Aluminium profiles ...................... C2
Linear guides .......................... C18
Drive elements ........................ C48
Linear units ........................... C56
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Aluminium profiles

**Overview**

**PP profiles**  Panel profiles
- PP 25
- PP 50
- PP 100
- PP 150
- PP 200
- PP 250

**PU profiles**  Universal profiles
- PU 25
- PU 50

**PT profiles**  T-groove panels
- PT 25
- PT 50

**RE profiles**  Rectangular profiles
- RE 40
- RE 65

**PL profiles**  Light frame profiles
- PL 40
- PL 80

**PS profiles**  Stand profiles
- PS 50
- PS 80
- PS 100
- PS 140
# Aluminium profiles Overview

<table>
<thead>
<tr>
<th>AT Workbenches</th>
<th>C13</th>
</tr>
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<tbody>
<tr>
<td>Accessories</td>
<td>C14</td>
</tr>
<tr>
<td>Profile connections</td>
<td>C16</td>
</tr>
<tr>
<td>Profile quick clamping extension</td>
<td>C17</td>
</tr>
</tbody>
</table>

CAD data on our website [www.isel.com](http://www.isel.com)
# Linear guides

## Overview

<table>
<thead>
<tr>
<th>LFS-8-1</th>
<th>Linear guide rails</th>
<th>C 22</th>
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<tbody>
<tr>
<td>LFS-8-2</td>
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<tr>
<td></td>
<td>with LW 6 carriage</td>
<td></td>
</tr>
<tr>
<td></td>
<td>with WS 1 aluminium slide</td>
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<table>
<thead>
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<th>C 24</th>
</tr>
</thead>
<tbody>
<tr>
<td></td>
<td>with LW 7 carriage</td>
<td></td>
</tr>
<tr>
<td></td>
<td>with WS 3 aluminium slide</td>
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<th>C 26</th>
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<tr>
<td></td>
<td>with LW 7 carriage</td>
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</tr>
<tr>
<td></td>
<td>with WS 3 aluminium slide</td>
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<table>
<thead>
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<th>C 28</th>
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<tbody>
<tr>
<td></td>
<td>with LW 3 carriage</td>
<td></td>
</tr>
<tr>
<td></td>
<td>with WS 4 aluminium slide</td>
<td></td>
</tr>
<tr>
<td></td>
<td>with LS 1 steel slide</td>
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</table>

<table>
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<th>LFS-12-11</th>
<th>Linear guide rail</th>
<th>C 30</th>
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</thead>
<tbody>
<tr>
<td></td>
<td>with LW 5 carriage</td>
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</tr>
<tr>
<td></td>
<td>with WS 6 aluminium slide</td>
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<table>
<thead>
<tr>
<th>LFS-12-2</th>
<th>Linear guide rail</th>
<th>C 32</th>
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<tbody>
<tr>
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<td>with LW 3 carriage</td>
<td></td>
</tr>
<tr>
<td></td>
<td>with WS 4 aluminium slide</td>
<td></td>
</tr>
</tbody>
</table>

---

CAD data on our website [www.isel.com](http://www.isel.com)
Linear guides Overview

- **LFS-12-3** Linear guide rail
  - with LW 2 carriage
  - with LW 8 carriage
  - with WS 7 aluminium slide

- **LFS-12-10** Linear guide rail
  - with LW 4 carriage
  - with WS 8 aluminium slide
  - With dual track set 1+2

- **LFS-16-2** Linear guide rail
  - with ILW 3 carriage
  - with IWS 1 aluminium slide
  - with ILS 1 steel slide

- **LFS-16-120** Linear guide rail
  - with 2 or 4 IWS 1 aluminium slides
  - with 2 or 4 ILS 1 steel slides

- **LFS-16-150** Linear guide rail
  - with ILS1 steel slide
  - with IWS1 aluminium slide

- **LFS-16-250** Linear guide rail
  - with ILS1 steel slide
  - with IWS1 aluminium slide

- **Accessories**

- **Operating loads calculation**

CAD data on our website www.isel.com
Panel profiles

Features
- For fast and easy erection of frames, benches and racks
- Aluminium, naturally anodised
- Produced to DIN EN 12020-2
- Easy, very strong under load
- Top edge particularly suitable as a load-bearing cladding, also takes very high loads
- Our profile linkages produce very rigid connections, resistant to tension, distortion and bending by means of drillings and Allen screws in conjunction with PS profiles.
- Profile cutting to order
- Extensive range of accessories (see page C14)

Technical specification

<table>
<thead>
<tr>
<th>PP 25</th>
<th>PP 50 L</th>
<th>PP 50</th>
<th>PP 100</th>
<th>PP 150</th>
<th>PP 200</th>
<th>PP 250</th>
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</thead>
<tbody>
<tr>
<td>Dimensions (W × H)</td>
<td>25 x 15 mm</td>
<td>50 x 50 mm</td>
<td>50 x 16 mm</td>
<td>100 x 16 mm</td>
<td>150 x 16 mm</td>
<td>200 x 16 mm</td>
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<tr>
<td>Length</td>
<td>up to 3 metres (special lengths to order)</td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>Weight</td>
<td>approx. 0.5 kg/m</td>
<td>approx. 1.7 kg/m</td>
<td>approx. 1.1 kg/m</td>
<td>approx. 1.9 kg/m</td>
<td>approx. 2.6 kg/m</td>
<td>approx. 3.4 kg/m</td>
</tr>
<tr>
<td>1 cavity insert Ø 3.2 mm for M4 screw</td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>2 cavity inserts Ø 5.5 mm for M6 screw</td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>1 cavity insert Ø 5.5 mm for M6 screw</td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>2 cavity inserts Ø 5.5 mm for M6 screw in 50 mm raster</td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>Moment of inertia I_y</td>
<td>0.88 cm^4</td>
<td>13.25 cm^4</td>
<td>8.13 cm^4</td>
<td>67.27 cm^4</td>
<td>213.92 cm^4</td>
<td>482.77 cm^4</td>
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<tr>
<td>Moment of inertia I_y</td>
<td>0.54 cm^4</td>
<td>13.25 cm^4</td>
<td>1.37 cm^4</td>
<td>2.46 cm^4</td>
<td>3.55 cm^4</td>
<td>4.64 cm^4</td>
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<tr>
<td>Moment of resistance W_y</td>
<td>0.70 cm^3</td>
<td>4.39 cm^3</td>
<td>3.25 cm^3</td>
<td>13.45 cm^3</td>
<td>28.52 cm^3</td>
<td>48.27 cm^3</td>
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<tr>
<td>Moment of resistance W_y</td>
<td>0.70 cm^3</td>
<td>4.39 cm^3</td>
<td>1.71 cm^3</td>
<td>3.08 cm^3</td>
<td>4.44 cm^3</td>
<td>5.80 cm^3</td>
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Ordering information

| Part no. for L = 1000 mm | 201 044 1000 | 201 045 1000 | 201 040 1000 | 201 041 1000 | 201 042 1000 | 201 043 1000 | 201 009 1000 |
| Part no. for L = 3000 mm | 201 044 3000 | 201 045 3000 | 201 040 3000 | 201 041 3000 | 201 042 3000 | 201 043 3000 | 201 009 3000 |

Dimensioned drawings
Universal profiles

PU 25 / PU 50

Merkmale
- For fast and simple erection of frames, benches and racks
- Aluminium, naturally anodised
- Produced to DIN EN 12020-2
- Light, compact & stable
- For universal use
- Suitable for very high loads
- Our clamped linkages produce very rigid connections, resistant to tension, distortion and bending, between profiles by means of profile drillings and clamping elements.
- Profile cutting to order
- Extensive range of accessories (see page C14)

Option: - powder coatings in anthracite and light grey

Technical specification

<table>
<thead>
<tr>
<th></th>
<th>PU 25</th>
<th>PU 50</th>
</tr>
</thead>
<tbody>
<tr>
<td>Dimensions (W × H)</td>
<td>25 x 25 mm</td>
<td>50 x 25 mm</td>
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<tr>
<td>Length</td>
<td>up to 3 metres (special lengths to order)</td>
<td></td>
</tr>
<tr>
<td>Weight</td>
<td>appr. 0.7 kg/m</td>
<td>appr. 1.3 kg/m</td>
</tr>
<tr>
<td></td>
<td>4 T-key inserts for M6 sliding nuts</td>
<td>4 T-key inserts for M6 sliding nuts</td>
</tr>
<tr>
<td></td>
<td>Cavity insert, Ø 5.5 mm for M6</td>
<td>2 cavity inserts, Ø 5.5 mm for M6</td>
</tr>
<tr>
<td>Moment of inertia Iₓ</td>
<td>1.43 cm⁴</td>
<td>10.99 cm⁴</td>
</tr>
<tr>
<td>Moment of inertia Iᵧ</td>
<td>1.43 cm⁴</td>
<td>2.81 cm⁴</td>
</tr>
<tr>
<td>Moment of resistance Wₓ</td>
<td>1.14 cm³</td>
<td>4.40 cm³</td>
</tr>
<tr>
<td>Moment of resistance Wᵧ</td>
<td>1.14 cm³</td>
<td>2.25 cm³</td>
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Ordering information

<table>
<thead>
<tr>
<th>Profile description</th>
<th>Part no.: L = 1000 mm</th>
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<td>PU 25 W 25 × H 25 mm</td>
<td>200 001 1000</td>
<td>200 001 3000</td>
</tr>
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<td>PU 50 W 50 × H 25 mm</td>
<td>200 002 1000</td>
<td>200 002 3000</td>
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</table>

Dimensioned drawings

made by isel
Aluminium profiles

T-groove panels

Figure: T-key plate PT 25 (square) and T-key plate PT 25 (circular) with optional drainage channel

Technical specification

<table>
<thead>
<tr>
<th>PT 25</th>
<th></th>
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</tr>
</thead>
<tbody>
<tr>
<td>Dimensions (W x H)</td>
<td>125 x 20 mm</td>
<td>250 x 20 mm</td>
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<tr>
<td>Length</td>
<td>up to 3 metres (special lengths to order)</td>
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</tr>
<tr>
<td>Weight</td>
<td>appr. 4.8 kg/m</td>
<td>appr. 9.6 kg/m</td>
</tr>
<tr>
<td>T-grooves</td>
<td>one-sided in 25 mm raster</td>
<td></td>
</tr>
<tr>
<td>Moment of inertia I_x</td>
<td>243.36 cm^4</td>
<td>1848.57 cm^4</td>
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<tr>
<td>Moment of inertia I_y</td>
<td>6.46 cm^4</td>
<td>12.77 cm^4</td>
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<tr>
<td>Moment of resistance W_x</td>
<td>38.94 cm^3</td>
<td>147.88 cm^3</td>
</tr>
<tr>
<td>Moment of resistance W_y</td>
<td>6.46 cm^3</td>
<td>12.77 cm^3</td>
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Ordering information

<table>
<thead>
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<th>L [mm]</th>
<th>PT 25 W 125 x H 20 mm</th>
<th>PT 25 W 250 x H 20 mm</th>
<th>PT 25 W 375 x H 20 mm</th>
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<td>Part no.</td>
<td>Part no.</td>
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<td>201 018 0400</td>
<td>201 020 0400</td>
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<td>201 014 0500</td>
<td>201 018 0500</td>
<td>201 020 0500</td>
</tr>
<tr>
<td>600</td>
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<tr>
<td>1000</td>
<td>201 014 1000</td>
<td>201 018 1000</td>
<td>201 020 1000</td>
</tr>
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<td>201 014 1100</td>
<td>201 018 1100</td>
<td>201 020 1100</td>
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<td>1200</td>
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<td>201 018 1200</td>
<td>201 020 1200</td>
</tr>
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<td>201 018 1800</td>
<td>201 020 1800</td>
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<td>201 018 3000</td>
<td>201 020 3000</td>
</tr>
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</table>

Dimensioned drawings

T-slot blocks - see accessories, aluminium profiles
**T-groove panels**

**Features**
- Universal precision, clamping and machining surface
- Aluminium, naturally anodised
- Produced to DIN EN 12020-2
- Milled flat on both sides
- For use with any machine
- Thick walled, distortion-free and extremely form-retaining
- Profile cutting to order
- Extensive range of accessories (see page C14)

