

USER MANUAL

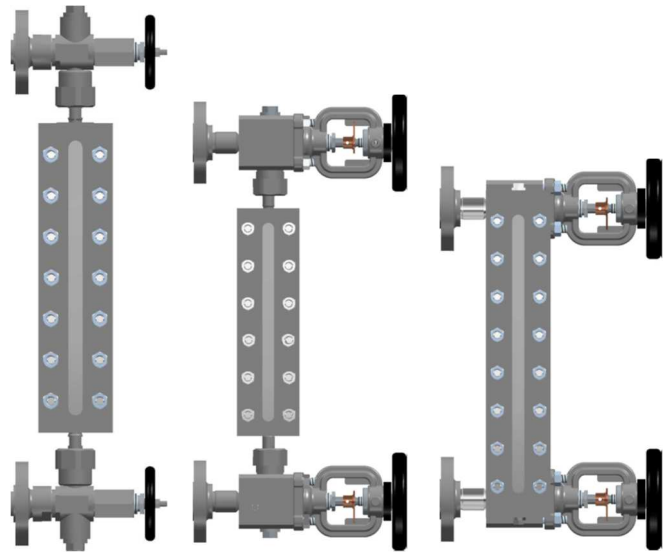
**LIQUID LEVEL GAUGE
WITH A FRAME zGAU**

Fig. 716

**Edition: 1/2024
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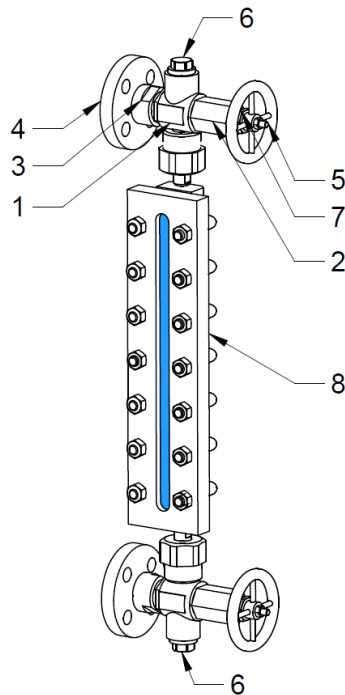
Product description

Liquid level gauges are used to indicate the level of the liquid in pressure vessels with the following operation parameters:

- liquid level gauge 716 version 50, 51, 52, 53, 54, 55 with 705.2 frame PN40 bar, max. temp. 300°C
- liquid level gauge 716 version 60, 61, 62, 63, 64, 65 with 705.2 frame PN40 bar, max. temp. 300°C
- liquid level gauge 716 version 70, 71, 72, 73, 74, 75 with 705.3 frame PN40 bar, max. temp. 300°C
- liquid level gauge 716 version 50, 51, 52, 53, 54, 55 with 703 frame PN63 bar, max. temp. 300°C
- liquid level gauge 716 version 60, 61, 62, 63, 64, 65 with 703 frame PN63 bar, max. temp. 300°C

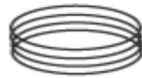
Test and working pressure according to the relevant standards.

Figure 1. Liquid level gauge 716, version with the 708.3 head (5x)



