ŌMEAX

Building applications valves

Your worldwide partner for industrial valves & fittings

Omeax is created by a group of valve specialists, who has direct market access in Far East. We export high quality of valves from Europe to Far East.

Our strength:

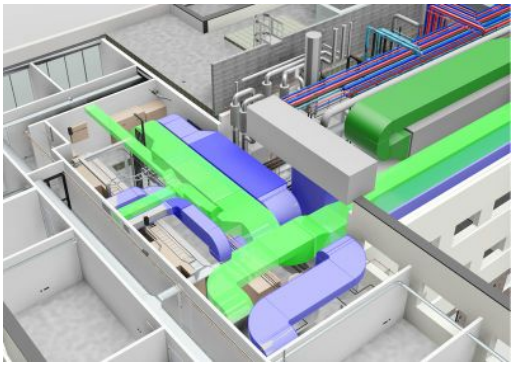
1. We are a professional sales team with more than 8 years of sales experiences in valves and fittings.
2. Our sales network covers Far East.
3. We provide professional sales assistance in each step of sales :
   Before sales : product prescription, product selection.
   During sales : commercial/technical support.
   After sales : warranty, customer services.
4. We select high quality product from Europe.
5. Our product range covers all application of : Building, Waterworks, Plumbing, Oil & Gas, and Industry.

I. HVAC VALVES

II. PRESSURE MANAGEMENT VALVES

III. TECHNICAL INFO

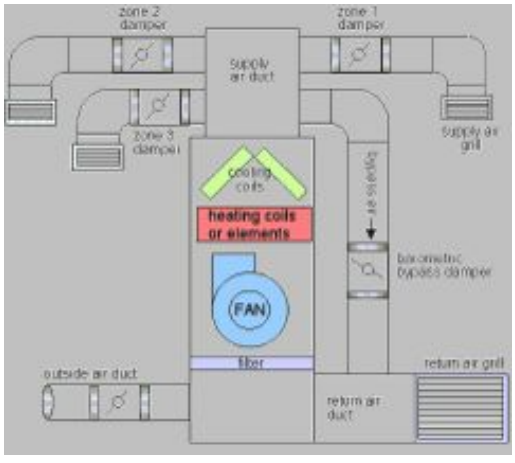
WHAT IS HVAC ?



HVAC systems stands for **Heating, Ventilation,** and **Air Conditioning systems**, which are designed for indoor or automotive environmental comfort. The HVAC technology is mostly used in the design of medium to large industrial and office buildings such as skyscrapers and marine environments. With the help of the HVAC systems, safe and healthy building conditions are regulated with **temperature and humidity.** This technology also helps in providing good fresh air outdoors and also in regulating a healthy building condition.

There are 3 interrelated central functions of HVAC systems, which provide **thermal comfort**, acceptable **indoor air quality**, within **reasonable installation, operation and maintenance costs**.

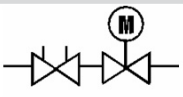
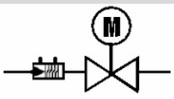
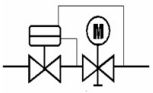
Heating is mostly used in cold climates. The main advantage of heating is to heat the private houses and public buildings. In smaller buildings, the heating is done with the help of boiler, furnace, or heat pump to heat up the water, steam or air. In large buildings, furnace room or mechanical room, do the heating. The central heating was invented with the installation of a HVAC systems of air ducts called as hypocaust in the walls and floors.



Ventilating is a process that helps in replacing air to control temperature or removing heat, dust, or to refill oxygen. It is done in two ways, as it includes exchange of air with the outside, as well as circulating the air within the same room.

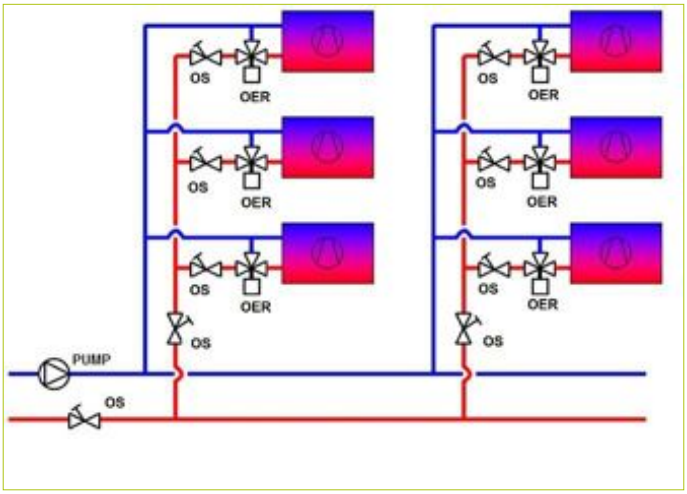
The **air conditioning** helps in removal of heat by radiation, convection and by heat pump systems. The process of removing of heat with radiation, convection and heat pump systems is known as refrigeration cycle. All the air conditioning systems provide cooling, ventilation, and humidity control.

APPLICATION COMPARATIVE TALBLE

	Motorised valves	Manual balancing valves + Motorized valve	Automatic balancing valves + Motorized valves	Differential pressure control valves + Motorized valves	PICV
					
Temperature control effectiveness	Bad, easy to vibrate	Normal, easy to be disturbed	Bad	Good	Good
Valves open at the same degree, is KV affected by Δ P ?	Yes	Yes	Yes, when system is parially loaded	Yes, Tiny	No
Achieve static system balance ?	No	Yes	Yes	Yes	Yes
Is control valves opening degree affected by system pressure variation ?	Big effect	Very big effect	Biggest effect	No effect	No effect at all
Anti - jamming capacity	Weak	Weak	Fixed flow, partial loaded, weak	Relatively Strong	Strong
Min Δ P request	No	No	Yes	Yes	Yes

