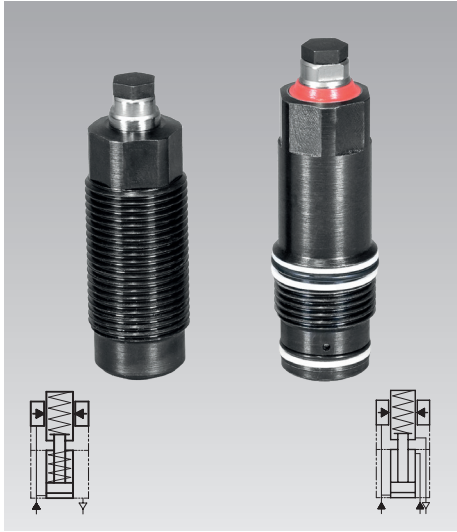




Threaded-body Work Supports

with metallic wiper edge or PU wipers, optional contact control, single and double acting, max. operating pressure 350 bar



Advantages

- Space-saving threaded-body version
- 3 sizes available
- Load force up to 13 kN
- Workpiece contact with various selectable spring clamping forces
- Optional pneumatic contact control
- Metal wiper edge with choice of a low-friction wiper or a PU wiper
- Mounting position: any
- Inner parts protected against corrosion
- Integrated orifice for flow rate limitation (type 1942)
- Connection of positive air pressure protection up to 4 bar is possible
- Venting of the spring area
- Hardened contact surfaces of the contact bolts
- Up to 3 stroke lengths available (up to 30 mm)

Application

Hydraulic work supports are used to provide a self-adjusting rest for workpieces and prevent their vibration and deflection under machining loads.

The threaded-body design allows for space-saving and direct installation into the fixture body.

Hydraulic oil supply and venting are made via drilled channels.

In case of the double acting version the return stroke of the support plunger is effected in a precisely defined time that is above all advantageous in cycle-dependent installations.

Description

In the body of the threaded-body work supports a thin-walled locking bush is integrated, which locks cylindrically around the freely-movable support plunger when pressurising the element with hydraulic oil.

The support plunger is installed hydraulically and using spring force. The correct contact at the workpiece can be controlled with the optional pneumatic contact control.

The body with metallic wiper edge protects the subjacent FKM wiper against coarse and hot swarf.

Pneumatic contact control

Description → page 10

Positive air pressure connection

To guarantee functioning of the work supports, a vent port is imperative. No liquids may enter the end of the bore hole (see also data sheet G 0.110 "Venting of the spring area").

It is recommended to connect positive air pressure protection. While locking the support plunger, the positive air pressure must not exceed 4 bar. If the support plunger is not locked, the positive air pressure must be reduced to a maximum of 0.2 bar.

The positive air pressure connection must be free of oil and water.

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

Function

The support plunger is retracted in off-position. When pressurised, the piston extends against an internal stop and the support plunger contacts the already clamped workpiece with spring force.

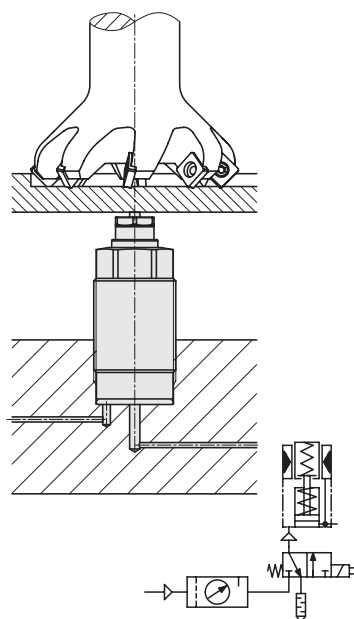
The support plunger will be locked by the increasing hydraulic pressure and can compensate forces in the axial direction. Unclamping releases the pressure.

Double acting: Pressure is applied to the return line. The piston returns to its off-position and retracts the support plunger.

Single acting: A spring pushes the piston back to its starting position.

Versions

Singl e acting → page 4



Important notes

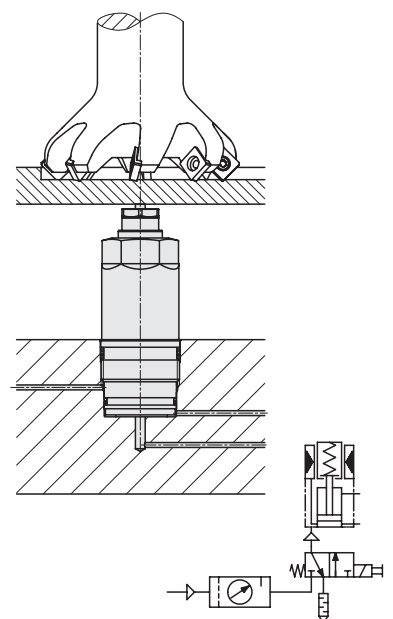
Work supports are not suitable to compensate side loads. The support plunger must not be stressed by tensile load.