**Technical specification**

<table>
<thead>
<tr>
<th>PT 50</th>
<th>L [mm]</th>
<th>PT 50 W 250 x H 20 mm</th>
<th>PT 50 W 375 x H 20 mm</th>
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<td>Part no.</td>
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<td>up to 3 metres (special lengths to order)</td>
<td>201 016 0600</td>
<td>201 019 0600</td>
</tr>
<tr>
<td></td>
<td>up to 3 metres (special lengths to order)</td>
<td>201 016 0700</td>
<td>201 019 0700</td>
</tr>
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<td>up to 3 metres (special lengths to order)</td>
<td>201 016 0800</td>
<td>201 019 0800</td>
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<td>up to 3 metres (special lengths to order)</td>
<td>201 016 0900</td>
<td>201 019 0900</td>
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<td>201 016 1000</td>
<td>201 019 1000</td>
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<td>201 019 1100</td>
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<td>up to 3 metres (special lengths to order)</td>
<td>201 016 1200</td>
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<td>up to 3 metres (special lengths to order)</td>
<td>201 016 1300</td>
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<td>up to 3 metres (special lengths to order)</td>
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<td>up to 3 metres (special lengths to order)</td>
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<tr>
<td></td>
<td>up to 3 metres (special lengths to order)</td>
<td>201 016 1800</td>
<td>201 019 1800</td>
</tr>
<tr>
<td></td>
<td>up to 3 metres (special lengths to order)</td>
<td>201 016 1900</td>
<td>201 019 1900</td>
</tr>
<tr>
<td></td>
<td>up to 3 metres (special lengths to order)</td>
<td>201 016 2000</td>
<td>201 019 2000</td>
</tr>
<tr>
<td></td>
<td>up to 3 metres (special lengths to order)</td>
<td>201 016 2500</td>
<td>201 019 2500</td>
</tr>
<tr>
<td></td>
<td>up to 3 metres (special lengths to order)</td>
<td>201 016 3000</td>
<td>201 019 3000</td>
</tr>
</tbody>
</table>

**Dimensioned drawings**

T-slot blocks - see accessories, aluminium profiles
Rectangular profiles

**RE 40**

**Features**
- Universal precision, clamping and machining surface
- As a stabiliser for machine and sub-frame constructions
- Aluminium, naturally anodised
- Produced to DIN EN 12020-2
- Light & very stable
- Numerous applications with the accessories are possible
- Profile cutting to order
- Extensive range of accessories (see page C14)

**Technical specification**

<table>
<thead>
<tr>
<th></th>
<th>Dimensions (W × H)</th>
<th>Length</th>
<th>Weight</th>
<th>Various cavities and T-slot inserts for sliding nuts or M6 tapped strips for frontal inserts for M6 screws</th>
<th>Moment of inertia I_x</th>
<th>Moment of inertia I_y</th>
<th>Moment of resistance W_x</th>
<th>Moment of resistance W_y</th>
</tr>
</thead>
<tbody>
<tr>
<td><strong>RE 40</strong></td>
<td>150 x 40 mm</td>
<td>up to 3 metres (special lengths to order)</td>
<td>appr. 4.8 kg/m</td>
<td></td>
<td>393.7 cm⁴</td>
<td>33.42 cm⁴</td>
<td>52.49 cm³</td>
<td>16.71 cm³</td>
</tr>
<tr>
<td></td>
<td>250 x 40 mm</td>
<td></td>
<td>appr. 7.6 kg/m</td>
<td></td>
<td>1654.53 cm⁴</td>
<td>54.18 cm⁴</td>
<td>131.64 cm³</td>
<td>27.09 cm³</td>
</tr>
<tr>
<td></td>
<td>350 x 40 mm</td>
<td></td>
<td>appr. 10.4 kg/m</td>
<td></td>
<td>4306.69 cm⁴</td>
<td>75.00 cm⁴</td>
<td>246.1 cm³</td>
<td>37.5 cm³</td>
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**Ordering information**

<table>
<thead>
<tr>
<th>Profile description</th>
<th>Part no.: L = 1000 mm</th>
<th>Part no.: L = 3000 mm</th>
</tr>
</thead>
<tbody>
<tr>
<td>RE 40</td>
<td>201 035 1000</td>
<td>201 035 3000</td>
</tr>
<tr>
<td>W 150 x H 40 mm</td>
<td>201 030 1000</td>
<td>201 030 9000</td>
</tr>
<tr>
<td>RE 40</td>
<td>201 031 1000</td>
<td>201 031 8305</td>
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<tr>
<td>W 250 x H 40 mm</td>
<td></td>
<td></td>
</tr>
<tr>
<td>RE 40</td>
<td>201 031 1000</td>
<td>201 031 8305</td>
</tr>
<tr>
<td>W 350 x H 40 mm</td>
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<td></td>
</tr>
</tbody>
</table>

**Dimensioned drawings**

- **RE 40 x 150**: 5 x Ø 5.5
- **RE 40 x 250**: 5 x Ø 5.5
- **RE 40 x 350**: 6 x 5.5
Rectangular profiles

### RE 65

**Dimensions** (W × H)
- 150 × 65 mm
- 250 × 65 mm
- 350 × 65 mm

**Length**
- up to 3 metres (special lengths to order)

**Weight**
- appr. 7.7 kg/m
- appr. 12.4 kg/m
- appr. 17.0 kg/m

**Features**
- Universal precision, clamping and machining surface
- As a stabiliser for machine and sub-frame constructions
- Aluminium, naturally anodised
- Produced to DIN EN 12020-2
- Light & very stable
- Milled flat on both sides
- Numerous applications with the accessories are possible
- Profile cutting to order
- Extensive range of accessories (see page C14)

**Technical specification**

<table>
<thead>
<tr>
<th></th>
<th>RE 65</th>
</tr>
</thead>
<tbody>
<tr>
<td>Dimensions (W × H)</td>
<td>150 x 65 mm</td>
</tr>
<tr>
<td></td>
<td>250 x 65 mm</td>
</tr>
<tr>
<td></td>
<td>350 x 65 mm</td>
</tr>
<tr>
<td>Length</td>
<td>up to 3 metres (special lengths to order)</td>
</tr>
<tr>
<td>Weight</td>
<td>appr. 7.7 kg/m</td>
</tr>
<tr>
<td></td>
<td>appr. 12.4 kg/m</td>
</tr>
<tr>
<td></td>
<td>appr. 17.0 kg/m</td>
</tr>
<tr>
<td>Various cavities and T-slot inserts for sliding nuts or M6 tapped strips for frontal inserts for M6 screws</td>
<td></td>
</tr>
<tr>
<td>Moment of inertia</td>
<td>633.47 cm^4</td>
</tr>
<tr>
<td></td>
<td>2,658.48 cm^4</td>
</tr>
<tr>
<td></td>
<td>6,953.91 cm^4</td>
</tr>
<tr>
<td>Moment of resistance</td>
<td>148.87 cm^4</td>
</tr>
<tr>
<td></td>
<td>243.85 cm^4</td>
</tr>
<tr>
<td></td>
<td>338.52 cm^4</td>
</tr>
<tr>
<td>Moment of resistance</td>
<td>84.46 cm^3</td>
</tr>
<tr>
<td></td>
<td>212.68 cm^3</td>
</tr>
<tr>
<td></td>
<td>397.37 cm^3</td>
</tr>
<tr>
<td>Moment of resistance</td>
<td>45.83 cm^3</td>
</tr>
<tr>
<td></td>
<td>75.03 cm^3</td>
</tr>
<tr>
<td></td>
<td>104.16 cm^3</td>
</tr>
</tbody>
</table>

**Ordering information**

<table>
<thead>
<tr>
<th>Profile description</th>
<th>Part no.: L = 1000 mm</th>
<th>Part no.: L = 3000 mm</th>
</tr>
</thead>
<tbody>
<tr>
<td>RE 65 W 150 × H 65 mm</td>
<td>201 034 1000</td>
<td>201 034 3000</td>
</tr>
<tr>
<td>RE 65 W 250 × H 65 mm</td>
<td>201 032 1000</td>
<td>201 032 3000</td>
</tr>
<tr>
<td>RE 65 W 350 × H 65 mm</td>
<td>201 033 1000</td>
<td>201 033 3000</td>
</tr>
</tbody>
</table>

**Dimensioned drawings**

[Images of dimensioned drawings for RE 65 profiles]
# Light frame profiles

## PL 40/PL 80

### Features
- For fast and simple erection of frames, benches and racks
- Aluminium, naturally anodised
- Produced to DIN EN 12020-2
- Light, compact & stable
- Suitable for very high loads
- Our clamped linkages produce very rigid connections between profiles, resistant to tension, distortion and bending, through profile drillings and clamping elements
- Profile cutting to order
- Extensive range of accessories (see page C14)

**Option:** - powder coatings in anthracite and light grey

### Technical specification

<table>
<thead>
<tr>
<th></th>
<th>PL 40</th>
<th>PL 80</th>
</tr>
</thead>
<tbody>
<tr>
<td><strong>Dimensions (W × H)</strong></td>
<td>40 x 40 mm</td>
<td>80 x 40 mm</td>
</tr>
<tr>
<td><strong>Length</strong></td>
<td>up to 3 metres (special lengths to order)</td>
<td></td>
</tr>
<tr>
<td><strong>Weight</strong></td>
<td>appr. 1.5 kg/m</td>
<td>appr. 2.9 kg/m</td>
</tr>
<tr>
<td><strong>4 T-slot inserts for M6 sliding nuts</strong></td>
<td></td>
<td></td>
</tr>
<tr>
<td><strong>5 cavity inserts, Ø 8.5 mm for M10</strong></td>
<td></td>
<td></td>
</tr>
<tr>
<td><strong>6 T-slot inserts for M6 sliding nuts</strong></td>
<td></td>
<td></td>
</tr>
<tr>
<td><strong>6 cavity inserts, Ø 8.5 mm for M10</strong></td>
<td></td>
<td></td>
</tr>
<tr>
<td><strong>Cavity insert, Ø 10.2 mm for M12</strong></td>
<td></td>
<td></td>
</tr>
<tr>
<td><strong>Moment of inertia Ix</strong></td>
<td>8.38 cm$^4$</td>
<td>64.40 cm$^4$</td>
</tr>
<tr>
<td><strong>Moment of inertia Iy</strong></td>
<td>8.38 cm$^4$</td>
<td>16.36 cm$^4$</td>
</tr>
<tr>
<td><strong>Moment of resistance Wx</strong></td>
<td>4.19 cm$^3$</td>
<td>16.10 cm$^3$</td>
</tr>
<tr>
<td><strong>Moment of resistance Wy</strong></td>
<td>4.19 cm$^3$</td>
<td>8.18 cm$^3$</td>
</tr>
</tbody>
</table>

### Ordering information

<table>
<thead>
<tr>
<th>Profile description</th>
<th>Part no.: L = 1000 mm</th>
<th>Part no.: L = 3000 mm</th>
</tr>
</thead>
<tbody>
<tr>
<td>PL 40 W 40 x H 40 mm</td>
<td>200 008 1000</td>
<td>200 008 3000</td>
</tr>
<tr>
<td>PL 80 W 80 x H 40 mm</td>
<td>200 009 1000</td>
<td>200 009 3000</td>
</tr>
</tbody>
</table>

### Dimensioned drawings

![PL 40 diagram](image1)

![PL 80 diagram](image2)

---

**made by isel**
Stand profiles

**PS 50 / PS 80**

**Features**
- For fast and simple erection of frames, benches and racks
- Aluminium, naturally anodised
- Produced to DIN EN 12020-2
- Light, compact & stable
- Suitable for high loads
- Our clamped linkages produce very rigid connections, resistant to tension, distortion and bending, between profiles
- Profile cutting to order
- Extensive range of accessories (see page C14)

