



DOUBLE-PORTED CONTROL GLOBE VALVES TYPE Z10


***without drive unit
and with pneumatic or electric
actuators
or manual drives***

**INSTRUCTION MANUAL FOR INSTALLATION,
OPERATION AND USE**

Przemyśl 10-2022

TABLE OF CONTENTS

1. Principle of operation
2. Standard operating conditions
3. Storage and transport
4. Installation
5. Activation
6. Maintenance and repairs
7. Changing series Z10 valve mode of operation
8. Typical problems and solutions
9. Operation safety conditions
10. Product disposal
11. List of spare parts
12. Additional requirements for equipment used in potentially explosive atmosphere according to Directive (2014/34/UE) (ATEX)
13. Explanations for drawings

)* – No  designation on the product plate and page 2 of this manual means that the product in the delivered condition must not be used in explosion-risk atmospheres.

Technical characteristics of the product

| | | | |
|-----------------------------------|-------------------|---------------------------------|------------------------------|
| Marking | | Conformity marking | |
| DN/NPS | PN/CLASS | PT [bar] | TS [°C] |
| Date of pressure test | | | |
| Serial number/ year of production | | | |
| Category acc. to PED | Category of fluid | Liquid <input type="checkbox"/> | Gas <input type="checkbox"/> |

Note:

1. The Instruction manual for installation, operation and use is intended for products designed and manufactured according to the requirements of the ISO 9001 quality management system, Pressure Equipment Directive

(PED) 2014/68/EU, ATEX Directive (2014/34/UE), intended for installation on pipelines.

2. General warnings

Prior to the product installation and use, read carefully and follow the Instruction. All activities related to installation, operation and use of the product have to be carried out by appropriately trained and skilled staff. "POLNA" S.A., hereinafter also called the manufacturer, has highly qualified service staff able to assist in installation, maintenance and repairs of our valves.

The warning symbol in the Instruction "!" means that the content (of a WARNING or CAUTION message) is very important due to safety reasons. The product is intended for installation on pipelines. Any other use has to be agreed with "POLNA" S.A. at the stage of ordering of the product. If in doubt, contact "POLNA" S.A. for explanation before performing any further actions.

If the product is installed and maintained correctly, its most ergonomic operation is ensured. However, it is necessary to follow the requirements given in the Instruction.

The product has to be installed and maintained according to domestic and industrial regulations and instructions.

The Instruction does not cover all cases and incidents that may occur during installation, use and maintenance or local safety regulations.

The content of the Instruction is of informative nature and is considered to be true. The company reserves the right to modifications, improvements and changes in the technical data without notice.

"POLNA" S.A. is not liable for a valve selection made by the buyer on his own or for operation and use of the valve against its intended use. Failing to comply with the provisions of this document, in particular when it comes to use, repairs etc., will result in losing the guarantee and warranty.

1. PRINCIPLE OF OPERATION

The amount of the flowing working medium is adjusted by means of linear shifts of the lower flange rigidly connected with the actuator or manual drive stem.

An input signal, i.e.:

- a) in pneumatic actuators:
 - compressed air of the nominal control pressure range of 20-100 kPa; 40-200 kPa or, in case a valve travel indicator is used, also within other ranges;
- b) in electric actuators:
 - with 3-point adjustment
 - electric signal with the supply voltage of 220 V AC; 24 V AC; 380 V AC, 500V AC etc. with continuous adjustment

- voltage signal of 0...10 V; 2...10 V or a current signal of 0...5 mA; 0...20 mA; 4...20 mA, results in a linear shift of the actuator stem. This shift is proportional to the input signal value. Actuators can come with a system of limit switches limiting the valve stem movement and location transmitter for position mapping.

2. STANDARD OPERATING CONDITIONS

Control valves should be operated in conditions whose parameters comply with parameters assumed for calculation of values and defining the structural and material type of a valve. In order to ensure problem-free operation throughout the entire operation period, the control valve, including its fittings and equipment, must be protected against impact and damage, and subjected to regular maintenance and periodical inspections.

Additional operating conditions:

- a) with pneumatic actuators:
 - ambient temperature from -40 to +80°C;
 - relative humidity up to 98%;
 - permissible fluctuation of air supplying the valve travel indicator + 10%;
 - supply and control air should not contain any mechanical impurities, oil and substances causing corrosion of steel, copper and aluminium alloys; it must be dried so that the dew point is equal to temperature lower than the minimum operating temperature of the travel indicator by at least 10°C;
- b) with electric actuators:
 - according to manufacturer's technical data;
- c) with manual drives
 - ambient temperature from -40 to +80°C;
 - relative humidity up to 98%

3. STORAGE AND TRANSPORT

Control valves should be stored in closed, dry and airy storage rooms with relative humidity not exceeding 80%. The room atmosphere must be free of vapours and aggressive gases. Valves can be transported by any covered means of transport, with or without packaging, with necessary protection against impact, tipping over and excessive vibrations. While packing, loading or unloading, valves should be handled using flexible clamping rings (e.g. rubber V-belts) wrapped around valve body flanges and actuator case (through an eye bolt – for pneumatic actuators).

