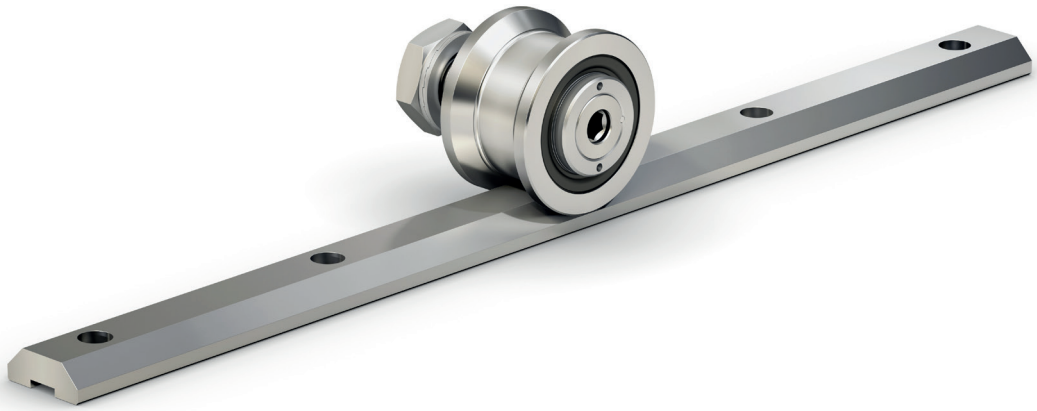
NADELLA ROLLON BY TIMKEN

HEAVY-LINE

Data sheet - rev. 1.0



LINEAR COMPONENTS

myRollon

MyRollon is **your digital working platform** for linear guides, telescopic slides, actuators and actuator systems.

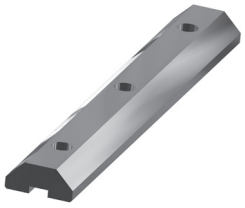
With myRollon, it is possible to determine the best linear motion solution according to your application specifications.

SCAN ME!

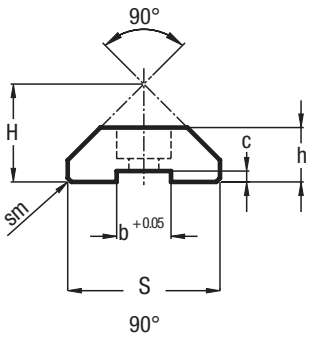
Index

GU SYSTEM
GUIDE RAILS GU ... M, GU ... MT

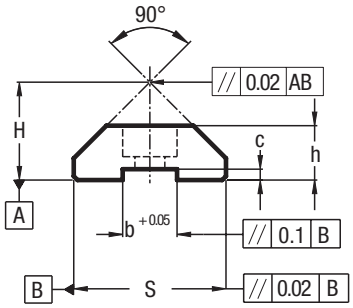
The longitudinal slot, made with + 0.05 tolerance, permits using reference elements SAG for guide positioning.

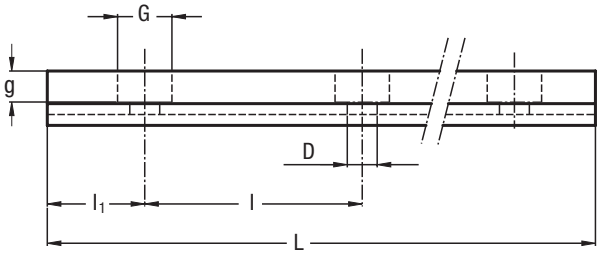


GU ... MT



GU ... M





Type	Dimensions (mm)											Weight [1] (kg/m)
	H ± 0.05	h ± 0.05	S ± 0.05	D + 0.1	G	g	b + 0.05	c ± 0.05	sm	l	l_1	
GU 28 MT	19	11	28.8	5.5	10	5.7	10	2.5	0.7 x 45°	90	30	1.97
GU 35 MT	23.9	15.7	35.5	6.6	11	6.8	10	3.8	1 x 45°	90	30	3.35
GU 50 MT	35.5	21	50.8	11	18	11	16	4.3	1 x 45°	90	30	6.89

Max. length in single element L = 4020 mm.
Longer rails are made by juxtaposing several elements with ground end.

1) Weight without holes

Type	Dimensions (mm)										Weight [2] (kg/m)
	H ± 0.05	h ± 0.05	S ± 0.05	D + 0.1	G	g	b + 0.05	c ± 0.05	l	l_1	
GU 28 M	18	10	28	5.5	10	5.7	10	2	90	30	1.8
GU 35 M	23	15	35	6.6	11	6.8	10	3.3	90	30	3.2
GU 50 M	34.5	20	50	11	18	11	16	3.8	90	30	6.8

Max. length in single element L = 4020 mm.
Longer rails are made by juxtaposing several elements with ground end.

2) Weight without holes

RAILS FINISHING

- Drawn, induction hardened and sandblasted tracks (MT)
- Drawn, induction hardened and ground (M)
- Induction hardening on raceways only

HOLE LAYOUT

- Holes according to catalogue (SB)
- Finishes to drawing (NZ)
- Without holes (NF)

OPTIONAL FEATURES

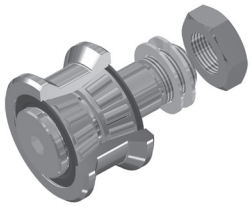
- Ground one end: side of the first hole (1R), side of the last hole (2R)
- Ground both ends (RR)
- Chemical nickel-plating (NW)

Example of standard designation: GU 35 MT 4300 SB

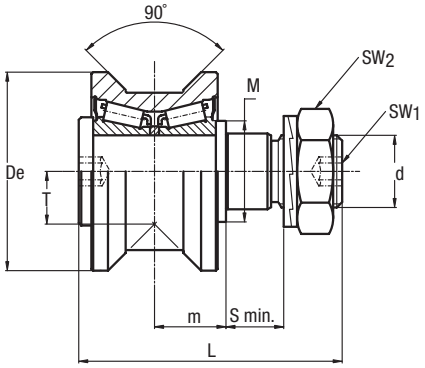
GU SYSTEM
GUIDE ROLLERS RKU

Guide rollers with tapered roller bearings.
The sides of the race are convex with radius R = 400.

Available in stainless steel version. NX



CONCENTRIC



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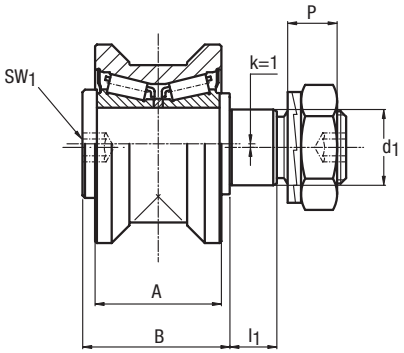


Type		Dimensions (mm)														
concentric	eccentric	De	d_1 [1]	d	T	m	S min.	P	L	A	B	l_1	M	SW_1	SW_2	k
RKU 55	RKUR 55	55	21	M20 x 1.5	14.6	19.8	15	13.4	73	35	41	14	28	8	30	1
RKU 65	RKUR 65	65	27	M24 x 1.5	18	20.8	19	15.4	83	37	44	18	35	10	36	1
RKU 75	RKUR 75	75	36	M30 x 1.5	23.7	27	19	21.6	100	45	55	18	44	12	46	1
RKU 95	RKUR 95	95	38	M36 x 1.5	25.5	30	24	24.6	115	53 56[2]	62	23	50	14	55	1
RKU 115	RKUR 115	115	42	M36 x 1.5	33.5	34	33	24.6	135	60 63[2]	70	32	56	14	55	1

1) Housing bore tolerance: H7
2) Dimensions relating to the stainless-steel rollers (suffix NX)

Type		Dynamic load (N)	Limit loads (N)		Life coefficients		Torque wrench settings[4] (Nm)	Weight (kg)
		C_w [3]	Radial F_r	Axial F_a	X	Y		
RKU 55	RKUR 55	42000	11900	3900	1	4	80	0.6
RKU 65	RKUR 65	48000	17000	6900	1	3.7	160	0.9
RKU 75	RKUR 75	69000	28500	10200	1	3.4	300	1.6
RKU 95	RKUR 95	134000	29000	12700	1	4.5	450	2.8
RKU 115	RKUR 115	190000	45000	17900	1	4.4	450	4.9

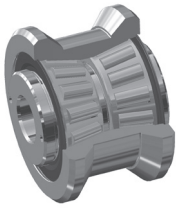
3) Cw basic load for 100 km
4) The torque wrench settings are given for non-lubricated threads; for lubricated threads, multiply figure by 0.8

- Standard seals: material NBR, RS type
- On request, the guide rollers can be supplied with external parts in stainless steel (suffix NX) and with Viton seals for operating temperatures up to 120°C (suffix V, not available for RKU 115). Internal rolling elements in standard bearing steel
- The guide rollers include self-locking washers and hexagonal nut (DIN 439B) for fitting
- Pressure angle α for load calculation: 45°

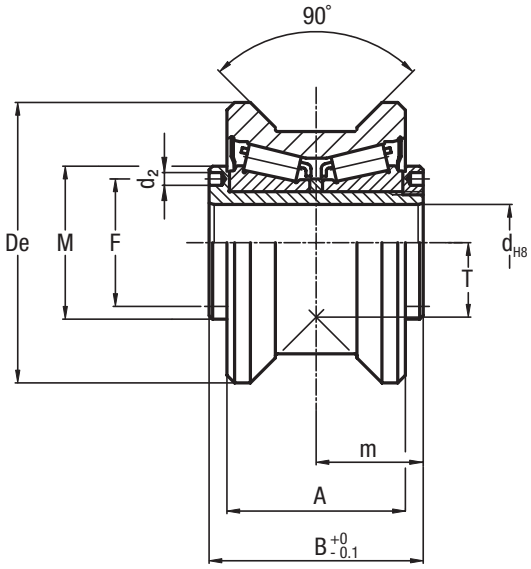
Tables refer to steel rollers, in case of inox version load capacity may change. Please contact technical department for further informations.

GU SYSTEM
GUIDE WHEELS FKU

Guide wheel with tapered roller bearings.
The sides of the race are convex with radius R = 400.



Available in stainless steel version. NX



Type	Dimensions (mm)								
	De	d	T	m	A	B	F	d_2 [2]	M
FKU 55	55	15	14.6	21	35	42	25	2.5	30
FKU 65	65	20	18	22.5	37	45	29	3	35
FKU 75	75	25	23.7	28	45	56	37	4	44
FKU 95	95	28	25.5	32	53 56[1]	64	42	4	49
FKU 115	115	35	33.5	36	60 63[1]	72	52	4	59

1) Dimensions relating to the stainless-steel rollers (suffix NX)
2) To prevent rotation between roller and shaft a pin can be fitted in one of the holes "d2" positioned in the side flange

Type	Dynamic load (N)	Limit loads (N)		Life coefficients		Weight (kg)
	C_w [3]	Radial F_r	Axial F_a	X	Y	
FKU 55	42000	11900	3900	1	4	0.5
FKU 65	48000	17000	6900	1	3.7	0.6
FKU 75	69000	28500	10200	1	3.4	1.2
FKU 95	134000	29000	12700	1	4.5	2.3
FKU 115	190000	45000	17900	1	4.4	3.9

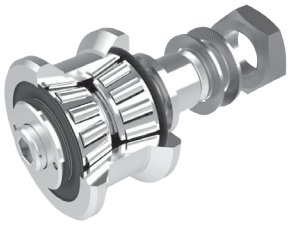
3) C_w = Basic load for 100 Km

- Viton seals for operating temperatures up to 120°C (suffix V) on request, not available for FKU 115.
- On request the guide rollers can be supplied with external parts in stainless steel (suffix NX). Internal rolling elements in standard bearing steel
- Pressure angle α for load calculation: 45°
- Standard seals: material NBR, RS type

Tables refer to steel rollers, in case of inox version load capacity may change. Please contact technical department for further informations.

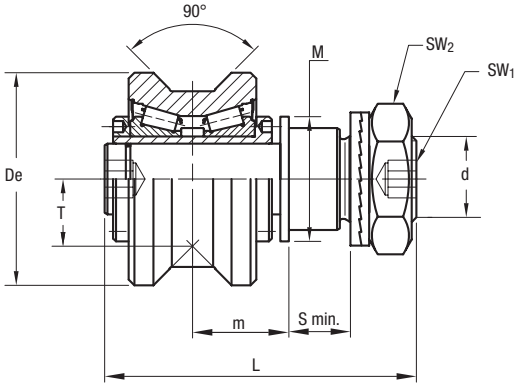
GU SYSTEM
FLOATING GUIDE ROLLERS RKUL

Floating guide rollers with tapared roller bearings.