**Option:** - powder coatings in anthracite and light grey

---

**Technical specification**

<table>
<thead>
<tr>
<th></th>
<th>PS 50</th>
<th>PS 80</th>
</tr>
</thead>
<tbody>
<tr>
<td><strong>Dimensions (W × H)</strong></td>
<td>50 x 50 mm</td>
<td>80 x 80 mm</td>
</tr>
<tr>
<td><strong>Length</strong></td>
<td>up to 3 metres</td>
<td>Special lengths to order</td>
</tr>
<tr>
<td><strong>Weight</strong></td>
<td>≈ 2.3 kg/m</td>
<td>≈ 4.5 kg/m</td>
</tr>
<tr>
<td><strong>4 T-slot inserts for M6 sliding nuts</strong></td>
<td>4 T-slot inserts for M6 sliding nuts</td>
<td></td>
</tr>
<tr>
<td><strong>4 cavity inserts, Ø 5.5 mm for M6</strong></td>
<td>4 cavity inserts, Ø 5.5 mm for M6</td>
<td></td>
</tr>
<tr>
<td><strong>Cavity insert, Ø 8.5 mm for M10</strong></td>
<td>Cavity insert, Ø 8.5 mm for M10</td>
<td></td>
</tr>
<tr>
<td><strong>Moment of inertia I_x</strong></td>
<td>22.06 cm⁴</td>
<td>111.8 cm⁴</td>
</tr>
<tr>
<td><strong>Moment of inertia I_y</strong></td>
<td>22.06 cm⁴</td>
<td>111.8 cm⁴</td>
</tr>
<tr>
<td><strong>Moment of resistance W_x</strong></td>
<td>8.82 cm³</td>
<td>27.95 cm³</td>
</tr>
<tr>
<td><strong>Moment of resistance W_y</strong></td>
<td>8.82 cm³</td>
<td>27.95 cm³</td>
</tr>
</tbody>
</table>

---

**Ordering information**

<table>
<thead>
<tr>
<th>Profile description</th>
<th>Part no.: L = 1000 mm</th>
<th>Part no.: L = 3000 mm</th>
</tr>
</thead>
<tbody>
<tr>
<td>PS 50 W 50 x H 50 mm</td>
<td>200 003 1000</td>
<td>200 003 3000</td>
</tr>
<tr>
<td>PS 80 W 80 x H 80 mm</td>
<td>200 014 1000</td>
<td>200 014 3000</td>
</tr>
</tbody>
</table>

---

**Dimensioned drawings**

- **PS 50**
- **PS 80**

---

*Made by isel*
Stand profiles

PS100 / PS140

Features
- For fast and easy erection of frames, benches and racks
- Aluminium, naturally anodised
- Produced to DIN EN 12020-2
- Light, compact & stable
- Suitable for high loadings
- Our clamped linkages produce very rigid connections, resistant to tension, distortion and bending, between profiles
- Profile cutting to order
- Extensive range of accessories (see page C14)

Option: - powder coatings in anthracite and light grey

Technical specification

<table>
<thead>
<tr>
<th></th>
<th>PS 100</th>
<th>PS 140</th>
</tr>
</thead>
<tbody>
<tr>
<td>Dimensions (W × H)</td>
<td>100 × 100 mm</td>
<td>140 × 140 mm</td>
</tr>
<tr>
<td>Length</td>
<td>up to 3 metres</td>
<td>up to 3 metres</td>
</tr>
<tr>
<td>Weight</td>
<td>appr. 5.1 kg/m</td>
<td>appr. 9.2 kg/m</td>
</tr>
<tr>
<td>4 T-slot inserts for M6 sliding nuts</td>
<td>4 T-slot inserts for M6 sliding nuts</td>
<td></td>
</tr>
<tr>
<td>4 cavity inserts, Ø 5.5 mm for M6</td>
<td>4 cavity inserts, Ø 5.5 mm for M6</td>
<td></td>
</tr>
<tr>
<td>Cavity insert, Ø 10.2 mm for M12</td>
<td>Cavity insert, Ø 14 mm for M16</td>
<td></td>
</tr>
<tr>
<td>Moment of inertia Ix</td>
<td>163.00 cm³</td>
<td>601.80 cm³</td>
</tr>
<tr>
<td>Moment of inertia Iy</td>
<td>163.00 cm³</td>
<td>598.11 cm³</td>
</tr>
<tr>
<td>Moment of resistance Wx</td>
<td>32.60 cm³</td>
<td>65.97 cm³</td>
</tr>
<tr>
<td>Moment of resistance Wy</td>
<td>32.60 cm³</td>
<td>85.44 cm³</td>
</tr>
</tbody>
</table>

Ordering information

<table>
<thead>
<tr>
<th>Profile description</th>
<th>Part no.: L = 1000 mm</th>
<th>Part no.: L = 3000 mm</th>
</tr>
</thead>
<tbody>
<tr>
<td>PS 100 W 100 x H 100 mm</td>
<td>200 015 1000</td>
<td>200 015 3000</td>
</tr>
<tr>
<td>PS 140 W 140 x H 140 mm</td>
<td>200 016 1000</td>
<td>200 016 3000</td>
</tr>
</tbody>
</table>

Dimensioned drawings
Workbenches

Features
Workbenches AT for clamping devices, clamping means, for measurement, checking, testing, etc.
• Sub-frame from aluminium profiles PS series with braces made from aluminium panel profiles PP series
• Aluminium bench plate RE series of right angle profiles 40 × 250 mm with T-key inserts

Options
• length up to 2 m
• Various accessories

Accessories
Insert base for AT 1
Part no.: 248551 0010

Insert base for AT 2
Part no.: 248551 0012

Ordering information

<table>
<thead>
<tr>
<th>Part no.</th>
<th>Description</th>
<th>Loading: surface load</th>
<th>Weight</th>
</tr>
</thead>
<tbody>
<tr>
<td>248 550 0010</td>
<td>Bench 1, W 1000 × D 500 × H 750 mm</td>
<td>200 kg</td>
<td>appr. 30 kg</td>
</tr>
<tr>
<td>248 550 0012</td>
<td>Bench 2, W 1500 × D 750 × H 750 mm</td>
<td>400 kg</td>
<td>appr. 60 kg</td>
</tr>
</tbody>
</table>

Dimensioned drawings

<table>
<thead>
<tr>
<th>Description</th>
<th>W</th>
<th>D</th>
<th>L 1</th>
<th>L 2</th>
<th>L 3</th>
<th>L 4</th>
</tr>
</thead>
<tbody>
<tr>
<td>Bench 1</td>
<td>1,000</td>
<td>500</td>
<td>900</td>
<td>456</td>
<td>536</td>
<td>980</td>
</tr>
<tr>
<td>Bench 2</td>
<td>1,500</td>
<td>750</td>
<td>1,380</td>
<td>680</td>
<td>800</td>
<td>1,500</td>
</tr>
</tbody>
</table>
Accessories

Tapped rails

- M6 tapped rail
  - 13 x 6 mm
  - galvanised
  - M6 Ra 50 mm
  - VE 3 pcs. at 1 m
  - for PT/RE 40, 65
  - Part no.: 209010

- M6 tapped rail
  - 10 x 4 mm
  - galvanised
  - M6 Ra 50 mm
  - VE 3 pcs. at 1 m
  - for all except PT/RE 40, 65
  - Part no.: 209011

Sliding nuts

- M6 sliding nut
  - L 25 x W 10 x H 5 mm
  - galvanised
  - VE 50 pcs.
  - for PT/RE 40, 65
  - Part no.: 209004 0001

- M6 tapping rails
  - L 45 x W 13 x H 6 mm
  - galvanised
  - 2 × M6 Ra 25 mm
  - VE 25 pcs.
  - for PT/RE 40, 65
  - Part no.: 209005 0001

- M5 tapping rails
  - L 25 x W 10 x H 3.5 mm
  - galvanised
  - VE 20 pcs.
  - for all except PT/RE 40, 65
  - Part no.: 209006 0001

- Angle tapping rails
  - 2 × M6
  - galvanised
  - VE 25 pcs.
  - for all except PT/RE 40, 65
  - Part no.: 209021 0003

- Special angle tapping rails
  - 3 × M6
  - galvanised
  - VE 25 pcs.
  - for all except PT/RE 40, 65
  - Part no.: 209022 0003

Tension rods

- Tension rods SE
  - with M6 setting screw
  - VE 2 pcs.
  - for RE/PT
  - Part no.: 290051

Clamping devices

- Hand lever clamping device SH 1
  - for RE/PT
  - Part no.: 290001

- Hand lever clamping device SH 2
  - for RE/PT
  - Part no.: 290002

Stop rails

- Stop rail (galvanised)
  - W 20 x H 10
  - Ra 50
  - VE 2 pcs. + fixing material
  - L 125 mm
  - Part no.: 290021 0125
  - L 175 mm
  - Part no.: 290021 0175
  - L 225 mm
  - Part no.: 290021 0225

Edging strip/section

- Black edging strip
  - 1-part
  - for plate thicknesses 3 - 4 mm
  - VE 10 m
  - Part no.: 209202 0002

- Black edging profile
  - 2-part
  - Plate thicknesses 3 - 6 mm
  - VE 3 pcs. at 3 m
  - for all except PT
  - Part no.: 209212 3000

- PP 50 cross-braces
  - L 490 mm
  - mitred
  - M6 drillings
  - for all except PT/RE 40, 65
  - Part no.: 209300 0000

- Plastic hinge strip
  - L 65 x W 40
  - VE 10 pcs. + fixing
  - Ra 43 x 20 mm
  - for PT
  - Part no.: 209050 0012

- Aluminium hinge strip
  - L 40 x W 40 mm
  - VE 10 pcs. + fixing
  - Ra 25 x 25 mm
  - for all except PT/RE 40, 65
  - Part no.: 209050 0011

Subject to technical modifications.
## Accessories

### Profile connection cubes
- **Profile connection cubes**
  - **black**
  - **VE 10 pcs. + fixing material**
  - **for PU 25**
  - 2 × Part no.: 209104 0002
  - 3 × Part no.: 209103 0002

### Profile covers
- **Profile covers, black**
  - **PU 25**
    - VE 25 pcs.
    - Part no.: 209105 0003
  - **PU 50**
    - VE 25 pcs.
    - Part no.: 209126 0003
  - **PL 40**
    - VE 20 pcs.
    - Part no.: 209127 0003
  - **PL 80**
    - VE 20 pcs.
    - Part no.: 209128 0003
  - **PS 50**
    - VE 25 pcs.
    - Part no.: 209129 0003
  - **PS 80**
    - VE 20 pcs.
    - Part no.: 209130 0003
  - **PS 140**
    - VE 10 pcs.
    - Part no.: 209130 1001

### Plastic equipment bases
- **Plastic equipment bases with rubber plate**
  - **VE 4 pcs. + setting screws**
  - **black**
    - for PL 40/PS 50
      - Ø 60
      - M10 × 50 setting screws
      - Part no.: 209032 0003
    - for PL 80/PS 80
      - Ø 80
      - M12 × 50 setting screws
      - Part no.: 209034 0001

### aluminium profiles
- **Aluminium profiles made by isel® C15**

### Current information under www.mechanik.isel.com

We reserve the right to make technical changes.
Profile connections

Examples:

**PS 50 with PU 50**

- **Allen screws**
  - M6 × 25 mm
  - VE 10 pcs.
  - Part no.: 209147 0009
  - VE 50 units
  - Part no.: 209147 0010

**PS 50 with PP 250**

- **Allen key**
  - SW 5
  - DIN 911
  - VE 1 pcs.
  - Part no.: 931152

**PS 80 with PL 80**

- **Tapped bushings**
  - M9/M6
  - VE 10 pcs.
  - Part no.: 209147 0001
  - VE 50 units
  - Part no.: 209147 0002

- **Tapped bushings**
  - M10/M6
  - VE 10 pcs.
  - Part no.: 209147 0124
  - VE 50 pcs
  - Part no.: 209147 0125

**Example PL 80**

- **Hexagon-Socket Screwdriver**
- **Grub Screw**
- **Drilling Template**
- **Twist Drill**
  - Ø 6 mm / Ø 10.4 mm

**Example:**

Profile quick clamping extension for PS 50

- **Tapped Bush** Ø 10.3 x 28 mm
- **Grub Screw DIN 914, M6 x 20 mm**
- **Extension Bolt M10 for PS 50**

**for PS 50/PL 40 (M10)**
- Locking bush, tapped pin, extension bolts
- Part no.: 209147 0120
- VE 50 sets
- Part no.: 209147 0121

