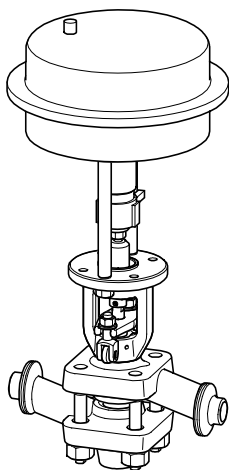


Rapid-action intermittent blowdown  
valve

# **PA 110**

# **MPA 110**



# Contents

- Foreword .....4**
  - Availability.....4
  - Formatting features in the document .....4
- Safety.....4**
  - Use for the intended purpose .....4
  - Basic safety notes .....5
  - Qualification of personnel.....6
  - Typographic features of warning notes.....6
  - Formatting features for warnings of property damage .....7
- Description .....7**
  - Scope of supply and equipment specification .....7
  - Task and function .....12
- Storing and transporting the equipment.....12**
  - Storing the equipment .....12
  - Transporting the equipment .....13
- Mounting and connecting the equipment.....13**
  - Preparing installation .....13
  - Connecting the equipment .....14
- Starting up the equipment.....15**
- Operating the equipment .....16**
  - Operating the PA 110 .....16
  - Operating the MPA 110 .....17
- After operation .....17**
  - Removing external dirt deposits .....18
  - Required tools for servicing .....18
  - Tightening torques.....19
  - Maintaining the equipment.....19
  - Servicing the equipment and installing spare parts .....20
  - Disassembling the equipment.....22
  - Assembling the equipment.....24
  - Retrofitting the equipment.....25
- Troubleshooting .....27**
- Putting the equipment out of operation .....28**
  - Removing harmful substances.....28
  - Removing the equipment .....28
  - Re-using equipment after storage.....29
  - Disposing of the equipment.....29
- Technical data.....30**
  - Dimensions and weights .....30
  - Flowrate.....32
  - Control pressure for MPA 110.....33

Pressure & temperature ratings ..... 34

**Manufacturer's Declaration ..... 35**

## Foreword

This installation & operating manual will help you use the following types of equipment safely and efficiently for their intended purpose.

- ▶ Rapid-action intermittent blowdown valve PA 110 (manually operated)
- ▶ Rapid-action intermittent blowdown valve MPA 110 (automatically operated)

These types will be called equipment in this document.

This installation & operating manual is intended for anyone commissioning, using, operating, servicing, cleaning or disposing of this equipment and, in particular, for professional after-sales service technicians, qualified personnel and authorised and trained staff.

All of these persons must read and understand the content of this installation & operating manual.

Following the instructions given in this installation & operating manual helps avoiding danger and increases the reliability and service life of the equipment. Please note that in addition to the instructions given in this installation & operating manual you must also observe all locally applicable rules and regulations concerning the prevention of accidents as well as approved safety guidelines for good professional practice.

## Availability

Keep this installation & operating manual together with the plant documentation for future reference. Make sure that this installation & operating manual is available to the operator.

The installation & operating manual is part of the equipment. Please hand over this installation & operating manual when selling the equipment or passing it on.

## Formatting features in the document

Certain text elements of this installation & operating manual feature a specific typographic design. You can easily distinguish the following text elements:

Standard text

*Cross-reference*

- ▶ Listing
  - ▶ Sub-items in listings
- Steps for action.



Here you will find additional useful information and tips serving to assist you in using the equipment to its fullest potential.

## Safety

### Use for the intended purpose

The following rapid-action intermittent blowdown valves are installed in pipes to discharge boiler blowdown water.

- ▶ Rapid-action intermittent blowdown valve PA 110 (manually operated)
- ▶ Rapid-action intermittent blowdown valve MPA 110 (automatically operated)

The equipment is designed for discharging boiler blowdown water with non-metallic solids from steam boilers.

The equipment must only be used within the allowable pressure and temperature limits and only if the chemical and corrosive influences on the equipment are taken into account.

The pipe between the steam boiler and the equipment must not be longer than 2 metres.

Correct use includes compliance with the instructions given in this installation & operating manual, in particular obedience to all safety instructions.

Any other use of the equipment is considered to be improper.

Note that the equipment is also used incorrectly if the materials of the equipment are not suitable for the fluid.

The equipment is also considered to be used improperly if:

- ▶ the equipment is not in proper working condition when being used
- ▶ the equipment is operated or serviced by unqualified personnel. The personnel must have the necessary qualification and experience for the required work.

## Basic safety notes

### Explosion hazard

- ▶ Explosion risk if equipment is used that is not suitable for the environmental conditions. When using the equipment in explosion risk areas make sure that:
  - ▶ The permissible surface temperature of the equipment for the place of installation must not be exceeded.
  - ▶ If electrically insulated equipment is installed appropriate measures must be taken to discharge any static electricity between pipe flanges.
- ▶ The heat generated by friction caused by moving parts that do not run smoothly can cause explosions. Make sure that all moving parts can operate smoothly.
- ▶ When carrying out welding work in order to install or remove the equipment flying sparks may be generated that can cause fire or explosion. Observe any on-site regulations for fire and explosion prevention. Only qualified personnel is allowed to mount or remove the equipment or its components.
- ▶ The mechanical strength of the equipment is designed for DN 25 end connections. If the pipe end connection load exceeds the strength limit for DN25 there is a risk of explosion. In this case take appropriate measures to provide additional support so that the pipe end connection load does not exceed the strength limit for DN 25.

### Risk of severe injuries

- ▶ The equipment is under pressure during operation and may be hot. Before carrying out any work on the equipment make sure that the following requirements are met:
  - ▶ The pipes must be depressurized (0 bar).
  - ▶ The fluid must be completely removed from the pipes and the equipment.
  - ▶ During work on the equipment the installation must be switched off and protected against unauthorised or unintended activation.
  - ▶ The pipes and the equipment must have cooled down to room temperature (approx. 20 °C).
- ▶ If the equipment is used in contaminated areas there is a risk of severe injuries or death caused by harmful substances in or on the equipment. Before working on the equipment make sure that it is completely decontaminated. Always wear the protective clothing prescribed for contaminated areas when working on the equipment.
- ▶ The equipment must only be used with fluids that do not attack the material and the gaskets and sealings of the equipment. Otherwise leaks may occur and hot or toxic fluid could escape.
- ▶ The equipment and its component parts must only be mounted or removed by qualified personnel. A qualified person must be acquainted with and experienced in the following:
  - ▶ Making pipe connections.
  - ▶ Selecting suitable lifting gear and understanding the rules for its safe use.
  - ▶ Working with dangerous (contaminated, hot or pressurized) fluids.
- ▶ If the admissible temperature and pressure limits are exceeded the equipment may be destroyed and hot or pressurized fluid may escape. Make sure that the equipment is only operated within the admissible service range and limits.  
For more information on limits and pressure & temperature ratings see name plate and the section "*Technical Data*".

- ▶ The moving parts of the equipment can cause severe injuries or death. Make sure that nobody is standing close to these moving parts or can touch them while the equipment is operating. Before working on the equipment make sure that the power supply to the actuator is cut off and cannot be switched on accidentally.
- ▶ If the stuffing box is leaking there is a risk of severe injuries caused by escaping hot fluid. Use the equipment only if it is in proper working condition. Replace any leaking stuffing box seal.

