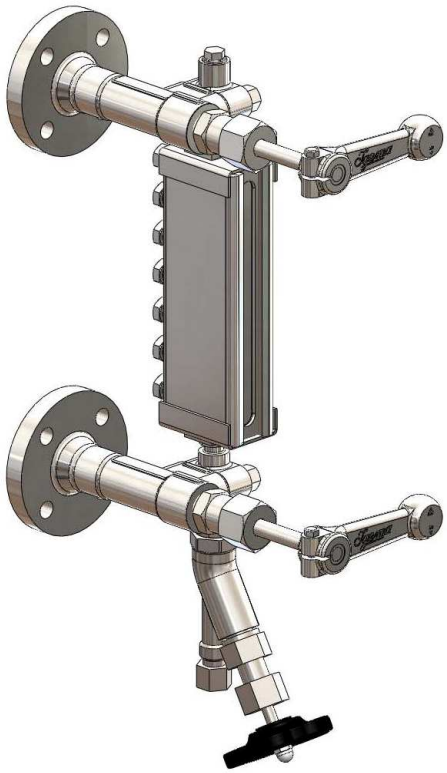
IGEMA GmbH
Measuring and control systems

Mounting and operating instructions

Reflex level gauge

LG40



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EUROPEAN VALVE ALLIANCE

GB

-ⓘTable of contents-

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!

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

Reflex level gauge:
The reflex level gauge LG40 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 97/23/EEC art. 3 par. 3 SEP (Sound Engineering Practice).
Applied rules as per TRD/AD2000 or ASME-Boilers.

3. Explanations

3.1 Scope of supply

LG40:

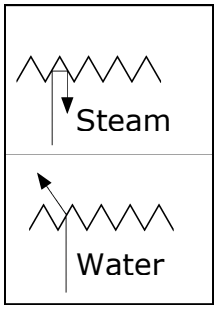
The unit is delivered as complete unit (see page 9):
1 level gauge (1)
1 upper shutoff valve (2)
1 Lower shutoff valve (3)
1 drain valve (4)

3.2 System description

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

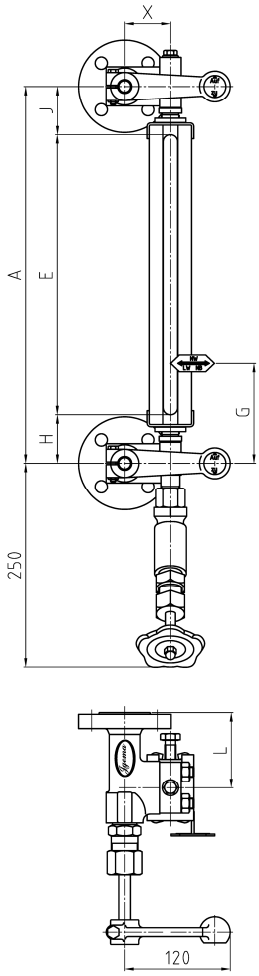
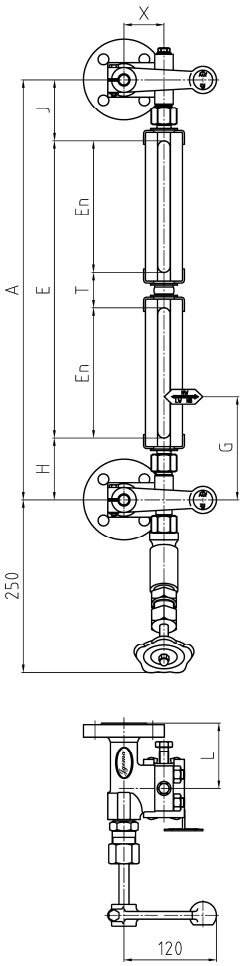
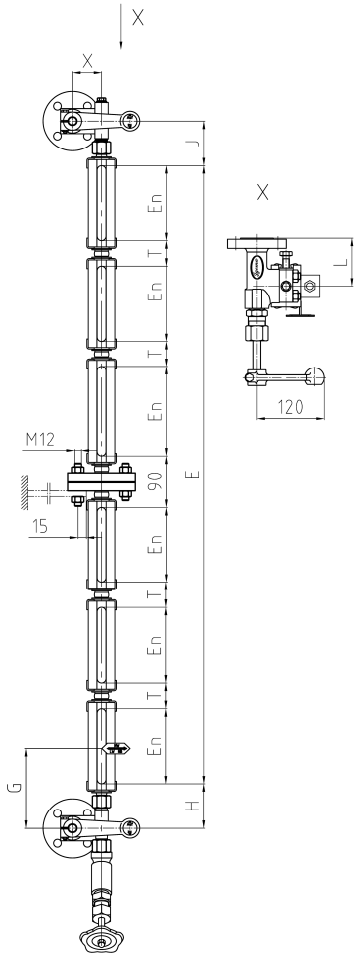
3.3 Function