4. INSTALLATION

Prior to assembling the valve with a pipeline, carefully remove all impurities, metal chips, rust, welding and mill scale, fats and grease as well as other foreign bodies from the pipeline. It is particularly important for valves fitted with perforated plugs. The valve must be installed in such a manner that the direction of the working medium flow conforms to the direction defined by the arrow located on the valve body. The working pressure of the medium flowing through the valve must conform to the content assumed to determine the nominal pressure, as specified on the valve rating plate (name plate). In case the valve nominal diameter is smaller than the pipeline diameter, apply reducing pipes of length conforming to applicable standards. In such cases, avoid using reducing pipe connectors, e.g. threaded, screw-in/screw-out and other pipe connectors.

In cases particularly vital for the process system, install a by-pass system consisting of three additional valves facilitating isolation of the control valve from the system (to perform repairs, grind in the seats, replace parts) without interrupting the operation.

After assembling the valve with a pipeline, it is necessary to:

- a) in valves with pneumatic actuators:
connect the lines supplying the pneumatic control signals to the actuator (from a regulator or operating panel). The pneumatic signal must be routed via a copper or plastic tube. For a 7.5 m long line supplying the pneumatic signal, adjust 6 x 1 mm tubes. For longer sections, use 8 x 1 mm (OD x thickness) tubes.

The lines supplying the pneumatic control signal must be connected, in straight actuators of type 37, to the upper diaphragm case, and, in reverse actuators of type 38, to the lower diaphragm case. The connection is made using straight or elbow joints with NPT 1/4" threads; upper yoke section – lubricator plug. While installing a valve equipped with a pneumatic or electro-pneumatic travel indicator, the lines supplying respectively pneumatic or current control signal from a regulator or operating (control) panel must be connected to the terminal labelled as (Signal). Moreover, the compressed air supply line (pressure 140 or 250 kPa, as required) must be routed and connected, through a filter-regulator, to the travel indicator terminal labelled as (Supply), taking into account the recommendations regarding line length and diameter stated above.

- b) In valves with electric actuators:
Connect electric supply and control lines to the actuator by soldering them to correct terminals of the connection socket. See separate "Maintenance documentation" for an electric actuator for detailed instructions regarding preparation of an installation to operate with an electric actuator and the control method.

Note!

In valves fitted with pneumatic actuators, connections and lines supplying control signals and supply air must be fully tight. Their tightness must be checked using an inspection pressure gauge, after air under pressure equal to the upper limit of the control pressure range is supplied and lines are cut off using a cut-off valve. Do not isolate finned bonnets.

The allowed position of the control valve is with the stem vertically upwards. In justified cases, it is possible to install the valve with a permissible deviation of $\pm 30^\circ$ from the vertical. Other positions may cause uneven and accelerated wear of internal parts of the valve (plug, seat, stem, guide sleeve) and seals. If it is necessary to use a different valve installation position on the pipeline than permitted, consultation with the valve manufacturer is mandatory. Without the approval of the manufacturer, an unauthorised installation position will result in loss of guarantee.

5. ACTIVATION

Prior to process installation commissioning, check the operation of the valve installed. To this end, activate an actuator or manual drive and check if the lower flange stem (10) moves smoothly without jamming, within the entire range of the nominal lift. During process start-up, the bonnet seals (6) can be slightly pressed by tightening the bonnet nuts or gland stud nuts (37), until necessary tightness within the plug stem is obtained. No adjustments of actuator spring tension setpoints or loosening the connection between the actuator stem and valve upper diaphragm case stem are permissible.

6. MAINTENANCE AND REPAIRS

Maintenance of the control valve during operation consists in ensuring correct tightness of the valve stem in the bonnet. To this end, the packing must be periodically pressed by tightening gland stud nuts (37). In case the packing follower rests on the upper bonnet surface, it must be removed and at least one more seal must be added. Adjust the pressure after reassembly.

Compulsory, documented periodical inspections ensure long-lasting and safe operation of the valve.

As regards valves operated continuously, periodical inspections should be conducted at least once every 6 months. As far as valves operating in a mode other than continuous are concerned, such inspections must be conducted at least every 12 months. During inspections, the valve must be maintained and repaired as required. As necessary, the scope of maintenance and repairs must include:

- cleaning the valve and assessing the wear and tear of components;
- grinding in the seats and lower flange;
- replacing the seats and lower flange;
- replacing the valve bonnet seals;

- replacing the pneumatic actuator diaphragm;
- replacing the pneumatic actuator (reverse) seals;
- replacing the valve body join rings.

