

Profile Rail Linear Guides

500 Series Ball Profile Rail, 500 Series Roller Profile Rail,
400 Series Profile Rail, AccuMini, MicroGuide, T-Series



Linear Motion. Optimized.™

Thomson – the Choice for Optimized Motion Solutions

Often the ideal design solution is not about finding the fastest, sturdiest, most accurate or even the least expensive option. Rather, the ideal solution is the optimal balance of performance, life and cost.

The Best Positioned Supplier of Mechanical Motion Technology

Thomson has several advantages that make us the supplier of choice for motion control technology.

- Thomson provides the broadest standard product offering of mechanical motion technologies in the industry.
- Modified versions of standard product or white sheet design solutions are routine for us.
- Choose Thomson and gain access to over 70 years of global application experience in industries including packaging, factory automation, material handling, medical, clean energy, printing, automotive, machine tool, aerospace and defense.
- As part of Danaher Corporation, we are financially strong and unique in our ability to bring together control, drive, motor, power transmission and precision linear motion technologies.

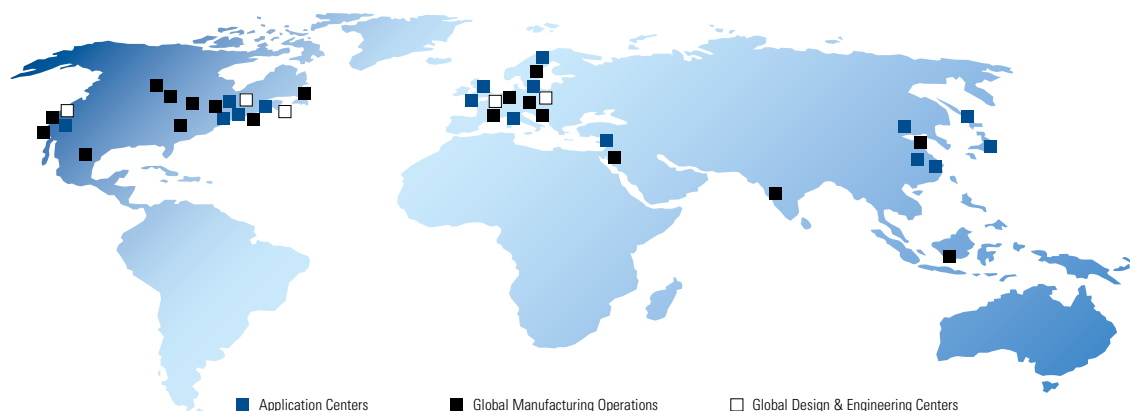
A Name You Can Trust

A wealth of product and application information as well as 3D models, software tools, our distributor locator and global contact information is available at www.thomsonlinear.com. For assistance, contact your local sales office (contact information listed on the back of catalog). Talk to us early in the design process to see how Thomson can help identify the optimal balance of performance, life and cost for your next application. And, call us or any of our 2000+ distribution partners around the world for fast delivery of replacement parts.

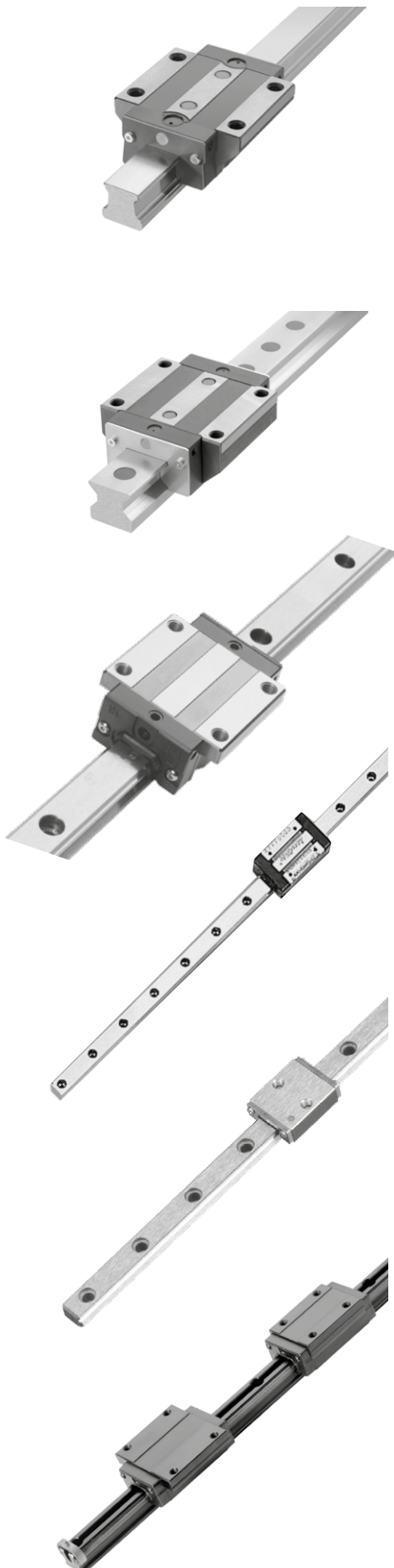
The Danaher Business System

The Danaher Business System (DBS) was established to increase the value we bring to customers. It is a mature and successful set of tools we use daily to continually improve manufacturing operations and product development processes. DBS is based on the principles of Kaizen which continuously and aggressively eliminate waste in every aspect of our business. DBS focuses the entire organization on achieving breakthrough results that create competitive advantages in quality, delivery and performance – advantages that are passed on to you. Through these advantages Thomson is able to provide you faster times to market as well as unsurpassed product selection, service, reliability and productivity.

Local Support Around the Globe



An Overview of Thomson Profile Rail



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500 Series Ball Profile Rail

500 Series Roller Profile Rail

400 Series Profile Rail

AccuMini

MicroGuide

T-Series

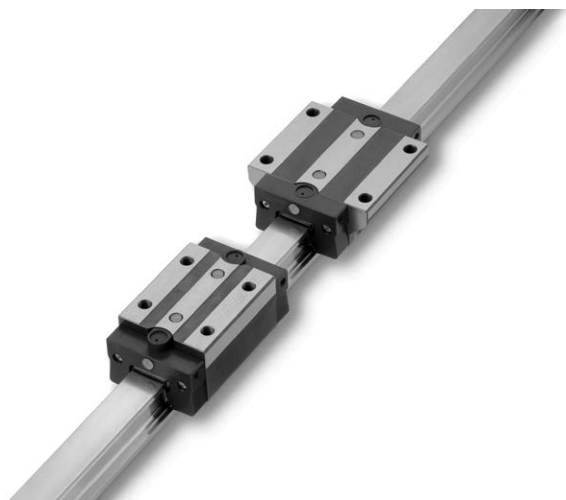
Installation Guide

Engineering Guide

Interchange Guide

Overview of Thomson Profile Rail Linear Guides

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, Thomson continues producing and developing these high quality, innovative products. The 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 AccuMini.



The Thomson 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 Linear Guide

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
- Replaces Thomson AccuGlide

Typical Applications

- Industrial Automation
- Machine Tool Equipment
- Precision Measuring Equipment
- Industrial Robots

500 Series Roller Profile Rail Linear Guide

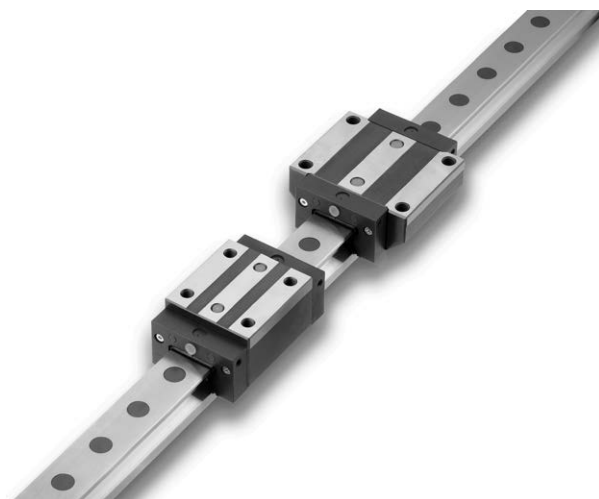
Features & Benefits

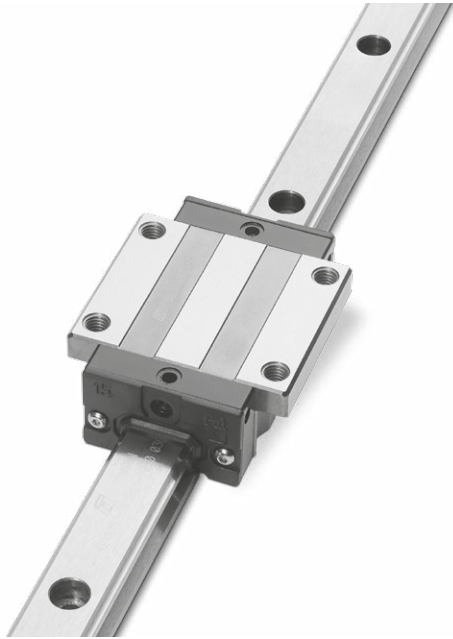
Superior Design. Superior Quality.

- 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
- Replaces Thomson AccuMax

Typical Applications

- Industrial Automation
- Industrial Robots
- Machine Tool Equipment
- Precision Measuring Equipment





400 Series Ball Profile Rail Linear Guide

Features & Benefits

- Polymer ball-return tube reduces noise and vibration while retaining lubrication
- Standard double lip end and longitudinal seals retain lubrication while protecting the bearing from contamination
- Lubrication channels that direct lubricant to individual ball tracks, maximizing lubricating effectiveness
- Double-faced ball tracks utilize a 45° face-to-face bearing arrangement, resulting in equal load-carrying capacity in all directions
- 413 ball cage option provides increased travel smoothness, lower noise at high speeds, and individual lubricant reservoirs
- See Thomson 400 Series Profile Rail Linear Guide catalog for more details

Typical Applications

- Industrial Automation
- Packaging Equipment
- Food Processing Equipment

AccuMini

Features & Benefits

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

Typical Applications

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





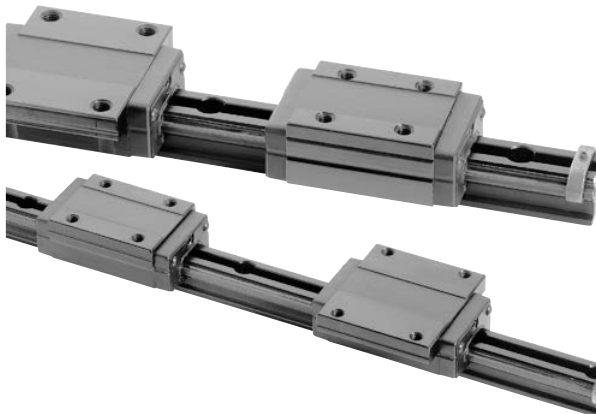
MicroGuide

Features & Benefits

- Industry standard drop-in replacement
- 440 stainless steel construction (corrosion resistance, little or no lubrication)
- High precision accuracy (up to $\pm 0.010\text{mm}$)
- Extremely smooth, quiet operation
- Low Profile
- High Moment Load Capacity for single rail / carriage applications
- Whisper quiet movement
- Gothic arch ball groove geometry provides enables single rail application
- One-piece length up to 1 meter (in sizes 7mm - 15mm)
- Contact Thomson for custom lengths and configurations

Typical Applications

- Front end semiconductor processing equipment
- Backend semiconductor packaging and handling equipment
- Medical diagnostic and imaging equipment
- Laboratory automation equipment
- Testing and inspection equipment



T-Series

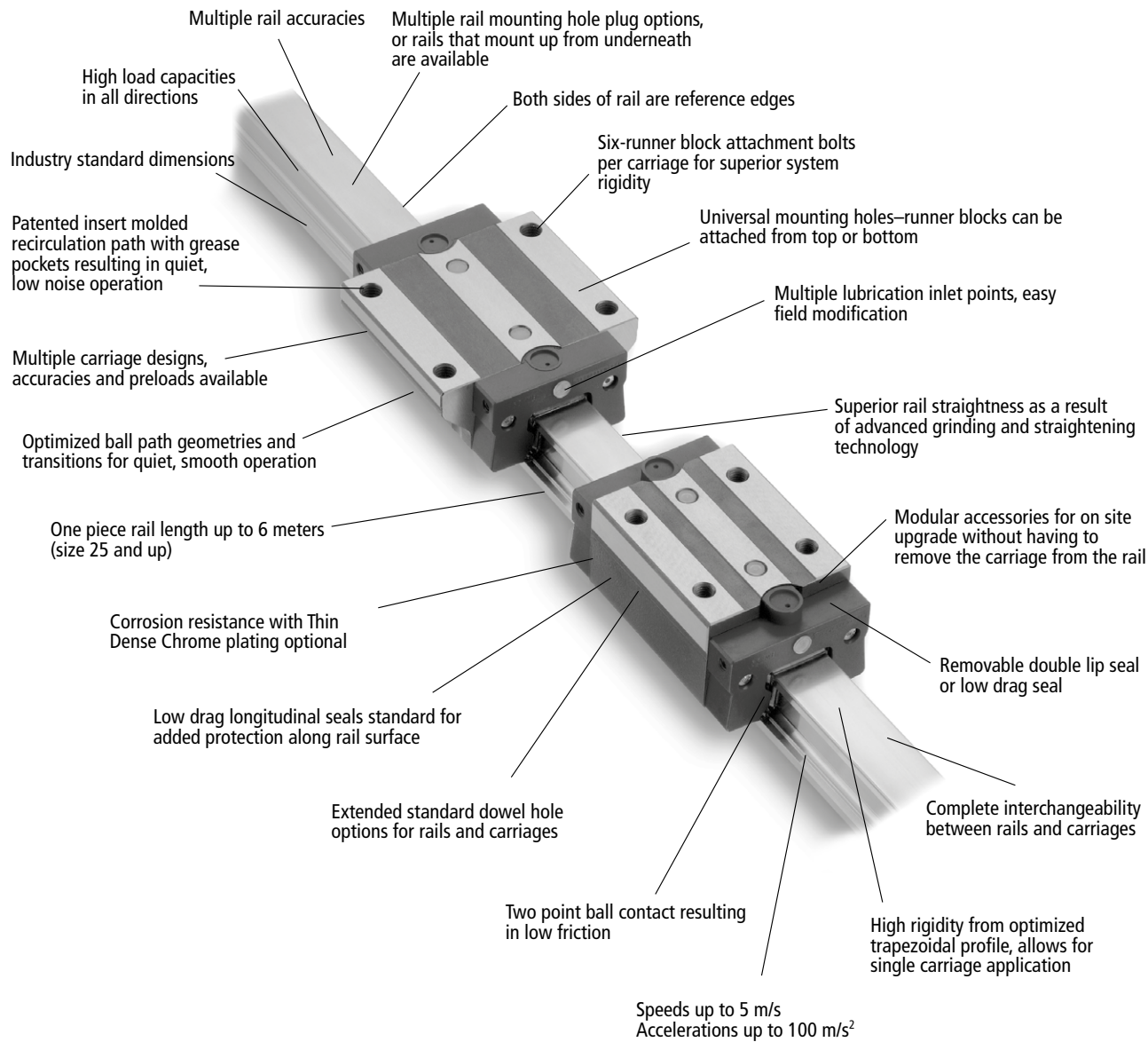
Features & Benefits

- Lightweight, flexible and forgiving alternative to all-steel profile rail.
- High quality product made from aircraft aluminum alloy with hardened steel load bearing plates and ball paths.
- Ideal choice for applications requiring reduced weight or inertia.
- High flexibility translates into N class radial run out only.
- Proprietary "U" channel construction allows the rail to "flex" to accommodate poor machine bases or misalignment errors.
- Lower cost installation and reduced installation time by eliminating the need for a costly machined base and special tools.
- Drop-in replacement for conventional all-steel profile linear guides.

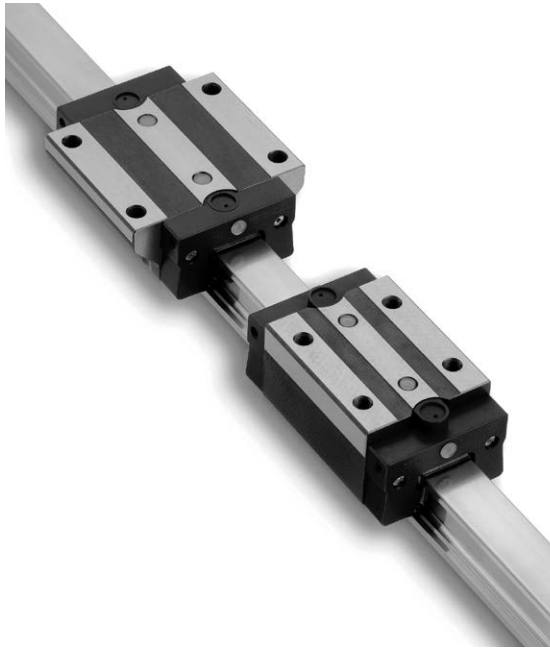
Typical Applications

- Airplanes
- Automobiles
- Ships
- Packaging

500 Series Ball Profile Rail Linear Guide



500 Series Ball Profile Rail Linear Guide



Features

The Thomson 500 Series Ball Linear Guide 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 modifications, and interchangeability with 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 7 carriage designs, and sizes 15 to 45mm.

Materials Linear Guides

The 500 Series Ball Linear Guides 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 deliver the highest quality product.

Interchangeability

The 500 Series Ball Linear Guides are completely interchangeable. Any carriage can be run on any rail of the same accuracy without compromising system accuracy. This is the result of our stringent manufacturing process controls.

Accuracy and Preload

The 500 Series Ball Linear Guides are available in three different accuracy classes, three different preload ranges and with clearance to allow for customization to your application needs.

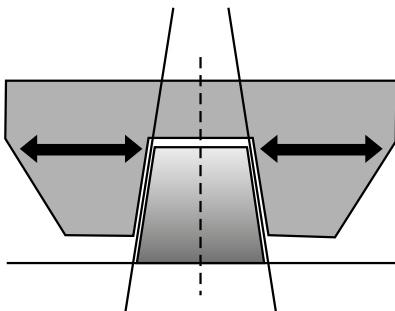
Straightness

The 500 Series Ball rail is subjected to multiple straightening processes during and after grinding of the roller paths.

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

Rigidity

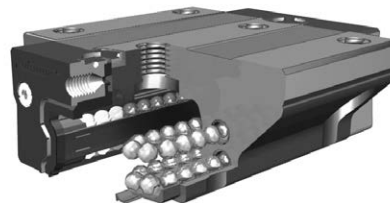
The 500 Series Ball Linear Guide rail utilizes a special trapezoidal profile that maximizes the carriage cross section, resulting in the highest possible rigidity.



500 Series Ball Profile Rail Linear Guide

Running Smoothness / Low Noise

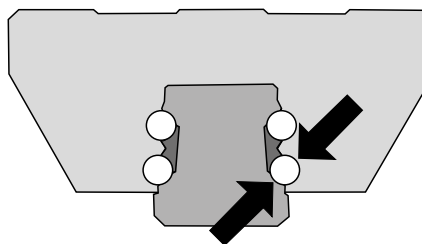
The running smoothness and low noise are the result of a patented, custom insert molded recirculation path that has an optimized geometric shape and minimal transitions, to ensure smooth and quiet operation in both low and high-speed operation.



In addition, the 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.

Back-to-Back

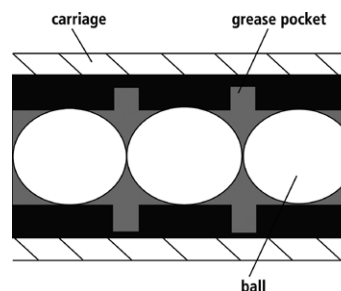
The 500 Series Linear Guide utilizes a back-to-back bearing arrangement, resulting in added rigidity. As a result, the 500 Series Ball can be used in single rail applications.



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.

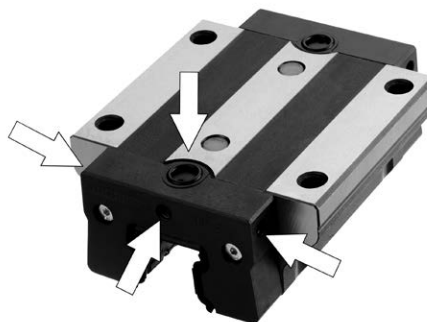
The pocket and area between the balls provide greater grease quantities in the ball path than a conventional designed linear guide bearing.



Multiple Lubrication Options

The 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? These carriages 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.



500 Series Ball Profile Rail Linear Guide



Modular Accessory Options

The standard carriage is supplied 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.

Optional metal scrapers or wipers, lube blocks and oil reservoir components can be easily added on-site in the field or can be supplied assembled from the factory.

The trapezoidal rail profile allows for easy servicing and replacing or adding of the end cap, additional wiper and oil reservoir without removing the carriage from the rail.

These innovative design features allow users to easily, efficiently, and economically upgrade carriage sealing.

Longitudinal Seals

The carriage 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 Thomson dowel hole options for both carriage and rail products. Take the guesswork out of design by using our standard assortment of dowel hole options for ease of design and availability, another solution from Thomson. Refer to page 29, 30 and 33 for more information and detailed datasheets.

Rail Accessories

The rails have multiple options to protect the mounting holes to eliminate possible contamination entry into the bearing. Custom designed plastic plugs, mylar tape and stainless steel rail cover strip are available.

Retained Balls

The rolling elements of the carriages are retained within the bearing so the carriage can be removed from the rail without worrying about the balls falling out. It is recommended to place any removed carriage onto an assembly rail or shipping arbor to provide added protection to the rolling elements.



500 Series Profile Rail Enhanced Carriage



New, 66% Smoother Running Design, with 50% Lower Drag Force* **New Ball Spacer and Stainless Steel Options**

Features and Benefits

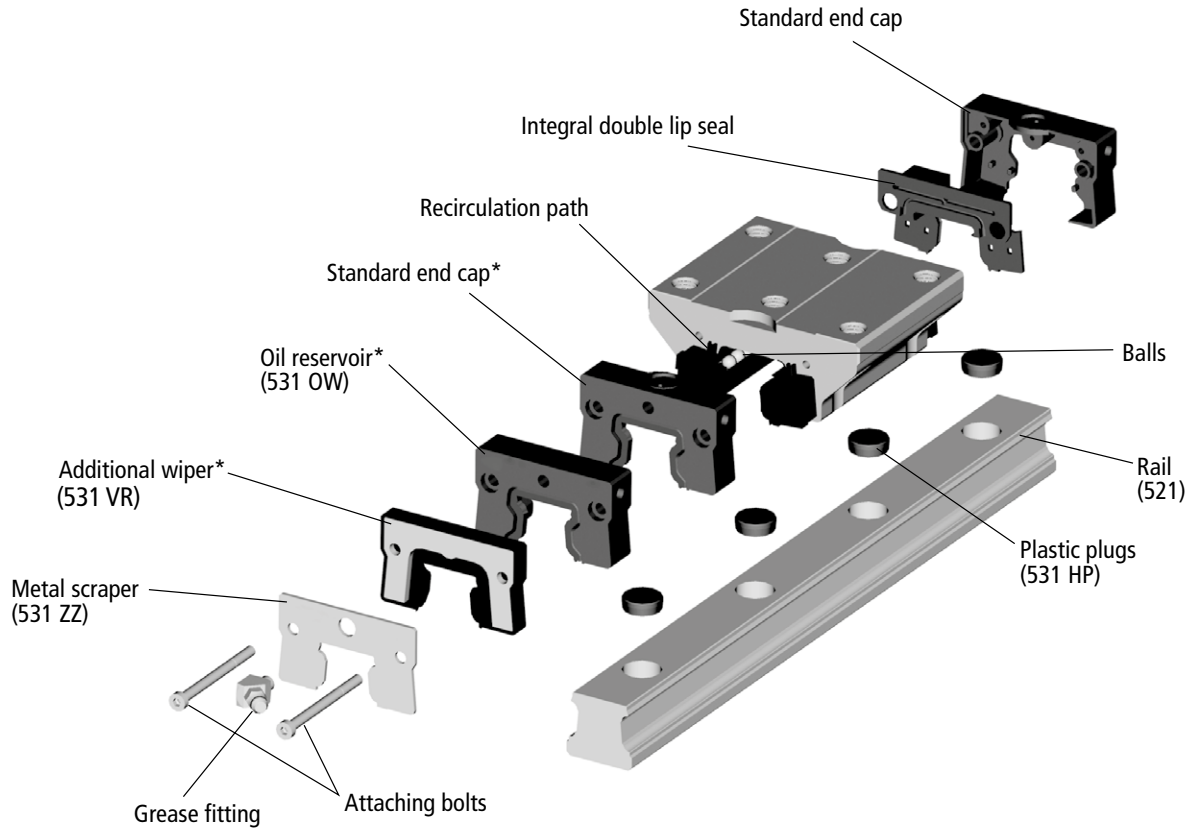
Now available in all sizes: the new Thomson 500 Series Profile Rail enhanced carriage design can improve the smoothness and precision of your linear motion application. New optional 440B stainless carriages and rails provide corrosion resistance well-suited for medical, food, electronic assembly and semiconductor applications.

- New ball spacer carriage option provides smooth, quiet motion.
- New, smoother running design optimizes the surface interfaces between steel and plastic transition areas along the ball bearing circulation path.
- New standard end seals provide twice the contaminant protection compared to competitive products. Optional low drag end seals are ideal for low push force requirements.
- Four longitudinal seals per carriage provide much better contaminant protection than competitive designs with only two longitudinal seals.
- Additional lubrication reservoir enables longer running time and easy change end caps & seals are quick to replace.
- 100% interchangeable with previous Thomson 500 Series carriage and rail.

** 66% smoothness increase measured as variability of drag force while the carriage is in motion. 50% lower drag force measured with new low drag seals option; 41% lower drag force measured with standard wiper option.*

500 Series Ball Profile Rail Linear Guide

Modular Accessory Exploded View



Also available (not shown):

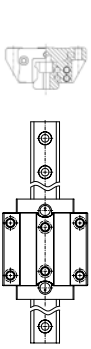
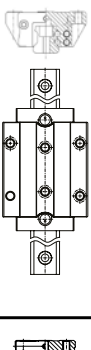
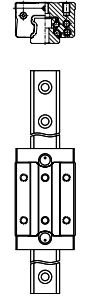
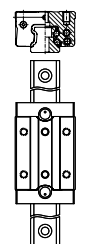
- Lube Block (531 LL)
- Mylar Rail Tape (531 RT)
- Bolt up from bottom rail (521 Type U)
- Stainless Steel Rail, Cover Strip and Rail (521 Type C and 531RCS)

* Can be installed without removing carriage from the rail

The modular building block design of the 500 Series Ball Profile Rail Linear Guide 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.

500 Series Ball Standard Carriages

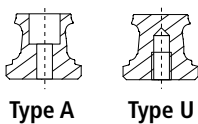
Thomson offers six carriage styles with six mounting holes allowing for additional mounting configurations in the field or for retrofitting. All provide superior rigidity and design flexibility.

| Style | Size | Accuracy | Basic Part Number | | | | Appropriate Rail Standard Style | Max. Single Piece Rail Length (mm) | |
|--|--|----------|-------------------|----------|----------|----------|---------------------------------|------------------------------------|------|
| | | | Clearance | Preload | | | | | |
| | | | | 0.03C | 0.08C | 0.13C | | | |
| Standard Carriage  | 15 | H | 511H15A0 | 511H15A1 | 511H15A2 | — | 521H15A | 1500 | |
| | | P | — | 511P15A1 | 511P15A2 | 511P15A3 | 521P15A | | |
| | | U | — | 511U15A1 | 511U15A2 | 511U15A3 | 521U15A | | |
| | 20 | H | 511H20A0 | 511H20A1 | 511H20A2 | — | 521H20A | 3000 | |
| | | P | — | 511P20A1 | 511P20A2 | 511P20A3 | 521P20A | | |
| | | U | — | 511U20A1 | 511U20A2 | 511U20A3 | 521U20A | | |
| | 25 | H | 511H25A0 | 511H25A1 | 511H25A2 | — | 521H25A | 6000 | |
| | | P | — | 511P25A1 | 511P25A2 | 511P25A3 | 521P25A | | |
| | | U | — | 511U25A1 | 511U25A2 | 511U25A3 | 521U25A | | |
| | 30 | H | 511H30A0 | 511H30A1 | 511H30A2 | — | 521H30A | 6000 | |
| | | P | — | 511P30A1 | 511P30A2 | 511P30A3 | 521P30A | | |
| | | U | — | 511U30A1 | 511U30A2 | 511U30A3 | 521U30A | | |
| | 35 | H | 511H35A0 | 511H35A1 | 511H35A2 | — | 521H35A | 6000 | |
| | | P | — | 511P35A1 | 511P35A2 | 511P35A3 | 521P35A | | |
| | | U | — | 511U35A1 | 511U35A2 | 511U35A3 | 521U35A | | |
| | 45 | H | 511H45A0 | 511H45A1 | 511H45A2 | — | 521H45A | 6000 | |
| | | P | — | 511P45A1 | 511P45A2 | 511P45A3 | 521P45A | | |
| | | U | — | 511U45A1 | 511U45A2 | 511U45A3 | 521U45A | | |
| Standard Long Carriage  | 20 | H | 511H20B0 | 511H20B1 | 511H20B2 | — | 521H20A | 3000 | |
| | | P | — | 511P20B1 | 511P20B2 | 511P20B3 | 521P20A | | |
| | | U | — | 511U20B1 | 511U20B2 | 511U20B3 | 521U20A | | |
| | 25 | H | 511H25B0 | 511H25B1 | 511H25B2 | — | 521H25A | 6000 | |
| | | P | — | 511P25B1 | 511P25B2 | 511P25B3 | 521P25A | | |
| | | U | — | 511U25B1 | 511U25B2 | 511U25B3 | 521U25A | | |
| | 30 | H | 511H30B0 | 511H30B1 | 511H30B2 | — | 521H30A | 6000 | |
| | | P | — | 511P30B1 | 511P30B2 | 511P30B3 | 521P30A | | |
| | | U | — | 511U30B1 | 511U30B2 | 511U30B3 | 521U30A | | |
| | 35 | H | 511H35B0 | 511H35B1 | 511H35B2 | — | 521H35A | 6000 | |
| | | P | — | 511P35B1 | 511P35B2 | 511P35B3 | 521P35A | | |
| | | U | — | 511U35B1 | 511U35B2 | 511U35B3 | 521U35A | | |
| | 45 | H | 511H45B0 | 511H45B1 | 511H45B2 | — | 521H45A | 6000 | |
| | | P | — | 511P45B1 | 511P45B2 | 511P45B3 | 521P45A | | |
| | | U | — | 511U45B1 | 511U45B2 | 511U45B3 | 521U45A | | |
| | Narrow Carriage  | 15 | H | 511H15C0 | 511H15C1 | 511H15C2 | — | 521H15A | 1500 |
| | | | P | — | 511P15C1 | 511P15C2 | 511P15C3 | 521P15A | |
| | | | U | — | 511U15C1 | 511U15C2 | 511U15C3 | 521U15A | |
| 20 | | H | 511H20C0 | 511H20C1 | 511H20C2 | — | 521H20A | 3000 | |
| | | P | — | 511P20C1 | 511P20C2 | 511P20C3 | 521P20A | | |
| | | U | — | 511U20C1 | 511U20C2 | 511U20C3 | 521U20A | | |
| 25 | | H | 511H25C0 | 511H25C1 | 511H25C2 | — | 521H25A | 6000 | |
| | | P | — | 511P25C1 | 511P25C2 | 511P25C3 | 521P25A | | |
| | | U | — | 511U25C1 | 511U25C2 | 511U25C3 | 521U25A | | |
| 30 | | H | 511H30C0 | 511H30C1 | 511H30C2 | — | 521H30A | 6000 | |
| | | P | — | 511P30C1 | 511P30C2 | 511P30C3 | 521P30A | | |
| | | U | — | 511U30C1 | 511U30C2 | 511U30C3 | 521U30A | | |
| 35 | | H | 511H35C0 | 511H35C1 | 511H35C2 | — | 521H35A | 6000 | |
| | | P | — | 511P35C1 | 511P35C2 | 511P35C3 | 521P35A | | |
| | | U | — | 511U35C1 | 511U35C2 | 511U35C3 | 521U35A | | |
| Narrow Long Carriage  | | 20 | H | 511H20D0 | 511H20D1 | 511H20D2 | — | 521H20A | 3000 |
| | | | P | — | 511P20D1 | 511P20D2 | 511P20D3 | 521P20A | |
| | | | U | — | 511U20D1 | 511U20D2 | 511U20D3 | 521U20A | |
| | 25 | H | 511H25D0 | 511H25D1 | 511H25D2 | — | 521H25A | 6000 | |
| | | P | — | 511P25D1 | 511P25D2 | 511P25D3 | 521P25A | | |
| | | U | — | 511U25D1 | 511U25D2 | 511U25D3 | 521U25A | | |
| | 30 | H | 511H30D0 | 511H30D1 | 511H30D2 | — | 521H30A | 6000 | |
| | | P | — | 511P30D1 | 511P30D2 | 511P30D3 | 521P30A | | |
| | | U | — | 511U30D1 | 511U30D2 | 511U30D3 | 521U30A | | |
| | 35 | H | 511H35D0 | 511H35D1 | 511H35D2 | — | 521H35A | 6000 | |
| | | P | — | 511P35D1 | 511P35D2 | 511P35D3 | 521P35A | | |
| | | U | — | 511U35D1 | 511U35D2 | 511U35D3 | 521U35A | | |

| Style | Size | Accuracy | Basic Part Number | | | | Appropriate Rail Standard Style | Max. Single Piece Rail Length (mm) | |
|----------------------------|--------------------------------|----------|-------------------|----------|----------|----------|---------------------------------|------------------------------------|------|
| | | | Clearance | Preload | | | | | |
| | | | | 0.03C | 0.08C | 0.13C | | | |
| Narrow High Carriage E | 15 | H | 511H15E0 | 511H15E1 | 511H15E2 | — | 521H15A | 1500 | |
| | | P | — | 511P15E1 | 511P15E2 | 511P15E3 | 521P15A | | |
| | | U | — | 511U15E1 | 511U15E2 | 511U15E3 | 521U15A | | |
| | 25 | H | 511H25E0 | 511H25E1 | 511H25E2 | — | 521H25A | 6000 | |
| | | P | — | 511P25E1 | 511P25E2 | 511P25E3 | 521P25A | | |
| | | U | — | 511U25E1 | 511U25E2 | 511U25E3 | 521U25A | | |
| | 30 | H | 511H30E0 | 511H30E1 | 511H30E2 | — | 521H30A | 6000 | |
| | | P | — | 511P30E1 | 511P30E2 | 511P30E3 | 521P30A | | |
| | | U | — | 511U30E1 | 511U30E2 | 511U30E3 | 521U30A | | |
| | 35 | H | 511H35E0 | 511H35E1 | 511H35E2 | — | 521H35A | 6000 | |
| | | P | — | 511P35E1 | 511P35E2 | 511P35E3 | 521P35A | | |
| | | U | — | 511U35E1 | 511U35E2 | 511U35E3 | 521U35A | | |
| | 45 | H | 511H45E0 | 511H45E1 | 511H45E2 | — | 521H45A | 6000 | |
| | | P | — | 511P45E1 | 511P45E2 | 511P45E3 | 521P45A | | |
| | | U | — | 511U45E1 | 511U45E2 | 511U45E3 | 521U45A | | |
| | Narrow High Long Carriage F | 25 | H | 511H25F0 | 511H25F1 | 511H25F2 | — | 521H25A | 6000 |
| | | | P | — | 511P25F1 | 511P25F2 | 511P20F3 | 521P25A | |
| | | | U | — | 511U25F1 | 511U25F2 | 511U20F3 | 521U25A | |
| 30 | | H | 511H30F0 | 511H23F1 | 511H30F2 | — | 521H30A | 6000 | |
| | | P | — | 511P30F1 | 511P30F2 | 511P30F3 | 521P30A | | |
| | | U | — | 511U30F1 | 511U30F2 | 511U30F3 | 521U30A | | |
| 35 | | H | 511H35F0 | 511H35F1 | 511H35F2 | — | 521H35A | 6000 | |
| | | P | — | 511P35F1 | 511P35F2 | 511P35F3 | 521P35A | | |
| | | U | — | 511U35F1 | 511U35F2 | 511U35F3 | 521U35A | | |
| 45 | | H | 511H45F0 | 511H45F1 | 511H45F2 | — | 521H45A | 6000 | |
| | | P | — | 511P45F1 | 511P45F2 | 511P45F3 | 521P45A | | |
| | | U | — | 511U45F1 | 511U45F2 | 511U45F3 | 521U45A | | |
| Narrow Short Carriage G | 15 | H | 511H15G0 | 511H15G1 | 511H15G2 | — | 521H15A | 1500 | |
| | | P | — | 511P15G1 | 511P15G2 | 511P15G3 | 521P15A | | |
| | | U | — | 511U15G1 | 511U15G2 | 511U15G3 | 521U15A | | |
| | 20 | H | 511H20G0 | 511H20G1 | 511H20G2 | — | 521H20A | 3000 | |
| | | P | — | 511P20G1 | 511P20G2 | 511P20G3 | 521P20A | | |
| | | U | — | 511U20G1 | 511U20G2 | 511U20G3 | 521U20A | | |

Extended Standard Carriage Options

The carriages are also available with the Thomson standard dowel holes or lubrication inlets as shown on pages 29 to 33 or special lubricants either from stock or with a short lead-time.

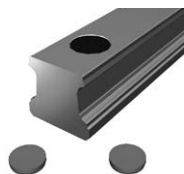


Rail Types and Accessories

The rails are 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 easily driven in place to any rail with a soft non-metallic 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

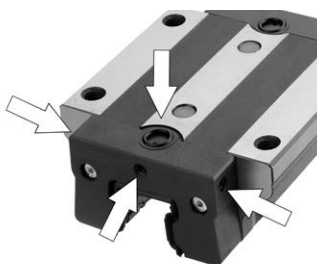
Option 531RCS utilizes a special rail (521 Type C) and stainless steel cover strip that is easily installed with the proper mounting tool.

Additional Seal Types and Lubrication Accessories

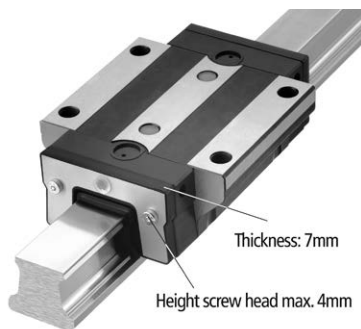


The carriage is designed with modular sealing and lubrication options for simple on-site field modification or can be supplied factory direct.

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 with a side inlet or top inlet.



Additional Seal

The **531 VR** seal provide an additional level of protection from contaminants to the assembly. This additional component can easily be added on-site without removing the carriage from the rail. It is supplied with the required screws to make the installation simple.

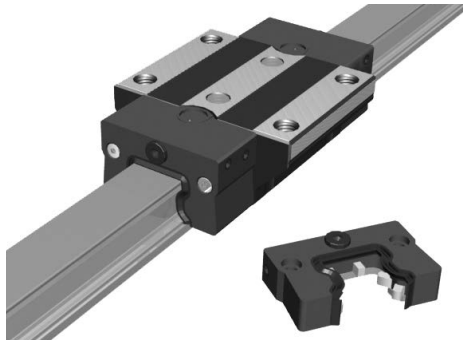
- 531 VR is constructed from durable Viton®

This seal can be used in conjunction with other optional modular accessories providing an easy upgrade to the standard seal. It 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.

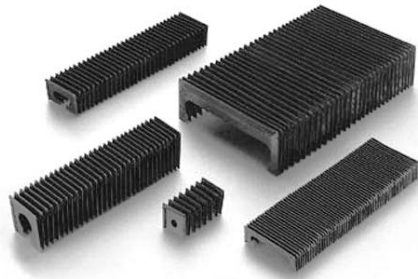


Oil Reservoir

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. For additional protection the assembly is packed with EP2 grease. 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.



Relative Drag Comparison for Design Consideration

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

• Low

**For ordering information
or for additional
Seal Types and
Lubrication Accessories,
see pages 37 to 38.**

Bellows

Standard bellows are available for all 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. 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 can be easily installed in conjunction with other optional modular seals providing you with a simple upgrade to the standard seal. These can be 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.

500 Series Ball Spacer

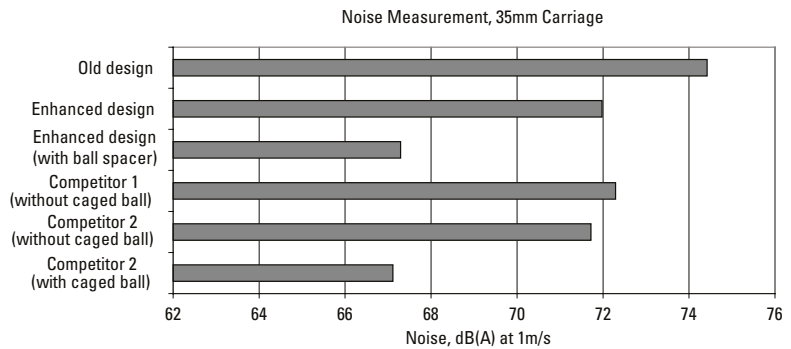


500 Series Ball Profile Rail carriages are now available with ball spacer elements that significantly reduce the running noise of the carriage. The ball spacer carriage is available in sizes 20, 25, 30, 35 and 45. It is a drop-in replacement for the current ball carriage; all external carriage dimensions are exactly the same.

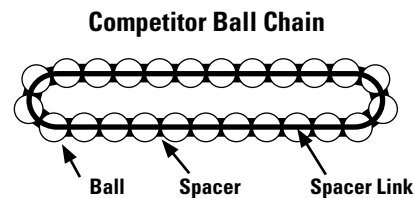
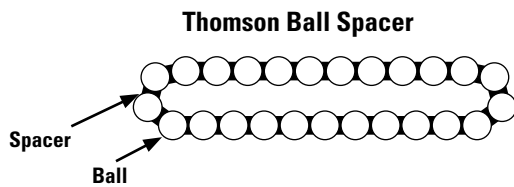
The noise reduction is achieved by inserting plastic discs between each ball bearing. This reduces noise by preventing the balls from contacting each other as well as bumping into the ball track. The addition of the plastic discs requires a reduced number of load carrying balls, which leads to a slight reduction of the static and dynamic load capacity of the ball spacer carriage.

Features and Benefits:

- Significant noise reduction (-6 dB)
- Minimum reduction of dynamic and static load capacity – Contact Thomson Application Engineering for load rating details
- Drop-in replacement for 511 ball carriage
- Same accessory options as 511 ball carriage
- Better or identical performance in comparison to competitor push force and noise
- Carriage type designation: 513



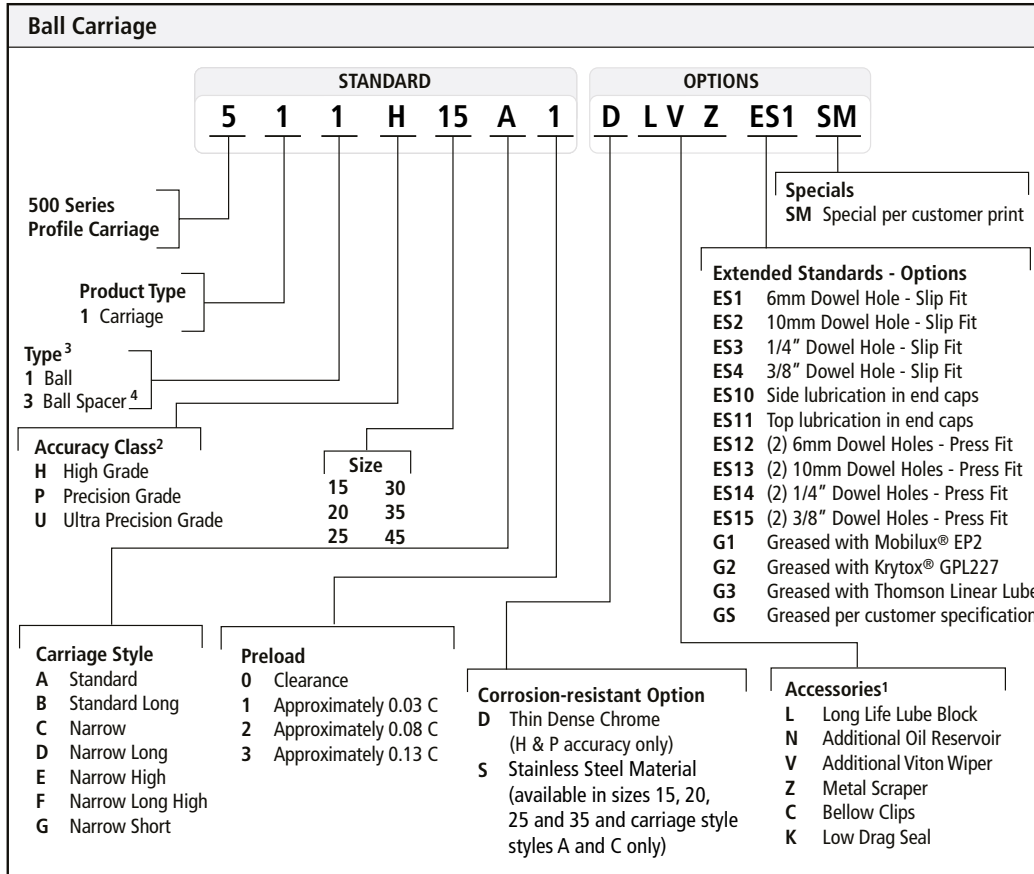
Ball Spacer Technology Comparison



| | Thomson 513 Ball Spacer | Competitor Ball Chain |
|-----------------------------|--|--|
| Internal Forces | No tensile load | Tensile load on spacer links |
| Quality | Automatic inspection of each spacer element | Optical inspection not possible without bending link |
| Balltrack clearances | Any clearance between balls and spacers is minimized during assembly | Spacer link tolerances leads to undefined clearances |
| Push Force | Slight increase in push force | Significant increase in push force |
| Reliability | Fewer elements = fewer failure modes | Broken link elements can block re-circulation path |

500 Series Ball

Part Numbering Description

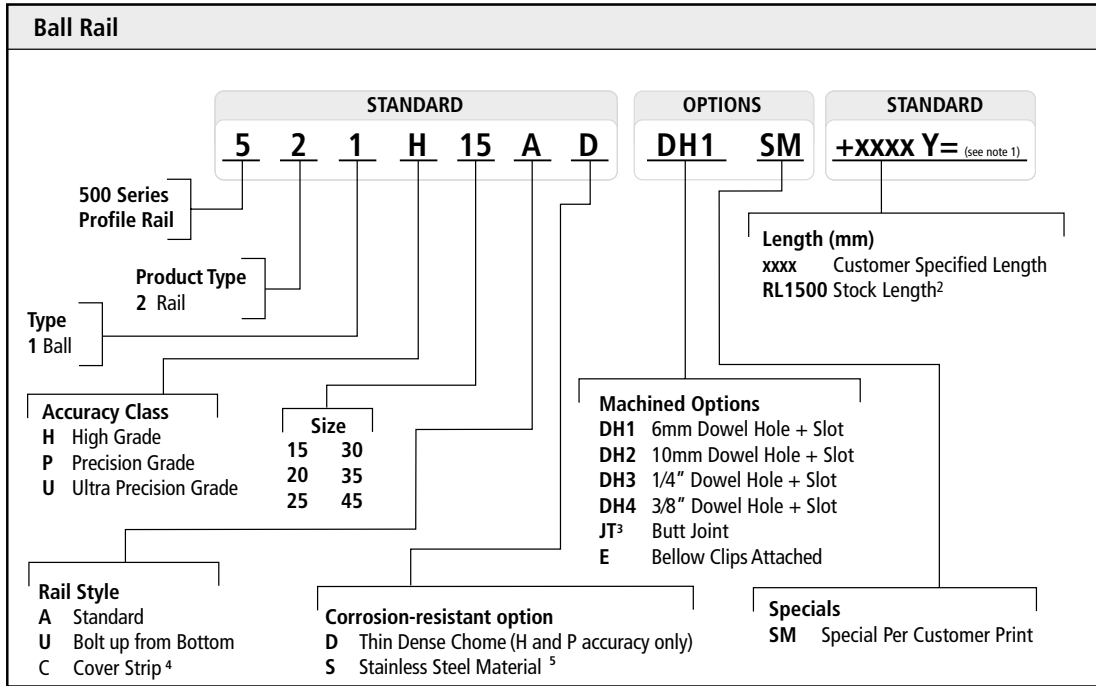


- Accessory combination part numbers are listed from carriage end cap outward. Not all combinations are available. For specific combination availability see pages 35-36.
- The 500 Series Ball lowest accuracy grade is High as a result of tight manufacturing controls and grinding capabilities. We do not offer Normal grade accuracy, our High grade is our Normal grade.
- New enhanced carriage does not retain ball bearings when end cap is removed. Removal of end caps can result in loss of ball bearings.
- Ball Spacer carriage not available in size 15.

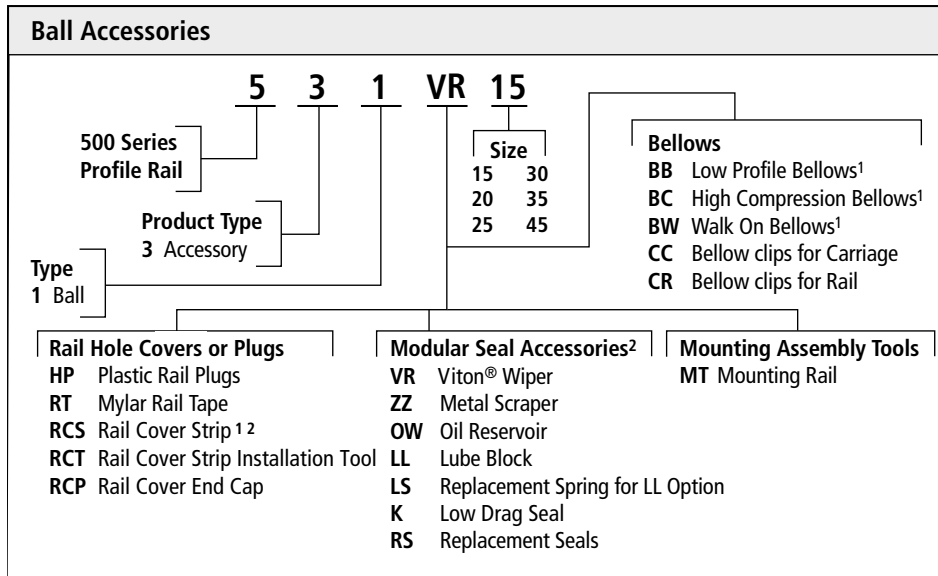
Assemblies are available, please see page 124 for assembly part number details.

