# BROEN STEEL BALL VALVES

# USER MANUAL

*Contents*


*1. General information.....2*
*1.1 BROEN Steel Ball Valves.....2*
*1.2 Approvals.....2*
*1.3 Quality Management.....2*

*2. Preoperational Instructions and Precautions .....2*

*3. Plates.....3*

*4. Transport and Storage .....3*

*5. Installation and Welding .....4*
*5.1 Installation.....4*
*5.2 Welding.....4*

*6. Commissioning and Use ..... .....4*
*6.1 Commissioning Test Pressures..... .....4*

*7. Operation ..... .....5*
*7.1 Valves operated by handle..... .....5*
*7.2 Valves operated by gearbox.....5*
*7.3 Valves prepared for mounting of gearbox/actuator .....5*

*8. Dismounting/remounting the manual gearbox .....5*
*8.1 Removing the gearbox from the valve.....5*
*8.2 Mounting the gearbox on the valve.....5*
*8.3 Adjusting the position stop screws.....6*
*8.3.1 To adjust the closed position stop.....6*
*8.3.2 To adjust the open position stop..... .....6*

*9. Maintenance .....7*

*10. Utilization .....7*

*11. Maximum Allowable Pressure at Different Temperatures.....7*

*12. Kv Value Chart .....8*

*13. Materials.....9*

# 1. General information

### 1.1 BROEN Steel Ball Valves

BROEN steel ball valves is intended for use in industrial and technological installations.
Valves for general are use in heating systems, reduction stations, heat exchangers and heating, central heating and cooling installations, air conditioning, etc. In general with media not decomposing plain carbon steel and materials in O-rings (EPDM and FKM "VITON") and seats (PTFE).
Valves for natural gas are intended for natural gas installations and in general with media not decomposing plain carbon steel and materials in O-rings (made of NBR) and seats (PTFE).
Valves for steam (high parameters) are intended for water and steam installations and in general with media not decomposing plain carbon steel and materials in seats (graphite and PTFE).
The valve body is made of carbon steel and the shaft and the ball of stainless steel.
The ball seals are made of carbon (20%) reinforced Teflon (PTFE). The stem sealing material depends of the valve type (see above).
Valves are bi-directionally tight and can be installed in all positions.
Valves are designed acc. to rules of PED on 100000 hours.
The number of valve cycles that guarantee its performance over the lifetime is given in the table:

| Cycles<br>open – close - open | Valve dimension |
|---|---|
| 500 | DN125 and up |
| 1000 | DN65, 80; 100 |
| 3000 | do DN50 |

The assessment of the expected actual life of valves should be made after obtaining the physicochemical data of the valve assembly environment and the flowing medium.

### 1.2 Approvals

BROEN steel ball valves have been approved according to the requirements of Pressure Equipment Directive (PED) 2014/68/EU, module H. Module H is the module for complete quality control.

### 1.3 Quality Management

BROEN is a certified ISO 9001 company. The ISO certification is approved by Bureau Veritas Quality International Ltd., London, one of the leading international authorities on ISO certification.
Bureau Veritas performs regular audits to check the operation of the system.
ISO 9001 covering all processes of production flow and customer service – from the very first product idea, through drawings, materials, production as well as inspection and testing procedures, packaging, shipping, staff training, contracts and technical documentation, maintenance and claim handling.

# 2. Preoperational Instructions and Precautions

Please read and note the following instructions before handling and operating the BROEN ball valves:

- Check that the valve is suitable and approved for the medium and application in question.
- Do not exceed temperature, pressure and media limits for the valves (see chapter 11).
  Note: Different types of valves (valves for general use, for natural gas, for steam)
- Be aware. Valves installed at pipelines in operation can be hot. Be careful not to get burned.

- In case the valve is used as an end stop valve at the pipeline, a closing cap or end flange must be mounted after the valve, and the valve should be left in open position.

- In order to secure safe operation the manual gear or actuator must not be removed or dismantled if the valve is pressurized or/and has a flow.

- In case there is a need for changing O–rings at the stem, BROEN should be consulted for guidance and safety instructions.

## 3. Plates




The identification plate is located at the valve body.

