Flat Lever Clamps

HILMA = STARK

ROEMHELD

Advanced Link System, pneumatic position monitoring optional single and double acting, max. operating pressure 250 bar



The flat lever clamp is a compact hydraulic clamping element for fixtures with oil supply through drilled channels.

Due to the minimum space required, the flat lever clamp is especially suitable for fixtures with little space for the installation of hydraulic clamping elements.

The flat clamping lever allows machining of surfaces that are only a few millimetres above the clamping point.

Double-acting versions are advantageous for time and cycle-dependent installations, since the return stroke is effected in a precisely defined time and the pneumatic position monitoring of the clamping lever is possible.

Advanced Link System

The newly developed lever kinematics enable trouble-free, process-safe operation.

Description

When pressurising the flat lever clamp, a piston moves upwards against the rear edge of the clamping lever and swivels the clamping lever to the clamping position. The piston force is deviated by 180° onto the workpiece. The clamping force depends on the operating pressure and the length of the clamping lever.

When unclamping the flat lever clamp, the clamping lever is swivelled back to the off-position by means of a hook-shaped carrier on the piston. Unclamping is made either hydraulically or when using a single-acting element with spring force. The pneumatic position monitoring allows the monitoring of both final positions of the clamping lever.

Important notes

Flat lever clamps must only be used for clamping of workpieces in industrial applications and may only be operated with hydraulic oil. Considerable injuries can be caused to fingers in the effective area of the clamping arm.

The manufacturer of the fixture or the machine is obliged to provide effective protection devices.

The clamping lever must not be impeded during swivelling. The clamping height h must be in the indicated tolerance range. To permanently secure correct functioning, the flat lever clamps must be regularly cleaned and greased. This applies especially for dry machining, minimum quantity lubrication and in case of accumulation of very small swarf.

Advantages

- Minimum dimensions
- Partially immersed body
- Mounting without pipes
- Unimpeded loading and unloading of the fixture
- Workpiece clamping without any side loads
- Flat clamping lever can be swivelled into small recesses
- Long clamping lever (blank) adaptable to the workpiece
- Pneumatic control of the clamping lever position (optional only double acting)
- Metallic wiper edge for piston rod
- Swarf sheet retrofittable
- Mounting position: any

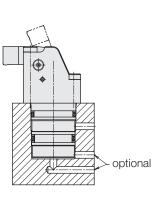
Installation and connecting possibilities

Single acting

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Double acting

Long clamping lever (blank)



Available versions 1. Single acting,

- without position monitoring
- **.1 Without clamping lever 18297X0E00** For the installation of a special clamping lever, which can be produced from the clamping lever blank.

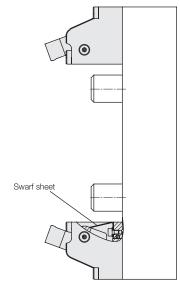
optional

- **1.2 With clamping lever 18297X0EXX** The clamping lever with length L as per chart (page 3) is installed.
- Double acting, without and with position monitoring With the pneumatic position monitoring, the clamping and/or unclamping position is queried directly at the clamping lever.
- A description can be found on page 5. **2.1 Without clamping lever, without position monitoring 18297X0D00** For the installation of a special clamping lever, which can be produced from the clamping lever blank.
- 2.2 Without clamping lever, with position monitoring 18297X3D00 The position monitoring can also be used with the clamping lever blank.
- 2.2 With clamping lever, without position monitoring 18297X0DXX

The clamping lever with length L as per chart (page 3) is installed.

2.3 With clamping lever, with position monitoring 18297X3DXX The clamping lever with length L as per chart (page 3) is installed.

Application example



Installation instructions:

The flat lever clamp is suitable for any installation position. If the selected installation position can cause swarf nests to form in the swivel area of the clamping lever, the swarf sheet available as an accessory can be retrofitted.

Metallic wiper

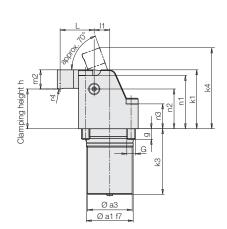
edge on the piston

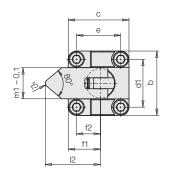
3 1.829

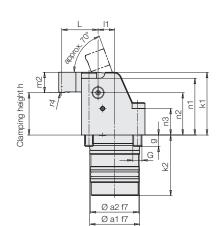
Double acting

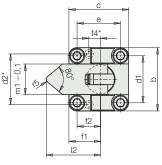
18297X0DXX

Single acting 18297X0EXX









* Only available for position monitoring

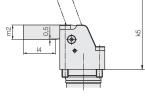
Fit depth P1

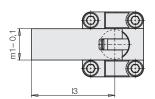
Location hole



Long clamping lever (blank)

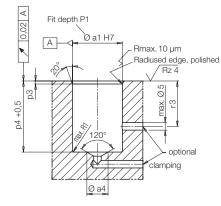
see accessories

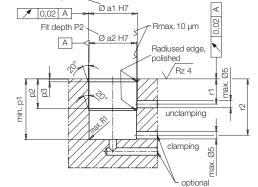


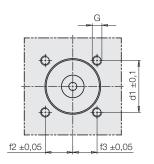


Fixing screws 10.9 – DIN 7984 Included in our delivery Tightening torque see chart.

