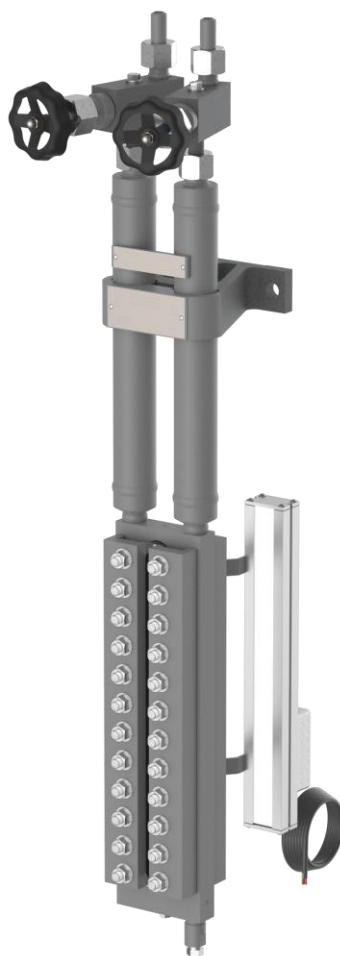




# Remote level gauge

## Type G



Version 05/2024

D-05-B-51518-EN-01

# Installation and operating instructions

(English translation)

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# 1 About this document

## 1.1 Introduction

The Installation and operating instructions are part of the Remote level gauge Type G. It must be made available to the responsible departments "Incoming goods, transport, assembly, commissioning and maintenance". The Installation and operating instructions must be stored in such a way that the qualified person has access to them at all times. If the gauge is passed on to a third party, these Installation and operating instructions must also be included in the national language of the third party.

### NOTICE

Safe and trouble-free operation of the Igema GmbH Remote level gauge is not possible without precise knowledge of the individual components.



- Installation and operating instructions Note installation and operating instructions.
- Familiarise yourself with all relevant documents.

The Installation and operating instructions contains important information for the proper use and safe operation of the Remote level gauge. Please also note important information on the repair, maintenance, care, safety and value retention of your measurement and control system.

If the Installation and operating instructions or the accompanying documents are partially not available or have become unusable, a new copy of the document for the gauge can be obtained by specifying the document number on the cover page. It is also possible to download the operating instructions after scanning the QR code shown on the back.

## 1.2 Product identification and rating plate

On the basis of the rating plate, the Installation and operating instructions can be assigned to the corresponding Remote level gauge. The Installation and operating instructions belongs to the Remote level gauge of the type **Type G**.

Additions that are entered after the description and describe the design of the Remote level gauge do not release these Installation and operating instructions from belonging to the Remote level gauge.



According to DIN EN19 the following are marked on the rating plate:

 IGEMA GmbH Mess- und Regelsysteme Antwerpener Straße 1 Germany - 48163 Münster   See installation instructions	S/N	A	Type	B
	PS	C	TS	D
	Conn. Type	E	F	
		G		

A	Year of manufacture and order number	E	Pressure level
B	Type designation	F	Nominal width
C	maximum permissible pressure	G	TAG No. (optional)
D	maximum permissible temperature		


## 1.3 Related documents







In addition to this Installation and operating instructions, the installation and operating instructions for the LED Secure Slim must also be observed.

Product	Document number/ Link	QR-Code
LED Secure Slim lighting device	54945 <a href="http://www.igema.com/document/54945">www.igema.com/document/54945</a>	
LED Secure Ex SOL W lighting device	51196 <a href="http://www.igema.com/document/51196">www.igema.com/document/51196</a>	

## 1.4 Marking of safety precautions

In the following Installation and operating instructions, safety instructions are marked with the following symbols:

 <b>SIGNAL WORD</b>	
<b>Nature and source of danger</b>	<b>SYMBOL(S)</b>
Consequences of non-compliance	
<ul style="list-style-type: none"> <li>Measures/ prohibitions to avoid the danger</li> </ul>	

	This symbol with the signal word <b>DANGER</b> and a background warning colour indicates a danger that will result in death or serious injury if not avoided.
	This symbol with the signal word <b>WARNING</b> and a background warning colour indicates a danger that can lead to death or serious injury if not avoided.
	This symbol with the signal word <b>CAUTION</b> and a background warning colour indicates a danger that can lead to injuries if not avoided.
	This symbol with the signal word <b>NOTICE</b> and a background colour indicates a danger that can lead to property damage if not avoided.
	This symbol with the signal word <b>ENVIRONMENT</b> and a background colour indicates a danger that can lead to environmental pollution if not avoided.
	This symbol with the signal word <b>TIP</b> and a background colour indicates a user tip that provides additional and useful tips.

## 1.5 Copyright

This Installation and operating instructions contains texts and drawings that may not be reproduced, distributed or otherwise communicated in whole or in part without the express permission of the manufacturer.

The copyright of the operating instructions remains with:

**Igema GmbH**  
**Antwerpener Str. 1**  
**48163 Muenster**  
**Germany**

Violations oblige you to pay compensation.

## 2 Safety Instructions

### 2.1 Requirements for personnel

#### NOTICE

**Property damage caused by incorrect installation, commissioning, maintenance and operation**



Only qualified persons who are familiar with the systems are allowed to carry out work

Igema GmbH can be commissioned for the installation and maintenance.

#### CAUTION

**Risk of injury due to external influences**



External influences can lead to injuries in the absence of protective equipment

- Put on personal protective equipment according to category II

### 2.2 Safety at work

#### DANGER

**Explosion hazard due to ignition sources**



Working in potentially explosive atmospheres during assembly, commissioning, maintenance and disassembly can lead to explosions.

- Ventilate the environment
- Switch off the system
- Allow explosive gases to escape.
- Carry out a gas value measurement before starting work.

#### WARNING

**Risk of injury due to corrosive liquids**



Corrosive liquids can cause serious injuries in case of skin contact

- Check the danger of the medium.
- Wear protective clothing including safety glasses.

### Risk of injury due to leaking medium



Inflammatory, irritating and harmful substances can escape from the gauge and lead to skin injuries and burns. This danger is also to be expected in the case of an unpressurised cooled system.

- Wear protective clothing including safety glasses.
- Check the danger posed by the medium and, if necessary, wear respiratory protection or support.
- Observe the order of work.
- Perform work only when the gauge is depressurised and emptied.
- In principle, do not consider any system to be depressurised.

### Danger of suffocation due to dangerous gases



Escaping gases can lead to suffocation.

- Check the danger of the medium.
- Wear respiratory protection.
- Before carrying out maintenance and dismantling work, wait until the system is adjusted to the atmospheric conditions.

### Risk of injury due to high temperatures



Surfaces of the gauges and areas near the gauges heat up to the maximum permissible temperature and can cause severe burns if touched.

- Check the danger of the medium.
- Wear protective clothing including safety glasses.
- Before carrying out maintenance and dismantling work, wait until the system is adjusted to the atmospheric conditions.



## CAUTION

### Risk of injury due to unsecured working area

An unsecured working area can endanger working and bystanders.

- Ensure safe access.
- Delimit and label the secured working area.
- Sufficiently illuminate the working area.

### Risk of injury due to heavy loads

There is a risk of injury when handling large and/or heavy gauges.

- Observe the load handling regulation.
- Use lifting equipment to move heavy and bulky appliances.

### Danger of health damage due to noise



Noise leads to damage to the health of the hearing.

- Wear hearing protection.
- Avoid or limit noise if possible.

## 2.3 Intended use of the gauge



## NOTICE

### Property damage caused by irregular use

- Use gauges exclusively to display filling levels on containers.
- Maintain maximum pressure and temperature ranges of all components.
- Ensure the suitability of the gauge for the planned use.
- Ensure the compatibility of the gauge and the medium.
- Observe the correct orientation of the gauge.



## CAUTION

### **Danger due to indeterminate use of the gauge liquid**

Improper use of the gauge liquid can cause damage to health, property and the environment.

- Observe the safety data sheet for the gauge liquid.
- Collect and store the liquid in a suitable container.

## 2.4 Damage to the product



## NOTICE

### **Property damage caused by incorrect storage and transport**

Incorrect transport and storage can cause damage to the gauge.

- Avoid bumps and hard setdown.
- Store the gauge protected from environmental influences and in a dry place.
- Secure the gauge against damage.

## 3 Contents of the packaging

### 3.1 Included

1. Type G The Remote level gauge will be delivered as a pre-assembled unit, unless otherwise contractually agreed:

Unit A

- Gauge
- Gauge valves

Unit B:

- Upper main shut-off valve with condenser
- Lower main shut-off valve

Unit C:

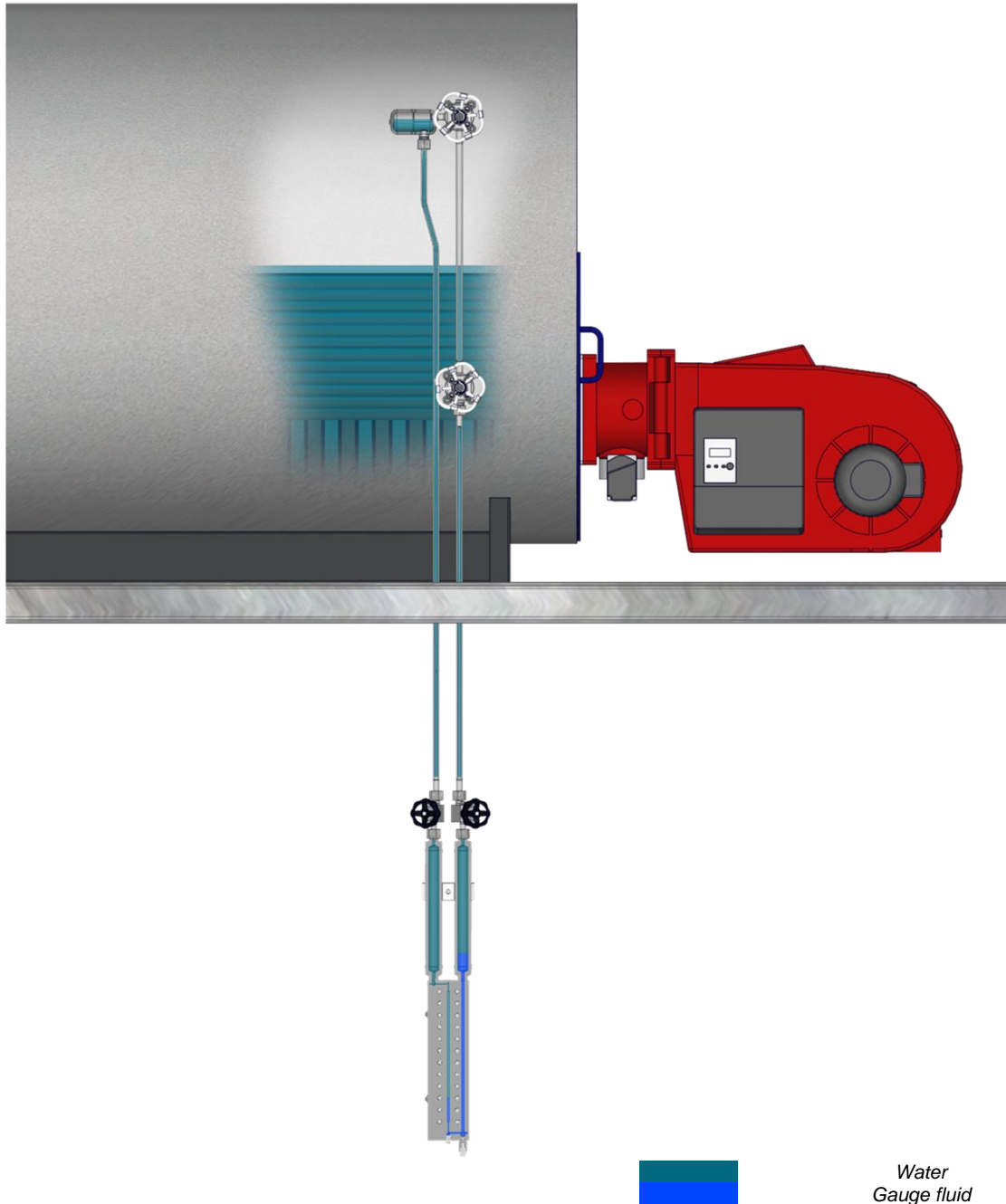
- Lighting device

2. Installation and operating instructions

## 4 System Description

### 4.1 Function

#### Fill level indicator

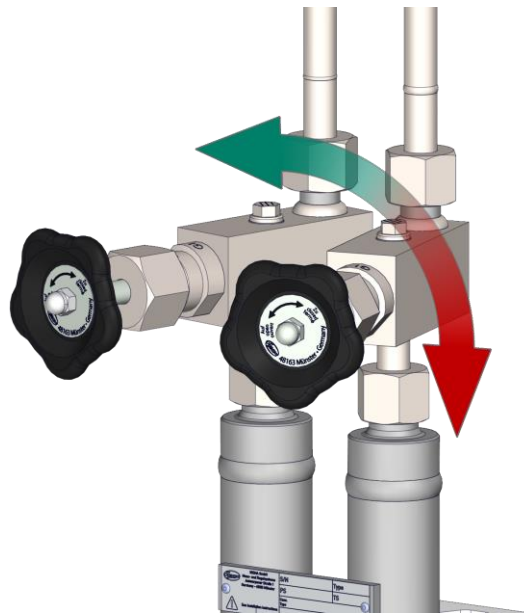


The type G remote level gauge is used on steam generators, with the exception of once-through steam generators. The gauge works on the principle of communicating tubes. The geodetic pressure difference between two water columns is transferred to a blue gauge liquid in the remote level gauge. The height of the gauge liquid level indicator column shows the fill level on a scale of 1:1 or on a reduced scale. In the visibility range, the fill level can be recognised by the height of the gauge liquid level indicator column.

## Valve actuation

Handle/handwheel rotated clockwise: shut-off valve is **closed**.

Handle/handwheel rotated anticlockwise: shut-off valve is **opened**.



### NOTICE

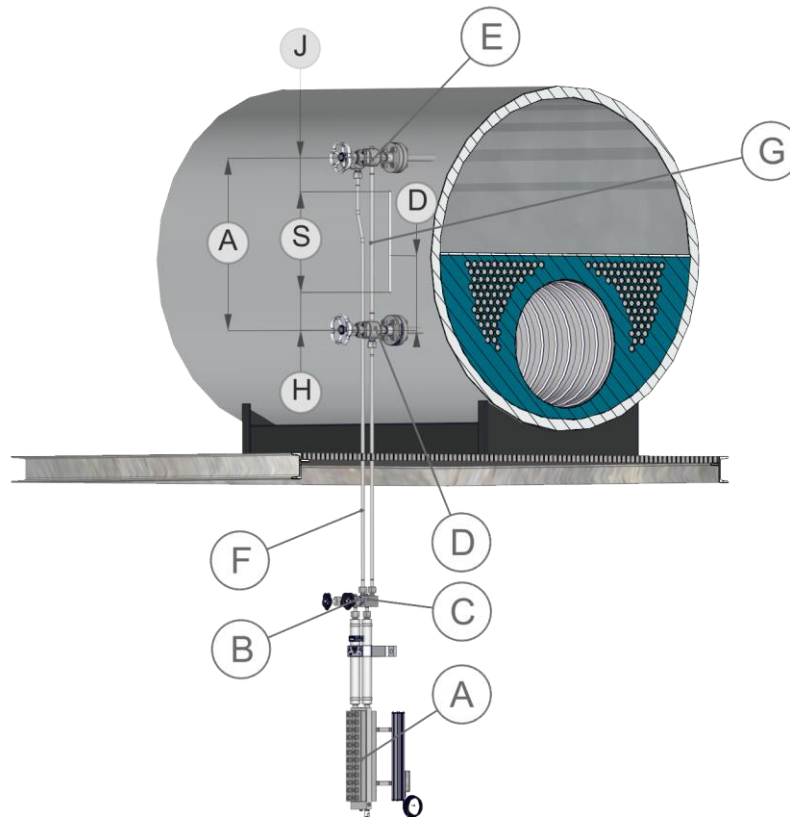
#### **Material damage due to increased torques**

Opening and closing the valves with excessive torques leads to leaks and damage.

