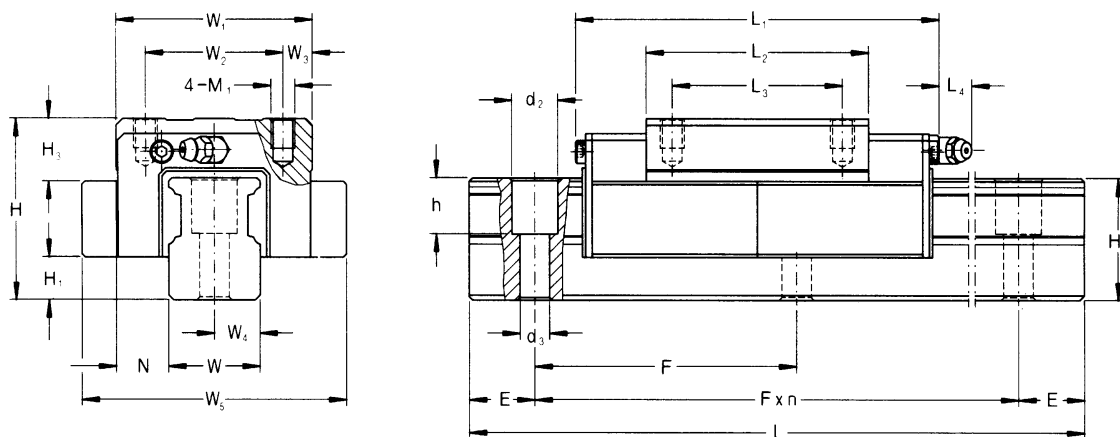


Rail		Load rating*)							Torque Moment			Weight	
W	W <sub>4</sub>	H <sub>4</sub>	d <sub>2</sub>	d <sub>3</sub>	h	F	C	C <sub>0</sub>	M <sub>A</sub>	M <sub>B</sub>	M <sub>C</sub>	Slide unit	Rail
mm							N		Nm			kg	kg/m
15	7,5	17	6	3,5	9	60	7 350	11 600	70	70	110	0,13	1,7
15	7,5	17	6	3,5	9	60	5 210	7 100	30	30	60	0,08	1,7
20	10	19,5	9,5	6	12	60	12 900	20 800	140	140	230	0,27	2,5
20	10	19,5	9,5	6	12	60	9 200	11 000	50	50	140	0,16	2,5
23	11,5	21,5	11	7	12,5	60	17 000	26 000	240	240	380	0,41	3,2
23	11,5	21,5	11	7	12,5	60	11 200	16 000	90	90	230	0,25	3,2
28	14	28	11	7	14	80	23 600	35 500	390	390	620	0,9	5,3
28	14	28	11	7	14	80	17 000	21 500	140	140	380	0,61	5,3
34	17	32	14	9	15	80	31 500	46 500	580	580	960	1,3	7,5
34	17	32	14	9	15	80	22 500	32 000	280	280	670	0,84	7,5
45	22,5	42	17,5	11	20,5	105	48 000	72 000	1130	1130	1960	2,2	12,9
48	24	46	20	14	25	120	75 000	112 200	2240	2240	3570	3,3	16,5

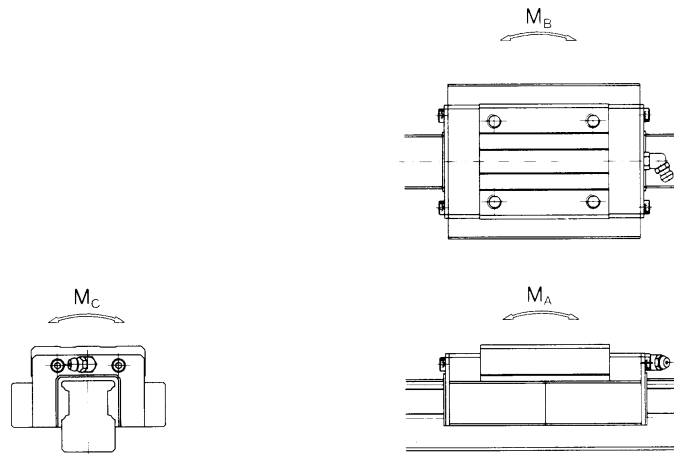
\*) All SKF load ratings are based on a cumulative travel of 100.000 m in accordance with DIN 636, Part 2. The dynamic load rating must be multiplied by 1,26 for comparison with figures based on 50.000 m cumulative travel.

