

Hydraulic clamping system for a variety of applications

Not only in our private lives should we be able to rely on someone who will support us in precarious situations. The hydraulics sector must also be reliable, especially when it comes to the protection of personnel. When implemented as safety components, the hydraulic clamping systems provide the necessary support.

Round rods that need to be secured for an unlimited amount of time without a power supply, can be held in place using the patented clamping unit – Ratio-Clamp provided by Herbert Hänchen GmbH & Co. KG. Parameters including a high clamping force or load, energy efficiency, safety, an exceptionally high number of clamping cycles, clamping from an upright position and extremely low frictional losses are guaranteed for all models. The HäKo product configurator at www.haenchen-hydraulic.com provides a range of rod diameters between 16 to 160 mm with clamping forces of 6.3 to 750 kN, while modified designs can cover a far wider range of parameters.

Application areas

There are many machines and systems where rods must be held in a certain position. For example to protect individuals, machines and tools in the event of a power failure or when shutting down systems. Other application areas include systems in which axes are intermittently fixed based on the function, either as part of the relevant process or to save energy. Specific examples include

- Continuously holding loads in place
- Blocking piston rods
- In safety devices

This in turn ensures they can be implemented in many different sectors:

- Machine and plant construction
- Tool and construction equipment
- Metal and plastic industry
- Smelting furnaces
- Foundry and furnace technology
- Hydraulic engineering and ship construction

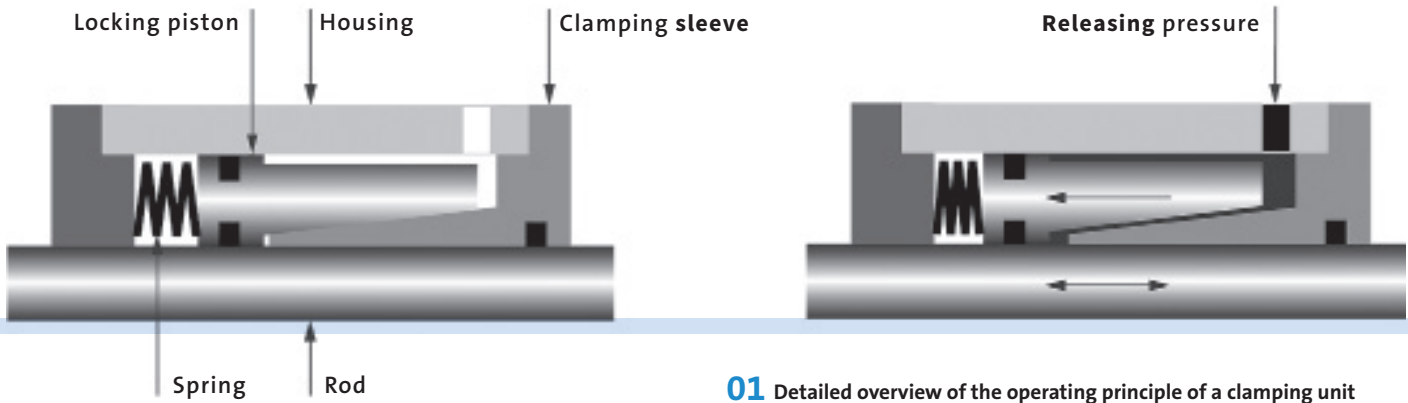
The functional principle

Ratio-Clamp operates according to the principle of frictional connection – it blocks a rod in the depressurized starting position. The hydraulic

releasing pressure that is applied moves the locking piston against the spring force by default thus releasing the clamping unit. There are two clear switching states during this process: unlocked and locked. As the clamping piece is directly connected to the housing and thus the fastening of the clamping unit no slip or play is generated following the clamping process. Even though this product, designed by Herbert Hänchen GmbH & Co. KG, has not been designed as a brake, in individual cases it is possible for the rod to slip without causing any damage when the rated load is exceeded. The basic design, including the high-quality standard Servocop seals, enables all round rods with a hard surface to achieve traverse rates of up to 1 m/s and even 2 m/s with a pressure piston seal. Clamping is implemented when the rod is at a standstill. The maximum releasing pressure is 160 bar, while the operating temperature ranges from -30 to +80 °C. Standard media include mineral oils, while others such as HFC or Skydrol® are available upon request. A load can be applied to the clamping unit in any direction.

