HELLO GARDEN LOVERS!!

AMES FIRE & WATERWORKS

REPCOR

AMES FIRE & WATERWORKS

SO…
LADIES AND GENTLEMEN
BOYS AND GIRLS
SPORTS FANS AND

AND ATHLETIC SUPPORTERS

WHAT IS AN AUTOMATIC CONTROL VALVE?

WHAT IS AN AUTOMATIC CONTROL VALVE??
IT IS A VALVE USED TO…

- Control Flow in a pipeline
- Control Pressure in a pipeline
- Control level of a Tank or Reservoir/Lake
- Control the operation of Booster Pumps and Well Pumps

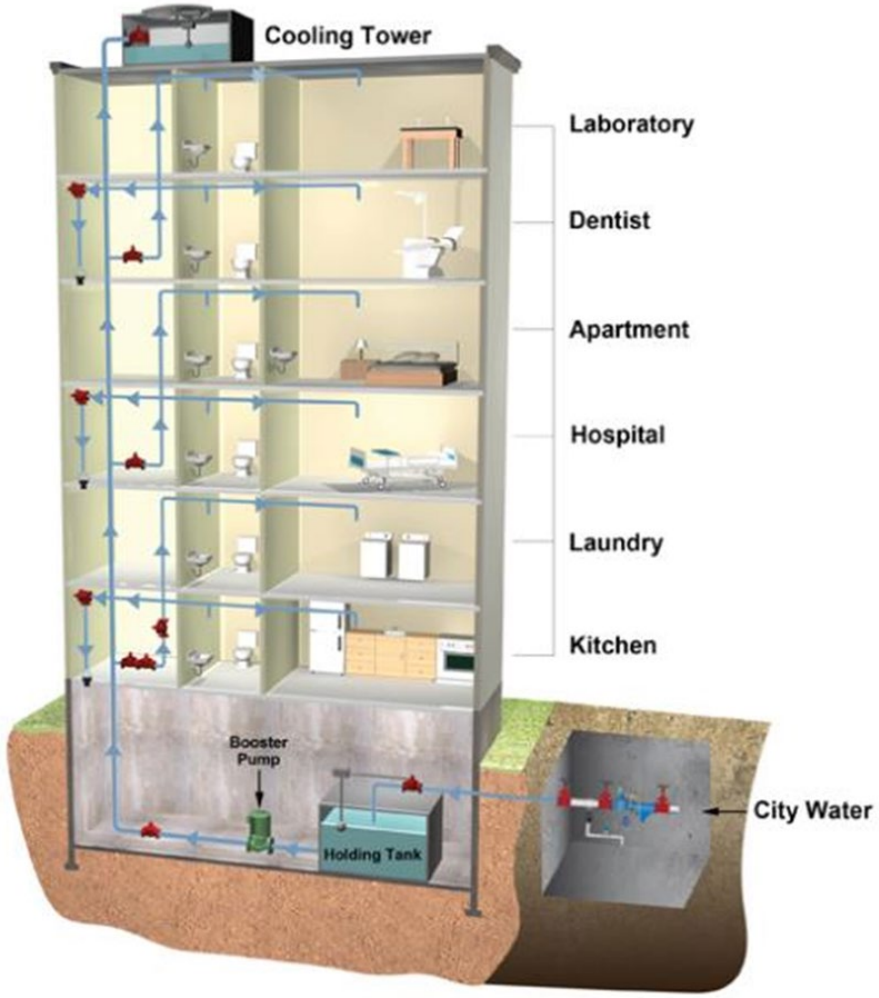
Where do you find Automatic Control Valves?

Markets

- Plumbing & Mechanical Systems
- Commercial High-Rse Buildings
- Municipal Waterworks
- Irrigation and Agriculture
- Industrial Water
- Reuse Water
- Wastewater
- Ship Yards
- Fire Protection Systems

IN ONE BUILDING,YOU COULD FIND ALL THESE DIFFERENT VALVES

- Pressure Reducing Valve
- Pressure Reducing Valve with Low Flow By-Pass Feature
- Pressure Reducing Valve with Hydraulic Check Feature
- Pump Control Valve
- Pressure Relief Valve
- High Pressure Safety Shut-Off Valve
- Level Control - Solenoid On-Off and or Float Valve
- Flood Protection Shutdown Valve

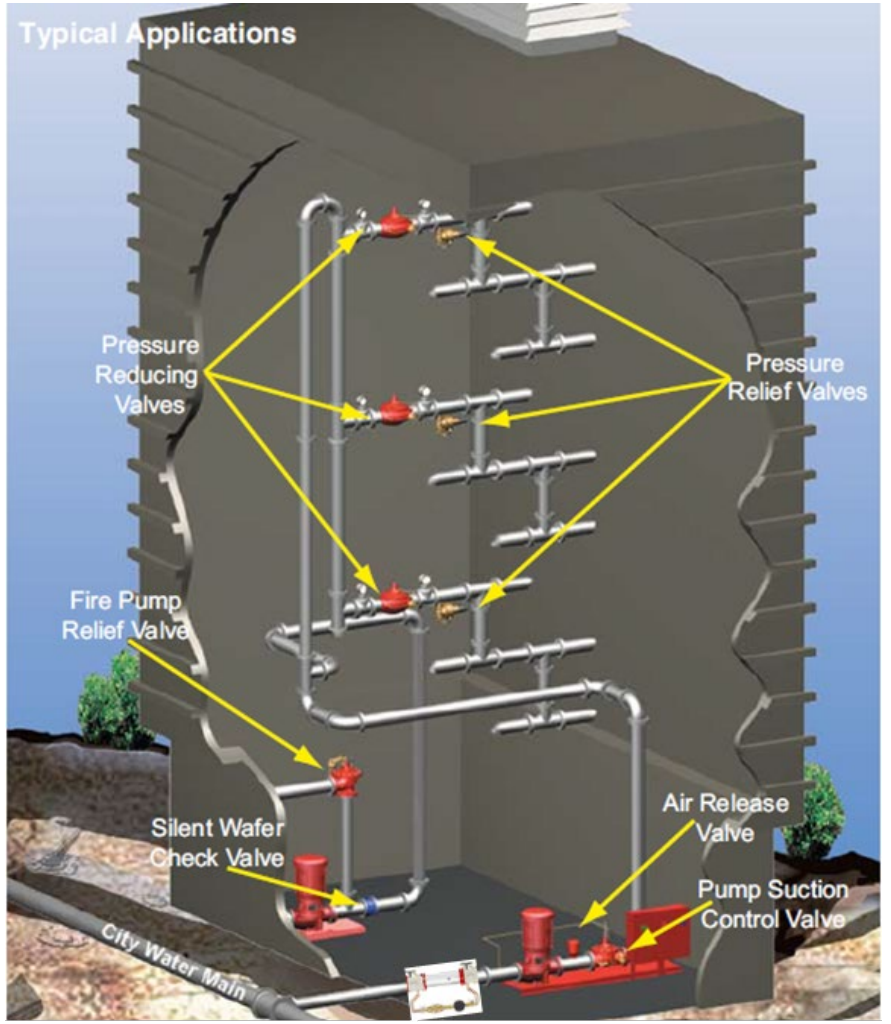


CONTROL VALVES FOR THE FIRE PROTECTION SYSTEM

Automatic Control Valves for Fire Protection Systems are used in commercial buildings, data centers, industrial and deluge applications.

- Pressure Reducing Valves
- Deluge Control Valves
- Fire Pump Relief Valves
- Fire Pump Suction Control Valves

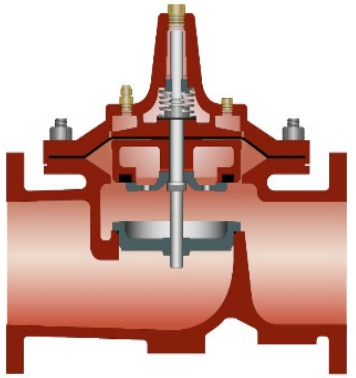
Protecting Life and Property

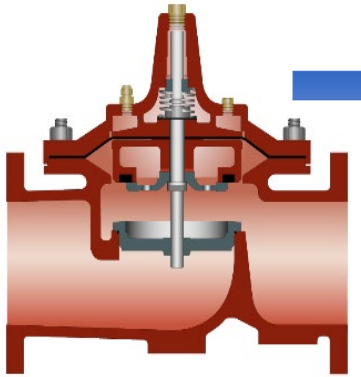


HOW IT WORKS

- Modified Globe Design
- Hydraulically operated
- Diaphragm actuated
- Pilot controlled

Pressure into Cover Chamber:
VALVE CLOSES

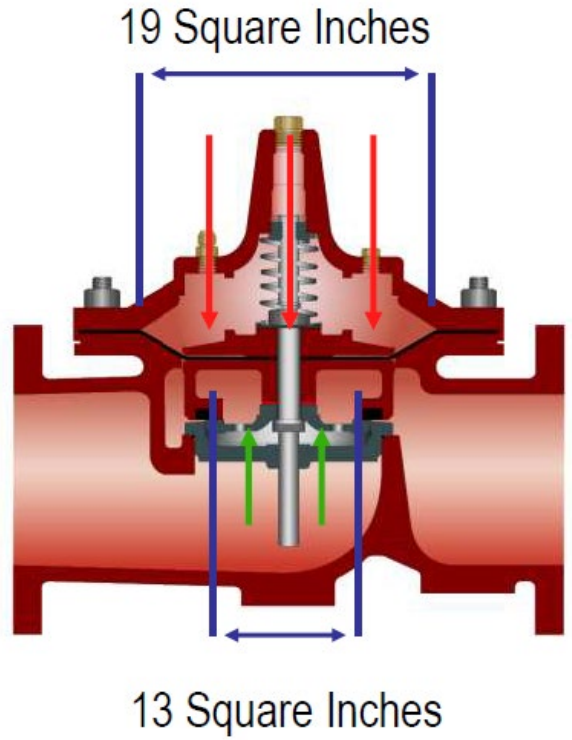




Pressure out of Cover Chamber:
VALVE OPENS

OPERATING PRINCIPLE
WHY IT WORKS

- Diaphragm to seat ratio is 1.5 : 1
- Line pressure 100psi
- Downward force = 1900 ft-lbs.
- Upward force = 1300 ft-lbs.
- Allows modulation of valve
- Valve closes if pressure equalizes
- Dead End Creep



What The #*%@& Is This?

Never lose sight of this:

To close the valve:

Put water on cover

To open valve:

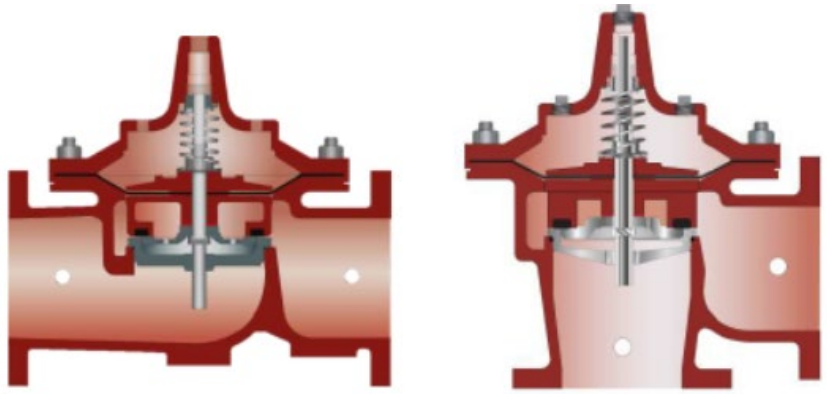
Take water off the cover

To Troubleshoot the Valve:

Start at Body Inlet and follow the tubing…

Do you have flow where you are supposed to?

MAIN VALVE CONFIGURATIONS

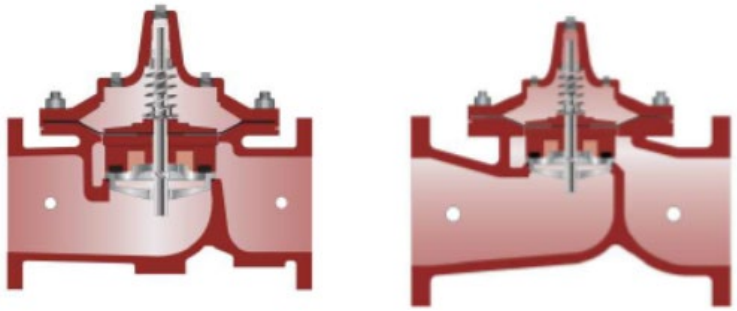


Globe Pattern (M100)

Angle Pattern (M1100)

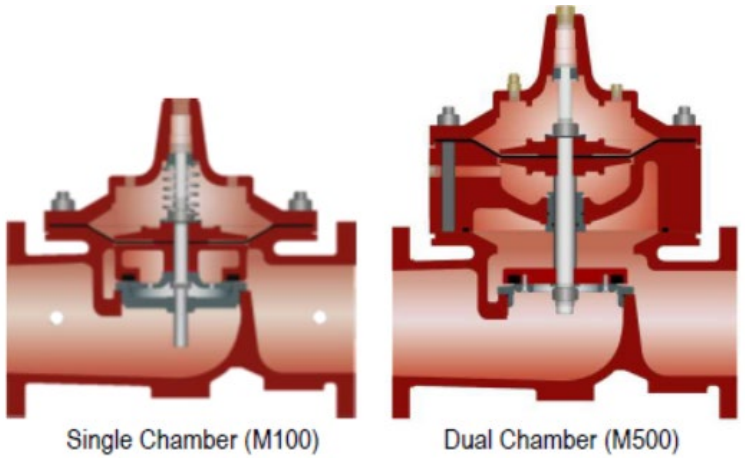
6" Flanges / 6" Internals

6" Flanges / 4" Internals



Full Port (M100)

Reduced Port (M6100)