- Open and close valves with manual torque.

## 5 Construction

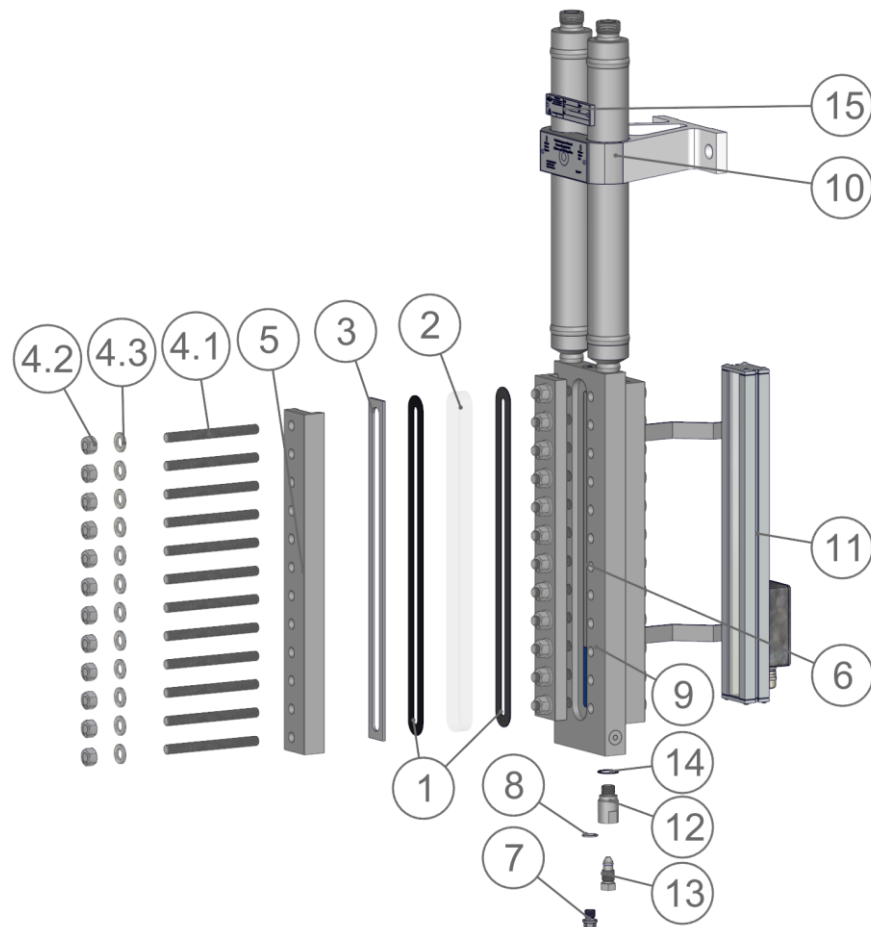
### 5.1 Boiler assembly



A	Gauge ( <i>chap. 5.2</i> )	E	Upper shut-off valve with condenser
B	Gauge valve	F	Equalising tube
C	Gauge valve	G	Connecting cable
D	Lower shut-off valve		

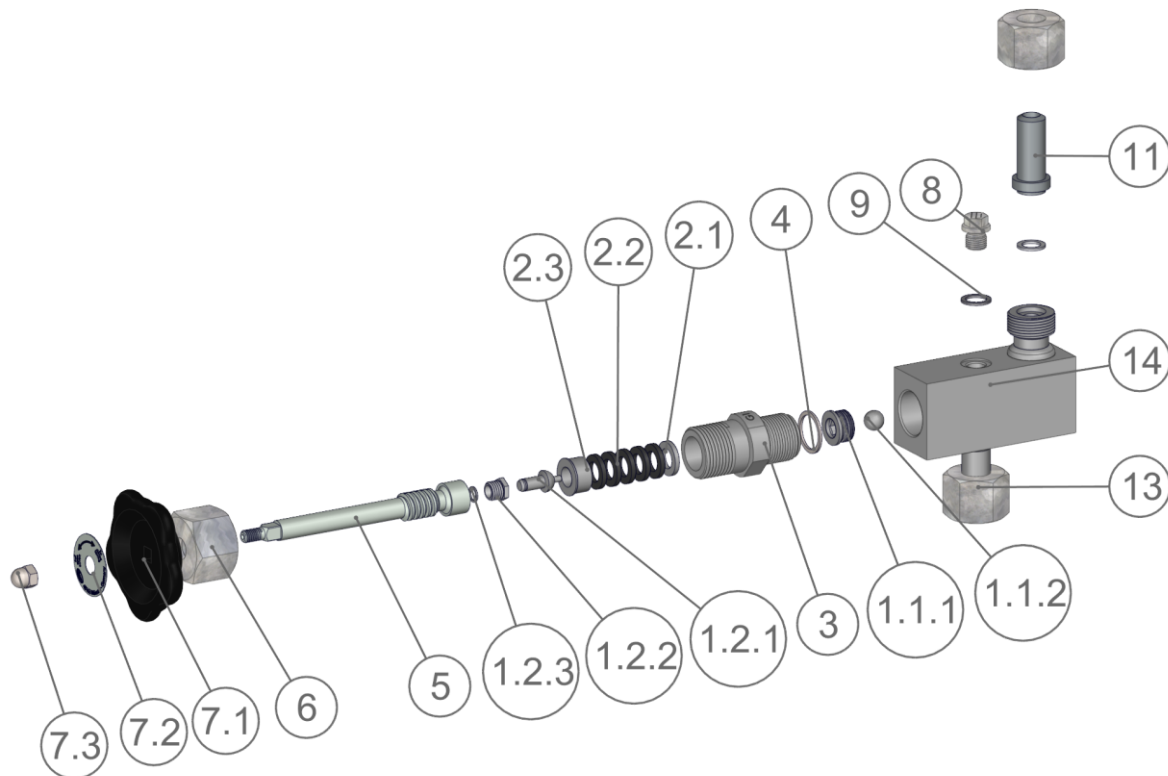
Measurements			
A	Connections dimension	S	Sight length
H	Lower blind space	J	Upper blind space
D	Difference Lower connection → Normal water		

5.2 Gauge



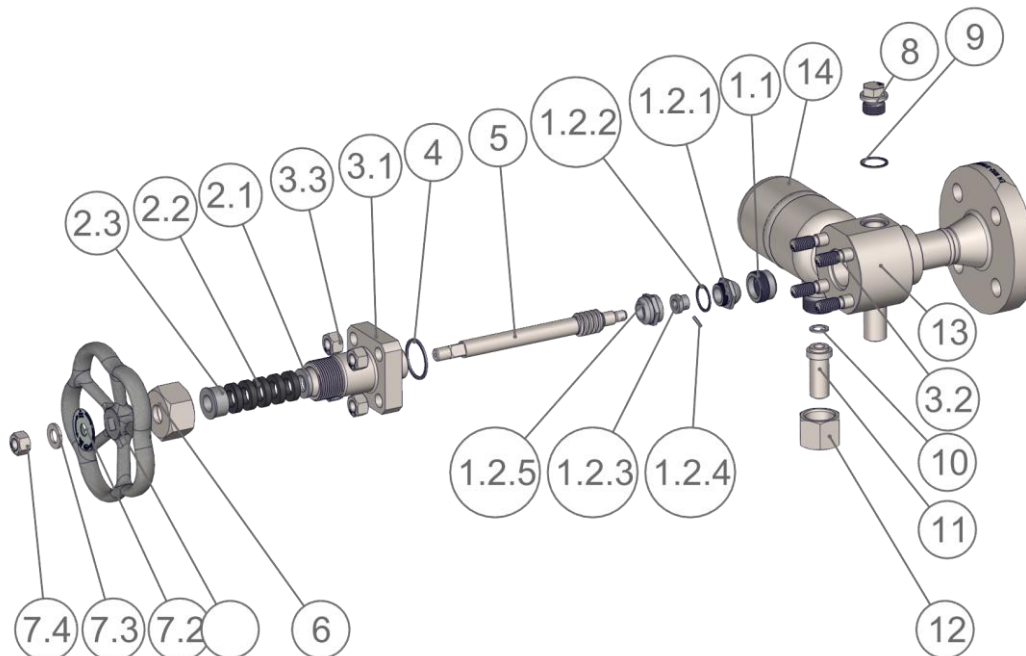
1	Seal	8	Sealing ring
2	Glass	9	Gauge fluid
3	Pressure plate	10	Support clamp
4.1	Threaded bolt	11	Lighting device
4.2	Hexagon nut	12	Drain sleeve
4.3	Washer	13	Drain plug
5	Cover rail	14	Sealing ring
6	Display body	15	Rating plate ( <i>chap. 1.2</i> )
7	Screw plug		

5.3 Gauge valve (AF410)



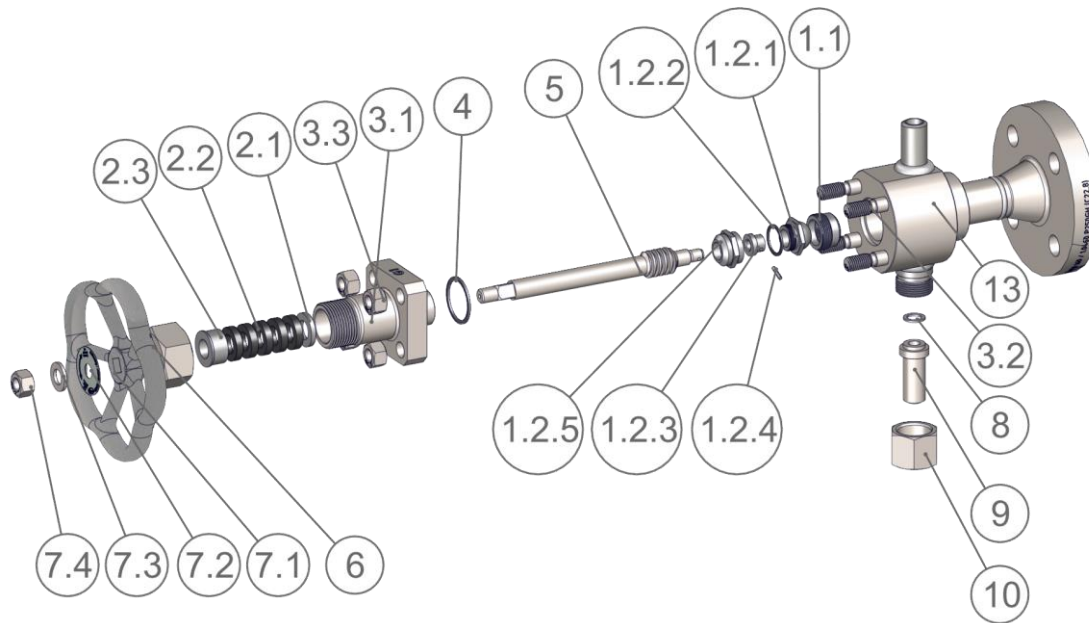
1.1.1	Valve seat	6	Cap nut
1.1.2	Ball	7.1	Handwheel
1.2.1	Valve cones	7.2	Information sign
1.2.2	Threaded sleeve	7.3	Cap nut
1.2.3	Explosive ring	8	Bleed screw
2.1	Base ring	9	Sealing ring
2.2	Packing ring	10	Sealing ring
2.3	Stop bushing	11	Weld-on nipple
3	Valve upper part	12	Cap nut
4	Sealing ring	13	Cap nut
5	Spindle	14	Valve body

## 5.4 Main shut-off valve with condenser (HA310 / HA320)



1.1	Valve seat	5	Spindle
1.2.1	Cone	6	Cap nut
1.2.2	Sealing ring	7.1	Handwheel
1.2.3	Clamping nut	7.2	Information sign
1.2.4	Grooved pin	7.3	Washer
1.2.5	Backsealing cone	7.4	Hexagon nut
2.1	Base ring	8	Bleed screw
2.2	Packing ring	9	Sealing ring
2.3	Stuffing box	10	Sealing ring
3.1	Valve upper part	11	Weld-on nipple
3.2	Stud bolt	12	Cap nut
3.3	Hexagon nut	13	Valve body
4	Sealing ring	14	Condenser

5.5 Main shut-off valve without condenser (HA300)



1.1	Valve seat	3.3	Hexagon nut
1.2.1	Cone	4	Sealing ring
1.2.2	Sealing ring	5	Spindle
1.2.3	Clamping nut	6	Cap nut
1.2.4	Grooved pin	7.1	Handwheel
1.2.5	Backsealing cone	7.2	Information sign
2.1	Base ring	7.3	Washer
2.2	Packing ring	7.4	Hexagon nut
2.3	Stuffing box	8	Sealing ring
3.1	Valve upper part	9	Weld-on nipple
3.2	Stud bolt	13	Valve body

## 6 Technical data

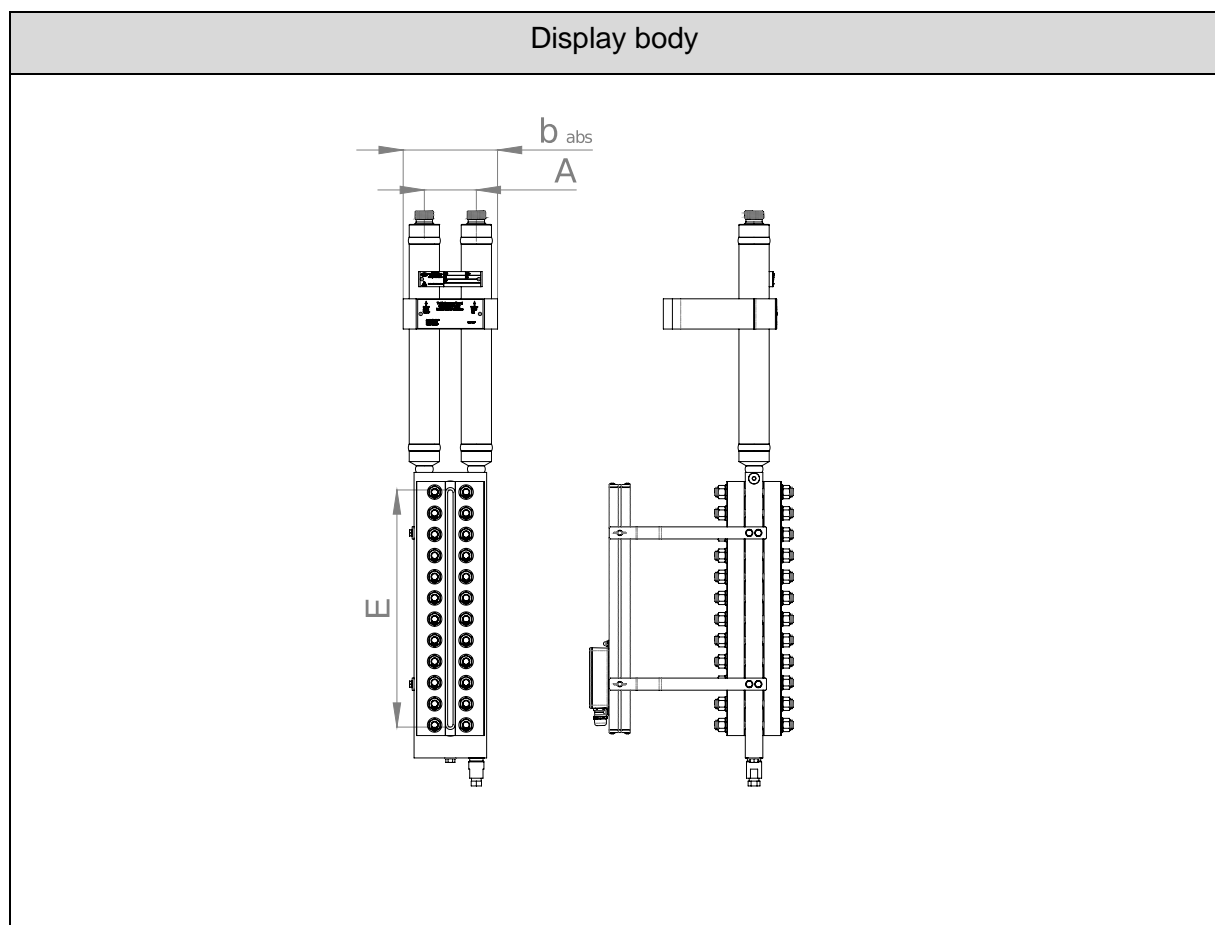
### 6.1 Operating limit

Operating limit Type G	perm. Pressure [PS]	perm. Temperature [TS]
	180 bar 2610 psig	40 °C 104 °F

The maximum permissible operating pressure of the Remote level gauge is determined by the lowest permissible pressure of the attached component.

