

Hinge Clamps

with metallic wiper edge and optional position monitoring, double acting, max. operating pressure 250 bar



Application

The hinge clamp is a low-cost hydraulic clamping element with many installation and connecting possibilities.

If the clamping lever is completely retracted, unimpeded loading and unloading of the fixture can be effected. A clamping recess in the workpiece a little bit wider than the clamping lever is sufficient as clamping surface.

The special kinematics allow clamping nearly without side loads of workpieces which are very sensitive against deformation.

Description

When pressurising the element, the piston moves upwards and swivels the clamping lever over the hinges forwards and at the same time downwards onto the workpiece.

The piston force is deviated by 180° and is available as clamping force with virtually no loss of efficiency.

If the level of the clamping surface is exactly on height h (see page 2), no side loads are introduced into the workpiece.

The bodies are recessible in the fixture up to the flange. Alternatively intermediate plates are available for height adjustment.

All versions are optionally available with extended piston rod and with inductive or pneumatic position monitoring.

Important notes!

Hinge clamps must only be used for clamping of workpieces in industrial applications and may only be operated with hydraulic oil.

Hinge clamps can generate very high forces. The workpiece, the fixture or the machine must be in the position to compensate these forces. Considerable injuries can be caused to fingers during clamping and unclamping in the effective area of the clamping lever.

The manufacturer of the fixture or the machine is obliged to provide effective protection devic-

Hinge clamps have to be checked regularly on contamination by swarf and have to be cleaned. Operating conditions, tolerances and other data see data sheet A 0.100.

Advantages

- Compact design
- Body partially recessible
- Oil supply alternatively via pipe threads or drilled channels
- Unimpeded loading and unloading of the fixture
- The clamping lever can be swivelled into small recesses
- Clamping possible without side loads
- Long clamping lever adaptable to the workpiece
- Lever mechanism easy to clean
- Standard metallic wiper edge
- Standard FKM seals
- Inductive or pneumatic control of the clamping position and the clamping range optional

Installation and connecting possibilities

Cartridge type

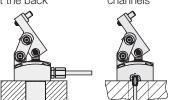
for horizontally-drilled channels



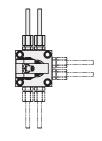
Pipe thread at the back / Plug-type connector

Pipe thread, at the back

for vertically-drilled channels



Pipe thread at 3 sides

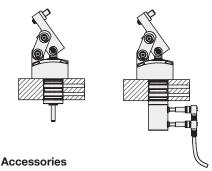


Metallic wiper edge

Option

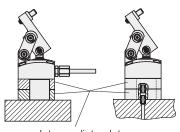
Extended piston rod

for all versions available without with position monitoring position monitoring



Intermediate plates

for all versions with pipe thread

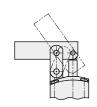


Intermediate plates

Option

Long clamping lever

for all versions available.



Alternatively all versions are also available without clamping lever.

Dimensions Accessories

Cartridge type

Clamping lever with swivel contact bolt

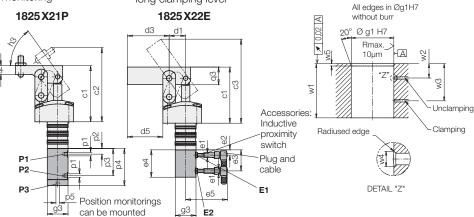
without clamping lever extended piston rod

1825 X11 1825 X20

Optionally

with pneumatic position monitoring

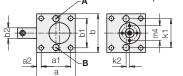
Optionally with inductive position monitoring/ long clamping lever



Pipe thread at the back / plug-type connector

Clamping lever with swivel contact bolt

without clamping lever extended piston rod



A = Clamping

B = Unclamping

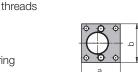
E1 = Clamping range, inductive

rotated by 4x90°

E2 = Unclamped, inductive **P1** = Clamping range, pneum.

P2 = Unclamped, pneum.

