INSTALLATION AND OPERATING MANUAL
SERIES KSE/F, KSE-C/F

RICHTER

Safety Valves

with certification

spring-loaded

Keep for future use!

This operating manual must be strictly observed before transport, installation, commissioning etc.

Richter

ITT Industries
Engineered for life

9530-050-en Revision 01 Edition 07/2002

List of Contents

1 Technical Data

Manufacturer:

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Designation:

Direct-acting, spring-loaded bellows safety valve with angle-type valve body.

Certified for vapours/gases **and** liquids.
Certification number TÜV-SV...871 D/G/F.

Standard safety valve, design and operation to German AD data sheet A2 (on pressure vessels), ISO 4126, EN 1268

Series KSE/F ➔ design standard
Series KSE-C/F ➔ Design konical Dichtflächen

Tightness tested to DIN 3230, Part 3

Flange connecting dimensions: DIN EN 1092-2 (ISO 7005-2) PN 16.

Or flanges drilled to ASME B16.5 class 150

General conditions of delivery for valves to DIN 3230.

Materials :

Shell material: Ductile cast iron EN-JS 1049 to DIN EN 1563 (0.7043 DIN 1693)

Lining material: PFA, PTFE
on request conductive design

Set pressure :

Valve size KSE	Set pressure (bar)	Valve size KSE-C	Set pressure (bar)
25/50	0,4 –13		
50/80	0,1 - 13		
80/100	0,1 - 10	80/100	0,15 – 1
100/150	0,15 - 10	100/150	0,15 – 1

Temperature range: –60 °C bis +180 °C
See pressure-temperature-diagram in Section 9.1

Valve size inlet/outlet in mm:

KSE 25/50, 50/80, 80/100, 100/150
KSE-C 80/100, 100/150

Weight:

KSE, KSE-C 25/50 ca. 15 kg
KSE, KSE-C 50/80 ca. 25 kg
KSE, KSE-C 80/100 ca. 40 kg
KSE, KSE-C 100/150 ca. 85 kg

Installation position:

A direction arrow on the shell indicates the direction of flow. See Section 5.5.

Dimensions and individual parts:

See sectional drawing in Section 10

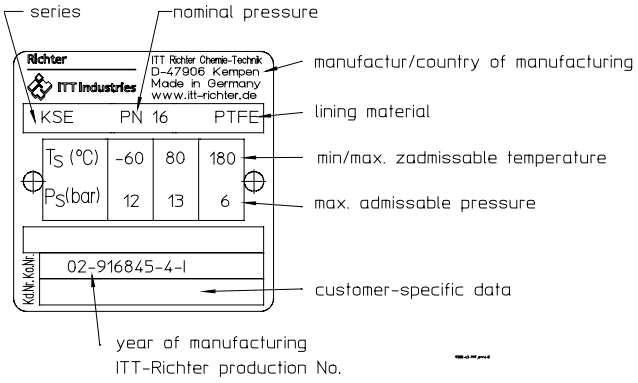
1.1 Name plate, CE- and body-marking

The stainless steel identification plate is permanently riveted to the body.

Another stainless steel tag plate riveted to the valve indicates the test pressure.

If the customer mounts his identification, it must be ensured that the valve corresponds to the application.

Example name plate:



CE-marking :

CE 0044

Body marking :

The shell bears the following information in accordance with DIN EN 19 and AD 2000, A4:

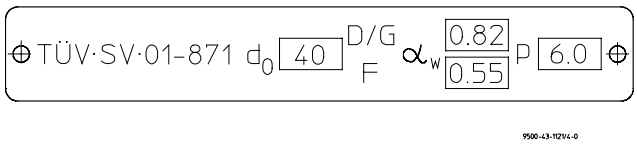
- nominal diameter
- rated pressure
- shell material
- manufacturer's identification
- charge number/foundry identification
- arrow for direction of flow

See also Se

1.2 Component identification

Certified safety valves KSE and KSE-C are identified with a certification plate to the German data sheet A2 (on pressure vessels). This stainless steel plate is riveted to the valve body.

It contains the following details for example:



TÜV	=	TÜV symbol
SV	=	Safety valve
91	=	Year of certification (here: 1991)
871	=	Certification number (here: 871)
d_0	=	Narrowest flow Ø in mm (here: 40)
D/G	=	intended for discharging vapours/gases
F	=	intended for discharging liquids
α_w	=	Certified coefficient of discharge (here: 0.82 for D/G and 0.55 for F)
p	=	Test pressure in bar (here: 6.0)

1.3 Application as directed

Richter safety valves of the series KSE and KSE-C are pressure-maintaining components in accordance with the Pressure Equipment Directive (DGRL) for the passage of fluids and the filtering of particles of a defined grain size. The valves are suitable for vapours, gases and liquids of group 1 in accordance with the DGRL and have a corrosion-resistant plastic lining.

Safety valves are intended to prevent inadmissible excessive pressures, e.g. in piping systems, pressure vessel plants and boilers. Risks to people, the environment and plants are thus avoided.

Solids can lead to increased wear, leaks, damage to sealing surfaces or to a reduction in the service life of the valve.

The safety valves have been set at the works to the desired test pressure, tested and lead-sealed. The precise operating conditions of the safety valve selected are documented in the *Data sheet*. It also contains the performance features such as the certified coefficient of discharge, the flow cross area, set pressure, opening pressure, reseating pressure and materials.

If the valve is intended for other operating data, the operator must carefully examine whether the design of the valve, accessories and materials are suitable for the new application.

