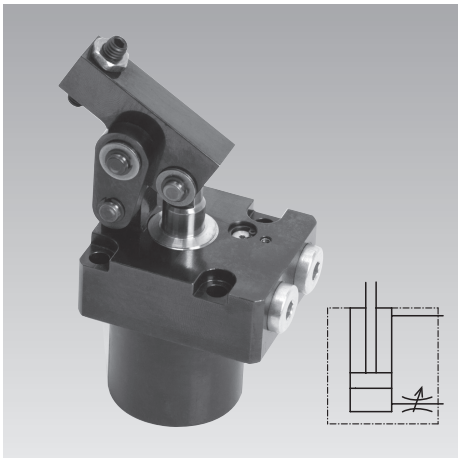
NEW
Approved up to 120 bar

Hinge Clamps 70 bar/120 bar

with throttle valve, metallic wiper edge and optional position monitoring double acting, max. operating pressure 120 bar



Application

Hydraulic hinge clamps are used for clamping workpieces when it is essential to keep the clamping points free for unrestricted fixture loading and unloading.
A clamping recess in the workpiece slightly wider than the clamping lever is sufficient as clamping surface.
The special kinematics allow clamping without side loads of workpieces which are very sensitive against deformation.
This series, with an operating pressure of 120 bar, is designed for direct connection to the low-pressure hydraulics of machine tools.
In combination with the optional pneumatic or electrical position monitorings, hinge clamps are particularly suitable for:

- Automatic manufacturing systems with very short cycle times
- Clamping fixtures with workpiece loading by handling systems
- Transfer lines
- Test systems for motors, gears and axes
- Assembly lines
- Special machine tools

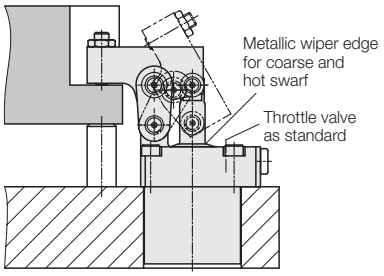
Description

The hinge clamp is a double acting hydraulic cylinder with integrated clamping lever. 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, depending on the lever length, the force is available as clamping force (see page 4).
The kinematics are so designed that no side loads act on the workpiece if the clamping surface is at the same height as the centre of rotation of the clamping lever (see comparison "Forces at the clamping point").
The 3 available clamping directions (L, G, R) make it easier to adapt to the workpiece shape or the hydraulic connectivity.
All sizes are available with a switch rod for external position monitoring as an option.
Electrical and pneumatic position monitorings for the clamping and unclamping position are available as accessories.

Important notes see page 6

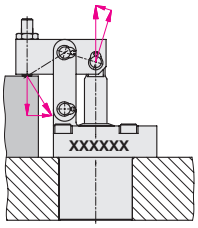
Advantages

- High clamping force in the low-pressure range
- Very short clamping time (min. 0.5 s)
- Throttle valve as standard, easily adjustable from the top
- Compact design partially recessible
- Lever bolt plain bearing
- 3 clamping directions selectable
- Clamping possible without side loads
- The clamping lever can be swivelled into small recesses
- Long clamping lever adaptable to the workpiece contour
- FKM wiper protected by metallic wiper edge
- Position monitoring available as an accessory
- Mounting position: any

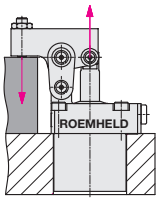


Forces at the clamping point

Conventional lever mechanism of other manufacturers

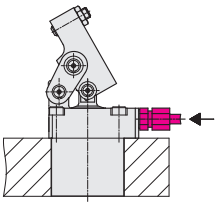


Lever mechanism without side loads ROEMHELD system

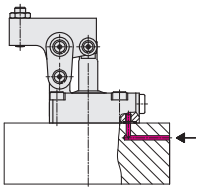


Installation and connecting options

Pipe thread

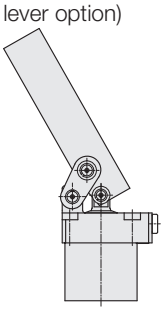


Drilled channels

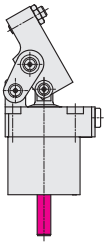


Versions

Without switch rod
(long clamping lever option)



