



PART 2

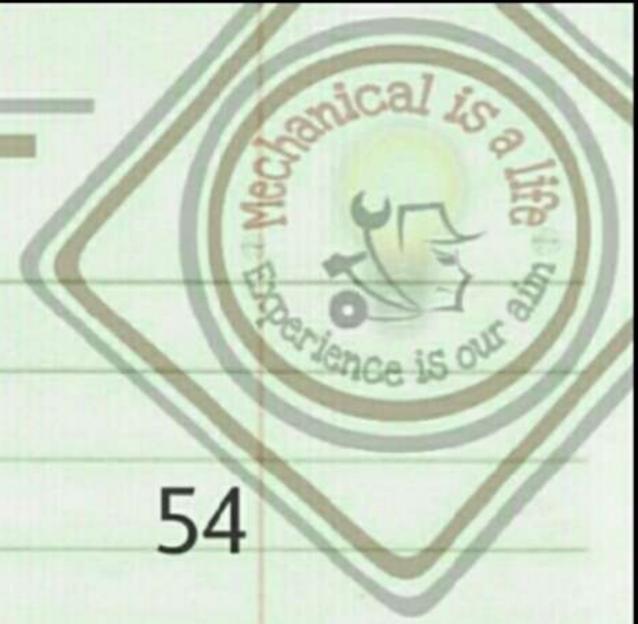
By Eng. /

Eng. Ramy Ghoraba

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PART 2 Contents

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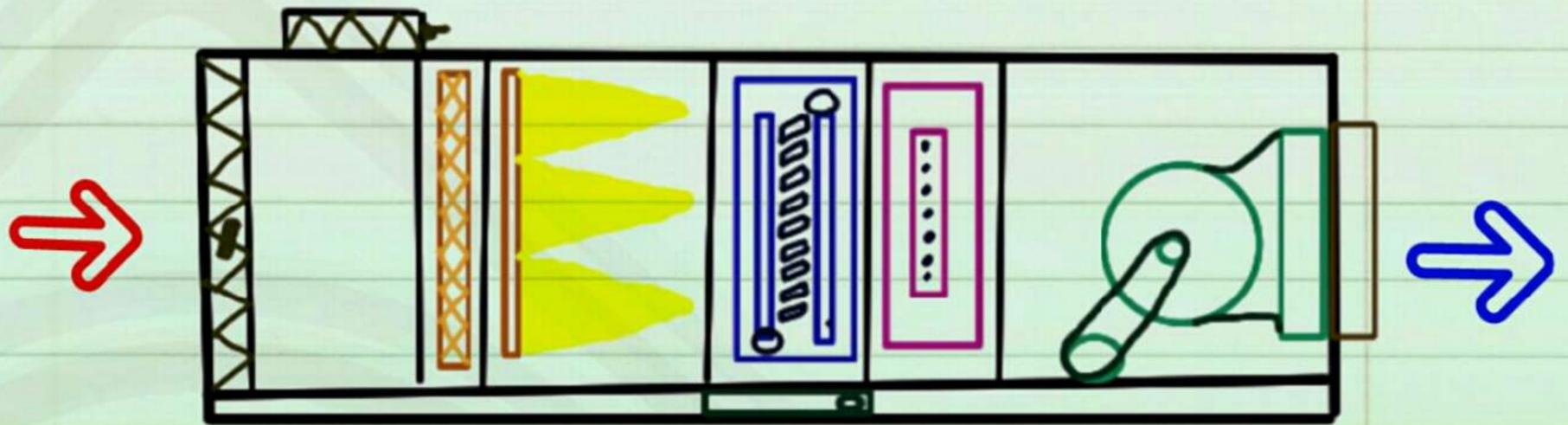




①

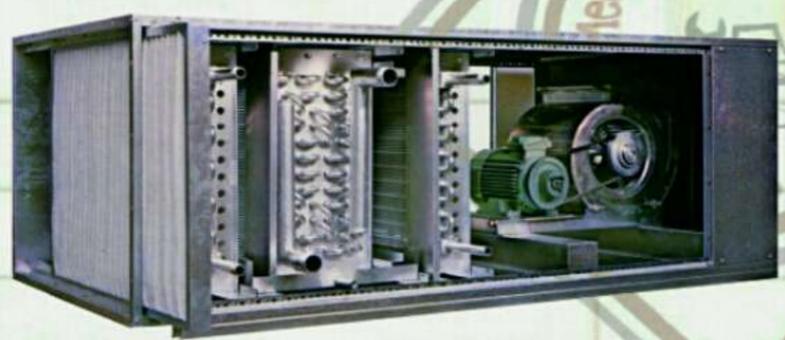
Air Handling Unit

AHU

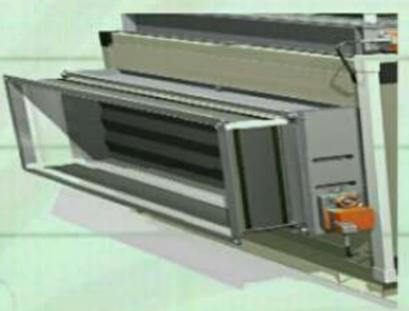




Air Handling Unit AHU



① Return Air open with V.D



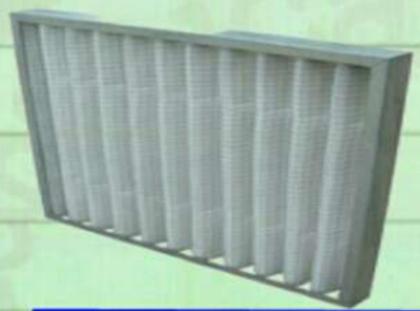
② Mixing Box



③ Fresh Air Open



④ Pre Filter



⑤ Bag Filter



⑥ Cooling Coil



⑦ Electric heater



⑧ Supply Fan



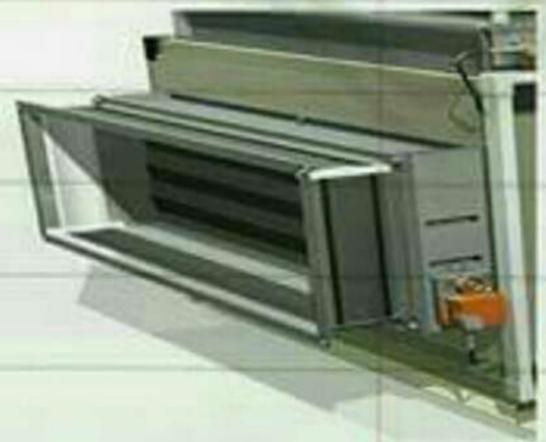
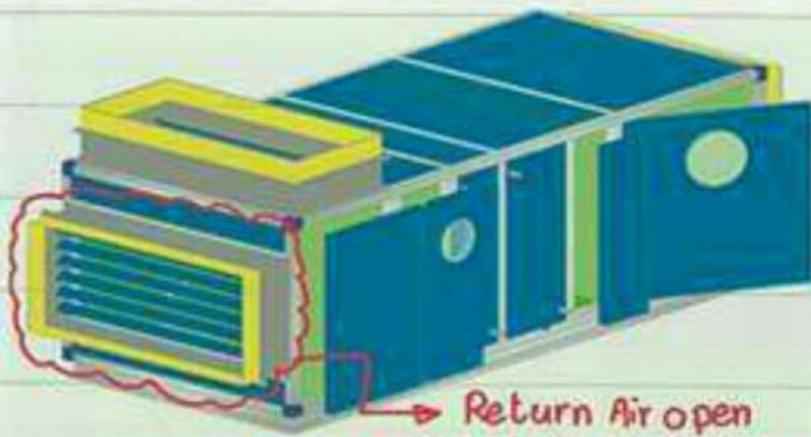
⑨ Drain pain



① Return Air opening with Volume damper

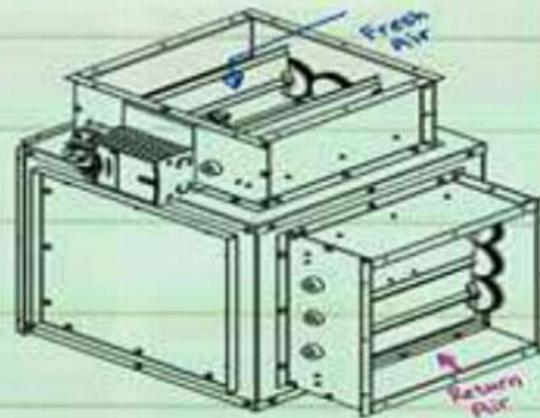
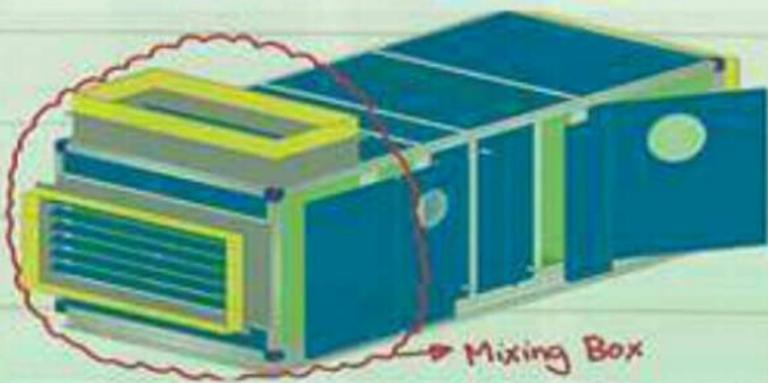
Eng. Ramy Ghoraba

- The opening which receive the return air from the building, and the volume damper exist to control of the quantity of Flow rate.



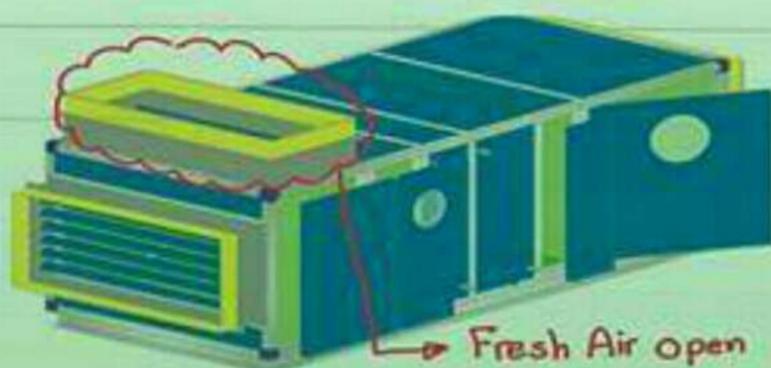
② Mixing Box

- The return Air and Fresh air are mix inside it with the required percentage



③ Fresh Air Opening

- The opening for fresh air and should have sand trap louver with volume damper and filter



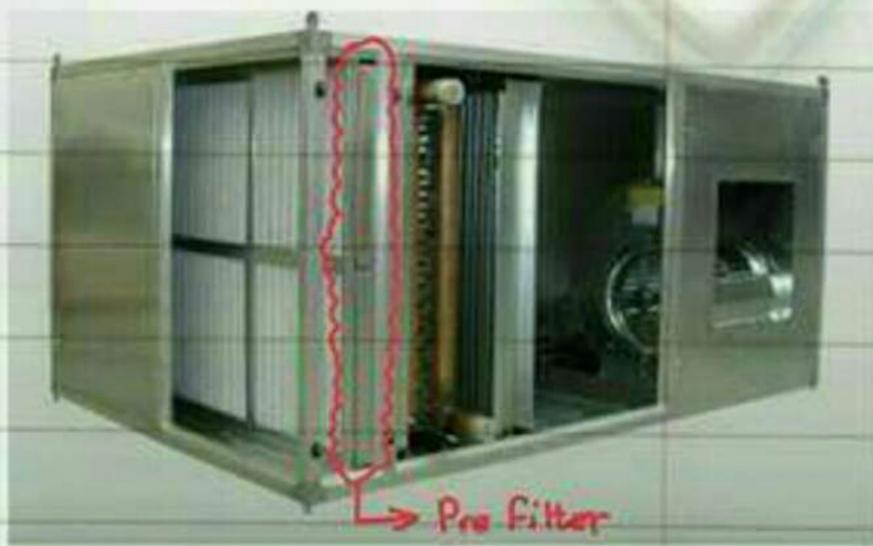
④ Pre Filter

→ It is the first filter that return air pass on it,

Function → Air purification from impurities.

→ It consists of a sponge and aluminum.

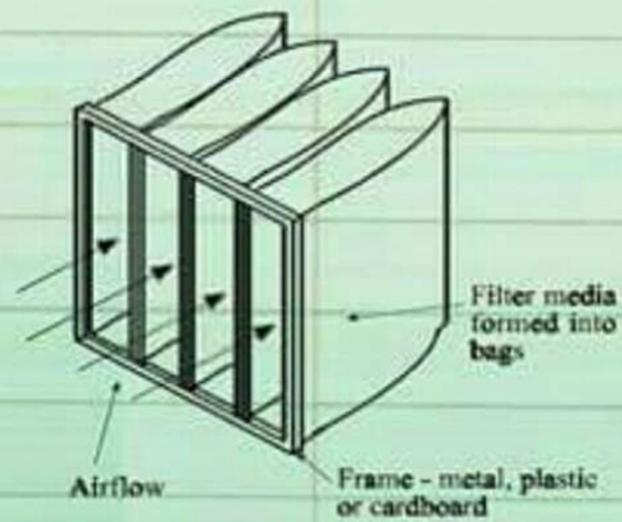
→ Easily to remove and cleaned.



⑤ Bag Filter

→ It is the second stage for air cleaning.

→ After mixing box, the air pass on a bag filter





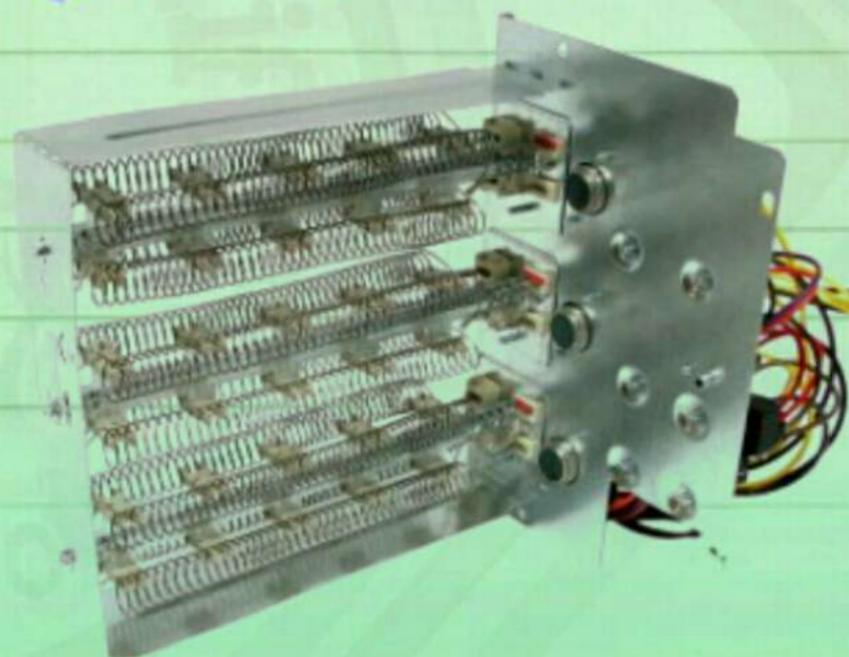
Cooling Coil

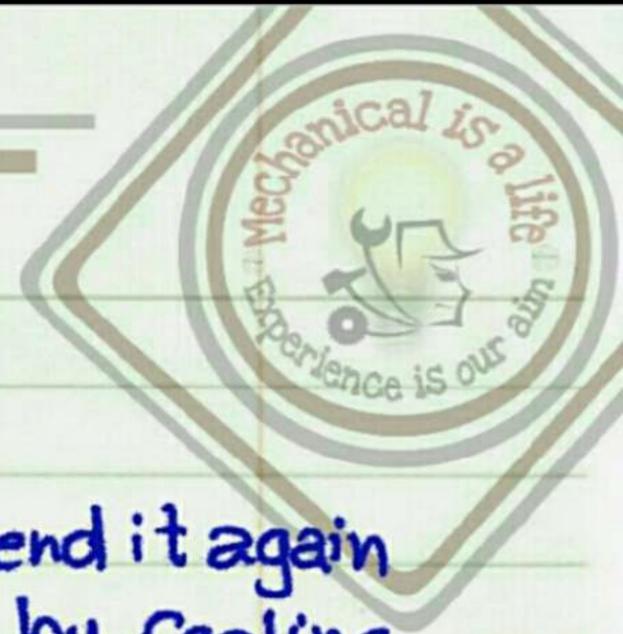
- Cold water passes through the Cooling Coil
- Hot return air passes on the Cooling Coil
- Heat exchange occurs between cold water from chiller & hot return air
- The air getting cold then send to the rooms.



Electric heater

- Optional if we need AHU work for cooling / heating
- Have a stages as per require load.





Fan Section

- Fan with electric motor
- Take the air from the room and send it again to the room after cooling the air by cooling coil.

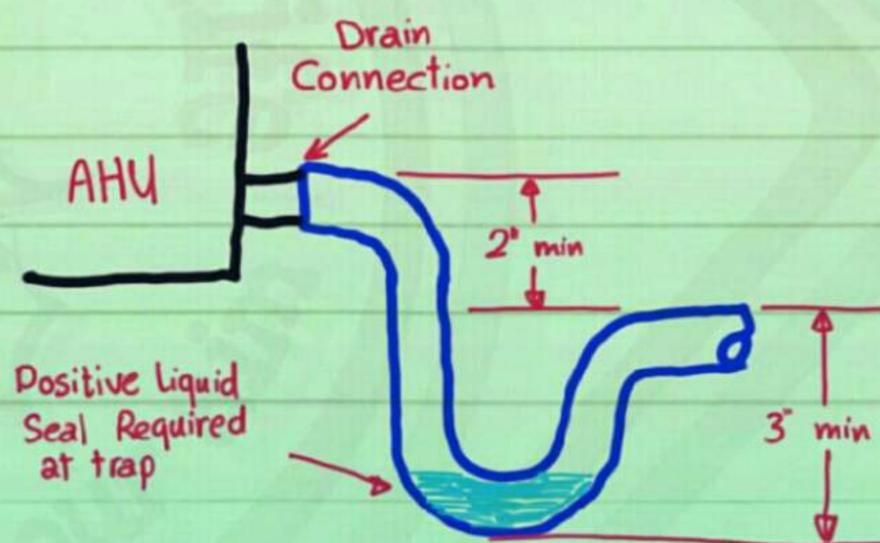


Drain pan

- To collect the Condensing water from the Cooling Coil.



