GESTRA Steam Systems

PA 46
PA 47
MPA 46
MPA 47

Installation Instructions 818447-00

Rapid-Action Intermittent Valve for Removing Boiler Sludge
PA 46, PA 47, MPA 46, MPA 47

Contents

Contents - continued -

Page

Important Notes

Usage for the intended purpose

PA 46, PA 47, MPA 46, MPA 47:
Use the *rapid-action intermittent valves**) only for removing boiler water containing accumulated non-metallic sediments from steam boilers within the admissible pressure und temperature ratings.

Use only compressed air (at room temperature) or pressurized water (at room temperature) as control fluid for the GESTRA diaphragm actuator in accordance with the specified pressure/temperature ratings.

Application in potentially explosive atmospheres as classified according to Annex I of ATEX Directive 94/9/EC.

***) Please note:**
In British English an intermittent valve for removing boiler sludge is referred to as "**(intermittent) bottom blowdown valve**".

In American English the term "**(intermittently operating) blowoff valve**" is used, but only in conjunction with a slow-opening valve (ASME code).

Safety Note

The equipment must only be installed and commissioned by qualified and competent staff.
Retrofitting and maintenance work must only be performed by qualified staff
who – through adequate training – have achieved a recognised level of competence.

Danger

The valve is under pressure during operation.
When loosening flanged connections, sealing plugs or stuffing boxes, hot water and steam may escape.

Before carrying out installation and maintenance work make sure the system is depressurized.
Isolate the valve from both upstream and downstream pressure.
Depressurize control lines!

The valve becomes hot during operation.
This presents the risk of severe burns to hands and arms.
Before carrying out installation and maintenance work make sure that the valve is cold.

Risk of severe burns and scalds to the whole body!
Before carrying out any maintenance work on the valve or loosening flanged connections, stuffing box unions or sealing plugs make sure that all connected lines are depressurized (zero bar) and cooled down to room temperature (20 °C).

During operation moving internals can pinch one's hands or fingers, causing severe injuries. Do not touch the valve during operation! The intermittent valves for removing boiler sludge MPA 46, MPA 47 are time controlled and can open and close abruptly.

Sharp edges on internals present a danger of cuts to hands. Always wear industrial gloves when replacing the packing, valve seat or valve plug!

Important Notes - continued -

Classification pursuant to Article 9 of the Pressure Equipment Directive (PED) 97/23/EC

Type	PA 46, PA 47				MPA 46, MPA 47			
Fluid	Gas, steam		Liquid		Gas, steam		Liquid	
Fluid group	1	2	1	2	1	2	1	2
Application	no	yes	no	yes	no	yes	no	yes

Type	PN	CLASS	Nominal size DN	
			Exception pursuant to article 3.3	Category I
MPA 46		CL 150	20, 25, 32, 40, 50	
MPA 46		CL 300	20, 25, 32	40, 50
MPA 46	PN 40		20, 25, 32	40, 50
MPA 47		CL 400	25	40, 50
MPA 47	PN 63		25	40, 50
PA 46		CL 150	20, 25, 32, 40, 50	
PA 46		CL 300	20, 25, 32	40, 50
PA 46	PN 40		20, 25, 32	40, 50
PA 47		CL 400	25	40, 50
PA 47	PN 63		25	40, 50
CE Marking			**no**	**CE 0525**

Classification pursuant to Annex 1 of ATEX Directive 94/9/EC

Type	PA 46, PA 47	MPA 46, MPA 47
Equipment group	II	II
Equipment category	2	2
Potentially explosive atmosphere (1999/92/EC)	1, 2, 21, 22	1, 2, 21, 22
CE Marking / EX Marking	CE Ex II 2 G/D c X	CE Ex II 2 G/D c X
Marking "X"	The equipment itself does not generate inadmissibly high surface temperatures. The user must make sure that the operating fluid does not generate inadmissibly high surface temperatures.	

Explanatory Notes

Scope of supply

PA 46
1 Intermittent valve for removing boiler sludge PA 46
1 Hand lever
1 Installation manual

PA 47
1 Intermittent valve for removing boiler sludge PA 47
1 Hand lever
1 Installation manual

MPA 46
1 Intermittent valve for removing boiler sludge MPA 46
1 Installation manual

MPA 47
1 Intermittent valve for removing boiler sludge MPA 47
1 Installation manual

Retrofitting kit for PA 46, PA 47
1 Diaphragm actuator
1 Spacer disc
1 Installation manual

Hand lever for emergency operation
1 Hand lever for emergency operation
1 Forkhead G 10 x 20, DIN 71752
1 Hexagon-head cap screw

Spare Parts
1 Kit according to spare parts list (see page 29)

Explanatory Notes - continued -

Description

Intermittent valves for manual or automatic and programme-controlled removing of boiler sludge from land or marine installations, particularly if these installations are operated without constant supervision in accordance with TRD 604. Sludge sediments, which are accumulated precipitates from boiler water that settle at the bottom of the boiler, will be removed from the steam boiler with the the aid of valves PA and MPA. These valves give the boiler a short blow at regular intervals, thereby discharging accumulated sludge and sediments.

- **PA 46** and **PA 47** are designed for manual operation (diaphragm actuator can be retrofitted).
- **MPA 46** and **MPA 47** feature a diaphragm actuator for compressed air or pressurized water.

Function

The intermittent valves for removing boiler sludge PA 46 and PA 47 are openend by means of a hand lever. A pressure pin forces the spring-loaded valve plug out of the valve seat. The large cross-sectional area of the orifice creates a suction effect, giving a short-term high water flow which will discharge the precipitated sludge and sediments and - if installed - move them to a mixing cooler (= blowdown receiver). The intermittent valve for removing boiler sludge must be completely opened for about 2 seconds with the aid of the hand lever in order to give the boiler a short and highly effective blow.

The intermittent valves for removing boiler sludge MPA 46 and MPA 47 are openend by the diaphragm actuator. The guide pin of the diaphragm actuator acts upon the pressure pin, which in turn forces the spring-loaded valve plug out of the valve seat. The large cross-sectional area of the orifice creates a suction effect, giving a short-term high water flow which will discharge the precipitated sludge and sediments and - if installed - move them to a mixing cooler (= blowdown receiver). Compressed air (at room temperature) or pressurized water (at room temperature) can be used as control fluid for the diaphragm actuator in accordance with the specified pressure and temperature ratings (see diagram on page 11).

The duration of the bottom blowdown, i. e. the time when the valve is open, should be approx. 2 seconds. The time period when the valve remains closed and hence the frequency of the bottom blowdown must be established as a function of the size and capacity of the steam boiler. We recommend that approx. 10 per cent of the total amount of boiler water to be removed is discharged via the intermittent valve for removing boiler sludge.

The duration and frequency of the bottom blowdown must be established individually by the user as a function of the size and capacity of the steam boiler, the boiler water quality and the corresponding load.