500 Series Ball

Part Numbering Description



- Y = Distance from end of rail to center of first mounting hole, Y1 = Y2 unless specified
- Stock length rails are considered random length, total length may exceed specified length, and Y1/Y2 are not equal. To be used by customer who will cut to length.
- Customer drawing required at time of quote and order. See page 122 for more information and templates.
- Cover strip rail available in size 25 and up only.
- Available in sizes 15, 20, 25 and 35 only. Max. rail length at 1,000 mm.

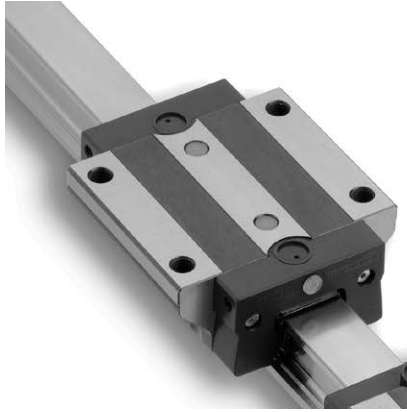


- Bellows and rail cover strip must include length at time of order. Example: 531BB15 + 1000mm. See page 118 on how to calculate bellows length.
- Cover strip rail available in size 25 and up only.
- Two standard screws included with each item. Screws for attaching this accessory to carriage and not combinations of accessories.

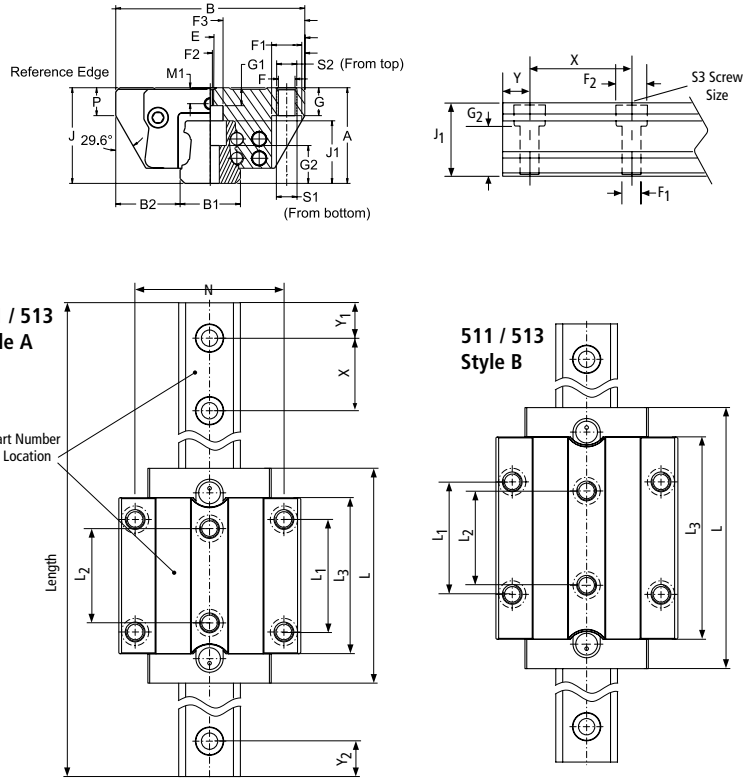
Assemblies are available, please see page 124 for assembly part number details.

500 Series Ball

511 / 513 Style A and B



Stainless Steel Material
(available in sizes 15, 20,
25 and 35 and carriage style
styles A and C only)



511 / 513[†] Style A – Standard Ball

| Size | Dimensions (mm) | | | | | J | J ₁ | L | L ₁ | L ₂ | L ₃ | X | N | S ₁ | S ₂ | S ₃ | F | F ₁ | F ₂ | F ₃ | Ball | | | | | | |
|------|-----------------|-----|-----------------------------|----------------|-------|------|----------------|-------|----------------|----------------|----------------|-----|-----|----------------|----------------|----------------|------|----------------|----------------|----------------|------|----|-----|----------------|----------------|----------------|------|
| | A | B | B ₁ [*] | B ₂ | O | | | | | | | | | | | | | | | | P | Ø | G | G ₁ | G ₂ | M ₁ | O |
| 15 | 24 | 47 | 15 | 16 | ±0.05 | 20.2 | 15.7 | 56.6 | 30 | 26 | 39.6 | 60 | 38 | M 4 | M 5 | M 4 | 4.4 | 4.5 | 8 | 7.5 | 3.2 | 7 | 4.5 | 9.5 | 4 | 7 | 7 |
| 20 | 30 | 63 | 20 | 21.5 | ±0.05 | 25.5 | 19 | 71.5 | 40 | 35 | 49.5 | 60 | 53 | M 5 | M 6 | M 5 | 5.4 | 5.8 | 10 | 9.5 | 4.0 | 8 | 6.5 | 11.5 | 5.2 | 8 | 8 |
| 25 | 36 | 70 | 23 | 23.5 | ±0.05 | 30.5 | 22.7 | 84.5 | 45 | 40 | 59.5 | 60 | 57 | M 6 | M 8 | M 6 | 6.8 | 7 | 11 | 11 | 4.8 | 9 | 8.7 | 14 | 5.5 | 7 | 11 |
| 30 | 42 | 90 | 28 | 31 | ±0.05 | 35.9 | 26 | 97.4 | 52 | 44 | 69.4 | 80 | 72 | M 8 | M 10 | M 8 | 8.5 | 9 | 15 | 15 | 5.6 | 12 | 10 | 14.5 | 7 | 8 | 12 |
| 35 | 48 | 100 | 34 | 33 | ±0.05 | 41 | 29.5 | 111.6 | 62 | 52 | 79.6 | 80 | 82 | M 8 | M 10 | M 8 | 8.5 | 9 | 15 | 15 | 6.4 | 12 | 12 | 18 | 7 | 8 | 14 |
| 45 | 60 | 120 | 45 | 37.5 | ±0.05 | 50.8 | 37 | 137.1 | 80 | 60 | 99.1 | 105 | 100 | M 10 | M 12 | M 12 | 10.5 | 14 | 20 | 18 | 7.9 | 15 | 15 | 22 | 8 | 10 | 17.5 |

511 / 513[†] Style B – Standard Long Ball

| Size | Dimensions (mm) | | | | | J | J ₁ | L | L ₁ | L ₂ | L ₃ | X | N | S ₁ | S ₂ | S ₃ | F | F ₁ | F ₂ | F ₃ | Ball | | | | | | |
|------|-----------------|-----|-----------------------------|----------------|-------|------|----------------|-------|----------------|----------------|----------------|-----|-----|----------------|----------------|----------------|------|----------------|----------------|----------------|------|----|-----|----------------|----------------|----------------|------|
| | A | B | B ₁ [*] | B ₂ | O | | | | | | | | | | | | | | | | P | Ø | G | G ₁ | G ₂ | M ₁ | O |
| 20 | 30 | 63 | 20 | 21.5 | ±0.05 | 25.5 | 19 | 87.5 | 40 | 35 | 65.5 | 60 | 53 | M 5 | M 6 | M 5 | 5.4 | 5.8 | 10 | 9.5 | 4.0 | 8 | 6.5 | 11.5 | 5.2 | 8 | 8 |
| 25 | 36 | 70 | 23 | 23.5 | ±0.05 | 30.5 | 22.7 | 103.5 | 45 | 40 | 78.5 | 60 | 57 | M 6 | M 8 | M 6 | 6.8 | 7 | 11 | 11 | 4.8 | 9 | 8 | 14 | 5.5 | 7 | 11 |
| 30 | 42 | 90 | 28 | 31 | ±0.05 | 35.9 | 26 | 119.4 | 52 | 44 | 91.4 | 80 | 72 | M 8 | M 10 | M 8 | 8.5 | 9 | 15 | 15 | 5.6 | 12 | 10 | 14.5 | 7 | 8 | 12 |
| 35 | 48 | 100 | 34 | 33 | ±0.05 | 41 | 29.5 | 137.1 | 62 | 52 | 105.1 | 80 | 82 | M 8 | M 10 | M 8 | 8.5 | 9 | 15 | 15 | 6.4 | 12 | 12 | 18 | 7 | 8 | 14 |
| 45 | 60 | 120 | 45 | 37.5 | ±0.05 | 50.8 | 37 | 168.6 | 80 | 60 | 130.6 | 105 | 100 | M 10 | M 12 | M 12 | 10.5 | 14 | 20 | 18 | 7.9 | 15 | 15 | 22 | 8 | 10 | 17.5 |

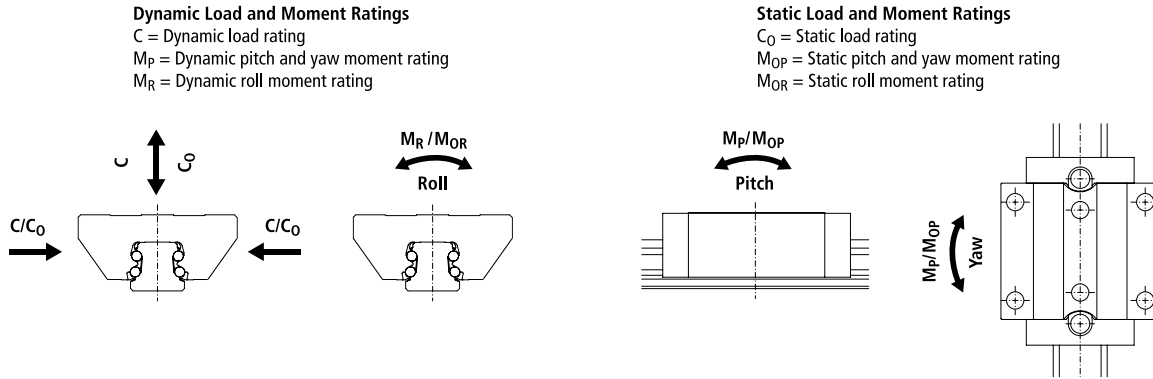
* Standard tolerance shown, special lower tolerances are available upon request. Please consult application engineering for additional information.

† 513 Spacer ball not available in size 15.

†† All thread pitches will be ISO coarse.

500 Series Ball

511 Style A and B



| 511 Style | Size | Load Rating | | | | | | | | | Weights | |
|-----------|---------------------|------------------------|----------------------|--------------------------|------------------------|-------|---------------------|------------------------|-------|-------|---------------|-------------|
| | | Static | | | Dynamic | | | | | | Carriage (kg) | Rail (kg/m) |
| | | C _O (N) | M _{OR} (Nm) | M _{OP, OY} (Nm) | 100 Km | | | 50 Km | | | | |
| C (N) | M _R (Nm) | M _{P, Y} (Nm) | C (N) | M _R (Nm) | M _{P, Y} (Nm) | C (N) | M _R (Nm) | M _{P, Y} (Nm) | | | | |
| A | 15 | 19 600 | 181 | 146 | 9 000 | 83 | 67 | 11 339 | 105 | 84 | 0.2 | 1.4 |
| | 15-S | 19 600 | 181 | 146 | 7 600 | 70 | 57 | 9 576 | 88 | 72 | 0.2 | 1.4 |
| | 20 | 31 400 | 373 | 292 | 14 400 | 171 | 134 | 18 143 | 215 | 169 | 0.5 | 2.2 |
| | 20-S | 31 400 | 373 | 292 | 12 000 | 143 | 112 | 15 120 | 180 | 141 | 0.5 | 2.2 |
| | 25 | 46 100 | 631 | 513 | 21 100 | 289 | 235 | 26 584 | 364 | 296 | 0.7 | 3.0 |
| | 30 | 63 700 | 1 084 | 829 | 29 200 | 497 | 380 | 36 790 | 626 | 479 | 1.2 | 4.3 |
| | 35 | 84 400 | 1 566 | 1 252 | 38 700 | 718 | 574 | 48 759 | 905 | 723 | 1.8 | 5.4 |
| | 45 | 134 800 | 3 193 | 2 498 | 61 900 | 1 466 | 1 147 | 77 989 | 1 847 | 1 445 | 3.3 | 8.8 |
| B | 20 | 41 100 | 490 | 495 | 17 400 | 206 | 208 | 21 923 | 260 | 262 | 0.6 | 2.2 |
| | 25 | 60 300 | 825 | 863 | 25 500 | 349 | 365 | 32 128 | 440 | 460 | 0.9 | 3.0 |
| | 30 | 83 300 | 1 414 | 1 390 | 35 300 | 599 | 589 | 44 475 | 755 | 742 | 1.5 | 4.3 |
| | 35 | 110 300 | 2 048 | 2 104 | 46 700 | 867 | 891 | 58 838 | 1 092 | 1 123 | 2.3 | 5.4 |
| | 45 | 176 300 | 4 175 | 4 199 | 74 700 | 1 769 | 1 779 | 94 116 | 2 229 | 2 241 | 4.2 | 8.8 |

- The dynamic load and moment ratings are based on the travel life specified on the table (100 km or 50 km). When comparing these load ratings with other bearings you must take into consideration the proper travel life basis.
- The static load and moment ratings are the maximum radial load and moment load that should be applied to the bearing when there is no relative motion between the carriage and the rail.
- For 513 Ball Spacer load ratings, contact Thomson Application Engineering.

Bearing Travel Life Comparison

$L = (C/F)^3 \times 100\text{km}$
 where:
 L = travel life, km
 C = 100 km dynamic load rating
 F = applied dynamic load, N

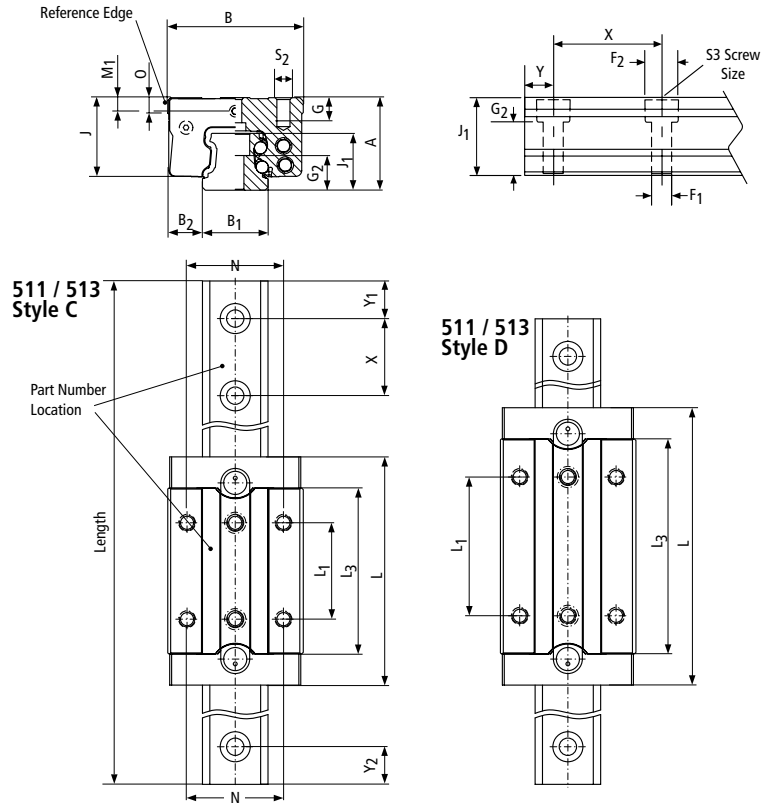
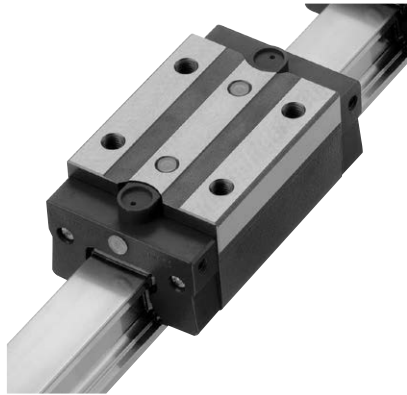
$C_{\min} = F \left(\frac{L}{100}\right)^{1/3}$
 where:
 C_{min} = minimum required dynamic load rating, N
 F = applied dynamic load, N
 L = required travel life, km

Operating Parameters:
Maximum Velocity: 5 m/s
Maximum Acceleration: 100 m/s²
Temperature:
 Min: -40° C
 Max: 80° C
 Max peak: 120° C short time*
 *without bellows

Conversion Factors: See Page 128

500 Series Ball Profile Rail Linear Guide

511 / 513 Style C and D



511 / 513' Style C Narrow

| Size | Dimensions (mm) | | | B ₂ | J | J ₁ | L | L ₁ | L ₃ | X | N | S ₂ /S ₃ | F ₁ | F ₂ | Ball Ø | G | G ₂ | M ₁ | O |
|------|-----------------|-------------------|---------------------------|----------------|------|----------------|-------|----------------|----------------|----|----|--------------------------------|----------------|----------------|--------|----|----------------|----------------|-----|
| | A | B +0.0 -0.4 | B ₁ * +0.05 | | | | | | | | | | | | | | | | |
| 15 | 24 | 34 | 15 | 9.5 | 20.2 | 15.7 | 56.6 | 26 | 39.6 | 60 | 26 | M 4 | 4.5 | 8 | 3.2 | 5 | 9.5 | 4 | 5.5 |
| 20 | 30 | 44 | 20 | 12 | 25.5 | 19 | 71.5 | 36 | 49.5 | 60 | 32 | M 5 | 5.8 | 10 | 4.0 | 7 | 11.5 | 5.2 | 6 |
| 25 | 36 | 48 | 23 | 12.5 | 30.5 | 22.7 | 84.5 | 35 | 59.5 | 60 | 35 | M 6 | 7 | 11 | 4.8 | 9 | 14 | 5.5 | 7.5 |
| 30 | 42 | 60 | 28 | 16 | 35.9 | 26 | 97.4 | 40 | 69.4 | 80 | 40 | M 8 | 9 | 15 | 5.6 | 11 | 14.5 | 7 | 8 |
| 35 | 48 | 70 | 34 | 18 | 41 | 29.5 | 111.6 | 50 | 79.6 | 80 | 50 | M 8 | 9 | 15 | 6.4 | 12 | 18 | 7 | 8 |

511 / 513' Style D Narrow Long

| Size | Dimensions (mm) | | | B ₂ | J | J ₁ | L | L ₁ | L ₃ | X | N | S ₂ /S ₃ | F ₁ | F ₂ | Ball Ø | G | G ₂ | M ₁ | O |
|------|-----------------|-------------------|---------------------------|----------------|------|----------------|-------|----------------|----------------|----|----|--------------------------------|----------------|----------------|--------|----|----------------|----------------|-----|
| | A | B +0.0 -0.4 | B ₁ * +0.05 | | | | | | | | | | | | | | | | |
| 20 | 30 | 44 | 20 | 12 | 25.5 | 19 | 87.5 | 50 | 65.5 | 60 | 32 | M 5 | 5.8 | 10 | 4.0 | 7 | 11.5 | 5.2 | 6 |
| 25 | 36 | 48 | 23 | 12.5 | 30.5 | 22.7 | 103.5 | 50 | 78.5 | 60 | 35 | M 6 | 7 | 11 | 4.8 | 9 | 14 | 5.5 | 7.5 |
| 30 | 42 | 60 | 28 | 16 | 35.9 | 26 | 119.4 | 60 | 91.4 | 80 | 40 | M 8 | 9 | 15 | 5.6 | 11 | 14.5 | 7 | 8 |
| 35 | 48 | 70 | 34 | 18 | 41 | 29.5 | 137.1 | 72 | 105.1 | 80 | 50 | M 8 | 9 | 15 | 6.4 | 12 | 18 | 7 | 8 |

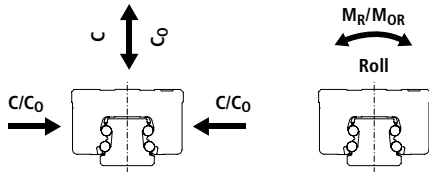
* Standard tolerance shown, special lower tolerances are available upon request. Please consult application engineering for additional information.
 † 513 Spacer ball not available in size 15.

500 Series Ball

511 Style C and D

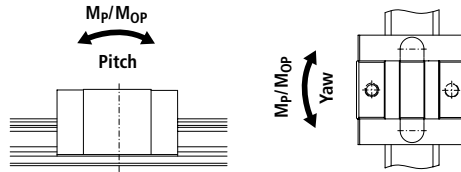
Dynamic Load and Moment Ratings

C = Dynamic load rating
M_P = Dynamic pitch and yaw moment rating
M_R = Dynamic roll moment rating



Static Load and Moment Ratings

C₀ = Static load rating
M_{OP} = Static pitch and yaw moment rating
M_{OR} = Static roll moment rating



| 511 Style | Size | Load Rating | | | | | | | | | Weights | |
|-----------|---------------------|------------------------|----------------------|--------------------------|------------------------|-------|---------------------|------------------------|-------|-------|---------------|-------------|
| | | Static | | | Dynamic | | | | | | Carriage (kg) | Rail (kg/m) |
| | | C ₀ (N) | M _{OR} (Nm) | M _{OP, OY} (Nm) | 100 Km | | | 50 Km | | | | |
| C (N) | M _R (Nm) | M _{P, Y} (Nm) | C (N) | M _R (Nm) | M _{P, Y} (Nm) | C (N) | M _R (Nm) | M _{P, Y} (Nm) | | | | |
| C | 15 | 19 600 | 181 | 146 | 9 000 | 83 | 67 | 11 339 | 105 | 84 | 0.2 | 1.4 |
| | 15-S | 19 600 | 181 | 146 | 7 600 | 70 | 57 | 9 576 | 88 | 106 | 0.2 | 1.4 |
| | 20 | 31 400 | 373 | 292 | 14 400 | 171 | 134 | 18 143 | 215 | 169 | 0.5 | 2.2 |
| | 20-S | 31 400 | 373 | 292 | 12 000 | 143 | 112 | 15 120 | 180 | 141 | 0.5 | 2.2 |
| | 25 | 46 100 | 631 | 513 | 21 100 | 289 | 235 | 26 584 | 364 | 296 | 0.7 | 3.0 |
| | 30 | 63 700 | 1 084 | 829 | 29 200 | 497 | 380 | 36 790 | 626 | 479 | 1.2 | 4.3 |
| | 35 | 84 400 | 1 566 | 1 252 | 38 700 | 718 | 574 | 48 759 | 905 | 723 | 1.8 | 5.4 |
| D | 20 | 41 100 | 490 | 495 | 17 400 | 206 | 208 | 21 923 | 260 | 262 | 0.6 | 2.2 |
| | 25 | 60 300 | 825 | 863 | 25 500 | 349 | 365 | 32 128 | 440 | 460 | 0.9 | 3.0 |
| | 30 | 83 300 | 1 414 | 1 390 | 35 300 | 599 | 589 | 44 475 | 755 | 742 | 1.5 | 4.3 |
| | 35 | 110 300 | 2 048 | 2 104 | 46 700 | 867 | 891 | 58 838 | 1 092 | 1 123 | 2.3 | 5.4 |

1. The dynamic load and moment ratings are based on the travel life specified on the table (100 km or 50 km). When comparing these load ratings with other bearings you must take into consideration the proper travel life basis.

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

3. For 513 Ball Spacer load ratings, contact Thomson Application Engineering.

Bearing Travel Life Comparison

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

where:

L = travel life, km

C = 100 km dynamic load rating

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:

5 m/s

Maximum Acceleration:

100 m/s²

Temperature:

Min: -40° C

Max: 80° C

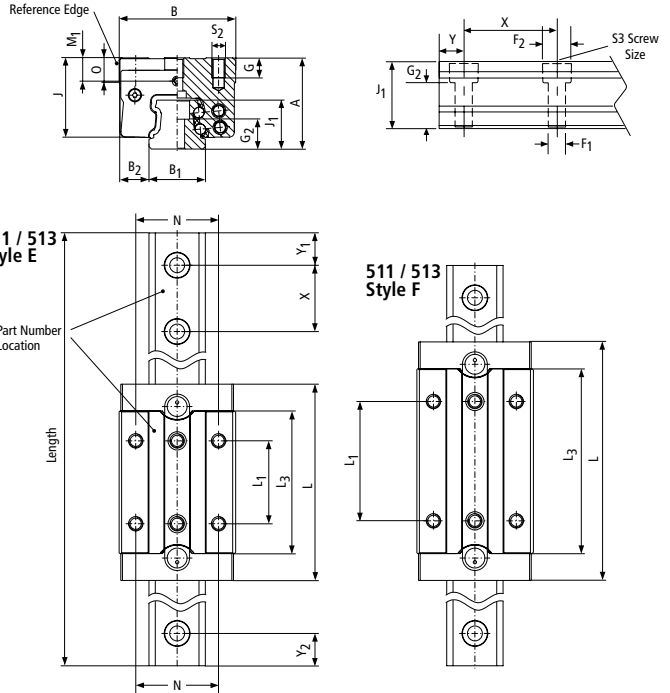
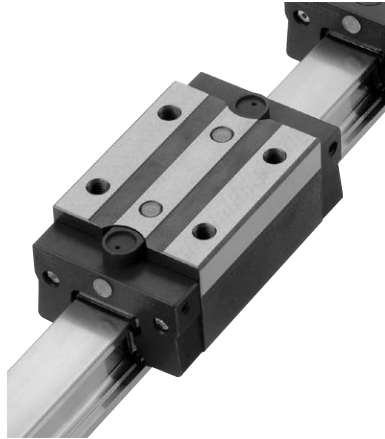
Max peak: 120° C short time*

*without bellows

Conversion Factors: See Page 128

500 Series Ball Profile Rail Linear Guide

511 / 513 Style E and F



511 / 513[†] Style E Narrow High

| Size | Dimensions (mm) | | | B ₂ | J | J ₁ | L | L ₁ | L ₃ | X | N | S ₂ /S ₃ | F ₁ | F ₂ | Ball Ø | G | G ₂ | M ₁ | O |
|------|-----------------|----|-----------------------------|----------------|------|----------------|-------|----------------|----------------|-----|----|--------------------------------|----------------|----------------|--------|----|----------------|----------------|----|
| | A | B | B ₁ [*] | | | | | | | | | | | | | | | | |
| 15 | 28 | 34 | 15 | 9.5 | 24.2 | 15.7 | 56.6 | 26 | 39.6 | 60 | 26 | M 4 | 4.5 | 8 | 3.2 | 6 | 9.5 | 8 | 6 |
| 25 | 40 | 48 | 23 | 12.5 | 34.5 | 22.7 | 84.5 | 35 | 59.5 | 60 | 35 | M 6 | 7 | 11 | 4.8 | 9 | 14 | 9.5 | 11 |
| 30 | 45 | 60 | 28 | 16 | 38.9 | 26 | 97.4 | 40 | 69.4 | 80 | 40 | M 8 | 9 | 15 | 5.6 | 11 | 14.5 | 10 | 11 |
| 35 | 55 | 70 | 34 | 18 | 48 | 29.5 | 111.6 | 50 | 79.6 | 80 | 50 | M 8 | 9 | 15 | 6.4 | 12 | 18 | 14 | 15 |
| 45 | 70 | 86 | 45 | 20.5 | 60.8 | 37 | 137.1 | 60 | 99.1 | 105 | 60 | M 10 | 14 | 20 | 7.9 | 18 | 22 | 18 | 19 |

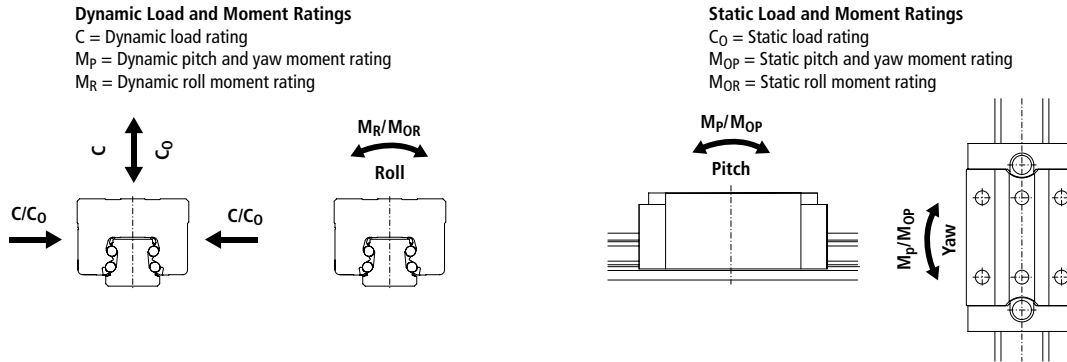
511 / 513[†] Style F Narrow Long High

| Size | Dimensions (mm) | | | B ₂ | J | J ₁ | L | L ₁ | L ₃ | X | N | S ₂ /S ₃ | F ₁ | F ₂ | Ball Ø | G | G ₂ | M ₁ | O |
|------|-----------------|----|-----------------------------|----------------|------|----------------|-------|----------------|----------------|-----|----|--------------------------------|----------------|----------------|--------|----|----------------|----------------|----|
| | A | B | B ₁ [*] | | | | | | | | | | | | | | | | |
| 25 | 40 | 48 | 23 | 12.5 | 34.5 | 22.7 | 103.5 | 50 | 78.5 | 60 | 35 | M 6 | 7 | 11 | 4.8 | 9 | 14 | 9.5 | 11 |
| 30 | 45 | 60 | 28 | 16 | 38.9 | 26 | 119.4 | 60 | 91.4 | 80 | 40 | M 8 | 9 | 15 | 5.6 | 11 | 14.5 | 10 | 11 |
| 35 | 55 | 70 | 34 | 18 | 48 | 29.5 | 137.1 | 72 | 105.1 | 80 | 50 | M 8 | 9 | 15 | 6.4 | 12 | 18 | 14 | 15 |
| 45 | 70 | 86 | 45 | 20.5 | 60.8 | 37 | 168.6 | 80 | 130.6 | 105 | 60 | M 10 | 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.
 † 513 Spacer ball not available in size 15.

500 Series Ball

511 Style E and F



| 511 Style | Size | Load Rating | | | | | | | | | Weights | |
|-----------|------|--------------------|----------------------|--------------------------|---------|---------------------|------------------------|--------|---------------------|------------------------|---------------|-------------|
| | | Static | | | Dynamic | | | | | | Carriage (kg) | Rail (kg/m) |
| | | C ₀ (N) | M _{OR} (Nm) | M _{OP, OY} (Nm) | 100 Km | | | 50 Km | | | | |
| | | | | | C (N) | M _R (Nm) | M _{P, Y} (Nm) | C (N) | M _R (Nm) | M _{P, Y} (Nm) | | |
| E | 15 | 19 600 | 181 | 146 | 9 000 | 83 | 67 | 11 339 | 105 | 84 | 0.2 | 1.4 |
| | 25 | 46 100 | 631 | 513 | 21 100 | 289 | 235 | 26 584 | 364 | 296 | 0.5 | 2.2 |
| | 30 | 63 700 | 1 084 | 829 | 29 200 | 497 | 380 | 36 790 | 626 | 479 | 0.7 | 3.0 |
| | 35 | 84 400 | 1 566 | 1 252 | 38 700 | 718 | 574 | 48 759 | 905 | 723 | 1.2 | 4.3 |
| | 45 | 134 800 | 3 193 | 2 498 | 61 900 | 1 466 | 1 147 | 77 989 | 1 847 | 1 445 | 1.8 | 5.4 |
| F | 25 | 60 300 | 825 | 863 | 25 500 | 349 | 365 | 32 128 | 440 | 460 | 0.6 | 2.2 |
| | 30 | 83 300 | 1 414 | 1 390 | 35 300 | 599 | 589 | 44 475 | 755 | 742 | 0.9 | 3.0 |
| | 35 | 110 300 | 2 048 | 2 104 | 46 700 | 867 | 891 | 58 838 | 1 092 | 1 123 | 1.5 | 4.3 |
| | 45 | 176 300 | 4 175 | 4 199 | 74 700 | 1 769 | 1 779 | 94 116 | 2 229 | 2 241 | 2.3 | 5.4 |

1. The dynamic load and moment ratings are based on the travel life specified on the table (100 km or 50 km). When comparing these load ratings with other bearings you must take into consideration the proper travel life basis.

2. The static load and moment ratings are the maximum radial load and moment load that should be applied to the bearing when there is no relative motion between the carriage and the rail.
 3. For 513 Ball Spacer load ratings, contact Thomson Application Engineering.

Bearing Travel Life Calculation

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

where:

L = travel life, km

C = 100 km dynamic load rating

F = applied dynamic load, N

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

where:

C_{min} = 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/s²

Temperature:

Min: - 40° C

Max: 80° C

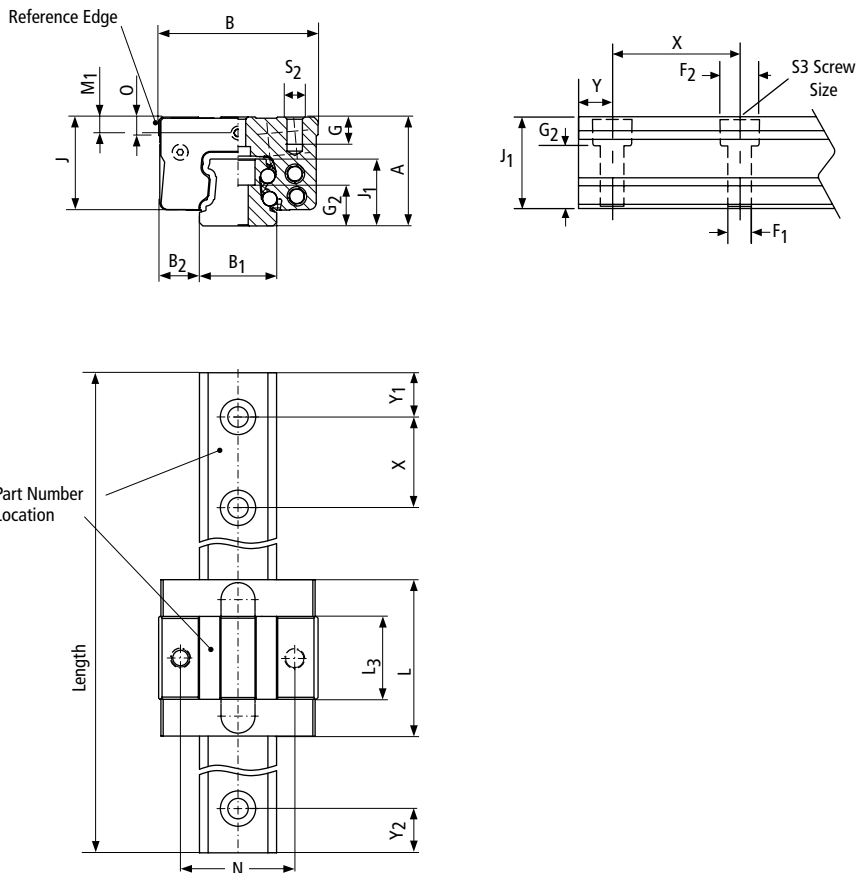
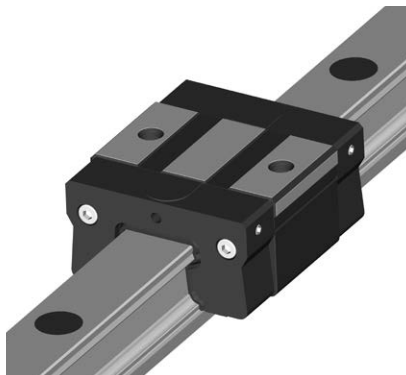
Max peak: 120° C short time*

*without bellows

Conversion Factors: See Page 128

500 Series Ball Profile Rail Linear Guide

511 Style G



511 Style G Narrow Short

| Size | Dimensions (mm) | | | | J | J ₁ | L | L ₃ | X | N | s ₂ /s ₃ | F ₁ | F ₂ | Ball Ø | G | G ₂ | M ₁ | O |
|------|-----------------|-------------------|--------------------------------------|----------------|------|----------------|------|----------------|----|----|--------------------------------|----------------|----------------|--------|---|----------------|----------------|---|
| | A | B +0.0 -0.4 | B ₁ [*] +0.05 | B ₂ | | | | | | | | | | | | | | |
| 15 | 24 | 34 | 15 | 9.5 | 20.2 | 15.7 | 37.6 | 20.6 | 60 | 26 | M4 | 4.5 | 8 | 3.2 | 6 | 9.5 | 4 | 6 |
| 20 | 28 | 44 | 20 | 12 | 23.5 | 19 | 47.7 | 25.7 | 60 | 32 | M5 | 5.8 | 10 | 4.0 | 6 | 11.5 | 4.2 | 4 |

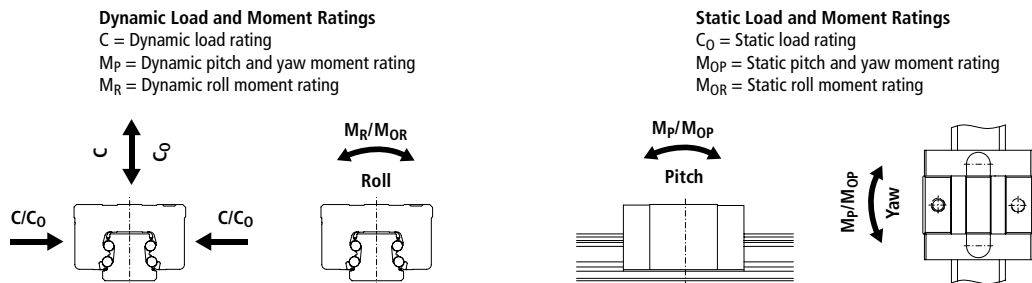
* Standard tolerance shown, special lower tolerances are available upon request. Please consult application engineering for additional information.

** When using additional modular seals or lubrication plates, the total length L will increase. Consult page 35-36 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 G



| Style | Size | Load Rating | | | | | | | | | Weights | |
|-------|------|--------------------|----------------------|--------------------------|---------|---------------------|------------------------|--------|---------------------|------------------------|---------------|-------------|
| | | Static | | | Dynamic | | | | | | Carriage (kg) | Rail (kg/m) |
| | | C ₀ (N) | M _{OR} (Nm) | M _{OP, OY} (Nm) | 100 Km | | | 50 Km | | | | |
| | | | | | C (N) | M _R (Nm) | M _{P, Y} (Nm) | C (N) | M _R (Nm) | M _{P, Y} (Nm) | | |
| G | 15 | 8 500 | 78 | 30 | 5 200 | 48 | 18 | 6 552 | 60 | 23 | 0.2 | 1.4 |
| | 20 | 13 100 | 150 | 58 | 8 400 | 99 | 37 | 10 583 | 125 | 47 | 0.5 | 2.2 |

- The dynamic load and moment ratings are based on the travel life specified on the table (100 km or 50 km). When comparing these load ratings with other bearings you must take into consideration the proper travel life basis.
- The static load and moment ratings are the maximum radial load and moment load that should be applied to the bearing when there is no relative motion between the carriage and the rail.
- Deflection charts are available on www.thomsonlinear.com.

Bearing Travel Life Calculation

$L = (C/F)^3 \times 100 \text{ km}$
 where:
 L = travel life, km
 C = 100 km dynamic load rating
 F = applied dynamic load, N

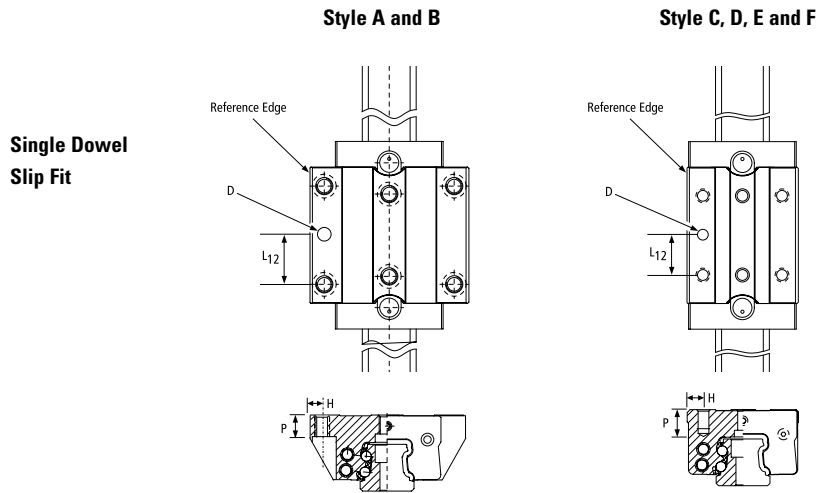
$C_{\min} = F \left(\frac{L}{100}\right)^{1/3}$
 where:
 C_{min} = minimum required dynamic load rating, N
 F = applied dynamic load, N
 L = required travel life, km

Operating Parameters:
Maximum Velocity: 5 m/s
Maximum Acceleration: 100 m/s²
Temperature:
 Min: - 40° C
 Max: 80° C
 Max peak: 120° C short time*
 *without bellows

Conversion Factors: See Page 128

Carriage Dowel Holes

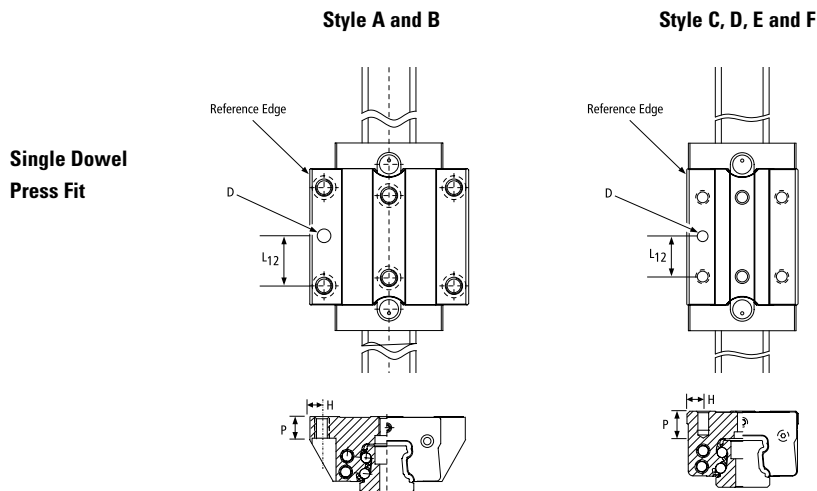
Dowel holes are commonly used to ensure proper alignment during installation and replacement of carriages and rails. The standard slip fit dowel hole options for the 500 series Standard Ball Carriages are:



| 511 | | L ₁₂ | ES1 | | | ES2 | | | ES3 | | | ES4 | | |
|--------|------|-----------------|-----|-----|----|-----|----|----|------|-----|----|------|----|----|
| Style | Size | | ØD | H | P | ØD | H | P | ØD | H | P | ØD | H | 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 | — | — | — | 10 | 9 | 14 | — | — | — | 3/8" | 9 | 14 |
| 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 | — | — | — | 10 | 9 | 14 | — | — | — | 3/8" | 9 | 14 |
| | 45 | 40 | — | — | — | 10 | 10 | 18 | — | — | — | 3/8" | 10 | 18 |
| Type C | 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 | — | — | — | 10 | 10 | 12 | — | — | — | 3/8" | 10 | 12 |
| Type D | 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 | — | — | — | 10 | 10 | 12 | — | — | — | 3/8" | 10 | 12 |
| Type E | 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 | — | — | — | 10 | 10 | 12 | — | — | — | 3/8" | 10 | 12 |
| | 45 | 30 | — | — | — | 10 | 13 | 12 | — | — | — | 3/8" | 13 | 12 |
| Type F | 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 | — | — | — | 10 | 10 | 12 | — | — | — | 3/8" | 10 | 12 |
| | 45 | 40 | — | — | — | 10 | 13 | 12 | — | — | — | 3/8" | 13 | 12 |

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

Carriage Dowel Holes (continued)

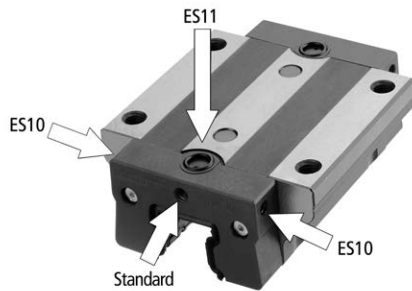


| 511 | | L ₁₂ | ES12 | | | ES13 | | | ES14 | | | ES15 | | |
|--------|------|-----------------|------|-----|----|------|----|----|------|-----|----|------|----|----|
| Style | Size | | ØD | H | P | ØD | H | P | ØD | H | P | ØD | H | P |
| Type A | 15 | 15 | 6 | 4.5 | 7 | — | — | — | 1/4" | 4.5 | 7 | — | — | — |
| | 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 | — | — | — | 10 | 9 | 14 | — | — | — | 3/8" | 9 | 14 |
| Type B | 45 | 40 | — | — | — | 10 | 10 | 18 | — | — | — | 3/8" | 10 | 18 |
| | 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 | — | — | — | 10 | 9 | 14 | — | — | — | 3/8" | 9 | 14 |
| Type C | 45 | 40 | — | — | — | 10 | 10 | 18 | — | — | — | 3/8" | 10 | 18 |
| | 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 |
| Type D | 35 | 25 | — | — | — | 10 | 10 | 12 | — | — | — | 3/8" | 10 | 12 |
| | 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 | — | — | — | 10 | 10 | 12 | — | — | — | 3/8" | 10 | 12 |
| Type E | 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 |
| | 45 | 30 | 6 | 13 | 12 | 10 | 13 | 12 | 1/4" | 13 | 12 | 3/8" | 13 | 12 |
| Type F | 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 | — | — | — | 10 | 10 | 12 | — | — | — | 3/8" | 10 | 12 |
| | 45 | 40 | — | — | — | 10 | 13 | 12 | — | — | — | 3/8" | 13 | 12 |

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

Lubrication Inlet Options

The standard 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 in the field or can be supplied factory direct (Standard inlet hole is M3 for 15mm, M6 for 20mm, 25mm, 30mm 35mm, 45mm). See page 70 for available lubrication fittings.



Option

ES10 Inlets on side – both ends– all sides

ES11 Inlet on top* – both ends

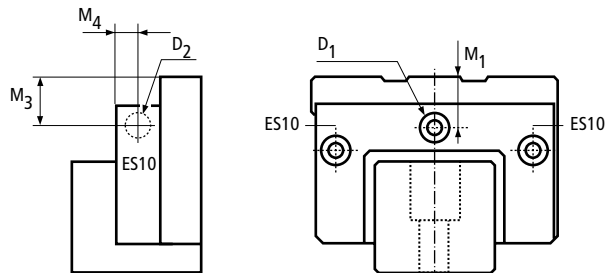
Notes:

- *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 M3 x 1.78mm thick. Size 20–45 O-ring ID M6 x 1.78mm thick.
- Set screw is installed in Standard inlet hole when ES10 and ES11 options are specified.
- Inlets on side and top are solid plugs. When modified on-site, inlets must be punctured to be utilized.

Lubrication inlet locates standard and ES10 option.

| Size | Style | M1 | M3 | M4 | D1 | D2 |
|------|-------|-----|-----|-----|----|----|
| 15 | A | 4 | 4 | 4 | M3 | M3 |
| | C | 8 | 8 | | | |
| | E | 8 | 8 | | | |
| | G | 4 | 4 | | | |
| 20 | A | 5.2 | 5.2 | 5.2 | M6 | M3 |
| | B | | | | | |
| | C | | | | | |
| | D | | | | | |
| | G | | | | | |
| 25 | A | 5.5 | 5.5 | 6 | M6 | M6 |
| | B | | | | | |
| | C | | | | | |
| | D | | | | | |
| | E | | | | | |
| | F | | | | | |
| 30 | A | 7 | 7 | 6 | M6 | M6 |
| | B | | | | | |
| | C | | | | | |
| | D | | | | | |
| | E | | | | | |
| | F | | | | | |
| 35 | A | 7 | 7 | 6 | M6 | M6 |
| | B | | | | | |
| | C | | | | | |
| | D | | | | | |
| | E | | | | | |
| | F | | | | | |
| 45 | A | 8 | 8 | 7.5 | M6 | M6 |
| | B | | | | | |
| | E | | | | | |
| | F | | | | | |

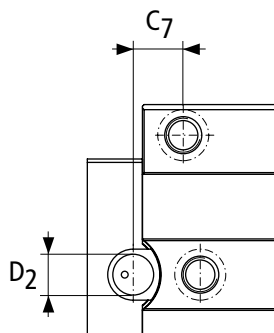
All dimensions in mm unless specified.



- D1 and D2 are threaded holes in the end cap to ensure proper integrity and durability of connection.
- Carriages are shipped with a grease fitting in the box. Size 15 include fitting 530LF3, Size 20 and up include fitting 530LN. See page 70 for more information.

Lubrication inlet location ES11 option

| Size | Style | C7 | D1 | D2 | D3 | D4 |
|------|-------|--------|------|----|------|----|
| 15 | A | 8.000 | 4.47 | 8 | 1.78 | 4 |
| | C | 10.000 | | | | |
| | E | 10.000 | | | | |
| 20 | A | 10.500 | 6.75 | 10 | 1.78 | 6 |
| | B | 18.500 | | | | |
| | C | 12.500 | | | | |
| | D | 13.500 | | | | |
| 25 | A | 13.200 | 8.75 | 12 | 1.78 | 8 |
| | B | 22.700 | | | | |
| | C | 18.200 | | | | |
| | D | 20.200 | | | | |
| | E | 18.200 | | | | |
| | F | 20.200 | | | | |
| 30 | A | 13.200 | 8.75 | 12 | 1.78 | 8 |
| | B | 22.700 | | | | |
| | C | 18.200 | | | | |
| | D | 20.200 | | | | |
| | E | 18.200 | | | | |
| | F | 20.200 | | | | |
| 35 | A | 14.500 | 8.75 | 12 | 1.78 | 8 |
| | B | 27.250 | | | | |
| | C | 20.500 | | | | |
| | D | 22.250 | | | | |
| | E | 20.500 | | | | |
| | F | 22.250 | | | | |
| 45 | A | 17.000 | 8.75 | 12 | 1.78 | 8 |
| | B | 32.750 | | | | |
| | E | 27.000 | | | | |
| | F | 32.750 | | | | |



- D1** = O-Ring internal diameter
- D2** = Counterbore diameter
- D3** = O-Ring thickness
- D4** = Max. recommended diameter of lubrication inlet from above plate

All dimensions in mm.

