

Safety relief valves

33501/33502/33503/33521/33601/33602/33603/33621

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1 General

1.1 Manufacturer

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1.2 Proper Application

- Safety relief valves protect a pressurized system (tanks, containers, pipelines) against impermissible pressure exceedance.
- Safety relief valves may be used for the intended purpose only. In this case, special attention must be paid to the permissible pressure and temperature ranges, the type of fluids to be discharged and the installation situation.
- Applicable and generally recognised safety rules as well as the operating manual instructions must be followed during assembly and disassembly, in operation and during maintenance.

1.3 Improper Application

The operator must specifically ensure that

- no fluids other than those specified in the operating manual are discharged.
- there are no prevailing operating conditions other than those specified in the operating manual.
- there are no shut-off devices which can override the safety relief valves installed upstream of the safety valves.
- safety relief valves are only used in a functional state.

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1.4 Duties of operator

The operator has to make sure that:

- The valve/component is operated properly and only in functional condition.
- The legal requirements are kept during operation and maintenance.
- Only sufficiently qualified and authorized staff maintain the valve/component.
- The staff responsible for operation and maintenance know and obey the operating instructions and in particular the safety advice.
- The safety and warning signs remain on the valve/component and are always legible.

1.5 Symbols



DANGER

Danger - endangerment caused by product-specific and process-specific conditions!

This symbol identifies an extremely dangerous situation that may result in severe bodily injury or even death if the relevant safety instructions are disregarded.



WARNING

Warning – general dangers!

This symbol identifies dangerous situations that may result in light to severe bodily injury if the relevant safety instructions are disregarded.



CAUTION

Caution – damage to components!

This symbol points out that special care must be taken during installation, operation or maintenance.

NOTICE



Note

This symbol refers to issues requiring special attention.

NOTICE



Note

This symbol identifies an environmentally friendly procedure or disposal method.

Safety relief valves

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2 Safety Information

2.1 Hazards and Safety Instructions

Endangerment to service personnel	
Explanations	Measures
<p>Squeezing danger for fingers, hands and feet Unintentional opening and closing of the safety relief valve must be prevented during maintenance work.</p>	<ul style="list-style-type: none"> • Disconnect the pneumatic connection with the safety valve. • Do not reach into the seat area of the valve disk with your hands.
<p>The safety relief valve can weigh several kilograms.</p>	<ul style="list-style-type: none"> • Secure the valve against slipping and falling during assembly, disassembly and in maintenance work.
<p>Shock and impact danger Before taking out the upper valve part and loosening the screws, the safety valve must be lifted manually or pneumatically.</p>	<ul style="list-style-type: none"> • Turn the counter nut on the valve rod by 2-3 rotations against the valve housing or apply compressed air to the valve actuator.
<p>Danger of thermal burns, chemical burns and scalding If the safety relief valve in a system is operated with hot media, the surface temperature of the safety valve can also reach this value.</p>	<ul style="list-style-type: none"> • Make sure that the piping system has cooled to a value below 50°C. • Attach warning signs (W026) for hot surfaces. • The piping area in question must be sealed off from the rest of the piping system.
<p>When discharging fluid from the safety relief valve, there is a risk of burns, scalding or chemical burns for the operating and service personnel.</p>	<ul style="list-style-type: none"> • Make sure that the fluids are discharged properly and safely (exhaust line). • Make sure that the valve is not opened in an uncontrolled manner during maintenance work.
<p>Chemical burns If the safety valve in a system is operated with acidic or alkaline media, your hands and fingers may suffer chemical burns when disassembling the valve.</p>	<ul style="list-style-type: none"> • Before removing the safety relief valve, check which fluid the piping was conducting. If necessary, rinse the piping again beforehand with water. • Check the system pressure before removing the safety relief valve.

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Malfunction due to incorrect handling	
Explanations	Measures
The valve must be switched off in the case of noticeable malfunctions.	<ul style="list-style-type: none"> Faults must be eliminated immediately.
The switching process of the valve is faulty or takes place jerkily.	<ul style="list-style-type: none"> Remove residues or loose small parts from the valve seat area. Ventilate the valve periodically to prevent jamming of the seat sealing (clean seat).
If the valve is not checked or maintained at regular intervals, this can lead to malfunction or major functional disruption.	<ul style="list-style-type: none"> Check the valve during operational maintenance cycles. Inspection and maintenance work should only be carried out by qualified staff.
Malfunction through improper use	
The range of application of the valve is intended for specific operating states (pressure, temperature, media).	<ul style="list-style-type: none"> Ensure proper use.



