The Hänchen range
From the cylinder to the complete drive system
There’s no limit to possibilities for application of hydraulic drives. No matter under which conditions a hydraulic cylinder should work for you, we make it possible – from rugged to precise use! With a complete system that is custom-made for your requirements.

When you choose Hänchen as your partner, you will benefit from our decades of experience in the field of industrial hydraulics in numerous industries and applications.

- Steel/rolling mill
- Foundry
- Testing technology
- Automotive
- Railway technology
- Machine tools
- Plastic injection molding/blow-moulding machines
- Presses

Hänchen.
Hydraulics are in our genes.
Hänchen. A family business in its third generation.
The passion for hydraulic cylinders and drive systems is hereditary. At least with us it is. We are the third generation to continue the work of our grandfather Herbert Hänchen. With the same pioneering spirit, the same passion for first-class quality and the same enthusiasm for the smell of oil and metal.

Everything started in 1925 with repairing motors: especially precise and long-lasting cylinders and crankshafts were needed. The solution was to hone the surface – a method we’re still using today.

Our passion for robust and reliable products is the reason why we have been concentrating on hydraulic cylinders as our core competence since 1952.

With more than 200 highly motivated employees, we have been developing, testing and manufacturing innovative solutions for our customers – in our own research and production departments in Germany. We are at home wherever service life, reliability and availability matters – the best proof of this are our cylinders that have been running without failure for up to 40 years.

Hänchen’s success story is still running smoothly. Hänchen’s complete service ranges from personal consulting to the interactive product configurator HäKo. From the planning phase to the start-up. From individual cylinders and clamping units to entire drive systems. From standard to special applications.
Our passion. Long service life.

Passion for high-quality hydraulic cylinders needs a basis of accuracy down to the last detail. Our cylinder production makes no compromises on quality, giving you every reason to choose Hänchen products: 80 % vertical integration. 100 % made in Germany. 100 % quality.

+ Low friction. Low wear. Long service life.

The high surface quality and geometrical accuracy of the component parts of every single Hänchen cylinder guarantee a long service life without failure.

Honed surfaces
For the best lubrication and running properties and as little wear as possible on cylinders and seals, the cylinders’ sliding surfaces are refined with a cross-hatch finish.

Current sealing technology
The constant development of our sealing systems – by combining already marketed and in-house developed seals – optimises our cylinders regarding wear, friction and leakage.

H7/f7 – Clearance fit
The guide clearance must be neither too small nor too large. This is why Hänchen places so much importance on optimal accuracy. The result is reduced stress on guidance and thus less wear on components.

Three components. One unit. Easy handling.

The fewer components a cylinder has, the less accident-prone it is. Even maintenance and installation are simpler and safer. The three main parts of a Hänchen cylinder:

Piston rod
In Hänchen products, piston and piston rod are inseparably joined. The piston is coated with non-ferrous metal, enabling a precise metallic guide. The sophisticated rod ends with rounded edges permit a seal-friendly installation.

Cylinder tube
Round-head design, inseparably welded to the cylinder mounting. Drilled ports permit a space-saving installation with many options for adjustment to various applications.

Cover
A cover type perfectly coordinated to the requirements is crucial for the service life of the entire cylinder. Special feature: the synthetic guide is permanently integrated, reaches a better load distribution and minimises the risk of scratches caused by dirt particles.
**HYDRAULIC CYLINDERS: ADVANTAGES & TYPES**

Best performance made easy.

Hydraulic cylinders have a lot of advantages: they are long-lasting, low-friction and robust.

+ **Good to go: full speed ahead under full load**
  The compact construction with low inertia resistance guarantees a high power density. The cylinders can start moving immediately from standstill fully loaded, and can quickly change direction.

+ **On position: in every situation**
  Speed adjustment is stepless with a simple control concept and high positioning accuracy – even when requirements vary greatly.

+ **Fast: even under high loads**
  Force and speed are continuously and simultaneously available at full capacity.

+ **Cylinders for every frequency range**
  The required dynamics of the drive determine the cylinder’s type of effect. When fast control valves are used, even single-rod cylinders achieve a high profile quality at high frequencies.

The limit values shown in the diagram are intended as guide values for your design. They depend on various operating conditions – we can help you make the right choice.

### Technical data standard cylinders

<table>
<thead>
<tr>
<th>Series</th>
<th>Max. pressure (bar)</th>
<th>Bore (mm)</th>
<th>Force (kN)</th>
<th>Stroke (mm)</th>
</tr>
</thead>
<tbody>
<tr>
<td>120</td>
<td>10/15/20/25*</td>
<td>12–60</td>
<td>1–6,055</td>
<td>1–6,000</td>
</tr>
<tr>
<td>300</td>
<td>25–60</td>
<td>1–6,483</td>
<td>1–6,000</td>
<td></td>
</tr>
</tbody>
</table>

* Depending on mounting and size

You can find detailed specifications on page 32.