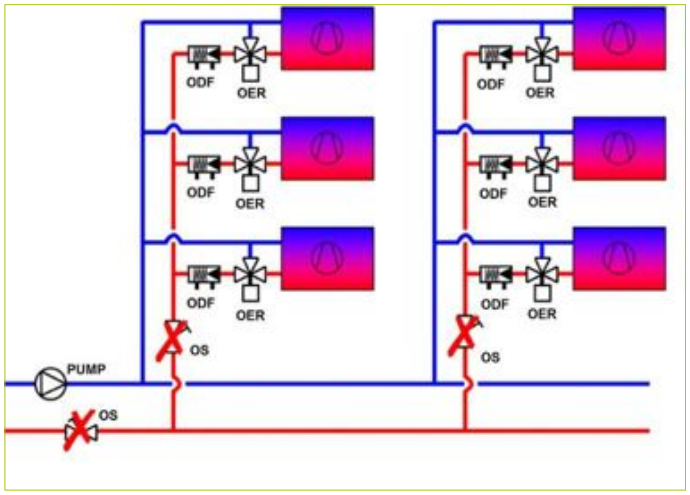
CONSTANT FLOW -MANUAL

Manual balancing valves are added to terminal unit



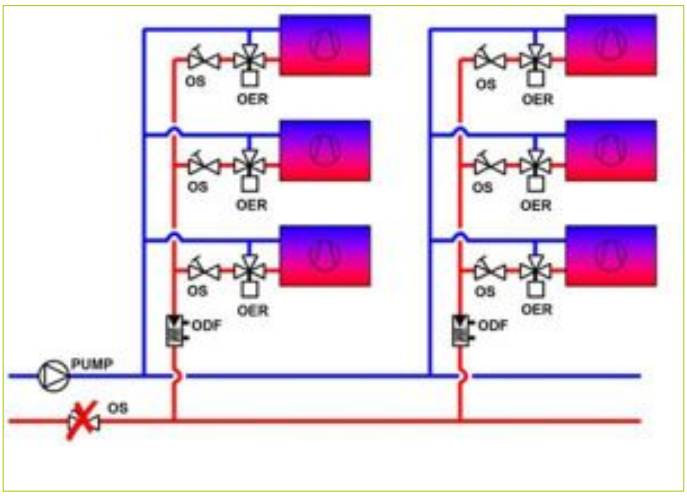
CONSTANT FLOW-AUTOMATIC

Automatic balancing valves are added to terminal unit



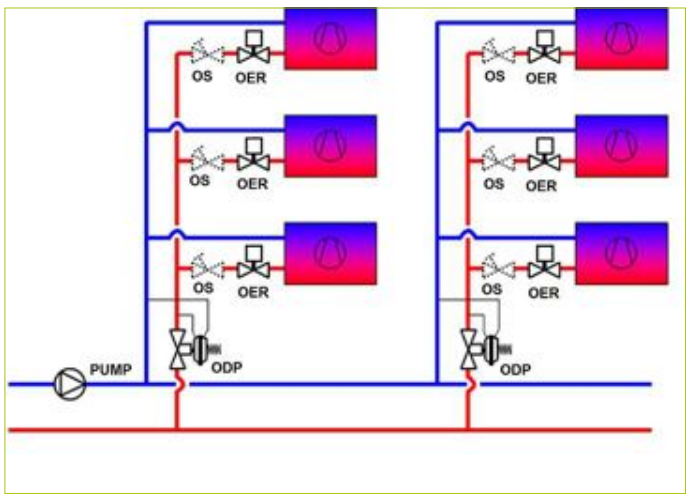
CONSTANT FLOW-MANUAL AND AUTOMATIC

Manual balancing valves are added to terminal unit, automatic balancing valves are added to riser



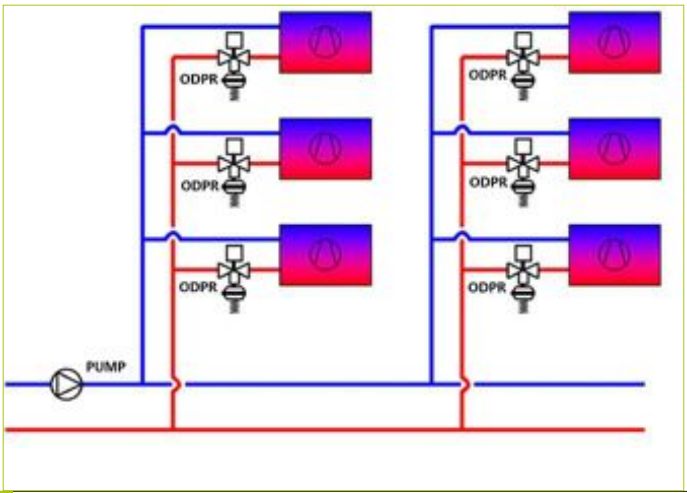
CONSTANT FLOW-PRESSURE DIFFERENTIAL CONTROL V

Manual balancing valves are added to terminal unit, pressure differential valves are added to riser



VARIABLE FLOW SYSTEM BALANCE

Pressure Independent Control Valves-PICV



Note :

OS : Manual balancing valves

ODF :Automatic balancing valves

OER : Equal-percentage control valves

ODP :Differential pressure control valves

ODPF :Pressure Independent Control Valves

AUTOMATIC BALANCING VALVES--ODF

- Brass body and cartridge
- DN15-DN40
- Threaded
- -10°C-120°C
- 25 bars
- React automatically to different pressure; Keep contstant flow in terminal unit

AUTOMATIC BALANCING VALVES--ODF

- Ductile iron body,stainless steel cartridge
- DN40-DN800
- Flanged
- -10°C-120°C
- 25 bars
- React automatically to different pressure; Keep contstant flow in terminal unit

DIFFERENTIAL PRESSURE CONTROL VALVES--ODP

- Brass body, EPDM membrane
- DN15-DN50
- Threaded
- -10°C-100°C
- 25 bars
- React automatically to different pressure; Keep contstant flow in terminal unit