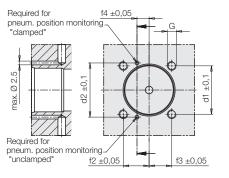








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2 O-rings 3 x 1 (part no. 3001 758) Included in our delivery

Pneumatic position monitoring see page 5

Technical data

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Ø P2 [mm] 34 32 34 4 p1 min. [mm] 36 41 46.5 4 p2 [mm] 17 20 20 22 p3 [mm] 2 2 3 3 p4 + 0.5 [mm] 39 47 46.5 64 r1 [mm] 14 17 16.5 18 r2 [mm] 33 35 - 38 40 - 44 44.5 r3 [mm] 16 - 36 17 - 44 17 - 44 18 r4 [mm] 4 4 8 8 r5 [mm] 2 2 4 4 Single acting, without position monitoring [mm] 2 2 4 4 Part no. with clamping lever [kg] 0.263 0.544 1.040 1.8 Weight, approx. [kg] 0.305 0.630 1.225 2.1 Double acting, without clamping lever [kg] 0.305 0.630 1.225 2.1 Double acting, without position monit	32
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Part no. with clamping lever length L 1829710E18 1829720E24 1829730E28 182973 Weight, approx. [kg] 0.305 0.630 1.225 2.1 Double acting, without clamping lever 1829710D00 1829720D00 1829730D00 1829730D00 Part no. with position monitoring 1829713D00 1829723D00 1829733D00 1829733D00	1.861
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Double acting, without clamping lever 1829710D00 1829720D00 1829730D00 1829730D	2.180
Part no. without position monitoring 1829710D00 1829720D00 1829730D00 18297 Part no. with position monitoring 1829713D00 1829723D00 1829733D00	
Part no. with position monitoring 1829713D00 1829723D00 1829733D00 18297	9740 <mark>D00</mark>
	9743 D00
Weight, approx. [kg] 0.246 0.491 0.962 1.5	1.576
Double acting, with clamping lever	
	9740 <mark>D</mark> 33
Part no. with position monitoring 1829713D18 1829723D24 1829733D28 18297	9743 <mark>D</mark> 33
	1.895
Accessories	
Part no. clamping lever length L 03541025 03541026 03541027 0354	54 1028
	0.319
	541032
	0.537
Part no.swarf sheet03538140403538140503538140603538* The clamping height h must be in the indicated tolerance range.	5381407

* The clamping height h must be in the indicated tolerance range.

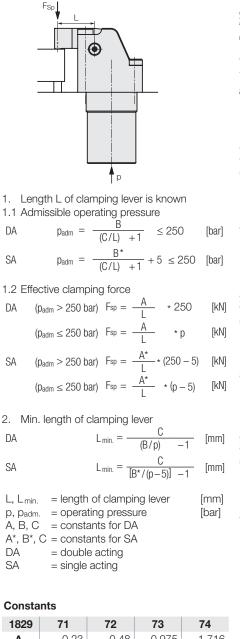
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Clamping force diagrams

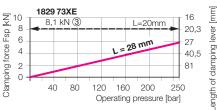
Single acting

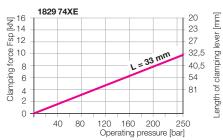


Calculations of the clamping force

1829	71	72	73	74
Α	0.23	0.48	0.975	1.716
A *	0.184	0.323	0.663	1.322
В	402.78	385.41	401.77	397.73
B*	509.76	555	578.57	503.37
С	11	13	17	19.5

1829 71XE Clamping force Fsp [kN] 4 3 15 15 18 22,5 30 = 18 mm 2 1 45 0 40 80 160 200 250 120 Operating pressure [bar] 1829 72XE 6 Length of clamping lever [mm] 13 Clamping force Fsp [kN] 5 4 -16 20 . 3 2 = 24 mm 26 39.5 1 79 0 40 80 120 160 250 200 Operating pressure [bar]





Example 1: Flat lever clamp 1829723D24 p = 100 bar; L = 24 mm (standard)

