

## SUPPORT ELEMENTS FOR STRESS-FREE CLAMPING AND LOW-VIBRATION MACHINING

- > supporting force up to 50 kN
- > observe safety factor for supporting force
- > operating pressure up to 400 bar
- > piston with internal thread
- > wipers to protect against contamination
- > oil supply via threaded port or oil channel in the fixture body
- > various design variants:
  - block version
  - installation version
  - screw-in version
  - flange version

### PRODUCT OVERVIEW:

Type	Supporting force [kN]	Supporting stroke [mm]	Positioning	No. of models	Operating mode
6961F/L	8,0 - 20,0	6,0 - 10,0	spring/air	6	single acting
6962F/L	8,0 - 20,0	6,0 - 10,0	spring/air	6	single acting
6964F/L	4,4 - 55,6	6,5 - 19,0	spring/air	12	single acting
6964H	4,4 - 17,0	6,5 - 12,5	hydraulic	5	single acting

### PRODUCT EXAMPLES:

NO. 6961F



- > supporting force: 8 - 20 kN
- > three design variants

NO. 6964F



- > supporting force: 4,4 - 55,6 kN
- > one design variant

NO. 6964H



- > supporting force: 4,4 - 17 kN
- > two design variants

# SUPPORT ELEMENTS - TECHNICAL INFORMATION

## OPERATING PRESSURE:

To achieve a guaranteed clamping function, the min. operating pressure must not be fallen below.  
The highest clamping force is achieved at max. operating pressure.

## CONTACT FORCE:

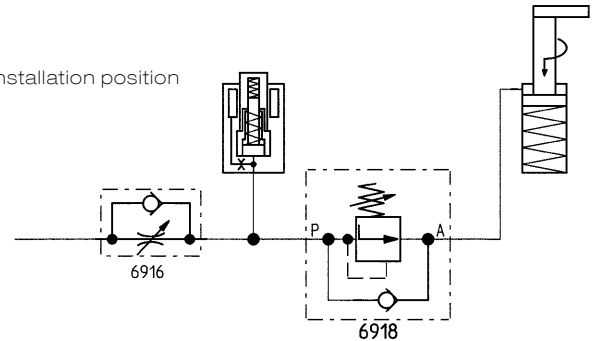
The spring-loaded contact force is at its greatest at a min. distance between the installation position and workpiece.

## SHEAR FORCES:

Support elements only absorb forces in axial direction of the piston.  
If shear forces occur, the thin-walled clamping sleeve will be deformed.  
The function of the support element can no longer be guaranteed.

## VOLUME FLOW:

The permissible volume flow must not be exceeded. The permitted volume flow can be controlled with a throttle/check valve. If the volume flow is too high, the oil pressure increases so quickly that the anchor is clamped before it is on the workpiece. If several support elements are used, the permissible volume flow is the total of the individually permissible volume flows.

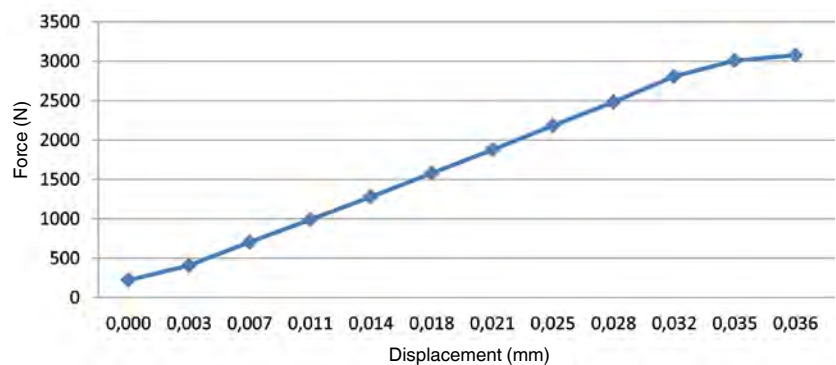


## ELASTIC CHANGE IN LENGTH:

Just like any steel component, the support elements also have an elastic behaviour.  
During heavy loading, a setting behaviour occurs.

## VENTING:

Support elements only need a very small oil volume.  
Since the hydraulic oil in the connection line hardly moves, careful venting is necessary. Air in the oil can prolong the clamping time considerably.  
If venting is not carried out properly, a diesel effect may occur and destroy the element. Always vent at low pressure.



## DIESEL EFFECT:

If petroleum containing air bubbles is compressed very quickly, the bubbles will be heated so strongly that a self-ignition of the air/gas mixture could occur. As a result, a very high pressure and temperature increase occurs locally, which could also damage seals as well as cause accelerated ageing of the oil.

## SPRING SPACE VENTILATION:

The free loading and venting of the spring spaces must be ensured.  
The pressure connection must be protected or arrayed properly so no coolant is taken in.  
Failure to observe this can lead to malfunctions.

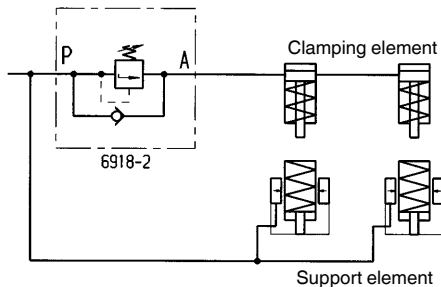
## COOLANT AND SHAVINGS:

Support elements should normally be protected against shavings and cooling water.



### CONTROLLING THE CLAMPING SEQUENCE:

The sequence of supports and clamps must be controlled time-dependent or pressure-dependent. This can be done using a sequence valve 6918 or supply valve 6918-80-10.



**SUPPORTING FORCE:**

The permissible loading force of support elements must always be regulated so that the clamping force of the clamping elements used and the static and dynamic machining forces can be absorbed safely. Permissible loading force minus clamping force minus safety reserve results in the possible machining force.

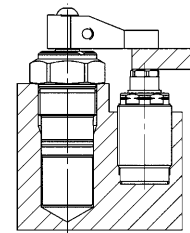
If the total number of occurring forces exceeds the permissible loading force, the anchor of the support element will be pressed backwards thereby damaging the support element.

The supporting force should always be at least twice as high as the clamping force.

### COMBINATIONS OF SUPPORT ELEMENT WITH SWING CLAMP

Example of support element 6964H-04-1 and swing clamp 6952E-02-21

	min. operating pressure [bar]	max. operating pressure [bar]	max. supporting force [kN]	max. clamping force [kN]
support element	50	350	4,4	-
swing clamp	40	350	-	2,0



### POSSIBLE MACHINING FORCE AT 350 BAR:

perm. loading force = 4,4 kN

minus clamping force = 2,0 kN

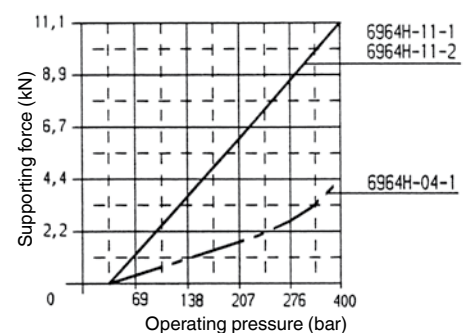
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arithmetic machining force                  ≤ 2,4 kN

perm. machining force max.  $\leq 2,0 \text{ kN}$

**NOTE:**

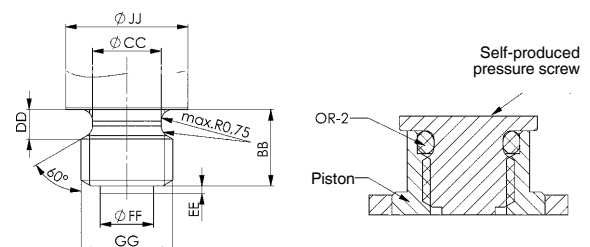
The permissible supporting forces in the diagram are static. Vibrations occurring during the machining could be far higher. For these cases, a large reserve must be included.



### SET SCREWS:

Support elements must never be operated without set screws, since penetrating dirt and cooling water impair the function. Most support elements are fitted with a set screw as standard.

When using special set screws, make sure that the set screws are tempered and designed slightly ball-shaped. Set screws with a tip or fluting should not be used. Special set screws can jeopardise the function of return stroke of the support pin and the spring-loaded system. During in-house production, please manufacture according to our specifications.

