



# Concentric positioning and clamping elements

## 2 and 3-point positioning, double acting



### 1 Description of the product

#### Description

Workpieces with cast or machined bores, reliefs or break-outs, can be easily loaded to the fixture with the concentric positioning and clamping elements and concentrically clamped or positioned for the machining.

Overtolerance conditions can be avoided and clamping tasks can be completely solved by an ingenious combination of 2 and 3-point elements. Various mounting and connecting possibilities extend the use for multiple applications. Different sizes and correspondingly adapted contact bolts allow exact adaptation to the required clamping diameter.

### 2 Validity of the documentation

This document applies to the following products:

Concentric positioning and clamping elements of data sheet H 4.305. The following types or part numbers are concerned:

#### 2-point elements

- 4312-000, 001, 002
- 4312 050, 051, 052, 053, 054, 055
- 4312 100, 101, 102, 103, 104
- 4312 200, 201, 202
- 4312 300, 301, 302
- 4312 400, 401, 402, 403

#### 3-point elements

- 4312 025, 026, 027
- 4312 075, 076, 077, 078, 079, 080
- 4312 150, 151, 152, 153, 154
- 4312 250, 251, 252
- 4312 350, 351, 352
- 4312 450, 451, 452, 453

### 3 Target group of this document

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

#### 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,

## Table of contents

1 Description of the product	1
2 Validity of the documentation	1
3 Target group of this document	1
4 Symbols and signal words	2
5 For your safety	2
6 Application	2
7 Installation	3
8 Start up	5
9 Maintenance	5
10 Trouble shooting	6
11 Technical characteristics	6
12 Storage	7
13 Disposal	7
14 Declaration of manufacture	8
3 Target group of this document	
Qualification of the personnel	
Expert knowledge	
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.

### ℹ 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.

Due to the interactions between the product and the machine/fixture or the environment, risks may arise that only can be determined and minimized by the user, e.g. :

- generated forces,
- generated movements,
- Influence of hydraulic and electrical control,
- etc.

## 6 Application

### 6.1 Intended use

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

Furthermore the following belongs to possible uses:

- Use within the capacity indicated in the technical characteristics.
- Use as per operating instructions.
- Compliance with service intervals.
- Qualified and trained personnel for the corresponding activities.
- Mounting of 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!**

### ℹ NOTE

#### Unsuitable for lathes

2 and 3-point concentric positioning and clamping elements are not suitable for use on turning machines.

## 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".

### ℹ️ 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

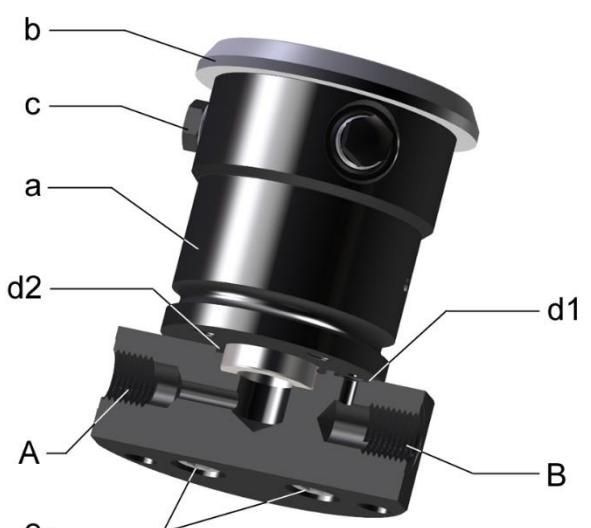


Figure 1: Version 4312 1XX; 2XX; 3XX; 4XX; 5XX

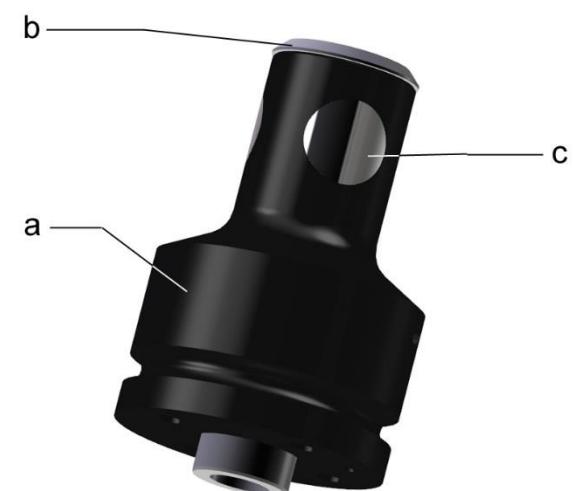


Figure 2: Version 4312 00X; 02X; 05X; 07X

a Body	c Fig. 1 contact bolt / Fig. 2 wedge bolt
A Port A (clamped)	e Fixing screws
B Port B (unclamped)	d1 O-ring
b Cover	d2 O-ring