Energy Efficient

Many plants, machines and equipment will maintain a position while a load or force is applied for short/long periods by an applied counterpressure. This can either be implemented with locking valves, although one disadvantage is that it may start to drop as a load is applied even without external influences such as the temperature, compressibility of the medium or leaks. Alternatively, a position or load can be held in a controlled manner, which results in the continuous consumption of energy by the valves and throttles in the fluid circulation system that convert pressure into heat. By using a Ratio-Clamp® instead, this ensures that the fluid circulation system can be depressurized – particularly suitable for longer clamping states. There are no time restrictions for this process. It is thus possible to maintain equipment in a deenergized standby position for months and to then directly release the equipment as quickly as possible by applying pressure without a return stroke being required.



01 Detailed overview of the operating principle of a clamping unit

Safety

These properties are also beneficial when hazards from external forces or loads need to be taken into consideration:

- In the event of fluctuations, loss or reconnection of pressurized energy, the clamping unit blocks all types of round rods that are axially loaded.
- The clamping unit can be used as an alternative to nonreturn valves if hazards caused by external forces can occur in the deenergized state.
- The clamping unit is used as an additional safety element for drives that are exposed to the force of gravity to guarantee redundant safety when a load is applied. This, for example, includes holding devices where it could pose a hazard to employees if the load started to sink.
- The clamping unit can also be used as a securing element if a cylinder has internal leaks or the position must be maintained in the event of a line breakage.

Individual products and system components

The Ratio-Clamp can be used for a variety of applications: as an individual element in conjunction with a round rod or as a system component combined with hydraulic cylinders, for example. As Hänchen has operated as a manufacturer of high-quality hydraulic cylinders for many decades, the company can provide a variety of solutions from a single source. The user can select a system unit made up of a cylinder and Ratio-Clamp within the HäKo product configurator at www.haenchen-hydraulic.com and will receive a complete element that is ready to install.

The clamping unit can also be easily combined with standard cylinders, products supplied by other manufacturers and other round rod applications. Proximity switches, that indicate whether the clamping unit is unlocked or locked, can also be integrated. A suitable hydraulic control block can also form part of a Ratio-Clamp solution. It guarantees consistent and functional control and reduces the number of switching measures.



02 Ratio Clamp in use: Testing elements on aircraft wings

Special designs

The principle of the Ratio-Clamp has proven itself on the market for decades. However, new designs and model ranges continue to be developed on this basis. The focus has also been shifted to meet new requirements such as energy efficiency. An important configuration criterion is the releasing pressure required to release the clamping unit. A variety of designs for high and low releasing pressures are thus available. For safety functions, the rod can be held for an unlimited amount of time, for example. However, if highly functional holding forces are required, the clamping unit can also be locked hydraulically. The unlocking process is implemented as usual via the hydraulic pressure.

Continuous developments and new tasks ensure that Ratio-Clamp is always being used in new areas of application. The availability of the HäKo Internet configurator provides just as much impetus as requests for new and additional options to optimize the energy efficiency or to implement it as a safety component.

Photographs: Herbert Hänchen GmbH & Co. KG

www.haenchen-hydraulic.com

About Herbert Hänchen GmbH & Co. KG

The family-run company based in Ostfildern, near Stuttgart in Germany, was founded in 1925. Nowadays, Hänchen employs more than 200 staff. More than 10% of them work in the research and development sector. All of the products are manufactured in Germany. In addition to cylinders, the product portfolio also includes clamping units, carbon components, hydraulic drive systems and testing machines.

