

# Linear axes & linear axis systems

## Double axes HD

### 15. Double axes HD

#### 15.1 Properties of double axes HD with toothed belt drive

The HIWIN double axes HD are linear modules for flexible use and consist of two belt axes HM-B, which are connected to each other via a synchronous shaft. They are preferably used in applications where a single axis is not sufficient due to high torque loads or the dimensions of the loads to be transported. HIWIN double axes HD are also ideally suited as a basis for multi-axis systems.



#### Synchronous shaft

The synchronous shaft ensures safe and rigid power transmission for parallel movement of both axes. Due to the generously dimensioned diameter, the synchronous shaft is very torsionally stiff, meaning no additional bearing is required, even at higher speeds and longer axis distances.



#### Critical speed of the synchronous shaft

The critical speed depends on the length and diameter of the synchronous shaft and must not be exceeded during operation. The resulting maximum centre distance depending on the size and the axis speed of the HIWIN double axes can be calculated using the diagram in Fig. 15.1.

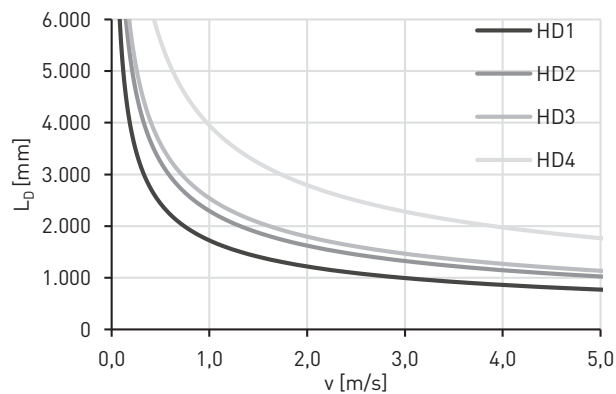
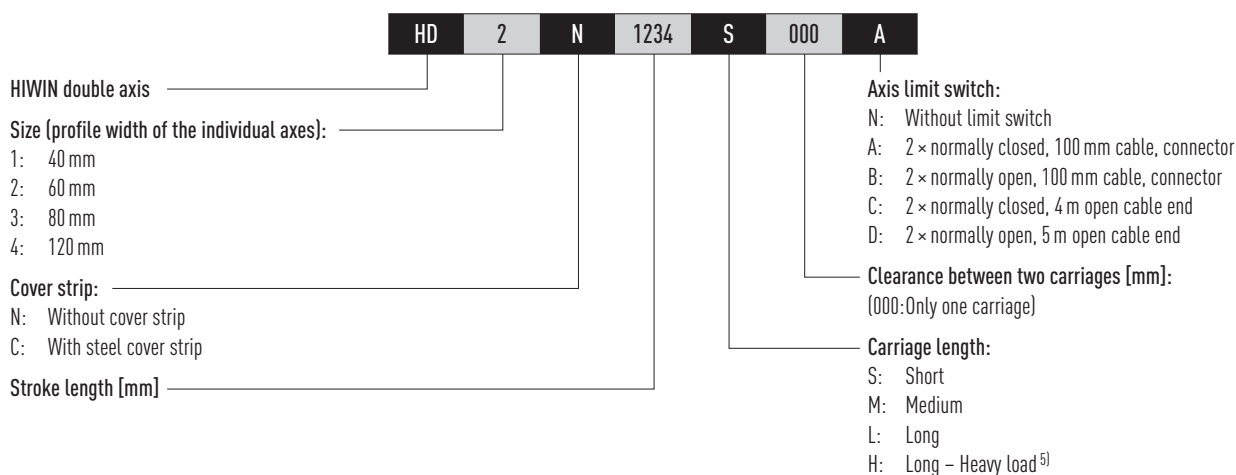
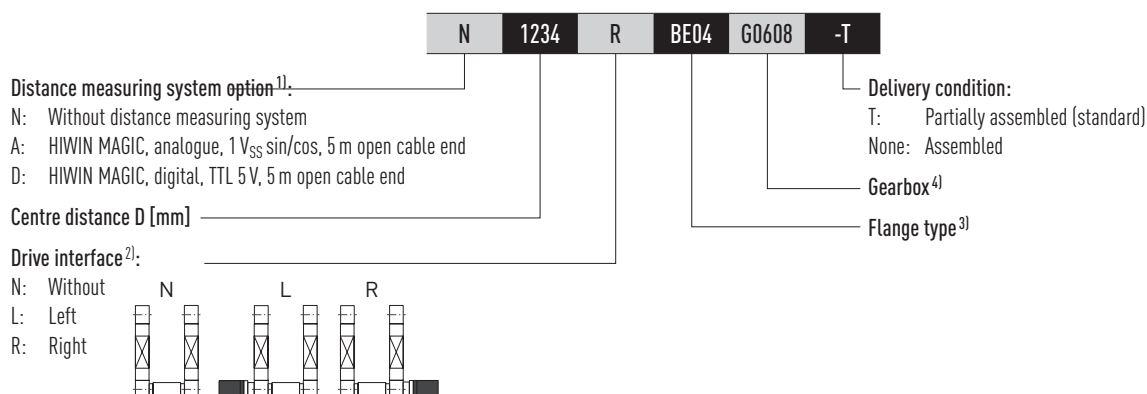


