

OPERATION AND DIAGNOSIS OF PNEUMATICALLY OPERATED VALVES

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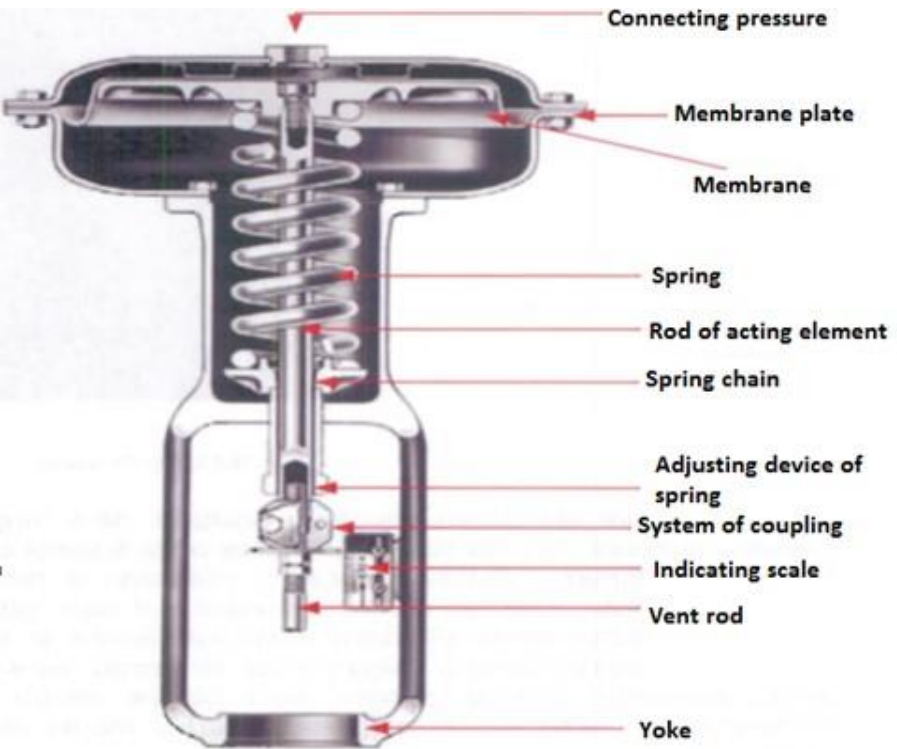
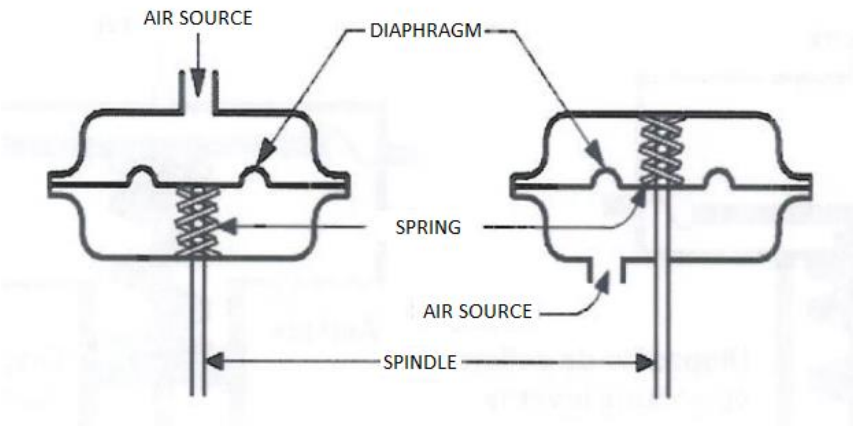
Pneumatic actuators are mechanical devices used to convert pressure of compressed air or gas in mechanical action. They exercise required air pressure from the compressor to create displacement by moving a piston.

Main advantage of pneumatic actuator over electric actuator is that it will always reach predefined safe position even after losing air pressure (most used type of pneumatic actuator is linear or pneumatic cylinder type).

There are three types of pneumatic actuators: 1) Linear Actuator or Pneumatic cylinders; 2) Rotary Actuator or Air motors; 3) Limited angle Actuators.

The air cylinder is a simple and efficient device for providing linear thrust or straight line motion with a fast response speed, particularly suitable for single purpose applications and /or where rapid movement is required.

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Some of the benefits of using the system to maintain the pneumatic system of the valve are: - Design verification; - Troubleshooting; - Actuator stroke calibration; - Calibration of the positioner and I/P.

