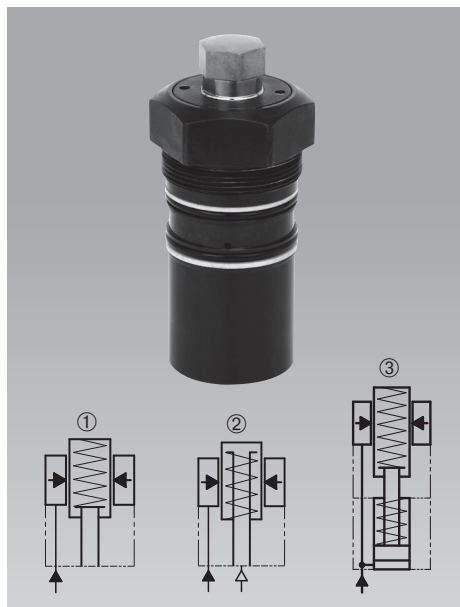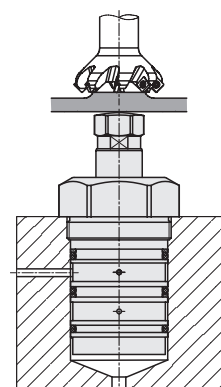# Threaded-Body Work Supports
## with metallic wiper edge, 3 sizes, 3 types of function, single acting, max. operating pressure 500 bar
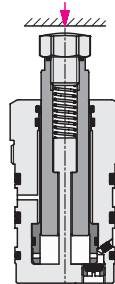
## Advantages
- Space-saving threaded-body version
- 3 sizes
- 3 types of function
- Contact force by spring or pneumatically adjustable (195X021)
- Load force up to 100 kN
- Venting for spring area universally connectable
- Metallic wiper edge and FKM wiper
- Connection of positive air pressure protection is possible
- Support plunger and interior parts protected against corrosion
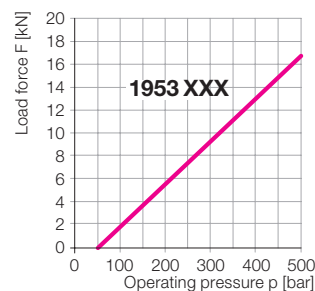- Connection of positive air pressure protection up to 4 bar is possible
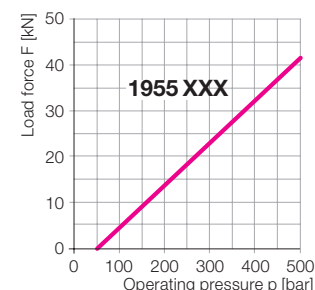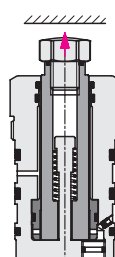
## Application
Hydraulic work supports are used to provide a self-adjusting rest for the workpiece during the machining operations. They compensate the workpiece surface irregularities, also vibration and deflection under machining loads.
The threaded-body design allows for space-saving and direct installation into the fixture body. Oil supply is made through drilled channels.

## Description
In the body of the threaded-body work support a thin-walled locking bush is integrated, which locks cylindrically around the freely-movable support plunger when pressurising the element with hydraulic oil.
The elements are protected against penetration of swarf by a metallic wiper edge and sealed against liquids. The venting port allows also the connection of positive air pressure protection.
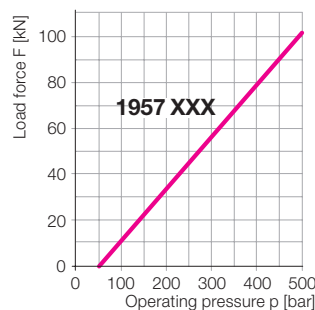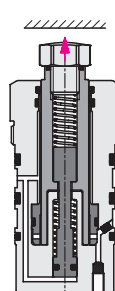
## Important notes
Work supports are not suitable to compensate side loads. The support plunger must not be stressed by tensile load. The admissible load force is valid for static or dynamic load. Machining forces can generate vibrations, whose amplitude exceeds far an average value, and this can cause yielding of the support plunger.
Operating conditions, tolerances and other data see data sheet A 0.100.

