ARMATUREN GmbH

Installation, Operating and Maintenance Manual Overflow Regulator Type 94/ 94 E

Table of content

*Will be enclosed here depending on the scope of the order

1. General on installation, operating and maintenance manual

1.1 Hazard notices

These instructions comply with EC safety standards, EC directive 97/23/EC (Pressure Equipment Directive) and the relevant rules and regulations of the Federal Republic of Germany.

When the valve is used outside the Federal Republic of Germany, those responsible for the design and operation of the plant must ensure that the relevant standards and national rules and regulations are observed.

This manual contains the instructions to install and operate the valve safely and in the prescribed manner. If difficulties or problems arise that cannot be solved with the aid of this manual, further information can be obtained from the manufacturer. Ignoring the above may cause damage to property, environmental damage and personal injury.

The manufacturer reserves all rights to make technical changes and improvements at any time.

The use of these instructions requires the user to be qualified as described in Section 1.2. The operator has to receive training according to the instructions.

1.2 Qualified staff

Qualified staff are persons who from their training and experience are familiar with the installation, mounting, commissioning, operation and maintenance of the regulator apply.

They may carry out inspections, functional checks, maintenance and re-commissioning. At plants regulated by the German Association for Gas and Water (DVGW), a second person must be present.

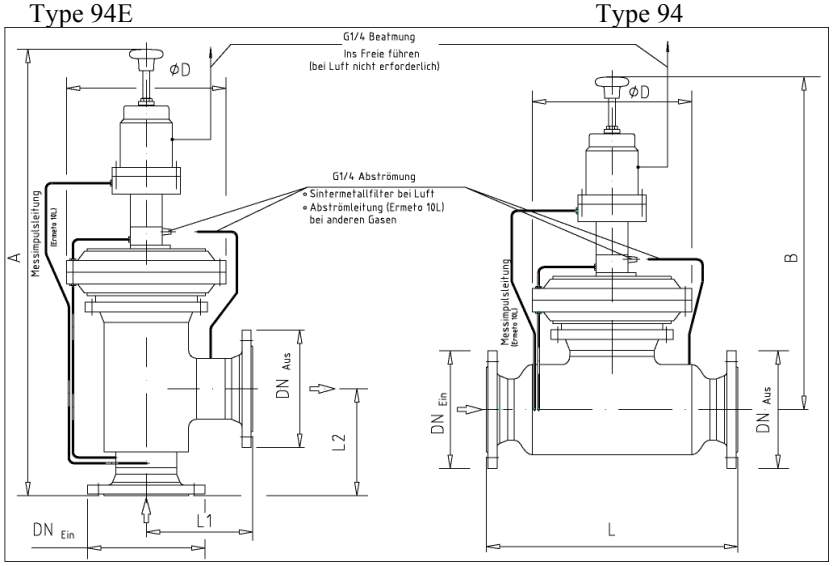
2. Functional description

The Type 94 overflow regulator protects against rising operating pressure upstream. It consists of a control regulator (I) and an actuator (II) (see sectional drawing).

The regulator cannot be used not as a check valve.

The angle design version of the regulator is called Type 94 E. The function and mode of operation remain the same (see figure below).

Type 94E



Type 94

Optionally, a vent silencer to reduce noise (see spare parts drawing 4) can be supplied or an external control nozzle (see spare parts drawing 5) can be installed. This does not have any influence on the function.

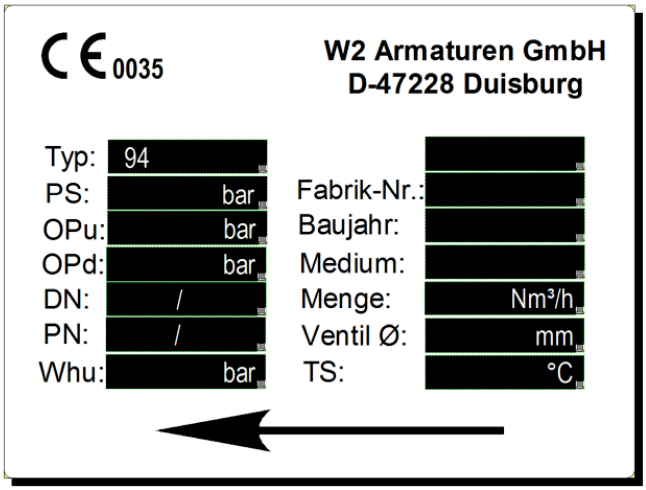
2.1 Identification

The component is identified with a hard stamp on the valve body and nameplate.

