TRIANGLE
WATERQUIP

Hydraulic Control Valve

Manual & Assembly Diagrams

Cometal is a Spanish manufacturer of irrigation hardware products that was established in the mid 1970's. The initial products made were sprinklers, but as demand for automation and better control systems increased, hydraulic control valves were added to the product range. It is now the largest producer of control valves in Spain.

Initially sold in the irrigation market, it was quickly recognised that the control valves lent themselves for use in other market sectors such as industrial, mining, municipal, fire services, etc.

Cometal utilises the latest in house CAD/CAM technology and equipment to ensure that accuracy and quality of the products is consistently maintained throughout all stages of the manufacturing processes. All finished products are checked and tested during and after final assembly.

Features and Advantages:

- ✓ **All products are designed and manufactured in house by Cometal using the latest CAD/CAM technology.**
- ✓ **Quality Assurance certification to ISO 9001.**
- ✓ **Low head/friction loss design.**
- ✓ **All internal components can be serviced without valve removal.**
- ✓ **Corrosion resistant epoxy polyester coating.**
- ✓ **All head loss graphs are independently tested to ISO 9644-94.**
- ✓ **All valves are hydrostatically pressure tested to ISO 9635-90.**
- ✓ **All pilots comply and are independently tested to ISO 10522-93.**

This manual is designed as a guide for the most popular valve functions and configurations, and as a reference for the correct connection of ancillary items such as Control Pilots, 3-Way taps, and Solenoids to achieve the operation required. There are numerous other configurations and combinations available that have not been included in this manual. These are available on request.

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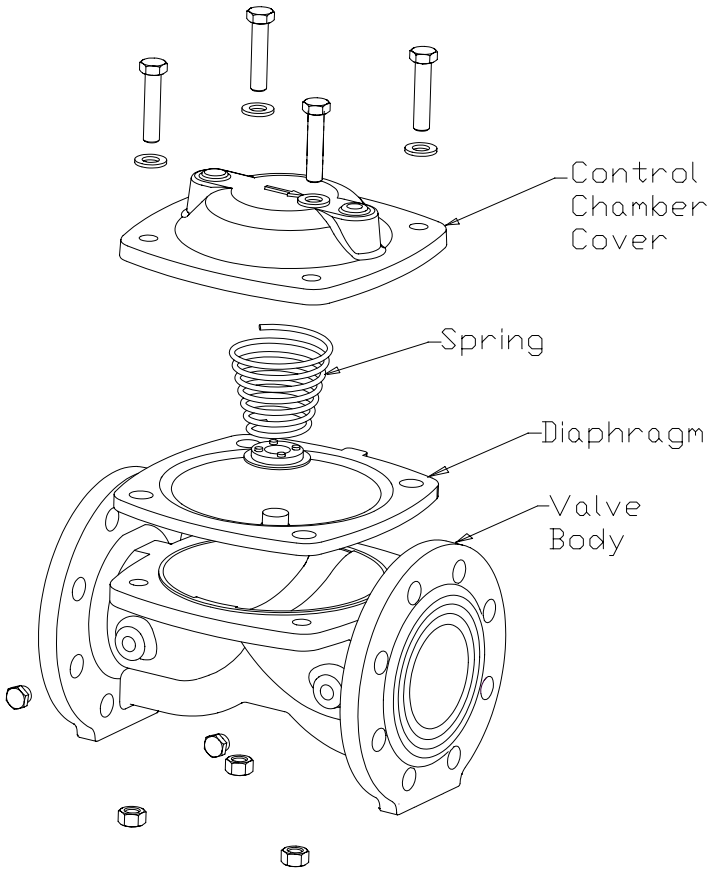
* Other configurations available on request.

A. Basic Hydraulic Control Valve Components

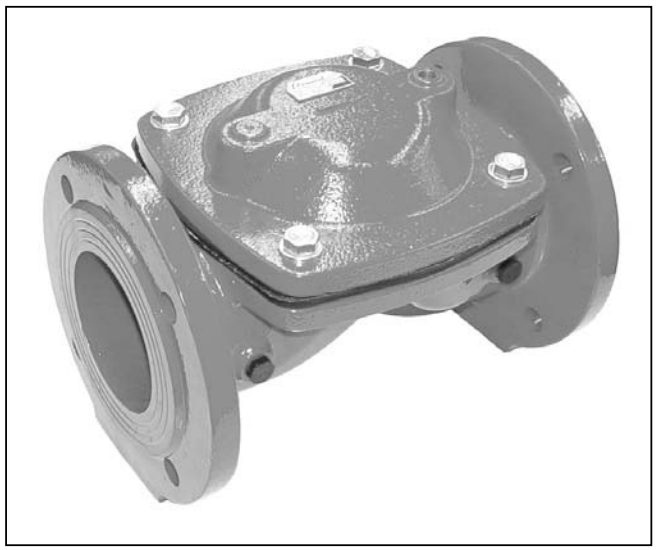
Cometal Hydraulic Control Valves consist of four (4) main components. The Valve Body, Diaphragm, Spring, and the Control Chamber Cover. The Diaphragm is the flexible moving element in the valve and is made of canvas reinforcing rubber.

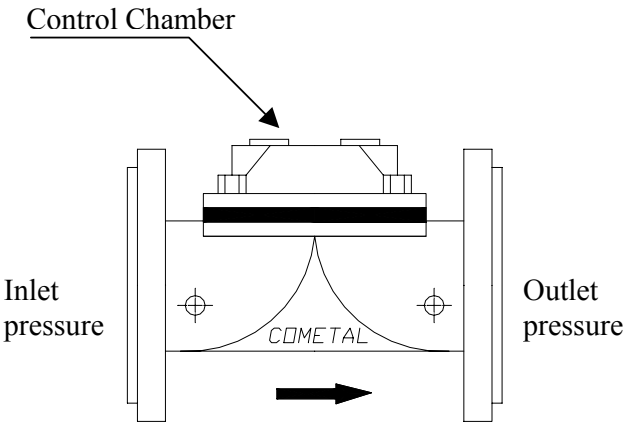
The valve can be Opened, Closed and Regulated by filling, removing or holding water in the Control Chamber, which in turn controls the position of the Diaphragm.



With the addition of a 3-Way tap the valve can be controlled manually, with a solenoid valve it can be controlled electrically. With the addition of a Control Pilot the Hydraulic Valve can be regulated to control the pressure **before,** or **after** the valve. (Pressure Sustaining, or Pressure Reducing). It can also be configured as a Quick Acting Pressure Relief Valve, or Float Level Control.

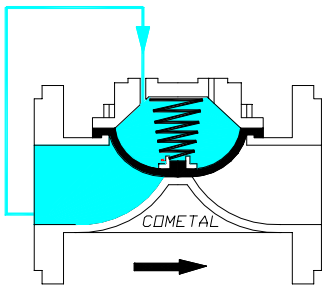
B. HydraulicValve Operation





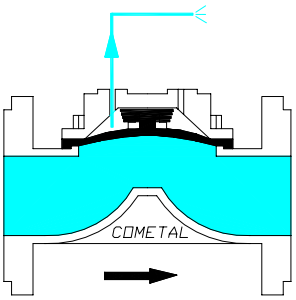
Function Diagram:

1



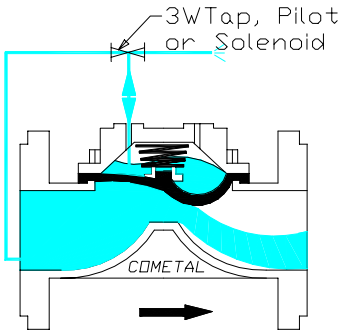
When the Control Chamber (on top of the valve) is full and pressurised the valve is fully closed.

