

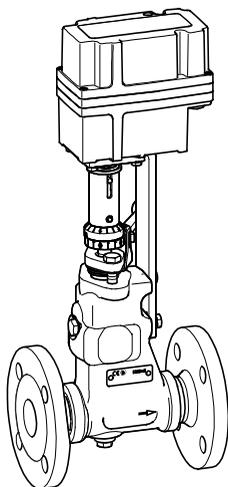
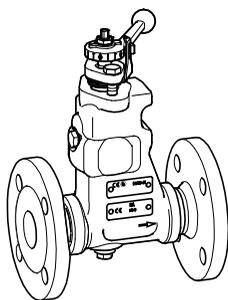
Continuous blowdown valve

**BA 46**

**BA 47**

**BAE 46**

**BAE 47**



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## Foreword

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

- ▶ Continuous blowdown valve BA 46 (manual operation)
- ▶ Continuous blowdown valve BA 47 (manual operation)
- ▶ Continuous blowdown valve BAE 46 (electric actuation)
- ▶ Continuous blowdown valve BAE 47 (electric actuation)

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.

You can find further information, instructions and details of equipment accessories in the respective manufacturer documentation.

These documents are regarded as belonging to this installation & operating manual. Keep these documents together with this installation & operating manual. Hand over this installation & operating manual if you sell or pass on the equipment to a third party.

## 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 continuous blowdown valves below are used for removing boiler blowdown from steam generating units:

- ▶ Continuous blowdown valve BA 46 (manual operation)
- ▶ Continuous blowdown valve BA 47 (manual operation)
- ▶ Continuous blowdown valve BAE 46 (electric actuation)
- ▶ Continuous blowdown valve BAE 47 (electric actuation)

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.

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

Usage for the intended purpose also includes reading and adhering to all instructions in the installation and operating manual for the actuator (if present).

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.
- ▶ the equipment is operated using an actuator not approved by the manufacturer.
- ▶ the equipment is operated with a control system not approved by the manufacturer.

## 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.
- ▶ Only equipment types BA 46 and BA 47 may be used in potentially explosive atmospheres. Do not use equipment types BAE 46 or BAE 47 in potentially explosive atmospheres.

## Risk of severe injuries

- ▶ The equipment is under pressure and can get hot during operation. Only perform work on the equipment if the following conditions are satisfied:
  - ▶ The pipes must be isolated from pressure.
  - ▶ All fluid must be thoroughly removed from pipes and the equipment.
  - ▶ Before carrying out any work, the higher-level system must be switched off and secured so it cannot be switched back on by unauthorised persons.
  - ▶ Pipes and the equipment must have cooled to around 20 °C (lukewarm).
- ▶ The equipment may only be used with fluids that are not aggressive in contact with material and seals. Otherwise, leaks may occur and hot or toxic fluid may escape.
- ▶ The equipment and its components may only be installed or removed by specialist personnel. Specialist personnel must have knowledge and experience of the following areas:
  - ▶ Producing pipe connections.
  - ▶ Selecting suitable lifting gear for the product, and using it safely.
  - ▶ Working with hot or pressurised 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.

- ▶ The connections of the electric actuator are live during operation. Take care not to touch connections during operation. Disconnect the actuator from the power supply before performing any work on the equipment.

## 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.
- ▶ An incorrectly positioned blowdown fitting can cause damage to the equipment or the higher-level system due to live steam leakage. Make sure the blowdown fitting is below the low water line in the tank.

## Qualification of personnel

Specialist personnel must have knowledge and experience of the following areas:

- ▶ explosion and fire precautions and occupational health & safety provisions applicable at the site of installation
- ▶ work on pressure equipment
- ▶ producing pipe connections
- ▶ working with hot or pressurised fluids
- ▶ lifting and transporting loads
- ▶ all information in this installation & operating manual and other applicable documentation
- ▶ 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

#### Scope of supply

For equipment types BA 46 and BA 47, delivery includes the following:

- ▶ one continuous blowdown valve
- ▶ one sampling valve
- ▶ one sealing ring A17 × 23 × 1.5 mm
- ▶ this installation & operating manual

For equipment types BAE 46 and BAE 47, delivery includes the following:

- ▶ one blowdown valve with actuator
- ▶ one sampling valve
- ▶ one sealing ring A17 × 23 × 1.5 mm
- ▶ this installation & operating manual
- ▶ actuator installation & operating manual
- ▶ Manufacturer's Declaration for the actuator

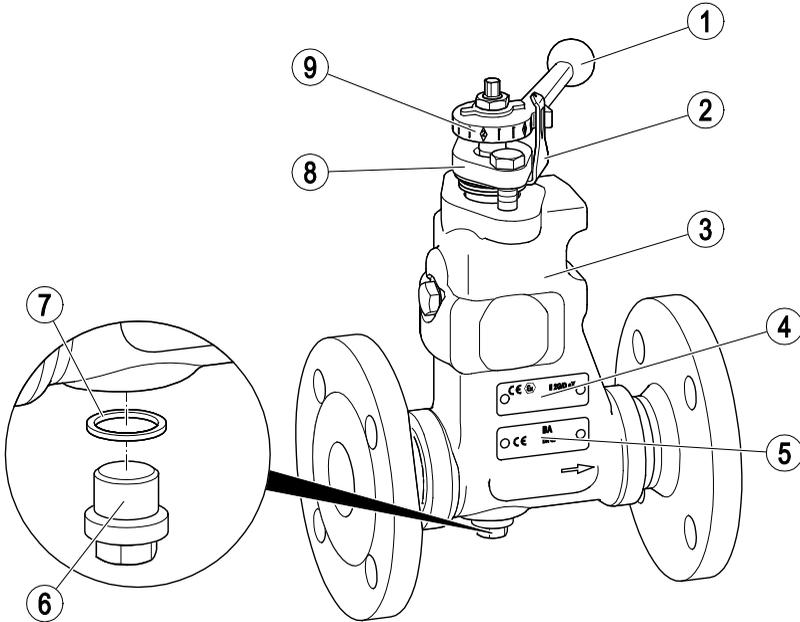
The equipment is packaged ready for installation with sampling valve supplied.

#### Equipment specification



BA and BAE models have different types of actuator. Below, the two types of actuator are shown in separate diagrams. The body with inner parts is identical in both valves and is shown separately.

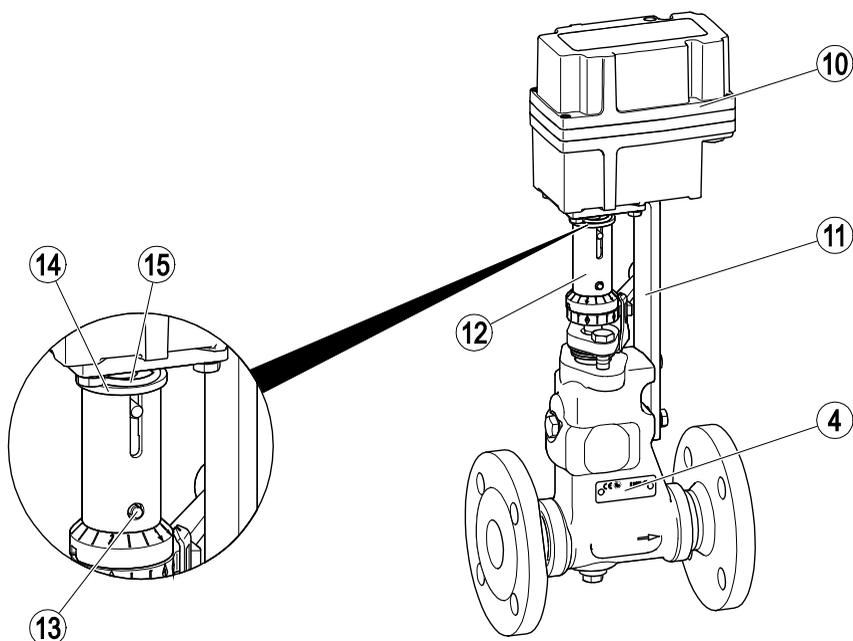
# Equipment overview, BA



No.	Designation
1	Control lever
2	Dial
3	Body
4	Rating plate
5	ATEX label (BA only)

No.	Designation
6	Sealing plug
7	Sealing ring
8	Stuffing box gland
9	Scale

## With electric actuator, BAE



No.	Designation
4	Rating plate
10	Actuator
11	Bracket
12	Coupling

No.	Designation
13	Control pin
14	Thrust ring
15	Spring

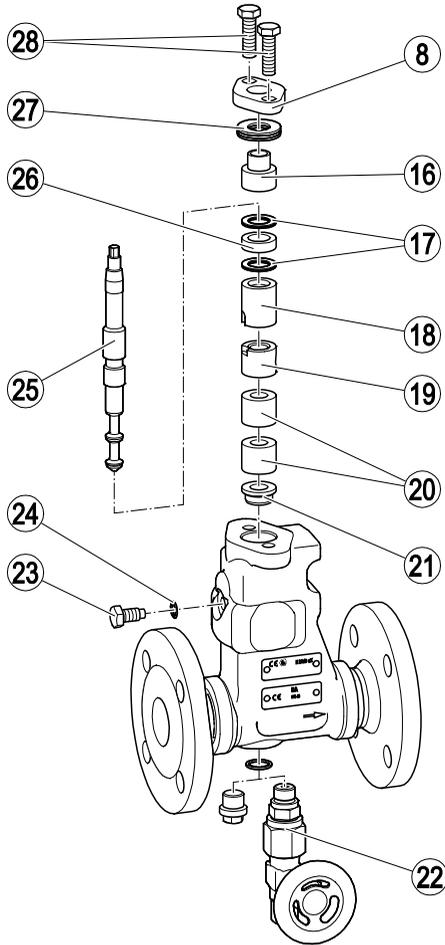
The following actuators are available as standard:

- ▶ EF 10
- ▶ EF 10-1
- ▶ EF 0.7
- ▶ EF 0.7-1

Other actuators are available on request.

