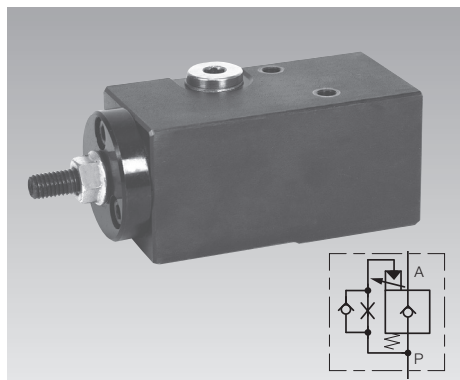


Sequence Valve ND 5
with adjustable switching time
max. operating pressure 250 bar



Advantages

- Realisation of switching sequences not dependent on pressure
- Parallel and series connection possible for delaying several components
- Large adjustment range
- No additional control valves required on the power unit
- Mounting directly on the fixture without additional lines
- Oil supply through drilled channels
- Pressure filter in both ports
- Similar connecting scheme as sequence valves as per data sheet C 2.954
- Subplate for pipe thread available

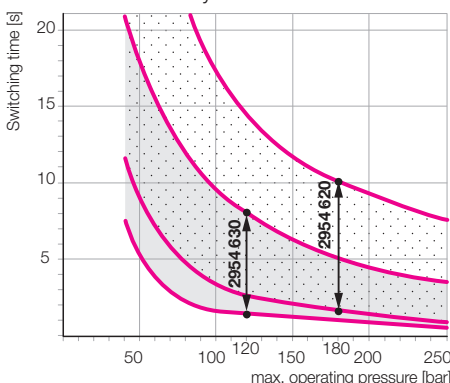
Function

A poppet valve is built into the housing, which can be opened by the hydraulically-operated control piston.

When pressure is applied to port P, hydraulic oil flows through an orifice check valve to the control piston. Since the piston stroke is relatively long, it takes a few seconds for the control piston to open the poppet valve. The delay time depends on the piston stroke, which is limited by the adjusting screw.

Adjustment range depending on the operating pressure

Measurement with hydraulic oil HLP32 at 25 °C



Examples

- Sequence valve **2954 620** at 180 bar
→ Adjustment range approx. 1.6...10 sec.
- Sequence valve **2954 630** at 120 bar
→ Adjustment range approx. 1.4...8 sec.

Application

This sequence valve is used in hydraulic fixtures to operate individual clamping cylinders or entire subassemblies with an adjustable time delay.

Description

Normal sequence valves open without delay, if the adjusted switching pressure is exceeded. Sometimes it is necessary to slow down the switching sequence for functional reasons. For this reason, this sequence valve does not open pressure-dependently, but by the adjustable stroke of a control piston.

Important notes

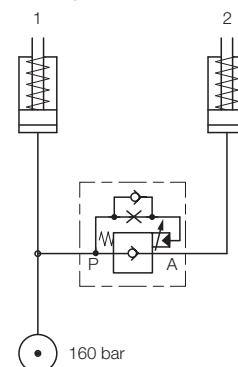
The constancy of the adjusted time delay depends on constant hydraulic conditions, i.e.

- operating pressure as constant as possible at the time of sequence control;
- oil temperature as constant as possible.

The valve should therefore always be adjusted at operating temperature!

The control piston requires a few seconds to return to the off-position. Therefore, the interval between "Unclamping" and "Clamping" should be at least 10 seconds.

Application example



Clamping cycle

1. Cylinder 1 moves without pressure against the stop.
2. Oil pressure increases up to 160 bar.
3. After the adjusted switching time the sequence valve opens and cylinder 2 moves almost without pressure against the stop.
4. The oil pressure at both cylinders increases up to 160 bar.