2



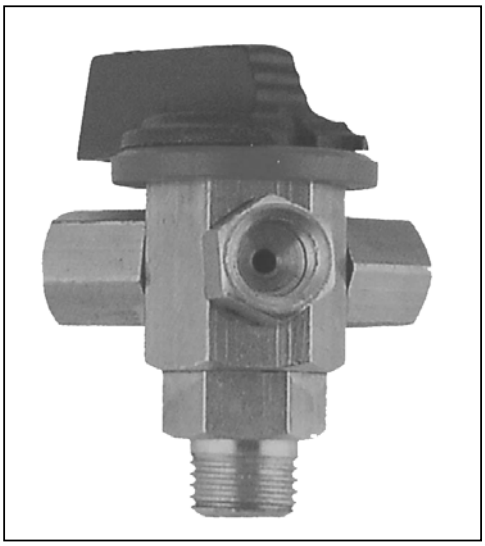
When the Control Chamber is empty the valve is fully open

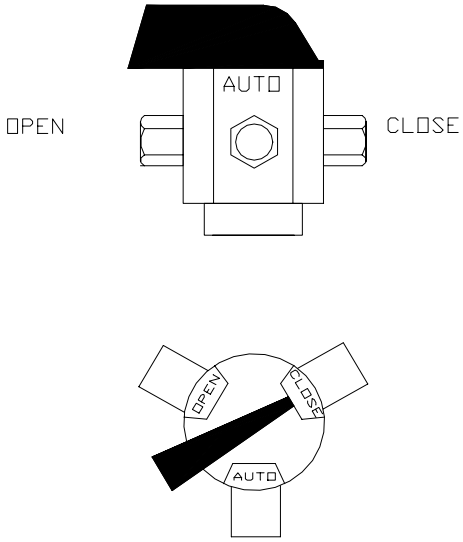
3



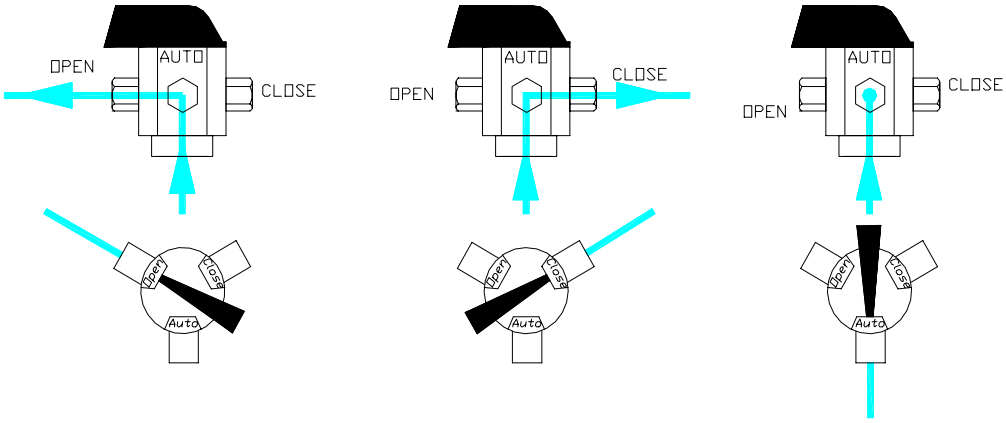
When the Control Chamber is partially full, the valve is also partially open and restricting/throttling the water flow. This can be to ***Reduce*** the pressure after the valve, or ***Sustain*** the pressure before the valve.

C. 3-Way Manual Taps





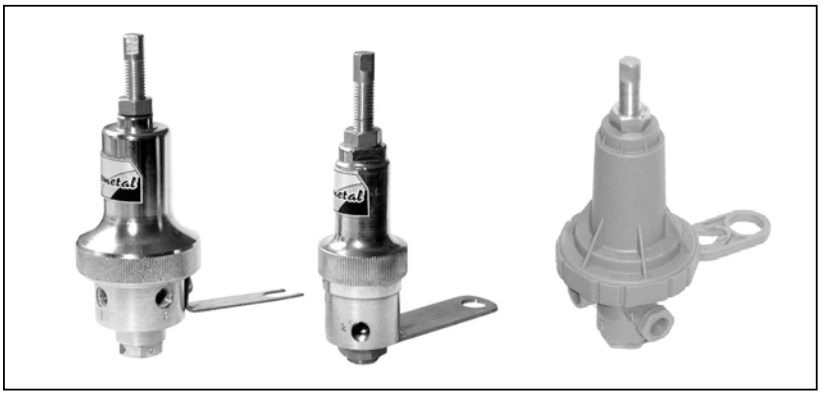
Function Diagram

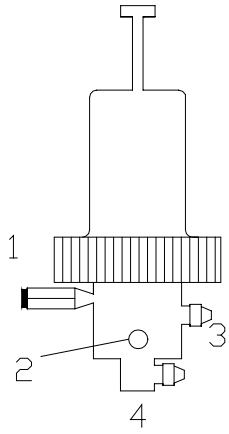


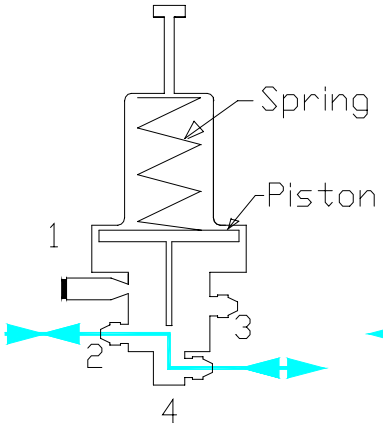
3-Way manual taps are fitted onto hydraulic control valves or control bars so that the valve can be manually operated. Ports for OPEN, CLOSE, or AUTO operating mode can be selected by simply rotating the selector to the lateral port required.

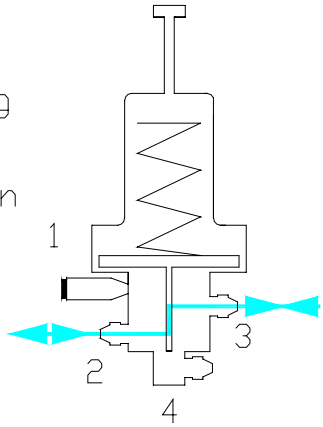
D. Control Pilots

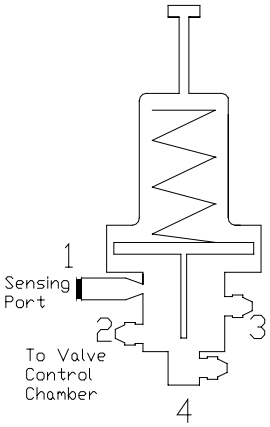
Pressure Reducing, Pressure Sustaining & Quick Relief Pilots











a) When the Piston is in the up position due to the pressure at Port 1 overcoming the spring, Ports 2 & 4 are connected.

For *Pressure Reducing* this fills the control chamber, for *Pressure Sustaining* this drains the control chamber.

b) When the piston is at the bottom, due to the spring overcoming the pressure at Port 1, Ports 2 & 3 are connected.

For *Pressure Reducing* this drains the control chamber, for *Pressure Sustaining* this fills the control chamber.

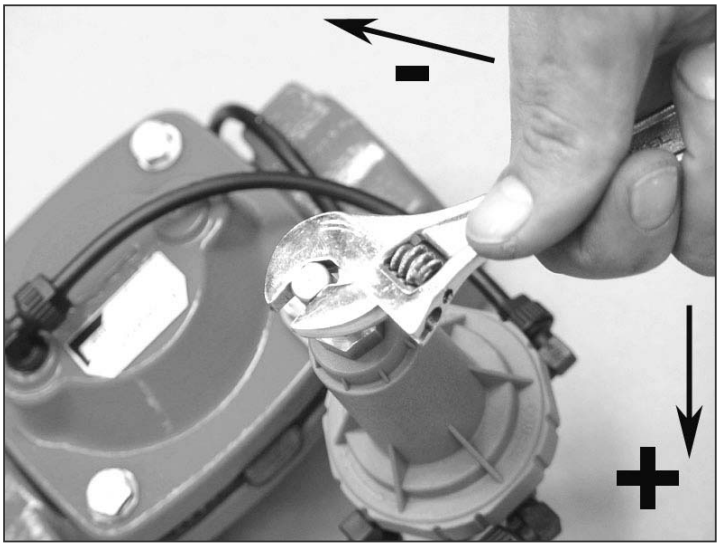
c) As the equilibrium position is reached, water does not flow through the Pilot.