In these models, the opening signal can be sent by various controllers. The actuator and control system are described in their own separate installation & operating manuals.

## Inner parts



No.	Designation
8	Stuffing box gland
16	Spring bushing
17	Wiper
18	Guide bushing
19	Anti-wear bushing
20	Stepped bushings
21	Seat bushing

No.	Designation
22	Sampling valve
23	Locking screw
24	Sealing ring
25	Nozzle needle
26	Packing ring
27	Disc springs
28	Stuffing box screws

## Optional extras

The following add-on equipment is available:

- ▶ Actuator for subsequently converting a BA 46 or BA 47 into a BAE 46 or BAE 47
  - ▶ ARIS EF 0.7 (actuator with two travel limit switches and a switch cam), for BAE 46-3
  - ▶ ARIS EF 0.7-1 (actuator with two travel limit switches, feedback potentiometer and switch cam), for BAE 46-3-1
  - ▶ ARIS EF 10 (actuator with two travel limit switches and a switch cam), for BAE 46 and BAE 47
  - ▶ ARIS EF 10-1 (actuator with two travel limit switches, feedback potentiometer and switch cam), for BAE 46-1 and BAE 47-1
- ▶ Control units, e.g. LRR 1- ...

## End connections

The equipment is available with the following end connections:

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

## Name plate

The following items are indicated on the name plate:

- ▶ Manufacturer
- ▶ Type designation
- ▶ Nominal size
- ▶ Pressure rating
- ▶ Max. service temperature
- ▶ CE marking

The following items are indicated on the equipment body:

- ▶ Direction of flow
- ▶ Date of manufacturing

## Type designations

The type designation indicates the pressure rating and actuator. The following type designations are possible.

- ▶ BA 46: PN 40, manual operation
- ▶ BA 47: PN 63, manual operation
- ▶ BAE 46: PN 40, electric actuator EF 10
- ▶ BAE 46-1: PN 40, electric actuator EF 10-1
- ▶ BAE 46-3: PN 40, electric actuator EF 0.7
- ▶ BAE 46-3-1: PN 40, electric actuator EF 0.7-1
- ▶ BAE 47: PN 63, electric actuator EF 10
- ▶ BAE 47-1: PN 63, electric actuator EF 10-1

You can find information on actuator type designations in the manufacturer's installation & operating manual.

## 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

Equipment types BAE 46 and BAE 47 are not suitable for use in potentially explosive atmospheres.

For equipment types BA 46 and BA 47, please note the following instructions for use in potentially explosive environments.

The equipment has classification:  
CE Ex 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.

**i** Special actuators with ATEX approval are available on request.

## Task and function

### Purpose

The equipment is used for the continuous manual or automatic removal of boiler blowdown from steam generating units.

### Function

Equipment types BA 46 and BA 47 are intended for manual operation. The required flowrate is calculated using a formula or can be seen in the flow diagrams (see page 18). The flowrate is set manually using the control lever.

In combination with an LRR 1-... conductivity controller, LRG 1-...-... conductivity electrode or LRGT 1-...-... conductivity transmitter, the equipment provides an automatic conductivity regulation system (continuous blowdown control).

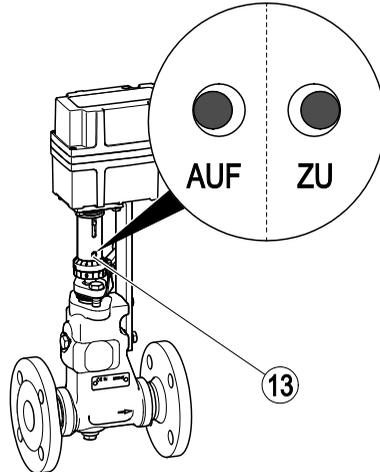
Control lever positions:

- ▶ Position "0" (CLOSED): No removal of boiler blowdown
- ▶ Operating position: The set quantity of blowdown is continuously removed
  - ▶ Position "1": Boiler blowdown is removed at 8 % of the maximum flowrate
  - ▶ Position "2": Boiler blowdown is removed at 33 % of the maximum flowrate
  - ▶ Position "3": Boiler blowdown is removed at 66 % of the maximum flowrate
- ▶ Position "4" (OPEN): Boiler blowdown is removed at the maximum flowrate.

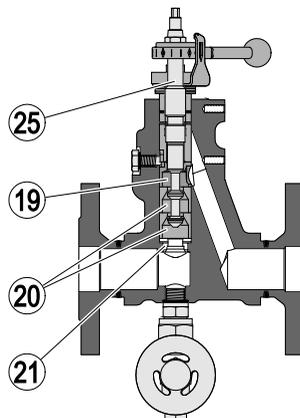
The operating position can be infinitely adjusted using the control lever or actuator. The set valve

position is displayed by the dial on the control lever scale.

In equipment models with actuator (BAE), the "OPEN" and "CLOSED" positions are indicated by the (13) control pin.



The nozzle needle (25) is raised depending on the set valve position. Fluid flows through the seat bushing (21), the stepped bushings (20) and the anti-wear bushing (19).



## 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.

### 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.
- Make sure that the control lever can move freely.

The control lever must have a full range of movement without touching other fittings.

---

## **Attention!**

Risk of equipment damage or malfunction if incorrectly installed.

- Make sure that connections on the steam generating unit have been correctly produced.
- To prevent water hammer, route the pipe downstream from the equipment with a downhill gradient.
- Always make sure the actuator has an inclination of less than 90 ° when installing the equipment.

---

Please note the following points to ensure correct connection to the pressure vessel:

- ▶ The equipment must be connected at about 100 mm below the low level line in the steam generating unit.
- ▶ Do not connect the equipment on the floor of the steam generating unit.
- ▶ Do not connect the equipment in the steam zone of the tank.

Note the following instructions for different installation positions:

- We recommend installing the equipment horizontally with the nozzle needle upright.
- If the equipment is installed with the nozzle needle inclined or horizontal, provide support for the actuator.
- Please contact the manufacturer if you wish to install the equipment in a different position.

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.

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



## **DANGER**

Danger of death from electric shock!

- Make sure the drive is disconnected from the mains connection during all work.
- Have specialist personnel handle the mains connection.

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Specialist personnel must have knowledge and experience of working on electrical systems with the required operating voltage and current.

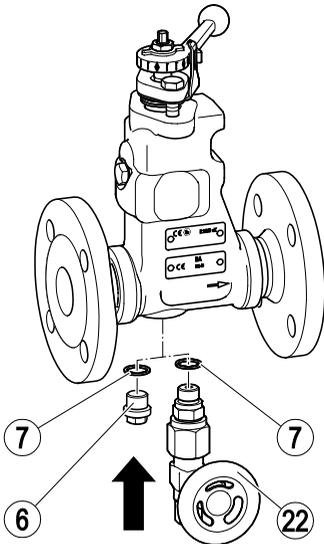
- Have specialist electrical technicians connect the actuator.
- Make sure that specialist personnel follow all instructions in the installation & operating manuals for the actuator and control system.

## Installing the sampling valve

- Remove the sealing plug (6).
- Remove the sealing ring (7) from the body.
- Insert the supplied sealing ring A17 × 23 × 1.5 mm (7) in the hole.
- Read and follow the instructions in the sampling valve installation & operating manual.
- Coat the thread and contact surfaces with temperature-resistant lubricant.

The lubricant must have the same properties as OKS 217.

- Screw the sampling valve (22) into the hole in the body with a torque of 130 Nm.



## Positioning the control lever

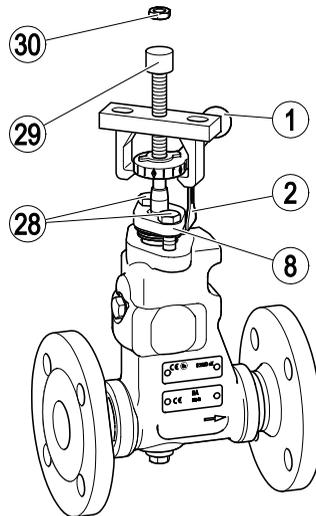


In BA models, you can change the position of the control lever by 180°.

You will find information on the required tools on page 26.

Proceed as follows:

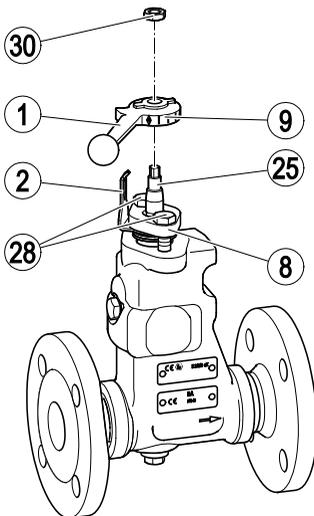
- Remove the hex nuts (30) from the control lever.
- Insert the puller (29) beneath the control lever.
- Remove the control lever (1).
- Remove the two stuffing box screws (28).
- Remove the stuffing box gland (8).
- Remove the dial (2).



- Turn the dial (2) on the nozzle needle (25) to the desired position.
- Place the stuffing box gland (8) on the nozzle needle (25).
- Hand-tighten the stuffing box screws (28).
- Unscrew the nozzle needle by a half turn.