## 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.

## Types of function

### 1. Spring advanced
Page 2

### 2. Air pressure advanced
Page 3

### 3. Hydraulic pressure and spring advanced
Page 4

Connection of positive air pressure protection

## Admissible load force as a function of the operating pressure



**1953 XXX**



**1955 XXX**



**1957 XXX**
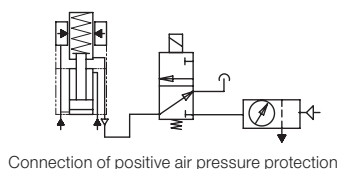
## Combination with clamping elements
Page 5
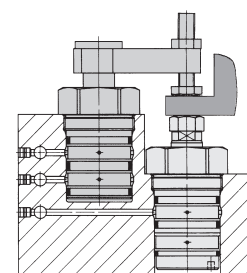
**Off-position**
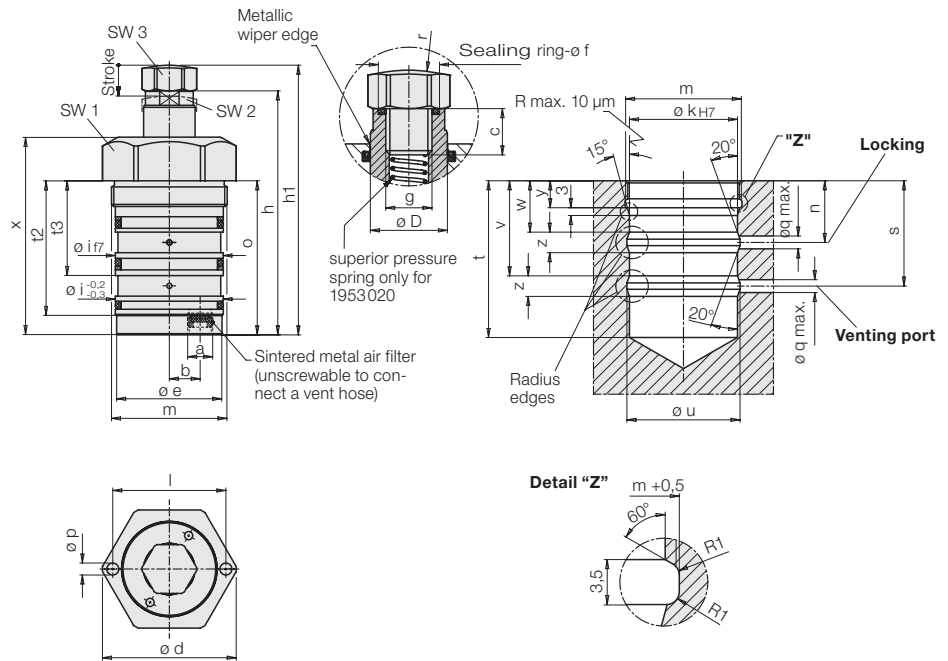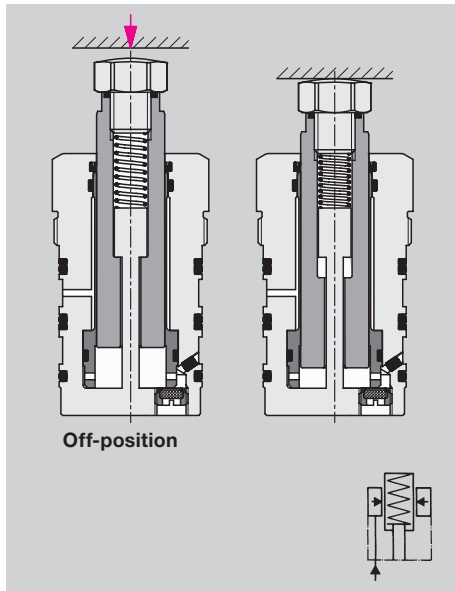


The support plunger is pushed back by the inserted workpiece, the spring force has to be overcome.

The support plunger will be locked by hydraulic pressure and can compensate forces in axis direction.

After unclamping the support plunger contacts still the workpiece with spring force, until the workpiece will be unloaded from the fixture.

