

Bore Clamp

Block-type, without centring function, double acting,
for bore diameter 7.8 - 17.7 mm, max. operating pressure 250 bar



Advantages

- Axial clamping in simple bore holes
- Machining from 5 sides is possible
- 2 sizes
- 2 connecting possibilities
- Hardened workpiece support
- Pneumatic seat check
- Interchangeable clamping bushings
- Radial clamping force not dependent on pressure
- Connection for positive air pressure protection
- Standard FKM seals

Application

The bore clamps are particularly suited for clamping of workpieces with smooth bore holes from diameter 7.8 to 17.7 mm in the support surface.

The required form-fit in the bore hole is obtained by the special profile of the hardened clamping bushings with penetrating points in the bore hole wall. Hardened materials cannot be clamped with these elements.

The workpiece is put directly onto the bore clamp and will not deform during clamping.

Since clamping is effected within the bore the remaining surfaces are free for machining on 5 sides.

The size of the possible machining forces is certainly limited using this type of clamping, especially crosswise to the clamping surface. Except the static friction force between the workpiece and the support, the bore clamp cannot compensate any transverse forces. Additional stops or work supports can help in such applications.

Also workpiece sections that are subject to vibrations and deformations during machining, have to be additionally supported or clamped in a flexible (floating) position.

Functional description

See page 4.

Description

The bore clamp is a double-acting pull-type cylinder. An exchangeable clamping bushing is fixed to its piston.

The 4 segments of the clamping bushing are expanded with spring force by a conic clamping bolt. Thus the expansion force is always the same and independent of the hydraulic clamping pressure.

Both unclamping of the clamping bushing and pull-down clamping of the workpiece are controlled hydraulically.

Connecting the positive air pressure protection the clamping bushing is protected against swarf and coolants.

In the hardened support surface for the workpiece there is a bore hole for connection of a pneumatic seat control.

Important notes

The bore clamp has no centring function.

The clamping bushing has to be protected against too high side loads during insertion or machining by suitable stops or centring bolts. The required positioning precision is ± 0.2 mm. The required penetration depth of the tothing depends on the strength of the material for the form-fit tothing with the workpiece. Therefore hardened or coated workpieces cannot be used.

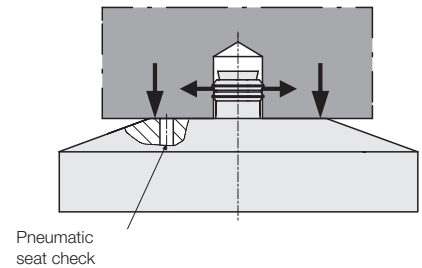
The tapering of the bore hole should not exceed 3° . In case of doubt we recommend a clamping test.

Clean the support surface and blast clean the clamping bushing before every clamping cycle. If swarf fall into an open clamping bore, blast air must be continuously switched on.

Clamping bushings, tie rods and wiper should be exchanged after 10,000 operations. Part numbers for complete clamping sets: see chart on page 3.

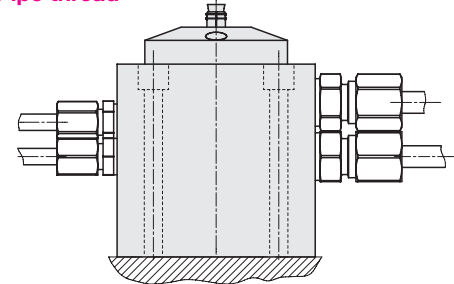
Operating conditions, tolerances and other data see data sheet A 0.100.

