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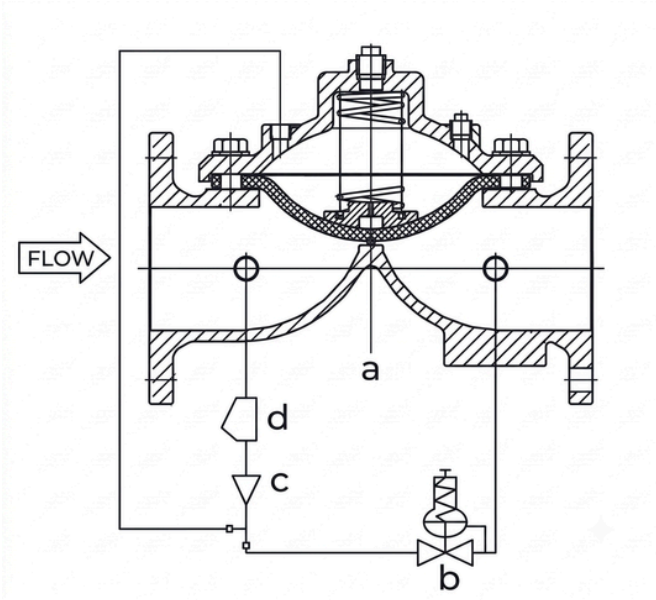
# Installation & Operation Manual

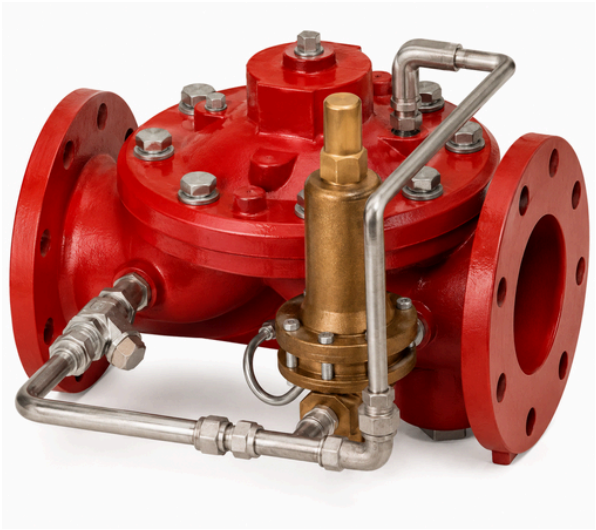
## Pressure Reducing Valve (BT 5920)

## Description:

The BT 5920 Pressure Reducing Valve is designed to reduce a higher upstream pressure to a lower, constant downstream pressure. It provides accurate pressure regulation to ensure reliable and stable system performance.

The BT 5920 Pressure Reducing Valve comprises the following components, as illustrated in the principle schematic:



| NO. | Components | Material |
|---|---|---|
| a | Main Valve | |
| b | Pressure Reducing Pilot | Bronze |
| c | Restriction Orifice | Stainless Steel 304 |
| d | Y-Strainer | Stainless Steel 304 |
| e | Pipeline | Stainless Steel 304 |

## Components :

### Basic Control Valve

A hydraulically operated, diaphragm-actuated globe valve that provides tight shut-off with an elastomer-to-metal seal, ensuring reliable and leak-free operation.

### Pressure Reducing Pilot

A two-way, normally open pilot valve that senses downstream pressure beneath its diaphragm and balances it against an adjustable spring force. As downstream pressure increases, the pilot gradually closes to maintain the preset outlet pressure.

### Restriction

A fixed orifice installed within a ferrule fitting that regulates the flow of control fluid, ensuring stable and accurate valve operation.

### Y-Strainer

A Y-type strainer that protects the pilot control system by preventing solid particles and debris in the pipeline from entering and affecting valve performance.

## Operation :

As the downstream pressure rises above the preset value, the Pressure Reducing Pilot gradually closes, increasing the pressure within the diaphragm chamber of the basic control valve. This causes the control valve to close slightly, reducing the downstream pressure back to the set value.

Conversely, when the downstream pressure falls below the preset value, the pilot opens further, reducing the pressure in the diaphragm chamber. This allows the basic control valve to open wider, increasing the downstream pressure to the required level.