types 50, 51

Version with flange connections



types 52, 53

Version with threaded connections

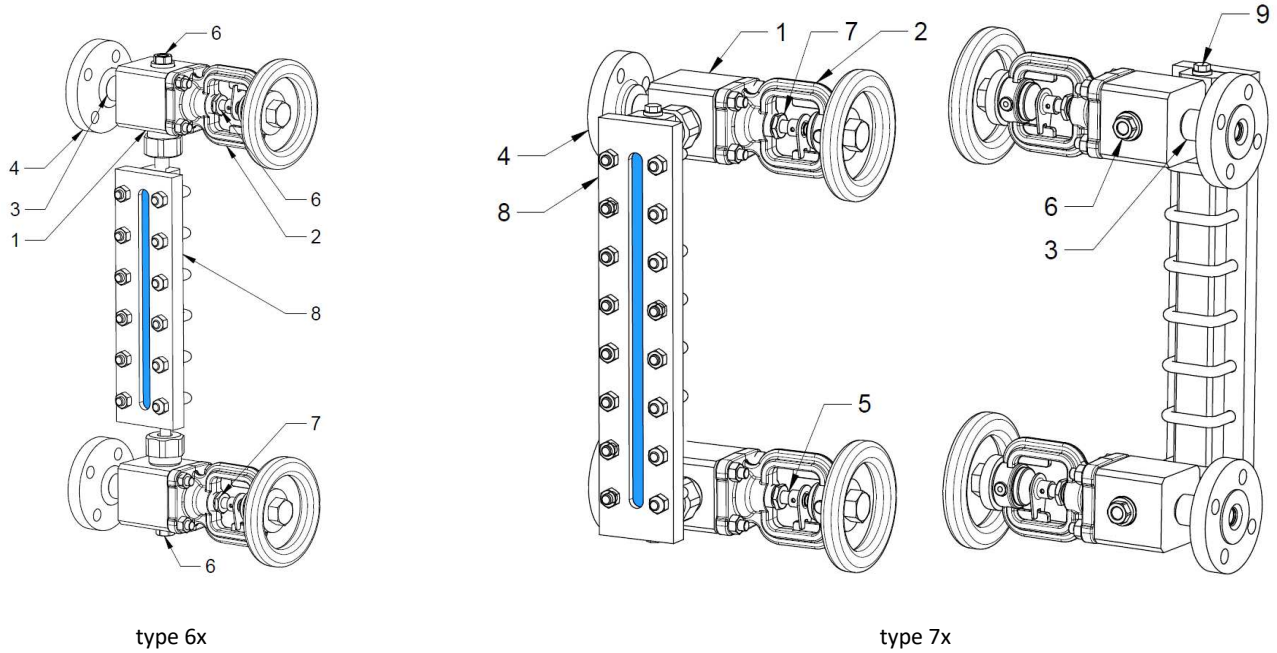


types 54, 55

Version with welding connection

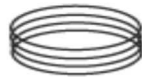
Item	Body material →		N	M
	Detail	Type	50, 51, 52, 53, 54, 55	
1	Head of liquid level gauge	50, 51, 52, 53, 54, 55	P250GH 1.0460	X5CrNi18-10 1.4301
2	Pin		X20Cr13 1.4021	X5CrNi18-10 1.4301
3	Tube		S235JR 1.0037	X6CrNiTi18-10 1.4541
4	Flange	50, 51	Carbon steel	Stainless steel
	Threaded connection	52, 53		
	Welding connection	54, 55		
5	Stem	50, 51, 52, 53, 54, 55	X17CrNi16-2 1.4057	X6CrNiTi18-10 1.4541
6	½" plug		Carbon steel	Stainless steel
7	Gland		X20Cr13 1.4021	X6CrNiTi18-10 1.4541
8	Frame of liquid level gauge	50, 51, 52, 53, 54, 55	S235JR / S275JR / C45 1.0037 / 1.0044 / 1.0503	X5CrNi18-10 1.4301

Figure 2. Liquid level gauge 716, version with the 708.1 head (6x and 7x)



