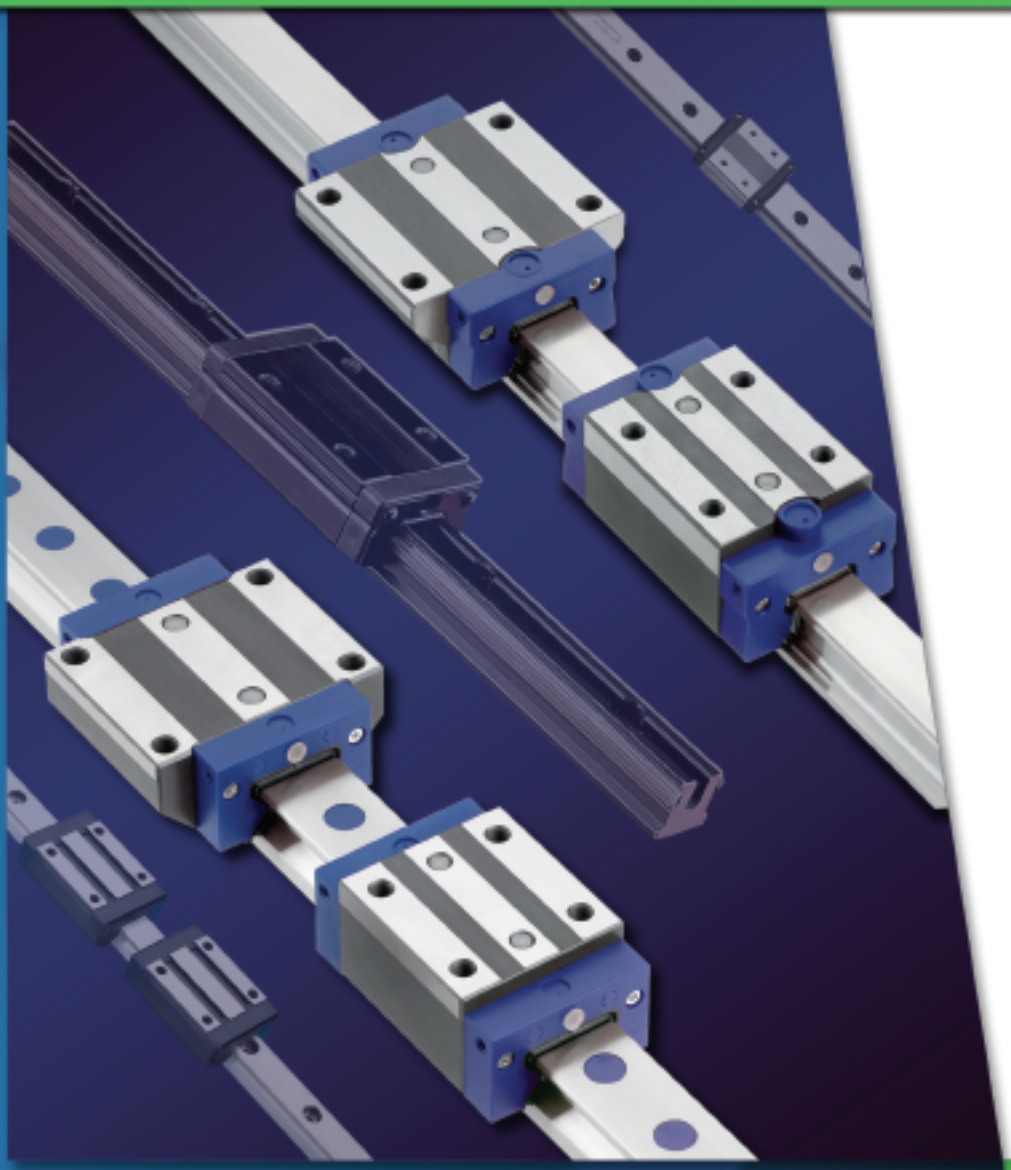
PROFILE RAIL LINEAR GUIDES

June 2004

www.DanaherMotion.com



THOMSON™

- 500 Series Ball Profile Rail
- 500 Series Roller Profile Rail
- MicroGuide™ Linear Guide
- T-Series™ Linear Guide
- AccuGlide™ Miniature Linear Guide

Solutions by DANAHER MOTION

Mechanical and Electro-Mechanical Product Solutions by Danaher Motion

New Name, Established Brands

Danaher Motion's wide range of motion control systems and components offer customers an unprecedented choice in selecting the right solution for their particular application requirements. Our product innovations have been improving the efficiency and productivity of complex manufacturing operations for over 60 years through trusted brand names such as Dover, Kollmorgen, Pacific Scientific, Portescap and Thomson in industries as diverse as semiconductor, aerospace and defense, mobile-off-highway, packaging, medical and robotics.

Danaher Motion's growing family of leading motion control products tells only half the story. With a worldwide service and support infrastructure, our field service engineers and support teams are available when you need them. It is part of the Danaher Corporation's unrelenting focus on you, our customer. That's why more and more design engineers are turning to Danaher Motion to meet their motion control requirements.

Danaher Motion Values

- Application Expertise
- Broad & Innovative Motion Control Products and Systems
- Customer Focus
- Customizable Products and Services
- Motion Control Pioneers with Global Staying Power
- Operational Excellence

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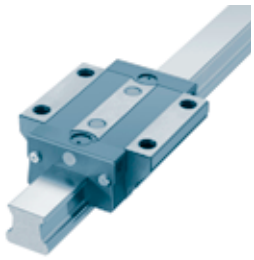
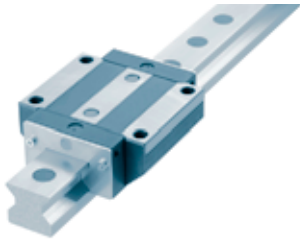
An Overview of Danaher Motion — Thomson Profile Rail

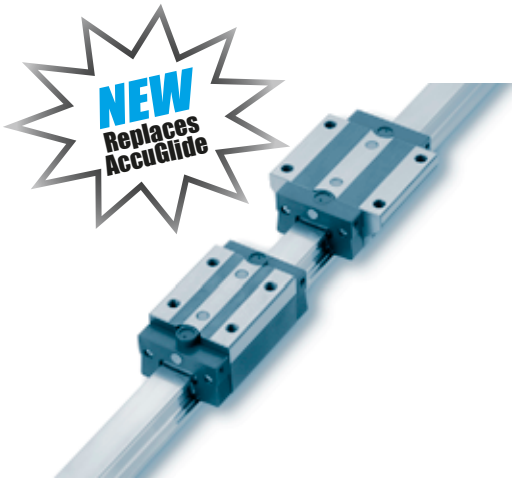




Overview of Danaher Motion – Thomson Profile Rail

Since the invention of the linear anti-friction Ball Bushing bearing by Thomson over 50 years ago, the Thomson precision linear products have meant high quality, innovative products. Today, Danaher Motion continues producing and developing these high quality, innovative products. The Danaher Motion Thomson Profile Rail assortment consists of the Next Generation Profile Rail "500 Series" Ball and Roller Linear Guides, compact miniature "MicroGuide™", lightweight "T-Series", and AccuGlide Mini.

The Danaher Motion Profile Rail – Linear Guide Assortment is a complete assortment of rails and carriages in a broad range of styles, sizes and unique features produced to industry standard dimensions for easy retrofitting into existing applications or designing into new applications.



500 Series Ball Profile Rail

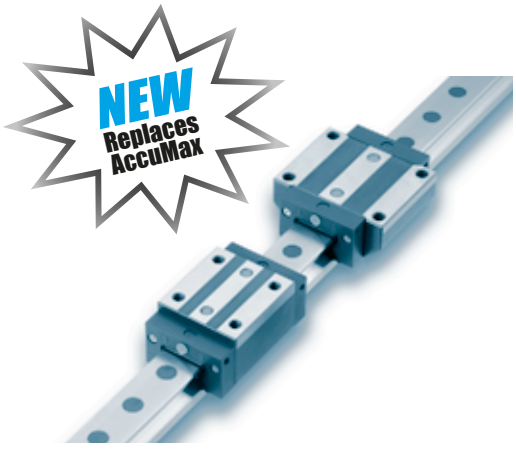
Features & Benefits

Superior Design. Superior Quality

- Straight rails through advanced grinding technologies
- Simple installation and greater accuracy with joint-free rails up to 6 meters
- Smooth, quiet movement through patented insert molded recirculation paths and optimized geometries
- Extended lubrication life as a result of grease pockets built into the recirculation path
- Multiple carriage styles and sizes available
- On site field modifiable modular seals
- Rail and carriage options from stock or short delivery
- Customization with expanded accessory offering

Typical Applications

- Industrial Automation
- Material Handling
- Industrial Robots
- Machine Tool Equipment
- Precision Measuring Equipment
- Food Processing Equipment



500 Series Roller Profile Rail

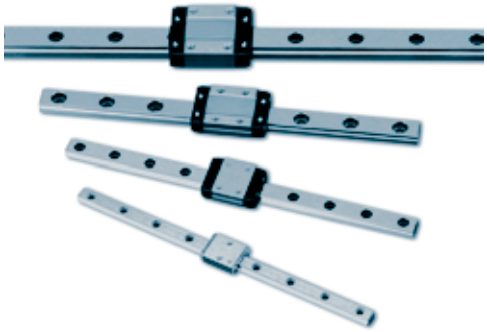
Features & Benefits

Superior Design. Superior Quality

- Industry leading load capacities
- High rigidity from back to back four roller track arrangement
- Straight rails through advanced grinding technologies
- Simple installation and greater accuracy with joint-free rails up to 6 meters
- Smooth, quiet movement through patented insert molded recirculation paths and optimized geometries
- Multiple carriage styles and sizes available
- On site field modifiable modular seals
- Rail and carriage options from stock or short delivery
- Customization with expanded accessory offering

Typical Applications

- Industrial Automation
- Material Handling
- Industrial Robots
- Machine Tool Equipment
- Precision Measuring Equipment
- Food Processing Equipment



MicroGuide™

Features & Benefits

- Whisper quiet movement
- Extremely smooth operation
- High precision accuracies
- High moment load capacity
- Multiple carriage styles and sizes available

Typical Applications

- Semiconductor processing equipment
- Medical diagnostic equipment
- Semiconductor packaging equipment
- Laboratory automation equipment
- Semiconductor handling equipment
- Testing and inspection equipment

T-Series

Features & Benefits

- Industry standard dimensions
- Light weight that can replaces conventional linear guide
- Forgiving to misalignment from poor machine plates or installation errors
- Low total cost of installation – no special tools or gauges to align rail

Typical Applications

- Packaging Equipment
- Material Handling
- Industrial Automation

AccuGlide Mini

Features & Benefits

- A ball control design for smooth, quiet, low friction at high speeds
- A full length integral wiper which protects important bearing from contaminants… effective system life is maximized
- A Gothic design, which provides high roll moment capacity...a requirement for stand-alone applications
- A wear-resistant, engineered polymer retainer which reduces system inertia and noise

Typical Applications

- Wafer Handling Equipment
- Assembly Equipment
- Inspection and Measurement Equipment

Assortment

		500 Series Ball						500 Series Roller				MicroGuide		T Series				AccuGlide Mini
		Standard		Narrow				Standard		Narrow		Wide	Standard	Standard		Narrow		Standard
	—		Long		Long		Long		Long		Long	—	—		—			
		—	—	—	—	High	High	—	—	—	—	—	—	—	—	—	—	
SIZE MM	5												●					
	7											●	●					
	9											●	●					
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	Style	A	B	C	D	E	F	A	B	C	D	WZ	Z	A	G	F	E	A
	Page	B12	B12	B14	B14	B16	B16	R12	R12	R14	R14	M4	M2	T4	T4	T6	T6	A2

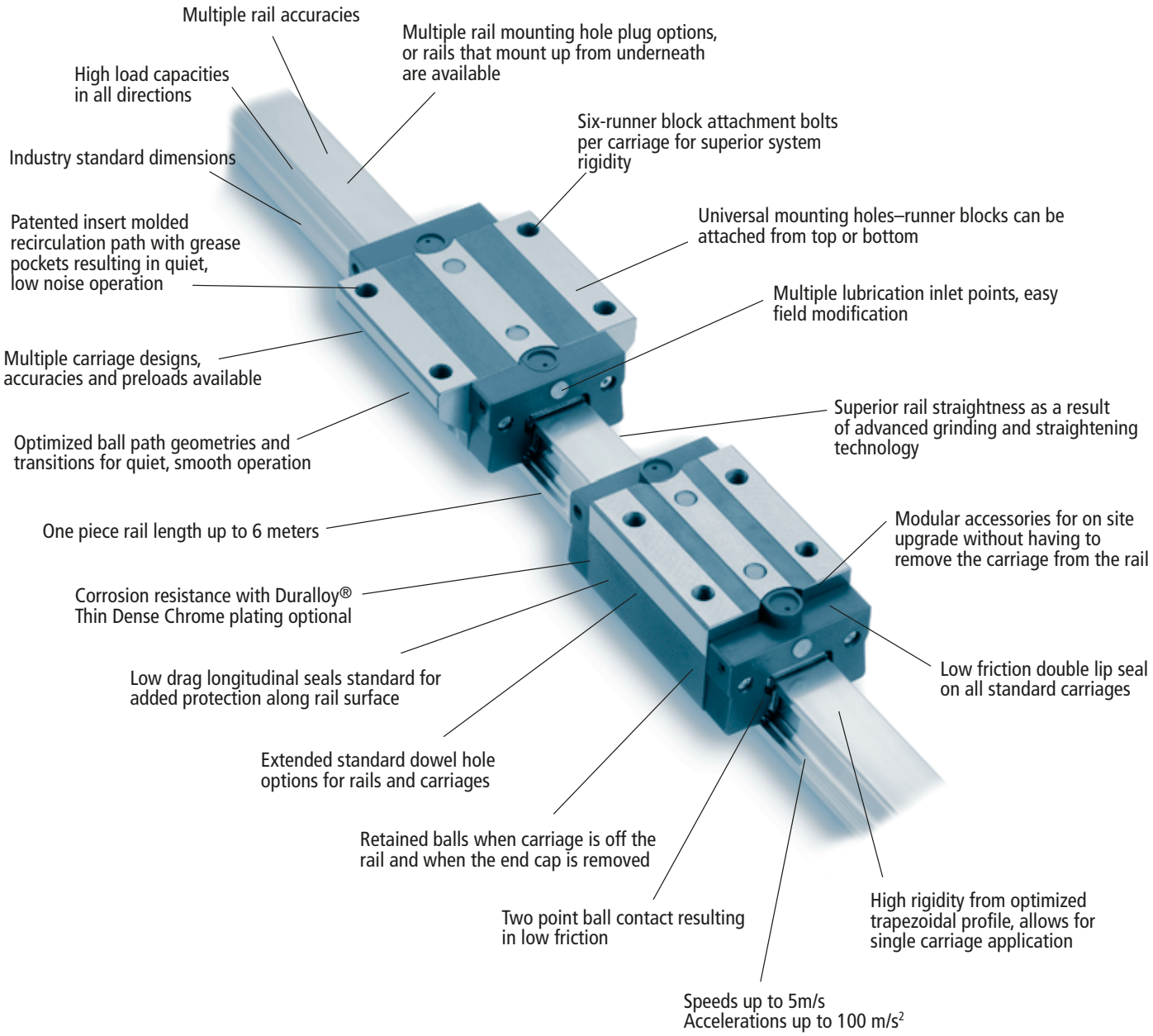
Application Criteria

Feature	500 Series Ball	500 Series Roller	MicroGuide	T Series	AccuGlide Mini
Load Capacity	●●●	●●●●	●	●●	●●
Equivalent Loads all directions	●●●	●●●●	●●	●	●●
Ultra Compactness	●	●	●●●●	●	●●●
High Travel Accuracy	●●●●	●●●●	●●●●	●●●	●●●●
Rigidity	●●●	●●●●	●●	●	●●
Smoothness	●●●	●●	●●●●	●●●	●●●●
Friction Charateristic	●●●●	●●	●●●●	●●	●●●●
Admissable Speed	●●●●	●●●	●●●●	●●●	●●●●
Ease of Installation	●●●	●●	●●●	●●●	●●
Lightweight			●●●	●●●●	●●
Industry Standard Dimensions	●●●●	●●●●	●●●●	●●●●	
Page	B1	R1	M1	T1	A1

• = satisfactory ●●●● = excellent

For more information, or to place an order, please contact your local authorized Thomson distributor or Danaher Motion at 1-800-554-8466, Fax: 1-800-445-0329, or E-mail at profilerail@danahermotion.com.

500 Series Ball Profile Rail



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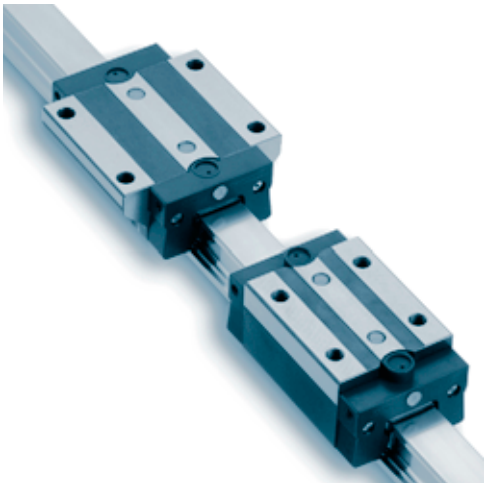
500 Series Ball Profile Rail



Features

The Thomson 500 Series Ball Profile Rail provides long life, exceptional rigidity, high dynamic and static load capacities, accommodation for high moment loads, high running accuracy, multiple sealing options and multiple lubrication inlet options. This allows for on-site field modification, and interchangeability to competitor offering.

These properties result in improved machine accuracies and rigidity resulting in reduced vibration extending machine and tool life. This has a direct effect on operational efficiency resulting in cost savings for the user.

Available in 6 carriage designs, and sizes 15 to 45mm.

Materials

The 500 Series Ball Profile Carriage and Rails are produced from high quality bearing steel. All carriages and rolling elements are through hardened and all rails are case hardened (except size 15 rail which is through hardened) The end cap is constructed of a high strength, glass filled nylon with nitrile rubber seal. Stringent quality controls are in place to ensure consistency of materials from the source, allowing us to ensure that we delivery the highest quality product.

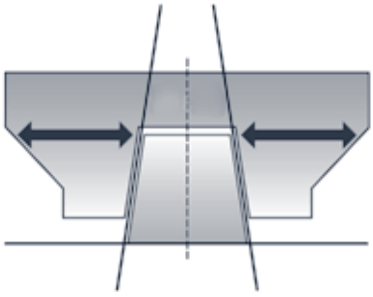
Accuracy

The 500 Series Ball Profile Rail and carriages are available in three different accuracy classes to allow for customization to your application needs.

Straightness

The 500 Series Roller Rail are subjected to multiple straightening processes during and after grinding of the roller paths, on one piece rails up to 6 meters long.

These added processes and inspections result in one of the straightest rails in the market today, improving machine accuracies wherever the 500 Series Ball is used.



Rigidity

The 500 Series Ball Profile Rail utilizes a special trapezoidal profile that maximizes the carriage cross section, resulting in the highest possible rigidity.

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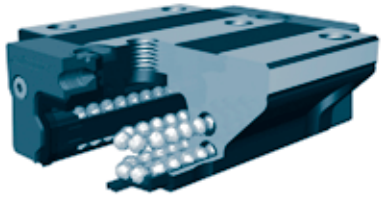
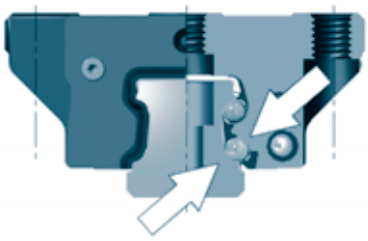
500 Series Ball Profile Rail

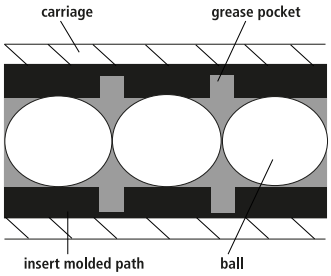


Running Smoothness / Low Noise

The running smoothness and low noise of the 500 Series Ball is the result of a patented, custom insert molded recirculation path that has an optimized geometric shape and minimal transitions, to ensure smooth and quiet operation in both low and high-speed operation.

In addition, the 500 Series Ball Profile balls make contact at only two points between rail and carriage. As a result, friction is reduced to a minimum, resulting in quiet, smooth operation.

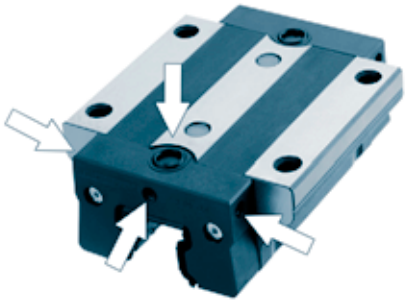




Internal Grease Pockets

The patented insert molded recirculation path has built in grease pockets. These provide an extra level of security by ensuring adequate lubrication is available to the ball bearings to help extend life.

The pocket and area between the balls provide greater grease quantities in the ball path than a conventional designed linear guide bearing.



Multiple Lubrication Options

The 500 Series Ball carriage standard end cap is designed for flexibility. The end cap comes standard with four lubrication inlet options. These inlet options are easily changed on-site in the field or can be supplied from the factory.

Unsure of the best lubrication inlet location? The 500 Series Ball will allow the user to make these changes easily in the field to optimize the system performance. In addition, they allow for ease in maintenance—all without removing the carriage from the rail.

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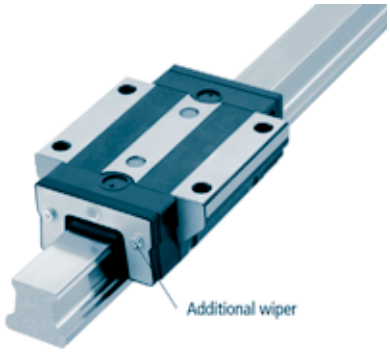
500 Series Ball Profile Rail



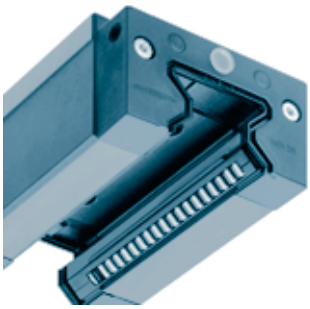
Modular Accessory Options

The 500 Series Ball is supplied standard with low friction double lip seals and longitudinal seals that completely encase the bearing carriage to protect the balls and track surfaces and minimize lubrication loss.

Additional metal scrapers or wipers, lube blocks and oil reservoir components can be easily added on-site in the field or can be supplied from the factory. A few options can be installed without removing the carriage from the rail.

The trapezoidal rail profile allows for easy servicing and replacing or adding of modular accessories without removing the carriage from the rail.

These innovative design features allow users to easily, efficiently, and economically upgrade carriage sealing without the need to replace the entire carriage assembly.



Longitudinal Seals

The 500 Series Ball has built in under carriage low drag longitudinal seals that protect the balls and ball path from contamination. These longitudinal seals are an added protection to increase the life and overall performance

Extended Standards

Extended Standards are an assortment of Danaher Motion dowel hole options for both carriage and rail products. Refer to page B18 for more information and detailed datasheets. Take the guesswork out of design by using our standard assortment of dowel hole options for ease of design and availablility, another solution from Danaher Motion.

Rail Accessories

The 500 Series Ball rails have multiple options to fill the mounting holes to eliminate possible contamination entry into the bearing. Custom designed plastic plugs and mylar tape are available from stock. A stainless steel rail cover strip will be available in late 2004.

Retained Balls

The rolling elements of the 500 Series Ball Carriage are retained within the bearing so the carriage can be removed from the rail, or the end cap from the carriage, without worrying about the balls falling out. It is recommended to place any removed carriage onto a mounting rail or shipping arbor to provide added protection to the rolling elements.

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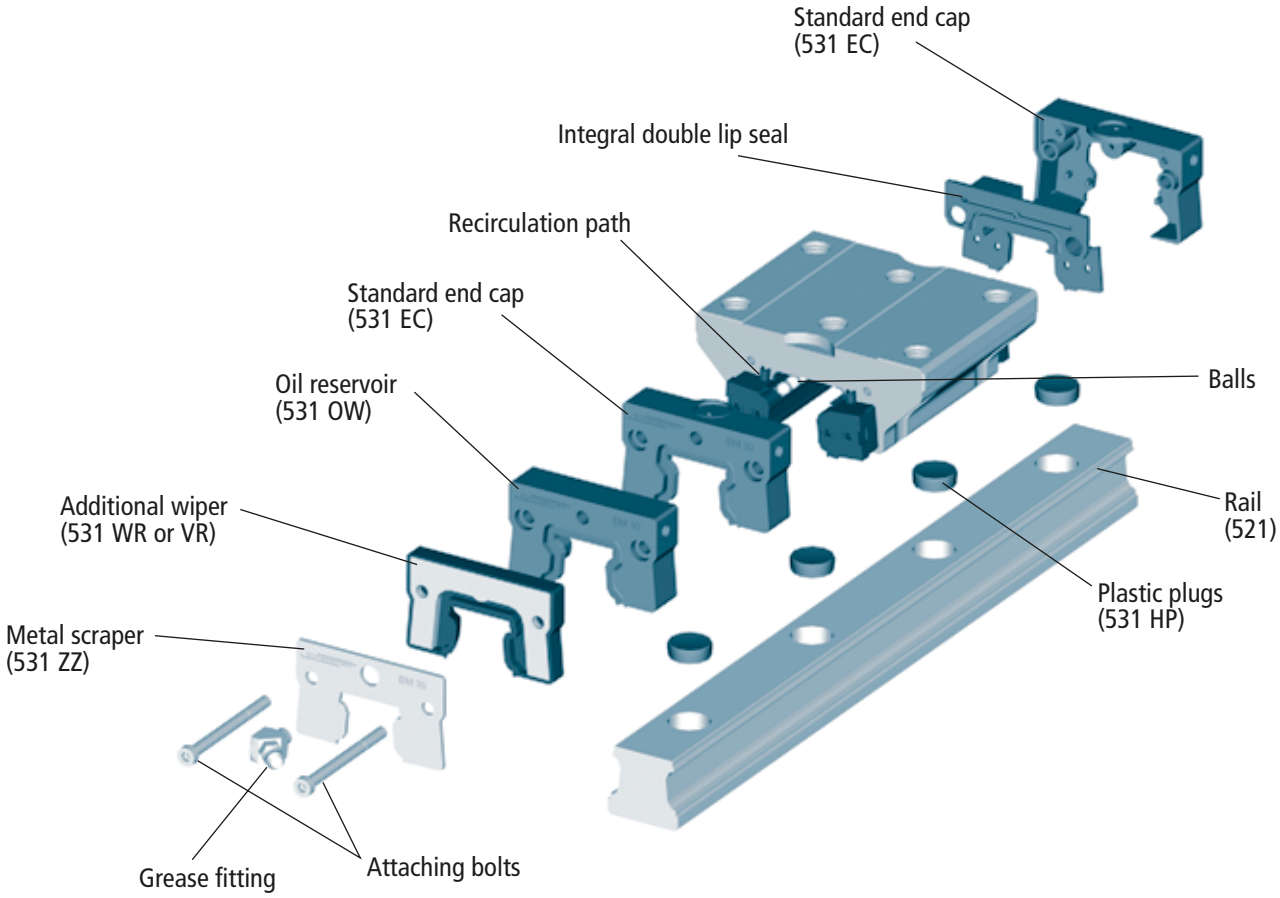
500 Series Ball Profile Rail

Modular Accessory Exploded View



The modular building block design of the 500 Series Roller Profile Rail assembly allows for easy on-site field upgrades for quick seal or lubrication changes, all without the need to remove the carriage from the rail

Also available (not shown):

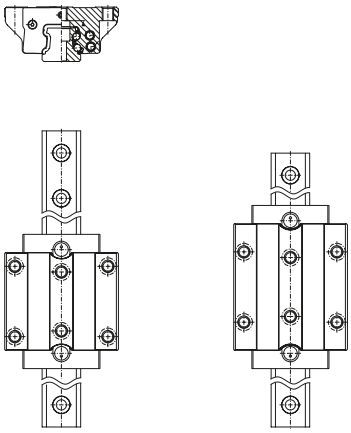
- Lube Block (531 LL)
- Mylar Rail Tape (531 RT)
- Bolt up from bottom rail (521 Type U)

For more information, or to place an order, please contact your local authorized Thomson distributor or Danaher Motion at 1-800-554-8466, Fax: 1-800-445-0329, or E-mail at profilerail@danahermotion.com.

500 Series Ball Profile Carriage and Rail Options

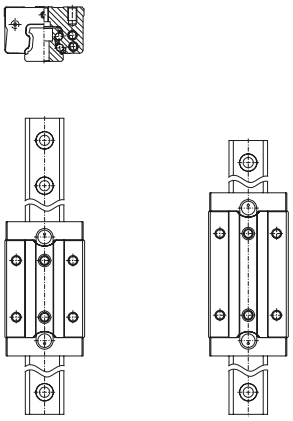
Danaher Motion offers six carriage styles with six mounting holes allowing for additional mounting configurations in the field or for retrofitting. All provide superior rigidity and design flexibility.

Standard Carriage
Style A
Sizes 15, 20, 25, 30, 35, 45



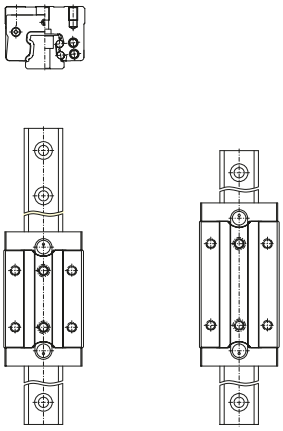
Standard Long Carriage
Style B
Sizes 20, 25, 30, 35, 45

Narrow Carriage
Style C
Sizes 15, 20, 25, 30, 35, 45



Narrow Long Carriage
Style D
Sizes 20, 25, 30, 35, 45

Narrow High Carriage
Style E
Sizes 15, 20, 25, 30, 35

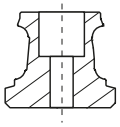


Narrow Long High Carriage
Style F
Sizes 20, 25, 30, 35

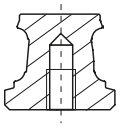
500 Series Ball Profile Carriage and Rail Options (cont'd)

Extended Standard Carriages

The 500 Series Roller Profile carriages are also available with the Thomson standard dowel holes or lubrication inlets as shown on page B18 or special lubricants either from stock or with a short lead-time.



Type A



Type U

Rail Types and Accessories

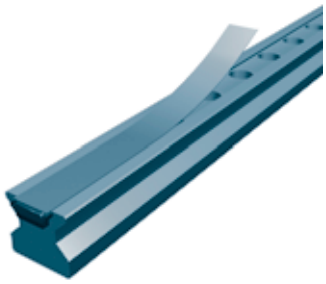
The 500 Series Ball Profile Rail is available in two configurations:

– Bolt down from the top – 521 Type A
– Bolt up from the bottom – 521 Type U

The standard 521 rail mounting holes can be plugged or sealed after installation with the options below.

Plastic Plugs

531HP plastic plugs are an inexpensive and simple method to seal the rail attachment bolt area. The plastic plugs are easy driven in place to any 500 Series Ball Rail with a soft non-metalic drift. They can easily be removed.



Mylar Tape

A simple and low cost alternative is specialty Mylar tape that can be placed quickly on the top surface of the rail. Part number 531RT is available in 3 meter lengths.

Stainless Steel Cover Strip

Option 531RC utilizes a special rail and stainless steel cover strip that is easily installed with the proper mounting tool. It will be available in late 2004.

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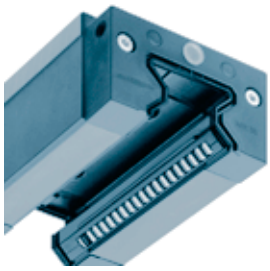
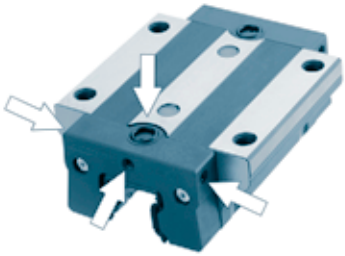
Additional Seal Types and Lubrication Accessories

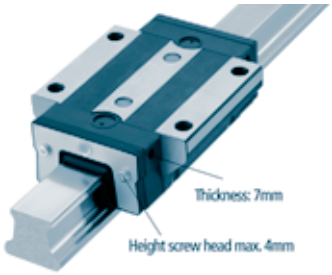


The 500 Series Ball Carriage is designed with modular sealing and lubrication options for simple on-site field modification or can be supplied factory direct.

The standard carriage end cap has an integral low friction double lip seal and longitudinal seal that completely encase the bearing carriage. The double lip design keeps contaminants out and lubrication in. It also allows for grease to purge out of the carriage to prevent excessive lubrication, which can result in higher operating temperatures. This double lip design can be used with oil lubrication.



The standard carriage end cap is equipped with a lubrication inlet centered with a specially designed lubricant channel to direct the lubrication to individual ball tracks. The lubrication inlet can be easily changed in the field or supplied from the factory as a side inlet or top inlet.



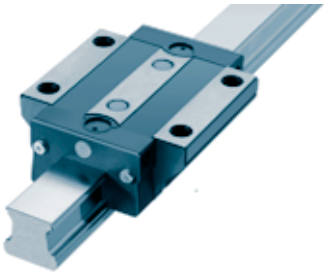
Additional Seal

The **531 WR** and **531 VR** seals provide an additional level of protection from contaminants to the 500 Series Profile Rail Bearing 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.

531 WR is constructed from durable nitrile rubber (Buna N)

531 VR is constructed from durable Viton®

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.



Metal Scraper

The Type **531 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.

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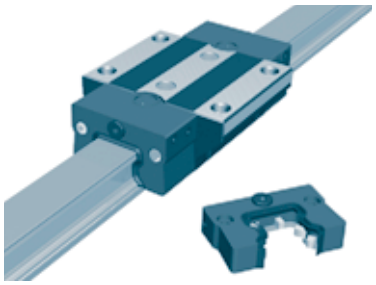
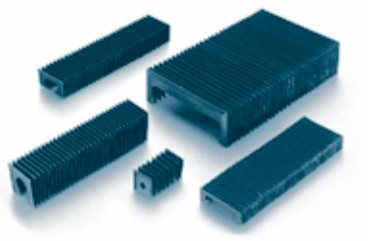


Oil Reservoir

The Type **531 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 531 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, and can operate up to 5000 km of travel. The Type 531 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.

Lube Block

The **531 LL Lube Block** is a solid lubricant that is a mixture of polymers, oils and selected additives that reduce the penetration of dirt, grit, and liquids into the ball path, preventing premature failures. The oil diffuses, lubricating the ball path surfaces by capillary action. Additional oil is supplied to the ball path surfaces from the polymer. There is no need for maintenance or additional lubrication during the life of the Lube Block filled bearing. The 531 LL Lube Block can be easily installed in conjunction with the 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.



Bellows

Standard bellows are available for all 500 Series Ball Profile assemblies. The bellows cover the entire length of the rail. The bellows are used to provide additional protection against dirt, dust and splashed liquids. Installation is simple and requires little time. Retrofitting is possible when the rail ends are drilled for the attachment of the end plate 531 CC. Bellows are available in three styles:

- Type B "Low Profile" with outside dimensions that do not exceed the carriage
- Type C "High Compression"
- Type W "Walk On" capable of handling the harshest environments with a 90kg load bearing capacity.

The bellow end plates can be easily installed in conjunction with other optional modular seals 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.

Note: Additional modular accessories add additional drag to the carriage assembly resulting in increased start up friction and power consumption.

Relative Drag Comparison for Design Consideration

Type	Relative Drag
Standard carriage	•
Rubber Wiper (531 WR)	• • •
Viton® Wiper (531 VR)	• • •
Metal Scraper (531 ZZ)	•
Oil Reservoir (531 OW)	• •
Lube Block (531 LL)	• • • •

• Low

500 Series Ball

Part Numbering Description

Ball Carriage

5 1 1 H 25 A 1 D L W Z ES1 SM

500 Series Profile Carriage

Product Type
1 Carriage

Type
1 Ball

Accuracy
H High
P Precision
U Ultra Precision

Size

Carriage Style
A Standard
B Standard Long
C Narrow
D Narrow Long
E Narrow High
F Narrow Long High

Preload
0 Clearance
1 Approximately 0, 03 C
2 Approximately 0, 08 C
3 Approximately 0, 13 C

Accessories
D Duralloy
L Long Life Lube Block
N Additional Oil Reservoir
Z Metal Scraper
W Additional Rubber Wiper
V Additional Viton Wiper
C Bellow Clips

Extended Standards
ES1 M6 Dowel Hole
ES2 M10 Dowel Hole
ES3 1/4" Dowel Hole
ES4 3/8" Dowel Hole
ES5 ES3 + ES7
ES6 ES4 + ES7
ES7 1/16" NPT side lube
ES8 ES1 + ES7
ES9 ES2 + ES7
ES10 Side lubrication in end caps
ES11 Top lubrication in end caps
G1 Greased with Mobilux® EP2
G2 Greased with Kyrtox® GPL227
GS Greased per customer specification

Specials
SM Special per customer print

Ball Rail

5 2 1 H 25 A 1 ES1 SM 1000 Y= (see note 1)

500 Series Profile Rail

Product Type
2 Rail

Type
1 Ball

Accuracy
H High
P Precision
U Ultra Precision

Size

Rail Style
A Standard
U Bolt up from Bottom
C Cover Strip (available late 2004)

Options
D Duralloy® (H and P accuracy only)
E Bellow Clips

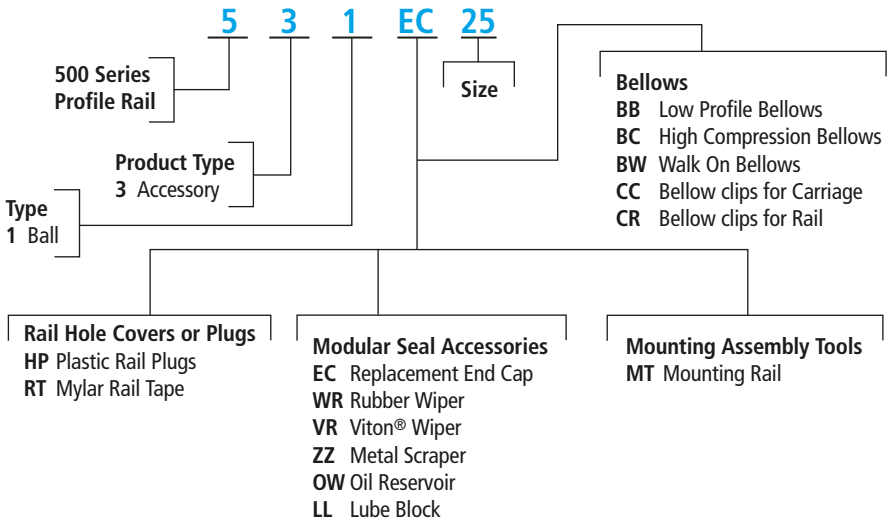
Extended Standards
DH1 6mm dowel hole + slot
DH2 10mm dowel hole + slot
DH3 1/4" dowel hole + slot
DH4 3/8" dowel hole + slot
JT Butt Joint

Length (mm)

Specials
SM Special per customer print

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

Ball Accessories



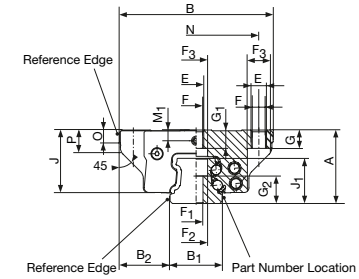
Lubrication Components

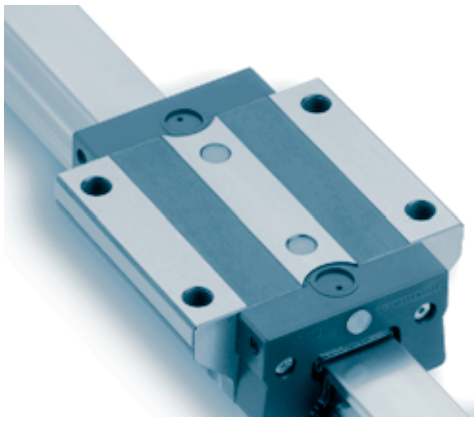
Part Number	Description
530LN45	M6 hydraulic type lube fitting - 45° angle
530LN	M6 hydraulic type lube fitting - straight
530LN90	M6 hydraulic type lube fitting - 90° angle
530LF3	M3 funnel type lubricating nipple
530LA3	M3 straight screw lubrication line fitting for M3 tubing
530LA4	M6 to 1/8" NPT Hex adapter
530LA5	M6 to M8x1 Hex adapter
530LA6	M6 to M8x1 round adapter
530BF6	M6 to M6 Banjo Fitting
530BF8	M6 to M8x1 Banjo Fitting
530LG	Grease gun for LF3 (M3 funnel type lubricating nipple)

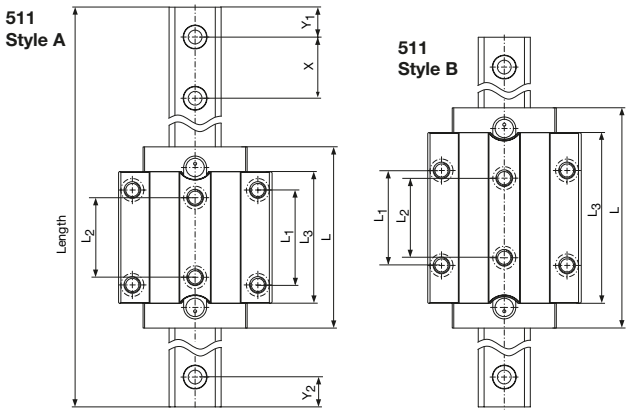
For more information, or to place an order, please contact your local authorized Thomson distributor or Danaher Motion at 1-800-554-8466, Fax: 1-800-445-0329, or E-mail at profilerail@danahermotion.com.