This continuous modulating action between the pressure reducing pilot and the basic control valve ensures that the downstream pressure remains constant, even when there are fluctuations in inlet pressure or system demand.

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## Pressure Reducing Valve (BT 5920)

## Installation :

The BT 5920 Pressure Reducing Valve is supplied fully factory assembled and ready for installation at the appropriate location within the system. To ensure safe, accurate and reliable operation, follow the guidelines below:

- Ensure the valve is correctly sized for the application.
- Inspect the valve carefully for any damage to the body, pipework, fittings or control components that may have occurred during transport. Confirm that all fittings are securely tightened.
- It is recommended that isolating (gate or block) valves are installed on both the inlet and outlet sides of the valve to facilitate inspection, servicing and maintenance.
- Before installation, thoroughly flush all connecting pipework to remove swarf, scale and other foreign matter.
- Install the valve in the pipeline with the flow direction matching the arrow cast on the valve body. The arrow must point in the direction of flow (downstream).
- Allow adequate clearance around the valve to provide easy access for adjustment, inspection and maintenance.
- For system protection, install a pressure relief valve with a minimum size of ½ in. (15 mm) downstream of the pressure reducing valve. Ensure suitable drainage is provided for the relief valve discharge.

## Start-up and Adjustment :

Follow the procedure below to commission and adjust the BT 5920 Pressure Reducing Valve:

- Install suitably rated pressure gauges upstream and downstream of the valve. If no convenient tapping points are available, the spare side ports on the basic control valve body may be used.
- Remove the protective cap from the pressure reducing pilot and loosen the lock nut. Turn the adjusting screw anti-clockwise until it can be turned easily by hand.
- Start the pump or bring the system into operation. At this stage, the basic control valve will be fully closed or only slightly open.
- Carefully loosen the pipe plug on the bonnet of the basic control valve until fluid begins to escape. Once a steady flow of clear fluid, free from air, is observed, tighten the plug securely.
- Check the downstream pressure. It should initially be below the required setting. If the pressure is already too high, reduce the downstream restriction by opening additional valves or increasing system demand until the pressure falls below the desired set point.
- Slowly turn the pilot adjusting screw clockwise until the downstream pressure reaches the required set point. Tighten the lock nut and refit the protective cap.
- Gradually close the downstream valves to reduce the flow to zero while monitoring the pressure gauge. A slight pressure increase above the set point is normal; however, it should not exceed 14.5 psi (1 bar).
- If further adjustment is required, turn the pilot adjusting screw clockwise to increase the downstream pressure or anti-clockwise to decrease it.

## Maintenance :

The BT 5920 Pressure Reducing Valve is designed for reliable operation with minimal maintenance. Regular inspection and routine servicing will help ensure long-term performance and efficiency.

- Inspect the valve for any chipped, cracked or peeling paint and repair as required to prevent corrosion.
- Check all fittings, flanged joints and pipe connections for signs of leakage. Tighten connections where necessary.
- Inspect the Y-Strainer screen for the build-up of debris or other solid contaminants. Clean the strainer as required, as a blocked strainer can adversely affect valve performance.
- On new installations, it is recommended that the strainer is inspected every one to two days until an appropriate maintenance interval can be established based on operating conditions.

## Troubleshooting:

The following guide will assist in identifying and correcting common faults with the BT 5920 Pressure Reducing Valve.

**Basic Control Valve Fails to Open**

- Ensure any downstream isolation valve is fully open.
- Check that the pressure reducing pilot has not been adjusted too far anti-clockwise. Readjust as required.
- Inspect the pressure reducing pilot stem for sticking or binding. Refer to the Pressure Reducing Pilot maintenance section.

**Basic Control Valve Fails to Close**

- Inspect and clean the Y-Strainer if it is blocked.
- Check that the pressure reducing pilot has not been adjusted too far clockwise.
- Inspect the pilot diaphragm for damage. A ruptured diaphragm is indicated by fluid discharging from the pilot bonnet vent. Replace the diaphragm if necessary.
- Check the pilot stem and valve seat for wear or binding. Service or replace the affected components.
- Inspect the basic control valve diaphragm for damage and replace if required.
- Check for foreign matter lodged within the basic control valve. Dismantle the valve, remove any debris and inspect internal components.

