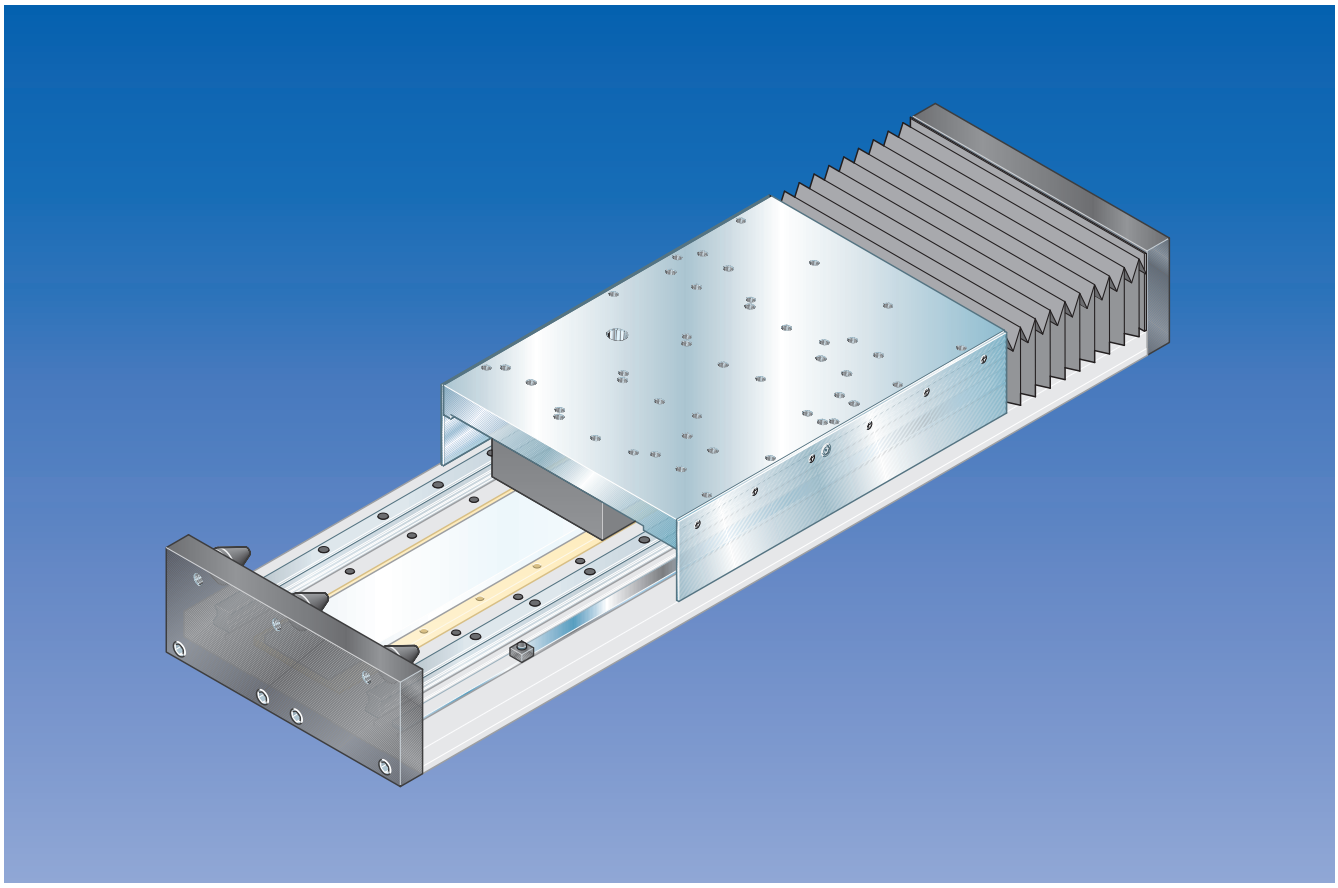
engineering
mannesmann
Rexroth



# STAR – Ball Rail Tables TKL

## with Ball Rail Systems and Linear Motor

Back to Overview

RE 82 531/2000-03

Rexroth
STAR
Star

# STAR – Linear Motion Technology

| | | |
|---|---|---|
| **Ball Rail Systems** | Standard Ball Rail Systems | |
| | Ball Rail Systems with Aluminum Runner Blocks | |
| | Super Ball Rail Systems | |
| | Wide Ball Rail Systems | |
| | Accessories | |
| | Miniature Ball Rail Systems | |
| | Cam Roller Guides | |
| **Roller Rail Systems** | | |
| **Linear Bushings and Shafts** | Linear Bushings | |
| | Linear Sets | |
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| | Shaft Support Rails | |
| | Shaft Support Blocks | |
| | Ball Transfer Units | |
| | Other Engineering Components | |
| **Screw Drives** | | |
| **Linear Motion Systems** | Linear Motion Slides | • Ball Screw Drive<br>• Toothed Belt Drive |
| | Linear Modules | • Linear Motor<br>• Toothed Belt Drive<br>• Rack and Pinion Drive<br>• Pneumatic Drive<br>• Ball Screw Drive |
| | Compact Modules | • Ball Screw Drive |
| | Precision Modules | • Ball Screw Drive |
| | **Ball Rail Tables** | • Linear Motor<br>• Ball Screw Drive |
| | ALU-STAR Profile System | |
| | Controllers, Motors, Electrical Accessories | |
| | Linear Actuators | |

# Ball Rail Tables TKL

# Ball Rail Tables TKL
# Product Overview

**Your direct route to success: our Ball Rail Tables TKL with integrated synchronous linear motor**

Ball Rail Tables TKL will help you solve your linear motion problems rapidly and cost-effectively for a wide variety of different applications – from simple single-axis systems to complex multi-axis configurations.

The well-matched combination of synchronous linear motor, ball rail system, linear encoder and carriage substantially reduces the design complexity of the mechanical structures usually needed for linear motion. Since they require no rotary to linear motion conversion mechanisms, Ball Rail Tables TKL offer you all the advantages of backlash-free drives.

Ball Rail Tables TKL are particularly suitable for applications calling for

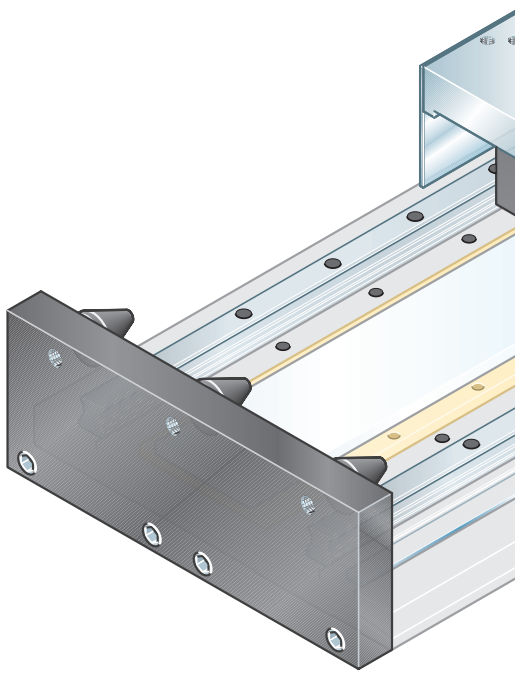
– high speed
– high acceleration
– extremely good positioning.

They can easily master positioning tasks at high approach speeds or involving a rapid succession of short-stroke movements with high acceleration, while coping with even the most demanding positioning accuracy requirements.

Control units and servo amplifiers with SERCOS interface, field bus, analog or positioning interface are available for optimal control of the Ball Rail Tables TKL.

**Application examples:**

– Transfer lines
– Machining centers
– Handling systems
– Textile machines
– Packaging machines
– Testing



