

# INDUSTRIAL SPARE PARTS SUPPLIER

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## Clamping unit Ratio-Clamp®

Securing and fixation of round rods



**HANCHEN®**

### 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!

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## Versatile use. Numerous advantages.



1 Clamping unit Ratio-Clamp®:  
sectional view with sealing  
system Servocop®



You can find further details on the  
clamping unit Ratio-Clamp® in the  
book "Hydraulic Systems".

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

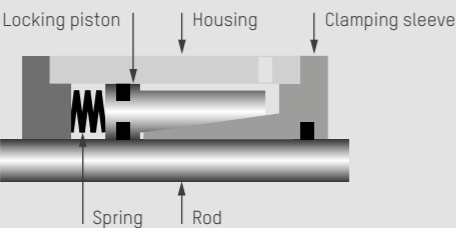
Hänchen clamping units can be used both for precise locking and for securing against unintentional movements.

- 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 (un)controlled pressure drop, emergency shutdown, power failure or system damage
- Fixes axes precisely, even when external forces act on the rod

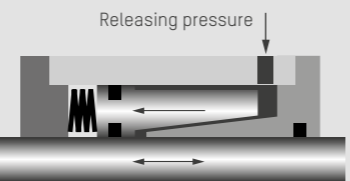
### + Advantages

- 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

#### Functional principle Locked state



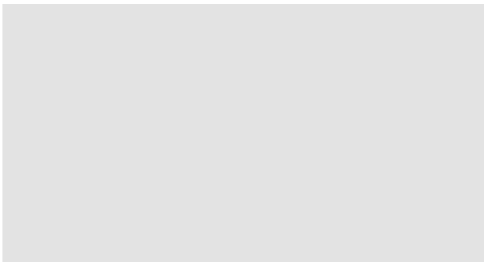
#### Functional principle Released state



On our YouTube channel at  
[www.youtube.com/Haenchen](https://www.youtube.com/Haenchen),  
you can find the video for the  
functional principle of the  
clamping unit Ratio-Clamp®.



Absolute efficiency.  
Safety without compromise.



- 1 Efficiency
- 2 Safety
- 3 Profitability

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

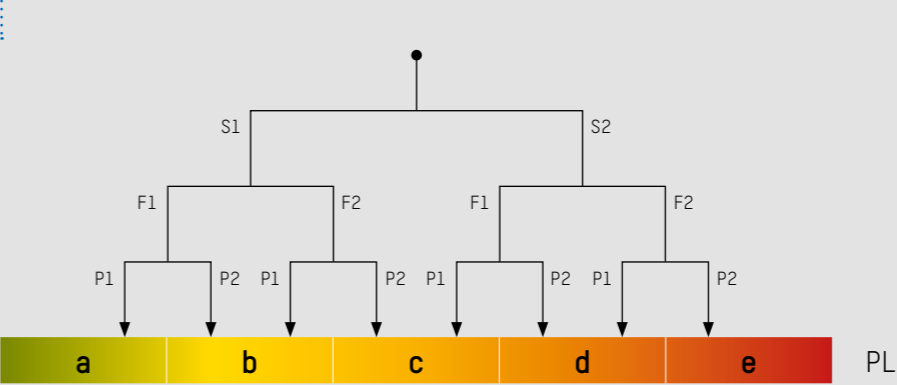
The clamping unit, with its frictional contact function, is permitted as a redundant safety component in accordance with EN ISO 13849-2. For example, a non-return valve can be used as a primary safety element.

The Ratio-Clamp® is approved in the version with DGUV Test certification for use on hydraulic presses according to EN 693 or on injection moulding machines according to EN 201.

Comparison of fixation options for round rods

	Electronic control	Port lock-off	Pivot pin locking	Clamping unit Ratio-Clamp®
Energy efficiency	–	+	+	+
Position accuracy	+	–	+	+
Independence from external influences	+	–	+	+
Effort	–	+	–	+
Flexible positioning	+	+	–	+