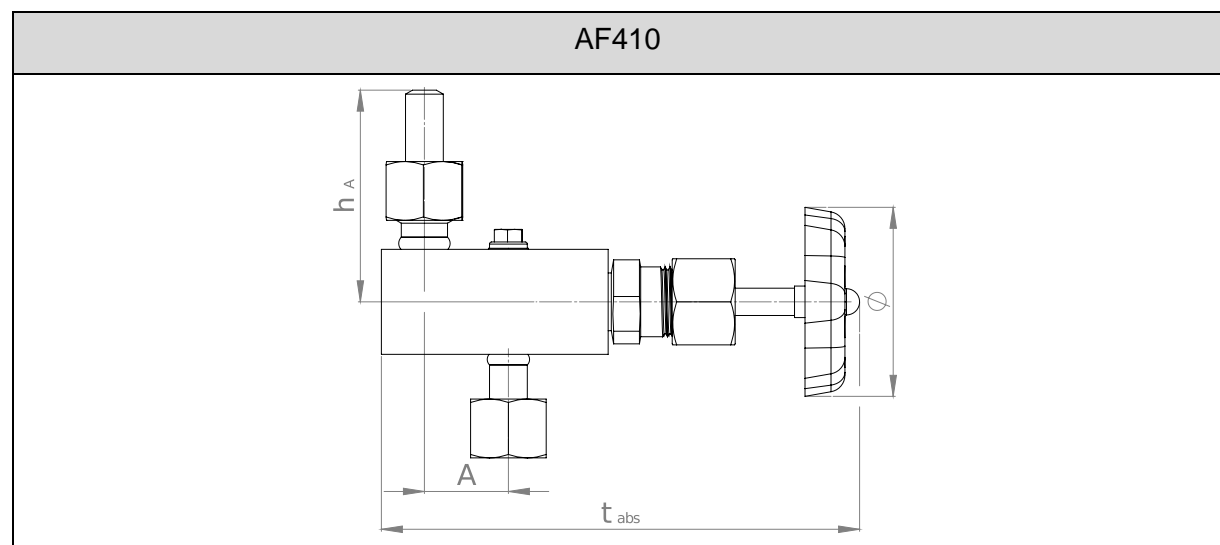
### 6.2 Dimensions

#### Fill level indicator

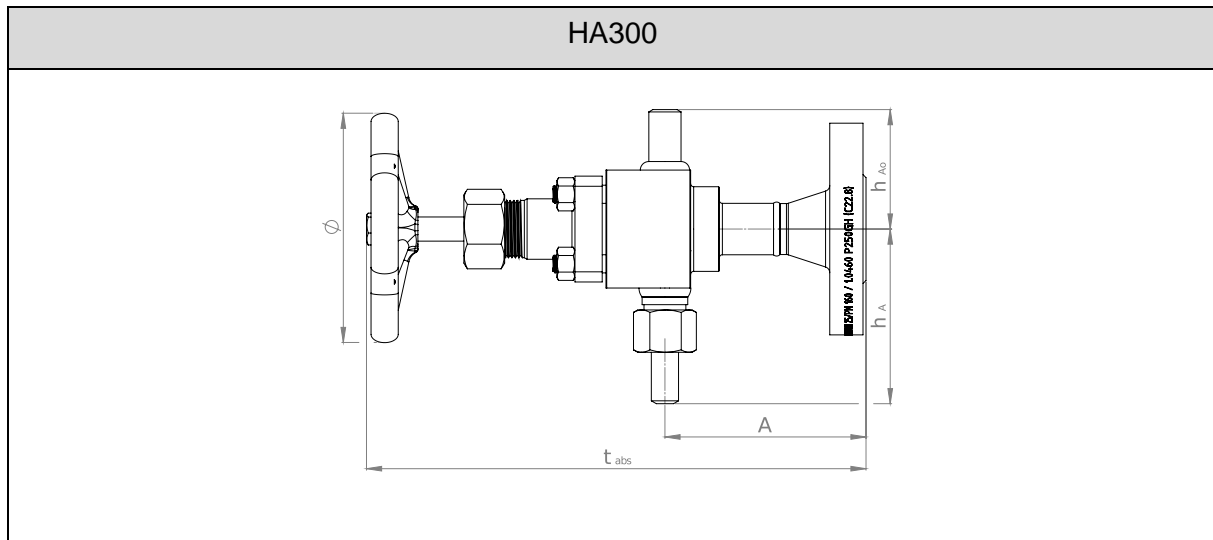


		[mm]		[inch]
Sight length	[E]	310 / 390		12 1/5 / 15 1/3
Absolute width	[b <sub>abs</sub> ]	100 bar	180 bar	6 1/7
		156	200	

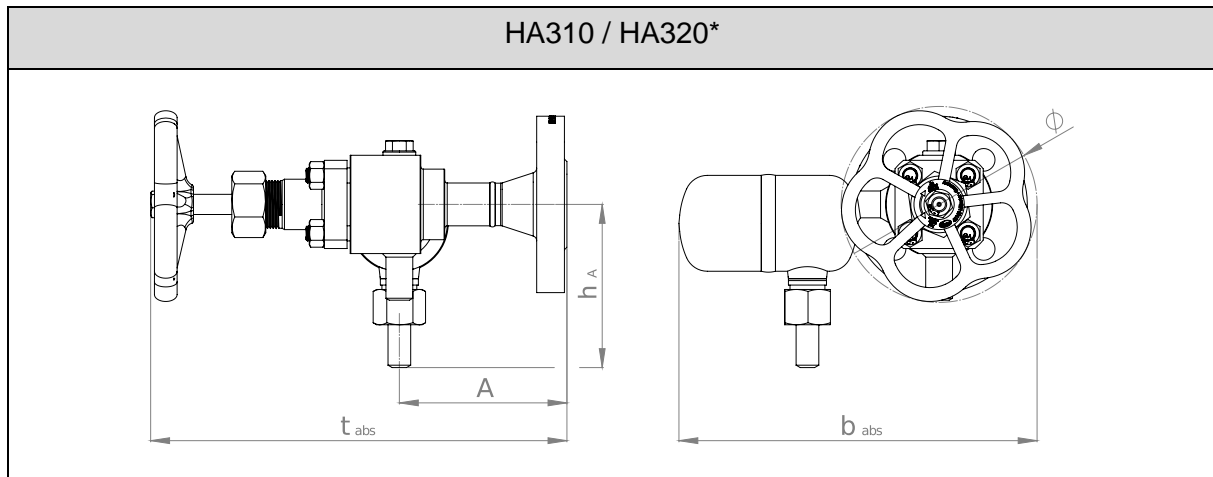
Valves



		[mm]	[inch]
Absolute depth	<b>[t<sub>abs</sub>]</b>	228	9
Connection dimension	<b>[A]</b>	40	1 4/7
Connection height	<b>[h<sub>A</sub>]</b>	100	4
Handwheel diameter	<b>[Ø]</b>	90	3 1/2



		[mm]	[inch]
Connection dimension	<b>[A]</b>	133	5 1/4
Absolute depth	<b>[t<sub>abs</sub>]</b>	336	13 2/9
Top connection height	<b>[h<sub>Ao</sub>]</b>	79	3 1/9
Bottom connection height	<b>[h<sub>A</sub>]</b>	117	4 3/5
Handwheel diameter	<b>[Ø]</b>	155	6 1/9



		<100bar / 1450 psig		>100bar to 200bar >1450psig to 2900psig	
		[mm]	[inch]	[mm]	[inch]
Connection dimension	<b>[A]</b>	133	5 1/4	133	5 1/4
Absolute depth	<b>[t<sub>abs</sub>]</b>	336	13 2/9	324	12 3/4
Connection height	<b>[h<sub>A</sub>]</b>	130	5 1/8	126.5	5
Absolute width	<b>[b<sub>abs</sub>]</b>	284	11 1/6	278	11
Handwheel diameter	<b>[Ø]</b>	155	6 1/9	155	6 1/9

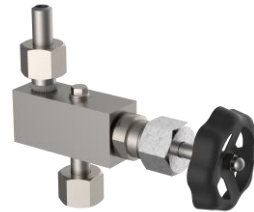
\*The HA320 valve has the same design as the HA310

The valves shown are fitted with a DN25 flange. The dimensions of the valves vary due to other customer specific designs.

### 6.3 Basic equipment



Shut-off valves to the remote level gauge  
(shown version <100bar)



Gauge valve



LED Secure Slim lighting device

Type	Document	Article-No.
Shut-off valve HA300 Flange DN25	-	15-00321
Shut-off valve HA310 Flange DN25		15-00227
Shut-off valve HA320 flange DN25		15-10107
Gauge valve AF410	-	15-00235
LED Secure Slim lighting device	D-A1-D-50988-DE	see data sheet

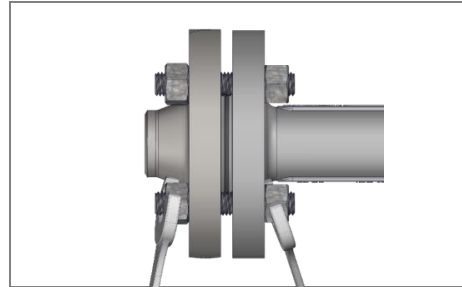
### 6.4 Optional versions

Examples of optional versions	
HA300 / HA310 / HA320 valves with customer specific process connections	
<p style="text-align: center;"><i>Example: HA300 &gt;100bar to 200bar with weld-on end Ø33.7 x 3.2</i></p>	<p style="text-align: center;"><i>Welding socket</i></p>
	<p style="text-align: center;"><i>Welding end</i></p>

## 7 Assembly

### 7.1 Version with flange

- Observe the orientation of the gauge.
- Check sealing surfaces for cleanliness
- Install the flange connection between the gauge and the boiler/pressure vessel according to the applicable standard



### 7.2 Version with welding end



## WARNING

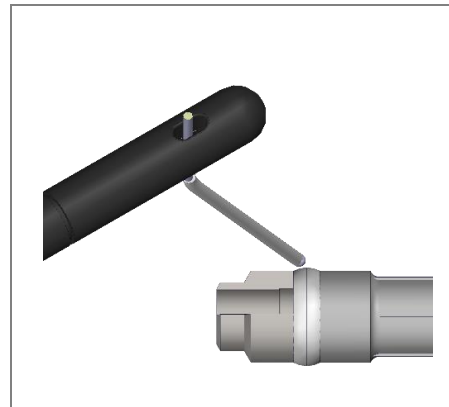
### Eye damage due to lack of personal protective equipment



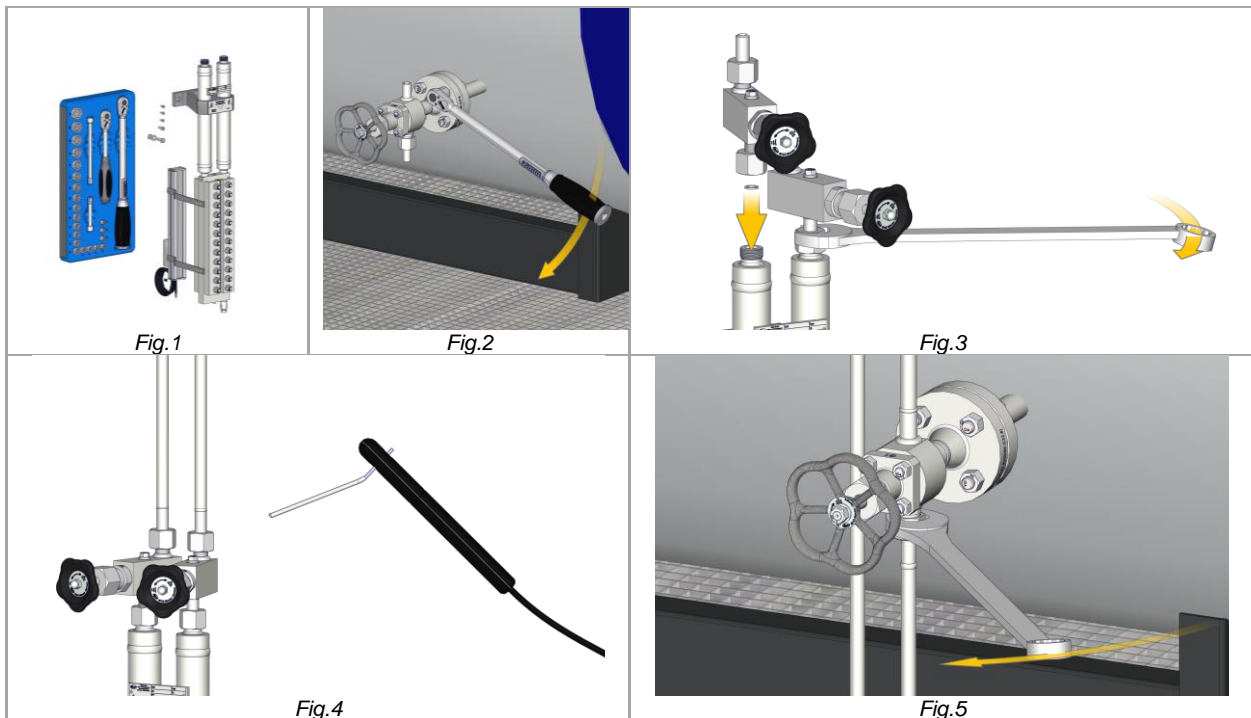
Lack of eye protection during welding leads to eye damage in working and bystanders.

- Secure the working area.
- Wear a welding protective mask.