Valve body:

Factory number
Material, possibly according to APZ,
DN PN, material and standard of the flanged joints

Nameplate:

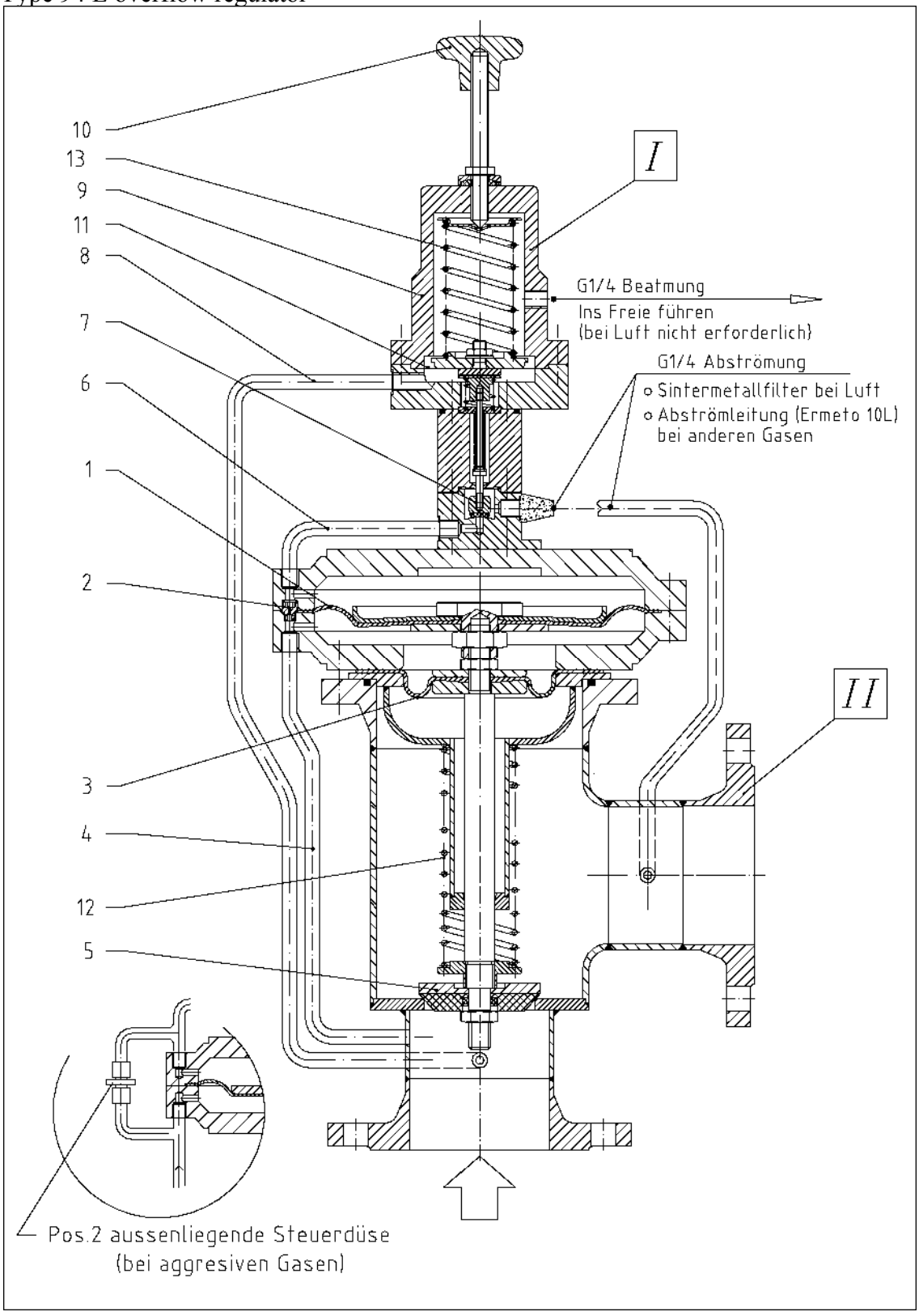


PS: Pressure Stage
OPu: Operating Pressure Upstream
OPd: Operating Pressure Downstream
DN: Nominal Width
PN: Rated Pressure
W_{ds}: Specific Set Input Range (Adjustment Range)

2.2

Sectional drawing/installation example

Type 94 E overflow regulator



2.3 Function (according to the sectional drawing)

The operating pressure upstream (OPu) is present at the bottom of the cone valve 5 and on the upstream pipe 4 on the compensation diaphragm 3 and under the working diaphragm 1; also over the control nozzle 2 in the top diaphragm chamber.