DANGER

Danger – endangerment caused by product-specific and process-specific conditions!

While the compressed air supply is connected, hands may be crushed as a result of reaching into the interior of the valve housing.

- Make sure that the compressed air supply has been disconnected.
- Therefore, never place your hand inside the valve housing.



WARNING



Warning – general dangers!

If the pressure system is subjected to increased media temperatures, the surface temperature of the armature can also reach this value.

- Attach warning signs (W026) for hot surfaces.



CAUTION

Caution – damage to components!

Installation of faulty or non-specified parts or using the same as replacement parts may disable or disrupt functionality considerably.

- Only use parts approved by the manufacturer.

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3 Delivery, Completeness, Storage

3.1 Transport

The goods should remain in the delivered packaging systems until assembly. It is vital to read the assembly manual after unpacking the goods and before assembly.



DANGER

Danger – endangerment caused by product-specific and process-specific conditions!

Any film packaging used is airtight.

Therefore never pull packaging material over your head.

Danger of suffocation!



DANGER

Danger - risk of injuries to persons!

The high weight constitutes an accident hazard during transportation.

- Secure the safety valve against slipping and falling.
- Always wear safety shoes and protective gloves.

3.2 Instructions for Delivery and Performance

- Check the delivery note data for factual correctness.
- Check the delivery for completeness. Later complaints will not be accepted.
- Perform visual inspection of the packaging system for external transport damage. These must be reported to the forwarder immediately. Claims due to transport damage not visible right away must be made within a week.

3.3 Storage Instructions

The goods must be stored in dry, closed rooms in the original packaging if possible. Exposure to UV radiation and direct sunlight must be avoided. The maximum moisture must not exceed 60 %; the maximum storage temperature must not exceed 40°C.

3.4 Disposal of Packaging

NOTICE



Note

Dispose of packaging in an environmentally sound way. The packaging can consist of the following materials:

Wood / polyethylene film (PE film) / paper or cardboard / plastic / strip iron.

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4 Technical Description

4.1 Technical Data

Valve data

Type	Normal safety relief valve
Type of functioning	Opens with pressure/closes with spring force
Order code	335xx/336xx

Product range

Materials	Stainless steel 1.4404
Seals	EPDM, optionally FKM/FPM (all FDA proof)
Surface	≤ 0.8 µm

Other parts

Materials	Stainless steel 1.4301, 1.4307
Seals	EPDM
Surface	Precision-turned, matte

Production / CIP

Applications	Free outflow
Fluids (nontoxic)	Fluids/gases/vapours (Group II, PED 2014/68/EU) Readily commercially-available CIP cleaning media with 2-4 % lye/acid
Performance data	Performance data within 10 % pressure increase
Operating pressure	PS min/max 0/10 bar-g
Temperature	TS min/max -20/160 °C
Control air pressure	5 – 7 bar, compressed air connection Ø 6/4 mm

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4.2 Valve types

Type	Lifting		Fluids	Nominal size per type [DN]	Set pressure [bar-g]	Counterforce	Installation position	Weight [kg]
	man	pneu						
33501, 33521	X		F/D/G	15 - 80	0.5 - 10.0	Pressure spring	standing or horizontal	2.5 - 28.0
33601, 33621		x	F/D/G	15 - 80	0.5 - 10.0			2.5 - 28.0
33502	X		F/D/G	50	0.5 - 10.0	Pressure spring	standing or horizontal	13.0 - 21.0
33602		X		---	---			
33503	X		F/D/G	40 - 80	0.5 - 10.0	Pressure spring	standing or horizontal	9.0 - 28.0
33603		X	F/D/G	40 - 80	0.5 - 10.0			9.0 - 28.0

Notes

- Fluids (F), air/gases (G), steam (D)
- Lifting: Manual (man) or pneumatic (pneu)
- Type: 33502/33602 with proportional opening characteristic
- Type: 33503/33603 with hygienic connecting flange integrated in housing
- Type: 33521/33621 with adjustable pressure range and scaling
- Sealing material: EPDM / optionally FKM (FPM)

