Linear actuator with integral planetary gearbox and servomotor

Series MLF 52155 ZR .. GTRI/.., MKUSE 25 ZR .. GTRI/..

Linear actuators with an integral gearbox and motor are ready-to-fit, driven linear units for unlimited stroke lengths. They are driven by means of a servomotor, planetary gearbox and toothed belt.

The gearbox is integrated in the return unit. Since there is no coupling or coupling housing, the design is very compact with a reduced number of components; this gives clear economic advantages for the customer.

These linear actuators are available with:
- a track roller guidance system for light to moderate loads
- a ball monorail guidance system for moderate to heavy loads
- two gearbox sizes/reduction ratios
- a servomotor with two power classes.

**Planetary gearbox**

The toothed belt pulley is used directly as the gearbox housing. As a result, the belt pulley does not require a bearing arrangement.

The gearboxes:
- are available with the reduction ratios $i = 4$ and $i = 8$
- have low mass and high dynamic characteristics
- are greased for life.

**Servomotor**

Brushless servomotors are the proven motor types used with INA linear actuators.

They have:
- a low mass moment of inertia
- high dynamic characteristics
- nominal torques from 2.4 Nm to 4.7 Nm.

**Applications**

These linear units are used in preference:
- in applications with high traverse speeds
- where forces and moments occur in all three axes
- in the handling equipment sector.
Linear actuator with track roller guidance system, planetary gearbox and servomotor

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- Ordering example and ordering designation .................. 5
- Drives and controls ....................................................... 14

Features

Linear actuators with track roller guidance system
- are complete units comprising:
  - an aluminium support rail with rolled-in steel shafts
  - a carriage guided on the support rail
  - a toothed belt drive with return units
  - a planetary gearbox
  - a servomotor with two power classes
- can support loads and moments about all axes
- are suitable for light to moderate loads
- have lubrication and wiper units on the carriage to protect the raceways
- have track rollers that are greased for life.
  The raceways of the support rails can be lubricated via four lubrication nipples on the end faces of the carriages
- are suitable for:
  - accelerations up to 40 m/s²
  - speeds up to 8 m/s
  - operating temperatures from –20 °C to +80 °C.

Planetary gearboxes
- are designed such that the toothed belt pulley is used as the gearbox housing
- are not restricted to particular mounting positions
- are supplied lubricated with grease
- are single-stage gearboxes
- are available with the reduction ratio i = 4:1 and i = 8:1
- have a torsional backlash of ≤3 angular minutes.

Servomotors
- have a low mass moment of inertia and high dynamic characteristics
- have a resolver feedback facility
- are available with a holding brake
- have a nominal speed of 3 000 min⁻¹ to 3 300 min⁻¹ – depending on the motor size.

Carriage

- saddle plate made from anodised profiled aluminium
- four track rollers
- driven by toothed belt
- lubrication holes on the end faces

Support rail with return unit

- composite guideway comprising anodised aluminium support rail and rolled-in shafts made from high alloy steel
- return unit
  - housing made from anodised profiled aluminium
  - return shaft with maintenance-free ball bearings
  - wiper brushes to protect the return area from contamination
Linear actuator – scope of basic delivery

MLF 52155 ZR... GTRI/..

- two mounting flange sizes
- two reduction ratios possible

Planetary gearbox

Servomotor

- brushless
- sine wave magnetisation and resolver feedback
- uniform torque curve
- with or without holding brake
Linear actuator with track roller guidance system, planetary gearbox and servomotor

Design and safety guidelines

The positions of the drive are shown in Figure 1. Description of the suffixes: see Table 1.

Table 1 · Drive variants – suffixes

<table>
<thead>
<tr>
<th>Drive system</th>
<th>Suffix</th>
<th>Design</th>
</tr>
</thead>
<tbody>
<tr>
<td>AR</td>
<td></td>
<td>Drive from right side</td>
</tr>
<tr>
<td>AL</td>
<td></td>
<td>Drive from left side</td>
</tr>
</tbody>
</table>

Power values of actuators/gearboxes and motors

Table 2 gives the maximum possible load that can be moved using the linear actuator and the positional controller. The table is valid for vertical and horizontal mounting of the actuators.

The bearing load must always be checked for the specific actuator.