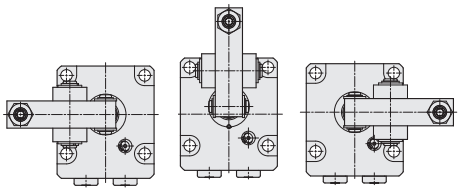
With switch rod



Clamping direction

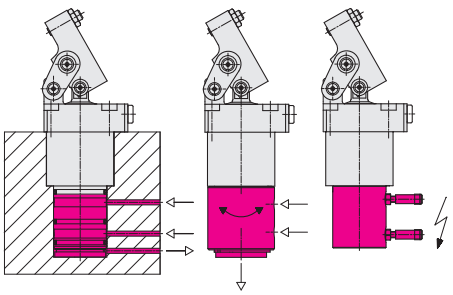
Code letter

L **G** **R**

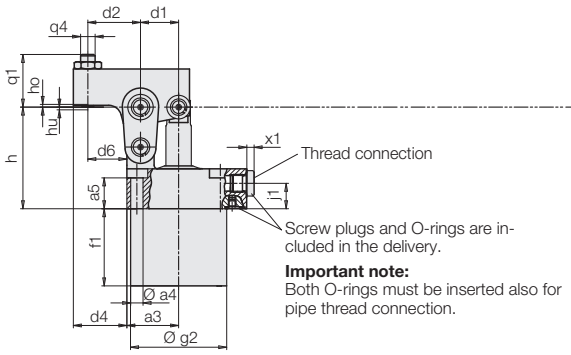


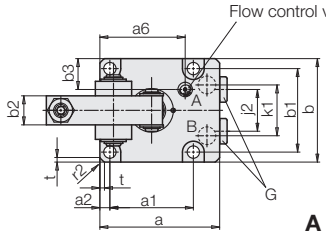
Position monitoring accessories

pneumatic **electrical**



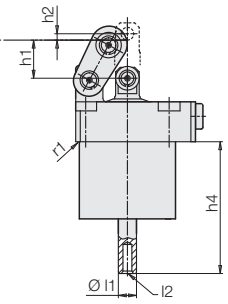
Without switch rod
1826G12X31
Clamping lever with contact bolt



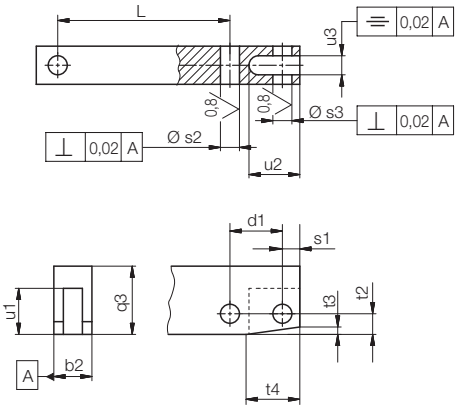


A = Clamping
B = Unclamping

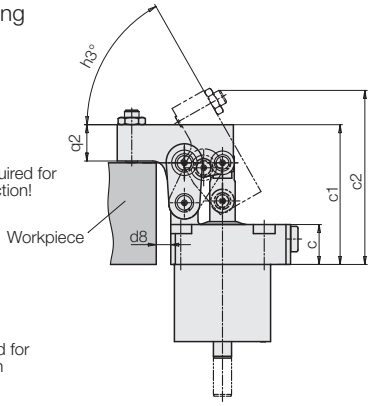
With switch rod
1826G12X40
Without clamping lever



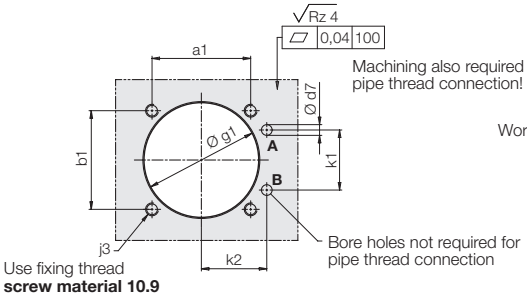
Connecting dimensions for self-manufactured clamping levers



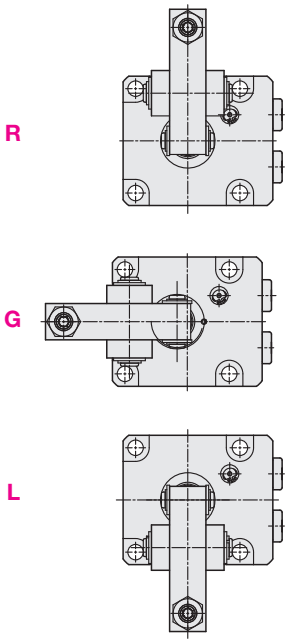
With switch rod
1826G12X41
Clamping lever with contact bolt