**for PS 80/PL 80 (M12)**
- Locking bush, tapped pin, extension bolts
- VE 10 sets
- Part no.: 209147 0122
- VE 50 sets
- Part no.: 209147 0123

**matching drill pattern 2**
- Part no.: 290015 0002

**Stepped drill**
- Ø 6/Ø 10.4 mm
- Part no.: 400090
Profile quick clamping connections

Example:
PL with PS 80

Quick Clamping Connection 0°
e.g. for PP/PS 80

Quick Clamping Connection 90°
e.g. for PP/PU/PS

Example:
PP with PS 50

Quick clamping connection

for PL
• Locking bush, tapped pin and bolts 0°
  • 10 sets:
    • Part no.: 209147 0102
  • 50 sets:
    • Part no.: 209147 0103

for PL
• Locking bush, tapped pin and bolts 90°
  • 10 sets:
    • Part no.: 209147 0112
  • 50 sets:
    • Part no.: 209147 0113

for PP/PU
• Locking bush, tapped pin and bolts 0°
  • 10 sets:
    • Part no.: 209147 0100
  • 50 sets:
    • Part no.: 209147 0101

for PP/PU
• Locking bush, tapped pin and bolts 90°
  • 10 sets:
    • Part no.: 209147 0110
  • 50 sets:
    • Part no.: 209147 0111

Stepped drill
• Ø 6 mm/Ø 10.4 mm
  • Part no.: 400090

matching drill pattern 2
  • Part no.: 290015 0002

Allen key
SW 3
• DIN 911
  • Part no.: 931150
Linear guides

Overview

- **LFS-12-3** Linear guide rail
  - with LW 2 carriage
  - with LW 8 carriage
  - with WS 7 aluminium slide

- **LFS-12-10** Linear guide rail
  - with LW 4 carriage
  - with WS 8 aluminium slide
  - With dual track set 1+2

- **LFS-16-2** Linear guide rail
  - with ILS1 steel slide
  - with IWS1 aluminium slide

- **LFS-16-120** Linear guide rail
  - with 2 or 4 IWS 1 aluminium slides
  - with 2 or 4 ILS 1 steel slides

- **LFS-16-150** Linear guide rail
  - with ILS1 steel slide
  - with IWS1 aluminium slide

- **LFS-16-250** Linear guide rail
  - with ILS1 steel slide
  - with IWS1 aluminium slide

- **Accessories**

- **Operating loads calculation**
Linear guide slide function

1. Both sides greasing option for the recirculating balls.
2. The basic supports for all linear guides are extruded aluminium profiles to DIN EN 12020-2, which are provided with T-key inserts for fastening in the body of the profile or have fixing borings.
3. Precision steel shafts with a hardness of 60 ± 2 HRC are used as guide rails. All LFS-8 versions are optionally available with stainless steel shafts.
4. The recirculating ball steering is reinforced with glass fibre.
5. There are patented recirculating balls in the linear slides. Ball bearings run in each case between two ground steel pins and the guidance shaft.
6. The slide is adjusted with self-locking setting screws. This is how the rows of balls and shafts or pins are used with each other and thus pre-stressed. The slides are preset in the factory to the correct stress. All shaft slides are optionally available stainless.
7. To secure transport loads, slide plates, etc., the shaft slides are provided with T-key inserts or fixing borings.

Aluminium shaft slides

The patented shaft slides are perfectly suited for assembling of complex multiple axis systems for handling and machining.

A wide range of models covers a multitude of applications.

All models can be produced to order with various profile lengths (70, 100, 150 and 200 mm).
General notes

Load capacity and working life

Installation position

In principal, the installation position for linear guides can be chosen anywhere. You merely have to consider whether all the forces and moments arising are below the maximum values for the relevant axes.

Temperatures

All linear guides are designed for continuous operation at ambient temperatures of up to 60 °C. In short-term operation, maximum temperatures of 80 °C are permissible.

Linear guides are unsuitable for temperatures below freezing.

Straightness/Warping

The aluminium profiles used are extruded profiles, which exhibit divergences from straightness and may be warped, owing to the manufacturing process. The tolerance of this deviation is set out in DIN EN 12020-2. In the worst case, the linear guide deviations equal these limits, but typically they are lower.

In order to achieve the desired guidance accuracy, the guide must be aligned using shims or clamped to a bearing service machined to the corresponding accuracy. This achieves tolerances of at least 0.1 mm/1,000 mm.

Principles

Load capacity and working life

The dimensioning of a linear guide is based on the load capacity of the individual elements. The load capacity is described by:

- the dynamic load factor C
- the static load factor C0
- the static torques M0X, M0Y and M0Z

The basis of the dynamic load factors according to DIN is a nominal working life of 100,000 m displacement path. Far East suppliers often quote load factors for a nominal working life of 50,000 m displacement path; this produces load factor figures which are approximately 20% higher than those according to DIN.

Dynamic load capacity

The fatigue characteristics of the material determine the dynamic load capacity. The working life - the fatigue period - also depends on:

- the stress on the linear guide
- the speed at which the linear guide moves
- the statistical randomness of the first damage occurring

Useful life

Useful life means the working life actually achieved by a linear guide. The useful life may differ from the computed working life.

The following can lead to premature failure through wear or fatigue:

- Misalignments between guide rails or guidance elements
- Contamination of the guide rails
- Insufficient lubrication
- Oscillating motion with very small lifts (formation of grooves)
- Vibrations at rest (formation of grooves)

Owing to the multiplicity of installation and operating relationships, it is impossible to determine the useful life of a linear guide exactly in advance. The safest way to make an accurate estimate of the useful life is, as before, a comparison with similar installations.
Linear guides

LFS-8-1  
LFS-8-2

Features

- W 30 x H 20 mm (LFS-8-1)  
  W 30 x H 32.5 mm (LFS-8-2)
- 2 precision steel shafts Ø 8
- Anti-twist lock
- Aluminium shaft housing profile, naturally anodised
- Fixing from below with M6 tapped rails in T-key insert
- Conditionally self-supporting
- Special lengths to order
- Weights: appr. 1.6 kg/m (LFS-8-1)  
  appr. 2.0 kg/m (LFS-8-2)

Options:

- stainless design
- drilled for M6 (LFS-8-1 only)

Ordering key

235 00X XXXX

LFS-8-1/standard = 0
LFS-8-1/stainless = 1
LFS-8-2/standard = 2
LFS-8-2/stainless = 3

Length in mm (in 100 mm raster)

- e.g. 0029 = Length 298
- 0299 = Length 2998

Steel shaft length: Total length L - 3 mm

Profile up to 6,000 mm available without impact connection, steel shafts divided.

Load data

<table>
<thead>
<tr>
<th>Shaft slide WS 1/70</th>
<th>Carriage LW 6</th>
</tr>
</thead>
<tbody>
<tr>
<td>C</td>
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</tr>
<tr>
<td>Fr. stat.</td>
<td>F. stat.</td>
</tr>
<tr>
<td>Fr. dyn.</td>
<td>F. dyn.</td>
</tr>
<tr>
<td>M1, stat.</td>
<td>M. stat.</td>
</tr>
<tr>
<td>M1, dyn.</td>
<td>M. dyn.</td>
</tr>
<tr>
<td>T1, stat.</td>
<td>M1 stat.</td>
</tr>
<tr>
<td>T1, dyn.</td>
<td>M1 dyn.</td>
</tr>
<tr>
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<td>C</td>
</tr>
<tr>
<td>Fr. stat.</td>
<td>F. stat.</td>
</tr>
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<td>M. stat.</td>
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<td>M1, dyn.</td>
<td>M. dyn.</td>
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<tr>
<td>T1, stat.</td>
<td>M1 stat.</td>
</tr>
<tr>
<td>T1, dyn.</td>
<td>M1 dyn.</td>
</tr>
</tbody>
</table>

Aluminium slide

- With recirculating ball guide
- Clamping surface plane milled
- M6 T-key inserts
- Central lubrication option
- Adjustable for no play
- Option: stainless design

L 96 x W 72 x H 28.5 mm (WS 1/70)
(Weight: appr. 0.4 kg)
Part no.: 223100 0070
Stainless steel: 223101 0070

L 126 x W 72 x H 28.5 mm (WS 1)
(Weight: appr. 0.5 kg)
Part no.: 223100
Stainless steel: 223101

Carriage LW 6

- L 125 × W 90 × H 7.7 mm
- ground steel plate
- 4 rollers Ø 31, sealed for life
- adjustable for no play
- Weight: appr. 1 kg
Part no.: 223011

Figure:
LFS-8-1 with aluminium slides WS 1/70

Figure:
LFS-8-2 with aluminium slides WS 1/70
Linear guide rails

**Bending**

Load config. 1

Load config. 2

**Dimensioned drawings**

LFS-8-1 or LFS-8-2 with aluminium slide WS 1/70 or WS 1

Profile length 298 ... 2998 mm in steps of 100 mm

LFS-8-1 or LFS-8-2 with carriage LW6

Profile length 298 ... 2998 mm in steps of 100 mm
Linear guide rail

LFS-8-3

Features
- W 115 × H 25.5 mm
- 2 precision steel shafts Ø 8
- Particularly resistant to twisting
- Aluminium shaft housing profile, naturally anodised
- Fixing from above through M6 drillings in the raster 100 mm
- Conditionally self-supporting
- Special lengths to order
- Weight: appr. 3.2 kg/m
- Option: stainless design

Ordering key

235 00X XXXX

Standard = 4
Stainless = 5
E.g. 0029 = Length 296
0299 = Length 2996

Steel shaft length: Length overall L - 1 mm
Profile up to 6000 mm available without impact link, steel shafts divided.

Load data

<table>
<thead>
<tr>
<th>Shaft slide WS 3/70</th>
<th>Shaft slide WS 3</th>
<th>Carriage LW 7</th>
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</thead>
<tbody>
<tr>
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<td>6945 N</td>
<td>C₁</td>
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<td>C</td>
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<td>F₂, stat.</td>
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<td>M₁, stat.</td>
<td>115.7 Nm</td>
<td>M₁, stat.</td>
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<td>M₁, dyn.</td>
<td>69.2 Nm</td>
<td>M₁, dyn.</td>
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<tr>
<td>M₂, dyn.</td>
<td>62.9 Nm</td>
<td>M₂, dyn.</td>
</tr>
<tr>
<td>M₁, dyn.</td>
<td>125.1 Nm</td>
<td>M₂, dyn.</td>
</tr>
</tbody>
</table>

Aluminium slide
- With recirculating ball guide
- Clamping surface plane milled
- M6 T-key inserts
- Central lubrication option
- Adjustable for no play
- Option: stainless design

L 96 × W 130 × H 32 mm (WS 3/70)
(Weight: appr. 0.5 kg)
Part no.: 223103 0070
Stainless steel: 223103 1070

L 176 × W 130 × H 32 mm (WS 3)
(Weight: appr. 0.9 kg)
Part no.: 223103
Stainless steel: 223103 1000

Carriage LW 7
- L 175 × W 150 × H 7.5 mm
- ground steel plate
- 4 rollers Ø 31, sealed for life
- adjustable for no play
- Weight: appr. 2 kg
Part no.: 223012
Linear guide rail

**Bending**

- **Load config. 1**
- **Load config. 2**

**Dimensioned drawings**

- LFS-8-3 with aluminium slides WS 3/70 or WS 3
- LFS-8-3 with carriage LW 7
Linear guide rail

Features
- W 80 × H 80 mm
- 2 precision steel shafts Ø 8
- anti-twist
- Aluminium shaft housing profiles, naturally anodised
- Fixing from below with M6 tapped rails in the T-key inserts or in the head side through M8 drillings
- side T-key inserts for limit switch securing
- conditionally self-supporting
- Special lengths to order
- Weight: appr. 7.2 kg/m
- Options: stainless design 2 extra steel shafts 2 slides or carriage

Ordering key
235 00X XXXX
Standard = 6 Length in mm (in 100 mm raster)
Stainless = 7 e.g. 0029 = Length 298
0299 = Length 2998

Steel shaft length: Length overall L - 3 mm
Profile up to 6000 mm available without impact link, steel shafts divided.