- Observe the orientation of the gauge.
- Remove protection caps. (locking for transport)
- Assembly only by using welding process 111 (shielded metal arc welding) or 141 (gas tungsten arc welding).
- Check on an application-specific basis whether a subsequent heat treatment of the weld seams is required.



### 7.3 Mounting the gauge



**Figure 1:**

- Attach the display body to the planned location using the support clamp and suitable fastening elements.

**Figure 2:**

- Install main shut-off valves on the boiler in accordance with the applicable standard

**Figure 3:**

- Place the gauge valves with sealing ring on the gauge and tighten the cap nut.

**Figure 4:**

- Weld in equalising and connecting pipes

#### NOTICE

##### Impaired function due to air pockets

Air pockets in the pipes can impair the function of the gauge



- Lay connecting pipes with a gradient.
- Ensure that the contents cannot freeze or evaporate.

**Figure 5:**







- Screw the screw connections on the valves tightly.

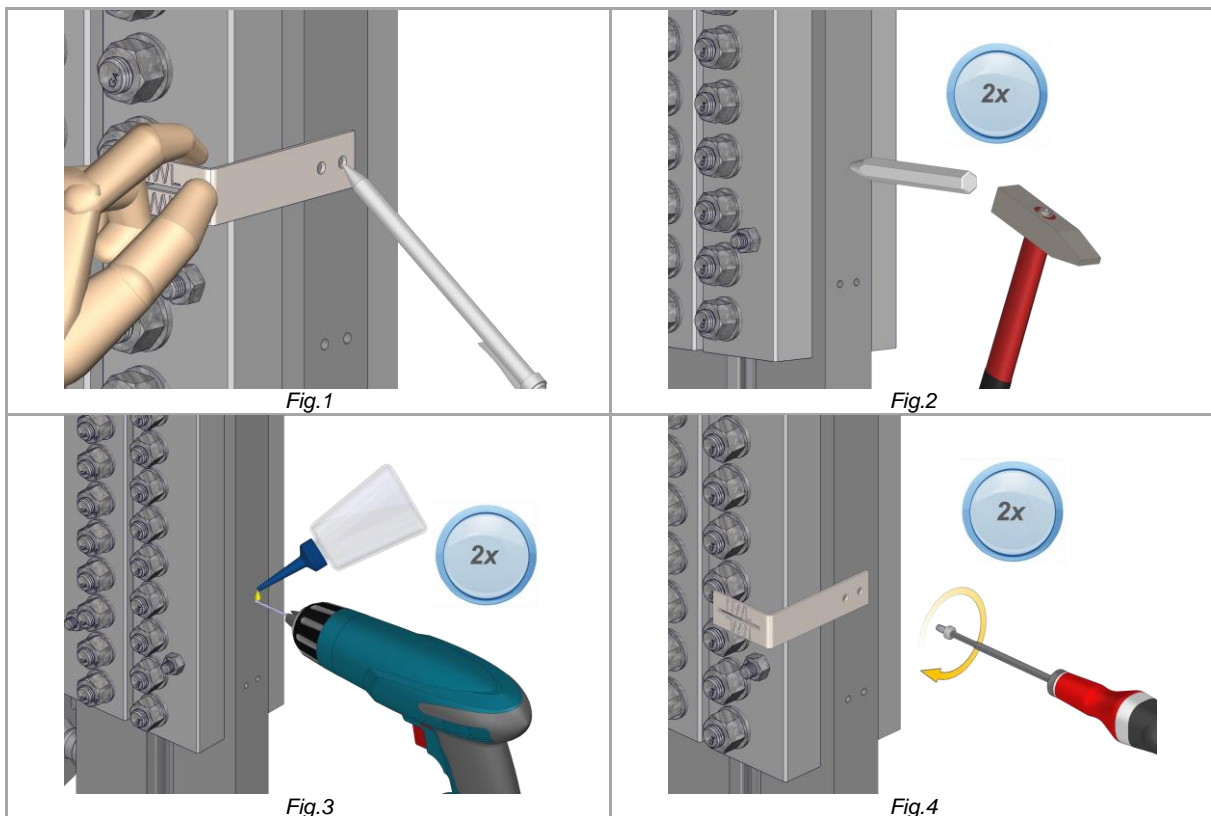
## 7.4 Fitting the water level mark

### Components

Description	Figure	Quantity
Water level mark		1
Thread-forming screw M4 x 12, stainless steel		2

### Tools

Description	Figure	Recommended size
Marker		0.6 mm linewidth
Grain		4mm lace width
Fitter's hammer		500g
HSS Twist Drills		Ø 3,6 mm
Hand Deburring		Ø 12.4 mm
Screwdriver		TX20

**Work steps**

**Figure 1**

- Stop the water level mark at the desired position and trace the holes with a marker.

***Mark the drill holes as centrally as possible on the display body.***

**Figure 2**

- Mark the markings with a light hammer blow.

**Figure 3**

- Drill the anchorages to a depth of 14mm with the HSS drill Ø3.6mm.
- Countersink the hole with a hand deburrer.

**Figure 4**

- Screw on the water level mark with self-tapping screws.

***Screw with moderate hand torque!***

## 7.5 Installing the lighting device

### TIP

Only install the lighting device after the device has been heated up once and then cooled down again.

### NOTICE

#### Property damage caused by incorrect installation, commissioning, maintenance and operation



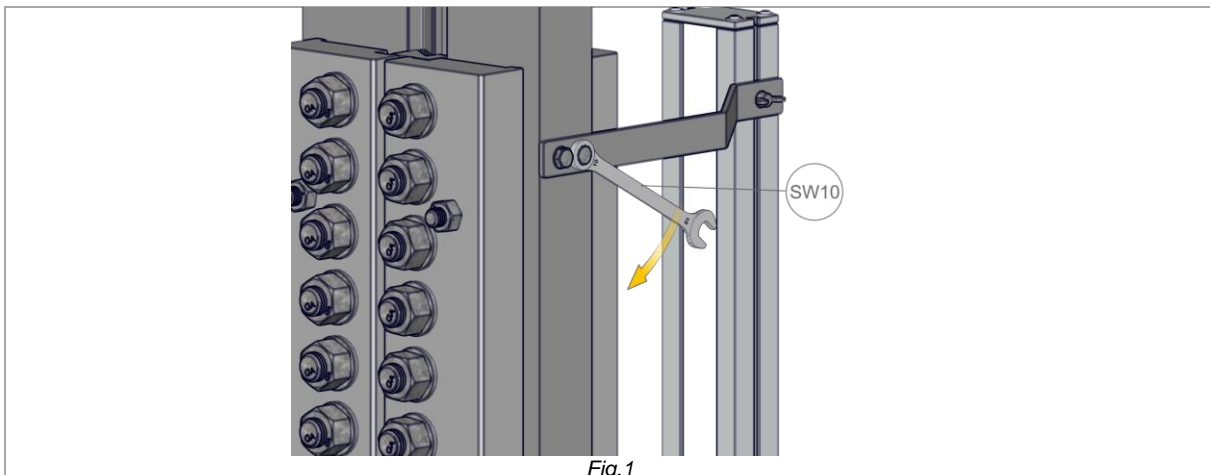
Only trained electricians may commission electrical components and carry out maintenance work on them.

**Igema GmbH can be commissioned for work on electronic components.**

### NOTICE

#### Property damage caused by irregular use

- Use the applicable documents to check whether the lighting device is intended for the planned use.



- Attach the lighting device to the gauge using the enclosed M5x8 hexagon head screws.

#### ***Tighten the screws with moderate manual torque.***

- Align the height of the light to the display body.
- Tighten the wing screws for connecting the holding bracket and light by hand.

## 8 Commissioning

### 8.1 Before commissioning

All level indicators are pressure tested before delivery. In individual cases, material settlement can occur due to transport, storage or assembly.

#### NOTICE

##### Leakage due to insufficient torques

- Check screw connections for appropriate torque and a tight fit.
- 24 hours after commissioning, check all screw connections again for the correct torque and possibly retighten.
- Check for leaks in the first few days after commissioning
- In the event of leaks, retighten the corresponding screw connection

When tightening the screws, the following tightening sequence must be ensured. Tighten the screw connection to the tightening torque  $Md_{max}$  according to the table.

perm. Pressure PS [bar]	Tightening torque $Md \rightarrow Md_{max}$ [Nm]				
	in steps				
	1	2	3		
$\leq 100$	35	50	<b>65</b>	-	-
$> 100$	45	60	75	90	<b>105</b>

Screw rows	
Uneven number	Even number
11   14 7   10 3   6 1   2 5   4 9   8 13   12	13   16 9   12 5   8 3   2 1   4 7   6 11   10 15   14

The cap nuts of the valves must be tightened so firmly that there is no leakage at the spindle and the handwheel/hand lever can still be turned.

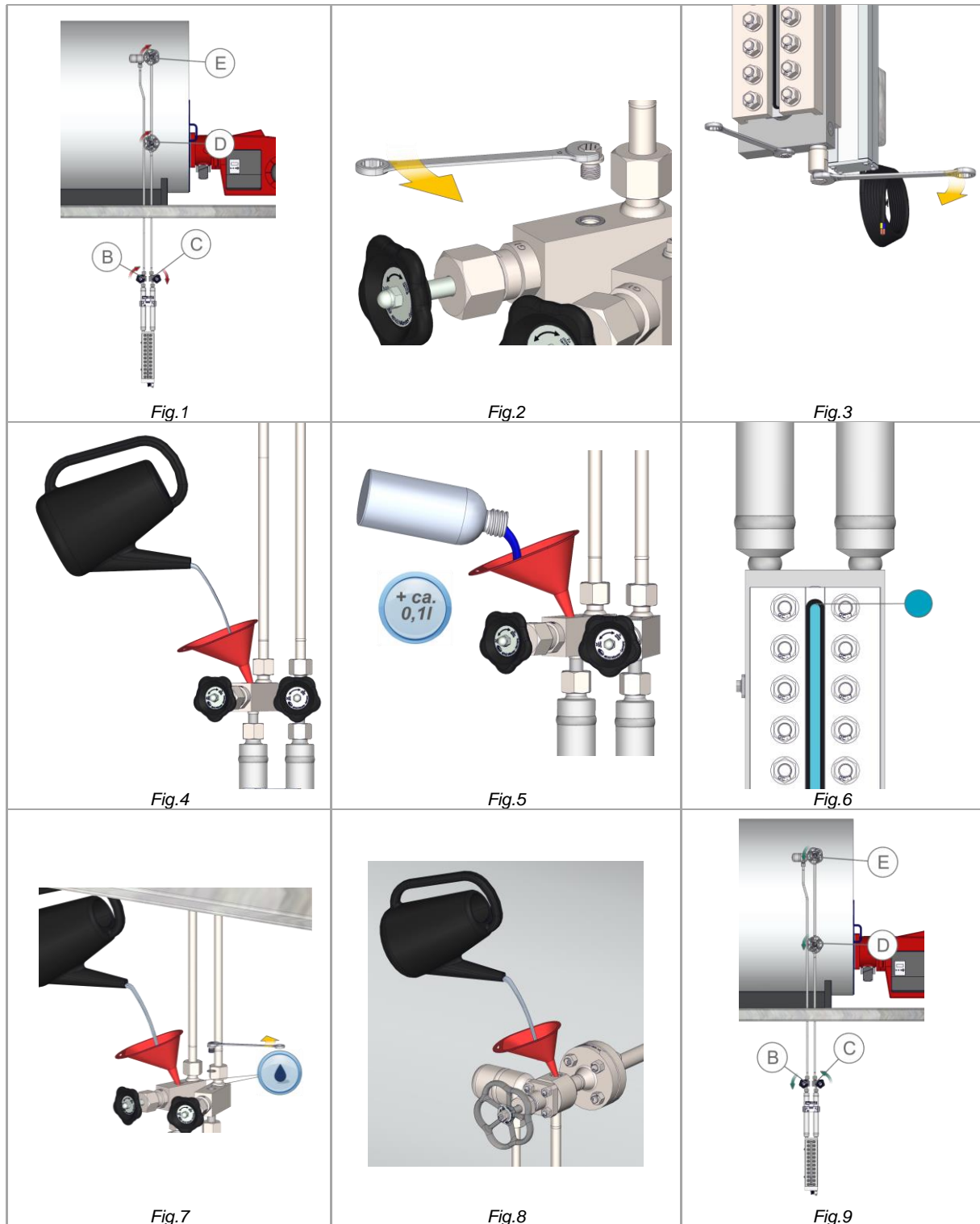
#### TIP

Leakages at the valves that occur during commissioning can be self-adjusting within a short period of time due to pressure and temperature.

8.2 Preparation of the gauge

**TIP**

Compliance with the sequence described ensures that air pockets are minimised.



**Figure 1:**

- Close all valves

**Figure 2:**

- Unscrew the bleed screws in all valves.

**Figure 3:**

- Ensure that the drain plug and the sealing plug are screwed in tightly.

**Figures 4 / 5 / 6:**

- Fill with fresh water through the plug opening on the gauge valve until the water level has reached the upper edge of the display opening.
- Fill the gauge fluid until the gauge fluid level has reached the upper edge of the display opening.
- Continue to fill with approx. 0.1 litre of gauge fluid.

**Figure 7:**

- Fill with fresh water until it overflows at the bleed screw on the gauge valves. Screw in plugs with seals tightly.

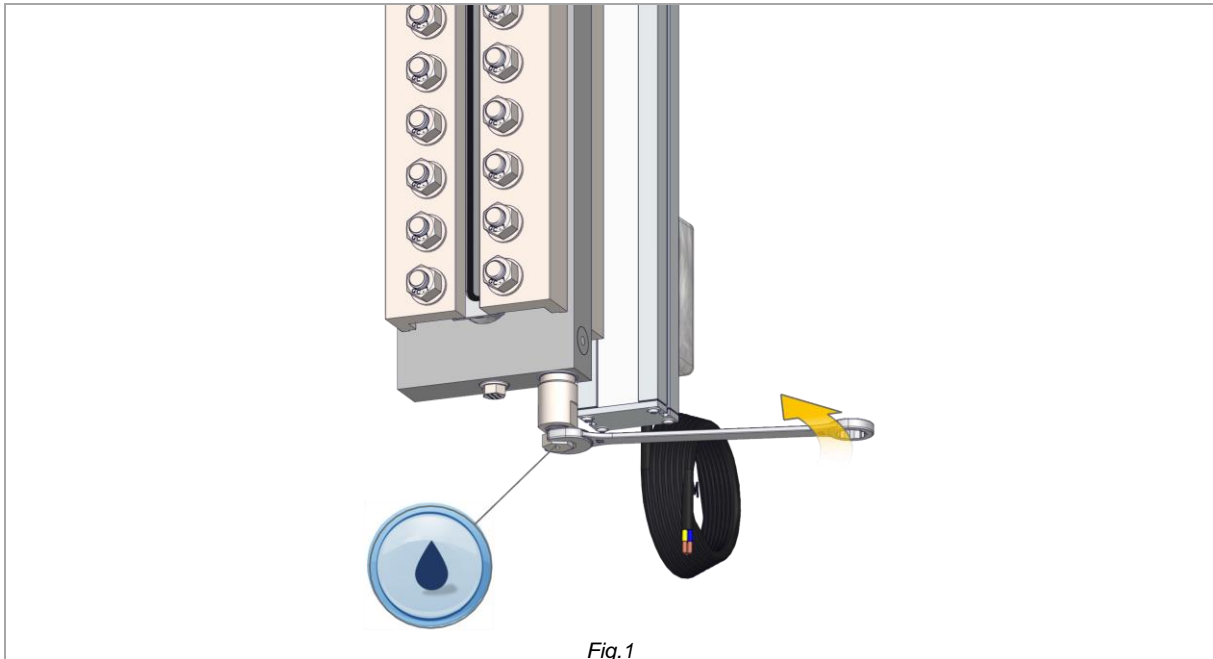
**Figure 8:**

- Fill with fresh water slowly until it overflows at the bleed screw of the main shut-off valve. Screw in the vent plug with seal.

