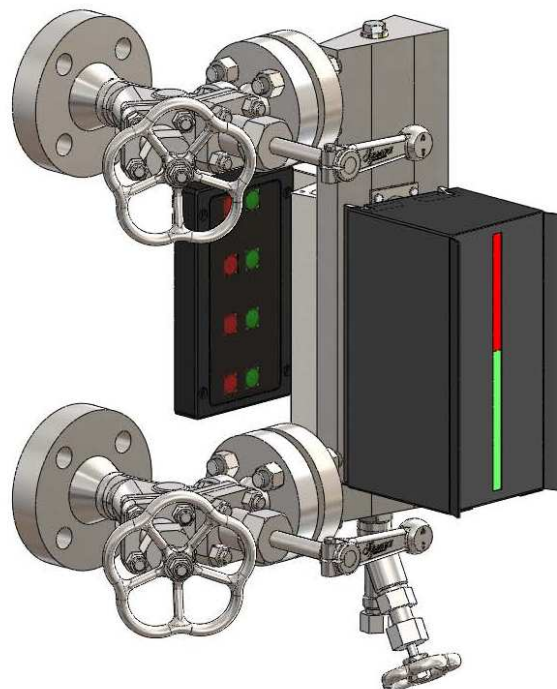


**IGEMA GmbH**  
*Measuring and control systems*

## Mounting and operating instructions

### Bicolour level gauge

- Type Green – Red



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# Safety instructions



## General health and safety instructions

### 1. Avoidance of danger for persons and property

- Only use unit for intended purpose.
- No additional mountings and modifications on the unit without our approval.
- Adhere to the standards for prevention of accidents and to the plant specific safety regulations.
- Read and observe installation and operating instructions.

### 2. Application limits

Only use this unit according to these operating instructions and to the parameters agreed upon in the delivery contract (see identification plate) including the agreed operating conditions.

### 3. Avoidance of danger and damages

- Distribute these mounting and operating instructions to appropriate department "arrival of goods, works transport, mounting, commissioning and maintenance".
- When passing the unit to a third party, these mounting and operating instructions must be enclosed in the national language of this third party.
- Only skilled and qualified personnel with special work order may work on the unit, which must be free of pipeline stress!
- Carefully read, observe and preserve these mounting and operating instructions.
- **Observe and adhere to the precautions marked in bold characters in the sections of these mounting and operating instructions!**
- Avoid shocks and impacts during transport, which could damage the unit.
- In case of intermediate storage take care for a dry and appropriate place where the unit cannot be damaged.

### 4. Marking

In these mounting and operating instructions, the safety instructions are specially marked with the following symbols:



Danger

means danger to life and/or serious property damage in case of non-observance. Never ignore!



Attention

means that you must pay special attention to the technical relationships.

### Unit-specific safety instructions

- ⇒ The fitting is under pressure during operation!  
If flange connections, screw plugs or stuffing boxes are unfixed, hot water and steam will escape.
- ⇒ Carry out assembly and maintenance works only if plant is completely pressureless!
- ⇒ The fitting is hot during operation!  
Severe burns on hands and arms are possible.  
Wait until the unit has cooled before carrying out assembly and maintenance works!
- ⇒ Severe burns and scaldings on the whole body are possible!
- ⇒ Wait until the unit has cooled. In case of opening and disassembling the unit, residual medium can escape. Further evaporation is also possible on pressureless plant.
- ⇒ Sharp-edged interior parts can cause cutting damages on the hands!  
Always wear work gloves when exchanging packing, valve seat and valve cone!
- ⇒ Information: Depending on the size and version of the level gauge the customer has to arrange a sufficient brace support (eg. spring suspension etc.).

### Exclusion of liability

The IGEMA GmbH Mess- und Regelsysteme does not accept liability when a/m regulations, instructions and warning indications are not observed and adhered to. The operator is responsible for modifications on a unit of IGEMA (if they are not explicitly specified in the mounting and operating instructions).

## 2. Important information

### 2.1 Intended use

#### **Bicolour level gauge:**

The bicolour level gauge type Green-Red is a direct water level gauge with illumination which can be used for steam boilers and containers.

Applied rules as per TRD/AD2000 or ASME-Boiler.

## 3. Explanations

### 3.1 Scope of supply

#### Green-Red:

The level gauge is delivered in 2 units (A and B).

Unit A consists of:

- upper shutoff valve (2)
- gauge body (1)
- lower shutoff valve (3)
- drain valve (4)

Unit B consists of:

- illumination device (5)

### 3.2 System description

The bicolour level gauge in different versions is used to detect the water level of steam generators or containers.

