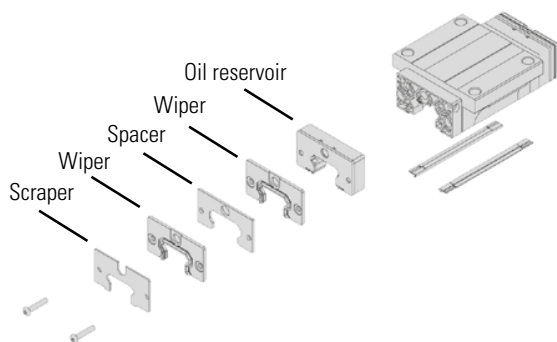
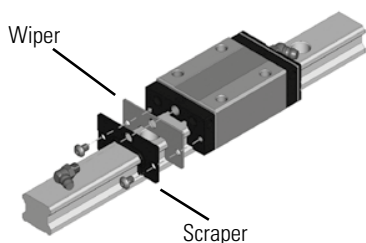




## Overview of Thomson 400 Series Profile Rail Linear Guides



### Features and Benefits

The 400 Series profile rail linear guide is the newest addition to the Thomson linear guide product line. The 400 Series is a cost-effective, transport-grade profile rail solution for cost-sensitive applications, and is a drop-in replacement with industry standard envelope and hole patterns. Double-faced ball track bearing arrangements provide compliance during installation as well as equal load-carrying capacity in all directions. Caged and non-caged carriages utilize the same rail design. This enables efficient use of inventory as only one rail type needs to be stocked for either carriage type.

### Low Noise and Vibration

Polymer ball-return tube reduces noise while retaining lubrication.

### Modular Accessory Options

Standard double lip end and longitudinal seals retain lubrication while protecting the bearing from contamination. Additional seals and scrapers available.

### Metal Scraper

The **Type 431 ZZ Metal Scraper** made of stainless steel, serves as an added protection to the seal lips against large dirt particles, metal shavings or chips. Large contaminants are easily pushed away providing an extra level of protection to the seal lips. The Metal Scraper is easily installed in conjunction with the other optional modular accessories providing you with an easy upgrade to the standard seal. These can be easily installed on-site in the field or can be supplied from the factory.

### Additional Seal

The **431 WR seal** provide an additional level of protection from contaminants to the assembly. These additional components can easily be added on-site without removing the carriage from the rail. They are supplied with the required screws to make the installation simple and is constructed from SPCC Steel and are nickel plated. These seals can be used in conjunction with other optional modular accessories providing an easy upgrade to the standard seal. These can be easily installed on-site in the field or can be supplied from the factory. When using double seals, a spacer is installed between the seals. This helps in better sealing of the carriage.

### Oil Reservoir

The **Type 431 OW oil reservoir** is a cost-effective, automatic lubrication system. It is constructed with an integrated oil reservoir that provides a uniform, consistent lubricating oil to the ball paths for extended periods of time. The Type 431

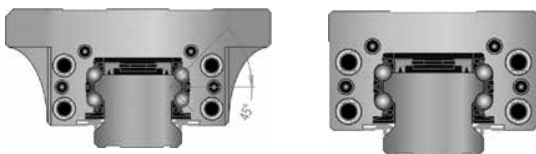
Overview of Thomson 400 Series Profile Rail Linear Guides

OW oil reservoir lubrication plate eliminates the need for a routine maintenance schedule, assures lubrication gets to the required points, can be refilled if required. It usually doubles the gap between service cycle. The Type 431 OW oil reservoir can be easily installed in conjunction with other optional modular accessories providing an easy upgrade to the standard seals. These can be easily installed on-site in the field or can be supplied from the factory.



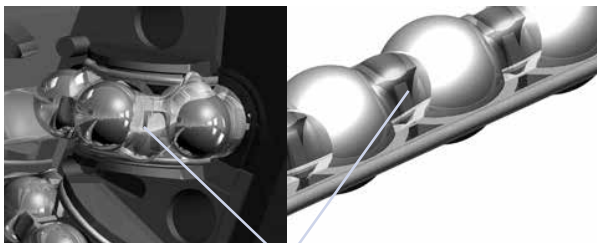
Lubrication Channels

Channels direct lubricant to individual ball tracks to maximize lubrication effectiveness.



Double-Faced Ball Tracks

The 400 Series Linear Guide utilizes a 45°, face-to-face bearing arrangement, resulting in equal load-carrying capacity in all directions. The primary advantage of face-to-face configuration is that the rails are much more tolerant of mounting surface inaccuracies. This enables automation machine builders to reduce cost further by not having to prepare high tolerance mounting surfaces.



Lubricant

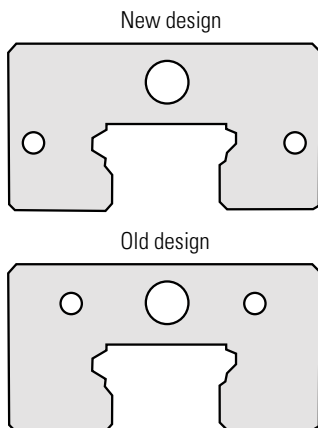
400 Series Ball Cage

The 413 ball cage option provides:

- Increased running smoothness
- Low noise at high speeds
- Individual ball lubricant reservoirs

New endcap design on our 400 Series carriages

The screw position on the end cap is being moved from top to center.

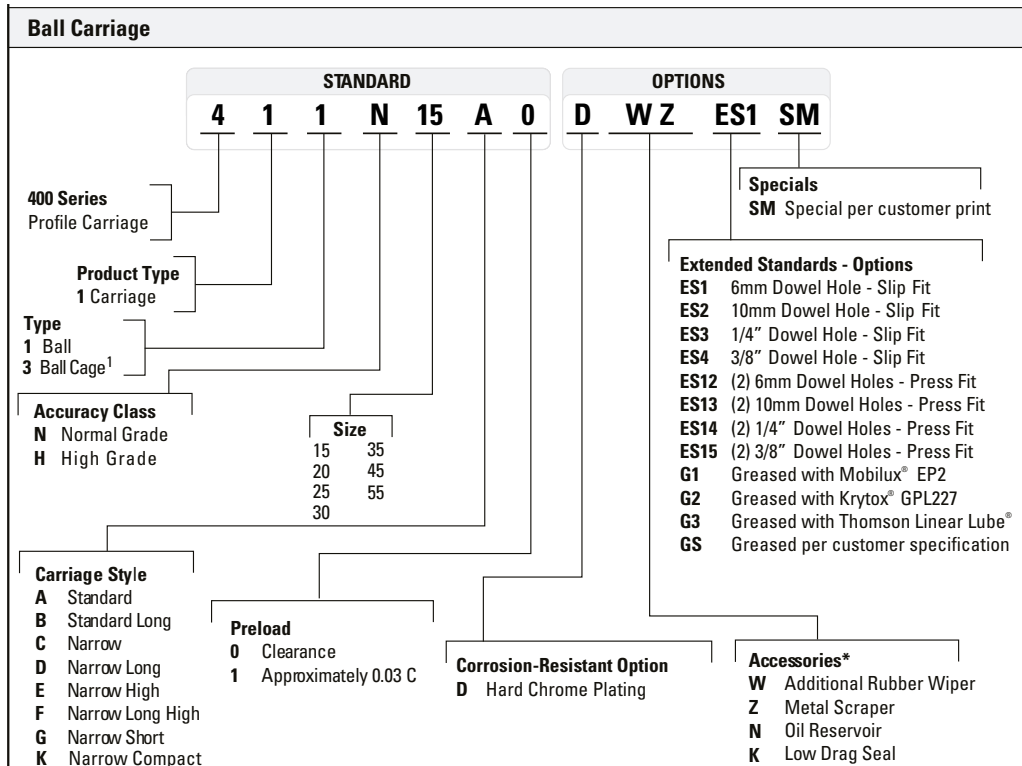


Advantages:

- Moving the screw position toward the center, helps to better secure the scrapper and efficiently scrap off dust on rail.
- This position provides better prevention from dust entering the ball tracks and improves carriage operation.
- All carriage dimensions remain exactly the same. Functioning of the carriage will not be affected.
- Accessories like wiper and scraper will also be changed accordingly to match the new hole pattern.
- New carriages will be available, once existing stock (with current/old endcap style) is used up.



