

## USERS MANUAL

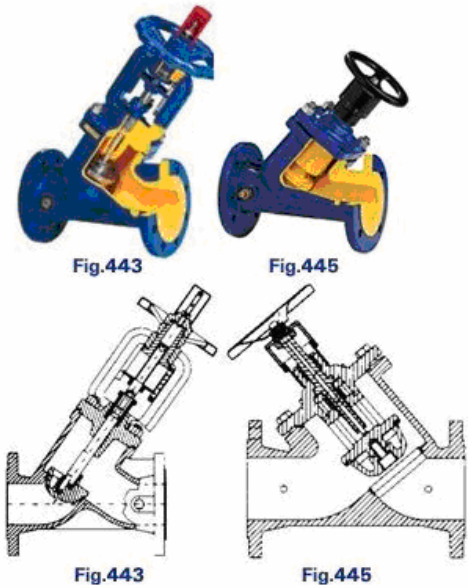
**Balancing valve**

**Fig.443, 445**

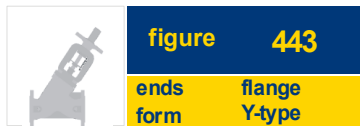
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### CONTENTS

1. Product description
2. Requirements for maintenance staff
3. Transport and storage
4. Function
5. Application
6. Assembly
7. Maintenance
8. Service and repair
9. Adjustment of balancing valve Fig. 443
10. Adjustment of balancing valve Fig. 445
11. Additional equipment of valves
12. Reasons of operating disturbances and remedy
13. Warranty terms



### 1. PRODUCT DESCRIPTION



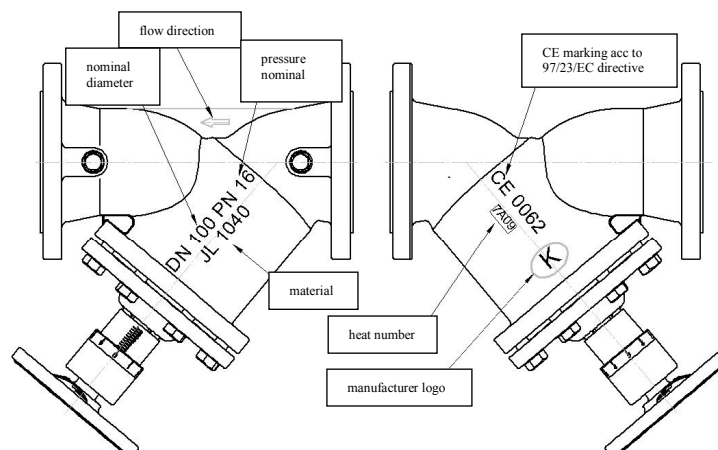
Balancing valves Fig.443 and Fig.445 are used for medium flow control. Medium flows according to arrow direction indicated on the valve.

Balancing valves are provided with casted marking according to requirements of PN-EN19 standard. The marking facilitates technical identification and contains :

- diameter nominal DN (mm),
- pressure nominal PN (bar),
- body and bonnet material marking,
- arrow indicating medium flow direction,
- manufacturer marking,
- heat number,
- CE marking, for valves subjected to 97/23/EC directive. CE marking starts from DN32.

### 2. REQUIREMENTS FOR MAINTENANCE STAFF

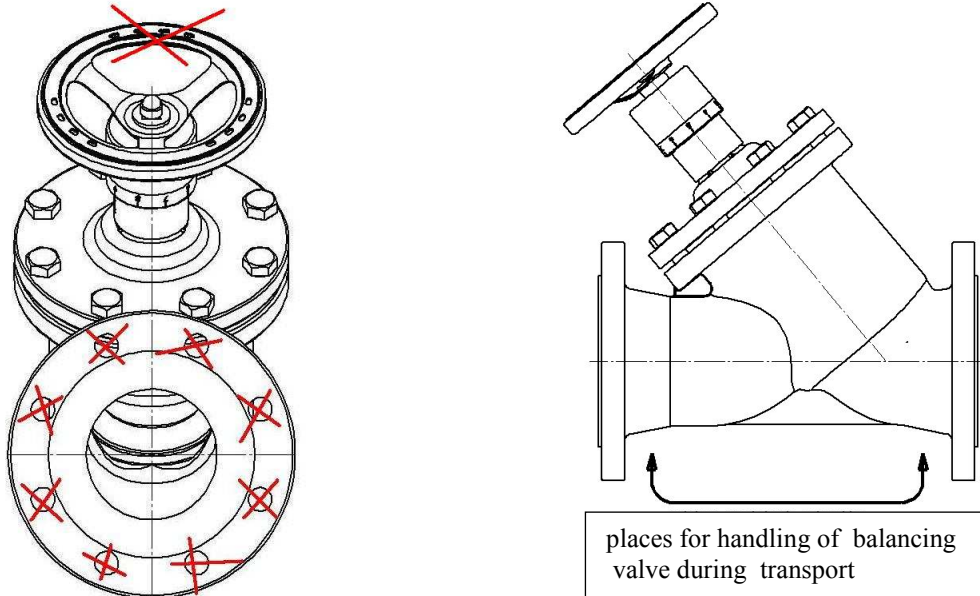
The staff assigned to assembly, operating and maintenance tasks should be qualified to carry out such jobs.



