

Hydraulic solutions
The right thing for testing



HANCHEN®

The testing sector is a multi-faceted and sophisticated field.

High speeds, frequencies, accelerations - good to know that Hänchen cylinders of the 320, 300 and 120 series always keep up. There are many factors to be considered when selecting the right cylinder.

We have made this easy for our customers. Because 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 devices to entire drive systems including documentation. From standard applications to custom-made special solutions. Decades of experience will help us find the perfect solution for you.



Hänchen.
Hydraulics are in our genes.



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**Hydraulic solutions
from a reputable company.**

Hänschen. 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 Hänschen. 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. With success!

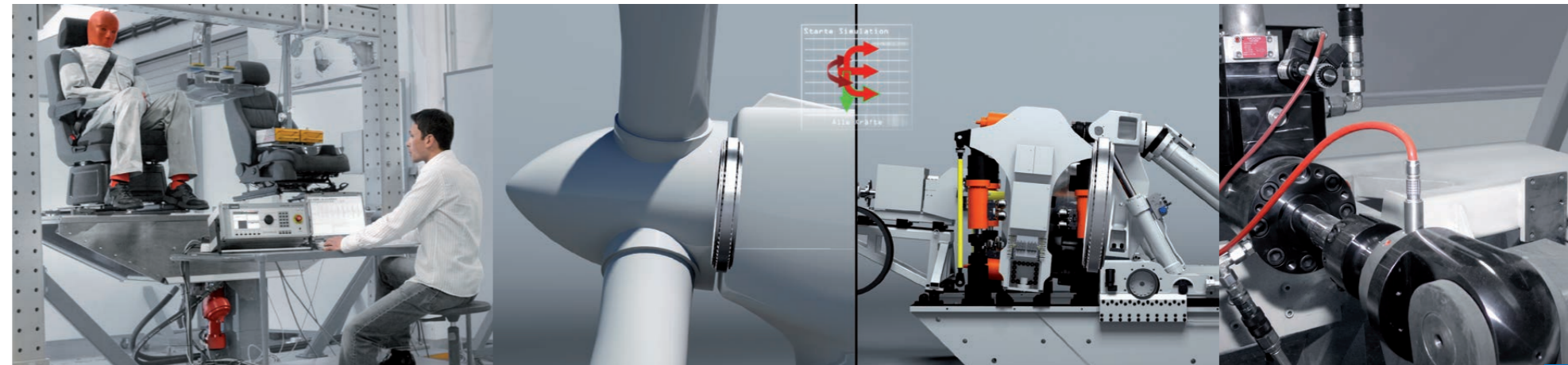
Our passion for robust and reliable products is why we’ve been building hydraulic cylinders for various applications, and also for testing purposes, for more than 60 years. Hydraulic drives are extremely reliable, extremely durable and, while being very compact, offer a high power density.

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 where durability, reliability and availability matter. Structure tests of Airbus aircraft, for instance, have been using Hänschen test cylinders since the very first A300.

The original Hänschen headquarters in Ruit near Stuttgart. In our certified company we create sustainable and future-oriented drive solutions.



Hänschen’s success story is still running smoothly. The reason for this is that our customers can be sure that we always use solutions tailored exactly to their requirements. This mutual trust is based on our know-how that has been growing for three generations, and which makes us a world-wide authority for drive solutions.



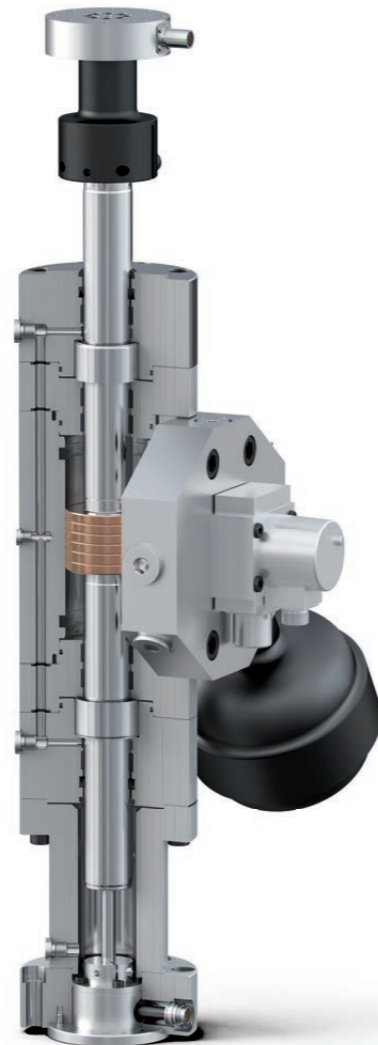
1 | Test stand for seats: Service strength test for vehicle seats
 2 | Large bearing test setup for rotor bearings in wind energy plants (figure: Schaeffler)
 3 | Simulation aerodynamic forces on the flight control surfaces of airplanes

Dynamics for test winners.