Technical Data

Connections		
Type	**Standard**	**On request**
(M)PA 46	Flanges to DIN, PN 40	Flanges to Class 150, 300 Butt-weld ends for DIN and ASME pipes Socket-weld ends for DIN and ASME pipes
(M)PA 47	Flanges to DIN, PN 63	Flanges to Class 400 Butt-weld ends for DIN and ASME pipes Socket-weld ends for DIN and ASME pipes

Pressure Ratings		
(M)PA 46	EN – PN 40	Class 150, 300
(M)PA 47	EN – PN 63	Class 400

Materials			
Designation	DIN EN	DIN	ASTM
Body *) PA..., MPA...	P250GH (1.0460)	C 22.8 (1.0460)	A 105
Stuffing box union *)	P250GH (1.0460)	C 22.8 (1.0460)	A 105
Sealing plug *)	42CrMo4 (1.7225)		A193 B7
Gasket	X5CrNi18-10 (1.4301)	X 5 CrNi 18 10 (1.4301)	
Seat, hardened	X46Cr13 (1.4034)	X 46Cr 13 (1.4034)	
Valve cone, hardened	X39CrMo17-1 (1.4122)	X 35 CrMo 17 (1.4122)	
Disk springs	51CrV4 (1.8159)	50 CrV 4 (1.8159)	
Compression springs	DIN EN 10270-1-SH	DIN 17223-C	
Diaphragm actuator		StW 23 (1.0334)	
Packing	PTFE-silk		
Control membrane	EPDM		

Pressure / Temperature Ratings
Acc. to EN 1092-1 for 1.0460 acc. to PED and AD 2000 or A 105 acc. to PED

	Ratings according to		max. pressure [bar] at t =				Control fluid	Control pressure
			100 °C	200 °C	300 °C	ts/p max		
(M)PA 46	PN 40 1.0460	EN 1092-1	37.3	30.2	25.8	234/29	Water or com-pressed air	Max. 8 bar
	PN 40 A105	EN 1092-1	40	37.9	33.5	246/36		
	Class 150 A105	ASME B16.34	17.7	14.0	10.2	198/14		
	Class 300 A105	ASME B16.34	46.4	43.9	38.9	254/41		
(M)PA 47	PN 63 1.0460	EN 1092-1	58.8	47.6	40.6	257/44		
	PN 63 A105	EN 1092-1	63	59.6	52.7	271/55		
	Class 400 A105	ASME B16.34	61.8	58.4	51.7	270/54		

Technical Data - continued -

Corrosion resistance

If the unit is used for the intended purpose, its safety is not impaired by corrosion.

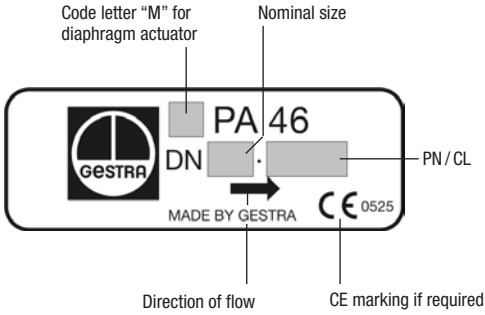
Sizing

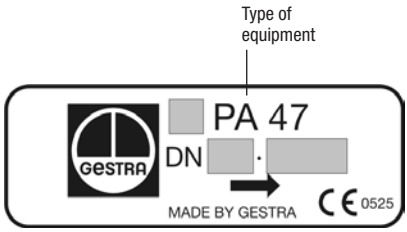
The housing must not be subjected to sharp increases in pressure. The dimensional allowances for corrosion reflect the latest state of technology.

Name plate / Marking

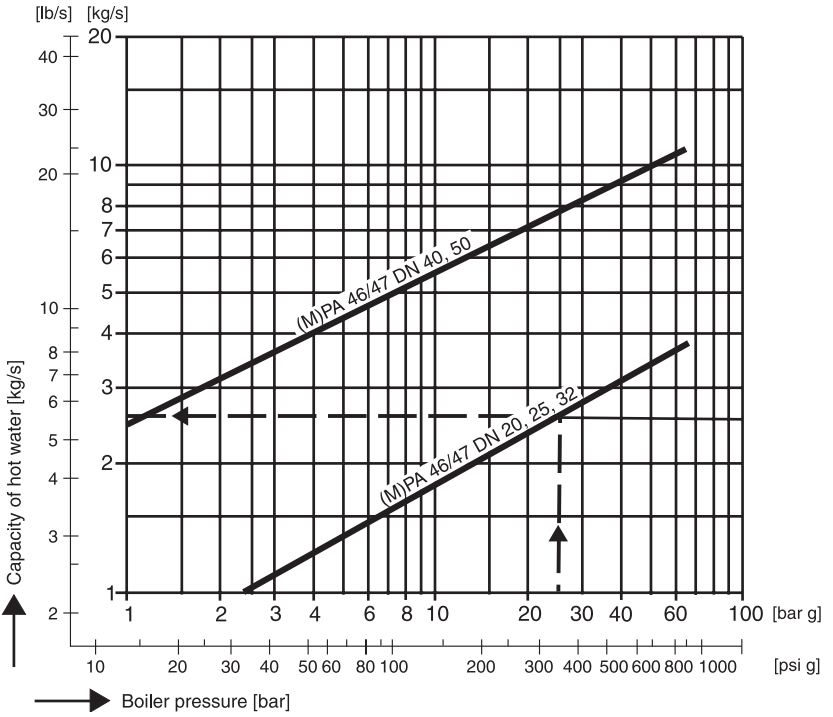
According to EN 19 the name plate and the housing indicate the valve type and design:

- Type designation — PA 46, PA 47: Design with hand lever; MPA 46, MPA 47: Design with diaphragm actuator
- Marking according to ATEX: Marking: CE Ex II 2G/D c X
- Stamp on valve body, e. g. $\frac{4}{04}$ indicates term and year of production (Example: 4th quarter 2004)





Capacity chart PA 46, PA 47, MPA 46, MPA 47



Calculation of the amount of boiler water to be discharged according to the following formula:

$$A = \frac{Q \cdot S}{K - S}$$

Conductivity of feedwater:	**S** [µS/cm]
Admissible conductivity of boiler water:	**K** [µS/cm]
Boiler capacity:	**Q** [kg/h]
Amount of boiler water to be discharged:	**A** [kg/h]

Example

Conductivity of feedwater:	**S** = 20 µS/cm
Admissible conductivity of boiler water:	**K** = 4000 µS/cm
Boiler capacity:	**Q** = 2000 kg/h
Amount of boiler water to be discharged:	**A** ≈ 10 kg/h

How to read chart fig. 1

Boiler pressure:	25 bar
Nominal size of intermittent valve for removing boiler sludge	DN 32
Capacity:	2.5 kg/s