Optional equipment

- Scaling and restraint
- Heating cartridges, plugging, proximity switch

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5 Performance Data

Fluid: Air						
33501/33521/33601/33621			33501/33503/33521/33601/33603/33621			
Pressure [bar-g]	Throughput [Nm ³ /h]					
	DN 15	DN 25	DN 40	DN 50	DN 65	DN 80
1	137	369	736	1.067	1.911	3.035
2	208	560	1.119	1.622	2.906	4.615
3	279	752	1.502	2.178	3.900	6.195
4	210	944	1.885	2.733	4.895	7.775
5	253	1.136	2.268	3.288	5.890	9.355
6	295	1.328	2.651	3.844	4.094	10.935
7	338	1.520	3.034	4.399	4.685	7.196
8	380	1.711	3.417	4.954	5.276	8.105
9	423	1.903	3.800	5.510	5.868	9.013
10	466	2.095	4.183	6.065	6.459	9.922

Fluid: Water						
33501/33521/33601/33621			33501/33503/33521/33601/33603/33621			
Pressure [bar-g]	Throughput [kg/h]					
	DN 15	DN 25	DN 40	DN 50	DN 65	DN 80
1	3.970	10.760	26.460	42.930	65.670	107.240
2	5.610	15.210	37.420	60.720	92.910	151.670
3	6.870	18.630	45.830	74.360	113.790	167.180
4	7.940	21.520	52.920	85.870	131.400	193.040
5	8.870	24.060	59.170	96.000	146.900	215.830
6	9.720	26.350	64.800	105.170	160.930	236.430
7	10.500	28.460	70.000	113.590	173.820	255.370
8	11.220	30.430	74.840	121.440	185.820	273.000
9	11.900	32.270	79.380	128.800	197.100	289.570
10	12.540	34.020	83.670	135.770	207.760	305.230

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Fluid: Steam						
33501/33521/33601/33621			33501/33503/33521/33601/33603/33621			
Pressure [bar-g]	Throughput [kg/h]					
	DN 15	DN 25	DN 40	DN 50	DN 65	DN 80
1	56	248	496	719	1.287	2.045
2	85	377	753	1.093	1.958	3.109
3	114	507	1.012	1.467	2.627	4.173
4	141	636	1.270	1.841	3.298	5.237

Fluid: Water		Fluid: Air		Fluid: Steam	
33502/33602					
Pressure [bar-g]	Throughput [kg/h]	Pressure [bar-g]	Throughput [Nm ³ /h]	Pressure [bar-g]	Throughput [kg/h]
	DN 50		DN 50		DN 50
1	18.628	1	527	1	401
2	26.344	2	802	2	603
3	32.265	3	1.076	3	801
4	37.257	4	1.351	4	1.000
5	41.654	5	1.625	---	---
6	45.630	6	1.900	---	---
7	49.286	7	2.174	---	---
8	52.689	8	2.449	---	---
9	55.885	9	2.723	---	---
10	58.908	10	2.998	---	---


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5.1 Component Identification

All the safety relief valves are marked with a component ID and the CE mark.

The component ID is structured as follows:

AH - SV - xxxxx - xxx. D/Gx,xx //Fx,xx . xx,x . xx/xxxxx PS0/10 TS-20/160  0062

AH	Manufacturer
SV	Safety relief valve
xxxxx	Valve type
xxx	Smallest flow diameter do (mm)
D/Gx.xx	Vapours/gases, discharge coefficient α_w
Fx.xx	Fluids, discharge coefficient α_w
xx.x	Set pressure p (bar-g)
xx/xxxx	Year of manufacturer/ID valve no.
PS/TS	Operating pressure min/max (bar-g)/operating temperature min/max (°C)

6 Operation

6.1 General

- Safety relief valves are intended for application in the beverage and food processing as well as in the chemical-pharmaceutical industries.
- Safety relief valves are subject to the Pressure Equipment Directive 2014/68/EC.
- Safety relief valves comply with the requirements of AD2000/A2 and DIN EN ISO 4126-1.