Available in stainless steel version. NX

CONCENTRIC



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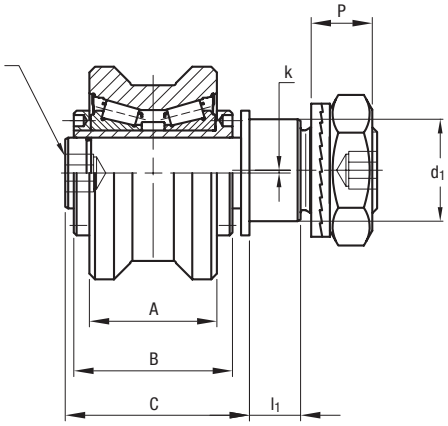


Type		Dimensions (mm)																
concentric	eccentric	De	d_1 [1]	d	T	m [2] min.	m [2] max.	S min.	P	L	A	B	C	l_1	M	SW_1	SW_2	k
RKUL 55	RKULR 55	55	21	M20 x 1.5	14.6	24	30	15	13.4	83	35	42	51	14	30	8	30	1
RKUL 65	RKULR 65	65	27	M24 x 1.5	18	25.5	31.5	19	15.4	93	37	45	54	18	35	10	36	1
RKUL 75	RKULR 75	75	36	M30 x 1.5	23.7	31	37	19	21.6	110	45	56	65	18	44	12	46	1
RKUL 95	RKULR 95	95	38	M36 x 1.5	25.5	36	43	24	24.6	128	53 56[3]	64	75	23	49	14	55	1
RKUL 115	RKULR 115	115	42	M36 x 1.5	33.5	40	47	33	24.6	148	60 63[3]	72	83	32	59	14	55	1

1) Housing bore tolerance: H7
2) To ensure a safe and proper functioning the dimension m must not be higher then m max.
3) Dimensions for stainless steel (NX) version

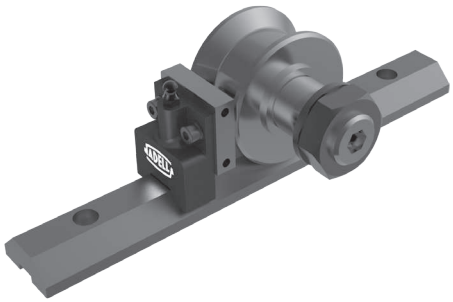
Type		Dynamic load (N)	Limit loads (N)	Torque wrench settings [5] (Nm)	Weight (kg)
		C_w [4]	Radial F_r		
RKUL 55	RKULR 55	42000	3050	80	0.8
RKUL 65	RKULR 65	48000	6850	160	1.1
RKUL 75	RKULR 75	69000	11200	300	1.8
RKUL 95	RKULR 95	134000	13800	450	3.0
RKUL 115	RKULR 115	190000	24000	450	5.1

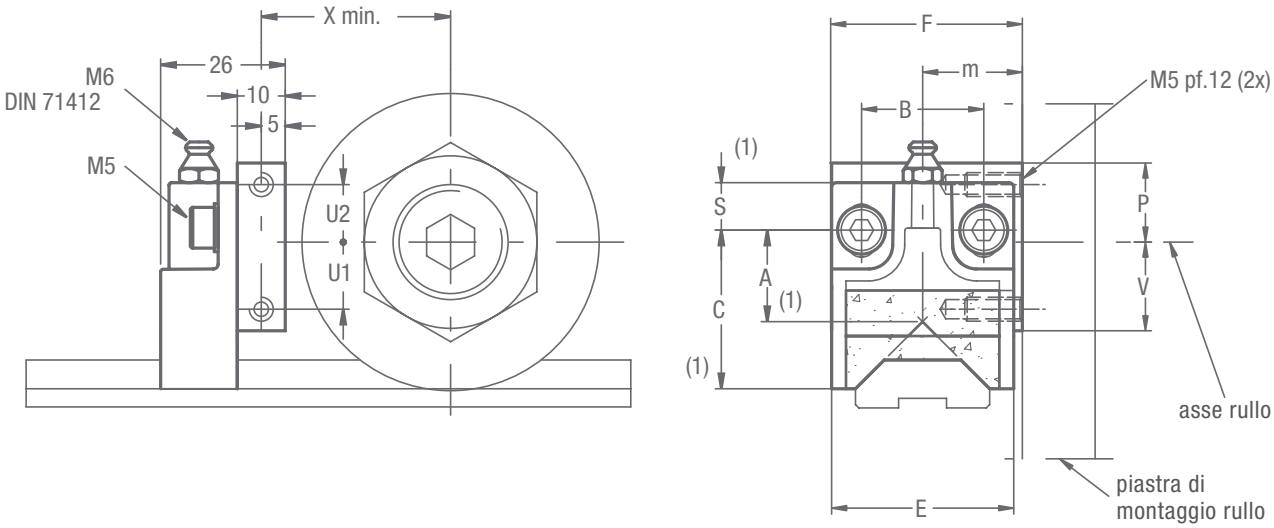
4) C_w = Basic load for 100 km
5) The torque wrench settings are given for non-lubricated threads; for lubricated threads multiply figure by 0.8

- On request the guide rollers can be supplied with external parts in stainless steel (suffix NX). Internal rolling elements in standard bearing steel
- Standard seals: material NBR, RS type
- Pressure angle α for load calculation: 45°
- On request guide rollers can be supplied with Viton seals for operating temperatures up to 120°C (suffix V, not available for RKUL 115)
- The guide rollers include self-locking washers and hexagonal nut (DIN 439B) for fitting

Tables refer to steel rollers, in case of inox version load capacity may change. Please contact technical department for further informations.

GU SYSTEM
LUBRICATOR LUBU





Type	Dimensions (mm)												Weight (g)	Suggested combinations
	X	U1	U2	F	m	B	S [1]	C [1]	A [1]	E	V	P		
LUBU 55	35	12	14	40	19.8	25.5	10	34	20	38	16.5	18.5	65	RKU 55, RKUR 55, FKU 55
LUBU 65	40	14	12	40	20.8	25.5	10	34	20	38	18.5	16.5	65	RKU 65, RKUR 65, FKU 65
LUBU 75	45	19	11	50	27	25.5	10	43	25.4	44	24	16	85	RKU 75, RKUR 75, FKU 75
LUBU 95	55	21	9	60	30	30	16.5	50	24.9	58	31	19	140	RKU 95, RKUR 95, FKU 95
LUBU 115	65	30	0	63	34	30	16.5	50	24.9	58	40	10	140	RKU 115, RKUR 115, FKU 115

1) The dimension of the plastic part refers to the centre of the regulation-slot. Allows a translation of +/- 3 mm

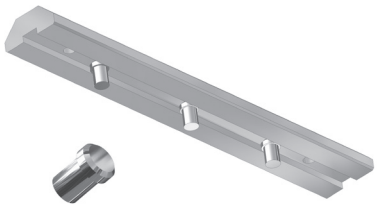
- The lubricator is supplied with the felt already lubricated. The lubricant has a mineral oil base
- During the mounting fix the aluminium support to the rollers plate, adjust the height of the plastic part in order to put it in contact with the raceways and than block it in that position with the M5 screws

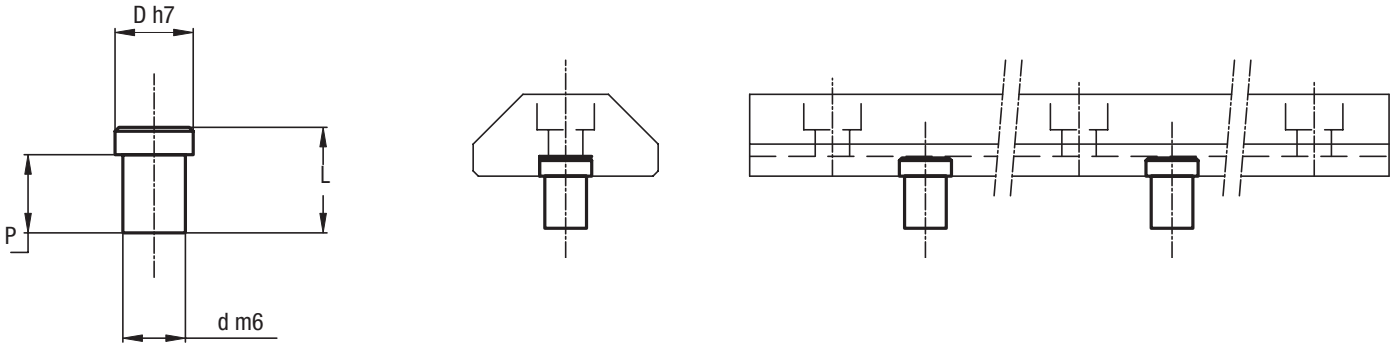
OPTIONAL FEATURES

- Felt without lubricant (D)

GU SYSTEM
GUIDE PINS SAG

Guide pins for mounting alignment.

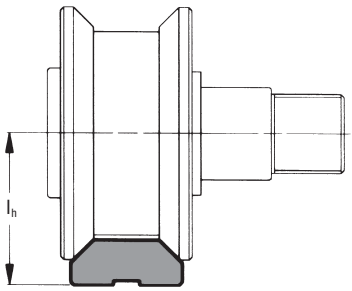




Pin type	Guide type	Dimensions (mm)			
		D	d [1]	P	L
SAG 28	GU 28 MT	10	8	10	12.3
SAG 35	GU 35 MT	10	8	10	13.5
SAG 50	GU 50 MT	16	10	11.2	15

1) Housing bore tolerance: H7

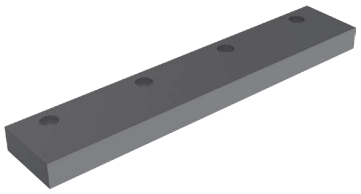
GU SYSTEM
GUIDE ROLLER COMBINATIONS (RKU, FKU, RKUL)

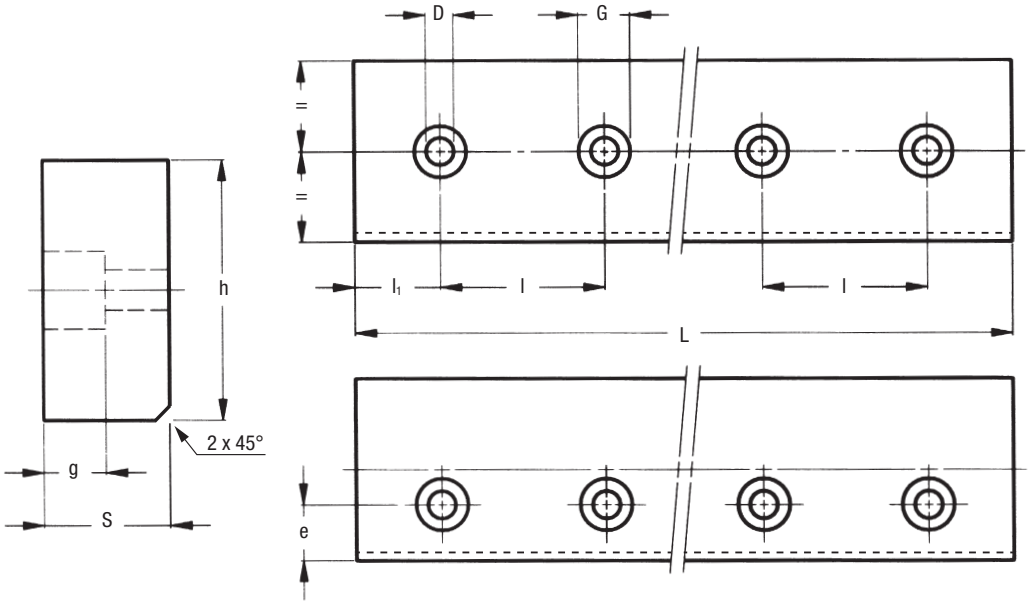


		Roller				
	Type	l_h (mm)				
		RKU, FKU, RKUL 55	RKU, FKU, RKUL 65	RKU, FKU, RKUL 75	RKU, FKU, RKUL 95	RKU, FKU, RKUL 115
Guide	GU 28 MT	33.6	37	–	–	–
	GU 28 M	32.6	36	–	–	–
	GU 35 MT	–	41.9	47.6	–	–
	GU 35 M	–	41	46.7	–	–
	GU 50 MT	–	–	–	61	69
	GU 50 M	–	–	–	60	68

GP SYSTEM
GUIDE RAIL GP ... M

Rail in steel, rough ground raceways.





BORING LAYOUT SA

BORING LAYOUT SB

Type	Dimensions (mm)								Weight [1] (kg/m)
	h ± 0.05	S ± 0.05	D	G	g	e	l	l_1	
GP 2626 M	26	26	9	15	9	[2]	120	50	5.3
GP 3232 M	32	32	9	15	9	[2]	150	60	8.1
GP 3617 M	36	17	6.5	11	6.8	12.5	120	50	4.8
GP 4321 M	43	21	9	15	9	11.5	150	60	7
GP 5050 M	50	50	18	26	17	[2]	180	60	19.6
GP 6222 M	62	22	9	15	9	21	150	60	10.7
GP 7232 M	72	32	13.5	20	13	24	180	70	18.1
GP 8222 M	82	22	13.5	20	13	20	180	70	14.2

Max. length in single element L = 3000 mm.
Longer rails are made by juxtaposing several elements with ground end.

1) Weight without holes
2) For boring layout A only

RAILS FINISHING

- Material: induction hardened steel
- Induction hardened on four sides
- Surface finished by tangential grinding (M)

HOLE LAYOUT

- Holes according to catalogue (SA or SB)
- Finishes to drawing (NZ)
- Without holes (NF)

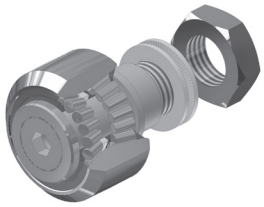
OPTIONAL FEATURES

- Ground one end: side of the first hole (1R), side of the last hole (2R)
- Ground both ends (RR)
- Chemical nickel plating (NW)

Example of standard designation: GP 6222 M 4300 SA, GP 6222 M 4300 SB

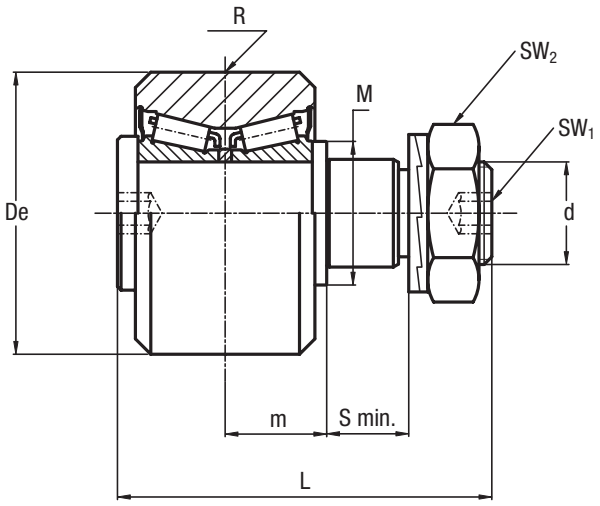
GP SYSTEM
GUIDE ROLLERS PK

Guide roller with tapered roller bearings.



