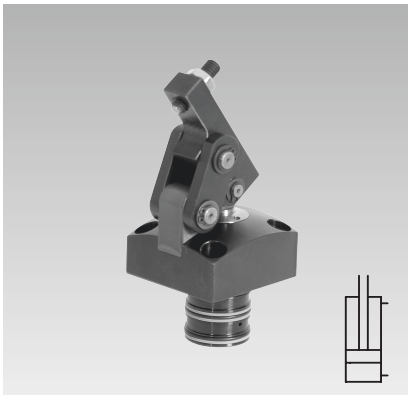
ROEMHELD
HILMA ▪ STARK

Issue 9-22 E

B 1.8251

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

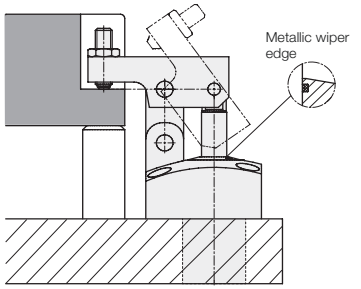


Application
The hinge clamp is a low-cost hydraulic clamping element with many installation and connecting possibilities.
If the clamping lever is completely retracted, unimpeded loading and unloading of the fixture can be effected. A clamping recess in the workpiece a little bit wider than the clamping 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.

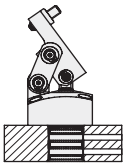
Important notes!
Hinge clamps must only be used for clamping of workpieces in industrial applications and may only be operated with hydraulic oil.
Hinge clamps can generate very high forces. The workpiece, the fixture or the machine must be in the position to compensate these forces.
Considerable injuries 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 devices.
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

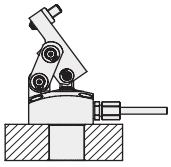


Installation and connecting possibilities

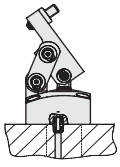
Cartridge type
for horizontally-drilled channels



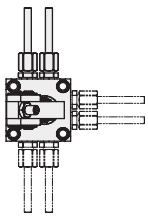
Pipe thread at the back / Plug-type connector
Pipe thread, at the back



for vertically-drilled channels



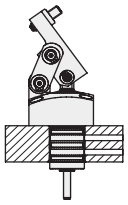
Pipe thread at 3 sides



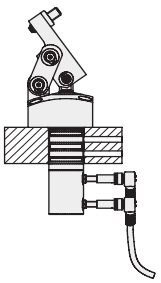
Option

Extended piston rod
for all versions available

without position monitoring

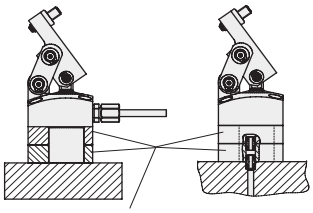


with position monitoring



Accessories

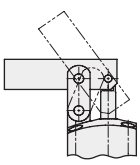
Intermediate plates
for all versions with pipe thread



Intermediate plates

Option

Long clamping lever
for all versions available.

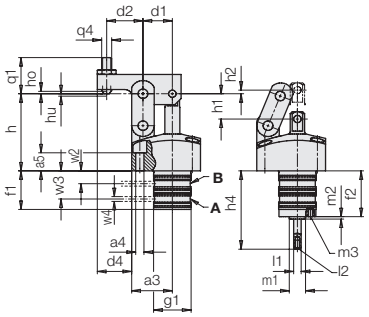


Alternatively all versions are also available without clamping lever.

Dimensions
Accessories

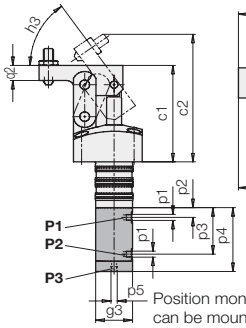
Cartridge type
Clamping lever with swivel contact bolt — without clamping lever extended piston rod

1825 X11 — **1825 X20**



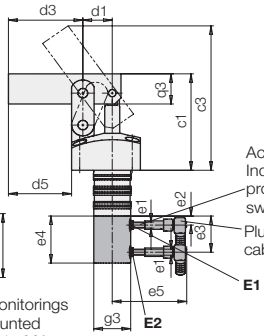
Optionally
with pneumatic position monitoring