**Figure 9:**

- A minimum operating pressure of 2 bar must be reached.
  - Open the upper shut-off valve, lower shut-off valve, left-hand gauge valve and right-hand gauge valve in the specified order.

### 8.3 Regulation of the gauge fluid level



- The gauge fluid level is adjusted during boiler operation at medium water level.

#### Figure 1:

- Briefly open the drain plug
- Repeat opening the drain plug until the level of the gauge fluid indicator matches the water level of the direct level indicator.



#### TIP

If the deviation is greater, the readjustment should be carried out in stages, with small interruptions.

If too much gauge fluid has been drained or too little has been added, the gauge must be reset. (Chap. 8.2)

## 9 Servicing

### CAUTION

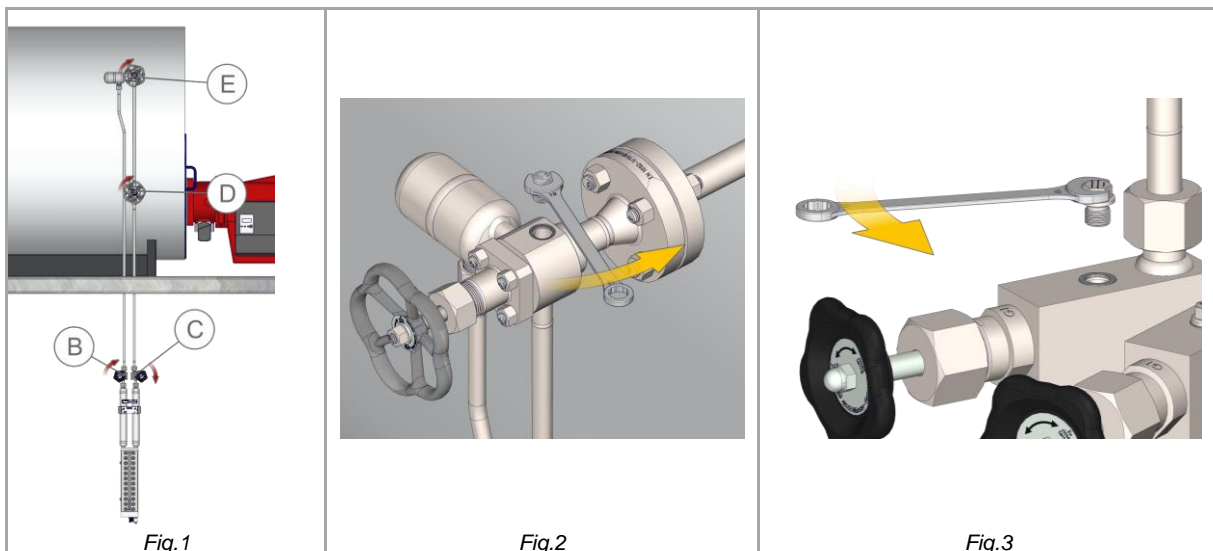
#### Cuts due to sharp-edged parts



During the maintenance of the device, sharp-edged parts may cause injuries.

- Always be aware of sharp-edged parts.
- Wear work gloves.

### 9.1 Release pressure



**Figure 1:**

- Close all valves

**Figure 2:**

- Carefully loosen the bleed screw on the main shut-off valve by one turn.

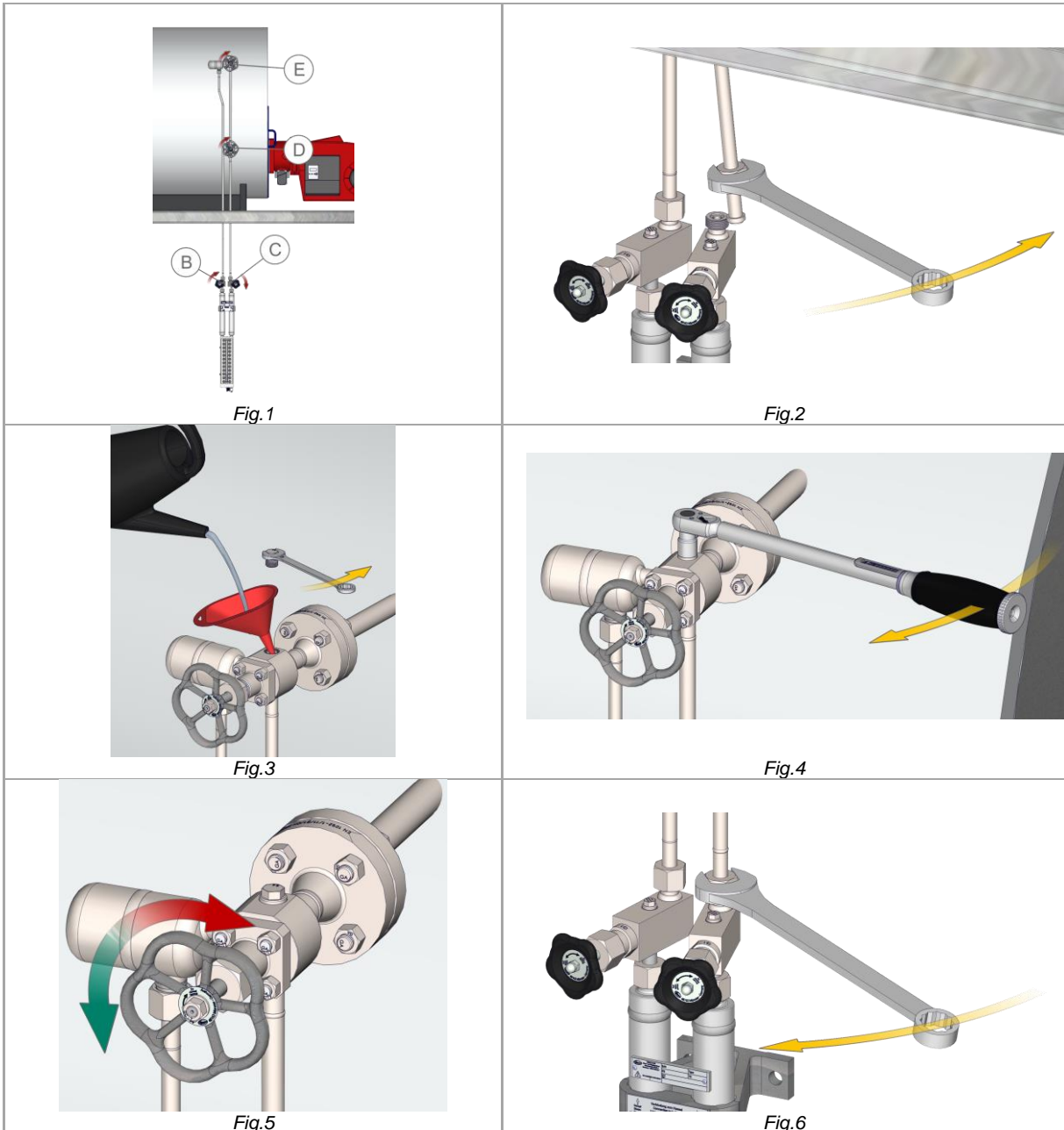
***The gauge is depressurised.***

- Unscrew the bleed screw completely.

**Figure 3:**

- Unscrew the bleed screw on the gauge valves.

9.2 Clean connecting lines



**Figure 1:**

- Close all valves.

**Figure 2:**

- Loosen the connecting lines on the indicator valves and carefully bend them slightly to the side.

**CAUTION****Risk of injury due to leaking medium**

Inflammable, irritating and health-endangering substances can escape from open lines and cause skin injuries and burns.

- Ensure that nobody is in the area of the open screw connections.

***There are two different ways to clean the connection lines.***

**Option A:****Figure 3:**

- Unscrew the vent plug in the main shut-off valve.
- Flush the connection lines with water via the vent opening.

**Option B:****Figure 4:**

- Tightly screw the vent plug to the main shut-off valve
- Set boiler to operating status

**Figure 5:**

- The boiler must have reached the operating state.
  - Open and close the main shut-off valves several times.

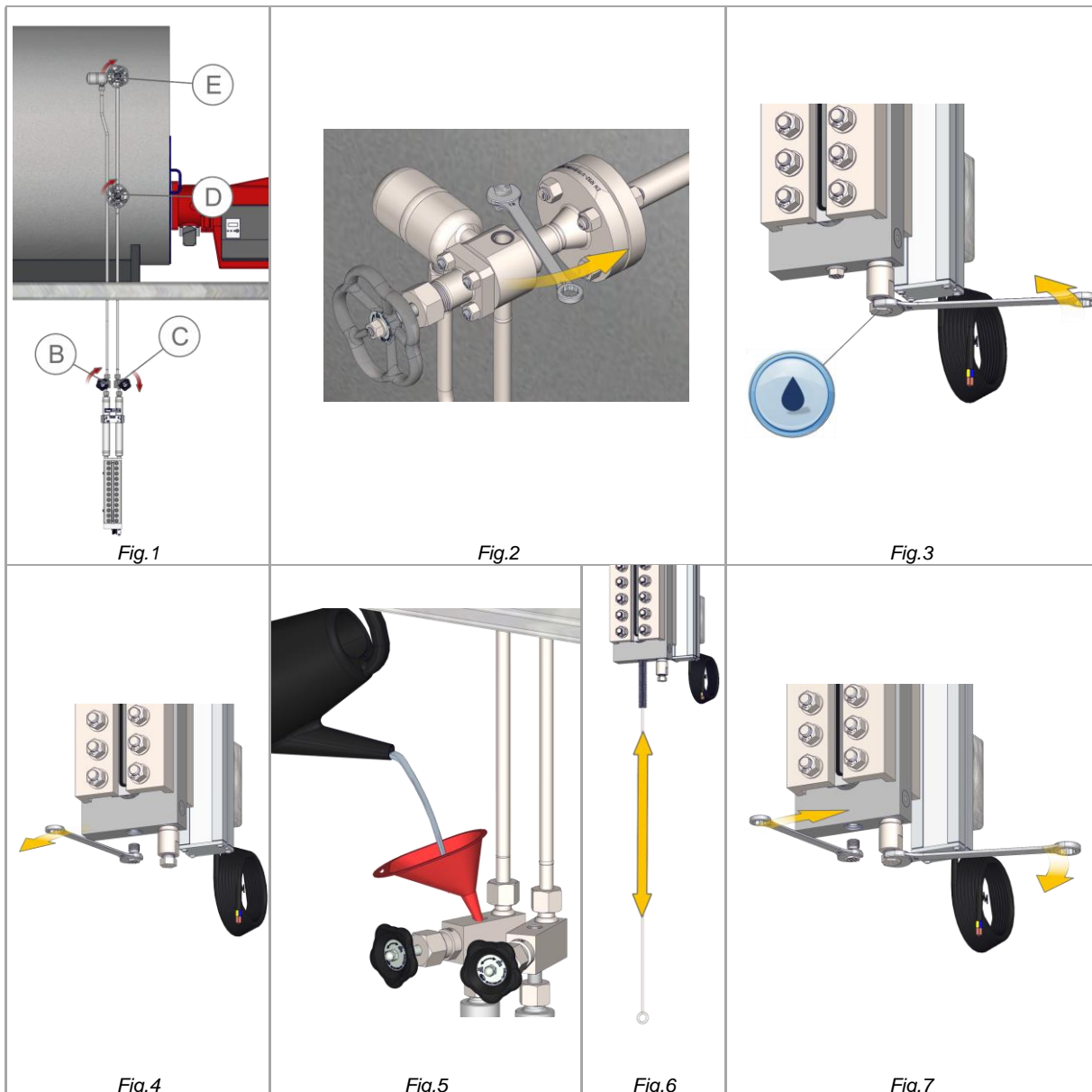
***The connecting pipes are flushed.***

***The cleaning of the connecting line has now been completed.***

**Figure 6:**

- Tightly screw the connection lines to the gauge valves.

### 9.3 Cleaning the gauge



**Figure 1:**

- Close the gauge valves.

**Figure 2:**

- Carefully loosen the bleed screw on the main shut-off valve

***The excess pressure in the gauge escapes.***

- Unscrew the bleed screw completely.

**Figure 3:**

- Loosen the drain plug for the gauge fluid on the gauge.

***The gauge fluid flows out of the gauge.***

**Figure 4:**

- Unscrew the drain plug.

**Figure 5:**

- Flush the indicator with water via the air vents of the gauge valves.

**Figure 6:**

- Insert the round brush (*article-no. 40-00775*) through the outlet opening of the gauge and clean the inside of the glasses.

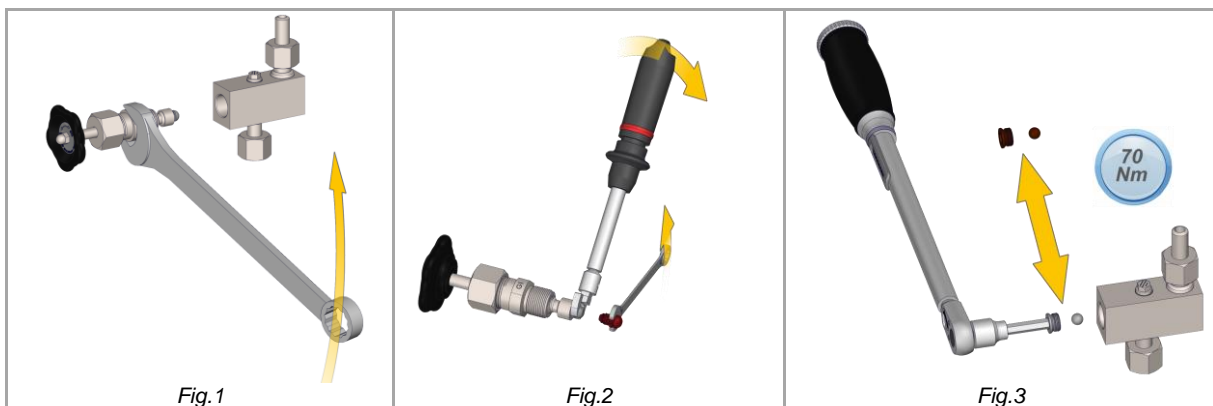
**Figure 7:**

- Screw in the drain and bleed screws.

***The cleaning of the gauge has now been completed. The gauge can be put back into operation after preparation (chap. 8).***

9.4 Gauge valve (AF410)

Replace valve seat, ball and disc set



- The gauge must be depressurised (*chap. 9.1*)

**Figure 1:**

- Unscrew the valve upper part with valve spindle.