During valve operation heat parts of the valve, for example handwheel, body or bonnet parts could cause burn. If necessary the user should fit insulation shields and warning boards.

### 3. TRANSPORT AND STORAGE

Transport and storage should be carried out at temperature from  $-20^{\circ}\text{C}$  to  $65^{\circ}\text{C}$ , and valves should be protected against external forces influence and destruction of painting layer as well. The aim of painting layer is to protect the valves against rust during transport and storage. Valves 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. The valves should be transported in such a way to avoid handwheel and valve stem damage.



**It is not allowed to fit lifting devices to connecting holes and handwheels.**

### 4. FUNCTION

Balancing valves are designed to control hydraulic flow at HVAC plants. The valves can be put into feeding and return pipelines as well.

Application range was mentioned at catalogue card. The kind of working medium makes some materials to be use or to be prohibited for use. Valves were designed for normal working conditions. In the case that working conditions exceed these requirements (for example for aggressive or abrasive medium) user should ask manufacturer before placing an order.

When selecting the valve for specific medium, "List of Chemical Resistance" can be helpful. It can be found at manufacturer website near catalogue cards.

Working pressure should be adapted to maximum medium temperature according to the table as below.

Balancing valve Fig. 443

Acc to EN 1092-2		Temperature [ $^{\circ}\text{C}$ ]				
Material	PN	-10 do 120	150	200	250	300
EN-GJL250	16	16 bar	14,4 bar	12,8 bar	11,2 bar	9,6 bar

Balancing valve Fig. 445

Acc to EN 1092-2		Temperature [° C]	
Material	PN	-10 do 120	150
EN-GJL250	16	16 bar	14,4 bar



**Plant designer is responsible for valve selection suitable for working conditions.**

## 5. APPLICATION

- heat water, cooling water and glycol plants
- heating, chilling, industrial air conditioning

## 6. ASSEMBLY

During the assembly of balancing valves following rules should be observed:

- to evaluate before an assembly if the valves were not damaged during the transport or storage and to make sure that applied valves are suitable for working conditions and medium used in the plant,
- to take off dust caps if the valves are provided with them,



dust cap

- to check if the valve interior is free of foreign bodies,
- to conduct steam pipes in such a way to avoid condensate cumulation ( refers to Fig. 443 ),
- to protect the valves during welding jobs against splinters and to use plastics against excessive temperature,



**Pipeline where the valves are fitted should be conducted and assembled in such a way that the valve body is not subjected to bending moment and stretching forces.**

- **Bolted joints on the pipeline must not cause additional stress resulted from excessive tightening, and fastener materials must comply with working conditions of the plant.**
- to apply expansion pipe joints in order to reduce influence of pipeline thermal expansion,



**To assembly the valve in such a way that flow direction comply with an arrow placed on the body,**

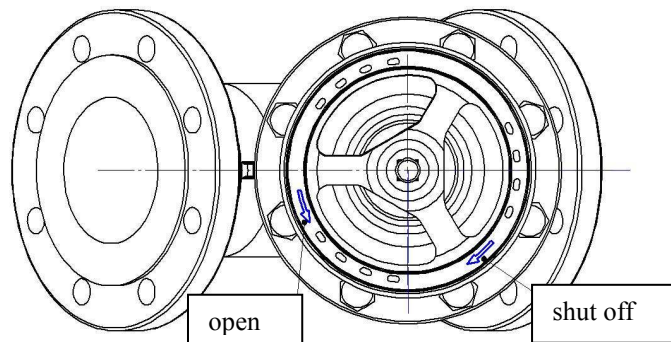
- correct acting of the valve requires suitably long straight pipelines: 5 x DN before the valve and 2 x DN after it
- during painting of pipeline the valve stem, and plastic parts as well as vernier pitch should be protected ,

- valves can be assembled in any position, however it is recommended to install the valve with handwheel downwards,
- before plant startup, especially after repairs carried out, flush out the pipelines through entirely open valves
- strainer ( wire mesh filter) installed before the valve increases certainty of its correct action.