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	
	Standard version	Divided version (starting from E>1700mm)
	 T= Dead space	 T= Dead space

Sight openings:

One sight opening	Size	5	6	7	8	9	10	
	Sight length E	200	230	260	300	320	350	
Sight openings superposed	2ü	445	505	565	645	685	745	
	3ü	690	780	870	990	1050	1140	
	4ü	935	1055	1175	1335	1415	1535	
	5ü	1180	1330	1480	1680	1825	1975	Divided version
	6ü	1425	1605	1830	2070	2190	2370	
	7ü	1715	1925	2135	2415	2555	2765	
	8ü	1960	2200	2440	2760	2920	3160	
	9ü	2205	2475	2745	3105	-	-	
	10ü	2450	2750	3050	3450	-	-	

Valves:

Valve	Type
Shutoff valve	A110, A120, A210
Drain valve	AV500

4.2 Type of connection

Standard : flanges according to DIN 2635

On request : flanges as per ASME
buttwelding ends according to DIN or ASME

4.3 Materials

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

4.4 Application limits

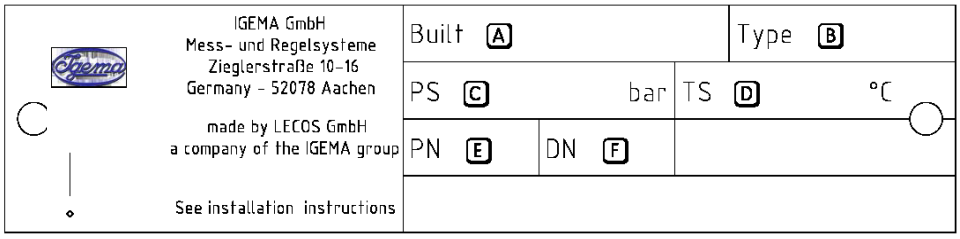
Max. allowable pressure **PS**	[bar]	32
Max. allowable temperature **TS**	[°C]	239

4.5 Corrosion resistance

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

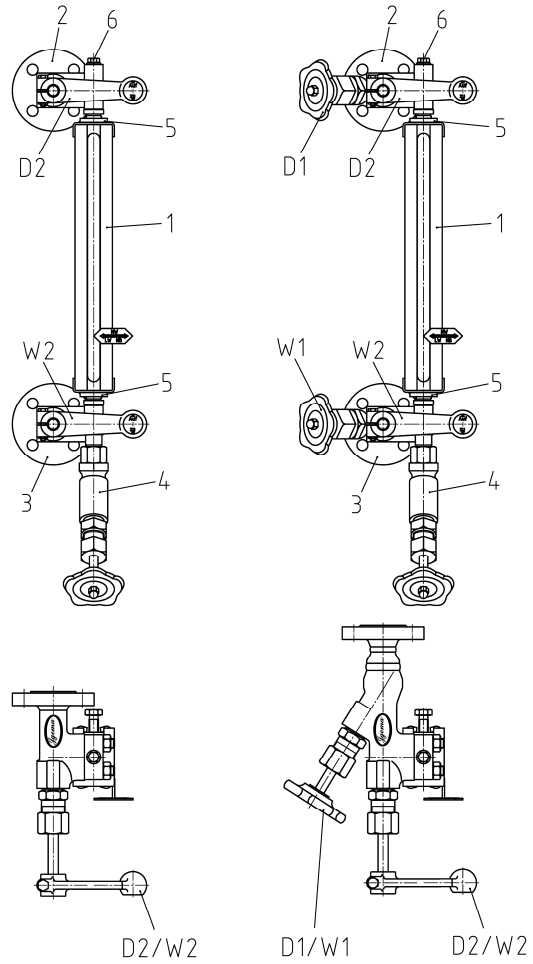
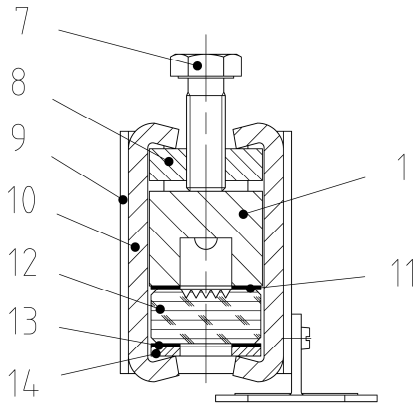
4.6 Identification plate / Marking