**Protection of integrated components**

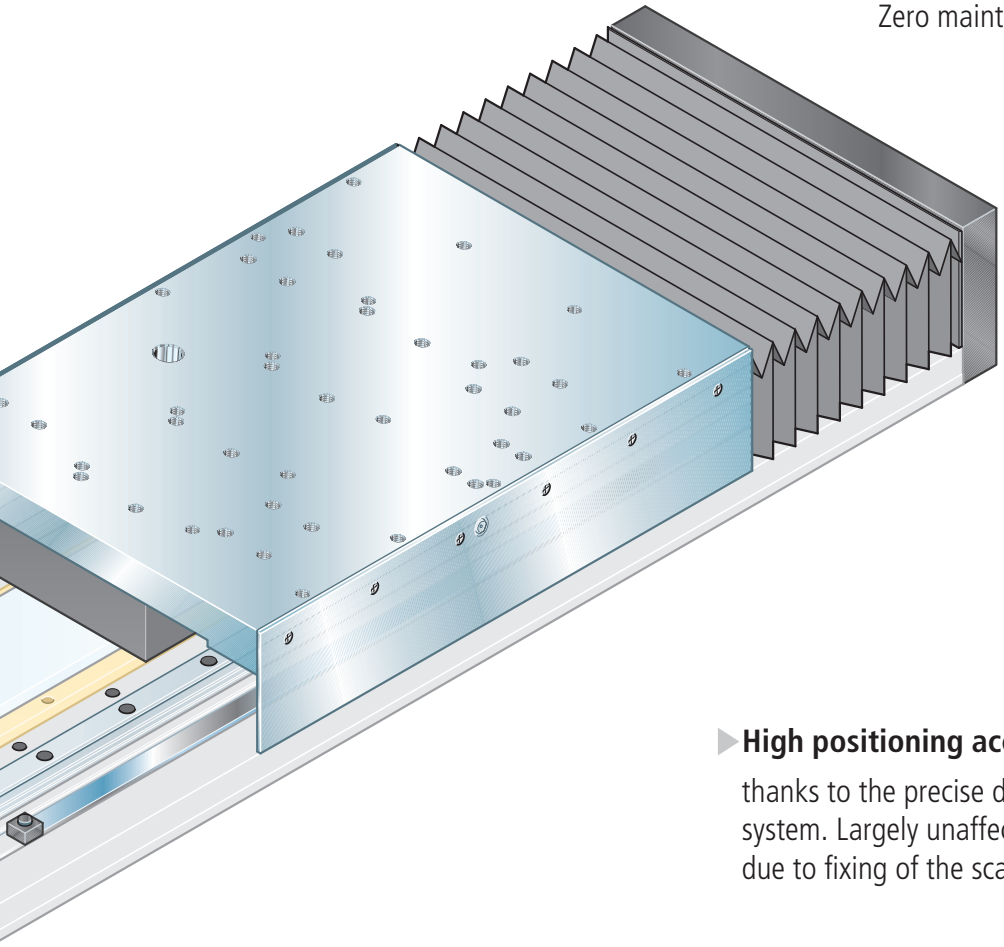
provided by high-quality, high-speed, oil and moisture resistant welded bellows.

**High travel speeds and high acceleration rates**

thanks to excellent dynamics of the linear motor.

**Easy maintenance**

of ball rail system via one central lubrication point. Lube ports provided on both carriage sides. Zero maintenance linear motor.



**Rapid and precise assembly**

due to machined reference edge on the base plate.

**High positioning accuracy**

thanks to the precise distance-coded sensing system. Largely unaffected by temperature due to fixing of the scale on the base plate.

**High load capacity**

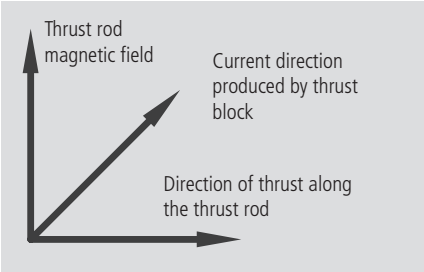
assured by the use of long runner blocks.

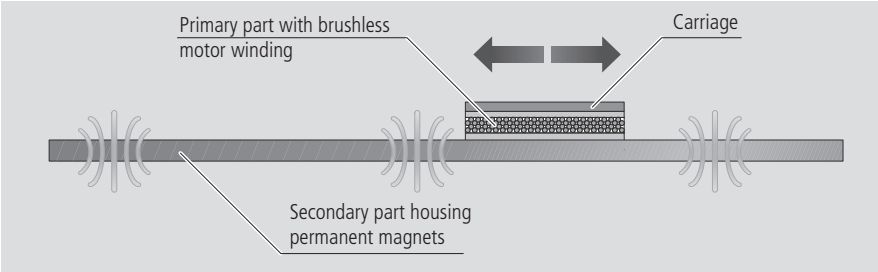
# Ball Rail Tables TKL
# Product Overview

## The Drive Unit

### Basic Principle

The key drive components of Ball Rail Tables TKL are the thrust block (primary part) and the permanently magnetized thrust rod (secondary part).
Two Ball Rail Systems support and guide the primary part and its load. The thrust block and the thrust rod do not come into contact with each other. The weight of the payload is transmitted to the Ball Rail System only.
Unlike rotary drive systems, the linear motor comprises no moving parts and is consequently wear and maintenance free. It is therefore ideal for 24-hour operation.
It also eliminates the need for additional rotary to linear conversion mechanisms. Because there is no backlash, positional repeatability is outstanding and is maintained for life.




## The advantages

**Easy to install and use**

Fully integrated load bearing system, providing a ready-to-install solution for the design engineer. No need to source individual components.

**High speeds and high acceleration**

Synchronous direct linear drive.
Stepless, cogging free motion, no force ripple.

**Precise motion and high dynamic response for life**

Thrust generated directly at the payload. No need for rotary to linear conversion mechanisms, no gears and thus no backlash. Linear high-resolution position sensing system.

**Ultra low EMI generation**

3-phase primary part with low inductance. No open coils. (Protection class IP65)

**Permits high load cycle rates**

Excellent heat dissipation thanks to liquid cooling of primary part.

**Easy maintenance**

No internal moving parts, no wear and no motor maintenance.
Central lube ports for maintenance of runner blocks (on both sides of carriage).

## Safety notes

**Warning**

Danger for people with pacemakers!
The drive unit generates strong magnetic fields (even when switched off!) which can under certain circumstances affect the functioning of pacemakers.
This could cause health problems. We therefore advise people with pacemakers to keep clear of the drive unit. We also recommend to mark hazard zones with a warning sign to DIN 40023.

**Caution**

Risk of injury or damage to the drive unit through improper handling or non-specialist installation!

- Mounting or dismounting only by specialists and using appropriate tools. Please note that the use of ferromagnetic materials can give rise to extremely high forces of attraction. Wrong handling could result in crushed hands or limbs.
- Provide additional external hydraulic shock absorbers in the end positions.
- Encapsulate the drive unit to prevent operational accidents.

**Caution**

On powering up, the system will respond with an initial uncontrolled movement of up to 37.5 mm before performing its reference cycle of 80 mm max.

**Caution**

Uncontrolled carriage movements can be caused by external factors affecting the optical position sensing system!
Use suitable covers to protect the position sensing system against external influences such as dirt or water.

**Caution**

Interference with on-board electronic systems in transportation (e.g. aircraft) due to strong magnetic fields! It is therefore vital to observe the relevant rules and regulations when transporting drive units.

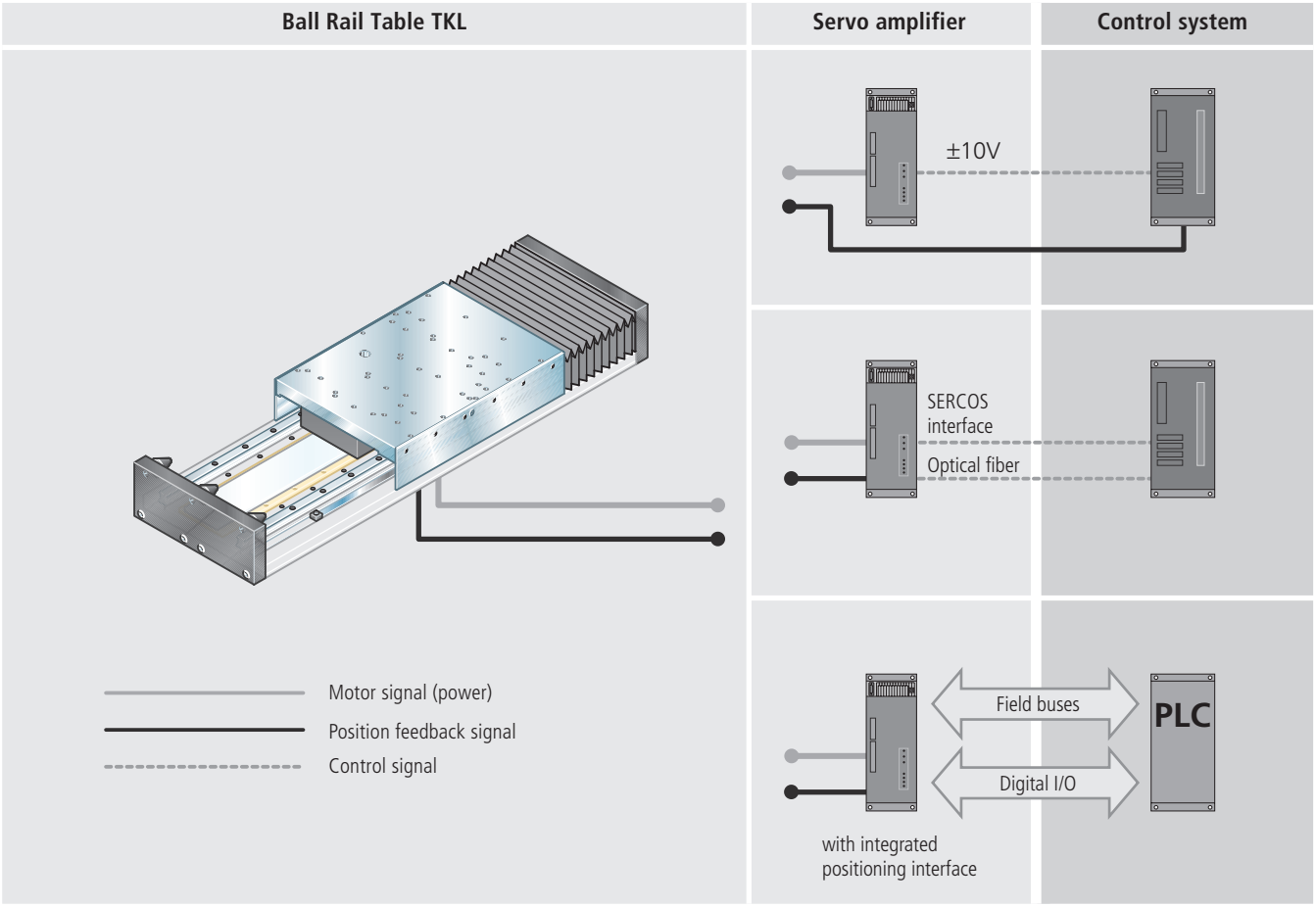
# The Control System

## Basic principle

Rexroth Star offers matching servo amplifiers for the Ball Rail Table TKL (see catalog RE 82 701 "Controllers, Motors, Electrical Accessories").