### 1. Venting via pocket hole



**Hydraulic**

O-ring not required

**Venting or positive air pressure protection**

### 2. Venting via drilled channels



**Hydraulic**

**Venting or positive air pressure protection**

Remove threaded pin
Remove air filter
Screw in plug

### 3. Venting via hoses



**Hydraulic**

O-ring not required
Remove air filter
Screw in connecting nipple
Connect vent hose

**Venting or positive air pressure protection**

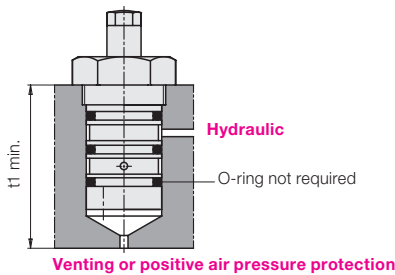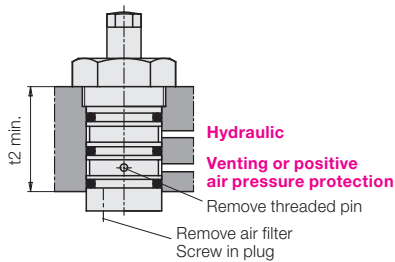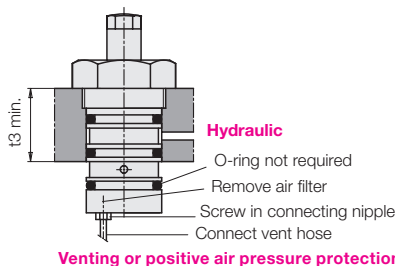| | | | | |
|---|---|---|---|---|
| Support plunger Ø D | [mm] | 20 | 32 | 50 |
| Stroke | [mm] | 12 | 16 | 20 |
| Load force at 200/500 bar | [kN] | 5.6/16.8 | 14/42 | 34/102 |
| Plunger contact force min./max. | [N] | 15/25 | 30/60 | 50/100 |
| Elastic deformation at 500 500 bar* | [mm/kN] | 0.004 | 0.003 | 0.002 |
| a | [mm] | G 1/8 | G 1/8 | G 1/4 |
| b | [mm] | 12 | 18 | 30.5 |
| c | [mm] | 12 | 12 | 20 |
| Ø d | [mm] | 52 | 64 | 100 |
| Ø e | [mm] | 41 | 53 | 83 |
| Ø f | [mm] | 15.9 | 15.9 | 19.6 |
| g | [mm] | M 12 | M 12 | M 16 |
| h | [mm] | 95 | 119 | 174 |
| h1 | [mm] | 105 | 129 | 184 |
| Ø i f7 | [mm] | 42 | 55 | 85 |
| Ø k H7 | [mm] | 42 | 55 | 85 |
| l | [mm] | – | – | 86 |
| m | [mm] | M45x1.5 | M60x1.5 | M90x2 |
| n | [mm] | 24 | 29 | 41 |
| o | [mm] | 60 | 66 | 126 |
| Ø p / deep | [mm] | – | – | 8/9 |
| Ø q max. | [mm] | 5 | 5 | 6 |
| r | [mm] | 45 | 45 | 60 |
| s | [mm] | 41 | 46.5 | 64 |
| t | [mm] | 61 | 67 | 127 |
| t1 | [mm] | 75 | 85 | 155 |
| t2 | [mm] | 52 | 58 | 80 |
| t3 | [mm] | 36 | 43 | 60 |
| Ø u | [mm] | 44 | 57 | 87 |
| v | [mm] | 37 | 41.5 | 59 |
| w | [mm] | 20 | 24 | 36 |
| x | [mm] | 77 | 99 | 146 |
| y | [mm] | 10.5 | 12.5 | 20.5 |
| z | [mm] | 8 | 10 | 10 |
| SW 1 | [mm] | 46 | 55 | 95 |
| SW 2 | [mm] | 17 | 27 | 41 |
| SW 3 | [mm] | 19 | 19 | 24 |
| **Part no.** | | **1953020** | **1955020** | **1957020** |
| **Spare seals** - Seal kit for external seals | | **0132384** | **0132385** | **0132386** |
| **Spare sealing ring** for contact bolt | | **3001731** | **3001731** | **3002018** |

