ADVANCED LINEAR MOTION METRIC COMPONENTS
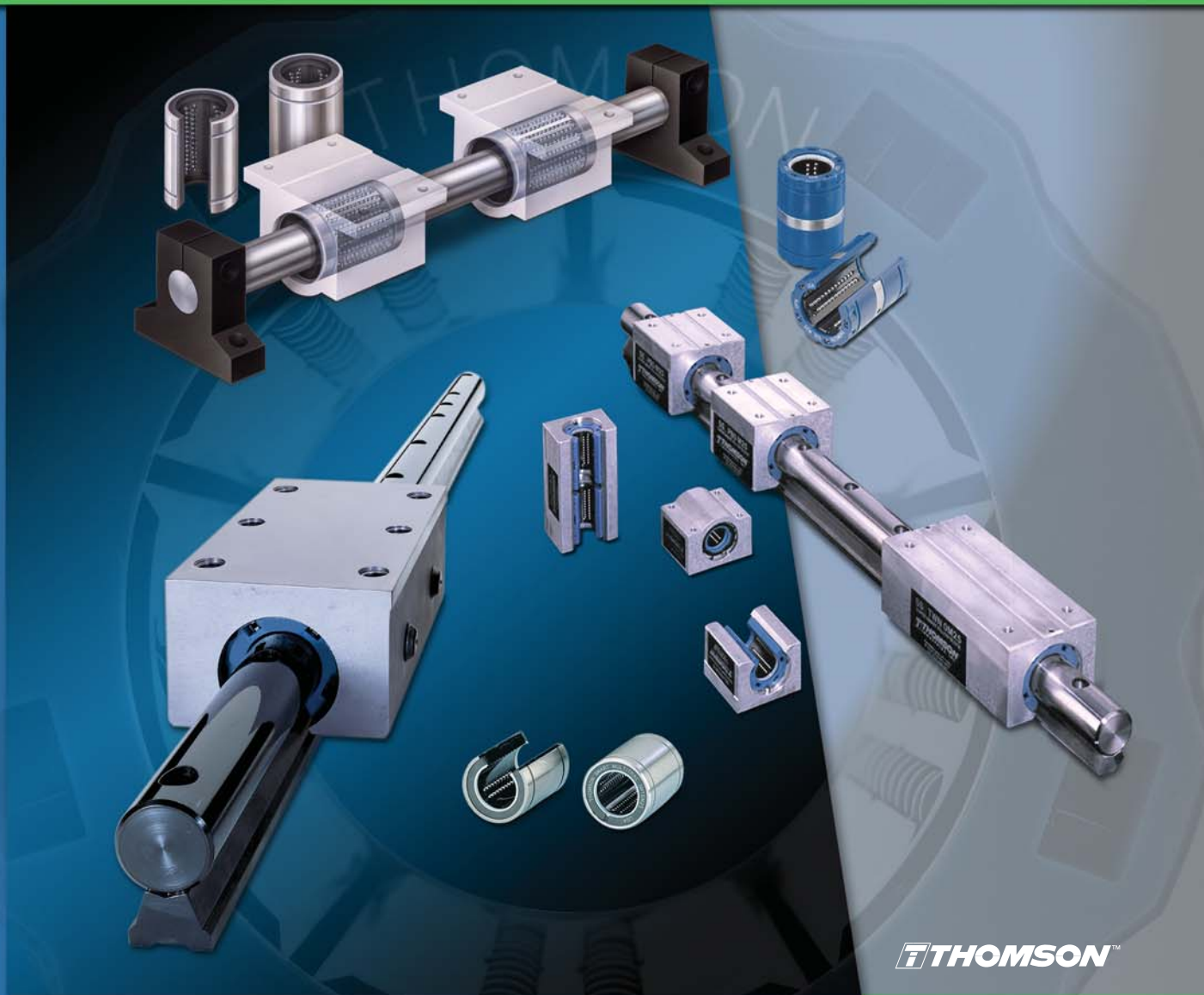
August 2004

www.DanaherMotion.com

THOMSON

Mechanical and Electro-Mechanical Product Solutions by Danaher Motion

New Name, Established Brands

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

In addition, Danaher Motion, through Motion Engineering (MEI), offers powerful integrated motion control solutions with its industry-leading, multi-axis motion platforms and SynqNet™ communications network for ultra-reliable machine performance. From software and controller, through the communications network to drives and I/O devices, to mechanical and electro-mechanical products, Danaher Motion differentiates itself in the marketplace by designing standard and custom solutions to satisfy the most demanding application requirements.

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

Danaher Motion Values

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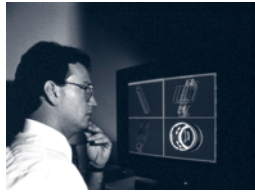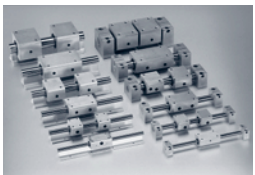- Operational Excellence

Website: www.DanaherMotion.com

Super Smart Ball Bushing Bearings

Super Smart Ball Bushing Pillow Blocks

MultiTrac Ball Bushing Bearings

60 Case LinearRace Shaft and Supports

The inherent ability of a RoundRail™ Ball Bushing™ bearing system to absorb torsional misalignment caused by inaccuracies in carriage or base machining or machine deflection...with little increase in stress to bearing components.
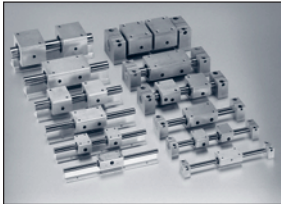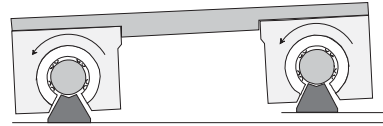
Super Smart Ball Bushing™ Bearings

Thomson Super Smart Ball™ Bushing Bearings represent a major advancement for linear technology, worldwide.

This patented self-aligning linear bearing provides two times the load carrying capacity of the industry standard Thomson Super Ball™ Bushing bearing. Super Smart Ball Bushing bearings also provide eight times the bearing life and up to five times the LinearRace™ shaft life when used in place of standard Super type bearings (See page 13)

Super Smart Ball Bushing Pillow Blocks

Thomson Super Smart Ball Bushing Pillow Blocks available in closed, adjustable and open styles in both single and twin versions.

To minimize installation time and cost, the Super Smart Ball bushing bearing can be ordered factory-installed in an industry standard single or twin pillow block. The closed type pillow block is used in end supported applications for spanning or bridging a gap. The open style is used in continuously supported applications when maximum rigidity and stiffness is required. Each Super Smart Pillow Block is complete with integral double acting seals which keep out contaminants, retain lubrication and maximize bearing life. Since each pillow block is dimensionally interchangeable with industry standard pillow blocks, system performance improvements can be realized immediately. All pillow blocks are available and in stock from 1800 authorized distributors worldwide. (See page 21)

MultiTrac Ball Bushing™ Bearings

Rigid, high load capacity, linear bearings

Extremely rigid MultiTrac Ball Bushing™ bearing gives you less deflection and twice the load capacity or eight times the travel life of conventional Ball Bushing™ bearings. This increased bearing performance significantly reduces downtime and maintenance, while increasing machine reliability. The improvement in bearing capacity permits designers to optimize system compactness and minimizes hardware costs. The bearing's patented ball control technology eliminates binding and chatter (stick-slip) common to high friction, plain bushings. Available and stocked in 7 standard sizes from over 1800 distributor locations worldwide. (See page 29)

60 Case™ LinearRace™ Shafts

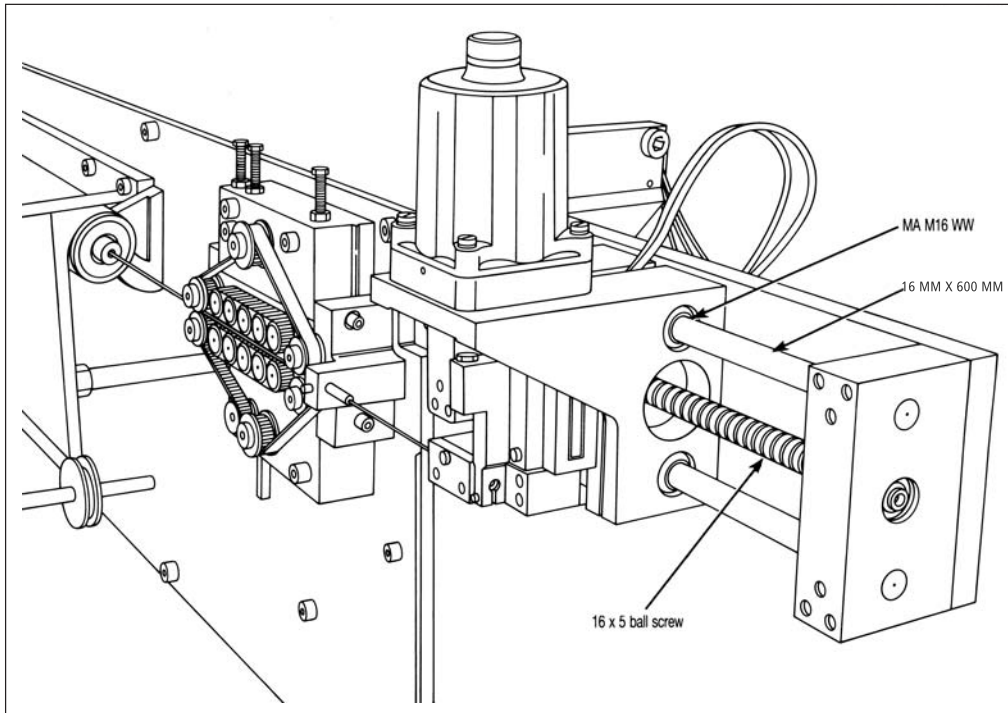**The recommended linear race for all RoundRail™ applications.**

Thompson 60 Case LinearRace is the preferred inner race for all linear bearing applications. Each hardened, precision-ground shaft is manufactured to world-class quality standards. The surface finish is enhanced by the Thomson Microbrite™ finishing process, which optimizes Ball Bushing™ bearing performance. 60 Case™ shafting is also a cost-effective answer to non-linear bearing applications. From piston rods to tie rods and spindles, 60 Case shafting provides improved performance and function. the hardened case provides three times the tensile strength of an unhardened shaft. 60 Case shafts are also available in corrosion-resistant 550C stainless steel material, and in chrome-plated steel. You can put our 45 years of experience in the custom machining of special shafts to work for you. Contact Danaher Motion today for your next Round Rail shafting requirement. Thomson 60 Case Products are available for immediate shipment from stock in diameters between 5 and 80mm (See page 41)

Size Availability

Size Type (mm)	5	8	10	12	16	20	25	30	35	40	50	60	80
Super Smart Ball Bushing™ Bearings													
Closed		•		•	•	•	•	•		•			
Open				•	•	•	•	•		•			
Super Smart Pillow Blocks													
Single Closed		•		•	•	•	•	•		•			
Single Closed Adjustable		•		•	•	•	•	•		•			
Single Open				•	•	•	•	•		•			
Single Open Adjustable				•	•	•	•	•		•			
Twin Closed		•		•	•	•	•	•		•			
Twin Closed Adjustable		•		•	•	•	•	•		•			
Twin Open				•	•	•	•	•		•			
Twin Open Adjustable				•	•	•	•	•		•			
MultiTrac Ball Bushing™ Bearings													
Closed		•		•	•	•	•	•		•			
Closed Adjustable		•		•	•	•	•	•		•			
Open				•	•	•	•	•		•			
Support Blocks and Shaft Support Rails													
Aluminum Shaft Support block		•		•	•	•	•	•		•			
Shaft Support Rail		•		•	•	•	•	•		•			
Smart Rail				•	•	•	•	•		•			
60 Case™ Shafting	•	•	•	•	•	•	•	•	•	•	•	•	•
Precision Machining	•	•	•	•	•	•	•	•	•	•	•	•	•

Application

Labels in figure: MA M16 WW, 16 MM X 600 MM, 16 x 5 ball screw

Thomson products manufactured by Danaher Motion are engineered to world-class performance standards, so that you can specify them with confidence worldwide. This Engineering Support section provides charts, formulas and technical information for:

• Ball Bushing™ bearing selection

• Load considerations for horizontal, side and vertical mounted applications

• Shaft deflection

• Installation

• Tolerance zones for internal and external diameters

Ball Bushing Bearing Life Expectancy and Load Capacity

Load Capacity
The load ratings given in the tables apply to Thomson Industries Ball Bushing™ bearings in conjunction with 60 Case™ LinearRace™ shafts.

1. The load is applied at 90° relative to the horizontal plane with the load carrying elements oriented as shown in the specific product polar graphs.

2. Shaft hardness is HRC 60 to 65.

For configurations other than those described above, the following formula is used:

$$W_R = \frac{P}{K_q \bullet K_s \bullet K_L}$$

where:
W_R = required dynamic load capacity (N)
P = resultant of externally applied loads (N)
K_q = factor for direction of resultant load
K_s = shaft hardness factor
K_L = travel life factor

Load Direction
In applications where the direction of the applied load is known, refer to the polar graphs on the product specification pages for the load correction factor, K_q.

Shaft Hardness
For shafts which do not meet 60 Case shaft hardness specifications, shaft hardness factor K_s must be applied.

Travel Life
The travel life correction factors, K_L, can be found on Figure 1.
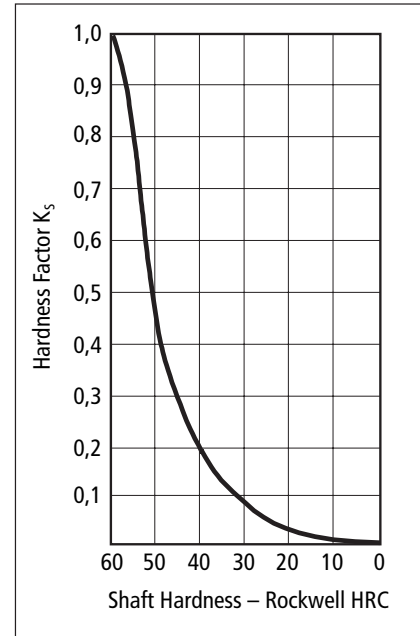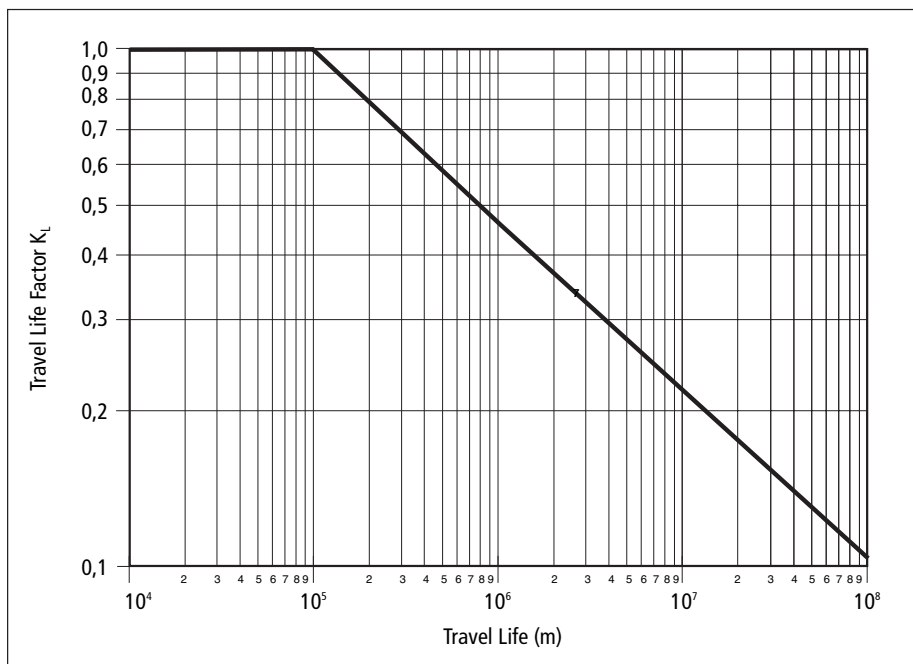
Figure 2

Figure 1

Load Limit

The load limit is the maximum load which can be applied to the bearing. It is important to analyze your application so that peak and shock loading does not exceed the load limit.

Dynamic Load Rating

The dynamic load rating is the maximum continuous load that can be applied to the bearing with a 90% reliability of achieving life of 100 km under conventional operating conditions. However, it is important to remember that very short strokes and the direction of the applied load can be significant factors.