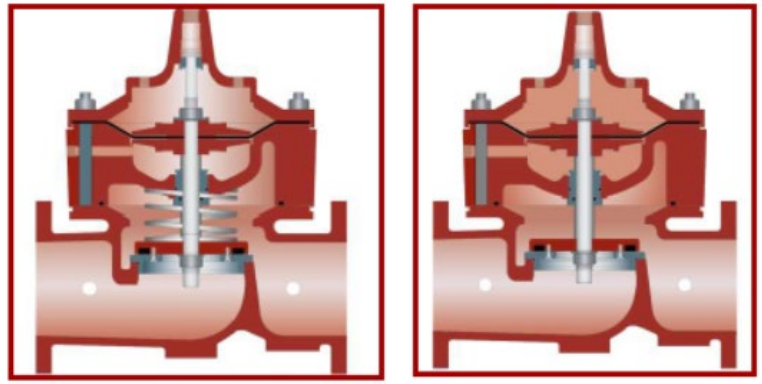


Single Chamber (M100)

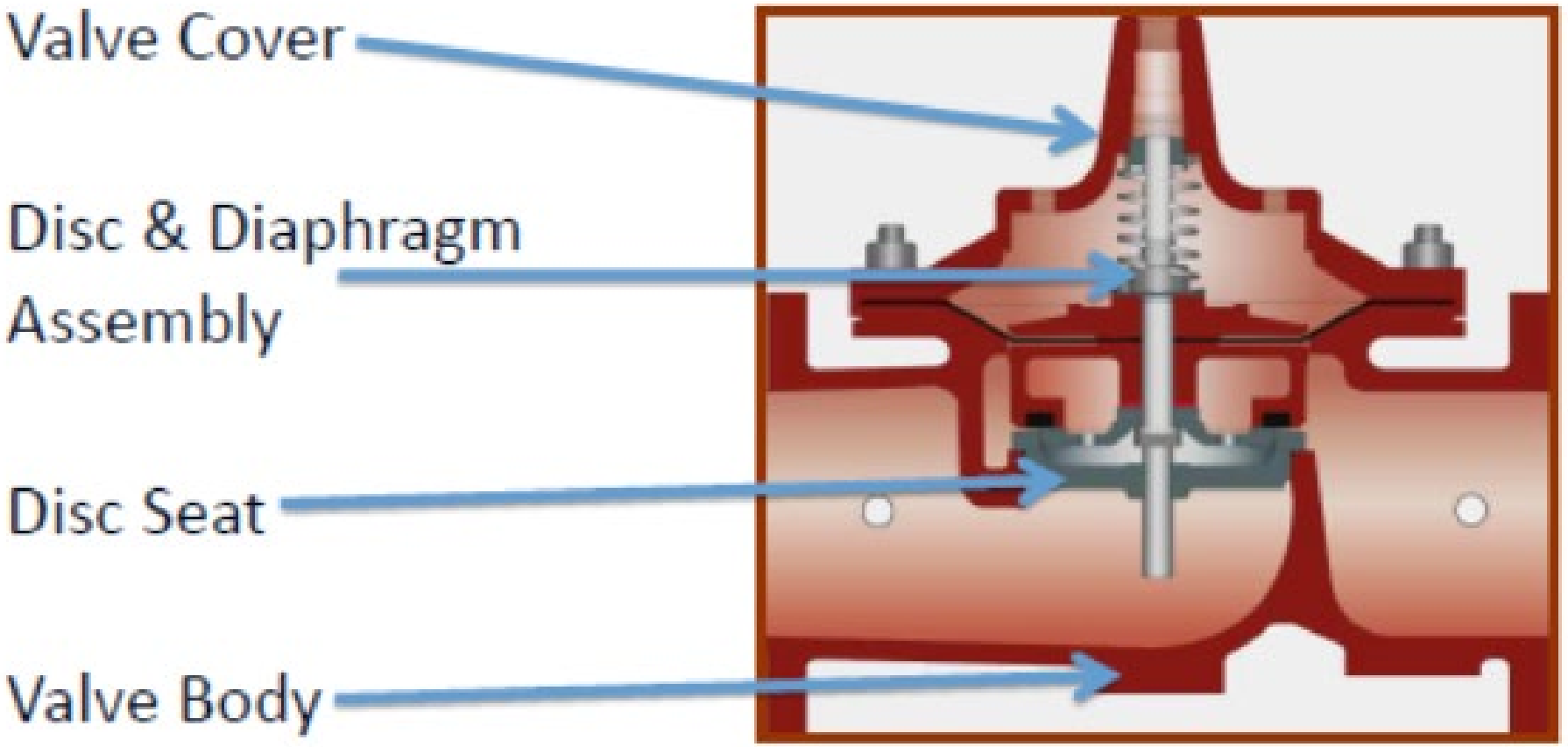
Dual Chamber (M500)

w/ Mechanical Check Feature

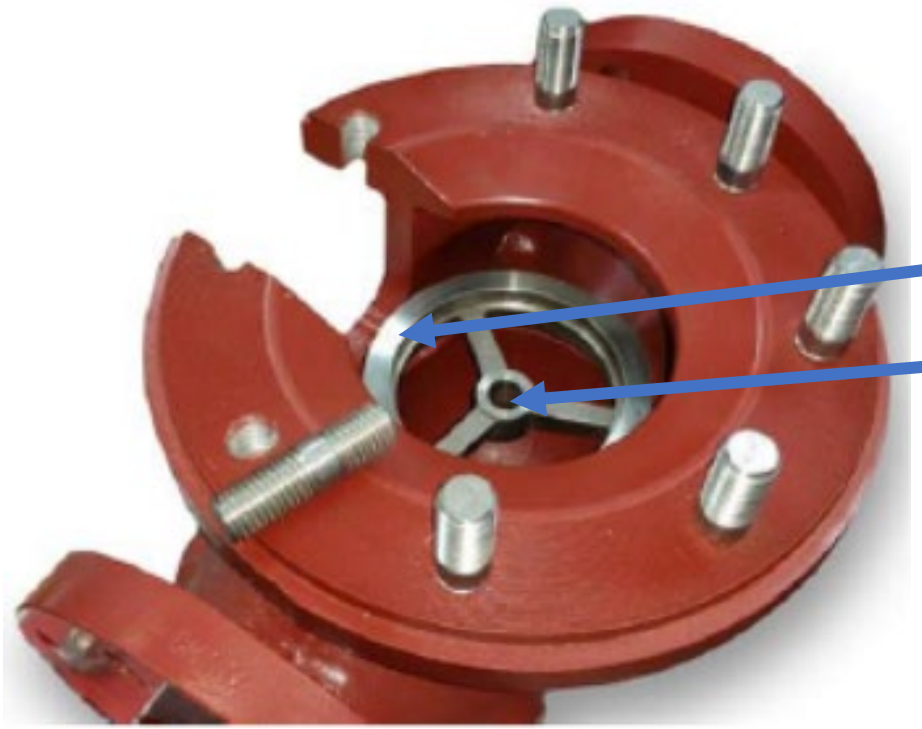
w/o Mechanical Check Feature



THE MAIN VALVE



Valve Body Assembly



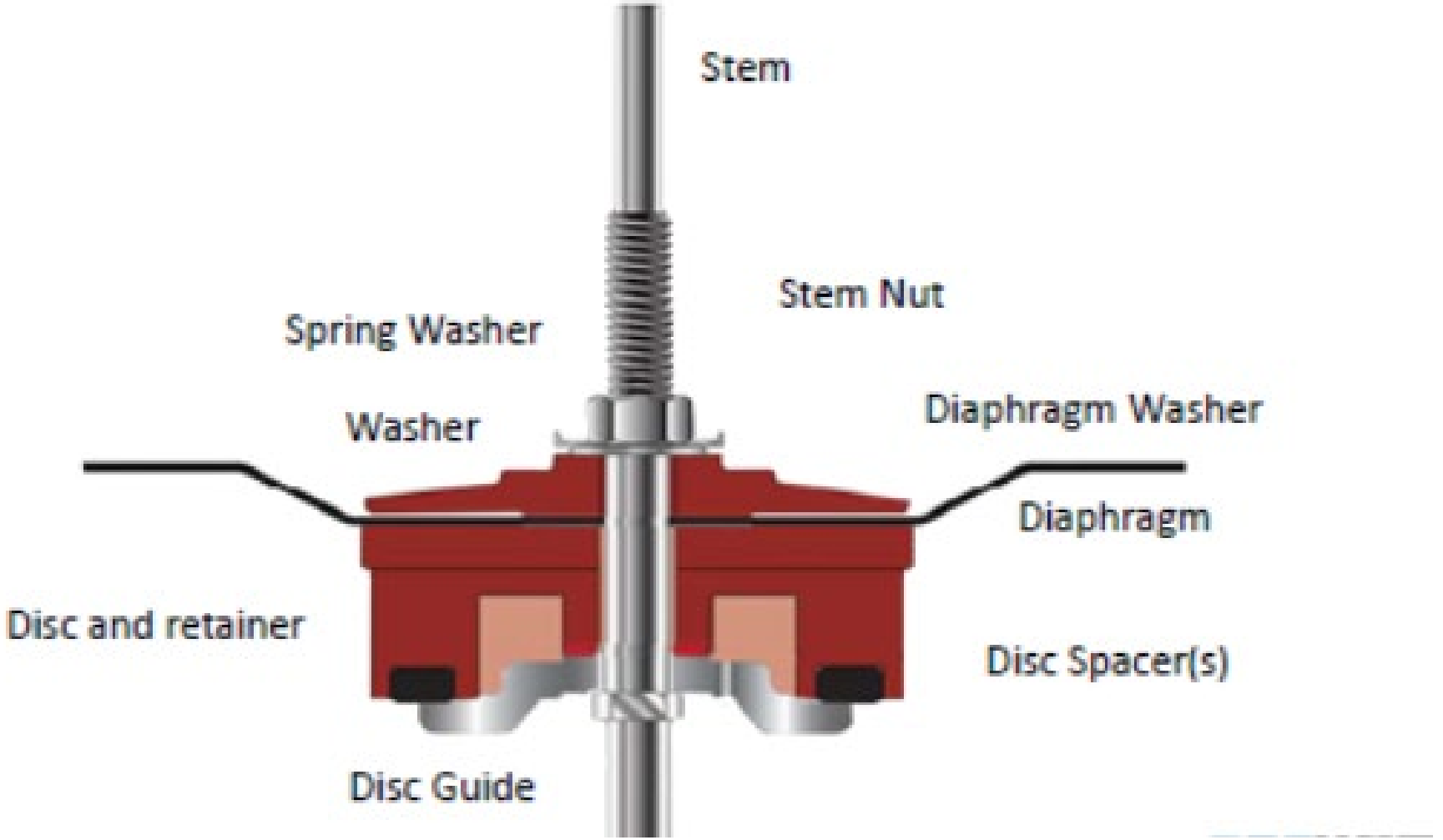
- Renewable Seat
- Bearing integral with the seat

VALVE SEAT

Valve Seat, along with the Sealing Disc, provides the sealing area

Valve Seat has a 5 degree taper so the flat Disc has a sharp edge to Seal against

Stem Assembly



Main Valve Stem

Disc and Diaphragm Assembly

Stem

- Connects the Disc to the diaphragm
- Made of 304 Stainless
- Treaded top for Cover Accessories
- Wrench Flats provided
- Threaded In the mid area
  - Diaphragm mounting

- Stem May be coated with Xylan
- **Xylan** is a fluoropolymer-based industrial coating.
- Generally, it is applied in a thin film to the target material.
- This prevents scale from attaching to the SS valve stem and disc guide

STEM ASSEMBLY COMPONENTS

- Contoured Disc Guide
  - Provides low flow accuracy and stability
- Spacer Washers
- Disc
- Disc Retainer
  - Provides a surface for diaphragm
  - Holds the disc on 3 1/2 sides

THE PARTS THAT MAKE UP THE MAIN VALVE

PART	MATERIAL	FUNCTION	T-SHOOT
Lower Body	Ductile Iron	Flowing Chamber	Visual Inspection
Seat O-Ring	Buna-N Rubber	Seal between Seat & Body	None – Replace
Seat	316 Stainless Steel	Sealing Surface for Disc / Lower Stem Guide	Visual Inspection
Main Valve Stem	304 Stainless Steel	Holds Internal Assembly Together	Visual Inspection
Contoured Disc Guide	316 Stainless Steel	Flow Stabilizer – Holds Disc in Place	Visual Inspection
Spacer Washer(s)	Paper Fiber	Provides Tolerances for Drip Tight Seal	Visual Inspection
Disc	Buna-N Rubber	Seals off the flow of water to close valve	Visual Inspection
Disc Retainer	Ductile Iron	Holds Disc in Place & Surface for Diaphragm	Visual Inspection
Diaphragm	Buna-N Rubber	Operates the Valve	Diaphragm Check
Diaphragm Washer	Ductile Iron	Holds Diaphragm in Place	Visual Inspection
Spring Guide	304 Stainless Steel	Holds Spring in Place	Visual Inspection
Stem Nut	304 Stainless Steel	Threads onto Stem / Holds Assembly in Place	Visual Inspection
Main Valve Spring	304 Stainless Steel	Assists in closing the Valve	Visual Inspection
Cover Bearing	316 Stainless Steel	Upper Stem Guide	Visual Inspection
Valve Cover	Ductile Iron	Forms the Cover Chamber	Visual Inspection