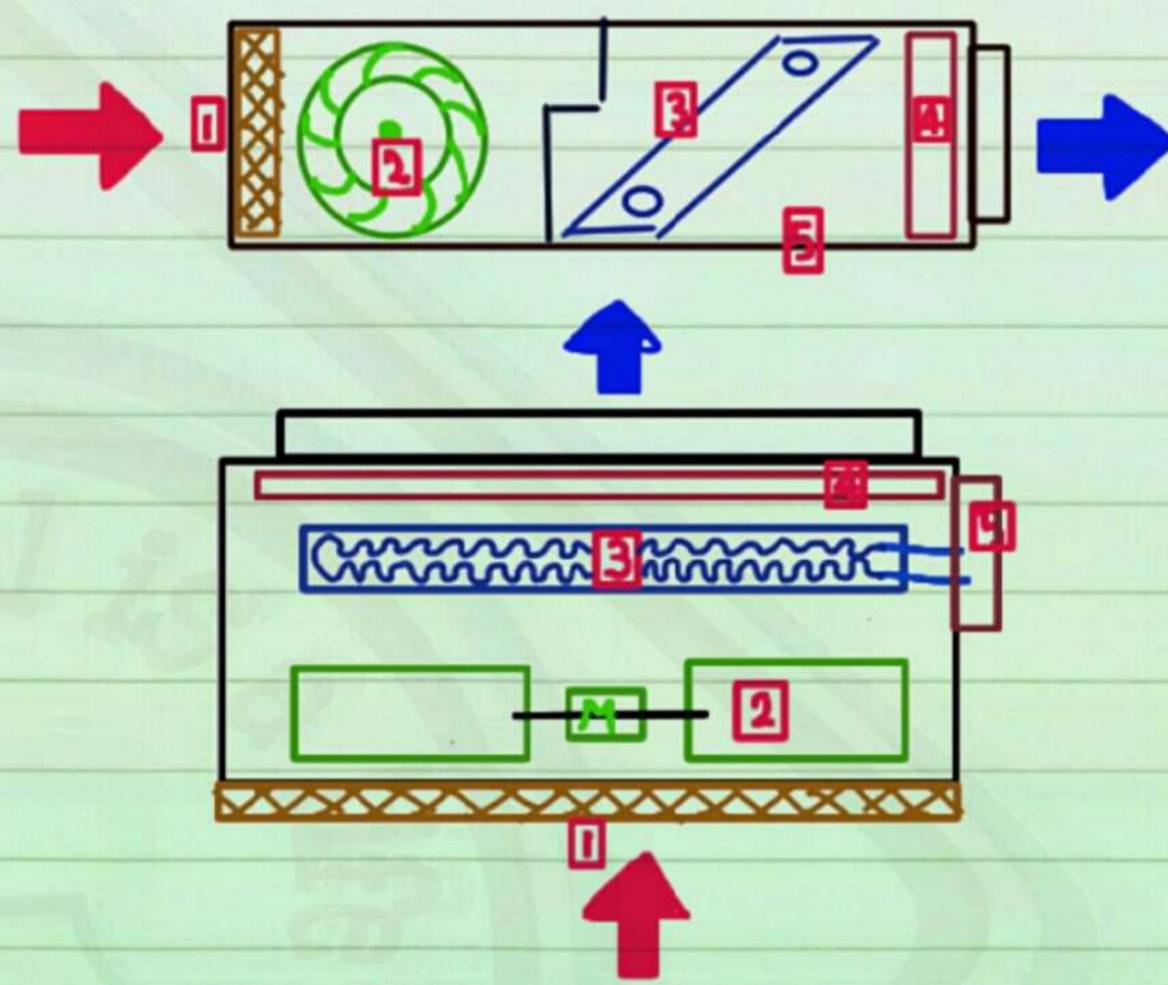
P-Trap for Drain pan





②

Fan Coil Unit FCU





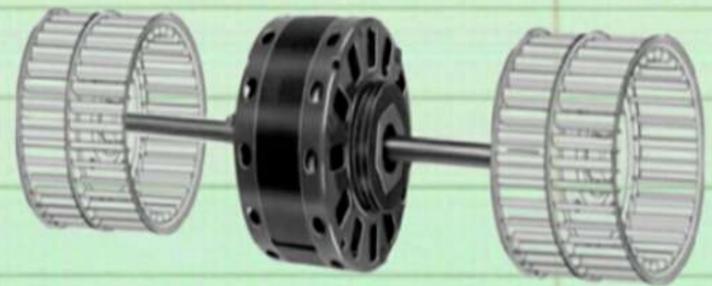
Fan Coil Unit FCU



① Pre Filter



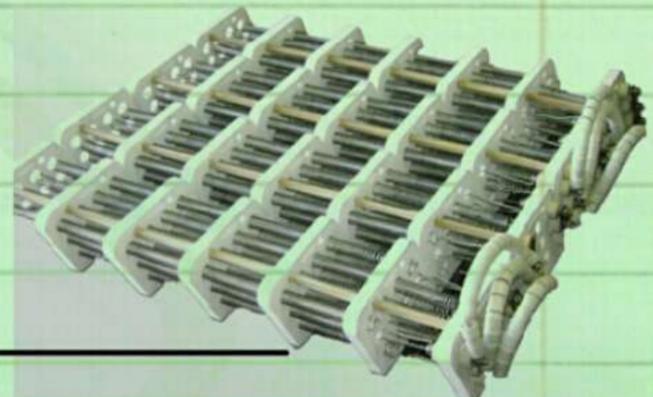
② Fan section



③ Cooling Coil



④ Electric heater



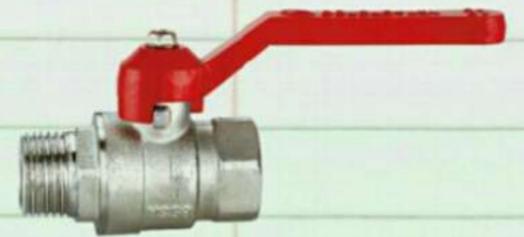
⑤ Drain pan





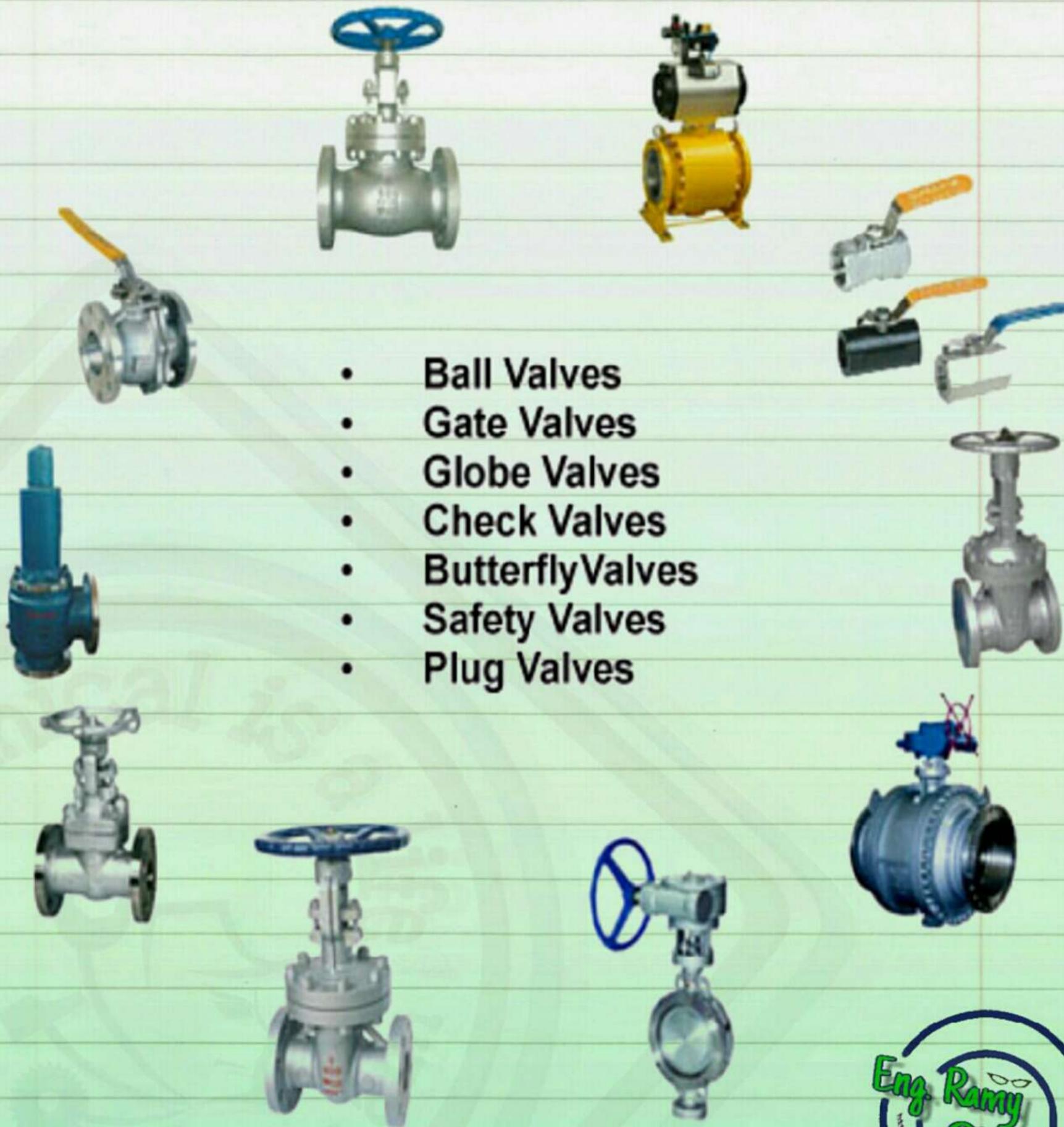
③

Valves





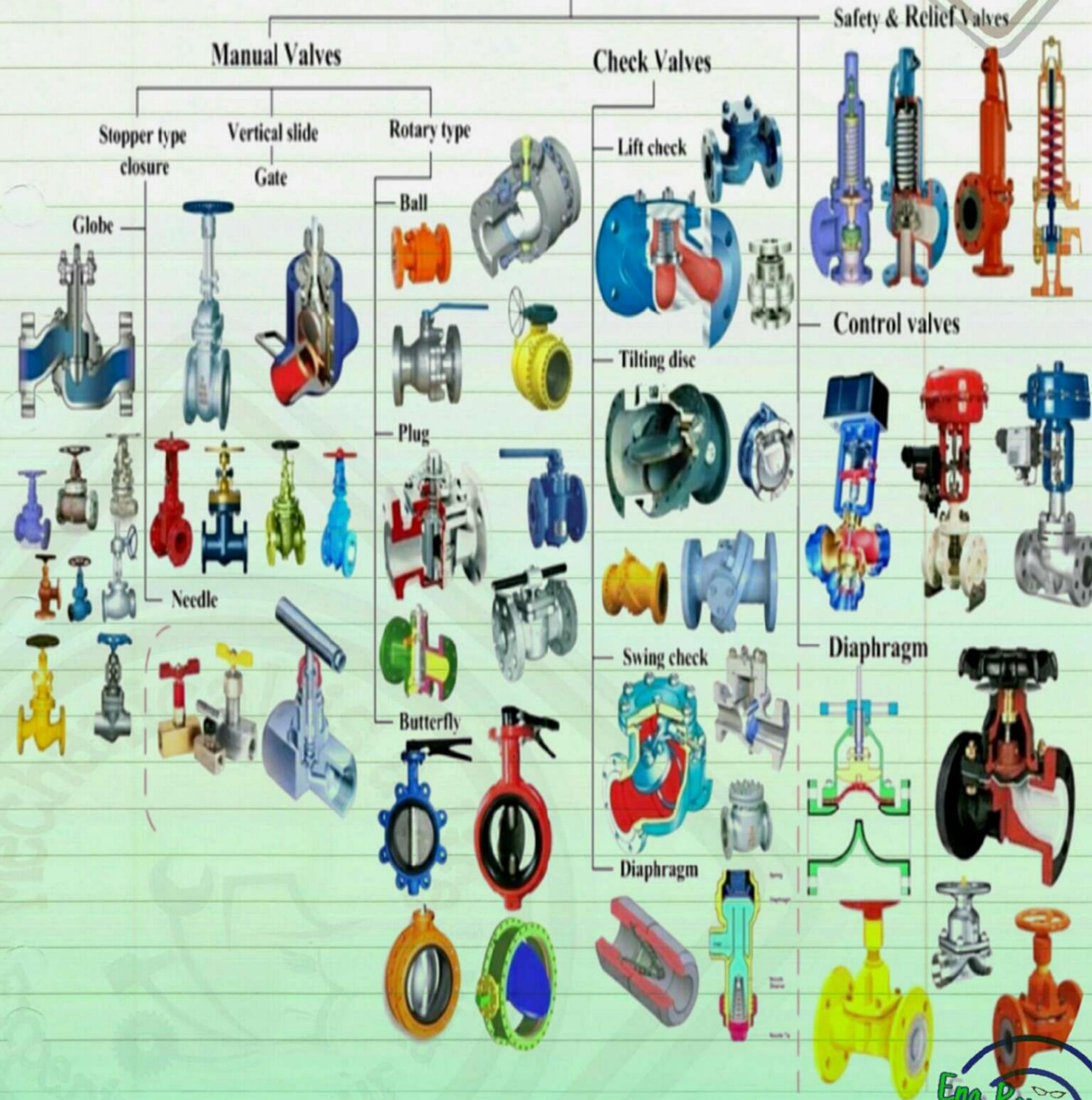
Valves





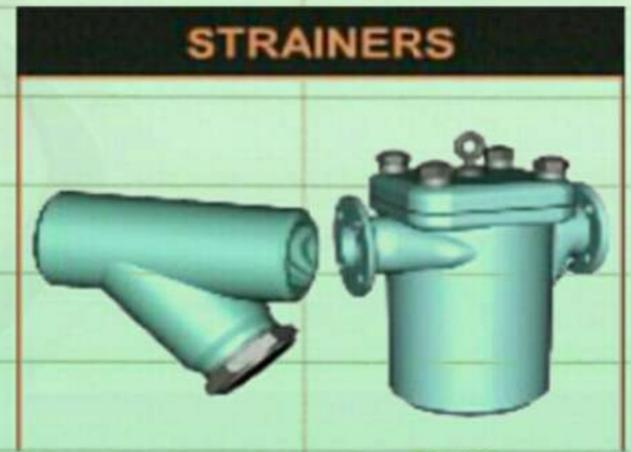
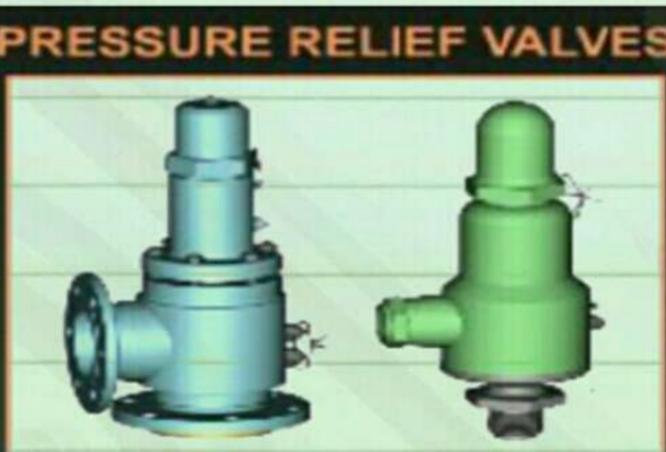
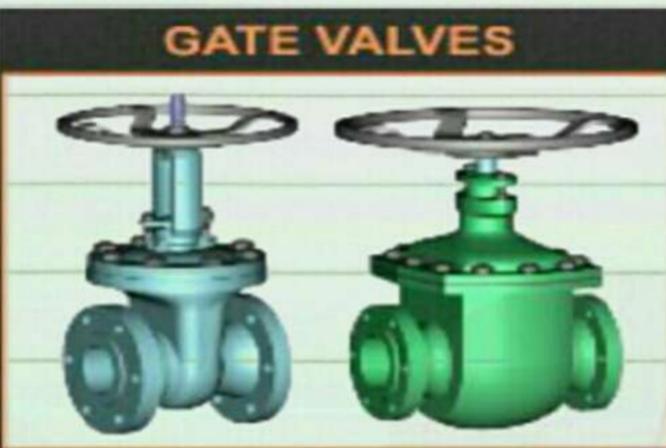
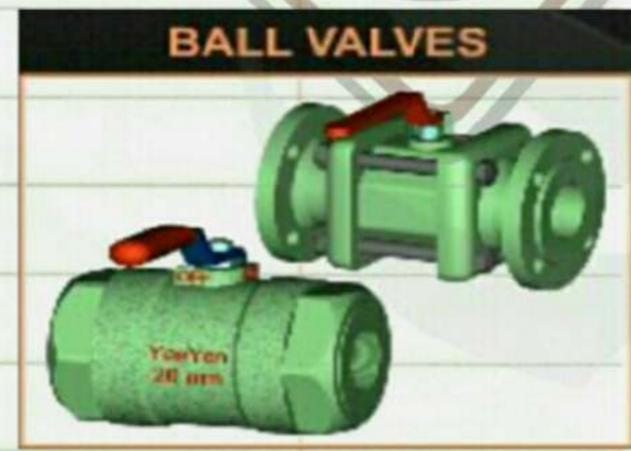
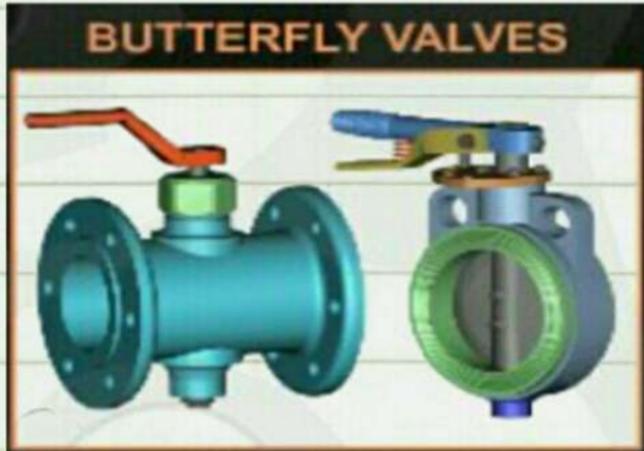
Classification of Valves types

Valves Types





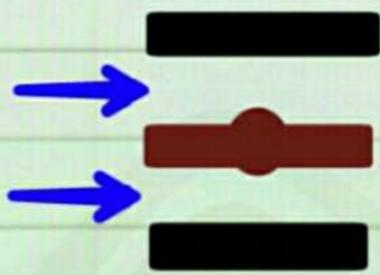
* Types of Valves



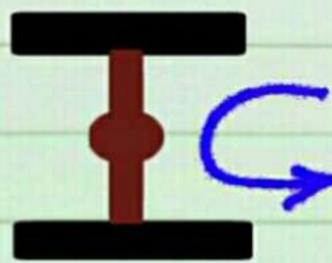


① Butter Fly Valve

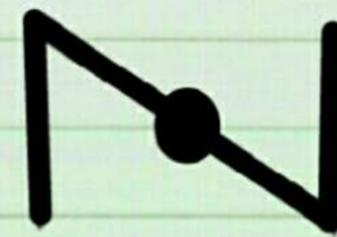
- Tight shut off.
- Can be used as a control valve.
- Little resistance of flow.
- Optimal for automated operation with a low operation torque and 90 degree operating angle.
- Light weight and Compact.



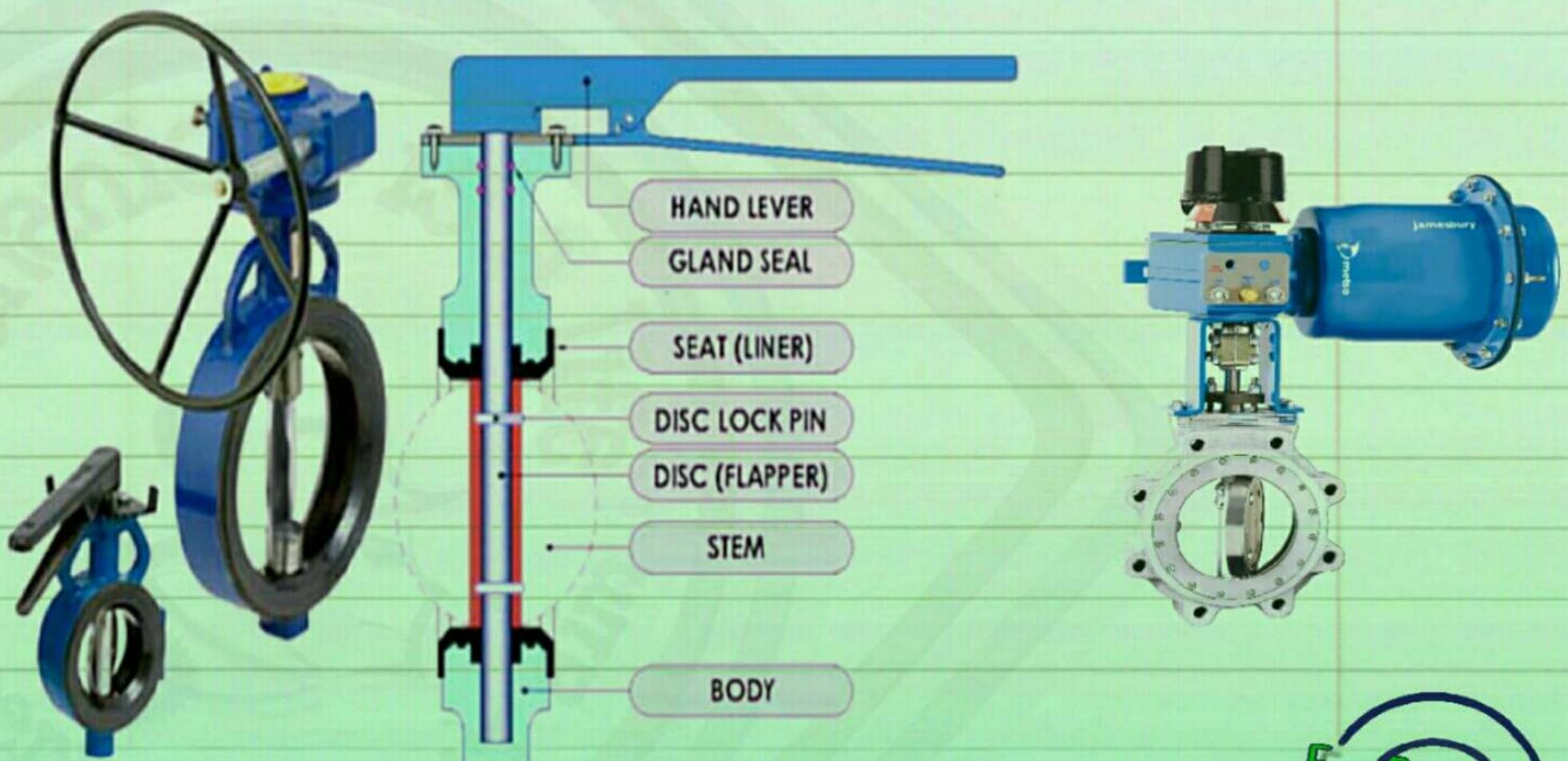
Open



Close



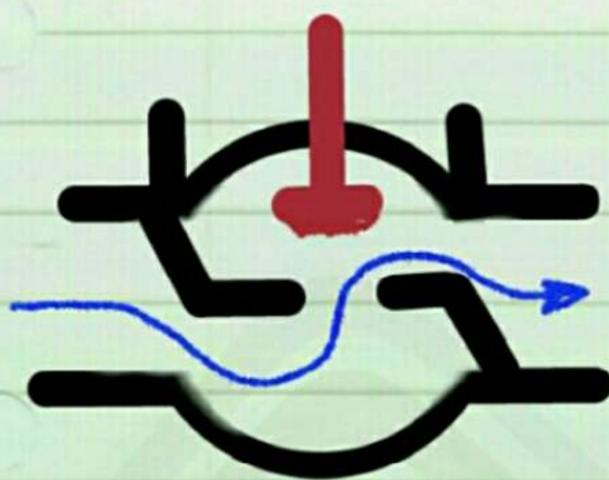
Symbole



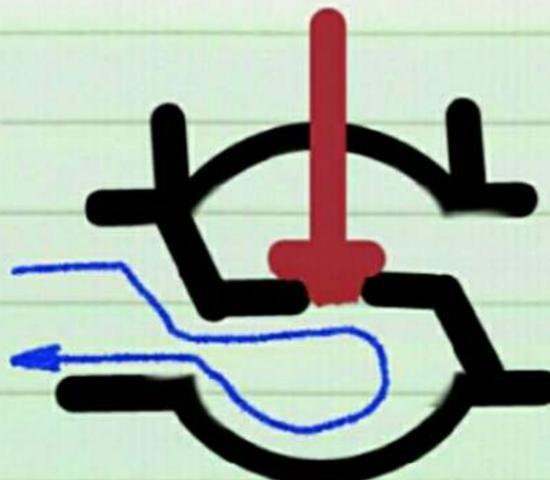
* Globe Valve



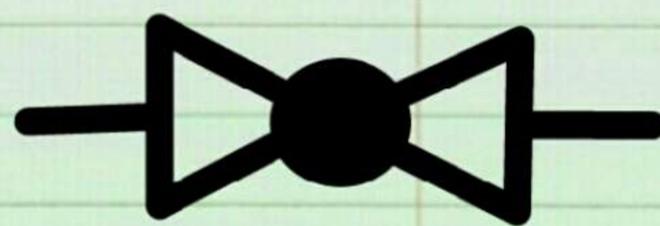
- The globe shaped body Control the Fluid into a S shaped Flow
- Tight shut off and Can be used as a Control Valve.
- Large resistance to flow
- Much power is required to open and close.



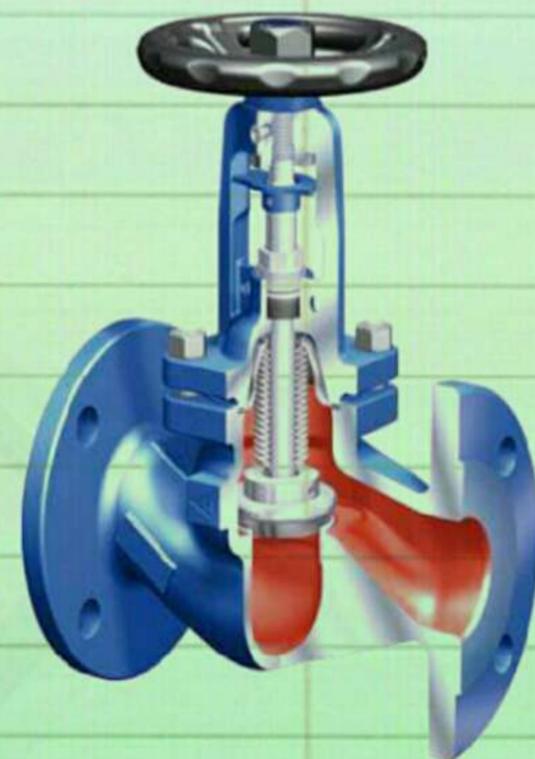
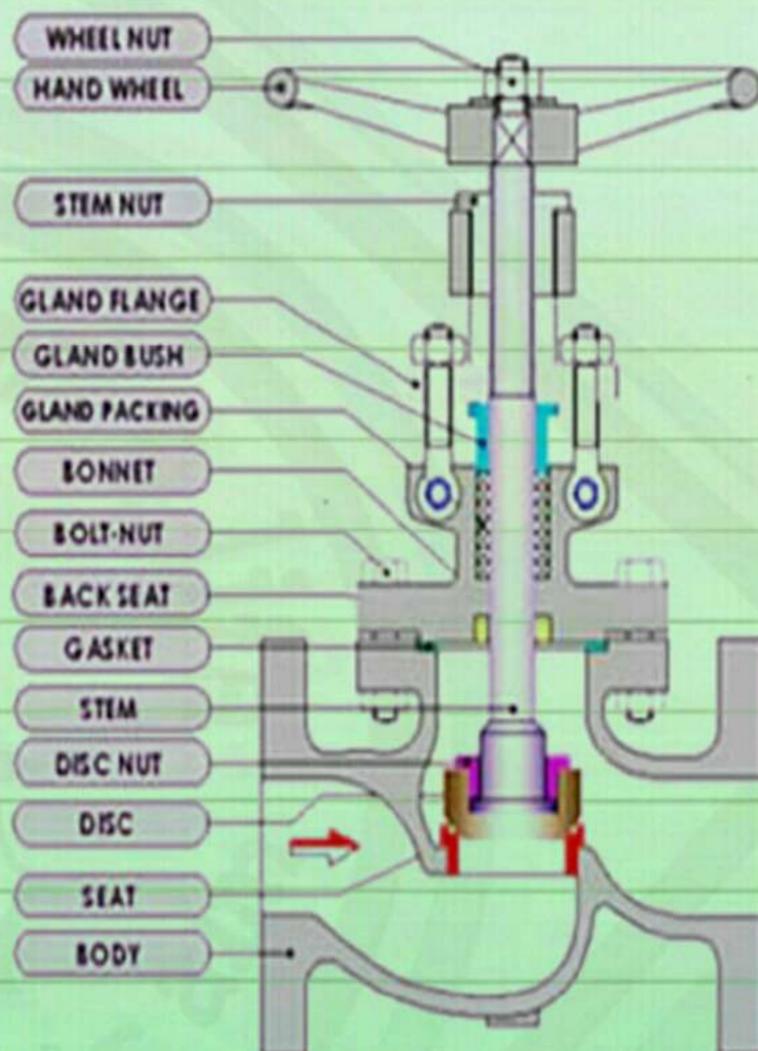
Open

