



# Installation and operating instructions



## Reflex Level Gauge

LG40-CS

D-02-B-31946-EN-0.doc

Ausgabe 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 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-CS 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 corresponding to the EU 2014/68/EU.

Applied standards as per EN 13445 / EN 12952 / EN 12953 / AD 2000 or ASME-Boiler.

## 3. Explanations

### 3.1 Scope of supply

LG40-CS:

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)

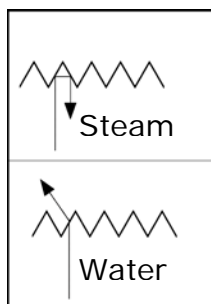
### 3.2 System description

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

### 3.3 Function

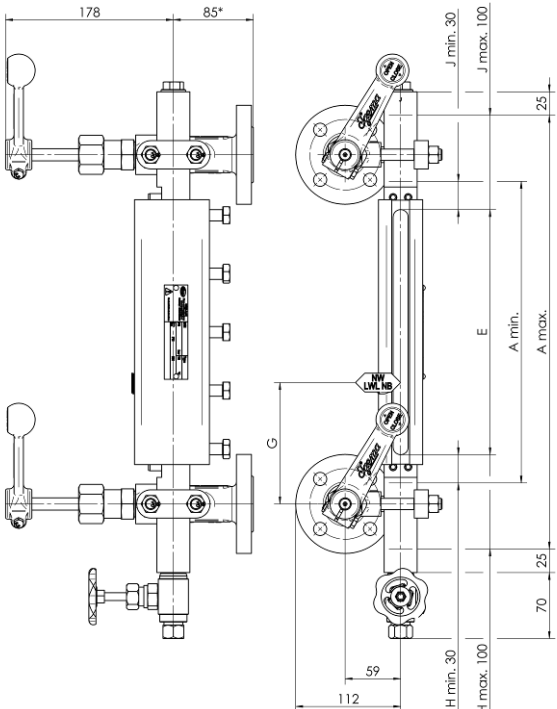
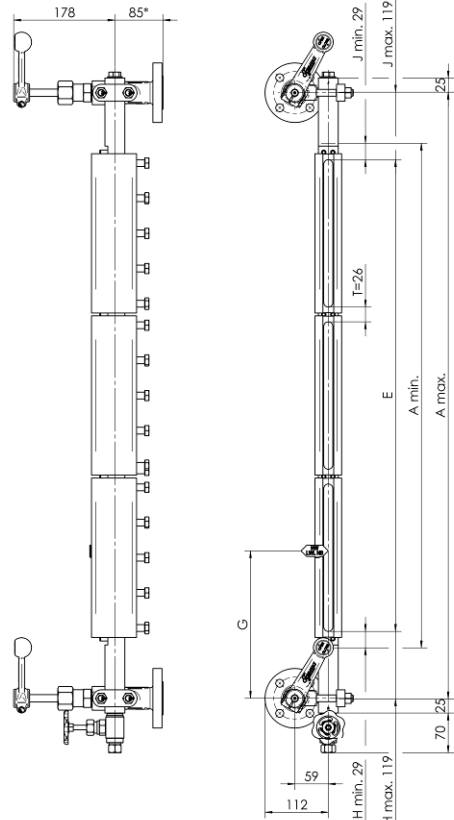
The level gauge works according to the physical law of the communicating tubes.

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 Designs

One sight opening design	On top of each other sight opening design
<p>View show the left sided model</p>  <p>*L=dependent from process connection</p>	<p>View show the left sided model</p>  <p>T=26mm (dead space) *L=dependent from process connection</p>

\*Using an A140-CS valve, dimension are differently. Different dimensions see on data sheet D-09-D-36387-EN

#### Sight openings standard designs:

One sight opening	Size	5	6	7	8	9	10
	Sight lenght	200	230	260	300	320	350
Sight opening on top of each other	2ü	426	486	546	626	666	726
	3ü	652	742	832	952	1012	1102
	4ü	878	998	1118	1278	1358	1478
	5ü	1104	1254	1404	1604	1704	1854
	6ü	1330	1510	1690	1930	2050	2230
	7ü	1556	1766	1976	2256	2396	2606
	8ü	1782	2022	2262	2582	2742	---
	9ü	2008	2278	2548	---	---	---
10ü	2234	2534	2834	---	---	---	