Available in stainless steel version. NX

CONCENTRIC



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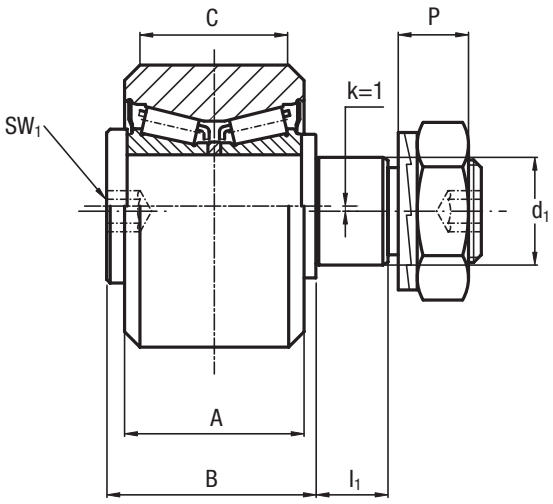


Type		Dimensions (mm)															
concentric	eccentric	D_e	d_1 [1]	d	m	S min.	P	L	A	B	C	R	l_1	M	SW_1	SW_2	k
PK 52 C	PKR 52 C	52	21	M20 x 1.5	19.8	15	13.4	73	35	41	29	800	14	28	8	30	1
PK 62 C	PKR 62 C	62	27	M24 x 1.5	20.8	19	15.4	83	37	44	29	800	18	35	10	36	1
PK 72 C	PKR 72 C	72	36	M30 x 1.5	27	19	21.6	100	45	55	33	1200	18	44	12	46	1
PK 90 C	PKR 90 C	90	38	M36 x 1.5	30	24	24.6	115	53 56 [2]	62	45	1200	23	50	14	55	1
PK 110 C	PKR 110 C	110	42	M36 x 1.5	34	33	24.6	135	60 63 [2]	70	48	1200	32	56	14	55	1

1) Housing bore tolerance: H7
2) Dimensions relating to the stainless-steel rollers (suffix NX)

Type		Dynamic load (N)	Limit loads (N)	Torque wrench settings [4] (Nm)	Weight (kg)
		C_w [3]	Radial F_r		
PK 52 C	PKR 52 C	42000	11900	80	0.6
PK 62 C	PKR 62 C	48000	22100	160	0.9
PK 72 C	PKR 72 C	69000	31300	300	1.6
PK 90 C	PKR 90 C	134000	43800	450	2.8
PK 110 C	PKR 110 C	190000	55600	450	4.9

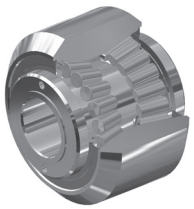
3) C_w = basic load for 100 km
4) The torque wrench settings are given for non-lubricated threads; for lubricated threads, multiply figure by 0.8

- On request, the guide rollers can be supplied with external parts in stainless steel (suffix NX) and with Viton seals for operating temperatures up to 120°C (suffix V, not available for dimension PK 110 C). Internal rolling elements in standard bearing steel
- The guide rollers are complete with self-locking washers and hexagonal nut (DIN 439B) for fitting
- Standard seals: material NBR, RS type

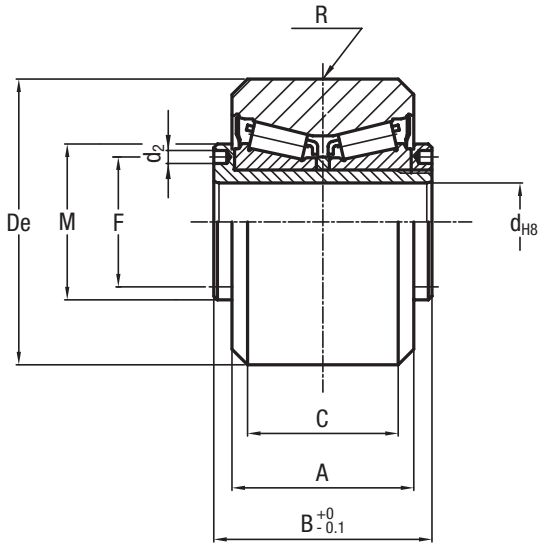
Tables refer to steel rollers, in case of inox version load capacity may change. Please contact technical department for further informations.

GP SYSTEM
GUIDE WHEELS FK

Guide wheel with tapered roller bearings.



Available in stainless steel version. NX



Type	Dimensions (mm)								
	D_e	d	A	B	C	R	F	d_2	M
FK 52 C	52	15	35	42	29	800	25	2.5	30
FK 62 C	62	20	37	45	29	800	29	3	35
FK 72 C	72	25	45	56	33	1200	37	4	44
FK 90 C	90	28	53 56[1)]	64	45	1200	42	4	49
FK 110 C	110	35	60 63[1)]	72	48	1200	52	4	59

1) Dimensions relating to the stainless-steel rollers (suffix NX)

Type	Dynamic load (N)	Limit loads (N)	Weight (kg)
	C_w [2)]	Radial F_r	
FK 52 C	42000	11900	0.5
FK 62 C	48000	22100	0.6
FK 72 C	69000	31300	1.2
FK 90 C	134000	43800	2.3
FK 110 C	190000	55600	3.9

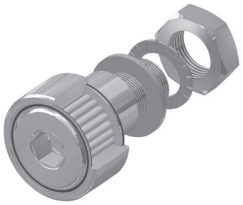
2) C_w = basic load for 100 km

- On request, the guide rollers can be supplied with external parts in stainless steel (suffix NX) and with Viton seals for operating temperatures up to 120°C (suffix V, not available for dimension FK 110 C). Internal rolling elements in standard bearing steel
- To prevent rotation between roller and shaft a pin can be fitted in one of the holes “d2” positioned in the side flange
- Standard seals: material NBR, RS type

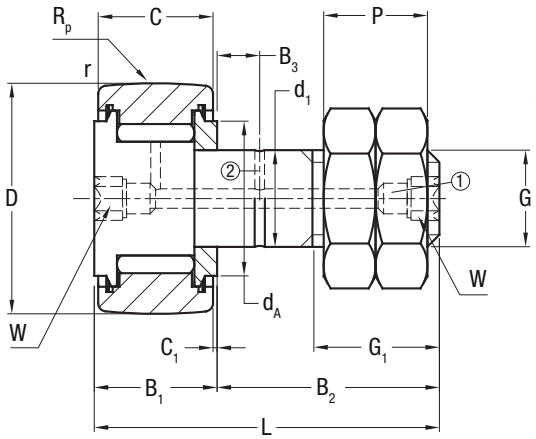
Tables refer to steel rollers, in case of inox version load capacity may change. Please contact technical department for further informations.

GP SYSTEM
CAM FOLLOWERS GC..SW

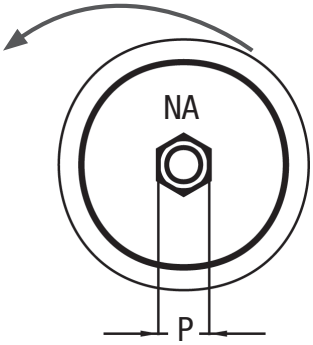
Cam followers with full complement of rollers with external diameter from 16 mm to 90 mm.



Available in stainless steel version. NX



Hole 1 starting from D=22 mm
Hole 2 starting from D=30 mm



DIRECTION FOR ADJUSTMENT OF THE EXCENTER

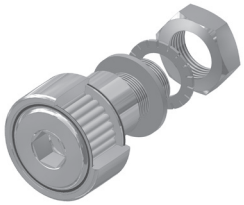
∅ outer D mm	Designation [1] GC .. SW	d_1 [2] mm	L mm	B_1 mm	B_2 mm	Threading G mm	G_1 mm	C mm	C_1 mm	d_A mm	B_3 mm	r mm	R_p [3] mm
16	16	6	28,2	12,2	16,5	M6x1	8	11	0,6	13,3		0,3	500
19	19	8	32,2	12,2	20,5	M8x1.25	10	11	0,6	15,3		0,3	500
22	22	10	36,2	13,2	23,5	M10x1.25	12	12	0,6	18,2		0,3	600
24	24	10	36,2	13,2	23,5	M10x1.25	12	12	0,6	18,2		0,3	600
26	26	10	36,2	13,2	23,5	M10x1.25	12	12	0,6	20,8		0,3	600
28	28	10	36,2	13,2	23,5	M10x1.25	12	12	0,6	20,8		0,3	600
30	30	12	40,2	15,2	25,5	M12x1.5	13	14	0,6	24,8	6	0,6	700
32	32	12	40,2	15,2	25,5	M12x1.5	13	14	0,6	24,8	6	0,6	700
35	35	16	52,2	19,6	33	M16x1.5	17	18	0,8	28,8	8	0,6	800
40	40	18	58,1	21,6	37	M18x1.5	19	20	0,8	33,8	8	1	1000
47	47	20	66,1	25,6	41	M20x1.5	21	24	0,8	38,7	9	1	1200
52	52	20	66,1	25,6	41	M20x1.5	21	24	0,8	38,7	9	1	1200
62	62	24	80,1	30,6	50	M24x1.5	25	29	0,8	52	11	1	1500
72	72	24	80,1	30,6	50	M24x1.5	25	29	0,8	52	11	1	1500
80	80	30	100	37	63,5	M30x1.5	32	35	1	68	15	1	1700
85	85 [9]	30	100	37	63,5	M30x1.5	32	35	1	68	15	1	1700
90	90	30	100	37	63,5	M30x1.5	32	35	1	68	15	1	1700

1) Cam follower with stud designation
GC..SW Concentric cam follower with stud optimised profile outer ring
GCL..SW Concentric cam follower with stud cylindrical outer ring (product available on request)
GCR.. Cam follower with stud with eccentric collar
No suffix Without seal
Suffix ..EE With plastic seal, ex. GC40EESW
Suffix ..EEM With metal seal, ex. GC40EEMSW
2) Hole diameter for assembly of concentric cam follower without stud: d_1 H7
3) Convex radius in the central part to contact pressure calculation

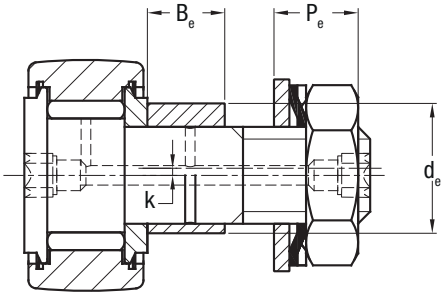
Tables refer to steel rollers, in case of inox version load capacity may change. Please contact technical department for further informations.

GP SYSTEM
CAM FOLLOWERS GC..SW

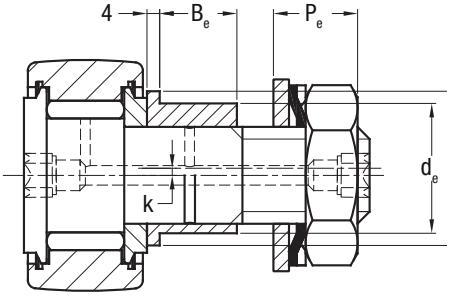
Cam followers with full complement of rollers with external diameter from 16 mm to 90 mm.