Effective clamping force

$$F_{Sp} = -\frac{A}{L} * p = \frac{0.48}{24} * 100 = 2 \text{ kN}$$

Example 2: Flat lever clamp 1829720**D**00 p = 210 bar

Min. length of clamping lever

$$L_{min} = \frac{C}{(B/p) - 1} = \frac{13}{(385.41/210) - 1} mm$$

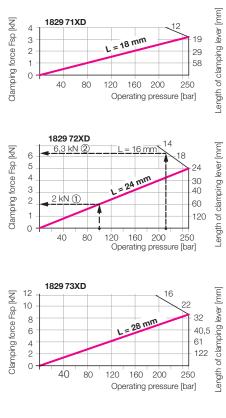
Admissible operating pressure (review) $p_{adm} = \frac{B}{(C/L) + 1} = \frac{385.41}{(13/16) + 1} = 213 \text{ bar}$

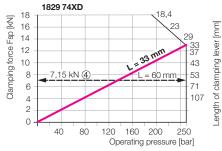
Effective clamping force at 210 bar

 $F_{Sp} = \frac{A}{L} * p = \frac{0.48}{16} * 210 = 6.3 \text{ kN}$

Double acting

ength of clamping lever [mm]





Example 3: Flat lever clamp 1829730**E**00 Special clamping lever L = 20 mm Admissible operating pressure $p_{adm} = \frac{B^*}{(C/L) + 1} = \frac{578.57}{(17/20) + 1} = \frac{312 \text{ bar} > 250}{\text{bar}!}$ Effective clamping force at 250 bar

$$F_{Sp} = \frac{A^{\star}}{L} * (p-5) = \frac{0.663}{20} * (250-5) = 8.12 \text{ kN}$$

Example 4: Flat lever clamp 1829740**D**00 Special clamping lever L = 60 mm Admissible operating pressure B 39773 = 300 bar > 250

$$p_{adm} = \frac{B}{(C/L) + 1} = \frac{397.73}{(19.5/60) + 1} = 300 \text{ bar} > 250$$

$$F_{Sp} = \frac{A}{L} * p = \frac{1.716}{60} * 250 = 7.15$$

B 1.829 / 4-21 US - page 4

kΝ

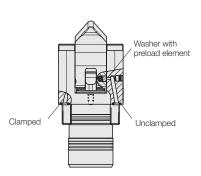
Pneumatic position monitoring

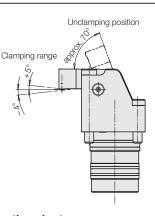
The double-acting flat lever clamps

18297X3DXX

are delivered with optional position monitoring. Depending on requirements, the compressed air is supplied via one or two drilled channels (see page 2).

The required O-rings in the flange are included in the delivery.





Description

On both sides of the clamping lever is a bore hole in which a washer with an elastic preload element is positioned.

In the guide for the clamping lever in the housing, two bore holes are arranged so that the clamping or unclamping position of the clamping lever will be closed by the preloaded washer.

Important note!

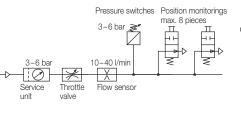
When mounting the clamping lever, the preload elements and the washers must be inserted into the provided bore holes in the clamping lever.

These parts are included in the delivery of all double-acting flat lever clamps that are delivered without the clamping lever.

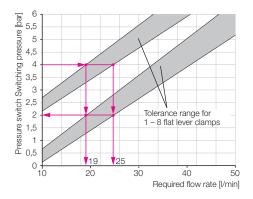
Monitoring by pneumatic pressure switch

For the evaluation of the pneumatic pressure increase standard pneumatic pressure switches can be used.

Pneumatic port



Required flow rate depending on the switching pressure of the pneumatic pressure switch for a pressure drop Δp 2 bar



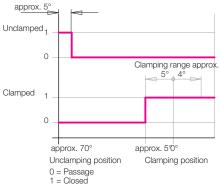
Example

Required switching pressure	4 bar
Pressure drop, if the clamp- ing or unclamping position has not yet been reached.	2 bar
As per diagram: Required flow rate* 1 element	approx. 19 l/min
8 elements	approx. 25 l/min

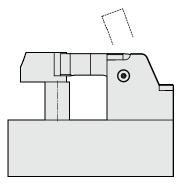
*) The pneumatic position monitoring is a metallic sealing system in which an air leakage of up to 1.5 I/min per element can occur when closed at 2 bar.

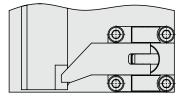
The amount of air leakage depends on the ambient conditions (cleanliness) and should be added to the required volume as per diagram.

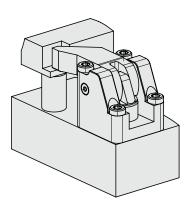
Function chart



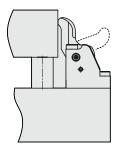
Cranked clamping arm







Lateral clamping of workpieces to eliminate the clearance



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