**Valves:**

Valves	Type
Shut-Off valves	A120-CS; A140-CS
Drain valves	AV100

## 4.2 Type of connection

Standard : flanges according to DIN EN 1092-1

On request : flanges as per ASME

Butt welding ends according to DIN or ASME

Socket Welding 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 <b>PS</b>	[bar]	32
Max. allowable temperature <b>TS</b>	[°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 plate:

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

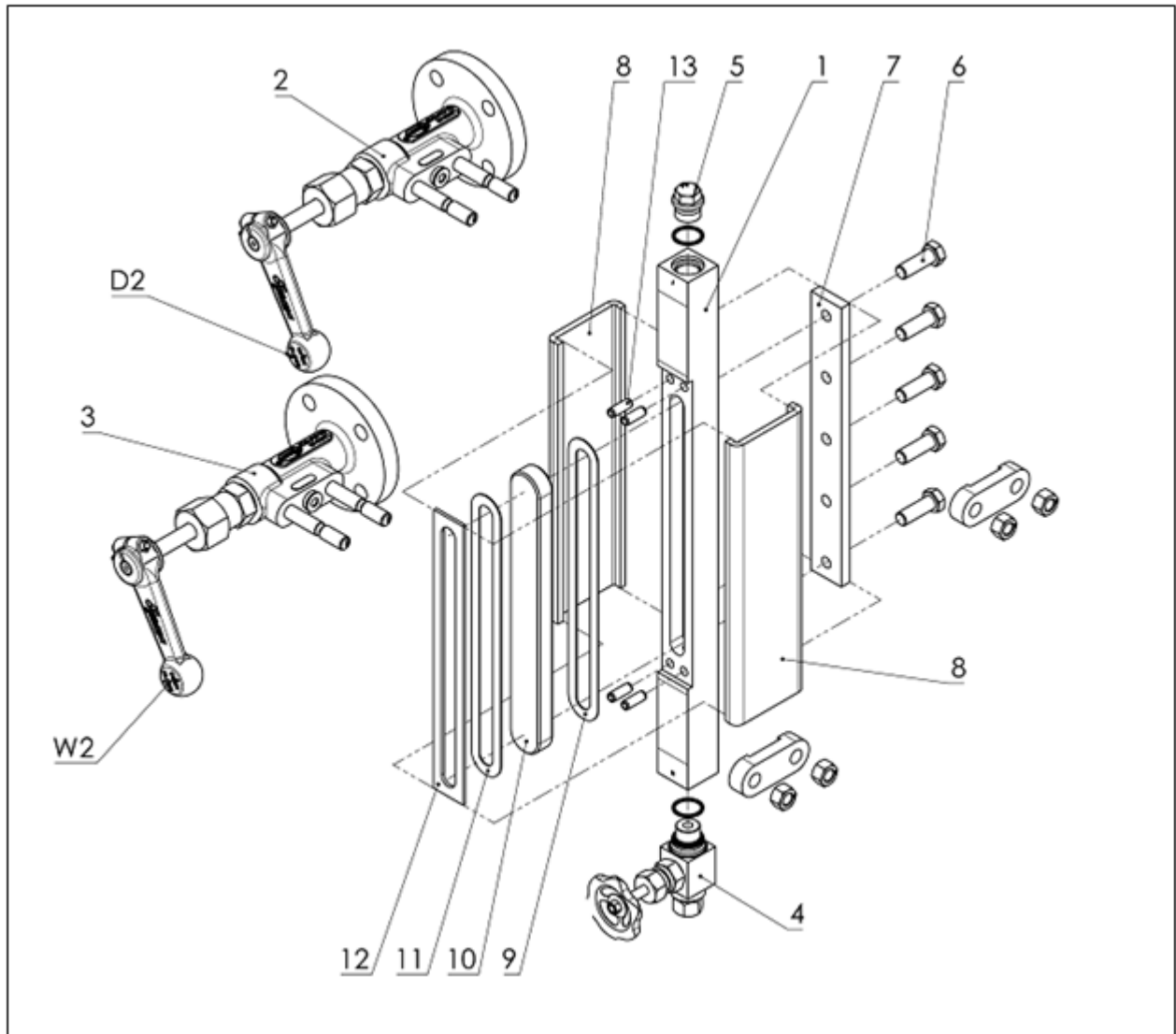
\* marking depending on the realization

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



## 5. Construction

for example: one sight design



## 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 butt welding 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 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 / 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  $Md_{max} = 60 \text{ Nm}$  .