The torque for the stuffing box screws varies depending on the equipment:

- ▶ For models with DN 15 to DN 32, the required torque is 7 Nm.
  - ▶ For models with DN 40 and DN 50, the required torque is 11 Nm.
- Tighten the stuffing box screws to the specified torque.
  - Turn the nozzle needle to closed position with a torque of 7 Nm.
  - Place the control lever (1) on the nozzle needle.
  - Align the scale (9) on the dial (2) so that the "0" mark is in the centre of the dial.
  - Screw the hex nut (30) onto the nozzle needle, holding the control lever firmly.
  - Tighten the hex nut to a torque of 20 Nm.



## Starting up the equipment



### WARNING

Risk of burns from hot parts during operation.

- Wear insulated and heat-resistant protective gloves to operate the control lever.



### WARNING

Risk of being crushed by moving parts.

BAE type equipment is actuated and controlled remotely. It can therefore open or close without warning.

- Never reach into moving parts during operation.
- 
- Actuate the equipment after the steam generating unit or pressure vessel has powered up, as described in the following section.
  - Check whether fluid is escaping from the stuffing box bush.
  - If it is, retighten the stuffing box as described on page 27.

## Determining the blowdown rate

Calculate the correct blowdown rate using a formula and determine the necessary position of the control lever using the flow diagrams below.

For BAE models, the blowdown rate can be determined by measuring the conductivity of the boiler blowdown. You can find further information on this in the control system installation & operating manual.

$$A = (Q \times S) / (K - S)$$

whereby:

A = quantity of boiler water to be drained [kg/h]

Q = boiler capacity [kg/h]

S = feedwater conductivity [ $\mu\text{s}/\text{cm}$ ]

K = admissible boiler water conductivity [ $\mu\text{s}/\text{cm}$ ]

### Example

Differential pressure: 15 bar with nominal size DN 20

Boiler capacity Q = 10,000 kg/h

Conductivity S = 100  $\mu\text{s}/\text{cm}$

Admissible conductivity K = 3,000  $\mu\text{s}/\text{cm}$

### Quantity of boiler water to be drained

**A = approx. 345 kg/h**

The required blowdown rate A1 is the quantity of boiler water to be drained A minus 10 % for intermittent blowdown.

**Blowdown rate A1 = 310 kg/h**

The required control lever position can be seen in the relevant flow diagram, with value A1.

- Use the flow diagram with which the required blowdown rate is achieved at the named differential pressure.

In the example shown here, you would use the flow diagram for DN 15 to DN 32 with a capacity range up to 1,020 kg/h.

- Determine the intersection of the curve for the given differential pressure with the required flowrate.
- Drop a perpendicular onto the axis of the control lever position.

In this example, the required control lever position is 41 %.

## Determining the flowrate

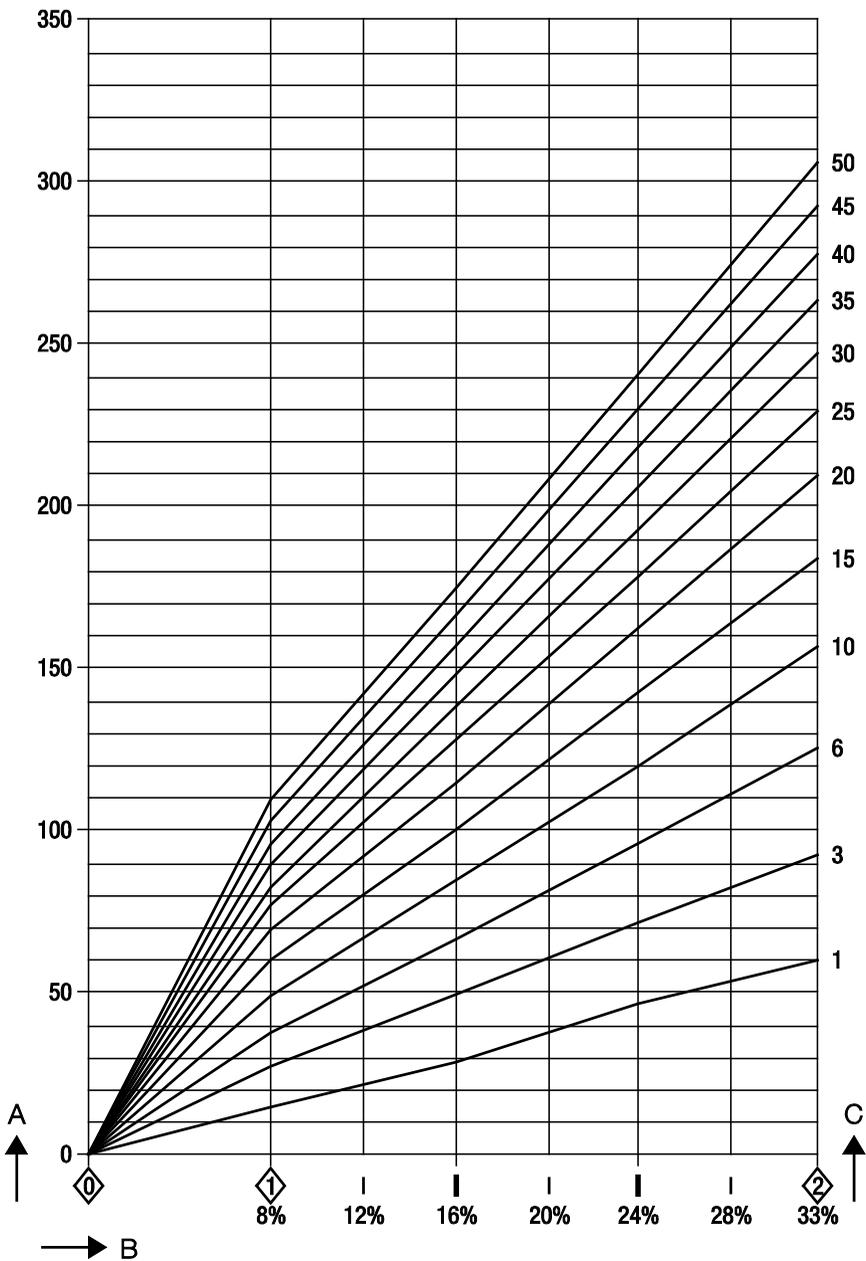
The possible flowrate as a function of the differential pressure is presented in the following diagrams.

To improve clarity, the flow diagrams for DN 15 to DN 32 and those for DN 40 and DN 50 are each shown separately over three pages.

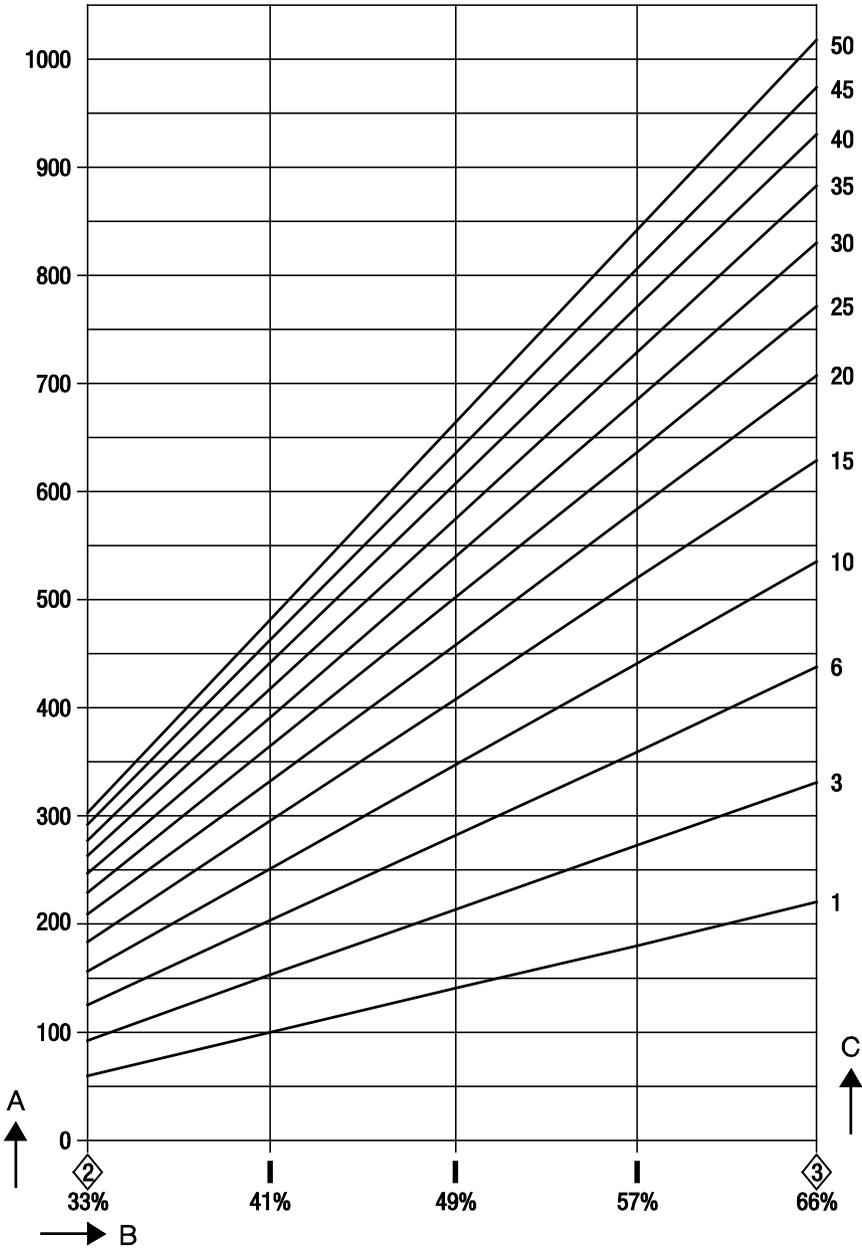
The abbreviations in the diagrams have the following meanings:

- A Flowrate [kg/h]
- B Position of control lever (dial position)
- C Differential pressure [bar]

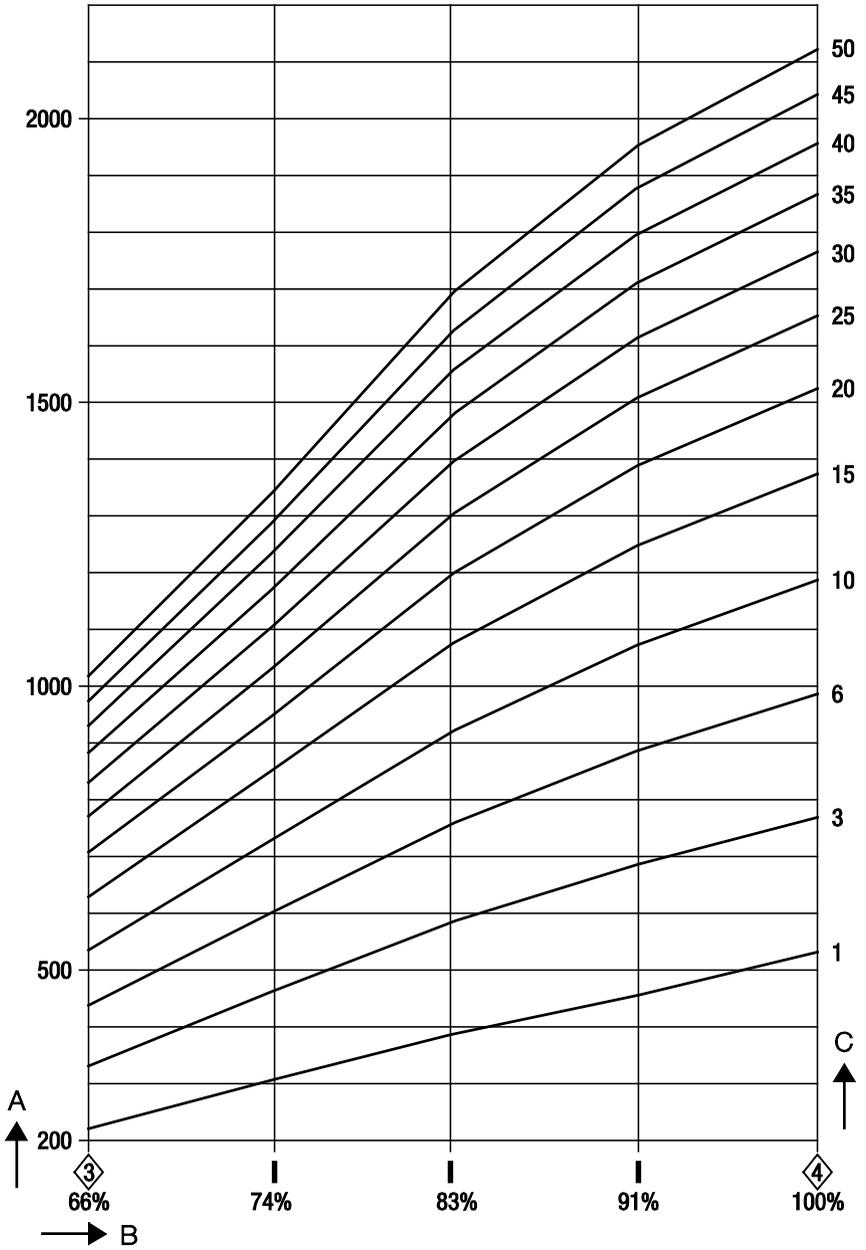
**Flow diagram for DN 15 to DN 32, capacity range up to 310 kg/h**



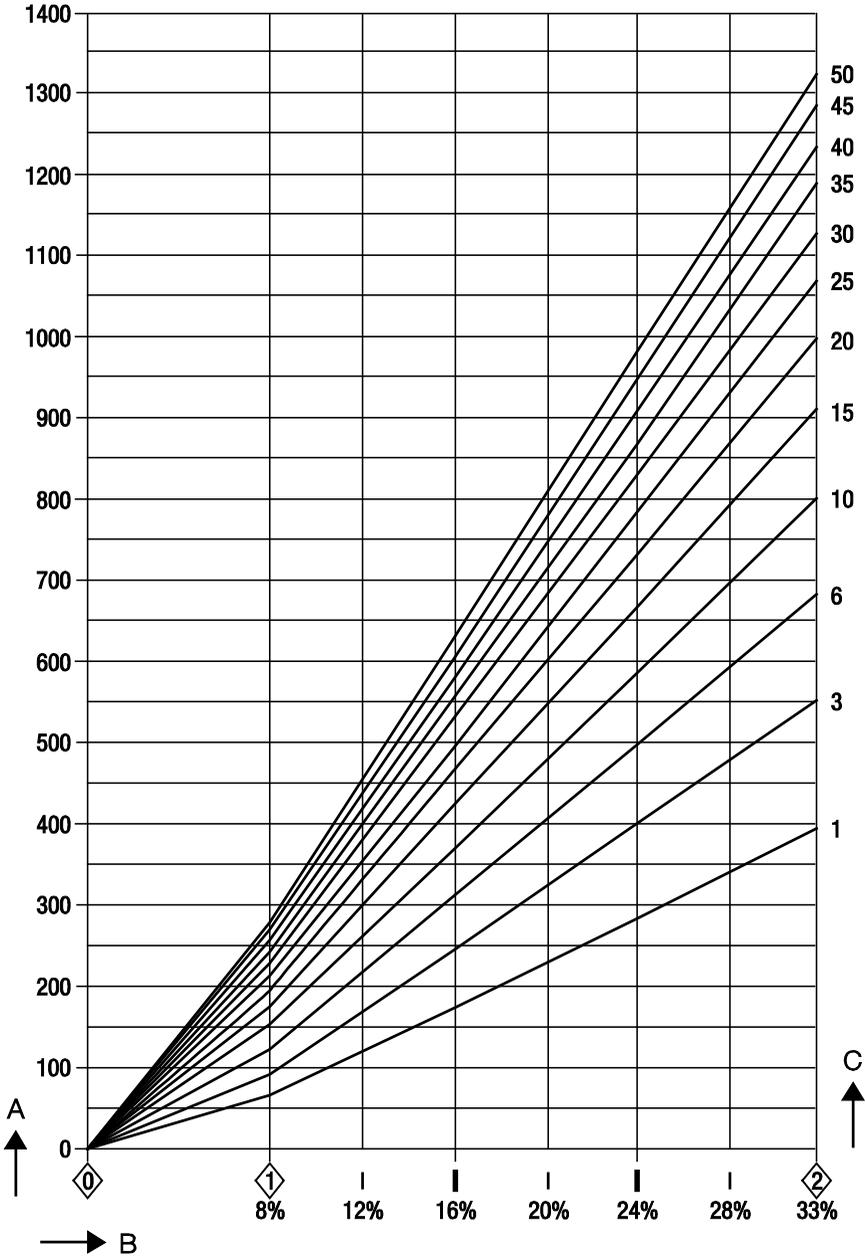
Flow diagram for DN 15 to DN 32, capacity range up to 1,020 kg/h



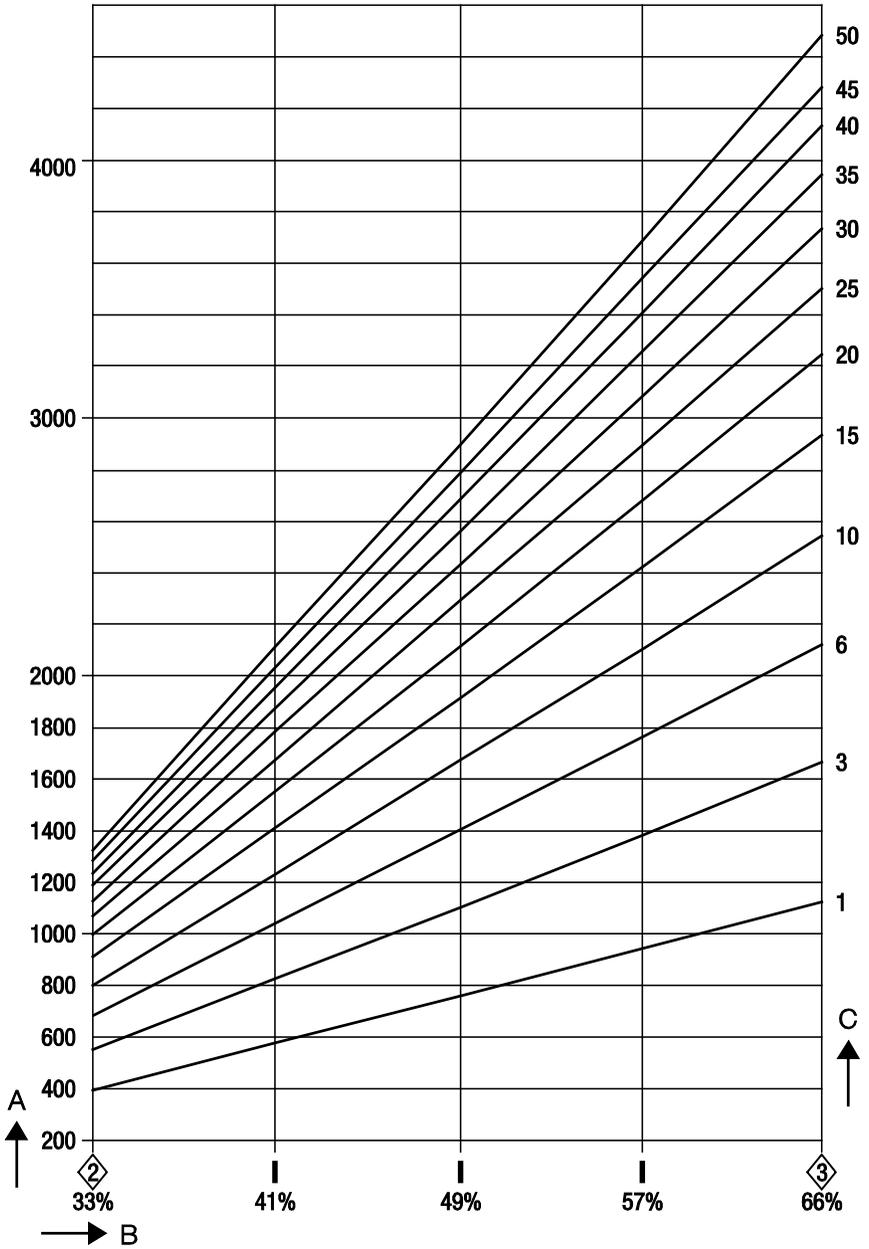
Flow diagram for DN 15 to DN 32, capacity range up to 2,120 kg/h