### Suitability of cylinder series according to frequency range

1. Folding machine: connecting the outer and inner parts of doors
2. Grinding wheel press: force and displacement controlled application of the closing force profile
3. Plastic injection machine: retraction of the upper two rods to remove the tool

We provide mounting plates, sensor technology, spherical rod eyes, flanges, clevis brackets and grade 12.9 screws.

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You can find the exact dimensions and the data sheets in our product configurator at [www.haenchen-hydraulic.com](http://www.haenchen-hydraulic.com).
**HYDRAULIC CYLINDERS: ACCORDING TO DIN & ISO**

**Series 100, 160, and 250:** cylinders according to standard

For all those who are obliged to use hydraulic cylinders with mounting dimensions according to DIN 24336 or ISO 6020-1/6022, our series matches the standard dimensions. With all the benefits you’ve come to expect from Hänchen.

- **Honed surfaces, geometrical accuracy, long service life.**
- **Although the mounting dimensions and accessory options are according to applicable standards, these series convince through their inner Hänchen values.**

**Series 550:**

Hänchen compact construction plus standard mounting dimensions

Cylinders with mounting dimensions according to ISO 6022 with even more Hänchen advantages. We elongate the piston rod to adapt Hänchen cylinders of the series 300 to the standard dimensions of the series 250.

The result:
- Compact, lightweight construction
- Low inertia moment in case of transverse acceleration
- Available with/without cushioning
- Optimal price-performance ratio
- Compatible with standard accessories

<table>
<thead>
<tr>
<th>Series</th>
<th>Max. pressure (bar)</th>
<th>Bore (mm)</th>
<th>Force (kN)</th>
<th>Stroke (mm)</th>
</tr>
</thead>
<tbody>
<tr>
<td>100 DIN 24336</td>
<td>100</td>
<td>25 – 125</td>
<td>5 – 123</td>
<td>1 – 6,000</td>
</tr>
<tr>
<td>160 ISO 6020-1</td>
<td>160</td>
<td>25 – 200</td>
<td>8 – 513</td>
<td>1 – 6,000</td>
</tr>
<tr>
<td>250 ISO 6022</td>
<td>250</td>
<td>25 – 200</td>
<td>49 – 385</td>
<td>1 – 6,000</td>
</tr>
</tbody>
</table>

Type of effect: single-rod (with cushioning)
Sealing systems: basic design, Servocop®, Servofloat®

You can find detailed specifications on page 33.
To operate the drive in an Industry 4.0 environment, sensors can also provide data for condition monitoring:

- Pressure transducers in the chambers analyse the friction behaviour
- Temperature and colour sensors provide information on the condition of the fluid
- Online particle counters indicate the degree of contamination of the system
- Flow sensors on the functional oil channel indicate the need for a seal change

For the necessary sensitivity, Hänchen offers convenient sensor technology components and valves – all for highly dynamic, precise drives with high energy density.

**High force. Full control.**

For a “deep stop” prevents possible crashes. Hänchen proximity switches can’t go in too far.

**Force transducer**

Force transducers use strain-gauge or piezo-technology and measure the retracting and extending forces of the hydraulic cylinder. They are installed directly on the piston rod and measure the load on the piston rod statically or dynamically. Force transducers are used e.g. for monitoring or controlling the cylinder force.

**Proximity switch**

Pressure-resistant inductive proximity switches detect the end positions of the stroke in the hydraulic cylinder – wear-free and without contact. The signal is used to check or control the hydraulic cylinder. Hydraulic cylinders with proximity switches also feature adjustable cushioning.

**Position transducers**

Position transducers show the position of the piston rod electronically. An analogue or digital travel signal can be generated using the stroke. This can be used e.g. as an actual signal in the position control circuit, or for monitoring position or speed limits. A position transducer can be integrated in the cylinder, making a compact, mechanically protected system.

**Valves**

Control valves regulate the flow rate in proportion to the electrical select signal. Depending on the application case, valves with hydraulic pilot control or directly proportional solenoid-controlled valves are used. Valves with zero overlap of the control edges are especially suitable for hydraulic control tasks.
HYDRAULIC CYLINDERS: TEST ACTUATORS

Dynamics for test winners.