- BALLOMAX® - the name of the valve (types: BALLOMAX, DZT, ARMATURA AH30),
- DN 50 – nominal size of the valve,
- PN 40 – the pressure class of the valve,
- Material: P235GH – valve body material,
- Temp. – minimum and maximum temperatures for the application of the valve,
- Fluid Group 2 – fluid group according to 2014/68/EU or info about suitable media (e.g. steam)
- PRODUCT / DATE: Batch no. / year and month of production and tests,
- BROEN POLAND sp. z o. o. 58-200 DZIERŻONIÓW – name and address of manufacturer,
- CE 0062 – CE mark and the number of the notifying body Bureau Veritas
- www.broen.com – manufacturer's website
- 100331 – plate item number

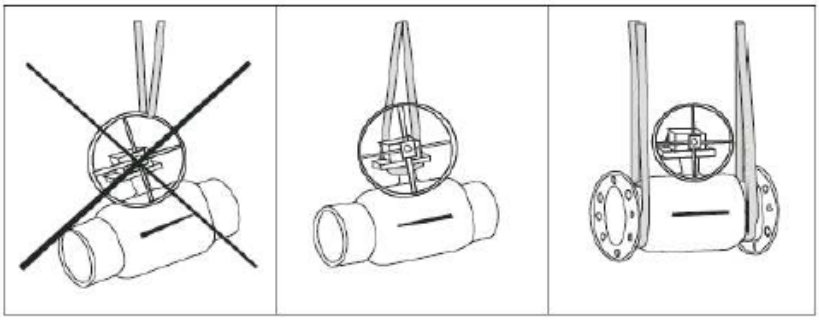
## 4. Transport and Storage

It is important that you check that the valve and its parts have not been damaged during transport. Please also check that the contents of the delivery are according to agreement - valve type, size, numbers, etc.

Information regarding possible damage, defects or irregularities compared to the agreement must be reported immediately to BROEN customer service.

Store the valve at a clean and dry place before the installation. Remember to remove the flow port protection before installation.
Use lifting ropes when large size valves are to be lifted. Do not lift the valve from its actuator, stem or handle.

If in doubt about the weight of the valve to be lifted, please check its weight from the BALLOMAX® catalogue or at the BROEN website - www.broen.com.



## 5. Installation and Welding

### 5.1 Installation

The pipelines must be cleaned properly before installing the valves (dirty assembly), otherwise possible impurities may damage the valve surface and sealings. Valves don't have any filters or filter elements. Before installation, the inside of the valve must also be checked for impurities and dirt that the valve may have been exposed to during storage or transport. Make sure that the valve's maximum and minimum temperatures are not exceeded! The maximum operational pressures and the minimum/maximum temperatures are stated on the valve identification plate.

Do not remove the manual gear or actuator from the valve unless absolutely necessary.
If the manual gear or actuator must be removed during or after the installation, please contact BROEN customer service or see chapter 8.

### 5.2 Welding

Electric welding (TIG, MIG) is recommended for all BROEN steel ball valves. Valve DN 150 and bigger valves must be welded on to the pipeline by use of electric welding.

Do not overheat the valve during welding – there is a risk of damage to the sealings.

The welder must be properly qualified to undertake the welding procedure.

The ball must be in fully open position during installation.

Cool down the valve (after welding) before normal operation. The valve may not be opened/closed after the welding before it has cooled down.

## 6. Commissioning and Use

After the installation of the valve, the pipeline must be flushed thoroughly.

### 6.1 Commissioning Pressure Tests

All valves (100 %) have been tested at the BROEN production facilities.

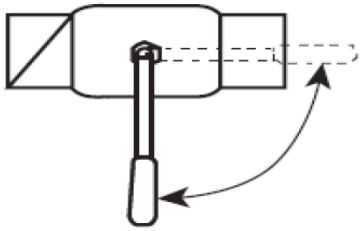
In case a pressure test of the system is required – be aware:

- The build-up of pressure must be done slowly and gradually in order to avoid pressure shocks/ water hammer.
- During the pipeline pressure testing (1.5xPN) the valve must be open.