With the help of VIPER 20 a series of critical parameters can be tracked such as:- Maximum and minimum benchset; - Maximum and average friction;- Pressing force on the seat;- spring;- Shaft effort;- Total race;- Changing the supply air pressure;- Pressure output from the I/P converter.

The following parameters can be registered with the VIPER20 test equipment:

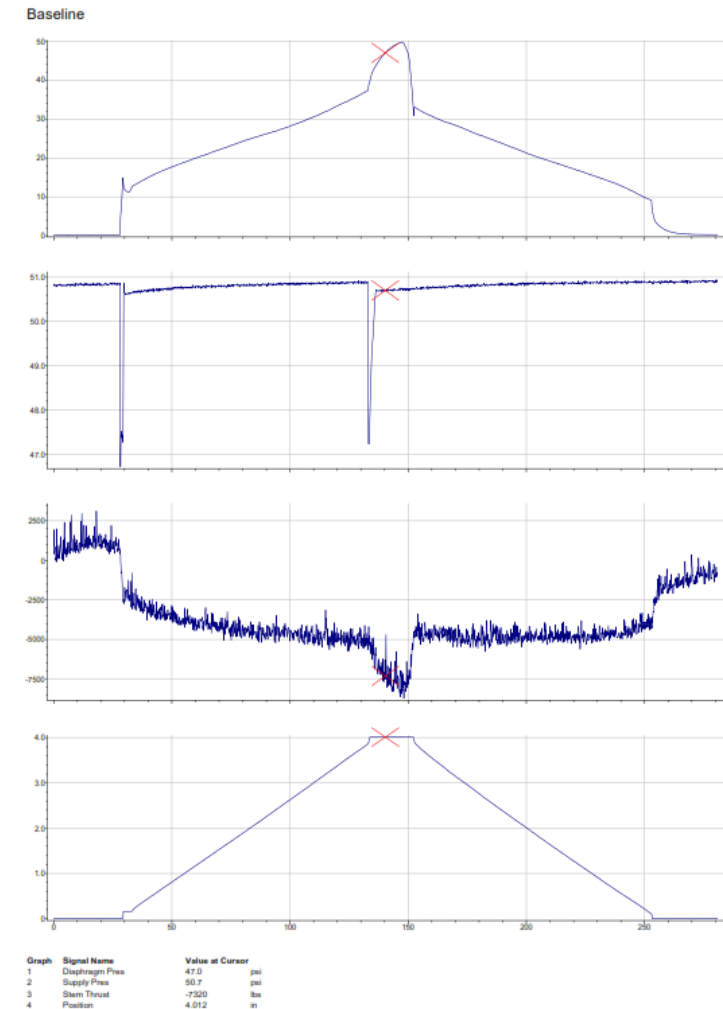
- Pneumatic circuit supply pressure, diaphragm supply pressure and pneumatic converter supply pressure.
- Parcol type pneumatic actuation pressure test at a set position for a period of time (eg at a position of 78% for a period of 10 minutes).
- Sealing friction force and seat pressing force.
- The position of the valve in relation to the command and control signal.
- Operation of the position signal limiters CLOSED - OPEN (where it is required to follow this parameter).

In order to be able to conclude the operating state of the pneumatic actuator, it is necessary to perform at least 4 tests: Baseline, HDRL, Step response and Step sensitivity. Following these analyzes it can be concluded if there are problems with the pneumatic actuator accessories:

- Defect or improper operation of pressure regulators.
- Defect or improper operation of I / P converters.
- Defect or improper operation of the electric positioner.
- Defect or improper operation of the position transducer.
- Defective or improper operation of the instrumental air volume amplifier.