Available in stainless steel version. NX



from GCR16SW to GCR52SW



from GCR62SW to GCR90SW

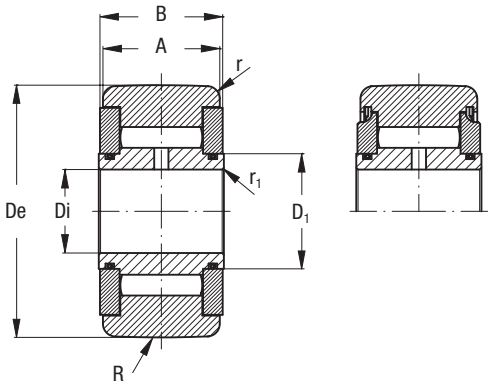
W mm	P [7] mm	Eccentric bearing					Load coefficients (N) [6]				Greasing speed limit with grease (min^{-1})	Weight of nut and washers Kg	Clamping torque Nm	∅ outer D mm
		d_e [4] [5] mm	k [5] mm	M [5] mm	B_e [5] mm	P_e [8] mm	Din. C_{w1} [10]	Din. C_{w2} [11]	Din. F_r	Stat. For.				
4	6,4	9	0,5		8	5,6	4900	4000	1200	2300	5000	0,024	3	16
4	8	11	0,5		10	6,4	5600	4800	2900	5400	4100	0,039	8	19
4	10	14	1		11	7,9	6900	6200	5300	9400	3400	0,057	20	22
4	10	14	1		11	7,9	7600	7000	5300	9800	3400	0,072	20	24
4	10	14	1		11	7,9	8600	8100	5300	9800	3000	0,08	20	26
4	10	14	1		11	7,9	9200	8900	5300	9800	3000	0,088	20	28
6	12	16	1		11	9,5	13000	12800	7900	15000	2600	0,118	26	30
6	12	16	1		11	9,5	13000	13000	7900	15000	2600	0,126	26	32
10	16	21	1,5		14	12,2	18000	18500	14000	23000	2100	0,22	64	35
12	18	24	1,5		16	13,4	22000	23600	19000	34000	1800	0,321	90	40
14	20	27	2		17,5	14,4	27000	30300	22000	35000	1500	0,5	120	47
14	20	27	2		17,5	14,4	33000	38200	22000	40000	1500	0,568	120	52
12	24	36	3	44	18	17,5	42000	51300	31000	58000	1200	1,035	220	62
12	24	36	3	44	18	17,5	46000	58800	31000	58000	1200	1,278	220	72
14	30	42	3	50	27	20,6	58000	76500	50000	93000	900	2,074	450	80
14	30	42	3	50	27	20,6	61000	81900	50000	93000	900	2,235	450	85
14	30	42	3	50	27	20,6	63000	86100	50000	93000	900	2,435	450	90

4) Hole diameter for assembly of the eccentric cam follower without stud: d_e H7
5) Dimensions of the eccentric bearing.
6) Fr and For load for cam follower without stud, with no eccentric collar.
7) The GC concentric cam followers with stud are supplied with two clamping nuts.
8) GCR eccentric cam followers with stud are supplied with eccentric bearing already fitted, clamping nut, cogged washer and support surface washer.
9) Product available on request
10) Cw_1: Calculation coefficient for service life with 1 million rpm base
11) Cw2: Calculation coefficient for the duration with base 100 km

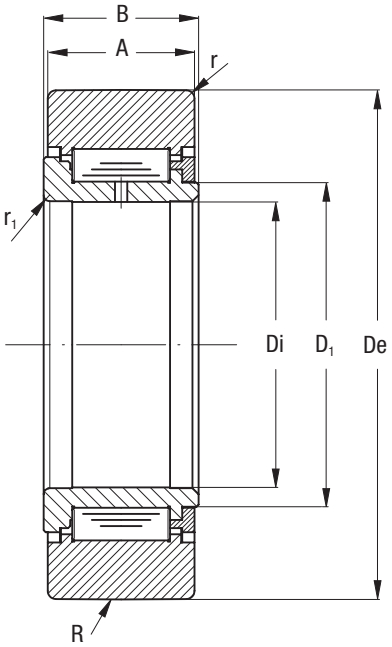
Tables refer to steel rollers, in case of inox version load capacity may change. Please contact technical department for further informations.

GP SYSTEM
CAM FOLLOWERS FG NEEDLE AND FGU ROLLER

FG series without seals
FG … EEM series with metal shields



FGU
FGU ... MM series: with metal shields



Type	Dimensions (mm)								
	D_e	D_i	A	B max.	D_1	M min.[1)]	r min.	r_1 min.	R
FG 6 19 SW	19	6	11	12	8.5	12	0.3	0.3	160
FG 10 30 SW	30	10	14	15	13.8	19.5	0.6	0.3	250
FG 12 32 SW	32	12	14	15	16	21.5	0.6	0.3	250
FG 15 35 SW	35	15	18	19	18.7	24	0.6	0.3	320
FG 17 40 SW	40	17	20	21	22	28	0.6	0.3	400
FG 20 47 SW	47	20	24	25	25.7	32.5	1	0.3	500
FG 25 52 SW	52	25	24	25	30.5	37	1	0.3	500
FG 30 62 SW	62	30	28	29	35.2	44	1	0.3	640
FG 35 72 SW	72	35	28	29	41	50	1	0.6	640
FG 40 80 SW	80	40	30	32	46.7	56	1	0.6	800
FG 50 90 SW	90	50	30	32	59.1	69	1	0.6	800
FGU 55 100	100	55	34	36	64	75.8	1.5	0.6	800
FGU 60 110	110	60	34	36	69.5	81.5	1.5	0.6	800
FGU 65 120	120	65	40	42	74.5	86.7	1.5	0.6	900
FGU 75 130	130	75	40	42	84	97	1.5	0.6	900

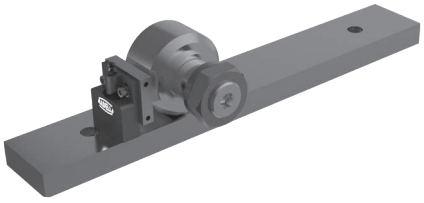
1) Minimum abutment diameter recommended in case of heavy axial load or vibration

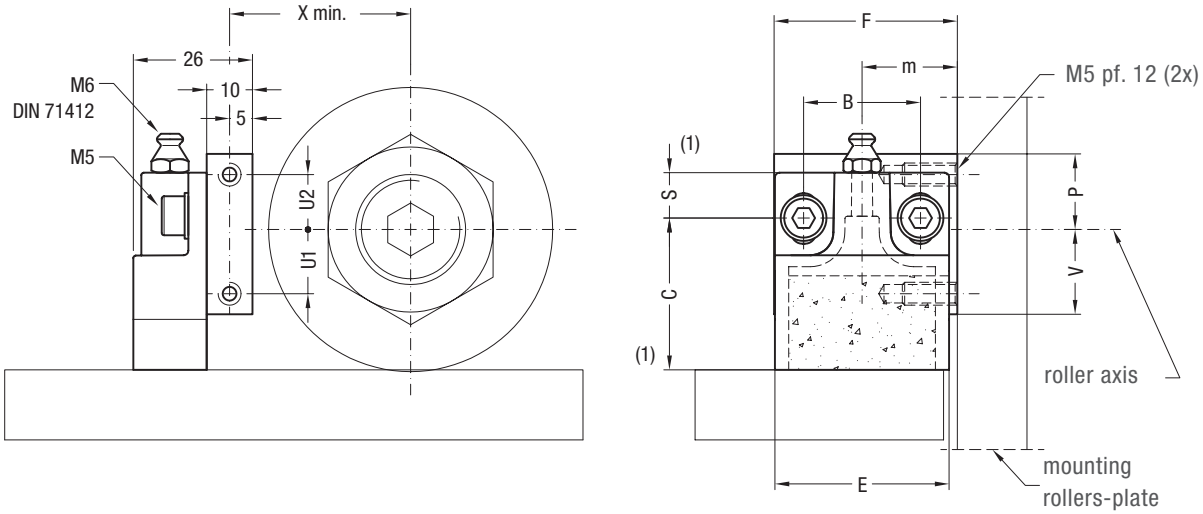
Type	Dynamic load [2)] (N)		Limit loads [3)] (N)		Speed limit grease lubrication [4)] r.p.m.
	C_{w1} [5)]	C_{w2} [6)]	Dyn. F	Sta. Fo	min-1
FG 6 19 SW	5600	4800	4050	6700	7600
FG 10 30 SW	13000	12800	8500	15500	4800
FG 12 32 SW	12000	12000	8300	16200	4200
FG 15 35 SW	17000	17500	12200	25600	3750
FG 17 40 SW	22000	23600	14200	31000	3150
FG 20 47 SW	27000	30300	21400	44500	2700
FG 25 52 SW	29000	33600	23600	48000	2330
FG 30 62 SW	38000	46400	38000	73000	2050
FG 35 72 SW	43000	54900	49000	90000	1800
FG 40 80 SW	52000	68600	66000	123000	1620
FG 50 90 SW	49000	66900	74000	123000	1300
FGU 55 100	72000	101500	53400	109000	1900
FGU 60 110	90000	130600	64000	129000	1770
FGU 65 120	110000	163800	89000	174000	1650
FGU 75 130	110000	167800	97000	185000	1480

2) These capacities are to be used for all types when the convex outer ring rotates directly on a cam.
They take account of the repetitive loads on the follower and consequent deformation of the outer ring
3) The load shown is limited by the strength of the outer ring when mounted in a housing
4) With oil lubrication of followers without seals FG, FGL types, these speeds can be increased by 30% for continuous rotation or up to 50% for intermittent rotation
5) C_{w1}: Coefficient to calculate the basic rating life based on one million revolutions
6) C_{w2}: Coefficient to calculate the basic rating life based on 100 km

GP SYSTEM
LUBRICATOR LUBP

Lubrication unit for GP rails





Type	Dimensions (mm)											Weight (g)	Suggested combinations
	X	U1	U2	F	m	B	S [1]	C [1]	E	V	P		
LUBP 52	33.5	12	14	40	19.8	25.5	10	32.5	38	16.5	18.5	65	PK 52 C, PKR 52 C, FK 52 C
LUBP 62	38.5	14	12	40	20.8	25.5	10	32.5	38	18.5	16.5	65	PK 62 C, PKR 62 C, FK 62 C
LUBP 72	43.5	19	11	50	27	25.5	10	40	44	24	16	85	PK 72 C, PKR 72 C, FK 72C
LUBP 90	52.5	21	9	60	30	30	16.5	43.5	58	31	19	140	PK 90 C, PKR 90 C, FK 90 C
LUBP 110	62.5	30	0	63	34	30	16.5	43.5	58	40	10	140	PK 110 C, PKR 110 C, FK 110 C

1) The dimension of the plastic part refers to the centre of the regulation slot. The regulation slot allows a translation of +/- 3 mm

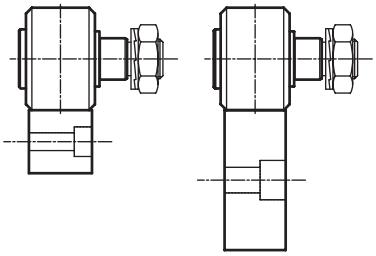
- The lubricator is supplied with the felt already lubricated. The lubricant has a mineral oil base
- During the mounting fix the aluminium support to the rollers plate, adjust the height of the plastic part in order to put it in contact with the raceways and then block it in that position with the M5 screws

OPTIONAL FEATURES

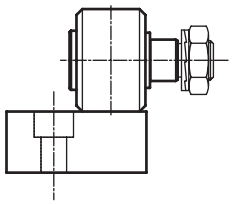
- Felt without lubricant (D)

GP SYSTEM
GUIDE ROLLERS COMBINATIONS

LAYOUT 1
HOLE PATTERN A AND B



LAYOUT 2
ONLY HOLE PATTERN B



Layout 1	GC												PK / FK				
	19	22	24	26	28	30	32	35	40	47	52	62	52	62	72	90	110
GP 2626 M	•	•	•	•	•	•	•	•	•								
GP 3232 M										•	•	•	•	•			
GP 3617 M	•	•	•	•	•	•	•										
GP 4321 M						•	•	•									
GP 5050 M															•	•	•
GP 6222 M								•	•								
GP 7232 M										•	•	•	•	•			
GP 8222 M								•	•								

Layout 1	FG / FGU												
	6 19	10 30	12 32	15 35	17 40	20 47	25 52	30 62	35 72	40 80	50 90	55 100	65 120	75 130
GP 2626 M	•	•	•	•	•									
GP 3232 M						•	•	•	•	•	•			
GP 3617 M	•	•	•											
GP 4321 M		•	•	•										
GP 5050 M												•	•	•
GP 6222 M				•	•									
GP 7232 M						•	•	•	•	•	•			
GP 8222 M				•	•									

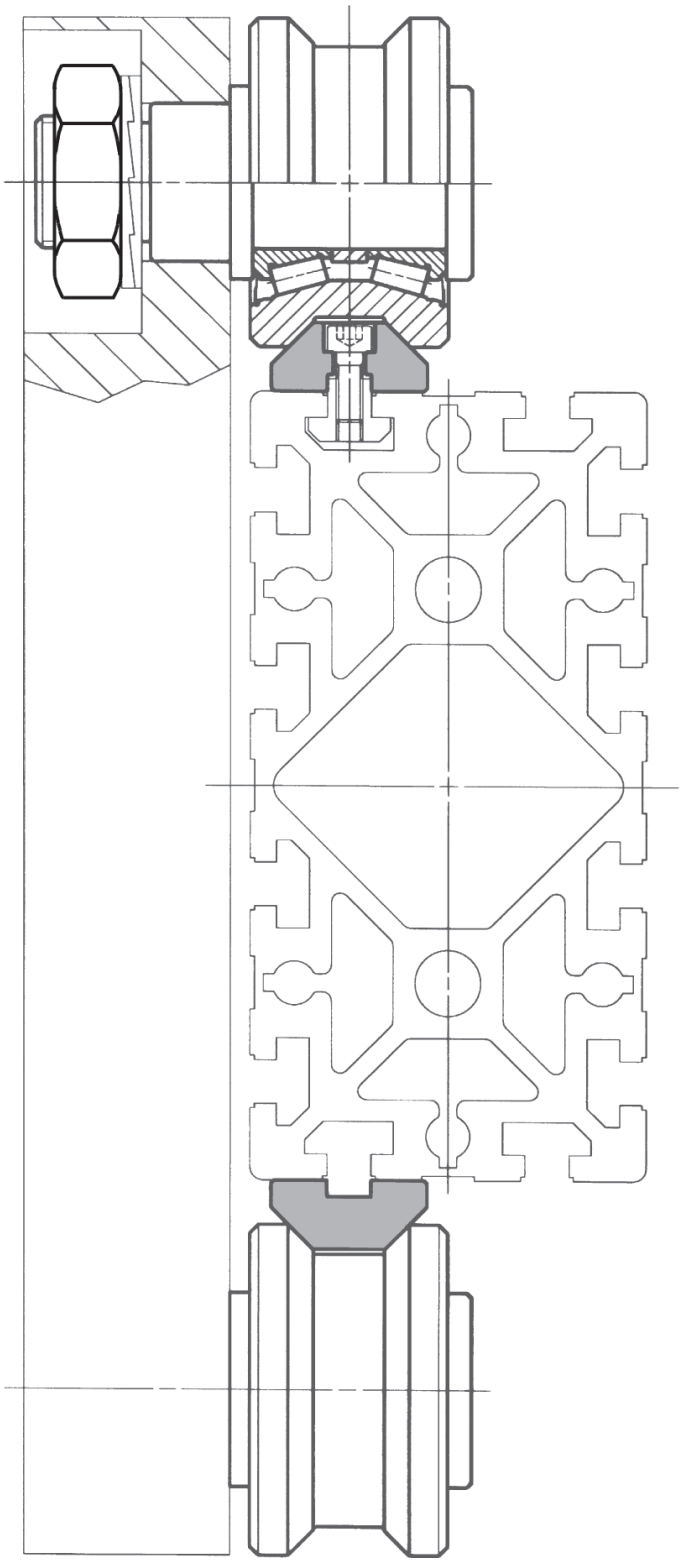
Layout 2	GC												PK / FK				
	19	22	24	26	28	30	32	35	40	47	52	62	52	62	72	90	110
GP 3617 M	•	•	•	•	•	•	•										
GP 4321 M							•	•	•								
GP 6222 M								•	•	•	•	•	•	•			
GP 7232 M										•	•	•	•	•	•		
GP 8222 M															•	•	•