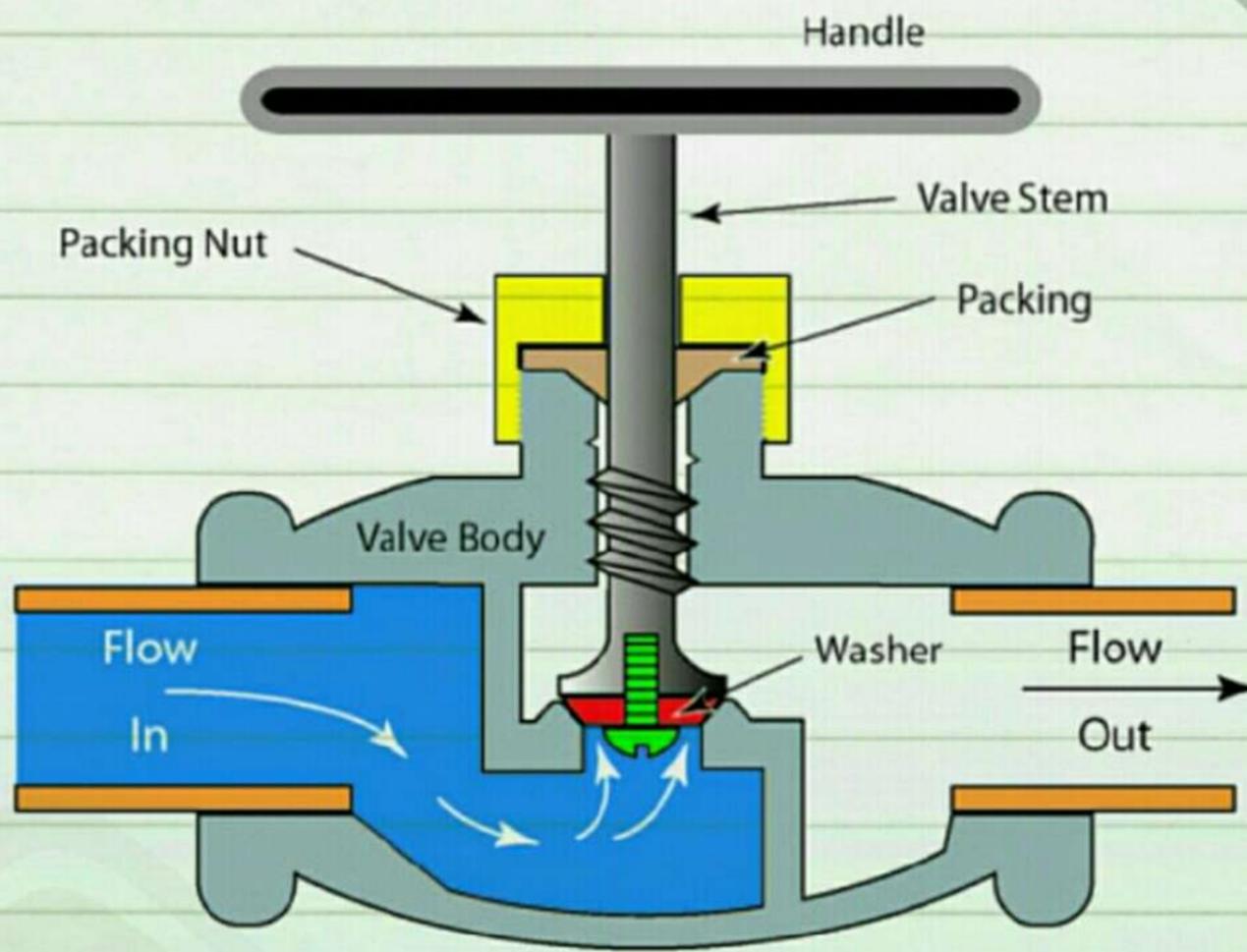


Close

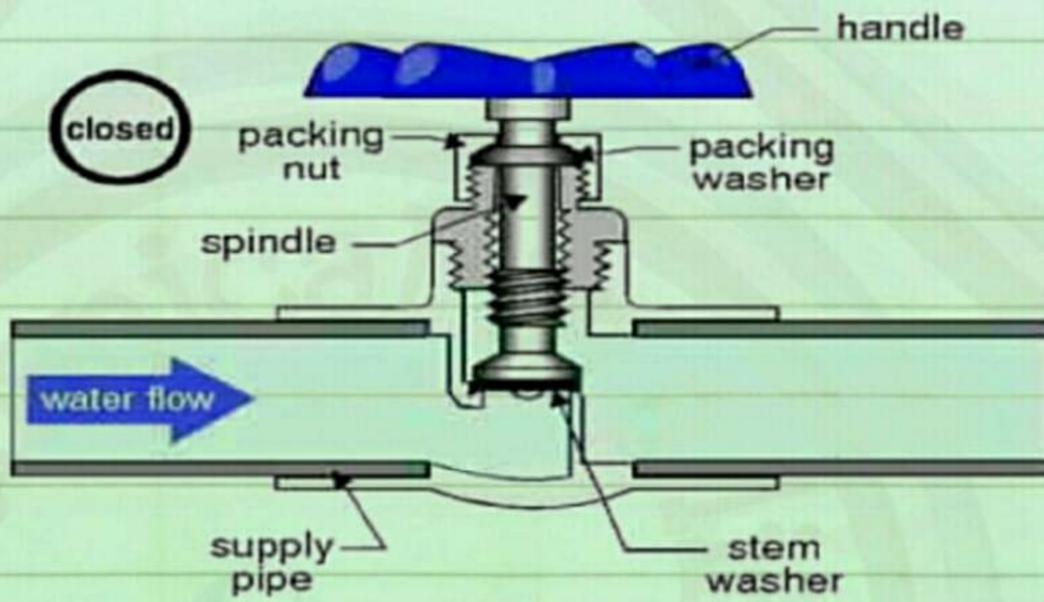


Symbol

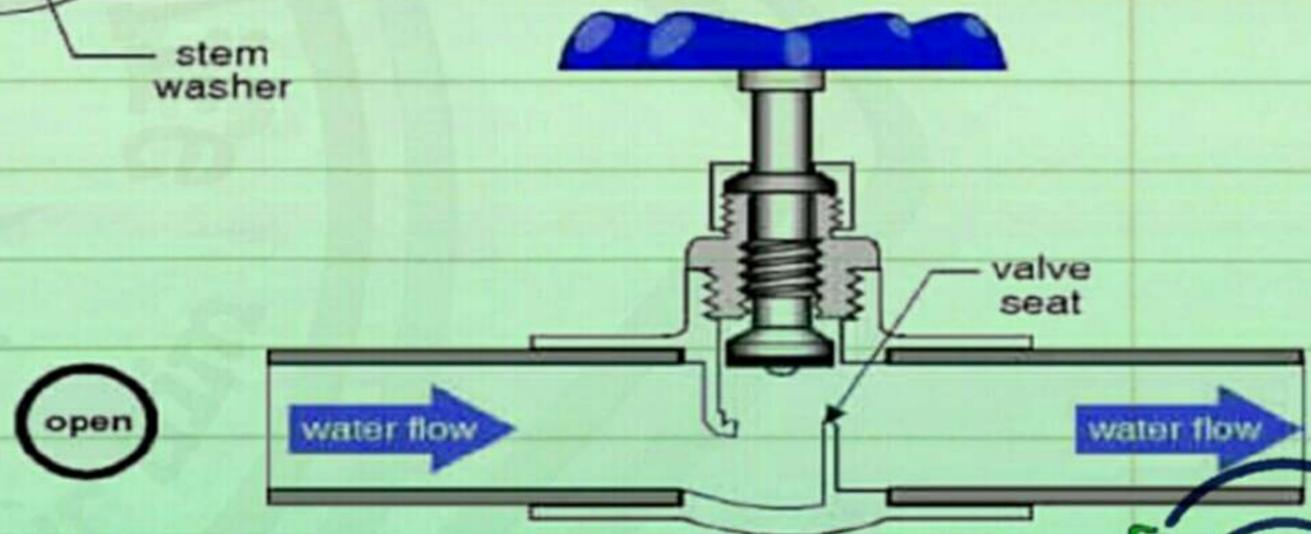


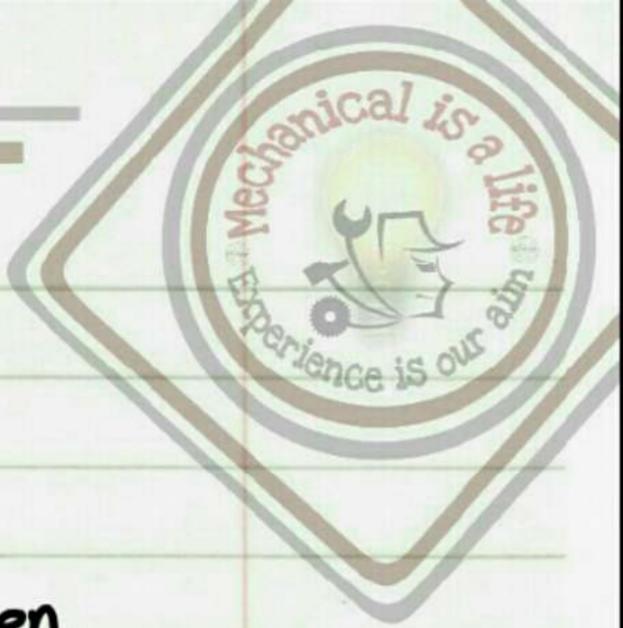


Globe valve



globe valves tend to be restrictive but, can be used to throttle water flow

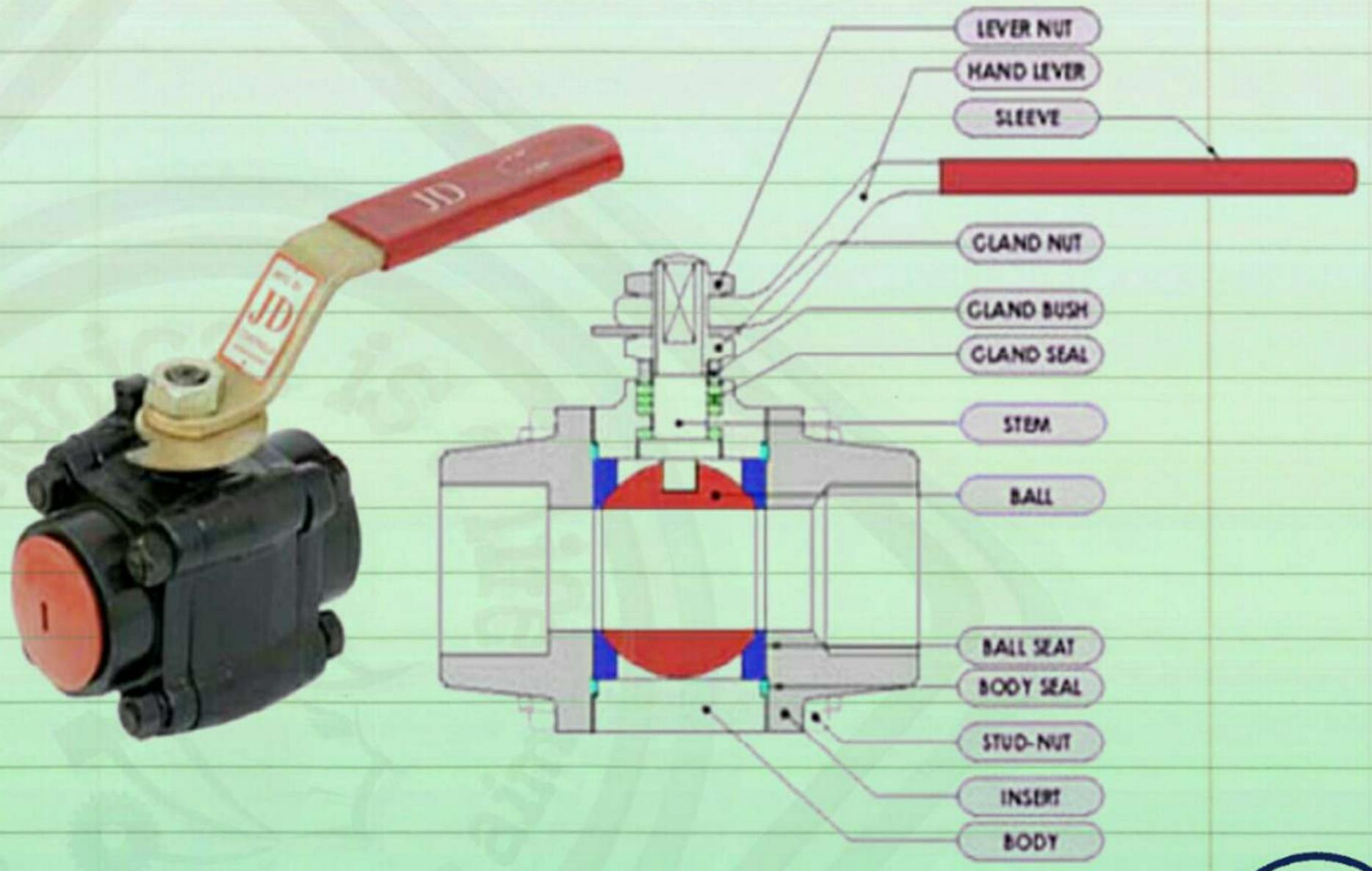
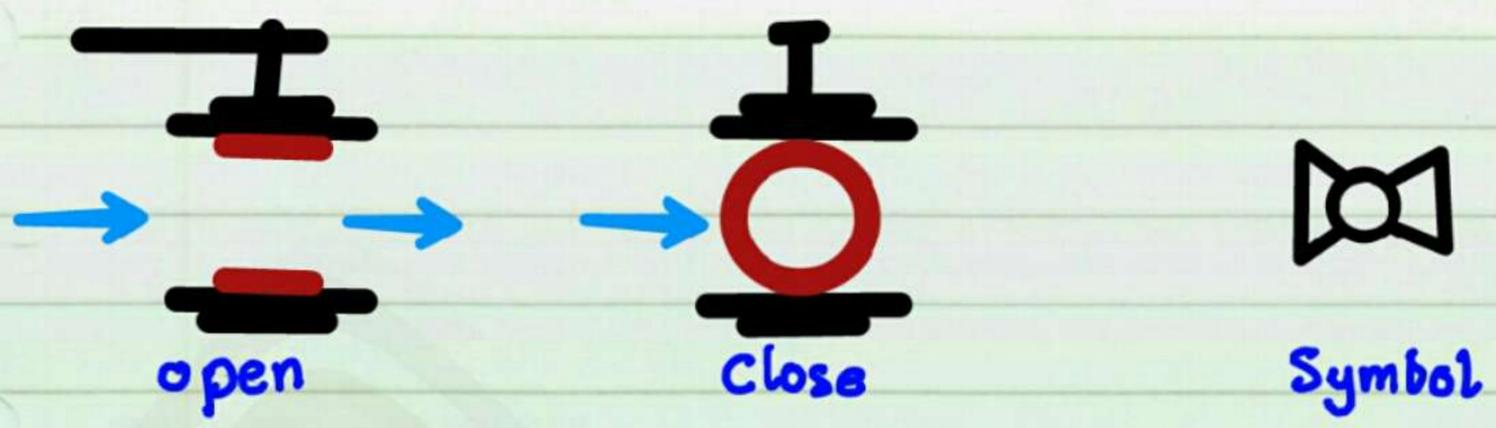


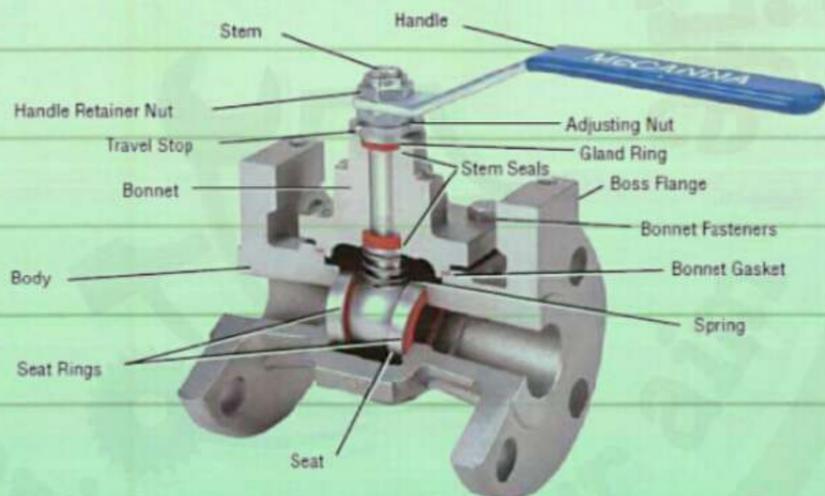
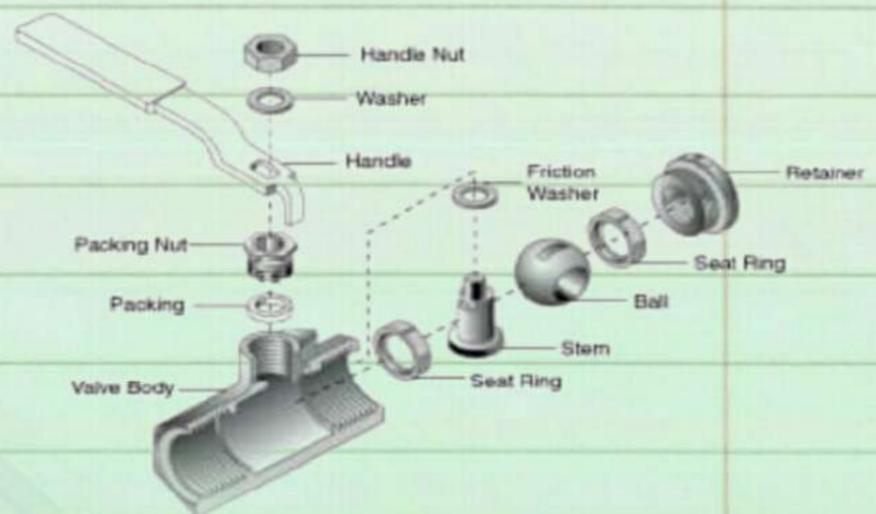
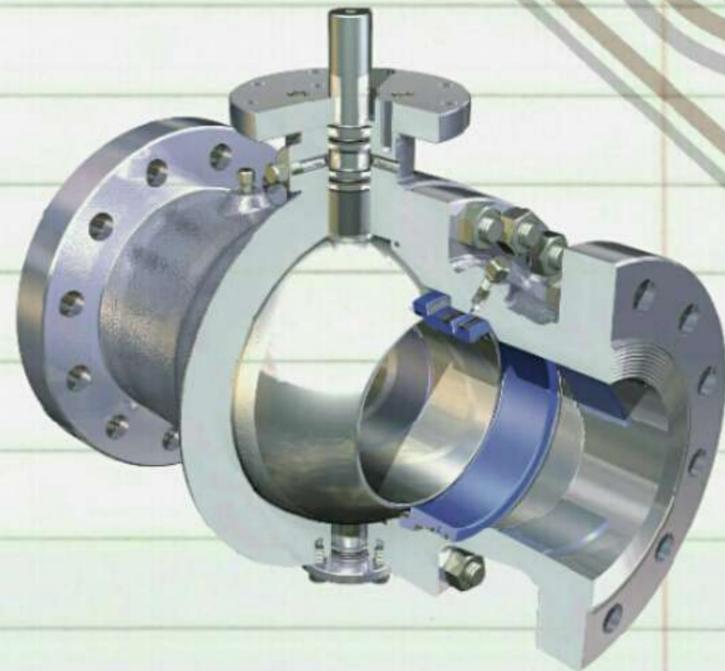


* Ball Valve



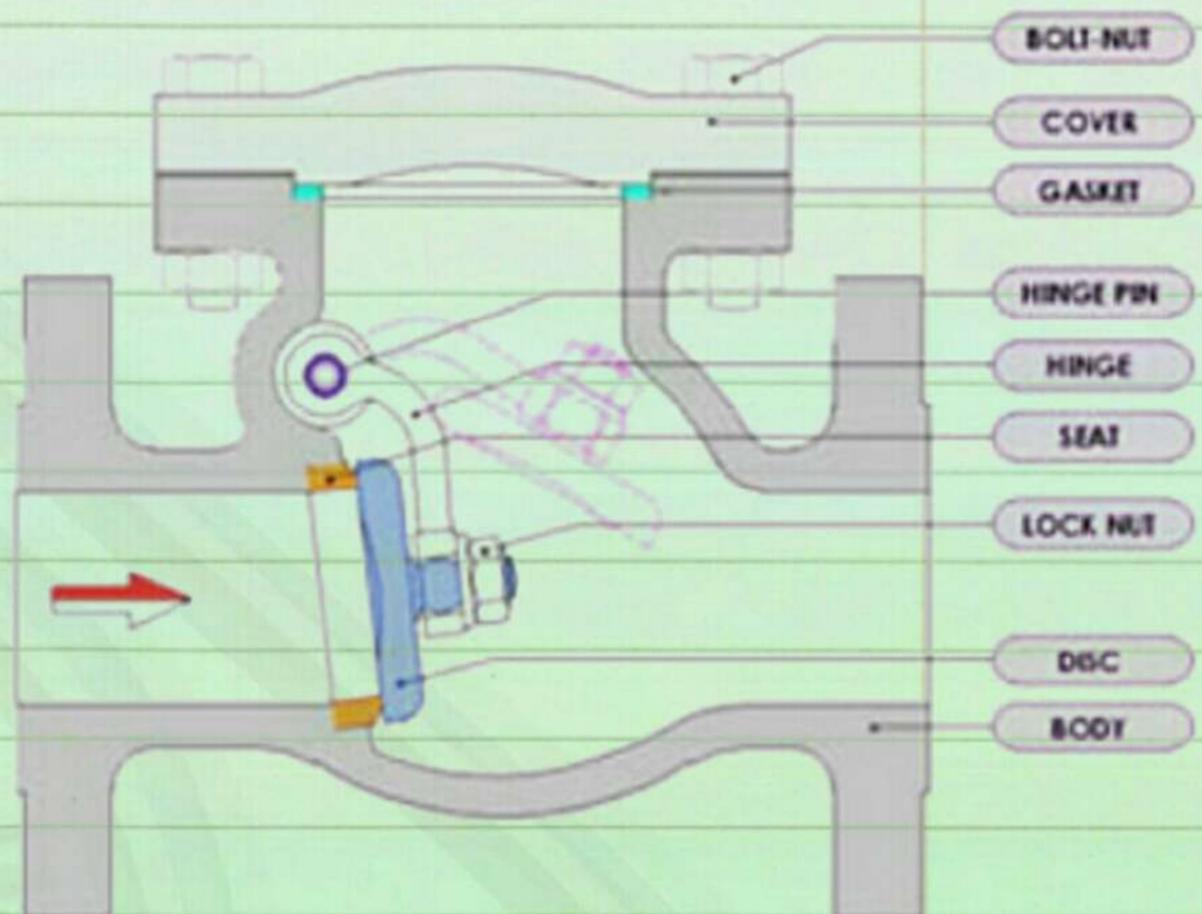
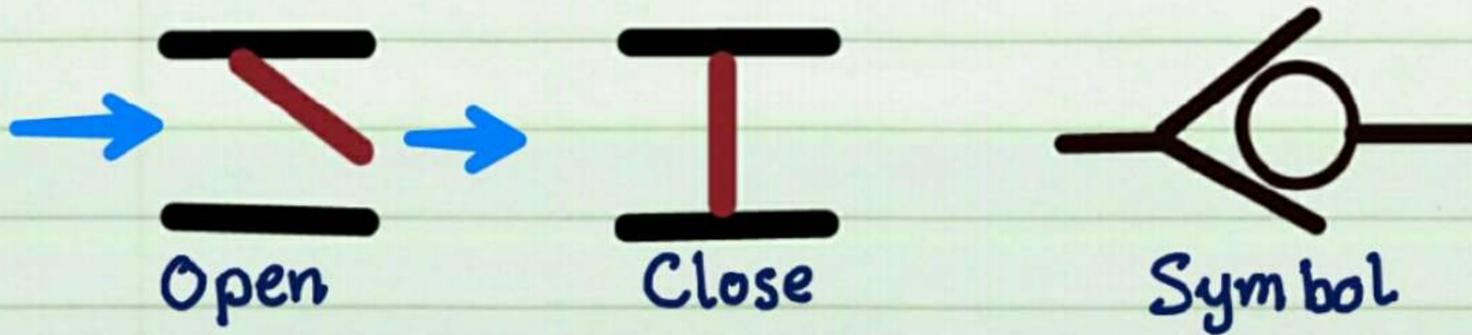
- Valve stopper is ball shaped.
- Used as ON - OFF.
- Little resistance to Flow when Fully open.
- Optimal for automated operation with 90 degree operating angle

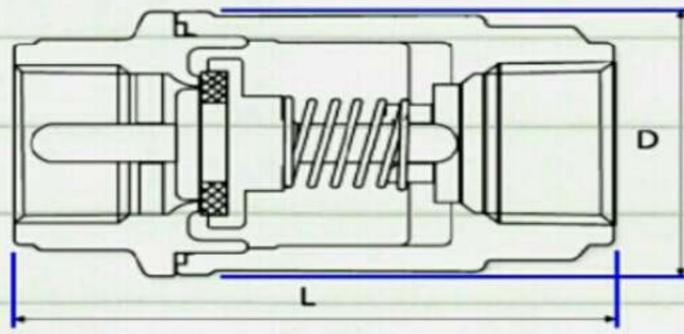




⊗ Check Valve.