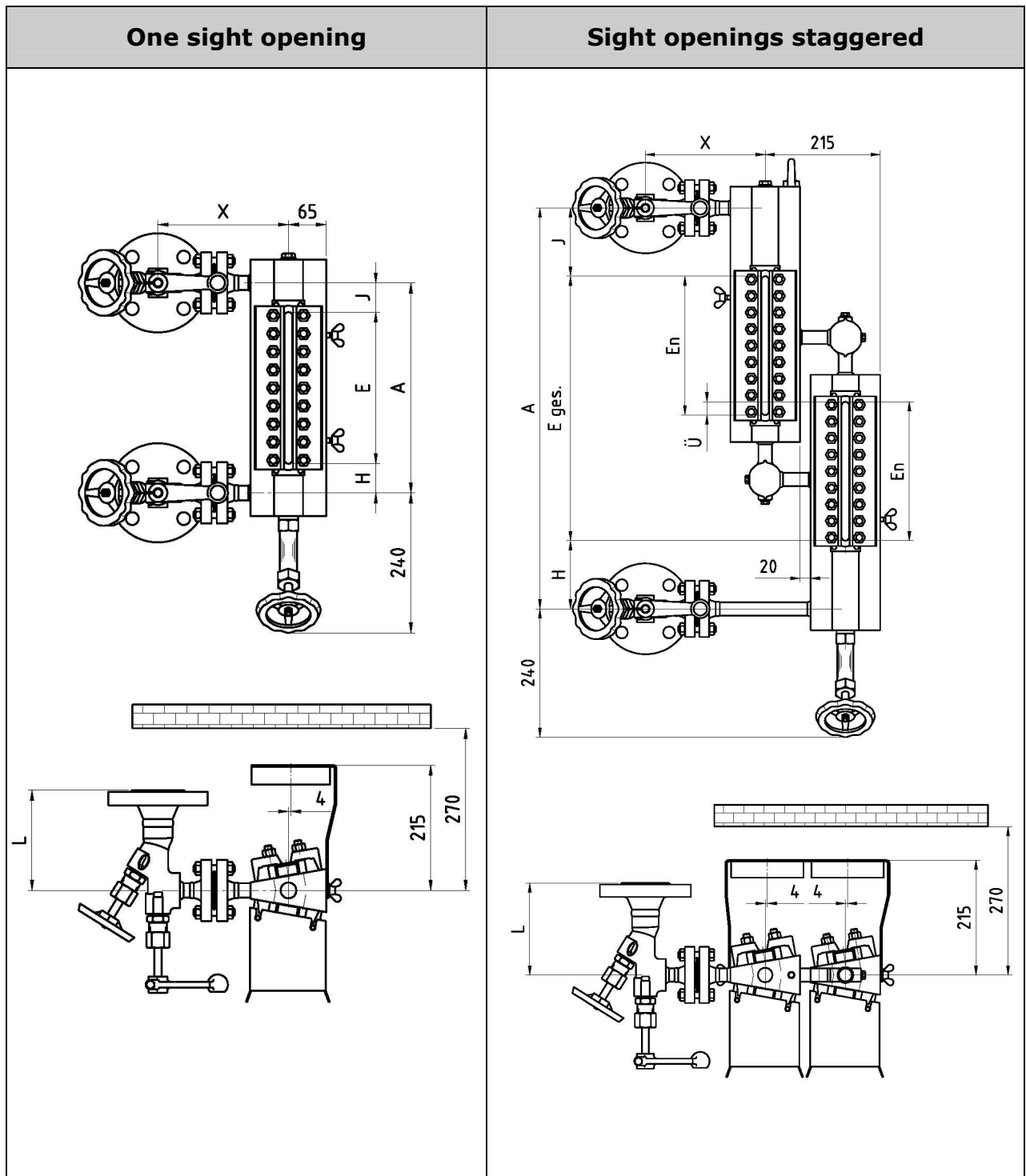
### 3.3 Function

The device works on the principle of communicating pipes. With the bicolour level gauge "green/red" model, the water level is shown by the rear LED illumination of the steam compartment. Red and green light falls on the display unit. If there is water in the display area, then the light rays will be diverted in such a way that the green light beam falls on to the slit diaphragm of the display box. In the steam area the light rays are not diverted and the red light beam is projected.

As a result, in the bicolour level gauge "green/red" model the water compartment always appears green and the steam compartment red.

