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Chapter 1 : Types of Manual Valves | TLV - A Steam Specialist Company (USA)

Application - It is used for flow and pressure control and shut off and for corrosive fluids,slurries,normal liquid and www.nxgvision.com high temp and pressure. Advantages of Ball Valve - Low pressure drop shut-off,quarter turn operation,easy to maintain,low www.nxgvision.com are small in size and low in weight.

Top Suppliers Common Types of Pneumatic Valves Pneumatic valves are one of an array of components responsible for controlling the pressure, rate, and amount of air as it moves through a pneumatic system. Pneumatic systems, which depend on the force of compressed air to transmit power, can be found in countless industrial applications, from pneumatic pressure power tools to diesel engines. Based on other components within a given application and the type of pneumatic system used, one of several types of pneumatic valves may be found at the heart of the device. Functional directional control valves, those that control the direction of air flow or inhibit flow all together, are a large class of pneumatic valves that houses multiple variants. Many functional directional pneumatic control valves are classified based on the number of entry and exit ports they possess, the number of flow paths they create, and the mechanism by which ports are opened and closed. Two-Way Directional Valve A two-way directional valve passes air in two directions, through two ports which can be open or closed. If the valve ports are closed no air can flow through the valve. If the ports are open, air may move from the first port through the valve and through the second port or in the opposite direction. Three-Way Directional Valve A three-way directional valve has three ports, each of which serves a different purpose. The first port is used to connect the valve to an actuator or another device. The second port is connected to an air-flow. The third port is used as an exhaust exit. When the first and second ports are open and the third is closed, air moves through the valve to the device. When the first and third ports are open and the second port is closed, the actuator can vent exhaust. Three-way valves are often connected to actuators in cylinders, or used in pairs and connected to double-acting cylinders. Four-Way Directional Valves A four-way directional valve has four distinct ports, two of which connect to actuators, one that connects to a pressurized air-flow, and one that serves as an exhaust pathway. They are among the most common types of valves found in pneumatic systems because the four distinct paths allow the valve to effectively reverse the motion of a motor or basic cylinder. An additional port is sometimes added to a four-way valve, making it a five-ported four-way valve. A four-way valve with an additional port is often used to provide dual pressure, meaning the valve can apply one of two kinds of pressure and alternate between the two depending on what the application requires. Alternatively, the valve can use the other port as a secondary exhaust port. Spring Offset This type of pneumatic valve classification refers to the manner in which air-flow direction is switched. For example, in a two-way directional valve, the valve is either open air-flow is enabled or closed air-flow is prevented. In order for each port to assume an open or close position, an actuator moves a valve spool into position. To release the valve spool and return the pneumatic valve to its previous position, a spring releases the spool. A two-way directional valve that functions in this manner is also called a spring offset valve. In devices where an open resting position is standard, air moves freely through the valve. In a closed resting state, the air-flow is blocked. In three-way valves, one port is always open.

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Chapter 2 : Control Valves and their Principles of Operation

The two types of control valves are linear motion and rotary motion. Linear Motion Linear motion valves have a closure member that moves with a linear motion to modify the rate of flow through the valve.

Share Tweet Introduction We have learned that valves are used to either shut-off flow, change the flow path or throttle flow, and that valves are characterized by how their flow coefficient varies with relation to closure member position, but valves are typed according to the motion of their closure member. The two types of control valves are linear motion and rotary motion. Linear Motion Linear motion valves have a closure member that moves with a linear motion to modify the rate of flow through the valve. Linear motion valves are generally named for the shape of their closure member. Common linear motion valves include globe, gate, diaphragm and pinch valves. Globe Valve Globe valves are so named for their globular shaped cavity around the valve seat area. The closure member of a globe valve is a plug with a flat or convex bottom that is lowered onto a matching horizontal seat located in the center of the valve. Raising the plug opens the valve, allowing fluid flow. Globe valves have good throttling characteristics but because the flow path is not linear they have a relatively high pressure drop across the valve. Globe valves are used in throttling and shut-off applications where this pressure drop is acceptable. The three primary body designs for globe valves are Z body, Y body and angle. Gate Valve The closure member of a gate valve is a flat face, vertical disc, or gate that slides down through the valve to block the flow. Gate valves are designed to operate in their fully open or fully closed position and therefore are found only in flow shut-off applications. When fully open the disc is removed completely from the flow stream. This offers virtually no resistance to flow when the valve is fully open, therefore gate valves operate with little pressure drop across the valve. Gate valves have very poor flow throttling characteristics and are not used for throttling purposes. Diaphragm Valve The closure member of a diaphragm valve is a flexible surface the diaphragm that is deformed. The main advantage of a diaphragm valve is that the stem seal is eliminated. Diaphragm valves are used mostly for shut-off service of slurries, corrosive or viscous fluids but may also be used in flow throttling applications as well. Diaphragm valves may be used in pumping applications with a set constant pressure on the diaphragm. This allows flow to be stopped in the absence of a motive force pump , but when a sufficient pressure is generated in the pipe to overcome the force on the diaphragm flow is allowed. Pinch Valve A pinch valve is similar to a diaphragm valve, however in a pinch valve the entire valve body is flexible and the closure member pinches the valve shut closing off flow. As a pinch valve has no internal obstructions it has a very low pressure drop and is well suited for applications of slurries or liquids with large amounts of suspended solids Rotary Motion Rotary valves have a closure member that moves with a rotary motion to modify the rate of flow through the valve. Like linear motion valves, rotary motion valves are generally named for the shape of their closure member. Common rotary motion valves include ball, butterfly and plug valves. Ball Valve The closure member of a ball valve is shaped like a ball with a port for fluid flow. A ball valve allows straight-through flow in the open position and shuts off flow when the ball is rotated 90 degrees. Because of their quarter turn actuation and low pressure drop ball valves are commonly found in flow shut-off applications. Depending on the particular flow port configuration of the ball they may be used in flow throttling applications as well. Butterfly Valve The closure member of a butterfly valve is a circular disc or vane with its pivot axis at right angles to the direction of flow in the pipe. Like ball valves, a butterfly valve allows straight-through flow in the open position and shuts off flow when the ball is rotated 90 degrees. Because of their quarter turn actuation and low pressure drop butterfly valves are commonly found in flow shut-off applications. Unlike ball valves, butterfly valves are generally not used for flow throttling applications. The advantage of a butterfly valve over a ball valve is its relative compactness Plug Valve The closure member of a plug valve is a cylindrical or tapered cylindrical shaped plug with a flow port. Like a ball valve, a plug valve allows straight-through flow in the open position and shuts off flow when the ball is rotated 90 degrees. Like ball valves, plug valves are found mostly in flow