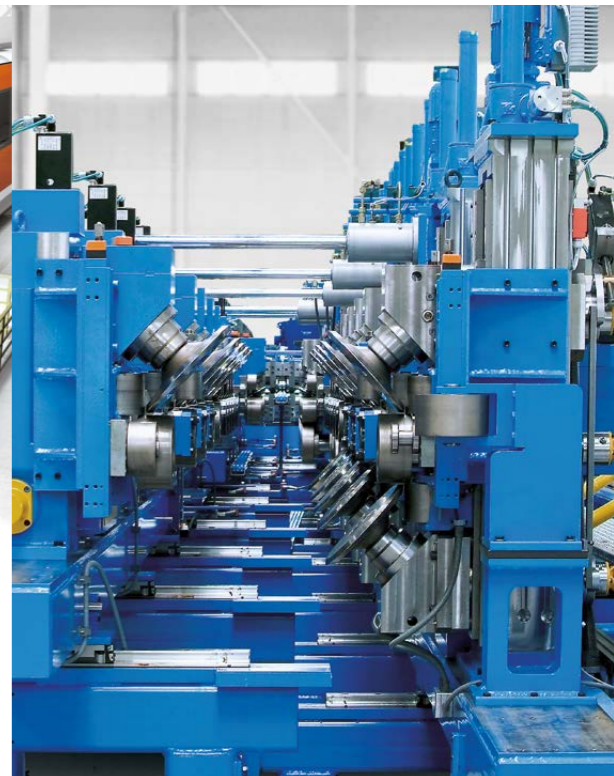
Performance level calculation



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 B<sub>100</sub> 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 shutdowns. 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

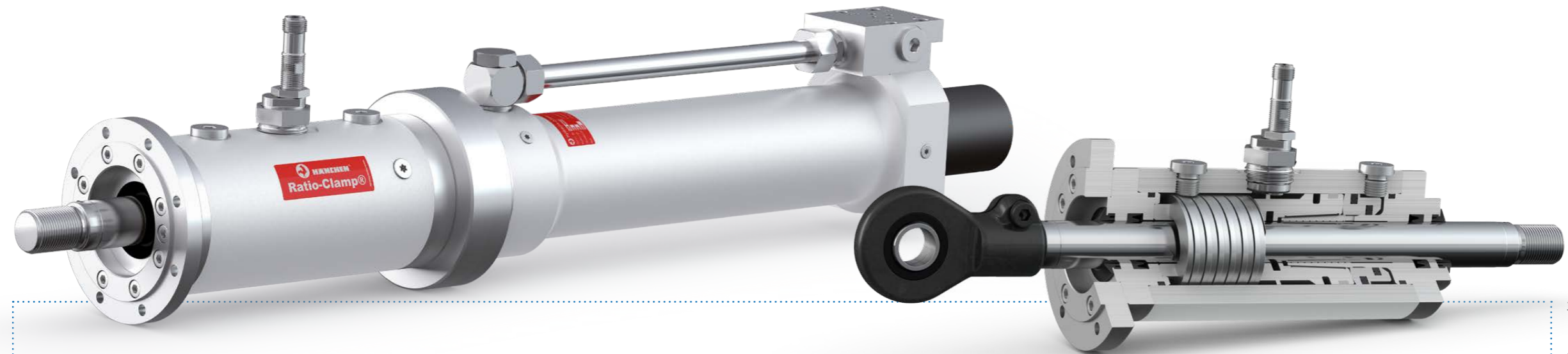
For maintenance purposes, trains must be fixed in the raised state – the Ratio-Clamp® is ideally suited for this purpose. The clamping units hold the train securely in position until the work has been completed and it can return to the rails.

#### 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.



Do you need support?  
At Hänchen, we offer you comprehensive all around service.  
From standard to special solutions – with decades of experience, we always find the right product for your application.



- 1 Clamping unit installed on a Hänchen hydraulic cylinder series 120
- 2 Clamping unit Ratio-Clamp®: sectional view with sealing system of pressure piston seal



### 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.

### 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.

#### + 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.

### Sealing system

#### + Servocop®: compact seal, lip seal, wiper ring

The basic type of Ratio-Clamp® uses the friction-optimised sealing system Servocop®. 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.

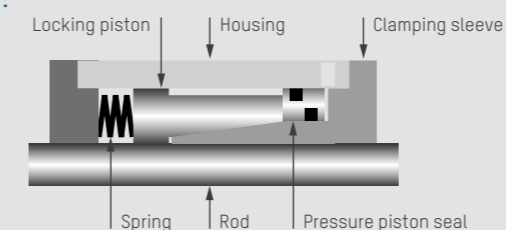
### Certification

#### + 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 B<sub>10D</sub> 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.