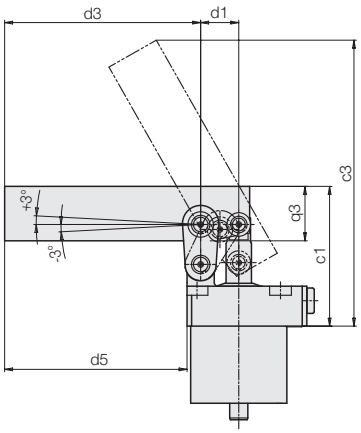
Connecting scheme



Clamping direction

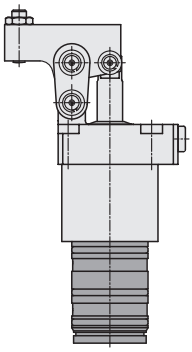


With switch rod
1826G12X42
Clamping lever, long

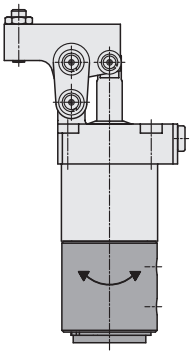


Accessories

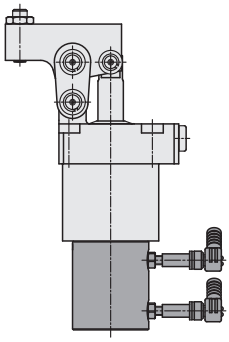
Pneumatic position monitoring (page 5)
Cartridge type



Pipe thread connection



Inductive position monitoring (page 6)



X = code letter for part no.