# Medium load profile rail guides

LLBNS..TR



Model no.	System dimensions			slide unit									
	H	H <sub>1</sub>	N	W <sub>1</sub>	W <sub>2</sub>	W <sub>3</sub>	W <sub>5</sub>	L <sub>1</sub>	L <sub>2</sub>	L <sub>3</sub>	L <sub>4</sub>	H <sub>3</sub>	M <sub>1</sub>
	mm			mm									
LLBNS 15 TR	27	5	9,5	34	26	4	46	65	36	26	0	8	M 4x5
LLBNS 20 TR	37	8	12,5	48	35	6,5	62	89	54	35	3	12	M 6x10
LLBNS 25 TR	45	9,5	16	60	40	10	75	102	62	40	10	12	M 8x12
LLBNS 30 TR	55	13	18	70	50	10	88	116	71	50	10	16	M 8x12
LLBNS 40 TR	70	17	20,5	86	60	13	109	141	88	60	10	18	M 10x14
LLBNS 50 TR	80	13	26	100	75	12,5	127	162	97	75	10	21,5	M 12x17



Rail							Load rating*)		Torque			Weight	
W	W <sub>4</sub>	H <sub>4</sub>	d <sub>2</sub>	d <sub>3</sub>	h	F	C	C <sub>0</sub>	M <sub>A</sub>	M <sub>B</sub>	M <sub>C</sub>	Slide unit	Rail
mm							N		Nm			kg	kg/m
15	7,5	18	6	3,5	9	60	4 520	8 000	50	50	70	0,16	1,9
23	11,5	25	9,5	6	13	60	9 200	16 000	140	140	230	0,44	4,0
28	14	32	11	7	16	80	13 800	22 000	220	220	380	0,7	6,4
34	17	37	11	7	16	80	19 500	30 000	320	320	610	1,2	9,0
45	22,5	48	14	9	23	105	34 400	49 500	670	670	1340	2,1	15,5
48	24	49	17,5	11	24	120	51 600	72 000	1130	1130	2110	3,7	16,6

\*) All SKF load ratings are based on a cumulative travel of 100.000 m in accordance with DIN 636, Part 2. The dynamic load rating must be multiplied by 1,26 for comparison with figures based on 50.000 m cumulative travel.

## M-Type profile rail guides

LLBMS..TW  
LLBMS..TC

M-Type profile rail guides from SKF are basic linear guidance systems for unlimited travel, with two ball recirculation paths in the slide unit. They can be used together with either an asymmetric rail having two raceways or with H-section 4-raceway units.

These offer the following benefits:

- Low assembly profile
- Simplicity of mounting
- Equal load carrying capacity in all load directions
- Quiet running at high speed
- High load carrying capacity

### Low assembly profile

In comparison with the other designs of rail guide, M-Type profile rail guides enable the construction of particularly low-profile systems. Combinations can also be made with the 'H-type' rails (fig 2).

### Simplicity of mounting

Since the balls are safely retained in the slide carrier, mounting is fast and simple. Two alternative models are available, depending on the type of mounting.

### Equal load carrying capacity in all load directions

With two slide units mounted in

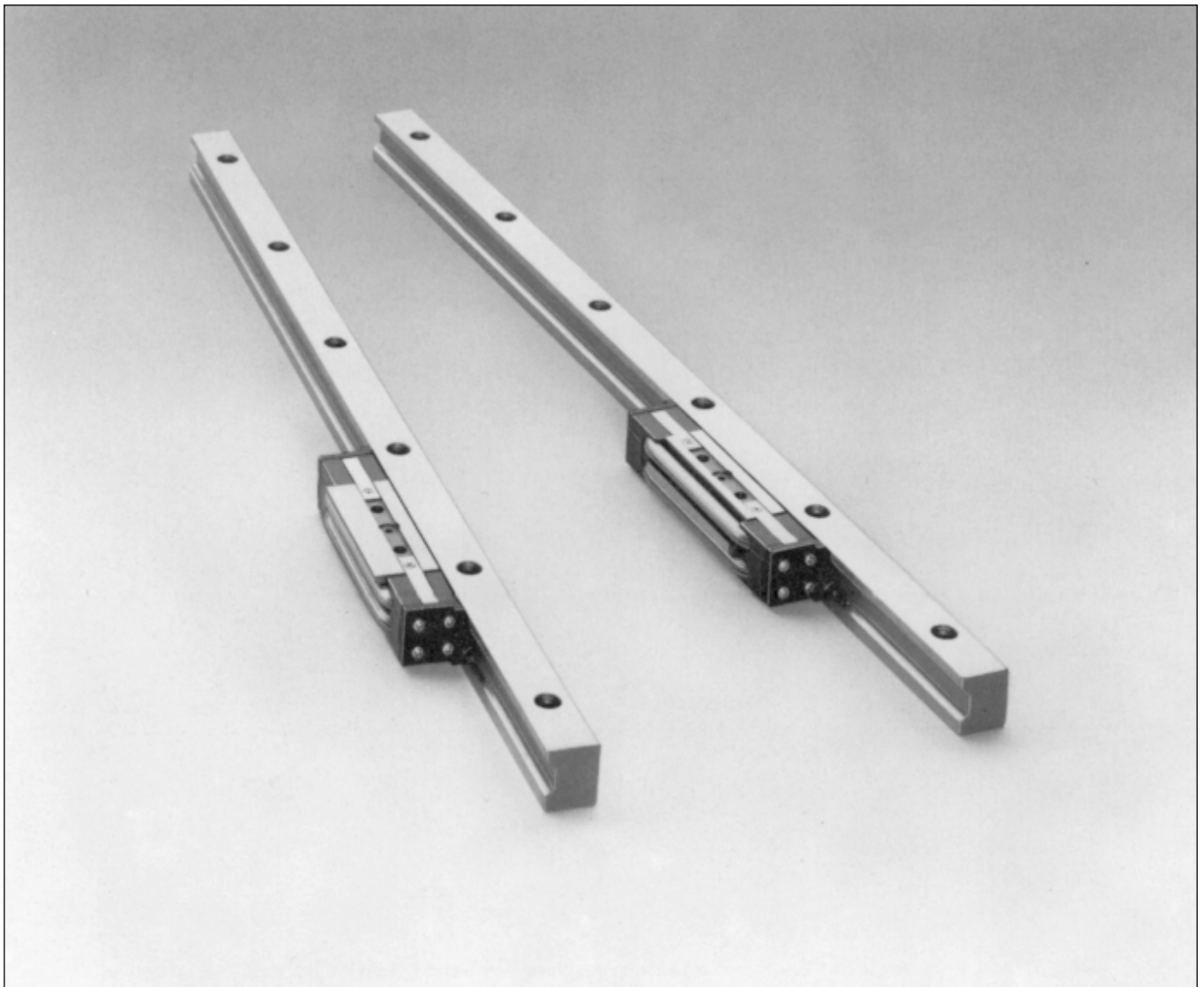
parallel, the guidance system can accommodate loads from any direction.

