# Concentric Clamp – Centric Power Clamp

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## 1 Description of the product

**Description**

A concentric clamp is a clamping tool that has been developed specifically to precisely centre and fix workpieces during machining. The concentric clamp uses hydraulic or pneumatic actuation to provide a uniform and powerful clamping force that ensures high positioning accuracy. The clamp has clamping jaws that move synchronously to keep the workpiece centred in the clamping fixture. This design ensures an even distribution of clamping force and prevents the workpiece from slipping, which is particularly important for precise machining.

## 2 Validity of the documentation

This document applies to the following products:

Concentric clamp in data sheet H4400. The following types or part numbers are concerned:

**Size 64:**

- 4ZBAAAA00000, 4ZBACAA00000

**Size 100:**

- 4ZBAAAB00000, 4ZBACAB00000

## 3 Target group of this document

- Specialists, fitters and set-up men of machines and installations with hydraulic expert knowledge.

- Specialists, fitters and set-up men of machines and installations with expert knowledge in pneumatics.

**Qualification of the personnel**

**Expert knowledge** means that the personnel must

- be in the position to read and completely understand technical specifications such as circuit diagrams and product-specific drawing documents,
- have expert knowledge (electric, hydraulic, pneumatic knowledge, etc.) of function and design of the corresponding components.

An **expert** is somebody who has due to its professional education and experiences sufficient knowledge and is familiar with the relevant regulations so that he

- can judge the entrusted works,
- can recognize the possible dangers,
- can take the required measures to eliminate dangers,
- knows the acknowledged standards, rules and guidelines of the technology.
- has the required knowledge for repair and mounting.

## 4 Symbols and signal words

**⚠ WARNING**

**Person damage**

Stands for a possibly dangerous situation.
If it is not avoided, death or very severe injuries will result.

**⚠ CAUTION**

**Easy injuries / property damage**

Stands for a possibly dangerous situation.
If it is not avoided, minor injuries or material damages will result.

**Hazardous to the environment**

The symbol stands for important information for the proper handling with materials that are hazardous to the environment.
Ignoring these notes can lead to heavy damages to the environment.

**Note**

This symbol stands for tips for users or especially useful information. This is no signal word for a dangerous or harmful situation.

## 5 For your safety

### 5.1 Basic information

The operating instructions serve for information and avoidance of dangers when installing the products into the machine as well as information and references for transport, storage and maintenance.
Only in strict compliance with these operating instructions, accidents and property damages can be avoided as well as trouble-free operation of the products can be guaranteed.
Furthermore, the consideration of the operating instructions will:

- avoid injuries
- reduce down times and repair costs,
- increase the service life of the products.

### 5.2 Safety instructions

The product was manufactured in accordance with the generally accepted rules of the technology.
Observe the safety instructions and the operating instructions given in this manual, in order to avoid personal damage or material damage.

- Read these operating instructions thoroughly and completely, before you work with the product.
- Keep these operating instructions so that they are accessible to all users at any time.
- Pay attention to the current safety regulations, regulations for accident prevention and environmental protection of the country in which the product will be used.
- Use the ROEMHELD product only in perfect technical condition.
- Observe all notes on the product.
- Use only accessories and spare parts approved by the manufacturer in order to exclude danger to persons because of not suited spare parts.
- Respect the intended use.
- You only may start up the product, when it has been found that the incomplete machine or machine, in which the product shall be mounted, corresponds to the country-specific provisions, safety regulations and standards.
- Perform a risk analysis for the incomplete machine, or the machine.
  Interactions between the product and the machine/fixture or its environment may result in risks, which may only be identified and minimized by the user, e.g.:
  - generated forces,
  - movements initiated,
  - influence of hydraulic and pneumatic control,
  - etc.

## 6 Application

### 6.1 Intended use

The products are used in industrial/commercial applications to transform hydraulic pressure to a movement and/or force. They must only be operated with hydraulic oil and compressed air.

In addition, use in compliance with the intended purpose includes:

- Use within the capacity indicated in the technical data sheets.
- Use as described in the operating instructions.
- Compliance with maintenance intervals.
- Have qualified and trained personnel carry out the corresponding activities.
- Mount spare parts only with the same specifications as the original part.

