

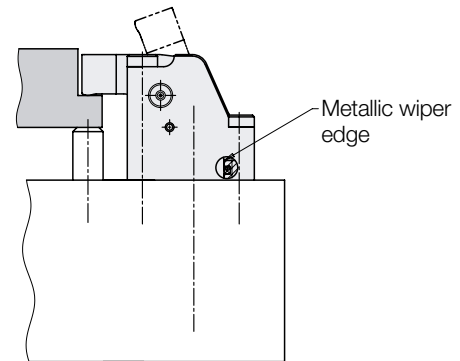


Hinge Clamps with Flat Clamping Lever with pneumatic position monitoring*, single and double acting, max. operating pressure 250 bar



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 (standard only double acting))
- Metallic wiper edge for piston rod
- Mounting position: any



Application

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

Due to the minimum space required, the hinge clamp with flat clamping lever 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.

Typical applications are:

- Multiple clamping fixtures with many workpieces that are closely arranged
- Rotary indexing fixtures in horizontal and vertical machining centres
- Assembly lines

Description

When pressurising the hinge 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 hinge 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

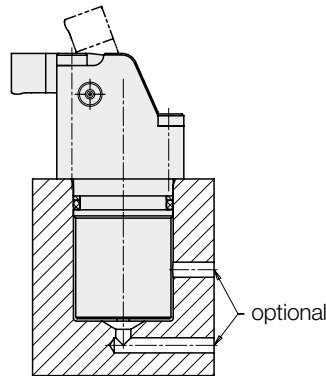
Hinge clamps with flat clamping lever must only be used for clamping of workpieces in industrial applications and may only be operated with hydraulic oil. Considerable injuries can be caused to fingers in the effective area of the clamping arm.

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.

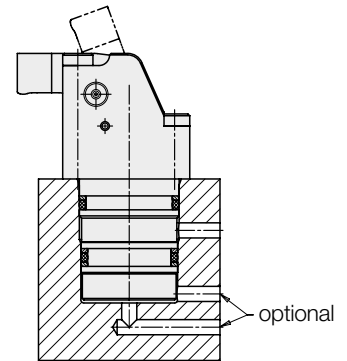
In order to permanently secure correct functioning, the hinge clamps with flat clamping lever must be regularly cleaned and greased. This applies especially for dry machining, minimum quantity lubrication and in case of accumulation of very small swarf.

Installation and connecting possibilities

Single acting



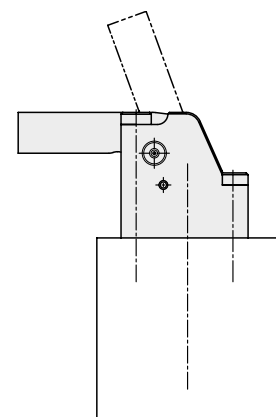
Double acting



Available versions

1. **Single acting, without position monitoring**
 - 1.1 Without clamping lever 18296X0E00
For the installation of a special clamping lever, which can be produced from the clamping lever blank.
 - 1.2 With clamping lever 18296X0EXX
The clamping lever with length L as per chart (page 3) is installed.
2. **Double acting, with position monitoring**
 - 2.1 Without clamping lever 18296X3D00
For the installation of a special clamping lever, which can be produced from the clamping lever blank.
 - 2.2 With clamping lever 18296X3DXX
The clamping lever with length L as per chart (page 3) is installed.

Long clamping lever (blank)