6.1. Valve disassembly and cleaning

Each time, during a periodical inspection, the following actions must be taken to disassemble and clean the valve:

- a) disconnect the line supplying the pneumatic control line to the actuator. As regards valves with a travel indicator, the line supplying the pneumatic control signal and supply air must also be disconnected and, possibly, the valve must be disassembled from the system;
- b) remove locking nuts and gland stud nuts (fixing the bonnet); remove the actuator with the bonnet, plug and stem from the valve body;
- c) clean the valve seat and plug faces using clean, soft cloth; clean the valve interior;
- d) inspect the condition of the valve seat and plug faces as well as the guiding surfaces of the plug and plug guide.

6.2. Grinding in the seats and lower flange

In case it is determined that the assembly is not tight enough, it is necessary to perform the grinding-in procedure of valve seat and plug faces. To this end, disassemble the valve (similarly as for the cleaning procedure) and proceed as follows:

- a) Disconnect the plug valve stem from the actuator stem by unscrewing the plug stem or loosening the stem joint screw(s).
- b) Loosen the actuator locking nut and detach the actuator from the bonnet.
- c) Apply a thin and even layer of grinding-in paste on the plug face and reassemble the bonnet with the plug and stem onto the valve body by fixing it lightly with both nuts on the opposite ends.
- d) Grind in the valve seat and plug faces by manually turning the stem several times by approx. 45° in both directions, applying light pressure towards the seat.
- e) Lift the plug, turn it by approx. 30°, insert carefully into the seat and repeat the actions described in item d).
- f) Repeat the above-mentioned actions several times until the plug makes a full turn.
- g) After grinding in, remove the bonnet, use petrol to carefully remove residues of the paste from the seat and plug and inspect the condition of the ground-in faces.
- h) Reassemble the valve with the actuator in a manner depending on the method of valve operation (see 6.5).

NOTE!

- !**
1. The grinding-in procedure must be performed carefully, using slight amounts of grinding-in paste. Prevent local dents on ground-in surfaces.
Applying too much pressure may result in deterioration of face quality.
 2. In order to avoid damaging the bellows, the plug by the bellows bonnet should be ground in by the manufacturer.

6.3. Seat replacement

In case grinding in of seats is impossible due to their wear, they must be replaced.

To this end, disassemble the valve (similarly as for the cleaning procedure) and proceed as follows after the plug is removed:

- a) Unscrew the seats using a special wrench for seats. Use very thin oil or naphtha to dampen the seat thread.
In the case of tightly secured seats when the valve can be removed from the system, use a lathe or drill to unscrew the seats. If the above-mentioned measures are insufficient or infeasible, warm up the valve body with a gas torch or cool down the seats, e.g. with dry ice. After unscrewing the seats, clean the threads and body interior thoroughly.
- b) Before screwing in new seats, a thin layer of paste sealing the threads and securing the seats against loosening during operation must be carefully applied on their threads.
A seat may be pressed using a wrench, lathe or drill. After pressing the seats, remove excess sealing agent.

Note: Seat wrenches can be purchased at POLNA.

6.4. Plug replacement

In case the plug face is excessively worn out or the profile section is eroded, the plug must be replaced. To this end, disassemble the valve (similarly as for the cleaning procedure) and proceed as follows:

- a) Disconnect the plug stem from the actuator stem.
- b) Slide the plug stem out of the bonnet (for 9", 11" and 13" actuators, after removing the locknuts with the position indicator from the stem).
- c) Strike the pin out using a drift and unscrew the stem from the plug.
- d) Screw the stem into a new plug and secure it with the pin.
- e) Carefully insert the plug stem with the plug back in the bonnet so as not to damage the seals.

6.4.1. Replacing sealing rings in tight plugs

In case excessive wear or damage of Teflon rings in tight plugs is detected, they must be replaced.

To this end, remove the plug from the valve and disassemble it as follows:

- Loosen the set screws.
 - Remove the locknuts and the lock washer.
 - Remove the pressure rings.
 - Disconnect the other plug elements and remove worn out rings.
- After mounting new Teflon rings, reassemble the plug in the reverse order.
Fix the tight plug in the valve following the procedure described in 6.4.

NOTE!

It is vital to ensure correct spacing between the lower and upper plug in the plug assembly (tight plugs come as an assembly consisting of the upper and lower plug) and adjust it to the spacing of seats in the body. The adjustment must be made after installing the tight plug in the body and unscrewing the cap from the lower flange.

It consists in loosening the locknuts and reciprocal screwing or unscrewing the upper and lower plug. Tight fit of plugs and seats ensures full tightness of flow cut-off.

6.5. Reassembly

6.5.1. Valves of the following operation mode:

“Air pressure decay – OPENS”.