Table 2 · Power values for linear actuators

<table>
<thead>
<tr>
<th>Max. mass</th>
<th>Max. speed</th>
<th>Mean speed¹</th>
<th>Acceleration</th>
<th>Gear reduction</th>
<th>Actuator⁴</th>
<th>Servocontroller</th>
</tr>
</thead>
<tbody>
<tr>
<td>m</td>
<td>m/s</td>
<td>m/s</td>
<td>m/s²</td>
<td>i</td>
<td></td>
<td></td>
</tr>
<tr>
<td>20</td>
<td>3,1</td>
<td>2,25</td>
<td>10</td>
<td>4</td>
<td>MLF 52155 ZR-AR (AL)-GTRI/4-1(2)/3173-2 670 STUNG COMPAX 2500 S</td>
<td></td>
</tr>
<tr>
<td>1,75</td>
<td>1,4</td>
<td>10</td>
<td>8</td>
<td>8</td>
<td>MLF 52155 ZR-AR (AL)-GTRI/8-1(2)/3173-2 670 STUNG COMPAX 1000 SL®</td>
<td></td>
</tr>
<tr>
<td>30</td>
<td>1,75</td>
<td>1,4</td>
<td>10</td>
<td>8</td>
<td>MLF 52155 ZR-AR (AL)-GTRI/8-1(2)/3173-2 670 STUNG COMPAX 2500 S</td>
<td></td>
</tr>
</tbody>
</table>

¹ Relative to effective stroke of 2,5 m.
² Servomotor with brake.
³ STUNG COMPAX 1000 SL: see INA Catalogue ALE (page 126).

Table 3 · Available gearboxes and motors

<table>
<thead>
<tr>
<th>Linear actuator</th>
<th>Gearbox</th>
<th>Motor</th>
</tr>
</thead>
<tbody>
<tr>
<td></td>
<td>Gear ratio reduction</td>
<td>Nominal output torque</td>
</tr>
<tr>
<td>MLF 52155 ZR .. GTRI/4</td>
<td>4:1</td>
<td>72</td>
</tr>
<tr>
<td>MLF 52155 ZR .. GTRI/8</td>
<td>8:1</td>
<td>60</td>
</tr>
</tbody>
</table>
**Ordering example and ordering designation**

**Ordering example**

Linear actuator with track roller guidance system MLF

Size 52
Width of carriage 155 mm
Toothed belt drive ZR
Drive shaft on right side AR
Integral gearbox GTRI
Gear ratio reduction i = 8
Motor with holding brake -2
Total length $L_{tot}$ 3003 mm
Total stroke (effective stroke + 2$S$) 2500 mm

**Ordering designation:**

MLF 52155 ZR AR GTRI/8-2/3 003-2 500 (Figure 2).

![MLF 52155 ZR AR GTRI/8-2/3 003-2 500](image)
Linear actuator with track roller guidance system, planetary gearbox and servomotor

Series MLF 52155 ZR.. GTRI/..

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### Dimension table - Dimensions in mm

<table>
<thead>
<tr>
<th>Designation</th>
<th>Mass</th>
<th>Dimensions</th>
<th>Mounting dimensions</th>
</tr>
</thead>
<tbody>
<tr>
<td></td>
<td>( G_{tot} )</td>
<td>( G_{law} )</td>
<td>( i )</td>
</tr>
<tr>
<td>MLF 52155 ZR.. GTRI/4</td>
<td>5</td>
<td>4</td>
<td>155</td>
</tr>
<tr>
<td>MLF 52155 ZR.. GTRI/8</td>
<td>5</td>
<td>8</td>
<td>155</td>
</tr>
</tbody>
</table>

1) \( L₂ = \) total stroke + 12.
2) \( L_{tot} = \) total stroke + 12 + 231.
3) Total stroke = effective stroke + 2×S (mm).
4) \( S \) designates a safety range suitable for the particular application and should be at least 85 mm; total stroke in mm.
5) Maximum support rail length \( L₂ = 8000 \text{ mm} \).
6) \( G_{law} = \) mass of carriage.
7) The values are single loads and apply when the underside of the actuator is fully supported.
8) These must be reduced for combined loads.
9) For design criteria for the linear guidance system, see INA Catalogue 801.
10) Values in [ ] for motor version with motor holding brake.
11) Version with motor holding brake.
12) Max. drive speed: 4 000 min⁻¹
13) Tightening torque \( Mₓ \) of clamping screw: 23,5 Nm.
14) Max. drive speed: 4 000 min⁻¹
15) Tightening torque \( Mₓ \) of clamping screw: 17,3 Nm.

