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# Bridge the testing gap

Ultrasonic fuel flow sensors that combine high accuracy measurement with bench-to-vehicle portability are facilitating compliance with RDE and other test standards

Since launching its ultrasonic fluid flow sensors at Automotive Testing Expo Europe 2016, Sentronics Limited has seen rapidly growing interest in its technology, driven largely by its applicability to new emissions testing regulations. Foremost of these are the RDE (NO<sub>x</sub>) standards coming into effect later this year in the EU, with Japan, South Korea, India and China likely to follow by the end of the decade. Similar reforms are anticipated for WLTP (CO<sub>2</sub>) and heavy-duty vehicle emissions testing procedures in the next few years.

Sentronics' FlowSonic LF (low-flow) model has been developed for the ultra-low fuel flow conditions found in modern high-efficiency road car engines, while the FlowSonic HF (high-flow) unit is designed to measure the high-volume fuel, oil, water and coolant flows seen in commercial and industrial vehicle powerplants. The two models' measurement ranges are 8-4,000ml/min and 1-500 l/min respectively.

The unprecedented advantage of Sentronics' fuel flow sensors is that they can be used on both bench and road. Conventional test bench flow measurement technology is too large, heavy and vibration-prone to be used in a vehicle. Traditional onboard equipment is less precise and its bulk can affect test results. The FlowSonic, by contrast, delivers laboratory-



Sentronics' FlowSonic LF sensor, based on its race-winning motorsport unit, is designed to measure the ultra-low fuel flows found in today's road car engines

quality data in a small, lightweight package robust enough to withstand the harshest conditions. With this breakthrough comes the promise of lower costs from implementing a single, much less-expensive technology.

The RDE standards require both bench and road testing (the latter using a new generation of portable emissions testing systems, or PEMS) of NO<sub>x</sub> emissions with a progressively decreasing deviation between the two types of results over the next four years. While the 2018 conformity factor of 1.4 may be within reach using existing technology, 2021's target of 1.1 is not. With fuel consumption a recognized correlate of emissions, the FlowSonic could help OEMs meet the 2021 standard from day one by virtue of its accuracy and identical performance in both bench and road testing modes. Furthermore, the FlowSonic provides the direct fuel

consumption data sought by OEMs, which PEMS cannot.

"Having first developed the technology for motorsport, it has been enlightening to see that OEM requirements are even more demanding," says MD Neville Meech. "Our work with several OEMs over the last year has helped us reach our highest level of performance so far, which in turn has opened the eyes of the motorsport industry to using the FlowSonic to improve their fuel management and pit stop strategy. Compared with ECU fuel injector data traditionally used to calculate fuel consumption, our race team customers are seeing their margin of error in real-time measurement of fuel consumption reduced by a factor of four. This is enabling them to adopt a more precise fuel strategy and run much deeper into the refueling window, yielding a tactical advantage."

FlowSonic features include an advanced ultrasonic design, a measurement rate of 2.2kHz for the LF and 1.0kHz for the HF, an industry-leading 500:1 turndown ratio, and fully digital internal processing delivering outstanding accuracy and repeatability. Data outputs include instantaneous and cumulative volume and mass flows, as well as runtime, speed-of-sound and diagnostics. The sensors can accommodate a wide range of flow rates, temperatures, vibration conditions and fluid types. CAN, digital TTL pulse and analog output formats are available. With no moving parts and the benefit of intensive testing by OEM road car and race team operations, the FlowSonic's reliability and durability are as impressive as its performance.

"We're hopeful we've arrived at the right place at the right time with the right technology," says Meech. "We believe the FlowSonic can deliver a useful tool for OEMs in their efforts to achieve ever greater efficiency and extend the viability of the internal combustion engine." ◀

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