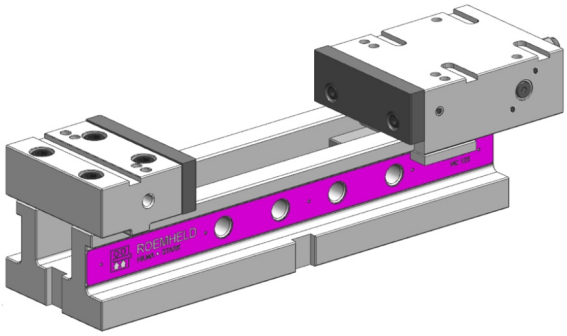
HILMA.NC and HILMA.NCH

Jaw width 100 mm, 125 mm, 160 mm



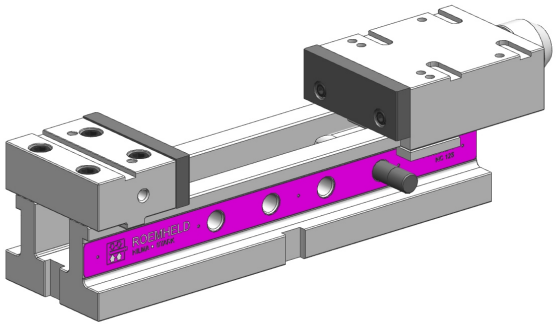


Table of contents

1 Description of the product

Description of HILMA.NC

The products are designed for universal workpiece clamping on machine tools. They are equipped with mechanical-hydraulic clamping slides with hydraulic power amplifiers. The internal design is the same for all variants.

When building up the clamping force, the primary piston is pressed into the oil chamber by means of the inner pressure spindle. A high hydraulic pressure and consequently a high clamping force is built up.

After pulling the socket pin, the clamping slide can be moved to another clamping range or removed completely (see chapter 9.2 "Setting the clamping range of HILMA.NC").

Description of HILMA.NCH

The products are designed for universal workpiece clamping on machine tools. They are equipped with hydraulic clamping slides.

The hydraulic power stroke is generated by an external pressure transducer. The return spring ensures fast opening of the clamping slide. After pulling the socket pin, the clamping slide can be moved to another clamping range.

or removed completely (see chapter 9.4 "Setting the clamping range of HILMA.NCH"). The precise adjustment of the clamping range is made with the crank handle.

Use of HILMA.NC and HILMA.NCH

The products are used for machining dimensionally stable workpieces in single or multiple clamping fixtures.

The products are suitable both for series production and individual production on 3-axis equipment.

2 Validity of the documentation

This documentation applies to the products:

Products of the catalogue WM-021-002. These are the types or order numbers in the number range 3070 and 3080 – e.g. the clamping system HILMA.NC with the number 930730203.

3 Target group

Specialists and machine and system installers with specialist knowledge of hydro-mechanical equipment.

Qualification of personnel

Expertise means that personnel must:

- be able to read and fully understand technical specifications such as circuit diagrams and product-specific drawing documents,
- have specialised knowledge of the function and structure of the corresponding components.

A **specialist** is a person who has sufficient knowledge based on their professional training and experience and is familiar with the relevant regulations to such an extent that they:

- can assess the work assigned to them,
- can recognise potential dangers,
- can take the necessary measures to eliminate hazards,

- are familiar with recognized technical standards, rules and guidelines,
- have the necessary repair and assembly skills.

4 Symbols and signal words

⚠ WARNING

Personal injury

Indicates a potentially dangerous situation.

If not avoided, death or serious injury can result.

⚠ CAUTION

Minor injuries/damage to property

Indicates a potentially dangerous situation.

If not avoided, minor injuries or property damage may result.

Hazardous to the environment

The symbol indicates important information for the proper handling of environmentally hazardous substances.

Failure to observe these instructions may result in serious environmental damage.

Mandatory sign!

The symbol indicates important information on the necessary protective equipment, etc.

NOTE

- The symbol indicates user tips or particularly useful information. This is not a signal word for a dangerous or harmful situation.

5 For your safety

5.1 Basic information

The operating manual serves to provide information and avoid hazards when installing the products in the machine as well as information and notes for transport, storage and maintenance.
Accidents and damage to property can only be avoided and trouble-free operation of the products can only be guaranteed if this operating manual is strictly observed.
Observance of the operating manual also has the same effect:

- avoidance of injuries,
- reduced downtime and repair costs,
- increased service life of the products.

5.2 Safety instructions

The product was manufactured in accordance with the generally recognised rules of technology.
Observe the safety instructions and descriptions of actions in this operating manual to avoid personal injury or damage to property.

- Read this operating manual thoroughly and completely before working with the product.
- Keep the operating manual in a place where it is accessible to all users at all times.
- Observe the applicable safety regulations, accident prevention and environmental protection regulations of the country in which the product is used.
- Use the product only in perfect technical condition.
- Observe all instructions on the product.
- Only use accessories and spare parts approved by the manufacturer in order to prevent personal injury due to unsuitable spare parts.
- Comply with intended use.
- You may only put the product into operation once it has been established that the incomplete machine or machinery into which the product is to be installed complies with the country-specific provisions, safety regulations and standards.
- Carry out a risk analysis for the incomplete machine or machinery.
  Due to the interaction of the product with the machine / device and the environment, risks may arise that can only be determined and minimised by the user, e.g.
  - forces generated,
  - movements generated,
  - Influence of hydraulic and electrical control,
  - etc.
- Ensure that personal protective equipment is used during all work steps.

6 Use

6.1 Intended use

The products are intended exclusively for clamping workpieces in industrial use. They may only be operated with hydraulic oil.
The intended use also includes

- Use within the performance limits specified in the technical data (see catalogue sheet).
- Use in the manner described in the operating manual.
- Compliance with the maintenance intervals.
- Personnel qualified or instructed in accordance with the activities.
- The installation of spare parts only with the same specifications as the original part.
- Only HLP hydraulic oils may be used.
- Only clamping jaws may be moved.

6.2 Improper use

⚠ WARNING

Injury, damage to property or malfunctions!

- Do not make any modifications to the product!

The use of the products is not permitted:

- For use at home.
- On pallets or tool tables in primary shaping and forming machines.
- If physical/chemical effects (vibrations, welding currents or others) could damage the product or the seals.
- In machines, pallets or tool tables used to change the properties of materials (magnetization, irradiation, photochemical processes, etc.).
- In areas where special guidelines apply, especially for equipment and machinery:
  - For use at fairgrounds and amusement parks.
  - In food processing or in areas with special hygiene regulations.
  - For military purposes.
  - In mines.
  - In explosive and aggressive environments (e.g. ATEX).
  - In medical technology.
  - In the aerospace industry.
  - For passenger transport.

- For deviating operating and environmental conditions, e.g:
  - With higher operating pressures than specified in the catalogue sheet or installation drawing.
  - For fluids that do not comply with the specifications.
  - For larger volume flows than specified in the catalogue sheet or installation drawing.

Special solutions are available on request!

7 Assembly

⚠ WARNING

Injury by high-pressure injection (squirting out of hydraulic oil under high pressure)!

- Improper connection can lead to escapes of oil under high pressure at the connections.
- Mounting or dismounting of the element must only be made in depressurised mode of the hydraulic system.
- Connection of the hydraulic line as per DIN 3852/ISO 1179.
- Unused connections have to be locked professionally.
- Use all mounting holes.

Injury by high-pressure injection (squirting out of hydraulic oil under high pressure)!

Wear, damage of the seals, ageing and incorrect mounting of the seal kit by the operator can lead to escapes of oil under high pressure.

- Before using them make a visual control.

Injury by dropping parts!

- Keep hands and other body parts away from the work area.
- Personal protective equipment

Poisoning due to contact with hydraulic oil!

Wear, damage of the seals, ageing and incorrect mounting of the seal kit by the operator can lead to escapes of oil.

Incorrect connection can lead to escapes of oil at the ports.

- For handling with hydraulic oil consider the material safety data sheet.
- Wear protection equipment.

⚠ CAUTION

Heavy weights can fall down

- Some product types have a considerable weight. These must be secured against falling during transport.
- The weight specifications can be found in the "Technical data" chapter.

NOTE

Aggressive media

If there is a possibility that aggressive cutting and cooling fluids with swarf may enter the interior of the clamping slide, the interior of the clamping slide must be cleaned by the customer.

Ease of movement

Ensure ease of movement during assembly!

7.1 Assembly types

⚠ WARNING

Risk of injury due to improper fixation of the product!

Improper fixation of the product can cause the product to come loose from the machine table or be damaged during clamping or processing.

- Install the product according to the instructions in this operating manual.
- Before installing the product, ensure that the mounting surface of the product base and machine table are clean.
- The mounting surface of the product substructure must be level and rest on the machine table with at least a 75 % overlap.
- Install the product according to the torque specifications in the operating manual.
- Fixate the product in such a way that it cannot be displaced by the machining forces.

Crushing, burns and broken bones from falling workpieces!

Workpieces can fall during work and cause injuries.

- Wear protective footwear with at least safety level 1 (S1) during work.

Risk of injury due to improperly fitted hand crank or fitted torque wrench!

If the crank handle or torque wrench is not properly attached, it may slip off when cranking or turning and injure the operator.

- Check that the hand crank or torque wrench is correctly seated.

Risk of injury due to restricted range of motion of the crank handle or torque wrench!

When cranking or turning, limbs can be crushed between the crank handle or torque wrench and objects within the range of motion of the crank handle or torque wrench.

