



Installation and operating instructions

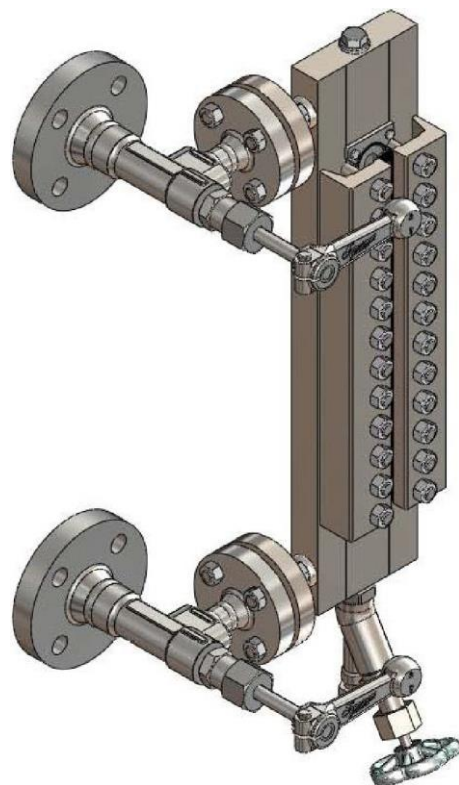


Reflex Level Gauge

LG40-x2

D-02-B-16800-EN-0.doc

issue date 07/2017



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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 work 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, ~~red~~ 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!

Important information

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).

2.1 Intended use

Reflex level gauge:

The reflex level gauge LG40-x2 is a direct water level gauge which can be used for steam boilers and containers.

In the sight opening, the water level is indicated dark and the steam light.

The product corresponds to the PED Directive 2014/68/EU.

Applied standards as per EN 13445 / EN12952 / EN 12953 / AD2000 or ASME-Boilers.

3. Explanations

3.1 Scope of supply

LG40-x2:

The unit is delivered as complete unit (see page 9):

1 level gauge (1)

- 1 upper shutoff valve (2)
- 1 Lower shutoff valve (3)
- 1 drain valve (4)