The following formula may be used to determine travel life.

$$L_m = (\frac{W}{P} \bullet K_q \bullet K_s)^3 \bullet 10^5 \, m$$

Where:

L_m = travel life (m)
W = dynamic load rating from tables (N)
P = resultant fo extremely applied loads (N)
K_q = factor for direction of resultant load
K_s = shaft hardness factor

Sample Calculations:

Determine the correct Ball Bushing™ bearing size for your application. In this example, the bearing/shaft system is subjected to a load of 2300 N perpendicular to the direction of travel. The load is distributed equally among four closed type MultiTrac Ball Bushing™ bearings. The carriage reciprocates over a 0,3 m stroke at a frequency of 100 complete cycles per minute. The minimum service life required is 3500 hours. 60 Case™ LinearRace™ shafting is used.

The first step is to determine the average load on each Ball Bushing bearing.

$$P = \frac{2300}{4} = 575 \, N$$

Next, determine the equivalent travel life in meters:

L_m = 2 • s • f • L_h • 60
L_m = 2 • 0,3 • 100 • 3500 • 60
L_m = 1,26 • 10^7 m

Where:

s = stroke in meters
f = frequency in cycles per minute
L_h = required life in hours

From Figure 1 (Travel Life Chart), the travel life factor (K_L) is 0,2. From Figure 2 (Shaft Hardness Chart), the shaft hardness factor (K_s) is 1. For closed type MultiTrac Ball Bushing™ bearings, the minimum value of K_q is 1, the assumed value for this calculation.

The required dynamic load capacity is obtained by using the following formula:

$$W_R = \frac{P}{K_L \bullet K_s \bullet K_q}$$

$$W_R = \frac{575}{2,0 \bullet 1 \bullet 1} = 2875N$$

By referring to the product specification and dimension sections of this catalog, the linear bearing with the next higher load capacity is the MultiTrac MA M40 with a dynamic load capacity of 3820 N.

Determining the travel life

The expected travel life of the MultiTrac MA M40 bearing under the conditions described in the example is:

W = 3820 N is the rated dynamic load capacity
P = 575 N is resultant of external loads
K_q = 1 is the orientation factor
K_s = 1 is the shaft hardness factor

The values are substituted into the following formula:

$$L_m = (\frac{W}{P} \bullet K_0 \bullet K_s)^3 \bullet 10^5 \, m$$

$$L_m = (\frac{3820}{575} \bullet 1 \bullet 1)^3 \bullet 10^5 \, m$$

$$L_m = \frac{293 \bullet 10^7}{2 \bullet 60 \bullet 0,3 \bullet 100}$$

This is converted into hours by the following:

$$L_h = \frac{L_m}{2 \bullet 60 \bullet s \bullet f}$$

$$L_h = \frac{293 \bullet 10^7}{2 \bullet 60 \bullet 0,3 \bullet 100}$$

$$L_h = 8139 \, h$$

Load Consideration

When designing a linear motion system, it is necessary to consider the effect the variables of operation will have on performance.

The following examples demonstrate how the position of the load and the center of gravity can influence the product selection. When evaluating your application, review each of the forces acting on your system and determine the product best for your needs.

Terms

d_0 = distance between centerlines of pillow blocks
d_1 = distance between centerlines of shafts
d_2 = distance from centerline of carriage to load action point
d_3 = distance from centerline of carriage to load action point
d_3 = distance from centerline of carriage to load action point
L = Load (N)
F_{NX} = Force in the X-axis direction (N)
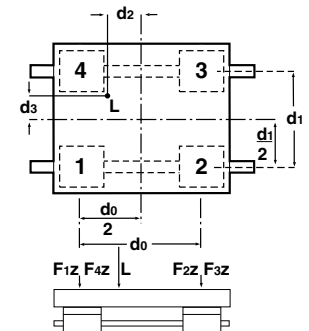F_{NY} = Force in the Y-axis direction (N)
F_{NZ} = Force in the Z-axis direction (N)

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

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

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

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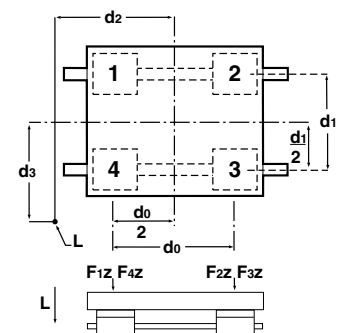

Horizontal Application I
At the time of movement with uniform velocity or at the time of stop.

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

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

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

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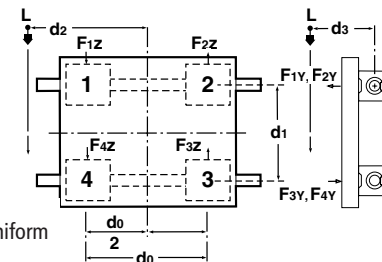

Horizontal Application II
At the time of movement with uniform velocity or at the time of stop.

$$F_{1Y} = F_{4Y} = \left(\frac{L}{2} \cdot \frac{d_3}{d_1}\right)$$

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

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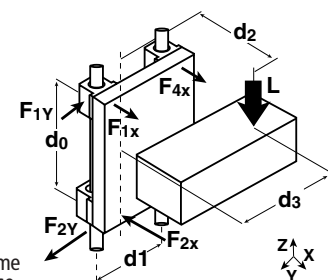

Side Mounted Application
At the time of movement with uniform velocity or at the time of stop.

$$F_{1X} \sim F_{4X} = \left(\frac{L}{2} \cdot \frac{d_2}{d_0}\right)$$

$$F_{1Y} \sim F_{4Y} = \left(\frac{L}{2} \cdot \frac{d_3}{d_0}\right)$$

$$F_{1X} + F_{4X} \sim F_{2X} + F_{3X}$$

$$F_{1Y} + F_{4Y} \sim F_{2Y} + F_{3Y}$$

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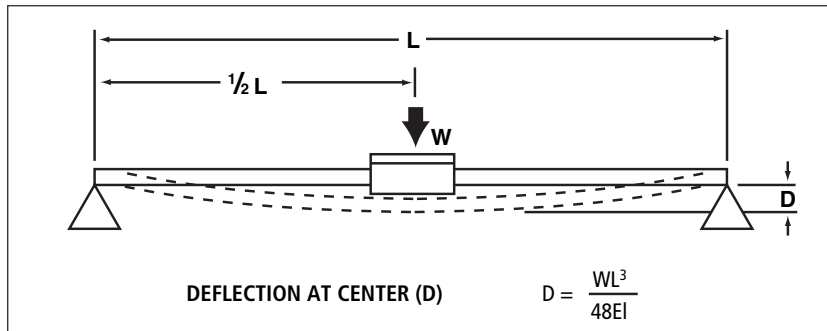
Shaft Deflection

When a Linear Motion System is used in an end supported configuration it is important to ensure that system deflections at the bearing locations are kept within performance limitations.
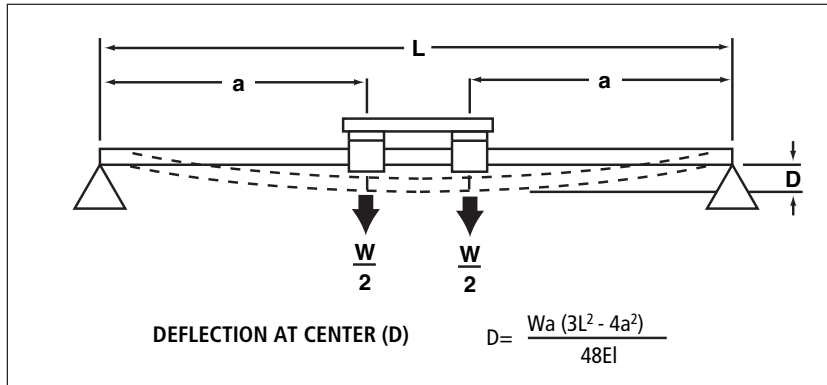
These equations give the deflection at the center of an end supported shaft. Systems with full shaft support are not subject to the same types of deflection.

For more detailed information of the deflection characteristics of Thomson linear motion products contact application engineering.

Values of EI for Thomson 60 Case™ Hardened and Ground Shafts	
Shaft Dia. (mm)	EI (Nm²)
5	5,838
8	38,26
10	93,41
12	193,7
16	612,2
20	1495
25	3649
30	7566
40	$2,391 \cdot 10^4$
50	$5,838 \cdot 10^4$
60	$1,211 \cdot 10^5$
80	$3,826 \cdot 10^5$

Simply Supported Shaft with Single Block

DEFLECTION AT CENTER (D) $D = \dfrac{WL^3}{48EI}$

Simply Supported Shaft with 2 Single Blocks

DEFLECTION AT CENTER (D) $D = \dfrac{Wa\,(3L^2 - 4a^2)}{48EI}$

Installation Guidelines

Thomson Ball Bushing™ bearings are manufactured to exceptionally close tolerances and offer smooth, virtually friction-free motion. The performance features of the bearings will only be realized, however, if care is taken during their installation.

Two areas of primary importance are the bearings alignment and the shaft parallelism. Two bearings are normally used on each shaft to assure smooth operation. The housing should be carefully aligned using the method given below. If a single twin-type housing is used, these procedures are not necessary.

It is also necessary to assure that the height from the housing mounting surface to the shaft is consistent within 0,025 mm. Shimming may be necessary depending on the accuracy of the mounting surfaces to which the housings are bolted.

The housing can be mounted to the plate using the following procedure:

a. Prepare the carriage plate with one side having an abutting surface.

b. Mount two housings with the reference edges located against the abutting surface and tighten the hold down bolts. Figure #1

c. Mount the second pair of housings on the opposite side of the carriage and tighten the bolts finger tight.

d. Insert a location shaft of correct diameter and tolerance (h6) through these two housings and reference the distance from the abutting surface in [b] above, to this locating shaft. Figure #2

e. After appropriate alignment of this pair of housings, tighten bolts to secure housings to carriage.

After the carriage is properly prepared, the shafts must be mounted to the surface. To achieve smooth, accurate motion, the shafts must be mounted parallel within 0,025 mm over the length of the stroke. This can be done by using the following procedure:

a. Mount one shaft (either end-supported or fully supported) to the surface with mounting bolts finger tight.

b. Using an aligning device such as a laser, auto-collimator or other optics, sight the shaft straight and secure to mounting surface.

c. After this first shaft is fixed, the second shaft can be positioned and held down with bolts finger tight.

d. The carriage is then mounted and its movement will pull this second shaft parallel to the first. Figures #3 and #4

e. If the second shaft is then secured into position, the procedure is complete. Note that for fully supported systems, this securing should be done when the carriage is close to the bolts. For end supported systems, the securing should be done when the carriage is at the ends of the shafts. Figure #5

f. An additional check can be done at this time to assure that the carriage is tracking correctly (i.e., that the carriage edge is moving parallel to the shaft). An indicator touching the carriage edge should not vary, as the carriage is moved along the shafts. Figure #6

Figure 1

Figure 2

Figure 3

Figure 4

Figure 5

Figure 6
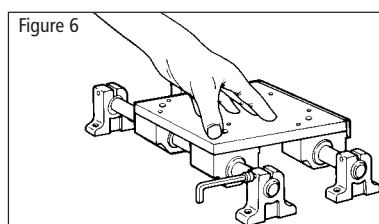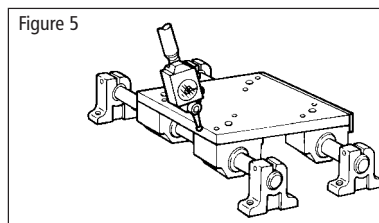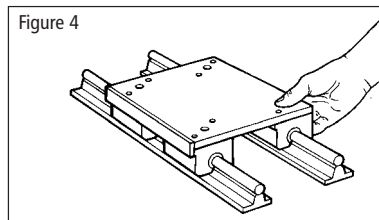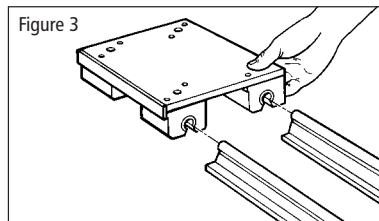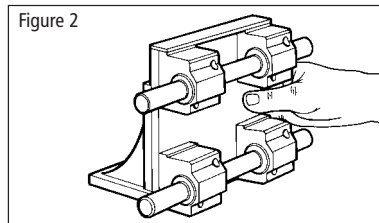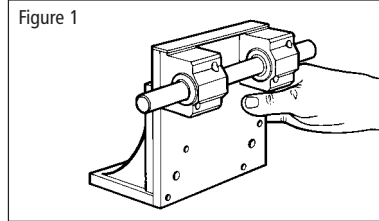
Tolerance Charts

Tolerance zones for internal (hole) dimensions (H15 through H5)   **(Dimensions in mm)**

Basic Size		H15	H14	H13	H12	H11	H10	H9	H8	H7	H6	H5
Over	6	+0,580	+0,360	+0,220	+0,150	+0,090	+0,058	+0,036	+0,022	+0,015	+0,009	+0,006
To	10	0,000	0,000	0,000	0,000	0,000	0,000	0,000	0,000	0,000	0,000	0,000
Over	10	+0,700	+0,430	+0,270	+0,180	+0,110	+0,070	+0,043	+0,027	+0,018	+0,011	+0,008
To	14	0,000	0,000	0,000	0,000	0,000	0,000	0,000	0,000	0,000	0,000	0,000
Over	14	+0,700	+0,430	+0,270	+0,180	+0,110	+0,070	+0,043	+0,027	+0,018	+0,011	+0,008
To	18	0,000	0,000	0,000	0,000	0,000	0,000	0,000	0,000	0,000	0,000	0,000
Over	18	+0,840	+0,520	+0,330	+0,210	+0,130	+0,084	+0,052	+0,033	+0,021	+0,013	+0,009
To	24	0,000	0,000	0,000	0,000	0,000	0,000	0,000	0,000	0,000	0,000	0,000
Over	24	+0,840	+0,520	+0,330	+0,210	+0,130	+0,084	+0,052	+0,033	+0,021	+0,013	+0,009
To	30	0,000	0,000	0,000	0,000	0,000	0,000	0,000	0,000	0,000	0,000	0,000
Over	30	+1,000	+0,620	+0,390	+0,250	+0,160	+0,100	+0,062	+0,039	+0,025	+0,016	+0,011
To	40	0,000	0,000	0,000	0,000	0,000	0,000	0,000	0,000	0,000	0,000	0,000
Over	40	+1,000	+0,620	+0,390	+0,250	+0,160	+0,100	+0,062	+0,039	+0,025	+0,016	+0,011
To	50	0,000	0,000	0,000	0,000	0,000	0,000	0,000	0,000	0,000	0,000	0,000
Over	50	1,200	+0,740	+0,460	+0,300	+0,190	+0,120	+0,074	+0,046	+0,030	+0,019	+0,013
To	65	0,000	0,000	0,000	0,000	0,000	0,000	0,000	0,000	0,000	0,000	0,000
Over	65	+1,200	+0,740	+0,460	+0,300	+0,190	+0,120	+0,074	+0,046	+0,030	+0,019	+0,013
To	80	0,000	0,000	0,000	0,000	0,000	0,000	0,000	0,000	0,000	0,000	0,000
Over	80	+1,400	+0,870	+0,540	+0,350	+0,220	+0,140	+0,087	+0,054	+0,035	+0,022	+0,015
To	100	0,000	0,000	0,000	0,000	0,000	0,000	0,000	0,000	0,000	0,000	0,000
Over	100	+1,400	+0,870	+0,540	+0,350	+0,220	+0,140	+0,087	+0,054	+0,035	+0,022	+0,015
To	120	0,000	0,000	0,000	0,000	0,000	0,000	0,000	0,000	0,000	0,000	0,000
Over	120	+1,600	+1,000	+0,630	+0,400	+,0250	+0,160	+0,100	+0,063	+0,040	+0,025	+0,018
To	140	0,000	0,000	0,000	0,000	0,000	0,000	0,000	0,000	0,000	0,000	0,000
Over	140	+1,600	+1,000	+0,630	+0,400	+,0250	+0,160	+0,100	+0,063	+0,040	+0,025	+0,018
To	160	0,000	0,000	0,000	0,000	0,000	0,000	0,000	0,000	0,000	0,000	0,000
Over	160	+1,600	+1,000	+0,630	+0,400	+0,250	+0,160	+0,100	+0,063	+0,040	+0,025	+0,018
To	180	0,000	0,000	0,000	0,000	0,000	0,000	0,000	0,000	0,000	0,000	0,000
Over	180	+1,850	+1,150	+0,720	+0,460	+0,290	+0,185	+0,115	+0,072	+0,046	+0,029	+0,020
To	200	0,000	0,000	0,000	0,000	0,000	0,000	0,000	0,000	0,000	0,000	0,000

Tolerance zones for external Linear Race™ shaft dimensions (h15 through h5)   **(Dimensions in mm)**