## 4. Technical data

### 4.1 Versions



#### **Sight openings:**

Size	7
Single sight length $E_n$	260

One sight opening

⇒  $E = E_n$

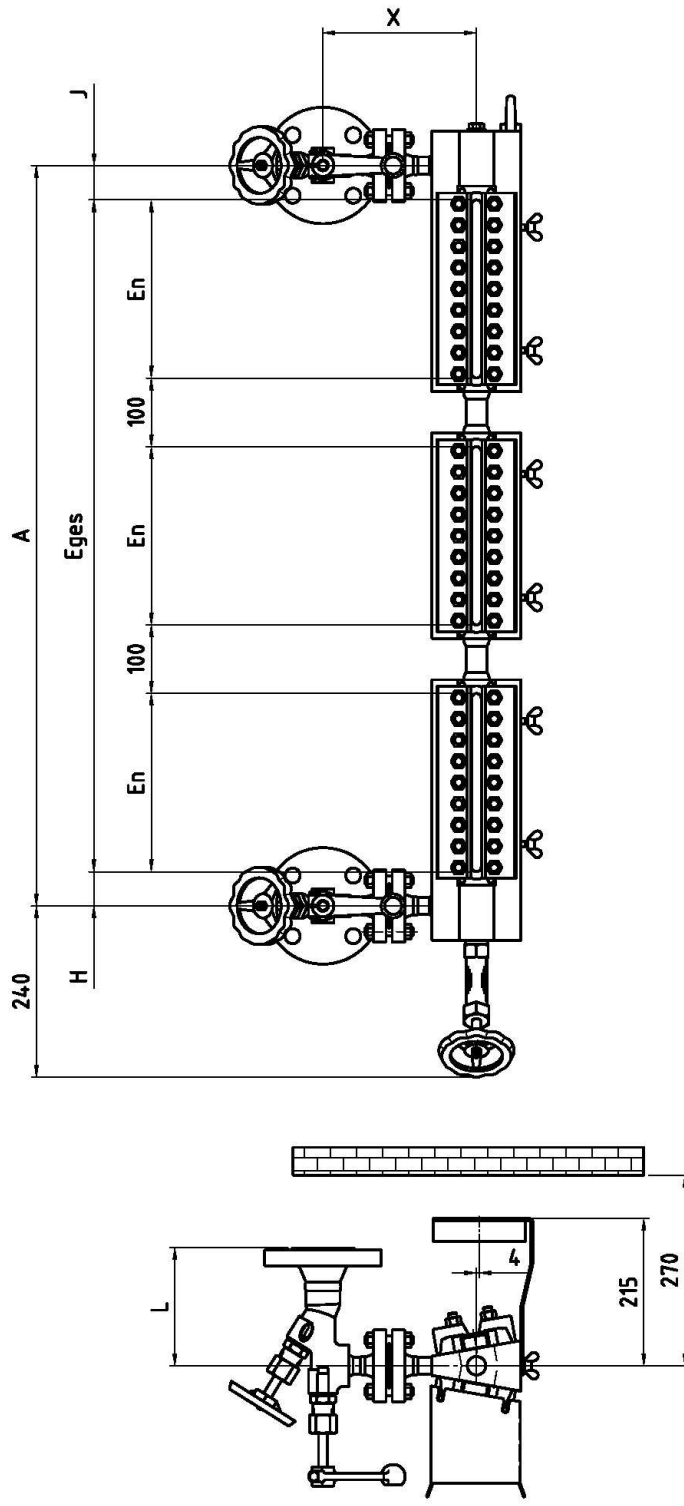
Sight openings staggered

⇒  $E = n \times E_n - (n-1) \times \ddot{U}$

Sight openings superposed

⇒  $E = n \times E_n + (n-1) \times T$

## Sight openings superposed



**Size marking for several sight openings:**

E	n	ü
Size of sight opening	Number of sight opening	ü = superposed

z.B. 8/3ü

**Valves:**

Valve	Type
Shutoff valve	A220
Drain valvel	AV500, AV520, AV540, AV550, AV56_, AV57_



## 4.2 Type of connection

Standard : flanges according to DIN

On request : flanges according to ASME  
Welding end or Socket Welding according to DIN or ASME

## 4.3 Materials

Parts in contact with the medium: C steel or stainless steel according to DIN or ASME.

Pressure holding components: C steel or stainless steel according to DIN or ASME.


## 4.4 Application limits

Max. all. pressure <b>PS</b> [bar]	32	50	80
Max. all. Temperature <b>TS</b> [°C]	239	265	296

## 4.5 Corrosion resistance

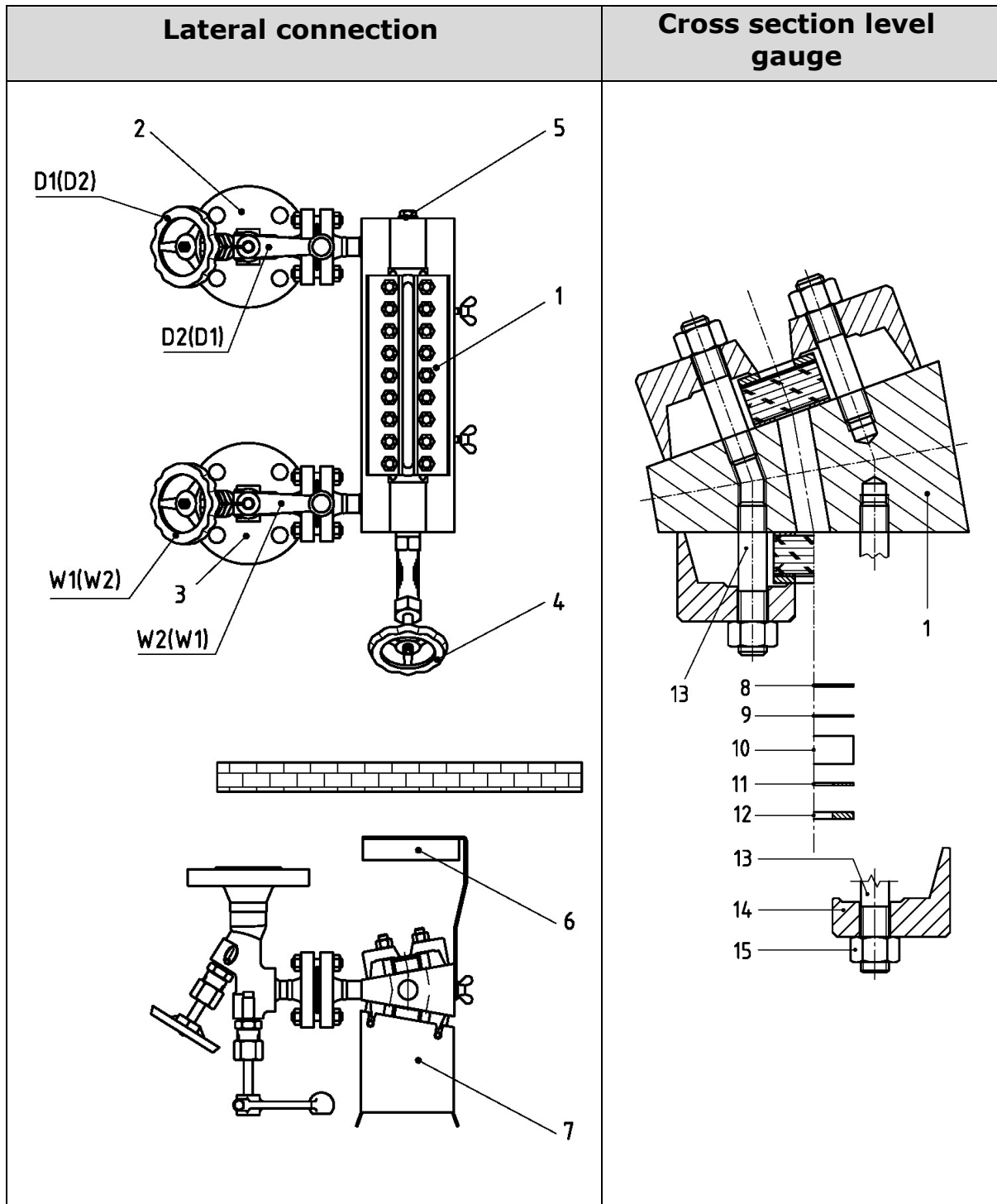
The safety of the unit is not influenced by corrosion if it is used as intended.

