

## **GESTRA Steam Systems**

# **BA 46**

# **BA 46-ASME**

# **BA 47**

# **BA 47-ASME**

# **BAE 46...**

# **BAE 46...-ASME**

# **BAE 47...**

# **BAE 47...-ASME**



## **Installation Instructions / Product Information 818609-01**

Continuous Blowdown Valve

BA 46 / BA 46-ASME, PN 40/CL 150/300, DN 15-DN 50

BA 47 / BA 47-ASME, PN 63/CL 400, DN 25, 40, 50

BAE 46... / BAE 46...-ASME, PN 40/CL 150/300, DN 15-DN 50

BAE 47... / BAE 47...-ASME, PN 63/CL 400, DN 25, 40, 50

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## Important Notes

### Usage for the intended purpose

#### **BA 46, BA 47:**

Use the continuous blowdown valves BA 46, BA 47 only for discharging boiler blowdown from steam boilers. Application in pipes within the admissible pressure/temperature ratings, taking the chemical and corrosive effects on the pressure equipment into account.

#### **BAE 46-1, BAE 46-3, BAE 46-40, BAE 47-1, BAE 47-40:**

Use the continuous blowdown valves BAE 46..., BAE 47... only in conjunction with the control equipment KS 90, LRR 1-40 or LRR 1-5, LRR 1-6 for discharging boiler blowdown from steam boilers. Application in pipes within the admissible pressure/temperature ratings, taking the chemical and corrosive effects on the pressure equipment into account.

To ensure the safe operation of the BAE 46..., BAE 47... mount only actuators that are explicitly specified by GESTRA onto the control valve. Specified and approved actuators are: ARIS EF 0.5, ARIS EF 1, ARIS EF 1-1 and GESTRA EF 1-40.

### Safety note

The equipment must only be installed and commissioned by qualified and competent staff.

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



#### **Danger**

The valve is under pressure during operation.

When loosening flanged connections, sealing plugs or stuffing boxes, hot water and steam may escape.

The valve becomes hot during operation.

This presents the risk of severe burns to hands and arms.

Before servicing the valve or loosening flanges, stuffing box connections or sealing plugs make sure that all connected lines are depressurised (0 bar) and cooled down to room temperature (20 °C).

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

During operation moving internals can pinch one's hands or fingers. Do not touch moving parts! The continuous blowdown valves BAE 46..., BAE 47... are remote controlled and can open and close very abruptly.

The terminal strips of the actuator EF ... are live during operation.

This presents the danger of electric shock.

Cut off power supply before fixing or removing the equipment.

## Important Notes – continued –



### Attention

The name plate specifies the technical features of the equipment. Note that any piece of equipment without its specific name plate must neither be commissioned nor operated.

### PED (Pressure Equipment Directive)

The equipment meets the requirements of the Pressure Equipment Directive 97/23/EC. Application in fluids of group 2. With CE marking, except equipment according to section 3.3.

### ATEX (Atmosphère Explosible)

The valves BA 46, BA 47 can be used in potentially explosive areas, provided that the following notes are observed:

The operating fluid must not generate excessively high temperatures. Electrostatic charges that may be generated during operation must be discharged. Make sure that the stuffing box is tight and that the valve spindle can run smoothly. The equipment can be used in Ex zones 1, 2, 21, 22 (1999/92/EC)

CE Ⓜ II 2 G/D c X.

According to the European Directive 94/9/EC the valves BAE 46..., BAE 47... **must not** be used in potentially explosive areas. For more information refer to our ATEX Declaration of Conformity.

## Explanatory Notes

### Scope of supply

#### BA 46

- 1 Continuous blowdown valve BA 46
- 1 Sample valve (not mounted)
- 1 Gasket A17 x 23 x 1.5
- 1 Installation manual GESTRA
- 1 Installation manual for sample valve

#### BA 47

- 1 Continuous blowdown valve BA 47
- 1 Sample valve (not mounted)
- 1 Gasket A17 x 23 x 1.5
- 1 Installation manual GESTRA
- 1 Installation manual for sample valve

#### Retrofitting kit for BA 46, BA 47

- 1 Electric actuator  
EF 0.5, EF 1, EF 1-1 or EF 1-40
- 1 Mounting kit for coupling / mounting bracket
- 1 Installation manual for ARIS actuator EF.../  
GESTRA actuator EF 1-40

#### Spare parts

- 1 Kit according to spare parts list, page 37

#### BAE 46...

- 1 Continuous blowdown valve BAE 46...
- 1 Sample valve (not mounted)
- 1 Gasket A17 x 23 x 1.5
- 1 Installation manual GESTRA
- 1 Installation manual for sample valve
- 1 Installation manual for ARIS actuator EF.../  
GESTRA actuator EF 1-40
- 1 Declaration of manufacturer

#### BAE 47...

- 1 Continuous blowdown valve BAE 47
- 1 Sample valve (not mounted)
- 1 Gasket A17 x 23 x 1.5
- 1 Installation manual GESTRA
- 1 Installation manual for sample valve
- 1 Installation manual for ARIS actuator EF.../  
GESTRA actuator EF 1-40
- 1 Declaration of manufacturer

### System description

Due to the continuous evaporation process in the steam boiler the density and hence the TDS (= Total Dissolved Solids) concentration of the boiler water is increased. The TDS level must remain within the limits specified by the boiler manufacturer and applicable guidelines. For this purpose a certain amount of boiler water (= boiler blowdown) is discharged continuously or periodically. The continuous blowdown valves BA... and BAE... feature specially designed and wear resistant nozzle stems that enter concentrically into a system of expansion chambers which are arranged one after the other, making the valve well suited for the continuous discharge of boiler blowdown at very high differential pressures. The continuous blowdown valves BA... and BAE ... are suitable for operation in steam boiler plants according to TRD 604, EN 12952 and EN 12953.

- **BA 46** PN 40, manually operated
- **BA 47** PN 63, manually operated
- **BAE 46** PN 40, operated by the electric actuator **EF 1**<sup>1)</sup>
- **BAE 46-1** PN 40, operated by the electric actuator **EF 1-1**<sup>1)</sup>
- **BAE 46-3** PN 40, operated by the electric actuator **EF 0.5**<sup>1)</sup>
- **BAE 46-40** PN 40, operated by the electric actuator **EF 1-40**<sup>1)</sup>
- **BAE 47** PN 63, operated by the electric actuator **EF 1**<sup>1)</sup>
- **BAE 47-1** PN 63, operated by the electric actuator **EF 1-1**<sup>1)</sup>
- **BAE 47-40** PN 63, operated by the electric actuator **EF 1-40**<sup>1)</sup>
- **EF 0.5** ARIS actuator with two position-controlled limit switches and one operating cam for intermediate positions (basic equipment)
- **EF 1** ARIS actuator with two position-controlled limit switches and one operating cam for intermediate positions
- **EF 1-1** ARIS actuator with two position-controlled limit switches and feedback potentiometer
- **EF 1-40** ARIS actuator with two position-controlled limit switches and feedback potentiometer and CANopen interface

<sup>1)</sup> Explosion-proof actuators or actuators powered by d. c. or three-phase current are available on request.

### Function

The continuous blowdown valve BA 46/BA 47 is moved to its control position by means of the control lever. Use the scale on the control lever to adjust the required amount of boiler blowdown. The required amount of boiler blowdown is calculated with the aid of a formula or read off on a nomogram. The continuous blowdown valve BAE 46... / BAE 47... is motored to its control position by means of the actuator EF... The actuator is activated by the GESTRA conductivity controller KS 90 working in conjunction with the GESTRA conductivity electrode LRGT 1...-1 or the conductivity controller LRR 1-5, LRR 1-6 in combination with the GESTRA conductivity electrode LRG 16... or the conductivity controller LRR 1-40 in conjunction with the conductivity electrode LRG 1...-40.

The actuator opens or closes the continuous blowdown valve as a function of the required amount of boiler blowdown and the desired operating position, at which – independent of the actual electrical conductivity of the boiler water – a freely selectable fundamental amount can be discharged by the BAE 46... / BAE 47... The valve positions “OPEN” and “CLOSED” are limited by the cam-operated switch located in the actuator, the “OPERATING POSITION” is variably adjustable by means of an operating cam. The power flow towards the closing direction is transmitted via a rigid coupling with integrated torsion spring. The coupling permits the actuator to travel a little bit further when the nozzle stem is pressed into the valve seat.

## Explanatory Notes – continued –

### Function – continued –

The conductivity of the boiler water is monitored by the equipment combination consisting of a conductivity electrode and a conductivity controller. The continuous evaporation process in the steam boiler increases the boiler water density and, consequently, the TDS level, causing the conductivity of the boiler water to rise. Once the set limit value is reached, the actuator receives an opening pulse from the conductivity controller according to the deviation from the conductivity setpoint. When the adjusted conductivity setpoint is attained, the actuator closes the continuous blowdown valve or returns to the adjusted operating position. The valve positions “CLOSED” and “OPEN” are limited by the cam-operated switch in the actuator, the “OPERATING POSITION” is variably adjustable by means of an operating cam or a feedback potentiometer.

### Information required when ordering

Please state:

Steam pressure, design, type of connection, nominal size, application.

The following test certificates can be issued on request, at extra cost:

Test certificate in accordance with EN 10204, (2.1, -2.2, -3.1 and 3.2).

All inspection requirements have to be stated with the order. After supply of the equipment certificates can no longer be established. Charges and extent of the above-mentioned certificates as well as the different tests confirmed therein are listed in our Price List “Test and Inspection Charges for Standard Equipment”. For other tests and inspections than those listed above, please consult us.

### Order and Enquiry Specifications

GESTRA Continuous blowdown valve for discharging boiler blowdown from steam generating units.

Type: BA 46 / BA 47 / BAE 46..... / BAE 47.....

Connections: Flanged, butt-weld ends, socket-weld ends

Size: DN 15 / DN 20 / DN 25 / DN 32 / DN 40 / DN 50

Pressure: PN 40 / PN 63 / CL 150 / CL 300 / CL 400

Actuator (BAE..): EF 0.5 / EF 1 / EF 1-1 / EF 1-40 / according to customer specification

Inspection: to 2.1 / 2.2 / 3.1 / 3.2.

The test certificates to EN 10204 (2.1, -2.2, -3.1 and 3.2) can be issued on request, at extra cost.

All inspection requirements have to be stated with the order. After supply of the equipment certificates can no longer be established. Charges and extent of the above-mentioned certificates as well as the different tests confirmed therein are listed in our Price List “Test and Inspection Charges for Standard Equipment”. For other tests and inspections than those listed above, please consult us.