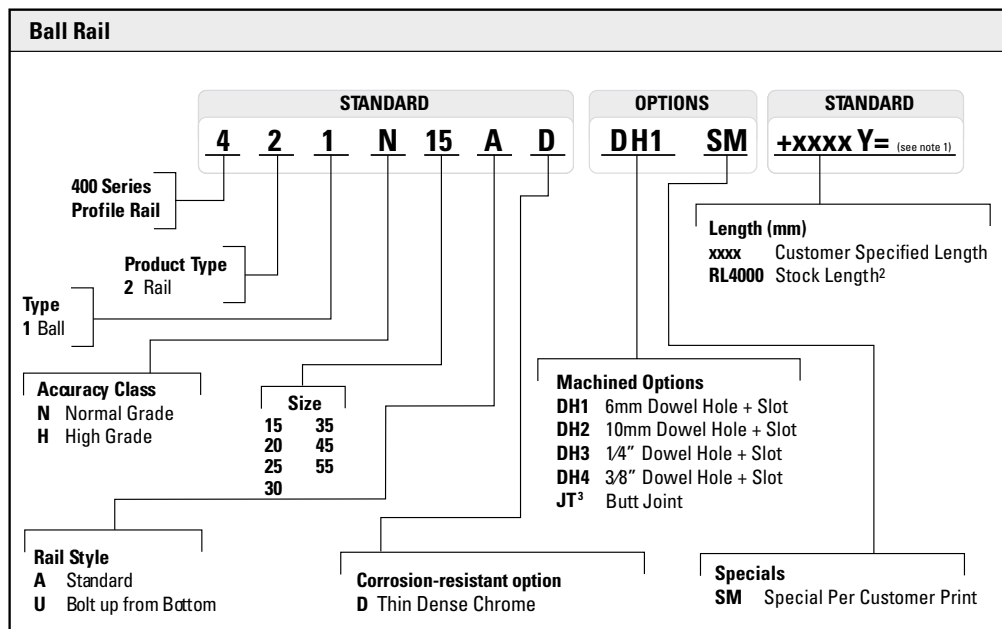
### 400 Series Part Numbering Description



**NEED SAME OR NEXT-DAY SHIPPING?**  
Go to page 164 for details on our 400 Series Express program

1. Carriage does not retain ball bearings when end cap is removed. Removal of end caps can result in loss of ball bearings.

\* Long life lube block and bellows may be available as options if desired, based on the opportunity. Please contact Customer Support for more details.



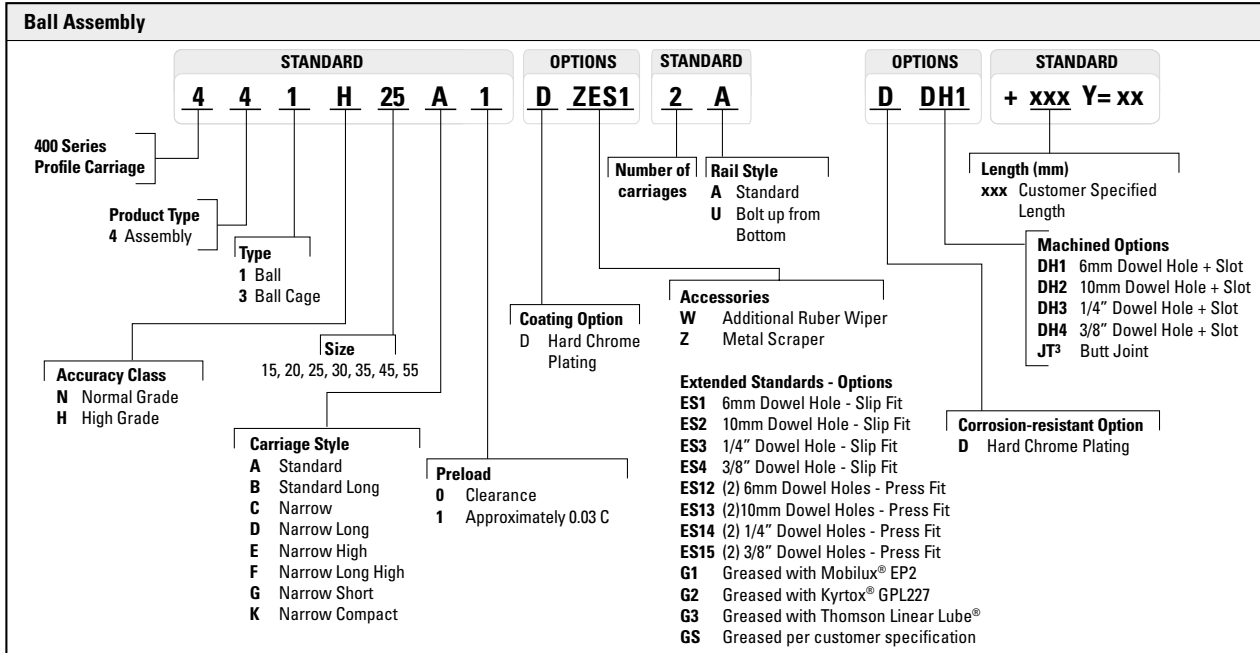
1. Y = Distance from end of rail to center of first mounting hole, Y1 = Y2 unless specified.

2. Stock length of rails are considered random length, total length may exceed specified length, and Y1/Y2 are not equal. To be used only by customer who will cut to length.

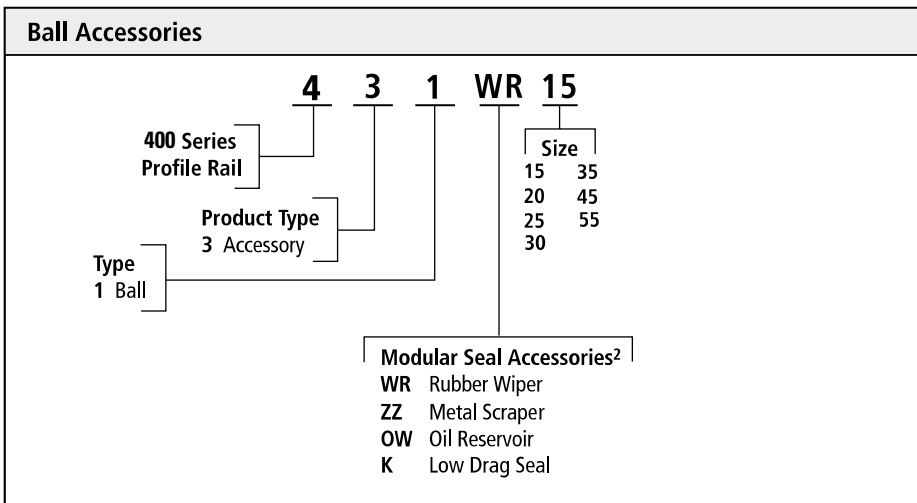
3. Customer drawing required at time of quote and order.

Profile Rail Linear Guides

400 Series Part Numbering Description



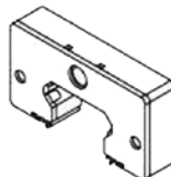
400 Series Profile Rail



Wiper



Scraper



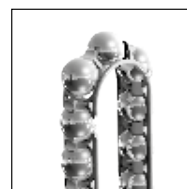
Oil Reservoir



Low Drag Seal

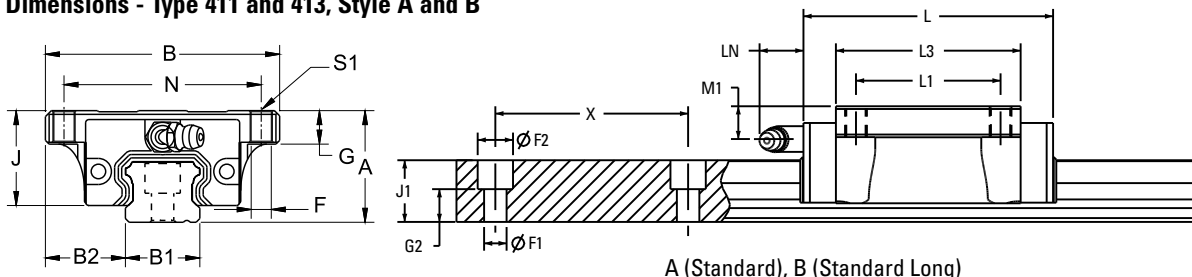


400 Series Specifications



Ball Cage

Dimensions - Type 411 and 413, Style A and B



Type 411/413 (No Ball Cage/Ball Cage) - Style A (Standard)

Size	Assembly [mm]				Carriage [mm]										Rail [mm]					
	A	B	B2	J	L	N	L1	S1	F	G	L3	Oil H	M1	LN	B1 +02 -05	J1	X	F1	F2	G2
15	24	47	16.0	20.7	58.6	38	30	M5	4.4	8.0	40.2	M4 X 0.7	5.5	(5.0)	15	13.0	60	4.5	7.5	7.0
20	30	63	21.5	25.5	69.3	53	40	M6	5.4	9.0	48.5	M6 X 1.0	7.1	(15.6)	20	16.3	60	6.0	9.5	7.8
25	36	70	23.5	30.2	79.2	57	45	M8	7.0	10.0	57.5	M6 X 1.0	10.2	(15.6)	23	19.2	60	7.0	11.0	10.2
30	42	90	31.0	35.0	94.8	72	52	M10	8.6	11.0	67.8	M6 X 1.0	8	(15.6)	28	22.8	80	9.0	14.0	10.8
35	48	100	33.0	40.5	111.5	82	62	M10	8.6	12.0	80.5	M6 X 1.0	8	(16.0)	34	26.0	80	9.0	14.0	14.0
55	70	140	43.5	57.3	155.0	116	95	M14	12.6	18.5	116.0	M8 X 1.25	14.0	(16.0)	53	38.0	120	16.0	23.0	18.0