types 60, 61, 70, 71

Version with flange connections



types 62, 63, 72, 73

Version with threaded connections

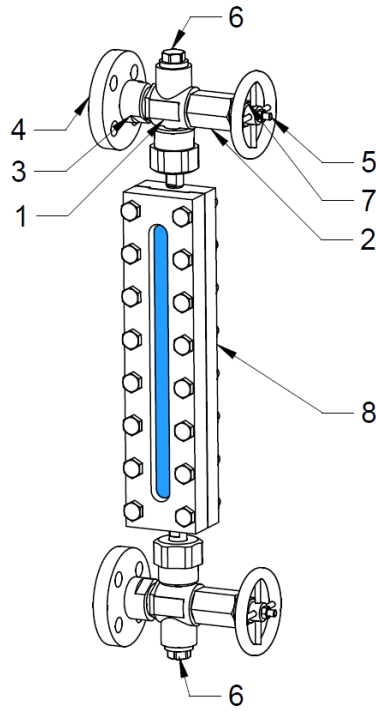


types 64, 65, 74, 75

Version with welding connection

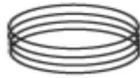
Item	Head material →		N	M
	Detail	Type	60, 61, 62, 63, 64, 65	
1	Head of liquid level gauge	60, 61, 62, 63, 64, 65	S235JR 1.0037	X5CrNi18-10 1.4301
2	Cover		GP240GH 1.0619	GX5CrNi19-10 1.4308
3	Tube		S235JR 1.0037	X6CrNiTi18-10 1.4541
4	Flange	60, 61	Carbon steel	Stainless steel
	Threaded connection	62, 63		
	Welding connection	64, 65		
5	Stem	60, 61, 62, 63, 64, 65	X20Cr13 1.4021	X6CrNiTi18-10 1.4541
6	½" plug		Carbon steel	Stainless steel
7	Gland		X20Cr13 1.4021	X6CrNiTi18-10 1.4541
8	Frame of liquid level gauge		S235JR / S275JR / C45 1.0037 / 1.0044 / 1.0503	X5CrNi18-10 1.4301

Figure 3. Liquid level gauge 716, version with the 708.3 head (5x)



types 50, 51

Version with flange connections



types 52, 53

Version with threaded connections

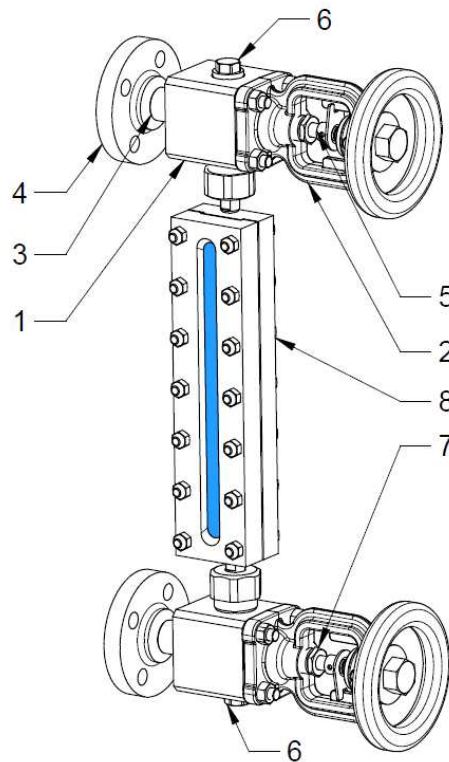


types 54, 55

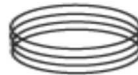
Version with welding connection

Item	Body material →		G	M
	Detail	Type	50, 51, 52, 53, 54, 55	
1	Head of liquid level gauge	50, 51, 52, 53, 54, 55	P250GH 1.0460	X6CrNiTi18-10 1.4541
2	Pin		X20Cr13 1.4021	X5CrNi18-10 1.4301
3	Tube		X20Cr13 1.4021	X6CrNiTi18-10 1.4541
4	Flange	50, 51	Carbon steel	Stainless steel
	Threaded connection	52, 53		
	Welding connection	54, 55		
5	Stem	50, 51, 52, 53, 54, 55	X17CrNi16-2 1.4057	X6CrNiTi18-10 1.4541
6	½" plug		Carbon steel	Stainless steel
7	Gland		X20Cr13 1.4021	X6CrNiTi18-10 1.4541
8	Frame of liquid level gauge	50, 51, 52, 53, 54, 55	S235JR / S275JR / C45 1.0037 / 1.0044 / 1.0503	X5CrNi18-10 1.4301