**Valve Operates but Does Not Control Pressure**

- If the downstream pressure remains too high despite adjustment, refer to Basic Control Valve Fails to Close.
- If the downstream pressure remains too low despite adjustment, refer to Basic Control Valve Fails to Open.
- If the downstream pressure fluctuates or oscillates, the system may be operating under very low demand. This condition often improves as demand increases. If necessary, slightly increase the pressure setting.

**Downstream Pressure Rises When There Is No Demand**

- Inspect the Pressure Reducing Pilot for internal leakage. Dismantle and service the pilot as required.
- Inspect the Basic Control Valve for leakage. Dismantle the valve, identify the cause and replace any worn or damaged components.

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## Basic Control Valve (BT 5920)

## Descritpion :

The Basic Control Valve is a hydraulically operated, diaphragm-actuated valve designed for reliable and accurate pressure control. The diaphragm is manufactured from synthetic rubber reinforced with nylon fabric, forming a sealed chamber that separates the control pressure from the line pressure. When pressure is applied above the diaphragm, the elastomeric seat disc is forced firmly against the valve seat, providing a tight, leak-free shut-off and dependable operation.

## Functional Description :

The Basic Control Valve operates on the principle of pressure differential. Inlet line pressure is directed through the pilot control circuit to the diaphragm chamber above the valve. This pressure, together with the valve spring, acts against the inlet pressure beneath the valve seat. As the effective area of the diaphragm is greater than the seat area, the valve remains tightly closed under normal conditions.

When the pilot control allows pressure to bleed from the diaphragm chamber, the force acting on the diaphragm is reduced. As the pressures balance, the valve opens progressively to regulate flow. Depending on the pilot arrangement, the valve can provide either simple on/off operation or accurate modulating pressure control.

For applications where the line fluid is contaminated or unsuitable for valve operation, an independent clean pressure supply may be used. The external pressure source must be equal to or greater than the system line pressure to ensure reliable valve performance.

## Installation :

To ensure safe, accurate and reliable operation of the Basic Control Valve, observe the following installation guidelines:

- Carefully inspect the valve for any damage to the body, pipework, fittings or control components. Ensure all fittings are secure and properly tightened.
- Thoroughly flush all connecting pipework before installation to remove swarf, scale and other foreign matter.
- Install the valve in the pipeline with the flow direction matching the arrow cast on the valve body. The arrow must point downstream.
- Provide sufficient clearance around the valve to allow easy access for adjustment, inspection and maintenance.

For optimum performance, the following recommendations should also be observed:

- Install isolation valves (such as gate or butterfly valves) on both the inlet and outlet sides of the valve to simplify servicing and maintenance.
- Fit pressure gauges upstream and downstream of the valve to monitor system pressure during commissioning and normal operation.
- Mount the control valve with the bonnet in the upright position whenever possible to achieve maximum performance and reliability.
- Alternative mounting positions may be acceptable; however, they can affect valve performance. For 8 in. (DN200) and larger valves, or valves fitted with a limit switch, consult the manufacturer before installation in any orientation other than upright.
- Ensure adequate space is available around the valve and pilot control system to facilitate inspection, adjustment and maintenance.

## Maintenance :

The Basic Control Valve is designed to operate with minimal maintenance and does not require lubrication. However, regular inspections should be carried out to ensure continued reliable performance and to assess the effect of the service fluid on the valve components.

The frequency of inspection will depend on the operating conditions, including fluid velocity and the presence of dissolved minerals, sediment or other contaminants. In water systems, these conditions can vary significantly between installations.

It is recommended that the valve undergoes a comprehensive inspection at least once a year, including examination of the internal components. Particular attention should be given to the elastomeric parts, especially the diaphragm, for signs of wear, damage or deterioration. Any worn or damaged components should be replaced promptly to maintain optimum valve performance and reliability.

## Repair Procedure :

In the event of a malfunction, first refer to the troubleshooting section for the specific Weflo Control Valve model to identify the cause of the fault. If the troubleshooting process indicates that the problem lies with the Basic Control Valve, follow the repair procedures in this section to inspect, service and restore the valve to proper operating condition.