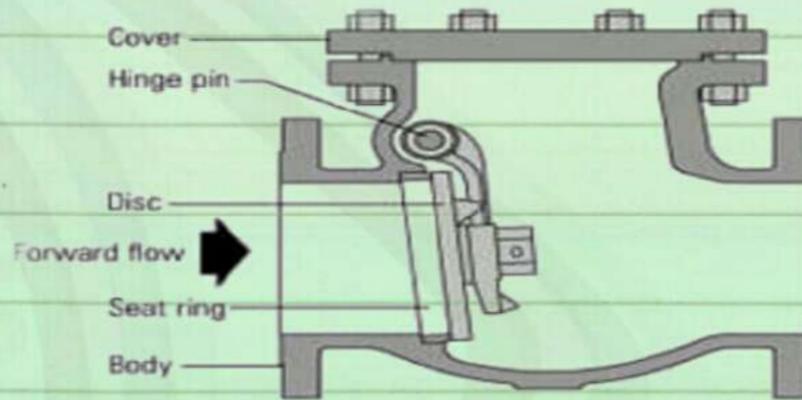
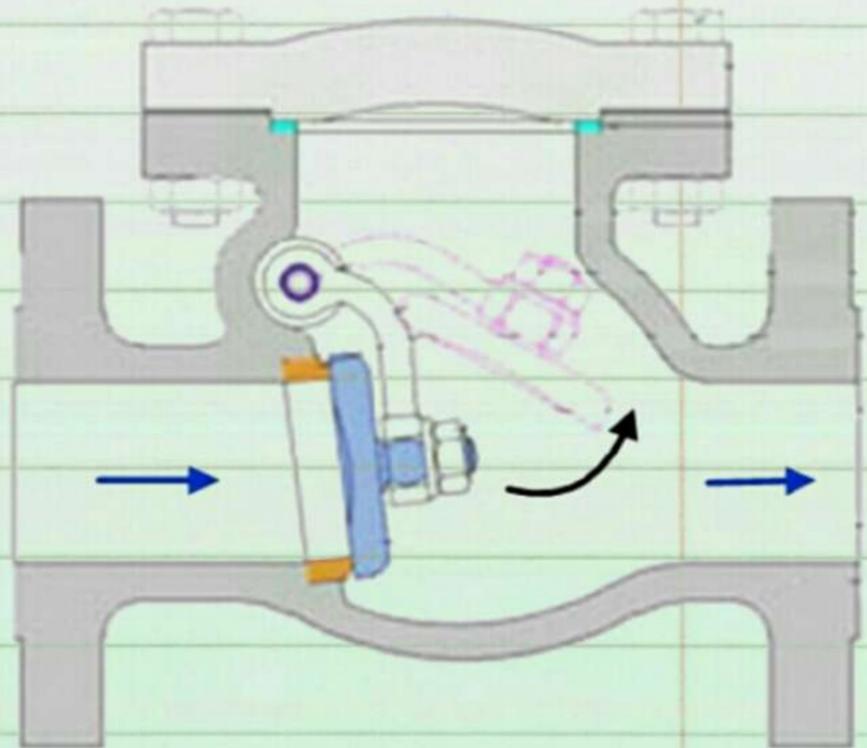
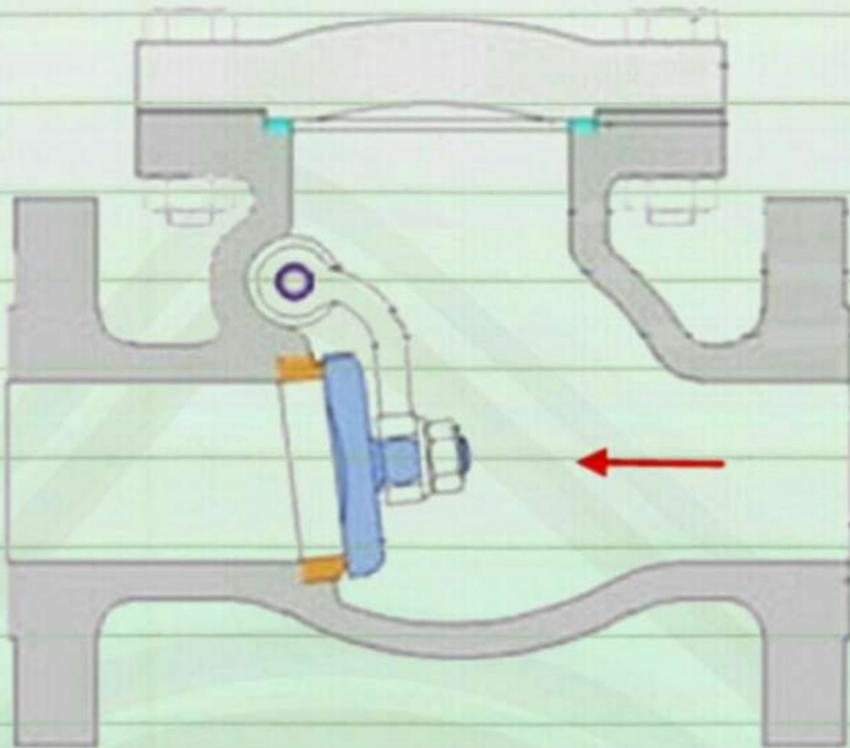
- Used only when the flow in one direction.
- Light weight disk allows vertical installation.
- High operating speed prevent water hammer.





Flow back prevented

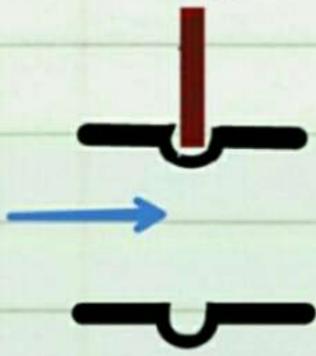
Inflow allowed



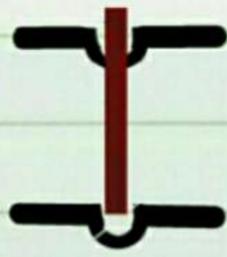
⊗ Gate Valve



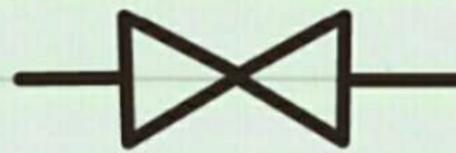
- The gate is lowered to cut off the path of flow.
- Use only as ON - OFF.
- Little resistance to flow when fully open.
- Long stroke requires time to open and close.



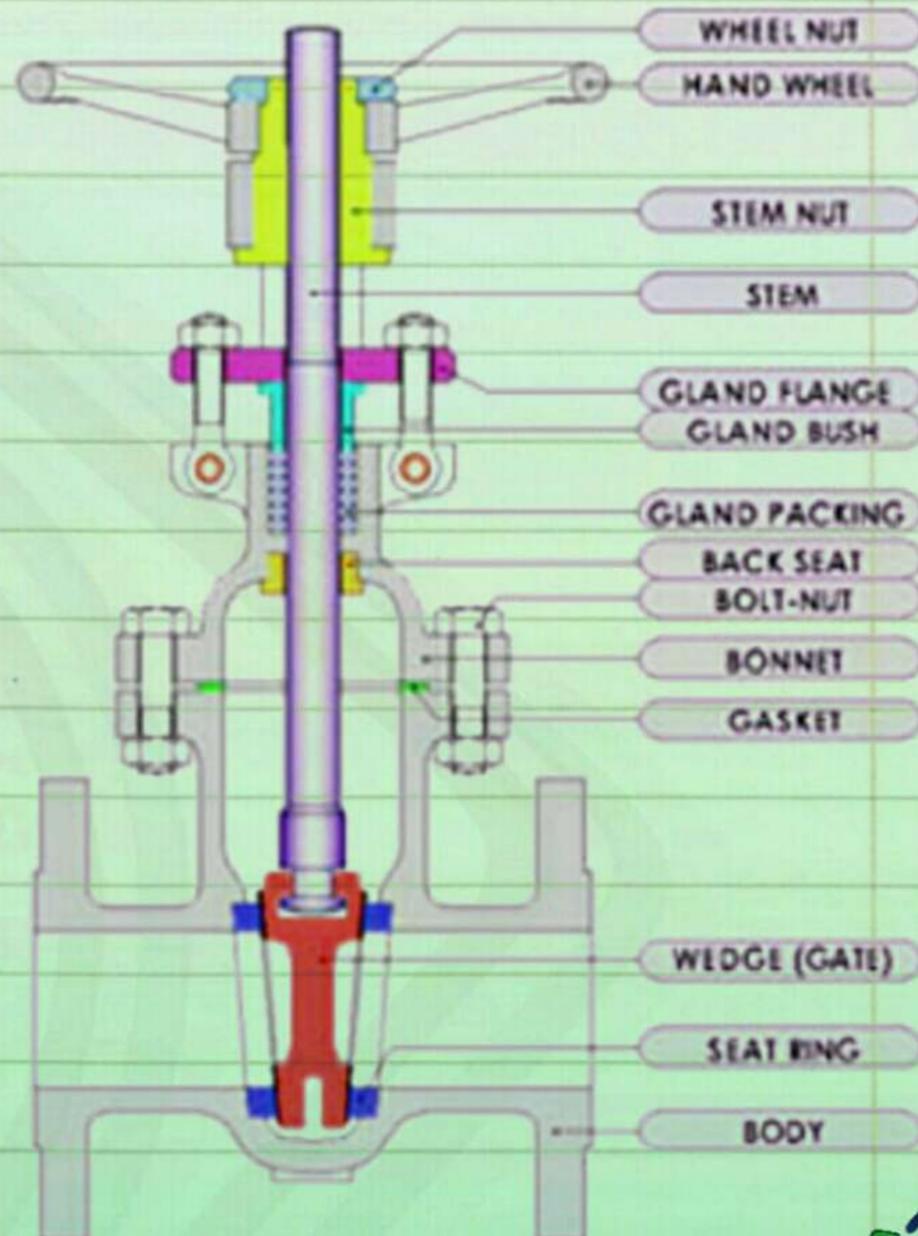
Open

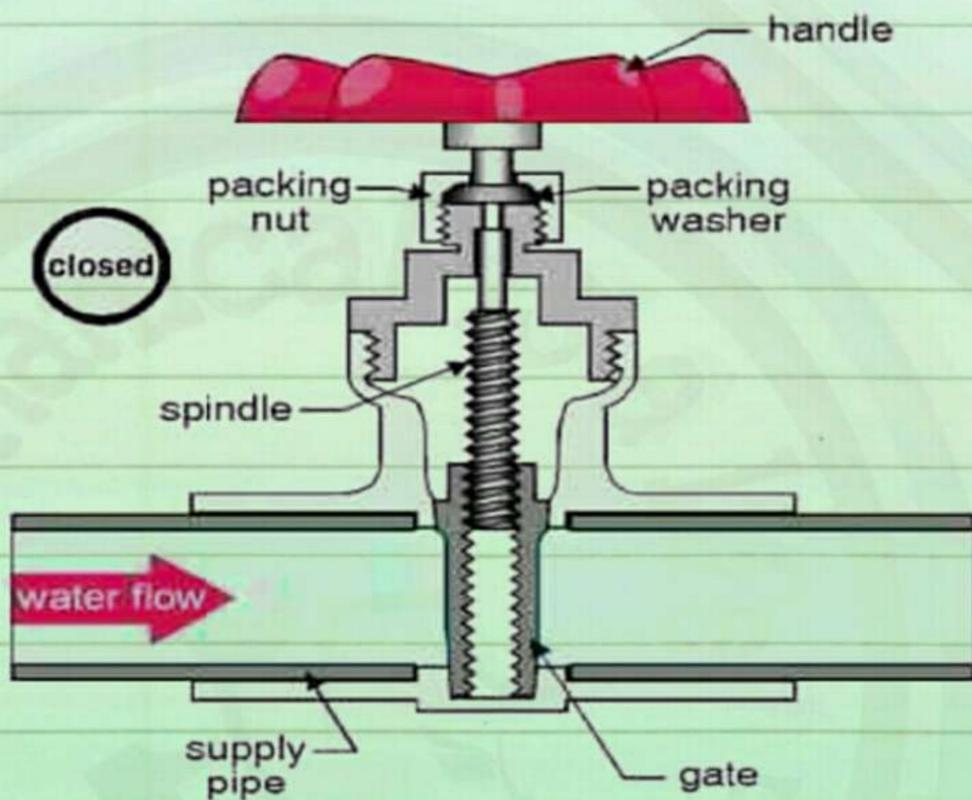
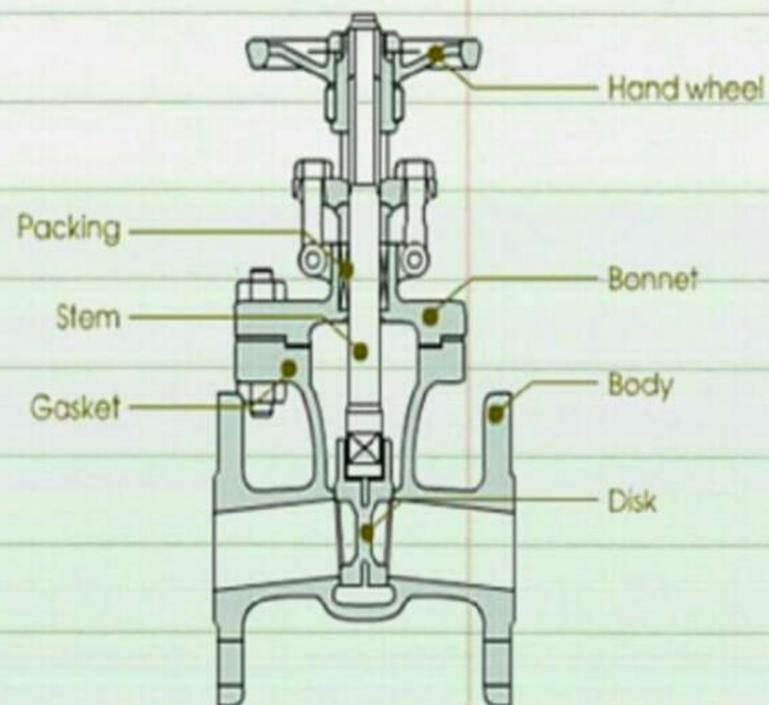
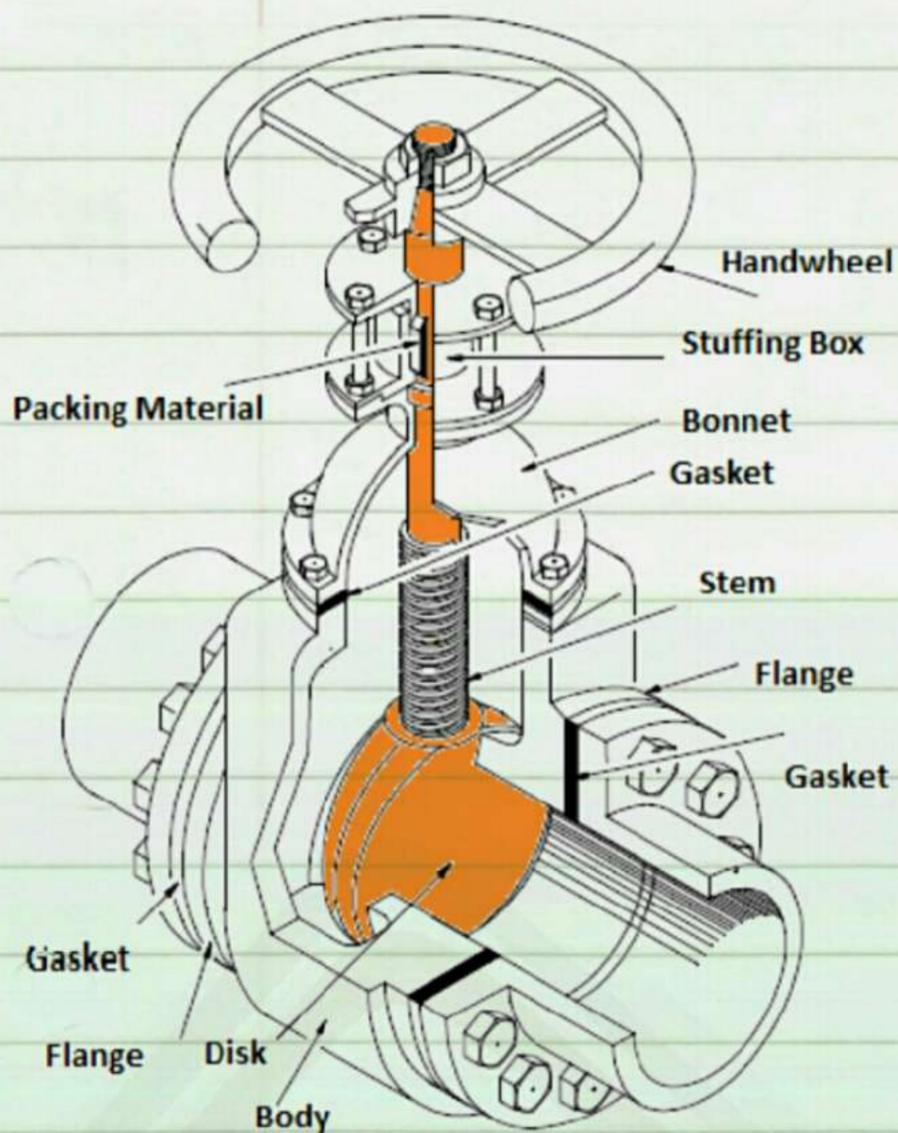


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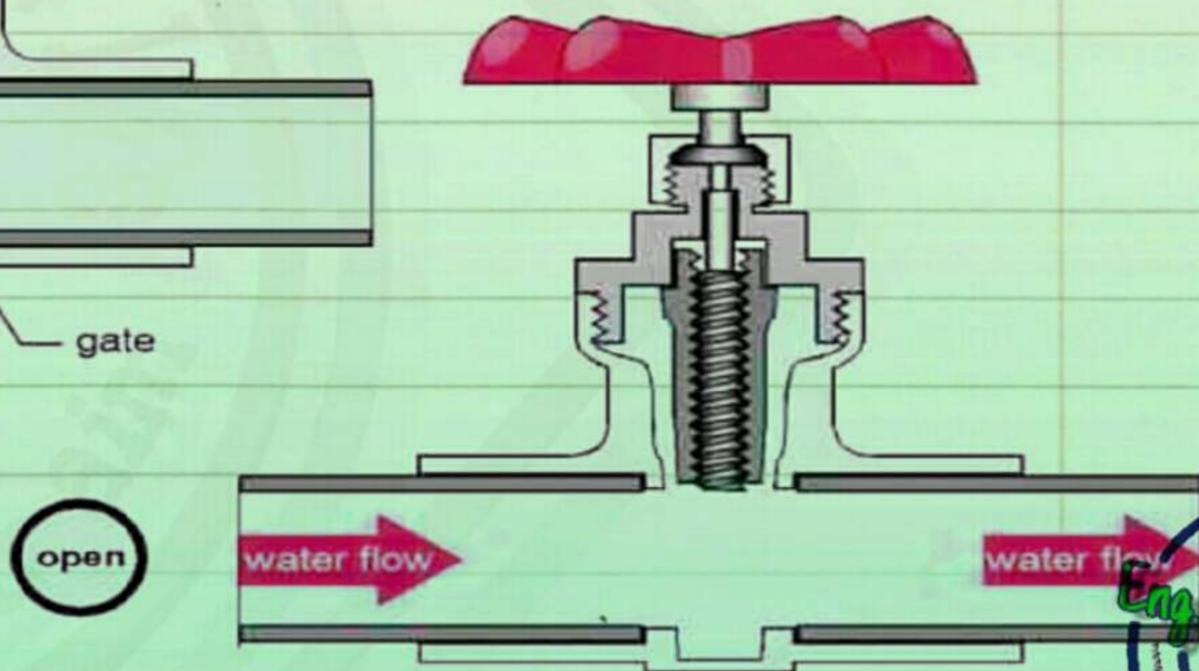


Symbol





gate valves are meant to be fully open or fully closed
since the seal is metal-to-metal, corrosion can cause these valves to fail



* 2 way Control Valve *



→ To Control the quantity of water which enter AHU - FCU.

→ Used only in case of Variable Speed Pump (VSP)

→ There's 2 kinds

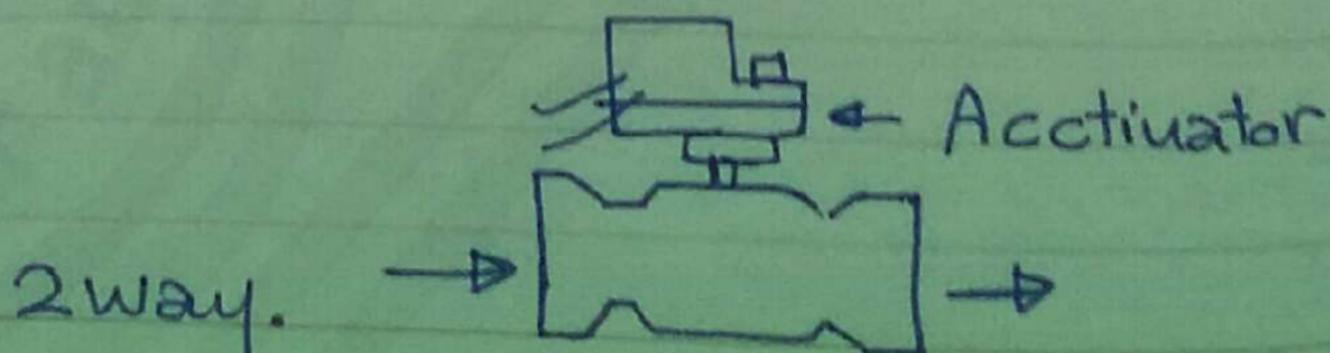
① ON/OFF

- When you have the setpoint → OFF 100%
- When you need to Cool → ON 100%
- No power saver
- Cheep.

② Modulating

- Close & open with scale according to the required temp.
- power saver

* It Controlled by install differential pressure switch (DPS) on the main chilled water pipe to send a signal to the VSP to increase or decrease the pump speed.