Note:
Port 1: Is the pressure sensing port, and is connected to the outlet for *Reducing*, or the inlet for *Sustaining* configurations of the valve.
Port 2: Is connected to the Control Chamber of the valve, for all configurations.
Port 3: Is connected to either drain (*Reducing*), or the valve inlet pressure (*Sustaining*).
Port 4: Is connected to either the valve inlet pressure (*Reducing*), or to drain (*Sustaining*).

E. Control Pilot Adjustment & Setting

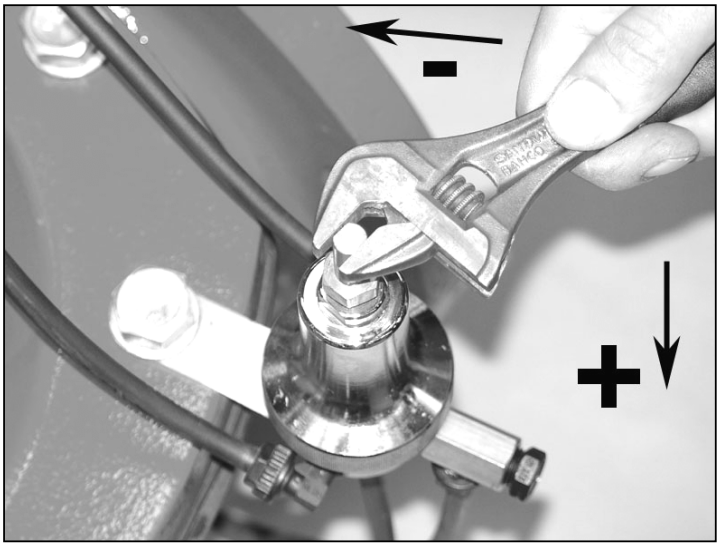
All Control Pilots are adjusted by undoing the lock nut, then turning the bolt mounted on top of the pilot. When the Pilot is set, re-tighten the lock nut.

a) Pressure Reducing



To reduce the pressure on the discharge side of the valve turn the adjusting bolt ANTI-CLOCKWISE (-). To increase the pressure on the valve discharge turn the adjusting bolt CLOCKWISE (+).

b) Pressure Sustaining



To increase the pressure on the inlet side of the valve turn the adjusting bolt CLOCKWISE (+). To reduce the pressure on the valve inlet turn the adjusting bolt ANTI-CLOCKWISE (-).

c) Quick Relief

To increase the relief set-point turn the bolt CLOCKWISE (+). To reduce the relief set-point turn the bolt ANTI-CLOCKWISE (-).

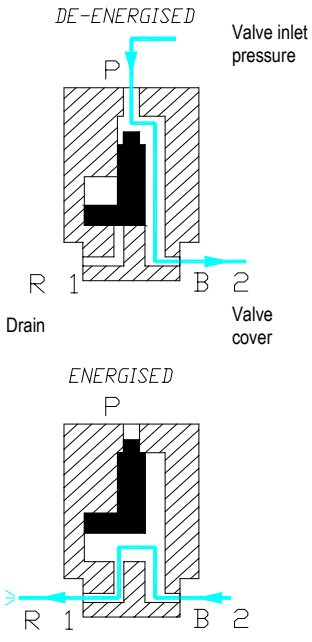
F. 3-Way Solenoid Valves

Solenoid Valves are fitted to hydraulic control valves where electric/automatic control of the valve is required. The solenoid can be configured so that the hydraulic valve is either normally closed (N.C.) or normally open (N.O.) when the coil is de-energised. Triangle uses a variety of solenoid valves to suit the hydaulic valve and application required.

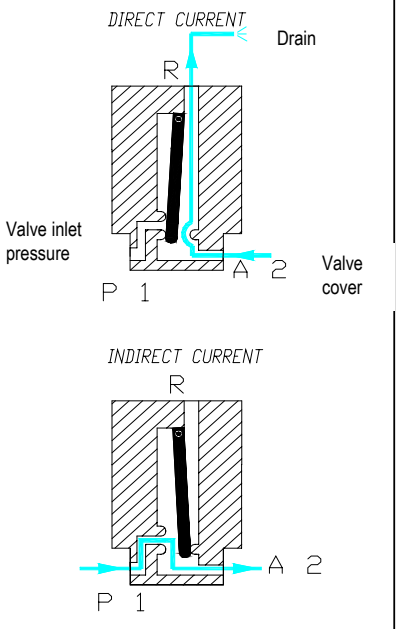
Function Logic Diagrams:

Normally Opened Solenoid

(For Normally Closed Hydraulic Valve)

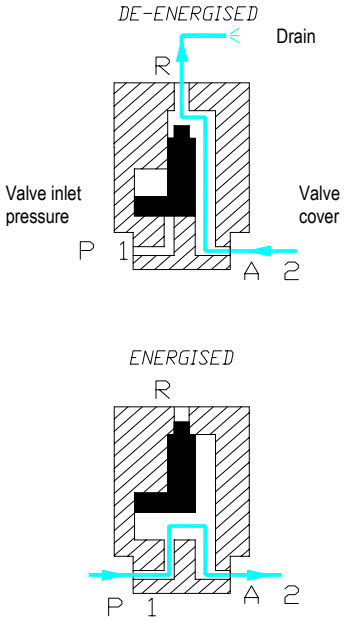


Latching DC Solenoid

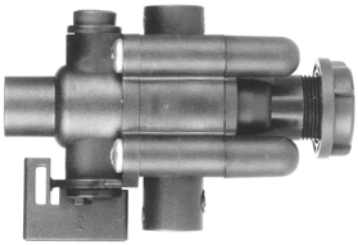


Normally Closed Solenoid

(For Normally Open Hydraulic Valve)



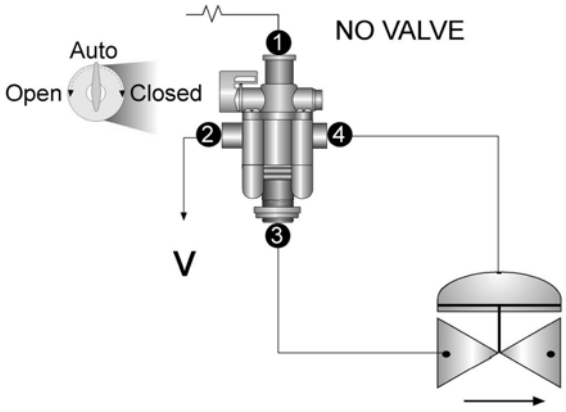
G. Hydraulic Relays

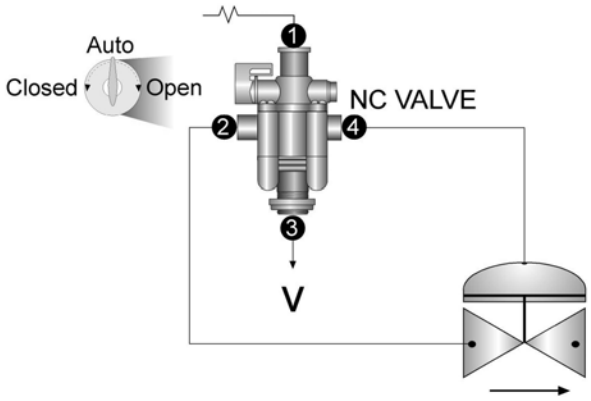


Hydraulic Relay valves are used for remote hydraulic control (On/Off) of a hydraulic control valve, or where the control signal is a long distance away from the valve, and/or very weak. The remote signal allows the pressure at the valve to open and close the hydraulic valve. The relay can be configured for N.O. or N.C. function.