### **Risk of minor injuries**

- ▶ Sharp edges on internals present the danger of cuts to hands. Always wear industrial gloves when servicing the equipment.
- ▶ If the support of the equipment during installation is insufficient the equipment might fall down, thereby causing bruises or injuries. Make sure the equipment is safely held in place during installation and cannot fall down. Wear protective safety footwear.

### **Information on property damage or malfunctions**

- ▶ Malfunctions will occur if the equipment is installed in a wrong position or with the flow arrow pointing in the opposite direction of the fluid flow. This may result in damage to the equipment or the installation. Make sure that the flow arrow on the equipment body matches the indicated direction of the fluid flow in the pipe.
- ▶ If the material is unsuitable for the fluid, increased wear may occur and fluid may escape. Make sure that the material is suitable for the fluid used in your installation.

## **Qualification of personnel**

A qualified person must be acquainted with and experienced in the following:

- ▶ the pertinent on-site rules and regulations for preventing fire and explosions as well as industrial safety regulations
- ▶ working on pressure equipment
- ▶ making pipe connections
- ▶ working with dangerous (hot or pressurized) fluids
- ▶ lifting and transporting loads
- ▶ observing all notes and instructions in this installation & operating manual and the applicable documents
- ▶ connecting the power supply of the actuator

## **Typographic features of warning notes**

---



### **DANGER**

Notes with the heading DANGER warn against imminent dangerous situations that can lead to death or serious injuries.

---



### **WARNING**

Notes with the heading WARNING warn against possibly dangerous situations that could lead to death or serious injuries.

---



### **CAUTION**

Notes with the heading CAUTION warn against dangerous situations that could lead to minor or moderate injuries.

---

## Formatting features for warnings of property damage

---

### ***Attention!***

This information warns of a situation leading to property damage.

---

## Description

### Scope of supply and equipment specification



PA 110 and MPA 110 differ from each other in the type of actuator used. In the following pages two separate drawings show the two actuator types. The bodies of both types of equipment are identical and shown in a separate drawing.

#### Scope of supply

The lever extension of the PA 110 is supplied with the equipment but not fitted.

The MPA 110 is delivered pre-assembled and ready for mounting.

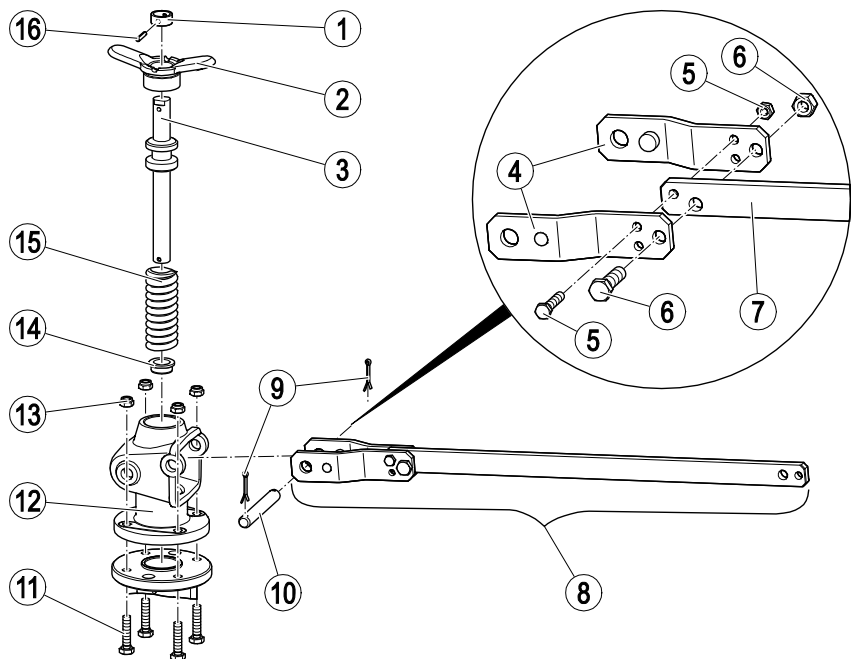
#### Equipment specification

The equipment consists of the following components:

- ▶ Actuator
- ▶ Body

The actuators for the two types of equipment are different. The bodies of both types of equipment are identical.

**Actuator for PA 110**



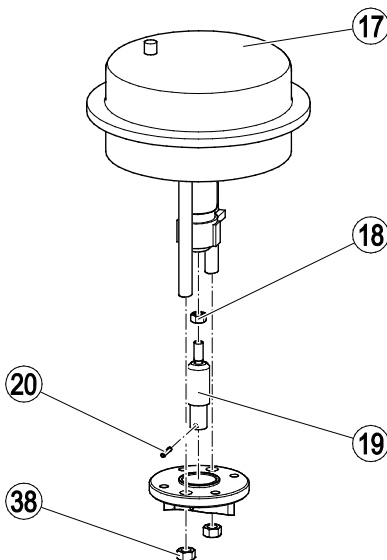
No.	Designation
1	Spindle bushing
2	Toggle
3	Spindle
4	Lever halves
5	Nut and bolt M8
6	Nut and bolt M12
7	Lever extension
8	Lever, complete

No.	Designation
9	Split pin
10	Hinged bolt
11	Screw
12	Yoke
13	Lock nut
14	Bushing
15	Spring
16	Spring pin



## Actuator for MPA 110

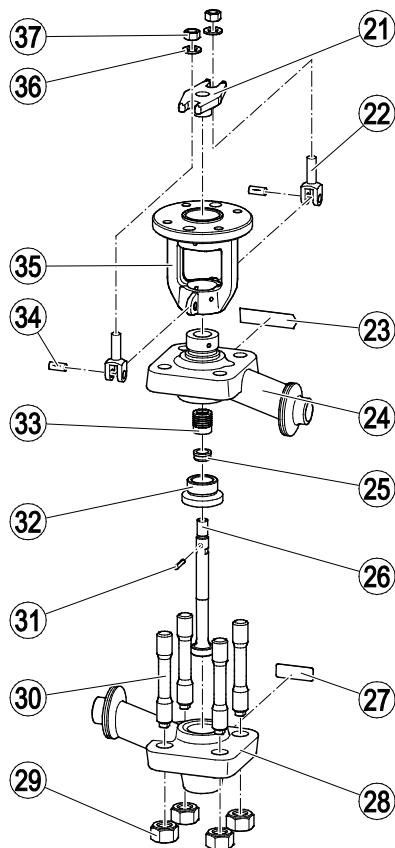
The MPA 110 is available with two different types of diaphragm actuator N II or N III. The main difference between these actuators is the size of the diaphragm.



No.	Designation
17	Diaphragm actuator
18	Nut
19	Spindle extension

No.	Designation
20	Spring pin
38	Nut

**Body of PA/MPA 110**



No.	Designation
21	Stuffing box
22	Hinged bolt
23	Name plate on upper part of body
24	Upper part of body
25	Bushing
26	Valve cone
27	Name plate on lower part of body
28	Lower part of body
29	Nut

No.	Designation
30	Stud bolts
31	Spring pin
32	Seat bushing
33	Packing rings
34	Grooved pin
35	Flange with yoke
36	Washer
37	Nut

## Optional extras

The following add-on equipment is available:

- ▶ Assembly kit 332614 for converting a PA 110 into a model with diaphragm actuator
- ▶ Diaphragm actuator for PA 110:
  - ▶ 332610 diaphragm actuator NII for maximum 160 bar differential pressure
  - ▶ 332611 diaphragm actuator NIII for maximum 220 bar differential pressure
- ▶ TA program controller for intermittent blowdown valve MPA 110

## End connections

The equipment is available with the following end connections:

- ▶ Socket-weld ends
- ▶ Butt-weld ends
- ▶ Flanges

## Name plate

The following items are indicated on the name plate:

- ▶ Manufacturer
- ▶ Type designation
- ▶ Design
- ▶ Nominal size
- ▶ Pressure rating
- ▶ Max. service temperature
- ▶ Max. service pressure



The name plate is pointed on one side. This serves as an additional indication of the flow direction.