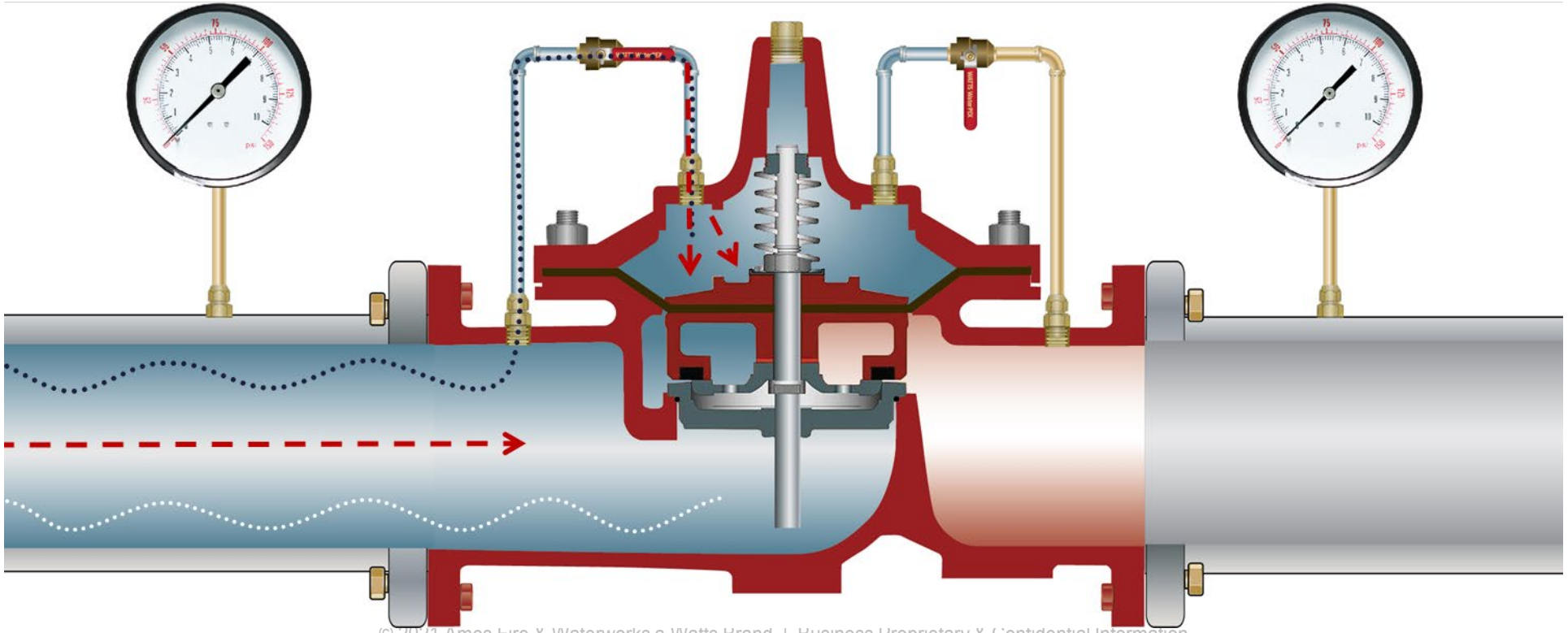
PILOT SYSTEMS AND APPLICATIONS

TWO TYPES OF AUTOMATIC CONTROL VALVES

- Non-modulating
  - ON/Off service
  - Valve is either Fully Open or Fully Closed
- Modulating
  - Valve spends it's life somewhere between Fully Open and Fully Closed

NON-MODULATING SERVICE – VALVE CLOSED

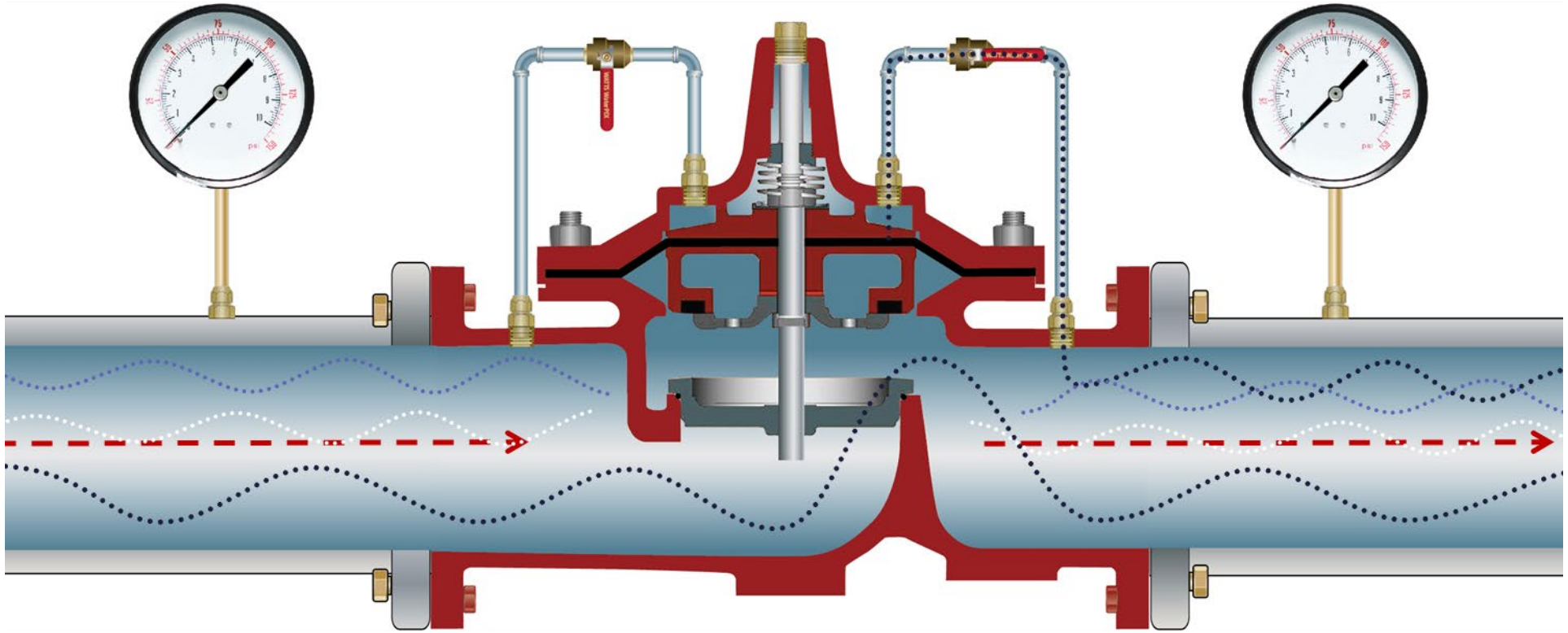
Almost all Non-Modulating Valves use some sort of 3-Way Control Pilot – These Pilots all have three ports and three connections. A Supply Port, a Cover Port and a Drain Port. These Pilots either block the Drain Port or the Supply Port while interconnecting the Cover Port with the unblocked Port – In this case the Supply is Connected to the Cover or Common Port while blocking the Drain and the Valve is Closed – ALL 3 – WAY PILOTS WORK LIKE THIS!!



NON-MODULATING SERVICE – VALVE OPEN

So, the Valve comes open when the 3-Way Control Pilot Shifts Positions and blocks the Supply Port while interconnecting the Common or Cover Port with the Drain Port and the Valve comes Open

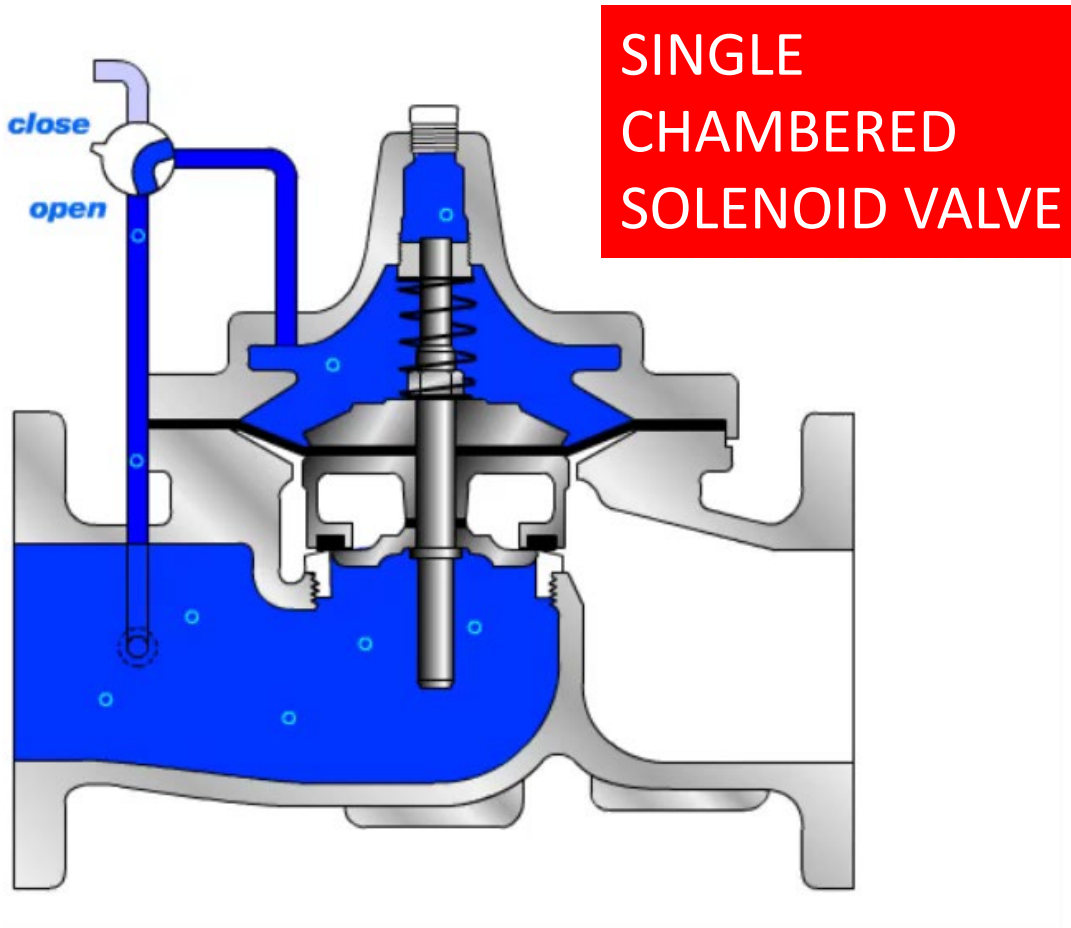
ALL THREE-WAY PILOTS WORK LIKE THAT!!



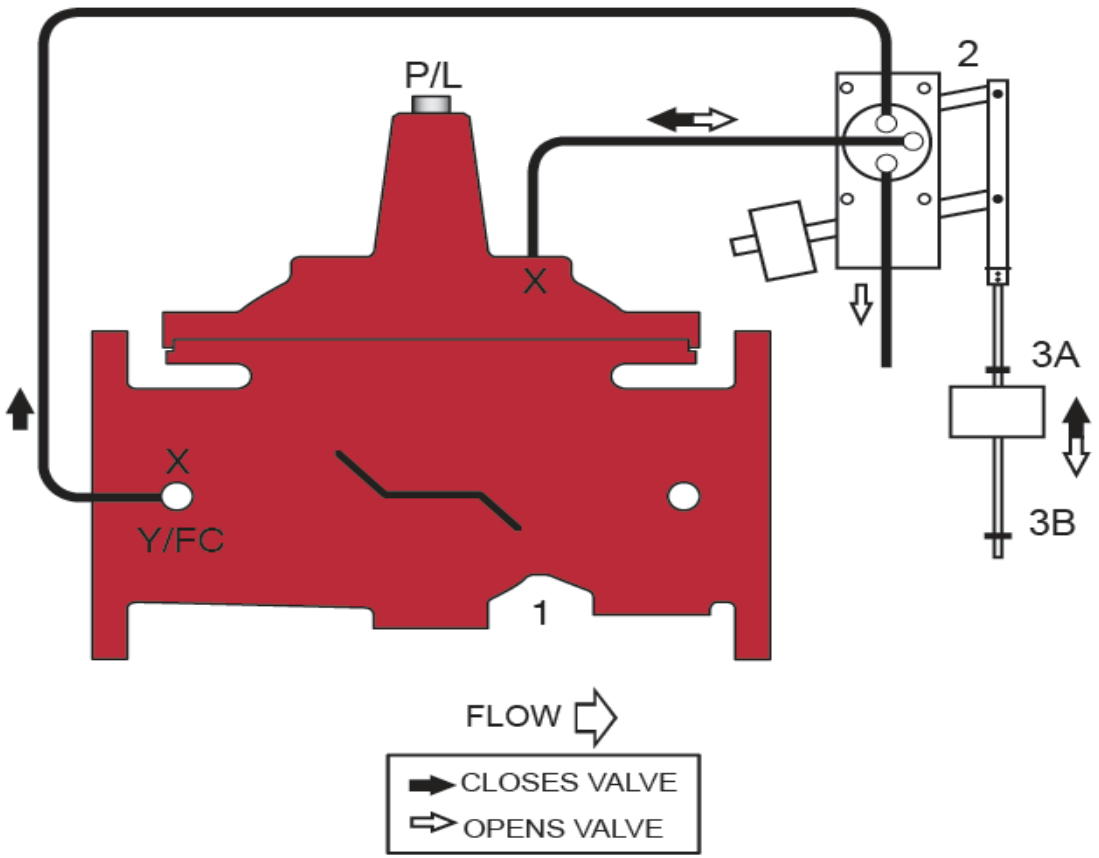
SINGLE CHAMBER ON/OFF VALVE

Non-Modulating Valves
Need 3 Connections:

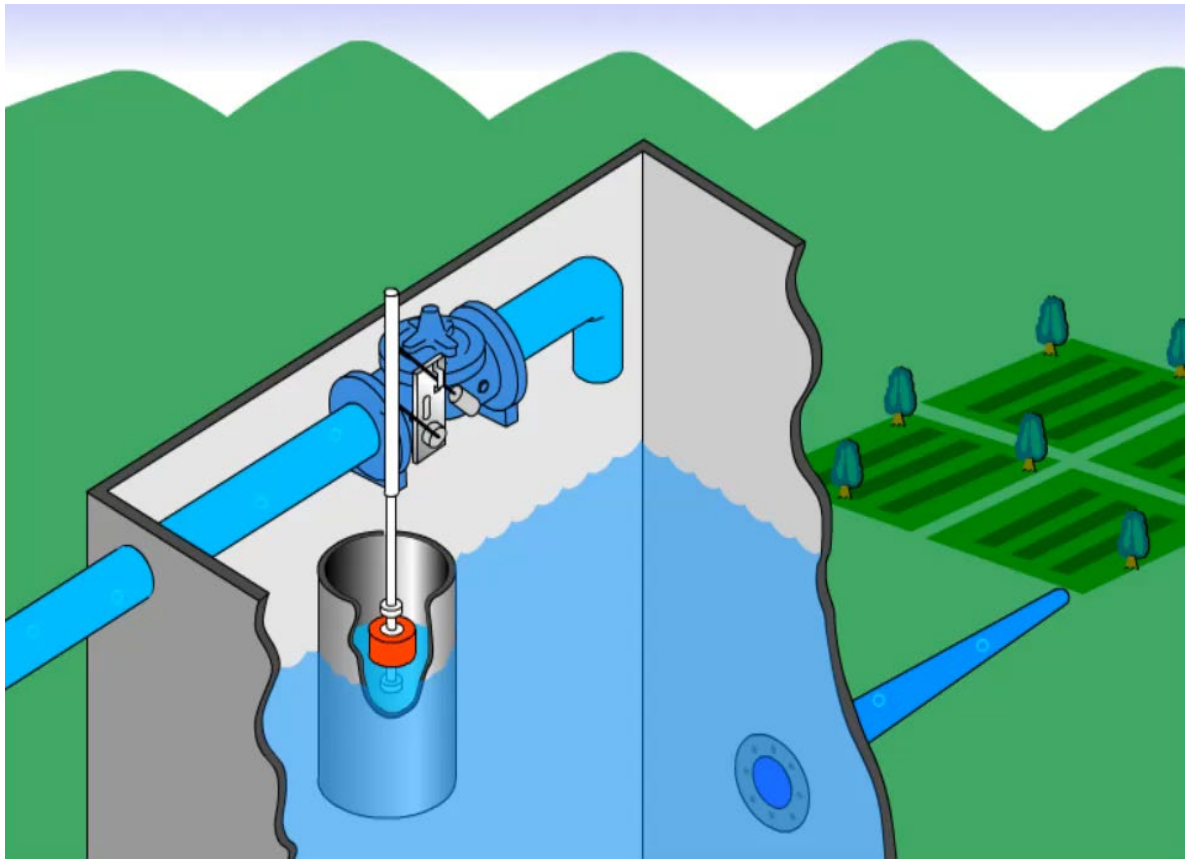
Supply Port / Connection
Cover Port / Connection
Drain Port / Connection



FLOAT VALVE

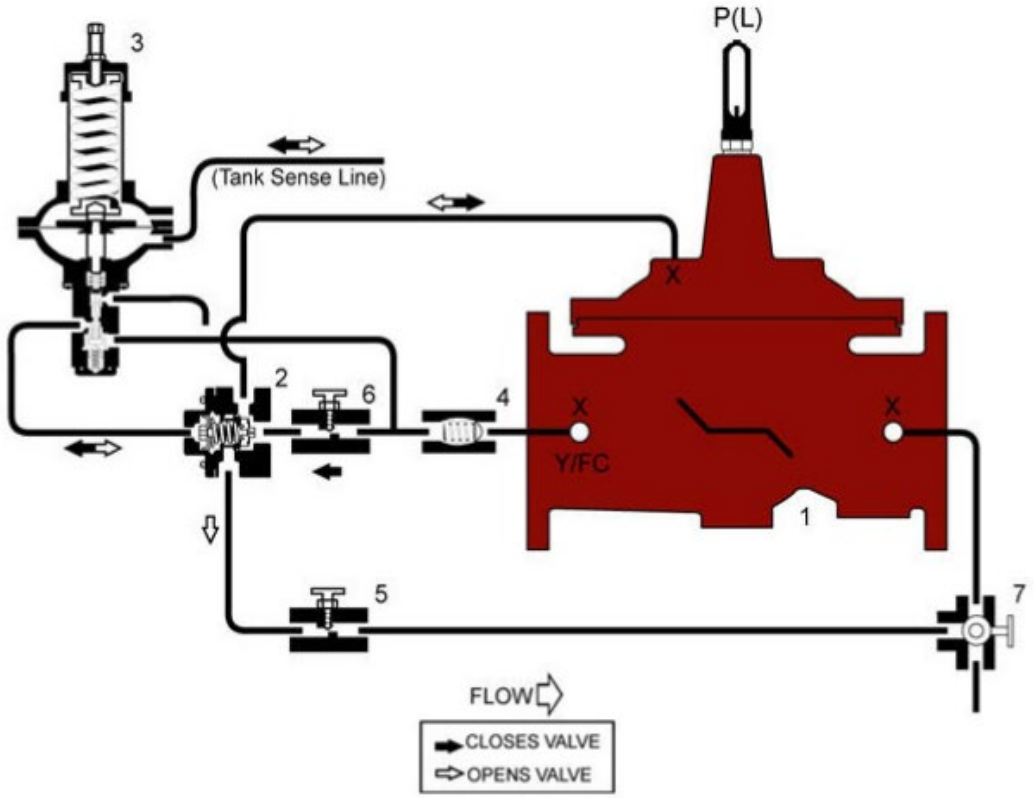


FLOAT VALVE



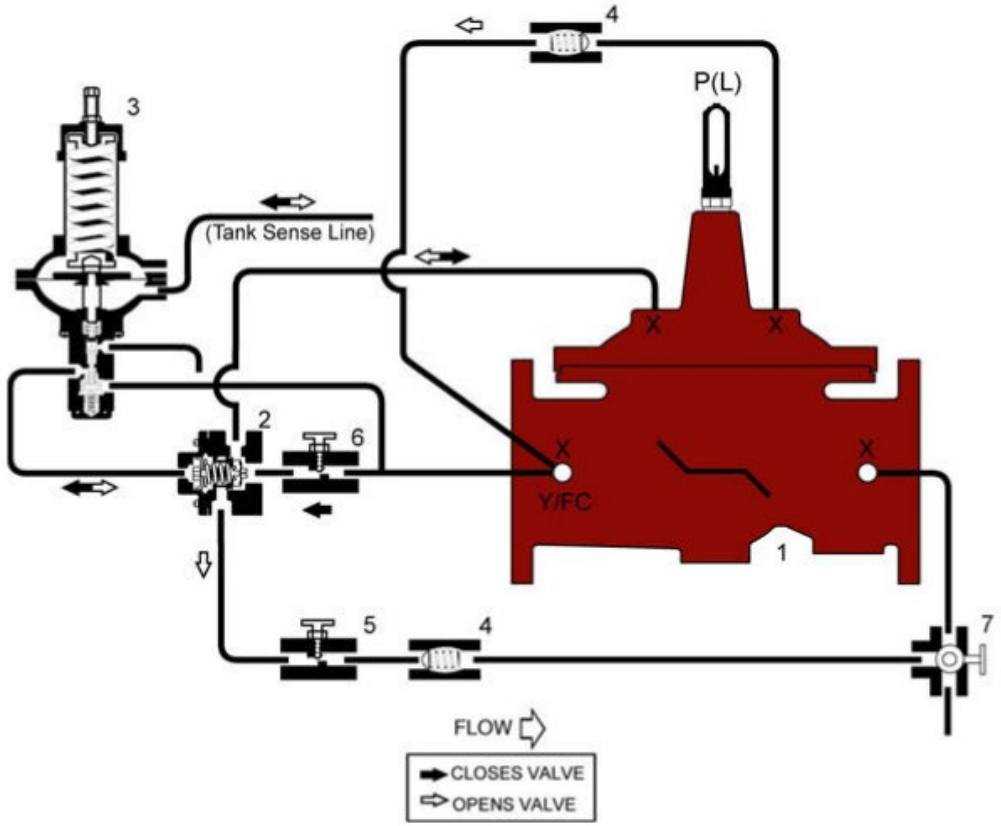
AMES SERIES 960 ALTITUDE VALVE FOR ONE-WAY FLOW

THE AMES SERIES 960GD ALTITUDE VALVE FOR ONE-WAY FLOW IS DESIGNED TO KEEP WATER STORAGE TANKS FULL VIA THE SINGLE POINT AMES MODEL 27 ALTITUDE CONTROL PILOT.



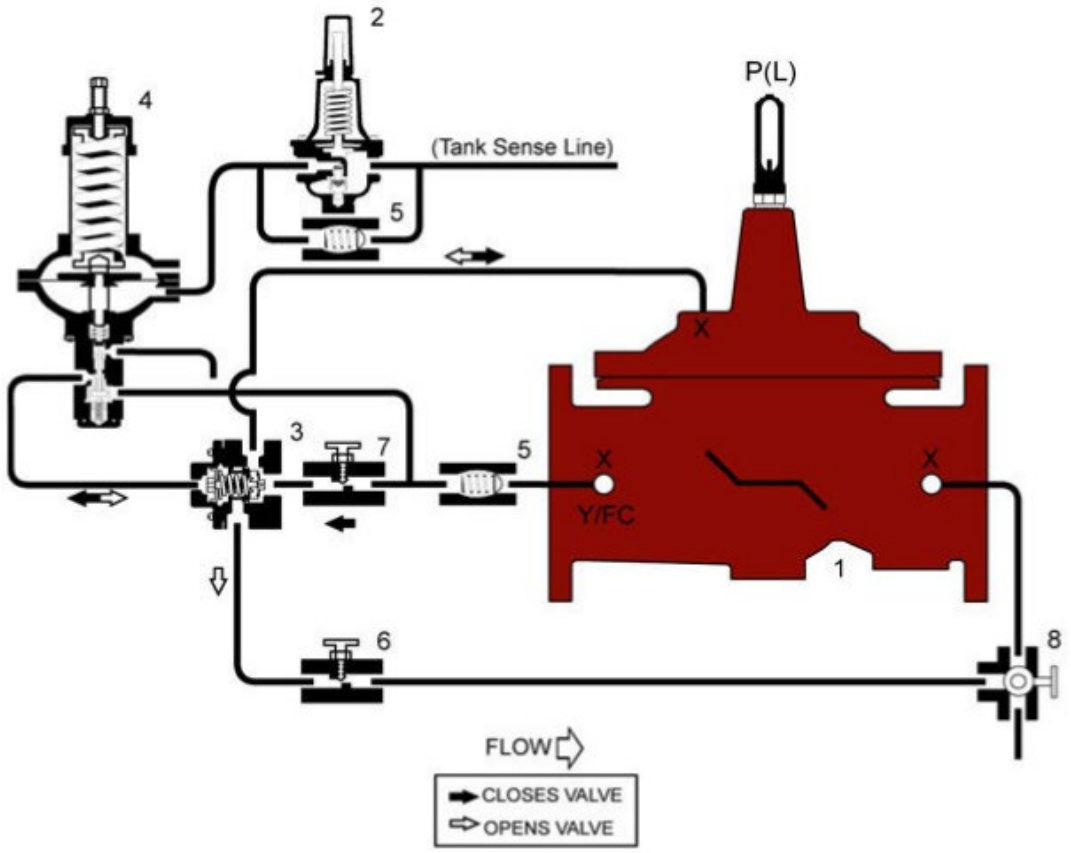
AMES MODEL 960GD-17 ALTITUDE VALVE WITH RETURN FLOW FEATURE

A VERY COMMON VARIATION ON THE THEME IS TO ADD THE RETURN FLOW FEATURE TO THE VALVE THAT ALLOWS THE TANK TO “FLOAT” ON THE SYSTEM. THIS ALLOWS THE VALVE TO BE OPEN AND EITHER FILLING THE TANK OR SUPPLYING WATER TO THE SYSTEM – THIS VALVE WILL BE OPEN FOR RETURN FLOW WHENEVER THE PRESSURE IS HIGHER ON THE TANK SIDE THAN THE SYSTEM SIDE.



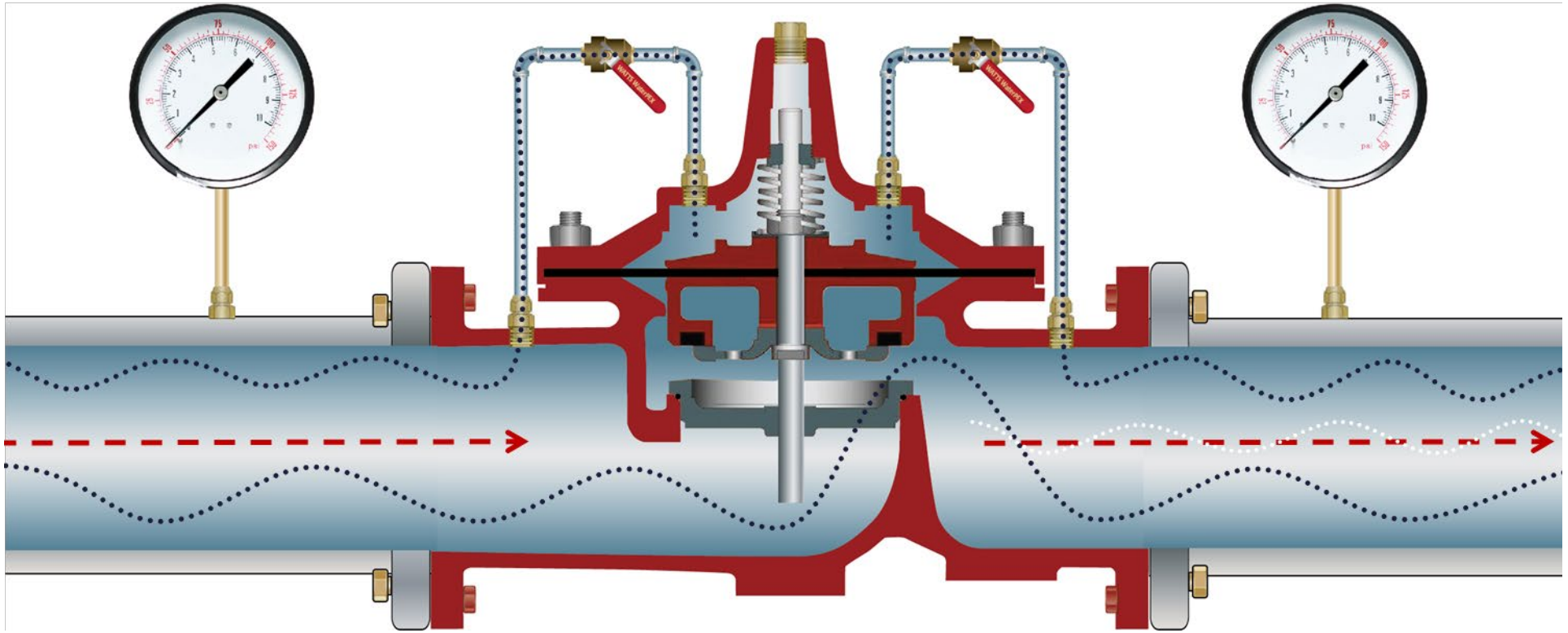
AMES MODEL 960GD-13 ALTITUDE VALVE WITH DELAYED OPENING FEATURE

ANOTHER COMMON FEATURE IS TO ADD THE DELAYED OPENING FEATURE. THIS ALLOWS THE TANK TO DRAIN TO A SPECIFIED LEVEL BEFORE THE VALVE OPENS TO REFILL THE TANK. THIS WILL GIVE YOU BETTER TANK TURNOVER AND KEEP THE WATER FROM BECOMING STAGNANT.