P3 = Outlet air, pneum. position monitoring

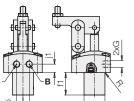


Intermediate plates for versions with pipe

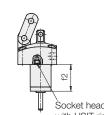
Location hole

for cartridge type

1825 X31



1825 X40



Socket head cap screw with USIT ring

Materials

Clamping lever: C45 + C (1.0503)

steel Body: Sealings: FKM

Without clamping lever

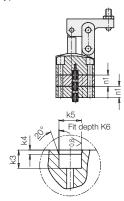
extended piston rod

Piston: high alloy steel

Accessories

Accessories:

Plug-type connector

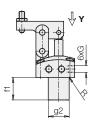


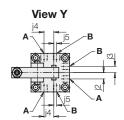
For oil supply through plug-type connectors, these bore holes have to be provided in the base plate. Required accessory when using plug-type connectors: 2 x sealing plug or 2 x screw plug (see page 4)

Pipe thread at 3 sides

1825 X51

Clamping lever with swivel contact bolt





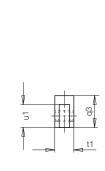


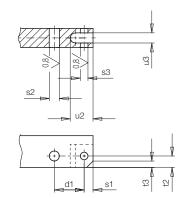
1825X60

4 x screw plug with sealing edge included in the delivery (dimension x 1)

Connecting dimensions for self-manufactured clamping levers

Commodating ammonoscino for communication of champing forcing					
Size		1	2	3	4
d1	[mm]	23.5	33	37	43.5
q3	[mm]	25	40	50	55
s1	[mm]	7	10.5	13	16.5
s2	[mm]	Ø8 H7	Ø12 H7	Ø15 H7	Ø18 H7
s3	[mm]	Ø6 H7	Ø9 H7	Ø12 H7	Ø14 H7
t1	[mm]	15 - 0.1	20 - 0.1	25 - 0.1	30 - 0.1
t2	[mm]	9	16.5	20	20
t3	[mm]	5	8	12	12
t4	[mm]	5	8	32	32
u1	[mm]	18	27.5	35.5	40
u2	[mm]	18	24	31	40
u3	[mm]	8.1 + 0.1	10 + 0.1	13 + 0.1	18 + 0.2





