



C-LINE



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7.1 PRODUCT DESCRIPTION

PAGE 90

7.2 SYSTEM LS

- For light-medium loads
- Guide rails LS
- Guide rollers RCS
- Guide rollers RAS
- Guide rollers RCN
- Guide rollers RAN
- Carriages C3 RCS, C3 RAS, C3 RYS
- Carriages C4 RCS, C4 RAS, C4 RYS
- Carriages C5 RCS, C5 RAS, C5 RYS
- Carriages C3 RCN, C3 RAN, C3 RYN
- Carriages C4 RCN, C4 RAN, C4 RYN
- Carriages C5 RCN, C5 RAN, C5 RYN
- Carriages C6 RCN, C6 RAN, C6 RYN

C-LINE

PRODUCT DESCRIPTION

KEY BENEFITS

- High balance of mounting surface errors and misalignment
- Guide rollers for fixed and floating bearing constructions
- Easy smooth running
- High speeds up to 8 m/s
- Integrated lubricating system

With the new C-Line family, NADELLA aims to offer a complete product line: the LS guides, available in 3 sizes; the guide rollers, also available in floating version cursors with 3, 4, 5 and 6 rollers already available in stock. The cold drawn rails have a C shape and the internal raceways are induction hardened. The guide rollers slide inside the rails, in this way, they are protected from any accidental impacts. The guides are zinc-plated as standard and can also be supplied nickel-plated for more aggressive environments.

The use of floating guide rollers, coupled with “fixed” rollers, allows to obtain a self-aligning system, able to balance possible axial or transversal misalignment errors between two parallel guides.

NADELLA has the advantage of using a single driving profile for both types of rollers. The C-line is available in three sizes and the guide rollers can be both centered and eccentric to allow adjustment of the play.

Sliders are available in two versions: sliders with central block in aluminum C.RCS ..., C.RAS ... and C.RYS and sliders with central block in steel C.RCN ..., C.RAN ... and C.RYN.

ESSENTIAL TECHNICAL FEATURES

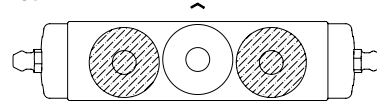
- Steel rail, drawn, induction hardened
- Zinc-plated rail, alternatively with nickel-plated surface
- Rollers for fixed and floating bearing constructions
- High balance of mounting surface errors and misalignment
- High performance and rugged
- Rollers lubricated for life
- Dust resistant
- Easy fitting
- Easy smooth running
- High speeds up to 8 m/s (depending on roller size and application)
- Acceleration up to 20 m/s²
- Working temperatures up to 80°C possible
- Pitch of rail borings standard or according to customer drawings
- Integrated lubricating system at the front sides of the carriage

CARRIAGE CONFIGURATION: CARRIAGES WITH CENTRAL BLOCK IN ALUMINUM RCS, RAS AND RYS

The load capacity of the carriage shown in the following paragraphs refer to the following mounting configuration, where the guide rollers dashed lines represent the concentric guide rollers (—), while the eccentric rollers which allow the adjustment of the play, do not exhibit hatch (^).

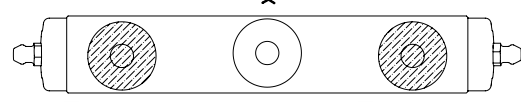
SHORT CARRIAGE WITH 3 ROLLERS

Type C3 ...



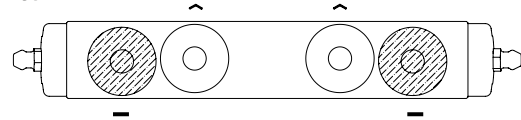
LONG CARRIAGE WITH 3 ROLLERS

Type C3 ... A

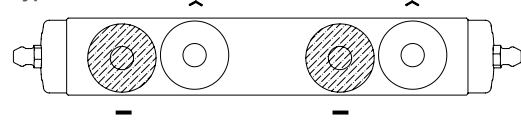


LONG CARRIAGE WITH 4 ROLLERS

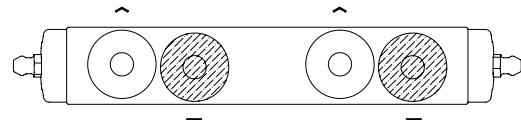
Type C4 ... C



Type C4 ... A

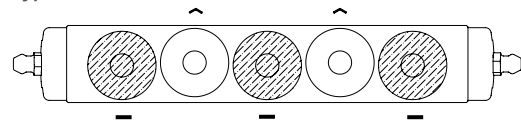


Type C4 ... B

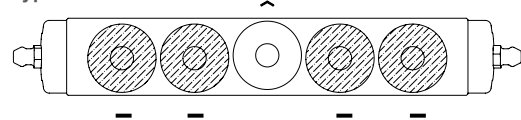


LONG CARRIAGE WITH 5 ROLLERS

Type C5 ... A



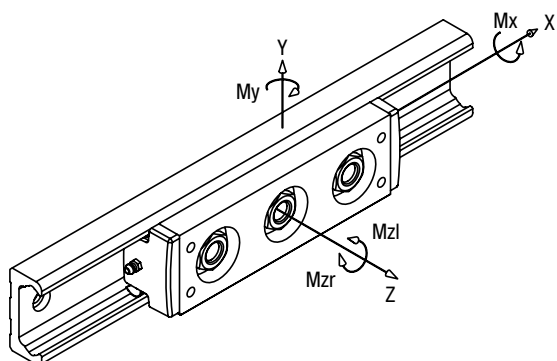
Type C5 ... B



Views from above

The markings ^ and — show the contact points with the running surface of the rails

MAXIMUM LOAD CAPACITY OF SINGLE CARRIAGE



The load capacity charts must be considered when loads act exclusively in a single load direction (only along the Y axis or only along the Z axis). In case of combined loads the maximum load allowed will have lower values.

The tables below show the values of maximum loads applicable on a single carriage in relation to the axis system shown.

CARRIAGE CORTO CON 3 ROTELLE TYPE RCS, RAS E RYS

Guide	Carriage	Fy ¹⁾ (N)	Fz ²⁾ (N)	Mx ³⁾ (Nm)	My ²⁾ (Nm)	Mz ⁴⁾ (Nm)
LS 28	C3 RCS 28 126	2400	660	5.9	17	30
LS 43	C3 RCS 43 170	5500	1700	23	66	107
LS 63	C3 RCS 63 226	13000	4400	81	264	390

1) Fy directed to load the concentric wheels, valid for carriage type RCS, RAS and RYS

2) For carriages type RYS the load is reduced by 50%; load equal to ZERO for carriages type RAS

3) Mx equal to ZERO on carriages type RAS and RYS

4) Mz valid for carriages type RCS, RAS and RYS

LONG CARRIAGE WITH 3, 4 AND 5 WHEELS TYPE RCS, RAS AND RYS

Guide	Carriage	Fy ⁵⁾ (N)	Fz ⁶⁾ (N)	Mx ⁷⁾ (Nm)	My ⁶⁾ (Nm)	Mz ⁸⁾ (Nm)	
						Mzl Mzr	
LS 28	C3 RCS 28 178 A	2400	660	5.9	34	62	62
	C4 RCS 28 178 C	2400	1320	12	43	94	94
	C4 RCS 28 178 A	1800	990	8.9	38	125	62
	C4 RCS 28 178 B	1800	990	8.9	38	62	125
	C5 RCS 28 178 A	3000	1320	12	43	94	94
	C5 RCS 28 178 B	3600	660	5.9	35	62	62
	LS 43	C3 RCS 43 245 A	5500	1700	23	129	209
C4 RCS 43 245 C		5500	3400	45	162	314	314
C4 RCS 43 245 A		4100	2380	34	129	418	209
C4 RCS 43 245 B		4100	2380	34	129	209	418
C5 RCS 43 245 A		6800	3400	45	162	314	314
C5 RCS 43 245 B		8200	1700	23	133	209	209

5) Fy directed to load the concentric wheels, valid for carriages type RCS, RAS and RYS

6) For carriages type RYS the load is reduced by 50%; load equal to ZERO for carriages type RAS

7) Mx equal to ZERO on carriage type RAS and RYS

8) Mz valid for carriages type RCS, RAS and RYS

DYNAMIC LOAD CAPACITY OF SINGLE CARRIAGE

The tables below show the dynamic load capacity that allows a nominal life of 100 km.

The nominal life of the carriage can be calculated using the following formula:

$$L_{10} = (C_i / P_i)^3 \times 100 \text{ km}$$

Where Ci and Pi are: the allowed dynamic loads (Ci) and the external loads (Pi) acting on the carriage in a particular direction of load (i).

SHORT CARRIAGE WITH 3 WHEELS TYPE RCS, RAS AND RYS

Guide	Carriage	Cy ⁹⁾ (N)	Cz ¹⁰⁾ (N)	CMx ¹¹⁾ (Nm)	CMY ¹⁰⁾ (Nm)	CMz ¹²⁾ (Nm)	
						Mzl Mzr	
LS 28	C3 RCS 28 126	4400	1100	9.6	27	55	55
LS 43	C3 RCS 43 170	13200	3600	48	142	257	257
LS 63	C3 RCS 63 226	28400	6700	124	403	852	852

9) Cy directed to load the concentric wheels, valid for cursor type RCS, RAS and RYS

10) For carriage type RYS the load is reduced by 50%; load equal to ZERO for cursor type RAS

11) CMx equal to ZERO for carriage type RAS and RYS

12) CMz valid for carriage type RCS, RAS and RYS

LONG CARRIAGE WITH 3, 4 AND 5 WHEELS TYPE RCS, RAS AND RYS

Guide	Carriage	Cy ¹³⁾ (N)	Cz ¹⁴⁾ (N)	CMx ¹⁵⁾ (Nm)	CMY ¹⁴⁾ (Nm)	CMz ¹⁶⁾ (Nm)	
						Mzl Mzr	
LS 28	C3 RCS 28 178 A	4400	1100	9.6	55	114	114
	C4 RCS 28 178 C	4400	2100	19	69	172	172
	C4 RCS 28 178 A	3300	1600	14	61	229	114
	C4 RCS 28 178 B	3300	1600	14	61	114	229
	C5 RCS 28 178 A	6600	2100	19	69	172	172
	C5 RCS 28 178 B	8800	1100	9.6	67	114	114
LS 43	C3 RCS 43 245 A	13200	3600	48	277	502	502
	C4 RCS 43 245 C	13200	7300	96	346	752	752
	C4 RCS 43 245 A	9900	5100	72	304	1003	502
	C4 RCS 43 245 B	9900	5100	72	304	502	1003
	C5 RCS 43 245 A	19800	7300	96	346	752	752
	C5 RCS 43 245 B	26400	3600	48	292	502	502