- The range of motion of the crank handle or torque wrench must be freely accessible.

Fixing on the machine table

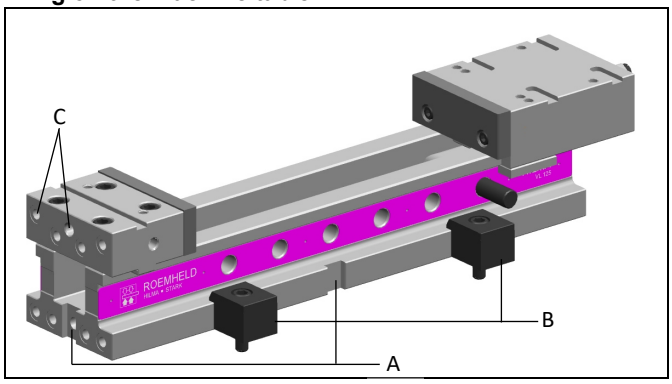


Fig. 1: Assembly types for series HILMA.NC(H) with reference keyway (A), clamping claw (B), drilling pattern on the face (C, on request, for vertical mounting)

Fixing to the machine table:

1. Remove any unevenness and swarf between the support and the base surface.
2. Alignment
   - with the dial gauge,
   - with keyblocks,
   - with positioning pins
3. Fixing
   - with screws,
   - with clamping claws.

Special fixing kits can be ordered for each series.

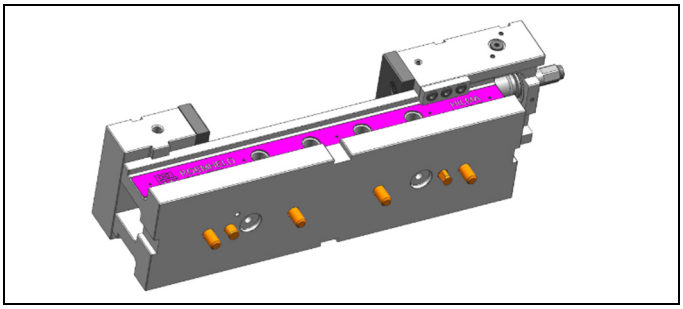


Fig. 2: Assembly for series HILMA.NC(H) with dowel pins and screws through the base (on request)

Fixing via zero point clamping system (ZPS)

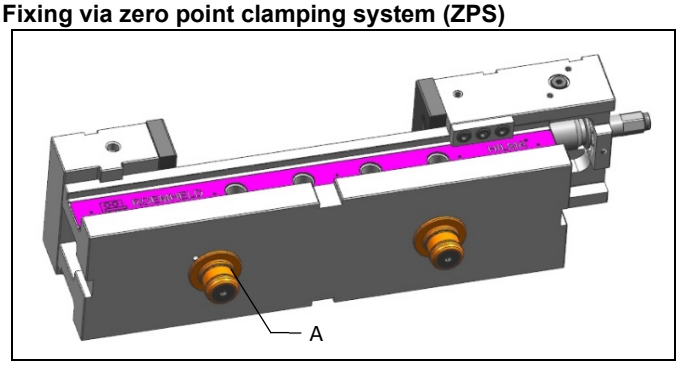


Fig. 3: Assembly for HILMA.NC(H) series via ZPS with retractable nipples (A)

Fixing via ZPS

1. Install the retractable nipple according to the manufacturer's instructions
2. Remove any unevenness and swarf between the ZPS and the base surface.
3. Release the ZPS, insert the vice and clamp the ZPS

8 Commissioning

⚠ WARNING

Poisoning due to contact with hydraulic oil!

Wear, damage of the seals, ageing and incorrect mounting of the seal kit by the operator can lead to escapes of oil.

Incorrect connection can lead to escapes of oil at the ports.

- For handling with hydraulic oil consider the material safety data sheet.
- Wear protection equipment.

Risk of injury from high-pressure injection due to improper handling!

If the hydraulic system is handled improperly, fluids can spray out of the hydraulic system under high pressure and injure people.

- Only allow work on hydraulic equipment to be carried out by qualified personnel with the appropriate knowledge in this area.

ⓘ NOTE

Lubricate before commissioning

The elements are supplied with minimum lubrication.

Before commissioning, the sliding surfaces must be lightly oiled with ISO VG 220 bedway oil!

- Check tight fit (check tightening torques of fixing screws).

ⓘ NOTE

Operation of the product on grinding machines

When the product is used on grinding machines, the product becomes increasingly dirty.

- Remove dirt from the product at regular intervals.

Observe clamping force and temperature difference

The product is to be used in such a way that the temperatures occurring as intended do not lead to inadmissible clamping forces. In particular, the following points must be observed:

- Durability of seals
- Expansion of media.
- Admissible temperature difference of the product in clamped condition is max. +/- 10 °C.

⚠ WARNING

Risk of injury or material damage due to collision with system components!

Persons may be injured by collision with the system components in the range of motion of the system components or property damage may be caused by collision with other system components.

- Before commissioning, check the movement range of the system components for collisions.

9 Operation

⚠ WARNING

Vibration loosens the fixation of the product!

Vibration impairs the fixation of the workpiece and leads to an improperly fixed workpiece. An improperly fixed workpiece can be ejected from the product during processing and injure people or cause material damage.

- Avoid vibration on the product as far as possible.

Risk of burns from hot workpieces!

Hot workpieces can cause burns to parts of the body.

- Wear heat-resistant protective clothing.

Risk of injury when clamping the workpiece!

Due to the characteristics of the workpiece, people may be injured during the clamping process because the workpiece is not properly clamped.

- Remove any dirt from the clamping surfaces before clamping.
- Observe the material properties of the workpiece when clamping.
- Observe the shape of the workpiece when clamping.
- Observe the clamping surface of the workpiece when clamping.
- Observe the mass inertia of the workpiece when clamping.

Risk of injury due to improperly secured socket pins!

If the socket pin is not properly secured, the socket pin may slip out of the securing. The clamping slide can slip from the base and cause injuries due to a socket pin not secured in the product.

- Check that the socket pin is properly secured before clamping.

⚠ CAUTION

Risk of injury due to crushing of limbs when clamping

The product must be used in such a way that no limbs of yourself or others can be crushed during clamping.

- When clamping, keep the clamping range clear of limbs of yourself or others.

Risk of injury when clamping and releasing the product due to the high force exerted

Initially, higher forces have to be overcome when unclamping the product. Persons can slip and injure themselves due to the high exertion when unclamping.

- Release clamping carefully and slowly.

NOTE

Machining with an attached crank handle or torque wrench is not permitted

A crank handle or torque wrench attached to the product is not permitted during machining.

- Before machining a workpiece, remove the crank handle or torque wrench from the product.

9.1 Design of HILMA.NC

The hydraulic force of an internal piston will be transmitted by the slide onto the clamping jaw.

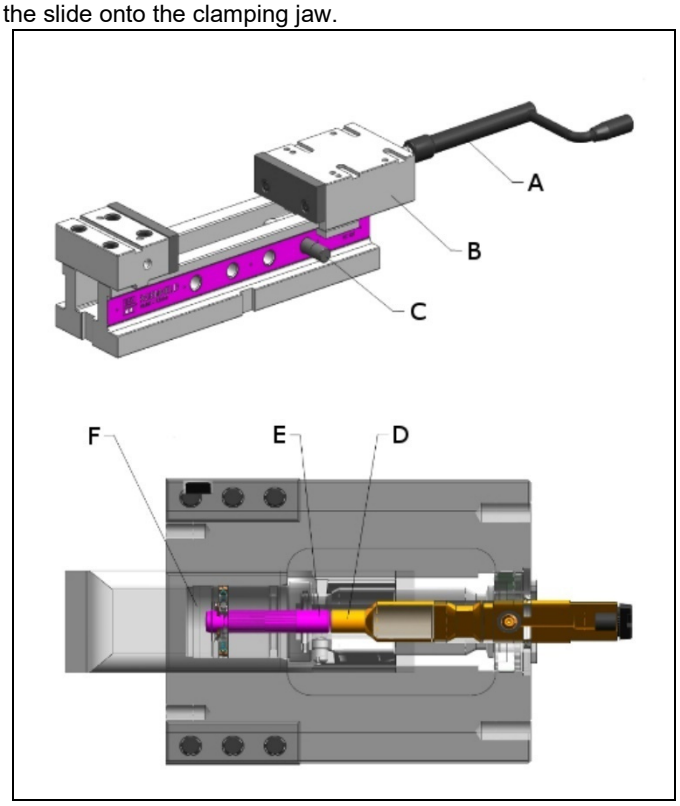


Fig. 4: Components HILMA.NC series

A	Crank handle	D	Pressure spindle
B	Clamping slide	E	Primary piston
C	Socket pin	F	Oil chamber

9.2 Setting the clamping range of HILMA.NC

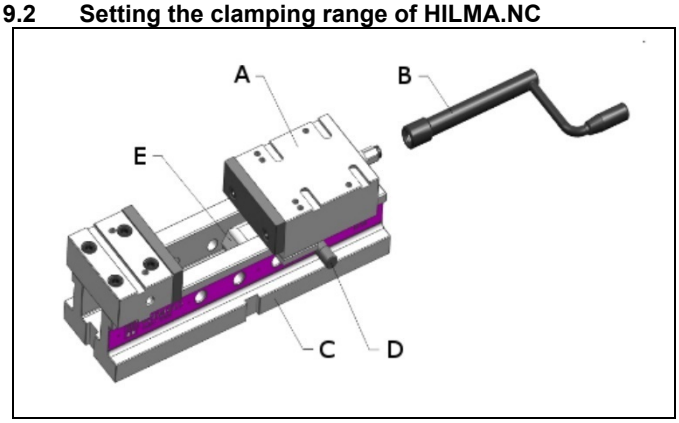


Fig. 5: Setting the clamping range

A	Clamping slide	D	Socket pin
B	Crank handle	E	Angle nut
C	Base		

- Pull the socket pin and move the clamping slide until the workpiece can be inserted.
- Push the clamping slide against the workpiece.
- Turn the crank handle until the angle nut in the base adjusts so that the socket pin can be inserted through the base and angle nut up to the stop.
- Insert the socket pin.
- Check clamping range overlap (min. 2 mm).