Our two variants for high speeds, frequencies and accelerations:

+ Perfect for highly dynamic industry and test tasks
  - Industrial applications – from friction welding and mould oscillation up to sinter metal pressing
  - Checking the functional safety of systems, components or products
  - Structure tests of airplanes, automobile exhaust systems, refrigerating compressors and many more
  - Load and movement simulations, e.g. operational profiles and flight profiles

+ Servo cylinders of the series 120 and 300: perfect for tasks with long strokes
  In their typical Hänchen quality with harmonised sealing elements and integrated position transducers, these cylinders fulfill highest technical requirements – for safe and reliable drive control.

Test actuators of the series 320: efficient for varying applications

Compact, versatile, quick, sensitive and robust – the best choice for challenging tasks.

- Suitable for every frequency range thanks to its thick-walled design
- Quick and cost-efficient remodelling the cylinder thanks to compatible mounting elements and accessories
- Working without a leak oil pump, with variable bores for adaptable cylinder areas – meaning lower acquisition/operation costs, and also energy efficient due to a smaller hydraulic system
- Stable, steady and admissible for high lateral forces

Technical data servo cylinders

<table>
<thead>
<tr>
<th>Series with PT</th>
<th>Max. pressure (bar)</th>
<th>Rod Ø (mm)</th>
<th>Force (kN)</th>
<th>Stroke (mm)</th>
</tr>
</thead>
<tbody>
<tr>
<td>120</td>
<td>150*</td>
<td>40-140</td>
<td>10-382</td>
<td>1-1,500</td>
</tr>
<tr>
<td>300</td>
<td>330</td>
<td>50-160</td>
<td>50-462</td>
<td>1-1,500</td>
</tr>
</tbody>
</table>

Type of effect: single-rod, double-rod
Sealing systems: basic design, Servocop®, Servoseal®, Servofloat®, Servobear®, Servoseal®, Servofloat®, Servobear®, Servoseal®, Servofloat®, Servobear®

* When mounting with pivot mounting, the pressure is limited to 120 bar.
PT = Position transducer
You can find detailed specifications on page 32.

Technical data test actuators

<table>
<thead>
<tr>
<th>Series</th>
<th>Max. pressure (bar)</th>
<th>Rod Ø (mm)</th>
<th>Force (kN)</th>
<th>Stroke (mm)</th>
</tr>
</thead>
<tbody>
<tr>
<td>320</td>
<td>320</td>
<td>25-160</td>
<td>up to 1,568</td>
<td>50-450</td>
</tr>
</tbody>
</table>

Type of effect: double-rod
Sealing systems: Servoseal®, Servofloat®, Servobear®, functional oil seal

You can find detailed specifications on page 34.

1. Test stand for seat: service strength test for vehicle seats
2. Hexapod: simulation of a driving route
3. Material test stand: long-term test of airplane wings

More information about our test actuators can be found in our brochure “Testing Technology.”
Unlimited possibilities. Accurate fitting combinations.

High temperatures in steel mills, high stress in outdoor applications, hygiene requirements in food processing: we’ll tune your cylinder. Tell us what you need – only those who set conditions get the perfect cylinder.

**Equipment in the cover**
For the perfect combination, the cover type with the best sealing and guiding system* with matching quality of piston rod and the right sealing material is selected based on your application.

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### SEALING SYSTEM

<table>
<thead>
<tr>
<th>Basic design</th>
<th>Servoclip®</th>
<th>Servoseal®</th>
<th>Servofloat®</th>
<th>Functional oil seal</th>
</tr>
</thead>
<tbody>
<tr>
<td>Lip seal, wiper ring</td>
<td>Compact seal, lip seal, wiper ring</td>
<td>Servoseal®, lip seal, wiper ring</td>
<td>Floating gap seal, functional oil seal, wiper ring</td>
<td>Functional oil seal, wiper ring</td>
</tr>
</tbody>
</table>

---

### GUIDING SYSTEM

<table>
<thead>
<tr>
<th>Servoslide®</th>
<th>Metallic guide</th>
<th>PTFE Wear rings</th>
<th>Servobear®</th>
</tr>
</thead>
<tbody>
<tr>
<td>Synthetic guide</td>
<td>Simple movements</td>
<td>Controlled movements</td>
<td>Sensitive movements</td>
</tr>
<tr>
<td>Long-stroke oscillations</td>
<td>Controlled movements</td>
<td>Long- and short-stroke oscillations</td>
<td>Sensitive movements</td>
</tr>
<tr>
<td>Side loads due to lateral movement</td>
<td>Mostly stick-slip-free</td>
<td>Long- and short-stroke oscillations</td>
<td>Long- and short-stroke oscillations</td>
</tr>
<tr>
<td>Low stick-slip</td>
<td>v ≤ 2 m/s</td>
<td>Side loads due to lateral movement</td>
<td>External side loads or due to lateral movement</td>
</tr>
<tr>
<td>v ≤ 0.5 m/s</td>
<td>Low-wear</td>
<td>v ≤ 2 m/s</td>
<td>Low-wear</td>
</tr>
</tbody>
</table>

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* The recommended cover type also depends on the series and the piston equipment.
**HYDRAULIC CYLINDERS: INDIVIDUAL CUSTOMISATION**

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**Low level of friction force**

Whether sensitive, free-moving or robust – the strength of Hänchen cylinders is in their extreme adaptability. Depending on what you need, we offer you the right cover type with optimal friction force for your static or dynamic application.