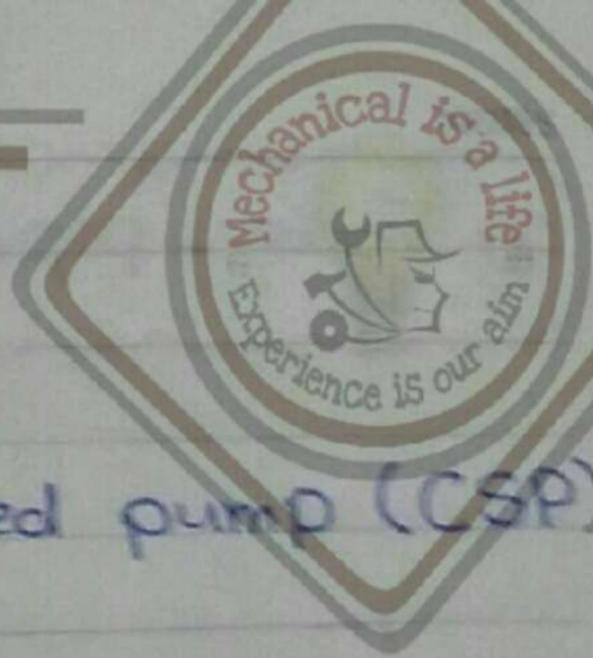


Actuator



2 Way valve





⊛ 3 way Control valve ⊛

→ Used only with a Constant speed pump (CSP)

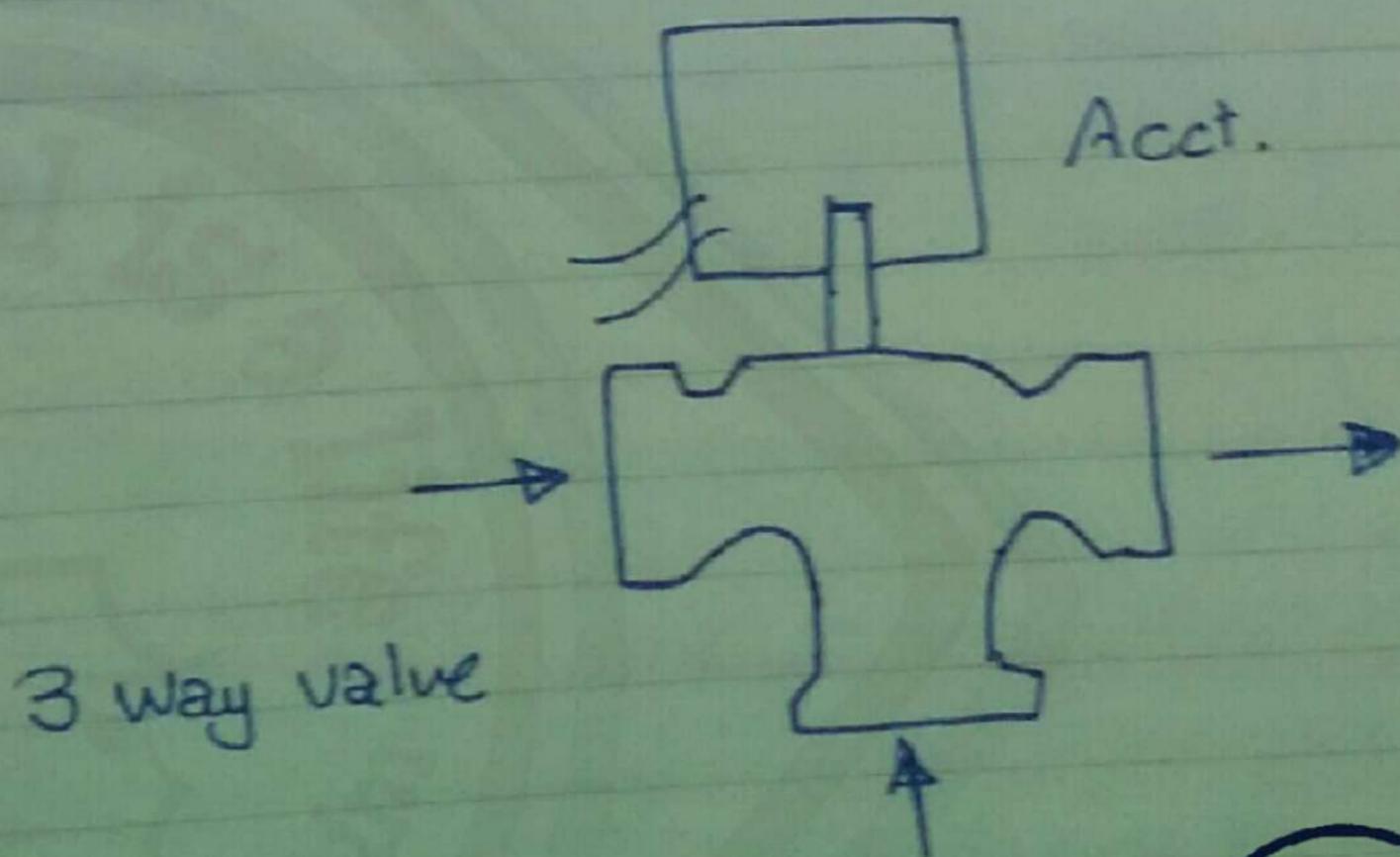
→ There is 2 kinds

① Mixing 3-way valve ⊛

- Installed in ~~entrance~~^{Exit} of the unit.
- Have 2 entrance & 1 exit

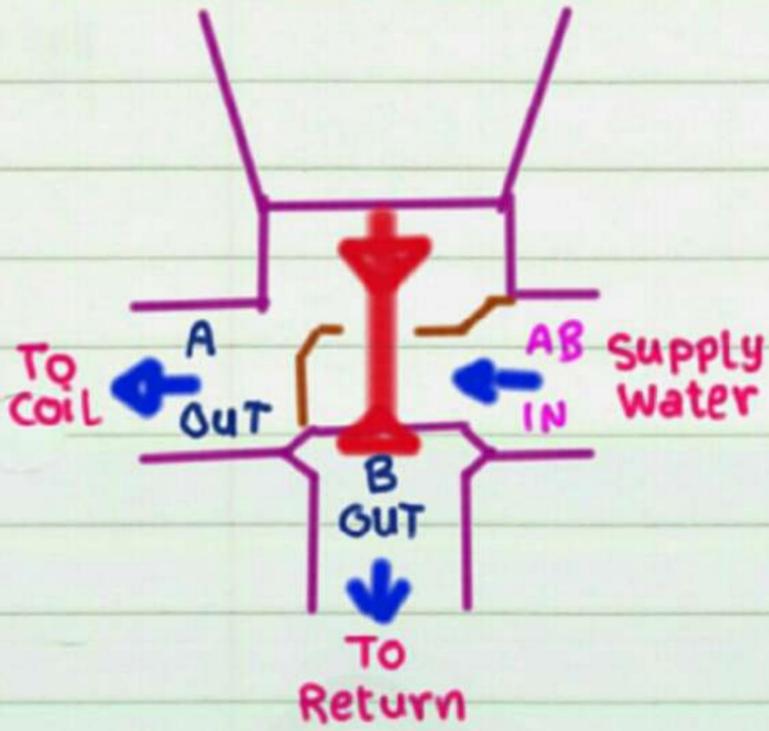
② Diverting 3-way valve

- Installed in exit of the unit
- Have 1 entrance & 2 exit.

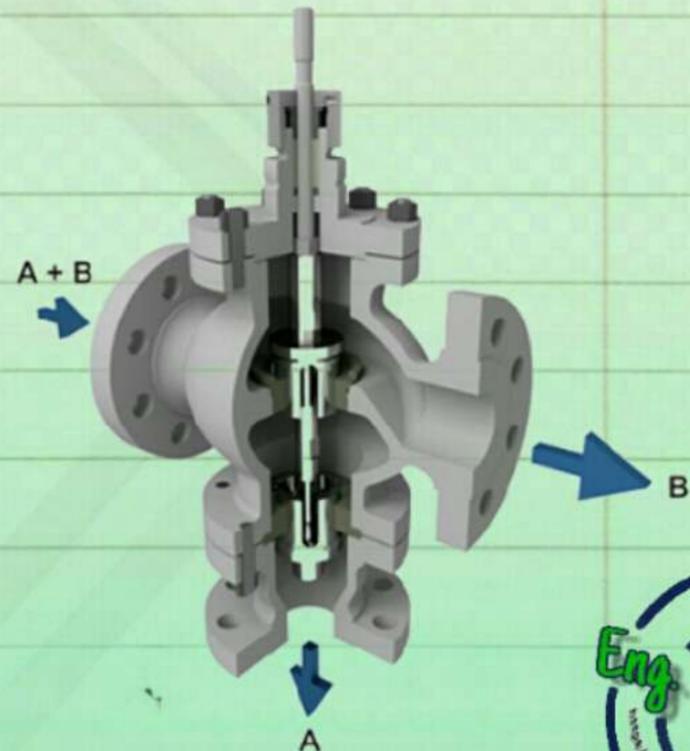
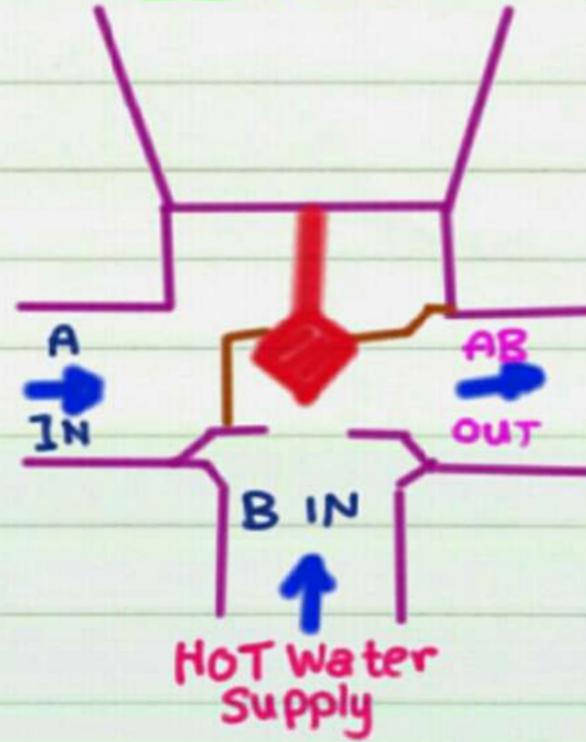




Diverting Valve



Mixing Valve

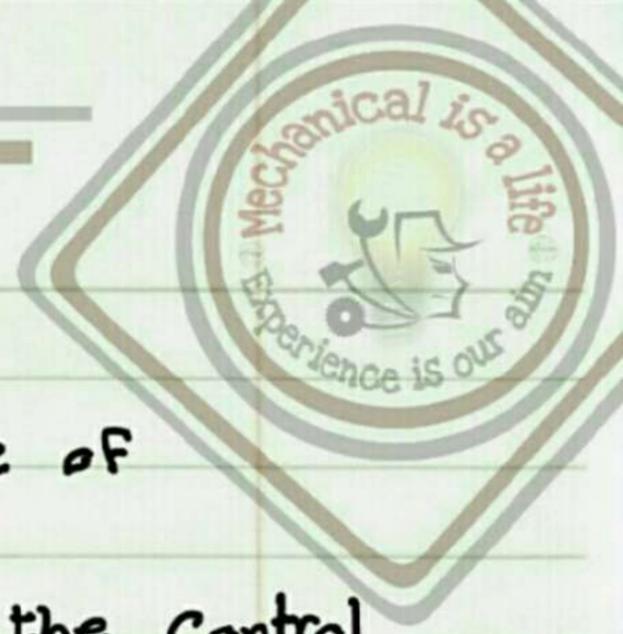




④

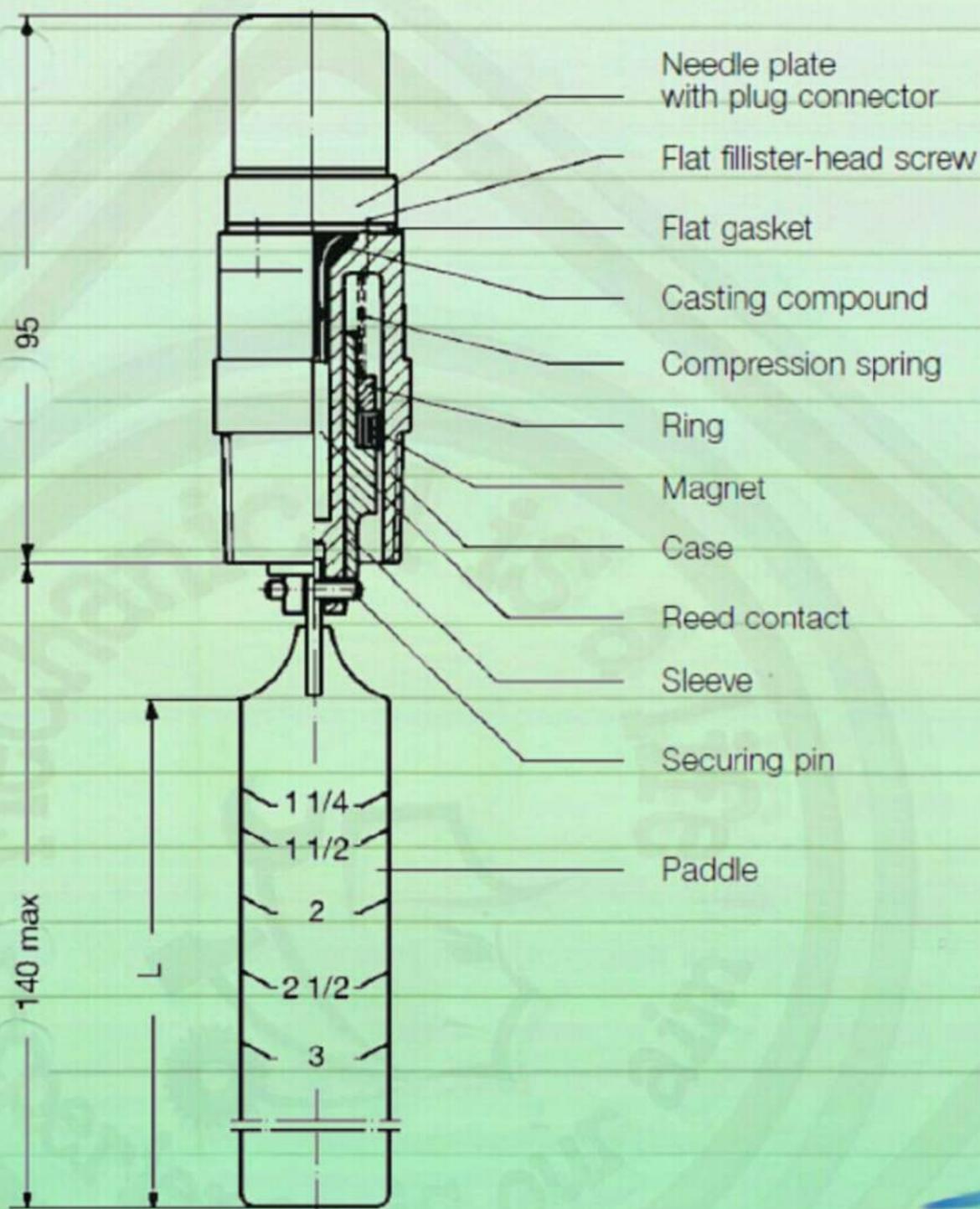
Flow Switch





* Flow Switch

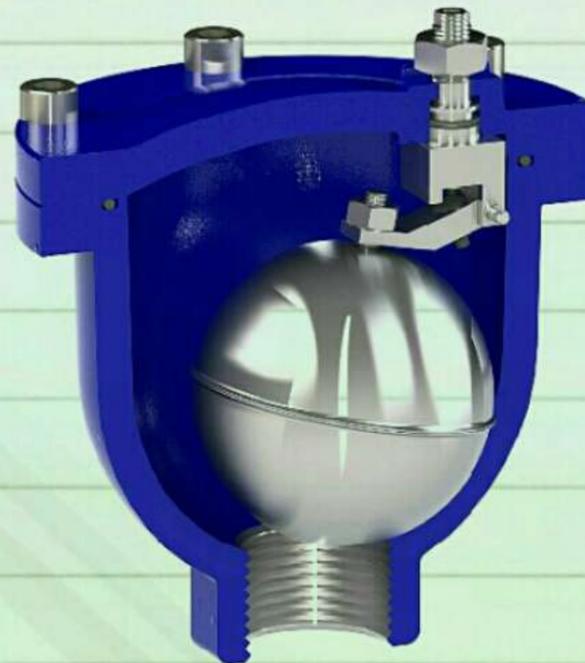
- It detects the presence or absence of flow in piping.
- Working by sending a trip signal to the control panel in the chiller to protect it from damage and for cooling circuit protection
- It is normally used to shut OFF the chiller whenever there is no circulation of water.





⑤

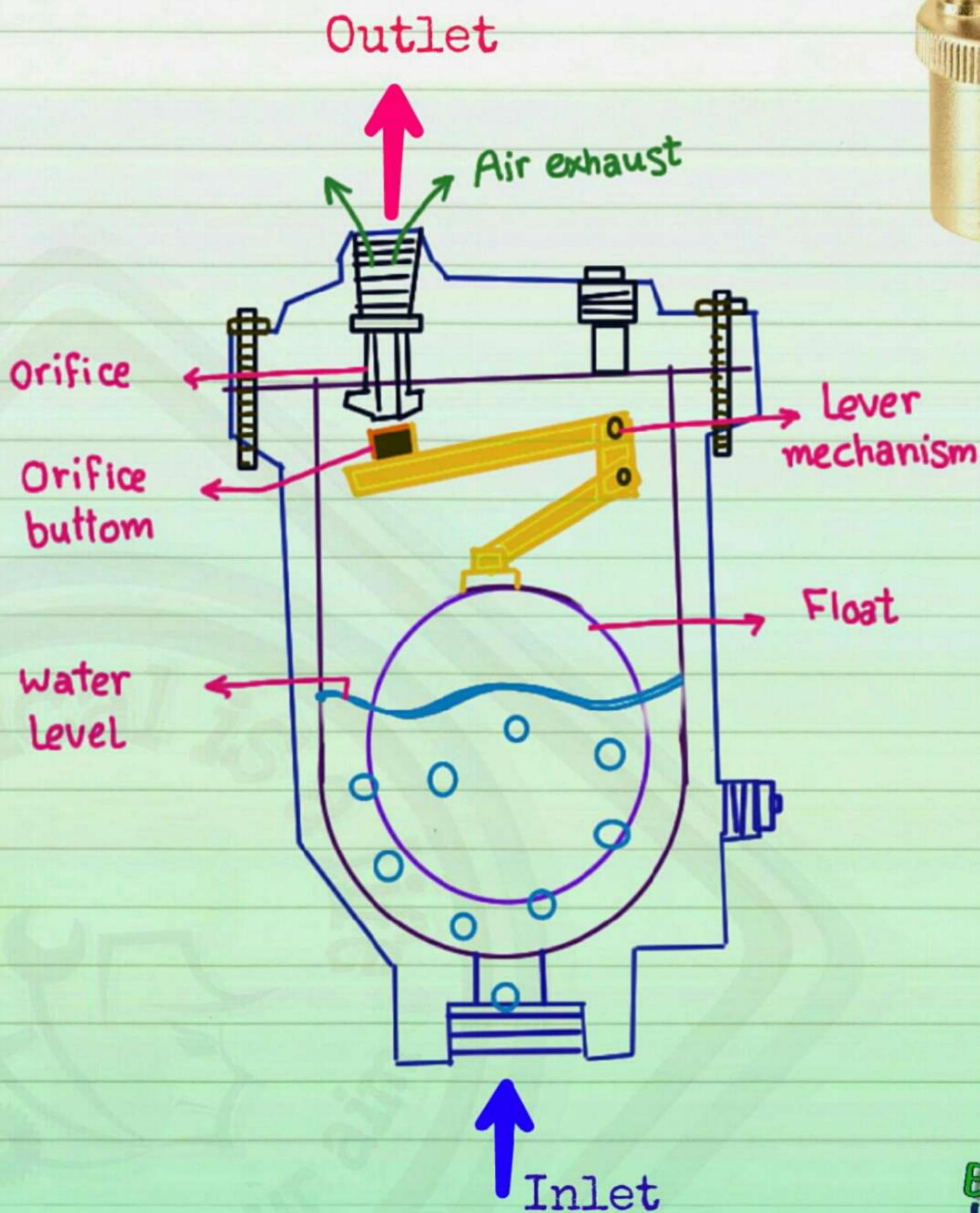
Automatic Air Vent





⊗ Automatic Air Vent.

- Used for exhaust the air from water pipe.
- Install in the pipe header.





How it works

At start-up the air vent is open allowing air to pass through the main valve. As soon as water reaches the vent the float is raised and the lever mechanism closes the valve.

When more air reaches the vent chamber, the float falls and opens the valve. After the air is discharged, the valve closes, due to a rising water level.

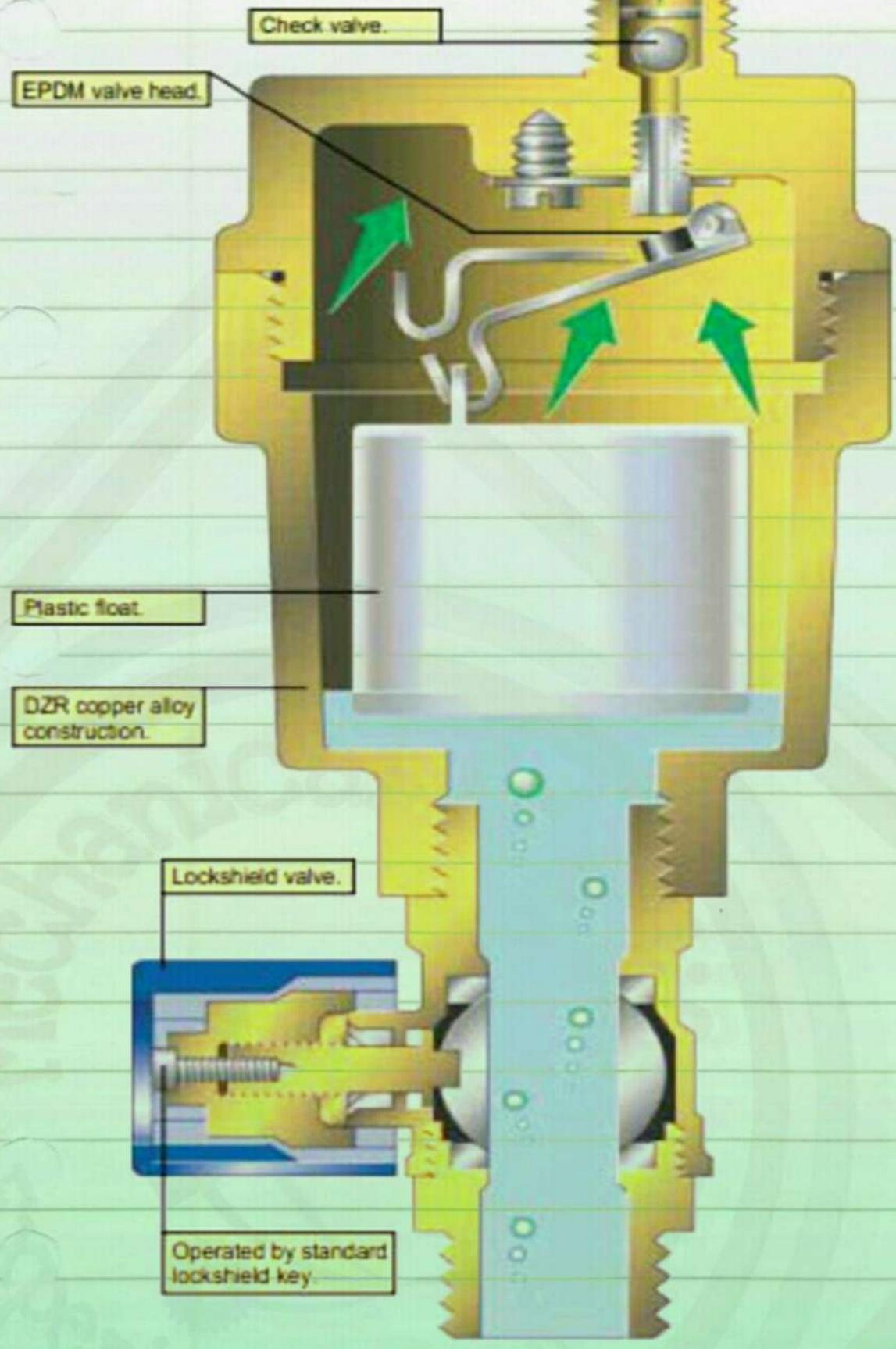
The check valve is essential where there is a possibility of the system operating in vacuum by preventing air being drawn into the system.

The lockshield ball valve has a unique feature that offers 3 modes of operation:

- Normal operation.
- Locked in open position.
- Locked in closed position.

In normal operation the ball valve can be adjusted using a lockshield key.

In the open or closed position the valve can be locked. If the plastic cover and screw are removed the valve stem can be rotated to lock the ball valve in the open or closed position.



Typical application

- The automatic air vent should be installed vertically with the inlet at the bottom. We recommend piping the discharge from the air eliminator / air vent to a suitable safe point.