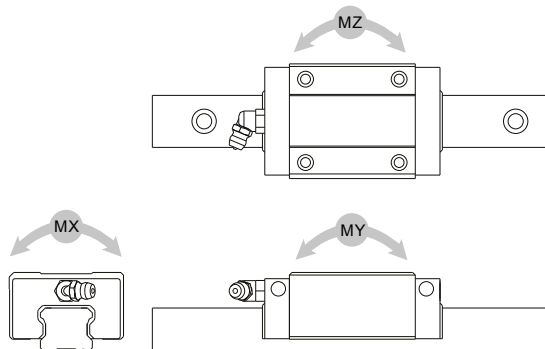
Type 411/413 (No Ball Cage/Ball Cage) - Style B - (Standard Long)

Size	Assembly [mm]				Carriage [mm]										Rail [mm]					
	A	B	B2	J	L	N	L1	S1	F	G	L3	Oil H	M1	LN	B1 +02 -05	J1	X	F1	F2	G2
15	24	47	16.0	20.7	66.1	38	30	M5	4.4	8.0	47.7	M4 X 0.7	5.5	(5.0)	15	13.0	60	4.5	7.5	7.0
20	30	63	21.5	25.5	82.1	53	40	M6	5.4	9.0	61.3	M6 X 1.0	7.1	(15.6)	20	16.3	60	6.0	9.5	7.8
25	36	70	23.5	30.2	93.9	57	45	M8	7.0	10.0	72.2	M6 X 1.0	10.2	(15.6)	23	19.2	60	7.0	11.0	10.2
30	42	90	31.0	35.0	105.0	72	52	M10	8.6	11.0	78.0	M6 X 1.0	8	(15.6)	28	22.8	80	9.0	14.0	10.8
35	48	100	33.0	40.5	123.5	82	62	M10	8.6	12.0	92.5	M6 X 1.0	8	(16.0)	34	26.0	80	9.0	14.0	14.0
45	60	120	37.5	51.1	145.0	100	80	M12	10.6	15.5	110.0	M8 X 1.25	14.4	(16.0)	45	31.1	105	14.0	20.0	14.1
55	70	140	43.5	57.3	193.0	116	95	M14	12.6	18.5	154.0	M8 X 1.25	14.0	(16.0)	53	38.0	120	16.0	23.0	18.0

## 400 Series Specifications

### Performance - Type 411 and 413, Style A and B

Applications with a single rail and a single carriage require the calculation of moment loads for all three axes. Double rail and double carriage configurations can eliminate moment loading on the constrained axes.



Type	Size	Style	Load Rating <sup>1</sup>		Static moment (Nm) <sup>2</sup>			Dynamic moment (Nm) <sup>2</sup>			Weights	
			C (N)	Co (N)	MX	MY	MZ	MX	MY	MZ	Carriage (kg)	Rail (kg/m)
411/413	15	A	9,300	19,600	135	118	118	65	56	56	0.21	1.28
411/413	15	B	11,300	23,700	164	169	169	78	80	80	0.23	1.28
411/413	20	A	14,300	30,500	285	221	221	134	104	104	0.40	2.15
411/413	20	B	18,600	39,500	370	361	361	174	170	170	0.46	2.15
411/413	25	A	20,100	41,100	440	352	352	216	173	173	0.57	2.88
411/413	25	B	25,900	52,800	567	568	568	278	279	279	0.72	2.88
411/413	30	A	29,700	54,600	707	551	551	386	300	300	1.10	4.45
411/413	30	B	38,500	70,700	915	822	822	499	447	447	1.34	4.45
411/413	35	A	42,400	81,100	1283	973	973	671	508	508	1.50	6.25
411/413	35	B	52,900	101,400	1604	1398	1398	838	730	730	1.90	6.25
411/413	45	B	69,000	129,500	2739	2124	2124	1458	1130	1130	2.68	9.60
411/413	55	A	69,800	133,400	3306	2306	2306	1730	1207	1207	3.44	13.80
411/413	55	B	94,200	178,900	4431	4104	4104	2335	2162	2162	4.63	13.80

1. The dynamic load and moment ratings are based on the travel life of 50 km.

2. Moment ratings are the maximum moment load that should be applied to the bearing when there is no relative motion between the carriage and the rail.

### Bearing Travel Life Comparison

$$L = (C/F)^3 \times 100\text{km}$$

where:

L = travel life, km

C = dynamic load rating, N

F = applied dynamic load, N

$$C_{\min} = F \left( \frac{L}{100} \right)^{1/3}$$

where:

C<sub>min</sub> = minimum required dynamic load rating, N

F = applied dynamic load, N

L = required travel life, km

#### Operating Parameters:

##### Maximum Velocity:

411 Series

5 m/s

413 Series

3 m/s

##### Maximum Acceleration:

50 m/s<sup>2</sup>

##### Temperature:

Min: - 40° C

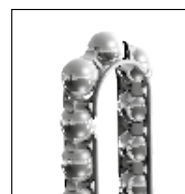
Max: 80° C

Max peak: 120° C short time\*

\*without bellows

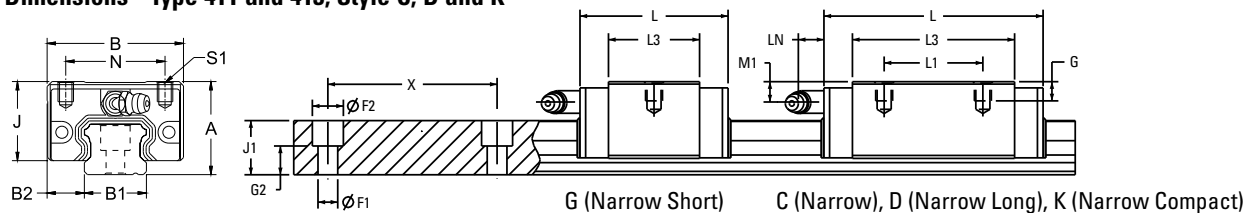


400 Series Specifications



Ball Cage

Dimensions - Type 411 and 413, Style C, D and K



Type 411/413 (No Ball Cage/Ball Cage) - Style C (Narrow)

Size	Assembly [mm]				Carriage [mm]									Rail [mm]					
	A	B	B2	J	L	N	L1	S1	G	L3	Oil H	M1	LN	B1 +0.02 -0.05	J1	X	F1	F2	G2
15	24	34	9.5	20.7	58.6	26	26	M4	4.8	40.2	M4 X 0.7	5.5	(5.0)	15	13.0	60	4.5	7.5	7.0
20	30	44	12.0	25.5	69.3	32	36	M5	6.5	48.5	M6 X 1.0	7.1	(15.6)	20	16.3	60	6.0	9.5	7.8
25	36	48	12.5	30.2	79.2	35	35	M6	9.0	57.5	M6 X 1.0	10.2	(15.6)	23	19.2	60	7.0	11.0	10.2
30	42	60	16.0	35.0	94.8	40	40	M8	10.0	67.8	M6 X 1.0	8.0	(15.6)	28	22.8	80	9.0	14.0	10.8
35	48	70	18.0	40.5	111.5	50	50	M8	10.0	80.5	M6 X 1.0	8.0	(15.6)	34	26.0	80	9.0	14.0	14.0
45	60	86	20.5	51.1	129.0	60	60	M10	15.5	94.0	M8 X 1.25	14.4	(16.0)	45	31.1	105	14.0	20.0	14.1
55	70	100	23.5	57.3	155.0	75	75	M12	18.0	116.0	M8 X 1.25	14.0	(16.0)	53	38.0	120	16.0	23.0	18.0

Type 411/413 (No Ball Cage/Ball Cage) - Style D (Narrow Long)

Size	Assembly [mm]				Carriage [mm]									Rail [mm]					
	A	B	B2	J	L	N	L1	S1	G	L3	Oil H	M1	LN	B1 +0.02 -0.05	J1	X	F1	F2	G2
15	24	34	9.5	20.7	66.1	26	26	M4	4.8	47.7	M4 X 0.7	5.5	(5.0)	15	13.0	60	4.5	7.5	7.0
25	36	48	12.5	30.2	108.6	35	50	M6	9.0	86.9	M6 X 1.0	10.2	(15.6)	23	19.2	60	7.0	11.0	10.2
30	42	60	16.0	35.0	130.5	40	60	M8	10.0	103.5	M6 X 1.0	8.0	(15.6)	28	22.8	80	9.0	14.0	10.8
35	48	70	18.0	40.5	153.5	50	72	M8	10.0	122.5	M6 X 1.0	8.0	(15.6)	34	26.0	80	9.0	14.0	14.0
45	60	86	20.5	51.1	174.0	60	80	M10	15.5	139.0	M8 X 1.25	14.4	(16.0)	45	31.1	105	14.0	20.0	14.1
55	70	100	23.5	57.3	210.0	75	95	M12	18.0	171.0	M8 X 1.25	14.0	(16.0)	53	38.0	120	16.0	23.0	18.0