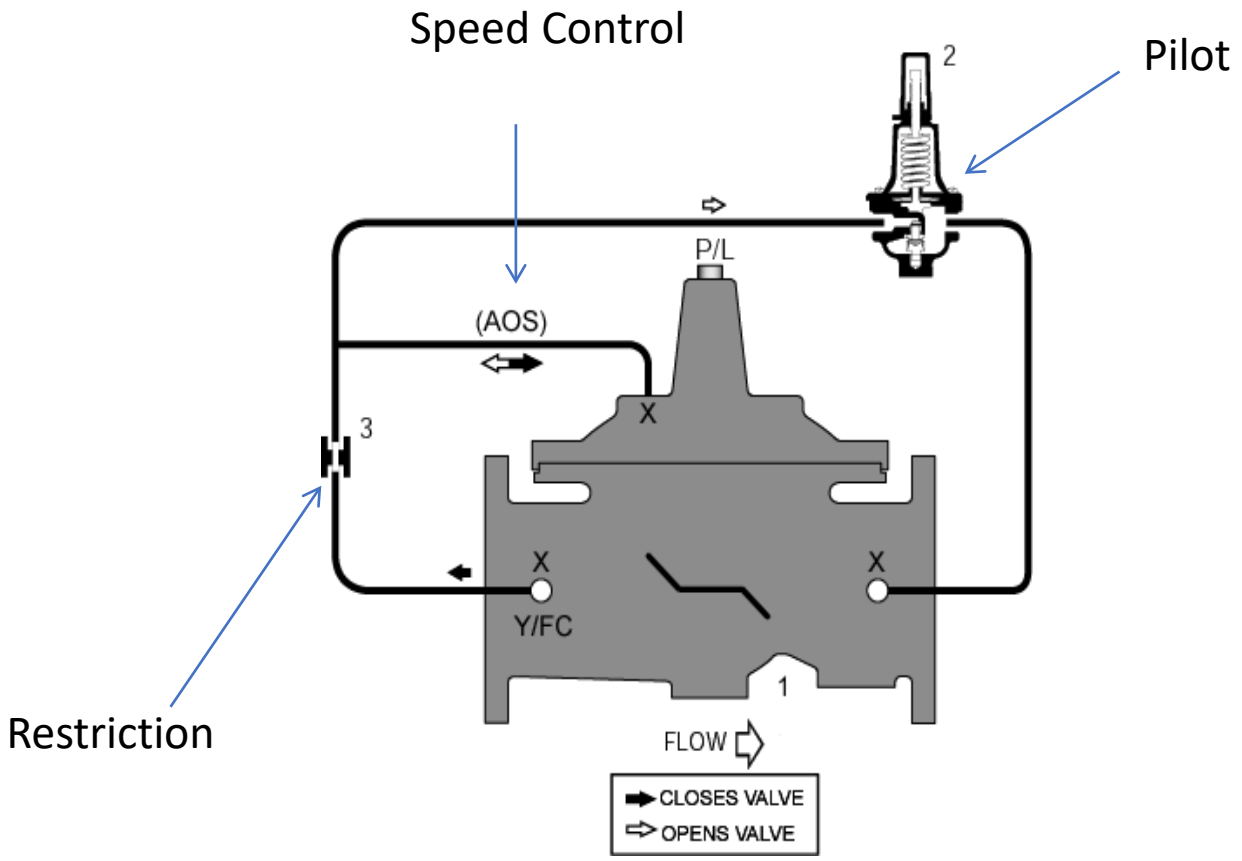
MODULATING SERVICE – FLOWING PILOT SYSTEM

For Modulating Valves, we are putting water on the cover and taking water off the cover at the same time creating a “Flowing Pilot System”



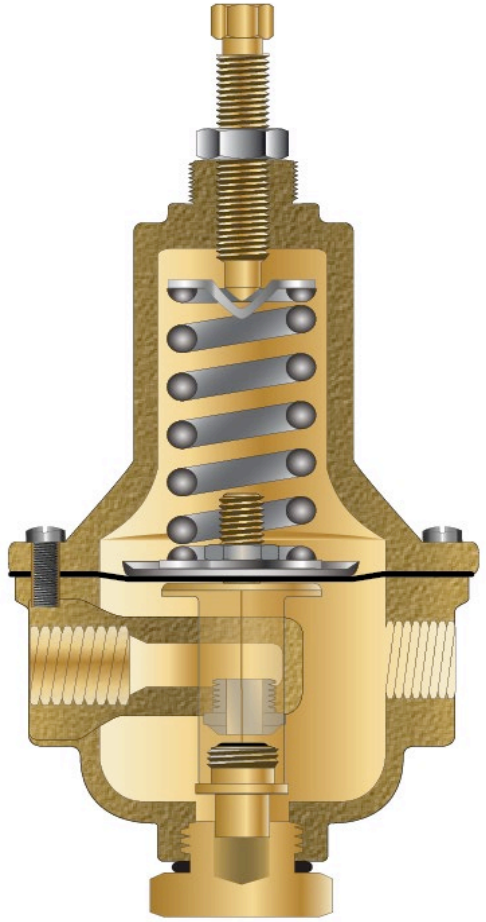
MODULATING VALVES NEED

Supply Port / Connection
Cover Port / Connection
Drain Port / Connection
Pilot
Restriction fitting
    Usually fixed orifice

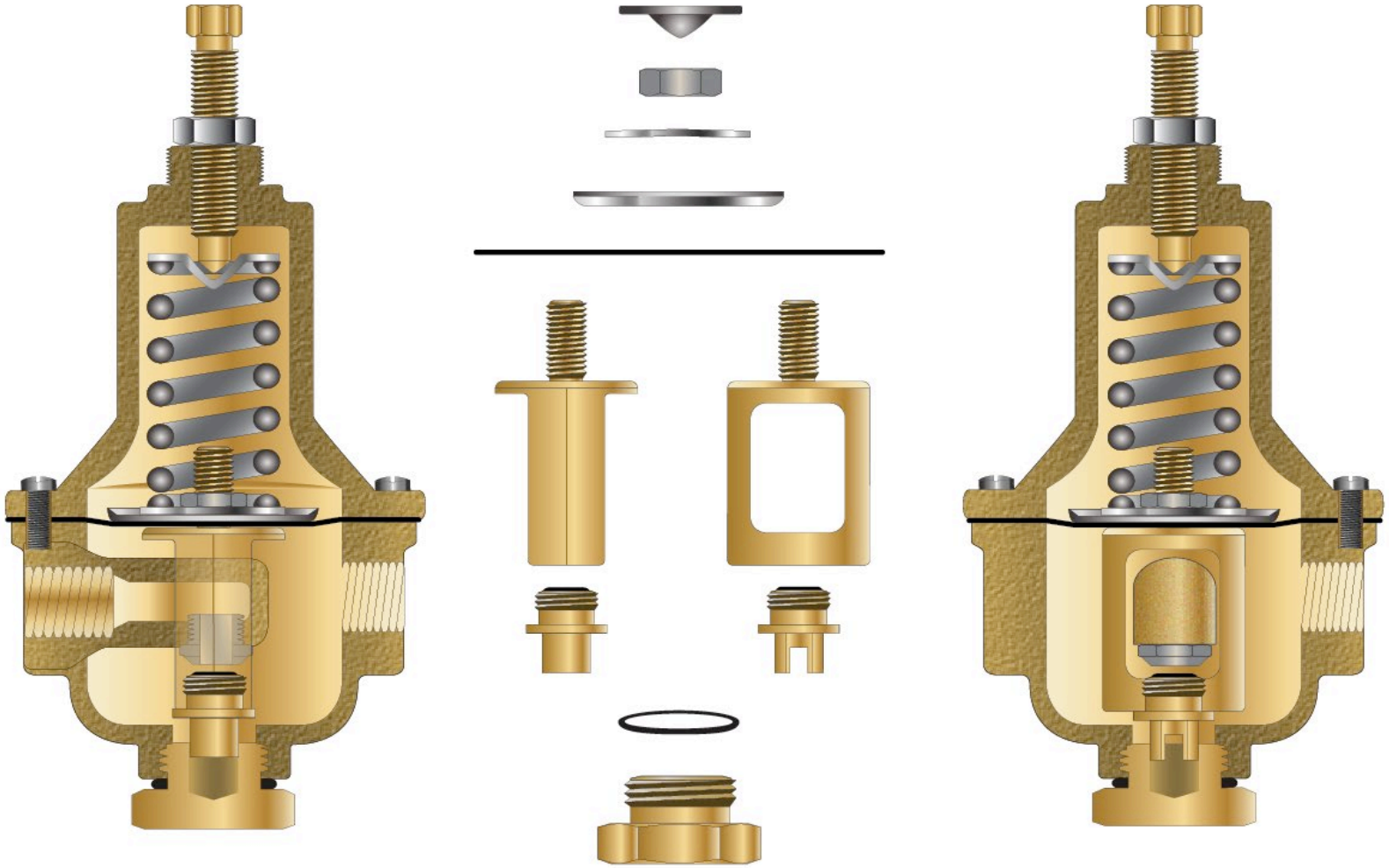


PRESSURE REDUCING CONTROL PILOT

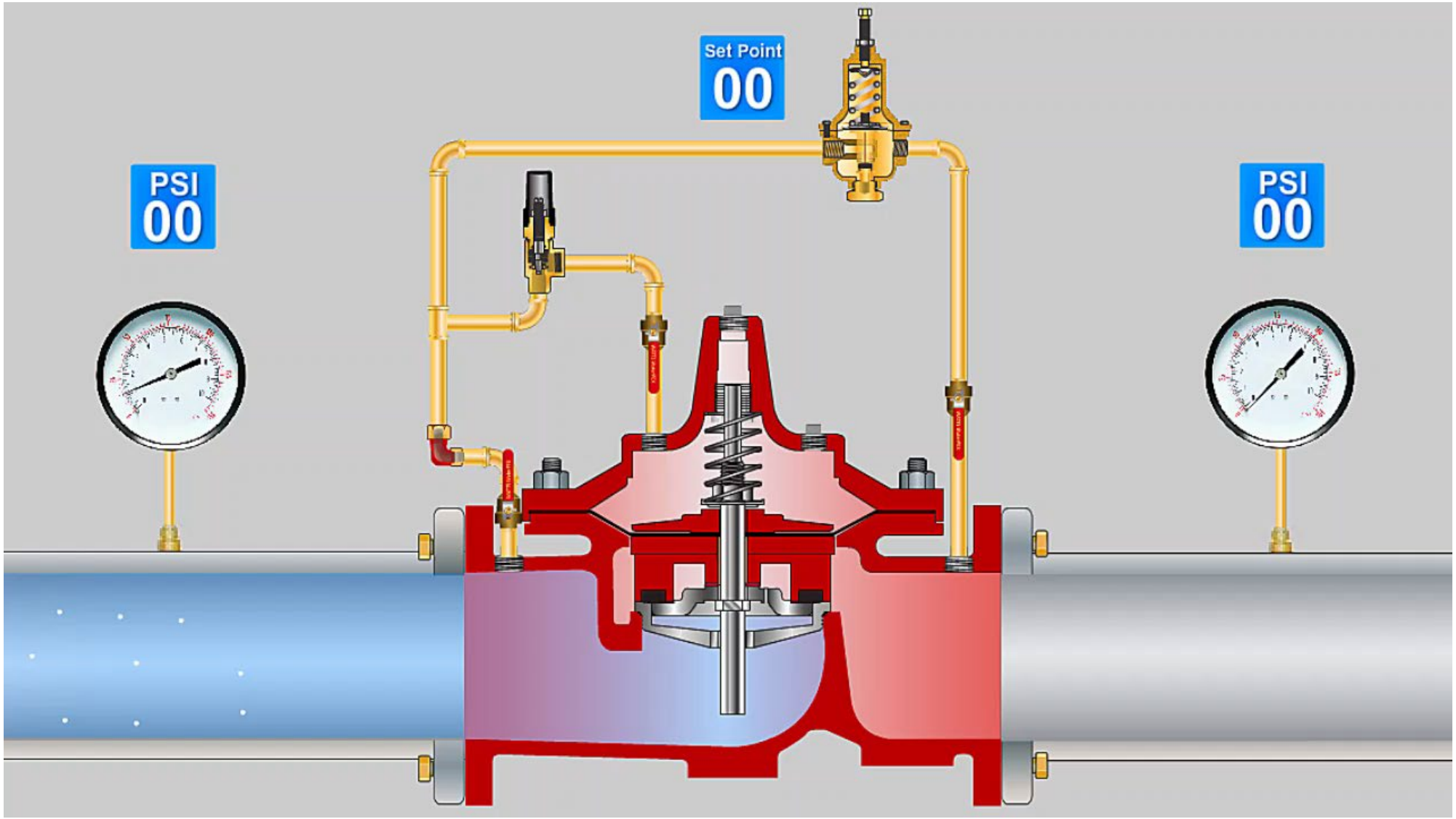
- Normally open
- Senses downstream pressure directly
- Screwing adjustment bolt
  - In = pressure increase
  - Out = decreasing pressure