The following items are indicated on the equipment body:

- ▶ Material
- ▶ Identification marking of material testing
- ▶ Date of manufacturing

The following items are indicated on the end connections:

- ▶ Flange size
- ▶ Flange face type (RJ number)

## Application of European Directives

### Pressure Equipment Directive

The equipment conforms to this Directive (see "Declaration of Incorporation" section) and can be used for the following media:

- ▶ Fluids of group 2

### ATEX Directive

The equipment has classification:  
CE Ec II 2G/D c X.

For use in potentially explosive atmospheres in zones (surrounding atmosphere to Directive 1999/92/EC) 1, 2, 21 and 22, please read and observe the following information:

The sign "X" in the Ex label signifies that operation at an excessive surface temperature caused by the medium must be avoided. The equipment itself does not generate additional surface temperatures.

Once installed, static electricity may arise between the equipment and the connected system. During use in potentially explosive atmospheres, the discharge or prevention of possible electrostatic charging is the responsibility of the manufacturer or owner of the system. If there is a possibility that medium might escape, e.g. via actuating devices or leaks in screwed couplings, the manufacturer or owner of the system must take this into consideration when dividing the area into zones.

If the MPA has a pneumatic drive, if incorrectly discharged the exhaust air (compressed air) required for operation can lead to swirls of potentially explosive dust.

## Task and function

### Purpose

The equipment is designed for the manual or automatic discharge of boiler blowdown water with non-metallic solids from steam boilers.

### Function

The PA 110 is designed for manual operation. For the blowdown process, it is opened fully by hand with the lever for around two to three seconds. The valve cone, which is compressed by a spring, is pushed out of the valve seat during this process. The sludge is discharged through the open valve. Slowly releasing the lever causes spring force to push the cone back into the valve seat (rapid closing). The valve is closed.

The MPA 110 is equipped with a diaphragm actuator for automatic operation. Compressed air is used as the control medium. For blowdown, it is opened by the diaphragm actuator.

Two versions of the diaphragm actuator are available. Diaphragm actuator NII is designed for differential pressure up to 160 bar, diaphragm actuator NIII for differential pressure up to 220 bar.

The opening signal can be sent by various controllers:

- ▶ the TA program controller, see data sheet
- ▶ a blowdown controller LRR 1-40, see data sheet LRR 1-40, or
- ▶ the SPECTORcontrol with CAN bus

## Storing and transporting the equipment

### ***Attention!***

Equipment can be damaged if stored or transported improperly.

- Close all openings with the sealing plugs or covers supplied with the equipment or use similar sealing covers.
- Protect the equipment against moisture and corrosive atmospheres.
- Please contact the manufacturer if the specified transport and/or storage requirements cannot be met.

## Storing the equipment

- Please observe the following items when storing the equipment:
  - ▶ Do not store the equipment for more than 12 months.
  - ▶ Use the supplied sealing plugs or other suitable seal caps in order to seal off all openings of the equipment.
  - ▶ Protect the sealing surfaces and contact areas against mechanical damage.
  - ▶ Protect the equipment and all components against hard shocks and impacts.
  - ▶ Store the equipment only in closed rooms that meet the following environmental conditions:
    - ▶ Air humidity below 50 %, not condensing
    - ▶ Indoor air: clean, salt-free and non-corrosive
    - ▶ Temperature 5–40 °C.
- Make sure that all these requirements are always met when storing the equipment.
- Please contact the manufacturer if you cannot comply with the recommended storage conditions.

## Transporting the equipment



### **DANGER**

Risk of bruises if the equipment or component parts fall down.

- Use suitable lifting gear when moving or lifting the equipment and/or component parts.
- Make sure that the equipment cannot topple over.
- Make sure that nobody is standing below the lifted equipment.

The lifting gear must be of sufficient strength for the equipment including the actuator.

- Meet the requirements for storage also when transporting the equipment.
- Prior to transport seal off connections with sealing plugs.



If you do not have the sealing plugs supplied with the equipment use appropriate seal caps to seal off the connections.

- For short distances (only a few metres) you can transport the equipment unpacked.
- When transporting the equipment over larger distances use the original packaging.
- If you do not have the original packaging use a box that protects the equipment adequately against corrosion and physical damage.



For a short period of time the equipment may be transported even if the temperature is below 0 °C, provided that the equipment is completely empty and dry.

## Mounting and connecting the equipment

### Preparing installation

- Take the equipment out of the transport packaging.
- Check the equipment for transport damage.
- Contact the manufacturer if you detect any kind of shipping damage.

When supplied by the factory, the connections may be sealed off with sealing plugs.

- Remove sealing plugs before mounting the equipment.
- Keep the sealing plugs and the packing for further use.



### **DANGER**

Personnel working on pipes are exposed to safety risks and may suffer severe injuries, poisoning or even loss of life.

- Make sure that no hot or hazardous fluid is in the equipment or the pipes.
- Make sure that the pipes upstream and downstream of the equipment are depressurised.
- Make sure that the installation is switched off and protected against unauthorised or unintended activation.
- Make sure that the equipment and the pipes have cooled down to room temperatures.
- Wear protective clothing that is suitable for the fluid and, if necessary, wear protective gear.

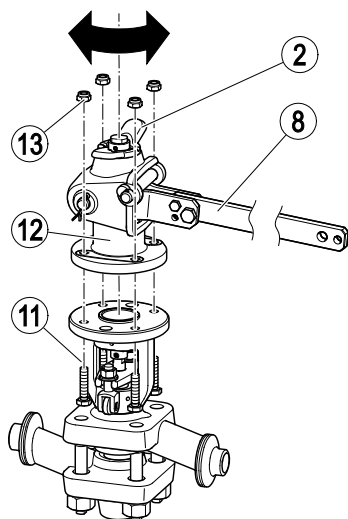
For more information on suitable protective clothing and safety gear refer to the safety data sheet of the fluid in question.

- Drain pipes until they are empty.

- Switch the installation off and protect it against unauthorised or unintended re-activation.
- To avoid waterhammer make sure that the pipe downstream of the equipment has a down gradient.
- If this is not possible provide other means to ensure draining.

**i** You can change the position of the lever of the PA 110 by repositioning the yoke by 90°, 180° or 270°.

- Turn the toggle (2) anticlockwise as far as it will go.
- Remove the four lock nuts (13) and the bolts (11) from the yoke (12).
- Press the lever (8) down and rotate it and the yoke until they are in the desired position.



- Slowly let go of the lever.
- insert the lock nuts and bolts.
- Tighten the bolts in diagonally opposite pairs to a torque of 22 Nm.

## Connecting the equipment



### DANGER

Incorrectly connected equipment can result in accidents with extremely severe injuries or death.

- Make sure that only specialist personnel connect the equipment to the pipe.
- Make sure that the direction of flow in the pipe matches the flow direction arrow on the equipment.
- Make sure that the connected pipe does not subject the body to any stress (forces or torques) during installation and operation.

Specialist personnel must have knowledge and experience of the type of pipe connection used.

### Attention!

Equipment will be damaged if the end connections are undersized.

- Make sure that the connections are strong and rigid enough to support the weight of the equipment and to withstand the forces that occur during operation.

Observe the following instructions, depending on the position of installation:

- Install the equipment preferably in a horizontal position with vertical spindle.
- If the spindle is tilted or in horizontal position provide additional support on site for the diaphragm actuator.
- If the valve is to be installed in a vertical downpipe attach the lever extension of the PA 110 in parallel to the valve axis.
- Make sure that the pipe length between the steam boiler and the equipment does not exceed 2 metres.

To allow easy access for routine servicing and exchanging components observe the indicated withdrawal distances and allow for clearances to adjacent installation parts.

- Make sure that the pipe system of the plant is clean.
- Make sure that the equipment is free from foreign matter.
- Install the equipment in the desired, permitted installation position.

For the MPA 110 proceed as follows:

- Connect the pressure connection of the diaphragm actuator to a compressed air supply with max. pressure 6 bar.



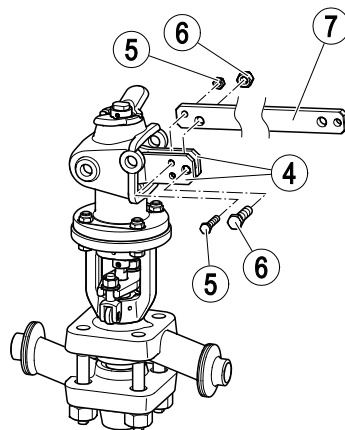
To determine the required minimum pressure see the control pressure chart on page 33. Take the boiler pressure and the type of actuator into consideration.

For PA 110 models, after installation in the pipe you must fit the lever extension.

- Remove the bolts and nuts (5, 6) from the lever halves (4).
- Remove the transport sleeve between the lever halves.
- Apply high-resistant lubricant to all threads, bearing faces of screws, nuts and bolts.

The lubricant must have the same properties as OKS® 217.

- Insert the lever extension (7) between the lever halves.
- Push the M8 (5) and M12 bolts (6) through the holes as shown.
- Place the M8 and M12 nuts on the bolts.
- Screw the M12 nuts (6) to a torque of 25 Nm.
- Screw the M8 nuts (5) to a torque of 85 Nm.



- Make sure that the equipment is safely mounted and that all connections are made correctly.

## Starting up the equipment



### WARNING

Component parts that get hot during operation can cause burnings.

- Always wear thermally insulated and heat resistant safety gloves when operating the lever.



### WARNING

Moving parts can cause bruises.

The MPA 110 is remote controlled and may open or close abruptly.

- Do not touch any moving parts during operation.
- 
- After start-up of the steam boiler or pressure vessel operate the valve as described in the following chapter.
- The valve must close automatically, ensuring tight shut-off.
- Operate the valve several times If it is not tight when closed.

## Operating the equipment

The intervals required for the boiler blowdown must be determined for each individual steam boiler and have to be stipulated by the operator.

## Operating the PA 110

### Intermittent boiler blowdown



#### WARNING

Component parts that get hot during operation can cause burnings.

- Always wear thermally insulated and heat resistant safety gloves when operating the lever.

To perform an intermittent boiler blowdown proceed as follows:

- To release the lock of the lever turn the toggle handle anticlockwise until it hits the stop (1.).

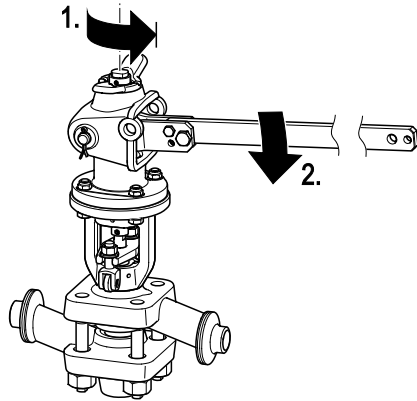


#### WARNING

Operating personnel may get injured if the spring-loaded lever shoots back to its original position in an uncontrolled manner.

- Do not let go of the lever in an uncontrolled manner.
- Hold the lever tight and slowly let it go back to its original position.

- Push the lever downwards (2.) and hold it there for two or three seconds.



The lever is under spring tension when it is pushed down.

- Slowly let the lever return to its original position.
- Perform several short blowdowns if foreign matter has caused the shut-off to leak.
- If the valve continues to leak disassemble it as described in section "*Disassembling the equipment*" from page 22 onwards.
- Clean the component parts of the equipment.
- Replace any defective component parts.
- To lock the lever turn the toggle handle clockwise until it hits the stop.

### Open valve & keep it open



#### WARNING

Component parts that get hot during operation can cause burnings.

- Always wear thermally insulated and heat resistant safety gloves when operating the lever.

To open the valve permanently proceed as follows:

- To release the lock of the lever turn the toggle handle anticlockwise until it hits the stop.



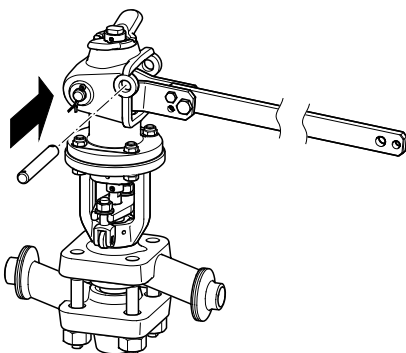


## WARNING

Operating personnel may get injured if the spring-loaded lever shoots back to its original position in an uncontrolled manner.

- Do not let go of the lever in an uncontrolled manner.
- Hold the lever tight and slowly let it go back to its original position.

- 
- Push the lever downwards and hold it down.
  - Put the safety bolt through the bore in the yoke.



- Slowly let go of the lever.
- The equipment remains open.



## WARNING

Operating personnel may get injured if the spring-loaded lever shoots back to its original position in an uncontrolled manner.

- Do not let go of the lever in an uncontrolled manner.
  - Hold the lever tight and slowly let it go back to its original position.
- 

To close the valve again proceed as follows:

- Push the lever downwards and hold it down.
  - Take the safety bolt out of the bore in the yoke.
- The lever is under spring tension when it is pushed down.
- Slowly let the lever return to its original position.
  - Keep the safety bolt for further use.

## Operating the MPA 110

Do not work on the equipment while it is operating.



## WARNING

Moving parts can cause bruises.

The MPA 110 is remote controlled and may open or close abruptly.

- Do not touch any moving parts during operation.
- 

## After operation



## DANGER

If the equipment is used in contaminated areas there is a risk of severe injuries or death caused by harmful substances in or on the equipment.

- Only qualified personnel are allowed to perform work on contaminated equipment.
  - Always wear the protective clothing prescribed for contaminated areas when working on the equipment.
  - Make sure that the equipment is completely decontaminated before carrying out any service work.
  - Follow the pertinent instructions for handling the hazardous substances in question.
-



## **DANGER**

Personnel working on pipes are exposed to safety risks and may suffer severe injuries, poisoning or even loss of life.