9.3 Design of HILMA.NCH

The hydraulic power stroke is generated by an external pressure transducer. The return spring ensures fast opening of the clamping slide. The precise adjustment of the clamping range is made with the crank handle.

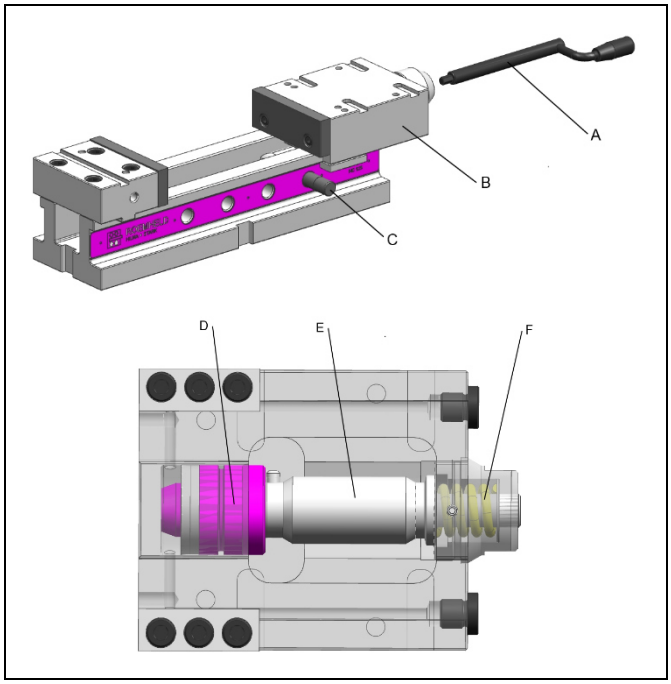


Fig. 6: Components for series NC

A	Crank handle	D	Piston
B	Clamping slide	E	Spindle
C	Socket pin	F	Return spring

9.4 Setting the clamping range of HILMA.NCH

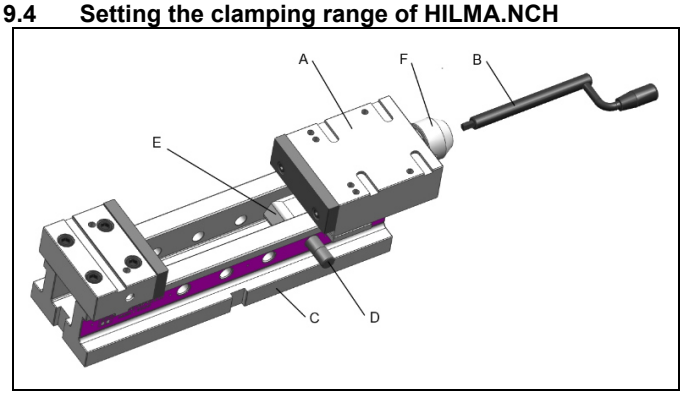


Fig. 7: Setting the clamping range

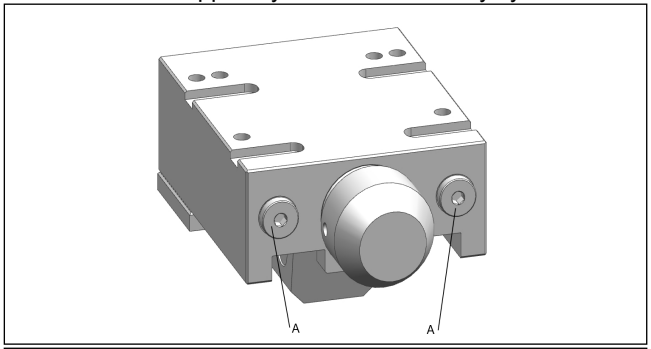
A Clamping slide	D Socket pin
B Crank handle	E Angle nut
C Base	F Rotation lock

- Remove the rotation lock from the bearing cover
- Pull the socket pin and move the clamping slide until the workpiece can be inserted.
- Push the clamping slide against the workpiece.
- Turn the crank handle until the angle nut in the base adjusts so that the socket pin can be inserted through the base and angle nut up to the stop.
- Insert the socket pin.
- Adjust the insertion clearance for the workpiece by turning the crank handle. BB100 = max. 3 mm, BB125 = max. 3 mm, BB160 = max. 5 mm
- Remove the crank handle and push and mount the rotation lock onto the bearing cover of the clamping slide.

Do not use the entire power stroke as insertion clearance, otherwise the clamping slides will move during clamping against the internal stop and as a result the workpiece will not be clamped. In the case of yielding parts, the clamping slide may have to be closed with the crank handle before clamping.

9.5 Oil port

At one of the two oil ports G1/4, the clamping slide is connected to the hydraulic unit via a high-pressure hose. The system is bled free from bubbles via the second port with low pressure adjustment of the power unit.
Oil recommendation: HLP32 or HLP46 as per DIN 51524
The pressure transducer should work in intermittent operation and be equipped with pressure monitoring and machine safety system. The pressure monitoring switches on the pump after a pressure drop of 10%. In the case of a pressure drop of 15%, the machine is stopped by the machine safety system.



A Oil port G1/4

9.6 Clamping and releasing

⚠ WARNING

Risk of injury due to flexible or insufficiently clamped workpieces!

Flexible or insufficiently clamped workpieces can be ejected from the machine during processing or fall down and injure people.

- Only use the product for clamping rigid workpieces.
- Clamp the workpiece sufficiently before machining.

Risk of injury due to insufficient clamping force or clamping of the workpiece!

An insufficient clamping force of the product or insufficiently clamped workpieces can be ejected from the machine during processing or fall down and injure people.

- Have the product checked for operational safety by a qualified specialist after prolonged downtime, after repairs and at regular intervals.
- Have the product checked for defined clamping force by a qualified specialist.
- Have the product checked for visual damage or wear by a qualified specialist.
- Before commissioning the product, check that the product is properly fixed.
- Before commissioning the product, check that the workpiece is securely clamped.

9.6.1 Clamping and releasing the HILMA.NC

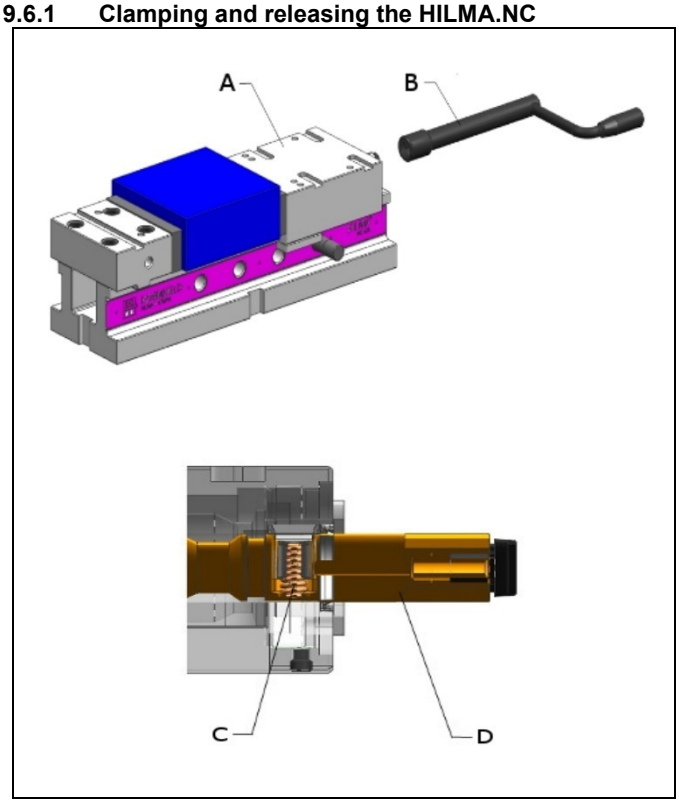


Fig. 8: Clamping and releasing

A Clamping slide	C Catch
B Crank handle	D Pressure spindle

- By turning the crank handle clockwise, the clamping slide is moved to the workpiece until a noticeable resistance is created. By means of the catch, the changeover to the mechanical-hydraulic power transmission takes place with increased force (or a stroke) on the crank handle. When the inner pressure spindle

is turned further, the clamping force is built up continuously up to the stop.

- The clamping force adjustment to sensitive workpieces is continuously adjustable by reducing the crank rotation (see technical data). A clamping force preselection (repeatable, gradual clamping force adjustment) is available as an accessory. For slides with clamping force display (see accessories), the clamping force is displayed and the clamping force can be precisely and continuously adjusted.
- The clamping force is continuously reduced by turning the crank handle counterclockwise until the catch engages noticeably. The vice is opened when the crank handle is turned further.
- The catch must engage, otherwise only a reduced clamping force will be achieved when reclamping.