They power the linear motor as well as constituting the interface to a master control system.

A linear encoder system integrated in the mechanical structure signals the carriage's actual position to the control system position loop.




## The advantages

### Various command signal interfaces offered

Available options:

- Control via analog +/- 10 V signal (velocity command signal)
- Control via SERCOS interface
- Control via positioning interface (integrated in the servo amplifier)
- Control via field buses

### Complete with position measuring system

Ready for connection to the linear measuring inputs in your servo amplifier or control unit.

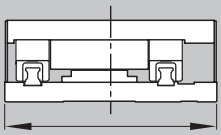
### Matching servo amplifier

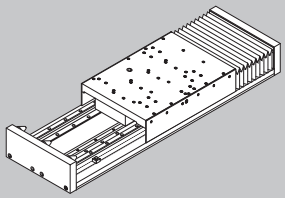
Designed for easy connection and installation. Diagnostic interface as standard.

# Ball Rail Tables TKL
# Product Overview

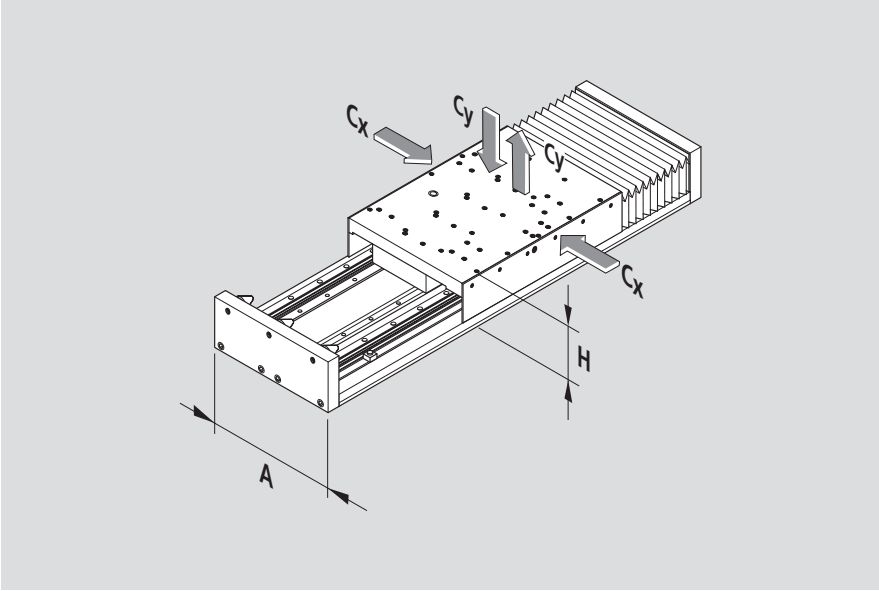
## Type designation (size)

The Ball Rail Tables are designated according to **type** and **size**.

| Ball Rail Tables TKL (example) = | Type | | | Size | |
|---|---|---|---|---|---|
| | T | K | L | 25- | 325 |
| **System** = Ball Rail Table ( **T** ) | | | | | |
| **Guideway** = Ball Rail System ( **K** ) | | | | | |
| **Drive unit** = Linear motor ( **L** ) | | | | | |
| **Dimensions of guideway** =  | | | | | |
| **Frame dimensions** =  | | | | | |

| | Type | Guideway | Drive unit | Ball Rail Table | |
|---|---|---|---|---|---|
| **STAR – Ball Rail Tables** | **TKL** |  **Ball Rail System** |  **Linear Motor** |  | |

## Overview of Ball Rail Tables with permissible loads




**Note**

The given values for the dynamic load capacity C depend on the carriage length and the motor version selected!

## Suitable loads

**(recommended values)**

As far as the desired service life is concerned, loads of up to approximately 20% of the dynamic load and moment values (C, $M_t$, $M_L$) have proved acceptable.

With a side load above 8% C, it should be taken into account when considering the service life that only one rail is secured laterally.

Higher side loads are only taken up by the runner blocks on the secured rail.

| Ball Rail Table | Dimensions A x H (mm) | Dynamic load capacity $C_X$ (N)[1)] | Dynamic load capacity $C_Y$ (N)[1)] |
|---|---|---|---|
| TKL 25 - 325 | 325 x 125 | 76000 | max. 68000 |
| TKL 35 - 440 | 440 x 145 | 139000 | max. 128 000 |

[1)] Take maximum loads into account.

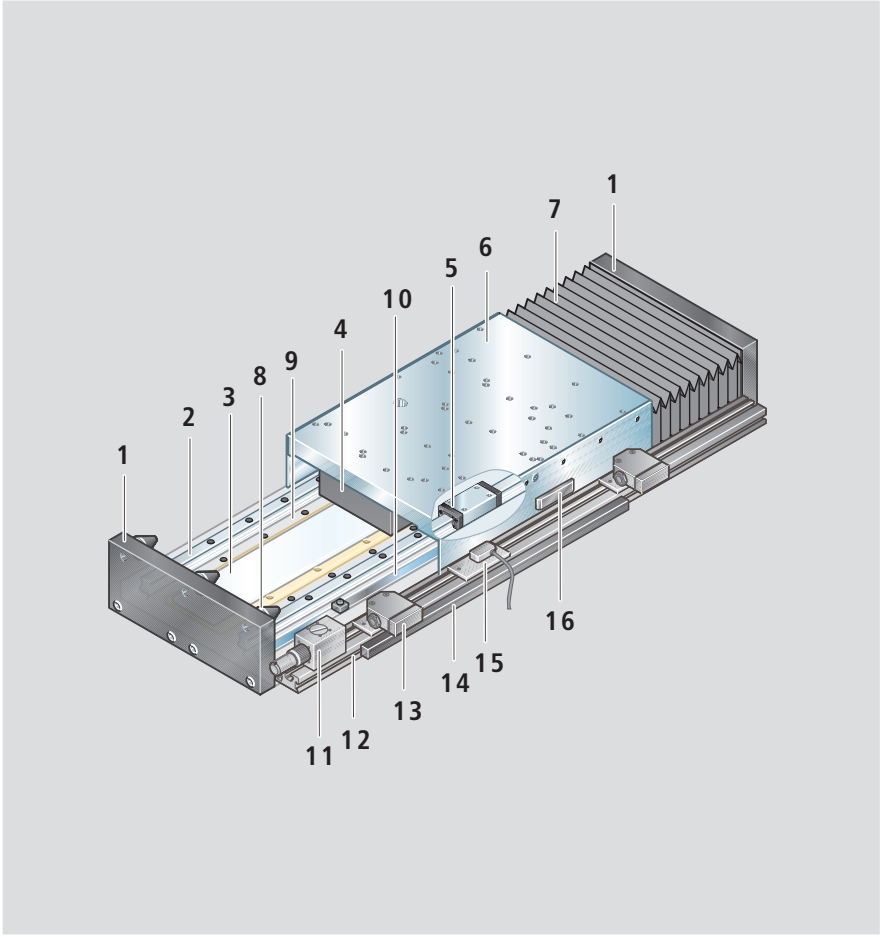
# Ball Rail Tables TKL
# Structure

## Structure

**1** End-plate
**2** Guide rail
**3** Linear motor secondary part
**4** Linear motor primary part
**5** Runner block
(4 in total)
**6** Carriage (aluminum)
**7** Polyurethane protective bellows
**8** Rubber buffer
**9** Base plate (aluminum)

Accessories:

**10** Position measuring system
**11** Socket/plug
**12** Profiled support
**13** Mechanical switch
(with mounting accessories)
**14** Cable duct
(aluminum alloy)
**15** Proximity switch
(with mounting accessories)
**16** Switching cam