- Make sure that no hot or hazardous fluid is in the equipment or the pipes.
- Make sure that the pipes upstream and downstream of the equipment are depressurised.
- Make sure that the installation is switched off and protected against unauthorised or unintended activation.
- Make sure that the equipment and the pipes have cooled down to room temperatures.
- Wear protective clothing that is suitable for the fluid and, if necessary, wear protective gear.

---

For more information on suitable protective clothing and safety gear refer to the safety data sheet of the fluid in question.



## **DANGER**

Risk of bruises when working on the equipment during operation.

- Switch off the equipment if you have to work close to any moving equipment parts.
- Make sure that the equipment cannot be switched on inadvertently.

---

## ***Attention!***

Damage to the equipment due to improper maintenance work.

- Make sure that only qualified personnel performs maintenance work.
- 

A qualified person must be acquainted with and experienced in the following:

- Working on pressure equipment
- Lifting loads
- Assembling and disassembling the equipment
- The qualified personnel must observe and follow the instructions given in this operating manual and in the applicable documents.

## **Removing external dirt deposits**

- Use fresh water and a cloth to remove dirt and contaminants from the equipment body.

## **Required tools for servicing**

- Size 12 combination spanner, DIN 3113, form B
- Size 13 combination spanner, DIN 3113, form B
- Size 16 combination spanner, DIN 3113, form B
- Size 17 combination spanner, DIN 3113, form B
- Size 18 combination spanner, DIN 3113, form B
- Size 24 combination spanner, DIN 3113, form B
- Size 32 combination spanner, DIN 3113, form B
- Torque wrench 20-120 Nm, ISO 6789
- Torque wrench 80-400 Nm, ISO 6789
- Punch 20 x 200, steel
- Punch 20 x 200, CuZn (brass)
- Pin punch 8 x 150, DIN 6450 C
- Piston-type grease gun
- Hammer

## Tightening torques

### ***Attention!***

Malfunctions due to incorrect tightening torques.

- Tighten the screws, nuts and bolts listed in the following table only with the indicated torques.

Part	Torque
5	85 Nm
6	25 Nm
11, 13	22 Nm
29	225 Nm

## Maintaining the equipment

### Maintenance schedule

Interval	Component	Activity
1 month	Spindle/valve cone	Move the valve cone at least one full stroke.
3 months	Stuffing box seal	Check visually for tightness. Replace leaking stuffing-box packing.
	<ul style="list-style-type: none"><li>• Connections</li><li>• Body gasket / seat bushing</li><li>• Valve cone guide in stuffing box</li><li>• Spindle</li></ul>	Check the equipment visually for: <ul style="list-style-type: none"><li>• tightness</li><li>• cleanliness</li><li>• wear</li></ul> Replace leaking or worn components. Remove dirt deposits.
	<ul style="list-style-type: none"><li>• Valve cone</li><li>• Seat bushing</li></ul>	Measure the temperature in order to check the correct closing of the equipment when the valve cone is in the closed position. Replace leaking or worn components.
12 months	Connection of the actuator	Check that screws are firmly tightened. Re-tighten any loose screws.
36 months	Whole equipment	Check the condition of the internals. Replace any faulty or worn components.

## Retightening the stuffing box

If the stuffing box flange leaks re-tighten the stuffing box.

- Tighten the nuts (37) of the stuffing box flange until the following conditions are met:

The equipment must be tight but it is still possible to operate it.

- If leaking continues replace the packing rings as described on page 23.

## Lubricating the components

---

### ***Attention!***

Equipment may be damaged if unsuitable lubricant is used.

- Use only specified lubricants.
- 

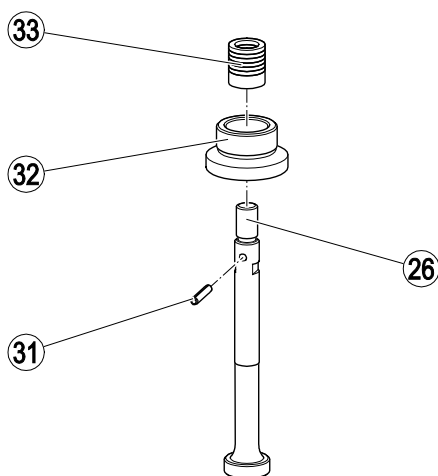
- Lubricate all moving parts of the equipment every three months.

## Servicing the equipment and installing spare parts

You may exchange the following component parts in case of wear or damage:

- ▶ Seat bushing
- ▶ Valve cone
- ▶ Packing
- ▶ Control diaphragms

## Spare parts for PA 110 and MPA 110



No.	Designation	Qty.	Stock code
33, 31	Spare parts set, comprising: <ul style="list-style-type: none"> <li>6 packing rings</li> <li>1 spring pin</li> </ul>	1	333712
33, 31, 26, 32	Spare parts set, comprising: <ul style="list-style-type: none"> <li>6 packing rings</li> <li>1 spring pin</li> <li>1 valve cone</li> <li>1 seat bushing</li> </ul>	1	333571
17	Diaphragm actuator NII	1	332610
	Diaphragm actuator NIII	1	332611
—	Diaphragms for NII actuator (MPA 110 only)	1	147599
—	Diaphragms for NIII actuator (MPA 110 only)	1	1503257

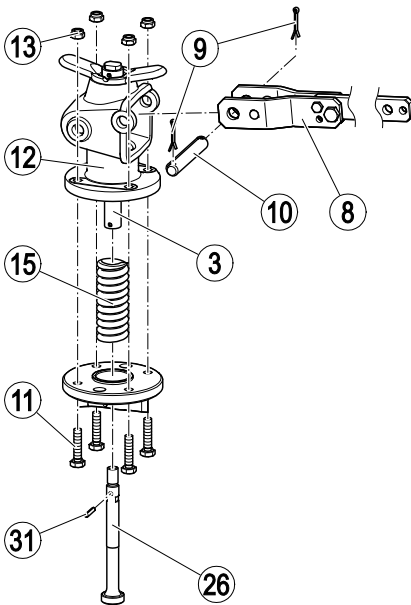
## Exchanging the control membrane in the diaphragm actuator

Refer to the installation & operating manual of the actuator.

## Disassembling the equipment

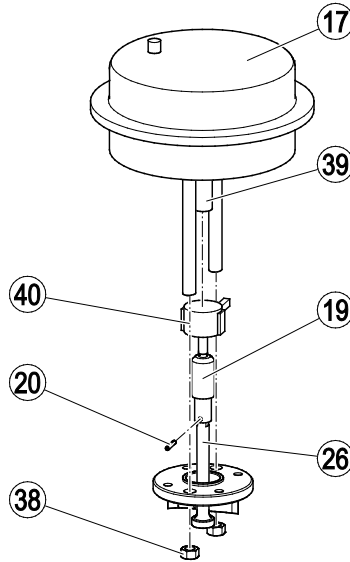
### Removing the lever actuator of the PA 110

- Remove the split pins (9) from the hinged bolt (10).
- Remove the hinged bolt.
- Remove the lever (8).
- Remove the bolts (11) and nuts (13) from the yoke (12) fastening.
- Remove the spring pin (31) that connects the cone (26) and spindle (3).
- Unscrew the cone from the spindle.
- Remove the yoke and spindle.
- Remove the spring (15).