Grease Lubricants

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

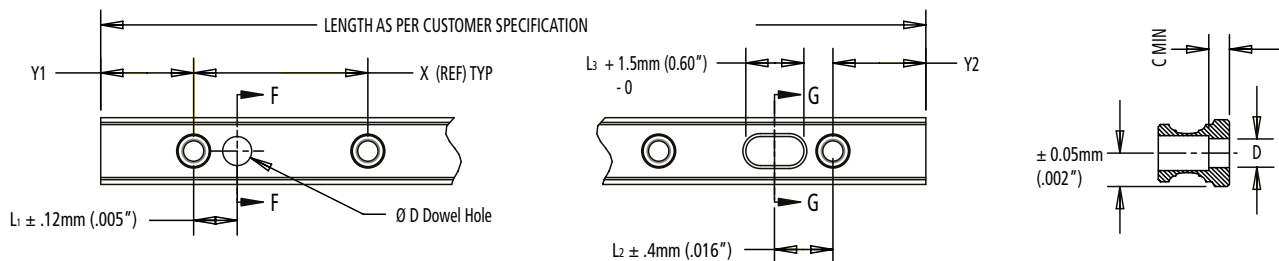
| Option | Type | Notes | Viscosity | Temperature Range |
|--------|-------------------------------------|---------------------------|--------------|-------------------|
| G1 | Mobilux® EP2 | All purpose NLG I2 grease | 160cSt @40°C | -20°C to 130°C |
| G2 | Krytox® GPL227 | High Temperature NLG I2 | 440cSt @40°C | -30°C to 288°C |
| G3 | Thomson LinearLube | Food Grade NLG I2 grease | 350cSt @40°C | -54°C to 230°C |
| GS | Customer specified at time of order | | | |

Rail Length

Maximum Length of One Piece Rail

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

Extended Standard Rail Options



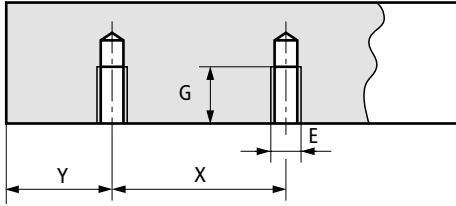
| Option | D | L1 | L2 | L3 | C |
|--------|------|--------|--------|---------|--------|
| DH1 | 6mm | 30mm | 30mm | 10.2 mm | 9.5 mm |
| DH2 | 10mm | 30mm | 30mm | 13.8 mm | 9.5 mm |
| DH3 | 1/4" | 1.181" | 1.181" | .542" | 3/8" |
| DH4 | 3/8" | 1.181" | 1.181" | .542" | 3/8" |

Y1 = Y2 unless specified at time of ordering

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

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

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 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 3 meters long as a single rail; longer lengths require butt joints.

Carriage assortment with Thin Dense Chrome

| Type | Style | Size | Accuracy | Clearance | Preload | | |
|------|-------|-----------|-----------|-----------|-----------|-----------|-----------|
| | | | | | 0.03C | 0.08C | 0.13C |
| 511 | A | 15 | H | 511H15A0D | 511H15A1D | 511H15A2D | - |
| | | | P | - | 511P15A1D | 511P15A2D | 511P15A3D |
| | | 20 | H | 511H20A0D | 511H20A1D | 511H20A2D | - |
| | | | P | - | 511P20A1D | 511P20A2D | 511P20A3D |
| | | 25 | H | 511H25A0D | 511H25A1D | 511H25A2D | - |
| | | | P | - | 511P25A1D | 511P25A2D | 511P25A3D |
| | | 30 | H | 511H30A0D | 511H30A1D | 511H30A2D | - |
| | | | P | - | 511P30A1D | 511P30A2D | 511P30A3D |
| | | 35 | H | 511H35A0D | 511H35A1D | 511H35A2D | - |
| | | | P | - | 511P35A1D | 511P35A2D | 511P35A3D |
| | | 45 | H | 511H45A0D | 511H45A1D | 511H45A2D | - |
| | | | P | - | 511P45A1D | 511P45A2D | 511P45A3D |
| | B | 20 | H | 511H20B0D | 511H20B1D | 511H20B2D | - |
| | | | P | - | 511P20B1D | 511P20B2D | 511P20B3D |
| | | 25 | H | 511H25B0D | 511H25B1D | 511H25B2D | - |
| | | | P | - | 511P25B1D | 511P25B2D | 511P25B3D |
| | | 30 | H | 511H30B0D | 511H30B1D | 511H30B2D | - |
| | | | P | - | 511P30B1D | 511P30B2D | 511P30B3D |
| | | 35 | H | 511H35B0D | 511H35B1D | 511H35B2D | - |
| | | | P | - | 511P35B1D | 511P35B2D | 511P35B3D |
| | | 45 | H | 511H45B0D | 511H45B1D | 511H45B2D | - |
| | | | P | - | 511P45B1D | 511P45B2D | 511P45A3D |
| | | H | 511H15C0D | 511H15C1D | 511H15C2D | - | |
| | | | P | - | 511P15C1D | 511P15C2D | 511P15C3D |
| 20 | H | 511H20C0D | 511H20C1D | 511H20C2D | - | | |
| | P | - | 511P20C1D | 511P20C2D | 511P20C3D | | |
| 25 | H | 511H25C0D | 511H25C1D | 511H25C2D | - | | |
| | P | - | 511P25C1D | 511P25C2D | 511P25C3D | | |
| 30 | H | 511H30C0D | 511H30C1D | 511H30C2D | - | | |
| | P | - | 511P30C1D | 511P30C2D | 511P30C3D | | |
| 35 | H | 511H35C0D | 511H35C1D | 511H35C2D | - | | |
| | P | - | 511P35C1D | 511P35C2D | 511P35C3D | | |

| Type | Style | Size | Accuracy | Clearance | Preload | | | |
|------|-------|------|----------|-----------|-----------|-----------|-----------|-----------|
| | | | | | 0.03C | 0.08C | 0.13C | |
| 511 | D | 20 | H | 511H20D0D | 511H20D1D | 511H20D2D | - | |
| | | | P | - | 511P20D1D | 511P20D2D | 511P20D3D | |
| | | 25 | H | 511H25D0D | 511H25D1D | 511H25D2D | - | |
| | | | P | - | 511P25D1D | 511P25D2D | 511P25D3D | |
| | | 30 | H | 511H30D0D | 511H30D1D | 511H30D2D | - | |
| | | | P | - | 511P30D1D | 511P30D2D | 511P30D3D | |
| | | 35 | H | 511H35D0D | 511H35D1D | 511H35D2D | - | |
| | | | P | - | 511P35D1D | 511P35D2D | 511P35D3D | |
| | | E | 15 | H | 511H15E0D | 511H15E1D | 511H15E2D | - |
| | | | | P | - | 511P15E1D | 511P15E2D | 511P15E3D |
| | | | 25 | H | 511H25E0D | 511H25E1D | 511H25E2D | - |
| | | | | P | - | 511P25E1D | 511P25E2D | 511P25E3D |
| | 30 | | H | 511H30E0D | 511H30E1D | 511H30E2D | - | |
| | | | P | - | 511P30E1D | 511P30E2D | 511P30E3D | |
| | 35 | | H | 511H35E0D | 511H35E1D | 511H35E2D | - | |
| | | | P | - | 511P35E1D | 511P35E2D | 511P35E3D | |
| | F | | 25 | H | 511H25F0D | 511H25F1D | 511H25F2D | - |
| | | | | P | - | 511P25F1D | 511P25F2D | 511P25F3D |
| | | | 30 | H | 511H30F0D | 511H30F1D | 511H30F2D | - |
| | | | | P | - | 511P30F1D | 511P30F2D | 511P30F3D |
| | | 35 | H | 511H35F0D | 511H35F1D | 511H35F2D | - | |
| | | | P | - | 511P35F1D | 511P35F2D | 511P35F3D | |
| | | 45 | H | 511H45F0D | 511H45F1D | 511H45F2D | - | |
| | | | P | - | 511P45F1D | 511P45F2D | 511P45F3D | |
| G | | 15 | H | 511H15G0D | 511H15G1D | 511H15G2D | - | |
| | | | P | - | 511P15G1D | 511P15G2D | 511P15G3D | |
| | | 20 | H | 511H20G0D | 511H20G1D | 511H20G2D | - | |
| | | | P | - | 511P20G1D | 511P20G2D | 511P20G3D | |

Chrome plated carriages and rails are designed and manufactured to be used together. If a non-chrome plated carriage is used on a chrome plated rail the clearance or preload of the carriage will be increased approximately one class. If a chrome plated carriage is used on a non-chrome plated rail the clearance or preload will be decreased approximately one class. This is the result of the coating thickness.

Modular Accessory Combination Options and Screw Size

| Option | Description | Size | | | | | |
|----------------|--|------------------------|--------------|------------------------|--------------|------------------------|-----------|
| | | 15 | | 20 | | 25 | |
| L ³ | "Lube for Life" Lube Block | Low/socket head screw | M2.5-0.45x20 | Low/socket head screw | M2.5-0.45x25 | Low/socket head screw | M4-0.7x35 |
| N ³ | Oil Reservoir | Low/socket head screw | M2.5-0.45x20 | Low/socket head screw | M2.5-0.45x25 | Low/socket head screw | M4-0.7x30 |
| V ³ | Viton Wiper | Low/socket head screw | M2.5-0.45x20 | Low/socket head screw | M2.5-0.45x20 | Low/socket head screw | M4-0.7x25 |
| Z ³ | Metal Scraper | Low/socket head screw | M2.5-0.45x15 | Low/socket head screw | M2.5-0.45x15 | Low/socket head screw | M4-0.7x20 |
| C ³ | Bellows Clips | Flat/socket head screw | M2.5-0.45x15 | Flat/socket head screw | M2.5-0.45x15 | Flat/socket head screw | M4-0.7x20 |
| LV | Lube Block + Wiper | Low/socket head screw | M2.5-0.45x25 | Low/socket head screw | M2.5-0.45x30 | Low/socket head screw | M4-0.7x35 |
| LVC | Lube Block, Wiper + Bellows Clip | Flat/socket head screw | M2.5-0.45x25 | Flat/socket head screw | M2.5-0.45x30 | Flat/socket head screw | M4-0.7x35 |
| LVZ | Lube Block, Wiper + Scraper | Low/socket head screw | M2.5-0.45x25 | Low/socket head screw | M2.5-0.45x30 | Low/socket head screw | M4-0.7x35 |
| LVZC | Lube Block, Wiper, Scraper + Bellows Clip | Flat/socket head screw | M2.5-0.45x25 | Flat/socket head screw | M2.5-0.45x30 | Flat/socket head screw | M4-0.7x35 |
| LZ | Lube Block + Scraper | Low/socket head screw | M2.5-0.45x20 | Low/socket head screw | M2.5-0.45x25 | Low/socket head screw | M4-0.7x35 |
| LZC | Lube Block, Scraper + Bellows Clip | Flat/socket head screw | M2.5-0.45x20 | Flat/socket head screw | M2.5-0.45x25 | Flat/socket head screw | M4-0.7x35 |
| LC | Lube Block + Bellows Clip | Flat/socket head screw | M2.5-0.45x20 | Flat/socket head screw | M2.5-0.45x25 | Flat/socket head screw | M4-0.7x35 |
| NV | Oil Reservoir + Wiper | Low/socket head screw | M2.5-0.45x30 | Low/socket head screw | M2.5-0.45x30 | Low/socket head screw | M4-0.7x40 |
| NVZ | Oil Reservoir, Wiper + Scraper | Low/socket head screw | M2.5-0.45x30 | Low/socket head screw | M2.5-0.45x35 | Low/socket head screw | M4-0.7x40 |
| NVC | Oil Reservoir, Wiper + Bellows Clip | Flat/socket head screw | M2.5-0.45x30 | Flat/socket head screw | M2.5-0.45x30 | Flat/socket head screw | M4-0.7x40 |
| NVZC | Oil Reservoir, Wiper, Scraper + Bellows Clip | Flat/socket head screw | M2.5-0.45x30 | Flat/socket head screw | M2.5-0.45x35 | Flat/socket head screw | M4-0.7x40 |
| NZ | Oil Reservoir + Scraper | Low/socket head screw | M2.5-0.45x25 | Low/socket head screw | M2.5-0.45x30 | Low/socket head screw | M4-0.7x35 |
| NZC | Oil Reservoir, Scraper + Bellows Clips | Flat/socket head screw | M2.5-0.45x25 | Flat/socket head screw | M2.5-0.45x30 | Flat/socket head screw | M4-0.7x35 |
| NC | Oil Reservoir + Bellows Clips | Flat/socket head screw | M2.5-0.45x20 | Flat/socket head screw | M2.5-0.45x25 | Flat/socket head screw | M4-0.7x35 |
| VC | Wiper + Bellows Clip | Flat/socket head screw | M2.5-0.45x20 | Flat/socket head screw | M2.5-0.45x20 | Flat/socket head screw | M4-0.7x25 |
| VZC | Wiper, Scraper + Bellows Clip | Flat/socket head screw | M2.5-0.45x20 | Flat/socket head screw | M2.5-0.45x25 | Flat/socket head screw | M4-0.7x30 |
| VZ | Viton Wiper + Scraper | Low/socket head screw | M2.5-0.45x20 | Low/socket head screw | M2.5-0.45x25 | Low/socket head screw | M4-0.7x25 |
| ZC | Scraper + Bellows Clip | Flat/socket head screw | M2.5-0.45x15 | Flat/socket head screw | M2.5-0.45x15 | Flat/socket head screw | M4-0.7x20 |

1. All fasteners are standard threads.
2. Consult Thomson for options not listed, engineering review is required.
3. When ordering component only, two screws include.

| Option | Description | Size | | | | | |
|--------|--|------------------------|-----------|------------------------|-----------|------------------------|-----------|
| | | 30 | | 35 | | 45 | |
| L | "Lube for Life" Lube Block | Low/socket head screw | M4-0.7x40 | Low/socket head screw | M4-0.7x45 | Low/socket head screw | M5-0.8x50 |
| N | Oil Reservoir | Low/socket head screw | M4-0.7x30 | Low/socket head screw | M4-0.7x35 | Low/socket head screw | M5-0.8x45 |
| V | Viton Wiper | Low/socket head screw | M4-0.7x25 | Low/socket head screw | M4-0.7x30 | Low/socket head screw | M5-0.8x35 |
| Z | Metal Scraper | Low/socket head screw | M4-0.7x20 | Low/socket head screw | M4-0.7x25 | Low/socket head screw | M5-0.8x30 |
| C | Bellows Clips | Flat/socket head screw | M4-0.7x20 | Flat/socket head screw | M4-0.7x25 | Flat/socket head screw | M5-0.8x30 |
| LV | Lube Block + Wiper | Low/socket head screw | M4-0.7x40 | Low/socket head screw | M4-0.7x45 | Low/socket head screw | M5-0.8x50 |
| LVC | Lube Block, Wiper + Bellows Clip | Flat/socket head screw | M4-0.7x40 | Flat/socket head screw | M4-0.7x45 | Flat/socket head screw | M5-0.8x50 |
| LVZ | Lube Block, Wiper + Scraper | Low/socket head screw | M4-0.7x40 | Low/socket head screw | M4-0.7x45 | Low/socket head screw | M5-0.8x50 |
| LVZC | Lube Block, Wiper, Scraper + Bellows Clip | Flat/socket head screw | M4-0.7x40 | Flat/socket head screw | M4-0.7x45 | Flat/socket head screw | M5-0.8x50 |
| LZ | Lube Block + Scraper | Low/socket head screw | M4-0.7x40 | Low/socket head screw | M4-0.7x45 | Low/socket head screw | M5-0.8x50 |
| LZC | Lube Block, Scraper + Bellows Clip | Flat/socket head screw | M4-0.7x40 | Flat/socket head screw | M4-0.7x45 | Flat/socket head screw | M5-0.8x50 |
| LC | Lube Block + Bellows Clip | Flat/socket head screw | M4-0.7x40 | Flat/socket head screw | M4-0.7x45 | Flat/socket head screw | M5-0.8x50 |
| NV | Oil Reservoir + Wiper | Low/socket head screw | M4-0.7x40 | Low/socket head screw | M4-0.7x45 | Low/socket head screw | M5-0.8x50 |
| NVZ | Oil Reservoir, Wiper + Scraper | Low/socket head screw | M4-0.7x40 | Low/socket head screw | M4-0.7x45 | Low/socket head screw | M5-0.8x55 |
| NVC | Oil Reservoir, Wiper + Bellows Clip | Flat/socket head screw | M4-0.7x40 | Flat/socket head screw | M4-0.7x45 | Flat/socket head screw | M5-0.8x55 |
| NVZC | Oil Reservoir, Wiper, Scraper + Bellows Clip | Flat/socket head screw | M4-0.7x45 | Flat/socket head screw | M4-0.7x50 | Flat/socket head screw | M5-0.8x55 |
| NZ | Oil Reservoir + Scraper | Low/socket head screw | M4-0.7x35 | Low/socket head screw | M4-0.7x40 | Low/socket head screw | M5-0.8x45 |
| NZC | Oil Reservoir, Scraper + Bellows Clips | Flat/socket head screw | M4-0.7x35 | Flat/socket head screw | M4-0.7x40 | Flat/socket head screw | M5-0.8x50 |
| NC | Oil Reservoir + Bellows Clips | Flat/socket head screw | M4-0.7x35 | Flat/socket head screw | M4-0.7x40 | Flat/socket head screw | M5-0.8x50 |
| VC | Wiper + Bellows Clip | Flat/socket head screw | M4-0.7x25 | Flat/socket head screw | M4-0.7x30 | Flat/socket head screw | M5-0.8x35 |
| VZC | Wiper, Scraper + Bellows Clip | Flat/socket head screw | M4-0.7x30 | Flat/socket head screw | M4-0.7x30 | Flat/socket head screw | M5-0.8x35 |
| VZ | Wiper + Scraper | Low/socket head screw | M4-0.7x25 | Low/socket head screw | M4-0.7x30 | Low/socket head screw | M5-0.8x35 |
| ZC | Scraper + Bellows Clip | Flat/socket head screw | M4-0.7x20 | Flat/socket head screw | M4-0.7x25 | Flat/socket head screw | M5-0.8x30 |

Consult Thomson for options not listed, engineering review required.

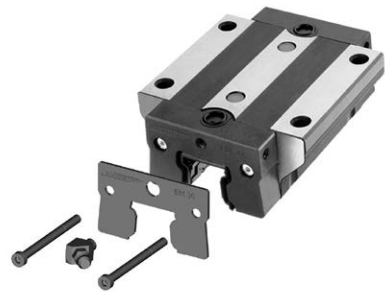
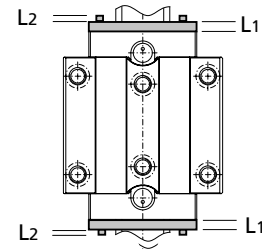
Modular Accessories



Additional Wiper

| Size | Viton® Part No. | L1 (mm) | L2 (mm) | Weight (kg) |
|------|-----------------|---------|---------|-------------|
| 15 | 531VR15 | 7 | 4 | 0.005 |
| 20 | 531VR20 | 7 | 4 | 0.008 |
| 25 | 531VR25 | 7 | 4 | 0.010 |
| 30 | 531VR30 | 7 | 4 | 0.016 |
| 35 | 531VR35 | 7 | 4 | 0.022 |
| 45 | 531VR45 | 7 | 4 | 0.036 |

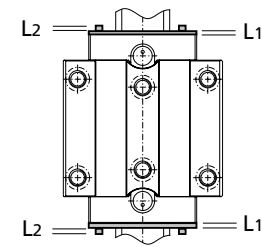
L1 – wiper thickness, L2 – max. screw head stickout
Can be installed without removing carriage from rail



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 |

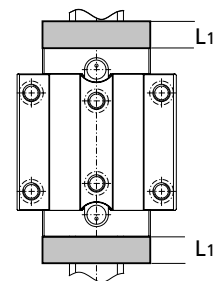
L1 – scraper thickness, L2 – max. screw head stickout

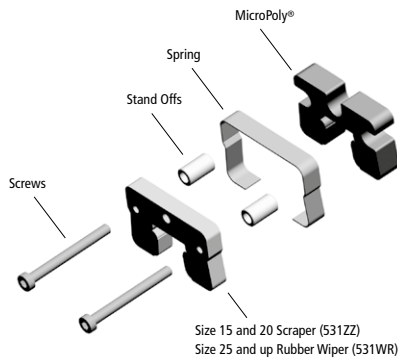


Oil Reservoir

| 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

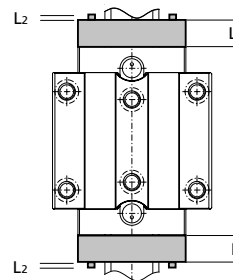




Lube Block

| Size | Lubrication Plate | L1 (mm) | L2 (mm) | Weight (kg) |
|------|-------------------|---------|---------|-------------|
| 15 | 531 LL 15 | 9.9 | 4 | 0.009 |
| 20 | 531 LL 20 | 11.9 | 4 | 0.024 |
| 25 | 531 LL 25 | 19.5 | 4 | 0.083 |
| 30 | 531 LL 30 | 21.2 | 4 | 0.213 |
| 35 | 531 LL 35 | 24.7 | 4 | 0.069 |
| 45 | 531 LL 45 | 26.9 | 4 | 0.123 |

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



When supplied from the factory as a complete unit the carriage is packed with EP2 grease and spring is loose for customer to install after assembling carriage on the rail.

Z scraper included in lube block assembly on sizes 15 and 20.
W wiper included on sizes 25 and up.

Example

| 511 Size 45 carriage with 531OW and 531WR modular seals on both sides: | |
|--|------------|
| Carriage Length (L) | = 89.3 |
| 531 OW 45 L ₁ x 2 | = 12.7 x 2 |
| 531 WR 45 L ₁ x 2 | = 7 x 2 |
| 531 WR 45 L ₂ x 2 | = 4 x 2 |
| Total Length | = 136.7 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, consult table on page 35 & 36 for proper screw size.

Bellows Dimensional Information

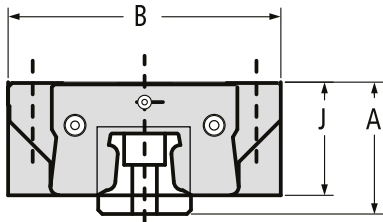
Bellows are available in three styles:

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, including welding and grinding applications, with a 90 kg load bearing capacity.

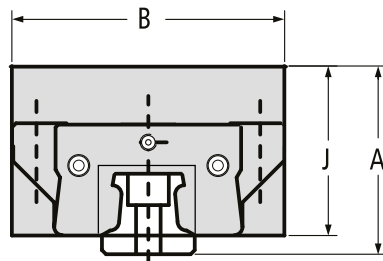
The bellows can be easily installed in conjunction with the other optional modular seals providing you with an easy upgrade to the standard seal. Installation is simple and requires little time. Retrofitting is possible. The rail ends have to be drilled for the attachment of the bellow clip adapter plate,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

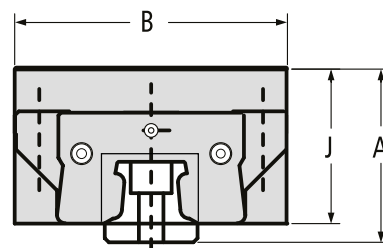
Customer to specify extended length at time of order, see page 122 for how to calculate.



531 BC “High Compression” Bellows

| Size | Part No. | B | J | A | CR |
|------|----------|------|------|------|------|
| 15 | 531 BC15 | 59 | 33 | 36 | 0.10 |
| 20 | 531 BC20 | 61.6 | 34 | 39 | 0.10 |
| 25 | 531 BC25 | 63.7 | 39 | 45.5 | 0.10 |
| 30 | 531 BC30 | 71.5 | 43.3 | 50.3 | 0.10 |
| 35 | 531 BC35 | 84 | 49.5 | 57.5 | 0.07 |
| 45 | 531 BC45 | 76 | 58 | 68 | 0.07 |

Customer to specify extended length at time of order, see page 122 for how to calculate.



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 | 0.15 |

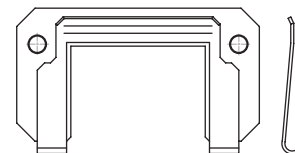
Customer to specify extended length at time of order, see page 122 for how to calculate.

Bellow Clip Adapter Plates

531 CC Carriage Bellows Clips – Attachment Plate

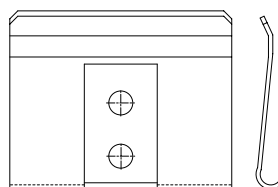
The 531 CC Carriage Bellows Clip – Attachment Plate is used to attach the bellows to the carriage. The bellows clip – adapter plate is made of steel.

| 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

The 531 CR Rail Bellow Clip – Attachment 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.

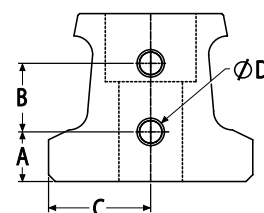


| Size | Part No. | Rail Machining Detail | | | | | Screw ¹ | | | | MinY ² |
|-----------------|----------|-----------------------|-------|-------|-----------|-----------|--------------------|-------|--------|-------------|-------------------|
| | | A | B | C | Depth Min | Depth Max | Size | Pitch | Length | Type | |
| 15 ³ | 531 CR15 | 3.50 | 8.00 | 7.50 | 5.70 | 7.70 | M3 | 0.5 | 8 | Button Head | 14 |
| 20 | 531 CR20 | 5.00 | 8.00 | 10.00 | | | | | | | 15 |
| 25 | 531 CR25 | 7.24 | 10.00 | 11.50 | 7.70 | 9.70 | M4 | 0.7 | 10 | Cap Screw | 17 |
| 30 | 531 CR30 | 9.12 | 10.00 | 14.00 | | | | | | | 20 |
| 35 | 531 CR35 | 11.00 | 10.00 | 17.00 | | | | | | | 20 |
| 45 | 531 CR45 | 15.01 | 10.00 | 22.50 | | | | | | | 22 |

All dimensions in mm, unless otherwise specified.

- Two screws are supplied with each Rail Bellow Clip.
- Min Y dimension to ensure drill depth does not break through rail mounting hole.
- Rail end may require annealing, see note above.

Rail End Machine Detail



Maintenance and Installation Tools and Accessories

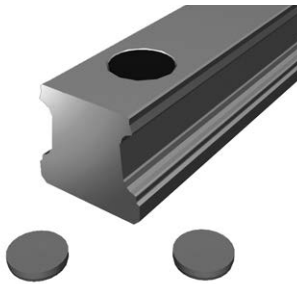
The assembly rail is required when the carriage must be removed from the rail and then reinstalled to ensure proper installation. It is recommended to leave the carriage on the assembly rail when it is removed to protect the balls against contamination. If necessary, the two internal mounting screws 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.

Assembly Rail – 531 MT



| Part Number | Size | Length (mm) | Weight (kg) |
|-------------|------|-------------|-------------|
| 531 MT 15 | 15 | 80 | 0.010 |
| 531 MT 20 | 20 | 115 | 0.021 |
| 531 MT 25 | 25 | 130 | 0.031 |
| 531 MT 30 | 30 | 160 | 0.061 |
| 531 MT 35 | 35 | 165 | 0.076 |
| 531 MT 45 | 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 HP 15 | 15 |
| 531 HP 20 | 20 |
| 531 HP 25 | 25 |
| 531 HP 30 | 30 |
| 531 HP 35 | 35 |
| 531 HP 45 | 45 |

Material: Nylon

| Mylar Tape | Size | Length |
|------------|------|--------|
| 531 RT 15 | 15 | 3m |
| 531 RT 20 | 20 | 3m |
| 531 RT 25 | 25 | 3m |
| 531 RT 30 | 30 | 3m |
| 531 RT 35 | 35 | 3m |
| 531 RT 45 | 45 | 3m |

500 Series Rail with Stainless Steel Cover Strip



| | Rail Coverstrip End Caps | Mounting Tool | Replacement End Caps | Standard Coverstrip Rail | Coverstrip Width (mm) | Max Single PC Length (mm) |
|------|--------------------------|---------------|--------------------------|--------------------------|-----------------------|---------------------------|
| Size | Part Number ¹ | Part Number | Part Number ² | Part Number ³ | | |
| 25 | 531RCS25 | 531RCT25 | 531RCP25 | 521H25C | 15 | 6000 |
| 30 | 531RCS30 | 531RCT30 | 531RCP30 | 521H30C | 19 | 6000 |
| 35 | 531RCS35 | 531RCT35 | 531RCP35 | 521H35C | 25 | 6000 |
| 45 | 531RCS45 | 531RCT45 | 531RCP45 | 521H45C | 25 | 6000 |

- Customer to specify length of rail to be used on at time of order.
Delivered piece will be 2 to 3.5 mm longer in order to properly install and fit end caps.
- Two end caps are supplied with each piece of 531RCS ordered.
- H grade accuracy shown for example purposes, P and U grade accuracy are available.
- Cover strip should not be installed more than 3 times.

Accuracy Class

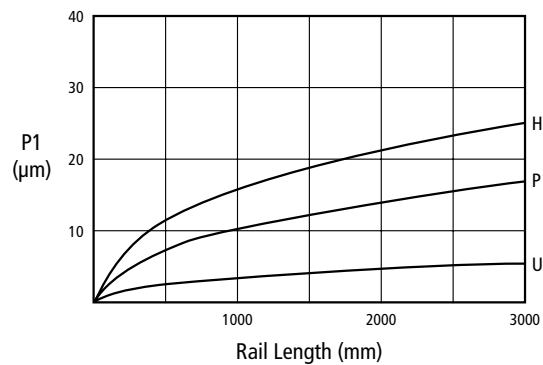
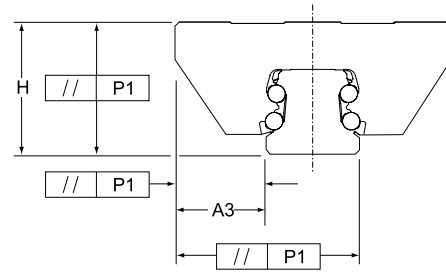
Three tolerances describe the accuracy of a Profile Rail bearing: Running Parallelism, Pair Variation, and Assembly Accuracy. These are measured from the rail base to the center of the carriage top (H), and from the rail reference edge to the center of the carriage reference edge (A3).

Running Parallelism describes the tolerance on H and A3 as a function of axial travel, measured from one carriage down the length of the 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

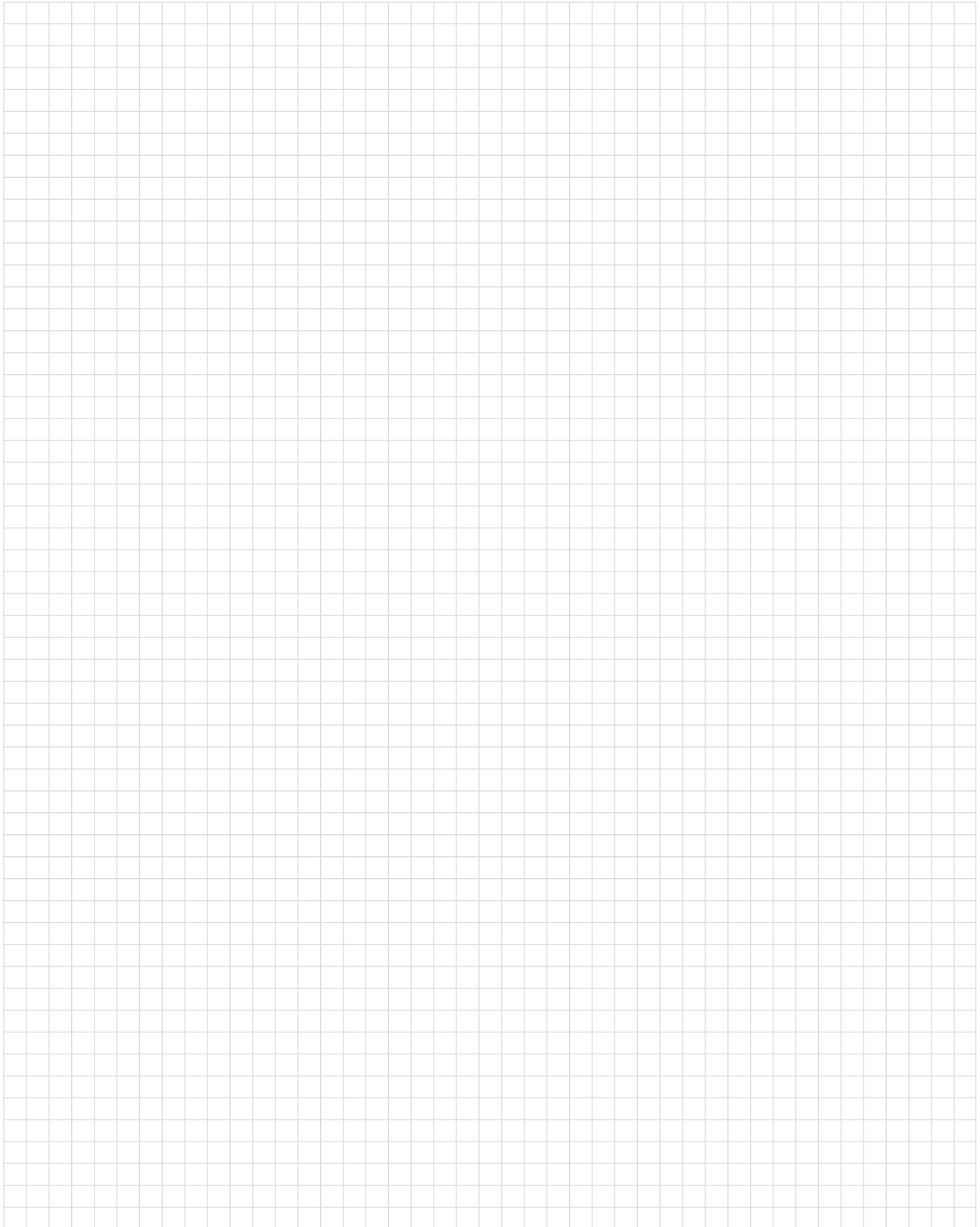
Three Preload classes and one clearance class are available with the 500 Series Ball Profile Rail carriages. Preload will minimize elastic deformation caused by external forces resulting in increased rigidity. Preload will eliminate internal clearances between the rail and carriage resulting in zero backlash.

Preload Accuracy Combinations

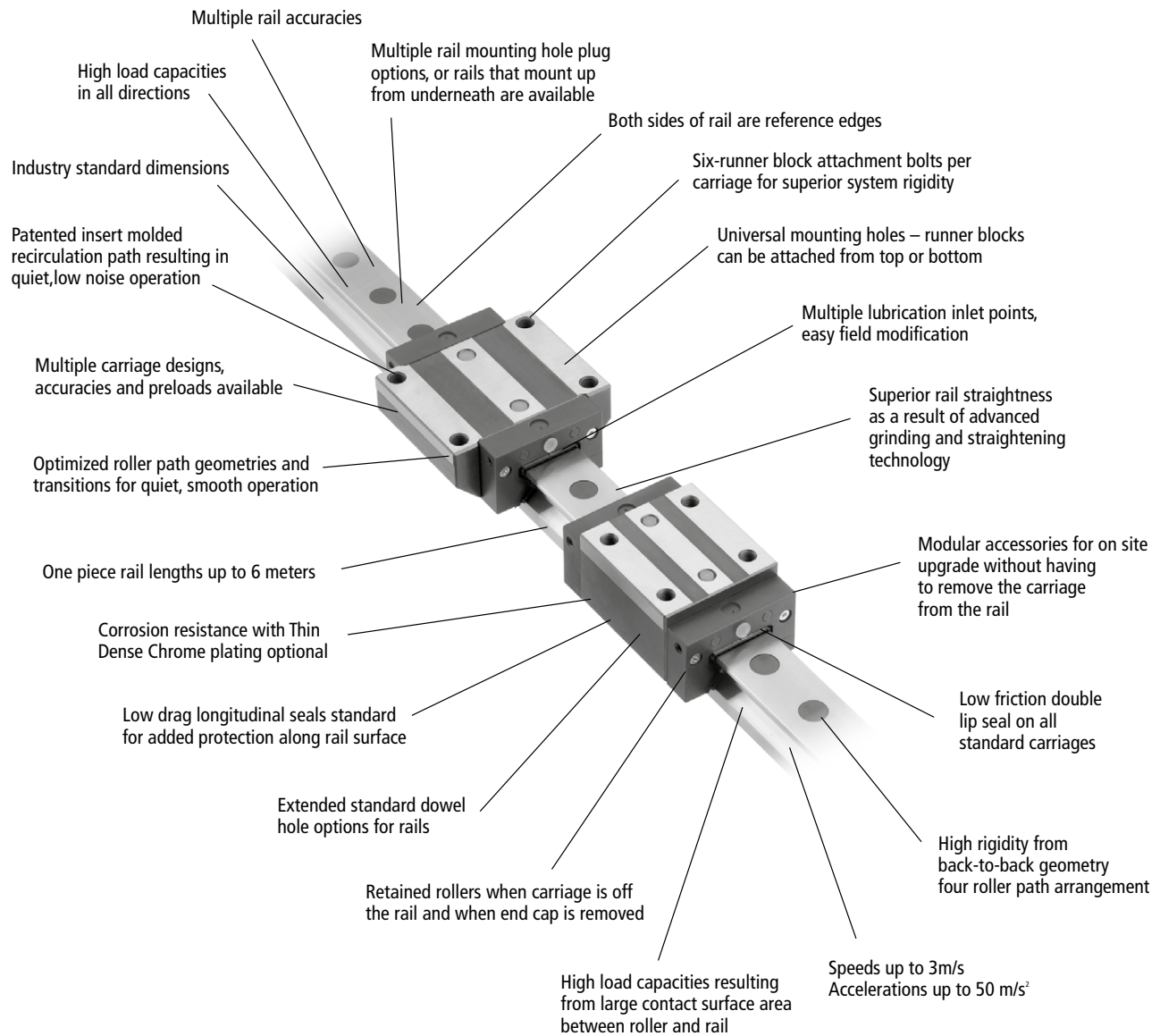
| Accuracy Class | Clearance | Preload | | |
|----------------|-----------|--------------------|--------------------|--------------------|
| | | 0.03C ¹ | 0.08C ¹ | 0.13C ¹ |
| H | 0 | 1 | 2 | |
| P, U | | 1 | 2 | 3 |

1. C = Dynamic load capacity of the bearing
2. A preloaded bearing loaded beyond the preload value has the same characteristics as a clearance bearing. Example: Size 25 A style carriage has dynamic load capacity of 21.1kN, Medium Preload = 0.08C = 0.08 x 21.1kN = 1.7kN; if applied load is greater than 1.7kN preload has no benefit.

NOTES:



500 Series Roller Profile Rail Linear Guide



500 Series Roller Profile Rail Linear Guide



Features

The Thomson 500 Series Linear Guide 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 with 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 Linear Guide is 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 deliver the highest quality product.

Interchangeability

The 500 Series Roller Linear Guide is completely interchangeable. Any carriage can be run on any rail of the same accuracy without compromising system accuracy. This is the result of our stringent manufacturing process controls.

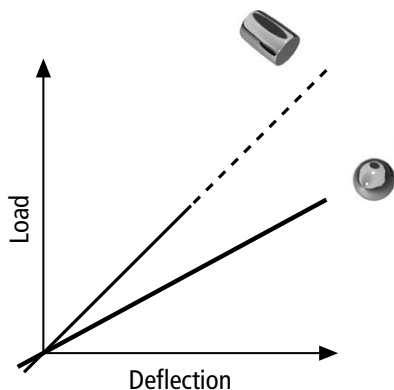
Accuracy and Preload

The 500 Series Roller Linear Guide is available in three different accuracy classes, and three different preload ranges to allow for customization to your application needs.

Straightness

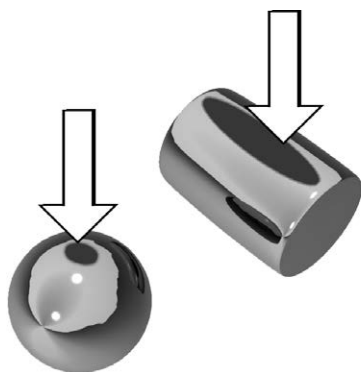
The 500 Series Roller rail is subjected to multiple straightening processes during and after grinding of the roller paths, on one piece rails up to 6 meters long.

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



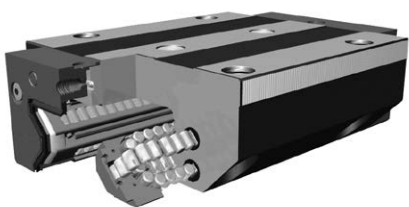
Rigidity

Profile Rail Linear Guide 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.



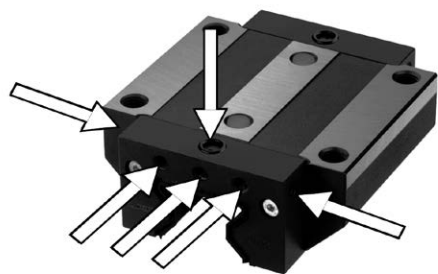
Load Capacity

The roller has an increased load capacity over the ball 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

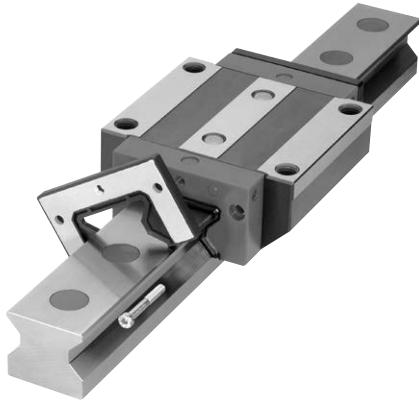
The running smoothness and low noise are the result of a propriety insert molded recirculation path that has an optimized geometric shape and minimal transitions. This ensures smooth, quiet operation.



Multiple Lubrication Options

The 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. Not all options available on size 25.

Unsure of the best lubrication inlet location? These carriages 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.



Modular Accessory Options

The carriage 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.

Optional metal scrapers or wiper and oil reservoir components can be easily added on-site in the field or can be supplied assembled 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 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

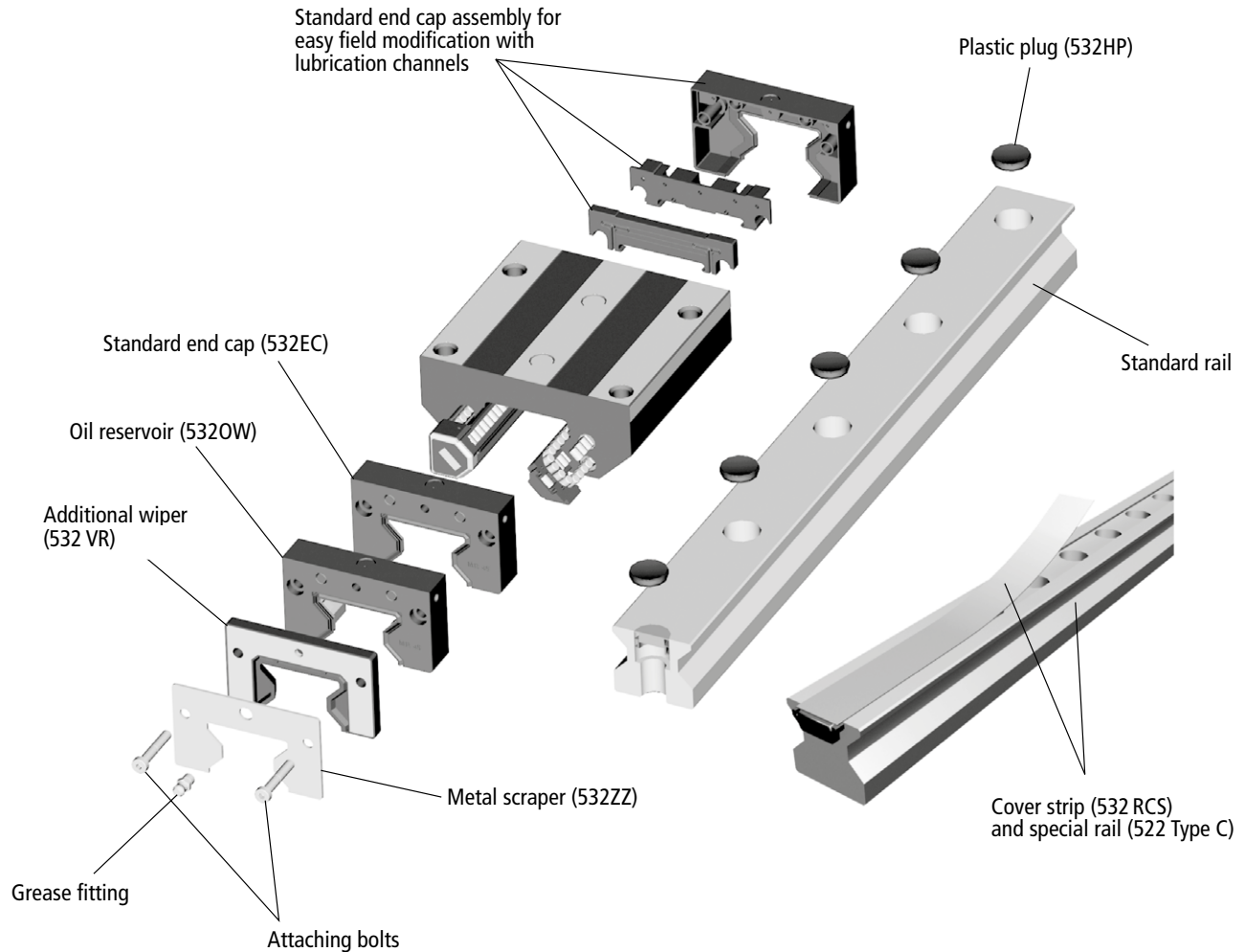
The rails have multiple options to fill the mounting holes to eliminate possible contamination entry into the bearing. Custom designed plugs are available in plastic, brass, or stainless steel. A special rail is available that utilizes a custom cover strip. In addition, Thomson stocks an assortment of 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 carriages 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.

500 Series Roller Profile Rail Linear Guide

Modular Design Exploded View



Also available (not shown):

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

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

500 Series Roller Standard Carriages

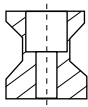
Thomson offers four carriage styles with six mounting holes allowing for additional mounting configurations in the field or retrofitting. All provide superior rigidity and design flexibility.

500 Series Roller
Profile Rail

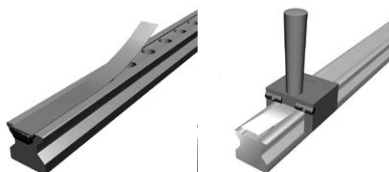
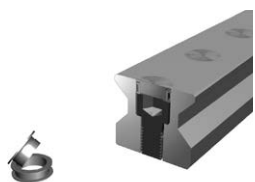
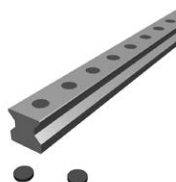
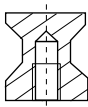
| Style | Size | Accuracy | Basic Part Number | | | Standard Rail Part Number | Max. Single Piece Rail Length (mm) | | | |
|------------------------|------|-----------------|-------------------|----------|----------|---------------------------|------------------------------------|----------|---------|------|
| | | | Preload | | | | | | | |
| | | | 0.03C | 0.08C | 0.13C | | | | | |
| Standard Carriage | A | 25 | P | 512P25A1 | 512P25A2 | 512P25A3 | 522P25A | 6000 | | |
| | | | S | 512S25A1 | 512S25A2 | 512S25A3 | 522S25A | | | |
| | | | U | 512U25A1 | 512U25A2 | 512U25A3 | 522U25A | | | |
| | | 35 | P | 512P35A1 | 512P35A2 | 512P35A3 | 522P35A | 6000 | | |
| | | | S | 512S35A1 | 512S35A2 | 512S35A3 | 522S35A | | | |
| | | | U | 512U35A1 | 512U35A2 | 512U35A3 | 522U35A | | | |
| | 45 | P | 512P45A1 | 512P45A2 | 512P45A3 | 522P45A | 6000 | | | |
| | | S | 512S45A1 | 512S45A2 | 512S45A3 | 522S45A | | | | |
| | | U | 512U45A1 | 512U45A2 | 512U45A3 | 522U45A | | | | |
| | 55 | P | 512P55A1 | 512P55A2 | 512P55A3 | 522P55A | 6000 | | | |
| | | S | 512S55A1 | 512S55A2 | 512S55A3 | 522S55A | | | | |
| | | U | 512U55A1 | 512U55A2 | 512U55A3 | 522U55A | | | | |
| Standard Long Carriage | B | 25 | P | 512P25B1 | 512P25B2 | 512P25B3 | 522P25A | 6000 | | |
| | | | S | 512S25B1 | 512S25B2 | 512S25B3 | 522S25A | | | |
| | | | U | 512U25B1 | 512U25B2 | 512U25B3 | 522U25A | | | |
| | | 35 | P | 512P35B1 | 512P35B2 | 512P35B3 | 522P35A | 6000 | | |
| | | | S | 512S35B1 | 512S35B2 | 512S35B3 | 522S35A | | | |
| | | | U | 512U35B1 | 512U35B2 | 512U35B3 | 522U35A | | | |
| | | 45 | P | 512P45B1 | 512P45B2 | 512P45B3 | 522P45A | 6000 | | |
| | | | S | 512S45B1 | 512S45B2 | 512S45B3 | 522S45A | | | |
| | | | U | 512U45B1 | 512U45B2 | 512U45B3 | 522U45A | | | |
| | | 55 | P | 512P55B1 | 512P55B2 | 512P55B3 | 522P55A | 6000 | | |
| | | | S | 512S55B1 | 512S55B2 | 512S55B3 | 522S55A | | | |
| | | | U | 512U55B1 | 512U55B2 | 512U55B3 | 522U55A | | | |
| | | 65 | P | 512P65B1 | 512P65B2 | 512P65B3 | 522P65A | 6000 | | |
| | | | S | 512S65B1 | 512S65B2 | 512S65B3 | 522S65A | | | |
| | | | U | 512U65B1 | 512U65B2 | 512U65B3 | 522U65A | | | |
| | | Narrow Carriage | C | 25 | P | 512P25C1 | 512P25C2 | 512P25C3 | 522P25A | 6000 |
| | | | | | S | 512S25C1 | 512S25C2 | 512S25C3 | 522S25A | |
| | | | | | U | 512U25C1 | 512U25C2 | 512U25C3 | 522U25A | |
| 35 | P | | | 512P35C1 | 512P35C2 | 512P35C3 | 522P35A | 6000 | | |
| | S | | | 512S35C1 | 512S35C2 | 512S35C3 | 522S35A | | | |
| | U | | | 512U35C1 | 512U35C2 | 512U35C3 | 522U35A | | | |
| 45 | P | | | 512P45C1 | 512P45C2 | 512P45C3 | 522P45A | 6000 | | |
| | S | | | 512S45C1 | 512S45C2 | 512S45C3 | 522S45A | | | |
| | U | | | 512U45C1 | 512U45C2 | 512U45C3 | 522U45A | | | |
| 55 | P | | | 512P55C1 | 512P55C2 | 512P55C3 | 522P55A | 6000 | | |
| | S | | | 512S55C1 | 512S55C2 | 512S55C3 | 522S55A | | | |
| | U | | | 512U55C1 | 512U55C2 | 512U55C3 | 522U55A | | | |
| Narrow Long Carriage | D | 25 | P | 512P25D1 | 512P25D2 | 512P25D3 | 522P25A | 6000 | | |
| | | | S | 512S25D1 | 512S25D2 | 512S25D3 | 522S25A | | | |
| | | | U | 512U25D1 | 512U25D2 | 512U25D3 | 522U25A | | | |
| | | 35 | P | 512P35D1 | 512P35D2 | 512P35D3 | 522P35A | 6000 | | |
| | | | S | 512S35D1 | 512S35D2 | 512S35D3 | 522S35A | | | |
| | | | U | 512U35D1 | 512U35D2 | 512U35D3 | 522U35A | | | |
| | | 45 | P | 512P45D1 | 512P45D2 | 512P45D3 | 522P45A | 6000 | | |
| | | | S | 512S45D1 | 512S45D2 | 512S45D3 | 522S45A | | | |
| | | | U | 512U45D1 | 512U45D2 | 512U45D3 | 522U45A | | | |
| | | 55 | P | 512P55D1 | 512P55D2 | 512P55D3 | 522P55A | 6000 | | |
| | | | S | 512S55D1 | 512S55D2 | 512S55D3 | 522S55A | | | |
| | | | U | 512U55D1 | 512U55D2 | 512U55D3 | 522U55A | | | |
| | | 65 | P | 512P65D1 | 512P65D2 | 512P65D3 | 522P65A | 6000 | | |
| | | | S | 512S65D1 | 512S65D2 | 512S65D3 | 522S65A | | | |
| | | | U | 512U65D1 | 512U65D2 | 512U65D3 | 522U65A | | | |

500 Series Roller Rail Options

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 rails 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 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 found on page 69.