- a) Mount the actuator on the valve bonnet, while simultaneously tightening the locking nut.
- b) In 9", 11" and 13" actuators, screw locknuts onto the plug stem.
- c) In 15", 18" and 18L" actuators, preliminarily connect the plug stem with the actuator stem (stem coupling).
- d) Mount the body join rings to seal the connection between the bonnet and body, seat the actuator assembly including the bonnet, plug and stem onto the valve body and tighten strongly.
Fix the lower flange in an analogous manner.
- e) In 9", 11" and 13" actuators, move the locknuts upwards with the travel indicator along the plug stem and press them to the actuator stem. The travel indicator should indicate the fully opened position on the actuator travel indicator scale.
- f) Connect correct lines supplying a pneumatic control signal to the actuator or pneumatic control signal and supply air to the travel indicator.
- g) Supply control (and possibly supply) air of pressure conforming to the upper limit of the spring range, as specified on the valve nameplate. The travel indicator should indicate the fully closed position of the valve on the travel indicator scale.
- h) Loosen the stem joint and unscrew the plug stem until the plug rests on the seats.
- i) Lock both stems in relation to each other.

- j) Lower the control pressure to zero. The travel indicator should indicate the fully opened position on the travel indicator scale.

6.5.2. Valves of the following operation mode:

“Air pressure decay – CLOSES”.

- a) Assemble the valve using the same procedure as for the valve with the “Air pressure decay – OPENS” operation mode.
- b) Unscrew the plug stem until the plug rests on the seats.
- c) Connect correct lines supplying a pneumatic signal to the actuator or pneumatic control signal and supply air to the pneumatic travel indicator.
- d) Supply control (and possibly supply) air of pressure equal to the upper limit of the spring range, as specified on the nameplate. The travel indicator should indicate the fully opened position of the valve on the travel indicator scale.
- e) Unscrew the plug stem by one full turn and lock stems in relation to each other.
- f) Lower the control pressure to zero. The travel indicator should indicate the fully closed position on the travel indicator scale.

NOTE!

! While dismantling valves with 13" actuators, the lock washer (see fig. 4) must be taken out from the cut-out in the actuator stem, before the plug stem is unscrewed. During reassembly, after adjusting the screw-in position, the washer projection can be inserted in one of the actuator stem cut-outs and the connection can be secured with locknuts.

6.6. Diaphragm replacement

6.6.1. Valves of the following operation mode:

“Air pressure decay – OPENS”

- a) Disconnect the line supplying control air to the actuator.
- b) Unscrew the adjustment screw until the actuator spring is fully released.
- c) Dismantle the upper diaphragm case.
- d) Unscrew the actuator stem nut and remove the washer.
- e) Replace the diaphragm and reassemble the actuator.
- f) Connect the control air line to the actuator.
- g) Screw the adjustment screw in its initial position (before replacing the diaphragm) by compressing the actuator spring.

- h) Supply the pneumatic control signal and observe the inspection pressure gauge. Read the air pressure value, at which the stem movement begins, from the gauge.
Adjust the spring tension in such a manner that the spring stem movement begins at the pressure value equal to the lower spring range limit, as specified on the valve nameplate.

6.6.2. Valves of the following operation mode:

“Air pressure decay – CLOSES”.

- a) Unscrew the sheath cap and screw the spring adjustor until the spring tension is fully released.
- b) Remove the upper diaphragm case, including the spring sheath.
- c) Remove the spring and its seat.
- d) Unscrew the nut from the actuator stem; remove the washer and diaphragm plate.
- e) Replace the diaphragm and reassemble the actuator.
- f) Connect an inspection pressure gauge to the control air supply air and adjust the spring tension in the same manner as in item 6.6.1. h.

6.7. Replacing the valve bonnet seals.

In case adding single seals to the bonnet chamber is insufficient or it is necessary to change the sealing type, the entire packing must be replaced. To this end:

- a) Disassemble the valve bonnet, including the actuator, plug and stem (see 6.1.).
- b) Disassemble the connection between the valve stem and actuator stem.
- c) Slide the valve stem out of the bonnet (for 9", 11" and 13" actuators, after removing the locknuts with the indicator from the stem) and clean it.
- d) Unscrew the bonnet screw stud nuts. Remove the packing flange and packing follower.
- e) Remove the bonnet seals and the lantern ring from the bonnet chamber and clean the chamber.
- f) Fix one seal from the new set. Next mount the lantern ring and the remaining seals until the bonnet chamber is fully filled.
- g) Assemble the valve in the reverse order and adjust.

7. CHANGING SERIES Z10 VALVE MODE OF OPERATION

Z10 series control valves with type 37 straight actuators can have the following modes of operation:

“Air pressure decay – OPENS” or

“Air pressure decay – CLOSES”.