Layout 2	FG / FGU													
	6 19	10 30	12 32	15 35	17 40	20 47	25 52	30 62	35 72	40 80	50 90	55 100	60 110	65 120	75 130
GP 3617 M	•	•	•												
GP 4321 M			•	•	•										
GP 6222 M				•	•	•	•	•	•						
GP 7232 M						•	•	•	•	•	•	•	•		
GP 8222 M												•	•	•	•

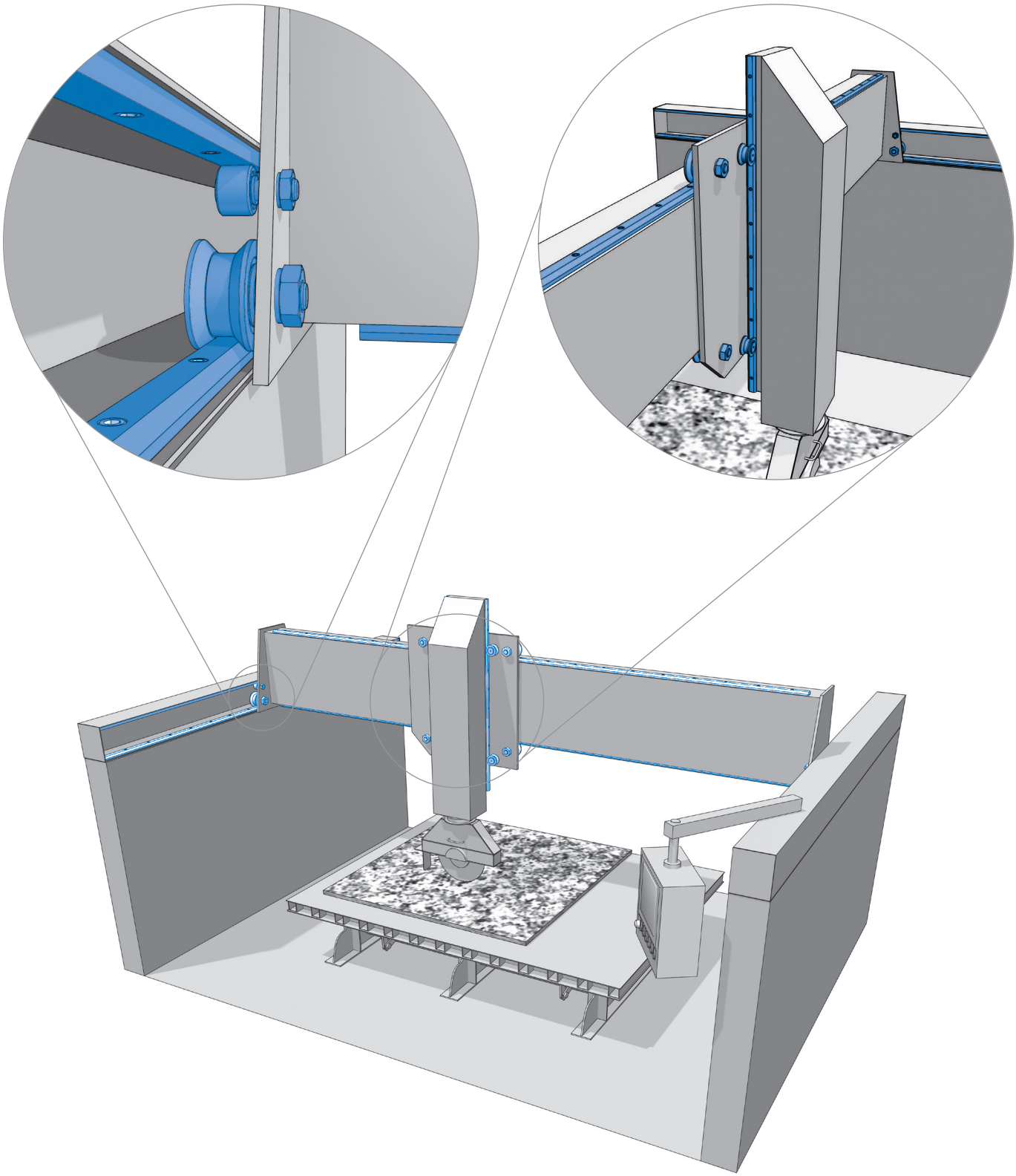
In the tables above the suggested combinations. Other combinations are possible but guide rollers must not run over the mounting holes.

MOUNTING EXAMPLES

Guide rails type GU 35 MT and rollers type RKU 75 operated on light-alloy structure.



MARBLE MACHINERY Heavy-Line systems GU and GP.



TECHNICAL FEATURES

With this line of products, NADELLA confirms the aim to provide manufacturing solutions tailored to the user's needs in order to achieve simple automation at a low cost. The process under way of transferring production automation and relevant handling onto increasingly heavier and cumbersome units has prompted us to seek original and flexible components for the different commodity sectors.

We have accumulated sound working experience in the following sectors:

- Marble-working machinery
- Foundry machinery
- Metal sheet working machinery
- Special lifting machines
- Pick up
- Automatic warehouses
- Textile machines
- Machine tool protections and utilities
- Oxygen cutting machines

Our Technical Department works with Customers and recommends the best component choice by making the calculations needed to determine the best life.

GUIDES

LENGTH

The maximum length of each single guide component is shown on the dimensional tables. The standard lengths of the rails are determined by adding the product of the fixing hole centre distance and the number of holes to twice the end dimension (see dimensional tables).

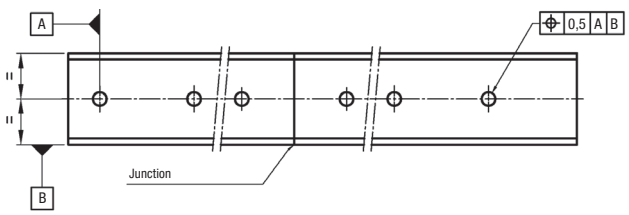
Length	≥ 150 < 420	≥ 420 < 1050	≥ 1050 < 2040	≥ 2040 < 4020	≥ 4020
Length tolerance	± 0,5	± 0,8	± 1,2	± 2	± 2,5

JOINTS

For strokes of greater length, the guide components can be joined after grinding the end faces (suffix R or RR). To maintain the hole centre distance tolerance, when ordering always specify the number of individual rails making one continuous length. Please specify in the order when rails have to be matched. The junctions are marked (letters and numbers) to avoid a mix-up of different rails.

FIXING HOLES

The guides are available with standard holes, as shown in dimensional tables, with special hole layout or without holes (see order code referencing) Standard tolerance for hole position is ± 0,25 mm.



The standard boring layout is designed to fit most common application requirements, but connection strength has to be evaluated on the application case.

STEEL GUIDES

GENERAL

Steel rails are made of bearing steel to give best stability and durability. Raceways are induction hardened to achieve 58 HRC hardness minimum. The rail core remains soft to allow easy machining. Rails can be provided with different finishes to meet specific application requirements.

- Guide rails MT type: Profile is produced by cold drawing process, raceways are induction hardened and sandblasted to improve surface strength and finish.
- Guide rails M type: Profile is usually produced by cold drawing process, induction hardened on raceways and ground to improve surface finish and profile geometry and to remove the partially decarburised surface (0.1 mm max. on cold drawn rails ... MT). Ground rails have to be used when there are high loads, heavy duty cycles or when there is a high accuracy requirement.
- Guide rails MC type (flat rail GP ... MC only): MC rails are induction-hardened on every side and finished by-a-rough grinding.

OPTIONS

Corrosion protection

For use in oxidising environments or in the presence of corrosive agents, the guides are available with chemical nickel-plating protective anticorrosion treatment (suffix NW). This treatment features substantial mechanical characteristics together with a resistance to salty mist corrosion superior to that of hard chrome. On request many rails are available in stainless-steel version (suffix NX) NX. On request can be supplied rails with different surface treatment, as chrome plating and phosphating. Rails LS are supplied with a standard surface treatment of zinc plating (suffix GZ). A wide range of stainless steel rails is available (suffix NX).

CIRCULAR RAIL

On request circular rails can be provided. Circular rails can be used as an alternative to rotating devices or as junction between straight rails.

TECHNICAL FEATURES

Standard rail straightness (for non-mounted rails) is 0.5 mm/m max. Higher accuracy can be supplied on request.

TEMPERATURE

Standard operating temperature range is –20°C up to 150°C. In lower or higher temperature applications please contact NADELLA Technical Service. Special care is required if guide rollers are operating at maximum temperature.

ALUMINUM GUIDES

GENERAL

Made by joining an aluminium alloy support element and hardened steel rods that form the sliding surfaces. The best features of the two materials and relevant working technologies are combined to give the lightness of the alloy and the hardness and surface finish of the rods. Guides of this type can be used for structural functions; they have a high moment of inertia that enables them to be used in many applications as carrying structures. Aluminium extruded profiles are stabilised and anodised. Sliding rods are induction hardened and ground.

OPTIONS

Corrosion protection

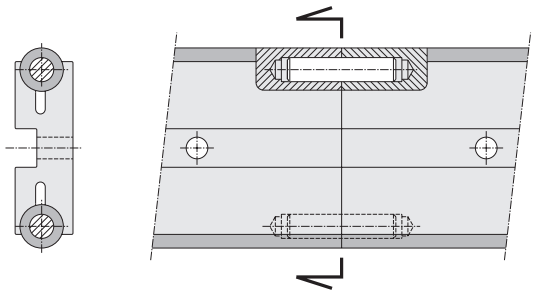
NX For use in oxidising environments or in the presence of corrosive agents, the guides of this series can feature stainless-steel bars (suffix NX).

Chromium-plated rods

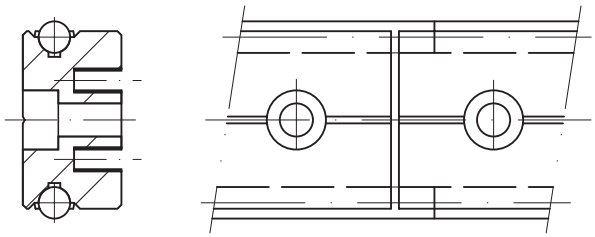
Optionally chromium-plated rods are available (suffix CH); the thickness of the chromium plating is 10 ± 5 µm with hardness ≥ 800 HV. Please check option availability in dimensional tables.

JOINTS

In case rail made by multiple C-DC or LM rails the most efficient joint can be realized with the insertion of a dowel pin inside the rods. This solution allows for simple assembly at the site and maintains alignment under load.



For rails FWS/FWN the joint can be realised by protruding the rods of one rail in order to engage them in the profile of the next rail. There will be a small gap between the aluminium profiles. The steel shafts are joined without gap.



TECHNICAL FEATURES

Standard rails' straightness (for non mounted rails) is 0.5 mm/m maximum. Higher accuracy can be supplied on request.

TEMPERATURE

Standard operating temperature range is –20°C up to 70°C. Applications with frequent temperature variation should be avoided. For operating conditions outside the given range please contact NADELLA Technical Service.

GUIDE ROLLERS

GENERAL

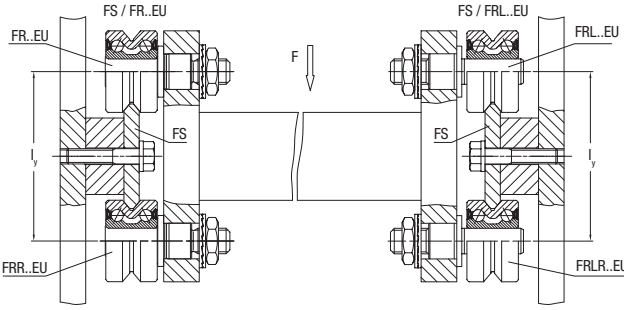
NADELLA provide a wide range of guide rollers to be able to meet different technical and economic requirements. All guide rollers are produced in concentric and eccentric versions to allow backlash adjustment during assembly on final equipment. Eccentric rollers are identified by additional R in the code.