Efficient with varying test setups, compact, versatile, quick, sensitive and robust – the best choice for challenging tasks.

For example for checking the functional safety of systems, component parts or products. For structural testing of aircraft, refrigeration compressors, automobile exhaust systems and many more. Or for loading and movement simulation, such as operational profiles and flight profiles.



+ For every frequency range and for high lateral forces

The test cylinders convince with their stability and high inherent stiffness. They are suitable for high speeds and can reliably bear high lateral forces.

+ Operation without leak oil pump

Thanks to the elaborate sealing and guiding system, Hanchen cylinders don't need leak oil pumps.

+ Bores with millimetre accuracy

The working areas can be designed individually for the respective requirements. This saves acquisition and operating costs for the required periphery and increases the energy efficiency, e.g. with regard to the system's energy input and cooling power.

+ Modular system for efficient change of applications



Switching between different test setups simply, quickly and cost-efficiently: Mounting parts and accessories such as spherical rod eyes, integrated position transducers, force transducers, mounting plates, accumulators or control valves fit cylinders with different forces, eliminating extra purchases – optimal utilization of the existing test environment.

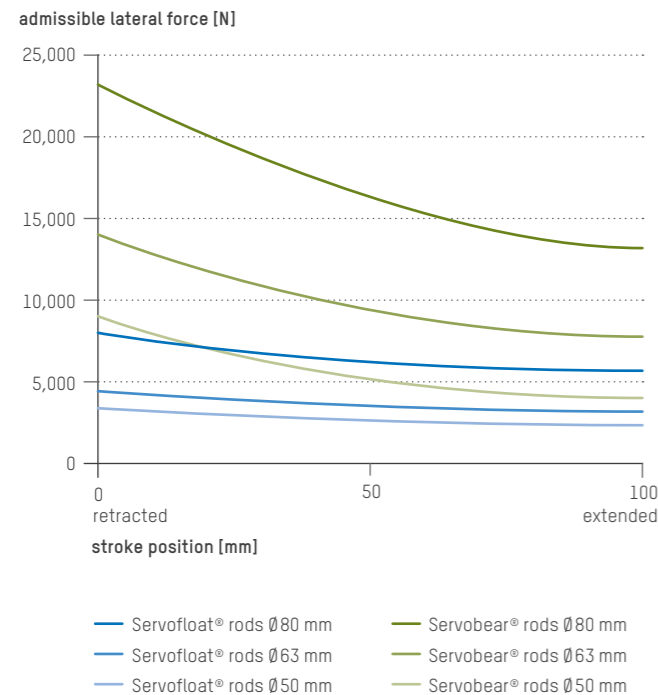


Especially important for designing test cylinders:
Taking into account the lateral forces acting on the piston rod,
and a cushioning to protect the cylinder.



1 | The bores are customizable to the millimetre

HAKO
In our product configurator at www.haenchen-hydraulic.com, you can find design assistants and the exact lateral forces for every dimension and stroke



+ Design according to the lateral forces

An important point to be considered when designing hydraulic cylinders is the ability to bear lateral forces or side loads acting on the piston rod. Beside the diameter, the elastic curve of a piston rod under lateral forces depends above all on the stroke length, the free piston rod end and the stroke position. So, the admissible lateral force in the retracted end position will always be higher than in the extended position.

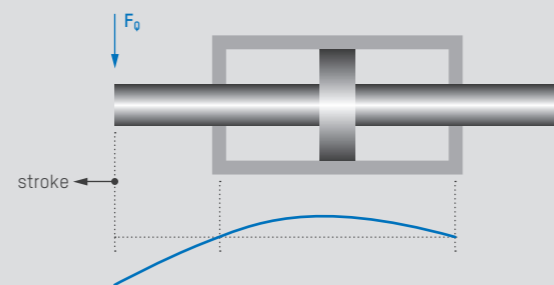
+ Protection against unforeseen movement

Every test cylinder of the 320 series is equipped with an emergency cushioning in front of every end position. This serves to protect the cylinder.

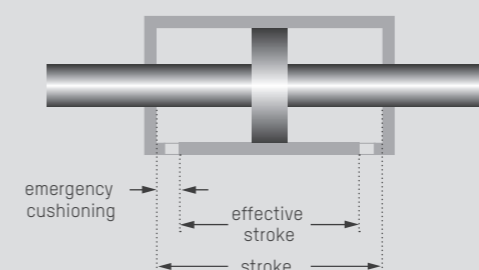
The length of the emergency cushioning is included in the stroke. The actual stroke without emergency cushioning is called the effective stroke.