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**The perfect sealing system on the piston**

Beside the selected cover type, the right piston design is also crucial for the dynamic movement of the cylinder.

If the cylinder is to be held in position under load for a longer period of time during operation, the rectangular compact seal can be equipped with a static elastomer seal for load-holding function. This prevents possible lowering of the piston rod.

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### Values measured on the double-rod cylinder (bore 46 mm without seal, rod Ø 40 mm) during sine operation according to VDMA24577 at 50 °C/HLPD46. The level of the friction force curves is lower than usual on the market.

### Friction in dependence on sealing and guiding system in the cover

<table>
<thead>
<tr>
<th>Pressure inside cylinder [bar]</th>
<th>Friction force [N]</th>
<th>Sealing system</th>
<th>Guiding system</th>
</tr>
</thead>
<tbody>
<tr>
<td>40</td>
<td>200</td>
<td>Basic design</td>
<td>Servoslide®</td>
</tr>
<tr>
<td>60</td>
<td>400</td>
<td>Servoclamp®</td>
<td>Servoslide®</td>
</tr>
<tr>
<td>80</td>
<td>600</td>
<td>Servoseal®</td>
<td>Servoslide®</td>
</tr>
<tr>
<td>100</td>
<td>800</td>
<td>Servofloat®</td>
<td>Servoslide®</td>
</tr>
<tr>
<td>120</td>
<td>1,000</td>
<td>Service oil seal</td>
<td>Servobear®</td>
</tr>
</tbody>
</table>

---

### Equipment on the piston

<table>
<thead>
<tr>
<th>SEALING SYSTEM</th>
<th>Rectangular compact seal</th>
<th>Servoseal®</th>
<th>Throttle gap (without seal)</th>
</tr>
</thead>
<tbody>
<tr>
<td><strong>SEALING SYSTEM</strong></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td><strong>Guiding system</strong></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td><strong>Metallic guide</strong></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>Simple movements</td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>Long-stroke oscillations</td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>Pistons leakage: none</td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>Pressure-dependent friction</td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>v ≤ 4 m/s</td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>Sensitive movements</td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>Long- and short-stroke oscillations</td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>Pistons leakage: very low</td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>Low friction</td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>v ≤ 4 m/s</td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>Sensitive movements</td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>Long- and short-stroke oscillations</td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>Pistons leakage: very low</td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>Very low friction</td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>v ≤ 4 m/s</td>
<td></td>
<td></td>
<td></td>
</tr>
</tbody>
</table>
Serially produced cylinders: cost-effective, individual, application-optimised

Our extensive standard range is perfectly suited for many different applications. If a higher batch size is required repeatedly, it is worthwhile to design the cylinder to the exact specific requirement. In this respect, Hänchen takes a holistic approach in order to offer a cylinder with an optimised price-performance ratio.

- Low cylinder unit costs
- Cylinder can deliver exactly what the application requires
- Fast delivery times thanks to processes optimised for serial production
- Rapid supply of spare parts by keeping the seals in stock

With decades of expertise in developing and manufacturing special solutions, our development team is always there for you. Whenever possible, we use minor modifications of our modular standard elements to adapt them to your requirements as cost-effectively as possible. If necessary, we can even develop entirely new solutions for you.

Fluids and materials

The sealing materials available as standard are suitable for HLP/HLPD hydraulic fluids or fire-resistant fluids such as HFA, HFC, HFD. But even other fluids pose no problems for Hänchen, like for example:

- Silicone oils
- Bio-degradable fluids
- Brake fluids

The use of special design materials also enables application under extreme conditions, such as low temperature use, seawater resistance or heat radiation. The constructive lightweight design enables the creation of very light hydraulic cylinders and further optimisation by combining them with lightweight design materials.