Fig. 15.1 Maximum centre distance  $L_D$  as a function of axis speed  $v$

## 15.2 Order code for double axes HD



Continuation, order code for double axes HD



<sup>1)</sup> More detailed information in chapter 21 from page 156 or in the "HIWIN MAGIC Distance Measuring Systems" assembly instructions".

<sup>2)</sup> If no drive interface is selected, the order code ends after this digit.

<sup>3)</sup> You can find all flange types in Table 22.1 from page 160. If no gearbox is selected, the order code ends after this digit.

<sup>4)</sup> You can find matching gearboxes in section 22.1.5.5 from page 170.

<sup>5)</sup> Only available for HD4

# Linear axes & linear axis systems

## Double axes HD

### 15.3 Dimensions and specifications of HD1

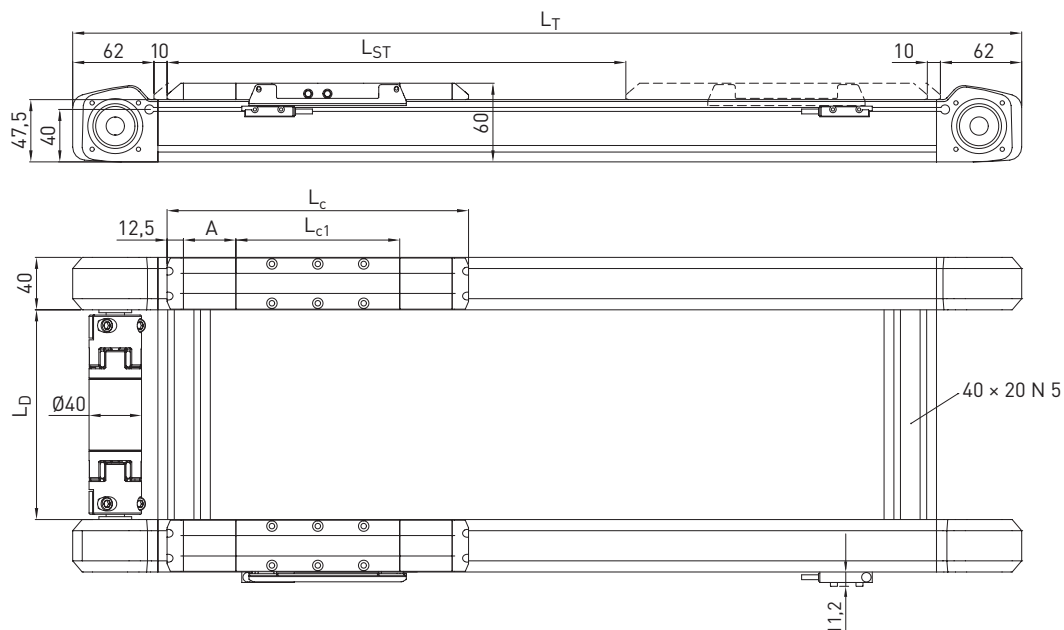


Table 15.1 HD1 dimensions

| Sledge type                         | Variant without cover |                      |                      | Variant with cover   |                      |                      |
|-------------------------------------|-----------------------|----------------------|----------------------|----------------------|----------------------|----------------------|
|                                     | S                     | M                    | L                    | S                    | M                    | L                    |
| Carriage profile length $L_C$ [mm]  | 125                   | 160                  | 230                  | 125                  | 160                  | 230                  |
| Total carriage length $L_{C1}$ [mm] | 150                   | 185                  | 255                  | 230                  | 265                  | 335                  |
| Cover strip deflection A [mm]       | —                     | —                    | —                    | 40                   | 40                   | 40                   |
| Max. stroke length $L_{ST}$ [mm]    | 3,000                 | 3,000                | 3,000                | 3,000                | 3,000                | 3,000                |
| Total length $L_T$ [mm]             | $L_T = L_{ST} + 294$  | $L_T = L_{ST} + 329$ | $L_T = L_{ST} + 399$ | $L_T = L_{ST} + 374$ | $L_T = L_{ST} + 409$ | $L_T = L_{ST} + 479$ |
| Centre distance $L_D$ min. [mm]     | 160                   | 160                  | 160                  | 160                  | 160                  | 160                  |
| Centre distance $L_D$ max. [mm]     | 1,500                 | 1,500                | 1,500                | 1,500                | 1,500                | 1,500                |