DIFFERENTIAL PRESSURE CONTROL VALVES--ODP

- Ductile iron body
- DN40-DN400
- Flanged
- -10°C-110°C
- 16 bars
- 0,1-2 bar Δ P
- React automatically to different pressure; Keep contstant flow in terminal unit

PRESSURE DIFFERENTIAL VALVES--ODPB

- Ductile iron body
- DN50-DN300
- Flanged
- -10°C-80°C
- 16/25bars
- Maintain a content preset differential pressure automatically

BUTTERFLY VALVES WITH ELECTRIC ACTUATOR-Z300ME/MER

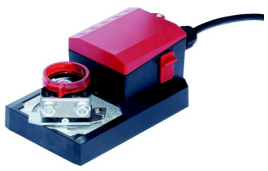
- Cast/Ductile iron body
- DN40-DN1200
- Flanged
- -10°C-110°C
- 16/25 bars
- Can be used with ODP Pressure Differential Controller as differential pressure control valves

ELECTRIC ACTUATOR--MR/MER/KEA

- ON/OFF and modulating
- Voltage: 24V DC/ 220V AC/380V AC
- Output torque: Max 6000NMInput
- Feedback signal: 0-10V/4-20mA
- IP67
- Integrated heater, emergency override hand wheel

DAMPER ACTUATOR--OATS3

- ON/OFF, 3 positions, proportional control
- Output torque: Max 30NM
- Input/feedback signal0-10V/4-20mA
- Voltage:24V DC/ 24V AC/220V AC
- IP67
- Brush less direct current motor,
- Rotation angle 95°C



OMEAX DAMPER ACTUATOR FEATURES:

- Brush less DC motor(electronically commutated motors) generate con- stant KVs.
- The actuator can be controlled by a software.
- Operation speed can be adjusted according to requirement through theswitches on the circuit board.
- The wearable gear assures the solidity of the actuator, and reduce fric- tion resistance.

EQUAL-PERCENTAGE CONTROL VALVES--OERB

- Brass body
- DN15-DN50
- Threaded
- -10°C-120°C
- 16/25 bars
- Hot and cold water, Refrigerant, Glycol
- Achieve equal-percentage control

EQUAL-PERCENTAGE CONTROL VALVES--OERB

- Ductile iron body
- DN65-DN100
- Flanged
- -10°C-120°C
- 16/25 bars
- Hot and cold water, Refrigerant, Glycol
- Achieve equal-percentage control

AUTOMATICALLY BALANCED TEMPERATURE CONTROL VALVES--ODBT

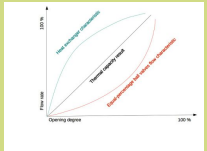
- Brass body
- DN15-DN25
- Threaded
- 0°C-80°C
- 16/25 bars
- Hot and cold water, Refrigerant, Glycol, Hydrazine
- Voltage: 220V AC

WHAT IS EQUAL PERCENTAGE CONTROL ?

To achieve stable control in HVAC system, the flow characteristic of control valves should complement the nonlinear characteristic of the heat exchanger in the HVAC system.An ordinary Ball Valve is not very suitable for control functions, because of its quick-opening flow characteristic, high flow coefficient (Kvs value).

Omeax offers V port ball valves to match the nonlinear characteristic of the heat exchanger.

1. V port ball valves achieve equal-percentage control.
2. No initial jump in flow during the valves opening stage.
3. Same diameter, 2 KV value choices to optimize control accuracy.
4. Brush less DC motor : constant torque, small size, high-precision, long life
5. Manual override



2/3 WAYS CONTROL VALVES--OERT

- Stainless steel body
- DN50-DN80
- Threaded
- −25°C −130°C (Water)/0°C −180°C (Steam)
- 16/25bars
- Hot and cold water, Steam, Refrigerant, Glycol, Hydrazine

2/3 WAYS CONTROL VALVES--OERF

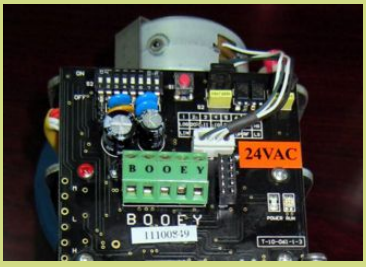
- Ductile iron body
- DN15-DN400
- Flanged
- −25°C −130°C (Water)/0°C −180°C (Steam)
- 16/25 bars
- Hot and cold water, Steam, Refrigerant, Glycol, Hydrazine

ELECTRIC ACTUATOR-LINEAR--OATS1/2

- 3-position/proportional control type
- Voltage: 24V DC/ 220V AC
- Output torque: 500-100NM
  and 1800/3000/5000NM
- Feedback signal: 0-10V/4-20mA
- IP54
- Travel time: 80/125 seconds

OMEAX LINEAR ELECTRIC ACTUATOR FEATURES:

- LED screen
- KVs can be adjusted from 30% to 100%
- Memorization of valve stroke.
- The valves position is adjusted automatically by the software.
- Multi output/input signals: 0(2) 10V DC; 0(4) 20mA
- 500 000 times actuations



MANUAL BALANCING VALVES--OS

- Brass body
- DN15-DN50
- Threaded
- -10°C-120°C
- 16 bars
- Hot and cold water, Refrigerant, Glycol,Hydrazine
- Equipped a test point for pressure and temperature

MANUAL BALANCING VALVES--OS

- Ductile Iron body
- DN65-DN350
- Flanged
- -10°C-120°C
- 16 bars
- Hot and cold water, Refrigerant, Glycol,Hydrazine
- Equipped a test point for pressure and temperature

PRESSURE INDEPENDENT CONTROL VALVES--ODPR

- Brass body
- DN25-DN40
- Threaded
- 1°C-80°C
- 16/25 bars
- Hot and cold water, Refrigerant
- Voltage:24V DC

PRESSURE INDEPENDENT CONTROL VALVES--ODPR

- Ductile iron body
- DN50-DN150
- Flanged
- 2°C-130°C
- 16/25 bars
- Hot and cold water, Refrigerant
- Voltage:24V DC