Fig. 1

Control pressure chart MPA 46, MPA 47

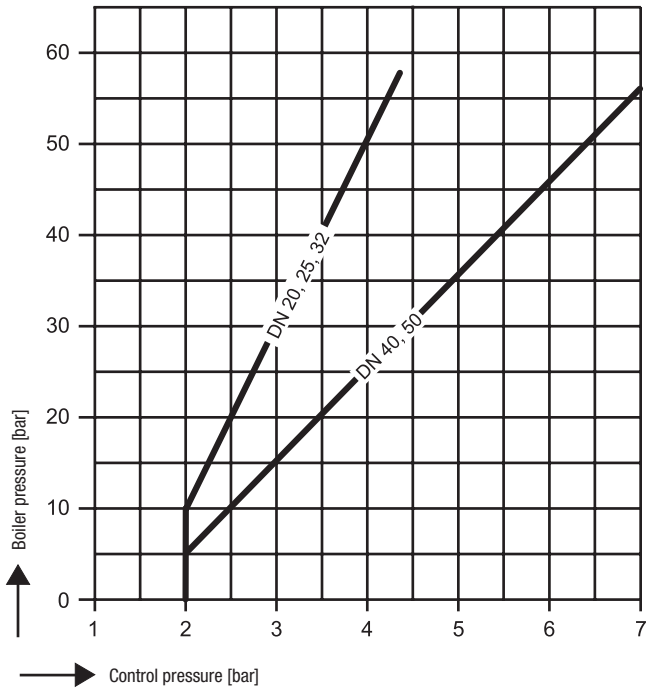


Fig. 2

Design PA 46, PA 47

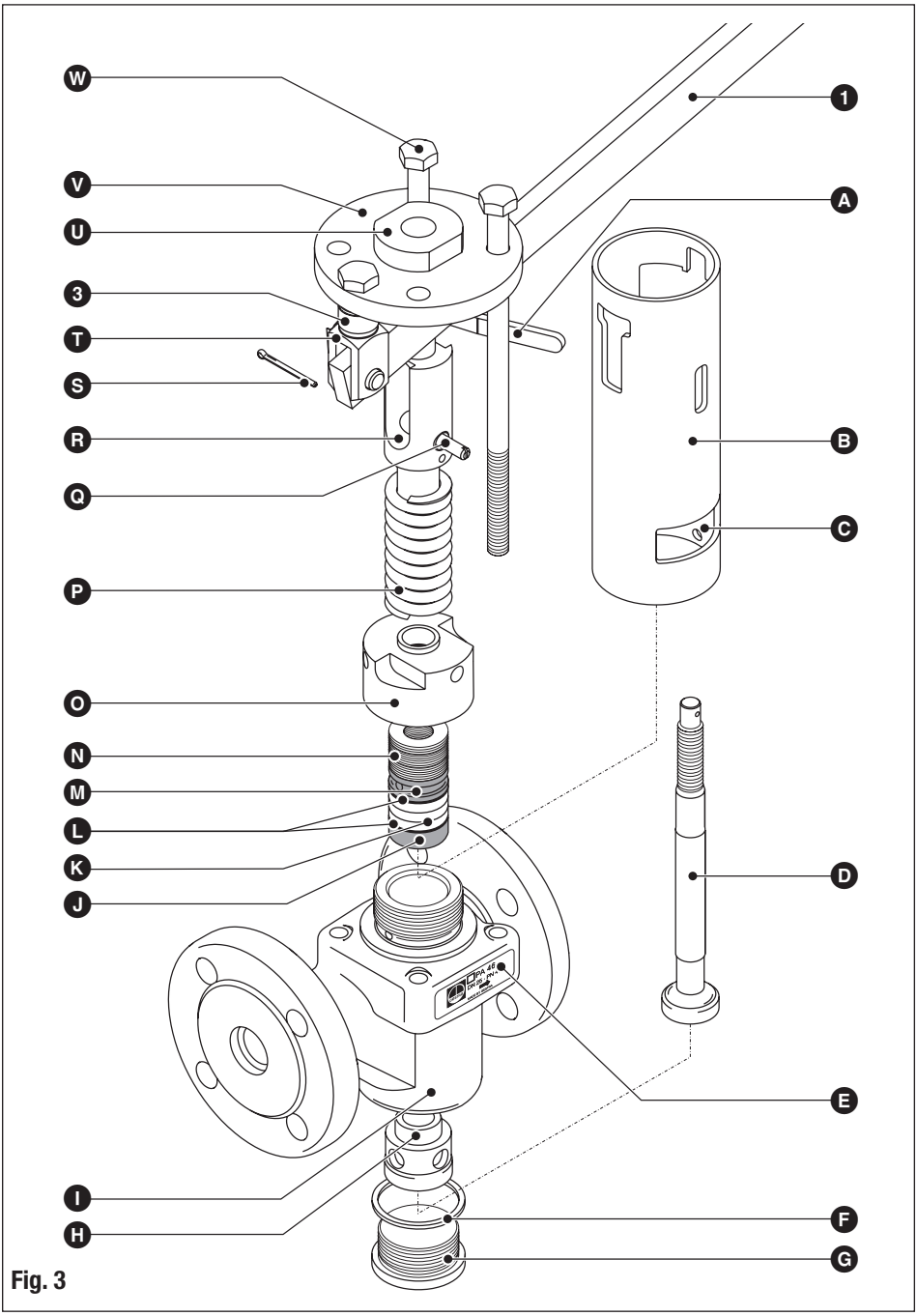


Fig. 3

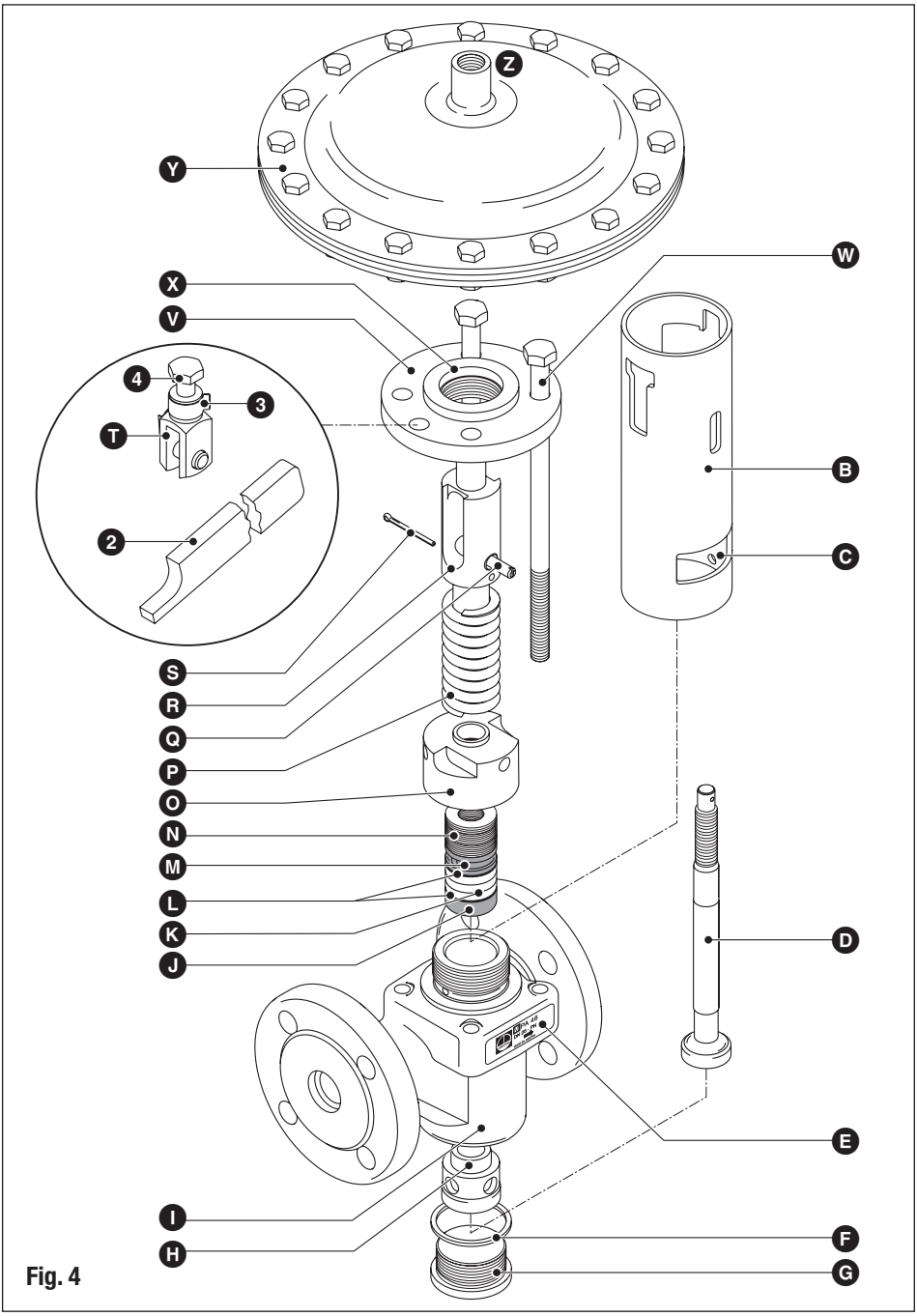


Fig. 4

Key

- **A** Locking lever
- **B** Mounting bracket
- **C** Check hole
- **D** Valve plug
- **E** Name plate
- **F** Gasket D 38 x 44 (DN 20-32), D 52 x 60 (DN 40-50)
- **G** Sealing plug
- **H** Valve seat
- **I** Valve body
- **J** Base bushing
- **K** Packing ring 14 x 28 x 7
- **L** Wiper ring
- **M** Pressure ring
- **N** Disc springs (15 pcs.)
- **O** Union nut
- **P** Compression spring
- **Q** Check pin
- **R** Pressure pin
- **S** Split pin 2.5 x 40, ISO 1234
- **T** Forkhead G 10 x 20, DIN 71752
- **U** Centering screw
- **V** Pressure plate
- **W** Hexagon-head cap screw M10 x 200, ISO 4014
- **X** Spacer disc
- **Y** GESTRA Diaphragm actuator
- **Z** Screwed connection ($^3/_8$") for control fluid

- **1** Hand lever for PA 46, PA 47
- **2** Hand lever for emergency operation MPA 46, MPA 47
- **3** Retaining piece for hand lever
- **4** Hexagon-head cap screw for forkhead M 10 x 25, ISO 4017

Installation

Danger

Risk of death, severe injuries, physical damage or destruction caused by explosive mixtures!
If the equipment is electrically insulated and installed between pipe flanges, electrostatic charges may build up.
When using the equipment in explosion-risk areas make sure that static electricity will be discharged (earthing).

PA 46, PA 47, MPA 46, MPA 47

The intermittent valve for removing boiler sludge can be installed in horizontal or vertical pipes.
The hand lever of the PA 46, PA 47 and the hand lever for the emergency operation of MPA 46, MPA 47 must be freely movable.

Attention

- To avoid waterhammer lay the pipe downstream of the intermittent valve in such a way that it has a slight fall, or evacuate the pipe before carrying out the boiler blowdown.
- The length of the pipe between the steam boiler and the intermittent valve for removing boiler sludge **must not exceed two metres!**

Flanged design

1. Observe position of installation. The hand lever ❶ or the hand lever for emergency operation ❷ (MPA...) must be freely movable.
2. Observe the direction of flow. The arrow indicating the flow direction is specified on the name plate Ⓔ.
3. Consider space required for opening the valve. When the intermittent valve for removing boiler sludge is installed, a minimum space of at least **150 mm** is required for removing or retrofitting the actuator!
4. Remove plastic plugs. They are only used as transit protection.
5. Clean seating surfaces of both flange faces.
6. Install intermittent valve for removing boiler sludge.

Socket-weld design

1. Observe position of installation. The hand lever ❶ or the hand lever for emergency operation ❷ (MPA...) must be freely movable.
2. Observe the direction of flow. The arrow indicating the flow direction is specified on the name plate Ⓔ.
3. Consider space required for opening the valve. When the intermittent valve for removing boiler sludge is installed a minimum space of at least **150 mm** is required for removing or retrofitting the actuator!
4. Remove plastic plugs. They are only used as transit protection.
5. Clean socket-weld ends.
6. Arc weld trap only manually (welding processes 111 and 141 in accordance with ISO 4063).

Installation - continued -

Butt-weld design

