Instruction manual for Hänchen Products
Hydraulic cylinder, clamping units, pressure transformer and tools

english | french | chinese | spanish | italian | german

The instruction manual summarises all important information regarding Hänchen products for assembly, start-up, operation, and maintenance.

The following Hänchen products are listed:

- Hydraulic cylinder
- Pressure transformer: pressure intensifier, pressure reducer, fluid separator *(hereinafter referred to simply as "pressure intensifier")*
- Clamping unit: Ratio-Clamp® locking unit and safety catcher
- Vibration and structure-borne sound absorber

Read the instruction manual completely and carefully, and do not use the product until you have fully understood it. For any questions, please contact **+Service**.

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User guide for instruction manual
Hänchen products

Target Audience

This instruction manual is intended for trained specialist personnel and certified hydraulic specialists. The content of this instruction manual must be made accessible to those persons entrusted with the assembly and operation of Hänchen products.

Structure of the instruction manual

Warnings

Warnings are structured as follows:

⚠ SIGNAL WORD!	**Type and source of the hazard!** Consequences if not observed → Action to avoid the hazard

Warnings differ according to the type of hazard as follows:

Signal Word Panel	Type of Hazard
⚠ DANGER!	Warns of an immediately impending hazard that will result in death or serious injury if not avoided.
⚠ WARNING!	Warns of a potentially hazardous situation that could result in death or serious injury if not avoided.
⚠ CAUTION!	Warns of a potentially hazardous situation that could result in moderate or minor injury if not avoided.
NOTE	Warns of a potentially hazardous situation that could result in property damage or environmental harm if not avoided.

Tips, Notes, Recommendations

ⓘ Provides the user with tips, notes, or recommendations for efficient handling of the product.

Action Instructions

Action instructions prompt you to perform an action or a work step. Always carry out the action instructions individually and in the specified order.
Action instructions are structured as follows:

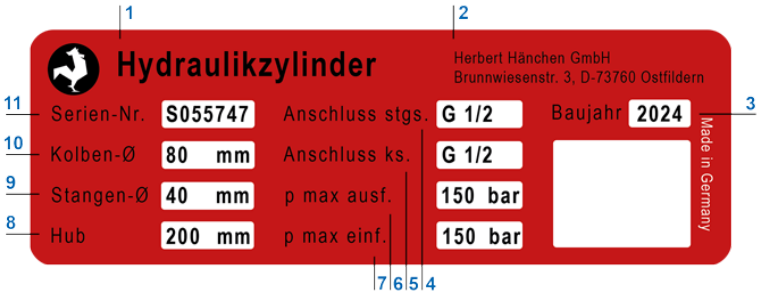
→ Instructions for an action by the machine manufacturer and operator. Statement of results, if required.

+ Applicable Documents

For the safe and correct use of the product, also observe the additionally supplied documents (e.g., delivery documents, engineering drawings, design documents) and relevant standards and laws.

+ Symbols on the product

The product features the following safety and health protection markings:
Type plate with maximum permissible pressure



Example Hydraulic Cylinder Type Plate

1. Product Designation
2. Company Address
3. Year of Manufacture
4. Head side port
5. Cap side port
6. Max. permissible pressure extended
7. Max. permissible pressure retracted
8. Stroke
9. Rod diameter
10. Bore
11. Serial number

The type plates for pressure transformers, clamping units, and vibration and structure-borne sound absorber also contain the product-specific information.

Safety instructions for the instruction manual
Hänchen Products

⚠ DANGER!	**Danger to life due to defective plant!** → Ensure that no hazards to persons and property arise in the event of a defect in a Hänchen product or its components. If a Hänchen product or its components are not functioning correctly: → Immediately take the Hänchen product out of service. → Protect the Hänchen product from unauthorized use.
⚠ DANGER!	**Danger to life due to improper use!** → Use the Hänchen product exclusively for its intended purpose. → Use the Hänchen product exclusively in its original condition, without unauthorized modifications, and in technically sound condition.
⚠ DANGER!	**Danger to life due to impaired perception!** → Ensure that persons working on or with the Hänchen product • not be under the influence of alcohol and drugs. • not be under physical or mental impairments.

Regulations

⚠ DANGER!	**Danger to life due to non-compliance with regulations!** Observe the safety regulations, requirements, and measures of the following standards: • EN ISO 12100 • EN ISO 4413

→ Clamping unit Ratio-Clamp® select and install:
- as specified in this assembly and instruction manual.
- according to the requirements of the product standards for the machines in which the clamping unit is to be installed.

When using the clamping unit as a safety element, a design specific to the respective application must be commissioned from Hänchen.

Personal Protective Equipment

⚠ DANGER!	**Danger to life due to lack of personal protective equipment!** For all work on Hänchen products or on hydraulic systems in which Hänchen products are used: → Wear personal protective equipment.

Personal protective equipment consists of:
- Protective gloves
- Safety helmet
- Safety shoes
- Safety glasses

+ Inspection and testing

⚠ DANGER!	**Danger to life due to insufficient inspection or undetected faults and damage!** → Inspect the hydraulic plant, in which the Hänchen product is installed, at regular intervals adapted to the operating conditions. → Ensure that the hydraulic plant and its components comply with the plant description. → Ensure that the connections of the components in the hydraulic plant comply with the circuit diagram. → Ensure that the hydraulic plant, including all safety components, functions correctly. → Ensure that no measurable, unintentional leakage occurs after the hydraulic plant has been subjected to either the maximum working pressure or the pressure specified by the manufacturer. Permissible leakage is a fluid quantity insufficient to form a drop.

Transport and Storage
Hänchen Products

Transport

NOTE	**Property damage due to improper transport!** → Transport Hänchen products in their original packaging. → Clearly mark lines and line connections. → Seal unprotected openings (e.g., ports) during transport. → Protect external threads during transport. → Protect functional surfaces (e.g., valve mounting surfaces) during transport.

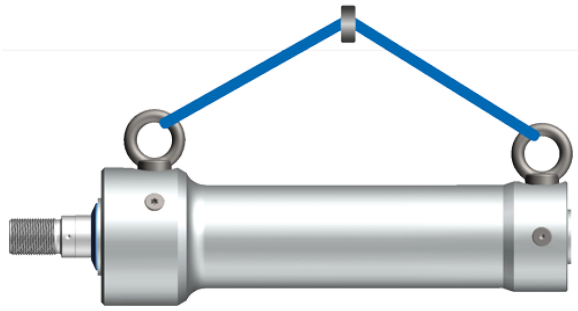
Transport with Lifting Equipment

⚠ DANGER!	**Danger to life due to breakage of the transport eyebolt from weight overload!** → Ensure that lifting using transport eyebolts on the Hänchen product is carried out exclusively and properly by trained personnel or certified hydraulic specialists.

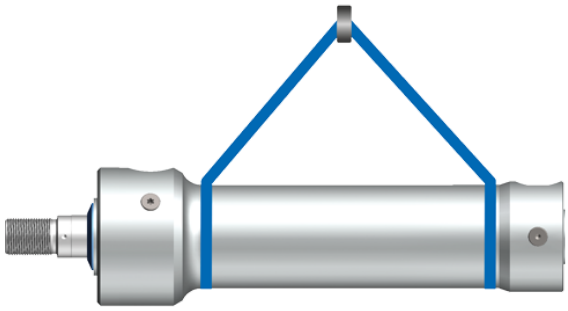
NOTE	**Property damage due to force exerted by lifting slings on mounted components (fitting plates, piping, etc.) during lifting!** → Attach lifting equipment (load chains, lifting slings) to the Hänchen product so that the lifting slings are clear during lifting, i.e., they do not lean against mounted components.

Lifting with transport eyebolts on the hydraulic cylinder:
→ Attach suitable transport eyebolts to the covers in pull-out threads (axial) or transport threads (radial).
→ If necessary, use oil ports for the transport screw.
→ Attach suitable lifting equipment (load chains, lifting slings) to the transport eyebolts on the Hänchen product.

Lifting with lifting slings, if no transport eyebolts are present:
→ Attach two lifting slings of equal length by forming loops at both ends of the Hänchen product's tube.
→ Observe the permissible load capacity of the lifting slings.
→ Ensure that the Hänchen product is not lifted by attached components, such as mounting plates, oil pipes, or sensors.



Use of transport eyebolts



Use of lifting slings

+ Storage

To protect the sliding surfaces of hydraulic cylinders and pressure intensifiers from corrosion during long-term storage:

→ Fill the cylinder with a suitable internal preservative.

→ Ensure that there is no air in the cylinder.

→ Seal the ports airtight.

Before the start-up of Hänchen products:

→ Completely remove preservative.

→ Ensure that sealing elements are not stuck by preservative.

Factory corrosion protection

Hänchen products are standardly painted with a primer coat (color shade grey RAL 9006).

The following surfaces on Hänchen products are not primed or painted:

- Fit diameters and mating surfaces towards the customer side
- Sealing surfaces for line connection
- Sealing surface for flange connection
- Connection surface for valve mounting
- Inductive proximity switches
- Position transducer
- Measuring coupling
- Joint/pivot bearing
- Grease nipple

Non-primed surfaces are protected with corrosion protection oil. For short-term storage in dry and evenly tempered rooms, the primer coating is sufficient as external preservation.

Internal preservation

Hänchen products are standardly tested with mineral oil according to DIN 51524 Part 2, unless otherwise specified. The oil film remaining inside after testing provides short-term internal corrosion protection.

Storing and cleaning sealing elements
Handling seals

For a longer service life of stored or used seals, please note the following:

NOTE	**Store and clean sealing elements correctly!** → For the storage of elastomer sealing elements, observe the standards DIN 7716, ISO 2230 and DIN 9088.

Store sealing elements as follows:

Unless otherwise described

- → cool, dry and dust-free
- → protected from light, especially from direct sunlight
- → Temperature range -10 °C to +25 °C
- → relative humidity below 65%
- → stress-free (without pressure, tension or other deformations)
- → Do not store solvents, fuels, lubricants, chemicals, acids, disinfectants, etc. in the storage room for rubber products.

Clean sealing elements as follows:

- → Use a clean cloth and lukewarm water to clean sealing elements.
- → Gasoline, benzene, turpentine, etc. are unsuitable for cleaning.
- → Allow sealing elements to air dry, not near heat sources (radiators).

Return or Disposal
Hydraulic cylinders and clamping units

In order to have Hänchen products serviced at the manufacturer's factory, they must be returned in packaging that protects against environmental influences.

NOTE	**Environmental pollution and risk of slipping due to leaking hydraulic oil** → Collect or contain any leaking hydraulic oil in a suitable container. → Dispose of any leaking hydraulic oil in an environmentally sound manner.

Returning Hydraulic Cylinders

- → Ship hydraulic cylinder as a whole.
- → Close hydraulic ports to protect against contamination and oil leakage.
- → Secure the piston rod against extending.
- → Ship the hydraulic cylinder in suitable packaging.

Returning a Ratio-Clamp® clamping unit

- → Seal ports against contamination and oil leakage.
- → Insert the transport rod from the released side into the Ratio-Clamp® clamping unit, or release the clamping unit and insert the key into the transport position.
- → Ship the clamping unit in suitable packaging.

Disposal

- → Dispose of packaging and replaced parts in accordance with the regulations of the country in which the Hänchen product was installed.
- → Dispose of Hänchen products according to national regulations.

Tools for maintenance
Assembly tool and tools

To avoid damage to the sealing elements caused by unsuitable tools, Hänchen recommends using the Hänchen assembly tool.

The Hänchen assembly tool can be found as an accessory in our +HÄKO product configurator.

+ Hook wrench according to DIN 1810 - B

- For holding the piston rod during assembly.
- Available for diameters from 12-200 mm.



+ Venting set with measuring coupling

- Important for smooth operation and protection against damage: Vent cylinders before first use and after each seal replacement.
- Clean and convenient venting without additional tools.
- The measuring coupling for the cylinder is available as a suitable connection for the venting set.

+More information about the venting set



+ Assembly aids

Assembly pin - rod

- For gentle insertion of the piston rod into the cover.
- For recalibrating seals made of PTFE.

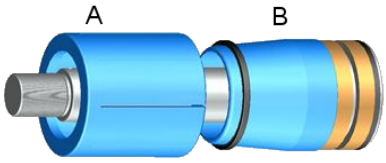
Rod Ø	12	16	20	25	30	40	50
Thread max.	M 10	M 14	M 16	M 22	M 24	M 35	M 40
Thread length max.	20	25	32	40	48	62	78



Assembly sleeve (A) and bushing (B) - piston seal

- The perfect combination for gentle, even expansion and insertion of piston seals made of PTFE.

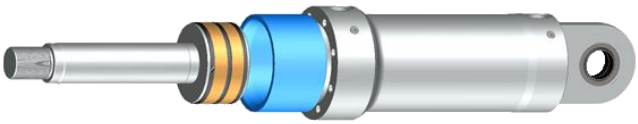
Bore	25	32	40	50	60	80	100



Assembly bushing - cylinder tube

- For gentle insertion of the piston rod into the cylinder tube and for recalibrating expanded PTFE piston seals.

Bore	25	32	40	50	60	80	100



Intended use and function
Hydraulic cylinders and pressure intensifiers

Intended Use

→ Hydraulic cylinders must be used exclusively for generating linear motion through hydraulic energy.
→ Pressure intensifiers must be used exclusively for generating secondary pressure through hydraulic energy.
→ Hydraulic cylinders or pressure intensifiers must be used exclusively for installation in a machine or partly completed machine in accordance with Machinery Directive 2006/42/EC.
→ Hydraulic cylinders or pressure intensifiers must be used exclusively within the specified limits.
→ Follow the instructions in the documentation applicable to the product.

Improper Use

→ Hydraulic cylinders must not be used:
- as a design element, for example as a guiding element
- with rotating piston rod

Exception: Such use is expressly permitted in the specific product documentation.

Function
Hydraulic Cylinders and Pressure Intensifiers

Hydraulic cylinders in various designs serve to generate linear motion through hydraulic energy. The hydraulic cylinders are intended exclusively for industrial use and are only designed to be installed in or assembled with complete or partly completed machines or equipment.

Pressure intensifiers serve to generate secondary pressure in a pressure chamber, which is acted upon by the extending piston rod of a hydraulic cylinder. The area ratio results in a pressure intensification factor.

Operation
Hydraulic Cylinders and Pressure Intensifiers

⚠ DANGER!	**Danger to life due to defective product!** → Ensure that no hazards to persons and property arise in the event of a defect in a Hänchen product or its components. If a Hänchen product or its components are not functioning correctly: → Immediately take the Hänchen product out of service. → Secure the Hänchen product against unauthorised use
⚠ DANGER!	**Danger to life due to movement of the hydraulic cylinder!** → Ensure that mechanical movements of the hydraulic cylinder (e.g., extending the piston rod), whether intended or unintended, do not lead to situations endangering persons. → Consider influences from accelerating, braking, or lifting/holding of mass.
⚠ DANGER!	**Danger to life due to high pressure!** → Ensure that the working temperature range does not exceed the specified limits of the hydraulic system and all components. → Operate the hydraulic system exclusively with fully connected hydraulic and electrical lines. → Inspect hydraulic supply lines and pipe connections at regular intervals, adapted to the operating conditions. → Replace damaged pipe connections.
⚠ CAUTION!	**Risk of burns from hot surfaces!** → Only touch the surface of the hydraulic cylinder with protective gloves.
NOTE	**Damage due to high side loads with long strokes in horizontal or inclined installation!** → Mount the cylinder with its weight relieved.

→ When operating the hydraulic plant in which the hydraulic cylinders or pressure intensifiers are used, observe the following conditions.

Operating conditions

→ Unless otherwise specified, observe the following operating conditions:
- Operation with hydraulic oils according to DIN 51524 with ISO VG 32 to VG 68
- Use in temperate climate zones
- Use in covered areas
- relative humidity < 70%
- Ambient temperature -15 °C to +80 °C
- Working temperatures for sealing elements: -15 °C to +80 °C

If other fluids (e.g., water, water emulsions, fire-resistant fluids or others) are used or other ambient or working temperatures are expected:

→ Coordinate the use of the hydraulic cylinders or pressure intensifiers under the modified operating conditions with Hänchen.

Recommended cleanliness classes according to ISO 4406:

→ for hydraulic cylinders or pressure intensifiers with standard sealing elements (cylinders with lip seal and wiper ring): cleanliness class 19/16/13.

→ for hydraulic cylinders or pressure intensifiers with gap seals, for example, the Servofloat® or Servobear® versions: cleanliness class 16/13/10.

Before start-up of the Hänchen product: Flush the plant and filter the fluid.

Potential hazards

→ If possible, take suitable constructive measures to prevent burns.

→ Potential pinch and clamping points should be secured by design on the operator's side, where possible.

→ Guards must be designed according to the requirements of EN ISO 14120.

Unexpected start-up

→ Prevent malfunctions or unexpected startup in the event of a control system error through circuit design, e.g., by using suitable hardware.

→ Ensure a controlled restart in the event of a defective output from the plant control system.

→ Ensure that the plant control system awaits enablement in the event of an unexpected startup.