The following data are indicated on the identification:



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

5. Construction

LG40	Cross section level gauge
	

(1) Glass holder
(2) Upper shutoff valve
(3) Lower shutoff valve
(4) Drain valve
(5) Clamping bolt
(6) Plug
(7) Pressure screw
(8) Screw holder
(9) Locking
(10) Clamping ring
(11) Sealing
(12) Glass
(13) Cushion
(14) Pressure plate

6. Assembly

6.1 Version with flange

- Respect installation position!
- Remove protecting 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 buttwelding end

- Respect installation position!
- Remove protecting 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 Indication direction

To change indication direction:

- unfasten clamping bolts (5)
- turn glass holder (1) into desired direction
- re-tighten clamping bolts (5)

7. Commissioning

7.1 Commissioning of unit together with the boiler

Check specifications of material, pressure and temperature!

- Close drain valve / plug.
- 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 steam until operating temperature is reached.
- Closed drain valve.
- Slowly open upper shutoff device (D2) and lower shutoff device (W2) as far as it will go. Wait for alignment of water level. (If water level is not visible, see special operating instructions shutoff valves / drain valve)
  (If water level is not visible, see 9.1 General information and operating instructions "self-closing ball")

7.3 Re-tightening of screws

All screw connections except pressure screws

- Before commissioning of level gauge, check all screw connections: plugs, valve and flange connections and screw caps of shutoff valves / drain valve (see special operating instructions shutoff valves / drain valve.
- We suggest to observe the level gauge especially during first days after commissioning.
- Re-tighten firmly screw connection where leakage appears.

Pressure screws

- Pressure screws have been tightened and tested in our factory with the corresponding tightening torques (see table chapter 8.6). Never re-tighten pressure screws during mounting / commissioning.
- Check if level gauge shows any leakages especially during 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 pressure has escaped.
- Re-tighten pressure screws from top to bottom in several steps (see table chapter 8.6) starting in the centre and using successively opposite diagonal tightening up to a tightening torque of **Md_{max} = 60 Nm**.

8. Maintenance

8.1 Leakage

Re-tighten corresponding screw connection in case of leakage
See point 7.3 (Re-tightening of screws).

If necessary, replace gasket and check sealing surface.

Severe burns and scaldings on the whole body are possible!
Replace gaskets only if level gauge is empty and pressureless!

8.2 Cleaning of glasses

During first commissioning or re-commissioning, oil or grease residues can deposit on the inside of the glass.
In this case:

- Close shutoff valves (2,3).
- After removing plug (6), the glasses and channel of the gauge body can be cleaned with a circular brush.

8.3 Cleaning / purging of level gauge

- Close upper and bottom shutoff devices (D1,D2,W1,W2).
- Open drain valve (4), hence unit is drained. Normally, the cleaning is finished now.
- For commissioning see point 7.

If cleaning was not sufficient:

- Close upper and bottom shutoff device (D2,W2).
- Open upper and bottom shutoff device (D1,W1) (if exists) and drain valve (4). Following that, slowly open upper shutoff device (D2) and steam flowing through the unit cleans the glasses.
- Close upper shutoff device (D2) and drain valve (4) again.
- For commissioning see point 7.

If this cleaning was not sufficient, replace glass.

8.4 Exchange of glass

Always place new glass, new gasket and new cushion!

- Close shutoff devices (D1,D2,W1,W2).
- Open drain valve (4), hence unit is drained.
- Unfasten pressure screws (7) and remove.
- Remove upper clamping (9).
- Remove right clamping ring (10), pressure plate (14), cushion (13), glass (12), gasket (11) and screw holder (8).
- Remove completely remaining gasket and cushion parts.
- Clean sealing surface of gauge body as well as contact surface of pressure plate.

