

Corrosion-resistant miniature linear ball bearing and guideway assemblies

Two-row and four-row designs

Foreword

Linear bearings for the miniature applications sector require a different approach in the design of guidance systems. While normal criteria such as load carrying capacity, rigidity and operating life are important, the additional factor of size also applies for miniature bearing arrangements.

Two-row and four-row designs

However, simply “scaling down” the standard sizes to smaller dimensions is not very successful in technical terms. We therefore developed the four-row miniature linear ball bearing and guideway assembly KUME...-C.

For applications with a lower requirement for load carrying capacity, this high-performance guidance system is supplemented by a two-row guidance system.

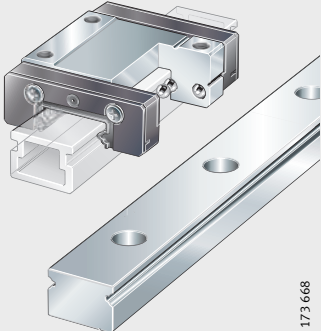
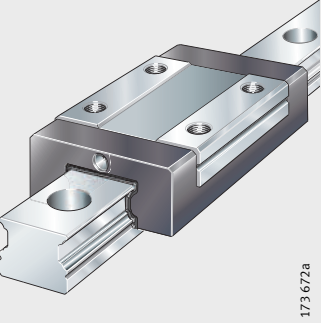
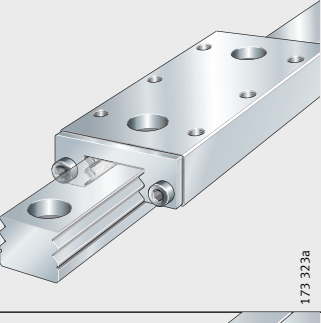
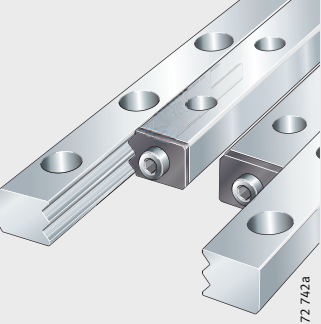
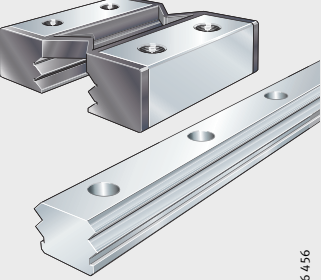
In order to extend the lubrication intervals, the two-row miniature linear ball bearing and guideway assemblies are also available with a long term lubrication unit (LZM). Where there are increased requirements in relation to temperature, radiation or dynamics, the two-row miniature linear ball bearing and guideway assemblies are also available with metal end pieces.

Replacement for...

Technical Product Information TPI 163 replaces Market Information MAI 81. The data in the catalogue represent the current level of technology and manufacture as of July 2007. They reflect not only progress in rolling bearing technology but also the experience gathered in practical use.

Data in earlier catalogues and publications that do not correspond to the data in this catalogue are therefore invalid.

**Miniature linear guidance systems
– Product range**

Linear guidance systems	Series	
<p>Corrosion-resistant miniature linear ball bearing and guideway assemblies Two-row design</p>	<p>TKDM KWEM</p>	<p>173 668</p>
<p>Four-row design</p>	<p>KUME..-C</p>	
<p>Corrosion-resistant miniature carriage units</p>	<p>RMWE</p>	
<p>Miniature linear guidance sets</p>	<p>RWS</p>	
<p>Miniature plain guidance systems Maintenance-free</p>	<p>GFS GFW</p>	

Features	Load carrying capacity	Rigidity	Publications
<ul style="list-style-type: none"> – Linear locating bearing for unlimited stroke lengths – Comprising guideway and carriage – Two-row design, four point contact of rolling elements with raceways – Preloaded – Seals on end faces of carriages – Greased, can be lubricated with oil or grease – Interchangeable 	Moderate to high	Moderate to high	TPI 163
<ul style="list-style-type: none"> – Linear locating bearing for unlimited stroke lengths – Comprising guideway and carriage – Four-row design, two point contact of rolling elements with raceways – Preloaded – With lubricant reservoir – Seals on end faces – Can be lubricated with oil or grease 	High to very high	High to very high	TPI 163
<ul style="list-style-type: none"> – Linear locating bearing for limited stroke lengths – Comprising guideway and carriage, single or double row cylindrical roller flat cages, end pieces – Cylindrical rollers in O or X arrangement – Higher load carrying capacity and rigidity than recirculating guidance systems in comparable design envelope – Preloaded – Greased, can be lubricated with oil or grease 	Very high	Very high	TPI 160
<ul style="list-style-type: none"> – Linear locating bearing for limited stroke lengths – Comprising guideways, cylindrical roller flat cages, end pieces – Cylindrical rollers in O or X arrangement – Higher load carrying capacity and rigidity than recirculating guidance systems in comparable design envelope – Spacing between guidance systems can be selected as required – Preloaded – Can be lubricated with oil or grease 	Very high	Very high	TPI 162
<ul style="list-style-type: none"> – Linear locating bearing for stroke lengths up to 3 m – Maintenance-free – Comprising guideway and carriage with plain sliding layer – Highly suitable for light metal constructions – Wear-resistant – Insensitive to contamination – Adjustable clearance – Interchangeable as required 	Low	Low	TPI 161

Corrosion-resistant miniature linear ball bearing and guideway assemblies

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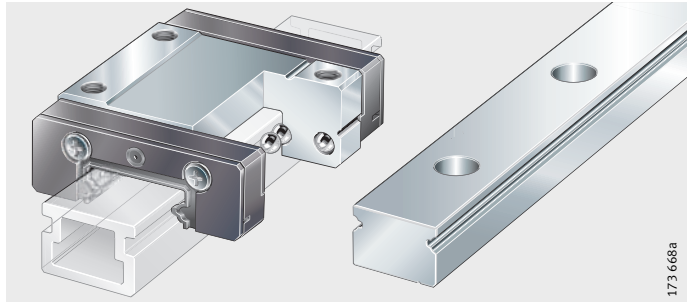
Product overview

Corrosion-resistant miniature linear ball bearing and guideway assemblies

Two-row design

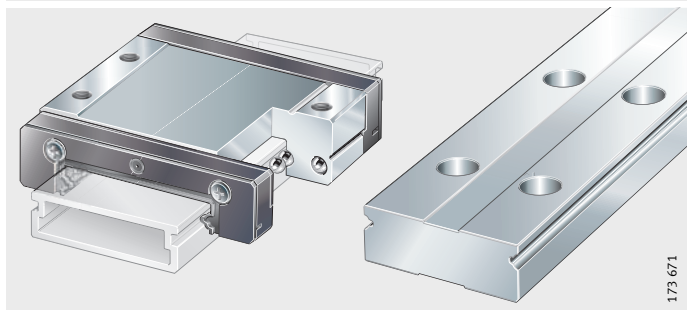
Carriage with dummy guideway

KWEM, TKDM



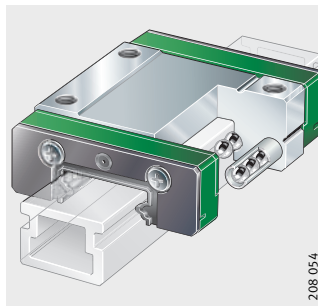
Wide carriage
with dummy guideway
Wide guideway