### 6.2 Misapplication

**⚠ WARNING**

**Injuries, material damages or malfunctions!**

Modifications can lead to weakening of the components, reduction in strength or malfunctions.

- Do not modify the product!

The use of the products is not authorised:
- For domestic use.
- For use at fairgrounds and amusement parks.
- In food processing or in areas with special hygiene regulations.
- In mines.
- In ATEX areas (in explosive and aggressive environments, e.g. explosive gases and dusts).
- If physical effects (welding currents, vibrations or others) or chemically acting media damage the seals (resistance of the seal material) or components and this can lead to functional failure or premature failure.

For deviating operating and environmental conditions,e.g.:
- Higher operating pressures or flow rates than indicated on the data sheet or installation drawing.
- With hydraulic fluids that do not correspond to the specifications.

**Special solutions are available on request!**

# 7 Installation

## ⚠ 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.

**Poisoning due to contact with hydraulic oil.**

Wear, damage of the seals, aging 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.

**Injury by dropping parts!**

Some products have a heavy weight and can cause injury when dropping.

- Transport products professionally.
- Wear personal protection equipment!

Weight specifications see chapter "Technical characteristics".

## NOTE

**Aggressive cutting fluids**

If aggressive cutting fluids and coolants with swarf can penetrate in the area of the clamping jaws of single-acting fixture clamps, this has to be prevented by the customer.

**Smooth running**

Pay attention to smooth running when mounting!

### 7.1 Design and assembly

**Hydraulic concentric clamp size 64**

The concentric clamp is attached to a base plate with four DIN 912 M6x40 screws (item a). Two dowel pins (8x18, item l) on the bottom side of the clamp are used for alignment. The appropriate bore holes must be present in the base plate.

The hydraulic connections must also be integrated into the base plate in order to operate the clamp from below. Alternatively, the clamp can be operated via lateral hydraulic connections by replacing the screw plugs with hose connections with an M5 thread. The hydraulic connections on the bottom side can be sealed with O-rings or M3 dowel pins and sealing material.

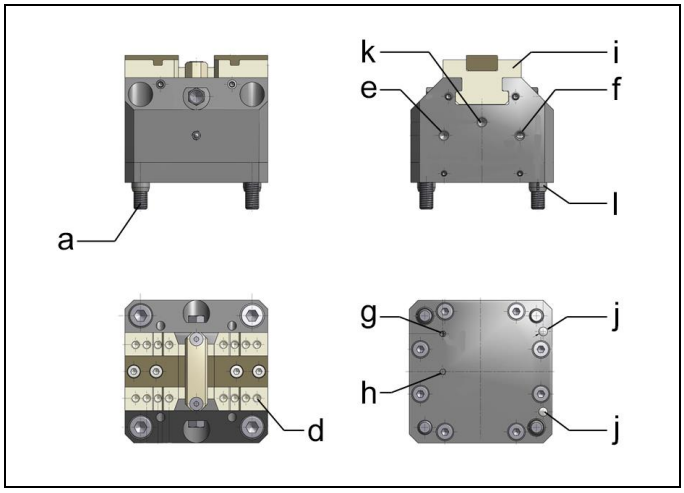


Fig. 1: Design

**Hydraulic concentric clamp size 100**

The concentric clamp is attached to a base plate with four DIN 912 M8x50 screws (item a). Two dowel pins 11x16, (item l) on the bottom side of the clamp are used for alignment. The appropriate bore holes must be present in the base plate.

The hydraulics can be connected either through connections in the base plate or from the side. For a side connection, replace the screw plugs with connections that have a G1/8 thread. The connections on the bottom side can be sealed with O-rings or M4 dowel pins and sealing material.