500 Series Ball

511 Style A and B







511 Style A – Standard Ball

Size	Dimensions (mm) A	B +0.4 −0.0	B1* ±0.05	B2	J	J1	L**	L1	L2	L3	X	N	E	F	F1	F2	F3	Ball Ø	G	G1	G2	M1	O	P
15	24	47	15	16	20.2	15.7	59.8	30	26	42.8	60	38	M 5	4.4	4.5	8	7.5	3.2	7	4.5	9.5	4	7	7
20	30	63	20	21.5	25.5	19	75.5	40	35	53.5	60	53	M 6	5.4	5.8	10	9.5	40	8	6.5	11.5	5.2	8	8
25	36	70	23	23.5	30.5	22.7	89.3	45	40	64.3	60	57	M 8	6.8	7	11	11	4.8	9	8	14	5.5	7	11
30	42	90	28	31	35.9	26	103	52	44	75	80	72	M 10	8.5	9	15	15	5.6	12	10	14.5	7	8	12
35	48	100	34	33	41	29.5	118	62	52	86	80	82	M 10	8.5	9	15	15	6.4	12	12	18	7	8	14
45	60	120	45	37.5	50.8	37	145	80	60	107	105	100	M 12	10.5	14	20	18	7.9	15	15	22	8	10	17.5

511 Style B – Standard Long Ball

Size	Dimensions (mm) A	B +0.4 −0.0	B1* ±0.05	B2	J	J1	L**	L1	L2	L3	X	N	E	F	F1	F2	F3	Ball Ø	G	G1	G2	M1	O	P
20	30	63	20	21.5	25.5	19	91.5	40	35	69.5	60	53	M 6	5.4	5.8	10	9.5	4.0	8	6.5	11.5	5.2	8	8
25	36	70	23	23.5	30.5	22.7	108.3	45	40	83.3	60	57	M 8	6.8	7	11	11	4.8	9	8	14	5.5	7	11
30	42	90	28	31	35.9	26	125	52	44	97	80	72	M 10	8.5	9	15	15	5.6	12	10	14.5	7	8	12
35	48	100	34	33	41	29.5	143.5	62	52	111.5	80	82	M 10	8.5	9	15	15	6.4	12	12	18	7	8	14
45	60	120	45	37.5	50.8	37	176.5	80	60	138.5	105	100	M 12	10.5	14	20	18	7.9	15	15	22	8	10	17.5

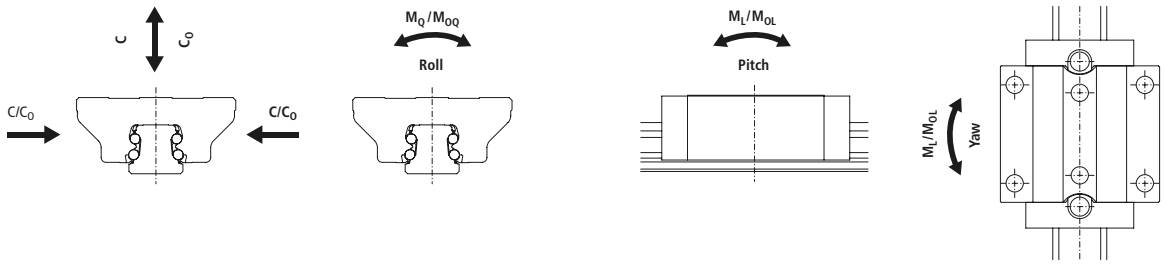
*Standard tolerance shown, special lower tolerances are available upon request. Please consult application engineering for additional information.
**When using additional modular seals or lubrication plates, the total length L will increase. Consult page B22 for additional information.
Length of rail to be specified at time of order, Y1 will equal Y2 unless specified otherwise at time of order.

500 Series Ball

511 Style A and B

Dynamic Load and Moment Ratings
C = Dynamic load rating
M_L = Dynamic pitch and yaw moment rating
M_Q = Dynamic roll moment rating

Static Load and Moment Ratings
C_O = Static load rating
M_{OL} = Static pitch and yaw moment rating
M_{OQ} = Static roll moment rating



Size & Style	Loading Capabilites Co (N)	C (N)	Moments M_{OQ} (Nm)	M_Q (Nm)	M_{OL} (Nm)	M_L (Nm)	Weights Carriage (kg)	Rail (kg/m)
15A	19600	9000	181	83	146	67	0.2	1.4
20A	31400	14400	373	171	292	134	0.5	2.2
20B	41100	17400	490	206	495	208	0.6	
25A	46100	21100	631	289	513	235	0.7	3.0
25B	60300	25500	825	349	863	365	0.9	
30A	63700	29200	1084	497	829	380	1.2	4.3
30B	83300	35300	1414	599	1390	589	1.5	
35A	84400	38700	1566	718	1252	574	1.8	5.4
35B	110300	46700	2048	867	2104	891	2.3	
45A	134800	61900	3193	1466	2498	1147	3.3	8.8
45B	176300	74700	4175	1769	4199	1779	4.2	

Notes:

1. The dynamic load and moment ratings are based upon 100 km travel life. When comparing these load ratings with other bearings, you must take into consideration some manufacturers dynamic and moment ratings are based on 50 km travel life. In order to compare with bearing dynamic and moment ratings based 50 km travel life, you must divide the dynamic capacity of the bearing rated for 50 km by 1.26 to get an accurate comparison.
2. The static load and moment ratings are the maximum radial load and moment load that should be applied by the bearing while there is no relative motion between the carriage and rail.

Bearing Travel Life Comparison

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

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:

Cmin = minimum required dynamic load rating, N

F = applied dynamic load, N

L = required travel life, km

Operating Parameters:

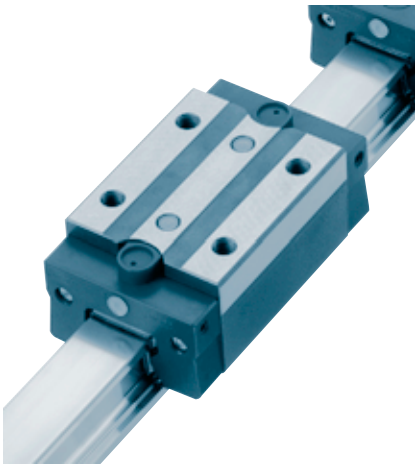
Maximum Velocity:	5 m/s
Maximum Acceleration:	100 m/s^2
Temperature:	
Min:	–40° C
Max:	80° C
Max peak:	120° C short time*

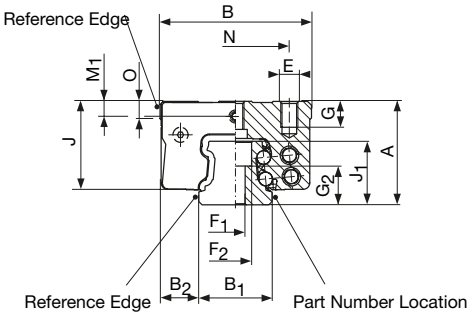
*without bellows

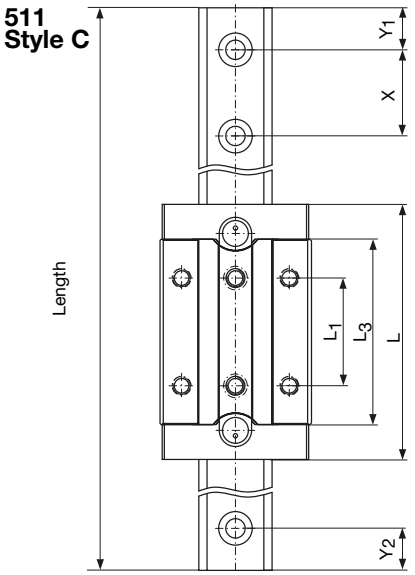
For more information, or to place an order, please contact your local authorized Thomson distributor or Danaher Motion at 1-800-554-8466, Fax: 1-800-445-0329, or E-mail at profilerail@danahermotion.com.

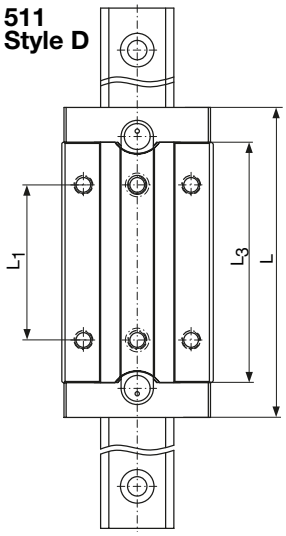
500 Series Ball

511 Style C and D









511 Style C Narrow

Size	Dimensions (mm) A	B +0.4 −0.0	B_1* +0.05	B_2	J	J_1	L**	L_1	L_3	X	N	E	F_1	F_2	Ball Ø	G	G_2	M_1	O
15	24	34	15	9.5	20.2	15.7	59.8	26	42.8	60	26	M 4	4.5	8	3.2	5	9.5	4	5.5
20	Use Style E – Narrow High																		
25	36	48	23	12.5	30.5	22.7	89.3	35	64.3	60	35	M 6	7	11	4.8	9	14	5.5	7.5
30	42	60	28	16	35.9	26	103	40	75	80	40	M 8	9	15	5.6	11	14.5	7	8
35	48	70	34	18	41	29.5	118	50	86	80	50	M 8	9	15	6.4	12	18	7	8

511 Style D Narrow Long

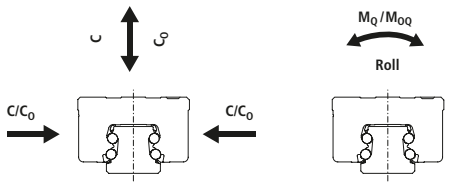
Size	Dimensions (mm) A	B +0.4 −0.0	B_1* +0.05	B_2	J	J_1	L**	L_1	L_3	X	N	E	F_1	F_2	Ball Ø	G	G_2	M_1	O
20	Use Style F – Narrow Long High																		
25	36	48	23	12.5	30.5	22.7	108.3	50	83.3	60	35	M 6	7	11	4.8	9	14	5.5	7.5
30	42	60	28	16	35.9	26	125	60	97	80	40	M 8	9	15	5.6	11	14.5	7	8
35	48	70	34	18	41	29.5	143.5	72	111.5	80	50	M 8	9	15	6.4	12	18	7	8

*Standard tolerance shown, special lower tolerances are available upon request. Please consult application engineering for additional information.
**When using additional modular seals or lubrication plates, the total length L will increase. Consult page B22 for additional information.
Length of rail to be specified at time of order, Y1 will equal Y2 unless specified otherwise at time of order.

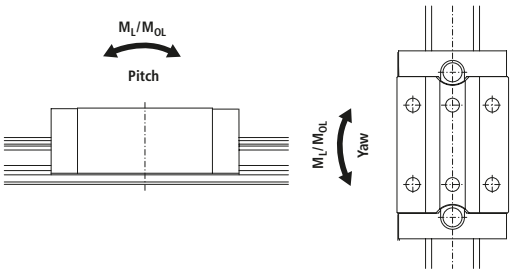
500 Series Ball

511 Style C and D

Dynamic Load and Moment Ratings
C = Dynamic load rating
M_L = Dynamic pitch and yaw moment rating
M_Q = Dynamic roll moment rating



Static Load and Moment Ratings
C_O = Static load rating
M_{OL} = Static pitch and yaw moment rating
M_{OQ} = Static roll moment rating



Size & Style	Loading Capabilites Co (N)	C (N)	Moments M_{OQ} (Nm)	M_Q (Nm)	M_{OL} (Nm)	M_L (Nm)	Weights Carriage (kg)	Rail (kg/m)
15C	19600	9000	181	83	146	67	0.2	1.4
20C 20D	Use Style E – Narrow High Use Stlye F – Narrow Long High							
25C 25D	46100 60300	21100 25500	631 825	289 349	513 863	235 365	0.6 0.7	3.0
30C 30D	63700 83300	29200 35300	1084 1414	497 599	829 1390	380 589	0.9 1.2	4.3
35C 35D	84400 110300	38700 46700	1566 2048	718 867	1252 2104	574 891	1.4 1.8	5.4

Notes:

1. The dynamic load and moment ratings are based upon 100 km travel life. When comparing these load ratings with other bearings, you must take into consideration some manufacturers dynamic and moment ratings are based on 50 km travel life. In order to compare with bearing dynamic and moment ratings based 50 km travel life, you must divide the dynamic capacity of the bearing rated for 50 km by 1.26 to get an accurate comparison.
2. The static load and moment ratings are the maximum radial load and moment load that should be applied to the bearing while there is no relative motion between the carriage and rail.

Bearing Travel Life Comparison

$L = (C/F)^3 \times 100\,km$

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:

Cmin = minimum required dynamic load rating, N

F = applied dynamic load, N

L = required travel life, km

Operating Parameters:

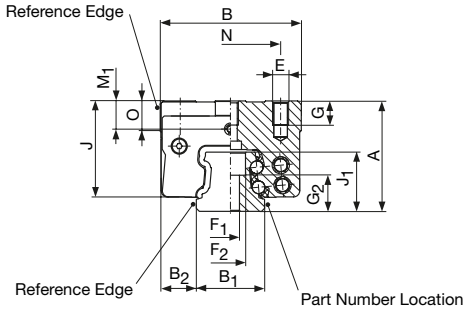
Maximum Velocity:	5 m/s
Maximum Acceleration:	100 m/s^2
Temperature:	
Min:	–40° C
Max:	80° C
Max peak:	120° C short time*

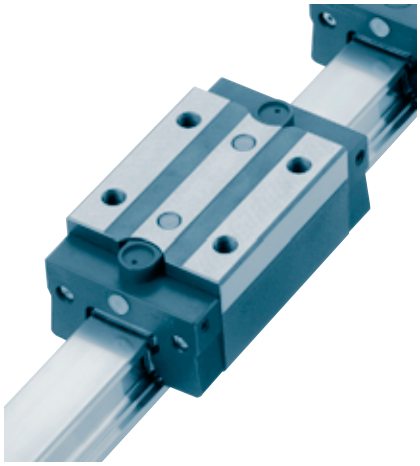
*without bellows

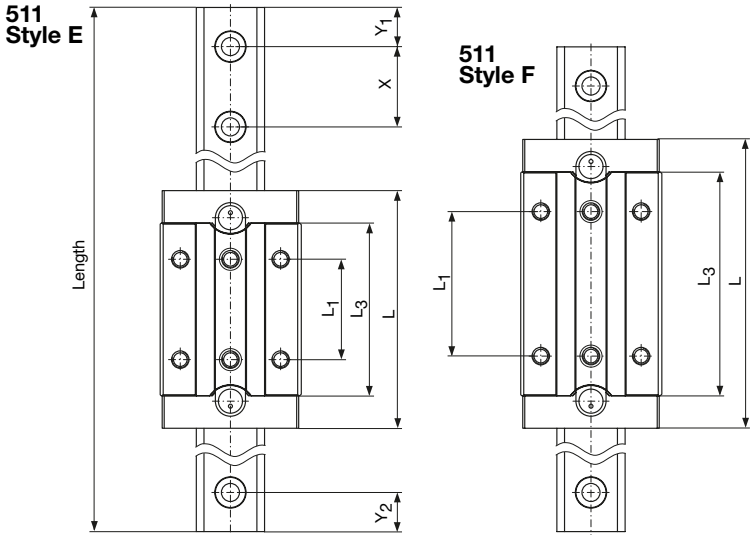
For more information, or to place an order, please contact your local authorized Thomson distributor or Danaher Motion at 1-800-554-8466, Fax: 1-800-445-0329, or E-mail at profilerail@danahermotion.com.

500 Series Ball

511 Style E and F







511 Style E Narrow High

Size	Dimensions (mm) A	B +0.4 -0.0	B_1* +0.05	B_2	J	J_1	L**	L_1	L_3	X	N	E	F_1	F_2	Ball Ø`	G	G_2	M_1	O
15	28	34	15	9.5	24.2	15.7	59.8	26	42.8	60	26	M 4	4.5	8	3.2	6	9.5	8	6
20	30	44	20	12	25.5	19	75.5	36	53.5	60	32	M 5	5.8	10	4.0	7	11.5	5.2	6
25	40	48	23	12.5	34.5	22.7	89.3	35	64.3	60	35	M 6	7	11	4.8	9	14	9.5	11
30	45	60	28	16	38.9	26	103	40	75	80	40	M 8	9	15	5.6	11	14.5	10	11
35	55	70	34	18	48	29.5	118	50	86	80	50	M 8	9	15	6.4	12	18	14	15
45	70	86	45	20.5	60.8	37	145	60	107	105	60	M10	14	20	7.9	18	22	18	19

511 Style F Narrow Long High

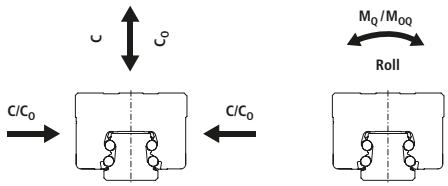
Size	Dimensions (mm) A	B +0.4 -0.0	B_1* +0.05	B_2	J	J_1	L**	L_1	L_3	X	N	E	F_1	F_2	Ball Ø`	G	G_2	M_1	O
20	30	44	20	12	25.5	19	91.5	50	60	69.5	32	M 5	5.8	10	4.0	7	11.5	5.2	6
25	40	48	23	12.5	34.5	22.7	108.3	50	60	83.3	35	M 6	7	11	4.8	9	14	9.5	11
30	45	60	28	16	38.9	26	125	60	80	97	40	M 8	9	15	5.6	11	14.5	10	11
35	55	70	34	18	48	29.5	143.5	72	80	111.5	50	M 8	9	15	6.4	12	18	14	15
45	70	86	45	20.5	60.8	37	176.5	80	105	138.5	60	M10	14	20	7.9	18	22	18	19

*Standard tolerance shown, special lower tolerances are available upon request. Please consult application engineering for additional information.
**When using additional modular seals or lubrication plates, the total length L will increase. Consult page "XY" for additional information.
Length of rail to be specified at time of order, Y1 will equal Y2 unless specified otherwise at time of order.

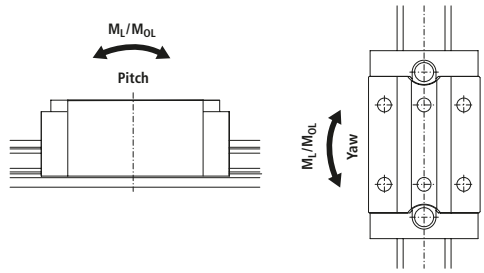
500 Series Ball

511 Style E and F

Dynamic Load and Moment Ratings
C = Dynamic load rating
M_L = Dynamic pitch and yaw moment rating
M_Q = Dynamic roll moment rating



Static Load and Moment Ratings
C_O = Static load rating
M_{OL} = Static pitch and yaw moment rating
M_{OQ} = Static roll moment rating



Size & Style	Loading Capabilites Co (N)	C (N)	Moments M_{OQ} (Nm)	M_Q (Nm)	M_{OL} (Nm)	M_L (Nm)	Weights Carriage (kg)	Rail (kg/m)
15E	19600	9000	181	83	146	67	0.3	1.4
20E 20F	31400 41100	14400 17400	373 490	171 206	292 495	134 208	0.4 0.5	2.2
25E 25F	46100 60300	21100 25500	631 825	289 349	513 863	235 365	0.6 0.8	3.0
30E 30F	63700 83300	29200 35300	1084 1414	497 599	829 1390	380 589	1.0 1.3	4.3
35E 35F	84400 110300	38700 46700	1566 2048	718 867	1252 2104	574 891	1.7 2.2	5.4
45E 45F	134800 176300	61900 74700	3193 4175	1466 1769	2498 4199	1147 1779	3.3 4.3	8.8

Notes:

1. The dynamic load and moment ratings are based upon 100 km travel life. When comparing these load ratings with other bearings, you must take into consideration some manufacturers dynamic and moment ratings are based on 50 km travel life. In order to compare with bearing dynamic and moment ratings based 50 km travel life, you must divide the dynamic capacity of the bearing rated for 50 km by 1.26 to get an accurate comparison.
2. The static load and moment ratings are the maximum radial load and moment load that should be applied to the bearing while there is no relative motion between the carriage and rail.

Bearing Travel Life Calculation

$L = (C/F)^3 \times 100\,km$

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:

Cmin = minimum required dynamic load rating, N

F = applied dynamic load, N

L = required travel life, km

Operating Parameters:

Maximum Velocity:	5 m/s
Maximum Acceleration:	100 m/s^2
Temperature:	
Min:	−40° C
Max:	80° C
Max peak:	120° C short time*

*without bellows

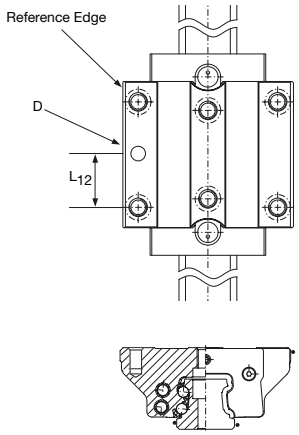
For more information, or to place an order, please contact your local authorized Thomson distributor or Danaher Motion at 1-800-554-8466, Fax: 1-800-445-0329, or E-mail at profilerail@danahermotion.com.

Extended Standard Carriage Options

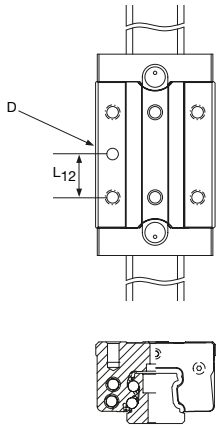
Carriage Dowel Holes

Dowel holes are commonly used to ensure proper alignment during installation and replacement of carriages and rails. The standard dowel hole options for the 500 series Standard Ball Carriages are:

Style A and B



Style C, D, E and F

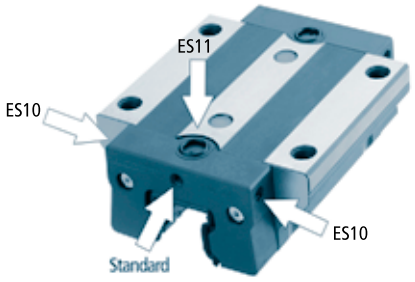


511 Style	511 Size	L_{12}	ES1 ØD	ES1 H	ES1 P	ES2 ØD	ES2 H	ES2 P	ES3 ØD	ES3 H	ES3 P	ES4 ØD	ES4 H	ES4 P
Type A	15	15	6	4.5	7	–	–	–	1/4″	4.5	7	–	–	–
	20	20	6	5	9	–	–	–	1/4″	5	9	–	–	–
	25	22.5	6	6.5	9	–	–	–	1/4″	6.5	9	–	–	–
	30	26	6	9	12	10	9	12	1/4″	9	12	3/8″	9	12
	35	31	6	9	14	10	9	14	1/4″	9	14	3/8″	9	14
	45	40	6	10	18	10	10	18	1/4″	10	18	3/8″	10	18
Type B	20	20	6	5	9	–	–	–	1/4″	5	9	–	–	–
	25	22.5	6	6.5	9	–	–	–	1/4″	6.5	9	–	–	–
	30	26	6	9	12	10	9	12	1/4″	9	12	3/8″	9	12
	35	31	6	9	14	10	9	14	1/4″	9	14	3/8″	9	14
	45	40	6	10	18	10	10	18	1/4″	10	18	3/8″	10	18
Type C	15	13	6	4	6	–	–	–	1/4″	4	6	–	–	–
	25	17.5	6	6.5	9	–	–	–	1/4″	6.5	9	–	–	–
	30	20	6	10	12	10	10	12	1/4″	10	12	3/8″	10	12
	35	25	6	10	12	10	10	12	1/4″	10	12	3/8″	10	12
Type D	25	25	6	6.5	9	–	–	–	1/4″	6.5	9	–	–	–
	30	30	6	10	12	10	10	12	1/4″	10	12	3/8″	10	12
	35	36	6	10	12	10	10	12	1/4″	10	12	3/8″	10	12
Type E	15	13	6	4	6	–	–	–	1/4″	4	6	–	–	–
	20	18	6	6	9	–	–	–	1/4″	6	9	–	–	–
	25	17.5	6	6.5	9	–	–	–	1/4″	6.5	9	–	–	–
	30	20	6	10	12	10	10	12	1/4″	10	12	3/8″	10	12
	35	25	6	10	12	10	10	12	1/4″	10	12	3/8″	10	12
	45	30	6	13	12	10	13	12	1/4″	13	12	3/8″	13	12
Type F	20	25	6	6	9	–	–	–	1/4″	6	9	–	–	–
	25	25	6	6.5	9	–	–	–	1/4″	6.5	9	–	–	–
	30	30	6	10	12	10	10	12	1/4″	10	12	3/8″	10	12
	35	36	6	10	12	10	10	12	1/4″	10	12	3/8″	10	12
	45	40	6	13	12	10	13	12	1/4″	13	12	3/8″	13	12

All dimensions in mm, unless otherwise specified.

Lubrication Inlet Options

The standard 500 Series Ball Carriage is supplied with a lubrication inlet centered over the rail. The carriage has multiple lubrication inlet point options. The options can be easily modified on-site field or can be supplied factory direct. (Standard inlet hole is M3 for 15mm, M6 for 20mm, 25mm, 30mm 35mm, 45mm)



Option

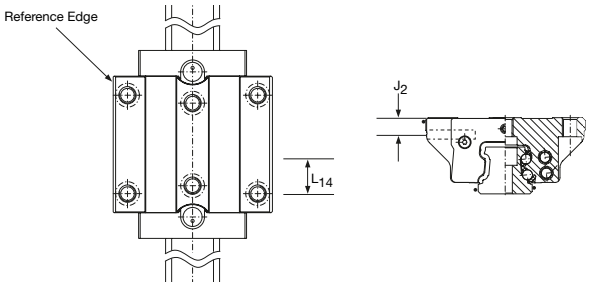
ES10 Inlets on side–both ends
ES11 Inlet on Top*–both ends

*An O-Ring is required to properly seat the mating surfaces to prevent grease or oil from escaping. One is supplied with this option. Size 15 O-ring ID M3x1.78mm thick, sizes 20–45 O-ring ID M6x1.78mm thick

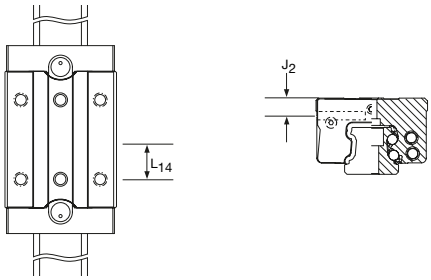
Extended Standard Lube Options: 1/16" NPT hole drilled in carriage (ES7)

511 Style	Size	ES7 D	L_{14}	J_2
A	20	1/16"-27 NPT	12.0	5.2
	25	1/16"-27 NPT	12.0	5.5
	30	1/16"-27 NPT	13.0	7
	35	1/16"-27 NPT	12.5	7
	45	1/16"-27 NPT	15.0	8
B	20	1/16"-27 NPT	12.0	5.2
	25	1/16"-27 NPT	12.0	5.5
	30	1/16"-27 NPT	13.0	7
	35	1/16"-27 NPT	12.5	7
	45	1/16"-27 NPT	15.0	8
C	25	1/16"-27 NPT	9.2	5.5
	30	1/16"-27 NPT	15.4	6
	35	1/16"-27 NPT	14.3	7
D	25	1/16"-27 NPT	9.2	5.5
	30	1/16"-27 NPT	15.4	6
	35	1/16"-27 NPT	14.3	7
E	20	1/16"-27 NPT	10.0	5.2
	25	1/16"-27 NPT	9.2	8.5
	30	1/16"-27 NPT	15.4	9
	35	1/16"-27 NPT	14.3	13
	45	1/16"-27 NPT	13.9	18
F	20	1/16"-27 NPT	10.0	5.2
	25	1/16"-27 NPT	9.2	8.5
	30	1/16"-27 NPT	15.4	9
	35	1/16"-27 NPT	14.3	13
	45	1/16"-27 NPT	13.9	18

Style A and B



Style C, D, E and F



Grease Lubricants

Standard 500 Series Ball Carriages are sold with oil preservative to protect the balls from corrosion during storage and transit. The 500 Series Ball Carriages are available with the following assortment of lubricants. Additional greases are available upon request, please consult Danaher Motion Application Engineering.

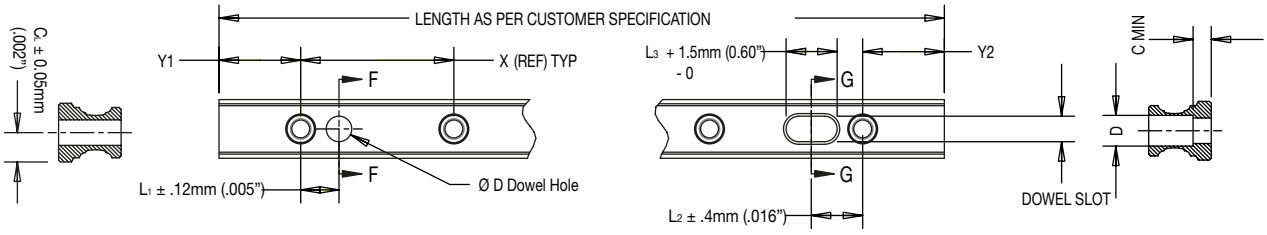
Option	Type	Notes	Viscosity	Temperature Range
G1	Mobilux® EP2	All purpose NLGI2 grease	160cSt @40°C	–20°C to 130°C
G2	Kyrtox® GPL227	High Temperature NLGI2	440cSt @40°C	–30°C to 288°C
GS	Customer specified at time of order			

Rail Modifications

Maximum Length of One Piece Rail

Size (mm)	15	20	25	30	35	45
One Piece Rail Length	1500mm	3000mm	6000mm			

Extended Standard Rail Options



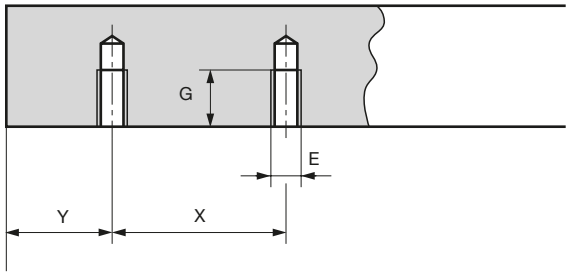
Option	D	L1	L2	L3	C
DH1	6mm	30mm	30mm	10.2 mm	9.5 mm
DH2	10mm	30mm	30mm	13.8 mm	9.5 mm
DH3	1/4"	1.181"	1.181"	.542"	3/8"
DH4	3/8"	1.181"	1.181"	.542"	3/8"

Y1 = Y2 unless specified at time of ordering

The 500 Series Ball 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.

For more information, or to place an order, please contact your local authorized Thomson distributor or Danaher Motion at 1-800-554-8466, Fax: 1-800-445-0329, or E-mail at profilerail@danahermotion.com.

521 Type U Rail–Bolt Up From Bottom



Size	X	E	G (mm)	Weight (kg/m)
15	60	M5	8	1.4
20	60	M6	10	2.2
25	60	M6	12	3
30	80	M8	15	4.3
35	80	M8	15	5.4
45	105	M12	19	8.8

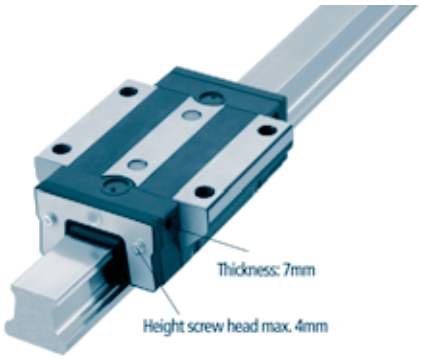
Customer to specify Y dimensions upon ordering $Y_1 = Y_2$ if not specified

Thin Dense Chrome Plating

Rails and carriages are available with Duralloy® DSV Thin Dense Chrome Plating with a thickness of 2–4 µm. As a result of the plating thickness range compared to the tolerance ranges in the different accuracy classes, it is only available in the High and Precision accuracy classes up to 2 meters long as a single rail, longer lengths can be butt jointed.

For more information, or to place an order, please contact your local authorized Thomson distributor or Danaher Motion at 1-800-554-8466, Fax: 1-800-445-0329, or E-mail at profilerail@danahermotion.com.

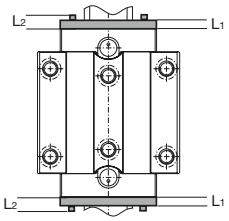
Modular Seals

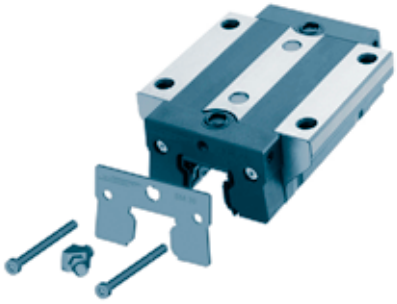


Additional Wiper

Size	Rubber Part No.	Viton® Part No.	L1 (mm)	L2 (mm)	Weight (kg)
15	531WR15	531VR15	7	4	0.005
20	531WR20	531VR20	7	4	0.008
25	531WR25	531VR25	7	4	0.010
30	531WR30	531VR30	7	4	0.016
35	531WR35	531VR35	7	4	0.022
45	531WR45	531VR45	7	4	0.036

L1 – wiper thickness, L2 – max. screw head stickout

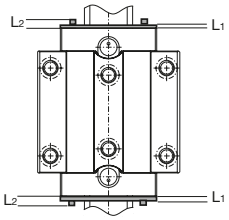


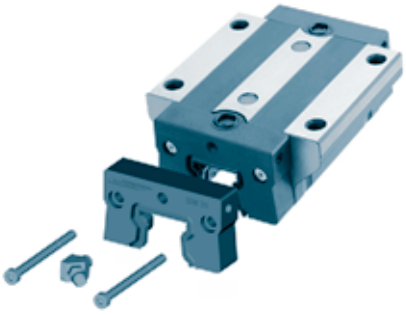


Metal Scraper

Size	Scraper Part No.	L1 (mm)	L2 (mm)	Weight (kg)
15	531ZZ15	1.5	4	0.005
20	531ZZ20	1.5	4	0.009
25	531ZZ25	1.5	4	0.011
30	531ZZ30	1.5	4	0.018
35	531ZZ35	1.5	4	0.024
45	531ZZ45	1.5	4	0.057

L1 – scraper thickness, L2 – max. screw head stickout

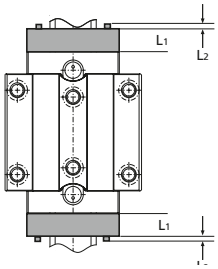




Oil Reservoir

Size	Lubrication Plate	L1 (mm)	Weight (kg)
15	531OW15	8.5	0.004
20	531OW20	11	0.010
25	531OW25	12.7	0.017
30	531OW30	14	0.023
35	531OW35	16.2	0.039
45	531OW45	19.2	0.065

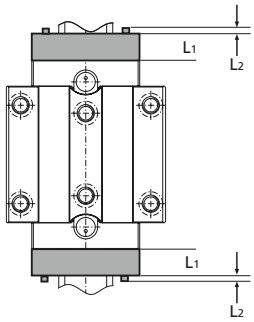
L1 = Oil reservoir thickness, screw heads are recessed in plate



Lube Block

Size	Lubrication Plate	L1 (mm)	L2 (mm)	Weight (kg)
15	531 LL15	13.4	4	0.009
20	531 LL20	18.3	4	0.024
25	531 LL25	16.9	4	0.083
30	531 LL30	18.4	4	0.213
35	531 LL35	20.2	4	0.069
45	531 LL45	23.2	4	0.123

L1 = Lube Block thickness, L2 = max. screw head stickout



Example:

511 Size 45 carriage with 531OW and 531WR modular seals on both sides:	
Carriage Length (L)	= 89.3
531 OW45 L_1 x 2	= 12.7 x 2
531 WR45 L_1 x 2	= 7 x 2
531 WR45 L_2 x 2	= 4 x 2
Total Length	= 136.7 mm

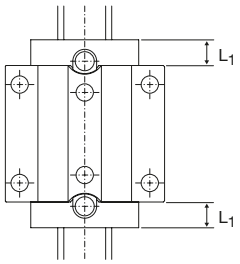
511 Size 35 carriage with 531OW modular seal on both sides and 531VR modular seals on one side:	
Carriage Length (L)	= 143.5
531 OW35 L_1 x 2	= 16.2 x 2
531 VR35 L_1 x 1	= 7 x 1
531 VR35 L_2 x 1	= 4 x 1
Total Length	= 197.9 mm

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

Replacement End Cap

Size	Replacement Front Plate	L1 (mm)	Weight (kg)
15	531EC15	8.5	0.004
20	531EC20	11	0.010
25	531EC25	12.5	0.017
30	531EC30	14	0.023
35	531EC35	16	0.039
45	531EC45	19	0.065

L1 = Front plate thickness, screw heads are recessed in plate



Bellows Dimensional Information

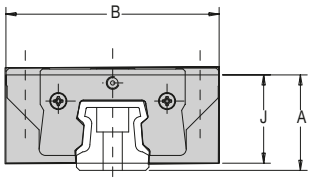
Bellows are available in three styles:

531 BB "Low Profile" with outside dimensions that do not exceed the carriage, constructed of polyurethane coated polyester, maximum ambient temperature of 80°C (175°F)

531 BC "High Compression" constructed of a spark resistant Teflon® coated fiberglass and designed to allow for higher compression, maximum ambient temperature exceeds maximum bearing peak temperatures.

531 WC "Walk On" capable of handling the harshest environments with a 90 kg load bearing capacity.

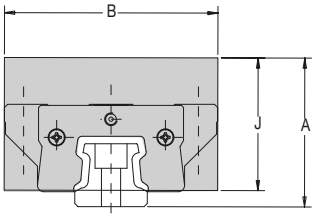
The bellows end cap can be easily installed in conjunction with the other optional modular seals providing you with an easy upgrade to the standard seal. Installation is simple and requires little time. Retrofitting is possible. The rail ends have to be drilled for the attachment of the bellow clip adapter plate, 531 CR. These can be easily installed on-site in the field or can be suppliend from the factory.



531 BB "Low Profile" Bellows

Size	Part No.	B	J	A	CR
15	531 BB15	45	23	26	0.17
20	531 BB20	41.6	24	29	0.17
25	531 BB25	43.7	29	35.5	0.17
30	531 BB30	51.2	33.3	40.3	0.17
35	531 BB35	64	39.5	47.5	0.15
45	531 BB45	76	48	58	0.15

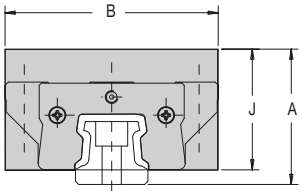
Customer to specify length at time of order



531 BC "High Compression" Bellows

Size	Part No.	B	J	A	CR
15	531 BC15	59	33	36	0.17
20	531 BC20	61.6	34	39	0.17
25	531 BC25	63.7	39	45.5	0.17
30	531 BC30	71.5	43.3	50.3	0.17
35	531 BC35	84	49.5	57.5	0.15
45	531 BC45	76	58	68	0.15

Customer to specify length at time of order



531 BW "Walk On" Bellows

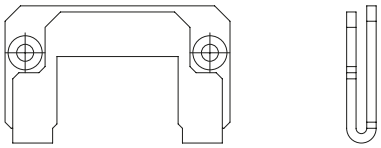
Size	Part No.	B	J	A	CR
15	531 BW15	55	30	31	0.19
20	531 BW20	61	33	34	0.19
25	531 BW25	65	36	40.5	0.19
30	531 BW30	70	39	44.2	0.19
35	531 BW35	77	42	48	0.19
45	531 BW45	101	53	61	0.19

Customer to specify length at time of order

Bellow Clip Adapter Plates

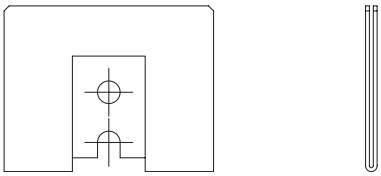
The 533 CC Carriage Bellows Clip–Adapter Plate is used to attach the bellows to the carriage. The bellows clip–adapter plate is made of steel.

The 531 CR Rail Bellow Clip–Adapter Plate is used to attach the bellows to the rail. The attaching holes can be drilled in the end of the rail if retrofitting or can be supplied from the factory. (Note: Size 15 rail is through hardened, annealing the end of the rail is required to properly drill end plate clip this results in an area on the end of the rail that will be soft and possibly out of tolerance). The bellows clip–adapter plate is made of steel.



531 CC Carriage Bellows Clips–Attachment Plate

Size	Part No.
15	531 CC15
20	531 CC20
25	531 CC25
30	531 CC30
35	531 CC35
45	531 CC45

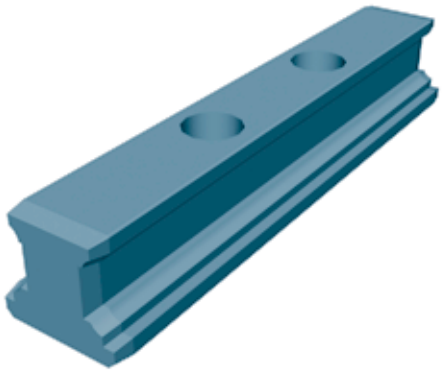


531 CR Rail Bellows Clips–Attachment Plate

Size	Part No.
15	531 RC15
20	531 RC20
25	531 RC25
30	531 RC30
35	531 RC35
45	531 RC45

Maintenance and Installation Tools and Accessories

Assembly Rail–531 MT



The assembly rail is required when the carriage must be removed from the rail and then reinstalled to ensure proper installation. It is recommended to leave the assembly rail in the carriage to protect the rollers against contamination. If necessary, the two internal mounting screws for fastening runner blocks to the carriage can be tightened to ensure the carriage remains on the assembly rail. The assembly rail is made of plastic.

