

Terminology:

Absolute Pressure - 14.7 (at sea level) + gauge pressure.

Actuator - That part of an automatic control valve assembly that causes the valve stem to move.

Alternate Hot and Cold Water Use - Some valves are used for both hot and cold water depending on the season. If so the construction must be such that the changing temperatures do not cause thermal shock – cracking a component — and thereby destroying the valve.

Ambient Temperature Rating - Temperature surrounding an actuator or valve body.

Angle Body - While most control valves are straight through flow, some are right angled or L shaped. These are used primarily for radiation.

Angle of Opening - The degrees or percent of opening of a disc or ball in a rotary valve. Globes are not rotary.

ANSI Class - Defines temperature and pressure ratings and other attributes of a valve.

Authority - The ratio of the wide open pressure loss through a valve to the system pressure loss (including the valve) across the subcircuit in which the valve is installed.

Automatic flow control valve - Valve connected in series with the control valve and coil to limit the flow, so it can not increase above the adjusted maximum value. It will be fully open when the flow is less than the setpoint. It is also called; “automatic balancing valve” or “self-adjusting dynamic balancing valve”.

Ball valve - Rotary valve whose turning element is a ball with a whole drilled through it. Several types are used. Standard port and reduced port ball valves were originally made for balancing and shut off purposes. Characterized port valves have shaped flow passages to produce flow characteristics like those of other control valves for modulating control.

Body - The outer casing of the valve which contains the water, steam, or air medium.

Body Rating – nominal, actual -Maximum allowable system pressure, within a specified temperature range. The nominal rating is the ANSI class. In some cases the actual rating varies. Check all specs to be sure the ratings meet the service.

Boiler - Hot water or steam generator.

Bonnet thread - The bonnet has thread to which a nut is often attached to allow mounting of the linkage. In retrofit applications the thread type must often be determined to allow selection of adapters to mount the Belimo linkage.

Booster pump - Small circulating pump often used as a secondary pump or a runaround pump.

BTUH - British Thermal Units per Hour. Amount of heat necessary to raise one gallon of water 1°F.

Bubbletight - Valve with a low leakage, for example a butterfly valve with resilient liner.

Butterfly valve - Single bladed rotary valve usually for high capacity control. The position of the disc determines the fluid flow. Used in two-way or three-way mixing or diverting valve applications, for two-position or proportional water control. The flow characteristic is shallow logarithmic. In modulating control the valve is usually opened a maximum of 70°.

Bypass - A pipe path which bypasses water around a boiler, chiller, or valve and coil.

Capacity Index - See Flow Coefficient.

Cavitation - In pumps and valves. Air entrained in water is released when a restriction causes static pressure to be lowered. The air bubbles implode when the water has passed the restriction and velocity decreases and the pressure again increases. The imploding vapor bubbles erode the surrounding material and cause an intense noise.

Characterized control valve TM - A ball valve which incorporates a characterizing disc.

Characterized port - A valve port which modifies the flow characteristic for modulation, equal percentage characteristics are produced.

Choked flow - When velocity of steam reaches the speed of sound it can go no faster and flow is referred to as "choked."

Chrome plating - Plating that is adhered to another surface such as brass. Common in valve trim components.

Close Off Pressure (Rating) - The maximum allowable differential pressure against which a valve can close off and keep any water from passing through.

Close-Off Rating (2 way valves) - Maximum allowable pressure drop (inlet to outlet) that the valve body will tolerate when fully closed.

Close-Off Rating (3 way valves) – Maximum pressure difference between either of the two inlet ports and the outlet port for mixing valves, or the pressure difference between the inlet port and either of the two outlet ports for diverting valves.

Common Port - The port in a diverting or mixing valve which is common to the other two.

Compressible Fluids – Indicated that fluid is capable of being compressed. Gas, Steam, and Vapor are examples of compressible fluids.