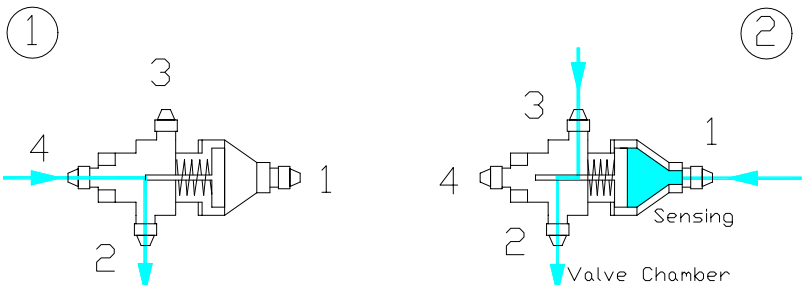
Function Logic Diagram:

Galit



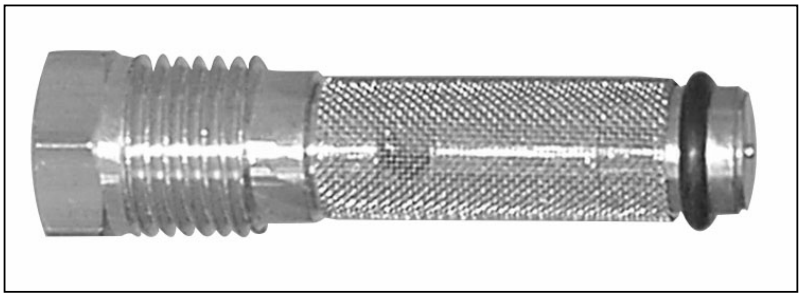


VAR



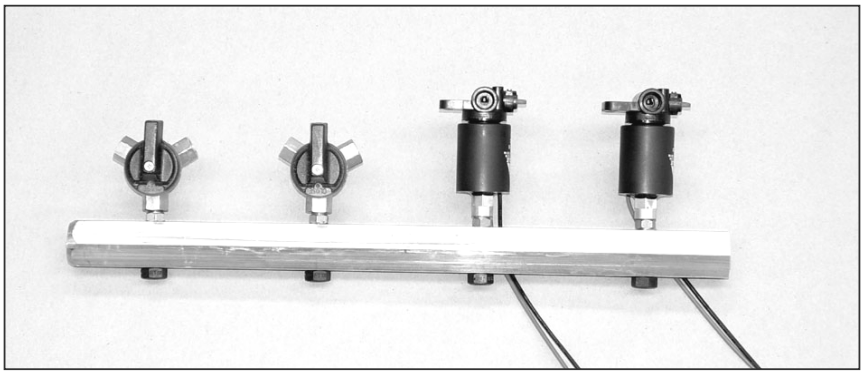
H. Finger Filter

Finger Filters are used to protect Control Pilots and Solenoid valves fitted to the Hydraulic Valve, from fouling with solids and debris. The Finger Filter is fitted into the 1/4" connection on the inlet side of the valve. The connection inside the Finger Filter is 1/8". The mesh is self cleaning.



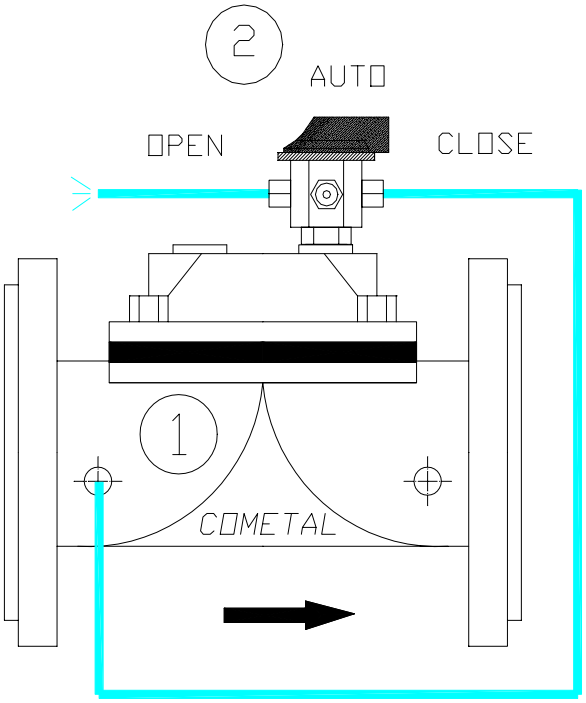
I. Control Bar

Control Bars are used for hydraulic systems where all the field valves are controlled from one central point (eg. Pump station). The valves are opened and closed manually using 3-Way taps, or automatically using solenoid valves. Polyethylene control tube connects each valve to the 3-Way tap or solenoid mounted on the control bar.



1. Hydraulic Valve with Manual Control

Connection Diagram

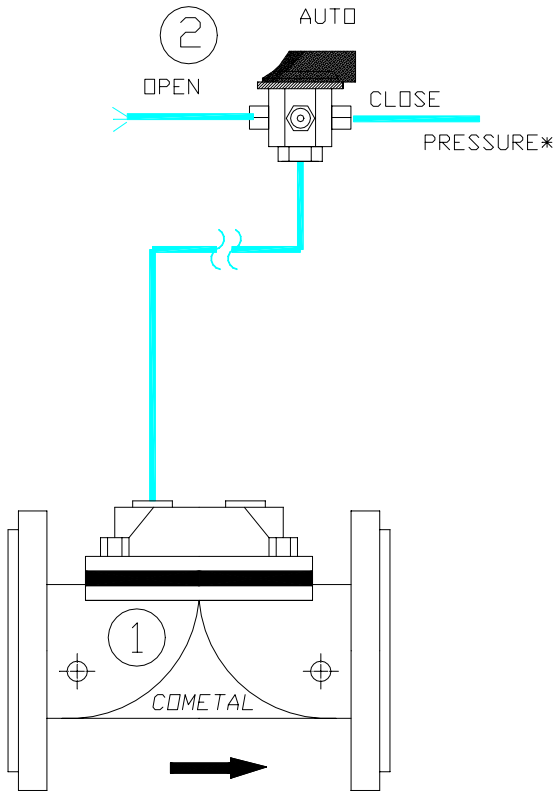


Main Components:

1. Basic hydraulic valve
2. 3-Way tap

2. Remote Hydraulic Manual Valve

Connection Diagram



* Pressure can be supplied from a control bar at the pump station.

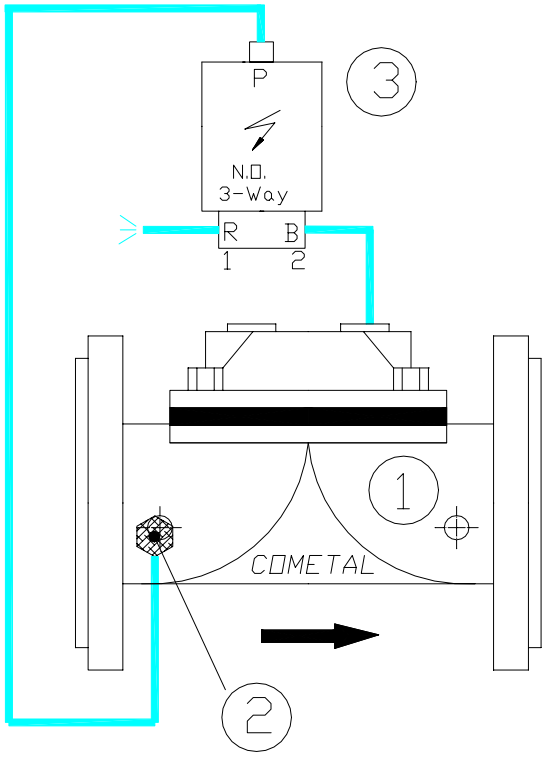
Main Components:

1. Basic hydraulic valve
2. 3-Way tap

3. Electric Normally Closed Valve (N.C.)

The valve is closed when the solenoid is de-energised.