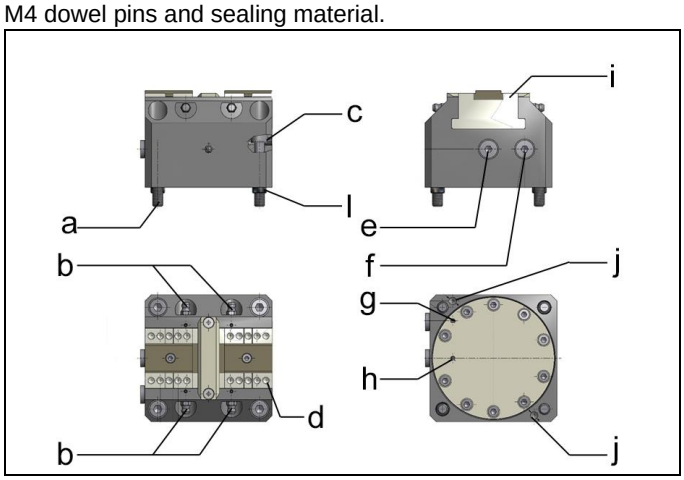


Fig. 2: Design

**Pneumatic concentric clamp size 64**

The concentric clamp is attached to a base plate with four DIN 912 M6x35 screws (item a). The clamp is aligned using the two dowel pins 8x18 (item l), which are located on the bottom side of the clamp. The alignment holes must be positioned accordingly on the base plate. The air connections must also be made in the base plate so that the clamp can be operated on the bottom side.

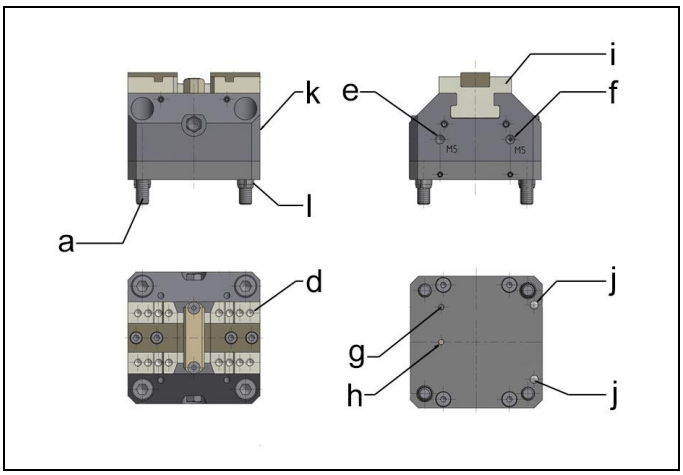


Fig. 3: Design

**Pneumatic concentric clamp size 100**

The concentric clamp is attached to the base plate with four DIN 912 M8x40 screws (item a). Two drill bushings (8x12x20, item l) on the bottom side of the clamp provide for alignment, whereby corresponding alignment holes in the base plate must exist. In addition, the air connections must be integrated into the base plate so that the clamp can be operated from below.

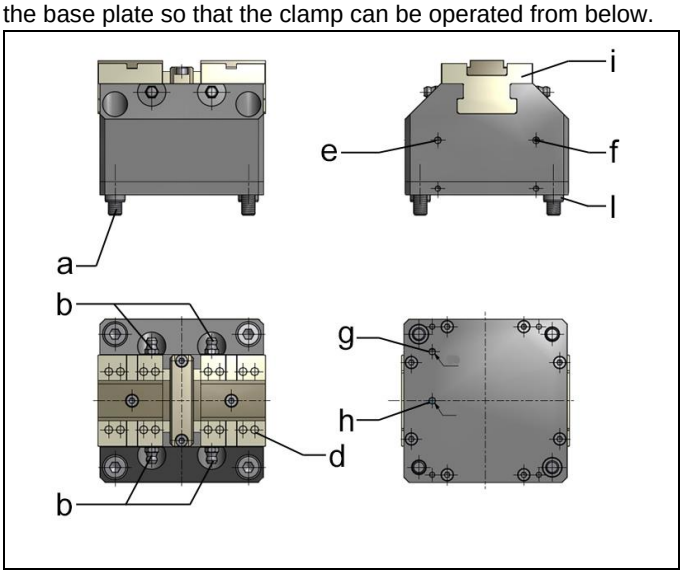


Fig. 4: Design

| | | | |
|---|---|---|---|
| a | Fixing screws | g | Port - clamping |
| b | Lubricating nipple | h | Port - unclamping |
| c | Port - positive air pressure connection | i | Base jaws |
| d | Fixing threads for clamping jaws | j | Alignment holes |
| e | Port - unclamping | k | Port - positive air pressure connection |
| f | Port - clamping | | |

### 7.1.1 Functional check

After installing the BSH-64 hydraulic concentric clamp, its function must be checked before commissioning. Particular care must be taken to ensure that there are no leaks in the pipe system. If the concentric clamp is used again after a collision, a new functional test is mandatory.