**Figure 2:**

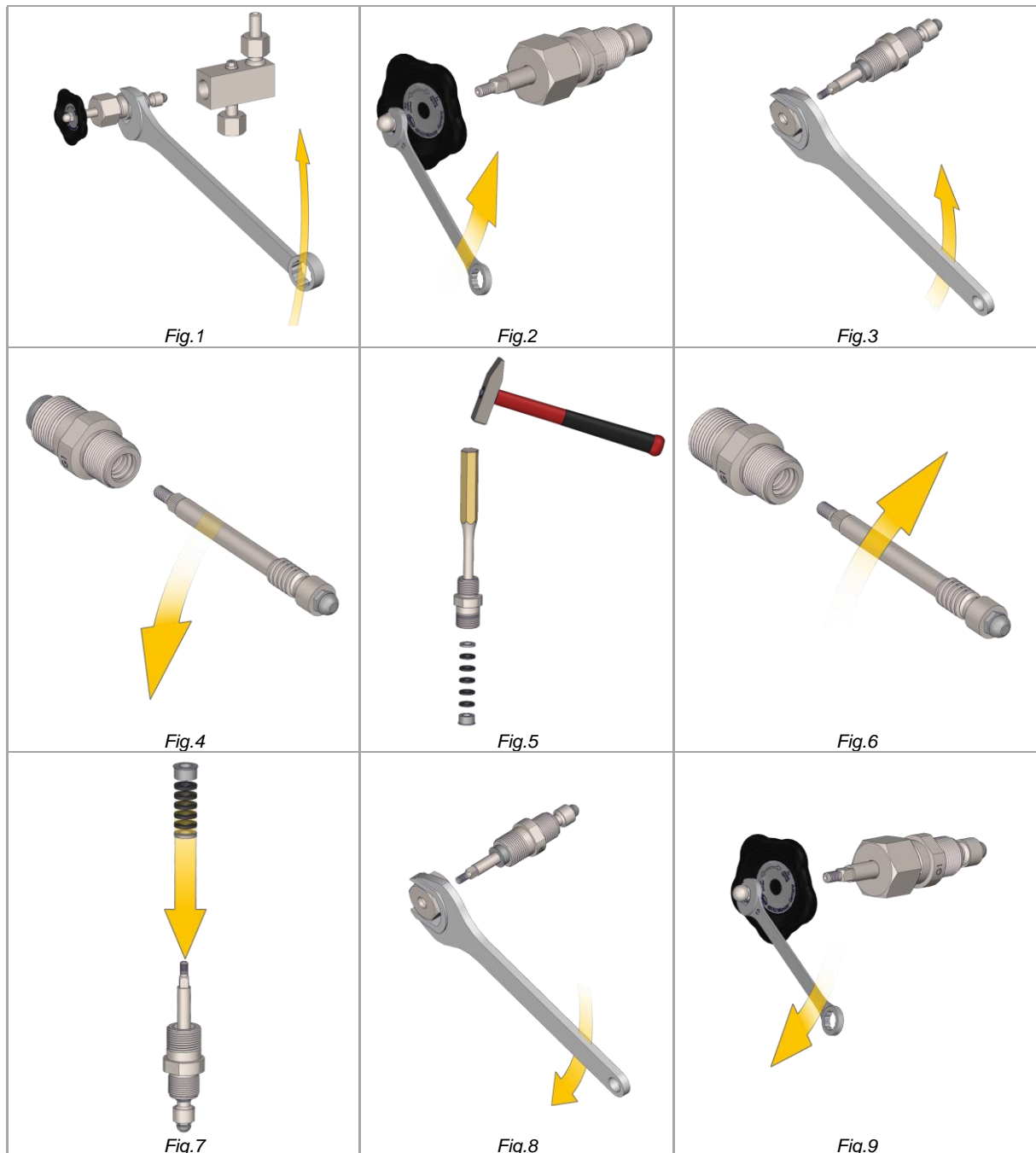
- Unscrew the disc set from the valve spindle and replace it. Screw in with a tightening torque of **Md=13Nm**.

**Figure 3:**

- Unscrew the valve seat.
- Replace valve seat and ball
- Screw in the valve seat with a tightening torque of **Md = 70 Nm**.

***The reassembly can now be carried out.***

## Changing the stuffing box packing



- The gauge must be depressurised (*chap. 9.1*)

### Figure 1:

- Unscrew the valve upper part with valve spindle.

### Figure 2:

- Loosen and remove the handwheel

### Figure 3:

- Loosen and remove the cap nuts.

**Figure 4:**

- Unscrew the valve spindle from the upper part of the valve.

**Figure 5:**

- Knock the packing set out of the upper part of the valve from behind using a punch (Ø14).

**Figure 6:**

- Remove deposits on the valve stem without damaging the material.
- Check the sealing surface for contamination and damage.
- Screw the greased valve spindle into the upper part of the valve.

**Figure 7:**

- Guide base ring, packing rings and stuffing box over the valve spindle.
- Insert the packing set centred in the upper valve part.

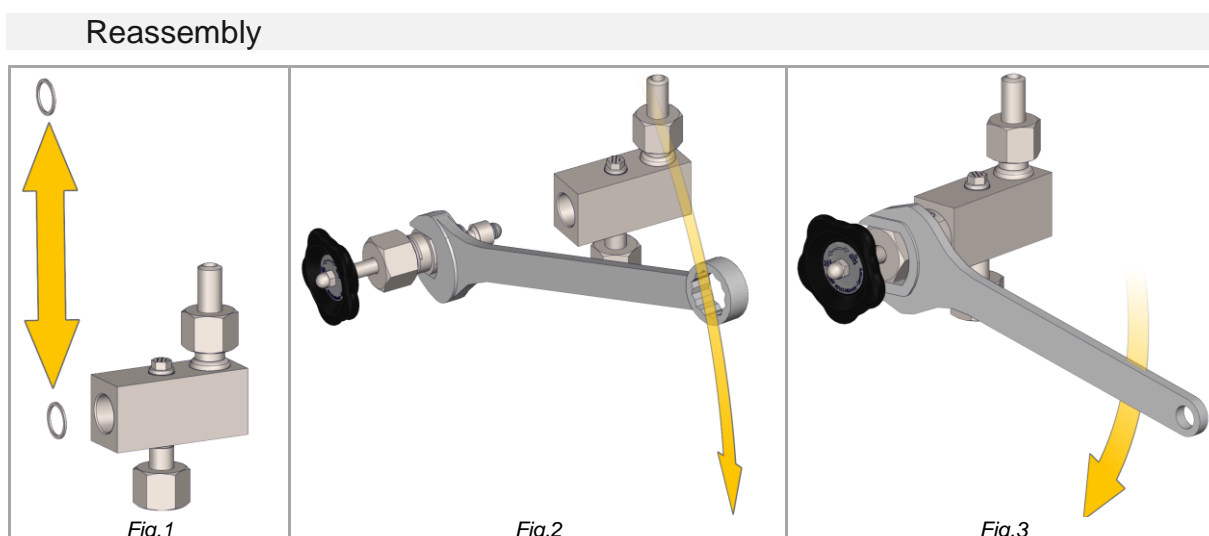
**Figure 8:**

- Unscrew the cap nut on the upper part of the valve.

**Figure 9:**

- Place the hand lever/wheel on the valve spindle.
- Tighten the hexagon nut.

***The reassembly can now be carried out.***


**Figure 1:**

- Replace old sealing rings with new ones.

**Figure 2:**

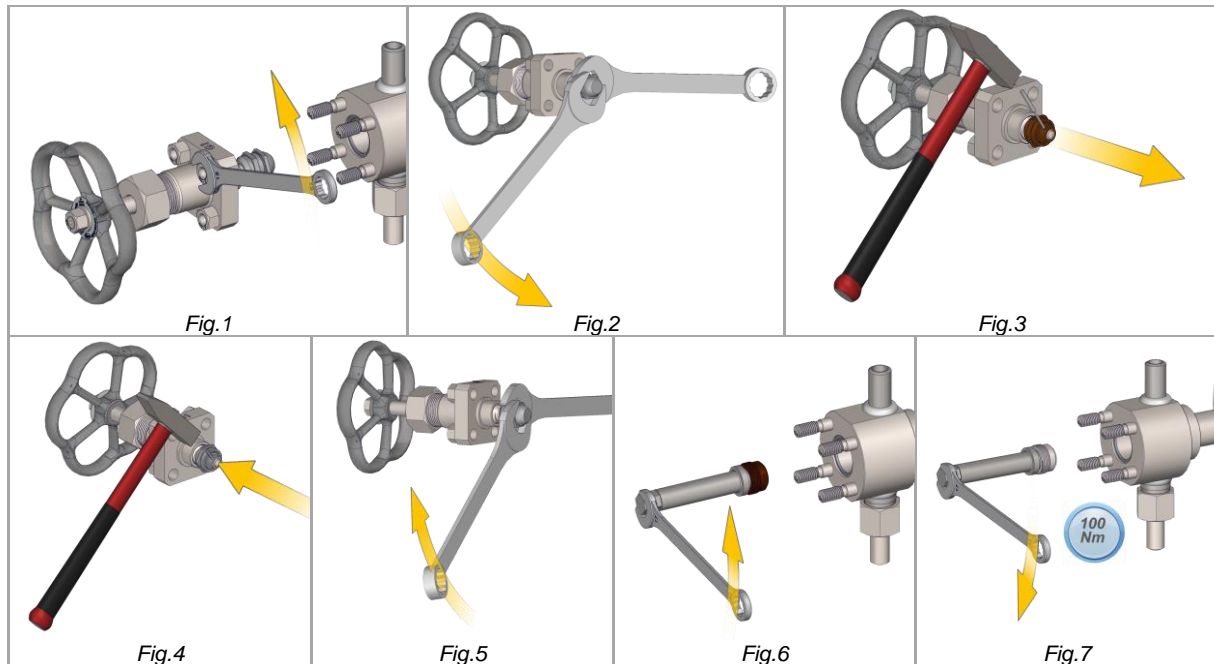
- The previously assembled assembly must be professionally pre-assembled.
  - Screw the assembly with the valve upper part into the valve body.
  - Tighten with a torque of 280Nm.

**Figure 3:**

- Tighten the cap nut so far that the hand lever/ handwheel can still be rotated.

## 9.5 Main shut-off valves (HA300, HA310 / HA320)

### Replace valve seat and disc set



- The gauge must be depressurised (*chap. 9.1*)

#### Figure 1:

- Loosen the nuts on the valve upper part
- Remove the valve upper part with valve spindle.

#### Figure 2:

- Unscrew screwed cone halves from each other

#### Figure 3:

- Knock the pin out of the clamping nut.
- Remove the clamping nut and the other half of the taper from the spindle.

#### Figure 4:

- Slide the new taper half and clamping nut onto the spindle.
- Drive the pin through the clamping nut and spindle.

#### Figure 5:

- Screw the second cone half to the cone half that has already been pushed on.

#### Figure 6:

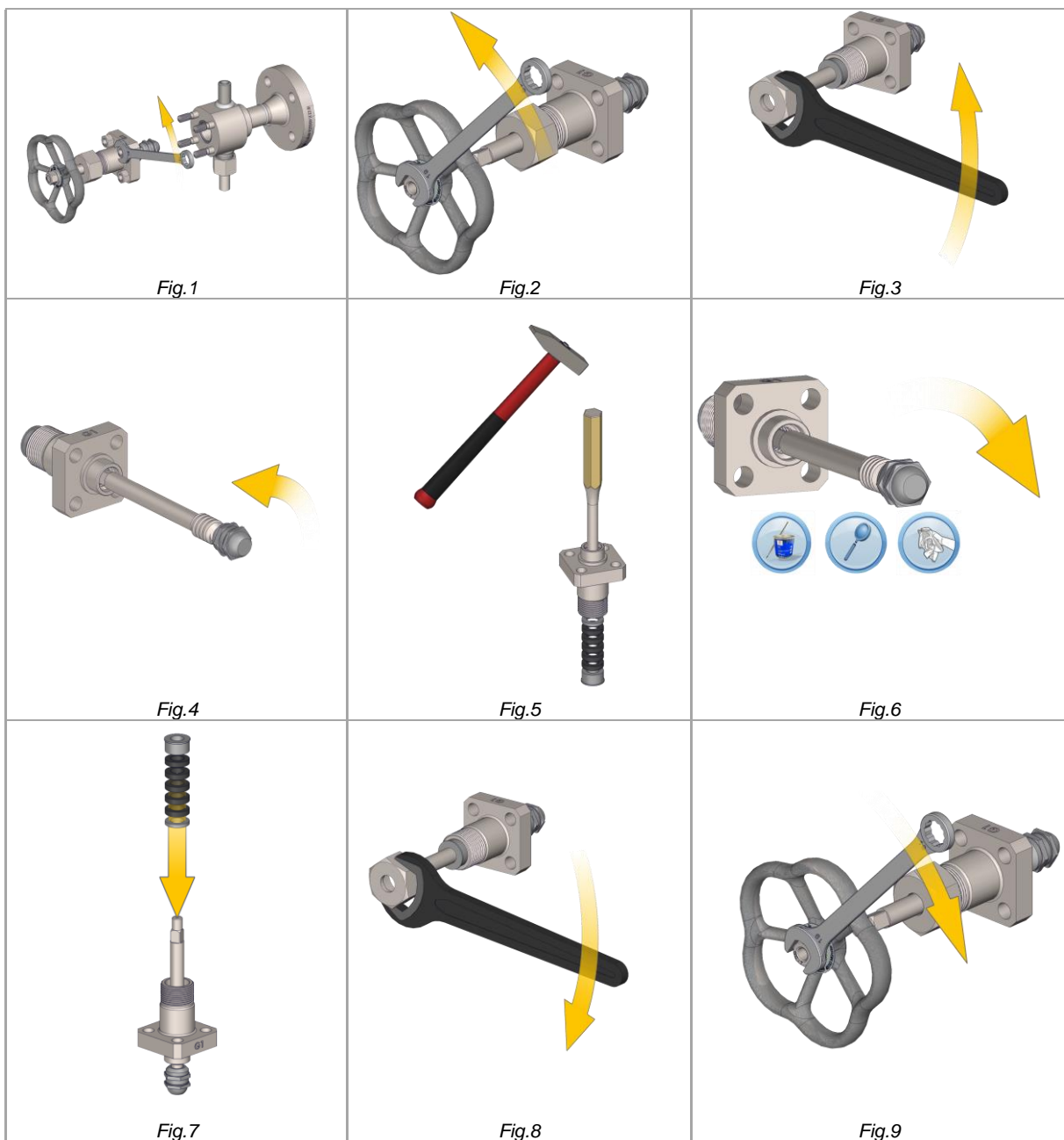
- Unscrew the seat with a special seat spanner.

#### Figure 7:

- Screw the new seat into the valve body using a special seat spanner with a tightening torque of **Md = 100 Nm**.

***The reassembly can now be carried out.***

## Changing the stuffing box packing



- The gauge must be depressurised (*chap. 9.1*)

**Figure 1:**

- Loosen the hexagon nuts on the valve upper part.
- Remove the valve upper part.

**Figure 2:**

- Loosen the cap nut on the handwheel and remove both together with the washer and reference disc

**Figure 3:**

- Loosen and remove the cap nuts.

**Figure 4:**

- Unscrew the valve spindle from the upper part of the valve.

**Figure 5:**

- Knock the packing set out of the upper part of the valve from behind using a punch ( $\varnothing 14$ ).

**Figure 6:**

- Remove deposits on the valve stem without damaging the material.
- Check the sealing surface for contamination and damage.
- Screw the greased valve spindle into the upper part of the valve.

**Figure 7:**

- Guide base ring, packing rings and stuffing box over the valve spindle.
- Insert the packing set centred in the upper valve part.