Contoured Plug - Shaped end of valve disc that controls the flow of the medium through the valve. Used for smaller sized equal percentage valves.

Controlled Medium - Fluid being controlled – hot water, chilled water or steam.

Critical Pressure Drop - The pressure drop across a valve which causes the maximum possible velocity of steam through the valve.

Design Conditions - Space temperature conditions that require the full heating or cooling requirements of a system.

Direct Acting - A valve which increases flow with an increase in signal.

Direction of Flow - The correct flow of the controlled fluid through the valve. Usually indicated on the valve body.

Disc Rotation - A butterfly rotates the disc. A globe lifts the disc.

Diverting Valve - A valve with 2 inlets and one outlet is mixing. A valve with one inlet and 2 outlets is diverting.

Double Seated - A valve with 2 seats and discs. By balancing the pressure across the discs torque requirement is very low. Leakage is high since getting the seats to touch the discs simultaneously is difficult. Mixing and diverting valves are forms of double seated valves.

Dynamic Pressure - Pressure due to flow of water as opposed to its weight.

End Fitting - Part of the valve body that connects to the piping. Union, screwed, flared, sweat, and flanged are typical examples of end fittings.

Equal Percentage Characteristic - In a valve having an equal percentage characteristic, like movements of the valve stem at any point of the flow range, changes the existing flow an equal percentage regardless of the existing flow. Example: Suppose a valve stem has been lifted 30 percent of its total lift and the flow at this time is 3.90 GPM. Now assume that the valve opens an additional 10 percent of its full travel and that the flow increases to 6.20 GPM or 60 percent increase. Next, suppose that the valve stem moves an additional 10 percent so that it is now 50 percent open. The flow now will be 10.0 GPM, or another 60 percent increase in flow.

Equalinear™ - Valve Cv vs Travel position is approximately mid-way between that of linear and equal percentage.

Expansion tank - A tank which maintains the pressurization of the system. It absorbs the volume changes due to temperature variations of the water. Some expansion tanks have a pressurized bladder inside.

Flanged-End Connections - A valve that connects to a pipe by bolting a flange on the valve to a flange screwed onto the pipe. Flanged connections are typically used on large valves.

Flow Characteristic - Relation between flow through the valve as the stem travel is varied between 0 and 100 percent.

Flow Coefficient, Cv - The quantity of water, in liters per second at 60°F, that will flow through a given valve with a pressure drop of 1 PSI (also called capacity index.)

Flow Rate - The amount of fluid passing a given point per unit of time. Units are gallons per minute (GPM) for water and pounds per hour for steam (#/hr).

Flow Resistance - Resistance to the flow in pipes, fittings, coils, valves, etc.. It is often expressed as a pressure drop, although not theoretically correct. K is the loss coefficient. $P_t = K \times P_v$

Fp - Piping geometry factor. See pipe geometry.

Full Port - Maximum flow capacity possible for a particular ball valve size.

Gauge Pressure - Pounds per square inch (PSI) as read on a gauge.

GPM - Gallons per minute.

“h” - Pressure or pressure difference.

Hysteresis - The required change in the control signal to reverse the movement of an actuator. The “dead zone” is the hysteresis. Often expressed in percentage of the control signal full span.

Incompressible - Description of liquids, because their change in volume due to pressure is negligible.

Inherent characteristic - The valve flow response characteristic or curve when the pressure drop across the valve is maintained constant. See Installed Characteristic.

Installed Characteristic - When a valve is installed with series losses the inherent characteristic changes becoming shallower with a small series loss or over the linear with a lot of series loss.

Isolation valve - Manual valves before and after a control valve or other pipe element which allow disconnection without water leakage.

Leakage - Water leakage through the seat and disc of the valve. Could be a leaky stem, but not normally used in this context. The leakage inside a shut valve is usually shown as a percentage of the Cv value.