## 4.6 Identification plate / Marking

 IGEMA GmbH Mess- und Regelsysteme Zieglerstraße 10-16 Germany - 52078 Aachen made by LECOS GmbH a company of the IGEMA group See installation instructions	Built <b>A</b>		Type <b>B</b>	
	PS <b>C</b> bar		TS <b>D</b> °C	
	PN <b>E</b>	DN <b>F</b>		

- A** Date of manufacture
- B** Type of unit
- C** Max. all. pressure
- D** Max. all. temperature
- E** Nominal pressure (not listed)
- F** Nominal diameter

## 5. Construction



- |                         |                                |
|-------------------------|--------------------------------|
| (1) Gauge body          | (8) Sealing                    |
| (2) Upper shutoff valve | (9) Mica shield                |
| (3) Lower shutoff valve | (10) Glass                     |
| (4) Drain valve         | (11) Sealing (used as cushion) |
| (5) Plug G1/2           | (12) Pressure plate            |
| (6) Illumination device | (13) Stud                      |
| (7) Viewing box         | (14) Cover rail                |
|                         | (15) Hexagon nut               |

## 6. Assembly

### 6.1 Version with flange

- Respect installation position!
- Remove protection caps from connection flanges. Caps *only* serve as transport protection.
- Ensure that sealing surfaces are clean and undamaged.
- Mount bicolour level gauge.

### 6.2 Version with welding end

- Respect installation position!
- Remove protection caps from connection flanges. Caps *only* serve as transport protection.
- Assembly only by using welding process 111 and 141.

### 6.3 Heat treatment of weldseams

Supplementary temper tests of weldseams are not required.

### 6.4 Drain piping

- Close valves (D1, D2, W1, W2) after mounting.
- Mount drain piping on drain valve (4) (to be provided by the customer).

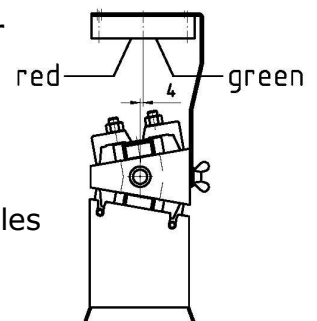


Ensure that drain piping has free outlet to atmosphere and is protected from pressure peaks!

### 6.5 Illumination device



Respect the instructions of the VDE (Association for Electrical, Electronic & Information Technologies) and of the local network operators for the electrical connection.



Observe the correct posture when mounting the illumination modules (see sketch ⇒).

## 7. Commissioning

### 7.1 Commissioning of unit together with the boiler

*Check specifications of material, pressure and temperature!*

- Close drain valve (4).
- Fully open shutoff devices (D1, D2, W1, W2).

## 7.2 Commissioning of unit if boiler is already in operating condition

- Close shutoff device (D2, W2).
- Fully open shutoff device (D1,W1) and drain valve (4).
- Slightly open upper shutoff device (D2), carefully heat up mica holder with flowing-in steam until operating temperature is reached.
- Close drain valve (4).
- Slowly open upper (D2) and lower shutoff device (W2) to the fully open position.

Wait for alignment of water level.

*(If water level is not visible, see operating instructions for shutoff valves / drain valve)*

## 7.3 Re-tightening of screws

### All bolts except cover screws

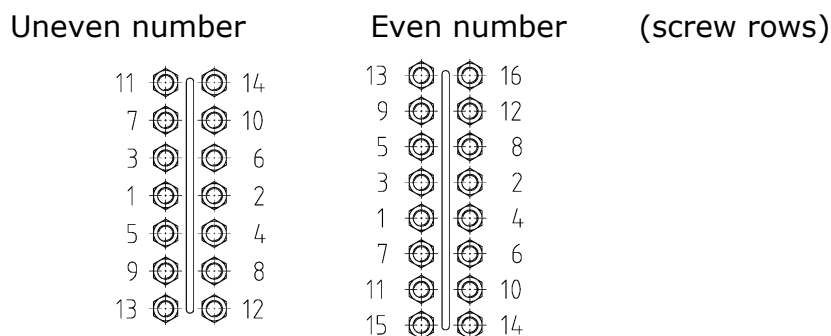
- Check all bolts before commissioning: plugs, valve and flange connections, clamping bolts as well as screw caps of shutoff valves and drain valve (see operating instructions shutoff valves / drain valve) and re-tighten if necessary.
- We recommend to observe if level gauge shows any leakages especially during first days after commissioning.
- Re-tighten corresponding screws where leakages appear.

### Cover screws

- The cover screws (13) have been tightened in our factory with the corresponding tightening torques (see table chapter 8.5) and checked. Do not re-tighten cover screws during assembly/commissioning.
- Observe if level gauges shows any leakages especially during the first days after commissioning.

### Leakage

- In case of leakage, close upper and lower shutoff valve (2, 3) and slowly open drain valve (4) a little.
- Fully open drain valve if noise of escaping pressure is no longer audible.
- Tighten cover screws (13) in several steps using successively opposite diagonal tightening from top to bottom (see table chapter 8.6) until tightening torque  $Md_{max}$  is reached.



## 8. Maintenance

### 8.1 Leakages

Re-tighten corresponding screws in case of leakages.  
See point 7.3 (Re-tightening of screws).

Replace sealing if necessary and check sealing surface.



Severe burns and scaldings on the whole body are possible!  
Before replacing the sealings, level gauge has to be pressureless and empty!

### 8.2 Cleaning of mica shields

During first commissioning or re-commissioning of a boiler, oil and grease residues can deposit on the inside of the mica shields.

In such cases:

- close shutoff valves (2, 3)
- remove plug (5) and clean mica shields as well as channel inside of the indicator body with a circular brush.

### 8.3 Cleaning and purging of level gauge

- Close upper and lower shutoff devices (D1, D2, W1, W2).
- Open drain valve (4). Unit is drained. Normally, cleaning is finished now.
- For commissioning, see chapter 7.

#### ***If cleaning was not sufficient:***

- Close upper and lower shutoff device (D2, W2).
- Open upper and lower shutoff device (D1, W1) and drain valve (4). Slowly open upper shutoff device (D2). The steam flowing through the unit cleans the mica shields.
- Close upper shutoff device (D2) and drain valve (4) again.
- For commissioning, see chapter 7.

Replace glasses and mica shields if cleaning was not sufficient.

