Product NEWS 2011

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Positioning system ELZA 40, 80, 80S, 100 / ELDZA 60, 60S

Specifications

Rack and pinion drive

ELZA 40, 80, 80S, 100

ELDZA 60, 60S

We have been implementing comprehensive model improvement measures so that we are able to offer our products in the segment of toothed rack drives in a more cost-effective and application-oriented way.

New innovative guiding profiles ELDZA have been developed, which can be used effectively in combination with standardized toothed racks. Depending on the specific task (e.g. load, mounting position, service life or cost) it is possible to use different material combinations.

Function:

This unit consists of an aluminium square profile with integrated, hardened steel guide rods. The carriage, which has internal linear ball bearings that can be adjusted free of play, is driven by a rack and pinion. The pinion is equipped with maintenance-free ball bearings.

Fitting position: As required. Max. length without joints 6,000 mm.

Carriage mounting: By T-slots.

Unit mounting: By T-slots and holes in the bearing blocks, mounting sets.

Rack: C45, Steel 1.4305 or plastic (POM) possible. Repeatability: ± 0,2 mm.

Forces and torques

<table>
<thead>
<tr>
<th>Size</th>
<th>ELZA 40</th>
<th>ELDZA 60</th>
<th>ELDZA 60 S</th>
<th>ELZA 80</th>
<th>ELZA 80 S</th>
<th>ELZA 100</th>
</tr>
</thead>
<tbody>
<tr>
<td>Forces/Torques</td>
<td>static</td>
<td>dynamic</td>
<td>static</td>
<td>dynamic</td>
<td>static</td>
<td>static</td>
</tr>
<tr>
<td>Fx (N)</td>
<td>900</td>
<td>750</td>
<td>1500</td>
<td>1200</td>
<td>2200</td>
<td>1800</td>
</tr>
<tr>
<td>Fy (N)</td>
<td>1200</td>
<td>1000</td>
<td>2100</td>
<td>1600</td>
<td>3000</td>
<td>2400</td>
</tr>
<tr>
<td>Fz (N)</td>
<td>900</td>
<td>650</td>
<td>1700</td>
<td>1100</td>
<td>2100</td>
<td>1600</td>
</tr>
<tr>
<td>Mx (Nm)</td>
<td>25</td>
<td>20</td>
<td>67</td>
<td>43</td>
<td>80</td>
<td>65</td>
</tr>
<tr>
<td>My (Nm)</td>
<td>32</td>
<td>25</td>
<td>90</td>
<td>70</td>
<td>150</td>
<td>120</td>
</tr>
<tr>
<td>Mz (Nm)</td>
<td>32</td>
<td>25</td>
<td>90</td>
<td>70</td>
<td>150</td>
<td>120</td>
</tr>
</tbody>
</table>

All forces and torques related to the following:

Existing values

Table values

Fx ≤ Fx dyn
Fz ≤ Fz dyn
Mx ≤ Mx dyn
My ≤ My dyn
Mz ≤ Mz dyn

Speed

[m/sec] max

2
2.5
3
3
3

Geometrical moments of inertia of aluminium profile

<table>
<thead>
<tr>
<th>L, mm</th>
<th>1,32x10^8</th>
<th>4,86x10^8</th>
<th>4,86x10^8</th>
<th>18,99x10^8</th>
<th>18,99x10^8</th>
<th>44,4x10^8</th>
</tr>
</thead>
<tbody>
<tr>
<td>I, mm^4</td>
<td>1,34x10^9</td>
<td>4,87x10^9</td>
<td>4,87x10^9</td>
<td>18,97x10^9</td>
<td>18,97x10^9</td>
<td>44,8x10^9</td>
</tr>
<tr>
<td>E-Modulus N/mm²</td>
<td>70000</td>
<td>70000</td>
<td>70000</td>
<td>70000</td>
<td>70000</td>
<td></td>
</tr>
</tbody>
</table>

Formula: ELZA/ELDZA

Driving torque:

\[
M_a = \frac{F \cdot P \cdot S_i}{2000 \cdot \pi + M_{\text{no}}}
\]

F = force (N)
P = pulley action perimeter (mm)
S_i = safety factor 1, 2 … 2
M_{\text{no}} = no-load torque (Nm)

\[
P_a = \frac{M_a \cdot \pi}{9000}
\]

F_a = load (N)
L = free length (mm)

f = deflection (mm)

= elastic modulus 70000 (N/mm²)

I = second moment of area (mm^4)

* = Depending on material combinations (see page 3) Fx values could be different!