8.5 Assembly:

- Insert sealing (11), glass (12), cushion (13) and pressure plate (14). ***Install glass with grooves turned to the medium!***
- Grease pressure screws (7) with suitable lubricant, screw into screw holder (8) and insert.
- Insert clamping ring (10).
- Install clamping (9).
- Tighten pressure screws loosely and then in several steps according to the table (see point 8.6) starting in the centre using successively opposite diagonal tightening up to a tightening torque **Md_{max} = 60 Nm**.
- For re-commissioning see point 7.

8.6 Tightening torques

Max. Pressure PS	Tightening torque Md → **Md_{max}** [Nm]		
	steps		
	1	2	3
32	30	45	**60**

9. Shutoff valves

Characteristics:

A	1	10
A	1	20
A	2	10
Drain valve	Quantity of shutoff possibilities	Serial no.

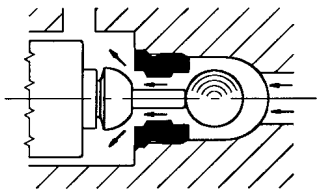
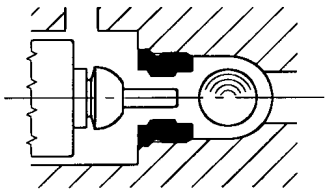
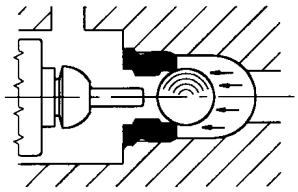
9.1 General information and operating instructions

IGEMA valves are mostly maintenance-free and allow an easy handling. All IGEMA valves seal metallically and are hand-operated. 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 the hand torque are not allowed.

The shutoff valve is equipped with self-closing ball (standard).
The self-closing ball is a safety device which automatically closes the valve passage of the shutoff valves on the process side if level gauge is damaged accidentally (glass break).
Residuals in piping or 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/mica break or incorrect commissioning

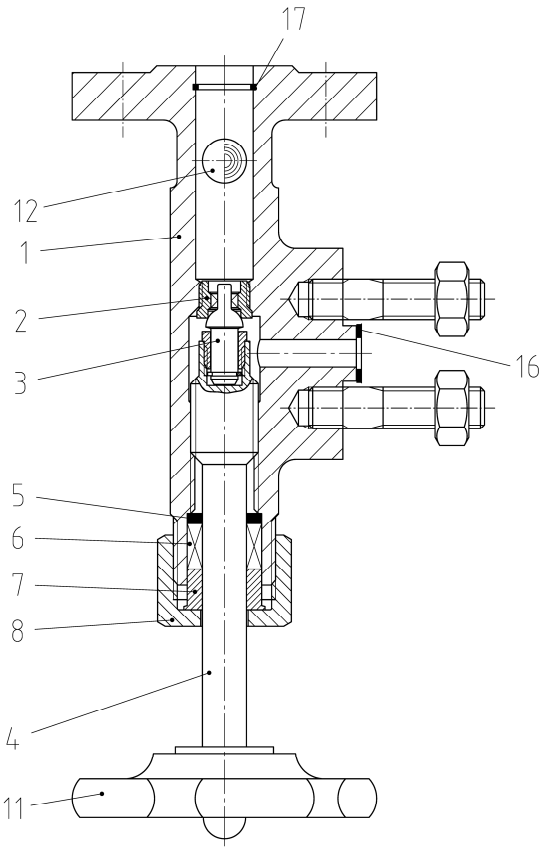
Functioning of self-closing ball is only guaranteed if valve is fully opened. Residuals (dirt, welding beads etc.) can set self-closing ball out of service.