Technical Characteristics

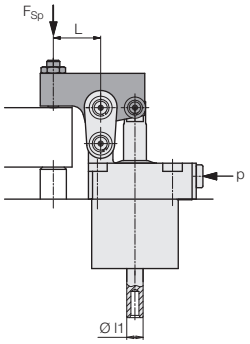
Size			1		2		3		4		5	
Operating pressure		[bar]	120	70	120	70	120	70	120	70	120	70
Max. clamping force at	Length of clamping lever d2											
	Without switch rod	[kN]	4.5	2.6	6.0	3.5	7.6	4.4	12.6	7.3	20.8	12.1
	With switch rod	[kN]	4.0	2.3	5.3	3.1	7.0	4.0	11.6	6.8	19.8	11.5
Piston force	Without switch rod	[kN]	5.9	3.4	8.5	4.9	11.5	6.7	18.2	10.6	29.6	17.2
	With switch rod	[kN]	5.3	3.0	7.5	4.3	10.6	6.1	16.9	9.8	28.2	16.4
Piston Ø		[mm]	25		30		35		44		56	
Piston rod Ø		[mm]	12		14		14		16		22	
Piston stroke		[mm]	18.7		20.7		24		26		32	
Piston area	Clamping without switch rod	[cm²]	4.9		7.06		9.62		15.2		24.6	
	Clamping with switch rod	[cm²]	4.4		6.28		8.83		14		23.4	
	Unclamping	[cm²]	3.77		5.52		8.08		13.1		20.8	
Oil volume	Clamping without switch rod	[cm³]	9.2		14.7		23.1		39.6		78.8	
	Clamping with switch rod	[cm³]	8.3		13		21.2		36.6		75.2	
	Unclamping	[cm³]	7.1		11.45		19.4		34.3		66.7	
Max. flow rate		[cm³/s]	16		25		40		75		150	
a		[mm]	55		60		66		82		96	
a1		[mm]	35		40		46		56		68	
a2		[mm]	5		5		5.5		7		9	
a3		[mm]	22.5		25		28.5		35		43	
Ø a4		[mm]	5.6		5.6		6.8		9		11	
a5		[mm]	18		17		17		20		20	
a6		[mm]	37.5		41		47		57		70.3	
b		[mm]	45		50		57		70		86	
b1		[mm]	35		40		46		56		68	
b2 –0.05		[mm]	12		12		16		19		22	
b3		[mm]	15.5		14		17		20		24	
c		[mm]	22		20.8		22		26		32	
c1		[mm]	63.5		68.5		77		93		110	
c2		[mm]	79.8		85.5		97		116.5		138.9	
c3		[mm]	129.1		152.8		157.6		204		226.8	
d1		[mm]	16.5		18.5		21		24.5		30.5	
d2		[mm]	20		23.5		29		32		39	
d3		[mm]	88		110.5		108		148.5		159.5	
d4		[mm]	20		23		29.5		31.5		37.5	
d5		[mm]	82		104		100.5		138		147	
d6		[mm]	14		17		21.5		21.5		26.5	
Ø d12 max.		[mm]	4		4		4		6		6	
d8 min.		[mm]	3		4		7		7		8	
f1		[mm]	33.5		39.5		42.5		47		55	
G			G1/8		G1/8		G1/8		G1/4		G1/4	
Ø g1 max.		[mm]	40		48		54		64		79	
Ø g2 ±0.1		[mm]	39		47		53		63		78	
h	Ideal clamping point	[mm]	48.5		51.5		56		67		79	
ho	Upper end of the clamping range	[mm]	1		1.2		1.5		1.8		2	
hu	Lower end of the clamping range	[mm]	1.1		1.3		1.5		1.7		2.1	
h1	Stroke up to the ideal clamping point	[mm]	15.7		17.7		21		23		29	
h2	Stroke up to the end of the clamping stroke	[mm]	3		3		3		3		3	
h3		[°]	57.6		58.6		60.4		57.6		57.4	
h4	Unclamping position	[mm]	60.2		68.2		72.6		78.1		93.6	
j1		[mm]	12.5		12.8		14		14		14	
j2		[mm]	20		22		23		30		38	
j3	Fixing thread		M5		M5		M6		M8		M10	
k1		[mm]	22		24		28		36		45	
k2		[mm]	25		28		30.5		36		42	
Ø l1 f12		[mm]	8		10		10		12		12	
l2			M5×15 deep		M6×11.5 deep		M6×11.5 deep		M8×16 deep		M8×16 deep	
q1		[mm]	26		26		29		39		48	
q2		[mm]	14		16		20		25		30	
q3		[mm]	21.5		26		30		36.5		45	
q4			M6		M6		M8		M10		M12	
r1		[mm]	0.4		0.4		0.4		0.4		0.4	
r2		[mm]	7		9		9		11		12	
s1		[mm]	5.5		6		6		7		10	
Ø s2 H12		[mm]	6		8		8		10		14	
Ø s3 H12		[mm]	6		6		7		8		12	
t		[mm]	2.4		3.9		2.5		4		4.7	
t2		[mm]	6.5		9		9		10.5		14	
t3		[mm]	4		3		4.3		5.1		6.6	
t4		[mm]	4		17		22		22		31	
u1		[mm]	14.5		17.5		17.5		19		28	
u2		[mm]	16		16.5		17		19		26	
u3 +0.1		[mm]	6.1		6.1		8.1		10.1		11.1	
×1		[mm]	4		4		4		5		5	
Weight		[kg]	1		1.2		1.5		2.6		4.5	
Part no. without switch rod												
Without clamping lever			**1826X12130**		**1826X12230**		**1826X12330**		**1826X12430**		**1826X12530**	
Clamping lever with contact bolt			**1826X12131**		**1826X12231**		**1826X12331**		**1826X12431**		**1826X12531**	
Clamping lever, long			**1826X12132**		**1826X12232**		**1826X12332**		**1826X12432**		**1826X12532**	
Part no. with switch rod												
Without clamping lever			**1826X12140**		**1826X12240**		**1826X12340**		**1826X12440**		**1826X12540**	
Clamping lever with contact bolt			**1826X12141**		**1826X12241**		**1826X12341**		**1826X12441**		**1826X12541**	
Clamping lever, long			**1826X12142**		**1826X12242**		**1826X12342**		**1826X12442**		**1826X12542**	
Spare O-ring		[mm]	7 × 1.5		7 × 1.5		7 × 1.5		8 × 1.5		8 × 1.5	
Part no.			**3000342**		**3000342**		**3000342**		**3000343**		**3000343**	

Product available on request

X = Code letter see page 2.