13) Cy directed to load the concentric wheels, valid for cursor type RCS, RAS and RYS

14) For carriage type RYS the load is reduced by 50%; load equal to ZERO for cursor type RAS

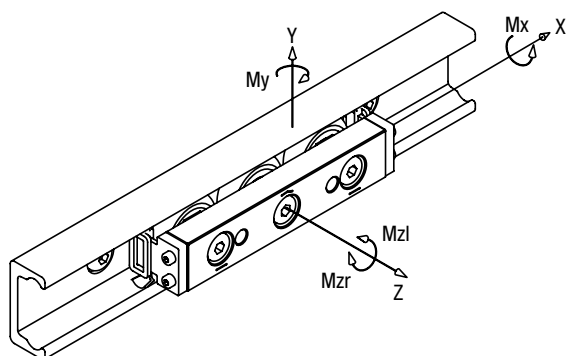
15) CMx equal to ZERO for carriage type RAS and RYS

16) CMz valid for carriage type RCS, RAS and RYS

C-LINE

PRODUCT DESCRIPTION

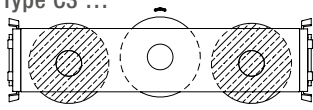
CARRIAGE CONFIGURATION: CARRIAGES WITH CENTRAL BLOCK IN STEEL RCN, RAN AND RYN



The load capacity of the carriage shown in the following paragraphs refer to the following mounting configuration, where the guide dashed lines represent the concentric guide rollers (—), while the eccentric rollers which allow the adjustment of the play, do not exhibit hatch (↗).

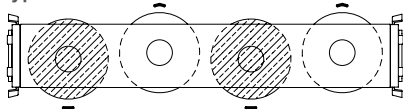
SHORT CARRIAGE WITH 3 WHEELS

Type C3 ...

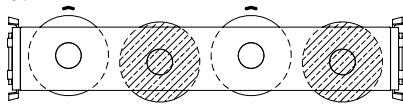


LONG CARRIAGE WITH 4 WHEELS

Type C4 ... A

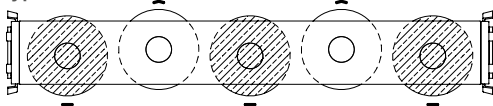


Type C4 ... B



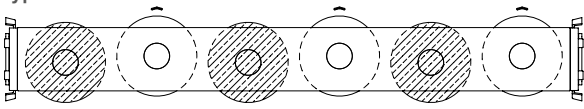
LONG CARRIAGE WITH 5 WHEELS

Type C5 ...

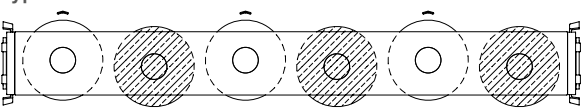


LONG CARRIAGE WITH 6 WHEELS

Type C6 ... A



Type C6 ... B



Views from above

The markings ↗ and — show the contact points with the running surface of the rails

MAXIMUM LOAD CAPACITY OF SINGLE CARRIAGE

The load capacity charts must be considered when loads act exclusively in a single load direction (only along the Y axis or only along the Z axis). In the case of combined loads the maximum load allowed will have lower values. The tables below show the values of maximum loads applicable to individual carriages in relation to the axis system shown.

SHORT CARRIAGE WITH 3 WHEELS TYPE RCN, RAN AND RYN

Guide	Carriage	Fy ¹⁾ (N)	Fz ²⁾ (N)	Mx ³⁾ (Nm)	My ²⁾ (Nm)	Mz ⁴⁾ (Nm)
LS 28	C3 RCN 28 080	2400	660	5.9	18	32
LS 43	C3 RCN 43 120	5500	1700	23	68	110
LS 63	C3 RCN 63 180	13000	4400	81	264	390

1) Fy directed to load the concentric wheels, valid for carriage type RCN, RAN and RYN

2) For carriages type RYN the load is reduced by 50%; load equal to ZERO for carriages type RAN

3) Mx equal to ZERO on carriages type RAN and RYN

4) Mz valid for carriages type RCN, RAN and RYN

LONG CARRIAGE WITH 3, 4, 5 AND 6 WHEELS TYPE RCN, RAN AND RYN

Guide	Carriage	Fy ⁵⁾ (N)	Fz ⁶⁾ (N)	Mx ⁷⁾ (Nm)	My ⁶⁾ (Nm)	Mz ⁸⁾ (Nm)	
						Mzl	Mzr
LS 28	C4 RCN 28 100 A	1600	750	7.7	18	90	30
	C4 RCN 28 100 B	1600	750	7.7	18	30	90
	C5 RCN 28 125	3000	1320	12	40	88	88
	C6 RCN 28 150 A	2200	1400	13	52	156	90
	C6 RCN 28 150 B	2200	1400	13	52	90	156
LS 43	C4 RCN 43 150 A	3650	1880	31	70	303	102
	C4 RCN 43 150 B	3650	1880	31	70	102	303
	C5 RCN 43 190	6800	3400	45	159	309	309
	C6 RCN 43 230 A	5000	3600	50	212	543	313
	C6 RCN 43 230 B	5000	3600	50	212	313	543
LS 63	C4 RCN 63 235 A	8670	4470	109	260	1131	377
	C4 RCN 63 235 B	8670	4470	109	260	377	1131
	C5 RCN 63 290	15600	8800	163	638	1131	1131
	C6 RCN 63 345 A	11830	8900	179	759	1927	1112
	C6 RCN 63 345 B	11830	8900	179	759	1112	1927

5) Fy directed to load the concentric wheels, valid for carriage type RCN, RAN and RYN

6) For carriages type RYN the load is reduced by 50%; load equal to ZERO for carriages type RAN

7) Mx equal to ZERO on carriages type RAN and RYN

8) Mz valid for carriages type RCN, RAN and RYN

DYNAMIC LOAD CAPACITY OF SINGLE CARRIAGE

The tables below show the dynamic load capacity that allows a nominal life of 100 km.

The nominal life of the carriage can be calculated using the following formula:

$$L_{10} = (C_i / P_i)^3 \times 100 \text{ km}$$

Where C_i and P_i are: the allowed dynamic loads (C_i) and the external loads (P_i) acting on the carriage in a particular direction of load.

SHORT CARRIAGE WITH 3 WHEELS TYPE RCN, RAN AND RYN

Guide	Carriage	$C_y^{(9)}$ (N)	$C_z^{(10)}$ (N)	$CM_x^{(11)}$ (Nm)	$CM_y^{(10)}$ (Nm)	$CM_z^{(12)}$ (Nm)
LS 28	C3 RCN 28 080	4400	1100	9.6	29	59
LS 43	C3 RCN 43 120	13200	3600	48	146	264
LS 63	C3 RCN 63 180	28400	6700	124	400	850

9) C_y directed to load the concentric wheels, valid for carriage type RCN, RAN and RYN

10) For carriages type RYS the load is reduced by 50%; load equal to ZERO for carriages type RAN

11) CM_x equal to ZERO on carriage, type RAN and RYN

12) CM_z valid for carriages type RCN, RAN and RYN

LONG CARRIAGE WITH 3, 4, 5 AND 6 WHEELS TYPE RCN, RAN AND RYN

Guide	Carriage	$C_y^{(13)}$ (N)	$C_z^{(14)}$ (N)	$CM_x^{(15)}$ (Nm)	$CM_y^{(14)}$ (Nm)	$CM_z^{(16)}$ (Nm)	
						Mzl	Mzr
LS 28	C4 RCN 28 100 A	2900	1300	13	32	165	55
	C4 RCN 28 100 B	2900	1300	13	32	55	165
	C5 RCN 28 125	4400	2100	19	65	162	162
	C6 RCN 28 150 A	4800	2400	21	87	286	165
	C6 RCN 28 150 B	4800	2400	21	87	165	286
LS 43	C4 RCN 43 150 A	8800	4100	64	149	726	244
	C4 RCN 43 150 B	8800	4100	64	149	244	726
	C5 RCN 43 190	13200	7300	96	341	740	740
	C6 RCN 43 230 A	14400	7800	105	438	1300	750
	C6 RCN 43 230 B	14400	7800	105	438	750	1300
LS 63	C4 RCN 63 235 A	18900	8000	166	465	2470	824
	C4 RCN 63 235 B	18900	8000	166	465	824	2470
	C5 RCN 63 290	42600	13400	249	974	2470	2470
	C6 RCN 63 345 A	31000	15100	271	1250	4210	2430
	C6 RCN 63 345 B	31000	15100	271	1250	2430	4210

13) C_y directed to load the concentric wheels, valid for carriage type RCN, RAN and RYN

14) For carriages type RYS the load is reduced by 50%; load equal to ZERO for carriages type RAN

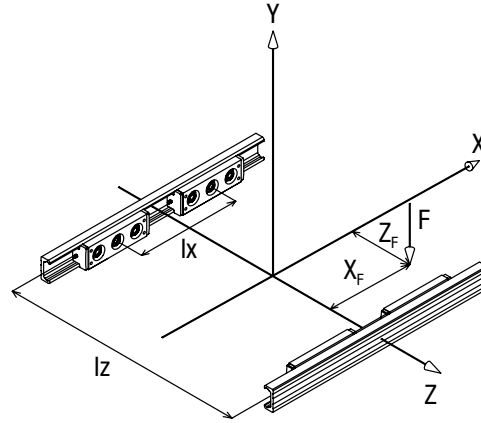
15) CM_x equal to ZERO on carriage type RAN and RYN

16) CM_z valid for carriages type RCN, RAN and RYN

CALCULATION EXAMPLE:

platform with 4 carriages C3 RCS 43 170

The general arrangement is shown in the drawing below.



The platform runs along the two rails and is charged with load F which takes effect 100 mm and 50 mm afar from the middle of the carriage.

Data: guide LS 43; carriage C3 RCS 43 170

$l_x = 400 \text{ mm}$

$l_z = 300 \text{ mm}$

$F = 6000 \text{ N}$

$X_F = 100 \text{ mm}$

$Z_F = 50 \text{ mm}$

In this configuration P_y is the load on the mostly loaded carriage and is calculated as follows:

$$P = \frac{F}{4} + \frac{F \cdot X_F}{2 \cdot l_x} + \frac{F \cdot Z_F}{2 \cdot l_z} = 2750 \text{ N}$$

The load F_y indicated in the table of max. load for carriage C3 RCS 43 170 is 5500 N.