Part Number	Size	Length (mm)	Weight (kg)
531 MT15	15	80	0.010
531 MT20	20	115	0.021
531 MT25	25	130	0.031
531 MT30	30	160	0.061
531 MT35	35	165	0.076
531 MT45	45	200	0.135

Standard Rail Plugs and Tape for use with to 500 Series Ball Carriage Type A

Type HP plastic plugs	Size
531 HP15	15
531 HP20	20
531 HP25	25
531 HP30	30
531 HP35	35
531 HP45	45

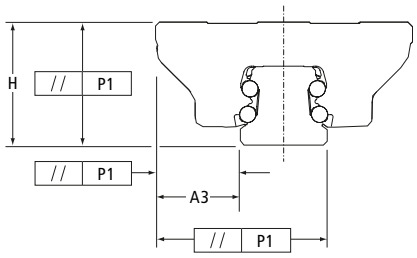
Material: Nylon

Mylar Tape	Size	Length
531 RT15	15	3m
531 RT20	20	3m
531 RT25	25	3m
531 RT30	30	3m
531 RT35	35	3m
531 RT45	45	3m

For more information, or to place an order, please contact your local authorized Thomson distributor or Danaher Motion at 1-800-554-8466, Fax: 1-800-445-0329, or E-mail at profilerail@danahermotion.com.

Accuracy Class

Three tolerances describe the accuracy of a Profile Rail bearing: Running Parallelism, Pair Variation, and Assembly Accuracy. These are measurred from the rail base to the center of the carriage top (H), and from the rail reference edge to the center of the carriage reference edge (A3).

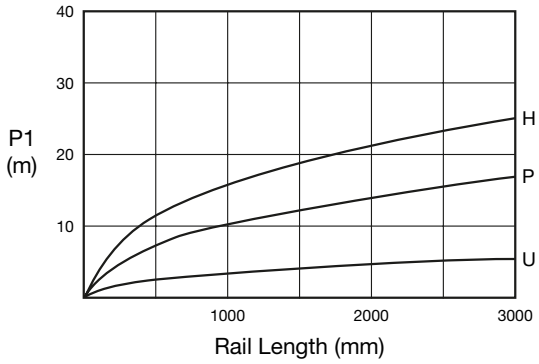


Running Parallelism describes the tolerance on H and A3 as a function of axial travel, measured from one carriage down the length of rail. This is analogous to straightness of travel. As such, parallelism describes attributes of the rail only.

Assembly Accuracy describes the tolerance on H and A3 as a function of a carriage–rail assembly, measured from the nominal dimensions.

Pair Variation describes tolerance on H and A3 as a function of carriages at the same position on a common rail. Pair variation describes carriage precision only.

The accuracy class selected will partially determine the accuracy of the system. Other factors such as mounting surface flatness and straightness also significantly affect system accuracy.



Tolerances

	Accuracy Class		
	H - High	P - Precision	U - Ultra Precision
Assembly Accuracy Tolerance on dimension H and A3 (measured at middle of carriage at any point along rail)	±50	±20	±5
Pair Variation Max variation in dimensions H and A3 measured on multiple carriages mounted on the same rail (measured at the middle of carriage at same position on rail)	15	7	3
Running Parallelism	100	40	10

All values in µm

Preload Accuracy Combinations

Accuracy Class	Clearance	Preload		
		0.03	0.08	0.13C
P, U		1	2	3
H	0	1	2	

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Deflection Curves

The following pages contain deflection charts for the 511 Linear Guides. The charts shown are calculated. The calculation is based on theoretical conditions regarding shape, position and dimension of the balls and raceways of the carriage and rails under the specified loading. The real behavior of the carriage can vary slightly in the application as a result of base flatness, angle of loading, temperature, etc.

Note that the deflection decreases as the preload or the bearing size increases.

For deflection characteristics of linear guide types not shown, contact Danaher Motion Application Engineering at 1-(800) 554-8466.

For more information, or to place an order, please contact your local authorized Thomson distributor or Danaher Motion at 1-800-554-8466, Fax: 1-800-445-0329, or E-mail at profilerail@danahermotion.com.

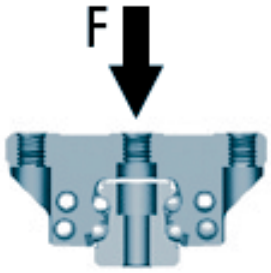
Deflection vs. Applied Load

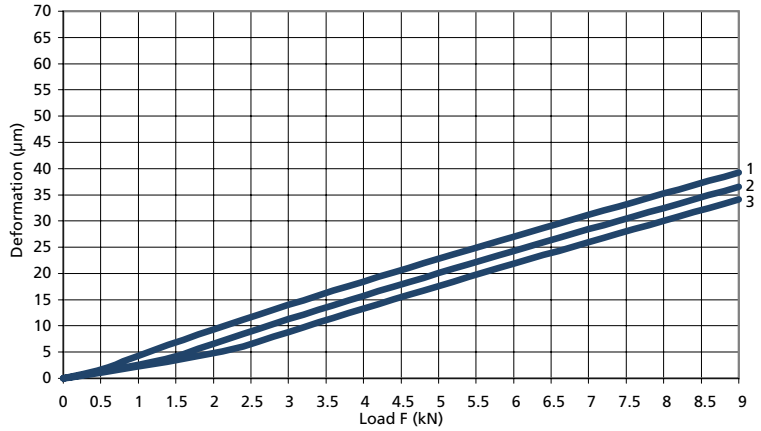
1. Preload 3% of C
2. Preload 8% of C
3. Preload 13% of C

C = Dynamic load carrying capacity

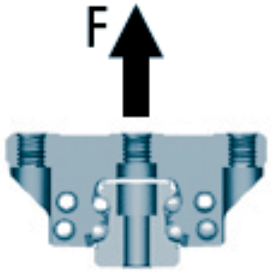
511 Style A, C, E
Size 15

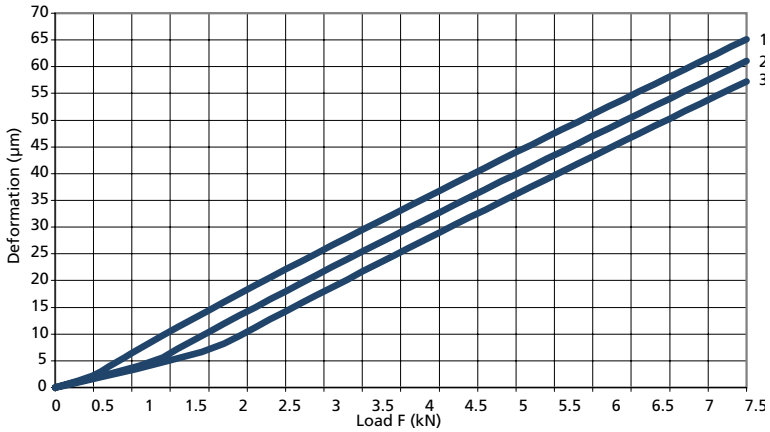
Compressive Load



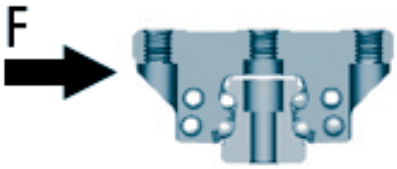


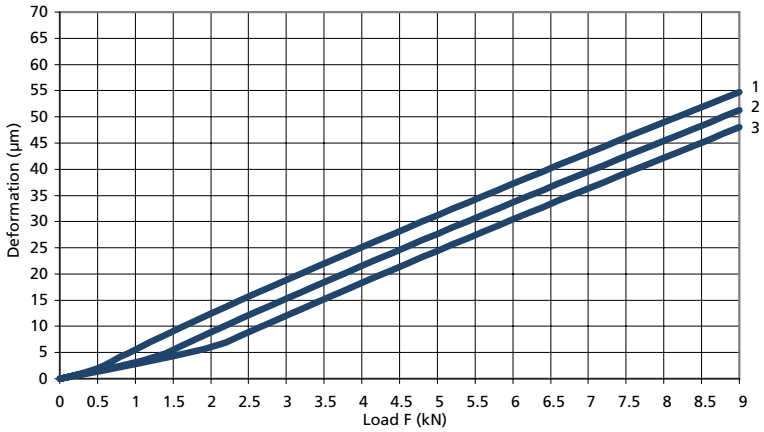
Tensile Load





Lateral Load





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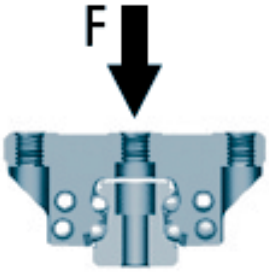
Deflection vs. Applied Load

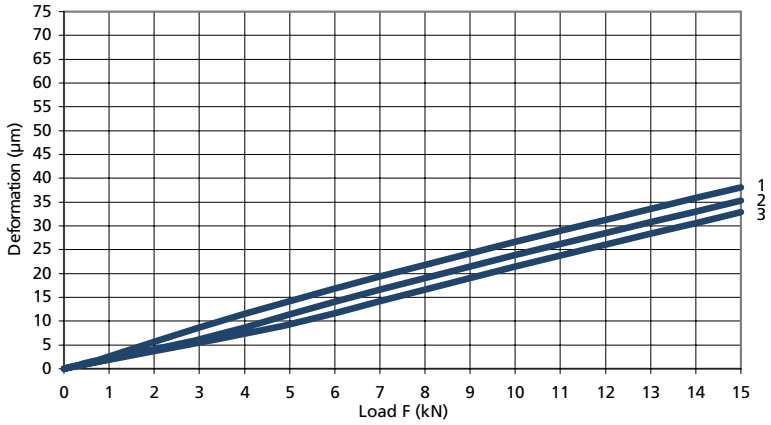
1. Preload 3% of C
2. Preload 8% of C
3. Preload 13% of C

C = Dynamic load carrying capacity

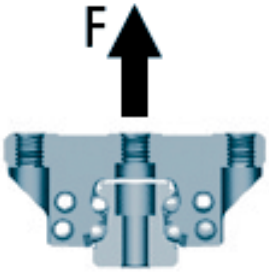
511 Style A, C, E
Size 20

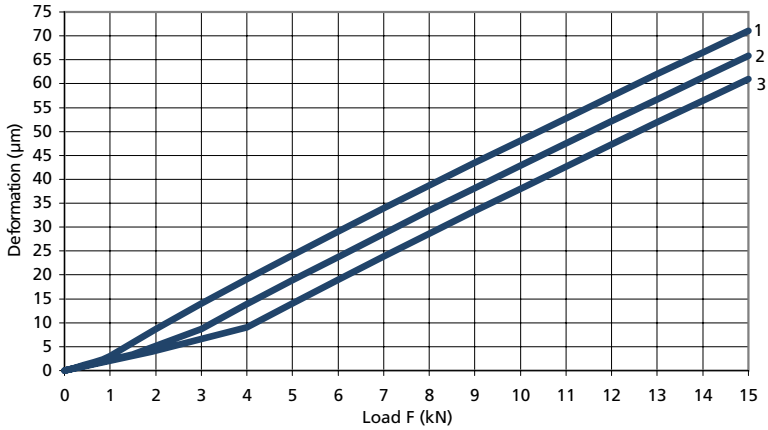
Compressive Load



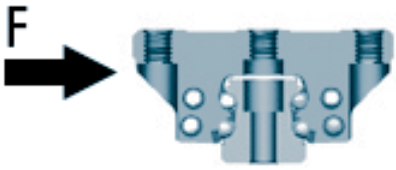


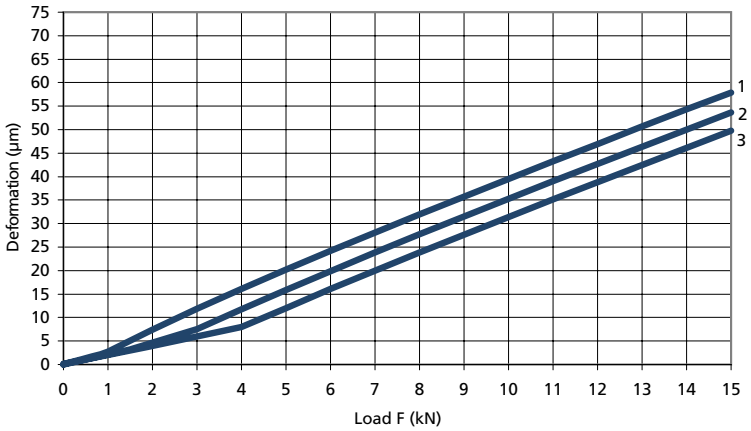
Tensile Load





Lateral Load





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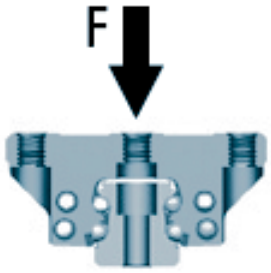
Deflection vs. Applied Load

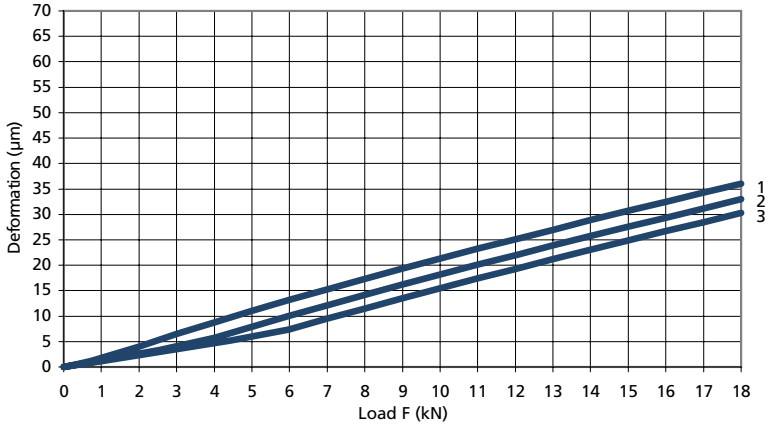
1. Preload 3% of C
2. Preload 8% of C
3. Preload 13% of C

C = Dynamic load carrying capacity

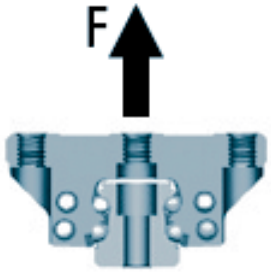
511 Style B, D, F
Size 20

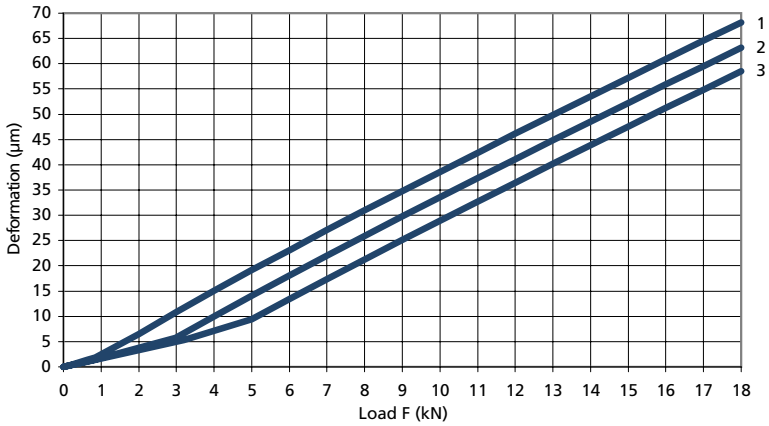
Compressive Load



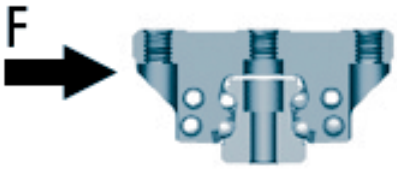


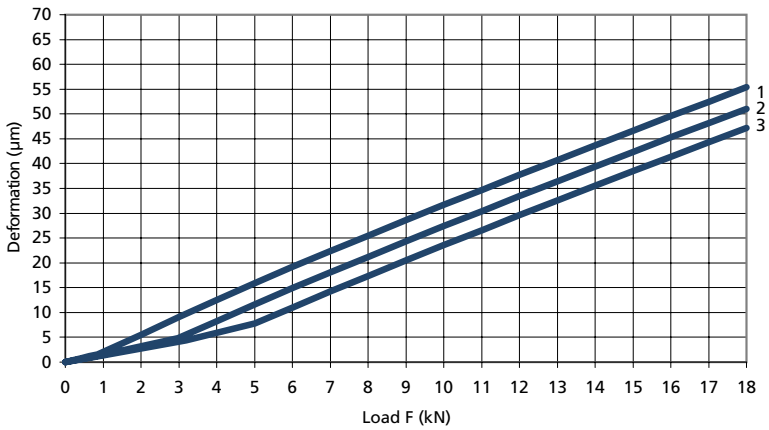
Tensile Load





Lateral Load





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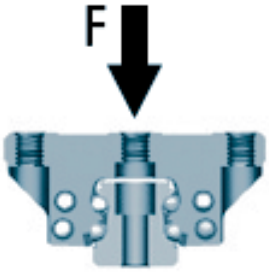
Deflection vs. Applied Load

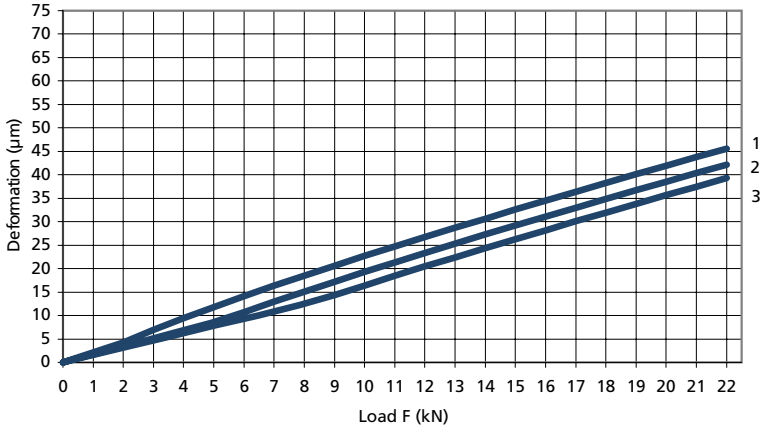
1. Preload 3% of C
2. Preload 8% of C
3. Preload 13% of C

C = Dynamic load carrying capacity

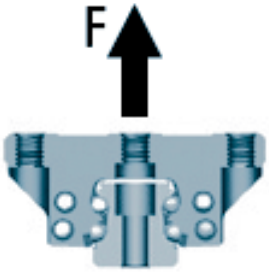
511 Style A, C, E
Size 25

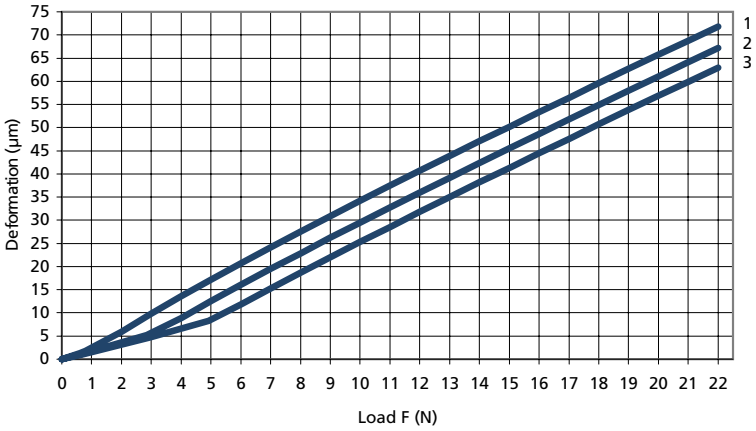
Compressive Load



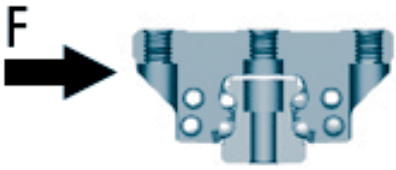


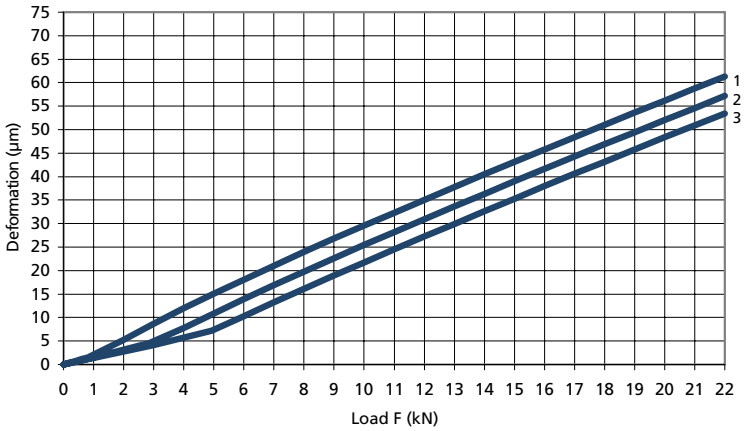
Tensile Load





Lateral Load





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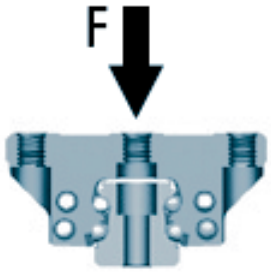
Deflection vs. Applied Load

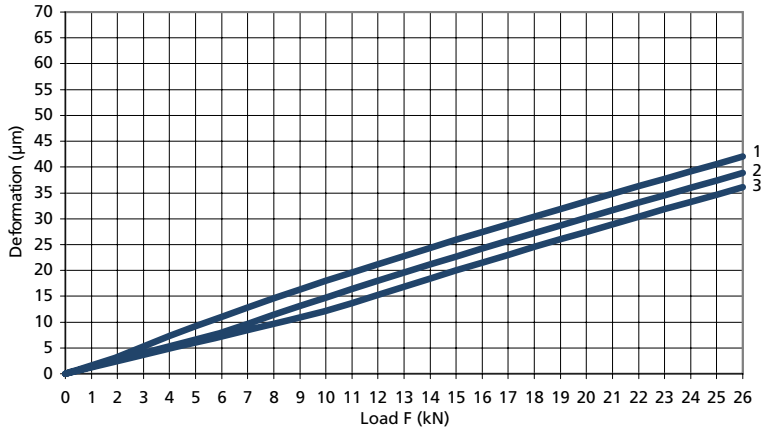
1. Preload 3% of C
2. Preload 8% of C
3. Preload 13% of C

C = Dynamic load carrying capacity

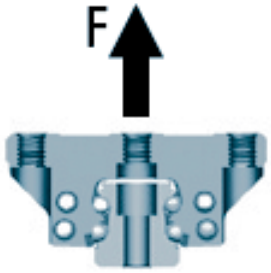
511 Style B, D, F
Size 25

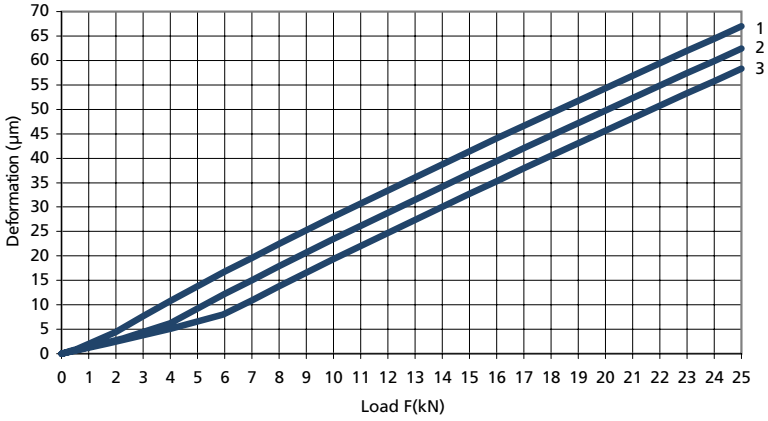
Compressive Load



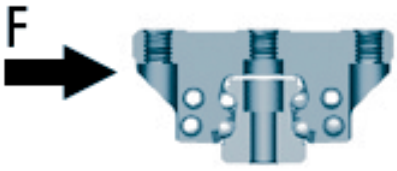


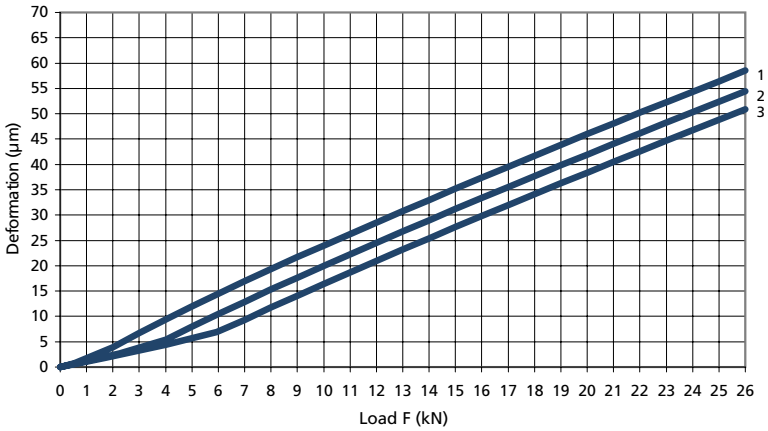
Tensile Load





Lateral Load





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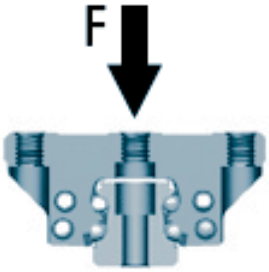
Deflection vs. Applied Load

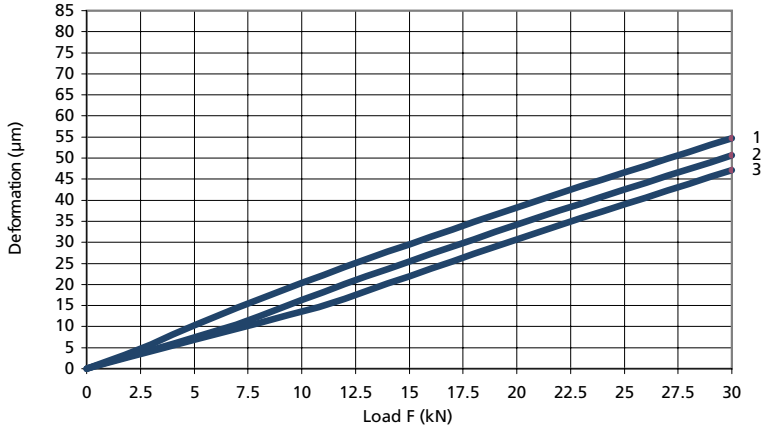
1. Preload 3% of C
2. Preload 8% of C
3. Preload 13% of C

C = Dynamic load carrying capacity

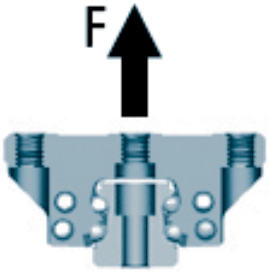
511 Style A. C. E
Size 30

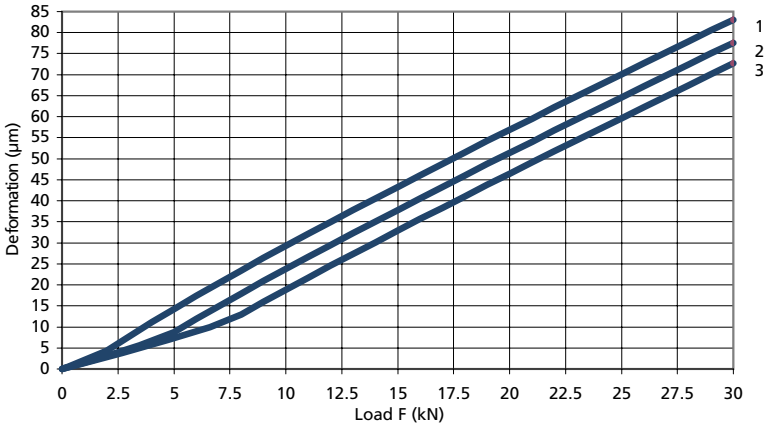
Compressive Load



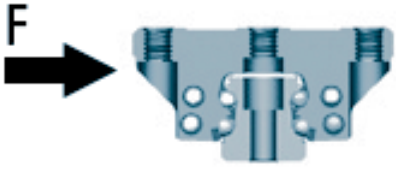


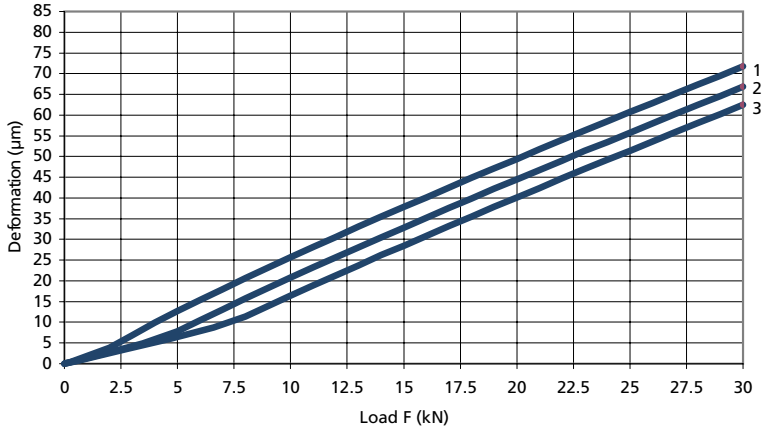
Tensile Load





Lateral Load





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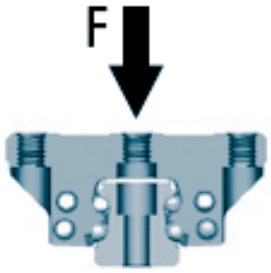
Deflection vs. Applied Load

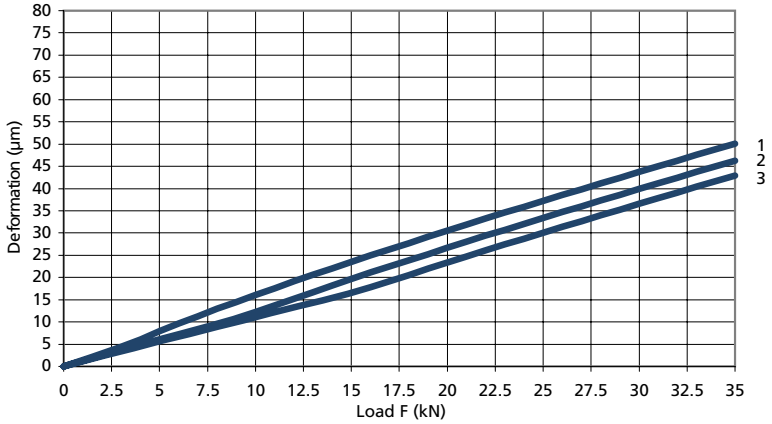
1. Preload 3% of C
2. Preload 8% of C
3. Preload 13% of C

C = Dynamic load carrying capacity

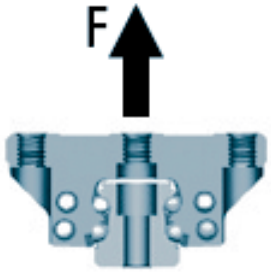
511 Style B, D, F
Size 30

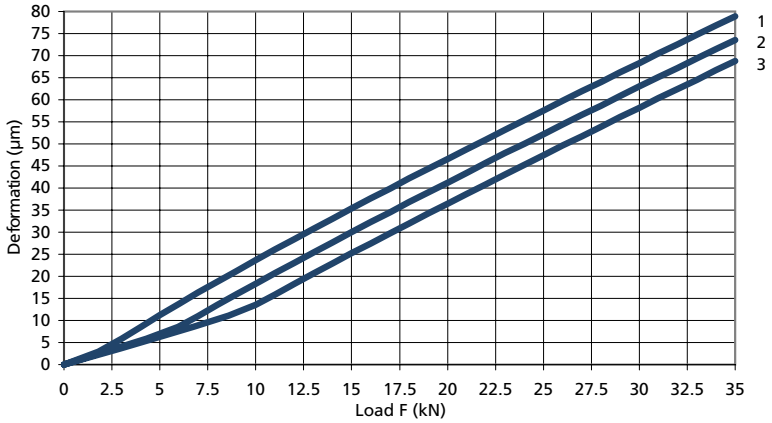
Compressive Load



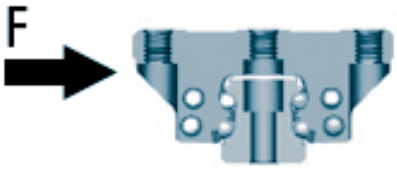


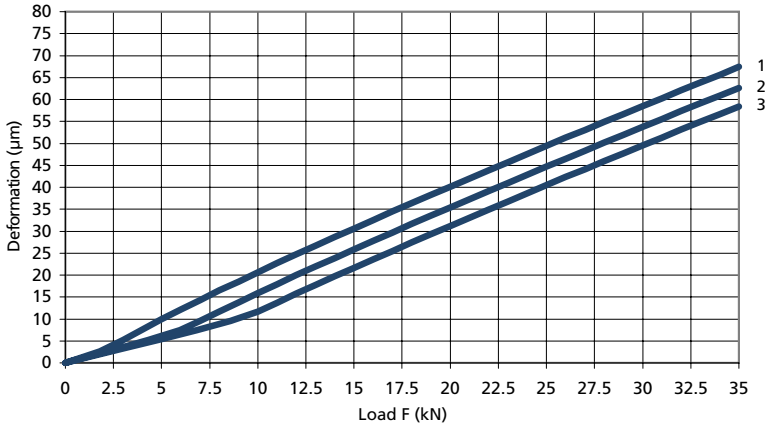
Tensile Load





Lateral Load





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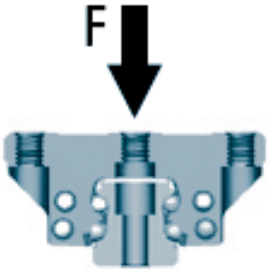
Deflection vs. Applied Load

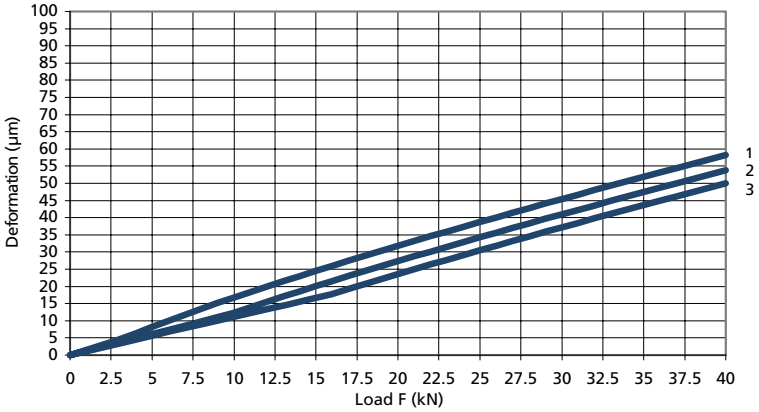
1. Preload 3% of C
2. Preload 8% of C
3. Preload 13% of C

C = Dynamic load carrying capacity

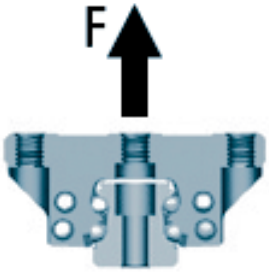
511 Style A, C, E
Size 35

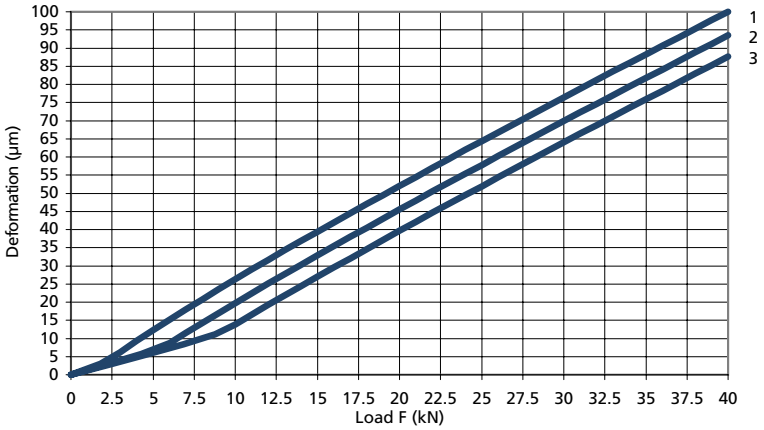
Compressive Load



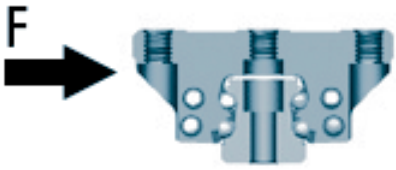


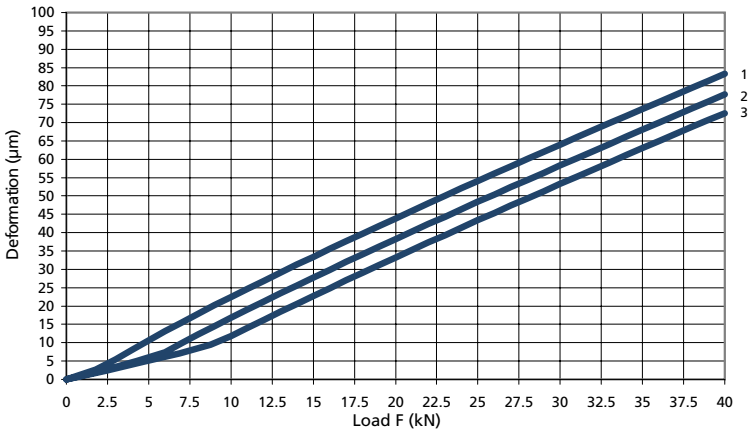
Tensile Load





Lateral Load





For more information, or to place an order, please contact your local authorized Thomson distributor or Danaher Motion at 1-800-554-8466, Fax: 1-800-445-0329, or E-mail at profilerail@danahermotion.com.