Be aware:

- The shut-off valves are designed to be fully open or closed. Check that the valve is either in open or closed position against the stopper.
- If the valve should be used as an end stop valve at the pipeline, a closing cap or end flange should be mounted after the valve, and the valve should be left in open position.
- When emptying a system in operation the valve has to be turned into a half-open position in order to remove all liquid behind the ball. This is especially important when the pipelines may be exposed to temperatures below 0ºC.

## 7. Operation



### 7.1 Valves operated by handle

When the valve is open, the handle
Is aligned with the pipeline.

### 7.2 Valves operated by gearbox

The valve opens when the manual gear is turned clockwise.

### 7.3 Valves prepared for mounting of gearbox/actuator

The position indicator line at the end of the stem shows the position of the ball versus the stem.

The opening and closing of valves must be done slowly and carefully in order to minimize pressure shocks (water hammer) in the pipeline system. This is especially important for big dimensions (DN 150 and bigger).

## 8. Dismounting/remounting the manual gearbox

**The following procedures must be carried out by skilled and experienced personnel only. Before starting the procedures - read the manual carefully and contact BROEN customer service if any questions.**

### 8.1 Removing the gearbox from the valve

1. Close the valve.
2. Remove the four (or eight) mounting screws and lockwashers.
3. Remove the gearbox from the valve.

### 8.2 Mounting the gearbox on the valve

1. Place the gearbox and the valve in the same position (both open or both closed).
2. Most of the gearboxes include an insert bush equipped with a key. If the insert bush is delivered separately, or falls out, (re)place the insert bush in the correct way.
3. Select the desired gearbox mounting position. Engage the gearbox with the valve shaft, and slide the gearbox into position on the top of the valve.
4. Mount the gearbox (and, if required, an insulating gasket) to the valve with the four (or eight) mounting screws.

**Do not forget the lockwashers!**

Tighten the screws as shown in table A below.

5. Adjust the open and closed positions stops as shown in following section. **"Adjusting the position stop screws".**

**Table 1 Fastener Torque Reguirements**

| Fastener dimension | M6 | M8 | M10 | M12 | M16 | M20 | M30 | M36 |
|---|---|---|---|---|---|---|---|---|
| Actuator mounting screw: **Steel** | 8,5 Nm | 20,5 Nm | 41 Nm | 71 Nm | 170 Nm | 350 Nm | 1190 Nm | 2100 Nm |
| Actuator mounting screw : **Stainless Steel (class 70)** | 5,9 Nm | 14,5 Nm | 30 Nm | 50 Nm | 121 Nm | 244 Nm | 445 Nm | 651 Nm |

### 8.3 Adjusting the position stop screws

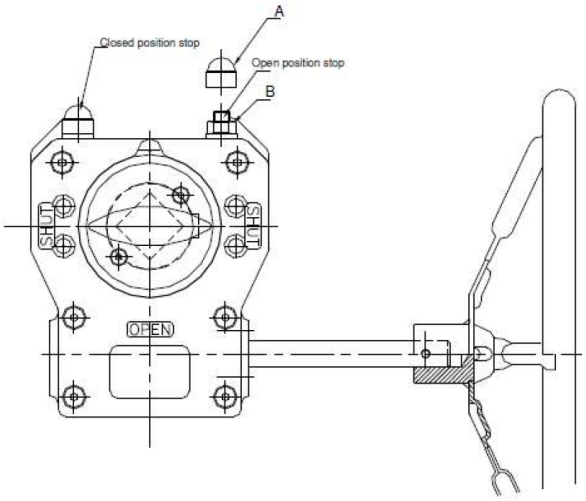



**Figure 1 Component identification**

The open and closed position stops prevent the actuator from rotating beyond the open and closed position of the valve. Each stop is adjustable.
The stops are not preset by the gearbox manufacturer. Adjusting has to be done when the gearbox is (re)mounted on the valve.
The adjustment has to be done as described below. We refer to figure 1 (above) for component identification. We also refer to the valve instructions for specific closed position requirements for the valve.