Connection Diagram



Main Components:

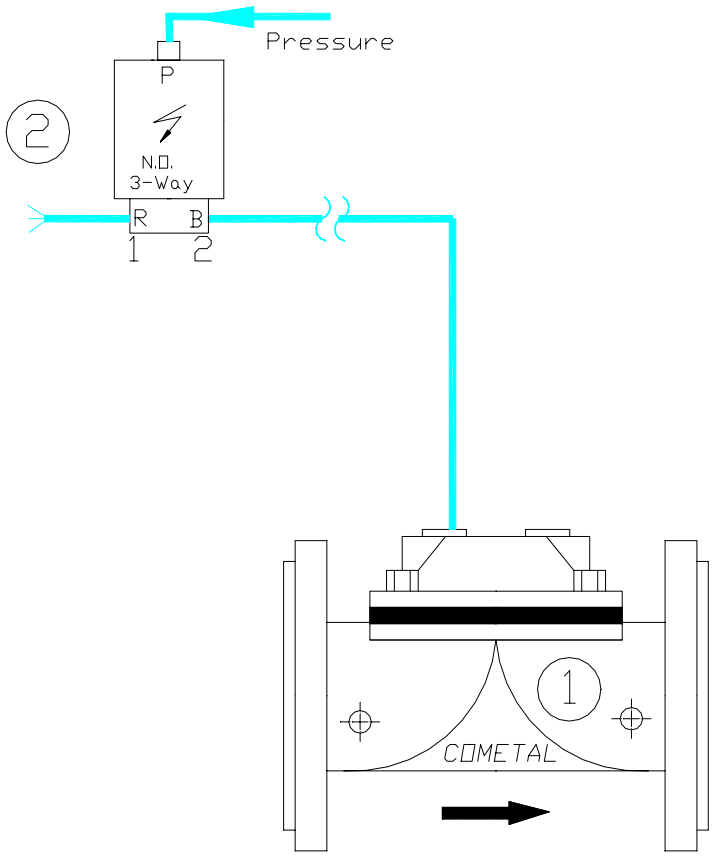
1. Basic hydraulic valve
2. Finger Filter
3. 3-way N.O. solenoid (Mounted on control chamber)

*Note: Solenoid valve connections, 1 & 2 = Plastic valve
P, A & R = Brass valve

4. Remote Electric N.C. Valve

The valve is closed when the solenoid is de-energised.

Connection Diagram



* Pressure supplied from control bar.

Main Components:

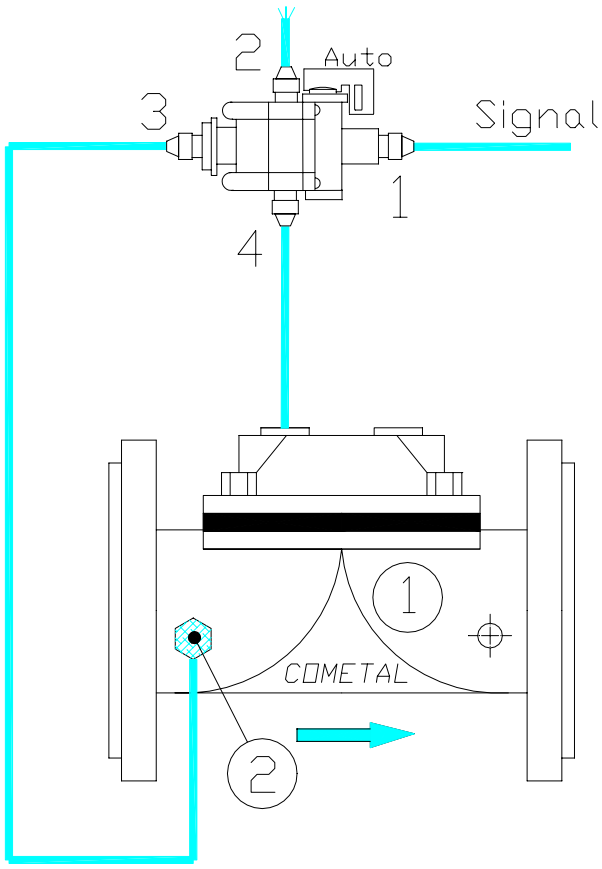
1. Basic hydraulic valve
2. 3-Way N.O. solenoid (Mounted on control chamber)

* Note: Solenoid Valve connections, 1 & 2 = Plastic valve
P, A & R = Brass valve

5. Remote Hydraulic Relay, On/Off Signal, Normally Open (N.O.)

The valve is open when the signal pressure = zero.

Connection Diagram



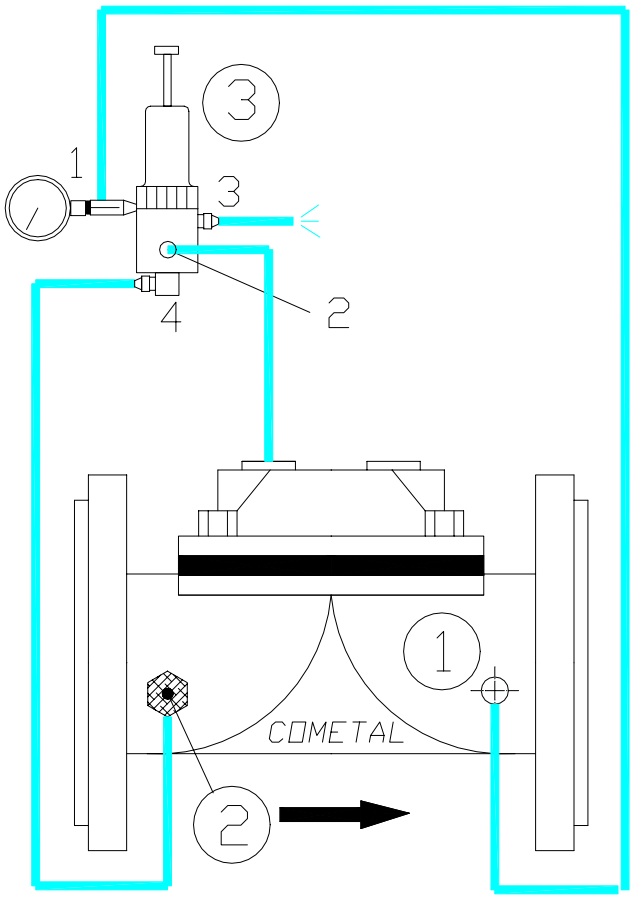
* Signal pressure is from a remote solenoid or 3-Way tap at control bar.

Main Components:

1. Basic hydraulic valve
2. Finger filter
3. Galit hydraulic relay (Mounted on control chamber)

6. Pressure Reducing Valve (PRV)

Connection Diagram:



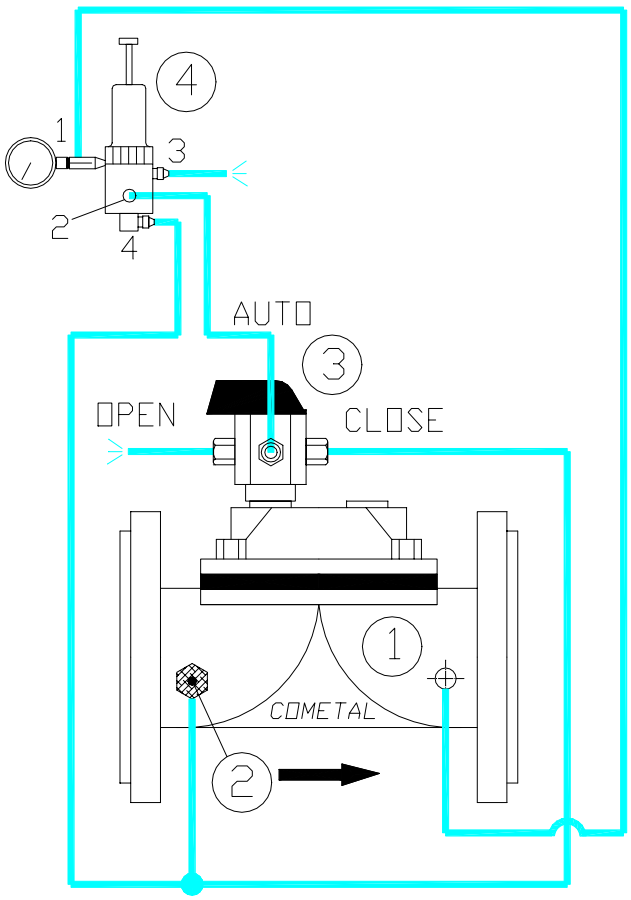
Main Components:

1. Basic hydraulic valve
2. Finger filter
3. Pilot - Pressure Reducing / Sustaining

* Gauge is an optional extra.