For life-time calculation of rollers use our CD-ROM or homepage!
### Positioning system ELZA 40, 80, 80S, 100 / ELDZA 60, 60S

#### Dimensions (mm)

![Dimensions Diagram]

Increasing the carriage length will increase the basic length by the same amount.

*For slide nuts refer to main catalog chapter 2.2 page 2.

#### Sample ordering code:
ELDZA 60 with standard body profile, standard carriage, standard shaft, steel pinion, 1295 mm stroke

#### Choice of guide body profile:
- (0) Standard
- (2) corrosion-protected guide rods and screws
- (4) expanded corrosion-protected version (depending on the availability of components)

#### Choice of carriages:
- (0) Standard
- (2) corrosion-protected
- (4) expanded corrosion-protected

#### Drive version:
- (1)

#### Rack/Pinion Version: (ONLY for ELDZA)

<table>
<thead>
<tr>
<th>Version</th>
<th>Material</th>
<th>Shaft a h6 x length</th>
<th>Key</th>
<th>Pinion</th>
</tr>
</thead>
<tbody>
<tr>
<td>0</td>
<td>Steel/Plastic (Standard)</td>
<td>188.5</td>
<td>1.5</td>
<td></td>
</tr>
<tr>
<td>1</td>
<td>Stainless steel/Plastic</td>
<td>251.3</td>
<td>2</td>
<td></td>
</tr>
<tr>
<td>2</td>
<td>Plastic/Steel</td>
<td>314.2</td>
<td>2</td>
<td></td>
</tr>
<tr>
<td>3</td>
<td>Plastic/Stainless steel</td>
<td>355.0</td>
<td>3</td>
<td></td>
</tr>
</tbody>
</table>

### Technical Specifications

| Size | Basic length | A | B | C | D | E | F | G | H | I | J | K | KK | für | M | MM | N | NN | O | Q | P | Q | T | V | Basic weight | Weight per 100 mm |
|------|--------------|---|---|---|---|---|---|---|---|---|---|---|---|-----|-----|---|---|---|---|---|---|---|-----|-----------------|
| 40   | 150          | 100| 21.5| 58 | 37 | 18 | 32 | 60 | 56 | -  | 35 | 6.5| -  | 47 | - | 100 | M 6 | M 6 | 12 | 122 | M 6 | - | 2.0 kg | 0.35 kg |
| 60   | 205          | 144| 28.0| 82 | 47 | 30 | 42 | 75 | 63 | -  | 49 | 8.5| M 6 | -  | 130 | M 8 | M 8 | 16 | 168 | M 8 | - | 4.7 kg | 0.63 kg |
| 60S  | 230          | 170| 34.5| 82 | 47 | 30 | 42 | 92 | 63 | -  | 53 | 8.5| M 6 | -  | 150 | M 8 | M 8 | 16 | 194 | M 8 | 10 | 7.2 kg | 0.63 kg |
| 80   | 240          | 170| 39.0| 102| 68 | 40 | 60 | 105| 100| 30 | 70 | 8.5| -  | 88 | M 6 | 170 | M 10| 20 | 194 | M 8 | 10 | 11.9 kg | 1.19 kg |
| 80S  | 260          | 190| 39.0| 102| 68 | 40 | 60 | 105| 100| 30 | 71 | 8.5| -  | 88 | M 6 | 170 | M 10| 20 | 214 | M 8 | 12 | 12.9 kg | 1.19 kg |
| 100  | 360          | 230| 55.3| 130| 90 | 50 | 80 | 155| 120| 29 | 89 | 10.5| -  | 112 | M 10 | 240 | M 10| 30 | 300 | M 10 | - | 24.0 kg | 1.75 kg |

**For combination kits and connecting elements refer to main catalog chapter 2.2**
Function:
This unit consists of a rectangular aluminium profile with 2 integrated rail guidess. The carriage is moved by a belt drive. An innovation is that the toothed belt is diverted within a drive block positioned centrically. The result is an enormous compactness with regard to the overall system length. The toothed drive pulley has a coupling claw in the standard version. Belt tension can be readjusted by a simple screw adjustment device in the carriage. This device can also be used for symmetrical adjustment of two or more linear units running parallel. The openings of the guide body are sealed with 3 stainless steel cover bands to protect the guide from splash water and dust. Alternatively, the opening can also delivered without cover bands.

Fitting position: As required. Max. length 6.000 mm without joints.
Carriage mounting: By T-slots.
Unit mounting: By T-slots and mounting sets. The linear axis can be combined with any T-slot profile.
Belt type: HTD with steel reinforcement, no backlash when changing direction, repeatability ± 0,1 mm.
Carriage support: In the standard version, the carriage runs on 4 runner blocks which can be serviced at a central servicing position. For longer carriages the number of runner blocks can be increased.

