

# Miniature carriage units – corrosion-resistant

with cylindrical roller flat cages



## Miniature carriage units

Miniature carriage units with cylindrical roller flat cages are corrosion-resistant, ready-to-fit cage guidance systems for limited stroke lengths. They have a high load carrying capacity, high rigidity and high accuracy whilst requiring very little space.

Due to their compact design, they can often be used to replace guidance systems which require significantly more space.

The units are produced in numerous carriage and guideway lengths, giving cost-effective designs.

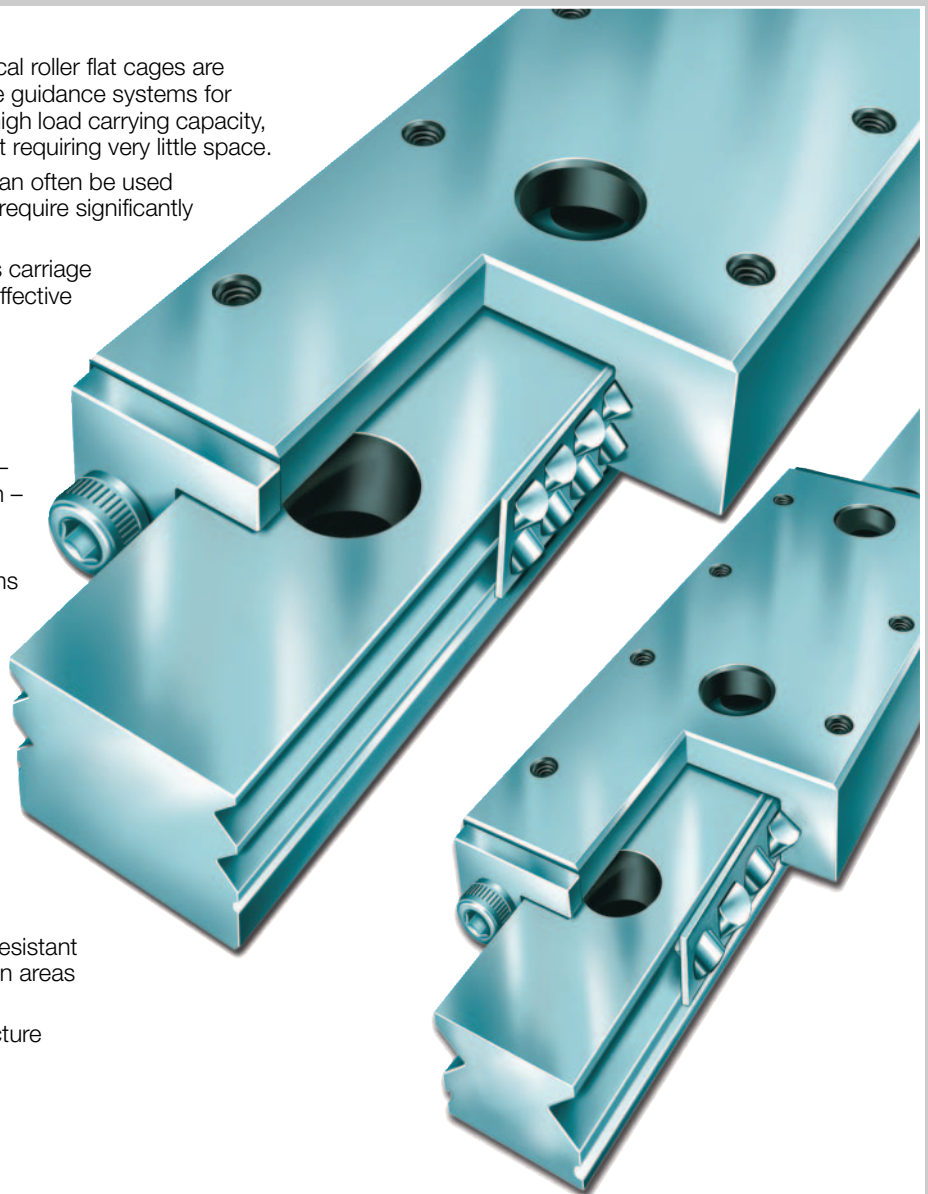
## Miniature carriage units

- are linear locating bearings with at least one carriage
- support loads from all directions – apart from the direction of motion – and moments about all axes
- have higher rigidity than linear recirculating ball guidance systems
- are very smooth-running
- have high running accuracy.

## Applications






Miniature carriage units:

- are particularly suitable for
  - short stroke lengths
  - low-friction motion
  - oscillating motion
  - high loads where high rigidity is also required
- are used, due to their corrosion-resistant design, in the following application areas
  - medical equipment
  - electronic component manufacture
  - robotics
  - laboratory equipment
  - in “clean room” conditions.



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## Features

### Miniature carriage units

- of these series are complete units comprising:
  - a carriage and a guideway
  - flat cages with one or two rows of cylindrical rollers, depending on the size
  - end pieces
  - plastic closing plugs
- have rolling element arrangements which transmit forces at a contact angle of 45°
  - RMWE 12 VA and RMWE 15 VA have four rows and RMWE 7 VA and RMWE 9A VA have two rows of cylindrical rollers in line contact with the raceways
  - RMWE 12 VA and RMWE 15 VA have cylindrical rollers in an O arrangement as standard
- have cylindrical rollers in an O or X arrangement
  - an O arrangement is more rigid and better suited to supporting tilting moments than an X arrangement. An X arrangement can be achieved by changing over the cages
  - RMWE 7 VA and RMWE 9A VA have cylindrical rollers in a crossed roller arrangement
- can be lubricated with oil or grease via the guideway
- are available in various lengths and stroke lengths.

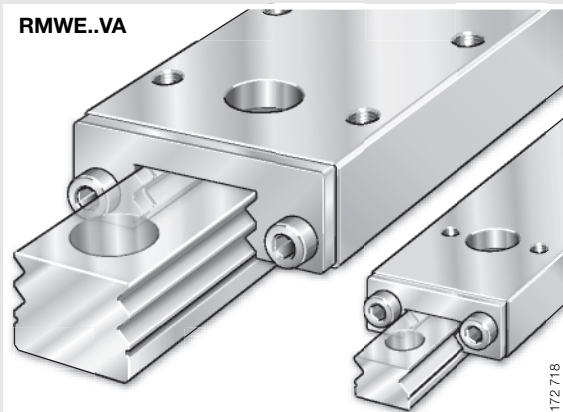
### End pieces

- are corrosion-resistant
- restrict the travel of the cage
- protect the rolling elements against contamination.

## Miniature carriage units – corrosion-resistant



### RMWE..VA

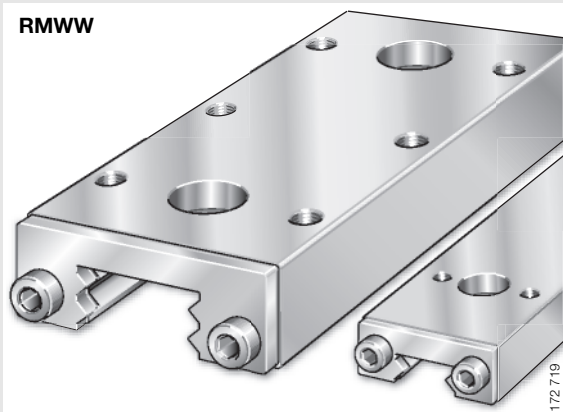


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- basic design comprising:
  - carriage and guideway
  - cylindrical roller flat cages
  - end pieces
  - closing plugs
- suitable for temperatures up to +120 °C

## Carriage – corrosion-resistant

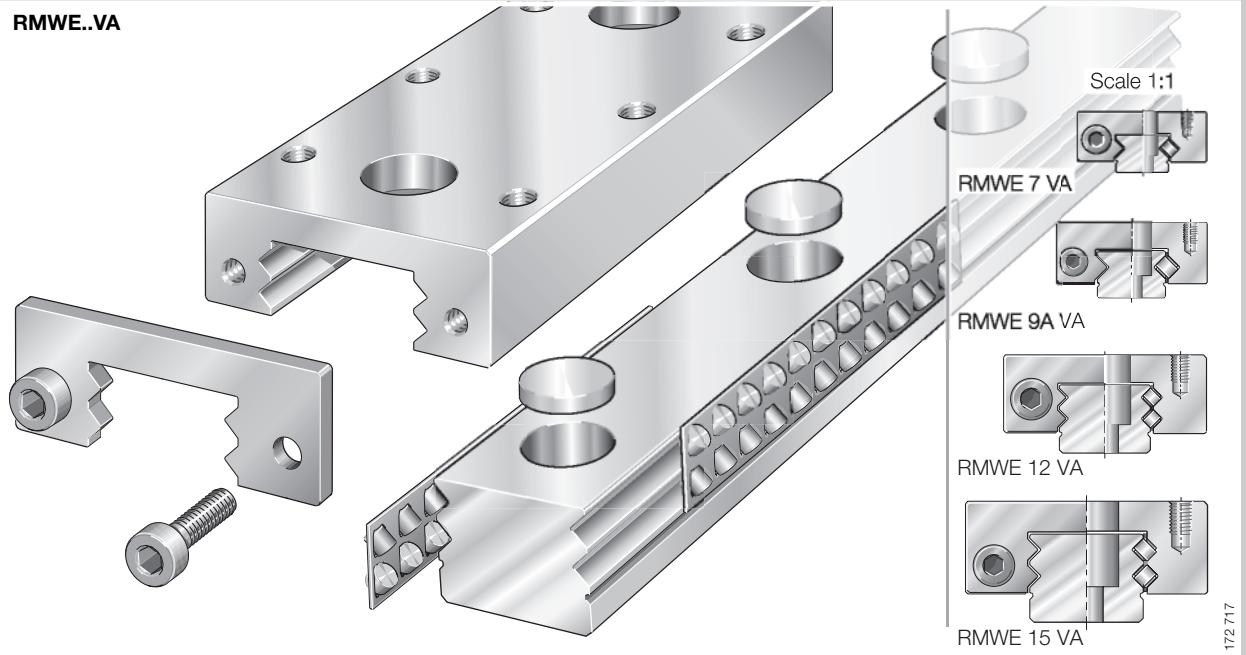
### RMWW



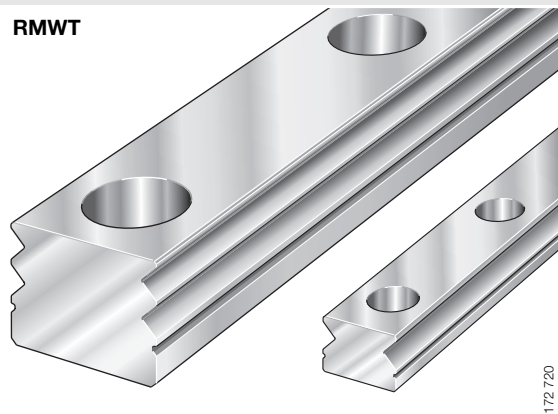
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- hardened and ground saddle plate made from corrosion-resistant steel
- RMWW 12 and RMWW 15 have four rolling element raceways, RMWW 7 and RMWW 9 have two raceways
- through holes for fixing the guideway through the carriage, threaded holes for fixing the carriage
- holes in the end faces for the end pieces

**Miniature carriage units – corrosion-resistant**

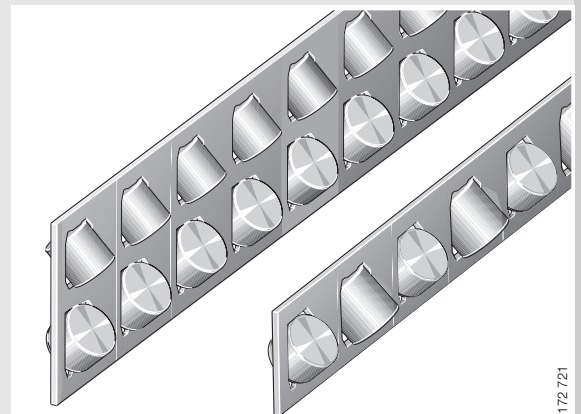


**Guideways – corrosion-resistant**



- through hardened, corrosion-resistant steel with a minimum hardness of 620 HV
- precision ground raceways for rolling elements
- counterbored through holes for the fixing screws

**Cylindrical roller flat cages – corrosion-resistant**



- cage strip made from corrosion-resistant steel
- cylindrical rollers to DIN 5 402-1

## Miniature carriage units – corrosion-resistant


with cylindrical roller flat cages



### Design and safety guidelines

#### Load carrying capacity and life

The size of the guidance unit is determined by the load carrying capacity of the individual elements. The load carrying capacity is described in terms of the basic dynamic load rating  $C$  and basic static load rating  $C_0$  (*dimension tables*).