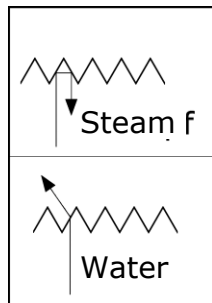
3.2 System description

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

3.3 Function

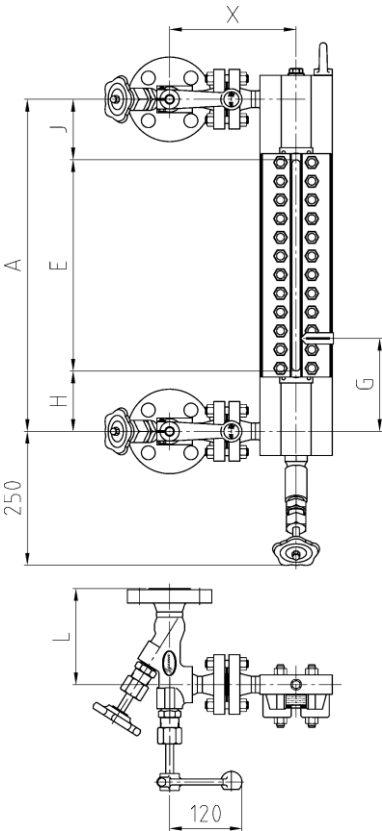
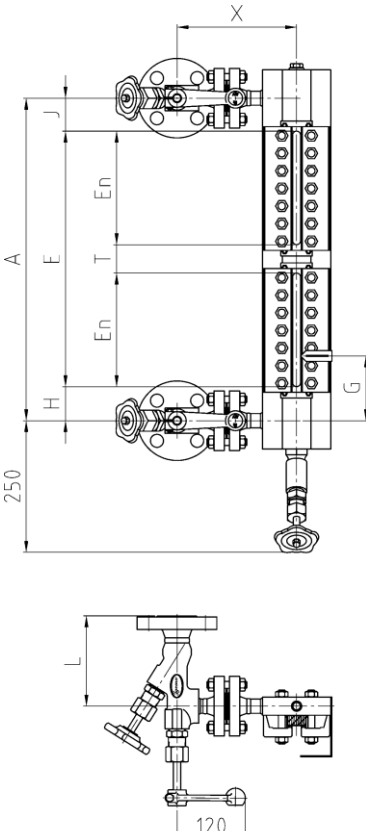
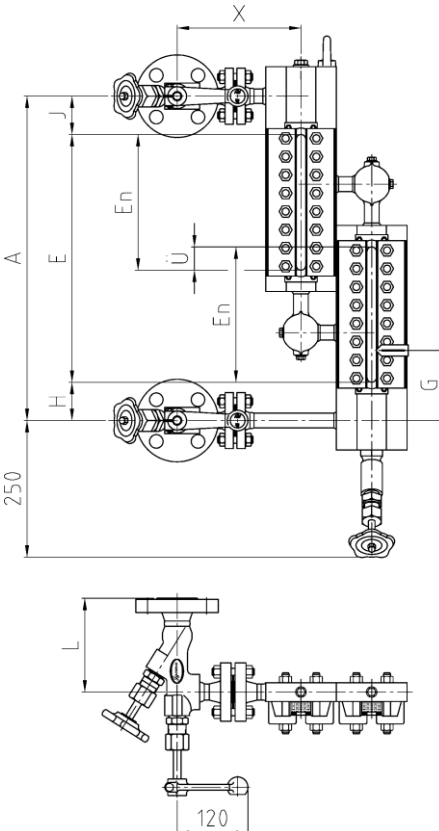
The level gauge works according to the physical law of the communicating tubes.

It is equipped with a longish sheet glass with prismatic grooves on the surface turned to the medium. The water space is indicated dark and the steam space light due to the different reflection (refraction) of the light.



4. Technical data

4.1 Versions

One sight opening	Sight openings superposed	Sight openings staggered
	 <p>T = dead space</p>	 <p>Ü = overlapping</p>

Sight openings:

Size	5	6	7	8	9	10
Single sight length En	200	230	260	300	320	350

n= quantity of sight openings

One sight opening
En

- E=

Sight openings superposed
1)xT Sight openings staggered
1)xÜ

- E= nxEn + (n-

- E= nxEn - (n-

Size marking for several sight openings:

E	n	ü
E	n	v
Size of sight opening	Number of sight opening	Version: v = staggered ü = superposed

z.B. 6/3ü , 7/2v

Valves:

Valve	Type
Shutoff valve	A130, A220
rain valve	AV500, AV540, AV56_

Type of connection

Standard : Flanges as per DIN 2635

On request : Flanges as per ASME
Buttwelding ends or Socket Welding as per DIN or ASME

4.2 Materials

Components in contact with the medium and pressure-holding components are made of C steel or stainless steel according to DIN or ASME.