Basic Size		h15	h14	h13	h12	h11	h10	h9	h8	h7	h6	h5
Over	6	0,000	0,000	0,000	0,000	0,000	0,000	0,000	0,000	0,000	0,000	0,000
To	10	-0,580	-0,360	-0,220	-0,150	-0,090	-0,058	-0,036	-0,022	-0,015	-0,009	-0,006
Over	10	0,000	0,000	0,000	0,000	0,000	0,000	0,000	0,000	0,000	0,000	0,000
To	14	-0,700	-0,430	-0,270	-0,180	-0,110	-0,070	-0,043	-0,027	-0,018	-0,011	-0,008
Over	14	0,000	0,000	0,000	0,000	0,000	0,000	0,000	0,000	0,000	0,000	0,000
To	18	-0,700	-0,430	-0,270	-0,180	-0,110	-0,070	-0,043	-0,027	-0,018	-0,011	-0,008
Over	18	0,000	0,000	0,000	0,000	0,000	0,000	0,000	0,000	0,000	0,000	0,000
To	24	-0,840	-0,520	-0,330	-0,210	-0,130	-0,084	-0,052	-0,033	-0,021	-0,013	-0,009
Over	24	0,000	0,000	0,000	0,000	0,000	0,000	0,000	0,000	0,000	0,000	0,000
To	30	-0,840	-0,520	-0,330	-0,210	-0,130	-0,084	-0,052	-0,033	-0,021	-0,013	-0,009
Over	30	0,000	0,000	0,000	0,000	0,000	0,000	0,000	0,000	0,000	0,000	0,000
To	40	-1,000	-0,620	-0,390	-0,250	-0,160	-0,100	-0,062	-0,039	-0,025	-0,016	-0,011
Over	40	0,000	0,000	0,000	0,000	0,000	0,000	0,000	0,000	0,000	0,000	0,000
To	50	-1,000	-0,620	-0,390	-0,250	-0,160	-0,100	-0,062	-0,039	-0,025	-0,016	-0,011
Over	50	0,000	0,000	0,000	0,000	0,000	0,000	0,000	0,000	0,000	0,000	0,000
To	65	1,200	-0,740	-0,460	-0,300	-0,190	-0,120	-0,074	-0,046	-0,030	-0,019	-0,013
Over	65	0,000	0,000	0,000	0,000	0,000	0,000	0,000	0,000	0,000	0,000	0,000
To	80	-1,200	-0,740	-0,460	-0,300	-0,190	-0,120	-0,074	-0,046	-0,030	-0,019	-0,013
Over	80	0,000	0,000	0,000	0,000	0,000	0,000	0,000	0,000	0,000	0,000	0,000
To	100	-1,400	-0,870	-0,540	-0,350	-0,220	-0,140	-0,087	-0,054	-0,035	-0,022	-0,015
Over	100	0,000	0,000	0,000	0,000	0,000	0,000	0,000	0,000	0,000	0,000	0,000
To	120	-1,400	-0,870	-0,540	-0,350	-0,220	-0,140	-0,087	-0,054	-0,035	-0,022	-0,015
Over	120	0,000	0,000	0,000	0,000	0,000	0,000	0,000	0,000	0,000	0,000	0,000
To	140	-1,600	-1,000	-0,630	-0,400	-,0250	-0,160	-0,100	-0,063	-0,040	-0,025	-0,018
Over	140	0,000	0,000	0,000	0,000	0,000	0,000	0,000	0,000	0,000	0,000	0,000
To	160	-1,600	-1,000	-0,630	-0,400	-,0250	-0,160	-0,100	-0,063	-0,040	-0,025	-0,018
Over	160	0,000	0,000	0,000	0,000	0,000	0,000	0,000	0,000	0,000	0,000	0,000
To	180	-1,600	-1,000	-0,630	-0,400	-,0250	-0,160	-0,100	-0,063	-0,040	-0,025	-0,018
Over	180	0,000	0,000	0,000	0,000	0,000	0,000	0,000	0,000	0,000	0,000	0,000
To	200	-1,850	-1,150	-0,720	-0,460	-0,290	-0,185	-0,115	-0,072	-0,046	-0,029	-0,020

Super Smart Ball Bushing™ Bearings

Thomson Super Smart Ball Bushing™ Bearing products offer:

• Up to six times the load capacity or 216 times the travel life of conventional linear bearings.

• Twice the load capacity or eight times the travel life of standard Super Ball Bushing™ bearings.

• Universal self-alignment feature, that compensates for misalignment of housing bores and 60 Case™ LinearRace™ shaft deflection, optimizes load distribution between ball tracks and assures uniform ball loading over the entire length of the bearing plate. Installation time and cost is minimized while bearing performance and life is maximized.

• Technologically advanced design that allows the bearing to maintain its diametral fit-up when installed in a housing that is slightly out-of-round.

• Up to 400% longer LinearRace shaft life and minimal machine downtime when replacing conventional linear bearings or the standard Super Ball Bushing bearing.

• RoundRail™ Advantage combined with universal self-alignment eliminating the need for derating factors commonly required when using linear guides.

• Coefficient of friction as low as 0,001. This allows the use of smaller less expensive motors, belts, gears and ball screws, when replacing high friction, plain bearings.

• Closed and open configurations.

• Double lip integral wipers that keep out dirt while retaining lubrication. Travel life is maximized.

• Worldwide availability from over 1800 authorized distributors.

Super Smart Ball Bushing Bearing

The new Super Smart Ball Bushing™ bearing represents a major advancement in linear bearing technology worldwide. The Super Smart Ball Bushing bearing offers twice the load capacity or eight times the travel life of the industry standard Super Ball Bushing™ bearing. An enormous technological breakthrough, considering the Super Ball Bushing bearing already offers three times the load capacity or twenty-seven times the travel life of conventional Ball Bushing™ bearings.

Technologically Advanced Design

The load carrying component of the Super Smart Ball Bushing bearing is the combination of four hardened bearing quality steel components (Figures #1 & #2).

The first component is the steel outer ring, which allows the bearing to maintain its diametrical fit-up even when installed in a housing that is slightly out-of-round. The unique ring design also allows for bearing adjustment and the removal of diametrical clearance. The second component is the precision super finished double track bearing plate that provides twice the load capacity and features universal self-alignment.

The third component is the rolling element. Each Super Smart Ball Bushing bearing utilizes precision ground balls manufactured to the highest quality standards for roundness and sphericity. The result is maximum load capacity, travel life and performance.

The last component is the 60 Case™ LinearRace™ shaft that acts as the inner race to the Super Smart Ball Bushing bearing. Each 60 Case LinearRace is manufactured to the highest quality standards for roundness, straightness, surface finish and hardness. Roundness is held under 4µm; straightness to 0,05mm per 300mm; surface finish under 0,30µm and hardness between 60-65 HRC. The combination of inner and outer race or 60 Case LinearRace and Super Smart Ball Bushing bearing provides the basis for the RoundRail™ Advantage.

The RoundRail Advantage

The RoundRail Advantage is the inherent ability of a Super Smart Ball Bushing bearing system to accommodate torsional misalignment (caused by inaccuracies in carriage or base machining or by machine defection) with little increase in stress to bearing components. Installation time and cost are minimized and system performance is maximized.

Figure 1
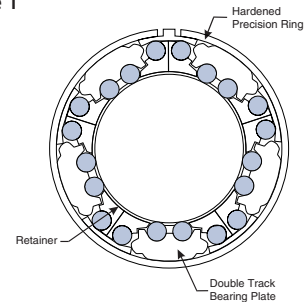
Cross-section of Super Smart Ball Bushing Bearing

Figure 2
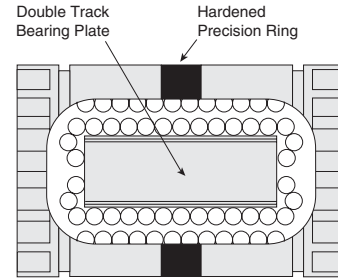
Super Smart Ball Bushing Bearing

Universal Self-Alignment

The bearing plate of the Super Smart Ball Bushing™ bearing is designed with many unique and technologically advanced features. The Universal Self-Alignment feature assures that the Super Smart Ball Bushing bearing will achieve maximum performance regarding load capacity, travel life, smooth operation and coefficient of friction. The three components that make up universal self-alignment are Rock, Roll and Yaw.

Figure 3

Hardened Precision Ring

Double Lip Wiper

0,5˚
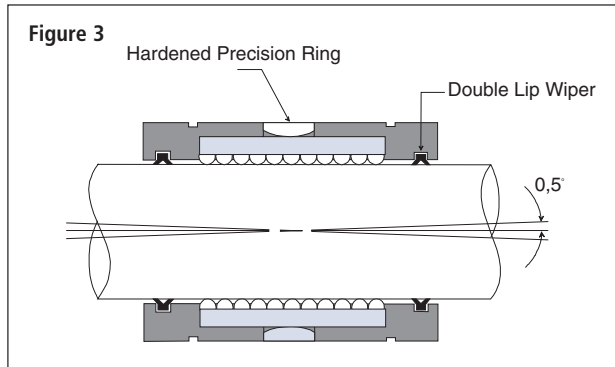
Rock

The bearing plate is designed to rock 0,5° about the hardened outer ring (Figure #3 & #4). This self-aligning feature allows the Super Smart Ball Bushing bearing to absorb misalignment caused by inaccuracies in housing bore alignment or 60 Case™ LinearRace™ shaft deflection.

This rocking capability provides smooth entry and exit of the precision balls into and out of the load zone assuring a constant low coefficient of friction. By compensating for misalignment, each bearing ball in the load carrying area is uniformly loaded providing maximum load capacity.

Figure 4

Close-up of hardened precision ring, showing how the bearing plate self-aligns (rocks) about the curved surface of the ring.
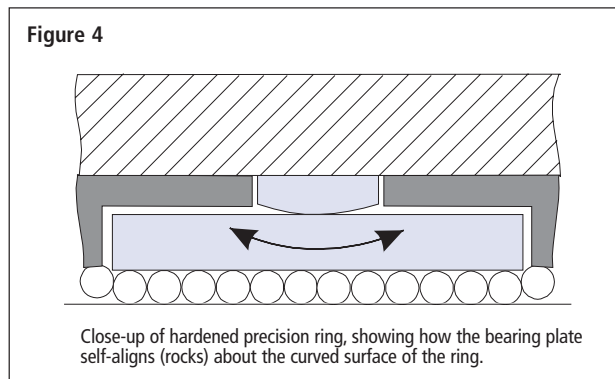
Figure 5
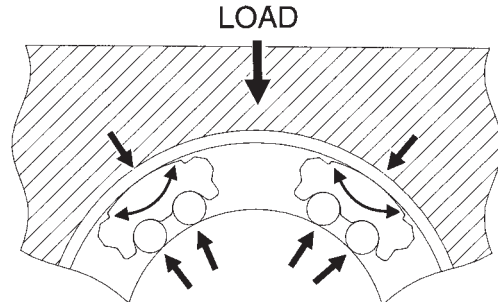
LOAD

Close-up of double track bearing plates showing how they self-align (roll) to evenly distribute the load on each of their two ball tracks.

Roll

The second key design feature of the Super Smart Ball Bushing bearing plate is its ability to **Roll**. The bearing plate is designed with the radius of its outer surface smaller than the inside radius of the precision outer ring (Figure #5). This allows the bearing plate to compensate for torsional misalignment and evenly distribute the load on each of its two ball tracks. The roll component assures maximum load capacity and travel life.

Yaw

The shape formed by the **Rock and Roll** features allows the Super Smart Ball Bushing bearing plate to rotate about its center (Figure #6). This allows the Super Smart Ball Bushing bearing to absorb skew caused by misalignment. The result is a constant low coefficient of friction and maximum bearing performance.

Figure 6
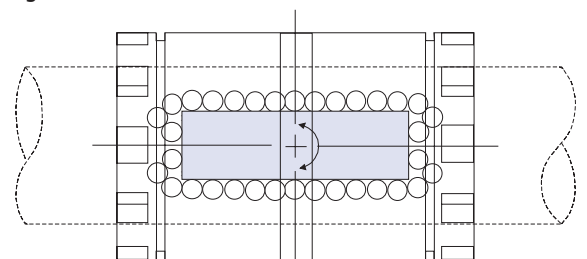
Bearing plates rotate about their center to prevent skewing relative to the 60 Case LinearRace.

Super Smart Ball Bushing™ Bearing - The Super Smart Advantage

Advantage: Load Capacity   →   **Downsizing**

LOAD COMPARISON
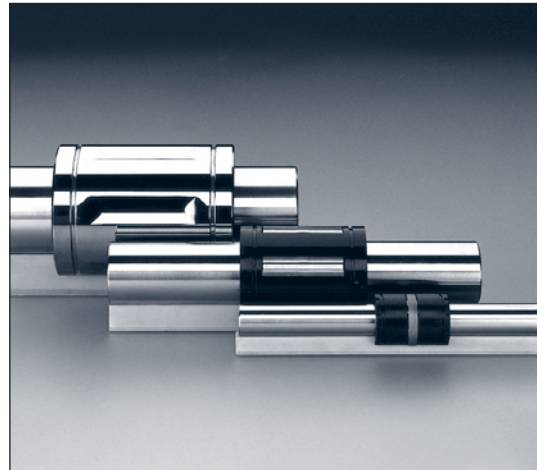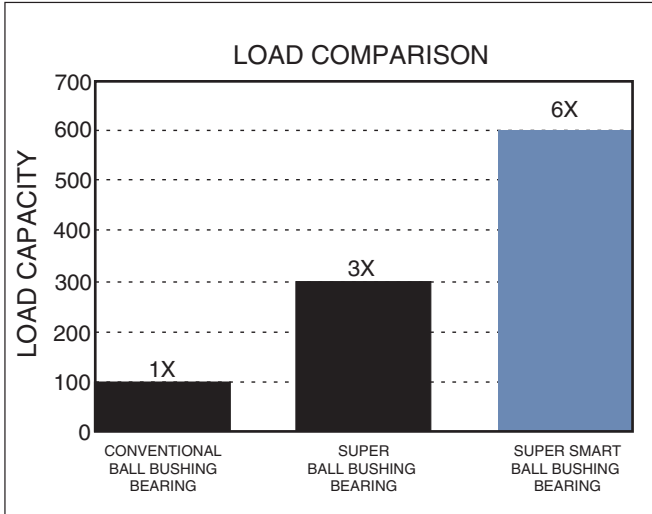
The Super Smart Ball Bushing™ bearing provides twice the load capacity of the industry standard Super Ball Bushing bearing and six times the load capacity of conventional Ball Bushing™ bearings.

The photograph above shows a conventional Ball Bushing bearing, Super Ball Bushing bearing and Super Smart Ball Bushing bearing, all of which have the same load capacity.

Advantage: Travel Life

LIFE COMPARISON
(AT EQUAL LOADING)
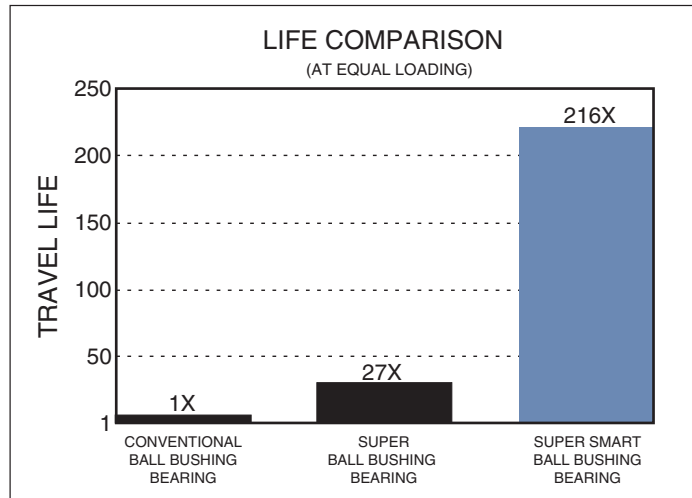
The Super Smart Ball Bushing bearing provides 8 times the travel life of the standard Super Ball Bushing bearing and 216 times the travel life of conventional Ball Bushing bearings.

Super Smart Ball Bushing™ Linear Bearings

Closed type

Part Number			Dimensions (mm)					No. of Ball Tracks	Mass (Kg)	Dynamic Load W[(1)(3)] (N)	Load Limit W₀[(2)(3)] (N)
Without Integral Wipers	With One Integral Wiper	With Two Integral Wipers	d[(4)]	D	C h14	C1 H13	C2 min.				
SP M08	SP M08 W	SP M08 WW	8	16	25	16,2	1,10	4	0,016	310	340
SP M12	SP M12 W	SP M12 WW	12	22	32	22,6	1,30	5	0,023	650	715
SSE M16	SSE M16 W	SSE M16 WW	16	26	36	24,6	1,30	10	0,030	2200	2400
SSE M20	SSE M20 W	SSE M20 WW	20	32	45	31,2	1,60	10	0,066	4000	4400
SSE M25	SSE M25 W	SSE M25 WW	25	40	58	43,7	1,85	10	0,135	6700	7300
SSE M30	SSE M30 W	SSE M30 WW	30	47	68	51,7	1,85	10	0,206	8300	9100
SSE M40	SSE M40 W	SSE M40 WW	40	62	80	60,3	2,15	10	0,392	13700	15000

[(1)]For rated travel life of 100 km. For longer travel lives, reduce load to •(100/L)$^{0.33}$ where L (km) is the required travel life. Do not exceed the Dynamic Load Rating for travellife of less than 100 km.