 For applications with temperatures in excess of  $+120\text{ °C}$ , factors must be used to reflect reductions in the basic load ratings. Please consult the INA engineering service.

#### Basic rating life

The basic rating life is determined using the following formulae:

$$L = k_{KHV} \cdot \left(\frac{C}{P}\right)^p$$

$$L_h = \frac{8,33 \cdot 10^5}{H \cdot n_{osc}} \cdot k_{KHV} \cdot \left(\frac{C}{P}\right)^p$$

$L$  m  
Basic rating life in 100 000 m

$k_{KHV}$  –  
Short stroke factor in accordance with DIN 636-3 (Figure 1)

$C$  N  
Basic dynamic load rating (*dimension tables*)

$P$  N  
Equivalent dynamic load

$p$  –  
Life exponent = 10/3

$L_h$  h  
Basic rating life in operating hours

$H$  mm  
Distance between ends of stroke

$n_{osc}$   $\text{min}^{-1}$   
Number of return strokes per minute.

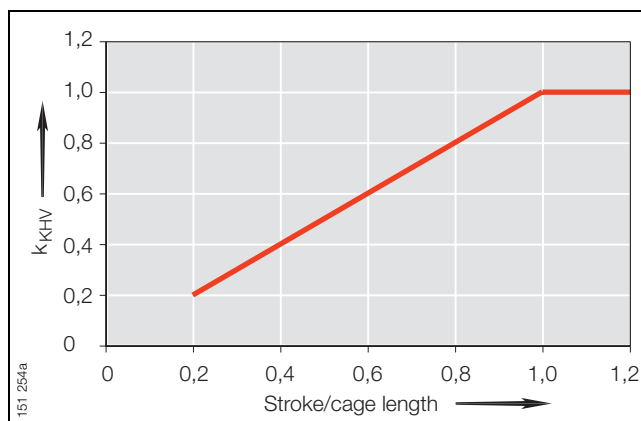


Figure 1 · Short stroke factor  $k_{KHV}$  –  
in accordance with DIN 636-3

### Static load safety factor

The static load safety factor  $S_0$  indicates the security with regard to permissible permanent deformation in the bearing without affecting the guidance accuracy and smooth running of the bearing.

It can be determined using the following formula:

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

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



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 be checked!

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

$$P_0 = F_{\max}$$

$$M_0 = M_{\max}$$

$S_0$  –  
Static load safety factor

$C_0$  N  
Basic static load rating (*dimension tables*)

$P_0$  N  
Maximum equivalent static load

$M_0$  Nm  
Basic static moment rating in load direction  
( $M_{0x}$ ,  $M_{0y}$ ,  $M_{0z}$  from *dimension tables*)

$M$  Nm  
Equivalent static moment in load direction.

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### Preload

Miniature carriage units RMWE..VA are preloaded (Table 1). Increasing the preload has the effect of increasing:

- the rigidity
- the moment load carrying capacity
- the guidance accuracy.

**!** However, preload also influences the displacement resistance and the operating life of cage guidance systems!

Table 1 · Preload class

Class	Preload	Suitable applications
V1	0,005 · C to 0,02 · C	Low to moderate loads; moderate to high rigidity; moment loads

### Location of guideways and carriages

The defined locating face on the carriage should be used in the design (Figure 2)

- the locating face is on the opposing side to the marked face.

If high rigidity and high load carrying capacity are required, the guidance elements should be abutted on both sides against locating faces of the adjacent construction (Figure 3).

**!** For high loads, the load carrying capacity of the fixing screws must be checked!

If fixing is to be carried out in accordance with DIN 645-2, smaller screws should be used in conjunction with appropriate support washers.

In order to avoid location defects, the holes in the adjacent construction must be carefully deburred.

**!** The counterbores of the guideway fixing holes have sharp edges! Risk of injury!

The carriage must not be removed from the guideway! Incorrect fitting or dismantling can damage the cage!

If corrosion-resistant fixing screws are used, their lower tensile strength and lower tightening torques must be taken into consideration!

After the guideways have been fitted, the counterbores must be closed off using plastic closing plugs in order to protect against contamination (special design, page 11) (Figure 4)

- for higher temperatures, brass closing plugs can be used – special accessories (page 11).

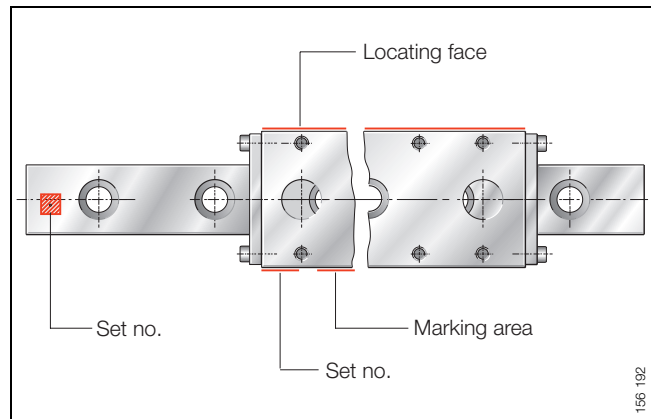


Figure 2 · Locating face and marked face

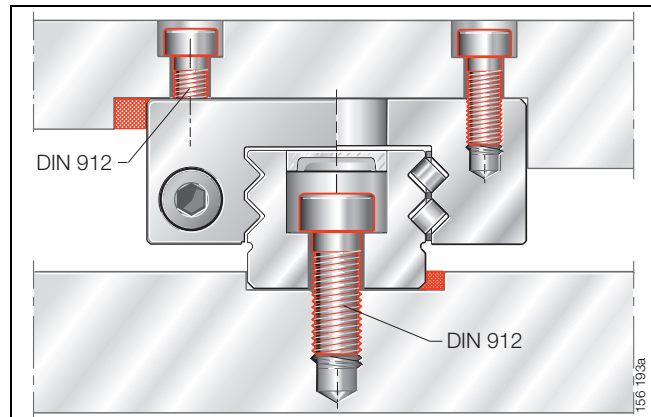


Figure 3 · Location of guideways and carriages

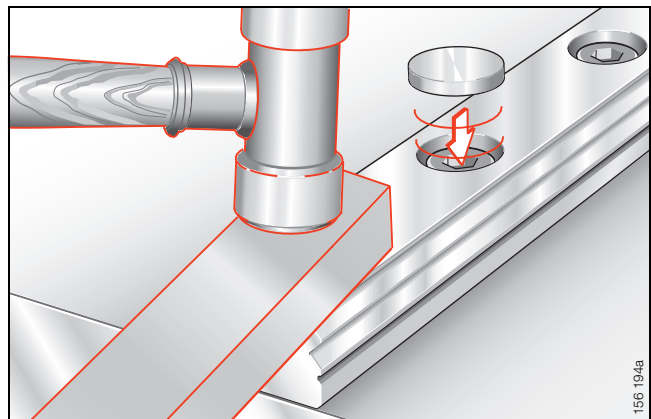


Figure 4 · Fitting the closing plugs

## Hole patterns

The hole pattern of the carriages and guideways conforms to DIN 645-2. The counterbores in the guideways for series RMWE 12 VA and RMWE 15 VA allow the use of larger fixing screws. Larger screws should always be used if high lateral loads or moment loads are present!

The guideways have a symmetrical hole pattern. In this case,  $C_5 = C_6$  (Figure 5).

For guideways with a symmetrical hole pattern:

$$C_5 = C_6 = \frac{1}{2} (L - n \cdot C_4 - V_s)$$

$C_5, C_6$  mm  
Distance between start or end of guideway and nearest hole

$L$  mm  
Length of guideway

$n$  -  
Maximum number of pitches between holes

$C_4$  mm  
Hole spacing (*Dimension table*)

$V_s$  mm  
Waste (cutting loss approx. 1,3 mm).

## Rolling elements in O and X arrangements

Sizes RMWE 12 VA and RMWE 15 VA have cylindrical rollers in an O arrangement as standard (Figure 6). An X arrangement can be achieved by changing over the cages (Figure 6).

## Delivered condition/initial operation/lubrication

Miniature carriage units are supplied greased.

The raceways must be:

- greased or oiled, depending on the lubrication process, before initial operation
- protected against solid and liquid contaminants.



Compatibility with the lubricant must be checked!

If the operating temperature is to be in excess of +120 °C, please consult the INA engineering service in relation to the lubricating grease!

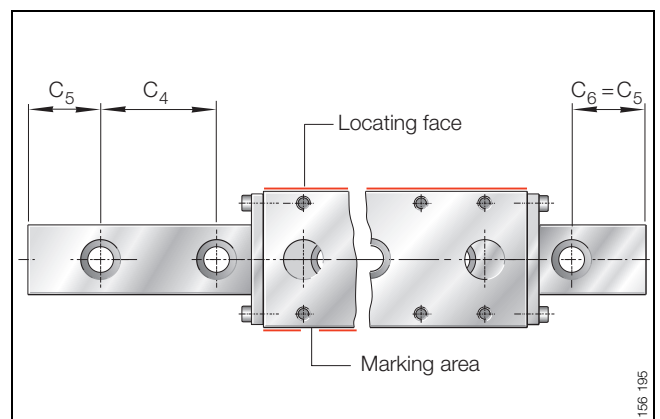


Figure 5 · Symmetrical hole pattern

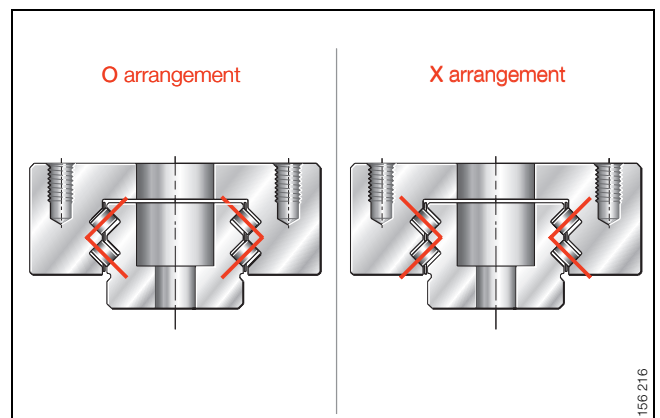


Figure 6 · Rolling elements in O and X arrangements

## Miniature carriage units – corrosion-resistant

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### Design of bearing arrangements

The design of a bearing arrangement with miniature guidance systems is essentially determined by requirements for:

- accuracy
- rigidity
- load carrying capacity.

This has a direct influence on the adjacent construction and predominantly relates to:

- geometrical and positional accuracy of mounting surfaces
- the location of the guidance elements
- the sealing of the bearing arrangement.

**!** Ensure that the adjacent construction has adequate strength – VDI guideline 2 230!

End pieces should not be used to limit the stroke!  
This can damage the guidance system!

### Geometrical and positional accuracy of mounting surfaces

The higher the requirements for accuracy and smooth running, the more attention must be paid to geometrical and positional accuracy.