PRESSURE REDUCING CONTROL PILOT



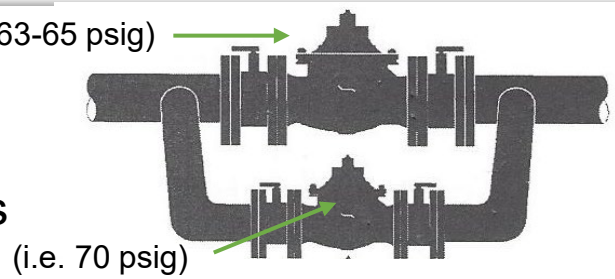
PRESSURE REDUCING VALVE

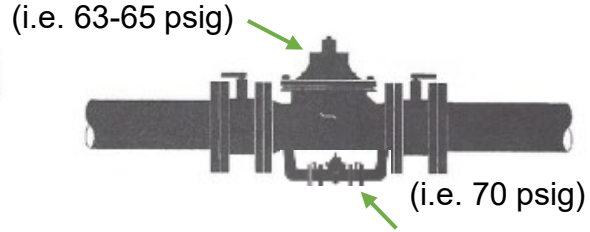


Pressure Reducing Installation Design Considerations

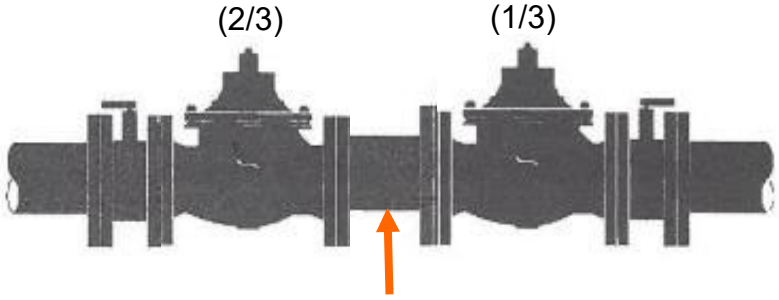
- SINGLE VALVE INSTALLATION
  - All Functions

- LOW-FLOW VALVE INSTALLATION
  - Common Application - Pressure Reduction
  - High Flow Main Valve w/ Low-Flow Bypass

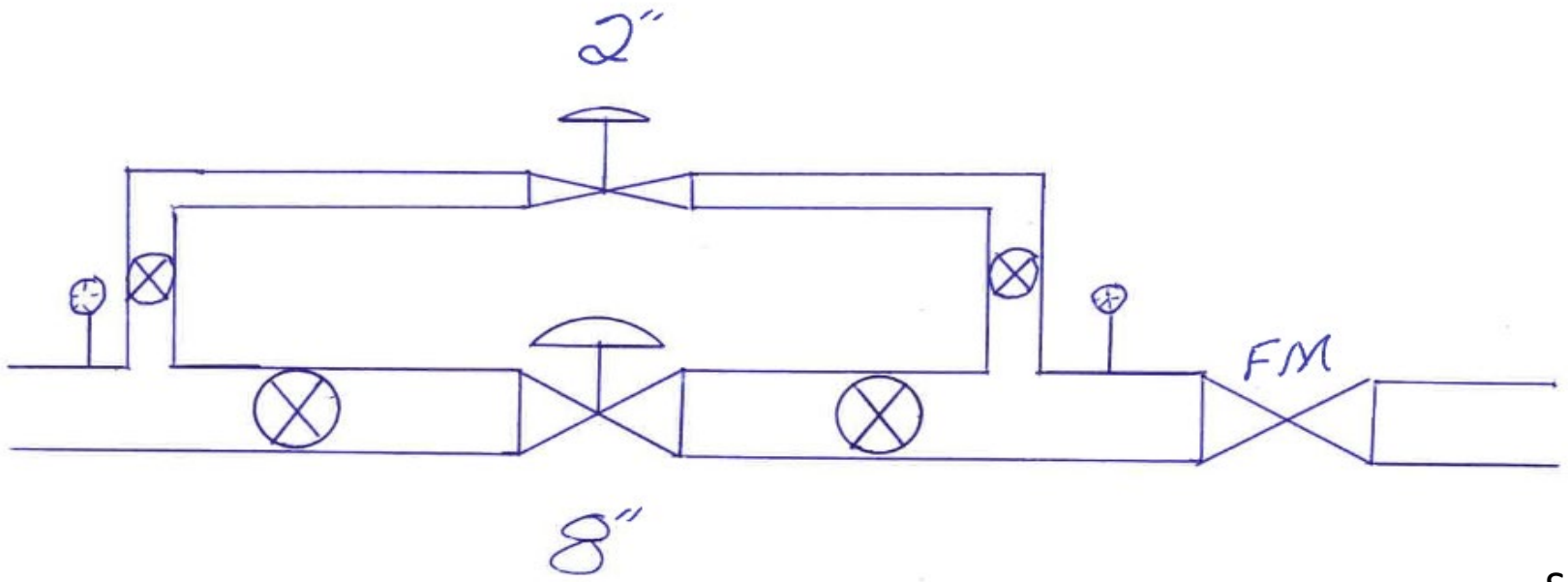




- STAGED PRESSURE REDUCTION
  (In Series) Application - Excessive Pressure Drop
  - Multiple Valves In Succession On Same Line (2/3 Then 1/3 Reductions PSIG)
  - Alternative Anti-Cavitation Trim
  - Combination - Multiple Valves and/or Anti-Cavitation Trim



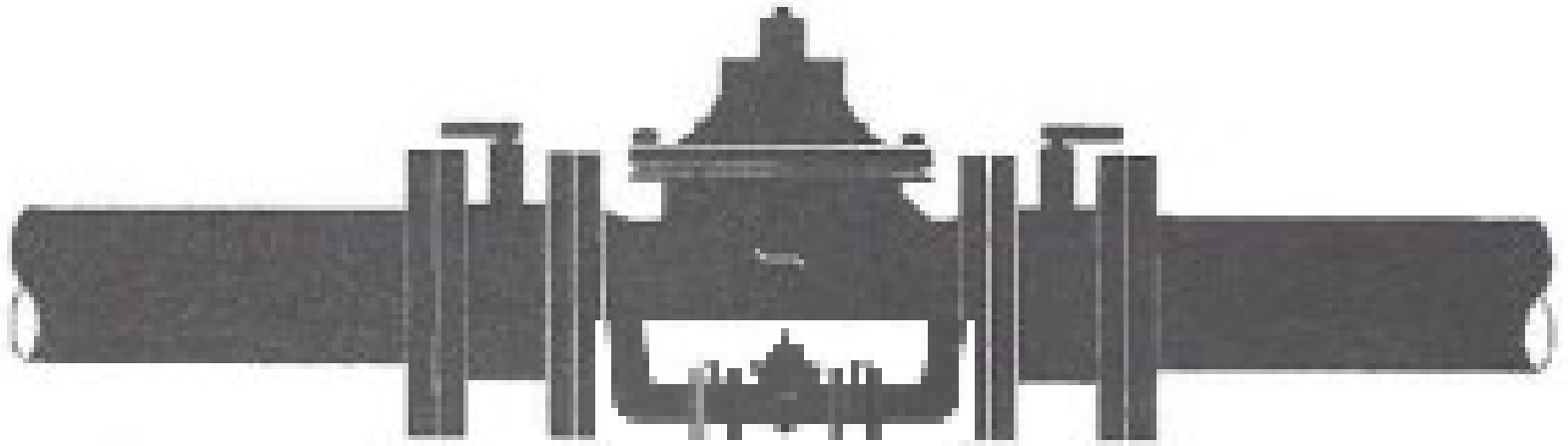
TYPICAL PRESSURE REDUCING STATION USING TWO DIAPHRAGM VALVES



Make sure you have both Upstream and Downstream Pressure Gages

Set the Valves 3 PSI apart so that the Small Valve handles the Low Flows and the Larger Valve handles the Higher Flows

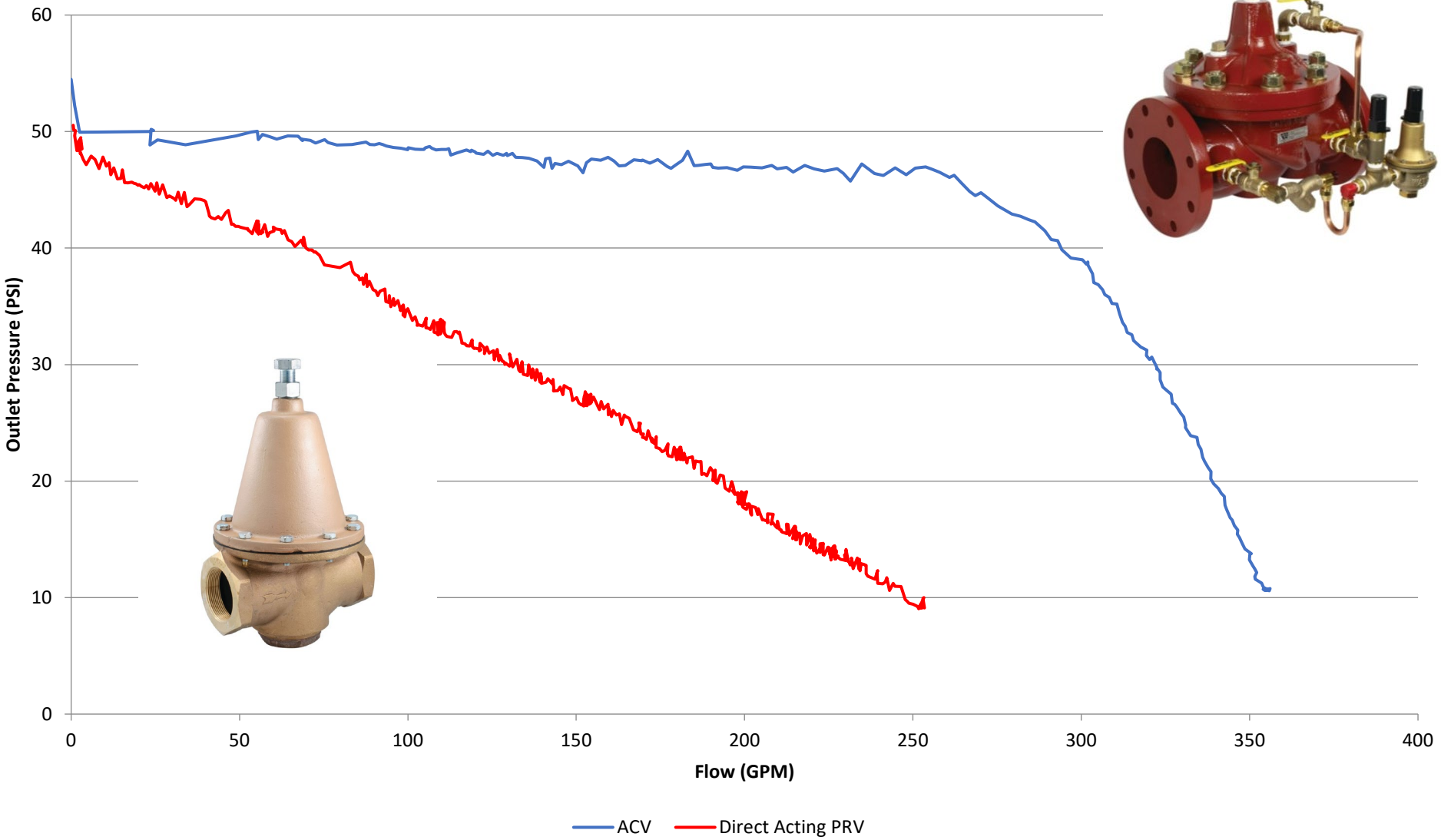
TYPICAL PRESSURE REDUCING STATION USING THE 115-74



Make sure you have both Upstream and Downstream Pressure Gages

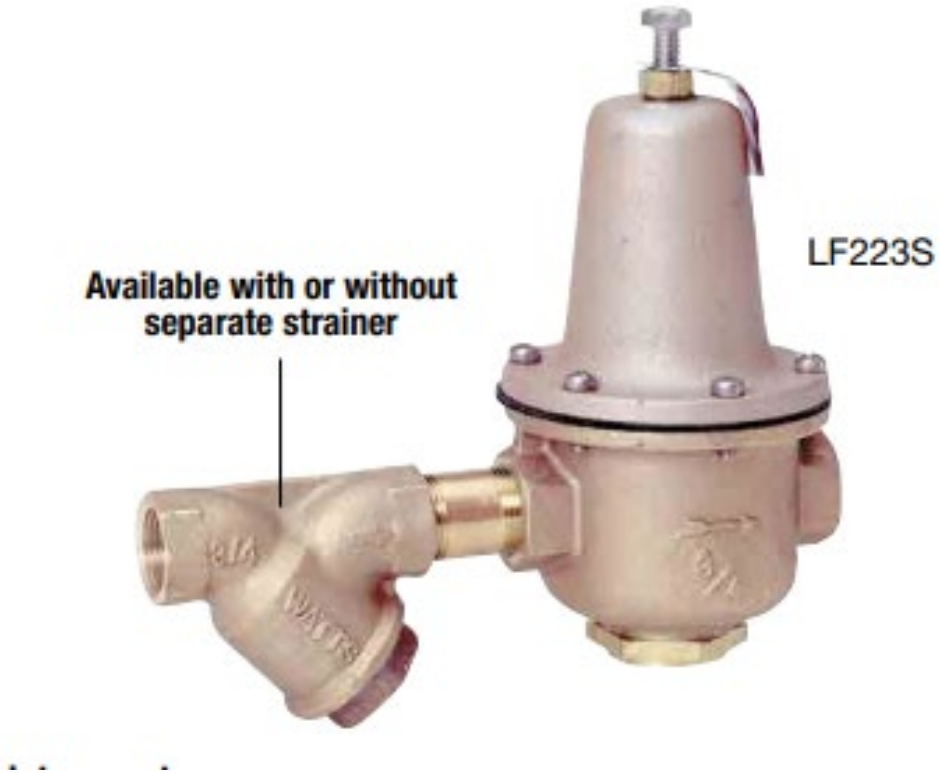
Set the Valves 7 – 10 PSI apart so that the Small Valve handles the Low Flows, and the Larger Valve handles the Higher Flows

