SENSING NEW MARKETS

TT Electronics makes high-temperature sensor technology used in passenger cars available for heavy-duty trucks, off-highway equipment

BY ROBERTA PRANDI

TT Electronics is introducing to the commercial vehicle and off-highway machinery markets a high-temperature sensor developed and manufactured in Klingenberg, Germany, under the AB Elektronik brand.

The company said it developed the HTS 1100 high-temperature sensor with thermocouple and digital signal output to cope with a large temperature range: -40° to 1200°C. The sensor is appropriate for measuring temperature in high-performing petrol engines, TT Electronics said, and has been in series production for passenger cars for three years. Since diesel engines are becoming more prevalent and utilize complex exhaust gas aftertreatment systems, the company said the product could represent the right choice for makers of heavy-duty trucks and even of some off-highway vehicles.

"Since 2015, we have been working with this particular thermocouple sensor for Euro 6-compliant heavy-duty trucks," said Frank Rothe, product application manager at TT Electronics' Center of Excellence for Temperature and Pressure Sensors. "Its design and construction characteristics make it an interesting choice for the commercial vehicle and off-highway market. First of all, its digital output signal, when combined with an electronic unit, enables up to four sensors to be combined into one single signal to the vehicle electronic control unit (ECU) using PWM (pulse-width modulation), SENT (single edge nibble transmission) or CAN protocol. "Nowadays, a typical exhaust gas aftertreatment system can use four sensors in various positions along the exhaust lines. As the number of input signals reaching the vehicle's ECU has increased significantly, it is important that the temperature signals coming from the exhaust tract can use only one input line in the ECU."

The in-house-manufactured thermocouple is composed of two wires that are welded at the tip of the sensor and housed in a mineral insulated cable (MIC). All electrical connections are welded or soldered, including at the electronic unit that amplifies the signal in order to measure the small voltage difference captured by the sensor.

"The HTS 1100 has a very robust housing, adapted for use in off-highway and heavy-duty applications," Rothe said. "One other characteristic of the sensor design is that while the MIC housing's diameter is 4.5 mm, at the tip this size is considerably reduced — to 3.2 mm. This is necessary to reduce the response time, and we are already working at reducing the size even further to reach 2.4 mm while still having insulated wires inside the housing."

Rothe said that tolerances are an important factor in temperature sensors, adding that the HTS 1100 has very low values — lower than for platinum resistance sensors in the high temperature ranges. "Between 900° and 1100°C, we measured tolerances below ±5K," he said. "With the two-unit sensor version, utilizing differential measurement, we can reach tolerances of ±1K."

According to Rothe, temperature dissipation is another important criterion. The HTS 1100 has very high dissipation, he said — from 1000°C measured at the tip down to 100°C at the cable output.

TT Electronics also offers the HTS 1100 thermocouples in preassemblies composed of two, three or four sensors. Customers can choose from various variants: straight or bent construction; tip diameter of 2.4, 3.2 or 4.5 mm; bending angle from 70° to 125°; and sensor length between 35 and 75 mm.

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