## Technical Data

### Name plate / marking

For pressure and temperature ratings see the designation on the valve body or the data given on the name plate. Further details are given in various GESTRA publications, such as datasheets and technical information.

In accordance with EN 19, the following type and design data are indicated on the name plate or body:

- Manufacturer
- Type designation
- Pressure class PN or Class
- Material number
- Maximum temperature
- Maximum pressure
- Direction of flow
- Stamp on valve body, e. g.  $\frac{4}{07}$  specifies the manufacturing quarter and year (in this case the 4<sup>th</sup> quarter of 2007)

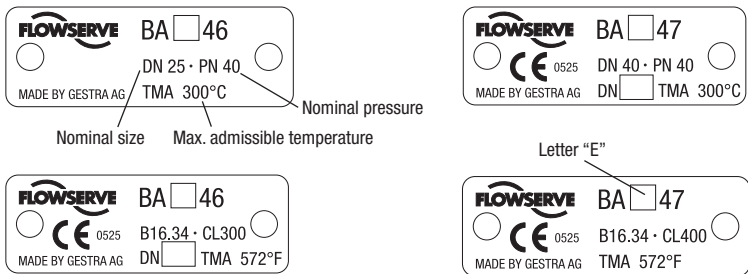


Fig. 1

Dimensions BA 46, BA 47

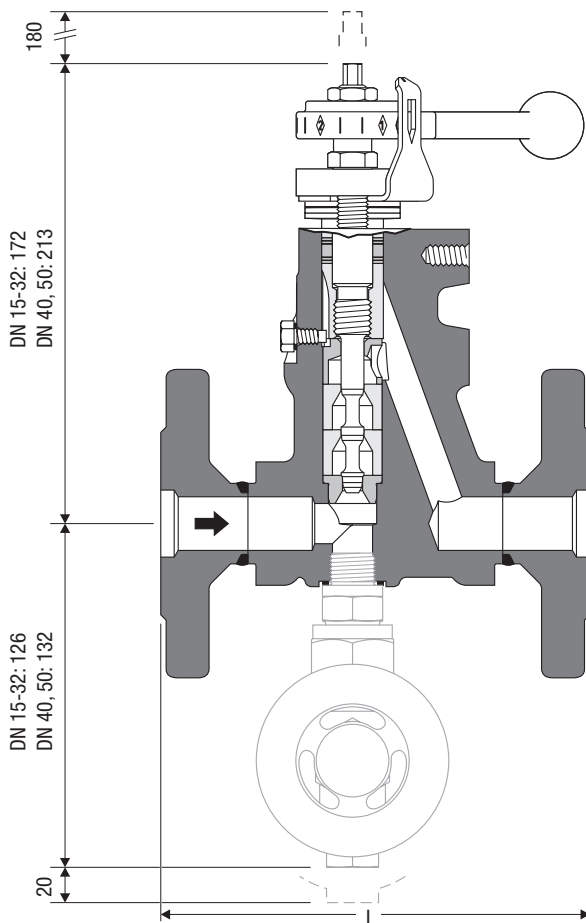


Fig. 2

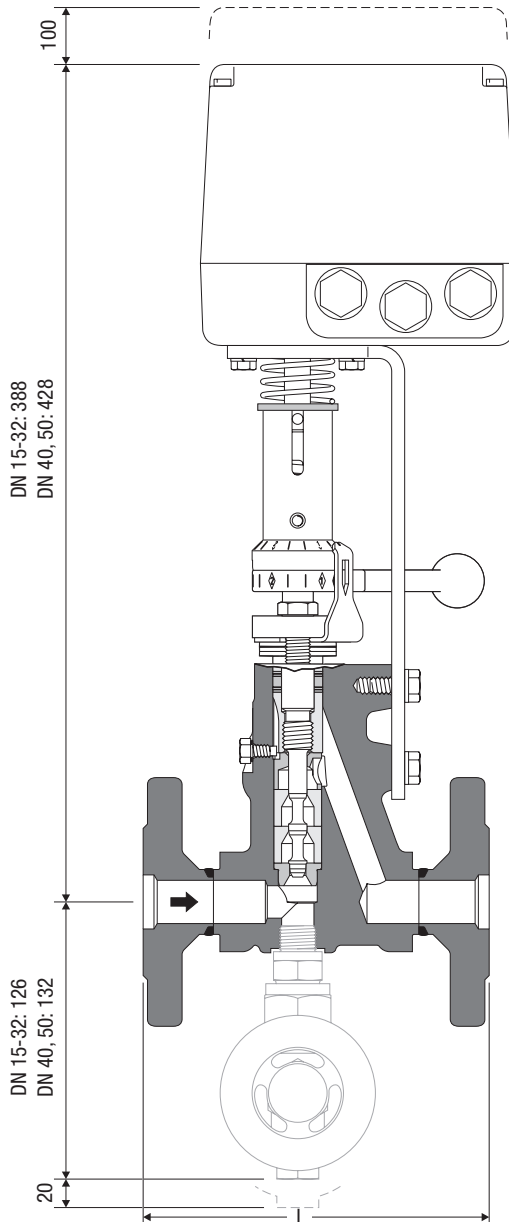
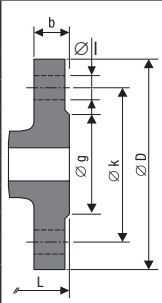
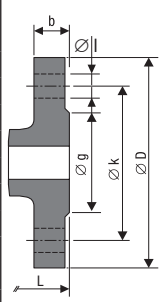


Fig. 3

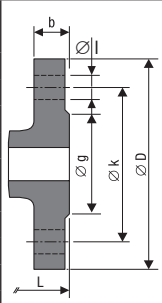
## End dimensions of flanges (extract)

	DN	EN 1092-1 PN 40					EN 1092-1 PN 63			
	[inch]	½	¾	1	1¼	1½	2	1	1½	2
	[mm]	15	20	25	32	40	50	25	40	50
D	95	105	115	140	150	165	140	170	180	
b	16	18	18	18	18	20	24	26	26	
k	65	75	85	100	110	125	100	125	135	
g	45	58	68	78	88	102	68	88	102	
l	14	14	14	18	18	18	18	22	22	
n	4	4	4	4	4	4	4	4	4	
L	150	150	160	180	200	230	190	220	250	
[kg]*	4.7/8.8	5.3/9.4	5.8/9.9	7.1/11.2	10.7/14.8	12.5/16.6	7.1/11.2	10.7/14.8	12.5/16.6	

\*) Weight BA 4... / Weight BAE 4...

	DN	ASME B16.5 Class 150								
	[inch]	½	¾	1	1¼	1½	2			
	[mm]	15	20	25	32	40	50			
D	88.9	98.4	107.9	117.5	127.0	152.4				
b	11.1	12.7	14.3	15.9	17.5	19.0				
k	60.3	69.8	79.4	88.9	98.4	120.6				
g	34.9	42.9	50.8	63.5	73.0	92.1				
l	15.9	15.9	15.9	15.9	15.9	19.0				
n	4	4	4	4	4	4				
L	150	150	160	180	230	230				
[kg]*	4.7/8.8	5.3/9.4	5.8/9.9	7.1/11.2	10.7/14.8	12.5/16.6				

\*) Weight BA 4... / Weight BAE 4...

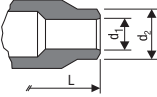
	DN	ASME B16.5 Class 300					ASME B16.5 Class 400			
	[inch]	½	¾	1	1¼	1½	2	1	1½	2
	[mm]	15	20	25	32	40	50	25	40	50
D	95.2	117.5	123.8	133.3	155.6	165.1	123.8	155.6	165.1	
b	14.3	15.9	17.5	19.0	20.6	22.2	17.5	22.2	25.4	
k	66.7	82.5	88.9	98.4	114.3	127	88.9	114.3	127	
g	34.9	42.9	50.8	63.5	73.0	92.1	50.8	73.0	92.1	
l	15.9	19.0	19.0	19.0	22.2	19.0	19.0	22.2	19.0	
n	4	4	4	4	4	4	4	4	4	
L	150	150	160	180	230	230	216	216	250	
[kg]*	4.7/8.8	5.3/9.4	5.8/9.9	7.1/11.2	10.7/14.8	12.5/16.6	7.1/11.2	10.7/14.8	12.5/16.6	

\*) Weight BA 4... / Weight BAE 4...

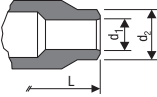
Other designs, special dimensions and materials of end connections on request.

## Technical Data – continued –

### Dimensions of butt-weld ends (extract)

	DN	DIN 3239-1 DIN 2559-2						DIN 3239-1 DIN 2559-2		
	[inch]	½	¾	1	1¼	1½	2	1	1½	2
	[mm]	15	20	25	32	40	50	25	40	50
	d <sub>2</sub>	22	28	34	32.0	38.0	40.0	34	49	61
	d <sub>1</sub>	17.3	22.3	28.5	21.8	27.3	34.1	28.5	42.5	54.5
	for pipe	21.3x2.0	26.9x2.3	33.7x2.6	42.6x2.6	48.3x2.6	60.3x2.9	33.7x2.6	48.3x2.9	60.3x2.9
	L	200	200	200	200	200	200	200	250	250
	[kg]*	4.1/8.2	4.7/8.8	4.7/8.8	5.4/9.5	8.9/13.0	10.2/14.3	4.7/8.8	8.9/13.0	10.2/14.3

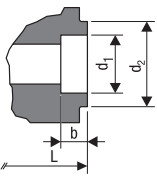
\*) Weight BA 4... / Weight BAE 4...

	DN	ASME B16.25, Schedule 40 ASME B36.10						ASME B16.25, Schedule 80 ASME B36.10		
	[inch]	½	¾	1	1¼	1½	2	1	1½	2
	[mm]	15	20	25	32	40	50	25	40	50
	d <sub>2</sub>	22	28	34	43	49	61	34	49	61
	d <sub>1</sub>	15.7	20.9	26.6	35.1	40.9	52.5	24.3	38.1	49.3
	for pipe	21.3x2.8	26.7x2.9	33.4x3.4	42.2x3.6	48.3x3.7	60.3x3.9	33.4x4.5	48.3x5.1	60.3x5.5
	L	200	200	200	200	200	200	200	250	250
	[kg]*	4.1/8.2	4.7/8.8	4.7/8.8	5.4/9.5	8.9/13.0	10.2/14.3	4.7/8.8	8.9/13.0	10.2/14.3

\*) Weight BA 4... / Weight BAE 4...