**Forces and torques**

<table>
<thead>
<tr>
<th>Size</th>
<th>120</th>
<th>160</th>
<th>200</th>
</tr>
</thead>
<tbody>
<tr>
<td>permitted dyn. Forces*</td>
<td>5000 km</td>
<td>10000 km</td>
<td>5000 km</td>
</tr>
<tr>
<td>( F_x (N) )</td>
<td>1900</td>
<td>1800</td>
<td></td>
</tr>
<tr>
<td>( F_y (N) )</td>
<td>5570</td>
<td>3900</td>
<td></td>
</tr>
<tr>
<td>( F_z (N) )</td>
<td>7050</td>
<td>5020</td>
<td></td>
</tr>
<tr>
<td>( M_x (Nm) )</td>
<td>358</td>
<td>255</td>
<td></td>
</tr>
<tr>
<td>( M_y (Nm) )</td>
<td>369</td>
<td>262</td>
<td></td>
</tr>
<tr>
<td>( M_z (Nm) )</td>
<td>364</td>
<td>258</td>
<td></td>
</tr>
<tr>
<td>( C (N) )</td>
<td>7800</td>
<td></td>
<td></td>
</tr>
</tbody>
</table>

All forces and torques related to the following:
- No-load torque
  - Nm without cover bands: 1,5
  - Nm with cover bands: 2,1
- Speed
  - (m/sec) max: 5
- Tensile force
  - permanent (N): 1900
  - 0,2 sec (N): 2090
- Geometrical moments of inertia of aluminium profile
  - \( I_{x} \ mm^4 \): 21,32x10^5
  - \( I_{y} \ mm^4 \): 123,36x10^5
- Elastic modulus N/mm²: 70000

**Formula: DSZS**

Driving torque:

\[
M_\text{a} = \frac{F * P * S}{2000 * \pi} + M_{\text{e}}
\]

\( M_\text{a} = \) no-load torque (Nm)
\( P = \) pulley action perimeter (mm)
\( S = \) safety factor 1,2 ... 2
\( M_{\text{e}} = \) no-load torque (Nm)
\( n = \) rpm pulley (min⁻¹)
\( P_a = \) driving torque (Nm)
\( P = \) motor power (KW)

Deflection:

\[
f = \frac{F * L^3}{E * I * 192}
\]

\( f = \) deflection (mm)
\( F = \) load (N)
\( L = \) free length (mm)
\( E = \) elastic modulus 70000
\( I = \) second moment of area (mm⁴)

Nominal lifetime:

\[
L = \left( \frac{F}{C} \right)^{1.3} \times 10^6
\]

\( L = \) Lifetime in meter
\( F = \) Middle load (N)
\( C = \) Dynamic load factor (N)

**Existing values**
| \( F_y \) & \( F_z \) & \( M_x \) & \( M_y \) & \( M_z \) |
|---|---|---|---|---|
| \( F_{ydyn} \) & \( F_{zdyn} \) & \( M_{xdyn} \) & \( M_{ydyn} \) & \( M_{zdyn} \) |
| \( \leq 1 \) |

* referred to lifetime
Positioning system DSZS 120, 160, 200

Increasing the carriage length will increase the basic length by the same amount.

<table>
<thead>
<tr>
<th>Size</th>
<th>Basic length</th>
<th>A</th>
<th>B</th>
<th>C</th>
<th>D</th>
<th>E</th>
<th>F</th>
<th>G</th>
<th>H</th>
<th>I</th>
<th>J</th>
<th>K</th>
<th>M</th>
<th>N for</th>
<th>O for</th>
<th>P</th>
<th>Q</th>
<th>T</th>
<th>U</th>
<th>X</th>
<th>Y</th>
<th>Basic weight</th>
<th>Weight per 100 mm</th>
</tr>
</thead>
<tbody>
<tr>
<td>DSZS 120</td>
<td>310 160 130 100</td>
<td>68 90 60 107 11 39 90 213 M 6 M 8 M 8</td>
<td>12 280 M 8 80 180 38</td>
<td>23.0 kg 1.9 kg</td>
<td></td>
<td></td>
<td></td>
<td></td>
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<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>DSZS 160</td>
<td>310 160 130 100</td>
<td>68 90 60 107 11 39 90 213 M 6 M 8 M 8</td>
<td>12 280 M 8 80 180 38</td>
<td>23.0 kg 1.9 kg</td>
<td></td>
<td></td>
<td></td>
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<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>DSZS 200</td>
<td>310 160 130 100</td>
<td>68 90 60 107 11 39 90 213 M 6 M 8 M 8</td>
<td>12 280 M 8 80 180 38</td>
<td>23.0 kg 1.9 kg</td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
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<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
</tbody>
</table>

Choice of guide body profile:

- Internal profile with cover bands
- Internal profile without cover bands

Stainless versions upon request.