The admissible load force as per the diagram is valid for static and increasing load. Machining forces can generate vibrations, whose amplitude exceeds far an average value, and this can cause yielding of the support plunger.

Remedy: increase the safety factor or the number of work supports. In dry machining applications, with minimum quantity lubrication or in case of accumulation of very small swarf, there can be a swarf holdup in the area of the metallic wiper edge.

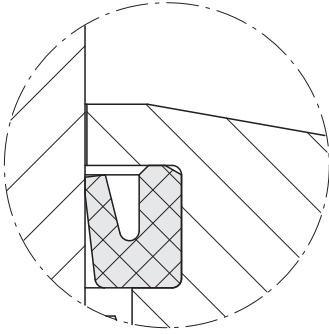
Remedy: Regular cleaning or protection cap installation.

Double acting → page 6



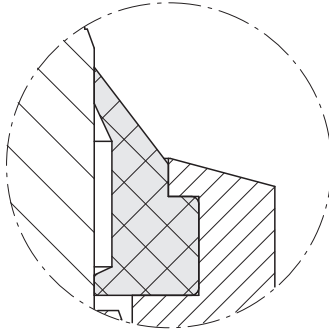
Wiper method

Metallic wiper edge M
with low-friction wiper



This wiper method reliably prevents the penetration of large and especially hot swarf.

PU wiper P

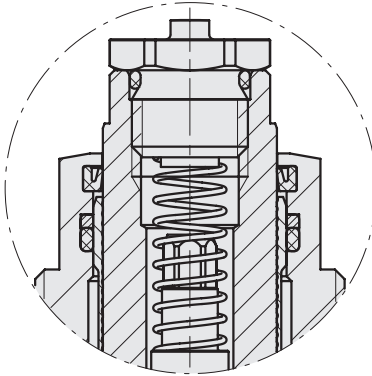


For applications with minimal lubrication or dry machining (dusting), the PU wiper is preferable

Spring clamping force

Optional **light contact force L**
and **normal contact force N**

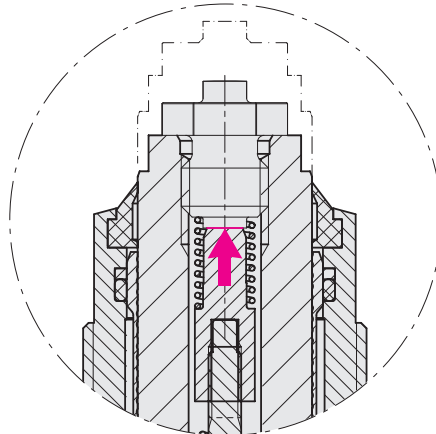
Spring clamping force → tables pages 5 and 7



By removing the contact bolt, the spring and thus the spring preload can be changed.
see Accessory → page 9

Knockout function

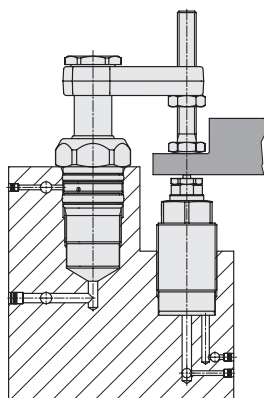
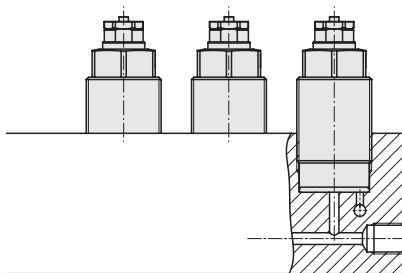
The knockout function is standard in the support elements. This ensures process safety for the movability of the support plunger, even when there are heavy contaminations from very fine swarf, which would otherwise lead to blockage.