KWEM...-W, TKDM...-W

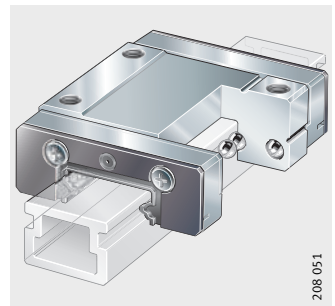


Carriage
With long term lubrication unit
With metal end pieces

KWEM...-LZM

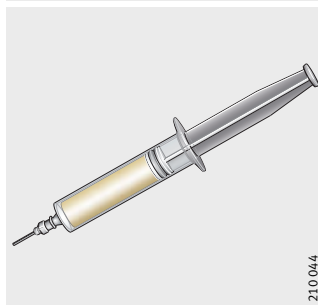


KWEM...-MKS

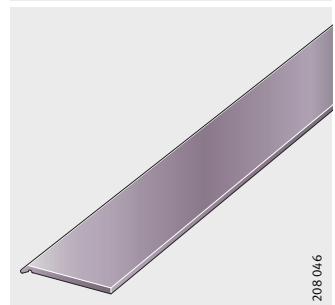


Accessories
Grease syringe
Sealing strips
for carriage

SPRI-KWEM

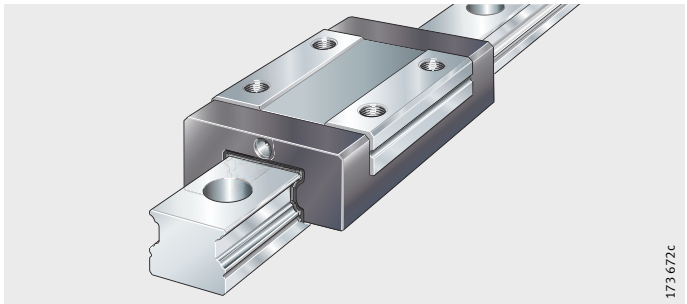


...-LD



Four-row design

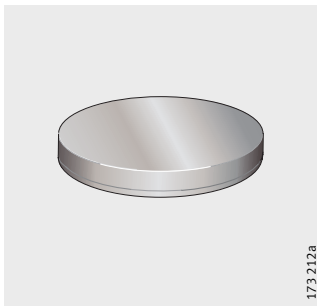
KUME..-C



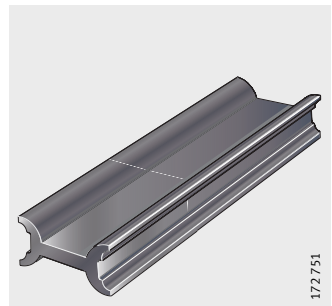
Standard accessories

- Plastic closing plug
- Dummy guideway

KA..-TN

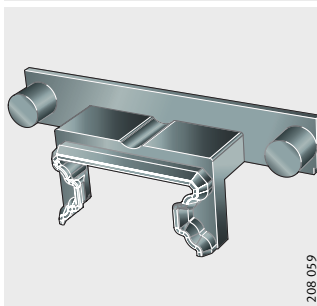


MKMD



Contact wiper

..-PP



Corrosion-resistant miniature linear ball bearing and guideway assemblies

Features	<p>Two-row and four-row miniature linear ball bearing and guideway assemblies are full complement, preloaded linear locating bearings for unlimited stroke lengths.</p> <p>A unit comprises at least one carriage with a locating face and a guideway.</p>
Load carrying capacity	<p>These guidance systems can support loads from all directions – apart from the direction of motion – and moments about all axes.</p> <p>The two-row units have two rows of rolling elements in four point contact with the raceways. KUME...C has four rows of rolling elements in two point contact with the raceways that transmit forces at a contact angle of 45°.</p>
Corrosion-resistant	<p>The miniature linear ball bearing and guideway assemblies are corrosion-resistant due to the steels used in the manufacture of the saddle plates and guideways.</p>
Caution!	<p>If very high levels of corrosion resistance are required, the suitability of the units for the specific application must be investigated.</p>
Two-row units	<p>In the case of the two-row design, the guideways and carriages are supplied separately. There is a plastic dummy guideway in the carriage. The dummy guideway prevents damage to the rolling element system.</p> <p>The guideways and carriages are also available in a wide version.</p>
Moderate to high load carrying capacity	<p>The guidance systems have moderate load carrying capacity and moderate to high moment load carrying capacity.</p> <p>They are suitable for accelerations up to 50 m/s² and speeds up to 180 m/min.</p>
Versatile in combination	<p>Due to their modular concept, the guideways can be combined within the same size and preload class with all carriage types – W guideways can only be combined with W carriages. This simplifies the fitting of guidance systems, gives easier spare parts purchasing and allows very economical stockholding.</p>
Sealing	<p>Seals on the end faces of the carriages protect the rolling element system against contamination.</p>
Caution!	<p>In order to prevent damage to the guidance systems, the raceways must be kept clean at all times. If the wipers used as standard are not adequate for this purpose, additional seals must be provided in the adjacent construction.</p>
Lubrication	<p>The carriages are greased, but can also be supplied ungreased. They can be relubricated via lubrication holes in the end pieces; in size 15, suitable lubrication nipples are included in the delivery.</p>

Four-row units	Four-row units are supplied preassembled, so there is at least one carriage on the guideway.
Very high load carrying capacity	<p>The units have very high load carrying capacity and rigidity and moment load carrying capacity.</p> <p>They are suitable for accelerations up to 40 m/s^2 and speeds up to 180 m/min.</p>
Sealing	Gap seals on the end faces of the carriages protect the rolling element system against contamination.
Caution!	In order to prevent damage to the guidance systems, the raceways must be kept clean at all times. If the wipers used as standard are not adequate for this purpose, additional seals must be provided in the adjacent construction.
Lubrication	<p>Due to the lubricant reservoir in the carriage, they are maintenance-free in many applications. The guidance systems are not greased but can be lubricated via lubrication holes in the end piece of the carriages; in size 15, lubrication nipples are mounted in the end pieces.</p> <p>The units have a preservative coating; the preservative is compatible with oils and greases.</p>
Caution!	The carriage must be oiled or greased before initial operation and protected against solid and liquid contaminants.
Guideways	<p>The guideways have two locating edges. They are made from corrosion-resistant steel, hardened and ground on all faces; the rolling element raceways are precision ground.</p> <p>For fixing to the adjacent construction, they have threaded holes with counterbores for the screw heads. In the case of the four-row units, plastic plugs are also supplied for closing off the counterbores. The guideways are fixed from above.</p>

Corrosion-resistant miniature linear ball bearing and guideway assemblies

Operating temperature The miniature linear ball bearing and guideway assemblies are suitable for operating temperatures from $-10\text{ }^{\circ}\text{C}$ to $+100\text{ }^{\circ}\text{C}$.

Suffixes Suffixes for available designs: see table.

Available designs

Suffix	Description	Design
LD	Two-row carriage with sealing strips	Special design
LZM	Two-row carriage with long term lubrication unit	Special design
MKS	Two-row carriage with metal end pieces	Special design
PP	Four-row carriage with contact wipers	Special design
UG	Two-row carriage without greasing	Special design

Applications

These recirculating units are particularly suitable for applications:

- in the microelectronics industry and related sectors
- in optical equipment
- in medical equipment
- in textile machinery
- that require high speeds and very uniform running behaviour
- where particularly economical miniature guidance systems are needed for moderate to high load requirements and moderate to high rigidity requirements.

Corrosion-resistant miniature linear ball bearing and guideway assemblies

Static load safety factor

The static load safety factor S_0 indicates the security with regard to permanent deformation at the rolling contact that can be regarded as permissible without affecting the guidance accuracy and smooth running of the bearing.

Static load safety factor

It can be determined using the following formula:

$$S_0 = \frac{C_0}{P_0}$$

$$S_0 = \frac{M_0}{M}$$

The equivalent static bearing load is determined by the maximum load F_{\max} .

$$P_0 = F_{\max}$$

$$M_0 = M_{\max}$$

C_0 N
Basic static load rating according to dimension tables

F_{\max} N
Maximum load

M Nm
Equivalent static moment in load direction

M_0 Nm
Basic static moment rating in load direction;
 M_{0x} , M_{0y} , M_{0z} according to dimension table

P_0 N
Maximum equivalent static load

S_0 –
Static load safety factor.

Caution! If high demands are placed on accuracy and smoothness of running, the static load safety factor should not be less than $S_0 = 3$.

For high loads, the load carrying capacity of the fixing screws must always be checked (see VDI Guideline 2 230).

Preload Miniature linear ball bearing and guideway assemblies are available in the preload classes V0 and V1; see table.
TKDM5 (-W)/KWEM5 (-C, -W, -WC) are only available in preload class V0.

Preload classes

Preload class	Preload setting
V0 (standard)	Zero to light preload
V1	Preload

Influence of preload on the linear guidance system

Increasing the preload increases the rigidity, the moment load carrying capacity and the guidance accuracy.
However, preload also influences the displacement resistance and operating life of the linear guidance system.

Corrosion-resistant miniature linear ball bearing and guideway assemblies

Hole patterns of guideways

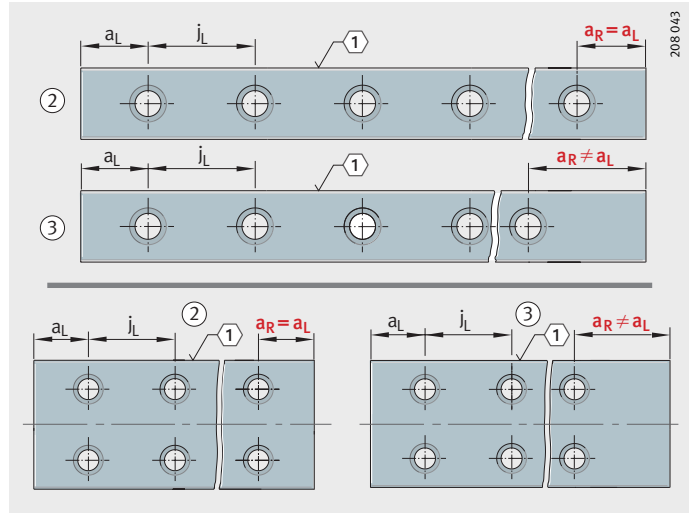
Unless specified otherwise, the guideways have a symmetrical hole pattern, *Figure 1*.

An asymmetrical hole pattern may be available at customer request. In this case, $a_L \geq a_{L \min}$ and $a_R \geq a_{R \min}$, *Figure 1*.

Two-row and four-row units

- ① Locating face
- ② Symmetrical hole pattern
- ③ Asymmetrical hole pattern

Figure 1
Hole patterns of guideways with one or two rows of holes



Maximum number of pitches between holes

The number of pitches between holes is the rounded whole number equivalent to:

$$n = \frac{l - 2 \cdot a_{L \min}}{j_L}$$

The distances a_L and a_R are generally determined by:

$$a_L + a_R = l - n \cdot j_L$$

For guideways with a symmetrical hole pattern:

$$a_L = a_R = \frac{1}{2} \cdot (l - n \cdot j_L)$$

Number of holes:

$$x = n + 1$$

a_L, a_R	mm
Distance between start or end of guideway and nearest hole	
$a_{L \min}, a_{R \min}$	mm
Minimum values for a_L, a_R according to dimension tables	
l	mm
Guideway length	
n	–
Maximum possible number of hole pitches	
j_L	mm
Distance between holes	
x	–
Number of holes.	

Caution! If the minimum values for a_L and a_R are not observed, the counterbores of the holes may be intersected.

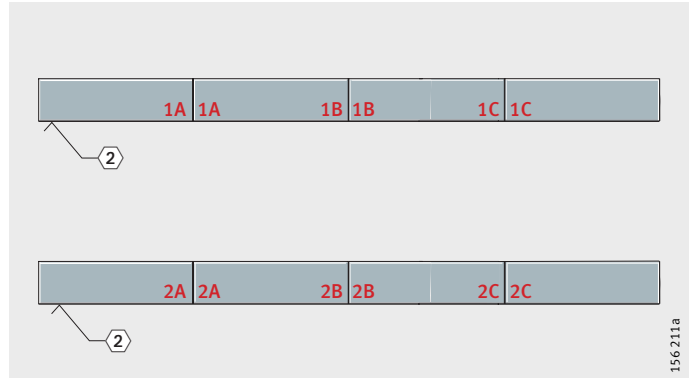
Corrosion-resistant miniature linear ball bearing and guideway assemblies

Multi-piece guideways

If the guideway length required is greater than l_{\max} according to the dimension tables, guideways of the total length are made up from individual sections. The individual sections are matched to each other and marked, *Figure 2*.

② Marking
Guideway sections:
1A, 1A
1B, 1B
1C, 1C
2A, 2A
2B, 2B
2C, 2C

Figure 2
Marking of
multi-piece guideways



Demands on the adjacent construction

The running accuracy is essentially dependent on the straightness, accuracy and rigidity of the fit and mounting surfaces.

