Clamping unit Ratio-Clamp®
Securing and fixation of round rods
The patented clamping unit Ratio-Clamp® fixes round rods without energy supply for unlimited time. The clamping unit is used worldwide as a safety component for the protection of persons and systems as well as a holding element for tools and workpieces in production processes or during testing procedures in numerous industries.

- Machine tools
- Presses
- Foundry
- Shipbuilding and offshore
- Plastic Injection molding machines
- Steel/rolling mill
- Testing technology

Ratio-Clamp®
Keeps the position for you!

- Functional principle
- Characteristics
- Applications
- Equipment
- Technical data
Versatile use.
Numerous advantages.

The Ratio-Clamp® operates mechanically according to the principle of frictional contact. The force stored in helical disc springs is deflected by a cone and clamps the rod through friction.

**Locking and securing loads**
If the releasing pressure drops, the force stored in the springs is released and causes the rod to clamp. Thus the load is secured and the Ratio-Clamp® is ready to take over the load.

**Loading**
Loading is possible immediately after clamping. No axial movement of the rod is required. In the clamped state, the forces in both directions can be kept free of play.

**Releasing**
The locking piston moves against the spring power by hydraulically releasing pressure and releases the clamping force. The rod can be moved in both directions.

**Overloading**
Short-term overloading with slipping of the rod is possible without damaging the rod or the clamping unit.

**Use**
Höfken clamping units can be used both for precise locking and for securing against unintentional movements.
- Fixation of all types of round rods in any position
- Out of a standstill
- Clamping force without energy supply for unlimited time
- In case of fuel-controlled pressure drop, emergency shutdown, power failure or system damage
- Fixes axes precisely, even when external forces act on the rod

**Advantages**
- Can be used horizontally and vertically
- Can take tension and pressure in any direction
- Immediate clamping effect without further rod movement
- Releasing the clamping without back movement
- Clamping unit and hydraulic cylinder from one source
Absolute efficiency.
Safety without compromise.

Our specialists have been developing, manufacturing, and optimising the clamping unit Ratio-Clamp® 100% in Germany since 1965. Functionality, precision and highest quality are a matter of course to us.

**Energy efficiency**

Do you have an application where a round rod has to be held in a specific position? There are different ways to achieve this by electronic control, shutting off all ports, locking with pivot pins or by using the clamping unit Ratio-Clamp®. The Ratio-Clamp® scores with numerous advantages:

- Stepless clamping without energy supply
- Fixes precisely at the desired positions
- Holds position at temperature fluctuations
- Savings in energy costs through clamping with spring power

**Safety**

The clamping unit is a reliable technological solution if hazards due to external forces or loads must be taken into account in accordance with EN ISO 13849-1. In case of fluctuations or loss of the pressure energy, the clamping unit immobilises round rods under an axial load.

- As a secure position retention element in case of a line break
- As a locking element if cylinders or valves have internal leakages, e.g., through gap seals
- As an additional safety component for axes strained by gravity, if the load causes hazards, e.g., in hold-up devices when lowering a load associated with hazards

The clamping unit, with its frictional contact function, is permitted as a redundant safety component in accordance with EN ISO 13849-2. For example, a non-return valve can be used as a primary safety element.

The Ratio-Clamp® is approved in the version with BGV Test certification for use on hydraulic presses according to EN 693 or on injection moulding machines according to EN 231.

## Comparison of fixation options for round rods

<table>
<thead>
<tr>
<th></th>
<th>Electronic control</th>
<th>Port lock-off</th>
<th>Pivot pin locking</th>
<th>Clamping unit Ratio-Clamp®</th>
</tr>
</thead>
<tbody>
<tr>
<td>Energy efficiency</td>
<td>-</td>
<td>+</td>
<td>+</td>
<td>+</td>
</tr>
<tr>
<td>Position accuracy</td>
<td>+</td>
<td>-</td>
<td>+</td>
<td>+</td>
</tr>
<tr>
<td>Independence from external influences</td>
<td>+</td>
<td>-</td>
<td>+</td>
<td>+</td>
</tr>
<tr>
<td>Effort</td>
<td>-</td>
<td>+</td>
<td>-</td>
<td>+</td>
</tr>
<tr>
<td>Flexible positioning</td>
<td>+</td>
<td>+</td>
<td>-</td>
<td>+</td>
</tr>
</tbody>
</table>

## Performance level calculation

- PL = performance level
- S = severity of injury
- F = frequency of hazard
- P = probability of hazard avoidance

To use the clamping unit as a safety component, you can request the Risk value from us to determine your performance level.
For every application. The right solution.