## **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  $Md_{max} = 60 \text{ Nm}$ .
- For re-commissioning see point 7.

## 8.6 Tightening torques

Max. Pressure PS	Tightening torque $Md \rightarrow Md_{max} \text{ [Nm]}$		
	steps		
	1	2	3
32	30	45	<b>60</b>

## 9. Shutoff valves

### Characteristics:

A	1	20
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 metalically and are hand-operated. Sealing of valve spindle is made with a gland packing.

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

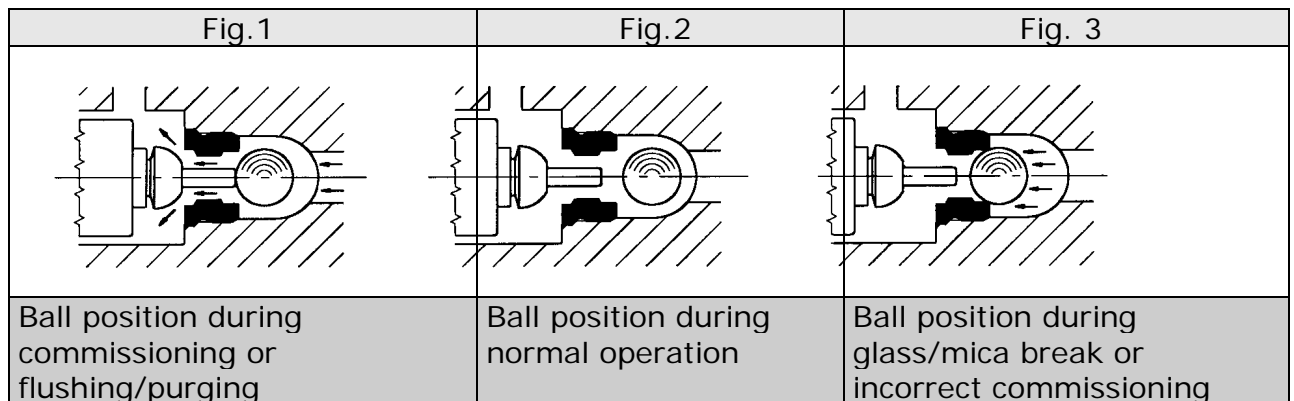
*Turn handlever/handwheel counterclockwisely to open the valve.*

#### **Tools to increase the hand torque are not allowed.**

The shutoff valve is equipped with self-closing ball (standard).