Figure 4. Liquid level gauge 716, version with the 708.1 head (6x)



types 60, 61
Version with flange connections



types 62, 63
Version with threaded connections



types 64, 65
Version with welding connection

Item	Head material →		Q	M
	Detail	Type	60, 61, 62, 63, 64, 65	
1	Head of liquid level gauge	60, 61, 62, 63, 64, 65	13CrMo4-5 1.7335	X6CrNiTi18-10 1.4541
2	Cover		GP240GH 1.0619	GX5CrNi19-10 1.4308
3	Tube		13CrMo4-5 1.7335	X6CrNiTi18-10 1.4541
4	Flange	60, 61	Carbon steel	Stainless steel
	Threaded connection	62, 63		
	Welding connection	64, 65		
5	Stem	60, 61, 62, 63, 64, 65	X20Cr13 1.4021	X6CrNiTi18-10 1.4541
6	½" plug		Carbon steel	Stainless steel
7	Gland		X20Cr13 1.4021	X6CrNiTi18-10 1.4541
8	Frame of liquid level gauge		S235JR / S275JR / C45 1.0037 / 1.0044 / 1.0503	X5CrNi18-10 1.4301

Requirements for maintenance staff

The staff assigned to assembly, operating and maintenance tasks should be qualified to carry out such jobs.









Transport and storage

Transport and storage should be carried out at temperature from -20° to 65°C, and the liquid level gauges should be protected against external forces influence and destruction of paint/zinc coating (depending on type). The paint/zinc coating is intended to protect the gauges against corrosion during transport and storage. The liquid level gauges should be kept at unpolluted rooms and they should be also protected against influence of atmospheric conditions. There should be applied drying agent or heating at damp rooms in order to prevent condensate formation.

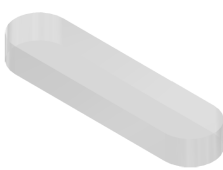


Liquid level gauges should be transported and stored in such a way as not to damage the gauge glass.

Application

industries				
	INDUSTRY	SHIPBUILDING INDUSTRY	PETROCHEMICAL INDUSTRY	HEATING
media				
	DRINKING WATER	SEWAGE	GLYCOL	PROCESS WATER

Application restrictions

			For factors that have an aggressive effect on glass, e.g. saturated steam, hot water			
			bar	°C		
	Type B reflective glass		35	243		
	Type B transparent glass		35 (it is recommended to use mica shields)	243		

The operating medium causes an order or prohibition to use specific materials. The liquid level gauges are designed for normal operating conditions. In the case of operating conditions exceeding these requirements, such as in the case of aggressive or abrasive media, the user should contact the manufacturer with an inquiry before placing an order.

The operating pressure should be adjusted to the maximum temperature of the medium, according to the table below.

	PN		-10°C	RT	50°C	100°C	150°C	200°C	250°C	300°C
S235JR	40	bar	30	40	40	40	36	32	28	23,8
P250GH			30	40	40	40	36	30,2	28	25,8
X5CrNi18-10			38	38	35,6	27,6	24,9	22,6	21	19,6

	PN		-10°C	RT	50°C	100°C	150°C	200°C	250°C	300°C
13CrMo4-5	63	bar	63	63	63	63	63	63	63	63
P250GH			63	63	63	60,6	57,2	56,9	54,7	51,3
X6CrNiTi18-10			55	63	63	62,4	58,8	55,8	53,1	49,4

Installation

Before installing the liquid level gauge on a device, verify that the liquid level gauge has not been damaged during transport and that the glass in the frame has not been broken. Before installing the liquid level gauge on a device, verify that the liquid level gauge has not been damaged

during transport and that the glass has not been broken. Liquid level gauges must be installed on a device to rigid or additionally tightened ferrules to secure liquid level gauge against the possible self-disassembly under pressure. Sample solution for tightening has been shown in Figures 5 and 6.

