

How to assemble High Performance Assembly instruction Type 441



Objectives of this Presentation. Increase special knowledge.

1. [Objectives](#) | 2. [General](#) | 3. [General Illustration](#) | 4. [Preparation for valve assembly](#) | 5. [Disassembly instruction Type 441](#)

Aim of this presentation is to give an overview about the assembly of **High Performance** safety valve type **441**.



General. High Performance Safety Valves.

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LESER High Performance safety valves are the ultimate solution for all industrial applications for steam, gas and liquid. They were used e. g. for protection of chemical processes and equipment and for heat exchangers.

Advantages:

- Great variety of types, materials and options to fit any application
- Flange connections acc. To DIN EN ASME and other
- Valve sizes from DN 20 through DN 400 1" through 16"
- High capacity compared to the API requirements



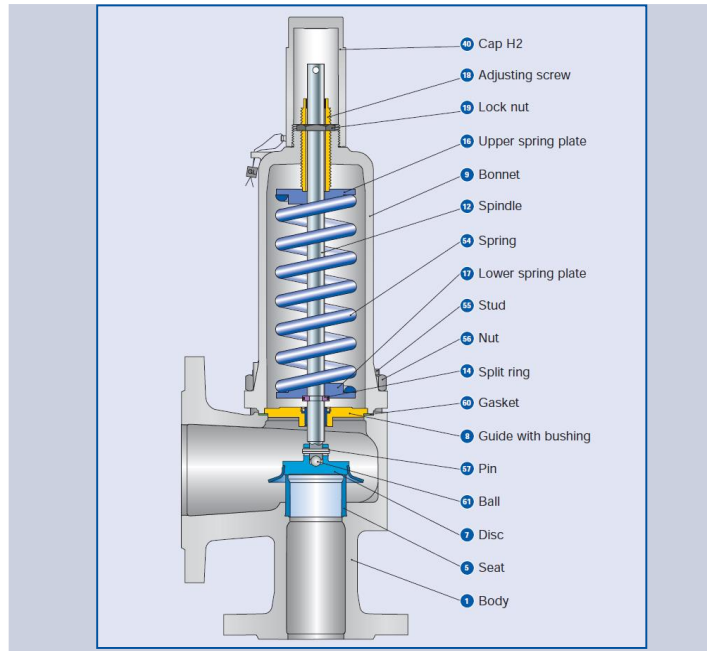
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General Illustration.

1. Objectives | 2. General | 3. **General Illustration** | 4. Preparation for valve assembly | 5. Disassembly instruction Type 441

Cross sectional drawing High Performance 441



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Preparation for valve assembly. Hammer in the punch numbers (if requested).

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- Hammer in the markings on the edge of the outlet flange
- Tools: Hammer, punch numbers



Assembly Type 441. 1. Assembly of HP Series – 1.1 Assembly of the nozzle.

1. Objectives | 2. General | 3. General Illustration | 4. Preparation for valve assembly | 5. Disassembly instruction Type 441

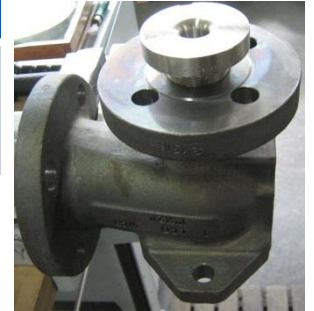
Step 1.1-1

- Grease sealing surface
- Tools: Assembly grease (Molykote-Paste), Brush.



Step 1.1-2

- Screw nozzle into the body



Step 1.1-3

- Tighten nozzle with C-spanner (put a small protective slab between the nozzle and C-spanner)
- Tools: C-spanner with a nose (Size: 52x55 – 230x245)



Assembly of the Type 441. 2. Screw the studs into the body.

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Step 2-1

- Screw in the studs with an impact wrench
- Tip: Place the guide on the opening of the body so that no studs can fall on the seat
- Tools: Impact wrench



Assembly of the Type 441. 3. Disc assembly. 3.1.