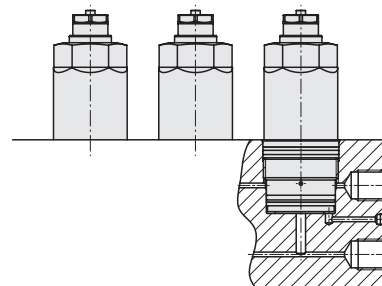
Installation and connecting possibilities

Drilled channels

Single acting



Double acting



Combination with clamping elements

With this combination, clamping and machining forces will add up:

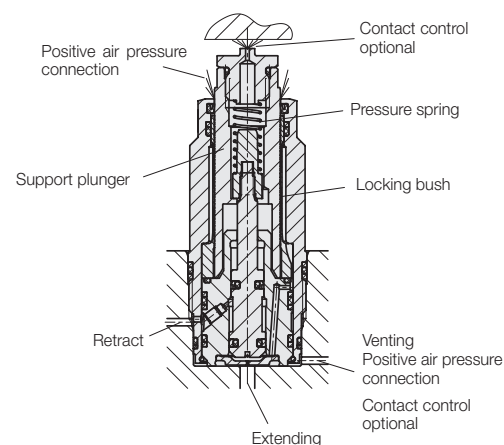
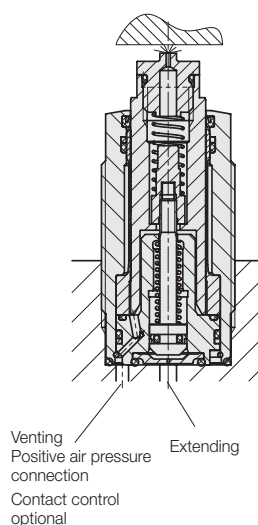
$$\begin{aligned} & \text{Clamping force} \\ & + \text{max. machining force} \\ & = \text{minimum support force} \times \text{safety factor} \end{aligned}$$

Rough calculation from practical application:

Required support force $\geq 2 \times$ clamping force

To increase safety, a maximum possible support force should be achieved by

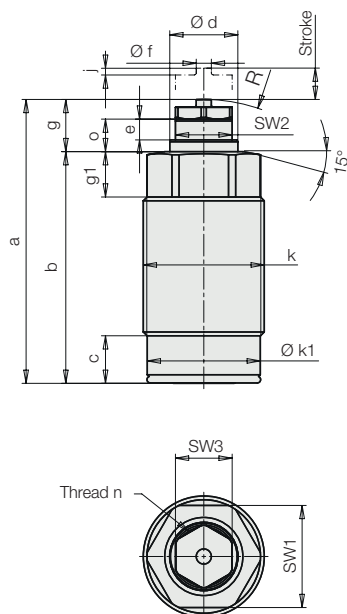
- using a larger work support
- or
- by using the max. operating pressure of 350 bar by installing a little intensifier (e.g. data sheet D 8.756), in the supply line of the work supports



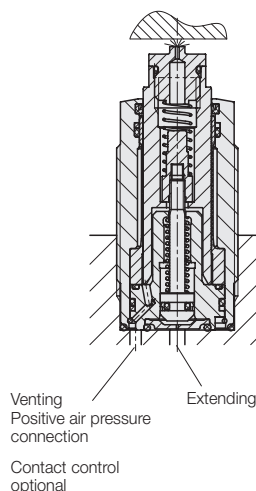
Threaded-body Work Support, single acting

Technical Characteristics

Single acting



Hydraulically and spring force

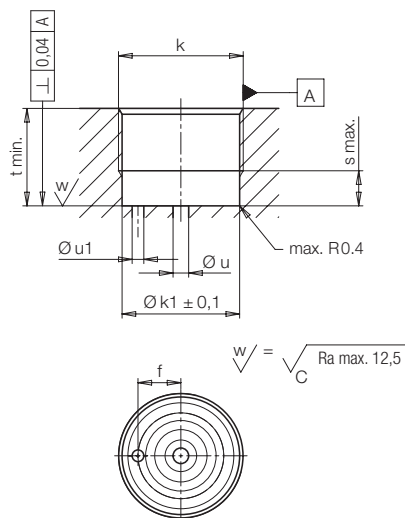


Off-position: Support plunger retracted

Extend with hydraulics
Contact by spring force

The support plunger is extended by a hydraulically pressurised small piston and contacts the workpiece with spring force. The support plunger will be locked by increasing hydraulic pressure and can compensate forces in the axial direction. For retraction, hydraulic pressure is released. The small piston retracts by spring force to its off-position and also retracts the support plunger.