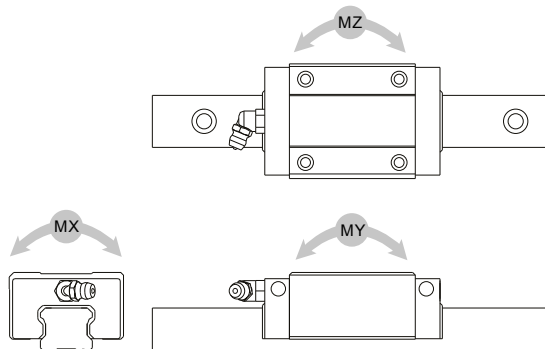
Type 411/413 (No Ball Cage/Ball Cage) - Style K (Narrow Compact)

Size	Assembly [mm]				Carriage [mm]									Rail [mm]					
	A	B	B2	J	L	N	L1	S1	G	L3	Oil H	M1	LN	B1 +0.02 -0.05	J1	X	F1	F2	G2
20	28	42	11.0	23.5	69.3	32	32	M5	5.5	48.5	M6 X 1.0	5.1	(15.6)	20	16.3	60	6.0	9.5	7.8
25	33	48	12.5	27.2	79.2	35	35	M6	6.8	57.5	M6 X 1.0	7.2	(15.6)	23	19.2	60	7.0	11.0	10.2

## 400 Series Specifications

### Performance - Type 411 and 413, Style C, D and K

Applications with a single rail and a single carriage require the calculation of moment loads for all three axes. Double rail and double carriage configurations can eliminate moment loading on the constrained axes.



Type	Size	Style	Load Rating <sup>1</sup>		Static moment (Nm) <sup>2</sup>			Dynamic moment (Nm) <sup>2</sup>			Weights	
			C (N)	Co (N)	MX	MY	MZ	MX	MY	MZ	Carriage (kg)	Rail (kg/m)
411/413	15	C	9,300	19,600	135	118	118	65	56	56	0.17	1.28
411/413	15	D	11,300	23,700	170	168	168	78	80	80	0.18	1.28
411/413	20	C	14,300	30,500	285	221	221	134	104	104	0.31	2.15
411/413	20	K	14,300	30,500	285	221	221	166	129	129	0.31	2.15
411/413	25	C	20,100	41,100	440	352	352	216	173	173	0.40	2.88
411/413	25	D	29,200	63,300	680	820	820	313	378	378	0.67	2.88
411/413	25	K	20,100	41,100	440	352	352	267	213	213	0.38	2.88
411/413	30	C	29,700	54,600	707	551	551	386	300	300	0.80	4.45
411/413	30	D	42,900	86,700	1123	1338	1338	555	661	661	1.16	4.45
411/413	35	C	42,400	81,100	1283	973	973	671	508	508	1.20	6.25
411/413	35	D	58,300	125,300	1983	2288	2288	922	1063	1063	1.84	6.25
411/413	45	C	58,000	108,900	2302	1525	1525	1225	812	812	1.64	9.60
411/413	45	D	79,700	163,300	3452	3382	3382	1684	1651	1651	2.42	9.60
411/413	55	C	69,800	133,400	3306	2306	2306	1730	1207	1207	2.67	13.80
411/413	55	D	157,700	253,600	6284	6462	6462	3165	3255	3255	3.97	13.80

1. The dynamic load and moment ratings are based on the travel life of 50 km.

2. Moment ratings are the maximum moment load that should be applied to the bearing when there is no relative motion between the carriage and the rail.

### Bearing Travel Life Comparison

$$L = (C/F)^3 \times 100\text{km}$$

where:

L = travel life, km

C = dynamic load rating, N

F = applied dynamic load, N

$$C_{\min} = F \left( \frac{L}{100} \right)^{1/3}$$

where:

C<sub>min</sub> = minimum required

dynamic load rating, N

F = applied dynamic load, N

L = required travel life, km

#### Operating Parameters:

##### Maximum Velocity:

411 Series 5 m/s

413 Series 3 m/s

##### Maximum Acceleration:

50 m/s<sup>2</sup>

##### Temperature:

Min: -40° C

Max: 80° C

Max peak: 120° C short time\*

\*without bellows



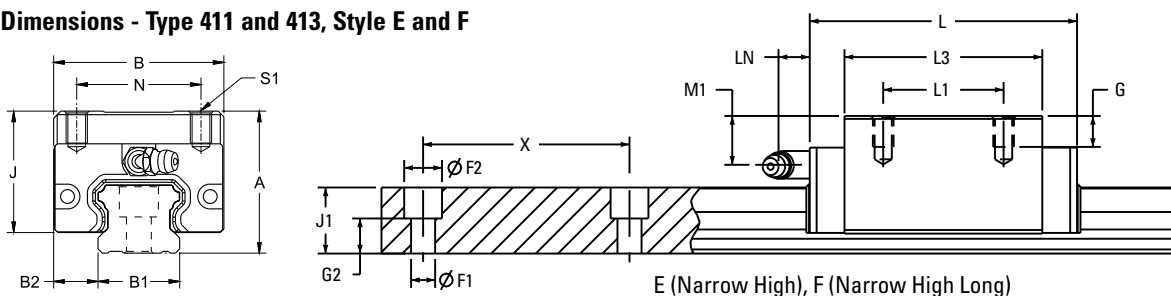


400 Series Specifications



Ball Cage

Dimensions - Type 411 and 413, Style E and F



Type 411/413 (No Ball Cage/Ball Cage) - Style E (Narrow High)

Size	Assembly [mm]				Carriage [mm]									Rail [mm]					
	A	B	B2	J	L	N	L1	S1	G	L3	Oil H	M1	LN	B1 +0.02 -0.05	J1	X	F1	F2	G2
15	28	34	9.5	24.7	58.6	26	26	M4	6.0	40.2	M4 X 0.7	9.5	(5.0)	15	13.0	60	4.5	7.5	7.0
25	40	48	12.5	34.2	79.2	35	35	M6	9.0	57.5	M6 X 1.0	14.2	(15.6)	23	19.2	60	7.0	11.0	10.2
30	45	60	16.0	38.0	94.8	40	40	M8	12.0	67.8	M6 X 1.0	11.0	(15.6)	28	22.8	80	9.0	14.0	10.8
35	55	70	18.0	47.5	111.5	50	50	M8	12.0	80.5	M6 X 1.0	15.0	(15.6)	34	26.0	80	9.0	14.0	14.0
45	70	86	20.5	61.1	129.0	60	60	M10	18.0	94.0	M8 X 1.25	24.4	(16.0)	45	31.1	105	14.0	20.0	14.1
55	80	100	23.5	67.3	155.0	75	75	M12	18.0	116.0	M8 X 1.25	14	(16.0)	53	38.0	120	16.0	23.0	18.0

Type 411/413 (No Ball Cage/Ball Cage) - Style F - Narrow High Long

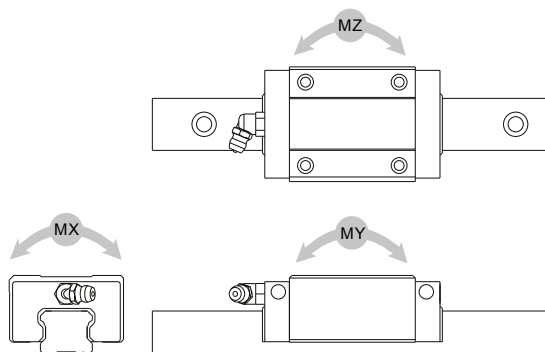
Size	Assembly [mm]				Carriage [mm]									Rail [mm]					
	A	B	B2	J	L	N	L1	S1	G	L3	Oil H	M1	LN	B1 +0.02 -0.05	J1	X	F1	F2	G2
20	30	44	12.0	25.5	82.1	32	50	M5	6.5	61.3	M6 X 1.0	7.1	(15.6)	20	16.3	60	6.0	9.5	7.8
25	40	48	12.5	34.2	93.9	35	50	M6	9.0	72.2	M6 X 1.0	14.2	(15.6)	23	19.2	60	7.0	11.0	10.2
30	45	60	16.0	38.0	105.0	40	60	M8	12.0	78.0	M6 X 1.0	11.0	(15.6)	28	22.8	80	9.0	14.0	10.8
35	55	70	18.0	47.5	123.5	50	72	M8	12.0	92.5	M6 X 1.0	15.0	(15.6)	34	26.0	80	9.0	14.0	14.0
45	70	86	20.5	61.1	145.0	60	80	M10	18.0	110.0	M8 X 1.25	24.4	(16.0)	45	31.1	105	14.0	20.0	14.1
55	80	100	23.5	67.3	193.0	75	95	M12	18.0	154.0	M8 X 1.25	14	(16.0)	53	38.0	120	16.0	23.0	18.0

\*Note: Mounting hole dimensions of 411 and 413 F Style carriages are different.

## 400 Series Specifications

### Performance - Type 411 and 413, Style E and F

Applications with a single rail and a single carriage require the calculation of moment loads for all three axes. Double rail and double carriage configurations can eliminate moment loading on the constrained axes.