The system nominal lifetime is calculated as follows: from the table of the dynamic load capacity, the value C_y for carriage C3 RCS 43 170 is 13200 N.

$$L_{10} = (13200 / 2750)^3 \times 100 = 11059 \text{ km}$$

IMPORTANT REMARK

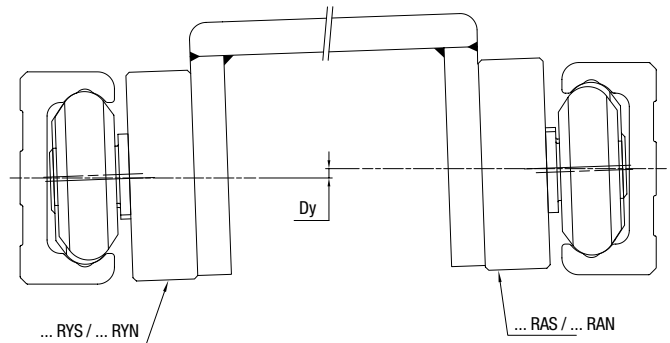
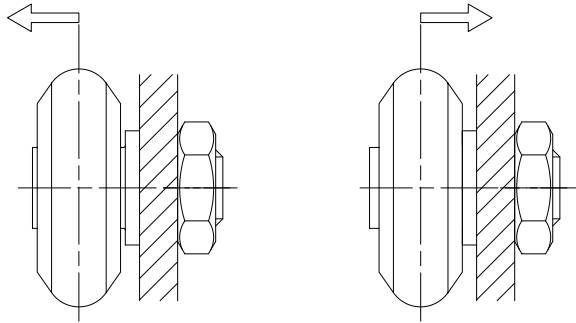
The rail must be lubricated to reach this value. Otherwise the expected lifetime can be reduced by fretting between rail and roller.

C-LINE

PRODUCT DESCRIPTION

SELF-ALIGNING SYSTEM

The combined use of “fixed” rollers type RCS and RCN with floating rollers type RAS and RAN allows to obtain a selfaligning system, in fact, floating rollers, where the bearing can slide axially on the stud, allow to recover any alignment error due to an inaccurate mounting or deformations.



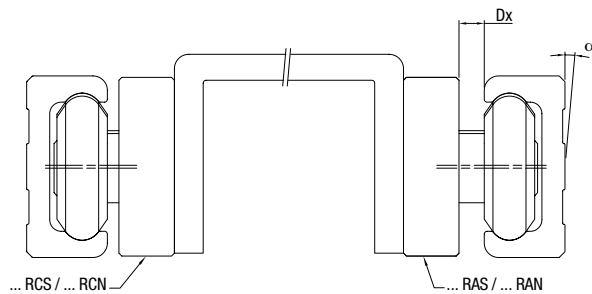
MAXIMUM MISALIGNMENT ALLOWED BY ALIGNING CARRIAGES RAS, RAN, RYS AND RYN

Guide	Carriage	α max.	S (mm)	H nominal (mm)
LS 28	C ... RAS 28 ...	1°	-0.5 / +1.2	24
	C ... RAN 28 ...			23.9
LS 43	C ... RAS 43 ...	1.5°	-0.8 / +1.5	37
	C ... RAN 43 ...			
LS 63	C ... RAS 63 ...	1°	-1 / +3	50.5
	C ... RAN 63 ...			49.8
LS 28	C ... RYS 28 ...	1°	-	24
	C ... RYN 28 ...			23.9
LS 43	C ... RYS 43 ...	1.5°	-	37
	C ... RYN 43 ...			
LS 63	C ... RYS 63 ...	1°	-	50.5
	C ... RYN 63 ...			49.8

HORIZONTAL MISALIGNMENT DX

In case of horizontal misalignment D_x between mounting surfaces, you can use on one side LS guides with carriages type RCS or RCN and, on the opposite parallel side, LS guides with floating carriages type RAS or RAN; carriages RAN and RAS allow an axial misalignment D_x .

Floating carriages can support radial forces only; the axial load, transverse to the running direction, will have to be supported entirely by the “fixed” carriage type RCS or RCN.

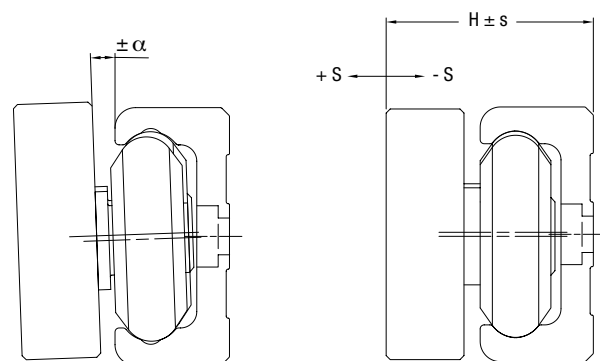


VERTICAL MISALIGNMENT DY

In the case of vertical misalignment D_y between the guides, you must allow rotation of both carriages; for this reason carriages type RYN and RYS are equipped with “fixed” rollers (RCS and RCN), in contact with a sliding track, and eccentric floating rollers (RASR and RANR) in contact with the opposite raceway. On the parallel guide, a carriage with only floating rollers type RAS or RAN must be mounted.

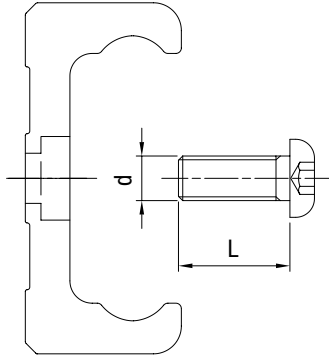
The maximum value of D_y depends on the distance between the guides and must not exceed the maximum angle α provided for the carriage equals to $\alpha = 1.5^\circ$.

The axial load capacity of carriages RYS and RYN is halved compared to the carriages RCS and RCN of the same size.



SCREW FOR RAILS WITH COUNTERBORE HOLES

Guides with counterbore holes come with complete set of shallow head screws DIN EN ISO 7380 (Class 10.9).

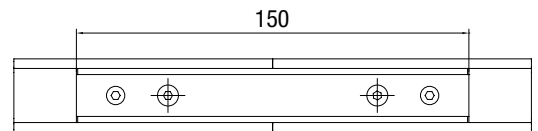
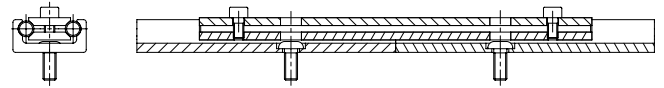


Guide	Screw diameter d	L	Torque wrench settings (Nm)
LS 28	M5 x 0.8	12	8
LS 43	M8 x 1.25	16	22
LS 63	M8 x 1.25	20	34

ALIGNMENT DEVICE ALS

For an easier mounting of two consecutive rails we recommend the use of alignment devices ALS.

Guide	Alignment device
LS 28	ALS 28
LS 43	ALS 43



INSTRUCTIONS

- Insert the screws into the holes of the guide without tightening
- Mount the alignment device and tighten its screws until it reaches the proper alignment
- Tighten the screws of the guides

C-LINE

GUIDE RAILS LS

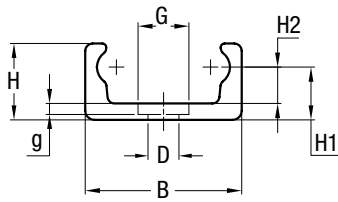
Rails totally in steel with internal hardened raceways.



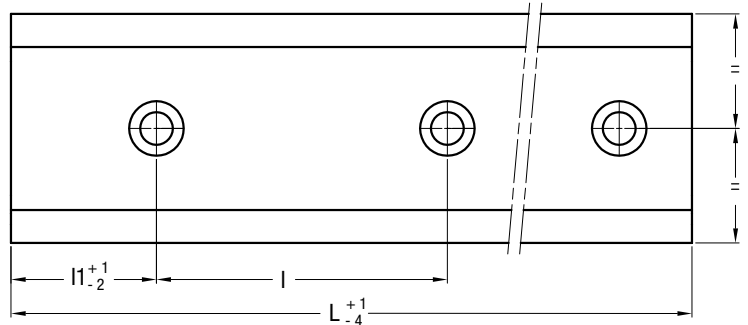
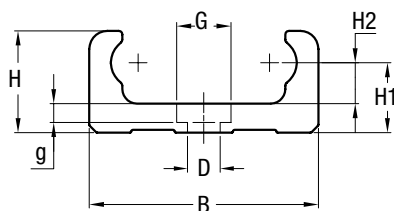
HOLE PATTERN A: BORING FOR COUNTERBORE SCREWS ACCORDING TO DIN EN ISO 7380

LS 28

LS 43



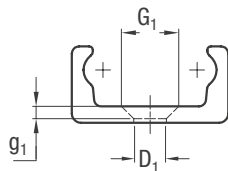
LS 63



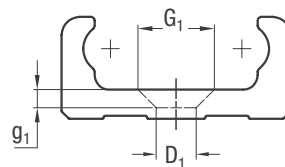
HOLE PATTERN B: BORING FOR COUNTERSUNK SCREWS ACCORDING TO EN ISO 10642.

LS 28

LS 43



LS 63



Type	Dimensions (mm)													Moment of inertia (cm ⁴)		Weight (kg/m)
	B	H	H1	H2	D	G	g	D ₁	G ₁	g ₁	l	l ₁	L max. 1)	J _x	J _y	
LS 28	28	12.5	9	5.5	6.6	11	2.1	5.5	10.6	2.6	80	40	4000	0.17	1.45	1.18
LS 43	43	21	14.5	10	9	15	2.5	9	17	4	80	40	4000	1.28	8.6	2.75
LS 63	63	28	19.25	11.25	9	15	4.5	11	21	5.5	80	40	4000	4.5	38.9	6.22

1) Longer rails will be fitted with finish-machined joints

RAIL DESIGN STANDARD

- Drawn, induction hardened raceways (MT)
- Surface zinc-plated (MT ... GZ)

FIXING HOLES

- Hole pattern according to catalogue (A or B)
- Hole pattern according to drawing (NZ)
- Without holes (NF)

SURFACE OPTIONS

- Chemically nickel-plated (NW)
- Uncoated, blasted

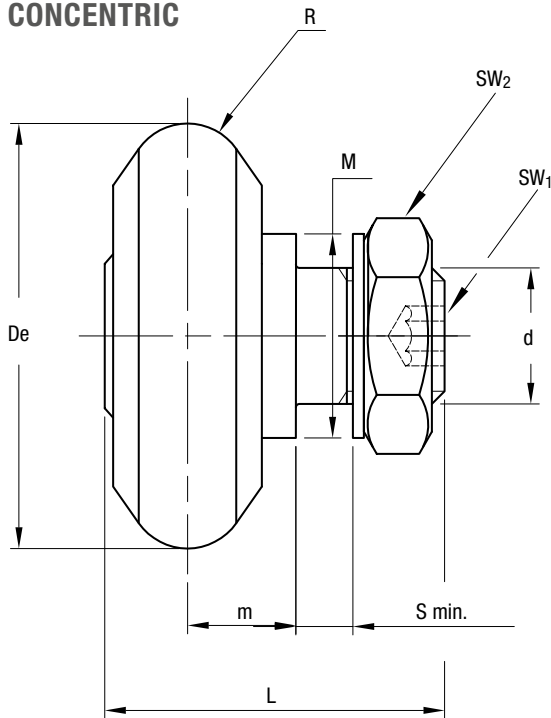
Example standard type: LS 43 MT 2480 AGZ
Screws DIN EN ISO 7380 (10.9) are included in delivery.

