Technical information for hydraulic clamping elements

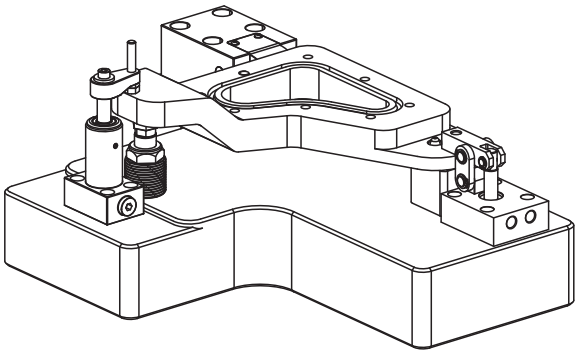
Hydraulic clamping elements are used on clamping fixtures where the generation and transmission of high forces through the use of small clamping elements is required. Furthermore, hydraulic clamping elements can be used to give good control and adjustability together with a long service life for a clamping fixture. The hydraulic clamping element product portfolio covers all support and clamping functions.

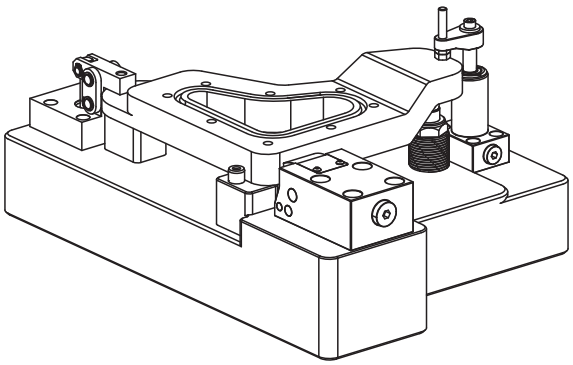
Thanks to the large hydraulic clamping element product range, any workpiece with any dimension in any batch size can be easily clamped with optimised set-up times.

Through having the choice between single-acting and double-acting clamping elements, the hydraulic clamping elements can be used in both automated and non-automated clamping fixtures.

Advantages:

- Clamping sequences in automated procedures can be precisely defined.
- Calculable clamping forces for the clamping elements.
- High safety standards.
- Reduction of clamp and release times.
- Information transfer between machine and clamping element.





General safety information for hydraulic clamping elements

Oil recommendation:

Oil temperature in °C	Oil designations acc. to DIN 51524
➔ +10-40 °C	HLP 22
➔ +15-50 °C	HLP 32
➔ +20-60 °C	HLP 46

Sealing materials:

NBR (acrylonitrile butadiene rubber).

PU (polyurethane).

Special materials to suit functional requirements.

Mounting position:

If no specifications are made in the data sheets, the mounting position of the hydraulic clamping elements is arbitrary.

Operating pressure:

Must be taken from the technical specifications of the product family and/or the individual articles.

Ambient temperature:

-10 °C to +80 °C by standard versions. Versions for higher ambient temperatures available on request.

Piston lateral forces:

Max. 5 % of the nominal piston force may act on the clamping element as lateral forces.

Permitted stroke speed:

Max. 0.25 m/s.

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Permitted flow rate:

The permissible flow rates for the individual hydraulic clamping elements must be observed. The values given in the technical data refer to the shortest clamping time of one second. Throttle check valves should be employed where there is a higher quotient (pump flow / number of cylinders) in the clamping device than the permissible flow rate. To prevent pressure intensification, the throttle check valve should be connected to the inlet port of the hydraulic clamping element so that the outflow of hydraulic oil from the clamping element is not obstructed.

Operating principle of hydraulic clamping elements:

Single-acting hydraulic clamping elements with spring return pistons (return time cannot be defined).

Double-acting hydraulic clamping elements (return time can be defined).

Influence of temperature:

An increase or decrease in temperature changes the volume of the enclosed oil. Here, a pressure change of ca. 10 bar per 1 °C can be assumed if there is no elastic oil volume. Hydraulic accumulators should be employed to prevent these physical influences in a clamping device.

Likewise, a pressure relief valve should be used if it is assumed that the permissible operating pressure could be exceeded.

Service life:

For a long product life, with single-acting clamping elements with spring return care must be taken that no liquids can penetrate the spring chamber of the clamping element.

Commissioning / Maintenance:

Installation information must be observed during the commissioning of hydraulic clamping elements.

When installing the clamping elements, pay attention to the cleanliness of the individual interfaces.

Only the specified, clean pressure media may be used for operation.

Every hydraulic system and hydraulic clamping element must be vented before commissioning is completed.

➔ Air pockets in the hydraulic oil significantly delay the clamping process. Therefore, venting must be carried out during commissioning:

Venting with screw connection:

1. Feed low oil pressure into the cylinder.
2. Lightly loosen the pipe fitting.
3. Maintain oil pressure until the oil comes out of the cylinder without bubbles.
4. Tighten the pipe fitting.

Venting with O-ring flange connection/drilled channels:

1. Feed low oil pressure into the cylinder.
2. Lightly loosen the screw plug.
3. Maintain oil pressure until the oil comes out of the cylinder without bubbles.
4. Tighten the screw plug.

➔ With single-acting clamping elements, the spring chamber must be vented to avoid malfunctions. The filter integrated into the vent port protects the spring chamber from contamination. To prevent liquids from penetrating, an additional vent line can be connected. The vent line should be routed to a protected location.

Maintenance intervals must be observed.

Accident prevention regulations:

Extreme forces can be generated with hydraulic clamping elements. This increases the risk of injury during operation through pinching or crushing.

Use protective devices with locks or latches and observe the general accident prevention regulations.

With single-acting clamping elements, the housing cover must under no circumstances be removed. There is a high risk of injury from the the heavily tensioned springs shooting out. Loose fastening screws must be retightened immediately.

Observance of DIN 31001, part 1.

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Key figures and SI units:

Area	A	m^2	cm^2	mm^2
Force	F	N	1000 N=kN	
Mass	m	kg		
Volume	V	m^3	cm^3	mm^3
Volume flow	Q	cm^3/sec	l/min	
Distance	s	m	cm	mm
Time	t	s	min	
Speed	v	m/s		
Revolution	n	s^{-1}	l/min	

Basic formula of hydrostatics

Pressure	=	Force / Area
p	=	F / A