	RATIO-CLAMP®		RATIO-CLAMP® REDUCED RELEASING PRESSURE		RATIO-CLAMP® PRESSURE PISTON SEAL		RATIO-CLAMP® AS SAFETY COMPONENT		
+ Releasing pressure	Basic design		Reduced design		Basic design		Basic design		
+ Locking	With spring power		With spring power		With spring power		With spring power		
+ Sealing system	Servocop®		Servocop®		Pressure piston seal		Servocop®		
+ Certification	TÜV		TÜV		TÜV		TÜV, DGUV Test		
Rod Ø (mm)	Max. holding load (kN)	Releasing pressure min. (bar)	Max. holding load (kN)	Releasing pressure min. (bar)	Max. holding load (kN)	Releasing pressure min. (bar)	Max. holding load (kN)	Permissible load according to DGUV Test (kN)	Releasing pressure min. (bar)
16	10	60	8	50					
18	12.5	55	8	35	12.5	75	12.5	6.25	55
20	14	55	9	40	14	75	14	7	55
22	17	70	12	45	17	90	17	8.5	70
25	20	70	15	50	20	90	20	10	70
28	31.5	90	25	65	31.5	120	31.5	15.75	90
30	40	105	30	75	40	135	40	20	105
32	40	60	30	45	40	90	40	20	60
36	45	75	32	50	45	100	45	22.5	75
40	50	80	38	55	50	100	50	25	80
45	65	70	45	50	65	90	65	32.5	70
50	80	90	55	60	80	110	80	40	90
56	90	75	60	50	90	100	90	45	75
60	100	75	70	55	100	100	100	50	75
63	100	85	60	55	100	110	100	50	85
70	140	80	100	55	140	110	140	70	80
80	180	90	130	65	180	110	180	90	90
90	200	65			200	85	200	100	65
100	250	75			250	95	250	125	75
110	300	65			300	90	300	150	65
120	330	70			330	90	330	165	70
125	350	75			350	90	350	175	75
140	450	65					450	225	65
160	750	90							

Other holding forces and rod Ø on request.  
Hydraulic locking is possible up to 2,000 kN holding load and 300 mm rod Ø.  
The stated values apply to operation with mineral oil. The holding load 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.haenchen-hydraulic.com](http://www.haenchen-hydraulic.com).



The maximum holding load depends on the rrod diameter and can be selected in the Hänchen HäKo product configurator at [www.haenchen-hydraulic.com](http://www.haenchen-hydraulic.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

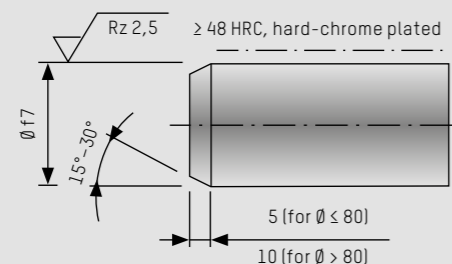
The clamping unit Ratio-Clamp® must not be used:

- 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 19/16/13 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 jolting when releasing.

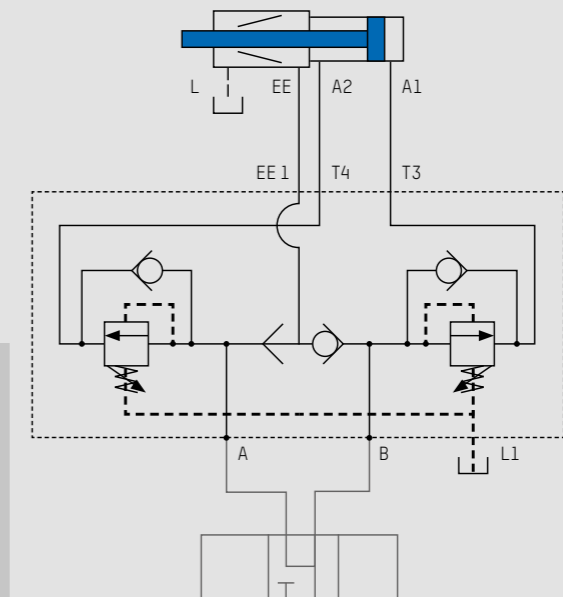
This can also be achieved with a hydraulic control block: first the releasing pressure is built up, then the cylinder is pressurised. Matching valves locks the pressure in the cylinder so that the Ratio-Clamp® can be unlocked almost without jolts even when handling vertical loads.

#### + State check

The respective state – rod locked or released – can be monitored via inductive proximity switches. The device for mounting a proximity switch is available as standard. On request, the clamping unit can be equipped with two proximity switches. When using the Ratio-Clamp® as a safety component or with required DGUV 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 Hänchen hydraulic cylinders or cylinders pursuant to ISO 6020-1, 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.



1 Control block: sequential control between the hydraulic cylinder/clamping unit and the directional valve.



Detailed information on installation and start-up can be found in the downloads section at [www.haenchen-hydraulic.com](http://www.haenchen-hydraulic.com).

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