1. Objectives | 2. General | 3. General Illustration | 4. Preparation for valve assembly | 5. Disassembly instruction Type 441

3.1 Assembly of the disc with rotating lifting aid

Step 3.1-1

- Individual parts of the disc with rotating lifting aid



Step 3.1-2

- Crimp the pin inwards at one end to make assembly easier
- Tools: Anvil, Hammer



Step 3.1-3

- Use the head of the hammer to lightly curve the pin (hit in the middle of the pin)



Step 3.1-4

- Put the assembly together (it must be easy to move the disc in the lifting aid by 360°) and secure it with pins



Assembly of the Type 441. 3. Disc assembly – 3.2 Disc assembly O-ring disc.

1. Objectives | 2. General | 3. General Illustration | 4. Preparation for valve assembly | 5. Disassembly instruction Type 441

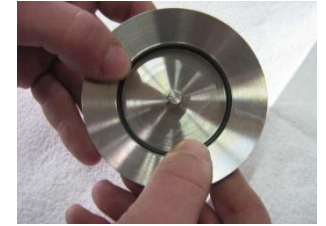
Step 3.2-1

- Individual parts of the O-ring disc



Step 3.2-2

- Wet O-ring with water and avoid twisting of ring when inserting



Step 3.2-3

- Insert retainer



Assembly of the Type 441. 3. Disc assembly – 3.2 Disc assembly O-ring disc.

1. Objectives | 2. General | 3. General Illustration | 4. Preparation for valve assembly | 5. Disassembly instruction Type 441

Step 3.2-4

- Screw nut onto neck and tighten
- Set torque as per LGS 3325
- Tools: Torque wrench

Step 3.2-5

- Secure the nut by hitting it with a centre punch
- Hammer in the marking for the O-Ring material according to WI 3308-08
- Tools: Centre punch, hammer, punch numbers



Assembly of the Type 441. 3. Disc assembly – 3.3 Disc assembly sealing plate.

1. Objectives | 2. General | 3. General Illustration | 4. Preparation for valve assembly | 5. Disassembly instruction Type 441

Step 3.3-1

- Put the sealing plate in the disc



Step 3.3-2

- Put the retainer on the sealing plate



Step 3.3-3

- Screw nut onto threaded neck and tighten
- Tools: Torque wrench



Step 3.3-4

- Secure the nut by hitting it with a centre punch Hammer in the marking for the sealing plate material according to WI 3308-08
- Tools: Punch numbers, hammer, centre punch



Assembly of the Type 441. 4. Assembly of spindle/disc assembly. 4.1.

1. Objectives | 2. General | 3. General Illustration | 4. Preparation for valve assembly | 5. Disassembly instruction Type 441

4.1 Assembly of spindle/disc assembly (without bellows)

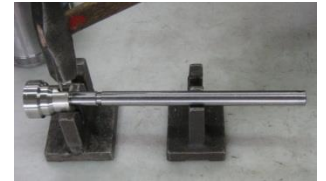
Step 4.1-1

- Put the ball into the disc body



Step 4.1-2

- Put the spindle in the disc and secure with a spanner



Step 4.1-3

- Put on lift stopper, if required



Step 4.1-4

- Push the guide onto the spindle



Disassembly of type 526. 4. Disassembly of the O-ring damper. 4.2.

1. Objectives | 2. General | 3. General Illustration | 4. Preparation for valve assembly | 5. Disassembly instruction Type 441

4.2 Disassembly of the O-ring damper H4.

Step 4.1-5

- Put split rings in the recess of the spindle and secure with a retaining clip



Step 4.1-6

- Push the lower spring plate, the spring and the upper spring plate over the spindle one after the other



Step 4.1-7

- Put the spacer onto the top spring disc



Assembly of the Type 441. 4. Assembly of spindle/disc assembly. 4.2.

1. Objectives | 2. General | 3. General Illustration | 4. Preparation for valve assembly | 5. Disassembly instruction Type 441

4.2 Assembly of spindle/disc assembly (with stainless steel bellows).

Step 4.2-1

- Some bellows versions must be screwed together



Step 4.2-2

- If the spindle has a thread on the bottom end, then put a minimal amount of glue on it and quickly screw into the bellows
- Tools: Glue Delo-Ca 2106 / 60H.0760.0001



Step 4.2-3

- Insert the ball into the disc body



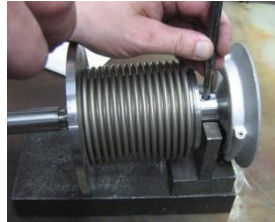
Assembly of the Type 441. 4. Assembly of spindle/disc assembly. 4.2.