9.6.2 Clamping and releasing the HILMA.NCH

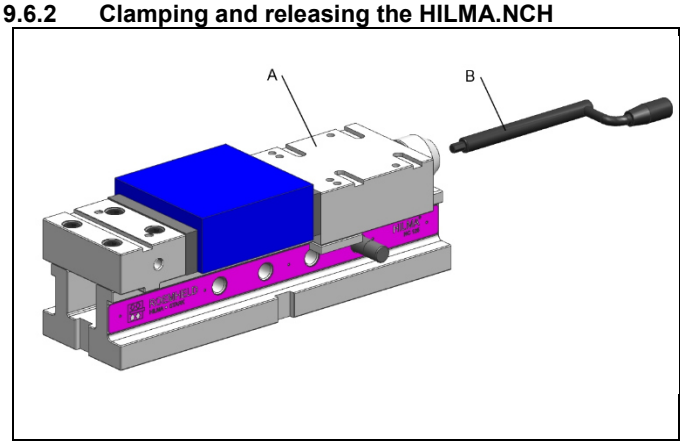


Fig. 9: Clamping and releasing

A Clamping slide	B Crank handle

When the hydraulic power unit is switched on, the workpiece is clamped proportionally to the set pressure, see chapter 12 "Technical data". To unclamp, a directional control valve is actuated so that the integrated spring returns the clamping slide to its off-position.

9.7 Clamping and releasing with clamping jaws with grip

To compensate for the plastic deformation of the workpiece when clamping with clamping jaws with grip, two clamping operations are required for the HILMA.NC, as described in chapter 9.6.1 "Clamping and releasing"

NOTE

Loss of clamping force in the gripper area

The first time the workpiece is clamped with the gripper, deformation occurs in the area of the gripper. Due to the deformation, the workpiece is no longer sufficiently clamped and must be reclamped in a second clamping operation.

- After the first clamping, do not move the workpiece and clamp it a second time.

9.8 Brake for clamping slides, as an accessory for the HILMA.NC(H) series

⚠ CAUTION

Risk of crushing due to falling clamping slide without brake (size 100 + 125)

When the product is used vertically with the socket pin pulled, the clamping slide is not held in position without the brake fitted. Without the brake fitted, the slide drops down along the base and can crush limbs.

- Install the brake before using the product vertically.

Risk of crushing due to falling clamping slide without gas pressure spring (size 160)

When the product is used vertically with the socket pin pulled, the clamping slide is not held in position without the gas pressure spring fitted. Without the gas pressure spring fitted, the slide drops down along the base and can crush limbs.

- Install the gas pressure spring before using the product vertically.

⚠ WARNING

Risk of injury due to damage to the gas pressure spring!

The gas pressure spring is under high pressure. When attempting to open or overheat the gas pressure spring, the pressure escapes from the gas pressure spring and may injure persons.

- Do not open gas pressure spring.
- Do not heat the gas pressure spring above 80 °C.
- After prolonged storage, check gas pressure spring for proper function.

Danger of crushing due to automatic pushing back of the clamping slide!

When the product is used horizontally and with the socket pin pulled, the gas pressure spring pushes the clamping slide to the rear and can crush limbs in the process.

- Keep the movement area of the clamping slide free of body parts and objects before pulling the socket pin.

NOTE

Vertical mounting with brake/gas pressure spring

The products are suitable for vertical mounting.

For this purpose, the brake (size 100 + 125) **must** be retrofitted (see 12.2 Accessory, page 15).

For size 160, the vertical design **must** be expressly provided for in the order (special version base and type plates). In this case, the gas pressure spring is already fitted as supplied.

9.8.1 Brake for clamping slide size 100 and 125

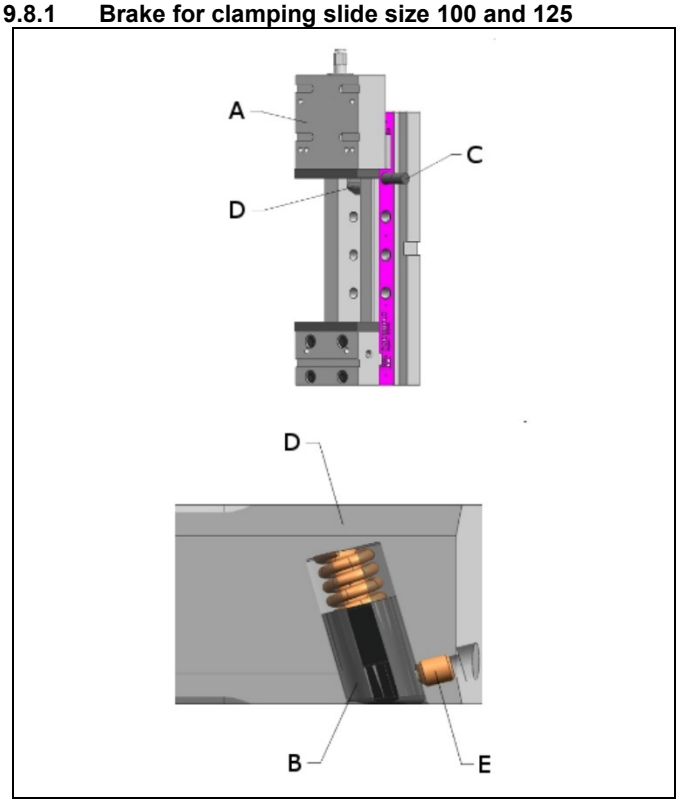


Fig. 10: Brake for clamping slide BB 100 + BB 125

A Clamping slide	D Angle nut
B Brake	E Locking screw
C Socket pin	

The brake is not mounted or activated when delivered. This enables easy adjustment of the clamping range in horizontal operation.

Mount the brake

- Pull the socket pin.
- Pull the clamping slide back to the end of the guide.
- Install contact piece, pressure spring and locking screw into the angle nut.

Release the brake

- Press the brake into the angle nut.
- Tighten locking screw.

9.8.2 Gas pressure spring for clamping slide size 160

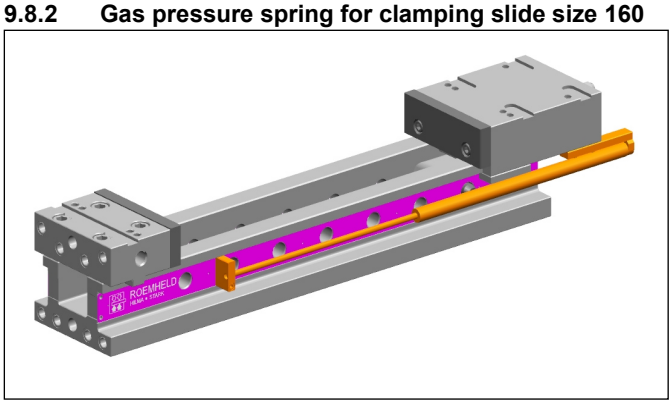


Fig. 11: Brake for clamping slide BB 160

9.9 Angle drive (HILMA.NC)

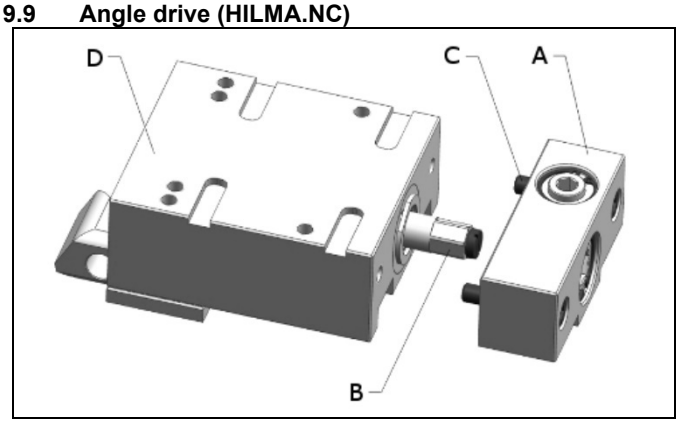


Fig. 12: Angle drive

A Angle drive	C Screws
B Pressure spindle	D Slide surface

Gear ratio NC100: 1.33; NC125: 1.36; NC160: 1.39
The gear ratio of the angle drive affects the clamping force curve of the slide (chapter 12). The number of spindle revolutions for a specific clamping force must be corrected by the gear ratio of the angle drive.

Mount the angle drive

- Push the angle drive onto the pressure spindle.
- Tighten the screws slightly.
- Align the angle drive parallel to the slide surface.
- Tighten the screws.
- Check smooth running.

Dismount the angle drive

- Loosen the screws.
- Remove the angle drive from the pressure spindle.

9.10 Rotation lock for clamping slide (HILMA.NCH)

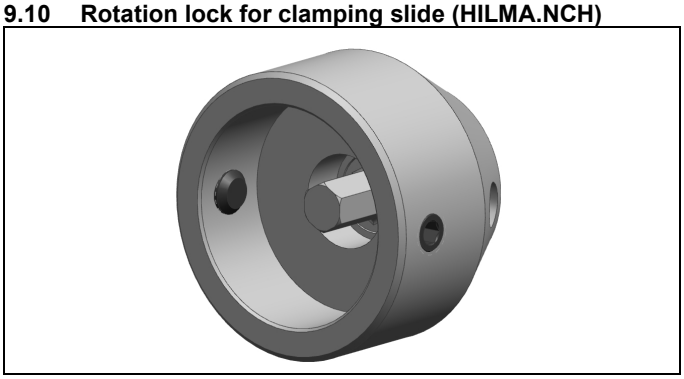


Fig. 13: Rotation lock

After adjusting the clamping range, the rotation lock is pushed onto the bearing cover of the clamping slide. To do this, align the hexagon socket of the spindle and the hexagon socket of the rotation lock with the flat surfaces on the bearing cover (observe the insertion clearance). Then secure with the set screws. This secures the spindle against torsion when the clamping force is repeatedly applied.