When the compressor starts, that is, with rising upstream pressure the overflow regulator opens, as the pressure above the working diaphragm 1 increases more slowly than in the lower diaphragm chamber because of the control nozzle 2. The cone valve 5 closes again when the pressure in the two diaphragm chambers has been equalised.

If the upstream pressure which passes via the control line 8 to the control regulator the set point of the set-point spring 13, the control valve 7 and opens and releases the gas from the top diaphragm chamber through the control line 6. This creates a pressure difference on the working diaphragm 1, which causes the valve cone 5 top open.

The discharge pressure is adjusted by the handwheel 10. Right turn increases the pressure.

3. Installation, operating instructions

3.1 Installation/assembly

The overflow regulator can be installed horizontally or vertically. In horizontal installations, the control regulator is mounted upright next to the actuator.

The control regulator is available in UH or UN versions. The Type UH is rated for operating pressures up to 7.5 bar, the Type UN is used under 1 bar. It has a larger diaphragm and thus a larger diaphragm housing, although this does not affect the function.

Outlet pressure	Drawing number	Control group (CG)
Control regulator UN		
0.01 - 0.12	4-St-12/DN/4	5/2.5
0.12 - 0.30	4-St-12/DN/5	2.5
0.30 - 0.60	4-St-12/DN/6	1
0.60 - 0.75	4-St-12/DN/7	1
0.75 - 1.00	4-St-12/DN/8	1
Control regulator UH		
0.05 - 0.30	4-St-12/DH/4	2.5
0.30 - 1.00	4-St-12/DH/5	2.5
1.00 - 1.90	4-St-12/DH/6	2.5
1.90 - 2.90	4-St-12/DH/7	1
2.90 - 4.30	4-St-12/DH/8	1
4.30 - 7.50	4-St-12/DH/9	1

Other adjustment ranges on request

The control group according to DIN 3380 refers to the permissible deviation from the set point in percentage. CG 5 means that it may deviate by 5% up or down.

An on-site pressure test with water is not possible.

3.2 Commissioning

After the regulator has been properly installed, commissioning can proceed as follows:
- Slacken the set-point spring of the control regulator, that is, the controller opens when excess pressure is applied.
- Close the gate valve on the pressure side.
- Start the blower.
- Slowly tension the set-point spring of the control regulator until the desired discharge pressure is reached.
- Secure the handwheel with lock nut.

The overflow regulator is ready for operation. Slowly reopen the pressure side gate valve.

To achieve the preset pressure, the spindle must be screwed in after dismantling until it stops. Only then the preset value specified in the enclosed documentation is reached.

4. Inspection and maintenance tasks

4.1 Inspection / maintenance

Special maintenance of the Type 94 overflow regulator is not required. Malfunctions can occur only through dirt or damage to individual components.
The maintenance intervals depend on the operating conditions and the nature of the gas used. Rigid maintenance intervals are therefore not specified, the responsibility lies with the operator.

4.2 Special maintenance instructions

The actuator (as per spare parts drawing 1) must be checked during maintenance to ensure that the cone valve 13 does not leak; the diaphragms 3, 18 must also be checked for wear and external leakage.
The cone valve 13 is tight if during plant operation no significant rise in temperature occurs, or no audible overflow occurs (preset set-point value is not reached). To remove the cone valve 13, first loosen the screws 25 and remove the diaphragm housing. Now the working diaphragm 3 can be unscrewed. Once the screws 19 have been loosened, the compensation diaphragm 18 can be removed as a unit with the valve suspension 9, the valve guide 7 and the cone valve 13.
All the wear parts can be replaced after dismantling.