1. Objectives | 2. General | 3. General Illustration | 4. Preparation for valve assembly | 5. Disassembly instruction Type 441

4.2 Assembly of spindle/disc assembly (with stainless steel bellows).

Step 4.2-4

- Put the stainless steel bellows into the disc and secure with a pin
- Tools: Grease, hammer, lubricant



Step 4.2-5

- If required insert the lift stopper
- Tools: Hammer, pin punch



Step 4.2-6

- Place the sealing ring on the bellows



Assembly of the Type 441. 4. Assembly of spindle/disc assembly. 4.2.

1. Objectives | 2. General | 3. General Illustration | 4. Preparation for valve assembly | 5. Disassembly instruction Type 441

4.2 Assembly of spindle/disc assembly (with stainless steel bellows).

Step 4.2-7

- Put on the guide (if bellows are not already screwed together with the guide)



Step 4.2-8

- Put split rings in the recess of the spindle and secure with a retaining clip



Step 4.2-9

- Put on the bottom spring plate



Assembly of the Type 441. 4. Assembly of spindle/disc assembly. 4.3.

1. Objectives | 2. General | 3. General Illustration | 4. Preparation for valve assembly | 5. Disassembly instruction Type 441

4.3 Assembly of spindle/disc assembly (with elastomer bellows).

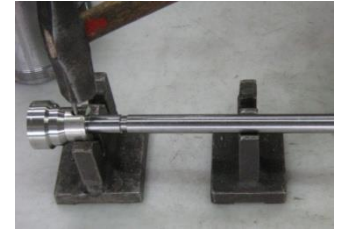
Step 4.3-1

- Put the ball into the disc body




Step 4.3-2

- Put the spindle in the disc and secure a pin



Step 4.3-3

- Caution:**  The pin is shorter than usual and must not protrude so that the elastomer bellows are not damaged later



Step 4.3-4

- Elastomer bellows, hose clamps and guide



Assembly of the Type 441. 4. Assembly of spindle/disc assembly. 4.3.

1. Objectives | 2. General | 3. General Illustration | 4. Preparation for valve assembly | 5. Disassembly instruction Type 441

4.3 Assembly of spindle/disc assembly (with elastomer bellows).

Step 4.3-5

- Put the hose clamp onto the elastomer bellows and put both together over the guide



Step 4.3-6

- Tighten the hose clamp with pliers
- Tools: Pliers



Step 4.3-7

- Put the second hose clamp with the lock opposite the first hose clamp on the elastomer bellows



Step 4.3-8

- Put the elastomer bellows on the spindle over the neck of the disc




Assembly of the Type 441. 4. Assembly of spindle/disc assembly. 4.3.

1. Objectives | 2. General | 3. General Illustration | 4. Preparation for valve assembly | 5. Disassembly instruction Type 441

4.3 Assembly of spindle/disc assembly (with elastomer bellows).

Step 4.3-9

- Tighten the second hose clamp with pliers
- **Attention!**  The hole for the pin and lock of the hose clamp must not lie on the seam of the elastomer bellows!
- Tools: Pliers



Step 4.3-10

- Put split rings in the recess of the spindle and secure with a retaining clip



Step 4.3-11

- Push the lower spring plate, the spring and the upper spring plate onto the spindle



Assembly of the Type 441. 5. Inserting the assembly. 5.1.

1. Objectives | 2. General | 3. General Illustration | 4. Preparation for valve assembly | 5. Disassembly instruction Type 441

5.1 (without bellows or with elastomer bellows).

Step 5.1-1

- Put the sealing ring in the sealing surface
- Put the assembly (depending on the weight and size with or without the spring and top spring plate) carefully into the outlet body



Step 5.1-2

- In the process, push the guide down and lift the spindle somewhat so that the disc does not touch down



Step 5.1-3

- Carefully put the disc with the spindle down on the seat
- Put on the spring and top spring plate (if not already done)



Assembly of the Type 441. 5. Inserting the assembly. 5.2

1. Objectives | 2. General | 3. General Illustration | 4. Preparation for valve assembly | 5. Disassembly instruction Type 441

5.2 Inserting the assembly (with stainless steel bellows).

Step 5.2-1

- Place the sealing ring in the sealing surface of the body



Step 5.2-2

- Put the bonnet spacer / cooling zone on the body
- Insert the sealing ring in the bonnet spacer / cooling zone