The following mounting types are possible:

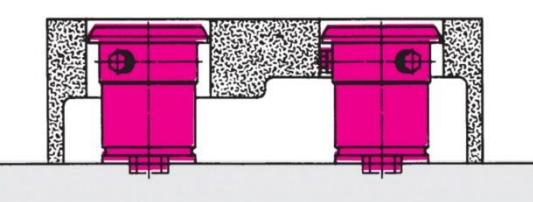


Figure 3: Direct mounting

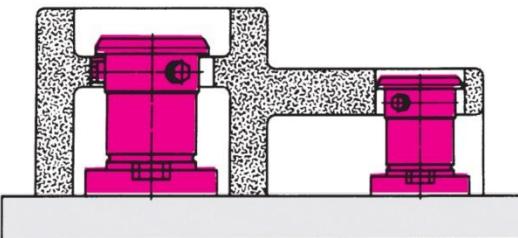


Figure 4: Flange mounting

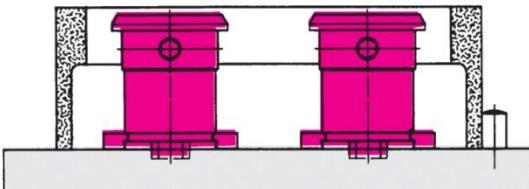


Figure 5: Mounting by segments

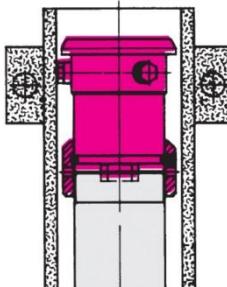


Figure 6: Mounting by ball nut

## 7.2 Admissible oil flow rate

### **WARNING**

#### **Injury due to overload of the element**

High-pressure injection (squirting out of hydraulic oil under high pressure) or flying components!

- Due to throttling or closing of ports a pressure intensification can occur.
- Connect the ports professionally!

### **CAUTION**

#### **Malfunction or early failure**

Exceeding the max. flow rate can lead to overload and premature failure of the product..

- The maximum flow rate must not be exceeded!

## 7.2.1 Calculation of the admissible flow rate

### **Admissible flow rate**

The admissible flow rate or the admissible stroke speed is valid for vertical mounting positions in combination with standard add-on parts as clamping arms or contact bolts, etc.

In case of other mounting positions and/or add-on parts the flow rate has to be reduced.

If the pump flow rate divided by the number of elements is larger than the admissible flow rate of one element, the flow rate has to be throttled.

This prevents an overload and therewith an early failure.

The flow rate can be checked as follows:

$$Q_P \leq 0,06 \cdot \dot{V}_Z \cdot n \quad \text{and/or} \quad Q_P \leq 6 \cdot v_Z \cdot A_K \cdot n$$

for clamping elements and work supports (indicated on the data sheets)

### **Maximum piston speed**

At specified pump flow rate  $Q_P$  and with the effective piston area  $A_K$  the piston speed can be calculated as follows:

$$v_m < \frac{Q_P}{6 \cdot A_K \cdot n}$$

### **Legend**

•  $\dot{V}_Z$  = Admissible flow rate of the element in [cm<sup>3</sup>/s]

$Q_P$  = Flow rate of the pump in [l/min]

$A_K$  = Piston area in [cm<sup>2</sup>]

$n$  = Number of elements, same dimensions

$v_Z = v_m$  = Admissible/maximum stroke speed in [m/s]

### **NOTE**

#### **Flow rate**

- The maximum oil volume and/or the maximum stroke speed depend on the corresponding product.
  - For clamping cylinders see data sheet A 0.100.
  - For clamping elements, work supports, hydraulic valves, power units and other hydraulic elements indicated on the corresponding data sheets.

Further "things worth knowing about hydraulic cylinders, basics, detailed knowledge and calculations on hydraulic cylinders" see Technical information on the internet!

## 7.2.2 Throttling of the flow rate

The throttling always has to be effected in the supply line to the element. Only thus pressure intensification and thereby pressures exceeding the operating pressure are avoided. The hydraulic circuit diagram shows flow control valves which allow oil return from the element without any impediments.