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Technical data Dimensions

	_				
Size Clamping force at a length of clamping lever d2 and 250 bar	[kN]	1 3.8	2 9.7	3 14.4	4 21.5
Clamping force at a length of clamping lever d2 and 250 bar	[kN]	3.3	9.1	13.9	21.3
with extended pistori rod		4.8	16.9		61.6
Oil volume clamping Oil volume clamping	[cm ³]			31.1	
with extended piston rod	[cm ³]	4.1	16.0	30.0	60.2
Oil volume unclamping Admissible flow rate	[cm ³] [cm ³ /s]	2.1 15.7	10.0 24.5	19.0 24.5	37.5 55
a	[mm]	55	70	85	100
a1	[mm]	42	56	69	81
a2 a3	[mm] [mm]	6.5 32.5	7 46	8 52	9.5 60
a4	[mm]	4 x Ø 6.6	4 x Ø 9	4 x Ø 11	4 x Ø 13.5
a5	[mm]	15	18	21.5	30
b b1	[mm] [mm]	55 42	70 56	85 69	100 81
b2	[mm]	15	20	25	30
c1	[mm]	80	116	143	163
c2 c3	[mm] [mm]	106 120	150 171	185 208	208 238.8
d1	[mm]	23.5	33	37	43.5
d2	[mm]	29	39.5	49	60.5
d3 d4	[mm] [mm]	59.5 27.5	81.5 37.5	98 47.5	114 57.5
d5	[mm]	50.5	68.5	83	97.5
e1		M5x0.5	M5x0.5	M5x0.5	M5x0.5
e2 e3	[mm] [mm]	7.5 30	9.7 41.9	11.6 46	14.5 58.3
e4	[mm]	39	49	55	68.5
e5	[mm]	approx. 60	approx. 60	approx. 60	approx. 60
f1 f2	[mm] [mm]	32 38	43 49	44.5 50.5	52.5 58.5
G	[111111]	G1/8	G1/8	G1/4	G1/4
Max. size of connecting fitting	. 1	6 L	8 S	10 L	10 L
g1 g2	[mm] [mm]	Ø 30 f7 Ø 29.8	Ø 42 f7 Ø 41.8	Ø 52 f7 Ø 51.8	Ø 65 f7 Ø 64.8
g3	[mm]	Ø 29.5	Ø 39	Ø 39	Ø 39
h ideal clamping point	[mm]	64	92.5	113	128
ho upper end of the clamping range hu lower end of the clamping range	[mm] [mm]	2	2.7 2.7	3.5 3.5	4.5 4.5
h1 piston stroke up to ideal clamping point	[mm]	21	30	33.5	41.5
h2 piston stroke up to the end of the clamping stroke	[mm]	3 54.5	4.5 55.5	5.2 56	7.5
h3 h4	[°] [mm]	65	86.5	93	58.2 111
j1	[mm]	12	16	17	20
j2 j3	[mm]	9	13.5	15.5	22 22
ری i4	[mm] [mm]	14	13.5 20	15.5 25	32
j4 j5	[mm]	4	2	25 6	12
k1 k2	[mm]	41 ± 0.02 5 ± 0.05	55 ± 0.02 0 ± 0.05	68 ± 0.02 0 ± 0.05	80 ± 0.02 0 ± 0.05
k3	[mm] [mm]	5 ± 0.05 6.5	6.5	6.5	0 ± 0.03 8
k4	[mm]	1.5	1.5	1.5	1.5
k5 k6	[mm] [mm]	Ø 8 H7 5.5	Ø 8 H7 5.5	Ø 8 H7 5.5	Ø 10 H7 7
11	[mm]	Ø 6 f7	Ø 6 f7	Ø 6 f7	Ø 6 f7
12		M4x7.5 deep	M4x7.5 deep	M4x7.5 deep	M4x7.5 deep
m1 m2	[mm] [mm]	Ø 13 f7 2	Ø 13 f7 2	Ø 13 f7 2	Ø 13 f7 2
m3	[IIIIII]	M4x6 deep	M4x6 deep	M4x6 deep	M4x6 deep
m4	[mm]	21	27	27	27
n1 p1	[mm]	16 M5	21.5 M5	22.5 M5	26.5 M5
p2	[mm]	8.5	10.6	12.3	15.2
p3	[mm]	38.6	50.9	55.1	66.5
p4 p5	[mm]	53 M5	73 G1/4	77 G1/4	84 G1/4
q1	[mm]	30	40	50	50
q1 q2	[mm]	12.5	20	25	28
q3 q4	[mm]	25 M8	40 M12	50 M16	55 M16
q4 R	[mm]	0.8	0.8	1	0.8
w1	[mm]	min. 31.5	min. 41.5	min. 43.5	51.5
w2 w3	[mm]	10.6 23.4	14.3 30.7	14.8 31.9	18 37.5
w3 w4	[mm] [mm]	23.4 max. Ø 4	max. Ø 5.5	max. Ø 5.5	max. Ø 5.5
w5	[mm]	2.5 – 0.5	2.5 – 0.5	2.5 - 0.5	2.5 - 0.5
x1	[mm]	7	7 2.3	8 3.8	8 6.1
	II/AI				
Weight approx. 1825 XX0 1825 XX1	[kg] [kg]	1.0 1.1	2.7	4.6	7.3 8.1

Calculations • Clamping force diagrams Code for part numbers • Accessories

Calculations

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

1 Admissible operating pressure
$$p_{adm} = \frac{B}{\frac{C}{L} + 1} \le 250 \text{ bar} \qquad [bar]$$
2 Effective clamping force

1.2 Effective clamping force

$$p_{adm} > 250 \text{ bar } \rightarrow \text{Fsp} = \frac{A}{L} * 250 \text{ [kN]}$$

$$p_{adm} < 250 \text{ bar } \rightarrow \text{Fsp} = \frac{A}{L} * p_{adm} \text{ [kN]}$$

2. Min. length of clamping lever

$$L_{min.} = \frac{C}{\frac{B}{p} - 1}$$
 [mm]

L, L_{min.} = Length of clamping lever [mm] p, p_{adm.} = Operating pressure

A, B, C, = Constants as per chart

Example 1: Hinge clamp 1825111 Operating pressure 200 bar

Standard clamping lever L = 29 mm

$$F_{Sp} = \frac{A}{L} * p = \frac{0.449}{29} * 200 = 3.1 \text{ kN}$$

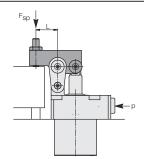
Example 2: Hinge clamp 1825110 Operating pressure 200 bar

Min. length of clamping lever

$$L_{min} = \frac{C}{\frac{B}{p} - 1} = \frac{22.325}{\frac{442.45}{200} - 1} = 18.4 \text{ mm}$$

Effective clamping force

$$F_{Sp} = \frac{A}{L} * p = \frac{0.449}{18.4} * 200 = 4.9 \text{ kN}$$



Con	ısta	nt

	18251	18252	18253	18254
Α	0.449	1.54	2.827	5.193
Α*	0.386	1.45	2.728	5.076
В	442.45	448.42	429.34	429.75
B*	514.86	475.83	444.98	420.08
С	22.325	31.35	35.15	43.5

A*, B* for version with switch rod

Example 3: Hinge clamp 1825210

Special clamping lever L = 30 mm Admissible operating pressure

$$p_{adm} = \frac{B}{\frac{C}{L} + 1} = \frac{\frac{448.42}{31.35}}{\frac{30}{10} + 1} = 219 \text{ bar}$$

Effective clamping force
$$F_{Sp} = \frac{A}{L} * p_{adm} = \frac{1.54}{30} * 219 = 11.25 \text{ kN}$$

Example 4: Hinge clamp 1825310

Special clamping lever L = 118 mm

(without proximity switch)

0 = without clamping lever

P = mounted position monitoring, pneumatic

1 = clamping levers with swivel contact bolt
2 = long clamping lever, unmachined Material: C45 + C (1.0503)

Admissible operating pressure

$$p_{adm} = \frac{B}{\frac{C}{L} + 1} = \frac{429.34}{\frac{35.15}{118} + 1} = 330.8 > 250 \text{ bar}$$

Effective clamping force

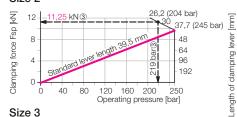
The max. operating pressure is 250 bar, thus

$$F_{Sp} = \frac{A}{L} * 250 = \frac{2.827}{118} * 250 = 6 \text{ kN}$$

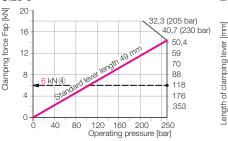
Clamping force diagrams

Size 1 17,4 (194 bar) Clamping force Fsp [kN] 27,5 (244 bar) Length of clamping lever 37 45 -56 -75

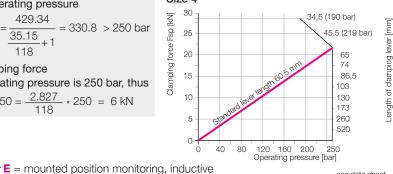
Size 2



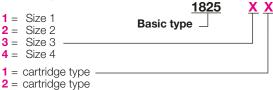
Size 3



Size 4



Code for part numbers



with extended piston rodo

3 = pipe thread at the back / plug-type connector

4 = pipe thread at the back / plug-type connector with extended piston rod

- **5** = pipe threads at three sides
- 6 = pipe threads at three sides
- with extended piston rod >
- prequisite for mounted position monitoring (addition: For P)

A prerequisite for mounted position monitoring (addition: E or P)					
Accessories	Size	1	2	3	4
Intermediate plate					
(not for cartridge-type version)		3456449*)	3456 468 *)	3456489 *)	3456534*)
Plug-type connector		9210145	9210145	9210145	9210132
Plug, flush screwable with hexa	gon socket	0361986	0361986	0361987	0361 987
Screw plug with hexagon head		3610047	3610047	3300821	3300821
Pneumatic position monitoring, c	omplete **)	0353845	0353853	0353855	0353962
Weight	[kg]	0.18	0.42	0.46	0.74
Inductive position monitoring,					
(without inductive proximity swi	tches) **)	0353846	0353854	0353856	0353963
Weight	[kg]	0.26	0.62	0.65	0.58
Inductive proximity switch		3829198	3829198	3829198	3829 198
Right angle plug with cable 5 m	1				
for inductive proximity switch		3829099	3829099	3829 099	3829099
*) on request					
**) Only mountable at 1825 X2X.	-X4XX6X				

Important note

Longer special clamping levers have a higher weight. Therefore the flow rate has to be considerably reduced to avoid damage of the mechanics in the stroke end positions.

A flow rate throttling always has to be effected in the supply line to the hinge clamp.

Technical characteristics for inductive proximity switches 3829198

proximity switches 3023130				
Operating voltage UB	1030 V DC			
Switching function	Interlock			
Output	PNP			
Material of housing	steel, corrosion			
	resistant			
Protection as per DIN 40050	IP 67			
Ambient temperature	-25+70 °C			
Type of connection	Plug S49 M8x1			
LED function display	yes			
Constant current max.	100 mA			
Rated operating distance	0.8 mm			
Protected against short circuits	yes			

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see data sheet