Observe the tolerances for the support and locating surfaces in accordance with Figure 7, Figure 8 and Table 3

- surfaces should be ground or precision milled.  
A mean roughness value of  $\leq R_a 1,6$  should be achieved.

**!** If these tolerances are not met,  
– this will impair overall guidance system accuracy  
– the preload will be affected  
– the guidance system life will be reduced!

The permissible values for  $\Delta H$  (Figure 7) are given by the formula below. If the variation is greater than this, please consult the INA engineering service.

$$\Delta H = a \cdot b$$

$\Delta H$              $\mu\text{m}$   
Maximum permissible deviation from the theoretically precise position

$a$                 –  
Factor dependent on bearing size (Table 2).  
This factor is valid for a guidance system set free from clearance!

$b$                 mm  
Centre distance between guidance elements.

Table 2 · Factor dependent on bearing size

Miniature carriage unit Designation	Factor a
RMWE 7 VA, RMWE 9A VA, RMWE 12 VA	0,04
RMWE 15 VA	0,08

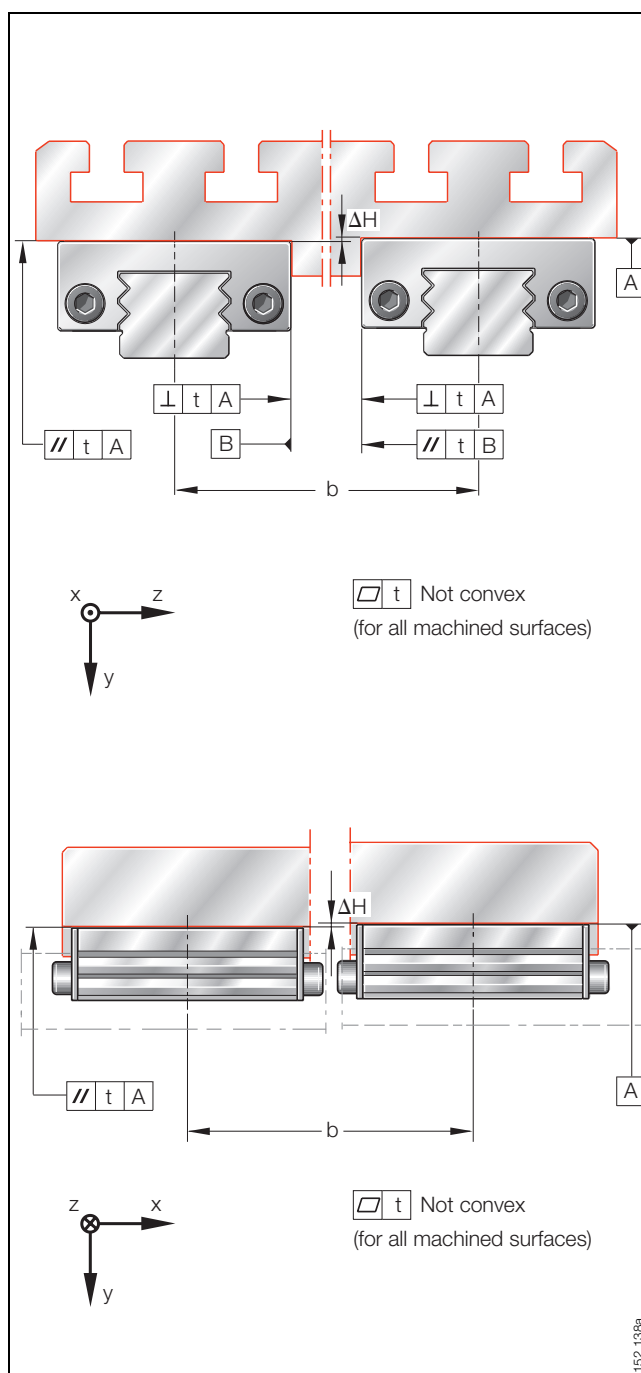


Figure 7 · Tolerances for mounting surfaces



### Parallelism of mounted guideways

For guideways arranged parallel to each other, the parallelism value  $t$  given in Figure 8 and Table 3 should be adhered to

- If the maximum values are used, this may increase the displacement resistance
- For larger tolerances, please consult the INA engineering service.
- For calculation of  $\Delta H$ , see page 8.

Table 3 · Values for  $t$

Miniature carriage unit Designation	Guideway Designation	Parallelism $t$ $\mu\text{m}$
RMWE 7 VA	RMWT 7	3
RMWE 9A VA	RMWT 9	3
RMWE 12 VA	RMWT 12	4
RMWE 15 VA	RMWT 15	5

### Locating heights and corner radii

Locating heights and corner radii should be in accordance with Figure 9 and Table 4.

Table 4 · Locating heights and corner radii

Miniature carriage unit Designation	Locating heights and corner radii			
	$h_1$	$h_2$ max.	$r_1$ max.	$r_2$ max.
RMWE 7 VA	2,5	1	0,4	0,1 <sup>1)</sup>
RMWE 9A VA	3	1,5	0,4	0,1 <sup>1)</sup>
RMWE 12 VA	4	2,5	0,4	0,4
RMWE 15 VA	5	3	0,4	0,4

<sup>1)</sup> Preferably with undercut.

### Sealing

In order to prevent damage to the guidance systems, the raceways must be kept clean at all times. If the end pieces used as standard are not adequate for this purpose, additional seals must be provided in the adjacent construction.

### Corrosion-resistant design

**!** Miniature carriage units RMWE..VA are corrosion-resistant due to the steels used in manufacture.

If very high levels of corrosion resistance are required, the suitability of the unit for the specific application must be investigated!

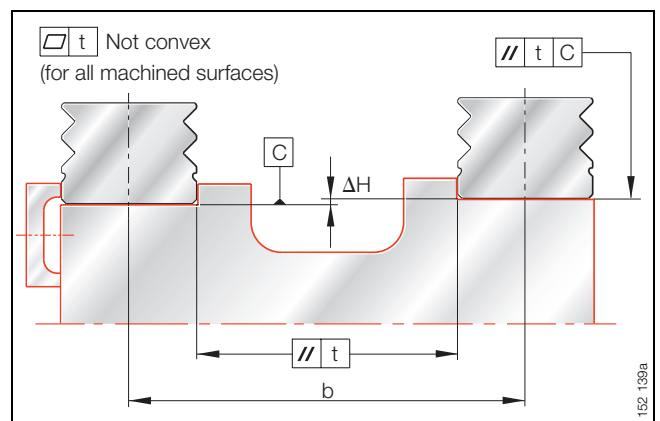


Figure 8 · Parallelism of mounted guideways

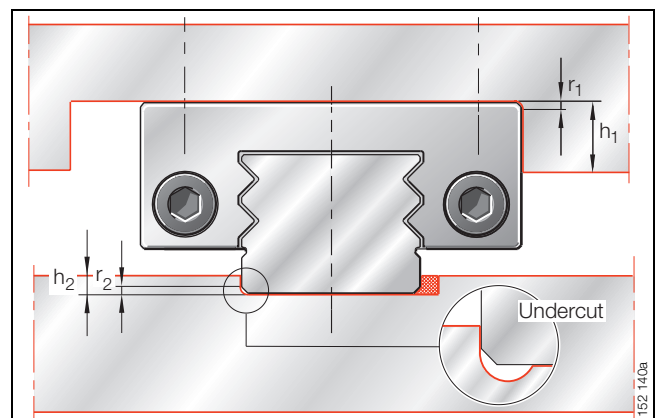


Figure 9 · Locating heights and corner radii

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## Accuracy

Accuracy classes available: see Figure 10 and Table 5.

Table 5 · Accuracy classes

Miniature carriage unit Designation	Accuracy class	
RMWE..VA	G1 <sup>1)</sup>	G2

<sup>1)</sup> Available only by agreement.  
The standard version G2 should be used in preference.

### Parallelism of raceways to locating surfaces

Parallelism tolerances of guideways: see Figure 10.

### Tolerances of reference dimensions for locating surfaces

The tolerances are arithmetic mean values (Figure 11 and Table 6). They relate to the centre point of the screw mounting or locating surfaces of the carriage. The dimensions H and A<sub>1</sub> should always remain within the tolerance irrespective of the position of the carriage on the guideway.

Table 6 · Accuracy class and tolerances

Tolerance		Accuracy class	
		G1 µm	G2 µm
for height	H	±10	±10
Height difference <sup>1)</sup>	ΔH	5	10
for distance	A <sub>1</sub>	±10	±20
Distance difference <sup>1)</sup>	ΔA <sub>1</sub>	7	15

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

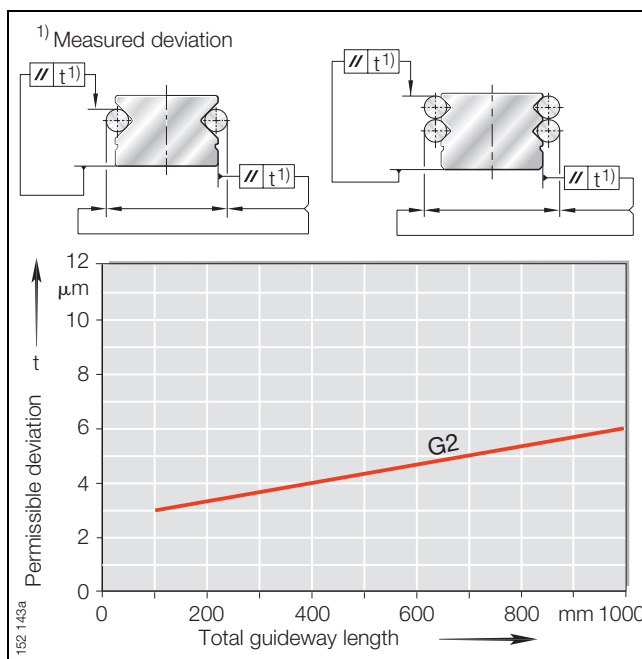


Figure 10 · Parallelism tolerances of guideways

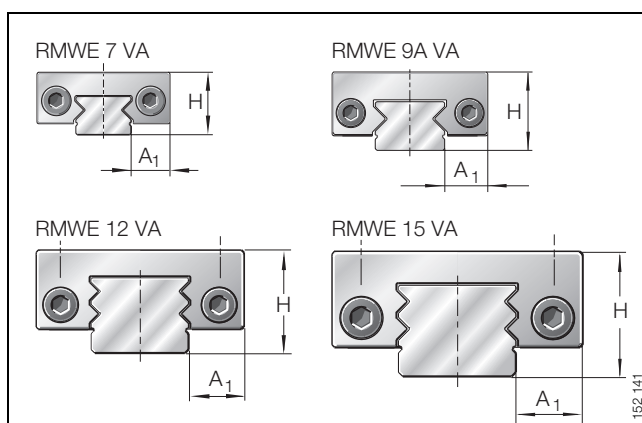


Figure 11 · Reference dimensions for accuracy

### Length tolerances for guideways

Tolerances: see Figure 12 and Table 7.

Table 7 · Length tolerances

Miniature carriage unit	Tolerances
Designation	Guideways/carriages $L \leq 360$ mm
RMWE..VA	from +0,6 mm to -1,1 mm



### Special designs

Available by agreement:

- plastic closing plugs  
– suffix KA
- brass closing plugs  
– suffix KAM.