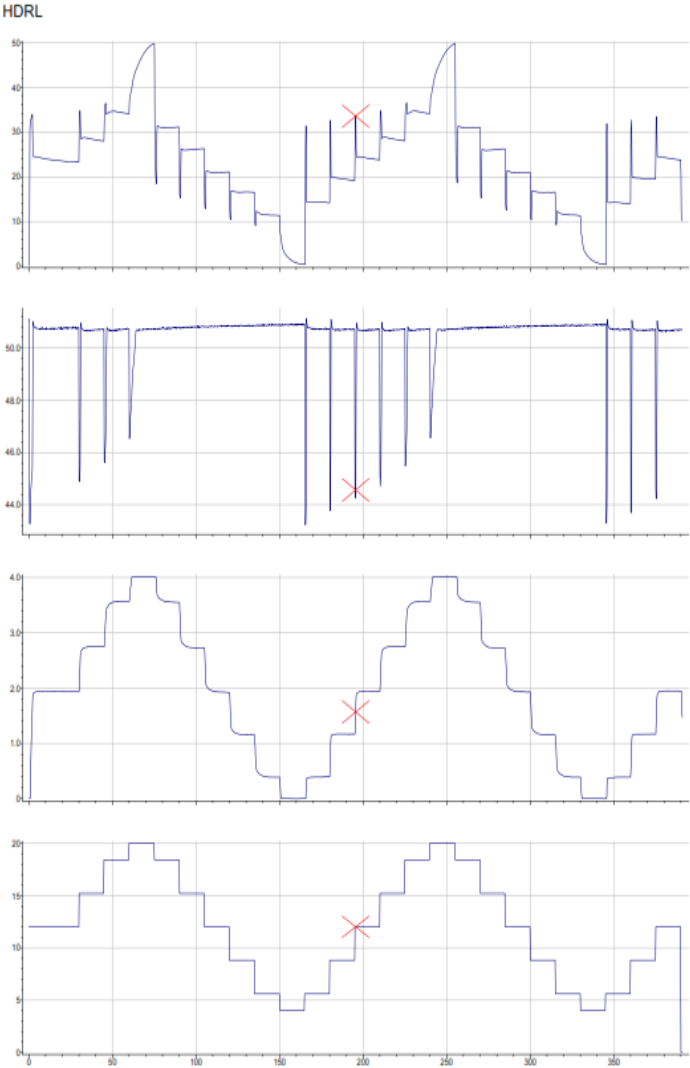
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In the recordings made with the Baseline test we can observe the supply pressure, the diaphragm pressure, the actuating force (when inserting the drawer in the closing element and removing it from the closing element) and from the shaft sealing element, the position of the valve following the signal control. Any variation in the recording signals means improper operation of the pneumatic actuator, its accessories or deficiencies in tightening or consolidating the sealing element.



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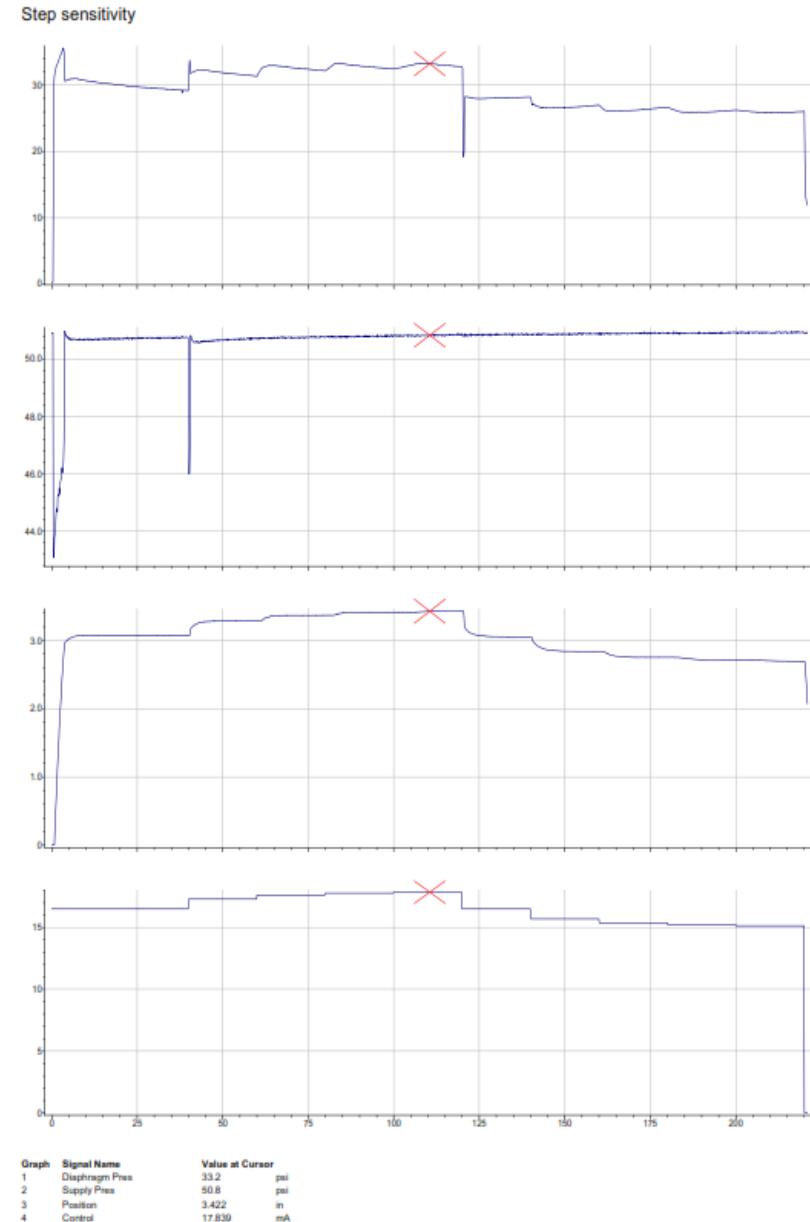
In the recordings made with the HDRL test we can observe the supply pressure, the diaphragm pressure, the position of the valve and its control. Any variations in the recording signals mean improper operation of the pneumatic actuator and / or its accessories.