GUIDE ROLLERS RCS

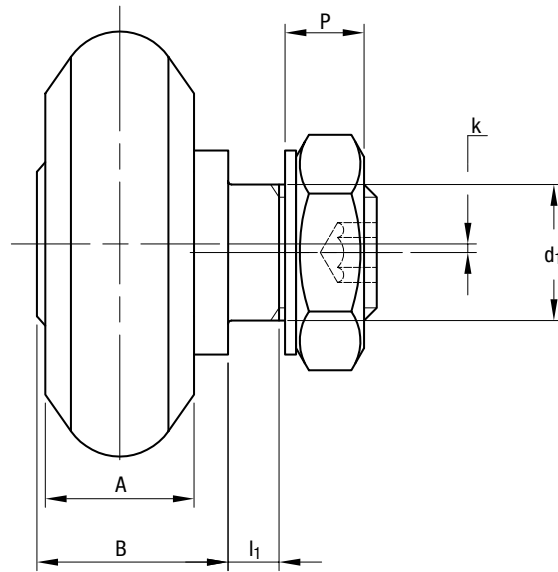
Guide rollers with balls for LS guide.



CONCENTRIC



ECCENTRIC



Type		Dimensions (mm)															Guide
concentric	eccentric	De	R	d ₁ ¹⁾	d	m	S min.	P	L	A	B	l ₁	M	SW ₁	SW ₂	k	
RCS 28	RCSR 28	23.5	3	8	M8	6	2.5	4.8	18.5	6	10	3.5	12	3	13	0.5	LS 28
RCS 43	RCSR 43	35.5	5	10	M10 x 1.25	9	4.5	6	27.5	11	15	5.5	17.5	4	16	0.75	LS 43
RCS 63	RCSR 63	50	7	16	M16 x 1.5	12.75	5.25	9.2	39.5	17	22.25	6.25	24	6	24	1	LS 63

1) Tolerance of mounting hole: H7

Type		Dynamic load (N)	Limit loads (N)		Life coefficients		Torque wrench settings ³⁾ (Nm)	Weight (g)
concentric	eccentric		C _w ²⁾	Radial F _r	Axial F _a	X		
RCS 28	RCSR 28	2200	1200	330	1	2.7	8	25
RCS 43	RCSR 43	6600	2750	850	1	2.2	20	80
RCS 63	RCSR 63	14200	6500	2200	1	2.8	64	255

2) C_w = load for lifetime of 100 km

3) The tightening torques apply to non-lubricated threads; for lubricated threads the values have to be multiplied by 0.8

- Guide rollers will be supplied with washers and nuts (DIN 439B)
- Contact angle α for the load calculation: 55°
- Standard seals type RS.

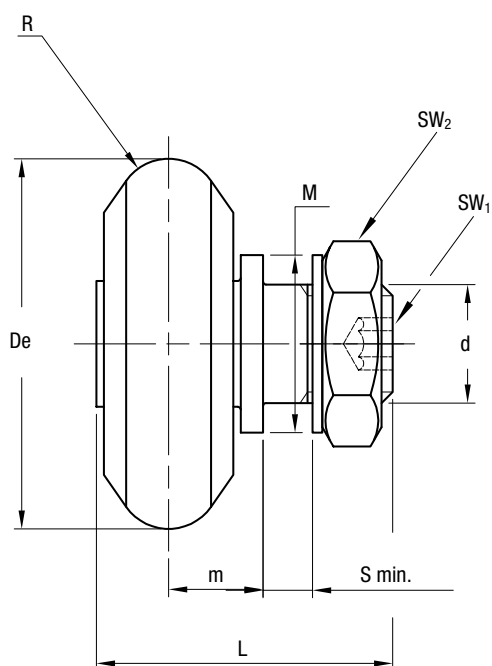
C-LINE

FLOATING GUIDE ROLLERS RAS

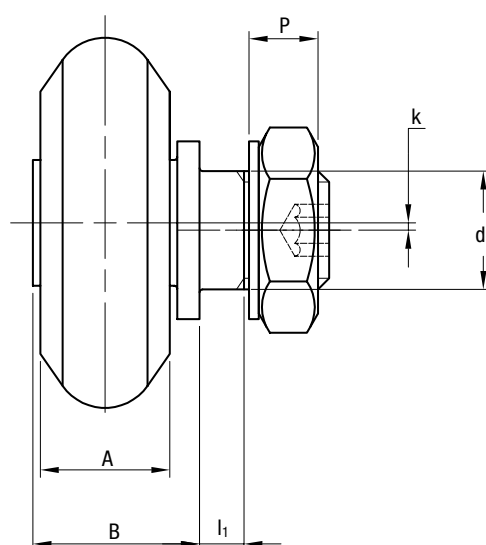
Floating guide rollers with balls.



CONCENTRIC



ECCENTRIC



Type		Dimensions (mm)																Guide
concentric	eccentric	De	R	d ₁ ¹⁾	d	m min. ²⁾	m max. ²⁾	S min.	P	L	A	B	I ₁	M	SW ₁	SW ₂	k	
RAS 28	RASR 28	23.5	3	8	M8	5.5	7.2	2.5	4.7	18	6	9.5	3.5	12	3	13	0.5	LS 28
RAS 43	RASR 43	35.5	5	10	M10 x 1.25	8.2	10.5	4.5	5.9	27	10	14.5	5.5	17.5	4	16	0.75	LS 43
RAS 63	RASR 63	50	7	16	M16 x 1.5	11.75	15.75	5.5	9.2	40	17	22.5	6.5	24	6	24	1	LS 63

1) Tolerance of mounting hole: H7

2) Maximum displacement of dimension m to ensure proper guide roller function and safety

Type		Dynamic load (N)	Limit loads (N)	Torque wrench settings ⁴⁾ (Nm)	Weight (g)
concentric	eccentric	C _w ³⁾	Radial F _r		
RAS 28	RASR 28	2200	1200	8	25
RAS 43	RASR 43	6600	2750	20	80
RAS 63	RASR 63	14200	6500	64	255

3) C_w = load for lifetime of 100 km

4) The tightening torques apply to non-lubricated threads; for lubricated threads the values have to be multiplied by 0.8

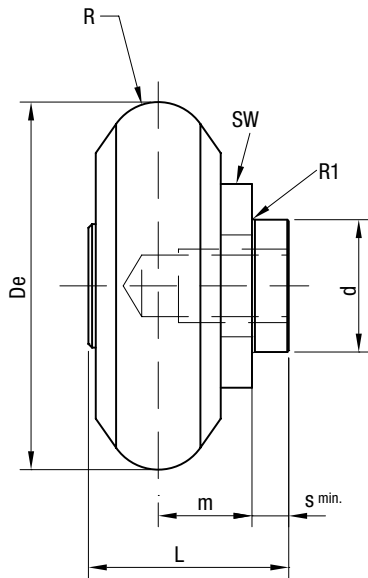
- Guide rollers will be supplied with washers and nuts (DIN 439B)
- Contact angle α for the load calculation: 55°
- Standard seals type RS

GUIDE ROLLERS RCN

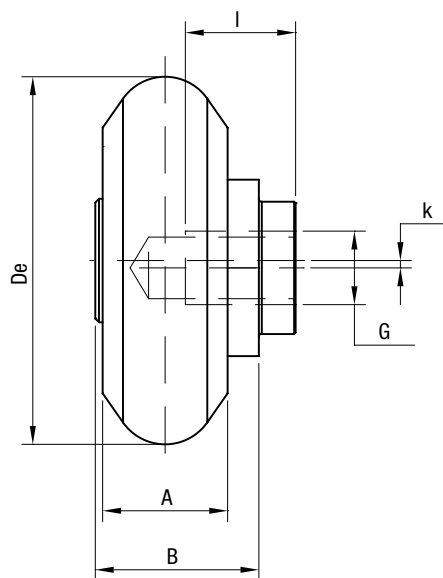
Guide rollers with balls for LS guide.



CONCENTRIC



ECCENTRIC



Type		Dimensions (mm)														Weight (g)	Guide
concentric	eccentric	De	R	d ¹⁾	m	R1 max.	S	L	A	B	SW	G	I	k			
RCN 28	RCNR 28	23.5	3	10	6	0.4	2	11.7	6	9.7	13	M5	8	0.5	22	LS 28	
RCN 43	RCNR 43	35.5	5	12	9	0.4	3	17.9	10	14.9	17	M8	11	0.75	76	LS 43	
RCN 63	RCNR 63	50	7	18	12.75	0.4	5	27.25	17	22.25	24	M10	15	1	237	LS 63	

1) Tolerance of mounting hole: H7

Type		Dynamic load (N)	Limit loads (N)		Life coefficients		Screw diameter G	Screw length (mm)	Torque wrench settings ³⁾ (Nm)
concentric	eccentric	C _w ²⁾	Radial F _r	Axial F _a	X	Y			
RCN 28	RCNR 28	2200	1200	330	1	2.7	M5	10	7
RCN 43	RCNR 43	6600	2750	850	1	2.2	M8	14	12
RCN 63	RCNR 63	14200	6500	2200	1	2.8	M10	20	35

2) C_w = load for lifetime of 100 km

3) The tightening torques apply to non-lubricated threads; for lubricated threads the values have to be multiplied by 0.8

- Screws type (10.9); the use of self-locking safety washers is recommended
- Contact angle α for the load calculation: 55°
- Standard seals type RS

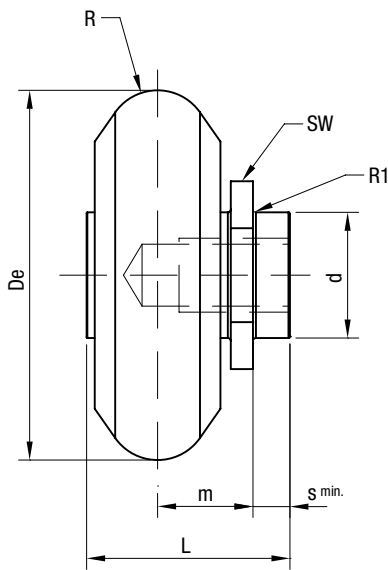
C-LINE

GUIDE ROLLERS RAN

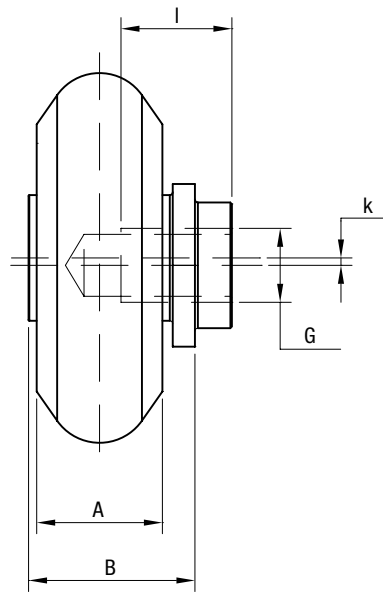
Floating guide rollers with balls.