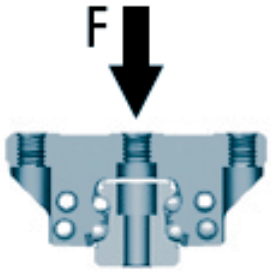
Deflection vs. Applied Load

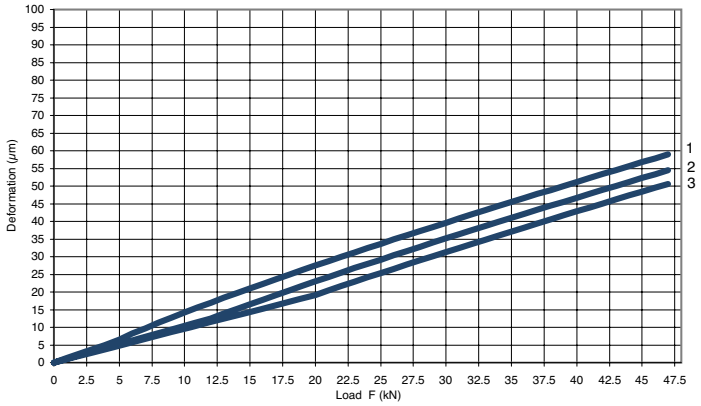
1. Preload 3% of C
2. Preload 8% of C
3. Preload 13% of C

C = Dynamic load carrying capacity

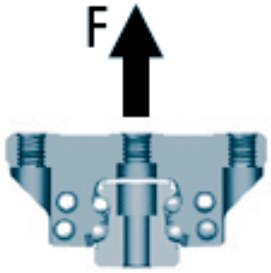
511 Style B, D, F
Size 35

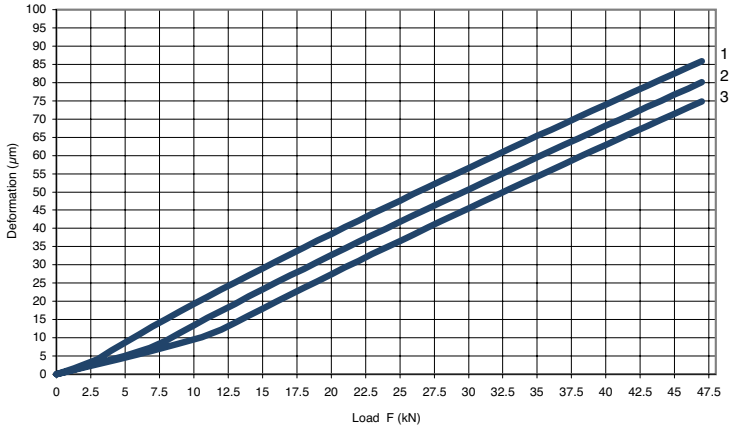
Compressive Load



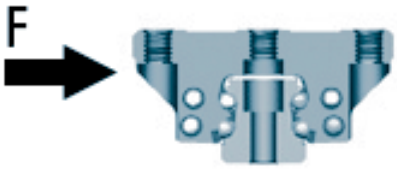


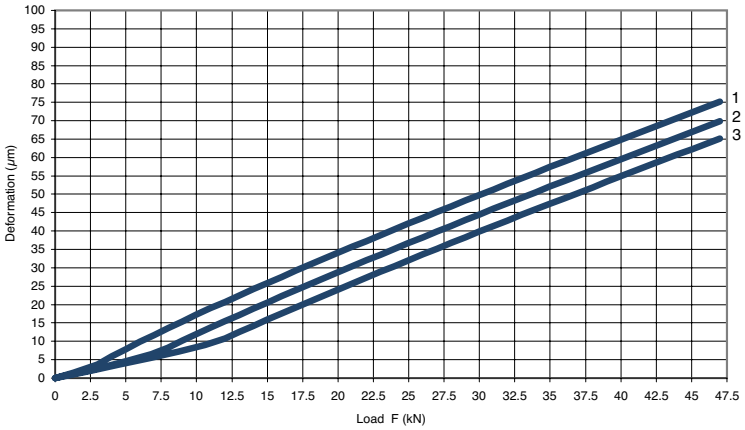
Tensile Load





Lateral Load





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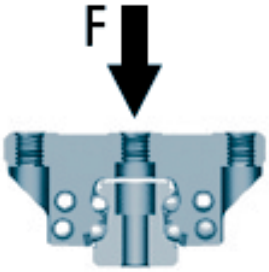
Deflection vs. Applied Load

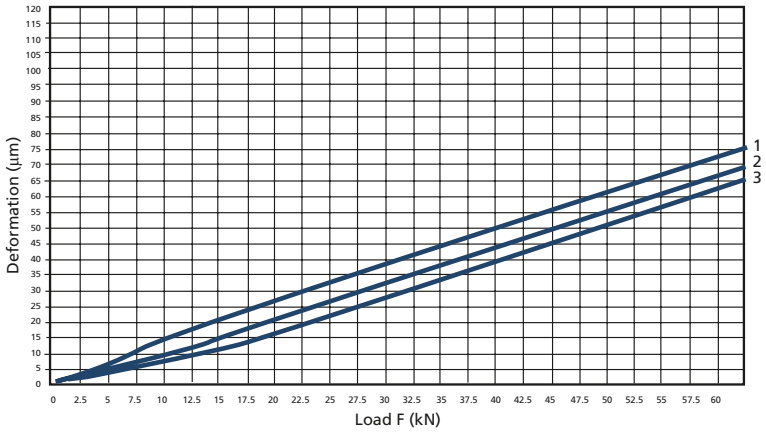
1. Preload 3% of C
2. Preload 8% of C
3. Preload 13% of C

C = Dynamic load carrying capacity

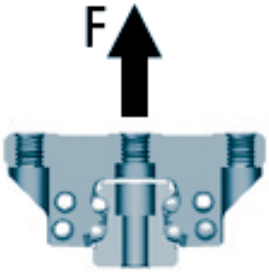
511 Style A, C, E
Size 45

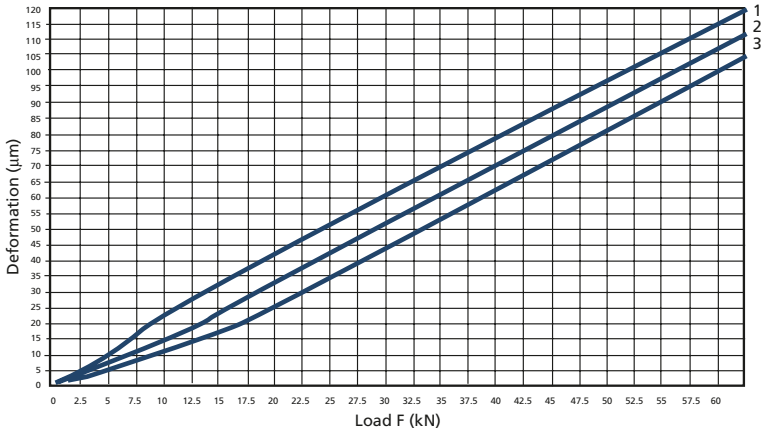
Compressive Load



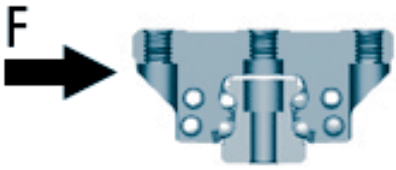


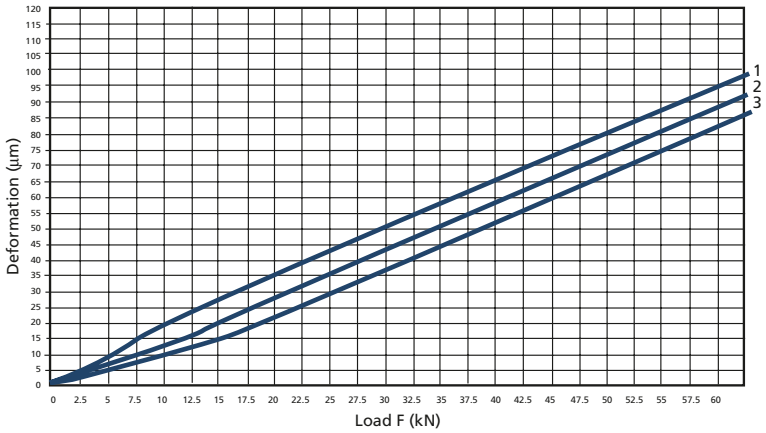
Tensile Load





Lateral Load





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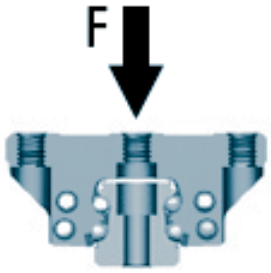
Deflection vs. Applied Load

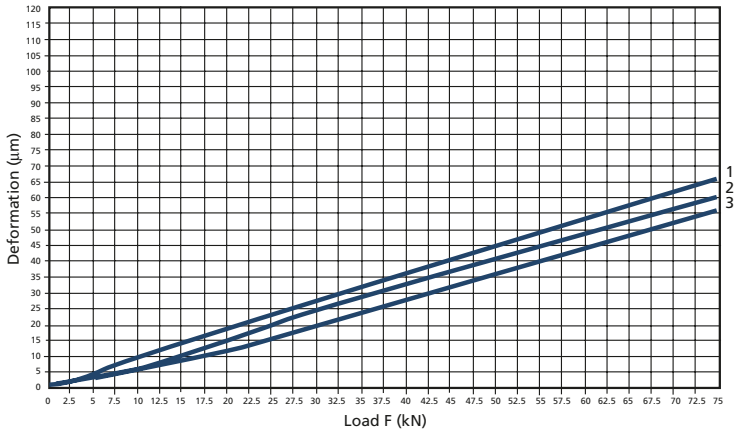
1. Preload 3% of C
2. Preload 8% of C
3. Preload 13% of C

C = Dynamic load carrying capacity

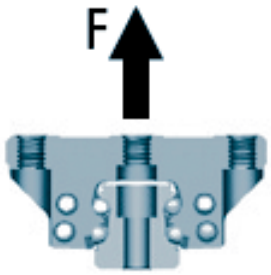
511 Style B, D, F
Size 45

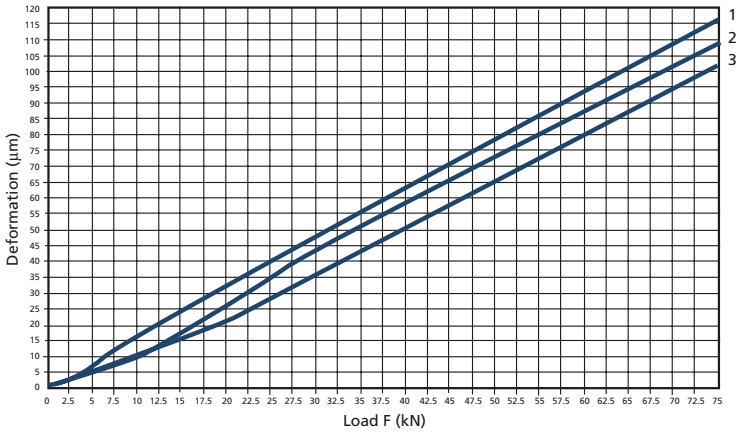
Compressive Load



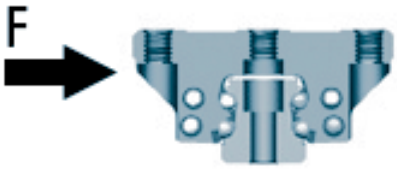


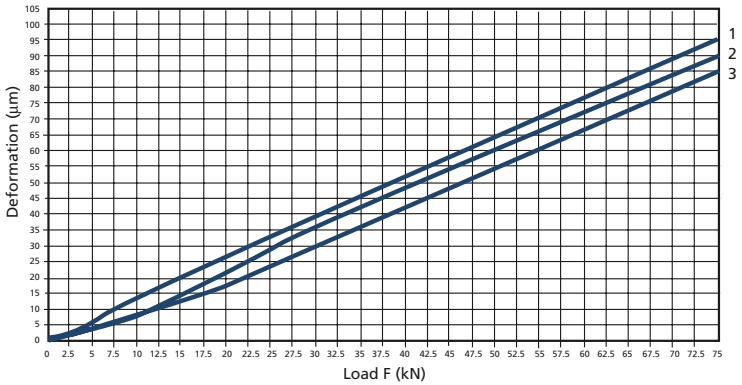
Tensile Load





Lateral Load





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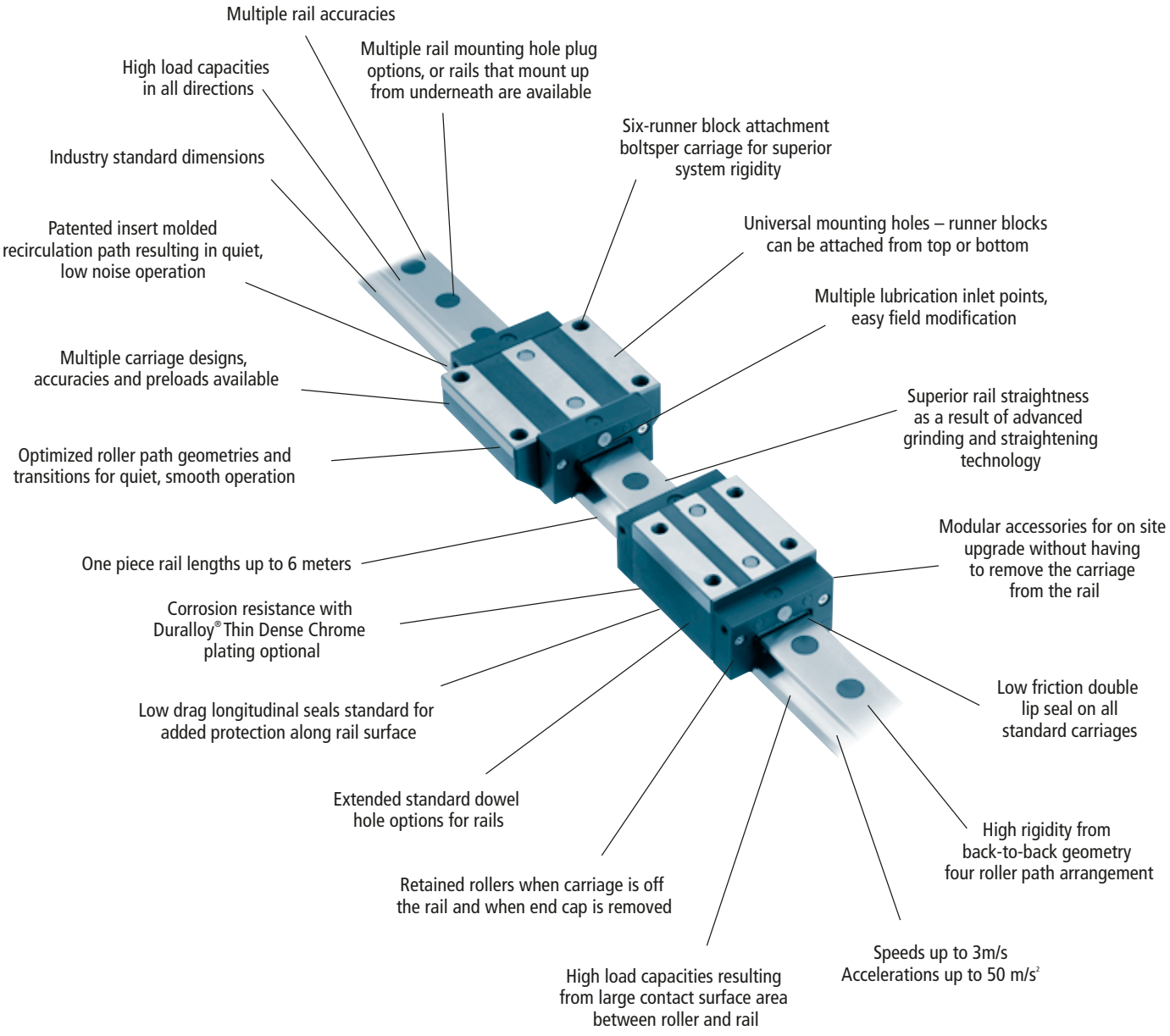
NOTES:

500 Series Roller Profile Rail



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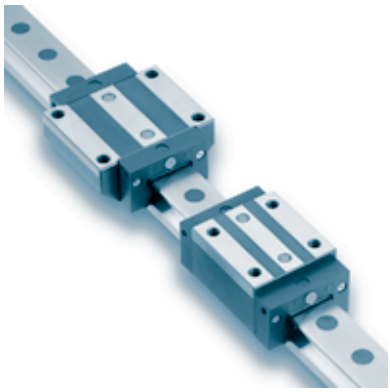
500 Series Roller Profile Rail



Features

The Thomson 500 Series Roller Profile Rail provides long life, exceptional rigidity, high dynamic and static load capacities, accommodation for high moment loads, high running accuracy, multiple sealing options and multiple lubrication inlet options. This allows for on-site field modification, and interchangeability to competitor offering.

These properties result in improved machine accuracies and rigidity resulting in reduced vibration extending machine and tool life. This has a direct effect on your operational efficiency resulting in cost savings for the user.

Available in 4 carriage designs.

Materials

The 500 Series Roller Profile Carriage and Rails are produced from high quality bearing steel. The end cap is made of a high strength, glass-filled nylon with a Nitrile Rubber seal. All carriages and rolling elements are through hardened and all rails are case hardened. Stringent quality controls are in place to ensure consistency of materials from the source, allowing us to ensure that we delivery the highest quality product.

Accuracy

The 500 Series Roller Profile Rail and Carriage are available in three different accuracy classes for the customization to your application needs.

Straightness

The 500 Series Roller Rail are subjected to multiple straightening processes during and after grinding of the roller paths, on one piece rails up to 6 meters long.

These added processes and inspections result in one of the straightest rails in the market today, improving machine accuracies wherever the 500 Series Roller is used.

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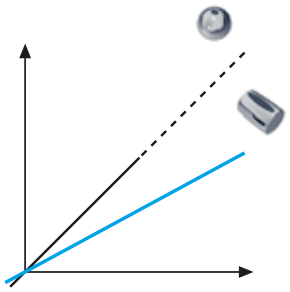
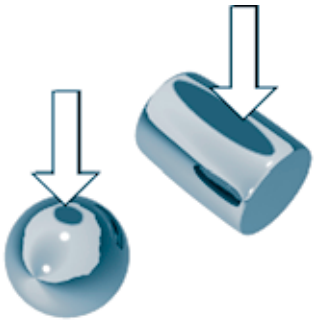


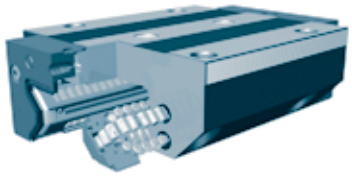
Rigidity

Profile rail bearings have a significant effect on the overall system rigidity. The 500 Series Roller rigidity is achieved by using the equivalent of a back-to-back bearing arrangement, complemented by special rollers that are crowned to prevent roller edge loading when misalignment is present. This results in lower elastic deformation as the load increases compared to a ball carriage—or face-to-face bearing arrangement.



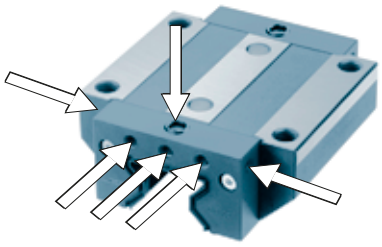
Load Capacity

The 500 Series Roller has an increased load capacity over Ball Profile Rail as a result of the increased contacting surface across the length of the roller. A ball provides a single point contact area, while a roller provides a much greater line contact area. This results in a substantially higher load carrying capacity and lower wear with minimum rolling friction.



Running Smoothness / Low Noise

The running smoothness and low noise of the 500 Series Roller is the result of a propriety insert molded recirculation path that has an optimized geometric shape and minimal transitions. This ensures smooth, quiet operation.

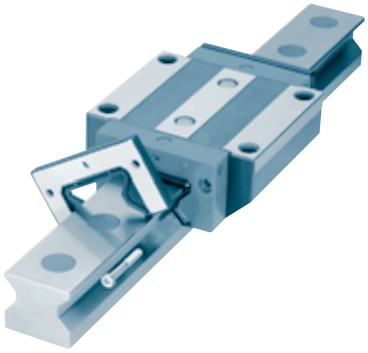


Multiple Lubrication Options

The 500 Series Roller carriage standard end cap is designed for flexibility. The end cap is equipped with six lubrication inlet points and additional internal options for directing grease or oil to the proper location. These options are easily changed on-site in the field or can be supplied from the factory.

Unsure of the best lubrication inlet location? The 500 Series Roller will allow the user to make these changes easily in the field to optimize the system performance. In addition, they allow for ease in maintenance.

For more information, or to place an order, please contact your local authorized Thomson distributor or Danaher Motion at 1-800-554-8466, Fax: 1-800-445-0329, or E-mail at profilerail@danahermotion.com.

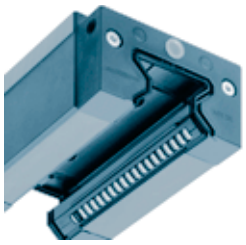


Modular Accessory Options

The 500 Series Roller is supplied standard with low friction double lip seals and longitudinal seals that completely enclose the bearing carriage to protect the rollers and track surfaces and minimize lubrication loss.

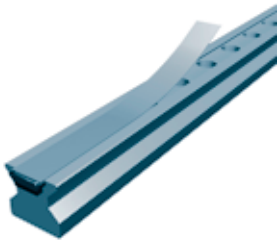
Additional metal scrapers or wiper and oil reservoir components can be easily added on-site in the field or can be supplied from the factory.

These innovative design features allow users to easily, efficiently, and economically upgrade carriage sealing and lubrication without needing to replace the entire carriage assembly.



Longitudinal Seals

The 500 Series Roller carriage has built-in under carriage low drag longitudinal seals that protect the rollers and roller track surfaces from contamination. These longitudinal seals are an added protection to increase the life and overall performance.



Rail Accessories

The 500 Series Roller rail have multiple options to fill the mounting holes to eliminate possible contamination entry into the bearing. Custom designed plugs are available in plastic, brass, or stainless steel. A special rail is available that utilizes a custom cover strip. In addition, Danaher Motion stocks an assortment of bellows to protect the entire assembly. All options are available from stock and represent another innovative design feature of the 500 Series. Mounting tools for easy and correct installation are available as well.

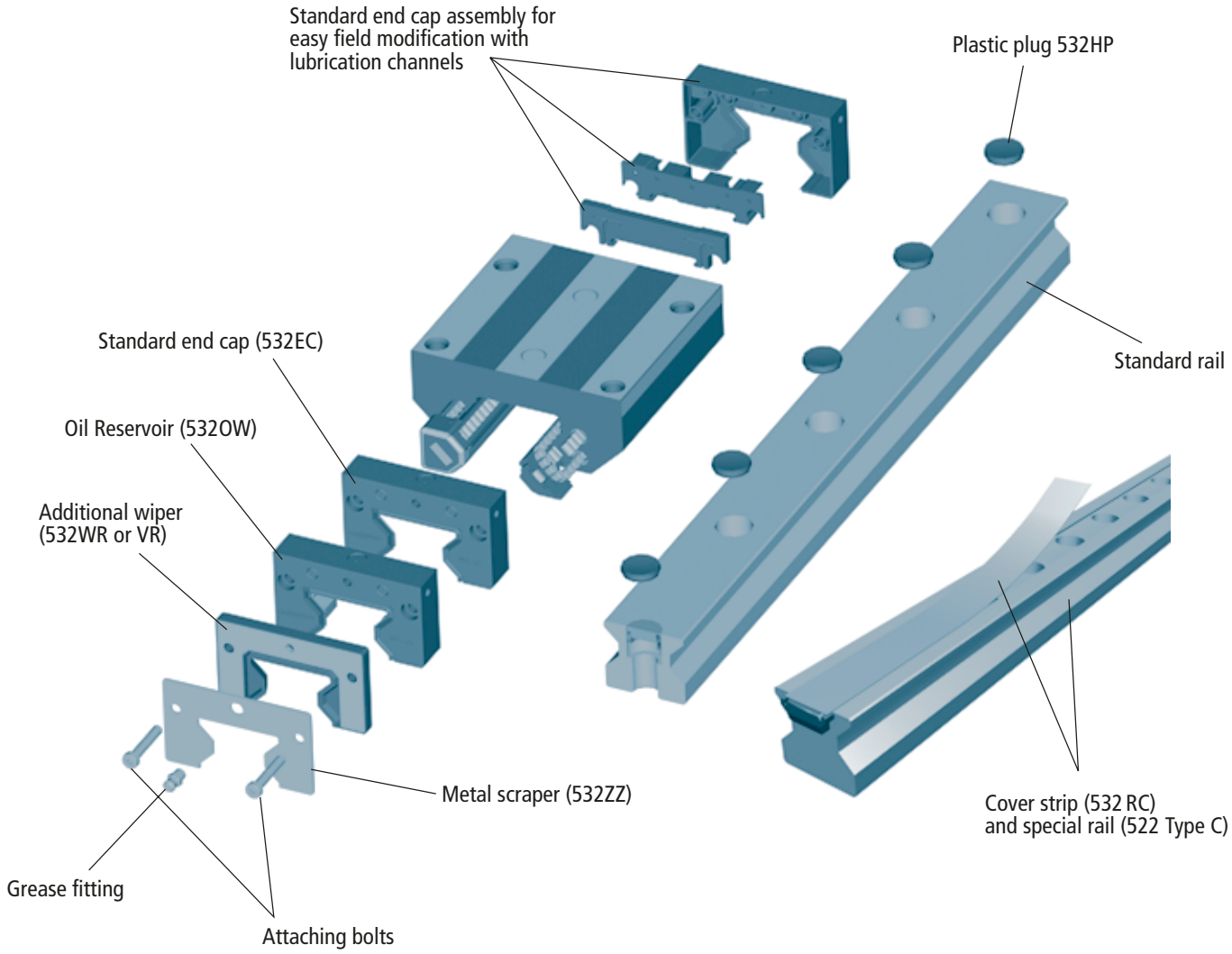
Retained Rollers

The rolling elements of the 500 Series Roller Carriage are retained within the bearing so the carriage can be removed from the rail, or the end cap from the carriage, without worrying about the rollers falling out. It is recommended to place any removed carriage onto a mounting rail or shipping arbor to provide added protection to the rolling elements.

For more information, or to place an order, please contact your local authorized Thomson distributor or Danaher Motion at 1-800-554-8466, Fax: 1-800-445-0329, or E-mail at profilerail@danahermotion.com.

500 Series Roller Profile Rail

Modular Design Exploded View



The modular, building block design, of the 500 Series Roller Profile Rail Assembly for easy on-site field upgrades, for quick seal or lubrication upgrades all without the need for new carriage or rails.

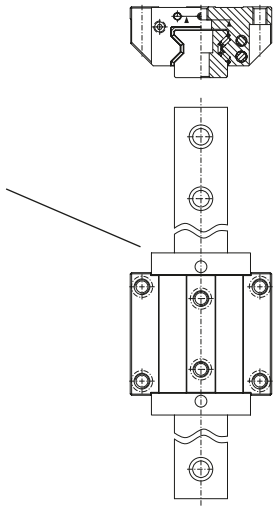
Also available (not shown):

- Stainless Steel Rain Plugs (532 HS)
- Brass Rail Plugs (532 HB)
- Mylar Tape (532 RT)
- Bolt up from bottom rail (522 Type U)

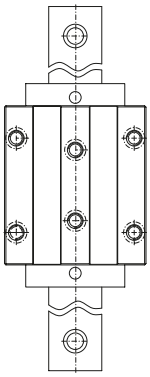
For more information, or to place an order, please contact your local authorized Thomson distributor or Danaher Motion at 1-800-554-8466, Fax: 1-800-445-0329, or E-mail at profilerail@danahermotion.com.

500 Series Roller Profile Carriage and Rail Options

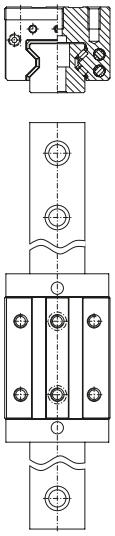
Danaher Motion offers four carriage styles with six mounting holes allowing for additional mounting configurations in the field or retrofitting. All provides superior rigidity and design flexibility.



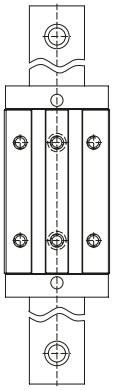
Standard Carriage
Style A
Sizes 25, 35, 45, 55



Standard Long Carriage
Style B
Sizes 25, 35, 45, 55, 65



Narrow Carriage
Style C
Sizes 25, 35, 45, 55



Narrow Long Carriage
Style D
Sizes 25, 35, 45, 55, 65

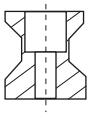
Carriage Option

The 500 Series Roller Profile carriages are also available with special lubrications. They can be ordered directly from stock or with a short lead-time.

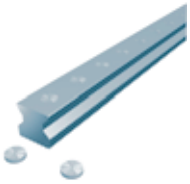
For more information, or to place an order, please contact your local authorized Thomson distributor or Danaher Motion at 1-800-554-8466, Fax: 1-800-445-0329, or E-mail at profilerail@danahermotion.com.

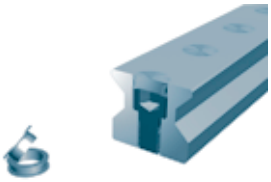
500 Series Roller Profile Carriage Rail Options (cont'd)

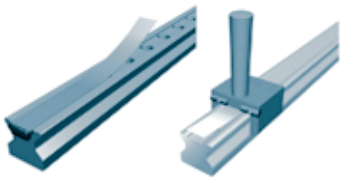
Bolt down from the top – 522 Type A



Bolt down from the bottom – 522 Type U







Rail Types and Accessories

The 500 Series Roller Profile Rail is available in two configurations:

– Bolt Down from the top – 522 Type A

– Bolt Up from the bottom – 522 Type U

The bolt down from the top design has various types of options to plug the holes.

The standard 522 Type A rail mounting holes can be plugged or sealed after installation using the options below.

Plastic Plugs

532 HP plastic plugs are an inexpensive and simple method to seal the rail attachment bolt area. The plastic plugs are easy driven in place to any 500 Series Standard Roller Rail with a soft non-metallic drift. They can easily be removed.

Brass Plugs

532 HB brass plugs are more rugged than the plastic plug, slightly more expensive, and require more precision during installation. They fit in all stand 500 Series Roller Rails and require some hand buffing or polishing of the rail surface after installation.

Two-piece Stainless Steel Plugs

532 HS two-piece stainless plugs are the most rugged plugs available for the 500 Series Roller Rails. The two piece construction and design allows the plugs to lock into place and rest on the top of the socket head bolt. They require no post installation polishing. The recommended hex head socket must be used to properly install the 532 HS plugs. For correct installation we recommend use of the 532 HST mounting tools.

Mylar Tape

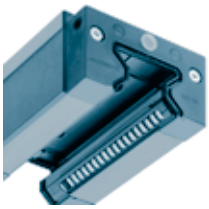
A simple and low cost alternative is specialty Mylar tape that can be placed quickly on the top surface of the rail. Part number 532 RT is available in 3 meter lengths.

Optional 500 Series Rail

Option 532 RC utilizes a special rail 522 Type C that is easily installed with the 532 RCT mounting tool found on page R23.

For more information, or to place an order, please contact your local authorized Thomson distributor or Danaher Motion at 1-800-554-8466, Fax: 1-800-445-0329, or E-mail at profilerail@danahermotion.com.

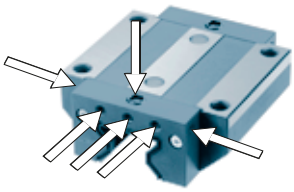
500 Series Roller Profile



Additional Seal Types and Lubrication Accessories

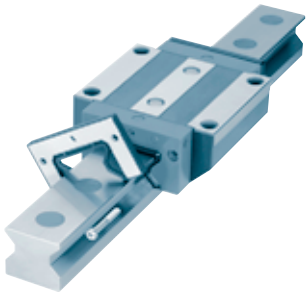
The 500 Series Roller Carriage is designed with modular sealing and lubrication options for simple on-site field modification or factory direct.

The standard carriage end cap has an integral low friction double lip seal and longitudinal seals that completely encloses the bearing carriage. The double lip design keeps contaminants out and lubrication in. It also allows for grease to purge out of the carriage to prevent excessive lubrication, which can result in higher operating temperatures. This double lip design allows for use with oil lubrication.



This standard carriage end cap comes standard with a lubrication inlet centered in the end cap with a specially designed and modified lubrication channels to direct the lubrication to the different roller tracks. The lubrication inlet can be easily changed in the field or supplied from the factory for side inlet, offset inlet or top inlet. Additionally, the internal configuration can be modified to allow for separating the lubrication paths for vertical mounting or oil lubrication.

The standard carriage end cap is equipped with lubrication channels directing lubrication to proper roller paths. The standard carriage end plate can be easily modified on-site in the field to channel lubrication separately or can be factory ordered.



Optional–on site field installable modular seals and accessories

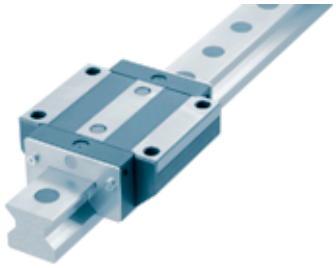
Additional Seal

The **532WR** and **532VR** seals provide an additional level of protection from contaminants to the 500 Series Profile Rail Bearing Assembly. These additional components can be easily added on-site. They are supplied with the required screws to make the installation simple.

532WR is made of durable nitrile rubber (Buna N)

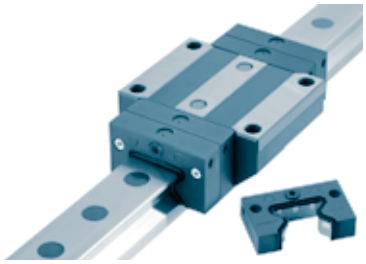
532VR is made of durable Viton®

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.



Metal Scraper

The **532ZZ 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 for an extra level of protection to the seal lips. The Metal Scraper is easily installed in conjunction with other optional modular accessories providing you with an easy upgrade to the standard seal. These are easily installed on-site in the field or can be supplied from the factory.

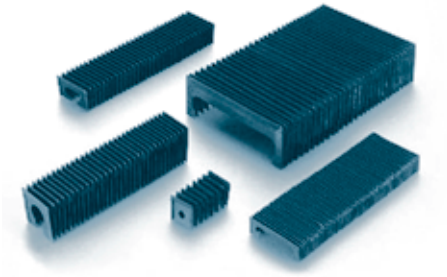


Oil Reservoir

The **532 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 roller paths for extended periods of time. The Type 532 OW oil reservoir eliminates the need for a routine maintenance schedule, assures lubrication gets to the required points, can be refilled if required, and can operate up to 5000 km of travel. The Type 532 OW oil reservoir can be easily installed in conjunction with other optional modular seals for an easy upgrade to the standard seal. These can be easily installed on-site in the field or can be supplied from the factory.

Bellows

Standard bellows are available for all 500 Series Roller Profile assemblies The bellows cover the entire length of the rail. The bellows are used to provide additional protection against dirt, dust and splashed liquid. Installation is simple and requires little time. Retrofitting is possible when the rail ends are be drilled for the attachment of the end plate 532 CC.



Bellows are available in three styles:

- Type B "Low Profile" with outside dimensions that do not exceed the carriage
- Type C "High Compression"
- Type W "Walk-On" capable of handling the harshest environments with a 90 kg load bearing capacity.

The bellow end plates can be easily installed in conjunction with the other optional modular accessories an easy upgrade to the standard seal. These can be easily installed on-site in the field.

Note: Additional Modular accessories add additional drag to the carriage assembly resulting in increased start-up friction and power consumption.

Relative Drag Comparison for Design Consideration

Type	Relative Drag
Standard carriage	●
Rubber Wiper (531 WR)	● ● ●
Viton® Wiper (531 VR)	● ● ●
Metal Scraper (531 22)	●
Oil Reservoir (531 OW)	● ●

• Low

For more information, or to place an order, please contact your local authorized Thomson distributor or Danaher Motion at 1-800-554-8466, Fax: 1-800-445-0329, or E-mail at profilerail@danahermotion.com.

Roller Carriage

5 1 2 H 25 A 1 D L W Z ES1 SM

500 Series Profile Carriage

Product Type
1 Carriage

Type
2 Roller

Accuracy Class
P Precision
S Super Precision
U Ultra Precision

Size

Carriage Style
A Standard
B Standard Long
C Narrow
D Narrow Long

Preload
1 Approximately 0.03 C
2 Approximately 0.08 C
3 Approximately 0.13 C

Accessories
D Duralloy® (P class only)
L Long Life Lube Lock
N Additional Oil Reservoir
Z Metal Scraper
W Additional Rubber Wiper
V Additional Viton® Wiper
C Bellow Clips

Extended Standards
ES1 Offset lubrication in end caps
ES2 Side lubrication in end caps
ES3 Top lubrication in end caps
ES4 ES1 + individual lubrication channels
ES5 ES2 + individual lubrication channels
G1 Greased with Mobilux® EP2
G2 Greased with Kyrtox® GPL227
GS Greased per customer specification

Specials
SM Special per customer print

Roller Rail

5 2 2 H 25 A 1 ES1 S2 1000 Y= (see note 1)

500 Series Profile Rail

Product Type
2 Rail

Type
2 Roller

Accuracy Class
H High
P Precision
U Ultra Precision

Size

Rail Style
A Standard
U Bolt up from Bottom
C Cover Strip

Options
D Duralloy® (P Class only)
E Bellow Clips

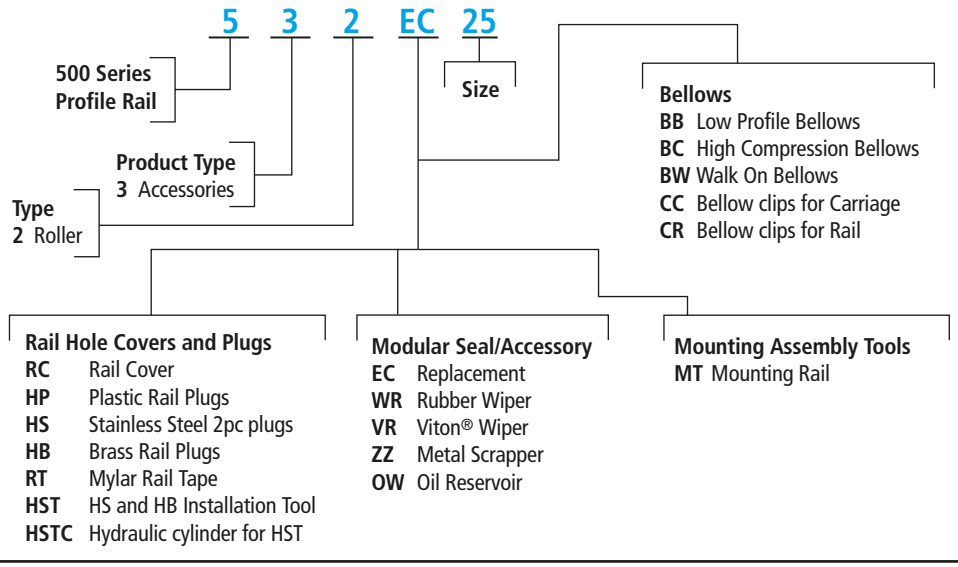
Extended Standards
DH1 8mm dowel hole + slot
DH2 10mm dowel hole + slot
DH3 12mm dowel hole + slot
DH4 3/8" dowel hole + slot
DH5 1/2" dowel hole + slot
JT Butt Joint

Length (mm)

Specials
SM Special per customer print

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

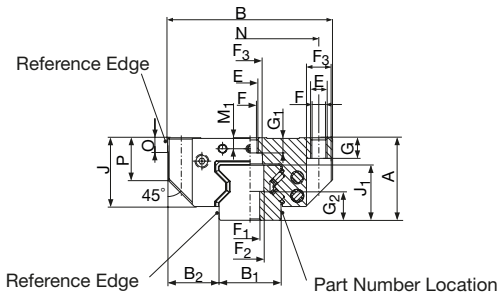
Roller Accessories

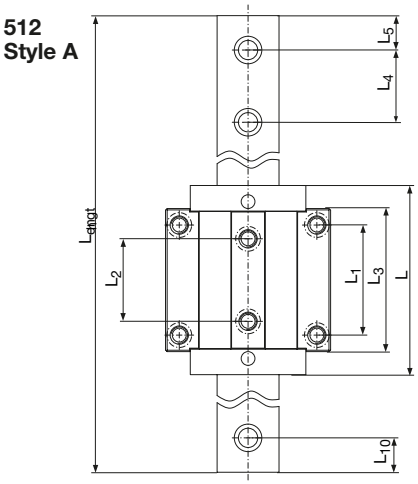


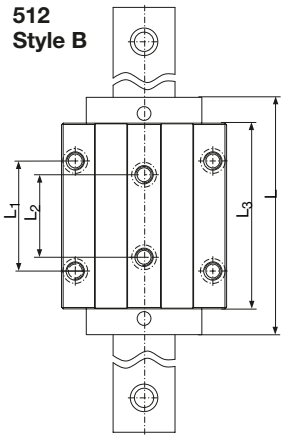
Part Number	Description
530 LN45	M6 hydraulic type lube fitting - 45° angle
530 LN	M6 hydraulic type lube fitting - straight
530 LN90	M6 hydraulic type lube fitting - 90° angle
530 LF3	M3 funnel type lubricating nipple
530 LA3	M3 straight screw lubrication line fitting for M3 tubing
530 LA4	M6 to 1/8" NPT Hex adapter
530 LA5	M6 to M8x1 Hex adapter
530 LA6	M6 to M8x1 round adapter
530 BF6	M6 to M6 Banjo Fitting
530 BF8	M6 to M8x1 Banjo Fitting
530 LG	Grease gun for LF3 (M3 funnel type lubricating nipple)

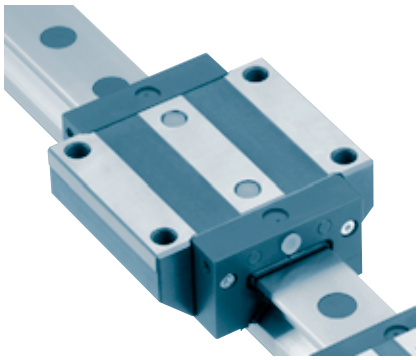
For more information, or to place an order, please contact your local authorized Thomson distributor or Danaher Motion at 1-800-554-8466, Fax: 1-800-445-0329, or E-mail at profilerail@danahermotion.com.

512 Style A and B









512 Style A – Standard Roller

Size	Dimensions (mm) A	B	B_1* ±0.05	B_2	J	J_1	L**	L_1	L_2	L_3	X	N	E	F	F_1	F_2	F_3	Roller Ø	G	G_1	G_2	M_1	O	P
25	36	70	23	23.5	29.5	24.5	81	45	40	60	30	57	M 8	6.8	7	11	11	3.2	9	6.5	13	5.5	7.5	17.5
35	48	100	34	33	40	32	109	62	52	80	40	82	M 10	8.5	9	15	15	4.5	12	10	15	7	8	23
45	60	120	45	37.5	50	40	137.5	80	60	104	52.5	100	M 12	10.5	14	20	18	5	15	11	21	8	10	30.5
55	70	140	53	43.5	57	48	163.5	95	70	120	60	116	M 14	12.5	16	24	20	6	18	13.5	26	9	12	34.5

512 Style B – Standard Long Roller

Size	Dimensions (mm) A	B	B_1* ±0.05	B_2	J	J_1	L**	L_1	L_2	L_3	X	N	E	F	F_1	F_2	F_3	Roller Ø	G	G_1	G_2	M_1	O	P
25	36	70	23	23.5	29.5	24.5	103.4	45	40	79.4	30	57	M 8	6.8	7	11	11	3.2	9	6.5	13	5.5	7.5	17.5
35	48	100	34	33	40	32	136	62	52	103	40	82	M 10	8.5	9	15	15	4.5	12	10	15	7	8	23
45	60	120	45	37.5	50	40	172.5	80	60	135	52.5	100	M 12	10.5	14	20	18	5	15	11	21	8	10	30.5
55	70	140	53	43.5	57	48	205.5	95	70	162	60	116	M 14	12.5	16	24	20	6	18	13.5	26	9	12	34.5
65	90	170	63	53.5	76	58	251	110	82	201	75	142	M16	14.5	18	26	23	7	23	19	32	13	15	51

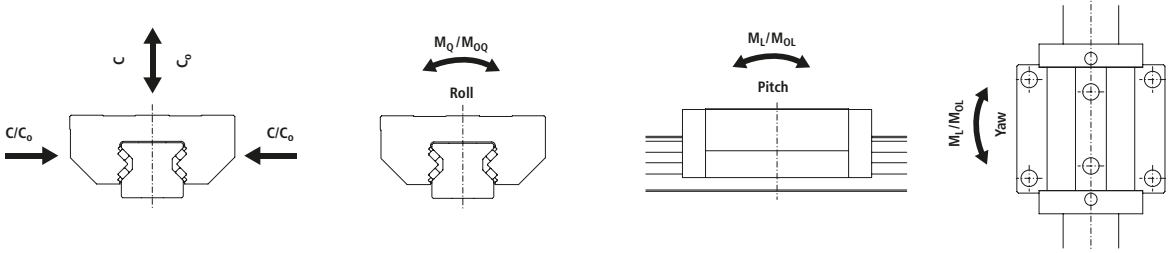
*Standard tolerance shown, special lower tolerances are available upon request. Please consult application engineering for additional information.
**When using additional modular seals or lubrication plates, the total length L will increase. Consult page R18 for additional information.
Length of rail to be specified at time of order, $Y_1 = Y_2$ unless specified otherwise at time of order.