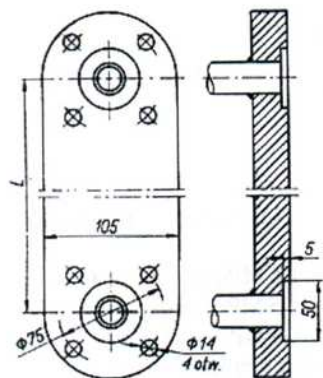


Figure 5. Boiler ferrules setting

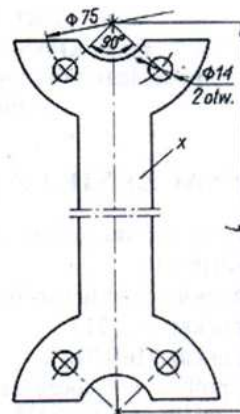


Figure 6. Tightening of the liquid level gauge heads

When mounting a liquid level gauge on the device, you must:

- Screw the flanges of liquid level gauge's heads (threaded screw connections) to the ferrules of the device using flat gaskets. The seal of the threaded connection depends on the conditions of use and medium (Teflon tape, glue, ...). The first step is to screw (weld) the flange (screw connection) of the bottom head and then move the top head to the required dimension and screw (weld) to the connection ferrules.
- Liquid level gauges 716 must be mounted in a vertical position
- On the frame of the liquid level gauge a user should select the minimum and maximum level (unless equipped with a level gauge at the factory).

Commissioning

During boiler's commissioning, with open liquid level gauge's heads, the pressure and temperature rise slowly and there is no danger of thermal shock which could affect the glass. However, the rapid increase in liquid level gauge's temperature can cause shortened glass operation or its breaking.

When restarting the liquid level gauge, after removing it from the working boiler first (e.g. to replace the glass) there is a danger of a sharp temperature rise in the liquid level gauge. To avoid this, you must adhere to the following recommendations:

- Close the bottom closing valve, open the drain plug / drain cock (depending on version), and then open slightly the upper valve, in such a way as to clearly see the condensate stream flowing along the glass in the frame. After a period of about 50 min. all liquid level gauge elements should reach the operating temperature.