The straightness of the system is only achieved when a guideway is pressed against the datum surface.

If high demands are to be made on the running accuracy and/or if soft substructures and/or movable guideways are used, please contact us.

Geometrical and positional accuracy of the mounting surfaces

The higher the requirements for accuracy and smooth running of the guidance system, the more attention must be paid to the geometrical and positional accuracy of the mounting surfaces.

Caution!

The tolerances must be in accordance with *Figure 3*, page 18, *Figure 4*, page 19 and table Values for parallelism tolerances t of two-row units, page 20.

Surfaces should be ground or precision milled – with the aim of achieving a mean roughness value $R_a 1,6$.

Any deviations from the stated tolerances will impair the overall accuracy, alter the preload and reduce the operating life of the guidance system.

Corrosion-resistant miniature linear ball bearing and guideway assemblies

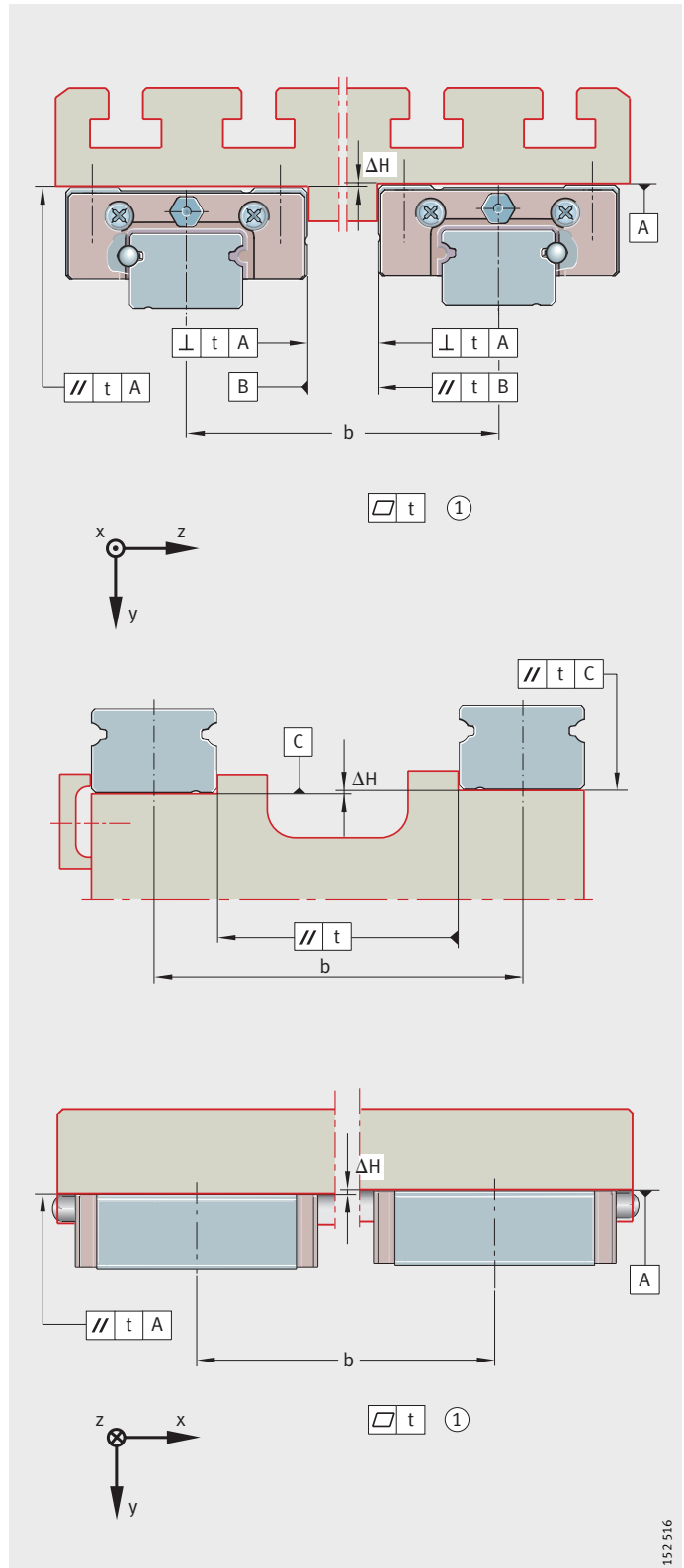
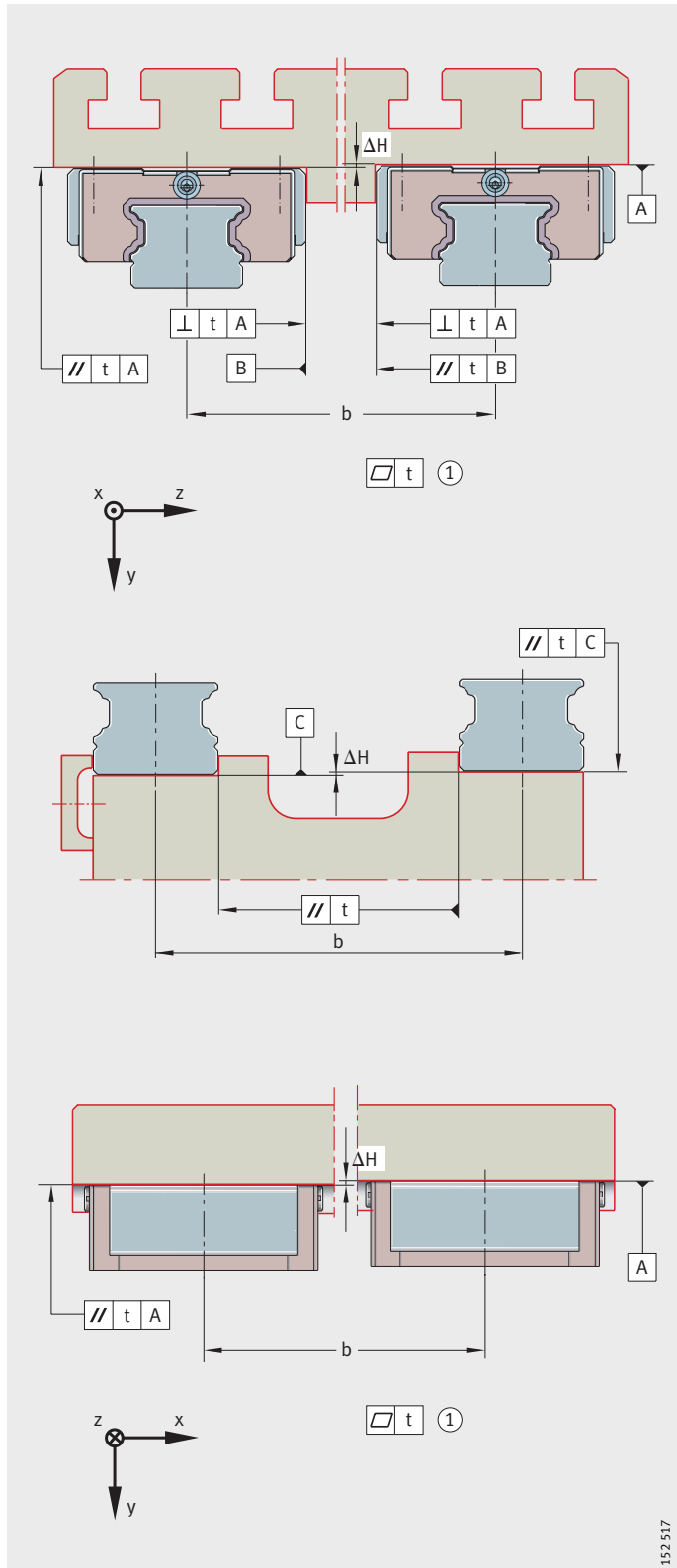


Figure 3

Tolerances of mounting surfaces and parallelism of mounted guideways



Four-row units

① Not convex
(for all machined surfaces)

Figure 4

Tolerances of mounting surfaces
and parallelism of mounted
guideways

152.517

Corrosion-resistant miniature linear ball bearing and guideway assemblies

Parallelism of mounted guideways

For guideways arranged in parallel, a parallelism t , *Figure 3*, page 18, *Figure 4*, page 19 and according to the table is required. If the maximum values are used, this may increase the displacement resistance. If larger tolerances are present, please contact us.

Caution! Calculation of ΔH : see page 17.

Values for parallelism tolerances t of two-row units

Designation Guideway	Accuracy class	
	G1	G2
	Parallelism tolerance t μm	
TKDM5 (-W)	20	30
TKDM7 (-W)		
TKDM9 (-W)		
TKDM12 (-W)		
TKDM15 (-W)		

Values for parallelism tolerances t of four-row units

Designation Guideway	Parallelism tolerance t μm
TKMD12-C	5
TKMD15-C	7

Locating heights and corner radii

The locating heights and corner radii must be designed in accordance with the table, *Figure 5* and *Figure 6*, page 22.

Locating heights and corner radii for two-row units

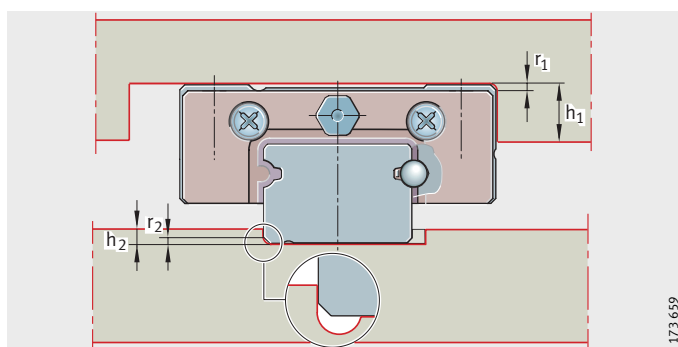
Designation		Locating heights		Corner radii	
Guideway	Carriage	h_1 mm	h_2 mm max.	r_1 mm max.	$r_2^{1)}$ mm max.
TKDM5	KWEM5 (-C)	2	0,8	0,3	0,2
TKDM5-W	KWEM5-W (-WL, -WC)	2	1,2	0,3	0,2
TKDM7	KWEM7 (-L, -C)	2,5	1,2	0,2 ¹⁾	0,2
TKDM7-W	KWEM7-W (-WL, -WC)	2,5	1,2	0,2 ¹⁾	0,2
TKDM9	KWEM9 (-L, -C)	3	1,5	0,2 ¹⁾	0,2
TKDM9-W	KWEM9-W (-WL, -WC)	3	2,5	0,2 ¹⁾	0,2
TKDM12	KWEM12 (-L, -C)	4	2,5	0,2 ¹⁾	0,2
TKDM12-W	KWEM12-W (-WL, -WC)	4	2,5	0,2 ¹⁾	0,2
TKDM15	KWEM15 (-L, -C)	4,5	3	0,2 ¹⁾	0,2
TKDM15-W	KWEM15-W (-WL, -WC)	5	3	0,2 ¹⁾	0,2

¹⁾ Preferably with undercut.