Clamping Force Diagrams

Calculations of the clamping force



1. Length L of clamping lever is known

1.1 Admissible operating pressure

$$p = \frac{B}{(C/L)+1} \leq 120 \text{ [bar]}$$

1.2 Effective clamping force

$$(p_{adm} > 120 \text{ bar}) \rightarrow F_{sp} = \frac{A}{L} * 120 \text{ [kN]}$$

$$(p_{adm} < 120 \text{ bar}) \rightarrow F_{sp} = \frac{A}{L} * p_{adm} \text{ [kN]}$$

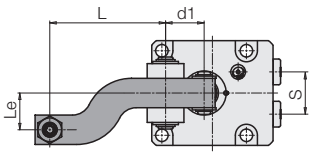
2. Min. clamping lever length

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

L, $L_{min.}$ = length of clamping lever [mm]
p, $p_{adm.}$ = Operating pressure [bar]
A, B, C, = constants as per chart
A*, B* for versions with switch rod

1826	121	122	123	124	125
A	0.73	1.18	1.82	3.35	6.76
A*	0.65	1.05	1.67	3.11	6.45
B	209.09	205.03	198.21	202.68	204.46
B*	232.95	230.40	215.83	218.97	214.29
C	14.85	16.65	18.9	22.05	27.45

Eccentric clamping lever



The diagrams show the admissible operating pressure for any combination of length L of clamping lever and the eccentricity Le.

Formula $p_{adm} = \frac{X * L}{(Y * Le) + L + Z}$ [bar]

L = length of clamping lever, Le = eccentricity [mm]
X, Y, Z = constant as per chart
X* for versions with switch rod

1826	121	122	123	124	125
X	219.03	214.49	206.90	211.89	213.86
X*	244.01	241.30	225.31	228.84	224.13
Y	3.666	3.7	3.5	3.379	3.588
Z	16.5	18.5	21	24.5	30.5

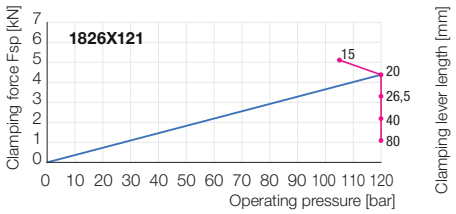
Example: Hinge clamp 1826G**122**
Special clamping lever L = 60 mm
Eccentricity Le = 48 mm
Per the diagram: p_{adm} = approx. 50 bar
According to formula:

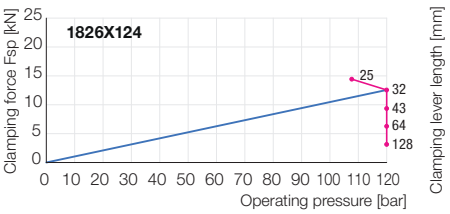
$$p_{adm} = \frac{X * L}{(y * Le) + L + Z} = \frac{214.491 * 60}{(3.7 * 48) + 60 + 18.5}$$

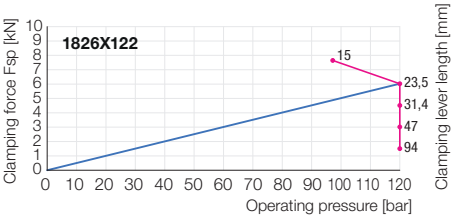
p_{adm} = 50.25 bar

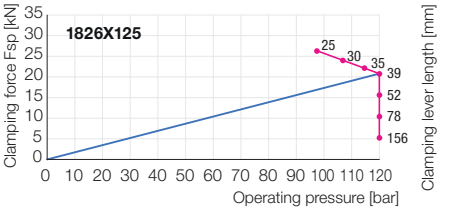
Effective clamping force (formula see above)

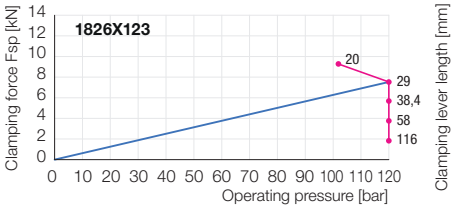
$$F_{Sp} = \frac{A}{L} * p_{adm} = \frac{1.18}{60} * 50.25 = 1 \text{ kN}$$