Problems with the basic control valve can be classed in three basic categories:

### Valve Fails to Close

Possible causes include:

- Damaged diaphragm – A ruptured or damaged diaphragm can prevent the valve from closing correctly. In most water service applications, where flow passes beneath the valve seat, diaphragm failure will keep the valve in the open position. Refer to Procedure A.
- Foreign object lodged in the valve – Debris or other foreign material trapped within the valve may prevent proper seating and closure. Refer to Procedure A.

# Installation & Operation Manual

## Basic Control Valve (BT 5920)

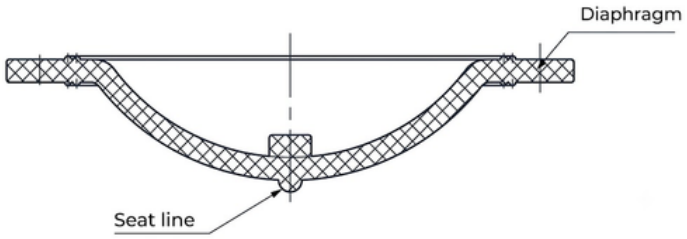
### Valve Opens and Closes but Leaks When Closed

Possible causes include:

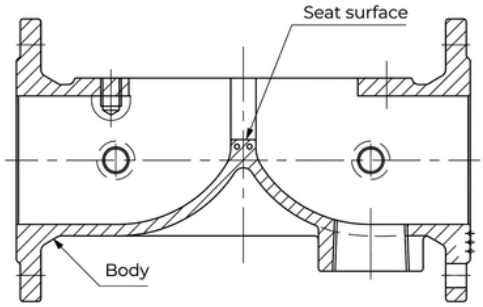
- Damaged diaphragm seat line – Wear or damage to the diaphragm seat line can prevent the valve from achieving a tight shut-off. Refer to Procedure A.
- Worn or damaged valve body seating surface – Deterioration of the valve seat surface may result in internal leakage when the valve is closed. Inspect the seating surface and repair or replace components as necessary. Refer to Procedure A.

### Procedure A

- Isolate the valve from the system by closing the upstream and downstream isolation valves.
- Loosen one of the tubing connections on the bonnet to relieve any residual pressure.
- Disconnect all control tubing from the bonnet.
- Remove the bonnet bolts.
- Carefully lift off the bonnet. If it is difficult to remove, gently tap around its edge with a rubber mallet to free it.
- Note: Valves 6 in. (DN150) and larger are fitted with lifting eye nuts to assist with safe bonnet removal.
- Remove the spring and spring retainer, and place them in a clean, safe location.
- Carefully remove the diaphragm assembly, including the diaphragm seat line, for inspection. Refer to the relevant illustration in the maintenance section.

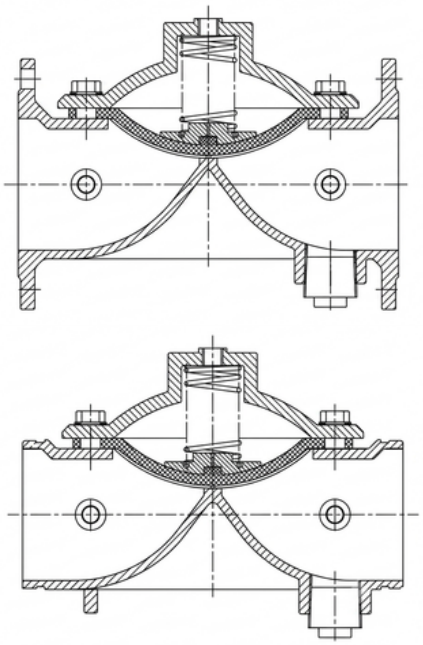



- Carefully inspect the diaphragm for signs of rupture, wear or deterioration. If the diaphragm or the diaphragm seat line is damaged, replace the diaphragm with a new one.
- Inspect the valve body seating surface for dirt, debris or any foreign material that could prevent proper sealing. Thoroughly clean the seating surface and remove all contaminants before reassembly.




- Reinstall the diaphragm, ensuring it is correctly seated and aligned.
- Refit the spring retainer and spring.
- Reinstall the bonnet and secure it with the bonnet bolts. Tighten the bolts evenly and securely.
- Reconnect all control tubing to the bonnet.
- Gradually reopen the upstream and downstream isolation valves.
- Before returning the valve to service, carry out the air bleeding procedure described in the commissioning section of this manual to remove any trapped air and ensure correct valve operation.