1.4 Relevant documents

- Data sheet
- Declaration of conformity
- General safety certificate QM 0912-16-2001

On request :

- Pressure spring table
- Bellows operating ranges, TIS 0587-02-0006
- VDTÜV data sheet "Safety valve 871"
- VDTÜV data sheet "Safety valve 100"
- ITT Richter publication "Certified Chemical Safety Valves, KSE Series".

2 Safety

A declaration of conformity pursuant to the EC Directive 97/23/EC on pressure equipment is enclosed with the safety valve.

This operating manual contains fundamental information which is to be observed during installation, operation and maintenance. It must therefore be carefully read **before installation and commissioning.**

It must always be available at the location of the machine/plant.

The staff for installation, operation and maintenance must have the appropriate qualifications for this work.

Not only are the general notes on safety listed under this main heading Safety to be observed but also the special safety notes included at other points.

The area of responsibility, authority and supervision of the staff must be regulated precisely by the customer.

General hazard symbol!
People may be put at risk.

Safety symbol! The valve and its function may be put at risk if this safety symbol is not observed.

It is imperative to observe warnings and signs attached to the valve and they are to be kept fully legible.

Non-observance of the notes on safety may result in the loss of any and all claims for damages.

For example, non-observance may involve the following hazards:

- Failure of important functions of the valve/plant.
- Risk to people from electric, mechanical and chemical effects.
- Risk to the environment through leaks of hazardous substances.

2.1 For the customer/operator

Please observe

- the notes on safety in this operating manual,
- Hot or cold valve parts must be protected by the customer from being touched.
- Guards for moving parts must not be removed when the valve is in operation.
- Leaks of hazardous media (e.g. explosive, toxic, hot) must be disposed of in such a way that there is no risk to people and the environment. Statutory provisions are to be observed.
- Fire protection to DIN EN ISO 10479 is not possible (plastic lining and plastic components).

2.2 For maintenance

Valves which have been exposed to media which are a health hazard must be decontaminated.

All safety and protective facilities must be remounted or enabled immediately after the end of work.

The points listed in **Section 6.1** Initial commissioning are to be observed before recommissioning.

2.3 Conversion work and production of spare parts by the customer

Conversion of or changes to the valves are only admissible after consultation with the manufacturer.

Only use original spare parts..

The use of other parts or design alterations to the valve by third parties may annul the manufacturer's liability for any resultant consequences.

2.4 Inadmissible modes of operation

The operational reliability of the valve supplied is only guaranteed if it is used properly in accordance with **Section 1.3** of this operating manual.
The operation limits specified on the identification plate must under no circumstances be exceeded.

3 Transport and storage

It is imperative, for all transport work, to observe generally accepted engineering practice and the accident prevention regulations.

During transport, storage and in particular shutdown, protective flange caps to DIN 3443 must be mounted on both valve flanges.

Handle the goods being transported with care. During transport the valve must be protected against impacts or collisions.

Never transport the valve using the lifting lever 238.
See drawing in **Section 10.1**.

Transport the valve in a box or on a pallet on a soft surface and deposit gently on flat ground.

Directly after receipt of the goods, the consignment must be checked for completeness and any in-transit damage.

Bei Schäden darf das Sicherheitsventil nicht in die Anlage eingebaut werden.

3.1 Securing the stem during transport

With the KSE and KSE-C 100/150 valves, a ring bolt **908/1** is screwed into the lifting cap which facilitates transport. It must be ensured that the ring bolt lies on the axis of the discharge flange so that equilibrium is guaranteed when the valve is lifted.

3.1.1 Transport securing for KSE

Safety vales with set pressures ≤ 0.5 bar are fitted at the works with a transport fastening strap which holds the stem in the axial direction and prevents damage to the shut-off element as a result of the stem shaking during transport. See **Fig. 1**.
The securing wire between the lifting lever **238** and the spring bonnet **535** is to be removed prior to commissioning.

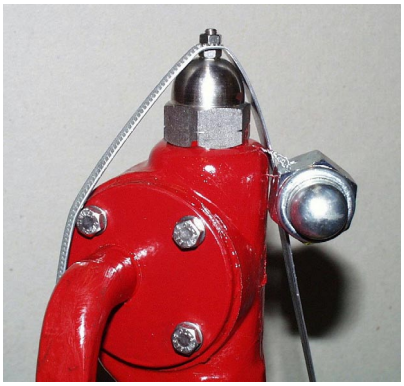


Fig. 1

3.1.2 Transport securing for KSE -C

The threaded rod is screwed through the inlet nozzle into the plug. It is inserted through the central bore of the flange cover and screwed against the inlet flange with a wooden disc and a self-locking hex. nut. See **Fig. 2**.

The flange cover can only be removed when the transport securing screw has been removed. This ensures that it is only possible to install the valve when the stem locking device has been removed.

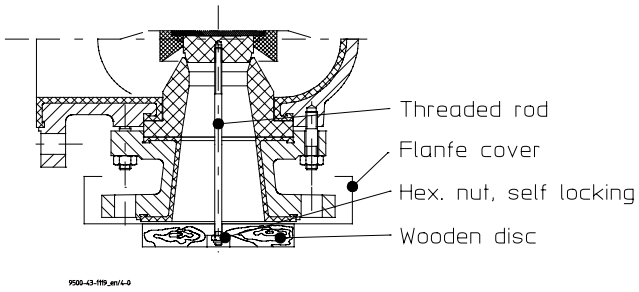


Fig. 2

3.2 Storage

If the valve is not installed immediately after delivery, it must be put into proper storage.