### 8.4 Exchange of glasses and mica shields

#### ***Always use new glasses, mica shields and sealings!***

- Close shutoff devices (D1, D2, W1, W2).
- Open drain valve (4). Unit is drained.
- Remove nuts (15) of cover screws (13) and holding screws (every second nut from top and bottom).
- Remove cover rails (14), pressure plate (12), sealing used as cushion (11), glass (10), mica shields (9) and sealing (8).
- Completely remove sealing residues.
- Clean sealing surface of indicator body and supporting surface of pressure plate.

## 8.5 Assembly:

**Place mica packets (surface with mark "Wasserseite" (water side) towards the medium)!**

**Install glasses (marking must be visible outside)!**

- Grease cover and holding screws (13) with suitable lubricant.
- For installation order see cross section of level gauge.
- Tighten cover screws (13) in several steps using successively opposite diagonal tightening from top to bottom (see table chapter 8.6) until tightening torque  $Md_{max}$  is reached.
- For commissioning, see chapter 7.

## 8.6 Tightening torques

All. pressure <b>PS</b> [bar]	Tightening torque $Md \rightarrow Md_{max}$ [Nm]					
	in steps					
	1	2	3	4	5	6
20-80	35	60	<b>65</b>	-	-	-

## 9. Shutoff valve

**Type marking:**

A	2	20
Shutoff valve	Number of shutoff possibilities	Serial no.

### 9.1 General information and operating instructions

IGEMA valves are mostly maintenance-free and easy to handle. All IGEMA valves are equipped with metal gaskets and hand operation. Sealing of valve spindle is made with a gland packing.

*Turn handlever/handwheel clockwise to close the valve.*

*Turn handlever/handwheel counterclockwise to open the valve.*

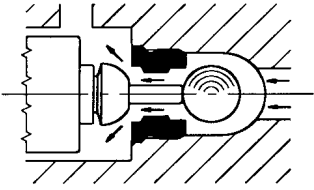
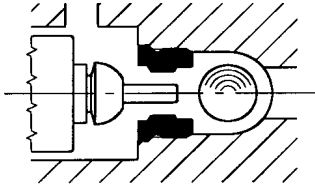
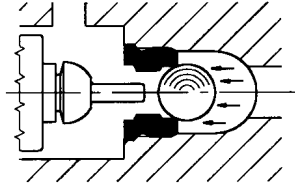
**Tools to increase hand torque are not permitted.**

Turn valve spindles counterclockwise as far as it will go (open position) for backseat, i.e. gland packing is released.

The standard shutoff device is equipped with self-closing ball.

The self-closing ball is a safety facility which automatically closes valve passage of shutoff valve if level gauge is damaged accidentally (mica break).

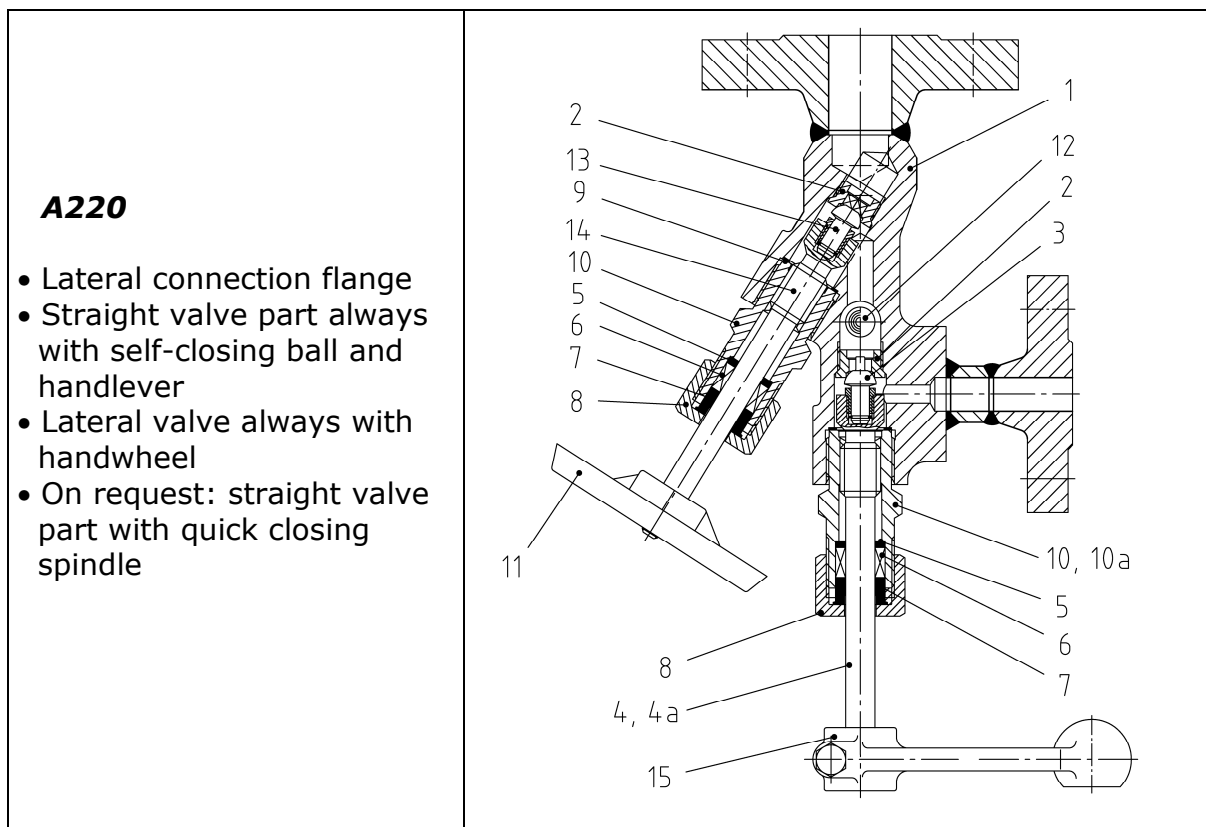
Residuals in piping and fitting (dirt, welding beads etc.) inevitably lead to leakages (seat/cone).