## Motor data

| Motor | Motor winding[2] | Peak thrust (N) | Continuous thrust[1] (N) | Peak speed (m/min)[2] | Peak acceleration ($m/s^2$) | Force constant (N/A) | Peak current (A) | Continuous current (A) | Phase inductance (mH) |
|---|---|---|---|---|---|---|---|---|---|
| **LSF 080 K** | **B** | 2300 | 950 | 200 | 60 | 63 | 41 | 15 | 18 |
| | **C** | 2300 | 950 | 200 | 60 | 73 | 43 | 13 | 23.8 |
| **LSF 080 L** | **A** | 3500 | 1400 | 200 | 70 | 61 | 100 | 23 | 12 |
| | **B** | 3500 | 1400 | 200 | 70 | 83 | 50 | 16.9 | 21 |
| | **C** | 3500 | 1400 | 200 | 70 | 119 | 40 | 11.8 | 44 |
| **LSF 080 M** | **A** | 4700 | 1900 | 200 | 75 | 70 | 100 | 27 | 11 |
| | **B** | 4700 | 1900 | 200 | 75 | 92 | 75 | 20.7 | 19 |
| **LSF 120 K** | **A** | 3800 | 1500 | 200 | 60 | 56 | 90 | 26.8 | 9.5 |
| | **B** | 3800 | 1500 | 200 | 60 | 82 | 60 | 18.30 | 20 |
| | **C** | 3800 | 1500 | 200 | 60 | 130 | 40 | 11.5 | 50 |
| **LSF 120 L** | **A** | 5800 | 2300 | 200 | 70 | 70 | 100 | 33 | 10 |
| | **B** | 5800 | 2300 | 200 | 70 | 84 | 100 | 27.5 | 14 |
| | **C** | 5800 | 2300 | 200 | 70 | 112 | 75 | 20.6 | 25 |
| **LSF 120 M** | **A** | 7800 | 3100 | 200 | 75 | 141 | 75 | 22 | 29 |
| | **B** | 7800 | 3100 | 200 | 75 | 108 | 90 | 28.7 | 17 |
| | **C** | 7800 | 3100 | 200 | 75 | 63 | 175 | 49 | 6 |

[1] With active liquid cooling. $Q_{min}$: 4l/min. Inlet temperature: max. 30°C.
Protection class of all motor primary part components: IP 65.

[2] Maximum speeds will vary according to the motor winding and controller combination.
Speeds of up to 200 m/min possible, though service life will be limited.

# Technical Data

## General technical data

| Size | Motor | Motor winding | Carriage length (mm) | Dyn. load capacity C (N) | Dynamic moment $M_t$ (Nm) | Dynamic moment $M_L$ (Nm) | Maximum load $F_y$ (N) | Maximum load $F_x$ (N) | Moved mass[1] $m_b$ (kg) | Maximum length $L_{max}$[2] (mm) | Planar moment of inertia $I_x$ ($cm^4$) | Planar moment of inertia $I_y$ ($cm^4$) |
|---|---|---|---|---|---|---|---|---|---|---|---|---|
| TKL 25-325 | LSF 080 K | B | 515 | 68000 | 7000 | 8900 | 93 600 | 23 400 | 37 | 2880 | 64.8 | 8051 |
| | | C | | | | | | | | | | |
| | LSF 080 L | A | 665 | 65000 | 6700 | 11300 | | | 47 | | | |
| | | B | | | | | | | | | | |
| | | C | | | | | | | | | | |
| | LSF 080 M | A | 815 | 62000 | 6300 | 13400 | | | 57 | | | |
| | | B | | | | | | | | | | |
| TKL 35-440 | LSF 120 K | A | 555 | 128000 | 17000 | 17000 | 163 200 | 40 800 | 64.5 | 3000 | 212 | 27230 |
| | | B | | | | | | | | | | |
| | | C | | | | | | | | | | |
| | LSF 120 L | A | 705 | 123000 | 16000 | 22000 | | | 80.5 | | | |
| | | B | | | | | | | | | | |
| | | C | | | | | | | | | | |
| | LSF 120 M | A | 855 | 118000 | 15000 | 26000 | | | 96 | | | |
| | | B | | | | | | | | | | |
| | | C | | | | | | | | | | |

1) Excluding the mass of cables and the power input cable.

2) Up to 15000 mm possible in special versions.

## Weight calculation

TKL 25-325:

$$M = 0.045 \cdot L + m_b - 5$$

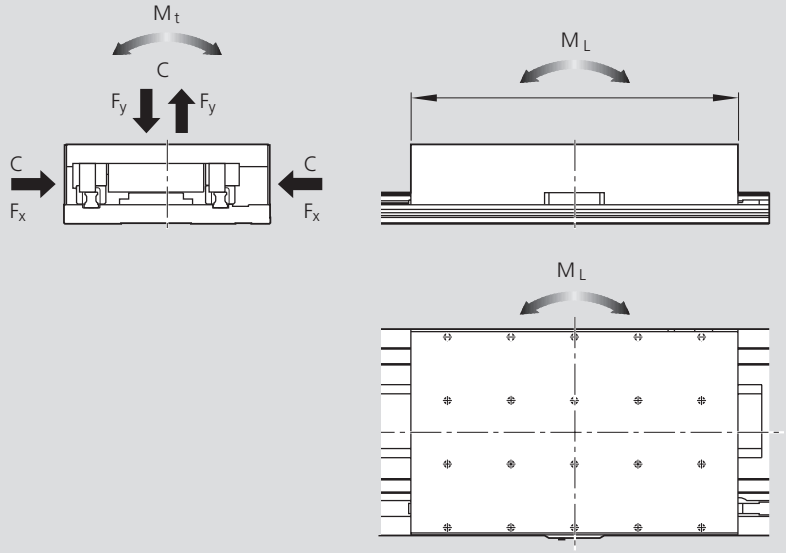
TKL 35-440:

$$M = 0.077 \cdot L + m_b - 12$$

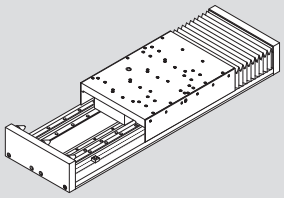
| | | | |
|---|---|---|---|
| M | = | Total mass of Ball Rail Table | (kg) |
| L | = | Total length of system | (mm) |
| $m_b$ | = | Moved mass | (kg) |

## Note on dynamic load capacities and moments

The dynamic load capacities and moments are based on 100,000 m travel.
However, a travel of just 50,000 m is often taken as a basis.
If this is the case, for comparison purposes:
Multiply values C, $M_t$ and $M_L$ from the table by 1.26.



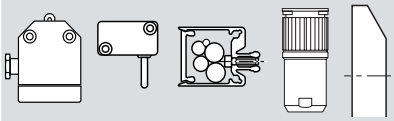
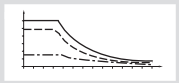
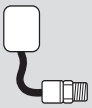
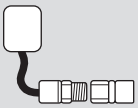
# Ball Rail Tables TKL
# Components and Ordering Data TKL 25-325

| Part number<br>1450-405-00, (....) mm | | Guideway (..) | Drive unit (..) | | | Carriage (..) | | Power input cable (..) | |
|---|---|---|---|---|---|---|---|---|---|
| | | | Motor winding | | | Preload of guideway | | | |
| | | | A | B | C | 2% C | 8% C | | |
|  | **Primary part K Carriage length 515** | (01) | | (02) | (03) | (01) | (02) | on request | |
| | **Primary part L Carriage length 665** | (02) | (11) | (12) | (13) | (11) | (12) | on request | |
| | **Primary part M Carriage length 815** | (03) | (21) | (22) | | (21) | (22) | on request | |

Control units and servo amplifiers on request.

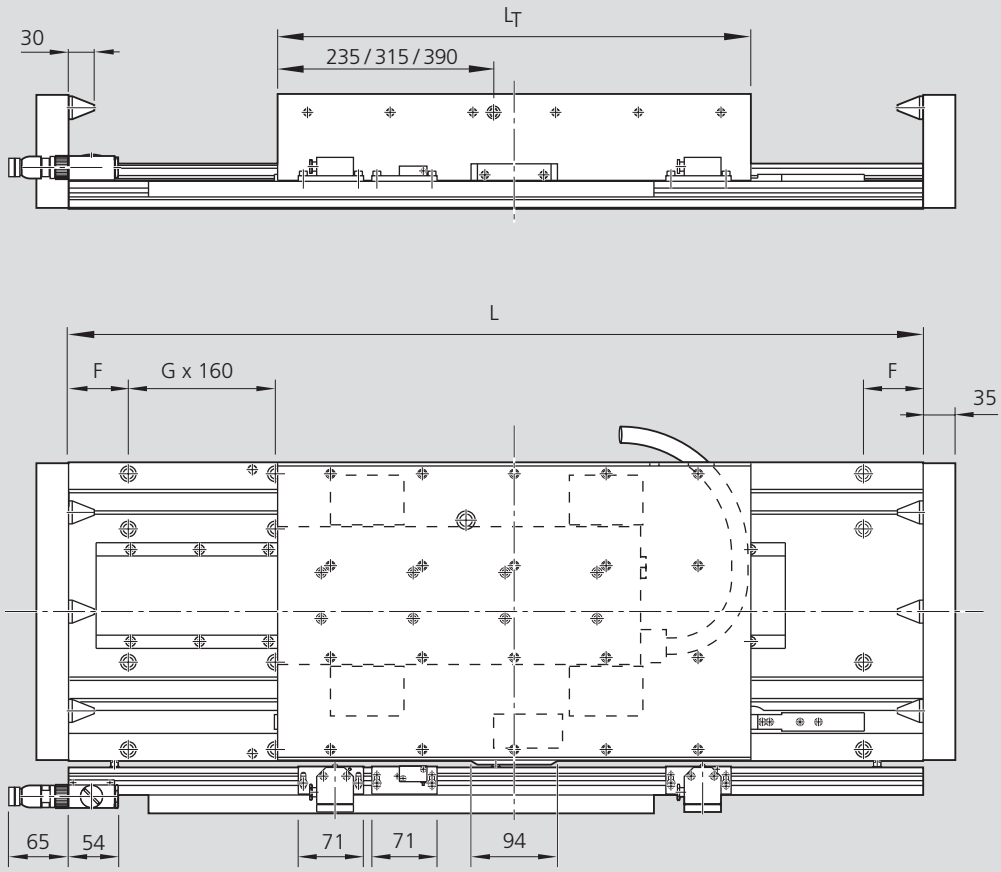
## Order example

| Ordering data | | Description |
|---|---|---|
| Ball Rail Table TKL<br>(part number): 1450-405-00 | | Ball Rail Table<br>TKL |
| **Guideway** | = 01 | ball rail system |
| **Drive unit** | = 02 | LSF 080 K B |
| **Carriage** | = 02 | carriage 515 mm long, 8% preload |
| **Position measuring system** | = 01 | optical encoder Heidenhain LIDA 185 C |
| **Cover** | = 01 | polyurethane bellows |
| **End cushioning** | = 02 | with end-plate and rubber buffers |
| **Documentation** | = 02 | measurement report: frictional drag |