Uncontrolled movement, blockage of the piston rod

→ Take appropriate measures to prevent uncontrolled, jerky movements or blocking of the piston rod in the event of a defective control or regulation system.

→ Take appropriate measures to prevent uncontrolled movements or incorrect feedback in the event of a breakage of control lines from sensors or valves.

→ Ensure that all outputs are de-energized in the event of a power failure.

Emergency stop

→ Implement appropriate measures within the hydraulic system's emergency switch-off or emergency stop system to prevent hazards posed by the hydraulic cylinder.

Pressure rating

→ Design all parts of the hydraulic system and the hydraulic cylinder or pressure intensifier to withstand pressures that
- are higher than the maximum working pressure of the hydraulic system or a component.
- exceed the rated pressure of the hydraulic system or a component.

→ Ensure that pressure surges and pressure fluctuations do not cause hazards.

Pressure loss

→ Ensure that pressure loss or a critical lowering/sinking of the pressure does not pose a hazard to personnel or damage the machine.

Pressure fluctuations

→ Avoid pressure fluctuations that lead to exceeding the rated pressures by implementing suitable measures.

Mountings

→ Design the mounting of the hydraulic cylinders or pressure intensifiers such that
- excessive deformation of the hydraulic cylinder or pressure intensifier due to compressive or tensile load is avoided.
- the introduction of side or bending loads is minimized.
- only the maximum permissible, specified side loads act on the piston rod.
- the load acts axially on the axis of the cylinder's piston rod.

→ Design the mounting surfaces such that twisting of the hydraulic cylinder or pressure intensifier is avoided when installed.

→ Design and install mounting screws for hydraulic cylinders or pressure intensifiers and accessories such that they absorb all foreseeable forces.

→ Ensure that mounting screws absorb the tilting moments.

→ Consider the maximum expected loads and pressure peaks.

→ If the hydraulic cylinder or pressure intensifier is used as an end stop, design the mounting components such that all occurring loads are absorbed without damage.

→ Avoid stressing the hydraulic cylinder or pressure intensifier due to mounting surfaces.
→ Consider pressure and temperature expansions.
→ For pivoted mounting that requires continuous external lubrication: Minimize pivoting speeds.

Accessories, End Stops

→ Secure all components attached to or connected with the hydraulic cylinder or pressure intensifier in such a way that loosening due to impacts or vibrations during operation is prevented.
→ Prevent the loosening of adjustable external or internal stroke end stops through design measures.

When using internal cushioning:

→ Consider the effects of mass deceleration during design and operation.

Buckling Resistance

→ Ensure the buckling resistance of the hydraulic cylinder for every stroke position.

Here you will find information on the **+calculation of buckling resistance** and **+buckling cases**

Wear, Corrosion, Damage

→ Protect piston rods against foreseeable damage (e.g., notches, scratches, corrosion).

Accessibility

→ Ensure that the hydraulic cylinder or pressure intensifier and accessories are easily accessible for maintenance and adjustment purposes, and that safe adjustment and maintenance are possible.
→ Consider the adjustment of the cushioning devices and the complete replacement of the hydraulic cylinder or pressure intensifier.

Noise Emissions

→ Minimize noise emissions through suitable measures.
Observe airborne, structure-borne, and fluid noise.

Installation
Hydraulic cylinder and pressure intensifier

Before installation into the machine:

→ Inspect the delivery for completeness and damage.

The scope of delivery includes the Hänchen product as ordered by the customer according to the order specifications and confirmed in the order confirmation.

→ Remove any sealing plugs or cover plates attached for protection against contamination during transport before assembly.

⚠ DANGER!	**Risk of fatal injury due to improper assembly!** → Ensure that assembly is carried out exclusively by trained specialist personnel or certified hydraulic specialists.
⚠ DANGER!	**Danger to life due to high pressure!** → Only loosen screw connections and hydraulic lines when depressurized.
⚠ CAUTION!	**Risk of injury due to sharp edges and corners!** → Wear personal protective equipment during all assembly work.
NOTE	**Damage to the piston rod guide, the piston rod, and in the cylinder tube!** During assembly and operation: → Ensure that the permissible side loads on the piston rod are not exceeded.
NOTE	**Property damage due to insufficient venting!** → For correct and easy venting, install hydraulic cylinders such that the venting ports are at the top. → Ensure that air discharge openings of cylinders with air-filled chambers are arranged in such a way that hazards are avoided. → Ensure that trapped air is expelled without hazards.

For cylinders with rigid mounting, such as side lugs mounting:

→ Install cylinders free of stress.

For long cylinders:

→ Observe thermal and expansion joints at the mounting elements.

For cylinders with movable mounting:

→ Ensure that sufficient space is available between the spherical rod eye and clevis, clevis bracket or similar for pivoting and tilting.

When counter-holding the piston rod:

→ Avoid damage to the rod surface.

→ Preferably use hook wrenches according to DIN 1810 with a round pin or open-end wrenches.

ⓘ The pressure ports are, unless otherwise specified in engineering drawings, designed for commercially available screw connections according to DIN 3852 – Part 2, Forms A and B.

ⓘ Hänchen recommends the use of screw-in studs with soft seals.

→ For mounting the cylinder and its accessories, use cylinder head screws with a minimum strength of 10.9.
→ Observe tightening torques according to VDI 2230 for a friction coefficient μ = 0.14.

Thread size	Tightening torque M_A	Thread size	Tightening torque M_A
M5	9.5 Nm	M12	137 Nm
M6	16.5 Nm	M16	338 Nm
M8	40 Nm	M20	661 Nm
M10	79 Nm	M24	1136 Nm

Tightening torque according to VDI 2230 with minimum strength 10.9

→ Observe tightening torques for screw connections and banjo bolts.

Thread size	Screw connection with external thread	Swivel screw connection and banjo bolts
G ⅛	18	18
G ¼	35	45
G ⅜	70	70
G ½	90	120
G ¾	180	230
G 1	310	320
G 1¼	450	540
G 1½	540	700

Tightening torques for screw connections and banjo bolts

+ Venting

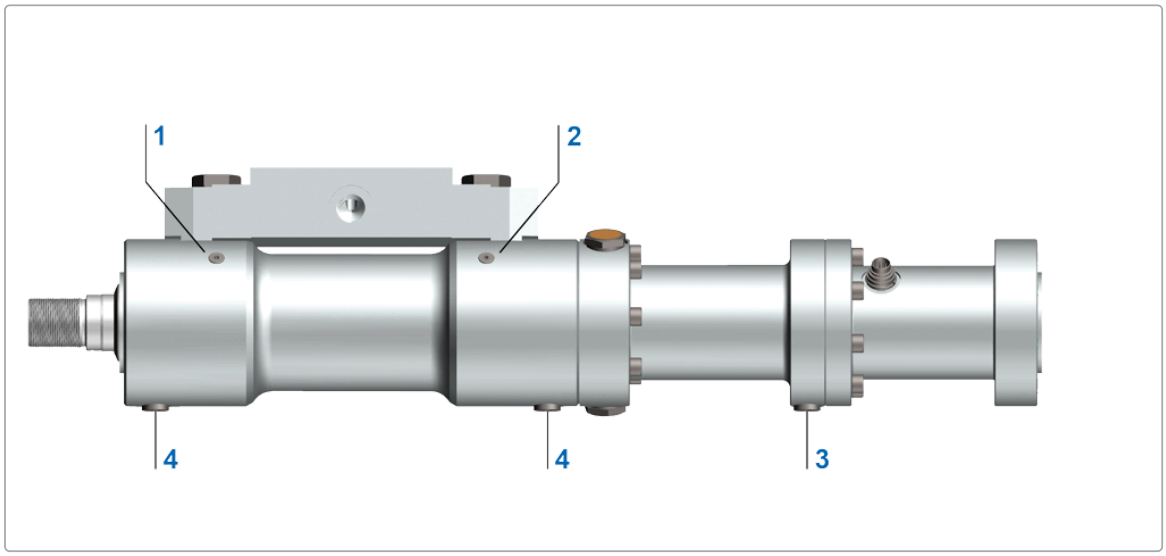
Hydraulic cylinders and pressure intensifiers are typically supplied with venting screws on both sides. The vent bores are suitable for measuring coupling ports.

Easy and clean venting via hoses is possible using a measuring coupling.



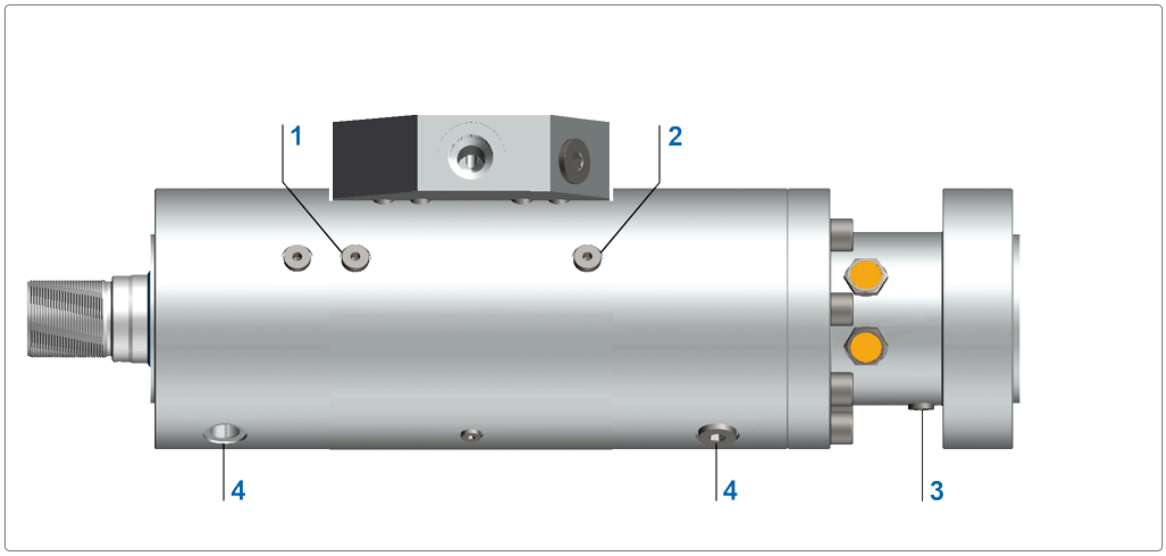
Identification of Venting ports on the product

→ Vent hydraulic cylinders or pressure intensifiers before start-up.



Venting and measuring ports for cylinder sealing systems Servocop® or Servoseal®

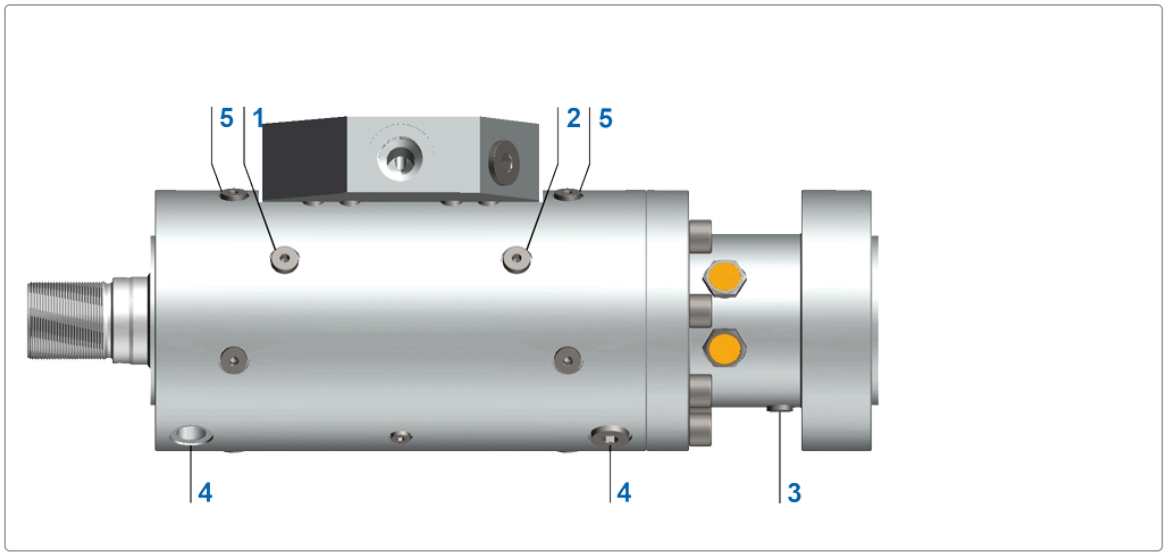
1. Venting and measuring port head side
2. Venting and measuring port cap side
3. Leak oil port protection tube
4. Leak oil port



Venting and measuring ports for cylinder sealing system Servofloat®

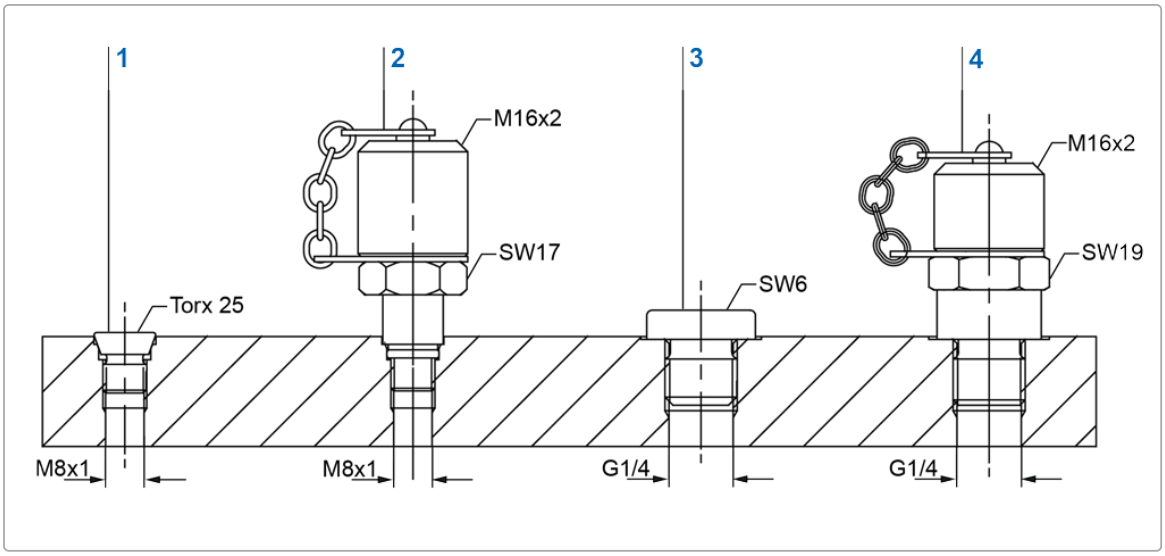
1. Venting and measuring port head side
2. Venting and measuring port cap side
3. Leak oil port protection tube
4. Functional oil port*

* For series 320, functional oil collection port



Venting and measuring ports cylinder sealing system Servobear®

1. Venting and measuring port head side
2. Venting and measuring port cap side
3. Leak oil port protection tube
4. Functional oil port
5. Measuring port hydrostatic pockets (4x)



Venting port tightening torques

1. Venting screw (tightening torque 16 Nm)
2. Measuring coupling (tightening torque 7 Nm)
3. Venting screw (tightening torque 45 Nm)
4. Measuring coupling (tightening torque 40 Nm)

Venting without Hänchen venting set
Free air in the hydraulic cylinder affects the physical properties of the hydraulic oil and has further detrimental effects on the components, operational behavior, and the fluid.

Perform venting without the Hänchen venting set as follows:
→ Ensure that the venting screws are located at the highest point of the cylinder.
→ Ensure that the relevant cylinder chamber is under low pressure (approx. 20 bar to 50 bar).
→ Open the venting screw by approximately one to two turns.

DANGER!	**Danger to life due to pressurised fluid!** → Ensure that the venting screw is not unscrewed too far.

The venting screw is designed such that air and oil can escape without completely removing it.

When bubble-free oil emerges from the gap:
→ Tighten the screw again.
→ Observe the tightening torque.

If there is still air in the cylinder:
→ Repeat the venting process until there is no more air in the cylinder.

After complete venting:
→ Slowly extend and retract the cylinder three to five times at no-load and low pressure.

Venting with Hänchen Venting Set
With the Hänchen venting set, a hydraulic cylinder can be vented cleanly and conveniently without additional tools.

Perform venting with the Hänchen venting set as follows:
→ Screw measuring couplings into the venting ports.
→ Ensure that the venting screws are located at the highest point of the cylinder.
→ Ensure that the relevant cylinder chamber is under low pressure (approx. 20 bar to 50 bar).
→ Screw the venting set onto the measuring coupling.

When bubble-free oil flows into the bottle of the venting set:
→ Remove the venting set from the measuring coupling.

If there is still air in the cylinder:
→ Repeat the venting process until there is no more air in the cylinder.

After complete venting:

→ Slowly extend and retract the cylinder three to five times at no-load and low pressure.

The +venting set is available as tools.