Fig.1	Fig.2	Fig. 3
		
Ball position during commissioning or flushing/purging	Ball position during normal operation	Ball position during glass break or incorrect commissioning



Functioning of self-closing ball is only guaranteed if valve is fully opened. Residuals (dirt, welding beads etc.) can set self-closing ball out of service.

## 9.2 Construction



- |                                  |                                    |
|----------------------------------|------------------------------------|
| (1) Valve housing                | (9) Sealing ring                   |
| (2) Seat                         | (10) Upper part                    |
| (3) Cone set with stud           | (10a) Upper part (quick closing)   |
| (4) Valve spindle                | (11) Handwheel                     |
| (4a) Quick closing valve spindle | (12) Ball                          |
| (5) Base ring                    | (13) Cone set without stud         |
| (6) Gland packing                | (14) Valve spindle (inclined part) |
| (7) Stuffing box                 | (15) Handlever                     |
| (8) Screw cap                    |                                    |

## 9.3 Commissioning



Before every commissioning, re-commissioning, repair or conversion, ensure proper completion of all installation/assembly works and that valve has correct functioning position.

Check specifications of material, pressure and temperature!

- Open shutoff device of valve without self-closing ball on steam and water holding boiler studs counterclockwise as far as it will go (backseat).
- Slightly open shutoff device of valve with self-closing ball on steam and water holding boiler studs counterclockwise to prevent that ball closes valve passage (see fig. 1). Fully open spindle after accomplished pressure balance (backseat).
- Compare function of level gauge and water level height with the other safety fittings.

## 9.4 Maintenance



Carry out maintenance works and disassembly only if boiler and level gauge are empty and pressureless.



Observe that lubricant is suitable for medium and operating temperature. Keep spindle thread always greased.

### ***Leakages on spindle (4, 4a, 14)/gland packing (6)***

- Re-tighten screw cap (8) gradually.  
Life of valve can be increased by regular control on tightness.

### ***Replacement of seat (2), cone set (3, 13) and ball (11)***

- Screw out upper part of valve (10, 10a) with valve spindle (4, 4a, 14) and remove from valve housing (1).
- Unfasten screw cap (8) and remove valve spindle (4, 4a, 14) from upper part of valve (10, 10a).
- Remove and replace cone set (3, 13).
- Screw out seat (2) with socket wrench (SW10).
- Remove ball (11), check and replace if necessary.
- Grease thread of new seat (2) and screw in.  
Tightening torque **Md= 70 Nm**
- For assembly see chapter 9.5.

### ***Replacement of packing set [base ring (5), gland packing (6), stuffing box (7)]***

- Screw out upper part of valve (10, 10a) with valve spindle (4, 4a, 14) and remove from valve housing (1).
- Unfasten handwheel (15) / handlever (12).



- Unfasten screw cap (8) and screw out valve spindle (4, 4a, 14) from upper part of valve (10, 10a).
- Push out packing set (5, 6, 7).
- Carefully remove deposits on valve spindle (4, 4a, 14).
- For assembly see chapter 9.5.

## 9.5 Assembly

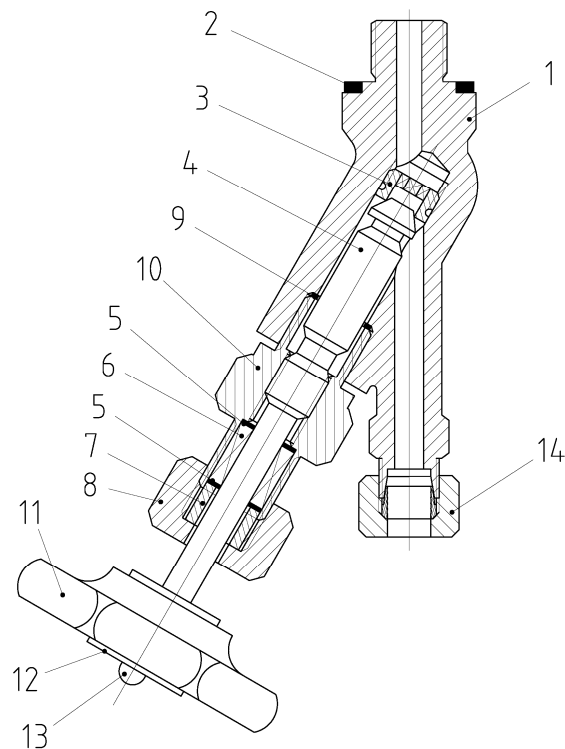
1. Grease thread of valve spindle (4, 4a, 14) and screw in valve spindle in upper part of valve (10, 10a) as far as it will go.
2. Insert base ring (5), gland packing (6) and stuffing box (7).
3. Screw on screw cap (8) and tighten gradually.  
- *spindle has to stay movable* -
4. Screw in complete upper part of valve (10, 10a) with new sealing ring (9) into valve housing (1) with tightening torque  **$M_d \text{ max} = 280 \text{ Nm}$** .
5. Fix handwheel (15) / handlever (12).
6. Close shutoff device.

## 10. Drain valve

### 10.1 Construction

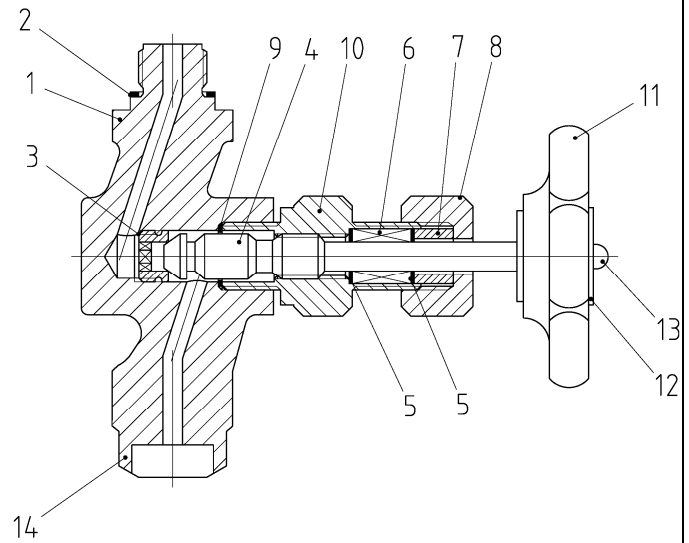
#### **AV500, AV520**

- Male thread G½ on input side
- Output side with cutting ring connection  $\varnothing 12$  as per DIN 2353 – DS12