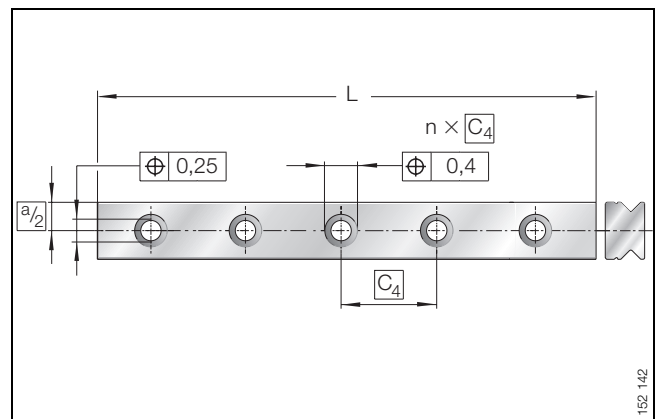


Figure 12 · Length tolerances



### Ordering example and ordering designation

Corrosion-resistant miniature carriage unit with cylindrical roller flat cage and one carriage

RMWE..VA	
Size code	15
Guideway length $C_1$	159 mm
Stroke h	54 mm
Cage length $L_k$	130,4 mm
Safety range z	$4 \leq z \leq 10$

Guideway length L

$$L = C_1 + h + z$$

$L = 159 \text{ mm} + 54 \text{ mm} + 10 \text{ mm} = 223 \text{ mm}$

Next guideway length = 239 mm  
(in accordance with table on page 22).

Ordering designation:

1 × RMWE 15 VA/159 × 239/54 (Figure 13).

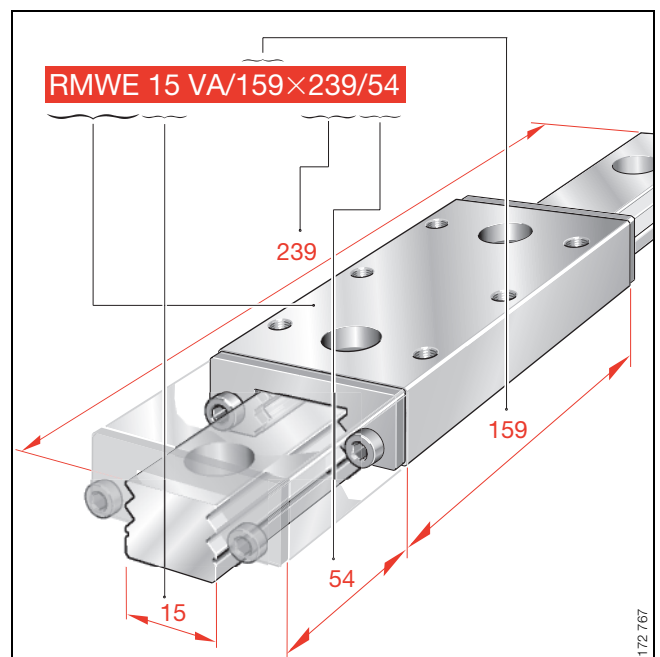
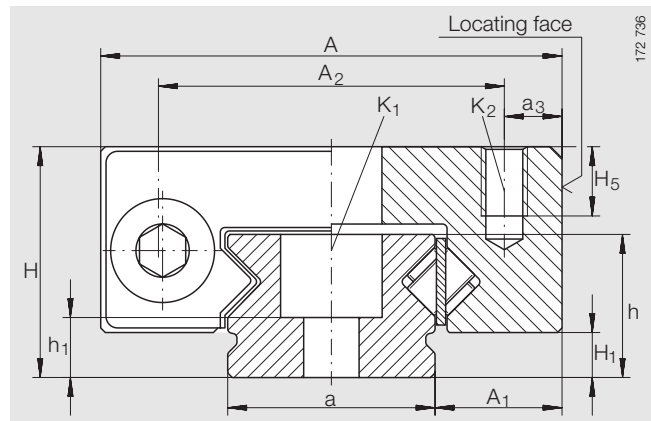


Figure 13 · Ordering example, ordering designation

# Miniature carriage units – corrosion-resistant

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Series RMWE 7 VA<sup>1)</sup>



RMWE 7 VA

## Dimension table · Dimensions in mm

Unit Designation	Dimensions				Mounting dimensions			
	$L_{\max}^{2)}$	$C_1 \max^{3)}$	H	A	$A_1$	$A_2$	$a_{-0,005}^{-0,05}$	$a_3$
<b>RMWE 7 VA</b>	250	200	8	17	5	12	7	2,5

1) Corrosion-resistant steels may nevertheless undergo various forms of localised corrosion and corrosion involving loss of surface material! If very high levels of corrosion resistance are required, the suitability of the unit for the specific application must be investigated!

2) Maximum manufactured length of guideway. Special lengths are available by agreement.

3) Maximum manufactured length of carriage.

### Example for RMWE 7 VA:

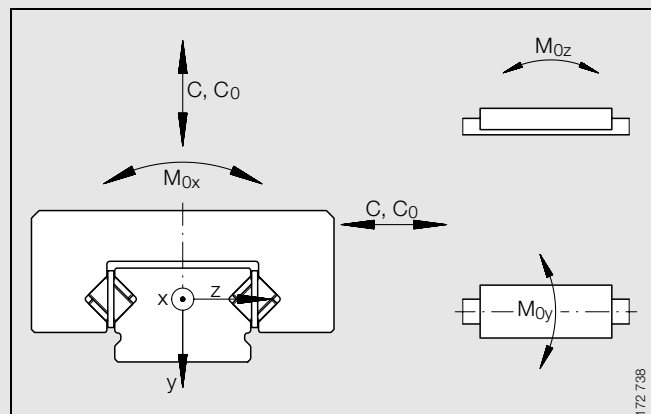
- $C_1$  Carriage length = 23 mm
- Stroke required = 16 mm
- h Stroke length = 18 mm
- $L_k$  Length of cage = 12,9 mm
- z Safety range = 10 mm ( $4 \leq z \leq 10$ )
- L Length of guideway (see formula and table *Guideway*, page 13).

$$L = C_1 + h + z$$

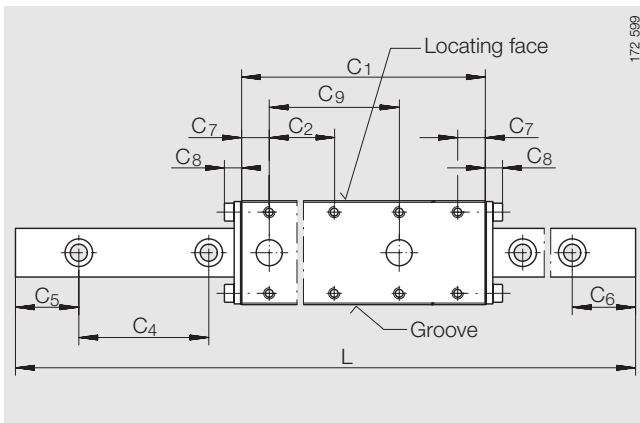
$L = 23 \text{ mm} + 18 \text{ mm} + 10 \text{ mm} = 51 \text{ mm}$  (next standard length from table *Guideway*:  $L = 89 \text{ mm}$ ).

Ordering data:

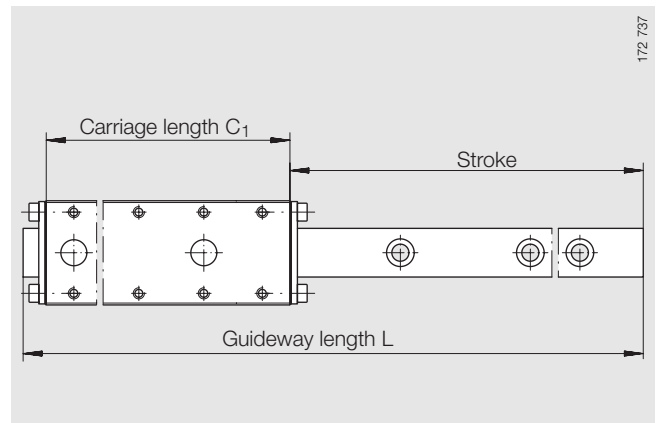
**RMWE 7 VA/23×89/18**



Load directions  
(table *Main dimensions, basic load ratings, moments*)



RMWE 7 VA · top view



Main dimension and stroke length  
(table *Main dimensions, basic load ratings, moments*)

										K <sub>1</sub> , K <sub>2</sub>		
C <sub>7</sub>	C <sub>2</sub>	C <sub>4</sub>	C <sub>5</sub> /C <sub>6</sub>	C <sub>8</sub>	C <sub>9</sub>	H <sub>1</sub>	H <sub>5</sub>	h	h <sub>1</sub>	For screw DIN 912-12.9	Tightening torque max. Nm	Screw corrosion- resistant <sup>1)</sup> max. Nm
3,5	8	15	7	3	16	1,3	2,5	4,9	1,7	M2	0,6	0,2

**Main dimensions, basic load ratings, moments**

Unit Designation <sup>1)</sup>	Stroke length h mm	Dimensions		Basic load ratings		Moment ratings		
		C <sub>1</sub> mm	L <sub>k</sub> <sup>4)</sup> mm	dyn. C N	stat. C <sub>0</sub> N	M <sub>0x</sub> Nm	M <sub>0y</sub> Nm	M <sub>0z</sub> Nm
<b>RMWE 7 VA</b>	18	23	12,9	950	1250	4	3	3
	6		18,9	1300	1870	6	7	7
	30	47	30,9	1940	3100	10	18	18
	18		36,9	2230	3750	12	25	25
	6	42,9	2500	4350	14	34	34	
	38	63	42,9	2500	4350	14	34	34
	26		48,9	2800	5000	16	44	44
	14		54,9	3050	5600	18	55	55
	2		60,9	3300	6200	20	67	67
	78	95	54,9	3050	5600	18	55	55
	66		60,9	3300	6200	20	67	67
	54		66,9	3550	6900	22	81	81
	42		72,9	3800	7500	24	95	95
	30		78,9	4050	8100	26	111	111
	18		84,9	4300	8700	28	128	128
	6		90,9	4550	9400	30	147	147

<sup>4)</sup> Length of cage. Special lengths are available by agreement.

**Carriage**

Carriage	
Designation	Mass ≈g
<b>RMWW 7</b>	12
	12
	25
	25
	25
	33
	33
	33
	33
	51
	51
	51
	51
	51
	51

**Guideway**

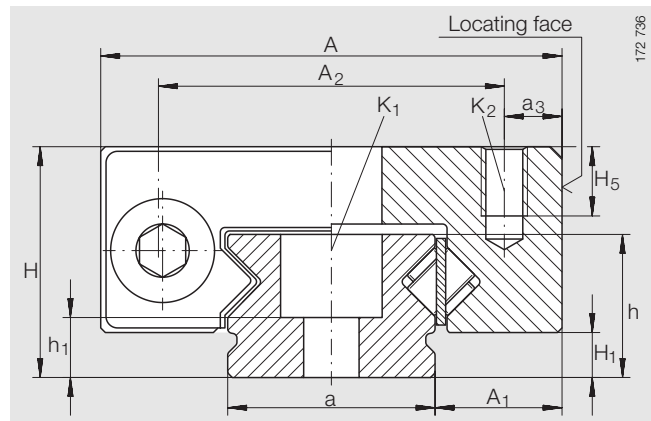
Guideway		
Designation	L <sup>5)</sup> mm	Mass ≈g
<b>RMWT 7</b>	44	9
	89	19
	104	23
	119	26
	134	30
	164	35
	209	44

<sup>5)</sup> Special lengths are available by agreement.

# Miniature carriage units – corrosion-resistant

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Series RMWE 9A VA<sup>1)</sup>



RMWE 9A VA

## Dimension table · Dimensions in mm

Unit Designation	Dimensions				Mounting dimensions			
	$L_{\max}^{2)}$	$C_1 \max^{3)}$	H	A	$A_1$	$A_2$	$a_{-0,005}^{-0,05}$	$a_3$
<b>RMWE 9A VA</b>	360	300	10	20	5,5	15	9	2,5

- 1)  Corrosion-resistant steels may nevertheless undergo various forms of localised corrosion and corrosion involving loss of surface material! If very high levels of corrosion resistance are required, the suitability of the unit for the specific application must be investigated!
- 2) Maximum manufactured length of guideway. Special lengths are available by agreement.
- 3) Maximum manufactured length of carriage.