In case it is necessary to change the mode of operation, proceed as follows:

- a) Unscrew the adjustment screw by a few full turns (count and remember the number of turns).
- b) Disconnect the valve stem from the actuator stem. In “Air pressure decay – CLOSES” type valves, make the disassembly at the control pressure upper range value.
- c) In 9", 11" and 13" actuators, remove the locknuts with the indicator from the valve stem.
- d) Loosen the actuator locking nut and detach the actuator from the bonnet.
- e) Decrease the packing flange and seal pressure by loosening the bonnet gland nuts.
- f) Unscrew the nuts that fix the bonnet and plug (lower cover), remove them and remove the plug with its stem from the bonnet.
- g) Strike the plug pin out using a drift and unscrew the stem from the plug.
- h) Insert the stem into the other end of the plug and secure it with a plug pin.
- i) Turn the valve body by 180° around the flow axis.
- j) Insert the plug with the stem into the body and mount the plug (lower cover) and bonnet, while inserting the plug stem into the bonnet. Ensure the seals are not damaged.
- k) Press the bonnet seals to ensure they are in the previous condition.
- l) Fix the actuator and tighten the locking nut.
- m) Connect the valve stem with the actuator stem.
- n) Screw in the adjustment screw by the same number of full turns as when it was being unscrewed (see 7a).
- o) Adjust the valve (see 6.6.1.h.)

NOTE!

The possibility of changing the valve mode operation is changed using only the type 37 straight actuator is not available to valves with tight plugs and valves with bellows bonnets. In such valves, the “Air pressure decay – CLOSES” mode of operation is achieved using the type 38 reversed actuator.

8. TYPICAL PROBLEMS AND SOLUTIONS

| Item | Problem symptoms | Causes | Solutions | Comments |
|------|--|--|--|----------|
| 1. | The valve demonstrates excessive hysteresis. | Excessive pressure on seals in the bonnet of the valve or reversed actuator. | Loosen the valve bonnet gland stud nuts or loosen the reversed actuator bonnet stud nut. | |
| | | No lubrication of the valve stem or reversed actuator. | Apply grease into the valve bonnet chamber or onto the actuator stem. | |
| 2. | The valve fails to make the full stroke. | The valve stem or reversed actuator stem surface is dirty. | Clean the valve stem or reversed actuator stem surface. | |
| | | The space over the plug in the bonnet is dirty. | Clean the valve. | |
| | | The seats are contaminated with | Clean the valve. | |

| | | | |
|----|---|---|--|
| | | hard particles. | |
| 3. | The valve stroke is not proportional to the control air pressure. | The actuator spring is maladjusted. | Adjust the preliminary spring compression - see 6.6. |
| | | The connection between the valve stem and actuator stem is maladjusted. | Adjust the connection between the valve stem and actuator stem. |
| 4. | The plug does not move. | The valve is jammed in the plug guide or seat. | Replace the plug and plug guide or the seat. |
| | | The actuator diaphragm is damaged. | Replace the diaphragm in the actuator. |
| 5. | Closing is not tight. | Plug or seat faces are damaged. | Grind in the plug and seats supporting surface or replace them. |
| | | The plug or seats are eroded. | Replace the plug and seats. |
| | | The seats are contaminated with hard debris. | Clean and flush the valve. |
| | | Teflon rings in tight plugs are damaged. | Replace the Teflon rings. |
| 6. | Valves with perforated plugs: - decrease in flow capacity; - limited stroke or valve stem movement jammed | Perforation holes are dirty. | Clean contaminated surfaces. Remove roughness of damaged friction faces. |

NOTE!

Operating problems caused by erroneous operation of electric actuators, travel indicators, filter-reducers, solenoid valves and other fixtures installed on the control valve must be solved in line with maintenance manuals provided by their manufacturers.

9. OPERATION SAFETY CONDITIONS

The following rules must be adhered to in order to ensure operation safety:

- The valve can be detached from a pipeline or parts coming into contact with a medium can be dismantled not before the user ensures that these elements are no longer under the medium pressure.
- The actuator spring is pre-tensioned. In case the actuator is being dismantled, the pre-tension must be fully released by full unscrewing of the adjustment screw.
- While operating in high temperatures, the hazard of burning/scalding is present, so provide guards where possible.
- Only qualified personnel can assemble/disassemble the valve.
- Other operating hazards are marked with “!” in this document.

10. PRODUCT DISPOSAL

After the product life is over, it must be dismantled and its components must be grouped according to their materials, i.e. metal components (non-ferrous metals, acid-resistant and carbon steels), rubber components (diaphragms, seals) and plastic components (plat seals and packing, electric components, plugs). Recycled materials must be reused in line with general rules regulating individual groups of materials. The product does not contain materials whose disposal is harmful for the environment.

11. LIST OF SPARE PARTS

| Part no. in drawing | Part name | Number of parts |
|---------------------|----------------------------|-----------------|
| 6 | Packing | 1 set |
| 8 | Plug | 1 |
| 9 | Plug pin | 1 |
| 10 | Plug stem | 1 |
| 11 | Upper seat | 1 |
| 12 | Lower seat | 1 |
| 14 | Body join ring | 2 |
| 17 | Plug guide | 2 |
| 75 | Diaphragm | 1 |
| 102 | Actuator bonnet seal (set) | - |
| - | PTFE ring (tight plugs) | 2 |

NOTE!