Table 15.2 General technical data

|                                          |        |
|------------------------------------------|--------|
| Max. feed force $F_{x\_max}$ [N]         | 450    |
| Max. speed [m/s]                         | 5      |
| Max. drive torque $M_{A\_max}$ [Nm]      | 7.9    |
| Typical load capacity <sup>1)</sup> [kg] | 25     |
| Single axis                              | HM040B |

<sup>1)</sup> With equal load distribution on both axes

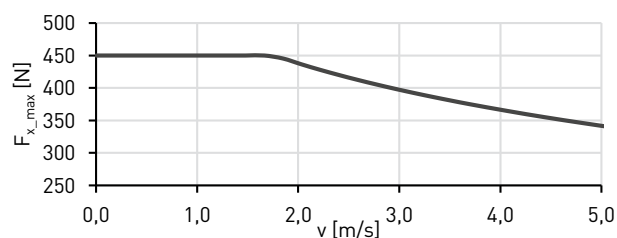


Fig. 15.2 Max. feed force  $F_{x\_max}$  as a function of axis speed  $v$

Table 15.3 Mechanical properties

| Sledge type                                                                             | Variant without cover |      |      | Variant with cover |      |      |
|-----------------------------------------------------------------------------------------|-----------------------|------|------|--------------------|------|------|
|                                                                                         | S                     | M    | L    | S                  | M    | L    |
| Mass of the carriage [kg]                                                               | 0.70                  | 0.82 | 1.04 | 0.84               | 0.95 | 1.17 |
| Mass at 0-stroke and centre distance $L_D = 0$ <sup>2)</sup> [kg]                       | 3.44                  | 3.77 | 4.43 | 4.17               | 4.50 | 5.17 |
| Mass per 1 m stroke [kg/m]                                                              | 6.20                  |      |      | 6.32               |      |      |
| Mass per 1 m centre distance $L_D$ [kg/m]                                               | 2.76                  |      |      | 2.76               |      |      |
| $J_{rot.}$ <sup>1)</sup> at 0-stroke and centre distance $L_D = 0$ [kgcm <sup>2</sup> ] | 1.16                  |      |      | 1.16               |      |      |
| $J_{rot.}$ <sup>1)</sup> per 1 m stroke centre distance [kgcm <sup>2</sup> /m]          | 3.24                  |      |      | 3.24               |      |      |
| Idle torque at 0-stroke [Nm]                                                            | 0.35                  |      |      | 0.50               |      |      |

<sup>1)</sup> Rotational moment of inertia

<sup>2)</sup> The values apply to axes with one carriage. For axes with 2 carriages, add the following: Mass of carriage + mass per 1 m stroke x (clearance between the carriages (in m) + carriage length  $L_C$  (in m))

Note: For further dimensions and data, see belt axis HM040B on Page 26.