* Only for double-acting versions

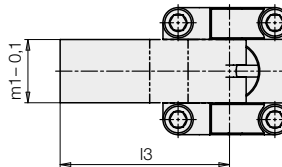
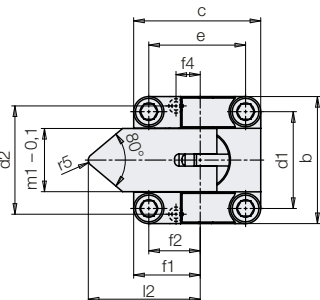
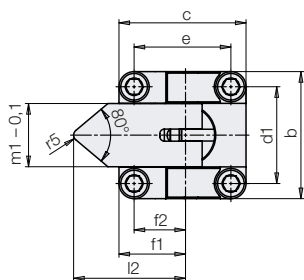
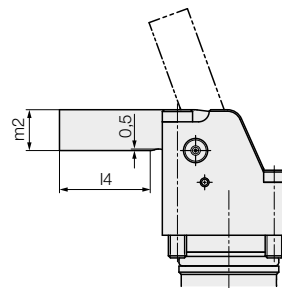
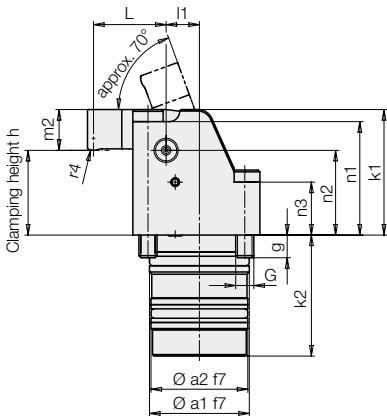
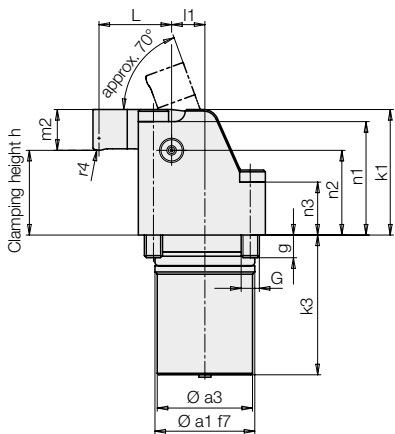
Versions: single-acting / double-acting

Single acting
18296X0EXX

Double acting
with position monitoring
18296X3DXX

Long clamping lever (blank)

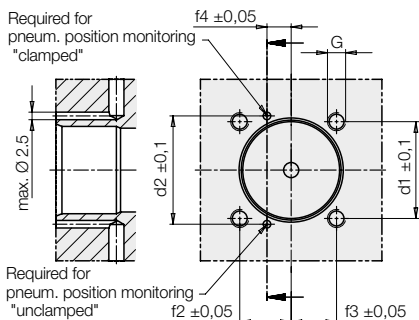
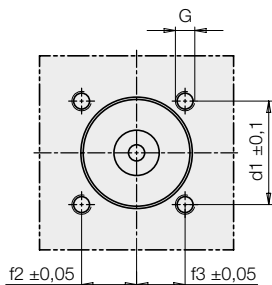
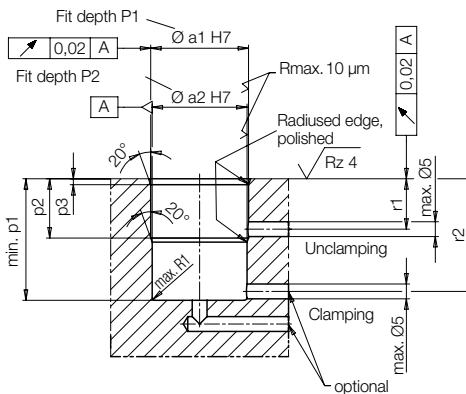
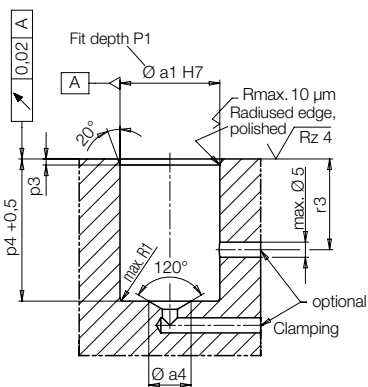
Material: 42CrMoS4+QT nitrocarburized