The sides of the races of the guide roller are slightly convex. Besides reducing rolling friction, this also permits offsetting slight guide flexing or small assembly alignment errors.

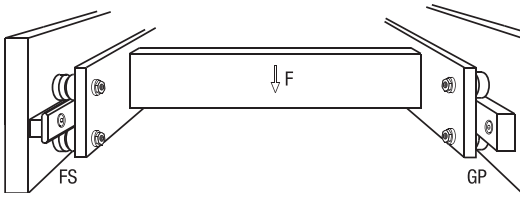
Guide rollers are fitted with seals or shields for bearing protection and lubricant retention as described in dimensional tables.

Guide rollers based on needle or tapered roller bearings (FRN ... EI,RK ...,PK ...) are recommended for critical applications with heavy axial loads and / or shock loading. Guide rollers based on ball bearings (FR ... EU, PFV, RCL) are more suitable for lighter loads or high dynamic systems.
The carriages based on Rolbloc's system are recommended for applications with heavy loads, high frequency of work and aggressive environment (dust, abrasive).

When mounting guide rails opposite to each other with connected carriages, as shown in the next sketch, a high level of parallelism between the guide rails is required when axially rigid rollers are used. To avoid operating problems it is recommended to use axially rigid fixed rollers on one carriage e.g. FR ... EU / FRR … EU and axially movable rollers on the other carriage e.g. FRL ... EU / FRLR ... EU. Movable rollers allow a little misalignment between the opposite mounted guide rails.



Another solution is to use one profiled guide rail e.g. FS and on the opposite side a flat rail e.g. GP in connection with rollers GC or PK.



Lubrication
Guide roller FRN ... EI, GC, FG permits bearing relubrication. All other guide rollers are long life lubricated.

Temperature
Guide roller should not operate at constant temperature above 80°C. For short durations 100°C can be accepted. For higher temperature please see the “option section”.

Speed limit
Max. velocity has to be determined for each application relevant to the guide roller type, size and load conditions. As general value, in normal conditions maximum speed is 4 m/sec but, with the correct choice of the components, the speed can reach 10 m/s. Contact NADELLA Technical service in case of specific request.

OPTIONS
Corrosion protection

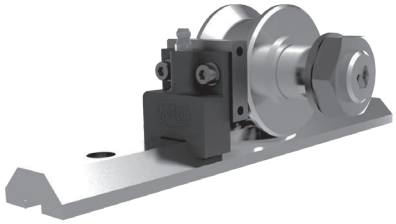
NX For use in oxidising environments or in the presence of corrosive agents, the guide rollers are available in stainless steel (suffix NX) the guide rollers with tapered rollers (RKU, RKY / X, FKU, FKY / X) and needles (FRN) are equipped with standard bearings. Check in the dimensional table component availability.

High temperature
On request guide rollers can be equipped with Viton seals to operate at temperatures up to 120°C (suffix V). Check in the dimensional table component availability.

ACCESSORIES
Tables and carriages
Standard table and carriages for C-, DC- and LM-systems incorporate a black anodised aluminium plate fitted with guide rollers.

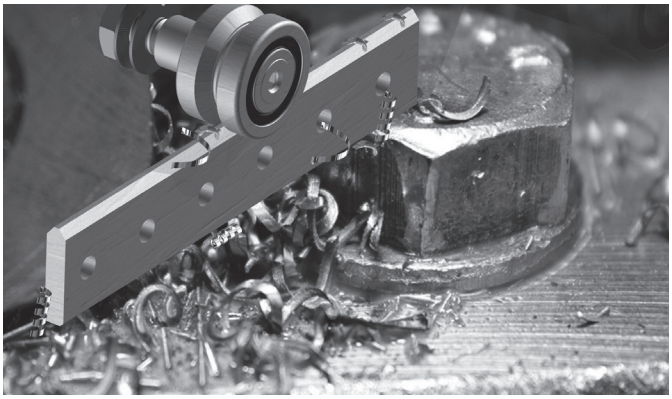
Wipers
Standard wipers NAID for C-, DC-rails are made from NBR compound moulded on a steel plate.

Lubricators
Are composed by two main parts: a plastic box with the same shape profile of the rail, and a lubricated felt; the felt is slightly pressed on the raceways by a spring. The plastic box, that drags the raceways, works as a wiper, and removes dust and shavings.



The plastic box can be mounted directly on the guide rollers plate by the appropriate aluminium plate included in the kit. In the lubricators for guide rollers size 52 or higher, the grease nipple allows an easy connection with a re-lubrication system. For the lubrication of the rails you can use one lubricator only on each raceway; in order to wipe the raceways it is better to mount two lubricators, before and after the carriage. The lubricators are supplied with the felt already lubricated.

USE IN DIRTY ENVIRONMENT
Due to the design cam rollers with profile are especially adapted to the use in rough and dirty environment. This property has proved true in many applications such as welding plants, steel and grinding machines and is superior to recirculating ball bearing guides in continuous operation.



LUBRICATION
BEARING LUBRICATION
All the guide rollers, except for the FRN ... EI, based on needle bearings, are equipped with long life lubricated bearings. This means that the grease inside the bearing is enough for the entire life of the roller guide. The roller guide type FRN ... EI, with needle bearings, accommodates the re-lubrication of the bearings.

Rail lubrication
Rails must be lubricated. This allows to reduce the friction, to reach the calculated lifetime of the system and to work at high speed. No or insufficient lubrication will cause rapid deterioration. The typical signal of tribocorrosion is the presence of a red / dark oxide and rapid wearing of the rail and guide rollers. The lubrication of the rail, the working environment and the load must be considered all together for a correct estimation of the lifetime of the guide system.

Generally speaking, for application with low duty frequency, a periodic re-lubrication with a grease or with a viscous oil will sufficiently maintain the lubrication film. The re-lubrication interval depends on the application and must always be tested in the real working conditions. In a system with ground rails and short stroke without lubricators, you can consider a re-lubrication interval every 100,000 cycles. Increasing the load, speed or stroke, or using an undersized bearing will increase lubrication demand and result in a shorter lubrication interval. For a constant lubrication we suggest the use of felt lubricators to ensure a constant layer of lubricant between guide rollers and raceways. Felt lubricators enlarge the lubrication interval more than ten times.

The recommended lubricants are greases and oil for bearings, linear rails or chains, with a high viscosity of the basic oil and with EP additives, in order to separate the metallic surfaces even with low speed.

ASSEMBLY INSTRUCTIONS

GUIDE ROLLERS

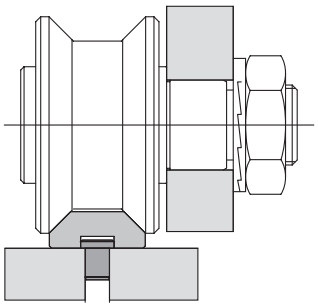
The eccentric guide rollers allow the preload or clearance of the carriage to be adjusted independently of the guide roller mounting hole positioning tolerance or the distance between the rails. Recommended mounting hole tolerance is H7. When adjusting the eccentric guide roller care has to be taken to avoid excessive preload. Excessive preload can reduce the life of the linear system. Set the preload turning the guide roller counterclockwise so that any movement caused by vibration will cause the nut to be tightened. Ensure the preload is not increased when tightening the nut.

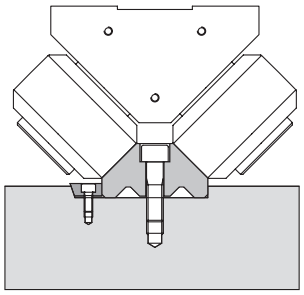
A simple way of setting a roller preload is as follows:

- Move the slider on the guide, holding the roller being adjusted with two fingers to prevent it from rotating
- Increase the preload by means of the wrench
- Repeat step 1 making sure the roller slides without rolling
- When it is no longer possible to prevent roller rolling, slightly decrease the preload and fully tighten the lock nut, thereby setting the position of the eccentric.

GUIDES

For single guide rail type FS, FWS, LS, DC, FWN and LM no special assembly instructions are necessary. For multiple parallel rails parallelism has to be checked to avoid guide rollers overload or excessive carriage play. When constant preload is required parallelism error has to be lower that 0.050 mm.
Connection between the rail and the mounting surface has to be§designed accordingly with the operating condition to ensure proper product positioning and functionality. The direction and intensity of the load, the number and strength of the screws, the geometry of mounting surfaces, use of pins or wedges have to be evaluated to fully utilize the linear guide load capacity.





CARRIAGES

Carriages are supplied with concentric guide rollers nut tightened already. Eccentric guide rollers have to be set and tightened during final assembly operation by customer.

CALCULATION PROCEDURE

Calculation is carried out in two steps, first defining the forces on the most heavily loaded roller and then estimating the safety factors and life.

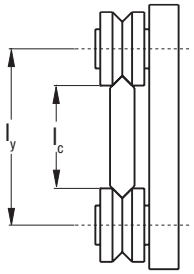
CALCULATING THE LOADS ON THE GUIDE ROLLERS

In the case of complex load situations, with forces acting in different directions, calculating the reactions on the rollers is difficult and hard to simplify. In the event of the applied load having a direction parallel to one of the co-ordinate axes, the radial Pr and axial Pa components of the reactions on the most loaded roller can be obtained using elementary formulas. With reference to the diagrams shown, we obtain the load components on the rollers relevant for checking and calculating the life, applying the following methods.

Angle α in the formulas is half the groove angle. Look in the dimensional table notes for the correct value.

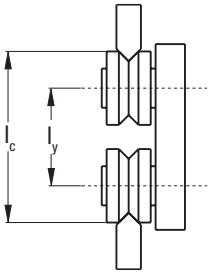
Distance l_c is the effective contact distance. With the exception of Rolbloc system the correct value is calculated as the guide roller centre distance across the rail plus or minus the outer guide roller diameter De, depending if the guide is outside or between the rollers.

Guides between the rollers



$l_c = l_y - De$

Guides outside the rollers



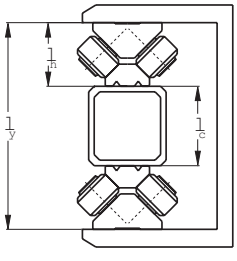
$l_c = l_y + De$

In case of Rolbloc the distance l_c is the distance between the rails basis.

Diagram a)

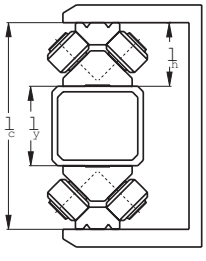
Load F applied parallel to axis Y

Guide between the rollers



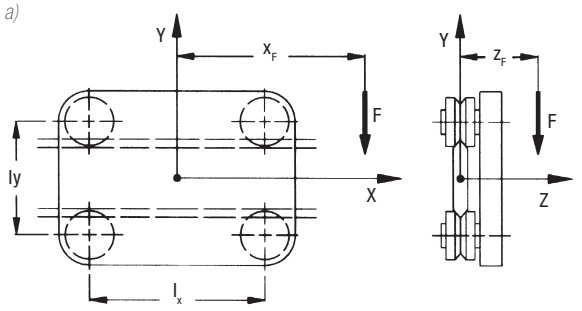
$l_c = l_y - 2\,l_h$

Guides outside the rollers



$l_c = l_y + 2\,l_h$

a)

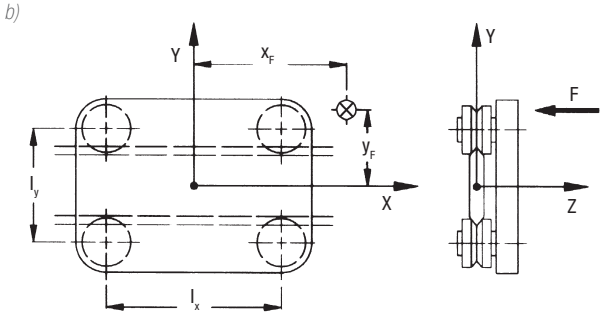


$$P_a = \frac{F \cdot z_F}{2 \cdot I_C}$$

$$P_r = \frac{F \cdot (I_x + 2 \cdot x_F)}{2 \cdot I_X} + \frac{F \cdot z_F \cdot \tan \alpha}{2 \cdot I_C}$$

Diagram c)
Load F applied parallel to axis X

b)

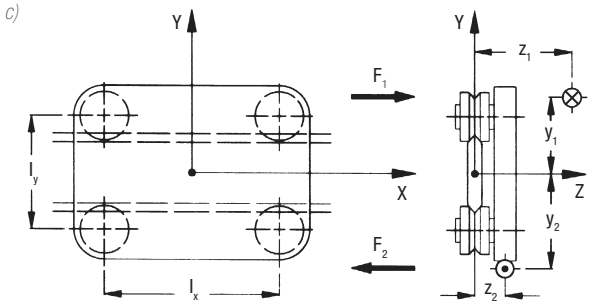


$$P_a = \frac{F}{4} + \frac{F \cdot x_F}{2 \cdot I_x} + \frac{F \cdot y_F}{2 \cdot I_C}$$

$$P_r = P_a \cdot \tan \alpha$$

Diagramma c)
Carico F applicato parallelo all'asse X

c)



In this case the external load F_1, applied at the point of coordinate y1 z1, should be considered together with reaction $(F_2)=(-F_1)$ applied at the point of co-ordinate y_2 z_2.