6.2 Valve actuator

- Safety relief valves protect a pressurised system against impermissible pressure exceedance.
- Fluids (F), gases (G) and vapours (D) can be discharged via the safety relief valves.
- During normal operation the safety relief valve should not be activated / opened. (Always ensure sufficient allowance between the operating pressure and the set pressure).
- Safety relief valves open within an opening pressure difference of 10% of the response pressure. At a response pressure of < 1 bar, the opening pressure difference can be up to 0.1 bar.
The specified exhaust performance is achieved here.
- The lifting itself can be performed according to the process requirements. The duration of lifting should be about 5-20 seconds and can take place during different cleaning steps. To prevent too strong splashing, the opening gap on the valve can be adjusted via the stroke on the pneumatic cylinder or lifting takes place during the startup phase of the pump with reduced power.

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6.3 Operating Characteristics

- All the safety relief valves are checked ex works and set to the required pressure. The setting or the set value is documented in a setting test log.
- The pressure setting occurs at ambient pressure. If external backpressure is applied to the exhaust side, the response may be delayed (max. external backpressure $\leq 10\%$ of the set pressure).
- A change of the set pressure is prevented through positive locking inside the upper valve part. An optional lead sealing provides an additional safety measure on the outside.
- Safety relief valves with variable pressure setting (setting scaling) can be set from the max. tested set pressure to a lower value within a certain pressure range (adjusting sleeve is rotated anticlockwise out of the upper part).



CAUTION

Caution – functional impairment or material damage!

Mechanical manipulations may cause malfunctions.

- Mechanical modifications to the safety relief valves that influence the set pressure or functionality are impermissible.
- Required modifications should only be carried out by the manufacturer.

Operating pressure:	Working pressure under normal operating conditions (lower than set pressure).
Set pressure:	Excess pressure at which the safety relief valve starts opening.
Response pressure:	Excess pressure at the safety relief valve starts opening during operation (abnormal operating condition).
Closing pressure:	Pressure at which the safety relief valve is closed again.

6.4 Valve cleaning / CIP

Safety relief valves should be cleaned within a defined time period.

- Manual safety relief valves must be disassembled. The seat area and the seal are cleaned manually.
- Safety relief valves with pneumatic actuator are lifted via compressed air. The seat area and the seal are cleaned within an automated CIP process. The safety relief valve should be alternately opened and closed.



CAUTION

Caution – functional impairment or material damage!

Jamming hazard for valve seat/valve disk!

- If the safety relief valve opens upon tank overfilling, especially with viscous, sugary media, the valve seat must always be cleaned.

Safety relief valves

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7 Disassembly and Assembly

NOTICE



Note

Before starting installation and commissioning:

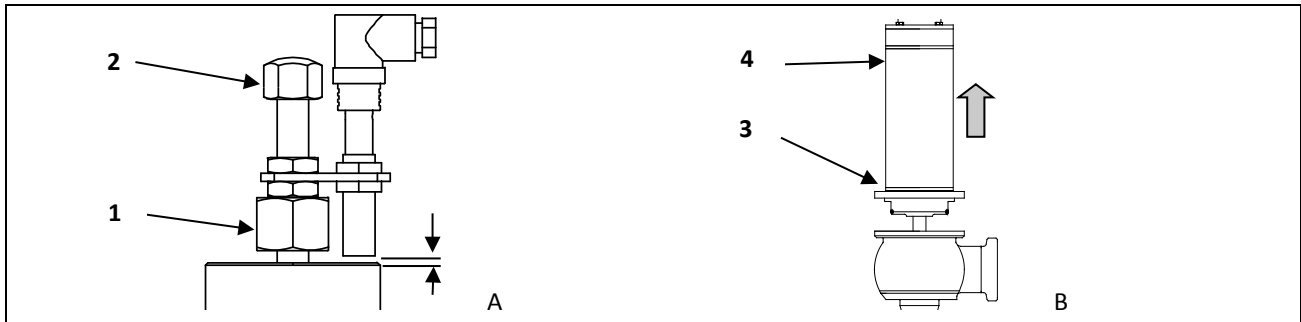
- Check the current system status (pressure, temperature, medium).
- Check the valve for visible external and internal damage.
- Check the valve function through manual lifting.
- Check the valve housing inside for residues.

