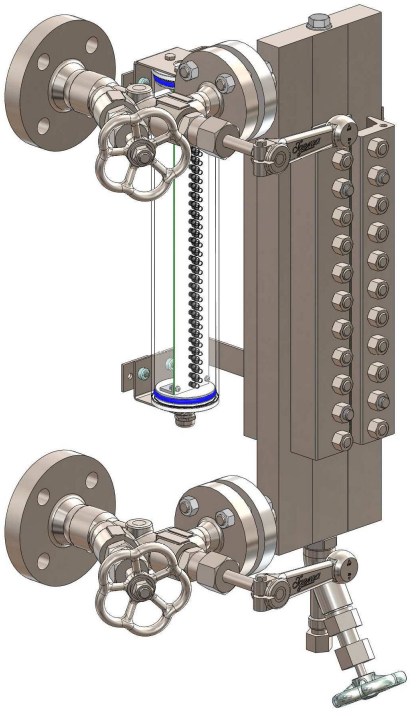
IGEMA GmbH
Measuring and control systems

Mounting and operating instructions

Transparent level gauge

- type glass/mica
  with LED tube light



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EUROPEAN VALVE ALLIANCE

GB

-ⓘTable of contents-

1. Health and safety instructions 4-5

1.1 General health and safety instructions 4
1.2 Unit-specific safety instructions 5
1.3 Exclusion of liability 5

2. Important information 6

2.1 Intended use 6

3. Explanations 6

3.1 Scope of supply 6
3.2 System description 6
3.3 Function 6

4. Technical data 7-8

4.1 Versions 7
4.2 Type of connection 8
4.3 Materials 8
4.4 Application limits 8
4.5 Corrosion resistance 8
4.6 Identification plate / Marking 8

5. Construction 9

6. Assembly 9-10

6.1 Version with flange 9
6.2 Version with welding end 10
6.3 Heat treatment of weldseams 10
6.4 Drain piping 10
6.5 Illumination device 10

7. Commissioning 10-11

7.1 Commissioning of unit together with the boiler 10
7.2 Commissioning of unit if boiler is already in operating condition ... 10
7.3 Re-tightening of screws 11

8. Maintenance 11-13

8.1 Leakages 11
8.2 Cleaning of mica shields.. 12
8.3 Cleaning and purging of level gauge 12
8.4 Exchange of glasses and mica shields 12
8.5 Assembly 12
8.6 Tightening torques..... 13

9. Shutoff valve 13-16

9.1 General information and operating instructions 13
9.2 Construction 14-15
9.3 Commissioning..... 15
9.4 Maintenance 15-16
9.5 Assembly 16

10. Drain valve 17-19

10.1 Construction 17-18
10.2 Assembly 18
10.3 Commissioning..... 18
10.4 Maintenance 19

11. Case of damage 19-20

12. Spare parts 20-21

12.1 Transparent level gauge 20-21
12.2 Shutoff valve 21
12.3 Drain valve 21

13. Decommissioning 22

13.1 Disposal 22

14. Supplement 23

14.1 Warranty 23

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

Transparent level gauge:

The transparent level gauge type glass/mica 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

Glass / mica:

The level gauge is delivered in 2 units (A and B). (see page 9)

Unit A consists of:
- upper shutoff valve (2)
- glass/mica holder (1)
- lower shutoff valve (3)
- drain valve (4)

Unit B consists of:
- illumination device (6)