Lift (stroke, travel, percent open) - In a globe, the inches of travel necessary to lift the disc off the seat and go to full open. Typically 1/2" to 11/2"

Line size valve - A valve whose inlet and outlet are the same size as the pipe.

Linear Characteristic - This flow-lift relationship, if plotted on rectilinear coordinates approximates a straight line, giving equal volume changes for equal lift changes, regardless of percent of valve opening.

Load - The demand on the mechanical equipment in an HVAC system.

Load Change - A change in building heating or cooling requirements as a result of lights, machinery, people, outside air temperature variations, solar effect, wind, etc.

Low Pressure - In steam, pressures below 15 psi.

Manual balancing valve - Circuit balancing valves (cbv) are used to adjust the flow resistance in the different parts of a hydronic system, to obtain the desired flow distribution. It is manually adjusted and has a calibrated stem/hand-wheel. The valve has two ports to facilitate measurement of the differential pressure across the valve.

Materials - Brass, Bronze, Chrome plated, Cast Iron, Composites, EPDM, Stainless Steel, Teflon, TEFZEL, Viton, Zinc, etc. Materials used in valve construction.

Maximum Pressure and Temperature Rating - The maximum pressure and temperature limitations of fluid flow that a valve can withstand. These ratings may be due to valve packing, body, disc material, or actuator limitations. The actual valve body ratings are exclusively for the valve body and the maximum pressure and temperature ratings are for the complete valve assembly (body and trim). Note that the maximum pressure and temperature ratings may be less than the actual valve body ratings.

Medium - Water, steam, air, etc. which run through the valve.

Medium/High Pressure - Pressures above 15psi for steam applications.

MFT – Multi Function Technology, offers the possibility to configure the actuator's input signal (on-off, floating, Vdc, PWM), feedback, running time, stroke, etc.. The actuators can be factory configured or configured in the field via Belimo's PC Tool software.

Mixing Valve - Three way valve having two inlets and one outlet. The proportion of fluid entering each of the two inlets can be varied by moving the valve stem. Not suitable for diverting applications.

Most resistive circuit - The loop with the largest pressure drop.

NEMA - NEMA ratings are standards that are useful in defining the types of environments in which an electrical enclosure can be used. The NEMA rating system is defined by the National Electrical Manufacturer Association, and frequently signifies a fixed enclosure's ability to withstand certain environmental conditions.

Normally Closed (N.C.) - Condition of the valve upon a loss of power or control signal to the actuator.

Normally Open (N.O.) - Condition of the valve upon a loss of power or control signal to the actuator.

NPT - National Pipe Thread. Screwed end valves are sometimes referred to as NPT. Plumbing pipe uses inside diameter.

Packing - Material used to seal the valve stem so that the controlled medium will not leak. Teflon and graphite are typical materials used.

Pipe geometry - A properly sized control valve may be smaller than the pipe it is connected to. Pipe reducers are used and the change in the cross section area, results in a lower Cv value.

Pipe losses - The pressure drop along a certain length of pipe. It is dependent upon the distance, size, flow velocity and the inside surface roughness. The resistance of pipe bends, fittings etc. are often expressed as "equivalent pipe length" which is added to the pipe losses.

Port - Opening (inlet or outlet) that allows media to flow through a valve.

Pressure Drop - The difference in pressure between the inlet and outlet of the control valve.

PSI - Pounds per square inch. **PSIA** - Pounds per square inch absolute. **PSIG** - Pounds per square inch gauge.

Pull pump - Coil pump. Also called runaround pump.

Pump head - The pressure increase between the inlet and outlet of a pump.

Pump performance curves - The relation between the flow and pump head at different impeller diameters. There are also curves showing the efficiency % and horse power at different operating points.

Rangeability - The flow through a control valve follows a certain characteristic down to a "minimum controllable flow" where the flow abruptly changes and the valve closes. The ratio of the maximum controllable flow to the minimum controllable flow is the rangeability. For instance, a valve with a rangeability of 50 to 1 having a total flow capacity of 100 GPM, fully open, will control flow accurately down to as low as 2 GPM.