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Load directions

---

### Linear actuator

<table>
<thead>
<tr>
<th>Designation</th>
<th>Toothed belt/drive</th>
</tr>
</thead>
<tbody>
<tr>
<td></td>
<td>Toothed belt Type</td>
</tr>
<tr>
<td>MLF 52155 ZR.. GTRI/4</td>
<td>32 AT 10</td>
</tr>
<tr>
<td>MLF 52155 ZR.. GTRI/8</td>
<td>32 AT 10</td>
</tr>
</tbody>
</table>
### Permissible load on carriage guidance system

<table>
<thead>
<tr>
<th>$H_6$</th>
<th>$L_1$</th>
<th>$L_5$</th>
<th>$S$</th>
<th>$X$</th>
<th>$X(1)$</th>
<th>$Y$</th>
<th>$F_{y1, \text{perm}}$</th>
<th>$F_{y2, \text{perm}}$</th>
<th>$F_{z1, \text{perm}}$</th>
<th>$F_{z2, \text{perm}}$</th>
<th>$M_{x, \text{perm}}$</th>
<th>$M_{y, \text{perm}}$</th>
<th>$M_{z, \text{perm}}$</th>
<th>$I_y$</th>
<th>$I_z$</th>
</tr>
</thead>
<tbody>
<tr>
<td>65.4</td>
<td>90</td>
<td>24</td>
<td>M12</td>
<td>191.5</td>
<td>238.5</td>
<td>112.5</td>
<td>4 800</td>
<td>7 900</td>
<td>8 000</td>
<td>8 000</td>
<td>101</td>
<td>166</td>
<td>480</td>
<td>288</td>
<td>474</td>
</tr>
<tr>
<td>65.4</td>
<td>90</td>
<td>24</td>
<td>M12</td>
<td>163.5</td>
<td>206.5</td>
<td>102.5</td>
<td>4 800</td>
<td>7 900</td>
<td>8 000</td>
<td>8 000</td>
<td>101</td>
<td>166</td>
<td>480</td>
<td>288</td>
<td>474</td>
</tr>
</tbody>
</table>

### Geometrical moment of inertia of support rail

<table>
<thead>
<tr>
<th>$I_y$</th>
<th>$I_z$</th>
</tr>
</thead>
<tbody>
<tr>
<td>386</td>
<td>301</td>
</tr>
</tbody>
</table>

---

**Carriage**

**T-slots**

**Planetary gearbox with reduction ratio $i = 4$**

**Planetary gearbox with reduction ratio $i = 8$**
Linear actuator with ball monorail guidance system, planetary gearbox and servomotor

**Features**

**Linear actuators with ball monorail guidance system**

- are complete units comprising:
  - a support rail – the supporting profiled section is extremely rigid and suitable for spanning large gaps
  - a carriage guided in the support rail by a KUSE guidance system with two carriages
  - a toothed belt drive with return units
  - a planetary gearbox
  - a servomotor with two power classes
- can support loads and moments about all axes
- are suitable for moderate to heavy loads
- can be relubricated; the guidance systems can be lubricated via lubrication nipples on the longitudinal faces of the carriages
- are suitable for:
  - accelerations up to 30 m/s²
  - speeds up to 5 m/s
  - operating temperatures from –20 °C to +80 °C.

**Planetary gearboxes**

- are designed such that the toothed belt pulley is used as the gearbox housing
- are not restricted to particular mounting positions
- are supplied lubricated with grease
- are single-stage gearboxes
- are available with the reduction ratio i = 4:1 and i = 8:1
- have a torsional backlash of ≤ 3 angular minutes.

**Servomotors**

- have a low mass moment of inertia and high dynamic characteristics
- have a resolver feedback facility
- are available with a holding brake
- have a nominal speed of 3 000 min⁻¹ to 3 300 min⁻¹ – depending on the motor size.