## 7. MAINTENANCE

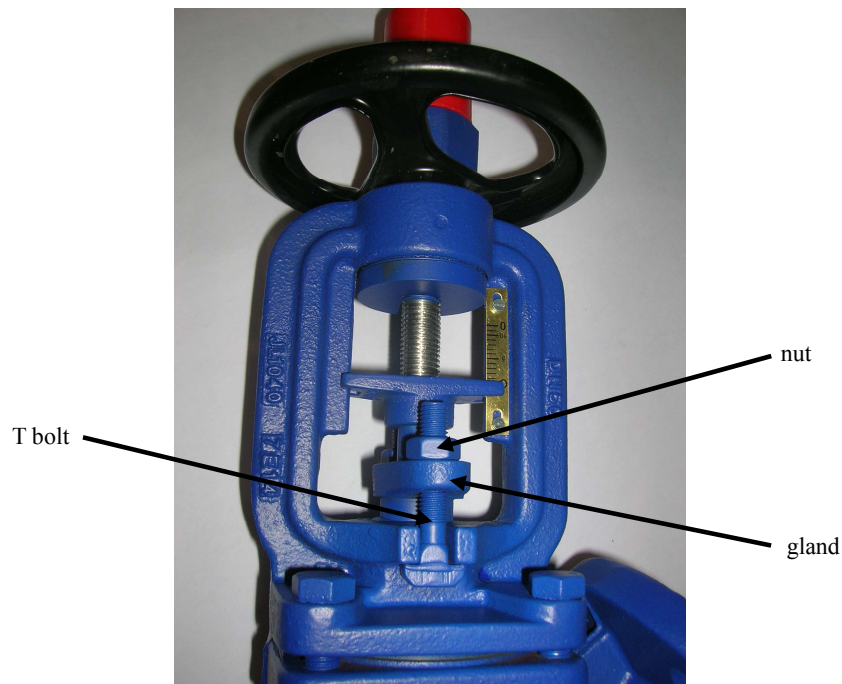
During maintenance following rules should be observed:

- startup process – sudden changes of pressure and temperature should be avoided when starting the plant,
- valve is closed by turning the handwheel clockwise when looking from above the handwheel (according to arrow direction marked on the handwheel),
- valve is opened by turning the handwheel counter-clockwise.



### **It is prohibited to use additional lever when turning the handwheel**

- performance of fitted valves can be checked by multiple closing and opening
- if leakage on stem occurs ( ref.to Fig. 443 ) , it is necessary to tighten with moderate force two T-bolt nuts pressing the packing gland until the leakage disappear.



- if necessary to complement the packing gland ( ref.to Fig. 443 ), it should be done with no pressure in the valve when the valve is fully open, inner space of the valve is completely closed then (due to back sealing),
- for packing gland replenishment ( ref.to Fig. 443 ) unscrew T-bolt nuts, move the gland into handwheel direction and fill up the gland box with open packing ring, after that tighten packing gland set again.
- maximum permissible pressure difference for correct valve performance is mentioned at the table as below:

DN	40-150	200	250	300
$\Delta p$	1,6 MPa	1,0 MPa	0,6 MPa	0,4 MPa

**!** In order to assure safety performance, each valve (especially rarely used) should be surveyed on regular basis. Inspection frequency should be laid down by user, but not less than one time per month.

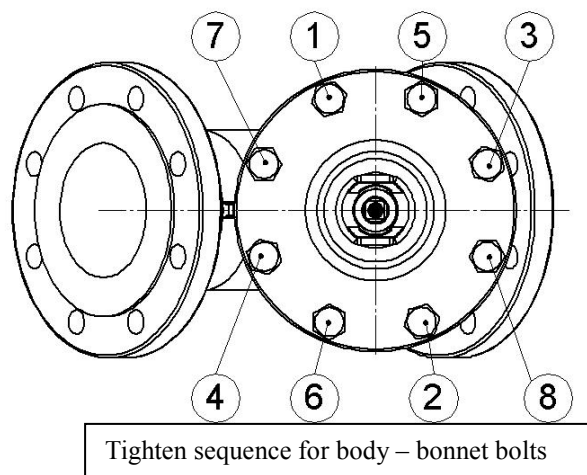
## 8. SERVICE AND REPAIR

**!** Before taking up any service jobs it is necessary to make sure, if medium supply to the pipeline was shut off, if the pressure was decreased up to atmospheric pressure, if the medium was removed and plant cooled down.