It should be stored in a dry, vibration-free and well-ventilated room at as constant a temperature as possible.

Store the valve in an upright position and secure it from falling over! In case of prolonged storage individual packing with a desiccant may be neces

3.3 Return consignments

Valves which have conveyed aggressive or toxic media must be well rinsed and cleaned before being returned to the manufacturer's works.

A **General safety certificate** on the field of application is to be enclosed with the returned goods.

Pre-printed forms are enclosed with the installation and operating manual.

Safety precautions and decontamination measures are to be mentioned.

4 Product description

The ITT Richter safety valves of the series KSE and KSE-C are direct-acting, bellows safety valves to DIN 3320, Part 1. They are spring-loaded and classified as standard safety valves as regards their opening characteristic.

The valves are supplied with a universally corrosion-resistant, soft-sealing plastic lining and are protected by an epoxy coating against corrosive atmospheres.

The sectional drawing in **Section 10.1** illustrates the valve design.

4.1 Body and inlet nozzle

The body **100** has a thick PTFE lining in the flow section.

The body dome is provided with a metallic centring for the upper body section.

The separate inlet nozzle **122** permits the valve seat to be replaced.

4.2 Shut-off element

The shut-off element largely consists of the plug **204**, seat **205,** bellows **206** and lifting aid **237**.

The plug **204** and seat **205** are available as special designs with tapered sealing surfaces.

The plug is centred in the body by the stem **802**, stem guide **306,** thrust flange **117** and thrust ring **405**.
The seat, plug, lifting aid and bellows can be replaced individually. The seat is located between the body and the inlet nozzle. The plug is screwed with the lifting aid onto the bellows.
The bellows protect the metal components of the upper section including the spring and guide against corrosion.

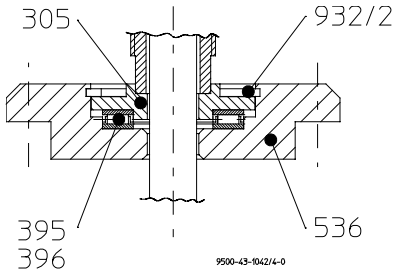
4.3 Valve actuation

The main components of the valve actuation system are the bonnet **513**,
stem nut **534,**
lifting lever **238,** and
lifting cap **535** with locking plate **539.**

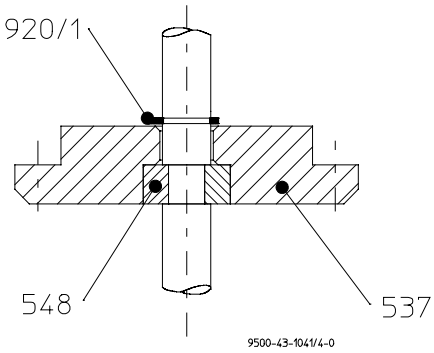
The bonnet **513** is of closed design.

The upper spring plate **536** and lower spring plate **537** ensure the central positioning and guidance of the pressure spring **952/1** in the bonnet.

An thrust needle roller cage **395** with an axial washer **396** is integrated in the upper spring plate **536**. This bearing prevents the bellows from turning during adjustment to the adjusting screw and the plug sealing surface from rubbing on the seat.



The lower spring plate **537** is pushed by a positive-locking connection over a ring 2-piece **548** which engages a groove in the stem. This connection is additionally secured by a snap ring **920/1**.



The lifting lever **236** is mounted in the lifting cap **535** and axially secured by the locking plate **539**.

A shortened lifting lever is available as an option. The lever itself is supplied loose and can be mounted when required. See **Section 10.2**.

On actuation of the valve, the fork-shaped claw of the lifting lever grips under the stem nut and the stem is pulled upwards. As the stem is connected to the bellows and the plug by means of positive locking via a cardanic mounting, lifting is also possible without admission pressure.

5 Installation

The installation conditions to the AD 2000 Code A2 (on pressure vessels) and TRD721 are to be observed. They are major preconditions for the safe operation of the valve.

5.1 Sizing of the inlet line

The admissible pressure loss in the inlet line must not exceed 3% of the set pressure of the safety valve. The determination of the pressure loss relates to the maximum flow of the valve at 110% of the set pressure and 110% of the certified coefficient of discharge.
An excessive pressure loss at the inlet of the safety valve can cause rapid opening and reseating of the valve or chattering.
Chattering results in a reduction in the discharge capacity and may cause an inadmissible rise in pressure in the system and damage to the seat sealing surfaces.
The inlet line must never be smaller than the nominal diameter of the safety valve inlet.
Lay inlet lines as short as possible. Install the valve, if possible, directly on the vessel to be protected and at least chamfer the vessel nozzle at the inlet or, even better, provide a radius. A tapered inlet nozzle has the optimum flow shape.

5.2 Sizing of the outlet line

Outlet lines are to be sized so that reliable functioning of the valve is ensured under all expected operating conditions.
The medium is to be discharged so that there is no risk to people and the environment. The statutory provisions (e.g. accident prevention regulations, and the equivalents of the German Pollution Control Act or the German Clean Air Code) as well as local regulations (works standards) are to be observed. There must be no possibility of the safety valves becoming ineffective due to shut-off elements.