+ Flushing the lines

→ Position flushing plates for the flushing process as close as possible to the consumer (e.g., hydraulic cylinder, valve).

→ Connect P and T lines.

→ Ensure that consumers are not filled during the flushing process.

The duration of the flushing process depends on the size of the system (duration: one hour to several days).

+ Mount accessories

For piston rods up to 25 mm diameter (with internal thread), the screwed-in mounting components such as rod eye plains, rod balls, rod clevises, etc., are secured with adhesive.

For piston rods from 30 mm diameter, the screwed-in mounting components are secured with a radial threaded pin.

NOTE	**Damage to the seal due to heat!** → Fully extend the piston rod to avoid damage to the seals in the cover.

For disassembling a mounting component secured with adhesive:

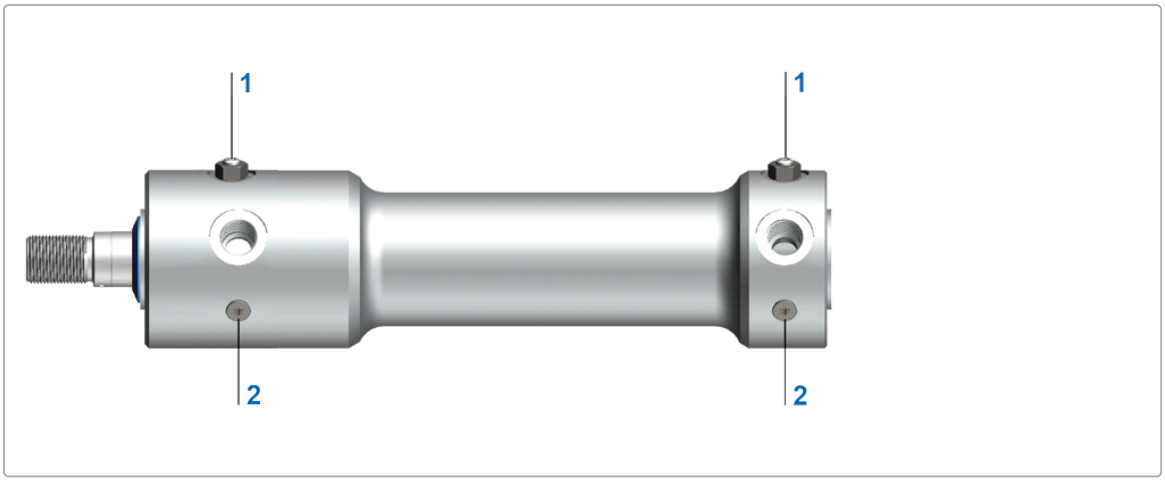
→ Heat the piston rod in the area of the screw-in depth to approx. 150 °C to loosen the adhesive.

When attaching a mounting component:

→ Secure the mounting component with a suitable thread-locking adhesive.

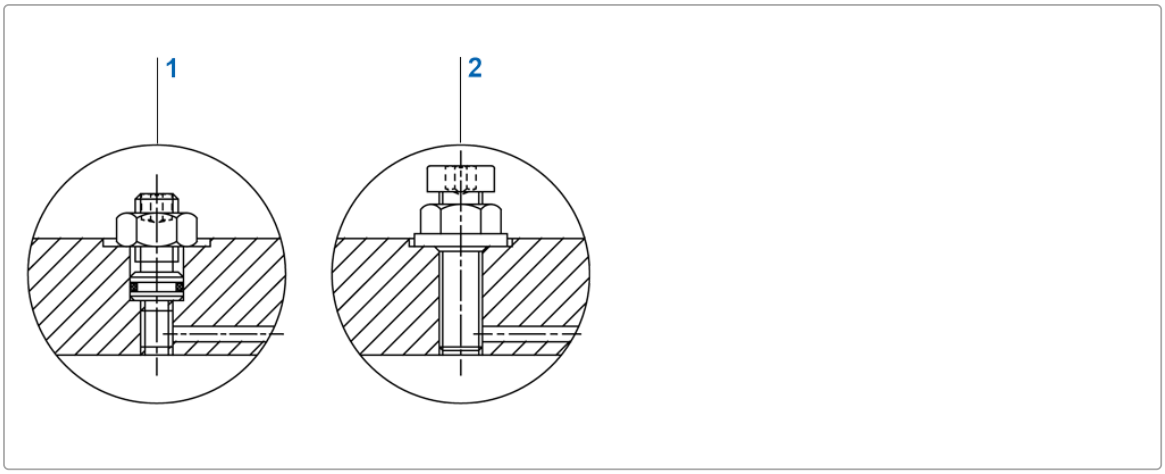
NOTE	**Damage to spherical plain bearing or bearing bush due to incorrect assembly!** → Support the spherical plain bearing or plain bearing bush at the inner ring during pressing. → Observe lubrication regulations. → Observe notes for adjustable spherical plain bearings.

+ Cushioning



Adjust cushioning

1. Cushioning adjusting screw **2.** Venting screw



Versions of cushioning adjusting screw

1. Adjusting screw Version A **2.** Adjusting screw Version B

Adjust hydraulic cylinder or pressure intensifier with adjustable cushioning as follows:
To increase cushioning effect:

→ Turn the adjusting screw to the right.
→ Secure the adjusting screw with the lock nut.

To reduce cushioning effect:

→ Turn the adjusting screw to the left.
→ Secure the adjusting screw with the lock nut.

Precise adjustment of the cushioning is only possible during operation.

DANGER!	**Danger to life due to pressurised fluid!** → Ensure that the adjusting screw is not unscrewed too far.

Check maximum unscrewing as follows:

→ Turn the adjusting screw in until it stops.
→ When the hydraulic cylinder enters the cushioning range: Loosen the adjusting screw by one turn at a time until the cushioning effect decreases.
→ If the hydraulic cylinder reaches its end position without cushioning, turn the adjusting screw a maximum of 2 to 3 turns further.

+ Proximity switch

NOTE	**Damage due to improper use of the proximity switch!** → Use pressure-resistant, inductive proximity switches exclusively for non-contact position sensing. Screwing in the proximity switch too deeply leads to mechanical destruction.

NOTE	**Damage to the Hänchen product due to unsuitable proximity switches!** → Only use proximity switches supplied by Hänchen.

Mount the proximity switch as follows:

→ Lubricate the o-ring and back-up ring (e.g., with operating fluid).
→ Screw the proximity switch into the designated screw-in thread on the Hänchen product.
→ Unless otherwise specified, screw in the proximity switch until it reaches the mechanical stop, then turn it back by ¼ turn.
→ Tighten the lock nut of the proximity switch with a maximum of 15 Nm, unless otherwise specified by the manufacturer.

By changing the screw-in depth of the proximity switch, it is possible to adjust the switching point.

+ Start-up
Hydraulic cylinders and pressure intensifiers

⚠ DANGER!	**Danger to life due to improper start-up!** → Ensure that the start-up is carried out exclusively and properly by trained specialist personnel or certified hydraulic specialists.

⚠ DANGER!	**Danger to life due to high pressure!** → Only start up the machine or partly completed machine, in which Hänchen products are installed, when the machine or partly completed machine complies with the provisions of the Machinery Directive. → Only start up the hydraulic system with fully connected hydraulic and electrical lines.

⚠ DANGER!	**Risk of injury due to malfunction or unexpected start-up!** Before start-up: → Check the correct port. → Check the correct feedback of the drive position.

NOTE	**Assembly grease on the piston rod!** → Wipe off any extruded assembly grease from the piston rod after the first few operating hours.

Before the start-up of the hydraulic cylinder or pressure intensifier:

→ Ensure that the maximum pressure specified on the type plate is not exceeded, even during pressure peaks.

→ Observe permissible values on engineering drawings and documentation, especially for:

- Compressive and retracting forces
- Temperature range
- Buckling resistance
- Piston speed

→ Completely remove preservative.

→ Ensure that sealing elements are not stuck by preservative.

NOTE	**Malfunctions and vibrations due to incorrectly set accumulator pressure!** → Adjust the nitrogen preload at the accumulator's filling port to achieve smooth cylinder operation.

Leak oil and functional oil drainage

For corresponding images, see **+Hydraulic cylinder - Operation**, section "Venting".

→ Drain any accumulating leak and functional oil from the corresponding ports (4) unpressurised up to max. 5 bar.

→ Do not extract leak and functional oil with vacuum.

→ Connect the leak oil port of the protection tube (3) depressurized.

+ Additional information for the start-up of hydraulic cylinders with Servofloat® sealing system.

No external pressure supply is required for the operation of the floating gap seal.

Supply pressure
p_{min} = 50 bar
p_{max} = according to type plate

+ Additional information for the start-up of hydraulic cylinders with Servobear® guiding system.

For internal bearing pressure supply (standard):

- The hydrostatic bearing is supplied internally through channels in the cylinder.
- System pressure before the servo valve
  p_{min} = 140 bar
  p_{max} = according to type plate

For external bearing pressure supply (non-standard):

→ Connect the hydrostatic bearing pressure to the threaded ports provided on the cylinder (see corresponding documentation).

NOTE	**Damage to the piston rod and hydrostatic bearing due to misalignment!** → During the alignment of the piston rod to the machine during start-up, the hydrostatic bearing must be in operation.

Decommissioning: Disassembly, Return, Disposal
Hydraulic cylinders and pressure intensifiers

Disassembly

DANGER!	**Risk of fatal injury due to improper decommissioning!** → Ensure that decommissioning is carried out exclusively and properly by trained specialist personnel or certified hydraulic specialists.

DANGER!	**Danger to life due to high pressure!** → Only loosen screw connections and hydraulic lines when depressurized.

CAUTION!	**Risk of burns from hot surfaces!** → Only touch the surface of the hydraulic cylinder with protective gloves.

Returns

To subject hydraulic cylinders and pressure intensifiers to maintenance at the manufacturer's plant, they must be returned in packaging protected against environmental influences.

→ Ship hydraulic cylinder as a whole.
→ Close hydraulic ports to protect against contamination and oil leakage.
→ Secure the piston rod against extending.
→ Ship the hydraulic cylinder in suitable packaging.

Disposal

NOTE	**Environmental pollution and risk of slipping due to leaking hydraulic oil!** → Collect or contain any leaking hydraulic oil in a suitable container. → Dispose of any leaking hydraulic oil in an environmentally sound manner.

→ Dispose of packaging and replaced parts in accordance with the regulations of the country in which the Hänchen product was installed.
→ Dispose of Hänchen products according to national regulations.
→ Dispose of cylinders only in a disassembled state.

Maintenance
Hydraulic Cylinders and Pressure Intensifiers

DANGER!	**Risk of fatal injury due to improper decommissioning!** → Ensure that decommissioning is carried out exclusively and properly by trained specialist personnel or certified hydraulic specialists.
WARNING	**Danger to life due to high pressure!** → Before disassembly, ensure that the hydraulic cylinder is depressurized.
NOTE	**Damage due to improper handling!** → Use handling equipment adapted to the weight of the component. → Do not lift the cylinder by the piston rod or other sensitive parts such as sensors, valves or piping.
NOTE	**Environmental pollution and risk of slipping due to leaking hydraulic oil** → Collect or contain any leaking hydraulic oil in a suitable container. → Dispose of any leaking hydraulic oil in an environmentally sound manner.

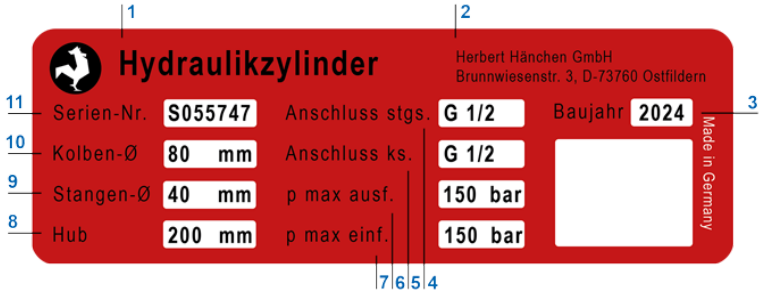
Depending on the application, but at least once a year:
→ Inspect hydraulic cylinders and pressure intensifiers for damage.
→ Inspect hydraulic cylinders and pressure intensifiers for wear.
→ Replace damaged or worn components.

Product Identification

By providing the serial number, embossed on the product and type plate, we can process your inquiry quickly. Even after 50 years!

For spare part orders:
→ Provide the 7-digit serial number - see type plate.
→ For older products (before 05/2010), please provide the 6-digit order or commission number.

If the data on the type plate is no longer legible:
- The serial number on the hydraulic cylinder is engraved next to the head side port.
- the serial number is indicated in the order confirmation, the shipping documents and the invoice.



Example Hydraulic Cylinder Type Plate

1. Product Designation
2. Company Address
6. Max. permissible pressure extended
7. Max. permissible pressure retracted

3. Year of Manufacture
4. Head side port
5. Cap side port
8. Stroke
9. Rod diameter
10. Bore
11. Serial number

+ Structural design

Depending on the design and size of the Hänchen hydraulic cylinder, there are differences in the structural design. The cylinders are equipped:

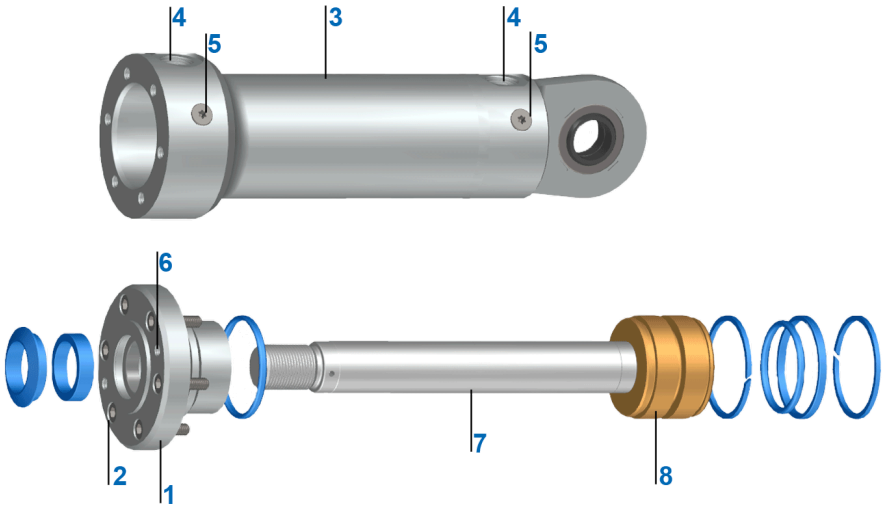
- with head side cover for standard cylinders DIN/ISO.
- with head side guide bushing for large cylinders.

Large cylinders include hydraulic cylinders of series 120 from 200 mm bore and hydraulic cylinders of series 300 from 160 mm bore.

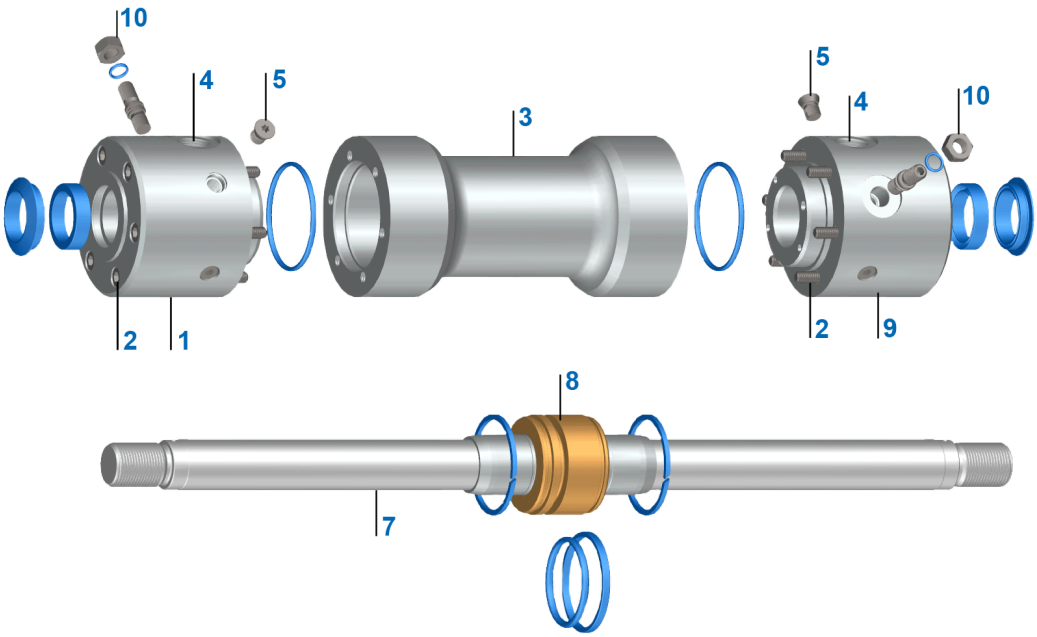
→ Custom cylinders can be completely individual. Please refer to the relevant documentation (engineering drawing) for this.