Location hole

Location hole

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



2 O-rings 3 x 1 (part no. 3001758).
Included in our delivery

Pneumatic position monitoring see page 5

Technical data

Size			1	2	3	4
Clamping force at 250 bar	single acting	approx. [kN]	2.5	3.3	5.8	9.8
and length of clamping lever L	double acting	approx. [kN]	3.2	5	8.7	13
Piston Ø	single acting	[mm]	16	20	25	32
	double acting	[mm]	18/16	24/20	30/25	36/32
Piston stroke		[mm]	9.5	11.5	15	18
Oil volume clamping	single acting	[cm ³]	1.9	3.6	7.4	14.5
	double acting	[cm ³]	2.4	5.2	10.6	18.3
Oil volume unclamping	double acting	[cm ³]	0.5	1.6	3.3	3.9
Adm. flow rate	single acting	[cm ³ /s]	4	7	13	32
Adm. flow rate	double acting	[cm ³ /s]	5	10	20	40
Min. operating pressure		[bar]	20	20	20	20
Max. pressure in return line	single acting	[bar]	0.5	0.5	0.5	0.5
Tightening torque (screws 10.9 DIN 7984)		[Nm]	7	12	29	58
a1 H7/f7		[mm]	25	33	40	46
a2 H7/f7		[mm]	24	32	38	44
a3		[mm]	23.8	31.5	37.5	43.5
a4		[mm]	14	14	14	32
b		[mm]	35	42	53	66
c		[mm]	33	42	54	63
d1		[mm]	26	32	40	50
d2		[mm]	28	35.8	40	50
e		[mm]	24	32	41	47
f1		[mm]	17.5	22	29.5	37
f2		[mm]	13	17	23	29
f3		[mm]	11	15	18	18
f4		[mm]	6.5	8	12.5	15
G		[mm]	M5	M6	M8	M10
g		[mm]	11	7.5	11	13
h clamping height*		[mm]	23 +1.5/-1.2	28 +2/-1.6	36 +2.4/-1.9	41 +2.8/-2.3
k1		[mm]	32.5	41.5	54	64
k2		[mm]	34	40	46	48
k3		[mm]	38	46.2	45.3	63.5
L		[mm]	18	24	28	33
l1		[mm]	10	11	16	20
l2		[mm]	30	37	48	57
l3		[mm]	45	56	71	85
l4		[mm]	22	30	34	41.5
m1 -0.1		[mm]	16.9	20.9	25.9	32.9
m2		[mm]	9.5	13.5	18	22.5
n1		[mm]	29	37.5	49	57
n2		[mm]	23	28	36	41
n3		[mm]	9	17.5	24	32
P1		[mm]	11	14	14	14
P2		[mm]	34	32	34	40
p1 min.		[mm]	36	41	46.5	49
p2		[mm]	17	20	20	23.5
p3		[mm]	2	2	3	3
p4 +0.5		[mm]	39	47	46.5	64.5
r1		[mm]	14	17	16.5	18.5
r2		[mm]	33	35-38	40-44	44.5-46
r3		[mm]	16-36	17-44	17-44	18-61
r4		[mm]	4	4	8	8
r5		[mm]	2	2	4	4

Single acting, without position monitoring

Part no. without clamping lever		1829610E00	1829620E00	1829630E00	1829640E00
Weight, approx.	[kg]	0.263	0.544	1.040	1.861
Part no. with clamping lever length L		1829610E18	1829620E24	1829630E28	1829640E33
Weight, approx.	[kg]	0.305	0.630	1.225	2.180

Double acting, with position monitoring

Part no. without clamping lever		1829613D00	1829623D00	1829633D00	1829643D00
Weight, approx.	[kg]	0.246	0.491	0.962	1.576
Part no. with clamping lever length L		1829613D18	1829623D24	1829633D28	1829643D33
Weight, approx.	[kg]	0.288	0.577	1.147	1.895

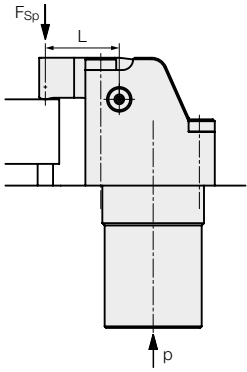
Accessories

Part no. clamping lever length L		0354974	0354975	0354976	0354977
Weight, approx.	[kg]	0.042	0.086	0.185	0.319
Part no. long clamping lever (blank)		0354978	0354979	0354980	0354981
Weight, approx.	[kg]	0.066	0.140	0.290	0.537