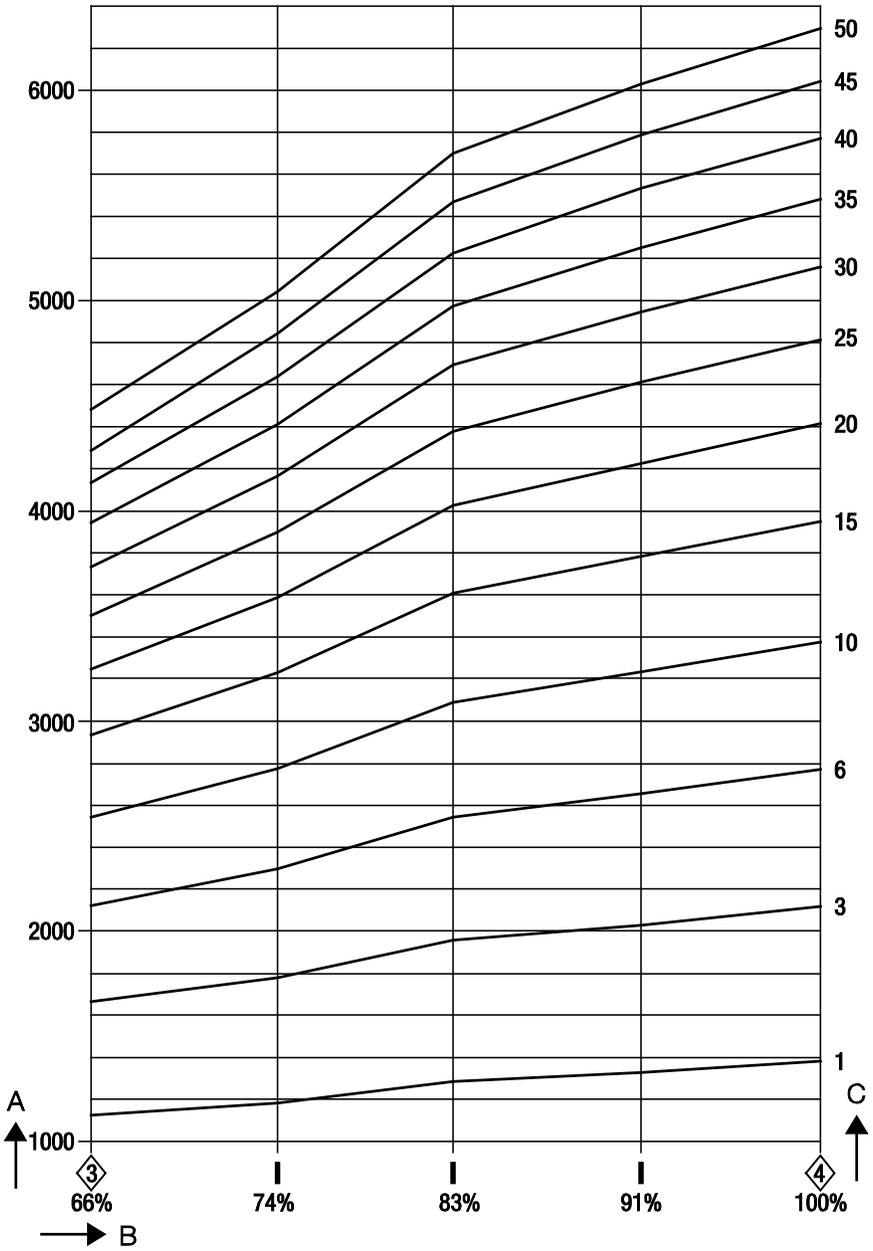
**Flow diagram for DN 40 and DN 50, capacity range up to 1,340 kg/h**



Flow diagram for DN 40 and DN 50, capacity range up to 4,500 kg/h



Flow diagram for DN 40 and DN 50, capacity range up to 6,300 kg/h



## Operating the equipment

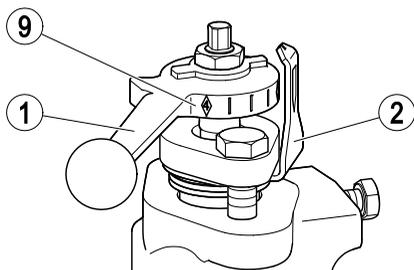
### Normal operation

For BA 46 or BA 47 models without actuator, proceed as follows:

- Turn the control lever (1) anti-clockwise to open.
- Turn the control lever clockwise to close.

The dial (2) must point to the relevant value on the scale (9).

- Set the control lever to the position you have determined.



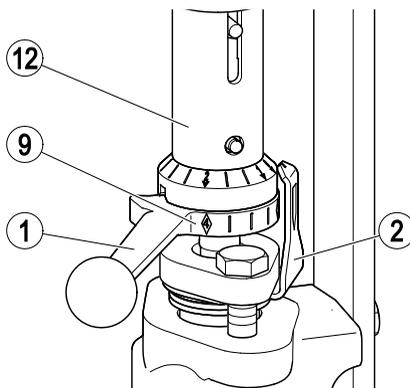
For BAE 46 or BAE 47 models with actuator, proceed as follows:

- Set the required boiler water conductivity on the control system.
- To do this, read and follow the instructions in the control system installation & operating manual.
- Check that the control pin in the coupling indicates the correct position.
- Check that the control lever is set to the desired position.

### Emergency operation on failure of the actuator in BAE models

If the actuator fails in BAE 46 or BAE 47 models, you can adjust the flowrate manually. Proceed as follows:

- Disconnect the actuator from the electricity mains and the control system.
- With your hand, push the coupling (12) up by roughly one centimetre until the control lever (1) can move freely.
- Adjust the control lever until the dial (2) indicates the desired position on the scale (9).
- Slowly lower the coupling.
- Have the actuator and control system checked immediately by a specialist electrical technician.



### Flushing the equipment

- Briefly open the equipment completely once a day.
- When doing this, take care not to exceed the temperature and pressure ratings of the system.
- Next, return the control lever to operating position.

## After operation



### WARNING

Risk of severe injury or death due to burns during work on pipes.

- Make sure that there are no hot fluids in the equipment or pipes.
- Make sure that the pipes to the equipment are not under pressure.
- Make sure that the system is switched off and secured so it cannot be turned on by an unauthorised person.
- Make sure that the equipment and pipes have cooled to a lukewarm temperature.



### 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

You will need the following tools for equipment servicing or maintenance:

- Size 7 combination spanner, DIN 3113, form B
- Size 10 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
- Torque wrench 1-12 Nm, ISO 6789
- Torque wrench 8-40 Nm, ISO 6789
- Torque wrench 80-400 Nm, ISO 6789
- Punch 14.8 x 220 (brass)
- Hammer, 300 g, DIN 1041
- Self-centring puller, size 0

## 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 [Nm]	
	DN 15-32	DN 40, 50
Stuffing box screw	7	11
Sealing plug	130	
Locking screw	5	11
Nozzle needle	7	
Hex nut	20	
Hex bolt	30	

# Maintaining the equipment

## Maintenance schedule

Interval	Component	Activity
Daily	Nozzle needle	Move nozzle needle by at least one full stroke.
3 months	Stuffing box seal	Visually inspect to ensure tightness. Replace a leaky stuffing box.
	<ul style="list-style-type: none"><li>▶ Connections</li><li>▶ Body gasket</li><li>▶ Cone guide</li></ul>	Visually inspect for the following points: <ul style="list-style-type: none"><li>▶ Tightness</li><li>▶ Cleanliness</li></ul> Replace leaky or worn components. Remove dirt.
12 months	Actuator fastening	Check that the actuator is securely seated on the equipment and inspect bolts. Tighten loose connections.

## Retightening the stuffing box



### WARNING

Component parts that get hot during operation can cause burnings.

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

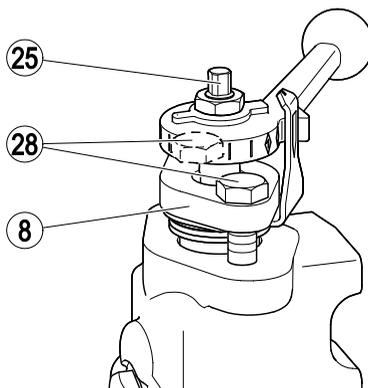
If fluid escapes via the stuffing box gland (8), retighten the stuffing box bush.

- Unscrew the nozzle needle (25) by a half turn.