Lateral forces on the piston rod



Emergency cushioning

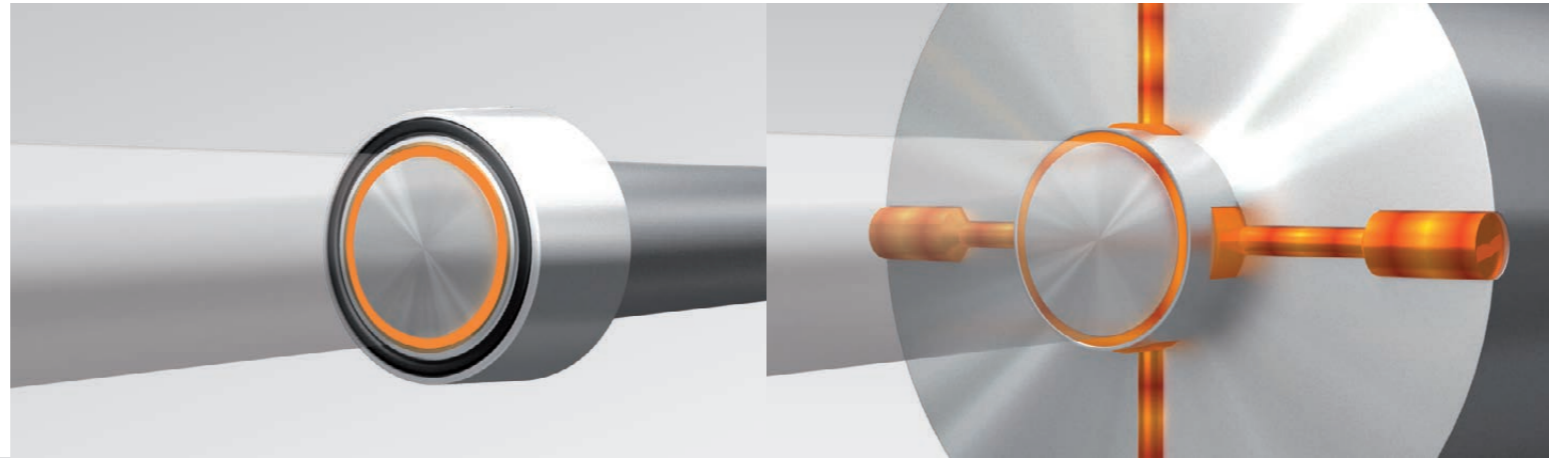


Technical data

Type of effect: double-rod | Sealing systems: Servofloat®, functional oil seal (Servobear®) | Speeds: up to 4 m/s

Rod Ø (mm)	Bore (mm)	Type	Force [kN] 210 bar	Force [kN] 320 bar	Stroke (mm)
25	28 - 45	strong	3 - 23	4 - 35	50 - 170
30	34 - 55	strong	4 - 35	6 - 53	50 - 220
40	45 - 70	strong	7 - 54	11 - 83	50 - 270
50	56 - 80	strong	11 - 64	16 - 98	50 - 450
63	70 - 110	strong	15 - 134	23 - 204	50 - 450
80	90 - 120	slim	28 - 132	43 - 201	50 - 450
80	90 - 150	strong	28 - 266	43 - 405	50 - 450
100	110 - 150	slim	35 - 206	53 - 314	50 - 450
100	110 - 175	strong	35 - 340	53 - 518	50 - 450
125	140 - 175	slim	66 - 247	100 - 377	50 - 450
125	140 - 200	strong	66 - 402	100 - 613	50 - 450
160	180 - 220	slim	112 - 376	171 - 573	50 - 450

strong: massive construction (e.g. vertical installation)
slim: lighter construction (e.g. horizontal installation with spherical rod eyes)



Servofloat® – with patented floating gap seal

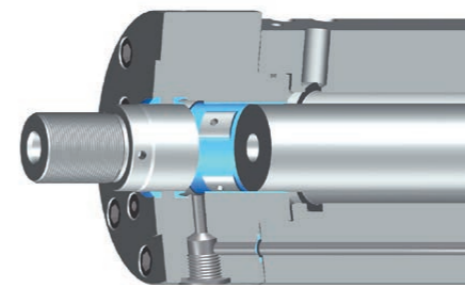
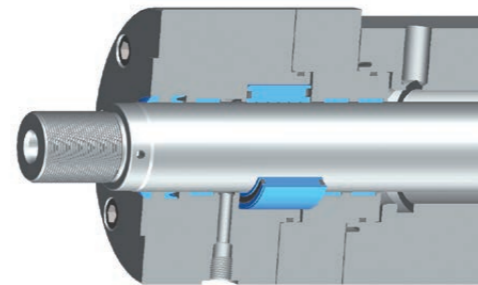
Servobear® – with hydrostatic piston rod guide

+ Servofloat® design with patented floating gap seal for extremely low friction

In the Servofloat® seal element (Domestic and foreign patents, US Pat. 4 406 463), the pressure in the cylinder chamber is discharged to the outside in a contact-free through a narrow no-contact throttle gap. This system requires no external pressure supply.