Step 5.2-3

- Put the assembly (depending on the weight and size with or without the spring and top spring plate) carefully into the outlet body
- In the process, push the guide down and lift the spindle somewhat so that the disc does not touch down
- Carefully put the disc with the spindle onto the seat



Assembly of the Type 441. 5. Inserting the assembly

1. Objectives | 2. General | 3. General Illustration | 4. Preparation for valve assembly | 5. Disassembly instruction Type 441

5.2 Inserting the assembly (with stainless steel bellows).

Step 5.2-4

- Put on the spring and top spring plate (if not already done)



Step 5.2-6

- Put the bearing washer on the axial needle roller and grease as well



Step 5.2-5

- If a thrust bearing is necessary, then assemble as follows:
Adapt the axial needle roller to the top disc plate and grease
- Tools: Brush, Halocarbon (OI-56 S / 60H)



Assembly of the Type 441. 6. Assembly of the bonnet. 6.1.

1. Objectives | 2. General | 3. General Illustration | 4. Preparation for valve assembly | 5. Disassembly instruction Type 441

6.1 Assembly of the bonnet up to DN65 (with and without bellows) 6.1.1 –”– (without bellows or with elastomer bellows).

Step 6.1.1-1

- Put the bonnet on the body

Step 6.1.1-2

- Screw on the nuts and tighten (torque as per LGS 3323)
- Tools: Open-end spanner, torque wrench



Assembly of the Type 441. 6. Assembly of the bonnet. 6.1 & 6.1.2

1. Objectives | 2. General | 3. General Illustration | 4. Preparation for valve assembly | 5. Disassembly instruction Type 441

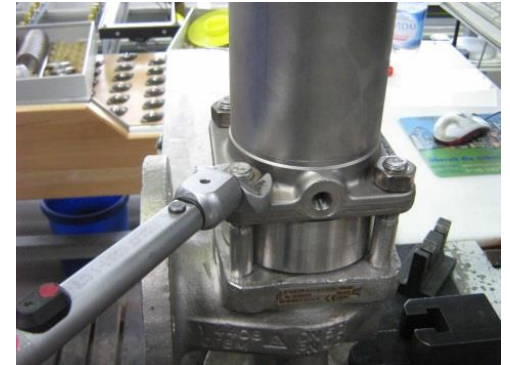
6.1 Assembly of the bonnet up to DN65 (with and without bellows) 6.1.2 Assembly of the bonnet up to DN 65 (with stainless steel bellows).

Step 6.1.2-1

- Put the bonnet on the body

Step 6.1.2-2

- Screw on the nuts and tighten (torque as per LGS 3323)
- Tools: Open-end spanner, torque wrench



Assembly of the Type 441. 6. Assembly of the bonnet. 6.1 & 6.1.2.

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6.1 Assembly of the bonnet up to DN65 (with and without bellows) 6.1.2 Assembly of the bonnet up to DN 65 (with stainless steel bellows).

Step 6.2.1-1

- Put the bonnet on the body and spindle/disc assembly

Step 6.2.1-2

- Put nuts on studs and tighten (torque as per LGS 3323)
- Tools: Open-end spanner, torque wrench



Assembly of the Type 441. 6. Assembly of the bonnet. 6.2 & 6.2.2

1. Objectives | 2. General | 3. General Illustration | 4. Preparation for valve assembly | 5. Disassembly instruction Type 441

6.2 Assembly of the bonnet up to DN 80 (with and without bellows) 6.2.2 Assembly of the bonnet up to DN 80 (with stainless steel bellows).

Step 6.2.2-1

- Put the bonnet on the body and spindle/disc assembly

Step 6.2.2-2

- Put nuts on studs and tighten (torque as per LGS 3323)
- Tools: Torque wrench



Assembly of the Type 441. 7. Installation of the lift stopper

1. Objectives | 2. General | 3. General Illustration | 4. Preparation for valve assembly | 5. Disassembly instruction Type 441

7.1 Lift stopper with ring/sleeve 7.1.1 Procedure for small valves without bellows.

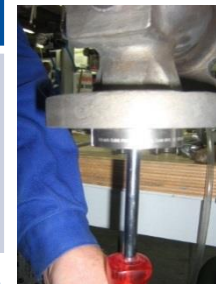
Step 7.1.1-1

- Take the extent to which the lift has to be limited from the order
- Insert the spindle/disc assembly without the spring and spring disc Put on the bonnet and tighten the nuts
Make sure the adjusting screw and spindle are flush



Step 7.1.1-2

- Clamp the body in a vice on the outlet Carefully open the disc with a screwdriver through the inlet up to the end stop
- Tools: Screwdriver



Step 7.1.1-3

- Measure the spindle overlap in an opened state Obtain the lift requested in the order from this measurement and have the lift stopper made
- Tools: Depth gauge



Assembly of the Type 441. 7. Installation of the lift stopper. 7.1.

