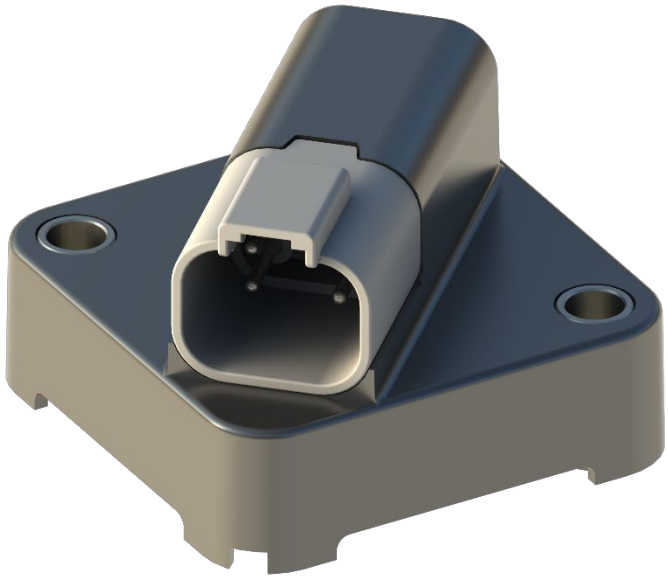
HYBRID O_2 LQ-SENSOR

Specification:

Description	**Specification**
Range	0 … 25.00 Vol%
Resolution	14bits
Accuracy (including repeatability, non-linearity and calibration uncertainty) Factory calibrated @ 13°C and 1013.25 hPa in 2 points, ZERO @ 100% N_2 and SPAN @ 20.8% O_2 or 10% O2 in N_2	± (1.5% of range +3% of reading), applies for readings above 2% of full scale Temperature dependence, typical < ± 0.2% /°C of reading @ -5°C … 30°C, corrected by internal temperature sensor. Long-term stability < ± 4.5% FS/2years Calibration is normalized to standard pressure, by internal barometer Readings are displayed in Vol%, reflecting the partial pressure of oxygen
Warm up time	< 1 min from power on to operational, 20 min to full performance
Time constant $T_{63\%}$	<5 min
Operational temperature and humidity	-5°C … 30°C at full accuracy, -20°C … 60°C at reduced accuracy, 0-100%RH Resistant to condensing environment
Recommended calibration interval in air	1-year intervals. SPAN-Calibration in ambient air @13°C, 20.8 % O_2, barometric correction, stabilization period > 45 min. Can be executed during reefer PTI.
Storage temperature	-40°C … 80°C
Measuring principle	Luminescence quenching by oxygen, ratio-metric decay-time measurement



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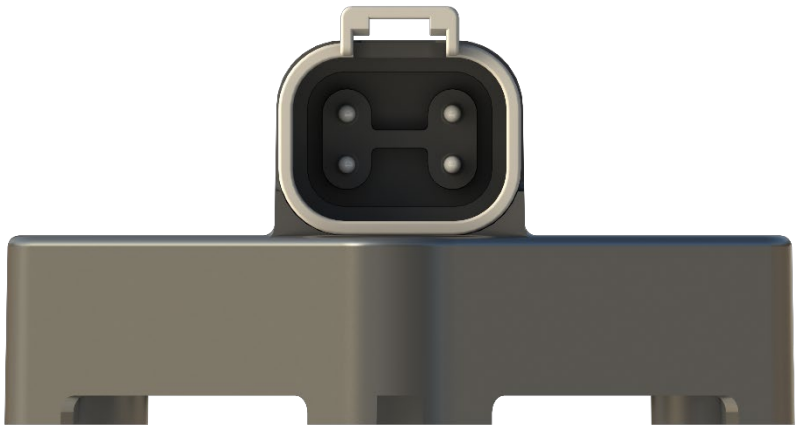
HYBRID CO_2-SENSOR

Measurement specifications:

Description	Specification
Range	0-20 Vol% CO_2
Resolution	14 bits
Accuracy (including repeatability, non-linearity and calibration uncertainty) Factory calibrated @ 13°C and 1013.25 hPa in 2 points, ZERO @ 100% N_2 and SPAN @ 10% CO_2 in 80% N_2	± (1.5% of range +3% of reading), applies for readings >2% of full scale Temperature dependence, typical < ±0.2% of reading /°C @ -5°C … 30°C, corrected by internal temperature sensor. Long-term stability < ±4.5% FS/2years. Calibration is normalized to standard pressure, by internal barometer. Readings are displayed in Vol%, reflecting the partial pressure of CO_2
Warm up time	< 1 min from power on to operational, < 20 min to specified performance
Response time, τ 63%	< 5 min
Recommended recalibration interval	1-year intervals. Baseline level calibration, ZERO in ambient air @13°C. Stabilization period > 45 min. Can be executed during reefer PTI.
Operating temperature and humidity	-5°C … 30°C at full accuracy, 0-100%RH. -20°C … 60°C @ reduced accuracy, 0.100%RH Resistant to condensing environment
Storage temperature	-40°C … 80°C
Measuring principle	NDIR, dual wavelength: 4,26 µm for CO_2 sensing and 3.91 µm for reference



HYBRID RH-SENSOR

Measurement specifications:

Description	**Specification**
Range	0-100 %RH (condensing)
Resolution	16 bits
Accuracy (factory calibrated) See: www.sensirion.com, *SHT30 sensor chip with filter*	SHT30: ± 3% RH, 10…90%RH @ 0°C … 60°C Option: SHT31: ± 2% RH 0…100%RH @ 0°C … 60°C Long-term drift < ±1.5%RH/year.
Warm up time	Instant on
Response time, τ 63%	< 8 sec
Recommended recalibration interval	No need for recalibration
Operating temperature and humidity	-20°C …80° Resistant to condensing environment
Storage temperature	-40°C … 80°C
Measuring principle	Capacitive Sensirion SHT30 chip sensor with PTFE filter

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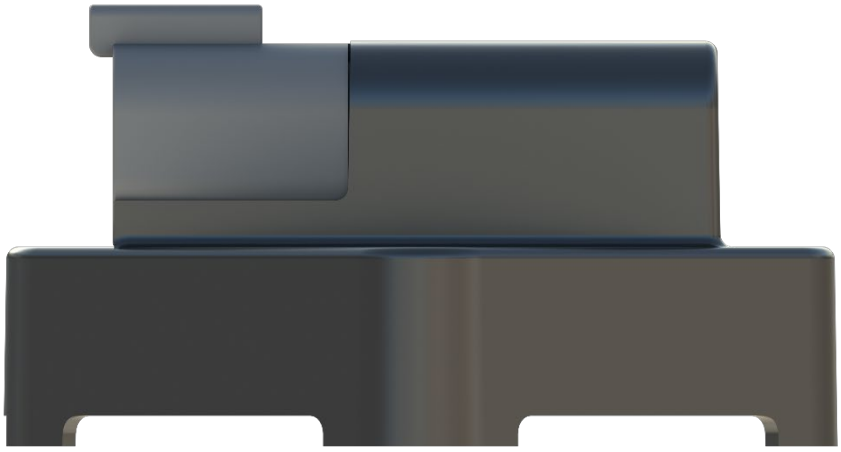
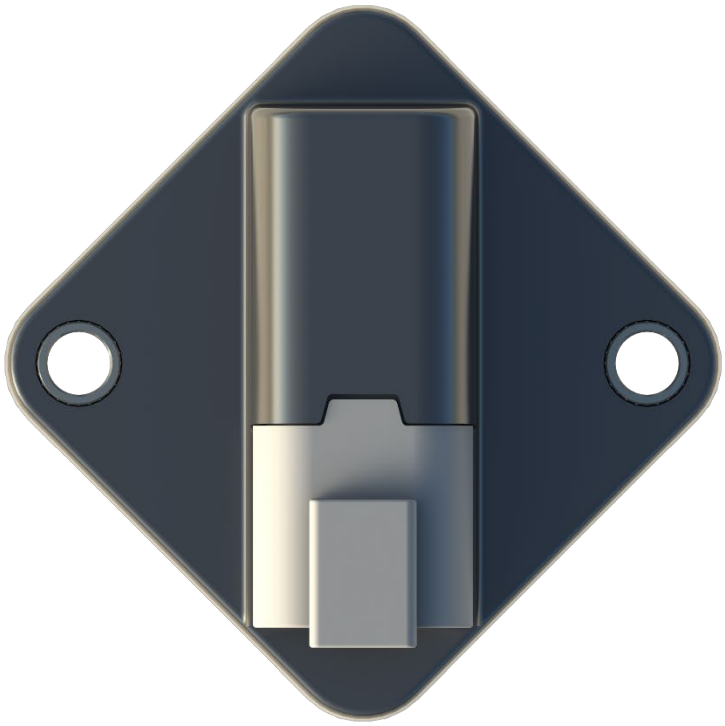