+ Servobear® design with hydrostatic piston rod guide for highest side loads

Servobear® combines seal and rod guide. The rod is "floating" on an oil film without touching the guide. The pressure is released through this narrow bearing gap. The pressure supply for the hydrostatic bearing is realized internally via the system pressure.



- +** Guiding system cover PTFE wear rings
= contact guiding element
- +** Sealing system cover Floating gap seal, functional oil seal, wiper ring
- +** Sealing system piston no seal with throttle gap

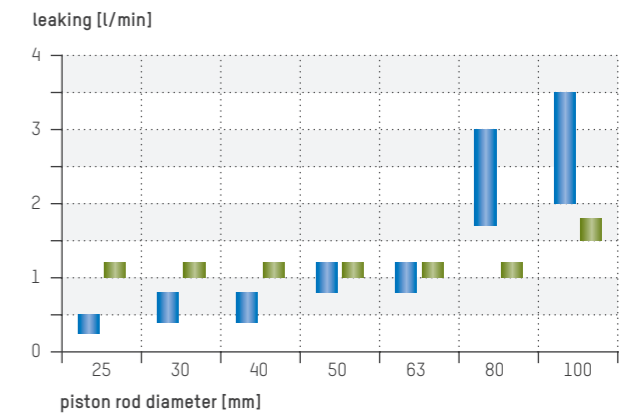
- +** Guiding system in cover Hydrostatic bearing
= no-contact guiding elements
- +** Sealing system on the cover Functional oil seal, wiper ring
- +** Sealing system on the piston no seal with throttle gap

- 1 | Servofloat® – the floating gap seal is centred toward the piston rod
- 2 | Servobear® – the piston rod is centred in the bearing

A dynamic test environment requires free-moving, low stick-slip hydraulic cylinders. Hänchen offers two test cylinder designs with especially low friction. High production accuracy with very little guide clearance guarantees wear-free use and thus a long service life.

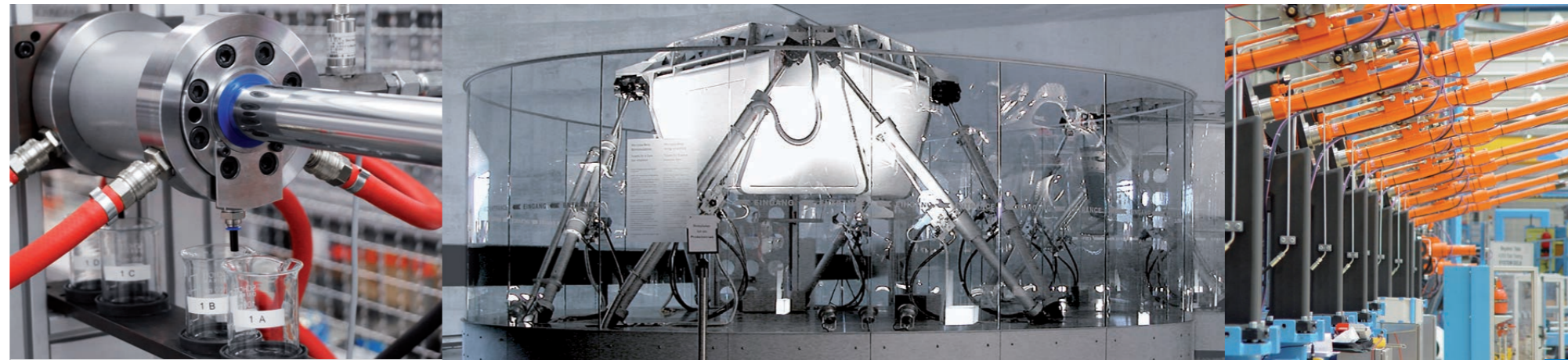
The functional oil flow with Servofloat® and Servobear®

In both designs, the contacting functional oil seal is not under pressure. This makes the residual friction in the entire pressure area constant and very low. The leak oil is discharged to the tank through the overflow oil connection without pressure, it should not be suctioned off.