- All service and repair jobs should be carried out by authorized staff using suitable tools and original spare parts.
- Before disassembly of complete valve from the pipeline or before service, the pipeline should be out of operation.
- During service and repair jobs it is necessary to use personal health protectives in pursuance of existing threat.
- After valve disassembly it is necessary to replace flange connection gaskets between valve and pipeline .
- Everytime when valve bonnet was disassembled sealing surface should be cleaned. During assembly it should be applied new gasket of the same type as previously used.

**!** Precautions should be taken when touching gasket between body and valve bonnet. The gasket contains stainless steel stripe that may cause injury,

- body-bonnet bolt connections should be tighten when the valve is at open position,
- the bolts should be tighten evenly and crosswise by torque wrench.

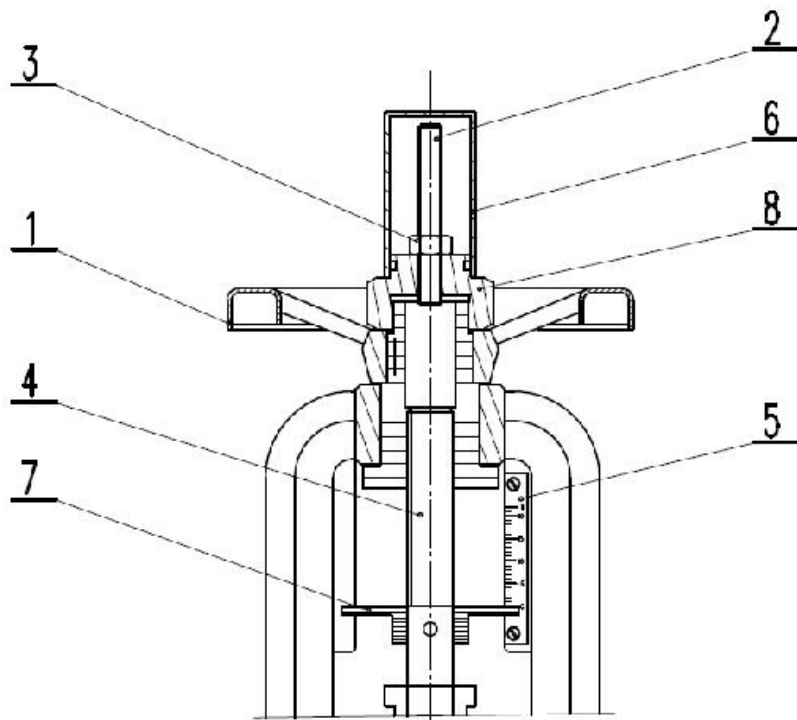


- Tighten torques

Screw	Torque
M12	65 – 70 Nm
M16	140 -150 Nm

- before valves re-assembly in the pipeline it is necessary to check valve operation and tightness of all connections. Tightness test should be carried out with water pressure of 1,5 nominal pressure of the valve.

### 9. ADJUSTMENT OF BALANCING VALVE Fig. 443



- in order to obtain correct valve adjustment it is recommended to use the data of the table as below and flow charts drawn up for each valve size,
- linear vernier scale (5) is used to read pre-adjustment, it is fitted to yoke, full handwheel turns are marked on it; each vernier line means one turn, number of turns are marked every 5 turns. Letter O means completely open valve, letter C means completely closed valve.

#### Adjustment and locking:

1. Take off protecting caps (6).
2. Unscrew locking nut (3) on the screw (2) and unscrew it into maximum upwards position.
3. Close the valve completely – check if the indicator(7) is on C mark on the vernier (5).
4. Open the valve to obtain required adjustment mentioned at the table - upper edge of the indicator (7) will match with selected line of the linear scale (5).
5. Screw in the screw (2) until it leans against the stem (4).
6. Lock the screw at adjusted position (2) by screwing in the locking nut (3) until it reaches surface of adjoining nut (8).

7. The valve is locked at correct adjustment now.
8. Adjustment can be checked by closing the valve and opening again until resistance will be felt.
9. Put on protecting cap (6).

So adjusted balancing valve can be closed many times now, but it can be open up to adjusted value only.