Example 1: Hinge clamp 1826G**124**32
p = 50 bar; L = 32 mm

Effective clamping force

$$F_{Sp} = \frac{A}{L} * p = \frac{3.35}{32} * 50 = 5.2 \text{ kN}$$

Example 2: Hinge clamp 1826G**124**32
p = 50 bar

Min. clamping lever length

$$L_{min} = \frac{C}{(B/p)-1} = \frac{22.05}{(202.68/50)-1} = 7.2 \text{ mm}$$

Effective clamping force

$$F_{Sp} = \frac{A}{L} * p = \frac{3.35}{7.2} * 50 = 23.2 \text{ kN}$$

Example 3: Hinge clamp 1826G **125** 32
Special clamping lever L = 20 mm

Admissible operating pressure

$$p_{adm} = \frac{B}{(C/L)+1} = \frac{204.46}{(27.45/20)+1} = 86.2 \text{ bar}$$

Effective clamping force

$$F_{Sp} = \frac{A}{L} * p_{adm} = \frac{6.76}{20} * 86.2 = 29.13 \text{ kN}$$

Example 4: Hinge clamp 1826G**125**32
Special clamping lever L = 78 mm

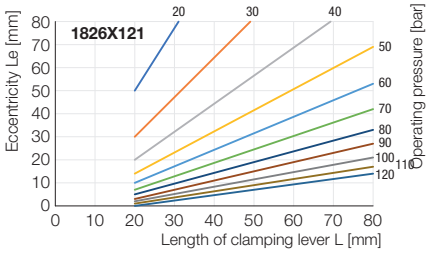
Admissible operating pressure

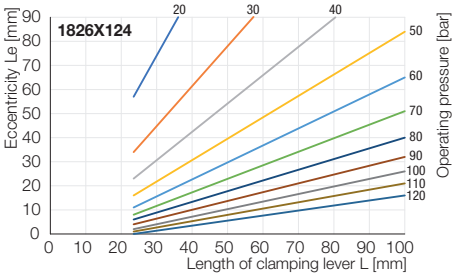
$$p_{adm} = \frac{B}{(C/L)+1} = \frac{204.46}{(27.45/78)+1} = 151.2 \text{ bar}$$

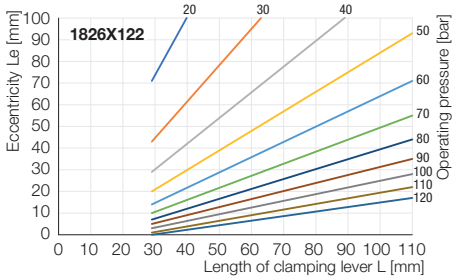
Effective clamping force
The max. operating pressure is 120 bar, thus

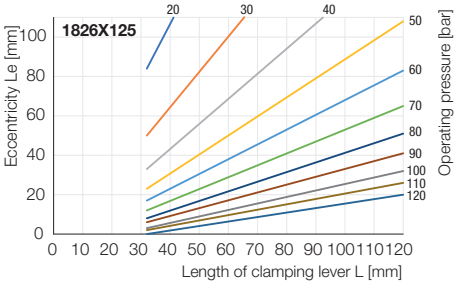
$$F_{Sp} = \frac{A}{L} * 70 = \frac{6.76}{78} * 120 = 10.4 \text{ kN}$$

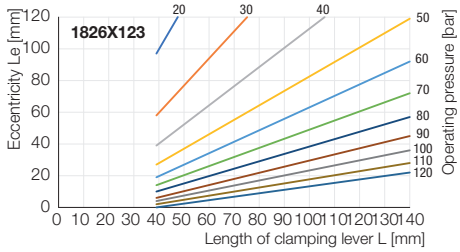
Admissible operating pressure p_{adm} at eccentric location of the clamping point











Important note

Depending on the eccentric load, there will be one-sided wear of the bolts and an increasing torsion of the clamping lever around the longitudinal axis.
Recommendation: Regular visual inspection

Application

The pneumatic position monitoring signals the following conditions by closing two bore holes:

1. Piston retracted and clamping lever in off-position
2. Piston in clamping area and clamping lever in clamping position

For each control function, a pneumatic line has to be provided at the clamping fixture.

Description

When moving to a switching position, the air pressure in the supply line increases and operates a differential pressure switch or an electro-pneumatic pressure switch.

Pneumatic port

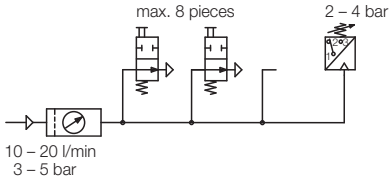
Cartridge type

The hinge clamp with the mounted position monitoring and inserted O-rings is put into the location hole and immediately ready for use.

Mounting body

The mounting body is put onto the cartridge-type version and held by the supplied safety ring. The pneumatic ports M5 can be rotated by 360°.