Two-row units

Figure 5

Locating heights and corner radii



Corrosion-resistant miniature linear ball bearing and guideway assemblies

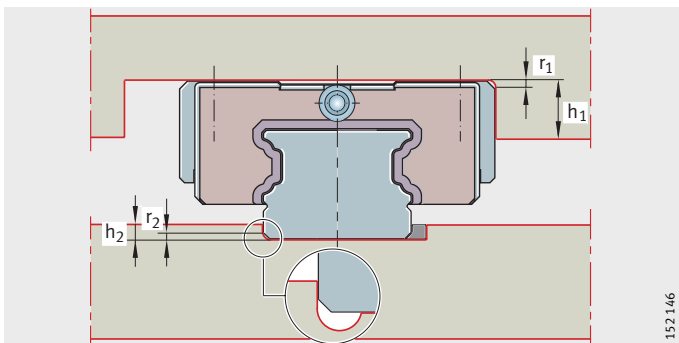
Locating heights and corner radii for four-row units

Designation Unit	Locating heights		Corner radii	
	h_1 mm	h_2 mm max.	r_1 mm max.	r_2 mm max.
KUME12-C	3	2,5	0,4	0,4
KUME15-C	5	3	0,7	0,4

Four-row units

Figure 6

Locating heights and corner radii



Accuracy Accuracy classes Two-row units

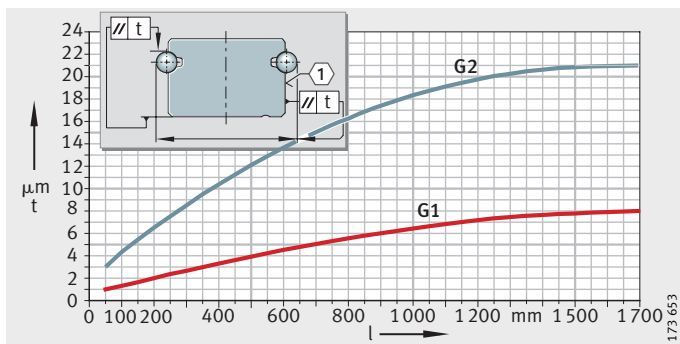
Two-row linear ball bearing and guideway assemblies are in accuracy classes G1 and G2, Figure 7. The standard accuracy class is G2.

Two-row units

t = parallelism tolerance with differential measurement
 l = total guideway length
 ① Locating face

Figure 7

Accuracy classes and parallelism tolerances of guideways



Four-row units

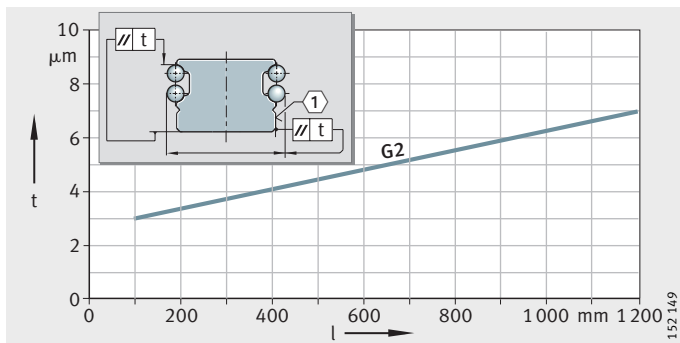
Four-row linear ball bearing and guideway assemblies are available in accuracy class G2, Figure 8

Four-row units

t = parallelism tolerance with differential measurement
 l = total guideway length
 ① Locating face

Figure 8

Accuracy classes and parallelism tolerances of guideways



Tolerances

Tolerances: see table Tolerances of accuracy classes, reference dimensions for accuracy: see *Figure 9* and *Figure 10*.

The tolerances are arithmetic mean values. They relate to the centre point of the screw mounting or locating surfaces of the carriage.

The dimensions H and A_1 (table Tolerances of accuracy classes) should always remain within the tolerance irrespective of the position of the carriage on the guideway.

Tolerances of accuracy classes

Tolerance		Accuracy class	
		G1 μm	G2 μm
Height tolerance	H	± 10	± 20
Height difference ¹⁾	ΔH	7	15
Spacing tolerance	A_1	± 15	± 25
Spacing difference ¹⁾	ΔA_1	10	20

¹⁾ Dimensional difference between several carriages on one guideway, measured at the same point on the guideway.

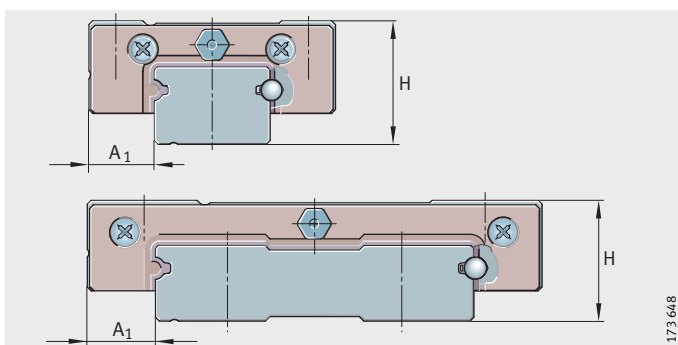
Parallelism of raceways to locating surfaces

The parallelism tolerances are shown in *Figure 7* and *Figure 8*, page 22.

Two-row units

Figure 9

Reference dimensions for accuracy

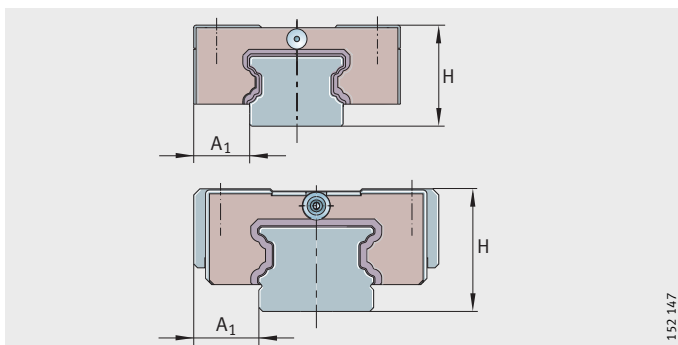


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Four-row units

Figure 10

Reference dimensions for accuracy



152 147

Corrosion-resistant miniature linear ball bearing and guideway assemblies

Positional and length tolerances of guideways

The positional and length tolerances are shown in *Figure 11*, *Figure 12*, page 25 and the tables.

The hole pattern corresponds to DIN ISO 1101.

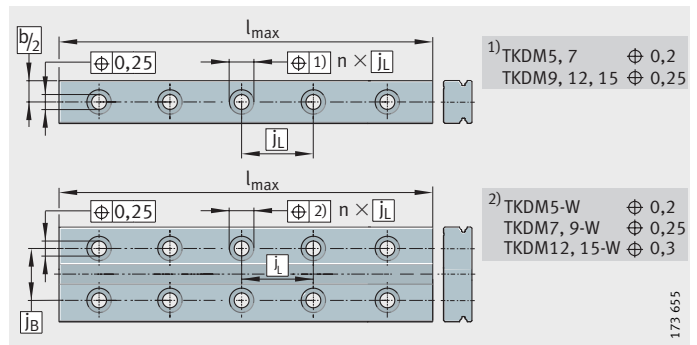
Length tolerances for two-row guideways

Designation Guideway	Tolerances mm
TKDM5	+0,2/-2,2
TKDM5-W	
TKDM7	
TKDM7-W	
TKDM9	+0,25/-2,25
TKDM9-W	
TKDM12	
TKDM12-W	
TKDM15	
TKDM15-W	

Two-row units

Figure 11

Positional and length tolerances of guideways



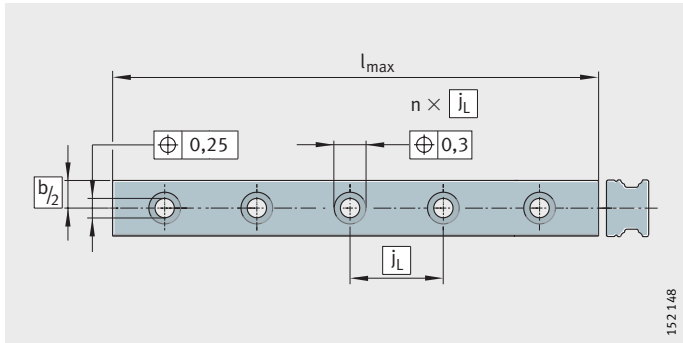
**Length tolerances
for four-row guideways**

Tolerances of guideways, as a function of length l_{max} Guideway length mm	
≤ 300	> 300
$\pm 0,3$	$\pm 0,1\%$ of guideway length

Four-row units

Figure 12

Positional and length tolerances
of guideways



Corrosion-resistant miniature linear ball bearing and guideway assemblies

Accessories

Two-row units

Carriage with sealing strips

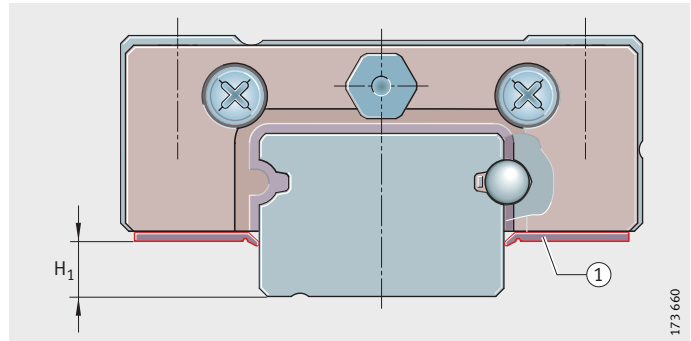
For applications in contaminated environments, the carriages can be fitted with sealing strips, *Figure 13* and according to the table. The suffix for carriages with sealing strips is LD.