Load data

LFS-8-4

Aluminium slide
- Clamping surface plane milled
- M6 T-key inserts
- Central lubrication option
- adjustable for no play
- Option: stainless steel version

L 96 × W 130 × H 32 mm (WS 3/70)
(Weight: appr. 0.5 kg)
Part no.: 223103 0070
Stainless steel: 223103 1070

L 176 × W 130 × H 32 mm (WS 3)
(Weight: appr. 0.9 kg)
Part no.: 223103
Stainless steel: 223103 1000

Carriage LW 7
- L 175 × W 150 × H 7.5 mm
- ground steel plate
- sealed for life
- adjustable for no play
- Weight: appr. 2 kg
Part no.: 223012
Linear guide rail

LFS-8-4

Bending

Load config. 1

Load config. 2

Dimensioned drawings

LFS-8-4 with aluminium slide WS 3/70 or WS 3

Profile length: 298 ... 2998 mm in steps of 100 mm

LFS-8-4 with carriage LW 7

Load config. 1

Load config. 2
## Linear guide rail

**Figure:**
2 precision steel shafts with aluminium slides WS 4 and shaft housing blocks

**Diagram:**
Shaft housing block

## LFS-12-1

### Features
- W 40 × H 27 mm
- 2 precision steel shafts Ø 12
- anti-twist
- Aluminium shaft housing blocks
- Securing from above or below with M6 drillings in the housing blocks
- Guide any length up to 3m
- Special lengths to order
- Weight: appr. 1.9 kg/m

## Ordering key
**227 312 XXXX**

Length in mm (in 100 mm raster)

- e.g. 0298 = Length 298
- 2998 = Length 2998

Special lengths to order

**N.B.**
The part no. refers to one steel shaft only

## Load data

### Shaft slide WS 4/70

| Fr, stat. | 2821 N | Fr, dyn. | 2071 N |
| Fr, stat. | 3393 N | Fr, dyn. | 2426 N |
| Fr, stat. | 4456 N | Fr, dyn. | 3508 N |
| Fr, stat. | 1837 N | Fr, dyn. | 2050 N |

### Shaft slide WS 4

| Fr, stat. | 2150 N | Fr, dyn. | 1652 N |
| Fr, stat. | 2017 N | Fr, dyn. | 1544 N |
| Fr, stat. | 3548 N | Fr, dyn. | 2189 N |

### Steel slide LS 1

| Mx, stat. | 29.8 Nm |
| Mx, dyn. | 16.8 Nm |
| Mx, stat. | 15.3 Nm |
| Mx, dyn. | 9.8 Nm |

### Carriage LW 8

| Mx, stat. | 109.5 Nm |
| Mx, dyn. | 57.4 Nm |
| Mx, stat. | 124.0 Nm |
| Mx, dyn. | 69.4 Nm |

---

### Aluminium slides
- Clamping surface plane milled
- Weight: appr. 0.3 kg
- Option: stainless design

L 94 x W 62 x H 31.5 mm (WS 4/70)
Part no.: 223104 0070
Stainless steel: 223104 1070
L 124 x W 62 x H 31.5 mm (WS 4)
Part no.: 223104
Stainless: 223104 1000

### Steel slide LS 1

| Mx, stat. | 43.9 Nm |
| Mx, dyn. | 21.7 Nm |
| Mx, stat. | 155.2 Nm |
| Mx, dyn. | 77.7 Nm |

### Carriage LW 3

| Mx, stat. | 109.5 Nm |
| Mx, dyn. | 57.4 Nm |
| Mx, stat. | 124.0 Nm |
| Mx, dyn. | 69.4 Nm |

---

### Shaft housing blocks
- Ø 40 mm, hole spacing 28 mm
- Cast zinc, VE 10 units

Part no.: 221501
Linear guide rail

Dimensioned drawings

LFS-12-1 with Carriage LW 3

LFS-12-1 with shaft slide WS 4/70 or WS 4

LFS-12-1 with steel slide LS 1

Shaft housing block
Linear guides

Linear guide rail

LFS-12-11

Features

- **W 20 × H 31 mm**
- Precision steel shaft Ø 12
- Aluminium shaft housing profile, naturally anodised
- Securing from below with M6 tapped rails in T-groove insert on flat surface
- Special lengths to order
- Weight: appr. 1.3 kg/m

Ordering key

220 002 XXXX

Length in mm

e.g. 0298 = Length 298
0998 = Length 998
Profile length = Length overall L - 2 mm

Loading data

<table>
<thead>
<tr>
<th>Shaft slide WS 6/70</th>
<th>Shaft slide WS 6</th>
<th>Carriage LW 5</th>
</tr>
</thead>
<tbody>
<tr>
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<td>3303 N</td>
<td>C</td>
</tr>
<tr>
<td>F1 stat.</td>
<td>2821 N</td>
<td>F1 stat.</td>
</tr>
<tr>
<td>F1 dyn.</td>
<td>1959 N</td>
<td>F1 dyn.</td>
</tr>
<tr>
<td>F2 stat.</td>
<td>3303 N</td>
<td>F2 stat.</td>
</tr>
<tr>
<td>F2 dyn.</td>
<td>1959 N</td>
<td>F2 dyn.</td>
</tr>
<tr>
<td>M1 stat.</td>
<td>-</td>
<td>M1 stat.</td>
</tr>
<tr>
<td>M1 dyn.</td>
<td>-</td>
<td>M1 dyn.</td>
</tr>
<tr>
<td>M2 stat.</td>
<td>123.3 Nm</td>
<td>M2 stat.</td>
</tr>
<tr>
<td>M2 dyn.</td>
<td>58.3 Nm</td>
<td>M2 dyn.</td>
</tr>
<tr>
<td>M3 stat.</td>
<td>155.3 Nm</td>
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</tr>
<tr>
<td>M3 dyn.</td>
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</tr>
<tr>
<td>M4 stat.</td>
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<td>F (a) = F1 cos α</td>
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<td></td>
</tr>
<tr>
<td>F (a) = F2 sin α</td>
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<td></td>
</tr>
</tbody>
</table>

Aluminium slide

- With recirculating ball guide
- M6 T-groove inserts
- Central lubrication system option
- Adjustable for no play
- Option: stainless steel design

L 96 × W 50 × H 31.5 mm (WS 6/70)
(Weight: appr. 0.3 kg)
Part no.: 223106 0070
Stainless steel: 223106 1070

L 126 × W 50 × H 31.5 mm (WS 6)
(Weight: appr. 0.5 kg)
Part no.: 223106
Stainless steel: 223106 1000

Carriage LW 5

- L 110 × W 75 × H 7.7 mm
- ground steel plate
- 4 rollers Ø 31, sealed for life
- adjustable for no play
- Weight: 0.81 kg
Part no.: 223010
Linear guide rail

**Bending**

1. Load config. 1: $F_1$
2. Load config. 2: $F_2$

**Dimensioned drawings**

- **LFS-12-11 with aluminium slide WS 6/70 or WS 6**
  - **Steel shaft**: Length 298 to 2998 mm in steps of 100 mm

- **LFS-12-11 with Carriage LW5**

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Linear guide rail

LFS-12-2

Features
- W 62 × H 31 mm
- 2 precision steel shafts Ø 12
- Anti-twist lock
- Aluminium shaft housing profile, naturally anodised
- High parallelism through patented shaft housing outline
- High guidance accuracy
- Securing from above or below using drillings Ø 6.5 in 100 mm raster on flat surface
- Lengths in 100 mm raster
- Max. length up to 2998 mm
- Special lengths to order
- Weight: appr. 3.3 kg/m

Ordering key
235 200 XXXX

Length in mm
e.g. 0298 = Length 298
0998 = Length 998
Profile length = Length overall L - 2 mm

Loading data

<table>
<thead>
<tr>
<th>Shaft slide WS 4/70</th>
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<th>Carriage LW 3</th>
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<td>F1, stat.</td>
<td>F1, stat.</td>
<td>F1, stat.</td>
</tr>
<tr>
<td>1873 N</td>
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<td>4000 N</td>
</tr>
<tr>
<td>F1, dyn.</td>
<td>F1, dyn.</td>
<td>F1, dyn.</td>
</tr>
<tr>
<td>1793 N</td>
<td>2071 N</td>
<td>3846 N</td>
</tr>
<tr>
<td>F2, stat.</td>
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<td>F2, stat.</td>
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<tr>
<td>2426 N</td>
<td>2071 N</td>
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<td>152.3 Nm</td>
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<td>181.7 Nm</td>
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<td>Mz, stat.</td>
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<tr>
<td>68.9 Nm</td>
<td>90.5 Nm</td>
<td>180.0 Nm</td>
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</tbody>
</table>

Aluminium slide
- With recirculating ball guide
- Clamping surface plane milled
- Option: stainless steel design

L 94 × W 62 × H 31.5 mm (WS 4/70)
(Weight: appr. 0.33 kg)
Part no.: 223104 0070
Stainless steel: 223104 1070

L 124 × W 62 × H 31.5 mm (WS 4)
(Weight: appr. 0.46 kg)
Part no.: 223104
Stainless steel: 223104 1000

Carriage LW 3
- L 125 × W 85 × H 7.7 mm
- ground steel plate
- Weight: 0.93 kg
Part no.: 223008
Linear guide rail

**Bending**

- Load config. 1
- Load config. 2

**Dimensioned drawings**

LFS-12-2 with aluminium slide WS 4/70 or WS 4

- Steel shaft: Length 298 to 2998 mm in steps of 100 mm

LFS-12-2 with Carriage LW3

- In steps of 100

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Linear guide rail LFS-12-2

Mechanics

Linear guides
Linear guides

Linear guide rail

LFS-12-3

Features
- W 90 × H 31 mm
- 2 precision steel shafts Ø 12
- anti-twist
- Aluminium shaft housing profile, naturally anodised
- increased shaft spacing allows higher torques to be absorbed
- Securing from above or below with M6 drillings in 100 mm raster
- Any guide length
- Weight: appr. 3.9 kg/m

Ordering key
235 300 XXXX
Length in mm (in 100 mm raster)
e.g. 0029 = Length 298
0299 = Length 2998
Profile length = Length overall L - 2 mm
Special lengths over 3000 mm with rod linkage to order.

Loading data

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<th>Carriage LW 8</th>
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<tr>
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<td>4000 N</td>
</tr>
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<tr>
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<tr>
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<td>M&lt;sub&gt;z&lt;/sub&gt; dyn.</td>
<td>221.1 Nm</td>
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</tbody>
</table>

Slide
- ground steel plate
- central lubrication system option
- adjustable for no play
L 100 × W 100 × H 32 mm (WS 7/70) (Weight: appr. 0.8 kg)
Part no.: 223107 0070
L 200 × W 100 × H 32 mm (WS 7)
Part no.: 223107

Carriage LW 8
- L 150 × W 125 × H 7.5 mm
- ground steel plate
- 4 rollers Ø 31, sealed for life
- adjustable for no play
- Weight: 1.31 kg
Part no.: 223013

Carriage LW 2
- L 150 × W 125 × H 34.5 mm
- Aluminium T-groove plate
- 4 rollers Ø 31, sealed for life
- adjustable for no play
- Weight: 0.97 kg
Part no.: 223005
Linear guide rail

LFS-12-3

Bending

Load config. 1

Load config. 2

Dimensioned drawings

LFS-12-3 with aluminium slide WS 7

LFS-12-3 with Carriage LW 8

LFS-12-3 with Carriage LW 2

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Linear guide rail

### FEATURES
- **W 36 × H 24.5 mm**
- 2 precision steel shafts Ø 12
- anti-twist
- Aluminium shaft housing profile, naturally anodised
- Fixing from below with M6 tapped rails in T-groove insert and from above M6 drillings in 50 mm raster
- conditionally freeloading
- Special lengths to order
- Weight: appr. 2.9 kg/m

### ORDERING KEY
**220 001 XXXX**

Length in mm (in 100 mm raster)
e.g. 0300 = Length 296
3000 = Length 2996
Profile length = Length overall L - 1 mm

Special lengths over 3000 with rod linkage to order.