500 Series Ball

512 Style A and B

Dynamic Load and Moment Ratings
C = Dynamic load rating
M_L = Dynamic pitch and yaw moment rating
M_Q = Dynamic roll moment rating

Static Load and Moment Capacities
C_O = Static load capacity
M_{OL} = Static pitch and yaw moment capacity
M_{OQ} = Static roll moment capacity



Size & Style	Loading Capabilites Co (N)	C (N)	Moments M_{OQ} (Nm)	M_Q (Nm)	M_{OL} (Nm)	M_L (Nm)	Weights Carriage (kg)	Rail (kg/m)
25A	49800	27700	733	408	476	265	0.7	3.4
25B	70300	39100	1035	576	936	521	0.9	
35A	93400	52000	2008	1118	1189	662	1.6	6.5
35B	128500	71500	2762	1537	2214	1232	2.2	
45A	167500	93400	4621	2577	2790	1556	3.2	10.7
45B	229500	127800	6333	3527	5161	2874	4.3	
55A	237000	131900	7771	4325	4738	2637	5.0	15.2
55B	324000	180500	10624	5919	8745	4872	6.8	
65B	530000	295000	20912	11640	17930	9980	13.5	22.5

Notes:

1. The dynamic load and moment ratings are based upon 100 km travel life. When comparing these load ratings with other bearings take into consideration that some manufacturers dynamic and moment ratings are based on 50 km travel life. In order to compare with bearing dynamic and moment ratings based on 50 km travel life, divide the dynamic capacity of the bearing rated for 50 km by 1.26 to get an accurate comparison.
2. The static load and moment rating are the maximum radial load and moment load that should be applied to the bearing while there is no relative motion between the carriage and rail.

Bearing Travel Life Comparison

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

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_{min} = minimum required dynamic load rating, N

F = applied dynamic load, N

L = required travel life, km

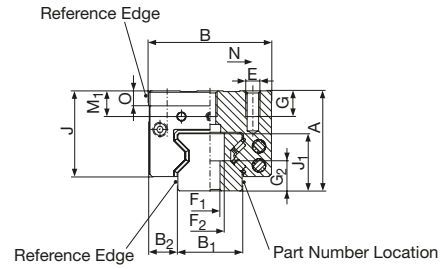
Operating Parameters:

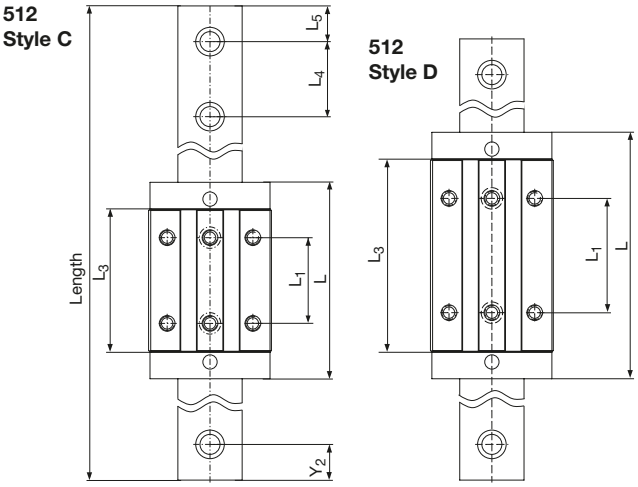
Maximum Velocity:	3 m/s	
Maximum Acceleration:	50 m/s²	
Temperature:	Min:	–40° C
	Max:	80° C
	Max peak:	120° C short time*

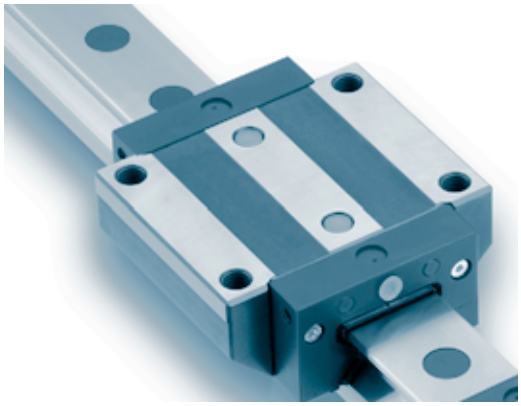
*without bellows

For more information, or to place an order, please contact your local authorized Thomson distributor or Danaher Motion at 1-800-554-8466, Fax: 1-800-445-0329, or E-mail at profilerail@danahermotion.com.

512 Style C and D







512 Style C Narrow Roller

Size	Dimensions (mm) A	B	B_1* +0.05	B2	J	J_1	L**	L_1	L_3	X	N	E	F_1	F_2	Roller Ø`	G	G_2	M_1	O
25	40	48	23	12.5	33.5	24.5	81	35/50	57	30	35	M 6	7	11	3.2	9	13	9.5	7.5
35	55	70	34	18	47	32	109	50/72	76	40	50	M 8	9	15	4.5	12	15	14	8
45	70	86	45	20.5	60	40	137.5	60/80	100	52.5	60	M 10	14	20	5	18	21	18	10
55	80	100	53	23.5	67	48	163.5	75/95	120	60	75	M 12	16	24	6	19	26	19	12

512 Style D Narrow Long Roller

Size	Dimensions (mm) A	B	B_1* +0.05	B2	J	J_1	L**	L_1	L_3	X	N	E	F_1	F_2	Roller Ø`	G	G_2	M_1	O
25	40	48	23	12.5	33.5	24.5	103.4	35/50	79.4	30	35	M 6	7	11	3.2	9	13	9.5	7.5
35	55	70	34	18	47	32	136	50/72	103	40	50	M 8	9	15	4.5	12	15	14	8
45	70	86	45	20.5	60	40	172.5	60/80	135	52.5	60	M 10	14	20	5	18	21	18	10
55	80	100	53	23.5	67	48	205.5	75/95	162	60	75	M 12	16	24	6	19	26	19	12
65	90	126	63	31.5	76	58	251	120	201	75	76	M16	18	26	7	20	32	13	15

*Standard tolerance shown, special lower tolerances are available upon request. Please consult application engineering for additional information.
**When using additional modular seals or lubrication plates, the total length L will increase. Consult page R18 for additional information.
Length of rail to be specified at time of order, Y1 = Y2 unless specified otherwise at time of order

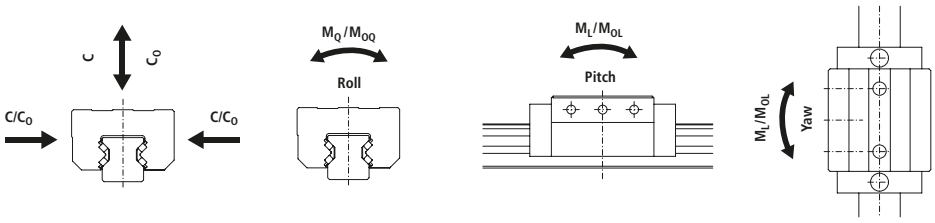
For more information, or to place an order, please contact your local authorized Thomson distributor or Danaher Motion at 1-800-554-8466, Fax: 1-800-445-0329, or E-mail at profilerail@danahermotion.com.

500 Series Roller

512 Style C and D

Dynamic Load and Moment Ratings
C = Dynamic load rating
M_L = Dynamic pitch and aw moment rating
M_Q = Dynamic roll moment rating

Static Load and Moment Capacities
C_O = Static load capacity
M_{OL} = Static pitch and yaw moment capacity
M_{OQ} = Static roll moment capacity



Size & Style	Loading Capabilites Co (N)	C (N)	Moments M_{OQ} (Nm)	M_Q (Nm)	M_{OL} (Nm)	M_L (Nm)	Weights Carriage (kg)	Rail (kg/m)
25C	49800	27700	733	408	476	265	0.6	
25D	70300	39100	1035	576	936	521	0.7	3.4
35C	93400	52000	2008	1118	1189	662	1.5	
35D	128500	71500	2762	1537	2214	1232	2.0	6.5
45C	167500	93400	4621	2577	2790	1556	3.0	
45D	229500	127800	6333	3527	5161	2874	4.0	10.7
55C	237000	131900	7771	4325	4738	2637	4.5	
55D	324000	180500	10624	5919	8745	4872	6.1	15.2
65D	530000	295000	20912	11640	17930	9980	10.4	22.5

Notes:

1. The dynamic load and moment ratings are based upon 100 km travel life. When comparing these load ratings with other bearings take into consideration some manufacturers dynamic and moment ratings are based on 50 km travel life. In order to compare with bearing dynamic and moment ratings based on 50 km travel life, divide the dynamic capacity of the bearing rated for 50 km by 1.26 to get an accurate comparison.
2. The static load and moment rating are the maximum radial load and moment load that should be applied to the bearing while there is no relative motion between the carriage and rail.

Bearing Travel Life Calculation

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

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_{min} = minimum required dynamic load rating, N

F = applied dynamic load, N

L = required travel life, km

Operating Parameters:

Maximum Velocity:	3 m/s	
Maximum Acceleration:	50 m/s²	
Temperature:	Min:	–40° C
	Max:	80° C
	Max peak:	120° C short time*

*without bellows

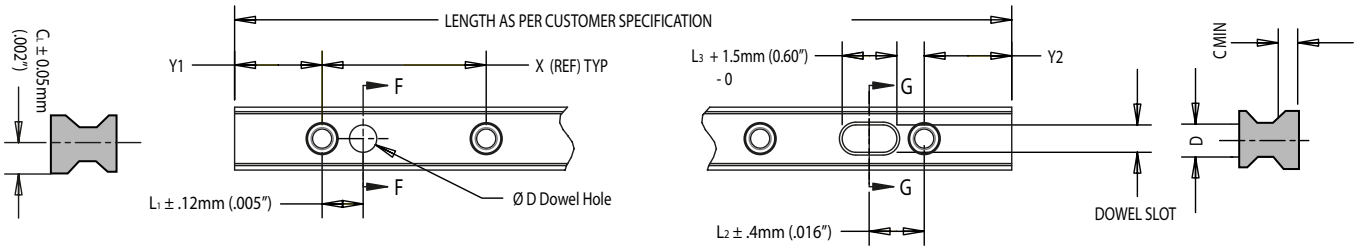
Rail Modifications

The 500 Series Roller Rail can be supplied with dowel holes, radial holes and coaxial holes. Please provide a drawing of your requirement and our Application Engineering Team can provide a quote.

Maximum Length of Single Piece Rail

Size (mm)	25	35	45	55	65
Maximum Length	6000 mm				

Extended Standard Rail Options



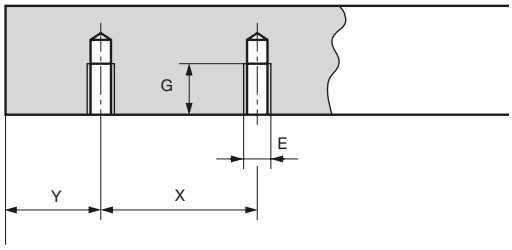
Option	D	L_1	L_2	L_3	C
DH1	8 mm	30 mm	30 mm	12 mm	9.5mm
DH2	10 mm	30 mm	30 mm	15 mm	9.5mm
DH3	12 mm	30 mm	30 mm	18 mm	9.5 mm
DH4	3/8"	1.181"	1.181"	.550"	3/8"
DH5	1/2"	1.181"	1.181"	.750"	3/8"

Y1 = Y2 unless specified at time of ordering.

522 Type U Rail Bolt Up From Bottom

Size	X	E	G (mm)	Weight (kg/in)
25	30	M6	12	3.4
35	40	M8	15	6.5
45	52.5	M12	19	10.7
55	60	M14	22	15.2
65	75	M16	25	22.5

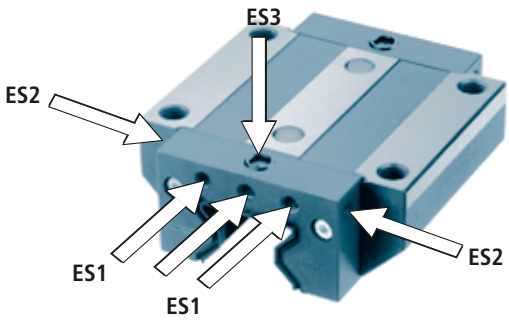
Y1 = Y2 unless specified at time of ordering.



For more information, or to place an order, please contact your local authorized Thomson distributor or Danaher Motion at 1-800-554-8466, Fax: 1-800-445-0329, or E-mail at profilerail@danahermotion.com.

Lubrication Inlet Options

The standard 500 Series Roller Carriage is supplied with a straight lubrication fitting centered. The carriage end cap has multiple lubrication inlet points and lubrication channels options and is supplied standard with the end cap center inlet plugged. These options can be easily modified on-site in the field or can be supplied factory direct. (Not available for size 25.)



Option	Inlet	Lubrication Channel
ES1	Inlet offset	Standard channel
ES2	Inlet on side	Standard channel
ES3	Inlet on Top*	Standard channel
ES4	Inlet offset	Individually channeled path
ES5	Inlet on ends	Individually channeled path

*An O-Ring is required to properly seal the mating surfaces to prevent grease or oil from escaping. One is supplied with this option.
Lubrication options available in size 35, 45, 55 and 65 only.

Grease Lubricants

Standard 500 Series Roller Carriages are sold with oil preservative to protect the rollers from corrosion during storage and transit. The 500 Series Roller Carriages are available with the following assortment of lubricants as standard.

Option	Type	Notes	Viscosity	Temperature Range
G1	Mobilux® EP2	All purpose NLGI2 grease	160cSt @40°C	–20°C to 130°C
G2	Kyrtox® GPL227	High Temperature NLGI2	440cSt @40°C	–30°C to 288°C
GS	Customer specified grease			

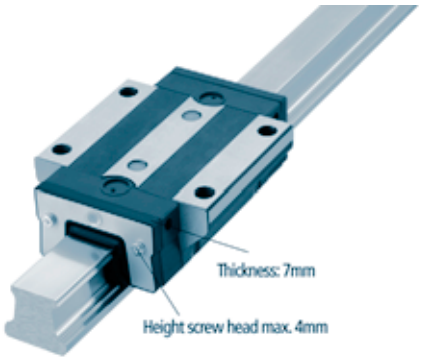
Additional greases may be available upon request. Please consult Danaher Motion Application Engineering.

Thin Dense Chrome Plating

Rails and carriages are available with Duralloy® DSV Thin Dense Chrome Plating, with a thickness of 2–4 µm. As a result of the plating thickness frange compared to the tolerance ranges in the different accuracy classes, it is only available with Precision accuracy class up to 2m long as a single rail, longer lengths can be butt jointed.

For more information, or to place an order, please contact your local authorized Thomson distributor or Danaher Motion at 1-800-554-8466, Fax: 1-800-445-0329, or E-mail at profilerail@danahermotion.com.

Modular Seals and Lubrication Accessories

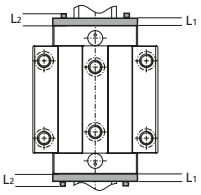


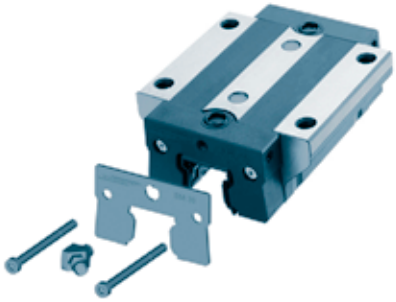
Additional Wipers

532WR – Rubber Wiper
532VR – Viton® Wiper

Size	Rubber Part Number	Viton® Part Number	L1 (mm)	L2 (mm)	Weight (kg)
25	532WR25	532VR25	7	4	0.005
35	532WR35	532VR35	7	4	0.012
45	532WR45	532VR45	7	4	0.024
55	532WR55	532VR55	7	4	0.029
65	532WR65	532VR65	7	4	0.040

L1 – wiper thickness, L2 – max. screw head stickout



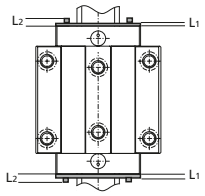


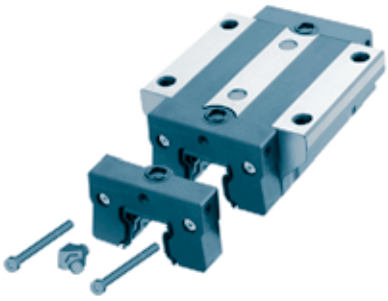
Metal Scraper

532ZZ

Size	Part Number	L1 (mm)	L2 (mm)	Weight (kg)
25	532ZZ25	1.5	4	0.011
35	532ZZ35	1.5	4	0.022
45	532ZZ45	1.5	4	0.034
55	532ZZ55	1.5	4	0.044
65	532ZZ65	1.5	4	0.078

L1 = scraper thickness, L2 = max. screw head stickout



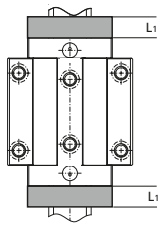


Oil Reservoir

532OW

Size	Lubrication Plate	L1 (mm)	Weight (kg)
25	532OW25	12.7	0.013
35	532OW35	16.7	0.032
45	532OW45	19	0.056
55	532OW55	22	0.103
65	532OW65	25.2	0.179

L1 = lubrication plate thickness, screw heads are recessed in plate



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

Example:

512 Size 45 carriage with 532OW and 532WR modular seals on both sides:

Carriage Length (L)	= 137.5
532OW L1 x 2	= 19 x 2
532WR L1 x 2	= 7 x 2
532WR L2 x 2	= 4 x 2
Total Length	= 193.5 mm

511 Size 35 carriage with 531OW modular seal on both sides and 531VR modular seals on one side:

Carriage Length (L)	= 109
532OW L1 x 2	= 16.7 x 2
532VR L1 x 1	= 7 x 1
532VR L2 x 1	= 4 x 1
Total Length	= 153.4 mm

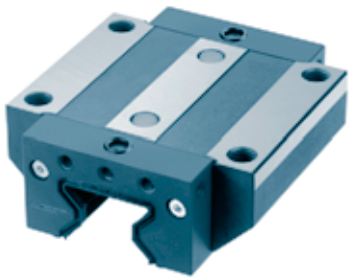
Each modular accessory is supplied with the proper screws to install them over the standard front plate. When combinations of modular seals are used longer screws may be required. The following sizes are available from our stock.

Replacement End Cap

532EC

Size	Replacement Front Plate	L1 (mm)	Weight (kg)
25	532EC25	10.5	0.006
35	532EC35	14.5	0.022
45	532EC45	16.75	0.038
55	532EC55	21.75	0.057
65	532EC65	25	0.089

L1 = Front Plate thickness, screw heads are recessed in plate



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Bellows Dimensional Information

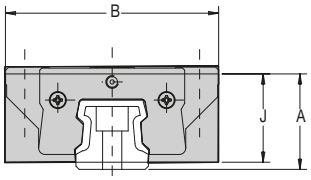
Bellows are available in three styles:

532 BB "Low Profile" with outside dimensions that do not exceed the carriage, constructed of polyurethane coated polyester, maximum ambient temperature of 80°C (175°F)

532 BC "High Compression" constructed of a spark resistant Teflon® coated fiberglass and designed to allow for higher compression, maximum ambient temperature exceeds maximum bearing peak temperatures.

532 WC "Walk On" capable of handling the harshest environments with a 90 kg load bearing capacity.

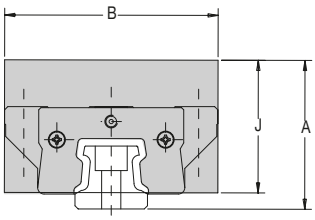
The bellows end cap can be easily installed in conjunction with the other optional modular seals providing you with an easy upgrade to the standard seal. Installation is simple and requires little time. Retrofitting is possible. The rail ends have to be drilled for the attachment of the bellow clip adapter plate, 532 CR. These can be easily installed on-site in the field or can be suppliend from the factory.



532 BB "Low Profile" Bellows

Size	Part No.	B	J	A	CR
25	532 BB25	47	30.5	36	0.17
35	532 BB35	70	41.3	47.5	0.15
45	532 BB45	81	51	59	0.15
55	532 BB55	99	58	69	0.10
65	532 BB65	109	65	79	0.10

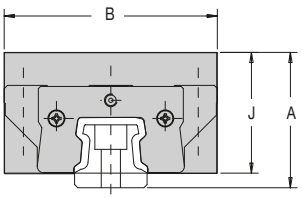
Customer to specify length at time of order



532 BC "High Compression" Bellows

Size	Part No.	B	J	A	CR
25	532 BC25	67	40.5	46	0.10
35	532 BC35	90	51.3	57.5	0.07
45	532 BC45	101	61	69	0.07
55	532 BC55	119	68	79	0.06
65	532 BC65	129	75	89	0.06

Customer to specify length at time of order



532 BW "Walk On" Bellows

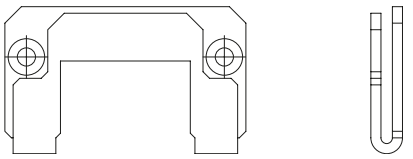
Size	Part No.	B	J	A	CR
25	532 BW25	57	35.5	41	0.19
35	532 BW35	77	42	48.2	0.19
45	532 BW45	101	53	61	0.15
55	532 BW55	111	58	69	0.15
65	532 BW65	119	70	84	0.15

Customer to specify length at time of order

Bellow Clip Adapter Plates

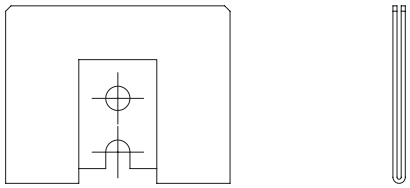
The 532 CC Carriage Bellows Clip – Attachment Plate is used to attach the bellows to the carriage. The bellows clip - adapter plate is made of steel.

The 532 CR Rail Bellow Clip – Adapter Plate is used to attach the bellows to the rail. The attaching holes can be drilled in the end of the rail if retrofitting or can be supplied from the factory. The bellows clip - adapter plate is made of steel.



532 CC Carriage Bellows Clips Attachment Plate

Size	Part No.
25	532 CC25
35	532 CC35
45	532 CC45
55	532 CC55
65	532 CC65



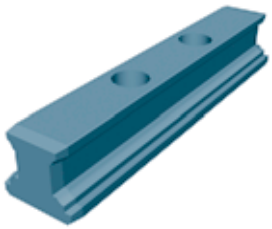
532 CR Rail Bellows Clips Attachment Plate

Size	Part No.
25	532 RC25
35	532 RC35
45	532 RC45
55	532 RC55
65	532 RC65

Customer to specify length at time of order

For more information, or to place an order, please contact your local authorized Thomson distributor or Danaher Motion at 1-800-554-8466, Fax: 1-800-445-0329, or E-mail at profilerail@danahermotion.com.

500 Series Roller Rail Information



Maintenance and Installation Tools & Accessories: Assembly Rail – 532 MT

An assembly rail is required when the carriage must be removed from the rail and then reinstalled during the installation. It is recommended to leave the assembly rail in the carriage to protect the rollers against contamination. If necessary, the two internal mounting screws for fastening runner blocks to the carriage can be tightened. The assembly rail is made of plastic.

Size	Standard Rail Part Number	Length (mm)	Weight (kg)
25	532 MT25	145	0.062
35	532 MT35	185	0.152
45	532 MT45	230	0.317
55	532 MT55	265	0.525
65	532 MT65	320	0.914

Standard Rail Plugs and Tape

HP plastic plugs

Size	Part Number	Qty per pack	Weight (kg)
25	532 HP25	25	.007
35	532 HP35	25	.014
45	532 HP45	25	.025
55	532 HP55	25	.047
65	532 HP65	25	.053

HB brass plugs

Size	Part Number	Qty per pack	Weight (kg)
25	532 HB25	1	.002
35	532 HB35	1	.005
45	532 HB45	1	.008
55	532 HB55	1	.011
65	532 HB65	1	.013

HS two-piece stainless steel plugs

Size	Part Number	Qty per pack	Weight (kg)
25	532 HS25	1 set	.003
35	532 HS35	1 set	.008
45	532 HS45	1 set	.012
55	532 HS55	1 set	.019
65	532 HS65	1 set	.026

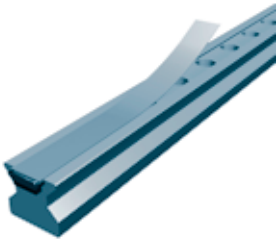
Mylar tape

Size	Part Number	Length
25	532RT25	3m
35	532RT35	3m
45	532RT45	3m
55	532RT55	3m
65	532RT65	3m

HST Stainless Steel and Brass installation tool

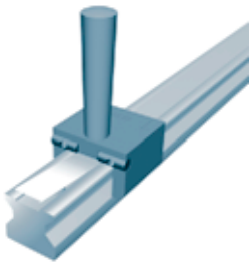
Sliding Block with insertion tool	Weight (kg)
532HST25 For size 25 rail	2.0
532HST35 For size 35 rail	3.5
532HST45 For size 45 rail	3.9
532HST55 For size 55 rail	5.4
532HST65 For size 65 rail	6.5
Hydraulic cylinder (for all sizes)	**Weight (kg)**
532HSTC	0.53

Optional 500 Series Rail with Stainless Steel Cover Strip



Cover Strip and End Plug 532RC for 522 Style C Rail

Size	Part Number
25	532RC25
35	532RC35
45	532RC45
55	532RC55
65	532RC65

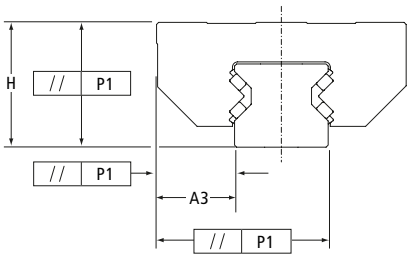


Cover Strip Mounting Tool

Size	Part Number
25	532RCT25
35	532RCT35
45	532RCT45
55	532RCT55
65	532RCT65

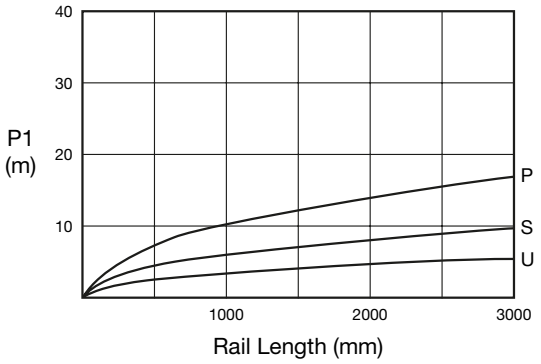
For more information, or to place an order, please contact your local authorized Thomson distributor or Danaher Motion at 1-800-554-8466, Fax: 1-800-445-0329, or E-mail at profilerail@danahermotion.com.

Accuracy Class



Three tolerances describe the accuracy of a Profile Rail bearing: Running Parallelism, Pair Variation, and Assembly accuracy. These are measured from the rail base to the center of the carriage top (H), and from the rail reference edge to the center of the carriage reference edge (A3) (Figure 1).

Running Parallelism describes the tolerance on H and A3 as a function of axial travel, measured from one carriage down the length of rail (Figure 2). This is analogous to straightness of travel. As such, parallelism describes attributes of the rail only.



Assembly Accuracy [Table 1] describes the tolerance on H and A3 as a function of a carriage–rail assembly, measured from the nominal dimensions.

Pair Variation [Table 1] describes tolerance on H and A3 as a function of carriages at the same position on a common rail. Pair variation describes carriage precision only.

The accuracy class selected will partially determine the accuracy of the system. Other factors such as mounting surface flatness and straightness also significantly affect system accuracy.

Tolerances

	Accuracy Class		
	P - Precision	S - Super Precision	U - Ultra Precision
Assembly Accuracy Tolerance on dimension H and A3 (measured at middle of carriage at any point along rail)	±20	±10	±5
Pair Variation Max variation in dimensions H and A3 measured on multiple carriages mounted on the same rail (measured at the middle of carriage at same position on rail)	10	5	3
Running Parallelism	40	20	10

All values in µm

Preload Accuracy Combinations

Accuracy Class	Preload		
	0.03C	0.08C	0.13C
P, S, U	1	2	3

For more information, or to place an order, please contact your local authorized Thomson distributor or Danaher Motion at 1-800-554-8466, Fax: 1-800-445-0329, or E-mail at profilerail@danahermotion.com.

Deflection Curves

The following pages contain deflection charts for the 512 Profile Rail. The charts shown are calculated. The calculation are based on theoretical conditions regarding shape, position and dimension of the roller, and raceways of the carriage and rails under the specified loading. The real behavior of the carriage can vary slightly in the application as a result of such things as base flatness, angle of loading, temperature, etc.

Note that the deflection decreases as the preload bearing size increases and decreases as the bearing size increases.

For deflection characteristics of profile rail types not shown, contact Danaher Motion Application Engineering at (800) 554-8466.

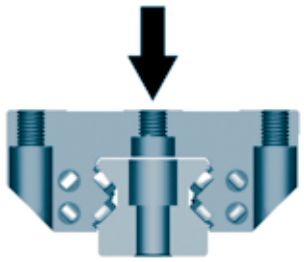
Deflection vs. Applied Load

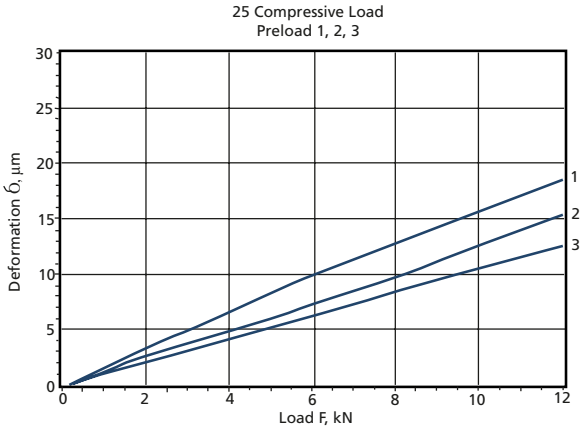
1. Preload 3% of C
2. Preload 8% of C
3. Preload 13% of C

C = Dynamic load carrying capacity

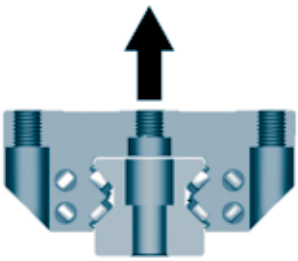
512 Style A and C
Size 25

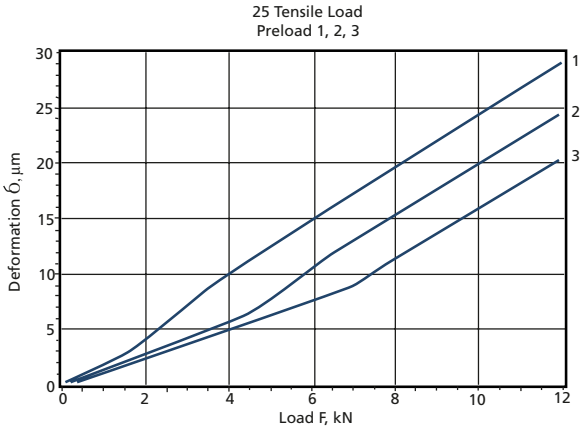
Compressive Load



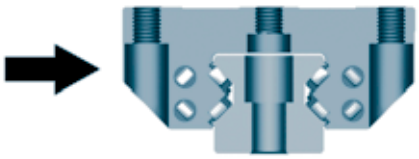


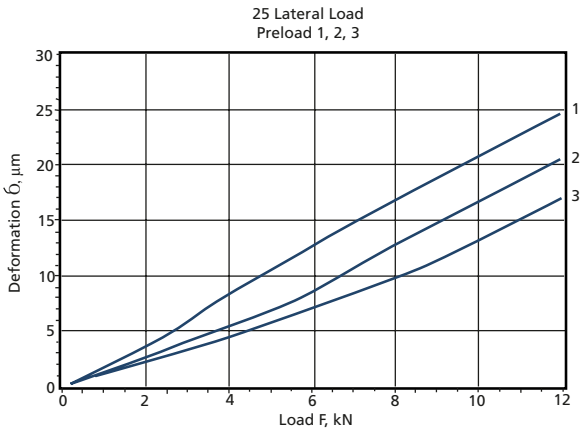
Tensile Load





Lateral Load





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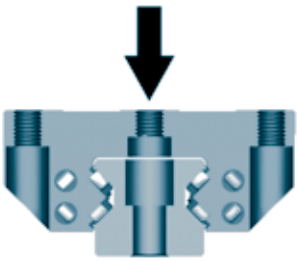
Deflection vs. Applied Load

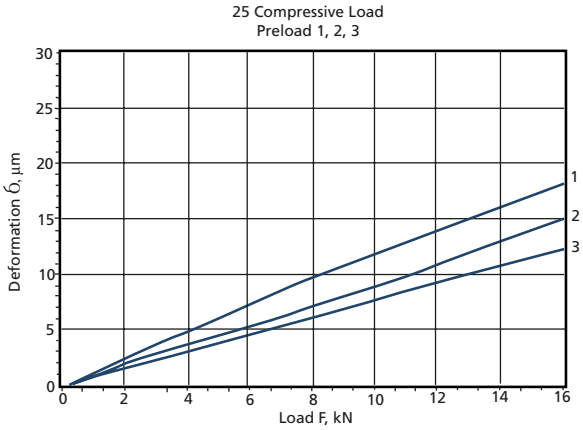
1. Preload 3% of C
2. Preload 8% of C
3. Preload 13% of C

C = Dynamic load carrying capacity

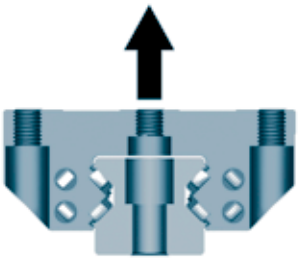
512 Style B and D
Size 25

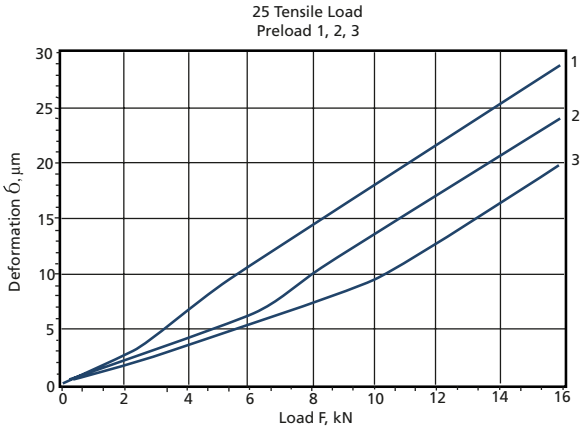
Compressive Load



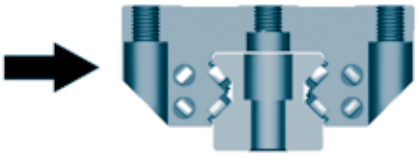


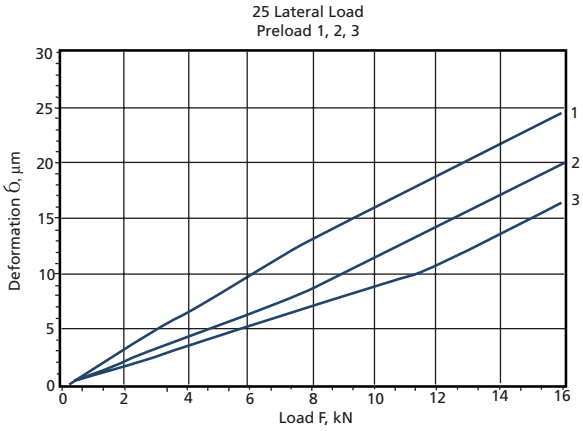
Tensile Load





Lateral Load





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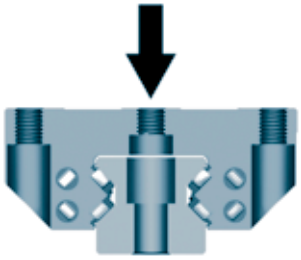
Deflection vs. Applied Load

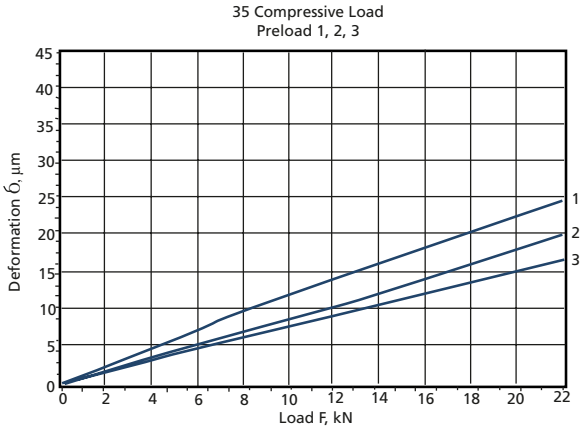
1. Preload 3% of C
2. Preload 8% of C
3. Preload 13% of C

C = Dynamic load carrying capacity

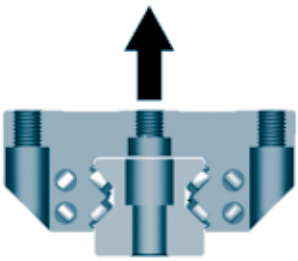
512 Style A and C
Size 35

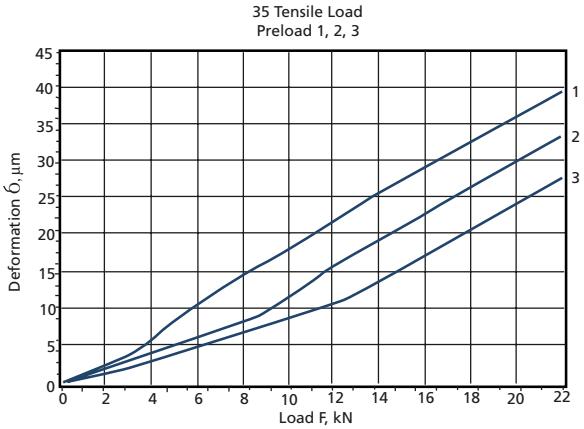
Compressive Load



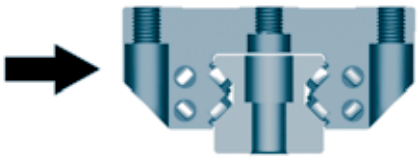


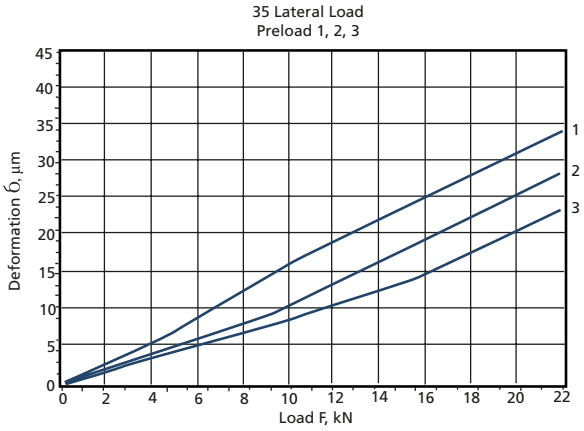
Tensile Load





Lateral Load





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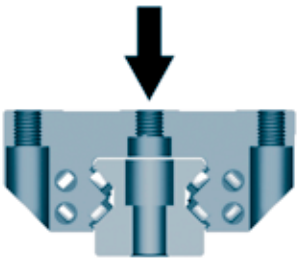
Deflection vs. Applied Load

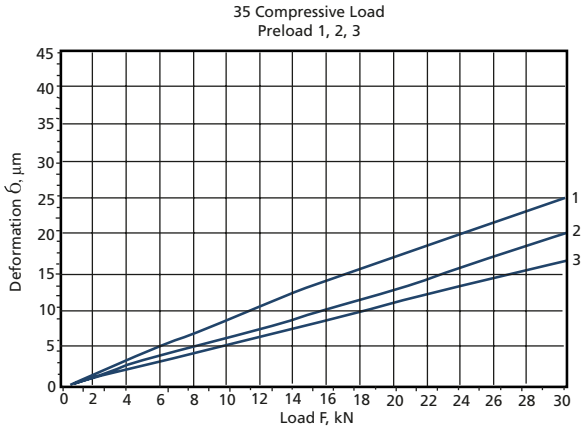
1. Preload 3% of C
2. Preload 8% of C
3. Preload 13% of C