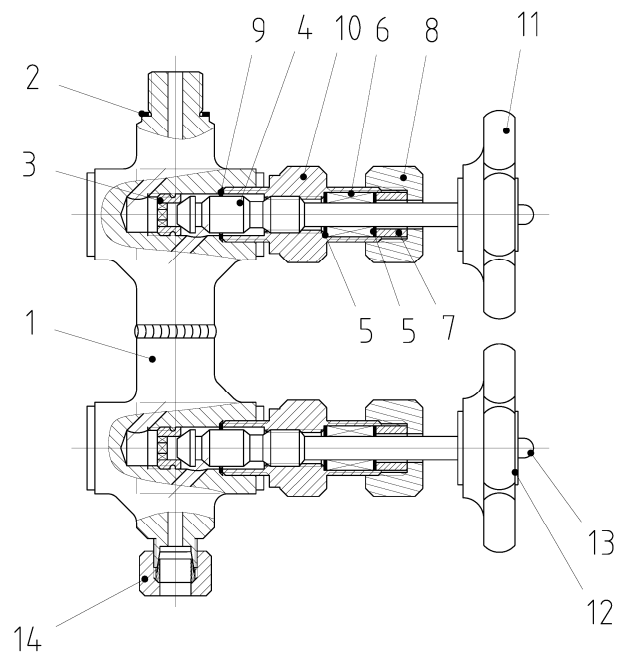
**AV540, AV550**

- Male thread G½ on input side
- Output side with welding end
- Other connections possible on request.



**AV56x, AV57x**

- Male thread G½ on input side
- Output side with cutting ring connection ø12 as per DIN 2353 – DS12
- Other connections possible on request.



- (1) Valve housing
- (2) Sealing ring
- (3) Seat
- (4) Valve spindle with cone
- (5) Scraper rings
- (6) Gland packing
- (7) Stuffing box

- (8) Screw cap
- (9) Sealing ring
- (10) Upper part of valve
- (11) Handwheel
- (12) Plate OPEN-CLOSED ("AUF-ZU")
- (13) Cap nut
- (14) Drain connection

## 10.2 Assembly



Ensure that drain piping has free outlet to atmosphere and is protected from pressure peaks.

- Firmly screw on drain valve with sealing ring (2) on existing unit.
- Cutting ring connection: Assemble drain piping (tube  $\varnothing$  12x1 material St 35.8) on provided drain connection (14) as per DIN 2353 (SW24) (on the part of the builder).

Welding end:	weld on
Socket welding:	weld on
Flange:	screw on

## 10.3 Commissioning

Rust, sand or similar impurities inside of the medium or during first flushing can cause leakage if they remain in the area of the seat.

### ***Purging of valve:***

- Fully open valve for purging. The pre-pressed gland packing can lose its denseness due to a longer storage (see chapter 10.4)
- Close valve.

## 10.4 Maintenance



Before carrying out maintenance works on drain valve, unit has to be pressureless and empty!  
Severe burns and scaldings on the whole body are possible!

### ***Re-tightening of gland packing:***

- If a valve is leaky, tighten screw cap (8) with open-end wrench (SW27) clockwise until valve is tight. Spindle (4) has to stay movable.
- Replace gland packing if re-tightening of packing was not successful.

### ***Replacement of packing:***

- Screw off cap nut (13) and remove handwheel (11).
- Unscrew upper part of valve (10).
- Remove screw cap (8) and stuffing box (7).
- Remove spindle with cone (4) upwards.
- Push out gland packing (6) with scraper rings (5) from top and clean packing space.

### ***Assembly:***

- Grease spindle thread, insert from top and firmly tighten screws.
- Place new greased packing with scraper rings (5).
- Insert stuffing box (7).

- Tighten screw cap (8).
- Insert new sealing ring (9).
- Grease thread of upper part of valve (10), screw in and tighten with tightening torque  $M_d = 220 \text{ Nm}$ .
- Place handwheel (11) and tighten cap nut (13).

### **Replacement of complete upper part:**

- For dismantling of component parts see "Replacement of packing"
- Unscrew seat (3) with hexagon socket wrench SW11.
- Grease seat thread, screw in and tighten with tightening torque  $M_d = 55 \text{ Nm}$ .
- Replace complete upper part.
- Place new spindle.
- For assembly of component parts see above.

## **11. Case of damage**



Provide security in the danger zone.  
Severe burns and scaldings on the whole body are possible!

- Check if no further steam escapes at the damaged place.
- **Set boiler pressureless!**  
Close valves as follows:
  - Close shutoff device without self-closing ball on steam and water holding stud.
  - Close shutoff device with self-closing ball on steam and water holding stud.
  - Slowly open drain valve. Level gauge becomes pressureless and water is drained.
  - For commissioning with new spare parts see chapter 9.3.