4.3 Application limits



Max. all. pressure PS	[bar]	32
Max. all. temperature TS	[°C]	239

4.4 Corrosion resistance

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

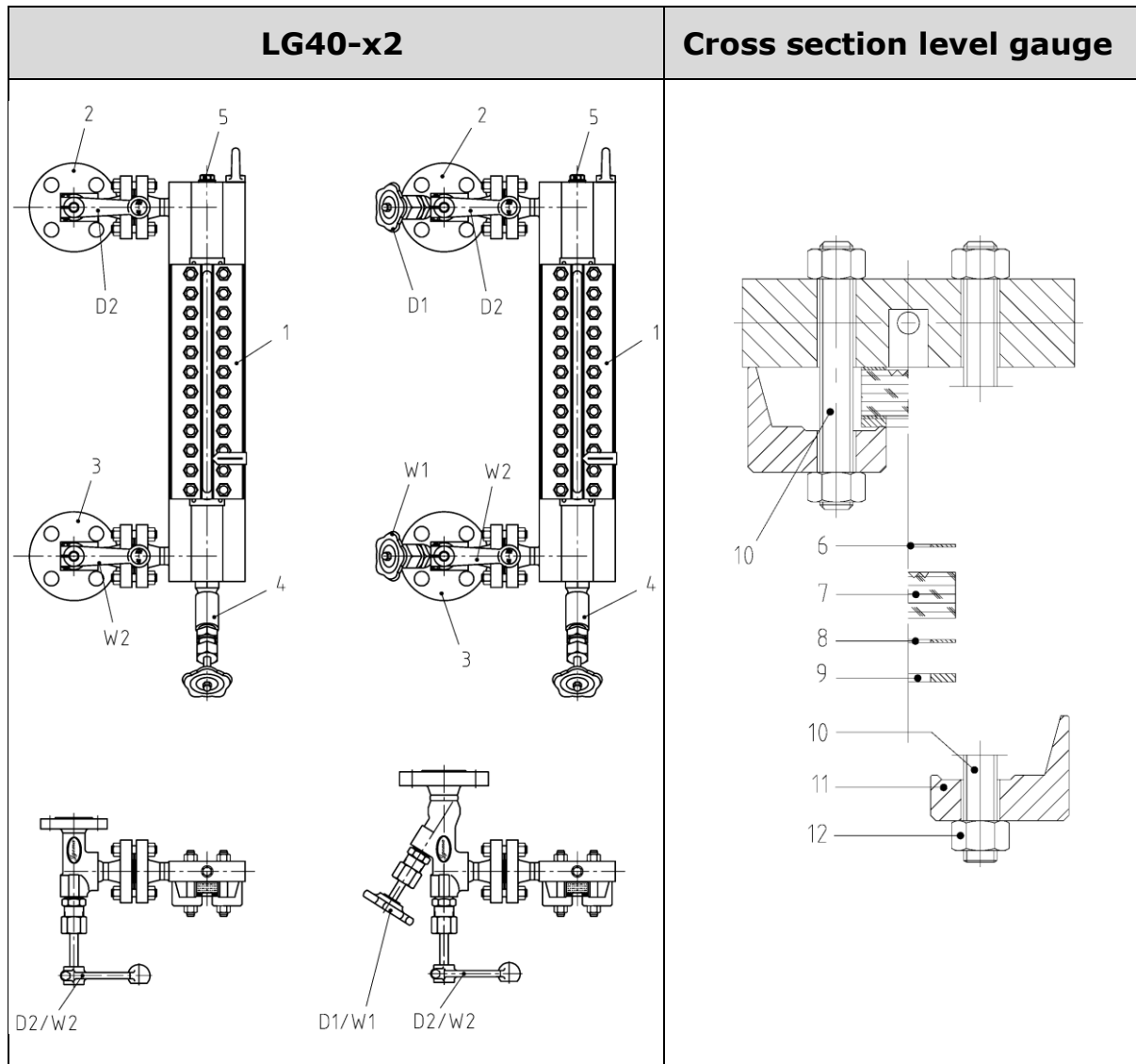
4.5 Identification plate / Marking

The following data are indicated on the identification:

 IGEMA GmbH Mess-und Regelsysteme Antwerpenerstraße 1 Germany - 48163 Münster  See installation instructions	Built A		Type B
	PS C	bar	TS D °C
	Conn. Type PN E	DN F	

- A Date of manufacture
- B Type of unit
- C Max. Allowable pressure
- D Max. Allowable temperature
- E Nominal pressure
- F Nominal diameter

5. Construction



- | | |
|--------------------------|---|
| (1) Glass holder | (9) Pressure plate |
| (2) Upper shutoff valve | (10) Cover screw |
| (3) Lower shutoff valve | (11) Cover rail |
| (4) Drain valve | (12) Hexagon nut |
| (5) Plug G $\frac{1}{2}$ | (13) Plug G $\frac{1}{4}$ (staggered version) |
| (6) Sealing | |
| (7) Glass | |
| (8) Cushion | |

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 reflex level gauge.