# Linear axes & linear axis systems

## Double axes HD

### 15.5 Dimensions and specifications of HD3

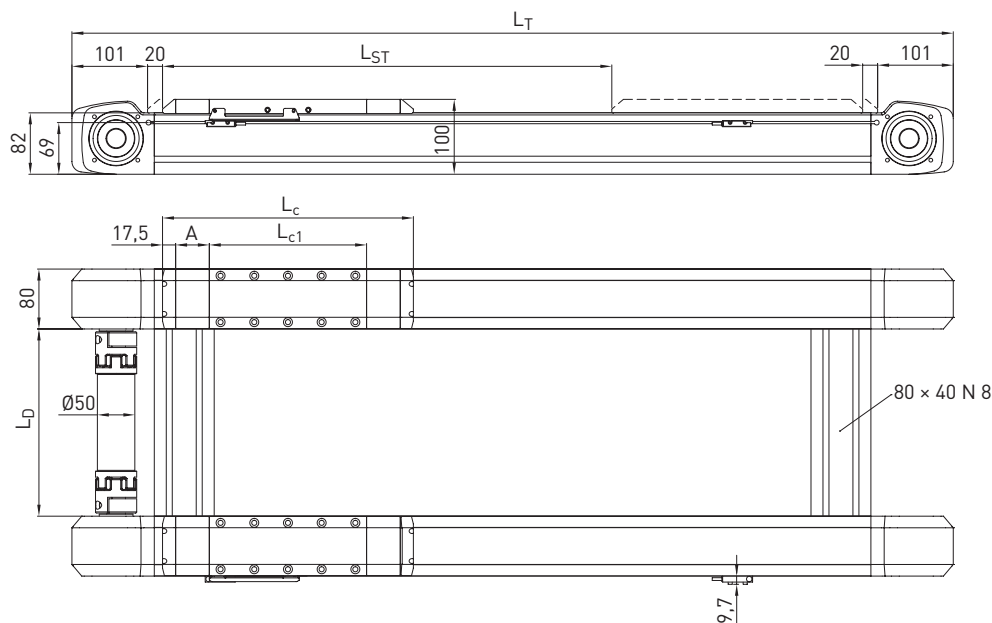


Table 15.7 HD3 dimensions

|                                     | Variant without cover |                      |                      | Variant with cover   |                      |                      |
|-------------------------------------|-----------------------|----------------------|----------------------|----------------------|----------------------|----------------------|
|                                     | S                     | M                    | L                    | S                    | M                    | L                    |
| Sledge type                         | S                     | M                    | L                    | S                    | M                    | L                    |
| Carriage profile length $L_c$ [mm]  | 210                   | 300                  | 390                  | 210                  | 300                  | 390                  |
| Total carriage length $L_{c1}$ [mm] | 245                   | 335                  | 425                  | 335                  | 425                  | 515                  |
| Cover strip deflection $A$ [mm]     | —                     | —                    | —                    | 45                   | 45                   | 45                   |
| Max. stroke length $L_{ST}$ [mm]    | 5,633                 | 5,543                | 5,453                | 5,543                | 5,453                | 5,363                |
| Total length $L_T$ [mm]             | $L_T = L_{ST} + 487$  | $L_T = L_{ST} + 577$ | $L_T = L_{ST} + 667$ | $L_T = L_{ST} + 577$ | $L_T = L_{ST} + 667$ | $L_T = L_{ST} + 757$ |
| Centre distance $L_D$ min. [mm]     | 200                   | 200                  | 200                  | 200                  | 200                  | 200                  |
| Centre distance $L_D$ max. [mm]     | 2,400                 | 2,400                | 2,400                | 2,400                | 2,400                | 2,400                |

Table 15.8 General technical data

|                                          |        |
|------------------------------------------|--------|
| Max. feed force $F_{x\_max}$ [N]         | 1,880  |
| Max. speed [m/s]                         | 5      |
| Max. drive torque $M_{a\_max}$ [Nm]      | 56.8   |
| Typical load capacity [kg] <sup>1)</sup> | 150    |
| Single axis                              | HM080B |