5.2.1 Admissible back pressure

The outlet line must never be smaller than the nominal diameter of the safety valve outlet.
The admissible back pressure in the valve outlet must not be exceeded in order to prevent destruction of the bellows or a reduction in the discharge capacity.

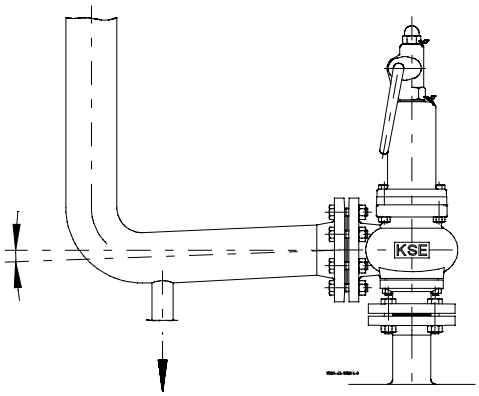
5.2.2 Drainage of condensate

Lay horizontal pipes with a gradient away from the valve so that the liquid medium cannot accumulate in the valve body and that, in the case of gases, no condensate collects in the body.

If outlet lines are laid with a geodetic level difference (e.g. for vapours or gases with a 90° vertical upright pipe bend out of the valve), the bend must not be located directly downstream of the valve.

A horizontal pipe section with a gradient must firstly be installed downstream of the valve.

A draining facility must be provided at the lowest point in the pipe. This opening for the drainage of condensate must be lower than the flow chamber of the body.



Lines for the drainage of condensate are to have adequate cross sections. They are to be laid with a gradient and must ensure safe drainage of the medium.

5.2.3 Discharge conditions and reaction forces

At low temperatures:

Outlet lines must be protected against freezing. This applies in particular if gas cooling as a result of expansion is to be expected or lines are laid outdoors.

With crystallising media:

In the case of media which tend to crystallise, solidify or stick, appropriate action must be taken to ensure that the solidification process cannot take place in the inlet or outlet lines or in the body (e.g. installed rupture disc, insulation, heating).

With gassing media:

In the case of gassing or vaporising liquids, adequately dimensioned flashtraps must be located in the direct vicinity of the valve.

Reaction forces during discharge:

The pipes and their holders are to be dimensioned so that their weight forces and the reaction forces and thermal loads produced during discharge can be safely absorbed.

5.3 Valve connecting dimensions

The safety valves can be equipped with flange connections to DIN EN 1092-2 (ISO 7005-2) PN 16, ANSI B16.5 Class 150 or other standards.

The dimensions of the flange connections and the main dimensions are contained in the drawing in **Section 10**.

5.4 Flange caps and gaskets

Contamination of or damage to the sealing surfaces is best avoided if the protective caps remain on the flanges until just before installation.

We recommend the installation of gaskets so that the sealing surfaces are not damaged by the mating flanges.

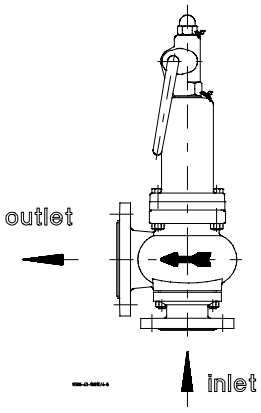
Where there is a particularly high risk of damage to the plastic sealing surfaces, e.g. if the mating flanges are made of metal or enamel, PTFE-lined gaskets with a metal inlay should be used. These gaskets are available as special accessories in the ITT Richter range.

5.5 Direction of flow and installation

When the valve is being installed, the direction of flow must be observed; it is indicated by an arrow on the valve body.

A mix-up of the inlet and outlet will result in the valve becoming ineffective and the bellows may be destroyed.

Always install the safety valve with the stem in a vertical position.



5.6 Installation

The plant components to be protected are to be cleaned thoroughly prior to installation of the valve. Solids jeopardise the soft-sealing, high-precision surfaces of the seat and plug and permanent leaks could arise.

The safety valve must be installed so that no inadmissible mechanical or thermal stresses are transmitted from the attached pipes to the body.

Changes in length of the pipes due to temperature are to be allowed for, e.g. through the installation of expansion joints.

Remove the flange covers.

For KSE : Before installation, remove metallic transport securing strip and cap nut for securing the valve during transport. Screw on attached lead-sealed cap nut **927/1**.

For KSE-C : Before commissioning, remove transport securing device. See **Section 3.1.2**.

Remove the securing wire between the bonnet and lifting lever.

Position and align the safety valve and any additional gaskets. Then tighten the pipe screws with a torque wrench in diametrically opposite sequence.

For tightening torques, see **Section 9.2**.

5.6.1 Blocking screw (option)

When the plant is being hydraulically tested, the safety valve cannot discharge through the blocking screw.

The lead-sealed cap nut **927/1** is replaced by a cap nut **927/2** with an additional tapped bore for the blocking screw **901/4** when the plant is being tested. In the KSE 100/150 the lead-sealed hex. screw **901/3** is replaced by a threaded rod **918** with a hex. nut **920/5**. The cap nut/blocking screw or the threaded rod/hex. nut are supplied separately.

See also the details in **Section 10.2**.

After the hydraulic test, remove the cap nut **927/2** with the blocking screw **901/4** or the threaded rod **918/1** with the hex. nut **920/5** again.

Screw in the cap nut **927/1** or, in the case of the KSE 100/150, the hex. screw **901/4** with the bore for the lead seal again and have them lead-sealed again.

See **Section 6.4**.