There are many situations that require rods to be held in a particular position: for example to protect people, machines and tools in case of power failures or plant shutoffs. But even in production, to fix axes during a process and in all highly dynamic applications and test procedures. Here are some practical examples:

1. **Grinding machine > production**
   During the production process of ICE rail sleepers, extremely large and heavy concrete workpieces must be positioned for grinding safely and with an accuracy of 0.01 mm. Hänchen’s hydraulic cylinders and Ratio-Clamp® clamping units are designed exactly for these requirements.

2. **Aviation > testing technology**
   The setups for aviation tests have been refined to the last detail. Hänchen cylinders are used in different fields of testing, simulating ambient conditions and loads during different flight phases. Ratio-Clamp® clamping units are used to protect the intricately constructed and expensive systems.

3. **Press > production**
   Hänchen lock cylinders guarantee safe movements of the press. Clamping units ensure safety during the pressing process in moulding and injection presses for the production of synthetic and rubber moulded parts in accordance with EN 289.

4. **Railway technology > maintenance**
   For maintenance purposes, trains must be fixed in the raised state – the Ratio-Clamp® is ideally suited for this purpose. The clamping units hold the train securely in position until the work has been completed and it can return to the rails.

5. **Profiling machine > production**
   Hänchen clamping units ensure precise machining and consistent quality in the production of metal profiles. During the production process, they facilitate the machining of the profiles by locking the forming tools in place. Ecological and efficient, purely with spring power.
**Releasing pressure**

- **Basic design**
  The basic releasing pressure required for releasing the clamping unit is between the minimum pressure and the maximum admissible pressure of 160 bar.

- **Reduced design**
  For application cases with low supply pressure, a version designed with a reduced releasing pressure is available.

- **Hydraulic**
  When very high holding loads are required, the clamping unit can also be locked hydraulically. For the release, hydraulic pressure is used as usual.

**Locking**

- **With spring power**
  Usually, energy stored in springs is used to clamp a rod. This means that the rod can be held for unlimited periods of time without any energy supply.

**Sealing system**

- **Servocap® compact seal, lip seal, wiper ring**
  The basic type of Ratio-Clamp® uses the friction-optimised sealing system Servocap®. Here, the primary seal touches the rod. The maximum speed of the rod is 1 m/s.

- **Pressure piston seal, lip seal, wiper ring**
  For very sensitive applications, we recommend the design with pressure piston seal, where no pressurised seal touches the rod. Thus, the sliding friction is very low and remains constant regardless of the releasing pressure. The maximum speed of the rod is 2 m/s.

**Certification**

- **TÜV**
  Every Ratio-Clamp® is type tested by TÜV SÜD.

- **DGUV Test**
  The clamping unit is also available with a DGUV Test certification (testing and certification system of the "Deutsche Gesetzliche Unfallversicherung"). Ratio-Clamp® has a B100 value according to EN ISO 13849-1 for use as a redundant safety component. The double safety requirement by the DGUV for the maximum holding load is already taken into account in the load specification on page 13.
## TECHNICAL DATA

<table>
<thead>
<tr>
<th>Certification</th>
<th>TÜV</th>
<th>TÜV</th>
<th>TÜV</th>
<th>TÜV</th>
</tr>
</thead>
<tbody>
<tr>
<td>Rod Ø (mm)</td>
<td>Max. holding load (kN)</td>
<td>Releasing pressure max. (min. bar)</td>
<td>Releasing pressure max. (min. bar)</td>
<td>Releasing pressure max. (min. bar)</td>
</tr>
<tr>
<td>10</td>
<td>10</td>
<td>50</td>
<td>12.5</td>
<td>75</td>
</tr>
<tr>
<td>18</td>
<td>12.5</td>
<td>55</td>
<td>8</td>
<td>75</td>
</tr>
<tr>
<td>20</td>
<td>14</td>
<td>40</td>
<td>14</td>
<td>75</td>
</tr>
<tr>
<td>22</td>
<td>17</td>
<td>45</td>
<td>17</td>
<td>85</td>
</tr>
<tr>
<td>25</td>
<td>20</td>
<td>50</td>
<td>20</td>
<td>85</td>
</tr>
<tr>
<td>28</td>
<td>31.5</td>
<td>65</td>
<td>31.5</td>
<td>120</td>
</tr>
<tr>
<td>30</td>
<td>40</td>
<td>75</td>
<td>40</td>
<td>100</td>
</tr>
<tr>
<td>32</td>
<td>40</td>
<td>45</td>
<td>40</td>
<td>100</td>
</tr>
<tr>
<td>36</td>
<td>45</td>
<td>50</td>
<td>45</td>
<td>100</td>
</tr>
<tr>
<td>40</td>
<td>50</td>
<td>55</td>
<td>50</td>
<td>100</td>
</tr>
<tr>
<td>45</td>
<td>65</td>
<td>50</td>
<td>65</td>
<td>110</td>
</tr>
<tr>
<td>50</td>
<td>80</td>
<td>60</td>
<td>80</td>
<td>100</td>
</tr>
<tr>
<td>56</td>
<td>90</td>
<td>50</td>
<td>90</td>
<td>100</td>
</tr>
<tr>
<td>60</td>
<td>100</td>
<td>55</td>
<td>100</td>
<td>100</td>
</tr>
<tr>
<td>63</td>
<td>100</td>
<td>65</td>
<td>100</td>
<td>100</td>
</tr>
<tr>
<td>70</td>
<td>140</td>
<td>80</td>
<td>140</td>
<td>110</td>
</tr>
<tr>
<td>80</td>
<td>180</td>
<td>65</td>
<td>180</td>
<td>110</td>
</tr>
<tr>
<td>90</td>
<td>200</td>
<td>85</td>
<td>200</td>
<td>100</td>
</tr>
<tr>
<td>100</td>
<td>250</td>
<td>75</td>
<td>250</td>
<td>95</td>
</tr>
<tr>
<td>110</td>
<td>300</td>
<td>90</td>
<td>300</td>
<td>150</td>
</tr>
<tr>
<td>120</td>
<td>330</td>
<td>110</td>
<td>330</td>
<td>160</td>
</tr>
<tr>
<td>125</td>
<td>350</td>
<td>90</td>
<td>350</td>
<td>175</td>
</tr>
<tr>
<td>140</td>
<td>450</td>
<td>65</td>
<td>450</td>
<td>115</td>
</tr>
<tr>
<td>160</td>
<td>750</td>
<td>90</td>
<td>750</td>
<td>85</td>
</tr>
</tbody>
</table>