During installation, make sure that the items 4, 11, 12 and 20 are also replaced. The cone valve 13 must be centred on the valve seat so that the compensation diaphragm 18 is automatically centred in the lower diaphragm housing 23 during installation. When installing the working diaphragm 3, make sure that the maximum preset valve travel is reached again. For this purpose, the following equation can be used as a rule of thumb: Valve travel [mm] = valve Ø [mm] x 0.25.
The valve travel is measured between the membrane suspension 27 and top diaphragm housing 1.

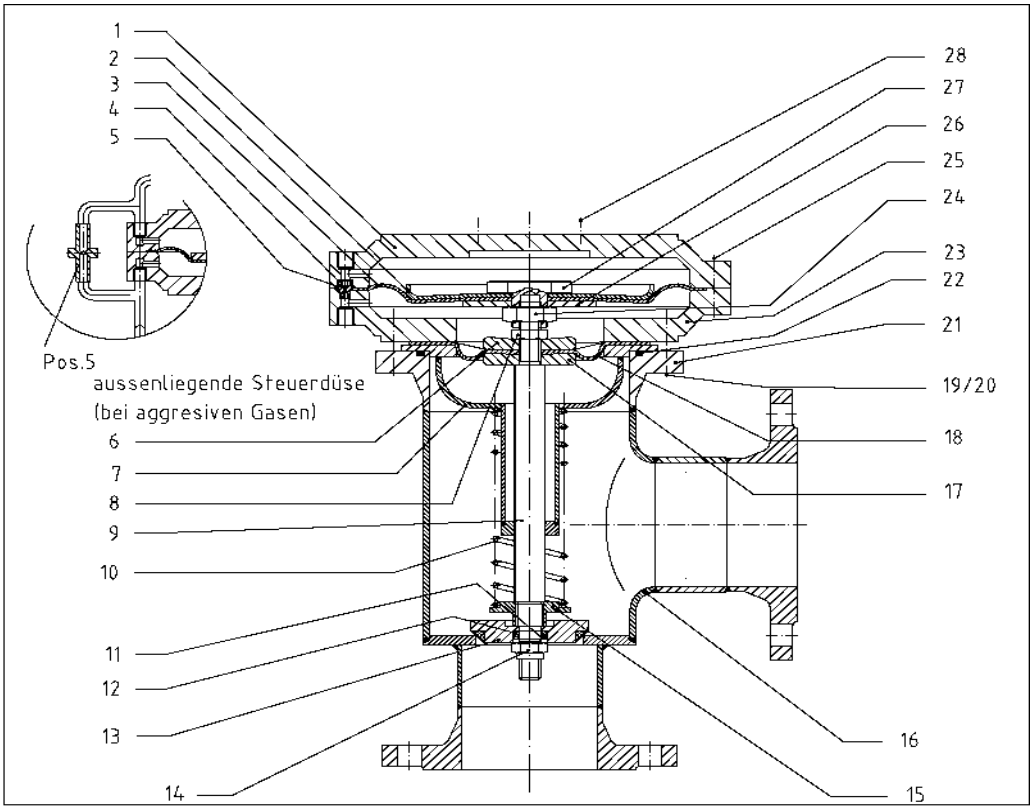
The control regulator *Type UH / UN* (as per spare parts drawings 2, 3) must be dismantled from the main unit for maintenance purposes. Before every disassembling of the control regulator the set point spring 12 must be released with the palm grip 17. During maintenance, the diaphragm 8, the control regulator insert (2, 3, 4) and the control valve 1 in particular must be checked for wear.
By loosening the screws 19, the diaphragm 8 can be taken out along with the suspension 7 and checked. By unscrewing the spring cap 6 and loosening the screws 21 and 27 as well as the nut 28, the control valve 1 can be unscrewed from the control regulator insert (2, 3, 4), the insert removed and checked. To maintain its general operational reliability, the insert should be replaced at least every 3 years. When assembling, make sure that:
- The control valve 1 is screwed to about a ¼ turn before the stop on the control regulator insert (2, 3, 4).
- The spring cap 6 on the control regulator insert (2, 3, 4) is screwed on only to the extent that when pressing down the spring cap 6, the loosely connected regulator foot 26 is lifted about 2 mm from the seat of the regulator body 24 by the control valve 1.