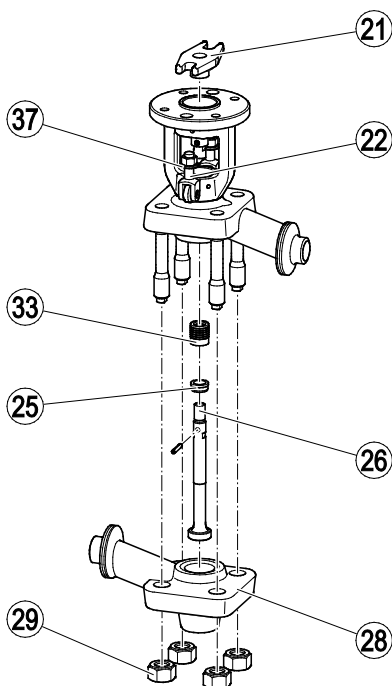
### Removing the diaphragm actuator of the MPA 110

- Remove the pressure connection from the diaphragm actuator (17).
- Take the lower part (40) of the coupling off the upper part (39).
- Remove the two nuts (38) that fix the diaphragm actuator.
- Lift the diaphragm actuator off the yoke flange.
- Remove the spring pin between the spindle extension (19) and the valve cone (26).
- Unscrew the spindle extension from the valve cone.



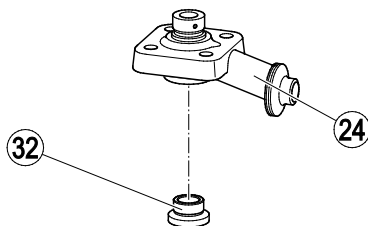
### Removing the packing and valve cone

- Remove the actuator.
- Undo the nuts (37) on the hinged bolts (22).
- Swing the hinged bolts to one side.
- Remove the nuts (29) from the lower body part (28).
- Remove the lower body part.
- Remove the valve cone (26).
- Remove the stuffing box (33).
- Remove the packing rings (33).
- Remove the bushing (25).



### Removing the seat bushing

- Remove the actuator.
- Clean the packing and the valve cone.
- Use a steel punch to knock the seat bushing (32) out of the upper body part (24).



## Assembling the equipment



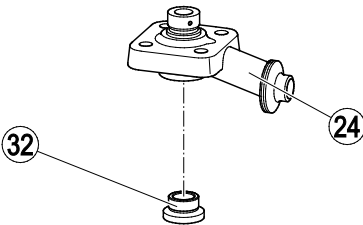
### WARNING

Hot fluid spitting out of the equipment may cause injuries and scalding.

- Carry out a pressure test whenever the upper and lower body parts have been taking apart and fitted together again.

### Mounting the seat bushing and valve cone

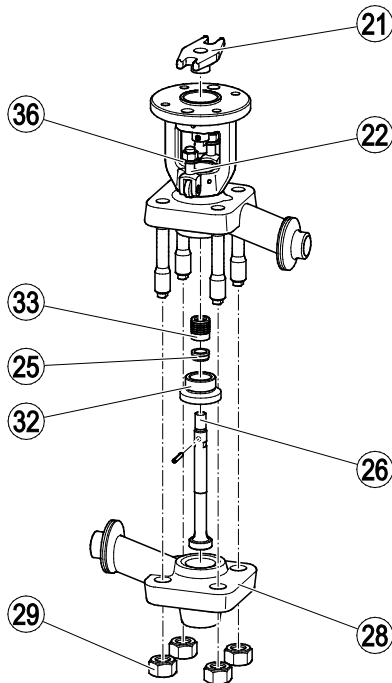
- Clean all component parts before re-assembly.
- Before re-assembling the equipment apply heat-resistant lubricant OKS 217 to the following components and surfaces:
  - ▮ Support surfaces for springs
  - ▮ Threads of screws and bolts
  - ▮ Bearing faces of nuts and bolts
  - ▮ Bushing of spindle extension
- Use a punch made from CuZn alloy to knock the seat bushing (32) out of the upper body part (24).



- Put the valve cone into the seat bushing.
- If you replace the valve cone and the seat bushing polish the cone with emery paste until it fits into the seat bushing.

### Mounting the packing

- Insert the bushing (25) of the stuffing box (25).
- Insert new stuffing box rings (33).
- Put the stuffing box (21) in place.
- Mount the lower body part (28).
- Fasten the screwed unions with the specified tightening torque.
- Swing the hinged bolts (22) into the recesses provided for this purpose in the stuffing box.
- Fasten the nuts (37) with the specified tightening torque.



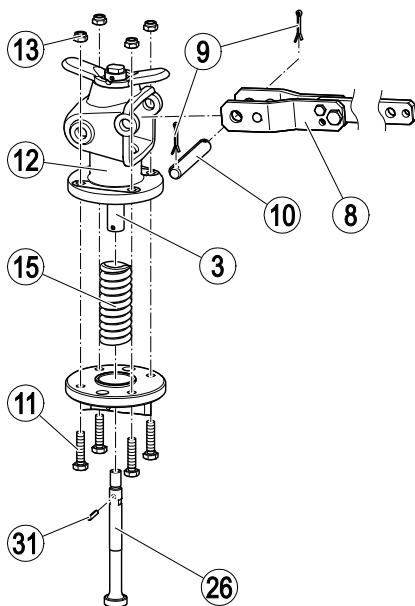


## Attaching the lever actuator to the PA 110

- Insert the spring (15).
- Put the yoke (12) together with the spindle in place.
- Screw the valve cone (26) into the spindle (3).

If you have replaced the cone, proceed as follows:

- Drill a hole jointly through the cone and spindle, and fix them together using a spring pin.
- Secure the yoke with the bolts (11) and nuts (13).
- Tighten the threaded joints to the specified torque.
- Insert the lever (8).
- Secure the lever with the hinged bolt (10) and split pins (9).



## Attaching the diaphragm actuator to the MPA 110

- Proceed as follows:

## Retrofitting the equipment

You can convert the manually operated PA 110 into MPA 110 with diaphragm actuator. For this purpose you need the assembly kit (stock number 332614) and one of the following diaphragm actuators:

- Diaphragm actuator NII (stock code number 332610) for differential pressures up to 160 bar
- Diaphragm actuator NIII (stock code number 332611) for differential pressures up to 227 bar

The assembly kit comprises the following items:

- Spindle extension
- Spring pin
- Counter nut for actuator connection

The required diaphragm actuator including the coupling have to be ordered separately.



For the conversion the yoke flange must be provided with two additional holes (diameter 16 mm). If this is not the case rework the yoke flange accordingly.

## Removing the lever actuator

- For this purpose proceed as described in section "Removing the lever actuator of the PA 110" from page 22 onwards.

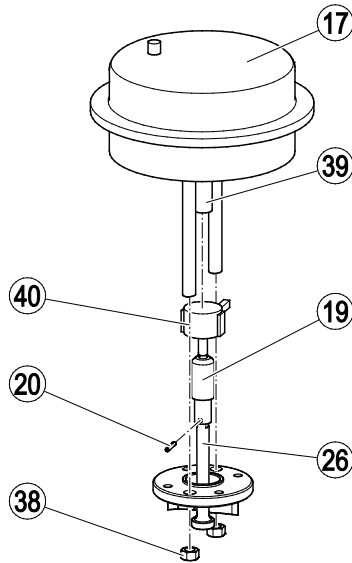
## Mounting the diaphragm actuator

- Screw the spindle extension (19) into the valve cone (26).
- Align the bore in the spindle extension so that it coincides with the bore in the valve cone.
- Use a 5 mm drill (tolerance +0.075 mm) to bore through the spindle extension and the valve cone.