Other designs, special dimensions and materials of end connections on request.

### Dimensions of socket-weld ends (extract)

	DN	DIN EN 12760, ASME B16.11 Class 3000								
	[inch]	½	¾	1	1¼	1½	2			
	[mm]	15	20	25	32	40	50			
	d <sub>2</sub>	32	37.5	46	55.5	62	75.5			
	d <sub>1</sub>	21.9	27.3	34	42.8	48.9	61.3			
	b	10	13	13	13	13	16			
	for pipe	21.3/21.3	26.9/26.7	33.7/33.4	42.4/42.2	48.3/48.3	60.3/60.3			
	L	160	160	160	160	160	160			
	[kg]*	5.1	5.1	5.1	5.1	5.1	5.1			

\*) Weight BA 4... / Weight BAE 4...

Other designs, special dimensions and materials of end connections on request.

## Technical Data – continued –

### Pressure & temperature ratings / Connections

#### BA 46, BAE 46, Flanged PN 40, EN 1092-1, 1.0460 \*)

$p_{\max}$ (max. pressure)	[bar]g	29					
$t_s$ (boiling temperature)	[°C]	234					

Calculated according to DIN EN 12516-2 \*) Material in accordance with AD-Bulletin

#### BA 46, BAE 46, Flanged PN 40, EN 1092-1, A 105

$p_{\max}$ (max. pressure)	[bar]g	36					
$t_s$ (boiling temperature)	[°C]	246					

Calculated according to DIN EN 12516-2

#### BA 47, BAE 47, Flanged PN 63 / PN 100, EN 1092-1, 1.0460 \*)

$p_{\max}$ (max. pressure)	[bar]g	44					
$t_s$ (boiling temperature)	[°C]	257					

Calculated according to DIN EN 12516-2 \*) Material in accordance with AD-Bulletin

#### BA 47, BAE 47, Flanged PN 63 / PN 100, EN 1092-1, A 105

$p_{\max}$ (max. pressure)	[bar]g	55					
$t_s$ (boiling temperature)	[°C]	271					

Calculated according to DIN EN 12516-2

#### BA 4..., BAE 4...-ASME, Flanged B16.5 Class 150, Butt-weld ends B16.25, Socket-weld ends B16.11, Class 3000

$p_{\max}$ (max. pressure)	[bar]g	14					
$t_s$ (boiling temperature)	[°C]	198					
$p_{\max}$ (max. pressure)	[psi]g	203					
$t_s$ (boiling temperature)	[°F]	388					

Calculated according to ASME B16.34

#### BA 4..., BAE 4...-ASME, Flanged B16.5 Class 300, Butt-weld ends B16.25, Socket-weld ends B16.11, Class 3000

$p_{\max}$ (max. pressure)	[bar]g	42					
$t_s$ (boiling temperature)	[°C]	254					
$p_{\max}$ (max. pressure)	[psi]g	609					
$t_s$ (boiling temperature)	[°F]	489					

Calculated according to ASME B16.34

#### BA 4..., BAE 4...-ASME, Flanged B16.5 Class 400/600, Butt-weld ends B16.25, Socket-weld ends B16.11, Class 3000

$p_{\max}$ (max. pressure)	[bar]g	55					
$t_s$ (boiling temperature)	[°C]	270					
$p_{\max}$ (max. pressure)	[psi]g	797					
$t_s$ (boiling temperature)	[°F]	518					

Calculated according to ASME B16.34

## Technical Data – continued –

### Materials

Type	BA 4..., BAE 4...	BA 4... ASME, BAE 4... ASME
Designation	DIN / EN	ASTM
Body	1.0460	A 105
Nozzle stem	1.4021	A 276 Grade 420
Seat and stage sleeve	1.4104	430F
Locking screw	A2-70	A 192 CL 2B-BB
Sealing plug	1.7225	A 193 B7

### Corrosion resistance

When used for its intended purpose, the safe functioning of the equipment will not be impaired by corrosion.

### Sizing

The valve body must not be subjected to sharp increases in pressure. The sizing and anti-corrosion additives reflect the latest state of technology.

Capacity chart for DN 15 to 32, capacity ranges at a glance

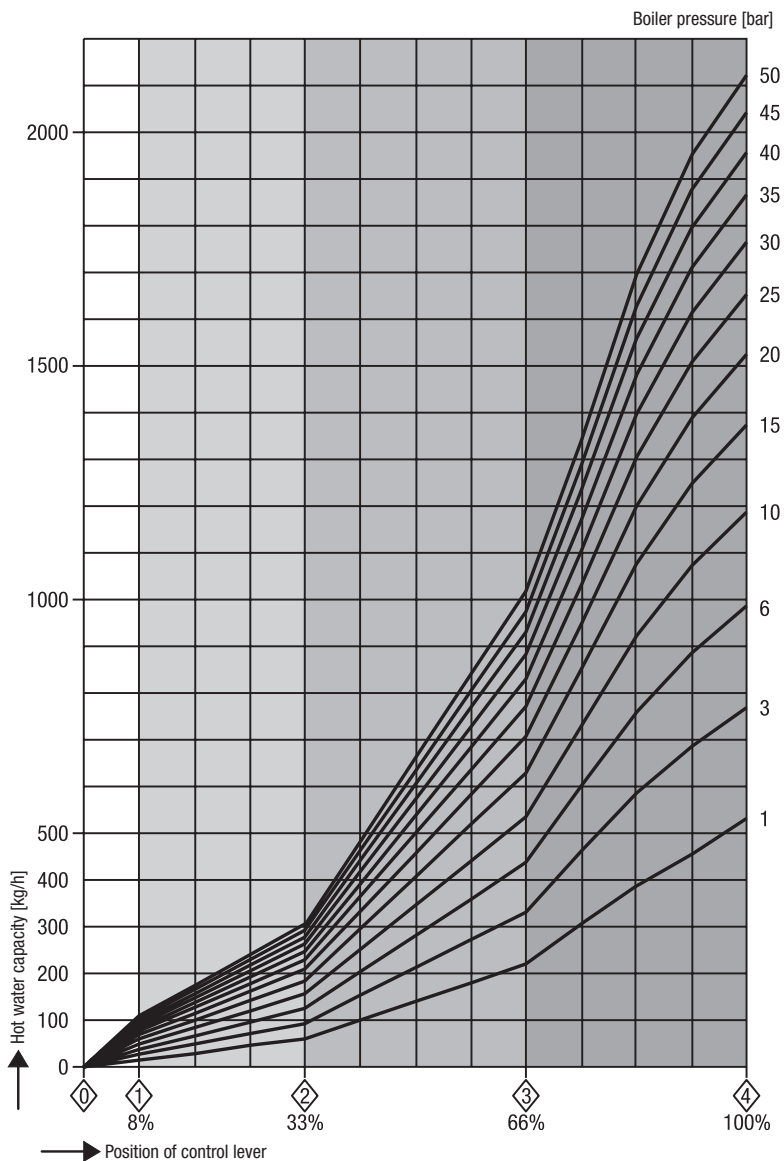
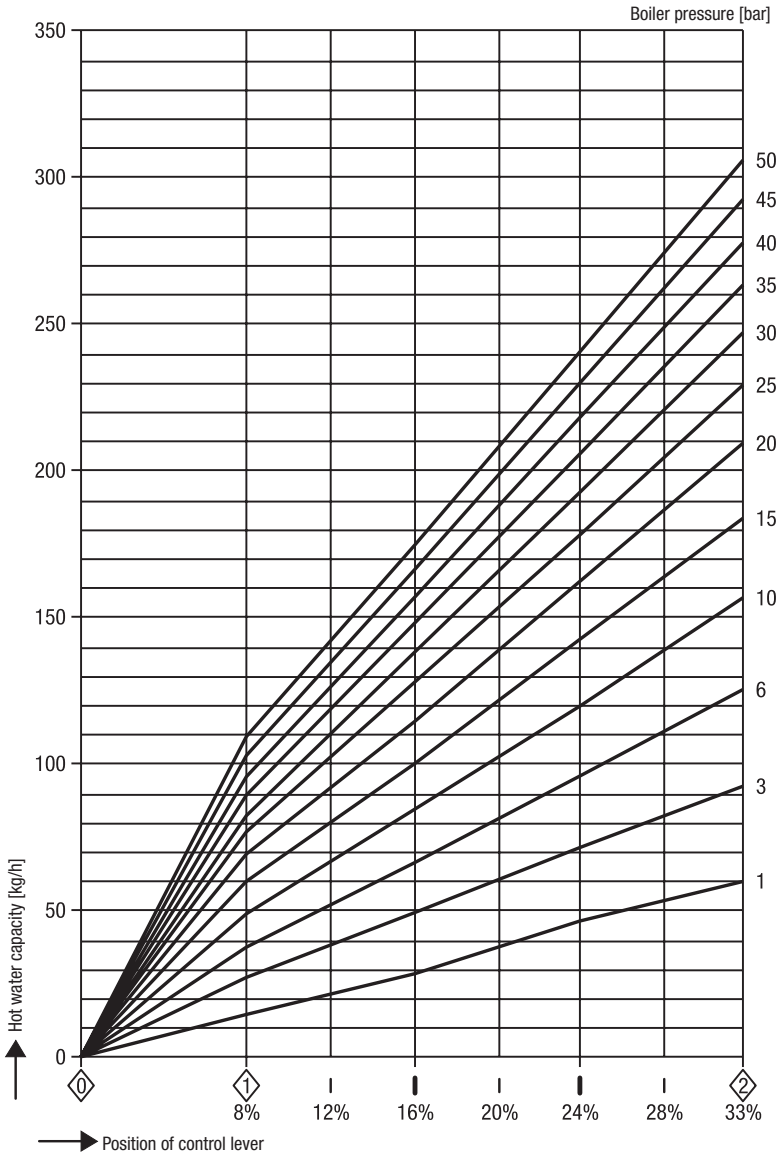