Disassembly and assembly
Hydraulic cylinder with cover

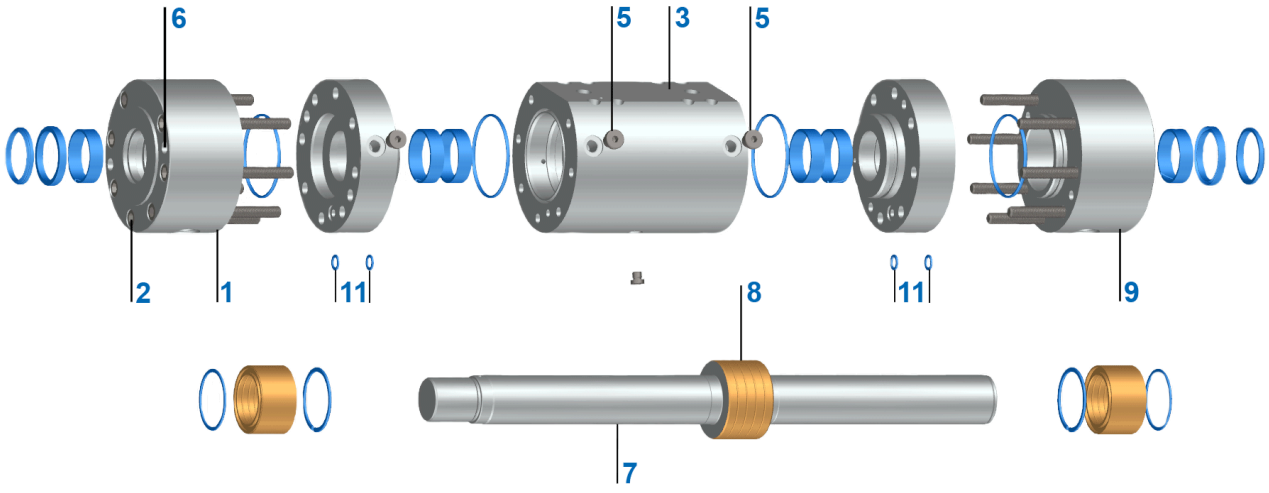
Hydraulic cylinders with a cover have screws distributed around the circumference for mounting the cover in the cylinder tube.



Design of single-rod cylinder (without cushioning)



Design of a double-rod cylinder (with cushioning)



Design of series 320 test actuator (with Servofloat®)

1. Head side cover
2. Mounting screw
3. Cylinder tube
4. Port
5. Venting screw
6. Pull-out thread
7. Piston rod
8. Piston
9. Cap side cover
10. Cushioning screw
11. Flange seal

+ Disassembling a hydraulic cylinder with a cover

General information

→ To avoid a vacuum in the cylinder, Hänchen recommends opening the ports or venting screws of the cylinder for disassembly.

→ Drain as much of the hydraulic fluid remaining in the cylinder as possible.

For cylinders with a position transducer, remove it before cylinder disassembly. Maintenance work on the position transducer is described in the section +Maintenance Product with Position Transducer.

Disassembly of the cover

→ Loosen and unscrew the mounting screws [2] crosswise from the head-side or cap-side cover [1 or 9].
→ Screw two mounting screws evenly into the pull-out thread bores [6].
→ Carefully pull the cover [1 or 9] over the piston rod.
→ Pull the piston rod [7] out of the cylinder tube.

+ Assembling a hydraulic cylinder with a cover

Assembly of the cover

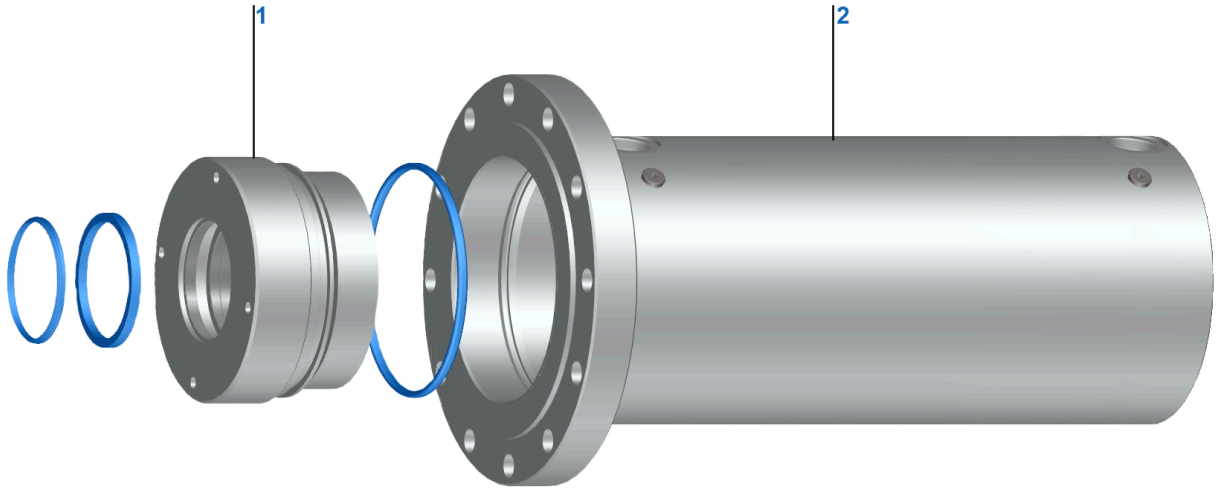
NOTE	**Damage caused by misalignment in double-rod cylinders** → Before tightening the screws, push the piston rod into the end position.

→ Moisten the piston [8] and cylinder tube [3] with operating fluid or use compatible assembly grease.
→ Position the piston rod [7] with the piston on the inside diameter of the cylinder tube.
→ Shape the wear rings and insert them into the groove (if the piston is equipped with wear rings).
→ Insert the piston rod into the cylinder tube and push it to the end stop.
→ Insert flange seals [11] - for series 320 - between the covers and the cylinder tube.
→ Carefully slide the cover [1 or 9] onto the piston rod.
→ Tighten mounting screws [2] crosswise. Observe tightening torques - see +Hydraulic cylinder - Operation.

A special feature of hydraulic cylinders with multi-part covers, e.g. with Servofloat® or Servoseal®: The individual cover parts are assembled and disassembled one after the other, in the same way as cylinders with a one-piece cover.

+ Disassembly and assembly
Hydraulic cylinder with guide bushing

Hydraulic cylinders with guide bushing have a thread for mounting the guide bushing in the cylinder tube.



Design of single-rod cylinder with guide bushing

1. Guide bushing
2. Cylinder tube

+ Dismantling hydraulic cylinder with guide bushing
General information

→ To avoid a vacuum in the cylinder, Hänchen recommends opening the ports or venting screws of the cylinder for disassembly.
→ Drain as much of the hydraulic fluid remaining in the cylinder as possible.

For cylinders with a position transducer, remove it before cylinder disassembly. Maintenance work on the position transducer is described in the section **+Maintenance Product with Position Transducer**.

Dismantling guide bushing

→ Loosen guide bushing [1] with a suitable pin wrench via the face-side holes and unscrew it.
→ Carefully pull the guide bushing over the piston rod.
→ Pull the piston rod out of the cylinder tube.

+ Assembling hydraulic cylinder with guide bushing
Assembling guide bushing

→ Moisten the piston and cylinder tube [2] with hydraulic fluid or use compatible assembly grease.
→ Position the piston rod with the piston on the inside diameter of the cylinder tube.
→ Shape the wear rings and insert them into the groove (if the piston is equipped with wear rings).
→ Insert the piston rod into the cylinder tube and push it to the end stop.

→ Carefully slide the guide bushing [1] onto the piston rod.
→ Screw the guide bushing into the cylinder tube.
→ Tighten the guide bushing with a suitable pin wrench.

Replacing seals
General information

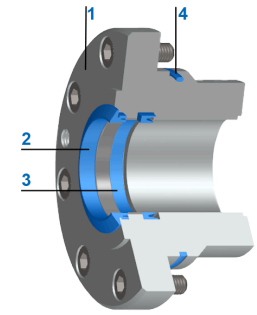
Please note the general information on dismantling and assembling hydraulic cylinders under section **+Disassembly and assembly cover**

NOTE	**Damage caused by improper tools** → Disassemble the sealing elements exclusively with suitable tools. → Avoid damage to the groove base and the workpiece edges. → Avoid damage to the new sealing elements. → Avoid damage to the guide and sliding surfaces.

NOTE	**Damage to the sealing lips on the cover due to sharp-edged rod ends such as thread flanks or wrench flats!** → Carefully slide the cover over the piston rod end.

To avoid damage to the sealing elements caused by unsuitable tools, we recommend using Hänchen **+assembly tool**.

Seal replacement basic design for cover and guide bushing





1. Cover
2. Wiper ring
3. Lip seal
4. O-ring

Disassembly of sealing elements basic design

TIP: Place disassembled parts and seals in the same order and orientation as they were installed.

Carefully pierce the successive seals with a pointed tool, tilt them out of the groove and remove:

- Wiper ring [2]
- Lip seal [3]
- O-ring [4]
- Wear rings - if present

Note

- Non-replaceable guides (Servoslide® synthetic guide) must not be treated with sandpaper or similar materials.
- If necessary, smooth metallic guides with fine sandpaper.

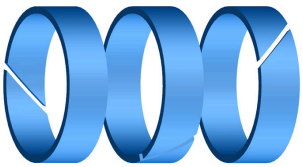
Assembly of sealing elements basic design

- Compress the lip seal [3], place it on one side into the groove of the cover and press it in.
- Note the correct installation position (the groove of the sealing ring must face inwards, towards the pressure side).
- Compress the wiper ring [2], insert it on one side into the groove and press it in.
- Note the correct installation position (sealing lip must point outwards).
- Slide the O-ring [4] over the rear outside diameter of the cover [1] and press it into the groove.
- Ensure that the o-ring is not twisted.

Note

- Ensure that installation spaces and sealing elements are clean and undamaged.
- For easier assembly: Moisten seals with functional fluid or use compatible assembly grease, warm up if necessary (max. +35 °C).
- Pre-shape wear rings slightly and insert them into the groove.

→ When installing several wear rings one behind the other, make sure that the joints of the wear rings are offset from each other.



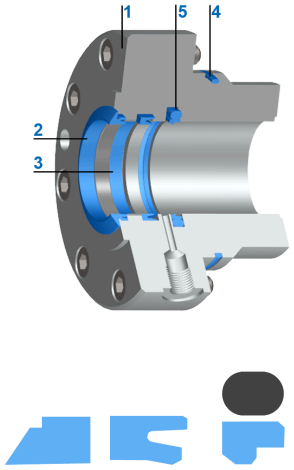
+ Video: Replacing seals for hydraulic cylinders Servocop® cover and basic design

Watch our tutorial on replacing the seals on a Hänchen hydraulic cylinder with Servocop® cover or with basic design. A step-by-step guide with helpful information on how to quickly and easily replace the seals.



+ Video link: Replacing seals on Servocop® and basic design

Servocop® seal replacement for cover and guide bushing



1. Cover
2. Wiper ring
3. Lip seal
4. O-ring
5. Compact seal with o-ring

Disassembly of Servocop® sealing elements

TIP: Place disassembled parts and seals in the same order and orientation as they were installed.

Carefully pierce the successive seals with a pointed tool, tilt them out of the groove and remove:

- Wiper ring [2]
- Lip seal [3]
- O-ring [4]
- Compact seal with o-ring [5]
- Wear rings - if present

Note

- Non-replaceable guides (Servoslide® synthetic guide) must not be treated with sandpaper or similar materials.
- If necessary, smooth metallic guides with fine sandpaper.

Assembly of Servocop® sealing elements

- Compress the o-ring of the compact seal [5] and press it into the groove of the cover [1].
- Compress the compact seal [5] into a kidney shape and insert it into the groove closer to the piston chamber.
- Press on the compact seal and recalibrate.
- Compress the lip seal [3], place it on one side in the groove and press it in.
- Note the correct installation position (the groove of the sealing ring must face inwards, towards the pressure side).
- Compress the wiper ring [2], insert it on one side into the groove and press it in.
- Note the correct installation position (sealing lip must point outwards).
- Slide the o-ring [4] over the rear outer diameter of the cover [1] and press it into the groove.

→ Ensure that the O-ring is not twisted.

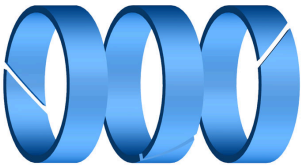
Note

→ Ensure that installation spaces and sealing elements are clean and undamaged.

→ For easier assembly: Moisten seals with functional fluid or use compatible assembly grease, warm up if necessary (max. +35 °C).

→ Pre-shape wear rings slightly and insert them into the groove.

→ When installing several wear rings one behind the other, make sure that the joints of the wear rings are offset from each other.



+ Video: Replacing seals for hydraulic cylinders Servocop® cover and basic design

Watch our tutorial on replacing the seals on a Hänchen hydraulic cylinder with Servocop® cover or with basic design. A step-by-step guide with helpful information on how to quickly and easily replace the seals.

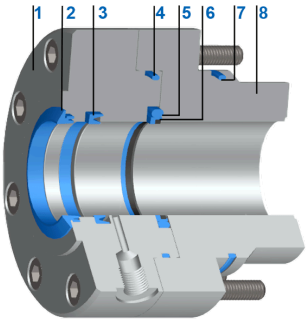


+ Video link: Seal replacement Servocop® and basic design

+ Servoseal® seal replacement for cover

In hydraulic cylinders with a Servoseal® sealing system, there are constructive differences in the guiding system depending on the pressure series and design:

- Double-rod cylinders of the 320 series are equipped with wear rings.
- Double-rod and single-rod cylinders in series 120 and 300 are equipped with the synthetic guide Servoslide®, wear rings or metallic *a* guide.





1. Cover 1
2. Wiper ring
3. Lip seal
4. O-ring cover 1
5. O-ring Servoseal
6. Servoseal
7. O-ring cover 2
8. Cover 2

+ Disassembly of Servoseal® sealing elements

TIP: Place disassembled parts and seals in the same order and orientation as they were installed.

Carefully pierce the successive seals with a pointed tool, tilt them out of the groove and remove:

→ Wiper ring [2]
→ Lip seal [3]
→ O-rings [4, 7]
→ Servoseal [6] with o-ring [5]
→ Wear rings - if present

Note

→ Non-replaceable guides (Servoslide® synthetic guide) must not be treated with sandpaper or similar materials.
→ If necessary, smooth metallic guides with fine sandpaper.

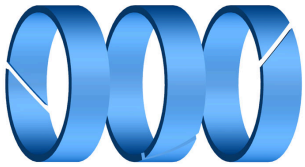
+ Installation of Servoseal® sealing elements

→ Compress the lip seal [3], place it on one side into the groove of the cover [1] and press it in.
→ Note the correct installation position (the groove of the sealing ring must face inwards, towards the pressure side).
→ Compress the wiper ring [2], insert it on one side into the groove and press it in.
→ Note the correct installation position (sealing lip must point outwards).

→ Slide the o-ring [4 + 7] over the rear outer diameter of the cover [1 + 8] and press it into the groove.
→ Ensure that the O-ring is not twisted.
→ Press o-ring [5] into groove of Servoseal [6].
→ Press Servoseal [6] into cover 1 [1].

Note

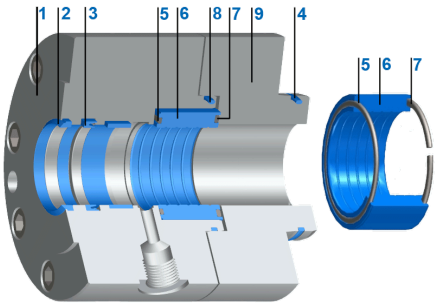
→ Ensure that installation spaces and sealing elements are clean and undamaged.
→ For easier assembly: Moisten seals with functional fluid or use compatible assembly grease, warm up if necessary (max. +35 °C).
→ Pre-shape wear rings slightly and insert them into the groove.
→ When installing several wear rings one behind the other, make sure that the joints of the wear rings are offset from each other.



Servofloat® seal replacement for cover

In hydraulic cylinders with Servofloat® sealing system, there are design differences in the guiding system depending on the pressure series and configuration:

- Double-rod cylinders of the 320 series are equipped with wear rings.
- Double-rod and single-rod cylinders in series 120 and 300 are equipped with the synthetic guide Servoslide®, wear rings or metallic *a* guide.





1. Cover 1
2. Wiper ring
3. Lip seal
4. O-ring cover 2
5. O-ring
6. Floating gap seal
7. O-ring slotted
8. O-ring cover 1
9. Cover 2

Disassembly of Servofloat® sealing elements

TIP: Place disassembled parts and seals in the same order and orientation as they were installed.

Carefully pierce the successive seals with a pointed tool, tilt them out of the groove and remove:

→ Wiper ring [2]
→ Lip seal [3]
→ O-rings [5, 7, 8, 4]
→ Floating gap seal [6]
→ Wear rings - if present

Note

→ Non-replaceable guides (Servoslide® synthetic guide) must not be treated with sandpaper or similar materials.
→ If necessary, smooth metallic guides with fine sandpaper.