Location hole



Size		E	K	L
k		M20 × 1.5	M26 × 1.5	M32 × 1.5
Support plunger Ød	[mm]	10	16	18
f	[mm]	7	8.5	11.5
k1	[mm]	18.4	24.4	30.2
s max.	[mm]	8	8	12
t min.	[mm]	15	15	20
u	[mm]	5	5	6
u1	[mm]	2	3	3

Important notes

Machining

The code letter c in the surface finish symbol for the sealing surface stands for a concentric groove direction (see drawing), which is given in case of a lowered sealing surface. In the case of circularly milled surfaces leakages can occur, since the grooves run at right angle to the sealing surface.

Pay attention when mounting:

The location hole must be dry and oil-free to ensure that no liquids penetrate into the spring area of the work supports.

When exchanging work supports:

To get a dry location hole, the hydraulic oil in drilled channels must be removed.

Threaded-body Work Support, single acting

Technical Characteristics

Size		E	K	L
k		M20 × 1.5	M26 × 1.5	M32 × 1.5
Adm. load force (350 bar)	[kN]	2.5	5/8	7/9/13
Support plunger Ød	[mm]	10	16	18
Stroke	[mm]	6.5	6.5/15	8/16/30
Stroke, springy	[mm]	5.5	5.5	7
Required oil per stroke extend	[cm³]	0.18	0.18/0.42	0.51/1.02/1.91
Admissible flow rate	[cm³/s]	25	25	25
Recommended minimum pressure	[bar]	150	100	100
Max. air pressure for positive air pressure connection with support plunger unlocked	[bar]	0.2	0.2	0.2
Spring force min./max. N	[N]	4.5/8.5	5.7/8.5	5.9/9.4
Spring force min./max. L *	[N]	2.9/4.4	4/7	4.6/7.6
Elastic deformation with load and 350 bar	[µm/kN]	10	4/6	4/5.5/8.8
Operating temperature	[°C]	0...70	0...70	0...70
Tightening torque	[Nm]	20	36	75
Weight, approx.	[kg]	0.1	0.19 / 0.26	0.33/0.43/0.6
a	[mm]	59.8	62.1/82.1	74.8/91.8/122.8
b	[mm]	50.4	50.4/70.4	61/78/109
c	[mm]	8.3	8.3	12.3
e	[mm]	3.3	3.3	5.5
f	[mm]	0	4	4
g	[mm]	9.4	11.7	13.8
g1	[mm]	10.5	10.5	12
j	[mm]	0	2	2
Ø k1	[mm]	18	24	29.9
n		M6	M8	M12
o	[mm]	6.4	6.7	8.6
R	[mm]	50	50	45
SW 1	[mm]	17	24	27
SW 2	[mm]	8	14	15
SW 3	[mm]	8	10	15

Hydraulically extended

* Version compression spring L not available for stroke 30 mm

Admissible load force F as function of operating pressure p

Variants configurable

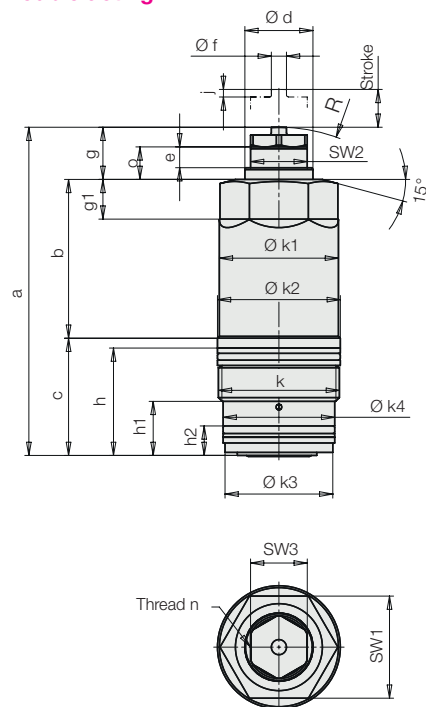
- Contact control, drilled through contact bolt
- PU wiper
- Compression spring N/L *

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

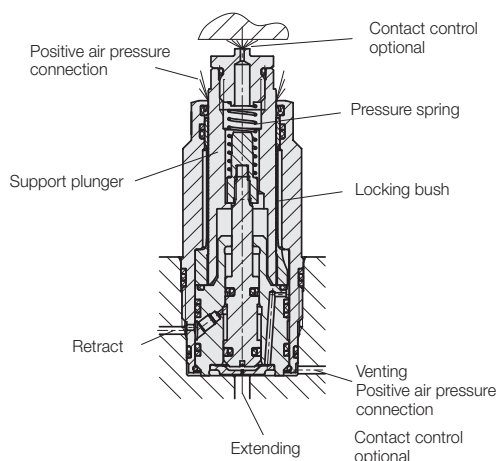
Threaded-body Work Support, double acting