C = Dynamic load carrying capacity

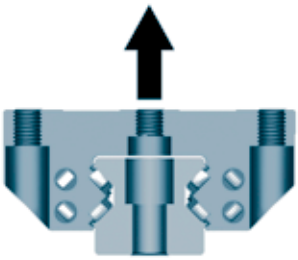
512 Style B and D
Size 35

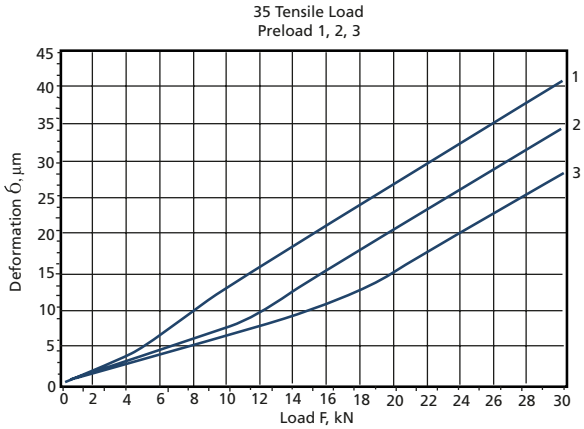
Compressive Load



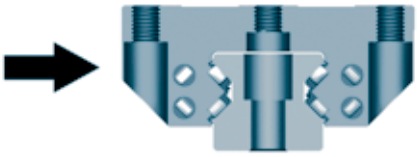


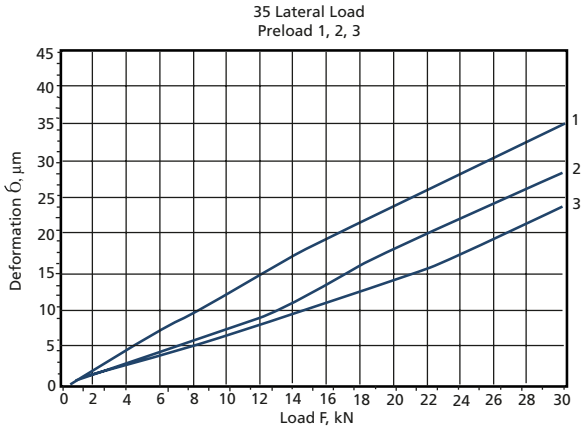
Tensile Load





Lateral Load





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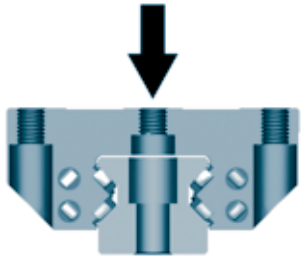
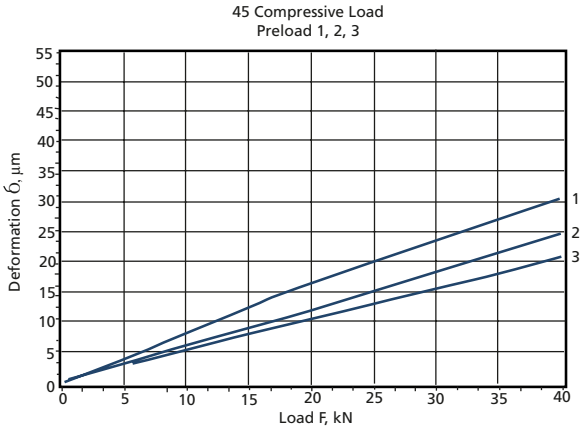
Deflection vs. Applied Load

1. Preload 3% of C
2. Preload 8% of C
3. Preload 13% of C
C = Dynamic load carrying capacity

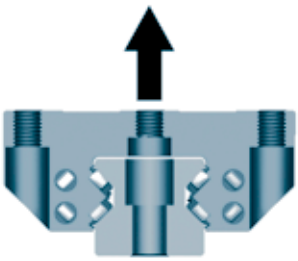
512 Style A and C
Size 45

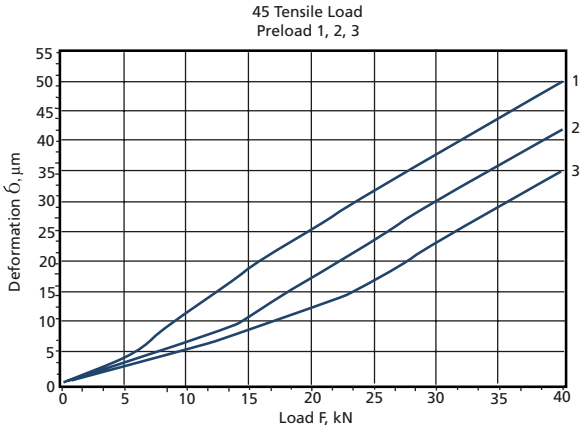
Compressive Load



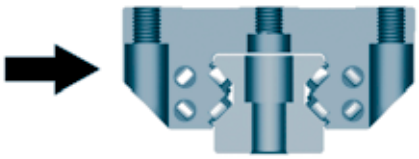


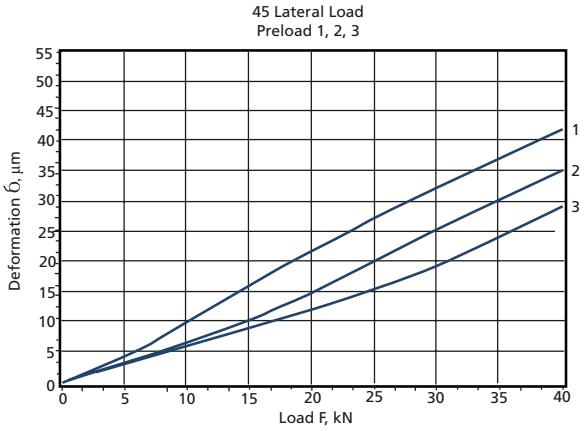
Tensile Load





Lateral Load





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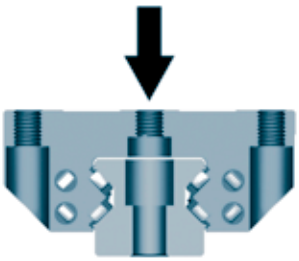
Deflection vs. Applied Load

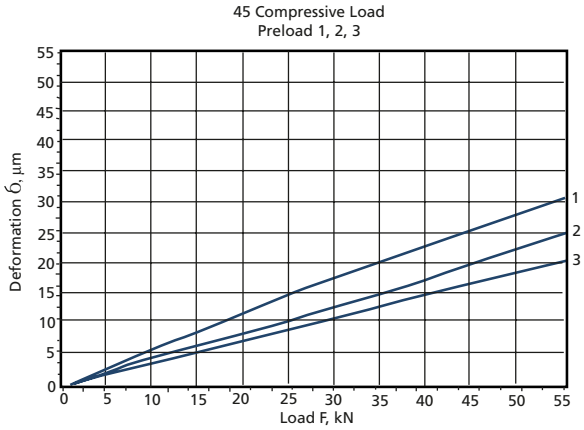
1. Preload 3% of C
2. Preload 8% of C
3. Preload 13% of C

C = Dynamic load carrying capacity

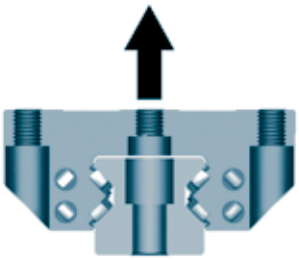
512 Style B and D
Size 45

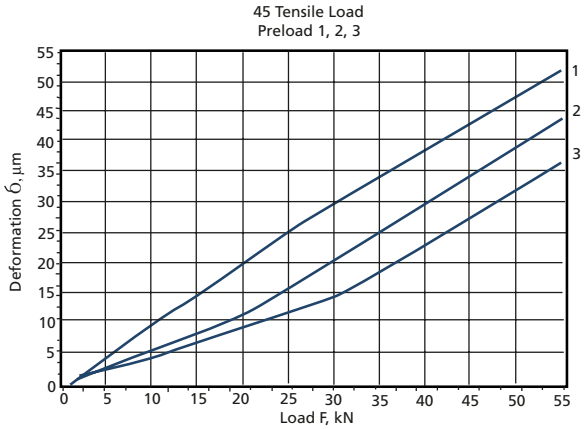
Compressive Load



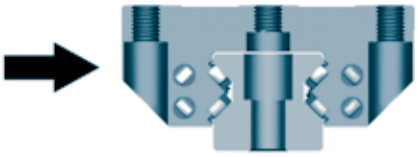


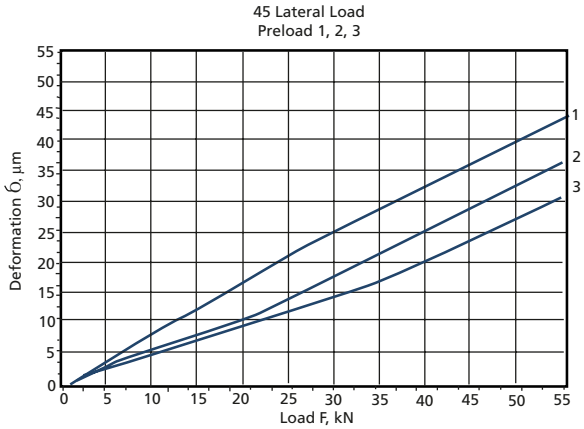
Tensile Load





Lateral Load





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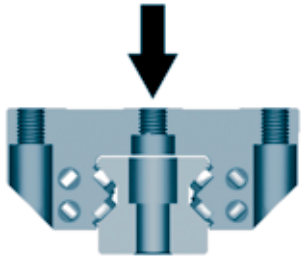
Deflection vs. Applied Load

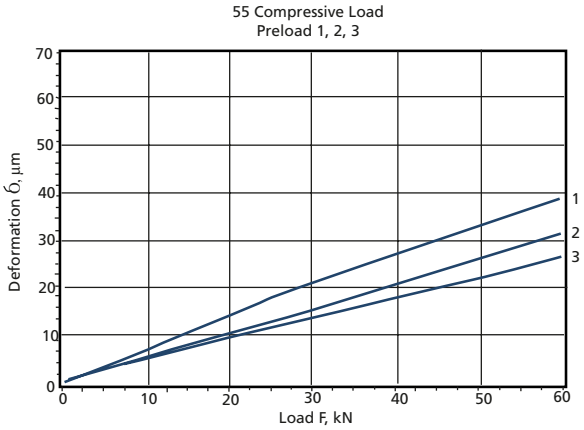
1. Preload 3% of C
2. Preload 8% of C
3. Preload 13% of C

C = Dynamic load carrying capacity

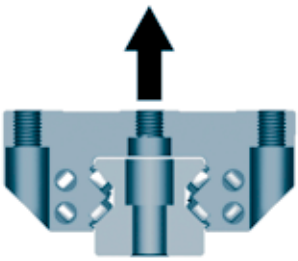
512 Style A and C
Size 55

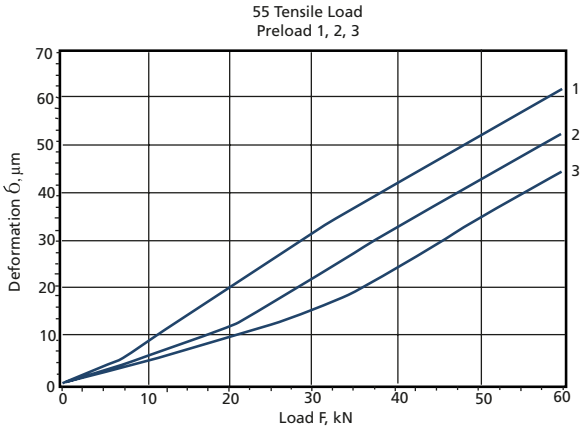
Compressive Load



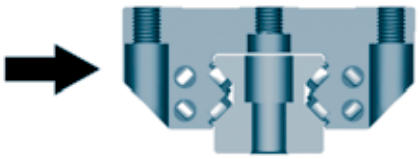


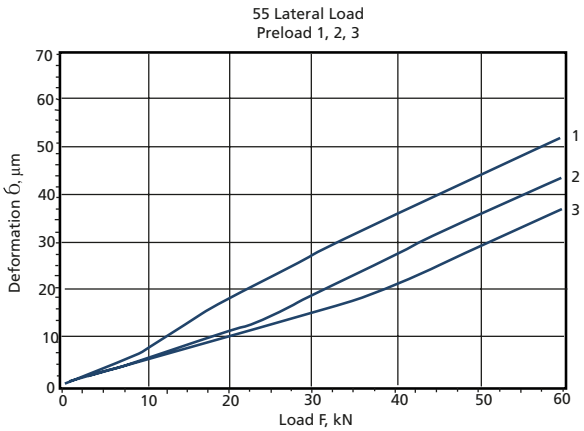
Tensile Load





Lateral Load





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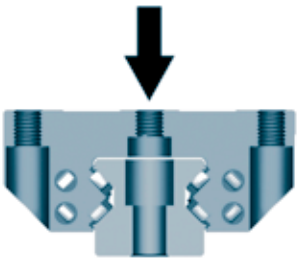
Deflection vs. Applied Load

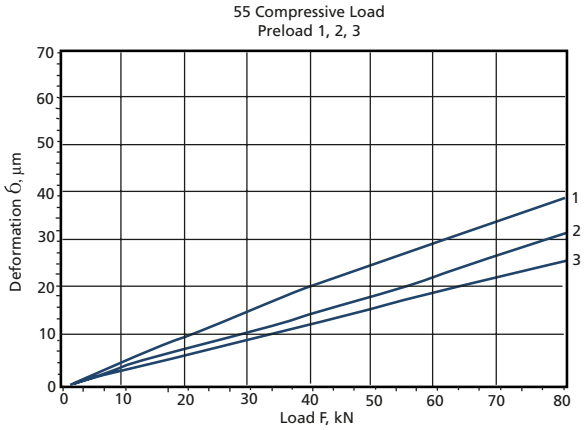
1. Preload 3% of C
2. Preload 8% of C
3. Preload 13% of C

C = Dynamic load carrying capacity

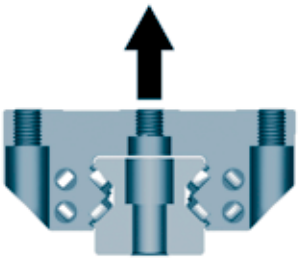
512 Style B and D
Size 55

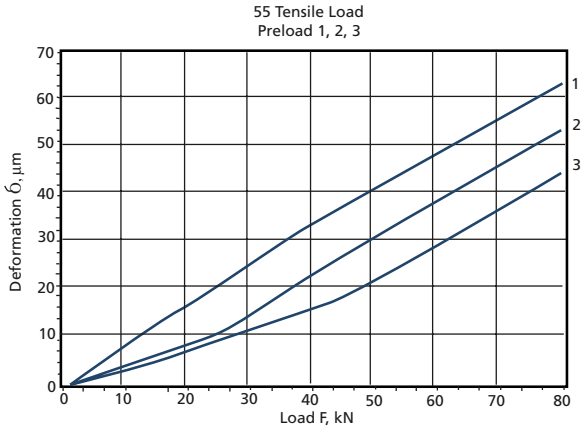
Compressive Load



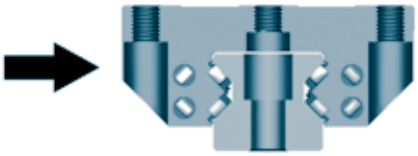


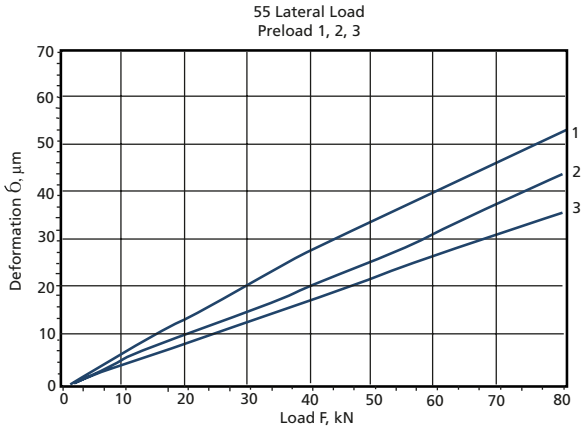
Tensile Load





Lateral Load





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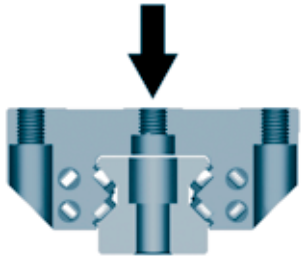
Deflection vs. Applied Load

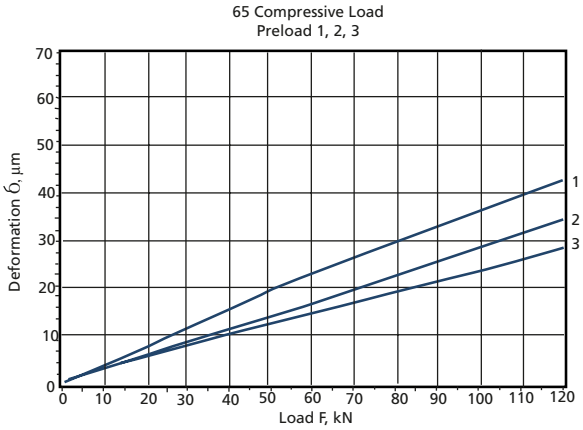
1. Preload 3% of C
2. Preload 8% of C
3. Preload 13% of C

C = Dynamic load carrying capacity

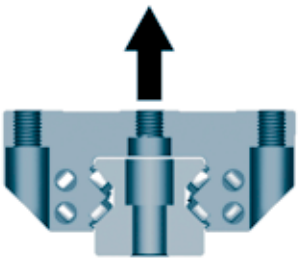
512 Style B and D
Size 65

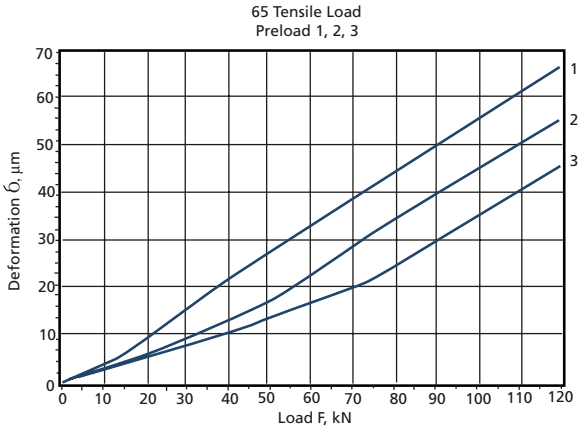
Compressive Load



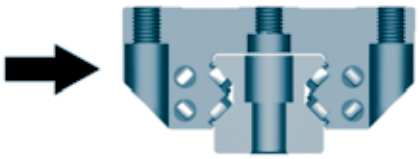


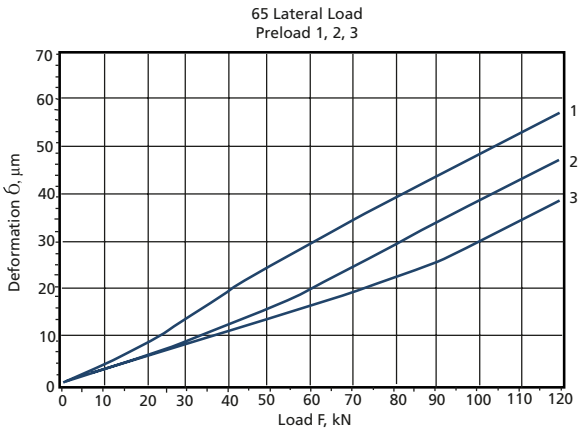
Tensile Load





Lateral Load





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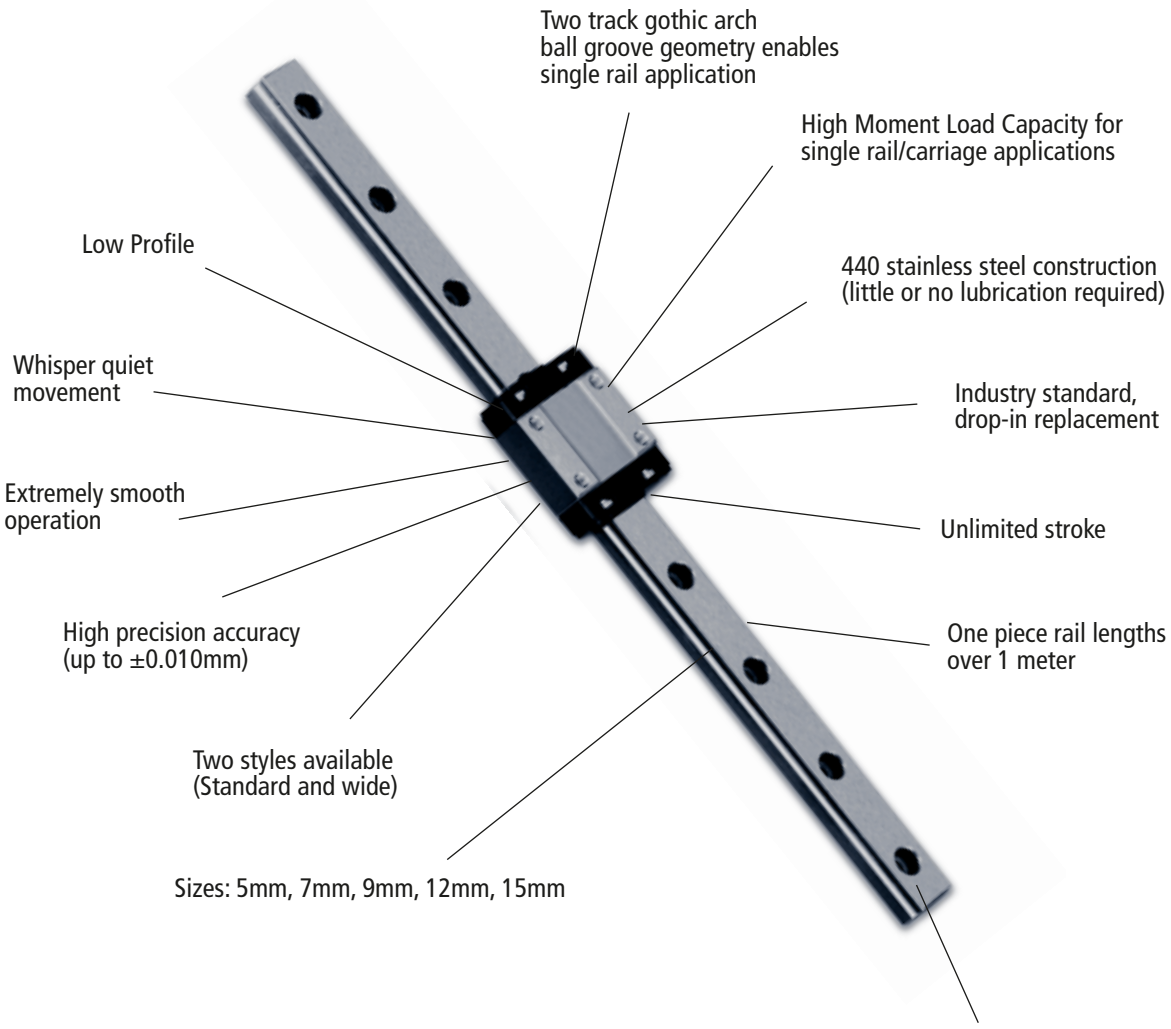

MicroGuide Part Numbering

2 TSR 12 WZ M UU C1 +350 P

- **Number of Carriages**: 2
- **Types TSR**: TSR
- **Rail and Carriage Size**: 12
- **Style**: Z Standard; WZ Wide
- **Material**: M Stainless Steel (standard)
- **Seal Configuration**: UU Lip Seal Standard
- **Preload**: Clearance Fit; C1 Light Preload
- **Length**: +350
- **Accuracy**: Normal; H High; P Precision

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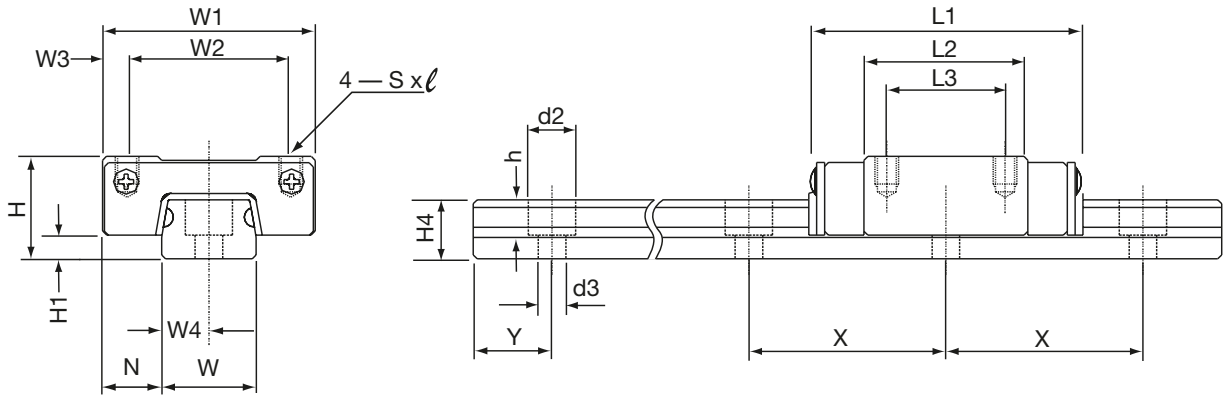
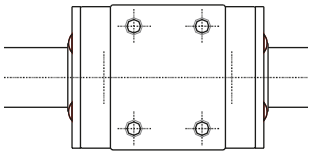
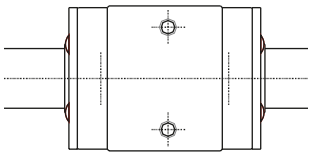
TSR -Z Standard



TSR 7, 9, 12, 15Z



TSR 5 Z



Standard Lengths of Rail

Sizes	5	7	9	12	15
Standard Lengths	40 55 70 100 130 160	40 55 70 85 100 130 1000	55 75 95 115 135 155 175 195 275 1015	70 95 120 145 170 195 220 245 270 320 370 470 1020	150 230 310 430 550 670 1030
X	15	15	20	25	40
Y	5	5	7.5	10	15

Longer lengths may be supplied with butt-joints on sizes 7 through 15.

MicroGuide™ TSR -Z (Standard)

size	Assembly Dimensions			Carriage Dimensions							Rail Dimensions							
	H	H1	N	W1	W2	W3	L1	L2	L3	Sx ℓ	W	W4	H4	d2	d3	h	Y	X
5	6	1.5	3.5	12	8	2	17	12.8	-	M2X1.5[1]	5	2.5	4	3.5	2.4	1	5	15
7	8	1.5	5	17	12	2.5	23.5	13.5	8	M2X2.5	7	3.5	4.7	4.2	2.4	2.3	5	15
9	10	2.2	5.5	20	15	2.5	31	20.0	10	M3X3	9	4.5	5.5	6	3.5	3.3	7.5	20
12	13	3	7.5	27	20	3.5	35	20.8	15	M3X3.5	12	6	7.5	6	3.5	4.5	10	25
15	16	4	8.5	32	25	3.5	43	25.7	20	M4X6	15	7.5	9.5	6	3.5	4.5	15	40

(1) For 5mm size, there are only 2 mounting holes per carriage.

Note: All Dimensions in mm except where noted otherwise. Longer lengths are available with butt joints on sizes 7-15. Sizes in between standards are available, Y dimensions will be the same unless specified at time of ordering

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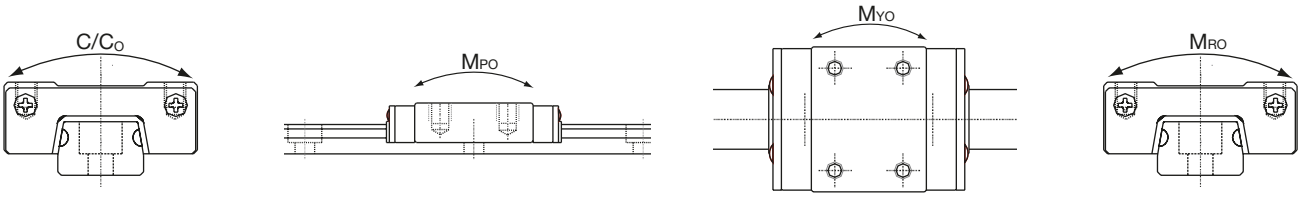
Dynamic Load and Moment Ratings
C= Dynamic load rating

Static Load and Moment Capacities
C = Static load capacity
M_{PO} = Static pitch moment capacity
M_{YO} = Static yaw moment capacity
M_{RO} = Static roll moment capacity



	Load Capacity (N)		Moments (Nm)			Mass	
Size	Dynamic C[1]	Limit Co[2]	M_{PO}	M_{YO}	M_{RO}	Carriage [kg]	Rail [kg/m]
5	336	620	0.8	0.8	1.47	0.01	0.14
7	924	1440	2.55	2.55	5.10	0.02	0.23
9	1544	2360	5.10	5.10	10.4	0.02	0.32
12	2780	4220	8.04	8.72	14.7	0.04	0.58
15	4410	6570	16.5	17.9	30.2	0.07	0.93

Notes:

1. The dynamic load and moment ratings are based upon 50 km travel life.
2. The static load and moment capacities are the maximum radial load and moment load that should be applied to the bearing while there is no relative motion between the carriage and rail.
3. The load limit is the maximum load that may be applied to a system. It is important to analyze the application so that peak and/or shock loads do not exceed the load limit.

Load/LifeCalculations

To determine proper carriage size:

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

To determine travel life:

$$L = \left(\frac{C}{F}\right)^3 \bullet 100$$

L = normal travel life (km)
C = rated dynamic load capacity of carriage (N)
F = equivalent load on carriage (N)

Operating Parameters
Maximum Velocity: 3 m/s
Maximum Acceleration: 50 m/s^2

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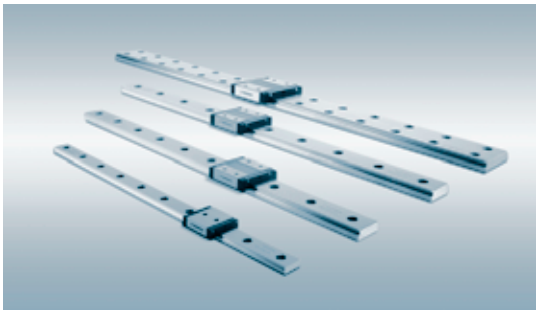
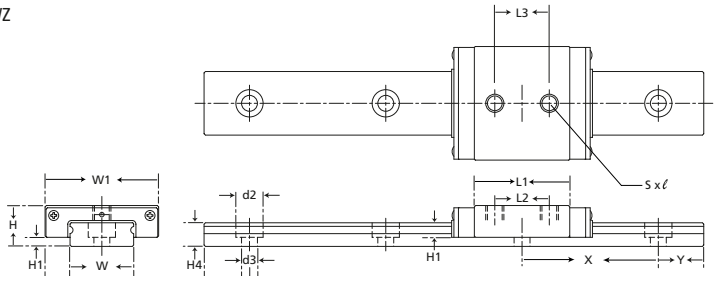
MicroGuide™

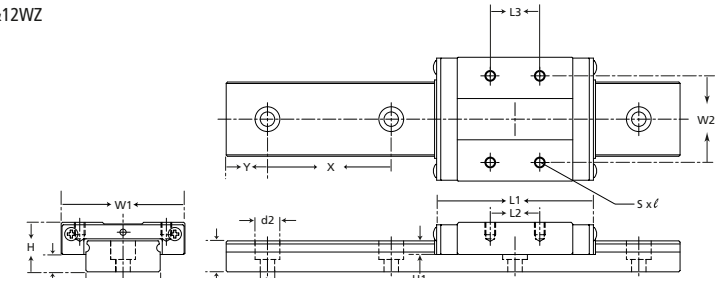
TSR - WZ (Wide)



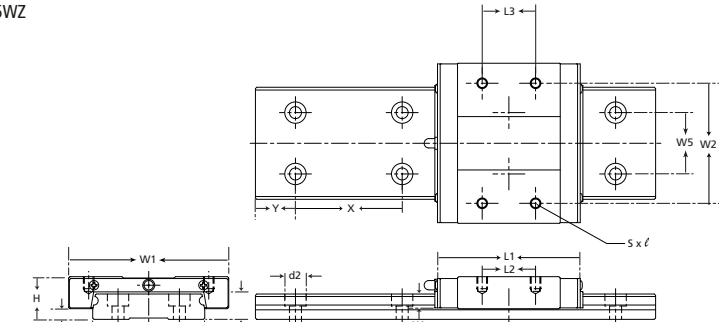
TSR7WZ



TSR9&12WZ



TSR15WZ



Standard Lengths of Rail

Sizes	7	9	12	15
Standard Lengths	50 85 170 100 130 260 350 440 530 620 800 1010	50 110 260 350 440 530 620 800 1010	70 150 310 390 470 630 790 950 1030	110 190 270 430 590 750 910 1030
X	30	30	40	40
Y	10	10	15	15

MicroGuide™ TSR - WZ (Wide)

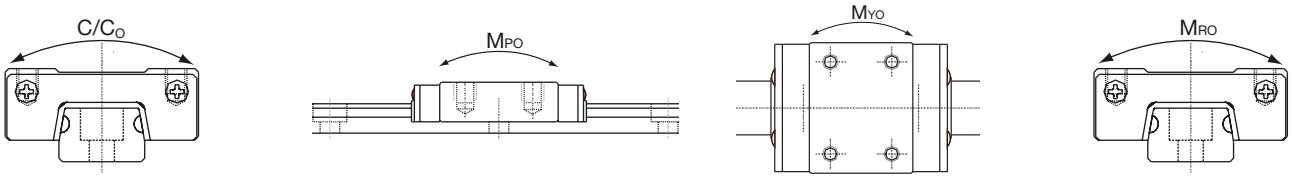
Size	Assembly Dimensions			Carriage Dimensions						Rail Dimensions							
	H	H1	N	W1	W2	L1	L2	L3	Sxℓ	W	W5	H4	d2	d3	h	Y	X
7	9	2	5.5	25	-	31	21.5	12	M4X3.5	14	-	5.2	6	3.5	3.2	10	30
9	12	4.2	6	30	21	39	28	12	M2.6X3	18	-	7.5	6	3.5	4.5	10	30
12	14	4	8	40	28	44.5	30.5	15	M3X3.5	24	-	8.5	8	4.5	4.5	15	40
15	16	4	9	60	45	55.5	38.5	20	M4X4.5	42	23	9.5	8	4.5	4.5	15	40

Note: All Dimensions in mm except where noted otherwise.. Longer lengths are available with butt joints.
Sizes in between standards are available, Y dimensions will be the same unless specified at time of ordering

For more information, or to place an order, please contact your local authorized Thomson distributor or Danaher Motion at 1-800-554-8466, Fax: 1-800-445-0329, or E-mail at profilerail@danahermotion.com.

Dynamic Load and Moment Ratings
C= Dynamic load rating

Static Load and Moment Capacities
C = Static load capacity
M_{PO} = Static pitch moment capacity
M_{YO} = Static yaw moment capacity
M_{RO} = Static roll moment capacity



	Load Capacity (N)		Moments (Nm)			Mass	
Size	Dynamic C[1]	Limit Co[2]	M_{PO}	M_{YO}	M_{RO}	Carriage [kg]	Rail [kg/m]
7	1370	2160	5.39	5.39	15.2	0.03	0.51
9	2450	3920	16.3	16.3	36.0	0.04	1.08
12	4020	6080	17.2	18.6	47.6	0.08	1.5
15	6660	9800	35.2	38.2	137	0.17	3.0

Notes:

1. The dynamic load and moment ratings are based upon 50 km travel life.
2. The static load and moment capacities are the maximum radial load and moment load that should be applied to the bearing while there is no relative motion between the carriage and rail.
3. The load limit is the maximum load that may be applied to a system. It is important to analyze the application so that peak and/or shock loads do not exceed the load limit.

Load/LifeCalculations

To determine proper carriage size:

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

C_{min} = minimum required dynamic load capacity of carriage (N)

F = equivalent load on carriage (N)

L = required travel life (km)

To determine travel life:

$L = \left(\frac{C}{F}\right)^3 \bullet 100$

L = normal travel life (km)

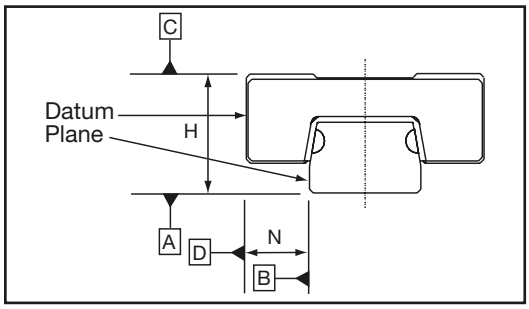
C = rated dynamic load capacity of carriage (N)

F = equivalent load on carriage (N)

Operating Parameters
Maximum Velocity: 3 m/s
Maximum Acceleration: 50 m/s^2

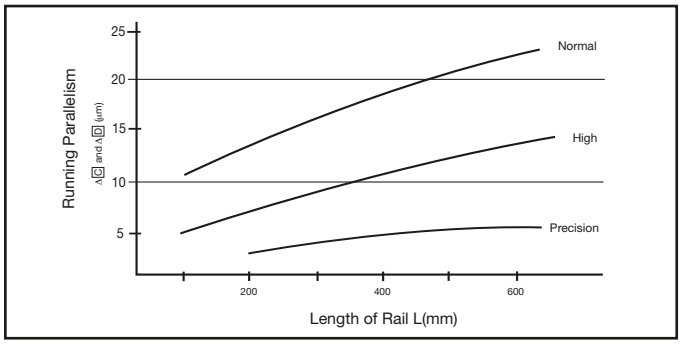
For more information, or to place an order, please contact your local authorized Thomson distributor or Danaher Motion at 1-800-554-8466, Fax: 1-800-445-0329, or E-mail at profilerail@danahermotion.com.

TSR-Z (Standard) Accuracy Tolerance



Accuracy of each part		TSR5 Z		TSR7 Z, TSR9 Z, TSR12 Z & TSR15 Z		
		Normal (blank)	Precision P	Normal (blank)	High H	Precision P
Height H	Dimensional Tolerance	±0.030	±0.015	±0.040	±0.020	±0.010
	Pair Tolerance	0.015	0.005	0.030	0.015	0.007
Width N	Dimensional Tolerance	±0.030	±0.015	±0.040	±0.025	±0.015
	Pair Tolerance	0.015	0.005	0.030	0.020	0.010

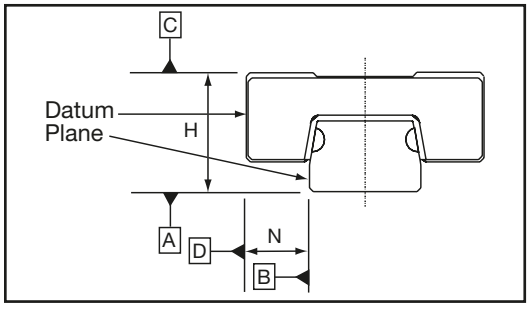
TSR-Z (Standard) Running Parallelism



TSR-Z (Standard) Fit Up

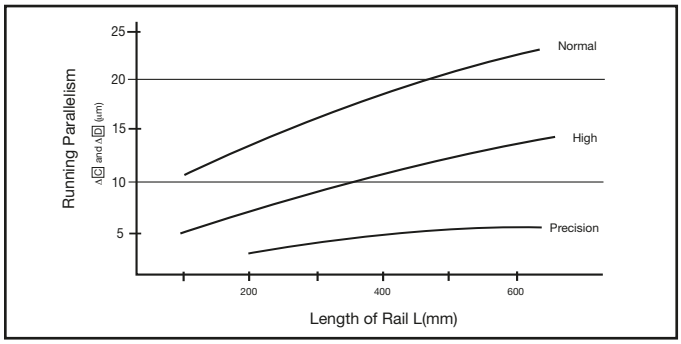
Series Type, Size, and Style	Radial Clearances (µm)	
	clearance fit (blank)	light preload C1
TSR5 Z	0~+1.5	-1.5~0
TSR7 Z	±2	-3~0
TSR9 Z	±2	-4~0
TSR12 Z	±3	-6~0
TSR15 Z	±5	-10~0

TSR-WZ (Wide) Accuracy Tolerance



Accuracy of each part		TSR WZ		
		Normal (blank)	High H	Precision P
Height H	Dimensional Tolerance	±0.040	±0.020	±0.010
	Pair Tolerance	0.030	0.015	0.007
Width N	Dimensional Tolerance	±0.040	±0.025	±0.015
	Pair Tolerance	0.030	0.020	0.010

TSR-WZ (Wide) Running Parallelism



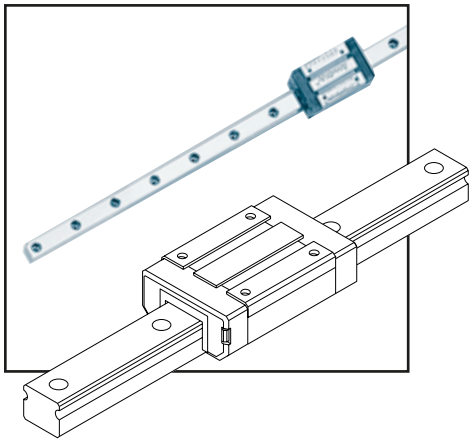
TSR-WZ Fit Up

Series Type, Size, and Style	Radial Clearances (µm)	
	clearance fit (blank)	light preload C1
TSR7 WZ	±2	-3~0
TSR9 WZ	±2	-4~0
TSR12 WZ	±3	-6~0
TSR15 WZ	±5	-10~0

For more information, or to place an order, please contact your local authorized Thomson distributor or Danaher Motion at 1-800-554-8466, Fax: 1-800-445-0329, or E-mail at profilerail@danahermotion.com.

AccuGlide Mini Linear Ball Guides

Ultra compact, high roll moment capacity



Thomson AccuGlide* Mini Linear Ball Guides offer:

- A ball control design for smooth, quiet, low friction at high speeds
- A full length integral wiper which protects important bearing from contaminants…effective system life is maximized
- A Gothic design, which provides high roll moment capacity... a requirement for stand-alone applications
- A resistant, engineered polymer retainer which reduces system inertia noise

Part Number Description and Specification

Miniature Carriage

Type	Description
CD	AccuGlide* Mini

CD 10 AA A H

- **Size:** 10, 15, 20
- **Carriage Suffix** (See Chart Below)

Style	Description
AA	Standard

Preload Designation	Description
A	Clearance
B	Approx. 0,03 C†

Accuracy Class: H = High, P = Precision

† Where C=Dynamic Load Capacity

Miniature Rail

Type	Description
RD	AccuGlide Miniature

RD 10 H LXXXX Y= (See Note 1 Below)

- **Size:** 10, 15, 20
- **Rail Suffix** (See Chart Below)
- **Accuracy Class**: H = High, P = Precision
- **Rail Length**: XXXX (mm)

Note 1 - Y= Distance from end of rail to center of 1st mounting hole

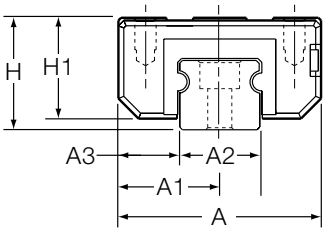
Product Options	Suffix	
	Carriage	Rail
Armoloy® Plating	-A	-A
Low Drag Seals (End Seals Only)	-LDS	-
Other Modifications (Dowel Holes, Special Lube Points, Special Lubricants, Other)	-MXXX (Contact Factory)	

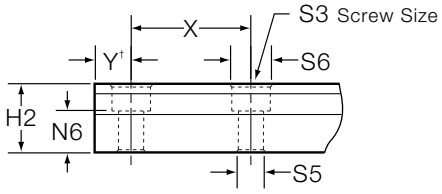
For more information, or to place an order, please contact your local authorized Thomson distributor or Danaher Motion at 1-800-554-8466, Fax: 1-800-445-0329, or E-mail at profilerail@danahermotion.com.