Type	Size	Style	Load Rating <sup>1</sup>		Static moment (Nm) <sup>2</sup>			Dynamic moment (Nm) <sup>2</sup>			Weights	
			C (N)	Co (N)	MX	MY	MZ	MX	MY	MZ	Carriage (kg)	Rail (kg/m)
411/413	15	E	9,300	19,600	135	118	118	65	65	56	0.19	1.28
411/413	20	F	18,600	39,500	370	361	361	174	170	170	0.36	2.15
411/413	25	E	20,100	41,100	440	352	352	267	213	213	0.45	2.88
411/413	25	F	25,900	52,800	567	568	568	278	279	279	0.66	2.88
411/413	30	E	29,700	54,600	707	551	551	386	300	300	0.91	4.45
411/413	30	F	38,500	70,700	915	822	822	499	447	447	1.04	4.45
411/413	35	E	42,400	81,100	1283	973	973	671	508	508	1.50	6.25
411/413	35	F	52,900	101,400	1604	1398	1398	838	730	730	1.80	6.25
411/413	45	E	58,000	108,900	2302	1525	1525	1225	812	812	2.28	9.60
411/413	45	F	69,000	129,500	2739	2124	2124	1458	1130	1133	2.67	9.60
411/413	55	E	69,800	133,400	3306	2306	2306	1730	1207	1207	3.42	13.80
411/413	55	F	94,200	178,900	4431	4104	4104	2335	2162	2162	5.08	13.80

1. The dynamic load and moment ratings are based on the travel life of 50 km.

2. Moment ratings are the maximum moment load that should be applied to the bearing when there is no relative motion between the carriage and the rail.

### Bearing Travel Life Comparison

$$L = (C/F)^3 \times 100\text{km}$$

where:

L = travel life, km

C = dynamic load rating, N

F = applied dynamic load, N

$$C_{\min} = F \left( \frac{L}{100} \right)^{1/3}$$

where:

C<sub>min</sub> = minimum required

dynamic load rating, N

F = applied dynamic load, N

L = required travel life, km

#### Operating Parameters:

##### Maximum Velocity:

411 Series

5 m/s

413 Series

3 m/s

##### Maximum Acceleration:

50 m/s<sup>2</sup>

##### Temperature:

Min: - 40° C

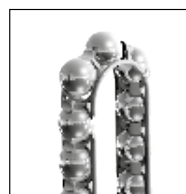
Max: 80° C

Max peak: 120° C short time\*

\*without bellows

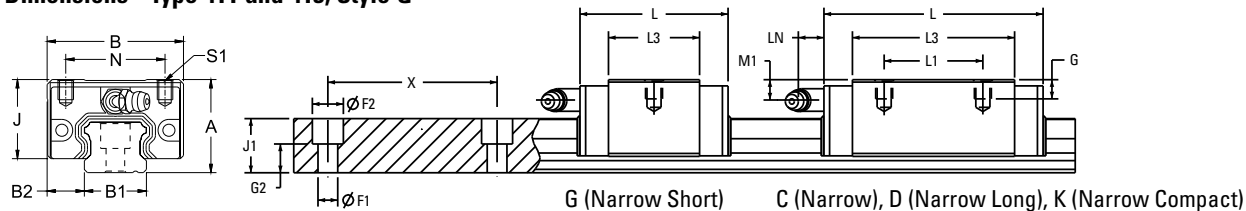


400 Series Specifications



Ball Cage

Dimensions - Type 411 and 413, Style G



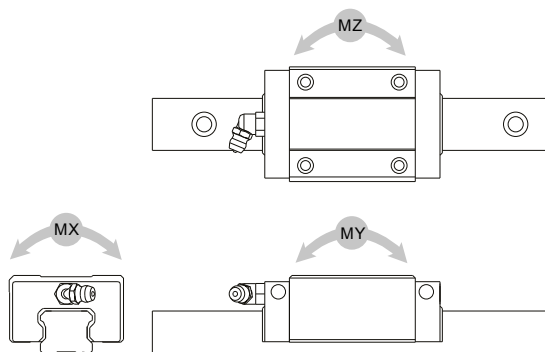
Type 411/413 (No Ball Cage/Ball Cage) - Style G (Narrow Short)

Size	Assembly [mm]				Carriage [mm]									Rail [mm]					
	A	B	B2	J	L	N	L1	S1	G	L3	Oil H	M1	LN	B1 +0.02 -0.05	J1	X	F1	F2	G2
15	24	34	9.5	20.7	40.6	26	--	M4	4.8	22.2	M4 X 0.7	5.5	(5.0)	15	13.0	60	4.5	7.5	7.0
20	28	42	11.0	23.5	48.3	32	--	M5	5.5	27.5	M6 X 1.0	5.1	(15.6)	20	16.3	60	6.0	9.5	7.8
25	33	48	12.5	27.2	54.0	35	--	M6	6.8	32.3	M6 X 1.0	7.2	(15.6)	23	19.2	60	7.0	11.0	10.2
30	42	60	16.0	35.0	64.2	40	--	M8	10.0	37.2	M6 X 1.0	8.0	(15.6)	28	22.8	80	9.0	14.0	10.8
35	48	70	18.0	40.5	75.5	50	--	M8	10.0	44.5	M6 X 1.0	8.0	(15.6)	34	26.0	80	9.0	14.0	14.0

## 400 Series Specifications

### Performance - Type 411 and 413, Style G

Applications with a single rail and a single carriage require the calculation of moment loads for all three axes. Double rail and double carriage configurations can eliminate moment loading on the constrained axes.



400 Series  
Profile Rail

Type	Size	Style	Load Rating <sup>1</sup>		Static moment (Nm) <sup>2</sup>			Dynamic moment (Nm) <sup>2</sup>			Weights	
			C (N)	Co (N)	MX	MY	MZ	MX	MY	MZ	Carriage (kg)	Rail (kg/m)
411/413	15	G	4,600	9,800	68	32	32	32	16	16	0.10	1.28
411/413	20	G	7,400	15,700	146	65	65	69	30	30	0.17	2.15
411/413	25	G	10,300	21,000	226	101	101	111	49	49	0.21	2.88
411/413	30	G	14,700	27,000	350	150	150	191	81	81	0.50	4.45
411/413	35	G	21,200	40,700	644	270	270	336	141	141	0.80	6.25

1. The dynamic load and moment ratings are based on the travel life of 50 km.

2. Moment ratings are the maximum moment load that should be applied to the bearing when there is no relative motion between the carriage and the rail.

### Bearing Travel Life Comparison

$$L = (C/F)^3 \times 100\text{km}$$

where:

L = travel life, km

C = dynamic load rating, N

F = applied dynamic load, N

$$C_{\min} = F \left( \frac{L}{100} \right)^{1/3}$$

where:

C<sub>min</sub> = minimum required dynamic load rating, N

F = applied dynamic load, N

L = required travel life, km

#### Operating Parameters:

##### Maximum Velocity:

411 Series 5 m/s

413 Series 3 m/s

##### Maximum Acceleration:

50 m/s<sup>2</sup>

##### Temperature:

Min: -40° C

Max: 80° C

Max peak: 120° C short time\*

\*without bellows



## 400 Series Life Calculations and Tolerances

### Bearing Travel Life Calculation

$$L = (C/F)^3 \times 50 \text{ km}$$

where:

L = travel life, km

C = 50 km dynamic load rating

F = applied dynamic load, N

$$C_{\min} = \left(\frac{L}{50}\right)^{1/3} F$$

where:

C<sub>min</sub> = minimum required dynamic load rating, N

F = applied dynamic load, N

L = required travel life, km

Operating Parameters:

Maximum Velocity:

411 Series 5 m/s

413 Series 3 m/s

Maximum Acceleration: 100 m/s<sup>2</sup>

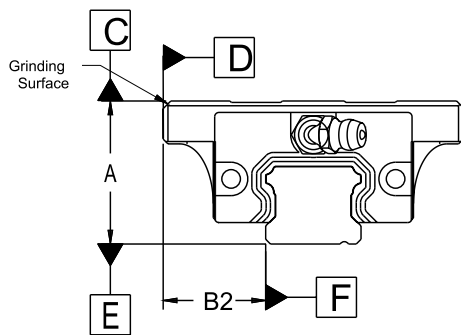
Temperature: Min: -40° C

Max: 80° C

Max peak: 120° C short time\*

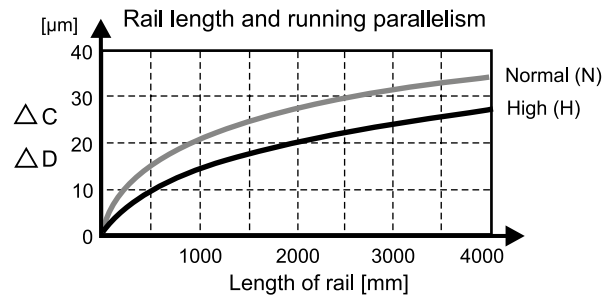
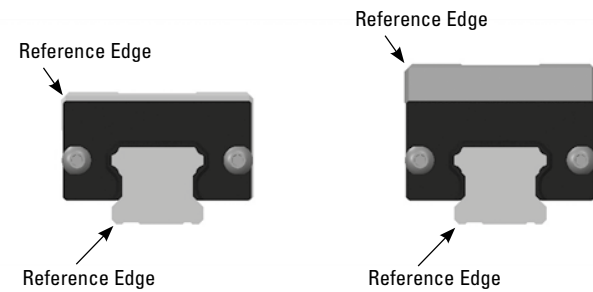
\*without bellows

Deflection charts are available on [www.thomsonlinear.com](http://www.thomsonlinear.com).