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.

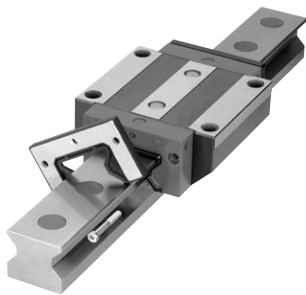
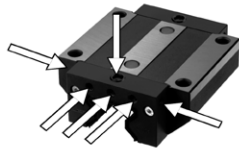
Optional 500 Series Rail

Option 532 RC utilizes a special rail 522 Type C that is easily installed with the 532 RCT mounting tool found on page 69.

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.

500 Series Roller Profile Rail



Additional Seal Types and Lubrication Accessories

The carriages are 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 enclose 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 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

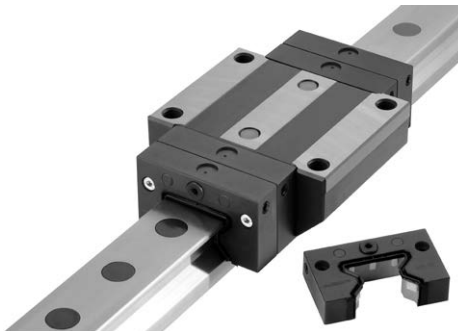
The **532 VR** seal provide an additional level of protection from contaminants to the assembly. This additional component can be easily added on-site. It is supplied with the required screws to make installation simple.

- 532 VR is made of durable Viton®

This seal can be used in conjunction with other optional modular accessories providing an easy upgrade to the standard seal. It can be easily installed on-site in the field or can be supplied from the factory.

Metal Scraper

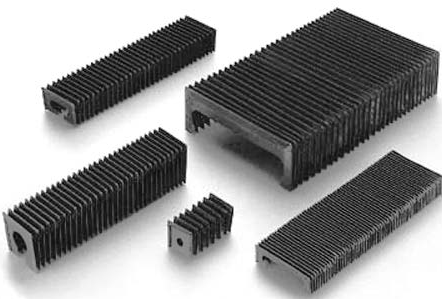
The **532 ZZ Metal Scraper** made of stainless steel, serves as an added protection to the seal lips against large dirt particles, metal shavings or chips. Large contaminants are easily pushed away for an extra level of protection to the seal lips. The Metal Scraper is easily installed in conjunction 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 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 drilled for the attachment of the rail clip 532 CR.

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 bellows can be easily installed in conjunction with the other optional modular accessories and are an easy upgrade to the standard seal. These can be easily installed on-site in the field.

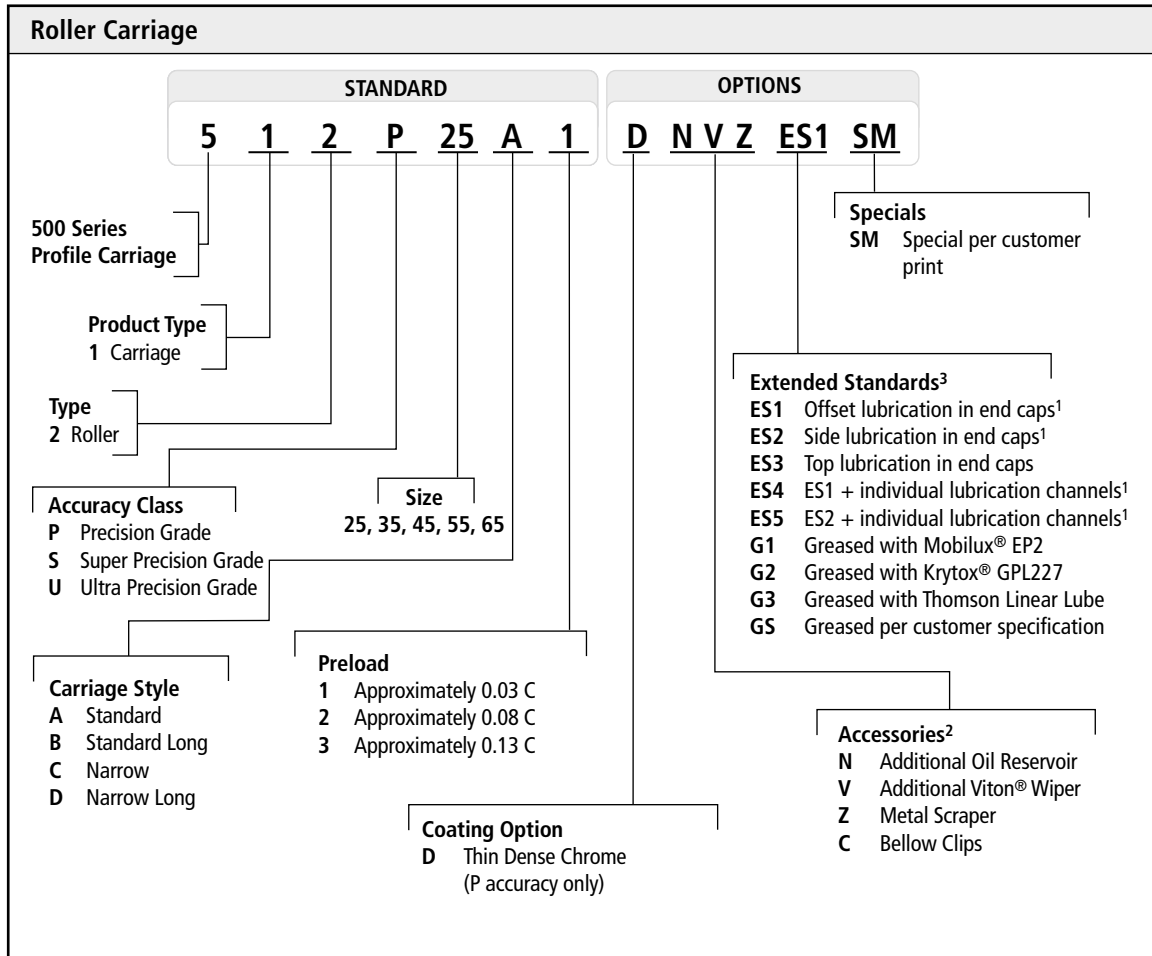
Note: Additional Modular accessories add additional drag to the carriage assembly resulting in increased start-up friction and power consumption.

Relative Drag Comparison for Design Consideration

| Type | Relative Drag |
|------------------------|---------------|
| Standard carriage | • |
| Viton® Wiper (531 VR) | ••• |
| Metal Scraper (531 ZZ) | • |
| Oil Reservoir (531 OW) | •• |

• Low

For ordering information or for additional Seal Types and Lubrication Accessories, see page 64.

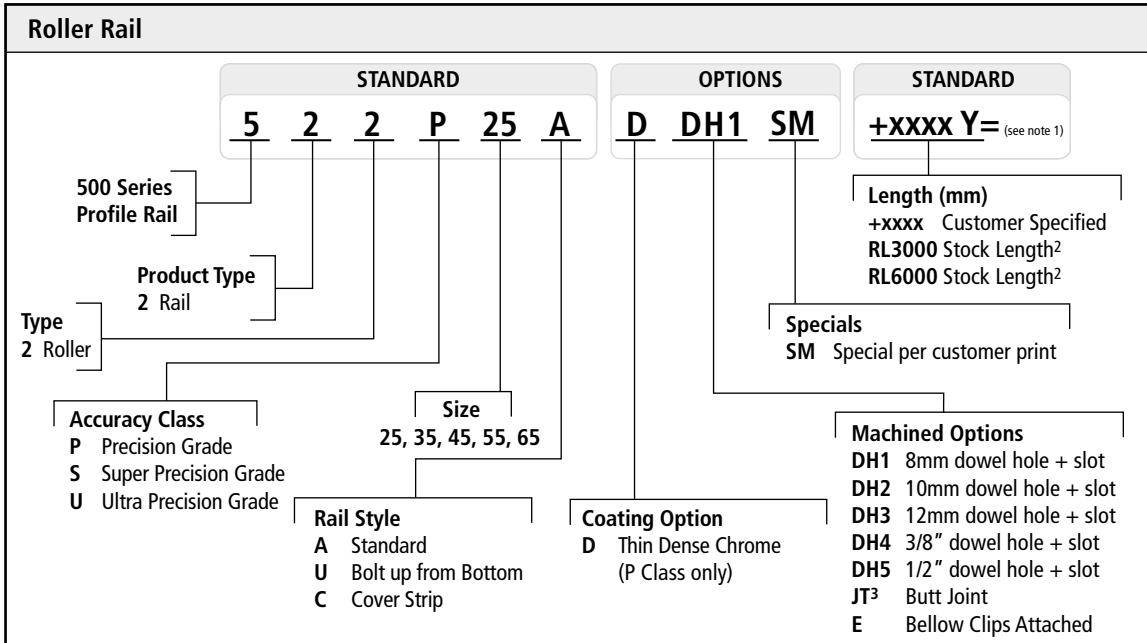


- ES1, ES2, ES4 and ES5 options are available size 35, 45, 55 and 65 only.
- Accessory combination part numbers are listed from carriage end cap outward. Not all combinations are available. For specific combination availability see page 63 or consult Thomson.

- Optional inlet and grease options may not be functional with all accessory combinations. (Example: G1 and Oil Reservoir "N"). Prior to selecting an inlet option review any interference or conflicts with the accessories selected.

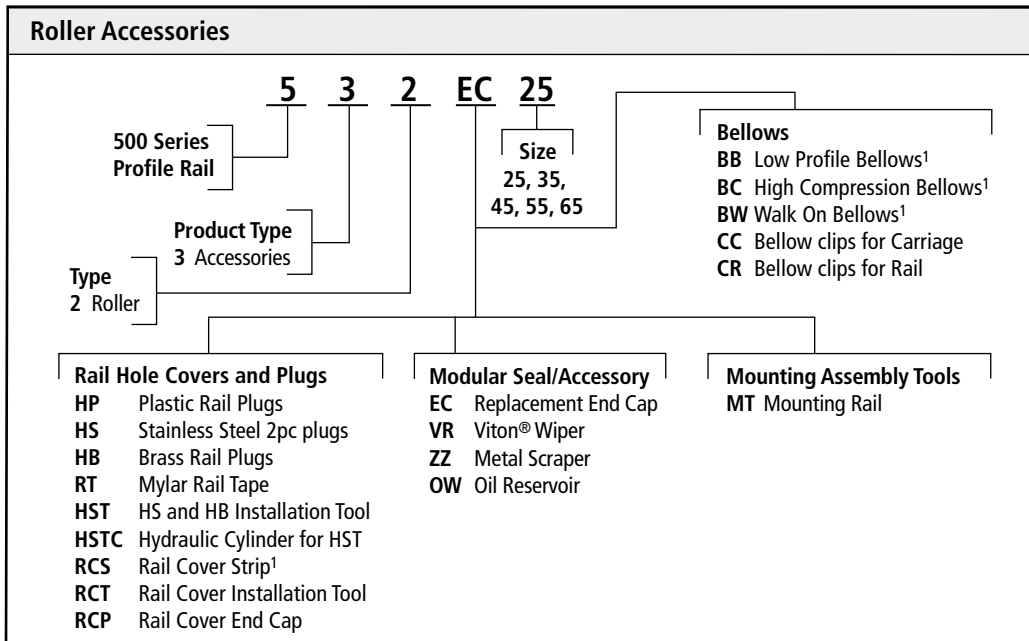
- Size 100 available upon request. Please contact customer service for more information.

Assemblies are available, please see page 124 for assembly part number details.



1. Y=Distance from end of rail to center of first mounting hole, Y1=Y2 unless specified.
2. Stock length rails are considered random length, total length may exceed specified length, and Y1/Y2 are not equal. To be used by customer who will cut to length.

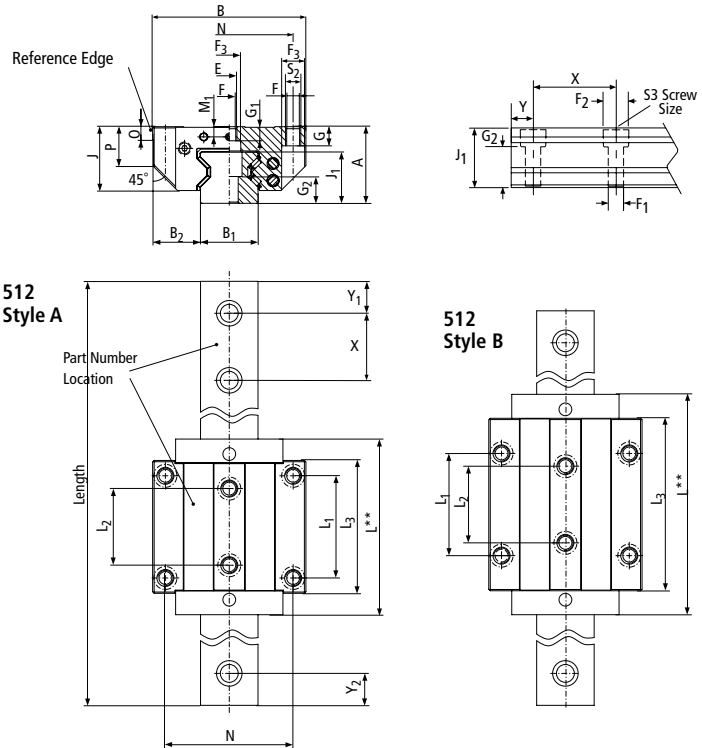
3. Customer drawing required at time of quote and order. See page 126 for more information and templates.



1. Bellows and rail cover strip must include length at time of order. (Example: 532BB35+1000 mm). See page 122 for how to calculate bellows length.

Assemblies are available, please see page 124 for assembly part number details.

512 Style A and B



500 Series Roller Profile Rail

512 Style A – Standard Roller

| Size | Dimensions (mm) | | | | | | | L ^{**} | L ₁ | L ₂ | L ₃ | X | N | S ₂ | S ₃ | F | F ₁ | F ₂ | F ₃ | Roller | | | | | | |
|------|-----------------|-----|--------------------------------------|----------------|------|----------------|-------|-----------------|----------------|----------------|----------------|-----|-----|----------------|----------------|----|----------------|----------------|----------------|--------|----------------|----------------|----------------|-----|------|--|
| | A | B | B ₁ [*] ±0.05 | B ₂ | J | J ₁ | ∅ | | | | | | | | | | | | | 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 | M8 | M6 | 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 | M10 | M8 | 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 | M12 | M12 | 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 | M14 | M14 | 12.5 | 16 | 24 | 20 | 6 | 18 | 13.5 | 26 | 9 | 12 | 34.5 | |

512 Style B – Standard Long Roller

| Size | Dimensions (mm) | | | | | | | L ^{**} | L ₁ | L ₂ | L ₃ | X | N | S ₂ | S ₃ | F | F ₁ | F ₂ | F ₃ | Roller | | | | | | |
|------|-----------------|-----|--------------------------------------|----------------|------|----------------|-------|-----------------|----------------|----------------|----------------|-----|-----|----------------|----------------|----|----------------|----------------|----------------|--------|----------------|----------------|----------------|-----|------|--|
| | A | B | B ₁ [*] ±0.05 | B ₂ | J | J ₁ | ∅ | | | | | | | | | | | | | 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 | M8 | M6 | 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 | M10 | M8 | 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 | M12 | M12 | 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 | M14 | M14 | 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 | M16 | 14.5 | 18 | 26 | 25.5 | 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 64-65 for additional information.

Length of rail to be specified at time of order, Y₁=Y₂ unless specified otherwise at time of order.

500 Series Roller

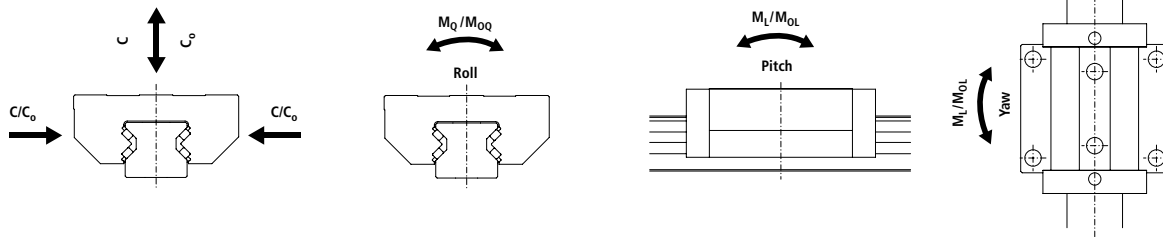
512 Style A and B

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_0 = Static load capacity
 M_{0L} = Static pitch and yaw moment capacity
 M_0 = Static roll moment capacity



| Size & Style | Loading Capabilities | | Moments | | | | Weights | |
|--------------|----------------------|--------|---------------|------------|---------------|------------|---------------|-------------|
| | C_0 (N) | C (N) | M_{0Q} (Nm) | M_0 (Nm) | M_{0L} (Nm) | M_L (Nm) | Carriage (kg) | Rail (kg/m) |
| 25A | 49800 | 27700 | 733 | 408 | 476 | 265 | 0.7 | |
| 25B | 70300 | 39100 | 1035 | 576 | 936 | 521 | 0.9 | 3.4 |
| 35A | 93400 | 52000 | 2008 | 1118 | 1189 | 662 | 1.6 | |
| 35B | 128500 | 71500 | 2762 | 1537 | 2214 | 1232 | 2.2 | 6.5 |
| 45A | 167500 | 93400 | 4621 | 2577 | 2790 | 1556 | 3.2 | |
| 45B | 229500 | 127800 | 6333 | 3527 | 5161 | 2874 | 4.3 | 10.7 |
| 55A | 237000 | 131900 | 7771 | 4325 | 6650 | 2637 | 5.0 | |
| 55B | 324000 | 180500 | 10624 | 5919 | 8745 | 4872 | 6.8 | 15.2 |
| 65B | 530000 | 295000 | 20912 | 11640 | 17930 | 9980 | 13.5 | 22.5 |

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 1.23 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

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

where:

L = travel life, km

C = dynamic load rating, N

F = applied dynamic load, N

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

where:

C_{\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

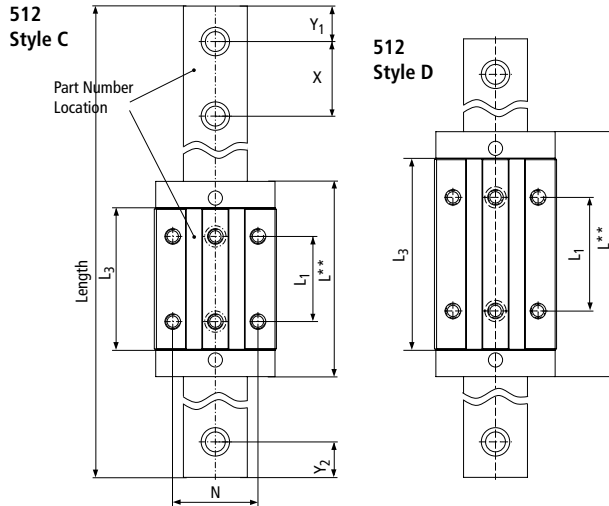
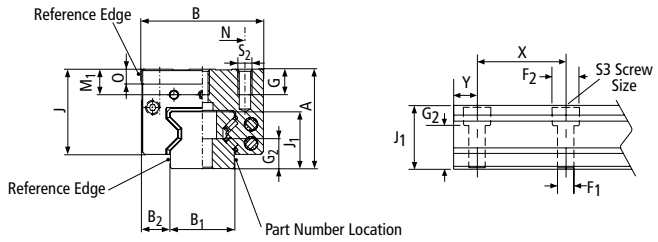
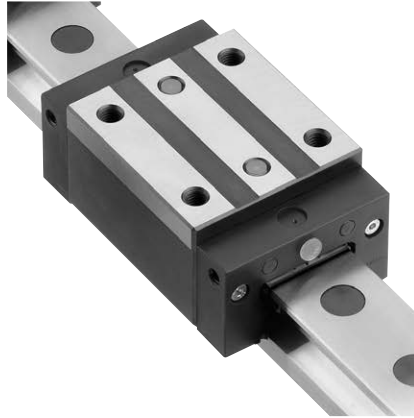
Max: 80° C

Max peak: 120° C short time*

*without bellows

500 Series Roller

512 Style C and D



500 Series Roller
Profile Rail

512 Style C Narrow Roller

| Size | Dimensions (mm) | | | | | | L** | L ₁ | L ₃ | X | N | S ₂ | S ₃ | F ₁ | F ₂ | Roller | | | | |
|------|-----------------|-----|---------------------------|----------------|------|----------------|-------|----------------|----------------|------|----|----------------|----------------|----------------|----------------|--------|----|----------------|----------------|-----|
| | A | B | B ₁ * +0.05 | B ₂ | J | J ₁ | | | | | | | | | | Ø | G | G ₂ | M ₁ | O |
| 25 | 40 | 48 | 23 | 12.5 | 33.5 | 24.5 | 81 | 35 | 57 | 30 | 35 | M6 | M6 | 7 | 11 | 3.2 | 9 | 13 | 9.5 | 7.5 |
| 35 | 55 | 70 | 34 | 18 | 47 | 32 | 109 | 50 | 76 | 40 | 50 | M8 | M8 | 9 | 15 | 4.5 | 12 | 15 | 14 | 8 |
| 45 | 70 | 86 | 45 | 20.5 | 60 | 40 | 137.5 | 60 | 100 | 52.5 | 60 | M10 | M12 | 14 | 20 | 5 | 18 | 21 | 18 | 10 |
| 55 | 80 | 100 | 53 | 23.5 | 67 | 48 | 163.5 | 75 | 120 | 60 | 75 | M12 | M14 | 16 | 24 | 6 | 19 | 26 | 19 | 12 |

512 Style D Narrow Long Roller

| Size | Dimensions (mm) | | | | | | L** | L ₁ | L ₃ | X | N | S ₂ | S ₃ | F ₁ | F ₂ | Roller | | | | |
|------|-----------------|-----|---------------------------|----------------|------|----------------|-------|----------------|----------------|------|----|----------------|----------------|----------------|----------------|--------|----|----------------|----------------|-----|
| | A | B | B ₁ * +0.05 | B ₂ | J | J ₁ | | | | | | | | | | Ø | G | G ₂ | M ₁ | O |
| 25 | 40 | 48 | 23 | 12.5 | 33.5 | 24.5 | 103.4 | 50 | 79.4 | 30 | 35 | M6 | M6 | 7 | 11 | 3.2 | 9 | 13 | 9.5 | 7.5 |
| 35 | 55 | 70 | 34 | 18 | 47 | 32 | 136 | 72 | 103 | 40 | 50 | M8 | M8 | 9 | 15 | 4.5 | 12 | 15 | 14 | 8 |
| 45 | 70 | 86 | 45 | 20.5 | 60 | 40 | 172.5 | 80 | 135 | 52.5 | 60 | M10 | M12 | 14 | 20 | 5 | 18 | 21 | 18 | 10 |
| 55 | 80 | 100 | 53 | 23.5 | 67 | 48 | 205.5 | 95 | 162 | 60 | 75 | M12 | M14 | 16 | 24 | 6 | 19 | 26 | 19 | 12 |
| 65 | 90 | 126 | 63 | 31.5 | 76 | 58 | 251 | 120 | 201 | 75 | 76 | M16 | 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 64-65 for additional information.

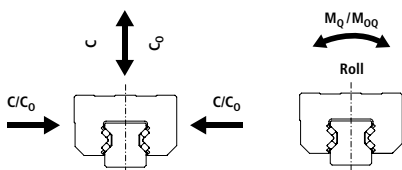
Length of rail to be specified at time of order, Y1=Y2 unless specified otherwise at time of order.

500 Series Roller

512 Style C and D

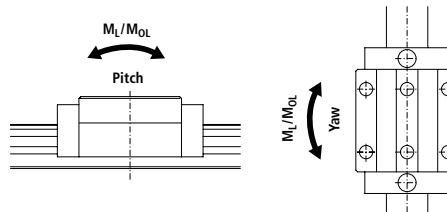
Dynamic Load and Moment Ratings

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



Static Load and Moment Capacities

C₀ = Static load capacity
 M_{OL} = Static pitch and yaw moment capacity
 M_{OQ} = Static roll moment capacity



| Size & Style | Loading Capabilities | | Moments | | | | Weights | |
|--------------|----------------------|--------|----------------------|---------------------|----------------------|---------------------|---------------|-------------|
| | C ₀ (N) | C (N) | M _{OQ} (Nm) | M _Q (Nm) | M _{OL} (Nm) | M _L (Nm) | 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 |

- 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 1.23 to get an accurate comparison.
- 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

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

where:

L = travel life, km

C = dynamic load rating, N

F = applied dynamic load, N

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

where:

C_{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

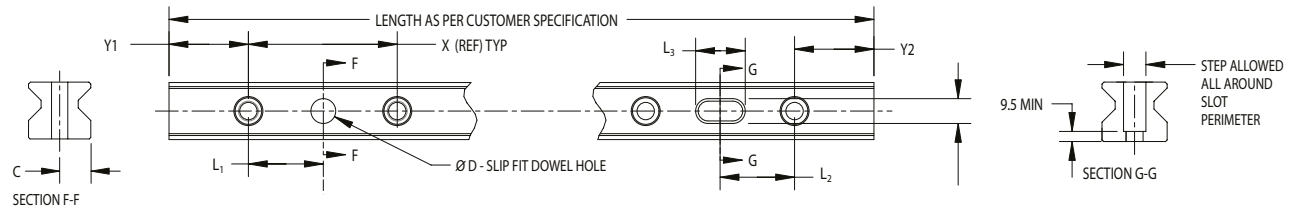
Rail Modifications

The rails 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

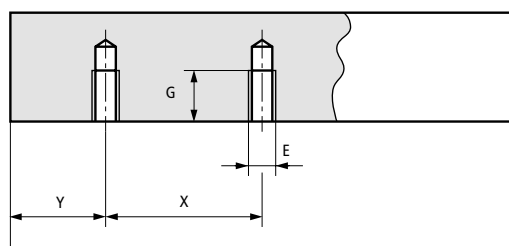


| Option | Size | D <small>+0.013 -0</small> | L ₁ <small>±0.12</small> | L ₂ <small>±0.40</small> | L ₃ <small>+1.5 -0</small> | C <small>±0.05</small> | | | | |
|--------|------|-----------------------------------|--|--|--|---------------------------|-------|-------|-------|-------|
| DH1 | 25 | 8 | 15 | 15 | 12 | 11.5 | | | | |
| | 35 | | 20 | 20 | | 17 | | | | |
| | 45 | | 30 | 30 | | 22.5 | | | | |
| | 55 | | | | | 26.5 | | | | |
| | 65 | | | | | 31.5 | | | | |
| DH2 | 25 | N/A | N/A | N/A | N/A | N/A | | | | |
| | 35 | 10 | 20 | 20 | 15 | 17 | | | | |
| | 45 | | 30 | 30 | | 22.5 | | | | |
| | 55 | | | | | 26.5 | | | | |
| | 65 | | | | | 31.5 | | | | |
| DH3 | 25 | | | | | N/A | N/A | N/A | N/A | N/A |
| | 35 | 12 | 30 | 30 | 18 | 22.5 | | | | |
| | 45 | | | | | 26.5 | | | | |
| | 55 | | | | | 31.5 | | | | |
| | DH4 | | | | | 25 | N/A | N/A | N/A | N/A |
| 35 | | | | | | 3/8" | .787" | .787" | .550" | .669" |
| 45 | | 1.181" | 1.181" | .886" | | | | | | |
| 55 | | | | 1.043" | | | | | | |
| 65 | | | | 1.240" | | | | | | |
| DH5 | 25 | | | N/A | N/A | | N/A | N/A | | N/A |
| | 35 | 1/2" | 1.181" | 1.181" | .750" | .886" | | | | |
| | 45 | | | | | 1.043" | | | | |
| | 55 | | | | | 1.240" | | | | |
| | 65 | | | | | | | | | |

All dimensions in mm unless otherwise specified.

Y1 = Y2 unless otherwise specified.

522 Type U Rail Bolt Up From Bottom

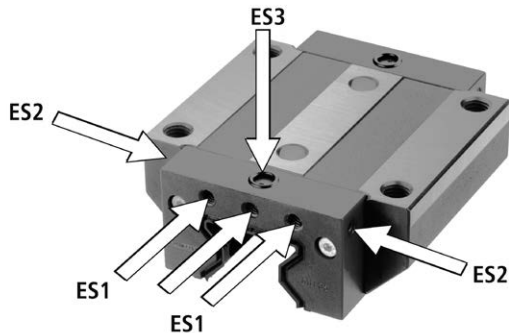


| Size | X | E | G (mm) | Weight (kg/in) |
|------|------|-----|--------|----------------|
| 25 | 30 | M6 | 12 | 3.4 |
| 35 | 40 | M8 | 15 | 6.5 |
| 45 | 52.5 | M12 | 19 | 10.7 |
| 55 | 60 | M14 | 22 | 15.2 |
| 65 | 75 | M16 | 25 | 22.5 |

Y1 = Y2 unless specified at time of ordering.

Lubrication Inlet Options

The standard 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.)



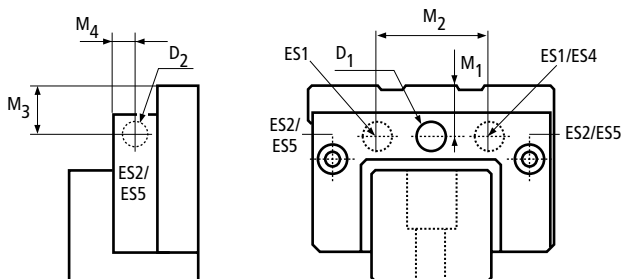
| Option | Inlet | Lubrication Channel |
|-------------------|--|-----------------------------|
| ES 1 ² | Inlets offset - both sides - all four | Standard channel |
| ES 2 | Inlets on side - both sides - all four | Standard channel |
| ES 3 ¹ | Inlet on top | Standard channel |
| ES 4 ² | Inlets offset - both sides - all four | Individually channeled path |
| ES 5 | Inlets offset - both sides - all four | Individually channeled path |

1. An O-Ring or adapter is required to properly seal the mating surfaces to prevent grease or oil from escaping. One is supplied with this option. The adapter is for C and D style carriages. Lubrication options available in size 35, 45, 55 and 65 only.
2. Option can not be used in combination with additional modular accessories.
3. Set screw is installed in Standard inlet hole when ES2 and ES3 options are specified.
4. Inlets on side and top are solid plugs. When modified on-site, inlets must be punctured to be utilized.

Lubrication inlet locations. Front of end cap above rail and slide.

| Size | Style | M ₁ | M ₂ | M ₄ | M ₃ | D ₁ | D ₂ |
|------|-------|----------------|----------------|----------------|----------------|----------------|----------------|
| 25 | A | 5.5 | N/A | N/A | N/A | M6 | N/A |
| | B | | | | | | |
| | C | | | | | | |
| | D | | | | | | |
| 35 | A | 7 | 32 | 6.5 | 7 | M6 | M6 |
| | B | | | | | | |
| | C | | | | | | |
| | D | | | | | | |
| 45 | A | 8 | 40 | 7.5 | 8 | M6 | M6 |
| | B | | | | | | |
| | C | | | | | | |
| | D | | | | | | |
| 55 | A | 9 | 50 | 8.5 | 9 | M6 | M6 |
| | B | | | | | | |
| | C | | | | | | |
| | D | | | | | | |
| 65 | B | 13 | 64 | 12.5 | 13 | M6 | M6 |
| | D | | | | | | |

All dimensions in mm.

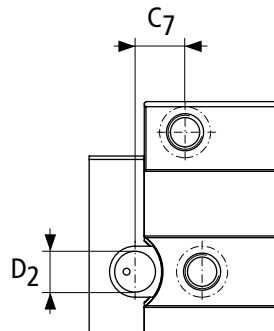


1. D1 and D2 are threaded holes in the end cap to ensure proper integrity and durability of connection.
2. Carriages are shipped with a grease fitting in the box (fitting 530LN). See page 70 for more information.

Lubricant Inlet Options, cont'd

Lubrication inlet locations. Inlet on top. "ES3"

| Size | Style | C7 | D1 | D2 | D3 | D4 | Adapter ¹ |
|------|-------|------|------|----|------|----|----------------------|
| 25 | A | 12.0 | 6.75 | 10 | 1.78 | 6 | N/A |
| | B | 23.2 | | | | | N/A |
| | C | 17.0 | | | | | 532ES3ADP25 |
| | D | 20.7 | | | | | 532ES3ADP25 |
| 35 | A | 14.0 | 6.75 | 10 | 1.78 | 6 | N/A |
| | B | 27.5 | | | | | N/A |
| | C | 20.0 | | | | | 532ES3ADP35 |
| | D | 22.5 | | | | | 532ES3ADP35 |
| 45 | A | 17.0 | 6.75 | 10 | 1.78 | 6 | N/A |
| | B | 34.5 | | | | | N/A |
| | C | 27.0 | | | | | 532ES3ADP45/55 |
| | D | 34.5 | | | | | 532ES3ADP45/55 |
| 55 | A | 21.5 | 6.75 | 10 | 1.78 | 6 | N/A |
| | B | 42.5 | | | | | N/A |
| | C | 31.5 | | | | | 532ES3ADP45/55 |
| | D | 42.5 | | | | | 532ES3ADP45/55 |
| 65 | B | 54.0 | 6.5 | 10 | 2 | 6 | N/A |
| | D | 49.0 | | | | | N/A |



- D1** = O-Ring internal diameter
D2 = Counterbore diameter
D3 = O-Ring thickness
D4 = Max. diameter of lubrication inlet diameter from above

All dimensions in mm.

1. Adapter supplied when ordering ES3 option.

Grease Lubricants

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

| Option | Type | Notes | Viscosity | Temperature Range |
|--------|----------------------------|---------------------------|--------------|-------------------|
| G1 | Mobilux [®] EP2 | All purpose NLGI 2 grease | 160cSt @40°C | -20°C to 130°C |
| G2 | Krytox [®] GPL227 | High Temperature NLGI 2 | 440cSt @40°C | -30°C to 288°C |
| G3 | Thomson LinearLube | Food Grade NLGI2 grease | 350cSt @40°C | -54°C to 230°C |
| GS | Customer specified grease | | | |

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

Thin Dense Chrome Plating

Rails and carriages are available with 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 with Precision accuracy classes up to 3 meters long as a single rail; long lengths can be butt jointed.

Carriage Assortment with Thin Dense Chrome

| Type | Style | Size | Accuracy | Preload | | | Appropriate Standard Rail | Max One Piece Rail Length (mm) |
|------|-------|------|----------|-----------|-----------|-----------|---------------------------|--------------------------------|
| | | | | 0.03C | 0.08C | 0.13C | | |
| 512 | A | 25 | P | 512P25A1D | 512P25A2D | 512P25A3D | 522P25AD | 3000 |
| | | 35 | P | 512P35A1D | 512P35A2D | 512P35A3D | 522P35AD | 3000 |
| | | 45 | P | 512P45A1D | 512P45A2D | 512P45A3D | 522P45AD | 3000 |
| | | 55 | P | 512P55A1D | 512P55A2D | 512P55A3D | 522P55AD | 3000 |
| | B | 25 | P | 512P25B1D | 512P25B2D | 512P25B3D | 522P25AD | 3000 |
| | | 35 | P | 512P35B1D | 512P35B2D | 512P35B3D | 522P35AD | 3000 |
| | | 45 | P | 512P45B1D | 512P45B2D | 512P45B3D | 522P45AD | 3000 |
| | | 55 | P | 512P55B1D | 512P55B2D | 512P55B3D | 522P55AD | 3000 |
| | | 65 | P | 512P65B1D | 512P65B2D | 512P65B3D | 522P65AD | 3000 |
| | C | 25 | P | 512P25C1D | 512P25C2D | 512P25C3D | 522P25AD | 3000 |
| | | 35 | P | 512P35C1D | 512P35C2D | 512P35C3D | 522P35AD | 3000 |
| | | 45 | P | 512P45C1D | 512P45C2D | 512P45C3D | 522P45AD | 3000 |
| | | 55 | P | 512P55C1D | 512P55C2D | 512P55C3D | 522P55AD | 3000 |
| | D | 25 | P | 512P25D1D | 512P25D2D | 512P25D3D | 522P25AD | 3000 |
| | | 35 | P | 512P35D1D | 512P35D2D | 512P35D3D | 522P35AD | 3000 |
| | | 45 | P | 512P45D1D | 512P45D2D | 512P45D3D | 522P45AD | 3000 |
| | | 55 | P | 512P55D1D | 512P55D2D | 512P55D3D | 522P55AD | 3000 |
| | | 65 | P | 512P65D1D | 512P65D2D | 512P65D3D | 522P65AD | 3000 |

Note: Chrome plated carriages and rails are designed and manufactured to be used together. If a non-chrome plated carriage is used on a chrome plated rail the preload of the carriage will be increased approximately one class.

If a chrome plated carriage is used on a non-chrome plated rail the preload will be decreased approximately one class. This is the result of the coating thickness.

Modular Accessory Combination Options and Screw Size

| Option | Description | Size | | | | |
|----------------|--|------------------------------|------------------------------|------------------------------|------------------------------|------------------------------|
| | | 25 | 35 | 45 | 55 | 65 |
| N ³ | Oil Reservoir | Low/socket head screw M4x30 | Low/socket head screw M4x35 | Low/socket head screw M5x45 | Low/socket head screw M6x45 | Low/socket head screw M6x55 |
| V ³ | Viton Wiper | Low/socket head screw M4x25 | Low/socket head screw M4x30 | Low/socket head screw M5x35 | Low/socket head screw M6x35 | Low/socket head screw M6x40 |
| Z ³ | Metal Scraper | Low/socket head screw M4x20 | Low/socket head screw M4x25 | Low/socket head screw M5x30 | Low/socket head screw M6x35 | Low/socket head screw M6x35 |
| C ³ | Bellows Clips | Flat/socket head screw M4x20 | Flat/socket head screw M4x25 | Flat/socket head screw M5x25 | Flat/socket head screw M6x30 | Flat/socket head screw M6x35 |
| NV | Oil Reservoir + Wiper | Low/socket head screw M4x40 | Low/socket head screw M4x45 | Low/socket head screw M5x50 | Low/socket head screw M6x55 | Low/socket head screw M6x65 |
| NVZ | Oil Reservoir, Wiper + Scraper | Low/socket head screw M4x40 | Low/socket head screw M4x45 | Low/socket head screw M5x55 | Low/socket head screw M6x60 | Low/socket head screw M6x65 |
| NVC | Oil Reservoir, Wiper + Bellows Clip | Flat/socket head screw M4x40 | Flat/socket head screw M4x45 | Flat/socket head screw M5x50 | Flat/socket head screw M6x55 | Flat/socket head screw M6x65 |
| NVZC | Oil Reservoir, Wiper, Scraper + Bellows Clip | Flat/socket head screw M4x40 | Flat/socket head screw M4x50 | Flat/socket head screw M5x55 | Flat/socket head screw M6x60 | Flat/socket head screw M6x65 |
| NZ | Oil Reservoir + Scraper | Low/socket head screw M4x35 | Low/socket head screw M4x40 | Low/socket head screw M5x50 | Low/socket head screw M6x55 | Low/socket head screw M6x60 |
| NZC | Oil Reservoir, Scraper + Bellows Clips | Flat/socket head screw M4x35 | Flat/socket head screw M4x40 | Flat/socket head screw M5x50 | Flat/socket head screw M6x55 | Flat/socket head screw M6x60 |
| NC | Oil Reservoir + Bellows Clips | Flat/socket head screw M4x35 | Flat/socket head screw M4x40 | Flat/socket head screw M5x50 | Flat/socket head screw M6x55 | Flat/socket head screw M6x60 |
| VC | Wiper + Bellows Clip | Flat/socket head screw M4x25 | Flat/socket head screw M4x30 | Flat/socket head screw M5x30 | Flat/socket head screw M6x35 | Flat/socket head screw M6x40 |
| VZ | Wiper + Scraper | Low/socket head screw M4x25 | Low/socket head screw M4x30 | Low/socket head screw M5x35 | Low/socket head screw M6x35 | Low/socket head screw M6x40 |
| VZ | Viton Wiper + Scraper | Low/socket head screw M4x25 | Low/socket head screw M4x30 | Low/socket head screw M5x35 | Low/socket head screw M6x35 | Low/socket head screw M6x40 |
| ZC | Scraper + Bellows Clip | Flat/socket head screw M4x20 | Flat/socket head screw M4x25 | Flat/socket head screw M5x25 | Flat/socket head screw M6x30 | Flat/socket head screw M6x35 |

1. All fasteners standard thread.
2. Consult Thomson for options not listed, engineering review is required.
3. Each modular accessory is supplied with proper screws to install over end cap only and not combinations of modular accessories.

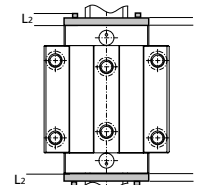
Modular Seals and Lubrication Accessories



Additional Wipers 532VR – Viton® Wiper

| Size | Viton® Part Number | L1 (mm) | L2 (mm) | Weight (kg) |
|------|--------------------|---------|---------|-------------|
| 25 | 532VR25 | 7 | 4 | 0.005 |
| 35 | 532VR35 | 7 | 4 | 0.012 |
| 45 | 532VR45 | 7 | 4 | 0.024 |
| 55 | 532VR55 | 7 | 4 | 0.029 |
| 65 | 532VR65 | 7 | 4 | 0.040 |

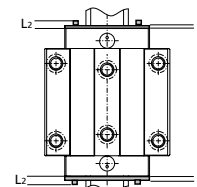
L1 – wiper thickness, L2 – max. screw head stickout



Metal Scraper 532 ZZ

| 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 |

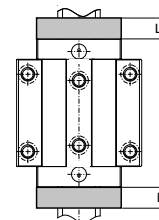
L1 = scraper thickness, L2 = max. screw head stickout



Oil Reservoir 532 OW

| 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



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 532 OW and 532 VR modular seals on both sides:

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

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

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

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

Bellows Dimensional Information

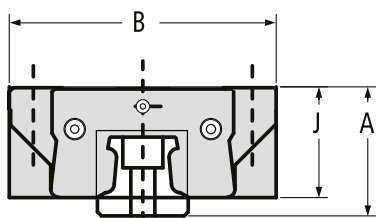
Bellows are available in three styles:

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 BW “Walk On” capable of handling the harshest environments, including welding and grinding applications, with a 90 kg load bearing capacity.

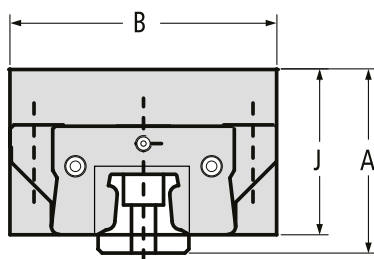
The bellows can be easily installed in conjunction with the other optional modular seals providing you with an easy upgrade to the standard seal. Installation is simple and requires little time. Retrofitting is possible. The rail ends have to be drilled for the attachment of the bellow clip adapter plate,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



532 BB “ 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 |

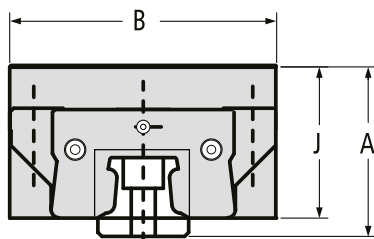
Customer to specify extended length at time of order, see page 118 for how to calculate.



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 extended length at time of order, see page 118 for how to calculate.



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 |

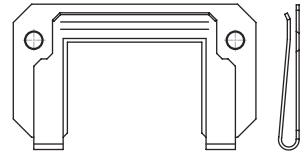
Customer to specify extended length at time of order, see page 118 for how to calculate.

Bellow Clip Adapter Plates

532 CC Carriage Bellow Clips – Attachment Plate

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

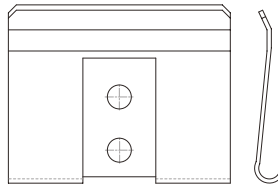
| Size | Part No. |
|------|----------|
| 25 | 532 CC25 |
| 35 | 532 CC35 |
| 45 | 532 CC45 |
| 55 | 532 CC55 |
| 65 | 532 CC65 |



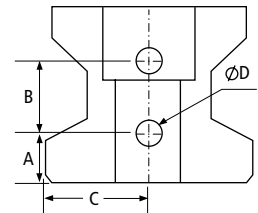
500 Series Roller
Profile Rail

532 CR Rail Bellow Clips – Attachment Plate

The 532 CR Rail Bellow Clip – Attachment 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.



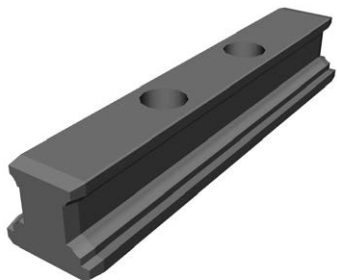
| Size | Part No. | Rail Machining Detail | | | | | Screw ¹ | | | | Min Y ² |
|------|----------|-----------------------|----|-------|-----------|-----------|--------------------|-------|--------|-----------------------|--------------------|
| | | A | B | C | Depth Min | Depth Max | Size | Pitch | Length | Type | |
| 25 | 532 CR25 | 7.24 | 10 | 11.50 | 7.7 | 9.70 | M4 | 0.70 | 10.00 | Button Head Cap Screw | 12 |
| 35 | 532 CR35 | 11.00 | | 17.00 | | | | | | | 20 |
| 45 | 532 CR45 | 15.01 | | 22.50 | | | | | | | 22 |
| 55 | 532 CR55 | 18.01 | | 26.50 | | | | | | | 24 |
| 65 | 532 CR65 | 24.00 | | 31.50 | | | | | | | 28 |



All dimensions in mm.

- Two screws are supplied with each Rail Bellow Clip.
- Min Y dimension to ensure drill depth does not break through rail mounting hole.

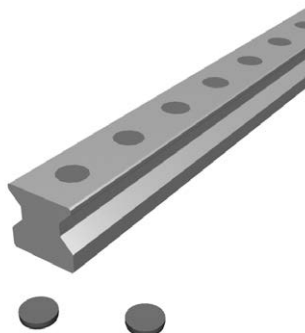
500 Series Roller Rail Information



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 carriage on the assembly rail to protect the rollers against con 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 HB 25 | 1 | .002 |
| 35 | 532 HB 35 | 1 | .005 |
| 45 | 532 HB 45 | 1 | .008 |
| 55 | 532 HB 55 | 1 | .011 |
| 65 | 532 HB 65 | 1 | .013 |



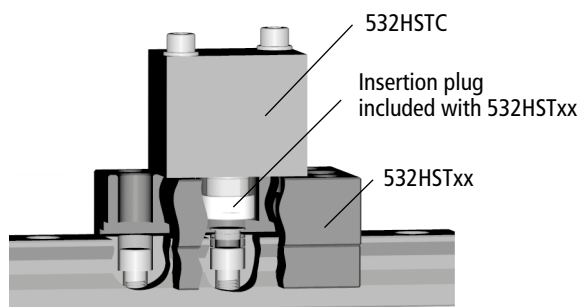
HS two-piece stainless steel plugs

| Size | Part Number | Qty per pack | Weight (kg) |
|------|-------------|--------------|-------------|
| 25 | 532 HS 25 | 1 set | .003 |
| 35 | 532 HS 35 | 1 set | .008 |
| 45 | 532 HS 45 | 1 set | .012 |
| 55 | 532 HS 55 | 1 set | .019 |
| 65 | 532 HS 65 | 1 set | .026 |

Mylar tape

| Size | Part Number | Length |
|------|-------------|--------|
| 25 | 532 RT 25 | 3 m |
| 35 | 532 RT 35 | 3 m |
| 45 | 532 RT 45 | 3 m |
| 55 | 532 RT 55 | 3 m |
| 65 | 532 RT 65 | 3 m |

HST Stainless Steel and Brass installation tool



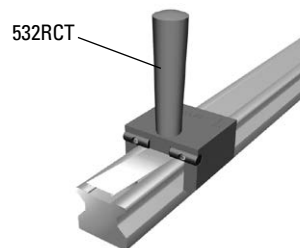
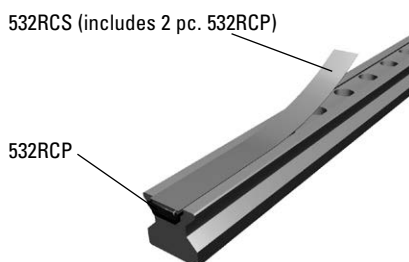
| Sliding Block with insertion plug | Weight (kg) |
|------------------------------------|-------------|
| 532 HST 25 For size 25 rail | 2.0 |
| 532 HST 35 For size 35 rail | 3.5 |
| 532 HST 45 For size 45 rail | 3.9 |
| 532 HST 55 For size 55 rail | 5.4 |
| 532 HST 65 For size 65 rail | 6.5 |
| Hydraulic cylinder (for all sizes) | Weight (kg) |
| 532 HSTC ¹ | 0.53 |

1. Hydraulic fitting size 1/4"-18 NPT, max pressure 120 x 103 hPa (120 bar).

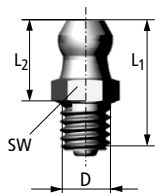
Optional 500 Series Rail with Stainless Steel Cover Strip

| Size | Rail Coverstrip End Caps | Mounting Tool | Replacement End Caps | Standard Coverstrip Rail | Coverstrip Width (mm) | Max Single PC Length (mm) |
|------|--------------------------|---------------|--------------------------|--------------------------|-----------------------|---------------------------|
| | Part Number ¹ | Part Number | Part Number ² | Part Number ³ | | |
| 25 | 532RCS25 | 532RCT25 | 532RCP25 | 522P25C | 15 | 6000 |
| 35 | 532RCS35 | 532RCT35 | 532RCP35 | 522P35C | 19 | 6000 |
| 45 | 532RCS45 | 532RCT45 | 532RCP45 | 522P45C | 25 | 6000 |
| 55 | 532RCS55 | 532RCT55 | 532RCP55 | 522P55C | 28.5 | 6000 |
| 65 | 532RCS65 | 532RCT65 | 532RCP65 | 522P65C | 32 | 6000 |

- Customer to specify length of rail to be used on at time of order. Delivered piece will be 2 to 3.5 mm longer in order to properly install and fit end caps.
- Two end caps are supplied with each piece of 532RCS ordered.
- P grade accuracy shown for example purposes, S and U grade accuracy are available.
- Cover strip should not be installed more than 3 times.