9.11 Clamping force preselection (HILMA.NC)

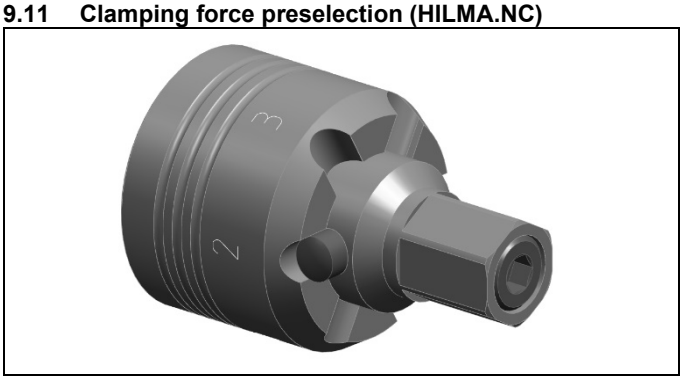


Fig. 14: Clamping force preselection

With the six-stage clamping force preselection, the clamping force can be reduced in fixed steps for all slide versions. With clamping force preselection, the stroke of the pressure spindle is reduced in six steps, whereby the clamping force is reduced in proportion to the stroke.

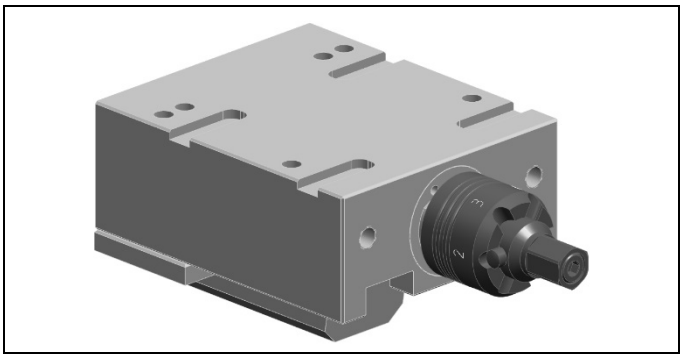


Fig. 15: Mounted clamping force preselection

Mount clamping force preselection:

1. Remove the screw plug and sealing ring on the pressure spindle
2. Remove the transportation lock nut in the clamping force preselection
3. Slide the clamping force preselection onto the pressure spindle.
4. Tighten clamping force preselection with fastening screw

Setting the clamping force:

1. Loosen the vice, the catch must be engaged.
2. Push the outer sleeve (numbered) of the clamping force preselection towards the clamping slide.
3. The sleeve can now be turned. The number at which the cylinder pin lies in the groove indicates the clamping force on a scale (1 = lowest clamping force, 6 = highest clamping force).

For operation, proceed as described in chapter Clamping and releasing the HILMA.NC". Instead of the primary piston in the bore hole, the pressure spindle is in contact with the slide via the clamping force preselection. The clamping force is limited by the reduced travel.

9.12 Clamping force display (HILMA.NC)

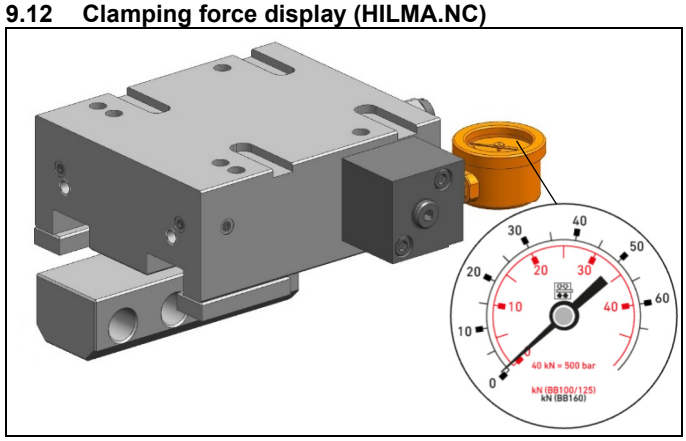


Fig. 16: Mounted clamping force display

The clamping force display is an optional extra for the clamping slide, which must be specified when ordering. The clamping force display consists of a connection block and a pressure gauge, which is equipped with suitable scales so that the existing clamping force can be read directly from the oil pressure. The inner (red) scale indicates the clamping force for jaw widths 100 and 125, the outer (black) scale for jaw width 160. The clamping force display can be mounted on the left (shown) and right of the clamping slide.

The clamping force can be continuously reduced and read off using the clamping force display. This is an advantage when clamping thin or delicate workpieces. When clamping slightly flexible workpieces, the reduced clamping force due to the flexibility can be read off. When clamping with gripping elements, the remaining clamping force after the initial embossing of the workpieces is also visible. This makes it possible to decide whether the clamping force is sufficient in certain situations.

10 Maintenance

⚠ WARNING

Risk of burns from hot surfaces!

- During operation, surface temperatures on the product can exceed 70 °C.
- Only carry out maintenance and repair work when the unit has cooled down or when wearing protective gloves.

Risk of injury due to breakage of parts of the product!

During operation, parts of the product may break and cause injury to persons.

- Observe the maintenance intervals for the parts in accordance with the operating manual.

Risk of injury from high-pressure injection due to improper handling!

If the hydraulic system is handled improperly, fluids can spray out of the hydraulic system under high pressure and injure people.

- Only allow work on hydraulic equipment to be carried out by qualified personnel with the appropriate knowledge in this area.

10.1 Maintenance schedule

Maintenance work	Interval	Implementation
Cleaning	As required	Operator
Regular checks	Daily (after 8 hours at the latest)	Operator
Regular lubrication	At the latest after 500 clamping cycles!	⚠ **Caution!** If this lubrication is not carried out, the machine vice may fail!
Repair		Qualified personnel

NOTE

Maintenance schedule

- We recommend keeping a maintenance schedule for documentation purposes.

10.2 Cleaning

⚠ CAUTION

Damage to the moving components

Avoid damaging the moving components (rods, plungers, bolts, etc.) as well as wipers and seals.

Aggressive cleaning agents

The product must not be cleaned with:

- corrosive or caustic components or
- organic solvents such as halogenated or aromatic hydrocarbons and ketones (nitro thinner, acetone etc.), as this may destroy the seals.

The element must be cleaned at regular intervals. The clamping slide and housing area in particular must be cleaned of swarf and any liquids.

In case of heavy contamination, cleaning must be carried out at shorter intervals.

10.3 Regular checks

1. Check hydraulic connections for leaks (visual inspection).
2. Leakage check on the housing and clamping slide.
3. Clamping force control by pressure check
4. Check compliance with the maintenance intervals.

10.4 Exchange seal kit

The exchange of the seal kit has to be made in case of external leakages. For high availability we recommend to change the seals at the latest after 1,000,000 cycles or 2 years.
The seal kit is available as spare part.

NOTE

Seal kits

- Do not install seal kits which were exposed to light for a longer time.
- Observe storage conditions (see chapter "Technical data").
- Only use original seals.

10.5 Maintenance and care

Dismantle clamping slide (HILMA.NC and HILMA.NCH)

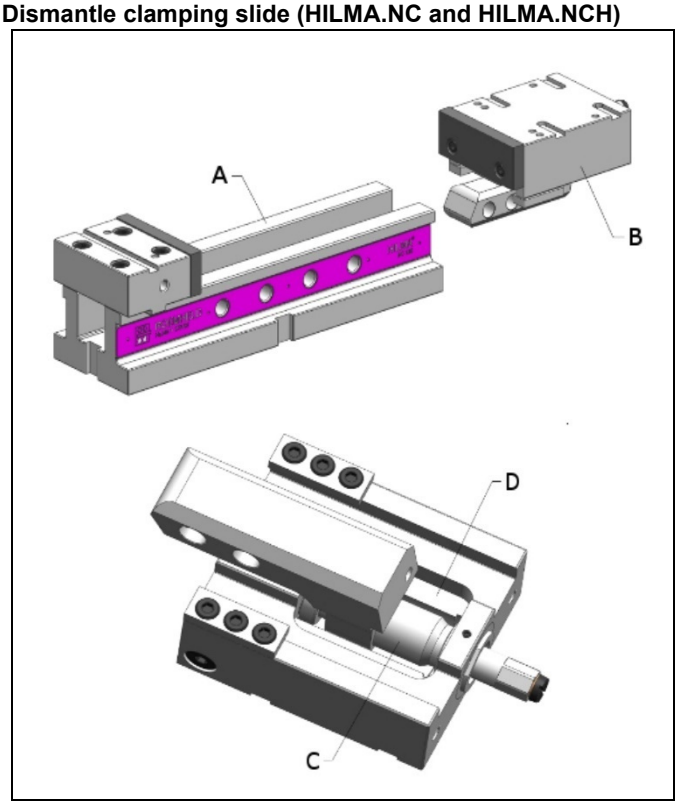


Fig. 17: Dismount the clamping slide

A	Base	C	Spindle thread
B	Clamping slide	D	Spindle area

The machine vice does not require any special maintenance other than the usual care. The following maintenance and care work must be carried out as required, at least once a month, at the latest after 500 clamping cycles:

1. Remove the clamping slide from the base, clean, oil the sliding surfaces with bedway oil and remove if necessary.
2. Lubricate the spindle thread with bedway oil.
3. Lubricate the lead screw area with bedway oil.