### LOADING DATA

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<th>Slide W5</th>
<th>Carriage LW 4</th>
<th>Dual Track set 1</th>
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<td>C</td>
<td>2100 N</td>
</tr>
<tr>
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<td>2426 N</td>
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<td>4173 N</td>
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<td>3237 N</td>
<td>F1 dyn.</td>
<td>4000 N</td>
</tr>
<tr>
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<td>2591 N</td>
<td>3237 N</td>
<td>F2 stat.</td>
<td>4173 N</td>
</tr>
<tr>
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<td>2591 N</td>
<td>3237 N</td>
<td>F2 dyn.</td>
<td>4000 N</td>
</tr>
<tr>
<td>M1 stat.</td>
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<td>68.8 Nm</td>
<td>M1 stat.</td>
<td>48.7 Nm</td>
</tr>
<tr>
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<td>48.7 Nm</td>
<td>68.8 Nm</td>
<td>M2 stat.</td>
<td>48.7 Nm</td>
</tr>
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<td>M1 stat.</td>
<td>48.7 Nm</td>
<td>68.8 Nm</td>
<td>M3 stat.</td>
<td>48.7 Nm</td>
</tr>
<tr>
<td>M1 dyn.</td>
<td>68.9 Nm</td>
<td>90.5 Nm</td>
<td>M1 dyn.</td>
<td>68.9 Nm</td>
</tr>
</tbody>
</table>

### SLIDE
- ground steel plate
- lubrication system option
- adjustable for no play

- L 125 × W 75 × H 31.5 mm (W5 8/70)
  (Weight: appr. 0.7 kg)
  Part no.: 223108 0070
- L 150 × W 75 × H 31.5 mm (W5 8)
  (Weight: appr. 1.0 kg)
  Part no.: 223108

### CARRIAGE LW 4
- L 125 × W 97 × H 7.7 mm
- 4 rollers Ø 31, sealed for life
- adjustable for no play
- Weight: 1.0 kg

Part no.: 223009

### Dual track set 1
- L75 x W75 x H30.2 mm
- with 2 SMALL linear ball bearings

Part no.: 223001

### Dual track set 2
- L125 x W75 x H30.2 mm
- with 2 LARGE linear ball bearings

Part no.: 223002

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For steel shafts Ø 12 mm

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Linear guide rail

Bending

Load config. 1

Load config. 2

Dimensioned drawings

LFS-12-10 with slide WS 8

Profile length 296 to 2996 mm in steps of 100 mm

LFS-12-10 with Carriage LW 4

LFS-12-10 with dual track set

Profile length 296 to 2996 mm in steps of 100 mm
Linear guides

Linear guide rail

LFS-16-2

Features
- W 25 × H 47.5 mm
- Precision steel shaft Ø 16
- Aluminium shaft housing profile, naturally anodised
- Securing from below on flat surface with M6 tapped rails in T-groove insert
- not self-supporting
- Lengths in 100 mm raster
- max. Length 2998 mm
- Special lengths to order
- Weight: appr. 2.7 kg/m

Ordering key

220 004 XXXX

Length in mm (in 100 mm raster)
- e.g. 0029 = Length 298
- 0299 = Length 2998

Profile length = Length overall L - 2 mm
Special lengths to order

Loading data

<table>
<thead>
<tr>
<th>Carriage ILW 1</th>
<th>Steel slide ILS 1</th>
</tr>
</thead>
<tbody>
<tr>
<td>C, 2180 N</td>
<td>C, 3060 N</td>
</tr>
<tr>
<td>F, stat. 4000 N</td>
<td>F, stat. 3750 N</td>
</tr>
<tr>
<td>F, dyn. 3997 N</td>
<td>F, dyn. 3750 N</td>
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<tr>
<td>F, stat. 2180 N</td>
<td>F, stat. 3060 N</td>
</tr>
<tr>
<td>F, dyn. 3997 N</td>
<td>F, dyn. 3060 N</td>
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<td>M, stat. 104.4 N</td>
<td>M, stat. 107.6 N</td>
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<td>M, dyn. 97.3 N</td>
<td>M, dyn. 97.3 N</td>
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<tr>
<td>M, stat. 175.2 N</td>
<td>M, stat. 194.8 N</td>
</tr>
<tr>
<td>M, dyn. 180.0 N</td>
<td>M, dyn. 180.0 N</td>
</tr>
</tbody>
</table>

Aluminium slide IWS 1
- L 94 × W 55 × H 33.5 mm
- Clamping surface plane milled
- Weight: 0.32 kg
- Option: stainless steel design

Part no.: 223220
Stainless steel: 223220 0001

Steel slide ILS 1
- L 94 × W 58 × H 33.7 mm
- Clamping surface ground
- Weight: 0.72 kg

Part no.: 223210

Carriage ILW 1
- L 125 × W 80 × H 7.7 mm
- ground steel plate
- Weight: 0.87 kg

Part no.: 223230
Linear guide rail LFS-16-2

Dimensioned drawings

LFS-16-2 with aluminium slide IWS 1

LFS-16-2 with aluminium slide ILS 1

LFS-16-2 with Carriage ILW 1

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**Linear guide rail**

**LFS-16-120**

**Features**
- W 190 × H 61 mm
- 2 precision steel shafts Ø 16
- anti-twist
- Aluminium shaft housing profile naturally anodised
- Securing from below with M6 tapped rails in T-groove profile
- conditionally not self-supporting
- Any guide length
- Weight: 10.2 kg/m

**Ordering key**

220 008 XXXX

Length in mm (in 100 mm raster)
e.g. 0029 = Length 298
0299 = Length 2998

Profile length = Length overall L - 2 mm
Special lengths to order

**Loading data**

<table>
<thead>
<tr>
<th>Load config. 1</th>
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<tr>
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</table>

<table>
<thead>
<tr>
<th>$F_1$ (ax) =</th>
<th>$F_2$ (ax) =</th>
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</thead>
<tbody>
<tr>
<td>$F_1$</td>
<td>$F_2$</td>
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</tbody>
</table>

**Bending**

[Diagram showing bending loads and deflections]

**Loading data table**

<table>
<thead>
<tr>
<th>Line with 2 x IL51</th>
<th>Line with 2 x IL51</th>
<th>Line with 4 x IL51</th>
<th>Line with 4 x IL51</th>
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<tbody>
<tr>
<td>$C_x$</td>
<td>6025 N</td>
<td>$C_x$</td>
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<tr>
<td>$C$</td>
<td>2600 N</td>
<td>$C$</td>
<td>3540 N</td>
</tr>
<tr>
<td>$F_1$, stat.</td>
<td>6448 N</td>
<td>$F_1$, stat.</td>
<td>7072 N</td>
</tr>
<tr>
<td>$F_2$, dyn.</td>
<td>4146 N</td>
<td>$F_2$, dyn.</td>
<td>5016 N</td>
</tr>
<tr>
<td>$M_1$, stat.</td>
<td>389 Nm</td>
<td>$M_1$, dyn.</td>
<td>317 Nm</td>
</tr>
<tr>
<td>$M_2$, stat.</td>
<td>156 Nm</td>
<td>$M_2$, dyn.</td>
<td>106 Nm</td>
</tr>
<tr>
<td>$M_3$, dyn.</td>
<td>121 Nm</td>
<td>$M_3$, dyn.</td>
<td>121 Nm</td>
</tr>
</tbody>
</table>

*Note: All values in N and Nm.*
Linear guide rail

LFS-16-120

Slide unit with 2 × steel slide ILS 1 (kit)
- L 84 × W 178 × H 8 mm
- ground steel plate
- 2 × ILS 1, central lubrication option
- adjustable for no play
- Total weight: 2.30 kg

Part no.: 223240 0009

Slide unit with 2 × aluminium slide IWS 1 (kit)
- L 84 × W 178 × H 8 mm
- ground steel plate
- 2 × IWS 1, central lubrication option
- adjustable for no play
- Total weight: 1.50 kg

Part no.: 223240 0007

Slide unit with 4 × steel slide ILS 1 (kit)
- L 180 × W 178 × H 8 mm
- ground steel plate
- 4 × ILS 1, central lubrication option
- adjustable for no play

Part no.: 223240 0008

Slide unit with 4 × aluminium slide IWS 1 (kit)
- L 180 × W 178 × H 8 mm
- ground steel plate
- 4 × IWS 1, central lubrication option
- adjustable for no play

Part no.: 223240 0010

Dimensioned drawings

Aluminium slide IWS 1

Steel slide ILS 1
Linear guides

Linear guide

LFS-16-150

Linear guide rail LS-16-150

- 2 precision steel shafts Ø 16 mm
- Aluminium profile rail with T-groove inserts, raster 25 mm, anodised
- exact, shaft housing outline milled in a clamping fixture
- Conditionally freeloading
- Standard length 3 m, any number of segments
- Weight: 13.9 kg/m

Part no.: 220030 0099 (Length 1 m)
220030 0199 (Length 2 m)
220030 0299 (Length 3 m)

Option:
- Other lengths (longer or shorter)

Steel slide ILS 1

- Steel slide
  L 94 × W 58 × 33.7 mm
- 4 recirculating balls, adjustable for no play
- Grease nipple on front
- Weight: 0.7 kg

Part no.: 223210

Aluminium slide IWS 1

- L 94 × W 55 × H 33.5 mm
- Clamping surface plane milled
- Weight: 0.32 kg
- Option: stainless steel design

Part no.: 223220
Stainless steel: 223220 0001

Aluminium slide IWS 1 with slot plate

- 2 or 4 linear guide slides
- Slot plate (ground steel)
- Adjustable for no play
- Weight: 2.5 kg or 5.1 kg

Part no.: 223240 0036 (2 slides)
223240 0037 (4 slides)

Loading data

<table>
<thead>
<tr>
<th>Linear guide LFS-16-150</th>
<th>Linear guide LFS-16-150</th>
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<tbody>
<tr>
<td>2 steel slide</td>
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</tr>
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<td>$F_{r}(x) = F_{1} \sin \alpha$</td>
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<tr>
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<td>$C_{r}$ 10130 N</td>
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<td>$C$ 4857 N</td>
<td>$C$ 6476 N</td>
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<td>$F_{1}$ stat. 6605 N</td>
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</tr>
<tr>
<td>$M_{z}$ dyn. 145.7 Nm</td>
<td>$M_{z}$ dyn. 356.2 Nm</td>
</tr>
</tbody>
</table>

Dimensioned drawing
Linear guide LFS-16-250

- 2 precision steel shafts Ø 16 mm
- Aluminium profile rail with T-groove inserts, raster 25 mm, anodised
- exact, shaft housing outline milled in a clamping fixture
- Conditionally not self-supporting
- Standard length 3 m, any number of segments
- Weight: 17.5 kg/m

Part no.: 220029 0099 (Length 1 m) 220029 0199 (Length 2 m) 220029 0299 (Length 3 m)

Option:
- Other lengths (longer or shorter)

Steel slide ILS 1

- Steel slide
  - L 94 × W 58 × H 33.7 mm
- 4 recirculating balls, adjustable for no play
- Grease nipple on front
- Weight: 0.7 kg

Part no.: 223210

Aluminium slide IWS 1

- L 94 × W 55 × H 33.5 mm
- Clamping surface plane milled
- Weight: 0.32 kg
- Option: stainless steel design

Part no.: 223220
Stainless steel: 223220 0001

Aluminium slide IWS 1 with slot plate

- 2 or 4 linear guide slides
- Slot plate (ground steel)
- Adjustable for no play
- Weight: 3.5 kg or 7.0 kg

Part no.: 223240 0040 (2 slides) 223240 0041 (4 slides)
Accessories

M6 tapped rail
• 10 × 4 mm
• galvanised
• VE 3 units at 1 m
Part no.: 209 011

M6 sliding nut (Figure 1)
• L 25 × W 10 × H 3.5 mm
• galvanised
• VE 100 units
• all except PT/RE 40, 65
Part no.: 209 001 0005

2 × M6 sliding nuts (Figure 2)
• L 45 × W 10 × H 3.5 mm
• galvanised
• VE 50 units
• for all except PT/RE 40, 65
Part no.: 209 002 0004

Angle sliding nut
2 × M6 (Figure 3)
• galvanised
• VE 25 units
• for all except PT/RE 40, 65
Part no.: 209 021 0003