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- Brake fluids

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#### Material properties

<table>
<thead>
<tr>
<th>Material Properties</th>
<th>Steel</th>
<th>Stainless Steel</th>
<th>Cold resistant steel</th>
<th>Titanium</th>
<th>Aluminum</th>
<th>H-CFRP®</th>
</tr>
</thead>
<tbody>
<tr>
<td>Tensile strength</td>
<td>++</td>
<td>+</td>
<td>++</td>
<td>++</td>
<td>-</td>
<td>++</td>
</tr>
<tr>
<td>Stiffness</td>
<td>++</td>
<td>++</td>
<td>++</td>
<td>+</td>
<td>++</td>
<td>++</td>
</tr>
<tr>
<td>Corrosion resistance</td>
<td>--</td>
<td>--</td>
<td>++</td>
<td>--</td>
<td>++</td>
<td>++</td>
</tr>
<tr>
<td>Weight</td>
<td>--</td>
<td>--</td>
<td>--</td>
<td>++</td>
<td>++</td>
<td>++</td>
</tr>
<tr>
<td>Magnesium</td>
<td>--</td>
<td>++</td>
<td>--</td>
<td>++</td>
<td>++</td>
<td>++</td>
</tr>
<tr>
<td>Temperature max.</td>
<td>250 °C</td>
<td>260 °C</td>
<td>250 °C</td>
<td>255 °C</td>
<td>265 °C</td>
<td>85 °C</td>
</tr>
<tr>
<td>Temperature min.</td>
<td>-20 °C</td>
<td>-40 °C</td>
<td>-40 °C</td>
<td>-40 °C</td>
<td>-40 °C</td>
<td>-40 °C</td>
</tr>
</tbody>
</table>

Special materials are possible for low temperature applications below -40 °C or for applications above 250 °C.
Example 1: rotary feedthrough
The multi-channel rotary feedthrough offers a solution for the transfer of fluids between a fixed and a rotating assembly. These are particularly used in machines and other precise, fast-rotating systems. The fluid is fed into rotating channels and passes through these into the rotating body.
Possible fields of application:
- Coolant supply in tool spindles
- Supply of hydraulic cylinders on rotating portals

Example 2: cylinder with anti-torsion mechanism
Piston rods in hydraulic cylinders are usually secured against torsion by means of mounting parts. If the rod is not fixed, torsion can occur. Even small external torques can be enough, and even the surface structure of the piston rod can cause torsion over the stroke. Mechanical devices can prevent this, even for very high torques. We select the best version for your application.

Example 3: screw-in cylinder
Hydraulic cylinders are mounted mechanically before establishing a hydraulic connection using hoses or pipes. A space-saving alternative are screw-in cylinders built into stepped bores using a stepped cylinder housing. Insertable in a block, this cylinder is usually integrated in a machine and protected from external influences.
The advantages:
- Small construction volume
- Easy installation without screwed fittings

Example 4: hydraulic cylinders as guide pillar
The solution for a space-saving combination of linear movement and an exact guide: the guide pillar with the hardened surface and an integrated hydraulic cylinder. This allows precise guidance and movement of loads coupled with the piston rod without subjecting the cylinder to side loads.

Individual designs
If simple adjustments don’t suffice, we’ll design complete cylinders to suit your requirements.
Whether you need cylinders with special damping, for dosing, injection, weight compensation or oscillation. Here you can see some examples for such special solutions.

For technical data about the guide pillar, please visit www.haenchen-hydraulic.com/industry/foundry-die-casting.html.
The patented clamping unit Ratio-Clamp® serves to protect human, machine and tools in case of a power failure or system shutdown. It fixes axes during the process or for highly dynamic applications and test processes.

**Safe advantages**
- Can be used horizontally and vertically
- Can take tension and pressure in any direction
- Immediate clamping effect without further rod movement
- Energy-efficient thanks to pressureless clamping process

**Use**
- Fixation of all types of round rods in any position
- Out of a standstill
- Clamping force without energy supply for unlimited time
- An additional safety component for gravity loaded axes

### Technical data

<table>
<thead>
<tr>
<th>Ratio-Clamp®</th>
<th>Rod Ø (mm)</th>
<th>Force (kN)</th>
</tr>
</thead>
<tbody>
<tr>
<td>Standard design</td>
<td>16 – 160</td>
<td>1 – 750</td>
</tr>
<tr>
<td>Special solution</td>
<td>up to 300</td>
<td>up to 2,000</td>
</tr>
</tbody>
</table>

Suitable for: all hydraulic cylinders, round rods
Certification: TÜV, DGUV test
Sealing systems: Servocop®, pressure piston seal

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1. Grinding machine: positioning of ICE rail sleeper beds during machining
2. Ferry: lifting, lowering and fixing the bow and stern doors
3. Profiling machine: protection against front and side impact

Ratio-Clamp® can be installed to all hydraulic cylinders using flanges. As suitable accessories/tools, we can provide:
- Proximity switch
  (to show locking state)
- Control block (releases Ratio-Clamp® before cylinder starts moving)

You can find further information on Ratio-Clamp® in our brochure “Clamping unit”.