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

Clamping force diagrams

Calculation of the clamping force



1. Length L of clamping lever is known
- 1.1 Admissible operating pressure

DA
$$p_{adm} = \frac{B}{(C/L) + 1} \leq 250 \quad [\text{bar}]$$

SA
$$p_{adm} = \frac{B^*}{(C/L) + 1} + 5 \leq 250 \quad [\text{bar}]$$

- 1.2 Effective clamping force

DA ($p_{adm} > 250 \text{ bar}$)
$$F_{Sp} = \frac{A}{L} * 250 \quad [\text{kN}]$$

($p_{adm} \leq 250 \text{ bar}$)
$$F_{Sp} = \frac{A}{L} * p \quad [\text{kN}]$$

SA ($p_{adm} > 250 \text{ bar}$)
$$F_{Sp} = \frac{A^*}{L} * (250 - 5) \quad [\text{kN}]$$

($p_{adm} \leq 250 \text{ bar}$)
$$F_{Sp} = \frac{A^*}{L} * (p - 5) \quad [\text{kN}]$$

2. Min. length of clamping lever

DA
$$L_{min.} = \frac{C}{(B/p) - 1} \quad [\text{mm}]$$

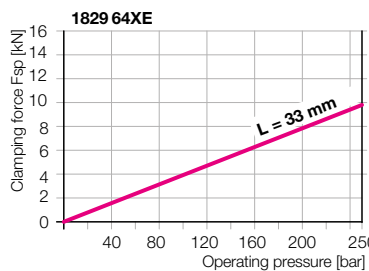
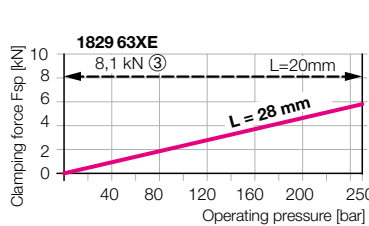
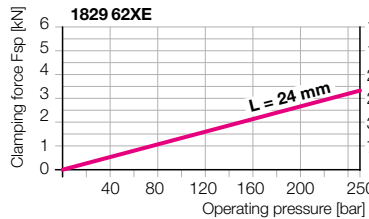
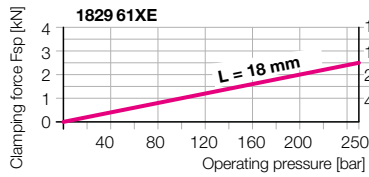
SA
$$L_{min.} = \frac{C}{[B^*/(p-5)] - 1} \quad [\text{mm}]$$

- L, L_{min.} = length of clamping lever [mm]
- p, p_{adm.} = operating pressure [bar]
- A, B, C = constants for DA
- A*, B*, C = constants for SA
- DA = double acting
- SA = single acting

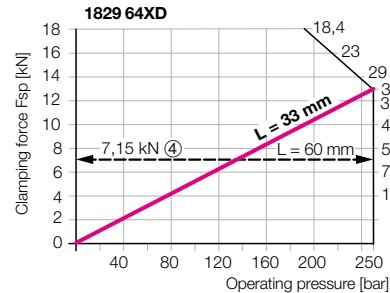
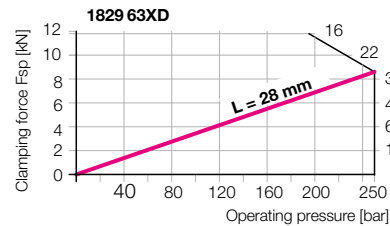
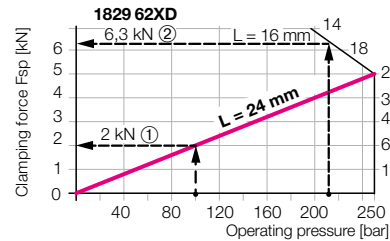
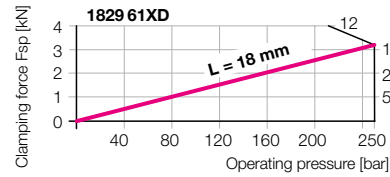
Constants

	1829	61	62	63	64
A		0.23	0.48	0.975	1.716
A*		0.184	0.323	0.663	1.322
B		402.78	385.41	401.77	397.73
B*		509.76	555	578.57	503.37
C		11	13	17	19.5