It is recommended that genuine valve manufacturer's parts should be used. Failure to observe this rule releases the manufacturer from any liability connected with the product.


12. ADDITIONAL REQUIREMENTS RESULTING FROM EQUIPMENT OPERATION IN EXPLOSIVE ATMOSPHERES, AS PER 2014/34/EU (ATEX) DIRECTIVE

12.1. Design requirements

Type “Z10” valves with type P/R pneumatic actuators are designed in line with the requirements applicable to equipment operating in explosive atmospheres, for Group II, Category 2, as per PN-EN 13463-1; 2002, with particular consideration of:

- ensuring operation in line with technical parameters defined by the manufacturer and high level of protection;
- operation in rooms where explosive atmospheres caused by mixtures of air with gases, mists, vapours or dust-air mixtures are likely to occur;
- providing explosion protection measures ensuring a high degree of protection, even in the event of frequent problems and faults.

12.2. Application requirements

“Z10” type valves with P/R pneumatic actuators designated as  can be operated in the following zones, as per PN-EN 1127-1; 1997:

- a) Zone 1 for gases / vapours including locations in which explosive atmosphere may sometimes occur during standard operation; the Zone may encompass, e.g.:
 - direct vicinity of Zone “0”;
 - direct vicinity of locations where raw materials are supplied or elements are filled and emptied;
 - direct vicinity of equipment vulnerable to damage or insufficiently protected seals.
- b) Zone for gases / vapours including locations in which explosive atmosphere does not occur during standard operation or it occurs for limited periods of time. This Zone may include, e.g. the vicinity of Zone “0” and “1”.
- c) Zone 21 for dust including locations in which explosive atmospheres in the form of a flammable dust cloud in the air may sometimes occur during standard operation and may include, e.g. locations in the direct vicinity of facilities where the dust is loaded/unloaded and locations with dust layers which, during standard operation, may create flammable mixtures of dust with air, within explosive concentration limits.
- d) Zone 22 for dust including locations in which explosive atmosphere in a form of flammable dust cloud in the air does not occur during standard operation or it occurs for limited periods of time. This Zone may include, e.g. locations in the direct vicinity of equipment where dust may accumulate or be released.

- e) In case the explosive atmosphere comprises acetylene, carbon disulphide, hydrogen, hydrogen sulphide or ethyl oxide, the actuator non-pressure (spring-actuated) chamber must be connected by means of piping with non-explosive atmosphere in order to eliminate the risk of explosion caused by mechanically induced sparking, e.g. in case the spring breaks.

12.3. Repair and maintenance requirements

While performing inspections, repairs and maintenance activities in explosive atmospheres, ensure safety conditions relating to the used tools and zones in which they can be utilised in line with EN 1127-7, Annex A.

13. EXPLANATIONS FOR DRAWINGS

| Part no. in drawing | Part name | Part no. in drawing | Part name |
|---------------------|-----------------------|---------------------|-----------------------------------|
| 1 | Valve body | 85 | Actuator stem |
| 2 | Standard bonnet | 86 | Stem nut |
| 2EB | Extended bonnet | 87 | Pipe plug |
| 2AB | Cooling finned bonnet | 88 | Travel indicator scale |
| 3 | Packing flange | 89 | Actuator nameplate |
| 4 | Packing follower | 90 | Valve nameplate |
| 5 | Lower flange | 91 | Screw |
| 6 | Packing | 92 | Yoke screw |
| 7 | Lantern ring | 93 | Diaphragm case screw |
| 8 | Plug | 94 | Diaphragm case nut |
| 9 | Plug pin | 95 | Nut |
| 10 | Plug stem | 96 | Round head grooved pin |
| 11 | Upper seat | 97 | Spring sheath |
| 12 | Lower seat | 98 | Sheath cap |
| 13 | Lubricator plug | 99 | Housing seal |
| 14 | Body join ring seal | 100 | Actuator bonnet |
| 17 | Plug guide | 101 | Actuator nut |
| 23 | Travel indicator | 102 | Actuator bonnet seal |
| 24 | Stem locknut | 103 | Bonnet washer |
| 31 | Gland stud | 104 | Snap ring |
| 32 | Body stud | 105 | Spacer bushing |
| 33 | Body stud | 106 | Stem coupling |
| 37 | Gland stud nut | 107 | Travel indicator |
| 39 | Locking nut | 108 | Travel indicator screw |
| 69 | Stem coupling nut | 109 | Stem coupling screw |
| 70 | Lock washer | 110 | Electric actuator connector |
| 71 | Yoke | | |
| 72 | Lower diaphragm case | | Type 20 manual drive parts |
| 73 | Upper diaphragm case | | |
| 74 | Diaphragm button | 111 | Drive yoke |
| 75 | Diaphragm | 112 | Drive handwheel |
| 76 | Diaphragm plate | 113 | Drive bushing |
| 77 | Diaphragm washer | 114 | Handwheel cap |

| | | | |
|----|-----------------|-----|------------------------|
| 78 | Spring I | 115 | Drive stem |
| 79 | Spring II | 116 | Keyway |
| 80 | Spring seat | 117 | Travel indicator scale |
| 81 | Bearing race | 118 | Ball bearing |
| 82 | Bearing balls | 119 | Grease nipple |
| 83 | Spring adjustor | 120 | Drive stem pin |
| 84 | Plug guide | 121 | Travel indicator |
| | | 122 | Screw |