1. Observe position of installation. The hand lever ❶ or the hand lever for emergency operation ❷ (MPA...) must be freely movable.
2. Observe the direction of flow. The arrow indicating the flow direction is specified on the name plate Ⓔ.
3. Consider space required for opening the valve. When the intermittent valve for removing boiler sludge is installed a minimum space of at least **150 mm** is required for removing or retrofitting the actuator!
4. Remove plastic plugs. They are only used as transit protection.
5. Arc-weld trap only manually (welding processes 111 and 141 in accordance with ISO 4063) or use gas welding process (welding process 3 in accordance with ISO 4063).

Attention

- Only qualified welders certified e. g. according to DIN EN 287-1 may weld the valve into pressurized lines.

Heat treatment of welds

A subsequent heat treatment of the welds is not required.

Mounting hand lever PA 46, PA 47

1. Release retaining piece for hand lever ❸ and pull it out of the forkhead Ⓣ.
2. Apply lubricant (e. g. WINIX 5000) to the retaining piece, forkhead and hole for attaching the hand lever.
3. Push hand lever ❶ through mounting bracket Ⓑ into the forkhead Ⓣ and fix it in place by means of the retaining piece ❸.

Commissioning

PA 46, PA 47, MPA 46, MPA 47

The flanged connections of the PA 46, PA 47, MPA 46, MPA 47 must be permanently bolted and leakproof.

After starting up the steam boiler or pressure vessel, the intermittent valve for removing boiler sludge should be completely opened and closed once. The valve must close automatically, ensuring tight shut-off.

The stuffing box must be leakproof! Inspect the check hole Ⓒ in order to detect any fluid leakage.

If the equipment is mounted in a new and unpurged installation increase the blowdown frequency a little at the beginning.

Operation

Duration and frequency of intermittent boiler blowdown

When the GESTRA intermittent valve opens, a localized low-pressure area forms around the blowoff opening and the boiler sludge rushes out at high velocity, giving the steam boiler a short blow. The discharge of sludge and precipitated solids (valve fully open) takes approx. 2 seconds. In order to ascertain the blowdown frequency, the operating data of the installation have to be taken into account:

1. Use formula of fig. 1 to calculate the amount of boiler water in [kg/h] that must be discharged so that the admissible conductivity value of the boiler water will not be exceeded. Example: **10 kg/h**
2. Use the capacity chart to determine the discharge capacity in [kg/h] of the existing intermittent valve or of the intermittent valve that has been selected according to the size of the boiler standpipe. Example: **2.5 kg/s**
3. The results of item 1) and 2) give a blowdown duration of **4 seconds.**

For an effective blowdown the valve must only be open for 2 seconds, which means that according to the above calculation 2 cycles per hour are required.
The time period between blowdowns (valve closed) is therefore **30 minutes.**
The GESTRA automatic intermittent blowdown control TA.... features the following settings: Blowdown duration (valve open) usually 2 seconds. Blowdown frequency (time between blowdowns - valve closed) adjustable, e. g. 30 minutes. It is possible to reduce the intermittent blowdown frequency if continuous (top) boiler blowdown is performed instead (see installation instructions BA.../ BAE...).