CONCENTRIC



ECCENTRIC



Type		Dimensions (mm)														Weight (g)	Guide
concentric	eccentric	De	R	d ¹⁾	m min. ²⁾	m max. ²⁾	R1 max.	S	L	A	B	SW	G	I	k		
RAN 28	RANR 28	23.5	3	10	5.4	7.1	0.4	2	11.4	6	9.4	13	M5	8	0.5	22	LS 28
RAN 43	RANR 43	35.5	5	12	7.8	10.1	0.4	3	18.1	10	15.1	17	M8	11	0.75	76	LS 43
RAN 63	RANR 63	50	7	18	11.7	15.7	0.4	5	27.5	17	22.5	24	M10	15	1	237	LS 63

1) Tolerance of mounting hole: H7

2) Maximum displacement of dimension m to ensure proper guide roller function and safety

Type		Dynamic load (N)	Limit loads (N)	Screw diameter G	Screw length (mm)	Torque wrench settings ⁴⁾ (Nm)
concentric	eccentric	C _w ³⁾	Radial F _r			
RAN 28	RANR 28	2200	1200	M5	10	7
RAN 43	RANR 43	6600	2750	M8	14	12
RAN 63	RANR 63	14200	6500	M10	20	35

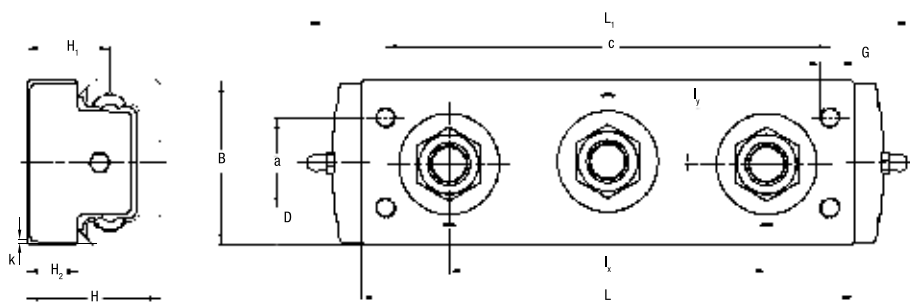
3) C_w = load for lifetime of 100 km

4) The tightening torques apply to non-lubricated threads; for lubricated threads the values have to be multiplied by 0.8

- Screws type (10.9); the use of self-locking safety washers is recommended
- Contact angle α for load calculation: 55°
- Standard seals type RS

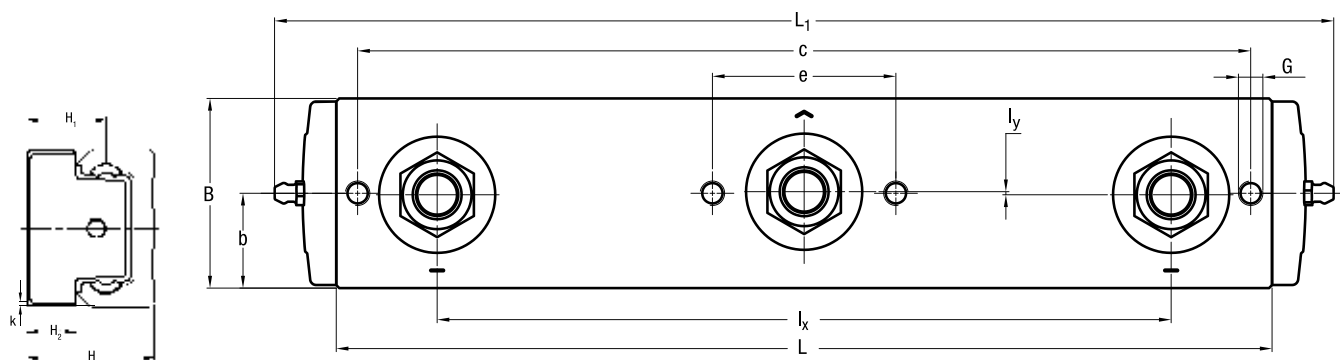
CARRIAGES C3 RCS, C3 RAS, C3 RYS

Carriages with body in anodised aluminium with 3 guide rollers.



SHORT CARRIAGE

Type	Dimensions (mm)													Weight (kg)	Guide
	L	L ₁	B	l _x	l _y	H	H ₁	H ₂	G	a	b	c	k		
C3 RCS 28 126	88	126	26.5	50	0.5	24	15	9	M5 (2x)	–	13.25	78	0.75	0.13	LS 28
C3 RCS 43 170	130	170	40	78	1	37	22.5	13.5	M8 (2x)	–	20	114	1.5	0.44	LS 43
C3 RCS 63 226	186	226	60	120	1	50.5	31.25	18.5	M8 (4x)	34	13	168	1.5	1.2	LS 63



LONG CARRIAGE

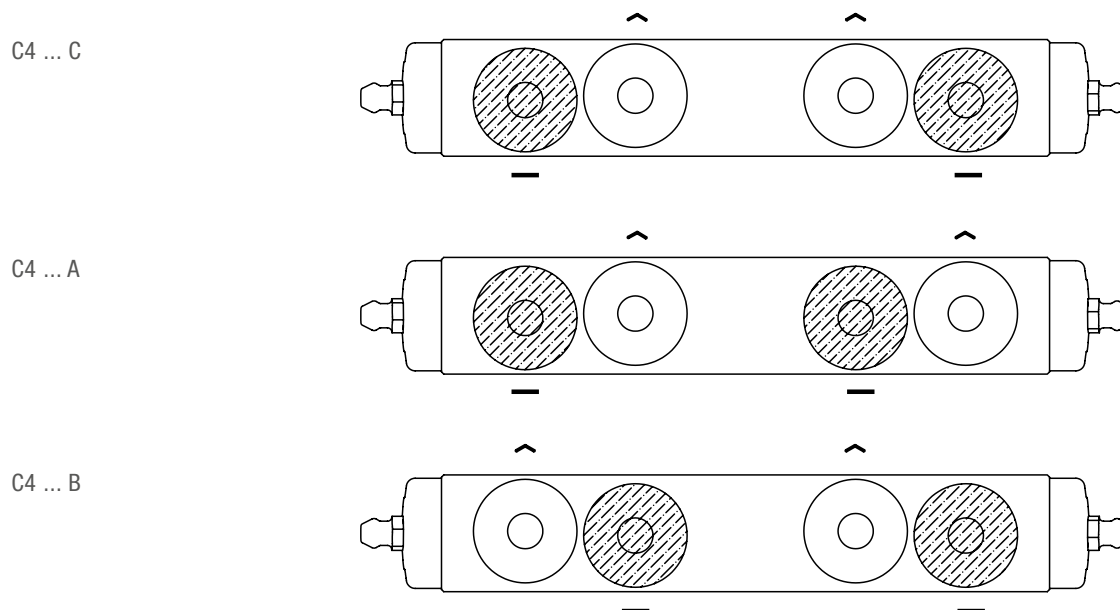
Type	Dimensions (mm)													Weight (kg)	Guide
	L	L ₁	B	l _x	l _y	H	H ₁	H ₂	G	b	c	e	k		
C3 RCS 28 178 A	140	178	26.5	104	0.5	24	15	9	M5	13.25	130	26	0.75	0.15	LS 28
C3 RCS 43 245 A	205	245	41	152	1	37	22.5	13.5	M8	20.5	188	37	1	0.50	LS 43

- Dimensions also apply to C3 RAS and C3 RYS
- The markings show the contact points with the running surface of the rails

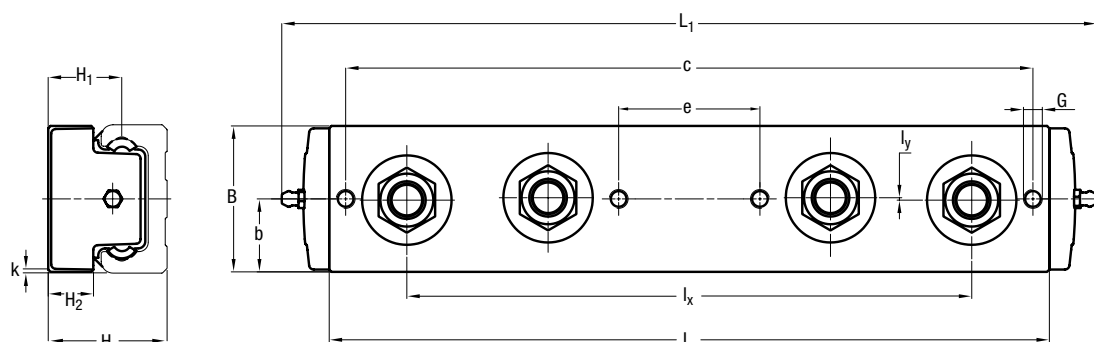
C-LINE

CARRIAGES C4 RCS, C4 RAS, C4 RYS

Carriages with body in anodised aluminium with 4 guide rollers.