Function

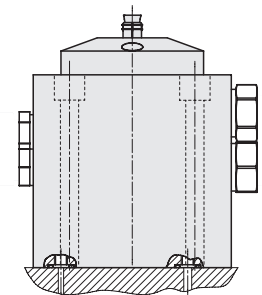


Connecting possibilities

Pipe thread

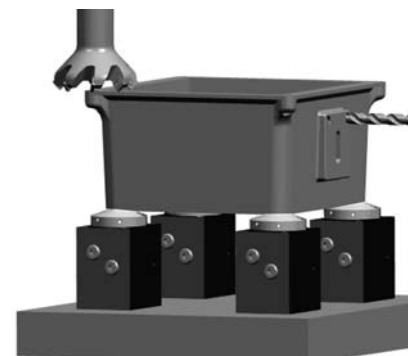


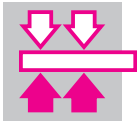
Drilled channels



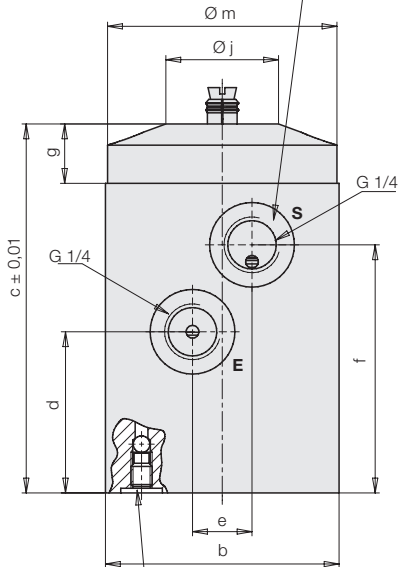
Application example

Machining from 5 sides of an oil sump

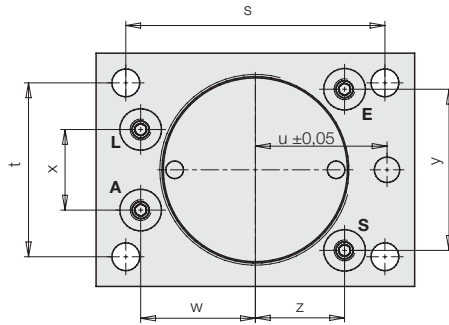




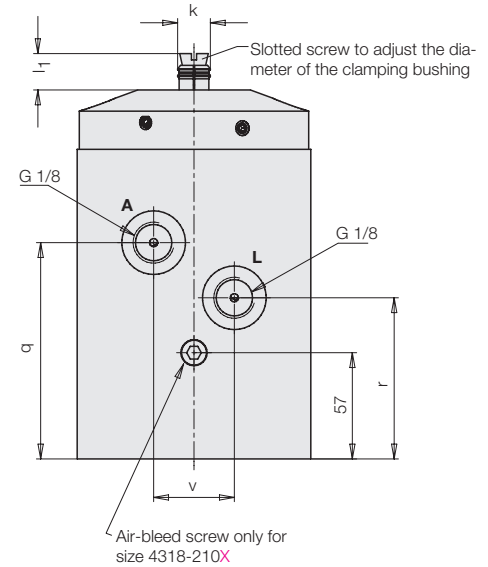
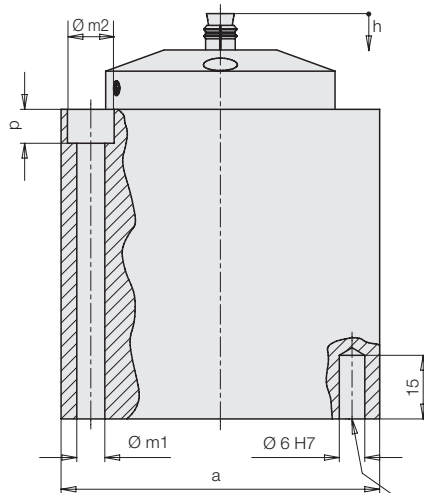
Connecting the oil supply through drilled channels, the connecting threads have to be closed by a screw plug (see accessory)



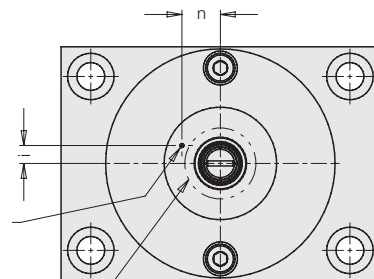
For manifold mounting remove stud screw with ball and insert O-ring into the counter-bore (see accessories)



S = Clamping (pull down)
E = Unclamping (pull down and clamping bushing)
A = Seat control
L = Positive air pressure protection