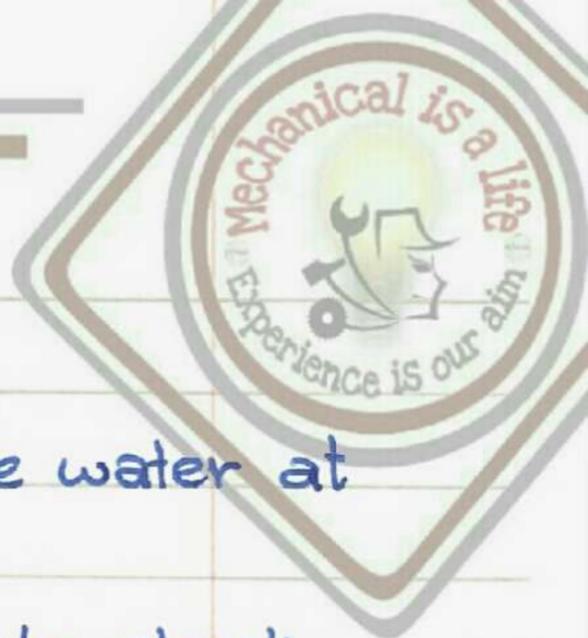




⑥

Pressure Gauge

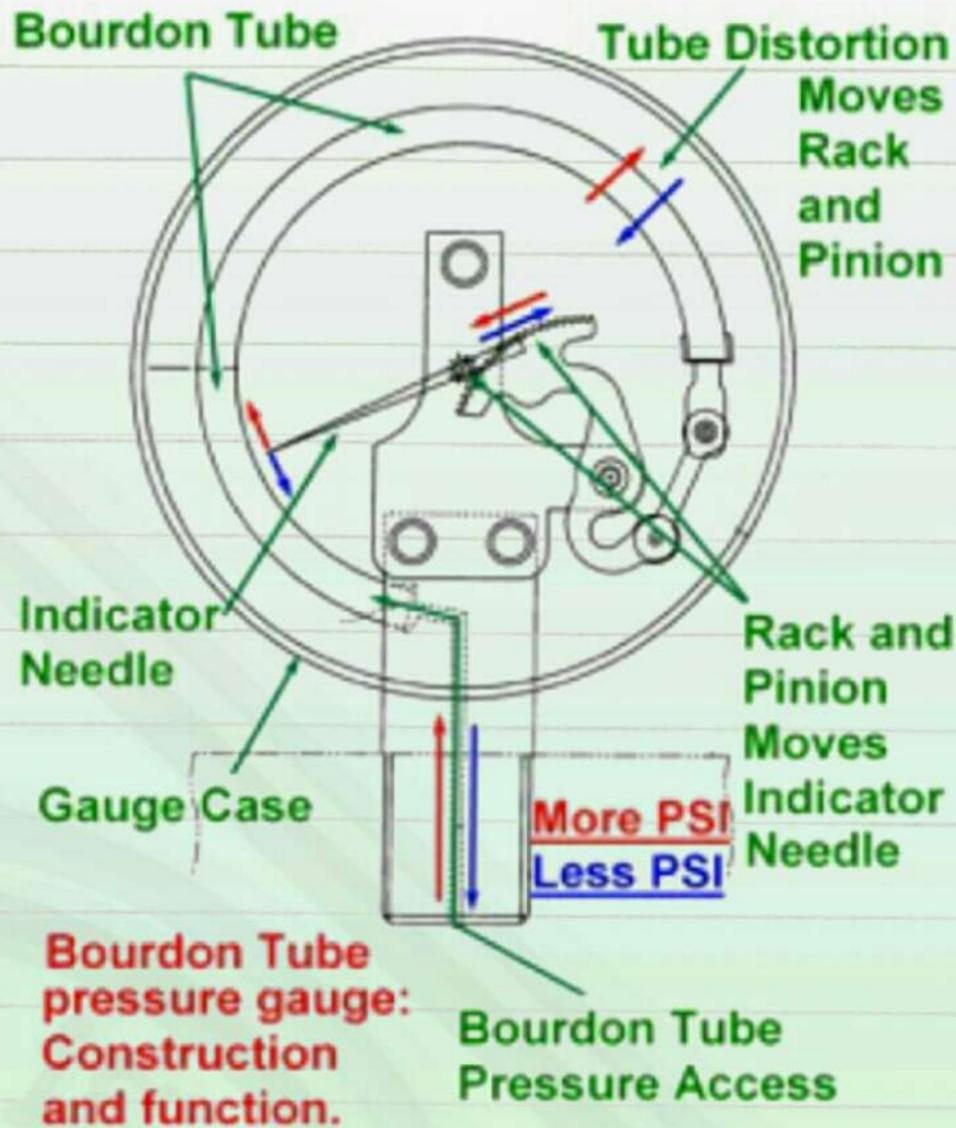


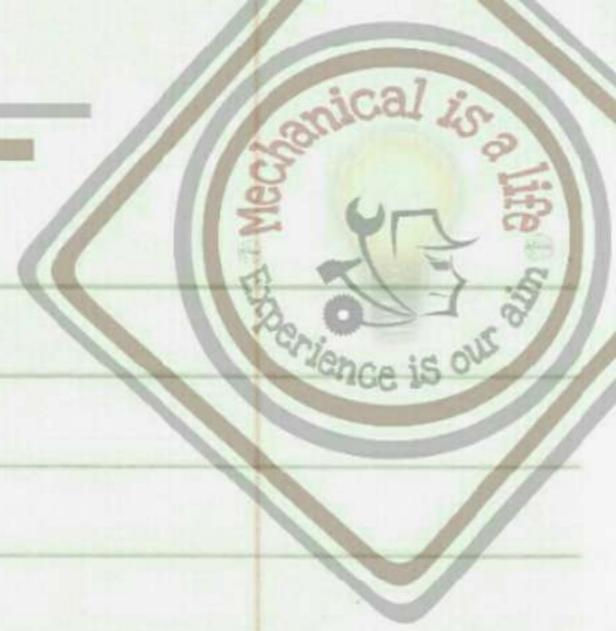


Pressure gauge



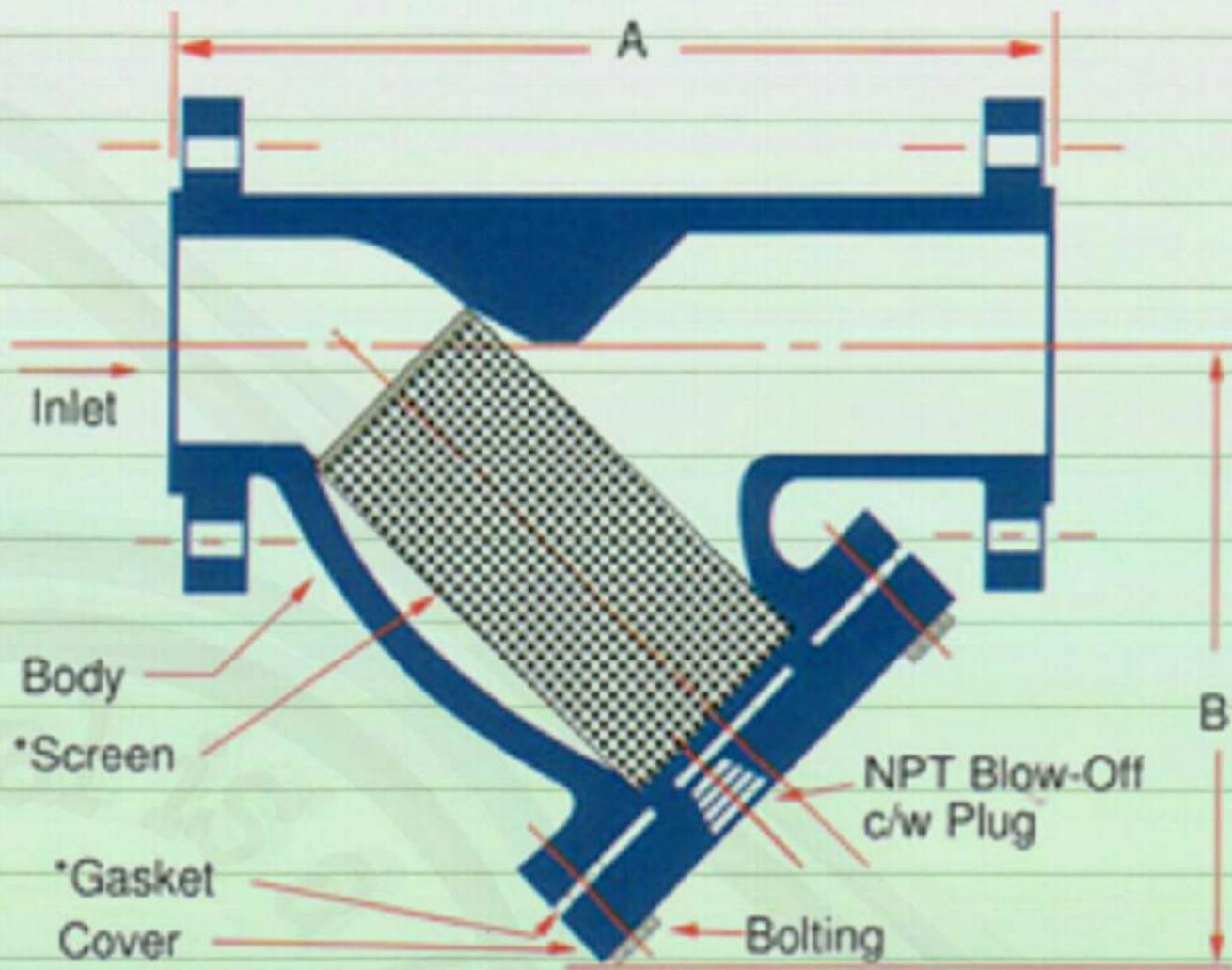
- Used to measure the pressure of the water at the current floor
- Used for the purpose of inspection to check the water pressure in pipes.





7

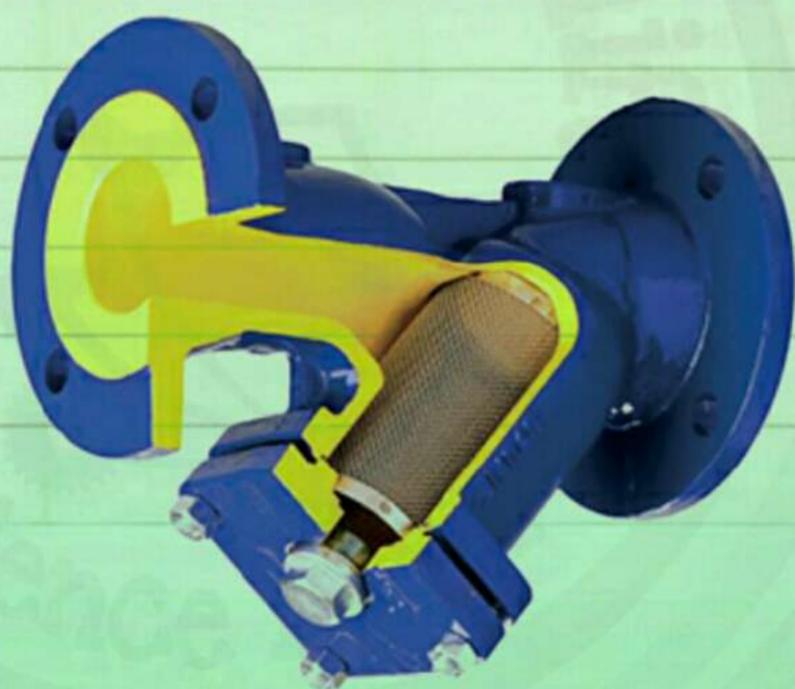
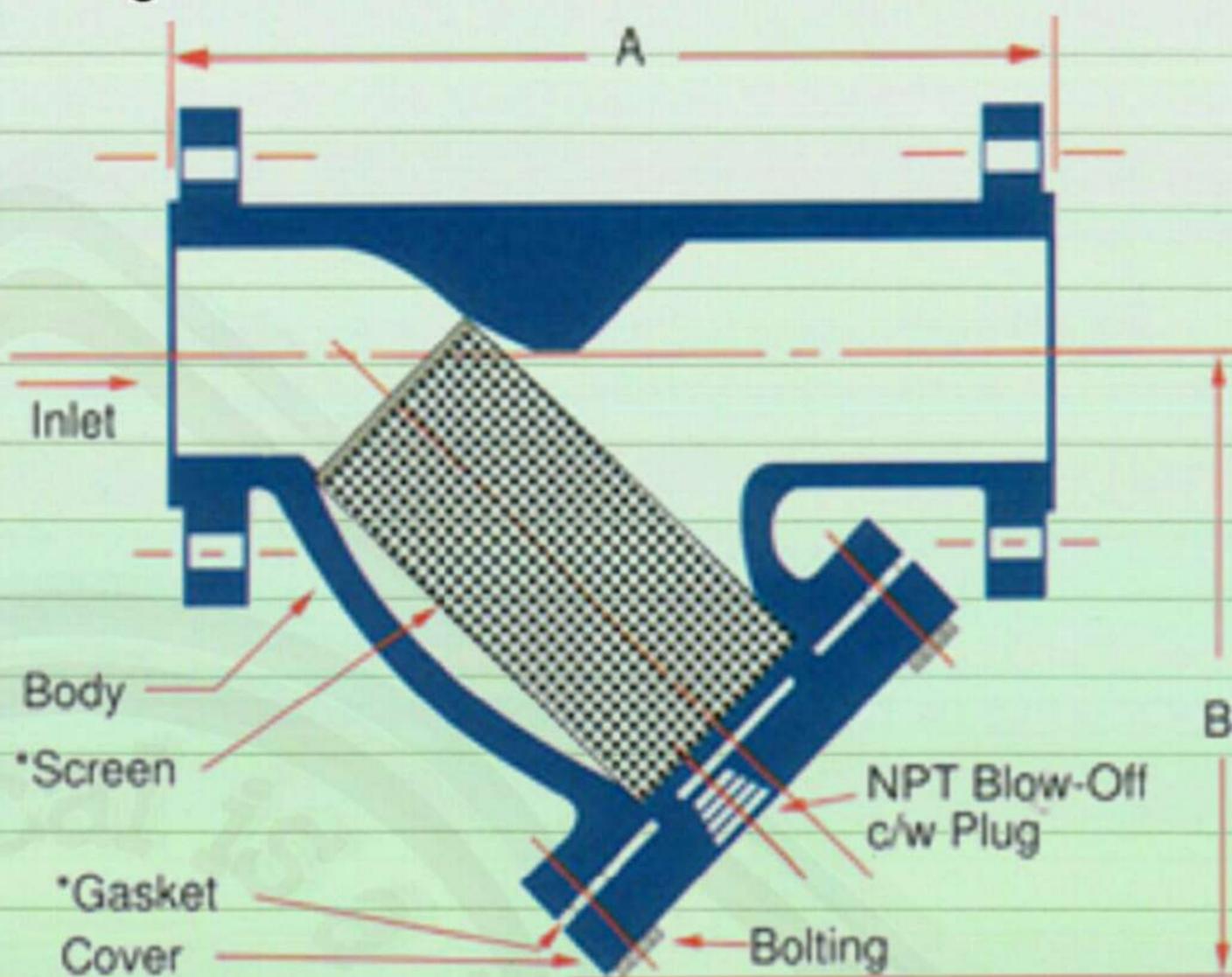
Y-Strainer



* Y-Strainer



- Take their name from their configuration.
- Install in the entrance line.
- Used in either horizontal or vertical pipe.
- Mechanically it remove solids from the water pipe before entering the coil pipes to prevent any damage in it.

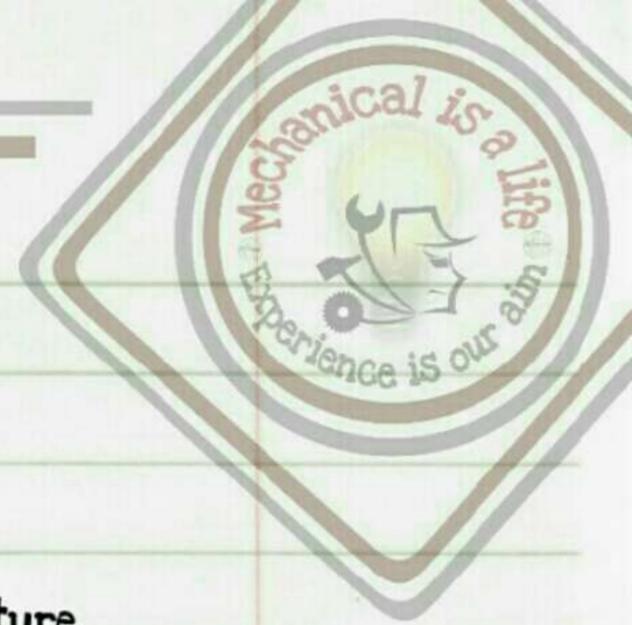




8

Flexible Joint





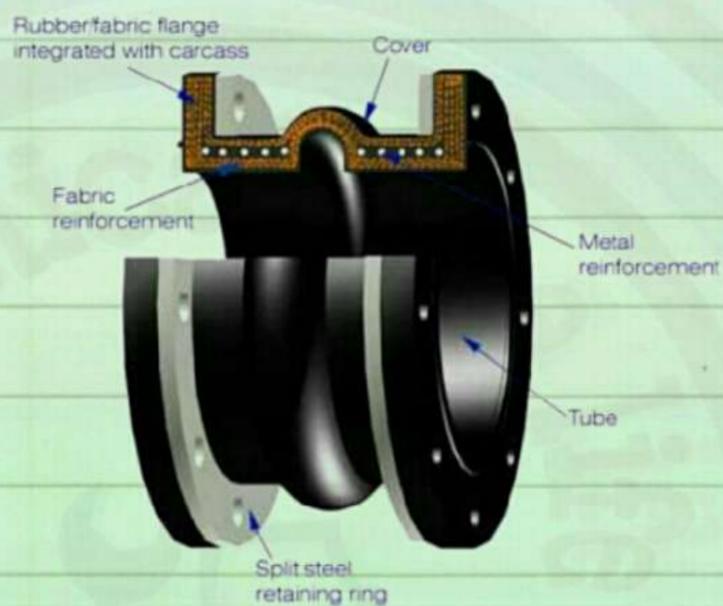
Flexible connection

Function

- Absorb and damp the vibration and noises.
- Compensate expansion caused by differences in the temperature.
- Tension reduction.
- Easily to remove when revising the pipe line

Types:

1- Rubber expansion joint



2- Stainless steel expansion joint





9

Hook Up

Chiller

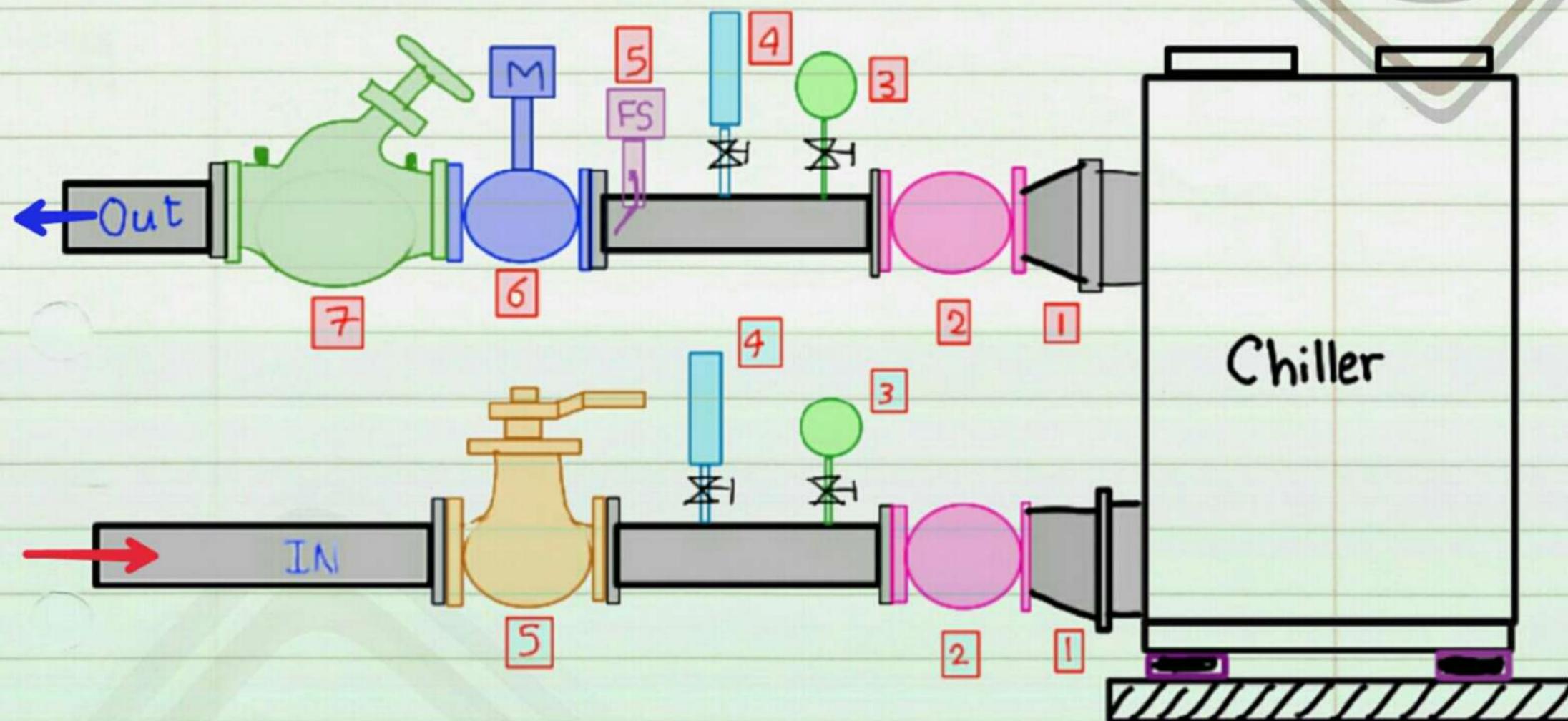
pump

AHU

FCU



- Chiller hook up



Inlet line

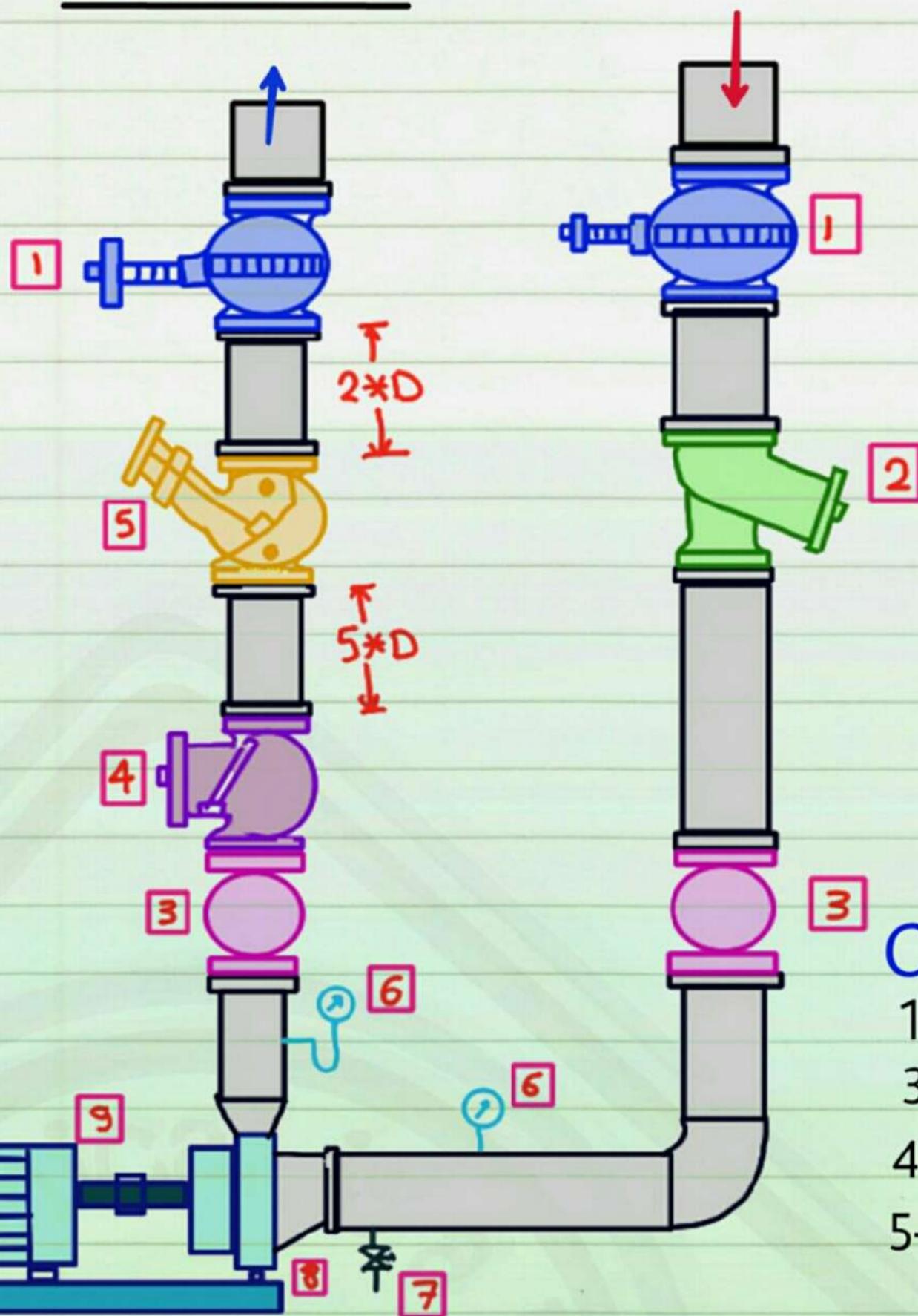
- | | | |
|----------------------|---|-------------------|
| 1- Eccentric reducer | 2- Flexible joint | 3- Pressure gauge |
| 4- Thermostat | 5- Isolation valve (Gate - Butterfly) | |