AccuGlide Mini

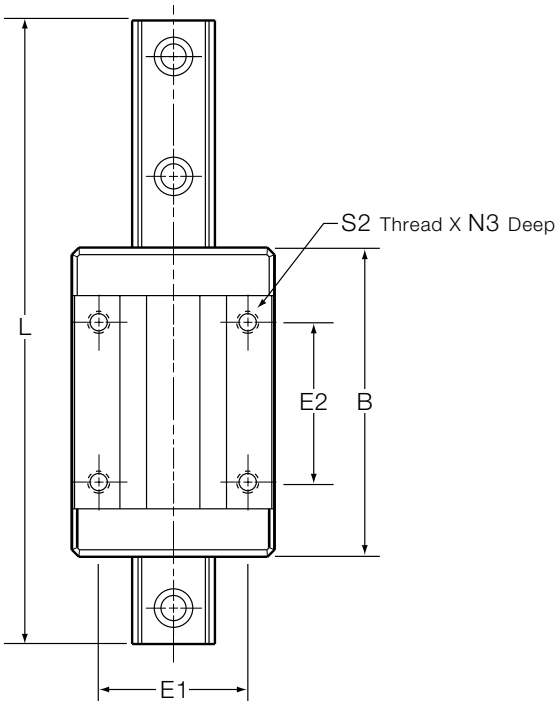
(Miniature Series)

Low Profile, Compact Design





† "Y" dimension will be equal on both ends unless specified by customer.



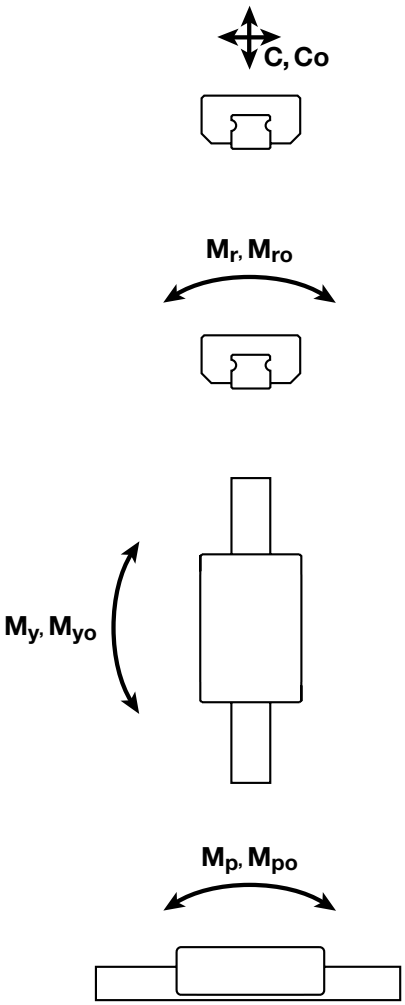
NOTE:

The AccuGlide linear guide Miniature Series carriages do not have retained balls. Removing the carriage from the rail without an arbor will result in the balls falling out.

AccuGlide* Linear Guide Miniature Series

(mm)														
Size	A	A1	A2	A3	H	H1	H2	B	E1	E2	S2	S3	S5	S6
10	26	13	10	8	15	13	9	40	17	20	M2,5	M2,5	3	5,5
15	38	19	15	11,5	21	19	13	58	28	30	M4	M4	4,5	8
20	50	25	20	15	28	25,6	18	76	37	40	M5	M5	5,5	9,5

For more information, or to place an order, please contact your local authorized Thomson distributor or Danaher Motion at 1-800-554-8466, Fax: 1-800-445-0329, or E-mail at profilerail@danahermotion.com.



Dynamic Load and Moment Ratings

C = Dynamic load rating

M_p = Dynamic pitch moment rating

M_r = Dynamic roll moment rating

M_y = Dynamic yaw moment rating

The dynamic load and moment ratings are based upon a 100 km travel life. In order to compare with bearings rated for 50 km, divide the dynamic capacity of the bearing rated for 50 km by 1.26.

Static Load and Moment Capacities

Co = Static load capacity

M_{po} = Static pitch moment capacity

M_{ro} = Static roll moment capacity

M_{yo} = Static yaw moment capacity

The static load and moment capacities are the maximum radial load and moment load that should be applied to the bearing while there is no relative motion between the carriage and rail.

Bearing Travel Life Calculation

$L = (C/F)^3 \times 100$ 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_{min} = minimum required dynamic load rating, N

F = applied dynamic load, N

L = required travel life, km

Operating Parameters

Maximum Velocity = 3 m/s

Maximum Acceleration = 50 m/s^2

Maximum Temperature = 80 °C

AccuGlide* Mini Series

(mm)					Load Rating	N (lbf)	Moment Rating	Nm (lbf-ft)			MASS Carriage	MASS Rail
Size	N3	N6	X	L_{max}‡	C(@100km)	C_o	M_p, M_y	M_{po}, M_{yo}	M_r	M_{ro}	kg	kg/m
10	4,5	5,5	25	1 500	2 820 (635)	5 300 1,190	10 (7)	20 (15)	15 (11)	28 (21)	0,045	0,65
15	6	7,5	40	1 500	6 375 (1,430)	15 200 (3,420)	35 (26)	66 (49)	51 (38)	96 (71)	0,141	1,42
20	8	9,5	60	3 000	11 870 (2,670)	23 000 (5,170)	75 (55)	140 (105)	125 (92)	235 (175)	0,345	2,55

‡ Maximum rail length in one section. Multiple sections can be butt jointed together for longer lengths.

For more information, or to place an order, please contact your local authorized Thomson distributor or Danaher Motion at 1-800-554-8466, Fax: 1-800-445-0329, or E-mail at profilerail@danahermotion.com.

Figure 1 - Dimensions H and A3

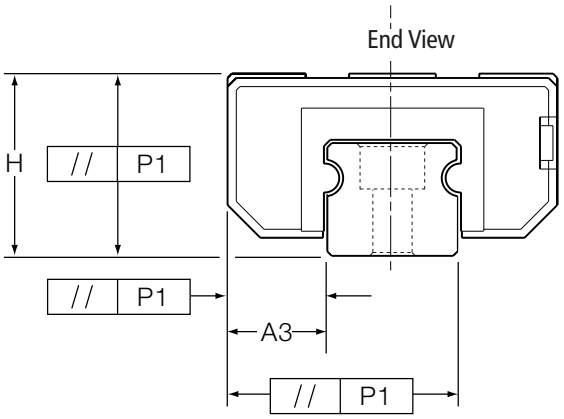


Figure 2 - Running Parallelism

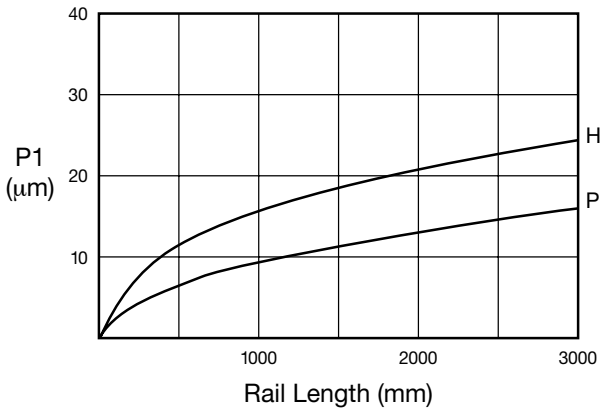


Table 1 - Tolerances (µm)

	Accuracy Classes	
	H High	**P** Precision
1. Dim. H and A3 (measured at middle of carriage at any point along rail)	±40	±20
2. Max variation in dimensions H and A3 measured on multiple carriages mounted on the same rail (measured at middle of carriage at same position on rail)	15	7
3. Parallelism (applies to the system)	See Figures 1 and 2	

Table 2 - Preload/Accuracy Combinations

Accuracy Class	Preload	
	Clearance up to 10 µm	Light approximately 0,03 C†
P	—	B
H	A	B

†Where C=Dynamic Load Rating

Table 3 - Calculations

To determine proper carriage size:

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

C_{min} = minimum required dynamic load capacity of carriage (N)

F = equivalent load on carriage (N)

L = required travel life (km)

To determine travel life:

$$L = \left(\frac{C}{F}\right)^{3} \bullet 100$$

L = normal travel life (km)

C = rated dynamic load capacity of carriage (N)

F = equivalent load on carriage (N)

Table 4 - Conversions

1	$\mathbf{lb_f}$	= 4,448 N
1	$\mathbf{kg_f}$	= 9,8 N
1	**km**	= 39,370 inches
1	**Nm**	= 0.7376 lb_f - ft

Operating Parameters

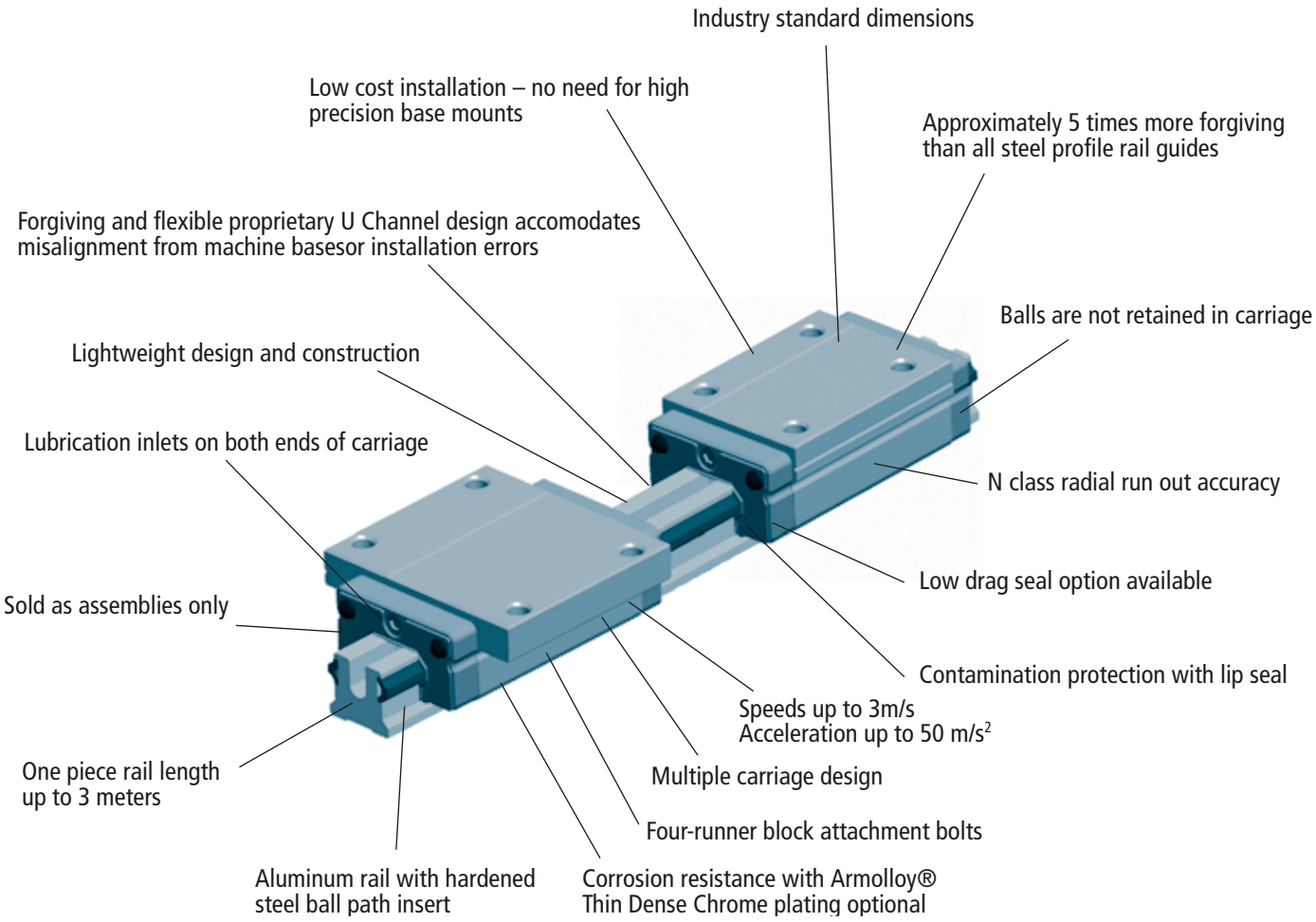
Maximum Velocity = 3 m/s

Maximum Acceleration = 50 m/s^2

Maximum Temperature = 80 °C

For more information, or to place an order, please contact your local authorized Thomson distributor or Danaher Motion at 1-800-554-8466, Fax: 1-800-445-0329, or E-mail at profilerail@danahermotion.com.

T-Series Ball Profile Rail



T-Series

AT 25 A LXXXX LDS Y=

Product Type
AT T-Series

Size

Length

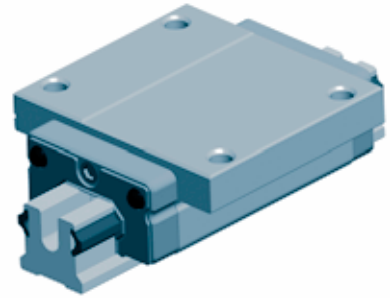
Y Dimension
The distance (from the rail end to the first hole) will be equal unless specified

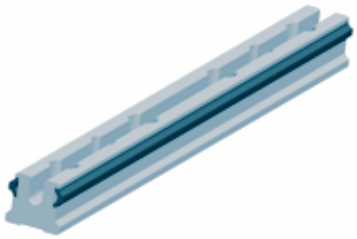
Carriage Style
- **A** Dimensionally Interchangeable with THK HSR A, B, CA & CB
- **E** Dimensionally Interchangeable with THK HSR R & TR
- **F** Dimensionally Interchangeable with THK SR W
- **G** Dimensionally Interchangeable with THK SR TB

Extended Standards
- A Armolloy
- LDS Low Drag Seal
- S... Special Option – sequential numbers

Note: 1. Sold as assemblies only
2. Carriages are dimensionally matched to rails during assembly

T-Series Ball Profile Rail





Features

The Thomson T-Series Ball Profile Rail is lightweight, highly flexible and forgiving — an ideal choice for poor misalignment. It has a low cost of installation and industry standard dimensions for easy replacement. It is a lightweight and forgiving alternative to all-steel profile rail.

Materials

The Thomson T-Series Ball Profile Rail carriage and rail is produced from high quality aircraft aluminum alloy. The carriage has hardened steel load bearing plates. The rail has a custom ball path insert made of hardened steel. Stringent quality controls are in place to ensure consistency of steel from the source, allowing us to ensure that we deliver the highest quality product.

Lightweight

The aluminum carriage and rail dramatically reduces the total weight of the assembly making Thomson T-Series an ideal choice for applications requiring reduced weight inertia such as airplanes, ships, automobiles, etc.

Accuracy

As a result of it's high flexibility to misalignment errors, the T-Series Ball Profile Rail is available in an N class radial run out only.

Forgiving to Misalignment

The Thomson T-Series propriety "U" channel construction allows the rail to "flex" to accommodate poor machine bases or misalignment errors.

Low Cost

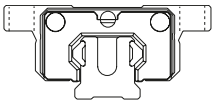
The Thomson T-Series can be mounted direct to non-machined bases without sacrificing total operational efficiency or the need for special tools or gauges to ensure proper rail and base straightness. By eliminating the costly machined base and special tools the installation time or machine build time can be cut in half, saving valuable time and money.

Drop-in Replacement

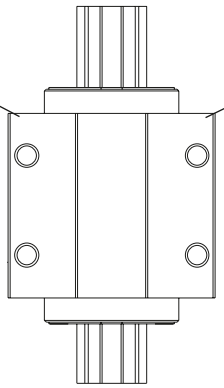
The Thomson T-Series is designed to industry standard dimensions and rail hole patterns. This means it can be used as a drop-in replacement for any conventional all steel profile linear guide in the market today.

For more information, or to place an order, please contact your local authorized Thomson distributor or Danaher Motion at 1-800-554-8466, Fax: 1-800-445-0329, or E-mail at profilerail@danahermotion.com.

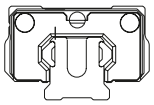
T-Series Carriage Styles



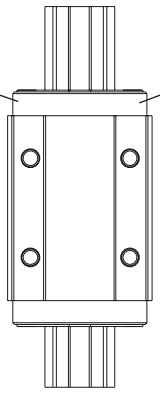
Standard Carriage
Style A
Sizes 20, 25, 35
Dimensionally interchangeable to THK HSR A, B, CA, CB and Thomson 511 A



Standard Short Hole Spacing
Style G
Sizes 20, 25, 35
Dimensionally interchangeable to THK SR TB



Narrow Carriage
Style E
Sizes 20, 25, 35
Dimensionally interchangeable to THK HSR R and TR and Thomson 511 E

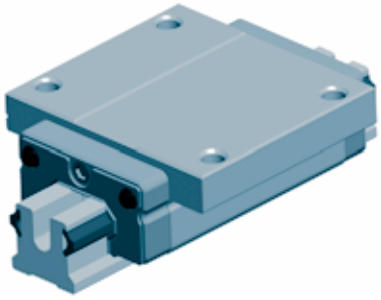


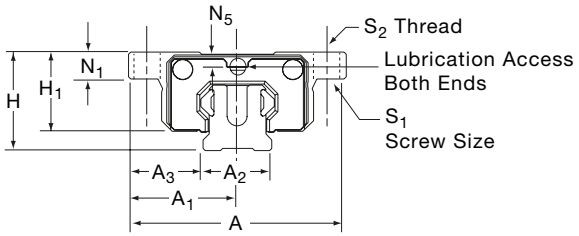
Narrow High
Style F
Sizes 20, 25, 35
Dimensionally interchangeable to THK SR W

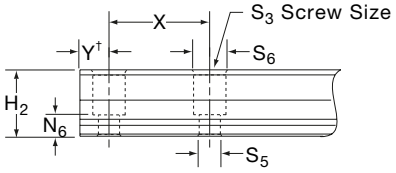
For more information, or to place an order, please contact your local authorized Thomson distributor or Danaher Motion at 1-800-554-8466, Fax: 1-800-445-0329, or E-mail at profilerail@danahermotion.com.

T-Series

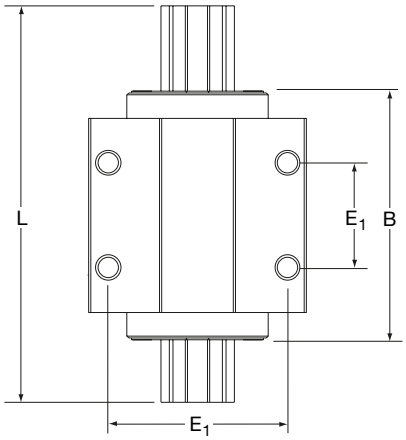
Style A and G



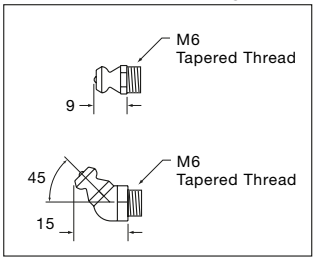




†- Will be equal on both ends, unless otherwise specified.



Supplied Lubrication Fittings



T-Series Profile Rail Standard High "A" Style

Size	A	A1	A2	A3	H	H1	H2	B	E1	E2	S1	S2	S3	S5	S6	N1	N5	N6	X	L_{max}
20	63	31.5	20	21.5	30	25	18	76	53	40	M5	M6	M5	5.8	9.5	10	6.25	7,5	60	3000
25	70	35	23	23.5	36	29.5	22	88	57	45	M6	M8	M6	7	10.7	12	8	10	60	3000
35	100	50	34	33	48	40	29	117	82	62	M8	M10	M8	9	14	15.26	6.6	11	80	3000

All dimensions in mm unless shown otherwise

T-Series Profile Rail Standard "G" Style

Size	A	A1	A2	A3	H	H1	H2	B	E1	E2	S1	S2	S3	S5	S6	N1	N5	N6	X	L_{max}
20	59	29.5	20	19.5	28	23	18	76	49	32	M5	M6	M5	5.8	9.5	8	4.25	7.5	60	3000
25	73	36.5	23	25	33	26.5	22	88	60	35	M6	M8	M6	7	10.7	9	5	10	60	3000
35	100	50	34	33	48	40	29	117	82	50	M8	M10	M8	9	14	15.26	6.6	11	80	3000

All dimensions in mm unless shown otherwise

For more information, or to place an order, please contact your local authorized Thomson distributor or Danaher Motion at 1-800-554-8466, Fax: 1-800-445-0329, or E-mail at profilerail@danahermotion.com.

T-Series
Style A and G

Dynamic Load Rating

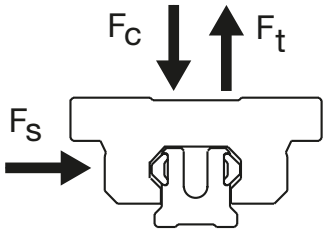
C = Dynamic load rating

The dynamic load rating is based upon a 100 km travel life. In order to compare with bearings rated for 50 km, divide the dynamic rating of the bearing rated for 50 km by 1.26.

Static Load Capacity

C_o = Static load capacity

The static load capacity is the maximum radial load that should be applied to the bearing while there is no relative motion between the carriage and rail.



Size	Style	Load Ratings N (lbf) C (@100km)	C_o	MASS Carriage kg	Rail kg/m
20	A G	9000 (2025)	11000 (2475)	0.22	0.79
25	A G	13000 (2925)	15000 (3375)	0.30	1.06
35	A G	25000 (5620)	28000 (6295)	0.74	2.27

	Dynamic Load Rating	Load Limit
F_c	C	C
F_t	C	0.6C
F_s	C	0.6C

Bearing Travel Life Calculation

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

where:

L = travel life, km

C = dynamic load rating, N

F = applied dynamic load, N

Operating Parameters

Maximum Velocity = 3 m/s

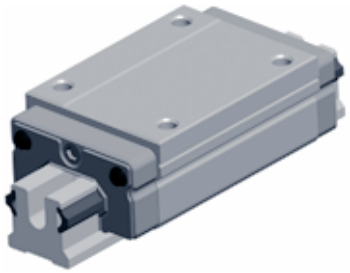
Maximum Acceleration = 50 m/s^2

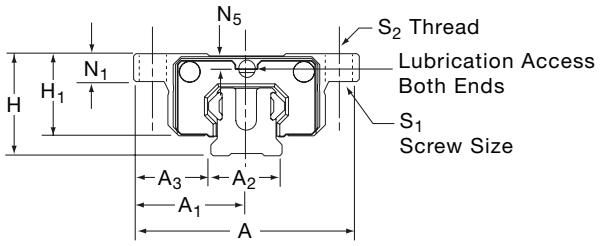
Maximum Temperature = 80°C

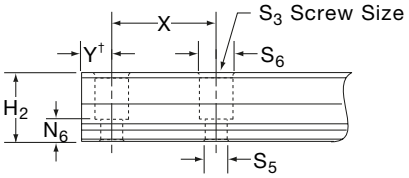
For more information, or to place an order, please contact your local authorized Thomson distributor or Danaher Motion at 1-800-554-8466, Fax: 1-800-445-0329, or E-mail at profilerail@danahermotion.com.

T-Series

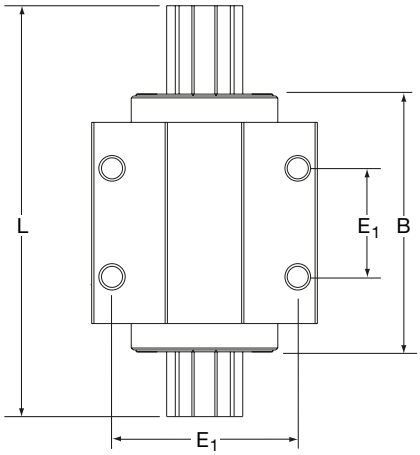
Style E and F



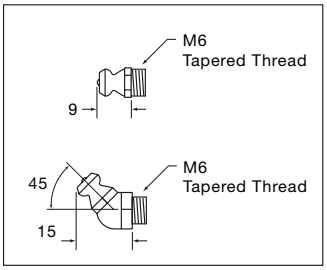




†- Will be equal on both ends, unless otherwise specified.



Supplied Lubrication Fittings



T-Series Profile Rail Narrow "E" Style

Size	A	A1	A2	A3	A4	H	H1	H2	B	E1	E2	S2	S3	S5	S6	N3	N5	N6	X	L_{max}
20	44	22	20	12	41.5	30	25	18	76	32	36	M5	M5	5.8	9.5	6	6.25	7.5	60	3000
25	48	24	23	12.5	50.9	40	33.5	22	88	35	35	M6	M6	7	10.7	8	12	10	60	3000
35	70	35	34	18	68.0	55	47	29	117	50	50	M8	M8	9	14	12	13.6	11	80	3000

All dimensions in mm unless shown otherwise

T-Series Profile Rail Narrow High "F" Style

Size	A	A1	A2	A3	A4	H	H1	H2	B	E1	E2	S2	S3	S5	S6	N3	N5	N6	X	L_{max}
20	42	21	20	11	41.5	28	23	18	76	32	32	M5	M5	5.8	9.5	6	4.25	7.5	60	3000
25	48	24	23	12.5	51.0	33	26.5	22	88	35	35	M6	M6	7	10.7	8	5	10	60	3000
35	70	35	34	18	68.0	48	40	29	117	50	50	M8	M8	9	14	12	6.6	11	80	3000

All dimensions in mm unless shown otherwise

For more information, or to place an order, please contact your local authorized Thomson distributor or Danaher Motion at 1-800-554-8466, Fax: 1-800-445-0329, or E-mail at profilerail@danahermotion.com.

T-Series
Style E and F

Dynamic Load Rating

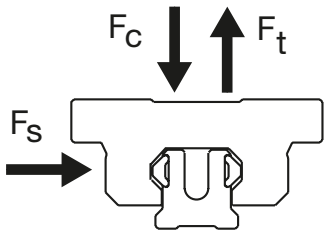
C = Dynamic load rating

The dynamic load rating is based upon a 100 km travel life. In order to compare with bearings rated for 50 km, divide the dynamic rating of the bearing rated for 50 km by 1.26.

Static Load Capacity

C_o = Static load capacity

The static load capacity is the maximum radial load that should be applied to the bearing while there is no relative motion between the carriage and rail.



Size	Style	Load Ratings N (lbf) C (@100km)	C_o	MASS Carriage kg	Rail kg/m
20	A G	9000 (2025)	11000 (2475)	0.22	0.79
25	A G	13000 (2925)	15000 (3375)	0.30	1.06
35	A G	25000 (5620)	28000 (6295)	0.74	2.27

	Dynamic Load Rating	Load Limit
F_c	C	C
F_t	C	0.6C
F_s	C	0.6C

Bearing Travel Life Calculation

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

where:

L = travel life, km

C = dynamic load rating, N

F = applied dynamic load, N

Operating Parameters

Maximum Velocity = 3 m/s

Maximum Acceleration = 50 m/s^2

Maximum Temperature = 80°C

For more information, or to place an order, please contact your local authorized Thomson distributor or Danaher Motion at 1-800-554-8466, Fax: 1-800-445-0329, or E-mail at profilerail@danahermotion.com.

NOTES:

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Installation Guidelines for 500 Series Ball and Roller, AccuGlide Mini, and T-Series

Surface Preparation

ProfileRail* bearings are generally mounted to structures that are inherently stiffer than the rail. For this reason, the bearings tend to assume the orientation of the surfaces to which they are fastened, through bearing deflection. When a deflection is imposed upon a bearing, especially a preloaded one, resultant forces occur. These forces are transferred to the rolling elements and races, potentially resulting in an increase in system friction and a decrease in system resolution, precision and life.

Figure 1

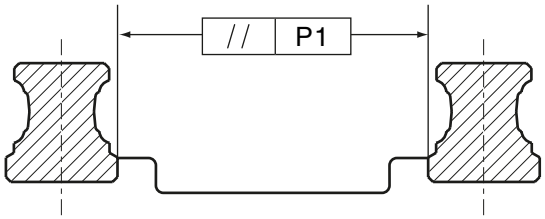


Table 1. Parallelism Between Multiple Rails, mm

Preload				
Bearing Type	**Clearance**	**0,03 C†**	**0,08 C†**	**0,13 C†**
500 Series Ball				
15	.015	.010	.007	.003
20	.017	.012	.008	.004
25	.024	.016	.010	.005
30	.024	.016	.010	.005
35	.032	.021	.014	.008
45	.036	.024	.016	.009
500 Series Roller linear guide				
25	–	.016	.010	.005
35	–	.021	.014	.008
45	–	.024	.016	.009
55	–	.026	.017	.01
65	–	.028	.018	.011
AccuGlide Mini linear guide				
10	.009	.004	–	–
15	.011	.006	–	–
20	.013	.008	–	–
T-Series* linear guide				
15	.045	–	–	–
20	.045	–	–	–
25	.050	–	–	–
30	.055	–	–	–
35	.060	–	–	–

† Where C=Dynamic Load Capacity

Various sources can contribute to the overall error of the mounting surfaces. These include the surface flatness of the base surfaces, the location and parallelism of the reference surfaces, and the attendant errors of the bearing as described within the accuracy classes.

The surfaces that contact the base and reference edges may be milled, scraped, ground, or prepared by any other method that will produce a flat mounting surface free of inconsistencies, which would tend to distort or skew the bearing. A simple stone may be used to remove high spots. Dirt and debris should be cleaned off, as they could contribute to the inaccuracies.

Associated with preload is a slight potential concavity of the carriage top surface. The preload is established when all the carriage screws are affixed to a planar surface, flattening the carriage base. Deviations affecting the planarity of the carriage mounting surface could result in a preload change.

Mounting Tolerances

The tolerances found in Tables 1-3 are intended to provide an installation for which the associated derating is negligible. These specifications are based upon the assumption that the structures of the application are infinitely rigid and are consideration for the bearing reactions only.

Rail Parallelism (See Figure 1)

A variation in the distance between the rails will induce a shear or side load on the bearings.

In order to minimize the effect of this shear load, tolerances for rail reference edge parallelism may be found in Table 1.

For more information, or to place an order, please contact your local authorized Thomson distributor or Danaher Motion at 1-800-554-8466, Fax: 1-800-445-0329, or E-mail at profilerail@danahermotion.com.

Figure 2

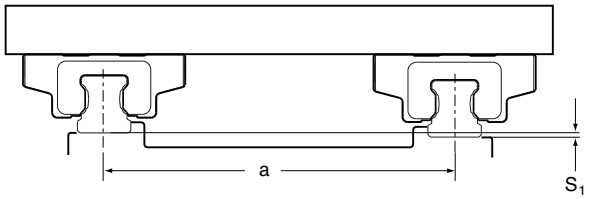


Table 2. Allowable Vertical Offsets Between Rails (S1/a)

	Preload			
Bearing Type	Clearance	0,03 C†	0,08 C†	0,13 C†
500 Series Ball	0,0006	0,0004	0,0003	0,0002
500 Series Roller	–	0,0007	0,0005	0,0004
AccuGlide Mini Linear Guide	0,0006	0,0004	–	–
T-Series* Linear Guide	.0020	-	–	–

†Where C=Dynamic Load Capacity

Figure 3

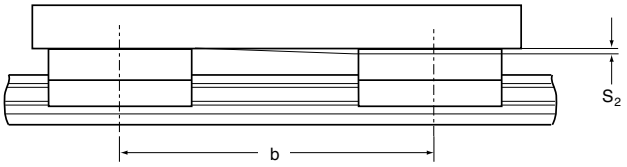


Figure 4

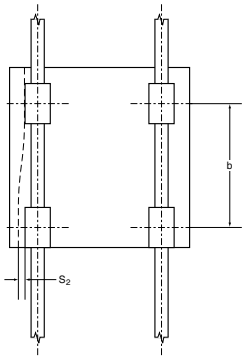


Figure 5. Shoulder Heights and Corner Radii

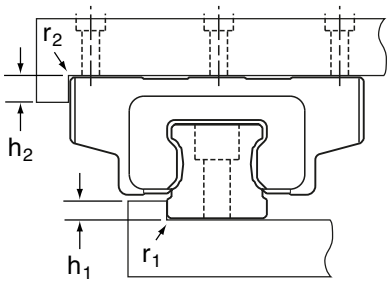


Table 3. Allowable Carriage Offsets (S2/b)

Preload			
Clearance	0,03 C†	0,08 C†	0,13 C†
0,00006	0,00005	0,00004	0,00003

†Where C=Dynamic Load Capacity

T-Series* Linear Guide	0,00012

Rail Vertical Offset (See Figure 2)

A vertical offset of the rails across the axis will induce a roll moment onto the carriages.

To minimize the effect of this roll moment, tolerances for the vertical offset may be found in Table 2. This tolerance describes the attributes of the mounting surface, perpendicular to the rail axis.

Vertical Carriage Offset (See Figure 3)

A vertical offset between fore and aft carriages will induce a pitch moment on the bearings.

Lateral Carriage Offset (See Figure 4)

A lateral offset of the carriage reference edges will induce a yaw moment.

In order to minimize the effects of these pitch and yaw moments, tolerances may be found in Table 3. This tolerance describes the attributes of the mounting surface parallel to the rail axis, and the reference edge straightness.

NOTE: All mounting tolerances should be inclusive of the H and A3 tolerances. Thus, a lower accuracy class bearing may require a more accurate installation.

Mounting Hole Tolerances

The positional tolerance between the through holes in the rails is 0.5 mm.

The positional tolerance of the first rail mounting hole dimensioned from the datum end (called the "Y-dimension") is ±1.0 mm.

The overall rail length tolerance is ±2.0 mm.

The positional tolerance between the mounting holes in the carriages is 0.2 mm.

Reference Edge Specifications

The maximum shoulder heights and corner radii are listed in Table 4.

For more information, or to place an order, please contact your local authorized Thomson distributor or Danaher Motion at 1-800-554-8466, Fax: 1-800-445-0329, or E-mail at profilerail@danahermotion.com.

Table 4. Shoulder heights and corner radii, mm

Guide Type	Rail		Carriage	
	h1 max	r1 max	h2	r2 max
500 Series Ball linear guide				
15	3.5	.8	3.5	.6
20	4	.9	4	.9
25	5	1.1	5	1.1
30	5.5	1.3	5.5	1.3
35	6	1.3	6	1.3
45	8	1.3	8	1.3
500 Series Roller linear guide				
25	5	.8	5	.8
35	6	.8	6	.8
45	8	.8	8	.8
55	10	1.2	10	1.2
65	10	1.5	10	1.5
AccuGlide Miniature linear guide				
10	1.75	0.4	3.5	0.4
15	1.75	0.4	5	0.4
20	2	0.5	7	0.5
AccuGlide T-Series* linear guide				
15	3	.3	8	.2
20	3.9	0.4	10	0.3
25	5.5	0.5	12	0.4
30	5.9	0.7	14	0.5
35	5.9	0.8	15	0.6

Recommended Bolt Tightening Torque, Nm

Table 5

Bolt Size	Class 8.8	Class 12.9
M2.5	0,7	1,2
M4	2,8	4,6
M5	5,7	9,5
M6	9,5	16
M8	23	39
M10	46	77
M12	80	135
M14	129	215
M16	198	330

Installation Procedure

Clean and inspect all mating surfaces for burrs, nicks, dirt, etc. A simple stone can be used to remove minor imperfections in the mounting surfaces.

Note: T-Series is not as sensitive to imperfections of the mounting surface.

Rail Mounting

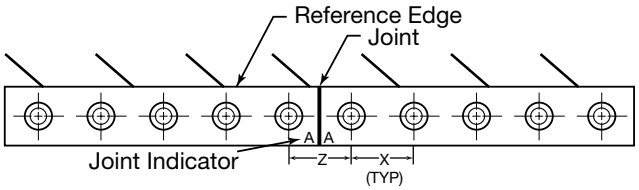
1. Carefully place the rail on the mounting surface.
2. Insert screws into the mounting holes and tighten lightly.
3. Clamp the reference edge of the rail against a locating edge on the mounting surface.

   The locating edge can be a machined reference edge, a straight edge, a row of dowels or keys, or some other edge which the rail can be clamped against. It should be straight, either within the mounting tolerances shown in Table 3 or according to the application requirements, whichever is tighter.
4. Starting from the center of the rail moving outwards, tighten each screw to the recommended tightening torque in Table 5.
5. If parallel rails are to be used, one of the following methods may be employed to obtain the parallelism recommended in Table 1.
   a. two parallel locating edges
   b. a gage block or parallel between the rails
   c. the use of the top plate with the carriages mounted, to locate or "float" the second rail into place.
6. Repeat steps 1– 4 to install the second rail.
7. Insert a rail plug into each counterbore in the rail. Carefully tap rail plugs into place using a soft material such as brass or wood. When properly installed, the rail plugs should be flush with the top surface of the rail. Do not countersink the rail plugs.

   Note: Rail plugs are available and are shipped with all rails except for the AccuGlide* Miniature Linear Guide size 10.
8. If desired, rail tape can then be applied to the top of the rail. For sizes 35 and below, the rail tape may be used without the rail plugs.

For more information, or to place an order, please contact your local authorized Thomson distributor or Danaher Motion at 1-800-554-8466, Fax: 1-800-445-0329, or E-mail at profilerail@danahermotion.com.

Figure 6. Butt jointed rails



Butt Joints

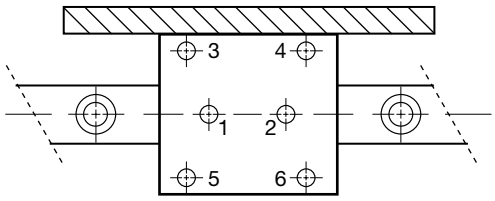
For rails longer than the longest length available in one piece, a butt joint is required. A butt joint is formed by butting the end of two matched rails together. The ends of rails to be butt jointed are specially machined and marked with same letter (A, B, C, etc.).

We strongly recommend the use of a locating edge when using butt jointed rails. This will ensure proper alignment of the raceways across the joint.

500 Series Ball and Roller linear guide rails, the mounting hole spacing across the joint, Z, will be equal to the standard mounting hole spacing, X.

Once mounted, a gap between the ends of the butt jointed rails of 0.5 mm or less is acceptable.

Figure 7. Recommended Tightening Sequence



Carriage Mounting

1. Carefully place the table top on the carriages.
2. Insert the screws into the mounting holes and tighten lightly.
3. Clamp the reference edge of the carriages to locating edges under the top plate.

   Note: This is only required if the location of the center of the top plate is critical to the application, or if the top plate is being used to position a second rail parallel.
4. Tighten each screw to the recommended tightening torque in Table 5. For carriages with six mounting screws, the tightening sequence shown in Figure 7 is recommended.
5. Lubricate bearings.

   Note: Extreme care should be taken when mounting the carriages to the rails. Forcing a carriage onto a rail can knock out rolling elements and/or damage the carriage and rail.

   For large side forces, hard mounting is recommended to resist any translation. Some methods for hard mounting are the use of tapered gibs, retaining plates, or set screws in combination with machined reference edges. Other methods include the use of an epoxy/replicating material, dowels, and keys. Upon request, carriages and rails can be special machined to accommodate dowels or keys. Consult the factory for details.