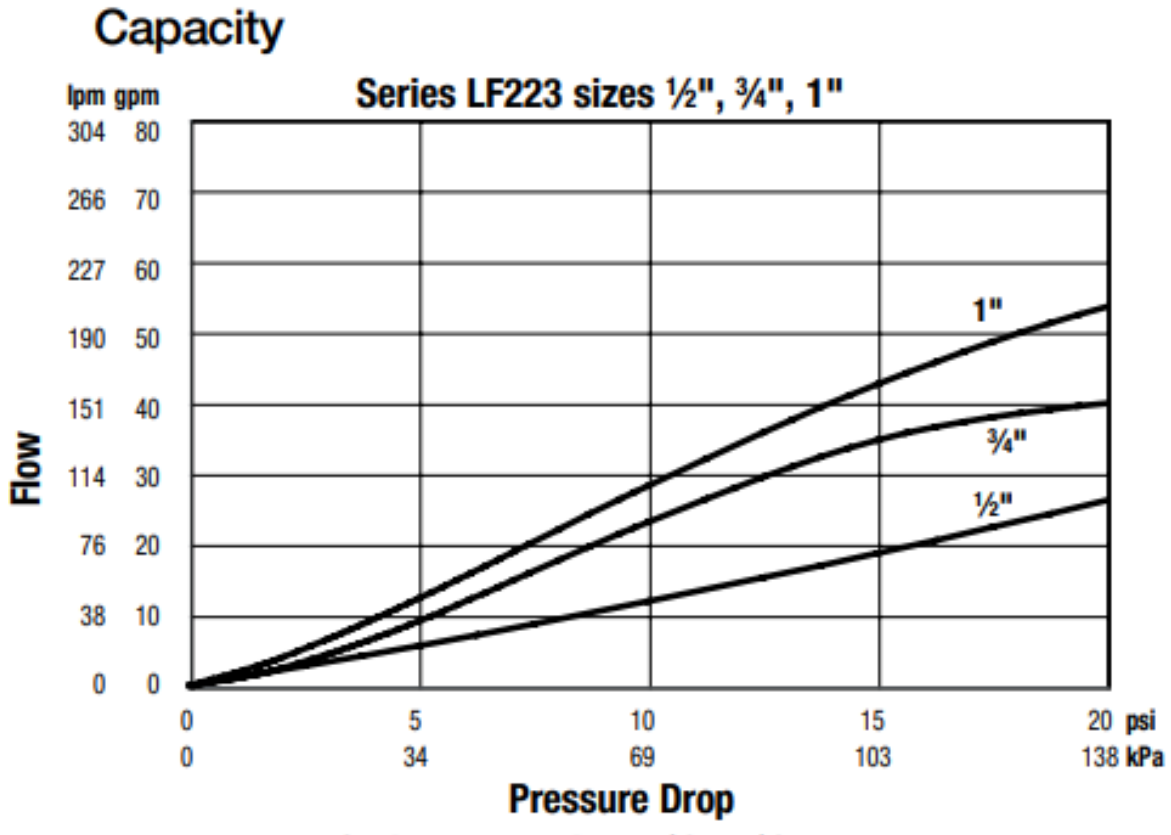
REDUCED PRESSURE FALLOFF – DIRECT ACTING VS DIAPHRAGM VALVE



- Performance
- Options

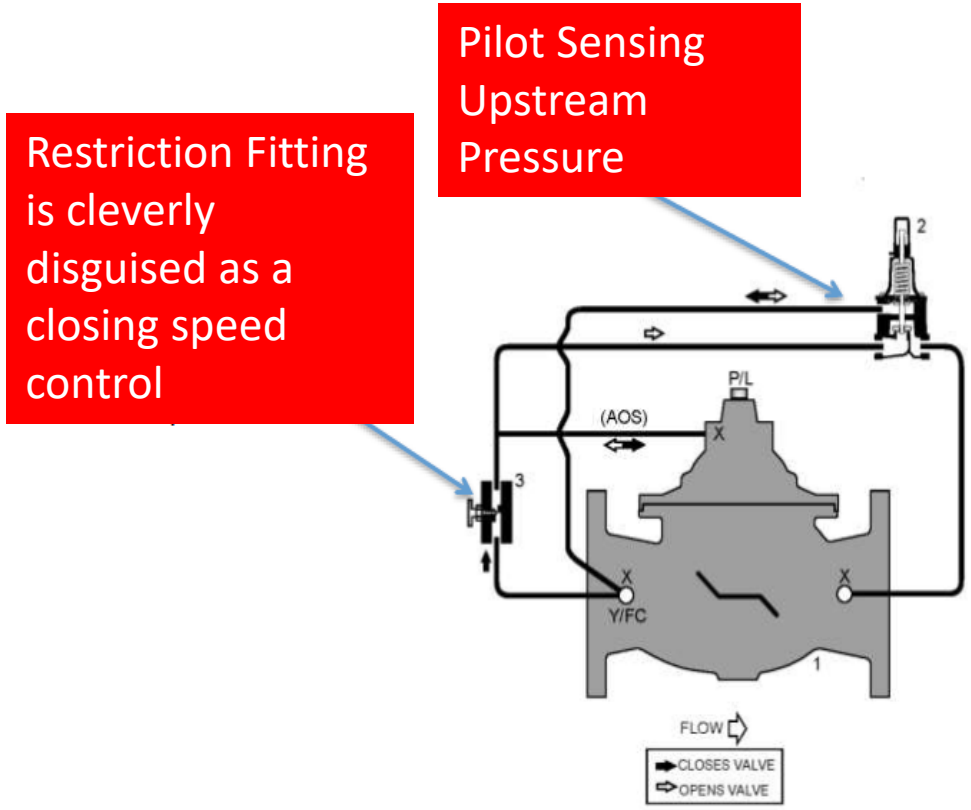
REDUCED PRESSURE FALLOFF IN SMALL (1/2” & 3/4”) DIRECT ACTING PRESSURE REDUCING VALVES





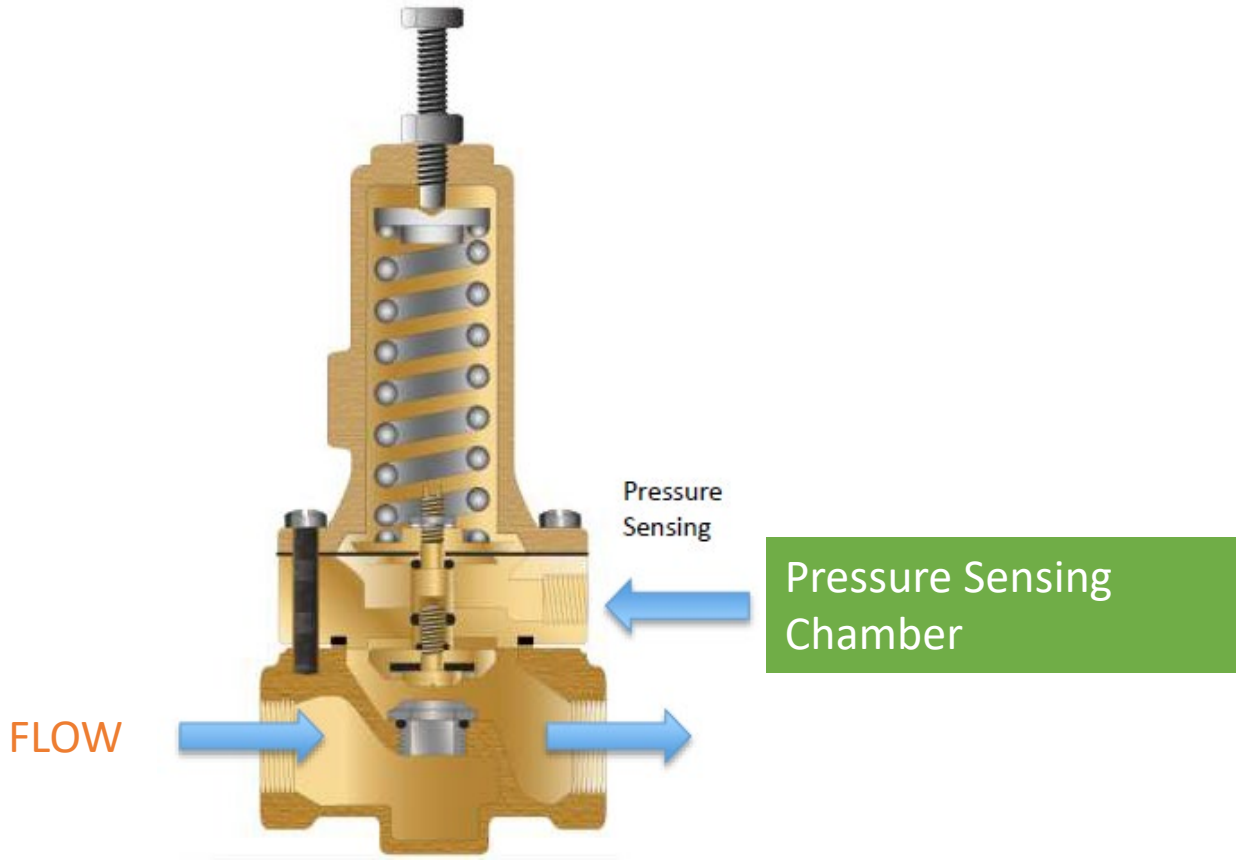
PRESSURE RELIEF/PRESSURE SUSTAINING VALVE

- Opens on rise of upstream pressure
- Maintain a constant upstream pressure
- Senses upstream pressure only

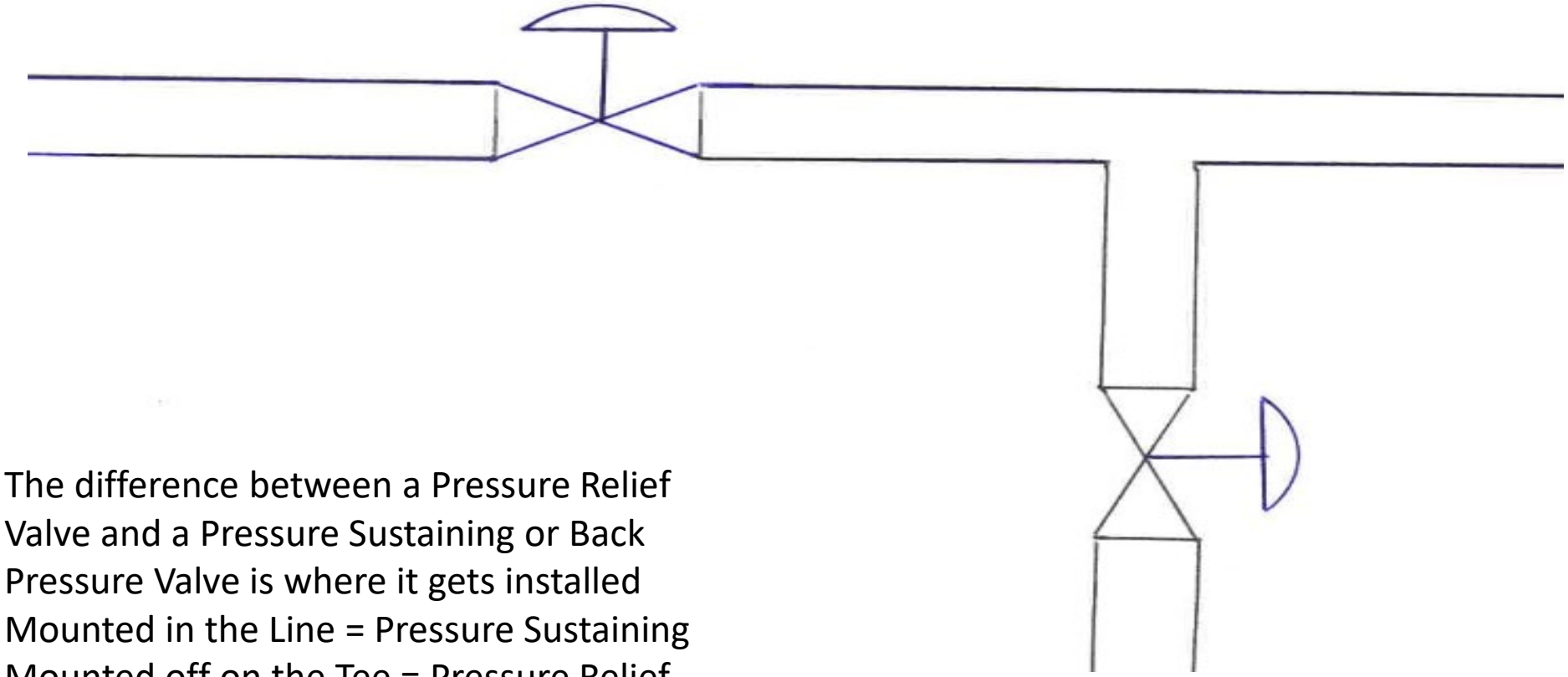


PRESSURE RELIEF CONTROL PILOT

- Normally closed pilot
- Opens on rise of upstream pressure
- Senses upstream pressure only through sensing chamber