<sup>1)</sup> With equal load distribution on both axes

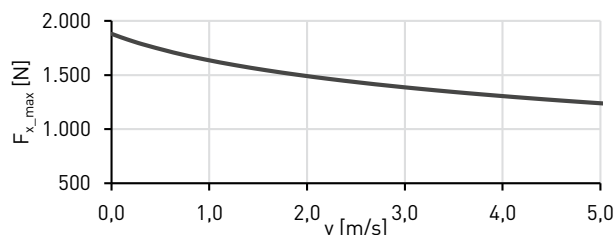


Fig. 15.4 Max. feed force  $F_{x\_max}$  as a function of axis speed  $v$

Table 15.9 Mechanical properties

|                                                                                         | Variant without cover |       |       | Variant with cover |       |       |
|-----------------------------------------------------------------------------------------|-----------------------|-------|-------|--------------------|-------|-------|
|                                                                                         | S                     | M     | L     | S                  | M     | L     |
| Sledge type                                                                             | S                     | M     | L     | S                  | M     | L     |
| Mass of the carriage [kg]                                                               | 3.22                  | 4.03  | 4.85  | 3.62               | 4.44  | 5.25  |
| Mass at 0-stroke and centre distance $L_D = 0$ <sup>2)</sup> [kg]                       | 16.28                 | 18.88 | 21.49 | 18.79              | 21.42 | 24.05 |
| Mass per 1 m stroke [kg/m]                                                              | 19.88                 |       |       | 20.15              |       |       |
| Mass per 1 m centre distance $L_D$ [kg/m]                                               | 10.26                 |       |       | 10.26              |       |       |
| $J_{rot.}$ <sup>1)</sup> at 0-stroke and centre distance $L_D = 0$ [kgcm <sup>2</sup> ] | 13.37                 |       |       | 13.37              |       |       |
| $J_{rot.}$ <sup>1)</sup> Per 1 m stroke centre distance [kgcm <sup>2</sup> /m]          | 6.63                  |       |       | 6.63               |       |       |
| Idle torque at 0-stroke [Nm]                                                            | 2.40                  |       |       | 2.60               |       |       |

<sup>1)</sup> Rotational moment of inertia

<sup>2)</sup> The values apply to axes with one carriage. For axes with 2 carriages, add the following: Mass of carriage + mass per 1 m stroke x (clearance between the carriages (in m) + carriage length  $L_c$  (in m))

Note: For further dimensions and data, see belt axis HM080B on Page 30.