Caution!

Take account of the smaller dimension H_1 according to the table, see table.

① Sealing strip

Figure 13
Sealing strips and small dimension H_1



Dimension H_1 with fitted sealing strips

Designation		H_1 mm
Guideway	Carriage	
TKDM9	KWEM9 (-L, -C)	1
TKDM9-W	KWEM9-W (-WL, -WC)	2
TKDM12	KWEM12 (-L, -C)	2
TKDM12-W	KWEM12-W (-WL, -WC)	2
TKDM15	KWEM15 (-L, -C)	3
TKDM15-W	KWEM15-W (-WL, -WC)	3

Carriage without greasing

The carriages can also be supplied without greasing. This variant has the suffix UG.

Clean room applications

For clean room applications, carriages with special grease are available. Please contact us for information about the clean room grease.

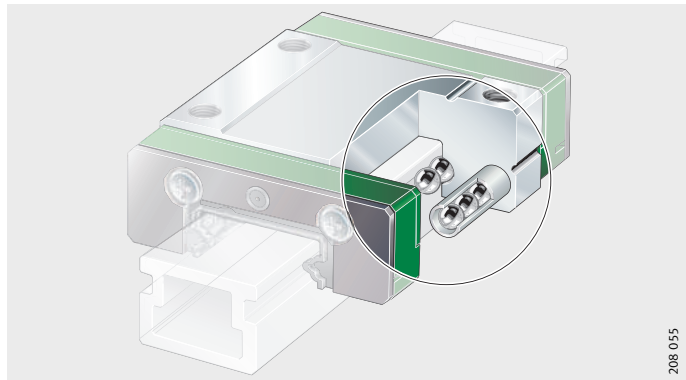
Grease syringe

A miniature grease syringe is available for carriages with a lubrication hole. This can be supplied with standard or clean room grease. The ordering designation for the standard grease is SPRI-KWEM.

Long term lubrication unit The long term lubrication unit is fitted in the return hole of the carriage KWEM and has the suffix LZM.

Delivered condition Two-row miniature linear ball bearing and guideway assemblies with a long term lubrication unit are supplied with initial greasing and are ready for immediate use.

The integrated standard end seal prevents lubricant loss, sealing strips are available as an option, suffix LD.



KWEM...LZM

Figure 14

Long term lubrication unit

Ordering example The ordering example for a two-row miniature linear ball bearing and guideway assembly of size 12, with long term lubrication unit, accuracy class G2, preload class V0 is:

KWEM12-G2-V0-LZM

Corrosion-resistant miniature linear ball bearing and guideway assemblies

Metal end piece	In the two-row miniature linear ball bearing and guideway assembly KWEM...-MKS, end pieces made from corrosion-resistant steel are fitted.
Advantages of the metal end pieces	<ul style="list-style-type: none">■ Their higher strength in comparison with plastic designs allows higher dynamic values■ Higher temperature resistance up to +180 °C.
Delivered condition	Two-row miniature linear ball bearing and guideway assemblies with metal end pieces are only supplied ungreased (suffix UG) and without seals (end seals and sealing strips). The metal end piece has the suffix MKS.
Ordering example	The ordering designation for a two-row miniature ball bearing and guideway assembly of size 7, with metal end pieces, accuracy class G2, preload class V0 is: KWEM7-G2-V0-UG-MKS
Four-row units	These units can be fitted with contact wipers. Carriages with these wipers have the suffix PP.

**Ordering example,
ordering designation**
Two-row units,
guideway with
symmetrical hole pattern

Carriage	Number of carriages	2
	Carriage	KWEM
	Size	9
	Sealing strip	LD
	Accuracy class	G1
	Preload	V1
Guideway	Number of guideways	1
	Guideway	TKDM
	Size	9
	Accuracy class	G1
	Length of guideway	220 mm
	a_L	10 mm
	a_R	10 mm

Ordering designation 2×KWEM9-LD-G1-V1
1×TKDM9-G1/220, Figure 15.

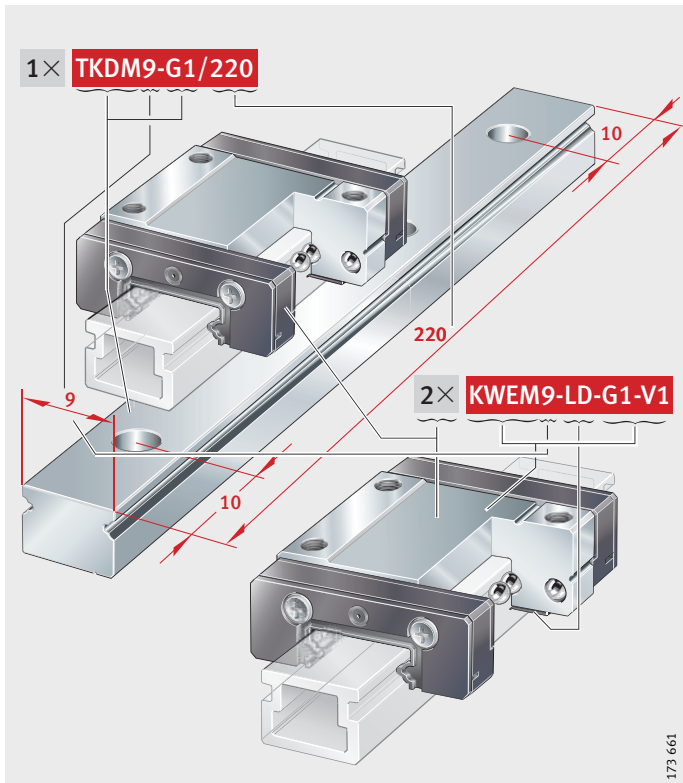


Figure 15
Ordering example,
ordering designation

173 661

Corrosion-resistant miniature linear ball bearing and guideway assemblies

Two-row units,
guideway with
symmetrical hole pattern

Carriage	Number of carriages	4
	Carriage	KWEM
	Size	15
	Wide design	W
	Accuracy class	G2
	Preload	V0
	Ungreased	UG
Guideway	Number of guideways	2
	Guideway	TKDM
	Size	15
	Wide design	W
	Accuracy class	G2
	Length of guideway	240 mm
	a_L	20 mm
	a_R	20 mm
Ordering designation	4×KWEM15-W-G2-V0-UG	
	2×TKDM15-W-G2/240, Figure 16.	

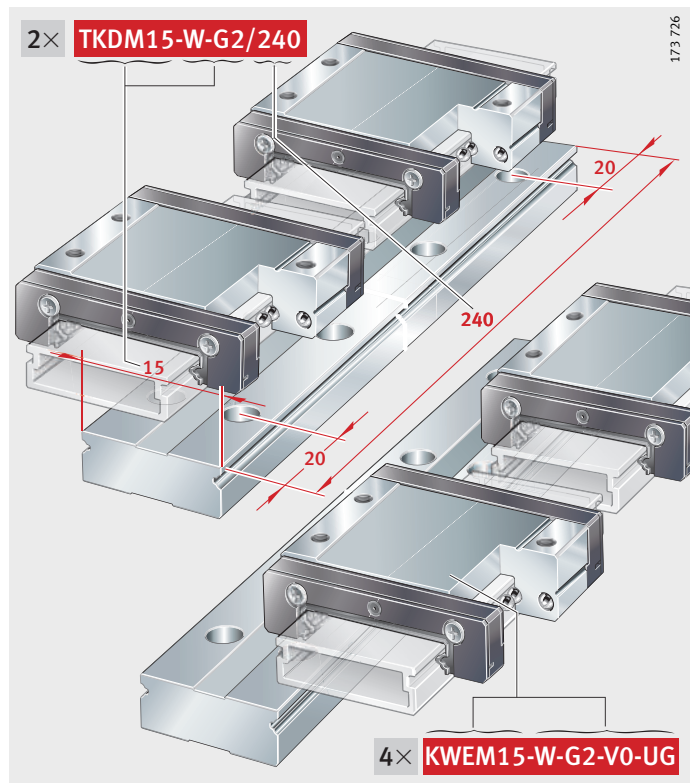


Figure 16
Ordering example,
ordering designation

**Two-row units,
guideway with
symmetrical hole pattern**

Carriage	Number of carriages	2
	Carriage	KWEM
	Size	9
	Long term lubrication unit	LZM
	Accuracy class	G1
	Preload	V1
Guideway	Number of guideways	1
	Guideway	TKDM
	Size	9
	Accuracy class	G1
	Length of guideway	220 mm
	a_L	10 mm
	a_R	10 mm

Ordering designation **2×KWEM9-G1-V1-LZM**
 1×TKDM9-G1/220, Figure 17

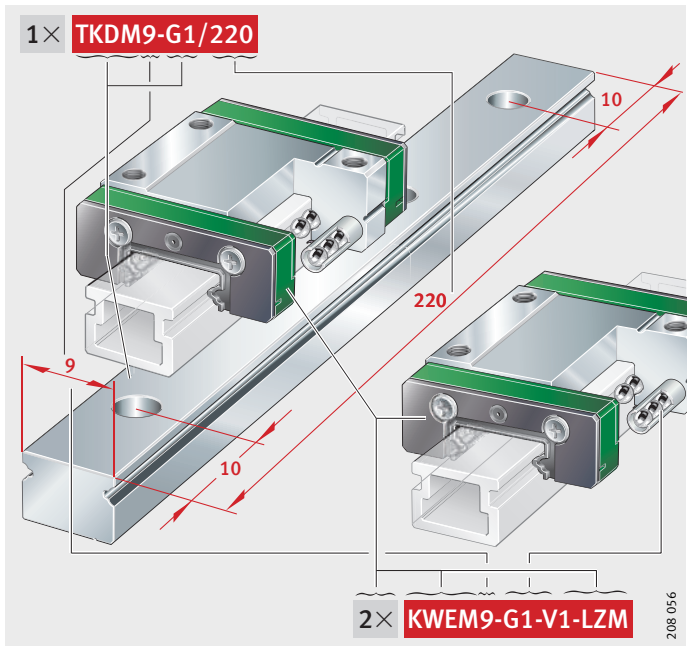


Figure 17
 Ordering example,
 ordering designation

Corrosion-resistant miniature linear ball bearing and guideway assemblies

**Four-row units,
guideway with asymmetrical
hole pattern**

Miniature linear ball bearing and guideway assembly	KUME-C
Size	12
Number of carriages per unit	W2
Preload	V0
Length of guideway	215 mm
a_L	9 mm
a_R	6 mm

Ordering designation 1×KUME12-C-W2-V0/215-9/6, Figure 18.