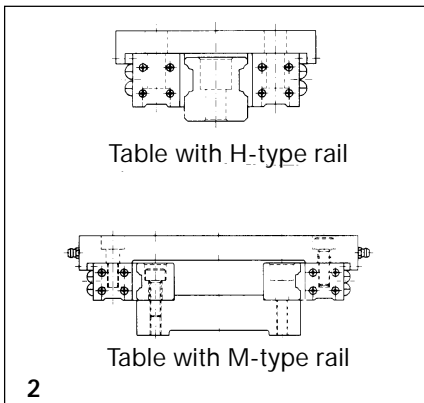
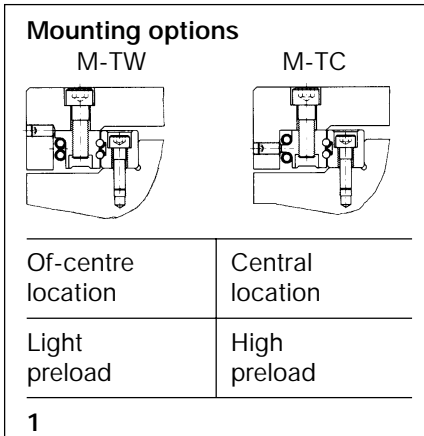
### Quiet running at high speed

The external ball return paths with their extra large radius of curvature ensure quiet running even at high speed.

### High load carrying capacity

The use of steel balls of relatively large diameter ensures the high stiffness and load carrying capacity of M-Type profile rail guides from SKF.





**Accuracy classes**

M-Type profile rail guides from SKF are available in five tolerance classes. (see tables 2 and 3).

**Height "H"**

The tolerance of the height "H" is significant when at least two rails with slid units are to be mounted on the same base. This avoids undue misalignment of the mating surfaces.

**Width "N"**

The dimension "N" is of particular significance in the case of a rail with several slide units.

**Table 1**

**Maximum rail length**

Size	Max. length (mm)
LLBMR 10	500
LLBMR 15	1500
LLBMR 25	1500
LLBMR 35	3000
LLBMR 40	3000
LLBMR 45	3000
LLBMR 55	3000
LLBMR 65	3000

**Standard lengths**

Rails for M-Type profile rail guides are available in various lengths (see Table 1).

Longer lengths can be achieved by putting together separate pieces. Special long rails can be made to order.