### **Attention!**

The spindle may get damaged if the spring pin is driven in incorrectly.

- Use a counter support when driving in the spring pin.
- 
- Drive the spring pin (20) into the bore.
  - Screw the nut onto the spindle extension.
  - Detach the lower half of the coupling (40) from the actuator.
  - Screw lower half of the coupling onto the spindle extension.
  - Put the diaphragm actuator (17) onto the yoke flange.
  - Fix the diaphragm actuator with the nuts (38) to the yoke flange.



## Setting the diaphragm actuator

- Move the valve cone with the spindle extension into the closed position.



To determine the required minimum pressure see the control pressure chart on page 33. Take the boiler pressure and the type of actuator into consideration.

- Make sure that the pressure of the compressed air supply corresponds to the ascertained minimum pressure and does not exceed 6 bar.
- Connect the diaphragm actuator to the compressed air supply.
- Move the shaft of the diaphragm actuator out until it protrudes enough to permit the two halves of the coupling to be screwed together. Refer to the installation & operating manual for the actuator.
- Screw the two coupling halves together.
- Use the counter nut to fix the coupling halves together.
- Install the lift indicators.

## Troubleshooting

Problem	Cause	Remedy
The valve cone jerks or does not slide smoothly or is blocked.	Malfunction in actuator or accessories.	Follow the instructions given in the operating manual for the actuator or the accessories.
	Malfunction in controller.	Follow the instructions in the operating manual for the controller.
	The stuffing box packing affects the lift of the valve cone.	Slightly loosen the nuts of the stuffing box flange. Replace the stuffing box packing if it keeps affecting the lift of the valve cone.
Valve does not close.	The lift of the valve cone is affected by foreign matter.	Open and close the valve several times very abruptly.
	The valve seat is dirty or clogged by foreign particles.	If the valve will not close disassemble the equipment and clean the component parts. Replace any defective component parts.

- If faults occur that are not listed above or cannot be corrected, please contact our Technical Service or authorized agency in your country.

## Putting the equipment out of operation

- For the disposal of all residues observe the pertinent legal regulations concerning waste disposal.

## Removing harmful substances



### DANGER

If the equipment is used in contaminated areas there is a risk of severe injuries or death caused by harmful substances in or on the equipment.

- Only qualified personnel are allowed to perform work on contaminated equipment.
- Always wear the protective clothing prescribed for contaminated areas when working on the equipment.
- Make sure that the equipment is completely decontaminated before carrying out any service work.
- Follow the pertinent instructions for handling the hazardous substances in question.

Qualified personnel must have extensive experience with and a working knowledge of:

- pertinent rules and regulations concerning handling hazardous substances
- special regulations for handling the hazardous substances encountered on site
- using the required personal protective equipment (PPE) and clothing



### Caution

Environmental damage may be caused by poisonous fluid residues.

- Before disposing of the equipment make sure that it is clean and free of fluid residues.
- For the disposal of all materials observe the pertinent legal regulations concerning waste disposal.

- Remove all residues from the equipment.

## Removing the equipment



### DANGER

Personnel working on pipes are exposed to safety risks and may suffer severe injuries, poisoning or even loss of life.

- Make sure that no hot or hazardous fluid is in the equipment or the pipes.
- Make sure that the pipes upstream and downstream of the equipment are depressurised.
- Make sure that the installation is switched off and protected against unauthorised or unintended activation.
- Make sure that the equipment and the pipes have cooled down to room temperatures.
- Wear protective clothing that is suitable for the fluid and, if necessary, wear protective gear.

For more information on suitable protective clothing and safety gear refer to the safety data sheet of the fluid in question.



### CAUTION

Risk of injuries if the equipment falls down.

- When removing the equipment make sure the it is safely held in place and cannot fall down.

Suitable measures are for instance:

- Equipment that is not too heavy may be supported by a second person.
- For heavy equipment use suitable lifting equipment of sufficient strength.
- Detach the end connections of the equipment from the pipes.
- Put the equipment onto a suitable base.
- Store the equipment as described on page 12.

## Re-using equipment after storage

Observe the following instructions if you want to remove the equipment and use it again somewhere else:

- Make sure that the equipment is free of any fluid residues.
- Make sure that all connections are in good condition and leak-free.
- If necessary re-work welded connections in order to ensure that they are in good working condition.
- Use the equipment only for its intended purpose and the service conditions for which it was specified.

## Disposing of the equipment



### Caution

Environmental damage may be caused by poisonous fluid residues.

- Before disposing of the equipment make sure that it is clean and free of fluid residues.
- For the disposal of all materials observe the pertinent legal regulations concerning waste disposal.

The equipment is made from the following materials:

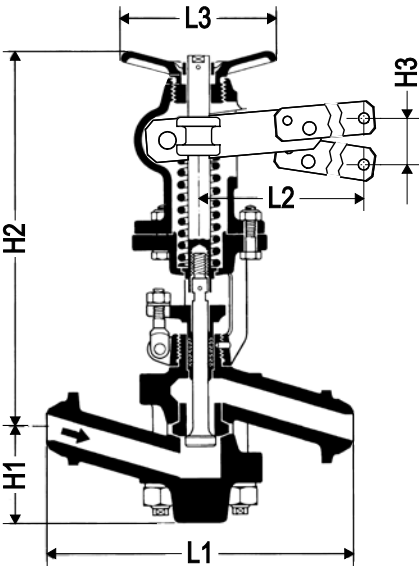
Component	EN	ASTM
Body <sup>1</sup>	13CrMo4-5 (1.7335)	A182-F12
Flange with yoke	P250GH (1.0460)	A105
Seat bushing Valve cone <sup>1</sup>	X6CrNiMoTi17-12-2 (1.4571)	AISI316Ti
Threaded bolt <sup>1</sup>	21CrMoV 5-7 (1.7709)	—
Nut <sup>1</sup>	21CrMoV 5-7 (1.7709)	—
Packing	Graphite	—
Yoke	EN-GJMW-350-4 (0.8035)	—
Compression spring	EN 10270-1	—