Graph	Signal Name	Value at Cursor
1	Diaphragm Press	33.5 psi
2	Supply Press	44.6 psi
3	Position	1.565 in
4	Control	11.999 mA

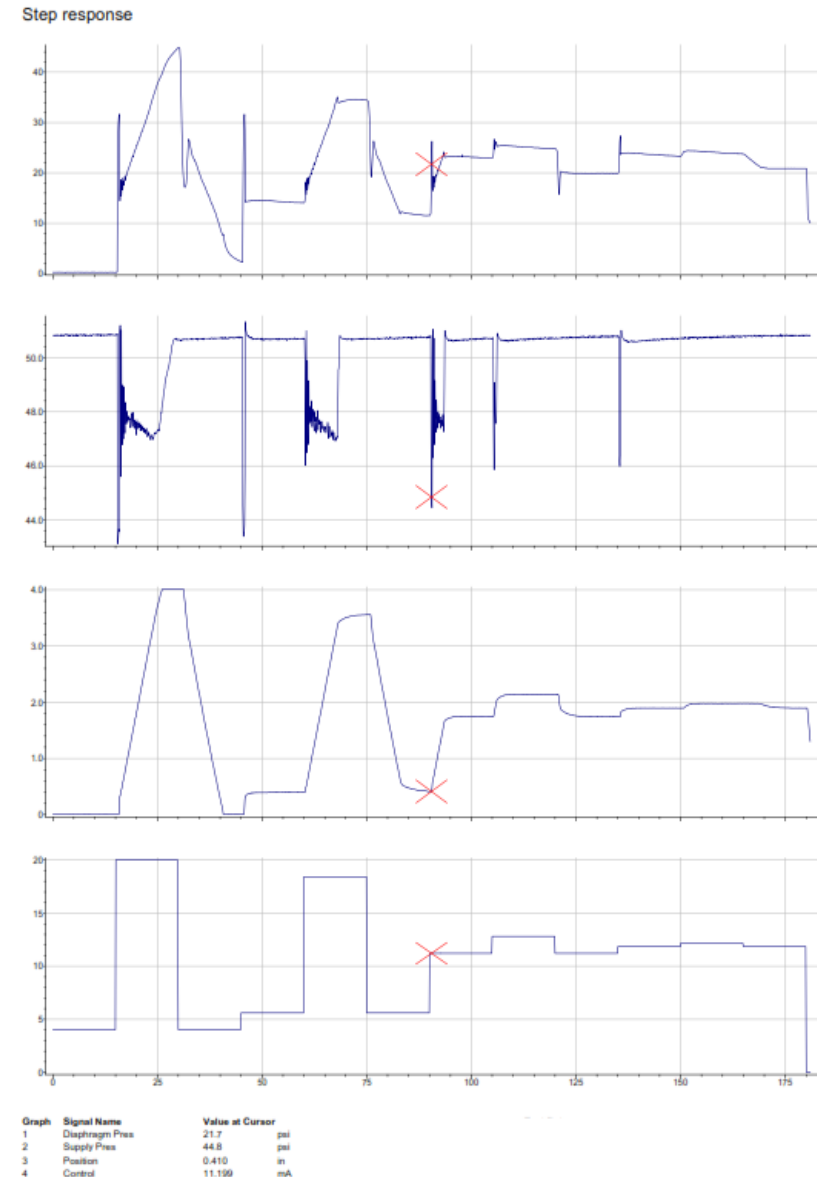
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In the recordings made with the Step Sensitivity test we can observe the supply pressure, the diaphragm pressure, the position of the valve and its control. This test verifies the sensitivity of the valve to low control requirements and its speed of response.