Fig. 4



**Capacity chart for DN 15 to 32, capacity range up to 310 kg/h**



**Fig. 5**

Capacity chart for DN 15 to 32, capacity range up to 1020 kg/h

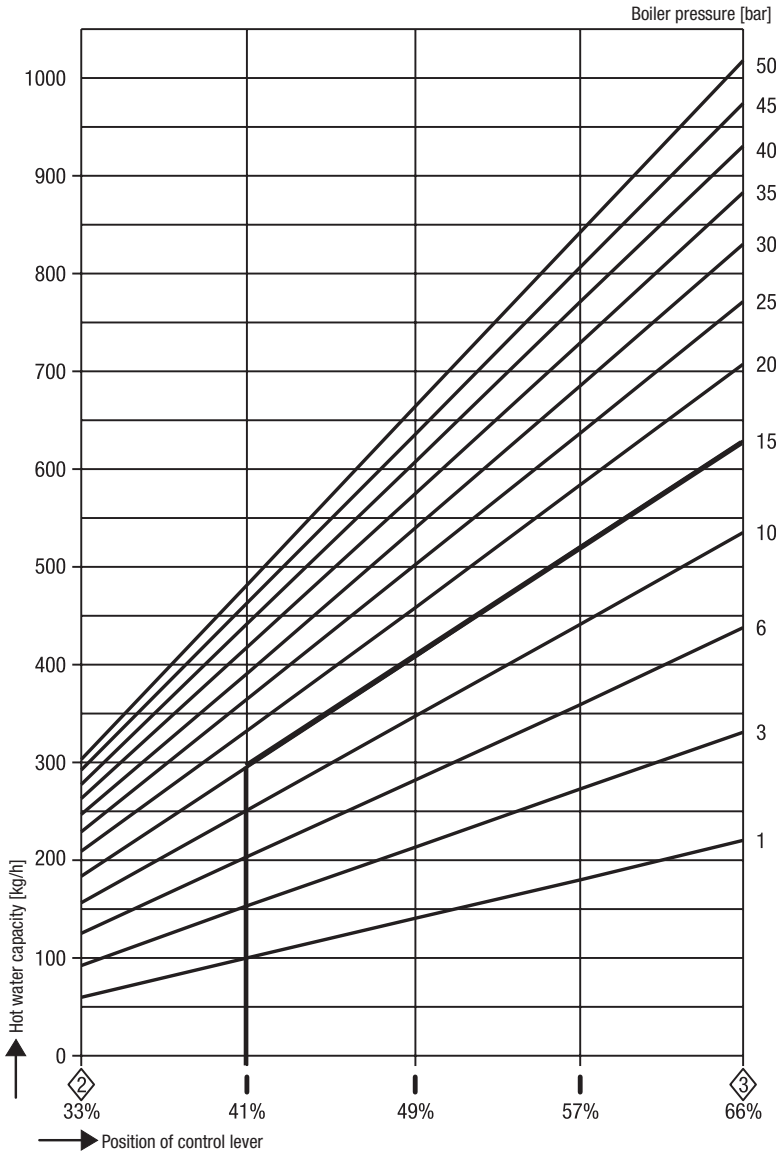
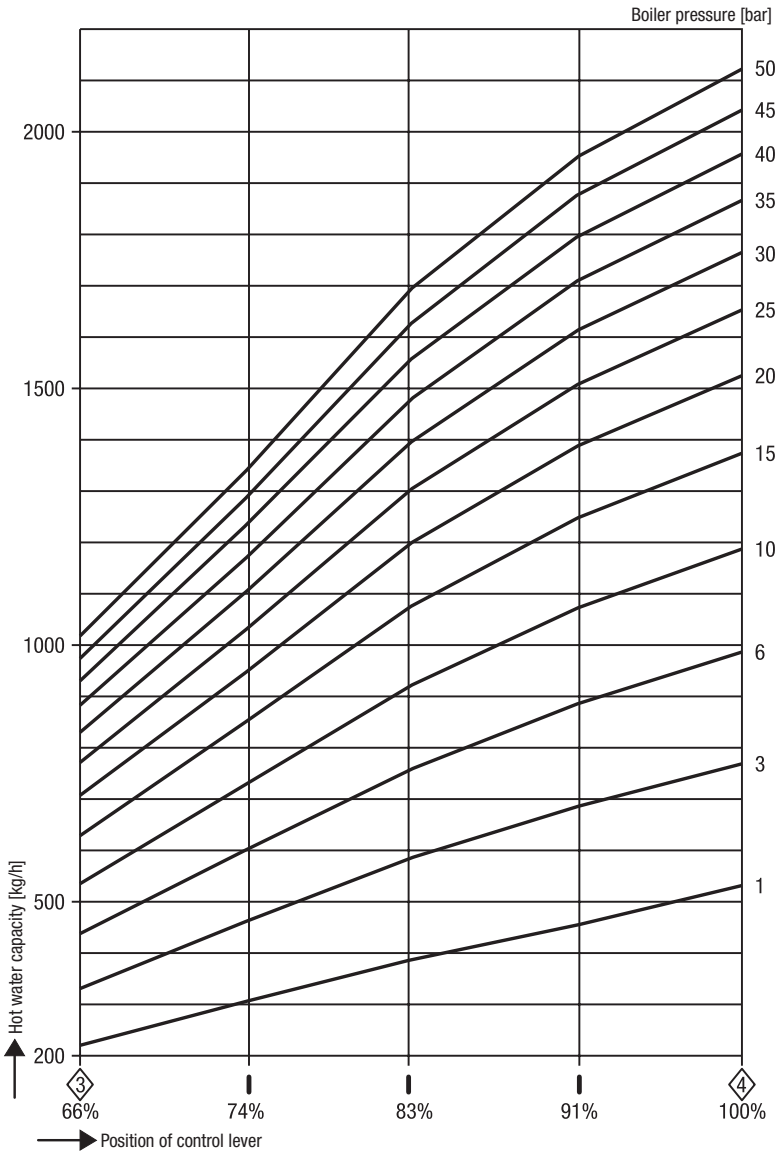


Fig. 6

**Capacity chart for DN 15 to 32, capacity range up to 2120 kg/h**



**Fig. 7**

Capacity chart for DN 40 and 50, capacity ranges at a glance

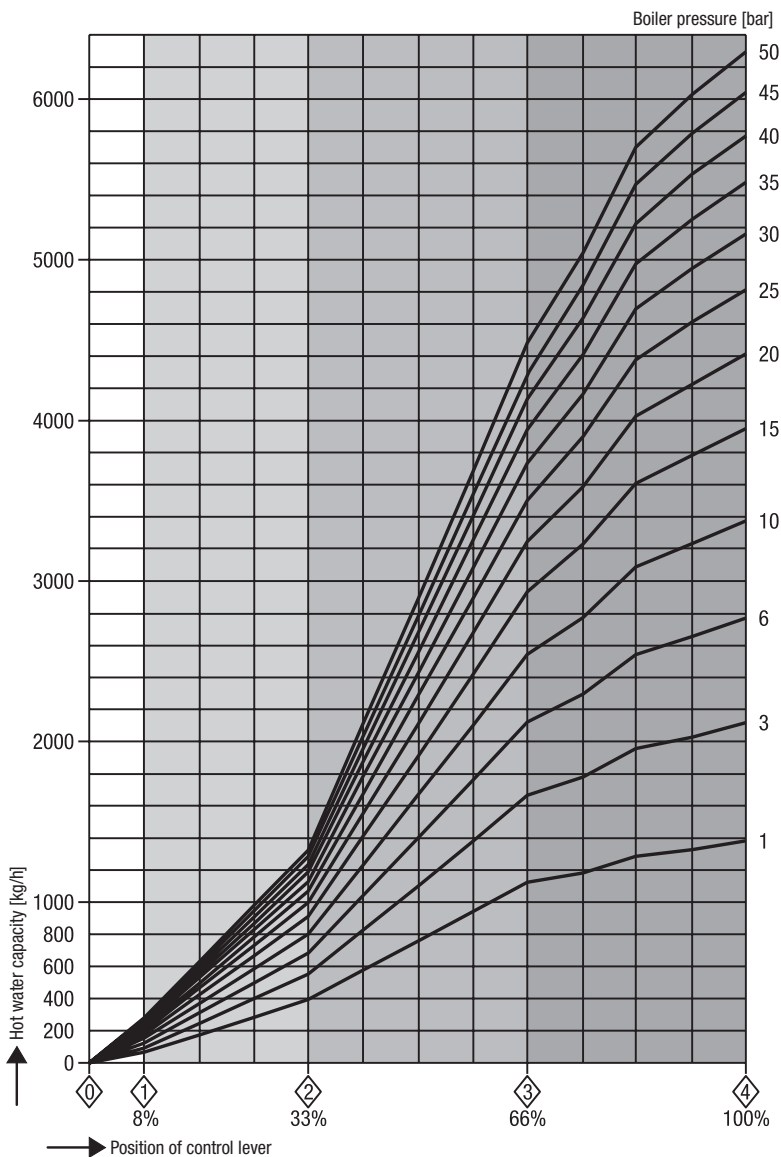
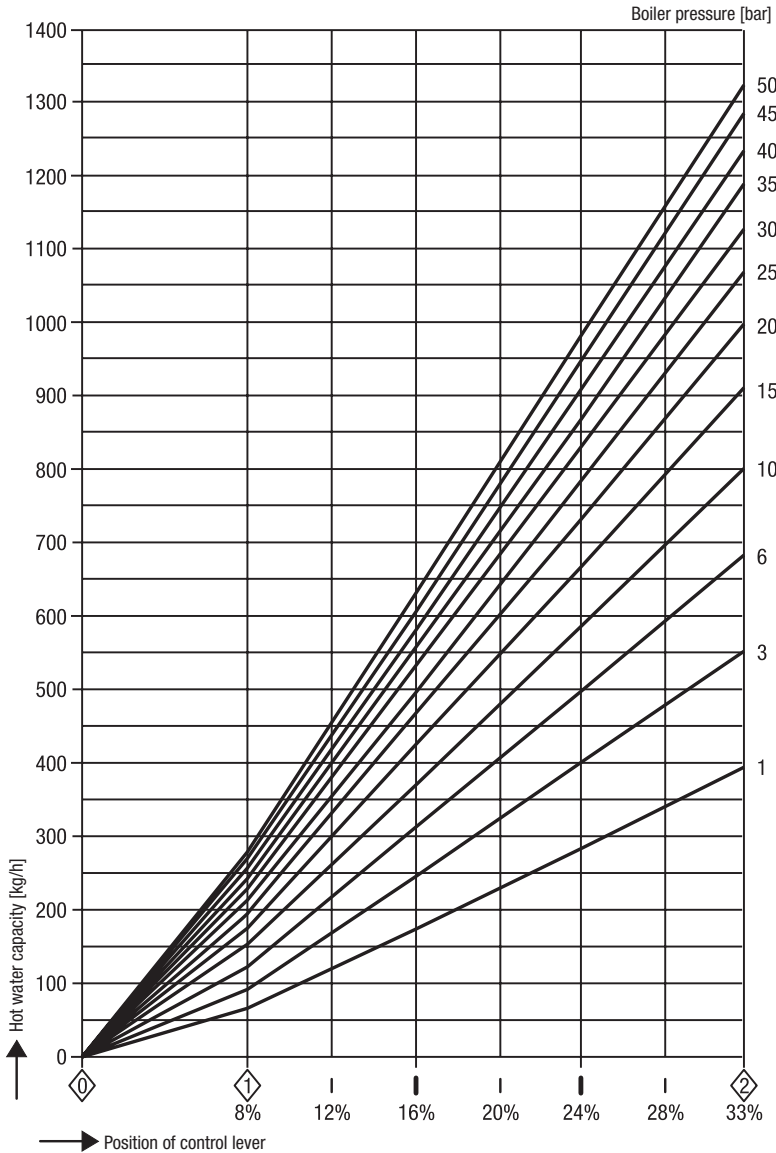