Dimensions • Accessories

Double acting



Hydraulically and spring force



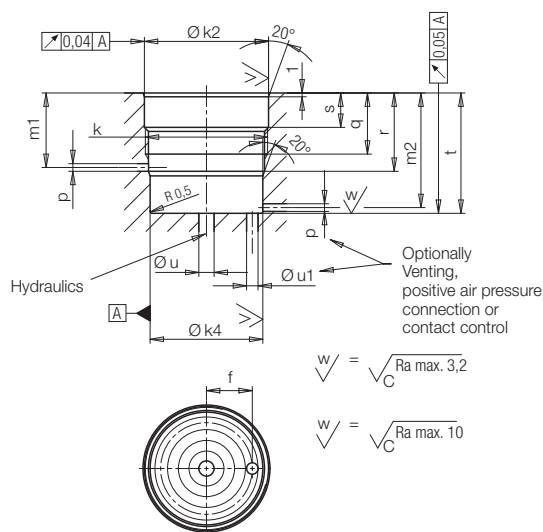
Off-position: Support plunger retracted

Extend with hydraulics
Contact by spring force

The support plunger is extended by a hydraulically pressurised double acting piston and contacts the workpiece with spring force. The support plunger will be locked by increasing hydraulic pressure and can compensate forces in the axial direction.

To retract, pressure is released and the return line is pressurised. The piston retracts to its off-position and also retracts the support plunger.

Location hole



Size	E	K	L
k	M20 × 1.5	M26 × 1.5	M32 × 1.5
Support plunger Ød [mm]	10	16	18
f [mm]	7	8.5	12
k2 F8 [mm]	20.5	26.5	32.5
k4 F8 [mm]	17.5	23	29.5
Fit depth [mm]	t - 1.5	t - 2.5	t - 2.5
m1 [mm]	16.5	18	18.5
m2 [mm]	25.5	29	30
p max. [mm]	3	3	3
q [mm]	16.5	16.5	18.5
r [mm]	18.5	20.5	20.5
s [mm]	7	7	9
t [mm]	27	30.5	31.5
u [mm]	5	5	6
u1 [mm]	2	3	3

Important notes

Pay attention when mounting:

The location hole must be dry and oil-free to ensure that no liquids penetrate into the spring area of the work supports.

When exchanging work supports:

To get a dry location hole, the hydraulic oil in drilled channels must be removed.

Threaded-body Work Support, double acting

Technical Characteristics

Size		E	K	L
k		M20 × 1.5	M26 × 1.5	M32 × 1.5
Adm. load force (350 bar)	[kN]	2.5	5/8	7/9/13
Support plunger Ød	[mm]	10	16	18
Stroke	[mm]	6.5	6.5/15	8/16/30
Stroke, springy	[mm]	5.5	5.5	7
Required oil per stroke extend	[cm³]	0.18	0.25/0.58	0.63/1.26/2.36
Required oil per stroke descend	[cm³]	0.06	0.07/0.15	0.12/0.24/0.45
Admissible flow rate	[cm³/s]	25	25	25
Recommended minimum pressure	[bar]	150	100	100
Minimum pressure retracting	[bar]	20	20	20
Max. air pressure for positive air pressure connection	[bar]	0.2	0.2	0.2
Spring force min./max. N	[N]	4.5/8.5	5.7/8.5	5.9/9.4
Spring force min./max. L *	[N]	2.9/4.4	4/7	4.6/7.6
Elastic deformation with load and 350 bar	[µm/kN]	10	4/6	4/5.5/8.8
Operating temperature	[°C]	0 ... 70	0 ... 70	0 ... 70
Tightening torque	[Nm]	20	36	75
Weight, approx.	[kg]	0.1	0.21/0.31	0.39/0.52/0.76
a	[mm]	67.3	70.4/98.9	86.8/111.8/156.8
b	[mm]	32.5	29.5/58	42/67/112
c	[mm]	25.4	29.2	31
e	[mm]	3.3	3.3	5.5
f	[mm]	0	4	4
g	[mm]	9.4	11.7	13.8
g1	[mm]	10.5	10.5	10.5
h	[mm]	24.8	28.5	28.4
h1	[mm]	11.3	15	14.3
h2	[mm]	6.2	7.2	7.8
j	[mm]	0	2	2
Øk1	[mm]	18.2	25.5	31.5
Øk2f8	[mm]	20.5	26.5	32.5
Øk3	[mm]	17.3	22.5	28.5
Øk4f7	[mm]	17.5	23	29.5
n		M6	M8	M12
o	[mm]	6.4	6.7	8.6
R	[mm]	50	50	45
SW 1	[mm]	17	24	27
SW 2	[mm]	8	14	15
SW 3	[mm]	8	10	15