## Basic Control Valve Section View :

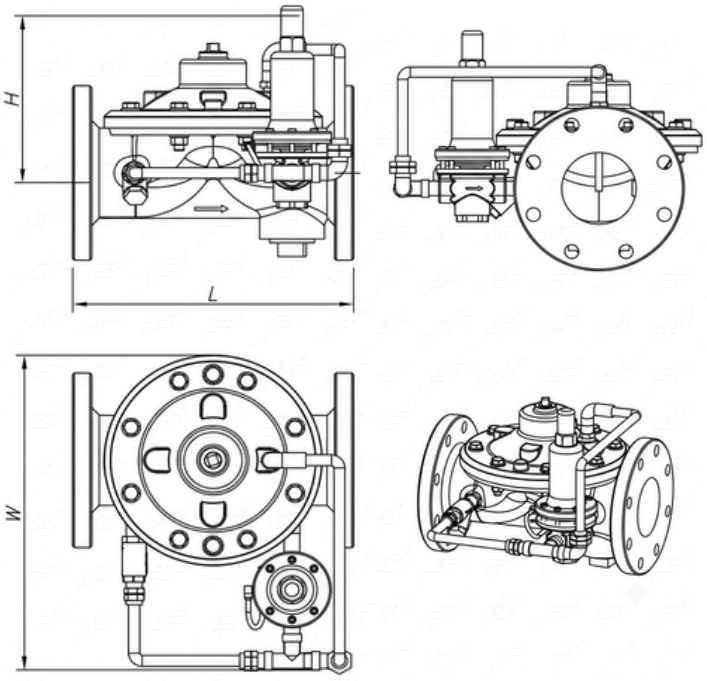


| Part Name | Material | ASTM Specification |
|---|---|---|
| Body | Ductile Iron | A536 Grade 65-45-12 |
| Cover | Ductile Iron | A536 Grade 65-45-12 |
| Diaphragm | Nylon Reinforced Natural Rubber | |
| Spring | Stainless Steel | A276 Type 304 |
| Spring Retainer | Ductile Iron | A536 Grade 65-45-12 |
| Bolt | Carbon Steel | A307 Grade B |
| Washer | Stainless Steel | A276 Type 304 |

# Installation & Operation Manual

## Basic Control Valve (BT 5920)

## Installation and Maintenance Space Dimensions (mm)




| Size | | L (mm) | W (mm) | H (mm) |
|---|---|---|---|---|
| mm | inch | | | |
| DN50 | 2" | 233 | 450 | 210 |
| DN65 | 2 1/2" | 290 | 485 | 220 |
| DN80 | 3" | 310 | 500 | 259 |
| DN100 | 4" | 356 | 520 | 270 |
| DN125 | 5" | 370 | 550 | 280 |
| DN150 | 6" | 436 | 590 | 290 |
| DN200 | 8" | 530 | 640 | 360 |
| DN250 | 10" | 636 | 700 | 380 |
| DN300 | 12" | 835 | 950 | 430 |

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## Pressure Reducing Pilot (BT 5920)

## Description :

The Pressure Reducing Pilot is a spring-loaded, diaphragm-operated control valve designed to maintain a constant downstream pressure. It provides accurate and reliable control by regulating the operation of the main control valve.

The pilot can also be used as a standalone downstream pressure regulator. It is available in bronze or stainless steel construction with 3/8 in. NPT or 1/2 in. NPT threaded connections.

**Spring Range :**

65psi - 165psi

## Functional Description :

The downstream pressure is sensed beneath the diaphragm of the Pressure Reducing Pilot and balanced against an adjustable spring force. When the downstream pressure falls below the preset value, the pilot opens further, reducing the pressure in the diaphragm chamber of the Basic Control Valve. This causes the valve to open proportionally, increasing the downstream pressure.

Conversely, when the downstream pressure rises above the preset value, the pilot closes progressively, increasing the pressure in the diaphragm chamber of the Basic Control Valve. This causes the valve to close proportionally, reducing the downstream pressure.