#### 8.3.1 To adjust the closed position stop

1. Remove the protection cap (A) from the jam nut on the closed position stop screw.
2. Loosen the jam nut (B) on the closed position stop screw and loosen the stop screw a few turns.
3. Turn the hand wheel (or other operating device) so that the valve is in closed position.
4. Turn the closed position stop screw clockwise until resistance is felt from the stop screw contacting the gear inside the actuator.
5. Hold the stop screw from turning and tighten the jam nut (B).
6. Put the protection cap (A) back on the jam nut.

#### 8.3.2 To adjust the open position stop

1. Remove the protection cap (A) from the jam nut on the open position stop screw.
2. Loosen the jam nut (B) on the open position stop screw and loosen the open screw a few turns.
3. Turn the hand wheel (or other operating device) so that the valve is in open position.
4. Turn the open position stop screw clockwise until resistance is felt from the stop screw contacting the gear inside the actuator.
5. Hold the stop screw from turning and tighten the jam nut (B).
6. Put the protection cap (A) back on the jam nut.

Be aware:
The exact position of the ball in open and closed position is very important in order to secure the tightness of the valve. If it is possible to see the inside of the valve, the position must be carefully checked.
Open position: ball exactly aligned with connecting ends and seat rings.
Closed position: full contact/overlap between ball and seat rings.
**If case of a need for disassembly or assembly of valves with electric actuators – carefully follow the instructions in the actuator manuals or contact BROEN customer service.**

## 9. Maintenance

The valves do not need extra service under normal conditions, but to guarantee the good working of the valves, opening and closing the valve a couple of times every year is highly recommended. Not to comply with the above recommendation may result in an excessive increase in the torque needed to open or close the valve. This applies in particular to valves with a handle.

The proper function of the valve requires a proper water quality and proper installation.

The valve housing is made of carbon steel and as such not corrosion resistant. To avoid corrosion coming from outside, the valve will either have to be installed in dry surroundings or it must be protected by watertight insulation or other surface protection.

If needed, the upper O-ring(s) of the stem can be replaced without draining the pipelines.
Note: only on depressurized pipelines with no hydrostatic pressure.

Be aware of all special circumstances and if necessary, contact BROEN customer service.

## 10. Utilization

VALVES AFTER WORKING MUST BE DISPOSED OF PROPERLY
COMPONENTS OF VALVES HAVE EFFECT ON THE NATURAL ENVIRONMENT.
BELOW THE PROCEDURE:

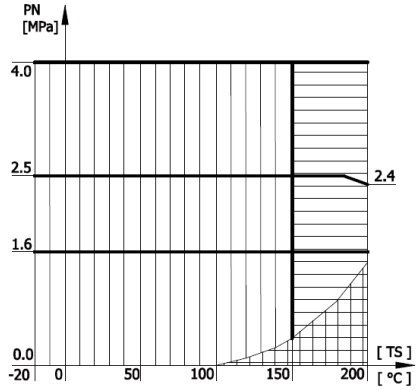
**Table 2. Permissible methods of disposal of valve elements**

| No. | Valve element | On your own responsible | External company |
|---|---|---|---|
| 1. | METAL COMPONENTS [valve body, connection ends, ball, stem, stem cover] | Re-use as part of minor repairs and maintenance | Handing over to an external company for recycling |
| 2. | ELEMENTS FROM PLASTICS [PUR + PEHD insulation, PTFE, Graphite gaskets, EPDM, VITON, NBR O-rings] | - | Handing over to an external company for recycling |

## 11. Maximum Allowable Pressure at Different Temperatures

### 11.1 Valves for general use

**DIAGRAM „PN-TS”**
**Valves without flanges**
**and with flanges on special request**



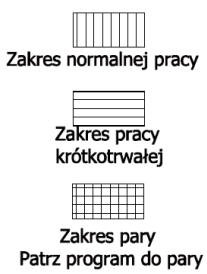
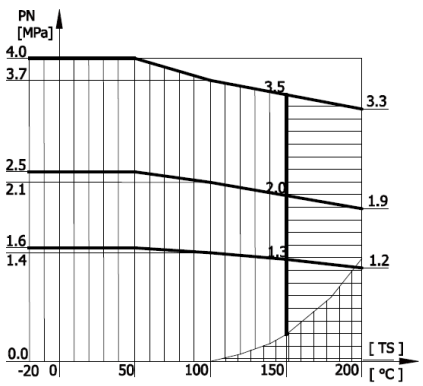