1. Objectives | 2. General | 3. General Illustration | 4. Preparation for valve assembly | 5. Disassembly instruction Type 441

7.1 Lift stopper with ring/sleeve 7.1.2 Procedure for large valves without bellows.

Step 7.1.2-1

- Carefully put the disc on the seat/nozzle and put the sealing ring in the body



Step 7.1.2-2

- Put the guide on the body and use the depth gauge to measure the path from the top edge of the guide to the top edge of the disc



Step 7.1.2-3

- Deduct the measurement of the guide as well as the desired lift from the order from the total dimensions and have the lift stopper made
- Tools: Depth gauge



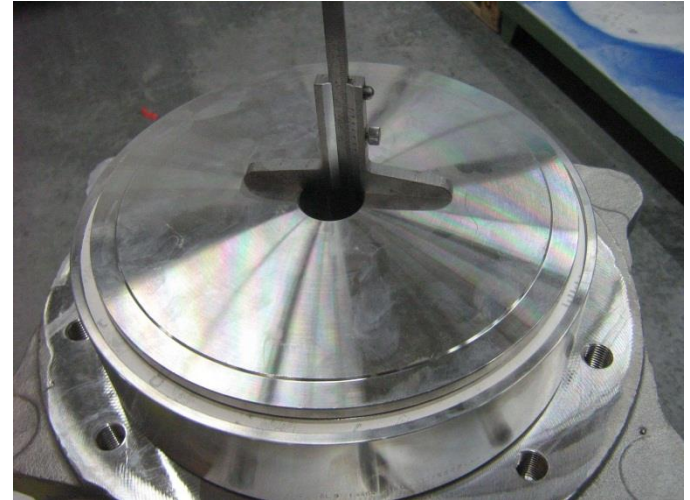
Assembly of the Type 441. 7. Installation of the lift stopper. 7.1.

1. Objectives | 2. General | 3. General Illustration | 4. Preparation for valve assembly | 5. Disassembly instruction Type 441

7.1 Lift stopper with ring/sleeve 7.1.3 Procedure for valves with bellows.

Step 7.1.3-1

- Place the completely assembled disc on the seat and insert the ball
- Put the bellows with the guide in the body, or alternatively the bonnet spacer
- Insert all sealing rings
- Use the depth gauge to measure the distance from the top edge of the guide to the bottom of the bellows, or alternatively to the built-in lift stopper
- Deduct the measurement of the guide as well as the desired lift from the order from the total dimensions and have the lift stopper made
- Tools: Depth gauge



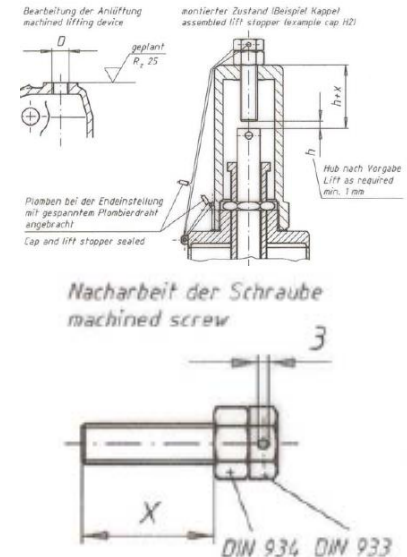
Assembly of the Type 441.7. Installation of the lift stopper. 7.2.

1. Objectives | 2. General | 3. General Illustration | 4. Preparation for valve assembly | 5. Disassembly instruction Type 441

7.2 Lift stopper with set screw (taken from LGS 3324).

Step 7.2-1

- Use a completely assembled valve to measure the distance from the top edge of the cap/lever to the end of the spindle
- Deduct the measurement of the guide as well as the desired lift and have the lift stopper made
- Seal the screws with PTFE tape, screw them in and tighten (torque as per LGS 3325)
- Tools: PTFE tape, depth gauge, open-end spanner



Assembly of the Type 441. 8. Adjusting the set pressure – 8.1 screw assembly.