6.2 Version with butt 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 weld seams

Supplementary temper tests of weld seams 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!

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) (if exists) and drain valve (4).
- Slightly open upper shutoff device (D2), carefully heat up glass 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 9.1 General information and operating instructions "self-closing ball")

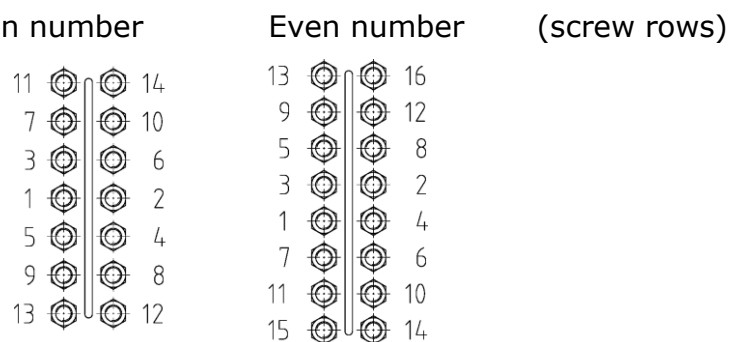
7.3 Re-tightening of screws

All bolts except cover screws

- Check all bolts before commissioning: plugs, valve and flange connections as well as screw caps of shutoff valves and 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.

- The cover screws (10, 12) have been tightened in our factory with the corresponding tightening torques (see table chapter 8.6) 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.

- 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 (10, 12) in several steps using successively opposite diagonal tightening from top to bottom (see table chapter 8.6) until tightening torque **Md_{max}** is reached.



8.1 Leakages

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!

In such cases:

- close shutoff valves (2, 3)
- remove plug (5, 13) 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) (if exists) and drain valve (4). Slowly open upper shutoff device (D2). The steam flowing through the unit cleans the glasses.
- 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

Always use new glasses and sealings!

- Close shutoff devices (D1, D2, W1, W2).
- Open drain valve (4). Unit is drained.
- Remove nuts (12) of cover screws (10).
- Remove cover rails (11), pressure plate (9), cushion (8), glass (7) and sealing (6).
- Completely remove sealing residues.
- Clean sealing surface of indicator body and supporting surface of pressure plate.

8.5 Assembly:

Install glasses (marking must be visible outside)!

- Grease cover and holding screws (10, 12) with suitable lubricant.
- For installation order see cross section of level gauge.
- Tighten cover screws (10, 12) 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 PS [bar]	Tightening torque Md → Md_{max} [Nm]					
	in steps					
	1	2	3	4	5	6
20-32	35	50	65	-	-	-

9. Shutoff valve

Type marking:

A	1	30
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.

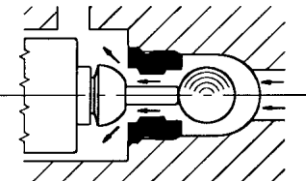
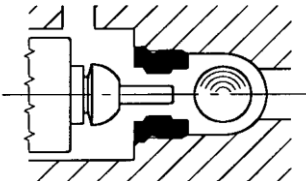
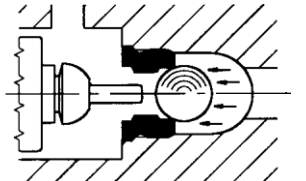
Tools to increase hand torque are not permitted.

