Concentric positioning and clamping elements
2 and 3-point positioning, double acting, hydraulically-operated, max. operating pressure 250 bar

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

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,
4 Safety instructions

DANGER

Danger of life / heavy health damages
Stands for an imminent danger.
If it is not avoided, death or very severe injuries will result.

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.

Mandatory sign!
The symbol stands for important information, necessary protection equipment, etc.

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.

6 Application

6.1 Intended use
The products are used in industrial applications to transform hydraulic pressure to a radial 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 (see data sheet).
• 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!
• Do not modify the product!

The use of these products is not admitted:
• For domestic use.
• On pallets or machine tool tables in primary shaping and metal forming machine tools.
• If due to vibrations or other physical/chemical effects damages of the products or seals can be caused.
• In machines, on pallets or machine tool tables that are used to change the characteristics of the material (magnetise, radiation, photochemical procedures, etc.).
• In areas for which special guidelines apply, especially installations and machines:
  - For the use on fun fairs and in leisure 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 engineering.
- In the aerospace industry.
- For passenger transport.

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

Special solutions are available on request!

**Note**

**Unsuitable for lathes**

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

7 Installation

7.1 Design

The following mounting types are possible:

- Direct mounting
- Flange mounting
- Mounting by segments

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

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

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

**Figure 3:** Direct mounting

**Figure 4:** Flange mounting

**Figure 5:** Mounting by segments
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**

Maximum flow rates do not exceed
The maximum flow rate must not be exceeded.

7.2.1 Calculation of the admissible flow rate

**Admissible oil 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:

\[
Q_p \leq 0.06 \cdot V_Z \cdot n \quad \text{and/or} \quad Q_p \leq 6 \cdot v_Z \cdot A_K \cdot n
\]

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

**Maximum piston speed**

At specified pump flow rate \(Q\) and with the effective piston area \(A\) the piston speed can be calculated as follows:

\[
v_m < \frac{Q_p}{6 \cdot A_K \cdot n}
\]

**Legend**

- \(V_Z\) = Admissible flow rate of the element in [cm³/s]
- \(Q_p\) = Flow rate of the pump in [l/min]
- \(A_K\) = Piston area in [cm²]
- \(n\) = Number of elements, same dimensions
- \(v_Z = v_m\) = Admissible/maximum stroke speed in [m/s]

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**Note**

**Oil volume**
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 in the Technical library on the internet!

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7.2.2 Throttling of the flow rate

The throttling always has to be effected in the supply line to the swing clamp. 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.

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**WARNING**

**Injury by falling products!**
Safety shoes have to be worn to avoid injuries due to falling objects.

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**Note**

**Tightening**
- 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".
5. Install bleeding screws at the upper ends of the piping.

3. Clean the support surfaces.

**7.4 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 ≤ 0.8 and a flatness of 0.04 mm to ≤10 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.

**9. Maintenance**

9.1 Plan for maintenance

<table>
<thead>
<tr>
<th>Maintenance works</th>
<th>Interval</th>
<th>Realisation</th>
</tr>
</thead>
<tbody>
<tr>
<td>Cleaning</td>
<td>As required</td>
<td>Operator</td>
</tr>
<tr>
<td></td>
<td>With increased dirt and coolant ingress more frequently!</td>
<td></td>
</tr>
<tr>
<td>Regular checks</td>
<td>daily</td>
<td>Operator</td>
</tr>
</tbody>
</table>
| Check the grease filling once a year | Remove the centering cover. If required, refill grease ALTEMP QNB50 | **Attention!** 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**

Avoid damages of the moved components
Avoid damages of the moved components (rods, plungers, bolts, etc.) as well as of wiper and seal.

Aggressive cleaning agents
The product must not be cleaned with:
- Corrosive or corroding components or
- Organic solvents as halogen or aromatic hydrocarbons and ketones (cellulose thinner, acetone, etc.), because this can destroy the seals.

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.
9.3 Regular checks
1. Check tightness of hydraulic connections (visual control).
2. Leakage control at the housing and the clamping slide.
3. Clamping force control by pressure control.
4. Check the observance of the maintenance intervals.

9.4 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 1,000,000 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.

- Only use original seals.
- The seal kit is available as spare part. An instruction for the exchange of the seal kit is made in case of external leakages.
- In case of improper storage, the seals can embrittle and completely lose their sealing function.

