



# Stainless Linear Carriages

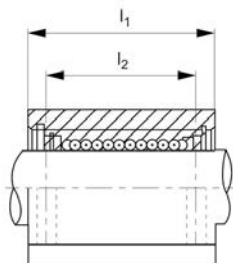
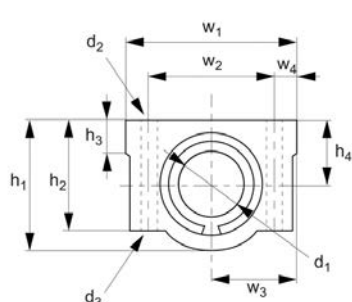
closed

## Linear Bearings



**L1751**

LINEAR BEARINGS



### Material

Aluminium carriage housing with L1709, stainless steel (440C) linear bushing installed.  
Bushing has a resin -RS (POM) or stainless

steel -SS (316) retainer and nitrile rubber (NBR) end seals -UU.  
Stainless steel balls 440C.  
Long versions have L1713 linear bearing installed.

### Technical Notes

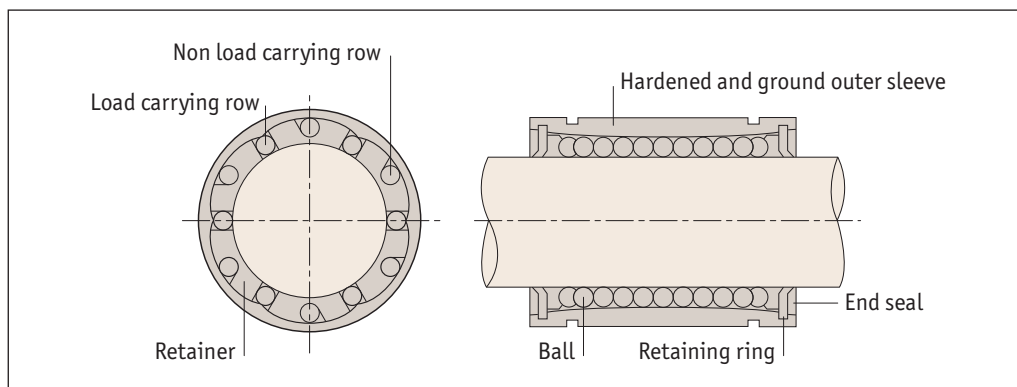
For use with corrosion resistant hardened shafts (see part no. L1772).  
Temperature range: -20°C to +120°C.