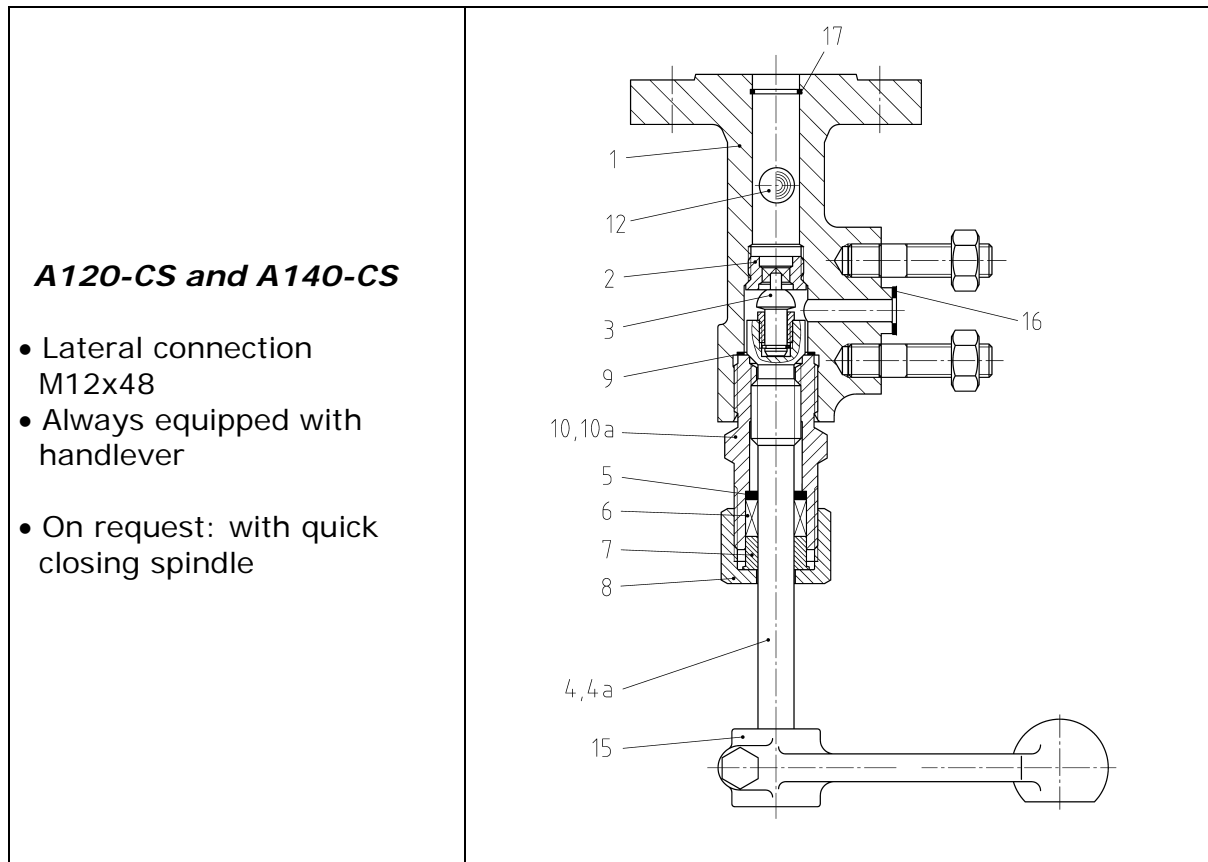
The self-closing ball is a safety device which automatically closes the valve passage of the shutoff valves on the process side if level gauge is damaged accidentally (glass break).

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



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, 10a)	Upper part valve
(3)	Cone set with stud	(12)	Ball
(4, 4a)	Valve spindle, quick closing	(15)	Hand lever
(5)	Base ring	(16)	Sealing ring
(6)	Gland packing	(17)	Retaining spring
(7)	Stuffing box		
(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!

- Slightly open shutoff valves with self-closing ball on boiler nozzles containing steam and water counterclockwise 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).
- 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 .
- Remove ball (12), check and replace if necessary.
- Grease thread of new seat (2) and screw in.  
A120,A210 ⇒ **70 Nm**
- For assembly see chapter 9.5.