- Servofloat®**
Guide values apply for chamber pressure (operating pressure) of 210 bar, fluid ISO VG 46 at 55 °C
- Servobear®**
Guide values apply for supply pressure (system pressure) of 280 bar, fluid ISO VG 46 at 55 °C





1 | Seal test stand
 2 | Hexapod: Simulation of a driving route
 3 | Simulation of ambient conditions acting on landing flaps on airplane wings

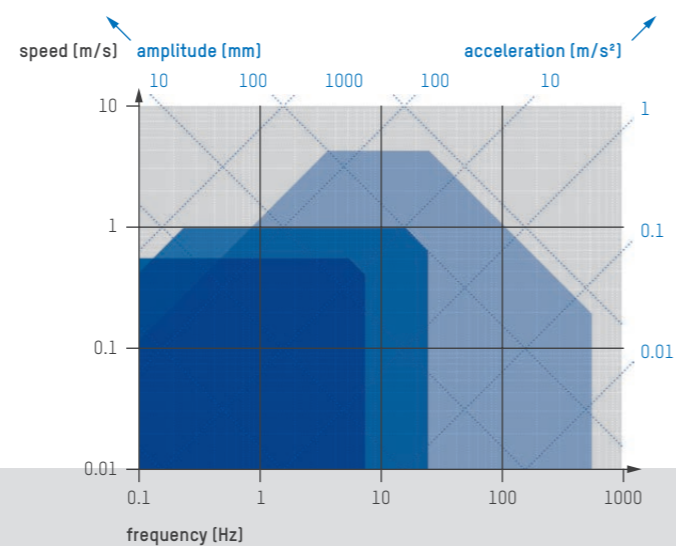
Exactly as it should be.
Perfect.



Your applications aren't that challenging? Then our Economy series 120 and 300 are just right for you. In typical Hänchen quality, of course – high surface quality, geometrical accuracy of the component parts, and coordinated sealing elements – for highest technical requirements and safe, reliably controlled drives.

Performance map

The performance map of a hydraulic drive describes the dynamic movement of a hydraulic cylinder in a sine wave. Depending on the cylinder design, different performance classes can be reached.



- Premium double-rod cylinder
- Economy double-rod cylinder
- Economy single-rod cylinder



**+ Economy series 120 and 300:
 Slim test cylinders for simpler test tasks**

Honed cylinder tubes, hard-chrome plated and honed piston rods, accurately fitting sealing elements – even with our Economy series, you can count on the high-quality processing that is typical for Hänchen cylinders.

+ Advantages:

- Optimal cost/performance ratio
- Especially suited for test tasks with long strokes
- As single-rod or double-rod cylinder
- With integrated position transducer
- Low dead weight
- Optionally available with mounting plate for control valve

Technical data

Type of effect: single-rod, double-rod
 Sealing systems: basic design, Servocop®, Servofloat®
 Speeds: up to 2 m/s

Series with position transducer	Max. pressure (bar)	Bore (mm)	Force (kN)	Stroke (mm)
120	120/150*	40 – 180	19 – 382	1 – 1,500
300	300	50 – 140	59 – 462	1 – 1,500

* depending on mounting

HAKO
 You can find design and calculation assistants in our product configurator at www.haenchen-hydraulic.com

Unlimited possibilities. Accurate fitting combinations.

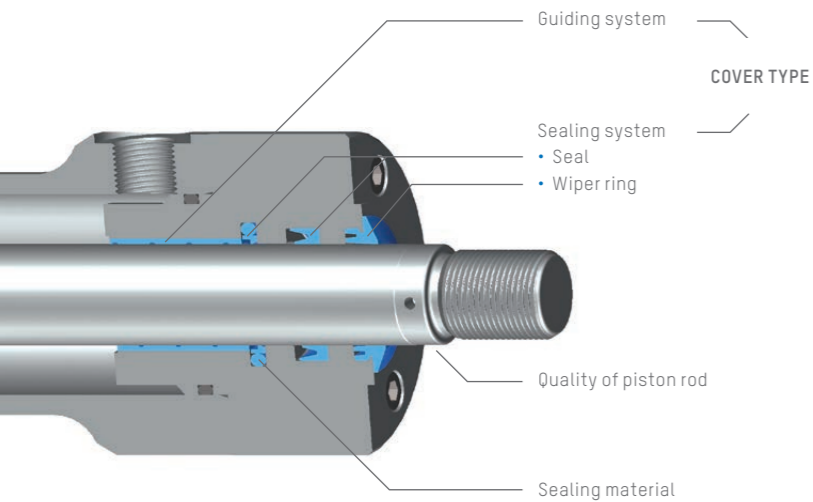


For further details on this and other equipment features, please refer to our book "The Hydraulic Cylinder".

Tests in salt spray fog, in climatic chambers or in a lab: We fit your cylinder up for anything. Tell us what you need – to make the perfect cylinder, we need to know what you want.

Equipment system

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



* The recommended cover type also depends on the series and the piston equipment.