| Order No.      | Type   | Ball cage | d <sub>1</sub><br>tol. h6 | l <sub>1</sub> | d <sub>2</sub> | d <sub>3</sub> | h <sub>1</sub> | h <sub>2</sub> | Weight<br>g |
|----------------|--------|-----------|---------------------------|----------------|----------------|----------------|----------------|----------------|-------------|
| L1751.008-RS   | Normal | Resin     | 8                         | 30.0           | M4x 8          | 3.4            | 22.0           | 18.0           | 60          |
| L1751.012-RS   | Normal | Resin     | 12                        | 39.0           | M5x10          | 4.3            | 30.0           | 24.5           | 118         |
| L1751.016-RS   | Normal | Resin     | 16                        | 44.0           | M5x12          | 4.3            | 38.5           | 32.5           | 180         |
| L1751.020-RS   | Normal | Resin     | 20                        | 53.0           | M6x12          | 5.2            | 41.0           | 35.0           | 245         |
| L1751.025-RS   | Normal | Resin     | 25                        | 67.0           | M8x18          | 6.8            | 51.5           | 41.0           | 550         |
| L1751.008-SS   | Normal | Stainless | 8                         | 30.0           | M4x 8          | 3.4            | 22.0           | 18.0           | 60          |
| L1751.012-SS   | Normal | Stainless | 12                        | 39.0           | M5x10          | 4.3            | 30.0           | 24.5           | 118         |
| L1751.016-SS   | Normal | Stainless | 16                        | 44.0           | M5x12          | 4.3            | 38.5           | 32.5           | 180         |
| L1751.020-SS   | Normal | Stainless | 20                        | 53.0           | M6x12          | 5.2            | 41.0           | 35.0           | 245         |
| L1751.025-SS   | Normal | Stainless | 25                        | 67.0           | M8x18          | 6.8            | 51.5           | 41.0           | 550         |
| L1751.008-L-RS | Long   | Resin     | 8                         | 58.0           | M4x 8          | 3.4            | 22.0           | 18.0           | 98          |
| L1751.012-L-RS | Long   | Resin     | 12                        | 77.0           | M5x10          | 4.3            | 30.0           | 24.5           | 232         |
| L1751.016-L-RS | Long   | Resin     | 16                        | 89.0           | M5x12          | 4.3            | 38.5           | 32.5           | 360         |
| L1751.020-L-RS | Long   | Resin     | 20                        | 106.0          | M6x12          | 5.2            | 41.0           | 35.0           | 490         |
| L1751.025-L-RS | Long   | Resin     | 25                        | 136.0          | M8x18          | 6.8            | 51.5           | 41.0           | 1100        |
| L1751.008-L-SS | Long   | Stainless | 8                         | 58.0           | M4x 8          | 3.4            | 22.0           | 18.0           | 98          |
| L1751.012-L-SS | Long   | Stainless | 12                        | 77.0           | M5x10          | 4.3            | 30.0           | 24.5           | 232         |
| L1751.016-L-SS | Long   | Stainless | 16                        | 89.0           | M5x12          | 4.3            | 38.5           | 32.5           | 360         |
| L1751.020-L-SS | Long   | Stainless | 20                        | 106.0          | M6x12          | 5.2            | 41.0           | 35.0           | 490         |
| L1751.025-L-SS | Long   | Stainless | 25                        | 136.0          | M8x18          | 6.8            | 51.5           | 41.0           | 1100        |
| L1751.008-S-RS | Short  | Resin     | 8                         | 14.4           | M4x 8          | 3.4            | 22.0           | 18.0           | 40          |
| L1751.012-S-RS | Short  | Resin     | 12                        | 20.3           | M5x10          | 4.3            | 30.0           | 24.5           | 82          |
| L1751.016-S-RS | Short  | Resin     | 16                        | 22.3           | M5x12          | 4.3            | 38.5           | 32.5           | 122         |
| L1751.020-S-RS | Short  | Resin     | 20                        | 28.3           | M6x12          | 5.2            | 41.0           | 35.0           | 176         |
| L1751.025-S-RS | Short  | Resin     | 25                        | 40.4           | M8x18          | 6.8            | 51.5           | 41.0           | 400         |
| L1751.008-S-SS | Short  | Stainless | 8                         | 14.4           | M4x 8          | 3.4            | 22.0           | 18.0           | 40          |
| L1751.012-S-SS | Short  | Stainless | 12                        | 20.3           | M5x10          | 4.3            | 30.0           | 24.5           | 82          |
| L1751.016-S-SS | Short  | Stainless | 16                        | 22.3           | M5x12          | 4.3            | 38.5           | 32.5           | 122         |
| L1751.020-S-SS | Short  | Stainless | 20                        | 28.3           | M6x12          | 5.2            | 41.0           | 35.0           | 176         |
| L1751.025-S-SS | Short  | Stainless | 25                        | 40.3           | M8x18          | 6.8            | 51.5           | 41.0           | 400         |