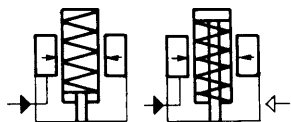


Subject to technical alterations.

## No. 6961F/L

### Support Element, block type

spring advanced or air advancing,  
max. operating pressure 400 bar,  
min. operating pressure 50 bar.



Order no.	Article no.	Contact force F1* [N]	Support force F2 [kN]	Stroke H [mm]	Vol. [cm³]	Piston area [cm²]	Weight [g]
65250	6961F-08	20-32	8	6	5,5	2,00	1100
65268	6961F-12	32-41	12	8	8,0	3,14	1800
65276	6961F-20	40-72	20	10	13,0	4,90	3100
65284	6961L-08	170	8	6	5,5	2,00	1100
65292	6961L-12	270	12	8	8,0	3,14	1800
65300	6961L-20	440	20	10	13,0	4,90	3100

\*Article No. 6961F-\*\*: Contact force F1 dependent on spring pretensioning and setting travel.

Article No. 6961L-\*\*: Contact force F1 dependent on air pressure at max. 10 bar.

### Design:

Cylinder body from steel, burnished. Support pin case hardened and ground. Internal locking sleeve system Kostyrka. Special wiper prevents contamination. Support pin with internal thread. Home position retracted or extended, depending on function. Internal parts from stainless steel. Oil supply via threaded connection or oil channel in the fixture body.

### Application:

Support element no. 6961F-\*\*: Plunger extended, spring adjustable contact force.

Support element no. 6961L-\*\*: Plunger retracted, pneumatic advance spring return.

These spring or pneumatic advancing hydraulic support elements provide additional support to avoid vibration or deflection during machining. Even large workpiece tolerances can be compensated (castings). Fitted directly below a clamping point they prevent distortion of the workpiece. The support elements can be matched with clamping cylinders of same nominal size into one circuit. To prevent the support plunger from possible slackening during a clamping procedure, it is advisable to connect a sequence valve (no. 6918-2) to control the support elements. Due to this fact, the support element is locked before the clamping procedure can be activated (fig. 1). Being used as an additional support to prevent from bending and vibration, the element should be preceded by a sequence valve (no. 6918-2) in order to ensure supporting before clamping. In case the clamping force is higher than the support force, the clamping force has to be reduced by using a pressure reducing valve no. 6917 (fig. 2).

### Features:

High resilience due to high operating pressure, matched to the forces of the clamping cylinder row. Smooth contacting of the workpiece by adjustable spring or pneumatic pressure. Universal use in each position. Easy attachment of thrust pieces in the piston rod thread.

### Note:

For spring advanced types, there is risk of sucking in coolant! To avoid this, a breather hose has to be connected to the pneumatic port and moved to a protected area. Support pin must be protected against the entry of dirt and splash water by fitting a set screw or plug. The support elements must be properly vented! The vent port must always be on top. Failure to do so can cause destruction of the clamping element by the escaping diesel.

**The supporting force should be matched to the clamping force in order to absorb machining forces.**

**The supporting force should always be at least twice as high as the clamping force.**

### Hydraulic diagrams:

fig. 1

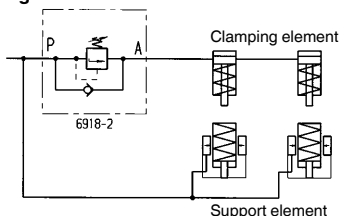
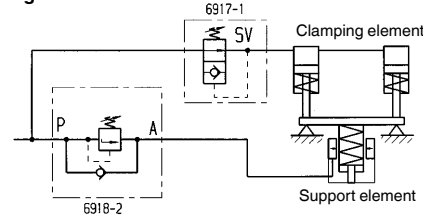
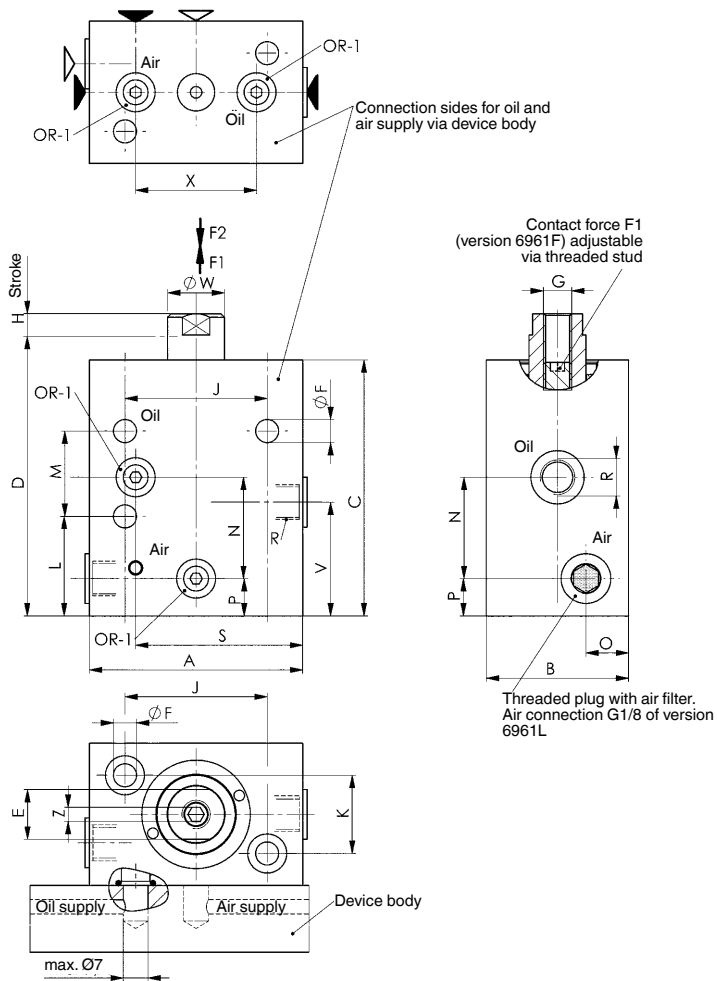
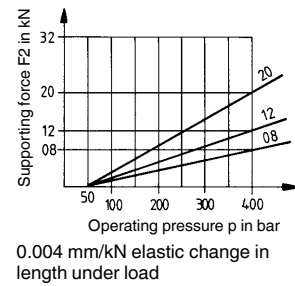


fig. 2





**Diagram:**



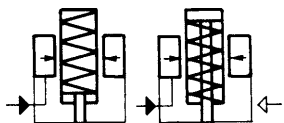
## Dimensions:

Order no.	Article no.	A	B	C	D	E	dia. F	G	J	K	L	M	N	O	P	R	S	V	dia. W	X	Z	OR-1 O-ring Order No.
65250	6961F-08	60	40	72	79,0	SW14	6,5	M8	40	22	28	24	28,5	12	10,5	G1/8	47	32	16	34	SW4	161554
65268	6961F-12	70	50	86	93,5	SW17	8,5	M10	50	30	32	32	33,5	16	12,5	G1/8	56	36	20	42	SW5	161554
65276	6961F-20	80	60	104	113,5	SW22	10,5	M12	60	40	33	40	40,0	20	14,0	G1/8	62	39	25	44	SW6	161554
65284	6961L-08	60	40	72	79,0	SW14	6,5	M8	40	22	28	24	28,5	12	10,5	G1/8	47	32	16	34	SW4	161554
65292	6961L-12	70	50	86	93,5	SW17	8,5	M10	50	30	32	32	33,5	16	12,5	G1/8	56	36	20	42	SW5	161554
65300	6961L-20	80	60	104	113,5	SW22	10,5	M12	60	40	33	40	40,0	20	14,0	G1/8	62	39	25	44	SW6	161554

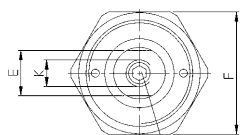
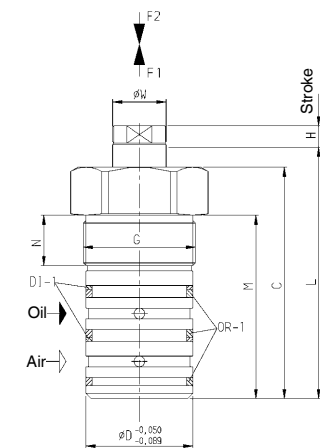
## No. 6962F/L

### Support Element, cartridge flange

spring advanced or air advancing,  
max. operating pressure 400 bar,  
min. operating pressure 50 bar.