shut-off applications. However plug valves are available in much larger sizes that ball valves.

Chapter 3 : List of valves - Wikipedia

Valves can be categorized into the following types, based on their operating mechanism. Ball valve, for on/off control without pressure www.nxgvision.com for quick shut-off, since a 90Â° turn completely shuts-off, compared to multiple Â° turns for other manual valves.

Operation[edit] Air-actuated control valves each with a mA "I to P" converter integral to a valve positioner. In this example each positioner is comparing the valve stem travel against control signal, and applying any correction. The opening or closing of automatic control valves is usually done by electrical , hydraulic or pneumatic actuators. Normally with a modulating valve, which can be set to any position between fully open and fully closed, valve positioners are used to ensure the valve attains the desired degree of opening. Air-actuated valves are commonly used because of their simplicity, as they only require a compressed air supply, whereas electrically-operated valves require additional cabling and switch gear, and hydraulically-actuated valves required high pressure supply and return lines for the hydraulic fluid. The pneumatic control signals are traditionally based on a pressure range of psi 0. Electrical control now often includes a "Smart" communication signal superimposed on the mA control current, such that the health and verification of the valve position can be signalled back to the controller. An automatic control valve consists of three main parts in which each part exist in several types and designs: Valve positioner - Which ensures the valve has reached the desired degree of opening. This overcomes the problems of friction and wear. Valve body - in which the modulating element, a plug, globe, ball or butterfly, is contained. Control action[edit] Showing the evolution of analogue control loop signalling from the pneumatic era to the electronic era. Example of current loops used for sensing and control transmission. Specific example of a smart valve positioner used. Globe control valve with pneumatic diaphragm actuator and "smart" positioner which will also feed back to the controller the actual valve position Taking the example of an air-operated valve, there are two control actions possible: There can also be failure to safety modes: Air or control signal failure to close" - On failure of compressed air to the actuator, the valve closes under spring pressure or by backup power. Air or control signal failure to open" - On failure of compressed air to actuator, the valve opens under spring pressure or by backup power. The modes of failure operation are requirements of the failure to safety process control specification of the plant. In the case of cooling water it may be to fail open, and the case of delivering a chemical it may be to fail closed. Valve positioners[edit] The fundamental function of a positioner is to deliver pressurized air to the valve actuator, such that the position of the valve stem or shaft corresponds to the set point from the control system. Positioners are typically used when a valve requires throttling action. A positioner requires position feedback from the valve stem or shaft and delivers pneumatic pressure to the actuator to open and close the valve. The positioner must be mounted on or near the control valve assembly. There are three main categories of positioners, depending on the type of control signal, the diagnostic capability, and the communication protocol: Pressure is typically modulated between In a common pneumatic positioner the position of the valve stem or shaft is compared with the position of a bellows that receives the pneumatic control signal. When the input signal increases, the bellows expands and moves a beam. The beam pivots about an input axis, which moves a flapper closer to the nozzle. The nozzle pressure increases, which increases the output pressure to the actuator through a pneumatic amplifier relay. The increased output pressure to the actuator causes the valve stem to move. Stem movement is fed back to the beam by means of a cam. As the cam rotates, the beam pivots about the feedback axis to move the flapper slightly away from the nozzle. The nozzle pressure decreases and reduces the output pressure to the actuator. Stem movement continues, backing the flapper away from the nozzle until equilibrium is reached. When the input signal decreases, the bellows contracts aided by an internal range spring and the beam pivots about the input axis to move the flapper away from the nozzle. Nozzle pressure decreases and the relay permits the release of diaphragm casing pressure to the atmosphere, which allows the actuator stem to move upward. Through the

cam, stem movement is fed back to the beam to reposition the flapper closer to the nozzle. When equilibrium conditions are obtained, stem movement stops and the flapper is positioned to prevent any further decrease in actuator pressure. Most modern processing units use a 4 to 20 mA DC signal to modulate the control valves. The pneumatic output signal provides the input signal to the pneumatic positioner. This type of positioner is a microprocessor-based instrument. The microprocessor enables diagnostics and two-way communication to simplify setup and troubleshooting. The microprocessor performs the position control algorithm rather than a mechanical beam, cam, and flapper assembly. This pressure is routed to a pneumatic amplifier relay and provides two output pressures to the actuator. With increasing control signal, one output pressure always increases and the other output pressure decreases Double-acting actuators use both outputs, whereas single-acting actuators use only one output. The changing output pressure causes the actuator stem or shaft to move. Valve position is fed back to the microprocessor. The stem continues to move until the correct position is attained. In addition to the function of controlling the position of the valve, a digital valve controller has two additional capabilities: Advantages of placing a smart positioner on a control valve: Automatic calibration and configuration of positioner. Reduced cost of loop commissioning, including installation and calibration. Use of diagnostics to maintain loop performance levels. Improved process control accuracy that reduces process variability. Types of control valve bodies[edit] A huge variety of valve types and control operation exist. However, there are two main forms of action; the sliding stem and the rotary action. The most common and versatile types of control valves are sliding-stem globe, V-notch ball, butterfly and angle types. Their popularity derives from rugged construction and the many options available that make them suitable for a variety of process applications.

Chapter 4 : Common Types of Pneumatic Valves

Globe valves are normally used for control, and their ends are usually flanged for ease of maintenance. Depending on their type of supply, the disk is moved by a hydraulic, pneumatic, electrical or mechanical actuator.

The principal types of check valves used are the tee-pattern lift check, the swing check, the tilting-disc check, the Wye-pattern lift check, and the ball check, illustrated in Figs. A to E, respectively. Construction of a Check Valve A basic check valve consists of a valve body, bonnet or cover , and a disc which is attached to a hinge and swings away from the valve seat to allow fluid to flow in the forward direction, as in a swing- or tilting-disc check valve, and returns to valve seat when upstream flow is stopped. Thus, reverse flow is prevented. In folding disc check valves, the disc consists of two halves attached in the middle. The two halves fold backward when upstream flow is initiated. Activated by a spring, the two halves quickly close the flow path when upstream flow ceases. In the case of lift-check valves, the disc is in the form of a piston which is moved out of the flow path by upstream flow and returns to the valve seat by gravity to stop back flow. Ball-check valves have a disc in the form of a ball. Other sizes may be made available to meet specific size requirements. Depending upon the design requirements of a piping system , a check valve may have butt welding, socket welding, threaded, or flanged ends. Advantages of Check Valves They are self-actuated and require no external means to actuate the valve either to open or close. They are fast acting. Disadvantages of Check Valves The following are some of the disadvantages that are attributed to check valves: Since all moving parts are enclosed, it is difficult to determine whether the valve is open or closed. Furthermore, the condition of internal parts cannot be assessed. Each type of check valve has limitations on its installation configurations. Valve disc can stick in open position. Types of Check Valves There are several types of check valves having varying body configurations. The following are some commonly used types of check valves: Swing Check Valve Fig. Swing check valve In swing check valves, the disc is unguided when it moves to fully open position or to fully closed position. Many different disc and seat designs are available to satisfy requirements of varying applications. Soft-seatedâ€”swing check valves provide improved leak tightness compared to metal-to metal seating surfaces. Combination seats consisting of a metal seat ring with resilient insert also offer better leak tight characteristics. The seating angle, the angle between the seat and the vertical plane, may vary from 0 to 45 degrees. Vertical seats have a 0 angle. Larger seat angles reduce the disc travel, resulting in quick closing, thus minimizing the possibility of water hammer. Usually the seat angles are in the range of 5 to 7 degrees. Lift Check Valve Lift check valves are particularly adapted for high-pressure service where velocity of flow is high. In lift check valves, the piston disc is accurately guided by long contact and a close sliding fit with the perfectly centered dash pot. The walls of the piston and dash pot are of approximately equal thickness. Large steam jackets are located outside of the dash pot and inside the piston to eliminate sticking because of differential expansion. The seat ring is of a barrel-type design of heavy uniform cross-section. It is normally screwed in and seal welded. The flow opening is full port size. Lift check valve The seat design of a lift-check valve is similar to a globe valve. The disc is usually in the form of a piston or a ball. The ball-lift check valves are used in highly viscous fluid service. These valves have superior leak tight characteristics to those of swing check valves. Wye-pattern lift check valve The piston type lift check valves have a tendency to stick in the open position when service fluid has sediment trapped above the piston. Large lift check valves are furnished with an equalizer line between the chamber above the disc and the downstream side of the valve. Tilting Disc Check Valve Fig. Tilting-disc check valve The tilting-disc check valve is designed to overcome some of the weaknesses inherent in conventional swing check valves. A combination of design features enables the valve to open fully and remain steady at lower flow velocities and to close quickly upon cessation of forward flow. The dome-shaped disc floats in the flow with fluid on both bottom and top of its surfaces, thus it has minimum dash pot effect. It performs well in pulsating, turbulent, and high-velocity flows. Folding Disc Check Valves Fig. Folding-disc check valve This valve is also referred to as double-disc