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

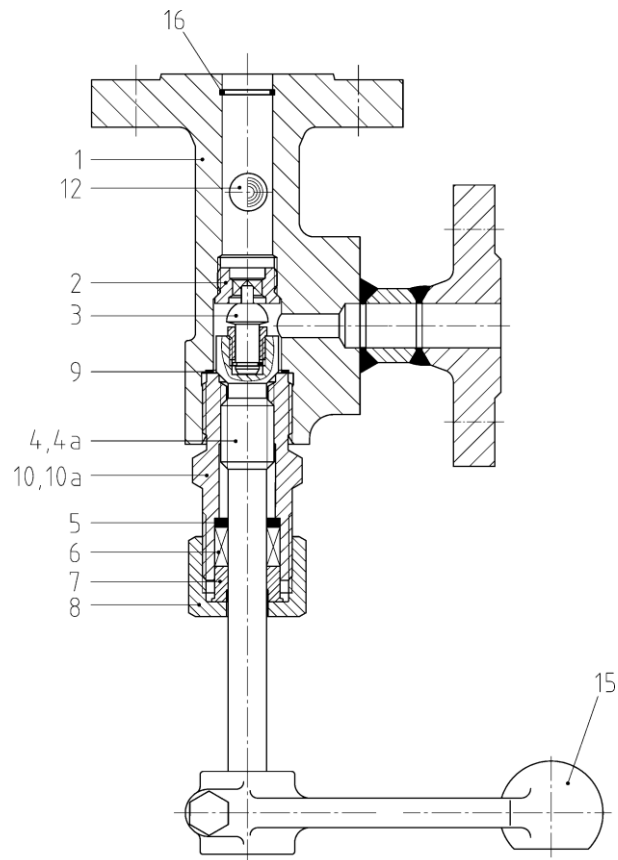


Functioning of self-closing ball is only guaranteed if valve is fully opened. Residuals (dirt, welding beads etc.) can set self-closing ball out of service.

9.2 Construction

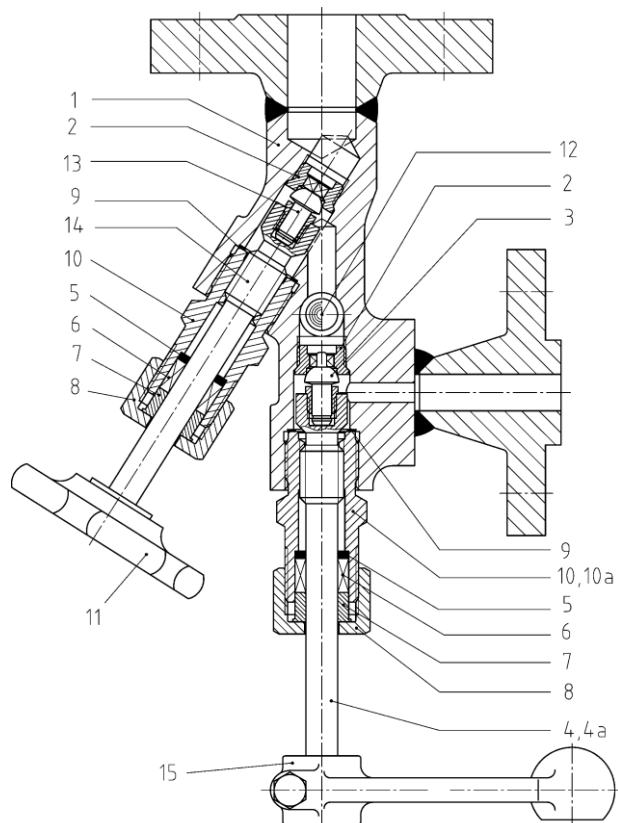
A130

- Lateral connection flange
- always equipped with handlever
- On request: with quick closing spindle



A220

- Lateral connection flange
- Straight valve part always with self-closing ball and handlever
- Lateral valve part always with handwheel
- On request: straight valve part with quick closing spindle



- | | |
|----------------------------------|------------------------------------|
| (1) Valve housing | (9) Sealing ring |
| (2) Seat | (10) Upper part |
| (3) Cone set with stud | (10a) Upper part (quickclosing) |
| (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 | (16) Retaining spring |

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 counterclockwisely as far as it will go (backseat).
- Slightly open shutoff device of valve with self-closing ball on steam and water holding boiler studs counterclockwisely 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 (12)

- 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 (12), 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 (11) / handlever (15).
- 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

