LOAD BALANCERS with EQUA-CHECK® VALVES

Pneumatic load balancer systems are used in a wide variety of equipment such as assembly equipment, manual spot welding, saw positioning systems, material handling, and equipment positioning.

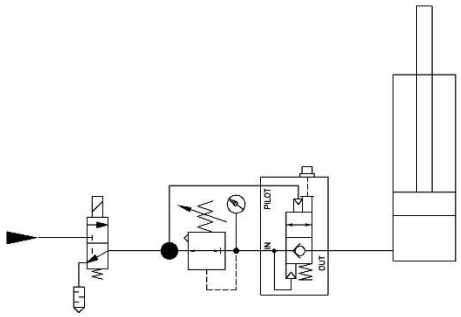
A basic pneumatic load balancing system involves the use of a **pressure control system** and a **(single acting) cylinder** to generate a force that counterbalances the weight of the item being balanced. The pressure control systems involve some form of relieving regulator (where the simplest system would use a manually adjusted relieving regulator) and a valve controlling the air supply to the regulator. While balancing a load, two-way flow needs to be maintained in the line between the cylinder and pressure regulator. More sophisticated systems may involve the use of an air piloted or an electronically piloted pressure regulator, whose control can involve a variety of manual or electronic control techniques.

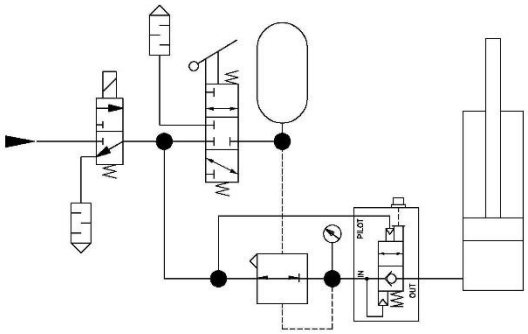
There is a need to be able to maintain the load balance or load position when the air supply pressure to the regulator is turned off, drops too low or is lost. Since normal operation of a load balancer requires two-way air flow between the cylinder and pressure regulator, some method is needed to stop air flow from the cylinder when the air supply is too low or is shut off. An Aladco Equa-Check® valve can be used to stop the air flow from the cylinder.

An Equa-Check® valve is an air piloted check valve where there is some balancing between IN port and PILOT port pressures. In a balancer, stop flow capability is obtained when the Equa-Check's® IN and OUT ports are connected to the line between the pressure regulator and cylinder and the PILOT port is connected to the air supply line to the regulator. As long as the pressure to the PILOT port is sufficiently higher than the pressure supplied to the cylinder, two-way flow between the pressure regulator and cylinder is maintained. Checked flow (from OUT to IN ports) will occur when the PILOT Port pressure drops close to the IN port pressure.

Two examples of balancer systems are illustrated:

The circuit to the right is an example of a simple system used to control a cylinder balancing a load.
The relieving regulator is manually adjusted to regulate a pressure that allows the cylinder to generate enough force to balance the load. The position of the balanced load can be changed by pushing up or down on the load. If weight is taken off or added, regulator adjustment would be needed to rebalance the load





The circuit to the left is another example of a system used to control a cylinder balancing a load. In this system, the relieving regulator is manually adjusted by changing the pilot pressure to the regulator. The regulated pressure can be changed to reposition the load and re-stabilize the position. If weigh is taken off or added, the pilot pressure to the regulator is adjusted to rebalance the load.

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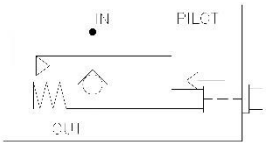
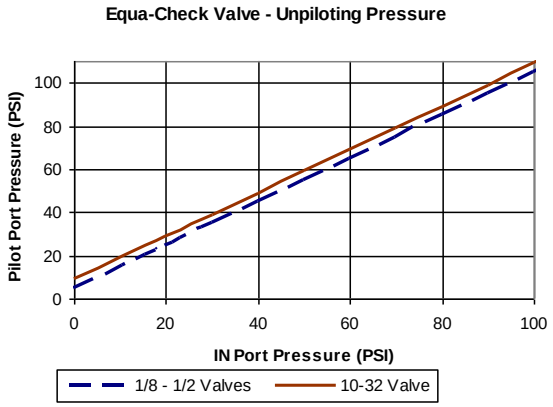
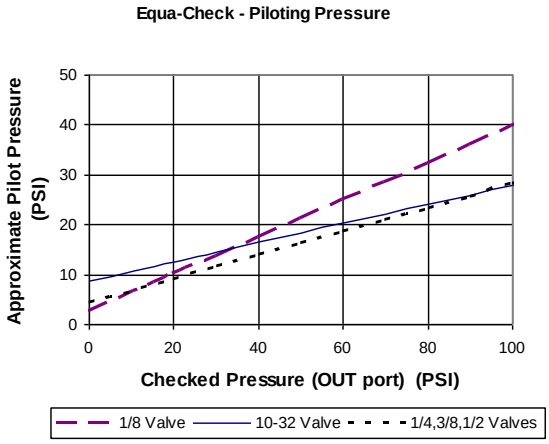
LOAD BALANCERS with EQUA-CHECK® VALVES

When using an Equa-Check® valve in a load balancer, the equipment behavior is primarily influence by the piloting and unpiloting pressure response characteristics of the Equa-Check® valve. The plots below summarize the piloting and unpiloting pressure response characteristics for Equa-Check® valves.



The figure to the right is a plot of the unpiloting response. The plot shows the PILOT port and IN port pressures where an Equa-Check® would switch from two way flow to checked flow. For 1/8" to ½" ported Equa-Check® valves, the plot illustrates that two way flow will be maintained as long as the PILOT port pressure is about 5 PSI higher than the IN port pressure. If the PILOT port pressure drops to within about 5 PSI of the IN port pressure, the check valve function will begin to engage.





The figure to the left are plots of the PILOT pressure responses for when the check function of an Equa-Check® valve is engage and the IN port pressure is zero. The plots show the PILOT pressure needed to disengage the check function verses the pressure being checked (OUT port). For example, with a ¼" ported Equa-Check® valve checking air at 60 PSI and the IN port pressure at zero, at least 18 PSI PILOT port pressure is needed to disengage the check function. Because there is internal pressure balancing between the PILOT and IN ports, pressure in the IN port will increase the required PILOT pressure.

Specific circuit design and component selection is application dependant. Your ALADCO distributor or ALADCO can be contacted to provide assistance with answering application questions.

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