The combined action of the Pressure Reducing Pilot and the Basic Control Valve provides continuous modulation, maintaining the downstream pressure at the preset value within very close limits, despite changes in system demand or inlet pressure.

## Installation and Adjustment :

The Pressure Reducing Pilot is normally installed in the main valve control pipework between the restriction and the downstream body tapping. Ensure that the pilot is installed with the flow direction matching the arrow marked on the valve body.

In most applications, a sensing line is factory fitted between the diaphragm sensing port and the downstream side port of the pilot, as illustrated in the installation drawing. Where remote sensing is required, connect a sensing line from the 1/8 in. NPT connection beneath the pilot diaphragm to the desired downstream location where pressure is to be controlled.

The downstream pressure setting is adjusted using the pilot adjusting screw:

- Turn the adjusting screw clockwise to increase the downstream pressure.
- Turn the adjusting screw anti-clockwise to decrease the downstream pressure.

## Maintenance :

The Pressure Reducing Pilot requires very little routine maintenance. To ensure reliable operation, all fittings, pipe connections and fasteners should be inspected periodically to confirm they remain secure. The pilot body should also be checked for signs of damage, corrosion or the build-up of dirt and other foreign material. Clean the pilot as required to maintain optimum performance.

## Troubleshooting :

Other than incorrect pressure adjustment, the Pressure Reducing Pilot is generally subject to only three common faults:

**Pilot Diaphragm Ruptured**

A damaged or ruptured pilot diaphragm may prevent the main valve from closing properly, resulting in excessively high downstream pressure. A ruptured diaphragm is typically indicated by fluid leaking from the vent hole in the pilot bonnet.

**Pilot Seat Disc Worn or Damaged**

A worn or deteriorated seat disc can cause the downstream pressure to gradually increase under dead-end (zero flow) conditions, preventing the pilot from maintaining the correct pressure setting.

**Pilot Stem Binding**

A sticking or binding pilot stem can result in unstable or inaccurate pressure control. In severe cases, it may prevent the main valve from opening or closing correctly, leading to improper system operation.

## Repair Procedures :

Refer to the Pressure Reducing Pilot Assembly Drawing for component identification before carrying out any maintenance.

### A. Diaphragm Replacement

1. Before dismantling the pilot, turn the adjusting bolt anti-clockwise until it can be turned freely by hand.
2. Remove the six bonnet screws and lift off the bonnet.
3. Remove the adjusting spring and spring retainer, and place them in a clean, safe location.
4. Remove the bottom plug and take out the bottom spring.
5. Using a suitable spanner to hold the second lock nut on the stem, remove the seat disc and withdraw the diaphragm assembly from the pilot body.
6. Remove the upper diaphragm plate and old diaphragm.
7. Inspect the diaphragm plate O-ring and replace it if worn or damaged.
8. Fit the new diaphragm and reassemble the diaphragm plate, O-ring and lock nuts. Tighten securely.
9. Reinsert the diaphragm assembly into the pilot body.
10. Refit the seat disc to the stem, holding the upper lock nut with a spanner while tightening the disc securely.
11. Reinstall the bottom plug.
12. Position the adjusting spring and spring retainer correctly on the diaphragm plate.
13. Refit the bonnet and tighten the bonnet screws evenly and securely.
14. Note: Install the shorter screws in the blind holes and the longer screws in the through holes.
15. Return the valve to service by following the Start-up and Adjustment procedure.