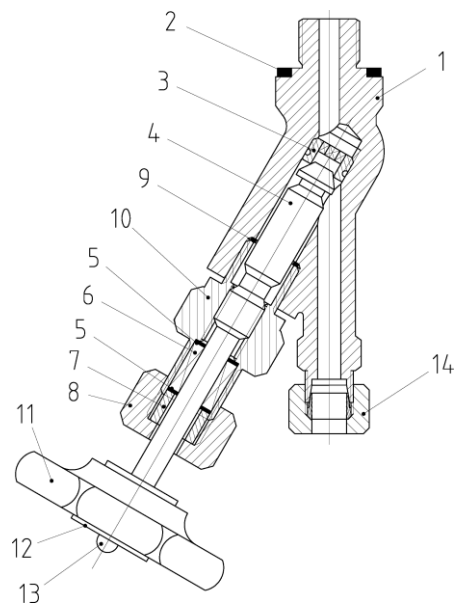
1. Grease thread of valve spindle (4, 4a, 14) and screw in valve spindle in upper part of valve (10, 10a) as far as it will go.
2. Insert base ring (5), gland packing (6) and stuffing box (7).
3. Screw on screw cap (8) and tighten gradually.
- *spindle has to stay movable* -
4. Screw in complete upper part of valve (10, 10a) with new sealing ring (9) into valve housing (1) with tightening torque **M_d max = 280 Nm**.
5. Fix handwheel (11) / handlever (15).
6. Close shutoff device.

10. Drain valve

10.1 Construction

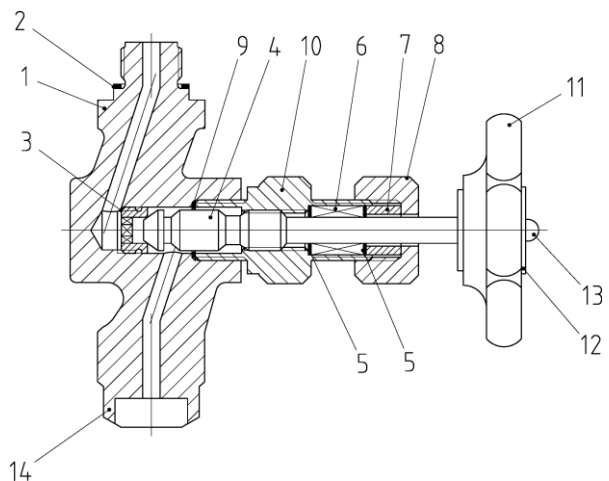
AV500

- Male thread G $\frac{1}{2}$ on input side
- Output side with cutting ring connection \varnothing 12 as per DIN 2353 – DS12



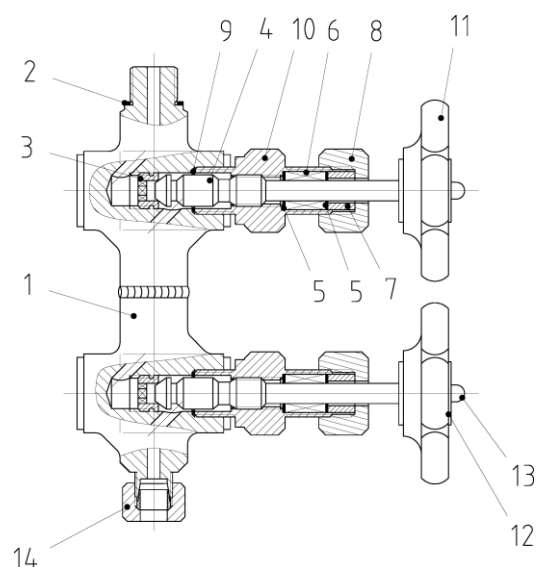
AV540

- Male thread $\frac{1}{2}$ on input side
- Output side with welding end
- Other drain connections possible on request



AV56x

- Male thread G $\frac{1}{2}$ on input side
- Output side with cutting ring connection \varnothing 12 as per DIN 2353 – DS12
- Other drain connections possible on request



- | | |
|-----------------------------|---------------------------------|
| (1) Valve housing | (8) Screw cap |
| (2) Sealing ring | (9) Sealing ring |
| (3) Seat | (10) Upper part of valve |
| (4) Valve spindle with cone | (11) Handwheel |
| (5) Scraper rings | (12) Plate OPEN-CLOSED (AUF-ZU) |
| (6) Gland packing | (13) Cap nut |
| (7) Stuffing box | (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).
- | | |
|------------------|----------|
| Buttwelding end: | 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!

