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PRODUCT SPECIFICATIONS
SGX – TRDU5

Battery Thermal Runaway Detection TRDU-5

TRDU5 is a Battery Failure Detection sensor that measures H2, CO, NH3, Pressure, Temperature and Humidity level when different battery leakage occur.

The module has to be placed in the battery enclosure allowing to detect a failure mode.

TRDU5 is a solution to allow Battery Management System (BMS) monitor the safe operation of the battery and send an **earlier signal** during a thermal runaway warning to give time to passengers to leave the vehicle safely.

Features :

> Automotive product

> Fast response time (< 1 s)

> MEMS sensor technology for H2, CO and NH3

> Absolute pressure sensor inside

> High sensitivities to gases H2, CO, NH$_3$ and Hydrocarbons

> Measurement redundancy (gases, pressure, temperature, humidity)

> LIN 2.1 output

> Thermal Runaway Trigger Signal can be setup

> Standard 3 pins connector

> Watertight housing IP6K7

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1 Functional specifications

1.1 Principle

There are different failure mode during the battery life time that could occur.
To prevent any injury to the passengers, one solution is to send an alarm as soon as possible to the passenger to leave the car when there is any leakage detection.

Our sensors are able to detect different gases, pressure change and environmental changes during a thermal runway.
All the failure mode are cover and earlier than any other single sensor element.
The TRDU5 product is giving to the customer different strategy and robustness to catch up all the cases for a quick reaction.

See below one failure mode example:

Thermal Runaway example

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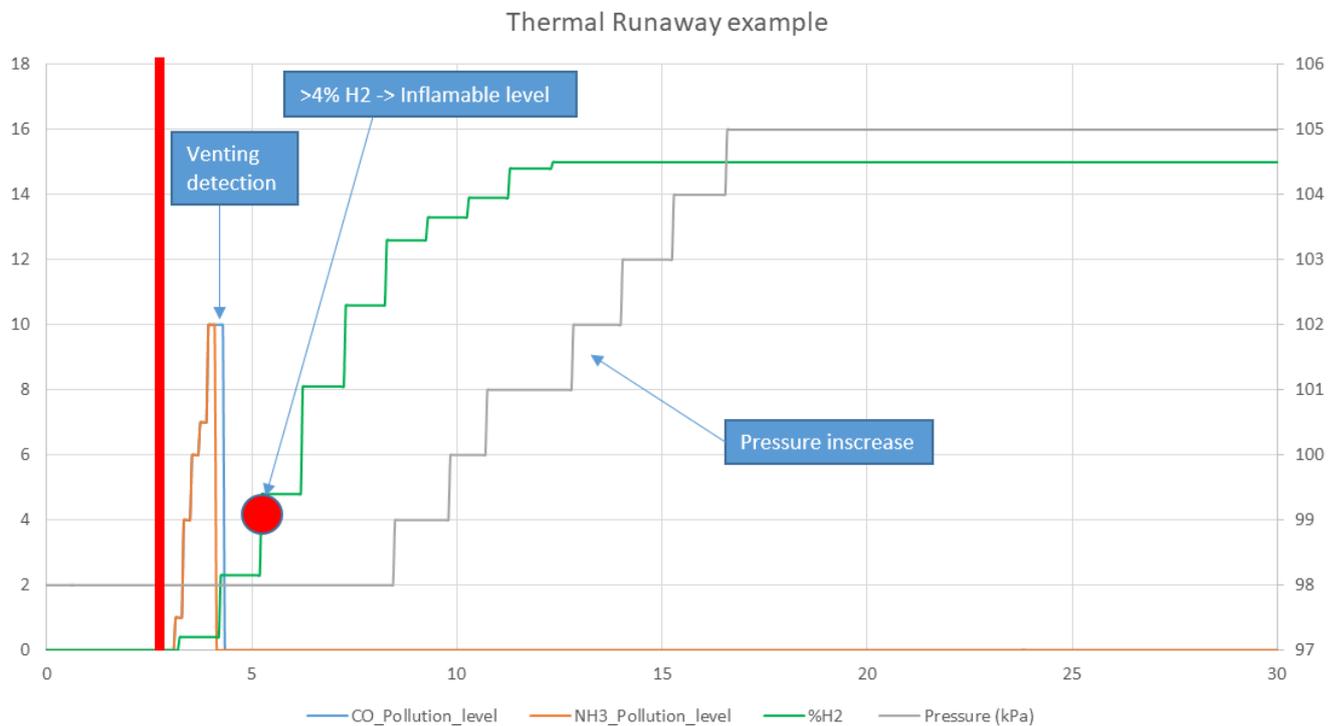
1.2 Main characteristics