[(2)]The Load Limit is the maximum load that may be applied to a bearing/shaft. It is important to analyze the application so that peak and/or shock do not exceed the Load Limit.

NOTE: External seals and retaining rings are available. See page ACS 1,2 for specifications.

NOTE: For additional technical data, see Engineering Support section.

NOTE: For a corrosion resistant bearing add suffix-CR to the part number and reduce the load capacity by 30%.
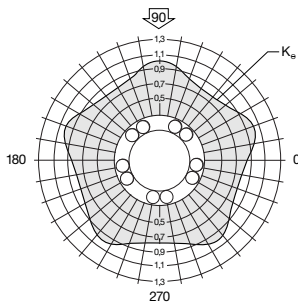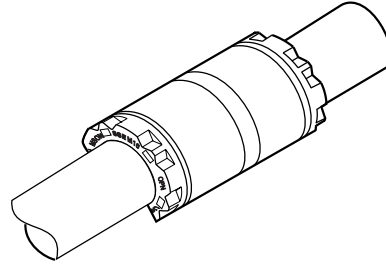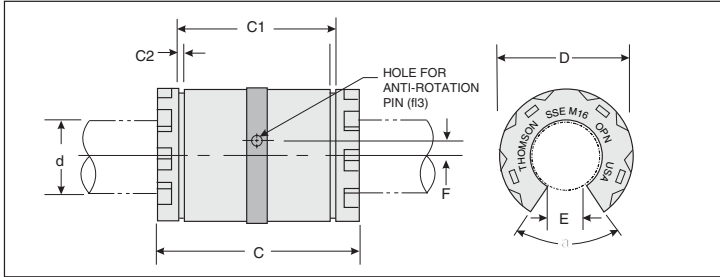

SSE M16
SSE M20
SSE M25
SSE M30
SSE M40
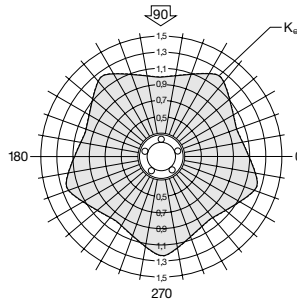
SP M12

SP M08

Super Smart Ball Bushing™ Linear Bearings

Open type

Part Number			Dimensions (mm)								No. of Ball Tracks	Mass (Kg)	Dynamic Load W[1][3] (N)	Load Limit W₀[2][3] (N)
Without Integral Wipers	With One Integral Wiper	With Two Integral Wipers	d[4]	D	C h14	C1 H13	C2 min.	E	F	Angle a (deg)				
SP M12 OPN	SP M12 OPN W	SP M12 OPN WW	12	22	32	22,6	1,30	7,0	1,35	70	4	0,018	750	825
SSE M16 OPN	SSE M16 OPN W	SSE M16 OPN WW	16	26	36	24,6	1,30	9,0	0	70	8	0,023	2200	2400
SSE M20 OPN	SSE M20 OPN W	SSE M20 OPN WW	20	32	45	31,2	1,60	10,0	0	50	8	0,054	4000	4400
SSE M25 OPN	SSE M25 OPN W	SSE M25 OPN WW	25	40	58	43,7	1,85	12,5	1,50[5]	60	8	0,107	6700	7300
SSE M30 OPN	SSE M30 OPN W	SSE M30 OPN WW	30	47	68	51,7	1,85	13,7	2,00	55	8	0,163	8300	9100
SSE M40 OPN	SSE M40 OPN W	SSE M40 OPN WW	40	62	80	60,3	2,15	19,0	1,50	54	8	0,315	13700	15000

[3]The load capacities W and W₀ are valid for a resultant load applied at 90° with the ball tracks oriented as shown in the polar graphs below. If the resultant acts along another direction, the appropriate multiplicative correction factor K₃, should be applied to W and W₀ respectively. Open type bearings have reduced load capacities when used in pull-off situations.

[4]Internal bearing diameter is affected by the housing bore, see Table 1.

[5]Hole for anti-rotation pin is below centerline.

NOTE: External seals and retaining are available. See pages ACS 1,2 for specifications.

NOTE: For additional technical data, see Engineering Support section.
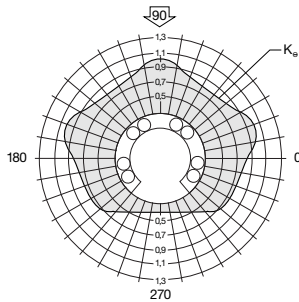
SSE M16 OPN
SSE M20 OPN
SSE M25 OPN
SSE M30 OPN
SSE M40 OPN
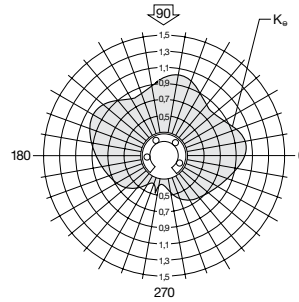
SSE M12 OPN

Table 1 –Standard Diametral Clearances

Nominal Shaft Diameter d (mm)	Nominal Housing Bore Dia. D (mm)	Diametral Clearance	
		Housing Bore H7 (mm)	Housing Bore H6 (mm)
12	22	+33 +4	+26 +3
16	26	+33 +4	+26 +3
20	32	+37 +6	+30 +4
25	40	+37 +6	+30 +4
30	47	+37 +6	+30 +4
40	62	+44 +7	+35 +5

For Super Smart Ball Bushing bearings mounted in a housing and with LinearRace™ shafts, h6 tolerance

Application

Cam-Actuated Part Transfer Mechanism for Multiple-Transfer Press

Objective
Improve production rate and increase the service life of a transfer table mechanism.

Solution
Replace the conventional linear bearings with adjustable Super Smart™ twin pillow blocks.
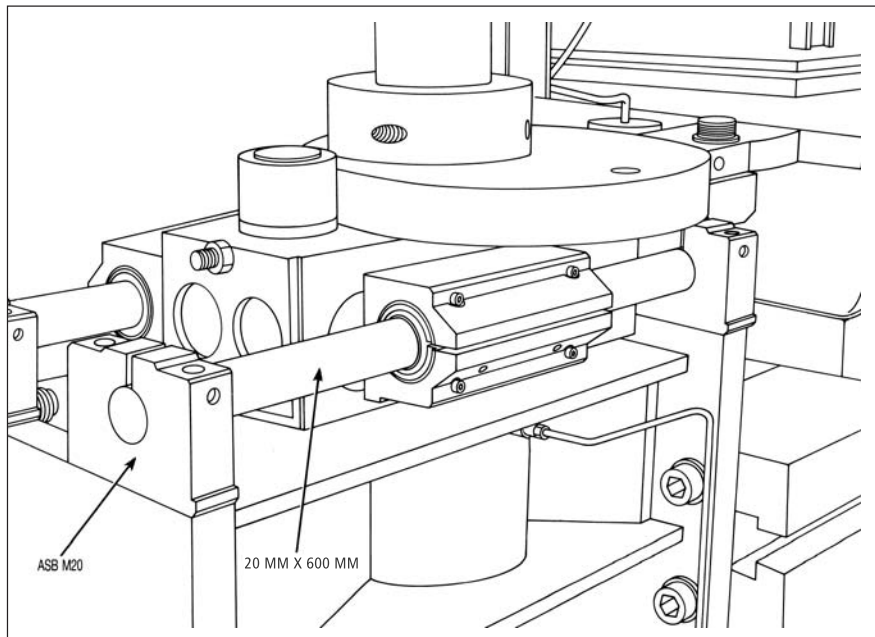
Product Specified
2-SSE TWNA M20 DD (Super Smart Twin™ Pillow Blocks)
4-ASB M20 (Shaft support blocks) blocks™
2-20 MM X 600 mm 60 Case™ Linear Race™ Shaft

Benefits
The table achieved maximum cycle efficiency by reducing costly downtime and improving service life. Bearing life is increased from 1 to 8 years.

ASB M20   20 MM X 600 MM

X-Y Inspection System

Objective
Accurately position an inspection probe of an X-Y system over small electronic components.

Solution
Design an X-Y system with Super Smart Ball Bushing™ pillow blocks to provide accurate and repeatable movement of the test probe. Utilize Thomson Industries linear motion systems on the Y-axis to reduce cost and installation time.

Products Specified
X–axis
2–SSE TWNA M16 DD
   (Super Smart Twin pillow blocks)
4–ASB M16 (Shaft support blocks)
2–16 MM X 600 MM (60 Case™ LinearRace™ shaft)
2–12 x5 Thomson ball screw assemblies

Y-axis
1–2CA M12 (pre-assembled linear motion system)
1–12 x5 Thomson ball screw assembly

Benefits
Outstanding positioning accuracy and repeatability was provided by the adjustable pillow blocks and ball screws. The use of a pre-engineered, pre-assembled linear motion system on the Y-axis saved valuable design and assembly time.
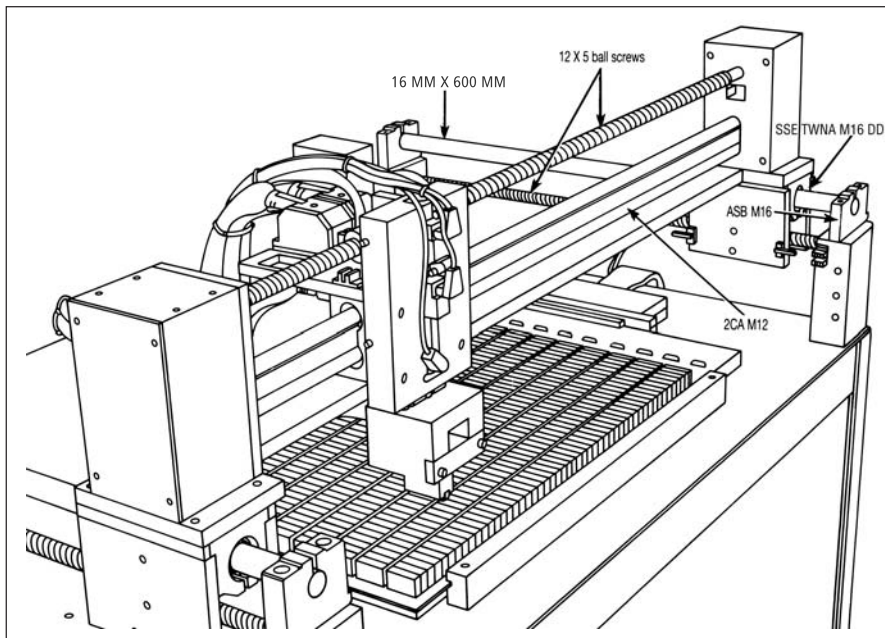
Super Smart Pillow Blocks
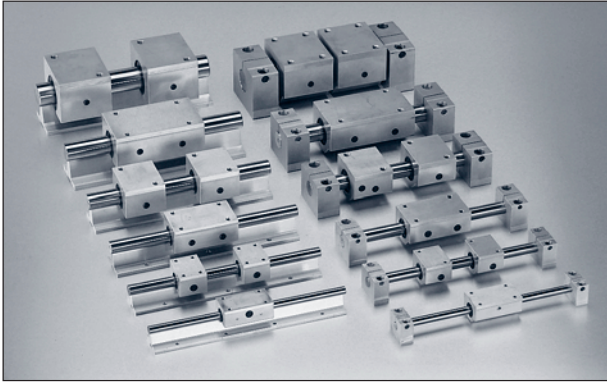
Thomson Pillow Blocks with factory-installed Super Smart Ball Bushing™ Bearings offer:

- Up to 6 times the load capacity or 216 times the travel life and 5 times the LinearRace™ shaft life when replacing conventional linear bearing pillow blocks.

- Accelerations as high as 150 m/s^2 and steady state travel speeds up to 3 m/s without the derating factors commonly required with linear guides.

- Replaceable bearing components for quick, cost-effective machine maintenance and minimal downtime.

- Standard, double-acting, integral seals at both ends which keep out dirt, grit and other contaminants, retain lubrication and maximize bearing life.

- Adjustable, closed, and open styles.

- Lubrication hole for easy maintenance.

- Tapped or thru hole mounting configuration for ease of installation.

- Twin version with two Super Smart Ball Bushing bearings providing twice the load capacity or 8 times more travel life than the single version.

- A single bearing version that self aligns in all directions, minimizing installation time and cost.

Note: See page 15 for information on Thomson Super Smart Ball Bushing bearings.
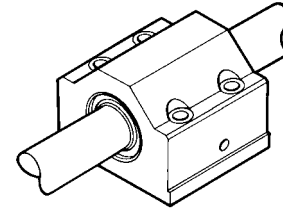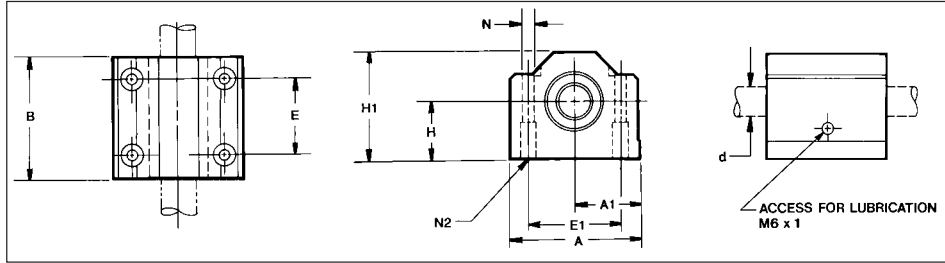
<div style="text-align: right">**Super Smart Ball Bushing Pillow Blocks**</div>

Super Smart Pillow Blocks

Closed type

Part Number	Dimensions (mm)										Mass (Kg)	Dynamic Load W[(1)(2)] (N)	Load Limit W₀[(2)(4)] (N)
	d[(5)]	H ±0,020	H1	A	A1 ±0,020	B	E ±0,1	E1 ±0,1	N Dia.	N2			
SP PB M08	8	15	28	35	17,5	32	20	25	3,3	M4	0,07	310	340
SP PB M12	12	18	35	43	21,5	39	23	32	4,3	M5	0,13	650	715
SSE PB M16 DD	16	22	42	53	26,5	43	26	40	5,3	M6	0,21	2200	2400
SSE PB M20 DD	20	25	50	60	30,0	54	32	45	6,6	M8	0,35	4000	4400
SSE PB M25 DD	25	30	60	78	39,0	67	40	60	8,4	M10	0,67	6700	7300
SSE PB M30 DD	30	35	71	87	43,5	79	45	68	8,4	M10	0,99	8300	9100
SSE PB M40 DD	40	45	91	108	54,0	91	58	86	10,5	M12	1,84	13700	15000

[(1)]For rated travel life of 100 km. For longer travel lives, reduce load to W • (100/L)[0.33] where L (km) is the required travel life. Do not exceed the Dynamic Load Rating for travel life of less than 100km.

[(2)]The Load Limit is the maximum load that may be applied to a bearing/shaft. It is important to analyze the application so the peak and/or shock loads do not exceed the Load Limit.

[(3)]For bearing diametral clearances, see Table 1.

NOTE: For additional technical data, see Engineering Support section.