### Example for RMWE 9A VA:

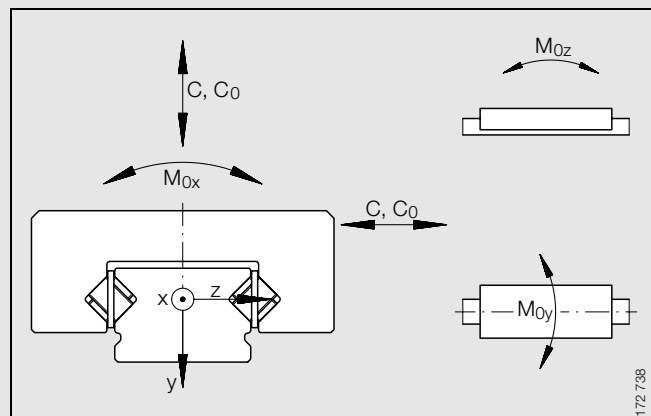
- $C_1$  Carriage length = 79 mm
- Stroke required = 12 mm
- h Stroke length = 14 mm
- $L_k$  Length of cage = 70,9 mm
- z Safety range = 10 mm ( $4 \leq z \leq 10$ )
- L Length of guideway (see formula and table *Guideway*, page 15).

$$L = C_1 + h + z$$

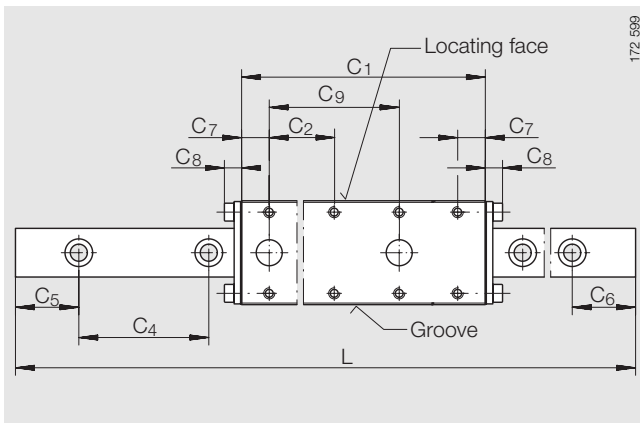
$L = 79 \text{ mm} + 14 \text{ mm} + 10 \text{ mm} = 103 \text{ mm}$  (next standard length from table *Guideway*:  $L = 99 \text{ mm}$ ).

Ordering data:

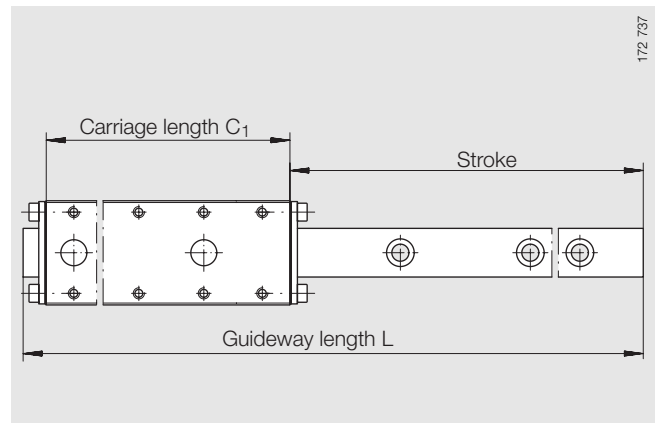
RMWE 9A VA/79×99/14



Load directions  
(table *Main dimensions, basic load ratings, moments*)



RMWE 9A VA · top view



Main dimension and stroke length  
(table *Main dimensions, basic load ratings, moments*)

										K <sub>1</sub> , K <sub>2</sub>		
C <sub>7</sub>	C <sub>2</sub>	C <sub>4</sub>	C <sub>5</sub> /C <sub>6</sub>	C <sub>8</sub>	C <sub>9</sub>	H <sub>1</sub>	H <sub>5</sub>	h	h <sub>1</sub>	For screw DIN 912-12.9	Tightening torque max. Nm	Screw corrosion- resistant <sup>1)</sup> max. Nm
4,5	10	20	9,5	3,5	20	1,7	3	6,2	2,6	M3	2,2	1

**Main dimensions, basic load ratings, moments**

Unit	Stroke length h	Dimensions		Basic load ratings		Moment ratings		
		C <sub>1</sub>	L <sub>k</sub> <sup>4)</sup>	dyn. C N	stat. C <sub>0</sub> N	M <sub>0x</sub> Nm	M <sub>0y</sub> Nm	M <sub>0z</sub> Nm
Designation <sup>1)</sup>	6	19	14,9	1740	2340	9	8	8
	24	49	35,9	3550	5900	22	40	40
	10		42,9	4100	7000	27	56	56
	56	79	49,9	4600	8200	31	75	75
	42		56,9	5100	9400	36	96	96
	28		63,9	5600	10500	40	120	120
	14	99	70,9	6100	11700	45	146	146
	68		63,9	5600	10500	40	120	120
	54		70,9	6100	11700	45	146	146
	40	129	77,9	6500	12900	49	176	176
	26		84,9	7000	14100	54	208	208
	12		91,9	7500	15200	58	242	242
	114	129	70,9	6100	11700	45	146	146
	100		77,9	6500	12900	49	176	176
	86		84,9	7000	14100	54	208	208
	72		91,9	7500	15200	58	242	242
	58		98,9	7900	16400	63	279	279
	44		105,9	8300	17600	67	319	319
	30		112,9	8800	18700	72	361	361
	16		119,9	9200	19900	76	406	406
2	126,9	9600	21100	81	454	454		

<sup>4)</sup> Length of cage. Special lengths are available by agreement.

**Carriage**

Carriage	
Designation	Mass
	≈g
<b>RMWW 9</b>	14
	37
	37
	60
	60
	60
	60
	75
	75
	75
	75
	75
	98
	98
	98
	98
	98
	98
	98

**Guideway**

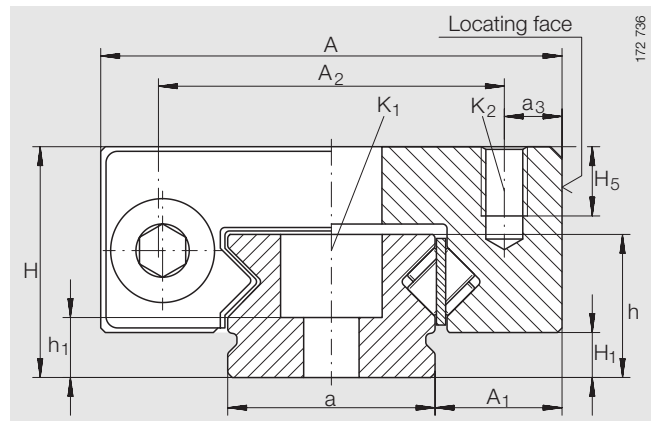
Guideway		
Designation	L <sup>5)</sup>	Mass
	mm	≈g
<b>RMWT 9A</b>	59	21
	99	36
	159	58
	199	72
	219	80
	299	108

<sup>5)</sup> Special lengths are available by agreement.

# Miniature carriage units – corrosion-resistant

with cylindrical roller flat cages

Series RMWE 9 VA<sup>1)</sup>



RMWE 9 VA

## Dimension table · Dimensions in mm

Unit Designation	Dimensions				Mounting dimensions			
	$L_{\max}^{2)}$	$C_1 \max^{3)}$	H	A	$A_1$	$A_2$	$a \begin{smallmatrix} -0,005 \\ -0,05 \end{smallmatrix}$	$a_3$
<b>RMWE 9 VA<sup>4)</sup></b>	360	300	10	20	5,5	15	9	2,5

- 1) Corrosion-resistant steels may nevertheless undergo various forms of localised corrosion and corrosion involving loss of surface material! If very high levels of corrosion resistance are required, the suitability of the unit for the specific application must be investigated!
- 2) Maximum manufactured length of guideway. Special lengths are available by agreement.
- 3) Maximum manufactured length of carriage.
- 4) Not to be used for new designs.

### Example for RMWE 9 VA:

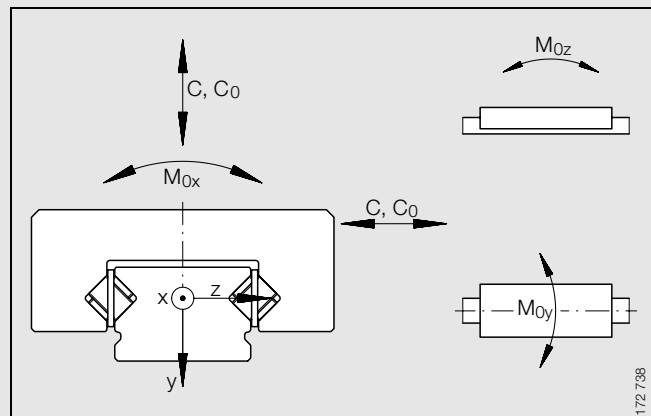
- $C_1$  Carriage length = 103 mm
- Stroke required = 60 mm
- h Stroke length = 62 mm
- $L_k$  Length of cage = 70,9 mm
- z Safety range = 10 mm ( $4 \leq z \leq 10$ )
- L Length of guideway (see formula and table *Guideway*, page 17).

$$L = C_1 + h + z$$

$L = 103 \text{ mm} + 62 \text{ mm} + 10 \text{ mm} = 175 \text{ mm}$  (next standard length from table *Guideway*:  $L = 199 \text{ mm}$ ).

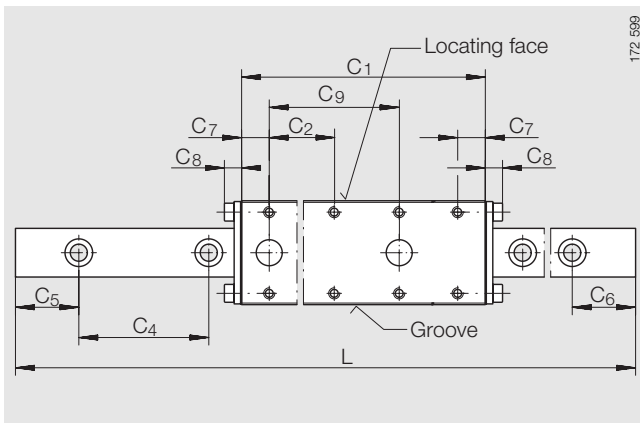
Ordering data:

**RMWE 9 VA/103×199/62**

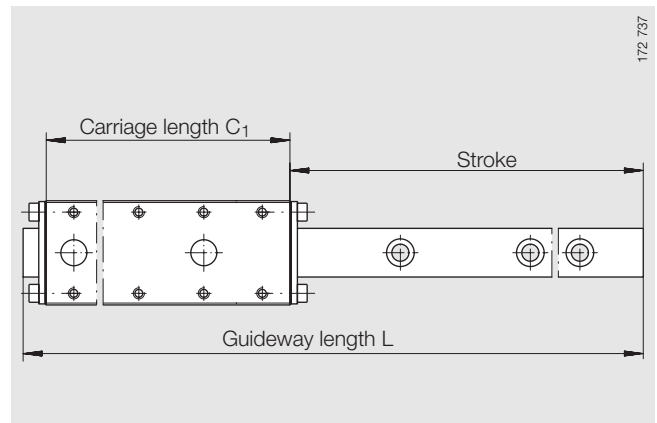


Load directions  
(table *Main dimensions, basic load ratings, moments*)





RMWE 9 VA · top view



Main dimension and stroke length  
(table *Main dimensions, basic load ratings, moments*)

										K <sub>1</sub> , K <sub>2</sub>		
C <sub>7</sub>	C <sub>2</sub>	C <sub>4</sub>	C <sub>5</sub> /C <sub>6</sub>	C <sub>8</sub>	C <sub>9</sub>	H <sub>1</sub>	H <sub>5</sub>	h	h <sub>1</sub>	For screw DIN 912-12.9	Tightening torque max. Nm	Screw corrosion- resistant <sup>1)</sup> max. Nm
6	13	20	9,5	3,5	26	1,7	2,5	6,2	2,6	M2	0,6	0,2