SEALING SYSTEM	Basic design: lip seal, wiper ring	Servocop®: compact seal, lip seal, wiper ring	Servofloat®: floating gap seal, functional oil seal, wiper ring	Functional oil seal: functional oil seal, wiper ring
GUIDING SYSTEM	<p>Servoslide®: Synthetic guide</p> <ul style="list-style-type: none"> • Simple movement, long-stroke oscillations ≤ 25 Hz • Side loads due to lateral movement • Good friction properties • Vibration-damping • Low stick-slip • $v \leq 0.5$ m/s 	<p>Metallic guide</p> <ul style="list-style-type: none"> • Simple movement • High temperatures • Universal application • $v \leq 0.5$ m/s 	<p>PTFE Wear rings</p> <ul style="list-style-type: none"> • Simple and controlled movement, long-stroke oscillations ≤ 25 Hz • Side loads due to lateral movement • Long cylinder stroke • Mostly stick-slip-free • $v \leq 3$ m/s 	<p>Servobear®: Hydrostatic bearing</p> <ul style="list-style-type: none"> • Sensitive movements, long- and short-stroke oscillations ≤ 25 Hz • External side loads or due to lateral movement • Extremely low friction • Low-wear • No leak-oil pump required • $v \leq 2$ m/s
		<ul style="list-style-type: none"> • Simple and controlled movement, long-stroke oscillations ≤ 25 Hz • Side loads due to lateral movement • Optimized friction properties • Vibration-damping • Mostly stick-slip-free • $v \leq 2$ m/s 	<ul style="list-style-type: none"> • Simple movement • High temperatures • Optimized friction properties • Mostly stick-slip-free • $v \leq 1$ m/s 	<ul style="list-style-type: none"> • Sensitive movements, long- and short-stroke oscillations ≤ 25 Hz • External side loads or due to lateral movement • Extremely low friction • Low-wear • No leak-oil pump required • $v \leq 2$ m/s
		<ul style="list-style-type: none"> • Simple movement • High temperatures • Universal application • $v \leq 0.5$ m/s 	<ul style="list-style-type: none"> • Simple movement • High temperatures • Optimized friction properties • Mostly stick-slip-free • $v \leq 1$ m/s 	<ul style="list-style-type: none"> • Simple movement • High temperatures • Extremely low friction • Low-wear • No leak-oil pump required • $v \leq 1$ m/s
		<ul style="list-style-type: none"> • Simple and controlled movement, long-stroke oscillations ≤ 25 Hz • Side loads due to lateral movement • Long cylinder stroke • Mostly stick-slip-free • $v \leq 3$ m/s 	<ul style="list-style-type: none"> • Sensitive movements, long- and short-stroke oscillations • High side loads • Extremely low friction • Low-wear • No leak-oil pump required • $v \leq 4$ m/s 	
				<ul style="list-style-type: none"> • Sensitive movements, short-stroke oscillations, highly dynamic > 25 Hz • Highest side loads • Extremely low friction • No leak-oil pump required • $v \leq 4$ m/s

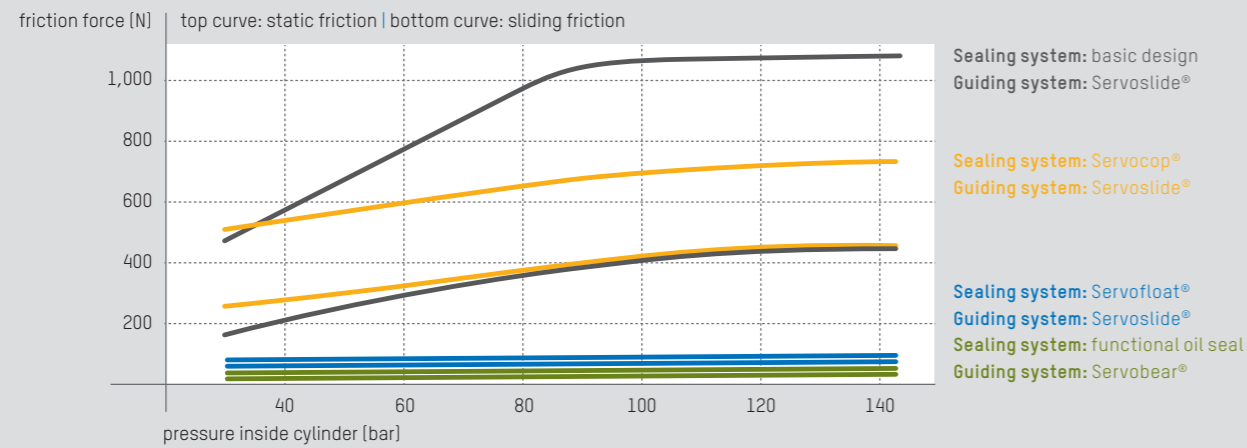


The strong point of Hänchen cylinders is their extreme versatility. We provide reliable cylinders with the perfect performance for your static or dynamic application case.

+ Low level of friction force

Sensitive, free-moving or robust – we have the right cover type for your requirements.

Friction in dependence on sealing and guiding system in the cover



Values measured on the double-rod cylinder (bore 46 mm without seal, piston 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.



