

APPLICATION NOTE A110-GP03 - KV VALUE TESTING FOR INJECTOR VALVES

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Air, petrol and a spark are the ingredients for the combustion engine in petrol-powered cars that make these vehicles move. Petrol reacts with oxygen from the air, and the increased volume of combustion gases pushes a set of pistons back and forth. Subsequently, a crankshaft converts this back-and-forth movement into a rotating movement of the car wheels. This way, chemical energy from fuel is converted into useful mechanical energy.

The injector valve is an essential device in combustion engines. It doses and atomises the petrol in such a way into the engine that oxygen and fuel are mixed optimally for the best possible reaction.

Our customer - a supplier of major components for the automotive industry - needs to test the performance of these injector valves for petrol engines under several conditions. They requested Bronkhorst to supply flow meters to this end.



Application requirements

The customer needs to test the leak tightness and operational performance of the fuel injector valves. In closed position the leak tightness is tested by applying air pressure. During operation the valves are tested with both liquid as well as gaseous media (water and air). The flow rates should be between set limits, otherwise the Kv value is not correct.

Important topics

- Measure gas tightness as well as flow rate
- Determining Kv value
- Measurements with gaseous and liquid media

Process solution

Bronkhorst [ES-FLOW](#) volumetric liquid flow meters and [EL-FLOW Prestige](#) thermal mass flow meters are used in the setup. The injector valves are tested by determining their Kv value. This flow factor is calculated by applying a pressure difference over the injector and measuring the mass flow through the device. Both Bronkhorst flow meters are used in a new test bench that consists of six lines.

The company uses both liquids as well as gaseous media to test the injector valves.

To measure flow rates at different activation levels of the valves, tests with water are performed. To accurately check the Kv value the [ES-FLOW](#) liquid flow meter is used, operating at a pre-set pressure of 5 bars and a maximum flow rate of 350 ml/min.

After the tests with water, the injector valves are cleaned with air and additional performance tests are done with air using the [EL-FLOW Prestige](#) thermal mass flow meter. This device is operated at 6 bars pressure, and can measure accurately and temperature-independent an air flow of up to 10 liters per minute.

One reason for this customer to use these devices is that they already have been familiar with Bronkhorst mass flow controllers and meters for a considerable time, and that they have good experience with them. The specific argument for using the accurate [ES-FLOW](#) and [EL-FLOW Prestige](#) is the robustness of these flow meters, in the sense that they can withstand the vibrations that occur in the environment of the test setup.

Recommended Products



ES-FLOW™ ES-103i

Min. flow 4 ... 200 ml/min
Max. flow approx. 1500 ml/min
Pressure rating 10 bar
IP66/IP67 display; touchscreen
Hygienic, flanged type design



ES-FLOW™ ES-113i

Min. flow 4 ... 200 ml/min
Max. flow approx. 1500 ml/min
Pressure rating 100 bar
IP66/IP67 display; touchscreen



EL-FLOW PRESTIGE FG-111B

Min. flow 0,14...7 mln/min
Max. flow 0,4...20 lln/min
Pressure rating 100 bar
100 selectable gases
Customized I/O configurations



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