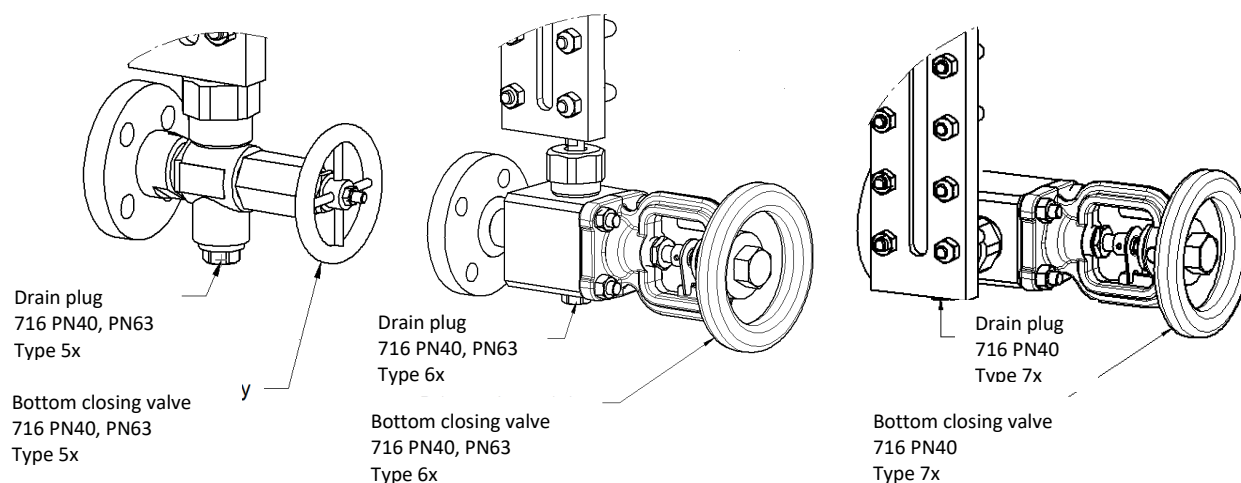


Figure 7

- Close the drain cock (or screw the plug). The liquid level gauge will start to fill with the condensate.
- Open the upper valve fully.
- Open the bottom valve fully.

- During slow heating, the seals are affected by temperature and may slightly change their dimensions. If there are leaks after starting the liquid level gauge, tighten with a torque wrench all bolts, nuts or screws in places of leakage. Before tightening the packing nut, first open and close the heads several times. This sealing should be carried out with the heads closed and the drain cock/plug open.

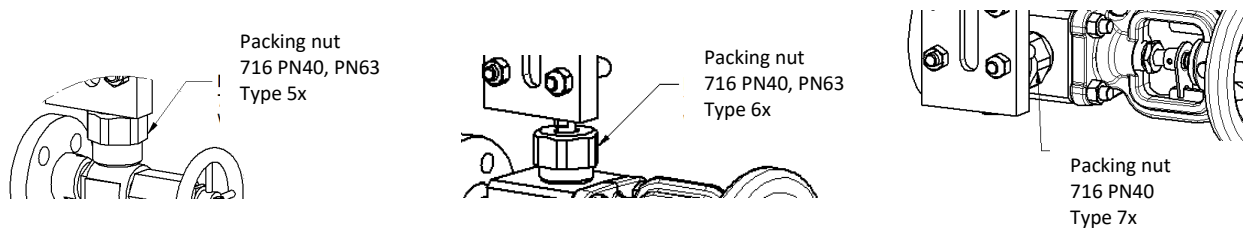


Figure 8

- In the event of a leak during operation, the connections should be sealed as in the previous point. If the leak cannot be eliminated, the seals should be replaced.

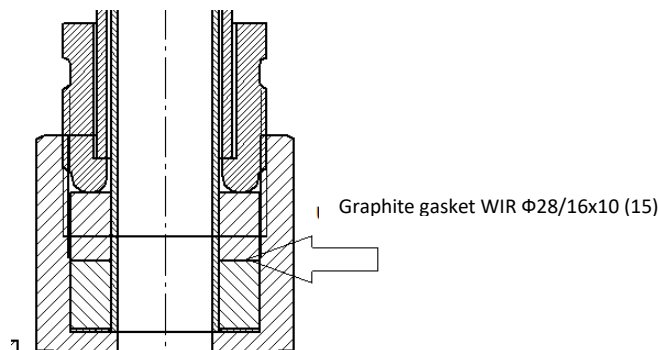


Figure 9

- During a longer standstill, the liquid level gauge should be drained. This means that the lower and upper valves should be closed and the drain cock should be opened / the drain plug should be unscrewed.

Service and repair

Glass replacement in the liquid level gauge

Before replacing the glass in the frame, you must close the heads of the liquid level gauge and open the drain cock (open the plug). To replace the frame, unscrew the packing nut in the upper and lower heads (figure 8), remove the upper head, and then slide the glass off the heads. If this is not possible, remove the entire liquid level gauge.

Glass replacement in the gauge frame

- Unscrew the frame clamping screws and remove the damaged glass and glass seals.
- Clean the frame elements, apply the seals and glass and reassemble the frame. The screws should be tightened alternately, with sensitivity and even force. Screw tightening torque max 30 Nm. For frames 705.2, 705.3, 705.4, 705.5, 703, tightening the nuts is shown in the drawing below (Figure 10).