Fig. 8

**Capacity chart for DN 40 and 50, capacity range up to 1340 kg/h**



**Fig. 9**

Capacity chart for DN 40 and 50, capacity range up to 4500 kg/h

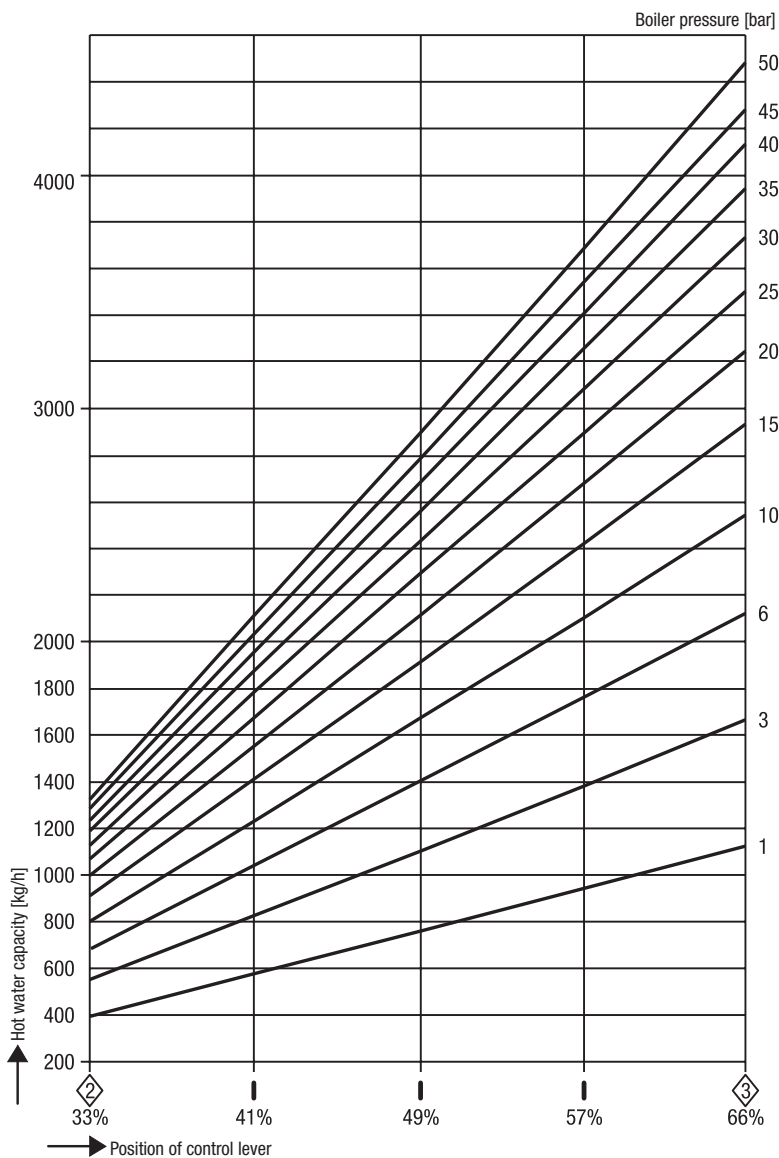
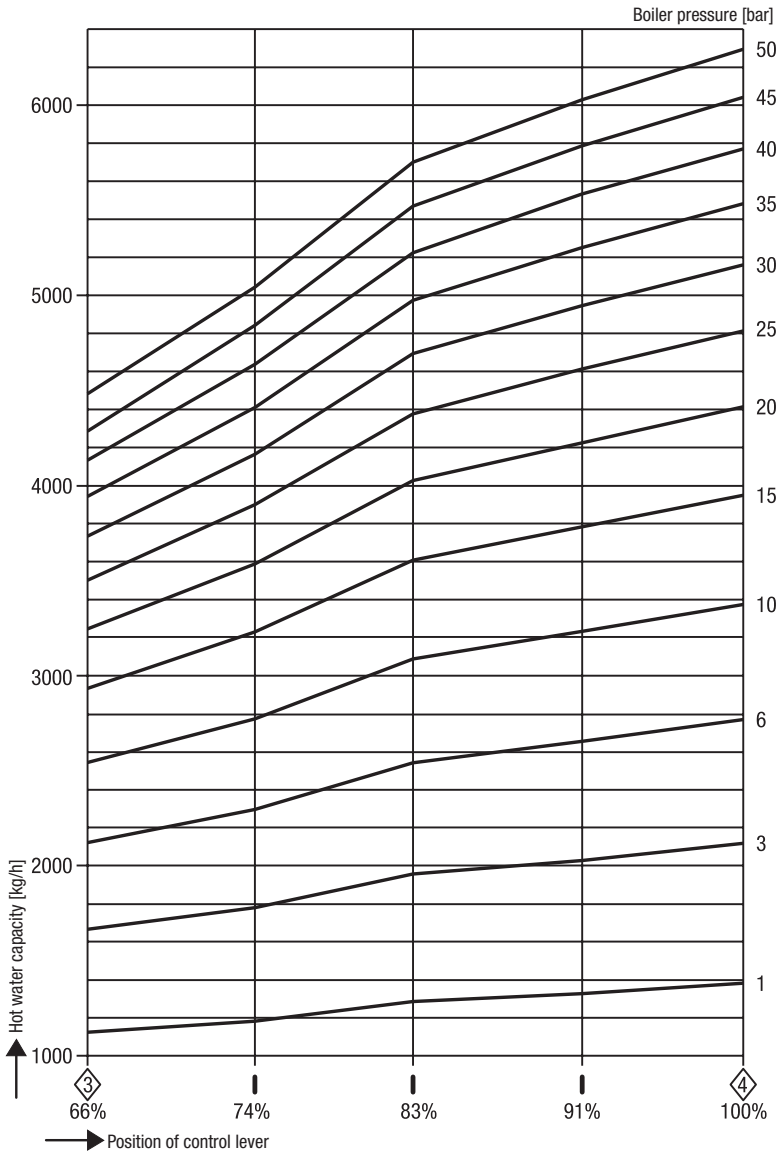


Fig. 10

**Capacity chart for DN 40 and 50, capacity range up to 6300 kg/h**



**Fig. 11**

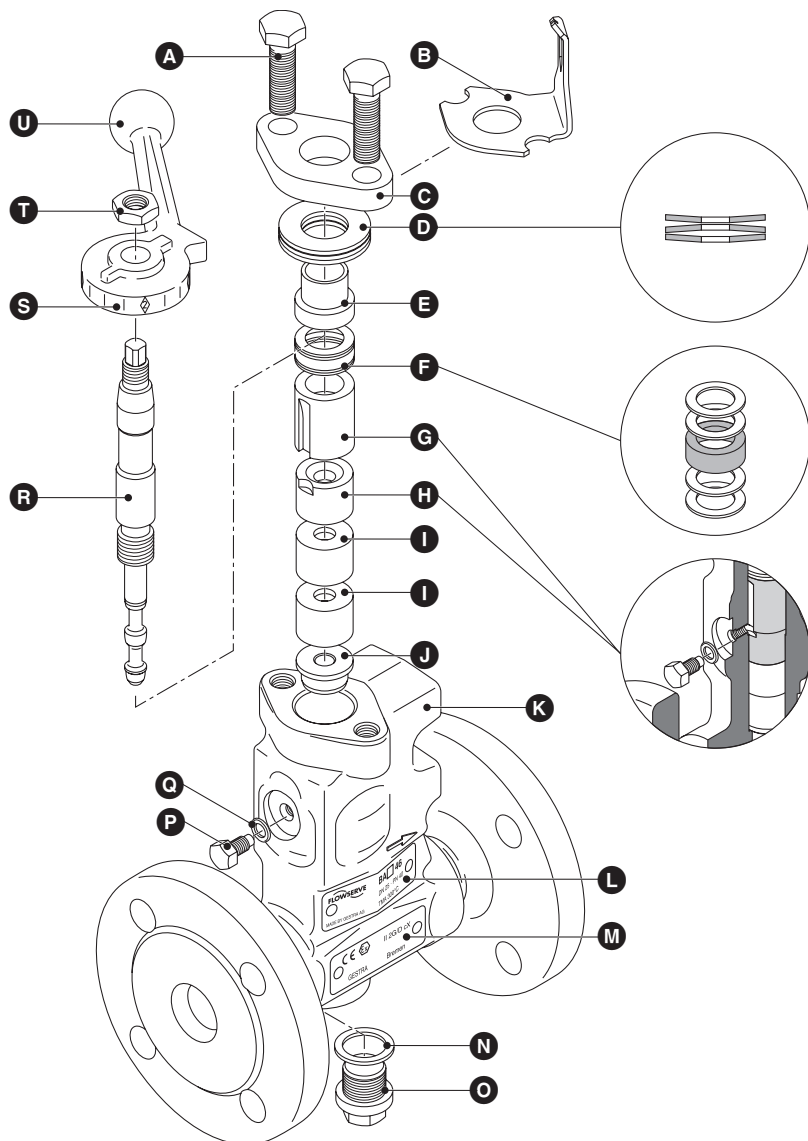
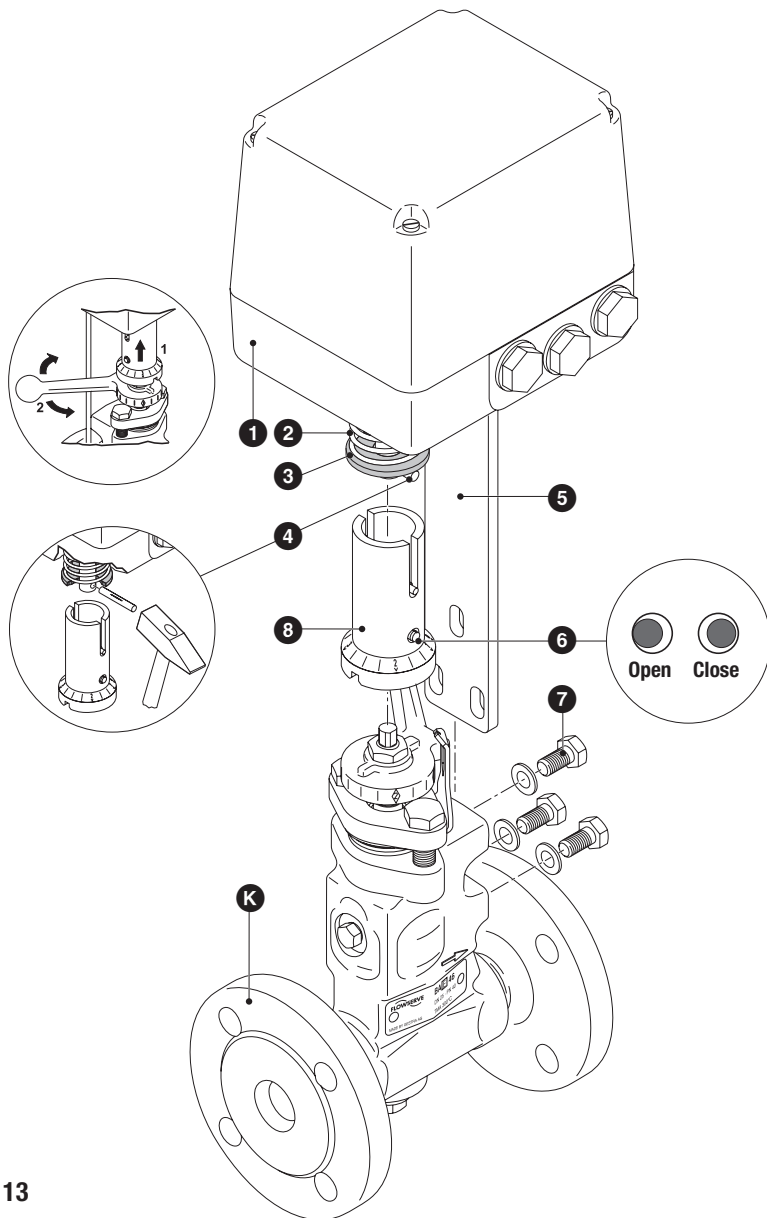