**Main dimensions, basic load ratings, moments**

Unit Designation <sup>1)</sup>	Stroke length h mm	Dimensions		Basic load ratings		Moment ratings		
		C <sub>1</sub> mm	L <sub>k</sub> <sup>5)</sup> mm	dyn. C N	stat. C <sub>0</sub> N	M <sub>0x</sub> Nm	M <sub>0y</sub> Nm	M <sub>0z</sub> Nm
<b>RMWE 9 VA</b>	18	25	14,9	1740	2340	9	8	8
	4		21,9	2380	3500	13	16	16
	28	51	35,9	3550	5900	22	40	40
	14		42,9	4100	7000	27	56	56
	52	77	49,9	4600	8200	31	75	75
	38		56,9	5100	9400	36	96	96
	24		63,9	5600	10500	40	120	120
	10		70,9	6100	11700	45	146	146
	76	103	63,9	5600	10500	40	120	120
	62		70,9	6100	11700	45	146	146
	48		77,9	6500	12900	49	176	176
	34		84,9	7000	14100	54	208	208
	20		91,9	7500	15200	58	242	242
	6		98,9	7900	16400	63	279	279
	114	129	70,9	6100	11700	45	146	146
	100		77,9	6500	12900	49	176	176
	86		84,9	7000	14100	54	208	208
	72		91,9	7500	15200	58	242	242
	58		98,9	7900	16400	63	279	279
	44		105,9	8300	17600	67	319	319
30	112,9		8800	18700	72	361	361	
16	119,9		9200	19900	76	406	406	
2	126,9		9600	21100	81	454	454	

<sup>5)</sup> Length of cage. Special lengths are available by agreement.

**Carriage**

Carriage	
Designation	Mass ≈g
<b>RMWW 9</b>	19
	19
	40
	40
	61
	61
	61
	61
	61
	61
	61
	61
	61
	61
	61
	61
	61
	61
	61

**Guideway**

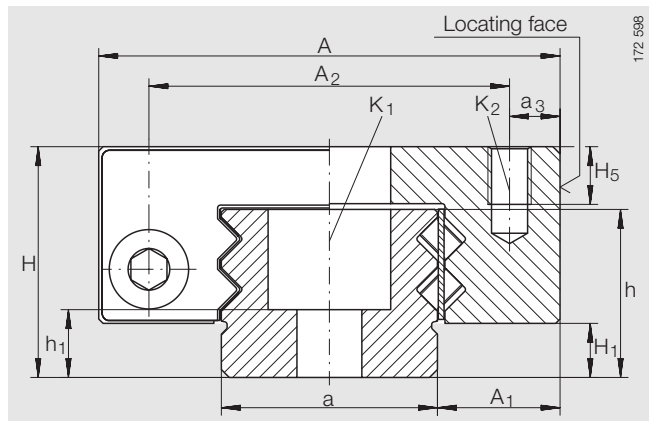
Guideway		
Designation	L <sup>6)</sup> mm	Mass ≈g
<b>RMWT 9</b>	59	21
	99	36
	159	58
	199	72
	219	80
	299	108

<sup>6)</sup> Special lengths are available by agreement.

# Miniature carriage units – corrosion-resistant

with cylindrical roller flat cages


Series RMWE 12 VA<sup>1)</sup>



RMWE 12 VA

## Dimension table · Dimensions in mm

Unit Designation	Dimensions				Mounting dimensions									
	$L_{\max}^{2)}$	$C_1 \max^{3)}$	H	A	$A_1$	$A_2$	$a_{-0,005}^{-0,05}$	$a_3$	$C_7$	$C_2$	$C_4$	$C_5/C_6$	$C_8$	$C_9$
<b>RMWE 12 VA<sup>4)</sup></b>	360	200	13	27	7,5	20	12	3,5	7	15	25	12	5	30

- 1)  Corrosion-resistant steels may nevertheless undergo various forms of localised corrosion and corrosion involving loss of surface material! If very high levels of corrosion resistance are required, the suitability of the unit for the specific application must be investigated!
- 2) Maximum manufactured length of guideway. Special lengths are available by agreement.
- 3) Maximum manufactured length of carriage.
- 4) Cylindrical rollers in O arrangement as standard. X arrangement available by agreement.
- 5) For interchangeability with standard elements, support washers and correspondingly smaller screws should be used.

### Example for RMWE 12 VA:

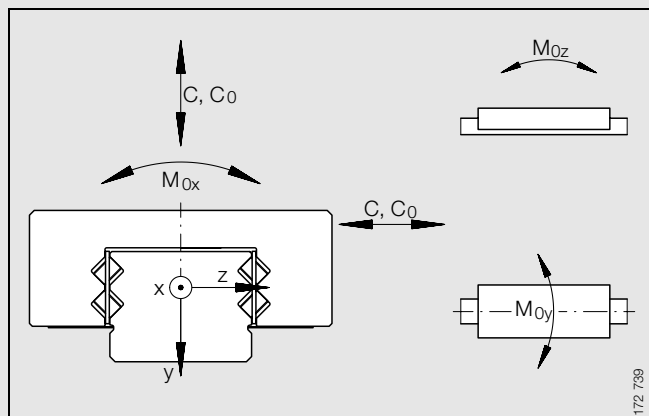
- $C_1$  Carriage length = 89 mm
- Stroke required = 20 mm
- h Stroke length = 24 mm
- $L_k$  Length of cage = 75,9 mm
- z Safety range = 10 mm ( $4 \leq z \leq 10$ )
- L Length of guideway (see formula and table *Guideway*, page 19).

$$L = C_1 + h + z$$

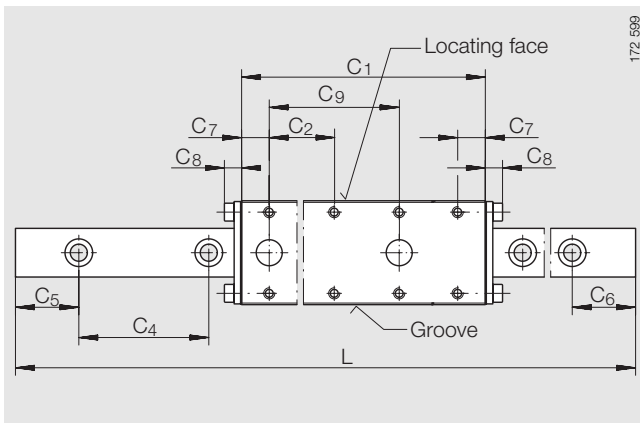
$L = 89 \text{ mm} + 24 \text{ mm} + 10 \text{ mm} = 123 \text{ mm}$  (next standard length from table *Guideway*:  $L = 124 \text{ mm}$ ).

Ordering data:

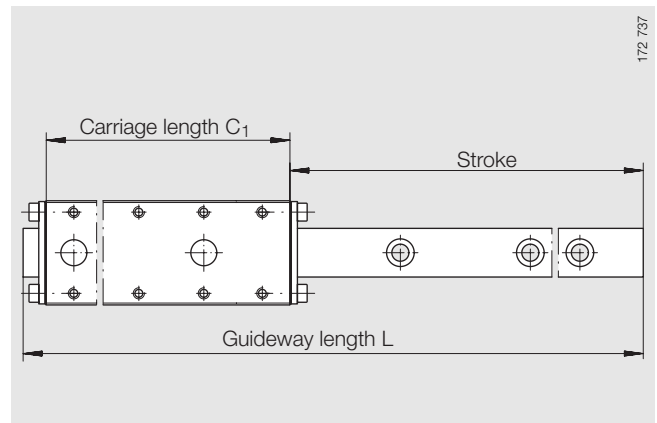
RMWE 12 VA/89×124/24



Load directions  
(table *Main dimensions, basic load ratings, moments*)



RMWE 12 VA · top view



Main dimension and stroke length  
(table *Main dimensions, basic load ratings, moments*)

				K <sub>1</sub> <sup>5)</sup>			K <sub>2</sub>		
H <sub>1</sub>	H <sub>5</sub>	h	h <sub>1</sub>	For screw DIN 912-12.9	Tightening torque max. Nm	Screw corrosion-resistant <sup>1)</sup> max. Nm	For screw DIN 912-12.9	Tightening torque max. Nm	Screw corrosion-resistant <sup>1)</sup> max. Nm
2,6	3,5	9	2,8	M4	5	1,7	M3	2,2	1

**Main dimensions, basic load ratings, moments**

Unit Designation <sup>1)</sup>	Stroke length h mm	Dimensions		Basic load ratings		Moment ratings			
		C <sub>1</sub> mm	L <sub>k</sub> <sup>6)</sup> mm	dyn. C N	stat. C <sub>0</sub> N	M <sub>0x</sub> Nm	M <sub>0y</sub> Nm	M <sub>0z</sub> Nm	
<b>RMWE 12 VA</b>	18	29	18,9	2230	3750	21	9	9	
	12		21,9	2500	4350	25	12	12	
	42	59	36,9	3800	7500	47	40	40	
	36		39,9	4050	8100	51	47	47	
	30		42,9	4300	8700	56	55	55	
	24		45,9	4550	9400	60	64	64	
	18		48,9	4800	10000	64	73	73	
	12		51,9	5000	10600	69	83	83	
	6		54,9	5200	11200	73	93	93	
	72		89	51,9	5000	10600	69	83	83
	66			54,9	5200	11200	73	93	93
	60			57,9	5500	11900	77	104	104
	54	60,9		5700	12500	82	116	116	
	48	63,9		5900	13100	86	128	128	
	42	66,9		6100	13700	90	141	141	
	36	69,9		6300	14400	94	154	154	
	30	72,9		6600	15000	99	168	168	
	24	75,9		6800	15600	103	183	183	
	18	78,9		7000	16200	107	198	198	
	12	81,9	7200	16900	112	214	214		
	6	84,9	7400	17500	116	231	231		
	102	119	66,9	6100	13700	90	141	141	
	96		69,9	6300	14400	94	154	154	
	90		72,9	6600	15000	99	168	168	
84	75,9		6800	15600	103	183	183		
78	78,9		7000	16200	107	198	198		
72	81,9		7200	16900	112	214	214		
66	84,9		7400	17500	116	231	231		
60	87,9		7600	18100	120	248	248		
54	90,9		7800	18700	125	266	266		

**Carriage**

Carriage	
Designation	Mass ≈g
<b>RMWW 12</b>	35
	35
	74
	74
	74
	74
	74
	74
	74
	74
	113
	113
	113
	113
	113
	113
	113
	113
	113
	152
	152
	152
	152

**Guideway**

Guideway		
Designation	L <sup>7)</sup> mm	Mass ≈g
<b>RMWT 12</b>	49	30
	99	64
	124	82
	149	98
	174	114
	224	148
	324	215

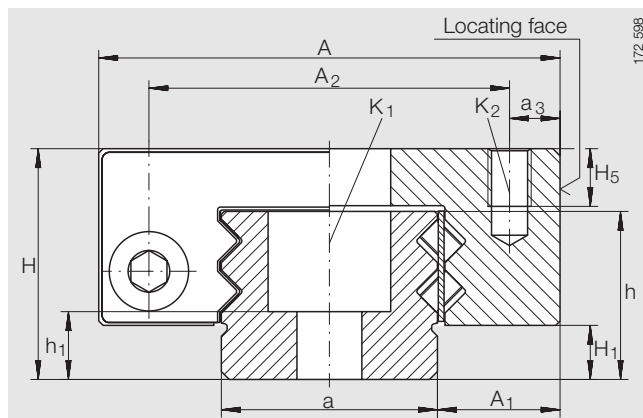
<sup>6)</sup> Length of cage.  
Special lengths are available by agreement.