Outlet line

- | | | |
|---|-------------------|-------------------|
| 1- Reducer | 2- Flexible joint | 3- Pressure gauge |
| 4- Thermostat | 5- Flow switch | |
| 6- Isolation valve (Optional - Motorized) | | |
| 7- Double regulating valve (Optional) | | |



Pump hook up

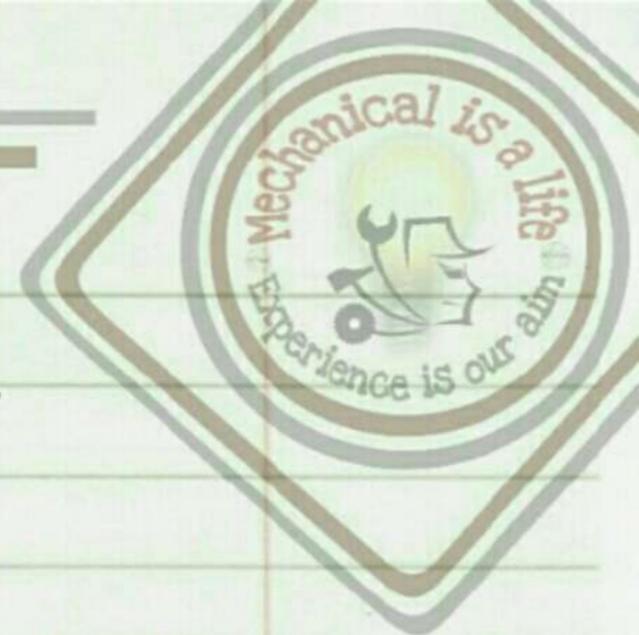


Inlet line

- 1- Gate valve
- 2- Strainer
- 3- Flexible joint
- 6- Pressure gauge
- 7- Drain valve
- 8- Eccentric reducer

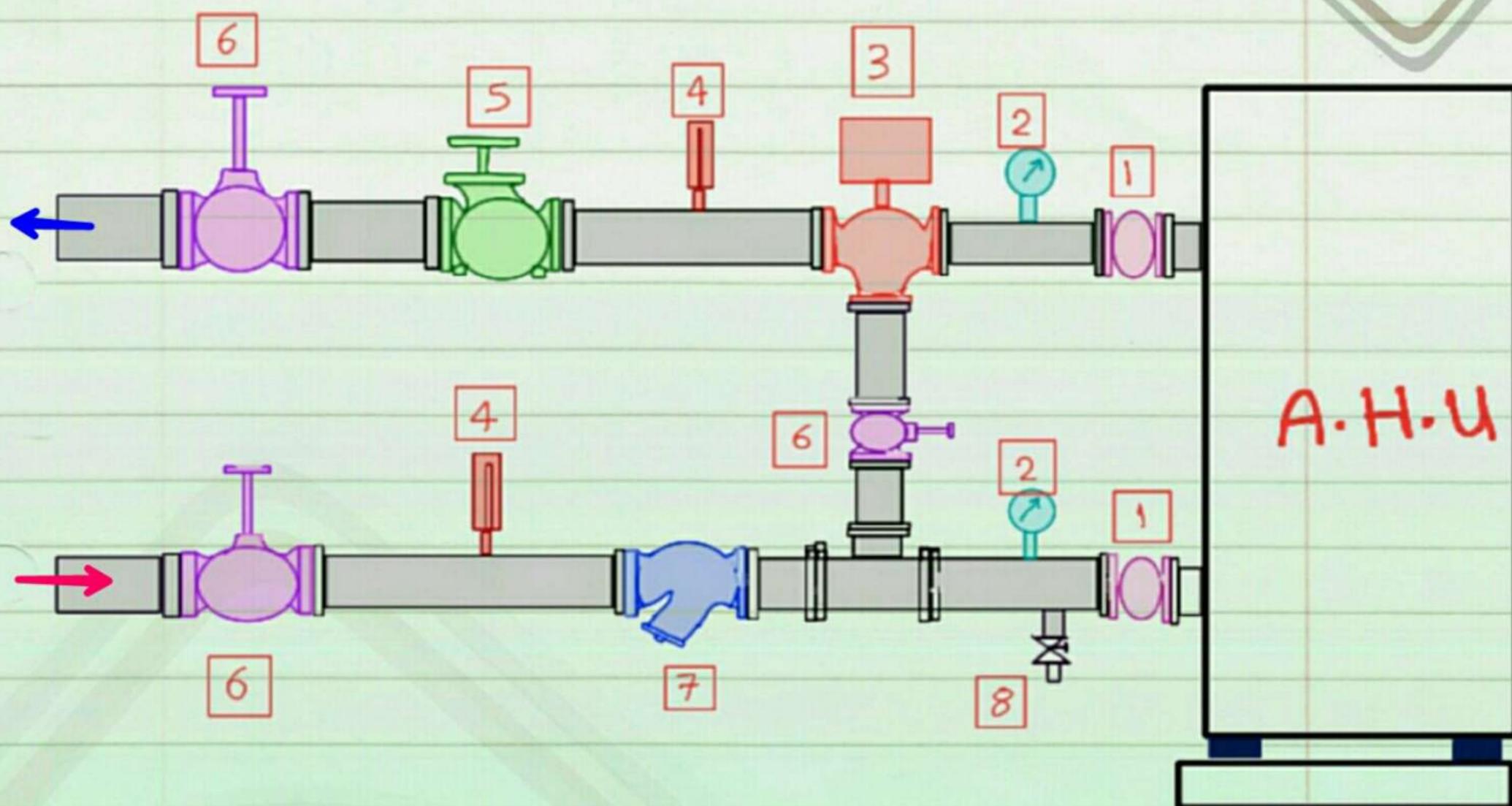
Outlet line

- 1- Gate valve
- 3- Flexible joint
- 4- Check valve
- 5- Balance valve (Optional)
- 6- Pressure gauge



Air Handling Unit (AHU)

With 3 Way valve



Outlet line

1- Flexible joint
4- Thermostat

2- Pressure gauge
5- Balance valve

3- 3 Way valve
6- Gate valve

Inlet line

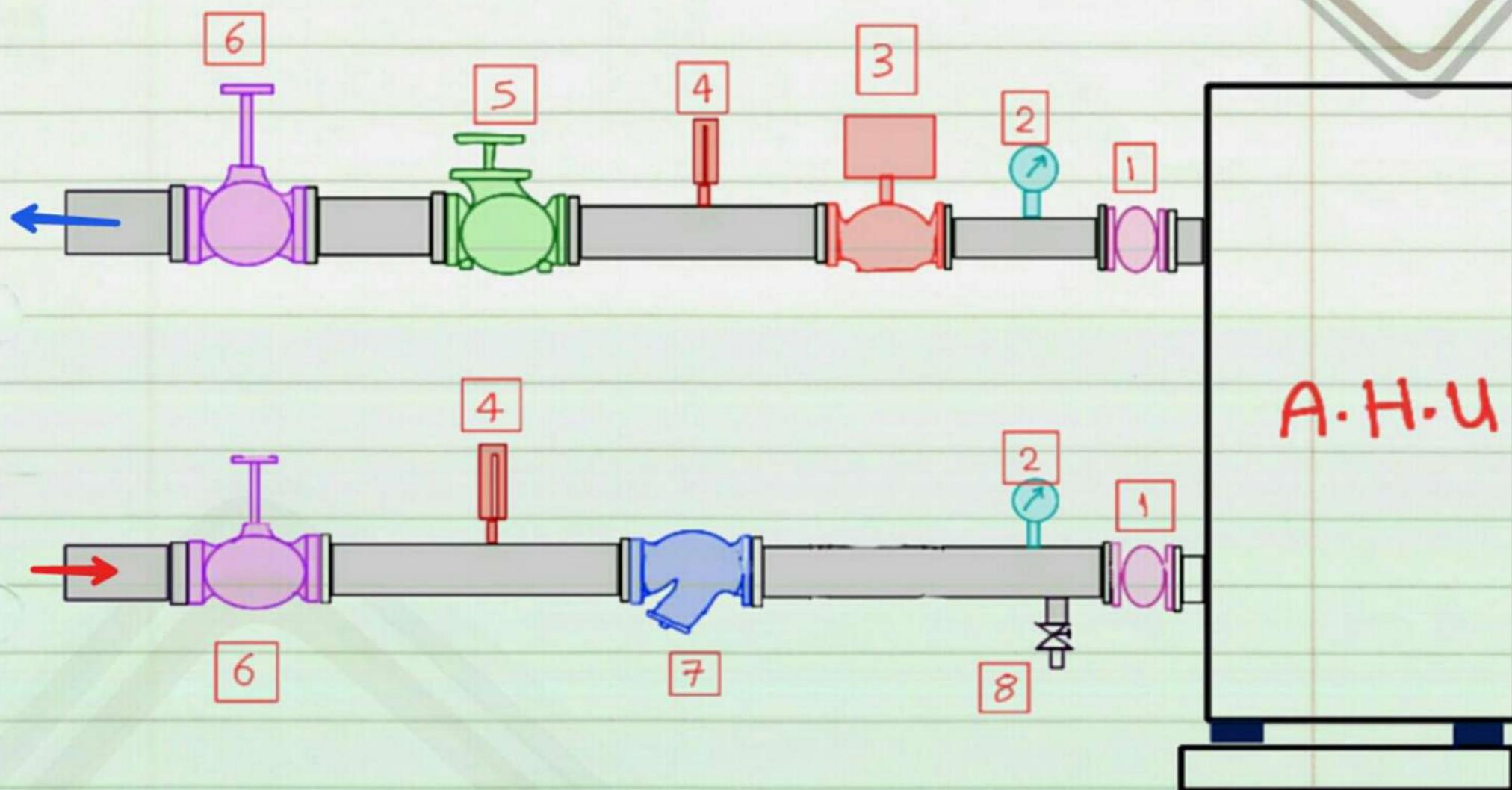
1- Flexible joint
6- Gate valve

2- Pressure gauge
7- Y Strainer

4- Thermostat
8- Drain valve

Air Handling Unit (AHU)

With 2 way valve



Outlet line

- 1- Flexible joint
- 4- Thermostat

- 2- Pressure gauge
- 5- Balance valve

- 3- 2 Way valve
- 6- Gate valve

Inlet line

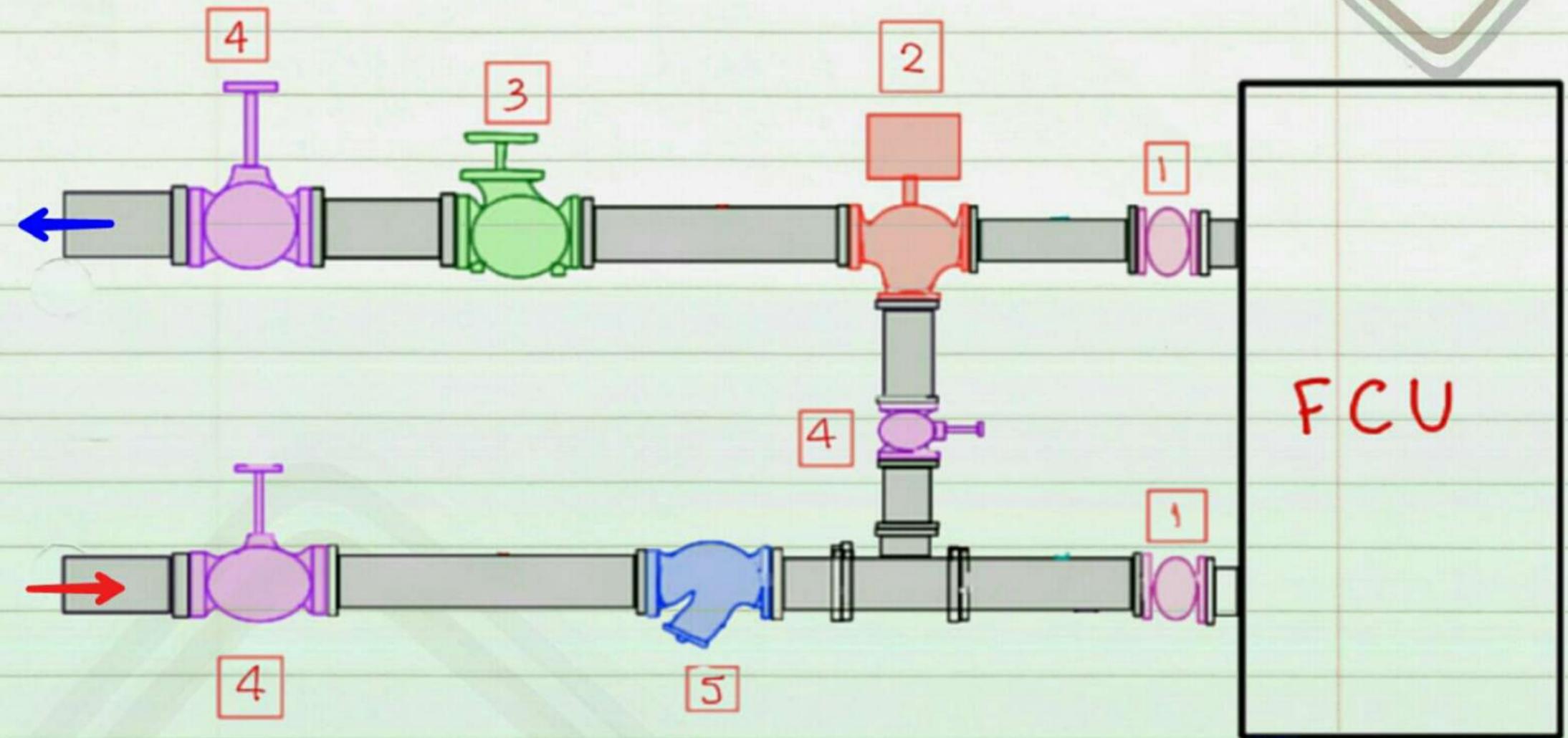
- 1- Flexible joint
- 6- Gate valve

- 2- Pressure gauge
- 7- Y Strainer

- 4- Thermostat
- 8- Drain valve

Fan Coil Unit (FCU)

With 3 way valve



Outlet line

1- Flexible joint
4- Gate valve

2- 3 Way valve

3- Balance valve

Inlet line

1- Flexible joint

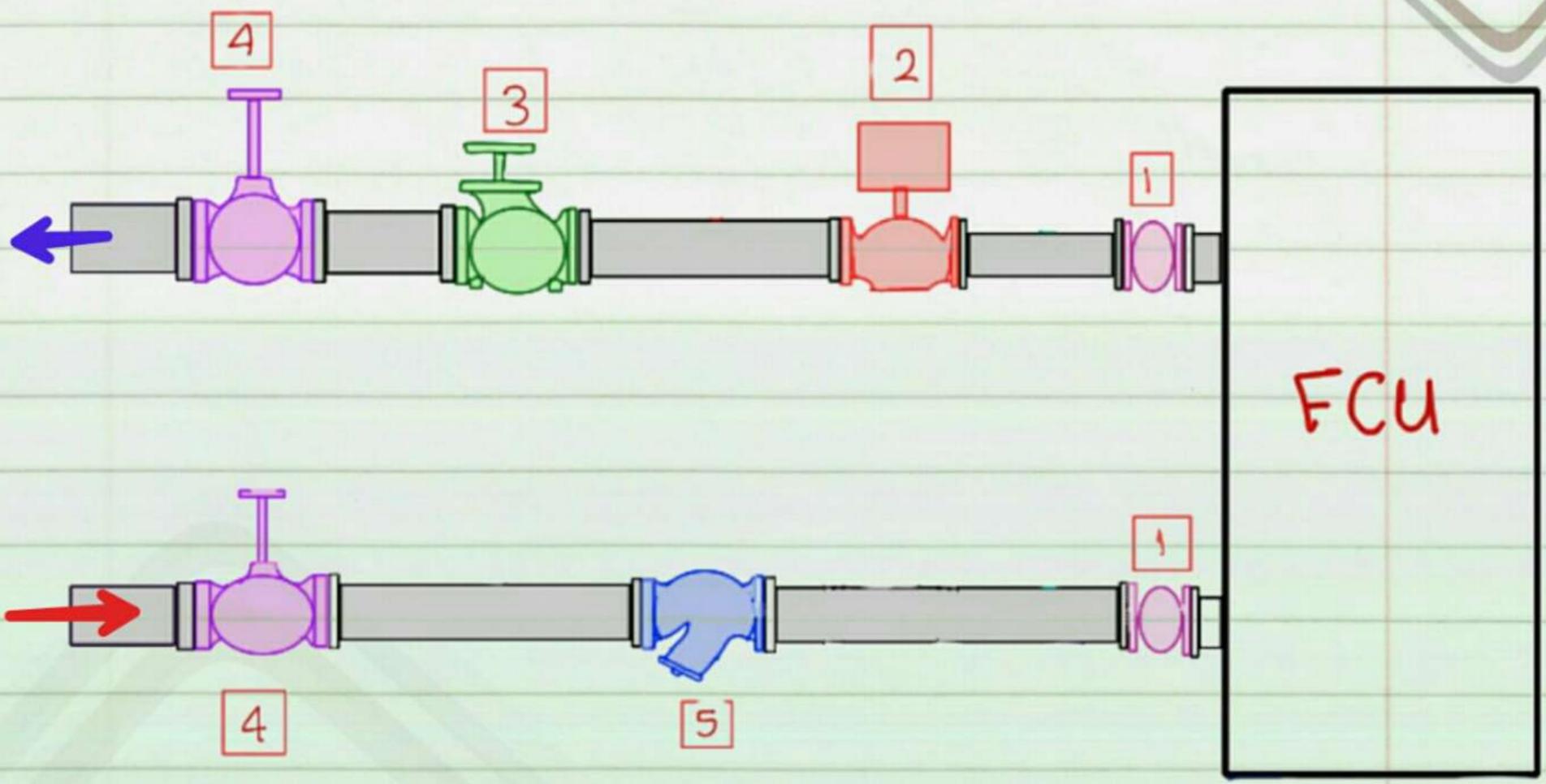
4- Gate valve

5- Y Strainer



Fan Coil Unit (FCU)