In addition, a visual inspection of the hydraulic or pneumatic concentric clamp for externally visible damage and defects must be carried out at least once per work shift to ensure safe operation.

### 7.1.2 Installing the hydraulic clamping jaws

Before clamping a workpiece, the clamping jaws must be securely connected to the concentric clamp. Make sure that both the base jaws and the top jaws are free of swarf or other contamination before assembly.

Use two screws per clamping jaw for fixing. The length of the screws depends on the top jaw used and should be selected accordingly.

### 7.1.3 Installing the pneumatic clamping jaws

Before clamping a workpiece, the clamping jaws must be securely connected to the concentric clamp. The cross offset jaws must be positioned in the slot of the base jaw of the clamp.

Make sure that both the base jaws and the top jaws are free of swarf or other contamination before assembly.

Use two screws per clamping jaw for fixing. The length of the screws depends on the top jaw used and should be selected accordingly.

## 7.2 Installation of pipe-mounted types

1. Clean the support surfaces.
2. Fix the element at the support surface (see figure "Mounting types).

**⚠ WARNING**

**Product can fall down**

Injury by falling products!

- Safety shoes have to be worn to avoid injuries due to falling objects.

**⚠ CAUTION**

**Product not properly tightened**

Product can loosen during operation.

- Fix and/or secure with sufficient tightening torque.

**NOTE**

**Determination of the tightening torque**

To determine the tightening torque of the fixing screws a screw calculation as per VDI 2230 page 1 has to be effected. The screw material is indicated in the chapter "Technical characteristics".

**NOTE**

**Tightening torques**

- The tightening torques for the fixing screws have to be designed with reference to the application (e. g. as per VDI 2230).

Proposals and approximate values for the tightening torques see chapter "Technical characteristics".

## 7.3 Installation of manifold-mounted types

1. Clean the support surfaces.
2. Position and fix on the fixture.
3. Install bleeding screws at the upper ends of the piping.

**NOTE**

**Tightening torques**

- The tightening torques for the fixing screws have to be designed with reference to the application (e. g. as per VDI 2230).

Proposals and approximate values for the tightening torques see chapter "Technical characteristics".

### 7.4 Connection of the hydraulic equipment

1. Connect hydraulic lines to qualifying standards and pay attention to scrupulous cleanness!

**NOTE**

**More details**
- See ROEMHELD data sheets A 0.100, F 9.300, F 9.310 and F 9.360.

**Screwed Plug**
- Use only fittings "screwed plug B and E" as per DIN 3852 (ISO 1179).

**Hydraulic connection**
- Do not use sealing tape, copper rings or coned fittings.

**Pressure fluids**
- Use hydraulic oil as per ROEMHELD data sheet A 0.100.

## 8 Start up

**⚠ WARNING**

**Poisoning due to contact with hydraulic oil.**
Wear, damage of the seals, aging 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.

**Injury by crushing!**
Components of the product make a movement while they are in operation, this can cause injuries.
- Keep parts of the body and items out of the working area!

**⚠ CAUTION**

**Injury due to bursting or malfunction**
Exceeding the max. operating pressure (see technical data) can cause the product to burst or malfunction.
- The maximum operating pressure must not be exceeded.
- If necessary, avoid overpressure by using suitable valves.

1. Check tight seat.
2. Check tight seat of the hydraulic ports (check tightening torque of the hydraulic ports).
3. Bleed the hydraulic system.