7. Pressure Reducing Valve (PRV), with Manual Control

Connection Diagram



Main Components:

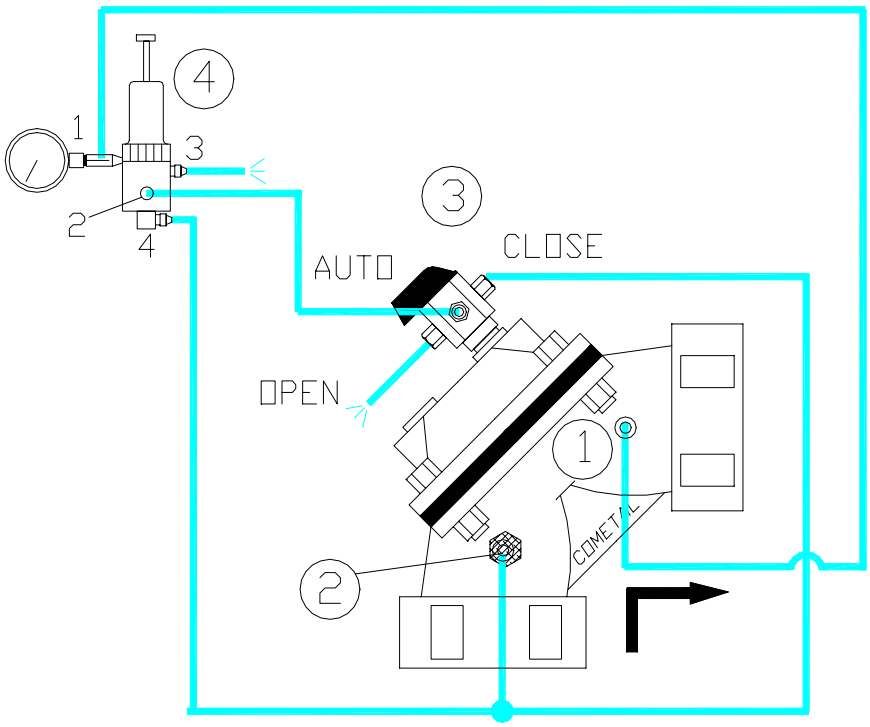
1. Basic hydraulic valve
2. Finger filter
3. 3-Way tap
4. Pilot - Pressure Reducing / Sustaining

* Gauge is an optional extra.

8. Pressure Reducing Angle Valve with Manual Control.

The pressure after the valve is reduced to the pilot set point.

Connection Diagram



Main Components:

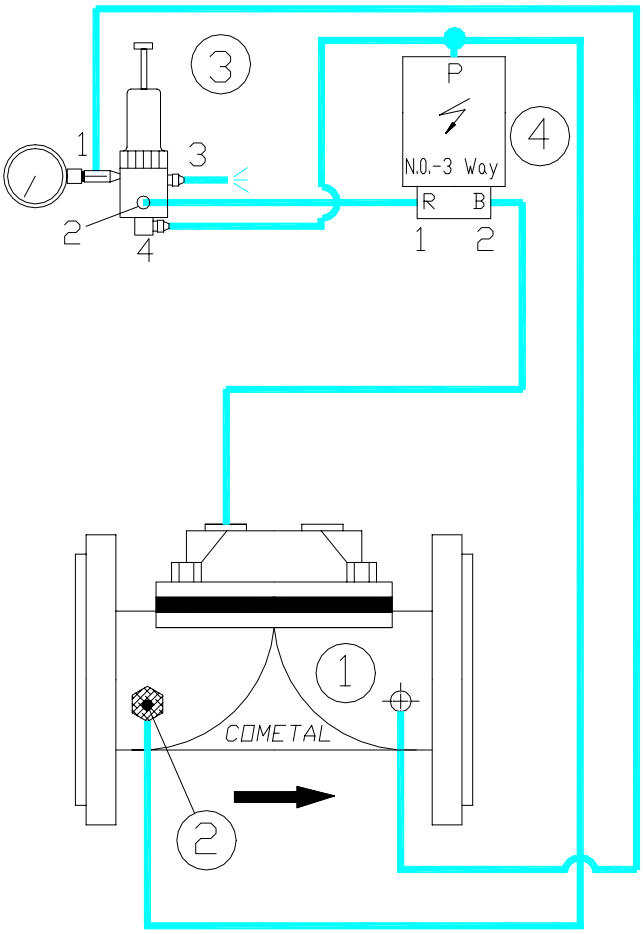
1. Hydraulic basic 90° angle valve
2. Finger filter
3. 3-Way tap
4. Pilot - Pressure Reducing / Sustaining

* Gauge is an optional extra

9. Electric N.C. Pressure Reducing Valve

The valve is closed when the solenoid is de-energised

Connection Diagram



Main Components:

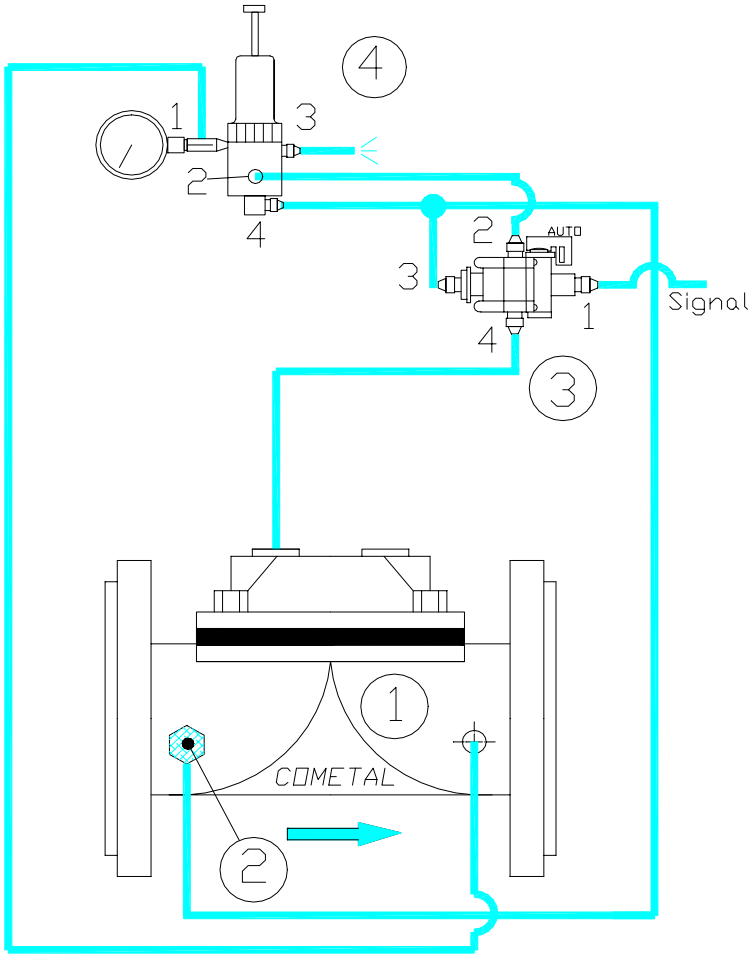
1. Basic hydraulic valve
2. Finger filter
3. Pilot Pressure Reducing / Sustaining
4. 3-Way N.O. solenoid (Mounted on control chamber)
   (Connections: 1 & 2 = Plastic valve, P, B & R = Brass valve)

* Gauge is an optional extra

10. Pressure Reducing Valve with N.O. Remote Hydraulic On/Off Signal

The valve is open when the signal pressure = zero.