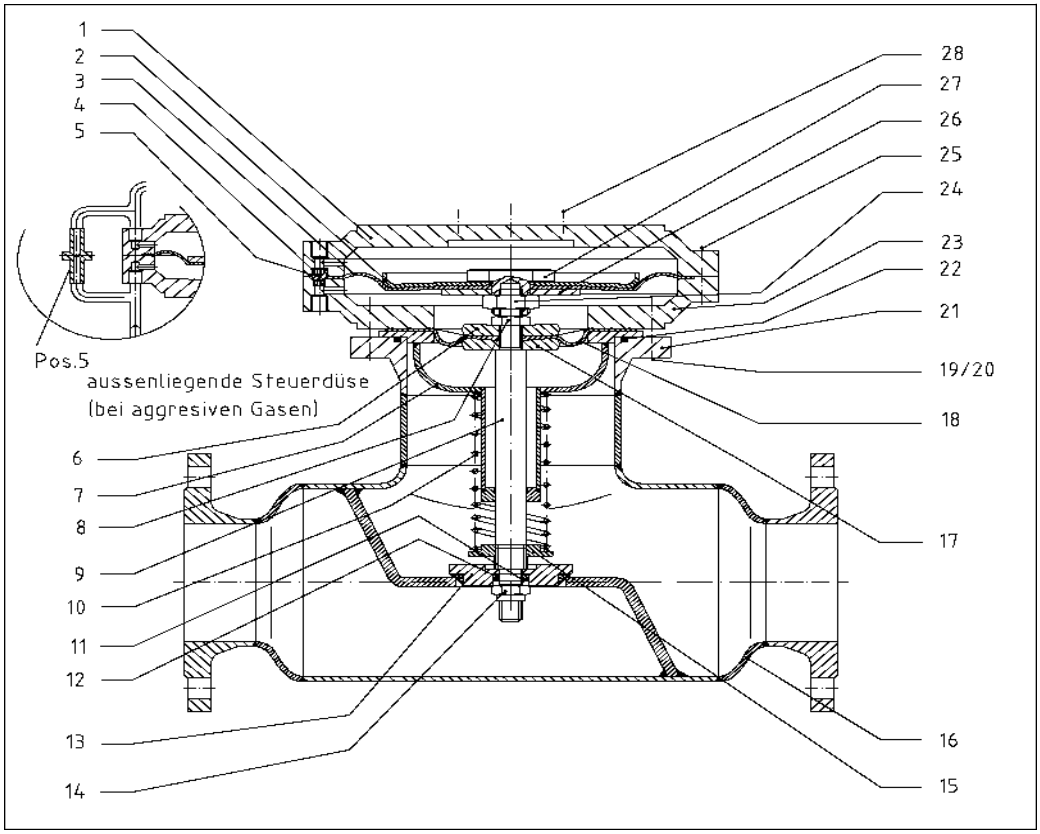
4.3 Inspection before commissioning / recurring service inspections

The operator must do and document service inspections before commissioning and at regular time intervals.
Inspections relating to, among other, compliance with the construction requirements, equipment integration, leaks and function.