Special angle sliding nut
3 × M6 (Figure 3)
• galvanised, VE 25 units
• for all except PT/RE 40, 65
Part no.: 209 022 0003

M5 sliding nuts
• galvanised
• VE 20 units
• for all except PT25, PT 50, PS 200, RE 40 and RE 65
(secure only possible from above)
with spring
Part no.: 209005 0002
(M5/Figure 1)
Part no.: 209005 0003
(M5/Figure 2)

with large chamfer
Part no.: 209005 0004
(M6/Figure 3)
in rhombus shape
Part no.: 209005 0005
(M5/Figure 4)
Part no.: 209005 0006
(M6/Figure 5)

Linear ball bearing
For steel shafts Ø 12 mm
Linear ball bearing, large
• L 80 × W 20 × H 19 mm, VE 2 units
Part no.: 222 002 0001
Linear ball bearing, medium
• L 60 × W 20.5 × H 17.8 mm, VE2 units
Part no.: 222 000
Linear ball bearing, small
• L 40 × W 20 × H 19 mm, VE 2 units
Part no.: 222 001

Grease/grease gun
Grease
Part no.: 299 032 0002
Impact press for grease and oil
Part no.: 299 032 0003

Guide shafts SF 12/SF 16
• Precision steel shafts Ø 12 or 16 mm, length 3 m
• Hardened and ground
• with M5 blind hole thread (SF12) or M6 (SF16) in 100 mm raster
• or with stepped bore for M4 (SF 12) or M5 (SF 16) in 100 mm raster
Part no.: 220019 0299
(SF12, 3m, blind hole thread for M5)
Part no.: 220020 0299
(SF12, 3m, stepped bore for M4)
Part no.: 220023 0299
(SF16, 3m, stepped bore for M5)
Part no.: 220024 0299
(SF16, 3m, blind hole thread for M6)

Rollers
Roller Ø 20 mm for SF 12
• with M4 tapped drilling
• VE 2 units
Part no.: 222 010
Roller Ø 30 mm for SF 16
• with M6 tapped drilling
• VE 2 units
Part no.: 222 010 0003
Operating loads calculation

Effective loading calculation

Various factors affect the calculation of the loading of isel guides. This includes the position of the C of G of the load, tensile and compressive forces, torques, load and acceleration forces.

For a linear bench on 4 bearings, the bearing forces are calculated according to the force application point for various load directions. The calculation can also be applied to a slot configuration with 2 slide.

The dimension $L_{2}/2$ is used as the dimension $L$ (see dimensioned drawings for the relevant guides). The load factor in this case is $C_{O}/2$.

Combined load

If the load alignment of an element does not coincide with one of the main load directions, then the equivalent load is calculated:

$$ P = \left| F_{1} \right| + \left| F_{2} \right| $$

If a force $F$ and a torque $M$ load an element simultaneously, then the dynamically equivalent load is:

$$ P = F + M $$

According to DIN, the dynamically equivalent load should not exceed the value $P = 0.5 \cdot C_{O}$.

Equivalent load calculation

Operating conditions

<table>
<thead>
<tr>
<th>Incremental change</th>
<th>Uniform change</th>
</tr>
</thead>
<tbody>
<tr>
<td>$P_1$, $P_2$, $P_3$</td>
<td>$P$, $P_1$, $P_2$, $P_3$</td>
</tr>
<tr>
<td>$L_1$, $L_2$, $L_3$</td>
<td>$L$, $L_1$, $L_2$, $L_3$</td>
</tr>
</tbody>
</table>

Equivalent load

$$ P = \frac{1}{3} \cdot \left( P_{1} \cdot L_{1} + P_{2} \cdot L_{2} + P_{3} \cdot L_{3} + P \cdot L \right) $$

Static safety

Operating conditions

<table>
<thead>
<tr>
<th>Normal motion</th>
<th>High speed</th>
<th>With impacts and vibration</th>
</tr>
</thead>
<tbody>
<tr>
<td>$S_0$</td>
<td>1.0 - 3.0</td>
<td>2.0 - 4.0</td>
</tr>
<tr>
<td>$S_s$</td>
<td>$C_{O}$</td>
<td>$M_{0}$</td>
</tr>
</tbody>
</table>

Static safety

$$ S_0 = \frac{C_{O}}{P_0} = \frac{M_{0}}{M} $$

Nominal working life

The nominal working life is achieved or exceeded by 90% of an adequately large quantity of identical bearings, before the first signs of material fatigue become apparent.

$$ L = \left( \frac{C}{P} \right)^{'} $$

Nominal working life in units of 100,000 m

$$ L_{h} = \frac{833}{H \cdot n_{100}} \cdot \left( \frac{C}{P} \right)^{'} $$

Nominal working life in hours run

$$ P \left( N \right) $$

Dynamically equivalent load

$$ H \left( m \right) $$

Single stroke of the oscillating motion

$$ n_{100} \left( \text{min}^{-1} \right) $$

Number of double strokes per minute

$$ v \left( \text{m/min} \right) $$

Average speed of movement

$S_0$, $S_s$, $C_0$, $P_0$, $M_0$, $M$ static load safety, static load factor, static equivalent bearing loading, static equivalent bearing loading, static equivalent static torque, static equivalent torque..
Operating loads calculation

Load vertically on the bench surface

Load on a Carriage

\[
P_1 = \frac{F}{4} + \frac{F \cdot L_1}{2L} + \frac{F \cdot L_2}{2a}
\]

\[
P_2 = \frac{F}{4} - \frac{F \cdot L_1}{2L} + \frac{F \cdot L_2}{2a}
\]

\[
P_3 = \frac{F}{4} + \frac{F \cdot L_1}{2L} - \frac{F \cdot L_2}{2a}
\]

\[
P_4 = \frac{F}{4} - \frac{F \cdot L_1}{2L} - \frac{F \cdot L_2}{2a}
\]

Load in direction of motion

Load on a Carriage

\[
P_{1\ldots4} = \frac{F \cdot L_1}{2L}
\]

Load at right angles to the direction of motion

Load on a Carriage

\[
P_{1\ldots4} = \frac{F \cdot L_2}{2a}
\]

\[
P_{4\ldots4} = \frac{F}{4} + \frac{F \cdot L_1}{2L}
\]

\[
P_{4\ldots4} = \frac{F}{4} - \frac{F \cdot L_1}{2L}
\]
Space for your notes
### Drive elements

**Function overview**

- Ball screw spindle Ø 16
- Ball screw spindle Ø 25
- Ball bearing nut 2
- Ball bearing nut 3
- Clamping blocks for nut version 3
- Flange bearing for spindle Ø 16
- Flange bearing for spindle Ø 25
- Bearing supports
- Shaft couplings

### Information

The ball screw nuts from isel Germany AG are of high quality, precise and abrasion-resistant (hardened and polished). Together with the ball screw spindles, they convert rotations into linear movements most friction-poorly.

The ball screw nut is inserted in the respective clamping block and fastened with a stud screw. The ball screw nuts have several balls paths with internal ball return.

A setscrew on the clamping block makes a clearance-free adjustment of the ball screw spindle's run possible.

The repeatability is less than 0.01 mm at a length of 300 m. To lubricate the linear drive, a grease nipple is fixed on the clamping block.

The ball screw spindles are produced with modern machines; they are rolled, hardened and polished.

Our linear drives are technically mature and have stood the test in practice for more than 20 years.
Drive elements Overview

Linear Drives

The most commonly used type of drive for a linear unit is a directly or by a tooth belt driven ball screw spindle.

Spindle 16 mm

Drive
Shaft coupling
Bearings seat
Locknut
Drive side Flange bearing
Ball screw spindle 16 mm
Ball screw nut and clamping block
Floating bearing side, flange bearing

Spindle 25 mm

Drive
Shaft coupling
Bearings seat
Locknut
Drive side Flange bearing
Ball screw spindle 25 mm
Ball screw nut and clamping block
Floating bearing side, flange bearing
Ball screw spindles

Ø 16 features
- Ø16 mm, rolled, hardened and polished
- Material CF 53, inductively hardened (HRC 60 ± 2); (for detailed information see DIN 17212)
- Spindle pitches: 2.5/4/5/10 and 20 mm
- Lengths up to max. 3052 mm available
- End machining to isel standard or to order (see “Available lengths”)
- Produced to DIN 69051, Part 3, Tolerance class 7

Available lengths
- Without end machining in 100 mm raster
  - 452 to 1052 mm
  - 1252 mm
  - 1752 mm
  - 2252 mm
  - 3052 mm
- End machining: 0 = not machined
- End machining suitable for all feeds (aluminium profile length +78 mm)
- Special length according to drawing: 211 13X 0998

Options
- End machining to order

Ordering key
2 1 1 1 3 X X X X

Options
- End machining to order

Ordering information
Slotted nut
- Self-locking
- M 10 x 0.75 mm
Part no.: 890257 0011

Dimensioned drawing

Ø 25 features
- Ø 25 mm, hardened and polished
- Material CF 53, inductively hardened (HRC 60 ± 2); (for detailed information see DIN 17212)
- Spindle pitches: 5/10 and 20 mm
- Lengths up to max. 3052 mm available
- End machining to isel standard or to order (see “Available lengths”)
- Produced to DIN 69051, Part 3, Tolerance class 7

Available lengths
- Without end machining in 100 mm raster
  - 500 to 3,000 mm
- Special length to drawing: 211 14X 0999

Options
- End machining to order

Ordering key
2 1 1 1 4 X X X X

Ordering information
Slotted nut
- Self-locking
- M 17 x 1.0 mm
Part no.: 890259 0011

Dimensioned drawing

Ball bearing nuts

**Version 2-Ø16**

**Features**
- Material 16MnCr5 or 20MnCr5, pressed, hardened, polished
- Versions for recirculating ball spindle Ø16 mm
- Nut pitches: 2.5/4/5/10 mm
- Balls are rerouted internally
- as block housing with base fixing
- Regreasing through grease nipples 90°, 0°

**Ordering information**
only for spindles Ø16

<table>
<thead>
<tr>
<th>Pitch (mm)</th>
<th>Nominal Ø</th>
<th>Dynamic load factor (N)</th>
<th>Static load factor (N)</th>
</tr>
</thead>
<tbody>
<tr>
<td>2.5</td>
<td>16</td>
<td>3500</td>
<td>5500</td>
</tr>
<tr>
<td>4.0</td>
<td>16</td>
<td>4600</td>
<td>7200</td>
</tr>
<tr>
<td>5.0</td>
<td>16</td>
<td>4600</td>
<td>7200</td>
</tr>
<tr>
<td>10.0</td>
<td>16</td>
<td>4200</td>
<td>6500</td>
</tr>
</tbody>
</table>

**Ordering information**

- VE 2 pcs. Part no.: 213500 0001

**Dimensioned drawings**

**Version 3–Ø16 Ø25**

**Features**
- Material 16MnCr5, ground
- Versions for recirculating ball spindles Ø16 and Ø25 mm
- Nut pitches: 2.5/4/5/10 and 20 mm (Ø 16 mm), 5/10 and 20 mm (Ø25 mm)
- Balls are rerouted internally
- The version with nut pitch 20 mm is supplied with scrapers

**Ordering information**
only for spindles Ø25

<table>
<thead>
<tr>
<th>Pitch (mm)</th>
<th>Nominal Ø</th>
<th>Dynamic load factor (N)</th>
<th>Static load factor (N)</th>
</tr>
</thead>
<tbody>
<tr>
<td>2.5</td>
<td>25</td>
<td>3570</td>
<td>8800</td>
</tr>
<tr>
<td>5.0</td>
<td>25</td>
<td>5100</td>
<td>12600</td>
</tr>
<tr>
<td>10.0</td>
<td>25</td>
<td>5100</td>
<td>12600</td>
</tr>
</tbody>
</table>

**Ordering information**

- VE 2 pcs. Part no.: 213700 9000

**Dimensioned drawings**
**Clamping blocks** For nut version 3

**Features**
- Material steel, gunmetal finish
- Versions for recirculating ball spindles Ø 25 and Ø 16 mm
- Nut pitches 5 / 10 and 20 mm (Ø 25 mm)
  2.5 / 4 / 5 / 10 and 20 mm (Ø 16 mm)
- Recirculating ball nuts are adjustable for no play
- Clamping blocks for base and flange securing