## 15.6 Dimensions and specifications of HD4

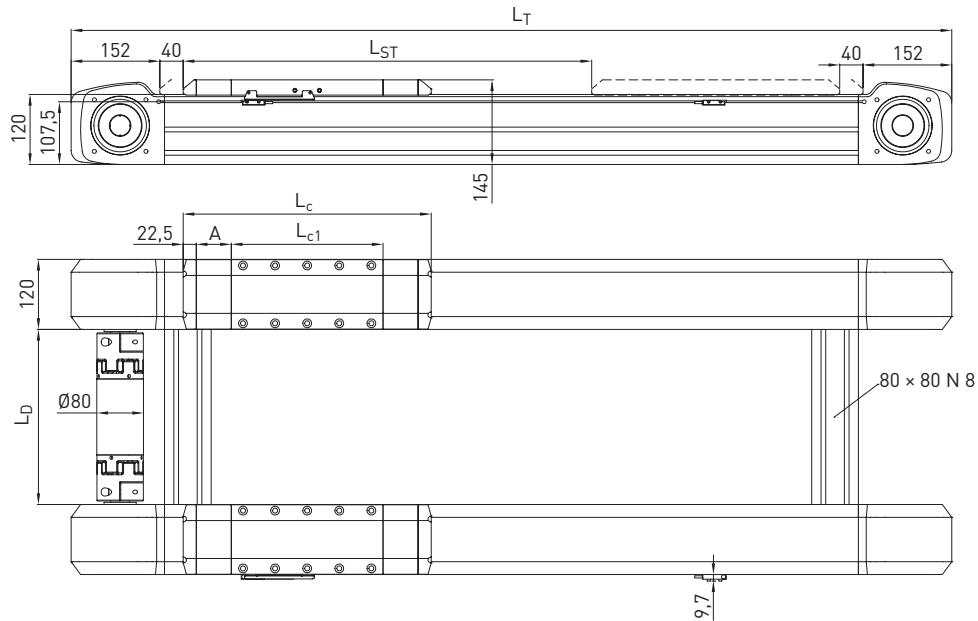


Table 15.10 HD4 dimensions

|                                                      | Variant without cover |                      |                      | Variant with cover   |                      |                        |
|------------------------------------------------------|-----------------------|----------------------|----------------------|----------------------|----------------------|------------------------|
|                                                      | S                     | M                    | L/H                  | S                    | M                    | L/H                    |
| <b>Sledge type</b>                                   | S                     | M                    | L/H                  | S                    | M                    | L/H                    |
| <b>Carriage profile length <math>L_C</math> [mm]</b> | 260                   | 370                  | 535                  | 260                  | 370                  | 535                    |
| <b>Total carriage length <math>L_C</math> [mm]</b>   | 305                   | 415                  | 580                  | 425                  | 535                  | 700                    |
| <b>Cover strip deflection A [mm]</b>                 | —                     | —                    | —                    | 60                   | 60                   | 60                     |
| <b>Max. stroke length <math>L_{ST}</math> [mm]</b>   | 5,531                 | 5,421                | 5,256                | 5,411                | 5,301                | 5,136                  |
| <b>Total length <math>L_T</math> [mm]</b>            | $L_T = L_{ST} + 689$  | $L_T = L_{ST} + 799$ | $L_T = L_{ST} + 964$ | $L_T = L_{ST} + 809$ | $L_T = L_{ST} + 919$ | $L_T = L_{ST} + 1,084$ |
| <b>Centre distance <math>L_D</math> min. [mm]</b>    | 256                   | 256                  | 256                  | 256                  | 256                  | 256                    |
| <b>Centre distance <math>L_D</math> max. [mm]</b>    | 3,000                 | 3,000                | 3,000                | 3,000                | 3,000                | 3,000                  |

Table 15.11 General technical data

| Sledge type                                           | S/M/L  | H      |
|-------------------------------------------------------|--------|--------|
| <b>Max. feed force <math>F_{x\_max}</math> [N]</b>    | 4,385  | 6,000  |
| <b>Max. speed [m/s]</b>                               | 5      | 5      |
| <b>Max. drive torque <math>M_{a\_max}</math> [Nm]</b> | 201    | 275    |
| <b>Typical load capacity [kg]<sup>1)</sup></b>        | 300    | 400    |
| <b>Single axis</b>                                    | HM120B | HM120B |

<sup>1)</sup> With equal load distribution on both axes

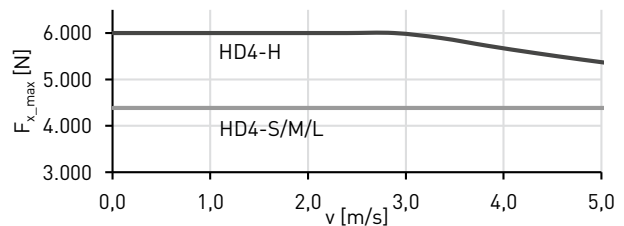


Fig. 15.5 Max. feed force  $F_{x\_max}$  as a function of axis speed  $v$

Table 15.12 Mechanical properties

|                                                                                                                   | Variant without cover |       |       |       | Variant with cover |       |       |       |
|-------------------------------------------------------------------------------------------------------------------|-----------------------|-------|-------|-------|--------------------|-------|-------|-------|
|                                                                                                                   | S                     | M     | L     | H     | S                  | M     | L/H   | H     |
| <b>Mass of the carriage [kg]</b>                                                                                  | 10.27                 | 12.52 | 15.89 | 17.44 | 11.21              | 13.46 | 16.84 | 18.39 |
| <b>Mass at 0-stroke and centre distance <math>L_D = 0</math><sup>2)</sup> [kg]</b>                                | 47.46                 | 54.34 | 64.66 | 66.21 | 53.93              | 60.85 | 71.22 | 72.77 |
| <b>Mass per 1 m stroke [kg/m]</b>                                                                                 | 42.06                 |       |       |       | 42.41              |       |       |       |
| <b>Mass per 1 m centre distance <math>L_D</math> [kg/m]</b>                                                       | 17.69                 |       |       |       | 17.69              |       |       |       |
| <b><math>J_{rot.}</math><sup>1)</sup> at 0-stroke and centre distance <math>L_D = 0</math> [kgcm<sup>2</sup>]</b> | 103.05                |       |       |       | 99.05              |       |       |       |
| <b><math>J_{rot.}</math><sup>1)</sup> Per 1 m stroke centre distance [kgcm<sup>2</sup>/m]</b>                     | 44.93                 |       |       |       | 44.93              |       |       |       |
| <b>Idle torque at 0-stroke [Nm]</b>                                                                               | 6.20                  |       |       |       | 7.00               |       |       |       |

<sup>1)</sup> Rotational moment of inertia

<sup>2)</sup> The values apply to axes with one carriage. For axes with 2 carriages, add the following: Mass of carriage + mass per 1 m stroke x (clearance between the carriages (in m) + carriage length  $L_C$  (in m))

Note: For further dimensions and data, see belt axis HM120B on [Page 32](#).