Grade	Normal (N)	High (H)
Item		
Height Tolerance (A)	± 0.1	± 0.04
Width Tolerance (B2)	± 0.1	± 0.04
Pair variation max (ΔA)	0.03	0.02
Pair variation max (ΔB2)	0.03	0.02
Running parallelism of carriage surface C with respect to surface E.	Δ C refer to Fig. 1-1	
Running parallelism of carriage surface D with respect to surface F.	Δ D refer to Fig. 1-1	

All items in mm.



### 400 Series Running Smoothness

#### Bearing Travel Life Calculation

$$L = (C/F)^3 \times 50 \text{ km}$$

where:

L = travel life, km

C = 50 km dynamic load rating

F = applied dynamic load, N

$$C_{\min} = \left(\frac{L}{50}\right)^{1/3} F$$

where:

C<sub>min</sub> = minimum required dynamic load rating, N

F = applied dynamic load, N

L = required travel life, km

#### Operating Parameters:

##### Maximum Velocity:

411 Series 5 m/s

413 Series 3 m/s

Maximum Acceleration: 100 m/s<sup>2</sup>

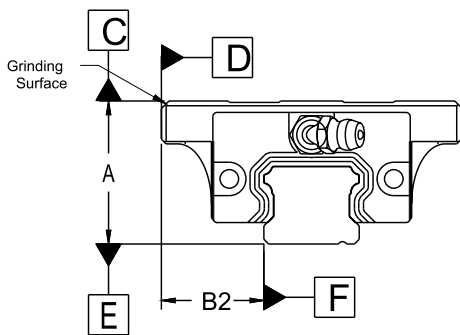
Temperature: Min: -40° C

Max: 80° C

Max peak: 120° C short time\*

\*without bellows

Deflection charts are available on [www.thomsonlinear.com](http://www.thomsonlinear.com).



Grade	Normal (N)	High (H)
Height Tolerance (A)	± 0.1	± 0.04
Width Tolerance (B2)	± 0.1	± 0.04
Pair variation max (ΔA)	0.03	0.02
Pair variation max (ΔB2)	0.03	0.02
Running parallelism of carriage surface C with respect to surface E.	Δ C refer to Fig. 1-1	
Running parallelism of carriage surface D with respect to surface F.	Δ D refer to Fig. 1-1	

All items in mm.

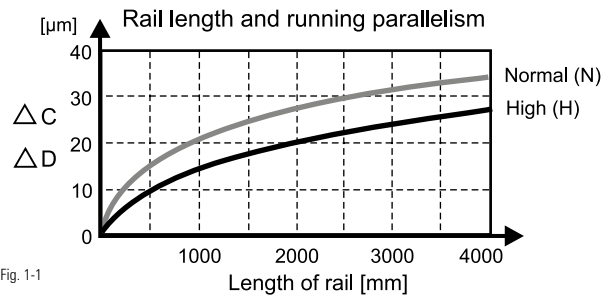
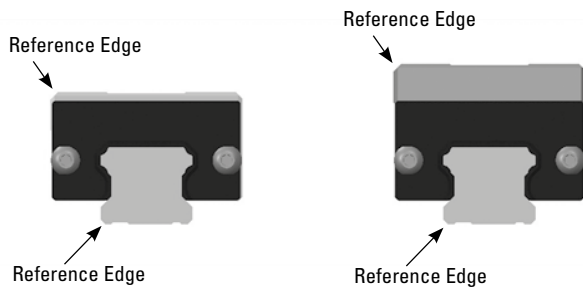
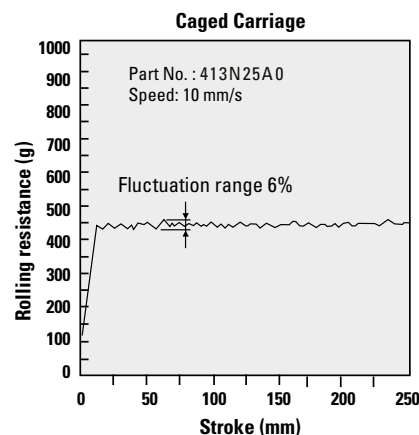
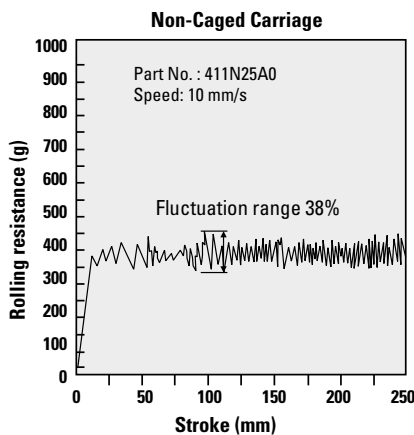


Fig. 1-1

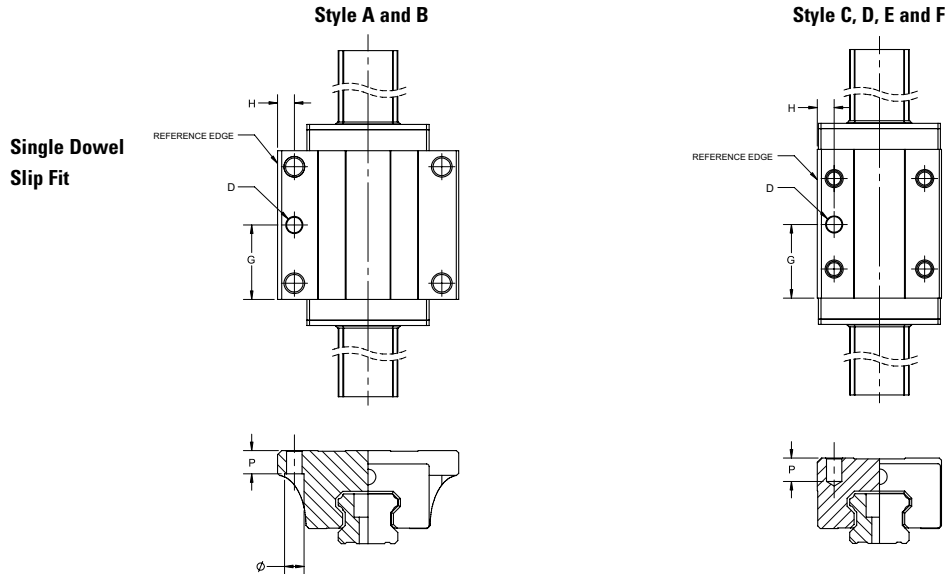
### 413 Caged Ball Carriage Increased Running Smoothness





### 400 Series - Carriage Dowel Holes

Dowel holes are commonly used to ensure proper alignment during installation and replacement of carriages and rails. The standard press fit dowel hole options for the 400 series Standard Ball Carriages are:



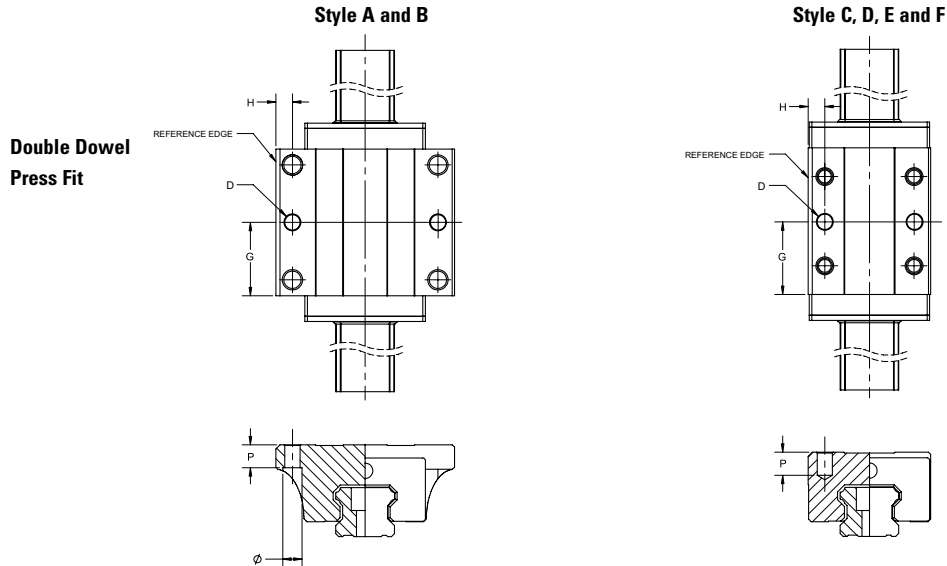
400		G	ES1			ES2			ES3			ES4		
Style	Size		ØD	H	P	ØD	H	P	ØD	H	P	ØD	H	P
Type A	15	20.10	6	4.5	7	-	-	-	1/4"	4.5	7	-	-	-
	20	24.25	6	5	9	-	-	-	1/4"	5	9	-	-	-
	25	28.75	6	6.5	9	-	-	-	1/4"	6.5	9	-	-	-
	30	33.90	6	9	12	10	9	12	1/4"	9	12	3/8"	9	12
	35	40.25	-	-	-	10	9	14	-	-	-	3/8"	9	14
	55	47.00	-	-	-	10	10	18	-	-	-	3/8"	10	18
Type B	20	30.65	6	5	9	-	-	-	1/4"	5	9	-	-	-
	25	36.10	6	6.5	9	-	-	-	1/4"	6.5	9	-	-	-
	30	39.00	6	9	12	10	9	12	1/4"	9	12	3/8"	9	12
	35	46.25	-	-	-	10	9	14	-	-	-	3/8"	9	14
	45	55.00	-	-	-	10	10	18	-	-	-	3/8"	10	18
	55	55.00	-	-	-	10	10	18	-	-	-	3/8"	10	18
Type C	15	20.10	6	4	4.8	-	-	-	1/4"	4	4.8	-	-	-
	20	24.25	6	6	5.5	-	-	-	1/4"	6	6.5	-	-	-
	25	28.75	6	6.5	9	-	-	-	1/4"	6.5	9	-	-	-
	30	33.90	6	10	10	10	10	10	1/4"	10	10	3/8"	10	10
	35	40.25	-	-	-	10	10	10	-	-	-	3/8"	10	10
Type D	25	43.45	6	6.5	9	-	-	-	1/4"	6.5	9	-	-	-
	30	51.75	6	10	10	10	10	10	1/4"	10	10	3/8"	10	10
	35	61.25	-	-	-	10	10	10	-	-	-	3/8"	10	10
Type E	15	20.10	6	4	6	-	-	-	1/4"	4	6	-	-	-
	25	28.75	6	6.5	9	-	-	-	1/4"	6.5	9	-	-	-
	30	33.90	6	10	12	10	10	12	1/4"	10	12	3/8"	10	12
	35	40.25	-	-	-	10	10	12	-	-	-	3/8"	10	12
	45	47.00	-	-	-	10	13	18	-	-	-	3/8"	13	18
	55	47.00	-	-	-	10	13	18	-	-	-	3/8"	13	18
Type F	25	36.10	6	6.5	9	-	-	-	1/4"	6.5	9	-	-	-
	30	39.00	6	10	12	10	10	12	1/4"	10	12	3/8"	10	12
	35	46.25	-	-	-	10	10	12	-	-	-	3/8"	10	12
	45	55.00	-	-	-	10	13	18	-	-	-	3/8"	13	18
	55	55.00	-	-	-	10	13	18	-	-	-	3/8"	13	18

All dimension in mm, unless otherwise specified.  
Hole tolerance  $\phi D +0.013/-0$

Profile Rail Linear Guides

400 Series - Carriage Dowel Holes (continued)

Dowel holes are commonly used to ensure proper alignment during installation and replacement of carriages and rails. The standard slip fit dowel hole options for the 400 series Standard Ball Carriages are:



400 Series  
Profile Rail

400		G	ES12			ES13			ES14			ES15		
Style	Size		ØD	H	P	ØD	H	P	ØD	H	P	ØD	H	P
Type A	15	20.10	6	4.5	7	—	—	—	1/4"	4.5	7	—	—	—
	20	24.25	6	5	9	—	—	—	1/4"	5	9	—	—	—
	25	28.75	6	6.5	9	—	—	—	1/4"	6.5	9	—	—	—
	30	33.90	6	9	12	10	9	12	1/4"	9	12	3/8"	9	12
	35	40.25	—	—	—	10	9	14	—	—	—	3/8"	9	14
	55	47.00	—	—	—	10	10	18	—	—	—	3/8"	10	18
Type B	20	30.65	6	5	9	—	—	—	1/4"	5	9	—	—	—
	25	36.10	6	6.5	9	—	—	—	1/4"	6.5	9	—	—	—
	30	39.00	6	9	12	10	9	12	1/4"	9	12	3/8"	9	12
	35	46.25	—	—	—	10	9	14	—	—	—	3/8"	9	14
	45	55.00	—	—	—	10	10	18	—	—	—	3/8"	10	18
	55	55.00	—	—	—	10	10	18	—	—	—	3/8"	10	18
Type C	15	20.10	6	4	4.8	—	—	—	1/4"	4	4.8	—	—	—
	20	24.25	6	6	5.5	—	—	—	1/4"	6	6.5	—	—	—
	25	28.75	6	6.5	9	—	—	—	1/4"	6.5	9	—	—	—
	30	33.90	6	10	10	10	10	10	1/4"	10	10	3/8"	10	10
	35	40.25	—	—	—	10	10	10	—	—	—	3/8"	10	10
Type D	25	43.45	6	6.5	9	—	—	—	1/4"	6.5	9	—	—	—
	30	51.75	6	10	10	10	10	10	1/4"	10	10	3/8"	10	10
	35	61.25	—	—	—	10	10	10	—	—	—	3/8"	10	10
Type E	15	20.10	6	4	6	—	—	—	1/4"	4	6	—	—	—
	25	28.75	6	6.5	9	—	—	—	1/4"	6.5	9	—	—	—
	30	33.90	6	10	12	10	10	12	1/4"	10	12	3/8"	10	12
	35	40.25	—	—	—	10	10	12	—	—	—	3/8"	10	12
	45	47.00	—	—	—	10	13	18	—	—	—	3/8"	13	18
	55	47.00	—	—	—	10	13	18	—	—	—	3/8"	13	18
Type F	25	36.10	6	6.5	9	—	—	—	1/4"	6.5	9	—	—	—
	30	39.00	6	10	12	10	10	12	1/4"	10	12	3/8"	10	12
	35	46.25	—	—	—	10	10	12	—	—	—	3/8"	10	12
	45	55.00	—	—	—	10	13	18	—	—	—	3/8"	13	18
	55	55.00	—	—	—	10	13	18	—	—	—	3/8"	13	18

All dimension in mm, unless otherwise specified.  
Hole tolerance  $\varnothing D +0/-0.013$



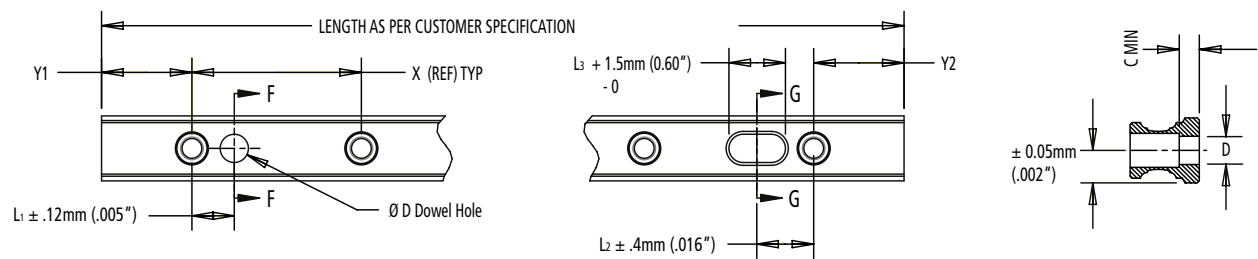


## 400 Series - Rail Length

### Maximum Length of One Piece Rail

Size (mm)	15	20	25	30	35	45	55
One Piece Rail Length	4000 mm						

### Extended Standard Rail Options



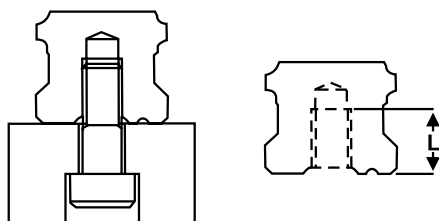
Option	D	L1	L2	L3	C
DH1	6mm	30mm	30mm	10.2 mm	9.5 mm
DH2	10mm	30mm	30mm	13.8 mm	9.5 mm
DH3	1/4"	1.181"	1.181"	.542"	3/8"
DH4	3/8"	1.181"	1.181"	.542"	3/8"

Y1 = Y2 unless specified at time of ordering

\*Size 25 and up step will be present around bottom of slot to control width tolerance during milling of slot.

The rail can be supplied with dowel holes, radial holes and coaxial holes to meet your application needs. Please provide a drawing of your requirement and our Application Engineering Team can provide a quote or select one of our extended standard options.

### Rail with Tapped Holes



Bolting the rail from the underside allows for a clean top surface with no openings for debris and other particles to collect.

Size (mm)	15	20	25	30	35	45	55
Screw	M5	M6	M6	M8	M8	M12	M14
Length of thread	8 mm	10 mm	12 mm	15 mm	17 mm	24 mm	24 mm

### Thin Dense Chrome Plating

Rails and carriages are available with **Thin Dense Chrome Plating** with a thickness of 2 – 4 µm. It is only available in both High and Precision accuracy classes up to 4 meters long as a single rail; longer lengths require butt joints.