1. Objectives | 2. General | 3. General Illustration | 4. Preparation for valve assembly | 5. Disassembly instruction Type 441

Step 8.1-1

- Individual parts of the adjusting screw



Step 8.1-2

- Put the bushing in the adjusting screw



Step 8.1-3

- Screw the lock nut on approximately three-quarters of the way down the adjusting screw



Step 8.1-4

- Grease adjusting screw
- Tools: Assembly grease (Molykote Paste), Brush



Assembly of the Type 441. 8. Adjusting the set pressure – 8.1 screw assembly.

1. Objectives | 2. General | 3. General Illustration | 4. Preparation for valve assembly | 5. Disassembly instruction Type 441

Step 8.1-5

- Screw into the bonnet until resistance from the spring is felt



Step 8.1-6

- Secure the spindle from turning with a pin punch
- Tools: Open-end spanner, pin punch



Step 8.1-8

- Secure the adjusting screw with the lock nut
- Afterwards, check the set pressure once again
- Tools: Open-end spanner



Step 8.1-7

- Slowly pressurise the valve on the test bench to find out whether the valve opens at the set pressure. The set pressure of the valve has been reached when you can hear air escaping. Full opening must be achieved. If the valve opens outside the stipulated set pressure tolerance, then the adjusting screw must be adjusted again. → Turning in a clockwise direction causes the valve to open at a higher pressure → Turning in an anti-clockwise direction causes the valve to open at a lower pressure
- Release the pressure when readjusting the adjusting screw. Readjust the adjusting screw and then pressurise the valve again.



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Assembly of the Type 441. 8. Adjusting set pressure – 8.2 seat tightness P12.

1. Objectives | 2. General | 3. General Illustration | 4. Preparation for valve assembly | 5. Disassembly instruction Type 441

This test is performed for **every valve** after setting the pressure.
The exact execution of the test is described in WI 0007.00 .

9. Assembly of the cap/lever – 9.1 Assembly of cap H2

Step 9.1-1

- Grease the thread and sealing face of the cap
- Tools: Brush, Halocarbon (OI-56 S / 60H)



Step 9.1-2

- Put on the E-CTFE sealing ring if it is shown in the parts list
- **Caution:** The sealing ring may only be used once. If it is necessary to disassemble the cap, the sealing ring must be replaced



Step 9.1-3

- Screw on the cap and tighten with a spanner (torque as per LGS 3323)
- Tools: Open-end spanner, torque wrench



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Assembly of the Type 441. 9. Assembly of the cap/lever – 9.2 lever H3.

1. Objectives | 2. General | 3. General Illustration | 4. Preparation for valve assembly | 5. Disassembly instruction Type 441

Step 9.2-1

- Push the spindle cap onto the spindle
- Use a pin and retaining clip to secure



Step 9.2-2

- Put clamping screw into H3 cap at designated place
- Tool: Ring spanner



Step 9.2-3

- Grease the thread of the lever and screw it onto the bonnet (lever must be opposite from outlet)
- Tools: Brush, Halocarbon (OI-56 S / 60H)



Step 9.2-4

- Insert the lifting lever into the spindle cap and fasten with a pin and retaining washers
- Tools: pliers



Disassembly of type 526. 10. Removing the studs from the body.

1. Objectives | 2. General | 3. General Illustration | 4. Preparation for valve assembly | 5. Disassembly instruction Type 441

Step 9.2-5

- Make sure that the lever has enough play to vent



Step 9.2-6

- Tighten the clamping screw on the lever
- Tools: Ring spanner



Step 9.2-7

- Completely assembled lever H3
- Tools: Open-end spanner



Assembly of the Type 441. 9. Assembly of the cap/lever – 9.3 lever H4.

1. Objectives | 2. General | 3. General Illustration | 4. Preparation for valve assembly | 5. Disassembly instruction Type 441

Step 9.3-1

- Put the spindle cap onto the spindle and secure with a pin and retaining clip



Step 9.3-2

- Put on the E-CTFE sealing ring if it is shown in the parts list
- Caution: The sealing ring may only be used once
If it is necessary to disassemble the cap, the sealing ring must be replaced



Step 9.3-3

- Align the lever with sealing rings so that the lever arm is parallel to the outlet
- Caution: If multiple E-CTFE sealing rings have to be used, then a metal sealing ring must be inserted between each of them
- Grease the lever and matching sealing rings
- Put them on and tighten with an open-end spanner (torque as per LGS 3323)
- Tools: Open-end spanner



Assembly of the Type 441. 10. Insertion of the lift indicator.