6 Operation

6.1 Initial commissioning

Normally, the valves have been tested for leaks with air or water. Normally, the valves have been tested for leaks with air or water. Unless otherwise agreed, there could be residual amounts of water in the flow section of the valve; this could result in a possible reaction with the medium.
The max. operating pressure of the plant must generally be less than the reseating pressure of the safety valve.

Following the initial loading of the valve with operating pressure and temperature, the torques of all connecting bolts must be checked.
See **Section 9.2**.

6.2 Shutdown

The local regulations are to be observed when dismantling the valve.

In every case ensure that the pipeline and the vessel have been relieved of pressure and emptied.Appropriate measures are to be taken to prevent human life and the environment being endangered by a leak of aggressive or toxic media.

If a dismantled valve is to be returned to the workshop or to the manufacturer, it has to be thoroughly cleaned.
See also **Section 3.3**.

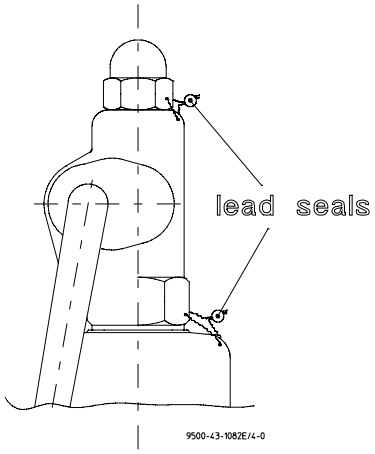
6.3 Recommissioning

When recommissioning the valve, make sure that **all the appropriate steps** as described in **Section 5** (Installation), and **Section 6.1** (Initial commissioning) are repeated.

6.4 Inadmissible modes of operation and their consequences

The test pressure, checked by the manufacturer, an approved authority or the supervisory company responsible is secured against unauthorised adjustment by a lead seal.

A broken lead seal must be replaced without delay. This can either be done by the manufacturer, the approved authority or the supervisory company responsible.



It is emphasised that in the case of the operating company adding the lead seal itself, it automatically assumes full responsibility for any operational hazard and resulting damage.

The travel set at the manufacturer's works ensures reliable operation of the valve. It is forbidden to arbitrarily alter the travel or to totally block the valve.

During operation of the valve, no hard foreign matter may be found between the seat and the plug of the valve.

If foreign matter is deposited on the sealing surfaces during reseating of the valve, the valve is probably not tight. Damage may also occur to the plastic sealing surfaces.

7 Maintenance

Safety valves must be checked for operability at regular intervals according to the national regulations (in Germany: UVV - pressure vessels, VBG 17 § 32 and TRD 601 sheet 2, paragraph 3.4). The intervals for regular checks are to be laid down by the customer in line with the operating conditions.

The lifting lever allows the valves to be actuated from outside. They then open at the operating pressure available. For lifting, the pressure is to be at least 85% of the test pressure.

For the arrangement, designation and item numbers of all parts of the valve, see **Section 10**.

All repair work is to be performed by qualified personnel using the appropriate tools. Generally recognised practice in mechanical engineering is to be observed.

7.1 Screw connections

Periodic checks of the tightening torques in line with the operating requirements are required at the following points:

- Body nuts/screws
- Pipe screws

For tightening torques, see **Section 9.2**.

To prevent screw connections from becoming loose in the event of pressure fluctuations or plant vibrations, we recommend the installation of expansion joints or pulsation dampers.

7.2 Cleaning

Prior to starting any repair work, the valve is to be thoroughly cleaned. Even if the valve has been properly emptied and rinsed, residual medium may still be found in the valve, e.g. between the lining and body or in the bonnet.

Plastic parts may absorb medium which gradually emerges from the material after cleaning.

Wear the prescribed protective clothing!

Safety valves which have been cleaned with water or other media must be dried before re-assembly of the parts and installation of the valve in the plant.

7.3 Modification of the safety valve

If modifications to the valve are required, the manufacturer must always be consulted.

Examples: Modification with changed test pressure, replacement of the spring or adaption to the mass flow by reducing the travel.

After approval by the manufacturer, these modifications can be performed either by the manufacturer or by the customer under the guidance of a technical supervisory agency or any other approval authority.

7.4 Adjustment of the test pressure

- Undo locking plate **539**, dismantle lifting lever **238** and unscrew the lifting cap **535**.
- Undo nut **920/3**.
- Adjust the spring tension with the adjusting screw **538** to the specified test pressure.
- Counter adjusting screw **538** with a hex. thin nut **920/3**.
- Check test pressure.
- Screw on lifting cap **535** and tighten.
- Insert lifting lever **238**.
- Mount locking plate **539**.
- Have the valve lead-sealed.

The data specified in the test certificates are to be observed.

7.5 Important notes on dismantling / installation

First relieve the plug **204**!
Then undo the screws between the body and the inlet nozzle or between the bonnet and body.

The seat and plug could otherwise be destroyed. Read the precise instructions in **Sections 7.5 and 7.6**.

Always replace the seat and plug **completely** and always rework them **completely**.

Reworking of the seat and plug requires specialised knowledge of the material as well as special lapping wheels.

It is therefore recommended to have this work carried out by the manufacturer.

After dismantling, check all parts for wear and damage.

Only use original spare parts.
See also **Section 2.3**.

7.6 Replacement of components

7.6.1 Dismantling of the plug

- Undo locking plate **539**, dismantle lifting lever **238** and unscrew lifting cap **535**.
- Mark the position of the stem nut **534**.
- Unscrew the self-locking hex. nut **929/1** and stem nut **534** off the stem **802**.
- When undoing or tightening the hex. nut, hold the stem tight with a pair of pliers.