**NOTE**

**Clamping time**
- Without bleeding the clamping time will be considerably prolonged and function problems may occur.

### 8.1 Bleeding of pipe-mounted types

1. Loosen carefully at low pressure union nut of the pipe at the hydraulic ports.
2. Pump until bubble free oil comes out.
3. Fasten union nuts of the pipe.
4. Check tightness.

### 8.2 Bleeding of manifold-mounted types

1. Loosen carefully the bleeding screws of the fixture at low pressure.
2. Pump until bubble free oil comes out.
3. Fasten the bleeding screws.
4. Check correct function.
5. Check sealing of the hydraulic connections!

## 9 Maintenance

**⚠ WARNING**

**Burning due to hot surface!**
During operation, surface temperatures on the product can exceed 70°C.
- Maintenance and repair work should only be performed in a cooled down condition and/or with protective gloves.

**Injury by crushing!**
Due to the stored energy, an unexpected start of the product can occur.
- Maintenance works at the product must only be made in depressurised mode!
- Keep hands and other parts of the body out of the working area!

### 9.1 Plan for maintenance

| Maintenance work | Interval | Performed by |
|---|---|---|
| Cleaning | As required<br>With increased dirt and coolant ingress more frequently! | Operator |
| Regular checks | Daily | Operator |
| Regular lubrication | Every 10,000 clamping cycles, lubricate with microGLEIT LP 410 through lubricating nipple **(b)**.<br>▶ **Note**<br>With increased dirt and coolant ingress lubrication must be made more frequently! | ⚠ **Caution!**<br>If lubrication is not performed, failure or interference of the concentric clamp can occur.<br>Operator |
| | Every 3 months<br>Remove base jaws and chuck piston(s). Clean the housing, base jaws, and chuck pistons and coat all guides with microGLEIT LP 410. | Operator |
| Repair | | Roemheld Service |

### 9.2 Replacing components

The base jaws (item 7), the chuck pistons (item 6) and the body (item 8) are compatible.
To replace these parts, send the concentric clamp complete with a repair order to Roemheld.