- Safety relief valves are installed in a vertical or horizontal position. For pressures of < 1 bar, the factory pressure setting also occurs in this installation position.
- Safety relief valves with a detachable connection are installed in the piping system free of tension.
- Safety relief valves for welding in must be disassembled first. For this purpose, the upper part of the valve is removed from the housing. The housing is then welded into the piping system free of tension.
- The welding work (TIG, forming gas) should only be carried out by qualified welders (EN 287-1).
- There must be sufficient free space around the installed valve for assembly and maintenance tasks later on.
- Shut-off devices that impair the function must not be installed on the upstream and downstream sides of the safety relief valve.
- The pipe cross-section of the supply and outflow pipes must at least correspond to that of the valve inlet and outlet.
- When the safety relief valves are installed horizontally, the exhaust manifold must face downward (draining).
- Exhausting must be performed without pressure. An exhaust line should empty into corresponding draining or collecting facilities without constituting a hazard.
- Exhaust lines for fluids must be routed downward and must empty into a receptacle without constituting a hazard (provide for complete draining).
- Exhaust lines for vapours and gases must be routed upward and must empty into a receptacle without constituting a hazard (provide for a condensate separator).
- If an extended supply line to the safety relief valve is used, the supply line must be self-draining.
- Pay attention to the direction of flow (marking arrow).

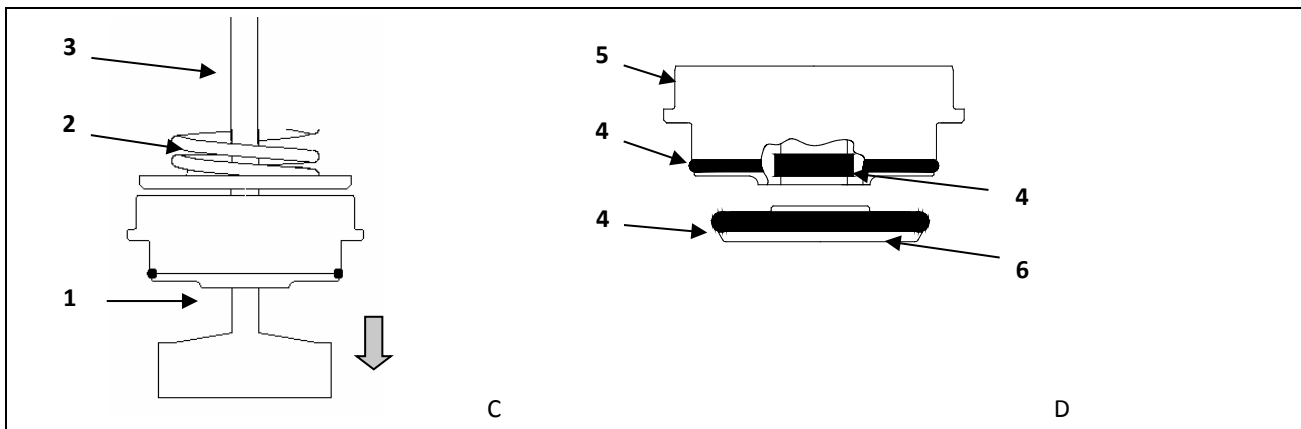
Safety relief valves

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7.1 Disassembling manual safety relief valves - Types 33501, 33502, 33503, 33521



- A) Remove the cap nut (2), turn lifting nut (1) against the actuator, add two further turns.
 B) Remove the screws (3), remove the lifting nut, extract the upper part of the valve (4).

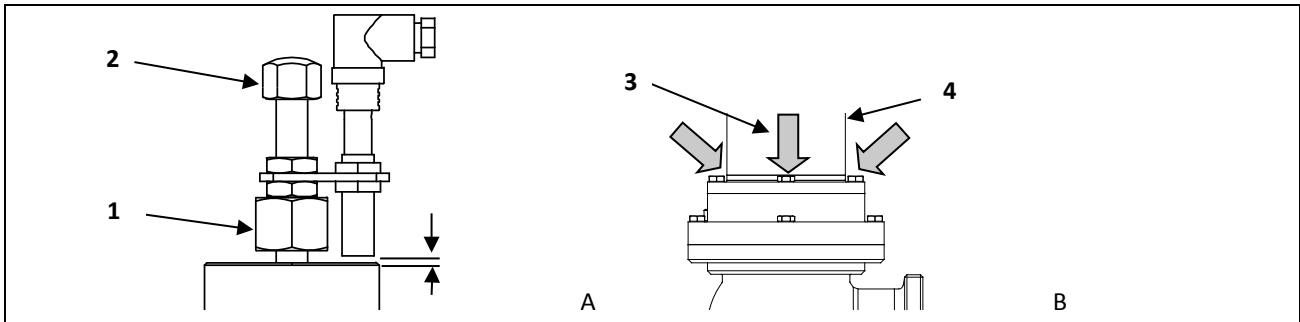


- C) Remove the pressure spring and securing ring (1), remove spring pressure disc (2).
 D) Replace the seals (4) of the housing inset (5) and the valve disk (6).

