

In Cylinder Pressure Sensors



Our innovative sensors are helping customers meet increasing global performance requirements and emission regulations. Examples of our innovation include a cylinder pressure sensor, either integrated in a glow plug or as a stand alone pressure sensor, which directly senses the cylinder pressure during the complete combustion cycle.

The inner structure of the glow plug is specially designed to incorporate the sensing element and ASIC, while at the same time fulfilling the requirements expected from a high performance ceramic glow plug which is supplied in cooperation with Federal Mogul.

Product family

Two main product families are being developed compatible with standard geometry.

- Glow plug pressure sensors (GPPS)
- Stand alone pressure sensors (SAPS)

Operating principle

Glow plug pressure sensor will provide an accurate direct measurement as it senses the pressure transferred from the tip of the glowing element. The integrated electronics provides for end of line calibration and ratio-metric output that can be tailored to individual customer requests.

The glow plug pressure sensor also features a high performance ceramic heating probe ensuring both highest possible hot spot temperature and extended durability equal to the engine lifetime. Stand alone pressure sensor will offer similar features to the above but without the glowing feature as required for Diesel engines employing other means of cold start. This stand alone pressure sensor option offers an extremely durable, economic and reliable solution for heavy duty applications.

Product application

The major difficulty to be overcome is the extreme harsh environment due to direct contact with the combustion media and the heat transfer from the combustion event. A highly miniaturized sensing element and electronics has been developed allowing integration within existing small envelopes (M8).

Technical data see back page

Sensors

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Target performance

	Glow plug pressure sensor	Stand alone pressure sensor
Resonant frequency	> 8kHz	> 20kHz
Cut off frequency	> 10kHz	> 10kHz
Measuring range	0 - 220 bars	0 - 300 bars
Accuracy	2.5% initial EOL accuracy incl. calibration 3.5% over lifetime	2.5% initial EOL accuracy incl. calibration 3.5% over lifetime
Geometry	Designed for M8 Other designs available Compatible with existing Glow plug	Designed for M8 Other designs available for Heavy Duties or gasoline
Temperature range	-40°C to +150°C	-40°C to +150°C
Signal output Analogue voltage	0 to 5v or 3.3v Linear / ratio metric	0 to 5v or 3.3v Linear / ratio metric
Linearity	< 0.2%	< 0.2%
Broad band noise	< 0.5 peak - peak	< 0.5 peak - peak
Robustness	> 1000 thermal cycles -40°C to +150°C	> 1000 thermal cycles -40°C to +150°C
Lifetime	Engine lifetime 300 000 km	Engine lifetime 1 Million Km
Advantages	Robustness, Signal/noise ratio Calibrated sensor Increased engine performance	Robustness, high durability Signal/noise ratio Cost effective Direct pressure measurement

Motivation for new combustion sensors

Future emissions regulations in the US and in Europe coupled with the next generations of diesel engines will present great challenges to system developers. In addition to after-treatment devices such as diesel particulate filters, there is a need for a sensor to improve the combustion process and help to lower engine out emissions.

Packaging proposals

Both families of in cylinder pressure sensors use an integrated connector that meets automotive standards.

Example of GPPS sensor signal and integral heat release processing:

