

## **OPERATING MANUAL**

**Non-return eccentric butterfly valves with counterweight  
or absorber**

**Cat. no 4499 4499A**



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## 1. INTENDED USE

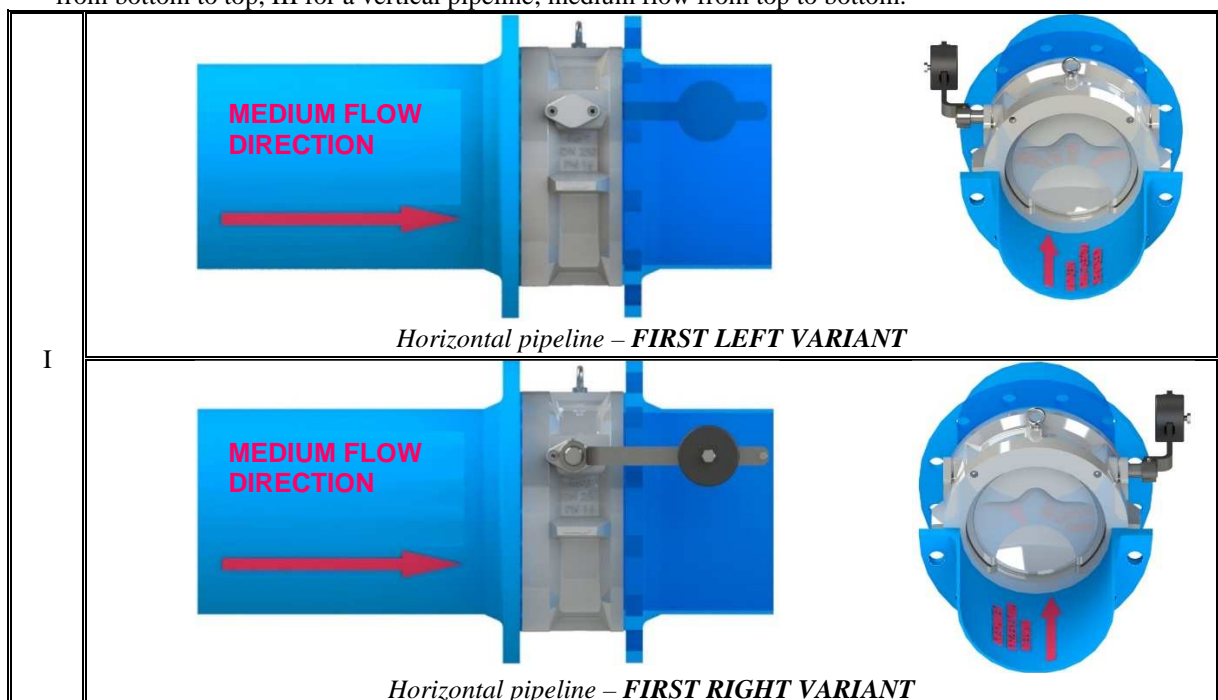
Non-return eccentric flangeless butterfly valves cat. no. 4499, 4499A are intended for drinking water supply systems and industrial systems of other non-aggressive liquids. Each valve can be installed in overground and underground pipelines as an integral inline part of the piping. When installed underground, the valves are to be installed in chambers. They may be created in various material versions and are used in water networks, technological systems, petrochemical industry, municipal engineering (sewage treatment plants), water purification stations. Butterfly valves are used to protect the installation against back flow of the stream. They are self-operating:

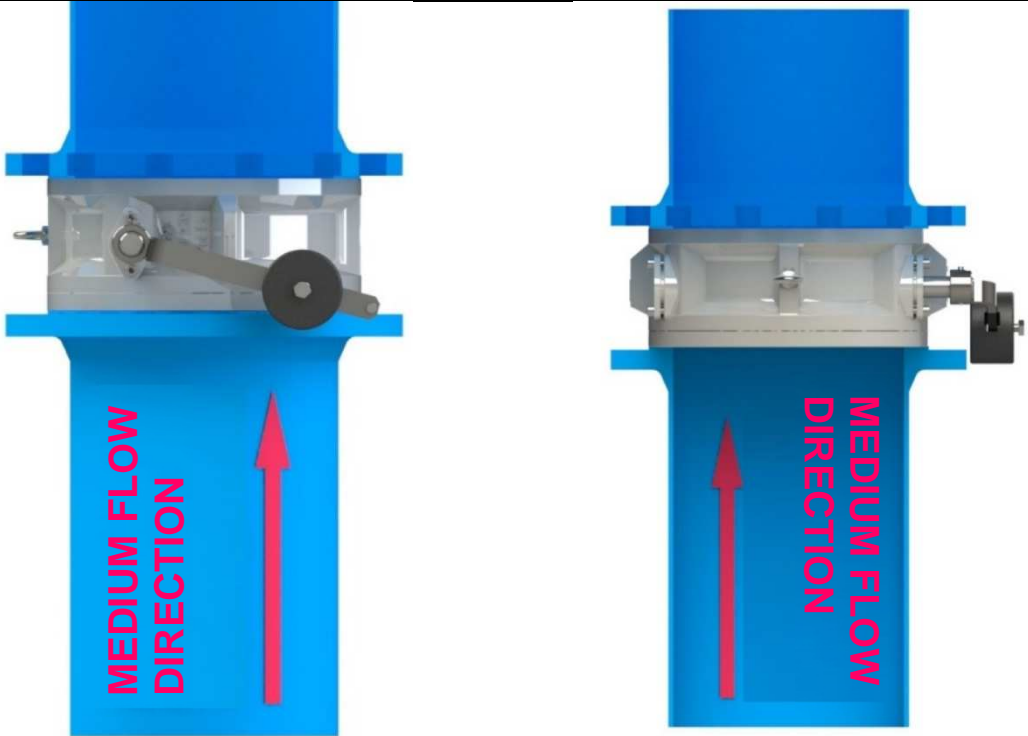
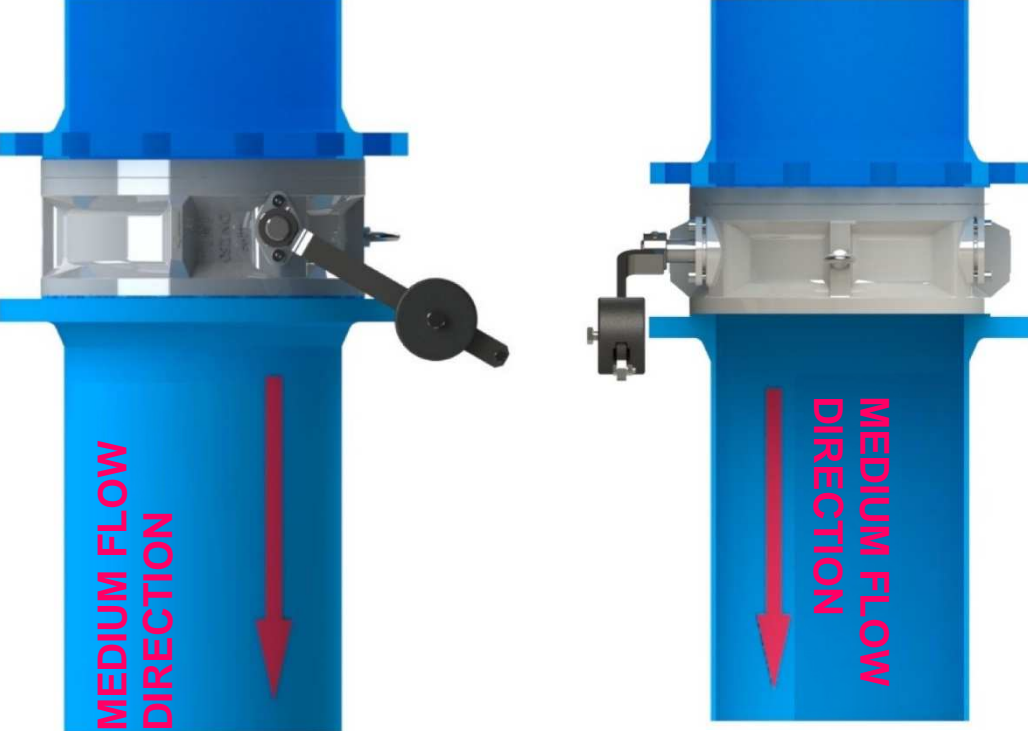
- in one direction the pressure of the passing medium opens the butterfly valve (flow in accordance with the direction of the arrow on the body),
- backflow (against the direction arrow on the body) closes the butterfly valve.

Flangeless butterfly valves with counterweight 4499 and absorber 4499A are used for installation between pipeline flanges.

## 2. TECHNICAL DESCRIPTION

- Production and acceptance according to EN 1074-2 (*Valves for water supply. Functional requirements and verification tests. Isolating valves*) and EN 12266-1 (*Industrial valves. Testing of valves*).
- 100% of each valve is leak tested.
- Temperature range of the valve from 0°C to +70°C (for special design from 0°C to +150°C for FKM rubber compound)
- Nominal pressure ratings: 0.6 MPa; 1.0 MPa; 1.6 MPa.
- Nominal diameter range:
  - 4499 (with counterweight): DN250 ÷ DN800 [mm],
  - 4499A (with absorber): DN300 ÷ DN800 [mm];
- Sealing performance versions:
  - EPDM,
  - NBR,
  - FKM.
- Hydraulic performance: maximum liquid medium flow rate is 3[m/s] PS10, to 4[m/s] PS16,
- Depending on whether the butterfly valve is supposed to be installed on a horizontal or vertical pipeline, there are the following variants: I for a horizontal pipeline (left or right), II for a vertical pipeline; medium flow from bottom to top, III for a vertical pipeline; medium flow from top to bottom.



II	 <p><i>Vertical pipeline, medium flow direction from bottom to top – <b>SECOND VARIANT</b></i></p>
III	 <p><i>Vertical pipeline, medium flow direction from top to bottom – <b>THIRD VARIANT</b></i></p>

In addition, for the direction of the medium flow through a horizontal pipeline, the following variants are distinguished (the position of the lever viewed from the direction of flow defines the variant):

- L – left,
- P – right.

Due to difficulties with obtaining tightness in the pressure range between 0 and 1.6 MPa (because initial pressure exerted on the flap is needed both for closing and opening), two closing tightness ranges are specified:

- W (high) – 0.3÷1.6 MPa,
- N (low) – 0.03÷0.6 MPa.

**The minimum closing tightness pressure ( $p_{min}$ ) to open the butterfly valve must exceed 0.03 MPa.**

$$p_{min} \geq 0,03 \text{ MPa}$$

**The above information on the variants due to the application, materials used and mounting configuration also applies to the version with absorber (4499A).**

The following are examples of the correct designation of the counterweighted butterfly valve variant (4499)

- non-return butterfly valve with counterweight 4499 DN300, variant “I”, left variant, for operation in the low pressure range,
- or
- non-return butterfly valve 4499 DN300-I-L-N,

The following are examples of the correct designation of the butterfly valve variant with absorber (4499A)

- non-return butterfly-valve with absorber 4499 DN400, variant “III” variant, for operation in the high pressure range
- or
- non-return butterfly valve 4499A DN400-III-W,

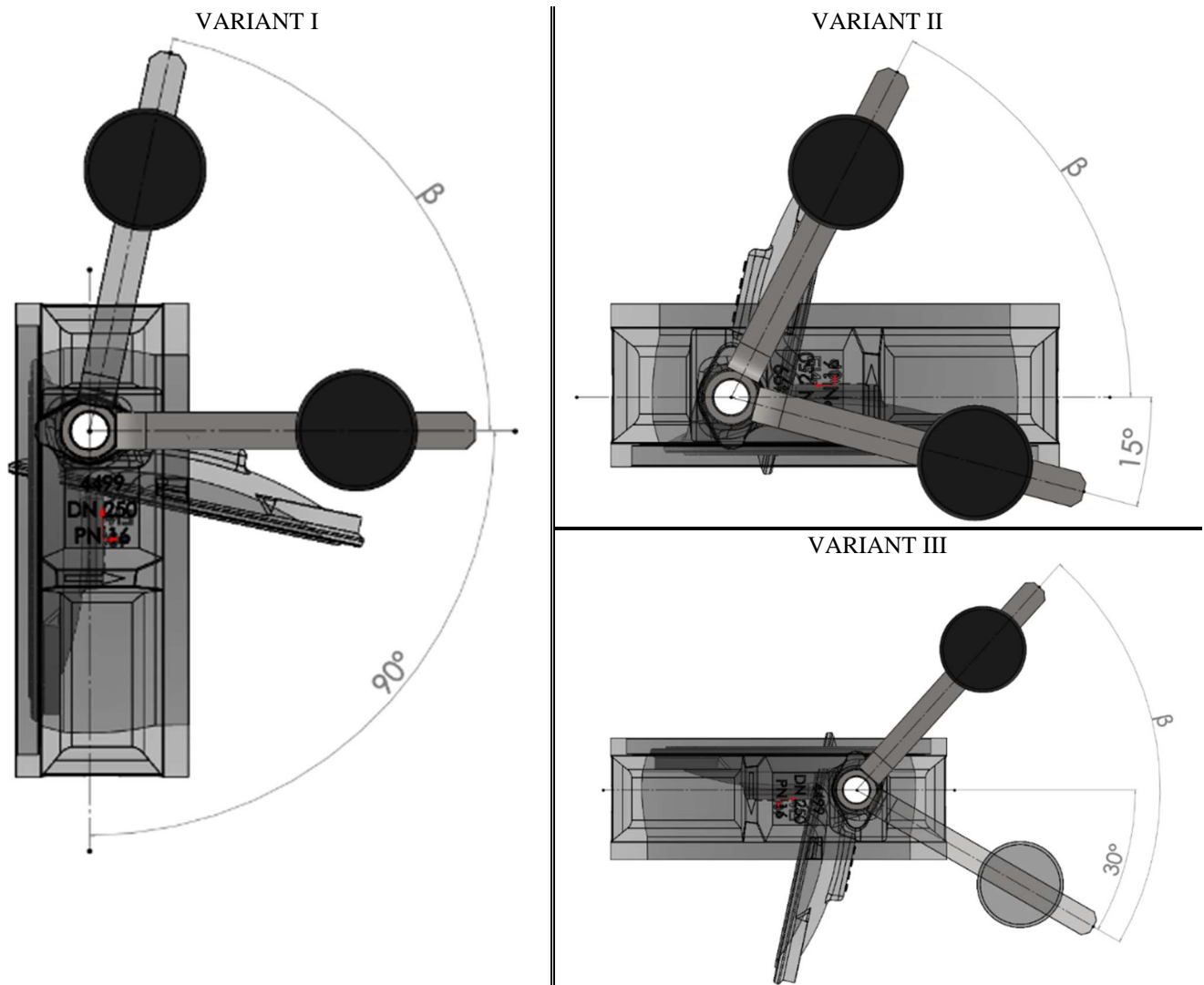
#### **ATTENTION:**

**If the customer does not specify the requirements in the order, butterfly valves will be manufactured for installation in horizontal pipelines (I) with flanges bored for PN16, as right-hand (P), with NBR sealing, for operation in the high pressure range (W) 0.3÷1.6 MPa for tightness of closure.**

- i) Flangeless design enables installation between flanges in accordance with EN 1092-2 (*Flanges and their joints. Circular flanges for pipes, valves, fittings and accessories, PN designated. Cast iron flanges*) and in sizes suitable for nominal pressure ratings (PN10 or PN16).
- j) The installation length and its tolerance are in accordance with the technical documentation by JAFAR:

DN	DN250	DN300	DN350	DN400	DN500	DN600	DN800
Tolerance	±1 mm						
L [mm]	135	160	180	200	240	260	241

k) The operating range of the butterfly valve flap for the various variants is shown in the following diagrams:

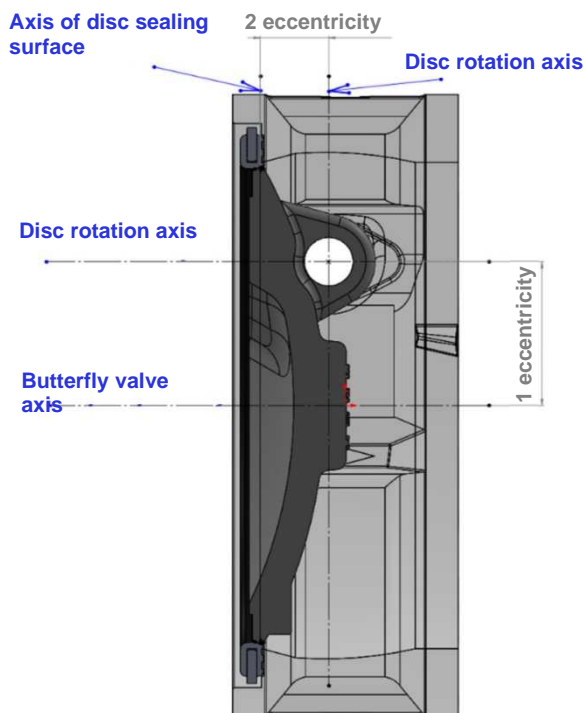


$\beta$  – maksymalny kąt otwarcia kłapy, gdzie dla przelotów:

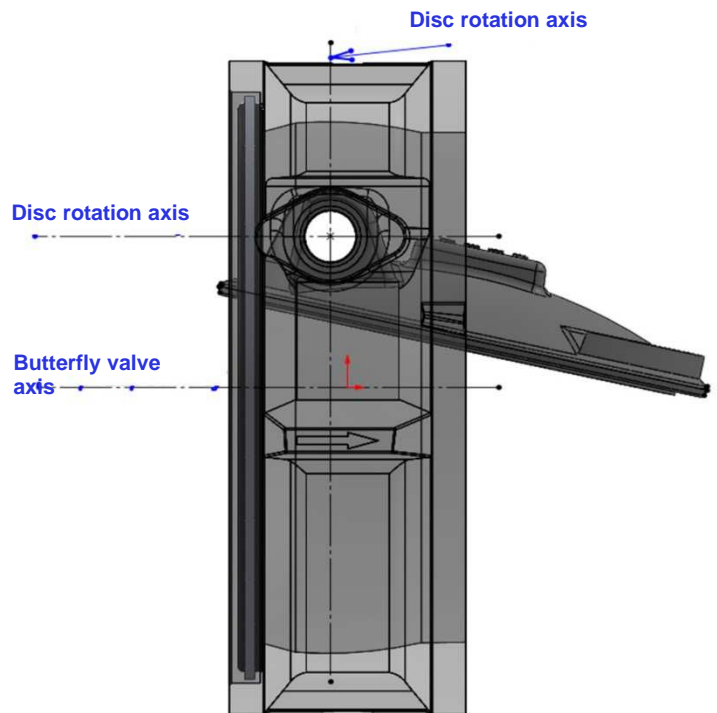
- DN250 and DN800  $\beta = 75^\circ$
- range D300 – DN600  $\beta = 78^\circ$

- l) The butterfly valves are manufactured and accepted in accordance with EN 12266-1 (*Industrial valves. Testing of metallic valves. Part 1: Pressure tests, test procedures and acceptance criteria*) and EN 593:2018 (*Industrial valves. Metallic butterfly valves for general purposes*).
- m) The butterfly valves are tested by a pressure test for body tightness and a test of flap closure with water. Other operating conditions, such as operating temperature and media flowing through the fittings, must be agreed with the manufacturer. Flangeless butterfly valves have a closure in a form of a double-arm flap, which rotates around an axis which is perpendicular to the medium stream.

- n) Product no. 4499 is manufactured in the range DN250-DN800, while product no. 4499A in the range DN300-DN800. The flap in the butterfly valve is set eccentrically, while the sealing ring (elastomer with metal insert) is permanently placed in the seat of the body of the butterfly valve.

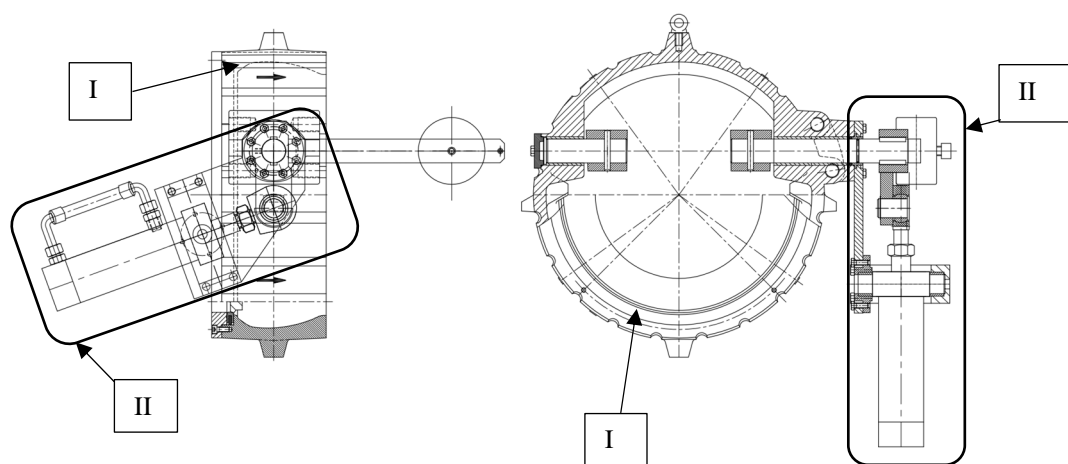


*Non-return butterfly valve – disc in closed position*



*Non-return butterfly valve – disc in open position*

- o) The butterfly valve is operated by means of a lever with a weight or a hydraulic actuator. The following is an example of a non-return butterfly valve with absorber cat. no. TYPE 4499A. It consists of:
- I. non-return butterfly valve type 4499.
  - II. hydraulic actuator assembly which include a shock absorber attached via a swing connection on the load bearing pate, set on the valve casing.





### 3. PRODUCT IDENTIFICATION MARKING

The valve marking meets the following standards: EN 19 (*Industrial valves. Marking of metallic valves*), EN 1074-1 (*Valves for water supply. Functional requirements and verification tests. Part 1: General requirements*). The permanent marking is located on the side wall of the body and on the rectangular surface of the hub, which is located between the pivots of the flap. The locations of permanent marking are shown below:



- product no.,
- DN diameter
- nominal pressure
- medium flow direction arrow

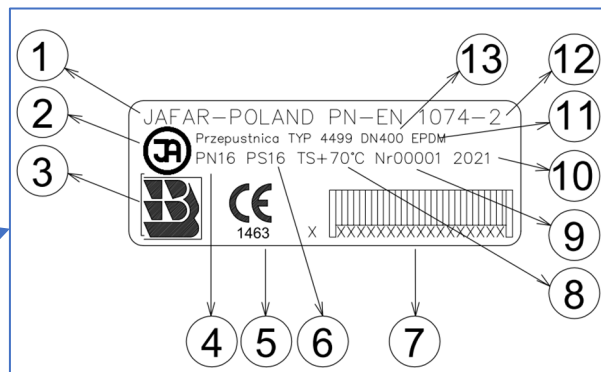


- manufacturer's trade mark
- body material type
- medium flow direction arrow



- product no.,
- DN diameter
- flap material type;
- heat number

In addition, identification plates containing the following data are placed at the indicated location:

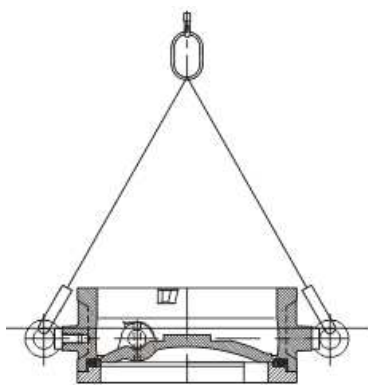


- |   |   |
|---|---|
| <ol style="list-style-type: none"> <li>1. Manufacturer's company and country of origin.</li> <li>2. Manufacturer's company logo.</li> <li>3. Polish construction mark (for the full range of diameter values).</li> <li>4. Alphanumeric reference designation for the combination of mechanical properties and sizing of the mating piping ends (PN).</li> <li>5. CE marking</li> <li>6. Maximum permitted pressure (PS).</li> <li>7. Barcode.</li> </ol> | <ol style="list-style-type: none"> <li>8. Maximum / minimum permissible temperature (TS).</li> <li>9. Production serial no. in the calendar year</li> <li>10. Year of manufacture of the product.</li> <li>11. Seal material.</li> <li>12. Reference standard the product is compliant with.</li> <li>13. Nominal diameter (DN).</li> </ol> |
|---|---|

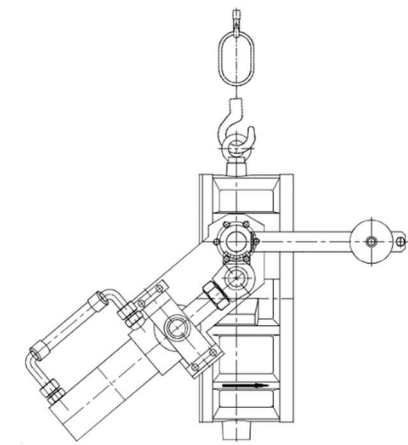
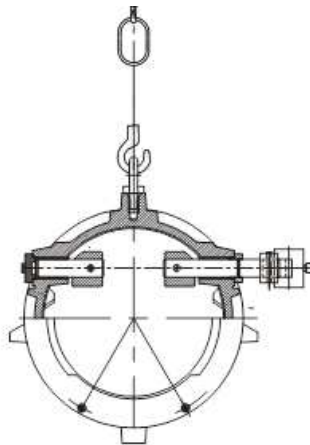


## 4. STORAGE & TRANSPORT

The products are packed on EURO pallets (1200x800) or in dedicated packaging. The valves should be stored in clean rooms, free from bacteriological and chemical contamination, at temperatures from -20°C to 70°C. The paint coating and rubber elements must be protected against long-term exposure to UV radiation. Valves should be stored so that they are protected against mechanical damage. Compression of rubber parts (the valve flap should be set in the rest position) should be avoided. Secure the products against shifting during shipping and handling. When lifting butterfly valves in the range DN250 to DN800, attachment by the eye only is permitted (see picture below). **Transport by the pin on the lever / shock absorber side is prohibited.**



*Non-return butterfly valve with counterweight*

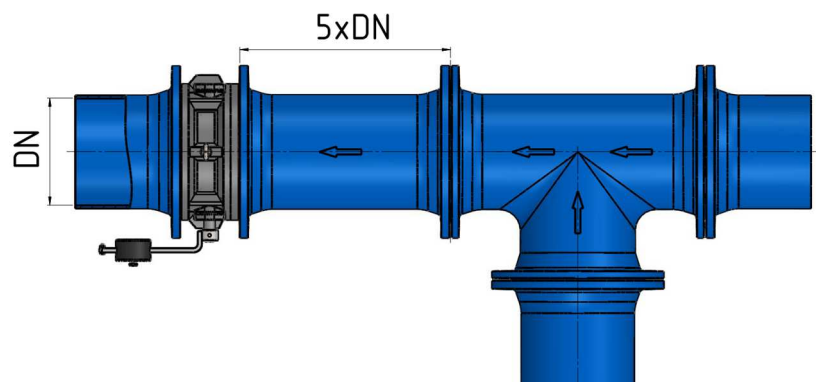


*Non shock absorbers return butterfly valve with absorber*

## 5. INSTALLATION

### 5.1. GENERAL REQUIREMENTS

Flangeless butterfly valves TYPE 4499 and TYPE 4499A can be installed in underground or overground pipelines on horizontal or vertical installations. The listed products are suitable for joining with the flanged ends of pipelines with the size equal to that of the valve flanges. The valves are to be installed in the pipeline so that the flow direction of the medium is in accordance with the flow direction indicated on the body. **Due to the non-uniformity of the speed and pressure fields near piping elbows and tees, it is recommended to maintain a straight piping run at least 5xDN long between the valve outer flange face and the piping bend or tee (see picture below). The manufacturer allows for a distance less than 5xDN, but this may result in noisy operation and faster wear of the butterfly valve.**



*Recommended distances from the piping bends*

The general rule is not to install the valve near any bend or tee or any piping bends (elbows / tees), especially with the valve on the high-pressure side of the piping (in the pump to valve to piping curve system) The normal flow

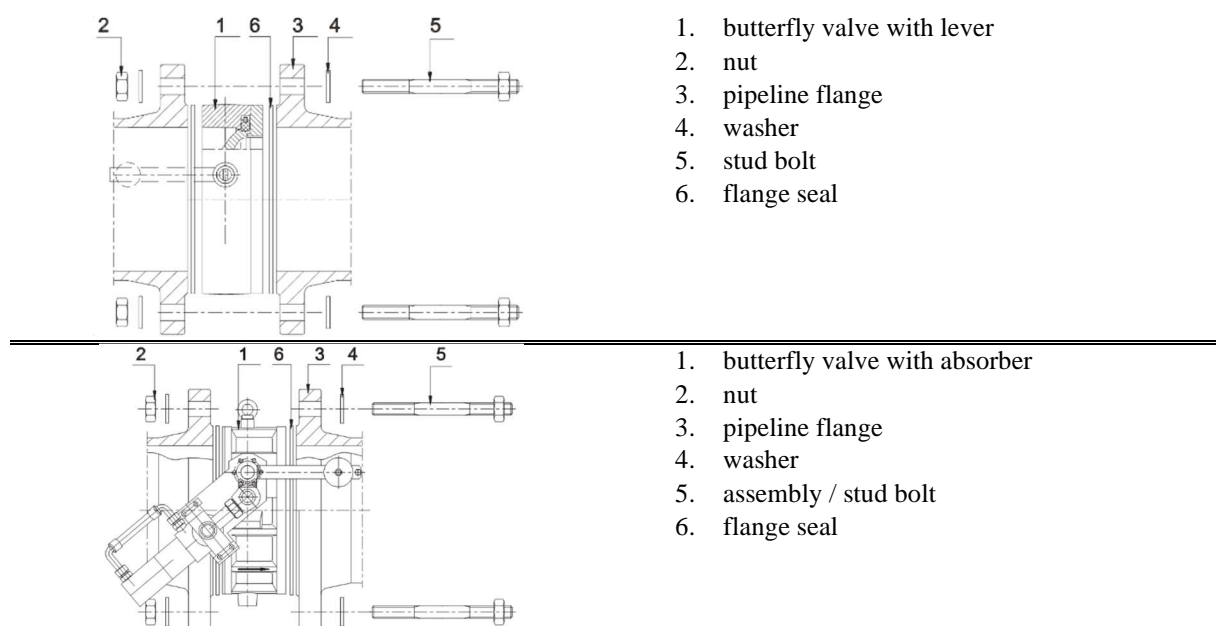
deflection over a piping bend will be aggravated by the low-pressure area of the valve (where a risk of flow interruption exists). Installation directly behind pumps, behind elbows or tees is not permitted due to the possibility of cavitation on the flap surface, vibration or disc oscillation and faster wear of bearings and sealing elements. The dimensions of the damper must also be taken into account in the technical design so that the fittings can be operated freely.

## 5.2. INSTALLATION ISNTRUCTIONS

Before installation, the condition of the internal surfaces of the butterfly valve and the surfaces to which the seals working with the pipeline will be fitted should be checked and, if necessary, thoroughly washed with water. When mounting butterfly valves between pipeline flanges, first remove any preservatives which may have been used to protect the surfaces during transport, clean thoroughly the side surfaces of the butterfly valve to which the seal is to be mounted, install previously prepared seals and fasten the whole assembly with appropriately long bolts or pins connecting two adjacent flanges. The design of butterfly valve cat. no. 4499A does not allow the use of stud bolts for all openings in pipeline flanges (conflict with the body). In order to properly install the butterfly valve onto a pipeline the threaded holes in the body provided by the manufacturer should be used. The number, thread diameter and thread length used in the body are given in the table below:

	DN300	DN350	DN400	DN500	DN600	DN800
PN10	2xM20x30	4xM20x30	4xM24x20	4xM24x45	4xM27x45	4xM30x45
PN16	2xM24x30	4xM24x30	4xM27x20	4xM30x45	4xM33x45	4xM36x45

For proper installation, the flange thickness for the selected DN of the pipeline must be taken into account. When opening the butterfly valve flap it extends beyond the installation length, therefore it is necessary to remember about free space in the pipeline for proper operation of the flap by using the appropriate fittings e.g. cast iron stub pipe, assembly insert. The minimum flap operation distance is the installation length L (installation lengths are given in paragraph 2j) except for DN800 which is 440 mm. Tighten the connection flange bolts crosswise to ensure a proper seal pressure. Start from the bolt holes near the valve pivot shaft. The tightening torque of the bolt nuts is specified in the PN-63/M-82056. Install the valve on a base or a support sufficient for the size and weight of the valve, to prevent straining of the piping by the valve. Installed fittings are an integral part of the pipeline. When butterfly valves are installed in underground installations, they should be installed in chambers. The installation method is shown in the following figure:



Note that the completed installation must not expose the valve to bending or tensile stress from loading with the unsupported pipeline sections. Install the product properly aligned with the piping centreline and with proper parallelism and flatness of the mating connection flanges, with prevention of hydraulic shock, and with due compensation of the pipeline dimensional changes from temperature and pressure. A valve is ready for installation

in the system as assembled and adjusted by the manufacturer. Any dismantling of the valve components (e.g. the shaft, the closure panel, or sleeves) may result in loss of seal. The requirements for correct quality of the mating flanges have to be satisfied, that is flatness and parallelism, during the installation process. During the installation process, do not leave any installation tools, bolts, nuts, or welding wire inside of the piping or they can stop in the sealing seat of the butterfly valve or on the flap (disc). This may lead to damage of the seat during closing of the valve and loss of seal across the valve. Tightness is ensured by a seal with a metal insert permanently fitted to the body of the valve.

The manufacturing tolerance of the valves and their components are large enough to ensure full interchangeability. The user carries out the installation of the valve in the pipeline on his or her own accord.

Before attempting to install the valve, check the technical and commercial documents delivered with the product to verify that your media and pipeline operating parameters comply with the manufacturer's declaration.

### 5.3. INITIAL START-UP OF VALVES

A properly installed butterfly valve should operate automatically. Check whether the manually raised level with a disc (to the flow position) returns after release to the closed position without resistance. Carry out the test without pressure and without medium flow.

Having completed the installation, perform a pressure test at a maximum test pressure equal to 1.5 times the nominal pressure in the fully open or 1.1 times the nominal pressure in fully closed position. **Attention! If the product has mechanical damage, do not install it in the pipeline.**

## 4. OPERATION

The valve shall be operated in accordance with all relevant requirements for stop valves.

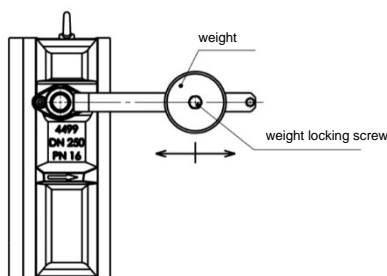
To ensure full operational efficiency, carry out a technical inspection and maintenance at least once a year as follows:

- making full valve overload,
- checking the tightness of all seal connections when the butterfly valve is closed,
- visually assessing the corrosion protection.

If the paint coat is damaged, rebuild it with the paint kits available from JAFAR. Exceeding the operating limits of the valve may result in damage that will not covered by the warranty or the statutory warranty granted by the manufacturer.

If hydraulic impacts are present, use butterfly valves for nominal pressure higher by one degree, (e.g. for pressure 1.0 MPa -> PN16) or lower the working pressure (e.g. for PN16 ->  $P_{\text{working}} = 1.0 \text{ MPa}$ ). The safe hydraulic load [Mg] for PN16 impact is given in the table below:

$D_{\text{nominal}}$	DN250	DN300	DN350	DN400	DN500	DN600	DN800
$M_g \left[ \frac{m^3}{m^2 \cdot h} \right]$	8	11	15	20	31	45	55



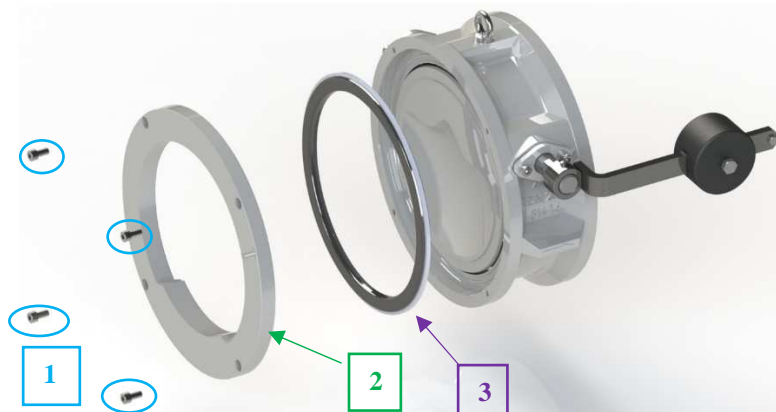
*Optimal position of the counterweight on the lever*

The position of the counterweight (weight) on the butterfly valve lever is optimal. Depending on the local flow velocity of the medium in the pipeline, the user can change the position of the weight in order to minimise the acoustic effects occurring during the final stage of the flap closing. This is done by unscrewing the screw that locks the weight and then twisting it into position.

If there are large hydraulic impacts, the 4499A non-return butterfly valve should be used, whose main function is to reduce the hydraulic impacts. A hydraulic absorber (hydraulic actuator) articulated to the lever slows down the movement of the lever, thus slowing down the closing of the flap.

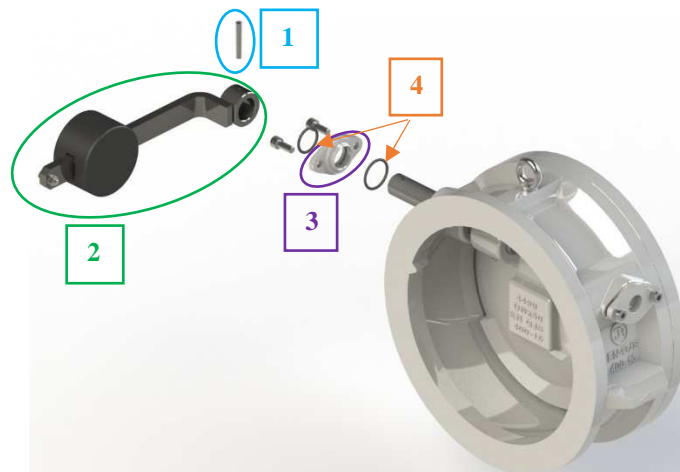
Any problems in the proper operation of the non-return butterfly valve can be divided into:

- I. *seal leakage – verify that the installed butterfly valve is designed for the pressure range as specified in paragraph 1h. If installed correctly, check the condition of the sealing ring. If it is damaged, replace it with a new one as shown below. Remove the screws (1), take off the cap (2) and then pull out the sealing ring (3). Installation should be carried out in reverse order.*



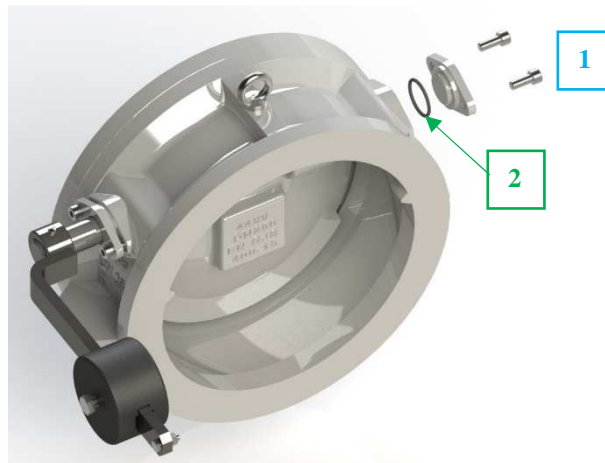
*Replacing the sealing ring*

- II. a leak in the housing can be caused by:
- leakage from under the cap – seal replacement (see paragraph I) – not closed tightly,
  - leakage on the lever pivot side – knock out the lever cone pin (1), remove the lever with the supporting weight (2), remove the cover (3). By removing the screws, replace the O-rings (4),



*O-ring replacement – lever pivot cover*

- leakage from the rear cover – unscrew the screws (1) and replace the O-ring (2).



*O-ring replacement – rear cover*

- III. Noisy operation (knocking) can be caused by high friction on the bearing pivots. Changing the position of the weight on the butterfly valve lever will reduce friction. The process is described earlier in this paragraph. The optimal disc position can be obtained even after several attempts. In case of further malfunctions contact the manufacturer (possible deformation of the flap pivots).

## 5. SAFETY

Installation and operation tasks related to the product shall be only be done by qualified professionals with sufficient training and experience to assess the current situation and identify and avoid hazards. Failure to follow this warning or this Operating Manual may cause death, severe bodily injury or substantial property damage.

Fabryka Armatur Jafar S.A. shall not be liable for any accidents or emergencies related to incorrect installation or operation of the product. If the installation is operated explosion hazard zones, ATEX requirements may apply; this will require suitably trained professionals (according to ATEX requirements). Do not use tools which may generate electrostatic discharge in the ATEX zone.

Do not use the product without thorough knowledge and understanding of this Operating Manual. Follow the general health and safety rules. Keep this Operating Manual throughout the service life of the product to ensure a safe operation of the latter.

## 6. WARRANTY

The product assembled, installed and operated in conformity with this operating manual and the data sheet is covered by a guarantee from the manufacturer. The warranty terms, conditions and period are specified in the Warranty Certificate available from [www.jafar.com.pl](http://www.jafar.com.pl).

The manufacturer may provide this product with custom materials and modifications on order. The final selection of the product which meets the optimum criteria for the installation project in question is made by the installation designer, who should consider this Operating Manual along with other data and information of significance for the correct operation of the product.

Failure to comply with the guidelines and instructions in this Operation and Maintenance Manual releases the manufacturer from all obligations, liability and warranty. Due to continuous business development, the manufacturer reserves the right to modify and change the design of the product presented herein.