3.2 System description

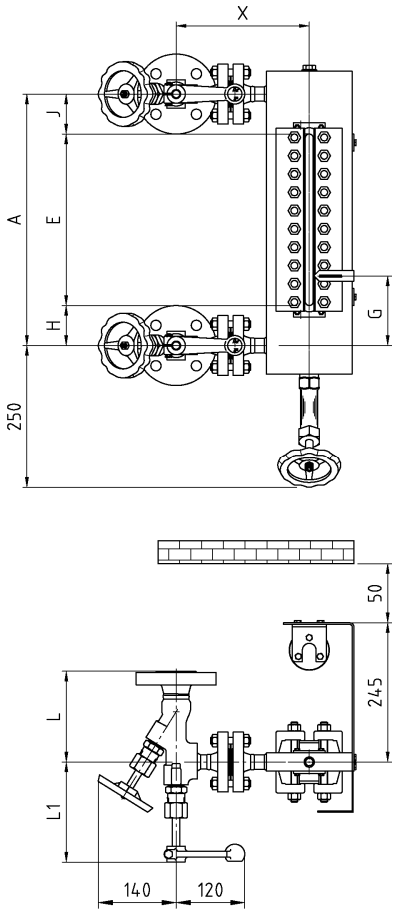
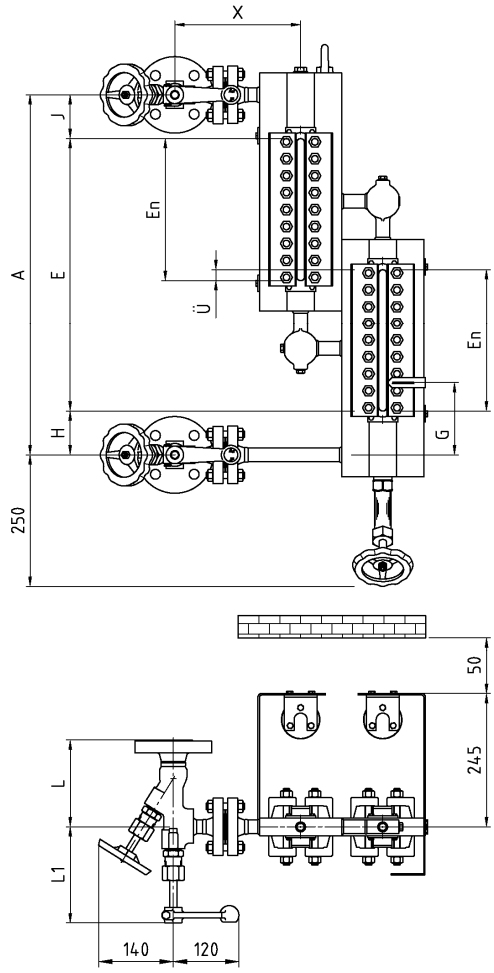
The transparent level gauge in different versions is used to detect the water level of steam generators or containers.

3.3 Function

The level gauge works according to the physical law of the communicating tubes. The water level is visible due to the illumination of the water-steam space from the back. In the sight opening, the water level is visible at the interface between water and steam.

4. Technical data

4.1 Versions

One sight opening	Sight openings staggered
	

Ü = overlapping

Sight openings:

Size	7	8	9	10	11
Single sight length En	260	300	320	350	400

other Sizes on request n= number of sight openings

One sight opening ⇨ E= En
Sight openings staggered ⇨ E= nxEn - (n-1)xÜ

Size marking for several sight openings:

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

e.g. 7/2v

Valves:

Valve	Type
Shutoff valve	A130, A150, A220
Drain valve	AV500, AV520, AV540, AV550, AV56_, AV57_

4.2 Type of connection

Standard : flanges according to DIN

On request : flanges according to ASME B16.5
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.

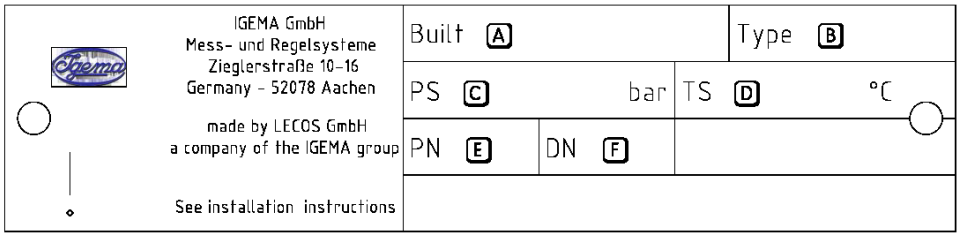
4.4 Application limits

Max. all. pressure **PS**	[bar]	32	50	80
Max. all. temperature **TS**	[°C]	239	265	296

