

DATASHEET FLOW CONTROLLERS IN AUTOMOTIVE INDUSTRY A069

APPLICATION NOTE

Gas flow controllers in automotive industry

For lambda probe testing

In the automotive industry, you can encounter flow measurement in many kinds of processes. One of them is for lambda probe testing. A research department of a major car manufacturer asked Bronkhorst for help with the performance test of their lambda probes. They wanted to test the probes with several gas compositions in their artificial exhaust line. Bronkhorst supplied gas flow controllers for this purpose.

A lambda probe is a sensor positioned in the exhaust section of the car. It measures the oxygen content of the car exhaust gases. This oxygen content, the 'lambda value', is a measure for the effectiveness of the combustion process in a car's engine. The lambda value is transferred to the car engine management system where the fuel/oxygen ratio to the combustion engine can be optimised by adjusting the fuel injection.



Application requirements

One of the requirements of the customer was to have the possibility to change the composition from exceptionally low contents of gases like carbon monoxide (CO) and nitrogen oxide (NO), to very high contents. Furthermore, they wanted to changeover very quickly to another gas mixture.

Important topics

- Accurate dosing of exhaust gas constituents
- Stability
- Flexibility, change gas compositions easily

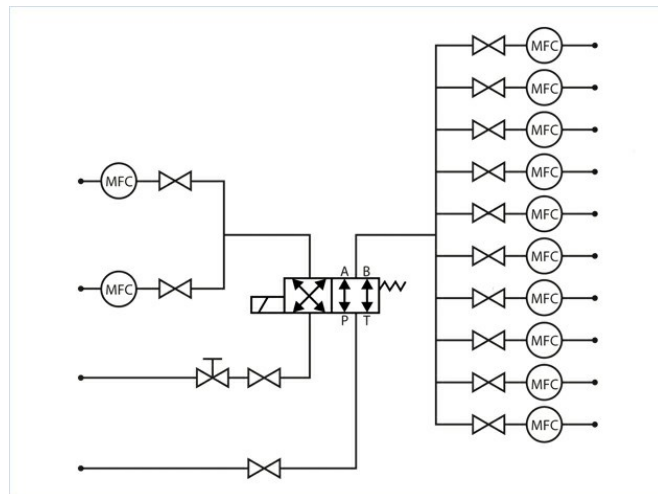
Process solution

Initially, Bronkhorst supplied a set of ten mass flow controllers (EL-FLOW Prestige), for supplying components into the artificial exhaust gas composition. This to simulate a certain working point. Each specific flow controller is meant for a component that may be present in the car exhaust gas (N_2 , O_2 , CO , CO_2 , NO , hydrocarbons, sulphur compounds etc.) These individually generated gas flows enter a mixing chamber, and when the flow is stable, it is fed to the lambda probe.

With the EL-FLOW Prestige devices it is possible to incorporate small amounts of gas into the exhaust gas mixture. Several ranges were used, and the mass flow controllers were calibrated from 9 millilitres per minute to 20 litres (N_2 gas) per minute.

In a later stage, a second set of ten EL-FLOW Prestige mass flow controllers was supplied, to simulate another working point in parallel. While the lambda probe was tested using an exhaust gas composition from the first train, the composition of the second train was premixed in the second mixing chamber. This made it possible to changeover from one working point to another, by physically (dis)connecting each of the mixing chambers from the lambda probe, saving time.

This solution was chosen because of high flexibility, and because of high accuracy. The setup needed to be flexible, as the real working points (compositions) do indeed vary. But also to be prepared for different compositions in the future if compositions or engine effectiveness may change.



Flow scheme

Recommended Products



EL-FLOW PRESTIGE FG-201CV

Min. flow 0,14...7
mln/min
Max. flow 0,4...20 l/min
Pressure rating 64 bar
100 selectable gases
Customized I/O
configurations