### **Replacement of packing set**

#### **[Base ring (5), gland packing (6), stuffing box (7)]**

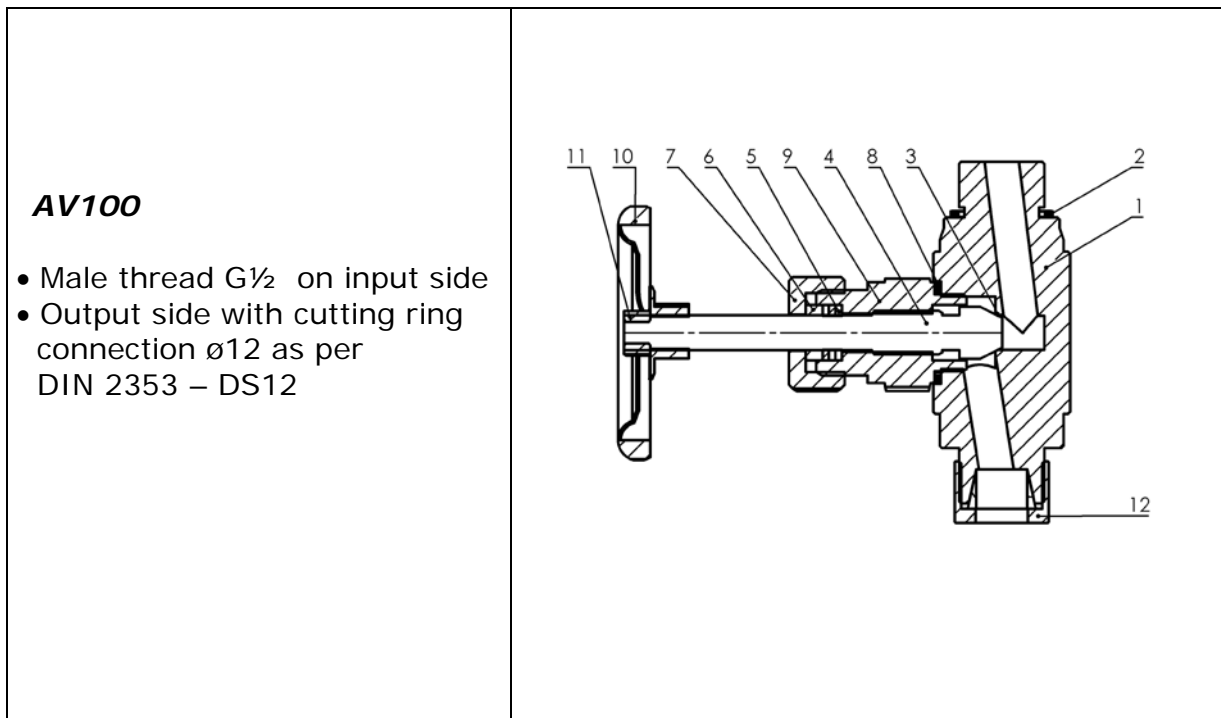
- Screw out upper part of valve (10, 10a) with valve spindle (4, 4a, 14) and remove from valve housing (1).
- Unfasten handwheel (11) / handlever (15).
- Unfasten screw cap (8) and screw out valve spindle (4, 4a, 14) from valve housing (1, 1a) / upper part of valve (10, 10a).
- Remove packing set (5, 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  **$M_d \text{ max} = 280 \text{ Nm}$**   
(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



- |                             |                              |
|-----------------------------|------------------------------|
| (1) Valve housing           | (7) Screw cap                |
| (2) Sealing ring            | (8) Sealing ring             |
| (3) Seat                    | (9) Upper part of valve      |
| (4) Valve spindle with cone | (10) Handwheel               |
| (5) Stuffing box            | (11) Cap nut                 |
| (6) Gland packing           | (12) 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) 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.
- 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!

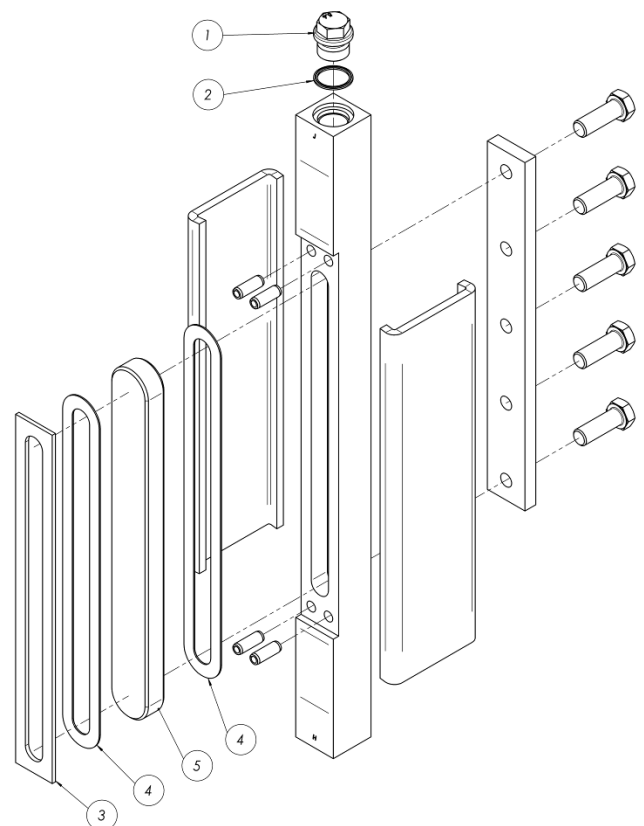
- Check if no further steam escapes at the damaged place.
- **Set boiler pressureless !** Close valves as follows:
  - Close valves on steam and water holding stud. Close shutoff device of main unit at the A210.
  - Slowly open drain valve. Level gauge becomes pressureless and water is drained.
  - For 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!