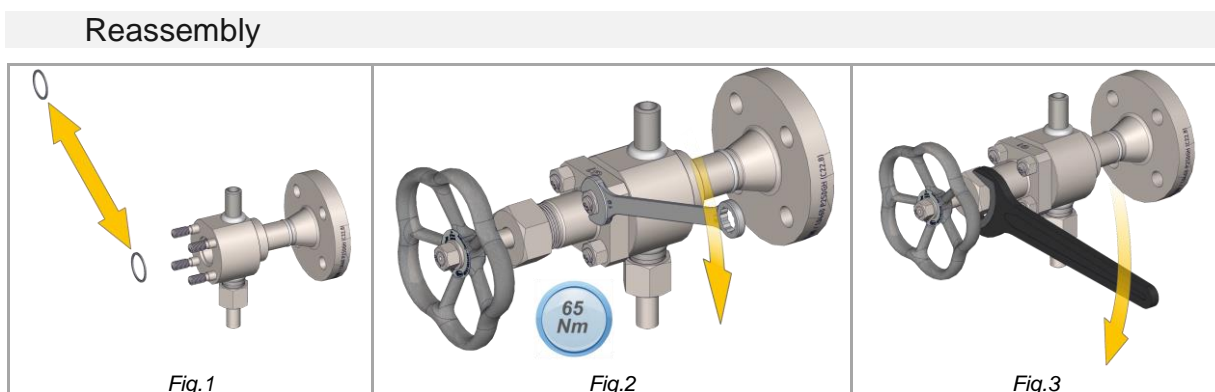
**Figure 8:**

- Unscrew the cap nut on the upper part of the valve.

**Figure 9:**

- Place the hand lever/wheel on the valve spindle.
- Tighten the hexagon nut.

***The reassembly can now be carried out.***

**Figure 1:**

- Replace old sealing rings with new ones.

**Figure 2:**

- The previously assembled assemblies must be professionally pre-assembled.
  - Insert the valve upper part into the valve body.
  - Tighten the nuts diagonally one after the other with a torque of **Md=65 Nm**.

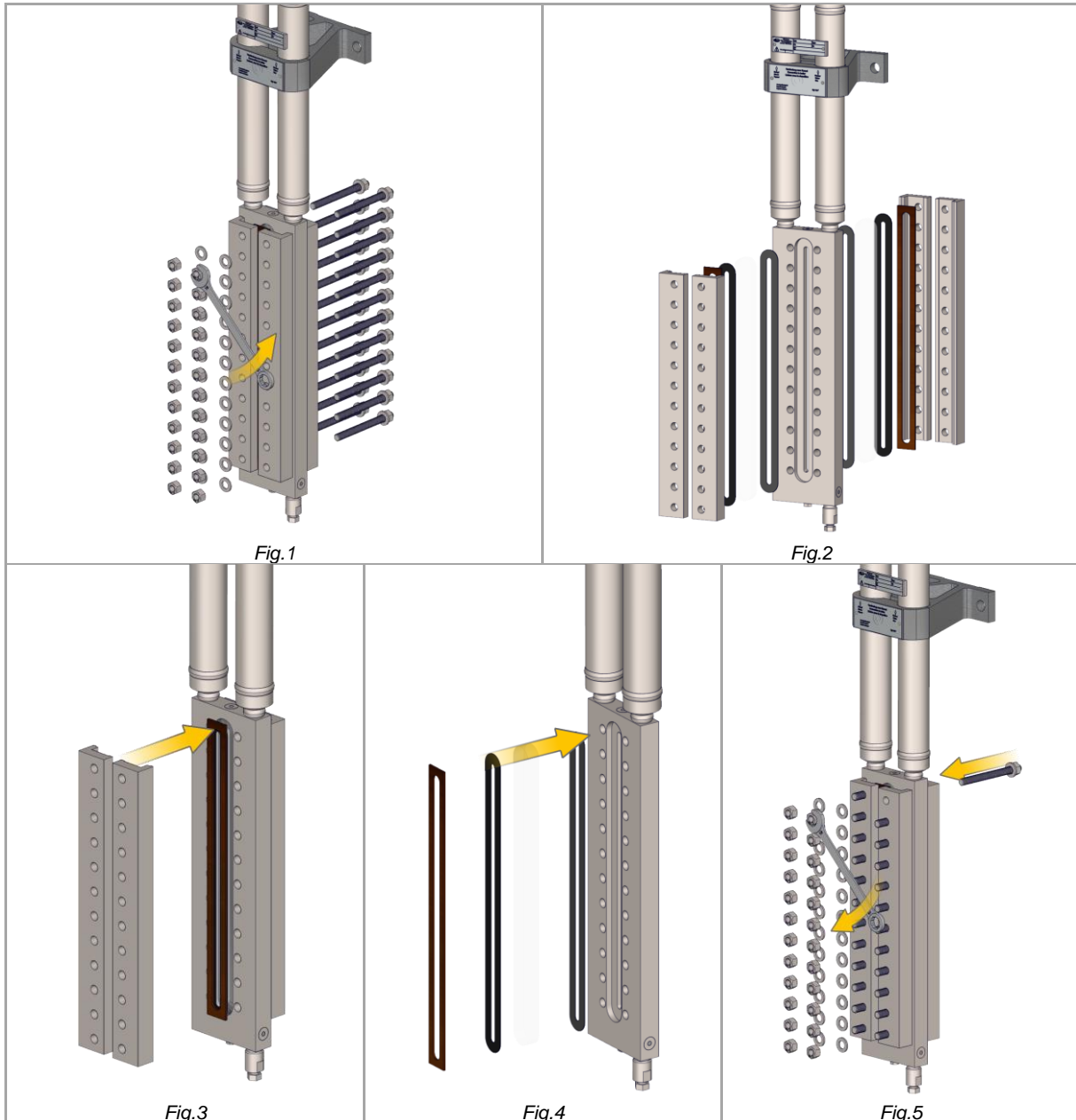
**Figure 3:**

- Tighten the cap nut so far that the hand lever/ handwheel can still be rotated.

## 9.6 Changing the glasses


**TIP**

The following work is recommended after disassembling the lighting device.



- The gauge must be depressurised and all fluids drained. (Chap. 9.1)

**Figure 1:**

- Loosen the nuts on one side of the bolts and remove together with the washers
- Pull out the bolt together with the remaining nut and washer.

**Figure 2:**

- Remove the cover rails on both sides.
- Remove seals and glasses from both sides of the gauge.
- Remove any sealing residue from the sealing surface of the gauge body and the contact surface of the cover rail, clean and check for damage.

**Figure 3:**

- Place the new seal, glass, and further seal on the display body in the order stated and hold in place.

**Figure 4:**

- Carefully attach the cover rail to the display body.

***Carry out steps 3 and 4 on both sides of the gauge body.***

**Figure 5:**

- Push the previously removed bolts with nuts and washers through the holes in both cover rails.
- Slide on the washers and screw on the nuts.
- Tighten the nuts to  $Md_{max}$  in the prescribed sequence and in the prescribed steps.  
(chap. 8.1)

***After the glass has been replaced, the gauge must be prepared again before it is put back into operation. (chap. 8)***

## 10 Operational monitoring and damage

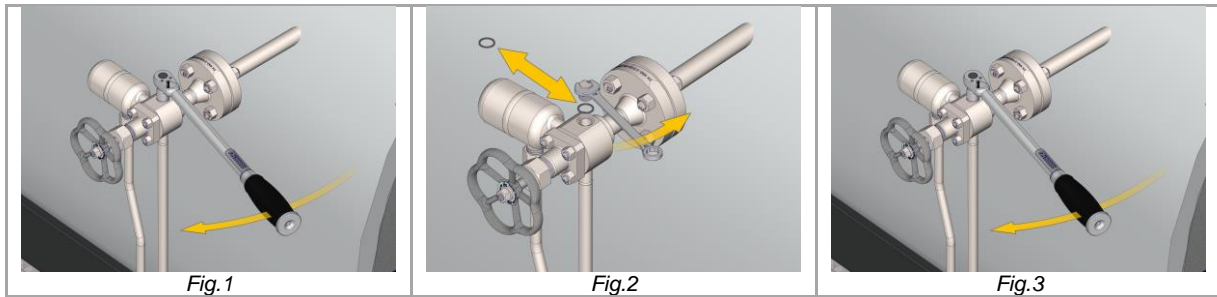
### NOTICE

#### Prescribed regular adjustment of the fill level

- The level of the remote level indicator must be compared with the level of the direct level indicator at regular intervals. An uneven gauge of the fill level can have the causes described.

Fault	Possible cause	Remediation
Unequal level indication of direct and remote level gauge	Gauge valve closed	Open gauge valves (chap. 4.1)
	Main shut-off valves closed	Close the gauge valves. Open the upper shut-off valve, lower shut-off valve, left-hand gauge valve and right-hand gauge valve (chap. 4.1)
	Condenser not hot enough / no condensate formation	Carefully loosen the bleed plug on the main shut-off valve by one turn, bleed the condenser, close the bleed plug again
	Sequence for opening the valves not observed	Drain the gauge fluid (chap. 8.3)
	Fill level too high	Adjust the gauge fluid level (chap. 8.3)
Leakage at drain or bleed screw	Wear and tear	Tighten the bleed screw / replace the sealing ring (chap. 10.2)
Leakage at cap nut	Material settings	Tighten the cap nut (chap. 10.2)
Leakage at valve spindle/stuffing box packing	Material settings	Tighten the cap nut (chap. 10.3)
Leakage between the seal and the display body	Wear/ material settling	Tighten the screws (chap. 10.4)

## 10.1 Leakage at vent or drain plugs



**Figure 1:**

- Tighten the torque of the screw plug

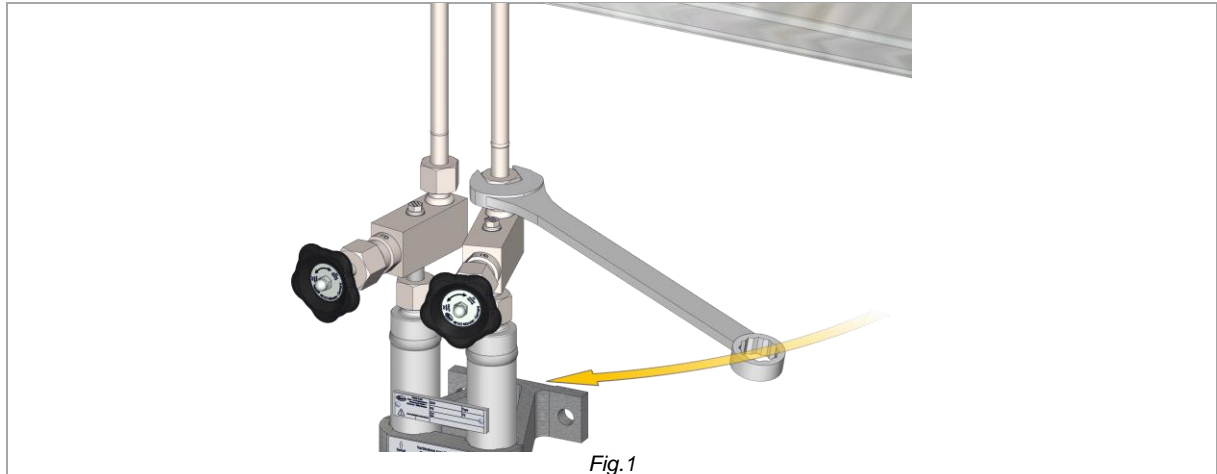
**Figure 2:**

- If there is no improvement:
  - Unscrew the screw plug
  - Replace the gasket.
  - Check the sealing surface for contamination and damage.

**Figure 3:**

- Tighten the screw plug to the specified torque.

## 10.2 Leakage at cap nuts



**Figure 1:**

- Tighten the corresponding cap nut.

### 10.3 Leakage at spindle/gland packing

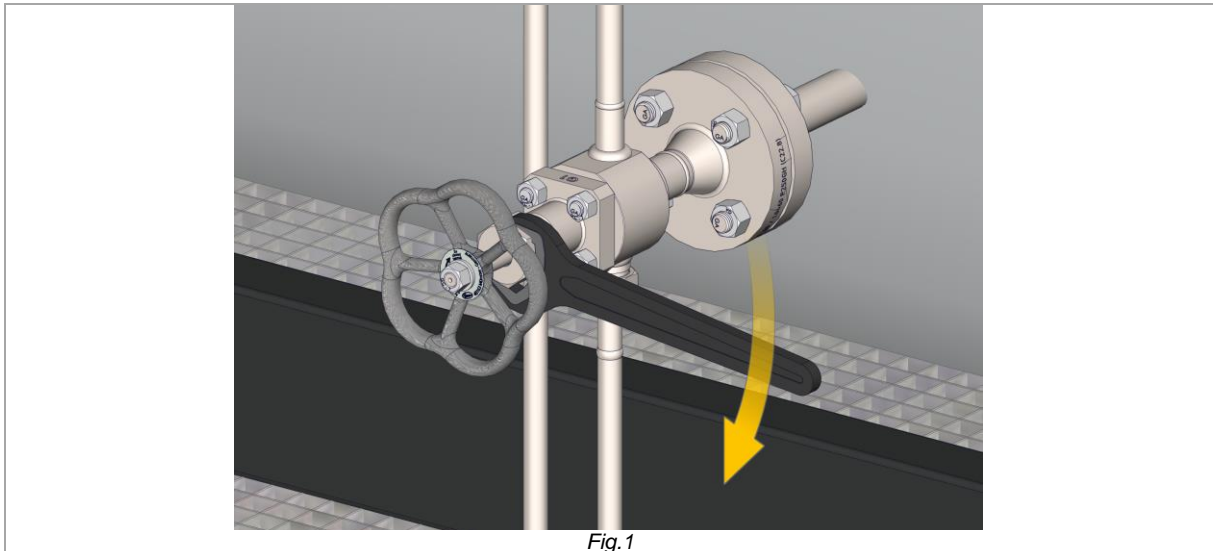


Fig.1

**Figure 1:**

- Tighten the cap nut on the appropriate spindle



**TIP**

The service life of the valves is increased by regularly checking for tightness.



**NOTICE**

**Error does not rectify after correction**

If the error does not rectify after the correction, the gland packing must be replaced.

- Changing the stuffing box packing (*chap. 9.4/9.5*)

## 10.4 Leakage between the seal and the display body



**Figure 1:**

- Tighten the hexagon nuts to the maximum tightening torque in the prescribed sequence. (*Chap. 8.1*)

### NOTICE

#### **Error does not rectify after correction**

If the error does not rectify after the correction, the glass must be replaced.

- Carrying out a glass change (*chap. 9.6*).