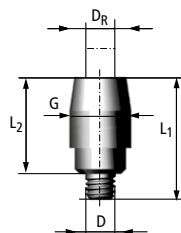
Lubrication Fittings



530LN
Hydraulic-type lubricating nipple, straight.
530BF6 = 2.5 mm / 530BF8 = 4mm

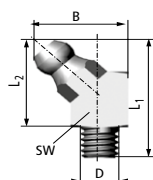
| D | L ₁ | L ₂ | SW |
|----|----------------|----------------|----|
| M6 | 16 | 10.5 | 7 |

* Note: 1 pc included with each carriage



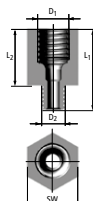
530LA3
Straight screw-in connection M3
For tubing with ext. diameter DR = 3 mm

| D | ØG | L ₁ | L ₂ |
|----|----|----------------|----------------|
| M3 | 6 | 12 | 9.5 |



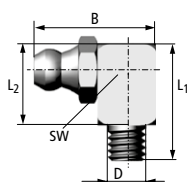
530LN45
Hydraulic-type lubricating nipple, 45° angle

| D | L ₁ | L ₂ | B | SW |
|----|----------------|----------------|----|----|
| M6 | 21 | 15.5 | 15 | 9 |



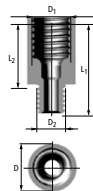
530LA... Adapter
Adapter with hexagon insert bit
For tubing with ext. diameter = 4 mm

| PIN | D ₁ | D ₂ | L ₁ | L ₂ |
|--------|----------------|----------------|----------------|----------------|
| 530LA4 | G1/8 | M6 | 20 | 14 |
| 530LA5 | M8x1 | M6 | 20 | 14 |



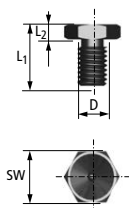
530LN90
Hydraulic-type lubricating nipple, 90° angle

| D | L ₁ | L ₂ | B | SW |
|----|----------------|----------------|----|----|
| M6 | 18 | 12.5 | 19 | 9 |



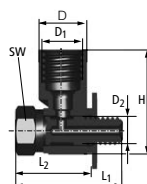
530LA6
Adapter, external round
For tubing with ext. diameter = 4 mm

| D ₁ | D ₂ | L ₁ | L ₂ | Ø |
|----------------|----------------|----------------|----------------|----|
| M8x1 | M6 | 20 | 14 | 10 |



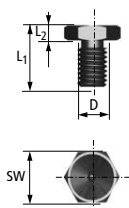
530LF3
Funnel type lubricating nipple M3

| D | L ₁ | L ₂ | SW |
|----|----------------|----------------|----|
| M3 | 6.6 | 1.6 | 5 |



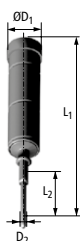
530BF... Banjo Fittings
For tubing with ext. diameter
530BF6 = 2.5 mm / 530BF8 = 4mm

| P/N | D ₁ | D ₂ | L ₁ | L ₂ | H |
|--------|----------------|----------------|----------------|----------------|----|
| 530BF6 | M6x0.75 | M6 | 22 | 16 | 18 |
| 530BF8 | M8x1 | M6 | 22 | 15.5 | 22 |



530LF6
Funnel type lubricating nipple M6

| D | L ₁ | L ₂ | SW |
|----|----------------|----------------|----|
| M6 | 9.5 | 3 | 7 |



530LG
Grease gun for funnel type lubricating nipple M3

| L ₁ | L ₂ | ØD ₁ | ØD ₂ |
|----------------|----------------|-----------------|-----------------|
| 210 | 55 | 34 | 5.5 |

Accuracy Class

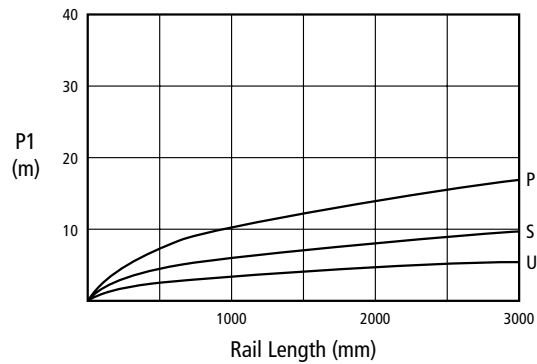
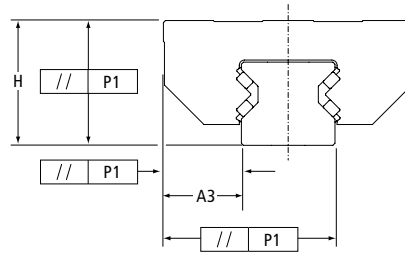
Three tolerances describe the accuracy of a Profile Rail bearing: Running Parallelism, Pair Variation, and Assembly Accuracy. These are measured from the rail base to the center of the carriage top (H), and from the rail reference edge to the center of the carriage reference edge (A3).

Running Parallelism describes the tolerance on H and A3 as a function of axial travel, measured from one carriage down the length of the 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 | | |
|---|----------------|---------------------|---------------------|
| | 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

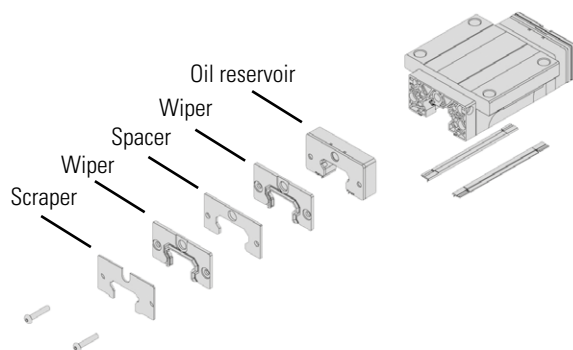
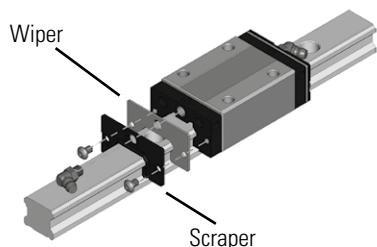
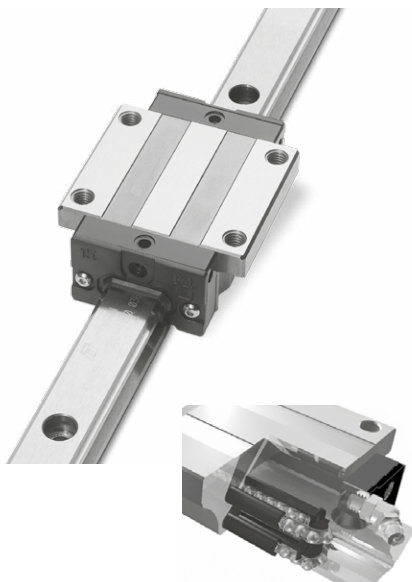
Three Preload classes are available with the 500 Series Roller Profile rail carriages. Preload will minimize elastic deformation caused by external forces resulting in increased rigidity.

Preload Accuracy Combinations

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

1. C = Dynamic load capacity of the bearing

Overview of Thomson 400 Series Profile Rail Linear Guides



Features and Benefits

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

Low Noise and Vibration

Polymer ball-return tube reduces noise while retaining lubrication.

Modular Accessory Options

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

Metal Scraper

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

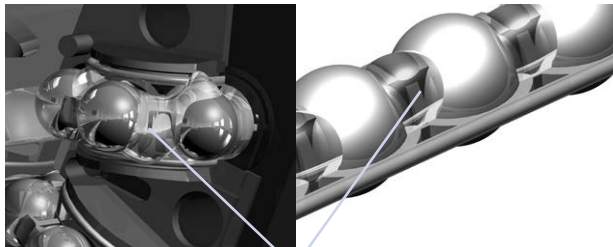
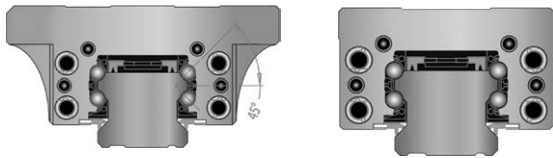
Additional Seal

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

Oil Reservoir

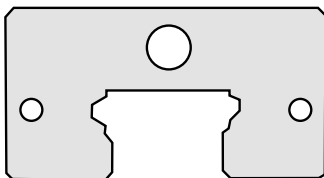
The **Type 431 OW oil reservoir** is a cost effective, automatic lubrication system. It is constructed with an integrated oil reservoir that provides a uniform, consistent lubricating oil

Overview of Thomson 400 Series Profile Rail Linear Guides

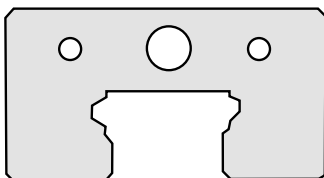


Lubricant

New design



Old design



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

Lubrication Channels

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

Double-Faced Ball Tracks

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

400 Series Ball Cage

The 413 ball cage option provides:

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

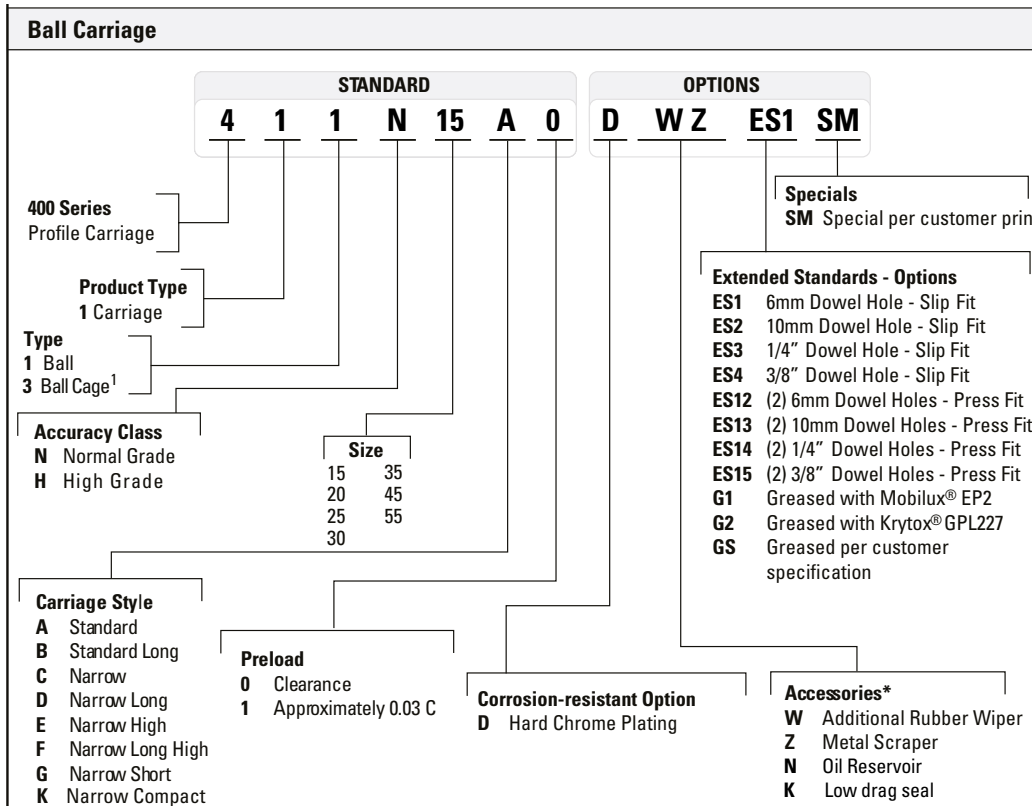
New endcap design on our 400 Series carriages

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

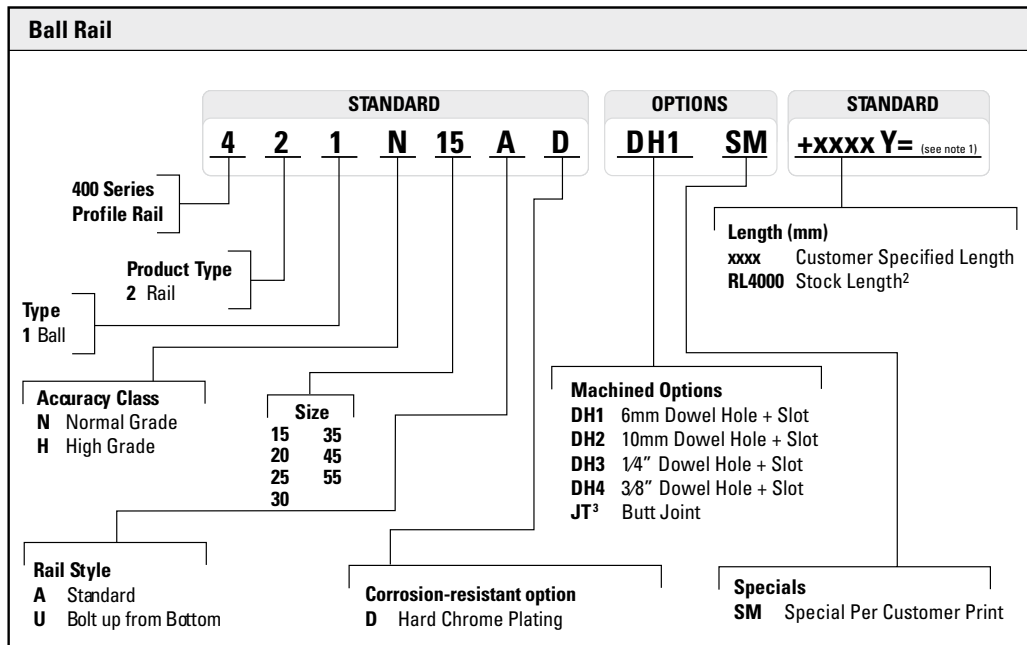
Advantages:

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

400 Series Part Numbering Description



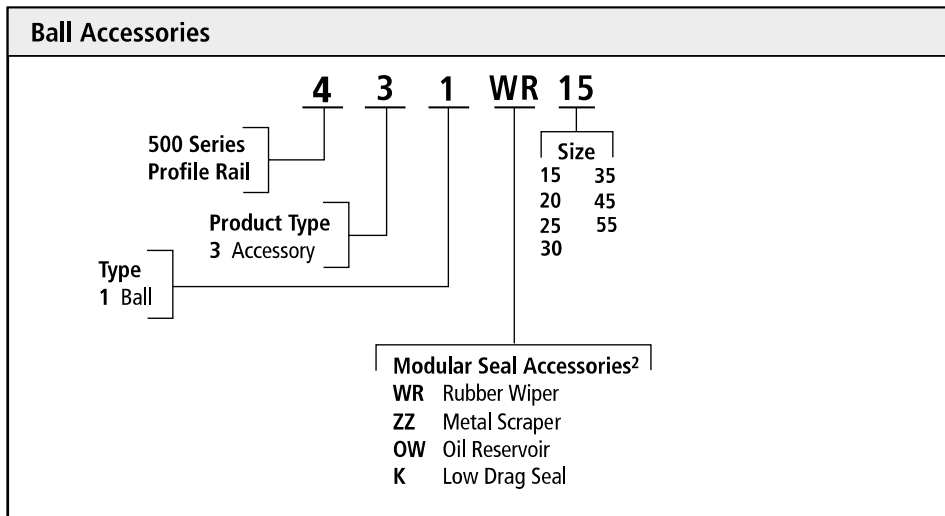
1. Carriage does not retain ball bearings when end cap is removed. Removal of end caps can result in loss of ball bearings.
 * Long life lube block and bellows may be available as options if desired, based on the opportunity. Please contact Customer Support for more details.



1. Y = Distance from end of rail to center of first mounting hole, Y1 = Y2 unless specified.
 2. Stock length of rails are considered random length, total length may exceed specified length, and Y1/Y2 are not equal. To be used only by customer who will cut to length.
 3. Customer drawing required at time of quote and order.

Assemblies are available, please see page 125 for assembly part number details.

400 Series Part Numbering Description



Assemblies are available, please see page 125 for assembly part number details.

Additional Seal Part Numbers

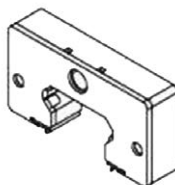
| Carriage Size | Wiper Part Number | Scraper Part Number | Oil Reservoir Part Number | Low Drag Seal |
|---------------|-------------------|---------------------|---------------------------|---------------|
| 15 | 431WR15 | 431ZZ15 | 431OW15 | 431K15 |
| 20 | 431WR20 | 431ZZ20 | 431OW20 | 431K20 |
| 25 | 431WR25 | 431ZZ25 | 431OW25 | 431K25 |
| 30 | 431WR30 | 431ZZ30 | 431OW30 | 431K30 |
| 35 | 431WR35 | 431ZZ35 | 431OW35 | 431K35 |
| 45 | 431WR45 | 431ZZ45 | 431OW45 | 431K45 |
| 55 | 431WR55 | 431ZZ55 | 431OW55 | 431K55 |



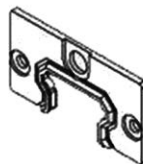
Wiper



Scraper



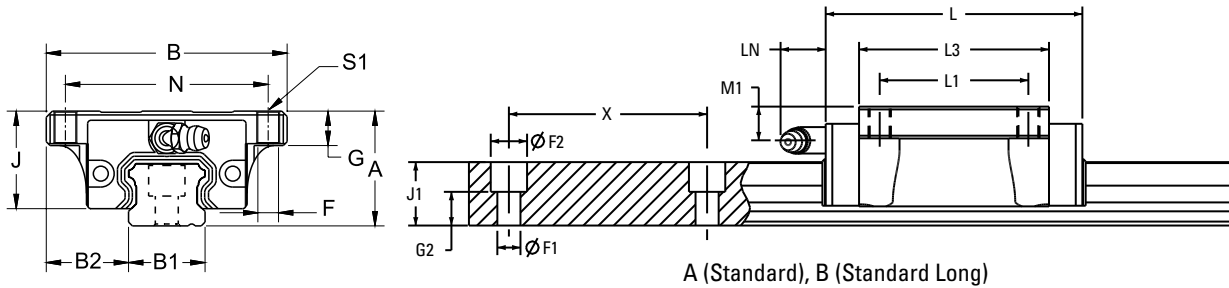
Oil Reservoir



Low Drag Seal

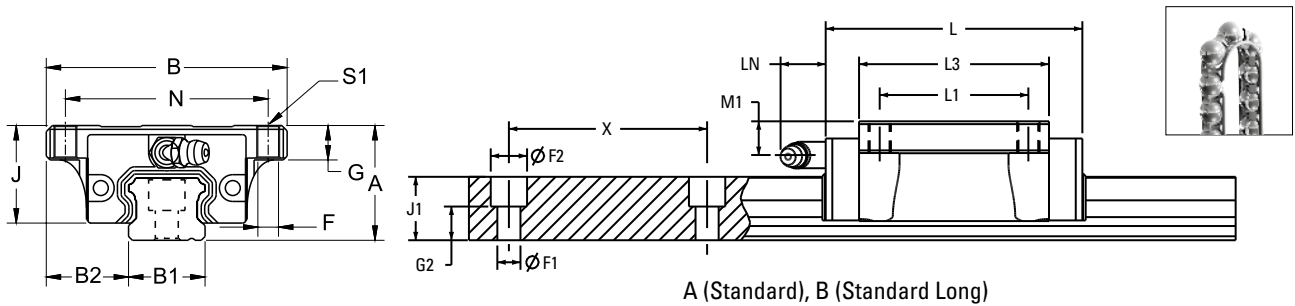
400 Series
Profile Rail

400 Series Specifications



411 Standard

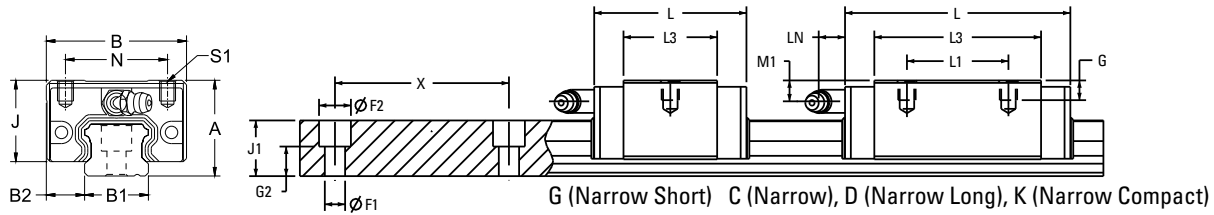
| Item | Assembly [mm] | | | | Carriage [mm] | | | | | | | | | | Rail [mm] | | | | | Load Rating | | Carriage Weight | Rail Weight | |
|----------|---------------|-----|------|------|---------------|-----|----|-----|------|------|-------|-----------|------|--------|-------------------|------|-----|------|------|-------------|--------|-----------------|-------------|--------|
| | A | B | B2 | J | L | N | L1 | S1 | F | G | L3 | Oil H | M1 | LN | B1 +0.02 -0.05 | J1 | X | F1 | F2 | G2 | C [N] | C0 [N] | [kg] | [kg/m] |
| 411N15A0 | 24 | 47 | 16.0 | 20.7 | 58.6 | 38 | 30 | M5 | 4.4 | 8.0 | 40.2 | M4 X 0.7 | 5.5 | (5.0) | 15 | 13.0 | 60 | 4.5 | 7.5 | 7.0 | 9,300 | 19,600 | 0.21 | 1.28 |
| 411N15B0 | 24 | 47 | 16.0 | 20.7 | 66.1 | 38 | 30 | M5 | 4.4 | 8.0 | 47.7 | M4 X 0.7 | 5.5 | (5.0) | 15 | 13.0 | 60 | 4.5 | 7.5 | 7.0 | 11,300 | 23,700 | 0.23 | 1.28 |
| 411N20A0 | 30 | 63 | 21.5 | 25.5 | 69.3 | 53 | 40 | M6 | 5.4 | 9.0 | 48.5 | M6 X 1.0 | 7.1 | (15.6) | 20 | 16.3 | 60 | 6.0 | 9.5 | 7.8 | 14,300 | 30,500 | 0.40 | 2.15 |
| 411N20B0 | 30 | 63 | 21.5 | 25.5 | 82.1 | 53 | 40 | M6 | 5.4 | 9.0 | 61.3 | M6 X 1.0 | 7.1 | (15.6) | 20 | 16.3 | 60 | 6.0 | 9.5 | 7.8 | 18,600 | 39,500 | 0.46 | 2.15 |
| 411N25A0 | 36 | 70 | 23.5 | 30.2 | 79.2 | 57 | 45 | M8 | 7.0 | 10.0 | 57.5 | M6 X 1.0 | 10.2 | (15.6) | 23 | 19.2 | 60 | 7.0 | 11.0 | 10.2 | 20,100 | 41,100 | 0.57 | 2.88 |
| 411N25B0 | 36 | 70 | 23.5 | 30.2 | 93.9 | 57 | 45 | M8 | 7.0 | 10.0 | 72.2 | M6 X 1.0 | 10.2 | (15.6) | 23 | 19.2 | 60 | 7.0 | 11.0 | 10.2 | 25,900 | 52,800 | 0.72 | 2.88 |
| 411N30A0 | 42 | 90 | 31.0 | 35.0 | 94.8 | 72 | 52 | M10 | 8.6 | 11.0 | 67.8 | M6 X 1.0 | 8 | (15.6) | 28 | 22.8 | 80 | 9.0 | 14.0 | 10.8 | 29,700 | 54,600 | 1.10 | 4.45 |
| 411N30B0 | 42 | 90 | 31.0 | 35.0 | 105.0 | 72 | 52 | M10 | 8.6 | 11.0 | 78.0 | M6 X 1.0 | 8 | (15.6) | 28 | 22.8 | 80 | 9.0 | 14.0 | 10.8 | 38,500 | 70,700 | 1.34 | 4.45 |
| 411N35A0 | 48 | 100 | 33.0 | 40.5 | 111.5 | 82 | 62 | M10 | 8.6 | 12.0 | 80.5 | M6 X 1.0 | 8 | (16.0) | 34 | 26.0 | 80 | 9.0 | 14.0 | 14.0 | 42,400 | 81,100 | 1.50 | 6.25 |
| 411N35B0 | 48 | 100 | 33.0 | 40.5 | 123.5 | 82 | 62 | M10 | 8.6 | 12.0 | 92.5 | M6 X 1.0 | 8 | (16.0) | 34 | 26.0 | 80 | 9.0 | 14.0 | 14.0 | 52,900 | 101,400 | 1.90 | 6.25 |
| 411N45A0 | 60 | 120 | 37.5 | 51.1 | 129.0 | 100 | 80 | M12 | 10.6 | 15.5 | 94.0 | M8 X 1.25 | 14.4 | (16.0) | 45 | 31.1 | 105 | 14.0 | 20.0 | 14.1 | 58,000 | 108,900 | 2.27 | 9.60 |
| 411N45B0 | 60 | 120 | 37.5 | 51.1 | 145.0 | 100 | 80 | M12 | 10.6 | 15.5 | 110.0 | M8 X 1.25 | 14.4 | (16.0) | 45 | 31.1 | 105 | 14.0 | 20.0 | 14.1 | 69,000 | 129,500 | 2.68 | 9.60 |
| 411N55A0 | 70 | 140 | 43.5 | 57.3 | 155.0 | 116 | 95 | M14 | 12.6 | 18.5 | 116.0 | M8 X 1.25 | 14.0 | (16.0) | 53 | 38.0 | 120 | 16.0 | 23.0 | 18.0 | 69,800 | 133,400 | 3.44 | 13.80 |
| 411N55B0 | 70 | 140 | 43.5 | 57.3 | 193.0 | 116 | 95 | M14 | 12.6 | 18.5 | 154.0 | M8 X 1.25 | 14.0 | (16.0) | 53 | 38.0 | 120 | 16.0 | 23.0 | 18.0 | 94,200 | 178,900 | 4.63 | 13.80 |



413 Standard (Caged)

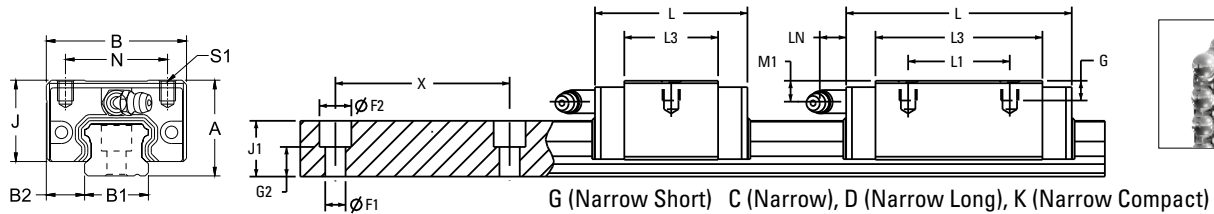
| Item | Assembly [mm] | | | | Carriage [mm] | | | | | | | | | | Rail [mm] | | | | | Load Rating | | Carriage Weight | Rail Weight | |
|----------|---------------|-----|------|------|---------------|-----|----|-----|------|------|-------|-----------|------|--------|-------------------|------|-----|------|------|-------------|--------|-----------------|-------------|--------|
| | A | B | B2 | J | L | N | L1 | S1 | F | G | L3 | Oil H | M1 | LN | B1 +0.02 -0.05 | J1 | X | F1 | F2 | G2 | C [N] | C0 [N] | [kg] | [kg/m] |
| 413N15A0 | 24 | 47 | 16.0 | 20.7 | 58.6 | 38 | 30 | M5 | 4.4 | 8.0 | 40.2 | M4 X 0.7 | 5.5 | (5.0) | 15 | 13.0 | 60 | 4.5 | 7.5 | 7.0 | 9,300 | 19,600 | 0.21 | 1.28 |
| 413N15B0 | 24 | 47 | 16.0 | 20.7 | 66.1 | 38 | 30 | M5 | 4.4 | 8.0 | 47.7 | M4 X 0.7 | 5.5 | (5.0) | 15 | 13.0 | 60 | 4.5 | 7.5 | 7.0 | 11,300 | 23,700 | 0.23 | 1.28 |
| 413N20A0 | 30 | 63 | 21.5 | 25.5 | 69.3 | 53 | 40 | M6 | 5.4 | 9.0 | 48.5 | M6 X 1.0 | 7.1 | (15.6) | 20 | 16.3 | 60 | 6.0 | 9.5 | 7.8 | 14,300 | 30,500 | 0.40 | 2.15 |
| 413N20B0 | 30 | 63 | 21.5 | 25.5 | 82.1 | 53 | 40 | M6 | 5.4 | 9.0 | 61.3 | M6 X 1.0 | 7.1 | (15.6) | 20 | 16.3 | 60 | 6.0 | 9.5 | 7.8 | 18,600 | 39,500 | 0.46 | 2.15 |
| 413N25A0 | 36 | 70 | 23.5 | 30.2 | 79.2 | 57 | 45 | M8 | 7.0 | 10.0 | 57.5 | M6 X 1.0 | 10.2 | (15.6) | 23 | 19.2 | 60 | 7.0 | 11.0 | 10.2 | 20,100 | 41,100 | 0.57 | 2.88 |
| 413N25B0 | 36 | 70 | 23.5 | 30.2 | 93.9 | 57 | 45 | M8 | 7.0 | 10.0 | 72.2 | M6 X 1.0 | 10.2 | (15.6) | 23 | 19.2 | 60 | 7.0 | 11.0 | 10.2 | 25,900 | 52,800 | 0.72 | 2.88 |
| 413N30A0 | 42 | 90 | 31.0 | 35.0 | 94.8 | 72 | 52 | M10 | 8.6 | 11.0 | 67.8 | M6 X 1.0 | 8 | (15.6) | 28 | 22.8 | 80 | 9.0 | 14.0 | 10.8 | 29,700 | 54,600 | 1.10 | 4.45 |
| 413N30B0 | 42 | 90 | 31.0 | 35.0 | 105.0 | 72 | 52 | M10 | 8.6 | 11.0 | 78.0 | M6 X 1.0 | 8 | (15.6) | 28 | 22.8 | 80 | 9.0 | 14.0 | 10.8 | 38,500 | 70,700 | 1.34 | 4.45 |
| 413N35A0 | 48 | 100 | 33.0 | 40.5 | 111.5 | 82 | 62 | M10 | 8.6 | 12.0 | 80.5 | M6 X 1.0 | 8 | (16.0) | 34 | 26.0 | 80 | 9.0 | 14.0 | 14.0 | 42,400 | 81,100 | 1.50 | 6.25 |
| 413N35B0 | 48 | 100 | 33.0 | 40.5 | 123.5 | 82 | 62 | M10 | 8.6 | 12.0 | 92.5 | M6 X 1.0 | 8 | (16.0) | 34 | 26.0 | 80 | 9.0 | 14.0 | 14.0 | 52,900 | 101,400 | 1.90 | 6.25 |
| 413N45A0 | 60 | 120 | 37.5 | 51.1 | 129.0 | 100 | 80 | M12 | 10.6 | 15.5 | 94.0 | M8 X 1.25 | 14.4 | (16.0) | 45 | 31.1 | 105 | 14.0 | 20.0 | 14.1 | 58,000 | 108,900 | 2.27 | 9.60 |
| 413N45B0 | 60 | 120 | 37.5 | 51.1 | 145.0 | 100 | 80 | M12 | 10.6 | 15.5 | 110.0 | M8 X 1.25 | 14.4 | (16.0) | 45 | 31.1 | 105 | 14.0 | 20.0 | 14.1 | 69,000 | 129,500 | 2.68 | 9.60 |
| 413N55A0 | 70 | 140 | 43.5 | 57.3 | 155.0 | 116 | 95 | M14 | 12.6 | 18.5 | 116.0 | M8 X 1.25 | 14.0 | (16.0) | 53 | 38.0 | 120 | 16.0 | 23.0 | 18.0 | 69,800 | 133,400 | 3.44 | 13.80 |
| 413N55B0 | 70 | 140 | 43.5 | 57.3 | 193.0 | 116 | 95 | M14 | 12.6 | 18.5 | 154.0 | M8 X 1.25 | 14.0 | (16.0) | 53 | 38.0 | 120 | 16.0 | 23.0 | 18.0 | 94,200 | 178,900 | 4.63 | 13.80 |

400 Series Specifications



411 Narrow

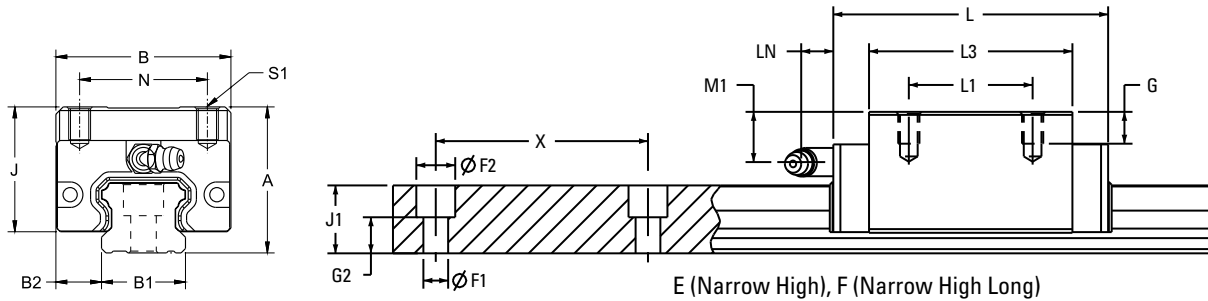
| Item | Assembly [mm] | | | | Carriage [mm] | | | | | | | | Rail [mm] | | | | | | Load Rating | | Carriage Weight | Rail Weight | |
|----------|---------------|-----|------|------|---------------|----|----|-----|------|-------|-----------|------|-----------|---------------|------|-----|------|------|-------------|---------|-----------------|-------------|--------|
| | A | B | B2 | J | L | N | L1 | S1 | G | L3 | Oil H | M1 | LN | B1 +02 -05 | J1 | X | F1 | F2 | G2 | C [N] | 0 [N] | [kg] | [kg/m] |
| 411N15G0 | 24 | 34 | 9.5 | 20.7 | 40.6 | 26 | -- | M4 | 4.8 | 22.2 | M4 X 0.7 | 5.5 | (5.0) | 15 | 13.0 | 60 | 4.5 | 7.5 | 7.0 | 4,600 | 9,800 | 0.10 | 1.28 |
| 411N15C0 | 24 | 34 | 9.5 | 20.7 | 58.6 | 26 | 26 | M4 | 4.8 | 40.2 | M4 X 0.7 | 5.5 | (5.0) | 15 | 13.0 | 60 | 4.5 | 7.5 | 7.0 | 9,300 | 19,600 | 0.17 | 1.28 |
| 411N15D0 | 24 | 34 | 9.5 | 20.7 | 66.1 | 26 | 26 | M4 | 4.8 | 47.7 | M4 X 0.7 | 5.5 | (5.0) | 15 | 13.0 | 60 | 4.5 | 7.5 | 7.0 | 11,300 | 23,700 | 0.18 | 1.28 |
| 411N20G0 | 28 | 42 | 11.0 | 23.5 | 48.3 | 32 | -- | M5 | 5.5 | 27.5 | M6 X 1.0 | 5.1 | (15.6) | 20 | 16.3 | 60 | 6.0 | 9.5 | 7.8 | 7,400 | 15,700 | 0.17 | 2.15 |
| 411N20C0 | 30 | 44 | 12.0 | 25.5 | 69.3 | 32 | 36 | M5 | 6.5 | 48.5 | M6 X 1.0 | 7.1 | (15.6) | 20 | 16.3 | 60 | 6.0 | 9.5 | 7.8 | 14,300 | 30,500 | 0.31 | 2.15 |
| 411N20K0 | 28 | 42 | 11.0 | 23.5 | 69.3 | 32 | 32 | M5 | 5.5 | 48.5 | M6 X 1.0 | 5.1 | (15.6) | 20 | 16.3 | 60 | 6.0 | 9.5 | 7.8 | 14,300 | 30,500 | 0.26 | 2.15 |
| 411N25G0 | 33 | 48 | 12.5 | 27.2 | 54.0 | 35 | -- | M6 | 6.8 | 32.3 | M6 X 1.0 | 7.2 | (15.6) | 23 | 19.2 | 60 | 7.0 | 11.0 | 10.2 | 10,300 | 21,000 | 0.21 | 2.88 |
| 411N25C0 | 36 | 48 | 12.5 | 30.2 | 79.2 | 35 | 35 | M6 | 9.0 | 57.5 | M6 X 1.0 | 10.2 | (15.6) | 23 | 19.2 | 60 | 7.0 | 11.0 | 10.2 | 20,100 | 41,000 | 0.40 | 2.88 |
| 411N25D0 | 36 | 48 | 12.5 | 30.2 | 108.6 | 35 | 50 | M6 | 9.0 | 86.9 | M6 X 1.0 | 10.2 | (15.6) | 23 | 19.2 | 60 | 7.0 | 11.0 | 10.2 | 29,200 | 63,300 | 0.67 | 2.88 |
| 411N25K0 | 33 | 48 | 12.5 | 27.2 | 79.2 | 35 | 35 | M6 | 6.8 | 57.5 | M6 X 1.0 | 7.2 | (15.6) | 23 | 19.2 | 60 | 7.0 | 11.0 | 10.2 | 20,100 | 41,100 | 0.38 | 2.88 |
| 411N30G0 | 42 | 60 | 16.0 | 35.0 | 64.2 | 40 | -- | M8 | 10.0 | 37.2 | M6 X 1.0 | 8.0 | (15.6) | 28 | 22.8 | 80 | 9.0 | 14.0 | 10.8 | 14,700 | 27,000 | 0.50 | 4.45 |
| 411N30C0 | 42 | 60 | 16.0 | 35.0 | 94.8 | 40 | 40 | M8 | 10.0 | 67.8 | M6 X 1.0 | 8.0 | (15.6) | 28 | 22.8 | 80 | 9.0 | 14.0 | 10.8 | 29,700 | 54,600 | 0.80 | 4.45 |
| 411N30D0 | 42 | 60 | 16.0 | 35.0 | 130.5 | 40 | 60 | M8 | 10.0 | 103.5 | M6 X 1.0 | 8.0 | (15.6) | 28 | 22.8 | 80 | 9.0 | 14.0 | 10.8 | 42,900 | 86,700 | 1.16 | 4.45 |
| 411N35G0 | 48 | 70 | 18.0 | 40.5 | 75.5 | 50 | -- | M8 | 10.0 | 44.5 | M6 X 1.0 | 8.0 | (15.6) | 34 | 26.0 | 80 | 9.0 | 14.0 | 14.0 | 21,200 | 40,700 | 0.80 | 6.25 |
| 411N35C0 | 48 | 70 | 18.0 | 40.5 | 111.5 | 50 | 50 | M8 | 10.0 | 80.5 | M6 X 1.0 | 8.0 | (15.6) | 34 | 26.0 | 80 | 9.0 | 14.0 | 14.0 | 42,400 | 81,100 | 1.20 | 6.25 |
| 411N35D0 | 48 | 70 | 18.0 | 40.5 | 153.5 | 50 | 72 | M8 | 10.0 | 122.5 | M6 X 1.0 | 8.0 | (15.6) | 34 | 26.0 | 80 | 9.0 | 14.0 | 14.0 | 58,300 | 125,300 | 1.84 | 6.25 |
| 411N45C0 | 60 | 86 | 20.5 | 51.1 | 129.0 | 60 | 60 | M10 | 15.5 | 94.0 | M8 X 1.25 | 14.4 | (16.0) | 45 | 31.1 | 105 | 14.0 | 20.0 | 14.1 | 58,000 | 108,900 | 1.64 | 9.60 |
| 411N45D0 | 60 | 86 | 20.5 | 51.1 | 174.0 | 60 | 80 | M10 | 15.5 | 139.0 | M8 X 1.25 | 14.4 | (16.0) | 45 | 31.1 | 105 | 14.0 | 20.0 | 14.1 | 79,700 | 163,300 | 2.42 | 9.60 |
| 411N55C0 | 70 | 100 | 23.5 | 57.3 | 155.0 | 75 | 75 | M12 | 18.0 | 116.0 | M8 X 1.25 | 14.0 | (16.0) | 53 | 38.0 | 120 | 16.0 | 23.0 | 18.0 | 69,800 | 133,400 | 2.67 | 13.80 |
| 411N55D0 | 70 | 100 | 23.5 | 57.3 | 210.0 | 75 | 95 | M12 | 18.0 | 171.0 | M8 X 1.25 | 14.0 | (16.0) | 53 | 38.0 | 120 | 16.0 | 23.0 | 18.0 | 157,700 | 253,600 | 3.97 | 13.80 |



413 Narrow (Caged)

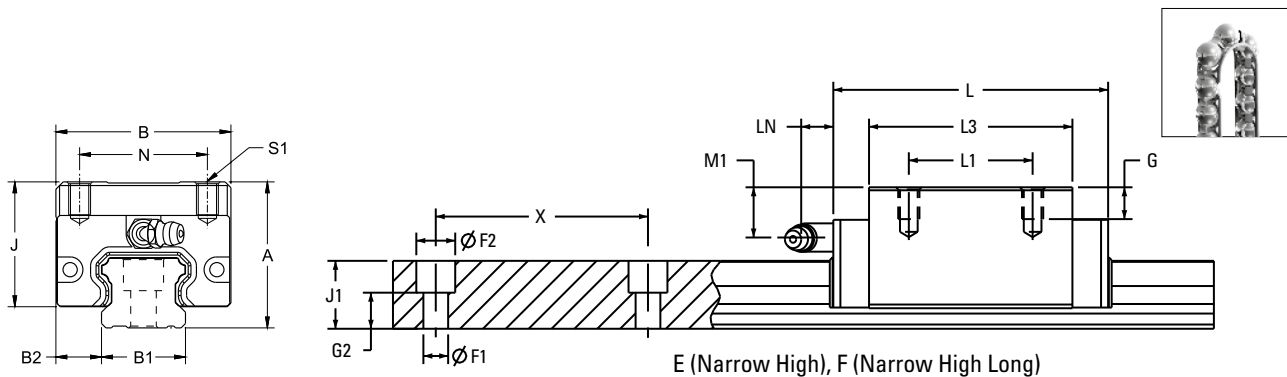
| Item | Assembly [mm] | | | | Carriage [mm] | | | | | | | | Rail [mm] | | | | | | Load Rating | | Carriage Weight | Rail Weight | |
|----------|---------------|-----|------|------|---------------|----|----|-----|------|-------|-----------|------|-----------|---------------|------|-----|------|------|-------------|---------|-----------------|-------------|--------|
| | A | B | B2 | J | L | N | L1 | S1 | G | L3 | Oil H | M1 | LN | B1 +02 -05 | J1 | X | F1 | F2 | G2 | C [N] | C0 [N] | [kg] | [kg/m] |
| 413N15G0 | 24 | 34 | 9.5 | 20.7 | 40.6 | 26 | -- | M4 | 4.8 | 22.2 | M4 X 0.7 | 5.5 | (5.0) | 15 | 13.0 | 60 | 4.5 | 7.5 | 7.0 | 4,600 | 9,800 | 0.10 | 1.28 |
| 413N15C0 | 24 | 34 | 9.5 | 20.7 | 58.6 | 26 | 26 | M4 | 4.8 | 40.2 | M4 X 0.7 | 5.5 | (5.0) | 15 | 13.0 | 60 | 4.5 | 7.5 | 7.0 | 9,300 | 19,600 | 0.17 | 1.28 |
| 413N15D0 | 24 | 34 | 9.5 | 20.7 | 66.1 | 26 | 26 | M4 | 4.8 | 47.7 | M4 X 0.7 | 5.5 | (5.0) | 15 | 13.0 | 60 | 4.5 | 7.5 | 7.0 | 11,300 | 23,700 | 0.18 | 1.28 |
| 413N20G0 | 28 | 42 | 11.0 | 23.5 | 48.3 | 32 | -- | M5 | 5.5 | 27.5 | M6 X 1.0 | 5.1 | (15.6) | 20 | 16.3 | 60 | 6.0 | 9.5 | 7.8 | 7,400 | 15,700 | 0.17 | 2.15 |
| 413N20C0 | 30 | 44 | 12.0 | 25.5 | 69.3 | 32 | 36 | M5 | 6.5 | 48.5 | M6 X 1.0 | 7.1 | (15.6) | 20 | 16.3 | 60 | 6.0 | 9.5 | 7.8 | 14,300 | 30,500 | 0.31 | 2.15 |
| 413N20K0 | 28 | 42 | 11.0 | 23.5 | 69.3 | 32 | 32 | M5 | 5.5 | 48.5 | M6 X 1.0 | 5.1 | (15.6) | 20 | 16.3 | 60 | 6.0 | 9.5 | 7.8 | 14,300 | 30,500 | 0.26 | 2.15 |
| 413N25G0 | 33 | 48 | 12.5 | 27.2 | 54.0 | 35 | -- | M6 | 6.8 | 32.3 | M6 X 1.0 | 7.2 | (15.6) | 23 | 19.2 | 60 | 7.0 | 11.0 | 10.2 | 10,300 | 21,000 | 0.21 | 2.88 |
| 413N25C0 | 36 | 48 | 12.5 | 30.2 | 79.2 | 35 | 35 | M6 | 9.0 | 57.5 | M6 X 1.0 | 10.2 | (15.6) | 23 | 19.2 | 60 | 7.0 | 11.0 | 10.2 | 20,100 | 41,100 | 0.40 | 2.88 |
| 413N25D0 | 36 | 48 | 12.5 | 30.2 | 108.6 | 35 | 50 | M6 | 9.0 | 86.9 | M6 X 1.0 | 10.2 | (15.6) | 23 | 19.2 | 60 | 7.0 | 11.0 | 10.2 | 29,200 | 63,300 | 0.67 | 2.88 |
| 413N25K0 | 33 | 48 | 12.5 | 27.2 | 79.2 | 35 | 35 | M6 | 6.8 | 57.5 | M6 X 1.0 | 7.2 | (15.6) | 23 | 19.2 | 60 | 7.0 | 11.0 | 10.2 | 20,100 | 41,000 | 0.38 | 2.88 |
| 413N30G0 | 42 | 60 | 16.0 | 35.0 | 64.2 | 40 | -- | M8 | 10.0 | 37.2 | M6 X 1.0 | 8.0 | (15.6) | 28 | 22.8 | 80 | 9.0 | 14.0 | 10.8 | 14,700 | 27,000 | 0.50 | 4.45 |
| 413N30C0 | 42 | 60 | 16.0 | 35.0 | 94.8 | 40 | 40 | M8 | 10.0 | 67.8 | M6 X 1.0 | 8.0 | (15.6) | 28 | 22.8 | 80 | 9.0 | 14.0 | 10.8 | 29,700 | 54,600 | 0.80 | 4.45 |
| 413N30D0 | 42 | 60 | 16.0 | 35.0 | 130.5 | 40 | 60 | M8 | 10.0 | 103.5 | M6 X 1.0 | 8.0 | (15.6) | 28 | 22.8 | 80 | 9.0 | 14.0 | 10.8 | 42,900 | 86,700 | 1.16 | 4.45 |
| 413N35G0 | 48 | 70 | 18.0 | 40.5 | 75.5 | 50 | -- | M8 | 10.0 | 44.5 | M6 X 1.0 | 8.0 | (15.6) | 34 | 26.0 | 80 | 9.0 | 14.0 | 14.0 | 21,200 | 40,700 | 0.80 | 6.25 |
| 413N35C0 | 48 | 70 | 18.0 | 40.5 | 111.5 | 50 | 50 | M8 | 10.0 | 80.5 | M6 X 1.0 | 8.0 | (15.6) | 34 | 26.0 | 80 | 9.0 | 14.0 | 14.0 | 42,400 | 81,100 | 1.20 | 6.25 |
| 413N35D0 | 48 | 70 | 18.0 | 40.5 | 153.5 | 50 | 72 | M8 | 10.0 | 122.5 | M6 X 1.0 | 8.0 | (15.6) | 34 | 26.0 | 80 | 9.0 | 14.0 | 14.0 | 58,300 | 125,300 | 1.84 | 6.25 |
| 413N45C0 | 60 | 86 | 20.5 | 51.1 | 129.0 | 60 | 60 | M10 | 15.5 | 94.0 | M8 X 1.25 | 14.4 | (16.0) | 45 | 31.1 | 105 | 14.0 | 20.0 | 14.1 | 58,000 | 108,900 | 1.64 | 9.60 |
| 413N45D0 | 60 | 86 | 20.5 | 51.1 | 174.0 | 60 | 80 | M10 | 15.5 | 139.0 | M8 X 1.25 | 14.4 | (16.0) | 45 | 31.1 | 105 | 14.0 | 20.0 | 14.1 | 79,700 | 163,300 | 2.42 | 9.60 |
| 413N55C0 | 70 | 100 | 23.5 | 57.3 | 155.0 | 75 | 75 | M12 | 18.0 | 116.0 | M8 X 1.25 | 14.0 | (16.0) | 53 | 38.0 | 120 | 16.0 | 23.0 | 18.0 | 69,800 | 133,400 | 2.67 | 13.80 |
| 413N55D0 | 70 | 100 | 23.5 | 57.3 | 210.0 | 75 | 95 | M12 | 18.0 | 171.0 | M8 X 1.25 | 14.0 | (16.0) | 53 | 38.0 | 120 | 16.0 | 23.0 | 18.0 | 157,700 | 253,600 | 3.97 | 13.80 |