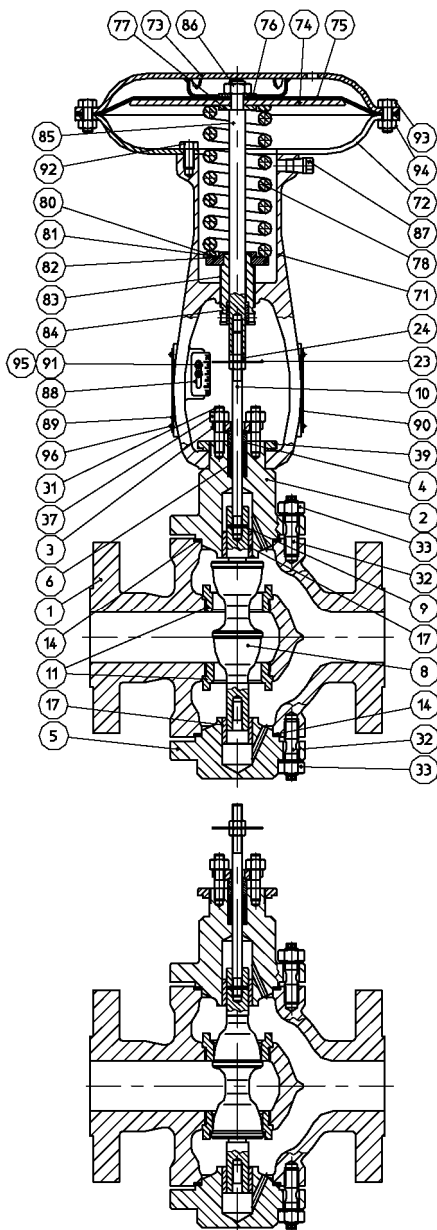


Fig.1.) Z10 series two-seat valve with the following mode of operation:
 - "Air pressure decay – OPENS"
 - "Air pressure decay – CLOSSES"

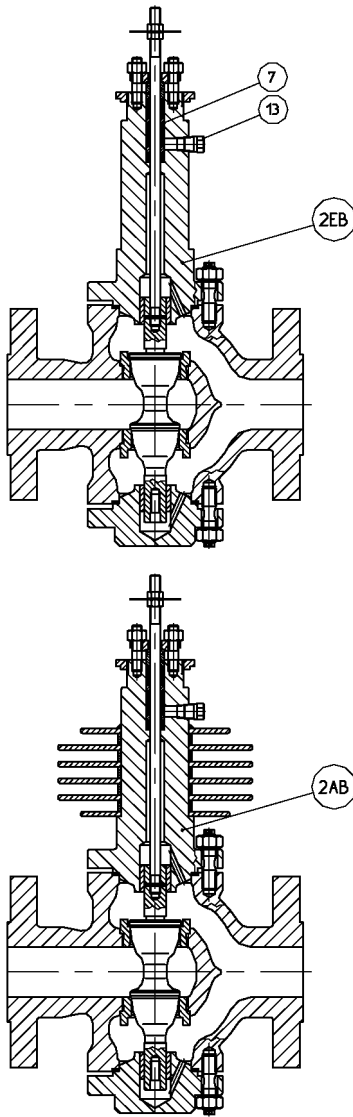


Fig. 2 Z10 control valve
- 2EB – with extended bonnet
- 2AB – with cooling finned bonnet