Hydraulic, double acting

* Version compression spring L not available for stroke 30 mm

Admissible load force F as function of operating pressure p

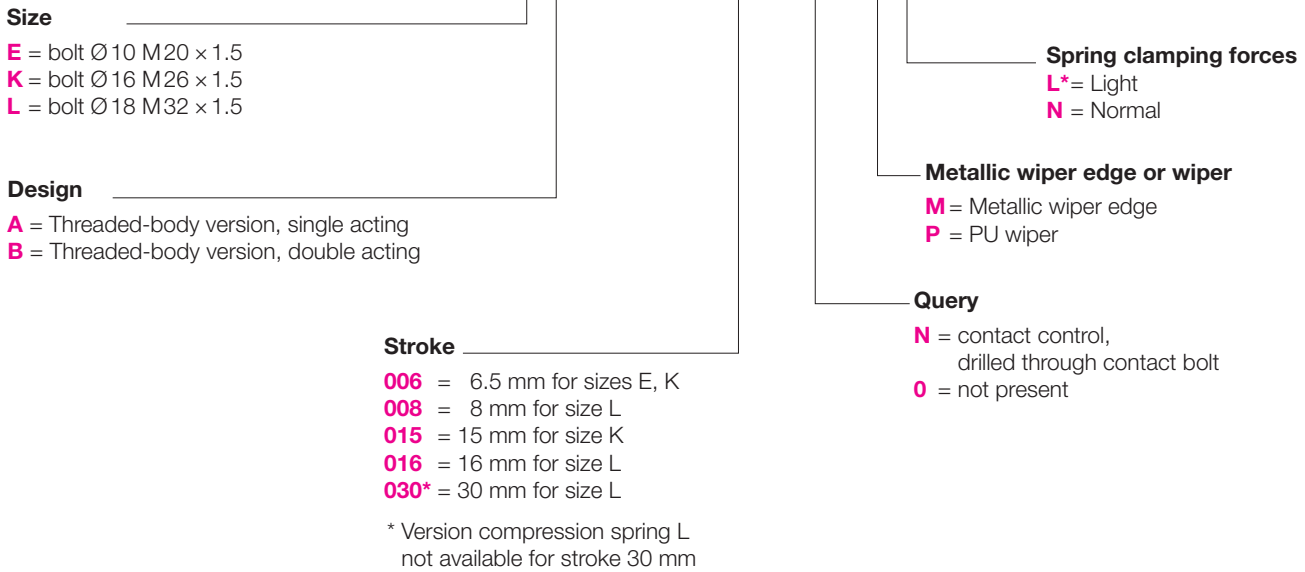
Variants configurable

- Contact control, drilled through contact bolt
- PU wiper
- Compression spring N/L *

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

Code for Part Numbers

V1 A B A - X X A 6 - H X X X - X N X X



Order examples

Bolt Ø10 M20 × 1.5 = **E**
 Single acting = **A**
 Stroke 6.5 mm = **006**
 Without monitoring = **0**
 PU wiper = **P**
 Spring clamping force, light = **L**

Bolt Ø16 M26 × 1.5 = **K**
 Double acting = **B**
 Stroke 15 mm = **015**
 Without monitoring = **0**
 Metallic wiper edge = **M**
 Spring clamping force, light = **L**

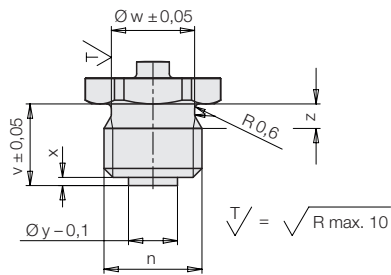
Bolt Ø16 M26 × 1.5 = **K**
 Single acting = **A**
 Stroke 6.5 mm = **006**
 Drilled through contact bolt = **N**
 PU wiper = **P**
 Spring clamping force, normal = **N**