or split disc check valve. It is manufactured in wafer-body pattern and is available with soft or hard seats. It is very popular in low-pressure liquid and gaseous services. Its lightweight compact construction makes it a preferable check valve when space and convenience are important. In-line ball check valves can be used in both vertical and horizontal lines. The fully guided disc inline check valves must be provided with a spring-assist closure when used in horizontal lines. In vertical lines, the guided disc in-line check valves may or may not be provided with spring-assist closure. The spring-assist closure not only assists in closing the valve quickly, it minimizes the possibility of water hammer by preventing flow reversal. Ball check valve They can be used in applications having pulsating flows, such as in a discharge line of a reciprocating compressor. Because they are compact in size, they are ideal for application in tight spaces. Stop Check Valve A stop check valve can either be used as a unidirectional check valve or as an isolation stop valve like a gate or globe valve. During normal operation of a system, these valves are used as a regular check valve; however, when needed, these valves can be closed with the help of a screw-down stem which is not fastened to the valve disc. The stem, when fully screwed down, holds the free-floating disc against the valve seat, just as in a gate or a globe valve. These valves are available in tee-pattern, wye-pattern, angle-pattern, and inclined pattern. Swing-disc stop check Fig. Wye-pattern stop check The swing-and-piston lift-disc design check valves are commonly used as stop check valves. Application Considerations The force of gravity plays an important role in the functioning of a check valve and, therefore, the location and orientation of the check valve must always be given consideration. Lift and ball check valves must always be placed so that the direction of lift is vertical. Swing checks must be located to ensure that the disc will always be closed freely and positively by gravity. The flow velocity of the fluid through the valve has a significant effect on the life of the check valve. The valve should be sized such that the fluid velocity under normal conditions is sufficient to keep the disc fully open and pressed against the stop. This minimizes disc fluttering, which is the primary cause of valve failure. Also, a check valve should not be located immediately downstream of a source of turbulence, such as a pump, elbow, control valve, or a tee-branch connection. Some manufacturers recommend 8-to pipe-diameter length of straight run of pipe upstream of the valve. Alternatives must be evaluated and the most reasonable and feasible approach be implemented. A swing check valve may be used in the vertical run of a pipe only when the flow is upward. In addition, the flow velocity and the fluid pressure must be adequate to overcome the disc weight and swing it to the fully open position. In-line ball check valves are suitable for application in horizontal or vertical lines. When the flow is suspected to be pulsating and low, use of a swing check valve is not recommended. Due to the continuous flapping of the swing disc against the seat, valves suffer considerable damage, and at times the swing discs can come loose. Application of Check Valves Table 1 summarizes preliminary application guidelines for selection of a suitable type of check valve. The user must evaluate specific application features to determine the right valve for the application. Typical Applications of Check Valves Table 1 provides a brief summary of different types of check valves and their typical applications. Get Notified for new Tutorials:

Chapter 5 : Fundamentals of valves and their types Instrumentation Tools

This operation is slow, but it gives accuracy and stability to position the closure member, which is necessary in some control valves. Types of valves: Gate valve, Globe valve, Fixed cone valve, Needle valve and Pinch valve.