**Accessory for venting**

| | | | | |
|---|---|---|---|---|
| **Type of venting 1**** | Air filter | **3302008** | **3302008** | **3302009** |
| | Threaded pin M3x4 | **3301461** | **3301461** | **3301461** |
| **Type of venting 2** | Plug | **0361986** | **0361986** | **0361987** |
| **Type of venting 3** | Connecting nipple | **3890092** | **3890092** | **3890093** |
| | Plastic hose | **3890131** | **3890131** | **3890131** |

**\*** during load          **\*\*** Included in the delivery

**Off-position**
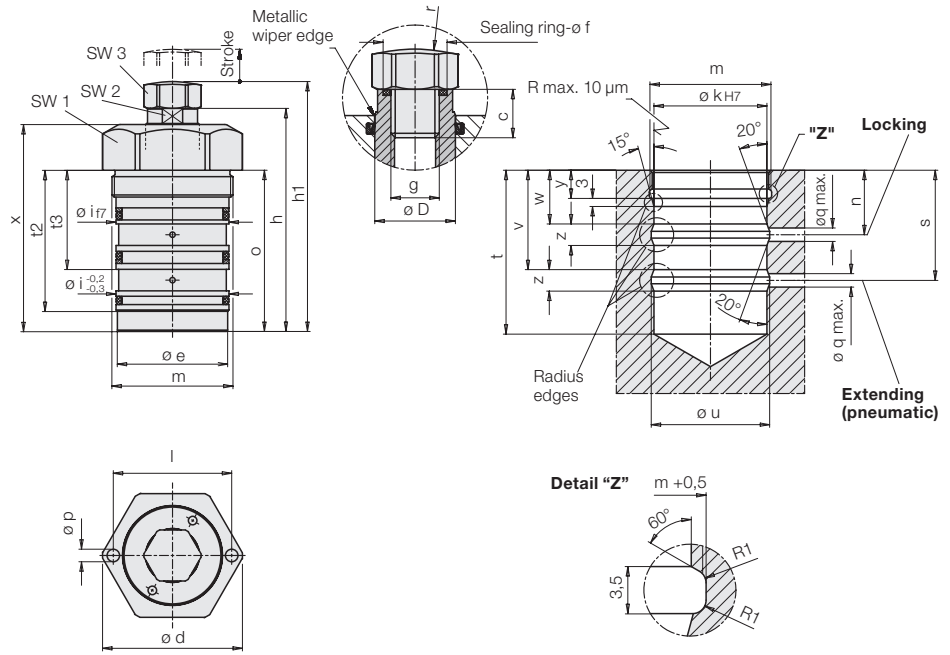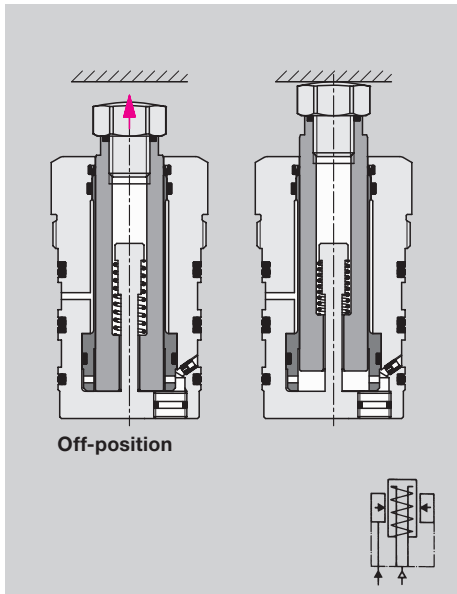


The support plunger contacts the workpiece by air pressure. The contact force is proportional to the air pressure less spring return force.

The support plunger will be locked by hydraulic pressure and can compensate forces in axis direction.

For unclamping hydraulic and air pressure will be released and the support plunger retracts by spring force to its off-position.