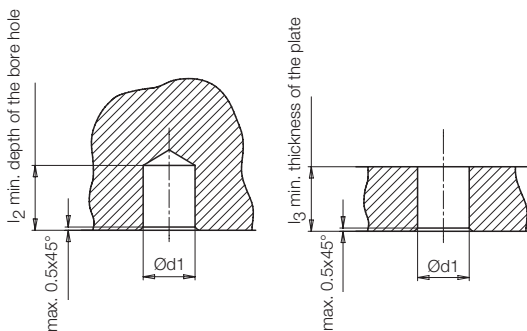
Dowel hole for radial alignment



Bore hole for pneumatic seat control

Minimum support Ø of the workpiece:
 Size 1: Ø 18 mm
 Size 2: Ø 27 mm

Demands on the bore hole in the workpiece



Adjusting Ø of the clamping bushing: $k = d1 - 0.2 \text{ mm}$



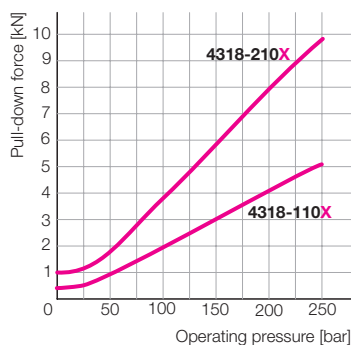
Technical characteristics

		Size 1 4318-110X	Size 2 4318-210X
Part-no. (X = Identification letter bore hole Ø)		4318-110X	4318-210X
Expansion force, radial	[kN]	approx. 9	approx. 14
Pull-down force	at 100 bar	2	3.9
	at 250 bar	5.1	9.8
Clamping bushing, unclamping	[bar]	min. 75**	min. 75**
Max. oil volume	Clamping	0.5	1
	Unclamping	10	25
Max. oil flow rate	[cm ³ /s]	25	50
a	[mm]	75	85
b	[mm]	55	63
c ±0,01	[mm]	87	111
d	[mm]	38	74.5
e	[mm]	14	17
f	[mm]	58.5	43
g	[mm]	14	16
h max. pull-down stroke	[mm]	2	2
i	[mm]	4.2	5.9
j	[mm]	26.5	38.3
k Adjusting Ø of the clamping bushing	[mm]	d1-0.2	d1-0.2
l ₁ max. height of the collet (unclamped)	[mm]	10	13
l ₂ min. depth of the bore hole	[mm]	10	13
l ₃ min. thickness of the plate	[mm]	9	12
m	[mm]	54	63
m1	[mm]	6.6 (M6)	8.5 (M8)
m2	[mm]	11	15
n	[mm]	9	12.7
p	[mm]	8	9
q	[mm]	51	77
r	[mm]	38	77
s	[mm]	61	66
t	[mm]	41	46
u	[mm]	31	35
v	[mm]	19	23
w	[mm]	27	32
x	[mm]	19	23
y	[mm]	38	23
z	[mm]	21	30
Weight	[kg]	2.3	3.9

Part numbers for accessories for connection through drilled channels

	[mm]	Ø 7x1.5	Ø 8x1.5
O-ring			
NBR		3000-342	3000-343
FKM		3001-077	3000-275
Screw plug G1/4 with hexagon head		3300-821	3300-821
Screw plug G1/8 with hexagon head		3610-047	3610-047
Screw plug G1/4 with socket head cap		0361-987	0361-987
Screw plug G1/8 with socket head cap		0361-986	0361-986

Pull-down force



*) Consider the tolerance of the bore hole

***) For operating pressures < 75 bar please contact us.

Bore hole Ø and part numbers

Size 1

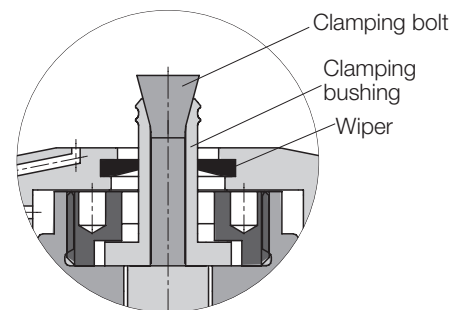
Bore hole Ø* d1 in mm	Part-no.
7.8 - 8.2	4318-110A
8.3 - 9.2	4318-110B
9.3 - 9.7	4318-110C
9.8 - 10.2	4318-110D
10.3 - 11.2	4318-110E

Size 2

Bore hole Ø* d1 in mm	Part-no.
11.3 - 11.7	4318-210F
11.8 - 12.7	4318-210G
12.8 - 13.7	4318-210H
13.8 - 14.7	4318-210K
14.8 - 15.7	4318-210L
15.8 - 16.7	4318-210M
16.8 - 17.7	4318-210N

Spare clamping sets

The clamping sets contain all required components to replace the clamping bushings. Every clamping set consists of clamping bushing, clamping bolt and wiper. Mounting or dismounting can be made on your own as per operating instructions.