400 Series Specifications



411 Narrow High

| Item | Assembly [mm] | | | | Carriage [mm] | | | | | | | | Rail [mm] | | | | | | Load Rating | | Carriage Weight | Rail Weight | |
|----------|---------------|-----|------|------|---------------|----|----|-----|------|-------|-----------|------|-----------|-------------------|------|-----|------|------|-------------|--------|-----------------|-------------|--------|
| | A | B | B2 | J | L | N | L1 | S1 | G | L3 | Oil H | M1 | LN | B1 +0.02 -0.05 | J1 | X | F1 | F2 | G2 | C [N] | C0 [N] | [kg] | [kg/m] |
| 411N15E0 | 28 | 34 | 9.5 | 24.7 | 58.6 | 26 | 26 | M4 | 6.0 | 40.2 | M4 X 0.7 | 9.5 | (5.0) | 15 | 13.0 | 60 | 4.5 | 7.5 | 7.0 | 9,300 | 19,600 | 0.19 | 1.28 |
| 411N20F0 | 30 | 44 | 12.0 | 25.5 | 82.1 | 32 | 50 | M5 | 6.5 | 61.3 | M6 X 1.0 | 7.1 | (15.6) | 20 | 16.3 | 60 | 6.0 | 9.5 | 7.8 | 18,600 | 39,500 | 0.36 | 2.15 |
| 411N25E0 | 40 | 48 | 12.5 | 34.2 | 79.2 | 35 | 35 | M6 | 9.0 | 57.5 | M6 X 1.0 | 14.2 | (15.6) | 23 | 19.2 | 60 | 7.0 | 11.0 | 10.2 | 20,100 | 41,100 | 0.45 | 2.88 |
| 411N25F0 | 40 | 48 | 12.5 | 34.2 | 93.9 | 35 | 50 | M6 | 9.0 | 72.2 | M6 X 1.0 | 14.2 | (15.6) | 23 | 19.2 | 60 | 7.0 | 11.0 | 10.2 | 25,900 | 52,800 | 0.66 | 2.88 |
| 411N30E0 | 45 | 60 | 16.0 | 38.0 | 94.8 | 40 | 40 | M8 | 12.0 | 67.8 | M6 X 1.0 | 11.0 | (15.6) | 28 | 22.8 | 80 | 9.0 | 14.0 | 10.8 | 29,700 | 54,600 | 0.91 | 4.45 |
| 411N30F0 | 45 | 60 | 16.0 | 38.0 | 105.0 | 40 | 60 | M8 | 12.0 | 78.0 | M6 X 1.0 | 11.0 | (15.6) | 28 | 22.8 | 80 | 9.0 | 14.0 | 10.8 | 38,500 | 70,700 | 1.04 | 4.45 |
| 411N35E0 | 55 | 70 | 18.0 | 47.5 | 111.5 | 50 | 50 | M8 | 12.0 | 80.5 | M6 X 1.0 | 15.0 | (15.6) | 34 | 26.0 | 80 | 9.0 | 14.0 | 14.0 | 42,400 | 81,100 | 1.50 | 6.25 |
| 411N35F0 | 55 | 70 | 18.0 | 47.5 | 123.5 | 50 | 72 | M8 | 12.0 | 92.5 | M6 X 1.0 | 15.0 | (15.6) | 34 | 26.0 | 80 | 9.0 | 14.0 | 14.0 | 52,900 | 101,400 | 1.80 | 6.25 |
| 411N45E0 | 70 | 86 | 20.5 | 61.1 | 129.0 | 60 | 60 | M10 | 18.0 | 94.0 | M8 X 1.25 | 24.4 | (16.0) | 45 | 31.1 | 105 | 14.0 | 20.0 | 14.1 | 58,000 | 108,900 | 2.28 | 9.60 |
| 411N45F0 | 70 | 86 | 20.5 | 61.1 | 145.0 | 60 | 80 | M10 | 18.0 | 110.0 | M8 X 1.25 | 24.4 | (16.0) | 45 | 31.1 | 105 | 14.0 | 20.0 | 14.1 | 69,000 | 129,500 | 2.67 | 9.60 |
| 411N55E0 | 80 | 100 | 23.5 | 67.3 | 155.0 | 75 | 75 | M12 | 18.0 | 116.0 | M8 X 1.25 | 14 | (16.0) | 53 | 38.0 | 120 | 16.0 | 23.0 | 18.0 | 69,800 | 133,400 | 3.42 | 13.80 |
| 411N55F0 | 80 | 100 | 23.5 | 67.3 | 193.0 | 75 | 95 | M12 | 18.0 | 154.0 | M8 X 1.25 | 14 | (16.0) | 53 | 38.0 | 120 | 16.0 | 23.0 | 18.0 | 94,200 | 178,900 | 5.08 | 13.80 |



413 Narrow High (Caged)

| Item | Assembly [mm] | | | | Carriage [mm] | | | | | | | | Rail [mm] | | | | | | Load Rating | | Carriage Weight | Rail Weight | |
|----------|---------------|-----|------|------|---------------|----|----|-----|------|-------|-----------|------|-----------|-------------------|------|-----|------|------|-------------|--------|-----------------|-------------|--------|
| | A | B | B2 | J | L | N | L1 | S1 | G | L3 | Oil H | M1 | LN | B1 +0.02 -0.05 | J1 | X | F1* | F2* | G2 | C [N] | C0 [N] | [kg] | [kg/m] |
| 413N15E0 | 28 | 34 | 9.5 | 24.7 | 58.6 | 26 | 26 | M4 | 6.0 | 40.2 | M4 X 0.7 | 9.5 | (5.0) | 15 | 13.0 | 60 | 4.5 | 7.5 | 7.0 | 9,300 | 19,600 | 0.19 | 1.28 |
| 413N20F0 | 30 | 44 | 12.0 | 25.5 | 82.1 | 32 | 50 | M5 | 6.5 | 61.3 | M6 X 1.0 | 7.1 | (15.6) | 20 | 16.3 | 60 | 6.0 | 9.5 | 7.8 | 18,600 | 39,500 | 0.36 | 2.15 |
| 413N25E0 | 40 | 48 | 12.5 | 34.2 | 79.2 | 35 | 35 | M6 | 9.0 | 57.5 | M6 X 1.0 | 14.2 | (15.6) | 23 | 19.2 | 60 | 7.0 | 11.0 | 10.2 | 20,100 | 41,000 | 0.45 | 2.88 |
| 413N25F0 | 40 | 48 | 12.5 | 34.2 | 93.9 | 35 | 50 | M6 | 9.0 | 72.2 | M6 X 1.0 | 14.2 | (15.6) | 23 | 19.2 | 60 | 7.0 | 11.0 | 10.2 | 25,900 | 52,800 | 0.66 | 2.88 |
| 413N30E0 | 45 | 60 | 16.0 | 38.0 | 94.8 | 40 | 40 | M8 | 12.0 | 67.8 | M6 X 1.0 | 11.0 | (15.6) | 28 | 22.8 | 80 | 9.0 | 14.0 | 10.8 | 29,700 | 54,600 | 0.91 | 4.45 |
| 413N30F0 | 45 | 60 | 16.0 | 38.0 | 105.0 | 40 | 60 | M8 | 12.0 | 78.0 | M6 X 1.0 | 11.0 | (15.6) | 28 | 22.8 | 80 | 9.0 | 14.0 | 10.8 | 38,500 | 70,700 | 1.04 | 4.45 |
| 413N35E0 | 55 | 70 | 18.0 | 47.5 | 111.5 | 50 | 50 | M8 | 12.0 | 80.5 | M6 X 1.0 | 15.0 | (15.6) | 34 | 26.0 | 80 | 9.0 | 14.0 | 14.0 | 42,400 | 81,100 | 1.50 | 6.25 |
| 413N35F0 | 55 | 70 | 18.0 | 47.5 | 123.5 | 50 | 72 | M8 | 12.0 | 92.5 | M6 X 1.0 | 15.0 | (15.6) | 34 | 26.0 | 80 | 9.0 | 14.0 | 14.0 | 52,900 | 101,400 | 1.80 | 6.25 |
| 413N45E0 | 70 | 86 | 20.5 | 61.1 | 129.0 | 60 | 60 | M10 | 18.0 | 94.0 | M8 X 1.25 | 24.4 | (16.0) | 45 | 31.1 | 105 | 14.0 | 20.0 | 14.1 | 58,000 | 108,900 | 2.28 | 9.60 |
| 413N45F0 | 70 | 86 | 20.5 | 61.1 | 145.0 | 60 | 80 | M10 | 18.0 | 110.0 | M8 X 1.25 | 24.4 | (16.0) | 45 | 31.1 | 105 | 14.0 | 20.0 | 14.1 | 69,000 | 129,500 | 2.67 | 9.60 |
| 413N55E0 | 80 | 100 | 23.5 | 67.3 | 155.0 | 75 | 75 | M12 | 18.0 | 116.0 | M8 X 1.25 | 14 | (16.0) | 53 | 38.0 | 120 | 16.0 | 23.0 | 18.0 | 69,800 | 133,400 | 3.42 | 13.80 |
| 413N55F0 | 80 | 100 | 23.5 | 67.3 | 193.0 | 75 | 95 | M12 | 18.0 | 154.0 | M8 X 1.25 | 14 | (16.0) | 53 | 38.0 | 120 | 16.0 | 23.0 | 18.0 | 94,200 | 178,900 | 5.08 | 13.80 |

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

400 Series Accuracy, Sizing and Running Smoothness

Bearing Travel Life Calculation

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

where:

L = travel life, km

C = 50 km dynamic load rating

F = applied dynamic load, N

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

where:

C_{\min} = 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/s²

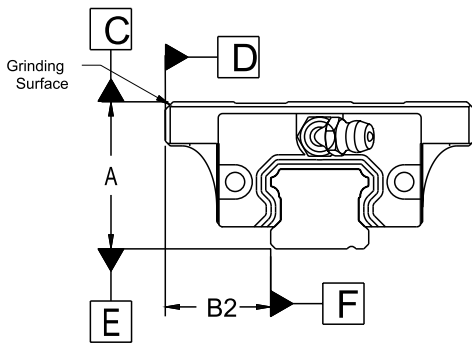
Temperature: Min: -40° C

Max: 80° C

Max peak: 120° C short time*

*without bellows

Deflection charts are available on www.thomsonlinear.com.



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

All items in mm.

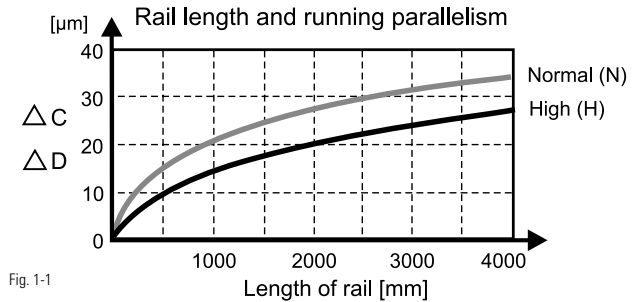
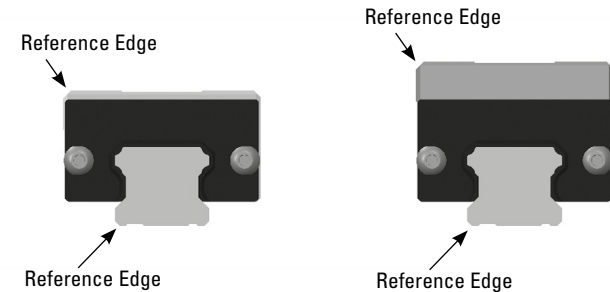
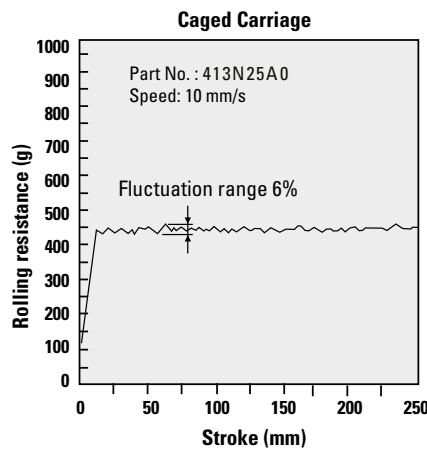
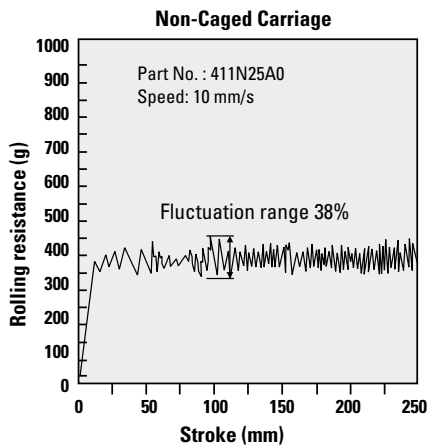


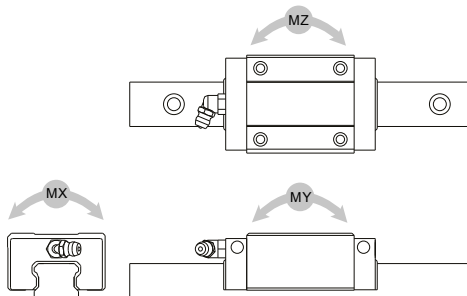
Fig. 1-1

413 Caged Ball Carriage Increased Running Smoothness



400 Series - 411 Standard Carriage Nominal Moment

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



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

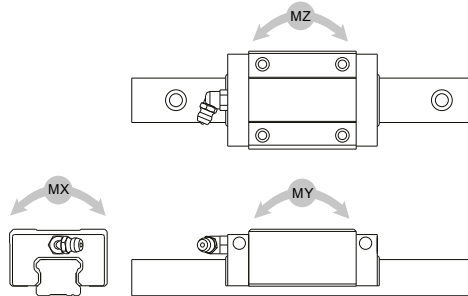
2. Moment ratings are the maximum moment load that should be applied to the bearing when there is no relative motion between the carriage and the rail.

411 Carriage Nominal Moment:

| Model | Basic permissible static moment (Nm) | | | Basic permissible dynamic moment (Nm) | | |
|----------|--------------------------------------|------|------|---------------------------------------|------|------|
| | MX | MY | MZ | MX | MY | MZ |
| 411N15A0 | 135 | 118 | 118 | 65 | 56 | 56 |
| 411N15B0 | 164 | 169 | 169 | 78 | 80 | 80 |
| 411N15C0 | 135 | 118 | 118 | 65 | 56 | 56 |
| 411N15D0 | 170 | 168 | 168 | 78 | 80 | 80 |
| 411N15E0 | 135 | 118 | 118 | 65 | 65 | 56 |
| 411N15G0 | 68 | 32 | 32 | 32 | 16 | 16 |
| 411N20A0 | 285 | 221 | 221 | 134 | 104 | 104 |
| 411N20B0 | 370 | 361 | 361 | 174 | 170 | 170 |
| 411N20C0 | 285 | 221 | 221 | 134 | 104 | 104 |
| 411N20F0 | 370 | 361 | 361 | 174 | 170 | 170 |
| 411N20G0 | 146 | 65 | 65 | 69 | 30 | 30 |
| 411N20K0 | 285 | 221 | 221 | 166 | 129 | 129 |
| 411N25A0 | 440 | 352 | 352 | 216 | 173 | 173 |
| 411N25B0 | 567 | 568 | 568 | 278 | 279 | 279 |
| 411N25C0 | 440 | 352 | 352 | 216 | 173 | 173 |
| 411N25D0 | 680 | 820 | 820 | 313 | 378 | 378 |
| 411N25E0 | 440 | 352 | 352 | 267 | 213 | 213 |
| 411N25F0 | 567 | 568 | 568 | 278 | 279 | 279 |
| 411N25G0 | 226 | 101 | 101 | 111 | 49 | 49 |
| 411N25K0 | 440 | 352 | 352 | 267 | 213 | 213 |
| 411N30A0 | 707 | 551 | 551 | 386 | 300 | 300 |
| 411N30B0 | 915 | 822 | 822 | 499 | 447 | 447 |
| 411N30C0 | 707 | 551 | 551 | 386 | 300 | 300 |
| 411N30D0 | 1123 | 1338 | 1338 | 555 | 661 | 661 |
| 411N30E0 | 707 | 551 | 551 | 386 | 300 | 300 |
| 411N30F0 | 915 | 822 | 822 | 499 | 447 | 447 |
| 411N30G0 | 350 | 150 | 150 | 191 | 81 | 81 |
| 411N35A0 | 1283 | 973 | 973 | 671 | 508 | 508 |
| 411N35B0 | 1604 | 1398 | 1398 | 838 | 730 | 730 |
| 411N35C0 | 1283 | 973 | 973 | 671 | 508 | 508 |
| 411N35D0 | 1983 | 2288 | 2288 | 922 | 1063 | 1063 |
| 411N35E0 | 1283 | 973 | 973 | 671 | 508 | 508 |
| 411N35F0 | 1604 | 1398 | 1398 | 838 | 730 | 730 |
| 411N35G0 | 644 | 270 | 270 | 336 | 141 | 141 |
| 411N45A0 | 2302 | 1525 | 1525 | 1225 | 812 | 812 |
| 411N45B0 | 2739 | 2124 | 2124 | 1458 | 1130 | 1130 |
| 411N45C0 | 2302 | 1525 | 1525 | 1225 | 812 | 812 |
| 411N45D0 | 3452 | 3382 | 3382 | 1684 | 1651 | 1651 |
| 411N45E0 | 2302 | 1525 | 1525 | 1225 | 812 | 812 |
| 411N45F0 | 2739 | 2124 | 2124 | 1458 | 1130 | 1133 |
| 411N55A0 | 3306 | 2306 | 2306 | 1730 | 1207 | 1207 |
| 411N55B0 | 4431 | 4104 | 4104 | 2335 | 2162 | 2162 |
| 411N55C0 | 3306 | 2306 | 2306 | 1730 | 1207 | 1207 |
| 411N55D0 | 6284 | 6462 | 6462 | 3165 | 3255 | 3255 |
| 411N55E0 | 3306 | 2306 | 2306 | 1730 | 1207 | 1207 |
| 411N55F0 | 4431 | 4104 | 4104 | 2335 | 2162 | 2162 |

400 Series - 413 Caged Carriage Nominal Moment

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



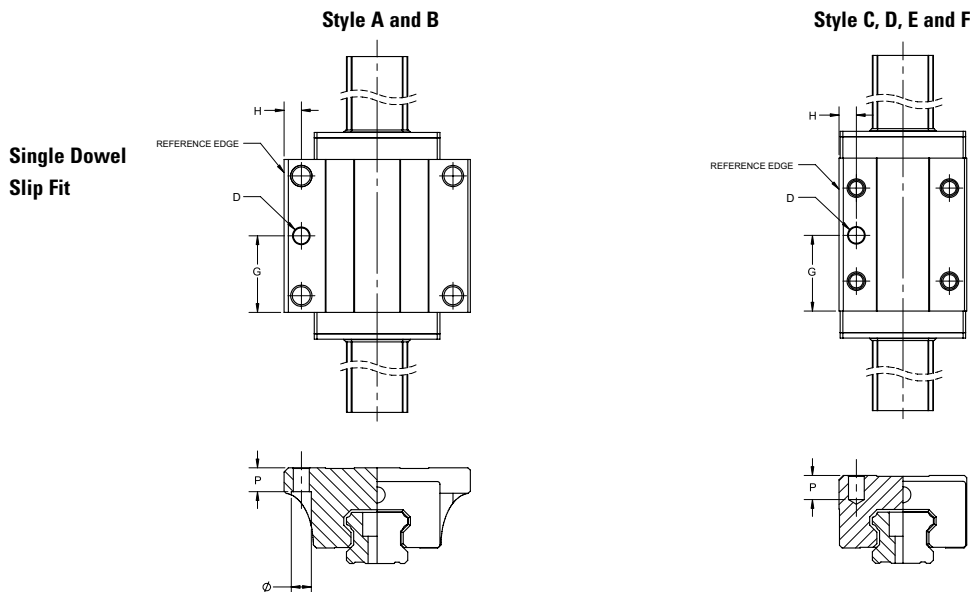
1. The dynamic load and moment ratings are based on the travel life of 50 km.
2. Moment ratings are the maximum moment load that should be applied to the bearing when there is no relative motion between the carriage and the rail.

413 Caged Carriage Nominal Moment

| Model | Basic permissible static moment (Nm) | | | Basic permissible dynamic moment (Nm) | | |
|----------|--------------------------------------|------|------|---------------------------------------|------|------|
| | MX | MY | MZ | MX | MY | MZ |
| 413N15A0 | 135 | 118 | 118 | 79 | 69 | 69 |
| 413N15B0 | 164 | 169 | 169 | 96 | 99 | 99 |
| 413N15C0 | 135 | 118 | 118 | 79 | 69 | 69 |
| 413N15D0 | 170 | 168 | 168 | 96 | 99 | 99 |
| 413N15E0 | 135 | 118 | 118 | 79 | 69 | 69 |
| 413N15G0 | 68 | 32 | 32 | 39 | 19 | 19 |
| 413N20A0 | 285 | 221 | 221 | 166 | 129 | 129 |
| 413N20B0 | 370 | 361 | 361 | 215 | 210 | 210 |
| 413N20C0 | 285 | 221 | 221 | 166 | 129 | 129 |
| 413N20F0 | 370 | 361 | 361 | 215 | 210 | 210 |
| 413N20G0 | 146 | 65 | 65 | 85 | 37 | 37 |
| 413N20K0 | 285 | 221 | 221 | 166 | 129 | 129 |
| 413N25A0 | 440 | 352 | 352 | 267 | 213 | 213 |
| 413N25B0 | 567 | 568 | 568 | 342 | 343 | 343 |
| 413N25C0 | 440 | 352 | 352 | 267 | 213 | 213 |
| 413N25D0 | 680 | 820 | 820 | 387 | 368 | 368 |
| 413N25E0 | 440 | 352 | 352 | 267 | 213 | 213 |
| 413N25F0 | 567 | 568 | 568 | 342 | 343 | 343 |
| 413N25G0 | 226 | 101 | 101 | 136 | 61 | 61 |
| 413N25K0 | 440 | 352 | 352 | 267 | 213 | 213 |
| 413N30A0 | 707 | 551 | 551 | 476 | 371 | 371 |
| 413N30B0 | 915 | 822 | 822 | 616 | 552 | 552 |
| 413N30C0 | 707 | 551 | 551 | 476 | 371 | 371 |
| 413N30D0 | 1123 | 1338 | 1338 | 686 | 816 | 816 |
| 413N30E0 | 707 | 551 | 551 | 476 | 371 | 371 |
| 413N30F0 | 915 | 822 | 822 | 616 | 552 | 552 |
| 413N30G0 | 350 | 150 | 150 | 235 | 101 | 101 |
| 413N35A0 | 1283 | 973 | 973 | 828 | 628 | 628 |
| 413N35B0 | 1604 | 1398 | 1398 | 1034 | 902 | 902 |
| 413N35C0 | 1283 | 973 | 973 | 828 | 628 | 628 |
| 413N35D0 | 1983 | 2288 | 2288 | 1138 | 1314 | 1314 |
| 413N35E0 | 1283 | 973 | 973 | 828 | 628 | 628 |
| 413N35F0 | 1604 | 1398 | 1398 | 1034 | 902 | 902 |
| 413N35G0 | 644 | 270 | 270 | 415 | 174 | 174 |
| 413N45A0 | 2302 | 1525 | 1525 | 1514 | 1003 | 1003 |
| 413N45B0 | 2739 | 2124 | 2124 | 1800 | 1396 | 1396 |
| 413N45C0 | 2302 | 1525 | 1525 | 1514 | 1003 | 1003 |
| 413N45D0 | 3452 | 3382 | 3382 | 2080 | 2038 | 2038 |
| 413N45E0 | 2302 | 1525 | 1525 | 1514 | 1003 | 1003 |
| 413N45F0 | 2739 | 2124 | 2124 | 1800 | 1396 | 1396 |
| 413N55A0 | 3306 | 2306 | 2306 | 2137 | 1490 | 1490 |
| 413N55B0 | 4431 | 4104 | 4104 | 2882 | 2669 | 2669 |
| 413N55C0 | 3306 | 2306 | 2306 | 2137 | 1490 | 1490 |
| 413N55D0 | 6284 | 6462 | 6462 | 3907 | 4018 | 4018 |
| 413N55E0 | 3306 | 2306 | 2306 | 2137 | 1490 | 1490 |
| 413N55F0 | 4431 | 4104 | 4104 | 2882 | 2669 | 2669 |

400 Series - Carriage Dowel Holes

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



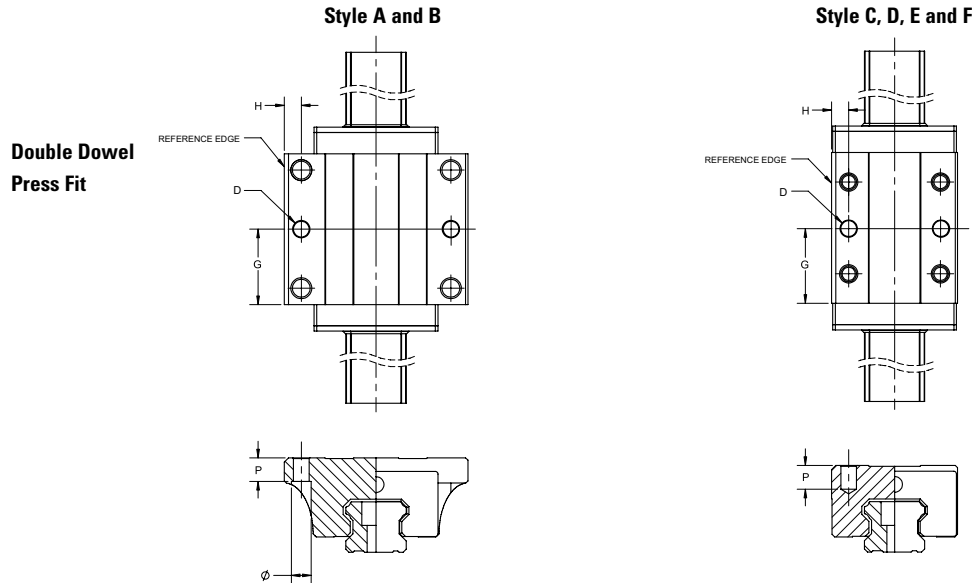
| 400 | | G | ØD | ES1 H | P | ØD | ES2 H | P | ØD | ES3 H | P | ØD | ES4 H | P |
|--------|------|-------|----|----------|-----|----|----------|----|------|----------|-----|------|----------|----|
| Style | Size | | | | | | | | | | | | | |
| Type A | 15 | 20.10 | 6 | 4.5 | 7 | — | — | — | 1/4" | 4.5 | 7 | — | — | — |
| | 20 | 24.25 | 6 | 5 | 9 | — | — | — | 1/4" | 5 | 9 | — | — | — |
| | 25 | 28.75 | 6 | 6.5 | 9 | — | — | — | 1/4" | 6.5 | 9 | — | — | — |
| | 30 | 33.90 | 6 | 9 | 12 | 10 | 9 | 12 | 1/4" | 9 | 12 | 3/8" | 9 | 12 |
| | 35 | 40.25 | — | — | — | 10 | 9 | 14 | — | — | — | 3/8" | 9 | 14 |
| | 45 | 47.00 | — | — | — | 10 | 10 | 18 | — | — | — | 3/8" | 10 | 18 |
| Type B | 20 | 30.65 | 6 | 5 | 9 | — | — | — | 1/4" | 5 | 9 | — | — | — |
| | 25 | 36.10 | 6 | 6.5 | 9 | — | — | — | 1/4" | 6.5 | 9 | — | — | — |
| | 30 | 39.00 | 6 | 9 | 12 | 10 | 9 | 12 | 1/4" | 9 | 12 | 3/8" | 9 | 12 |
| | 35 | 46.25 | — | — | — | 10 | 9 | 14 | — | — | — | 3/8" | 9 | 14 |
| | 45 | 55.00 | — | — | — | 10 | 10 | 18 | — | — | — | 3/8" | 10 | 18 |
| Type C | 15 | 20.10 | 6 | 4 | 4.8 | — | — | — | 1/4" | 4 | 4.8 | — | — | — |
| | 20 | 20.25 | 6 | 6 | 6.5 | — | — | — | 1/4" | 6 | 6.5 | — | — | — |
| | 25 | 28.75 | 6 | 6.5 | 9 | — | — | — | 1/4" | 6.5 | 9 | — | — | — |
| | 30 | 33.90 | 6 | 10 | 10 | 10 | 10 | 10 | 1/4" | 10 | 10 | 3/8" | 10 | 10 |
| Type D | 25 | 43.45 | 6 | 6.5 | 9 | — | — | — | 1/4" | 6.5 | 9 | — | — | — |
| | 30 | 51.75 | 6 | 10 | 10 | 10 | 10 | 10 | 1/4" | 10 | 10 | 3/8" | 10 | 10 |
| | 35 | 61.25 | — | — | — | 10 | 10 | 10 | — | — | — | 3/8" | 10 | 10 |
| Type E | 15 | 20.10 | 6 | 4 | 6 | — | — | — | 1/4" | 4 | 6 | — | — | — |
| | 25 | 28.75 | 6 | 6.5 | 9 | — | — | — | 1/4" | 6.5 | 9 | — | — | — |
| | 30 | 33.90 | 6 | 10 | 12 | 10 | 10 | 12 | 1/4" | 10 | 12 | 3/8" | 10 | 12 |
| | 35 | 40.25 | — | — | — | 10 | 10 | 12 | — | — | — | 3/8" | 10 | 12 |
| | 45 | 47.00 | — | — | — | 10 | 13 | 18 | — | — | — | 3/8" | 13 | 18 |
| Type F | 25 | 36.10 | 6 | 6.5 | 9 | — | — | — | 1/4" | 6.5 | 9 | — | — | — |
| | 30 | 39.00 | 6 | 10 | 12 | 10 | 10 | 12 | 1/4" | 10 | 12 | 3/8" | 10 | 12 |
| | 35 | 46.25 | — | — | — | 10 | 10 | 12 | — | — | — | 3/8" | 10 | 12 |
| | 45 | 55.00 | — | — | — | 10 | 13 | 18 | — | — | — | 3/8" | 13 | 18 |
| | 55 | 55.00 | — | — | — | 10 | 13 | 18 | — | — | — | 3/8" | 13 | 18 |

All dimension in mm, unless otherwise specified.

Hole tolerance $\varnothing D +0.013/-0$

400 Series - Carriage Dowel Holes (continued)

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



400 Series
Profile Rail

| 400 | | G | ES12 | | | ES13 | | | ES14 | | | ES15 | | |
|--------|------|-------|------|-----|-----|------|----|----|------|-----|-----|------|----|----|
| Style | Size | | ØD | H | P | ØD | H | P | ØD | H | P | ØD | H | P |
| Type A | 15 | 20.10 | 6 | 4.5 | 7 | — | — | — | 1/4" | 4.5 | 7 | — | — | — |
| | 20 | 24.25 | 6 | 5 | 9 | — | — | — | 1/4" | 5 | 9 | — | — | — |
| | 25 | 28.75 | 6 | 6.5 | 9 | — | — | — | 1/4" | 6.5 | 9 | — | — | — |
| | 30 | 33.90 | 6 | 9 | 12 | 10 | 9 | 12 | 1/4" | 9 | 12 | 3/8" | 9 | 12 |
| | 35 | 40.25 | — | — | — | 10 | 9 | 14 | — | — | — | 3/8" | 9 | 14 |
| | 45 | 47.00 | — | — | — | 10 | 10 | 18 | — | — | — | 3/8" | 10 | 18 |
| Type B | 20 | 30.65 | 6 | 5 | 9 | — | — | — | 1/4" | 5 | 9 | — | — | — |
| | 25 | 36.10 | 6 | 6.5 | 9 | — | — | — | 1/4" | 6.5 | 9 | — | — | — |
| | 30 | 39.00 | 6 | 9 | 12 | 10 | 9 | 12 | 1/4" | 9 | 12 | 3/8" | 9 | 12 |
| | 35 | 46.25 | — | — | — | 10 | 9 | 14 | — | — | — | 3/8" | 9 | 14 |
| | 45 | 55.00 | — | — | — | 10 | 10 | 18 | — | — | — | 3/8" | 10 | 18 |
| | 55 | 55.00 | — | — | — | 10 | 10 | 18 | — | — | — | 3/8" | 10 | 18 |
| Type C | 15 | 20.10 | 6 | 4 | 4.8 | — | — | — | 1/4" | 4 | 4.8 | — | — | — |
| | 20 | 20.25 | 6 | 6 | 6.5 | — | — | — | 1/4" | 6 | 6.5 | — | — | — |
| | 25 | 28.75 | 6 | 6.5 | 9 | — | — | — | 1/4" | 6.5 | 9 | — | — | — |
| | 30 | 33.90 | 6 | 10 | 10 | 10 | 10 | 10 | 1/4" | 10 | 10 | 3/8" | 10 | 10 |
| Type D | 25 | 43.45 | 6 | 6.5 | 9 | — | — | — | 1/4" | 6.5 | 9 | — | — | — |
| | 30 | 51.75 | 6 | 10 | 10 | 10 | 10 | 10 | 1/4" | 10 | 10 | 3/8" | 10 | 10 |
| | 35 | 61.25 | — | — | — | 10 | 10 | 10 | — | — | — | 3/8" | 10 | 10 |
| Type E | 15 | 20.10 | 6 | 4 | 6 | — | — | — | 1/4" | 4 | 6 | — | — | — |
| | 25 | 28.75 | 6 | 6.5 | 9 | — | — | — | 1/4" | 6.5 | 9 | — | — | — |
| | 30 | 33.90 | 6 | 10 | 12 | 10 | 10 | 12 | 1/4" | 10 | 12 | 3/8" | 10 | 12 |
| | 35 | 40.25 | — | — | — | 10 | 10 | 12 | — | — | — | 3/8" | 10 | 12 |
| | 45 | 47.00 | — | — | — | 10 | 13 | 18 | — | — | — | 3/8" | 13 | 18 |
| | 55 | 47.00 | — | — | — | 10 | 13 | 18 | — | — | — | 3/8" | 13 | 18 |
| Type F | 25 | 36.10 | 6 | 6.5 | 9 | — | — | — | 1/4" | 6.5 | 9 | — | — | — |
| | 30 | 39.00 | 6 | 10 | 12 | 10 | 10 | 12 | 1/4" | 10 | 12 | 3/8" | 10 | 12 |
| | 35 | 46.25 | — | — | — | 10 | 10 | 12 | — | — | — | 3/8" | 10 | 12 |
| | 45 | 55.00 | — | — | — | 10 | 13 | 18 | — | — | — | 3/8" | 13 | 18 |
| | 55 | 55.00 | — | — | — | 10 | 13 | 18 | — | — | — | 3/8" | 13 | 18 |

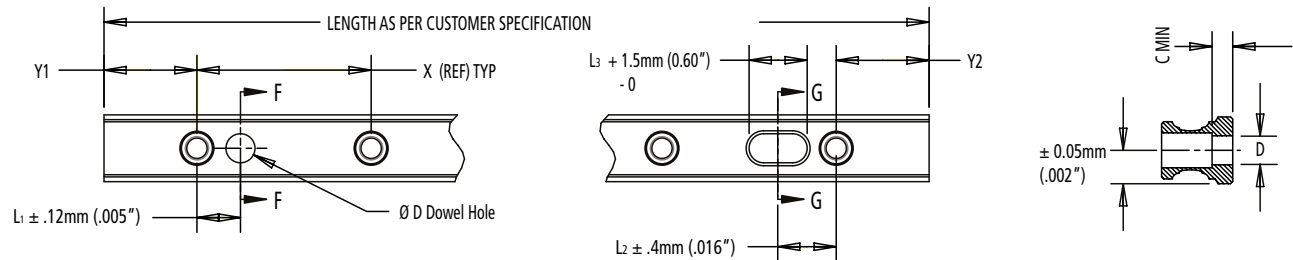
All dimension in mm, unless otherwise specified.
Hole tolerance $\varnothing D +0/-0.013$

400 Series - Rail Length

Maximum Length of One Piece Rail

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

Extended Standard Rail Options



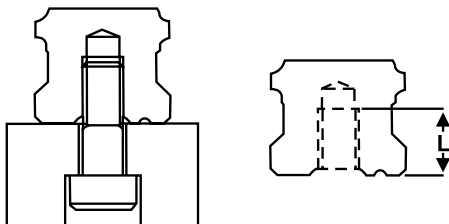
| Option | D | L1 | L2 | L3 | C |
|--------|------|--------|--------|---------|--------|
| DH1 | 6mm | 30mm | 30mm | 10.2 mm | 9.5 mm |
| DH2 | 10mm | 30mm | 30mm | 13.8 mm | 9.5 mm |
| DH3 | 1/4" | 1.181" | 1.181" | .542" | 3/8" |
| DH4 | 3/8" | 1.181" | 1.181" | .542" | 3/8" |

Y1 = Y2 unless specified at time of ordering

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

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

Rail with Tapped Holes



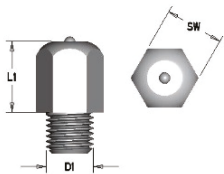
Bolting the rail from the underside allows for a clean top surface with no openings for debris and other particles to collect.

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

Thin Dense Chrome Plating

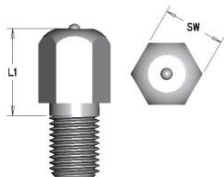
Rails and carriages are available with **Thin Dense Chrome Plating** with a thickness of 2–4 µm. It is only available in both High and Precision accuracy classes up to 4 meters long as a single rail; longer lengths require butt joints.

400 Series - Oil Fittings

**430LN15L3**

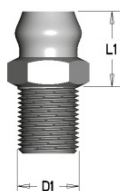
Hydraulic-type lubricating nipple.

| SW | D1 | L1 |
|----|-------------|----|
| 5 | M4x0.7xL3.5 | 6 |

**430LN15L-5**

Hydraulic-type lubricating nipple.

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

**430LN20L / 15L7 / 15L12**

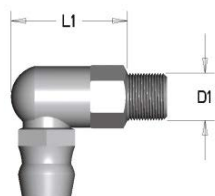
Hydraulic-type lubricating nipple. Straight.

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

**430LN35L / LNL**

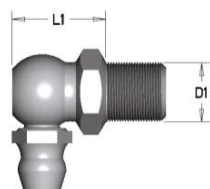
Hydraulic-type lubricating nipple. Straight.

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

**430LN90L5 / L7 / L12**

Hydraulic-type lubricating nipple. 90° angle.

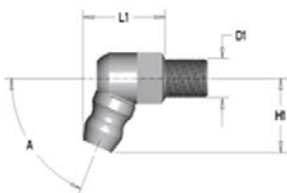
| Part No. | SW | D1 | L1 |
|------------|----|------------|------|
| 430LN90L5 | | M6x1.0xL5 | 14.7 |
| 430LN90L7 | | M6x1.0xL7 | 14.7 |
| 430LN90L12 | | M6x1.0xL12 | 14.7 |

**430LN95L8 / L12**

Hydraulic-type lubricating nipple. 90° angle.

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

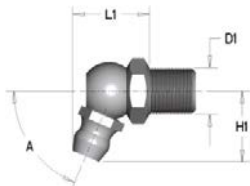
400 Series - Oil Fittings



430LN45L5 / 45L7 / 45L

Hydraulic-type lubricating nipple. 67.5° angle.

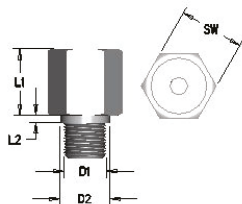
| Part No. | SW | D1 | L1 | H1 | A |
|-----------|----|------------|------|------|------|
| 430LN45L5 | | M6x1.0xL5 | 13.5 | 11.4 | 67.5 |
| 430LN45L7 | | M6x1.0xL7 | 13.5 | 11.4 | 67.5 |
| 430LN45L | | M6x1.0xL12 | 13.5 | 11.4 | 67.5 |



430LN55L8 / L

Hydraulic-type lubricating nipple. 67.5° angle.

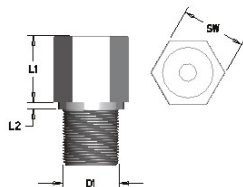
| Part No. | SW | D1 | L1 | H1 | A |
|-----------|----|-------------|------|------|------|
| 430LN55L8 | | M8x1.25xL8 | 13.3 | 12.3 | 67.5 |
| 430LN55L | | M8x1.25xL12 | 13.3 | 12.3 | 67.5 |



430LNS25L5 / L8 / L12

Hydraulic-type lubricating nipple. Straight.

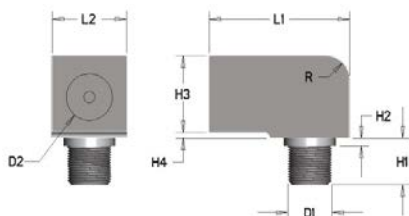
| Part No. | SW | D1 | D2 | L1 | L2 |
|-------------|-----|------------|----|-----|----|
| 430LNS25L5 | 9.2 | M6x1.0xL5 | 7 | 9.4 | 1 |
| 430LNS25L8 | 9.2 | M6x1.0xL7 | 7 | 9.4 | 1 |
| 430LNS25L12 | 9.2 | M6x1.0xL12 | 7 | 9.4 | 1 |



430LNS35L8 / L12

Hydraulic-type lubricating nipple. Straight.

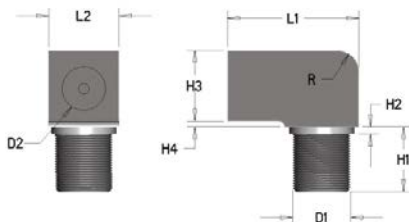
| Part No. | SW | D1 | L1 | H1 | A |
|-------------|-----|-------------|------|------|------|
| 430LNS35L8 | 9.2 | M8x1.25xL8 | 13.3 | 12.3 | 67.5 |
| 430LNS35L12 | 9.2 | M8x1.25xL12 | 13.3 | 12.3 | 67.5 |



430LNA25L5 / L8 / L12

Hydraulic-type lubricating nipple. 90° angle block.

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



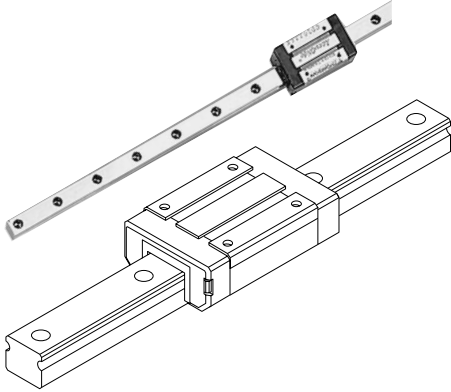
430LNA35L8 / L12

Hydraulic-type lubricating nipple. 90° angle block.

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

AccuMini Linear Ball Guides

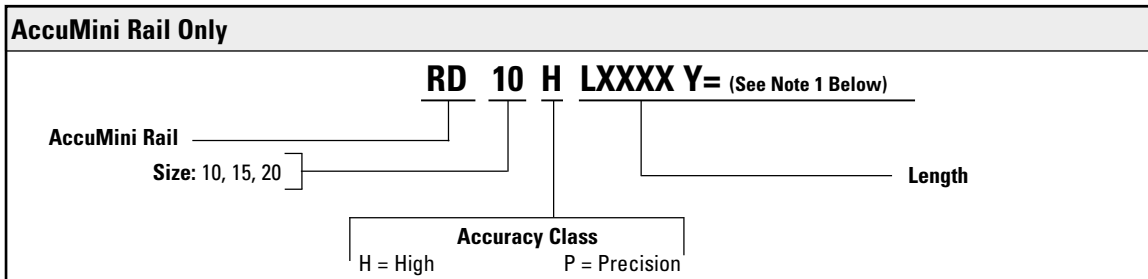
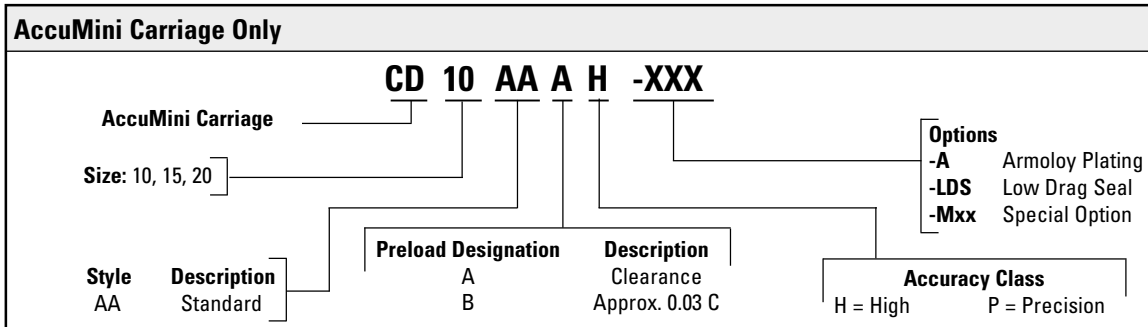
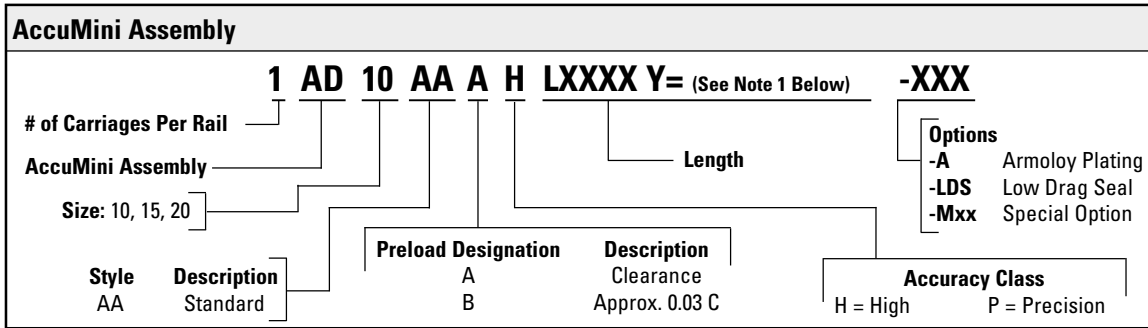
Ultra compact, high roll moment capacity



Thomson AccuMini Linear Ball Guides offer:

- Advanced Ball Control - reduces friction to provide smooth, quiet operation at high speeds.
- Full Length Integral Wiper - protects critical components from contamination to maximize system life.
- Gothic Arch Profile - provides high roll moment capacity, critical for single rail designs.
- Engineered Polymer Retainer - reduces system inertia and noise.
- Stainless Steel Ball Bearings - resist corrosion from harsh environments.

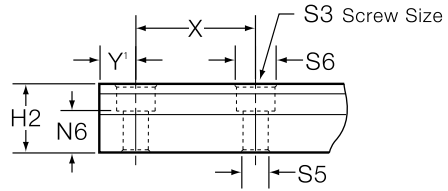
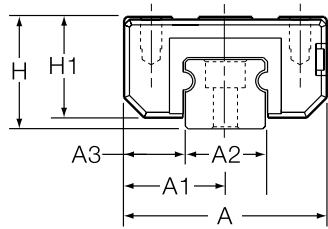
Part Number Description and Specification



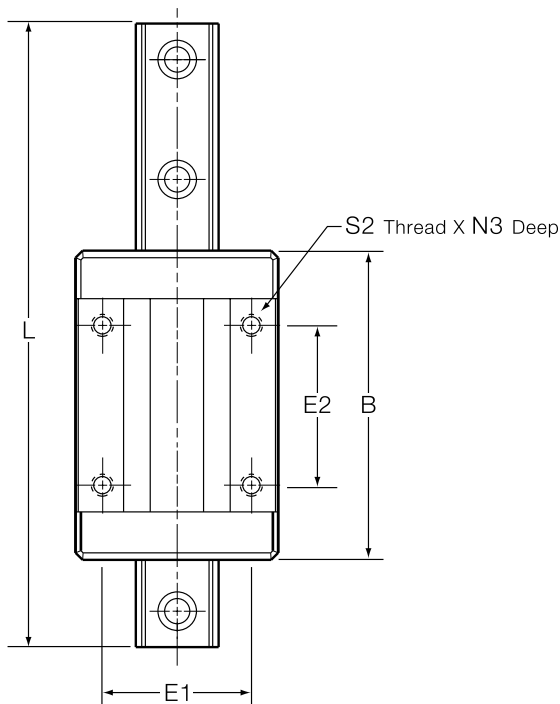
1. Y= Distance from end of rail to center of 1st mounting hole

AccuMini

(Miniature Series)
Low Profile, Compact Design



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



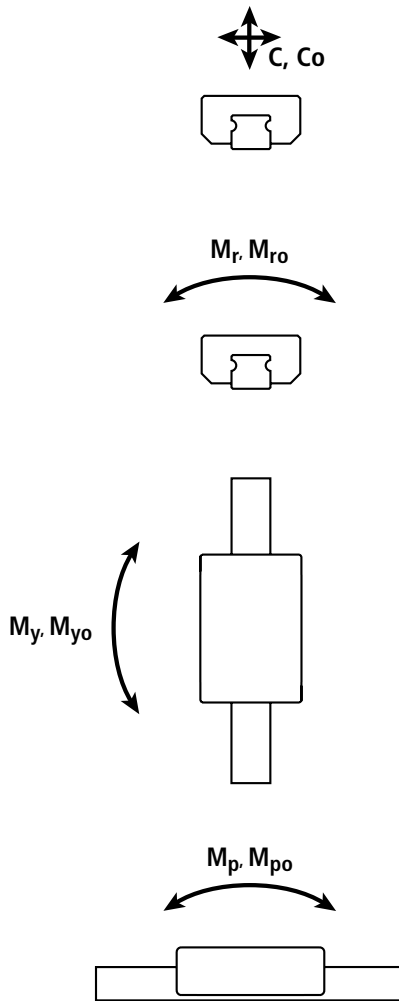
NOTE:

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

AccuMini Linear Guide 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 |

AccuMini



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

- C_o** = 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 Comparison

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

where:

- L** = travel life, km
- C** = dynamic load rating, N
- F** = applied dynamic load, N

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

where:

- C_{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
- Maximum Temperature = 80° C

AccuMini

AccuMini Series

| Size | (mm) | | | | Load Rating | | Moment Rating | | | | MASS Carriage Rail | |
|------|------|-----|----|--------------------|------------------|------------------|---------------------------------|-----------------------------------|----------------|-----------------|--------------------|------|
| | N3 | N6 | X | L _{max} ‡ | C(@100 km) | N (lbf) | M _p , M _y | M _{po} , M _{yo} | M _r | M _{ro} | kg | kg/m |
| 10 | 4,5 | 5,5 | 25 | 3000 | 2820 (635) | 5300 1,190 | 10 (7) | 20 (15) | 15 (11) | 28 (21) | 0,045 | 0,65 |
| 15 | 6 | 7,5 | 40 | 3000 | 6375 (1,430) | 15200 (3,420) | 35 (26) | 66 (49) | 51 (38) | 96 (71) | 0,141 | 1,42 |
| 20 | 8 | 9,5 | 60 | 3000 | 11870 (2,670) | 23000 (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.