1 Pressure parts

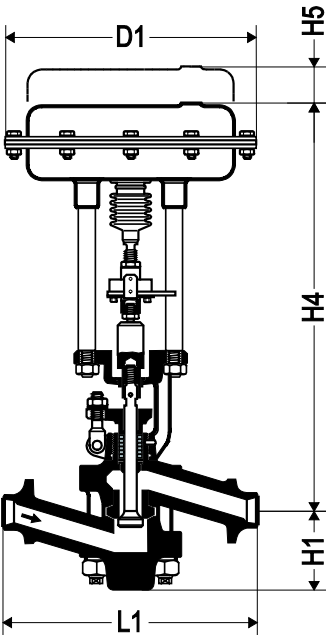
Technical data

Dimensions and weights

PA 110



MPA 110



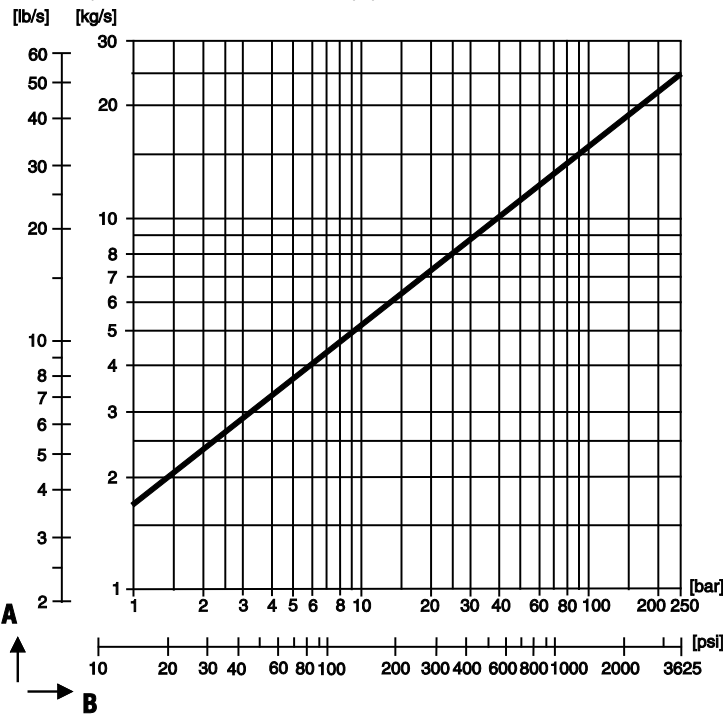
Dimension [mm]	N II*	N III*
D1	300	405
H1	90	
H2	370	
H3	180	
H4	520	586
H5 (space required for servicing)	40	
L1	See the following table	
L2	645	
L3	150	

\* Diaphragm actuator

Type of connection	Dimension L1 [mm]	Weight, approx. [kg]		
		PA 110	MPA 110/NII	MPA 110/NIII
Flange PN 63/100/160, DN25	390	29	49	74
Flange PN 250, DN25	410	30	50	75
Flange class 400/600, DN25	410	29	49	74
Flange class 900/1500, DN25	440	30	50	75
Butt-weld end, EN or ASME DN25	300	23	43	68
Butt-weld end via transition pieces, DN25	400	24	44	69
Socket-weld end	280	29	49	74

# Flowrate

The diagram shows the maximum flow of hot water.  
The flowrate is influenced by the differential pressure. The differential pressure is calculated from the pressure upstream of the equipment minus the pressure downstream of the equipment.



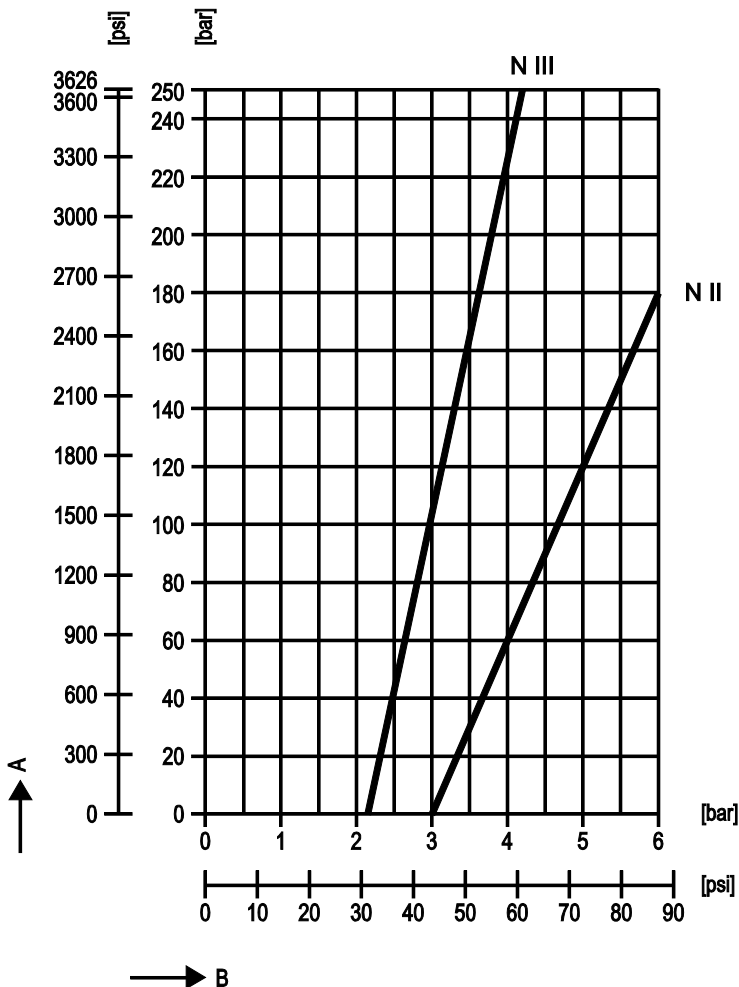
- A Flow rate
- B Differential pressure



## Control pressure for MPA 110

The control medium for the diaphragm actuator is compressed air. The control pressure must not exceed 6 bar.

➤ Use the diagram below to determine the minimum control pressure based on the differential pressure and the drive.



A Differential pressure

B Control pressure

NII Actuator for differential pressure up to 160 bar/2320 psi

NIII Actuator for differential pressure above 160 bar/2320 psi

## Pressure & temperature ratings

### PA 110, MPA 110

Type of connection	Flange PN 160 and EN butt-weld ends (for pipe $33.7 \times \geq 2.6$ )				
Pressure <sup>1</sup> p [barg]	160	160	160	160	144
Temperature <sup>1</sup> T [°C]	20	100	200	300	400
Maximum pressure at boiling temperature [bar/°C]	154/344				

<sup>1</sup> Operating limits for strength of body/cover to EN 1092-1

Type of connection	Flange PN 250 and EN butt-weld ends (for pipe $33.7 \times \geq 3.6$ )				
Pressure <sup>1</sup> p [barg]	250	250	250	250	225
Temperature <sup>1</sup> T [°C]	20	100	200	300	400
Maximum pressure at boiling temperature [bar/°C]	220/374				

<sup>1</sup> Operating limits for strength of body/cover to EN 1092-1

Type of connection	Flange CLASS 400/600				
Pressure <sup>1</sup> p [barg]	103.0	100.9	92.5	85.7	73.3
Temperature <sup>1</sup> T [°C]	38	100	200	300	400
Maximum pressure at boiling temperature [bar/°C]	85/300				

<sup>1</sup> Operating limits for strength of body/cover to ASME B16.34

Type of connection	Flange CLASS 1500, butt-weld ends schedule 80 and schedule 160, socket- weld ends CLASS 6000				
Pressure <sup>1</sup> p [barg]	258.6	252.2	231.3	214.4	183.1
Temperature <sup>1</sup> T [°C]	38	100	200	300	400
Maximum pressure at boiling temperature [bar/°C]	195/364				

<sup>1</sup> Operating limits for strength of body/cover to ASME B16.34

## Manufacturer's Declaration

For more information on the Conformity Assessment according to European rules refer to our Declaration of Conformity or our Declaration by Manufacturer.

To download the current Declaration of Conformity or Declaration by Manufacturer go to [www.gestra.com/documents](http://www.gestra.com/documents) or contact:

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



Agencies all over the world: [www.gestra.de](http://www.gestra.de)

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