Standard roller combinations
The markings show the contact points with the running surface of the rails



Type	Dimensions (mm)													Weight (kg)	Guide
	L	L ₁	B	l _x	l _y	H	H ₁	H ₂	G	b	c	e	k		
C4 RCS 28 178 C	140	178	26.5	104	0.5	24	15	9	M5	13.25	130	26	0.75	0.23	LS28
C4 RCS 28 178 A															
C4 RCS 28 178 B															
C4 RCS 43 245 C	205	245	41	152	1	37	22.5	13.5	M8	20.5	188	37	1	0.58	LS43
C4 RCS 43 245 A															
C4 RCS 43 245 B															

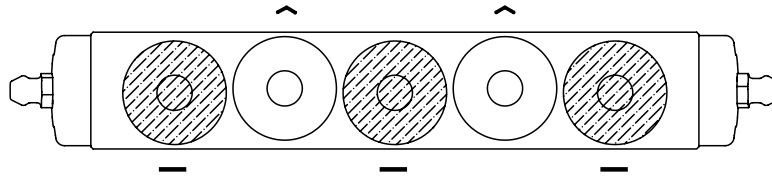
- Dimensions also apply to C4 RAS C / A / B and C4 RYS C / A / B

CARRIAGES C5 RCS, C5 RAS, C5 RYS

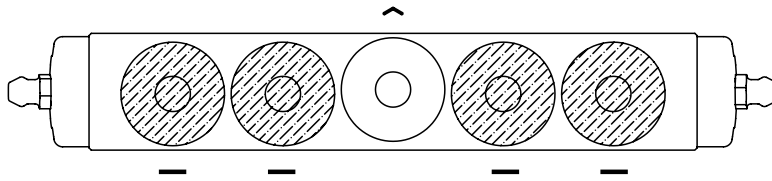
Carriages with body in anodised aluminium with 5 guide rollers.



C5 ... A

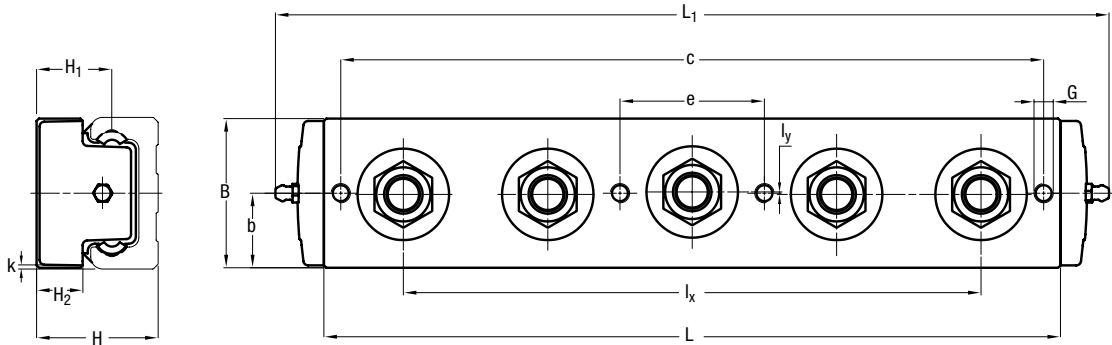


C5 ... B



Standard roller combinations

The markings show the contact points with the running surface of the rails



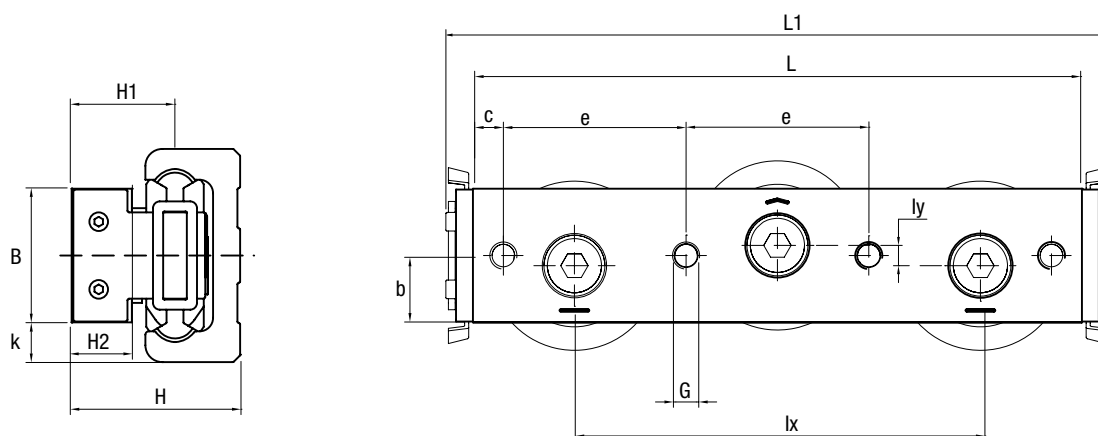
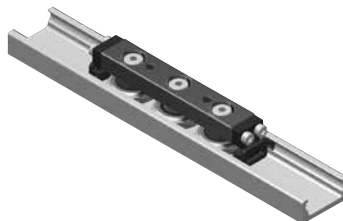
Type	Dimensions (mm)													Weight (kg)	Guide
	L	L ₁	B	l _x	l _y	H	H ₁	H ₂	G	b	c	e	k		
C5 RCS 28 178 A C5 RCS 28 178 B	140	178	26.5	104	0.5	24	15	9	M5	13.25	130	26	0.75	0.25	LS 28
C5 RCS 43 245 A C5 RCS 43 245 B	205	245	41	152	1	37	22.5	13.5	M8	20.5	188	37	1	0.66	LS 43

- Dimensions also apply to C5 RAS A / B and C5 RYS A / B

C-LINE

CARRIAGES C3 RCN, C3 RAN, C3 RYN

Carriages with steel body with 3 guide rollers for LS guides.

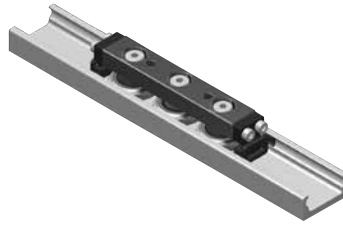


Type	Dimensions (mm)													Weight (kg)	Guide
	L	L1	B	lx	ly	H	H1	H2	G	b	c	e	k		
C3 RCN 28 080	80	96	14.9	54	0.5	23.9	14.9	8.9	M5 (2 x)	7.45	22.5	35	6.55	0.145	LS 28
C3 RCN 43 120	120	136	24.9	80	0,75	37	22.5	13.5	M8 (2 x)	12.45	32.5	55	9.05	0.534	LS 43
C3 RCN 63 180	180	196	39.5	120	1	49.8	30.55	17.8	M8 (4 x)	19.75	9	54	6.75	1.666	LS 63

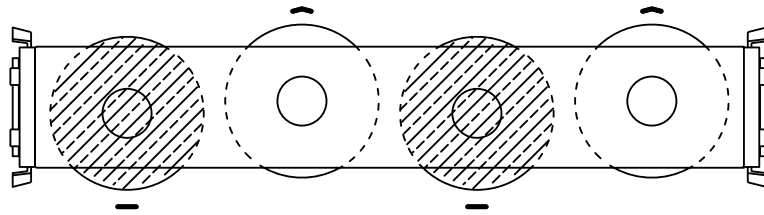
- Dimensions also apply to C3 RAN and C3 RYN
- The markings show the contact points with the running surface of the rails

CARRIAGES C4 RCN, C4 RAN, C4 RYN

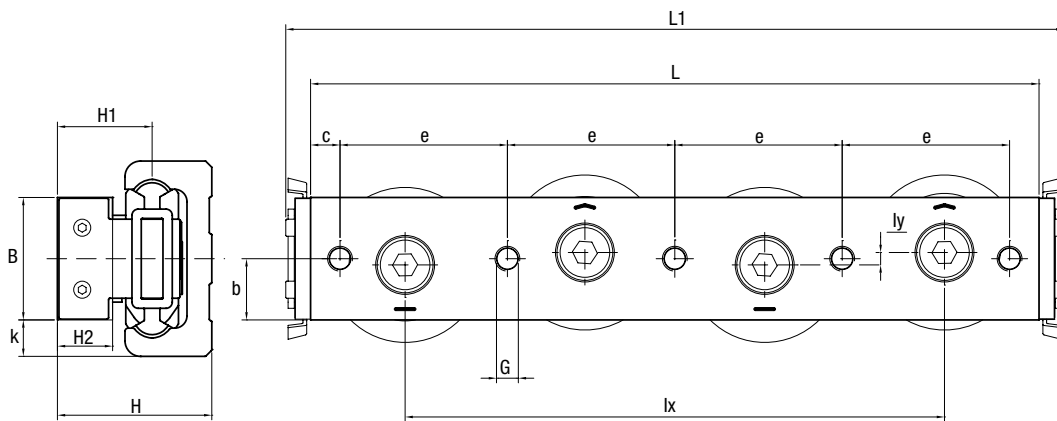
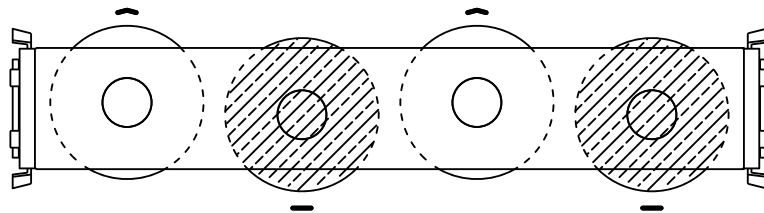
Carriages with steel body with 4 guide rollers for LS guides.



C4 ... A



C4 ... B



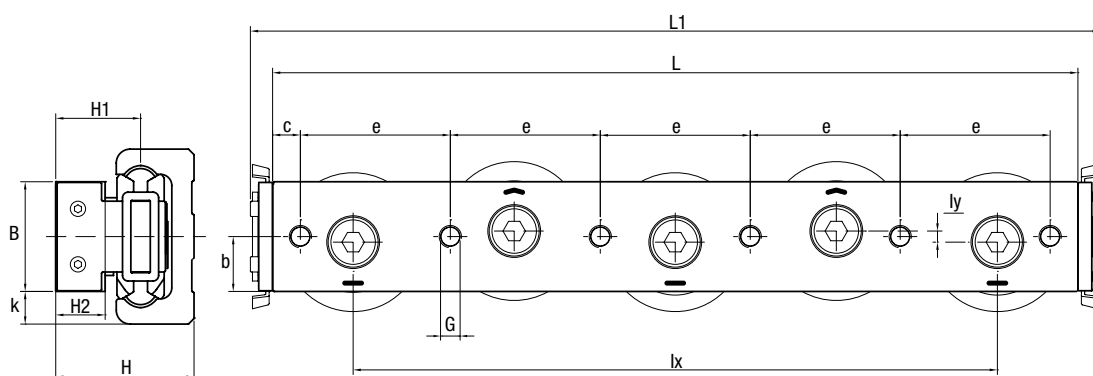
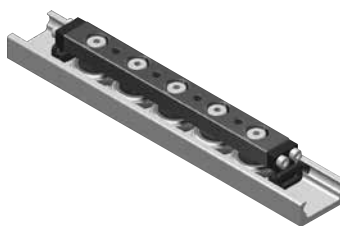
Type	Dimensions (mm)													Weight (kg)	Guide
	L	L1	B	lx	ly	H	H1	H2	G	b	c	e	k		
C4 RCN 28 100 A C4 RCN 28 100 B	100	116	14.9	75	0.5	23.9	14.9	8.9	M5 (2 x)	7.45	25	50	6.55	0.18	LS 28
C4 RCN 43 150 A C4 RCN 43 150 B	150	166	24.9	110	0,75	37	22.5	13.5	M8 (2 x)	12.45	35	80	9.05	0.684	LS 43
C4 RCN 63 235 A C4 RCN 63 235 B	235	251	39.5	174	1	49.8	30.55	17.8	M8 (5 x)	19.75	9.5	54	6.75	2.149	LS 63

- Dimensions also apply to C4 RAN and C4 RYN
- The markings show the contact points with the running surface of the rails

C-LINE

CARRIAGES C5 RCN, C5 RAN, C5 RYN

Carriages with steel body with 5 guide rollers for LS guides.