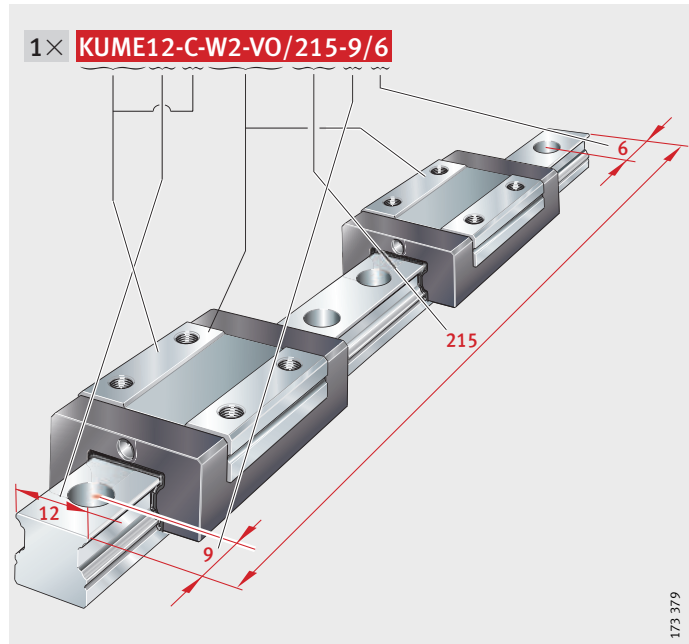
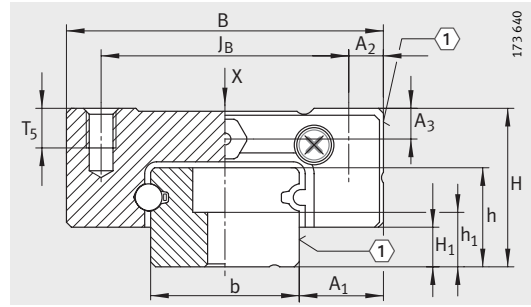


Figure 18
Ordering example,
ordering designation

Two-row miniature linear ball bearing and guideway assemblies

Corrosion-resistant



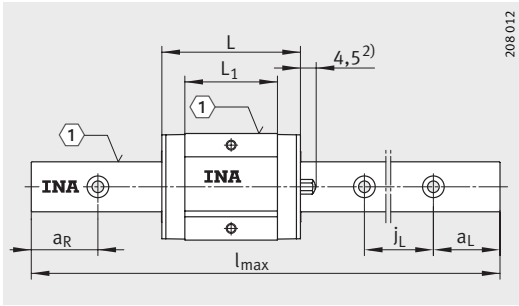
KWEM...-L, KWEM...-C with TKDM
①³⁾

Dimension table - Dimensions in mm

Carriage Designation	Guideway Designation	Dimensions				Mounting dimensions			
		$l_{max}^{1)}$	H	B	L	A ₁	J _B	b	A ₂
KWEM5	TKDM5	210	6	12	19	3,5	8	5	2
KWEM5-C			6	12	16	3,5	8	5	2
KWEM7	TKDM7	300	8	17	23,5	5	12	7	2,5
KWEM7-L			8	17	31	5	12	7	2,5
KWEM7-C			8	17	19	5	12	7	2,5
KWEM9	TKDM9	860	10	20	30	5,5	15	9	2,5
KWEM9-L			10	20	40,5	5,5	15	9	2,5
KWEM9-C			10	20	21,5	5,5	15	9	2,5
KWEM12	TKDM12	1 000	13	27	34	7,5	20	12	3,5
KWEM12-L			13	27	44	7,5	20	12	3,5
KWEM12-C			13	27	25	7,5	20	12	3,5
KWEM15	TKDM15	1 000	16	32	42	8,5	25	15	3,5
KWEM15-L			16	32	57	8,5	25	15	3,5
KWEM15-C			16	32	32	8,5	25	15	3,5

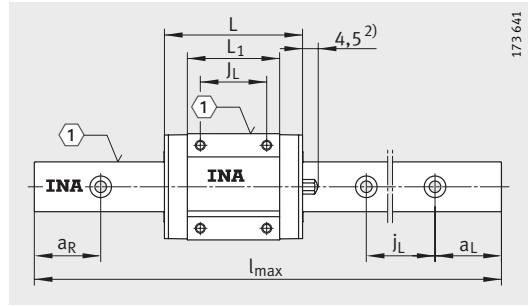
For further table values see page 36 and page 37.

- ¹⁾ Maximum guideway length; longer guideways may be available by agreement.
Available standard lengths: see page 36.
- ²⁾ A lubrication nipple is supplied with size 15.
- ³⁾ ① Locating face



208 012

KWEM5, KWEM..-C with TKDM ·
View rotated 90°
①³⁾



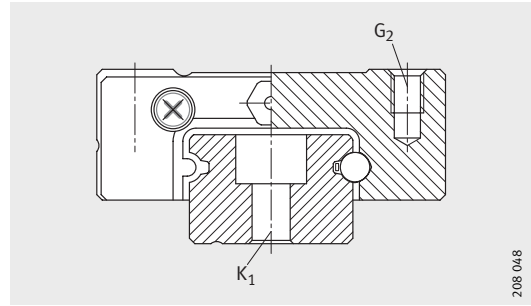
173 641

KWEM..-L with TKDM ·
View rotated 90°
①³⁾

L ₁	j _L	j _L	a _L		a _R		H ₁	T ₅	A ₃	h	h ₁
			min.	max.	min.	max.					
12,6	-	15	4	11,5	4	11,5	1	1,5	1,2	3,7	2,9
9,6	-	15	4	11,5	4	11,5	1	1,5	1,2	3,7	2,9
14,3	8	15	4,5	12	4,5	12	1,5	2,5	1,5	5	2,7
21,6	12	15	4,5	12	4,5	12	1,5	2,5	1,5	5	2,7
9,6	-	15	4,5	12	4,5	12	1,5	2,5	1,5	5	2,7
20,8	10	20	4,5	14,5	4,5	14,5	2	3	2,2	6	2,5
30,9	15	20	4,5	14,5	4,5	14,5	2	3	2,2	6	2,5
11,9	-	20	4,5	14,5	4,5	14,5	2	3	2,2	6	2,5
21,6	15	25	5	17,5	5	17,5	3	3,5	2,7	8	3,5
32	20	25	5	17,5	5	17,5	3	3,5	2,7	8	3,5
13	-	25	5	17,5	5	17,5	3	3,5	2,7	8	3,5
27,8	20	40	5,5	25,5	5,5	25,5	4	4	3,1	10	5,5
42,7	25	40	5,5	25,5	5,5	25,5	4	4	3,1	10	5,5
17,7	-	40	5,5	25,5	5,5	25,5	4	4	3,1	10	5,5

Two-row miniature linear ball bearing and guideway assemblies

Corrosion-resistant



KWEM with TKDM

Dimension table (continued)

Carriage			Mass m ≈kg	Guideway	
Designation				Designation	Mass m ≈kg/m
Standard	With long term lubrication unit	With metal end pieces ¹⁾			
KWEM5	KWEM5-LZM	KWEM5-UG-MKS	0,004	TKDM5	0,120
KWEM5-C	KWEM5-C-LZM	KWEM5-C-UG-MKS	0,003		
KWEM7	KWEM7-LZM	KWEM7-UG-MKS	0,010	TKDM7	0,220
KWEM7-L	KWEM7-L-LZM	KWEM7-L-UG-MKS	0,014		
KWEM7-C	KWEM7-C-LZM	KWEM7-C-UG-MKS	0,007		
KWEM9	KWEM9-LZM	KWEM9-UG-MKS	0,019	TKDM9	0,350
KWEM9-L	KWEM9-L-LZM	KWEM9-L-UG-MKS	0,028		
KWEM9-C	KWEM9-C-LZM	KWEM9-C-UG-MKS	0,011		
KWEM12	KWEM12-LZM	KWEM12-UG-MKS	0,035	TKDM12	0,650
KWEM12-L	KWEM12-L-LZM	KWEM12-L-UG-MKS	0,051		
KWEM12-C	KWEM12-C-LZM	KWEM12-C-UG-MKS	0,022		
KWEM15	KWEM15-LZM	KWEM15-UG-MKS	0,064	TKDM15	1,070
KWEM15-L	KWEM15-L-LZM	KWEM15-L-UG-MKS	0,095		
KWEM15-C	KWEM15-C-LZM	KWEM15-C-UG-MKS	0,042		

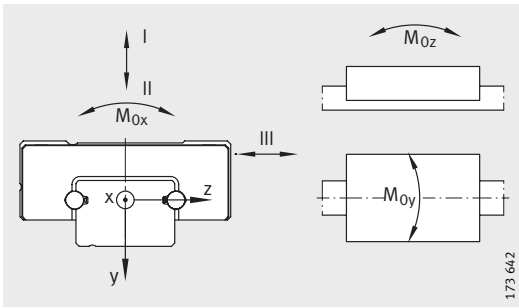
1) Without greasing – preservative coating only – and without seals.

2) If there is a possibility of settling, the fixing screws should be secured against rotation.

3) The screws required for fixing are available by agreement.