Table 1 – Standard Diametral Clearances Closed Type

Nominal Size d (mm)	Diametral Clearance (mm)	
8	+23	+2
12	+26	+3
16	+26	+3
20	+30	+4
25	+30	+4
30	+30	+4
40	+35	+5

For pillow blocks used with LinearRace™ Shaft, h6 tolerance
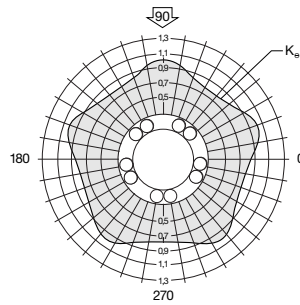
SSE PB M16 DD
SSE PB M20 DD
SSE PB M25 DD
SSE PB M30 DD
SSE PB M40 DD
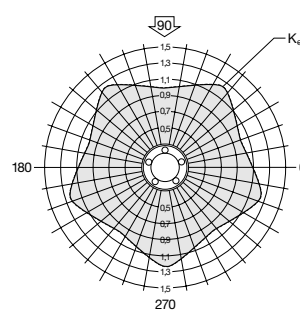
SP PB M12
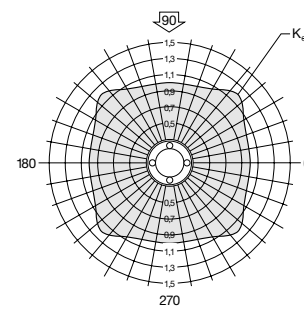
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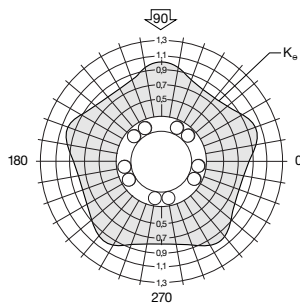
Super Smart Pillow Blocks

Closed adjustable type
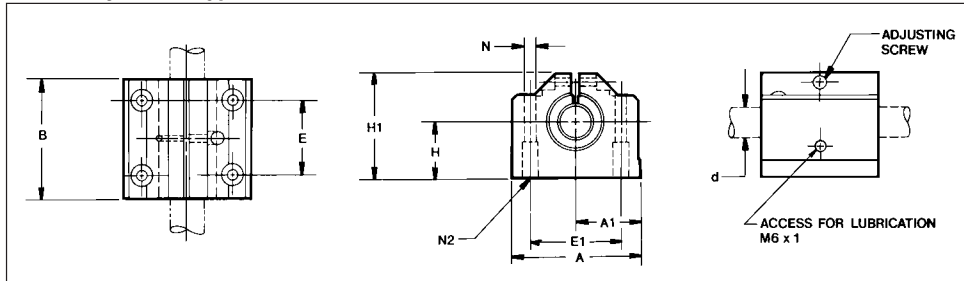
Part Number	$d^{(5)}$	Dimensions (mm)									Mass (Kg)	Dynamic Load $W^{(1)(2)}$ (N)	Load Limit $W_0^{(2)(4)}$ (N)
		H ±0,020	H1	A	A1 ±0,020	B	E ±0,1	E1 ±0,1	N Dia.	N2			
SP PBA M08	8	15	28	35	17,5	32	20	25	3,3	M4	0,07	310	340
SP PBA M12	12	18	35	43	21,5	39	23	32	4,3	M5	0,13	650	715
SSE PBA M16 DD	16	22	42	53	26,5	43	26	40	5,3	M6	0,21	2200	2400
SSE PBA M20 DD	20	25	50	60	30,0	54	32	45	6,6	M8	0,35	4000	4400
SSE PBA M25 DD	25	30	60	78	39,0	67	40	60	8,4	M10	0,67	6700	7300
SSE PBA M30 DD	30	35	71	87	43,5	79	45	68	8,4	M10	0,99	8300	9100
SSE PBA M40 DD	40	45	91	108	54,0	91	58	86	10,5	M12	1,84	13700	15000

[4]The load capacities W and W_0 are valid for a resultant load applied at 90° with the ball tracks oriented as shown in the polar graphs below. If the resultant acts along another direction, the appropriate multiplicative correction factor, K_q, should be applied to W and W_0 respectively. Open type bearings have reduced load capacities when used in pull-off situations.

[5]Adjusted to nominal.

NOTE: For additional technical data, see Engineering Support section.
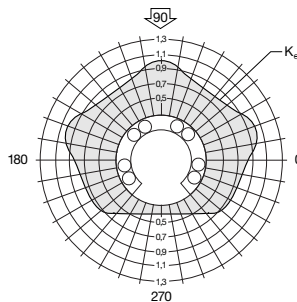

SSE PBA M16 DD
SSE PBA M20 DD
SSE PBA M25 DD
SSE PBA M30 DD
SSE PBA M40 DD
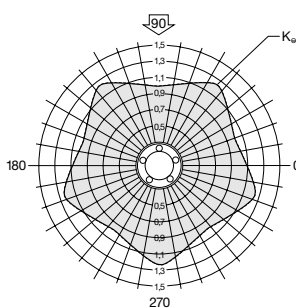
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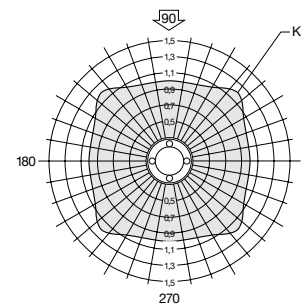
SP PBA M08

Super Smart Pillow Blocks

Open type

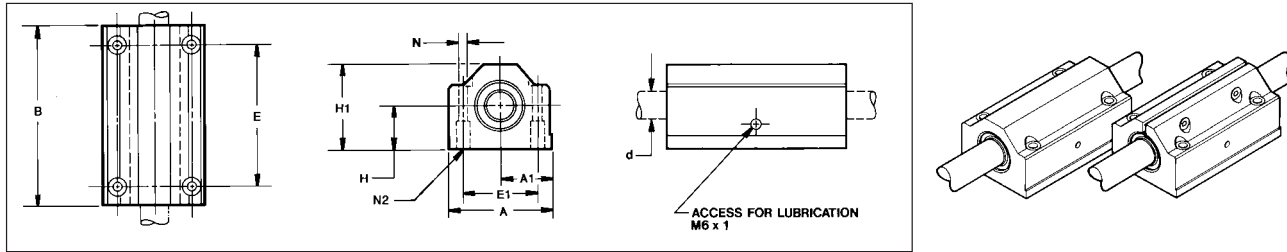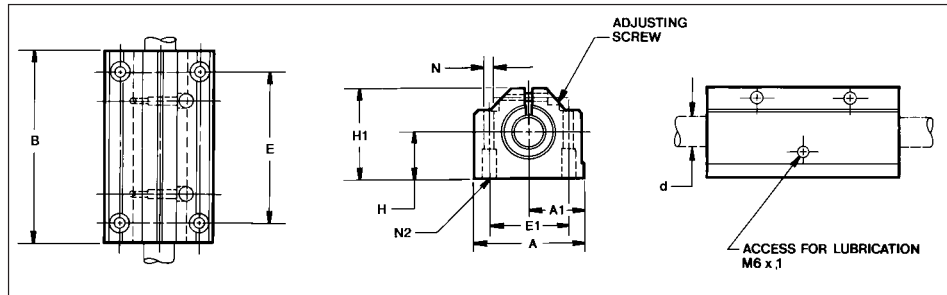| Part Number	Dimensions (mm)										Angle A (deg)	Mass (Kg)	Dynamic Load W[1][2] (N)	Load Limit W₀[2][4] (N)
	d[5]	H ±0,020	H1	A	A1 ±0,020	B	E ±0,1	E1 ±0,1	N Dia.	N2				
SP PBO M12	12	18	28	43	21,5	39	23	32	4,3	M5	70	0,11	750	825
SSE PBO M16 DD	16	22	35	53	26,5	43	26	40	5,3	M6	70	0,19	2200	2400
SSE PBO M20 DD	20	25	42	60	30,0	54	32	45	6,6	M8	50	0,30	4000	4400
SSE PBO M25 DD	25	30	51	78	39,0	67	40	60	8,4	M10	60	0,60	6700	7300
SSE PBO M30 DD	30	35	60	87	43,5	79	45	68	8,4	M10	55	0,93	8300	9100
SSE PBO M40 DD	40	45	77	108	54,0	91	58	86	10,5	M12	54	1,66	13700	15000

[1]For rated travel life of 100 km. For longer travel lives, reduce load to W • (100/L)[0,33] where L (km) is the required travel life. Do not exceed the Dynamic Load Rating for travel life of less than 100km.

[2]The Load Limit is the maximum load that may be applied to a bearing/shaft. It is important to analyze the application so that peak and/or shock loads do not exceed the Load Limit.

[3]For bearing diametral clearances, see Table 2.

NOTE: For additional technical data, see Engineering Support section.

Table 2 –Standard Diametral Clearances Open Type

Nominal Size d (mm)	Diametral Clearance (mm)	
12	+26	+3
16	+26	+3
20	+30	+4
25	+30	+4
30	+30	+4
40	+35	+5

For pillow blocks used with LinearRace™ Shaft, h6 tolerance
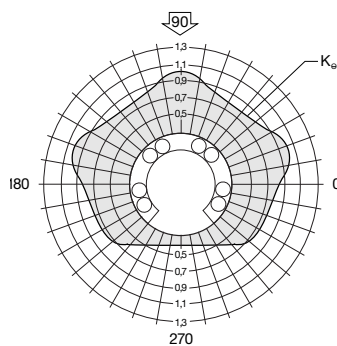
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SSE PBO M20 DD
SSE PBO M25 DD
SSE PBO M30 DD
SEE PBO M40 DD
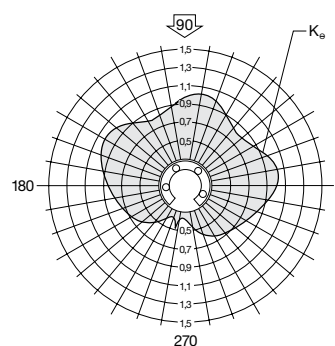
SP PBO M12

Super Smart Pillow Blocks

Open adjustable type

Part Number	Dimensions (mm)										Angle a (deg)	Mass (Kg)	Dynamic Load W(1)(2) (N)	Load Limit W₀(2)(4) (N)
	d(5)	H ±0,020	H1	A	A1 ±0,020	B	E ±0,1	E1 ±0,1	N Dia.	N2				
SP PBOA M12	12	18	28	43	21,5	39	23	32	4,3	M5	70	0,11	750	825
SSE PBOA M16 DD	16	22	35	53	26,5	43	26	40	5,3	M6	70	0,19	2200	2400
SSE PBOA M20 DD	20	25	42	60	30,0	54	32	45	6,6	M8	50	0,30	4000	4400
SSE PBOA M25 DD	25	30	51	78	39,0	67	40	60	8,4	M10	60	0,60	6700	7300
SSE PBOA M30 DD	30	35	60	87	43,5	79	45	68	8,4	M10	55	0,93	8300	9100
SSE PBOA M40 DD	40	45	77	108	54,0	91	58	86	10,5	M12	54	1,66	13700	15000

(4)The load capacities W and W₀ are valid for a resultant load applied at 90° with the ball tracks oriented as shown in the polar graphs below. If the resultant acts along another direction, the appropriate multiplicative correction factor, K₉, should be applied to W and W₀ respectively. Open type bearings have reduced load capacities when used in pull-off situations.

(5)Adjusted to nominal.

NOTE: For additional technical data, see Engineering Support section.

SSE PBOA M16 DD
SSE PBOA M20 DD
SSE PBOA M25 DD
SSE PBOA M30 DD
SSE PBOA M40 DD
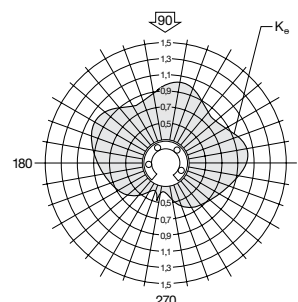
SP PBOA M12

Super Smart Twin Pillow Blocks

Closed type

ACCESS FOR LUBRICATION
M6 x 1

Part Number	Dimensions (mm)										Mass (Kg)	Dynamic Load W[(1)(2)] (N)	Load Limit W₀[(2)(4)] (N)
	d[(5)]	H ±0,020	H1	A	A1 ±0,020	B	E ±0,1	E1 ±0,1	N Dia.	N2			
SP TWN M08	8	15	28	35	17,5	62	50	25	3,3	M4	0,15	500	550
SP TWN M12	12	18	35	43	21,5	76	56	32	4,3	M5	0,27	1060	1165
SSE TWN M16 DD	16	22	42	53	26,5	84	64	40	5,3	M6	0,41	4400	4800
SSE TWN M20 DD	20	25	50	60	30,0	104	76	45	6,6	M8	0,67	8000	8800
SSE TWN M25 DD	25	30	60	78	39,0	130	94	60	8,4	M10	1,24	13400	14600
SSE TWN M30 DD	30	35	71	87	43,5	152	106	68	8,4	M10	1,94	16600	18200
SSE TWN M40 DD	40	45	91	108	54,0	176	124	86	10,5	M12	3,63	27400	30000

Closed Adjustable type

ADJUSTING SCREW

ACCESS FOR LUBRICATION
M6 x 1

Part Number	Dimensions (mm)										Mass (Kg)	Dynamic Load W[(1)(2)] (N)	Load Limit W₀[(2)(4)] (N)
	d[(5)]	H ±0,020	H1	A	A1 ±0,020	B	E ±0,1	E1 ±0,1	N Dia.	N2			
SP TWNA M08	8	15	28	35	17,5	62	50	25	3,3	M4	0,15	500	550
SP TWNA M12	12	18	35	43	21,5	76	56	32	4,3	M5	0,27	1060	1165
SSE TWNA M16 DD	16	22	42	53	26,5	84	64	40	5,3	M6	0,41	4400	4800
SSE TWNA M20 DD	20	25	50	60	30,0	104	76	45	6,6	M8	0,67	8000	8800
SSE TWNA M25 DD	25	30	60	78	39,0	130	94	60	8,4	M10	1,24	13400	14600
SSE TWNA M30 DD	30	35	71	87	43,5	152	106	68	8,4	M10	1,94	16600	18200
SSE TWNA M40 DD	40	45	91	108	54,0	176	124	86	10,5	M12	3,63	27400	30000

See footnotes (1) (2) (3) (4) (5) on page SSEPB 2 and 3. For diametral clearances, see single versions of pillow block.

Super Smart Twin Pillow Blocks

Closed type

Part Number	Dimensions (mm)										Angle a (deg)	Mass (Kg)	Dynamic Load W[(1)(2)] (N)	Load Limit W$_0$[(2)(4)] (N)
	d[(5)]	H ±0,020	H1	A	A1 ±0,020	B	E ±0,1	E1 ±0,1	N Dia.	N2				
SP TWNO M12	12	18	28	43	21,5	76	56	32	4,3	M5	70	0,22	1220	1340
SSE TWNO M16 DD	16	22	35	53	26,5	84	64	40	5,3	M6	70	0,37	4400	4800
SSE TWNO M20 DD	20	25	41	60	30,0	104	76	45	6,6	M8	50	0,58	8000	8800
SSE TWNO M25 DD	25	30	50	78	39,0	130	94	60	8,4	M10	60	1,16	13400	14600
SSE TWNO M30 DD	30	35	60	87	43,5	152	106	68	8,4	M10	55	1,78	16600	18200
SSE TWNO M40 DD	40	45	77	108	54,0	176	124	86	10,5	M12	54	3,25	27400	30000

Open Adjustable type

Part Number	Dimensions (mm)										Angle a (deg)	Mass (Kg)	Dynamic Load W[(1)(2)] (N)	Load Limit W$_0$[(2)(4)] (N)
	d[(5)]	H ±0,020	H1	A	A1 ±0,020	B	E ±0,1	E1 ±0,1	N Dia.	N2				
SP TWNOA M12	12	18	28	43	21,5	76	56	32	4,3	M5	70	0,22	1220	1340
SSE TWNOA M16 DD	16	22	35	53	26,5	84	64	40	5,3	M6	70	0,37	4400	4800
SSE TWNOA M20 DD	20	25	41	60	30,0	104	76	45	6,6	M8	50	0,58	8000	8800
SSE TWNOA M25 DD	25	30	50	78	39,0	130	94	60	8,4	M10	60	1,16	13400	14600
SSE TWNOA M30 DD	30	35	60	87	43,5	152	106	68	8,4	M10	55	1,78	16600	18200
SSE TWNOA M40 DD	40	45	77	108	54,0	176	124	86	10,5	M12	54	3,25	27400	30000

See footnotes (1) (2) (3) (4) (5) on page SSEPB 4 and 5. For diametral clearances, see single versions of pillow block.

Application Punch Press

Objective
Reduce deflection of plate loader to minimize scrap and improve cycle speed.

Solution
Replace super type linear bearings with Super Smart™ pillow blocks and Smart Rail™ assemblies to improve accuracy, load capacity, service life, efficiency and reduce downtime.

Products Specified
4—SSE PBOA M25 DD (Super Smart pillow blocks)
2—LSRA M25 T4 900 mm Smart Rail assemblies

Benefits
By retrofitting with Super Smart Pillow blocks, machine productivity increased 700%. Smart Rail assemblies provided reduced deflection during plate loading. The retrofit required minimum downtime due to the pillow blocks' ease of installation.