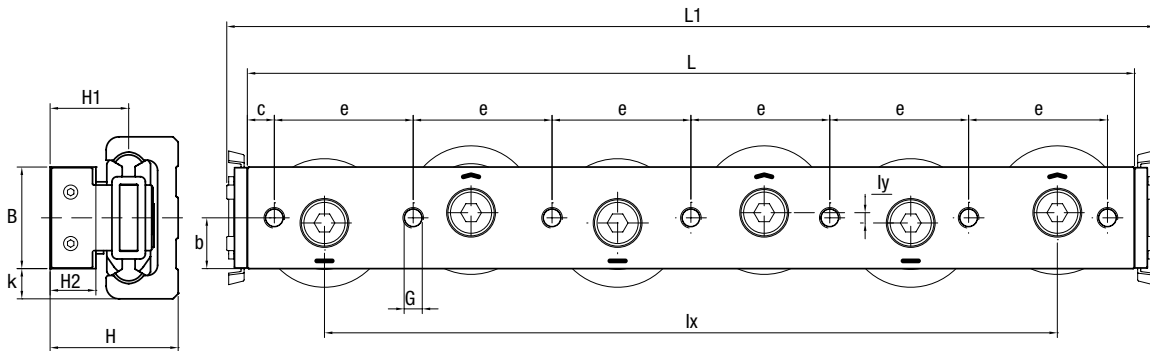
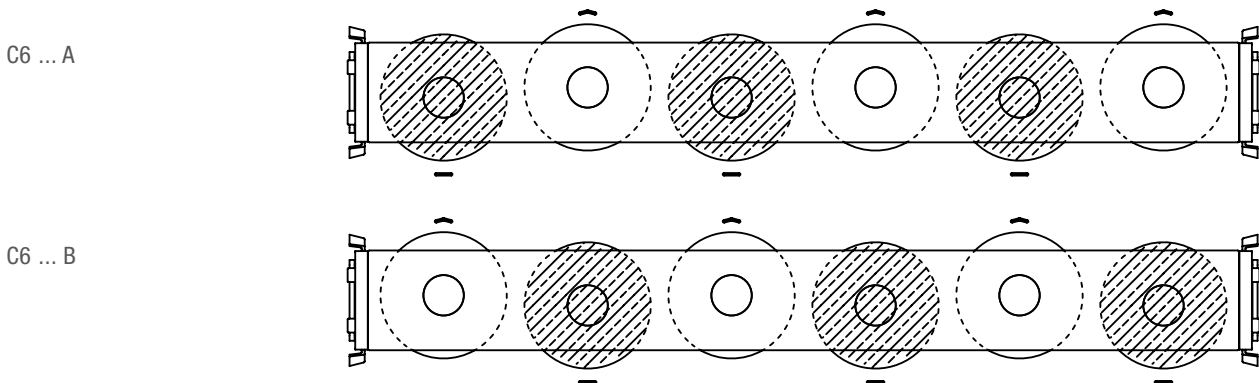
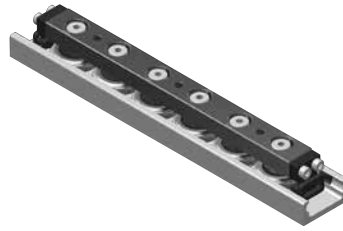


Type	Dimensions (mm)													Weight (kg)	Guide
	L	L1	B	lx	ly	H	H1	H2	G	b	c	e	k		
C5 RCN 28 125	125	141	14.9	98	0.5	23.9	14.9	8.9	M5 (4 x)	7.45	25	25	6.55	0.229	LS 28
C5 RCN 43 190	190	206	24.9	150	0,75	37	22.5	13.5	M8 (4 x)	12.45	35	40	9.05	0.853	LS 43
C5 RCN 63 290	290	306	39.5	232	1	49.8	30.55	17.8	M8 (6 x)	19.75	10	54	6.75	2.672	LS 28

- Dimensions also apply to C5 RAN and C5 RYN
- The markings show the contact points with the running surface of the rails

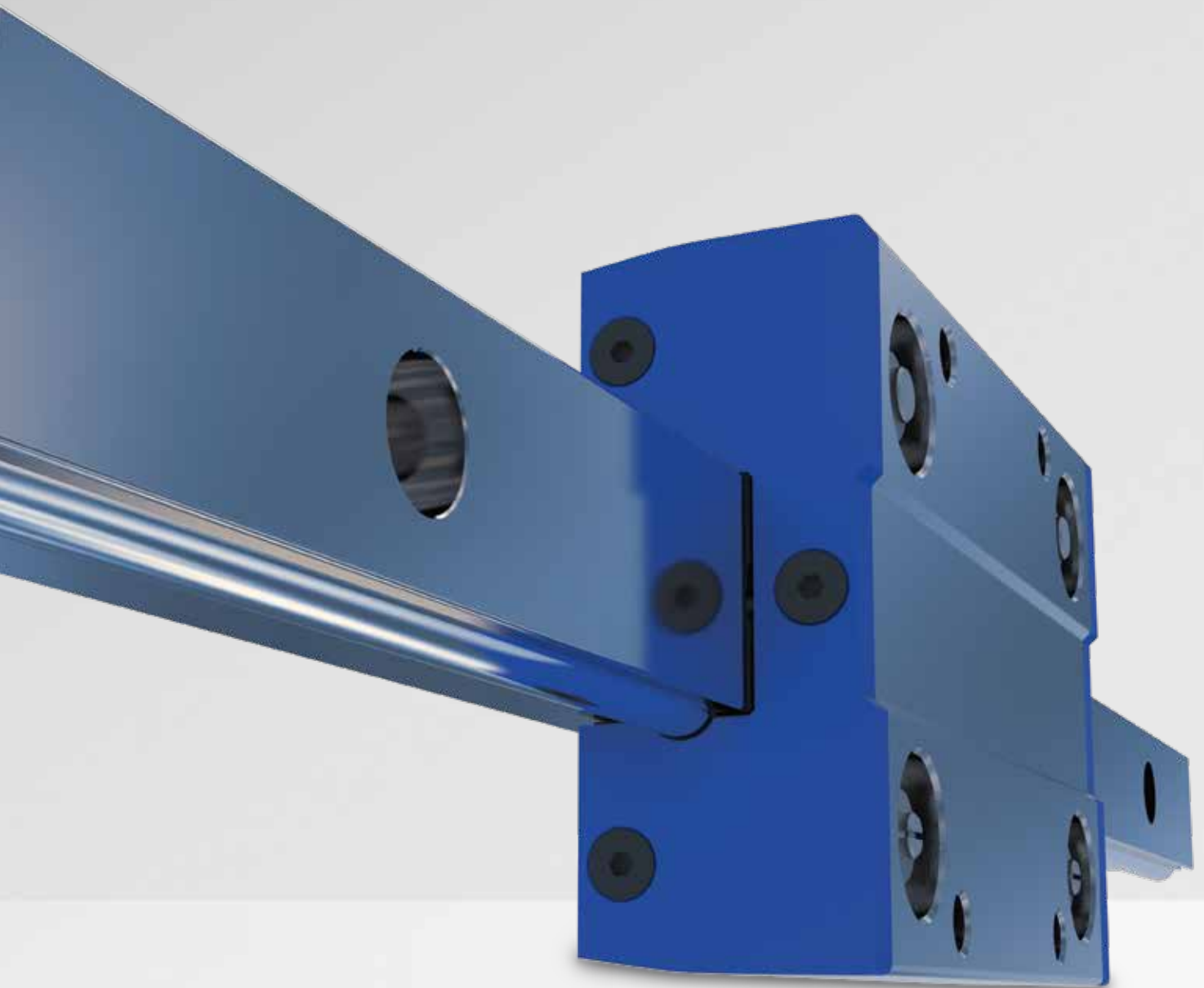
CARRIAGES C6 RCN, C6 RAN, C6 RYN

Carriages with steel body with 6 guide rollers for LS guides.



Type	Dimensions (mm)													Weight (kg)	Guide
	L	L1	B	lx	ly	H	H1	H2	G	b	c	e	k		
C6 RCN 28 150 A C6 RCN 28 150 B	150	166	14.9	125	0.5	23.9	14.9	8.9	M5 (3 x)	7.45	25	50	6.55	0.265	LS 28
C6 RCN 43 230 A C6 RCN 43 230 B	230	246	24.9	190	0,75	37	22.5	13.5	M8 (3 x)	12.45	35	80	9.05	1.036	LS 43
C6 RCN 63 345 A C6 RCN 63 345 B	345	361	39.5	285	1	49.8	30.55	17.8	M8 (7 x)	19.75	10.5	54	6.75	3.158	LS 63

- Dimensions also apply to C6 RAN and C6 RYN
- The markings show the contact points with the running surface of the rails



FLEXI-LINE 645



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8.1 PRODUCT DESCRIPTION

PAGE 125

8.2 FWN SYSTEM

For light-medium loads

- Guide rails FWN
- Carriage TA4
- Carriage TB4

PAGE 127

8.3 MOUNTING EXAMPLE

FLEXI-LINE 645 PRODUCT DESCRIPTION

KEY BENEFITS

- Dimensions according to DIN 645 with flexible configuration
- For light and medium loads
- Ready-to-install

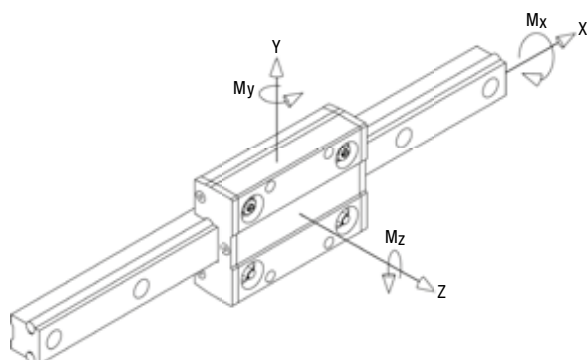


Aluminium guide rails FWN as well as carriages TA4 and TB4 are the components of this line. In addition to the standard dimensions that are DIN 645 compatible, the guide system can be adapted to customers' requirements. Bore holes and threads on the guide rails can be made in any distance required, the carriages may have over-lengths and a special hole pattern.