Standard lengths for guideways

TKDM5		TKDM7		TKDM9		TKDM12		TKDM15	
Length mm	Mass ≈kg	Length mm	Mass ≈kg	Length mm	Length ≈kg	Length mm	Length ≈kg	Length mm	Length ≈kg
60	0,007	60	0,013	60	0,021	100	0,065	160	0,171
90	0,011	90	0,020	80	0,028	150	0,098	240	0,257
105	0,013	120	0,026	120	0,042	200	0,13	320	0,342
120	0,014	150	0,033	160	0,056	275	0,179	440	0,471
150	0,018	180	0,040	220	0,077	350	0,228	560	0,599
210	0,025	240	0,053	280	0,098	475	0,309	680	0,728
–	–	300	0,066	860	0,301	1 000	0,65	1 000	1,07

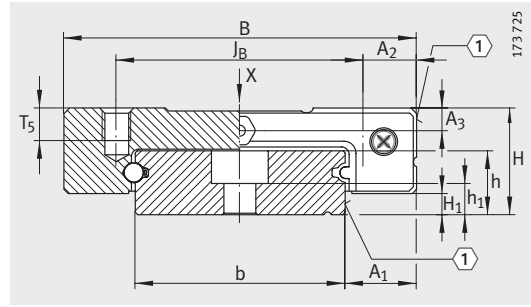


Load directions, see column Load carrying capacity

Fixing screws ²⁾				Load carrying capacity						
K ₁		G ₂		Basic load ratings				Moment ratings		
DIN ISO 4762-12.9				Load directions I and II (tensile and compressive load)		Load directions III (lateral load)				
	M _A Nm		M _A Nm	C N	C ₀ N	C N	C ₀ N	M _{0x} Nm	M _{0y} Nm	M _{0z} Nm
M2 ³⁾	0,6	M2	0,6	534	1 090	470	916	2,9	1,9	2,3
				444	841	391	706	2,2	1,2	1,4
M2	0,6	M2	0,6	1 051	1 890	925	1 587,6	6,9	3,9	4,7
				1 335	2 650	1 175	2 226	9,7	7,4	8,8
				740	1 140	651	958	4,1	1,5	1,8
M3	2,2	M3	2,2	1 430	2 760	1 258	2 318	12,8	7,6	9,1
				1 872	4 030	1 648	3 385	18,7	15,7	18,7
				932	1 480	820	1 243	6,9	2,4	2,9
M3	2,2	M3	2,2	2 631	4 290	2 315	3 604	26,6	12,9	15,4
				3 405	6 200	2 996	5 208	38,4	25,7	30,6
				1 746	2 380	1 536	1 999	14,8	4,5	5,3
M3	2,2	M3	2,2	3 934	6 490	3 462	5 452	50	24,9	29,7
				5 230	9 740	4 602	8 182	75	53,6	63,9
				2 757	3 890	2 426	3 268	30	9,8	11,7

Two-row miniature linear ball bearing and guideway assemblies

Corrosion-resistant



KWEM..-W (-WL, -WC) with TKDM..-W
①²⁾

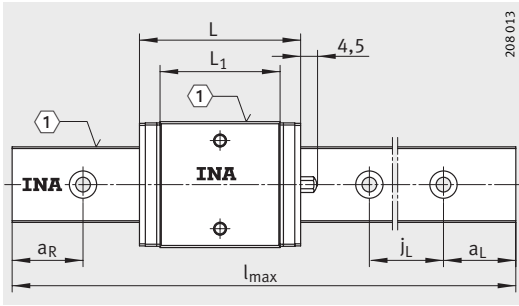
Dimension table - Dimensions in mm

Carriage Designation	Guideway Designation	Dimensions				Mounting dimensions			
		$l_{\max}^{1)}$	H	B	L	A ₁	J _B	b	A ₂
KWEM5-W	TKDM5-W	300	6,5	17	24,5	3,5	13	10	2
KWEM5-WC			6,5	17	20,5	3,5	13	10	2
KWEM7-W	TKDM7-W	300	9	25	31,5	5,5	19	14	3
KWEM7-WL			9	25	42	5,5	19	14	3
KWEM7-WC			9	25	22,5	5,5	19	14	3
KWEM9-W	TKDM9-W	690	12	30	39	6	21	18	4,5
KWEM9-WL			12	30	50,5	6	23	18	3,5
KWEM9-WC			12	30	26,5	6	21	18	4,5

For further table values see page 40 and page 41.

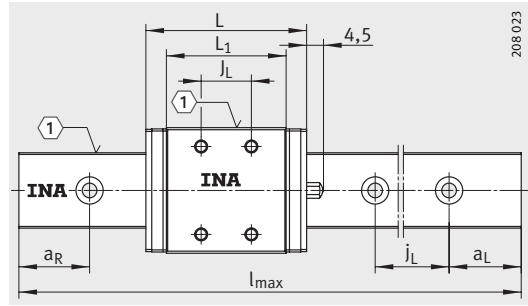
¹⁾ Maximum guideway length; longer guideways may be available by agreement.
Available standard lengths: see page 40.

²⁾ ① Locating face



208 013

KWEM5-W (-WC) with TKDM ·
View rotated 90°
①²⁾



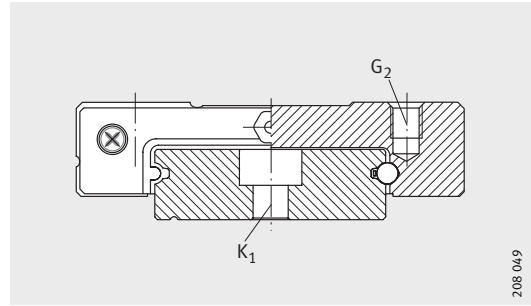
208 023

KWEM..-W (-WL) with TKDM ·
View rotated 90°
①²⁾

L ₁	j _L	j _L	a _L		a _R		H ₁	T ₅	A ₃	h	h ₁
			min.	max.	min.	max.					
17,6	-	20	4,5	14,5	4,5	14,5	1,5	1,5	1,3	4	2,4
13,6	-	20	4,5	14,5	4,5	14,5	1,5	1,5	1,3	4	2,4
22	10	30	5,5	20,5	5,5	20,5	2	3	1,7	5,5	2,3
32,5	19	30	5,5	20,5	5,5	20,5	2	3	1,7	5,5	2,3
13	-	30	5,5	20,5	5,5	20,5	2	3	1,7	5,5	2,3
28,6	12	30	5,5	20,5	5,5	20,5	3	3	2,5	7	2,5
40,4	24	30	5,5	20,5	5,5	20,5	3	3	2,5	7	2,5
16,6	-	30	5,5	20,5	5,5	20,5	3	3	2,5	7	2,5

Two-row miniature linear ball bearing and guideway assemblies

Corrosion-resistant



KWEM...-W with TKDM...-W

Dimension table (continued)

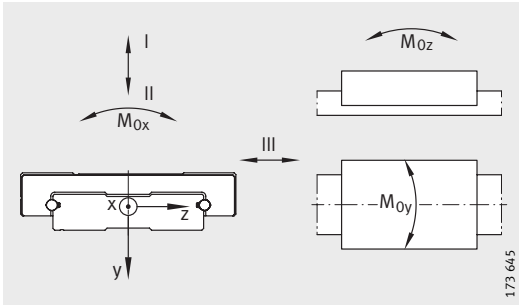
Carriage			Guideway	
Designation		Mass m ≈kg	Designation	Mass m ≈kg/m
Standard	With metal end pieces ¹⁾			
KWEM5-W	KWEM5-W-UG-MKS	0,008	TKDM5-W	0,280
KWEM5-WC	KWEM5-WC-UG-MKS	0,006		
KWEM7-W	KWEM7-W-UG-MKS	0,021		
KWEM7-WL	KWEM7-WL-UG-MKS	0,031	TKDM7-W	0,540
KWEM7-WC	KWEM7-WC-UG-MKS	0,013		
KWEM9-W	KWEM9-W-UG-MKS	0,044	TKDM9-W	0,900
KWEM9-WL	KWEM9-WL-UG-MKS	0,061		
KWEM9-WC	KWEM9-WC-UG-MKS	0,026		

¹⁾ Without greasing – preservative coating only – and without seals.

²⁾ If there is a possibility of settling, the fixing screws should be secured against rotation.

Standard lengths for guideways

TKDM5-W		TKDM7-W		TKDM9-W	
Length mm	Mass ≈kg	Length mm	Mass ≈kg	Length mm	Mass ≈kg
60	0,017	90	0,049	90	0,081
80	0,022	120	0,065	120	0,108
120	0,034	150	0,081	150	0,135
160	0,045	180	0,097	180	0,162
220	0,062	240	0,13	240	0,216
280	0,078	300	0,162	300	0,27
300	0,084	–	–	690	0,621

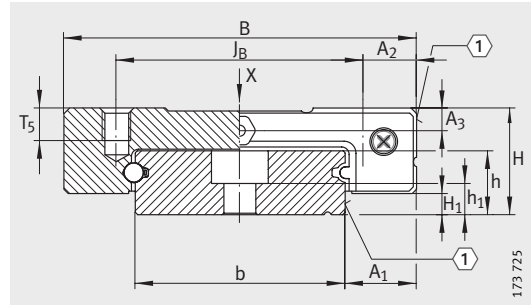


Load directions: see column Load carrying capacity

Fixing screws ²⁾				Load carrying capacity						
K ₁ DIN ISO 4762-12.9		G ₂		Basic load ratings				Moment ratings		
				Load directions I and II (tensile and compressive load)		Load directions III (lateral load)				
	M _A Nm		M _A Nm	C N	C ₀ N	C N	C ₀ N	M _{0x} Nm	M _{0y} Nm	M _{0z} Nm
M2,5	-	M2,5	-	671	1 510	590	1 268	7,8	3,5	4,2
				562	1 180	495	991	6,1	2,2	2,6
M3	2,2	M3	2,2	1 398	2 840	1 231	2 386	20,3	8,4	10,1
				1 833	4 160	1 613	3 494	29,8	17,6	21
				980	1 700	862	1 428	12,2	3,2	3,8
M3	2,2	M3	2,2	1 801	3 810	1 585	3 200	34,9	14,2	16,9
				2 267	5 300	1 995	4 452	48,5	26,7	31,9
				1 193	2 120	1 050	1 781	19,4	4,7	5,5

Two-row miniature linear ball bearing and guideway assemblies

Corrosion-resistant



KWEM12-W (-WL, -WC) with TKDM12-W
 ①³⁾

Dimension table - Dimensions in mm

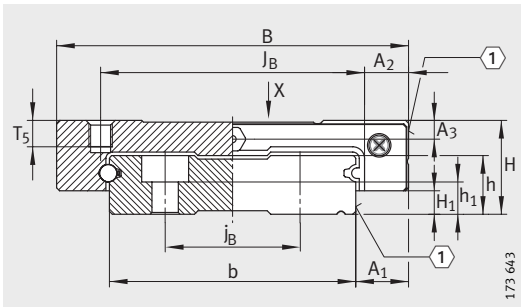
Carriage Designation	Guideway Designation	Dimensions				Mounting dimensions			
		$l_{\max}^{1)}$	H	B	L	A ₁	J _B	b	A ₂
KWEM12-W	TKDM12-W	680	14	40	44	8	28	24	6
KWEM12-WL			14	40	59	8	28	24	6
KWEM12-WC			14	40	30,5	8	28	24	6
KWEM15-W	TKDM15-W	680	16	60	55	9	45	42	7,5
KWEM15-WL			16	60	74,5	9	45	42	7,5
KWEM15-WC			16	60	41,5	9	45	42	7,5

For further table values see page 44 and page 45.