| Order No.      | $h_3$ | $h_4$<br>$\pm 0.02$ | $l_2$<br>$\pm 0.2$ | $w_1$ | $w_2$<br>$\pm 0.2$ | $w_3$<br>$\pm 0.02$ | $w_4$ | Dyn. load C<br>N<br>max. | Static load $C_0$<br>N<br>max. | Linear ball bushing used |
|----------------|-------|---------------------|--------------------|-------|--------------------|---------------------|-------|--------------------------|--------------------------------|--------------------------|
| L1751.008-RS   | 6     | 11                  | 18                 | 34    | 24                 | 17                  | 5.0   | 260                      | 400                            | L1709.008                |
| L1751.012-RS   | 8     | 15                  | 26                 | 44    | 33                 | 22                  | 5.5   | 410                      | 590                            | L1709.012                |
| L1751.016-RS   | 9     | 19                  | 34                 | 50    | 36                 | 25                  | 7.0   | 770                      | 1170                           | L1709.016                |
| L1751.020-RS   | 11    | 21                  | 40                 | 54    | 40                 | 27                  | 7.0   | 860                      | 1370                           | L1709.020                |
| L1751.025-RS   | 12    | 26                  | 50                 | 76    | 54                 | 38                  | 11.0  | 980                      | 1560                           | L1709.025                |
| L1751.008-SS   | 6     | 11                  | 18                 | 34    | 24                 | 17                  | 5.0   | 260                      | 400                            | L1709.508                |
| L1751.012-SS   | 8     | 15                  | 26                 | 44    | 33                 | 22                  | 5.5   | 410                      | 590                            | L1709.512                |
| L1751.016-SS   | 9     | 19                  | 34                 | 50    | 36                 | 25                  | 7.0   | 770                      | 1170                           | L1709.516                |
| L1751.020-SS   | 11    | 21                  | 40                 | 54    | 40                 | 27                  | 7.0   | 860                      | 1370                           | L1709.520                |
| L1751.025-SS   | 12    | 26                  | 50                 | 76    | 54                 | 38                  | 11.0  | 980                      | 1560                           | L1709.525                |
| L1751.008-L-RS | 6     | 11                  | 42                 | 34    | 24                 | 17                  | 5.0   | 410                      | 800                            | 2 x L1709.008            |
| L1751.012-L-RS | 8     | 15                  | 64                 | 44    | 33                 | 22                  | 5.5   | 650                      | 1180                           | 2 x L1709.012            |
| L1751.016-L-RS | 9     | 19                  | 79                 | 50    | 36                 | 25                  | 7.0   | 1230                     | 2340                           | 2 x L1709.016            |
| L1751.020-L-RS | 11    | 21                  | 90                 | 54    | 40                 | 27                  | 7.0   | 1370                     | 2740                           | 2 x L1709.020            |
| L1751.025-L-RS | 12    | 26                  | 119                | 76    | 54                 | 38                  | 11.0  | 1560                     | 3120                           | 2 x L1709.025            |
| L1751.008-L-SS | 6     | 11                  | 42                 | 34    | 24                 | 17                  | 5.0   | 410                      | 800                            | 2 x L1709.508            |
| L1751.012-L-SS | 8     | 15                  | 64                 | 44    | 33                 | 22                  | 5.5   | 650                      | 1180                           | 2 x L1709.512            |
| L1751.016-L-SS | 9     | 19                  | 79                 | 50    | 36                 | 25                  | 7.0   | 1230                     | 2340                           | 2 x L1709.516            |
| L1751.020-L-SS | 11    | 21                  | 90                 | 54    | 40                 | 27                  | 7.0   | 1370                     | 2740                           | 2 x L1709.520            |
| L1751.025-L-SS | 12    | 26                  | 119                | 76    | 54                 | 38                  | 11.0  | 1560                     | 3120                           | 2 x L1709.525            |
| L1751.008-S-RS | 6     | 11                  | -                  | 34    | 24                 | 17                  | 5.0   | 260                      | 400                            | L1709.008                |
| L1751.012-S-RS | 8     | 15                  | -                  | 44    | 33                 | 22                  | 5.5   | 410                      | 590                            | L1709.012                |
| L1751.016-S-RS | 9     | 19                  | -                  | 50    | 36                 | 25                  | 7.0   | 770                      | 1170                           | L1709.016                |
| L1751.020-S-RS | 11    | 21                  | -                  | 54    | 40                 | 27                  | 7.0   | 860                      | 1370                           | L1709.020                |
| L1751.025-S-RS | 12    | 26                  | -                  | 76    | 54                 | 38                  | 11.0  | 980                      | 1560                           | L1709.025                |
| L1751.008-S-SS | 6     | 11                  | -                  | 34    | 24                 | 17                  | 5.0   | 260                      | 400                            | L1709.508                |
| L1751.012-S-SS | 8     | 15                  | -                  | 44    | 33                 | 22                  | 5.5   | 410                      | 590                            | L1709.512                |
| L1751.016-S-SS | 9     | 19                  | -                  | 50    | 36                 | 25                  | 7.0   | 770                      | 1170                           | L1709.516                |
| L1751.020-S-SS | 11    | 21                  | -                  | 54    | 40                 | 27                  | 7.0   | 860                      | 1370                           | L1709.520                |
| L1751.025-S-SS | 12    | 26                  | -                  | 76    | 54                 | 38                  | 11.0  | 980                      | 1560                           | L1709.525                |

## Linear ball bushings



### Applications

- Computers and peripheral equipment.
- Recording equipment.
- Linear motion systems.
- Multi-axis drilling machine.
- Printing machines.
- Food packaging machines.
- Punching presses.
- Tool grinders.
- Assembly systems.
- Card selectors.

