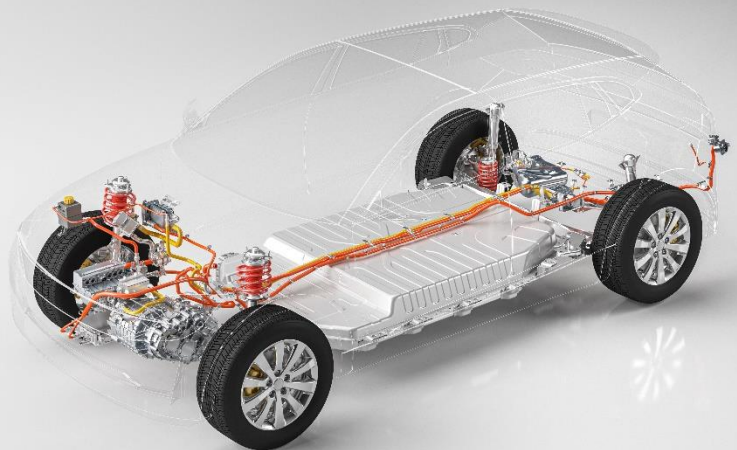
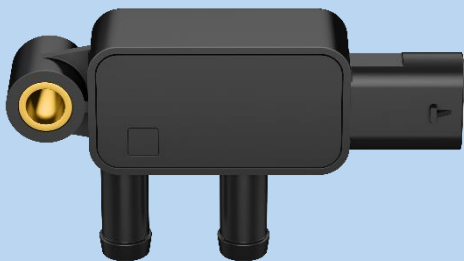


Product Brief 2021

Pressure Sensors for xEVs

Battery Thermal Management Application



Battery Pressure Sensor



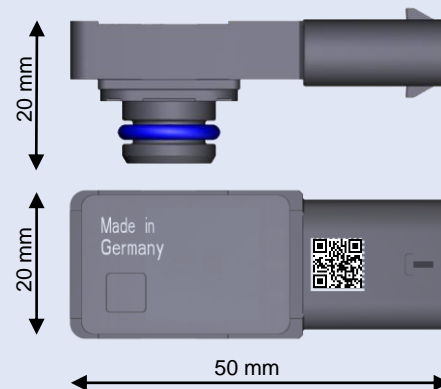
General information

- Modern Battery Management Systems (BMS) assure an efficient and safe operation of lithium ion cells in electric vehicles.
- Besides temperature and current sensors, the BMS can include a battery pressure sensor to track working conditions and events that might occur from overheating or overcharging.
- Pressure sensors in the battery pack provide valuable information of working pressures and unusual pressure increases as input for the Battery Management System.
- As the pressure signature of a thermal event occurs faster than the local temperature increase, pressure sensors can accurately detect thermal events within sealed lithium ion battery cell earlier than temperature sensors alone

Product



Overall dimensions



*Concept pictures
Actual product design and its dimensions are subject to vary.

Features

- Pressure measurement: relative or absolute
- Measured media: gases
- Adjustable pressure ranges from -5 to 5 kPa or up to 40 kPa
- Operating temperature range from -40 to +140 °C
- Output signal: Analog (0.5 to 4.5 V) or SENT
- Optional temperature sensing of the battery pack with digital SENT output
- Response time of <2ms for fast measurement of slightest pressure peaks
- High sensing accuracy of less than 1.0% FS (Full scale)
- Flat and compact design with a high level of customization for different mounting and interface options

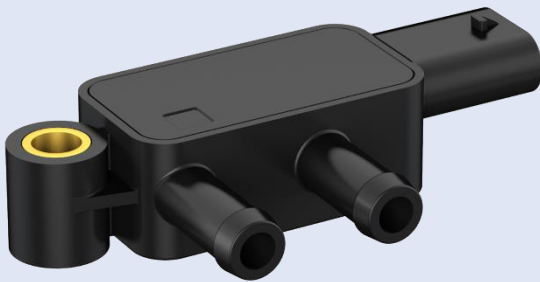
Battery Coolant Pressure Sensor



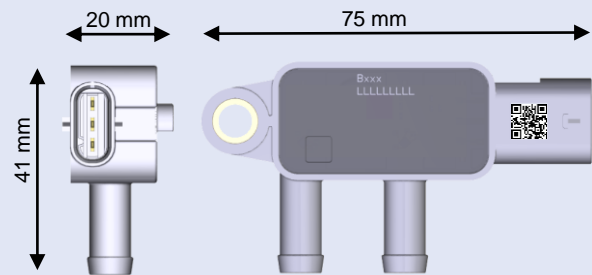
General information

- Thermal management in electric vehicles is important for maintaining the temperature of battery packs within the specified range for efficient performance and long battery life.
- Liquid cooling systems are more efficient as they have higher heat transfer rates compared to air cooling systems. The flow of liquid within the cooling system has to be controlled accurately for effective heat transfer.
- Thermal management systems can include a battery coolant pressure sensor for indirect flow measurement of liquid or detection of leaks by accurately sensing the pressure changes within the liquid cooling system.

