

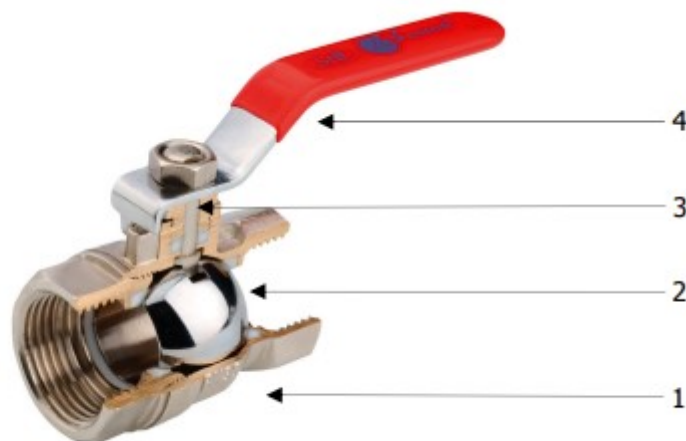
There are five general body styles of ball valves: single body, three piece body, split body, top entry, and welded. The difference is based on how the pieces of the valve - especially the casing that contains the ball itself - are manufactured and assembled. The valve operation is the same in each case. In addition, there are different styles related to the bore of the ball mechanism itself: A full port or more commonly known full bore ball valve has an over-sized ball so that the hole in the ball is the same size as the pipeline resulting in lower friction loss. Flow through the valve is unrestricted. In reduced port or more commonly known reduced bore ball valves, flow through the valve is one pipe size smaller than the valve's pipe size resulting in the flow area being smaller than the pipe.

As the flow discharge remains constant [and is equal to area of flow (A) times velocity (V), $A1V1 = A2V2$] the velocity increases with the reduced area of flow. A V port ball valve has either a 'v' shaped ball or a 'v' shaped seat. This allows the orifice to be opened and closed in a more controlled manner with a closer to linear flow characteristic. When the valve is in the closed position and opening is commenced the small end of the 'v' is opened first allowing stable flow control during this stage. This type of design requires a generally more robust construction due to higher velocities of the fluids, which might damage a standard valve. V Ball valves are commonly used in modulating applications as they offer better flow control characteristics than conventional round bore ball valves. A trunnion ball valve has additional mechanical anchoring of the ball at the top and the bottom, suitable for larger and higher pressure valves (say, above 10cm/ 4" and 40 bars). Cavity filler or cavity filled ball valve.

Many industries encounter problem with residues in the ball valve. Where the fluid is meant for human consumption, residues may also be health hazard, and when where the fluid changes from time to time contamination of one fluid with another may occur. Residues arise because in the half open position of the ball valve a gap is created between the ball bore and the body in which fluid can be trapped. To avoid the fluid getting into this cavity, the cavity has to be plugged, which can be done by extending the seats in such a manner that it is always in contact with the ball. Manually operated ball valves can be closed quickly and thus there is a danger of water hammer. Some ball valves are equipped with an actuator that may be pneumatically or motor operated.

These valves can be used either for on/off or flow control. A pneumatic flow control valve is also equipped with a positioner which transforms the control signal into actuator position and valve opening accordingly. Cutaway of a simple manual ball valve:


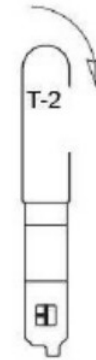


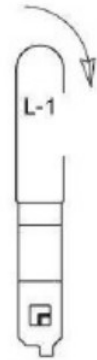













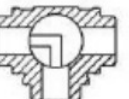
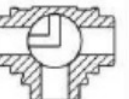

- 1) Body
- 2) Ball
- 3) Stem
- 4) Lever



Ball Valve Types

Three-way ball valves have an 'L' or 'T' shaped hole through the ball. The different combinations of flow are shown below. It is easy to see that a T port valve can connect any pair of ports, or all three together. The L port valve can connect the center port to either side or running port, or disconnect all three, but it cannot connect the side / running ports together. Multi-port ball valves with 4 ways, or more, are also commercially available, the inlet often being orthogonal to the plane of the outlets.

The 4-way ball valve has two L-shaped ports in the ball that do not interconnect, sometimes referred to as an "x" port. Ball valves in sizes up to 2 inch generally come in single piece, two or three piece designs. One piece ball valves are almost always reduced bore, two piece are generally full bore, both are relatively inexpensive and generally are throw-away, non maintainable. Three piece ball valves allow easy replacement of seats and seals as the centre section can be swung out allowing maintenance without disturbing the pipework.

	T-Port				L-Port		
Lever Assembly							
Position 1							
Position 2							
Note	The flow paths are indicated by the markings on the spindle.						