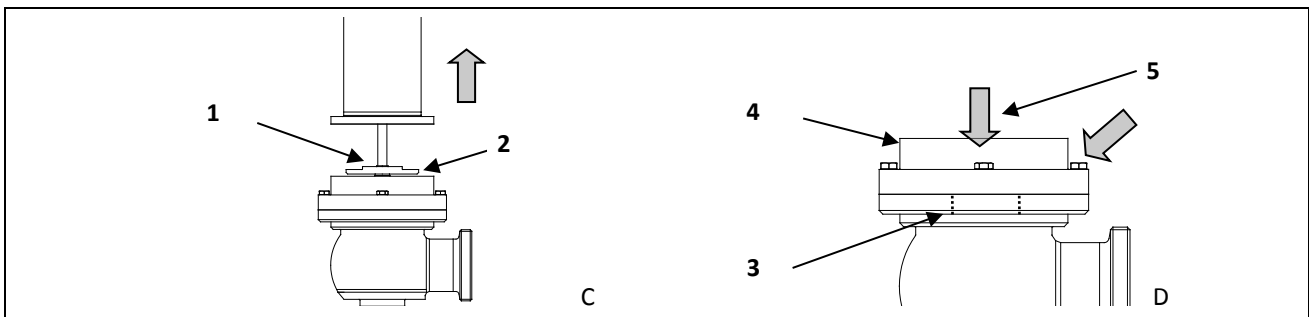
Safety relief valves

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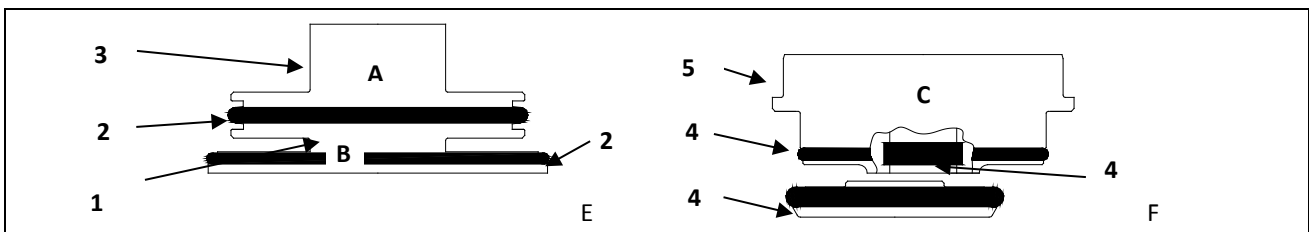
7.2 Disassembling pneumatic safety relief valves - Types 33601, 33602, 33603, 33621



- A) Remove the cap nut (2), turn lifting nut (1) against the actuator, add two further turns.
 B) Remove the screws (3), remove the lifting nut, extract the upper part of the valve (4).



- C) Remove the pressure spring and securing ring (1), remove spring pressure disc (2).
 D) Remove screws (5), remove pneumatic drive (4), loosen inside screws (3) and remove flange (only with large nominal sizes DN 50, 65, 80), remove housing insert with valve rod.