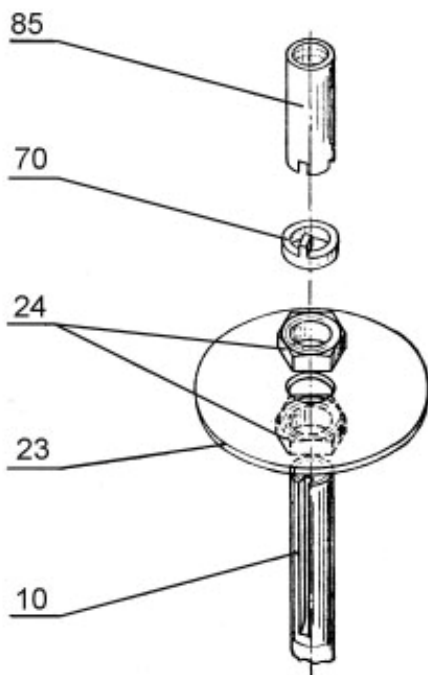


Fig.3.) Connection of actuator stem and valve stem by means of lock washer

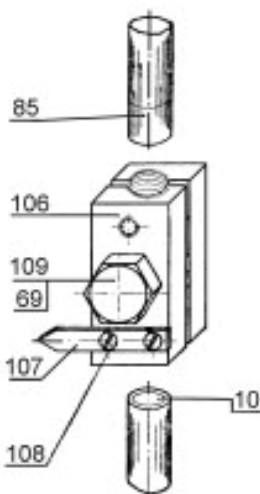


Fig.4.) Connection of actuator stem and valve stem by means of joint

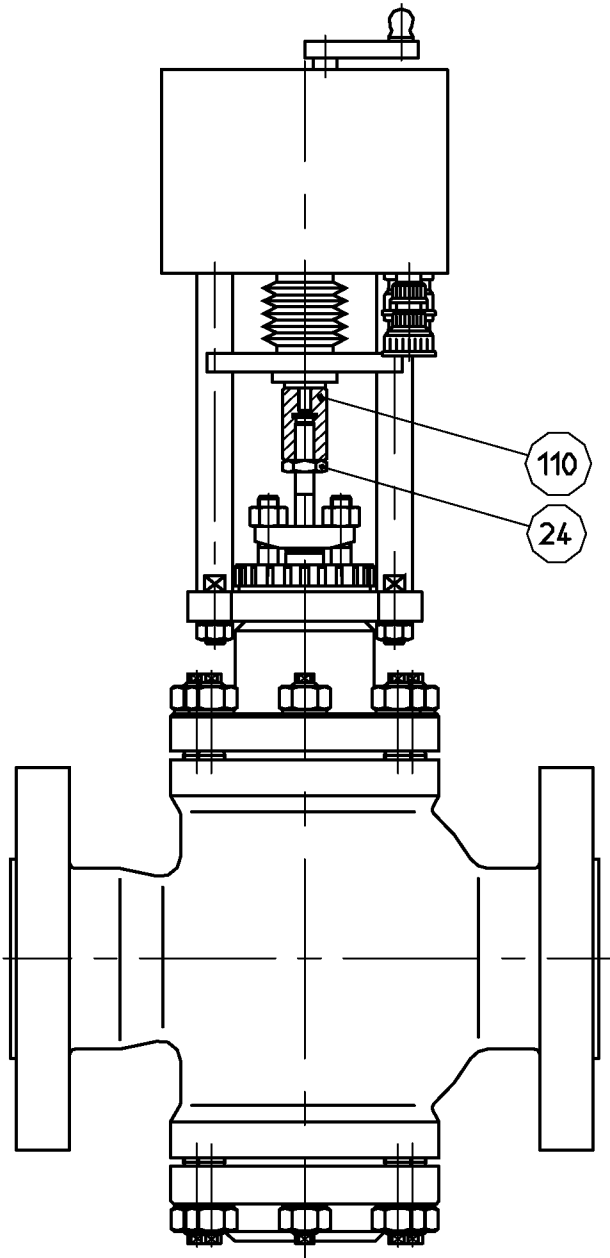


Fig. 5 Z10 series valve with electric actuator

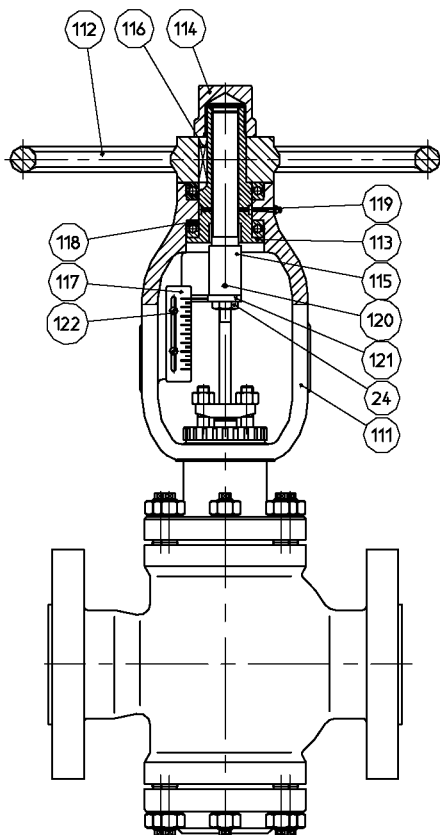


Fig. 6 Type 20 manual drive



Zakłady Automatyki "POLNA" S.A

Obozowa 23 Str. 37-700 Przemyśl, POLAND

Phone: +48 16 678-66-01

Fax: +48 16 678-65-24, +48 16 678-37-10

www.polna.com.pl; email: sales@polna.com.pl

Edition Z10/10/2022

Valid until the next edition is published.