In the process cylinder 1 becomes again nearly pressureless. (Remedy see page 2)

Special features

When using this sequence valve, some special features must be taken into account which do not occur with pressure-dependent sequence valves:

5. **Reduction of switching time**
When cylinder 1 extends under load, i.e. not nearly pressureless, the pressure at port P increases. Thus, the switching time already starts to run before the cylinder 1 has driven against the stop. The longer this time lasts, the shorter is the remaining delay time.
6. **Pressure increase in the delay phase**
Unlike pressure-dependent sequence valves, the pressure at port P can rise to the maximum operating pressure of the power unit during the delay time. This could trigger the signal "clamped" on pressure switches, even though the clamping process has not yet been completed.
7. **Pressure drop in front of the sequence valve**
Unlike pressure-dependent sequence valves, the pressure at port P drops completely after the delay time has elapsed when the components connected to port A extend almost without pressure. Possible remedies include three "Examples of how to avoid a pressure drop" on page 2.
8. **Influences on the switching time**
Operating pressure ↓
Oil temperature ↓ = longer switching time ↑
Oil viscosity ↑

Operating pressure ↑
Oil temperature ↑ = shorter switching time ↓
Oil viscosity ↓

Technical data

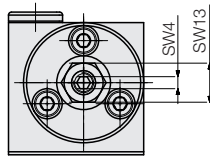
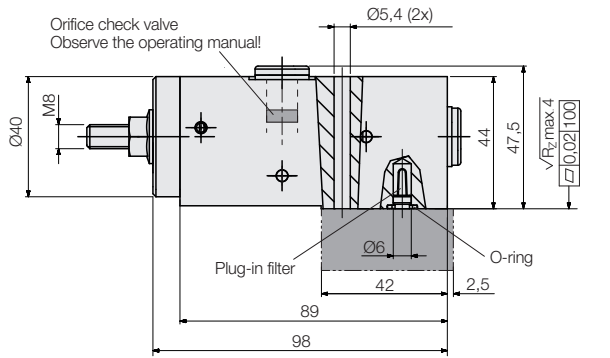
Min./max. operating pressure	[bar]	40/250	
Max. flow rate	[l/min]	8	
Weight, approx.	[kg]	1.3	
Possible switching times* at operating pressure	[bar]	Adjustment ranges*	ca. [s]
	50	9..... 45	5..... 18
	70	6..... 25	3... 13.5
	100	3.3..... 17	1.5.... 9.5
	150	2... 11.5	1.2..... 6
	200	1.3..... 9	0.9.... 4.5
	250	0.9.... 7.5	0.5.... 3.5

Part no.	2954 620	2954 630
Spare parts:		
Orifice check valve**	3815 065	3815 059
Plug-in filter	3887 143	3887 143
O-ring 7x1.5 NBR70	3000 342	3000 342

* Measurement with hydraulic oil HLP32 at 25 °C
** Can be converted to the other adjustment range on site.
Observe the operating manual!

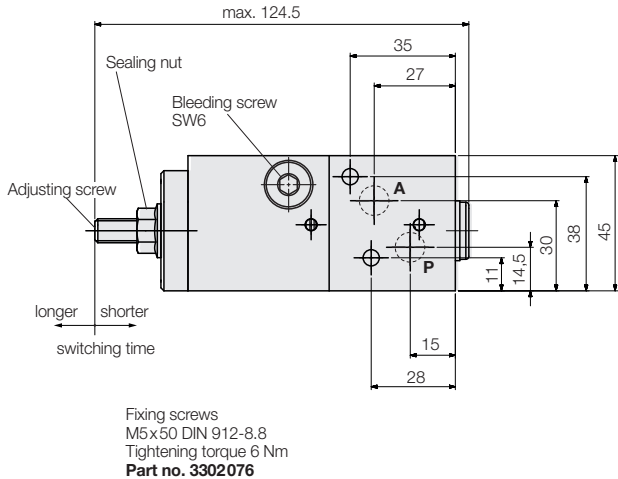
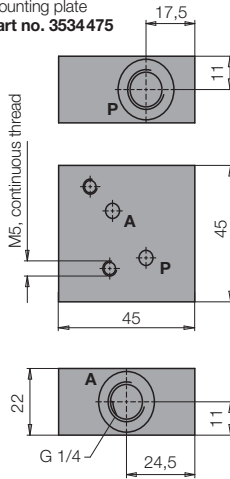
Dimensions