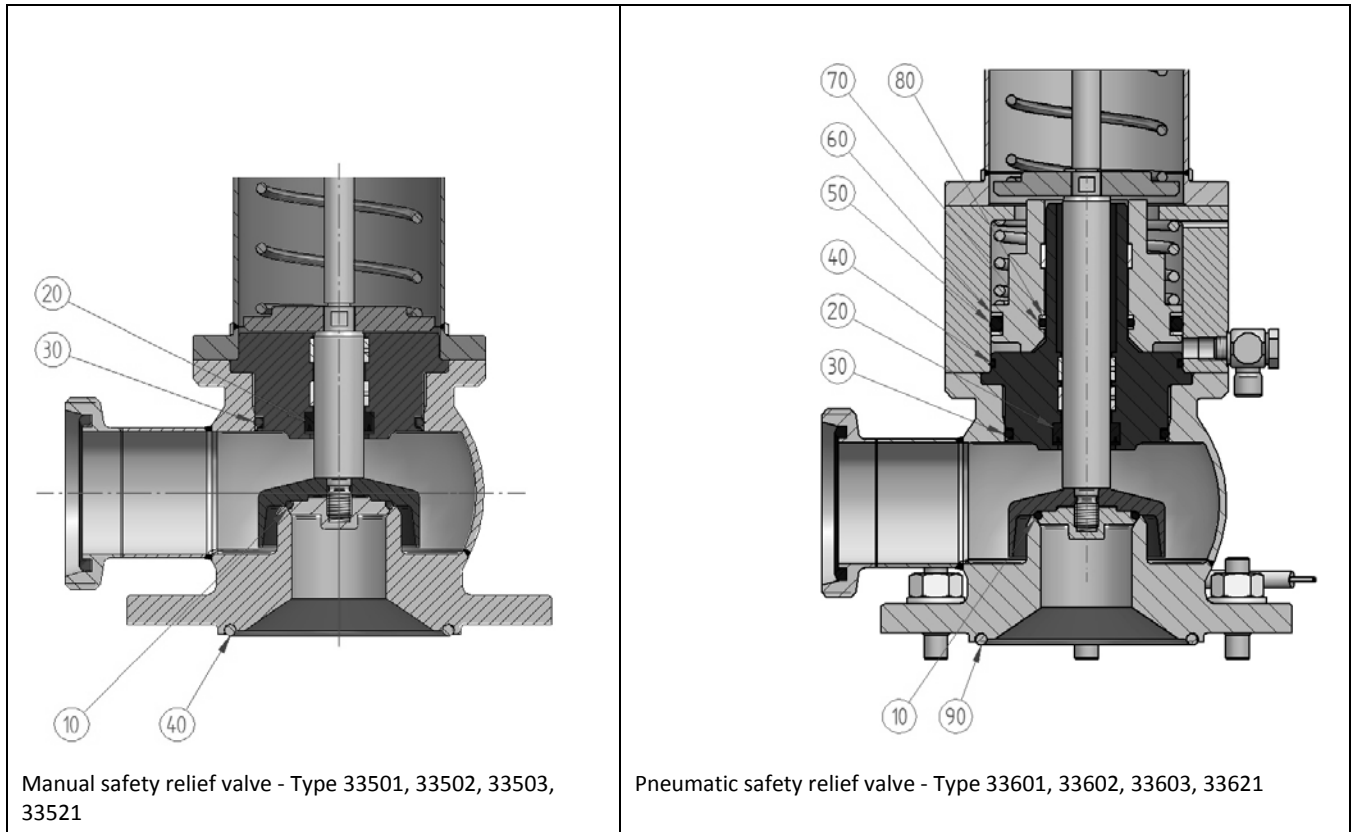


- E) Pull lifting piston (3) from piston guide (1), replace seals (2).
 F) Screw on valve disk, replace seals (4) for housing insert (5) and valve disk.

Safety relief valves

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7.3 Seals



Manual safety relief valves Type 33501, 33502, 33503, 33521	Designation		Qty.
	10	O-ring for valve seat	1
	20	Internally lipped seal	1
	30	O-ring for housing	1

Pneumatic safety relief valves Type 33601, 33602, 33603, 33621	Designation		Qty.
	10	O-ring for valve seat	1
	20	Internally lipped seal	1
	30	O-ring for housing	1
	40	O-ring for piston guide	1
	50	O-ring for piston	1
	60	Support rings	2
	70	O-ring for piston	1
80	Support rings	2	

Safety relief valves

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8 Maintenance



WARNING

Warning – general danger!

Pressurised liquid, steam or gas constitutes a danger at connection points.

- Check the current system status (pressure, temperature, medium).
- All maintenance work must always be performed while depressurised and cleaned.



CAUTION

Caution – functional impairment or material damage!

Jamming will impair the switching process of the valve.