On this occasion, check the oil reserve at distance "F" between secondary piston and slide body "F" = 1 ± 0.2 mm (only for NC). If the gap dimension is not reached, top up with hydraulic oil as described in chapter 10.5.1 "Refilling of hydraulic oil (HILMA.NC)".

10.5.1 Refilling of hydraulic oil (HILMA.NC)

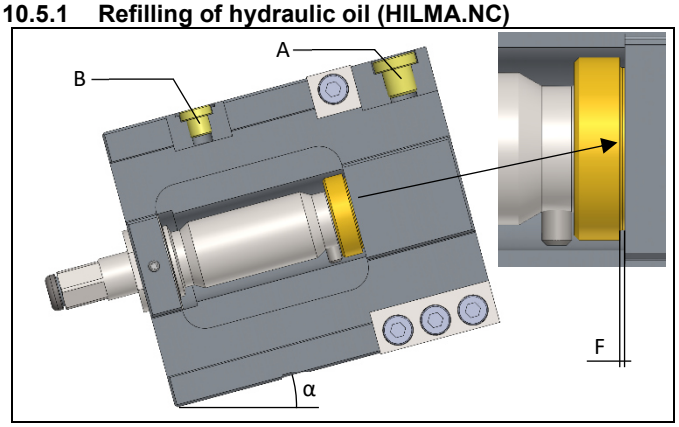


Fig. 18: Refilling of hydraulic oil (on the universal slide)

A Screw plug A	F Distance 1 ± 0.2 mm
B Screw plug B	α Angle 10° horizontal

Use hydraulic oil HLP 68 or HLP 32 for topping up!
Screw plugs with damaged seals must always be replaced!
We recommend replacing the screw plugs at the third oil change!

1. Turn the pressure spindle back until the catch engages.
2. Remove the clamping slide from the base, clean and oil the sliding surfaces with bedway oil and draw them down if necessary.
3. Open all screw plugs, empty the oil in the clamping slide, fit screw plugs G⅛"
4. Pressurise the oil chamber with compressed air (e.g. using a compressed air gun with a rubber head or a gun sealed with a cloth; movement of the piston is visible).
5. Place the clamping slide at an angle of 10° (see Fig. 18).
6. Open screw plug B, fill oil slowly and bubble-free through the hole for screw plug A up to the upper edge of the thread of screw plug B (ideally allow oil to run along the thread into the bore system).
7. Screw in screw plug B, slowly fill oil up to the upper edge of the thread of screw plug A, wait 10 minutes after filling.
8. Air bubbles will rise, top up oil to the upper edge of the thread in between.
9. Screw in screw plug A quickly*.
10. The gap dimension F should be around 0.3 mm. Insert 0.3 mm feeler tape. If there is no gap, open the screw plug and continue with step 8.
11. Lay the clamping slide flat, open screw plug A, top up with oil and quickly* screw screw plug A back in.
12. Insert an appropriate feeler gauge into the resulting gap.
13. Open screw plug A, top up with oil and quickly* screw screw plug A back in.
14. Repeat steps 12-13 until the gap dimension F is 1.0 - 1.2 mm. The filling process is complete. If the gap is too large, insert a correspondingly thinner feeler gauge in step 12.
15. Tighten the screw plugs. Observe the tightening torque:
    a. 12 Nm for G1/8 (clamping force display)
    b. 30 Nm for G1/4 (size 100+125)
    c. 50 Nm for G3/8 (size 160)
16. Lubricate the spindle thread and spindle chamber with bedway oil.
17. Check the clamping force with a load cell

*quickly ~ 2 turns of the screw plug per second

If oil has to be topped up more than twice a year or the clamping force cannot be maintained, there is a risk of damaged seals. The seal set should be replaced in accordance with chapter 10.4 "Exchange seal kit". Alternatively, the slide can be sent to the manufacturer's factory for a factory overhaul.

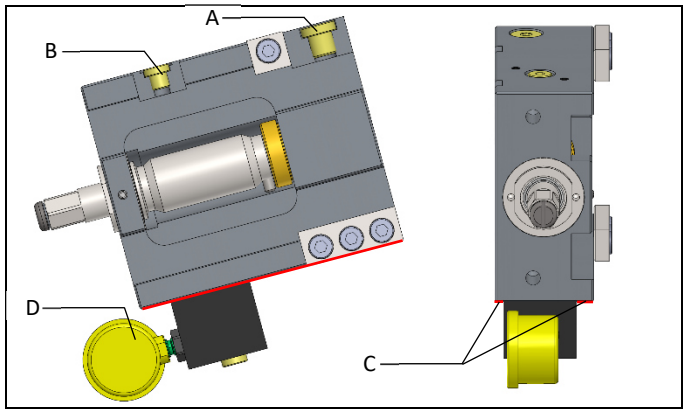


Fig. 19: Slide with pressure gauge, left

A Screw plug A	C Contact areas
B Screw plug B	D Pressure gauge

When filling, the slide must not rest on the pressure gauge or the connection block! The slide may only rest on the support surfaces C or the pressure spindle (e.g. on parallel supports).

If the clamping force display on the left is fitted, an empty clamping must be carried out after step 18. To do this, place the slide in the base and clamp the clamping slide without the workpiece and the socket pin. During the hydraulic power transmission, the hollow spindle moves slightly out of the carriage. At the end of the clamping process (pressure spindle at the stop), the pressure gauge must read max. 2 kN.

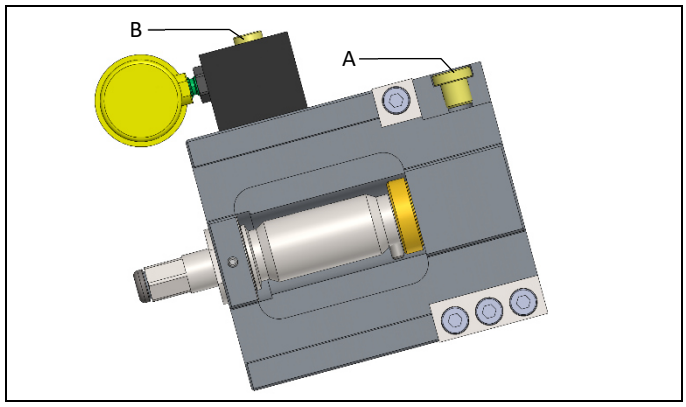


Fig. 20: Slide with pressure gauge, right

A Screw plug A	B Screw plug B

On the slide on the right, the screw plug on the connection block of the pressure gauge is used for filling.

When using the clamping force display, the filling process changes as follows:

6. Open screw plug A and B, fill oil slowly and bubble-free up to the upper edge of the thread of screw plug A, wait 10 min. (ideally allow oil to run along the thread into the bore system).
7. Top up oil if necessary, screw in screw plug A, slowly fill oil up to the upper edge of the thread of screw plug, wait 3 min.
8. Top up oil if necessary, screw in screw plug B, open screw plug A, top up oil.

If the clamping force display on the right is fitted, an empty clamping must be carried out after step 18. To do this, place the slide in the base and clamp the clamping slide without the workpiece and the socket pin. During the hydraulic power transmission, the hollow spindle moves slightly out of the carriage. At the end of the clamping process (pressure spindle at the stop), the pressure gauge must read max. 2 kN.

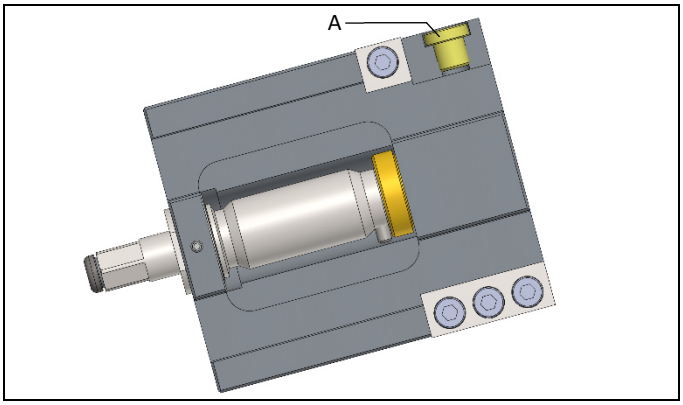


Fig. 21: Slide "old version"

A Screw plug A	

The second screw plug is omitted on the previous version of the slide. The following steps change:

5. not applicable, slide can be filled horizontally.
6. Open screw plug A, fill oil slowly and bubble-free up to the upper edge of the thread, (ideally allow oil to run along the thread into the bore system), wait 5 min.
7. not applicable

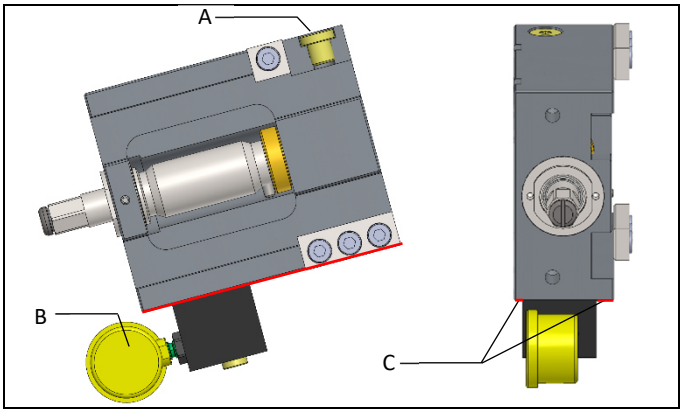


Fig. 22: Slide "old version" with pressure gauge

A Screw plug A	B Pressure gauge
C Contact areas	

When filling, the slide must not rest on the pressure gauge or the connection block! The slide may only rest on the support surfaces D (e.g. on parallel supports).