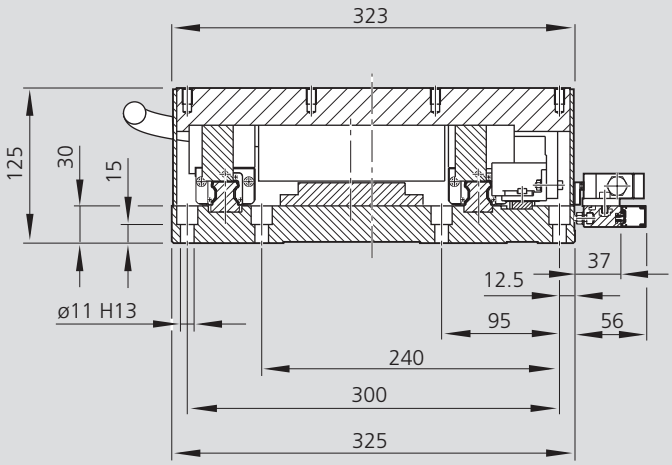
| | Position measuring system (..) | | Cover (..) | | Rubber buffers (..) | Switches (..) | Documentation (..) |
|---|---|---|---|---|---|---|---|
| |  | |  | |  |  |  |
| |  without plug |  with plug | without | Poly-urethane bellows | | Socket/plug = (..)<br>Switching cam = (..)<br>Cable duct = (..) | Standard report |
| | (01) | (11) | (00) | | (01) with | without (00)<br>Switches*:<br>PNP NC (11)<br>PNP NO (13)<br>NPN NC (12)<br>NPN NO (14)<br>Mechanical switch (15)<br>Cable duct* length = L (20)<br>Socket/plug* (17)<br>Switching cam* (26) | (02) Frictional drag<br>(05) Positioning accuracy<br>(07) Frictional drag and positioning accuracy |
| | (02) | (12) | | | | | |
| | (03) | (13) | (01) | | (02) without | | |

* supplied loose

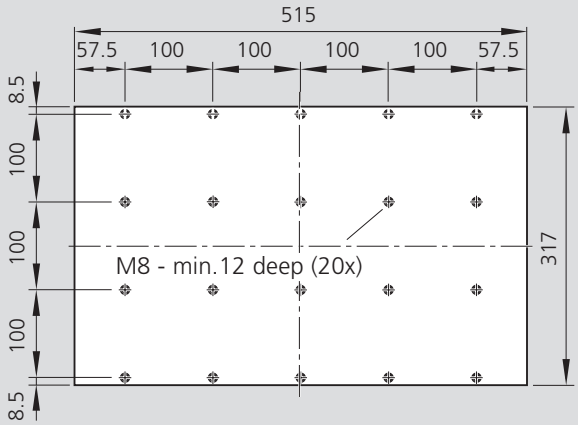
# Ball Rail Tables TKL
# Dimension Drawings TKL 25-325



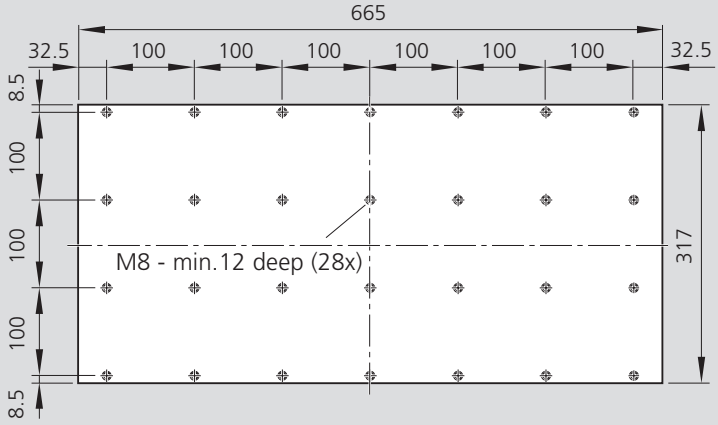

| Length L (mm) | Counterbored mounting hole spacing F - G x 160 - F | Max. travel (mm) (without bellows) for carriage length 515 | 655 | 815 | Max. travel (mm) (with bellows) for carriage length 515 | 655 | 815 |
|---|---|---|---|---|---|---|---|
| **630** | 75 - 3 x 160 - 75 | 55 | - | - | 61 | - | - |
| **780** | 70 - 4 x 160 - 70 | 205 | 55 | - | 195 | 61 | - |
| **930** | 65 - 5 x 160 - 65 | 355 | 205 | 55 | 328 | 195 | 61 |
| **1080** | 60 - 6 x 160 - 60 | 505 | 355 | 205 | 462 | 328 | 195 |
| **1230** | 55 - 7 x 160 - 55 | 655 | 505 | 355 | 595 | 462 | 328 |
| **1380** | 50 - 8 x 160 - 50 | 805 | 655 | 505 | 729 | 595 | 462 |
| **1530** | 45 - 9 x 160 - 45 | 955 | 805 | 655 | 862 | 729 | 595 |
| **1680** | 40 - 10 x 160 - 40 | 1105 | 955 | 805 | 996 | 862 | 729 |
| **1830** | 35 - 11 x 160 - 35 | 1255 | 1105 | 955 | 1130 | 996 | 862 |
| **1980** | 30 - 12 x 160 - 30 | 1405 | 1255 | 1105 | 1263 | 1130 | 996 |
| **2130** | 25 - 13 x 160 - 25 | 1555 | 1405 | 1255 | 1397 | 1263 | 1130 |
| **2280** | 20 - 14 x 160 - 20 | 1705 | 1555 | 1405 | 1530 | 1397 | 1263 |
| **2430** | 15 - 15 x 160 - 15 | 1855 | 1705 | 1555 | 1664 | 1530 | 1397 |
| **2580** | 90 - 15 x 160 - 90 | 2005 | 1855 | 1705 | 1797 | 1664 | 1530 |
| **2730** | 85 - 16 x 160 - 85 | 2155 | 2005 | 1855 | 1931 | 1797 | 1664 |
| **2880** | 80 - 17 x 160 - 80 | 2305 | 2155 | 2005 | 2065 | 1931 | 1797 |



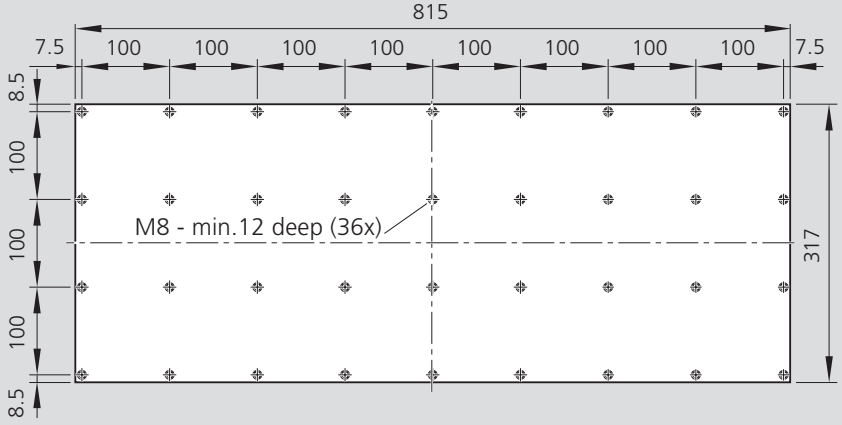

**Mounting hole pattern for carriage length $L_T$ = 515**



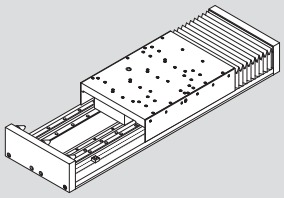

**Mounting hole pattern for carriage length $L_T$ = 665**




**Mounting hole pattern for carriage length $L_T$ = 815**



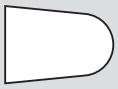
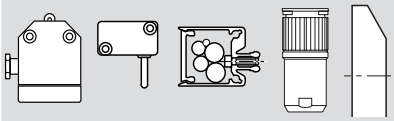
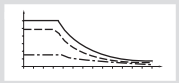
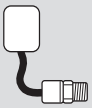
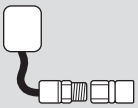
# Ball Rail Tables TKL
# Components and Ordering Data TKL 35-440

| Part number<br>1450-505-00, (....) mm | | Guideway (..) | Drive unit (..) | | | Carriage (..) | | Power input cable (..) | |
|---|---|---|---|---|---|---|---|---|---|
| | | | Motor winding | | | Preload of guideway | | | |
| | | | A | B | C | 2% C | 8% C | | |
|  | **Primary part K<br>Carriage length 555** | (01) | (01) | (02) | (03) | (01) | (02) | on request | |
| | **Primary part L<br>Carriage length 705** | (02) | (11) | (12) | (13) | (11) | (12) | on request | |
| | **Primary part M<br>Carriage length 855** | (03) | (21) | (22) | (23) | (21) | (22) | on request | |

Control units and servo amplifiers on request.