4.5 Corrosion resistance

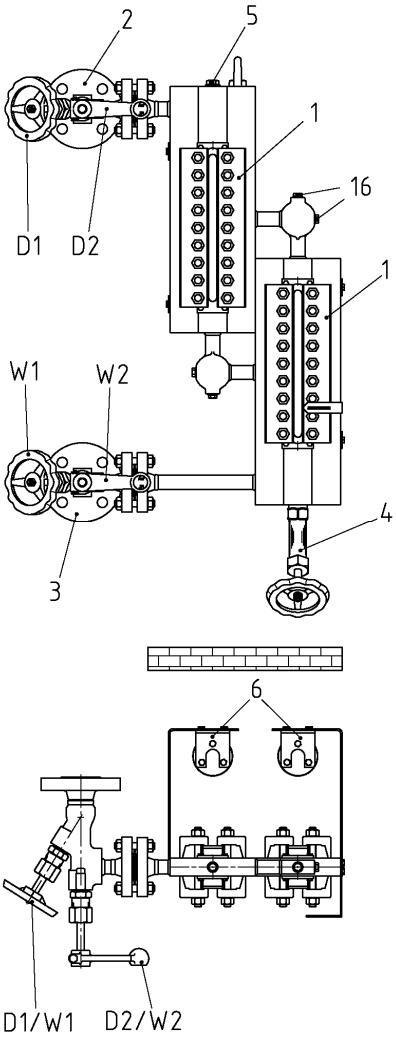
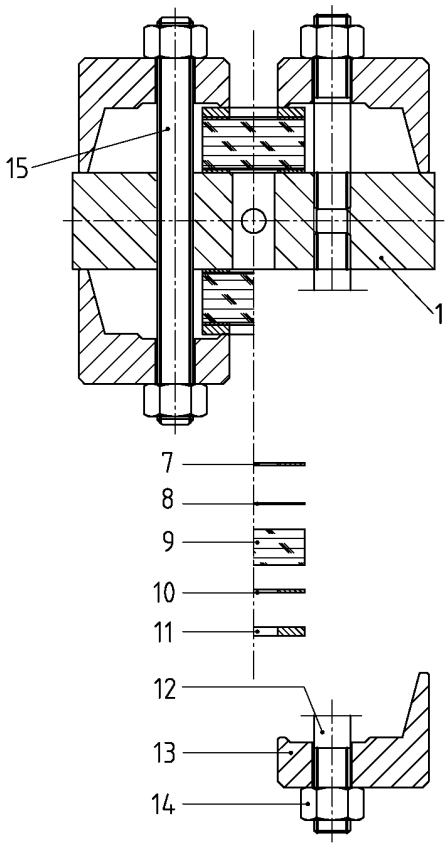
The safety of the unit is not influenced by corrosion if it is used as intended.

4.6 Identification plate / Marking



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

Lateral connection	Cross section level gauge
	

(1) Glass/mica holder
(2) Upper shutoff valve
(3) Lower shutoff valve
(4) Drain valve
(5) Plug G½
(6) Illumination
(7) Sealing
(8) Mica shield
(9) Glass
(10) Sealing (used as Cushion)
(11) Pressure plate
(12) Stud
(13) Cover rail
(14) Hexagon nut
(15) Cover screw
(16) Plug G¼ (staggered version)

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 transparent 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

Only use the lamp in *explosion-proofed* rooms!
Only skilled and qualified electricians may carry out assembly and connection of the lamps!
Never insulate illumination devices!

Mount the illumination device with the fixing elements on the level gauge.

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 glass/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 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, 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.

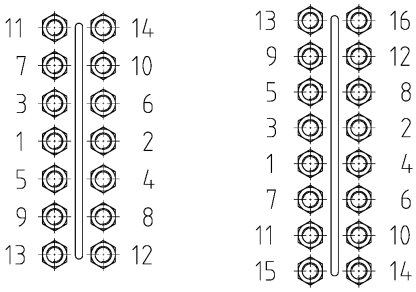
Cover screws

- The cover screws (12, 15) have been tightened in our factory with the corresponding tightening torques (see table 1) 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 (12, 15) in several steps using successively opposite diagonal tightening from top to bottom (see table chapter 8.6) until tightening torque **Md $_{max}$** is reached.