**Carriage**

- saddle plate made from anodised profiled aluminium with T-slots
- two KUSE carriages
- driven by toothed belt
- funnel type lubrication nipples on longitudinal faces

**Support rail with return unit**

- support rail – composite rail made from anodised aluminium profiled supporting section, combined with guideway of linear recirculating ball bearing and guideway assembly KUSE
- return unit
Linear actuator – scope of basic delivery

MKUSE 25 ZR...GTRI/..

- Planetary gearbox
  - two mounting flange sizes
  - two reduction ratios possible

- Servomotor
  - brushless
  - sine wave magnetisation and resolver feedback
  - uniform torque curve
  - with or without holding brake
Design and safety guidelines

The positions of the drive are shown in Figure 1. Description of the suffixes: see Table 1.

Table 1 · Drive variants – suffixes

<table>
<thead>
<tr>
<th>Drive system</th>
<th>Suffix</th>
<th>Design</th>
</tr>
</thead>
<tbody>
<tr>
<td>AR</td>
<td></td>
<td>Drive from right side</td>
</tr>
<tr>
<td>AL</td>
<td></td>
<td>Drive from left side</td>
</tr>
</tbody>
</table>

Power values of actuators/gearboxes and motors

Table 2 gives the maximum possible load that can be moved using the linear actuator and the positional controller. The table is valid for vertical and horizontal mounting of the actuators.

⚠️ The bearing load must always be checked for the specific actuator.

Table 2 · Power values for linear actuators

<table>
<thead>
<tr>
<th>Max. mass m</th>
<th>Max. speed $v_{\text{max}}$ m/s</th>
<th>Mean speed $v$ m/s</th>
<th>Acceleration $a$ m/s²</th>
<th>Gear reduction ratio $i$</th>
<th>Actuator(2)</th>
<th>Servocontroller</th>
</tr>
</thead>
<tbody>
<tr>
<td>20</td>
<td>3,1</td>
<td>2,25</td>
<td>10</td>
<td>4</td>
<td>MKUSE 25 ZR-AR (AL) N-GTRI/4-1 (2)/3176-2 670</td>
<td>STUNG COMPAX 2500 S</td>
</tr>
<tr>
<td>30</td>
<td>1,75</td>
<td>1,4</td>
<td>10</td>
<td>8</td>
<td>MKUSE 25 ZR-AR (AL) N-GTRI/8-1 (2)/3176-2 670</td>
<td>STUNG COMPAX 1000 SL(3)</td>
</tr>
</tbody>
</table>

1) Relative to effective stroke of 2,5 m.
2) Servomotor with brake.
3) STUNG COMPAX 1000 SL: see INA Catalogue ALE (page 126).

Table 3 · Available gearboxes and motors

<table>
<thead>
<tr>
<th>Linear actuator</th>
<th>Gearbox</th>
<th>Motor</th>
</tr>
</thead>
<tbody>
<tr>
<td></td>
<td>Gear ratio reduction</td>
<td>Nominal output torque $M_N$ Nm</td>
</tr>
<tr>
<td>MKUSE 25 ZR .. GTRI/4</td>
<td>4:1</td>
<td>72</td>
</tr>
<tr>
<td>MKUSE 25 ZR .. GTRI/8</td>
<td>8:1</td>
<td>60</td>
</tr>
</tbody>
</table>
Ordering example and ordering designation

Ordering example
Linear actuator with
six-row linear ball bearing and guideway assembly MKUSE
Size 25
Toothed belt drive ZR
Drive shaft on right side AR
Carriage with T-slots (note total length L₁ = 263 mm) N
Integral gearbox GTRI
Gear ratio reduction i = 4
Motor without holding brake -1
Total length Lₜₐₜ 3 506 mm
Total stroke (effective stroke + 2×S) 3 000 mm

Ordering designation:
1 off MKUSE 25 ZR AR N GTRI/4-1/3 506-3 000 (Figure 2).

Figure 2 · Ordering example and ordering designation – linear actuator MKUSE 25 ZR AR N GTRI/4-1/3 506-3 000
Linear actuator with ball monorail guidance system, planetary gearbox and servomotor

Series MKUSE 25 ZR..GTRI/..