ZONE VALVE FOR FCU-OET

- Brass valves
- Stainless steel actuator cover
- 4V/110V/220V±10%, 50/60Hz
- Power: < 7W
- 25 bars
- Travel time: 10s;
- Wiring: 3 point floaing
- IP: 40

ZONE VALVE FOR FCU-OET

- Brass valves
- Stainless steel actuator cover
- 220V±10%, 50/60Hz
- Power: < 7W
- 16 bars
- Open time: 14 to 18s;
- Close time: 5 to 7s
- Wiring: 2 position (ON/OFF)
- IP: 42

DIFFERENTIAL PRESSURE SWITCH – OGPS

- Range: 30 Pa - 2000 Pa
- Temperature: -40°C to 85°C
- Pressure: 5000 Pa

THERMOSTAT(LED) – OTCL

- Temperature control precision:±1°C
- High/Middle/Low speed controlled by fan coil
- Current load: < 2A
- Selfpower consumption: <2W
- 16 bars
- Power supply: 220V AC ±10% 50/60Hz
- Dimension: 86×86×15mm

LCD TEMPERATURE PI CONTROLLER – OPIC

- Humiditycontrol: 0-100%RH
- Externalsensor: NTCIOK
- Current load: < 3A
- Power supply: 220V AC ±10% 50/60Hz

THERMOSTAT(KNOB) – OTCM

- Temperature control precision:±1°C
- High/Middle/Low speed controlled by fan coil
- Current load: < 3A
- Selfpower consumption: <1,5W
- 16 bars
- Power supply: 220V AC ±10% 50/60Hz
- Dimension: 130×85×38mm

DIFFERENTIAL PRESSURE SWITCH – OTP

- Range: 55-414 kPa
- ΔP: 14 kPa/10kPa
- Bellow pressure: 830kPa/1241kPa
- Contact point voltage: 1A/24 V AC

It detects pressure difference between its two connection ports resulting the switch to give either an alert signal or to shutdown the system. The operational difference can be set by the adjuster to any value within the control range. When the differential pressure increases, the control valves will open larger to let more flow into the bypass line.

ANTI-FREEZE SWITCH – OAFS

- Voltage: 4A/250 V AC
- IP: 54
- Senor limit: 80°C
- Circuit-breaker temperature: 1°C to7,5° C
- Temperature hysteresis: 4,5°C to 5,5°C
- Application: AHU (chilled/hot water) anti-freeze alarm device

TEMPERATURE SENSOR – OTSW

- Temperature range: −20°C to 80°C /−50°C to 200°C

FAIL-SAFE DEVICE – OTUP

- Input voltage: 24 V AC, 56/60HZ
- Power consumption: < 12 VA(charging); < 3 VA (Standby)
- Reset output: 24VAC±10%,50Hz±2

It is used to reset the position (open/close according to safety requirement) of control valves in HVAC and steam system during power failure.

KVS REGULATOR – OKS

- Voltage: 24 V AC, ±15%, 50/60Hz
- Self power consumption: 1VA
- Input/outputsignal: 0-10V; 4-20 Ma
- Openingangle: 30%-100%

Kvs regulator can regulate maximum flow remotely from 30% Kvs to 100% Kvs to decrease the unnecessary power consumption.

FLOW MEASURING ORIFICE–OSTP

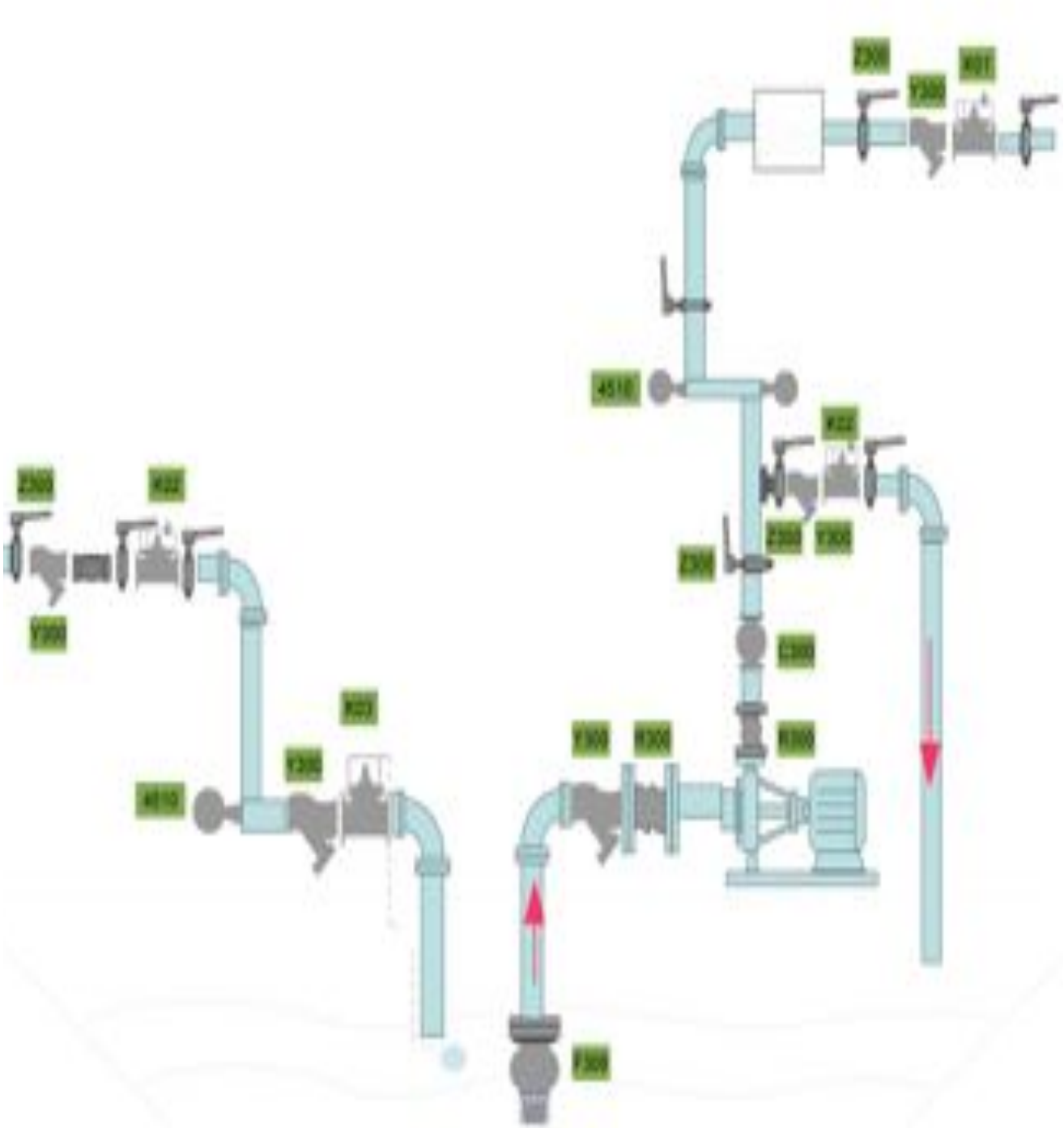
- Stainless steel body
- Connection: Wafer
- −10°C to 100°CMax
- 25bars
- Hot and cold water, Refrigerant, Glycol, Hydrazine
- Equipped a test point for pressure and temperature