Profile Rail Linear Guides

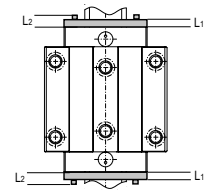
Modular Seals and Lubrication Accessories

Additional Wipers

431WR – Rubber Wiper



Size	Part Number	Thickness (mm)	Max Screw Head (mm)	Weight (g)
15	431WR15	A=1.8 / B=2.5	1.5	3.4
20	431WR20	A=2.3 / B=3.2	1.65	5.6
25	431WR25	A=2 / B=2.75	1.65	6.6
30	431WR30	A=2.5 / B=3.5	1.65	13.6
35	431WR35	A=3 / B=4	2.2	22
45	431WR45	A=3 / B=4.5	2.2	32
55	431WR55	A=3 / B=4.5	2.2	44.6

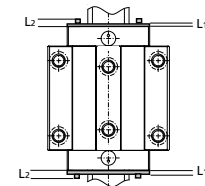


Metal Scraper

431 ZZ



Size	Part Number	Thickness (mm)	Max Screw Head (mm)	Weight (g)
15	431ZZ15	1.6	1.5	2.6
20	431ZZ20	2.1	1.65	4.8
25	431ZZ25	2.2	1.65	5.8
30	431ZZ30	2.3	1.65	9.4
35	431ZZ35	2.6	2.2	12.6
45	431ZZ45	3	2.2	18.3
55	431ZZ55	2.8	2.2	26

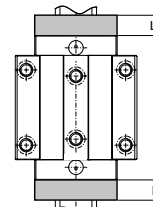


Oil Reservoir

431 OW



Size	Part Number	Thickness (mm)	Weight (g)
15	431OW15	10.3	3
20	431OW20	10.3	4.5
25	431OW25	10.3	5
30	431OW30	10.3	6.7
35	431OW35	10.3	9.8
45	431OW45	13	15.3
55	431OW55	13	19.5

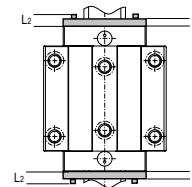


Low Drag Seal

431 K



Size	Part Number	L1 (mm)	L2 (mm)	Weight (g)
15	431K15	2.3	1.5	3.4
20	431K20	2.6	1.65	5.6
25	431K25	3	1.65	6.6
30	431K30	3.4	1.65	13.6
35	431K35	3.8	2.2	22
45	431K45	3.8	2.2	32
55	431K55	3.8	2.2	44.6



400 Series  
Profile Rail



When using a combination of different plates, add the cumulative thickness of the plates to get an accurate overall carriage length.

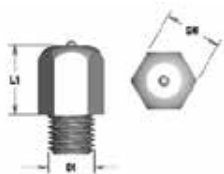
**Example:**

**411 Size 30 carriage with 431 WR  
and 431 OW modular seals on both sides:**

Carriage Length (L)	= 94.8 mm
431 WR L1 x 2	= 7 mm
431 OW L1 x 2	= 20.6 mm
Screw Head L x 2	= 3.3 mm
<b>Total Length</b>	<b>= 125.7 mm</b>

Each modular accessory is supplied with the proper screws to install them over the end cap. When combinations of modular seals are used longer screws may be required.

400 Series - Oil Fittings



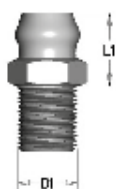
**430LN15L3**  
Hydraulic-type lubricating nipple.

SW	D1	L1
5	M4x0.7xL3.5	6



**430LN15L-5**  
Hydraulic-type lubricating nipple.

Part No.	SW	D1	L1
430LN15L5	5	M4x0.7xL5	7
430LN15L	5	M4x0.7xL8	7



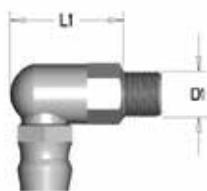
**430LN20L / 15L7 / 15L12**  
Hydraulic-type lubricating nipple. Straight.

Part No.	SW	D1	L1
430LN20L		M6x1.0xL5	7.3
430LN15L7		M6x1.0xL7	7.3
430LN15L12		M6x1.0xL12	7.3



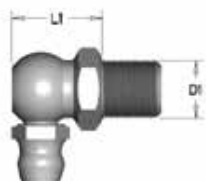
**430LN35L / LNL**  
Hydraulic-type lubricating nipple. Straight.

Part No.	SW	D1	L1
430LN35L		M8x1.25xL8	10.2
430LNL		M8x1.25xL12	10.2



**430LN90L5 / L7 / L12**  
Hydraulic-type lubricating nipple. 90° angle.

Part No.	SW	D1	L1
430LN90L5		M6x1.0xL5	14.7
430LN90L7		M6x1.0xL7	14.7
430LN90L12		M6x1.0xL12	14.7

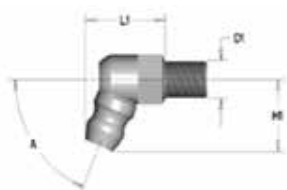


**430LN95L8 / L12**  
Hydraulic-type lubricating nipple. 90° angle.

Part No.	SW	D1	L1
430LN95L8		M8x1.25xL8	12.5
430LN95L12		M8x1.25xL12	12.5



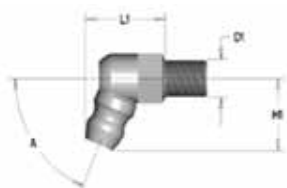
400 Series - Oil Fittings



430LN40L5 / L8

Hydraulic-type lubricating nipple. 67.5° angle.

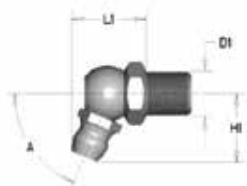
Part No.	SW	D1	L1	H1	A
430LN40L5		M4x0.7xL5	10.5	8	67.5
430LN40L8		M4x0.75xL8	10.5	8	67.5



430LN45L5 / 45L7 / 45L

Hydraulic-type lubricating nipple. 67.5° angle.

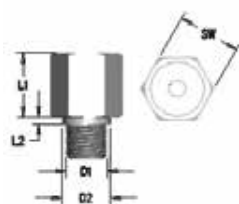
Part No.	SW	D1	L1	H1	A
430LN45L5		M6x1.0xL5	13.5	11.4	67.5
430LN45L7		M6x1.0xL7	13.5	11.4	67.5
430LN45L		M6x1.0xL12	13.5	11.4	67.5



430LN55L8 / L

Hydraulic-type lubricating nipple. 67.5° angle.

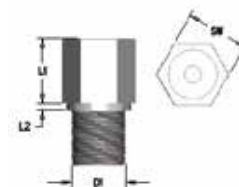
Part No.	SW	D1	L1	H1	A
430LN55L8		M8x1.25xL8	13.3	12.3	67.5
430LN55L		M8x1.25xL12	13.3	12.3	67.5



430LNS25L5 / L8 / L12

Hydraulic-type lubricating nipple. Straight.

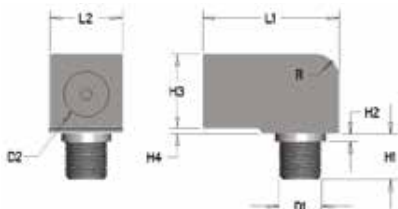
Part No.	SW	D1	D2	L1	L2
430LNS25L5	9.2	M6x1.0xL5	7	9.4	1
430LNS25L8	9.2	M6x1.0xL7	7	9.4	1
430LNS25L12	9.2	M6x1.0xL12	7	9.4	1



430LNS35L8 / L12

Hydraulic-type lubricating nipple. Straight.

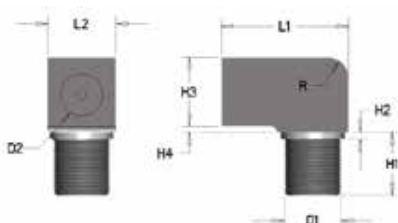
Part No.	SW	D1	L1	H1	A
430LNS35L8	9.2	M8x1.25xL8	13.3	12.3	67.5
430LNS35L12	9.2	M8x1.25xL12	13.3	12.3	67.5



430LNA25L5 / L8 / L12

Hydraulic-type lubricating nipple. 90° angle block.

Part No.	D1	L1	L2	H1	H2	H3	H4	D2	R
430LNA25L5	M6x1.0xL5	18.2	9.2	6	1	9.8	.75	M8x1	3
430LNA25L8	M6x1.0xL7	18.2	9.2	8	1	9.8	.75	M8x1	3
430LNA25L12	M6x1.0xL12	18.2	9.2	13	1	9.8	.75	M8x1	3



430LNA35L8 / L12

Hydraulic-type lubricating nipple. 90° angle block.

Part No.	D1	L1	L2	H1	H2	H3	H4	D2	R
430LNA35L8	M8x1.25xL8	18.2	9.2	9	1	9.8	.75	M8x1	3
430LNA35L12	M6x1.0xL12	18.2	9.2	13	1	9.8	.75	M8x1	3