**DIAGRAM „PN-TS”**
**Standard valves with flanges**
**Flange dimensions acc. to EN1092-1**



### 11.2 Valves for natural gas

**DIAGRAM „PN-TS”**
**Valves without flanges**
**and with flanges on special request**

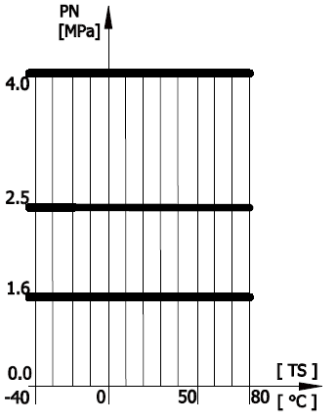
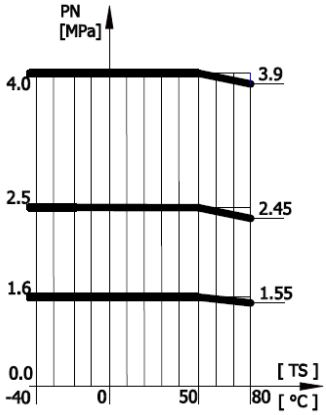



**DIAGRAM „PN-TS”**
**Standard valves with flanges**
**Flange dimensions acc. to EN1092-1**




### 11.3 Valves for steam

**DIAGRAM „PN-TS”**
**Valves without flanges**
**and with flanges on special request**

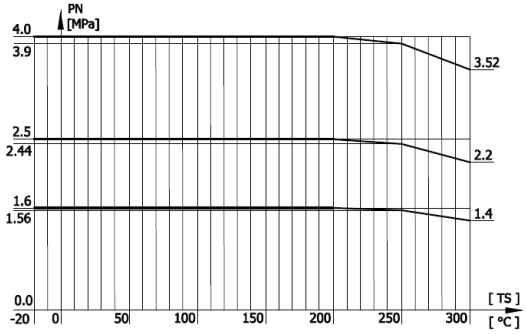
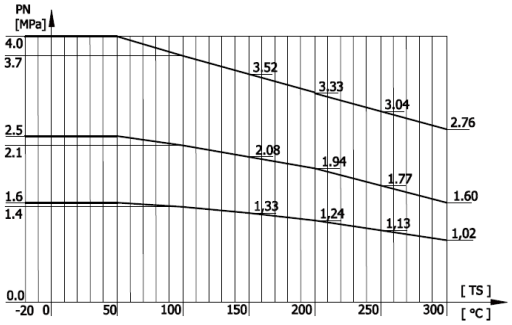



**DIAGRAM „PN-TS”**
**Standard valves with flanges**
**Flange dimensions acc. to EN1092-1**




## 12. Kv Value Chart

Kv Values when the valve is fully open:

**Table 2 Kv values for reduced bore valves**

| DN mm | 10 | 15 | 20 | 25 | 32 | 40 | 50 | 65 | 80 | 100 | 125 | 150 | 200 | 250 | 300 | 350 | 400 | 500 |
|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|
| Kv $m^3/h$ | 7 | 7 | 15 | 27 | 40 | 69 | 110 | 168 | 288 | 417 | 699 | 1046 | 1500 | 2770 | 4620 | 7250 | 10540 | 11780 |
| z | 0,32 | 0,44 | 0,41 | 0,37 | 0,33 | 0,40 | 0,40 | 0,39 | 0,36 | 0,32 | 0,33 | 0,32 | 0,35 | 0,33 | 0,29 | 0,24 | 0,22 | 0,21 |

**Table 3 Kv values for full bore valves**

| DN mm | 15 | 20 | 25 | 32 | 40 | 50 | 65 | 80 | 100 | 125 | 150 | 200 | 250 | 300 | 350 | 400 |
|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|
| Kv $m^3/h$ | 32 | 57 | 81 | 133 | 229 | 295 | 498 | 754 | 1159 | 1841 | 2652 | 5720 | 14790 | 22040 | 25400 | 36350 |
| z | 0,079 | 0,078 | 0,094 | 0,078 | 0,115 | 0,115 | 0,115 | 0,115 | 0,115 | 0,115 | 0,115 | 0,078 | 0,068 | 0,057 | 0,057 | 0,043 |