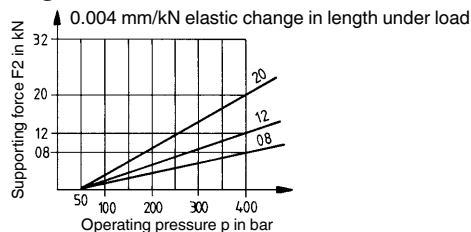


CAD

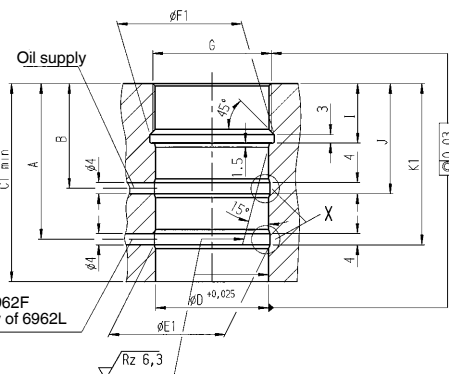


Contact force F1 (version 6962F)  
adjustable via threaded stud

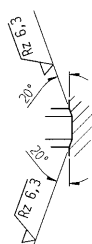
### Diagram:



### Installation dimensions:



Detail X



### Installation dimensions:

Order no.	Article no.	A	B	C1 min.	dia. D H7	dia. E1	dia. F1	G	I	J	K1	OR-1 O-ring Order No.	DI-1 Seal Order No.
65052	6962F-08	44,5	27,5	58	36	37	40	M38x1,5	14,5	29,5	46,5	110254	136192
65078	6962F-12	55,0	37,0	70	40	41	44	M42x1,5	21,0	39,0	57,0	173047	136200
65094	6962F-20	71,0	48,0	86	45	46	50	M48x1,5	24,0	50,0	73,0	136218	136226
65060	6962L-08	44,5	27,5	58	36	37	40	M38x1,5	14,5	29,5	46,5	110254	136192
65086	6962L-12	55,0	37,0	70	40	41	44	M42x1,5	21,0	39,0	57,0	173047	136200
65102	6962L-20	71,0	48,0	86	45	46	50	M48x1,5	24,0	50,0	73,0	136218	136226

Order no.	Article no.	Contact force F1* [N]	Support force F2 [kN]	Stroke H [mm]	Vol. [cm³]	Piston area [cm²]	Weight [g]
65052	6962F-08	20-32	8	6	5,5	2,00	500
65078	6962F-12	32-41	12	8	8,0	3,14	700
65094	6962F-20	40-72	20	10	13,0	4,90	1100
65060	6962L-08	170	8	6	5,5	2,00	500
65086	6962L-12	270	12	8	8,0	3,14	700
65102	6962L-20	440	20	10	13,0	4,90	1100

\*Article No. 6962F-\*\*: Contact force F1 dependent on spring pretensioning and setting travel.  
Article No. 6962L-\*\*: Contact force F1 dependent on air pressure at max. 10 bar.

### Design:

Cylinder body from steel, burnished. Support pin case hardened and ground. Internal locking sleeve system Kostyrka. Special wiper prevents contamination. Support pin with internal thread. Home position retracted or extended, depending on function. Internal parts from stainless steel. Oil supply via oil channel in fixture body.

### Application:

Support element no. 6962F-\*\*: Plunger extended, spring adjustable contact force.  
Support element no. 6962L-\*\*: Plunger retracted, pneumatic advance spring return.  
These spring or pneumatic advancing hydraulic support elements provide additional support to avoid vibration or deflection during machining. Even large workpiece tolerances can be compensated (castings). Fitted directly below a clamping point they prevent distortion of the workpiece. The support elements can be matched with clamping cylinders of same nominal size into one circuit. To prevent the support plunger from possible slackening during a clamping procedure, it is advisable to connect a sequence valve (no. 6918-2) to control the support elements. Due to this fact, the support element is locked before the clamping procedure can be activated (fig. 1, page 96). Being used as an additional support to prevent from bending and vibration, the element should be preceded by a sequence valve (no. 6918-2) in order to ensure supporting before clamping. In case the clamping force is higher than the support force, the clamping force has to be reduced by using a pressure reducing valve no. 6917.

### Features:

High resilience due to high operating pressure, matched to the forces of the clamping cylinder row. Smooth contacting of the workpiece by adjustable spring or pneumatic pressure. The threaded type allows the supporting element to be accommodated in fixtures in a space-saving manner. Easy attachment of thrust pieces and/or thrust bolts in the piston rod thread.

### Note:

For spring advanced types, there is risk of sucking in coolant! To avoid this, a breather hose has to be connected to the pneumatic port and moved to a protected area. Support pin must be protected against the entry of dirt and splash water by fitting a set screw or plug. The support elements must be properly vented! The vent port must always be on top. Failure to do so can cause destruction of the clamping element by the escaping diesel.

The supporting force should be matched to the clamping force in order to absorb machining forces.

The supporting force should always be at least twice as high as the clamping force.

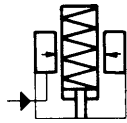
Subject to technical alterations.



## No. 6964F

### Support Element, base-flange-mounting

Normally extended. Spring advanced,  
max. operating pressure 350 bar,  
min. operating pressure 50 bar.



CAD

Order no.	Article no.	Contact force F1 [N]	Support force at 350 bar [kN]	Stroke C [mm]	Vol. [cm <sup>3</sup> ]	Weight [g]
66852	6964F-04-2	4,5 - 9,0	4,4	6,5	0,16	281
66878	6964F-11-2	9,0 - 26,5	11,0	9,5	0,33	660
66894	6964F-33	40 - 80	33,4	12,5	1,64	2019
66910	6964F-55	49 - 71	55,6	19,0	4,26	4291

### Design:

Cylinder body from steel, hardened. Support pin with internal thread case hardened and ground. Wiper to protect against dirt and cooling water. Internal parts from stainless steel. Oil supply via threaded port.

### Application:

The support element is used as an extra support to prevent sagging and vibration of a workpiece.

### Features:

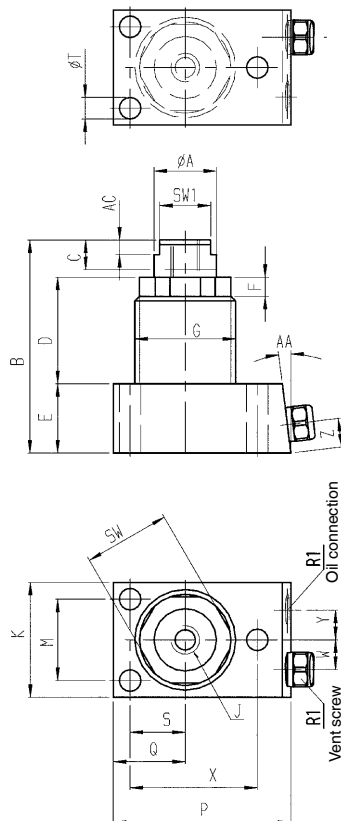
Element with high load capacity and low height. Spring extension: the plunger is normally extended. Variable spring setting permits sensitive adjustment of contact force.

### Note:

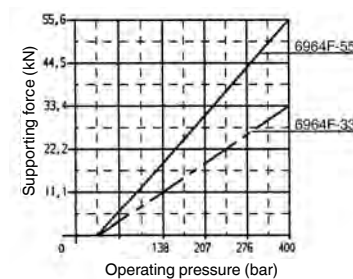
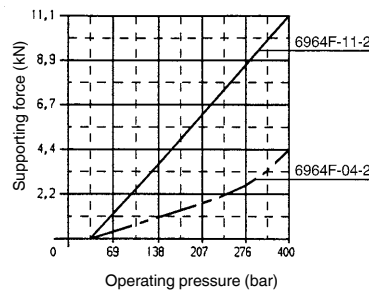
Support pin must be protected against the entry of dirt and splash water by fitting a set screw or plug. When placing into operation, ensure that all air is bled from the system. Failure to do so can cause destruction of the clamping element by the escaping diesel effect.