Calling Δ_y the absolute value of y_2-y_1 and Δ_z the absolute value of z_2-z_1, the following formula is used:

$$P_a = \frac{F_1 \cdot \Delta_z}{2 \cdot I_X}$$

$$P_r = \frac{F_1}{I_X} \cdot \left(\frac{\Delta_z \cdot \tan \alpha}{2} + \Delta_y \right)$$

GUIDE ROLLER CALCULATION

In the table for each roller the following data is specified:

- C_w basic dynamic load, it is the radial load (N) that applied to the guide roller gives 100 km nominal life.
- F_r limit radial load, it is the maximum radial load (N) that can be applied on the guide roller; guide roller considering the strength of the stud.
- F_a limit axial load, it is the maximum axial load (N) that can be applied on the guide roller; guide roller considering the strength of the stud.
- X and Y coefficients to define the equivalent load for bearing life.
- α is the contact angle dependent on the guide roller type.

Rollers FRN ... EI work as combined bearings, the basic dynamic load is defined as:

- C_{wr} basic radial dynamic load, it is the radial load (N) that applied to the guide roller gives 100 km nominal life.
- C_{wa} basic axial dynamic load, it is the axial load (N) that applied to the guide roller gives 100 km nominal life.

Note: ISO 281 states 'the nominal life will be exceeded by 90 % of bearings before the first sign of material fatigue'.

NOMINAL LIFE CALCULATION

System life is the minimum life of either the bearings in the guide roller or the rail / roller contact surfaces.

For the rail / roller surface see the lubrication paragraph. For the bearings' life proceed as follows.

The loads Pr and Pa are calculated for ideal condition. However, in practice, because of the structure and operating conditions a better calculation and life estimation is performed using overload factor f_w as follows:

1.0 – 1.2	Smooth operation at low speed at constant load without shocks
1.2 – 1.5	Smooth operation with load variation
1.5 – 2.0	Operation with small shocks and vibrations
2.0 – 4.0	High acceleration, shocks and vibrations

Once P_a and P_r have been defined we can proceed to calculate the equivalent load P_{eq} (not for FRN ... EI).

$$P_{eq} = X \cdot P_R + Y \cdot P_a \quad \text{(N)}$$

Coefficients X and Y can be obtained from guide roller tables (in the case of tapered bearings according to the ratio between P_a e P_r). In

case of pure radial guide roller as PK and GC or floating bearings FRL, RAL, RKXL, RKUL.

$$P_{eq} = P_r \qquad (N)$$

Nominal bearing life:

$$L_{10} = 100 \cdot \left(\frac{C_w}{P_{eq} \cdot f_w} \right)^p \qquad (km)$$

Where coefficient p is:

- p = 3 for ball bearing guide rollers (FR ... EU, RCL ..., PFV ..., RAL)
- p = 10/3 for roller bearing guide rollers (PK ..., RKY, RKX, Rolbloc, GC ...)

In case of guide rollers based on needle bearings type FRN ... EI nominal bearing life is calculated as the minimum between:

$$L_{10} = 100 \cdot \left(\frac{C_{wr}}{P_r \cdot f_w} \right)^{10/3} \qquad (km)$$

and

$$L_{10} = 100 \cdot \left(\frac{C_{wa}}{P_a \cdot f_w} \right)^{10/3} \qquad (km)$$

CHECKING THE GUIDE ROLLER MAX. LOAD

The values of the radial limit loads F_r and axial limit loads F_a shown in the catalogue refer to extreme operating conditions, meaning:

- $P_a = 0$ (pure radial load)
- $P_r = P_a \cdot \tan \alpha$ (maximum axial load)

In intermediate cases, when the ratio is included between the extreme values, the equivalent limit load F_k to be considered must be calculated according to ratio $k = P_a / P_r$.

$$F_k = \frac{F_r \cdot F_a}{k \cdot F_r + (1 - k \tan \alpha) \cdot F_a} \qquad (N)$$

To check the strength of the guide roller, in relation to the limit load, the safety factor has to be greater than 1.

$$F_k / P_r > 1$$

Note: in the following common cases it is not necessary to calculate Fk and the evaluation can be completed easily. Rollers that allow axial movement (FRL, PK, RKYL, RKUL, GC) don't support axial loads.

In case of loads acting in the guide roller plane (F_x o F_y acting with Z=0) the axial load is also zero (0) (see calculation example n° 3).
In these cases it has to be:

$$F_r / P_r > 1$$

In case of load F_z acting perpendicular to guide roller plane the axial load is maximum (see calculation example n°4).

$$F_a / P_a > 1$$

EXAMPLES OF CALCULATION

EXAMPLE N° 1:

A FORK-LIFT TRUCK FEATURING VERTICAL MOVEMENT

The resulting magnitude of the weight passes through point (1), while the vertical force that balances this, for instance the traction of a timing belt, passes through point (2).

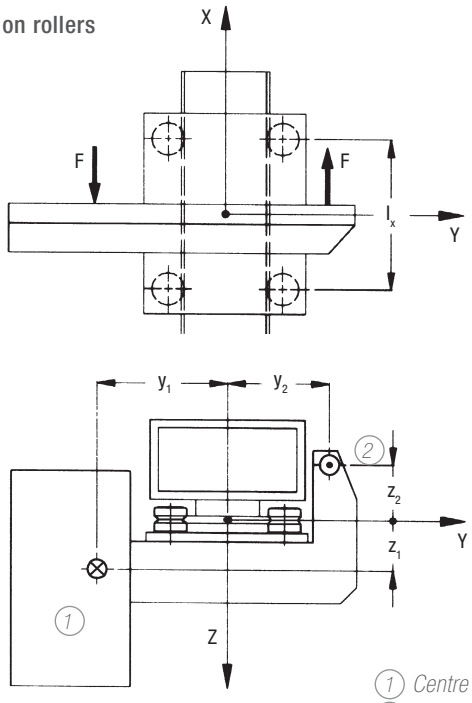
Guide rollers type RKY 52 are used with guide rail type FS 62 MT:

overload factor $f_w = 1,0$
center distance $l_x = 300$ mm
$l_y = 144.3$ mm

$F = 1800$ N
$z_1 = 100$ mm $\quad z_2 = -250$ mm
$y_1 = -150$ mm $\quad y_2 = 350$ mm
$\Delta_z = 350$ mm $\quad \Delta_y = 500$ mm

Scheme 1:

Load on rollers



(1) *Centre of gravity*
(2) *Force passing through point*

$$P_a = \frac{1800 \cdot 350}{2 \cdot 300} = 1050 \text{ N}$$

$$P_r = \frac{1800}{300} \cdot \left(\frac{350 \cdot \tan 40°}{2} + 500 \right) = 3881 \text{ N}$$

Nominal life

X = 1

Y = 3.38

Equivalent dynamic load

$$P_{eq} = 1 \cdot 3881 + 3.7 \cdot 1050 = 7766 \text{ N}$$

$$L_{10} = 100 \cdot \left(\frac{41000}{7766 \cdot 1} \right)^{10/3} = 25622{,}5 \text{ km}$$

Limit load check

Equivalent limit load F_k

$K = P_a / P_r = 0.27$

$$F_k = \frac{11900 \cdot 4250}{0.27 \cdot 11900 + (1 - 0.27 \cdot \tan 40) \cdot 4800} = 8248 \text{ N}$$

Guide roller safety coefficient

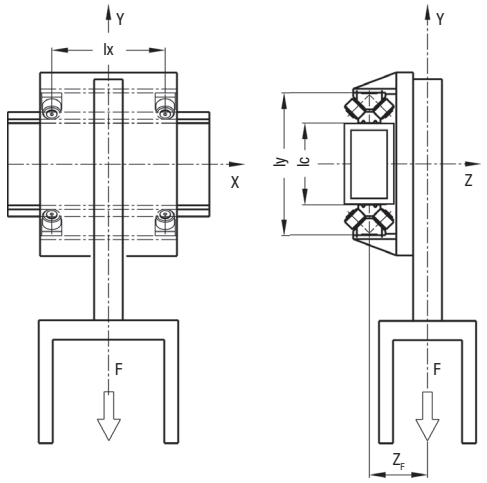
$$F_k / P_r = 8248 / 3881 = 2{,}1$$

EXAMPLE N° 2:

THE HORIZONTAL AXIS OF A MANIPULATOR IN STEEL INDUSTRY

The centre of gravity of the vertical axis and load is placed in the middle of the horizontal centre-axis lx and 160 mm distance from the guide axis. The dirty environment and the possibility of shocks lead to the choice of Rolbloc system.

Scheme 2:



Guide rollers BL 252 are used with guide GU 62 M:

Overload factor $f_w = 1.4$

Centre distance $l_x = 350$ mm

$l_y = 400$ mm

F = 6000 N

x = 0

y = –1000 mm

$z_F = 160$ mm

Load on rollers

The effective center axis l_c is 400 – 85 – 85 = 230 mm

$$P_a = \frac{6000 \cdot 160}{2 \cdot 230} = 2087 \text{ N}$$

$$P_r = \frac{6000 \cdot (350 + 0)}{2 \cdot 350} + \frac{6000 \cdot 160 \cdot \tan 45}{2 \cdot 230} = 5087 \text{ N}$$

Nominal life

From the Rolbloc table

X = 1

Y = 1

$$P_{eq} = 1 \cdot 2087 + 1 \cdot 5087 = 7174 \text{ N}$$

$$L_{10} = 100 \cdot \left(\frac{59000}{7174 \cdot 1.4} \right)^{10/3} = 36577 \text{ km}$$

Limit load check

$K = P_a / P_r = 2087 / 5087 = 0.41$

$$F_k = \frac{16800 \cdot 8400}{0.41 \cdot 16800 + (1 - 0.41 \cdot \tan 45) \cdot 8400} = 11915 \text{ N}$$

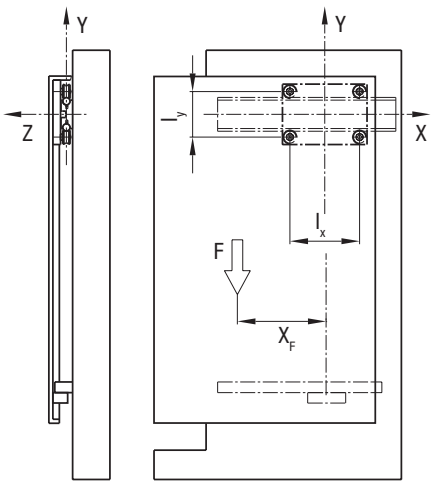
$$F_k / P_r = 11915 / 5087 = 2.3$$

EXAMPLE N° 3:

THE SLIDING DOOR OF A MACHINE TOOL (RAIL ON TOP)

The door is supported by the rail DC type on the upper edge and driven on bottom side by an auto-aligning carriage C3 RAL on LM guide rail type. Because of the effect of the bottom rail there isn't any torque applied at the DC rail. The door weight acts in a plane coincident with the roller / rail vertical axis and as such there is no overturning moment. In this case, limit load calculation can be easily carried out from basic data F_r without F_k calculation. Of course the calculation is always the same.

Scheme 3:



Guide rail DC 18.65 is used with carriage T4 PFV 3518 250:

Overload factor $f_w = 1.1$
Centre distance $l_x = 213$ mm
$l_y = 113$ mm

F = 450 N
x = –300 mm
y = –500 mm
z = 0 mm (because of LM rail)

Load on rollers

The effective center axis l_c is 450 + 32 = 482 mm

$$P_a = \frac{450 \cdot 0}{2 \cdot 78} = 0 \text{ N}$$

$$P_r = \frac{450 \cdot (213 + 2 \cdot 300)}{2 \cdot 213} + \frac{450 \cdot 0 \cdot \tan 40}{2 \cdot 213} = 859 \text{ N}$$

Nominal life

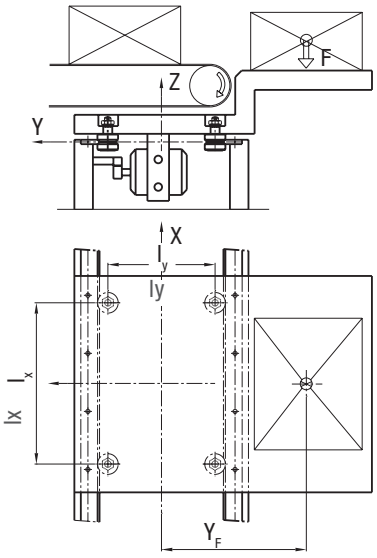
$$L_{10} = 100 \cdot \left(\frac{4550}{859 \cdot 1.1}\right)^3 = 11150 \text{ km}$$

Limit load check

$$F_r / P_r = 1500 / 859 = 1.7$$

EXAMPLE N° 4:
TRANSFER UNIT
The box weight loads the carriage with max. axial load. In this load configuration the limit load check calculation can be easily done directly by the F_a value without F_k calculation.