Adjusting instructions • Circuit examples



Included in our delivery:
2 plug-in filters **3887 143**
2 O-rings **3000342** (7x1.5 NBR70)

Accessory
Mounting plate
Part no. **3534475**



Fixing screws
M5x50 DIN 912-8.8
Tightening torque 6 Nm
Part no. **3302076**

Notes on adjusting the switching time

During start up, the hydraulic system must be well bled to ensure a constant switching time. Carefully open the bleeding screw on the sequence valve at low pressure until bubble-free oil escapes. Repeat this procedure after a few operations.

To adjust the switching time, it is necessary that the intended operating pressure is adjusted;

- that the hydraulics are at operating temperature.

The adjusting screw is screwed in ex works up to the stop, i.e. to free flow and zero switching time.

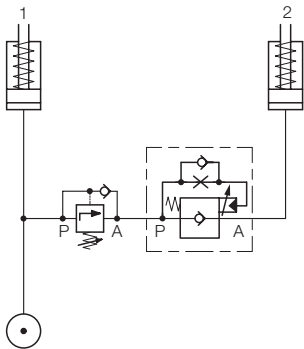
The lock nut of the adjusting screw is designed as a sealing nut. The adjusting screw may therefore only be adjusted in the depressurised mode.

Adjust the desired switching time:

1. Measure existing switching time.
 2. Loosen the sealing nut in depressurised mode. Make sure that the adjusting screw does not move.
 3. Extend switching time → Screw out adjusting screw.
Shorten switching time → Screw in adjusting screw.
 4. Tighten sealing nut.
Make sure that the adjusting screw does not move.
 5. Measure existing switching time.
If not ok, repeat the adjustment from point 2.
- Drive a few switching cycles after each adjusting procedure and only then measure!

Examples for avoiding a pressure drop after the switching time has elapsed

1. Series connection with a pressure-dependent sequence valve as per data sheet C 2.954



Adjustment

Since this sequence valve works pressure-dependent, it has to be adjusted to an opening pressure which should not be fallen below at cylinder 1 during the nearly pressureless extension of cylinder 2.

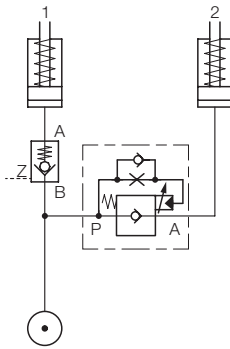
Advantage

Combination of pressure-dependent sequence switching with adjustable time delay.

Disadvantage

Additional expense

2. Pilot-operated check valve as per data sheet C 2.9511 or C 2.9512



Adjustment

Not required.
The pressure obtained at cylinder 1 remains constant.

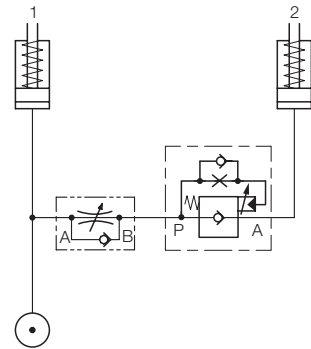
Advantage

Maximum safety against pressure drop.

Disadvantage

The hydraulic control must have a double-acting function to open the check valve (port Z).

3. Series connection with flow control valve as per data sheet C 2.940



Adjustment

The flow control valve has to be shut off at system operational temperature so that during extension of cylinder 2 the pump pressure (pressure gauge) does not drop below the desired value.

Advantage

Minimum additional expense

Disadvantages

Adjustment depends on viscosity.
No safety for minimum pressure level at cylinder 1.
Cylinder 2 extends throttled.