AccuMini

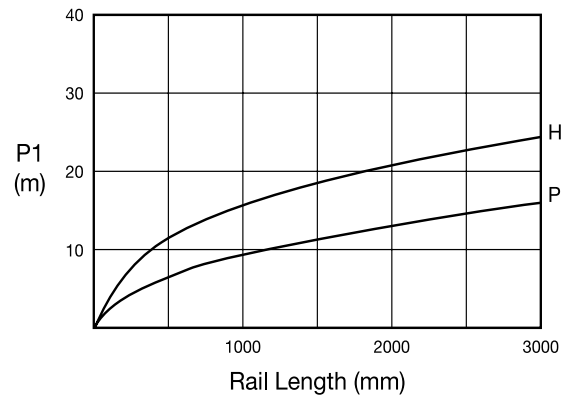
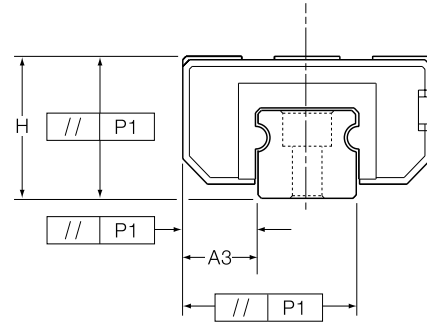
Three tolerances describe the accuracy of a Profile Rail bearing: Running Parallelism, Pair Variation, and Assembly Accuracy. These are measured from the rail base to the center of the carriage top (H), and from the rail reference edge to the center of the carriage reference edge (A3).

Running Parallelism describes the tolerance on H and A3 as a function of axial travel, measured from one carriage down the length of the 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 |
| Assembly Accuracy Tolerance on dimension H and A3 (measured at middle of carriage at any point along rail) | ±40 | ±20 |
| 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 |
| Running Parallelism | See figures above. | |

All values in µm

Preload Accuracy Combinations

| Accuracy Class | Preload | |
|----------------|-----------------------|--|
| | Clearance up to 10 µm | Light approximately 0,03C ¹ |
| P | – | B |
| H | A | B |

1. C = Dynamic load capacity of the bearing.

Calculations

To determine proper carriage size:

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

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:

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

L = normal travel life (km)

C = rated dynamic load capacity of carriage (N)

F = equivalent load on carriage (N)

Conversions

1 lb_f = 4,448 N

1 kg_f = 9,8 N

1 km = 39,370 inches

1 Nm = 0.7376 lb_f - ft

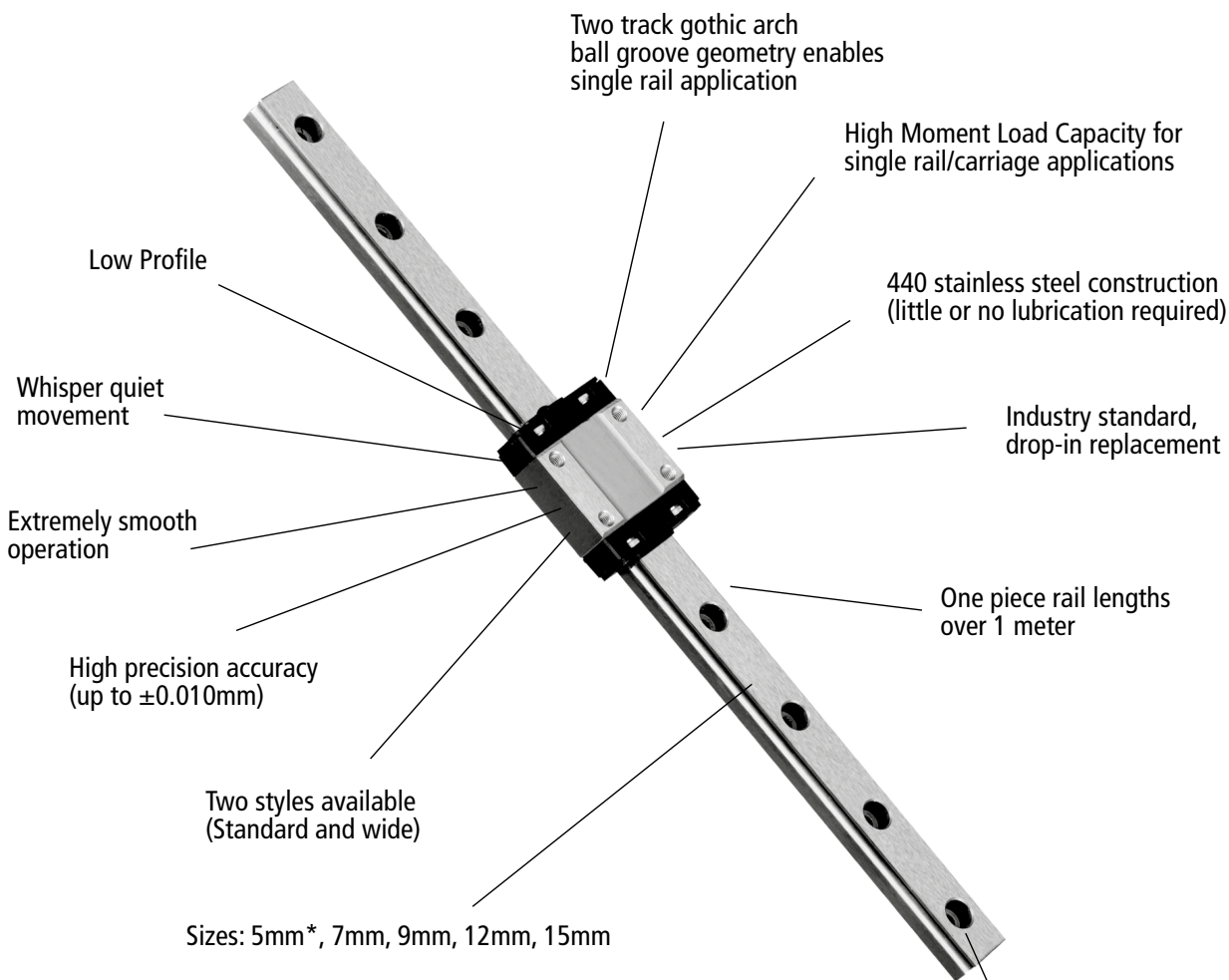
Operating Parameters

Maximum Velocity = 3 m/s

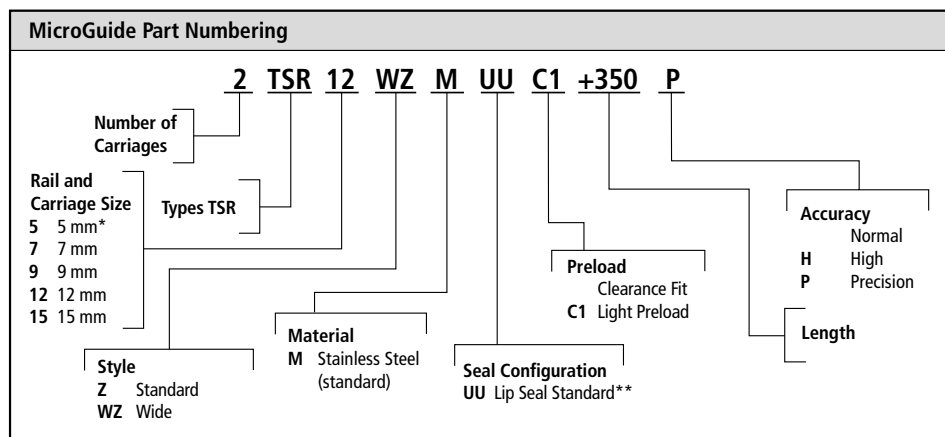
Maximum Acceleration = 50 m/s²

Maximum Temperature = 80° C

MicroGuide™ Profile Rail



Note! The Microguide linear guide series carriages do not have retained balls. Removing the carriage from the rail without an arbor will result in the balls falling out.

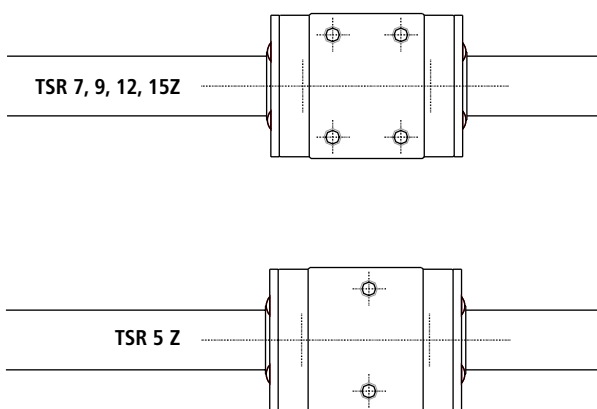
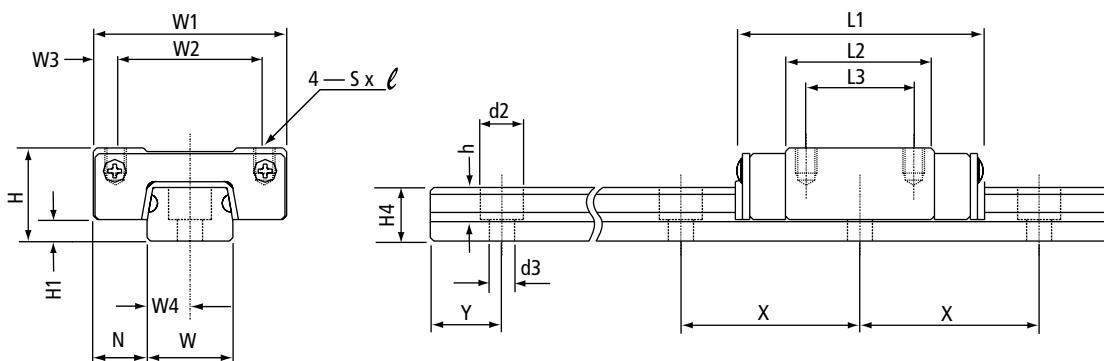


*For 5 mm size, there are only 2 mounting holes per carriage.
**Seals are not available for 5 mm size.

MicroGuide

MicroGuide™ Profile Rail

TSR-Z Standard



Standard Lengths of Rail

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

Longer lengths may be supplied as single rail or butt joints. Please contact customer service for more information.

MicroGuide™ TSR-Z (Standard)

| Size | Assembly Dimensions | | | Carriage Dimensions | | | | | | | Rail Dimensions | | | | | | | |
|------|---------------------|-----|-----|---------------------|----|-----|------|------|----|-----------------------|-----------------|-----|-----|-----|-----|-----|-----|----|
| | H | H1 | N | W1 | W2 | W3 | L1 | L2 | L3 | Sxℓ | W | W4 | H4 | d2 | d3 | h | Y | X |
| 5 | 6 | 1.5 | 3.5 | 12 | 8 | 2 | 19 | 11 | - | 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 | M3X4 | 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.

MicroGuide™ Profile Rail

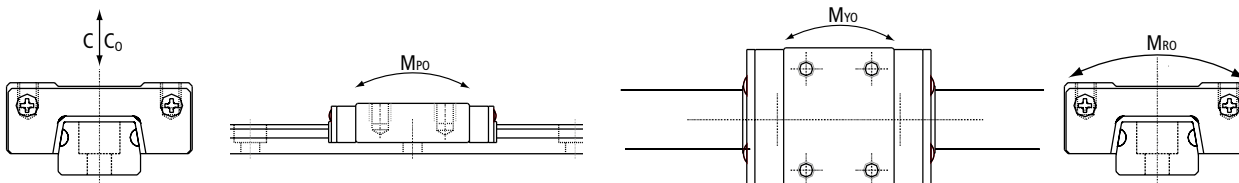
TSR-Z Standard

Dynamic Load and Moment Ratings

C = Dynamic load rating

Static Load and Moment Capacities

C₀ = Static load rating
 M_{P0} = Static pitch moment capacity
 M_{Y0} = Static yaw moment capacity
 M_{R0} = Static roll moment capacity



| Size | Load Capacity (N) | | Moments (Nm) | | | Mass | |
|----------------|------------------------|-------------------------------------|-----------------|-----------------|-----------------|---------------|-------------|
| | Dynamic C ¹ | Limit C ₀ ^{2,3} | M _{P0} | M _{Y0} | M _{R0} | Carriage [kg] | Rail [kg/m] |
| 5 ⁴ | 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:

- The dynamic load and moment ratings are based upon 50km travel life.
- 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.
- 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.
- Size 5 does not have end seals. Pan head screws required to mount rail.

Load/Life Calculations

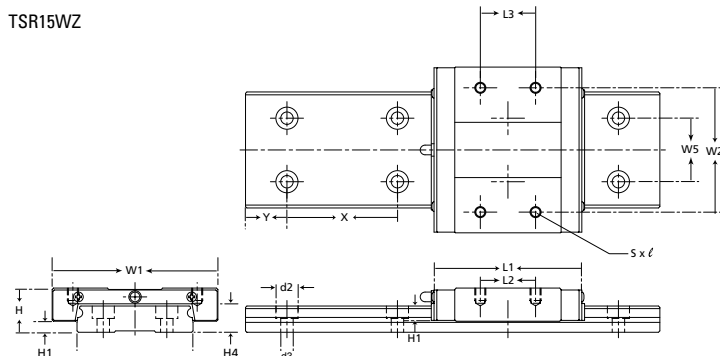
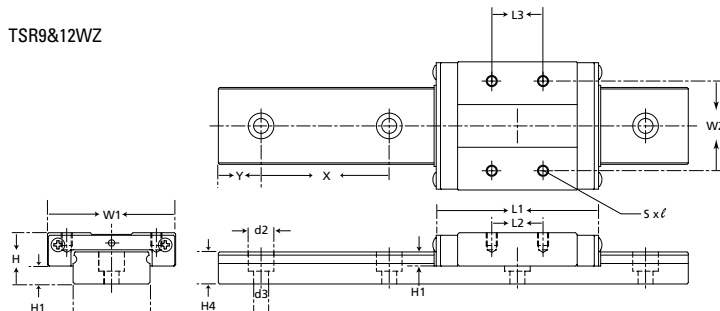
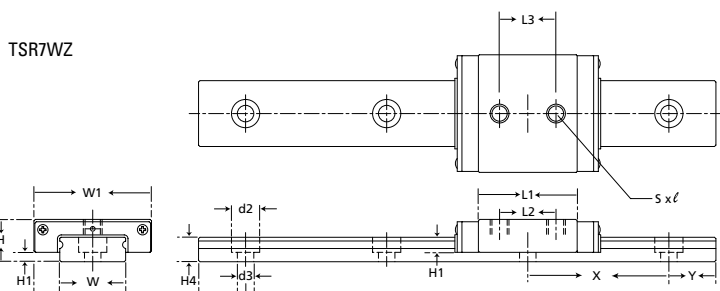
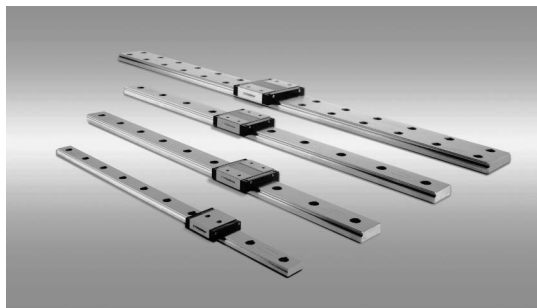
| | |
|---|---|
| To determine proper carriage size: | To determine travel life: |
| $C_{\min} = F \cdot \left(\frac{50}{L}\right)^{1/3}$ | $L = \left(\frac{C}{F}\right)^3 \cdot 50$ |
| C _{min} = minimum required dynamic load capacity of carriage (N) | L = normal travel life (km) |
| F = equivalent load on carriage (N) | C = rated dynamic load capacity of carriage (N) |
| L = required travel life (km) | F = equivalent load on carriage (N) |

Operating Parameters

Maximum Velocity: 3 m/s
 Maximum Acceleration: 50 m/s

MicroGuide™ Profile Rail

TSR-WZ Wide



Standard Lengths of Rail

| Sizes | 7 | 9 | 12 | 15 |
|------------------|------|------|------|------|
| Standard Lengths | 50 | 50 | 70 | 110 |
| | 85 | 110 | 150 | 190 |
| | 170 | 260 | 310 | 270 |
| | 100 | 350 | 390 | 430 |
| | 130 | 440 | 470 | 590 |
| | 260 | 530 | 630 | 750 |
| | 350 | 620 | 790 | 910 |
| | 440 | 800 | 950 | 1030 |
| | 530 | 1010 | 1030 | |
| | 620 | | | |
| | 800 | | | |
| | 1010 | | | |
| 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 7 mm size, there are only 2 mounting holes per carriage.

MicroGuide™ Profile Rail

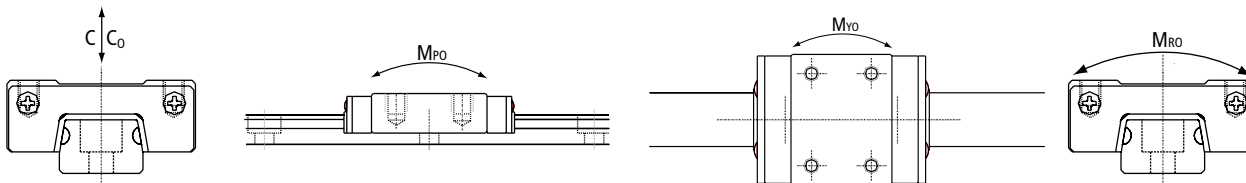
TSR-WZ Wide

Dynamic Load and Moment Ratings

C = Dynamic load rating

Static Load and Moment Capacities

C₀ = Static load rating
 M_{PO} = Static pitch moment capacity
 M_{YO} = Static yaw moment capacity
 M_{RO} = Static roll moment capacity



| Size | Load Capacity (N) | | Moments (Nm) | | | Mass | |
|------|------------------------|-------------------------|-----------------|-----------------|-----------------|---------------|-------------|
| | Dynamic C ¹ | Limit Co ^{2,3} | 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:

- The dynamic load and moment ratings are based upon 50 km travel life.
- 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.
- 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/Life Calculations

| | |
|---|---|
| <p>To determine proper carriage size:</p> $C_{min} = F \cdot \left(\frac{50}{L}\right)^{1/3}$ <p>C_{min} = minimum required dynamic load capacity of carriage (N)</p> <p>F = equivalent load on carriage (N)</p> <p>L = required travel life (km)</p> | <p>To determine travel life:</p> $L = \left(\frac{C}{F}\right)^3 \cdot 50$ <p>L = normal travel life (km)</p> <p>C = rated dynamic load capacity of carriage (N)</p> <p>F = equivalent load on carriage (N)</p> |
|---|---|

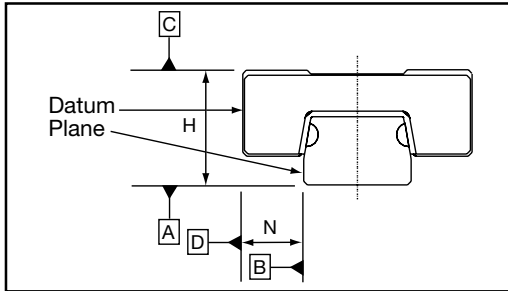
Operating Parameters

Maximum Velocity: 3 m/s
 Maximum Acceleration: 50 m/s²

MicroGuide

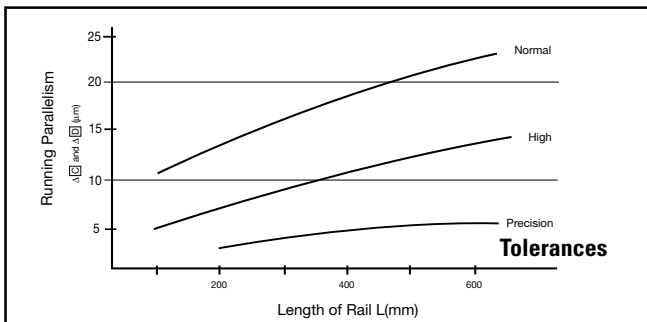
MicroGuide™ Profile Rail

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 |

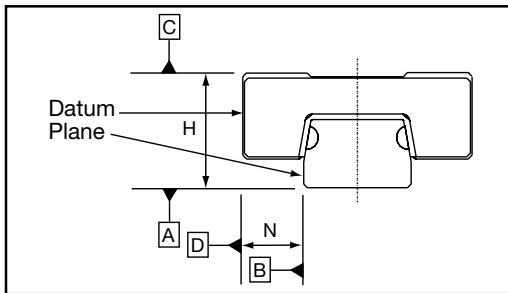
TSR-Z (Standard) Running Parallelism



TSR-Z (Standard) Fit Up

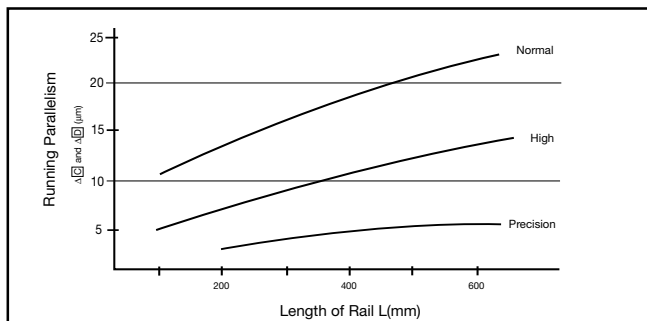
| Series Type, Size and Style | Radial Clearances (µm) | |
|-----------------------------|------------------------|------------------|
| | clearance fit (blank) | light preload C1 |
| TSR5 Z | 0~+1.5 | -1.5~0 |
| TSR7 Z | ±2 | -3~0 |
| TSR9 Z | ±2 | -4~0 |
| TSR12 Z | ±3 | -6~0 |
| TSR15 Z | ±5 | -10~0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

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



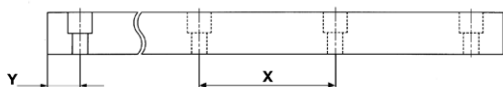
TSR-WZ (Wide) Fit Up

| 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 |

MicroGuide™ Profile Rail

Standard Lengths of Rail

| Sizes | 7 WZ | 9 WZ | 12 WZ | 15 WZ |
|------------------|------|------|-------|-------|
| Standard Lengths | 50 | 50 | 70 | 110 |
| | 110 | 110 | 150 | 190 |
| | 170 | 170 | 230 | 270 |
| | 260 | 260 | 310 | 430 |
| | 350 | 350 | 390 | 590 |
| | 440 | 440 | 470 | 750 |
| | 530 | 530 | 630 | 910 |
| | 620 | 620 | 790 | 1030 |
| | 800 | 800 | 950 | |
| | 1010 | 1010 | 1030 | |
| X | 30 | 30 | 40 | 40 |
| Y | 10 | 10 | 15 | 15 |



Load/Life Calculations

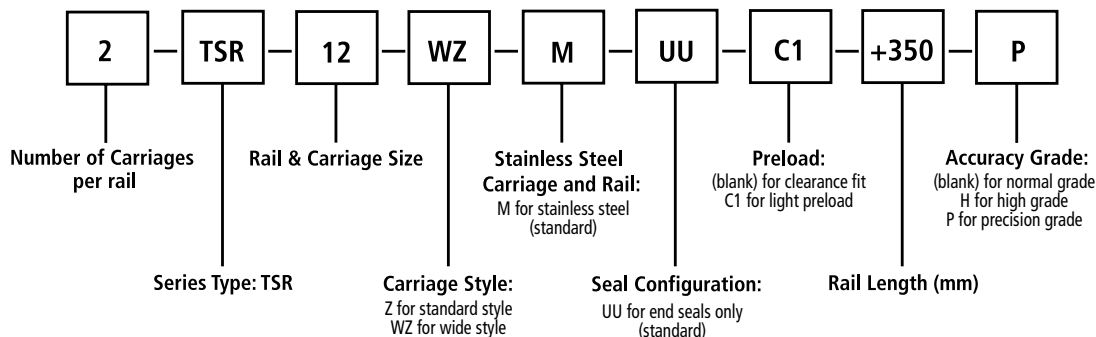
| | |
|---|---|
| To determine proper carriage size: $C_{min} = F \cdot \left(\frac{50}{L}\right)^{1/3}$ C_{min} = minimum required dynamic load capacity of carriage (N) F = equivalent load on carriage (N) L = required travel life (km) | To determine travel life: $L = \left(\frac{C}{F}\right)^3 \cdot 50$ L = normal travel life (km) C = rated dynamic load capacity of carriage (N) F = equivalent load on carriage (N) |
|---|---|

Conversions

| | |
|------------------------|-------------------------------|
| 1 lbf = 4.448 N | 1 km = 39,370 inches |
| 1 kgf = 9.8 N | 1 Nm = 0.7376 lbf - ft |

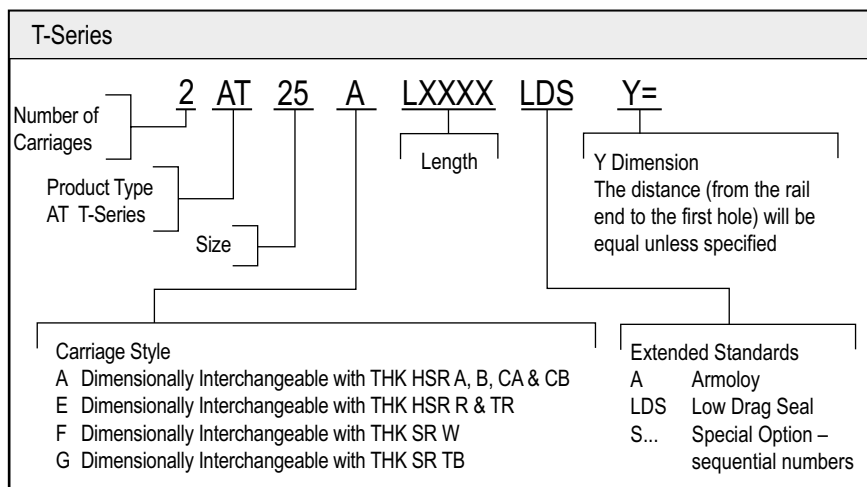
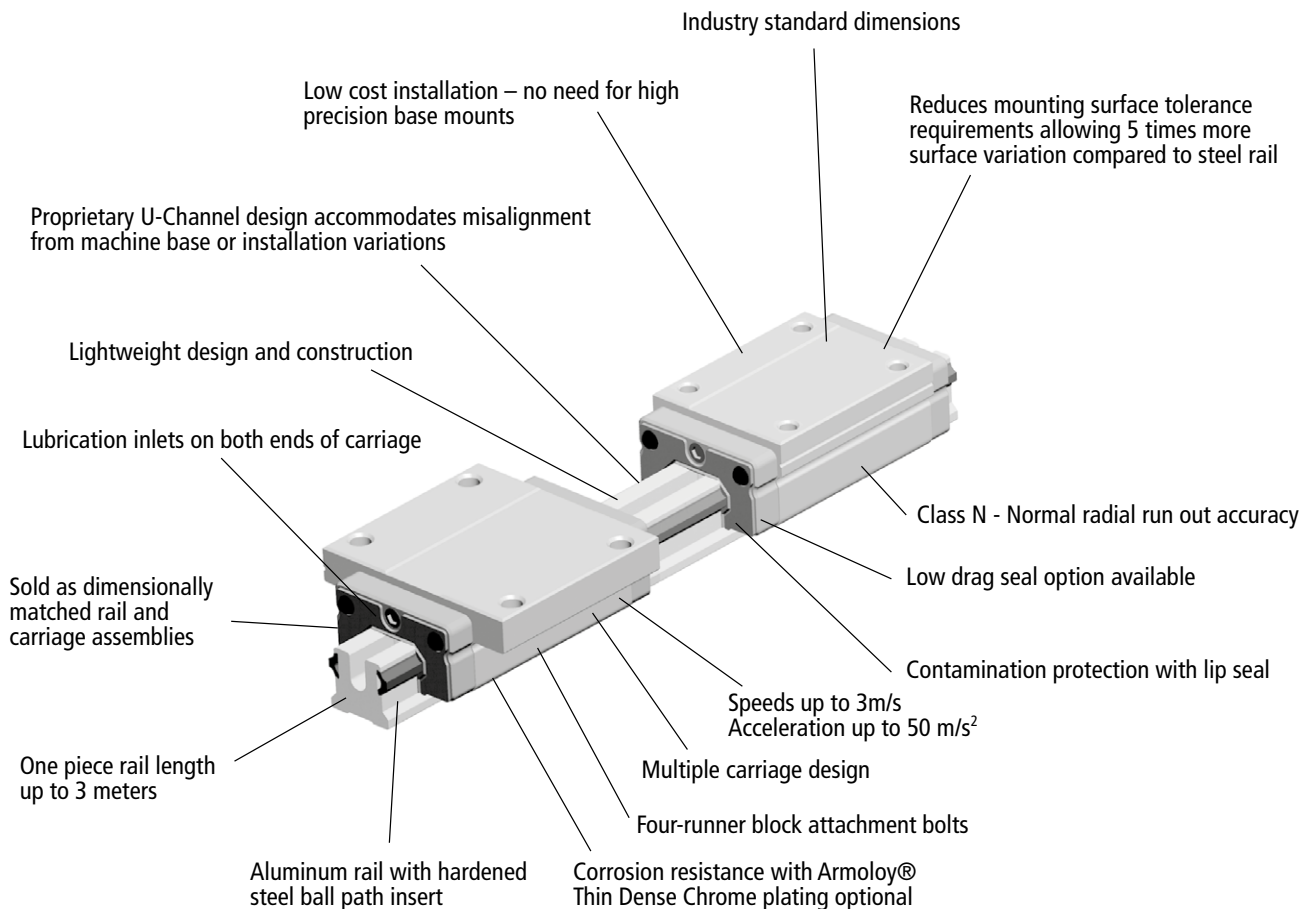
Maximum Travel Speed: $V_{max} = 3 \text{ m/s}$
Maximum Acceleration: $a_{max} = 50 \text{ m/s}^2$

How To Order



MicroGuide

T-Series Profile Rail



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 systems with low tolerance mounting surfaces.

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 Thomson to deliver the highest quality product.

Lightweight

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

Accuracy

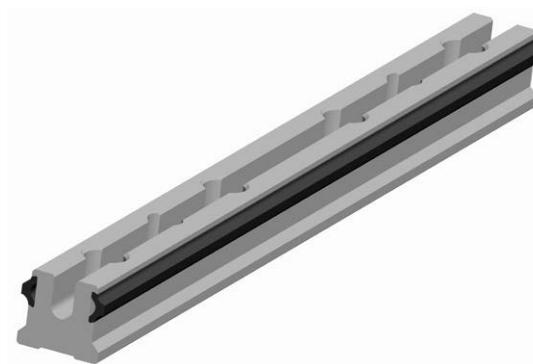
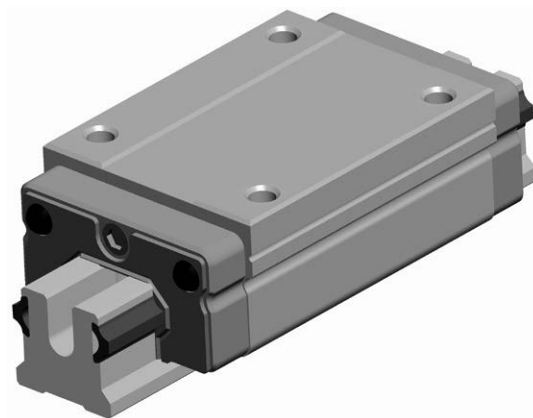
As a result of its high tolerance for alignment errors, the T-Series Ball Profile Rail is available in an N class radial run out only.

Easy Installation

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.

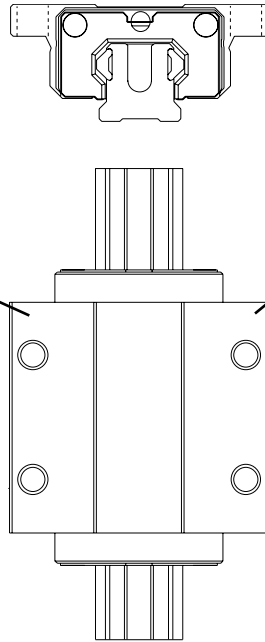
Drop-in Replacement

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.



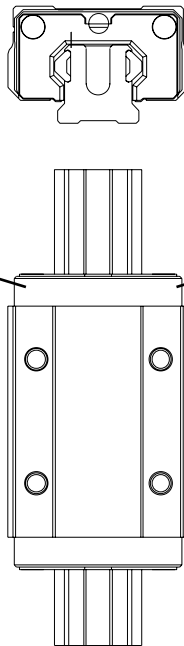
T-Series Carriage Styles

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



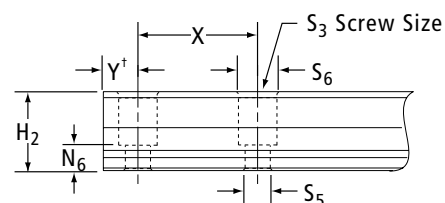
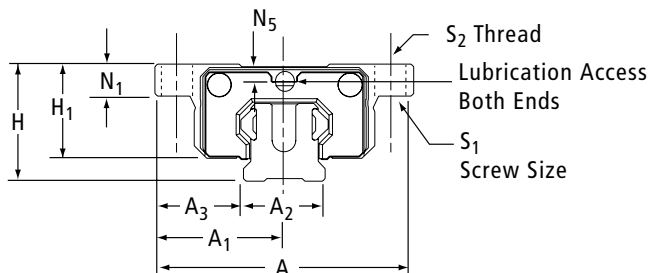
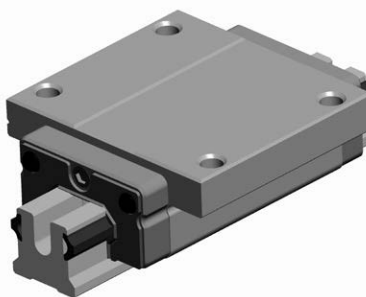
Standard Short Hole Spacing Style G
Sizes 20, 25, 35
Dimensionally interchangeable to THK SR TB

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

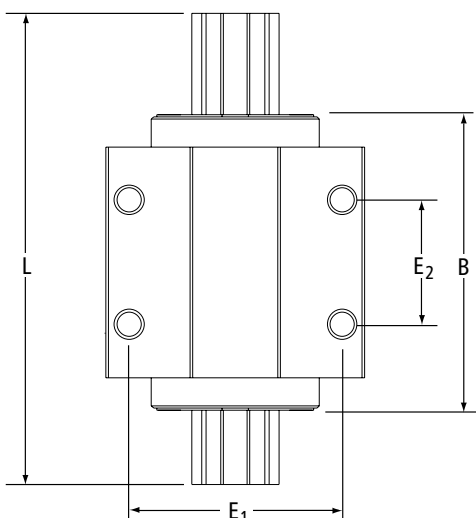


Narrow High Style F
Sizes 20, 25, 35
Dimensionally interchangeable
to THK SR W

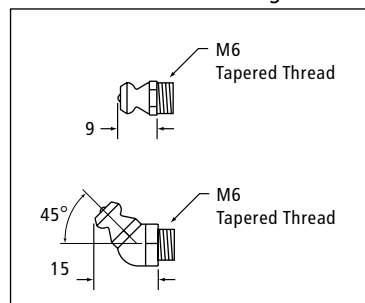
T-Series Ball Profile Rail Style A and G



†- 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 |

T-Series Ball Profile Rail Style A and G

Dynamic Load Rating

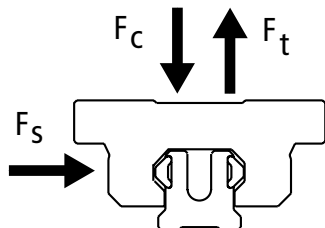
C = Dynamic load rating

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

C₀ = 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) | | Mass Carriage kg | Rail kg/m |
|------|--------|----------------------|----------------|------------------|-----------|
| | | C (@100km) | C ₀ | | |
| 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

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

where:

L = travel life, km

C = dynamic load rating, N

F = applied dynamic load, N

Operating Parameters

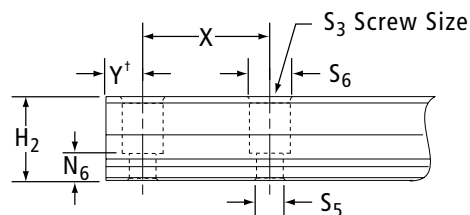
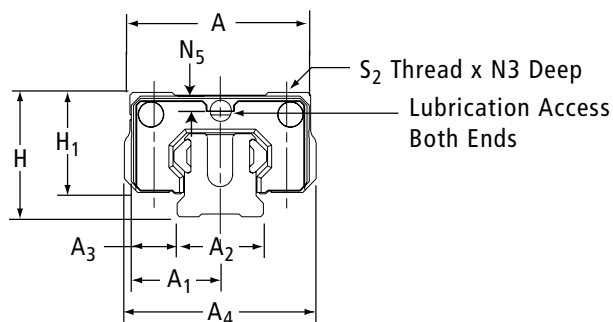
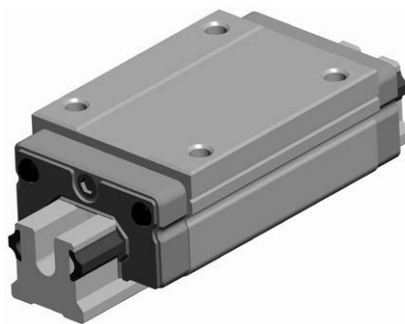
Maximum Velocity = 3 m/s

Maximum Acceleration = 50 m/s²

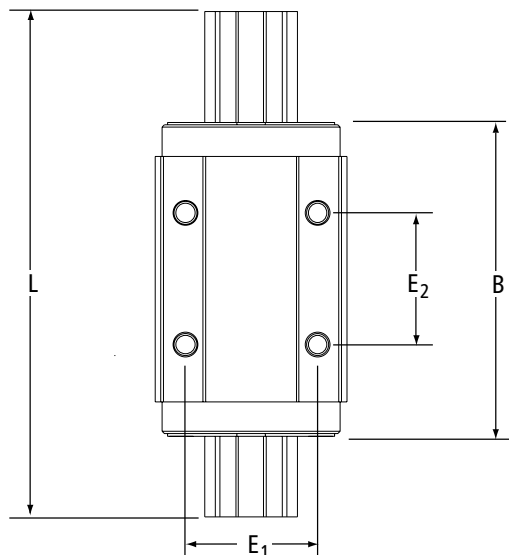
Maximum Temperature = 80°C

T-Series Ball Profile Rail

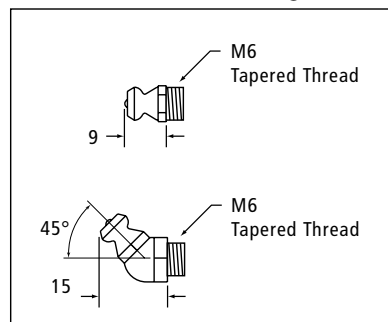
Style E and F



t - 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

T-Series

T-Series Ball Profile Rail

Style E and F

Dynamic Load Rating

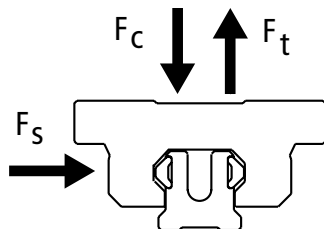
C = Dynamic load rating

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

C₀ = 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) | | Mass | |
|------|--------|----------------------|----------------|-------------|-----------|
| | | C (@100km) | C ₀ | Carriage kg | Rail kg/m |
| 20 | E F | 9000 (2025) | 11000 (2475) | 0.22 | 0.79 |
| 25 | E F | 13000 (2925) | 15000 (3375) | 0.30 | 1.06 |
| 35 | E F | 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

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

where:

L = travel life, km

C = dynamic load rating, N

F = applied dynamic load, N

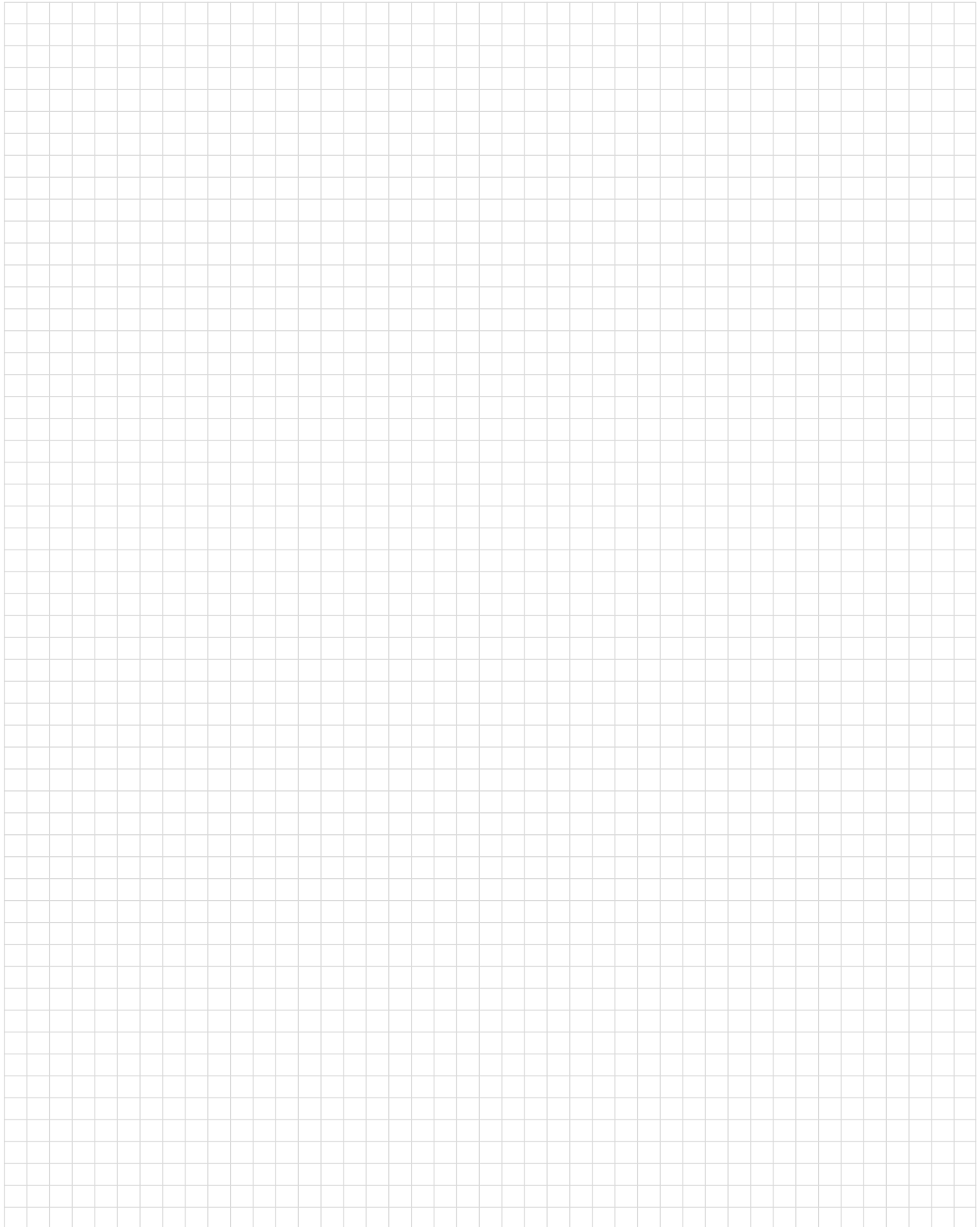
Operating Parameters

Maximum Velocity = 3 m/s

Maximum Acceleration = 50 m/s²

Maximum Temperature = 80°C

NOTES:



Installation Guidelines

Figure 1

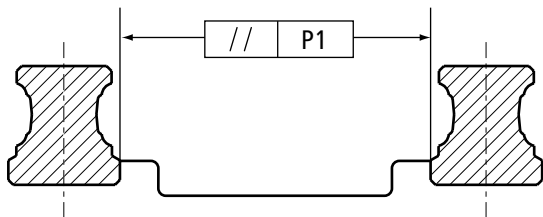


Table 1. Parallelism Between Multiple Rails, mm

| Bearing Type | Clearance | Preload | | |
|--------------------------------|-----------|---------------------|---------------------|---------------------|
| | | 0,03 C [†] | 0,08 C [†] | 0,13 C [†] |
| 500 Series Ball Linear Guide | | | | |
| 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 | – | .012 | .014 | .008 |
| 45 | – | .024 | .016 | .009 |
| 55 | – | .026 | .017 | .010 |
| 65 | – | .028 | .018 | .011 |
| AccuMini 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 | – | – | – |
| 400 Series Ball Linear Guide | | | | |
| 15 | .025 | .018 | – | – |
| 20 | .025 | .020 | – | – |
| 25 | .025 | .020 | – | – |
| 30 | .040 | .030 | – | – |
| 35 | .050 | .035 | – | – |
| 45 | .060 | .040 | – | – |
| 55 | .070 | .050 | – | – |

† Where C = Dynamic Load Capacity

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.

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 of 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.

Installation Guidelines

Figure 2

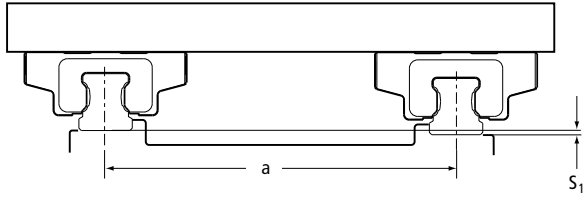


Table 2. Allowable Vertical Offsets Between Rails (S_1/a), inch

| Bearing Type | Preload | | | |
|------------------------|-----------|---------------------|---------------------|---------------------|
| | 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 |
| AccuMini Linear Guide | 0.0006 | 0.0004 | – | – |
| T-Series Linear Guide | 0.0020 | – | – | – |
| 400 Series 15, 20 & 25 | 0.0050 | 0.0030 | – | – |
| 400 Series 30 | 0.0060 | 0.0040 | – | – |
| 400 Series 35 | 0.0080 | 0.0050 | – | – |
| 400 Series 45 | 0.0090 | 0.0060 | – | – |
| 400 Series 55 | 0.0118 | 0.0080 | – | – |

[†]Where C=Dynamic Load Capacity

Figure 3

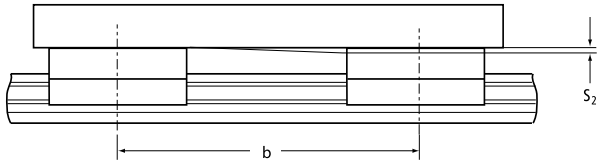


Figure 4

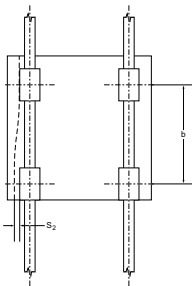


Table 3. Allowable Carriage Offsets (S_2/b)

| Bearing Type | Preload | | | |
|--------------------|-----------|---------------------|---------------------|---------------------|
| | Clearance | 0.03 C [†] | 0.08 C [†] | 0.13 C [†] |
| 500 Series (All) | 0,00006 | 0,00005 | 0,00004 | 0,00003 |
| 400 Series 15 & 20 | 0.0009 | 0.0007 | – | – |
| 400 Series 25 | 0.0011 | 0.0008 | – | – |
| 400 Series 30 | 0.0015 | 0.0011 | – | – |
| 400 Series 35 | 0.0019 | 0.0013 | – | – |
| 400 Series 45 | 0.0023 | 0.0015 | – | – |
| 400 Series 55 | 0.0027 | 0.0017 | – | – |

[†]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.

Installation Guidelines

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 |
| AccuMini 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 |
| 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 |
| 400 Series Ball Linear Guide | | | | |
| 15 | 2.8 | 0.6 | 5 | 0.6 |
| 20 | 4.3 | 0.9 | 6 | 0.9 |
| 25 | 5.6 | 1.1 | 7 | 1.1 |
| 30 | 6.8 | 1.4 | 8 | 1.4 |
| 35 | 7.3 | 1.4 | 9 | 1.4 |
| 45 | 8.7 | 1.6 | 12 | 1.6 |
| 55 | 11.8 | 1.6 | 17 | 1.6 |

Table 5. Recommended Bolt Tightening Torque, Nm

| 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

- Carefully place the rail on the mounting surface.
- Insert screws into the mounting holes and tighten lightly.
- 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.

- Starting from the center of the rail moving outwards, tighten each screw to the recommended tightening torque in Table 5.
 - If parallel rails are to be used, one of the following methods may be employed to obtain the parallelism recommended in Table 1:
 - two parallel locating edges
 - a gage block or parallel between the rails
 - the use of the top plate with the carriages mounted, to locate or "float" the second rail into place.
 - Repeat steps 1–4 to install the second rail.
 - 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 AccuMini Linear Guide size 10.
- 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.

Installation Guidelines

Figure 5. Shoulder Heights and Corner Radii

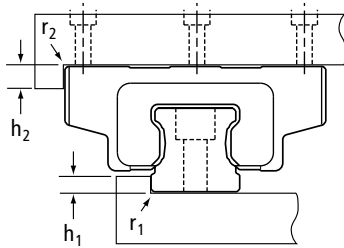


Figure 6. Butt jointed rails

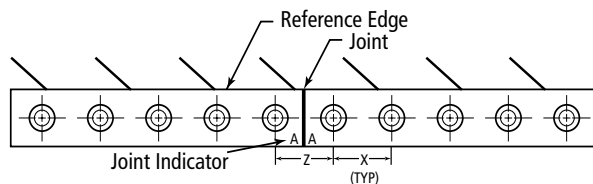
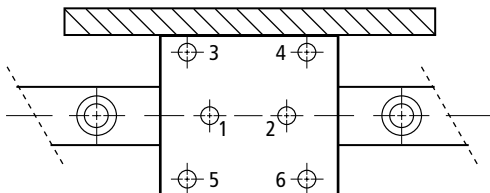


Figure 7. Recommended Tightening Sequence



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, Roller and 400 Series 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.