Part no.
V1ABA-EAA6-H006-0NPL

Part no.
V1ABA-KBA6-H015-0NML

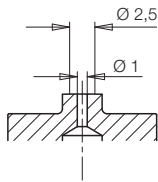
Part no.
V1ABA-KAA6-H006-NNPN

Required dimensions for self-made contact bolts



Size	E	K	L
Thread	M20 × 1.5	M26 × 1.5	M32 × 1.5
n [mm]	M6	M8	M12
v ± 0.05 [mm]	8	8.5	10
w ± 0.05 [mm]	4.5	6	10.2
x [mm]	0.5	1	1
y - 0.1 [mm]	3.1	4	6
z [mm]	1.5	2	3
Accessory O-ring	4 × 1.5	6 × 1.5	10 × 1.5
Part no.	3002167	3001526	3001922

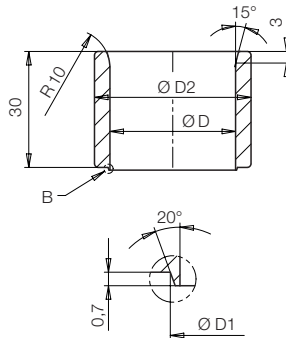
Contact bolt for contact control



Replacing pressure screws

The contact bolts with and without sensor hole are dimensionally identical and therefore also replaceable at the customer's plant.

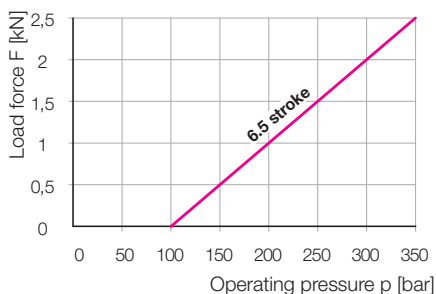
Dimensions for assembly aid for double acting work supports



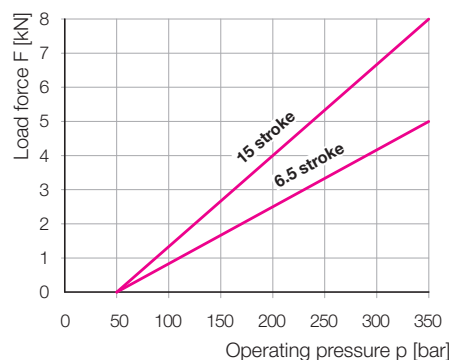
Size	E	K	L
Thread	M20 × 1.5	M26 × 1.5	M32 × 1.5
D F7 [mm]	20.5	26.5	32.5
D1 ± 0.1 [mm]	21.2	27.2	33.5
D2 [mm]	30	35	40
Part no.	34101464	34101471	34101431

Admissible load force F as function of operating pressure p

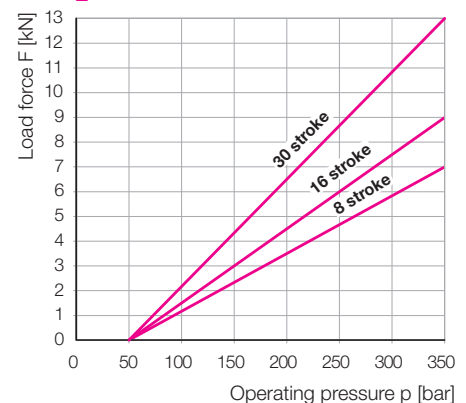
E



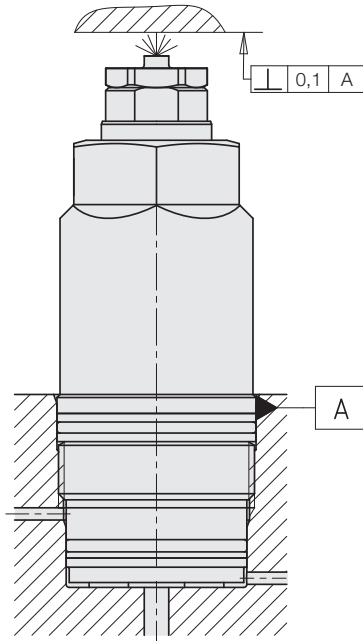
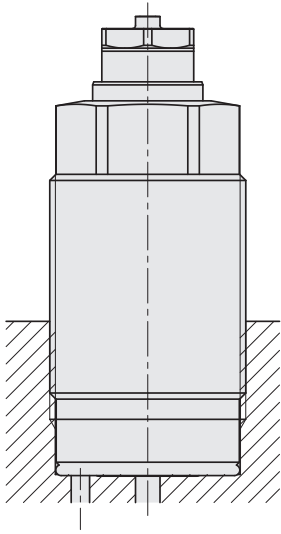
K



L



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



Off-position:

Support plunger (with spring force) retracted. Positive air pressure connection of 0.2 bar switched on, if required.