Connection Diagram



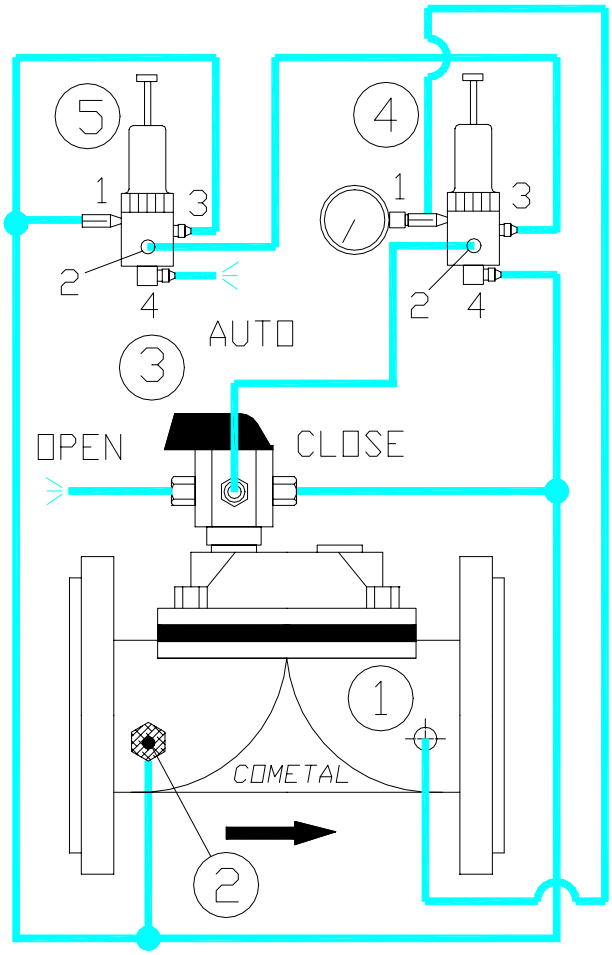
Main Components:

1. Basic hydraulic valve
2. Finger filter
3. Galit hydraulic relay (Mounted on control chamber)
4. Pilot - Pressure Reducing / Sustaining

* Gauge is optional extra

11. Pressure Reducing / Pressure Sustaining Valve, with Manual Control (PRV/PSV)

Connection Diagram



Main components:

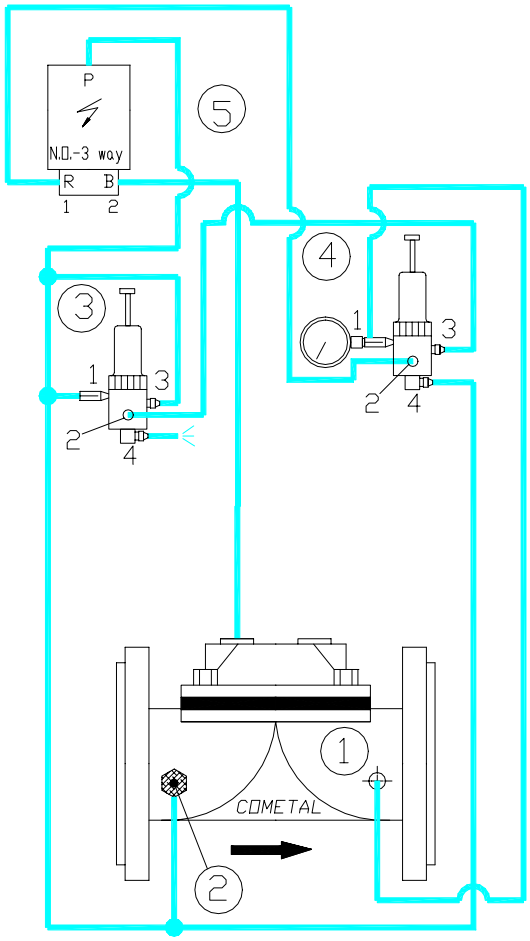
1. Basic hydraulic valve
2. Finger filter
3. 3-Way tap
4. Pilot - Pressure Reducing
5. Pilot - Pressure Sustaining

* Gauge is optional extra

12. Electric N.C. Pressure Reducing/Sustaining Valve

The valve is closed when the solenoid is de-energized.

Connection Diagram



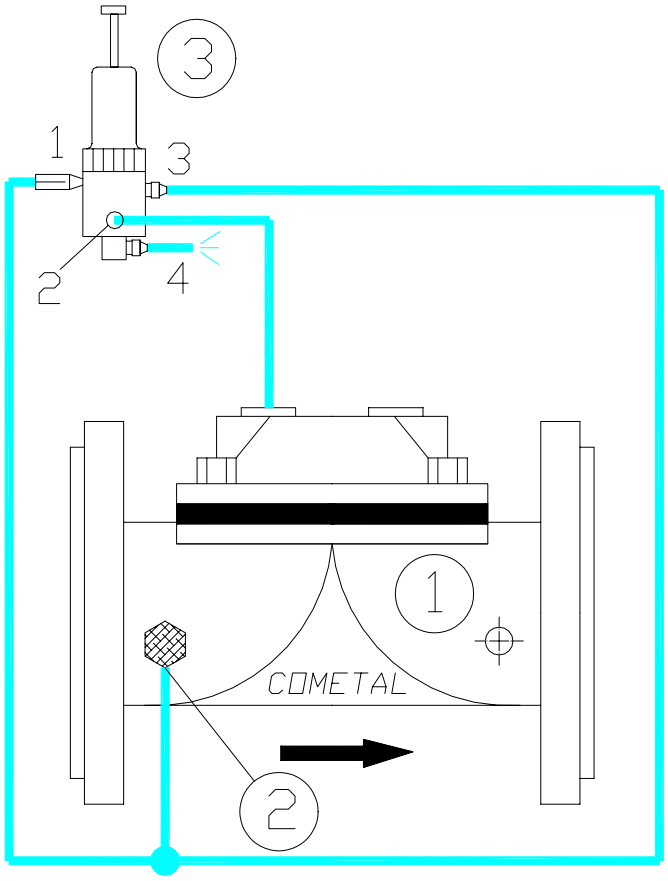
Main Components:

1. Basic hydraulic valve
2. Finger filter
3. Pilot - Pressure Sustaining
4. Pilot - Pressure Reducing
5. Solenoid valve, 3-Way N.O. (Mounted on control chamber)
   (Connections:1 & 2 = Plastic valve, R, B & P = Brass valve)

* Gauge is optional extra

13. Pressure Sustaining Valve / Quick Relief (PSV)

Connection Diagram

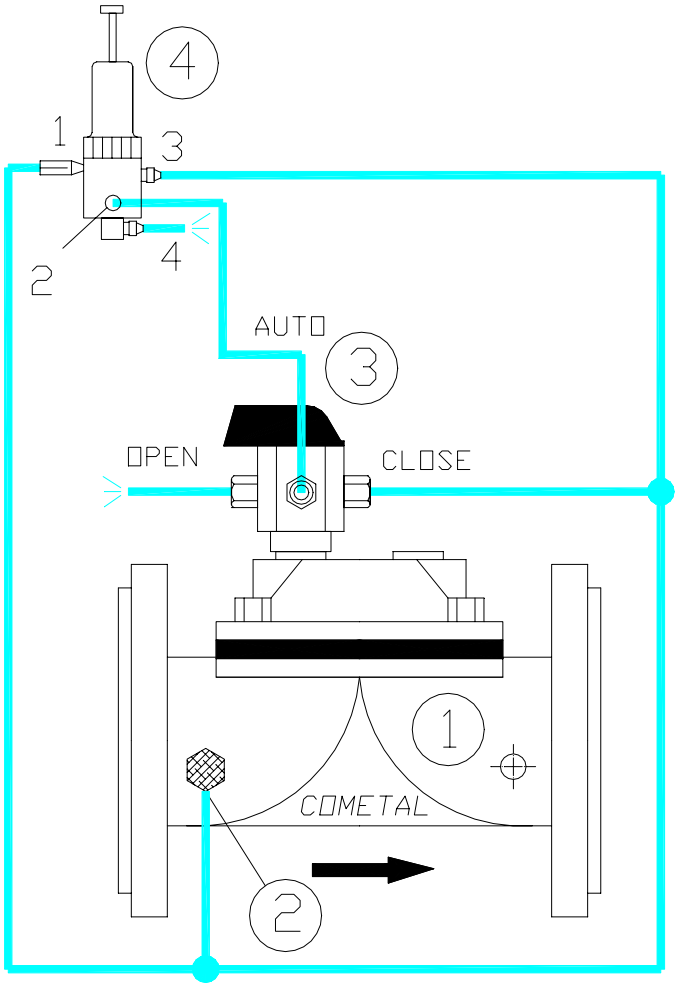


Main Components:

1. Basic hydraulic valve
2. Finger filter
3. Pilot - Pressure Sustaining / Reducing

14. Pressure Sustaining Valve with Manual Control

Connection Diagram



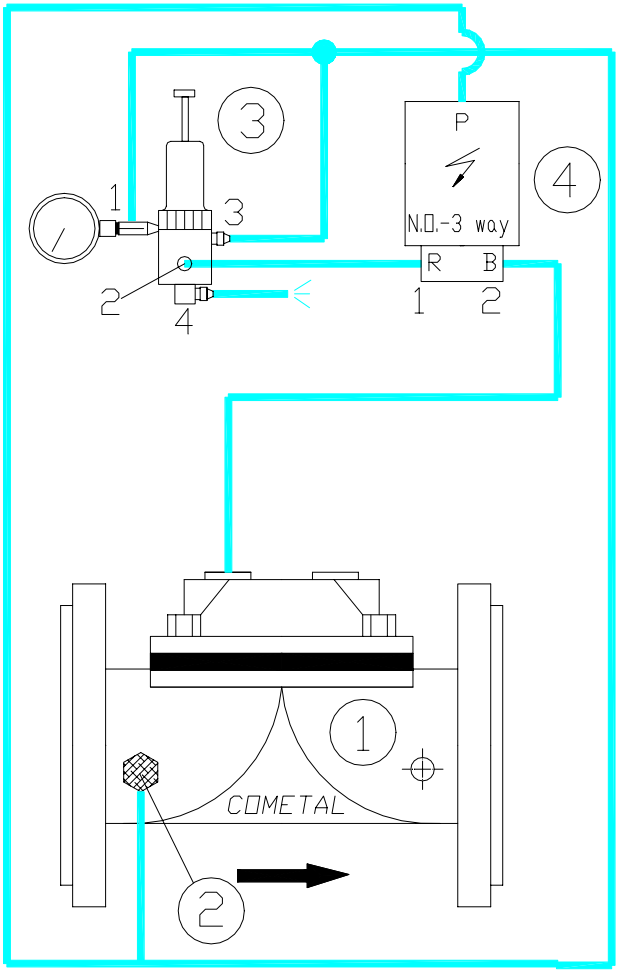
Main Components:

1. Basic hydraulic valve
2. Finger filter
3. 3-Way tap
4. Pilot - Pressure Reducing / Sustaining

15. Electric N.C. Pressure Sustaining Valve

The valve is closed when the solenoid is de-energised.

Connection Diagram



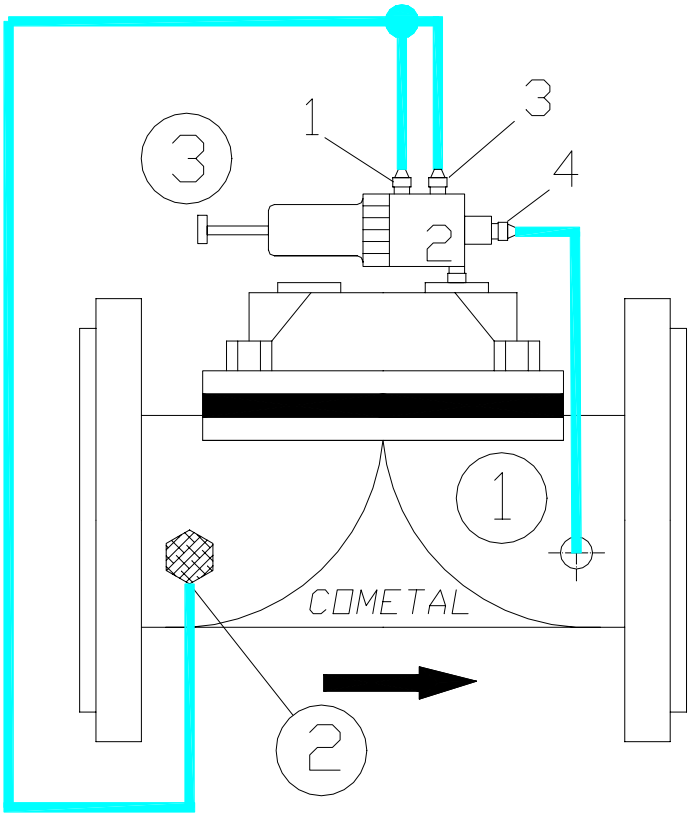
Main Components:

1. Basic hydraulic valve
2. Finger filter
3. Pilot - Pressure Reducing / Sustaining
4. Solenoid Valve, 3-Way N.O. (Mounted on control chamber)
   (Connections: 1 & 2 = Plastic valve, R & B = Brass valve)
   * Gauge is optional extra

16. Quick Relief Valve. (QRV)

Valve opens when the inlet pressure rises above the pilot set pressure.

Connection Diagram

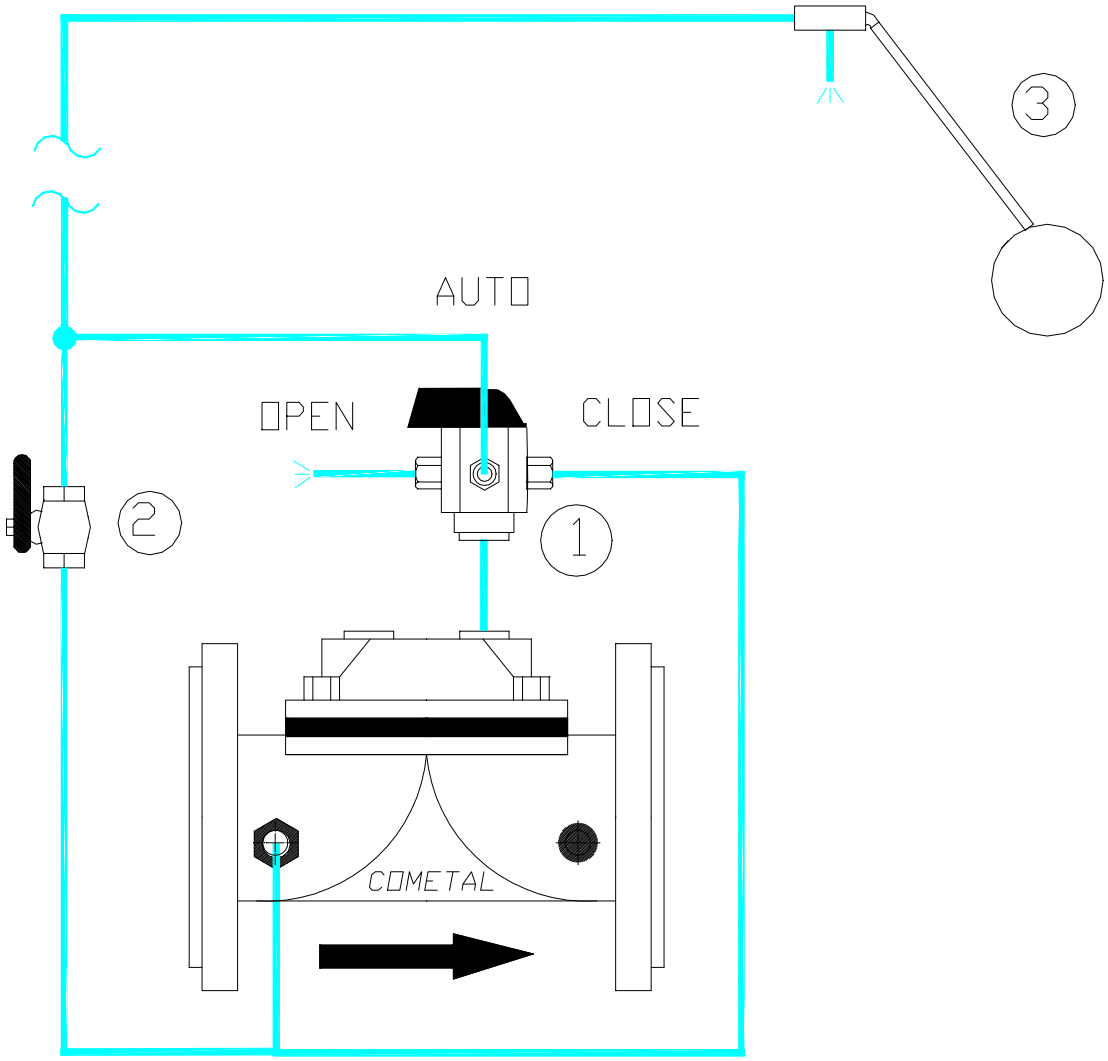


Main Components:

1. Basic Hydraulic Valve
2. Finger Filter
3. Pilot – Pressure Reducing / Pressure Sustaining

17. Tank Level Control Valve

Connection Diagram



Main Components:

1. 3-Way tap
2. Needle valve
3. Float cock