Fig. 12





**Fig. 13**

### Key

- A** Stuffing box screw
- B** Scale plate
- C** Stuffing box gland
- D** Disk spring (3 pieces)
- E** Spring sleeve
- F** Packing with 4 wiper rings
- G** Guide sleeve
- H** Wearing bushing
- I** Stage bushing
- J** Seat bushing
- K** Valve body
- L** Nameplate
- M** ATEX marking
- N** Gasket A 17 x 23 x 1.5
- O** Sealing plug (connection for a sample valve)
- P** Locking screw
- Q** Gasket C6 x 10 x 1.5 (DN 15-32) C10 x 16 x 1.5 (DN 40, 50)
- R** Nozzle stem
- S** Scale
- T** Hexagon nut
- U** Control lever
- 1** Actuator
- 2** Compression spring
- 3** Thrust washer
- 4** Grooved dowel pin ISO 8742
- 5** Mounting bracket
- 6** Checking pin
- 7** Hexagon screw with washer
- 8** Coupling

## Installation

### BA 46, BA 47, BAE 46..., BAE 47...

Mount the continuous blowdown valve, taking the direction of the flow arrow into account. The blowdown take-off point must be located in the steam boiler **underneath the low level mark** and close to the steam outlet. The continuous blowdown valve can be installed in horizontal and vertical pipes. The continuous blowdown valve is delivered ready for installation, with the actuator mounted or supplied separately. Before commissioning read the technical documentation provided by the manufacturer of the actuator and store the document together with the installation manual "BA 46, BA 47, BAE 46..., BAE 47..." in a sheltered place. The continuous blowdown valve is delivered with a sample valve (not installed). This sample valve must only be attached to the continuous blowdown valve at the intended point. Before commissioning read the technical documentation provided by the manufacturer of the sample valve and store the document together with the installation manual "BA 46, BA 47, BAE 46..., BAE 47..." in a sheltered place.



#### Attention

- Note that the inclination of the actuator when installed must not exceed 90°!

### Valve with flanged ends

1. Ensure correct position of installation. The control lever **U** must be freely movable.
2. Observe direction of flow. The flow arrow is on the valve body.
3. Consider space required for servicing the valve. When the continuous blowdown valve is installed a minimum space of at least 180 mm is required for removing the equipment or for the subsequent installation of the actuator.
4. Remove plastic plugs. They are only used as transit protection.
5. Clean seating surfaces of both flanges.
6. Install the continuous blowdown valve.

### Valve with socket-weld ends

1. Ensure correct position of installation. The control lever **U** must be freely movable.
2. Observe direction of flow. The flow arrow is on the valve body.
3. Consider space required for servicing the valve. When the continuous blowdown valve is installed a minimum space of at least 180 mm is required for removing the equipment or for the subsequent installation of the actuator.
4. Remove plastic plugs. They are only used as transit protection.
5. Clean socket-weld ends
6. Arc-weld trap only manually (welding process 111 and 141 to ISO 4063) or apply gas-welding process (welding process 3 in accordance with ISO 4063).

### Valve with butt-weld ends

1. Ensure correct position of installation. The control lever **U** must be freely movable.
2. Observe direction of flow. The flow arrow is on the valve body.
3. Consider space required for servicing the valve. When the continuous blowdown valve is installed a minimum space of at least 180 mm is required for removing the equipment or for the subsequent installation of the actuator.
4. Remove plastic plugs. They are only used as transit protection.
5. Clean butt-weld ends.
6. Arc-weld trap only manually (welding process 111 and 141 to ISO 4063) or apply gas-welding process (welding process 3 in accordance with ISO 4063)



### Attention

- Only qualified welders certified according to EN 287-1 may weld continuous blowdown valves in pressurised lines.

### Heat treatment of welds

After welding the continuous blowdown valve in place the welds might require a subsequent heat treatment (stress-relief annealing process to DIN EN 10052). Note that the heat treatment must be limited to the area close to the welds. The internal parts of the continuous blowdown valve do **not** have to be removed before performing the heat treatment.

### Reposition control lever by 180° (if position of installation is unfavourable)

If the position of installation is unfavourable (flow from right to left), it may be necessary to reposition the control lever by 180° so that the scale plate can be seen.

1. Take heed of the danger note on page 5.
2. Unscrew the hexagon nut **T** and detach control lever **U** with the aid of a pulling device.
3. Undo stuffing box screws **A**, remove stuffing box gland **C** and scale plate **B**. Turn scale plate by 180° and put it back in place.
4. Mount stuffing box gland **C** and screw in stuffing box screws **A**.
5. Screw out nozzle stem **R** by half a turn and tighten stuffing box screws **A**.
6. Turn nozzle stem **R** into the closed position, applying a torque of **7 Nm**. Put control lever **U** in place and align scale **S** with the scale plate **B** such that the diamond-shaped marker "0" is in the middle of the scale plate.
7. Screw hexagon nut **T** onto the threaded part of the nozzle stem **R** and tighten while holding the control lever.

Please refer to table "Torques required for tightening".

### Install sample valve (if desired)

1. Unscrew sealing plug **O** and remove gasket **N**.
2. Observe installation instructions of the sample valve.
3. Install the sample valve, applying rules of good practice.

## Electrical Connection



### Danger

During operation moving internals can pinch one's hands or fingers. Do not touch moving parts! The continuous blowdown valves BAE 46..., BAE 47... are remote controlled and can open and close very abruptly.

The terminal strips of the actuator EF ... are live during operation.

This presents the danger of electric shock.

Cut off power supply before fixing or removing the equipment.

### Continuous blowdown valves BAE 46..., BAE 47... with actuator

Apart from the positions OPEN and CLOSED you can select an OPERATING POSITION for the actuators **EF 0.5** and **EF 1**. The OPERATING POSITION allows the continuous discharge of a defined amount of boiler water. The OPERATING POSITION can be adjusted in the actuator via the switching cam. For more information refer to the attached installation manual "Actuators EF...". The actuator **EF 1-1** has a feedback potentiometer (0 – 1000 ohm) but no switching cam for setting an OPERATING POSITION. For more information on the setting refer to the attached installation manual "Actuators EF...". The actuator **EF 1-40** sends a data telegram at regular intervals to the controller LRR 1-40. The data are transferred via CAN bus, using the CANopen protocol. For more information refer to the installation manual of the actuator EF 1-40.

Wire the actuator EF... in accordance with the attached installation manual "Actuators EF...".

### Factory settings of BAE 46..., BAE 47...

The default settings of the actuators **EF 0.5** and **EF 1** are: CLOSED (scale position "0"), OPERATING POSITION (scale position "1") and OPEN (scale position "4"), **Fig. 4, Fig. 8**

In the OPERATING POSITION a predefined amount of boiler water is continuously discharged. The OPERATING POSITION can be set in the actuator via the switching cam. For more information on the adjustment refer to the installation manual "Actuators EF...". The default settings of the actuators **EF 1-1** and **EF 1-40** are: CLOSED (scale position "0") and OPEN (scale position "4"). The default factory setting of the feedback potentiometer is  $50 \Omega \pm 5 \Omega$  for scale position "0" and  $940 \Omega \pm 5 \Omega$  for scale position "4".

## Commissioning



### Danger

The control lever of the continuous blowdown valve and the coupling of the actuator become hot during operation. This presents the risk of severe burns to hands and arms when touching the control lever or the coupling. Do not operate the equipment unless you are wearing thermally insulated and temperature resistant safety gloves.

### BA 46, BA 47, BAE 46..., BAE 47...

Make sure that the flanged connections of the BA 46, BA 47, BAE 46..., BAE 47... are securely tightened and not leaking. Retighten the stuffing box gland **C** if there is a leak in this area.