The torque for the stuffing box screws varies depending on the equipment:

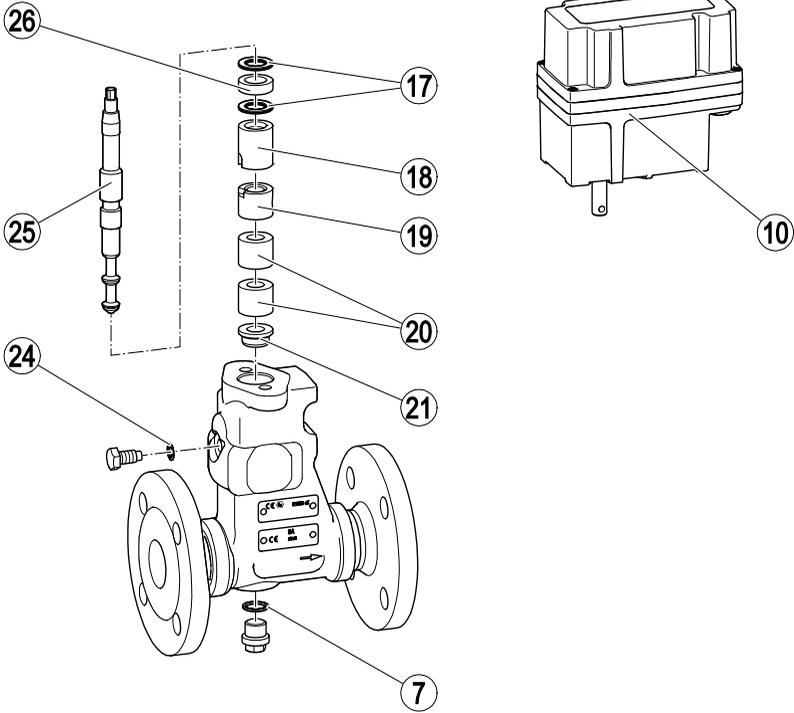
- ▶ For models with DN 15 to DN 32, the required torque is 7 Nm.
- ▶ For models with DN 40 and DN 50, the required torque is 11 Nm.
- Tighten the stuffing box screws (28) to the specified torque.
- Make sure the following conditions are satisfied:
  - ▶ The valve must be able to open and close.

- ▶ No more fluid escapes from the stuffing box gland.
- If you are unable to eliminate the leak, replace the stuffing box as described on page 30.



# Servicing the equipment and installing spare parts

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



No.	Designation	Stock code	
		BA 46 BA 47	BAE 46 BAE 47
7, 17, 24, 26	Packing and sealing set DN 15–32, comprising: <ul style="list-style-type: none"> <li>▶ Packing ring 15 × 23 × 8 with 4 wipers</li> <li>▶ Sealing ring C 6 × 10 × 1.5</li> <li>▶ Sealing ring A 17 × 23 × 1.5</li> </ul>	335702	335702
7, 17, 24, 26	Packing and sealing set DN 40, DN 50, comprising: <ul style="list-style-type: none"> <li>▶ Packing ring 18 × 28 × 10 with 4 wipers</li> <li>▶ Sealing ring C 10 × 16 × 1.5</li> <li>▶ Sealing ring A 17 × 23 × 1.5</li> </ul>	335704	335704
7, 17, 18, 19, 20, 21, 24, 25, 26	Spare parts set DN 15 – DN 32, comprising: <ul style="list-style-type: none"> <li>▶ Packing and sealing set</li> <li>▶ Nozzle needle</li> <li>▶ Seat bushing</li> <li>▶ 2 stepped bushings</li> <li>▶ Anti-wear bushing</li> <li>▶ Guide bushing</li> </ul>	335703	335703
7, 17, 18, 19, 20, 21, 24, 25, 26	Spare parts set DN 40, DN 50, comprising: <ul style="list-style-type: none"> <li>▶ Packing and sealing set</li> <li>▶ Nozzle needle</li> <li>▶ Seat bushing</li> <li>▶ 2 stepped bushings</li> <li>▶ Anti-wear bushing</li> <li>▶ Guide bushing</li> </ul>	335705	335705
10	Actuator EF 0.7 for BAE 46-3	–	336806
	Actuator EF 0.7-1 for BAE 46-3-1	–	336807
	Actuator EF 10 for BAE 46 and BAE 47	–	336808
	Actuator EF 10-1 for BAE 46-1 and BAE 47-1	–	336809

## Replacing the actuator



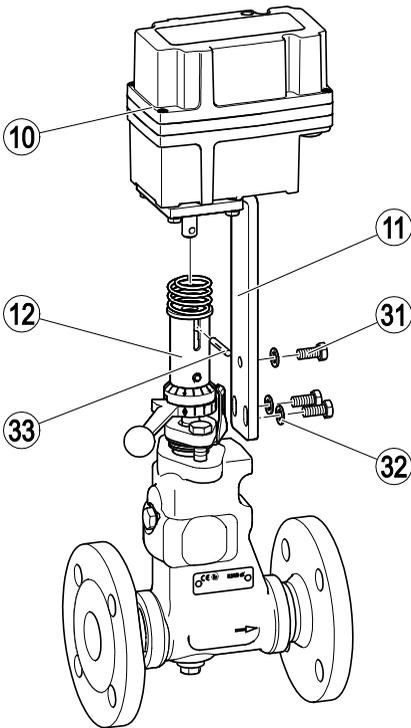
### DANGER

Danger of death from electric shock!

- Make sure the drive is disconnected from the mains connection during all work.
- Have specialist personnel handle the mains connection.

Specialist personnel must have knowledge and experience of working on electrical systems with the required operating voltage and current.

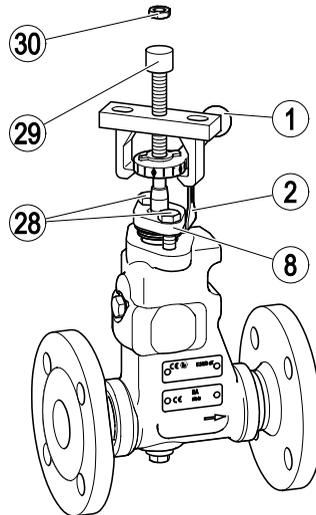
- Remove the hex bolts (31) and shims (32).
- Remove the grooved pin (33).
- Lift off the actuator (10) and bracket (11).



## Replacing the stuffing box and inner parts

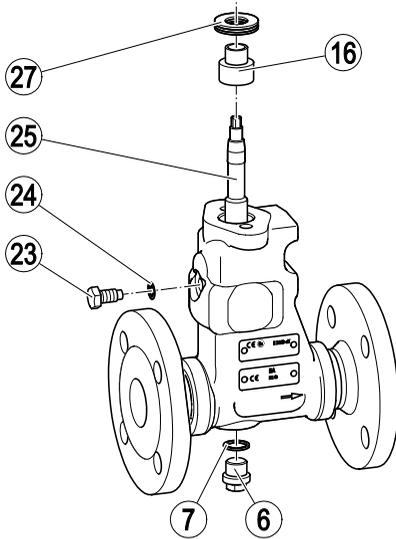
If the stuffing box bush cannot be sealed using the set torque, or the control lever can no longer be moved, replace the stuffing box with a new one.

- Install the actuator as described on page 30.
- Remove the hex nuts (30) from the control lever.
- Insert the puller (29) beneath the control lever.
- Remove the control lever (1).
- Remove the two stuffing box screws (28).
- Remove the stuffing box gland (8).
- Remove the dial (2).

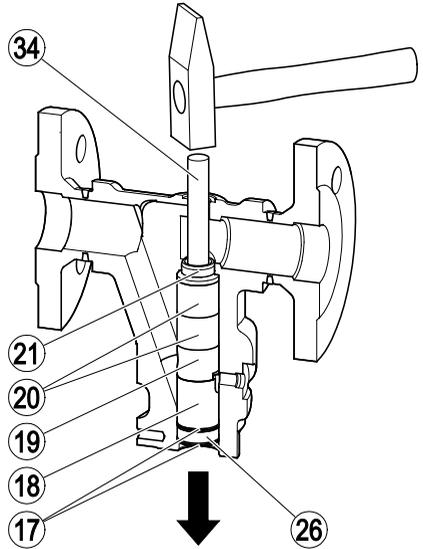


- Fit the actuator as described on page 34.

- Remove the disc springs (27).
- Remove the spring bushing (16).
- Unscrew the nozzle needle (25) from the body.
- Remove the locking screw (23) and sealing ring (24).
- Remove the sealing plug (6) and sealing ring (7).



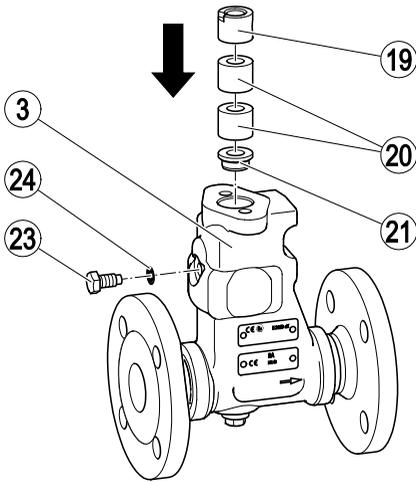
- Using a brass punch (34), knock the following inner parts out of the body as shown.
- ▶ Stuffing box with packing ring (26) and four wipers (17)
- ▶ Guide bushing (18)
- ▶ Anti-wear bushing (19)
- ▶ Two stepped bushings (20)
- ▶ Seat bushing (21)



- Clean all removed parts and the body.
- Inspect all parts to ensure they are in perfect condition.
- Replace damaged parts.
- Insert the seat bushing (21) in the body (3) using adhesive.