Compared to linear guides made of steel these guide rails and carriages weigh up to 45 % less and stand out due to their excellent running performance which minimises the driving power and reduces significantly the cost for motors and controls.

With eccentric bolts the guide rollers of the carriages are kept free from play. However the user also has the possibility to change the settings, for example in case of vibrations, and to apply an individual preload on the guide system. On both sides of the carriages end plates with oil-soaked felt seals can be mounted to ensure low-wear operation.

The following graph applies to the loads indicated in the tables:



DYNAMIC LOAD OF THE INDIVIDUAL CARRIAGE

The table below shows the load corresponding to the nominal working life of 100 km. The nominal working life of the carriage can be determined by the standard bearing formula.

$$L_{10} = (C_i / P_i)^3 \times 100 \text{ km}$$

C_i is the carrying capacity in a specific direction and P_i is the load applied in the same direction.

Carriage	C _y (N)	C _z (N)	CM _x (Nm)	CM _y (Nm)	CM _z (Nm)
TA4 GLA 17.06 TB4 GLA 17.06	2596	1445	13	46	84
TA4 GLA 19.06 TB4 GLA 19.06	4920	2700	30	100	180

IMPORTANT REMARK

- Values are calculated on the basis of lubricated rails.
- For combined loads please proceed as indicated in the calculation examples at the end of the catalogue. In case of questions our application engineers will be pleased to assist you.

MAXIMUM LOAD ON INDIVIDUAL CARRIAGES

The table below shows the maximum load that can be applied to an individual carriage.

Carriage	F _y (N)	F _z (N)	M _x (Nm)	M _y (Nm)	M _z (Nm)
TA4 GLA 17.06 TB4 GLA 17.06	600	400	5	15	20
TA4 GLA 19.06 TB4 GLA 19.06	1700	960	19	33	70

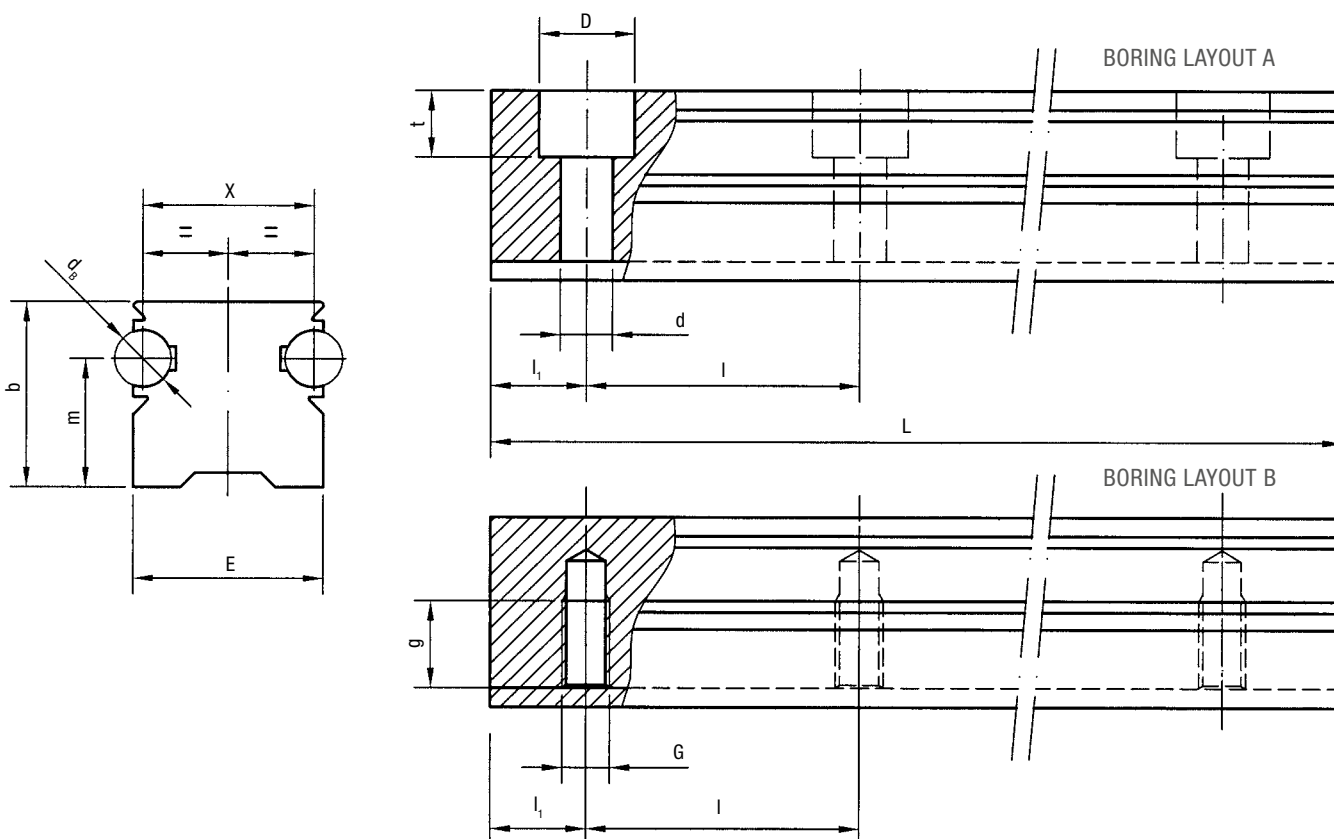
FLEXI-LINE 645 – FWN SYSTEM

GUIDE RAILS FWN

9.2

Rail composed by an aluminium body and two shafts in steel, with two raceways. Dimensions according to DIN 645.

Available in stainless steel version.



Type	Dimensions (mm)												Weight (kg/m)
	d_B	E	X	D	d	G	g	m	t	b	l_1	l	
FWN 20	6	20	18	10	5.5	M6	12	13.5	7	19.5	30	60	1.3
FWN 25	6	23	21	11	6.6	M6	12	18.0	8.5	25.5	30	60	1.8

Max. length in single element $L = 5800$ mm. Longer rails are supplied in sections with ground butt joints and, on request, with pin connection

HOLE LAYOUT

- Holes according to DIN (A or B)
- Finishes to drawing (NZ)
- Without holes (NF)

OPTIONAL FEATURES

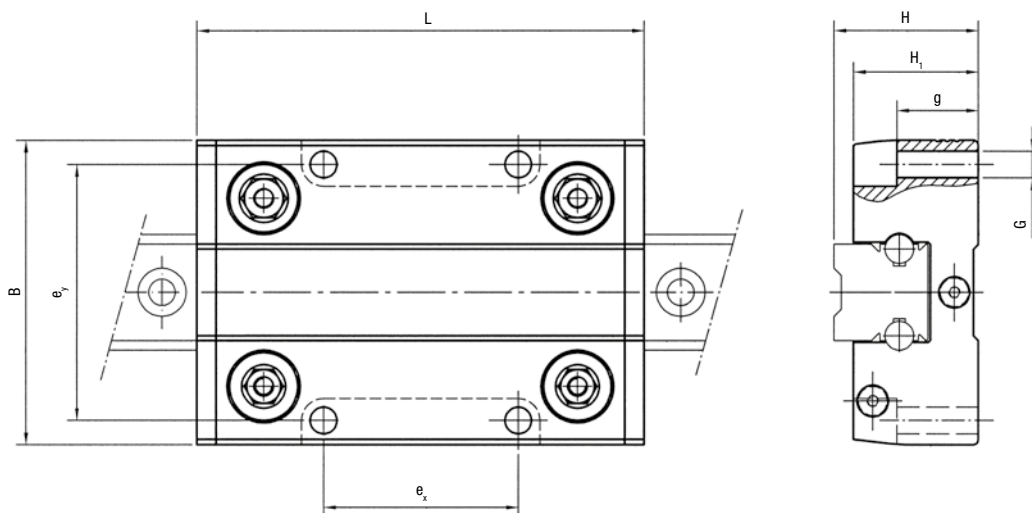
- Ground one end: side of the first hole (1R), side of the last hole (2R)
- Ground both ends (RR)
- Stainless steel shafts (NX)
- Chromium plated shafts (CH)
- Pin based shaft connection (G)

Example of standard designation: FWN 20 / 1000 A

FLEXI-LINE 645 – FWN SYSTEM

CARRIAGE TA4 AND TB4

Carriages with anodised aluminium body
with four guide rollers type GLA for FWN rails.
Dimensions according to DIN 645.

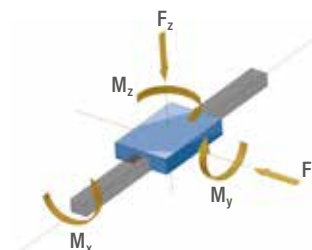


Type	Dimensions (mm)								Weight (kg)	Suggested combinations
	B	G	H	H ₁	L	e _x	e _y	g		
TA4 GLA 17.06	63	M6	30	26	92	40	53	12	0.3	FWN 20
TA4 GLA 19.06	70	M8	36	31	104	45	57	16	0.4	FWN 25
TB4 GLA 17.06	63	5,5	30	26	92	40	53	17	0.25	FWN 20
TB4 GLA 19.06	70	6,6	36	31	104	45	57	23,5	0.35	FWN 25

Longer carriages on request

MAX. LOAD ON A SINGLE CARRIAGE

Carriage	F _y (N)	F _z (N)	M _x (Nm)	M _y (Nm)	M _z (Nm)
TA4 GLA 17.06	600	400	5	15	20
TA4 GLA 19.06	1700	960	19	33	70
TB4 GLA 17.06	600	400	5	15	20
TB4 GLA 19.06	1700	960	19	33	70



OPTIONAL FEATURES

- Available with felts for lubrication, non lubricated (UU).
On request the felts can be supplied lubricated

FLEXI-LINE 645 MOUNTING EXAMPLE

Medical equipment
Flexi-Line