**Preload and stiffness**

Preload is adjusted through the use of set screws on the side of the unit. By measuring the required resistance to movement of the mounted and adjusted slide unit, the preload can be calculated relatively accurately according to the following formula:

$$P = F/0,004$$

P = Preload in Newtons (N)

F = Resistance to movement in Newtons (N)

**Table 2 System accuracy**

Units:  $\mu\text{m}$

Dimension	Class	P001	P01	P1	P3	P5
Height H	Dimensional tolerance	$\pm 10$	$\pm 15$	$\pm 20$	$\pm 50$	$\pm 100$
	Deviation between paired rails	3	5	10	20	50
Width $W_4$	Dimensional tolerance	$\pm 20$	$\pm 30$	$\pm 50$	$\pm 100$	$\pm 200$
	Deviation between paired rails	3	5	10	20	50

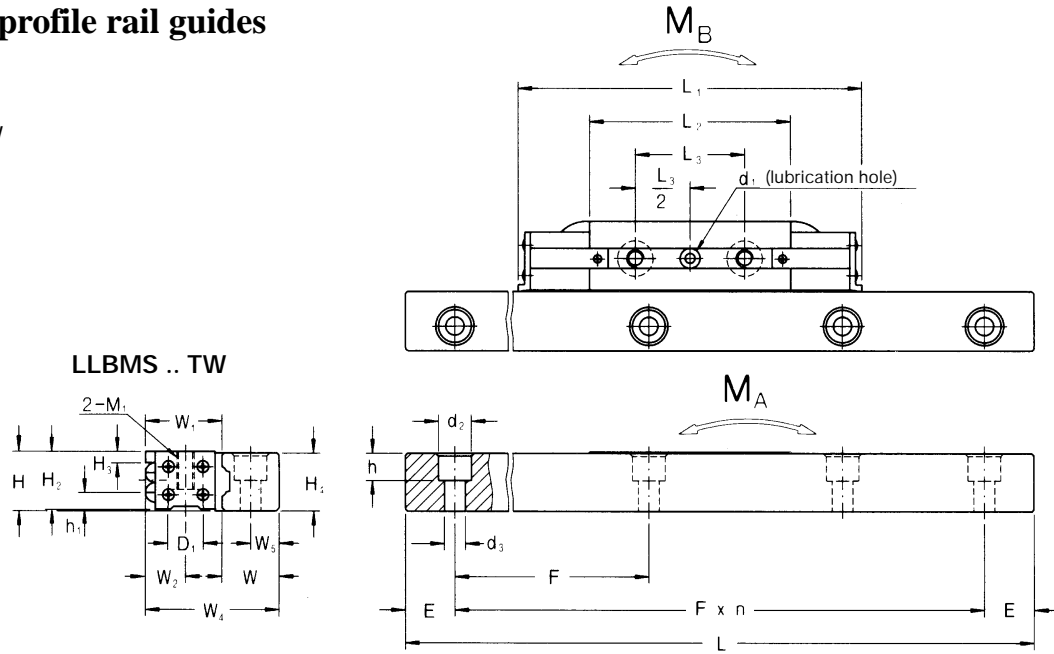
**Table 3 Parallelism**

Units:  $\mu\text{m}$

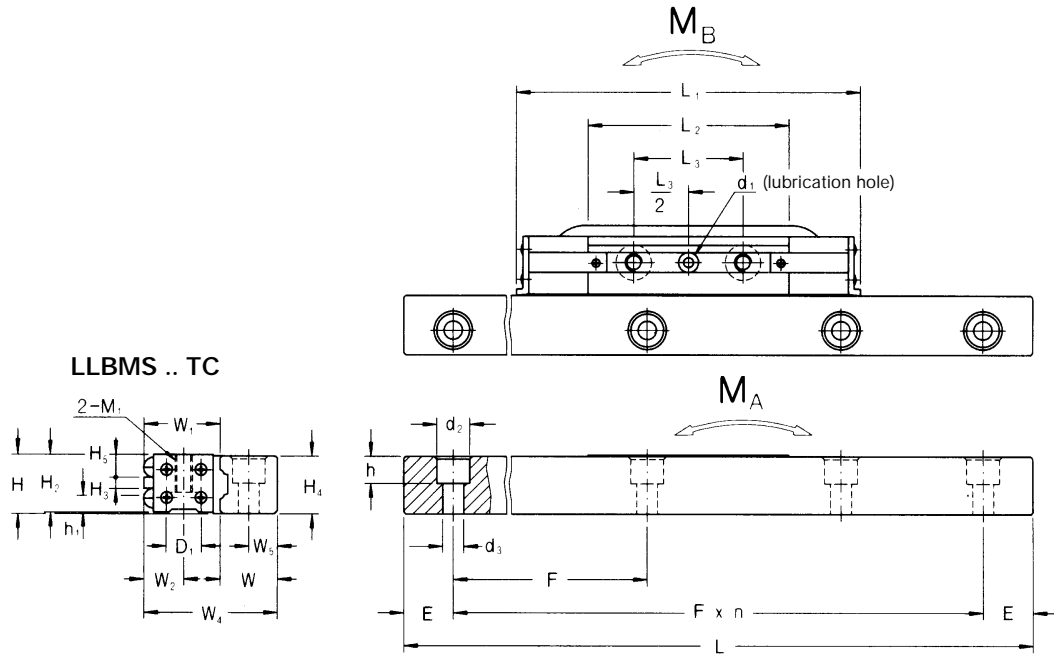
Rail track length (mm)		Parallelism of plane C to datum plane A Parallelism of plane D to datum plane B				
over	up to	P001	P01	P1	P3	P5
–	315	1,5	2	2,5	8	16
315	400	2	2,5	3,5	10	20
400	500	2	3	4,5	11	24
500	630	2	3,5	6	14	27
630	800	2,5	4	8	16	32
800	1000	3	4,5	9	19	38
1000	1250	3	6	11	22	43
1250	1600	4	7	14	25	50
1600	2000	4,5	8	16	29	57
2000	2500	6	9	18	30	60
2500	3150	6	10	18	30	60