Scheme 4:



Guide rollers FRN(R) 32 EI with rails FSH 32 M

Overload factor $f_w = 1.2$
Centre distance $l_x = 670$ mm
$l_y = 450$ mm

F = 400 N
x = 0 mm
y = 650 mm
z = 50 mm

Load on rollers

The effective center axis l_c is 450 + 32 = 482 mm

$$P_a = \frac{400}{4} + \frac{400 \cdot 650}{2 \cdot 482} = 370 \text{ N}$$

$$P_r = 370 \cdot \tan 40 = 310 \text{ N}$$

Nominal Life

$$L_{10r} = 100 \cdot \left(\frac{5600}{310 \cdot 1.2}\right)^{10/3} = 840000 \text{ km}$$

$$L_{10a} = 100 \cdot \left(\frac{2100}{370 \cdot 1.2}\right)^{10/3} = 177600 \text{ km}$$

L10 = 17760 km

Limit load check

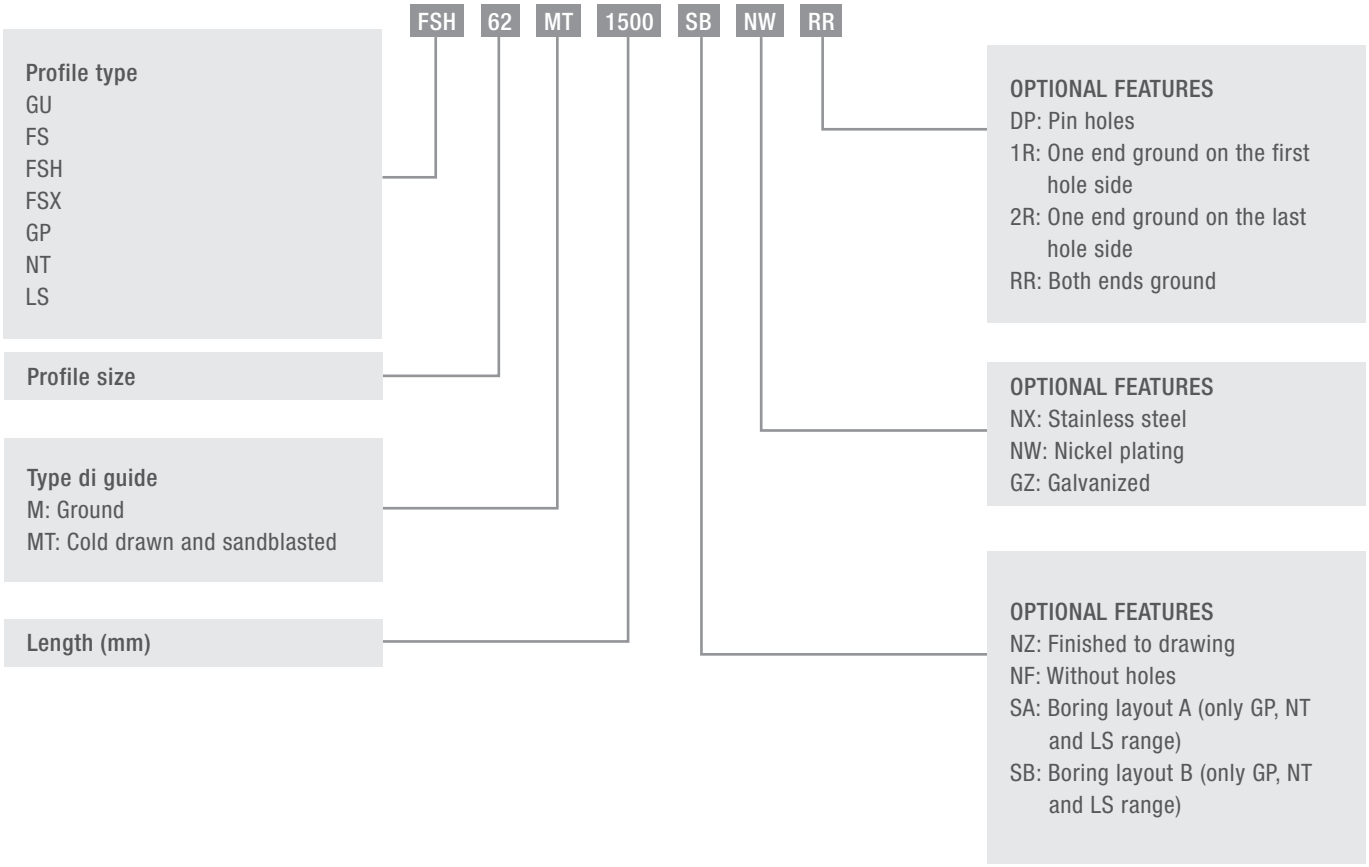
$$F_a / P_a = 950 / 370 = 2.5$$

For further details, contact the NADELLA Technical Service.

ORDERING KEY

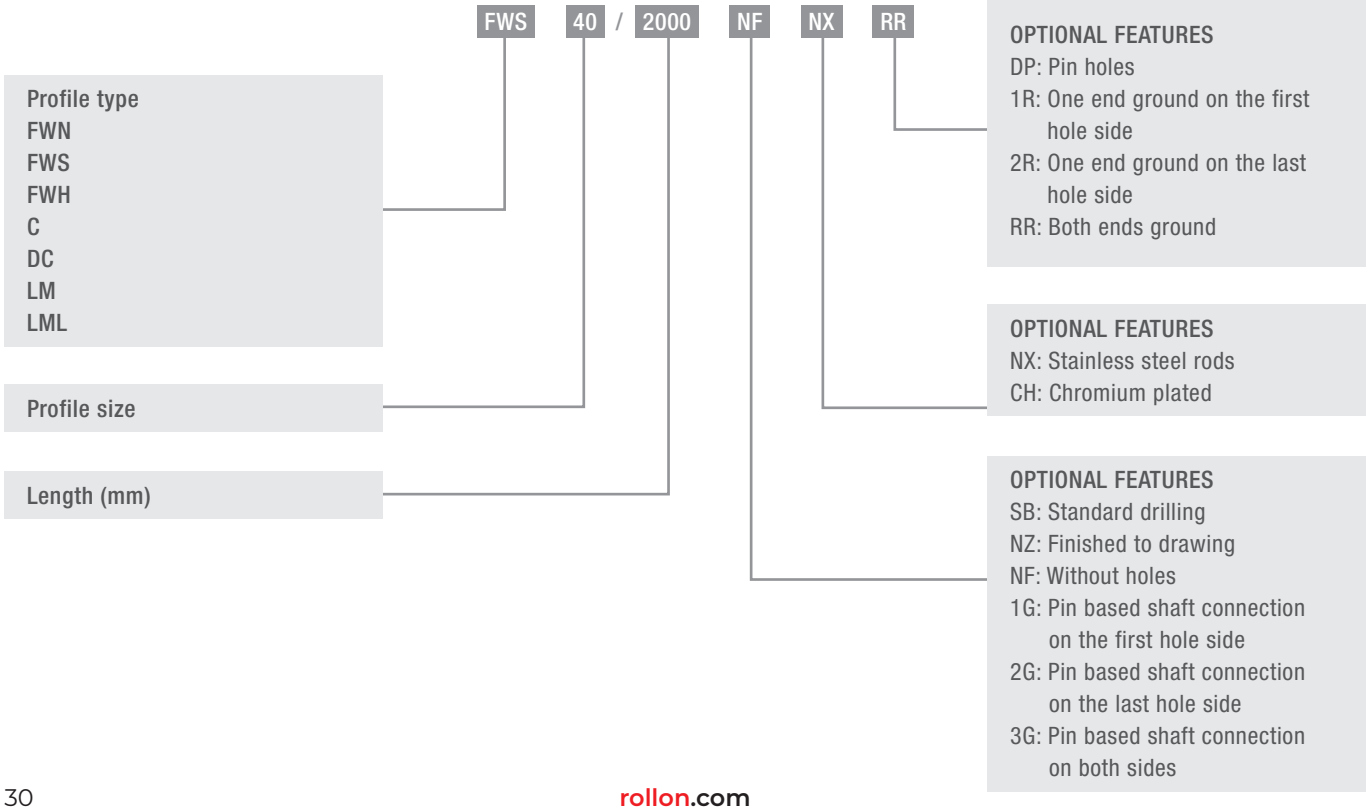
STEEL RAIL

ORDER CODE



ALLUMINIUM RAIL

ORDER CODE



PRODUCT INDEX (IN ALPHABETIC ORDER)

PRODUCT	DESCRIPTION	PAGE
FSX ... M	Rail in steel with ground raceways, for V-Line system	51
FSX ... MT	Rail in steel with sandblasted raceways, for V-Line system	50
FWH	Rail composed by an aluminium body and one shaft in steel, with a single raceway for Base-Line system	115
FWN	Rail composed by an aluminium body and two shafts in steel, with two raceways for Flexi-Line 645 system	125
FWS	Rail composed by an aluminium body and two shafts in steel, with two raceways for Base-Line system	114
GC..SW	Guide roller with needle roller bearings for GP rails of Heavy-Line system	28
GLA	Guide roller with double row of balls with oblique contact, with “gothic arch” profile for U-Line system	137
GP ... M	Rail in steel, ground raceways for Heavy-Line system	24
GU ... M	Rail in steel, ground raceways for Heavy-Line and Rolbloc system	39/18
GU ... MT	Rail in steel, sandblasted raceways for Heavy-Line and Rolbloc system	39/18
LM	Rail composed by an aluminium body and two shafts in steel, with two internal raceways for U-line system	134
LML	Rail totally in aluminium with two internal raceways for U-line system	142
LS	Rails totally in steel with internal hardened raceways for C-Line system	90
LUBC	Lubricator for Base-Line system (guide rollers running on C and DC rails)	113
LUBL	Lubricator for Rolbloc	43
LUBM	Lubricator for U-Line system (carriages running in LM rails)	141
LUBR	Lubricator system for circular rails	79
LUBP	Lubricator for Heavy-Line system (guide rollers running on GP rails)	32
LUBU	Lubricator for Heavy-Line system (guide rollers running on GU rails)	22
LUBX, LUBY	Lubricator for V-Line system (guide rollers running on FS and FSH rails)	63
LUBZ	Lubrication wheel	63
NAID	Wipers for C and DC rails of Base-Line system	112
NT	Rails totally in steel with internal hardened raceways with V-profile for C-Line system	
PFV gothic profile	Guide roller with “gothic arch” profile, based on ball bearings, for C and DC rails of Base-Line system, and LM rails of U-Line system	107 135
PFV	Guide roller based on ball bearings, for C and DC rails of Base-Line system, and LM rails of U-Line system	108
PK	Guide roller with tapered roller bearings for GP rails of Heavy-Line system	26
PR	Adjustment plates for BL carriages of Rolbloc system	42
PZ	Pinion for FSHZ-FSXZ guide rail	62
RAL	Floating guide rollers with “gothic arch” profile, with a double row of balls with oblique contact, for LM rails of U-Line system	136
RAS	Floating guide rollers with balls for LS rails of C-Line system	92
RCL	Guide rollers with “gothic arch” profile, with a double row of balls with oblique contact, for LM rails of U-Line system	135
RCP	Guide rollers with “gothic arch” profile, with a double row of balls with oblique contact, for LM rails of U-Line system	135
RCS	Guide rollers with balls profile, for LS rails of C-Line system	91
RKO	Guide rollers with tapered roller bearings, with “gothic arch” profile for C and DC rails of Base-Line system	110
RKU	Guide rollers with tapered roller bearings, for GU rails of Heavy-Line system	19
RKUL	Floating guide rollers with tapared roller bearings for GU rails of heavy line system	21
RKX	Guide rollers with tapered roller bearings, for FSX rails of V-Line system	57
RKY	Guide rollers with tapered roller bearings, for FS and FSH rails of V-Line system	57
RKYL RKXL	Floating guide rollers with tapered roller bearings for FS ... rails of V-Line system	60
RPT	Wipers for Rolbloc BL carriages	43
SAG	Guide pins for the mounting alignment of GU rails of Heavy-Line system	23
TA4 / TB4	Carriages with anodised aluminium body with four guide rollers type GLA for FWN rails of Flexi-Line system	126
T4 FR	Carriages with anodised aluminium body with four guide rollers type FR ... EI for FWS rails Base-Line system	119

PRODUCT	DESCRIPTION	PAGE
T4 PFV	Carriages with anodised aluminium body with four guide rollers type PFV with “gothic arch” profile for C and DC rails of Base-Line system, and LM rails of U-Line system	111 140
T4 R …	Carriages with fixed guide rollers Steering carriage for FSR ... M circular rails of Multi-Motion-Line system	77 78
T4 RAL	Carriages with black anodised aluminium body with four floating guide rollers type RAL with “gothic arch” profile for LM rails of U-Line system	140
T4 RCL T4 RCP	Carriages with black anodised aluminium body with four guide rollers type RCL or RCP with “gothic arch” profile for LM rails of U-Line system	140
T4 RYL	Carriages with black anodised aluminium body with four guide rollers type RCL / RCP and RAL with “gothic arch” profile for LM rails of U-Line system	140

SUFFIX INDEX (IN ALPHABETIC ORDER)

SA	Standard hole pattern according to the catalogue
AC	Hollow shafts optional for rails C, DC and LM
SB	Standard hole pattern according to the catalogue
CH	Chromium plated shafts
D	Felt without lubricant
DP	Pin holes
EE	Synthetic sealer for GC
EEM	Ground profile
G	Pin based shaft connection
GZ	Surface zinc-plated for LS rails (C-Line)
M	Ground profile
MC	Rough ground profile (for GP rails)
MM	Metallic sealer for FGU
MT	Sandblasted profile
NF	Rails without holes
NX	Stainless steel version for guide rollers or guide rails
NW	Chemical nickel-plating
NZ	Finishes to drawing
1R	One end ground on the first hole side
2R	One end ground on the last hole side
RR	Both ends ground
S	Holes for DC guide
UU	Felts for lubrication available (for carriages TA4 and TB4 of Flexi-Line 645 system)
V	Seals in Viton