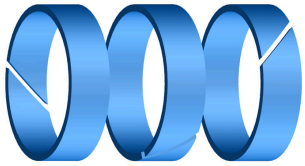
Assembly of Servofloat® sealing elements

→ Compress the lip seal [3], place it on one side into the groove of the cover [1] and press it in.
→ Note the correct installation position (the groove of the sealing ring must face inwards, towards the pressure side).
→ Compress the wiper ring [2], insert it on one side into the groove and press it in.
→ Note the correct installation position (sealing lip must point outwards).

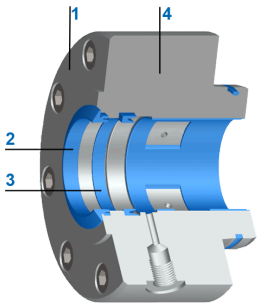
→ Slide the o-ring [4 + 8] over the rear outer diameter of the cover [1 + 9] and press it into the groove.
→ Ensure that the O-ring is not twisted.
→ Insert the o-ring [5] into the inner groove in the floating gap seal [6].
→ Insert the slotted o-ring [7] onto the face side with the centrally located groove in the floating gap seal [6]. If this is not slotted: Cut the o-ring transversely and cut out a 2 to 4 mm wide piece.
→ The slotted o-ring points to the pressure chamber.
→ Mount the floating gap seal [6] with the o-rings [5 + 7] between cover 2 [9] and cover 1 [1] one after the other in the cylinder.

Note

→ Ensure that installation spaces and sealing elements are clean and undamaged.
→ For easier assembly: Moisten seals with functional fluid or use compatible assembly grease, warm up if necessary (max. +35 °C).
→ Pre-shape wear rings slightly and insert them into the groove.
→ When installing several wear rings one behind the other, make sure that the joints of the wear rings are offset from each other.



Functional oil seal replacement
for cover with hydrostatic Servobear® bearing





1. Cover
2. Wiper ring
3. Lip seal
4. O-ring

Disassembly of sealing elements functional oil seal

TIP: Place disassembled parts and seals in the same order and orientation as they were installed.

Carefully pierce the successive seals with a pointed tool, tilt them out of the groove and remove:

- → Wiper ring [2]
- → Lip seal [3]
- → O-ring [4]

Note

- → If necessary, smooth metallic guides with fine sandpaper.

Assembly of sealing elements functional oil seal

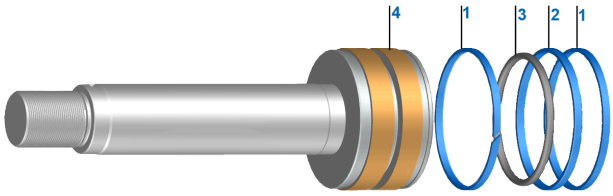
- → Compress the lip seal [3], place it on one side in the groove of the cover and press it in.
- → Note the correct installation position (the groove of the sealing ring must face inwards, towards the pressure side).
- → Compress the wiper ring [2], insert it on one side into the groove and press it in.
- → Note the correct installation position (sealing lip must point outwards).
- → Slide the O-ring [4] over the rear outside diameter of the cover [1] and press it into the groove.
- → Ensure that the O-ring is not twisted.

Note

- → Ensure that installation spaces and sealing elements are clean and undamaged.
- → For easier assembly: Moisten seals with functional fluid or use compatible assembly grease, warm up if necessary (max. +35 °C).

+ Piston seal replacement
Assembly and disassembly

Hänchen offers piston types with seals in the following designs: rectangular compact seal, rectangular compact seal with elastomer and Servoseal®. And a seal-less version: throttle gap.



Piston in design: rectangular compact seal

1. Wear ring
2. Rectangular compact seal piston
3. O-ring
4. Piston

+ Disassembly of sealing elements on the piston

TIP: Place disassembled parts and seals in the same order and orientation as they were installed.

→ Remove wear rings [1].
→ Carefully cut open the rectangular compact seal piston [2] and lever it out of the groove with a blunt tool.
→ Pierce the o-ring [3] under the rectangular compact seal [2], tilt it out of the groove and remove it.

Note

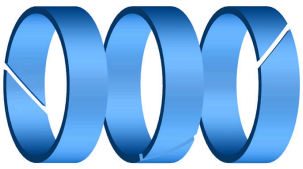
→ If necessary, smooth metallic guides with fine sandpaper.

+ Assembly of sealing elements on the piston

→ Slightly stretch the o-ring [3] and insert it into the groove in the piston.
→ Ensure that the O-ring is not twisted.
→ Expand the rectangular compact seal [2] with **+assembly sleeve and bushing (piston seal)** - or by hand - and insert it into the groove in the piston.
→ Reform the rectangular compact seal with **+assembly bushing (cylinder tube)** or with cylinder tube.
→ Insert the wear rings directly when pushing the piston into the cylinder tube - or into the assembly bushing (cylinder tube).
→ If rectangular compact seal with elastomer: Slightly stretch the elastomer sealing ring and insert it into the groove in the rectangular compact seal.
→ Make sure that the elastomer ring is not twisted.

Note

→ Ensure that installation spaces and sealing elements are clean and undamaged.
→ For easier assembly: Moisten seals with functional fluid or use compatible assembly grease, warm up if necessary (max. +35 °C).
→ When installing several wear rings one behind the other, make sure that the joints of the wear rings are offset from each other.



Intended use and function
Clamping units: Ratio-Clamp® and safety catcher

Intended Use

- The clamping unit is used for clamping rods at a standstill or for holding static loads from a standstill.
- For installation in a machine or partly completed machine in accordance with Machinery Directive 2006/42/EC.
- For installation as a mechanical holding device in injection moulding machines or hydraulic presses in accordance with the requirements of DIN EN ISO 20430 or DIN EN ISO 16092-1/-3.
- For the safety function 'holding the load' (mechanically, from a standstill) with a target PLd or PLe according to DIN EN ISO 13849-1, meeting the requirements of categories 2 or 3 (PLd) or category 4 (PLe).
- For braking, in occasional emergency situations, from motion, in the sense of an emergency stop function.
- Clamping unit exclusively
  - use for purely translatory moving rods according to the respective specification.
  - use within the specified limits.
- Follow the instructions in the documentation applicable to the product.

It is possible to mount the Ratio-Clamp® on hydraulic cylinders or operate it as a separate component.

Improper Use

- Do not use the clamping unit:
  - for regular clamping from motion, acting as a brake.
  - for clamping rotating rods or shafts.
  - for assuming a stop function, acting as a brake.

Function

Clamping unit Ratio-Clamp®

The Ratio-Clamp® operates on the principle of frictional contact. In clamping units with springs, the energy stored in the springs is redirected as force and applied for clamping. In clamping units without spring elements, hydraulic energy is redirected as force and applied for clamping.

The Ratio-Clamp® clamping unit is released by applying hydraulic pressure to the release port.

Clamping unit safety catcher

The safety catcher operates on the principle of frictional contact. The clamping segments, under spring preload, engage the rod to be clamped and secure the load. If the rod subsequently moves in the direction of the load, the clamping system self-locks, thereby building up the holding load and taking over the load.

The clamping unit safety catcher is released by applying hydraulic or pneumatic pressure at the release port, supported by a return stroke of the rod.

As a control engineering protective measure, the operator must count the clamping load changes, as the clamping unit **must be regularly inspected**.

Operation
Clamping units: Ratio-Clamp® and Safety Catcher

⚠ DANGER!	**Danger to life due to defective product!** → Ensure that no hazards to persons and property arise in the event of a defect in a Hänchen product or its components. If a Hänchen product or its components are not functioning correctly: → Immediately take the Hänchen product out of service. → Secure the Hänchen product against unauthorised use

⚠ DANGER!	**Danger to life due to high pressure!** → Ensure that the working temperature range does not exceed the specified limits of the plant and all components. → Operate the system exclusively with fully connected hydraulic/pneumatic and electrical lines. → Check hydraulic or pneumatic supply lines and pipe connections at regular intervals adapted to the operating conditions. → Replace damaged pipe connections.

→ When operating the hydraulic plant in which the clamping unit is used, observe the following conditions.

Operating conditions

→ Unless otherwise specified, observe the following operating conditions:
- Use in temperate climate zones
- Use in covered areas
- relative humidity < 70%
- Ambient temperature Ratio-Clamp® -15 °C to +80 °C
- Ambient temperature safety catcher 0 °C to +60 °C
- Working temperatures for sealing elements: -15 °C to +80 °C

If other fluids (e.g., water, water emulsions, fire-resistant fluids or others) are used or other ambient or working temperatures are expected:

→ Coordinate the use of the clamping unit under changed operating conditions with Hänchen.

Recommendation for hydraulic applications:

→ Operation with hydraulic oils according to DIN 51524 with ISO VG 32 to VG 68

→ for clamping units with standard sealing elements: cleanliness class 19/16/13 according to ISO 4406.

Recommendation for pneumatic applications:

→ Operation with compressed air according to ISO 8573-1

Before start-up of the Hänchen product: Flush the plant and filter the fluid.

Potential hazards

→ Potential pinch and clamping points should be secured by design on the operator's side, where possible.

→ Implement guards in accordance with the requirements of EN ISO 14120.

When using the clamping unit as a holding device to prevent a hazardous movement according to ISO 13849-1, in the event of a fault, the clamped rod may experience lowering/sinking due to its own weight:

→ Use the clamping unit redundantly depending on the required Performance Level.

→ Take measures to prevent the clamping unit from releasing before the load is externally held.

Unexpected start-up

→ Prevent malfunctions or unexpected startup in the event of a control system error through circuit design, e.g., by using suitable hardware.

→ Ensure a controlled restart in the event of a defective output from the plant control system.

→ Ensure that the plant control system awaits enablement in the event of an unexpected startup.

Uncontrolled movement, rod blockage

→ Take appropriate measures to prevent uncontrolled, jerky movements or blockage of the rod in case of a faulty control system.

→ Take appropriate measures to prevent uncontrolled movements or incorrect feedback in the event of a breakage of control lines from sensors or valves.

→ Ensure that all outputs are de-energized in the event of a power failure.

Emergency stop

→ In the emergency switch-off or emergency stop system of the hydraulic plant, take suitable measures to prevent hazards caused by the clamping unit.

Pressure rating

→ All parts of the hydraulic plant and the clamping unit must be designed to withstand pressures that
- are higher than the maximum working pressure of the hydraulic system or a component.
- exceed the rated pressure of the hydraulic system or a component.

→ Ensure that pressure surges and pressure fluctuations do not cause hazards.

Pressure loss

→ Ensure that pressure loss or a critical lowering/sinking of the pressure does not pose a hazard to personnel or damage the machine.

Pressure fluctuations

→ Avoid pressure fluctuations that lead to exceeding the rated pressures by implementing suitable measures.

Mountings

→ Design the mounting of the clamping unit such that
- excessive deformation of the clamping unit due to compressive or tensile load is avoided.
- the introduction of side or bending loads is minimized.
- the load acts centrally on the axis of the rod to be clamped.

→ Design and install mounting screws for the clamping unit and accessories to absorb all foreseeable forces.

→ Consider the maximum expected loads and pressure peaks.

→ Avoid stressing the clamping unit through mounting surfaces.

Buckling Resistance

→ Ensure buckling stability of the functional rod to be clamped.

Wear, Corrosion, Damage

→ Protect the functional rod against foreseeable damage (e.g., notches, scratches, corrosion).

Accessibility

→ Ensure that the clamping unit and accessories are easily accessible for maintenance and adjustment purposes, and that safe adjustment and maintenance are possible.

Limit Values

→ Observe the following limit values and tolerances according to specification or product documentation:
- max. permissible axial load (permissible holding load or permissible load)
- permissible pressures
- Condition of the **+rod to be clamped**

→ Match the driving force or load to the holding load of the clamping unit (Ratio-Clamp® or safety catcher).

Installation
Clamping unit: Ratio-Clamp®

Before installation into the machine:

→ Inspect the delivery for completeness and damage.

The scope of delivery includes the Hänchen product as ordered by the customer according to the order specifications and confirmed in the order confirmation.

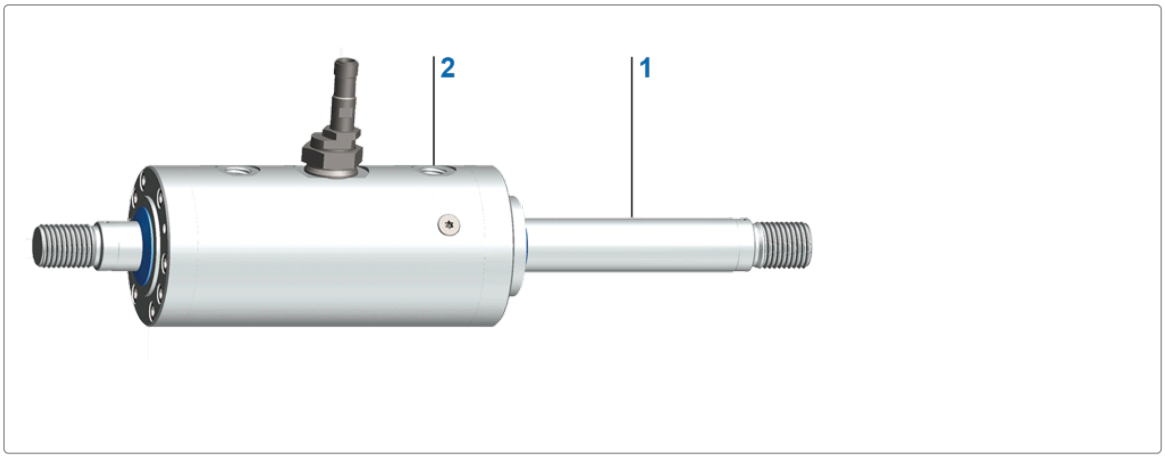
→ Remove any installed cover plugs or cover plates used for protection against contamination during transport.

DANGER!	**Danger to life due to failure of the clamping unit!** → Assemble Ratio-Clamp® according to the specification or the respective engineering drawing. → Ensure that the Ratio-Clamp® is installed without stress.
WARNING!	**Risk of injury from tensioned spring elements!** → Ensure that the assembly or disassembly of the Ratio-Clamp® is carried out exclusively by trained specialist personnel.
CAUTION!	**Risk of injury due to sharp edges and corners!** → Wear personal protective equipment during all assembly work.

Installation of clamping unit Ratio-Clamp®

DANGER!	**Risk of injury due to hydraulic pressure!** → Generate hydraulic pressure for assembly or disassembly only with a small flow volume using a hand pump, and only apply it to break free the piston. → Under no circumstances pressurize the Ratio-Clamp® with hydraulic pressure when the screws are loosened.
DANGER!	**Danger to life due to improper installation!** → Do not use the transport rod for clamping. → Only tighten the screws when the Ratio-Clamp® is fully assembled. → Do not tighten screws without the rod installed. → Never apply pressure to the Ratio-Clamp® without the rod installed. → Never apply pressure to the Ratio-Clamp® in its as-delivered condition (with transport o-ring).

Installation of the Ratio-Clamp® clamping unit with functional rod



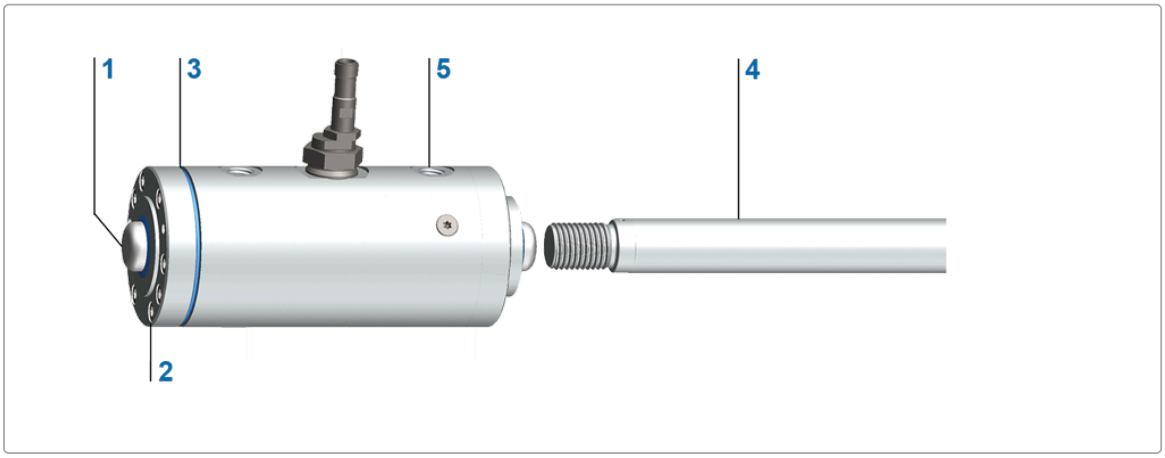
Installation of the Ratio-Clamp® clamping unit with functional rod

1. Functional rod
2. Release port EE

→ Do not disassemble the Ratio-Clamp®; the device is ready for operation.
→ Attach the Ratio-Clamp® to the machine.
→ Fasten the functional rod to the machine.
→ Ratio-Clamp® is operational.