Monitoring by pneumatic pressure switch



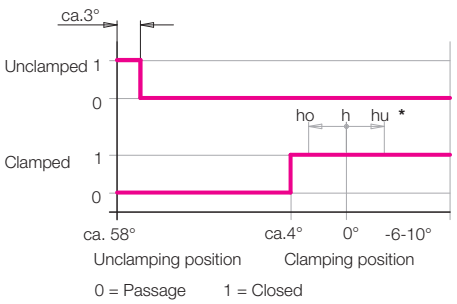
For the evaluation of the pneumatic pressure increase, standard pneumatic pressure switches can be used. Up to 8 position monitorings can be controlled with one pressure switch (see circuit diagram).
Note that reliable functioning of pneumatic monitoring is only guaranteed if the throttled air pressure and air flow rate are throttled.

Technical characteristics

Port	Drilled channels or threads M5
Nominal diameter	2 mm
Max. air pressure	10 bar
Range of operating pressure	3–5 bar
Differential pressure*) at	
3 bar System pressure	min. 1.5 bar
5 bar System pressure	min. 3.5 bar
Air volume **)	10 – 20 l/min

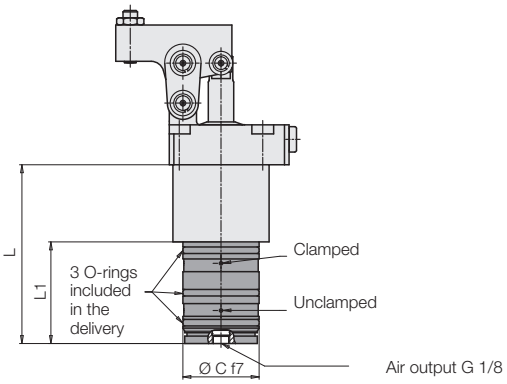
*) Minimum pressure difference, if one or several position monitorings are not operated.
**) Appropriate devices are available to measure the flow rate.

Function chart

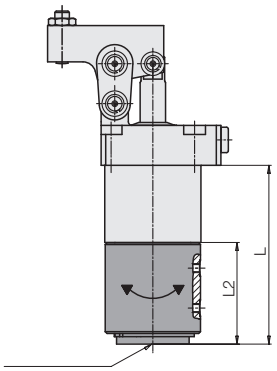


***** Dimensions see pages 2 and 3

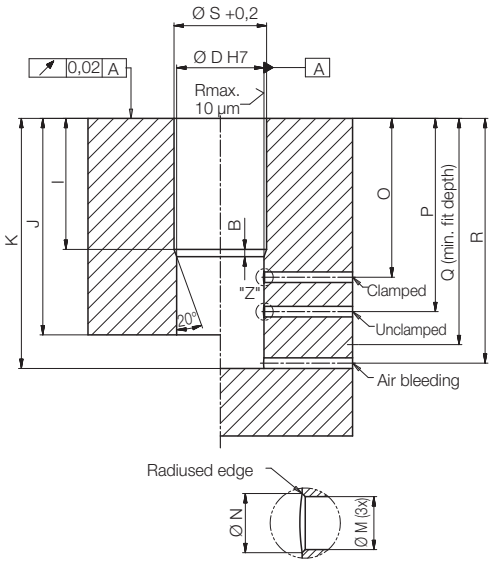
Cartridge type



Pipe thread connection

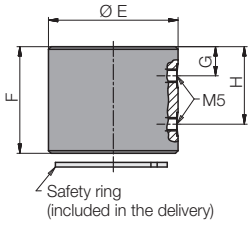


Location hole



Detail "Z"

Mounting body



Size		1	2	3	4	5
Ø A ± 0.1	[mm]	39	47	53	63	78
B	[mm]	1.3	2	2	2	2
Ø C f7	[mm]	38	42	42	45	45
Ø D H7	[mm]	38	42	42	45	45
Ø E	[mm]	49	53	52.5	62.5	62.5
F	[mm]	40.3	46	50	54	60
G	[mm]	11	13	14	14	15
H	[mm]	29.3	33	36	40	45
I +0.2	[mm]	34	40	43	47.5	55.5
J min.	[mm]	78	87	91	100	114
K min.	[mm]	84	95	100	109	123
L	[mm]	82.5	93.5	98.5	107	121.5
L1	[mm]	49	54	56	60	66.5
L2	[mm]	46.15	53.85	55.8	59.8	65.8
Ø M	[mm]	4	4	4	4	4
Ø N	[mm]	5	5	5	5	5
O	[mm]	46	52	55.5	60	70.6
P	[mm]	65	74	80	86	100.5
Q min.	[mm]	77	85	90	98.5	113
R	[mm]	79.5	90.5	95.5	104	118.5
Ø S max.	[mm]	40	48	54	64	79
Part no.						
Cartridge type With 4 screws		**0353341**	**0353342**	**0353343**	**0353344**	**0353345**
Mounting body For retrofitting of the cartridge type		**0353341A**	**0353342A**	**0353343A**	**0353344A**	**0353345A**

Application

The electrical position monitoring signals the following conditions due to damping of two inductive proximity switches:

1. Piston retracted and clamping lever in off-position.
2. Piston extended and clamping lever in off-position.

For each control function, an electrical line has to be provided at the clamping fixture.