Emergency operation MPA 46, MPA 47

Danger

Risk of severe injuries to the whole body. Make sure that the line for the control fluid of the diaphragm actuator is depressurized (zero bar) and isolated during the emergency operation of the MPA 46, MPA 47.
Insert the hand lever for emergency operation only to operate the valve and remove it immediately after operation.

Fit hand lever for emergency operation

1. Fit hand lever for emergency operation ❷, operate intermittent valve for removing boiler sludge.
2. Remove hand lever for emergency operation ❷ immediately after operation.

Maintenance

GESTRA intermittent valves for removing boiler sludge PA 46, PA 47, MPA 46 and MPA 47 are usually free of maintenance.
After starting up the steam boiler or pressure vessel, the intermittent valve for removing boiler sludge should be completely opened and closed once. The valve must close automatically, ensuring tight shut-off.
The stuffing box must be leakproof! Inspect the check hole Ⓒ in order to detect any fluid leakage.

Danger

Risk of severe burns and scalds to the whole body!

Before carrying out any maintenance work on the valve or loosening flanged connections, stuffing box unions or sealing plugs make sure that all connected lines are depressurized (zero bar) and cooled down to room temperature (20 °C).

Replacing stuffing box PA 46, PA 47

1. Undo retaining piece ❸ for forkhead ❶ and pull out hand lever ❶. **Fig. 3**
2. Unscrew hexagon-head cap screws ⓦ and remove locking lever Ⓐ.
3. Remove pressure plate Ⓥ and mounting bracket Ⓑ.
4. Pull out split pin Ⓢ.
5. Use open-end spanner A. F. 28 mm to unscrew the pressure pin Ⓡ from the valve plug Ⓓ.
6. Remove compression spring Ⓟ.
7. Use open-end spanner A. F. 32 mm to unscrew the union nut Ⓞ.
8. Unscrew sealing plug Ⓖ and remove gasket Ⓕ.
9. Pull out valve plug Ⓓ.
10. Take out internal parts Ⓝ Ⓜ Ⓛ Ⓚ Ⓛ Ⓙ of stuffing box.
11. Clean stuffing box, valve body and valve plug.
12. Re-insert valve plug Ⓓ and use abrasive paste type TETRABOR® F400 for polish grinding.
13. Insert new gasket Ⓕ and screw in sealing plug Ⓖ. Tighten with a torque of **350 Nm**.
14. Re-insert internal parts of stuffing box according to order as specified on page 24. **Fig. 5, Fig. 6**
15. Apply heat-resistance lubricant to stuffing box thread (use e.g. WINIX® 2150).
16. Align valve plug Ⓓ such that the hole for the split pin Ⓢ is perpendicular to the flow direction of the intermittent valve.
17. Use open-end spanner A. F. 32 mm to screw in union nut Ⓞ and tighten at room temperature with a torque of **55 Nm**.
18. Apply heat-resistant lubricant to both sides of the compression spring Ⓟ (use e. g. WINIX® 2150) and place it onto the union nut Ⓞ.
19. Use open-end spanner A. F. 28 mm to screw the pressure pin Ⓡ onto the valve plug Ⓓ until the holes for the split pin Ⓢ in the valve plug and the pressure pin overlap.
20. Insert split pin Ⓢ.
21. Re-insert mounting bracket Ⓑ and pressure plate Ⓥ. Align check hole Ⓒ to the right.
22. Insert and screw in hexagon-head cap screws ⓦ and locking lever Ⓐ and tighten them in diagonally opposite pairs, applying a torque of **20 Nm**.
23. Insert hand lever ❶ and fix it to the forkhead ❶ by means of retaining piece ❸.
24. Operate valve once (open it until it hits the stop).

Replacing stuffing box, valve seat and valve plug PA 46, PA 47

1. Undo retaining piece for forkhead ⓣ and pull out hand lever ❶. **Fig. 3**
2. Unscrew hexagon-head cap screws ⓦ and remove locking lever Ⓐ.
3. Remove pressure plate Ⓥ and mounting bracket Ⓑ.
4. Pull out split pin Ⓢ.
5. Use open-end spanner A. F. 28 mm to unscrew the pressure pin Ⓡ from the valve plug Ⓓ.
6. Remove compression spring Ⓟ.
7. Use open-end spanner A. F. 32 mm to unscrew the union nut Ⓞ.
8. Unscrew sealing plug Ⓖ and remove gasket Ⓕ.
9. Pull out valve plug Ⓓ.
10. Take out internal parts ⓃⓂⓁⓀⓁⒿ of stuffing box.
11. Use steel punch to knock the valve seat Ⓗ out of the valve body Ⓘ. **Fig. 7**
12. Clean stuffing box and valve body.
13. Insert new valve seat Ⓗ such that two opposite holes are in the flow direction of the intermittent valve.
14. Use punch made of CuZn to fix the valve seat in the valve body. **Fig. 8**
15. Re-insert valve plug Ⓓ and use abrasive paste type TETRABOR® F400 for polish grinding.
16. Insert new gasket Ⓕ and screw in sealing plug Ⓖ. Tighten with a torque of **350 Nm**.
17. Re-insert internal parts of stuffing box according to order as specified on page 24. **Fig. 5, Fig. 6**
18. Apply heat-resistance lubricant to stuffing box thread (use e.g. WINIX® 2150).
19. Align valve plug Ⓓ such that the hole for the split pin Ⓢ is perpendicular to the flow direction of the intermittent valve.
20. Use open-end spanner A. F. 32 mm to screw in union nut Ⓞ and tighten at room temperature with a torque of **55 Nm**.
21. Apply heat-resistant lubricant to both sides of the compression spring Ⓟ (use e. g. WINIX® 2150) and place it onto the union nut Ⓞ.
22. Use open-end spanner A. F. 28 mm to screw the pressure pin Ⓡ onto the valve plug Ⓓ until the holes for the split pin Ⓢ in the valve plug and the pressure pin overlap.
23. Insert split pin Ⓢ.
24. Put mounting bracket Ⓑ and pressure plate Ⓥ in place. Align check hole Ⓒ to the right.
25. Insert and screw in hexagon-head cap screws ⓦ and locking lever Ⓐ and tighten them in diagonally opposite pairs, applying a torque of **20 Nm**.
26. Insert hand lever ❶ and fix it to the forkhead ⓣ by means of retaining piece ❸.
27. Operate valve once (open it until it hits the stop).

