EMISSION MEASUREMENT INSTRUMENTS

AVL SMOKE METER

THE CHALLENGE

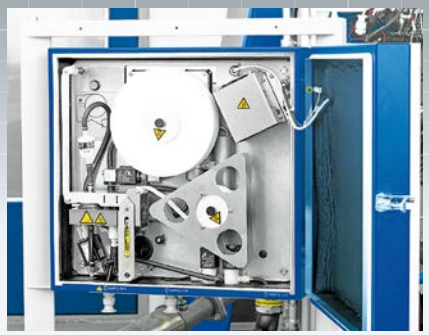
Increasingly stringent emission regulations for combustion engines are the main drivers for high-performance emission measurement instruments. For some applications, such as durability tests, reliability and robustness are important factors.

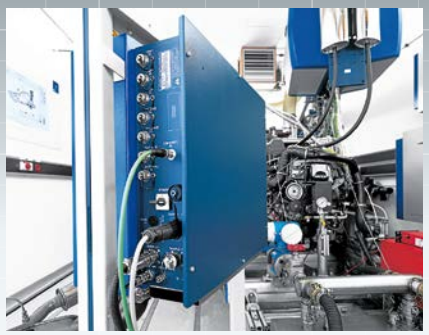
The measurement challenges of engines equipped with exhaust aftertreatment systems are high pressures and temperatures at the exhaust sampling point combined with high emission rates. Furthermore, engines emit hardly any soot after reducing the exhaust emissions with a diesel particulate filter system (DPF), which additionally requires a very low detection limit as well as a high accuracy for soot measurement equipment.

The costs of ownership also plays a crucial role, they are to be kept as low as possible.

THE SOLUTION

The AVL Smoke Meter uses the filter paper method to determine the Filter Smoke Number (FSN defined according to ISO 10054) and the soot concentration in mg/m³. The variable sampling volume and the thermal conditioning of the exhaust gas ensure an extremely high reproducibility and a wide range of applications. The instrument can be used for emission measurements at large/heavy duty engines and at small engines installed in passenger cars independent of their generation. The main fields of application are combustion optimization at prototype engines, emission monitoring until the start of series production and afterwards. In addition, soot concentration measurements in raw exhaust (e.g. upstream a DPF) or measurements up to 5,000 m altitude can be carried out by using device options. To minimize operating costs, short service times, short training periods – due to intuitive operation, easy integration into the test bed automation system and remote maintenance options are essential factors that are met by the AVL Smoke Meter.





MEASUREMENTS WITH HIGH REPRODUCIBILITY

Additional injections in exhaust aftertreatment systems, which are used to clean and burn out the particulate filter, often cause heavy contamination inside the exhaust measurement equipment. In order to prevent this, the AVL Smoke Meter can be equipped with a shop air purge option. It purges the entire gas path with shop air from the inlet to the measurement block and back to the sampling probe. The higher pressure compared to purging with the diaphragm pump has the key advantage of reducing particulate deposits in the device and in the sample lines. Therefore, purging with compressed air ensures a higher reproducibility of the measured values and reduces hang-up effects.

REMAINING PAPER INDICATOR FOR SEAMLESS OPERATION

By default the AVL Smoke Meter is equipped with a remaining filter paper indicator on the front of the housing. The LED is clearly visible from the outside and indicates when the paper supply is low, making it easy to tell whether the paper roll should be replaced, for example before starting a durability test. The remaining paper quantity can also be queried numerically with AK commands on the test bed PC.

ALTITUDE SIMULATIONS AND ALTITUDE MEASUREMENTS

The AVL Smoke Meter also enables altitude simulations using low pressure in the exhaust gas system and measurements up to 5,000 m above sea level. For low pressure simulations the simulated pressure in the exhaust gas system can be entered via software, while for real altitude measurements an integrated absolute pressure sensor takes over this task.

TECHNICAL DATA

Measurement principle	Filter paper blackening
Measured value output	FSN (Filter Smoke Number), mg/m³ (soot concentration)
Measurement range	0 to 10 FSN
Detection limit	0.002 FSN or 0.02 mg/m³
Exhaust pressure ranges	• (–300*) –100 to 400 mbar • (–500*) –200 to 750 mbar with Special Sampling Option • 0 to 3,000 mbar with High Pressure Option
Maximum exhaust temperature	600 °C with standard probe (800 °C with 780 mm long probe)
Interfaces	• 2 x RS232 with AK protocol • Digital via Instrument • Controller TCP/IP with AK protocol (Only with InPort Option)
Power supply	100–115 VAC or 230 VAC, 50/60 Hz
Compressed air (Option)	~150 l/min during purge
Weight	< 40 kg
Dimensions (w x h x d)	560 x 620 x 300 mm
Ambient conditions	5 to 55 °C / max. 95 % relative humidity (non-condensing)
Repeatability	Standard deviation $1\sigma \leq \pm$ (0.005 FSN + 3 % @ 10 seconds intake time)

* with activated altitude simulation

FOR FURTHER INFORMATION PLEASE CONTACT:

AVL List GmbH, Hans-List-Platz 1, 8020 Graz, Austria
Phone: +43 316 787-0, fax: +43 316 787-400, email: info@avl.com, www.avl.com

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