We suppose the the basic premise of a plumbing valve is simple but the types of valves and the broad range of applications are anything but simple. Angle Valve or Stop â€" Angle stops are named because they are manufactured at a 90 degree angle, they are used as shut off valves at the water intake of plumbing fixtures or appliances. They usually have an oval handle or can have a removable handle when vandalism or theft is an issue. The angle valve is not meant for high pressure applications. The type of connections used for angle stops are sweat, threaded and compression connections. It is still used everyday on large diameter piping, in high pressure applications and in application where a valve is needed for a complete shut down. The gate valve is typically operated by a wheel handle and that handle lifts and lowers a metal disc or wedge cutting off or opening the flow of water. A gate valve should not be used to throttle or regulate the flow of water. When a gate valve is left partially opened water tends to rattle the mechanism inside eventually wearing out the seats and seals. Non-rising stem gate valves are used in areas where space is an issue. The type of connections commonly used to connect a gate valve to the piping are threaded, flanged and sweat connections. Check Valve â€" A check valve is a one way valve in that is has one inlet and one outlet that allows the a liquid to travel in one direction. It is used to halt the flow of the aforementioned liquid in case of a drop in pressure or reverse in directional flow. The majority of check valves used in the plumbing industry work automatically meaning when the pressure or direction changes the valve slams shut. One example of a check valve that is easy to understand is a backwater valve used on a sewer main as it leaves a residential or commercial building. If the city sewer runs full the only place for the water to go are the buildings connected to it, the valve keeps the water from coming back into the building. These valve can have a manual handle to close the valve, this is especially useful when leaving the residence or building unattended. The only problem is you have to remember to open it back up, you can imagine the mess if you use the toilets, lavatories etc. Backwater Check Valve â€" This valve works just like the above. It is a one way valve that is used most often in residential applications They are made by several manufacturers and they are basically heavy duty check valves. They are installed on the main sewer right at the foundation wall. They come in a check valve style in that when water starts backing up into the sewer line the valve slams shut or in a manual style. If a home owner chooses a manual style back water valve they have to crank the valve shut during heavy rains and remember to open it back up when the rain is over because if someone uses the facilities while the valve is closed you will have some serious backups. Advantages of having a backwater valve, they work and they work well. Ball Valve â€" The ball valve is the most popular and widely used type of valve in the plumbing industry. It is built using a spherical disc or ball with a hole in it. When the ball is turned to the open position the hole or port is lined up with the flow of liquid letting it pass through. It was a manufactured out of brass with a brass ball and seats. The valve became an afterthought and was not mentioned in the Chapman literature. A wafer valve is made using a thin disc that can be fastened in the center or the top or can be spring loaded in the center. This valve is meant to placed between two flanged fittings and secured between the two fittings with all thread rod. The valve is notched in the same positions as the bolt pattern of the flanges so the rod can pass by the valve. The valve is secured at both ends by the flanges. Butterfly Valve â€" The butterfly valve has some similar features to that of the above wafer check valve. It is very thin and lightweight so space and support are not issues. It is closed using a wafer or disc that is mounted on a rod that is secured in the middle of the valve. The rod exits the valve at the top and ends with a handle that incrementally controls the internal disc. In the open position the disc is parallel to the pipe in the closed position the disc is perpendicular to the pipe closing off flow. These types of valves can be used to control flow and are especially affective in tight spots. Most times the handles are spring loaded and allow you to lock the valve into a certain position. So we would be remiss in not

thanking Nibco for stopping in and giving us a little history and an engineering lesson regarding butterfly valves. We wanted to pass along that information to you so here goes. The butterfly valve was first used in the Russian oil fields. Some credit is given to Mr. Mendeleev was a brilliant scientist and inventor who was also credited with putting together the first periodic table of elements, he also founded the first oil refinery in The oil refinery needed something to control the flow of oil. Gate valves were bulky and difficult to move from line to line so the butterfly was born. The materials used to manufacture the discs in a butterfly valve are as follows: There are few different types of methods to secure the shaft to the discs, here are the two most popular: Stub Shaft â€" This has two stems. One going from the top down into the disc and one starting from the bottom and going up into the disc. Bolt and Nut Drive â€" This stem is one piece and travels from the handle through the disc and is secured to the disc by a pin. Will the valve be used bi-directionally? Will the flow of liquid be coming in both directions If you are using a butterfly valve for a Dead End will it be used eventually? Is it a future? What is the Dead End rating for the valve? The inside surface area of a butterfly valve are usually lined with a material to extend the life of the valve. Not all liners are created the same, here are the different types of liners. Cartridge Liner â€" This is a liner that fits inside the valve and is held in place by the stem. This is not the right valve to be used in a dead end application because of how the pressure is exerted inside the valve. The liquid tends to push on one side of the liner and with nothing but the shaft to secure it the liquid could get under the liner and foul the valve. This type of liner relies on the flanges outside the valve to keep it secure. Boot Liner â€" This liner is more secure than the previous. It is secured by a ridge that is manufactured into the valve. The liner fits into the ridge. Molded Liner â€" This is the best type of lined butterfly valve. It is made by injection molding and does not need flanges in place to secure the liner. This type of valve is effective in all circumstance where butterfly valves are specified. A circuit setter is a balancing type valve used in an HVAC or plumbing system to regulate pressure in the whole system or within part of the system. In a plumbing system it is used to regulated pressure between hot and cold water inside the potable water system. Many years ago a check valve and a ball valve where used, the check valve would shut down a hot or cold water supply if there was a sudden drop in pressure and the ball valve with a memory stop was used to regulate flow. This prevented cold or hot water bleed over if the pressure was increased or decreased in either supply piping. Here are some things you should look for when choosing a circuit setter What is the adjustment range of valve. Is the valve only able to adjust in quarter turn increments? If precision adjustment is needed look for a valve that has degrees of adjustment. What kind of test ports are on the valve. You should have a port for temperature and another for pressure. Can you achieve a positive shut down for isolation purposes? Gas Cock â€" A gas cock is a valve that is used to regulate low pressure natural or LP gas. The most common place to see this type of valve would be on the incoming gas supply for a kitchen appliance. Please see diagram below for a cross sectional view. This is not a full port valve. New style gas valves are ball valves with small gas valve type handle. The diaphragm flush valve remains largely unchanged. The flush valve is comprised of two chambers, the upper and the lower. When the valve is not used both chambers are filled with water and equalized by the water supply pressure and it is kept equalized by the by-pass orifice. More about the by-pass orifice in a second. The handle is attached to a handle assembly, the flat end of the handle is butted up against the flat end of the operating stem. When the handle is depressed it pushes the operating stem which trips the stem of the diaphragm. This stem rocks the diaphragm out of the seat thereby releasing the water from the upper chamber. Because there is now less pressure in the upper chamber the diaphragm is pushed up from the water pressure in the lower chamber and flushing begins. The diaphragm slowly re-seats itself as water from the lower chamber enters through the by-pass orifice equalizing pressure between the two chambers. A globe valve can be used to regulate flow in a plumbing line. Think of the valve body being bisected by baffles that are manufactured into the valve body and those baffles come together in the middle of the valve and that opening is closed by seating a disc or plug. The handle is attached to the stem which raises and lower the disc into place. Because of the baffles it does not allow for full flow, there are too many right angles. Since the flow is restricted this type of valve may not meet engineering specifications