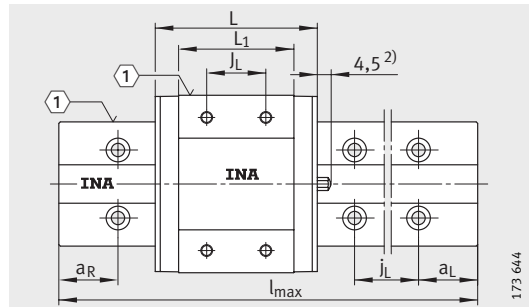
¹⁾ Maximum guideway length; longer guideways may be available by agreement.
 Available standard lengths: see page 44.

²⁾ A lubrication nipple is supplied with size 15.

³⁾ ① Locating face

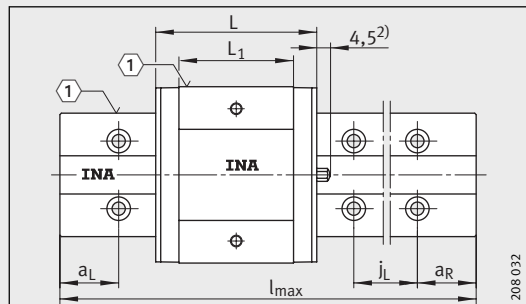


KWEM15-W (-WL, -WC) with TKDM15-W
 ①³⁾



KWEM15-W (-WL) with TKDM15-W ·
 View rotated 90°
 ①³⁾

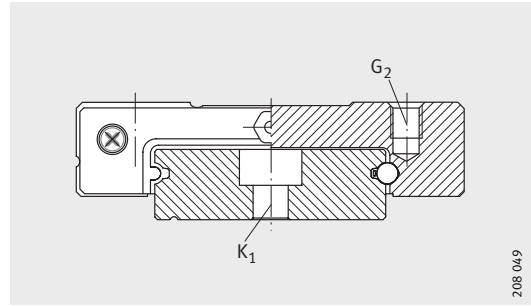
L ₁	j _L	j _L	j _B	a _L		a _R		H ₁	T ₅	A ₃	h	h ₁
				min.	max.	min.	max.					
31	15	40	–	6,5	26,5	6,5	26,5	3	3,5	3,2	8	3,5
46,3	28	40	–	6,5	26,5	6,5	26,5	3	3,5	3,2	8	3,5
17,7	–	40	–	6,5	26,5	6,5	26,5	3	3,5	3,2	8	3,5
39	20	40	23	6,5	26,5	6,5	26,5	4	4,5	3,2	10	5,5
58,3	35	40	23	6,5	26,5	6,5	26,5	4	4,5	3,2	10	5,5
25,3	–	40	23	6,5	26,5	6,5	26,5	4	4,5	3,2	10	5,5



KWEM15-WC with TKDM15-W
 ①³⁾

Two-row miniature linear ball bearing and guideway assemblies

Corrosion-resistant



KWEM...-W with TKDM...-W

208 049

Dimension table (continued)

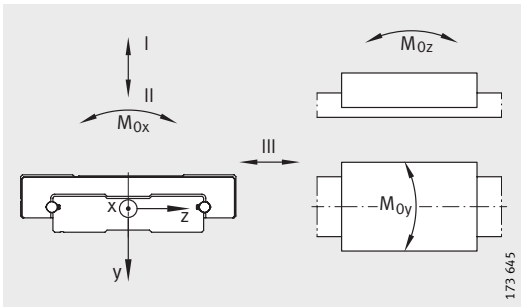
Carriage			Guideway	
Designation		Mass	Designation	Mass
Standard	With metal end pieces ¹⁾	m		m
		≈kg		≈kg/m
KWEM12-W	KWEM12-W-UG-MKS	0,076	TKDM12-W	1,390
KWEM12-WL	KWEM12-WL-UG-MKS	0,111		
KWEM12-WC	KWEM12-WC-UG-MKS	0,045		
KWEM15-W	KWEM15-W-UG-MKS	0,140	TKDM15-W	2,940
KWEM15-WL	KWEM15-WL-UG-MKS	0,204		
KWEM15-WC	KWEM15-WC-UG-MKS	0,095		

¹⁾ Without greasing – preservative coating only – and without seals.

²⁾ If there is a possibility of settling, the fixing screws should be secured against rotation.

Standard lengths for guideways

TKDM12-W		TKDM15-W	
Length	Mass	Length	Mass
mm	≈kg	mm	≈kg
120	0,167	160	0,470
160	0,222	240	0,706
240	0,334	320	0,941
320	0,445	440	1,294
400	0,556	560	1,646
480	0,667	680	2,000
680	0,945	–	–

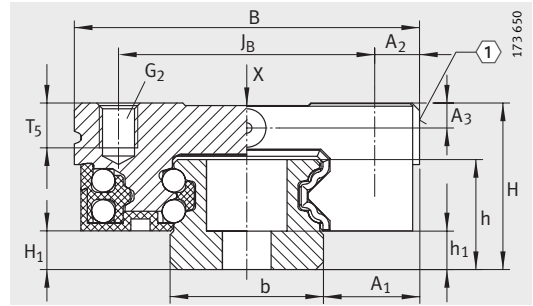


Load directions: see column Load carrying capacity

Fixing screws ²⁾				Load carrying capacity						
K ₁ DIN ISO 4762-12.9		G ₂		Basic load ratings				Moment ratings		
				Load directions I and II (tensile and compressive load)		Load directions III (lateral load)				
	M _A Nm		M _A Nm	C N	C ₀ N	C N	C ₀ N	M _{0x} Nm	M _{0y} Nm	M _{0z} Nm
M3	2,2	M3	2,2	3 405	6 200	2 996	5 208	75,6	25,7	30,6
				4 440	9 060	3 907	7 610	111	53,1	63,3
				2 212	3 340	1 947	2 806	40,7	8,2	9,7
M3	2,2	M3	2,2	5 570	9 840	4 901	8 266	209	51,4	61,3
				7 268	14 400	6 396	12 096	305	106	126
				3 974	6 050	3 497	5 082	128	20,8	24,8

Four-row miniature linear ball bearing and guideway assemblies

Corrosion-resistant



KUME..-C
①³⁾

Dimension table - Dimensions in mm

Designation	Carriage		Guideway		Closing plug	Mounting dimensions				Dimensions	
	Designation	Mass m ≈kg	Designation	Mass m ≈kg/m		$l_{max}^{1)}$	H	B	L	A ₁	J _B
KUME12-C	KWEM12-C	0,03	TKMD12-C	0,6	KA6-TN	1 000	13	27	35,8	7,5	20
KUME15-C	KWME25-C	0,06	TKMD15-C	1,1	KA6-TN	1 200	16	32	44	8,5	25

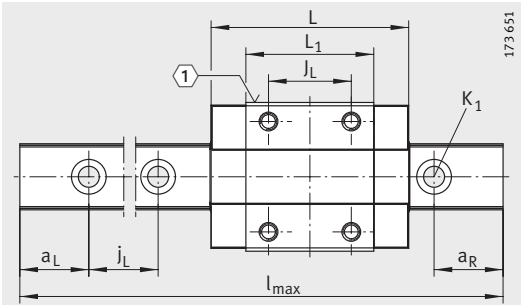
¹⁾ Maximum guideway length; longer guideways available by agreement.

²⁾ If there is a possibility of settling, the fixing screws should be secured against rotation.

³⁾ ① Locating face

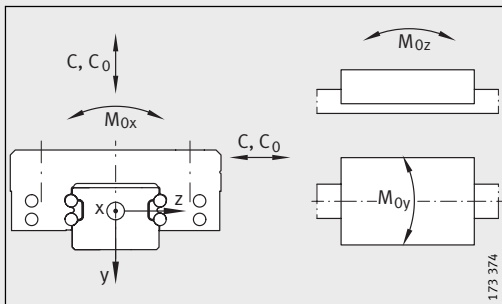
Dimension table (continued)

Designation	Load carrying capacity					Fixing screws ²⁾			
	Basic load ratings		Moment ratings			K ₁		G ₂	
	C	C ₀	M _{0x}	M _{0y}	M _{0z}	DIN ISO 4 762-12.9			
N	N	Nm	Nm	Nm		M _A Nm		M _A Nm	
KUME12-C	2 900	5 200	33	17	17	M3	2,2	M3	2,2
KUME15-C	4 400	8 300	67	34	34	M3	2,2	M3	2,2



KUME..-C ·
View rotated 90°
(1)³⁾

b	A ₂	L ₁	J _L	j _L	a _L		a _R		H ₁	T ₅	A ₃	h	h ₁
					min.	max.	min.	max.					
12	3,5	23,2	15	25	5	20	5	20	3	3,5	1,95	8,6	3
15	3,5	28	20	40	6	34	6	34	3,5	4	2,46	10,6	4,1



Load directions:
see column Load carrying capacity

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