Instruction

Linear Motion Designer

Version 3.1
Start page

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Dimensioning / Calculation
- Profiled Rail System (PRS)
- Screw Assemblies (SA)
- PRS und SA in one step
- Linear Bushings
Application

Applies to Profiled rail system and Linear bushing

6 applications are selectable.

If your application is not included you are welcome to contact Bosch-Rexroth.
(see „Project“, Request of Information or visit our product side on the Bosch-Rexroth homepage

www.boschrexroth.com/lmd)
System dimensions

Applies to Profiled rail system and Linear bushing

1. Drive
   - Input to the position of the drive
     - Schematic representation
   - Stiffness in X-direction
     - Stiffness of the drive, if known
       (Influence on the displacement calculation in X-direction)

2. Dimensioning
   - Input runner block/bushing distance
   - Input guide rails/shafts distance
     (Required fields)

3. Rotation angle
   Rotation angle α: Rotation around the X-axis (f.e. 90° at wall mounting)
   Rotation angle β: Rotation around the Y-axis (f.e. 90° at vertical applications)

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Mouseover help text
Screw Assembly journal bearing
- Fixed - Lose
- Fixed - Fixed
- Fixed - Free

Lead of screw (Required fields)
- The lead can still be adjusted when selecting the nut

Bearing centre to centre distance (Required fields)
- The value is determined exactly after selection of the spindle ends

Rotation angle $\beta$
- f.e. 90° at vertical applications

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Dynamics

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Dynamics
4 input options

- **Dynamic cycle**
  - Input via velocity, acceleration, time, distance

- **Part of time**
  - Input via percentage duty cycle of the respective phases and average speed

- **Percentage of stroke**
  - Distance of the respective phases and average speed

- A change between the input options is possible

- **Motion profile**
  - Predefined cycles
  - Input via stroke and time

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Process data

1. **Masses**
   - Input up to 9 masses
   - Masses generally activated
   - Acceleration forces in direction of travel are calculated automatically
   - For multi-axis applications, enter the lateral acceleration \(a_{quer, y}\) and \(a_{quer, z}\) in the respective phases. The lateral forces are calculated automatically

2. **Forces**
   - Input up to 12 forces
   - Forces must still be activated in the active phases

3. **Additional loads**
   - The additional load is added to each carriage in each phases

4. **Tips**
   - Calculation assumptions and design tips
Result Runner block

- Service Performance: Input data to service performance, or required lifetime
- Lubrication: Calculation to lubrication interval and quantity
- Selection guide: Product proposal based on industry and application specifications

- Calculation
  - Automatically detection if the runner block distance is too small (deselected)
  - Automatically detection from short stroke (deselected)
  - Automatically matching from limiting values (max. acceleration, max. velocity, …)
  - Notes at low load ratio

- Show Deflection
  - See next page

- Help
  - Shows the legend to descriptions and informations about the various load ratios

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Deflection

Deflection values of the individual application force points in the respective phases
- Red values are max. values per phase, per appl. force point

Deflection of the application force points refer to unloaded condition
- Starting position is an unloaded condition on the runner blocks

Deflection of the application force points refer to phase T1...T18
- f.e. phase T2, the deflection values in phase T2 are set to zero
Filter criteria
- Preselection for a much quicker bushing selection

Calculation
- Automatically detection if the bushing distance is too small (deselected)
- Automatically detection from short stroke (deselected)
- Automatically matching from limiting values (max. acceleration, max. velocity, ...)
- Consideration of reduction factors due to shaft hardness >60HRC, temperature >100°C
- Notes at low load ratio

Help
- Shows the legend to descriptions and informations about the various load ratios

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Result Screw Assembly - Nut

Unit end bearing: Specification of spindle ends or end bearing
- Lubrication: Calculation to lubrication interval and quantity
- Service Performance: Input data to service performance, or required lifetime

Calculation
- Automatically detection of critical speed and max. permissible axial load
- Automatically detection from short stroke (deselected)
- Automatically matching from limiting values (max. acceleration, max. velocity, ...)
- Notes at low load ratio

Show critical speed
- See next page

Help
- Shows the legend to descriptions and informations about the various load ratios

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Depending on the position the critical speed can be read off the diagram. Thus in certain stroke ranges the permissible critical speed can be higher.
Result Screw Assembly - Spindle

- Selection of a suitable bearing unit
  - Form and version are defined
- Selection form and version of the spindle ends
  - Details in the product catalogue
- Bearing centre to centre distance
  - Value from "system dimensions"
- Minimum length
  - The minimum bearing centre to centre distance calculated via stroke, length of the nut and non-usable spindle length
- Warning massages
  - Matching of the max. permissible drive torque on the spindle journal
  - Matching of the load capacity of the end bearing < load capacity of the nut
- Help
  - Shows the legend to descriptions and informations about the various load ratios

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1. Documentation
   - Create a rtf-document (Print-out)

2. Online-Catalogue
   - Direct link to the calculated product to the online catalogue for additional information

3. CAD
   - Link to the configurator
   - Transferring the existing parameters to the configurator

4. Request consultation
   - Mailbox of the technical design and support center at Bosch-Rexroth Linear technology
Definitions

- **Zero point**
  - Centerline between the runner blocks/bushings in X-direction
  - Centerline between the guide rails/shafts in Y-direction
  - On the top mounting surface plane in Z-direction

- **Rotation of the axis**
  - The coordinate system also rotates

- **Definition moving direction**
  - Moving direction of the axis is always X-direction

- **System requirements at Profiled rails system**
  - Moving: Guide rails fixed; runner blocks are moving
  - Mounting: Form lock fixing from guide rails and runner blocks