**Dimension table** - Dimensions in mm

<table>
<thead>
<tr>
<th>Designation</th>
<th>Mass</th>
<th>Dimensions</th>
<th>Mounting dimensions</th>
</tr>
</thead>
<tbody>
<tr>
<td></td>
<td>G&lt;sub&gt;tot&lt;/sub&gt; (L&lt;sub&gt;tot&lt;/sub&gt; – 231)×0.0169 + 19.9 [20,5]</td>
<td>B</td>
<td>H</td>
</tr>
<tr>
<td><strong>MKUSE 25 ZR..GTRI/4</strong></td>
<td>3.8</td>
<td>4</td>
<td>110</td>
</tr>
<tr>
<td><strong>MKUSE 25 ZR..GTRI/8</strong></td>
<td>3.8</td>
<td>8</td>
<td>110</td>
</tr>
</tbody>
</table>

1) L<sub>2</sub> = total stroke + L<sub>1</sub> + 12.
2) L<sub>tot</sub> = total stroke + L<sub>1</sub> + 12 + 231.
3) Total stroke = effective stroke + 2×S (mm).

The allowance S designates a safety range suitable for the particular application and should be at least 85 mm; total stroke in mm.

Maximum single-piece support rail length L<sub>2</sub> = 8000 mm.

2) G<sub>law</sub> = mass of carriage.
3) The values are single loads and apply when the underside of the actuator is fully supported.
These must be reduced for combined loads.
For design criteria for the linear guidance system, see INA Catalogue 605.

4) Values in [ ] for motor version with motor holding brake.
5) Version with motor holding brake.
6) Max. drive speed: 4 000 min<sup>−1</sup>
Tightening torque M<sub>x</sub> of clamping screw: 23.5 Nm.
7) Max. drive speed: 4 000 min<sup>−1</sup>
Tightening torque M<sub>y</sub> of clamping screw: 17.3 Nm.

---

### Linear actuator

<table>
<thead>
<tr>
<th>Designation</th>
<th>Toothed belt/drive</th>
</tr>
</thead>
<tbody>
<tr>
<td></td>
<td>Type</td>
</tr>
<tr>
<td></td>
<td>N</td>
</tr>
<tr>
<td><strong>MKUSE 25 ZR..GTRI/4</strong></td>
<td>50 AT 10</td>
</tr>
<tr>
<td><strong>MKUSE 25 ZR..GTRI/8</strong></td>
<td>50 AT 10</td>
</tr>
</tbody>
</table>

### Basic load ratings of carriage guidance system

<table>
<thead>
<tr>
<th>Designation</th>
<th>Load direction I</th>
<th>Load direction II</th>
<th>Load direction III</th>
</tr>
</thead>
<tbody>
<tr>
<td></td>
<td>Compressive load</td>
<td>Tensile load</td>
<td>Lateral load</td>
</tr>
<tr>
<td></td>
<td>C kN</td>
<td>C kN</td>
<td>C kN</td>
</tr>
<tr>
<td></td>
<td>C&lt;sub&gt;0&lt;/sub&gt; kN</td>
<td>C&lt;sub&gt;0&lt;/sub&gt; kN</td>
<td>C&lt;sub&gt;0&lt;/sub&gt; kN</td>
</tr>
<tr>
<td><strong>MKUSE 25 ZR..GTRI/4</strong></td>
<td>45.5</td>
<td>134</td>
<td>37.2</td>
</tr>
<tr>
<td><strong>MKUSE 25 ZR..GTRI/8</strong></td>
<td>45.5</td>
<td>134</td>
<td>37.2</td>
</tr>
</tbody>
</table>
### Permissible static torque of carriage guidance system

<table>
<thead>
<tr>
<th>H_4</th>
<th>L_1</th>
<th>L_3</th>
<th>X</th>
<th>X[5]</th>
<th>Y</th>
<th>M_{0x\text{ perm}}</th>
<th>M_{0y\text{ perm}}</th>
<th>M_{0z\text{ perm}}</th>
<th>\text{i}_y</th>
<th>\text{i}_z</th>
</tr>
</thead>
<tbody>
<tr>
<td>75</td>
<td>263</td>
<td>117,5</td>
<td>191,5</td>
<td>238,5</td>
<td>112,5</td>
<td>1070</td>
<td>2250</td>
<td>2000</td>
<td>712</td>
<td>506</td>
</tr>
<tr>
<td>75</td>
<td>263</td>
<td>117,5</td>
<td>163,5</td>
<td>206,5</td>
<td>102,5</td>
<td>1070</td>
<td>2250</td>
<td>2000</td>
<td>712</td>
<td>506</td>
</tr>
</tbody>
</table>