**Ordering information**

<table>
<thead>
<tr>
<th>Clamping block 2 Ø16</th>
<th>Clamping block 1 Ø16</th>
<th>Clamping block 2 Ø25</th>
<th>Clamping block 1 Ø25</th>
</tr>
</thead>
<tbody>
<tr>
<td><strong>Flange securing</strong></td>
<td><strong>Base securing</strong></td>
<td><strong>Flange securing</strong></td>
<td><strong>Base securing</strong></td>
</tr>
<tr>
<td>all</td>
<td>213 501</td>
<td>all</td>
<td>213 500</td>
</tr>
<tr>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
</tbody>
</table>

**Dimensioned drawings – spindle clamping blocks Ø 16**

**Dimensioned drawings – spindle clamping blocks Ø 25**

*Dimensions at pitch 20*
Flange bearing

for spindle Ø 16 mm

Features
- Bearing, spindle drive side (fixed bearing side) and the spindle floating bearing side
- Flange bearing, drive side: Bushing with two pressed angular contact ball bearings in an O-configuration
- Flange bearing, floating bearing side (counterbearing): bushing with a pressed needle bearing

Ordering information
- Flange bearing, drive side
  Part no.: 216 504 0001
- Flange bearing, floating bearing side
  Part no.: 216 504 0002

Dimensioned drawings
- Flange bearing drive side
- Flange bearing floating bearing side

for spindle Ø 25 mm

Features
- Bearing, spindle drive side (fixed bearing side) and the spindle floating bearing side
- Flange bearing, drive side: Bushing with two pressed angular contact ball bearings in an O-configuration
- Flange bearing, floating bearing side (counterbearing): bushing with a pressed needle bearing

Ordering information
- Flange bearing, drive side
  Part no.: 216 504 0006
- Flange bearing, floating bearing side
  Part no.: 216 504 0005

Dimensioned drawings
- Flange bearing drive side
- Flange bearing floating bearing side
Bearing supports

Bearing support 1

- Aluminium profile to DIN EN 12020-2
- As a parallel connection of flange bearing and motor flange
- Flat milled securing surfaces
- Version for recirculating ball spindle Ø 16 mm
- Universal securing options

Part no.: 2165040007

Bearing support 2

- Aluminium profile to DIN EN 12020-2
- As a parallel linkage of flange bearing and motor flange
- Version for recirculating ball spindle Ø 25 mm
- Universal securing options

Part no.: 2165040008
Shaft couplings

Connection options

Direct drive

LE S 4 | LES 6 | LES 5 | Angular transmission Securing 0° | Angular transmission Securing 90°
---|---|---|---|---
MS 135 HT - 2 MS 200 HT - 2 DC 100 EC 60 | Connection via clutch housing 1 short bushing with corresponding shaft coupling | | Clutch housing 1 long bushing |
MS 600 HT MS 900 HT DC 300 EC 86 | Connection via clutch housing 2 short bushing with corresponding shaft coupling | | Clutch housing 2 long bushing |
Angular transmission Securing 0° | split clutch housing short bushing with corresponding shaft coupling | | Connection via Transmission shaft set |
Angular transmission Securing 90° | split clutch housing long bushing with corresponding shaft coupling | | |

Shaft couplings

Deliverables: 2 aluminium blocks, 3 PUR sprockets (86°, 92° and 98° Shore) and matching adjusting screws

For part no. see table

PUR sprockets

Other clutches to order.

Clutch housing 1 + 2

short bushing Part no.: 218 100 001
long bushing Part no.: 218 100 002

short bushing Part no.: 218 100 1001
long bushing Part no.: 218 100 1002

short bushing Part no.: 218 100 2001
long bushing Part no.: 218 100 2002

Clutch

Part no. | d 1 | d 2
---|---|---
20/30 | 218001 5060 | 5.0 | 6.0
 | 218001 9999 | from 4 to 7 mm
30/40 | 218002 6380 | 6.35 | 8.0
 | 218002 8080 | 8.0 | 8.0
 | 218002 9999 | from 4 to 13 mm
40/60 | 218003 9580 | 9.52 | 8.0
 | 218003 9999 | from 4 to 18 mm

for WK 20/30 Part no.: 217 011 00**
for WK 30/40 Part no.: 217 012 00**
for WK 40/60 Part no.: 217 013 00**
for ** use the Shore hardness
### Linear units

**Overview**

- **LES functional overview**
- **LES 4**
  - with spindle drive
- **LES 6**
  - with spindle drive
- **LES 5**
  - with spindle drive
- **LES 16-150**
  - with spindle drive
- **LES 16-250**
  - with spindle drive
- **Calculations**
- **Combination examples**
- **Motor modules**
- **Installation kit** with angular transmission
- **Slot/crossbench plates**
- **T-key slot plates**
- **Angle bracket**
- **Accessories**
- **Cross bench 10/20**

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**Combined examples**

- **MECHANICS Linear units**

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**LES functional overview**

**LES 4**
- with spindle drive

**LES 6**
- with spindle drive

**LES 5**
- with spindle drive

**LES 16-150**
- with spindle drive

**LES 16-250**
- with spindle drive

**Calculations**

**Combination examples**

**Motor modules**

**Installation kit** with angular transmission

**Slot/crossbench plates**

**T-key slot plates**

**Angle bracket**

**Accessories**

**Cross bench 10/20**

---

**Cross bench 10/20**
Linear units

Overview

- LEZ functional overview
- LEZ 1 with toothed belt drive
- LEZ 2 with toothed belt drive
- LEZ 3 with toothed belt drive
- LEZ 9 with toothed belt drive
- Accessories
- Examples in use
- iLD with direct drive

CAD data on our website www.isel-germany.de
Functional overview at example LES 5

- End position buffering both sides with soft PVC parabolic springs
- Counter-bearing with 2 needle bushings
- Spindle support from a profile length of 1500 mm without limiting the travel
- Recirculating ball in patented aluminium linear slots
- Glass fibre reinforced loop components with scrapers
**Functional overview** at example LES 5

- Preset play-free recirculating ball nut with scrapers
- Central lubrication system for recirculating ball nut and circulations
- Integrated overrun limit switch
- Spindle bearing with angular contact bearings
- Axially free from play by means of self-locking special nuts
- Belt return and connecting electronics covered completely by protective cap

Friction-resistant lip seals to protect the guide elements

Motor
Incorporated in the profile
Linear units

Features

- Aluminium shaft housing profile 
  \( W75 \times H75 \text{ mm}, \) naturally anodised
- Clamping area and profile underside milled flat
- with 2 precision steel shafts 
  \( \Phi 12 \text{ h6}, \) material Cf53, Hardness \( 60 \pm 2 \text{ HRC} \)
- Aluminium shaft slots WS 5/70, 
  \( 2 \times \text{WS 5/70 (70 mm long),} \) adjustable for no play, central lubrication system
- Recirculating ball transmission with 
  \( 2.5/4/5/10 \) and \( 20 \text{ mm pitches} \)
- Profile sealing with friction-resistant lip seals
- Cast aluminium end plates
- with 2 limit or reference switches, Repeatability \( \pm 0.02 \text{ mm} \)
- sealed angular contact bearings in drive - steel flange

Options:

- Black powder-coated aluminium profile
- Electromagnetic brake
- Steel slots LS2 (Part no. 223007)
- Limit switch attachment kit (see accessories)

Technical specification

Aluminium profile

<table>
<thead>
<tr>
<th>Moment of inertia ( i_x )</th>
<th>107.711 cm(^4)</th>
</tr>
</thead>
<tbody>
<tr>
<td>Moment of inertia ( i_y )</td>
<td>125.843 cm(^4)</td>
</tr>
<tr>
<td>Centre of gravity ( x ) (see dimensioned drawing)</td>
<td>33.23 mm</td>
</tr>
<tr>
<td>Cross-sectional area ( A )</td>
<td>18.81 cm(^2)</td>
</tr>
<tr>
<td>Material ( \text{AlMgSiO, SF} 22 )</td>
<td></td>
</tr>
<tr>
<td>Anodising ( E6/EV1 )</td>
<td></td>
</tr>
<tr>
<td>Weight with steel shafts</td>
<td>6.2 kg/m</td>
</tr>
<tr>
<td>Weight with steel shafts and spindles</td>
<td>7.6 kg/m</td>
</tr>
</tbody>
</table>

No load running torques

<table>
<thead>
<tr>
<th>Speed (rpm)</th>
<th>2.5</th>
<th>4</th>
<th>5</th>
<th>10</th>
<th>20</th>
</tr>
</thead>
<tbody>
<tr>
<td>Spindle pitch</td>
<td>15</td>
<td>15</td>
<td>17</td>
<td>17</td>
<td>18</td>
</tr>
<tr>
<td>1500</td>
<td>19</td>
<td>19</td>
<td>19</td>
<td>20</td>
<td>21</td>
</tr>
<tr>
<td>3000</td>
<td>23</td>
<td>24</td>
<td>25</td>
<td>25</td>
<td>26</td>
</tr>
</tbody>
</table>

Made by isel®
**Linear units**

**LES 4**

**with spindle drive**

**Bending**

- **Load config. 1**
- **Load config. 2**

**Load factors**

<table>
<thead>
<tr>
<th>Load config.</th>
<th>LES 4 with one WS 5/70</th>
<th>LES 4 with two WS 5/70</th>
</tr>
</thead>
<tbody>
<tr>
<td>$F_1$ (ax) = ( \frac{F_2}{\cos \alpha} )</td>
<td>$C_e$ = 2576.65 N</td>
<td>$C_e'$ = 4954.5 N</td>
</tr>
<tr>
<td>$F_2$ (ax) = ( \frac{F_1}{\sin \alpha} )</td>
<td>$C$ = 1461.14 N</td>
<td>$C$ = 2509.5 N</td>
</tr>
<tr>
<td>$F_2$ stat.</td>
<td>$F_e$ stat. = 1247.93 N</td>
<td>$F_e$ stat. = 2398.5 N</td>
</tr>
<tr>
<td>$F_2$ dyn.</td>
<td>$F_e$ dyn. = 2576.65 N</td>
<td>$F_e$ dyn. = 4954.5 N</td>
</tr>
<tr>
<td>$M_2$ stat.</td>
<td>$M_e$ stat. = 36.45 Nm</td>
<td>$M_e$ stat. = 44.7 Nm</td>
</tr>
<tr>
<td>$M_2$ dyn.</td>
<td>$M_e$ dyn. = 82.16 Nm</td>
<td>$M_e$ dyn. = 126.94 Nm</td>
</tr>
<tr>
<td>$M_2$ dyn.</td>
<td>36.45 Nm</td>
<td>44.7 Nm</td>
</tr>
</tbody>
</table>

**permissible spindle speeds**

<table>
<thead>
<tr>
<th>LES 4 / 5 / 6 / 7</th>
<th>Spindle pitch p (mm)</th>
<th>max. permissible spindle speed n (rpm)</th>
<th>max. permissible feed speed v permissible (mm/min)</th>
</tr>
</thead>
<tbody>
<tr>
<td>250</td>
<td>4000</td>
<td>120</td>
<td>60</td>
</tr>
<tr>
<td>300</td>
<td>3000</td>
<td>125</td>
<td>250</td>
</tr>
<tr>
<td>330</td>
<td>1520</td>
<td>125</td>
<td>500</td>
</tr>
<tr>
<td>435</td>
<td>150</td>
<td>125</td>
<td>80</td>
</tr>
<tr>
<td>1150</td>
<td>150</td>
<td>125</td>
<td>175</td>
</tr>
<tr>
<td>1350</td>
<td>150</td>
<td>125</td>
<td>250</td>
</tr>
<tr>
<td>1650</td>
<td>150</td>
<td>125</td>
<td>350</td>
</tr>
<tr>
<td>1800</td>
<td>150</td>
<td>125</td>
<td>550</td>
</tr>
</tbody>
</table>

*with spindle support*

**Dimensioned drawing**

- **process travel**
  - at 1xWS 5/70 = L1 - 150 mm
  - at 2xWS 5/70 = L1 - 280 mm

- **external limit switches** see page C85

**Dimensioned drawing**

**Aluminium profile**

- **made by isel**