Function sequence

Workpiece loading and clamping on fixed points.

Switch on hydraulics for support plunger

Support plungers extend hydraulically; they are in contact with the workpiece by spring force and are hydraulically locked.

Switch on contact control

After the message "support plungers are in contact":

Machining of the workpiece

Switch off contact control or reduce pressure of positive air pressure connection to 0.2 bar.

Important note!

Before unclamping, switch off pneumatic pressure for contact control or reduce pressure of positive air pressure connection to 0.2 bar to allow retraction of the support plunger by spring force.

Limits of application

The pneumatic contact control can only be used if

- the contact surface at the workpiece is square to the axis of the work support.
- the contact surface is machined.
- the air is free of oil and water.

Signal conversion: Pneumatic-electric

If the contact bolt is in contact with the workpiece, the little nozzle will be closed.

An electro-pneumatic measuring device can measure either the pressure increase or a drop of the air flow rate.

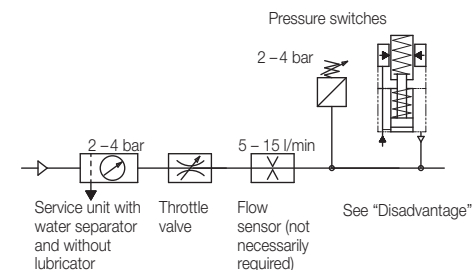
1. Pressure switches

Advantage

Easy adjustment.

Disadvantage

When contacting the workpiece, the tightness of the nozzle depends on the surface quality of the contact surface and depending on the workpiece more or less large changes in air pressure are possible. With an increasing number of work supports, the pressure differences will decrease and this makes the process-safe setting of a pressure switch more difficult.



2. Flow meter

The flow meter should have a digital display and at least one adjustable limit switch with a binary output (e.g. type SFAB of FESTO).

Advantages

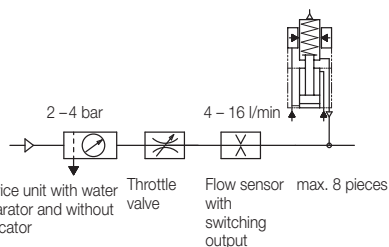
For the flow measurement, an air pressure of 2 to 4 bar is sufficient so that the support plunger contact force at the workpiece is still relatively low.

Simple adjustment of the switching point:

1. Measure the flow rate (Q_{min}) when all support plungers are in contact with the workpiece.
2. Repeat the measurement if 1 support plunger has no contact (Q_{max}).
3. Enter and save switching point = $0.5 \times (Q_{min} + Q_{max})$.

Disadvantages

If the difference ($Q_{max} - Q_{min}$) is too small, increase the flow rate or reduce the number of support points per sensor.



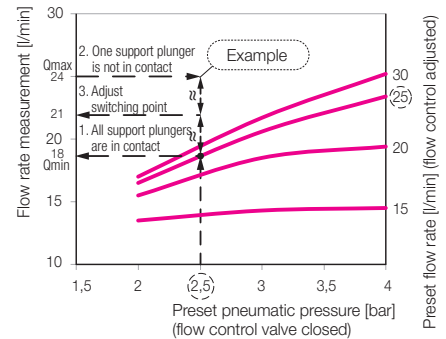
Alternatives

The air gap sensor SOPA from FESTO has an integrated compressed air preparation, as well as two solenoid valves for measuring air and positive air pressure connection. The device can be expanded to 4 measuring circuits.

Diagram for determination of the switching point

for flow meters with built-in limit switch as a function of the flow rate and the pneumatic pressure. The curves were determined in the test and apply for the following situation:

"In clamped mode, at least one work support of maximum 8 pcs is not correctly in contact with the workpiece."



Example

8 work supports

V1ABA-EAA6-H006-NNPL

Preset pneumatic pressure

2.5 bar

Preset flow rate

25 l/min

As per diagram:

Flow rate, if all work supports are in contact approx. 18 l/min

Flow rate,

if at least one support plunger has no contact approx. 24 l/min

Switching point = $0.5 \times (18 + 24) = 21$ l/min

The limit switch at the flow meter is adjusted to 21 l/min.

3. Differential pressure switch

Differential pressure switches (e.g. PEL System) require only 0.5 to 1.5 bar working pressure.

The exact adjustment of a setting nozzle under practical conditions is required.

Recommendation

If several work supports have to be controlled, a flow measurement is preferable.