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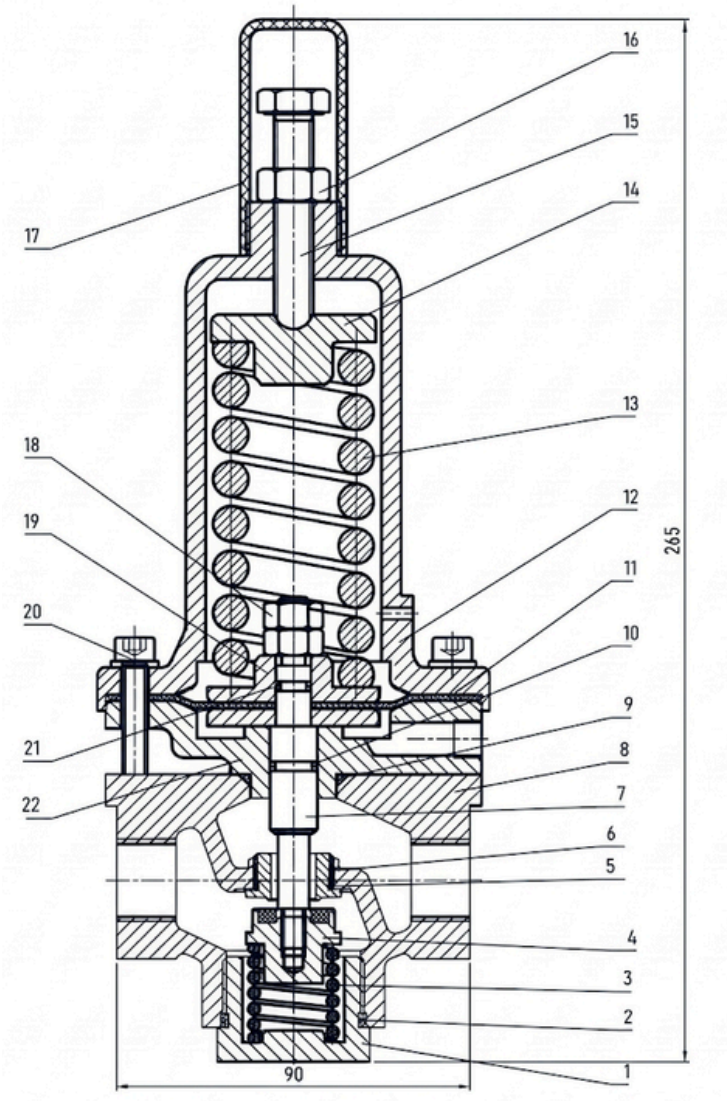
## Pressure Reducing Pilot (BT 5920)

### B. Seat Disc Replacement

1. Follow Steps 1–4 of the Diaphragm Replacement procedure.
2. Hold the second lock nut on the stem with a suitable spanner and remove the seat disc.
3. Fit the new seat disc and tighten securely.
4. Note: Tighten both lock nuts on the stem to prevent loosening during operation.
5. Reassemble the pilot by following Steps 12–14 of the Diaphragm Replacement procedure.

### C. Stem Repair

1. Follow Steps 1–5 of the Diaphragm Replacement procedure.
2. Carefully inspect the stem and O-ring for wear, scoring or damage.
3. Remove any light scratches or deposits from the stem using fine-grade emery cloth. Replace the stem if it is badly scored or damaged.
4. Replace the O-ring if necessary.
5. Apply a generous coating of petroleum jelly or an equivalent lubricant to the stem and O-ring.
6. Reassemble the pilot by following Steps 11–14 of the Diaphragm Replacement procedure.




## Material Specifications :

| Item | Description | Material |
|---|---|---|
| 1 | Plug | Brass |
| 2 | O-ring | NBR/EPDM |
| 3 | Bottom Spring | Stainless Steel 304 |
| 4 | Disc | Stainless Steel 304 & NBR/EPDM |
| 5 | O-ring | NBR/EPDM |
| 6 | Seat | Stainless Steel 304 |
| 7 | Stem | Stainless Steel 304 |
| 8 | Body | Bronze/Brass/ Stainless Steel 304 |
| 9 | O-ring | NBR/EPDM |
| 10 | O-ring | NBR/EPDM |
| 11 | Diaphragm | Nylon Reinforced Natural Rubber/NBR |
| 12 | Bonnet | Bronze/Brass/ Stainless Steel 304 |
| 13 | Adjusting Spring | Stainless Steel 304 |
| 14 | Spring Retainer | Stainless Steel 304 |
| 15 | Adjusting Bolt | Stainless Steel 304 |
| 16 | Jam Nut | Stainless Steel 304 |
| 17 | Cap | PVC |
| 18 | Nut | Stainless Steel 304 |
| 19 | Diaphragm Plate | Stainless Steel 304 |
| 20 | Screw | Stainless Steel 304 |
| 21 | O-ring | NBR/EPDM |
| 22 | Adaptor | Bronze/Brass/ Stainless Steel 304 |

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