Clamping – an automation module of the Tünkers Group

At your service - worldwide
Clamping

The Tünkers clamping technology programme with its broadly diversified product range is unique. From mini clamps, cylinder diameter of 16 mm, standard toggle clamps, the special ALPHA clamp up to tailor-made solutions for underbody clamping – you will not find a broader portfolio of solutions for your challenges in the fixture.

It is not without good reason that we have this expertise. For decades Tünkers clamping technology has set the standard in car body manufacturing. From the introduction of the flat clamp, the sensing cartridge, the ALPHA clamp with curve mechanism up to the presentation of the universal clamp today and a comprehensive electrical product range - Tünkers sets standards in body-in-white automation. The Tünkers company sees itself as a key innovation driver in equipment standardisation. This is also expressed by our company motto: “A new idea every day, a new product every week!”

This prospectus gives you an overall view of the available product range.

**Principle of a power clamp**

- **Clamp arm**
- **Release pin**
- **Enclosed aluminum housing with needle bearing**
- **Sensing cartridge**
- **Plotted-in needle bearing**
- **Cylinder with end position damping**
- **Housing with angular scale**
- **Detail arm position**
- **Detail end position damping**
- **Detail opening angle**
- **Detail vane principle**

**ALPHA clamp with curve-driven lever mechanism**

**Loss installation space**
- More work contents in the manufacturing cell due to flexible fixtures for different modal variants.
- Parallel processes such as forming, clamping, adhesive bonding and welding.
- Restricted space in fixtures with unfavourable accessibility.

**Higher Force**
- Highly rigid metal sheets, multiple layer connections and wide, plane contour blocks require higher clamping force.

**Low energy consumption**
- Call for energy saving concepts also in fixture construction.

**Reduced overall length due to cylinder integrated in clamp housing**

**Consequence of lower overall length:**
- Lower weight.
- Higher power density.
- Less space requirement in the plant.

**Cylinder integrated in housing**

**Beyond dead centre mechanism**

- Standard mechanism generates high forces in the end position, danger of clamp arm ‘starving’ due to insufficient power supply. For energy savings Electric Clampr.

**Curve-driven lever mechanism**

- Toggle point is curve-driven, results practically nearly constant force progression with adjusting function.

**Plate Thickness compensation**

- Curve-driven lever mechanism (API) instead of Beyond dead centre mechanism (B).

**For electrically operating Electric Clamps**

**Basic: Clamp arm with throat depth: 100 mm, operating power: 6 bar, compressed-air hose: 3 m, inside Ø 10 mm**

**Electrical 24V DC Series**

The electric clamp is the compatible alternative to the pneumatic clamp. Driven by the safety concepts in the factories, a conventional DC motor with safety extra-low voltage of 24 Volt is used as drive. The electric clamp with nearly unchanged dimensions, in combination with an extremely robust trapezoidal threaded spindle, is an extremely compact and at the same time robust equivalent of the previous compressed-air standard.

**Expertise in underbody clamp technology**

- Hook clamp, UZ clamp or underbody clamp – many terms describe this special clamping technology, which is in particular used for clamping an entire underbody assembly group.

For this purpose, normally four to eight underbody clamps are positioned by a centering pin, clamped on it by a hook and held securely during the process step.

- Over the years we have developed significant expertise. High-strength steels and aluminium automotive bodies require their own underbody clamping concept.

We would be pleased to advise and help you with the standardisation, even before the beginning of the classic design stage of the line.

**APhP underbody clamp with 3 mm power stroke**

APhP force curve

**Available clamping force depends on clamp arm length**

All clamps with clamp arm in swivelling bearings generate a defined torque (M) at the drive axis.

Due to the context: \( M = \frac{F_{a} \times l}{2} = \frac{F_{a} \times a}{2} \) the actually effective clamping force at the clamping point is being reduced in relation to clamp arm 1.

- **Double arm length** = Half clamping force!

**General procedure when choosing a clamp**

A. Definition of the required clamping force to the particular component points.

- Metal sheet thickness (s)
- Metal sheet quality (e.g. ST quality)

\[ F_{a} = 48 \times s^{3} \]  

B. Definition of the required tightening torque „Mt“.

- Thread depth component / clamp arm length

\[ M_{t} = \frac{F_{a}}{2} \]

C. Choice of the clamping tool, which provides the tightening torque with an assumed certainty (e.g. 1.5) 2° before the end position.

**For energy savings Electric Clamp**

Basic: Clamp arm with throat depth: 100 mm, operating power: 6 bar, compressed-air hose: 3 m, inside Ø 10 mm

The above table compares the energy consumption of a standard pneumatic clamp - cylinder diameter 50 mm, to its electric equivalent.

| Basic clamp arm, throat depth: 100 mm, operating power: 6 bar, inside Ø 10 mm. Accordingly, the presented values of energy consumption, CO2 emissions are converted into operating costs, in each variant for 1500 cycles/day, per year and projected over a project duration of 8 cycles.

| Table 1: | CO2 emissions in kg | Energy consumption in kWh | Operating cost in €
|----------|---------------------|--------------------------|------------------
| Basic clamp arm | 0.25 | 0.05 | 0.05
| Electric clamp | 0.08 | 0.02 | 0.02

The savings of nearly 94% for each clamp. This corresponds to factor 15!

**Technical data**

- **Type 1**

  - Enclosed aluminium housing
  - Steel supporting plate
  - Sensing cartridge
  - Plate thickness compensation: curve-driven lever mechanism (APH) instead of Beyond dead centre mechanism (B).
  - Cylinder integrated in clamp housing
  - Cylinder with end position damping

**Type 2**

- **Motor Terminal TM1**

- **V6 3.1 for comparison ALPHA 63**
### Clamping

**PKS 16-25.1**
- Compact clamp with toggle mechanism
- Beyond dead centre lock
- Housing in mono-block design made of high-strength rigid aluminium material
- Prepared with magnetic piston for sensing

**PKG 16-25**
- Compact clamp with toggle mechanism
- Housing in mono-block design made of high-strength rigid aluminium material

**Clamp force (F1) (kN)**

<table>
<thead>
<tr>
<th>PKS 16-25.1</th>
<th>PKG 16-25</th>
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<tbody>
<tr>
<td>0.105</td>
<td>0.175</td>
</tr>
<tr>
<td>0.410</td>
<td>0.630</td>
</tr>
<tr>
<td>1.480</td>
<td>2.200</td>
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</tbody>
</table>

**Corresponding (l x b x t) [mm]**

<table>
<thead>
<tr>
<th>PKS 16-25.1</th>
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<tbody>
<tr>
<td>95 x 95</td>
<td>111 x 68</td>
</tr>
<tr>
<td>110 x 185</td>
<td>118,5 x 78</td>
</tr>
</tbody>
</table>

**Weight ~ (kg)**

<table>
<thead>
<tr>
<th>PKS 16-25.1</th>
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<tbody>
<tr>
<td>0.3</td>
<td>0.5</td>
</tr>
<tr>
<td>0.8</td>
<td>1.1</td>
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</tbody>
</table>

**Dimensions (l x b x t) [mm]**

<table>
<thead>
<tr>
<th>PKS 16-25.1</th>
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<tbody>
<tr>
<td>32 x 26</td>
<td>39 x 30</td>
</tr>
<tr>
<td>45 x 35</td>
<td>50 x 50</td>
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<tr>
<td>55 x 55</td>
<td>60 x 60</td>
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**Tightening torque**

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<tr>
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<tr>
<td>27 30</td>
<td>30 32</td>
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<tr>
<td>40 50</td>
<td>50 60</td>
</tr>
<tr>
<td>60 75</td>
<td>75 90</td>
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**Connection (G)**

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<tr>
<th>PKS 16-25.1</th>
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<tr>
<td>M 5 G 1/8</td>
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**Electrical connection**

- 140 x 50 145 x 50
- 50 x 50 55 x 55

**Clamp weight (kg)**

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<td>200 320</td>
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<td>380 800</td>
<td>600 1000</td>
</tr>
<tr>
<td>1100 2500</td>
<td>1550 3800</td>
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**MK...**
- Manual clamp with enclosed cast housing
- toggle mechanism with maintained control

**MK...**
- Manual clamp with enclosed cast housing
- Torque screw

**MK...**
- Manual clamp with enclosed cast housing
- Torque screw

**HKU...**
- Manual clamp in steel plate design
- Mounting on front side

**ML...**
- Precision push rod clamp
- Friction-pressure function
- Guide arm for contour block mounting

**U63 / U50**
- New standard series
- Universal clamp with optimised toggle mechanism
- Consumption of compressed air is reduced when smaller tube diameters are used

**V/V2... BR2 5-135°**
- Variable clamp with toggle mechanism
- Beyond dead centre lock
- Enclosed housing in aluminium design
- Oblong-shaped flat cylinder in size 50, 63, 80
- Fork-shaped clamp arm with standard hole pattern for contour blocks
- Opening angle continuously adjustable to 5-135°

**K 60 U**
- Underbody clamp with completely retractable clamp for clamping operations in workplace openings
- Retracting hook via pneumatic cylinder by toggle mechanism
- End position locked beyond dead centre

**APH 40-60**
- Compact clamp with toggle mechanism
- Housing in mono-block design made of high-strength rigid aluminium material

**Dimensions (l x b x t) [mm]**

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**Electrical connection**

- M 5 G 1/8

**Electrical connection**

- M 5 G 1/8

**MK...**
- Manual clamp with enclosed cast housing
- Torque screw

**MK...**
- Manual clamp with enclosed cast housing
- Interchangeable with pneumatic clamp of various series