### Attention

- As the stuffing box screws are tightened the break-out force and the frictional forces of the nozzle steam are increased.
- The break-out force and the frictional forces of the nozzle steam must not exceed the max. allowable operating forces of the actuator.
- Excessive fastening of the stuffing box screws impairs the correct functioning of the continuous blowdown valve and can cause jamming of the nozzle stem.
- If the nozzle stem is jammed, the continuous blowdown valve can no longer open, control or close.

## Calculating the amount of boiler blowdown

Amount of boiler water to be discharged

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

A = Amount of boiler blowdown [kg/h]

Q = Boiler capacity [kg/h]

S = Conductivity of feedwater [ $\mu\text{S}/\text{cm}$ ]

K = Admissible conductivity of boiler water [ $\mu\text{S}/\text{cm}$ ]

### Example

Boiler pressure: 15 bar

Nominal size of the continuous blowdown valve: DN 20

Boiler capacity: Q = 10000 kg/h

Conductivity of feedwater: S = 100  $\mu\text{S}/\text{cm}$

Admissible conductivity of the boiler water: K = 3000  $\mu\text{S}/\text{cm}$

Amount of boiler water to be discharged: A  $\approx$  345 kg/h

10 % of which is intermittently blown out:  $\approx$  35 kg/h

Amount of continuous blowdown: A<sub>1</sub>  $\approx$  310 kg/h

Set control lever according to scale to an opening of 41 %, Fig. 6

### Continuous blowdown valves BA 46, BA 47 without actuator

The amount of boiler blowdown dictated by the operating conditions can be adjusted by means of the control lever on the continuous blowdown valve. For more information please refer to the capacity charts on pages 16 to 23.

### Continuous blowdown valves BAE 46..., BAE 47... with actuator

Use the control equipment KS 90, LRR 1-40, LRR 1-5 or LRR 1-6 to set the required TDS level of the boiler water. Please compare the resulting valve positions (see scale on the control lever) with the values indicated in the capacity charts on page 16 to 23.

## Operation



### Danger

The control lever of the continuous blowdown valve and the coupling of the actuator become hot during operation. This presents the risk of severe burns to hands and arms when touching the control lever or the coupling. Do not operate the equipment unless you are wearing thermally insulated and temperature resistant safety gloves.

### BA 46, BA 47, BAE 46..., BAE 47...

Make sure that the flanged connections of the BA 46, BA 47, BAE 46..., BAE 47... are securely tightened and not leaking. Retighten the stuffing box **C** if there is a leak in this area.



### Attention

- As the stuffing box screws are tightened the break-out force and the frictional forces of the nozzle steam are increased.
- The break-out force and the frictional forces of the nozzle steam must not exceed the max. allowable operating forces of the actuator.
- Excessive fastening of the stuffing box screws impairs the correct functioning of the continuous blowdown valve and can cause jamming of the nozzle stem.
- If the nozzle stem is jammed, the continuous blowdown valve can no longer open, control or close.

## Purging

Completely open the blowdown valve once a day for a short period of time, taking the operating limits of the plant into consideration.

## Emergency Operation

### BAE 46..., BAE 47...

1. Cut off power supply to the actuator and lift the coupling **8** approx. 1 cm by hand. **Fig. 13**
2. Use the scale **S** on the control lever **U** to set the desired blowdown rate, **Fig. 13**

## Maintenance

### BA 46, BA 47, BAE 46..., BAE 47...

The continuous blowdown valves BA 46, BA 47, BAE 46, BAE 47 do not require any special maintenance. Depending on the quality of the boiler water it might be necessary to service the valve every one or two years.

### Changing packing and internals of BA 46, BA 47

- 1 Take heed of the danger note on page 5.
- 2 Unscrew the hexagon nut **T** and detach control lever **U** with the aid of a pulling device.
- 3 Undo stuffing box screws **A**, remove stuffing box gland **C**, scale plate **B**, disk springs **D** and spring sleeve **E**.
- 4 Unscrew nozzle stem **R** and pull it out of the valve body.
- 5 Unscrew locking screw **P** and remove gasket **Q**.
- 6 Unscrew sealing plug **O** and remove gasket **N**.
- 7 Use a brass drift punch  $d = 14.8$  mm to force out the internals **F** to **J**, **Fig. 14**
- 8 Clean and, if required, exchange valve body **K** and internals.
- 9 Apply glue "Loctite® 620" to seat bushing **J** and put it in place. Insert stage bushing **I**.
- 10 Align wearing bushing **H** in such a way that the groove is on the longitudinal axis of the locking screw **P**.
- 11 Screw in the locking screw **P** together with gasket **Q** and tighten it when cold.
- 12 Align and insert the guide sleeve **G** in such a way that the groove on the longitudinal axis is on the locking screw **P**, **Fig. 12**.
- 13 Insert new wiper rings and packing rings **F** as shown, **Fig. 12**.
- 14 Apply lubricant (type WINIX® 2010) to the thread and sealing surface of the nozzle stem.
- 15 Insert nozzle stem **R** and screw it into the guide sleeve **G** by two turns.
- 16 Insert spring sleeve **E** and disk springs **D** in the shown sequence.
- 17 Put scale plate **B** and stuffing box gland **C** in place and tighten stuffing box screws **A** slightly.
- 18 Screw out nozzle stem **R** by half a turn and fasten stuffing box screws **A**.
- 19 Turn nozzle stem **R** into the closed position, applying a torque of **7 Nm**. Put control lever **U** in place and align scale **S** with the scale plate **B** such that the diamond-shaped marker "0" is in the middle of the scale plate.
- 20 Screw hexagon nut **T** onto the threaded part of the nozzle stem **R** and tighten while holding the control lever.
- 21 Screw sealing plug **O** together with gasket **N** into the valve body and tighten or screw in the sample valve with the gasket according to the instructions given by the manufacturer.

Please see table "Torques required for tightening".



### Changing packing and internals of BAE 46..., BAE 47...

1. Take heed of the danger note on page 5.
2. Cut off power supply to actuator **1**.
3. Undo hexagon screws **7** and remove actuator and coupling **8**.
4. Unscrew the hexagon nut **T** and detach control lever **U** with the aid of a pulling device.
5. Undo stuffing box screws **A**, remove stuffing box gland **C**, scale plate **B**, disk springs **D** and spring sleeve **E**.
6. Unscrew nozzle stem **R** and pull it out of the valve body.
7. Unscrew locking screw **P** and remove gasket **Q**.
8. Unscrew sealing plug **O** and remove gasket **N**.
9. Use a brass drift punch  $d = 14.8 \text{ mm}$  to force out the internals **F** to **J**, **Fig. 14**
10. Clean and, if required, exchange valve body **K** and internals.
11. Apply glue type "Loctite® 620" to seat bushing **J** and put it in place. Insert stage bushing **I**.
12. Align wearing bushing **H** in such a way that the groove is on the longitudinal axis of the locking screw **P**.
13. Screw in the locking screw **P** together with gasket **Q** and tighten it when cold.
14. Align and insert the guide sleeve **G** in such a way that the groove on the longitudinal axis is on the locking screw **P**, **Fig. 12**.
15. Insert new wiper rings and packing rings **F** as shown, **Fig. 12**.
16. Apply lubricant (type WINIX® 2010) to the thread and sealing surface of the nozzle stem.
17. Insert nozzle stem **R** and screw it into the guide sleeve **G** by two turns.
18. Insert spring sleeve **E** and disk springs **D** in the shown sequence.
19. Put scale plate **B** and stuffing box gland **C** in place and tighten stuffing box screws **A** slightly.
20. Screw out nozzle stem **R** by half a turn and fasten stuffing box screws **A**.
21. Turn nozzle stem **R** into the closed position, applying a torque of **7 Nm**. Put control lever **U** in place and align scale **S** with the scale plate **B** such that the diamond-shaped marker "0" is in the middle of the scale plate.
22. Screw hexagon nut **T** onto the threaded part of the nozzle stem **R** and tighten while holding the control lever.
23. Screw sealing plug **O** together with gasket **N** into the valve body and tighten or screw in the sample valve with the gasket according to the instructions given by the manufacturer.
24. Put coupling **8** onto control lever **U** and fix the mounting bracket **5** and actuator **1** to the valve body using the hexagon screws **7**. Adjust control lever until the coupling makes contact.
25. Align the actuator, making sure that the coupling **8** is level on the control lever. Fasten hexagon screws **7**.
26. Adjust the switching cams for OPEN, CLOSED and OPERATING POSITION or, if fitted, the feedback potentiometer according to the attached installation manual "Actuators EF...".
27. Set the switching cam for CLOSED in the actuator such that the torque checking pin **6** is to the right but does not touch the checking hole. The closing torque in this position is **10 Nm**. **Fig. 13**

Please see table "Torques required for tightening".

## Torques required for tightening

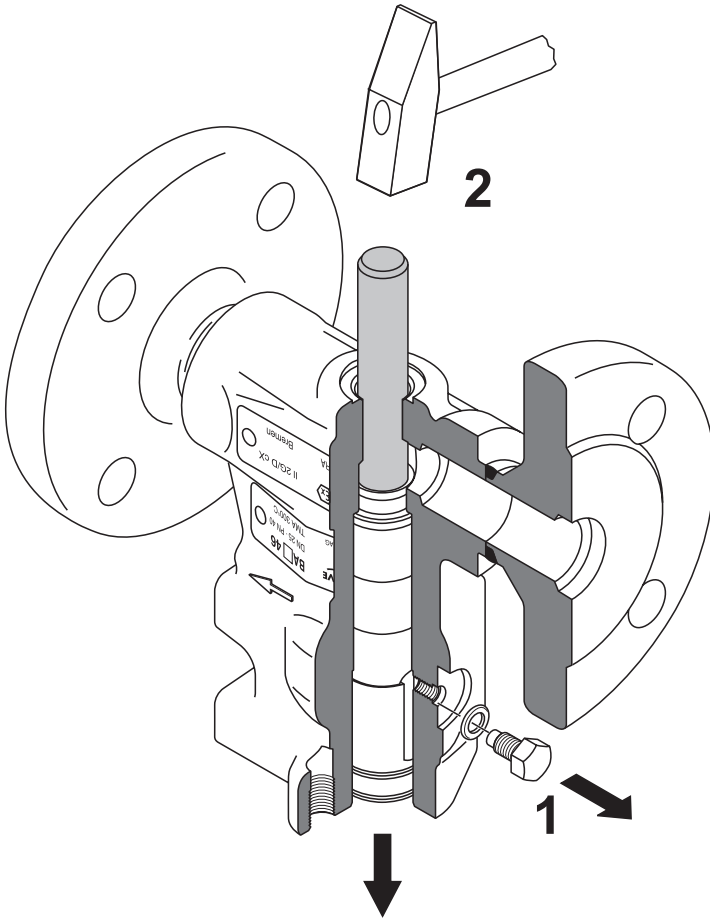
Item	Continuous blowdown valve	Torque required for tightening [Nm]	
		DN 15-32	DN 40, 50
<b>A</b>	BA 46, BA 47, BAE 46..., BAE 47...	7	11
<b>O</b>	BA 46, BA 47, BAE 46..., BAE 47...	130	
<b>P</b>	BA 46, BA 47, BAE 46..., BAE 47...	5	11
<b>R</b>	BA 46, BA 47, BAE 46..., BAE 47...	7	
<b>T</b>	BA 46, BA 47, BAE 46..., BAE 47...	20	
<b>7</b>	BAE 46..., BAE 47... DIN EN 10052	7	