### 1. Pneumatic via pocket hole



Hydraulic

Remove O-ring
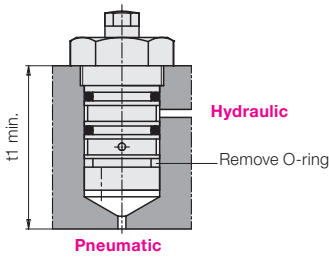
Pneumatic

### 2. Pneumatik über gebohrte Kanäle



Hydraulic

Pneumatic

### 3. Pneumatic via hoses



Hydraulic

Remove throttle screw
Screw in threaded pin M3

O-ring not required

Screw in connecting nipple with throttle bore hole

Connect pneumatic hose

Pneumatic

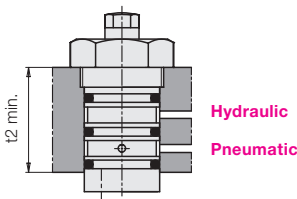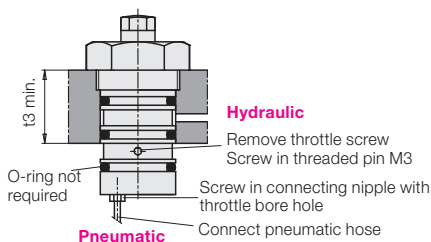| | | | | |
|---|---|---|---|---|
| Support plunger Ø D | [mm] | 20 | 32 | 50 |
| Stroke | [mm] | 12 | 16 | 20 |
| Load force at 200/500 bar | [kN] | 5,6/16,8 | 14/42 | 34/102 |
| Spring force min./max. | [N] | 15/25 | 30/60 | 50/100 |
| Plunger contact force at 1 bar air pressure (deduct spring force if necessary) | [N] | 31 | 80 | 196 |
| Elastic deformation at 500 bar* | [mm/kN] | 0,004 | 0,003 | 0,002 |
| a | [mm] | G 1/8 | G 1/8 | G 1/4 |
| b | [mm] | 12 | 18 | 30,5 |
| c | [mm] | 12 | 12 | 20 |
| Ø d | [mm] | 52 | 64 | 100 |
| Ø e | [mm] | 41 | 53 | 83 |
| Ø f | [mm] | 15,9 | 15,9 | 19,6 |
| g | [mm] | M12 | M12 | M16 |
| h | [mm] | 83 | 103 | 154 |
| h1 | [mm] | 93 | 113 | 164 |
| Ø i f7 | [mm] | 42 | 55 | 85 |
| Ø k H7 | [mm] | 42 | 55 | 85 |
| l | [mm] | – | – | 86 |
| m | [mm] | M45x1,5 | M60x1,5 | M90x2 |
| n | [mm] | 24 | 29 | 41 |
| o | [mm] | 60 | 66 | 126 |
| Ø p / deep | [mm] | – | – | 8/9 |
| Ø q max. | [mm] | 5 | 5 | 6 |
| r | [mm] | 45 | 45 | 60 |
| s | [mm] | 41 | 46,5 | 64 |
| t | [mm] | 61 | 67 | 127 |
| t1 | [mm] | 75 | 85 | 155 |
| t2 | [mm] | 52 | 58 | 80 |
| t3 | [mm] | 36 | 43 | 60 |
| Ø u | [mm] | 44 | 57 | 87 |
| v | [mm] | 37 | 41,5 | 59 |
| w | [mm] | 20 | 24 | 36 |
| x | [mm] | 77 | 99 | 146 |
| y | [mm] | 10,5 | 12,5 | 20,5 |
| z | [mm] | 8 | 10 | 10 |
| SW 1 | [mm] | 46 | 55 | 95 |
| SW 2 | [mm] | 17 | 27 | 41 |
| SW 3 | [mm] | 19 | 19 | 24 |
| **Part no.** | | **1953021** | **1955021** | **1957021** |
| **Spare seals** - Seal kit for external seals | | **0132384** | **0132385** | **0132386** |
| **Spare sealing ring** for contact bolt | | **3001731** | **3001731** | **3002018** |

### Accessory for venting

| | | | | |
|---|---|---|---|---|
| **Type of venting 1+2**** | Plug | **0361986** | **0361986** | **0361987** |
| | Throttle screw | **3610151** | **3610150** | **3610154** |
| **Type of venting 3** | Connecting nipple | **3890190** | **3890191** | **3890192** |
| | Threaded pin M3x4 | **3301461** | **3301461** | **3301461** |
| | Plastic hose | **3890131** | **3890131** | **3890131** |

**\*** during load    **\*\*** Included in the delivery

**Off-position**



superior pressure spring only for 1953022

Sintered metal air filter (for 1955 022 and 1957 022 unscrewable to connect a vent hose)

1) Only for 1953 022: Second port M5 (to connect a vent hose the threaded pin has to be removed and the sintered metal port has to be closed with that pin.)