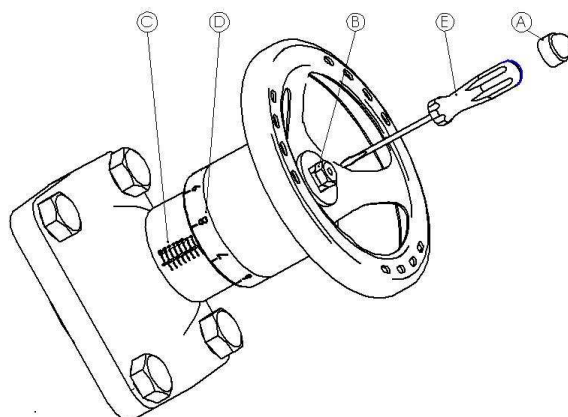
**Kv values for specific adjustment of Fig. 443:**

n	DN40	DN50	DN65	DN80	DN100	DN125	DN150	DN200	DN250	DN300
	Kv [m <sup>3</sup> /h]									
1	3,91	4,77	6,05	6,12	15,5	20,3	29,5	47,2	63,5	73,3
2	6,55	7,85	9,55	10,8	25,9	36,6	50,0	75,6	96,2	124,1
3	9,18	11,45	13,7	16,2	37,9	52,9	70,5	103,9	128,9	174,9
4	11,80	15,04	17,9	21,7	49,8	69,3	91,0	132,3	161,7	225,7
5	14,38	18,51	22,4	27,5	60,7	86,6	114,0	160,2	197,0	276,8
6	16,96	21,97	26,9	33,3	71,5	103,9	137,0	188,1	232,4	328,4
7	19,61	25,30	31,2	39,0	82,3	120,6	160,0	215,5	266,3	369,5
8	22,26	28,63	35,5	44,7	93,2	137,4	183,0	243,0	300,2	411,3
9	25,99	32,18	39,7	50,2	104,9	156,3	205,0	269,7	333,8	465,9
10	29,72	35,73	43,9	55,7	116,6	175,2	227,0	296,3	367,5	520,3
11	33,30	40,98	48,3	61,5	131,9	201,7	252,0	325,2	401,8	552
12	36,88	46,23	52,6	67,3	147,3	228,1	276,9	354,2	436,2	584
13		50,29	56,9	73,1	164,3	256,6	304,9	383,1	470,5	616
14		54,26	62,7	81,5	181,3	285,2	332,9	412,1	505,9	648
15		58,42	68,4	90,0	198,3	313,7	360,8	441,0	539,2	680
16		59,37	74,1	98,5	215,3	342,3	388,8	478,4	575,7	766
17			79,1	107,0	232,6	370,8	416,8	515,9	612	852
18			85,1	115,5			444,7	553	649	939
19			91,2	123,9			472,7	591	685	1025
20			96,9	132,4			500,6	628	721,5	1111
21				147,1				668	763	1155
22								709	805	1199
23								749	847	1243
24								789	889	1287
25								829	930	1331
26								870	979	1383
27								910	1028	1436
28									1078	1488
29									1125	1540
30									1173	1592
31									1216	1630
32									1259	1668
33										1705

n – number of handwheel turns

**Remark: On request we deliver flow charts of the valves.**

## 10. VALVE ADJUSTMENT FOR Fig. 445



- in order to obtain correct valve adjustment it is recommended to use the data of the table and flow charts drawn up for each valve size,
- the full turn numbers of rough adjustment is indicated on the linear scale (C), fine adjustment value is indicated on circular scale (D), where one turn was divided into ten parts.

### Adjustment and locking:

1. Take off protecting cap (A) from the nut (B) fitting handwheel to stem.
2. Shut off the valve completely; linear scale (C) and circular scale (D) should indicate 0,0 value.
3. Open the valve until required value from the table will be reached.
4. Using attached screwdriver (E), screw in locking screw located inside the stem through the hole inside the nut (B)
5. Put on protecting cap (A) on the nut (B).
6. In order to check adjustment correctness, the valve should be closed and afterwards open until resistance will be felt; locked adjustment will be indicated on the scale then.

So adjusted balancing valve can be closed many times now, but it can be open up to adjusted value only .