Uneven number Even number (screw rows)



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 (6, 6a) 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 trough 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 (14) of cover screws (15) and holding screws (12) (every second nut from top and bottom).
- Remove cover rails (13), pressure plate (11), sealing used as cushion (10), glass (9), mica shields (8) and sealing (7).
- 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 (12,15) with suitable lubricant.
- For installation order see cross section of level gauge.
- Tighten cover screws (12, 15) in several steps using successively opposite diagonal tightening from top to bottom (see table chapter 8.6) until tightening torque $\mathbf{Md}_{\mathbf{max}}$ 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
20-80	35	60	**65**	**-**	-	-

9. Shutoff valve

Type marking:

A	1	30, 50
A	2	20
Shutoff valve	Number of shutoff possibilities	Serial no.

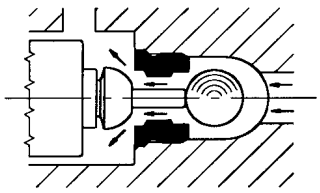
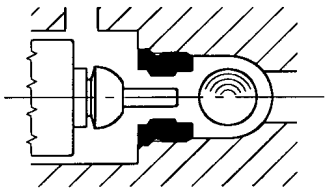
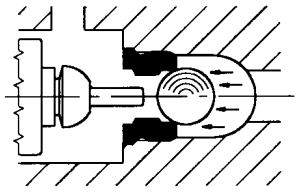
9.1 General information and operating instructions

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 clockwisely to close the valve.
Turn handlever/handwheel counterclockwisely to open the valve.

Tools to increase hand torque are not permitted.

Turn valve spindles counterclockwisely 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

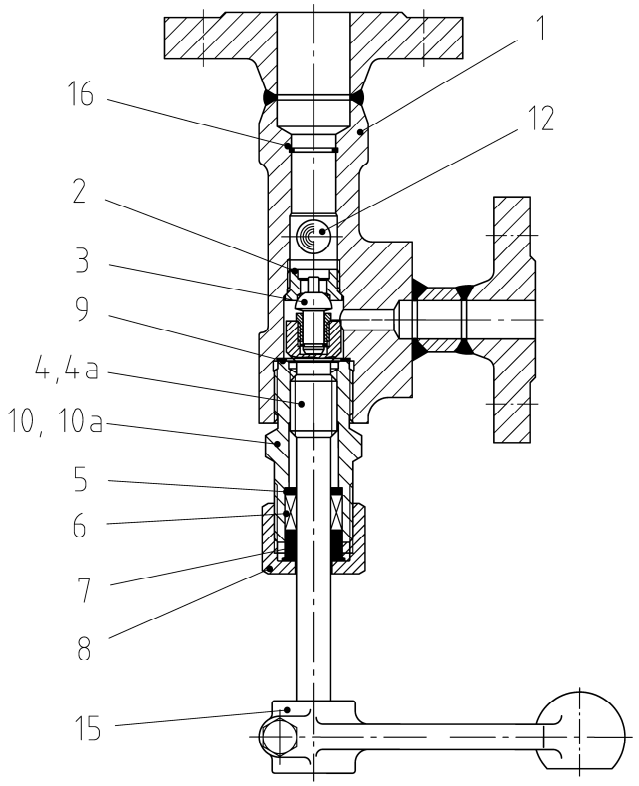
Functioning of self-closing ball is only guaranteed if valve is fully opened. Residuals (dirt, welding beads etc.) can set self-closing ball out of service.