WHY PRESSURE MANAGEMENT IN BUILDING ?

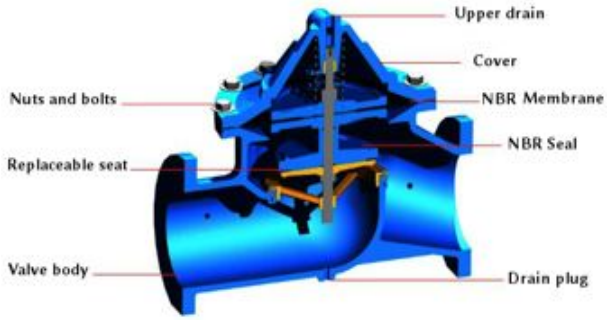
High water pressure is a contributing factor to background leakage (small leaks from the pipe system, typically at joints, that don't make it to the surface and are hard find) and burst water mains.

Research has shown that by managing water pressure, we can reduce pipe leakage, reduce the number of unplanned interruptions, improve the reliability of public assets and even prolong the life of appliances like your hot water services and dishwashing machines.

HOW TO MANAGE PRESSURE IN WATER SUPPLY SYSTEM ?

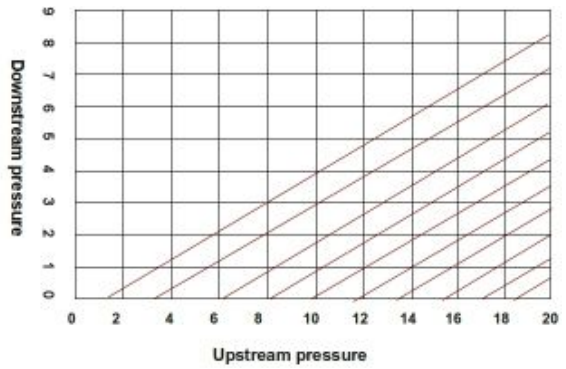


DESIGN AND TECHNICAL ADVANTAGE



1. Specially designed for building market.
2. Compact and robust design
3. Epoxy powder coating.
4. Easy installation and maintenance.
5. Installation: horizontal or vertical.
6. Multiple options.
7. Traceability and identification ensured by riveted metal tag

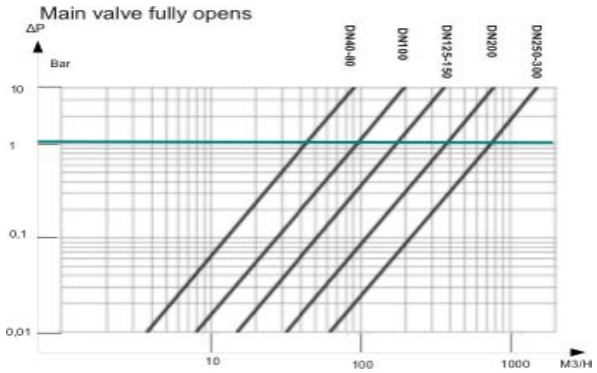
CONTROL VALVES SELECTION



CAVITATION CHART *

It is important to size the control valve correctly, in order to avoid cavitation phenomenons.
Please refer to the diagram, if needed, 2 or 3 control valves could be installed one after another in order to reduce the differential pressure.

*see page 18



HEADLOSS CHART *

Head Loss is the measure of the reduction in the total head of the liquid as it moves through a system. The total head is the sum of the elevation head, velocity head and pressure head. Head loss is unavoidable and is present because of the friction between the fluid and the walls of the pipe and is also present between adjacent fluid particles as they flow along the pipe. Head loss is a measure of the reduction in the total head (sum of elevation head, velocity head and pressure head) of the fluid as it moves through a fluid system.

*see page 18

DN mm	Min flow m^3/h	Max flow m^3/h	KV factor m^3/h
50	0,45	32,78	45,56
65	0,79	39,98	45,56
80	1,14	49,78	45,56
100	1,49	79,67	94,49
125	2,98	99,89	169,87
150	4,49	149,99	169,87
200	9,99	299,57	372,98
250	14,89	549,78	739,78
300	24,89	849,99	739,78

KV FACTOR CHART

It is important to size the control valve correctly, in order to avoid undesirable characteristics. Such as noises, ex- cessive wear, vibrations etc...