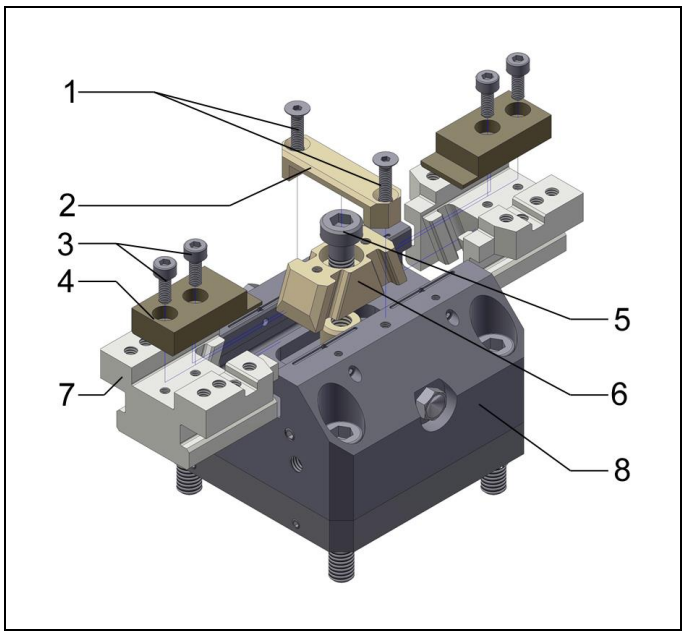


Fig. 5: Size 64

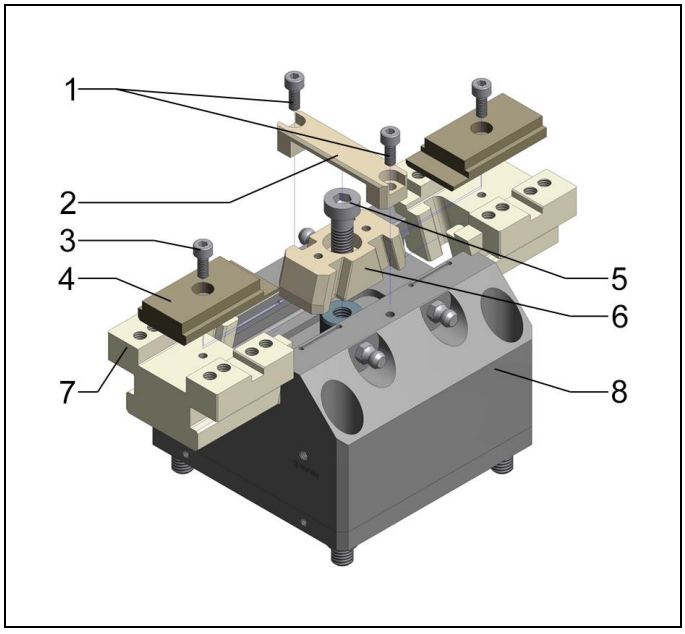


Fig. 6: Size 100

### 9.3 Dismantling the concentric clamp

1. **Open the jaws**: Open the jaws of the concentric clamp and relieve the system by removing the air or hydraulic pressure.
2. **Remove the cover profile**: Loosen the countersunk screws (item 1) in the cover profile (item 2) and remove the cover profile.
3. **Dismantle the guide bars**: Loosen the socket head cap screw (item 3) to remove the guide bars (item 4).
4. **Remove the chuck pistons**: Loosen the socket head cap screw (item 5) and remove the chuck piston (item 6).
5. **Remove the clamping jaws**: Slide the clamping jaws (item 7) out to the side. Note the position of the chuck piston to ensure centring accuracy during assembly.
6. **Cleaning the guides**: Clean the exposed guides as per the instructions and regrease them.
7. **Thorough cleaning if heavy contamination**: If the system is heavily contaminated, clean it thoroughly with petrol, kerosene or similar cleaning agents.
8. **Installation**: Reinstall the concentric clamp in reverse order.

**NOTICE**

Please follow the instructions carefully during installation to ensure that the clamping system functions properly.

## 10 Trouble shooting

**Hydraulic concentric clamp**

| Interference | Cause | Remedy |
|---|---|---|
| The clamping jaws do not move: | • Oil supply is interrupted | • Check oil supply |
| | • Ports reversed | • Check ports |
| | • Sealings are damaged | • Roemheld Service |
| | • Piston is firmly seated | |
| The clamping system does not perform the full stroke: | • Swarf or dirt between cover profiles and base jaws | • Clean cover profiles and base jaws |
| Clamping force decreases: | • Couplings and/or sealing glands are leaky | • Check couplings and/or sealing glands |
| | • Seals are damaged | • Roemheld Service |
| | • Lubrication is inadequate | • Regrease |
| | • Incorrect lubricating grease | • Check lubricating grease |
| The clamping system moves suddenly: | • Steel surfaces on the sliding surfaces not greased | • Lubricate the steel guides |

**Pneumatic concentric clamp**

| Interference | Cause | Remedy |
|---|---|---|
| The clamping jaws do not move: | • Air supply is interrupted | • Check the air supply |
| | • Ports reversed<br>• Unused air connections not closed<br>• Required air connections closed | • Check ports |
| | • Piston is firmly seated | • Roemheld Service |
| The clamping system does not perform the full stroke: | • Swarf or dirt between cover profiles and base jaws | • Clean cover profiles and base jaws |
| Clamping force decreases: | • Couplings and/or sealing glands are leaky | • Check couplings and/or sealing glands<br>• Check lubricating grease |
| | • Seals are damaged | • Roemheld Service |
| | • Lubrication is inadequate | • Regrease |

| | | |
|---|---|---|
| | • Incorrect lubricating grease | • Check lubricating grease |
| The clamping system moves suddenly: | • Steel surfaces on the sliding surfaces not greased | • Lubricate the steel guides |

## 11 Technical characteristics

**General characteristics, hydraulic**

| Type | Maximum operating pressure (bar) | Maximum clamping force, (kN) |
|---|---|---|
| 4ZBAAAA00000 | 65 | **4.8** |
| 4ZBAAAB00000 | 90 | **20.25** |