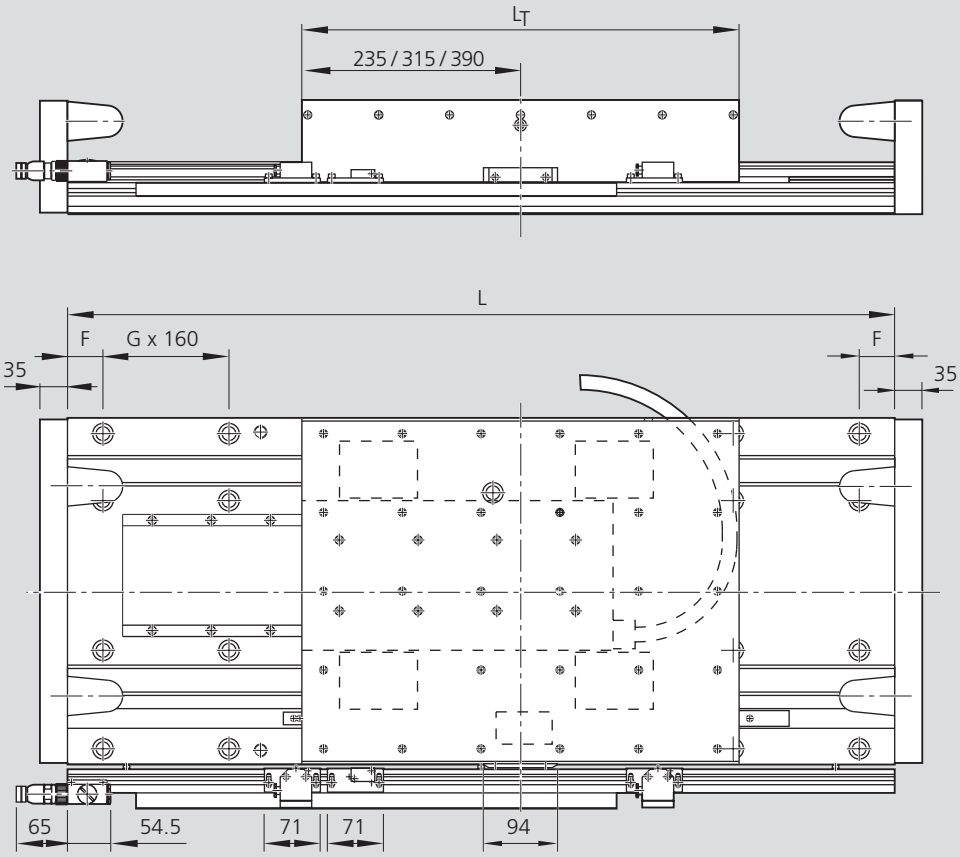
## Order example

| Ordering data | | Description |
|---|---|---|
| Ball Rail Table TKL<br>(part number): 1450-505-00 | | Ball Rail Table<br>TKL |
| **Guideway** | = 01 | ball rail system |
| **Drive unit** | = 01 | LSF 120 K B |
| **Carriage** | = 02 | carriage 550 mm long, 8% preload |
| **Position measuring system** | = 01 | optical encoder Heidenhain LIDA 185 C |
| **Cover** | = 01 | polyurethane bellows |
| **End cushioning** | = 02 | with end-plate and rubber buffers |
| **Documentation** | = 01 | standard report |

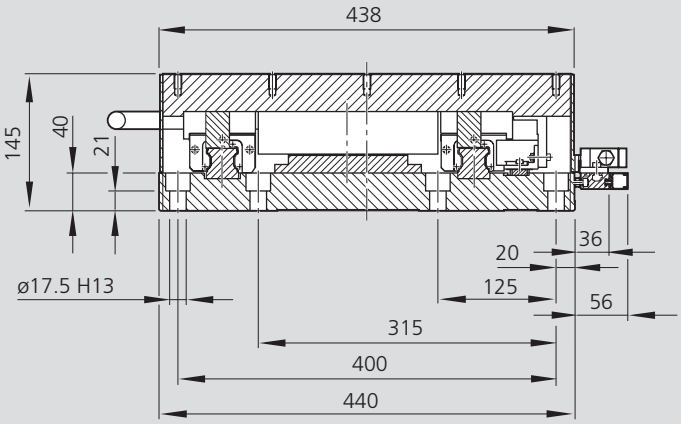
| | Position measuring system (..) | | Cover (..) | | Rubber buffers (..) | Switches (..) | Documentation (..) |
|---|---|---|---|---|---|---|---|
| |  | |  | |  |  |  |
| |  without plug |  with plug | without | Poly-urethane bellows | | Socket/plug = (..)<br>Switching cam = (..)<br>Cable duct = (..) | Standard report |
| | (01) | (11) | (00) | | (01) with | without (00)<br>Switches*:<br>PNP NC (11)<br>PNP NO (13)<br>NPN NC (12)<br>NPN NO (14)<br>Mechanical switch (15)<br>Cable duct* length = L (20)<br>Socket/plug* (17)<br>Switching cam* (26) | (02) Frictional drag<br>(05) Positioning accuracy<br>(07) Frictional drag and positioning accuracy |
| | (02) | (12) | | | | | |
| | (03) | (13) | (01) | | (02) without | | |

* supplied loose

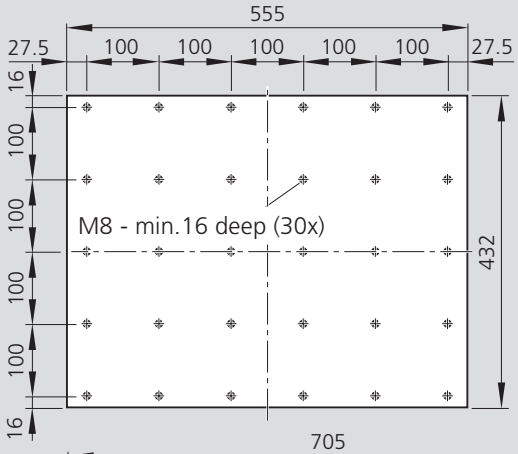
# Ball Rail Tables TKL
# Dimension Drawings TKL 35-440



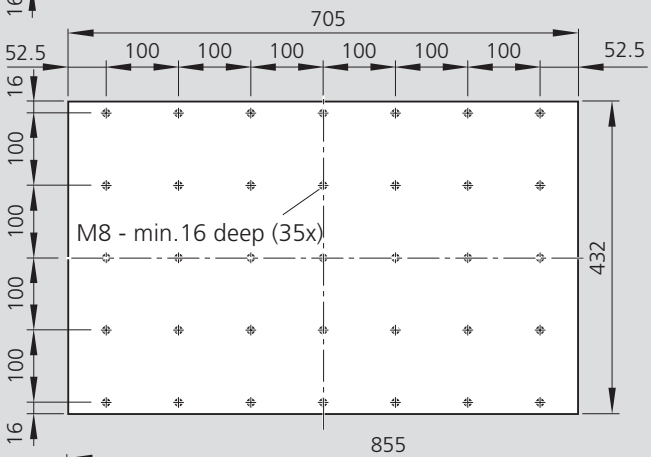

| Length L (mm) | Counterbored mounting hole spacing F - G x 160 - F | Max. travel (mm) (without bellows) for carriage length 555 | 705 | 855 | Max. travel (mm) (with bellows) for carriage length 555 | 705 | 855 |
|---|---|---|---|---|---|---|---|
| **750** | 55 - 4 x 160 - 55 | 55 | - | - | 132 | - | - |
| **900** | 50 - 5 x 160 - 50 | 205 | 55 | - | 266 | 132 | - |
| **1050** | 45 - 6 x 160 - 45 | 355 | 205 | 55 | 399 | 266 | 132 |
| **1200** | 40 - 7 x 160 - 40 | 505 | 355 | 205 | 533 | 399 | 266 |
| **1350** | 35 - 8 x 160 - 35 | 655 | 505 | 355 | 667 | 533 | 399 |
| **1500** | 30 - 9 x 160 - 30 | 805 | 655 | 505 | 800 | 667 | 533 |
| **1650** | 25 - 10 x 160 - 25 | 955 | 805 | 655 | 934 | 800 | 667 |
| **1800** | 20 - 11 x 160 - 20 | 1105 | 955 | 805 | 1067 | 934 | 800 |
| **1950** | 15 - 12 x 160 - 15 | 1255 | 1105 | 955 | 1201 | 1067 | 934 |
| **2100** | 90 - 12 x 160 - 90 | 1405 | 1255 | 1105 | 1334 | 1201 | 1067 |
| **2250** | 85 - 13 x 160 - 85 | 1555 | 1405 | 1255 | 1468 | 1334 | 1201 |
| **2400** | 80 - 14 x 160 - 80 | 1705 | 1555 | 1405 | 1602 | 1468 | 1334 |
| **2550** | 75 - 15 x 160 - 75 | 1855 | 1705 | 1555 | 1735 | 1602 | 1468 |
| **2700** | 70 - 16 x 160 - 70 | 2005 | 1855 | 1705 | 1869 | 1735 | 1602 |
| **2850** | 65 - 17 x 160 - 65 | 2155 | 2005 | 1855 | 2002 | 1859 | 1735 |
| **3000** | 60 - 18 x 160 - 60 | 2305 | 2155 | 2005 | 2136 | 2002 | 1859 |