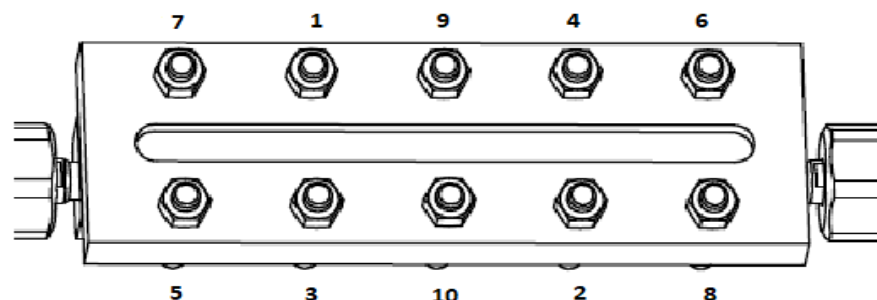


Figure 10. Screw tightening sequence

- The pins of the assembled frame should be placed in the stuffing boxes (new sealant should be placed in the boxes first). Pre-seal the connection with packing nuts, and then slide the frame onto the gauge heads.
- Assemble the frame in reverse order, remembering to install new gaskets and seal the entire gauge.



After completing the above steps, seal all connections and restart the liquid level gauge in accordance with point 6.

Checking patency of channels

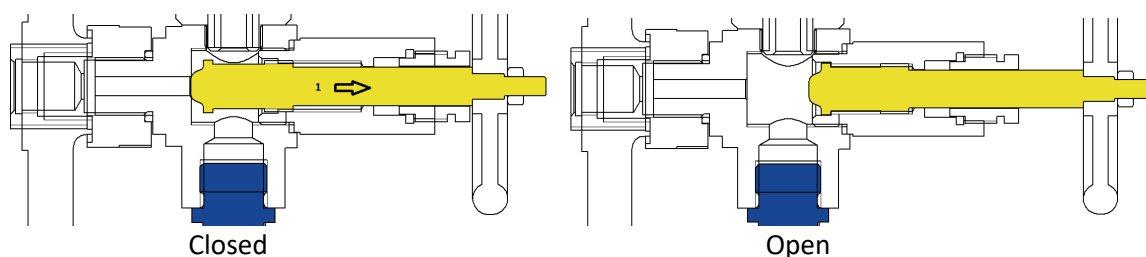
Due to the possibility of boiler stone or other impurities coming from the medium or from the installation in the liquid level gauge channels, their patency should be checked. The frequency of this activity depends on the operating conditions and should meet regulatory requirements.

To check the patency of the channels, the liquid level gauge should be blown. Blowing is carried out for each head separately, by closing one head to blow the other, with the drain cock open.

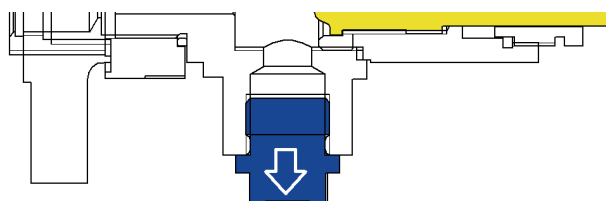
If it is necessary to unblock the channels:

For the 5x type

- Close the medium flow to the liquid level gauge (it is best to unblock the channels according to the tank inspection schedule – it is necessary to dismantle the liquid level gauge from the device).
- In case of unblocking the channels supplying the medium to the frame:
 - a. open the lower valve to the max position (until resistance appears on the wheel)



- b. Remove the plug [2]



- c. Insert a rod up to 8 mm in diameter into the channel
- d. Pierce the channel, then remove the rod
- e. Insert the plug and remember to replace the gasket
- f. The above operation should be repeated for the upper head

For the 6x, 7x types

- Close the medium flow to the liquid level gauge (it is best to unblock the channels according to the tank inspection schedule – it is necessary to dismantle the liquid level gauge from the device).
- Remove the nuts securing the cover (2) with the head (1).
- Insert a rod up to 5 mm in diameter into the channel (or 8 mm after removing the screw inside the head).
- Pierce the channel and then remove the rod.
- If the head screw is removed, it must be screwed in again when the gasket is replaced (according to the manufacturer's instructions).
- Screw the cover and the head back on again, remembering to replace the gasket between them.