**The supporting force should be matched to the clamping force in order to absorb machining forces.**

**The supporting force should always be at least twice as high as the clamping force.**



### Diagrams:



0.004 mm/kN elastic change in length under load

### Dimensions:

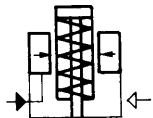
Order no.	Article no.	dia. A	B	D	E	F	G	SW	SW1	J x depth	K	M	P	Q	R1	S	dia.T	W	X	Y	Z	AA	AC
66852	6964F-04-2	16,0	56,0	25,0	24,0	5,5	M26x1,5	23	-	M8x7,5	33,5	24,5	44,5	17,5	G1/8	13,0	5,5	9	31,0	9	8,5	7°	-
66878	6964F-11-2	20,5	70,5	33,0	25,0	6,5	M35x1,5	30	-	M10x11,5	41,5	30,0	59,0	24,0	G1/8	18,0	7,0	10	43,0	10	8,5	7°	-
66894	6964F-33	38,0	111,0	68,5	25,0	12,5	Ø 57	50	28,5	M12x15	63,5	52,5	76,0	31,5	G1/8	26,0	7,0	16	61,0	16	10,3	-	4
66910	6964F-55	51,0	133,0	76,0	31,5	12,5	Ø 76	70	41,5	M16x20	89,0	73,0	97,0	44,5	G1/8	36,5	9,0	24	81,5	24	10,3	-	4

Subject to technical alterations.

## No. 6964L

### Support Element, base-flange-mounting

Normally retracted. Air advanced, max. operating pressure 350 bar, min. operating pressure 50 bar.



CAD



Order no.	Article no.	Contact force F1 [N]	Support force at 350 bar [kN]	Stroke C [mm]	Vol. [cm³]	Weight [g]
66936	6964L-04-2	17,5*	4,4	6,5	0,16	255
66621	6964L-11-2	35,5*	11,0	9,5	0,33	665
66688	6964L-33	89,0*	33,4	12,5	1,64	2023
66704	6964L-55	253,3*	55,6	19,0	4,26	4300

\* Contact force with max. 1.7 bar air pressure.

### Design:

Cylinder body from steel, hardened. Support pin with internal thread case hardened and ground. Wiper to protect against dirt and cooling water. Internal parts from stainless steel. Oil supply via threaded port.

### Application:

The support element is used as an extra support to prevent sagging and vibration of a workpiece.

### Features:

Element with high load capacity and low height. Pneumatic: the plunger is normally retracted. Sensitive adjustment of contact force by varying the air pressure.

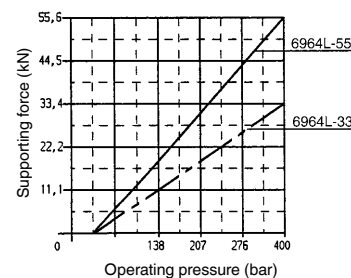
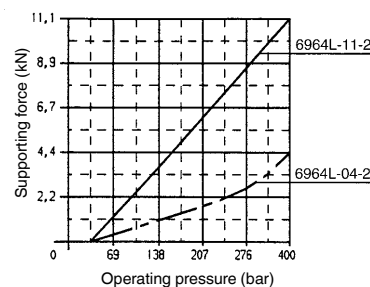
### Note:

Support pin must be protected against the entry of dirt and splash water by fitting a set screw or plug. When placing into operation, ensure that all air is bled from the system. Failure to do so can cause destruction of the clamping element by the escaping diesel effect.

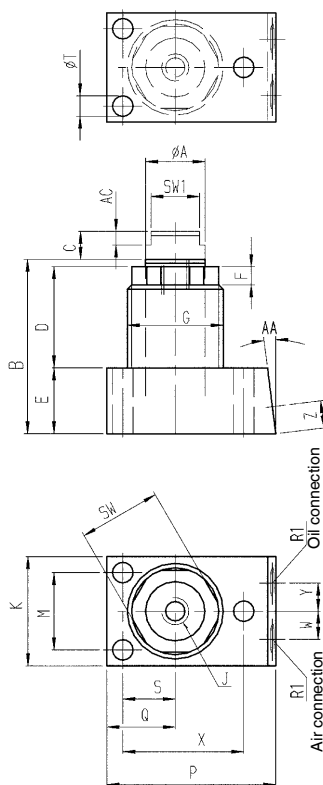
**The supporting force should be matched to the clamping force in order to absorb machining forces.**

**The supporting force should always be at least twice as high as the clamping force.**

### Diagrams:



0.004 mm/kN elastic change in length under load



### Dimensions:

Order no.	Article no.	dia. A	B	D	E	F	G	SW	SW1	J x depth	K	M	P	Q	R1	S	dia. T	W	X	Y	Z	AA	AC
66936	6964L-04-2	16,0	49,5	25,0	24,0	5,5	M26x1,5	23	-	M6x7,5	33,5	24,5	44,5	17,5	G1/8	13,0	5,5	9	31,0	9	8,5	7°	-
66621	6964L-11-2	20,5	61	33,0	25,0	6,5	M35x1,5	30	-	M8x6,0	41,0	30,0	59,0	24,0	G1/8	18,0	7,0	10	43,0	10	8,5	7°	-
66688	6964L-33	38,0	98	68,5	25,0	12,5	Ø 57	50	28,5	M12x15,0	63,5	52,5	76,0	31,5	G1/8	26,0	7,0	16	61,0	16	10,3	-	4
66704	6964L-55	51,0	114	76,0	31,5	12,5	Ø 76	70	41,5	M16x20,0	89,0	73,0	97,0	44,5	G1/8	36,5	9,0	24	81,5	24	10,3	-	4

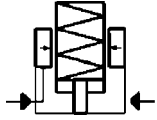
Subject to technical alterations.



## No. 6964H

### Support Element, base-flange-mounting

Normally retracted. Hydraulic advanced.  
Spring force for contact,  
max. operating pressure 350 bar,  
min. operating pressure 50 bar.



CAD

Order no.	Article no.	Contact force F1 [N]	Support force at 350 bar [kN]	Stroke C [mm]	Q max. [l/min]	Vol. [cm³]	Weight [g]
66746	6964H-11-2	13,5-44,5	11	6,5	2,13	3,0	845
325878	6964H-17-3	26,5 - 53,5	17	12,5	2,13	10,5	1920

### Design:

Cylinder body from steel, hardened. Support pin with internal thread case hardened and ground. Wiper to protect against dirt and cooling water. Internal parts from stainless steel. Oil supply via threaded port.

### Application:

The support element is used as an extra support to prevent sagging and vibration of a workpiece.

### Features:

Element with high load capacity and low height. Hydraulic and spring: the plunger is normally retracted. When pressure is applied, the support pin advances with a weak spring-applied force to contact the workpiece. The spring force varies with the stroke. As the hydraulic pressure rises, the support plunger is hydraulically clamped. When the pressure is released, the support plunger returns to the retracted position. Very high repeatability ensures optimum production quality.

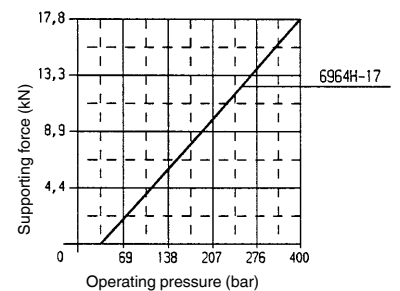
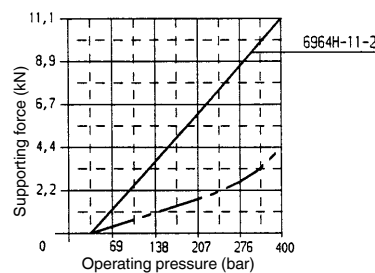
### Note:

Support pin must be protected against the entry of dirt and splash water by fitting a set screw or plug. When placing into operation, ensure that all air is bled from the system. Failure to do so can cause destruction of the clamping element by the escaping diesel effect.

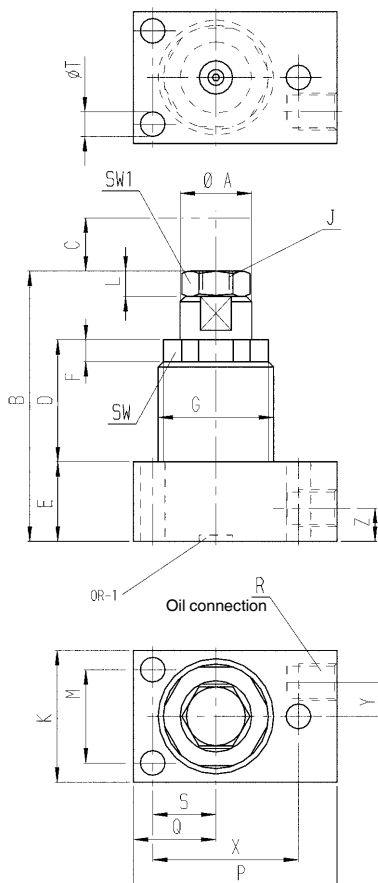
The supporting force should be matched to the clamping force in order to absorb machining forces.