1. For a throttling valve application, 2 stages installation should be used.
2. The maximum flow rates are calculated by using a velocity of 4.5m/s

MAINTENANCE INSTRUCTION

Regular maintenance is recommended, for a period of 6 to 12 months according to the quality of the water.

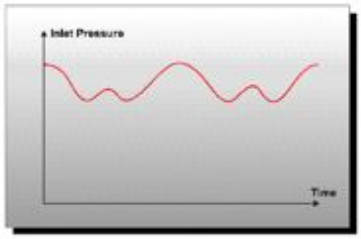
- Checking and cleaning filters of the pilot circuit and main pipe.
- Purging the upper chamber of main valve.
- Flashing the valves not frequently used.
- A general maintenance is needed for every 5 years.

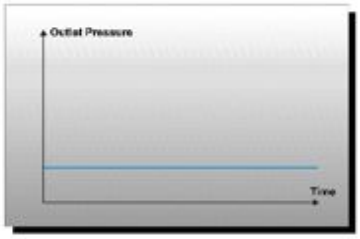
PRESSURE REDUCING VALVES-K01

- Cast ductile iron body
- DN50-DN300
- Flanged
- +1°C to +65°C
- PN 10/16/25
- Clear water, building, irrigation

K01 reduces delivery pressure when water distribution is done by gravity.
K01 reduces pressure to a preset value within a given area.
K01 reduces working pressure in pipeline when the pump discharge is too high.

Pressure reducing valves control and maintain a preset reduced downstream pressure regardless of variations of upstream pressure.





PRESSURE RELIEF VALVES
PRESSURE SUSTAINING VALVE-K02

- Cast ductile iron body
- DN50-DN300
- Flanged
- +1°C to +65°C
- PN 10/16/25
- Clear water, building, irrigation

Pressure relief valves controls and maintains a preset upstream pressure regardless of downstream pressure and flow rate.

FLOAT VALVES-K03

- Cast ductile iron body
- DN50-DN300
- Flanged
- +1°C to +65°C
- PN 10/16/25
- Clear water, building, irrigation

Float valves is used to control a constant water level in a water tank.
K03 avoids overflow to the water tank.
K03 assures progressive opening and closing of the valves.

DIRECT ACTING PRESSURE REDUCING VALVES-RM01

- Brass diaphragm mechanism
- DN3/8" - ½" - ¾"
- Threaded
- +1°C to +80°C
- PN 15
- Clear water, building

1. Adjustable outlet pressure between 1 and 4 bar
2. Pressure compensation system

DIRECT ACTING PRESSURE REDUCING VALVES-RM02

- Brass diaphragm mechanism
- DN1/2"-2"
- Threaded
- +1°C to +80°C
- PN 25
- Clear water, building

1. Adjustable outlet pressure between 0,5 and 6 bar
2. Pressure compensation system

WATER HAMMER ARRESTOR-4510

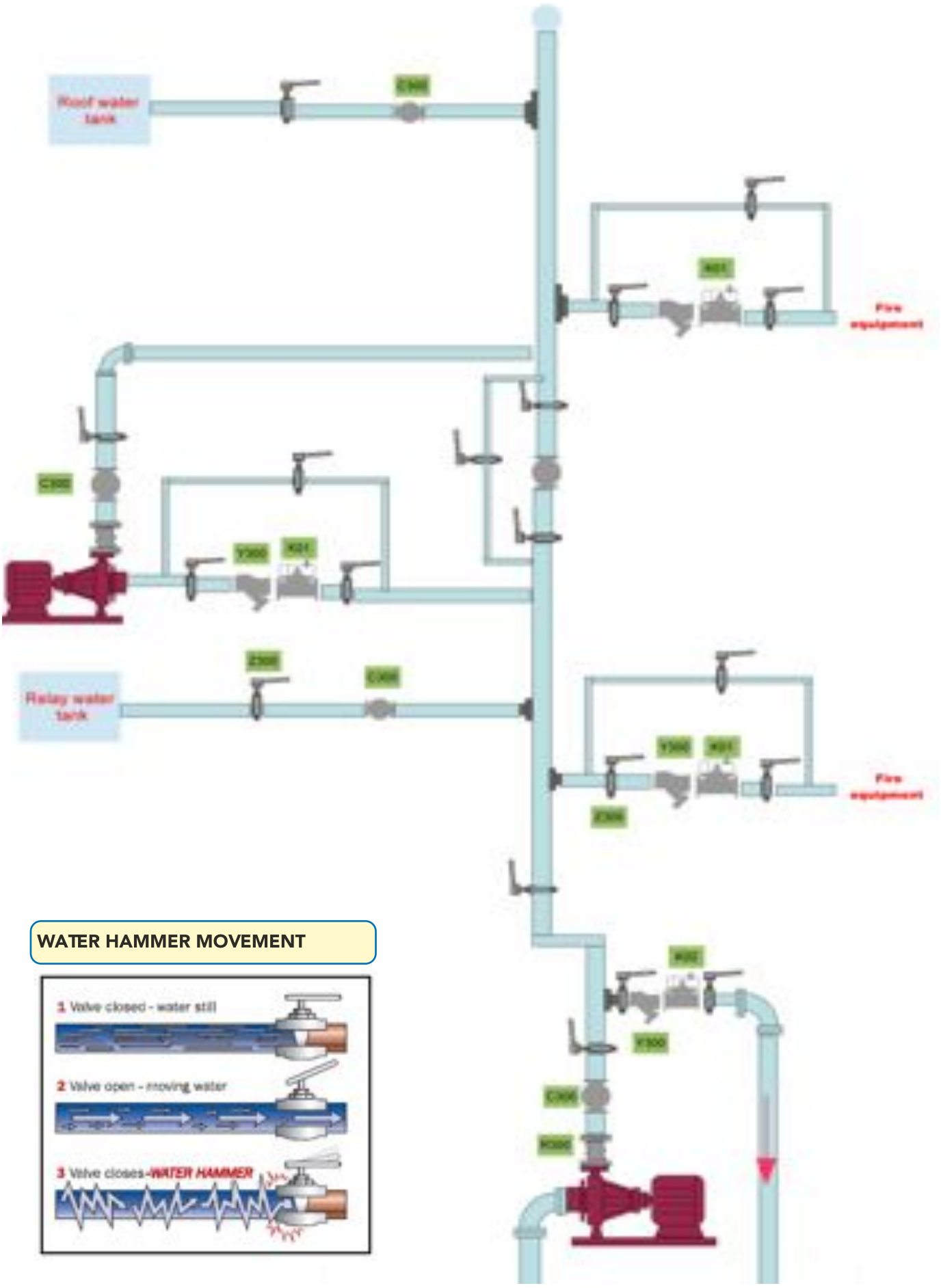
- Brass body
- DN ½" - 2"
- Threaded
- -15°C to +80°C
- PS 21 bars
- Pressure in chamber2,5 bars
- Clear water, building