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

## Tools

- Combination spanner 7 mm A. F., DIN 3113, form B
- Combination spanner 10 mm A. F., DIN 3113, form B
- Combination spanner 13 mm A. F., DIN 3113, form B
- Combination spanner 16 mm A. F., DIN 3113, form B
- Combination spanner 17 mm A. F., DIN 3113, form B
- Torque spanner 1 – 12 Nm, ISO 6789
- Torque spanner 8 – 40 Nm, ISO 6789
- Torque spanner 80 – 400 Nm, ISO 6789
- Punch 14.8 x 220 CuZn (brass)
- Hammer 300 g, DIN 1041
- Self-centering pulling device, size 0

**Removing internals**



**Fig. 14**

## Retrofitting

GESTRA continuous blowdown valves BA 46 and BA 47 can be retrofitted with a GESTRA actuator EF.. (BAE 46..., BAE 47...).



### Danger

During operation moving internals can pinch one's hands or fingers. Do not touch moving parts! The continuous blowdown valves BAE 46..., BAE 47... are remote controlled and can open and close very abruptly.

The terminal strips of the actuator EF ... are live during operation.

This presents the danger of electric shock.

Cut off power supply before fixing or removing the equipment.

## Mounting the actuator

1. Observe the installation instructions of the actuator manufacturer.
2. Attach compression spring **2**, thrust washer **3** and grooved dowel pin **4** to actuator **1** EF..., **Fig. 13**
3. Put coupling **8** onto control lever **U** and fix the mounting bracket **5** and actuator **1** with hexagon screws **7** to the valve body. Align control lever until the coupling makes contact.
4. Align the actuator, making sure that the coupling **8** is level on the control lever. Fasten hexagon screws **7** with a torque of **7 Nm**.
5. Adjust the switching cams for OPEN, CLOSED and OPERATING POSITION or, if fitted, the feedback potentiometer according to the attached installation manual "Actuators EF...".
6. Set the switching cam for CLOSED in the actuator such that the torque checking pin **6** is to the right but does not touch the checking hole. The closing torque in this position is **10 Nm**. **Fig. 13**
7. Remove ATEX marking **M** from the valve body **K**. BAE 46..., BAE 47... must not be used in potentially explosive areas.

## Torques required for tightening

Item	Continuous blowdown valve	Torque [Nm]
<b>7</b>	BAE 46..., BAE 47...	7

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

## Tools

- Combination spanner 13 mm A. F., DIN 3113, form B
- Torque spanner 1 – 12 Nm, ISO 6789
- Hammer 300 g, DIN 1041

## Spare Parts

### Spare parts list

Item	Designation	Stock code	Stock code
		BA 46 BA 47	BAE 46... BAE 47...
<b>F</b> <b>N</b> <b>Q</b>	Packing/gasket kit, DN 15 to DN 32: 2 Packing rings 15 x 23 x 4, 4 wiper rings, 1 Gasket C 6 x 10 x 1.5, 1 Gasket A 17 x 23 x 1.5	335702	335702
<b>F</b> <b>N</b> <b>Q</b>	Packing/gasket kit, DN 40 and DN 50: 2 Packing rings 18 x 28 x 5, 4 wiper rings, 1 Gasket C 10 x 16 x 1.5, 1 Gasket A 17 x 23 x 1.5	335704	335704
<b>R</b> <b>J</b> <b>I</b> <b>H</b> <b>G</b> <b>F</b> <b>N</b> <b>Q</b>	Complete spare parts kit, DN 15 to DN 32: 1 Nozzle stem, 1 seat bushing, 2 stage bushings, 1 Wearing bushing, 1 guide sleeve, 2 Packing rings 15 x 23 x 4, 4 wiper rings, 1 Gasket C 6 x 10 x 1.5, 1 Gasket A 17 x 23 x 1.5	335703	335703
<b>R</b> <b>J</b> <b>I</b> <b>H</b> <b>G</b> <b>F</b> <b>N</b> <b>Q</b>	Complete spare parts kit, DN 40 and DN 50: 1 Nozzle stem, 1 seat bushing, 2 stage bushings, 1 Wearing bushing, 1 guide sleeve, 2 Packing rings 18 x 28 x 5, 4 wiper rings, 1 Gasket C 10 x 16 x 1.5, 1 Gasket A 17 x 23 x 1.5	335705	335705
<b>1</b>	Actuator <b>EF 0.5</b> , 230 V, 50/60 Hz		332754
<b>1</b>	Actuator <b>EF 1</b> , 230 V, 50/60 Hz		333312
<b>1</b>	Actuator <b>EF 1-1</b> , 230 V, 50/60 Hz		333311
<b>1</b>	Actuator <b>EF 1-40</b> , 230 V, 50/60 Hz		335664

Explosion-proof actuators or actuators powered with d. c. or three-phase current are available on request.

## Retrofitting Parts

### Retrofitting parts list

Item	Designation	Stock code	Stock code
		BA 46 BA 47	BAE 46... BAE 47...
<b>1</b> <b>2</b> <b>3</b> <b>4</b> <b>5</b> <b>7</b> <b>8</b>	1 Actuator <b>EF 0.5</b> , 230 V, 50/60 Hz 1 Mounting bracket, 1 assembly set for coupling 3 Hexagon screws (for BAE 46-3)	335658	
	1 Actuator <b>EF 1</b> , 230 V, 50/60 Hz 1 Mounting bracket, 1 assembly set for coupling 3 Hexagon screws (for BAE 46..., BAE 47...)	335659	
	1 Actuator <b>EF 1-1</b> , 230 V, 50/60 Hz 1 Mounting bracket, 1 assembly set for coupling 3 Hexagon screws (for BAE 4...-1)	335660	
	1 Actuator <b>EF 1-40</b> , 230 V, 50/60 Hz 1 Mounting bracket, 1 assembly set for coupling 3 Hexagon screws (for BAE 4...-40)	335661	
	1 Mounting bracket, 1 assembly set for coupling 3 Hexagon screws (without actuator 1)	835769	

## Decommissioning



### Danger

The equipment becomes hot during operation.

This presents the risk of severe burns and scalds to the whole body.

Before loosening flanged connections or sealing plugs make sure that all connected lines are depressurised (0 bar) and cooled down to room temperature (20 °C).

The terminal strips of the actuator EF ... are live during operation.

This presents the danger of electric shock.

Cut off power supply before fixing or removing the equipment.

### Disposal

Dismantle the equipment and separate the waste materials.

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

## Annex

### Declaration of Conformity CE

We hereby declare that the equipment **BA 46, BA 47** conforms to the following European Directives:

- ATEX Directive 94/9/EC of 23 March 1994
- Pressure Equipment Directive 97/23/EC of 29 May 1997 (unless the equipment is excluded from the scope of the Directive according to section 3.3).

Applied conformity assessment procedure: Annex III, Module H, verified by the Notified Body 0525.

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

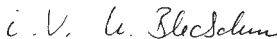
We hereby declare that the equipment **BAE 46..., BAE 47...** conforms to the following European Directives:

- Pressure Equipment Directive 97/23/EC of 29 May 1998 (unless the equipment is excluded from the scope of the Directive according to section 3.3).

Applied conformity assessment procedure: Annex III, Module H, verified by the Notified Body 0525.

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

Bremen, 5<sup>th</sup> October 2005  
GESTRA AG



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



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



GESTRA

Agencies all over the world:

**www.gestra.de**

### España

#### **GESTRA ESPAÑOLA S.A.**

Luis Cabrera, 86-88

E-28002 Madrid

Tel. 00 34 91 / 5 15 20 32

Fax 00 34 91 / 4 13 67 47; 5 15 20 36

E-mail: [aromero@flowserve.com](mailto:aromero@flowserve.com)

### Polska

#### **GESTRA POLONIA Spolka z.o.o.**

Ul. Schuberta 104

PL - 80-172 Gdansk

Tel. 00 48 58 / 3 06 10 -02 od 10

Fax 00 48 58 / 3 06 33 00

E-mail: [gestra@gestra.pl](mailto:gestra@gestra.pl)

### Great Britain

#### **Flowserve Flow Control (UK) Ltd.**

Burrell Road, Haywards Heath

West Sussex RH 16 1TL

Tel. 00 44 14 44 / 31 44 00

Fax 00 44 14 44 / 31 45 57

E-mail: [gestraukinfo@flowserve.com](mailto:gestraukinfo@flowserve.com)

### Portugal

#### **Flowserve Portuguesa, Lda.**

Av. Dr. Antunes Guimarães, 1159

Porto 4100-082

Tel. 0 03 51 22 / 6 19 87 70

Fax 0 03 51 22 / 6 10 75 75

E-mail: [jtavares@flowserve.com](mailto:jtavares@flowserve.com)

### Italia

#### **Flowserve S.p.A.**

Flow Control Division

Via Prealpi, 30

I-20032 Cormano (MI)

Tel. 00 39 02 / 66 32 51

Fax 00 39 02 / 66 32 55 60

E-mail: [infoitaly@flowserve.com](mailto:infoitaly@flowserve.com)

### USA

#### **Flowserve GESTRA U.S.**

2341 Ampere Drive

Louisville, KY 40299

Tel.: 00 15 02 / 267 2205

Fax: 00 15 02 / 266 5397

E-mail: [dgoodwin@flowserve.com](mailto:dgoodwin@flowserve.com)

## GESTRA AG

P. O. Box 10 54 60, D-28054 Bremen

Münchener Str. 77, D-28215 Bremen

Telephone +49 (0) 421 35 03 - 0

Fax +49 (0) 421 35 03 - 393

E-Mail [gestra.ag@flowserve.com](mailto:gestra.ag@flowserve.com)

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