The supporting force should always be at least twice as high as the clamping force.

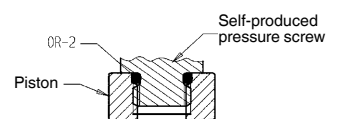
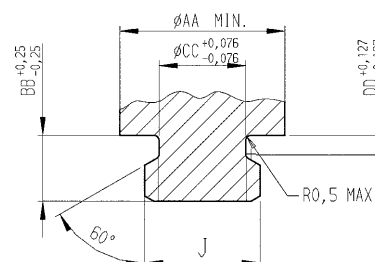
### Diagrams:



0.004 mm/kN elastic change in length under load



### Production dimensions with self-production of the clamping screw for support element:



### Dimensions:

Order no.	Article no.	dia. A	B	D	E	F	G	SW	SW1	J x depth	K	L	M	P	Q	R	S	dia. T	X	Y	Z	ØAA	BB	dia. CC	DD	OR-1 O-ring Order No.	OR-2 O-ring Order No.
66746	6964H-11-2	20,5	82,5	34	31,5	9,0	M35x1,5	30	19	M12x6,5	41,5	5	30,2	58,5	24,0	G1/8	18,3	7,1	43,1	10,5	10,5	14,1	6,35	9,91	1,78	330803	335422
325878	6964H-17-3	38,0	82,5	40	25,0	12,5	M60x1,5	54	19	M12x6,5	73,0	5	52,4	81,0	36,5	G1/8	26,2	7,1	62,6	16,0	10,5	14,1	6,35	9,91	1,78	330803	335422

Subject to technical alterations.

## No. 6964F

### Support Element, cartridge flange

Normally extended. Spring advanced, max. operating pressure 350 bar, min. operating pressure 50 bar.



CAD

Order no.	Article no.	Contact force F1 [N]	Support force at 350 bar [kN]	Stroke C [mm]	Vol. [cm <sup>3</sup> ]	Md max. [Nm]	Weight [g]
165092	6964F-04-1	4,5-9,0	4,4	6,5	0,16	40,5	160
165100	6964F-11-1	9,0-26,5	11,0	9,5	0,33	40,5	320

#### Design:

Cylinder body from steel, hardened. Support pin with internal thread case hardened and ground. Wiper to protect against dirt and cooling water. Internal parts from stainless steel. Oil supply via oil channel in fixture body.

#### Application:

The support element is used as an extra support to prevent sagging and vibration of a workpiece.

#### Features:

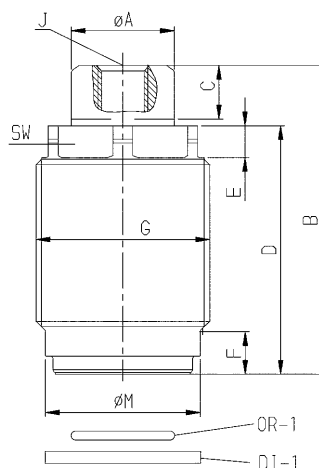
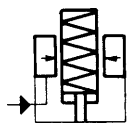
Element with high load capacity and low height. Spring extension: the plunger is normally extended. Variable spring setting permits sensitive adjustment of contact force.

#### Note:

Support pin must be protected against the entry of dirt and splash water by fitting a set screw or plug. When placing into operation, ensure that all air is bled from the system. Failure to do so can cause destruction of the clamping element by the escaping diesel effect.

**The supporting force should be matched to the clamping force in order to absorb machining forces.**

**The supporting force should always be at least twice as high as the clamping force.**

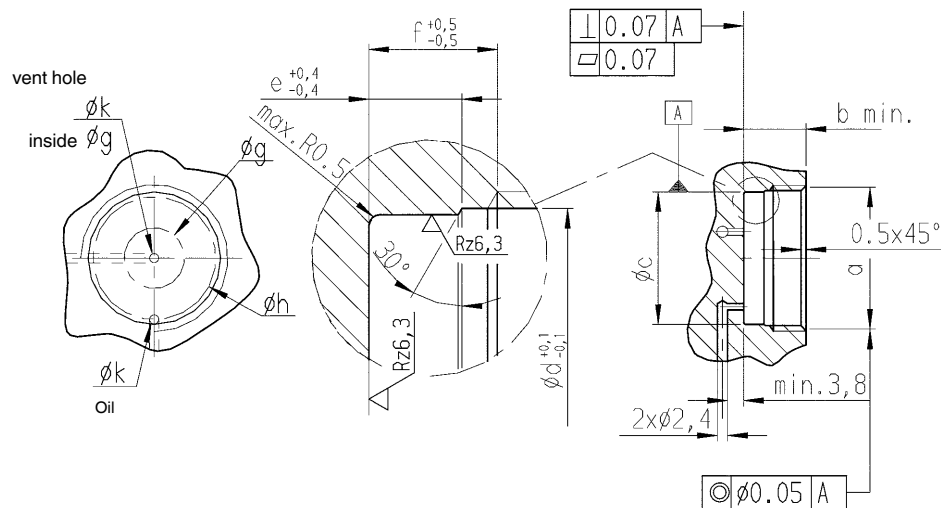


#### Dimensions:

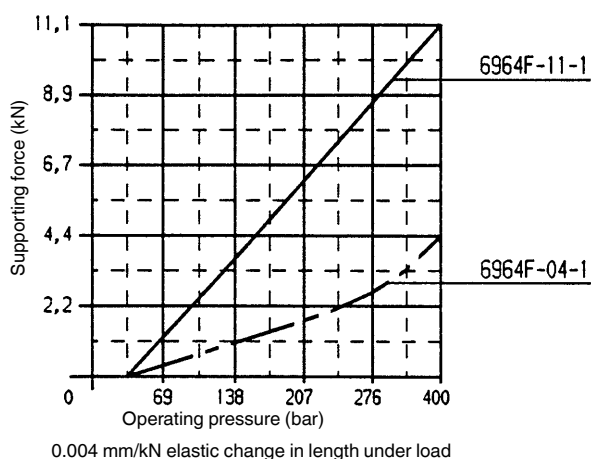
Order no.	Article no.	dia. A	B	D	E	F	G	J x depth	dia. M	SW	OR-1 O-ring Order No.	DI-1 Seal Order No.
165092	6964F-04-1	16,0	47,5	40,5	5,5	7,5	M26 x 1,5	M8x7,5	24	23	479550	346270
165100	6964F-11-1	20,5	62,0	49,5	6,5	8,5	M35 x 1,5	M10x11,5	31	30	479618	550211

### Installation dimensions:

Order no.	Article no.	a	b	dia. c	dia. d	e	f	Øg	Øh	dia. k
165092	6964F-04-1	M26 x 1,5-6H	15,5	24,20 +0,025	24,5	5,7	7,0	7,5	20,4	1,6 ±0,1
165100	6964F-11-1	M35 x 1,5-6H	16,4	31,16 +0,075	33,5	6,7	8,0	14,0	26,5	1,6 ±0,3



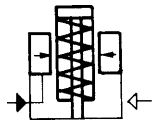
**Diagram:**



## No. 6964L

### Support Element, cartridge flange

Normally retracted. Air advanced, max. operating pressure 350 bar, min. operating pressure 50 bar.



CAD

Order no.	Article no.	Contact force F1 [N]	Support force at 350 bar [kN]	Stroke C [mm]	Vol. [cm <sup>3</sup> ]	Md max. [Nm]	Weight [g]
165167	6964L-04-1	17,5*	4,4	6,5	0,16	40,5	150
165183	6964L-11-1	35,5*	11,0	9,5	0,33	40,5	340

\* Contact force with max. 1.7 bar air pressure.

### Design:

Cylinder body from steel, hardened. Support pin with internal thread case hardened and ground. Wiper to protect against dirt and cooling water. Internal parts from stainless steel. Oil supply via oil channel in fixture body.