9.2 Construction of the valves

A110

- Lateral connection M12x32
- Standard version with handwheel

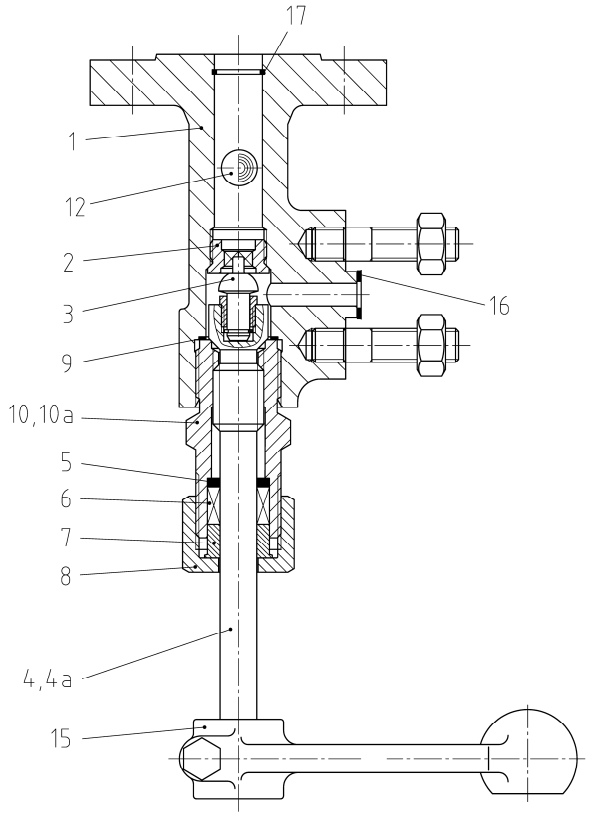
- On request: with handlever



A120

- Lateral connection M12x32
- Always equipped with handlever

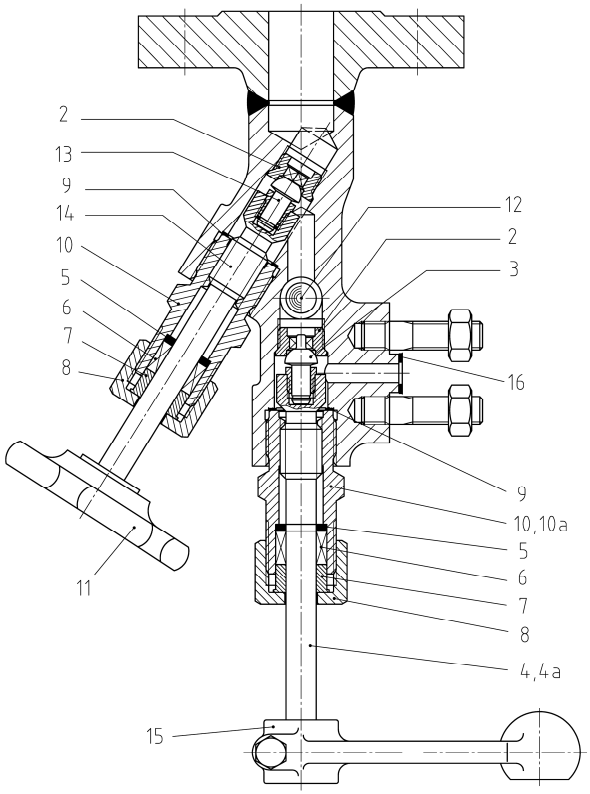
- On request: with quick closing spindle



A210

- Lateral connection M12x32
- 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
(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) Sealing ring
(17) 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!

- Slightly open shutoff valves with self-closing ball on boiler nozzles containing steam and water counterclockwisely for approximately 5 minutes 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).
  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 valve housing (1). (This step is not applicable for the valve A110)
- Unfasten screw cap (8) and remove valve spindle (4,4a,14) from valve housing (1) / upper part of valve (10,10a).
- Remove and replace cone set (3,13).
- Screw out seat (2) with socket wrench (A110=SW8 / A120,A210=SW10).
- Remove ball (12), check and replace if necessary.
- Grease thread of new seat (2) and screw in.
  A110 ⇨ **55 Nm**
  A120,A210 ⇨ **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). (This step is not applicable for the valve A110)
- Unfasten handwheel (11) / handlever (15).
- Unfasten screw cap (8) and screw out valve spindle (4, 4a, 14) from valve housing (1, 1a) / upper part of valve (10, 10a).
- Remove packing set (5, 6, 7).
- Carefully remove deposits on valve spindle (4, 4a, 14).
- For assembly see chapter 9.5.