Description

The electrical position monitoring can be easily retrofitted at all hinge clamps with switch rod (1826**X**12X**4**X) .

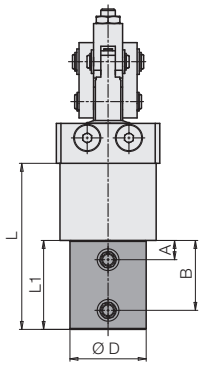
Included in our delivery are:

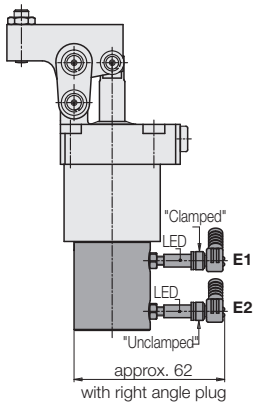
1 Signal sleeve with screw
1 Adapter with 4 countersunk screws
1 Control housing with 3 set screws
2 Inductive proximity switches with right angle plug (if ordered)

The signal sleeve is screwed onto the switch rod. The adapter is mounted with 4 countersunk screws on the bottom cover.
The control housing can be put onto the adapter in any angular position and locked with 3 set screws.
For information on adjustment of proximity switches, see operating manual.

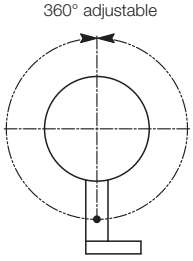
Important notes

Inductive position monitorings are not suitable for the use in coolant and swarf areas. According to the corresponding application conditions, safety measures have to be planned and checked later on.





Four fixing screws included in our delivery



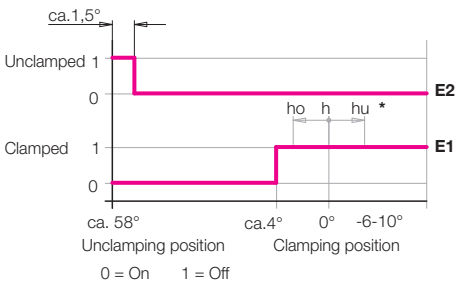
Possible position of the proximity switches

Technical characteristics

Operating voltage	10–30 V DC
Max. residual ripple	10 %
Max. constant current	100 mA
Switching function	interlock
Output	PNP
Housing material	stainless steel
Thread	M 5 × 0.5
Code class	IP 67
Ambient temperature	–25 to +70 °C
LED function display	Yes
Protected against short circuits	Yes
Type of connection	Connector
Length of cable	5 m

Size		**1**	**2**	**3**	**4**	**5**
A	[mm]	12.5	12.5	10.5	10	12
B	[mm]	35	37	38.5	42.5	50
Ø D	[mm]	33	42	42	45	45
L	[mm]	75.5	84.5	91.5	103.5	117
L1	[mm]	42	45	49	56.5	62
Part no.						
without switches		**0353 351**	**0353 352**	**0353 353**	**0353 354**	**0353 355**
with switch and plug		**0353 351S**	**0353 352S**	**0353 353S**	**0353 354S**	**0353 355S**
Spare parts						
Inductive proximity switch		**3829 198**	**3829 198**	**3829 198**	**3829 198**	**3829 198**
Right angle plug with cable 5 m		**3829 099**	**3829 099**	**3829 099**	**3829 099**	**3829 099**

Function chart



***** Dimensions see pages 2 and 3

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 absorb these forces. Considerable injuries to fingers during clamping and unclamping in the effective area of the clamping lever can occur.
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.

Conversion kit with clamping lever mechanism for operating pressure 120 bar

Existing hinge clamps rated up to 70 bar can be operated at a pressure of 120 bar by replacing the clamping lever mechanism.

Size	Part no.
BG 1	0182611
BG 2	0182612
BG 3	0182613
BG 4	0182614
BG 5	0182615