10 Trouble shooting

<table>
<thead>
<tr>
<th>Trouble</th>
<th>Cause</th>
<th>Remedy</th>
</tr>
</thead>
<tbody>
<tr>
<td>Clamping unit does not clamp:</td>
<td>Hydraulic oil supply or return is impeded</td>
<td>Check and blow through tubes.</td>
</tr>
<tr>
<td></td>
<td>Collet not sufficiently screwed in into the clamping unit.</td>
<td>Completely screwed in, check tight seat</td>
</tr>
<tr>
<td>System pressure drops:</td>
<td>Hydraulic ports leaky seal</td>
<td>Replace sealing rings.</td>
</tr>
<tr>
<td></td>
<td>Wear of the seals</td>
<td></td>
</tr>
<tr>
<td>Clamping unit does not unclamp:</td>
<td>Backing-up pressure in the return line too high</td>
<td>Eliminate backing-up pressure</td>
</tr>
<tr>
<td></td>
<td>Return spring broken</td>
<td>Repair required</td>
</tr>
<tr>
<td></td>
<td>Body corroded in the inside</td>
<td>Exchange clamping unit</td>
</tr>
</tbody>
</table>

11 Technical characteristics

General characteristics

<table>
<thead>
<tr>
<th>Type</th>
<th>Maximum operating pressure [bar]</th>
<th>Clamping force at 100 bar</th>
<th>Clamping force at 250 bar</th>
</tr>
</thead>
<tbody>
<tr>
<td>4312-00X</td>
<td></td>
<td>4</td>
<td>10</td>
</tr>
<tr>
<td>4312-02X</td>
<td></td>
<td>4</td>
<td>10</td>
</tr>
<tr>
<td>4312-05X</td>
<td></td>
<td>3</td>
<td>7</td>
</tr>
<tr>
<td>4312-07X</td>
<td></td>
<td>7</td>
<td>17</td>
</tr>
<tr>
<td>4312-1XX</td>
<td></td>
<td>11</td>
<td>28</td>
</tr>
<tr>
<td>4312-2XX</td>
<td></td>
<td>17</td>
<td>44</td>
</tr>
</tbody>
</table>

<table>
<thead>
<tr>
<th>Types</th>
<th>Clamping range Ø [mm]</th>
<th>Weight [kg]</th>
</tr>
</thead>
<tbody>
<tr>
<td>4312-00X</td>
<td>Ø 25-36</td>
<td>0.5</td>
</tr>
<tr>
<td>4312-02X</td>
<td>Ø 36-55</td>
<td>0.7</td>
</tr>
<tr>
<td>4312-05X</td>
<td>Ø 54-76</td>
<td>1.1</td>
</tr>
<tr>
<td>4312-07X</td>
<td>Ø 76-96</td>
<td>1.8</td>
</tr>
<tr>
<td>4312-1XX</td>
<td>Ø 98-130</td>
<td>3.6</td>
</tr>
<tr>
<td>4312-2XX</td>
<td>Ø 130-177</td>
<td>7.2</td>
</tr>
</tbody>
</table>

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!

<table>
<thead>
<tr>
<th>Thread</th>
<th>Tightening torque [Nm]</th>
</tr>
</thead>
<tbody>
<tr>
<td>8.8</td>
<td>10.9</td>
</tr>
<tr>
<td>M6</td>
<td>10</td>
</tr>
<tr>
<td>M8</td>
<td>25</td>
</tr>
<tr>
<td>M10</td>
<td>49</td>
</tr>
<tr>
<td>M12</td>
<td>85</td>
</tr>
<tr>
<td>M14</td>
<td>135</td>
</tr>
<tr>
<td>M16</td>
<td>210</td>
</tr>
<tr>
<td>M20</td>
<td>425</td>
</tr>
<tr>
<td>M24</td>
<td>730</td>
</tr>
<tr>
<td>M30</td>
<td>1,450</td>
</tr>
</tbody>
</table>

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 $\mu = 0.14$ - not oiled, utilisation of the minimum yield point $= 90\%$.

### Note
For further technical data see ROEMHELD data sheet.

12 Storage

- The product may not be exposed to direct solar radiation, because the UV light can destroy the seals.
- A storage differing from the storage conditions is inadmissible.
- In case of improper storage, the seals can embrittle and resinification of the anti-corrosive oil or corrosion at the element can occur.

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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**Declaration of manufacture of the 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
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- 4312 150, 151, 152, 153, 154
- 4312 250, 251, 252
- 4312 350, 351, 352
- 4312 450, 451, 452, 453

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 and EN 982, 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.

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

Römheld GmbH
Friedrichshütte
Laubach, 18.04.2013