Choice of carriages:

- Version 0
- Version 1

Drive version:

- 0
- 1
- 3
- 4
- 5

5 is as 0, but with coupling claws on both sides.

The standard version is supplied without shaft. A shaft can be retrofitted by inserting it into the pulley bore and securing it with 2 locking rings or tension sets (size 200).

Belt table

<table>
<thead>
<tr>
<th>Code No.</th>
<th>Size</th>
<th>Belt</th>
<th>mm/rev.</th>
<th>Number of teeth</th>
</tr>
</thead>
<tbody>
<tr>
<td>0 4</td>
<td>120</td>
<td>SM25</td>
<td></td>
<td></td>
</tr>
<tr>
<td>0 7</td>
<td>160</td>
<td>BM30</td>
<td>192</td>
<td>24</td>
</tr>
<tr>
<td>0 9</td>
<td>200</td>
<td>BM50</td>
<td></td>
<td></td>
</tr>
</tbody>
</table>

Shaft dimensions

<table>
<thead>
<tr>
<th>Size</th>
<th>Shaft Ø x length</th>
<th>Key</th>
</tr>
</thead>
<tbody>
<tr>
<td>120</td>
<td>18 x 45</td>
<td>5x5x40</td>
</tr>
<tr>
<td>160</td>
<td></td>
<td></td>
</tr>
<tr>
<td>200</td>
<td></td>
<td></td>
</tr>
</tbody>
</table>

Inductive proximity switch sets, which can be mounted inside of the square profile, are available as accessories. Coupling and a special plug are mounted from the outside. For additional accessories refer to main catalog chapter 2.2 – 4.2.
Positioning system DSM 160P, 200P

Specifications

Linear motor drive

Function:
This unit consists of a rectangular aluminium profile with 2 integrated rail guidance. The linear motor DSM unit is based on the principle of a linear, synchronous AC motor. The guiding profile is fitted with permanent magnets as stator (secondary part). The carriage is fitted with the actuator (primary part). The magnetic attraction causes a force between carriage and guiding profile also in the absence of current. This force can be used for the initial tension of the bearings. Several carriages (primary parts) can be driven independently on one guiding profile. A special design of the carriage geometry results in the guiding profile being covered. This prevents small parts from falling into the system, so that clean-room applications are possible.

Fitting position:
As required. Max. length 3,000 mm without joints.

Carriage mounting:
By threaded holes.

Unit mounting:
By T-slots and mounting sets. The linear axis can be combined with any T-slot profile.

Carriage support:
In the standard version, the carriage runs on 4 runner blocks which can be serviced at a central servicing position. For longer carriages the number of runner blocks can be increased. Repeatability ± 0,05mm mm. Repeated accuracy max. ± 0,05mm up to 3,000 mm

<table>
<thead>
<tr>
<th>Size</th>
<th>160</th>
<th>200</th>
</tr>
</thead>
<tbody>
<tr>
<td>Motor size</td>
<td>1</td>
<td>2</td>
</tr>
<tr>
<td>permitted dyn. Forces*</td>
<td>10000 km</td>
<td>10000 km</td>
</tr>
<tr>
<td>Fx (N)</td>
<td>1200</td>
<td>1800</td>
</tr>
<tr>
<td>Fzm (N)</td>
<td>1590</td>
<td>2800</td>
</tr>
<tr>
<td>Fz (N)</td>
<td>1775</td>
<td>351</td>
</tr>
<tr>
<td>Mx (Nm)</td>
<td>160</td>
<td>128</td>
</tr>
<tr>
<td>My (Nm)</td>
<td>373</td>
<td>351</td>
</tr>
<tr>
<td>Mz (Nm)</td>
<td>222</td>
<td>261</td>
</tr>
<tr>
<td>Number of runner blocks</td>
<td>4</td>
<td>4</td>
</tr>
</tbody>
</table>

All forces and torques related to the following:

Motor specifications Fx:

<table>
<thead>
<tr>
<th>Motor size</th>
<th>1</th>
<th>2</th>
<th>3</th>
<th>1</th>
<th>2</th>
<th>3</th>
</tr>
</thead>
<tbody>
<tr>
<td>Carriage weight (kg)</td>
<td>4,8</td>
<td>5,3</td>
<td>7,1</td>
<td>10,9</td>
<td>11,4</td>
<td>16,9</td>
</tr>
<tr>
<td>Weight primary part (kg)</td>
<td>1,4</td>
<td>3,7</td>
<td>5,2</td>
<td>4,5</td>
<td>6,4</td>
<td>8,4</td>
</tr>
<tr>
<td>permanent (N)</td>
<td>115</td>
<td>271</td>
<td>406</td>
<td>383</td>
<td>574</td>
<td>766</td>
</tr>
<tr>
<td>Max. (N) 1sec.</td>
<td>323</td>
<td>607</td>
<td>911</td>
<td>868</td>
<td>1301</td>
<td>1735</td>
</tr>
</tbody>
</table>

Moving force without current

| N | 30 | 30 | 60 | 40 | 40 | 80 |

Geometrical moments of inertia of aluminium profile

<table>
<thead>
<tr>
<th>L mm²</th>
<th>2,13 x10⁶</th>
<th>4,81 x10⁶</th>
</tr>
</thead>
<tbody>
<tr>
<td>I mm⁴</td>
<td>12,3 x10⁹</td>
<td>26,0 x10⁹</td>
</tr>
<tr>
<td>Elastic modulus N/mm²</td>
<td>70000</td>
<td>70000</td>
</tr>
</tbody>
</table>

Formula: DSM P

Deflection:

\[ f = \frac{F \cdot x^2}{E \cdot I} \]

f = deflection (mm)
F = load (N)
L = free length (mm)
E = elastic modulus 70000 N/mm²
I = second moment of area (mm⁴)

Nominal lifetime:

\[ L = \left( \frac{C}{F} \right)^3 \times 10^4 \]

C = Dynamic load faktor (N)
F = Middle load (N)

* referred to lifetime
Positioning system DSM 160P, 200P

Increasing the carriage length will increase the basic length by the same amount.

*For slide nuts refer to main catalog chapter 2.2 page 2

V = Q + 100 mm

W = servicing position

Size   | Basic length | L   | A  | B  | C  | E  | F  | G  | H  | J  | K  | M  | N  | O  | P  | U  | Basic weight | Weight per 100 mm |
-------|--------------|-----|----|----|----|----|----|----|----|----|----|----|----|----|----|----|--------------|-------------------|
DSM 160P | Q + 30       | 160 | 144| 76 | 90 | 76 | 100| 11 | 104| 106| M 6 | M 8 | M 8 | 12 | 80 | 12 | 1/2/3 | 1/2/3 |
DSM 200P | Q + 35       | 200 | 182| 75 | 140| 90 | 126| 15 | 128| 129| M 8 | M 10| M 10| 15 | 100| 26 | 1/2/3 | 1/2/3 |

Dimensions (mm)

For standard carriage length see ‘Q’ in table.
The carriages can be delivered in any non-standard length upon request; the longer the carriage, the greater the load capacity. For digital controllers and linear encoder refer to main catalog chapter 9.1 page 10.

Choice of guide body profile:

(0) without internal profile and cover bands
(1) without internal profile without cover bands

Stainless version upon request.

Measurement system:
(1) Measurement system LE100/1 5V Resolution 0.05
(2) Measurement system LE100/1 10,5-30V
(3) Hall sensor
(4) Measurement system provided by customer

Plug:
(1) Plug Pos. 1
(2) Plug Pos. 2
(3) open unconnected cable end

Motor size:
(1) Motor size 1 with Q₁
(2) Motor size 2 with Q₂
(3) Motor size 3 with Q₃
(4) Supply with Q₁*
(5) Supply with Q₂*
(6) Supply with Q₃*
* = provided by customer

Dimensioning criteria for motor output

<table>
<thead>
<tr>
<th>l₁</th>
<th>b₂</th>
<th>hₚₛ</th>
<th>Q₁</th>
<th>Q₂</th>
<th>Q₃</th>
</tr>
</thead>
<tbody>
<tr>
<td>160</td>
<td>Q-70</td>
<td>71</td>
<td>50</td>
<td>316</td>
<td>360</td>
</tr>
<tr>
<td>200</td>
<td>Q-70</td>
<td>85</td>
<td>62</td>
<td>410</td>
<td>444</td>
</tr>
</tbody>
</table>

l₁ = length primary part; b₂ = width primary part;

hₚₛ = height primary part + height secondary part + interspaces primary/secondary part

Basic length + stroke = total length

Sample ordering code:
DSM160P, Bahr Modultechnik Linear motor, standard body profile, Measurement system LE100/1, 5V. Plug Pos. 1, motor size 1, 1154 mm stroke
Function:
Various assemblies and axis types can be connected to the angle bracket profile. It can also be used to reinforce self-supporting positioning systems or to mount portals on profile frames.