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.

Profile Rail Engineering Guide

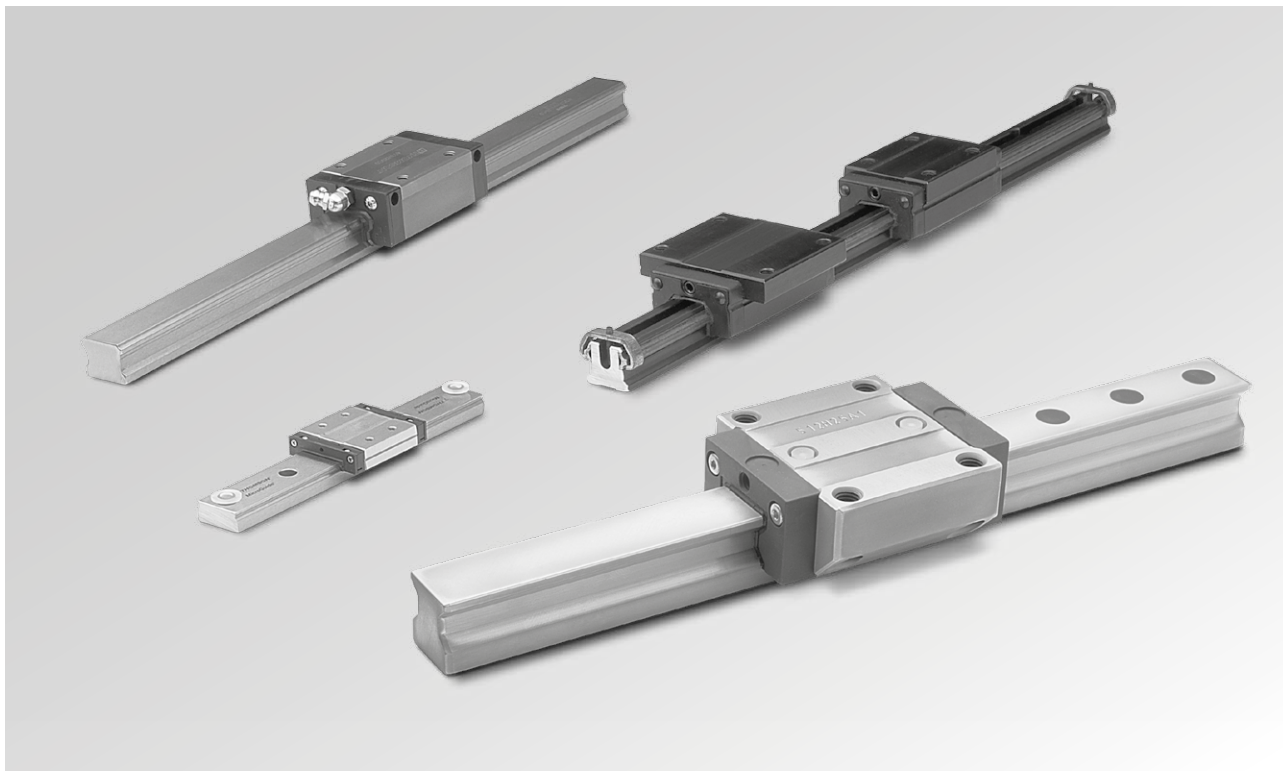


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Profile Rail Selection

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 Customer Support** or your local Thomson distributor.

Sizing & Defining Guide Characteristics

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} .
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 platen 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.

[†] 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.

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:

- d₀**= distance between centerlines of carriages or bearings (in) or (mm)
- d₁**= distance between centerlines of rails (in) or (mm)
- d₂**= distance from centerline of carriage or bearing to load action point (in) or (mm)
- d₃**= 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.

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

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

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

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

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

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

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

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

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

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

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

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

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

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

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

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

$$F_{3v} = F_{4v} = + \left(\frac{W}{2} \cdot \frac{d_2}{d_0}\right)$$

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

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.

Equivalent Applied 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.

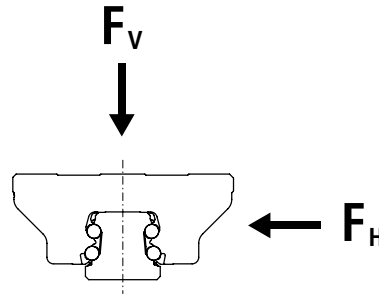
For ProfileRail* Carriages & Closed RoundRail* Bearings:

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

F_{EQ} = Equivalent Load

F_H = Horizontal Component of Resultant Applied Load

F_V = Vertical Component of Resultant Applied Load



For 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 $F_{EQ} < (3 \times F_P)$]:

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:

$$F_{EQ} = F_p + \frac{2}{3} (F_H + F_V)$$

F_p = Initial Preload Force

(i.e., for 'B' Preload Designation $F_p = .03 \times C$)

† 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 102).

‡ The 0.6 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.

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

Where:

$F_{EQ1} \dots F_{EQn}$ = equivalent dynamic load for distances $d1$ through dn

D = total distance of stroke = $d1+d2 \dots +dm$

$P = 3$ (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, L_r , for most linear guides is 100 km 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:

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

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

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

$$C_{100 \text{ km}} = C_{50 \text{ km}} / 1.26$$

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.

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.

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

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:

$$F_{\text{ext}} = 3F_p$$

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.

Example Applications

| Preload | Clearance | .03C | .08 - .13C |
|---------------------|---|--|--|
| Conditions | 1. weak impact 2. 2 rails in pair 3. low accuracy 4. small resistance | 1. cantilever 2. single rail 3. light load 4. high accuracy | 1. strong impact 2. strong vibration 3. heavy machining |
| Applications | 1. welding machine 2. chopping machine 3. feeding mechanism 4. tool change mechanism 5. ordinary XY table | 1. NC lathe 2. EDM 3. precise XY table 4. ordinary Z-axis 5. industrial robot 6. PCB punching | 1. machining centre 2. NC lathe and milling machine 3. feeding axis of grinder 4. tool feeding axis |

Deflection Curves

Curves are available for Thomson 500 Series at: www.thomsonlinear.com.

Actuation Force

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

1. Frictional resistance (F_f)
2. Intrinsic resistance (D_{int})
3. Inertia of the moving components ($F_{inertia}$)
4. Viscose drag of the lubrication (D_l)

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

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 (F_{ext}) applied to the linear guide in non-preloaded guides, and preloaded guides loaded beyond 3 times the preload value (F_p).

$$F_i = F_{ext}$$

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

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

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, D_{intr} 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 viscosity 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.

500 Series Ball Profile Rail

| Size D_{int} (N) | Carriage Style A, C D_{int} (N) | | Carriage Style B, D D_{int} (N) | |
|-----------------------|---|-------|---|-------|
| | 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 VG 68, 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 |
| 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

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.

Thomson's general lubricant recommendation for linear guides is a grade 2 grease. A maximum of one year or 100 km, 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.)

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.

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 |

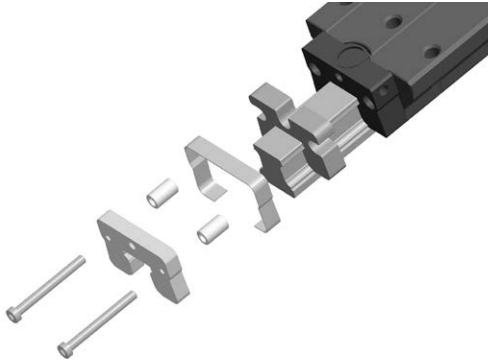
Oil Reservoir Refill Quantity

| Size | 500 Series Ball 5310W Oil (cm ³) | 500 Series Roller 5320W 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 |

Relubrication

| Size | 15 | 20 | 25 | 30 | 35 | 45 | 55 | 65 |
|--------------------|---------|----|----|----|----|----|---------|----|
| Travel Distance | 2500 km | | | | | | 5000 km | |

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.

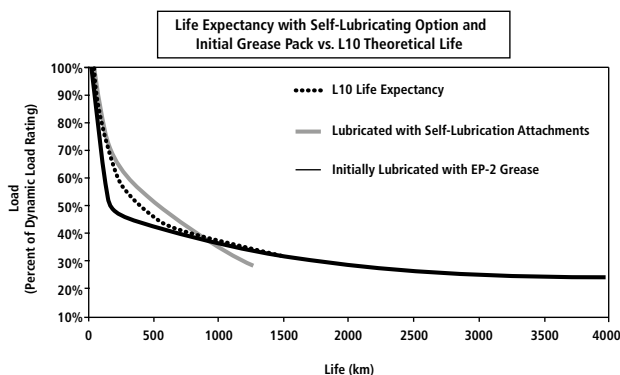
A contact spring assures continuous contact with the rail, releasing oil as the carriage moves. This ensures a film of lubricant between the rolling elements and races. When the carriage is at rest, oil is re-absorbed by the polymer.

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

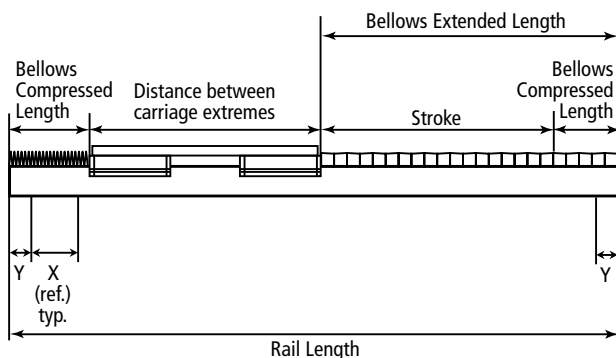
Speed : 0,6m/s

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.

Calculations for Bellows 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 5 mm. This value is used as the length in the way cover part number when ordering.



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 = 200 mm
 Distance Between Carriage Extremes = 520 mm
 Bellows Type = Walk-On
 CR = 0.19 for size 35 500 Series Ball Walk-on type bellows
 Way Cover Extended Length = Stroke /
 (1-CR) = 200 mm / (1-0.19) = 200 mm / .81 = 246.91 mm

Round up to next increment of 5 mm, therefore,
 Way Cover Extended Length = 250 mm
 Way Cover Compressed Length = Way Cover Extended Length - Stroke = 250 mm - 200 mm = 50 mm
 Rail Length = Compressed Length + Extended Length + Distance Between Carriage Extremes = 50 mm + 250 mm + 520 mm = 820 mm

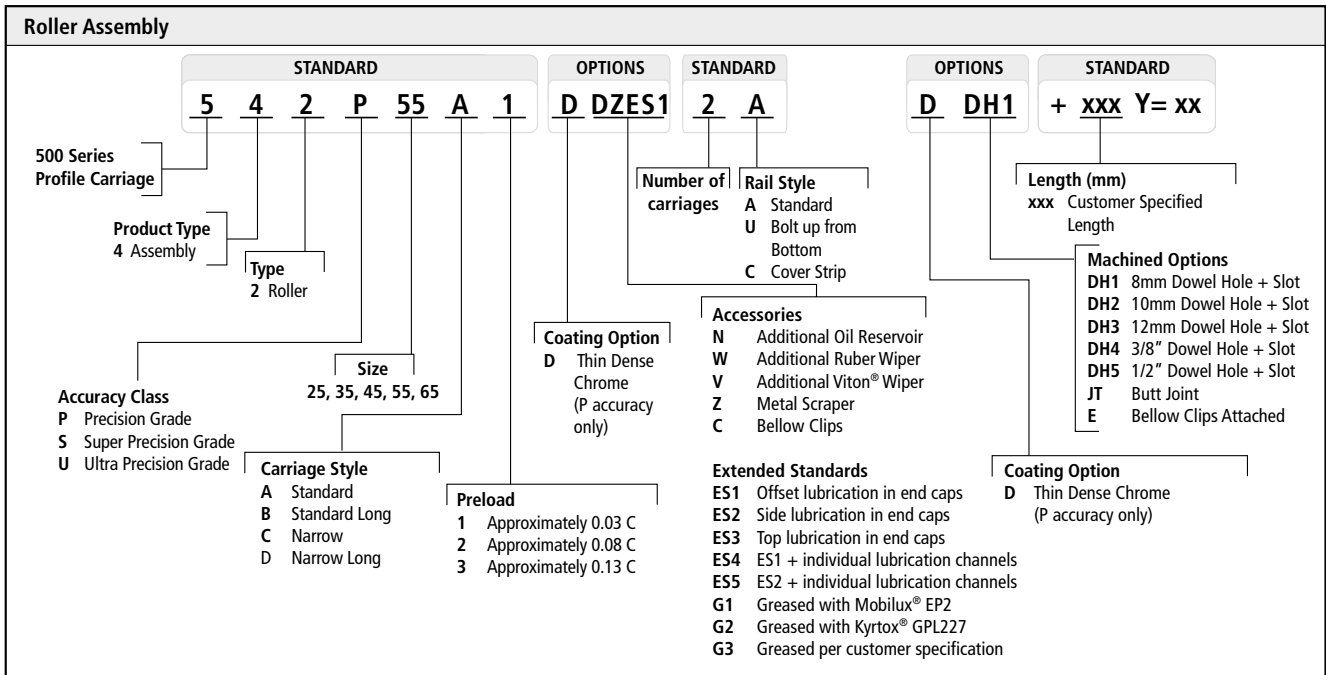
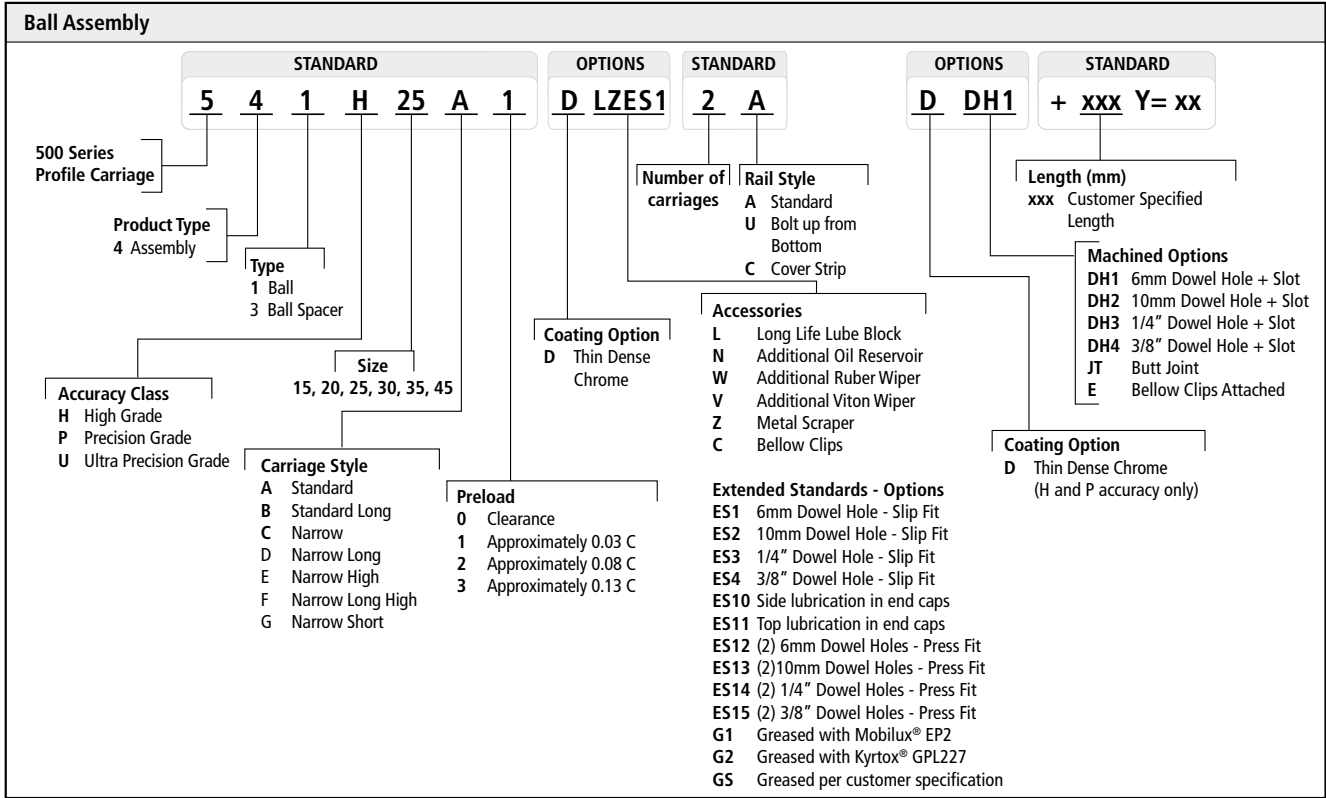
Specification Sheet for the Butting of Rails

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.

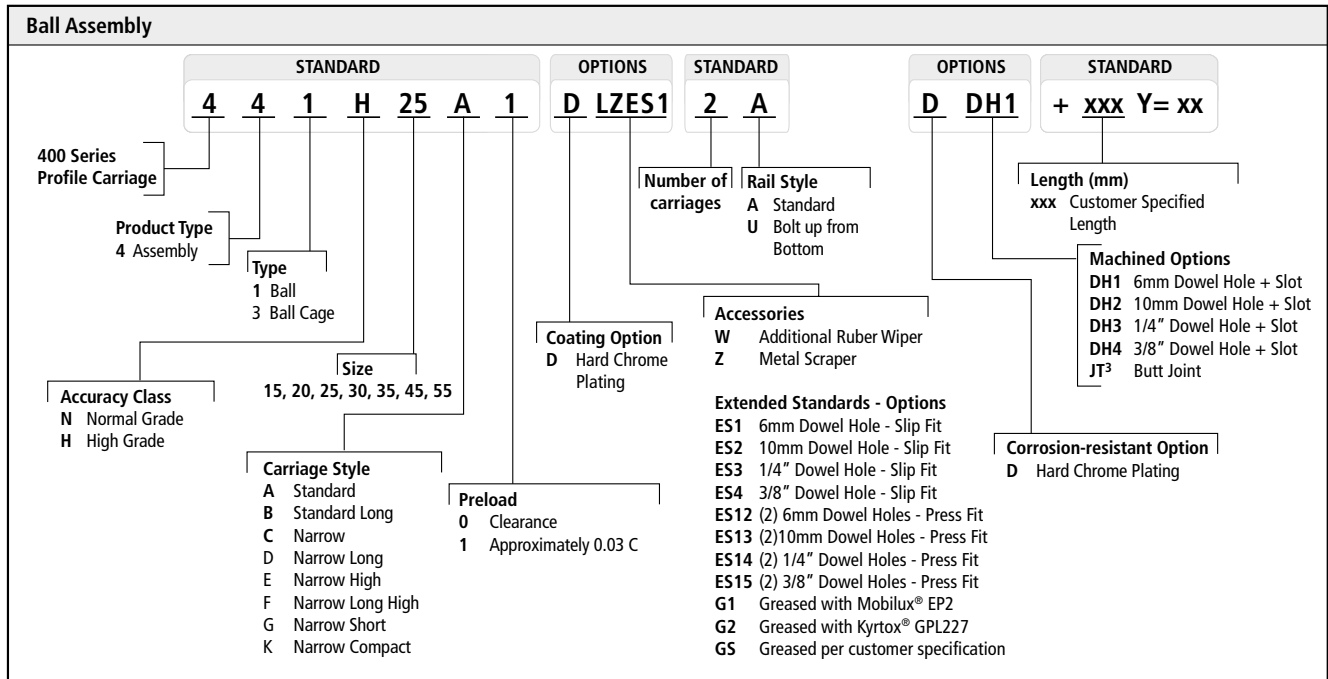
| Linear Guide Product | Size | "X" dim | Standard "Z" dim | Minimum "Y" dim | Maximum "Y" dim | Fastener size | Maximum length without a joint |
|----------------------|------|---------|------------------|-----------------|-----------------|---------------|--------------------------------|
| 500 Series Ball | 15 | 60 | 60 | 8 | 52 | M4 | 1 500 |
| 500 Series Ball | 20 | 60 | 60 | 8 | 52 | M5 | 3 000 |
| 500 Series Ball | 25 | 60 | 60 | 8 | 52 | M5 | 6 000 |
| 500 Series Ball | 30 | 80 | 80 | 10 | 70 | M8 | 6 000 |
| 500 Series Ball | 35 | 80 | 80 | 10 | 70 | M8 | 6 000 |
| 500 Series Ball | 45 | 105 | 105 | 13 | 92 | M12 | 6 000 |
| 500 Series Roller | 25 | 30 | 30 | 8 | 52 | M6 | 6 000 |
| 500 Series Roller | 35 | 40 | 40 | 10 | 30 | M8 | 6 000 |
| 500 Series Roller | 45 | 52.5 | 52.5 | 13 | 39.5 | M12 | 6 000 |
| 500 Series Roller | 55 | 60 | 60 | 15 | 45 | M14 | 6 000 |
| 500 Series Roller | 65 | 75 | 75 | 17 | 58 | M16 | 6 000 |

All dimensions in mm.

500 Series Part Numbering Description



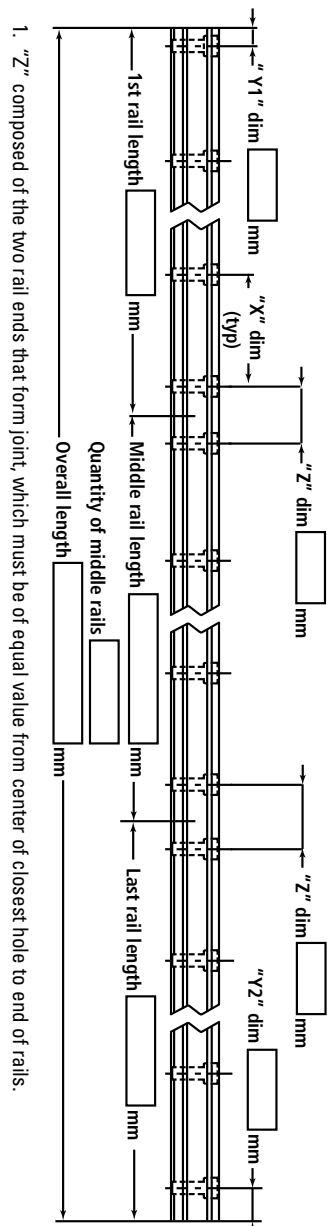
400 Series Part Numbering Description



Request for Quotation Form

| | | | | | |
|--|--|---|--|--|--|
| <p>Specification sheet for the butting of 2 rails</p> | | | | | |
| | | | | | |
| <p>1. "Z" composed of the two rail ends that form joint, which must be of equal value from center of closest hole to end of rails.</p> | | | | | |
| <p>Customer: _____</p> <p>Quotation Number: _____</p> | | <p>DO NOT SCALE DRAWING</p> | | | |
| <p>APPROVAL DATE</p> <p>DRAWN BY DATE</p> | | <p>THOMSON</p> <p>TITLE</p> <p>Dwg Number: _____</p> | | | |

Request for Quotation Form

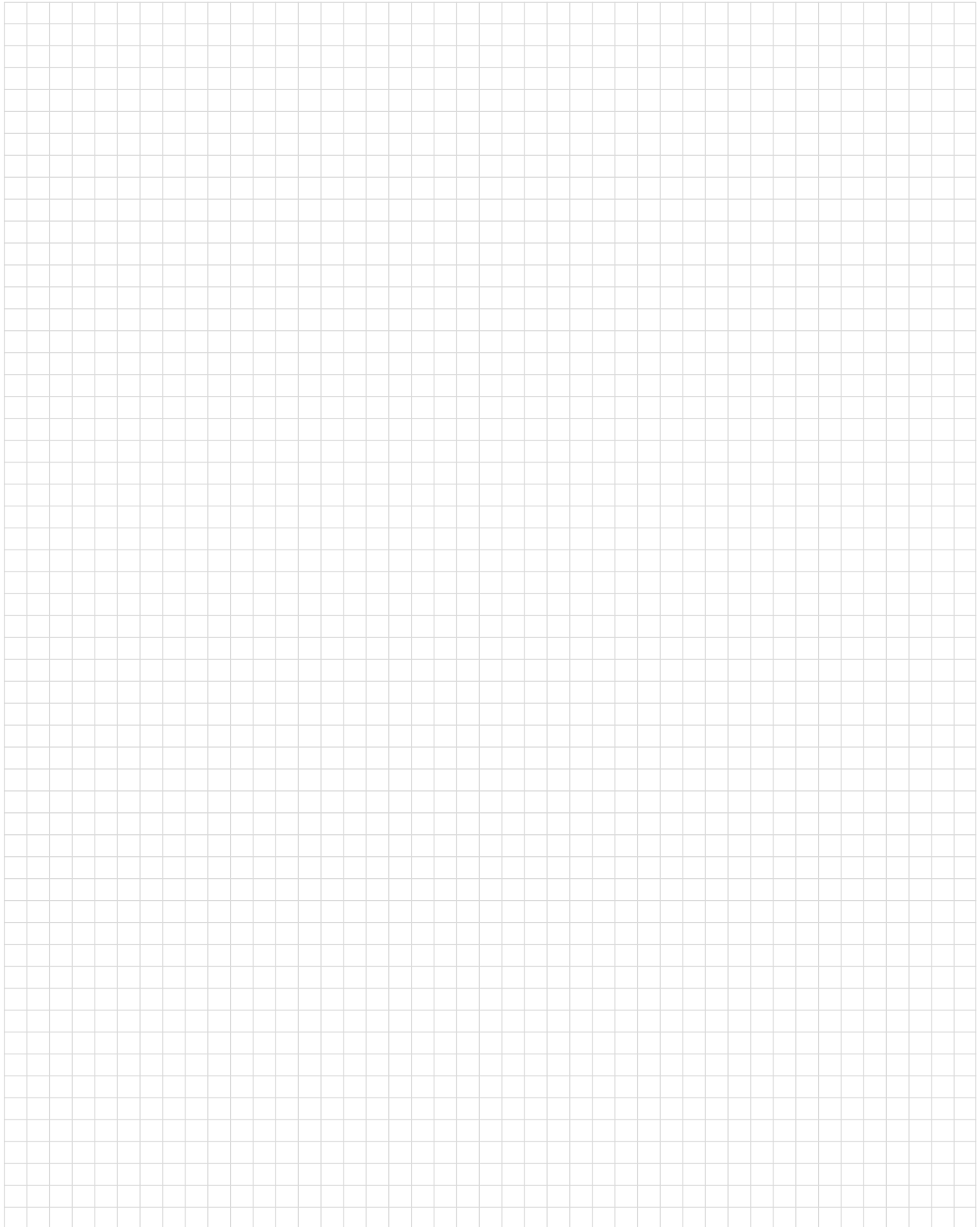
| | | | | | | | | | | | |
|--|------|-----------------------------|---|---|---|----------|------|----------|------|-------------------|--|
| A | B | C | D | E | F | | | | | | |
| <p>Specification sheet for the butting of 3 or more rails</p>  <p>1. "Z" composed of the two rail ends that form joint, which must be of equal value from center of closest hole to end of rails.</p> | | | | | | | | | | | |
| 2 | | | | | | | | | | | |
| 3 | | | | | | | | | | | |
| 4 | | | | | | | | | | | |
| <p>Customer: _____</p> <p>Quotation Number: _____</p> | | <p>DO NOT SCALE DRAWING</p> | | <table border="1" style="width: 100%; border-collapse: collapse;"> <tr> <td style="width: 50%; text-align: center;">APPROVAL</td> <td style="width: 50%; text-align: center;">DATE</td> </tr> <tr> <td style="width: 50%; text-align: center;">DRAWN BY</td> <td style="width: 50%; text-align: center;">DATE</td> </tr> <tr> <td colspan="2" style="text-align: center;">Dwg Number: _____</td> </tr> </table> | | APPROVAL | DATE | DRAWN BY | DATE | Dwg Number: _____ | |
| APPROVAL | DATE | | | | | | | | | | |
| DRAWN BY | DATE | | | | | | | | | | |
| Dwg Number: _____ | | | | | | | | | | | |
| A | B | C | D | E | F | | | | | | |
| 4 | | | | | | | | | | | |
| 3 | | | | | | | | | | | |
| 2 | | | | | | | | | | | |
| 1 | | | | | | | | | | | |



Unit Conversion Table

| Quantity | Conventional | | SI Unit | Conversion Factors |
|---------------------------|--|---|---|---|
| | Inch Unit | Metric Unit (MKS) | | |
| Length | Inch in | Meter m | Metre m | 1 in = 25.4 mm 1 mm = 0.03937 in 1 m = 3.2808 ft 1 ft = 0.3048 m |
| Area | Square Inch in² | Square Meter m² | Square Metre m² | 1 in ² = 6.4516 cm ² 1 cm ² = 0.155 in ² 1 m ² = 10.764 ft ² 1 ft ² = 0.092903 m ² |
| Mass | Pound lb_m | Kilogram kg | Kilogram kg | 1 lb _m = 0.45359237 kg 1 kg = 2.2046 lb |
| Force | Pound Force lb_f | Kilogram Force kg_f | Newton N | 1 lb _f = 0.45359237 kg _f 1 lb _f = 4.44822 N 1 kg _f = 2.2046 lb _f 1 kg _f = 9.80665 N 1 N = 0.1019716 kg _f 1 N = 0.224809 lb _f |
| Stress or Pressure | Pounds per Square Inch lb_f/in² | Kilograms per Square Meter kg_f/m² | Pascal Pa | 1 MPa = 10 ⁶ N/m ² = N/mm ² 1 kPa = 10 ³ N/m ² 1 lb _f /in ² = 0.070307 kg _f /cm ² 1 lb _f /in ² = 7.0307 x 10 ⁻⁴ kg _f /mm ² 1 lb _f /in ² = 6.8947 x 10 ⁻³ N/mm ² (MPa) 1 kg _f /cm ² = 14.2233 lb _f /in ² 1 kg _f /cm ² = 9.80665 x 10 ⁻² N/mm ² (MPa) |
| Torque or Work | Inch Pounds lb_f-in | Kilogram Meters kg_f-m | Newton-Metres Nm | 1 lb _f -in = 1.1521 kg _f -cm 1 kg _f -cm = 0.8679 lb _f -in 1 lb _f -in = 0.1129848 Nm 1 kg _f -m = 9.80665 Nm 1 kg _f -cm = 9.80665 x 10 ⁻² Nm 1 Nm = 8.85 lb _f -in 1 Nm = 10.19716 kg _f -cm |
| Power | Foot Pound per Minute lb_f-ft/min | Force per Second kg_f-m/s | Newton Metre per Second Nm/s | 1 kW = 1000 Nm/s 1 kW = 60,000 Nm/s 1 kW = 44,220 lb _f -ft/min 1 kW = 1.341 hp 1 hp = 75 kg _f -m/s 1 hp = 44,741 Nm/min 1 hp = 33,000 lb _f -ft/min 1 hp = 0.7457 kW |
| Velocity | Feet per Second ft/s | Meters per Second m/s | Metres per Second m/s | 1 ft/sec = 0.3048 m/s 1 in/sec = 2.54 cm/s 1 ft/sec = 0.00508 m/s 1 mile/hr = 0.44704 m/s 1 km/hr = 0.27777 m/s 1 mile/hr = 1.609344 km/hr |
| Acceleration | Feet per Second Squared ft/s² | Meters per Second Squared m/s² | Metres per Second Squared m/s² | 1 ft/s ² = 0.3048 m/s ² |

NOTES:



Interchange Guide

| THK HSR LM GUIDE TO THOMSON 500 SERIES BALL PROFILE RAIL INTERCHANGE SHEET | |
|---|---|
| THK HSR | THOMSON 500 SERIES BALL |
| Assembly Part Number $\frac{\text{HSR}}{1} \frac{20}{2} \frac{A}{3} \frac{2}{4} \frac{SS}{9} \frac{C1}{5} + \frac{1000}{7} \frac{P}{6}$ | Carriage Part Number $\frac{(2)}{4} \text{ pcs} \quad \frac{511}{1} \frac{P}{6} \frac{20}{2} \frac{A}{3} \frac{1}{5} \frac{Z}{9}$ and Rail Part Number $\frac{(1)}{4} \text{ pc} \quad \frac{521}{1} \frac{P}{6} \frac{20}{2} \frac{A}{8} \frac{1000}{7}$ |
| Carriage Part Number $\frac{\text{HSR}}{1} \frac{20}{2} \frac{A}{3} \frac{UU}{9}$ | Carriage Part Number $\frac{511}{1} \frac{P}{6} \frac{20}{2} \frac{A}{3} \frac{1}{4}$ |
| Rail Part Number $\frac{\text{HSR}}{1} \frac{20}{2} + \frac{1000L}{7}$ | Rail Part Number $\frac{521}{1} \frac{P}{6} \frac{20}{2} \frac{A}{8} \frac{1000}{7}$ |

| 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 |
| OZ | N |
| N/A | L |

Interchange Guide

| STAR BALL RAIL SYSTEMS TO THOMSON 500 SERIES BALL INTERCHANGE SHEET | |
|---|--|
| STAR | THOMSON |
| <p>Carriage Part Number</p> $\frac{16}{1} \frac{51}{2} - \frac{8}{3} \frac{1}{4} \frac{2}{5} - \frac{10}{7}$ <p>Rail Part Number</p> $\frac{16}{1} \frac{05}{2} - \frac{8}{3} \frac{0}{5} \frac{2}{5} - 31, \frac{1000}{6}$ | <p>Carriage Part Number</p> $\frac{511}{1} \frac{P}{5} \frac{20}{3} \frac{A}{2} \frac{1}{4}$ <p>Rail Part Number</p> $\frac{521}{1} \frac{P}{5} \frac{20}{3} \frac{A}{2} + \frac{1000}{6}$ |

| 1. TYPE | | |
|-------------|------------------------------|----------------------------|
| STAR | THOMSON | |
| 16 | Carriage - 511 Rail - 521 | |
| 2. STYLE | | |
| STAR | THOMSON | |
| CARRIAGE | 03 | B |
| | 04 | A |
| | 21 | E |
| | 22 | C |
| | 23 | D |
| | 24 | F |
| | 51 | A |
| | 53 | B |
| 66 | G | |
| RAIL | 1605-X0X-XX | A + 531HP |
| | 1605-X3X-XX | C + 531RCS (size 25 & up) |
| | 1605-X6X-XX | C + 531RCS (size 25 & up) |
| | 1607-XXX-XX | U |
| | 1645-X03-XX | AD + 531HP |
| | 1645-X33-XX | CD + 531RCS (size 25 & up) |
| 1647-X03-XX | UD | |

| 3. SIZE | |
|----------------|---------|
| STAR | THOMSON |
| 1 | 15 |
| 2 | 25 |
| 3 | 35 |
| 4 | 45 |
| 5 | N/A |
| 6 | N/A |
| 7 | 30 |
| 8 | 20 |
| 4. PRELOAD | |
| STAR | THOMSON |
| 1 | 1 |
| 2 | 2 |
| 3 | 3 |
| 9 | 0 |
| 5. ACCURACY | |
| STAR | THOMSON |
| 1 | U |
| 2 | P |
| 3 | H |
| 4 | H |
| 9 | 0 |
| 6. RAIL LENGTH | |
| STAR | THOMSON |
| XXXX | +XXXXX |
| 7. REVISION | |
| STAR | THOMSON |
| 10 | blank |
| 20 | blank |

| STAR ROLLER RAIL SYSTEM TO THOMSON 500 SERIES ROLLER PROFILE RAIL INTERCHANGE SHEET | |
|---|--|
| STAR | THOMSON |
| <p>Carriage Part Number</p> $\frac{18}{1} \frac{51}{2} - \frac{2}{3} \frac{1}{4} \frac{2}{5} - \frac{10}{7}$ <p>Rail Part Number</p> $\frac{18}{1} \frac{05}{2} - \frac{2}{3} \frac{0}{8} \frac{2}{5} - \frac{31}{9}, \frac{1000}{6}$ | <p>Carriage Part Number</p> $\frac{512}{1} \frac{P}{5} \frac{20}{3} \frac{A}{2} \frac{1}{4}$ <p>Rail Part Number</p> $\frac{522}{1} \frac{P}{5} \frac{25}{3} \frac{A}{2} + \frac{1000}{6}$ |

| 1. TYPE | | |
|---|------------------------------|---|
| STAR | THOMSON | |
| 18 | Carriage - 512 Rail - 522 | |
| 2. STYLE | | |
| STAR | THOMSON | |
| CARRIAGE | 51 | A |
| | 53 | B |
| | 21 | C |
| | 24 | D |
| Rail - see RAIL STYLE - 1, 2, 8 and 9 Section | | |
| 3. SIZE | | |
| STAR | THOMSON | |
| 2 | 25 | |
| 3 | 35 | |
| 4 | 45 | |
| 5 | 55 | |
| 6 | 65 | |
| 4. PRELOAD | | |
| STAR | THOMSON | |
| 1* | 1 | |
| 2 | 2 | |
| 3 | 3 | |
| 5. ACCURACY | | |
| STAR | THOMSON | |
| 3 | N/A | |
| 2 | P | |
| 1 | S | |
| 9 | U | |

| 6. LENGTH | |
|------------------------|--|
| STAR | THOMSON |
| XXXX | +XXXX |
| 7. VERSION | |
| STAR | THOMSON |
| 10 | blank |
| 13 (ALUMINIUM END CAP) | N/A |
| 18 | ES4 |
| 60 | D-Thin Dense Chrome |
| RAIL STYLE 1,2,8 AND 9 | |
| STAR | THOMSON |
| 1805-x2x-31 | C |
| 1805-x3x-31 | C + 532RCS (size 25) |
| 1805-x3x-61 | C + 532RCS (size 35 & up) |
| 1805-x5x-31 | A |
| 1805-x6x-31 | C + 532RCS (size 25) |
| 1805-x6x-61 | C + 532RCS (size 35 & up) |
| 1806-x5x-31 | A |
| 1807-x0x-11 | U |
| 1845-x1x-31 | A + Thin Dense Chrome |
| 1845-x5x-31 | C + Thin Dense Chrome + 532RCS (size 25) |
| 1845-x5x-61 | C + Thin Dense Chrome + 532RCS (size 35 & up) |
| 1845-x8x-31 | C + Thin Dense Chrome + 532RCS |
| 1847-x1x-31 | U + Thin Dense Chrome |
| 18xx-xxx-41 | Coated End for Thin Dense Chrome options in place of -31 |
| 18xx-xxx-71 | Coated End for Thin Dense Chrome options in place of -61 |

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 designs
- 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 521 P 20 A 1000 1 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 ¹ | |
| AccuGlide | THOMSON 500 SERIES BALL |
| A | D |
| C2C2 (plastic) | C (steel) |
| C3C3 | C |
| D### | See pg. 132 or Consult Thomson |
| KK | W |
| LDS | Standard Longitudinal Seal is low drag |
| LL | L |
| M### | See pg. 132 or Consult Thomson |
| R2R2 | E |
| ZZ | Z |
| N/A | V (Viton Wiper) |
| N/A | N (Oil Reservoir) |

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 designs
- 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 $\frac{CM}{1} \frac{35}{2} \frac{AA}{3} \frac{B}{4} \frac{S}{5} \frac{8}{8}$ | Carriage Part Number $\frac{512}{1} \frac{S}{5} \frac{35}{2} \frac{A}{3} \frac{1}{4} \frac{8}{8}$ |
| Rail Part Number $\frac{RM}{1} \frac{35}{2} \frac{S}{5} \frac{L1000}{6} \frac{8}{8}$ | Rail Part Number $\frac{522}{1} \frac{S}{5} \frac{35}{2} \frac{A}{7} \frac{8}{8} \frac{1000}{6}$ |

| 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 ¹ | |
| AccuMax | THOMSON 500 SERIES ROLLER |
| A C2C2 (plastic) C3C3 D### KK LDS LL M### R2R2 ZZ N/A | D C (steel) C See pg. 132 or Consult Thomson W Standard Longitudinal Seal is low drag L See pg. 132 or Consult Thomson E Z V (Viton Wiper) |

| THK SHS LM GUIDE TO THOMSON 400 SERIES BALL CAGE PROFILE RAIL INTERCHANGE SHEET | |
|--|---|
| THK SHS | THOMSON 400 SERIES |
| <p>Assembly Part Number</p> $\frac{\text{SHS}}{1} \frac{25}{2} \frac{\text{LC}}{3} \frac{2}{4} \frac{\text{DD}}{9} \frac{\text{C1}}{5} + \frac{1200\text{L}}{7} \frac{\text{H}}{6}$ | <p>Carriage Part Number</p> $\frac{(2)}{4} \text{ pcs} \quad \frac{413^*}{1} \frac{\text{H}}{6} \frac{25}{2} \frac{\text{B}}{3} \frac{1}{5} \frac{\text{W}}{9}$ <p>and</p> <p>Rail Part Number</p> $\frac{(1)}{4} \text{ pc} \quad \frac{421}{1} \frac{\text{H}}{6} \frac{25}{2} \frac{\text{A}}{8} \frac{1200}{7}$ |
| <p>Carriage Part Number</p> $\frac{\text{SHS}}{1} \frac{25}{2} \frac{\text{LC}}{3} \frac{2}{4} \frac{\text{SS}}{9} \frac{\text{C1}}{5} \frac{\text{H}}{6} \text{ (GK) BLOCK}$ | <p>Carriage Part Number</p> $\frac{413^*}{1} \frac{\text{H}}{6} \frac{25}{2} \frac{\text{B}}{3} \frac{1}{5}$ |
| <p>Rail Part Number</p> $\frac{\text{SHS}}{1} \frac{25}{2} \frac{-1200\text{L}}{7} \frac{\text{H}}{6} \text{ (GK) RAIL}$ | <p>Rail Part Number</p> $\frac{421}{1} \frac{\text{H}}{6} \frac{25}{2} \frac{\text{A} + 1000}{8} \frac{1}{7}$ |

| 1. TYPE | |
|-----------------------|--------------------|
| THK | THOMSON 400 SERIES |
| Carriage - SHS | Carriage - 413* |
| Rail - SHS | Rail - 421 |
| 2. SIZE | |
| THK | THOMSON 400 SERIES |
| 15 | 15 |
| 20 | 20 |
| 25 | 25 |
| 30 | 30 |
| 35 | 35 |
| 45 | 45 |
| 55 | 55 |
| 65 | N/A |
| 3. CARRIAGE STYLE | |
| THK | THOMSON 400 SERIES |
| C | A |
| LC | B |
| V | C |
| LV | D |
| R | E |
| LR | F |
| 4. CARRIAGES PER RAIL | |

* Thomson 400 Series carriages are available in both Ball (411) and Ball cage (413) design whereas, THK SHS carriages are only available in cage design. Thomson 400 Series Ball carriages can be substituted for THK SHS carriages if the application does not require low noise at high speeds. Ball carriages are more economical and dimensionally interchangeable to THK SHS carriages. When selecting the carriage type, 413 can be replaced by 411 to change from ball cage to ball type.

| 5. PRELOAD | |
|---------------|--------------------|
| THK | THOMSON 400 SERIES |
| blank | 0 |
| C1 | 1 |
| C0 | N/A |
| 6. ACCURACY | |
| THK | THOMSON 400 SERIES |
| blank | N |
| H | H |
| 7. LENGTH | |
| THK | THOMSON 400 SERIES |
| xxxxL | xxxx |
| 8. RAIL STYLE | |
| THK | THOMSON 400 SERIES |
| blank | A |
| K | U |
| 9. SEALS | |
| THK | THOMSON 400 SERIES |
| UU | blank (standard) |
| SS | blank (standard) |
| DD | W |
| ZZ | Z |
| KK | WZ |

Common AccuGlide Options

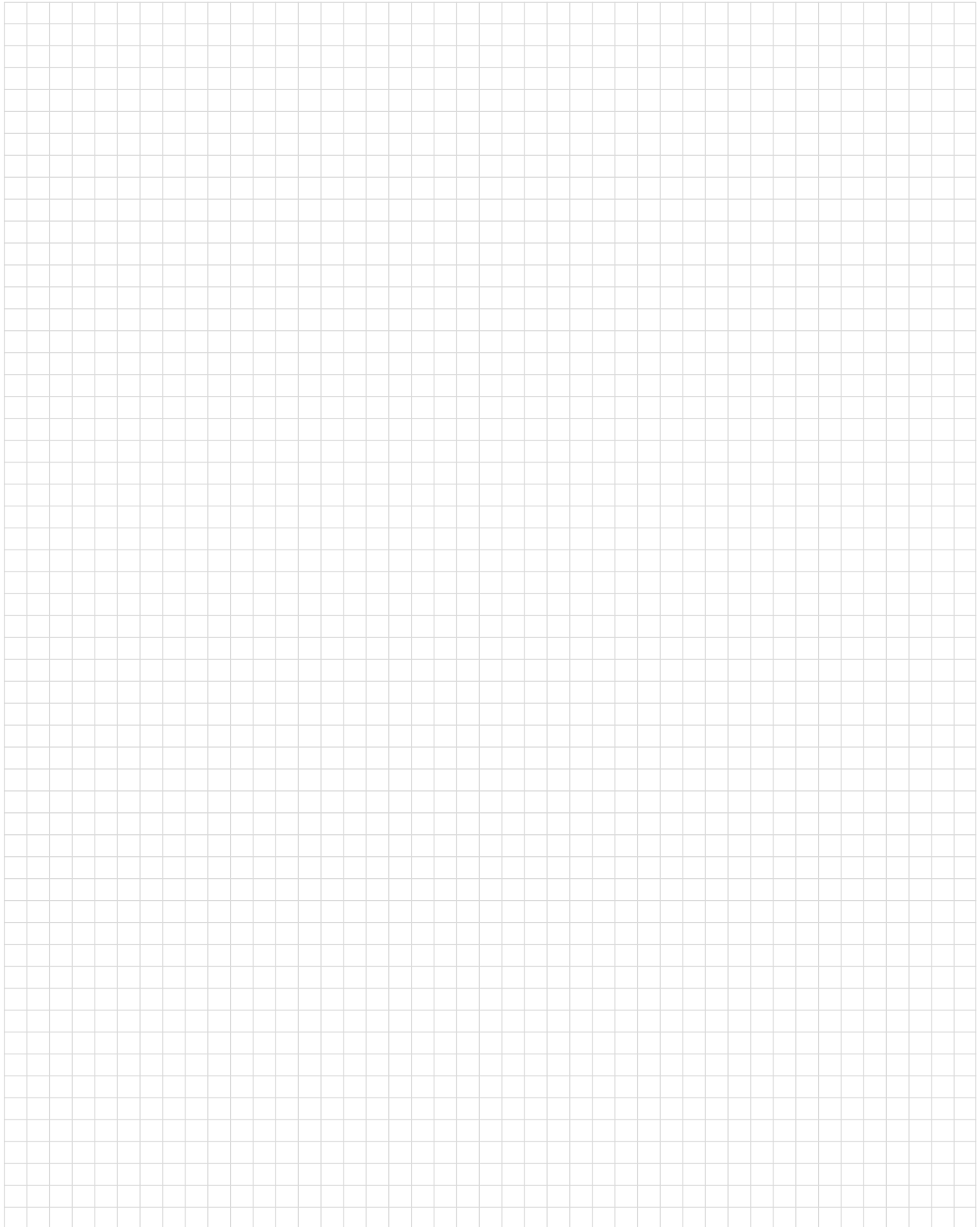
| Carriage Options | 500 Series Option |
|------------------|---|
| C2C2 | C |
| C3C3 | C |
| D035 | ES1 |
| D047 | ES10* |
| D065 | ES2 |
| D086 | ES1ES10* |
| D087 | ES8 or ES1ES10* |
| D088 | ES2ES10* |
| D089 | ES9 or ES2ES10* |
| D134 | ZCES1 |
| D135 | CES1 |
| D147 | CES10* |
| D150 | ZC |
| D164 | ZCES2 |
| D165 | CES2 |
| D186 | CES1ES10* |
| D187 | CES7 or CES10* |
| D188 | CES10* |
| D189 | CES9 or CES2ES10* |
| D192 | LCES9 or LCES2ES10* |
| D234 | LES1 |
| D235 | LZES1 |
| D236 | LZCES1 |
| D237 | LCES1 |
| D241 | LC |
| D251 | LZC |
| D262 | LES2 |
| D263 | LCES2 |
| D264 | ZES2 |
| D265 | LZES2 |
| D266 | LZCES2 |
| D267 | LCES2 |
| D274 | LES12 |
| D275 | LZES12 |
| D289 | LES9 or LES2ES10* |
| D292 | LZES9 or LZES2ES10* |
| LDS | now standard |
| LL | L |
| LLZZ | LZ |
| M035 | ES3 |
| M038 | CES3 |
| M041 | 1/4-28 in side options: ES7 or ES10 option* |
| M043 | C + 1/4-28 in side options: CES7 or CES10 option* |
| M047 | ES7 or ES10* |
| M049 | CES7 or CES10* |
| M063 | CES4 |
| M065 | ES4 |
| M075 | ES14 |
| M077 | ES14 + ES7 |
| M087 | ES5 |
| M088 | ES4ES10 |
| M089 | ES6 |
| M094 | ES7 + ES15 |
| M095 | ES15 |

| Carriage Options | 500 Series Option |
|------------------|-------------------|
| M097 | ZES15 |
| M099 | CES15 |
| M125 | ES11 |
| M134 | ES6 |
| M147 | CES7 |
| M153 | W |
| M157 | WZ |
| M168 | Duralloy |
| M171 | Z |
| M183 | ZES5 |
| M186 | ES5 |
| M187 | CES5 |
| M188 | CES10* |
| M189 | CES6 |
| M192 | ZES6 |
| M209 | LES6 |
| M210 | WES7 |
| M234 | LES3 |
| M235 | LZES3 |
| M236 | LZCES3 |
| M241 | LC |
| M242 | Duralloy + L |
| M249 | LCES7 or LCES10* |
| M251 | LZC |
| M263 | LES4 |
| M264 | ZES4 |
| M265 | LZES4 |
| M266 | LZCES4 |
| M267 | LCES4 |
| M275 | LZES14G1 |
| M287 | LES5 |
| M289 | LES6 |
| M290 | LCES6 |
| M292 | LZES6 |
| M293 | WES5 |
| M294 | GS |
| ZZ | Z |

* ES10 option is side lube in end cap, size 15=M3, size 20 and up=M6.

| Rail Options | 500 Series Designation |
|--------------|------------------------|
| D080 | DH1 |
| D085 | DH2 |
| D181 | EDH1 |
| D185 | EDH2 |
| D187 | EDH2 |
| M080 | DH3 |
| M082 | EDH3 |
| M083 | EDH3 |
| M085 | DH4 |
| M088 | EDH4 |
| M091 | EDH4 |
| R2R2 | E |
| R3R3 | E |

NOTES:



NOTES:

A large grid area for taking notes, consisting of a 30x30 grid of small squares. The grid is empty and occupies the central portion of the page.

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