### Application:

The support element is used as an extra support to prevent sagging and vibration of a workpiece.

### Features:

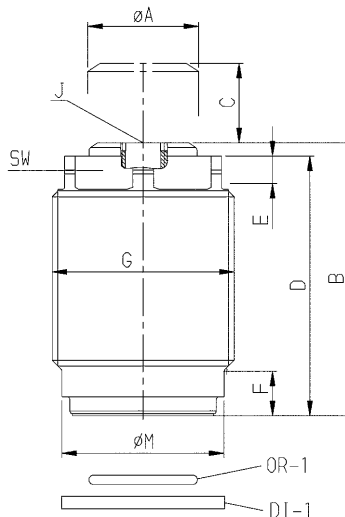
Element with high load capacity and low height. Pneumatic: the plunger is normally retracted. Sensitive adjustment of contact force by varying the air pressure.

### Note:

Support pin must be protected against the entry of dirt and splash water by fitting a set screw or plug. When placing into operation, ensure that all air is bled from the system. Failure to do so can cause destruction of the clamping element by the escaping diesel effect.

**The supporting force should be matched to the clamping force in order to absorb machining forces.**

**The supporting force should always be at least twice as high as the clamping force.**

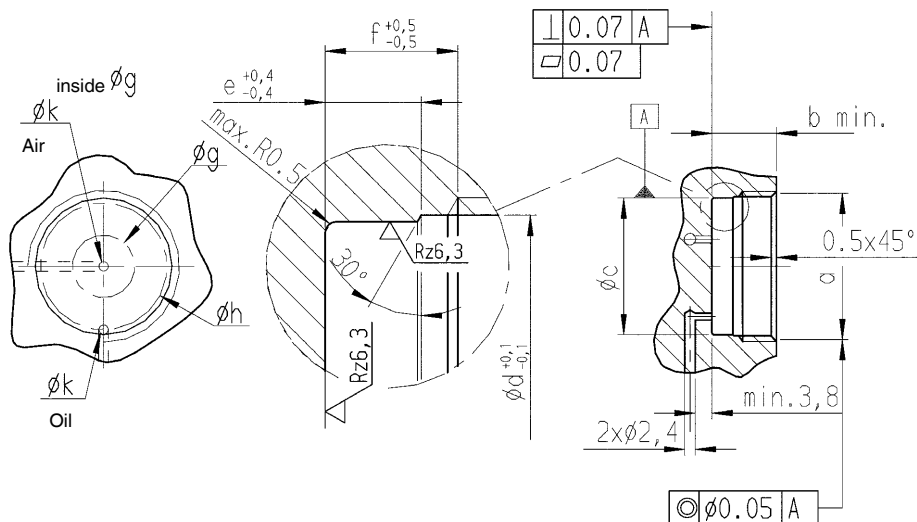


### Dimensions:

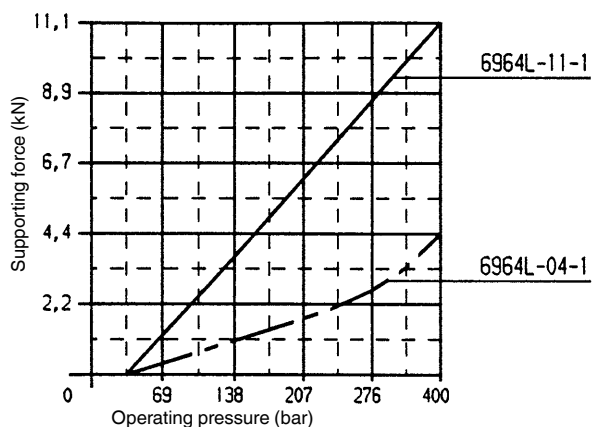
Order no.	Article no.	dia. A	B	D	E	F	G	J x depth	dia. M	SW	OR-1 O-ring Order No.	DI-1 Seal Order No.
165167	6964L-04-1	16,0	41,0	40,5	5,5	7,5	M26x1,5	M6x7,5	24	23	479550	346270
165183	6964L-11-1	20,5	52,5	49,5	6,5	8,5	M35x1,5	M8x6,0	31	30	479618	550211

## Installation dimensions:

Order no.	Article no.	a	b	dia. c	dia. d	e	f	Øg	Øh	dia. k
165167	6964L-04-1	M26x1,5-6H	15,5	24,2 +0,025	24,5	5,7	7,0	7,5	20,4	1,6 ±0,1
165183	6964L-11-1	M35x1,5-6H	16,4	31,16 +0,075	33,5	6,7	8,0	14,0	26,5	1,6 ±0,3



## Diagram:



0.004 mm/kN elastic change in length under load

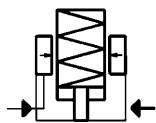
## No. 6964H

### Support Element, cartridge flange

Normally retracted. Hydraulic advanced.  
Spring force for contact,  
max. operating pressure 350 bar,  
min. operating pressure 50 bar.



Order no.	Article no.	Contact force F1 [N]	Support force at 350 bar [kN]	Stroke C [mm]	max. oil flow rate [l/min.]	Vol. [cm <sup>3</sup> ]	Md max. [Nm]	Weight [g]
165225	6964H-04-1	4,4-26,7	4,4	6,5	2,13	2,5	40,5	180
66720	6964H-11-1	13,5-44,5	11,0	6,5	2,13	3,0	54,0	380
165241	6964H-17-1	27,0-53,0	17,0	12,5	2,13	10,5	136,0	1150



### Design:

Cylinder body from steel, hardened. Support pin with internal thread case hardened and ground. Wiper to protect against dirt and cooling water. Internal parts from stainless steel. Oil supply via oil channel in fixture body.

### Application:

The support element is used as an extra support to prevent sagging and vibration of a workpiece.

### Features:

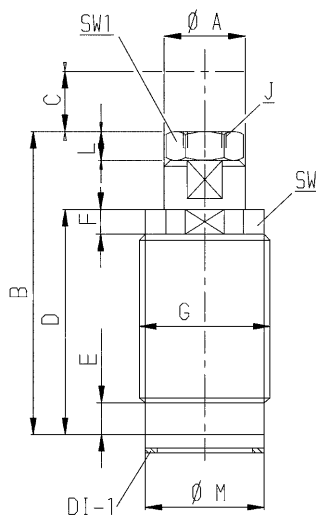
Element with high load capacity and low height. Hydraulic and spring: the plunger is normally retracted. When pressure is applied, the support pin advances with a weak spring-applied force to contact the workpiece. The spring force varies with the stroke. As the hydraulic pressure rises, the support pin is hydraulically clamped. When the pressure is released, the support pin returns to the retracted position. Very high repeatability ensures optimum production quality.

### Note:

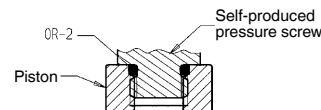
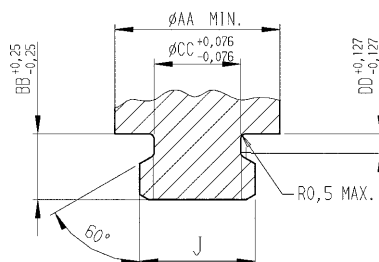
Support pin must be protected against the entry of dirt and splash water by fitting a set screw or plug. When placing into operation, ensure that all air is bled from the system. Failure to do so can cause destruction of the clamping element by the escaping diesel effect.