Just contact us, we will be pleased to help you! You can find our contact addresses on the insert.

+ The perfect sealing system on the piston

Beside the selected cover type, the right piston is also crucial for the dynamic movement of the cylinder. We select the right piston for your cover type, exactly meeting your requirements.

Piston types for test engineering

SERIES	Economy: Single-rod cylinder	Economy: Double-rod cylinder	Premium: Double-rod cylinder
SEALING SYSTEM			
Rectangular compact seal	<ul style="list-style-type: none"> All movements longer than seal width Speed ≤ 4 m/s Frequency < 7 Hz Amplitude > 6 mm 	<ul style="list-style-type: none"> All movements longer than seal width Speed ≤ 4 m/s Frequency < 25 Hz Amplitude > 6 mm 	
Throttle gap (no seal)	<ul style="list-style-type: none"> Oscillations, friction-friendly Speed ≤ 4 m/s Frequency < 7 Hz Amplitude = unlimited 	<ul style="list-style-type: none"> Oscillations, friction-friendly Speed ≤ 4 m/s Frequency < 25 Hz Amplitude = unlimited 	<ul style="list-style-type: none"> Highly dynamic movement Speed ≤ 4 m/s Frequency = unlimited Amplitude = unlimited

All piston types use the metallic guide.



Special tasks?
Individual solutions!



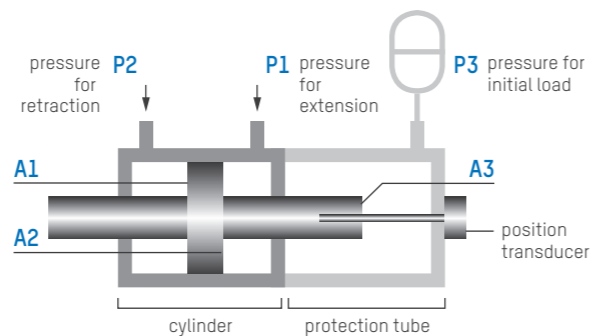
- 1 | Material test stand: Structure test of airplane wings using synchronous cylinders
- 2 | Hydraulic cylinder with pressure protection tube in a test of the interface between airplane and landing gear
- 3 | Pipe bursting test with pressure intensifiers

Our large team of developers is there for you when you need a special solution developed and manufactured – from small adjustments to complete new constructions. 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'll rise to the challenge and develop an entire new system for you. Here you can see some examples.

+ Example 1: Hydraulic cylinder with pressure protection tube

For weight compensation or to obtain a resilience effect, sometimes initial loads must be applied to the test objects. This is a job for hydraulic cylinders with a pressurized protection tube. Drive and hydraulic spring are combined in one component part.

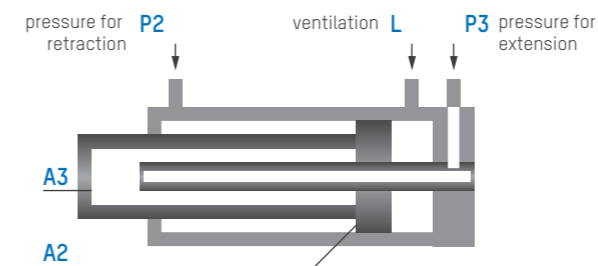
Additional pressure from an accumulator is applied to the free piston rod, the so-called protection tube side, of a double-rod cylinder. Thus, the working area A3, determined by the rod diameter, acts as a "protection tube spring". With its two chambers A1 and A2, the hydraulic cylinder works in addition to this continuous hydraulic force.



+ Example 2: Synchronous cylinders

Hydraulic cylinders with working areas of the same size are convenient for dynamic movement. Synchronous cylinders are the solution for constricted spaces or long-stroke test tasks.

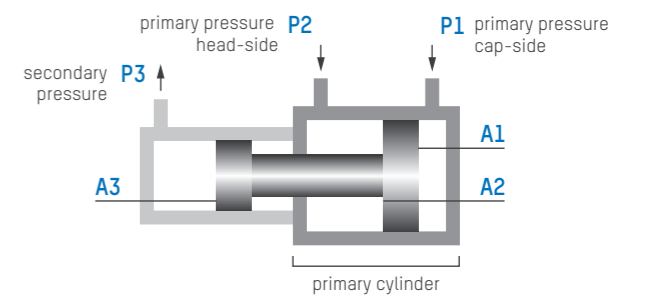
Their length corresponds to that of cylinders with one-side piston rods. A large rod, in which a smaller rod is moving, transfers the force to the outside. This creates two working areas of the same size, A3 for extension and A2 for retraction.



+ Example 3: Pressure intensifier

With a hydraulic cylinder (primary cylinder) with a servo-hydraulic drive, any operational profile for the piston rod can be created. This operational profile creates a certain pressure pattern in the high-pressure chamber, which can be applied to a test object as test pressure.