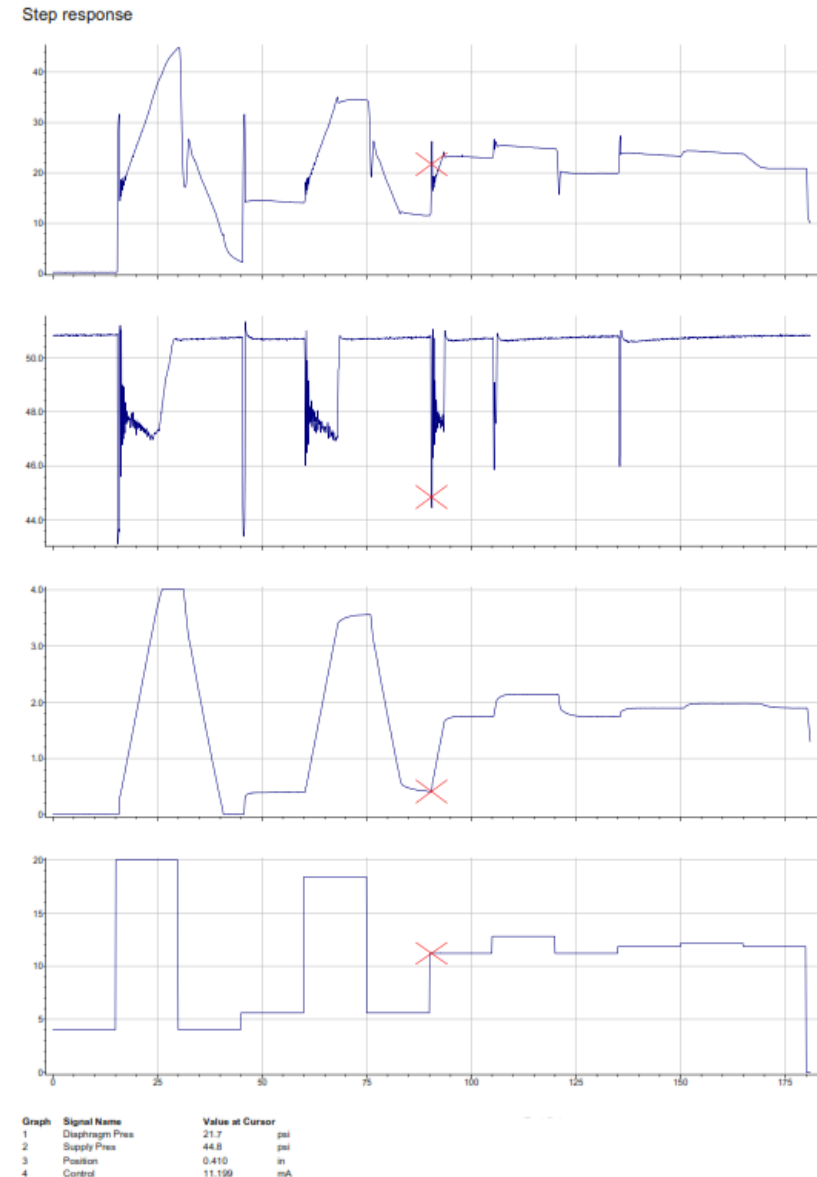
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In the recordings made with the Step Response test we can observe the supply pressure, the diaphragm pressure, the valve position and its control. With the help of this test it is possible to determine the operating time of the valve from closed - open and from open - closed, this being a quite important criterion for the pneumatic control actuations. As can be seen in the recordings, several simulations are made on smaller and smaller variations up to the value of 1% of the total stroke, where the pneumatic actuation also performs this variation (the valves are properly calibrated and the accessories go in normal parameters of operation).



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With the help of the VIPER20 diagnostic and analysis equipment, the defect that leads to abnormal operation of a or pneumatic drive can be safely identified, this being helpful to the worker who carries out fault identification / repair activities (no longer checks each equipment or sub-assembly separately, supply circuits: control and force, etc.), significantly reducing the duration of unavailability of the equipment and replacement only of the defective part or equipment (for example: in a pneumatic drive where there is more equipment in the pneumatic control chain such as: regulator of pressure, pneumatic solenoid valve, pneumatic current / pressure converter, positioner, by using VIPER20 equipment, the part that has an abnormal operation is identified and only that part will be replaced, resulting in minimizing the time of unavailability of the equipment and savings on spare parts).With the help of the VIPER20 diagnostic and analysis equipment, a database is created where all the records made on a device are stored.