We claim:

1. An actuated valve system comprising:

a valve including a flow controlling valve element;

an actuator assembled with the valve and including a fluid driven actuator member operatively connected with the valve element and movable with the valve element from a normal position to an actuated position in response to pressurization of an inlet port of the actuator;

a valve control module including an actuation port connected with the actuator inlet port, a pressurization port for connection with a source of pressurized fluid, and an exhaust port, the valve control module including a pilot valve arrangement operable between a first condition permitting flow between the pressurization port and the actuation port and blocking flow between the actuation port and the exhaust port for pressurization of the actuator inlet port, a second condition blocking flow between the pressurization port and the actuation port and blocking flow between the actuation port and the exhaust port to capture pressurized fluid in the actuator inlet port, and a third condition blocking flow between the pressurization port and the actuation port and permitting flow between the actuation port and the exhaust port for venting of the actuator inlet port;

a sensor in fluid communication with the actuator inlet port to measure a fluid condition in the actuator inlet port; and

a controller in circuit communication with the sensor and with the pilot valve arrangement for operation of the pilot valve arrangement to the first, second and third conditions, wherein the controller is configured to automatically adjust operation of the pilot valve arrangement in response to the measured fluid condition communicated to the controller from the sensor;

wherein the actuator includes a biasing spring arrangement having a spring rate configured such that the actuator pressure required to move the actuator member and valve element from the normal position to the actuated position is at least 50% greater than the actuator pressure required to begin the actuator stroke from the normal position.

2. The system of claim 1, wherein the sensor is disposed in the valve module.

3. The system of claim 1, wherein the controller is disposed in the valve module.

4. The system of claim 1, wherein the spring rate of the biasing spring arrangement is configured such that the actuator pressure required to move the actuator member and valve element from the normal position to a midpoint position between the normal position and the actuated position is at least 30% greater than the actuator pressure required to begin the actuator stroke from the normal position.

5. The system of claim 1, wherein the biasing spring arrangement has a spring rate that is greater than about five times a spring force of the biasing spring arrangement when the valve element is in the normal position.

6. The system of claim 1, wherein the pilot valve arrangement comprises a first shutoff valve connecting the pressurization port with the actuation port, and a second shutoff valve connecting the exhaust port with the actuation port.

7. The system of claim 1, wherein the pilot valve comprises a switching valve connecting the actuation port with each of the pressurization port and the exhaust port, the switching valve being movable between a first position corresponding with the first condition, a second position corresponding with the second condition, and a third position corresponding with the third condition.

8. The system of claim 1, wherein the sensor comprises a pressure sensor.

9. The system of claim 1, wherein movement of the actuator member from the normal position to the actuated position moves the valve element from a shutoff position to a fluid flow position.

10. The system of claim 1, wherein the actuator member comprises a piston.

11. The system of claim 1, further comprising a second sensor connected with the actuator inlet port, the sensor being configured to measure a fluid flow condition in the actuator inlet port

corresponding to at least one of movement of the actuator member between the normal position and the actuated position, and leakage of pressurized fluid past the actuator member.

12. The system of claim 1, wherein the sensor comprises a flow sensor.

13. The system of claim 1, wherein the pilot valve arrangement is configured to provide a fill or pressurization pulse duration between approximately 2 ms and approximately 10 ms to begin an actuation cycle, and an exhaust pulse duration between approximately 3 ms and approximately 10 ms, at a cycle time between approximately 200 ms and approximately 10,000 ms, with the pilot valve arrangement being maintained in the second condition and the sensor monitoring actuator inlet pressure between pulses.

14. The system of claim 1, further comprising a second sensor in communication with the controller.

15. The system of claim 14, wherein the second sensor comprises one of a temperature sensor, a pressure sensor, and a flow sensor.

16. The system of claim 1, further comprising a pressurized chamber connected with the pressurization port.

17. The system of claim 16, wherein the sensor is configured to measure a difference in pressure between the pressurized chamber and the actuator inlet port.

18. The system of claim 1, wherein the actuation port is connected with the actuator inlet port by an actuator supply line.

19. The system of claim 18, wherein the sensor is disposed in the actuator supply line.