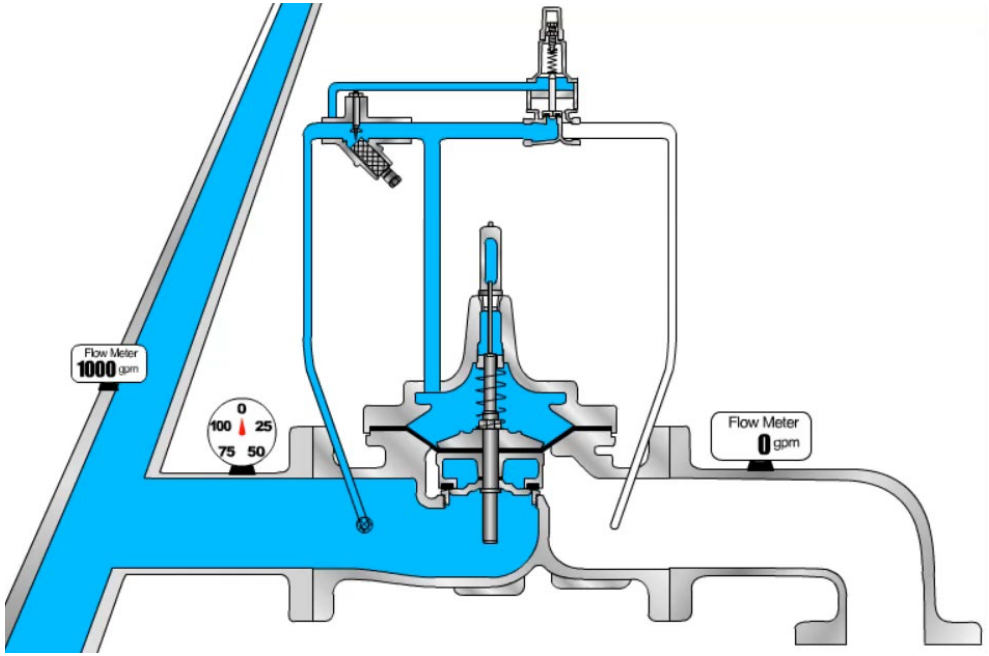
PRESSURE RELIEF OR PRESSURE SUSTAINING



The difference between a Pressure Relief Valve and a Pressure Sustaining or Back Pressure Valve is where it gets installed
Mounted in the Line = Pressure Sustaining
Mounted off on the Tee = Pressure Relief

PRESSURE RELIEF VALVE

PV20C Setting – 60 PSI



CONTROL VALVE MAINTENANCE

The Number One Question I get is:

- How often do I have to pull Maintenance?
  - There are three types of Maintenance
    - Emergency Maintenance
    - Scheduled Maintenance
    - Preventative Maintenance
  - Depends on the Quality of Water – How Aggressive is it?
    - High Hardness – High Pressure – High Velocity – High Chems
    - Generally…Every 3 to 7 Years for scheduled Maintenance

CONTROL VALVE MAINTENANCE

- What does Maintenance consist of?
  - Emergency Maintenance is performed as needed
    - Replace Tubing, Clean a Strainer, Bleed Air, Replace a Pilot, Replace a Diaphragm, etc…
  - Scheduled Maintenance is done every 3-7 years and consists of:
  - Thorough Cleaning of Valve & Pilot System and
  - Installing Rubber Goods Repair Kits in Valve & Pilots
  - Replacing Pilots, Tubing, & Fittings, & Appurtenances
  - Strainers, Ball Valves, Speed Controls, Restrictors, etc…
  - AND NOW…HERE IS A NEW TERM THAT YOU MAY OR MAY NOT KNOW…

PREVENTATIVE MAINTENANCE

PREVENTATIVE MAINTENANCE

- What is Preventative Maintenance
  - According to Webster's Dictionary: It is the stuff you do to your equipment so that it operates at it's optimum efficiency and does not fuck up as often (Clyde Webster's Dictionary – plumber in Cleveland)
  - What does Preventative Maintenance consist of
    - Once a Year, Twice a Year, Quarterly, Monthly you are going to want to show your Valve some Love…
      - Look for Leaks or Drips from any Cover or Body Plugs
      - Make sure Sight Glass isn't broken
      - Check all Pilot System connections for Leaks or Drips
      - BLEED THE AIR OUT OF THE COVER
      - BLEED THE AIR OUT OF THE PILOT SYSTEM

MORE ***PREVENTATIVE*** MAINTENANCE

- Can you make the Valve Open (Open Position Indicator slightly)
- Can you make the Valve Close (Close the Downstream Ball Valve)
- If there is a Pressure Regulator, can you raise and lower the Operating Pressure of the Valve by turning the Adjustment Screw on the Pilot
- Is there water leaking from the Weep Hole on the Pilot
  - Is there evidence of a prior leak
- Check and Clean the Pilot System Strainer
- Check the Pilot System Isolation Ball Valves
  - Loosen a fitting, then open and close each Ball Valve to see if you get Flow/No Flow
- Check and Flush the Speed Controls
- Check Electrical Connections – look for frayed wires or wire nuts that need replacing
- Are you getting the correct Energize / De-Energize signals
- Does any of the Tubing or Fittings need replacing – is Tubing crimped or bent
- Bleeding Air, Checking, Cleaning and Replacing any Tubing, Fittings, Pilots, and/or any Appurtenances will keep your Valve working at its' best and will last years longer!!

What The #*%@& Is This?

Never lose sight of this:

To close the valve:

Put water on cover

To open valve:

Take water off the cover

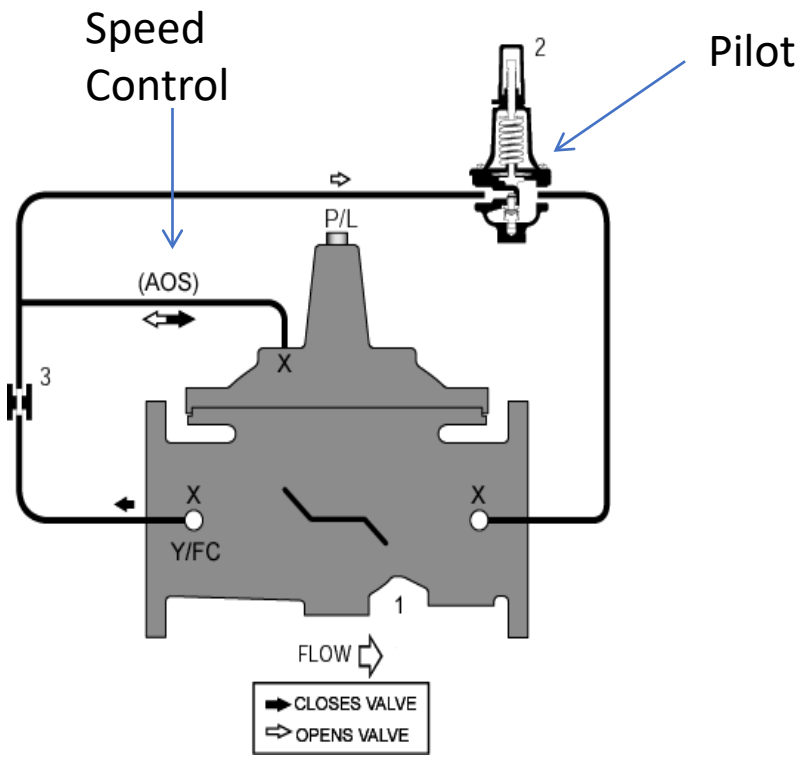
To Troubleshoot the Valve:

Start at Body Inlet and follow the tubing…

Do you have flow where you are supposed to?

TROUBLESHOOTING YOUR CONTROL VALVE

When you go to a Valve site to Troubleshoot a Valve…You should have the O & M Manual or at least a Schematic Diagram that you can use as a guide or reference.



Schematic Diagram for a Pressure Reducing Valve…

Includes:

1. Main Valve
2. Pilot Control
3. Restriction Fitting
X. Isolation Ball Valves
Y/FC. Pilot System Strainer

Options:

FC. Flo-Clean Strainer (1 1/4”-3”)
Y. Wye Strainer (4” & Larger)
AOS. Opening Speed Control
ACS. Closing Speed Control
P. Position Indicator
L. Limit Switch

KNOW WHAT YOU HAVE

A FEW THINGS TO KNOW PRIOR TO GOING OUT TO THE SITE:

- The Size and complete Model Number of the Valve
  - This will tell you what the function of the Valve is, what Pilots are on it, and what other appurtenances are on the Valve
- Materials of Construction – Ductile Iron / Stainless Steel / Brass
- Epoxy Coated?
- Stainless Steel Trim or Bronze Trim
- Standard Buna-N Rubber or Viton or EPDM
- Is the Valve Threaded or Flanged
  - Threaded Valves are rated to 400 PSI
  - What is the Flange Rating
    - Class 150 – rated to 250 PSI
    - Class 300 – rated to 400 PSI

TROUBLESHOOTING YOUR CONTROL VALVE

- **Valve Won't Open**
  - **Determine if problem is in Pilot System or inside Valve**
    Evacuate Cover Pressure - if valve comes open the problem is in the Pilot System – if not then it's inside the Main Valve and you are going to have to pull the cover BUT maybe it was air locked and Evacuating the Cover fixed it
- **Valve Won't Close**
  - **Determine if problem is in Pilot System or inside Valve**
    Close the Downstream Ball Valve - if valve closes the problem is in the Pilot System – if not then it's inside the Main Valve and you are going to have to pull the cover

TROUBLESHOOTING YOUR CONTROL VALVE

Problem is in the Pilot System

- **Valve Won't Open**

  Fixed Orifice Missing or Wallowed Out

  Clogged or Damaged Pilot not allowing water off Cover

  Downstream Crimped or Clogged Tubing

- **Valve Won't Close**

  Fixed Orifice is Clogged Up…Probably Pipe Dope!

  Damaged or Clogged Pilot not Closing or Switching

  Upstream Crimped or Clogged Tubing

  Closed or Clogged Strainer or Ball Valve

TROUBLESHOOTING YOUR CONTROL VALVE

- **Problem is inside the Main Valve:**
- **Valve Won't Open – very rare…Pull Cover & Check:**
  - Stem Assembly
    - Is it so Tuburculated that it is stuck to the sides of the Valve?
    - Is there Debris stuck in cover Bearing that Stem can't move?
    - Is there Scaling on Stem that has it stuck in Lower Bearing?
- **Valve Won't Close – not so rare…Pull Cover & Check For:**
  - Stem Assembly – Same as above and then
  - Debris under the seat not allowing the Stem to move
    - Rocks, Wood, Bicycle Seats, Body Parts…
  - Hole in Diaphragm

TROUBLESHOOTING YOUR CONTROL VALVE

Valve is chattering

Bleed Air off Cover – This should stop the Chattering

I can make the Valve Open & Close but it won't Regulate

Check for Clogs:

Opening Spd Control, DS Ball Valve, Pilot Port

Check for Crimped Tubing & Check the Fixed Orifice

Check the Weep Hole on the Pilot

If you determine that the problem is in the Pilot Valve

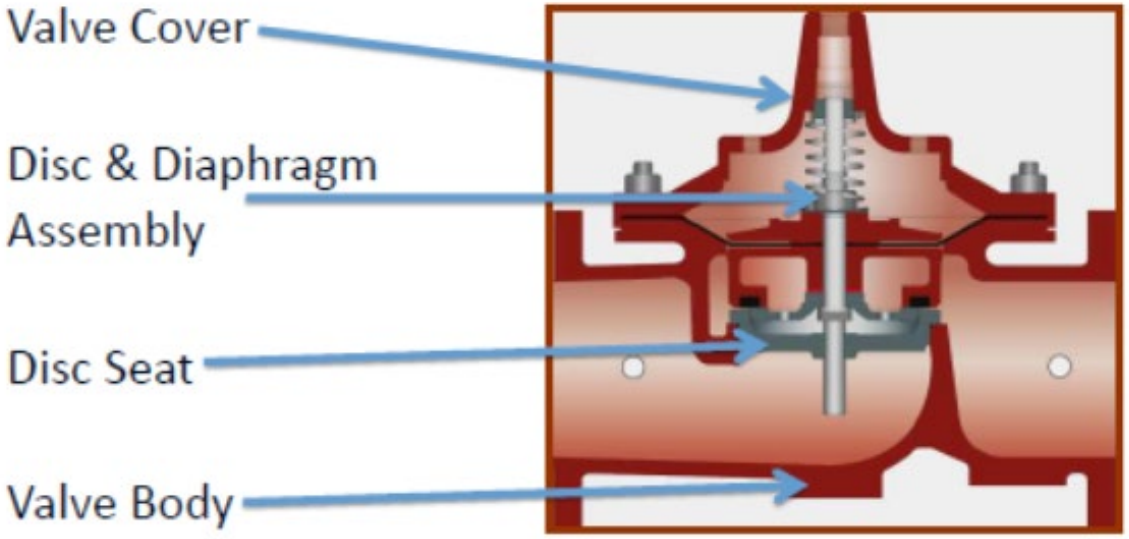
Install Rubber Goods Repair Kit in Pilot Valve

Replace Pilot Valve

DEBRIS UNDER THE SEAT

QUESTIONS / RECAP

- We know What an Automatic Control Valve is
- We know How an Automatic Control Valve Works
- We know Why an Automatic Control Valve Works
- We know What Parts make up the Main Valve
- We know What the Function of the Parts are
- We know What the Parts are Made of
- We know How to Inspect these Parts
- We know How to Troubleshoot a Valve that won't open
- We know How to Troubleshoot a Valve that won't close



AUTOMATIC CONTROL VALVE MAINTENANCE

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WATTS / AMES AUTOMATIC CONTROL VALVES

AMES FIRE & WATERWORKS

REPCOR

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