Do not turn the entire stem **802**! There is a risk of the insert sleeve **308** being unscrewed out of the bellows **206** or the folds being damaged!

- Mount a suitable distance sleeve (not included in the scope of delivery) over the stem **802**.
- Screw the stem nut **534** against the distance sleeve. The plug **204** is lifted off the seat **205** and the closing force becomes ineffective.
- Loosen the bolts **901/1** and **920/2** (in the case of KSE and KSE-C 100/150 **902/2, 934/1** and **920/2**) and lift the bonnet with internals completely off.
- Grip the bellows **206** in the reinforced section just above the lifting aid **237** with a pair of pliers. Unscrew the lifting aid off the bellows and remove the plug **204**.

7.6.2 Dismanteling of the seat

- Remove bonnet **513** from the body **100**.
  See **Section 7.6.1**.
- Dismantle inlet nozzle **122** from the body **100** and remove the seat **227**.

7.6.3 Installation of the seat

- Centre the new or reworked seat **205** in the body **100**.
- Then insert the inlet nozzle **122** into the centring of the body **100**.
  The components must be smooth running, i.e. can be centred without any constraining forces.
  If necessary, the inlet nozzle is to be turned through 90°.
- First tighten the attachment nuts **920/1** hand-tight and then with a torque wrench evenly and in diametrically opposite sequence.

It is imperative to observe the prescribed torques for the connection body / inlet nozzle! See **Section 9.2**.

7.6.4 Installation of the plug

- All parts are to be thoroughly cleaned before assembly.
- Centre the new or reworked plug **204** in the lifting aid **237** and screw completely onto the thread of the bellows hand-tight. Counter the bellows **206** on the reinforced section with a pair of pliers.
- Undo the hex. socket screws **914/1**. Centre the bonnet **513** with internals on the body **100**. Ensure that there is metallic contact between the body and the bonnet. Then tighten the screws **901/1** and **920/2** (on 100/150 902**/1, 934/1 and 920/2**).
- Tighten the hex. socket screws **914/1** for the bellows gasket/seal? evenly in line with the tightening torques.
- Undo stem nut **534**.
- Remove distance sleeve.
- Screw stem nut **534** onto the stem **802** up to the marking. Then counter with the self-locking hex. nut **929/1**.
- Screw on lifting cap **535** and mount lifting lever **238** with locking plate **539**.

7.5.5 Installation of the thrust ring

Make sure that the O-ring **400/1** is positioned completely inside the groove of the thrust ring **405** so that it is not damaged when the thrust ring is inserted into the thrust flange **117**.
If the O-ring **400/1** has been damaged by improper assembly, water may enter from outside into the valve mechanism and the bellows and cause corrosion damage. A defective O-ring must be replaced before the valve is installed in the plant.

7.7 Tests

Following the assembly of the valve, the lift and the test pressure must be checked.

7.7.1 Lift

Lift check :

Remove the cap nut **935/1** from the lifting cap **535** and determine the height of the stem **802** up to the upper edge of the lifting cap **535**.

Determine this measurement in both the closed and fully opened state. Actuate the lifting lever **238** until the mechanical travel stop can be felt.
The measurement can be made with a slide caliper gauge and a depth indicator to DIN 862.

The lift is derived from the difference in the two heights. It must be at least as high as the lift given in the test certificate.

7.6.1 Test pressure

This test should take place on a test bench with a neutral medium such as air or water. Regarding their suitability and precision, the employed pressure gauges must conform to the requirements of current national regulations (in Germany: e.g. VdTÜV data sheet "Safety Valve 100" of the Association of the German Technical Supervisory Boards).

All pressure tests should be carried out in compliance with DIN 3230 part 3 or API 527.

It is recommended to use a bubble test with a 5 mm diameter hose positioned 50 mm below the surface of water. The other end of the hose is sealed to the outlet of the valve by means of a plug.

To check the test pressure, the pressure in the valve inlet is slowly increased until the valve commences to open.

To check the reseating pressure, the pressure in the valve inlet is slowly decreased until the valve is bubble-tight.

8 Malfunctions: Causes and their elimination

Safety valve is leaking.

- Is there foreign matter between the seat and plug?
- Is there any wear or damage to the seat or plug?
- Have the nuts at the inlet nozzle been unevenly tightened?

Actuation of the lifting lever can help to regain the required sealing effect. If this does not succeed in stopping the leak, the sealing surface of the plug must either be reworked or the plug or seat must be replaced.

The lift given in the test certificate is not achieved.

- Are the bellows impeded in their movement by external influences (e.g. foreign matter, solidified medium between the folds etc.)?
- Has the insert sleeve **308** been screwed out of the thread of the bellows?

If the required lift is still not attainable after elimination of the disorders, an examination at the manufacturer's is necessary.

Medium is escaping at the bonnet.

- Have the hex. socket screws **914/1** not been tightened ?

If, after tightening the screws, tightness still cannot be restored, either the plastic lining or the bellows is damaged. The cause of cracked bellows could have been, for example, an inadmissibly high back pressure during operation of the safety valve. Dismantle the safety valve and have it repaired.

Flange connection valve/pipe is leaking

- Retighten the flange screws to a tightening torque according to **Section9.2**. If this does not remedy the leak, the recommended torques may be exceeded by 10%. If this also fails to stop the leak, dismantle and inspect the ball valve.