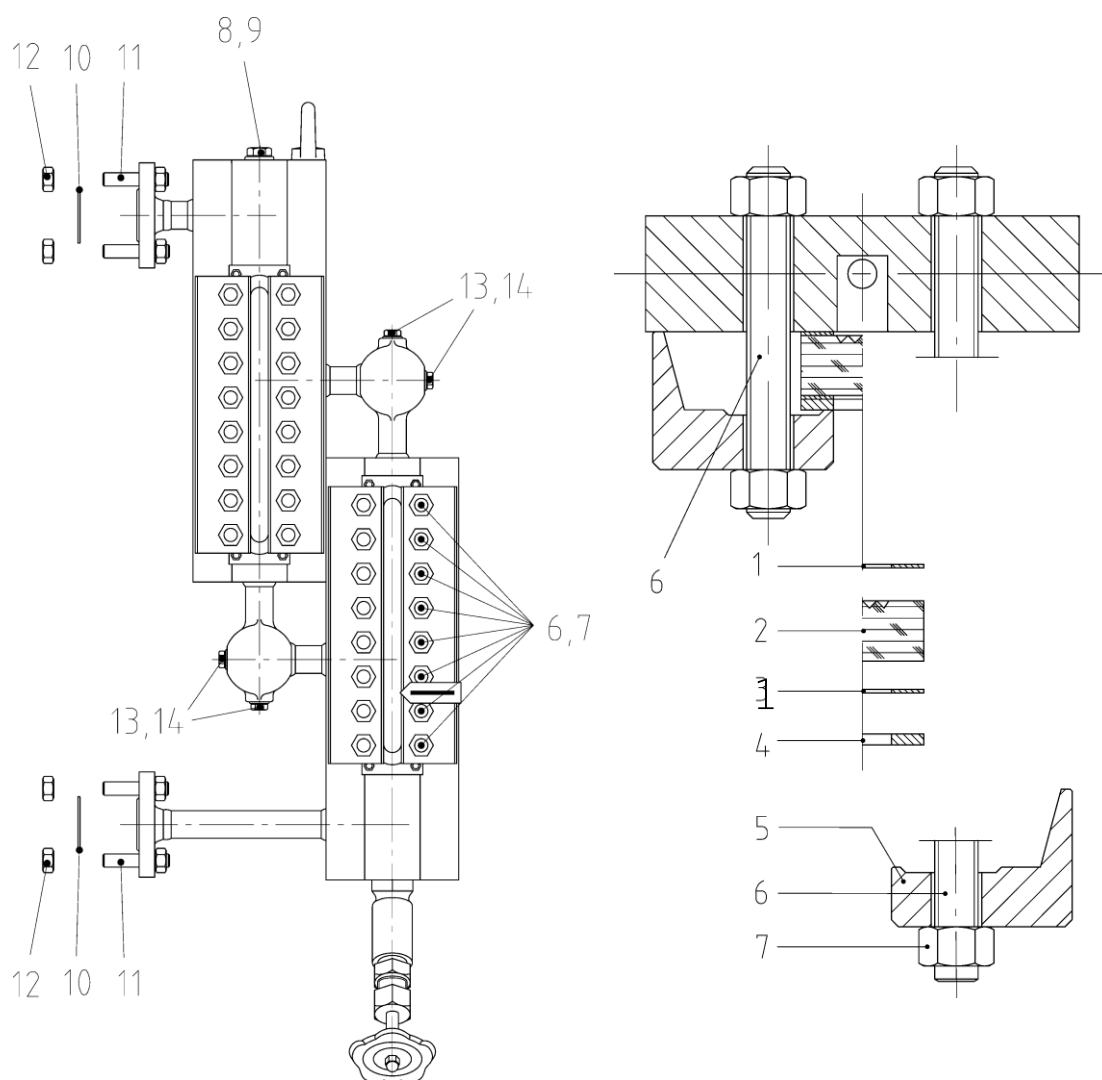
- Check if no further steam escapes at the damaged place.
- **Set boiler pressureless!**
Close valves as follows:
 - Close shutoff device without self-closing ball on steam and water holding stud.
 - Close shutoff device with self-closing ball on steam and water holding stud.
 - Slowly open drain valve. 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. and serial no. (indicated on the identification plate) in case of spare parts order!

12.1 Reflex level gauge

n = number of sight openings



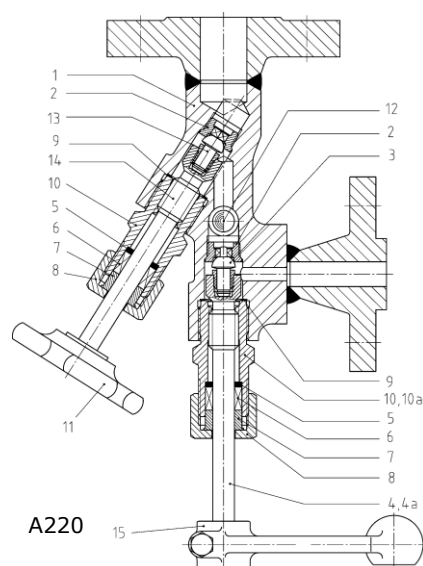
Pos. no.	Designation	Qty.	Article no.					
			Size					
			5	6	7	8	9	10
1	Sealing	nx1	40-00074	40-00075	40-00076	40-00077	40-00078	40-00079
2	Reflex glass	nx1	40-00048	40-00049	40-00050	40-00051	40-00052	40-00053
4	Pressure plate	nx1	40-00425	40-00426	40-00427	40-00428	40-00429	40-00430
5	Cover rail	DIN	25-00780	25-00781	25-00782	25-00783	25-00784	25-01040
		ASME	25-04328		25-01641	25-01867	25-01706	25-03528

Pos. no.	Designation		Article no.	Quantity					
				Size					
				5	6	7	8	9	10
6	Cover screw	DIN	40-00353	nx14	nx16	nx18	nx20	nx22	nx24
		ASME	40-01548						
7	Hexagon nut	DIN	40-00583	nx28	nx32	nx36	nx40	nx44	nx48
		ASME	40-01369						
8	Screw plug G½		40-00329	1					
9	Sealing ring		40-00099	1					
13	Screw plug G¼		40-00316	4					
14	Sealing ring		40-00114	4					

Pos. no.	Designation	DIN 2690 DIN 2697 ASME B16.5	Article no.	Quantity
10	Sealing	PN25-40	40-00156	2
		Class 300	40-01536	
11	Threaded bolt	PN25-40	40-00350	8
		Class 300	40-01713	
12	Hexagon nut	PN25-40	40-00583	16
		Class 300	40-00741	

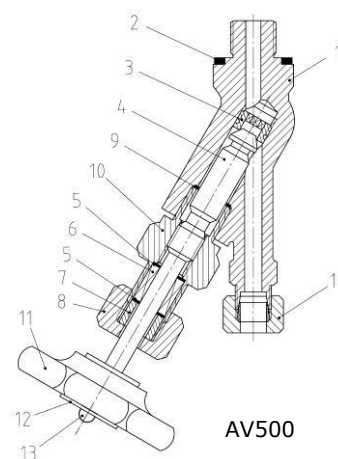
12.2 Shutoff valve

Pos. no.	Designation	Article no.	
		A130	A220
2	Seat	15-00116	15-00115
3	Cone set with stud		
12	Ball		
16	Retaining spring	40-00342	
2	Seat		15-00114
13	Cone set 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	Article no.	
		AV500	AV540, AV56x
-	Complete valve	40-01803	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

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 and sealings installed in the reflex 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.

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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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