**General characteristics, pneumatic**

| Type | Maximum operating pressure (bar) | Maximum clamping force, (kN) |
|---|---|---|
| 4ZBACAA00000 | 9 | **4** |
| 4ZBACAB00000 | 9 | **14** |

**Weights, hydraulic version**

| Types | Clamping range (mm) | Weight (kg) |
|---|---|---|
| 4ZBAAAA00000 | 0-55 | **1.4** |
| 4ZBAAAB00000 | 0-90 | **5** |

**Weights, pneumatic version**

| Types | Clamping range (mm) | Weight (kg) |
|---|---|---|
| 4ZBACAA00000 | 0-55 | **1.2** |
| 4ZBACAB00000 | 0-90 | **4** |

**Proposal, tightening torques for screws of tensile strength 8.8, 10.9, 12.9**

**NOTE**

The indicated values are approximate values and have to be interpreted according to the user's application!
See note!

| Thread | Tightening torque [Nm] | | |
|---|---|---|---|
| | 8.8 | 10.9 | 12.9 |
| M3 | 1,3 | 1,8 | 2,1 |
| M4 | 2,9 | 4,1 | 4,9 |
| M5 | 6,0 | 8,5 | 10 |
| 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 |
| M24 | 730 | 1050 | 1220 |
| M30 | 1,450 | 2100 | 2450 |

**Note:** Valid for workpieces and set screws made of steel with metric thread and connecting surface dimensions as per DIN 912, 931, 933, 934 / ISO 4762, 4014, 4017, 4032
In the table values for tightening torques the following is considered:
Design steel/steel, friction value μges = 0.14 - not oiled, utilisation of the minimum yield point = 90%.

**NOTE**

**Further information**
- For further technical data see ROEMHELD data sheet.

## 12 Storage

**⚠ CAUTION**

**Damage due to incorrect storage of components**
In case of improper storage, the seals can embrittle and resinification of the anti-corrosive oil or corrosion on/in the element can occur.
- Storage in the packaging and moderate environmental conditions.
- The product must not be exposed to direct sunlight, since UV light may cause serious damage to the seals.

The elements are tested by default with mineral oil. The exterior of the elements is treated with a corrosion inhibitor.
The oil film remaining after the test provides for a six-month interior corrosion protection, if stored in dry and uniformly tempered rooms.
For longer storage times, the element has to be filled with a non-resinifying corrosion inhibitor and the outside surfaces must be treated.

## 13 Disposal

**Hazardous to the environment**
Due to possible environmental pollution, the individual components must be disposed only by an authorised expert company.

The individual materials have to be disposed as per the existing regulations and directives as well as the environmental conditions.
Special attention has to be drawn to the disposal of components with residual portions of hydraulic fluids. The instructions for the disposal at the material safety data sheet have to be considered.
For the disposal of electrical and electronic components (e.g. stroke measuring systems, proximity switches, etc.) country-specific legal regulations and specifications have to be kept.

# 14 Declaration of manufacture

**Manufacturer**

Römheld GmbH Friedrichshütte
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35321 Laubach, Germany
Tel.: +49 (0) 64 05 / 89-0
Fax: +49 (0) 64 05 / 89-211
E-mail: info@roemheld.de
www.roemheld.com

**Responsible person for the documentation:**
Dipl.-Ing. (FH) Jürgen Niesner, Tel.: +49(0)6405 89-0.

**Declaration of manufacture of the products**

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.
In accordance with EC-MSRL, these products are components, that are not yet ready for use and are exclusively designed for the installation in a machine, a fixture or a plant.

According to the pressure equipment directives the products are not to be classified as pressure reservoirs but as hydraulic placing devices, since pressure is not the essential factor for the design, but the strength, the inherent stability and solidity with regard to static or dynamic operating stress.

The products may only be put into operation after it was assessed that the incomplete machine / machine, in which the product shall be installed, corresponds to the machinery directives (2006/42/EC).

The manufacturer commits to transmit the special documents of the products to state authorities on request.
The technical documentation as per appendix VII part B was prepared for the products.

Laubach, 09.10.2024