### Interchangeability

Our linear bushing systems are designed to have full interchangeability, with other manufacturers' parts. **For shafting see part numbers L1770 to L1785.**

### High precision retainer

The single body retainer guides 4-6 ball circuits. It precisely guides the balls with a smooth motion.

### Tolerance of housing bore

Normal fit is standard, pressed fit is for without clearance.

| Type                                             | Case       |             |
|--------------------------------------------------|------------|-------------|
| Part no.                                         | Normal fit | Pressed fit |
| L1706 to L1733                                   | H7         | K6, J6      |
| L1706... <sup>-1</sup> to L1733... <sup>-1</sup> | H7         | J7          |

### Rigid outer sleeve

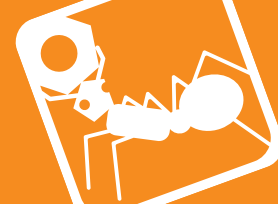
The hardened and precisely ground outer sleeve is made of bearing steel.

### L1750 bushing carriages

Consists of light aluminium case and L1706 type linear bushing, so the installation can be finished simply by bolting. Longer life can be obtained by adjusting the orientation of the ball circuits in the linear carriage element against the direction of load.

### Tolerance of shaft

| Type                                             | Shaft      |           |
|--------------------------------------------------|------------|-----------|
| Part no.                                         | Normal fit | Tight fit |
| L1706 to L1733                                   | h6         | k6        |
| L1706... <sup>-1</sup> to L1733... <sup>-1</sup> | f6, g6     | h6        |



#### Basic dynamic load rating C

The basic dynamic load rating is defined as the constant load both in direction and magnitude under which a group of identical linear bushings are individually operated. 90% of the units can travel 50Km without failing due to rolling contact fatigue.

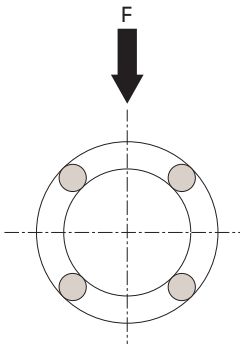
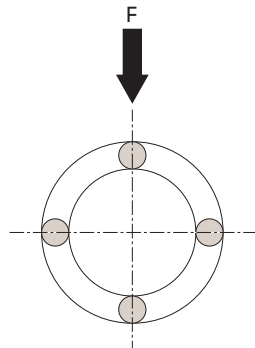
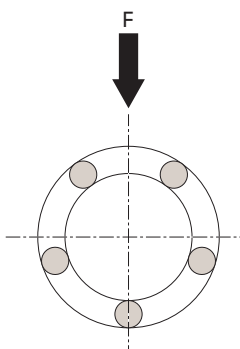
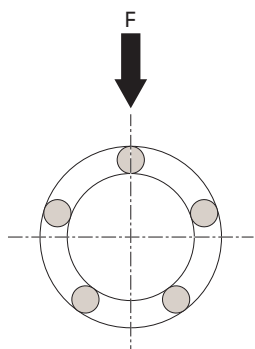
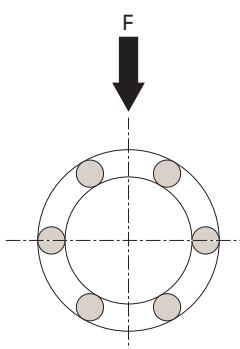
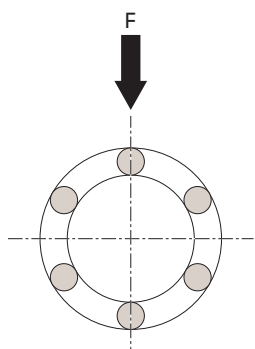
#### Basic static load rating C<sub>0</sub>

If a linear bushing is subject to an excessive load or impact, a permanent deformation occurs between the raceway and the rolling element. The basic static load rating is defined as the static load that gives a prescribed constant contact stress at the centre of the contact area between the rolling element and raceway receiving the maximum load.

#### Relationships between load ratings and the position of ball circuits

Load ratings of linear bushing are affected by the position of the ball circuits as shown below.