LSRA M25 T4 X 900mm

SSE PBOA M25 DD
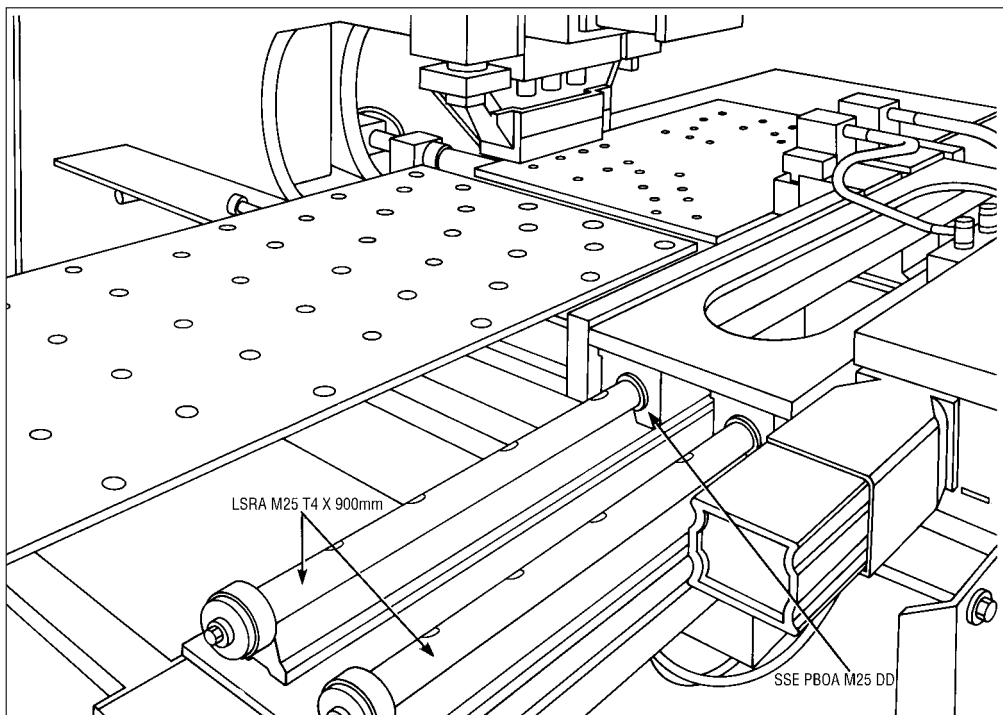
MultiTrac Ball Bushing™ Linear Bearings
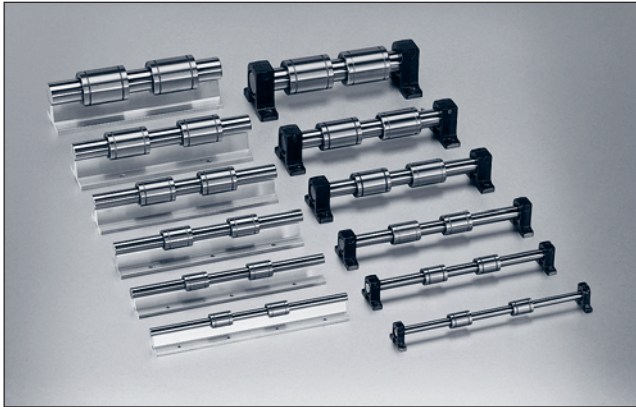
Thomson MultiTrac Ball Bushing™ bearings offer:

• Patented, multiple-track design with up to twice the load carrying capacity, or 8 times the life, of conventional linear bearings.

• Rigid design for minimal deflection assuring accurate, precise positioning.

• Coefficient of friction as low as 0,001.

• Patented ball control technology which eliminates binding and chatter (stick-slip) common to high-friction, plain bushings and sliding-way bearings.

• RoundRail™ Advantage which, combined with the advanced MultiTrac Ball Bushing™ bearing design, eliminates the need for the derating factors commonly required with square rail linear guides.

• Steady state speeds up to 3 m/s and accelerations up to 150 m/s^2, without the use of derating factors.

• Wear-resistant, engineered-polymer retainers to reduce inertia and noise levels.

• Adjustable, closed and open configurations.

MultiTrac Ball Bushing™ Linear Bearings
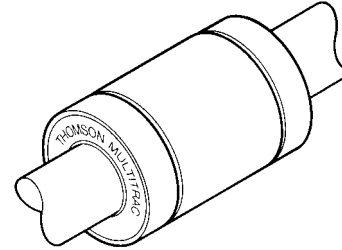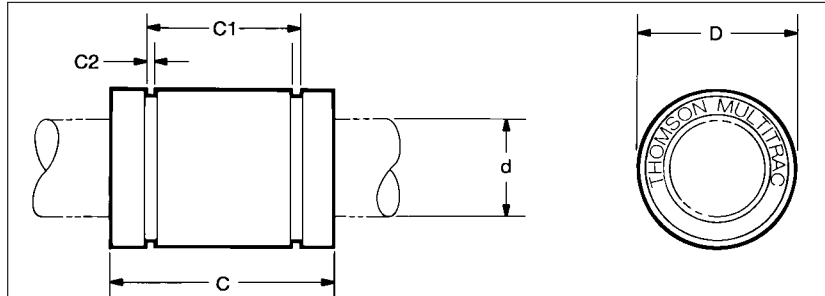
Closed type

Part Number			Dimensions (mm)					No. of Ball Tracks	Mass (Kg)	Dynamic Load W[(1)(3)] (N)	Load Limit W₀[(2)(3)] (N)
Without Integral Wipers	With One Integral Wiper	With Two Integral Wipers	d[(3)]	D	C h14	C1 H13	C2 min.				
MA M08	MA M08 W	MA M08 WW	8	16	25	16,2	1,10	4	0,02	180	330
MA M12	MA M12 W	MA M12 WW	12	22	32	22,6	1,30	6	0,04	350	880
MA M16	MA M16 W	MA M16 WW	16	26	36	24,6	1,30	8	0,06	550	1300
MA M20	MA M20 W	MA M20 WW	20	32	45	31,2	1,60	8	0,11	1000	2360
MA M25	MA M25 W	MA M25 WW	25	40	58	43,7	1,85	8	0,20	1980	5100
MA M30	MA M30 W	MA M30 WW	30	47	68	51,7	1,85	8	0,33	2060	5800
MA M40	MA M40 W	MA M40 WW	40	62	80	60,3	2,15	8	0,63	3820	9250

[(1)]For rated travel life of 100 km. For longer travel lives, reduce load to $W \bullet (100/L)^{0.33}$ where L (km) is the required travel life. Do not exceed the Dynamic Load Rating for travel life of less than 100 km.

[(2)]The load Limit is the maximum load that may be applied to a bearing/shaft. It is important to analyze the application so that peak and/or shock loads do not exceed the Load Limit.

[(3)] For diametral clearance, see Table 1

NOTE: External seals and retaining rings are available. See pages ACS 1,2 for specifications.

NOTE: For additional technical data, see Engineering Support section.

Table 1 –Standard Diametral Clearances Closed Type

Nominal Size d (mm)	Diametral Clearance (mm)	
8	+15	+3
12	+19	+3
16	+19	+3
20	+22	+4
25	+22	+4
30	+22	+4
40	+27	+5

For closed type bearings with LinearRace™ Shaft, h6 tolerance
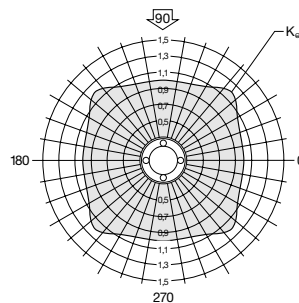
MA M16	MA M16 ADJ
MA M20	MA M20 ADJ
MA M25	MA M25 ADJ
MA M30	MA M30 ADJ
MA M40	MA M40 ADJ

MultiTrac Ball Bushing™ Linear Bearings

Closed adjustable type
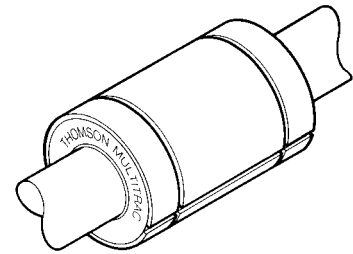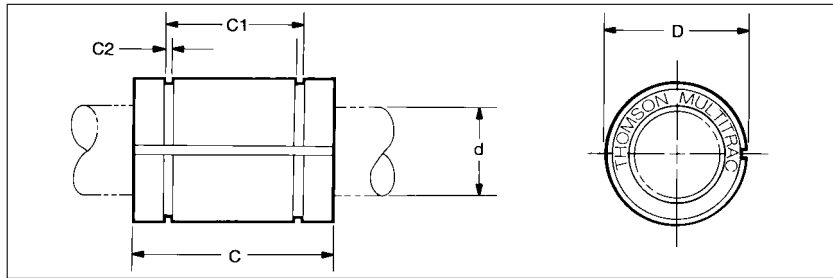
Part Number			Dimensions (mm)					No. of Ball Tracks	Mass (Kg)	Dynamic Load W[1][4] (N)	Load Limit W₀[2][4] (N)
Without Integral Wipers	With One Integral Wiper	With Two Integral Wipers	d[5]	D	C h14	C1 H13	C2 min.				
MA M08 ADJ	MA M08 ADJ W	MA M08 ADJ WW	8	16	25	16,2	1,10	4	0,02	180	330
MA M12 ADJ	MA M12 ADJ W	MA M12 ADJ WW	12	22	32	22,6	1,30	6	0,04	350	880
MA M16 ADJ	MA M16 ADJ W	MA M16 ADJ WW	16	26	36	24,6	1,30	8	0,06	550	1300
MA M20 ADJ	MA M20 ADJ W	MA M20 ADJ WW	20	32	45	31,2	1,60	8	0,11	1000	2360
MA M25 ADJ	MA M25 ADJ W	MA M25 ADJ WW	25	40	58	43,7	1,85	8	0,20	1980	5100
MA M30 ADJ	MA M30 ADJ W	MA M30 ADJ WW	30	47	68	51,7	1,85	8	0,33	2060	5800
MA M40 ADJ	MA M40 ADJ W	MA M40 ADJ WW	40	62	80	60,3	2,15	8	0,63	3820	9250

[4]The load capacities W and W₀ are valid for a resultant load applied at 90° with the ball tracks oriented as shown in the polar graphs below. If the resultant acts along another direction, the appropriate multiplicative correction factor, K_q, should be applied to W and W₀ respectively. Open type bearings have reduced load capacities when used in pull-off situations.

[5]Diametral fit-up is determined by the housing diameter. See Table 2

NOTE: External seals and retaining rings are available. See pages ACS 1,2 for specifications.

NOTE: For additional technical data, see Engineering Support section
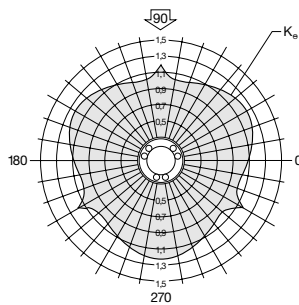
MA M12
MA M12 ADJ
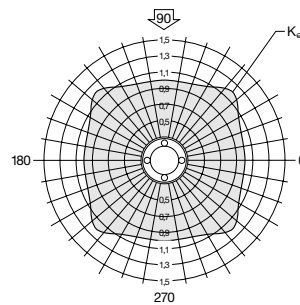
MA M08
MA M08 ADJ

Table 2 – Standard Diametral Clearances, Adjustable & Open Type

Nominal Clearances Size d (mm)	Diametral Housing Bore H6 (mm)	
8	+28	+7
12	+33	+9
16	+33	+9
20	+40	+10
25	+40	+10
30	+40	+10
40	+48	+12

For adjustable and open type bearings with LinearRace™ Shaft, h6 tolerance.

MultiTrac Ball Bushing™ Linear Bearings

Open type
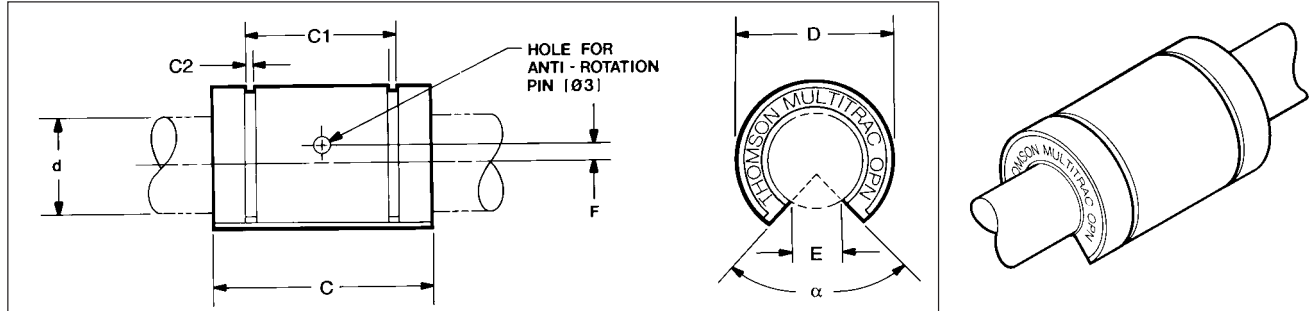
Part Number			Dimensions (mm)										Dynamic Load Rating W[(1)(4)] (N)	Load Limit W₀[(2)(4)] (N)
Without Integral Wipers	With One Integral Wiper	With Two Integral Wipers	d[(5)]	D	C h14	C1 H13	C2 min.	E	F	Angle a (deg)	No. of Ball Tracks	Mass (Kg)		
MA M12 OPN	MA M12 OPN W	MA M12 OPN WW	12	22	32	22,6	1,30	7,3	1,35	120	4	0,04	440	1100
MA M16 OPN	MA M16 OPN W	MA M16 OPN WW	16	26	36	24,6	1,30	10,6	0	90	6	0,06	600	1500
MA M20 OPN	MA M20 OPN W	MA M20 OPN WW	20	32	45	31,2	1,60	11,5	0	90	6	0,11	1100	2720
MA M25 OPN	MA M25 OPN W	MA M25 OPN WW	25	40	58	43,7	1,85	13,9	1,50[(6)]	90	6	0,20	2170	5300
MA M30 OPN	MA M30 OPN W	MA M30 OPN WW	30	47	68	51,7	1,85	20,3	2,00	90	6	0,33	2260	6710
MA M40 OPN	MA M40 OPN W	MA M40 OPN WW	40	62	80	60,3	2,15	20,9	1,50	90	6	0,63	4200	10700

[(6)]Hole for anti-rotation pin is below centerline.
For footnotes 1-5, see pages MA 2, and MA 3.
Note: External seals and retaining rings are available. See pages ACS 1,2 for specifications.
NOTE: For additional technical data, see Engineering Support section.
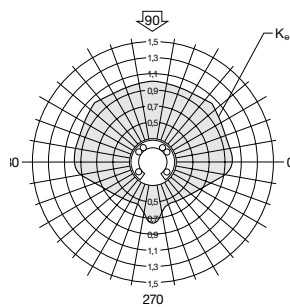
MA M16 OPN
MA M20 OPN
MA M25 OPN
MA M30 OPN
MA M40 OPN
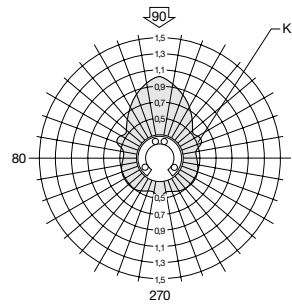
MA M12 OPN

MultiTrac Ball Bushing™ Linear Bearings

Our Thomson MultiTrac Ball Bushing bearings are designed with greater rigidity and up to twice the load capacity of conventional linear bearings. The design incorporates a one-piece, bearing quality steel sleeve (see Figure 1) for maximum rigidity. The single-piece engineered polymer ball retainer provides smooth, quiet operation.

Twice the Load Capacity
The bearing's load capacity is improved by the optimal positioning of the load tracks. This places the maximum number of load-bearing balls in the load zone (see Figure #1).

High Speed Operation
The advanced design also improves the bearing's ball control. This allows accelerations as high as 150 m/s^2 and travel speeds up to 3 m/s.

Integral Seals
The bearing includes double acting integral wipers, which keep out dirt, grit and other contaminants, and retain bearing lubrication.

Improved Ball Control
Through advanced computer-aided design techniques, ball control improvements assure smooth entry and exit of the balls in and out of the load zone.

Fig. 1

MultiTrac Ball Bushing Bearings
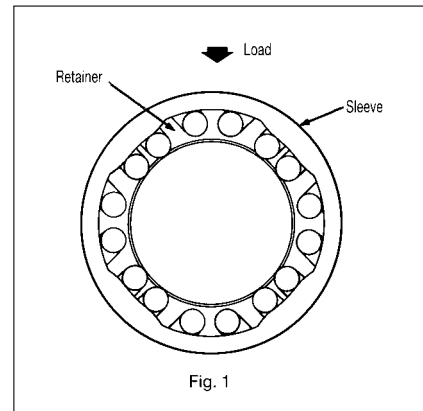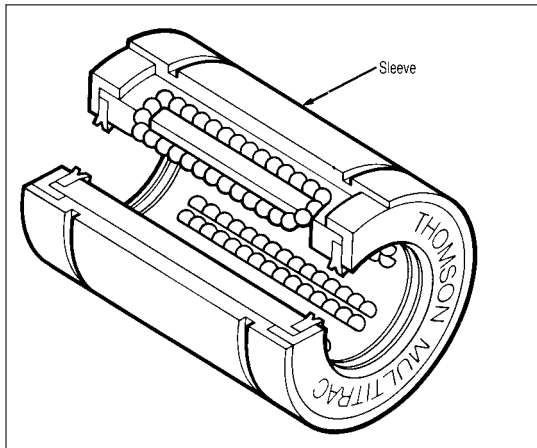
Application Wire Straightening/Feeding Machine

Objective
Redesign a wire straightening/feeding mechanism for a wire drawing machine that improves cycle time and minimizes downtime.