Detail "Z"

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 the increasing hydraulic pressure and can compensate forces in axis direction.

For unclamping hydraulic pressure will be released. The small piston retracts by spring force to its off-position and also retracts the support plunger.

## 1. Venting via pocket hole



Hydraulic

O-ring not required

**Venting or positive air pressure protection**

## 2. Venting via drilled channels



Hydraulic

**Venting or positive air pressure protection**

Remove threaded pin

1953: screw in threaded pin
1955/1957: remove air filter and screw in plug

## 3. Venting via hoses



Hydraulic

1953: Screw in connecting nipple M5
1955/1957: Remove air filter, screw in connecting nipple

O-ring not required

Connect vent hose

**Venting or positive air pressure protection**

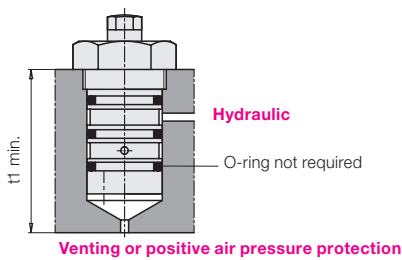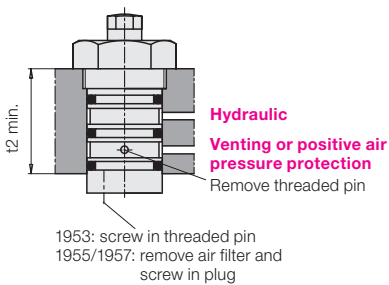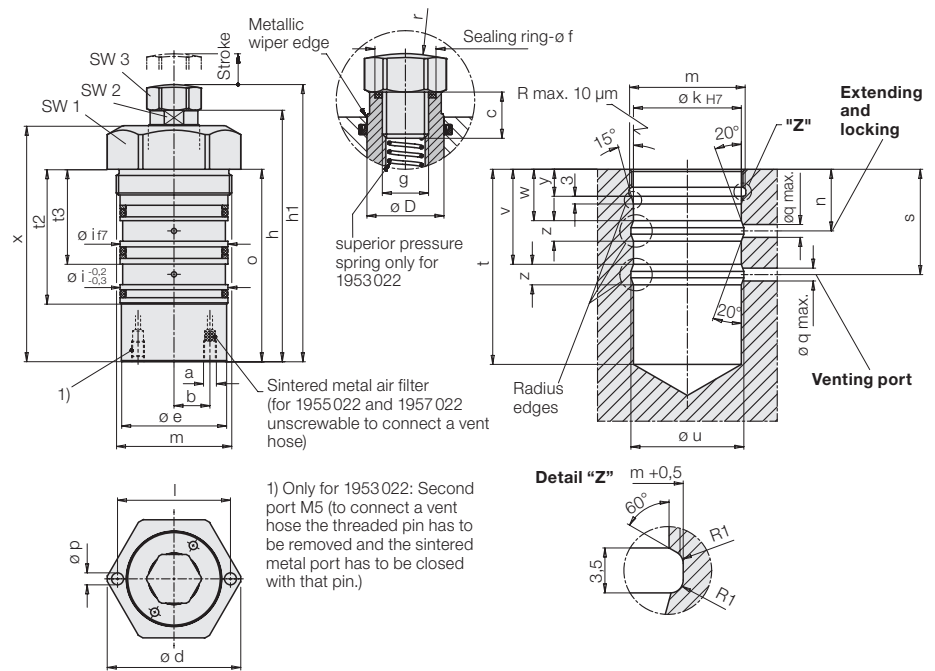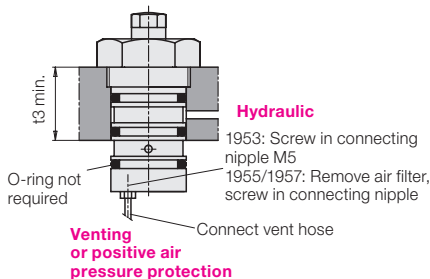| | | | | |
|---|---|---:|---:|---:|
| Support plunger Ø D | [mm] | 20 | 32 | 50 |
| Stroke | [mm] | 12 | 16 | 20 |
| Load force at 200 / 500 bar | [kN] | 5.6 / 16.8 | 14 / 42 | 34 / 102 |
| Plunger contact force min. / max. | [N] | 15 / 25 | 30 / 60 | 50 / 100 |
| Admissible oil flow rate | [cm³/sec] | 25 | 35 | 100 |
| Required oil per stroke | [cm³] | 1.0 | 3.3 | 9.8 |
| Elastic deformation at 500 bar* | [mm/kN] | 0.004 | 0.003 | 0.002 |
| a | [mm] | M5 | G 1/8 | G 1/4 |
| b | [mm] | 14 | 18 | 30.5 |
| c | [mm] | 12 | 12 | 20 |
| Ø d | [mm] | 52 | 64 | 100 |
| Ø e | [mm] | 41 | 53 | 83 |
| Ø f | [mm] | 15.9 | 15.9 | 19.6 |
| g | [mm] | M12 | M12 | M16 |
| h | [mm] | 98 | 120 | 172 |
| h1 | [mm] | 108 | 130 | 182 |