The adhesive must have the same properties as Loctite® 620.

- Insert the two stepped bushings (20) in the body.
- Insert the anti-wear bushing (19) in the body.
- Position the anti-wear bushing so that the retaining groove points towards the hole for the locking screw.
- Insert the sealing ring (24).
- Hand-tighten the locking screw (23).



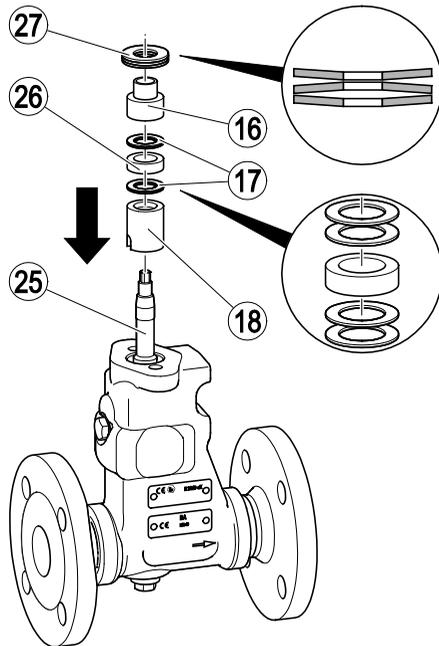
The torque for the locking screw varies depending on the equipment:

- For models with DN 15 to DN 32, the required torque is 5 Nm.
  - For models with DN 40 and DN 50, the required torque is 11 Nm.
- Tighten the locking screw to the specified torque.

- Position the guide bushing (18) so that the retaining groove points towards the locking screw.
- Insert the guide bushing (18).
- Insert the new stuffing box comprising the packing ring (26) and four wipers (17) as shown.
- Coat the thread and sealing surface of the nozzle needle (25) with lubricant.

The lubricant must have the same properties as WINIX® 2010.

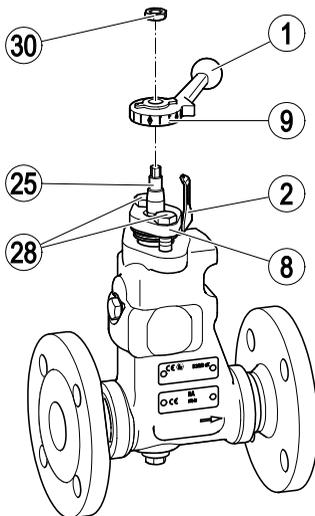
- Insert the nozzle needle in the body.
- Screw the nozzle needle into the guide bushing by two full turns.
- Position the spring bushing (16) on the nozzle needle.
- Position the disc springs (27) on the spring bushing in the position shown.



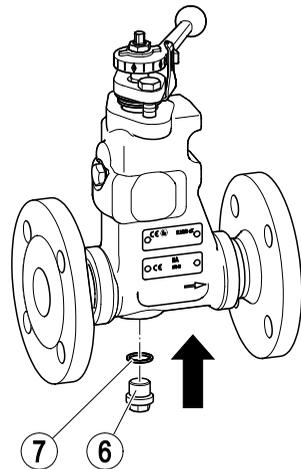
- Turn the dial (2) on the nozzle needle (25) to the desired position.
- Place the stuffing box gland (8) on the nozzle needle (25).
- Hand-tighten the stuffing box screws (28).
- Unscrew the nozzle needle by a half turn.

The torque for the stuffing box screws varies depending on the equipment:

- ▶ For models with DN 15 to DN 32, the required torque is 7 Nm.
- ▶ For models with DN 40 and DN 50, the required torque is 11 Nm.
- Tighten the stuffing box screws to the specified torque.
- Turn the nozzle needle to closed position with a torque of 7 Nm.
- Place the control lever (1) on the nozzle needle.
- Align the scale (9) on the dial (2) so that the "0" mark is in the centre of the dial.
- Screw the hex nut (30) onto the nozzle needle, holding the control lever firmly.
- Tighten the hex nut to a torque of 20 Nm.



- Insert the sealing ring (7).
- Screw in the sealing plug (6) or sampling valve to a torque of 130 Nm.



- Fit the actuator as described on page 34.

## Retrofitting an actuator

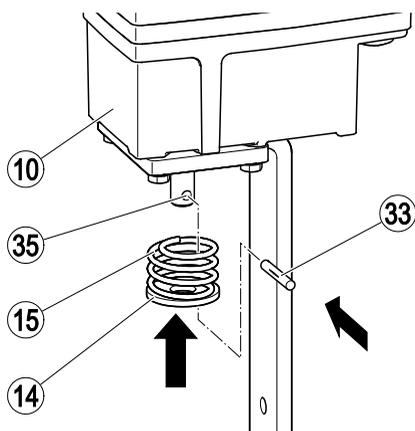
You can convert the manually operated BA to a BAE with electric actuator. You will need a retrofit kit to do this.

A retrofit kit without actuator is available if you already have one.

<b>Designation</b>	<b>Contents</b>	<b>Stock code</b>
Actuator EF 0.7 for BAE 46-3	<ul style="list-style-type: none"> <li>▶ Actuator</li> </ul>	336810
Actuator EF 0.7-1 for BAE 46-3-1	<ul style="list-style-type: none"> <li>▶ Bracket</li> <li>▶ Coupling assembly kit</li> </ul>	336811
Actuator EF 10 for BAE 46 and BAE 47	<ul style="list-style-type: none"> <li>▶ 3 hex bolts</li> <li>▶ 3 shims</li> </ul>	336812
Actuator EF 10-1 for BAE 46-1 and BAE 47-1	<ul style="list-style-type: none"> <li>▶ 3 hex bolts</li> <li>▶ 3 shims</li> </ul>	336813
Retrofit kit without actuator	<ul style="list-style-type: none"> <li>▶ Bracket</li> <li>▶ Coupling assembly kit</li> <li>▶ 3 hex bolts</li> <li>▶ 3 shims</li> </ul>	335769

Install the actuator as follows:

- Insert the spring (15) and thrust ring (14) in the actuator (10).
- Using a hammer, knock the grooved pin (33) into the hole (35) in the drive shaft.



- Position the coupling (12) on the control lever (1).
- Fit the bracket (11) onto the body.
- Screw the bracket onto the body using three hex bolts (31) and the shims (32).
- Adjust the control lever until the coupling engages.
- Make sure the coupling is lying flat on the control lever.
- Tighten the three hex bolts (31) to a torque of 30 Nm.
- Adjust the actuator (10) as described in the actuator installation & operating manual.

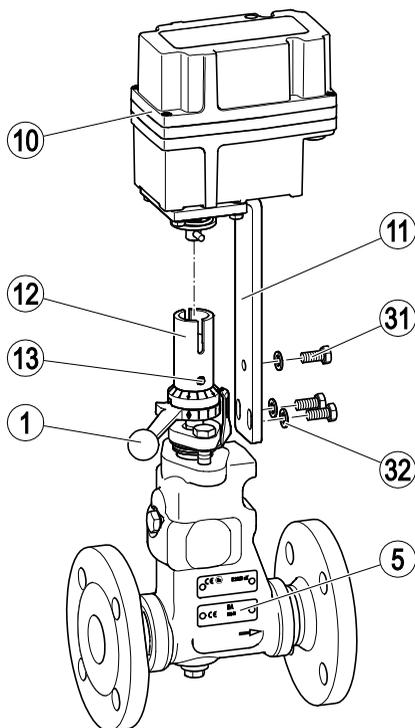
You must set the switch cams for "OPEN", "CLOSED" and "OPERATING POSITION". You will

also need to adjust the feedback potentiometer, if present.

- Make sure the "CLOSED" switch cam is adjusted in the actuator in such a way that the control pin (13) is nearly touching the right-hand side of the inspection hole.

In this position, the torque for closing the valve with the actuator is 10 Nm.

- Remove the ATEX label (5) from the body.



## Troubleshooting

<b>Problem</b>	<b>Cause</b>	<b>Remedy</b>
Fluid escapes (equipment is leaking).	The equipment or the body is damaged.	Replace the equipment with a new one.
Fluid escapes (equipment is leaking).	A gasket is damaged.	Replace the gasket with a new one. Clean gasket seating surfaces.
Fluid escapes (equipment is leaking).	The connections are not tight.	Provide the connections with leakproof seals.
Fluid escapes (equipment is leaking).	The stuffing box packing has not been tightened enough.	Tighten the stuffing-box packing hand tight. Make sure that the stuffing box packing does not impair the movement of the internals.
Fluid escapes (equipment is leaking).	The stuffing-box packing is damaged.	Replace the stuffing-box packing.
Moving inner parts move jerkily or with difficulty, or are jammed. The actuator cuts out automatically.	The stuffing box is hampering the movement of inner parts.	Slacken the stuffing box screw a little. Replace the stuffing box if damaged.
Moving inner parts move jerkily or with difficulty, or are jammed. The drive cuts out automatically.	The drive or other accessories are defective or damaged.	Follow the instructions in the installation & operating manuals for the drive and accessories.
Moving inner parts move jerkily or with difficulty, or are jammed. The actuator cuts out automatically.	The control system is not working correctly.	Follow the instructions in the control system installation & operating manual.
The equipment does not close fully.	The equipment contains dirt, deposits or foreign bodies.	Open and close the equipment several times quickly. Clean all inner parts. Replace damaged inner 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

### Removing the equipment

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#### WARNING

Risk of severe injury or death due to burns during work on pipes.

- Make sure that there are no hot fluids in the equipment or pipes.
- Make sure that the pipes to the equipment are not under pressure.
- Make sure that the system is switched off and secured so it cannot be turned on by an unauthorised person.
- Make sure that the equipment and pipes have cooled to a lukewarm temperature.