Replacing stuffing box MPA 46, MPA 47

1. Detach pressure line for the control fluid of the diaphragm actuator from the screwed socket Ⓩ.
2. Remove diaphragm actuator Ⓨ. **Fig. 4**
3. Remove spacer disk Ⓧ and pressure plate Ⓥ.
4. Unscrew hexagon-head cap screws Ⓦ.
5. Remove pressure plate Ⓥ and mounting bracket Ⓑ.
6. Pull out split pin Ⓢ.
7. Use open-end spanner A. F. 28 mm to unscrew the pressure pin Ⓡ from the valve plug Ⓓ.
8. Remove compression spring Ⓟ.
9. Use open-end spanner A. F. 32 mm to unscrew the union nut Ⓞ.
10. Unscrew sealing plug Ⓖ and remove gasket Ⓕ.
11. Pull out valve plug Ⓓ.
12. Take out internal parts ⓃⓂⓁⓀⓁⒿ of stuffing box.
13. Clean stuffing box, valve body and valve plug.
14. Re-insert valve plug Ⓓ and use abrasive paste type TETRABOR® F400 for polish grinding.
15. Insert new gasket Ⓕ and screw in sealing plug Ⓖ. Tighten with a torque of **350 Nm**.
16. Re-insert internal parts of stuffing box according to order as specified on page 24. **Fig. 5, Fig. 6**
17. Apply heat-resistance lubricant to stuffing box thread (use e.g. WINIX® 2150).
18. Align valve plug Ⓓ such that the hole for the split pin Ⓢ is perpendicular to the flow direction of the intermittent valve.
19. Use open-end spanner A. F. 32 mm to screw in union nut Ⓞ and tighten at room temperature with a torque of **55 Nm**.
20. Apply heat-resistant lubricant to both sides of the compression spring Ⓟ (use e. g. WINIX® 2150) and place it onto the union nut Ⓞ.
21. Use open-end spanner A. F. 28 mm to screw the pressure pin Ⓡ onto the valve plug Ⓓ until the holes for the split pin Ⓢ in the valve plug and the pressure pin overlap.
22. Insert split pin Ⓢ.
23. Re-insert mounting bracket Ⓑ and pressure plate Ⓥ. Align check hole Ⓒ to the right.
24. Insert hexagon-head cap screws Ⓦ and tighten them in diagonally opposite pairs with a torque of **20 Nm**.
25. Put spacer disk Ⓧ onto pressure plate Ⓥ.
26. Screw on diaphragm actuator Ⓨ with a torque of **120 Nm**.
27. Attach pressure line for the control fluid of the diaphragm actuator.
28. Operate the valve once.

Replacing stuffing box, valve seat and valve plug MPA 46, MPA 47

1. Detach pressure line for the control fluid of the diaphragm actuator from the screwed socket Ⓩ.
2. Remove diaphragm actuator Ⓨ. **Fig. 4**
3. Remove spacer disk Ⓧ and pressure plate Ⓥ.
4. Unscrew hexagon-head cap screws Ⓦ.
5. Remove pressure plate Ⓥ and mounting bracket Ⓑ.
6. Pull out split pin Ⓢ.
7. Use open-end spanner A. F. 28 mm to unscrew the pressure pin Ⓡ from the valve plug Ⓓ.
8. Remove compression spring Ⓟ.
9. Use open-end spanner A. F. 32 mm to unscrew the union nut Ⓞ.
10. Unscrew sealing plug Ⓖ and remove gasket Ⓕ.
11. Pull out valve plug Ⓓ.
12. Take out internal parts Ⓝ Ⓜ Ⓛ Ⓚ Ⓛ Ⓙ of stuffing box.
13. Use steel punch to knock the valve seat Ⓗ out of the valve body Ⓘ. **Fig. 7**
14. Clean stuffing box, valve body and valve plug.
15. Insert new valve seat Ⓗ such that two opposite holes are in the flow direction of the intermittent valve.
16. Use punch made of CuZn to fix the valve seat in the valve body. **Fig. 8**
17. Insert valve plug Ⓓ and apply abrasive paste type TETRABOR® F400 for polish grinding.
18. Insert new gasket Ⓕ and screw in sealing plug Ⓖ. Tighten with a torque of **350 Nm**.
19. Re-insert internal parts of stuffing box according to order as specified on page 24. **Fig. 5, Fig. 6**
20. Apply heat-resistance lubricant to stuffing box thread (use e. g. WINIX® 2150).
21. Align valve plug Ⓓ such that the hole for the split pin Ⓢ is perpendicular to the flow direction of the intermittent valve.
22. Use open-end spanner A. F. 32 mm to screw in union nut Ⓞ and tighten at room temperature with a torque of **55 Nm**.
23. Apply heat-resistant lubricant to both sides of the compression spring Ⓟ (use e.g. WINIX® 2150) and place it onto the union nut Ⓞ.
24. Use open-end spanner A. F. 28 mm to screw the pressure pin Ⓡ onto the valve plug Ⓓ until the holes for the split pin Ⓢ in the valve plug and the pressure pin overlap.
25. Insert split pin Ⓢ.
26. Re-insert mounting bracket Ⓑ and pressure plate Ⓥ.
27. Insert hexagon-head cap screws Ⓦ and tighten them in diagonally opposite pairs with a torque of **20 Nm**.
28. Put spacer disk Ⓧ onto pressure plate Ⓥ.
29. Screw on diaphragm actuator Ⓨ with a torque of **120 Nm**.
30. Attach pressure line for the control fluid of the diaphragm actuator.
31. Operate the valve once.

Retightening stuffing box

If fluid leaks out of the control hole ⓒ, re-tighten the stuffing box with the union nut ⓞ.

1. Insert pin punch through opening of the mounting bracket ⓑ and push it into one of the holes of the union nut ⓞ. Carefully tighten union nut clockwise until the fluid stops leaking out of the control hole ⓒ.
2. Operate valve once - the valve must close automatically, ensuring tight shut-off.

Attention

- If the stuffing box cannot be tightened further by means of the union nut ⓞ all internal parts of the stuffing box must be replaced!
- If the force of the spring does not close the valve automatically loosen the union nut ⓞ a little. If fluid leaks out of the control hole the internals of the stuffing box must be replaced.

Replacing control membrane in diaphragm actuator MPA 46, MPA 47

1. Detach pressure line for the control fluid of the diaphragm actuator.
2. Unscrew hexagon-head bolts ❺ and hexagon nuts. **Fig. 9**
3. Remove and clean upper part ❻ of the diaphragm actuator.
4. Take out old control membrane ❼. Clean lower part ❽.
5. Insert new control membrane ❼, aligning its holes with the holes of the lower part.
6. Put upper part ❻ on top and align its holes with the holes of the control membrane and the lower part.
7. Insert hexagon-head bolts ❺ and tighten them with the respective hexagon nuts in diagonally opposite pairs to a torque of **5 Nm**.
8. Attach pressure line for the control fluid of the diaphragm actuator.
9. Check tightness. If necessary retighten hexagon-head bolts ❺ carefully in diagonally opposite pairs.
10. To grease the guide plate pin ❾ apply lubricant to the grease nipple in the connecting socket of the diaphragm actuator (use e. g. WINIX 5000).

Attention

- The torque for tightening the hexagon-head cap screws ❺ must not exceed **5 Nm** because higher torques could damage the control membrane!

Maintenance - continued -

Torques

Item	Intermittent valves for removing boiler sludge	Torques [Nm]
G	PA 46, PA 47, MPA 46, MPA 47	350
O	PA 46, PA 47, MPA 46, MPA 47	55
W	PA 46, PA 47, MPA 46, MPA 47	20
U	PA 46, PA 47	60
Y	MPA 46, MPA 47	120
5	MPA 46, MPA 47	5

All torques indicated in the table are based at a room temperature of 20 °C.