Single acting



Double acting



Example 1: Hinge clamp with flat clamping lever 1829623D24
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: Hinge clamp with flat clamping lever 1829620D00
p = 210 bar

Min. length of clamping lever
$$L_{min} = \frac{C}{(B/p) - 1} = \frac{13}{(385.41/210) - 1} = 15.56 \rightarrow 16 \text{ mm}$$

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

Example 3: Hinge clamp with flat clamping lever 1829630E00
Special clamping lever L = 20 mm

Admissible operating pressure
$$p_{adm} = \frac{B^*}{(C/L) + 1} = \frac{578.57}{(17/20) + 1} = 312 \text{ bar} > 250 \text{ bar}$$

Effective clamping force at 250 bar
$$F_{Sp} = \frac{A^*}{L} * (p - 5) = \frac{0.663}{20} * (250 - 5) = 8.12 \text{ kN}$$

Example 4: Hinge clamp with flat clamping lever 1829640D00
Special clamping lever L = 60 mm

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

Effective clamping force at 250 bar
$$F_{Sp} = \frac{A}{L} * p = \frac{1.716}{60} * 250 = 7.15 \text{ kN}$$

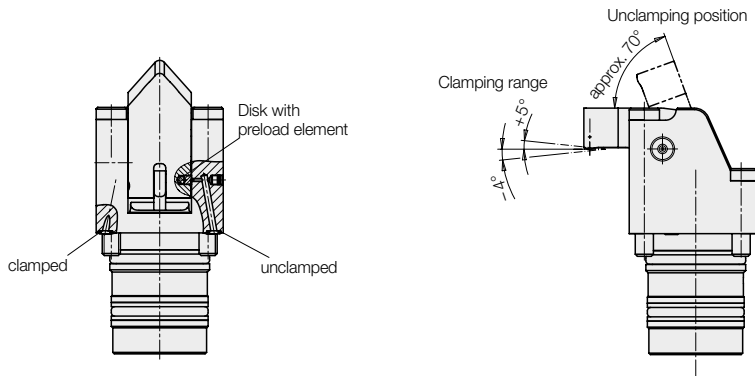
Pneumatic position monitoring

The double-acting hinge clamps with flat clamping lever

18296X3DXX

are delivered with standard 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

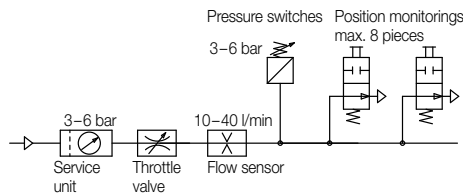


Monitoring by pneumatic pressure switch

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

With one pressure switch up to 8 hinge clamps with flat clamping lever can be queried.

Pneumatic port



Description

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

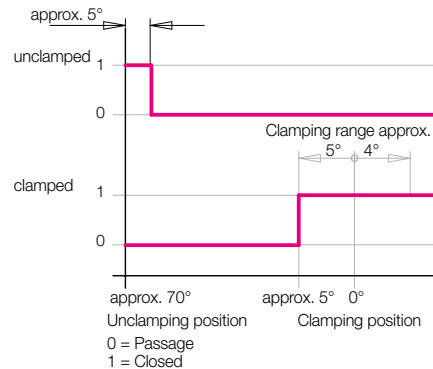
In the guide for the clamping lever in the housing, two bore holes are arranged so that the clamping or unclamping position of the clamping lever will be closed by the preloaded disk.

Important note!

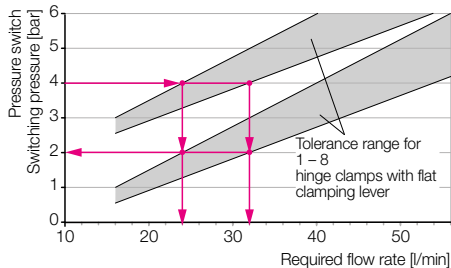
When mounting the clamping lever, the preload elements and the disks must be inserted into the provided bore holes in the clamping lever.

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

Function chart



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 clamping or unclamping position has not yet been reached 2 bar

As per diagram:

Required flow rate approx. 24-32 l/min (depending on the number of connected elements)