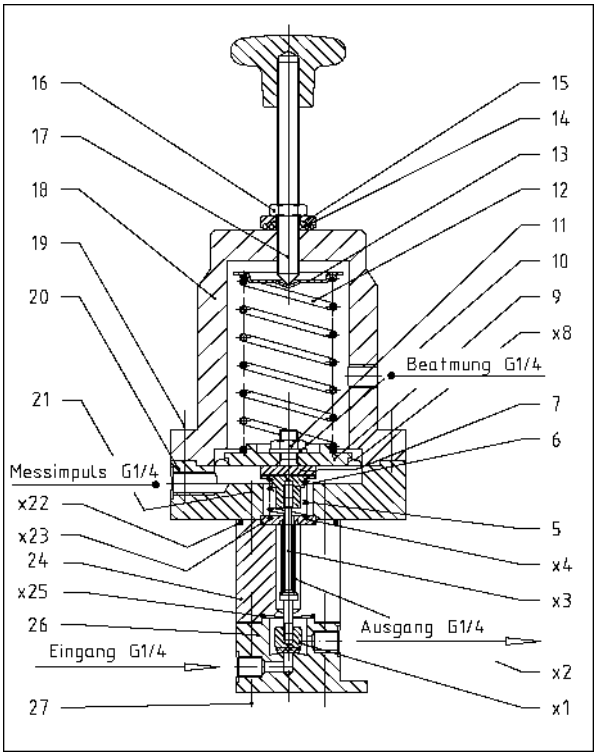
5. Technical documentation

5.1 Spare parts drawing 1 Actuator Type 94E/ Type 94

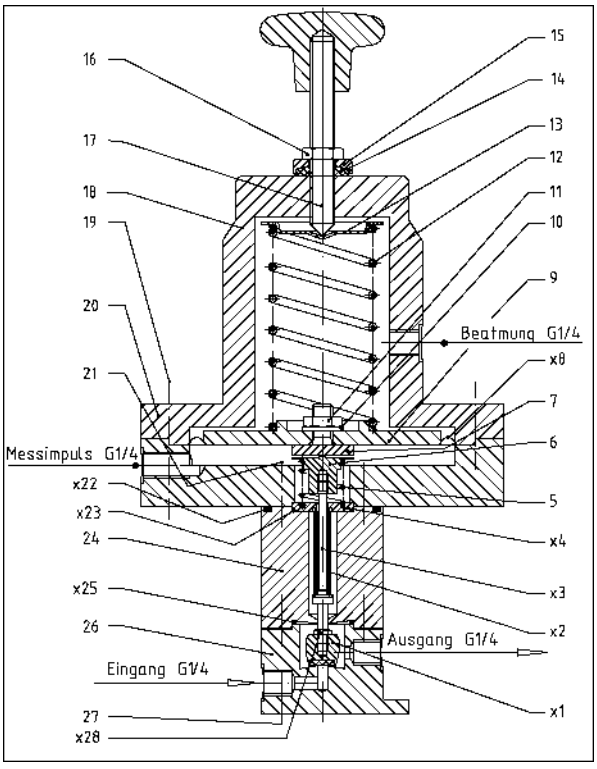




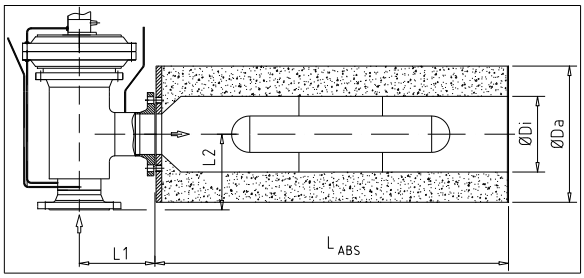
Spare parts drawing 2 Control regulator Type UH



Spare parts drawing 3 Control regulator Type UN



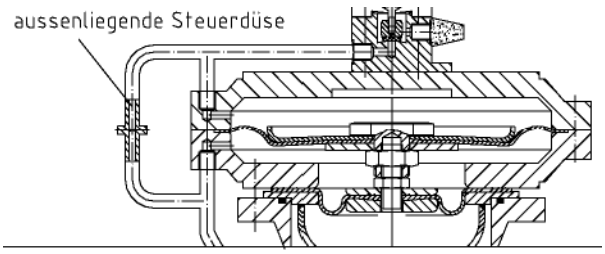
Spare parts drawing 4 Vent silencer



Venting noises by the overflow regulators discharging gas into the atmosphere when opened can effectively be reduced with a flange mounted silencer.
The absorption silencer only generate a low back pressure and act in a relatively wide frequency spectrum. They are designed for the specific application and dampen sound up to 20 dB.

Outlet flange	L_{ABS} [mm]	D_i [mm]	D_a [mm]
DN 50 - 150	1500	200	360
From DN 200	Design according to requirement		

Spare parts drawing 5 External control nozzle



The external control nozzle is used when:
- Dirt and blockage are expected or when wet gas is present.
- Easier and faster access to the control nozzle is required.

10L Ermeto fittings are used standard to connect the control nozzle.

5.2 Spare parts list

x: Keep wear parts in stock for maintenance.
The storage requirements of the respective manufacturers apply.