<sup>7)</sup> Special lengths are available by agreement.

# Miniature carriage units – corrosion-resistant

with cylindrical roller flat cages

Series RMWE 12 VA<sup>1)</sup>




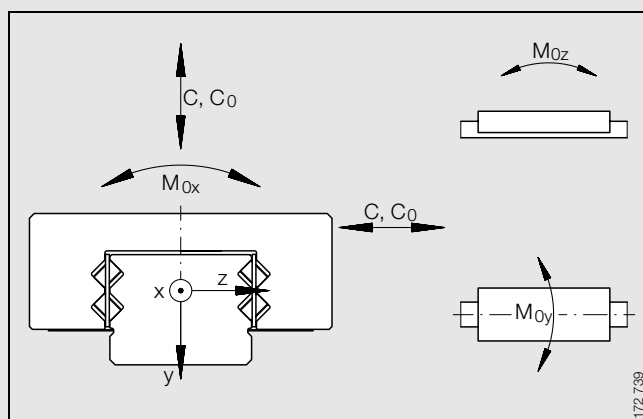
RMWE 12 VA

**Dimension table** (continued) · Dimensions in mm

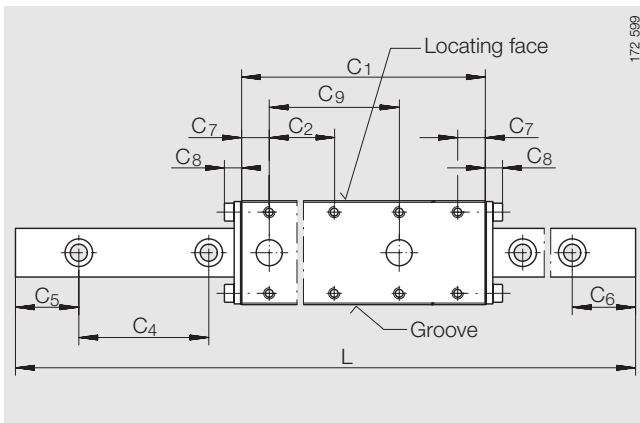
Unit Designation	Dimensions				Mounting dimensions									
	$L_{\max}^{2)}$	$C_1 \max^{3)}$	H	A	$A_1$	$A_2$	$a_{-0,005}^{-0,05}$	$a_3$	$C_7$	$C_2$	$C_4$	$C_5/C_6$	$C_8$	$C_9$
<b>RMWE 12 VA<sup>4)</sup></b>	360	200	13	27	7,5	20	12	3,5	7	15	25	12	5	30

Example for selection of unit: see page 18.

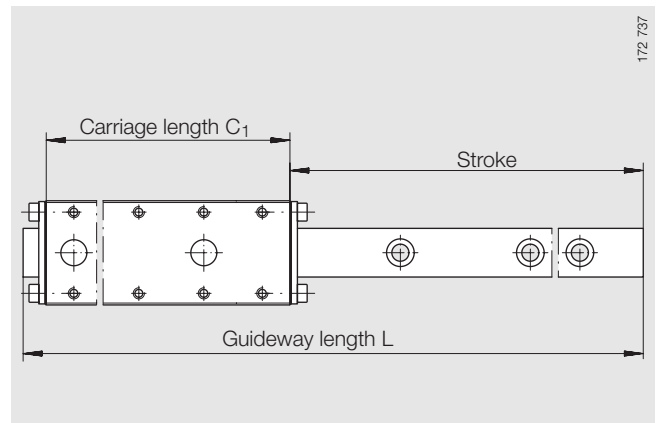
- 1)  Corrosion-resistant steels may nevertheless undergo various forms of localised corrosion and corrosion involving loss of surface material! If very high levels of corrosion resistance are required, the suitability of the unit for the specific application must be investigated!
- 2) Maximum manufactured length of guideway. Special lengths are available by agreement.
- 3) Maximum manufactured length of carriage.
- 4) Cylindrical rollers in O arrangement as standard. X arrangement available by agreement.
- 5) For interchangeability with standard elements, support washers and correspondingly smaller screws should be used.



Load directions  
(table Main dimensions, basic load ratings, moments)



RMWE 12 VA · top view



Main dimension and stroke length  
(table *Main dimensions, basic load ratings, moments*)

				K <sub>1</sub> <sup>5)</sup>			K <sub>2</sub>		
H <sub>1</sub>	H <sub>5</sub>	h	h <sub>1</sub>	For screw DIN 912-12.9	Tightening torque max. Nm	Screw corrosion-resistant <sup>1)</sup> max. Nm	For screw DIN 912-12.9	Tightening torque max. Nm	Screw corrosion-resistant <sup>1)</sup> max. Nm
2,6	3,5	9	2,8	M4	5	1,7	M3	2,2	1

**Main dimensions, basic load ratings, moments**

Unit Designation <sup>1)</sup>	Stroke length h mm	Dimensions		Basic load ratings		Moment ratings		
		C <sub>1</sub> mm	L <sub>k</sub> <sup>6)</sup> mm	dyn. C N	stat. C <sub>0</sub> N	M <sub>0x</sub> Nm	M <sub>0y</sub> Nm	M <sub>0z</sub> Nm
<b>RMWE 12 VA</b>	48	119	93,9	8000	19400	129	284	284
	42		96,9	8200	20000	133	303	303
	36		99,9	8400	20600	138	322	322
	30		102,9	8600	21200	142	342	342
	24		105,9	8800	21900	146	363	363
	18		108,9	9000	22500	151	385	385
	12		111,9	9200	23100	155	407	407
	6		114,9	9400	23700	159	429	429
	132	149	81,9	7200	16900	112	214	214
	126		84,9	7400	17500	116	231	231
	120		87,9	7600	18100	120	248	248
	114		90,9	7800	18700	125	266	266
	108		93,9	8000	19400	129	284	284
	102		96,9	8200	20000	133	303	303
96	99,9		8400	20600	138	322	322	
90	102,9		8600	21200	142	342	342	
84	105,9		8800	21900	146	363	363	
78	108,9		9000	22500	151	385	385	
72	111,9	9200	23100	155	407	407		
66	114,9	9400	23700	159	429	429		
60	117,9	9600	24400	164	452	452		
54	120,9	9800	25000	168	476	476		
48	123,9	9900	25500	172	500	500		
42	126,9	10100	26000	177	525	525		
36	129,9	10300	27000	181	551	551		
30	132,9	10500	27500	185	577	577		
24	135,9	10700	28000	189	604	604		
18	138,9	10900	28500	194	632	632		
12	141,9	11100	29500	198	660	660		
6	144,9	11200	30000	202	689	689		

**Carriage**

Carriage	
Designation	Mass ≈g
<b>RMWW 12</b>	152
	152
	152
	152
	152
	152
	152
	152
	152
	190
	190
	190
	190
	190

**Guideway**

Guideway		
Designation	L <sup>7)</sup> mm	Mass ≈g
<b>RMWT 12</b>	49	30
	99	64
	124	82
	149	98
	174	114
	224	148
	324	215

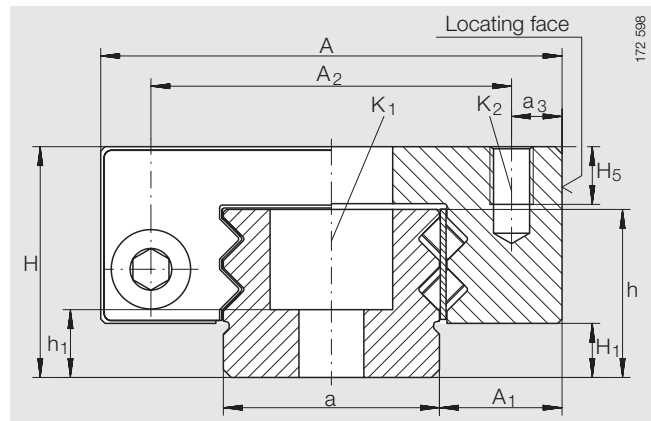
<sup>6)</sup> Length of cage.  
Special lengths are available by agreement.

<sup>7)</sup> Special lengths are available by agreement.

# Miniature carriage units – corrosion-resistant

with cylindrical roller flat cages

Series RMWE 15 VA<sup>1)</sup>



RMWE 15 VA

## Dimension table · Dimensions in mm

Unit Designation	Dimensions				Mounting dimensions									
	$L_{\max}^{2)}$	$C_1 \max^{3)}$	H	A	$A_1$	$A_2$	$a_{-0,005}^{-0,05}$	$a_3$	$C_7$	$C_2$	$C_4$	$C_5/C_6$	$C_8$	$C_9$
<b>RMWE 15 VA<sup>4)</sup></b>	360	300	16	32	8,5	25	15	3,5	9,5	20	40	19,5	5	40

- 1) Corrosion-resistant steels may nevertheless undergo various forms of localised corrosion and corrosion involving loss of surface material! If very high levels of corrosion resistance are required, the suitability of the unit for the specific application must be investigated!
- 2) Maximum manufactured length of guideway. Special lengths are available by agreement.
- 3) Maximum manufactured length of carriage.
- 4) Cylindrical rollers in O arrangement as standard. X arrangement available by agreement.
- 5) For interchangeability with standard elements, support washers and correspondingly smaller screws should be used.

### Example for RMWE 15 VA:

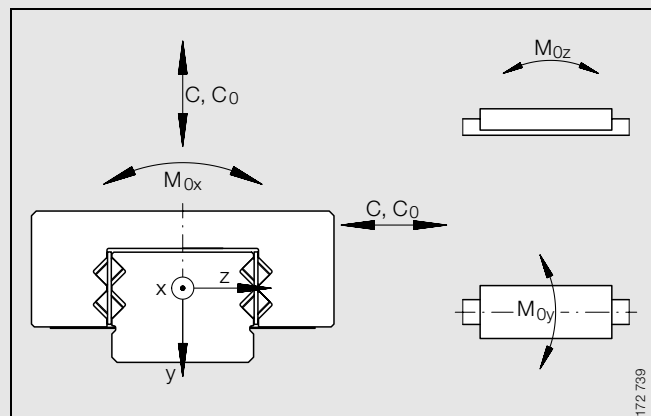
- $C_1$  Carriage length = 119 mm
- Stroke required = 20 mm
- h Stroke length = 24 mm
- $L_k$  Length of cage = 105,9 mm
- z Safety range = 10 mm ( $4 \leq z \leq 10$ )
- L Length of guideway (see formula and table *Guideway*, page 23).

$$L = C_1 + h + z$$

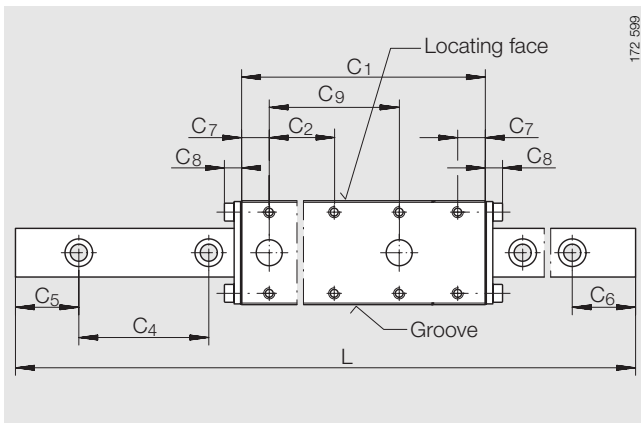
$L = 119 \text{ mm} + 24 \text{ mm} + 10 \text{ mm} = 153 \text{ mm}$  (next standard length from table *Guideway*:  $L = 159 \text{ mm}$ ).