# M-Type profile rail guides

LLBMS..TW  
LLBMS..LC



Model no.	System dimensions		slide unit												
	H	W <sub>4</sub>	W <sub>1</sub>	W <sub>2</sub>	L <sub>1</sub>	L <sub>2</sub>	L <sub>3</sub>	H <sub>2</sub>	H <sub>3</sub>	H <sub>5</sub>	D <sub>1</sub>	h <sub>1</sub>	M <sub>1</sub>	S	d <sub>1</sub>
	mm		mm												
M 10 TW	11	23	11,7	7	69	37	15	10,8	1,8		5	3	M 3	2,55	2
M 15 TW	15	30	16,6	10	81	44	20	14,5	2,2		6,5	3,5	M 4	3,3	2
M 15 TC	15	30	16,6	10	81	44	20	14,5	3	5,8	6,5	3,5	M 4	3,3	2
M 25 TW	20	42	22,4	13	111	66	35	19,5	2,3		9,5	5,4	M 6	5,3	3
M 25 TC	20	42	22,4	13	111	66	35	19,5	4	7,8	9,5	5,4	M 6	5,3	3
M 35 TW	25	55	29,1	16	141	83	45	24,5	2,4		11	6,5	M 8	6,8	3
M 35 TC	25	55	29,1	16	141	83	45	24,5	5	9,8	11	6,5	M 8	6,8	3
M 40 TW	30	65	35	19	156	92	50	29,5	4		14	8,6	M 10	8,6	4
M 40 TC	30	65	35	19	156	92	50	29,5	8	10,8	14	8,6	M 10	8,6	4
M 45 TW	35	75	39,9	21,5	180	110	60	34,5	5,1		17,5	10,8	M 12	10,5	4
M 45 TC	35	75	39,9	21,5	180	110	60	34,5	9	12,8	17,5	10,8	M 12	10,5	4
M 55 TW	40	85	45,6	24	207	126	70	39,5	5,8		20	13	M 14	12,5	4
M 55 TC	40	85	45,6	24	207	126	70	39,5	11	14,3	20	13	M 14	12,5	4
M 65 TW	50	105	55,3	30	240	148	85	49,5	7,2		23	15,2	M 16	14,5	5
M 65 TC	50	105	55,3	30	240	148	85	49,5	15	12,3	23	15,2	M 16	14,5	5



Rail		Load rating*)		Torque		Weight						
W	W <sub>5</sub>	H <sub>4</sub>	d <sub>2</sub>	d <sub>3</sub>	h	F	C	C <sub>0</sub>	M <sub>A</sub>	M <sub>B</sub>	Slide unit	Rail
mm							N		Nm		kg	kg/m
11	5	10,8	6	3,4	5	40	2 200	4 000	30	30	0,04	0,83
13	6	14,5	6	3,4	5	60	4 000	6 600	50	50	0,07	1,3
13	6	14,5	6	3,4	5	60	4 000	6 600	50	50	0,07	1,3
19	8	19,5	9,5	5,5	9	60	9 300	14 500	140	140	0,21	2,5
19	8	19,5	9,5	5,5	9	60	9 300	14 500	140	140	0,21	2,5
25	10	24,5	14	9	12	80	17 300	24 500	330	330	0,6	4,1
25	10	24,5	14	9	12	80	17 300	24 500	330	330	0,6	4,1
29	12	29,5	14	9	12	80	20 200	31 000	430	430	0,72	6,0
29	12	29,5	14	9	12	80	20 200	31 000	430	430	0,72	6,0
34	14,5	34,5	17,5	11	16	105	26 300	41 000	680	680	1,1	8,2
34	14,5	34,5	17,5	11	16	105	26 300	41 000	680	680	1,1	8,2
38	16	39,5	20	14	19	120	41 200	55 000	1110	1110	1,7	10,9
38	16	39,5	20	14	19	120	41 200	55 000	1110	1110	1,7	10,9
48	20	49,5	26	18	24	150	62 600	82 000	1900	1900	2,9	16,4
48	20	49,5	26	18	24	150	62 600	82 000	1900	1900	2,9	16,4

\*) All SKF load ratings are based on a cumulative travel of 100.000 m in accordance with DIN636, Part 2. The dynamic load rating must be multiplied by 1,26 for comparison with figures based on 50.000 km cumulative travel.