NOTE	**Bring the Ratio-Clamp® clamping unit into the desired position!** → Hydraulically release the Ratio-Clamp® at port (EE) using a hand pump. Observe minimum and maximum pressure. → Move the functional rod

Installation of the Ratio-Clamp® clamping unit with transport rod

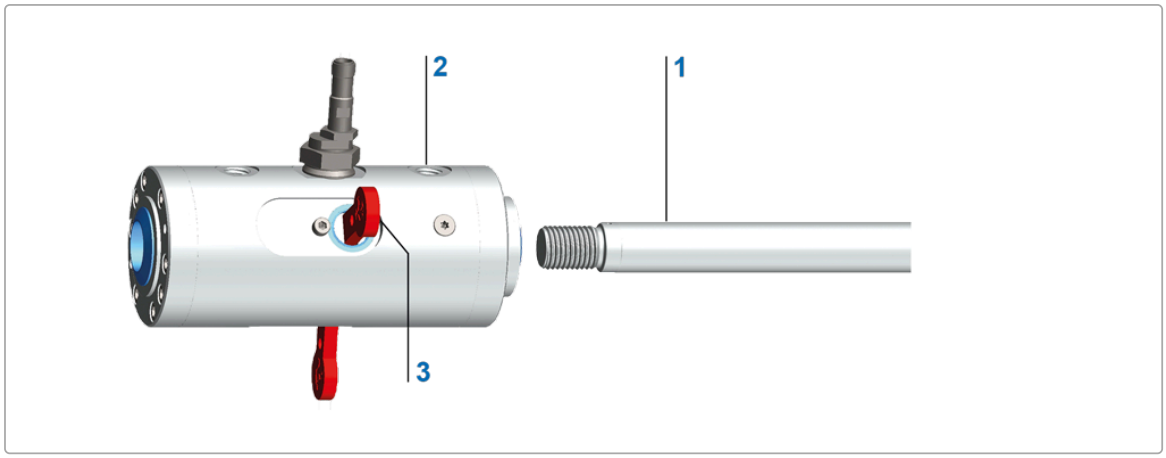


Installation of the Ratio-Clamp® clamping unit with transport rod

1. Transport rod
2. Screws on the cover
3. Transport o-ring
4. Rod to be clamped
5. Release port EE

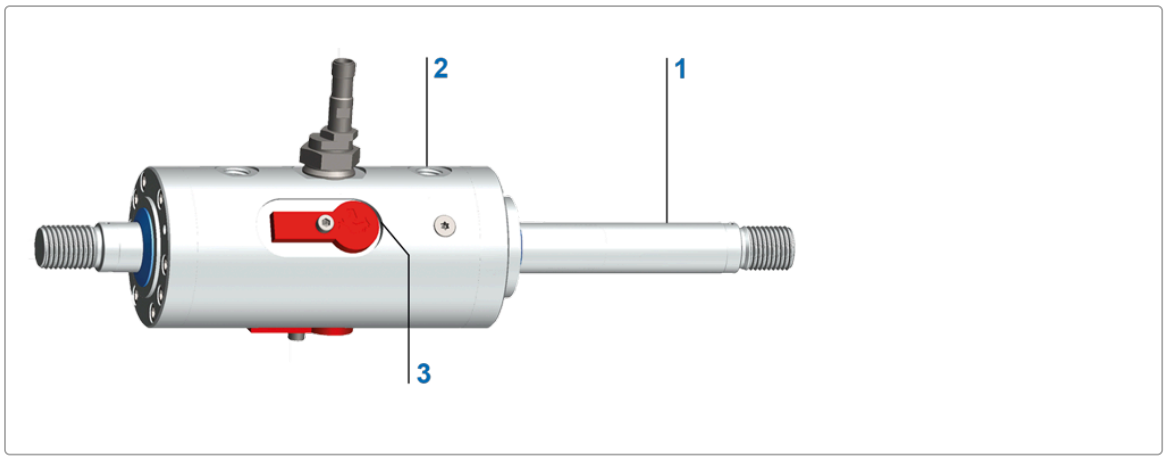
→ Loosen screws (2) on the cover by one turn each.
→ Cut and remove the marked transport o-ring (3).
→ Insert the clamping unit onto the rod to be clamped, with the releasing side EE first.
→ Carefully slide the transport rod (1) out of the Ratio-Clamp® with the rod to be clamped.
→ Position the Ratio-Clamp® as desired.
→ Tighten loosened screws on the cover crosswise until the cover rests flush on the cylinder tube.
→ Observe tightening torques according to VDI 2230. Refer to the table under **+Hydraulic cylinder - Installation**.

Installation of the Ratio-Clamp® clamping unit with key



Installation of the Ratio-Clamp® clamping unit with key in transport position

1. Rod to be clamped **3.** Key in transport position
2. Release port EE



Installation of the Ratio-Clamp® clamping unit with key in operating position

1. Rod to be clamped **3.** Key in operating position
2. Release port EE

→ Do not disassemble the Ratio-Clamp®; the device is ready for operation.
→ Insert the Ratio-Clamp® onto the rod to be clamped, with the releasing side EE first.
→ Attach the Ratio-Clamp® to the machine. For this purpose, use the pre-assembled flange or the screws on the release side (EE).

CAUTION: The opposing screws on the leak oil side (L) are under spring preload.

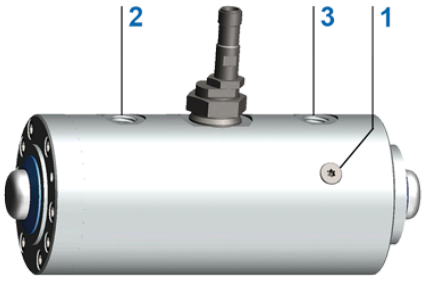
→ Attach the rod to be clamped to the machine.
→ Hydraulically release the Ratio-Clamp® at port (EE). Observe minimum and maximum pressure.
→ Remove the key from the transport position and place it in the operating position. Secure the key with a screw.
→ Ratio-Clamp® is operational.

+ Flushing the lines

→ Ensure that the clamping unit is not filled during the flushing process.

+ Port and vent

→ Connect release port EE and leak oil port L of the Ratio-Clamp®.
→ Perform venting analogously as described in **+Hydraulic cylinder - Installation**.



Venting screw

1. Venting screw
2. Leak oil port L
3. Release port EE

→ Vent the Ratio-Clamp® before start-up.

The venting set is available as tools.

+ Actuation

When the Ratio-Clamp® is used together with a hydraulic cylinder, observe the following actuation sequence:

→ Release the Ratio-Clamp® by actuating the release port.
→ Move the rod by pressurizing the piston surfaces in the cylinder.

After the rod has reached the desired position:

→ Depressurise the A and B ports of the cylinder.
→ Depressurize the Ratio-Clamp® release port.

Ratio-Clamp® is locked.

Implement measures to prevent the unlocking of the Ratio-Clamp® before the load is assumed.

Ensure that the valve or valve combination used to control the unlocking is depressurized.

When using a Hänchen control block connected between the directional valve and the Ratio-Clamp®/cylinder unit, the described sequence occurs automatically. The control block ensures logical and functional control, reducing the circuit engineering effort for the user to a minimum.

+ Proximity switch

⚠ CAUTION!	**Malfunctions due to signal errors!** → Perform the installation of signal lines in an EMC-compliant manner. → Ensure static discharge before installation. → Establish proper mass connection.

To indicate whether the Ratio-Clamp® is locked or released, Hänchen recommends the installation of an inductive proximity switch. Proximity switches operate contact-free and wear-free. The optional additional diagnostic output monitors the function of the switch and the supply line.

Check the setting of the proximity switch

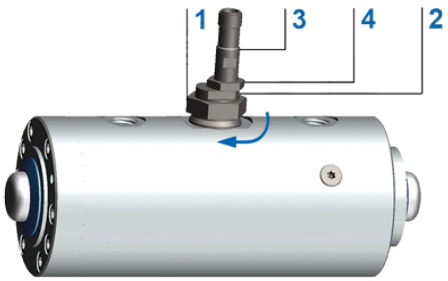
Upon delivery, the proximity switch is set to the desired indication according to the documentation (locked or released).

→ Check the adjustment of the proximity switch as follows: Apply minimum release pressure to the Ratio-Clamp® clamping unit.

The switch activates to the desired position.
→ If necessary, change the setting of the proximity switch.

Change proximity switch settings

Set the proximity switch display to locked as follows:
→ Ratio-Clamp® depressurize (pressure < minimum release pressure).



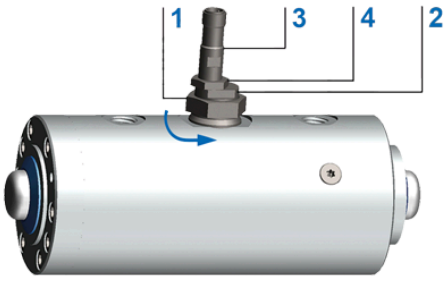
Set the proximity switch to locked

1. Lock nut
2. Eccentric
3. Proximity switch
4. Lock nut of proximity switch

→ Loosen the lock nut (1).
→ Turn the eccentric (2) until the proximity switch closes and the indicator light illuminates.
→ Tighten lock nut (1) with max. 70 Nm.
→ Apply minimum release pressure to the Ratio-Clamp®.

Proximity switch opens. Indicator turns off.

Set the proximity switch display to released as follows:
→ Apply minimum release pressure to the Ratio-Clamp®.



Set the proximity switch to released

1. Lock nut
2. Eccentric
3. Proximity switch
4. Lock nut of proximity switch

→ Loosen the lock nut (1).
→ Turn the eccentric (2) until the proximity switch closes and the indicator light illuminates.
→ Tighten lock nut (1) with max. 70 Nm.
→ Ratio-Clamp® depressurize (pressure < minimum release pressure).

Proximity switch opens. Indicator turns off.

Malfunctions

If the proximity switch sends no signal or no signal in the desired position:

→ Ensure that an operating voltage of 10 VDC to 30 VDC is present at the proximity switch.
→ Apply the minimum release pressure to the Ratio-Clamp® clamping unit.
→ Ensure that the clamping unit Ratio-Clamp® is released.

If the clamping unit Ratio-Clamp® is released:
→ Loosen the lock nut (1).
→ Turn the eccentric (2) until the proximity switch closes or the indicator lights up.
→ Tighten lock nut (1) with max. 70 Nm.
→ Relieve pressure from the clamping unit Ratio-Clamp®.
→ Ensure that the indicator light goes out or the switch opens.

If the proximity switch does not switch in either the released or locked state:
→ Remove plug.
→ Loosen lock nut on proximity switch (4).
→ Unscrew the proximity switch.
→ Connect the plug.
→ Check if operating voltage of 10 VDC to 30 VDC is present at the proximity switch.

If operating voltage is present:
→ Guide the proximity switch with its end face towards the steel component.

If the proximity switch activates approx. 0.5 mm to 0.8 mm before touching the steel part: The proximity switch is functioning correctly.
→ Reinstall the proximity switch.
→ Tighten the lock nut of the proximity switch (4) with max. 15 Nm.

If the proximity switch does not activate approx. 0.5 mm to 0.8 mm before touching the steel part: The proximity switch is defective.
→ Replace proximity switch.

+ Installation
Clamping unit: safety catcher

Before installation into the machine:

→ Inspect the delivery for completeness and damage.

The scope of delivery includes the Hänchen product as ordered by the customer according to the order specifications and confirmed in the order confirmation.

→ Remove any installed cover plugs or cover plates used for protection against contamination during transport.

⚠ DANGER!	**Danger to life due to failure of the clamping unit!** → Assemble the safety catcher according to the specification or the respective engineering drawing. → Ensure that the safety catcher is not installed under strain.
⚠ WARNING!	**Risk of injury from tensioned spring elements!** → Ensure that the installation and removal of the safety catcher are carried out exclusively by trained specialist personnel.
⚠ CAUTION!	**Risk of injury due to sharp edges and corners!** → Wear personal protective equipment during all assembly work.

+ Installation of the safety catcher clamping unit

⚠ DANGER!	**Risk of injury due to pressure!** → Never apply hydraulic or pneumatic pressure to the safety catcher when the screws are loosened.

safety catcher the rod into the safety catcher rod that the clamping segments are pushed in the "up" direction. Incorrect installation can impair the locking mechanism's function and compromise safety.

+ Flushing the lines

→ Ensure that the clamping unit is not filled during the flushing process.

+ Port and vent

→ Connect the release port EE and, if required, the leak oil port L of the safety catcher.

→ Perform venting at the opposite releasing port analogously as described in **+Hydraulic cylinder - Installation**.

+ Actuation

When the safety catcher is used in conjunction with a hydraulic cylinder, observe the following control sequence:

→ release port safety catcher to safety catcher ; the clamping segments will engage. safety catcher now securing the load."

→ Cylinder pressure off: The rod transitions from the "secure load" state to "assume load".

→ Release the safety catcher by applying pressure to the release port. Move the rod upwards.

Implement measures to prevent the unlocking of the safety catcher before the load is assumed.

Ensure that the valve or valve combination used to control the unlocking is depressurized.

+ Proximity switch

⚠ CAUTION!	**Malfunctions due to signal errors!** → Perform the installation of signal lines in an EMC-compliant manner. → Ensure static discharge before installation. → Establish proper mass connection.

The safety catcher can be equipped with up to three independent inductive proximity switches:

- Switch 1: Load secured
- Switch 2: Released
- Switch 3: Locked

Further information on the safety catcher's sensors can be found **+here**.

Start-up
Clamping units: Ratio-Clamp® and safety catcher

⚠ DANGER!	**Danger to life due to improper start-up!** → Ensure that the start-up is carried out exclusively and properly by trained specialist personnel or certified hydraulic specialists.

⚠ DANGER!	**Danger to life due to high pressure!** → Only start up the machine or partly completed machine, in which Hänchen products are installed, when the machine or partly completed machine complies with the provisions of the Machinery Directive. → Only start up the hydraulic system with fully connected hydraulic and electrical lines.

Before starting up the clamping unit:

→ Ensure that the maximum pressure specified on the type plate is not exceeded, even during pressure peaks.

→ Observe permissible values on the engineering drawing and order confirmation for:
- maximum operating speed
- working temperature
- holding loads

→ Completely remove preservative.

→ Ensure that sealing elements are not stuck by preservative.

→ Consider the efficiency loss that can occur with lubricant-wetted friction surfaces compared to the design by Hänchen.

Decommissioning: Disassembly, Return, Disposal
Clamping units: Ratio-Clamp® and safety catcher

Disassembly

DANGER!	**Risk of fatal injury due to improper decommissioning!** → Ensure that decommissioning is carried out exclusively and properly by trained specialist personnel or certified hydraulic specialists.

DANGER!	**Danger to life due to high pressure!** → Only loosen screw connections and hydraulic lines when depressurized.

Returns

To subject the clamping unit to maintenance at the manufacturer's plant, it must be returned in packaging protected against environmental influences.

→ Seal ports against contamination and oil leakage.

→ For the Ratio-Clamp® clamping unit:

- Version with transport rod: insert it from the unlocking side.
- Version key-operated: unlock the clamping unit and insert the key into the transport position.

→ Ship the clamping unit in suitable packaging.

Disposal

NOTE	**Environmental pollution and risk of slipping due to leaking hydraulic oil!** → Collect or contain any leaking hydraulic oil in a suitable container. → Dispose of any leaking hydraulic oil in an environmentally sound manner.

→ Dispose of packaging and replaced parts in accordance with the regulations of the country in which the Hänchen product was installed.

→ Dispose of Hänchen products according to national regulations.

Maintenance
Clamping units: Ratio-Clamp® and safety catcher

DANGER!	**Risk of fatal injury due to improper decommissioning!** → Ensure that decommissioning is carried out exclusively and properly by trained specialist personnel or certified hydraulic specialists.
WARNING	**Danger to life due to high pressure!** → Before disassembly, ensure that the clamping unit is depressurized.
NOTE	**Damage due to improper handling!** → Use handling equipment adapted to the weight of the component. → Do not lift the clamping unit by sensitive components such as sensors.
NOTE	**Environmental pollution and risk of slipping due to leaking hydraulic oil.** → Collect or contain any leaking hydraulic oil in a suitable container. → Dispose of any leaking hydraulic oil in an environmentally sound manner.
NOTE	**Reassembly of the clamping unit requires testing and adjustment of the holding load.** → We recommend having this carried out by Hänchen, the manufacturer.

Inspection of the clamping unit

Depending on the application, regularly, at least semi-annually, or after extended periods of downtime:
→ Check for tightness.
→ Ensure that the holding load corresponds to the value specified in the documentation.

Depending on the application, but at least once a year:
→ Have the condition and effectiveness inspected by an expert.
→ Observe legal regulations.

When used as a safety catcher:
→ Test individually used clamping units according to the product standard; load with at least 1.5 times the load to be held (E ≥ 1s long); redundant clamping units, if possible, each individually with at least 1.1 times the load normally held jointly by all clamping units (E ≥ 1s long).
→ If there are no test specifications in the product standard, implement automatic test measures including test interval according to the risk assessment and instruction manual of the machine.