Ordering data:

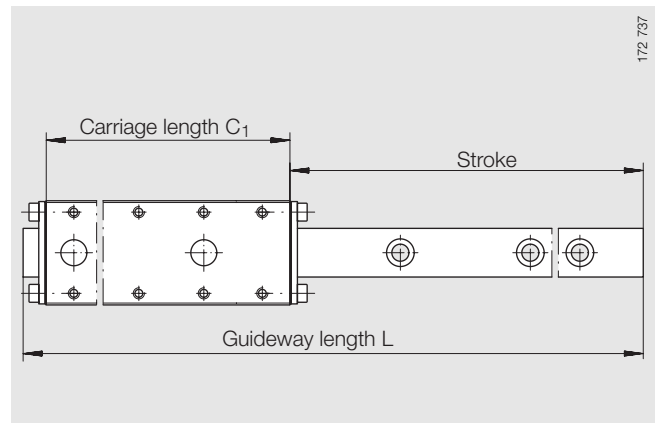
RMWE 15 VA/119×159/24



Load directions  
(table *Main dimensions, basic load ratings, moments*)



RMWE 15 VA · top view



Main dimension and stroke length  
(table *Main dimensions, basic load ratings, moments*)

				K <sub>1</sub> <sup>5)</sup>			K <sub>2</sub>		
H <sub>1</sub>	H <sub>5</sub>	h	h <sub>1</sub>	For screw DIN 912-12.9	Tightening torque max. Nm	Screw corrosion-resistant <sup>1)</sup> max. Nm	For screw DIN 912-12.9	Tightening torque max. Nm	Screw corrosion-resistant <sup>1)</sup> max. Nm
3,5	4	11,7	4,7	M4	5	1,7	M3	2,2	1

**Main dimensions, basic load ratings, moments**

Unit Designation <sup>1)</sup>	Stroke length h mm	Dimensions		Basic load ratings		Moment ratings		
		C <sub>1</sub> mm	L <sub>k</sub> <sup>6)</sup> mm	dyn. C N	stat. C <sub>0</sub> N	M <sub>0x</sub> Nm	M <sub>0y</sub> Nm	M <sub>0z</sub> Nm
<b>RMWE 15 VA</b>	24	39	25,4	4600	8200	69	37	37
	18		28,9	5100	9400	79	48	48
	10		32,4	5600	10500	89	60	60
	14		35,9	6100	11700	99	73	73
	62	79	46,4	7500	15200	128	121	121
	56		49,9	7900	16400	138	139	139
	48		53,4	8300	17600	148	159	159
	42		56,9	8800	18700	158	180	180
	34		60,4	9200	19900	168	203	203
	28		63,9	9600	21100	178	227	227
	20		67,4	10000	22300	188	252	252
	14		70,9	10400	23400	198	279	279
	6		74,4	10800	24600	208	306	306
	100		119	67,4	10000	22300	188	252
	94	70,9		10400	23400	198	279	279
	86	74,4		10800	24600	208	306	306
	80	77,9		11200	26000	218	336	336
	72	81,4		11600	27000	228	366	366
	66	84,9		12000	28000	239	398	398
	58	88,4		12400	29500	247	431	431
52	91,9	12800		30500	257	465	465	
44	95,4	13200		31500	267	501	501	
38	98,9	13500		33000	277	538	538	
30	102,4	13900	34000	287	577	577		
24	105,9	14300	35000	297	616	616		
16	109,4	14600	36500	307	657	657		
10	112,9	15000	37500	317	700	700		
2	116,4	15400	38500	327	743	743		

**Carriage**

Carriage	
Designation	Mass ≈g
<b>RMWW 15</b>	65
	65
	65
	65
	131
	131
	131
	131
	131
	131
	131
	131
	131
	131
	131
	131
	131
	131
	131

**Guideway**

Guideway		
Designation	L <sup>7)</sup> mm	Mass ≈g
<b>RMWE 15</b>	79	92
	119	138
	159	185
	199	234
	239	280
	359	422

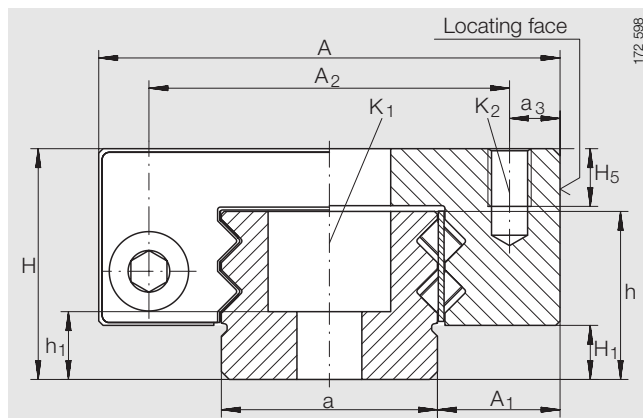
<sup>7)</sup> Special lengths are available by agreement.

<sup>6)</sup> Length of cage. Special lengths are available by agreement.

# Miniature carriage units – corrosion-resistant

with cylindrical roller flat cages

Series RMWE 15 VA<sup>1)</sup>




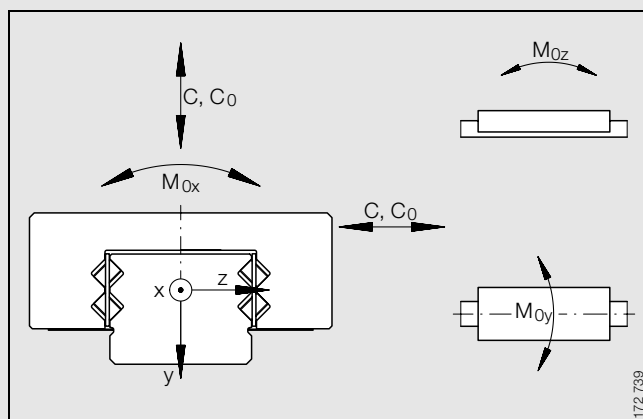
RMWE 15 VA

**Dimension table** (continued) · Dimensions in mm

Unit Designation	Dimensions				Mounting dimensions									
	$L_{\max}^{2)}$	$C_1 \max^{3)}$	H	A	$A_1$	$A_2$	$a_{-0,005}^{-0,05}$	$a_3$	$C_7$	$C_2$	$C_4$	$C_5/C_6$	$C_8$	$C_9$
<b>RMWE 15 VA<sup>4)</sup></b>	360	300	16	32	8,5	25	15	3,5	9,5	20	40	19,5	5	40

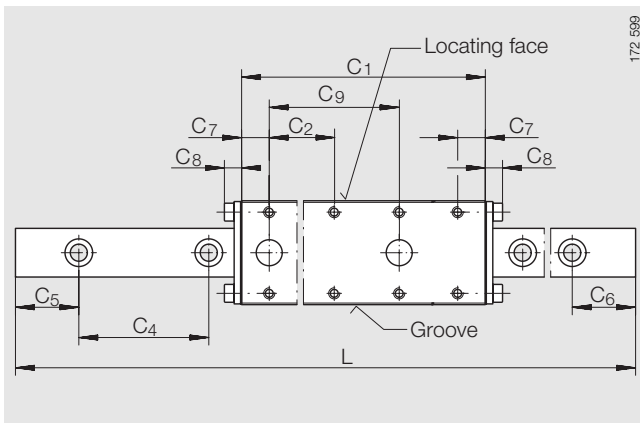
Example for selection of unit: see page 22.

- 1)  Corrosion-resistant steels may nevertheless undergo various forms of localised corrosion and corrosion involving loss of surface material! If very high levels of corrosion resistance are required, the suitability of the unit for the specific application must be investigated!
- 2) Maximum manufactured length of guideway. Special lengths are available by agreement.
- 3) Maximum manufactured length of carriage.
- 4) Cylindrical rollers in O arrangement as standard. X arrangement available by agreement.
- 5) For interchangeability with standard elements, support washers and correspondingly smaller screws should be used.

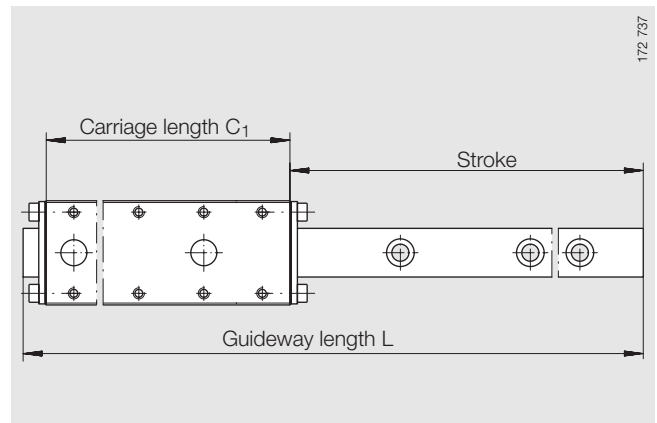


Load directions  
(table Main dimensions, basic load ratings, moments)





RMWE 15 VA · top view



Main dimension and stroke length  
(table *Main dimensions, basic load ratings, moments*)

				K <sub>1</sub> <sup>5)</sup>			K <sub>2</sub>		
H <sub>1</sub>	H <sub>5</sub>	h	h <sub>1</sub>	For screw DIN 912-12.9	Tightening torque  max. Nm	Screw corrosion- resistant <sup>1)</sup>  max. Nm	For screw DIN 912-12.9	Tightening torque  max. Nm	Screw corrosion- resistant <sup>1)</sup>  max. Nm
3,5	4	11,7	4,7	M4	5	1,7	M3	2,2	1

Main dimensions, basic load ratings, moments								
Unit	Stroke length	Dimensions		Basic load ratings		Moment ratings		
		C <sub>1</sub>	L <sub>k</sub> <sup>6)</sup>	dyn. C	stat. C <sub>0</sub>	M <sub>0x</sub>	M <sub>0y</sub>	M <sub>0z</sub>
Designation <sup>1)</sup>	h	mm	mm	N	N	Nm	Nm	Nm
<b>RMWE 15 VA</b>	146	159	84,9	12000	28000	238	398	398
	138		88,4	12400	29500	247	431	431
	132		91,9	12800	30500	257	465	465
	124		95,4	13200	31500	267	501	501
	118		98,9	13500	33000	277	538	538
	110		102,4	13900	34000	287	577	577
	104		105,9	14300	35000	297	616	616
	96		109,4	14600	36500	307	657	657
	90		112,9	15000	37500	317	700	700
	82		116,4	15400	38500	327	743	743
	76		119,9	15700	40000	337	788	788
	68		123,4	16100	41000	347	835	835
	62		126,9	16500	42000	357	882	822
	54		130,4	16800	43500	367	931	931
	48		133,9	17200	44500	376	982	982
	40		137,4	17500	45500	386	1030	1030
	34		140,9	17900	47000	396	1080	1080
	26		144,4	18200	48000	406	1140	1140
	20		147,9	18600	49000	416	1190	1190
12	151,4	18900	50500	426	1250	1250		
6	154,9	19200	51500	436	1310	1310		

<sup>6)</sup> Length of cage. Special lengths are available by agreement.

Carriage		Guideway			
Carriage		Guideway			
Designation	Mass	Designation	L <sup>7)</sup>	Mass	
	≈g		mm	≈g	
<b>RMWW 15</b>	267	<b>RMWE 15</b>	79	92	
	267		119	138	
	267		159	185	
	267		199	234	
	267		239	280	
	267		359	422	
	267				
	267				
	267				
	267				
	267				
	267				
	267				

<sup>7)</sup> Special lengths are available by agreement.

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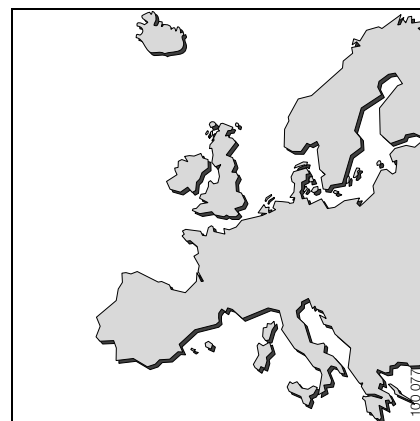
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