The second screw plug is omitted on the previous version of the slide with pressure gauge. The following steps change:

6. Open screw plug A, fill oil slowly and bubble-free up to the upper edge of the thread, (ideally allow oil to run along the thread into the bore system), wait 5 min.
7. not applicable

If the clamping force display is fitted, an empty clamping must be carried out after step 18. To do this, place the slide in the base and clamp the clamping slide without the workpiece and the socket pin. During the hydraulic power transmission, the hollow spindle moves slightly out of the carriage. At the end of the clamping process (pressure spindle at the stop), the pressure gauge must read max. 2 kN.

10.5.2 Lubrication of the catch (HILMA.NC)

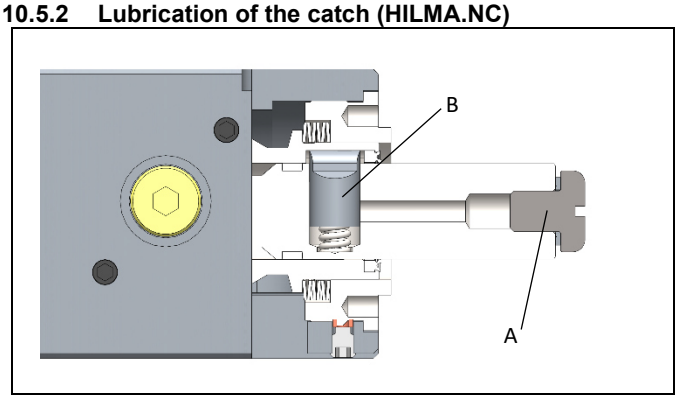


Fig. 23: Lubrication of the catch

A Screw plug	B Locking bolt

1. Loosen screw plug A.
2. Add approx 0.5 ml of Vactra 2 bedway oil.
3. Screw in screw plug A again
4. Relubricate as required, but at least once a month.

10.6 Service / maintenance service

1. Austria and Germany
   <u>Repair at the manufacturer's factory:</u>
   Please return the clamping system carriage paid with a STARK return note.

   Stark Spannsysteme GmbH
   Römergrund 14
   6830 Rankweil, Austria
   Tel: +43 5522 37400
   E-mail: info@stark-roemheld.com

   <u>Repair at the customer's factory:</u>
   Please request the maintenance service.

   Service telephone: +49 6405 89400
   E-mail: service@roemheld.de

2. Third country
   Please contact the HILMA-RÖMHELD general importer or your local dealer.

11 Troubleshooting

11.1 Troubleshooting HILMA.NC

Fault	Cause	Remedy
Clamping slide has play	Guide knocked out	Exchange vice, exchange component, if required.
Clamping pressure reduces due to leakages at the vice	Wear at the seals	Replace seals.
No clamping pressure build-up	Pressure spindle not in off-position.	Turn pressure spindle back, until the indexing bolt engages (see chapter 9.6.1 "Clamping and releasing the HILMA.NC").
	Clamping range set incorrectly.	See chapter 9.2 "Setting the clamping range of HILMA.NC"
	Premature change over to hydraulic power transmission due to blocked slide guide.	After pulling the socket pin, remove the clamping slide from the base, clean and oil all sliding surfaces.
	High pressure path consumed by protruding burr or yielding workpiece.	Clamp only burr-free workpieces. Support yielding workpieces or clamp with formed jaws.
	Oil reserve exhausted.	Top up hydraulic oil (see chapter 10.5.1 "Refilling of hydraulic oil (HILMA.NC)").
Socket pin sluggish	Dirt between base and angle nut	Remove the clamping slide and clean the guide.
Sluggish clamping range adjustment	Brake effective.	See chapter 9.8.1 "Brake for clamping slide size 100 and 125" and 9.8.2 "Gas pressure spring for clamping slide size 160".

11.2 Troubleshooting HILMA.NCH

Fault	Cause	Remedy
Clamping slide has play	Guide knocked out	Exchange vice, exchange component, if required.
Workpiece is not clamped or not clamped sufficiently	Slide moves against internal stop	Reduce insertion clearance (see chapter 9.4 "Setting the clamping range of HILMA.NCH").
	Yielding workpiece	Support the workpiece or close the slide manually before clamping
	Operating pressure too low	Set higher pressure at pressure unit
	Spindle has loosened	Slide the rotation lock onto the bearing cover of the clamping slide (see chapter 9.4"Setting the clamping range of HILMA.NCH").
Clamping slide does not return to off-position or returns to off-position only slowly when pressure is relieved	Too high resistance in the return line	Increase hose cross-section or reduce hose length.
	Directional control valve dirty or defective	Clean the directional control valve and exchange if necessary
	Hydraulic oil too thick	Use hydraulic oil HLP 32 or HLP 46 as per DIN 51524
	Return spring defective	Exchange return spring
	The clamping slide jams due to heavy contamination.	Pull the socket pin and remove the clamping slide from the base. Clean the guideway, pull down if necessary, and lubricate.
Socket pin sluggish	Dirt between base and angle nut	Remove the clamping slide and clean the guide.
Sluggish clamping range adjustment	Brake effective.	See chapter 9.8.1 "Brake for clamping slide size 100 and 125" and 9.8.2 "Gas pressure spring for clamping slide size 160".

12 Technical data

Characteristic values

HILMA.NC			
Jaw width [mm]	100	125	160
Max. clamping force [kN]	25	40	50
Effort on the crank [N]	50	75	95
Crank radius [mm]	80	100	125

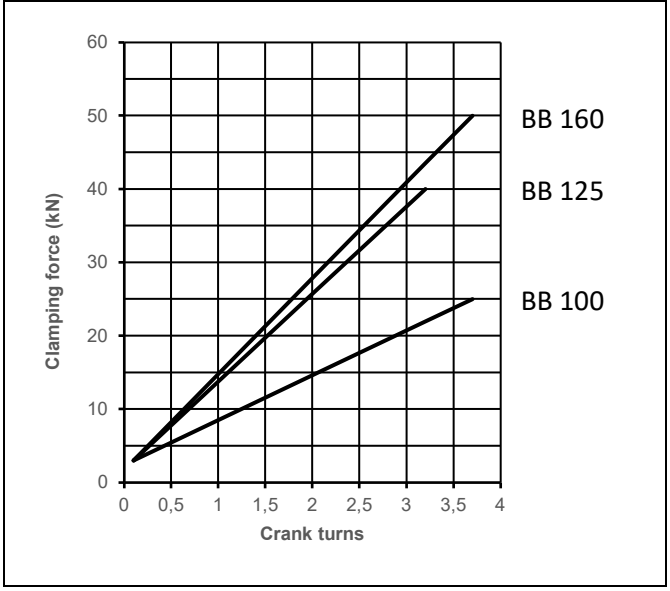


Fig. 24: Clamping force ratios of HILMA.NC

HILMA.NCH			
Jaw width [mm]	100	125	160
Max. clamping force [kN]	25	40	63
Operating pressure [bar]	350	350	350
Hydraulic power stroke [mm]	5	5	7
Oil volume per power stroke [cm³]	5	7	14

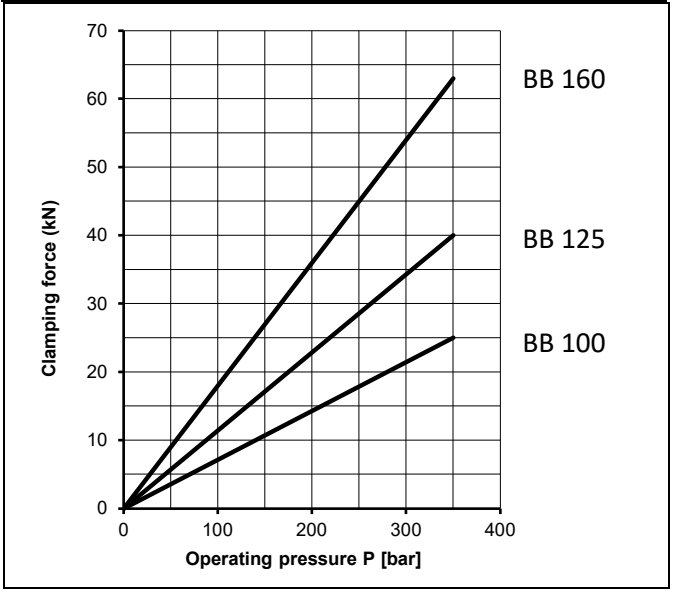


Fig. 25: Clamping force ratios of HILMA.NCH

NOTE

Further details

- Further technical data can be found in the catalogue sheet.

Suggestion, tightening torques for screws of strength class 8.8; 10.9, 12.9

NOTE

- The specified values are to be regarded as guide values and must be designed by the user depending on the application!
  See note!