Have Ratio-Clamp® from Hänchen inspected:

- without safety function, after a maximum of two million clamping cycles.
- with safety function, after a maximum of one million clamping cycles.

Have safety catcher from Hänchen inspected:

- after a maximum of two million clamping cycles for "secure load".
- after a maximum of 100,000 clamping operations "assume load".

+ Product Identification

By providing the serial number, embossed on the product and type plate, we can process your inquiry quickly. Even after 50 years!

For spare part orders:

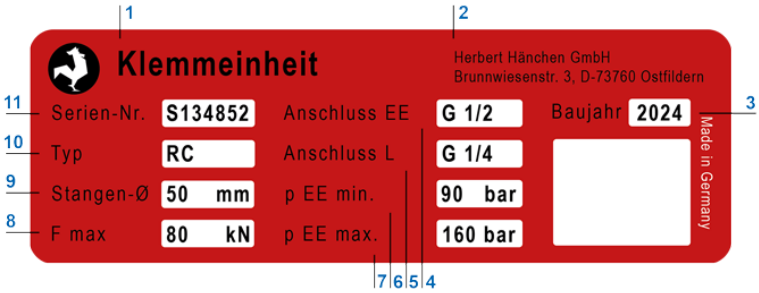
→ Provide the 7-digit serial number - see type plate.

→ For older products (before 05/2010), please provide the 6-digit order or commission number.

Type:

→ RC = locking unit Ratio-Clamp®

→ AS = safety catcher



Example of clamping unit type plate

1. Product Designation
2. Company Address
3. Year of Manufacture
4. Unlocking port
5. Leak oil port
6. Min. pressure to unlock
7. Max. allowable pressure to unlock
8. Max. holding load/load
9. Rod diameter
10. Type
11. Serial number

If the data on the type plate is no longer legible:

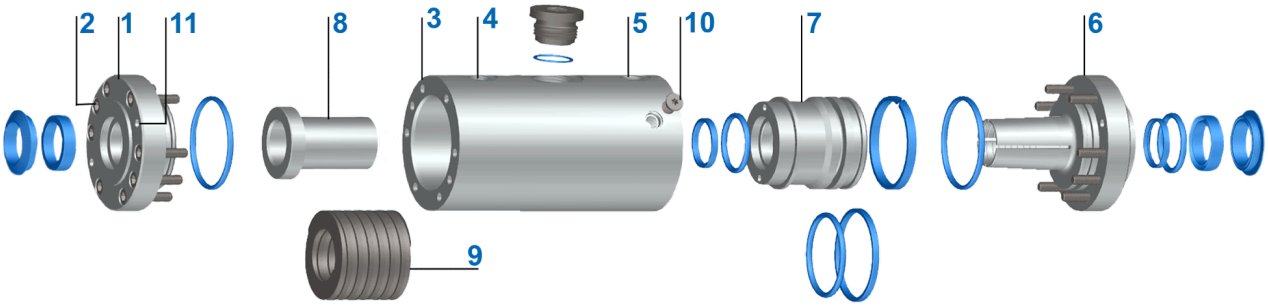
- the serial number on the clamping unit is engraved above the releasing port (EE).
- the serial number is indicated in the order confirmation, the shipping documents and the invoice.

Disassembly and Assembly
Ratio-Clamp® clamping unit

Maintenance on the clamping unit requires readjustment of the holding loads. It is therefore recommended to send the clamping unit to Hänchen for maintenance.

⚠ WARNING	**Danger to life due to spring-loaded parts!** → Loosen the screws on the cover carefully, gradually and crosswise.

Structural design of Ratio-Clamp®



Clamping unit structure with one-piece cover and a spring

1. Cover
2. Mounting screws
3. Pipe
4. Port L (leak oil)
5. Port EE (releasing)
6. Cover with clamping sleeve
7. Clamping piston
8. Distance bushing
9. Spring
10. Venting screw
11. Pull-out thread

Depending on the design and size of the Ratio-Clamp® , there are differences in the structural design:

- A spring is installed up to rod Ø 50 mm.
- From rod Ø 56 mm, several springs are installed distributed around the circumference.

For versions from rod Ø 90 mm, the cover with clamping sleeve is designed in two parts. It is not necessary to disassemble these two parts.

Clamping unit disassembly
in key version

To independently perform a seal replacement, first remove the clamping unit from the machine and then dismantle the Ratio-Clamp® clamping unit.

Removal from the machine

→ Do not disassemble clamping unit
→ Hydraulically unlock the clamping unit at port [EE]. Observe minimum and maximum pressure.

→ Remove all keys from the operating position and insert them into the transport position.
→ Depressurize the clamping unit and remove the hoses.
→ Remove the mounting screws of the clamping unit to the machine.

Clamping unit disassembly

→ Loosen and remove the mounting screws [2] on the cover [1] crosswise.
→ Have a container ready to catch any escaping hydraulic oil.
→ Completely drain hydraulic oil from the release port EE [5] of the clamping unit.
→ Remove the cover [1] from the tube with pull-out threads.
→ Remove the cover with clamping sleeve [6] from the tube with pull-out threads.
→ Remove the clamping piston and other parts from the pipe.

+ Clamping unit disassembly
without key version

To carry out a seal change independently, disassemble the cover of the Ratio-Clamp® clamping unit on the functional rod of your machine.

Removal from the machine

→ Loosen the mounting screws [2] on the cover [1] gradually in a criss-cross pattern.
→ Unscrew the mounting screws approx. 5-7 turns, do not remove.
→ Pressurize release port EE [5] hydraulically with a hand pump until the cover [1] abuts the mounting screws [2], or the clamping unit is released. This serves to disengage the clamping piston [7] from the cover with clamping sleeve [6].
→ Remove hand pump.
→ Unscrew and remove the mounting screws completely.
→ Have a container ready to catch any escaping hydraulic oil.
→ Pull the clamping unit off the functional rod.

Clamping unit disassembly

→ Have a container ready to catch any escaping hydraulic oil.
→ Completely drain hydraulic oil from the release port EE [5] of the clamping unit.
→ Remove the cover [1] from the tube with pull-out threads.
→ Remove the cover with clamping sleeve [6] from the tube with pull-out threads.
→ Remove the clamping piston and other parts from the pipe.

+ Mounting clamping unit
For all versions

To mount the clamping unit in key version ready for installation - secured with the key - a functional rod is required.

We recommend mounting the clamping unit in key version directly on the functional rod in the same way as the clamping unit without key version.

→ Install the cover with clamping sleeve [6] in the tube and tighten the screws.
→ Mount the clamping piston and other parts.
→ Install the cover [1] in the tube, screw in the screws crosswise until a gap of approx. 5 mm remains between the cover and the tube. The springs remain uncompressed.
→ With the releasing side EE facing forward, slide the clamping unit onto the rod to be clamped.
→ Tighten the screws on the cover [1] in the tube crosswise until there is no gap left.
→ Check holding load.

For clamping unit in key version

→ Attach the key to the clamping unit in the operating position.

Intended use and function
Vibration Damper - Structure-borne Sound Absorber

Intended Use

→ Use vibration and structure-borne sound absorbers exclusively for damping vibrations and structure-borne sound transmissions.

Improper Use

→ Do not use vibration and structure-borne sound absorbers:
- for damping switching or acceleration shocks in hydraulic plants.
- for damping vibrations caused by oscillating non-return valves, undamped pressure-limiting valves, etc.
- for storing hydraulic energy.

Function
Vibration Damper - Structure-borne Sound Absorber

Vibration and structure-borne sound absorbers reduce oscillations of the oil column in the hydraulic system. A low-pulsation oil flow exits the vibration and structure-borne sound absorber.

Operation
Vibration and structure-borne sound absorber

DANGER!	**Danger to life due to defective product!** → Ensure that no hazards to persons and property arise in the event of a defect in a Hänchen product or its components. If a Hänchen product or its components are not functioning correctly: → Immediately take the Hänchen product out of service. → Secure the Hänchen product against unauthorised use
DANGER!	**Danger to life due to high pressure!** → Ensure that the working temperature range does not exceed the specified limits of the plant and all components. → Operate the system exclusively with fully connected hydraulic/pneumatic and electrical lines. → Check hydraulic or pneumatic supply lines and pipe connections at regular intervals adapted to the operating conditions. → Replace damaged pipe connections.
CAUTION!	**Risk of burns from hot surfaces!** → Only touch the surface of the vibration and structure-borne sound absorber with protective gloves.

Installation
Vibration damper - Structure-borne sound damper

Before installation into the machine:

→ Inspect the delivery for completeness and damage.

The scope of delivery includes the Hänchen product as ordered by the customer according to the order specifications and confirmed in the order confirmation.

→ Remove any sealing plugs or cover plates attached for protection against contamination during transport before assembly.

⚠ DANGER!	**Risk of fatal injury due to improper assembly!** → Ensure that assembly is carried out exclusively by trained specialist personnel or certified hydraulic specialists.
⚠ DANGER!	**Danger to life due to high pressure!** → Only loosen screw connections and hydraulic lines when depressurized.
⚠ CAUTION!	**Risk of injury due to sharp edges and corners!** → Wear personal protective equipment during all assembly work.
NOTE	**Damage to the vibration and structure-borne sound absorber or piping due to vibrations from the pump drive!** → Connect the oil outlet side of the vibration and structure-borne sound absorber to the hydraulic plant using a flexible hose. Minimum hose length: • Pipe diameter ≤ 18 mm: 600 mm • Pipe diameter > 18 mm: 900 mm → Avoid tight hose bends.

→ Ensure that the fluid always flows through the absorber in the direction of the printed arrow (flow direction).

→ Install the absorber near the pump.

→ Connect the pump's pressure port directly to the vibration and structure-borne sound absorber with a pressure hose.

For correct venting:

→ Ensure that the outlet port of the vibration and structure-borne sound absorber is at the highest point.

For optimal noise attenuation:

→ Mount the mounting clamps of the vibration and structure-borne sound absorber with the supplied vibration isolators.

→ Observe the following limit values (see type plate):
- Working pressure
- max. flow rate

Start-up
Vibration and structure-borne sound absorber

⚠ DANGER!	**Danger to life due to improper start-up!** → Ensure that the start-up is carried out exclusively and properly by trained specialist personnel or certified hydraulic specialists.

⚠ DANGER!	**Danger to life due to high pressure!** → Only start up the machine or partly completed machine, in which Hänchen products are installed, when the machine or partly completed machine complies with the provisions of the Machinery Directive. → Only start up the hydraulic system with fully connected hydraulic and electrical lines.

Before the start-up of the vibration and structure-borne sound absorber:

→ Ensure that the maximum pressure specified on the type plate is not exceeded, even during pressure peaks.
→ Observe notes and permissible values on engineering drawings and order confirmations.
→ Completely remove preservative.
→ Ensure that sealing elements are not stuck by preservative.
→ Observe the flow direction.

Decommissioning: Disassembly, Return, Disposal
Vibration and structure-borne sound absorber

Disassembly

DANGER!	**Risk of fatal injury due to improper decommissioning!** → Ensure that decommissioning is carried out exclusively and properly by trained specialist personnel or certified hydraulic specialists.

DANGER!	**Danger to life due to high pressure!** → Only loosen screw connections and hydraulic lines when depressurized.

Returns

To subject vibration and structure-borne sound absorbers to maintenance at the manufacturer's plant, they must be returned in packaging protected against environmental influences.

→ Ship the vibration and structure-borne sound absorber in suitable packaging.

Disposal

NOTE	**Environmental pollution and risk of slipping due to leaking hydraulic oil!** → Collect or contain any leaking hydraulic oil in a suitable container. → Dispose of any leaking hydraulic oil in an environmentally sound manner.

→ Dispose of packaging and replaced parts in accordance with the regulations of the country in which the Hänchen product was installed.

→ Dispose of Hänchen products according to national regulations.

+ Maintenance
Vibration and structure-borne sound absorber

⚠ DANGER!	**Risk of fatal injury due to improper decommissioning!** → Ensure that decommissioning is carried out exclusively and properly by trained specialist personnel or certified hydraulic specialists.
⚠ WARNING	**Danger to life due to high pressure!** → Before disassembly, ensure that the vibration and structure-borne sound absorber is depressurized.
NOTE	**Damage due to improper handling!** → Use handling equipment adapted to the weight of the component.
NOTE	**Environmental pollution and risk of slipping due to leaking hydraulic oil** → Collect or contain any leaking hydraulic oil in a suitable container. → Dispose of any leaking hydraulic oil in an environmentally sound manner.

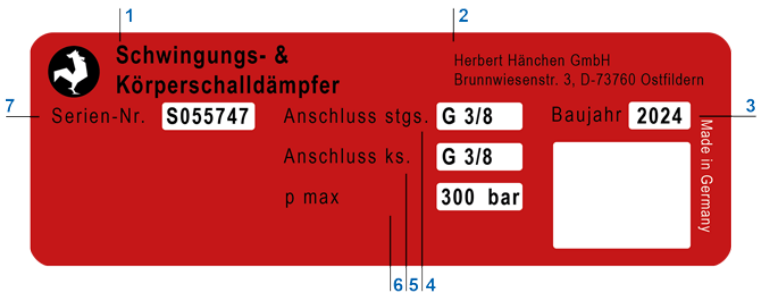
Depending on the application, but at least once a year:
→ Check the vibration and structure-borne sound absorber for damage.

+ Product Identification

By providing the serial number, embossed on the product and type plate, we can process your inquiry quickly. Even after 50 years!

For spare part orders:
→ Provide the 7-digit serial number - see type plate.
→ For older products (before 05/2010), please provide the 6-digit order or commission number.

If the data on the type plate is no longer legible:
- The serial number is engraved at the top of the tube on the vibration and structure-borne sound absorber.
- the serial number is indicated in the order confirmation, the shipping documents and the invoice.



Example type plate for vibration and structure-borne sound absorber

1. Product Designation
2. Company Address
3. Year of Manufacture
4. Head side port
5. Cap side port
6. max. permissible pressure
7. Serial number

Replacement of sensor technology during the maintenance of Hänchen products

To replace complete sensors, they can be removed from Hänchen hydraulic cylinders or clamping units.

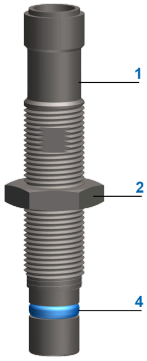
Spare parts can be ordered from Hänchen using the serial number of the hydraulic cylinder or the information on the type plate of the sensor.

WARNING	**Danger to life due to high pressure!** → Before disassembly, ensure that the hydraulic cylinder or clamping unit is depressurized. → Retraction of the piston rod of the hydraulic cylinder.

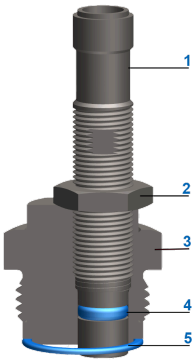
NOTE	**Environmental pollution and risk of slipping due to leaking hydraulic oil** → Collect or contain any leaking hydraulic oil in a suitable container. → Dispose of any leaking hydraulic oil in an environmentally sound manner.

Proximity switches in Hänchen products
Disassembly and assembly

Proximity switches in hydraulic cylinders detect the final stroke positions. In the Ratio-Clamp® clamping unit, the proximity switch detects the locked or released clamping status.



Proximity switch
for hydraulic cylinders



Proximity switch
for clamping unit

1. Proximity switch
2. Lock nut
3. Eccentric retaining nut
4. O-ring with support ring
5. O-ring on eccentric retaining nut

Remove proximity switch

→ Remove connector from the proximity switch.
→ Loosen lock nut [2].
→ Unscrew proximity switch [1].

Mount proximity switch

→ Moisten the o-ring with support ring [4] on the proximity switch [1] with operating fluid.
→ Screw proximity switch [1] into the threaded hole on the Hänchen product.
→ Unless otherwise specified, screw in proximity switch [1] until it stops mechanically and then turn it back 1/4 of a turn.
→ Tighten lock nut [2] with max. 70 Nm.

Replace sealing elements on the proximity switch

If the o-ring with support ring is damaged, it is recommended to replace the entire proximity switch.

Replace o-ring [5] on eccentric retaining nut as follows (only for clamping unit):
→ Remove connector from the proximity switch [1].
→ Remove the proximity switch [1] (is not absolutely necessary).
→ Unscrew eccentric retaining nut [3] and replace o-ring [5].
→ Moisten o-ring [5] with operating fluid and screw eccentric retaining nut [3] back in.
→ Set the switching status by turning the eccentric retaining nut.
→ If necessary, mount the proximity switch [1] again.