Other holding torques and rod Ø are requested.
Hydraulic locking is possible up to 2,020 Nm holding load and 300 mm rod Ø.
The stated values apply to operation with mineral oil. The holding loads may differ when using other fluids.

The clamping unit Ratio-Clamp® can be used as an accessory on all hydraulic cylinders by using a flange.

Contact us: we provide you with comprehensive advice and support you during the design phase, on-site, at one of our locations, by telephone or via e-mail. You can find our contact details at www.haemhuser-hydraulics.com.

The maximum holding load depends on the rod diameter and can be selected in the Haemhuser HIK product configurator at www.haemhuser-hydraulics.com.
Quality taken to the next level.
Application made easy.

**Intended use**
The clamping unit Ratio-Clamp® clamps round rods out of standstill:
- As a separate constructive unit
- As an attachment element to a hydraulic cylinder

**Improper use**
The clamping unit Ratio-Clamp® must not be used:
- For clamping out of motion, i.e. as a brake
- For clamping rotating rods or shafts

**Rod requirements**
The round rod to be clamped shall have a hard surface and must meet the minimum requirements when installing the Ratio-Clamp®. A honed rod is recommended.

**Functional test**
The Ratio-Clamp® shall be inspected at the factory after 2 million switching cycles. This is reduced to 1 million cycles if safety-relevant functions are overtaken. Depending on the load, the clamping unit must be checked regularly, but at least every 6 months and after prolonged standstill. This includes checking for leaks and ensuring that the holding load is maintained according to the values specified in the documentation.

**Operating conditions**
Unless otherwise specified, the following operating conditions must be observed:
- Relative humidity ≤ 70%
- Working temperatures from -30°C to +80°C
- Max. releasing pressure: 160 bar
- Max. rod speed: 1 m/s with Servocop®, 2 m/s with pressure piston seal
- Fluids: mineral oils, others like water, HFC or Skydrol® on request
- Recommended cleanliness class 10/16/13 in accordance with ISO 4406

**Control**
When controlling a Ratio-Clamp®, it must first be released by applying pressure to the releasing port – only then may the rod be moved. When using a clamping unit together with a hydraulic cylinder, it can be done by means of a hydraulic sequential control or by electronic monitoring. For example, in order to build up counterpressure, sensors in an electronic control system can measure the load on vertically installed cylinders. This prevents the rod from jorting when releasing.

This can also be achieved with a hydraulic control block: first the releasing pressure is built up, then the cylinder is pressurised. Matching valves locks the pressure in the cylinder so that the Ratio-Clamp® can be unlocked almost without jorts even when handling vertical loads.

**State check**
The respective state – rod locked or released – can be monitored via inductive proximity switches. There is an option for mounting a proximity switch as an option or with required DBUV Test certification. It is obligatory to have a proximity switch with diagnostic output installed. This also monitors the function of the switch and supply line.

**Attachment**
A fixed flange is used for attachment to Hännchen hydraulic cylinders or cylinders pursuant to ISO 6025-1, ISO 6020-2 and other makes. For this purpose, the rod must be extended according to the length of the clamping unit. If attached separately, the clamping unit can also be loosely installed using a collar flange to compensate for axis misalignment.

Detailed information on installation or start-up can be found in the downloads section at www.haennchen-hydraulic.com.