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Step 10-1

- Individual parts of the lift indicator



Step 10-2

- Put the cap into position as described in 10.3 and secure
- Tools: Open-end spanner



Step 10-3

- Put the eccentric hole of the holder into such a position that the collar of the spindle cap would seal on top with the edge of the lift indicator
- Tools: Depth gauge



Assembly of the Type 441. 10. Insertion of the lift indicator.

1. Objectives | 2. General | 3. General Illustration | 4. Preparation for valve assembly | 5. Disassembly instruction Type 441

Step 10-4

- Secure the position with a lock nut

Step 10-5

- Screw the lift indicator into the collar of the spindle cap as far as it will go
- Then unscrew it one complete turn.
Secure the position of the lift indicator by tightening the first nut hand tight.
Then lock with a second nut
- Tools: Open-end spanner Depth gauge



Assembly of the Type 441. 11. Assembly of the test gag.

1. Objectives | 2. General | 3. General Illustration | 4. Preparation for valve assembly | 5. Disassembly instruction Type 441

Step 11-1

- Grease the sealing surface of the short bolt
- Tools: Brush, Halocarbon (OI-56 S / 60H)



Step 11-2

- Put on the sealing ring and grease it as well
- Tools: Brush, Halocarbon (OI-56 S / 60H)



Step 11-3

- Screw the test gag into the cap or lever and tighten
- Tools: Torque wrench



Assembly of the Type 441. 12. Assembly of the O-ring-damper. 12.1.

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12.1 O-ring-damper H2 (Option code: J65).

Step 12.1-1

- Individual parts of the O-ring damper H2 (Option code: J65)



Step 12.1-2

- Put the support sleeve onto the adjusting screw



Step 12.1-3

- Put O-ring onto the spindle over the support sleeve
- The O-ring must not sit on the cross hole or a thread, if this is present



Step 12.1-4

- Put the counter ring onto the O-ring or support sleeve



Assembly of the Type 441. 12. Assembly of the O-ring-damper. 12.1.

1. Objectives | 2. General | 3. General Illustration | 4. Preparation for valve assembly | 5. Disassembly instruction Type 441

12.1 O-ring-damper H2 (Option code: J65).

Step 12.1-5

- Put pressure spring onto the counter ring



Step 12.1-7

- Tighten the cap with an open-end spanner
- Tools: Open-end spanner



Step 12.1-6

- Grease the cap on the thread
- Tools: Brush, Halocarbon (OI-56 S / 60H)



Assembly of the Type 441. 12. Assembly of the O-ring-damper. 12.2.

1. Objectives | 2. General | 3. General Illustration | 4. Preparation for valve assembly | 5. Disassembly instruction Type 441

12.2 O-ring-damper H4 (J66).

Step 12.2-1

- Individual parts of the O-ring damper H4 (Option code: J66)



Step 12.2-3

- Individual parts of the O-ring damper H4



Step 12.2-2

- Fasten the O-ring damper on the spindle with a steel pin and retaining clip
- Then assemble the H4 lever cover as described in 12.2-4



Step 12.2-4

- Put the first O-ring - counter ring - second O-ring - support sleeve - spring - cap onto the lever one after the other



Assembly of the Type 441. 13. Testing the seal tightness of the back seal P21.

1. Objectives | 2. General | 3. General Illustration | 4. Preparation for valve assembly | 5. Disassembly instruction Type 441

This test is performed in **every gas-tight valve** after ist assembly.

14. Sealing of safety valve

Step 14-1

- If structurally possible (sealing hole/lug on cap/lever and bonnet exist), seal the valve. Otherwise sealing lugs must be welded on at the closest workstation
- Closely connect the sealing hole or lug from the cap/lever and bonnet in a clockwise direction and seal the ends of the wire with a lead seal
- If classification approvals (TÜV etc.) are required, then seal afterwards
- Tools: Sealing pliers, lead seal, seal wire



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Thank you for your attention.



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