9.5 Assembly

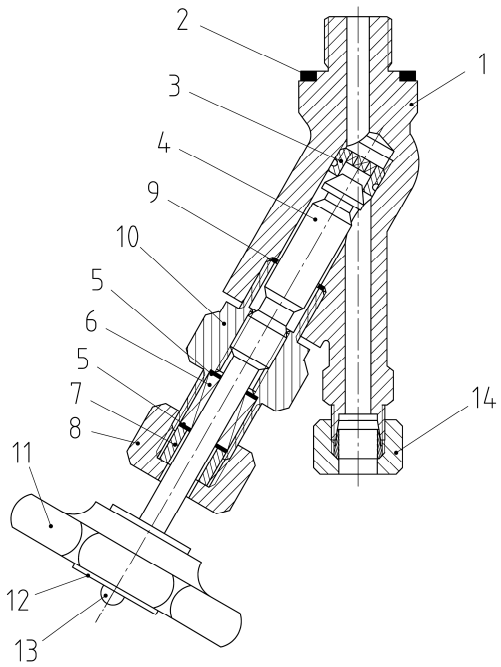
1. Grease thread of valve spindle (4,4a,14) and screw in valve spindle in valve housing (1) / upper part of valve (10,10a).
2. Insert base ring (5), gland packing (6) and stuffing box (7).
3. Screw on screw cap (8) and tighten gradually.
   - spindle has to stay movable -
4. Screw in complete upper part of valve (10, 10a) with new sealing ring (9) into valve housing (1) with tightening torque **M_d max = 280 Nm**
   (This step is not applicable for the valve A110)
5. Fix handwheel (11) / handlever (15).
6. Close shutoff device.

10. Drain valve

10.1 Construction

AV500

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



(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) Cutting ring 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.
- Assemble drain piping (tube ø 12x1, material St 35.8) on provided pipe union (14) as per DIN 2353 (on the part of the builder).

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.
- Insert 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 valves on steam and water holding stud. Close shutoff device of main unit at the A210.
  - 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

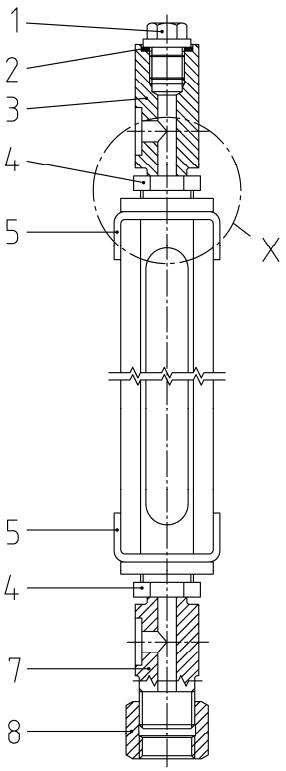
n = number of sight openings

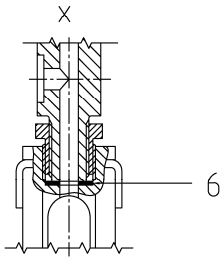
Pos. no.	Designation	Article no.	Qty.
1	Plug	40-00316	1
2	Sealing ring	40-00114	
3	Upper connection stud	25-01660	
4	Clamping bolt	25-00128	2
5	Locking	40-00431	nx2
6	Sealing ring	40-00137	2
7	Lower connection stud	25-01661	1
8	Tension adjusting nut	25-00046	1

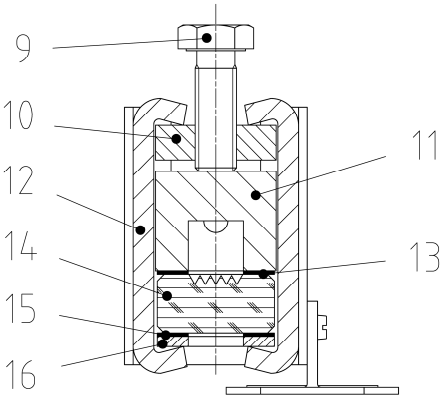
Pos. no.	Designation	Article no.	Quantity								
			Size								
			2	3	4	5	6	7	8	9	10
9	Pressure screw	40-04299	nx5	nx6	nx6	nx7	nx8	nx9	nx10	nx11	nx12

Pos. no.	Designation	Qty.	Article no.			
			Size			
			2	3	4	5
10	Screw holder	nx1	25-03241	25-02008	25-02009	25-02010
11	Glass holder	1	depending on the order			
12	Clamping ring	nx2	25-00055	25-00056	25-00057	25-00058
13	Sealing	nx1	40-00071	40-00072	40-00073	40-00074
14	Glass	nx1	40-00045	40-00046	40-00047	40-00048
15	Cushion	nx1	40-00082	40-00084	40-00085	40-00086
16	Pressure plate	nx1	40-00422	40-00423	40-00424	40-00425