#### 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.

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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 13.

## 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

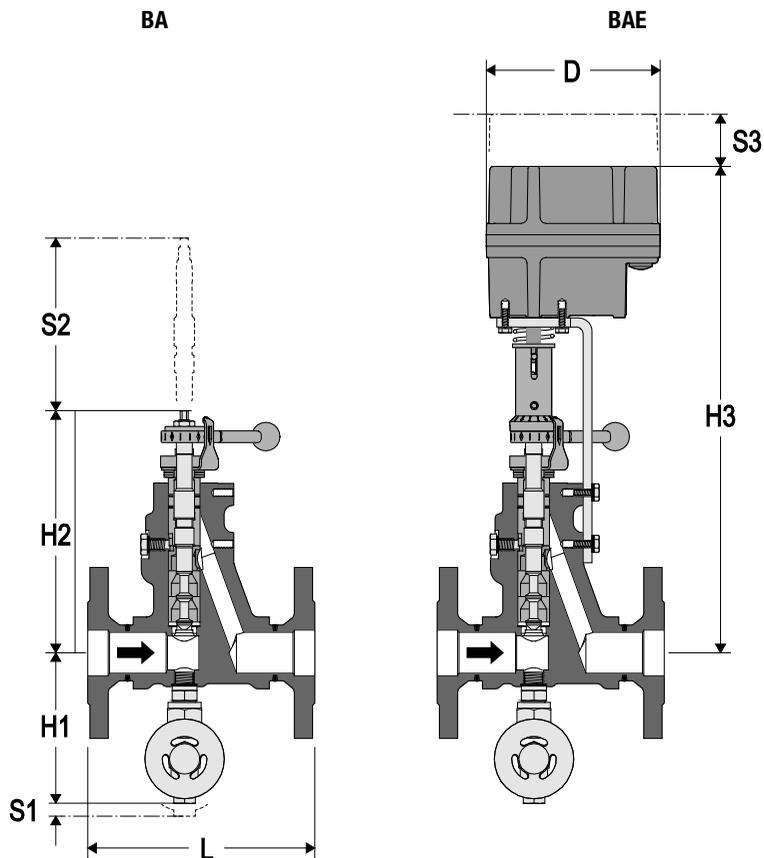
The equipment is made from the following materials:

<b>Component</b>	<b>DIN/EN</b>	<b>ASTM</b>
Body <sup>1</sup>	1.0460	A 105
Stuffing box gland <sup>1</sup>	1.0570	–
Stuffing box screws <sup>1</sup>	A2-70	–
Stuffing box	PTFE yarn	PTFE yarn
Sealing plug <sup>1</sup>	1.7225	A 193 B7
Sealing ring	1.4301	–
Seat, stepped bushings	1.4104	430F
Disc springs	1.8159	–
Nozzle needle <sup>1</sup>	1.4021	–
Locking screw	A2-70	A 192 CL 2B-BB
Welding neck flange/ butt-weld end via transition pieces/ socket-weld end <sup>1</sup>	1.0460	A 105

1 Pressure-bearing components

## Technical data

### Dimensions and weights



**BA 46 and BAE 46, flange PN 40 and ASME CLASS 150 and CLASS 300**

DN	[mm]	15	20	25	32	40	50
	[in]	½	¾	1	1¼	1½	2
<b>D (BAE only)</b>	[mm]	154					
<b>H1</b>	[mm]	126	126	126	126	132	132
<b>H2 (BA)</b>	[mm]	172	172	172	172	213	213
<b>H3 (BAE)</b>	[mm]	385	385	385	385	425	425
<b>L</b>	[mm]	150	150	160	180	200 (PN 40, CLASS 150) 230 (CLASS 300)	230
<b>S1</b>	[mm]	20					
<b>S2 (BA)</b>	[mm]	180					
<b>S3 (BAE)</b>		100					
<b>Weight (BA)</b>	[kg]	4.7	5.3	5.8	7.1	10.7	12.5
<b>Weight (BAE)</b>		8.8	9.4	9.9	11.2	14.8	16.6

**BA 47 and BAE 47, flange PN 63**

DN	[mm]	25	40	50
	[in]	1	1½	2
<b>D (BAE only)</b>	[mm]	154		
<b>H1</b>	[mm]	126	132	132
<b>H2 (BA)</b>	[mm]	172	213	213
<b>H3 (BAE)</b>	[mm]	385	425	425
<b>L</b>	[mm]	190	220	250
<b>S1</b>	[mm]	20		
<b>S2 (BA)</b>	[mm]	180		
<b>S3 (BAE)</b>		100		
<b>Weight (BA)</b>	[kg]	7.1	10.7	12.5
<b>Weight (BAE)</b>		11.2	14.8	16.6

### BA 47 and BAE 47, CLASS 600 flange

DN	[mm]	25	40	50
	[in]	1	1½	2
<b>D (BAE only)</b>	[mm]	154		
<b>H1</b>	[mm]	126	132	132
<b>H2 (BA)</b>	[mm]	172	213	213
<b>H3 (BAE)</b>	[mm]	385	425	425
<b>L</b>	[mm]	216	216	250
<b>S1</b>	[mm]	20		
<b>S2 (BA)</b>	[mm]	180		
<b>S3 (BAE)</b>		100		
<b>Weight (BA)</b>	[kg]	7.1	10.7	12.5
<b>Weight (BAE)</b>		11.2	14.8	16.6

### BA 46/47 and BAE 46/47, butt-weld end

DN <sup>1</sup>	[mm]	15	20	25	32	40	50
	[in]	½	¾	1	1¼	1½	2
<b>D (BAE only)</b>	[mm]	154					
<b>H1</b>	[mm]	126	126	126	126	132	132
<b>H2 (BA)</b>	[mm]	172	172	172	172	213	213
<b>H3 (BAE)</b>	[mm]	385	385	385	385	425	425
<b>L</b>	[mm]	200	200	200	200	250	250
<b>S1</b>	[mm]	20					
<b>S2 (BA)</b>	[mm]	180					
<b>S3 (BAE)</b>		100					
<b>Weight (BA)</b>	[kg]	4.1	4.7	4.7	5.4	8.9	10.2
<b>Weight (BAE)</b>		8.2	8.8	8.8	9.5	13.0	14.3

1 DN 47 and BAE 47 in DN 25, 40, 50 only

**BA 46/47 and BAE 46/47, socket-weld end**

DN <sup>1</sup>	[mm]	15	20	25	32	40	50
	[in]	½	¾	1	1¼	1½	2
<b>D (BAE only)</b>	[mm]	154					
<b>H1</b>	[mm]	126	126	126	126	132	132
<b>H2 (BA)</b>	[mm]	172	172	172	172	213	213
<b>H3 (BAE)</b>	[mm]	385	385	385	385	425	425
<b>L</b>	[mm]	200	200	200	200	250	250
<b>S1</b>	[mm]	20					
<b>S2 (BA)</b>	[mm]	180					
<b>S3 (BAE)</b>		100					
<b>Weight (BA)</b>	[kg]	3.7	3.9	4.2	5.1	8.3	9.5
<b>Weight (BAE)</b>		7.8	8.0	8.3	9.2	12.4	13.6

1 BA 47 and BAE 47 in DN 25, 40, 50 only

## Pressure & temperature ratings

### Pressure and temperature ratings of BA 46 and BAE 46

Type of connection	PN 40 flange and EN butt-weld ends			
Pressure <sup>1</sup> p [bar]	40.0	37.1	33.3	27.6
Temperature <sup>1</sup> T [°C]	20	100	200	300

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

Operating data: Maximum pressure 31 [bar] at boiling temperature 237.5 [°C]

Type of connection	CLASS 150 flange, socket-weld ends and butt-weld ends			
Pressure <sup>1</sup> p [bar]	19.6	17.7	13.8	10.2
Temperature <sup>1</sup> T [°C]	20	100	200	300

1 Operating limits for strength of body/cover to ASME B16.5

Type of connection	CLASS 300 flange, socket-weld ends and butt-weld ends			
Pressure <sup>1</sup> p [bar]	51.1	46.6	43.8	39.8
Temperature <sup>1</sup> T [°C]	20	100	200	300

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

Operating data: Maximum pressure 41.5 [bar] at boiling temperature 254 [°C].

### Pressure and temperature ratings of BA 47 and BAE 47

Type of connection	PN 63 flange, socket-weld ends and butt-weld ends			
Pressure <sup>1</sup> p [bar]	63.0	58.5	52.5	43.5
Temperature <sup>1</sup> T [°C]	20	100	200	300

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

Operating data: Maximum pressure 46.7 [bar] at boiling temperature 261 [°C]

Type of connection	CLASS 600 flange, socket-weld ends and butt-weld ends			
Pressure <sup>1</sup> p [bar]	102.1	93.2	87.6	79.6
Temperature <sup>1</sup> T [°C]	20	100	200	300

1 Operating limits for strength of body/cover to ASME B16.5

Operating data: Maximum pressure 55 [bar] at boiling temperature 271 [°C]

## 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:

### **GESTRA AG**

Münchener Straße 77

28215 Bremen

Germany

Telefon +49 421 3503-0

Telefax +49 421 3503-393

E-Mail [info@de.gestra.com](mailto:info@de.gestra.com)

Web [www.gestra.de](http://www.gestra.de)

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)

## **GESTRA AG**

Münchener Strasse 77

28215 Bremen

Germany

Phone +49 421 3503-0

Fax +49 421 3503-393

e-mail [info@de.gestra.com](mailto:info@de.gestra.com)

Web [www.gestra.com](http://www.gestra.com)

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