| Ø i f7 | [mm] | 42 | 55 | 85 |
| Ø k H7 | [mm] | 42 | 55 | 85 |
| l | [mm] | – | – | 86 |
| m | [mm] | M45 x 1.5 | M60 x 1.5 | M90 x 2 |
| n | [mm] | 24 | 29 | 41 |
| o | [mm] | 75 | 83 | 144 |
| Ø p / deep | [mm] | – | – | 8/9 |
| Ø q max. | [mm] | 5 | 5 | 6 |
| r | [mm] | 45 | 45 | 60 |
| s | [mm] | 41 | 46.5 | 64 |
| t | [mm] | 76 | 84 | 145 |
| t1 | [mm] | 90 | 102 | 172 |
| t2 | [mm] | 52 | 58 | 80 |
| t3 | [mm] | 36 | 43 | 60 |
| Ø u | [mm] | 44 | 57 | 87 |
| v | [mm] | 37 | 41.5 | 59 |
| w | [mm] | 20 | 24 | 36 |
| x | [mm] | 92 | 116 | 164 |
| y | [mm] | 10.5 | 12.5 | 20.5 |
| z | [mm] | 8 | 10 | 10 |
| SW 1 | [mm] | 46 | 55 | 95 |
| SW 2 | [mm] | 17 | 27 | 41 |
| SW 3 | [mm] | 19 | 19 | 24 |
| **Part no.** | | **1953 022** | **1955 022** | **1957 022** |
| **Spare seals** – Seal kit for external seals | | **0132 384** | **0132 385** | **0132 386** |
| **Spare sealing ring** for contact bolt | | **3001 731** | **3001 731** | **3002 018** |

### Accessory for venting

| | | | | |
|---|---|---:|---:|---:|
| **Type of venting 1**** | Air filter | 3302 008 | 3302 008 | 3302 009 |
| | Threaded pin M3 x 4 | 3301 461 | 3301 461 | 3301 461 |
| **Type of venting 2** | Threaded pin M5 x 6 | 3301 300 | – | – |
| | Plug | – | 0361 986 | 0361 987 |
| **Type of venting 3** | Connecting nipple | 3890 091 | 3890 092 | 3890 093 |
| | Plastic hose | 3890 131 | 3890 131 | 3890 131 |

\* during load   \*\* Included in the delivery

Subject to modifications

## Dimensioning of the load force of work supports

The admissible load force of work supports has always to be dimensioned so that the clamping force of the used clamping elements and the static and dynamic machining forces can be safely compensated.