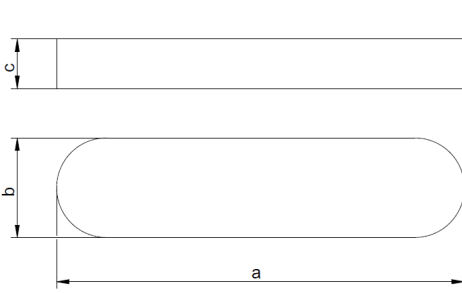
Causes of disruption and solution

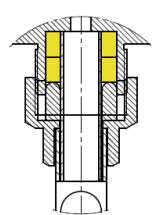
Disruption	Possible cause	Solution
No flow	Closed valves	Open the valves
	Flange caps have not been removed	Remove the flange caps
Poor flow	Valves opened only minimally	Open the valves
	Flange caps have not been removed	Remove the flange caps
Leak at the tube	Valves opened only minimally	Open the valves
	Scale in flow channels	Clean the flow channels as per point 7.2.
Leak at the gland	The connection after starting the liquid level gauge was not sealed	Tighten with a suitable wrench
	Gasket wear	Replace gaskets

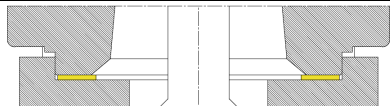
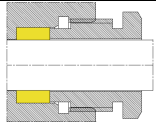
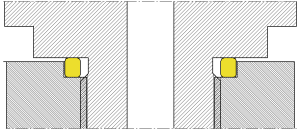
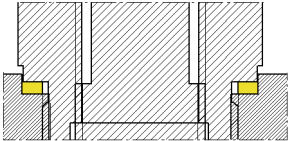
Decommissioning

All obsolete and dismantled liquid level gauges must not be disposed with household waste. The liquid level gauges are made of materials which can be re used and should be delivered to designated recycling centres.

Spare parts

Liquid level gauge glasses with a set of gaskets (reflective and transparent))				
	716 PN40 716 PN63 All types	a	b	c
				140
		165		
		190		
		220		
		250		
		280		
		320		
		340		
		370		
		430		
		460		

Drawing	Application	Description	Quantity required for a complete liquid level gauge
	716 PN40 Types 5, 6, 7 716 PN63 Types 5, 6,	Sealing of the fluid level gauge frame connector in the head	4

	716 PN40, PN63 Types 6, 7 716 PN63 Type 6	Gasket for liquid level gauge head with cover	2
	716 PN40, PN63 All types	Stuffing box gasket	2
	716 PN40, PN63 Type 5	Gasket connecting the liquid level gauge head with the pipe	2
	716 PN40, PN63 Type 5	Gasket connecting the liquid level gauge head with the screw	2

Warranty terms

ZETKAMA grants quality guarantees providing correct functioning of their products, provided that the assembly is performed in accordance with the user manual and operation in accordance with the technical conditions and specifications in the ZETKAMA catalogue cards. The warranty period is 18 months from the date of installation, but not longer than 24 months from the date of sale.

Warranty claim does not cover assembly of foreign parts and design changes done by user as well as pressure set changes and natural wear.

Immediately after detection the user should inform ZETKAMA about hidden defects of the product.

A claim should be prepared in written form.

Other warranty conditions require agreement between the manufacturer of the valve and the buyer.



The manufacturer reserves the right to make technical changes as a result of improvements in the design and manufacturing technology.

Non-compliance by the user of rules and instructions contained in this manual releases the manufacturer from all liability and the warranty.

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