Tools

- Spanner A. F. 13 mm, DIN 3113, Form B
- Spanner A. F. 17 mm, DIN 3113, Form B
- Spanner A. F. 28 mm, DIN 3113, Form B
- Spanner A. F. 32 mm, DIN 3113, Form B
- Spanner A. F. 36 mm, DIN 3113, Form B
- Spanner A. F. 41 mm, DIN 3113, Form B
- Torque spanner 1 - 12 Nm, ISO 6789
- Torque spanner 20 - 120 Nm, ISO 6789
- Torque spanner 80 - 400 Nm, ISO 6789
- Socket spanner 13 x 250, DIN 3112
- Punch 20 x 200, made of steel
- Punch 20 x 200, made of CuZn (brass)
- Pin punch 8 x 150, DIN 6450 C
- Grease gun (for valve plug)

Single parts of stuffing box, valve plug, valve seat

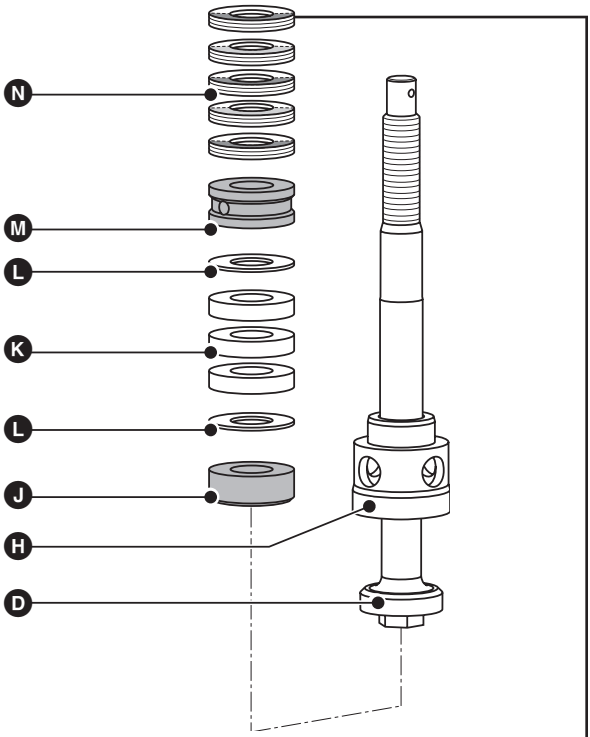


Fig. 5

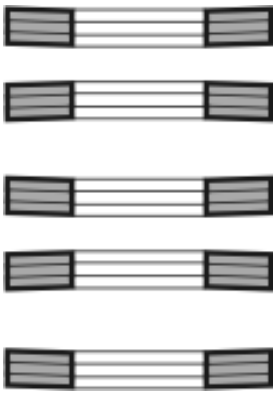


Fig. 6

Maintenance - continued -

Mounting/removing valve seat

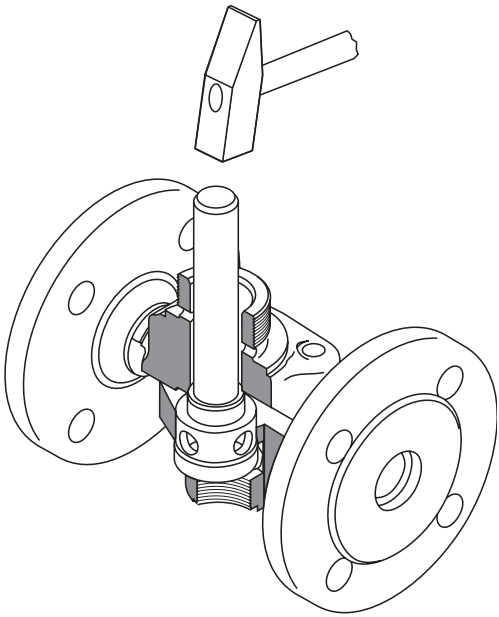


Fig. 7

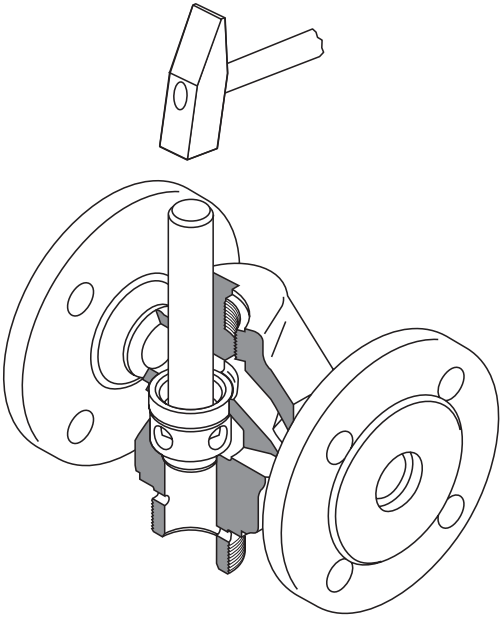


Fig. 8

Mounting/removing control membrane

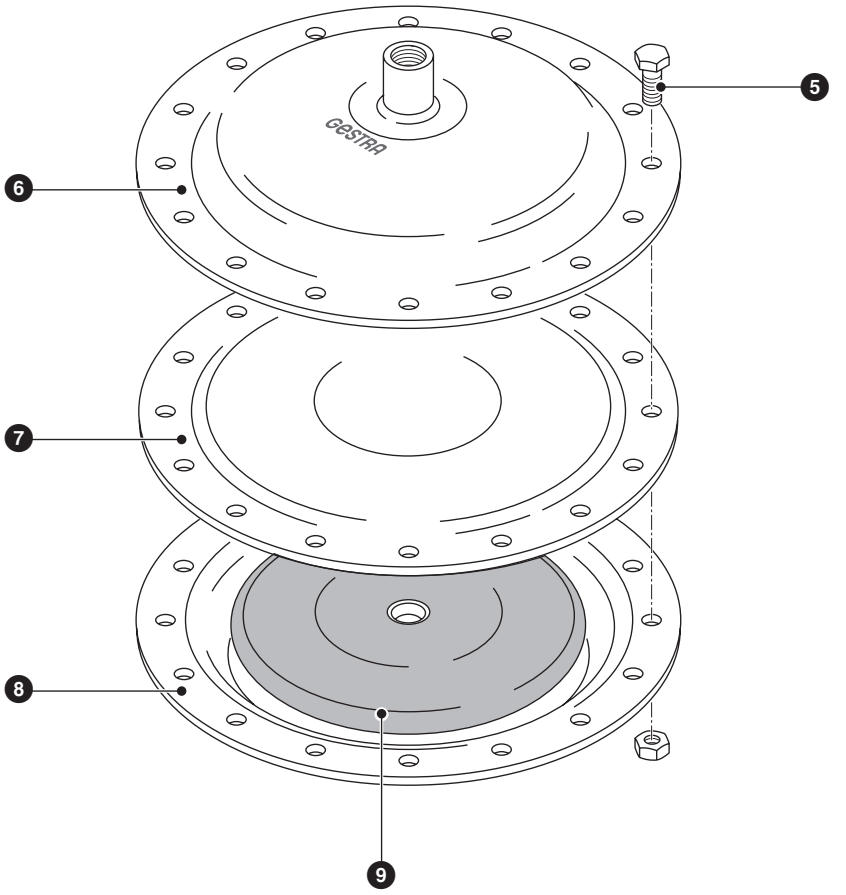


Fig. 9

Key

❺ Hexagon-head bolt M8 with hexagon nut M8

❻ Upper part of the diaphragm actuator

❼ Control membrane

❽ Lower part of the diaphragm actuator with connector socket

❾ Guide pin with plate

Retrofitting

GESTRA intermittent valves PA 46 and PA 47 can be retrofitted with a GESTRA diaphragm actuator (MPA 46, MPA 47).