where full flow is required. Double Detector Check Valve â€" A double detector check assembly is one device that houses two check valve assemblies in the line of flow. The check valves are spring actuated and are designed to open with 1 pound of pressure.

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Chapter 6 : Types of Manual Valves | TLV - A Steam Specialist Company (International)

A common feature used is the valves quarter turn ability, which caters to a wide range of flow control applications. Strainer - Strainer valves are a device that separates liquids from solids, allowing fluid to flow in an application.

Process plants consist of hundreds, or even thousands, of control loops all networked together to produce a product to be offered for sale. Each of these control loops is designed to keep some important process variable such as pressure, flow, level, temperature, etc. Each of these loops receives and internally creates disturbances that detrimentally affect the process variable, and interaction from other loops in the network provides disturbances that influence the process variable. To reduce the effect of these load disturbances, sensors and transmitters collect information about the process variable and its relationship to some desired set point. A controller then processes this information and decides what must be done to get the process variable back to where it should be after a load disturbance occurs. When all the measuring, comparing, and calculating are done, some type of final control element must implement the strategy selected by the controller. Principles of Operation The most common final control element in the process control industries is the control valve. The control valve manipulates a flowing fluid, such as gas, steam, water, or chemical compounds, to compensate for the load disturbance and keep the regulated process variable as close as possible to the desired set point. Control valves may be the most important, but sometimes the most neglected, part of a control loop. Any control loop usually consists of a sensor of the process condition, a transmitter and a controller that compares the "process variable" received from the transmitter with the "set point," i. The controller, in turn, sends a corrective signal to the "final control element," the last part of the loop and the "muscle" of the process control system. While the sensors of the process variables are the eyes, the controller the brain, then the final control element is the hands of the control loop. This makes it the most important, alas sometimes the least understood, part of an automatic control system. This comes about, in part, due to our strong attachment to electronic systems and computers causing some neglect in the proper understanding and proper use of the all important hardware. What is a Control Valve? However, if none of the systems exceeds the ratings for Class valves, this is not necessary. Globe valves are normally used for control, and their ends are usually flanged for ease of maintenance. Depending on their type of supply, the disk is moved by a hydraulic, pneumatic, electrical or mechanical actuator. The valve modulates flow through movement of a valve plug in relation to the port s located within the valve body. The valve plug is attached to a valve stem, which, in turn, is connected to the actuator. Control Valve Arrangement The image below shows how a control valve can be used to control rate of flow in a line. The "controller" receives the pressure signals, compares them with pressure drop for the desired flow and if the actual flow is different, adjusts the control valve to increase or decrease the flow. Comparable arrangements can be devised to control any of numerous process variables. Temperature, pressure, level and flow rate are the most common controlled variables. Image comes from http:

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Chapter 7 : Control valve - Wikipedia

Control valves, also known as control nozzles, are essential products used in many industries. One of their most well-known applications is the oil and gas industry. Control valves are used to control operating conditions such as flow, temperature, pressure, and liquid levels.

Valves are instrumental in everything from pumping soap out of a dispenser to starting a jet. Without valves, there would be no control of your pipe flow. Here are some of the types of valves and their applications. Gate Valves Gate valves, the most common type of valve in the industry, are valves that open by lifting a gate out of the route of the fluid. Gate valves are designed to be fully open or closed; they are regularly used as a block valve for isolating pipe systems. When a gate valve is open, there is no obstruction in the flow path resulting in very little friction loss. Gate valves are used when a straight-line flow of fluid and minimum restriction is desired. These can be controlled by a hand-wheel, air powered diaphragm, electric motor, or a piston actuator. Globe valves regulate by the position of a movable disk or plug in relation with the stationary ring seat. A globe valve may have ports that run straight across, or may be pointed at an angle. This type of angled supply valve is commonly used for corrosive or thick, viscous fluids that tend to solidify. Having outlets on an angled supply valve that point downward helps the fluid to drain off to prevent clogging and corrosion. Needle Valves The needle valve is essentially a variation of the globe valve used for very fine control of flow. Butterfly Valves The butterfly valve is also designed to regulate flow, but with limited control capability. This is a simpler industrial valve and fitting that is easily operated by rotating a handle 90 degrees. The butterfly valve has not generally been thought to give a positive shut-off, however modern technology has facilitated the assembly of a bubble-tight shut-off. Check Valves Check valves, also known as NRVs non-return valves , permit fluid to flow in one direction only. Their purpose is to prevent backflow. Ball check valves and piston check valves operate by requiring a minimum amount of inbound flow pressure; backflow is not forceful enough to lift the ball or piston back up to travel the other direction. Flow in a swing check valve pushes through a hinged flap that only opens in one direction, assuring the fluid cannot travel backwards. Relief Valves The relief valve, also known as the safety valve, is an industrial valve and fitting installed to set a limit on the amount of pressure in a system. This type of angled supply valve is strictly for preventing over-pressure that could cause damage to the system. Contact us today and learn how we can help fulfill your industrial valve and fitting needs on time and on budget.