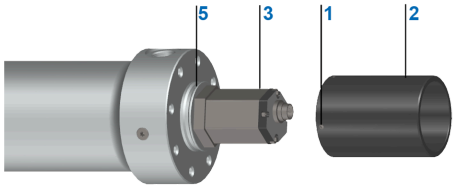
Magnetostrictive position transducers in Hänchen products
Disassembly and assembly

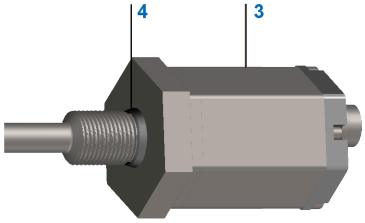
The position transducer is integrated into the cylinder. For this purpose, the measuring rod is located within the hollow-bored piston rod, and the electronics tube is surrounded by a protection tube.

If necessary, the seal (o-ring / flange seal) [4] or the entire position transducer [3] must be replaced.

The magnet installed on the piston rod does not have to be replaced if the position transducer is replaced with an identical one.

Design open protection tube with radial threaded pins





1. Threaded pin
2. Protection tube
3. Position transducer
4. O-ring / flange seal
5. Centering collar

Disassemble position transducer

→ Remove the connector plug of the position transducer.
→ Loosen the threaded pins (M5: SW 2.5) [1].
→ Carefully remove the protection tube [2].
→ Unscrew position transducer [3] (AF 46) and carefully pull it out of the cover.

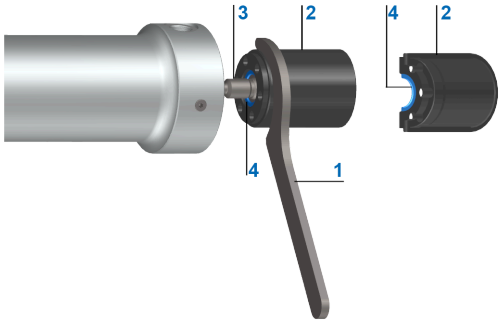
Assemble position transducer

→ Fully retract the piston rod into the cylinder.
→ Apply screw locking lacquer (medium strength) to the thread of the position transducer.
→ Carefully slide the position transducer into the cover and ensure that the position transducer is inserted into the bore of the piston rod.
→ Tighten the position transducer (tightening torque: 30 Nm, SW 46).
→ Ensure that the seal (o-ring / flange seal) [4] is seated correctly.
→ Carefully slide the protection tube [2] onto the centering collar [5].

→ Moisten threaded pins [1] with screw locking varnish.
→ Tighten the threaded pins (tightening torque: 6 Nm, SW 2.5).
→ Mount the connector plug.

+ Version with open protection tube with radial hook wrench holes

The required hook wrench B 68-75 according to DIN 1810 is available from Hänchen. You can find this under Zubehör in our **+product configurator HÄKO**.



1. Hook wrench
2. Protection tube for position transducer
3. Position transducer
4. Flange seal

Disassemble position transducer

→ Remove the connector plug of the position transducer.
→ Loosen the protection tube [2] with the hook wrench [1].
→ Unscrew the protection tube [2] together with the position transducer [3] from the cover.
→ Carefully pull the position transducer [3] out of the cover.

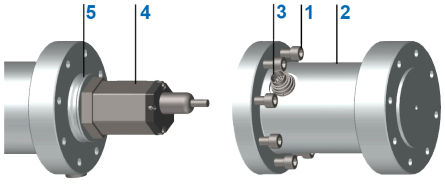
Assemble position transducer

→ Fully retract the piston rod into the cylinder.
→ Slide the position transducer [3] through the central bore in the protection tube until the hexagon of the position transducer rests against the inner, frontal hexagon centering such that the corners of the hexagon fit into the recesses in the protection tube.
→ Insert the flange seal [4] into the centric bore of the protection tube.
→ Apply screw locking lacquer (medium strength) to the thread of the position transducer.
→ Carefully slide the position transducer with protection tube and flange seal into the cover.
→ Tighten the position transducer (tightening torque: 30 Nm).
→ Use the hook wrench [1] to tighten the protection tube.
→ Mount the connector plug.

+ Version with closed protection tube

The version with a closed protection tube offers the possibility of mounting further accessories, such as a spherical rod eye.

The required assembly key is available from Hänchen. You can find it under tools in our **+HÄKO product configurator**.



1. Screws on the protection tube
2. Protection tube
4. Position transducer
5. Centering collar

3. Flange connector for position transducer

Disassemble position transducer

→ Remove the connector plug from the flange connector [3].
→ Carefully loosen the nut on the flange connector [3] with a mounting wrench.
→ Press the flange connector inwards into the protection tube.
→ Loosen and remove the screws [1] on the protection tube.
→ Carefully remove the protection tube [2] (pay attention to the connection cable).
→ Loosen the position transducer [4] (SW 46) and carefully pull it out of the cover.

Assemble position transducer

→ Fully retract the piston rod into the cylinder.
→ Apply screw locking lacquer (medium strength) to the thread of the position transducer.
→ Carefully slide the position transducer into the cover and ensure that the position transducer is inserted into the bore of the piston rod.
→ Tighten the position transducer (tightening torque: 30 Nm, SW 46).
→ Ensure that the seal (o-ring / flange seal) is seated correctly.
→ Guide the flange connector [3] from the inside through the protection tube [2].
→ Fasten the flange connector to the protection tube with a nut (the nose of the flange connector must sit in the recess - anti-torsion mechanism).
→ Carefully slide the protection tube onto the centring collar [5].
→ Tighten two screws [1] crosswise on the cover.
→ Tighten all remaining screws crosswise (observe tightening torques).
→ Mount the connector plug.

+ Inductive position transducers in Hänchen products
Disassembly and assembly

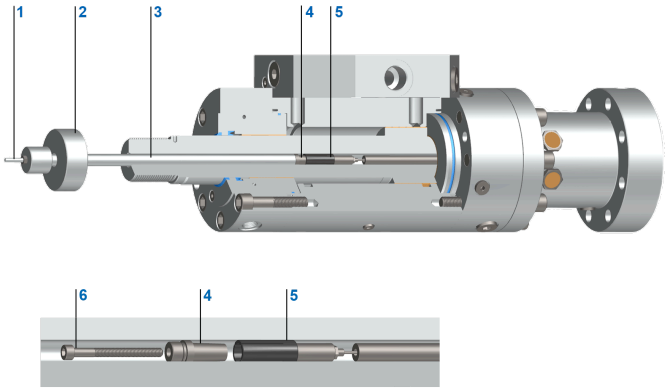
The position transducer is integrated into the cylinder. For this purpose, the measuring rod is located within the hollow-bored piston rod, and the electronics tube is surrounded by a protection tube.

We recommend sending hydraulic cylinders with inductive position transducers to Hänchen for disassembly. After assembly, calibration of the position transducer is required.

+ Immersion anchor mounting for inductive position transducer

In hydraulic cylinders with an inductive position transducer, the immersion anchor of the position transducer is fixed in the hollow-bored piston rod via a clamping piece and a clamping sleeve.

The Hänchen assembly tool for inductive position transducers with immersed anchor mounting can be found as tools in our **+product configurator HÄKO**.



1. Mounting spindle
2. Weight with stop
3. Mounting tube
4. Clamping piece
5. Clamping sleeve
6. Screw

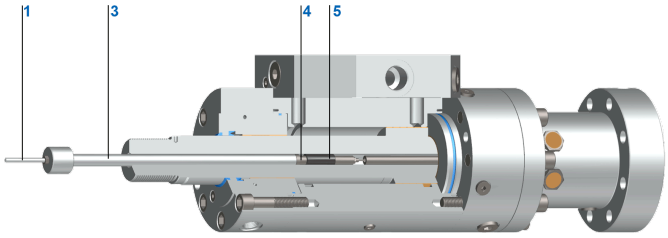
Dismantling the plunger

→ Loosen and remove screw [6] with a long wrench (M4: SW 3 or M6: SW 5).
→ Insert the assembly tool into the piston rod.
→ Screw the assembly spindle [1] into the clamping sleeve [5].
→ Screw the mounting tube [3] onto the clamping piece [4].
→ Strike weight [2] against the stop on the assembly tool so that the clamping piece [4] detaches from the clamping sleeve [5].
→ Pull the assembly tool including the immersed anchor of the position transducer out of the piston rod.

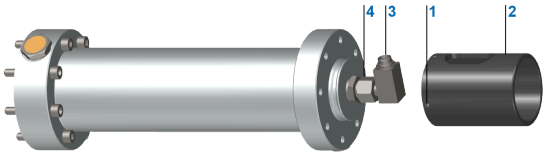
Mounting immersed anchor

→ Move the piston rod to the desired zero position of the sensor signal (e.g. central position or end position).
→ Insert clamping sleeve [5] with mounting tube [3] to the correct dimension (zero position ≈ 0mV at the position transducer), hold position.

→ Insert the assembly spindle [1] with clamping piece [4] into the clamping sleeve and clamp the connection.
→ Remove the mounting tube and mounting spindle again.
→ Tighten screw [6] with a long wrench (M4: SW 3 or M6: SW 5).



+ Tube mounting for inductive position transducer
Open protection tube version

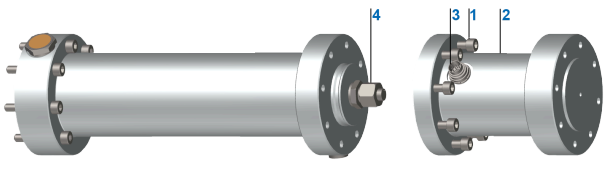


1. Threaded pin
2. Protection tube
3. Flange connector for position transducer
4. Screw-in fitting with nut

Disassemble position transducer
→ Remove the connector plug from the flange connector [3].
→ Loosen the four threaded pins [1] (M5: SW 2.5).
→ Carefully remove the protection tube [2].
→ Hold the screw-in fitting [4] in place and loosen the nut.
→ Carefully pull out position transducer [3].

Assemble position transducer
→ Carefully slide the position transducer into the screw connection and ensure that the immersion anchor is inserted into the bore of the position transducer.
→ Tighten the nut [4] of the screw connection.
→ Carefully slide the protection tube [2] onto the centering collar.
→ Apply screw locking lacquer to the threaded pins [1] and tighten them.
→ Mount the connector plug.

+ Tube mounting for inductive position transducer
Closed protection tube version
The version with a closed protection tube offers the possibility of mounting further accessories, such as a spherical rod eye. If available, accessories must be dismantled before dismantling the inductive position transducer.



1. Screws on the protection tube
2. Protection tube
3. Flange connector for position transducer
4. Screw-in fitting with nut

Disassemble position transducer

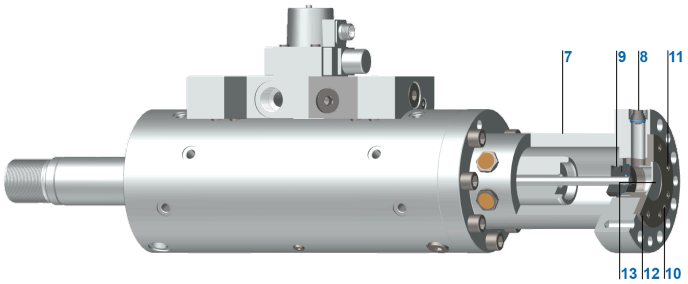
→ Remove the connector plug from the flange connector [3].
→ Carefully loosen the nut on the flange connector [3] with a mounting wrench.
→ Press the flange connector inwards into the protection tube.
→ Loosen and remove the screws [1] on the protection tube [2].
→ Carefully remove the protection tube [2] (pay attention to the connection cable).
→ Hold the screw-in fitting [4] in place and loosen the nut.
→ Carefully pull out position transducer [3].

Assemble position transducer

→ Carefully slide the position transducer into the screw connection and ensure that the immersion anchor is inserted into the bore of the position transducer.
→ Tighten the nut [4] of the screw connection.
→ Guide the flange connector [3] from the inside into the bore in the protection tube [2].
→ Fasten the flange connector to the protection tube with a nut (the nose of the flange connector must sit in the recess - anti-torsion mechanism).
→ Carefully slide the protection tube [2] onto the centering collar.
→ Tighten two screws crosswise on the cover.
→ Tighten all remaining screws crosswise (observe tightening torques).
→ Mount the connector plug.

+ Tube mounting for inductive position transducer Series 320

Inside the protection tube, the position transducer is secured with a synthetic retaining flange. The synthetic retaining flange is screwed to a mounting flange. The position transducer, synthetic retaining flange, and mounting flange can be removed as a single unit.



7. Protection tube
8. Flange connector for position transducer
9. Synthetic retaining flange
10. Extraction holes
11. Mounting screws
12. Mounting flange position transducer
13. Synthetic cap

Disassemble retaining flange and position transducer

→ Remove the connector plug of the position transducer.
→ Carefully loosen the nut on the flange connector [3] with a mounting wrench.
→ Press the flange connector inwards into the protection tube.
→ Pull the synthetic cap [13] off the protection tube [7].
→ Loosen the mounting screws [11].
→ Remove mounting flange position transducer [12] using the extraction bores [10].
→ Remove the position transducer together with the mounting flange [12] from the protection tube [7].
→ Loosen the clamping screw on the synthetic retaining flange [9] and remove the position transducer.

Assemble position transducer

→ Slide the position transducer into the synthetic retaining flange [9] so that the end of the position transducer is flush with the rear face of the synthetic retaining flange.
→ Tighten the clamping screw on the synthetic retaining flange until the screw head is lightly seated.

Mount the retaining flange

- → Screw the synthetic retaining flange [9] to the mounting flange [12].
- → Insert the unit consisting of the position transducer, synthetic retaining flange, and mounting flange into the piston rod and ensure that the immersion anchor is inserted into the bore of the position transducer.
- → Tighten the mounting screws [11] on the mounting flange [12].
- → Guide the flange connector [8] from the inside into the bore in the protection tube [2].
- → Fasten the flange connector to the protection tube with a nut (the nose of the flange connector must sit in the recess - anti-torsion mechanism).
- → Press synthetic cap [9] into the mounting flange position transducer.
- → Mount the connector plug.

Accessories for Hänchen products
Replacement and Maintenance

Hänchen offers numerous accessories for hydraulic cylinders or clamping units. Some of these require regular maintenance. You will find important information here for the complete replacement.

Spare parts can be ordered from Hänchen using the serial number of the hydraulic cylinder.

WARNING	**Danger to life due to high pressure!** → Before disassembly, ensure that the hydraulic cylinder or clamping unit is depressurized.

NOTE	**Damage due to improper handling!** → Use handling equipment adapted to the weight of the component. → Do not lift the cylinder by the piston rod or other sensitive parts such as sensors, valves or piping.

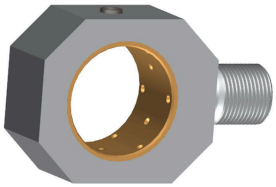
NOTE	**Environmental pollution and risk of slipping due to leaking hydraulic oil** → Collect or contain any leaking hydraulic oil in a suitable container. → Dispose of any leaking hydraulic oil in an environmentally sound manner.

+ Mounting Heads
Assembly and Maintenance

Mounting heads for hydraulic cylinders and clamping units are used to attach the piston rod to the machine.



Mounting head with internal thread



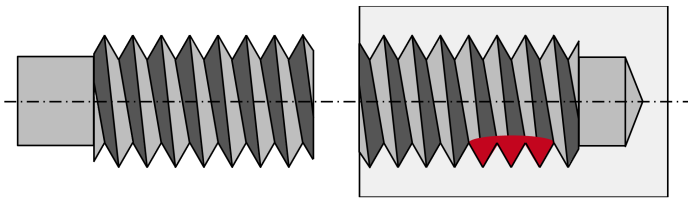
Mounting head with external thread

+ Mount the mounting head

→ Before assembly, moisten the thread surface with screw locking adhesive, e.g. Loctite 243. Please note the type of wetting.
→ Screw in the mounting head until it stops and tighten it.

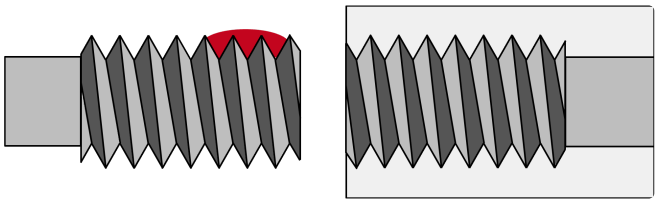
Type of moistening for thread locking adhesive

Liquid thread lockers fill the thread clearance and harden after tightening. This secures the thread.



Type A
For nut threads in blind holes (e.g. piston rod internal threads or unslotted spherical rod eyes) when the trapped air cannot escape:
→ Apply thread locking adhesive to the lower third of the nut thread.

The trapped air presses the adhesive outwards when screwing in and distributes it over the entire thread surface.



Type B
For open nut threads (e.g. for piston rod internal threads with continuous deep-hole drilling or spherical rod eyes with slot)
→ Apply thread locking adhesive to the front third of the screw thread.

By screwing in the screw, the adhesive is pressed inwards and distributed over the entire thread surface.

Tip: Please note our information on suitable **+tools**

+ Maintenance of radial spherical plain bearings

The design of the spherical plain bearings requires maintenance as standard. These must be lubricated regularly according to the load and spherical plain bearing manufacturer's recommendation. Please note our information in the **+Technical Information - Spherical Plain Bearings**