Component parts can, for example, be vibrated with internal pressure - ideal for bursting tests of hollow objects such as hoses, pipes and containers. The test cylinder can work with hydraulic oil, while the high-pressure part uses water or other environmentally-friendly liquids.





Won't let you down!



1 | 2 Test stand for wings for airflow simulation
3 | Drawing: Cylinder arrangement in a 3-axis test stand



You can find more detailed information on Ratio-Clamp® in our book "The Hydraulic Cylinder" and at www.haenchen-hydraulic.com

The patented clamping device Ratio-Clamp® holds the rod in a standstill and locks it into position mechanically. The clamping effect is immediate, lasts for an unlimited period of time and doesn't require an energy supply – suitable for various applications, as a safety element or for locking component parts into place. 100% reliable! If necessary, we can also develop a customized solution for you.

+ Safe advantages

- Immediate fixation of the rod, with zero play in case of load reversal
- immediate clamping effect in case of a power failure, for unlimited periods of time
- Allowance- and wear-free locking, even with vibrations of the application
- Load capacity independent of direction
- Energy-efficient thanks to pressureless clamping process



Technical data

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

Ratio-Clamp®	Rod Ø (mm)	Force (kN)
Standard version	16 – 160	1 – 750
Special solution	up to 300	up to 2,000

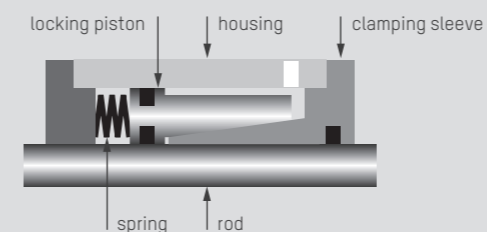
+ Application areas

- Protecting people and machines in case of a power failure or plant shutdown
- Locks axes during certain processes, even for highly dynamic applications/ test processes

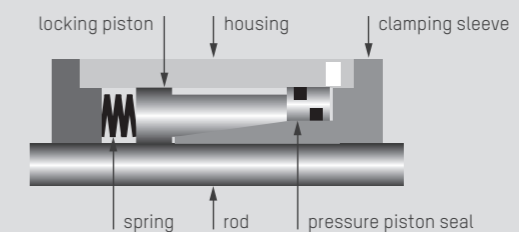
+ Sealing systems: Servocop® or pressure piston seal

- In the friction-optimized Servocop® variant, the sealing elements on clamping sleeve and locking piston touch the rod and are pressurised, which causes low sliding friction. The max. speed of the rod is 1 m/s.
- Low-friction sensitive applications: Thanks to the pressure piston seal, no pressurized seal touches the rod – the sliding friction is very low, constant and independent of the releasing pressure. The max. speed of the rod is 2 m/s.

Servocop®



Pressure piston seal



You can find the exact dimensions and the data sheets in our product configurator at www.haenchen-hydraulic.com



Basis for a successful business relationship.



+ Our know-how: Your benefit

- Consulting service for individual cylinders and engineering and project development for complex drive systems
- Design planning on-site or at one of our locations
- Small lot sizes possible
- Available 24/7: HÄKO, the product configurator with design assistance and calculation programs >> www.haenchen-hydraulic.com

+ Simply safe: Service with additional benefits

- Approval e.g. according to Lloyd's (Register of Shipping) or customer-specific
- Realization as per your requirements, e.g. according to ATEX directives
- Drawings: 3D models complete with accessories – for a perfect fit without errors
- Documentation according to EG machine directive
- Operating manual in several languages
- Preliminary and final start-up on request

Comprehensive consulting service and quick support:

We're pleased to help you anytime with any questions or challenges you might face – from the accessories to the equipment. Because we want to give you the best drive solution and smooth test scenarios for your individual requirements: by minimizing the time required for installation and maintenance, and providing the best functional reliability.

+ Short reaction time: We're always there for you

- From the first quote up to helping in an emergency
- Broad range of field service options – we'll come to you for consulting and service
- Quick availability of spare parts throughout the service life thanks to consistent documentation and a serial number on every single cylinder
- As good as new after repair

+ Everything included: Equipment available

- Sealing and assembly tools for correct seal replacement
- Hook wrench for holding the piston rod in place during installation
- Venting set with measuring coupling: venting makes the seal last longer
- Air filter for dirt protection or filtering air and gases, used e.g. for non-pressurized hydraulic cylinder spaces or oil containers up to 100 °C

Herbert Hänchen GmbH & Co. KG
Brunnwiesenstr. 3, 73760 Ostfildern
Postfach 4140, 73744 Ostfildern
Fon +49 711 44139-0
Fax +49 711 44139-100
info@haenchen.de
www.haenchen.de



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