9.2 Construction

A130, 150

- Lateral connection flange
- always equipped with handlever

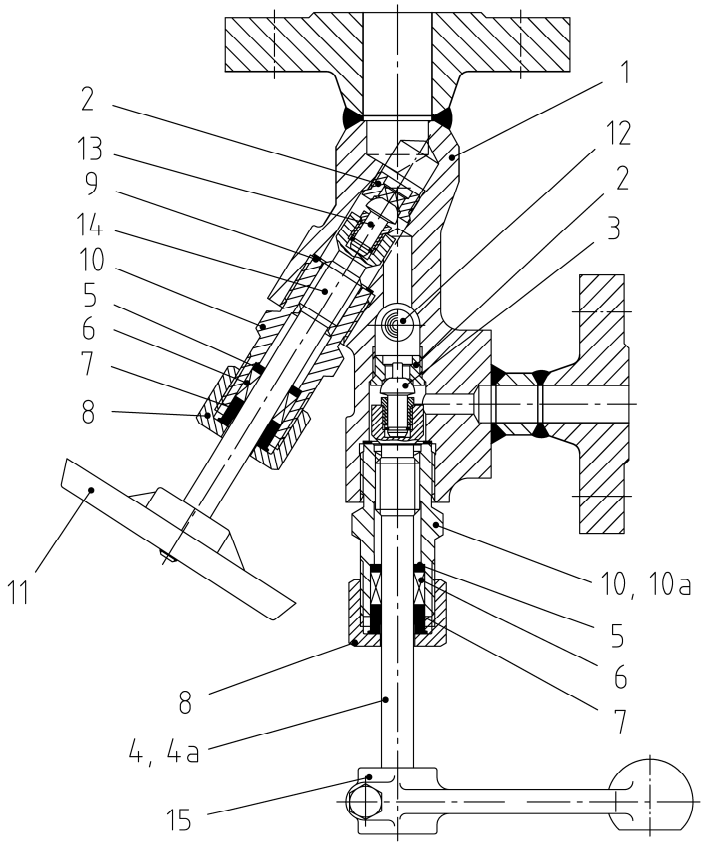
- On request: with quick closing spindle



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

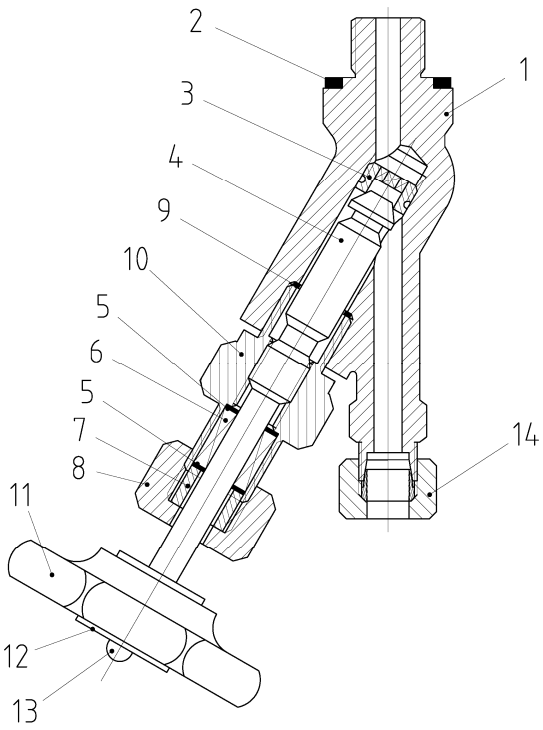
1. Grease thread of valve spindle (4, 4a, 14) and screw in valve spindle in upper part of valve (10, 10a) as far as it will go.
2. Insert base ring (5), gland packing (6) and stuffing box (7).
3. Screw on screw cap (8) and tighten gradually.
   - spindle has to stay movable -
4. Screw in complete upper 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, AV520

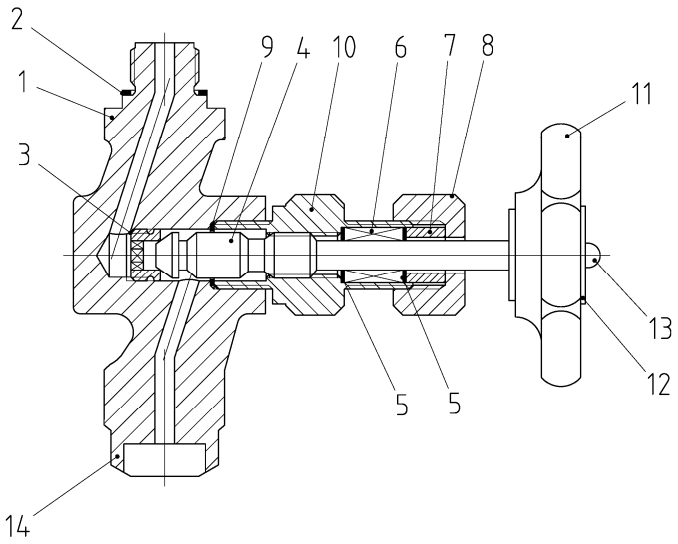
- Male thread G½ on input side
- Output side with cutting ring connection ø 12 as per DIN 2353 – DS12