Product



Overall dimensions



*Concept pictures
Actual product design and its dimensions are subject to vary.

Features

- Pressure measurement: differential
- Measured media: water-glycol coolant
- Pressure ranges from -10 to 10 kPa up to -100 to 100 kPa
- Proof pressure up to 300 kPa to withstand pressure peaks during first filling
- Operating temperature range from -40 to +140 °C
- Output signal: Analog (0.5 to 4.5 V) or SENT
- Optional temperature sensing with digital SENT output
- Outstanding accuracy and long term stability

Pressure Units

Conversion table for pressure units						
bar	psi	kPa	cm H ₂ O	inch H ₂ O	mm Hg	lbf/ft ²
0.016	0.232	1.6	16.32	6.43	12.0	33.416
0.025	0.363	2.5	25.49	10.04	18.8	52.213
0.040	0.58	4.0	40.79	16.06	30.0	83.54
0.060	0.87	6.0	61.18	24.09	45.0	125.31
0.100	1.45	10.0	101.97	40.15	75.0	208.85
0.160	2.32	16.0	163.2	64.25	120.0	334.16
0.250	3.63	25.0	254.9	100.35	188.0	522.125
0.400	5.8	40.0	407.9	160.59	300.0	835.4
0.600	8.7	60.0	611.8	240.87	450.0	1253.1
1.000	14.5	100.0	1019.7	401.46	750.0	2088.5
1.600	23.2	160.0	1632.0	642.52	1200.0	3341.6
2.500	36.3	250.0	2549.0	1003.54	1875.0	5221.25
4.000	58.0	400.0	4079.0	1605.91	3000.0	8354.0
6.000	87.0	600.0	6118.0	2408.66	4500.0	12531.0
10.00	145.0	1000.0	10197.0	4014.57	7501.0	20885.0
16.00	232.0	1600.0	16316.0	6423.62	12001.0	33416.0
25.00	363.0	2500.0	25494.0	10037.01	18752.0	52212.5
40.00	580.0	4000.0	40790.0	16059.06	30002.0	83540.0
60.00	870.0	6000.0	61184.0	24088.19	45003.0	125310.0
100.00	1450.0	10000.0	101974.0	40147.24	75006.0	208850.0

About TDK Corporation

TDK Corporation is a world leader in electronic solutions for the smart society based in Tokyo, Japan. Built on a foundation of material sciences mastery, TDK welcomes societal transformation by resolutely remaining at the forefront of technological evolution and deliberately "Attracting Tomorrow." It was established in 1935 to commercialize ferrite, a key material in electronic and magnetic products. TDK's comprehensive, innovation-driven portfolio features passive components such as ceramic, aluminum electrolytic and film capacitors, as well as magnetics, high frequency, and piezo and protection devices. The product spectrum also includes sensors and sensor systems such as temperature and pressure, magnetic, and MEMS sensors. In addition, TDK provides power supplies and energy devices, magnetic heads and more. These products are marketed under the product brands TDK, EPCOS, InvenSense, Micronas, Tronics and TDK-Lambda.

TDK focuses on demanding applications in automotive, industrial, and information & communication technology. Especially for xEVs, TDK offers a broad product portfolio of components that are characterized by high reliability and long service life. These include DC link capacitors in film, ceramic and aluminum electrolytic technology. Protective components and solutions for ensuring EMC play an equally important role. Another focus is on power inductors and transformers used in converters for the various voltage levels. Moreover, the TDK product portfolio includes long-term stable NTC temperature sensors and above-mentioned pressure sensors that are indispensable for efficient thermal management and enable reliable monitoring of the battery state of electrical vehicles.

Important information: Some parts of this publication contain statements about the suitability of our products for certain areas of application. These statements are based on our knowledge of typical requirements that are often placed on our products. We expressly point out that these statements cannot be regarded as binding statements about the suitability of our products for a particular customer application. It is incumbent on the customer to check and decide whether a product is suitable for use in a particular application. This publication is only a brief product survey, which may be changed from time to time. Our products are described in detail in our data sheets. The *Important notes* (www.tdk-electronics.tdk.com/en/530500/products/product-catalog/important-notes) and the product-specific *Cautions and warnings* must be observed. All relevant information is available through our sales offices.