1825 X21P

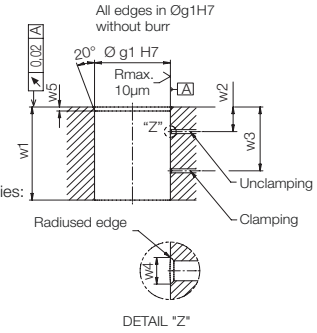


Optionally
with inductive position monitoring/ long clamping lever

1825 X22E

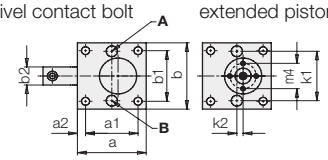


Location hole for cartridge type



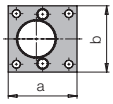
Pipe thread at the back / plug-type connector

Clamping lever with swivel contact bolt — without clamping lever extended piston rod

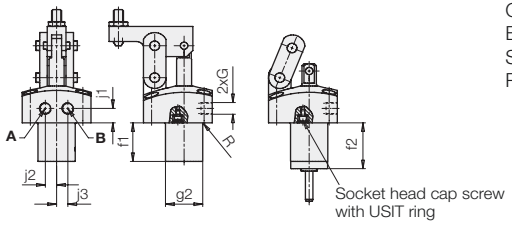


A = Clamping
B = Unclamping
E1 = Clamping range, inductive
E2 = Unclamped, inductive
P1 = Clamping range, pneum.
P2 = Unclamped, pneum.
P3 = Outlet air, pneum. position monitoring

Accessories:
Intermediate plates for versions with pipe threads



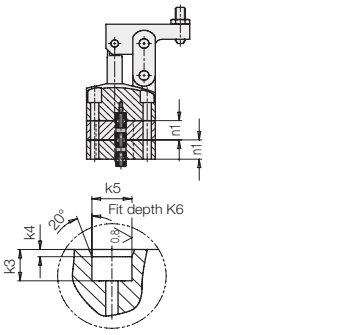
1825 X31 — **1825 X40**



Materials

Clamping lever:	C45 + C (1.0503)
Body:	steel
Sealings:	FKM
Piston:	high alloy steel

Accessories
Plug-type connector

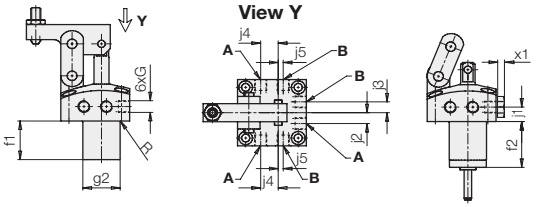


For oil supply through plug-type connectors, these bore holes have to be provided in the base plate.
Required accessory when using plug-type connectors:
2 x sealing plug or 2 x screw plug (see page 4)

Pipe thread at 3 sides

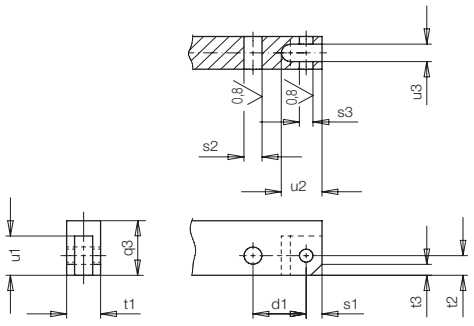
1825 X51
Clamping lever with swivel contact bolt

1825 X60
Without clamping lever extended piston rod



Connecting dimensions for self-manufactured clamping levers

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



Technical data
Dimensions

Size			1	2	3	4
Clamping force at a length of clamping lever	d2 and 250 bar	[kN]	3.8	9.7	14.4	21.5
Clamping force at a length of clamping lever with extended piston rod	d2 and 250 bar	[kN]	3.3	9.1	13.9	21
Oil volume clamping		[cm³]	4.8	16.9	31.1	61.6
Oil volume clamping with extended piston rod		[cm³]	4.1	16.0	30.0	60.2
Oil volume unclamping		[cm³]	2.1	10.0	19.0	37.5
Admissible flow rate		[cm³/s]	15.7	24.5	24.5	55
a		[mm]	55	70	85	100
a1		[mm]	42	56	69	81
a2		[mm]	6.5	7	8	9.5
a3		[mm]	32.5	46	52	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		[mm]	55	70	85	100
b1		[mm]	42	56	69	81
b2		[mm]	15	20	25	30
c1		[mm]	80	116	143	163
c2		[mm]	106	150	185	208
c3		[mm]	120	171	208	238.8
d1		[mm]	23.5	33	37	43.5
d2		[mm]	29	39.5	49	60.5
d3		[mm]	59.5	81.5	98	114
d4		[mm]	27.5	37.5	47.5	57.5
d5		[mm]	50.5	68.5	83	97.5
e1			M5x0.5	M5x0.5	M5x0.5	M5x0.5
e2		[mm]	7.5	9.7	11.6	14.5
e3		[mm]	30	41.9	46	58.3
e4		[mm]	39	49	55	68.5
e5		[mm]	approx. 60	approx. 60	approx. 60	approx. 60
f1		[mm]	32	43	44.5	52.5
f2		[mm]	38	49	50.5	58.5
G			G1/8	G1/8	G1/4	G1/4
Max. size of connecting fitting			6 L	8 S	10 L	10 L
g1		[mm]	Ø 30 f7	Ø 42 f7	Ø 52 f7	Ø 65 f7
g2		[mm]	Ø 29.8	Ø 41.8	Ø 51.8	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	[mm]	2	2.7	3.5	4.5
hu	lower end of the clamping range	[mm]	2	2.7	3.5	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	4.5	5.2	7.5
h3		[°]	54.5	55.5	56	58.2
h4		[mm]	65	86.5	93	111
j1		[mm]	12	16	17	20
j2		[mm]	9	13.5	15.5	22
j3		[mm]	9	13.5	15.5	22
j4		[mm]	14	20	25	32
j5		[mm]	4	2	6	12
k1		[mm]	41 ± 0.02	55 ±0.02	68 ±0.02	80 ±0.02
k2		[mm]	5 ±0.05	0 ±0.05	0 ±0.05	0 ±0.05
k3		[mm]	6.5	6.5	6.5	8
k4		[mm]	1.5	1.5	1.5	1.5
k5		[mm]	Ø 8 H7	Ø 8 H7	Ø 8 H7	Ø 10 H7
k6		[mm]	5.5	5.5	5.5	7
l1		[mm]	Ø 6 f7	Ø 6 f7	Ø 6 f7	Ø 6 f7
l2			M4x7.5 deep	M4x7.5 deep	M4x7.5 deep	M4x7.5 deep
m1		[mm]	Ø 13 f7	Ø 13 f7	Ø 13 f7	Ø 13 f7
m2		[mm]	2	2	2	2
m3			M4x6 deep	M4x6 deep	M4x6 deep	M4x6 deep
m4		[mm]	21	27	27	27
n1		[mm]	16	21.5	22.5	26.5
p1			M5	M5	M5	M5
p2		[mm]	8.5	10.6	12.3	15.2
p3		[mm]	38.6	50.9	55.1	66.5
p4		[mm]	53	73	77	84
p5			M5	G1/4	G1/4	G1/4
q1		[mm]	30	40	50	50
q2		[mm]	12.5	20	25	28
q3		[mm]	25	40	50	55
q4			M8	M12	M16	M16
R		[mm]	0.8	0.8	1	0.8
w1		[mm]	min. 31.5	min. 41.5	min. 43.5	51.5
w2		[mm]	10.6	14.3	14.8	18
w3		[mm]	23.4	30.7	31.9	37.5
w4		[mm]	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	8	8
Weight approx.	**1825XX0**	[kg]	1.0	2.3	3.8	6.1
	1825XX1	[kg]	1.1	2.7	4.6	7.3
	1825XX2	[kg]	1.2	3.0	5.1	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

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

1.2 Effective clamping force

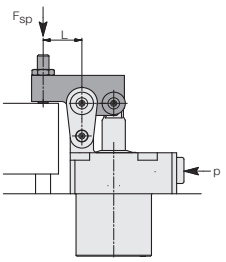
$$p_{adm} > 250 \text{ bar} \rightarrow F_{sp} = \frac{A}{L} * 250 \quad [\text{kN}]$$

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

2. Min. length of clamping lever

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

L, $L_{min.}$ = Length of clamping lever [mm]
p, $p_{adm.}$ = Operating pressure [bar]
A, B, C, = Constants as per chart



Constant

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

A*, B* for version with switch rod

Example 1: Hinge clamp 1825111
Operating pressure 200 bar
Standard clamping lever L = 29 mm

Effective clamping force

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

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

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

Example 3: Hinge clamp 1825210
Special clamping lever L = 30 mm

Admissible operating pressure

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

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

Admissible operating pressure

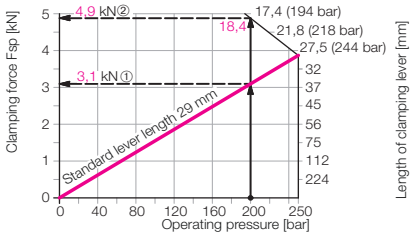
$$p_{adm} = \frac{B}{\frac{C}{L}+1} = \frac{429.34}{\frac{35.15}{118}+1} = 330.8 > 250 \text{ bar}$$

Effective clamping force
The max. operating pressure is 250 bar, thus

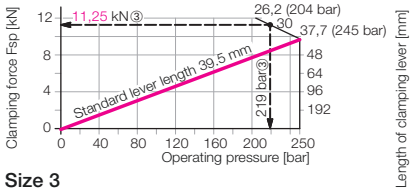
$$F_{Sp} = \frac{A}{L} * 250 = \frac{2.827}{118} * 250 = 6 \text{ kN}$$

Clamping force diagrams

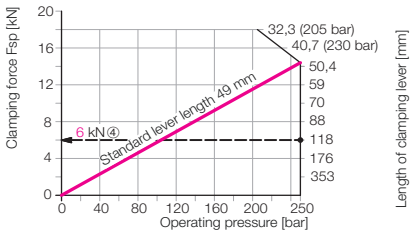
Size 1



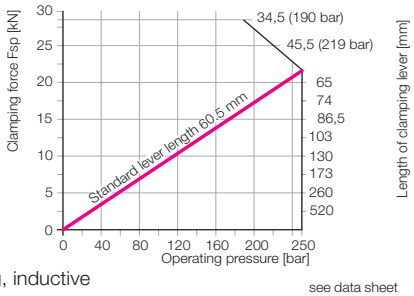
Size 2



Size 3



Size 4



Code for part numbers

1825 **X X X X**

Basic type

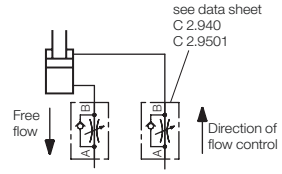
1 = Size 1
2 = Size 2
3 = Size 3
4 = Size 4

1 = cartridge type
2 = cartridge type with extended piston rod◊
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◊

E = mounted position monitoring, inductive (without proximity switch)
P = mounted position monitoring, pneumatic

0 = without clamping lever
1 = clamping levers with swivel contact bolt
2 = long clamping lever, unmachined
Material: C45 + C (1.0503)

◊ A prerequisite for mounted position monitoring (addition: E or P)



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.

Accessories	Size	1	2	3	4
Intermediate plate (not for cartridge-type version)		3456449*)	3456468*)	3456489*)	3456534*)
Plug-type connector		9210145	9210145	9210145	9210132
Plug, flush screwable with hexagon socket		0361986	0361986	0361987	0361987
Screw plug with hexagon head		3610047	3610047	3300821	3300821
Pneumatic position monitoring, complete **)		0353845	0353853	0353855	0353962
Weight	[kg]	0.18	0.42	0.46	0.74
Inductive position monitoring, (without inductive proximity switches) **)		0353846	0353854	0353856	0353963
Weight	[kg]	0.26	0.62	0.65	0.58
Inductive proximity switch		3829198	3829198	3829198	3829198
Right angle plug with cable 5 m for inductive proximity switch		3829099	3829099	3829099	3829099

*) on request
**) Only mountable at 1825X2X, -X4X, -X6X

Technical characteristics for inductive proximity switches 3829198

Operating voltage UB	10…30 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