AV540, AV550

- Male thread G½ on input side
- Output side with welding end

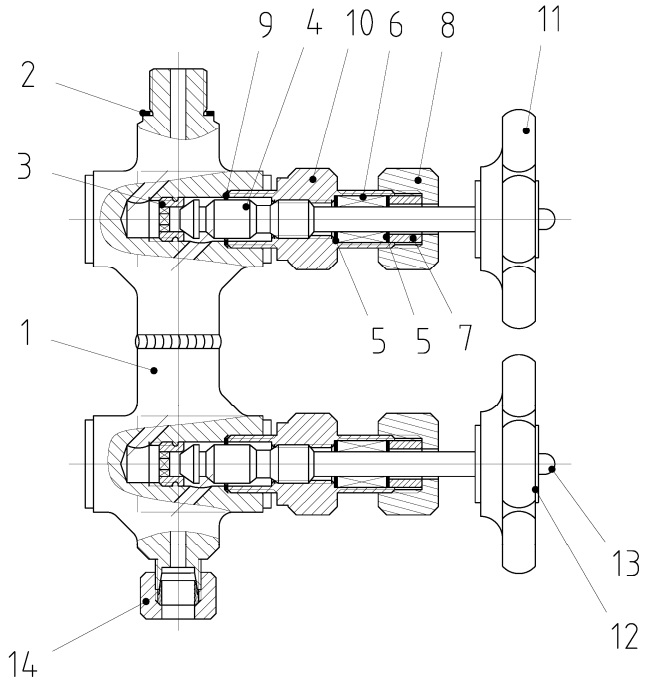
- On request other connections possible



AV56x, AV57x

- Male thread G½ on input side
- Output side with cutting ring connection ø12 as per DIN 2353 – DS12

- On request other connections possible



(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 ø 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
  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) clockwisely 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 Nm**.
- Place handwheel (11) and tighten cap nut (13).

Replacement of complete upper part:

- For dismounting 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 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

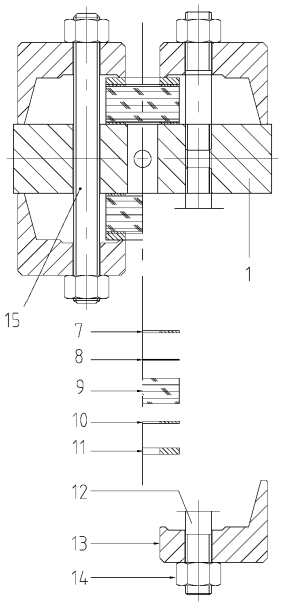
Always indicate article no. and serial no. (indicated on the identification plate) in case of spare parts order!

12.1 Transparent level gauge

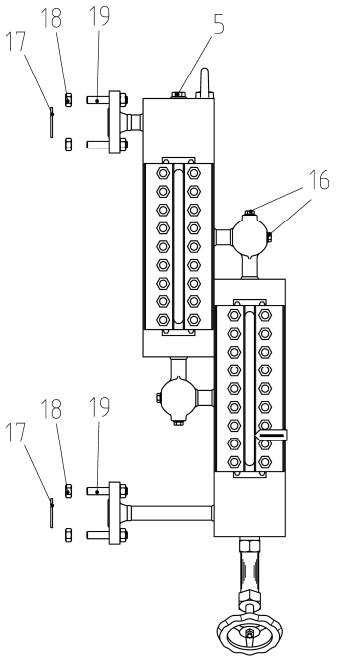
n = number of sight openings

Pos. no.	Designation	Qty.	Article no.						
			Size						
			5	6	7	8	9	10	11
7	Sealing	nx2	40-00074	40-00075	40-00076	40-00077	40-00078	40-00079	40-00081
8	Mica shield	nx2	40-00951	40-00952	40-00953	40-00954	40-00955	40-00956	40-00957
9	Glass	nx2	40-00003	40-00004	40-00005	40-00006	40-00007	40-00008	40-03846
10	Sealing (used as Cushion)	nx2	40-00074	40-00075	40-00076	40-00077	40-00078	40-00079	40-00081
11	Pressure plate	nx2	40-00425	40-00426	40-00427	40-00428	40-00429	40-00430	40-00420
13	Cover rail DIN	nx4	25-00780	25-00781	25-00782	25-00783	25-00784	25-01040	25-00785
	Cover rail ASME	nx4	25-04328		25-01641	25-01867	25-01706	25-03528	25-03660