Size 1

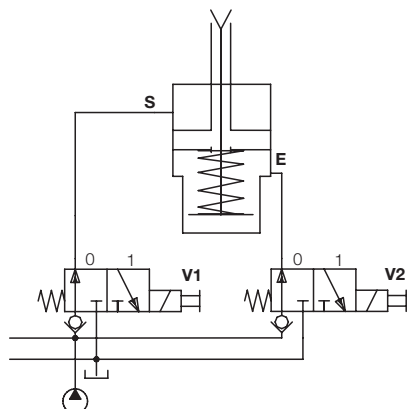
Bore hole Ø* d1 in mm	Clamping set Part-no.
7.8 - 8.2	0431-701A
8.3 - 9.2	0431-701B
9.3 - 9.7	0431-701C
9.8 - 10.2	0431-701D
10.3 - 11.2	0431-701E

Size 2

Bore hole Ø* d1 in mm	Clamping set Part-no.
11.3 - 11.7	0431-702F
11.8 - 12.7	0431-702G
12.8 - 13.7	0431-702H
13.8 - 14.7	0431-702K
14.8 - 15.7	0431-702L
15.8 - 16.7	0431-702M
16.8 - 17.7	0431-702N



Hydraulic connection



Workpiece clamping

1. Put the workpiece onto the hardened support surfaces and position by external stops or pins, if required.
2. Start the clamping process by switching the valves.
3. With pressure relief of the unclamping port the clamping bushings will be radially expanded very quickly. According to the material the tooling penetrates more or less deep into the bore hole wall and a form fit will be obtained.
4. In case of pressure increase at the clamping port, the hydraulic piston pulls the expanded clamping bushing and thereby also the workpiece onto the support surface.

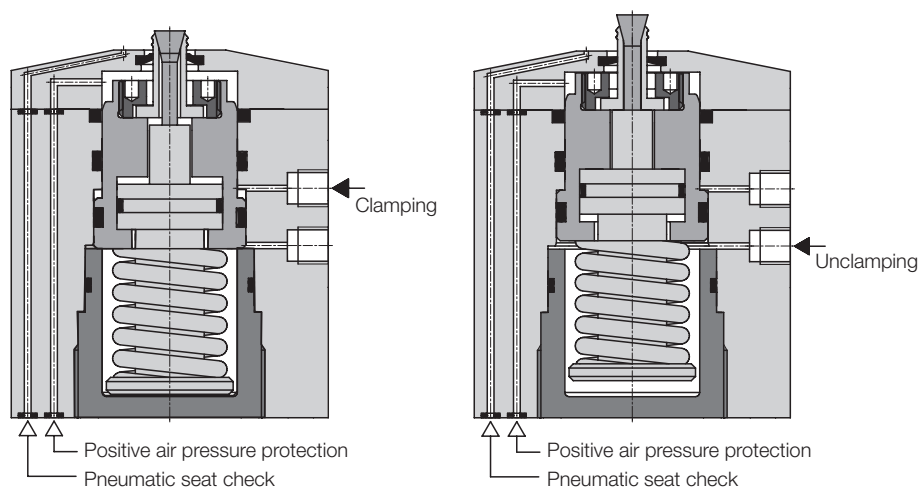
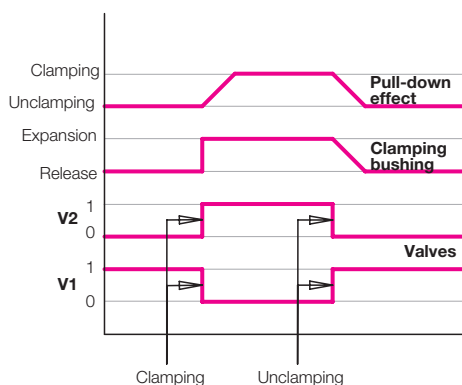
Workpiece unclamping

1. For unclamping a minimum pressure of 75 bar is required. In case of pressure increase at the unclamping port, the hydraulic piston returns to its off-position and the spring tension of the clamping bushing will be released. Very light workpieces can be slightly lifted.
2. Remove the workpiece.

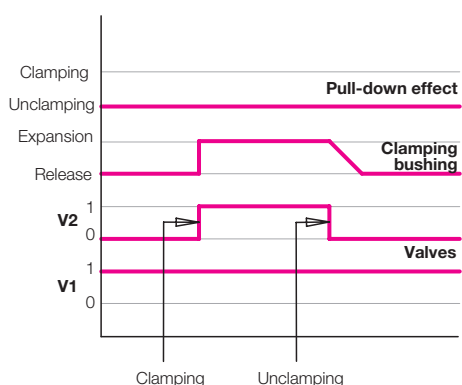
Note:

For operating pressures < 75 bar please contact us.

Function sequence



Clamping bushing only expansion



What happens in case of pressure drop of the clamping pressure?

In case of pressure drop the workpiece is no longer pulled onto the hardened support surface. The radial expansion of the clamping jaws and thereby the form fit with the workpiece are maintained by the spring tension.

What happens in case of pressure drop of the unclamping pressure?

The clamping bushing is expanded by spring force and can only be released with the minimum unclamping pressure of 75 bar. If there is no oil pressure the workpiece can neither be taken out nor a new workpiece can be inserted.