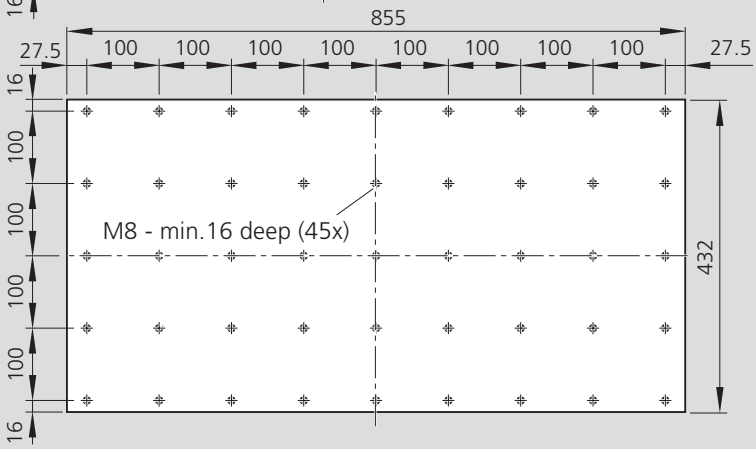

**Mounting hole pattern for carriage length $L_T$ = 555**




**Mounting hole pattern for carriage length $L_T$ = 705**

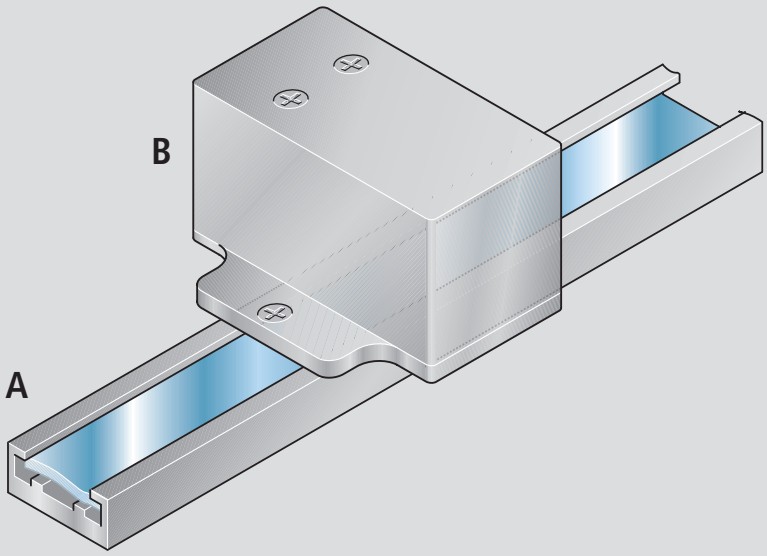



**Mounting hole pattern for carriage length $L_T$ = 855**



# Ball Rail Tables TKL
# Position Measuring System

**Optical encoder**
**Heidenhain LIDA 185 C**




**A: Steel scale,**
incremental
distance coded

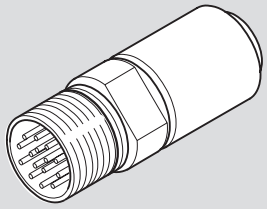
| | |
|---|---|
| Width: | 16 mm |
| Grid ruling: | 40 µm |
| Temperature coefficient: | depends on base plate |
| Operating temperature: | 0 - 50°C |

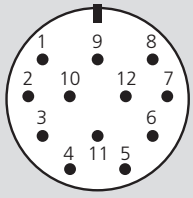
**B: Scanner**

| | |
|---|---|
| Operating temperature: | 0 - 50°C |
| Cable length: | 3 m with coupling (standard) |

## Pin allocation

**12-pin coupling**






| 5 | 6 | 8 | 1 | 3 | 4 | 12 | 10 | 2 | 11 | 9 | 7 | / |
|---|---|---|---|---|---|---|---|---|---|---|---|---|
| **A** | | **B** | | **R** | | **5 V UP** | **0 V UN** | **5 V sensor** | **0 V sensor** | **free** | **/** | **free** |
| + | – | + | – | + | – | | | | | | | |
| brown | green | gray | pink | red | black | brown/ green | white/ green | blue | white | / | violet | yellow |

IEC742 EN 50178

# Switch Mounting Arrangements

## Switch mounting

### Switching system overview

**1** Socket and plug

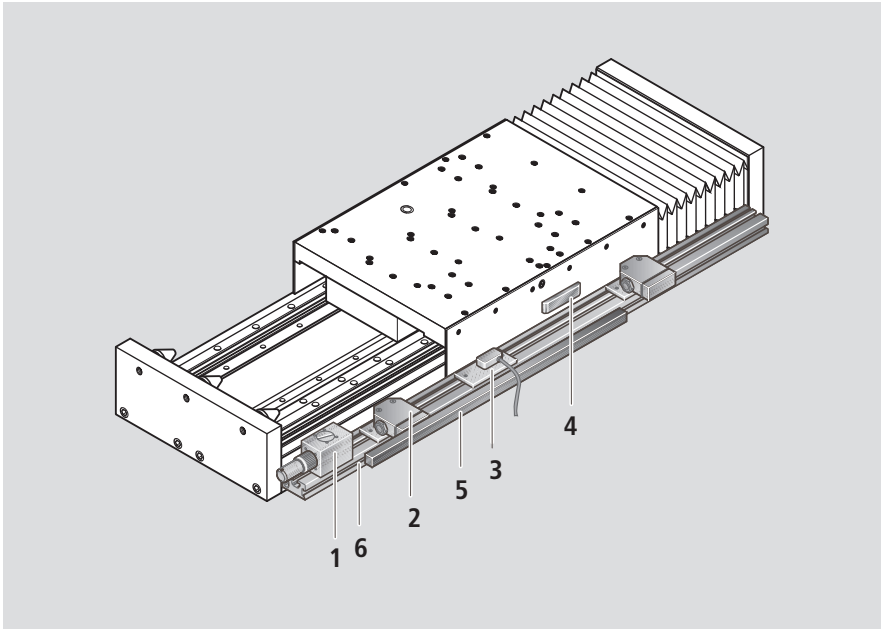
**2** Mechanical switch (with mounting accessories)

**3** Proximity switch (with mounting accessories)

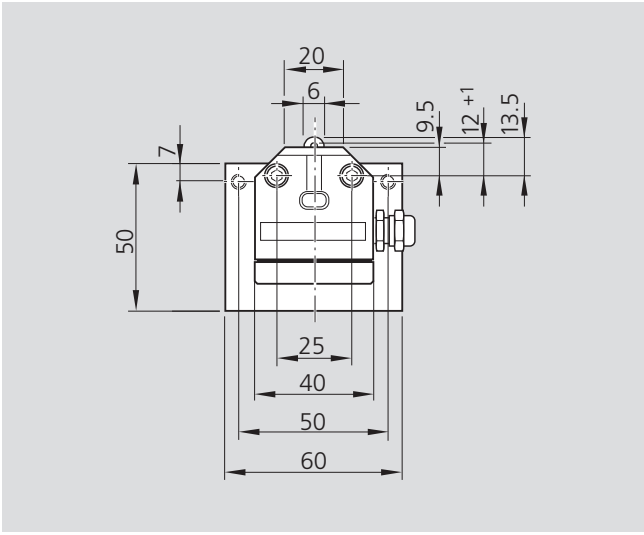
**4** Switching cam

**5** Cable duct (aluminum alloy)

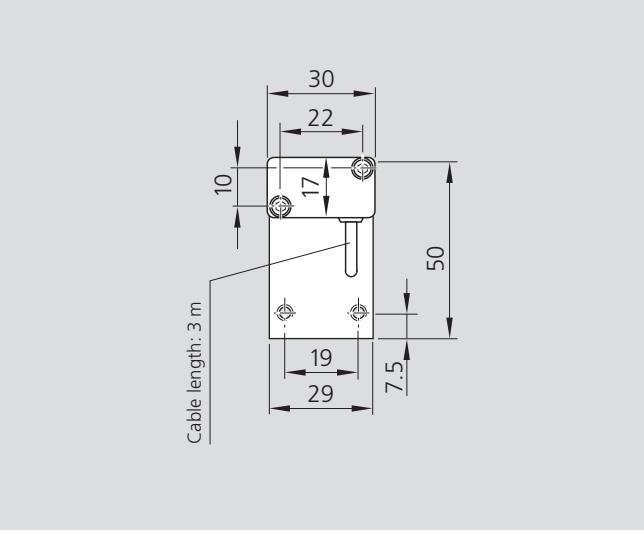
**6** Profiled support




| Mechanical switch (with mounting accessories) | |
|---|---|
| **Reproducibility** | = ± 0.05 mm |
| **Permissible ambient temperature** | = -5ºC to +80ºC |
| **Enclosure** | = DIN 40050 IP 67 |
| **Contact time** | = < 2 ms |
| **Insulation** | = group C to VDE 0110 |
| **Rated voltage** | = 250 V AC |
| **Continuous current** | = 5 A |
| **Switching capacity at 220 V, 40-60 Hz** | = cosφ = 0.8 at 2 A |
| **Contact resistance when new** | = < 240 mΩ |
| **Connection** | = screw connection |
| **Contact system** | = single-pole changeover |
| **Switch system** | = snap-action |