The safety valve chatters during discharge.

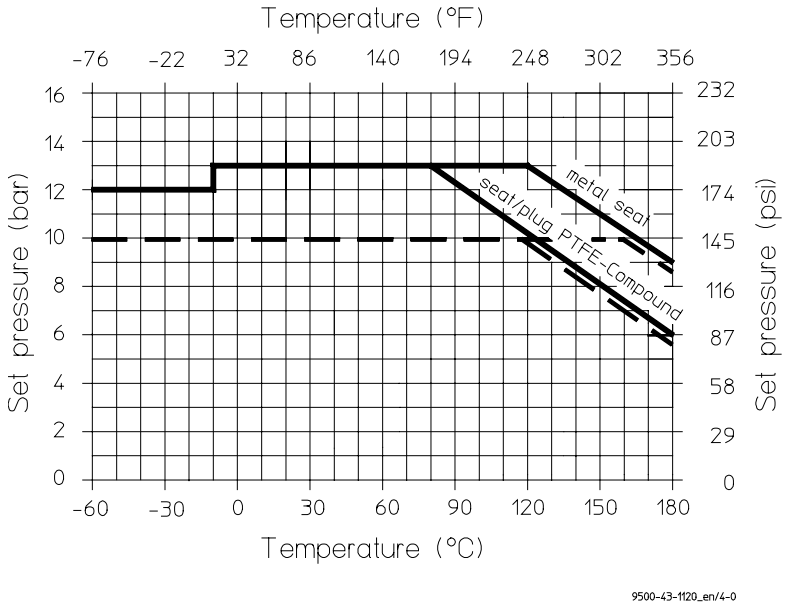
- Do the inlet and outlet lines conform to the relevant regulations?
  See also **Section 5**.
- Is the valve oversized ?

Valves which are too large can subsequently be adapted to the mass flow reducing the lift. To this end, the required lift is determined and a travel stop ring is mounted inside the valve.

9 Diagram and tightening torques

9.1 Pressure/temperature diagram

Max. permittable pressure/tempere for the body.



9.2 Tightening torques

The tightening torques for pipe screws and body screws mentioned must not be exceeded. For an exception, see **Section 8**, Flange connection valve/pipe is leaking.

The following tightening torques are recommended:

Pipe screws, flanges to ISO/DIN

Flange nom. diameter [mm]	Screws [ISO/DIN]	Torque [Nm]
25	4 x M12	12
50	4 x M16	30
80	8 x M16	25
100	8 x M16	30
150	8 x M20	55

Pipe screws, flanges ISO/DIN, drilled to ASME

Flange nom. diameter [mm]	[inch]	Screws [ASME]	Torque [in-lbs]
25	1	4 x M12	12
50	2	4 x M16	30
80	3	8 x M16	25
100	4	8 x M16	30
150	6	8 x M20	55

Screws body / inlet nozzle

Valve type	Screws	Torque (Nm)	Torque (in-lbs)
KSE 25/50	4 x M10	12	106
KSE, 50/80	4 x M12	25	354
KSE, KSE-C 80/100	8 x M10	20	177
KSE, KSE-C 100/150	8 x M16	25	354

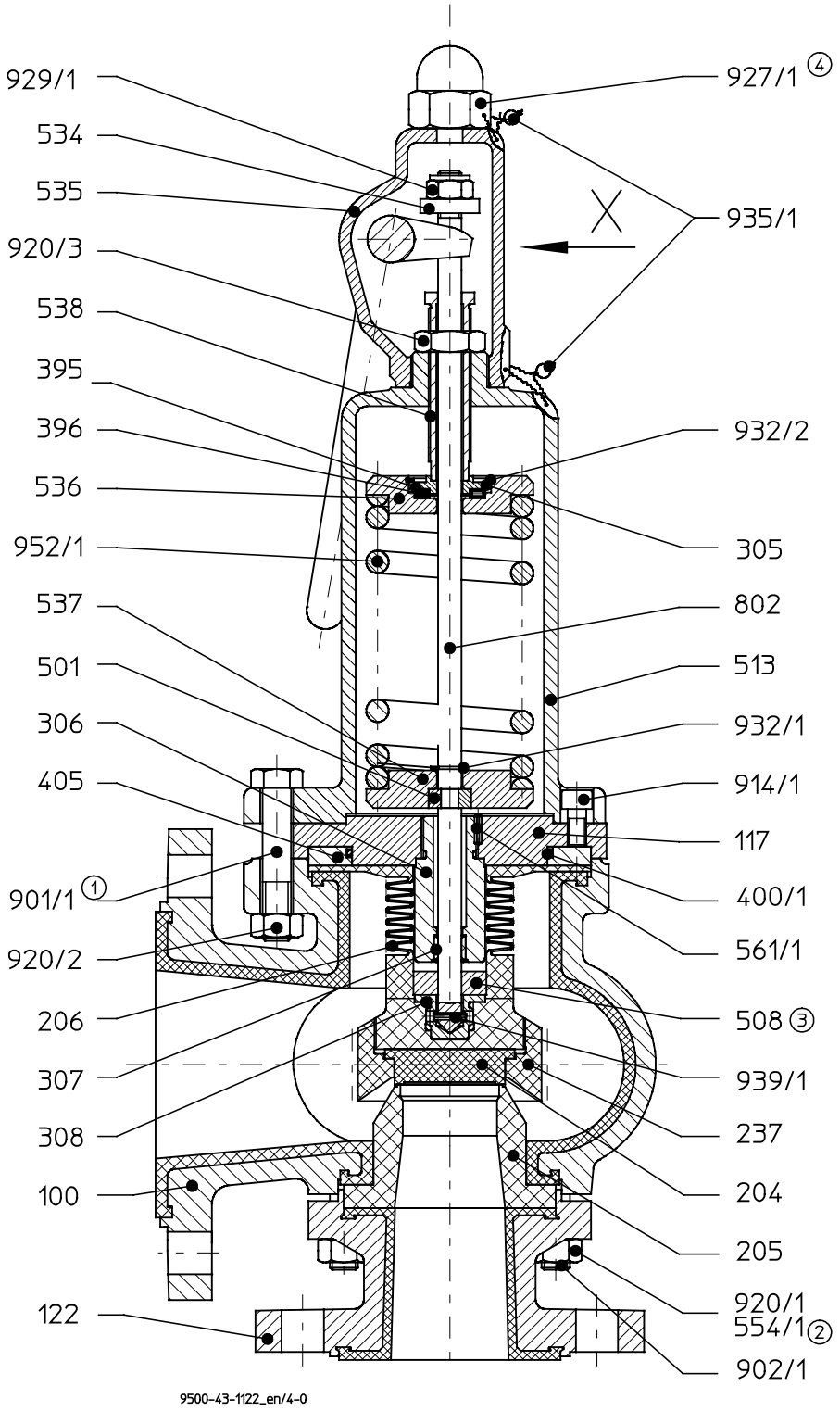
Hex. socket screws of the bellows gasket