Reduced Port - Smaller flow capacity that is possible for particular end fitting.

Reducer - A pipe fitting that is used to couple a pipe of one size to a pipe of a different size. When flow is from the smaller pipe to the larger pipe an increaser may be used.

Reset schedule - The supply water temperature to the heating or cooling system is changed with respect to a parameter that is proportional to the load, usually the outdoor temperature.

Resolution - The finest positioning change of an actuator when discrete changes of the control signal are made. Electronic actuators have a far greater resolution than commercial grade pneumatic actuators.

Reverse Acting - Valve which decreases flow with an increase in signal. Typically a function of the actuator.

Runaround pump - Coil pump. Also called pull pump.

Saturated Steam - The maximum amount of vapor that can exist at specific temperature and pressure.

Screwed-End Connection - A valve with threaded pipe connection. Valve threads are usually female, but male connections are available for special applications. Some valves have an integral union fitting for easier installation.

Seat - The stationary portion of the valve which seals the valve (prevents flow) when in full contact with the moveable ball, disc, or plug.

Seating Torque - Torque necessary to close valve.

Secondary pumps - Pumps used to provide circulation in secondary loops that are de-coupled from the main loop.

Single seated - Most valves have single seats as opposed to the double seated valves.

Stainless steel - Strong hard steel which withstands corrosion and high temperatures.

Static Pressure Rating - Maximum pressure (inside to outside the body) that the valve will tolerate before leaking. Pressure varies with temperature.

Stem - The cylindrical shaft which is moved manually or by an actuator to which the throttling plug, ball, or wafer is attached. Straightway Body - A two way valve body that has end fittings on opposite sides.

Stroke - The total distance that a linear valve stem travels or moves. Also known as lift.

Superheated Steam - Steam at a temperature higher than saturation temperature at the given pressure.

Sweat - Soldered connections to valve inlet and outlet.

System curve - A curve showing the relationship between flow and pressure in a system served by a pump. An exponential curve representing the system pressure loss versus the flow quantity.

System Pressure Drop - The sum of all pressure drops (or gains) in a hydronic system.

Three-Way Valve - Valve with one inlet and two outlets or two inlets and one outlet.

Throttling - Proportional or modulating.

Tight Shut-off - A valve having tight shut-off that will have virtually no flow or leakage in its closed position.

Trim - Inside components of valve which have contact with medium. The seat, plug, stem, and ball are all trim components.

Turbulent Flow - A flow regime characterized by random motion of the fluid particles in the transverse direction as well as motion in the axial direction. This occurs at high Reynold's numbers and is the type of flow most common in industrial fluids systems.

Turndown ratio - Ratio between maximum usable flow and minimum controllable flow. The turndown is usually less than rangeability.

Two-Way Valve - Valve with single flow path-one inlet and one outlet.

V-port - Shaped Characterized ball. Parabolic.

Valve - A controlled device which will vary the rate of flow of a controlled medium such as water or steam.

Valve Body - The portion of the valve casting through which the controlled medium flows.

Valve Disc - The movable part of a butterfly valve which makes contact with the valve seat when the valve is closed.

Valve Flow Characteristic - The relationship between the stem travel, expressed in percent of travel, and the flow of the fluid through the valve, expressed in percent of full flow.

Valve Guide - The part of the globe valve throttling plug which keeps the disc aligned with the valve seat.

Variable speed pumping - The pump is operated at a variable speed by a variable speed drive, which can be adjusted manually, or controlled automatically. It reduces the operating costs of the pump significantly and improves pressure control.

Wire Draw - A small eroded area or thin slit on a valve seat or plug. This is the result of a high velocity fluid acting on the surfaces when the valve is just above the seat.

Zone Valve - Small valves to control zones. Also used as trade name for some valves.