Solution
Combine the performance advantages of the Multitrac Ball Bushing™ Linear bearings with the
operating efficiency of Thomson all screws.

Products Specified
4–MA M16 WW (MultiTrac Ball Bushing linear bearings)
2–16 MM X 600 MM (60 Case™ LinearRace™ shaft)
1–16 x 5 Thomson ball screw assembly

Benefits
Because MultiTrac Ball Bushing™ Linear bearings have twice the load capacity of conventional linear bearings, service life increased from six months to
four years. This significantly reduced downtime and maintenance requirements and provided increased productivity with substantial cost savings.
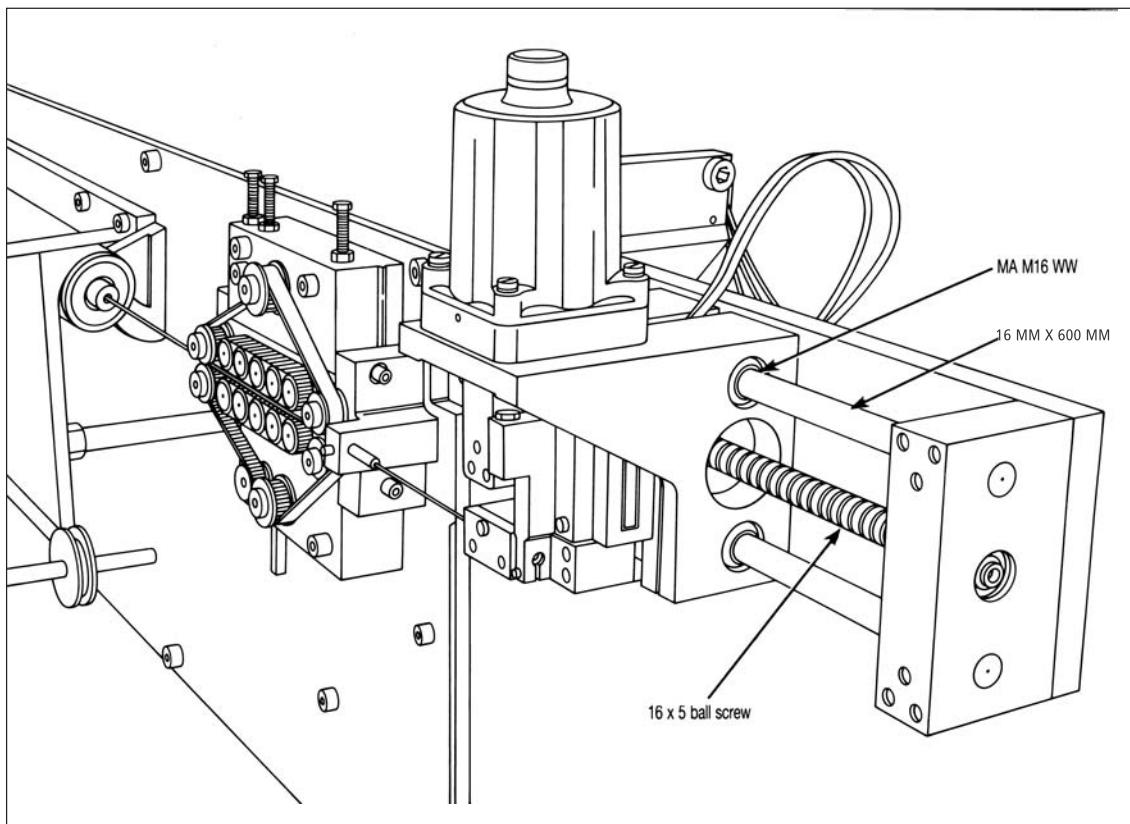
Thomson 60 Case LinearRace, LinearRace Support Rails and LinearRace Support Blocks

Thomson 60 Case™ hardened and precision-ground LinearRace™ shafting offers:

• Diameters between 5 and 80 mm available and stocked for immediate shipment.

• Complete source for your cut-to-length or fully machined shafting requirements.

• Up to 3 times more tensile strength than unhardened shafts.

• Thomson MicroBrite™ finishing process, enhancing bearing performance while improving surface finish.

• Cost-effective and dependable answer to all RoundRail™ linear bearing and non-bearing applications.

Thomson shaft support accessories offer:

• LinearRace support rails for continuously supported linear bearing applications. They optimize compactness and provide minimal deflection.

• Easy-to-install, LinearRace end-support blocks. They enable Thomson linear bearing products to bridge gaps, a shortcoming of square rail linear guide technology, due to its inability to absorb rail deflection.

• Complete, ready-to-bolt-down, LinearRace support rail assemblies. This reduces installation time and cost.

• LinearRace support rails and support blocks for shaft diameters between 8 and 40mm available and stocked for immediate shipment.

60 Case LinearRace Shaft and Supports

Application Engineering Data Thomson 60 Case Hardened and Precision-Ground LinearRace Shafts

60 Case LinearRace Shaft – Dimensions and Specifications

Nominal Shaft Dia. (mm)	Class M[1] Tolerance (h6) (mm)	Max.[2] Length (m)	Minimum Hardness Depth (mm)	Mass (kg/m)	EI (Nm²)
5	+0/-8	2,40	1,0	0,16	5,838
8	+0/-9	4,25	1,0	0,39	38,26
10	+0/-9	4,25	1,0	0,62	93,26
12	+0/-11	4,25	1,5	0,89	193,7
16	+0/-11	4,25	1,5	1,57	612,2
20	+0/-13	4,25	1,5	2,45	1495
25	+0/-13	4,25	2,0	3,86	3649
30	+0/-13	4,25	2,0	5,53	7566
40	+0/-16	4,25	2,0	9,87	$2{,}391 \bullet 10^4$
50	+0/-16	4,25	2,5	15,43	$5{,}838 \bullet 10^4$
60	+0/-19	4,25	2,5	22,14	$1{,}211 \bullet 10^5$
80	+0/-19	4,25	2,5	39,46	$3{,}826 \bullet 10^5$

[1] Please specify tolerance class.

[2] For longer lengths, LinearRace shafts may be joined at factory.

Fig. 1 LinearRace Shaft Straightness

Thomson 60 Case™ hardened and precision-ground LinearRace™ shafting provides the inner race for Super Smart Ball Bushing™ and MultiTrac Ball Bushing™ bearings. All 60 Case LinearRace shafts are manufactured to extremely close tolerances for surface finish, roundness, hardness, and straightness to provide long service life with reduced maintenance.

Hardness
60 Case LinearRace is made from high quality carbon steel and case hardened to HRC 60 min. Heat treatment on specialized equipment assures uniformity of hardness. The minimum depth of hardness is carefully controlled to provide the high load carrying capability of Super Smart Ball Bushing™ bearings.

Diameter Accuracy
60 Case LinearRace shafts are precision ground to the extremely close diameter tolerance of h6. Diametral accuracy is an important factor when using Thomson MultiTrac Ball Bushing or Super Smart Ball Bushing bearings. Diametral accuracy assures dependable diametral fit-up when minimum clearance is required.

Straightness
The exceptional straightness of 60 Case LinearRace shaft helps to eliminate binding, especially in parallel shaft applications. The straightness of shafts may be verified in accordance with Fig. 1.

Surface finish
60 Case LinearRace shaft have an extremely smooth surface finish to reduce friction and wear.

Specifications
Hardness: Minimum of 60 HRC

Surface Finish:
Standard (Ra) 0,30 mm except on machined or annealed surfaces. Surface finish of (Ra) 0,20 mm is available upon request.

Roundness:
4 μm for class M (h6)

Straightness:
Standard straightness tolerance is 0,050 mm per 0,3 m cumulative. Special straightness of 0,025 mm per 0,3 m is available upon request.

Length Tolerance:
Standard length tolerance on cut-to-length shafts is ± 0,8 mm for shaft diameters up to 50 mm and ± 1,6 mm for shafts diameters of 50 mm and larger. Special length tolerance up to ± 0,05 mm are available upon request.

Chamfer:
Standard chamfer on shaft diameters up to 25 mm is 0,8 mm x 45° and 1,6 mm x 45° for shaft diameters larger than 25 mm. Other chamfers can be supplied upon request.
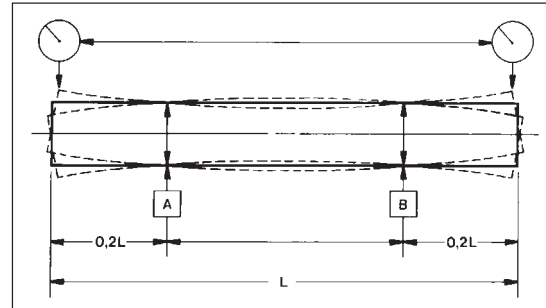
Thomson LinearRace™ Support Blocks

Aluminum type
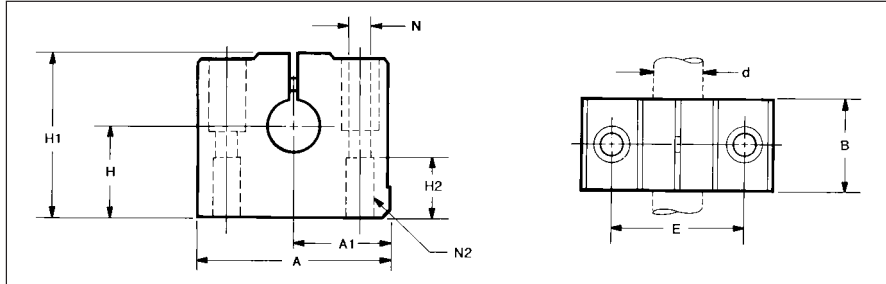
Part Number	Dimensions (mm)										LinearRace Block Mass (Kg)
	d h6	H ±0,01	H1	H2	A	A1 ±0,015	B	E ±0,12	N	N2	
ASB MO8	8	15	28	9	32	16,0	18	22	3,5	M4	0,04
ASB M12	12	20	36	13	43	21,5	20	30	5,3	M6	0,10
ASB M16	16	25	43	18	53	26,5	24	38	6,6	M8	0,15
ASB M20	20	30	51	22	60	30,0	30	42	8,4	M10	0,23
ASB M25	25	35	61	26	78	39,0	38	56	10,5	M12	0,41
ASB M30	30	40	71	26	87	43,5	40	64	10,5	M12	0,53
ASB M40	40	50	88	34	108	54,0	48	82	13,5	M16	0,99

Steel type
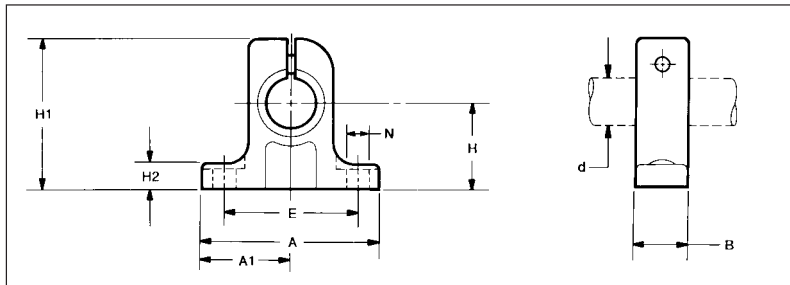
Part Number	Dimensions (mm)									LinearRace Block Mass (Kg)
	d h6	H ±0,01	H1	H2	A	A1 ±0,012	B	E ±0,12	N	
SB MO8	8	15	27	5,2	32	16	10	25	4,5	0,03
SB M12	12	20	35	5,5	42	21	12	32	5,5	0,06
SB M16	16	25	42	6,5	50	25	16	40	5,5	0,11
SB M20	20	30	50	8,0	60	30	20	45	5,5	0,21
SB M25	25	35	58	9,0	74	37	25	60	6,6	0,35
SB M30	30	40	68	10,0	84	42	28	68	9,0	0,52
SB M40	40	50	86	12,0	108	54	32	86	11,0	0,92

60 Case LinearRace Shaft and Supports

Thomson 60 Case Metric Shaft Support Rails

Shaft Support Rails
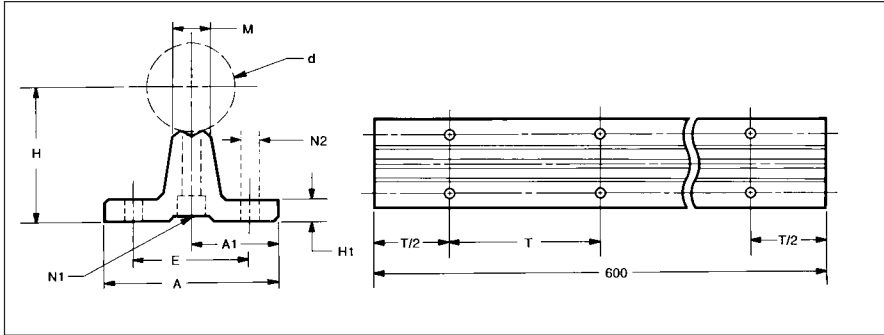
Type SR Shaft Support Rails

| Part Number | | | Dimensions (mm) | | | | | | | Bolt Hole | | | | Shaft[1] Rail Mass |
| | | | | | | | | | | Spacing (T) | | Sizes | | |
Without Holes	With T1 Hole Spacing	With T2 Hole Spacing	d h6	H ±0,02	H1	A	A1 ±0,02	M	E ±0,15	T1 (mm)	T2 (mm)	N1	N2	(kg)
SR M12	SR M12 T1	SR M12 T2	12	28	5	43	21,5	9	29	75	120	M4	4,5	1,9
SR M16	SR M16 T1	SR M16 T2	16	30	5	48	24,0	10	33	100	150	M5	5,5	2,8
SR M20	SR M20 T1	SR M16 T2	20	38	6	56	28,0	11	37	100	150	M6	6,6	4,2
SR M25	SR M25 T1	SR M25 T2	25	42	6	60	30,0	14	42	120	200	M8	6,6	5,9
SR M30	SR M30 T1	SR M30 T2	30	53	8	74	37,0	14	51	150	200	M10	8,6	8,7
SR M40	SR M40 T1	SR M40 T2	40	60	8	78	39,0	18	55	200	300	M10	8,6	13,6

[1] Standard length 600 mm   Material: Aluminum Alloy

Low Shaft Support Rails
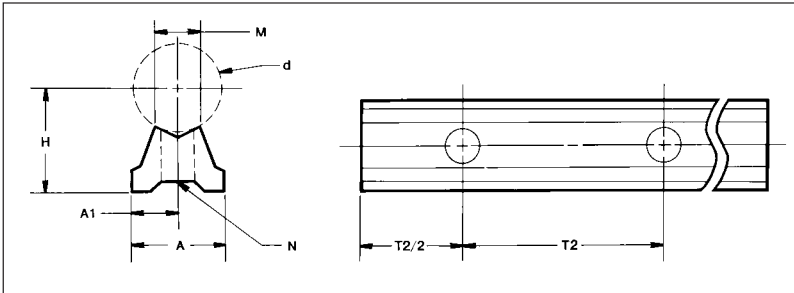
Type LSR Low Shaft Support Rails

| Part Number | | Dimensions (mm) | | | | | Bolt Hole | | Shaft[2] Rail Mass |
Without Holes	With T2 Hole Spacing	d h6	H ±0,02	A	A1 ±0,02	M ±0,15	Spacing (mm) T2	Size N	(kg)
LSR M12	LSR M12 T2	12	14	12	6,0	6,0	120	M4	1,5
LSR M16	LSR M16 T2	16	18	14	7,0	7,0	150	M5	2,4
LSR M20	LSR M20 T2	20	22	17	8,5	8,3	150	M6	3,7
LSR M25	LSR M25 T2	25	26	21	10,5	10,8	200	M8	5,6
LSR M30	LSR M30 T2	30	30	23	11,5	11,0	200	M10	9,0
LSR M40	LSR M40 T2	40	39	30	15,0	15,0	300	M12	13,3

[2] Standard length 1200 mm   Material: Steel

Smart Rail Guides (For use with Super Smart Ball Bushing™ bearings only)

Smart Rail™ guides offer:

- Quick installation is made possible with the bolt-down-from-the-top mounting feature.

- Reduce machine costs and size through the use of smaller, less expensive Super Smart Ball Bushing bearings and Smart Rail guides.

- Lengths up to 178 inches are available without requiring joints.