## Miniature profile rail guides

LLBKS..TR

Miniature profile rail guides from SKF are for use in high precision applications. Their advanced design offers the following benefits:

- simplicity of mounting
- equal load carrying capacity in all load directions
- optimised ball recirculation
- simplicity of design

### **Simplicity of mounting**

The ribbed underside of the rail enables simple mounting in a suitably machined groove.

### **Equal load carrying capacity in all load directions**

The steel balls circulate in four paths between the rail and slid unit. The square configuration of the raceways results in a guidance system with good rigidity, thus providing a high dynamic load rating in all four load directions.

### **Optimised ball recirculation**

An external ball return path enables the use of an extra large radius, ensuring quiet running even at higher speeds. The use of an external return path also avoids unnecessary

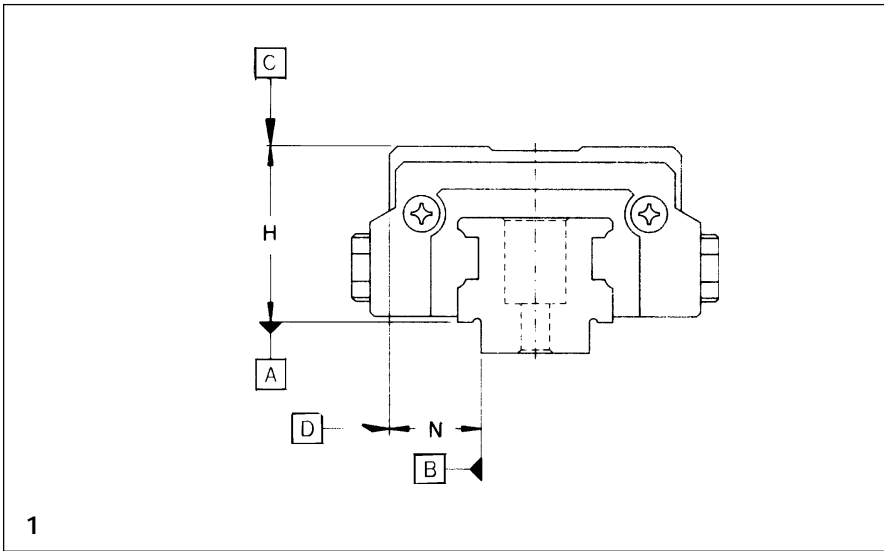
weakening of the slid unit and therefore allows greater stiffness of the system.

### **Simplicity of design**

Although the design is relatively simple, with one-piece ball return paths, the balls are safely retained in the slide unit, thus allowing easy mounting.







### Accuracy

Miniature profile rail guides from SKF are manufactured in three accuracy classes, as shown in Tables 1 and 2.

### Preload and stiffness

Miniature profile rail guides from SKF are available in two different preload classes. Preloaded guides have approximately twice the stiffness of those without preload. Table 3 shows the values of preload for the various sizes of rail guide.

**Table 1 System accuracy**

Units:  $\mu\text{m}$

Dimensions		Class	P1	P3	P5
Height H	Dimensional tolerance		$\pm 10$	$\pm 20$	$\pm 40$
	Deviation between paired rails		5	20	40
Width N	Dimensional tolerance		$\pm 10$	$\pm 30$	$\pm 50$
	Deviation between paired rails		10	30	40

**Table 3**

### Preload

Units: N

Preload class	Size	No Pre-load	Light Pre-load
		T0	T1
LLBKS	7 TR	0	50
	9 TR	0	50
	12 TR	0	100