Pos. no.	Designation		Article no.	Quantity						
				Size						
				5	6	7	8	9	10	11
15	Cover screw	DIN	40-00358	nx10	nx12	nx14	nx16	nx18	nx20	nx24
		ASME	40-01545							
14	Hexagon nut	DIN	40-00583	nx28	nx32	nx36	nx40	nx44	nx48	nx56
		ASME	40-01369							
12	Stud	DIN	40-00585	nx8						
		ASME	40-01368							
16	Screw plug		40-00316	4						
	Sealing ring		40-00114	4						
5	Screw plug		40-00329	1						
	Sealing ring		40-00099	1						

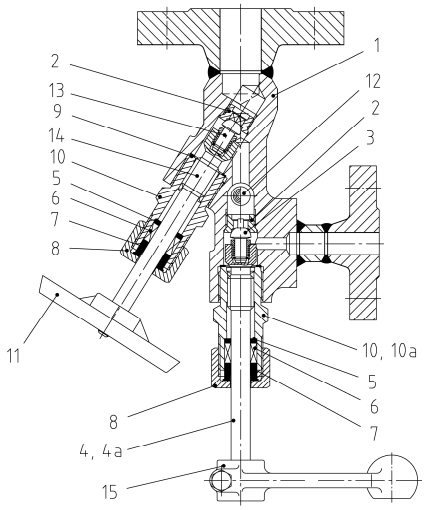


Pos. Nr.	Designation	DIN 2690 DIN 2697 ASME B16.5	Article-no.		Quantity
			DIN	ASME	
18	Sealing ring	PN25-PN40	40-00156		2
20	Bolt		40-00350		8
19	Hex nut		40-00583		16
18	Sealing	PN63-PN100	40-00206		2
20	Bolt		40-00352		8
19	Hex nut		40-00583		16
18	Sealing	Class 300		40-01536	2
20	Bolt			40-01713	8
19	Hex nut			40-00741	16
18	Sealing	Class 600		40-01536	2
20	Bolt			40-01540	8
19	Hex nut			40-00741	16



12.2 Shutoff valve

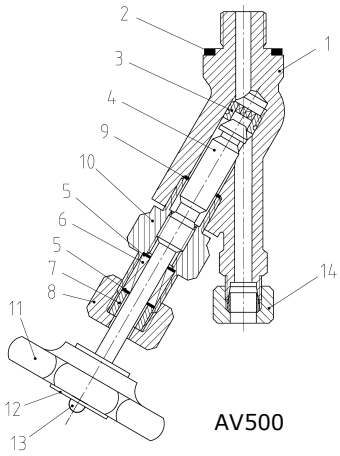
Pos. no.	Designation	Article no. A130, A150	Article no. A220
2	Seat	15-00116	15-00115
3	Cone set with stud		
12	Ball		
2	Seat		15-00114
13	Cone set without stud		
4	Valve spindle	25-00126	
4a	Quick closing valve spindle	25-00553	
14	Valve spindle (inclined part)		25-00652
9	Sealing ring	40-00117	
5	Base ring	15-00113	
6	Gland packing		
7	Stuffing box		
8	Screw cap	25-00008	
11	Complete handwheel		15-00237
15	Complete handlever	15-00338	
16	Retaining spring	40-00342	



A220

12.3 Drain valve

Pos. no.	Designation	Max. Pressure PS [bar]	Article no. AV500, AV520	Article no. AV540, AV550, AV56x, AV57x
-	Complete valve	32	40-01803	On request
-	Complete valve	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	



AV500

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*.

Created: Düsseldorf	Authorized:	Date: 05.10.2010