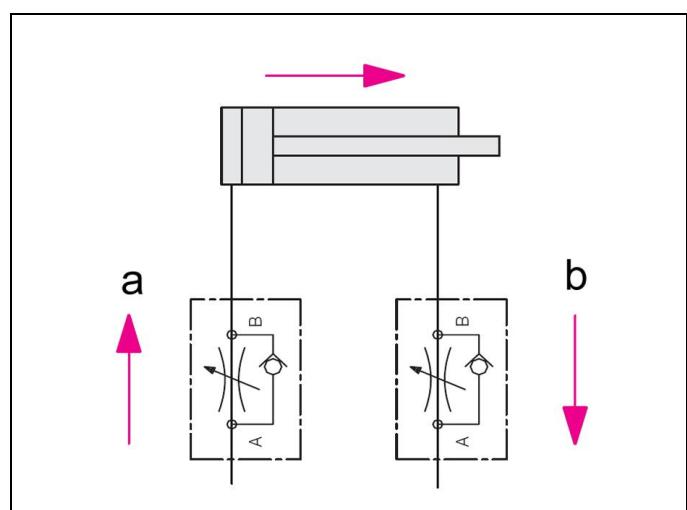


Figure 7: Hydraulic circuit diagram without flow control valves

a Throttling direction

b Free flow

If a return-flow throttling is required due to a negative load, it must be guaranteed that the max. operating pressure (see technical characteristics) will not be exceeded.

### 7.3 Installation of manifold-mounted types

1. Drill the holes for hydraulic oil supply and return in the fixture (see also data sheet).
2. Grind or finish mill flange surface ( $Ra \leq 0,8$  and a flatness of 0.04 mm to  $\square 100$  mm. Marks, scratches, shrink holes are not admissible on the surface.)
3. Clean the support surfaces.
4. Position and fix on the fixture.
5. 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 cleanliness!

### NOTE

#### More details

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

#### 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 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 works	Interval	Realisation
Cleaning	As required With increased dirt and coolant ingress more frequently!	Operator
Regular checks	daily	Operator
Check the grease filling once a year	Remove the centering cover. If required, refill grease ALTEMP QNB50	 <b>Attention!</b> The hollow space must only be filled with grease by 20%.
Repair		Qualified personnel

\* Brand name

Description as per DIN 51 502: KPHC 2 N-40.

Description as per ISO 6743-9: ISO-L-X-DDHB 2

## 9.2 Cleaning

### ⚠ CAUTION

#### Material damage, damage to moving components

Damage to piston rods, plungers, bolts, etc., as well as wipers and seals can lead to leakage or premature failure!

- Do not use cleaning agents (steel wool or similar) that cause scratches, marks or the like.

#### Material damage, damage or functional failure

Aggressive cleaning agents can cause damage, especially to seals.

The product must not be cleaned with:

- corrosive or caustic substances or
- organic, solvents such as halogenated or aromatic hydrocarbons and ketones (cellulose thinner, acetone, etc.).

The element must be cleaned at regular intervals. Especially the clamping slide and the housing have to be cleaned of swarf and other liquids.

In the case of heavy contamination, the cleaning has to be made in shorter intervals.

#### 9.2.1 Regular checks

- Check tightness of hydraulic connections (visual control).
- Leakage control at the housing and the clamping slide.
- Clamping force control by pressure control.
- Check the observance of the maintenance intervals.

## 9.3 Exchange seal kit

The exchange of the seal kit is made in case of external leakages. For high availability, the seals have to be changed at the latest after 500,000 cycles or 2 years.

The seal kit is available as spare part. An instruction for the exchange of the seal kit is available on request.

### NOTE

#### Seal Kits

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

## 10 Trouble shooting

Trouble	Cause	Remedy
Clamping unit does not clamp:	Hydraulic oil supply or return is impeded	Check and blow through tubes.
System pressure drops:	Hydraulic ports leaky Wear of the seals	seal Replace sealing rings.

## 11 Technical characteristics

### General characteristics

Type	Maximum operating pressure [bar]	Clamping force at 100 bar	Clamping force at 250 bar
4312-00X	250	4	10
4312-02X		4	10
4312-05X		3	7
4312-07X		7	17
4312-1XX		11	28
4312-2XX		17	44
4312-3XX			
4312-4XX			

### Weights

Types	Clamping range Ø [mm]	Weight [kg]
4312-00X	Ø 25-36	0.5
4312-02X	Ø 36-55	0.7
4312-05X	Ø 54-76	1.1
4312-07X	Ø 76-98	1.8
4312-1XX	Ø 98-130	3.6
4312-2XX	Ø 130-177	7.2
4312-3XX		
4312-4XX		

**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  $\mu_{ges} = 0.14$  - not oiled, utilisation of the minimum yield point = 90%.

**NOTE****Further information**

- For further technical data see ROEMHELD data sheet.  
H4305

**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  
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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, 28.05.2024