Thread	Tightening torques (MA) [Nm]		
	8.8	**10.9**	**12.9**
M6	10	15	18
M8	25	36	45
M10	49	72	84
M12	85	125	145
M14	135	200	235
M16	210	310	365
M20	425	610	710

Note: Valid for workpieces and shaft screws made of steel with metric thread and head dimensions such as DIN 912, 931, 933, 934 / ISO 4762, 4014, 4017, 4032
The table values for tightening torques (MA) are taken into account:
Steel/steel design, coefficient of friction µtotal = 0.14 - not lubricated, utilisation of minimum yield strength = 90%.

12.1 Storage

⚠ CAUTION

Storage of components!

- The product must not be exposed to direct sunlight, as the UV light can destroy the seals.
- Storage outside the storage conditions is not permitted.
- Improper storage can lead to embrittlement of seals and resinification of the anti-corrosion oil or corrosion of the element.

The products are tested with mineral oil as standard. On the outside, the products are treated with an anti-corrosion agent. The oil film remaining after the test provides six months of internal corrosion protection when stored in dry and evenly tempered rooms.
For longer storage periods, the product must be filled with a non-resinifying corrosion inhibitor and the outer surfaces must be treated.

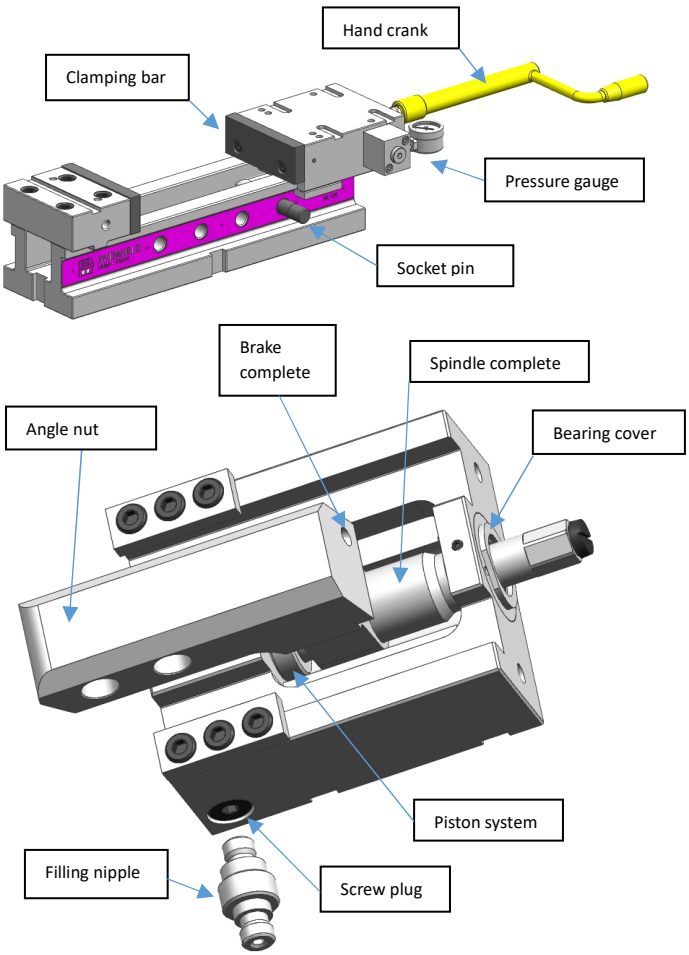
12.2 Accessory

NOTE

Accessory

- See catalogue sheet.
- Only the use of original STARK components, such as clamping jaws or corresponding accessories, is approved.

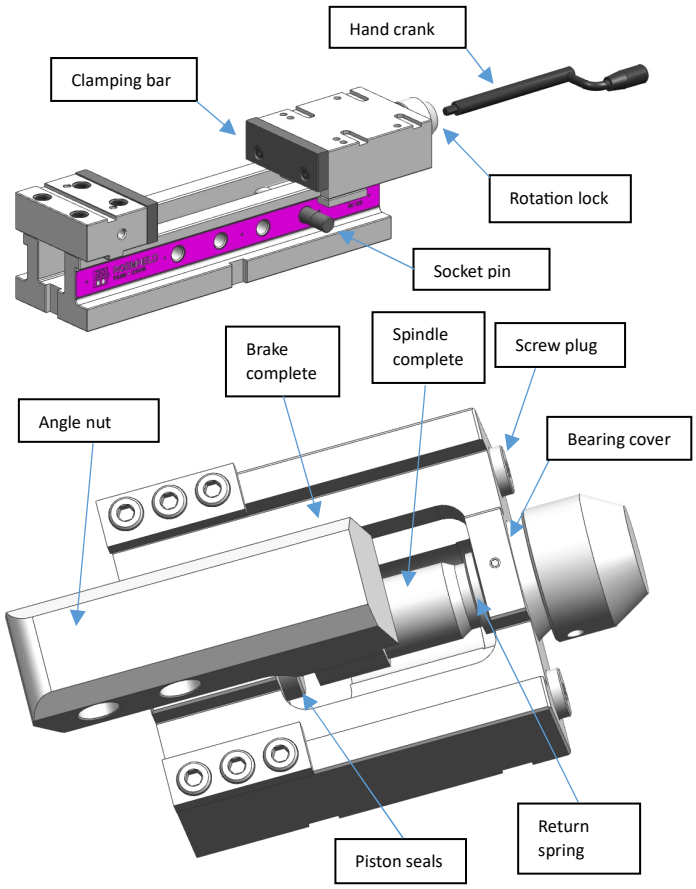
12.3 Spare parts HILMA.NC



Denomination	Pc(s)	Spare part no.		
		BB 100	BB 125	BB 160
Socket pin	1	730720006	730730006	730740006
Hand crank	1	420560020	420560019	420560021
Screw plug	1	109081009 G1/4"	109081009 G1/4"	109081010 G3/8"
Screw plug	2	109081008 G1/8"	109081008 G1/8"	109081008 G1/8"
Filling nipple	1	530900006	530900006	530900007
Angle nut	1	520530075	520530073	520530074
Spindle complete	1	930720523	930730523	930740523
Bearing cover	1	520310038	520310039	520310040
Clamping bar	1	932711201	932711301	932711401
Piston system	1	930720522	930730522	930740522
Pressure gauge left-hand	1	931220552	931220552	931220552
Pressure gauge right-hand	1	931220554	931220554	931220554
Brake complete (accessory)	1	931220551 in angle nut	931230551 in angle nut	937690401 Gas spring

Subject to modifications

12.4 Spare parts HILMA.NCH



Denomination	Pc(s)	Spare part no.		
		BB 100	BB 125	BB 160
Socket pin	1	730720006	730730006	730740006
Hand crank	1	420560022	420560022	420560023
Screw plug	1	109081009 G1/4"	109081009 G1/4"	109081009 G1/4"
Return spring	1	120980364	120980366	120980365
Angle nut	1	520530075	520530073	520530074
Spindle complete	1	930820513	930830513	930840513
Bearing cover	1	930820521	930830521	930840521
Clamping bar	1	932711201	932711301	932711401
Piston	1	510101064	510101049	510101065
Seals	1	930820520	930830520	930840520
Rotation lock	1	937651204	937651304	937651404
Brake complete (accessory)	1	931220551 in angle nut	931230551 in angle nut	937690401 Gas spring

Subject to modifications

If the seals are visually defective, the screw plugs must be replaced!

Examples (twisted/frayed seal):

13 Disposal

Hazardous to the environment
Due to possible environmental pollution, the individual components must be disposed of by an authorised specialist company.

The individual materials must be disposed of in accordance with the applicable guidelines and regulations as well as the environmental conditions.
Special attention must be paid to the disposal of components with residual pressurised fluids. The instructions for disposal in the safety data sheet must be observed.
When disposing of electrical and electronic components (e.g. position measuring systems, proximity switches, etc.), the country-specific legal regulations and provisions must be observed.

14 Declaration of Incorporation

Manufacturer

STARK Spannsysteme GmbH
Römergrund 14
6830 Rankweil Austria
Tel.: +43 5522 37400-0
E-mail: info@stark-roemheld.com
Internet: www.stark-roemheld.com

They are designed and manufactured in line with the relevant versions of the directives **2006/42/EC** (EC MSRL) and in compliance with the valid technical rules and standards.
According to the MD, these products are components that are not ready for use and are intended exclusively for installation in a machine, device or system.
The products may only be put into operation once it has been established that the incomplete machine / machinery into which the product is to be installed complies with the provisions of the Machinery Directive (2006/42/EC).

The manufacturer undertakes to provide the specific documentation of the products to national authorities on request.
The technical documentation in accordance with Annex VII Part B has been prepared for the products.

15 List of applied standards

Product Safety Act; November 2011

DIN EN ISO 12100, 2011--03, Safety of machinery; Basic concepts, general principles for design (replacement for parts 1 and 2)

DIN EN ISO 13857; 2008--06, Safety of machinery; Safety distances to prevent hazard zones being reached by upper and lower limbs. (replaced: DIN EN 294)

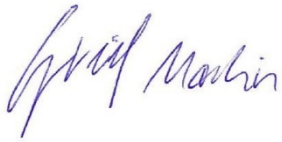
DIN EN 349, 2008--09, Safety of machinery; Minimum gaps to avoid crushing of parts of the human body.

DIN EN 81714--2, 2007--08; Design of graphical symbols for use in the technical documentation of products

DIN EN ISO 4413, 2011--04, Hydraulic fluid power – General rules and safety requirements for systems and their components

DIN EN 82079; 2010--10, Preparation of instructions for use; Structuring, content and presentation – Part 1

STARK SPANNSYSTEME GmbH
Martin Greif
Managing director



Rankweil, 21.05.2026

STARK Spannsysteme

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