**Table 2 Parallelism**

Units:  $\mu\text{m}$

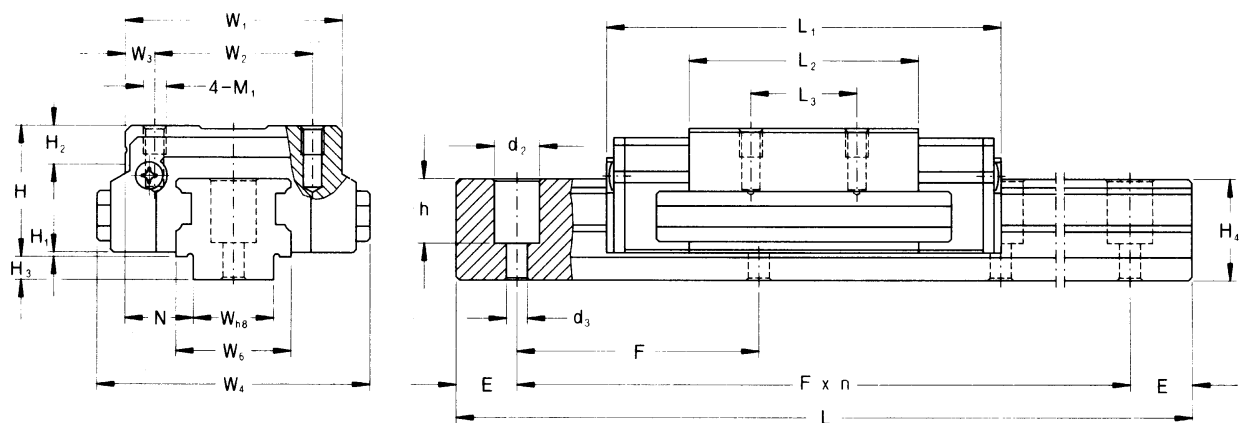
Rail track length (mm)		Parallelism of plane C to datum plane A Parallelism of plane D to datum plane B		
over	up to	P1	P3	P5
–	120	1,5	4	10
120	180	1,5	5	12
180	250	2	6	14
250	315	2,5	8	17
315	400	3,5	10	20
400	500	4,5	11	24
500	630	6	14	27

### Standard lengths

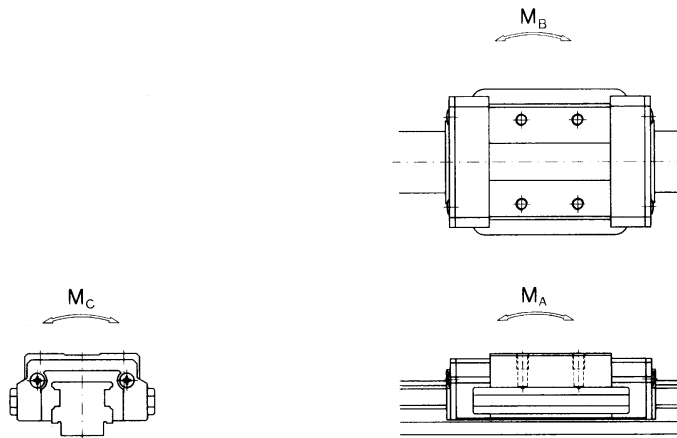
The maximum standard length for miniature profile rail guides is 500 mm. For longer runs, separate lengths can easily be joined together.

# Miniature profile rail guides

LLBKS..TR



Model no.	System dimensions				slide unit								
	H	H <sub>1</sub>	H <sub>3</sub>	N	W <sub>1</sub>	W <sub>2</sub>	W <sub>3</sub>	W <sub>4</sub>	L <sub>1</sub>	L <sub>2</sub>	L <sub>3</sub>	H <sub>2</sub>	M <sub>1</sub>
	mm				mm								
LLBKS 7 TR	15	0,5	3	9	25	18	3,5	32	46	26	10	4	M 3x4
LLBKS 9 TR	17	0,5	3	9,5	28	21	3,5	36	52	30	14	4,5	M 3x4
LLBKS 12 TR	19	0,5	3	10	32	25	3,5	41	58	34	16	5	M 3x4



Rail							Load rating*)		Torque			Weight	
$W_{h8}$	$W_6$	$H_4$	$d_2$	$d_3$	$h$	$F$	$C$	$C_0$	$M_A$	$M_B$	$M_C$	Slide unit	Rail
mm							N		Nm			kg	kg/m
7	12	12,5	4,4	2,4	7,5	32	950	2 300	10	10	17	0,05	0,98
9	14	13,5	5,2	2,9	8,5	32	2 060	4 400	22	22	38	0,07	1,2
12	17	14,5	6,5	3,4	9,5	50	3 100	6 300	38	38	65	0,14	1,5

\*) All SKF load ratings are based on a cumulative travel of 100.000 m in accordance with DIN 636, Part 2. The dynamic load rating must be multiplied by 1,26 for comparison with figures based on 50.000 m cumulative travel.