- Corrosion resistant versions are also available to suit a wide variety of needs.
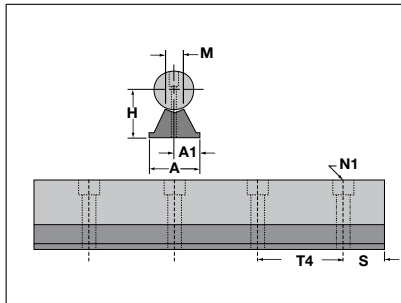
Type LSRAM Smart Rail guides

Part Number[3]		LinearRace Diameter	H	A	A1	M	Mounting Holes		Mass
Smart Rail LinearRace[1] shafting	Smart Rail LinearRace[2] shafting	h6	±.02		±0.02	±0.15	T4	N1	kg/m
LSRA M16	LSRA M16 CR	16	18	14	7.0	7.0	40	M3	3.6
LSRA M20	LSRA M20 CR	20	22	17	8.5	8.3	60	M4	5.5
LSRA M25	LSRA M25 CR	25	26	21	10.5	10.8	60	M5	8.5
LSRA M30	LSRA M30 CR	30	30	23	11.5	11.7	80	M6	13.0
LSRA M40	LSRA M40 CR	40	39	30	15.0	15.0	105	M10	21.0

(1) = Consists of black oxide steel rail and high carbon steel LinearRace shafting (HRC 60-65).
(2) = Consists of zinc plated steel rail and 440C stainless steel LinearRace shafting (HRC 50-55).
(3) = Specify length of Smart Rail when ordering. For example, LSRA M20 x 1200mm. S dimension is equal on each end unless specified by customer.

Attention: Thomson Linear Ball Bushing bearings are precision components. To preserve bearing warranty you must use the specified Thomson 60 Case™ LinearRace™ shafting.

Shaft Support Rails

SPECIFY LENGTH WHEN ORDERING

Assemblies may be ordered in any length
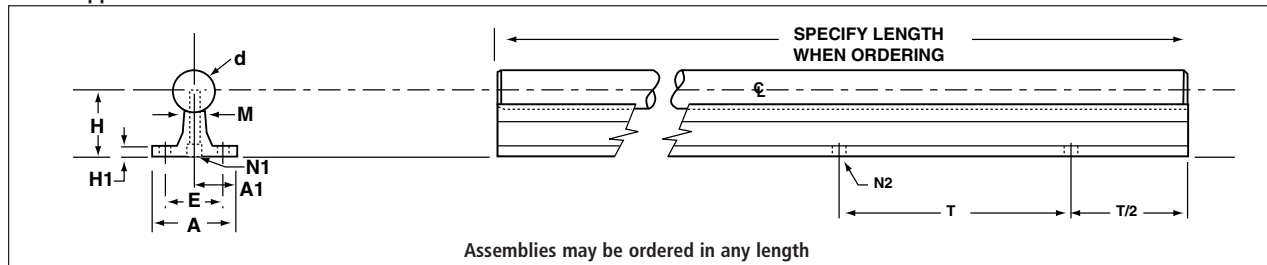
Metric Shaft Rail Assemblies

Type SRAMT1 and SRAMT2 LinearRace shafting Support Rail Assemblies

Part Number		d	H	H1	A	A1	M	E	N1	N2	T1	T2	Mass
SRAMT1 Assembly With LinearRace shafting	SRAMT2 Assembly With LinearRace shafting		±.02			±0.02		±0.15					kg/m
SRAM12T1	SRAM12T2	12	28	5	43	21.5	9	29	M4	4.5	75	120	4,06
SRAM16T1	SRAM16T2	16	30	5	48	24	10	33	M5	5.5	100	150	6,24
SRAM20T1	SRAM20T2	20	38	6	56	28	11	37	M6	6.6	100	150	10,44
SRAM25T1	SRAM25T2	25	42	6	60	30	14	42	M8	6.6	120	200	13,69
SRAM30T1	SRAM30T2	30	53	8	74	37	14	51	M10	8.6	150	200	20,02
SRAM40T1	SRAM40T2	40	60	8	78	39	18	55	M10	8.6	200	300	32,54

Options for 60 Case™ LinearRace™ Shafting

Danaher Motion has over 45 years of experience in machining hardened, precision-ground Thomson 60 Case LinearRace shafting.

Shown below are some of the many types of machining operations we offer.

Threading of Diameters[(1)]
Threading is available on diameters between 5 and 80 mm. Maximum thread length is 300 mm.
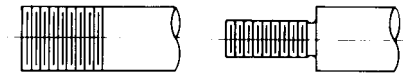
Reduced Diameters[(1)]
Standard tolerance on reduced diameters is ± 0,025 mm; special tolerances to ± 0,007 mm are available. Concentricity of reduced diameters will be within 0,05 mm total indicator reading. For concentricity better than 0,05 mm please contact Application Engineering.
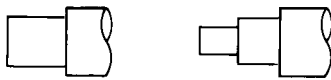
Radial drilled and tapped holes to the center of the LinearRace shaft
Standard tolerance for hole alignment and location is ± 0,4 mm; special tolerances to ± 0,13 mm are available. Radial drilled and tapped holes are available on shaft diameters of 12 mm and larger.
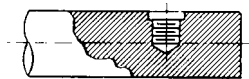
Radial holes drilled and tapped through the LinearRace shaft
Tolerance for alignment and location is ± 0,25 mm. The circumference of the shaft will be annealed and soft at the location of the hole. Available on shaft diameters of 12 mm and larger.
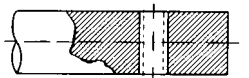
[(1)] LinearRace shafts may be annealed and soft around the circumference along the length and adjacent to the reduced and/or threaded diameter.

Radial holes drilled through the LinearRace shaft
Tolerance for alignment and location is ± 0,25 mm. Diameter tolerance is ± 0,13 mm. Available on shaft diameters of 12 mm and larger.
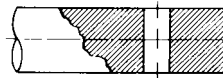
Radial holes drilled and reamed through the LinearRace shaft.
Tolerance for alignment and location is ± 0,25 mm. Diameter tolerance is ± 0,025 mm. Available on shaft diameters of 12 mm and larger. The circumference of the shaft will be annealed and soft at the location of the hole.
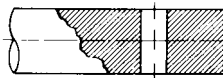
Radial holes drilled through the LinearRace shaft and counterbored
The tolerance for alignment and location is ± 0,25 mm. Available on shaft diameters of 20 mm and larger.

Coaxial holes drilled and tapped in the center of the LinearRace shaft
Concentricity of coaxial holes will be within 0,13 mm.

Retaining Ring Grooves
Standard groove-to-groove location tolerance is ± 0,40mm. Special tolerance of ± 0,13 is available upon request annealed and soft for certain groove profiles.

Flats
The location tolerance of flats will be ± 0,40 mm. The tolerance on the width and depth is ± 0,05 mm.
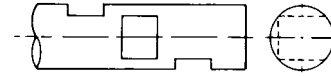
Keyways
The maximum length of a keyway is 250 mm. The tolerance on the width of keyways is ± 0,05 mm. The circumference of the LinearRace shaft along the length of the keyway will be annealed and soft.
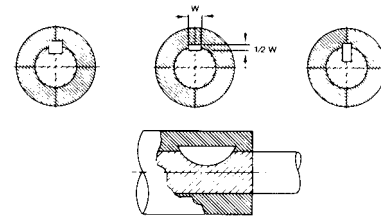
Butt, doweled, and threaded and ground joints for longer length LinearRace shafting
Maximum length of LinearRace shaft with a threaded and ground joint is 6,0 m. concentricity of doweled joints is within 0,025 mm. Butted joints are available on LinearRace shaft diameters of 12 mm and larger. Doweled and threaded ground joints are available on LinearRace shaft diameters of 20 mm and larger. All joints should be supported with a LinearRace support rail.

Threaded and ground joint

Dowel joint

Butted joint
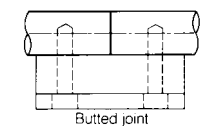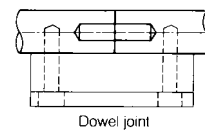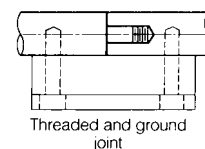
Application - Pick and Place X-Y System

Objective
Build an X-Y System that transfers the work piece between two separate machining stations.

Solution
Assemble the X-Y System utilizing Super Smart Ball Bushings™ Bearing pillow blocks on end supported shafts for the X-axis and continuous supported 60 Case LinearRace™ shaft on the Y-axis. Utilize Thomson Saginaw™ ball screws for high speed positioning.

Products Specified
X–axis
2– 40 MM X 1200 MM (60 Case LinearRace)
4– SB M40 (shaft support blocks)
4– SSE PBA M40 DD (Super Smart pillow blocks)
1– 32 x 5 Thomson ball screw assembly Y-axis
2– LSRA M40 T5 X 1200 mm (Smart Rail™ guides)
4– SSE PBOA M40 DD (Super Smart pillow blocks)
1– 32 x 5 Thomson ball screw assembly

Benefits
The 60 Case LinearRace shafts and shaft support end blocks provided an important bridge between machining stations. The Super Smart pillow blocks and Thomson ball screws provided uninterrupted high speed movement of the work piece. Productivity increased by 200%

60 Case LinearRace
Shaft and Supports
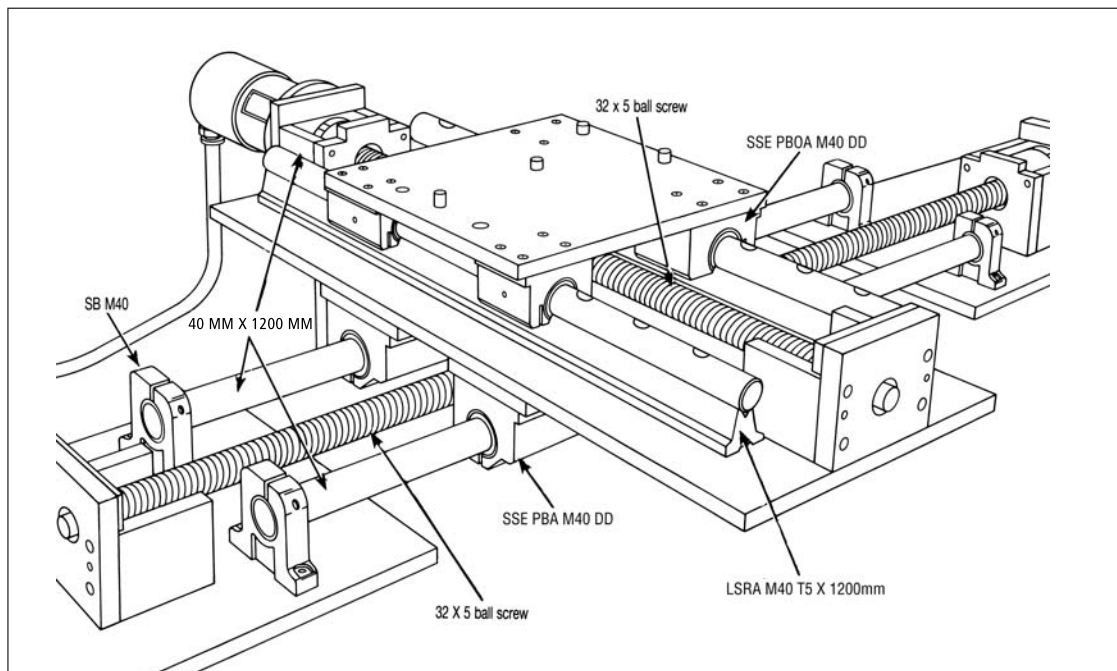
Accessories - Internal retaining rings for Super Smart Ball Bushing™ Bearings and MultiTrac Ball Bushing™ Bearings

Push-in internal retaining rings, as shown, are for use with Super Smart Ball Bushing™ and MultiTrac Ball Bushing™ bearings. Each retaining ring is installed inside the housing bore at each end of the bearing.
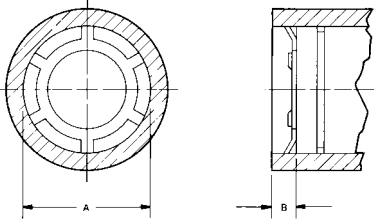
Part Number	Use with Ball Bushing™ bearing No.	Nominal Shaft Dia. mm	Nominal Housing Bore A mm	Min. End Space B mm
PR MO8	SP M08 or MA M08	8	16	1,5
PR M12	SP M12 or MA M12	12	22	2,0
PR M16	SSE M16 or MA M16	16	26	2,0
PR M20	SSE M20 or MA M20	20	32	2,0
PR M25	SSE M25 or MA M25	25	40	2,0
PR M30	SSE M30 or MA M30	30	47	2,0
PR M40	SSE M40 or MA M40	40	62	2,5

External retaining rings for Super Smart Ball Bushing™ Bearings and MultiTrac Ball Bushing™ Bearings

External retaining rings are used to form one or two shoulders on the O.D. of the Super Smart Ball Bushing™ and MultiTrac Ball Bushing™ bearings.
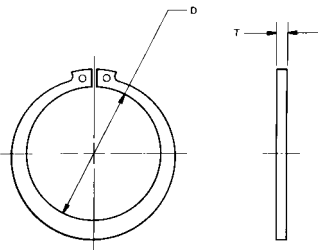
Part Number	Use with Ball Bushing™ bearing No.	Nominal Shaft Dia. mm	Dimensions	
			T mm	Free Dia. D mm
WR MO8	SP M08 or MA M08	8	1,00	14,7
WR M12	SP M12 or MA M12	12	1,20	20,5
WR M16	SSE M16 or MA M16	16	1,20	24,2
WR M20	SSE M20 or MA M20	20	1,50	29,6
WR M25	SSE M25 or MA M25	25	1,75	36,5
WR M30	SSE M30 or MA M30	30	1,75	43,5
WR M40	SSE M40 or MA M40	40	2,00	57,8

External Seals for Super Smart Ball Bushing™ Bearings and MultiTrac Closed Ball Bushing™ Bearings.

Double-acting seals for use in fixed diameter housings.
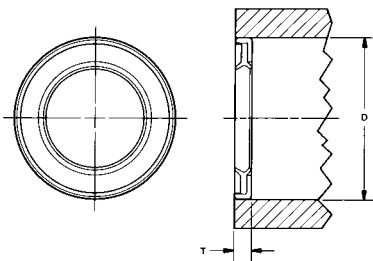
Part Number	Use with Ball Bushing™ bearing No.	Nominal Shaft Dia. mm	Dim T	Nominal(1) Housing Dia. D
SM 08	SP M08 or MA M08	8	3,0	16
SM 12	SP M12 or MA M12	12	3,0	22
SM 16	S SE M16 or MA M16	16	3,0	26
SM 20	S SE M20 or MA M20	20	4,0	32
SM 25	S SE M25 or MA M25	25	4,0	40
SM 30	S SE M30 or MA M30	30	5,0	47
SM 40	S SE M40 or MA M40	40	5,0	62

All dimensions in mm.

External Seals for Super Smart Ball Bushing™ Bearings and Adjustable MultiTrac Ball Bushing™ Bearings

Double-acting seals for use in adjustable diameter housings. Series ADJ seals have a radial slot through the circumference to facilitate diameter adjustment.
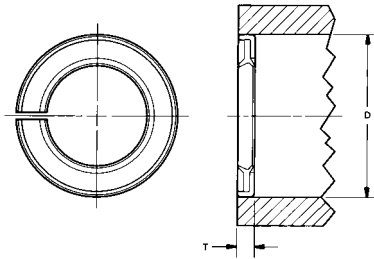
Part Number	Use with Ball Bushing™ bearing No.	Nominal Shaft Dia. mm	Dim T	Nominal(1) Housing Dia. D
SM 08 ADJ	SP M08 or MA M08	8	3,0	16
SM 12 ADJ	SP M12 or MA M12	12	3,0	22
SM 16 ADJ	SSE M16 or MA M16	16	3,0	26
SM 20 ADJ	SSE M20 or MA M16	20	4,0	32
SM 25 ADJ	SSE M25 or MA M25	25	4,0	40
SM 30 ADJ	SSE M30 or MA M30	30	5,0	47
SM 40 ADJ	SSE M40 or MA M40	40	5,0	62

All dimensions in mm.

External Seals for Open Type Super Smart Ball Bushing™ Bearings and MultiTrac Ball Bushing™ Bearings
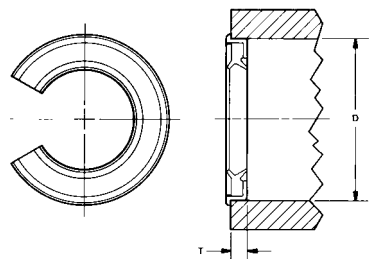
Part Number	Use with Ball Bushing™ bearing No.	Nominal Shaft Dia. mm	Dim T	Nominal(1) Housing Dia. D
SM 12 OPN	SP M12 or MA M12	12	3,20	22
SM 16 OPN	SSE M16 or MA M16	16	3,20	26
SM 20 OPN	SSE M20 or MA M20	20	4,20	32
SM 25 OPN	SSE M25 or MA M25	25	4,20	40
SM 30 OPN	SSE M30 or MA M30	30	5,15	47
SM 40 OPN	SSE M40 or MA M40	40	5,15	62

[1]For use in tolerance zones up to H7. All dimensions in mm.

Double-acting seals for use in open type housings.

THOMSON™

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MOTION

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