## 13. Materials

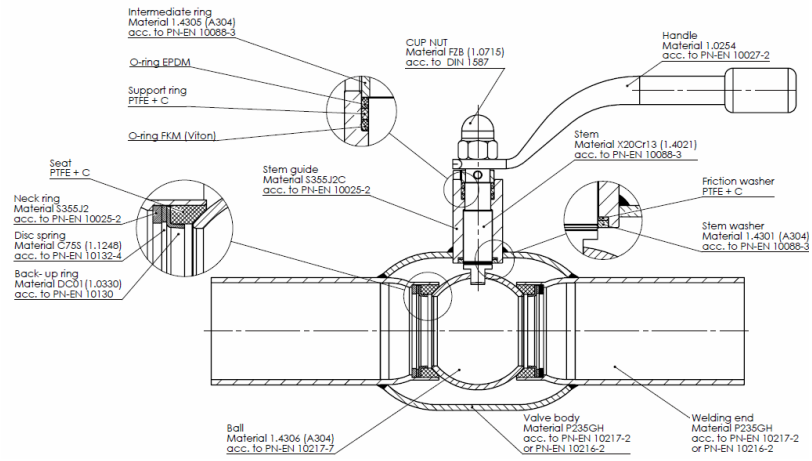



**Figure 2 Materials of standard reduced bore valves for general use DN10-DN50**

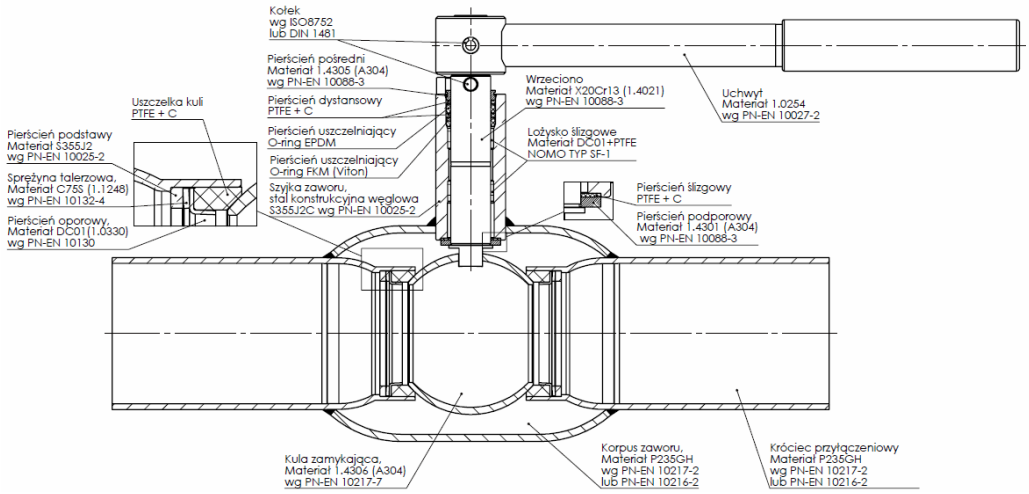



**Figure 3 Materials of standard reduced bore valves for general use DN65-DN500**

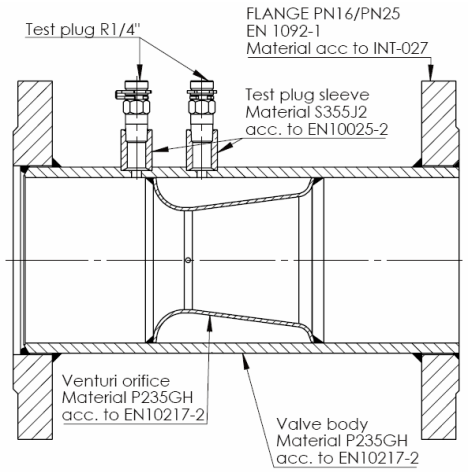



**Figure 4 Materials of Ballorex Venturi, Nexus, Nexus Fluctus measured units DN65-DN600**