You can find the exact dimensions and the data sheets in our product configurator at www.haenchen-hydraulic.com.
The perfect boost: pressure intensifier

Pressure intensifiers are the perfect solution when you need more pressure, and reconfiguring the entire system would be too complex. Perfect in clock mode for high-pressure compression forming, for bursting tests of hoses, pipes or containers, and closing or clamping tools or moulds.

If certain processes require more or less force or a different fluid, pressure transformers and fluid separators are a quick and cost-efficient solution. The secondary side can operate with almost any fluid, such as water, HFA, HFC, mineral oil or AdBlue®.

Change of application made easy.

- More precision: pressure reducer
For quick moving or exact control of fluids at low pressure, pressure reducers are the best choice – for instance for sensitive low pressure tests of heat exchangers, fittings or hot-water storage tanks.

- Clearly separated: fluid separator
For a change of fluids without its own hydraulic supply – the pressure remains the same on both sides. A complete separation of the two fluids is possible. For all pressure ranges and almost all fluids, e.g. for pressure cases in testing facilities for different fluids, or for separating two fluids, e.g. hydraulic oil to Skydrol®.

To design a pressure intensifier for a specific stroke and delivery volume, it is necessary to have the information on the fluid, compressibility and primary pressure.

Design proposals

<table>
<thead>
<tr>
<th>p2 (bar)</th>
<th>D1 (mm)</th>
<th>D2 (mm)</th>
<th>Transmission ratio</th>
<th>p1 (bar)</th>
<th>Dynamics</th>
</tr>
</thead>
<tbody>
<tr>
<td>630</td>
<td>100</td>
<td>60</td>
<td>2.78</td>
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<td>up to 20 Hz</td>
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<td>1,600</td>
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<td>60</td>
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<td>256</td>
<td>up to 10 Hz</td>
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<td>205</td>
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<td>6.25</td>
<td>256</td>
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<td></td>
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<tr>
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<tr>
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<td>50</td>
<td>16.00</td>
<td>250</td>
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Design proposals

<table>
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<tr>
<th>p2 (bar)</th>
<th>D1 (mm)</th>
<th>D2 (mm)</th>
<th>Transmission ratio</th>
<th>p1 (bar)</th>
<th>Dynamics</th>
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<td>15</td>
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<td>0.07</td>
<td>21.1</td>
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<td>20</td>
<td>20</td>
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<td>0.08</td>
<td>24</td>
<td></td>
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<td>30</td>
<td>125</td>
<td>0.11</td>
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<td>256</td>
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<td>284</td>
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</tr>
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<td>50</td>
<td>125</td>
<td>0.16</td>
<td>250</td>
<td></td>
</tr>
</tbody>
</table>

Pressures and applications on request. Don’t hesitate to contact us, we will be pleased to advise you! You can find our contact details on the insert.
The design and production for special engineering is one of Hänchen’s strengths. Individual machine elements are an integral part in the implementation of special requests. We do not provide you standard catalogue products, but exactly what you need.

**Made of metal**
High-quality steel materials such as 20MnV8, 42CrMo4V, 18MnCr5, stainless steels such as 1.4571 or 1.4462, but also aluminium alloys or non-ferrous metals are the raw material for the production of:

- Rods, shafts and axes
- Sealing systems and guiding elements
- Mounting elements

**Made of carbon**
H-CFRP® is a composite of carbon fiber-reinforced plastic and other components with high load capacity developed by Hänchen and refined into a material. We use this hybrid carbon material to design and produce round components with and without metallic components.

- Rods, bars and tubes
- With pressure-resistant and liquid-tight coating
- Without coating, unsmoothed winding surface or honed
- With high-tensile bond between CFRP and metal

**Our possibilities**
In our machining centres, we can produce individual pieces or small series with up to Ø 600 mm and a length up to 400 mm. Our lathes can machine up to Ø 200 mm and a length of up to 3,500 mm.

**Design and engineering drawing**
We are happy to take over the development and design for your individual machine element or manufacture according to your model. We use modern methods such as FEM calculations and CAD/CAM.

**Production technologies**
Machining with state-of-the-art turning, drilling and milling centres. Precision-finishing by internal and external honing, finishing and grinding. Solid, as hollow shaft or with deep-hole drilling – in all common ISO fits.

**Coating**
Anodised aluminium, hardened steel, hard-chrome plated or nickel plated – as your application requires. Bronze and synthetic layers can be fitted as sliding surfaces on the inside and outside.
HäKo – the Hänchen configurator

Do you know exactly what you need? Then simply configure your products yourself: whether hydraulic cylinders, clamping units or mounting elements – our product configurator helps you to find the perfect solution for the requirements of your industry. Should you have any further questions, we will be glad to advise you personally.