Chapter 8 : Complete Guide to Actuators (Types, Attributes, Applications and Suppliers)

A typical use is the control of various valves such as a ball or butterfly. Each actuator type has versions for various power configurations and come in many styles and sizes depending on the application.

Share 0 Fundamental of valves and their types Valves are mechanical devices. They are basic elements with which the flow of fluids and pressure within a system can be regulated. They are mainly used to control the direction of fluid flow as well regulate the amount fluid flowing through a particular system or a process. Starting and stopping or isolating fluid flow. This corresponds to on and off functions. Controlling or varying throttling the amount of fluid flow by change of direction or restriction. This corresponds to volume functions. Checking the flow or controlling the direction of fluid flow and preventing backflow. This corresponds to directional functions. Regulating downstream system or process pressure Relieving component or piping over pressure There are many valve designs and types that satisfy one or more of the functions identified above. A multitude of valve types and designs safely accommodate a wide variety of industrial applications. Regardless of type, all valves have the following basic parts: Valves work by creating a partial or complete obstruction in the flow of fluids. The formation of obstruction can be formed manually or by injecting automatic elements in the system. A manual valve is generally controlled by handles, pedals or levers. An automatic valve is generally driven by pressure changes pneumatic valves , although there can be other versions as well, where they are driven by electrical signals solenoid valves. Automatic valves are more common nowadays, except for operations which require human judgement. The regulation is accomplished by the varying resistance that the valve introduces into the system as the valve is stroked. As the valve modulates to the closed position the system pressure drop shifts to the valve and reduces the flow in the system. Because of the diversity of the types of systems, fluids, and environments in which valves must operate, a vast array of valve types have been developed. Possible valve choices for isolating service are gate valves, ball valves, butterfly valves and plug valves. Possible choices for control and regulating service are globe valves, butterfly valves, ball valves and plug valves. Under check valves swing check are most common. They are designed to open and relieve excess pressure, re-close after normal conditions are restored, and function when normal operating controls fail. They are not designed to control normal operating pressure. These valves are most critical valve in pressurized systems and they are often referred to as PRVs pressure reducing valves. Other common types of valves are the diaphragm valve, and pinch valve. Each type of valve is normally designed to meet specific needs. Some valves are capable of throttling flow while other valve types can only stop flow. There are valves which work well in corrosive systems while some other valves handle high pressure fluids. Each valve type has certain inherent advantages and disadvantages. Although all valves have the same basic components and function to control flow in some fashion, the method of controlling the flow can vary dramatically. In general, there are four methods of controlling flow through a valve as given below. Move a disc, or plug into or against an orifice for example, globe or needle type valve. Slide a flat, cylindrical, or spherical surface across an orifice for example, gate and plug valves. Rotate a disc or ellipse about a shaft extending across the diameter of an orifice for example, a butterfly or ball valve. Move a flexible material into the flow passage for example, diaphragm and pinch valves. Each method of controlling flow has characteristics that make it the best choice for a given application of function. Types of valves Some of important types of valves are described below. Gate valves â€" They are generally used in systems where low flow resistance for a fully open valve is desired and there is no need to throttle the flow. Gate Valves are designed to operate either in fully open or fully closed position. Because they operate slowly they prevent fluid hammer, which is detrimental to piping systems. There is very little pressure loss through a gate valve. In the fully closed position, gate valves provide a positive seal under pressure. However, under very low pressure, i. Globe valves â€" These valves are used in systems where good throttling characteristics and low seat leakage are desired and a relatively high head loss in an open valve is acceptable. Globe valves, as is the case with all valve designs, have both advantages and