| Proximity switch (with mounting accessories) | |
|---|---|
| **Miniature circuit-breakers with potted cable (3 x 0.14 mm² Unitronic),** | |
| **Housing form** | = NO |
| **Minisensor** | = Form A DIN 41635 |
| **Voltage** | = 10 to 30 V DC |
| **Residual ripple** | = ≤ 10 % |
| **Load** | = 200 mA |
| **No-load current** | = ≤ 20 mA |
| **Switching frequency** | = max. 1500 Hz |
| **Temperature-related shift in make point** | = ≤ 4 µm/ºC |
| **Output signal steepness** | = ≥ 1 V/µs |
| **Repeatability of make point to EN 50008** | = ≤ 0.1 mm |

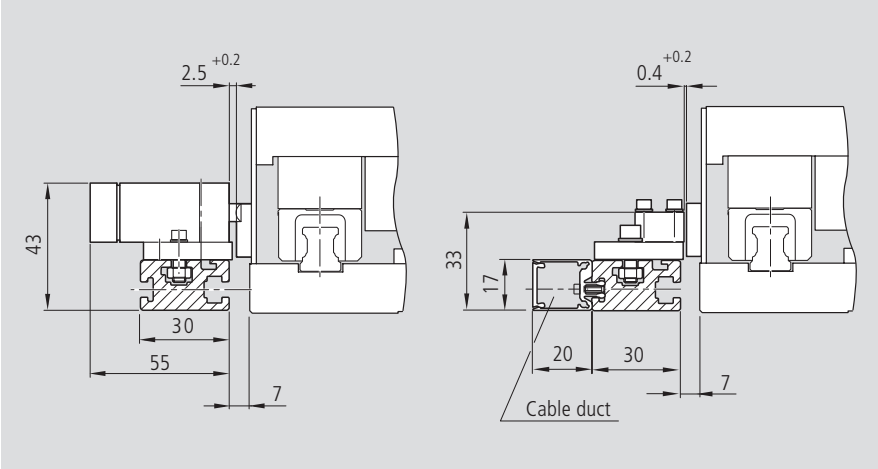


# Ball Rail Tables TKL
# Switch Mounting Arrangements

## Switching gaps for mechanical and proximity switches

Switch mounting is the same for all sizes.

The switching gaps for mechanical and proximity switches must be adjusted when installing the switches.




## Socket and plug

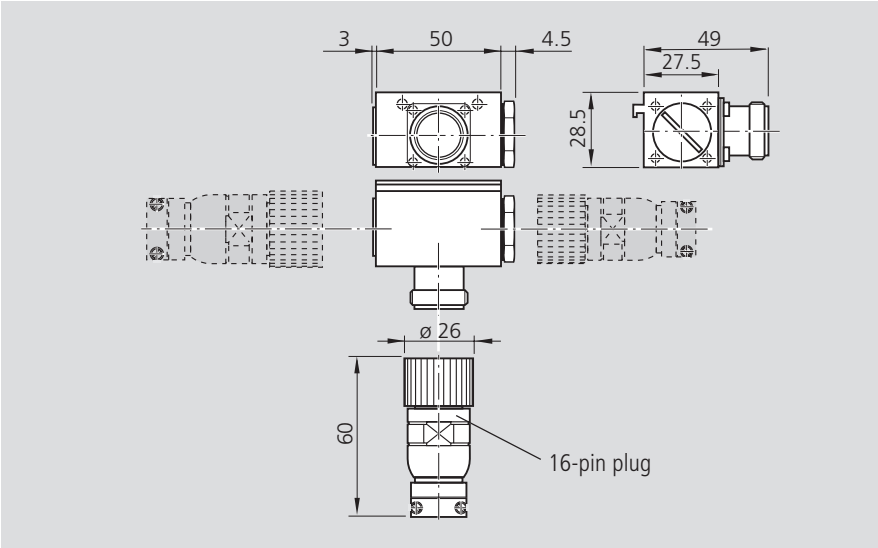
– Fix the socket to the switch support profile.

Socket and plug each have 16 pins.

Socket and switch are not prewired. The switch activation points can thus be optimized during start-up.

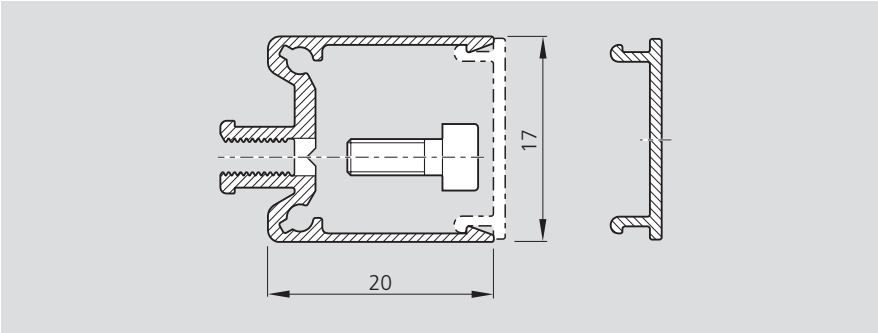
A plug is provided.

The plug can be mounted in three directions (see diagram).




## Cable duct

– Clip the cable duct into the T-slot in the switch support profile and secure it with the fixing screw.
– Fixing screws and cable grommets are provided.




## Ordering switches and mounting accessories

The part numbers are listed in the table.

Mounting accessories can be ordered separately.

| Item | | Part numbers |
|---|---|---|
| 1 | **Socket/plug** | 0399-800-20 |
| 2 | **Proximity switch** | |
| | **- mounting accessories without switch** | 0236-203-02 |
| | **- PNP NC** | 8453-040-01 |
| | **- NPN NC** | 8453-040-02 |
| | **- PNP NO** | 8453-040-03 |
| | **- NPN NO** | 8453-040-04 |
| 3 | **Cable duct** | 0399-800-06 |
| 4 | **Switching cam** | 0399-800-75 |

# Ball Rail Tables TKL
# Inquiry/Order Form

**Rexroth Star GmbH**

D-97419 Schweinfurt

Telephone +49-9721-937-0
Telefax (general) +49-9721-937-275
Telefax (direct) +49-9721-937-350

## STAR – Ball Rail Tables TKL

Order example: Ball Rail Tables TKL 25-325

| Ordering data | | Description |
|---|---|---|
| **Ball Rail Tables TKL** (Part number): 1450-405-00 | | Ball Rail Table with linear motor TKL 25-325 |
| **Guideway** | = 01 | ball rail system |
| **Drive unit** | = 02 | LSF 080 K B |
| **Carriage** | = 02 | carriage 515 mm long, 8% preload |
| **Position measuring system** | = 01 | optical encoder Heidenhain LIDA 185 C |
| **Cover** | = 01 | polyurethane bellows |
| **1st switch** | = 11 | PNP NC |
| **2nd switch** | = 11 | PNP NC |
| **Cable duct** | = 20 | cable duct |
| **Socket/plug** | = 17 | socket/plug on switch side |
| **Switching cam** | = 26 | with switching cam for switch activation |
| **Documentation** | = 02 | measurement report: frictional drag |

### To be completed by customer: Inquiry ☐ / Order ☐

**Ball Rail Table**

(Part number): _____-_____-_____

| | |
|---|---|
| **Guideway** | = ☐☐ |
| **Drive unit** | = ☐☐ |
| **Carriage** | = ☐☐ |
| **Position measuring system** | = ☐☐ |
| **Cover** | = ☐☐ |
| **1st switch** | = ☐☐ |
| **2nd switch** | = ☐☐ |
| **Cable duct** | = ☐☐ |
| **Socket/plug** | = ☐☐ |
| **Switching cam** | = ☐☐ |
| **Documentation** | = ☐☐ |

**Quantity:** _____ **pcs,** _____ **per month,** _____ **per year, per order, or** _____

**Comments:**

**From**

**Company:** _____ **Contact:** _____

**Address:** _____ **Department:** _____

_____ **Phone:** _____

_____ **Fax:** _____

engineering
mannesmann
Rexroth



CERTIFIED DIN ISO 9001 QUALITY SYSTEM REG. No. 1617 - 03

CERTIFIED EQNet QUALITY SYSTEM

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Ball Rail Tables TKL
with Ball Rail Systems
and Linear Motor

RE 82 531/2000-03

Printed in Germany - p 2000/06/

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