### Geometrical moment of inertia of support rail

<table>
<thead>
<tr>
<th>\text{cm}^4</th>
<th>\text{cm}^4</th>
</tr>
</thead>
<tbody>
<tr>
<td>712</td>
<td>506</td>
</tr>
<tr>
<td>712</td>
<td>506</td>
</tr>
</tbody>
</table>

---

**Carriage**

**T-slots**

**Planetary gearbox with reduction ratio i = 4**

**Planetary gearbox with reduction ratio i = 8**
Drives and controls

Servomotors
Brushless servomotors have long proven successful for driving INA linear actuators. These motors are based on neodymium magnets and achieve high power density.

In conjunction with digital positional controllers, the sine wave magnetisation and resolver feedback ensure a completely uniform torque curve even at low speeds.

The motors are available with or without an integral holding brake. With a holding brake, the motor is somewhat longer.

These motors have:
- a low mass moment of inertia
- high dynamic characteristics
- nominal torques from 2.4 Nm to 4.7 Nm
- anti-overload protection
- connectors for power and resolver facility
- three times the nominal torque for acceleration.

For all drives, shielded and customised power and resolver cables are available in stepped lengths up to 30 m.

Figure 1 · Servomotor MOT SMH..
Drives and controls

Servomotors

Dimension table \* Dimensions in mm

<table>
<thead>
<tr>
<th>Designation</th>
<th>Dimensions</th>
</tr>
</thead>
<tbody>
<tr>
<td></td>
<td>A</td>
</tr>
<tr>
<td>MOT SMH 82</td>
<td>163,5</td>
</tr>
<tr>
<td>MOT SMHA 82-BR</td>
<td>206,5</td>
</tr>
<tr>
<td>MOT SMH 100</td>
<td>191,5</td>
</tr>
<tr>
<td>MOT SMHA 100-BR</td>
<td>238,5</td>
</tr>
</tbody>
</table>

Technical data of servomotors

<table>
<thead>
<tr>
<th>Designation</th>
<th>Stationary torque M_0 Nm</th>
<th>Nominal torque M_N Nm</th>
<th>Nominal speed n_N min^{-1}</th>
<th>Rated current I_N A</th>
<th>Mass m kg</th>
</tr>
</thead>
<tbody>
<tr>
<td>MOT SMH 82</td>
<td>3</td>
<td>2,4</td>
<td>3300</td>
<td>2,8</td>
<td>3,5</td>
</tr>
<tr>
<td>MOT SMHA 82-BR</td>
<td>3</td>
<td>2,4</td>
<td>3300</td>
<td>2,8</td>
<td>4,2</td>
</tr>
<tr>
<td>MOT SMH 100</td>
<td>6</td>
<td>4,7</td>
<td>3000</td>
<td>4,6</td>
<td>4,7</td>
</tr>
<tr>
<td>MOT SMHA 100-BR</td>
<td>6</td>
<td>4,7</td>
<td>3000</td>
<td>4,6</td>
<td>5,3</td>
</tr>
</tbody>
</table>
Drives and controls
Digital servocontroller STUNG COMPAX 2500 S

Digital servocontroller STUNG COMPAX 2500 S

COMPAX 2500 S is a compact servocontroller for installation in control cabinets. The aluminium housing of the controller is screw mounted by means of two sheet metal fixing brackets to the control cabinet mounting plate. The controller can be used for all INA linear actuators, is user-friendly and easily put into operation. Since almost all the connectors are of the push-fit type, installation time is considerably reduced.

The speed and positional controller for controlling the servomotors are integrated in the controller. The controller can operate as a stand-alone system or can be incorporated in comprehensive control systems. Ten free inputs are available (total 16 I/O). It is connected to a 230 V mains supply.

The power level of the controller is 2.5 kW. The peak power during the acceleration phase of the motors can reach 5 kW. COMPAX 2500 S can be connected to a computer using an RS-232 interface. The universal PLC data interface allows easy exchange of data with all PLC types. The only requirement is 5 binary inputs and outputs. A profibus and other fieldbus interfaces are optional. One servoaxis can be controlled; connection to several axes is possible.