Main technical characteristics	
Temperature and humidity range	0~95% RH -40°C to +85°C
Temperature storage	-40°C to 120°C
IP level	IP6K7
Fixing	Bayonet Delphi clip (optional)
Connector	3pins connector ref : AMP 967642-1 Coding B
External dimensions	39mm x 35mm x 27 mm
Weight	< 15 g
Power supply operating range	9 to 15V
Power consumption	<80 mA at 12V
Output signal	LIN 2.1 / 19'200 Bds
H2 detection	Minimum 10 vol.% in air (Inflammability level >4%) ± 0.4 vol.% in air H2 ≤4% ± 10% in air H2 ≥4% At 23 °C
CO detection	Pollution level 0 to 10 (venting phase reach the level 10)
NH3 detection	Pollution level from 0 to 10 (venting phase reach the level 10)
Pressure	Range: 20 to 250kPa Resolution: 0.0329kPa Accuracy: ± 5.5kPa between 20 and 250kPa max allowed 300kPa burst 750kPa
Internal Temperature	Range: -40/+85°C Resolution: 1°C Accuracy: ±3%
Internal Humidity	Range: 0 to 100% Resolution: 0.0019% Accuracy:± 3% RH (max), 0–80% RH

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Response time (T80)	<60ms
Start-up time	< 400ms
Lifetime	Minimum 10 years Minimum 13'000h

2   Interface and integration

2.1 Connector specification

Connector type	AMP 967642-1 Coding B
Pinout	Pin1: Vbat Pin2: GND Pin3: LIN
Communication	LIN 2.1 / ID 0x16

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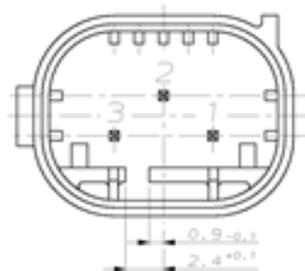
2.2 Recommendation for integration

The sensor must be exposed to measure the air from the **battery pack only**. Preferably, the filtering membrane included in the module should be facing downward. If this is not possible, it should be vertical, but should never be facing upward, to prevent accumulation of dirt, water.
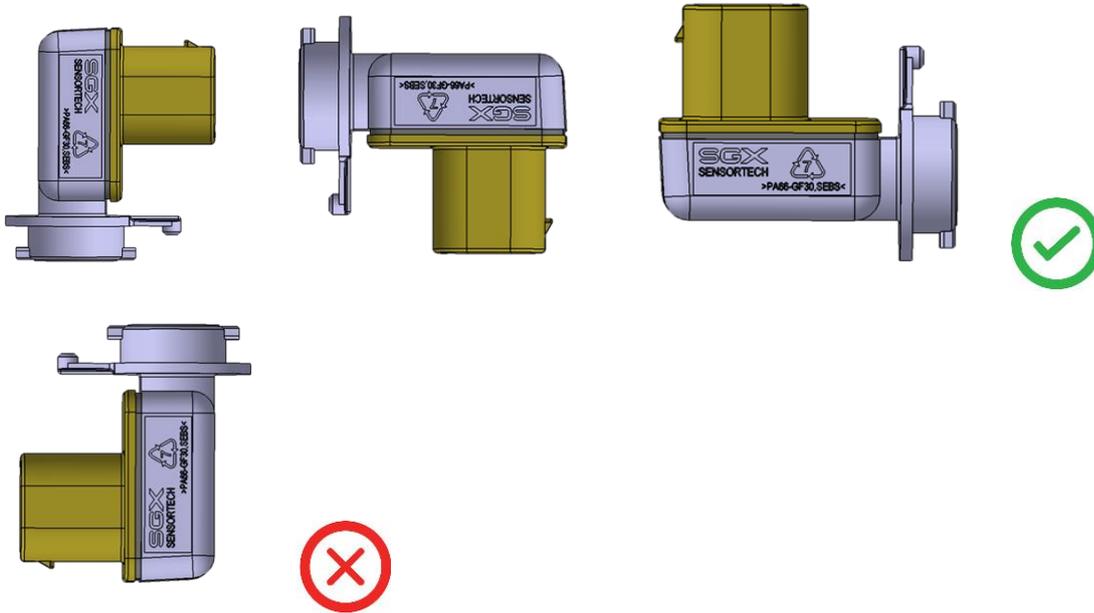
Bayonet fixing, mating with following interface:

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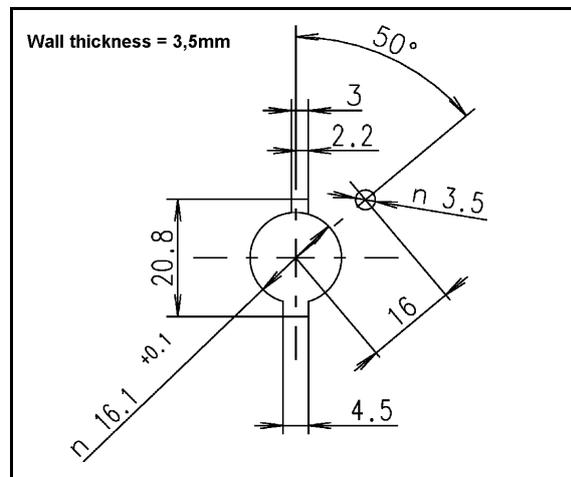
<u>Optional, the sensor can be mounted with a standard Delphi-clip.</u>
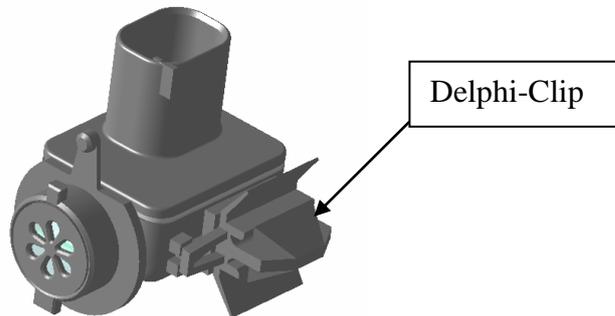
Delphi-Clip

Recommended hole for Delphi-Clip

15±0.1mm

8±0.1mm
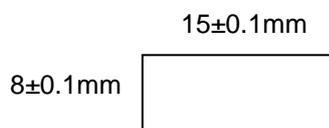
Sheet Metal Thickness (Max) 0.8 – 2.8mm

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2.3 LIN interface

Below is the description of the frame of the sensor, its ID is 0x16 and its DLC is 8 bytes

startbit	byte\bit	0	1	2	3	4	5	6	7
		frame 8 bytes							
0	0	Pressure							
8	1								
16	2	Temperature							
24	3	Hydrogen							
32	4	Level CO sensor				Level NH3 sensor			
40	5	voltage							
48	6	Humidity							
56	7								

Description of the signals:

Name	Description	Readings	Measurement data	Unit	Comments
Pressure	absolute pressure	43601	925.31	mBar	(readings/65535)x1000 +-40
Temperature	Temperature from NTC	105	45	°C	readings - 60
Hydrogen	Hydrgen value	21	2.1	%	readings x0.1
Level CO sensor	Level based on the CO sensor	2	2	level	
Level NH3 sensor	Level based on the NH3 sensor	2	2	level	
Humidity	internal humidity	12618	18.07	%	(readings*125/63536)-6
internal voltage	voltage	123	12.3	V	readings x0.1

Pressure, Hydrogen and CO/NH3 levels are the outputs of the sensor
Internal voltage is for diagnosis purpose
Temperature and humidity are for internal used

Levels of CO and NH3 are representative of an increase, 0 means no change, 10 means a huge increase

For samples availability check with your SGX Sensortech contact person.