WATER HAMMER ARRESTOR-4520

- Cast iron body
- DN50 - 200
- Flanged
- -15°C to +80°C
- PN 16 bars
- PS 21 bars
- Pressure in chamber2,5 bars
- Clear water, building

WATER HAMMER-The contents are traveling in a steady flow and under high pressure in a constant direction; that flow is halted abruptly such as by turning off a valve; the water in the pipe is still traveling with considerable force so it slams into the closed valve which creates a pressure wave that shakes the entire pipe. This pressure wave can create a large enough vibration and shock that it causes damage to pipes, valves and pump.

WHY PRESSURE MANAGEMENT IN FIRE PROETION SYSTEM ?



WATER HAMMER MOVEMENT

CENTRIC BUTTERFLY VALVES-Z300

- Cast/Ductile iron body
- DN40 -1200
- Wafer/Lug/double flanges
- EPDM:-10°C – 90°C/ NBR:-10°C – 80°C
- PN 10/16/25

EPDM : hot water, cold water HVAC, Irrigation.
NBR: hydrocarbons, waster water, Sea water fuel,natural gas, oil, grease, compressed air, glycol

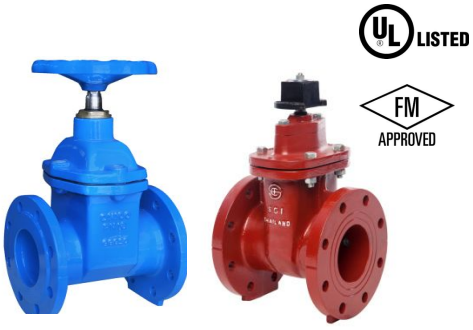
DOUBLE ECCENTRIC BUTTERFLY VALVES-Z500/700

- Cast/Ductile iron body
- DN100 -3600
- Wafer/double flanges
- PN 10/16/25/40

EPDM:-10°C – 90°C/ hot water, cold water HVAC, Irrigation
NBR:-10°C – 80°C/hydrocarbons, waster water, Sea water fuel,natural gas, oil, grease, compressed air, glycol
METAL: Industrial processes, Steam, Mining, Ship building, Oil, Gas, General services, smoke,Water distribution and treatment

GATE VALVES-G300/ G300FM

- Cast/Ductile iron body
- DN40 -2800 (G300FM max DN300)
- Flanges-BS5163, DIN3352
- 0°C to +80°C
- PN10/16
- Clear water, waste water, Irrigation



FILTER-Y300

- Cast/Ductile iron body
- DN15 - 450
- Flanged
- -15°C to +80°C
- PN 10/16
- Clear water, building

SILENT CHECK VALVES-C300

- Cast/Ductile iron body
- DN15 - 300
- Flanged
- +1°C to +80°C
- PN 10/16
- Clear water, building

Silent, Non slam, Anti-waterhammer,
Any position installation, Excellent hydraulic performance

DOUBLE DOOR CHECK VALVES-C100

- Cast/Ductile iron body
- DN15 - 300
- Wafer
- +1°C to +80°C
- PN 10/16
- Clear water, building

Space saving, funtional solution

UL LISTED

FM APPROVED

SWING CHECK VALVES - C400FM -- UL/FM

- Ductile body
- DN50 - 300 (FM)/DN50-DN2000 (metal seated)
- Flange
- +1°C to +80°C
- PN 10/16
- Water, Raw water

RUBBER JOINT-R300

- Cast iron body
- Galvanized steel flange
- DN50 - 600
- Flange
- -10°C to +100°C
- PN 10/16

Anti-viberation, noisy

WATER METER WITH IMPLUSES-1712

- Multi-jet
- Brass body
- DN15 - 50 (Ref 1718:Dn50-200)
- Threaded
- 0°C to +30°C
- PN 16
- Cold water

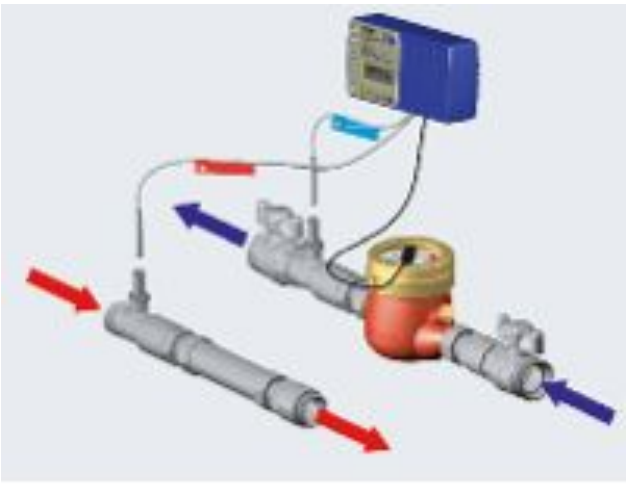
Magnetic transmission, With impulse emitter device

HEAT METER 1730

- Brass body
- DN15 and 20
- Threaded
- 5°C to +90°C
- 16 bars

For heating or cooling systems Magnetic-proof (can not be tampered) LCD multifonctions indicator 7 digits Battery long life (10 years)