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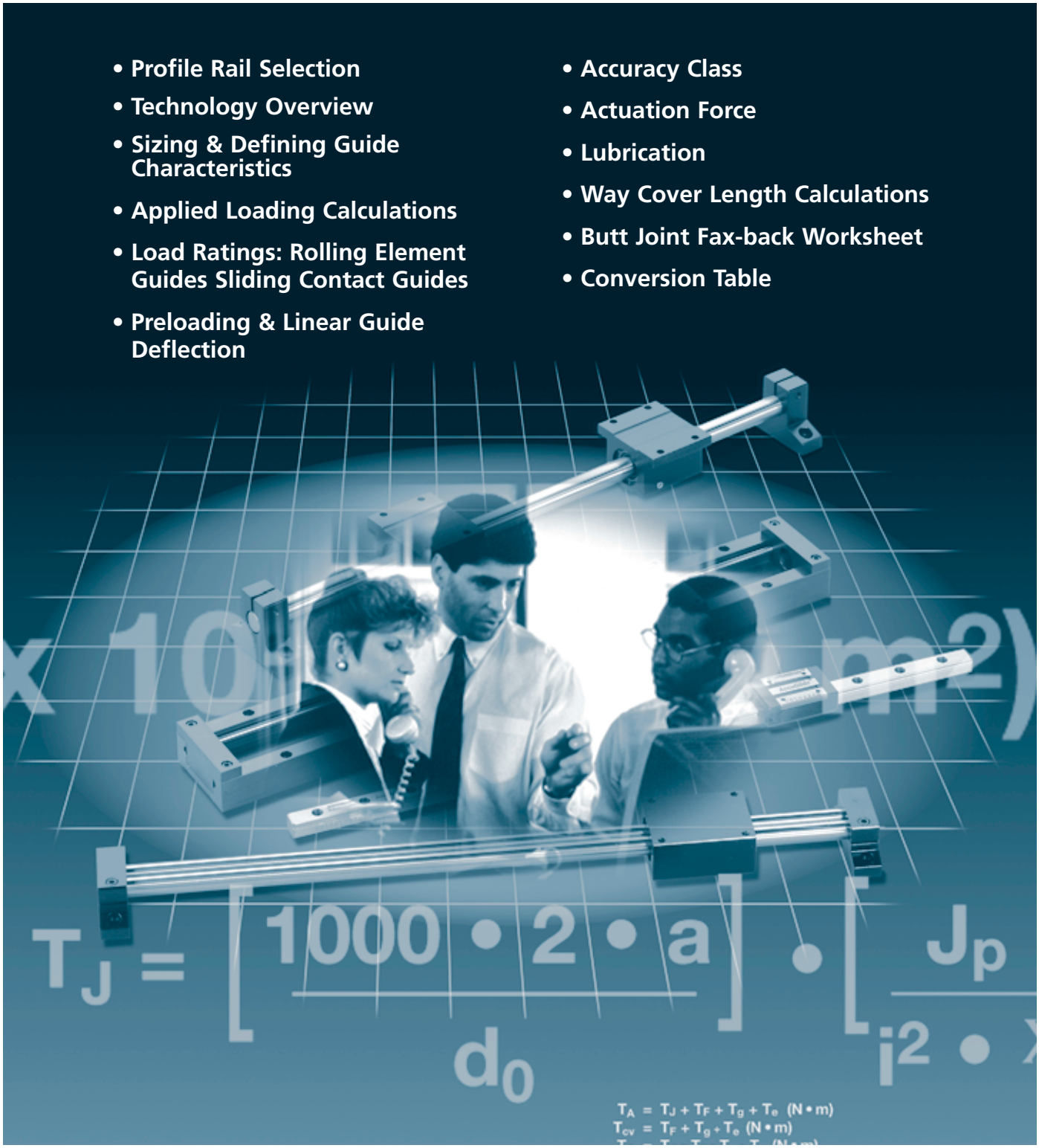
Profile Rail Engineering Section

- Profile Rail Selection
- Technology Overview
- Sizing & Defining Guide Characteristics
- Applied Loading Calculations
- Load Ratings: Rolling Element Guides Sliding Contact Guides
- Preloading & Linear Guide Deflection
- Accuracy Class
- Actuation Force
- Lubrication
- Way Cover Length Calculations
- Butt Joint Fax-back Worksheet
- Conversion Table



Guide

Profile Rail Selection

The selection of a linear guide can greatly affect machine performance and overall cost. In order to meet the wide variety of demands created by today's applications, proper selection from a broad range of linear guides is required.

For example, selecting a guide with too much rigidity will decrease the allowable installation tolerances, therefore, greatly increasing surface preparation costs. If the mounting surface is not prepared properly, the guide will run rough, and need to be replaced more frequently due to an unexpected reduction in travel life.

Consider all criteria appropriate for the application. Selection criteria include:

- Rigidity
- Travel accuracy
- Travel life
- Smoothness of travel
- Speed & Acceleration
- Envelope
- Environment
- Cost of Product
- Cost of Installation
- Cost of Replacement

Selection of the most appropriate type of guide, should be based on quantitative/ qualitative requirements and ranking by importance of the above selection criteria, as well as the following guidelines for the technology available.

Technology Overview

The performance of a linear guide is based upon contact type, rolling element type, inner race geometry (Round Rail and Profile Rail), and other characteristics such as self-aligning capabilities. It is important to recognize that the options available for each characteristic have performance attributes. The selection process should be focused on matching these attributes with the most critical requirements of the application. The following technology guidelines can be used to assist in selecting the most appropriate type of profile rail. For a detailed application analysis, contact the **Thomson Technical Helpline* at (800) 554-8466** or your local Danaher Motion Linear Motion Specialist.

For more information, or to place an order, please contact your local authorized Thomson distributor or Danaher Motion at 1-800-554-8466, Fax: 1-800-445-0329, or E-mail at profilerail@danahermotion.com.

Sizing & Defining Guide Characteristics

The previous sections along with the "Application Selector Guide" should help narrow down the selection to one or two types of linear guides. From here, it is necessary to formulate the appropriate part number so that other comparisons, such as "Cost of Product" can be made.

The following 9 step procedure can be used to select the characteristics necessary to generate the appropriate part number:

1. Determine the load on the most heavily loaded carriage or bearing (see Applied Loading Calculations). Multiply by a safety factor if desired in your application.
2. Determine the minimum required travel life for the application based on the intended duty cycle.
3. Calculate the **Minimum Required Dynamic Load Rating**, C_{min} (see Page E7).
4. Select the size which offers the load rating, C, equal to or greater than the minimum required dynamic load rating, C_{min}. Also, consider **Dynamic Load Limit** and **Static Capacities**.
5. If the guide selected offers various preload† levels, select a preload based upon the allowable bearing deflection. Contact the factory for detailed deflection information. Some carriage or bearing **Deflection Charts** are provided in this catalog.
6. If the guide selected offers various accuracy classes, select an accuracy class based upon the required travel accuracy.
7. Determine the need for accessories or options.
8. Calculate the guide length based upon the stroke and platten length. Remember to include additional length of accessories (i.e. self-lubricating option) and the stroke reduction caused by the use of bellows, if applicable.
9. Once the above characteristics have been determined, assign the appropriate part number based on the part numbering instructions located in the catalog section corresponding to the linear guide selected.

Note:

† Choosing a higher preload level will reduce the allowable installation tolerances. For this reason, the minimum preload which meets the applications requirements should be selected. If the highest preload level does not meet the deflection requirements, a larger size may be required.

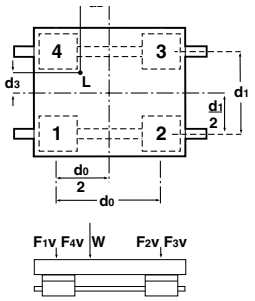
For more information, or to place an order, please contact your local authorized Thomson distributor or Danaher Motion at 1-800-554-8466, Fax: 1-800-445-0329, or E-mail at profilerail@danahermotion.com.

$$F_{1v} = \frac{W}{4} + \left(\frac{W}{2} \bullet \frac{d_2}{d_0}\right) - \left(\frac{W}{2} \bullet \frac{d_3}{d_1}\right)$$

$$F_{2v} = \frac{W}{4} - \left(\frac{W}{2} \bullet \frac{d_2}{d_0}\right) - \left(\frac{W}{2} \bullet \frac{d_3}{d_1}\right)$$

$$F_{3v} = \frac{W}{4} - \left(\frac{W}{2} \bullet \frac{d_2}{d_0}\right) + \left(\frac{W}{2} \bullet \frac{d_3}{d_1}\right)$$

$$F_{4v} = \frac{W}{4} + \left(\frac{W}{2} \bullet \frac{d_2}{d_0}\right) + \left(\frac{W}{2} \bullet \frac{d_3}{d_1}\right)$$



Horizontal Application I
At the time of movement with uniform velocity or at the time of stop.

$$F_{1v} = \frac{W}{4} + \left(\frac{W}{2} \bullet \frac{d_2}{d_0}\right) - \left(\frac{W}{2} \bullet \frac{d_3}{d_1}\right)$$

$$F_{2v} = \frac{W}{4} - \left(\frac{W}{2} \bullet \frac{d_2}{d_0}\right) - \left(\frac{W}{2} \bullet \frac{d_3}{d_1}\right)$$

$$F_{3v} = \frac{W}{4} - \left(\frac{W}{2} \bullet \frac{d_2}{d_0}\right) + \left(\frac{W}{2} \bullet \frac{d_3}{d_1}\right)$$

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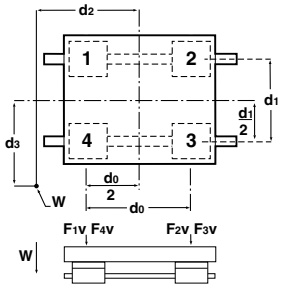


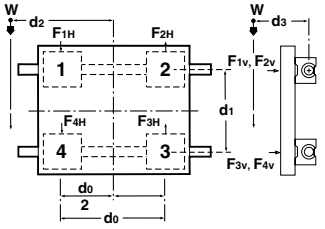
Horizontal Application II
At the time of movement with uniform velocity or at the time of stop.

$$F_{1v} = F_{2v} = -\left(\frac{W}{2} \bullet \frac{d_3}{d_1}\right)$$

$$F_{3v} = F_{4v} = +\left(\frac{W}{2} \bullet \frac{d_3}{d_1}\right)$$

$$F_{1H} = F_{4H} = \frac{W}{4} + \left(\frac{W}{2} \bullet \frac{d_2}{d_0}\right)$$

$$F_{2H} = F_{3H} = \frac{W}{4} - \left(\frac{W}{2} \bullet \frac{d_2}{d_0}\right)$$

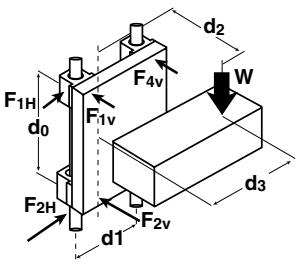


Side Mounted Application
At the time of movement with uniform velocity or at the time of stop.

$$F_{1v} = F_{4v} = -\left(\frac{W}{2} \bullet \frac{d_2}{d_0}\right)$$

$$F_{2v} = F_{3v} = +\left(\frac{W}{2} \bullet \frac{d_2}{d_0}\right)$$

$$F_{1H} = -F_{2H} = -F_{3H} = F_{4H} = \frac{W}{2} \bullet \frac{d_3}{d_0}$$



Vertical Application
At the time of movement with uniform velocity or at the time of stop.
At the time of start & stop, the load varies because of inertia.

Applied Loading Calculations

The majority of applications utilize a four carriage or bearing and two rail design for stability. Shown are four typical configurations and calculations for the resultant loads applied to each bearing. Resultant loads are divided into a horizontal and a vertical components, which represent the static or constant velocity condition and account for gravity but not acceleration.

Use the appropriate configuration to determine the horizontal and vertical components of the resultant applied load on the most heavily loaded carriage or bearing. These values will be referred to henceforth as FH & FV, respectively.

Terms:

d_0 = distance between centerlines of carriages or bearings (in) or (mm)

d_1 = distance between centerlines of rails (in) or (mm)

d_2 = distance from centerline of carriage or bearing to load action point (in) or (mm)

d_3 = distance from centerline of carriage or bearing to load action point (in) or (mm)

W = Applied Load (lbf) or (N)

FNH = Horizontal component of resultant applied load with respect to each carriage or bearing (lbf) or (N)

FNV = Vertical component of resultant applied load with respect to each carriage or bearing (lbf) or (N)

Reminder:

- Be sure to use consistent units (English or metric).
- Be sure to use the appropriate sign (positive or negative).
- A negative number is used when the actual force is in the opposite direction represented by the arrow.

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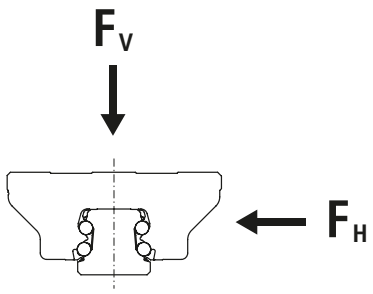


Equivalent Load†

An equivalent load is used to consolidate applied load components into one value which can later be used to calculate the minimum required load rating and the expected life of the carriage/bearing selected.

For ProfileRail* Carriages & Closed RoundRail* Bearings:

$$F_{EQ} = F_H + F_V$$

F_{EQ} = Equivalent Load
F_H = Horizontal Component of Resultant Applied Load
F_V = Vertical Component of Resultant Applied Load

For T-Series Bearings:‡

When Fv is negative:

$$F_{EQ} = F_H + (F_V 0.6)$$

When Fv is positive:

$$F_{EQ} = F_H + F_V$$

For Single Carriage or Single Rail Configurations:

$$F_{EQ} = F_H + F_V + (M/M_c) \times C$$

M = Applied Moment Load
M_c = Dynamic Moment Capacity of Bearing
C = Dynamic Load Capacity of Bearing

For Preloaded Carriages [Only when FEQ < (3 x Fp)] :

Even with no external load applied, a preloaded bearing has a load on the races. A load greater than the externally applied load is present within a bearing with an externally applied load less than the preload end point. In order to calculate the loads on the load sets, the following formulae may be employed:

$$F_{EQ} = F_p + {}^2/_3 (F_H + F_V)$$

F_p = Initial Preload Force
(i.e., for 'B' Preload Designation F_p = .03 x C)

† Before calculating F_{EQ}, make sure that neither F_H or F_V exceeds the Dynamic Load Limit of the guide intended for use. (See **Dynamic Load Limit** on Page E7).

‡ The 0.5 value used accounts for a derating factor of the capacity during tensile loading. Therefore, when calculating expected life based on F_{EQ}, the Full Dynamic Load Rating (C) may be used.

Mean Dynamic Load

In applications with loads of varying magnitude, a mean dynamic load should be calculated.

$$F_{EQ} = \sqrt[P]{F_{EQ1}^{P}\left(\frac{d1}{D}\right) + F_{EQ2}^{P}\left(\frac{d2}{D}\right) + \ldots + F_{EQn}^{P}\left(\frac{dn}{D}\right)}$$

Where: $F_{EQ1}..F_{EQn}$= equivalent dynamic loads for distances d1 through dn
D = total distance of stroke = d1+d2...+dm
P = 3 (linear guides w/Ball Type Rolling Elements)
10/3 (linear guides w/Roller Type Rolling Elements)

Load Ratings for Rolling Element Guides

Dynamic Load Rating, C, and Travel Life

The dynamic load rating, C, is the load at which when applied will yield the rated travel life. The rated travel life, Lr, for most linear guides is 100km for metric products and 4 million inches for inch products (the rated travel life is listed on the page with the dynamic load rating). For a given applied load, P, the dynamic load rating and rated travel life are used to calculate the travel life using the following load/life equation:

$$L = (C/F_{EQ})^{n} \times Lr$$

Where:

L = calculated travel life
C = dynamic load rating
F_{EQ} = equivalent applied load
n = 3 for ball guides, 10/3 for roller guides
L_r = rated travel life

Note: Some manufacturers dynamic load ratings are based upon a 50km life. To compare dynamic load ratings for guides with a 50km rated life with a 100km life, divide the 50km dynamic load rating by 1.26.

C100km = C50km/1.26

Some types of linear guides do not have the same dynamic load rating in all directions. The dynamic load rating for orthogonal load directions is shown as a percentage of C. It is not necessary to use this percentage of C in the load/life equation provided that the **Equivalent Applied Load Section** has been adhered to, because the calculations for equivalent applied load already account for it.

For more information, or to place an order, please contact your local authorized Thomson distributor or Danaher Motion at 1-800-554-8466, Fax: 1-800-445-0329, or E-mail at profilerail@danahermotion.com.

Calculating the Minimum Required Dynamic Load Rating, C_{min}

The load/life equation above can be rewritten to calculate the minimum required dynamic load rating which should be selected for a given applied load and minimum required travel life:

$$C_{min} = P(L_m/L_r)^{1/n}$$

Where:

C_{min} = minimum required dynamic load rating
P = applied load
L_m = minimum required travel life
L_r = rated travel life
n = 3 for ball guides, 10/3 for roller guides

Note: Check that the applied load, P does not exceed the dynamic load limit.

Dynamic Load Limit

The dynamic load limit, is the maximum load which should be applied to the carriage/pillowblock. In some cases, the dynamic load capacity equals the dynamic load rating. In others, a limit shown as a percentage of the dynamic load rating is the maximum load which should be applied. A dynamic load limit less than the dynamic load rating does not derate the life of the guide.

Static Capacities

The static capacities are the maximum loads that should be applied to the bearing while there is no relative motion between the rolling elements and the raceways. The value C_0 is the static load capacity for a radial load acting orthogonal to the axis of travel. The values M_{OL} and M_{OQ} are the static roll, pitch, and yaw moment capacities.

It is important to analyze the application so that shock loads do not exceed these capacities. Exceeding these capacities may permanently deform the rolling elements and raceways. This type of damage will be realized by an increase in friction, noise, and vibration, as well as by an increase in clearance between the carriage and the rail.

Note: For systems experiencing repetitive shock loading less than the static load capacities, the bearing life should be determined by means of fatigue calculations.

For more information, or to place an order, please contact your local authorized Thomson distributor or Danaher Motion at 1-800-554-8466, Fax: 1-800-445-0329, or E-mail at profilerail@danahermotion.com.

Preloading & Linear Guide Deflection

Preload

A preloaded bearing has a condition of interference between the races of the rails, the rolling elements, and the races of the carriage.

Preloading decreases the deflection due to external loads. This occurs because the contact reaction has already developed, eliminating much of the initial non-linear deflection associated with rolling elements.

The rolling element reactions within a preloaded bearing may be considered as having two components. One component acts in the direction of external load, and one component acts in the opposing direction in order to maintain static equilibrium. These components are referred to as load sets. As external load is applied, one load set increases in load, as the opposite load set decreases in load. At some point, the load on the decreasing load set becomes zero. This point, at which the preload is relieved, is called the preload end point. Preload end typically occurs when the external load is approximately three times the preload.

Preload end point : $F_{ext} = 3F_p$

where:

F_{ext} = externally applied load

F_p = preload

By definition, a preloaded bearing, loaded beyond the preload endpoint, has the same deflection characteristics of an unpreloaded bearing externally loaded to that percentage of its dynamic load capacity. A preload level is assigned as a percentage of the dynamic load capacity of the bearing.

For more information, or to place an order, please contact your local authorized Thomson distributor or Danaher Motion at 1-800-554-8466, Fax: 1-800-445-0329, or E-mail at profilerail@danahermotion.com.

Actuation Force

The force required to actuate a linear guide (FA) has four basic components:

1. Frictional resistance (F_f)
2. Intrinsic resistance (Dint)

$$F_A = F_f + D_{int} + F_{inertia} + D_l$$

3. Inertia of the moving components ($F_{inertia}$)
4. Viscose drag of the lubrication (D_l)

Frictional Resistance

Rolling Element Guides

Friction occurs in rolling element guides as a result of slipping of the rolling elements on the raceways. The frictional resistance can be calculated by means of the following equation:

$$F_f = \mu \times F_i$$

Where:

μ = coefficient of friction (dependent upon type of guide type, rolling element type and load)

F_i = force internal to the linear guide

The following table lists the coefficient of friction for different types of guides:

Profile Rail	
Ball Type	Roller Type
0.002 - 0.003	0.001 - 0.002

The value for the coefficient of friction is a function of the applied load. The coefficient of friction increases as load is applied. This is due to the increased contact area between the rolling elements and races.

The force internal to the linear guide is equal to the external force (Fext) applied to the linear guide in non-preloaded guides, and preloaded guides loaded beyond 3 times the preload value (Fp).

$$F_i = F_{ext}$$

For preloaded guides loaded below a level of 3 times the preload value (Fp), the internal force can be approximated with the following equation:

$$F_i = 2F_p + 1/3\ F_{ext}$$

For more information, or to place an order, please contact your local authorized Thomson distributor or Danaher Motion at 1-800-554-8466, Fax: 1-800-445-0329, or E-mail at profilerail@danahermotion.com.

500 Series Ball Profile Rail

Size Dint (N)	Carriage Style A, C Dint (N)		Carriage Style B, D Dint (N)	
Preload	0.03C	0.13C	0.03C	0.13C
15	7	15	8	14
20	10	16	11	18
25	13	22	14	22
30	16	26	19	30
35	23	37	25	41
45	27	44	30	49

Values for lubricant oil VG68, speed 0.1 m/s

500 Series Roller Profile Rail

Size	Carriage Style A,C D_{int} (N)	Carriage Style B,D D_{int} (N)
25	17	18
35	35	51
45	53	60
55	98	124
65	—	170

Value for 0.13 C Preload, lubricant oil VG68, speed 0.1 m/s

AccuGlide* Mini linear guide

Size	Carriage Style AA D_{int} (N)
10	0.9
15	2.8
20	7.0

Values for clearance preload, no lubricant

Intrinsic Resistance

The intrinsic resistance is the measured actuation force required to move the guide at a constant velocity, without lubrication, regardless of load. It consists of the seal drag (larger component) and force required to circulate the rolling elements (smaller component). The intrinsic resistance can be assumed to be a constant for linear guides carrying more than 5% of their dynamic load rating (C). For guides loaded below that value, the force required to circulate the rolling elements will increase.

The following chart shows the intrinsic resistance, $\mathbf{D_{int}}$, for different types and sizes of linear guides.

Inertia of Moving Components

Inertia is directly related to the mass and acceleration by the following equation: $F_{inertia} = Ma$

Viscose Drag of the Lubrication

The viscose drag of the lubricant is dependent upon the visiosity of the lubricant selected.

Preload

Preload of the assembly has an effect on intrinsic resistance, the greater the preload the greater the intrinsic resistance to move the guide.

For more information, or to place an order, please contact your local authorized Thomson distributor or Danaher Motion at 1-800-554-8466, Fax: 1-800-445-0329, or E-mail at profilerail@danahermotion.com.

Initial Grease Volume for 500 Series Ball Bearings

Size	Carriage Style A, C, E (cm^3)	Carriage Style B, D, F (cm^3)
15	0.9	--
20	1.7	2.1
25	2.8	3.5
30	4.7	5.8
35	6.6	8.1
45	12.6	15.6

Initial Grease Volume for 500 Series Roller Bearings

Size	Carriage Style A, C (cm^3)	Carriage Style B, D (cm^3)
25	1.9	2.2
35	2.9	3.7
45	5.3	6.6
55	10.6	10.6
65	--	18.9

Oil Reservoir Refill Quantity

Size	500 Series Ball 531OW Oil (cm^3)	500 Series Roller 532OW Oil Qty (cm^3)
15	0.5	—
20	1.4	—
25	2.4	2.2
30	2.9	—
35	5.	6
45	10.9	11
55	—	19
65	—	43

Lubrication

Lubrication provides protection against wear, corrosion, heat, and friction. Application-specific variables, such as load, speed, and environmental conditions, determine the most suitable lubricant and lubrication schedule for that specific application.

Danaher Motion's general lubricant recommendation for linear guides is a grade 2 grease. A maximum of one year or 100km, whichever comes first, between applications of lubricant is recommended. A grease with an extreme pressure additive should be used for guides loaded beyond 50 of their dynamic load rating (C). Oil can also be used and is recommended in applications where the bearings experience high speeds. Use the uppermost lubrication port on oil-lubricated bearings that are vertically oriented to ensure gravity-assisted lubricant dispersal.

Linear guide products are supplied with a light coating of preservative oil. This preservative oil is for storage purposes only and is not recommended as lubrication for the bearing.

Lubrication Procedure

For best lubrication dispersal, the carriage should be moved on the rail while applying lubricant to ensure circulation to all internal bearing surfaces. It is not possible to over lubricate the bearings, as excess lubricant will merely exit the carriage under the seals.

Recommended initial volumes of lubricant for 500 Series bearings are shown in the tables. The recommended volume for relubrication is 1/2 the initial volume.

Short Stroke

In the case of a stroke less than 2X's the carriage length, two lubrication connections are recommended, one at each end to ensure adequate lubrication to the entire ball or roller track.

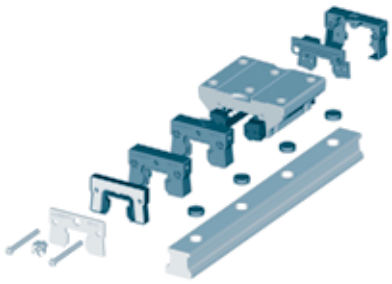
Oil Reservoir

The oil reservoir is supplied from the factory ready for installation (filled with oil). Relubrication is dependent upon many factors such as speeds, temperature, cleanliness, etc. The following is a guideline for relubrication. (It is recommended to relubricate every 12 months.)

Travel Distance	2500km	5000km

The oil reservoir is filled in the factory with Kluber Lamora D220 oil. If relubricating with different oil it is the responsibility of the user to determine oil compatibility. The recommended refill quantity is shown in the table.

Guide



Self-Lubricating Profile Rail Lube Block

The self-lubricating Lube Block option offers maintenance free operation and enhanced protection for a broad range of applications. It offers:

- Reduced system cost by eliminating the need for designing, purchasing, and installing expensive lubrication systems.
- Environmentally friendly operation
- Increased bearing life by offering enhanced protection

Design

The self-lubricating option utilizes self-lubricating attachments at both ends of the carriage and includes an initial EP2 grease pack of the carriage. The self-lubricating attachments consist of a section of oil saturated polymer actively compressed by a contact spring, inside a double lip seal.

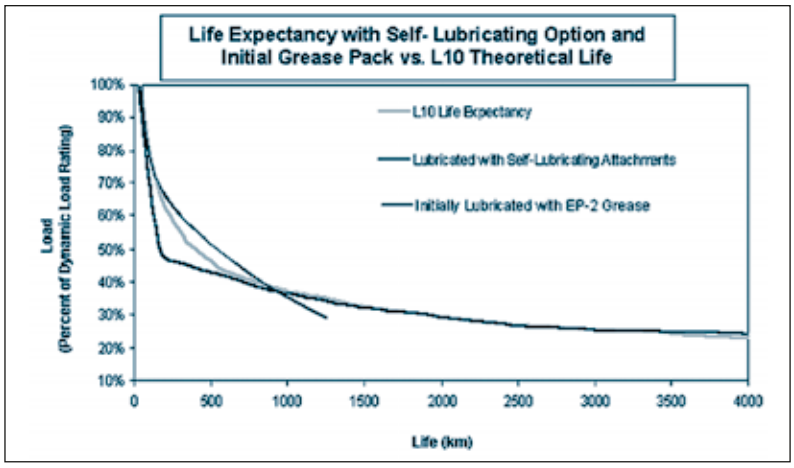
A contact spring assures continuous contact with the rail, releasing oil as the carriage moves. This ensures a film of lubricant between the rolling elements and races. When the carriage is at rest, oil is re-absorbed by the polymer.

Performance

The design has incorporated a proven oil-saturated polymer used for over 10 years to lubricate radial bearings. This method of lubrication has a successful track record in applications ranging from food processing to automotive assembly.

The graph below shows the theoretical L10 life expectancy and actual test results for the following two methods of lubrication:

1. Bearing with self-lubricating attachments only.
2. Bearing initially packed with EP2 grease only.



Testing Parameters
Stroke: 500 mm
Speed: 0,6 m/s

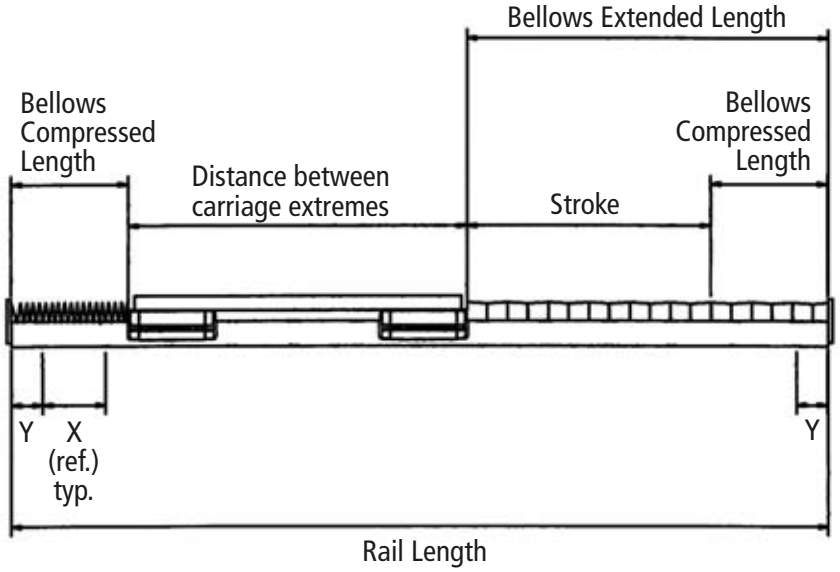
This chart illustrates how using the self-lubricating option, which combines the self-lubricating attachments and initial grease pack, will enable the bearing to achieve the L10 life expectancy under all loading condition. Note that for travel lives exceeding 30,000 km, recharging or replacing of the self-lubricating polymer is recommended.

For more information, or to place an order, please contact your local authorized Thomson distributor or Danaher Motion at 1-800-554-8466, Fax: 1-800-445-0329, or E-mail at profilerail@danahermotion.com.

Calculations for Way Cover Extended Length & Rail Length

Given the Stroke and Distance Between Carriage Extremes:

Way Cover Extended Length (mm) = Stroke (mm) / (1-CR). After dividing, round number up to the next increment of 5mm. This value is used as the length in the way cover part number when ordering.



Note: The Way Cover Extended Length will be cut to next vee at the factory.

Way Cover Compressed Length (mm) = Way Cover Extended Length (mm) - Stroke (mm)

Rail Length = Compressed Length + Extended Length + Distance Between Carriage Extremes.

Example:

Product: 500 Series Ball Linear Guide Size 35

Stroke Length = 200mm

Distance Between Carriage Extremes = 520mm

Bellows Type = Walk-On

CR = 0.19 for size 35 500 Series Ball Walk-on type bellows

Way Cover Extended Length = Stroke / (1-CR) = 200mm / (1-0.19) = 200mm / .81 = 246.91mm

Round up to next increment of 5mm, therefore, Way Cover Extended Length = 250 mm

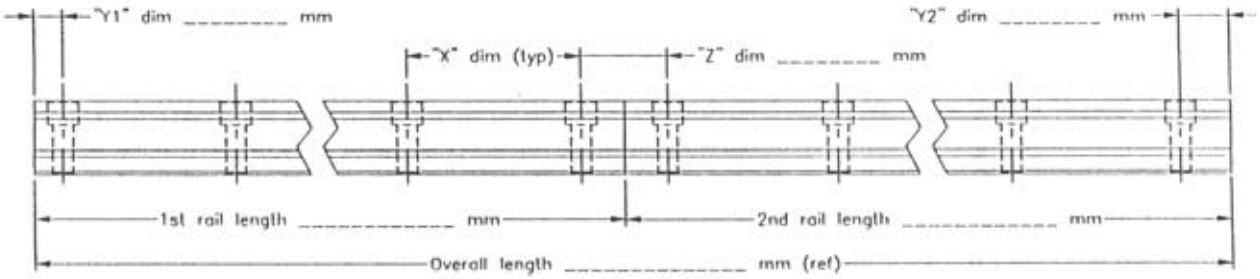
Way Cover Compressed Length = Way Cover Extended Length - Stroke = 250mm - 200mm = 50mm

Rail Length = Compressed Length + Extended Length + Distance Between Carriage Extremes = 50mm + 250mm + 520mm = 820mm

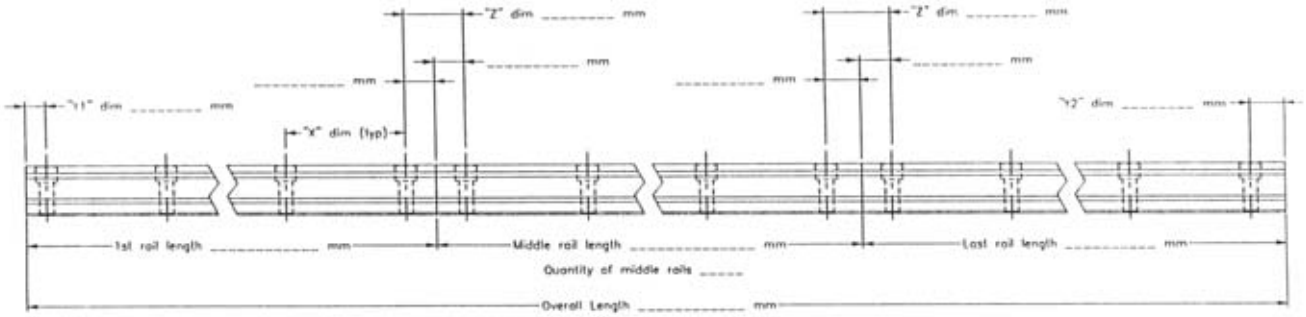
For more information, or to place an order, please contact your local authorized Thomson distributor or Danaher Motion at 1-800-554-8466, Fax: 1-800-445-0329, or E-mail at profilerail@danahermotion.com.

Specification sheet for the butting of 2 rail$_{st}$

A butt joint will be require for rail lengths longer than the maximum shown in the chart below. If a butt joint is required, the 1st and 2nd rail lengths must each be less than the maximum shown. The "Y1" and "Y2" dimensions must be between the minimum and maximum shown below to avoid cutting into a mounting hole. The standard "Z" dimension should be used for best performance.



Specification sheet for the butting of 3 or more rail$_{st}$



Linear Guide Product	"X" dim	Standard "Z" dim	Minimum "Y" dim	Maximum "Y" dim	Fastener size	Maximum length without a joint
500 Series Ball	60	30	8	52	M4	1,500
500 Series Ball	60	30	8	52	M5	3,000
500 Series Ball	60	30	8	52	M5	6,000
500 Series Ball	80	40	10	70	M8	6,000
500 Series Ball	80	40	10	70	M8	6,000
500 Series Ball	105	52.5	13	92	M12	6,000
500 Series Roller	40	40	10	30	M8	6,000
500 Series Roller	52.5	52.5	13	39.5	M12	6,000
500 Series Roller	60	60	15	45	M14	6,000
500 Series Roller	75	75	17	58	M16	6,000

For more information, or to place an order, please contact your local authorized Thomson distributor or Danaher Motion at 1-800-554-8466, Fax: 1-800-445-0329, or E-mail at profilerail@danahermotion.com.

NOTES:

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Interchange Guide

THK HSR LM Guide to Thomson 500 Series Series Ball Profile Rail Interchange Sheet

THK HSR	Thomson 500 Series Ball
Assembly Part Number HSR 20 A 2 SS C1 + 1000 P 1 2 3 4 9 5 7 6	**Carriage Part Number** (2) pcs 4 — 511 P 20 A 1 Z / 1 6 2 3 5 9 and **Rail Part Number** (2) pcs 4 — 521 P 20 A 1000 / 1 6 2 8 7
Carriage Part Number HSR 20 A UU 1 2 3 9	**Carriage Part Number** 511 P 20 A 1 1 6 2 3 4
Rail Part Number HSR 20 + 1000L 1 2 7	**Rail Part Number** 521 P 20 A 1000 1 6 2 8 7

1 - TYPE	
THK	**THOMSON 500 SERIES BALL**
Carriage - HSR Rail - HSR	Carriage - 511 Rail - 521

2 - SIZE	
THK	**THOMSON 500 SERIES BALL**
15	15
20	20
25	25
30	30
35	35
45	45
55	N/A

3 - CARRIAGE STYLE	
THK	**THOMSON 500 SERIES BALL**
A	A
B	A
CA	A
CB	A
LA	B
LB	B
HA	B
HB	B
R	E
TR	E
LR	F
HTR	F

4 - CARRIAGES PER RAIL

5 - PRELOAD	
THK	**THOMSON 500 SERIES BALL**
blank	0
C1	1
C2	2
N/A	3

6 - ACCURACY	
THK	**THOMSON 500 SERIES BALL**
blank	H
H	H
P	P
SP	U
UP	U

7 - LENGTH	
THK	**THOMSON 500 SERIES BALL**
xxxxL	xxxx

8 - RAIL STYLE	
THK	**THOMSON 500 SERIES BALL**
blank	A
K	U
N/A	C

9 - SEALS	
THK	**THOMSON 500 SERIES BALL**
SS	blank
UU	blank
ZZ	Z
DD	W
KK	WZ
QZ	N
N/A	L

The Thomson 500 Series Ball Profile Rail replaces the Thomson AccuGlide* Profile Rail.

The 500 Series Ball Profile Rail provides the following advantages when compared to AccuGlide*:

- Increased rail straightness through advanced grinding technologies
- Simpler installation and greater accuracy on joint-free rails up to 6 meters long
- Smoother, quieter movement through insert molded recirculation paths, minimized transitions and optimized geometries
- Increased load capacity from longer ball paths and total number of rolling elements
- On-site field modifiable and upgradeable easy-to-use modular carriage and seal designes
- Customization with expanded accessories offering

Thomson AccuGlide* to Thomson 500 Series Ball Profile Rail Interchange Sheet

Thomson AccuGlide*	Thomson 500 Series Ball
Assembly Part Number CG 20 AA B P __ 1 2 3 4 5 8	**Carriage Part Number** 511 P 20 A 1 __ 1 5 2 3 4 8
Rail Part Number RG 20 P L1000 __ 1 2 5 6 8	**Rail Part Number** 1 521 P 20 A __ 1000 5 2 7 8 6

1. TYPE	
AccuGlide	**THOMSON 500 SERIES BALL**
Carriage - CG Rail - RG	Carriage - 511 Rail - 521

2. SIZE	
AccuGlide	**THOMSON 500 SERIES BALL**
15	15
20	20
25	25
30	30
35	35
45	45
55	N/A

3. CARRIAGE STYLE	
AccuGlide	**THOMSON 500 SERIES BALL**
AA	A
BA	B
CE	C
DE	D
EE	E
HE	F

4. PRELOAD	
AccuGlide	**THOMSON 500 SERIES BALL**
A	0
B	1
C	2
D	3

5. ACCURACY	
AccuGlide	**THOMSON 500 SERIES BALL**
N	H
H	H
P	P
S	U
U	U

6. LENGTH	
AccuGlide	**THOMSON 500 SERIES BALL**
Lxxxx	xxxx

7. RAIL STYLE	
AccuGlide	**THOMSON 500 SERIES BALL**
—	A
N/A	U
N/A	C

8. OPTIONS	
AccuGlide	**THOMSON 500 SERIES BALL**
A	D
C2C2 (plastic)	C (steel)
C3C3	C
D####	Consult Danaher Motion
KK	W
LDS	Standard Longitudinal Seal is low drag
LL	L
M###	Consult Danaher Motion
R2R2	E
ZZ	Z
N/A	V (Viton Wiper)
N/A	N (Oil Reservoir)

For more information, or to place an order, please contact your local authorized Thomson distributor or Danaher Motion at 1-800-554-8466, Fax: 1-800-445-0329, or E-mail at profilerail@danahermotion.com.

The Thomson 500 Series Roller Profile Rail replaces the Thomson AccuMax* Profile Rail.

The 500 Series Roller Profile Rail provides the following advantages when compared to AccuMax*:

- Increased rail straightness through advanced grinding technologies
- Simpler installation and greater accuracy on joint-free rails up to 6 meters long
- Smoother, quieter movement through insert molded recirculation paths, minimized transitions and optimized geometries
- Increased load capacity from longer roller paths and total number of rolling elements
- Expanded offering of ultra-rigid roller carriage sizes and styles for all applications
- On-site field modifiable and upgradeable easy-to-use modular carriage and seal designes
- Customization with expanded accessories offering

Thomson AccuMax* to Thomson 500 Series Roller Profile Rail Interchange Sheet

Thomson AccuMax*	Thomson 500 Series Roller
Assembly Part Number CM 35 AA B S _ 1 2 3 4 5 8	**Carriage Part Number** 512 S 35 A 1 _ 1 5 2 3 4 8
Rail Part Number RM 35 S L1000 _ 1 2 5 6 8	**Rail Part Number** 522 S 35 A _ 1000 1 5 2 7 8 6

1. TYPE	
AccuMax	**THOMSON 500 SERIES ROLLER**
Carriage - CM Rail - RM	Carriage - 512 Rail - 522
2. SIZE	
AccuMax	**THOMSON 500 SERIES ROLLER**
N/A 35 45 55 N/A	25 35 45 55 65
3. CARRIAGE STYLE	
AccuMax	**THOMSON 500 SERIES ROLLER**
AA N/A N/A N/A	A B C D
4. PRELOAD	
AccuMax	**THOMSON 500 SERIES ROLLER**
B C D	1 2 3

5. ACCURACY	
AccuMax	**THOMSON 500 SERIES ROLLER**
P S U	P S U
6. LENGTH	
AccuMax	**THOMSON 500 SERIES ROLLER**
Lxxxx	xxxx
7. RAIL STYLE	
AccuMax	**THOMSON 500 SERIES ROLLER**
— N/A N/A	A U C
8. OPTIONS	
AccuGlide	**THOMSON 500 SERIES BALL**
A C2C2 (plastic) C3C3 D#### KK LDS LL M### R2R2 ZZ N/A N/A	D C (steel) C Consult Danaher Motion W Standard Longitudinal Seal is low drag L Consult Danaher Motion E Z V (Viton Wiper) N (Oil Reservoir)

For more information, or to place an order, please contact your local authorized Thomson distributor or Danaher Motion at 1-800-554-8466, Fax: 1-800-445-0329, or E-mail at profilerail@danahermotion.com.

NOTES:

NOTES:

New Thomson 500 Series Profile Rails

www.LinearGuides.com

Next Generation Profile Rails. Superior Design. Superior Quality.

Danaher Motion introduces a new line of profile rails that can be easily integrated into your new or existing application. The 500 Series of profile rails feature:

- **Increased rail straightness** through advanced grinding technologies
- **Simpler installation and greater accuracy** on joint-free rails up to 6 meters long
- **Smoother, quieter movement** through insert molded recirculation paths
- **On site field modifications** with easy-to-use modular carriage (accessories) design
- **Expanded offering** of ultra-rigid roller carriage sizes and styles for all applications
- **Customization** with expanded accessories offering

THOMSON™

500 Series Roller Profile Rail

500 Series Ball Profile Rail

Also Available: T-Series

Also Available: MicroGuide

Also Available: AccuGlide Mini

Visit:
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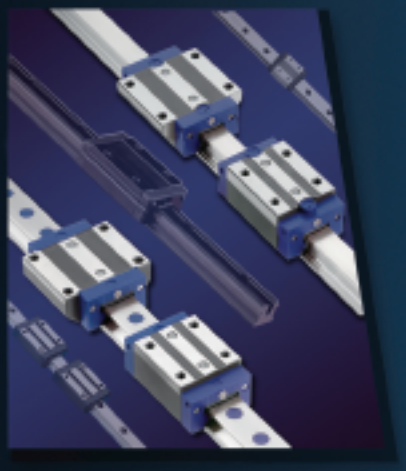

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