- Safety relief valves must be lifted manually or pneumatically at periodical intervals.
- The pressure springs are designed for load changes > 1 month. Based on experience this corresponds to an operating time of 10-15 years. The condition of the pressure springs should be checked in this time.
- A function check must be performed.



CAUTION

Caution – functional impairment or material damage!

If the valve is not checked or maintained at regular intervals, this can lead to malfunction or major functional disruption.

- Visual inspections must be carried out on an ongoing basis every 1-2 weeks.
>> Check electrical power supply and pneumatic supply
>> Check for leakage, check valve functions.
- To ensure that the safety relief valve is ready for operation and functionally reliable, it should be checked every six months as part of the general internal maintenance procedure. The maintenance intervals depend on the operating conditions and must be determined by the plant operator.
- If, for maintenance purposes, protection devices have been attached or if supply and exhaust lines to the safety relief valve blocked, the protection devices must be disassembled and line blockages must be removed.
- **Ensure that a function check is always performed on the safety relief valve following maintenance work.**

Safety relief valves

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8.1 Trouble-Shooting

- All faults must be checked and repaired immediately.
- The work required may only be carried out by qualified personnel in compliance with the safety instructions.

Fault	Possible cause	Measures
Safety relief valve does not open (pneumatic)	<ul style="list-style-type: none"> • Valve seat jammed • Pressure not sufficient for opening. • Lifting/opening process is blocked • Compressed air supply not sufficient. • Malfunction of solenoid valve or electrical control faulty. 	<ul style="list-style-type: none"> • Lift valve manually and clean valve seat • Check the pressure setting • Check the mobility of the valve rod (lift valve manually) • Compressed air with a pressure of at least 5 bar should be applied. • Check the compressed air hose. • Check the solenoid valve.
Safety relief valve does not close (pneumatic)	<ul style="list-style-type: none"> • Lifting nut is screwed against the housing • Solid body in the valve seat out of line. • Actuator spring blocked or broken • Pressure bleeding defective. 	<ul style="list-style-type: none"> • Screw the lifting nut upwards • Clean valve housing and seat • The defective actuator may only be repaired by the manufacturer. • Check the solenoid valve.

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8.2 Spare parts

Type	DN 15	DN 25	DN 40	DN 50	DN 65	DN 80
33501	033501.00015LE	033501.00025LE	033501.00040LE	033501.00050LE	033501.00065LE	033501.00080LE
	033501.00015LV	033501.00025LV	033501.00040LV	033501.00050LV	033501.00065LV	033501.00080LV
33502	033501.00015LE	033501.00025LE	033501.00040LE	033501.00050LE	033501.00065LE	033501.00080LE
	033501.00015LV	033501.00025LV	033501.00040LV	033501.00050LV	033501.00065LV	033501.00080LV
33503	---	---	033503.00040LE	033503.00050LE	033503.00065LE	033503.00080LE
			033503.00040LV	033503.00050LV	033503.00065LV	033503.00080LV
33521	033501.00015LE	033501.00025LE	033501.00040LE	033501.00050LE	033501.00065LE	033501.00080LE
	033501.00015LV	033501.00025LV	033501.00040LV	033501.00050LV	033501.00065LV	033501.00080LV

Type	DN 15	DN 25	DN 40	DN 50	DN 65	DN 80
33601	033601.00015LE	033601.00025LE	033601.00040LE	033601.00050LE	033601.00065LE	033601.00080LE
	033601.00015LV	033601.00025LV	033601.00040LV	033601.00050LV	033601.00065LV	033601.00080LV
33602	033601.00015LE	033601.00025LE	033601.00040LE	033601.00050LE	033601.00065LE	033601.00080LE
	033601.00015LV	033601.00025LV	033601.00040LV	033601.00050LV	033601.00065LV	033601.00080LV
33603	---	---	033603.00040LE	033603.00050LE	033603.00065LE	033603.00080LE
			033603.00040LV	033603.00050LV	033603.00065LV	033603.00080LV
33621	033601.00015LE	033601.00025LE	033601.00040LE	033601.00050LE	033601.00065LE	033601.00080LE
	033601.00015LV	033601.00025LV	033601.00040LV	033601.00050LV	033601.00065LV	033601.00080LV

Note: LE - EPDM
LV - FKM/FPM/Viton