With 2 Way valve



Outlet line

- 1- Flexible joint
- 2- 2 Way valve
- 3- Balance valve
- 4- Gate valve

Inlet line

- 1- Flexible joint
- 4- Gate valve
- 5- Y Strainer





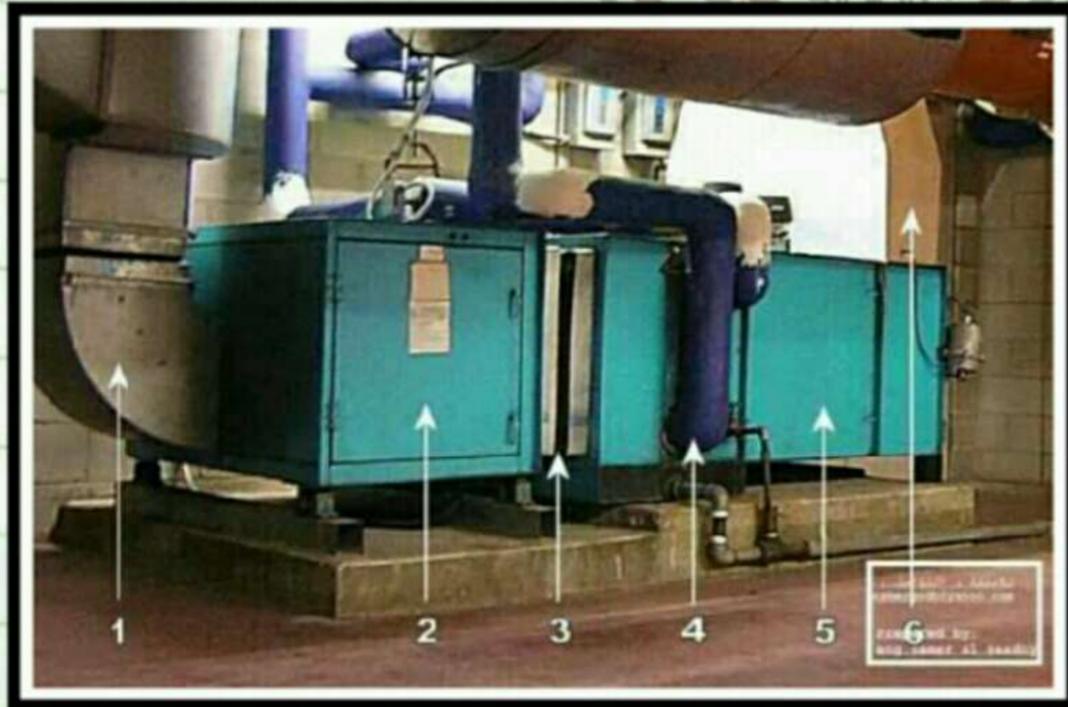
10

Photo From Real Site





AHU



FCU





Flexible joint



Pressure gauge



Gate valve



Flow switch



Y Strainer



Globe - Balance valve





Check valve



Ball valve



3 way valve for AHU



2 way valve, Pressure gauge & Thermometer in AHU



3 way valve in FCU



Butter fly valve





Chiller hook up



Pump hook up

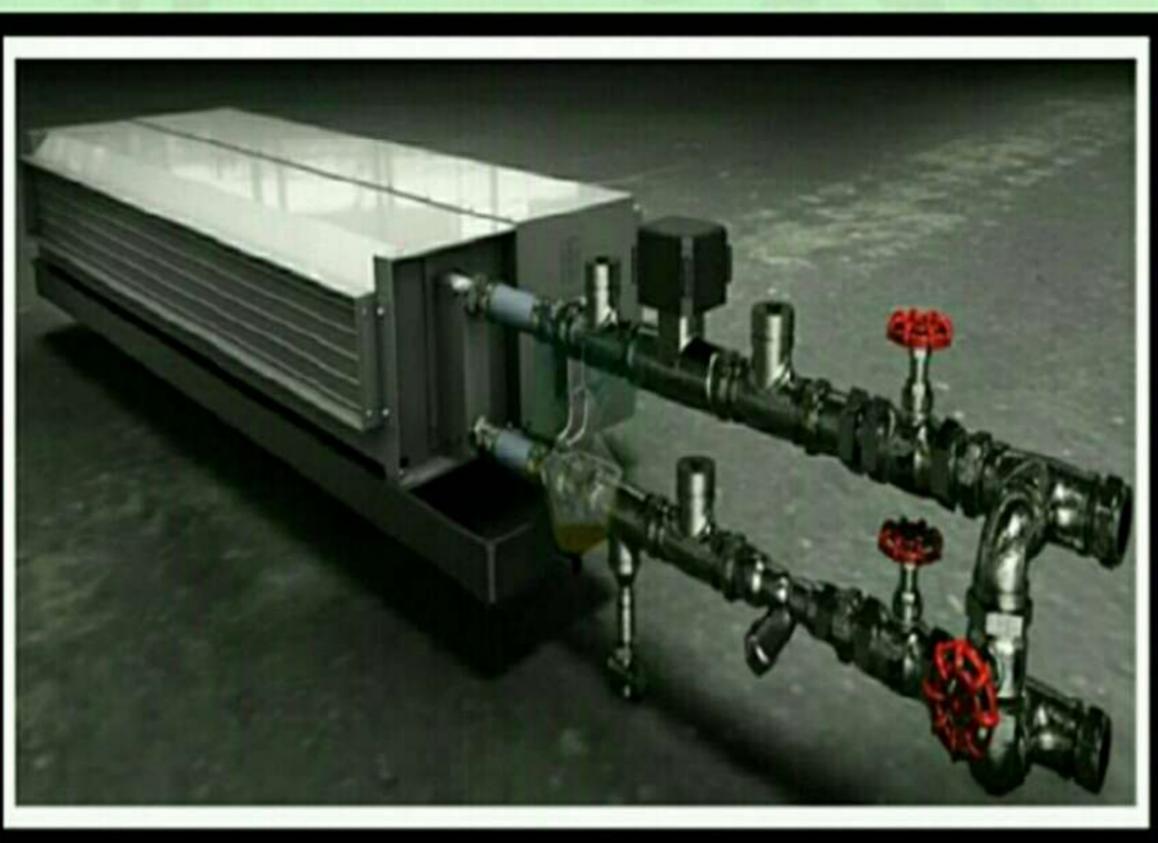




AHU HOOK UP



AHU HOOK UP

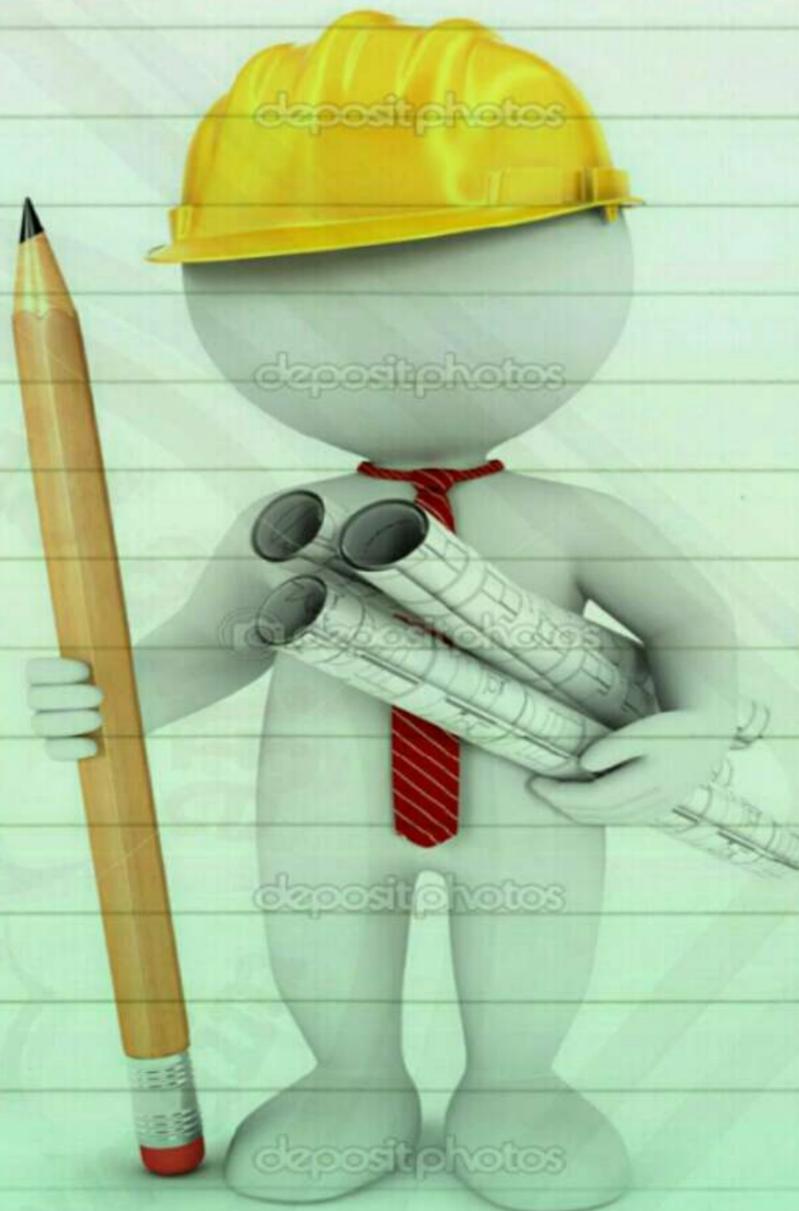


FCU HOOK UP



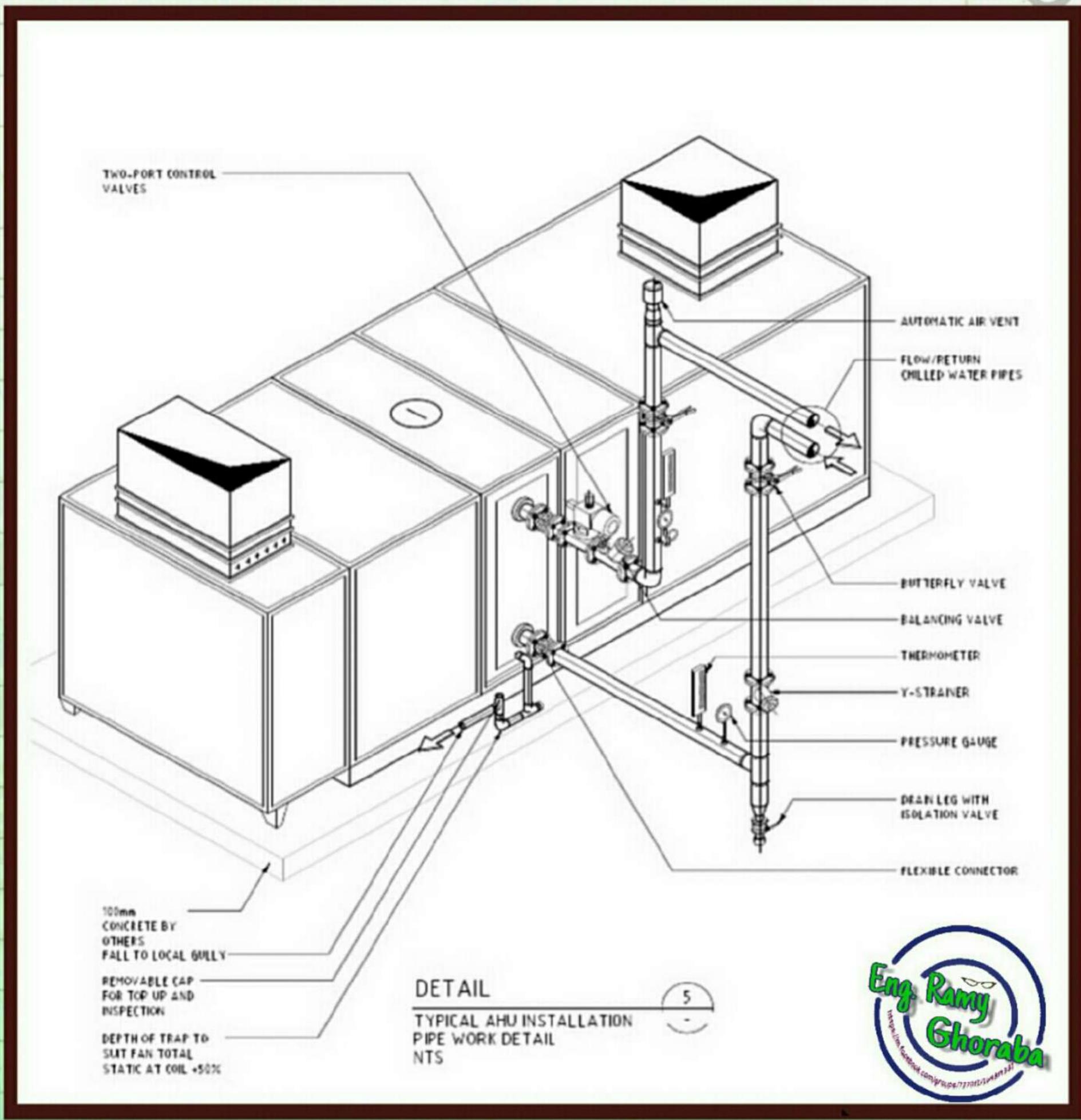


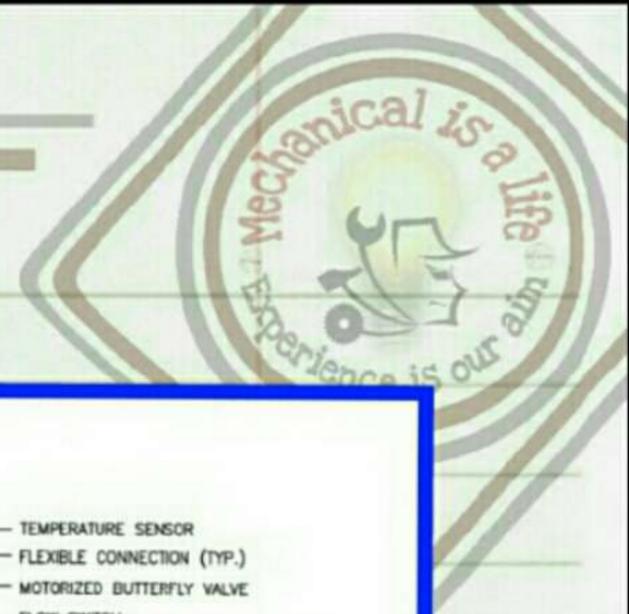
Symbol From IFC Drawing



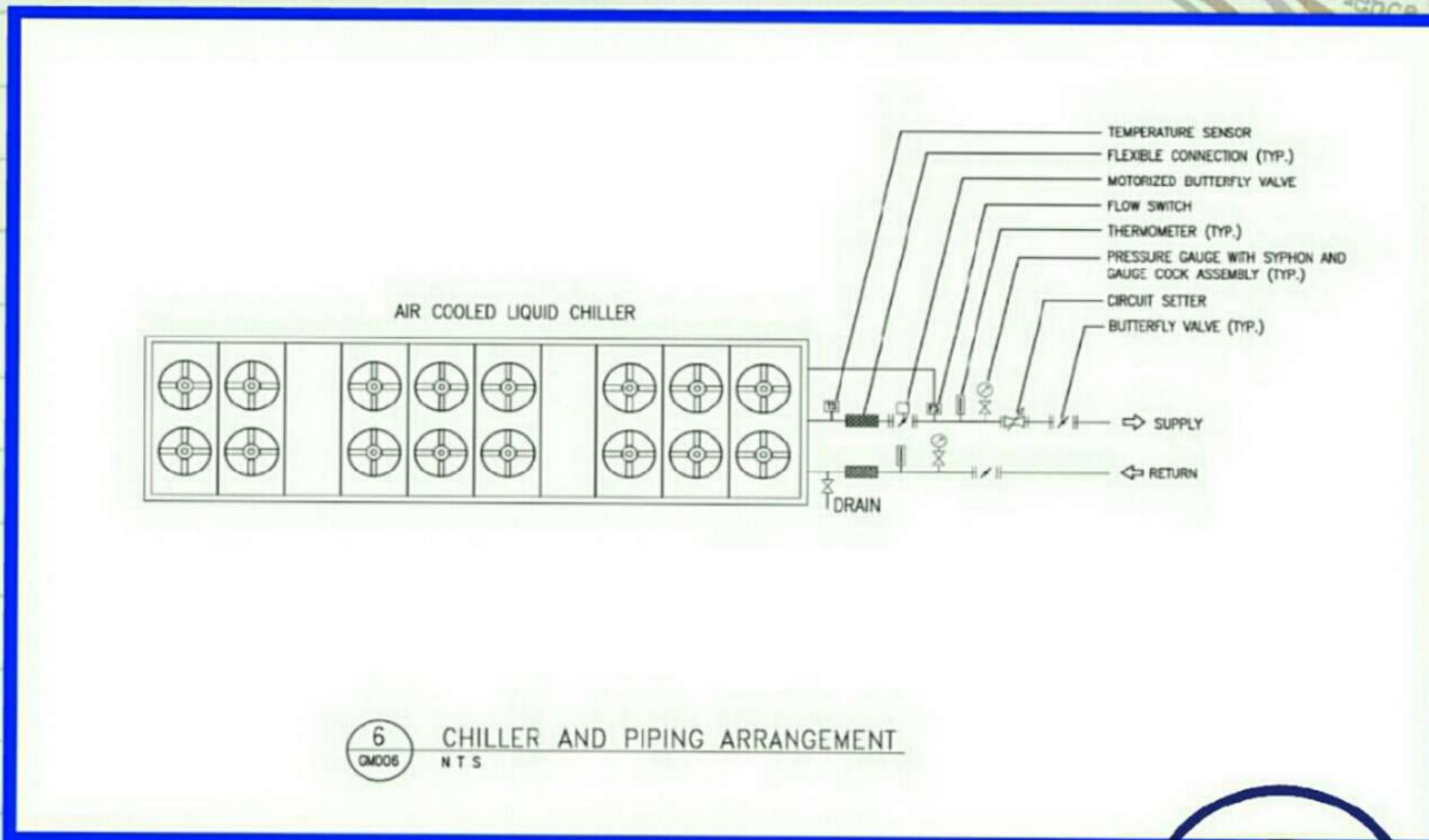


Isometric for AHU hook up

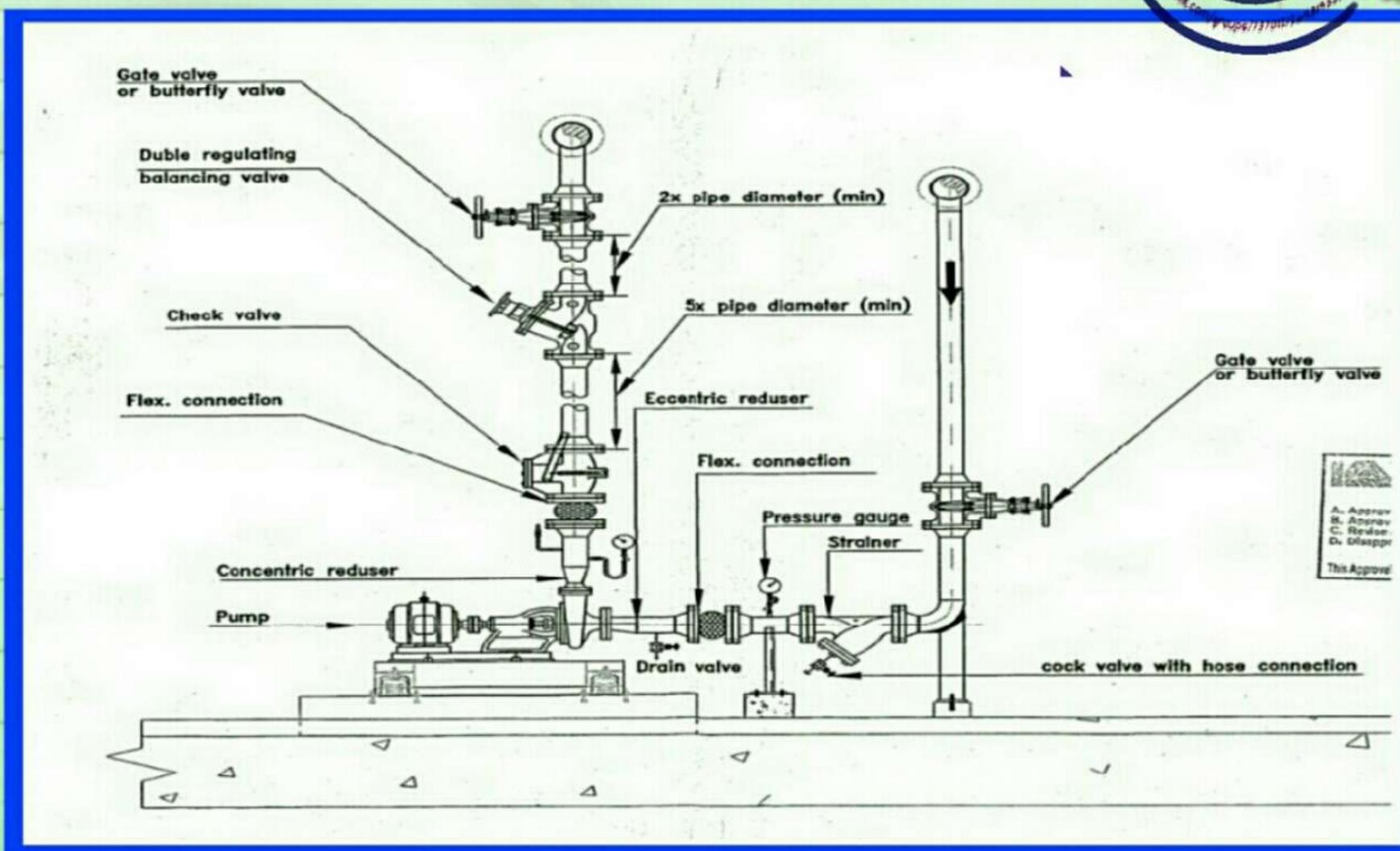


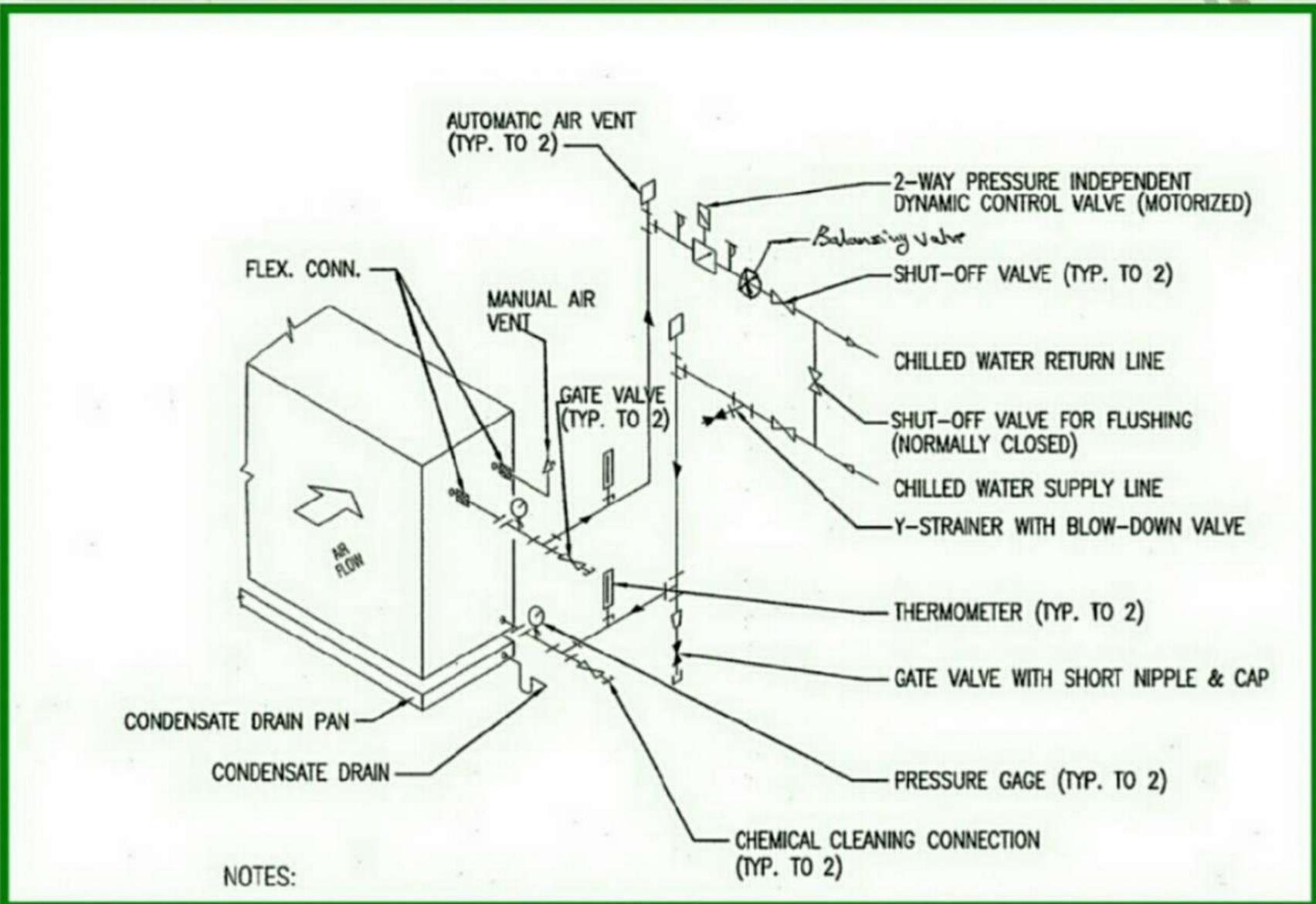
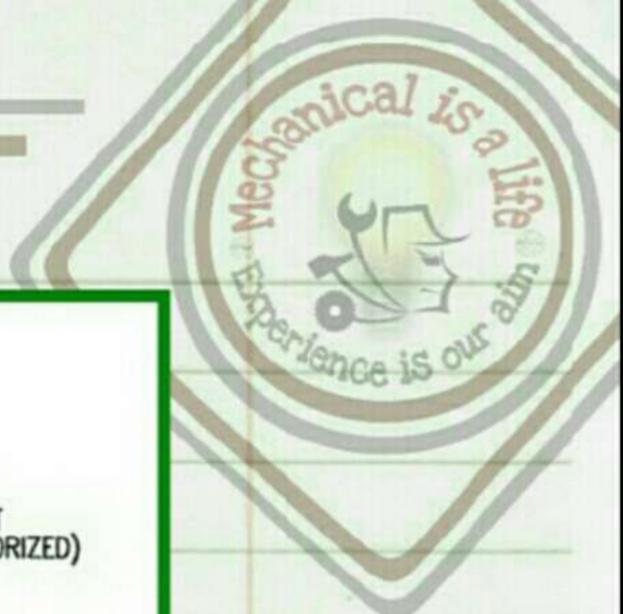


Chiller hook up

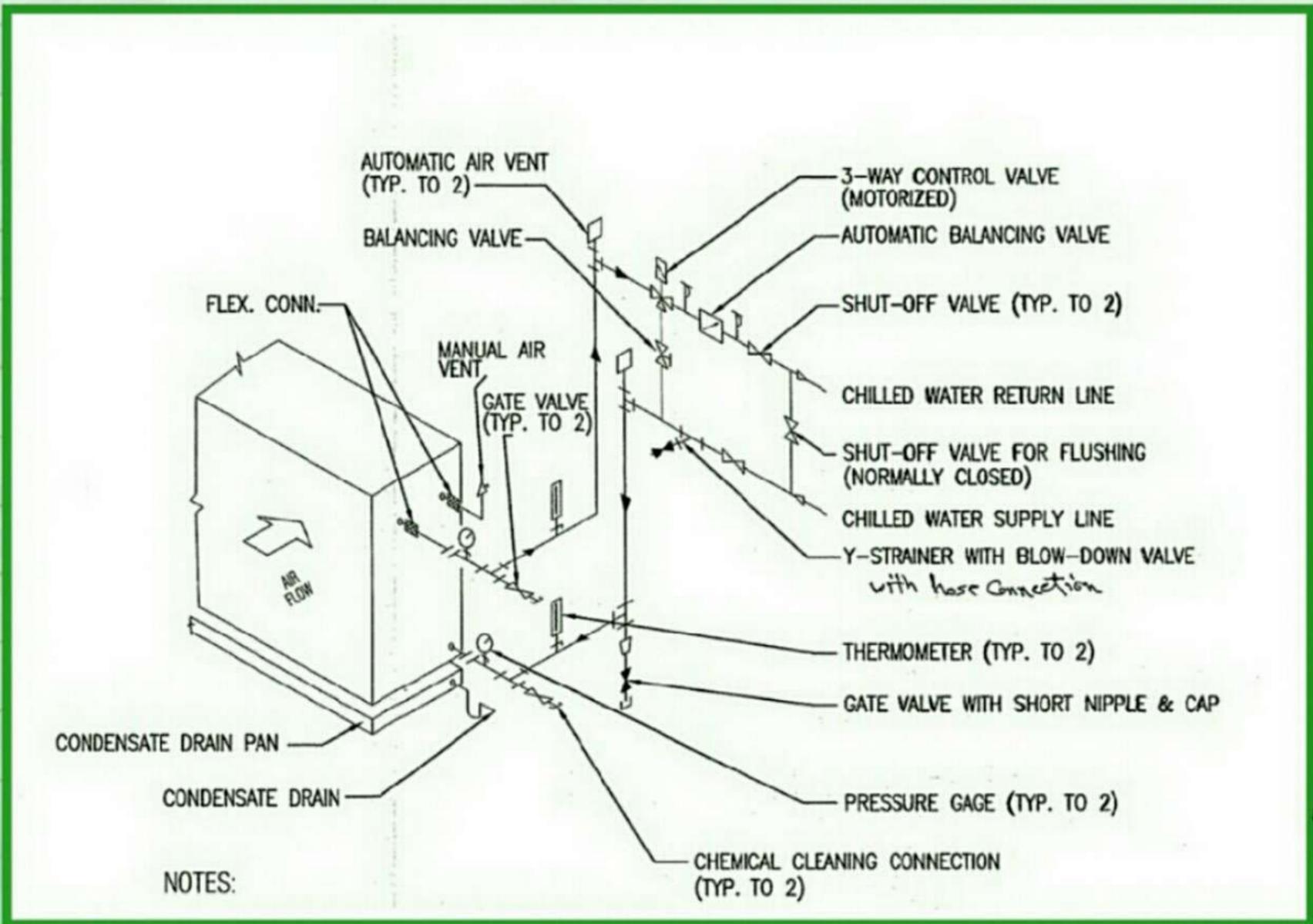


Pump hook up





2 way valve connection for AHU & FCU



3 way valve connection for AHU & FCU