Pos. no.	Designation	Qty.	Article no.				
			Size				
			6	7	8	9	10
10	Screw holder	nx1	25-02011	25-02012	25-02013	25-02014	25-02015
11	Glass holder	1	depending on the order				
12	Clamping ring	nx2	25-00059	25-00060	25-00061	25-00062	25-00063
13	Sealing	nx1	40-00075	40-00076	40-00077	40-00078	40-00079
14	Glass	nx1	40-00049	40-00050	40-00051	40-00052	40-00053
15	Cushion	nx1	40-00087	40-00088	40-00089	40-00090	40-00091
16	Pressure plate	nx1	40-00426	40-00427	40-00428	40-00429	40-00430

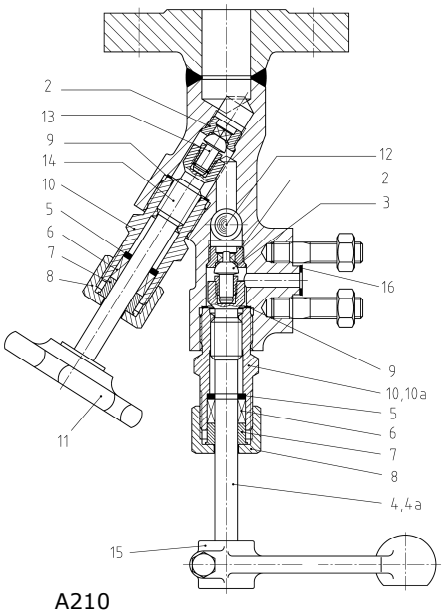






12.2 Shutoff valve

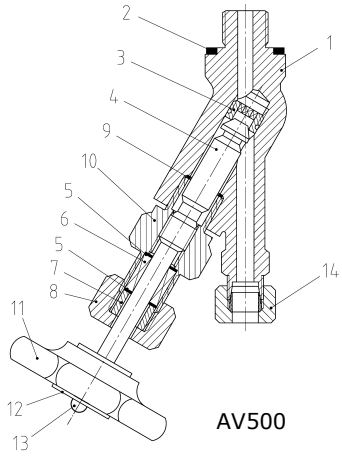
Pos. no.	Designation	Article no. A110	A120	A210
2	Seat	15-00118	15-00116	15-00115
3	Cone set with stud			
12	Ball			
17	Retaining spring	40-00342		
2	Seat			15-00114
13	Cone set without stud			
14	Valve spindle (inclined part)			25-00652
4	Valve spindle	25-00003	25-00126	
4a	Quick closing valve spindle	25-00133	25-00553	
9	Sealing ring		40-00117	
5	Base ring	15-00113		
6	Gland packing			
7	Stuffing box			
8	Screw cap	25-00008		
11	Complete handwheel	15-00323		15-00237
15	Complete handlever		15-00338	
16	Sealing ring	40-00109		



A210

12.3 Drain valve

Pos. no.	Designation	Article no. AV500
-	Complete valve	40-01803
3	Seat	40-01864
9	Sealing ring	
4	Spindle with rolled cone	40-01866
5	Scrapper 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, pressure 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 reflex 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.

Manufacturer's declaration

Manufacturer's declaration about the use of the PED directive 97/23/EEC

We, the company:

IGEMA GmbH
LECOS GmbH
J.G. Merckens Mess- und
Regelsysteme GmbH & Co. KG
Zieglerstraße 11 A
52078 Aachen
Deutschland

declare as IGEMA group that the product „reflex level gauge"
as pressure holding parts

type of product:

Reflex level gauge
LG40

comply with the Directive 97/23/EEC.
Due to the low pressure/litre product they are designed and produced
as per article 3, paragraph 3 of SEP.

These products may not receive a CE mark according
to the PED 97/23/EEC.

Applicable standards:
TRD, AD2000, ASME-Boilers

Aachen, 09.11.2006

E.H. Kilchert	A.Scholl	P. Barth
(Managing director)	(QM representative)	(Development)

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:01/2009