**The supporting force should be matched to the clamping force in order to absorb machining forces.**

**The supporting force should always be at least twice as high as the clamping force.**



### Production dimensions with self-production of the clamping screw for support element:



### Dimensions:

Order no.	Article no.	dia. A	B	D	E	F	G	J x depth	L	dia. M	SW	SW1	ØAA	BB	dia. CC	DD	OR-2 O-ring Order No.	DI-1 Seal Order No.
165225	6964H-04-1	16,0	53,5	42,5	7,0	5,5	M26x1,5	M8x5,0	3,5	23,3	23	13	9,75	5,00	6,05	1,19	181289	550124
66720	6964H-11-1	20,5	72,0	55	9,5	9,0	M35x1,5	M12x6,5	5,0	29,7	30	19	14,10	6,35	9,91	1,78	335422	550125
165241	6964H-17-1	38,0	72,5	55	6,5	12,5	M60x1,5	M12x6,5	5,0	54,8	54	19	14,10	6,35	9,91	1,78	335422	474445

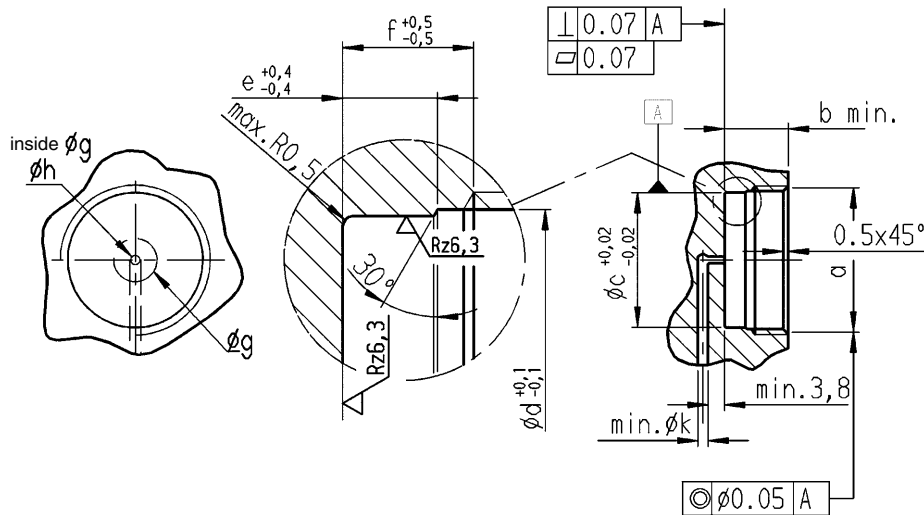
Subject to technical alterations.



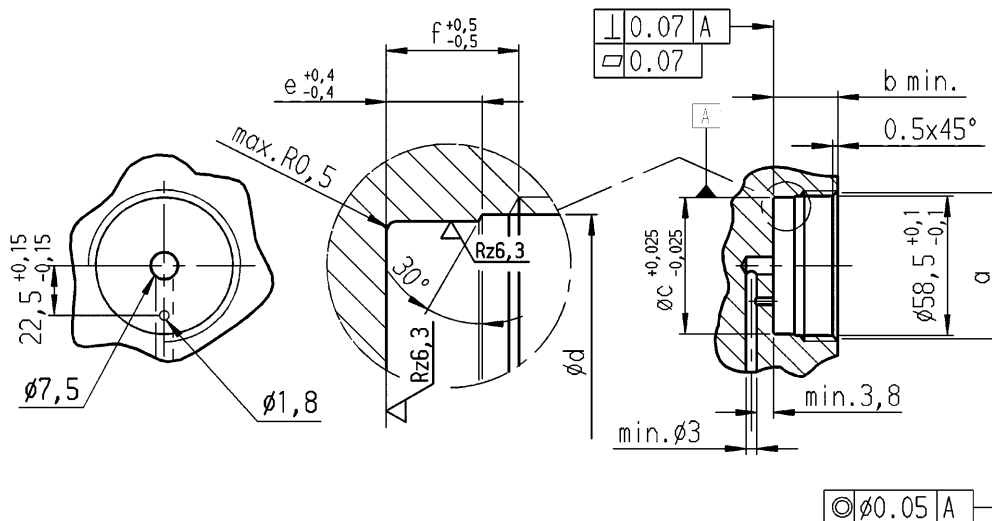
## Installation dimensions:

Order no.	Article no.	a	b	dia. c	dia. d	e	f	Øg	Øh	dia. k
165225	6964H-04-1	M26x1,5-6H	14,5	23,44	24,5 ±0,1	4,5	6,0	7,5	1,6 ±0,3	2
66720	6964H-11-1	M35x1,5-6H	19,0	29,90	33,5 ±0,1	5,0	6,4	19,0	3,0	3
165241	6964H-17-1	M60x1,5-6H	15,0	55,00	58,5 ±0,1	4,0	5,3	-	-	-

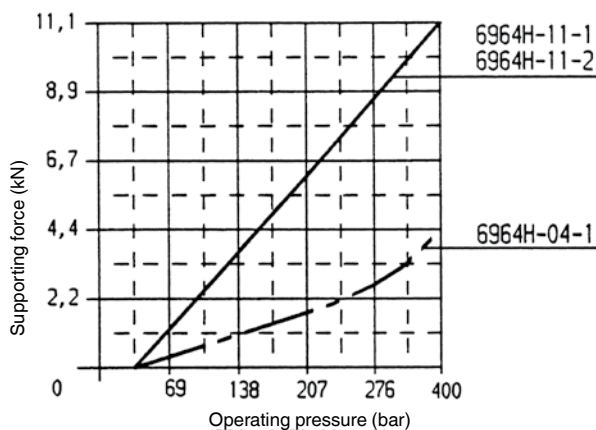
### 6964H-04-1, 6964H-11-1:



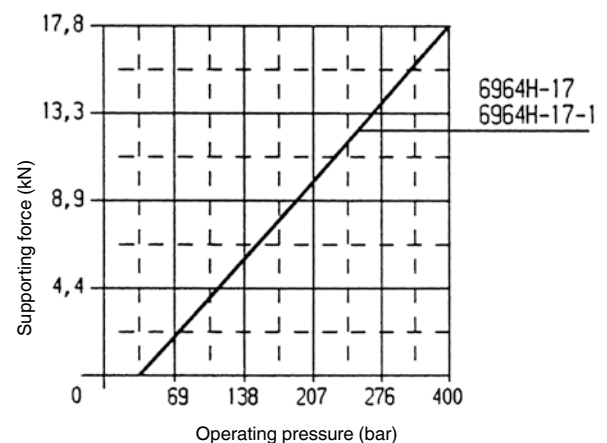
### 6964H-17-1:



## Diagrams:



0.004 mm/kN elastic change in length under load



No. 6964H-xx-20

Splash protection



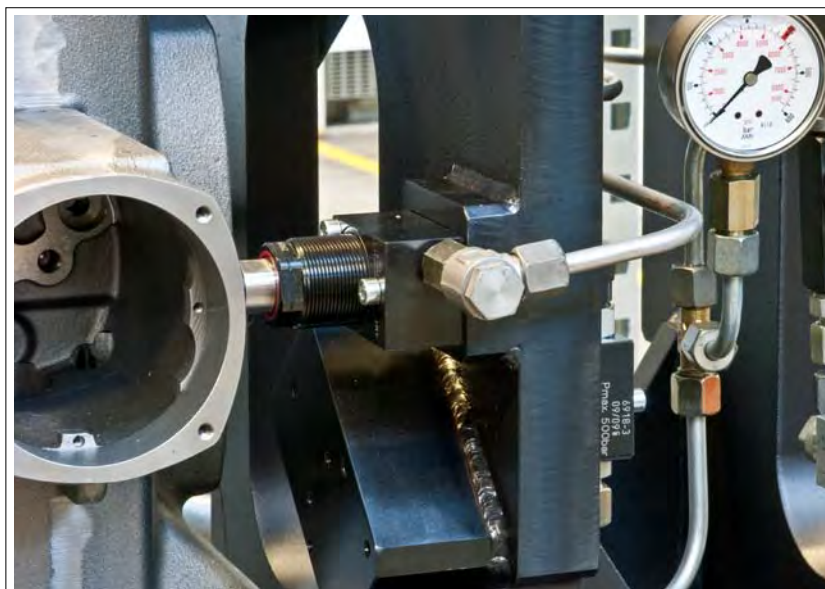
Order no.	Article no.	Weight [g]
326520	6964H-04-20	6
326546	6964H-11-20	12
326561	6964H-17-20	33

## Application:

For protection against entry of chips and splash water.

## Note:

Use only for hydraulic support element. Observe mounting position!



Subject to technical alterations.

CAD







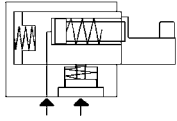
No. 6965

## Hydraulic Compensating Clamp

Single acting, with spring return,  
max. operating pressure 100 bar.



CAD



Order no.	Article no.	max. clamping force [kN]	max. locking force [kN]	Clamping stroke [mm]	Compensating stroke [mm]	Pin dia.	OR-1 O-ring Order No.	Weight [g]
320333	6965-08-00	2	1	12	3	16,0*	550265	1675
320341	6965-08-01	2	1	12	3	5,5	550265	1675
320358	6965-08-02	2	1	12	3	8,5	550265	1675

\* Clamping bolt blank not hardened

### Design:

Housing from steel, burnished. Piston from case-hardened steel, hardened and ground. Complete with four fixing screws M6 x 70 and O-ring for flange seal. Oil supply via threaded connection or oil channel in the fixture body.