The simple programming language allows a sequential program to be created within a very short time. Acceleration times, speeds and positions can be programmed quickly. Furthermore, inputs can be polled, outputs allocated and subroutine techniques used.

The servocontroller COMPAX 2500 S provides the user with a complete, powerful and particularly economical automation solution for precise positioning tasks.

Designation and article number

Designation of controller:
■ STUNG COMPAX 2500 S.

Article number of controller:
■ 000-293-016.

Figure 2 · Digital servocontroller – STUNG COMPAX 2500 S

Figure 3 · Dimensions of servocontroller – STUNG COMPAX 2500 S
Drives and controls
Technical data for STUNG COMPAX 2500 S

Performance characteristics

Range of functions
- Positional, speed and current controller
- IGBT output stage with short-circuit and short-to-earth protection
- Digital positional controller
- Motion control.

Output current

<table>
<thead>
<tr>
<th>Device</th>
<th>Rated current $I_{\text{eff}}$</th>
<th>Peak current $I_{\text{eff}} &lt; 5,\text{s}$</th>
<th>Power $k\text{VA}$</th>
</tr>
</thead>
<tbody>
<tr>
<td>COMPAX 2500 S</td>
<td>6,3</td>
<td>12,6</td>
<td>2,5</td>
</tr>
</tbody>
</table>

Supply voltage
- 230 V AC + 10% – 15% 45 – 65 Hz.

Line-side fuse protection
- 16 A
- K automatic fuse or NeoZed fuse-link.

Operating voltage
- 300 V DC.

Control voltage
- 24 V DC ±10%, waviness < 1 V$_{\text{SS}}$
  (must be provided by customer)

Required power
- 0,8 A for device
- 100 mA for each digital output
- For motor holding brake (0,5 – 0,67 A).

Accuracy
- Positioning on motor shaft
- Resolution 16 bit (= 0,3 angular minutes)
- Absolute accuracy: ±15 angular minutes.

Maximum power loss
- 80 W.

Block memory
- 250 blocks, powerfail-protected.

Block functions
- Positioning commands, I/O instructions, program commands ACCEL, SPEED, POSA, POSR, WAIT, GOTO, GOSUB, IF, OUTPUT, REPEAT, RETURN, END, WAIT START, GOTO EXT, GOSUB EXT, SPEED SYNC, OUTPUT A0, GOTO, POSR SPEED, POSR OUTPUT, +, –, *, /.

Setpoint generator
- Linear, quadratic, jerk-free ramp form
- Positional data in mm, inches and increments
- Variable by means of scaling factor.

Monitoring functions
- Power/auxiliary voltage range
- Motor final stage temperature/locking protection
- Monitoring of contouring errors.

CE conformity
- EMC interference immunity/emissions to EN 61800-3.

Safety
- VDE 0160/EN 50178.
Drives and controls
Technical data for STUNG COMPAX 2500 S

Interfaces
Control inputs
■ 16
■ 24 VDC/10 kOhm.

Control outputs
■ 16
■ Voltage level 24 V/100 mA
■ Active HIGH
■ Short-circuit protection.

RS 232
■ 9600 baud, rigidly set
■ Word length 8 bit, 1 start bit, 1 stop bit
■ Software handshaking XON, XOFF.

Encoder – interface (option)
■ Encoder simulator: 512/1024 increments/revolution
■ Encoder input: RS-422 interface
■ Power supply: 5 V 120-10.000 increments/revolution.

HEDA – interface (option)
■ synchronous, serial real-time interface.

Bus connectors (optional)
Profibus (option)
■ 1,5 Mbaud, Sinec L2-DP and FMS.

RS 485 (option)

Interbus-S (option)

CAN-Bus

Operation
Parameter input/status check
■ Via COMPAX hand terminal BDF 2
■ Via RS-232 interface
■ Via bus interface.

Hardware
Housing
■ Closed metal housing
■ Insulated to VDE 0160
■ Protection IP 20.

Connectors
■ Motor, power, control inputs/control outputs via push-fit terminals, emitter cable, interfaces via sockets.

Standard delivery
■ COMPAX with product manual
■ Mating connectors for X8, X9, X10, X11
■ Software Servomanager.