COMPLETE SOLUTION OF HEAT METER DN15-200

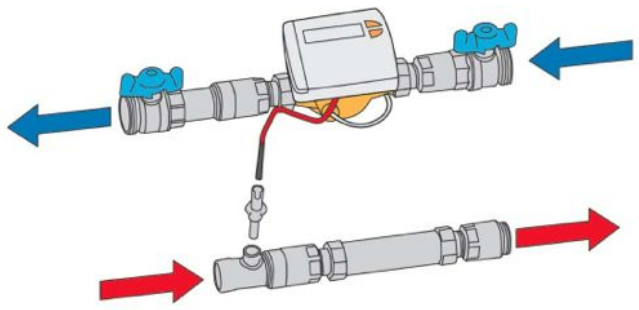


Solution 1

Flanged water meter with impluse
+ Hydrosplit
+ Pair of Sensor D6 X 45mm+ 3m of cable
+ Senor port

Solution 2

Threaded water meter with impluse
+ Hydrosplit
+ Pair of Sensor D6 X 45mm+ 3m of cable
+ Senor port



WHAT IS BALANCED SYSTEM?

A cooling or heating water distribution system is in balance when the flow in the whole system (through the component terminal lines, distributing lines and main distributing lines) corresponds to the flow rates that were specified for the design of the system. If the correct balancing of the system is not established, this will result in unequal distribution of the flow so that there will be a surplus effect in some of the terminals, whereas the effect will be inadequate in others. The result of this will be that the wanted heating/chilling will not be ensured in all parts of the installation. In practice it is not possible to make a correctly balanced system by manipulation of the piping or alteration of the pipe dimensions only. A correct set of balancing valves can ensure the correct distribution of the flow in the system.

CONSTANT FLOW SYSTEM, VARIABLE FLOW SYSTEM, AND ENERGY SAVING

Constant-flow systems set the standard in HVAC system design. They allow standard designs to be applied to numerous different projects, typically incorporating fixed-speed pumps sized to match the maximum load of the system.These systems are balanced using a proportional method with manually set, fixed-orifice, double-regulating balancing valves installed to account for and reduce the impact of pressure changes in the system.In such constant-flow systems, the capital costs are, indeed, low. However, the energy usage is high, since these systems and the pumps driving them rarely operate at the 100\% load they were designed for, calling into question the effectiveness of balancing this type of system in the first place. Further, the process of proportional balancing to commission the system is long, painstaking and expensive.

Variable-flow systems have risen in popularity primarily because they reduce a system's energy consumption. Variable speed pumps work by matching the pumps flow with the requirement of the system at any one time. As parts of the system reach temperature, and the control valves close, the pump senses a change in pressure.This pressure sensor is linked to a variable speed drive which matches the pump speed with the system requirement.

Prior to variable speed, pumps ran at either 0\% or 100\%.Controlling the pump speed means we can provide enough flow to achieve the comfortable temperatures, and at the same time dramatically reduce the energy used to get it there. However this modulation of the pump, makes the system pressure and flow variable. This variable pressure means traditional static balancing (commissioning) valves cannot operate effectively in this type of system.In variable flow systems, dynamic balancing valves is needed, because it reacts to the changes in system pressure automatically.

CAVITATION

Cavitation is the formation and then immediate implosion of cavities in a liquid – i.e. small liquid-free zones ("bubbles") – that are the consequence of forces acting upon the liquid. It usually occurs when a liquid is subjected to rapid changes of pressure that cause the formation of cavities where the pressure is relatively low.Cavitation is a significant cause of wear in some engineering contexts. When entering high pressure areas, cavitation bubbles that implode on a metal surface cause cyclic stress through repeated implosion. This results in surface fatigue of the metal causing a type of wear also called "cavitation". The most common examples of this kind of wear are pump impellers and bends when a sudden change in the direction of liquid occurs.In order to minimise this problem of cavitation, large pressure differences between upstream and down- stream should be avoided.If there is a risk of cavitation (eg 10 bars - 1 bar), two valves should be fitted in succession (eg 10 bars - 3 bars then 3 bars - 1 bar)

HEAD LOSS

Head Loss is the measure of the reduction in the total head of the liquid as it moves through a system. The total head is the sum of the elevation head, velocity head and pressure head. Head loss is unavoidable and is present because of the friction between the fluid and the walls of the pipe and is also present between adjacent fluid particles as they flow along the pipe. Head loss is a measure of the reduction in the total head (sum of elevation head, velocity head and pressure head) of the fluid as it moves through a fluid system.

This is unavoidable in real fluids.Energy losses are proportional to the square of the speed of the fluid (and therefore to the square of the flow rate) and inversely proportional to the diameter of the pipework:

if d↗ then ΔH ↘
if v↗ then ΔH ⇈

$$\Delta H = \lambda \times \frac{l}{d} \times \frac{v^2}{2g}$$

WATER HAMMER

Water hammer is a pressure surge or wave caused when a fluid (usually a liquid but sometimes also a gas) in motion is forced to stop or change direction suddenly (momentum change). Water hammer commonly occurs when a valve closes suddenly at an end of a pipeline system, and a pressure wave propagates in the pipe. It's also called hydraulic shock.This pressure wave can cause major problems, from noise and vibration to pipe collapse.

Allievi's formula allows the speed of propogation of the wave to be calculated :

$$V_p = \frac{1420}{\sqrt{1+\frac{k}{E}\times\frac{d}{e}}} ms$$

k: modulus of compression of the fluid
E: modulus of elasticity of the material of the pipes
d: diameter of the conduit (m)
e: thickness of the sides (m)

$$\Delta P = m \times V_p \times (V_0 - V_1)$$

m: density of the fluid (kg/m3)
Vo: speed of flow of the fluid before conduit (m)
e: thickness of the sides (m)
V1: speed of flow of the fluid

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