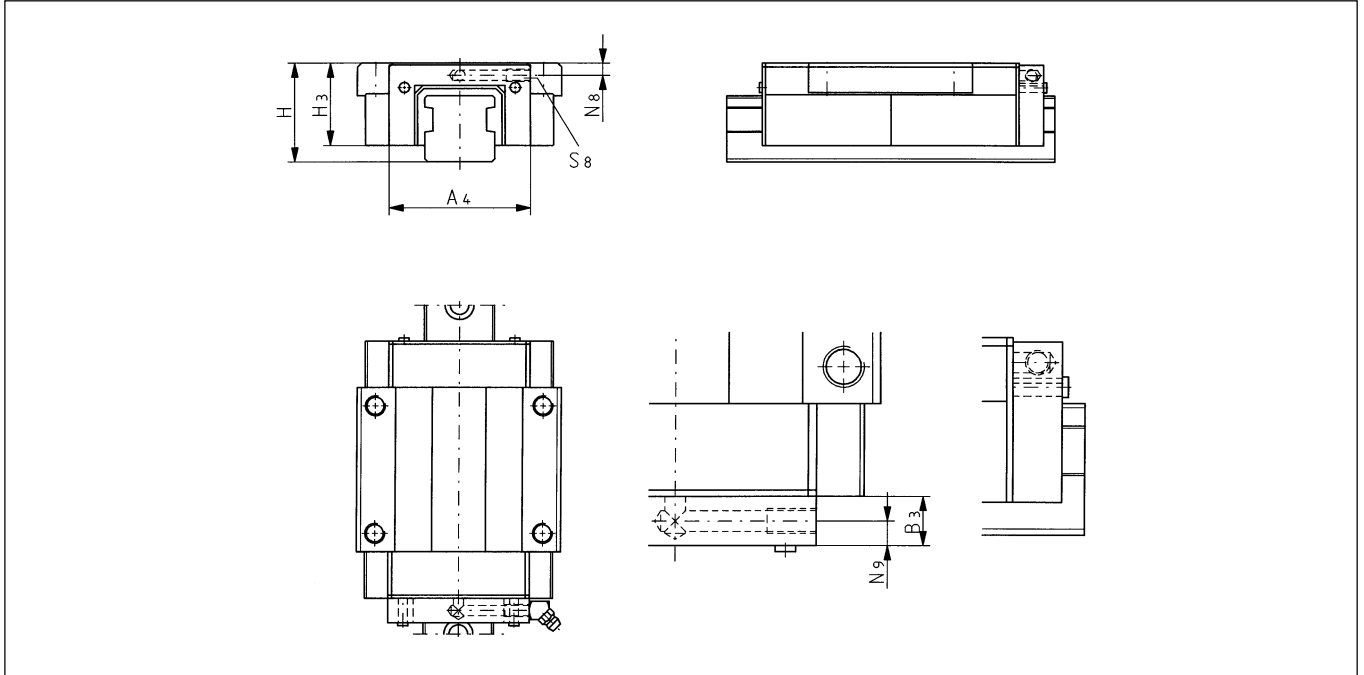
## Accessories

### Lubrication plate

Material: Aluminium

One set consists of:

- Seal
- Screws
- Grease nipple
- Aluminium body



Model no.	System dimensions							Weight
	A <sub>4</sub>	B <sub>3</sub>	H	H <sub>3</sub>	N <sub>8</sub>	N <sub>9</sub>	S <sub>8</sub>	
	mm							g
LLBHA 15 .. - G	33,5/38	12	24	19,4	2,5/2,9	6	3	20/25
LLBHA 20 .. - G	45	12	30	25	4,5	6	3	25
LLBHA 25 .. - G	47/55	12	36	29,5	5,5	6	M6	30/35
LLBHA 30 .. - G	59	12	42	35	5	6	M6	45
LLBHA 35 .. - G	69	12	48	40	6	6	M6	60
LLBHA 45 .. - G	85	12	60	49	7	6	M6	85
LLBHA 55 .. - G	99	12	70	56	8	6	M6	115
LLBHA 65 .. - G	125	12	85	71	9	6	M6	250

Designations:

LLBHA 15 .. - G

└── Abbreviation Carriage  
(A, TA)

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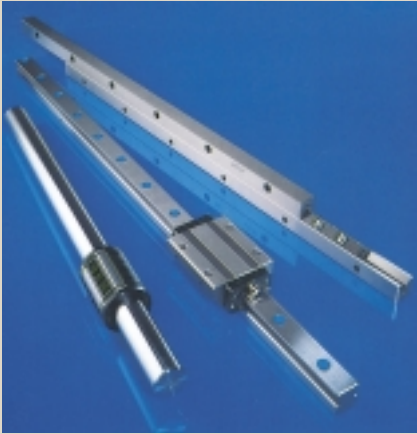
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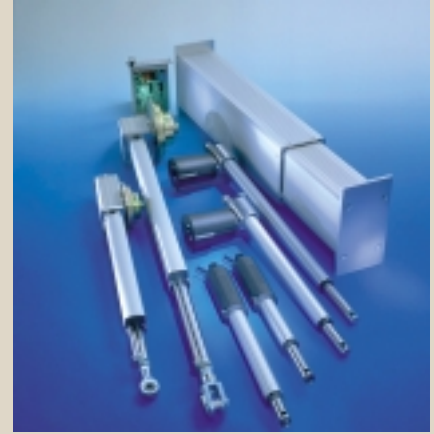
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SKF Linear Motion offers a wide range of precision engineered linear motion components, units and systems. In addition to comprehensive product literature and software, SKF offers assistance from experienced linear motion engineers.

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However the product availability as well as the product application is **world-wide granted by the SKF Bearing international network**. To get any other SKF address all over the world, please contact one of the companies below.

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