Danger

Risk of severe burns and scalds to the whole body!

Before carrying out any retrofitting work on the valve or loosening flanged connections, stuffing box unions or sealing plugs make sure that all connected lines are depressurized (zero bar) and cooled down to room temperature (20 °C).

Insert the hand lever for emergency operation ❷ only to operate the valve and remove it immediately after operation.

Mounting diaphragm actuator

1. Undo centering screw ⓤ. **Fig. 3**
2. Undo retaining piece ❸ for forkhead ⓣ and pull out hand lever ❶.
   Note that the hand lever must not be mounted again!
3. Snap retaining piece ❸ on forkhead ⓣ.
4. Unscrew hexagon-head cap screws ⓦ and remove locking lever Ⓐ.
5. Insert hexagon-head cap screws ⓦ and tighten them with a torque of **20 Nm**.
6. Put spacer disk ⓧ onto pressure plate ⓥ.
7. Apply heat-resistant lubricant to the connector socket of the diaphragm actuator (use e.g. WINIX® 2150).
8. Screw on diaphragm actuator ⓨ with a torque of **120 Nm**.
9. Attach pressure line (3/8") for the control fluid of the diaphragm actuator.
10. Operate the valve once.

Retrofitting - continued -

Mounting the forkhead (hand lever for emergency operation)

1. Align and fit forkhead ❶ together with hexagon-head cap screw ❹ to the pressure plate ❺. Tighten the hexagon-head cap screw ❷ with a torque of **20 Nm**. **Fig. 4**
2. Fit hand lever for emergency operation ❷, operate intermittent valve for removing boiler sludge.
3. Remove hand lever for emergency operation ❷ immediately after operation.

Tools

- Spanner A. F. 16 mm, DIN 3113, Form B
- Spanner A. F. 17 mm, DIN 3113, Form B
- Spanner A. F. 41 mm, DIN 3113, Form B
- Torque spanner 20 - 120 Nm, ISO 6789

Torques

Item	Intermittent valves for removing boiler sludge	Torques [Nm]
❻	MPA 46, MPA 47	120
❹	MPA 46, MPA 47	20
❽	PA 46, PA 47, MPA 46, MPA 47	20

All torques indicated in the table are based at a room temperature of 20 °C.

Spare Parts

Spare parts list

Item	Designation	Stock code	Stock code
		PA 46, PA 47	MPA 46, MPA 47
J K L M N F	Internal parts of stuffing box, DN 20 to DN 50: Base bushing, wiper ring, Packing ring 14 x 28 x 7, pressure ring, disk springs (15 pcs.), Gasket D 38 x 44, D 52 x 60	335 064	335 064
D H J K L M N F	Valve plug, valve seat and internal parts of stuffing box, DN 20, DN 25, DN 32: Base bushing, wiper ring, Packing ring 14 x 28 x 7, pressure ring, disk springs (15 pcs.), Gasket D 38 x 44	335 063	335 063
D H J K L M N F	Valve plug, valve seat and internal parts of stuffing box, DN 40, DN 50: Base bushing, wiper ring, Packing ring 14 x 28 x 7, pressure ring, disk springs (15 pcs.), Gasket D 52 x 60	335 065	335 065
7	Control membrane for diaphragm actuator		335 131
2 3 4 T	Hand lever for emergency operation with forkhead		335 060
9	Guide pin with plate		335 130
N F	Diaphragm actuator with spacer disk		335 093

Parts for retrofitting

List of parts for retrofitting

Item	Designation	Stock code	Stock code
		PA 46, PA 47	MPA 46, MPA 47
Y X	Diaphragm actuator with spacer disk	335 093	
2 3 4 T	Hand lever for emergency operation with forkhead		335 060

Decommissioning

Danger

Risk of severe burns and scalds to the whole body!

Before loosening flanged connections, stuffing box unions or sealing plugs make sure that all connected lines are depressurized (zero bar) and cooled down to room temperature (20 °C).

Disposal

Dismantle the valve and separate the waste materials, using the material specifications in the table „Materials“ on page 8 as a reference.

For the disposal of the valve observe the pertinent legal regulations concerning waste disposal.

Annex

Declaration of Conformity

We hereby declare that the pressure equipment **PA 46, PA 47, MPA 46 and MPA 47** conform to the following European Directives:

- Pressure Equipment Directive 97/23/EC of 29 May 1997 for equipment of category 1 according to the table “Pressure Equipment Directive” on page 5.
- ATEX Directive 94/9/EC of 23 March 1994.

Applied conformity assessment procedure according to 97/23/EC: Annex III, Module H, verified by the Notified Body 0525.

Applied conformity assessment procedure according to 94/9/EC: Annex VIII.

This declaration is no longer valid if modifications are made to the equipment without consulation with us.

Bremen, 8th March 2004
GESTRA AG

i. V. U. Bledschun

Dipl.-Ing. Uwe Bledschun
(Academically qualified engineer)
Head of the Design Dept.

i. V.

Dipl.-Ing. Lars Bohl
(Academically qualified engineer)
Quality Assurance Manager

FLOWSERVE GESTRA

Agencies all over the world:

www.gestra.de

España

GESTRA ESPAÑOLA S.A.
Luis Cabrera, 86-88
E-28002 Madrid
Tel. 00 34 91 / 5 15 20 32
Fax 00 34 91 / 4 13 67 47; 5 15 20 36
E-mail: aromero@flowserve.com

Polska

GESTRA POLONIA Spolka z.o.o.
Ul. Schuberta 104
PL - 80-172 Gdansk
Tel. 00 48 58 / 3 06 10 -02 od 10
Fax 00 48 58 / 3 06 33 00
E-mail: gestra@gestra.pl

Great Britain

Flowserve Flow Control (UK) Ltd.
Burrel Road, Haywards Heath
West Sussex RH 16 1TL
Tel. 00 44 14 44 / 31 44 00
Fax 00 44 14 44 / 31 45 57
E-mail: gestraukinfo@flowserve.com

Portugal

Flowserve Portuguesa, Lda.
Av. Dr. Antunes Guimarães, 1159
Porto 4100-082
Tel. 0 03 51 22 / 6 19 87 70
Fax 0 03 51 22 / 6 10 75 75
E-mail: jtavares@flowserve.com

Italia

Flowserve S.p.A.
Flow Control Division
Via Prealpi, 30
I-20032 Cormano (MI)
Tel. 00 39 02 / 66 32 51
Fax 00 39 02 / 66 32 55 60
E-mail: infoitaly@flowserve.com

USA

Flowserve DALCO Steam Products
2601 Grassland Drive
Louisville, KY 40299
Tel.: 00 15 02 / 4 95 01 54, 4 95 17 88
Fax: 00 15 02 / 4 95 16 08
E-mail: dgoodwin@flowserve.com

GESTRA AG

P. O. Box 10 54 60, D-28054 Bremen
Münchener Str. 77, D-28215 Bremen
Telephone +49 (0) 421 35 03 - 0
Fax +49 (0) 421 35 03 - 393
E-Mail gestra.ag@flowserve.com
Internet www.gestra.de

GESTRA

818447-00/1205cm · © 2004 GESTRA AG · Bremen · Printed in Germany