disadvantages. Like a gate, they close slowly to prevent fluid hammer. These valves can throttle the flow and they will not leak under low pressure when they are shut off. Flow and pressure control valves as well as hose bibs generally use the globe pattern. Ball valves â€" These valves allow quick, quarter turn on-off operation and have poor throttling characteristics. These valves are also designed to be operated fully open or fully closed with any liquid containing particles that could scratch the ball. Many people use them successfully for throttling clear water. Ball valves have low pressure drops, open and close quickly, are simple, and are trouble free. With the development of Teflon seals, ball valves have grown in popularity. Opening or closing a ball valve too quickly can cause fluid hammer. Plug valves â€" These valves are often used to direct flow between several different ports through use of a single valve. Like the gate valve, a plug valve has an unobstructed flow, yet requires only a 90 degree turn to open it. It also requires very little headroom. Stem corrosion is minimal because there are no screw threads. Almost all plug valves are now furnished with an elastomer coated plug. These valves seals off drip tight. Plug valves are available in much larger sizes than ball valves and are highly suitable for use in wastewater plants. Butterfly valves â€" These valves provide significant advantages over other valve designs in weight, space, and cost for large valve applications. These valves have center-hinged swinging disc. Low pressure and low temperature designs are resilient seated, usually rubber lined. These valves can be used for blocking or regulating. High performance types of valves are metal seated. They are generally used for handling large flows of gases or liquids, including slurries, but should not be used for throttling for extended periods of time. They are also very compact relative to flanged gate and ball valves. These valves are relatively expensive to repair. Diaphragm valves â€" Diaphragm valves are linear motion valves that are used to start, regulate, and stop fluid flow. The name is derived from its flexible disk, which mates with a seat located in the open area at the top of the valve body to form a seal. These valves are used in systems where it is desirable for the entire operating mechanism to be completely isolated from the fluid. Pinch valves â€" The relatively inexpensive pinch valve is the simplest in any valve design. It is simply an industrial version of the pinch cock used in the laboratory to control the flow of fluids through rubber tubing. Pinch valves are suitable for on-off and throttling services. Pinch valves are ideally suited for the handling of slurries, liquids with large amounts of suspended solids, and systems that convey solids pneumatically. Because the operating mechanism is completely isolated from the fluid, these valves also find application where corrosion or metal contamination of the fluid might be a problem. Check valves â€" These valves are automatically open to allow flow in one direction. Check valves are designed to prevent the reversal of flow in a piping system. These valves are activated by the flowing material in the pipeline. The pressure of the fluid passing through the system opens the valve, while any reversal of flow will close the valve. Closure is accomplished by the weight of the check mechanism, by back pressure, by a spring, or by a combination of these means. The general types of check valves are swing, tilting-disk, piston, butterfly, and stop. A stop check valve is a combination of a lift check valve and a globe valve and incorporates the characteristics of both. The distinguishing characteristic of a needle valve is the long, tapered, needle like point on the end of the valve stem. The longer part of the needle is smaller than the orifice in the valve seat and passes through the orifice before the needle seats. This arrangement permits a very gradual increase or decrease in the size of the opening. Needle valves are often used as component parts of other, more complicated valves. For example, they are used in some types of reducing valves. Safety and relief valves â€" are used to provide automatic over pressurization protection for a system. Relief and safety valves prevent equipment damage by relieving accidental over pressurization of fluid systems. The main difference between a relief valve and a safety valve is the extent of opening at the set point pressure. A relief valve gradually opens as the inlet pressure increases above the set point. A relief valve opens only as necessary to relieve the over-pressure condition. A safety valve rapidly pops fully open as soon as the pressure setting is reached. A safety valve will stay fully open until the pressure drops below a reset pressure. The reset pressure is lower than the actuating pressure set point.

Chapter 9 : What are the Types of control Valves? | Instrumentation and Control Engineering

Valves can be found in non-industrial applications. These may include valves used for residential applications such as a faucet or outdoor hose, or in medicine such as a heart valve. GlobalSpec is the leading specialized vertical search, information service and e-publishing company serving the engineering, manufacturing and related scientific.

Application - It is used for on-off application. Suited for high temperature and pressure use with variety of fluids. They are not primarily used for slurries,viscous fluid etcâ€¦ Advantages of Gate Valve - Low pressure drop when fully open and tight sealing Disadvantages of Gate Valve - Causes vibration,seat disc wear in partial open condition. Slow response characteristics and require large actuating force. Globe Valve In globe valves disc or plug is moved on or off the seat. The seat opening is directly proportional to the travel of the plug. It is short stem travel,high seating capacity,large pressure drop and high flow controllability. Application - It is used primarily for throttling purposes. It may be considered a general purpose flow control valve high temp application. Advantages of Globe Valve - Faster to open or close,most reliable form of seating,throttling to control the flow to any desired degree,positive shut-off. Disadvantages of Globe Valve - Seat disc wear in partial open conditions. Plug Valves It consist of body,plug and cover. The plug is tapered or cylindrical. In the open position,the bore in the plug connects the inlet and outlet ends of the valve providing straight line flow. Application - The plug valves are extensively used in refinery,petrochem and chemical industries and for general purpose involving on off services. Advantages of plug valve - Normally small in size,require less headroom and available in wide range of materials. They provide tight shut off,quick opening and low pressure drop. Disadvantages of plug valve- Plug valve may be subjected to galling Ball Valves It is improvisation of the plug valve. It is basically a ported sphere in a housing. The seat matching the ball is circular so that the seating stress is circumferentially uniform. The seats are usually made up of PTFE which is inert to all chemicals,has low coefficient of friction and resiliency. Application - It is used for flow and pressure control and shut off and for corrosive fluids,slurries,normal liquid and gases. For high temp and pressure. Advantages of Ball Valve - Low pressure drop shut-off,quarter turn operation,easy to maintain,low torque. They are small in size and low in weight. Disadvantages of Ball valve - PTFE seats are subjected to extrusion is the valve is used for throttling. Fluid trapped in the ball in the closed position may cause problem of build up of vapor pressure and corrosion.