Spare parts list 1 Actuator Type 94 / Type 94E

Item	Quantit	Unit	Designation	Standard / drawing number	Material / remarks
1	1	Piece	Diaphragm housing, top	4-132-1/	GGG 40 / St
2	1	Piece	Diaphragm plate, working	4-132-2/	St, chromated
x3	1	Piece	Working diaphragm	4-132-3/	Perbunan/Viton
x4	1	Piece	Control nozzle seal	8 x 12 x 6	Perbunan
5	1	Piece	Control nozzle/ external Control	4-132-5 / 4-94-5	VA
6	1	Piece	Diaphragm disc, top	4-132-20	Al
7	1	Piece	Valve guide		St, chromated
x8	1	Piece	Hexagon nut	DIN 439, M16	St, galvanised
9	1	Piece	Valve suspension	4-	VA
x10	1	Piece	Closing spring	4-132-29	Spring steel C,
x11	2	Piece	Sealing ring	DIN 7603 A,16x24x1 .5	Cu
x12	1	Piece	O-ring	16 x 5	Perbunan
x13	1	Piece	Cone valve	4-132-13/	St, Perbunan/ Viton
x14	1	Piece	Locknut	DIN 985, M16	St, galvanised
15	1	Piece	Spring cup	4-94	Al/VA
16	1	Piece	Body	4-94	St
17	1	Piece	Diaphragm disc, bottom	4-132-20	Al
x18	1	Piece	Compensation diaphragm		Perbunan/Viton
19	8/12	Piece	Allen screw	DIN 912, M12x35/40	8.8, galvanised
x20	8/12	Piece	Sealing ring	DIN 7603 A, 12x18x1 ,5	Cu
21	1	Piece	Body flange	4-132-32/	C22.8
x22	1	Piece	Round packing cord/O-ring	~ 5 / ~ 168x5	Perbunan
23	1	Piece	Diaphragm housing, bottom		GGG 40 / St
24	1	Piece	Hexagon nut	DIN 431, G3/4	St, galvanised
25	12	Piece	Allen screw	DIN 912, M10x35/40	8.8, galvanised
26	1	Piece	Membrane disc, working diaphragm	4-132-34	St, galvanised
27	1	Piece	Membrane suspension, working	G 3/4	Al
28	2	Piece	Allen screw	DIN 912, M8x16	8.8, galvanised

Spare parts list 2, 3 Control regulator Type UH/ UN

Item	Quantity	Unit	Designation	Standard / drawing number	Material / remarks
x1	1	Piece	Control valve	4-St-1/D//a	Ms
x2	1	Piece	Spring body	4-St-2	Bronze
x3	1	Piece	Valve suspension	4-St-3/D	VA
x4	1	Piece	Solder flange	4-St-4	VA
5	1	Piece	Closing spring	4-St-5	VA spring steel
6	1	Piece	Spring cap	4-St-6	VA
7	1	Piece	Diaphragm suspension	4-St-7	VA
x8	1	Piece	Diaphragm	4-St-8/...	Perbunan
9	1	Piece	Diaphragm plate	4-St-9/...	Al
10	1	Piece	Disc	DIN 125; 10.5x2.5; Form B	St, galvanised
11	1	Piece	Hexagon nut	DIN 439; M10;	St, galvanised
12	1	Piece	Set point spring	4-St-1 2/...	Spring steel C,
13	1	Piece	Spring cup	4-St-13	St, chromated
14	1	Piece	Stem seal	4-St-14	Perbunan
15	1	Piece	Press ring	4-St-15	Ms
16	1	Piece	Hexagon nut	DIN 431; G1/4;	St, galvanised
17	1	Piece	Palm grip with spindle	4-St-1 7	Ms; Duroplast
18	1	Piece	Diaphragm housing, top	4-St-18/...	Al
19	8	Piece	Allen screw	DIN 912; M6x20;	8.8, galvanised
20	1	Piece	Diaphragm housing, bottom	4-St-20/...	Al
21	4	Piece	Allen screw	DIN 912; M6x25;	8.8, galvanised
x22	1	Piece	O-ring	48 x 4	Perbunan
x23	1	Piece	O-ring	26 x 2	Perbunan
24	1	Piece	Regulator body	4-St-24/D	Al
x25	1	Piece	O-ring	26 x 2	Perbunan
26	1	Piece	Regulator foot	4-St-26/D//a	Al
27	4	Piece	Allen screw	DIN 912; M6x50; 8.8	8.8, galvanised

6. Disposal

Environmental damage can occur during disposal when the equipment still contain poisonous fluid residues.

It is therefore essential to ensure that the equipment is cleaned and free of fluid residues before disposal.

After that, all materials can be disposed of according to the regulations applicable at the operating site.