Convince yourself of our product configurator HäKo.
You can access it through www.haenchenn-hydraulic.com.
**TECHNICAL DATA: SERIES 100, 120, 160, 250, 300 & 550**

### Standard hydraulic cylinders

<table>
<thead>
<tr>
<th>Bore (mm)</th>
<th>Rod Ø (mm)</th>
<th>SERIES 120</th>
<th>SERIES 300</th>
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<tbody>
<tr>
<td></td>
<td></td>
<td>Force $F_1$</td>
<td>Force $F_2$</td>
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<tr>
<td>25</td>
<td>12</td>
<td>7.4</td>
<td>5.7</td>
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<tr>
<td>32</td>
<td>16</td>
<td>12.1</td>
<td>9.0</td>
</tr>
<tr>
<td>40</td>
<td>20</td>
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<td>50</td>
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<td>60</td>
<td>30</td>
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</tr>
<tr>
<td>80</td>
<td>40</td>
<td>75.4</td>
<td>56.5</td>
</tr>
<tr>
<td>100</td>
<td>50</td>
<td>117.8</td>
<td>88.4</td>
</tr>
<tr>
<td>125</td>
<td>60</td>
<td>184.1</td>
<td>140.7</td>
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<tr>
<td>140</td>
<td>80</td>
<td>230.9</td>
<td>155.5</td>
</tr>
<tr>
<td>160</td>
<td>100</td>
<td>301.6</td>
<td>226.2</td>
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<tr>
<td>180</td>
<td>100</td>
<td>381.7</td>
<td>283.9</td>
</tr>
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<td>200</td>
<td>100</td>
<td>628.3</td>
<td>471.2</td>
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<tr>
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<td>120</td>
<td>760.3</td>
<td>534.1</td>
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<td>250</td>
<td>120</td>
<td>981.7</td>
<td>755.6</td>
</tr>
<tr>
<td>300</td>
<td>160</td>
<td>1.443</td>
<td>1.011</td>
</tr>
</tbody>
</table>

*When pivot mounted, the pressure is limited to 120 bar.

$F_1$ = Compressive force while the cylinder is extended

$F_2$ = Compressive force while the cylinder is retracted

With double-rod cylinders, retraction and extension corresponds to the value $F_2$.

### Standard cylinders according to DIN & ISO

<table>
<thead>
<tr>
<th>Bore (mm)</th>
<th>Rod Ø (mm)</th>
<th>DIN 24330 100 bar</th>
<th>ISO 6022-1 100 bar</th>
<th>ISO 6022-2 250 bar</th>
<th>ISO 6022-3 300 bar</th>
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</thead>
<tbody>
<tr>
<td>25</td>
<td>12</td>
<td>4.9</td>
<td>3.8</td>
<td>7.9</td>
<td>5.4</td>
</tr>
<tr>
<td>32</td>
<td>14</td>
<td>8.0</td>
<td>6.5</td>
<td>12.9</td>
<td>8.8</td>
</tr>
<tr>
<td>40</td>
<td>18</td>
<td>12.8</td>
<td>10.0</td>
<td>20.1</td>
<td>14.0</td>
</tr>
<tr>
<td>50</td>
<td>22</td>
<td>19.6</td>
<td>15.8</td>
<td>31.4</td>
<td>21.6</td>
</tr>
<tr>
<td>60</td>
<td>30</td>
<td>31.2</td>
<td>25.0</td>
<td>49.1</td>
<td>33.6</td>
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<tr>
<td>80</td>
<td>40</td>
<td>50.3</td>
<td>40.1</td>
<td>80.4</td>
<td>55.0</td>
</tr>
<tr>
<td>100</td>
<td>50</td>
<td>70.7</td>
<td>63.6</td>
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<tr>
<td>125</td>
<td>60</td>
<td>78.5</td>
<td>62.6</td>
<td>125.7</td>
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</tr>
<tr>
<td>140</td>
<td>80</td>
<td>122.7</td>
<td>98.1</td>
<td>196.3</td>
<td>134.8</td>
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<tr>
<td>160</td>
<td>100</td>
<td>321.7</td>
<td>218.9</td>
<td>306.8</td>
<td>181.1</td>
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<td>180</td>
<td>120</td>
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<td>140</td>
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<td>478.6</td>
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**TECHNICAL DATA: SERIES 320 & SQUARE HYDRAULIC CYLINDER**