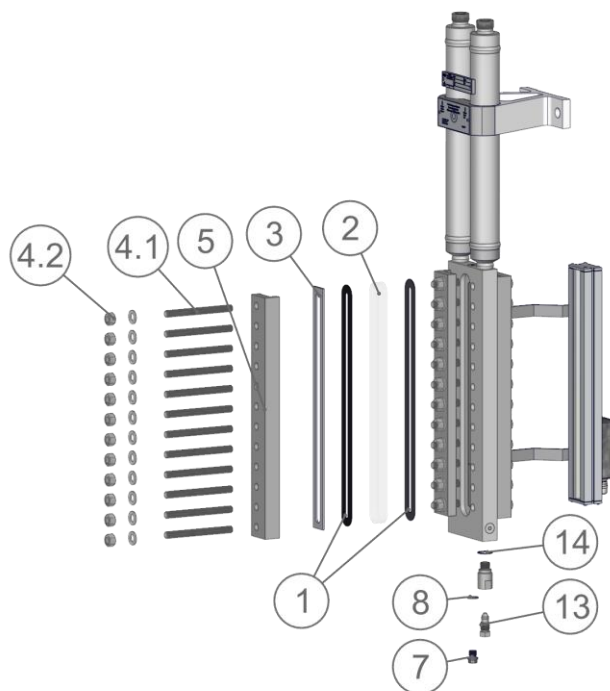
## 11 Spare parts and accessories

### 11.1 Gauge fluid

Pos.	Description	Density ( $\text{kg}/\text{dm}^3$ )	Article-No.
9	Gauge fluid	1.68	40-04443
		1.78	40-04444
		1.93	40-04445

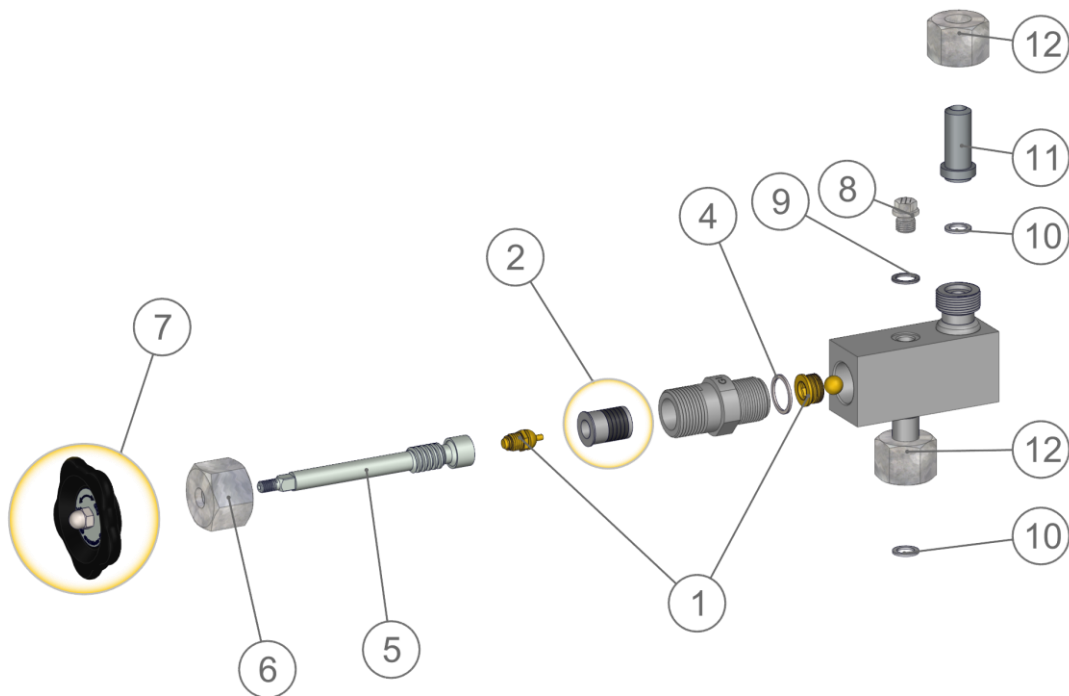
11.2 Display body

	Pos.	Description	Size	Article-No.		Quantity
				≤100 bar / ≤1450 psig	>100 bar / >1450 psig	
S=310mm / 12 1/5"	1	Seal	-	40-00247		4
	2	Glass	-	40-00007	40-00026	2
	3	Pressure plate	-	40-00429		2
	4.1	Threaded bolt	M12 x 130 / M14 x 135	40-11784	40-00369	20
	4.2	Hexagon nut	M12 / M14	40-10550	40-00716	40
	5	Cover rail	-	25-06154	25-16660	4
S=390mm / 15 1/3"	1	Seal	-	40-00248		4
	2	Glass	-	40-00010	40-00028	2
	3	Pressure plate	-	40-00420		2
	4.1	Threaded bolt	M12 x 130 / M14 x 135	40-11784	40-00369	24
	4.2	Hexagon nut	M12 / M14	40-10550	40-00716	48
	5	Cover rail	-	25-06372	25-01296	4
For both sight lengths	7	Screw plug	G 1/4"	40-10493		1
	8	Sealing ring	13.5 x 19 x 1.5mm	40-00127		
	13	Drain plug	M16 x 1,5mm	15-04135		1
	14	Sealing ring	17.5 x 21 x 1.5 mm	40-00123		



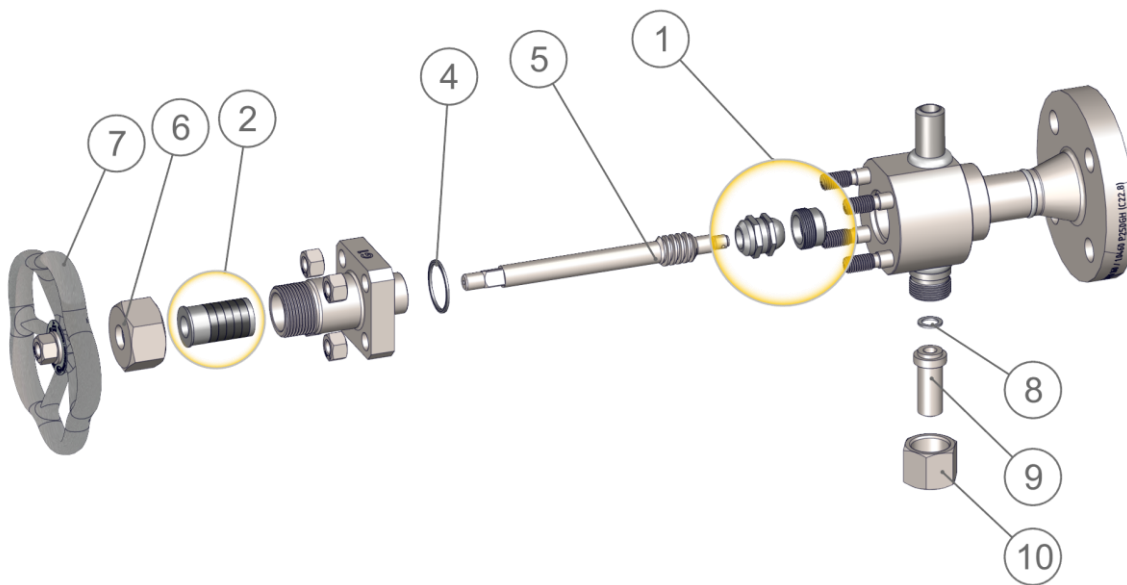
## 11.3 Gauge valves (AF410)

Pos.	Description	Size	Article-No.	Quantity
1	Cone set, ball and valve seat	-	15-00115	1
2	Stuffing box	-	15-00113	1
4	Sealing ring	Ø22 x Ø27 x 1.5mm	40-00129	1
5	Spindle	Tr18 x 4mm	25-00557	1
6	Cap nut	G 1"	25-00657	1
7	Complete handwheel	Ø90mm	15-00323	1
8	Bleed screw	G 1/4"	40-10493	1
9	Sealing ring	Ø13.5 x Ø19 x 1.5mm	40-00127	1
10	Sealing ring	Ø12 x Ø18 x 1.5mm	40-01365	2
11	Weld-on nipple	-	25-00744	1
12	Cap nut	G 7/8"	25-02438	2



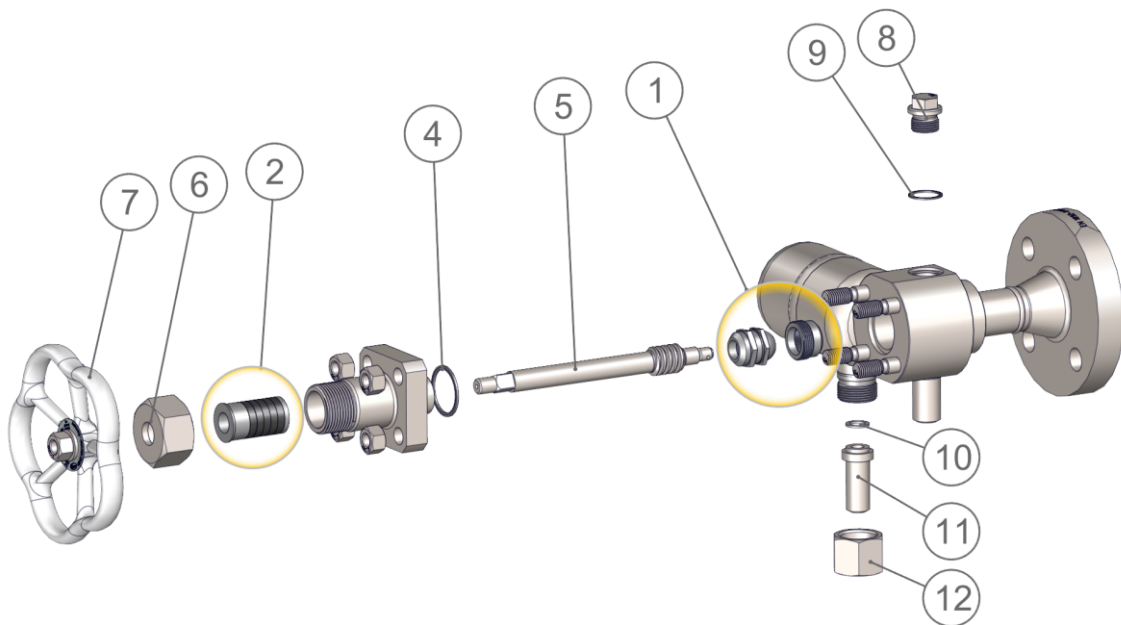
11.4 Shut-off valve (HA300)

Pos.	Description	Size	Article-No.	Quantity
1	Cone set and seat	-	15-00297	1
2	Packing set	-	15-00112	1
4	Sealing ring	Ø39 x Ø33 x 2mm	40-00120	1
5	Spindle	Tr22 x 5mm	15-02690	1
6	Cap nut	G 1 1/8"	25-00662	1
7	Handwheel	Ø 150mm	15-00419	1
8	Sealing ring	Ø 17.8 x Ø 12 x 1.5mm	40-00113	1
9	Weld-on nipple	-	25-00744	1
10	Cap nut	G 7/8"	25-02438	1



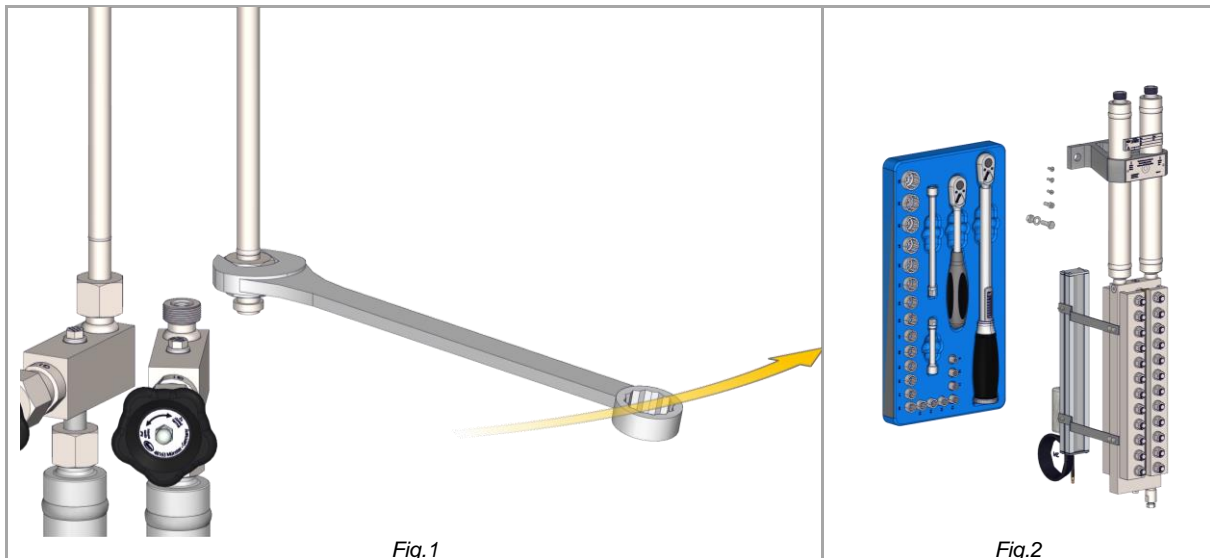
## 11.5 Shut-off valve (HA310 / HA320)

Pos.	Description	Size	Article-No.	Quantity
1	Cone set and seat	-	15-00297	1
2	Packing set	-	15-00112	1
4	Sealing ring	Ø39 x Ø33 x 2mm	40-00120	1
5	Spindle	Tr22 x 5mm	15-02690	1
6	Cap nut	G 1 1/8"	25-00662	1
7	Handwheel	Ø 150mm	15-00419	1
8	Bleed screw	G 1/2"	25-15442	1
9	Sealing ring	Ø26 x Ø21 x 1.5mm	40-00099	1
10	Sealing ring	Ø 17.8 x Ø 12 x 1.5mm	40-00113	1
11	Weld-on nipple	-	25-00744	1
12	Cap nut	G 7/8"	25-02438	1



## 12 Decommissioning and disposal

### 12.1 Dismantle the gauge



**Figure 1:**

- Loosen screw connections on pipes.
- Remove the pipes together with the cap nuts.

**Figure 2:**

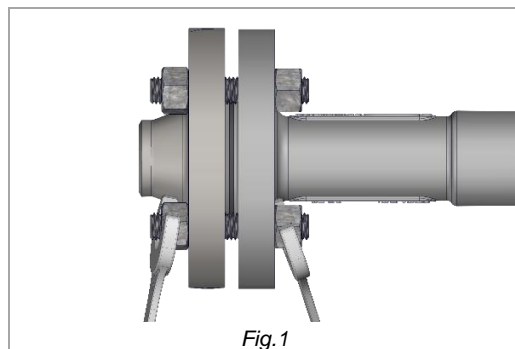
- Loosen the support clamp and remove the gauge.

***Dismantle the valves from the boiler.***

#### Flange connections

***During the following work, the individual components hang freely and must be secured against falling.***

- Loosen nuts on flange connections.
- Removing bolts from flanges
- Secure the seal between the flanges against falling off



#### Welded connections

Valves and gauges that are firmly connected to each other (e.g. welded connections) must be separated from each other at the connection points. For this purpose, suitable tools must be selected according to the application and environment.

## 12.2 Disposal

**ENVIRONMENT****Danger to the environment due to residues**

Residues can pose a danger to the environment.

- For returns, observe the applicable safety and environmental laws according to GGVSEB [The Dangerous Goods Ordinance on Roads, Railways and Inland Waterways].
- Indicate possible dangers and take precautionary measures.
- Label possible residues and enclose the safety data sheet.
- Register hazardous substance with the logistics service provider.

**Danger to the environment from waste materials**

Incorrectly disposed waste materials cause damage to the environment.

- Separating waste materials.
- Comply with local and legal regulations for waste disposal.

**CAUTION****Health hazard due to dangerous residues**

Residues of hazardous substances pose a health hazard.

- Indicate possible dangers and take precautionary measures.



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If the device supplied indicates transport damage or gives cause for complaint in spite of our final quality check, please contact our SERVICE department on telephone +49 2501 92424-0 immediately.



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**Igema GmbH**

Antwerpener Str. 1  
48163 Muenster  
Germany

[www.igema.com](http://www.igema.com)

Phone: +49 2501 924 24 0  
Fax: +49 2501 924 24 99  
[info@igema.com](mailto:info@igema.com)