### Kv values for specific adjustment of Fig. 445

n	DN65	DN80	DN100	DN125	DN150	DN200	DN250	DN300
	Kv [m <sup>3</sup> /h]							
0,66	6,05	6,15						
1	7,35	8,30	15,64					
2	13,04	15,45	26,2	36,6	50,0	75,6	96,2	124
3	20,01	24,30	37,79	52,5	71,4	105	127	
4	26,87	33,62	50,32	69,3	91,0	132	162	226
5	33,39	41,79	60,24	87,0	111,4	160	198	
6	39,67	50,48	72,15	103,9	137,0	188	232	328
7	46,10	59,14	82,31	120,1	160,0	215	263	
8	52,23	67,88	94,13	137,4	183,1	243	300	411
9	59,76	77,30	105,04	156,7	205,7	270	332	

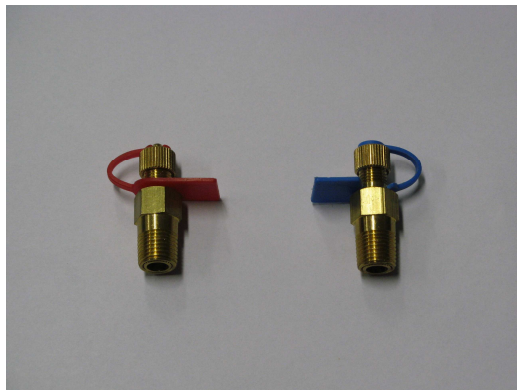
10	66,83	88,14	117,73	175,2	227,1	296	367	520
11	75,17	100,14	132,55	202,5	253,1	327	400	
12	84,15	112,87	148,70	228,1	276,9	355	447	
13	96,94	128,87	163,24	255,9	304,5	382	469	
14		146,77	178,82	285,5	332,6	412	506	
15		148,95	197,47	313,5	361,7	441	539	680
16			214,96	342,6	390,0	477	572	
17			234,60	370,8	417,0	518	608	
18					445,7	553	646	
19					472,5	590	684	
20					500,6	628	721	1111
21						668	762	
22						707	808	
23						750	848	
24						790	891	
25						825	930	1331
26						867	981	
27						910	1031	
28							1078	
29							1126	
30							1173	1592
31							1217	
32							1257	
33							1302	
33,3								1718

n – number of handwheel turns

**Remark: On request we deliver flow charts of the valves.**

## 11. ADDITIONAL EQUIPMENT OF VALVES.

The valves are provided with threaded holes G ¼” on each flange, with plugs screwed in as standard. On customer request the plugs can be replaced with measuring nipples. If these nipples are applied in Fig 443, maximum working temperature is limited till 150°C.



Digital measuring computer can be used to take the measurements. Flow values of ZETKAMA’s balancing valves are stored in its memory, so direct flow measurement is possible. The computer enables pressure or temperature drop measurement and recording possibilities. Detailed description of this device is included at catalogue card of computer manufacturer.

## 12. REASONS OF OPERATING DISTURBANCES AND REMEDY

- When seeking of valve malfunction reasons safety rules should be strictly obeyed



<b>Fault</b>	<b>Possible reason</b>	<b>Remedy</b>
No flow	Valve closed	Open the valve
	Flange dust caps were not removed	Remove dust caps on the flanges
Poor flow	Valve is not open enough	Open the valve
	Dirty filter	Clean or replace the screen
	Clogged pipeline	Check the pipeline
Control difficulties	Dry stem	Grease the stem
	Gland packing tighten too much ( ref. to Fig.443 )	Slightly slacken gland nuts. Put attention to keep stuffing box tightness.
Stem leakage	Too much loose on the gland (ref. to Fig. 443 )	Tighten the gland untill tightness will be reached If necessary add packing rings in stuffing box. Keep special caution.
	Damaged O-rings (ref. to Fig. 445 )	Replace O-rings
Seat leakage	Shut off not correct	Tighten the handwheel without any auxiliary tools.

	Seat or disc damage	Replace the valve and contact supplier or manufacturer
	Pressure difference too much	Check if the valve was assembled according to arrow direction marked on the valve.
	Medium polluted with solid particles	Clean the valve. Fit strainer before the valve.
Broken connecting flange	Bolts tighten unevenly	Replace the valve with new one

### 13. WARRANTY TERMS

- ZETKAMA grants quality warranty with assurance for proper operation of its products, providing that assembly of them is done according to the users manual and they are operated according to technical conditions and parameters described in ZETKAMA's catalogue cards. Warranty period is 18 months starting from assembly date, however not longer than 24 months from the sales date.

- warranty claim does not cover assembly of foreign parts and design changes done by user as well as natural wear.

- immediately after detection the user should inform ZETKAMA about hidden defects of the product

- a claim should be prepared in written form.

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