Load ratings and orientation of balls.

| No of ball rows | Orientation of balls                                                                 |                                                                                       |
|-----------------|--------------------------------------------------------------------------------------|---------------------------------------------------------------------------------------|
|                 | Maximum load rating                                                                  | Minimum load rating                                                                   |
| 4               |   |   |
|                 | $F = 1.41 \times C$                                                                  | $F = C$                                                                               |
| 5               |  |  |
|                 | $F = 1.46 \times C$                                                                  | $F = C$                                                                               |
| 6               |  |  |
|                 | $F = 1.26 \times C$                                                                  | $F = C$                                                                               |



# Technical Information

## Load rating important information

# Linear Ball Bushings

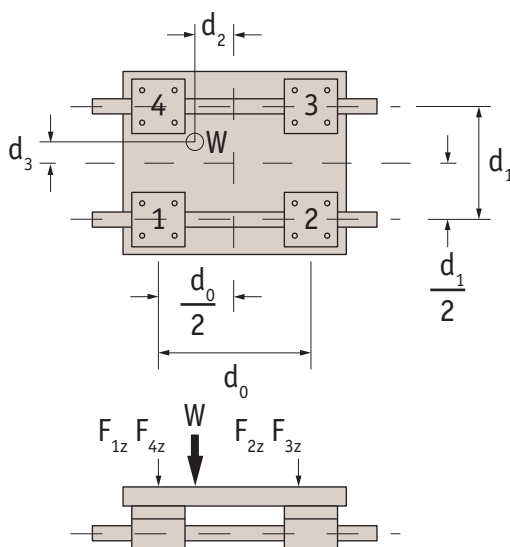
When designing a linear motion system it is necessary to consider how the application will affect performance. The following examples demonstrate how the position of the load and the centre of gravity can influence product selection. When evaluating your application, review each of the forces acting on your system and determine the product that best suits your needs.

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

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

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

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



### Horizontal application

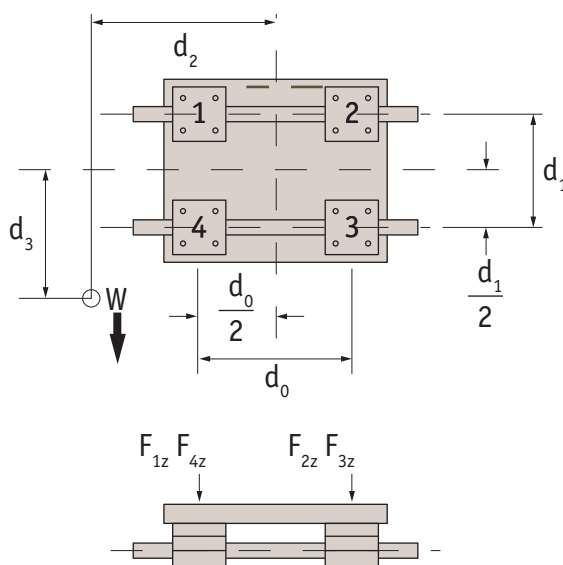
For uniform speed or when stopped.

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

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

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

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



### Horizontal application

For uniform speed or when stopped.



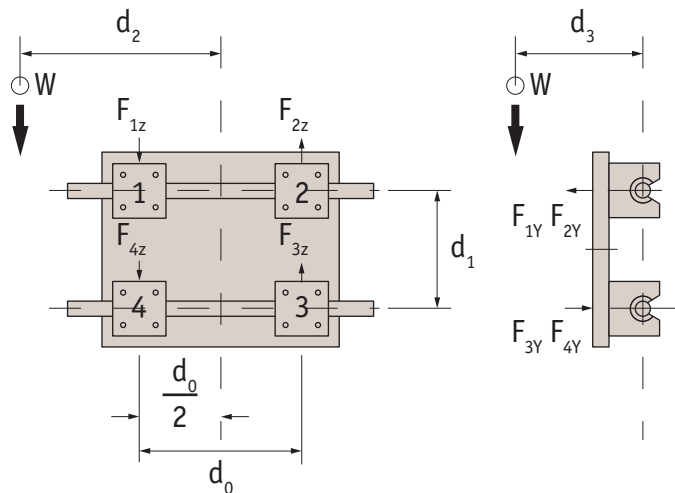
#### Side mounted application

For uniform speed or when stopped.

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

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

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



#### Vertical application

For uniform speed or when stopped. On start up/stop the load varies due to inertia in the system.

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

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

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

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