## **12. Spare parts**

*Always indicate article no. An serial no. (indicated on the identification plate) in case of spare parts order!*

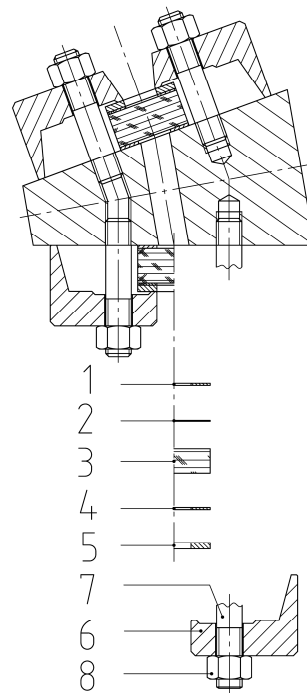
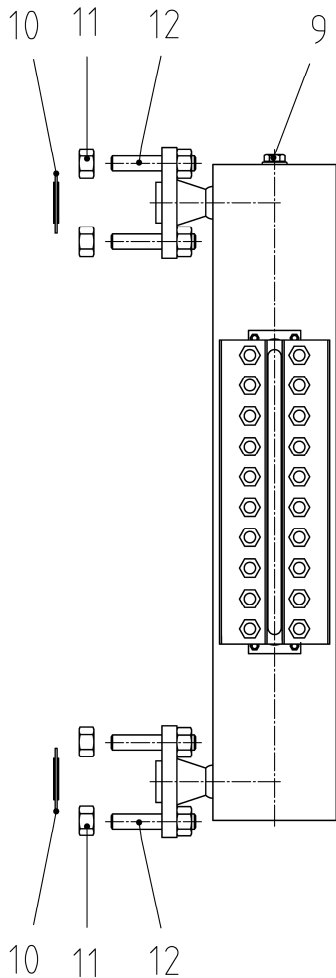
### **12.1 Transparent level gauge**

n = number of sight openings

Pos. no.	Designation	Qty.	Article-no.
			Size 7
1	Sealing	nx2	40-00076
2	Mica shield	nx2	40-00953
3	Glas	nx2	40-00005
4	Sealing (used as cushion)	nx2	40-00076
5	Pressure plate	nx2	40-00427
6	Cover rail DIN	nx4	
	Cover rail ASME	nx4	25-02983

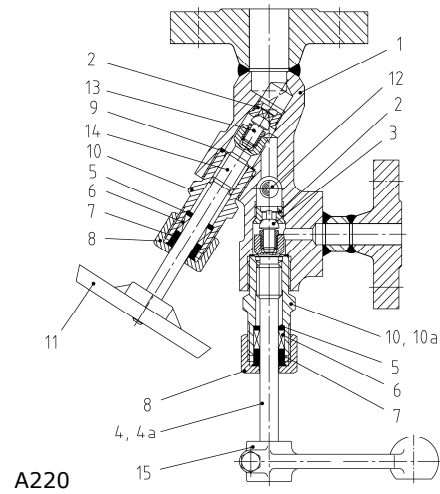
Pos. no.	Designation	Article- no.	Quantity
			Größe 7
7	Cover screw	DIN 40-00585	nx36
		ASME 40-01368	
8	Hexagon nut	DIN 40-00583	nx36
		ASME 40-01369	
9	Srew plug	40-00329	
	Sealing ring	40-00099	

Pos. no.	Designation	DIN 2690 DIN 2697 ASME B16.5	Article- no.		Qty.
			DIN	ASME	
10	Sealing ring	PN25 - PN40	40-00156		2
11	Hexagon nut		40-00583		16
12	Bolt		40-00350		8
10	Sealing	PN63 - PN100	40-00206		2
11	Hexagon nut		40-00352		8
12	Bolt		40-00583		16
10	Sealing	Class 300		40-01536	2
11	Hexagon nut			40-00741	16
12	Bolt			40-01713	8
10	Sealing	Class 600		40-01536	2
11	Hexagon nut			40-00741	16
12	Bolt			40-01540	8



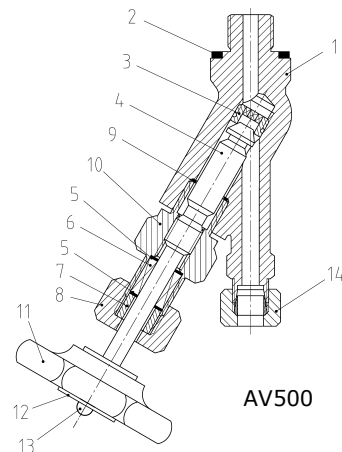
## 12.2 Shutoff valve

Pos. no.	Designation	Article-no. A220
2	Seat	15-00115
3	Cone with stud	
12	Ball	
2	Seat	15-00114
13	Cone without stud	
4	Valve spindle	25-00126
4a	Quick closing valve spindle	25-00553
14	Valve spindle (inclined part)	25-00652
9	Sealing ring	40-00117
5	Base ring	15-00113
6	Gland packing	
7	Stuffing box	
8	Screw cap	25-00008
11	Complete handwheel	15-00237
15	Complete handlever	15-00338



## 12.3 Drain valve

Pos. no.	Designation	Max. pressure PS [bar]	Article-no.	
			AV500, AV520	AV540, AV550, AV56x, AV57x
-	Complete valve	32	40-01803	On request
-	Complete valve	80-200	40-01845	On request
3	Seat	-	40-01864	40-01953
9	Sealing ring	-		
4	Spindle with rolled cone	-	40-01866	40-04135
5	Scraper rings	-	40-01867	
6	Gland packing	-		
7	Stuffing box	-		
9	Sealing ring	-	40-01873	
2	Sealing ring	-	40-00099	



## 13. Decommissioning



Severe burns and scaldings on the whole body are possible!

Before detaching flange connections, screws of stuffing box, cover screws or screw plugs, all connected lines must be pressureless (0 bar) and cooled off to ambient temperature (20°C)!

### 13.1 Disposal

Dismount unit and separate waste products.

When disposing the unit, observe legal regulations for waste disposal.

## 14. Supplement

### 14.1 Warranty

We accord a warranty period of 24 months on our products. A condition for that is the appropriate treatment according to these mounting and operating instructions. The warranty for wear and spare parts is restricted to material defects and construction faults.

The glasses, mica shields and sealings installed in the transparent level gauge are wear parts and are **not** included in the warranty.

The sealings/gland packing installed in the valves are **not** included in the warranty.



This high quality IGEMA product has been developed, manufactured and inspected in accordance with a quality management system according to DIN EN ISO 9001:2000.

If on receipt of this unit you notice damage in transit or another cause for complaint despite our final quality inspection, please contact immediately our customer service, phone no. +49 (0) 241-56 87-0.

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