|   | Admissible load force |
|---|---|
| – | Clamping force |
| – | Safety (reserve) |
| = | Possible machining force |

If the total of all occuring forces exceeds the admissible load force, the support plunger of the work support will be pushed back and the work support will be damaged.
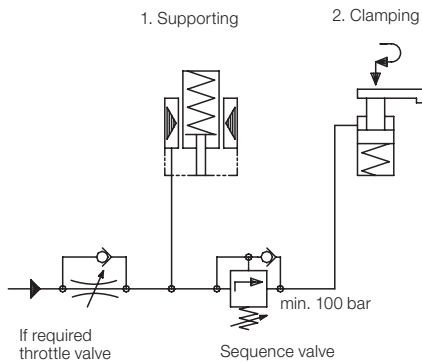
## Ratio of load force to clamping force

On principle the load force of the work supports should be at least twice the clamping force of the clamping elements.

**Load force ≥ 2 x clamping force**

## Clamping onto the work support
## Control of clamping sequence

The sequence – supporting and clamping – has to be controlled as a function of the pressure, e.g. by a sequence valve.



The sequence valve has to be adjusted to an opening pressure above the intersection of the two straight lines in the diagram.
If due to a too high flow rate a throttle valve is required, installation should be made as shown in the hydraulic circuit diagram.
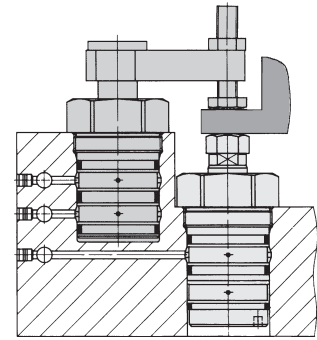
## Combinations work supports with swing clamps of the same size

To get a load force twice the clamping force, for all 3 sizes of work supports an operating pressure of at least 200 bar is required.
The vertical distance of the two straight lines in the area of the colorised surface indicates the resulting maximally possible machining force including reserve.

**Size 1953**
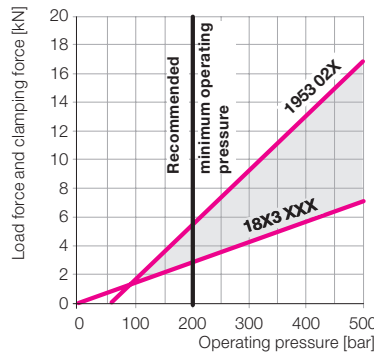


**Size 1955**
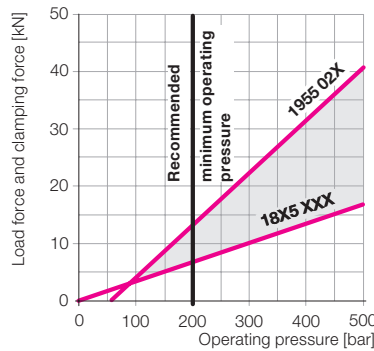


**Size 1957**
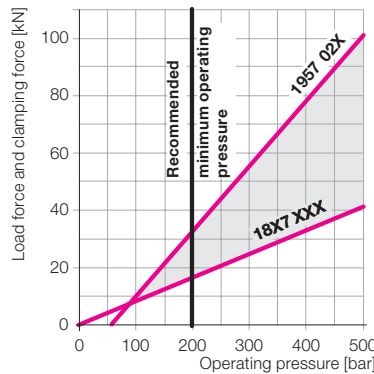


## Important note

The admissible load forces as per the diagram are static. The machining forces can also generate vibrations which exceed by far the mean value. For this reason a corresponding safety factor has to be taken into account.

## Example

The threaded-body swing clamp 1895 101 (data sheet B 1.892) clamps a workpiece onto the work support 1955 022.



For size 1955 the following can be taken from the diagram:

| | |
|---|---|
| Minimum operating pressure: | 200 bar |
| Load force at 200 bar: | 14 kN |
| Clamping force at 200 bar: | 7 kN |

Possible machining force at 200 bar:

|   | | |
|---|---|---|
|   | Admissible load force: | 14 kN |
| – | Clamping force: | 7 kN |
| = | Possible machining force: (including reserve) | 7 kN |