Valve type	Screws	Torque (Nm)	Torque (in-lbs)
KSE 25/50	4 x M8	10	89
KSE, 50/80	4 x M8	12	106
KSE, KSE-C 80/100	4 x M8	12	106
KSE, KSE-C 100/150	8 x M8	10	89

All screws greased, tighten in diametrically opposite sequence!

10 Drawing

10.1 Sectional drawing



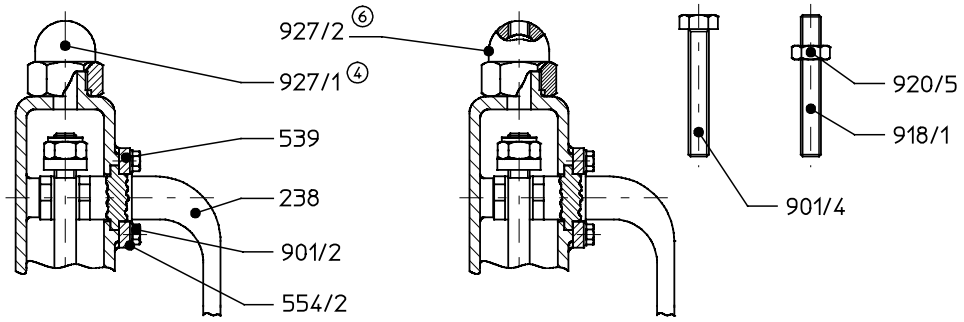
① Size 100/150 stud screw 901/2, lock washer 934/1
② Only size 80/100 and 100/150
③ Only KSE/KSE-C with travel stop
④ Only size 150/100 hex. head screw plug 938/1
⑤ Only size 100/150

10.2 Details and Legend

Option blocking screw

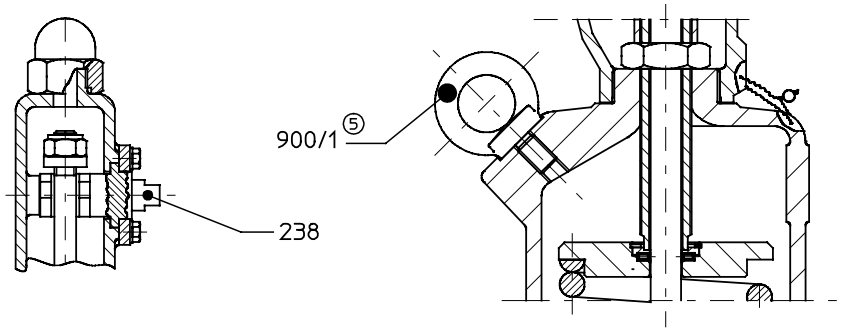
View X

100/150



⑥ Cap nut 527/2 with a additional tapped bore for blocking screw. The threaded rod 918/1 for size 100/150 is screwed directly into the lifting cap 535.

Option
shortened lfting lever



100	body	537	lower spring plate
117	thrust flange	538	adjusting screw
122	inlet nozzle	539	locking plate
204	plug	554/X	washer
205	seat	561/1	grooved pin
206	bellows	802	spindle
237	lifting aid	900/1	ring bolt
238	lifting lever	901/X	hex. screw
305	bearing guide	902/X	stud screw
306	stem guide	914/1	hex. socket screw
307	bearing bush	918/1	threaded rod
308	insert sleeve	920/X	hex. nut
395	axial needle roller cage	920/3	hex. thin nut
396	axial washer	927/1	cap nut
400/X	o-ring	929/1	prevailing torque type hex. nut
405	thrust ring	932/X	snap ring
501	ring, 2-piece	934/1	lock washer
508	travel stop	935/1	lead seal
513	spring bonnet	938/1	hex. head screw plug
534	stem nut	939/1	spring-type slotted pin
535	lifting cap	952/1	pressure spring
536	upper spring plate		

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