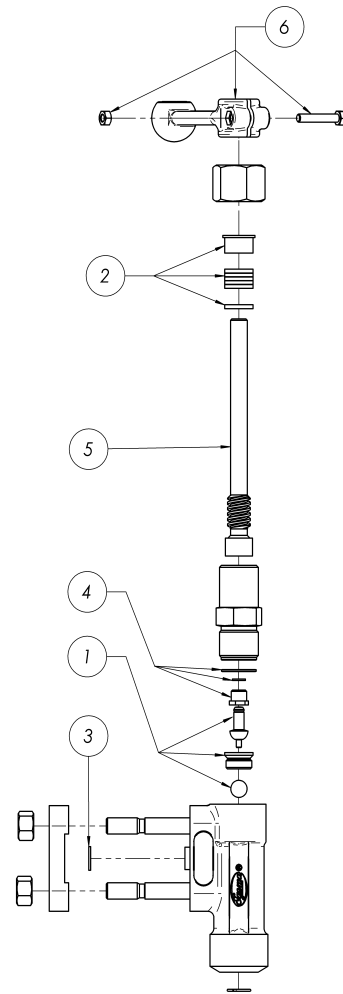
### 12.1 Reflex level gauge

Pos-N.	Designation	Size	Article-N.	Qua.
1	Plug G 1/2"	-	40-00329	1
2	Sealing ring ø21 x ø26 x 1,5 mm	-	40-00099	1
3	Pressure plate	2	40-00422	nx1
3	Pressure plate	3	40-00423	nx1
3	Pressure plate	4	40-00424	nx1
3	Pressure plate	5	40-00425	nx1
3	Pressure plate	6	40-00426	nx1
3	Pressure plate	7	40-00427	nx1
3	Pressure plate	8	40-00428	nx1
3	Pressure plate	9	40-00429	nx1
3	Pressure plate	10	40-00430	nx1
4-5	Spare part package	2	15-13051	nx1
4-5	Spare part package	3	15-13058	nx1
4-5	Spare part package	4	15-13059	nx1
4-5	Spare part package	5	15-13060	nx1
4-5	Spare part package	6	15-13061	nx1
4-5	Spare part package	7	15-13062	nx1
4-5	Spare part package	8	15-13063	nx1
4-5	Spare part package	9	15-13064	nx1
4-5	Spare part package	10	15-13065	nx1
Spare part package consist of 2x seals and 1x glas				
n = number of sight openings				



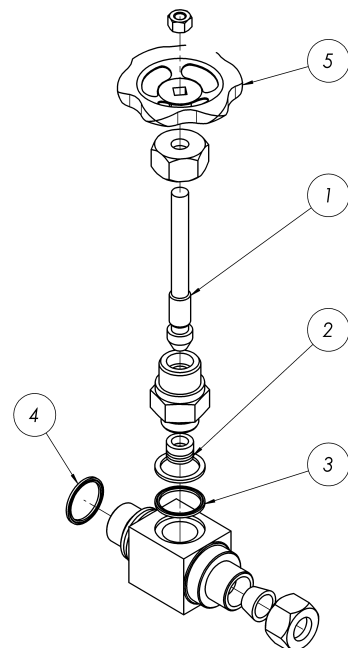
## 12.2 Shut off Valve

Pos-N.	Designation	Article-N.	Qua.
1	Cone set, seat, ball	15-00116	1
2	Packaging unit	15-00113	1
3	Sealing ring $\varnothing 9 \times \varnothing 17,5 \times 1,5$ mm	40-00109	1
4	Sealing ring $\varnothing 22 \times \varnothing 27,5 \times 1,5$ mm	40-00117	1
5	Spindle	25-00126	1
6	Hand lever set	25-00102	1



## 12.3 Drain valve

Pos-N.	Designation	Article-N.	Qua.
1	Spindle with conus	40-11308	1
2	Packaging unit	40-11309	1
3	Sealing ring $\varnothing 20 \times \varnothing 24 \times 1,5$ mm	40-01873	1
4	Sealing ring $\varnothing 21 \times \varnothing 26 \times 1,5$ mm	40-00099	1
5	Hand lever made of sheet steel	-	1



## 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.

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This high-quality IGEMA product was designed, manufactured and tested with the application of the QM System guidelines in accordance with DIN EN ISO 9001:2000.  
If the device supplied indicates transport damage or gives cause for complaint in spite of our final quality control please contact our SERVICE department on telephone 0241- 5687-0 by return.