### Test actuators

<table>
<thead>
<tr>
<th>Rod Ø (mm)</th>
<th>Type</th>
<th>Bore (mm)</th>
<th>Force (kN) 210 bar</th>
<th>Force (kN) 320 bar</th>
<th>Stroke (mm)</th>
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</thead>
<tbody>
<tr>
<td>25</td>
<td>strong</td>
<td>28 – 46</td>
<td>2.6 – 23.1</td>
<td>4.0 – 35.2</td>
<td>50 – 170</td>
</tr>
<tr>
<td>30</td>
<td>strong</td>
<td>34 – 55</td>
<td>4.2 – 35.0</td>
<td>6.4 – 53.4</td>
<td>50 – 220</td>
</tr>
<tr>
<td>40</td>
<td>strong</td>
<td>45 – 70</td>
<td>7.0 – 54.4</td>
<td>10.7 – 82.9</td>
<td>50 – 270</td>
</tr>
<tr>
<td>50</td>
<td>strong</td>
<td>56 – 80</td>
<td>10.5 – 64.3</td>
<td>16.0 – 96.0</td>
<td>50 – 350</td>
</tr>
<tr>
<td>63</td>
<td>strong</td>
<td>70 – 110</td>
<td>15.4 – 134.1</td>
<td>23.4 – 234.4</td>
<td>50 – 450</td>
</tr>
<tr>
<td>80</td>
<td>slim</td>
<td>90 – 120</td>
<td>28.0 – 131.9</td>
<td>42.7 – 201.1</td>
<td>50 – 450</td>
</tr>
<tr>
<td>100</td>
<td>strong</td>
<td>90 – 150</td>
<td>28.0 – 265.5</td>
<td>42.7 – 404.6</td>
<td>50 – 450</td>
</tr>
<tr>
<td>100</td>
<td>slim</td>
<td>110 – 150</td>
<td>34.6 – 208.2</td>
<td>52.8 – 314.2</td>
<td>50 – 450</td>
</tr>
<tr>
<td>125</td>
<td>slim</td>
<td>140 – 175</td>
<td>34.6 – 340.2</td>
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<td>50 – 450</td>
</tr>
<tr>
<td>125</td>
<td>strong</td>
<td>140 – 200</td>
<td>65.8 – 247.4</td>
<td>99.9 – 377.0</td>
<td>50 – 450</td>
</tr>
<tr>
<td>160</td>
<td>slim</td>
<td>180 – 220</td>
<td>57.2 – 378.0</td>
<td>170.8 – 573.0</td>
<td>50 – 450</td>
</tr>
<tr>
<td>160</td>
<td>strong</td>
<td>200 – 260</td>
<td>237.5 – 690.7</td>
<td>381.9 – 1,055.6</td>
<td>50 – 450</td>
</tr>
<tr>
<td>200</td>
<td>slim</td>
<td>240 – 280</td>
<td>290.3 – 833.3</td>
<td>442.3 – 965.1</td>
<td>50 – 450</td>
</tr>
<tr>
<td>200</td>
<td>strong</td>
<td>250 – 320</td>
<td>371.1 – 1,029.2</td>
<td>565.5 – 1,568.3</td>
<td>50 – 350</td>
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</tbody>
</table>

*strong*: massiv construction (e.g. vertical installation)

*slim*: lighter construction (e.g. horizontal installation with spherical rod eyes)

### Square hydraulic cylinders

<table>
<thead>
<tr>
<th>Bore (mm)</th>
<th>Rod Ø (mm)</th>
<th>Stroke (mm)</th>
<th>Force $F_1$ (kN)</th>
</tr>
</thead>
<tbody>
<tr>
<td>12</td>
<td>6</td>
<td>30</td>
<td>1.4</td>
</tr>
<tr>
<td>16</td>
<td>8</td>
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<td>3.8</td>
</tr>
<tr>
<td>25</td>
<td>12</td>
<td>50</td>
<td>5.9</td>
</tr>
</tbody>
</table>

---

If required, we also supply suitable accessories: mounting plates, sensor technology, spherical rod eyes and flanges to clevis brackets.

Do you need support or further dimensions? Contact us: we provide you with comprehensive advice and support you during the design phase. You can find our contact details on the insert.

You can find design and calculation assistants together with data sheets in our product configurator at www.haenchen-hydraulic.com.

---

Do you need support? At Hähenchen, we offer you comprehensive all around advice and fast support.

For all questions and problems regarding virtually anything, such as accessories and tools, we are always at your side. Because we want to give you the best drive solution and smooth test scenarios for your individual requirements: by minimising the time required for installation and maintenance, and providing the best functional reliability.

At www.haenchen-hydraulic.com, you will find further information on:

- Technical information
- Applications
- Installation and maintenance

Basis for a successful collaboration.
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