### Application:

The Hydraulic Compensating Clamp is employed in fixtures for the distortion-free, floating clamping and support of workpieces. It is possible to use several Hydraulic Compensating Clamps without distorting a workpiece.

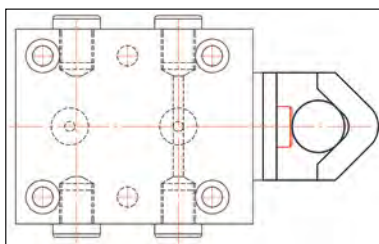
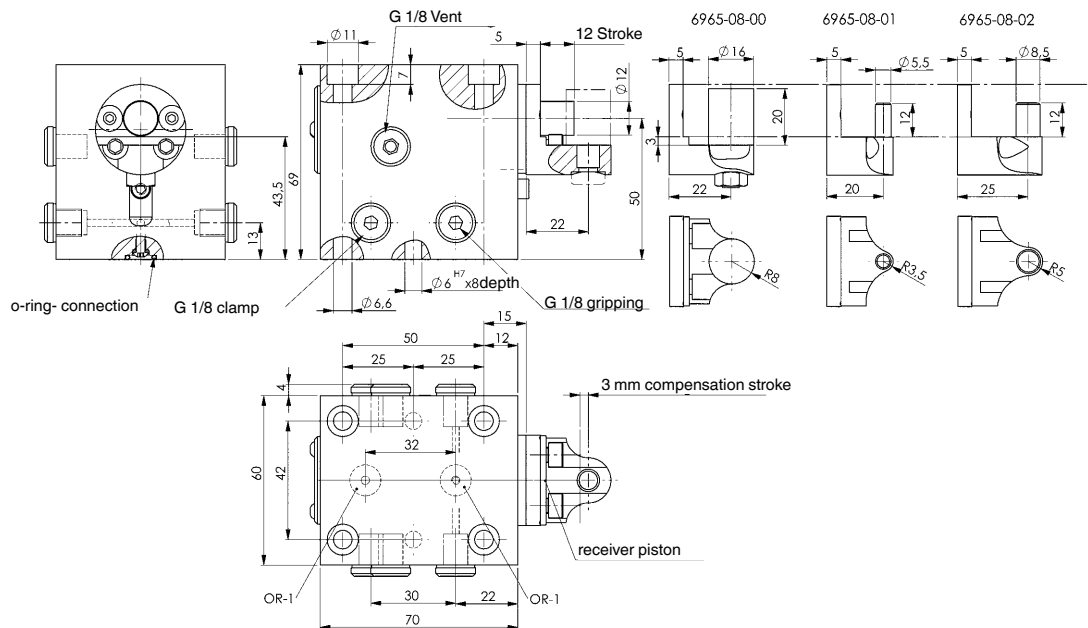
### Features:

The floating piston has a compensating stroke of 3 mm, thereby also permitting the clamping of workpieces with large shape deviations or differing and inaccurate drill hole tolerances. Immediately after the clamping process, the support piston is clamped, specifically in a clamped position, via a sequence valve! The workpiece holder on the adjustable clamp is easy to change and is therefore simply and quickly adapted to the various workpiece contours.

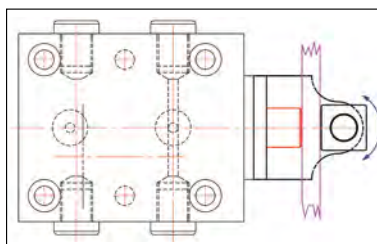
### Note:

Please do not operate a Hydraulic Compensating Clamp without a workpiece in place; doing so can damage the return spring or cause it to set and lose force.

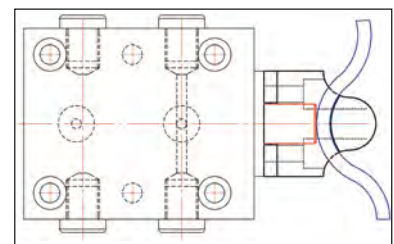
For single acting cylinders there is risk of sucking in coolant through the breather port. In such cases the breather port has to be piped to a clean protected area. The system has to be completely vented during installation.



Clamping of workpiece with moulded lugs.

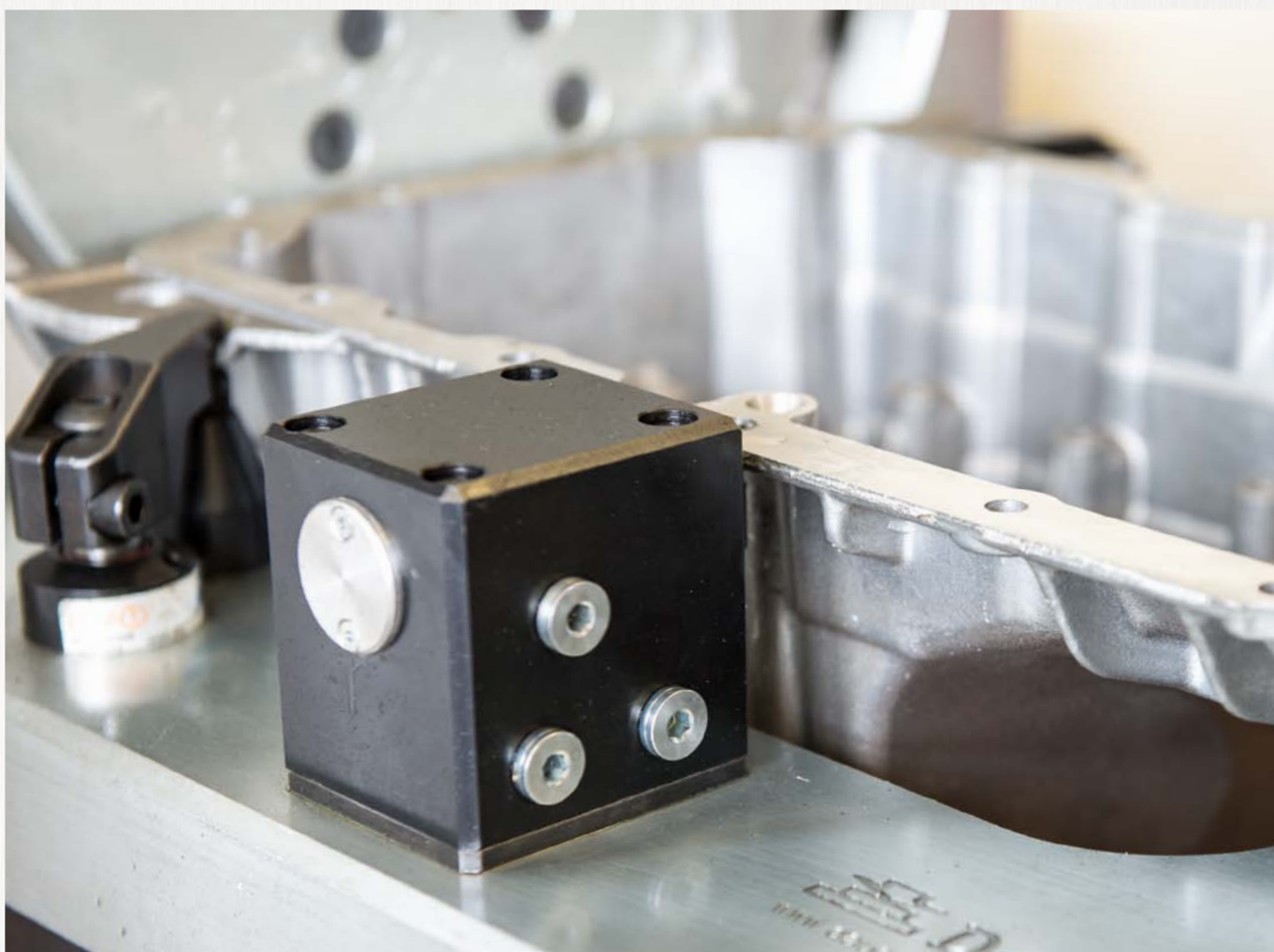


Clamping at heat fin.



Clamping to CAD-data geometry.

Subject to technical alterations.



Subject to technical alterations.