HYBRID TEMPERATURE-SENSOR

Measurement specifications:

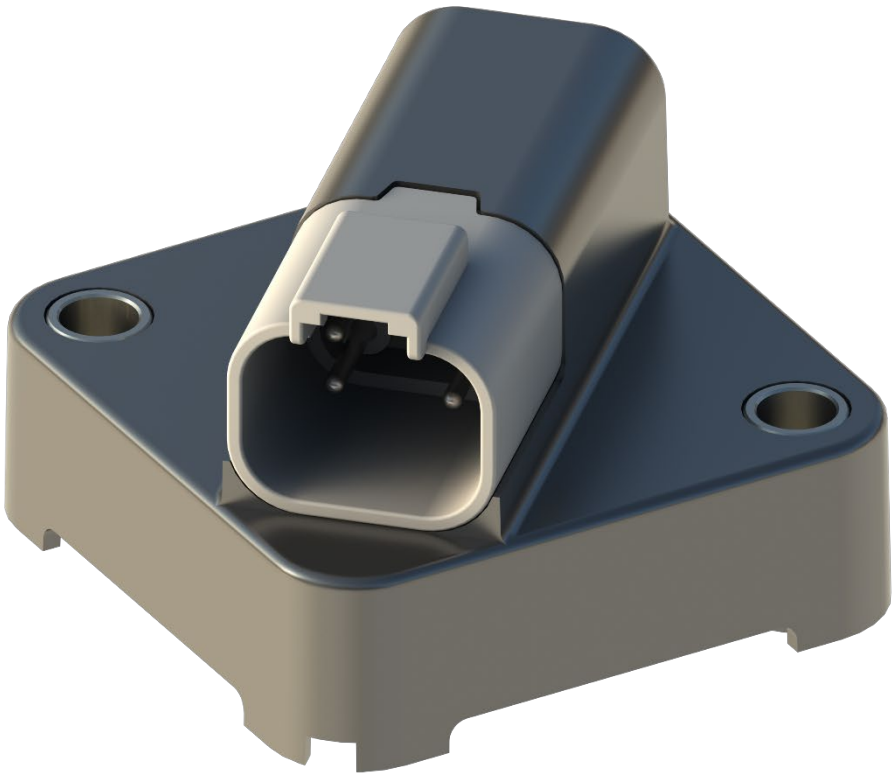
Description	**Specification**
Range	-40°C to 60°
Resolution	16 bits
Accuracy (factory calibrated) See: www.sensirion.com, *SHT30 sensor chip with filter*	± 0.7°C. @ -40°C … 60°C Long-term drift < <0.03°C./year.
Warm up time	Instant on
Recommended recalibration interval	No need for recalibration
Operating temperature and humidity	-40°C …60°C. Resistant to condensing environment
Storage temperature	-40°C … 60°C
Measuring principle	CMOSSens Sensirion SHT30 chip sensor with PTFE filter



HYBRID PRESSURE-SENSOR

Measurement specifications:

Description	Specification
Range	260 hPa to 1260 hPa.
Resolution	24 bits
Accuracy	± 1hPa. @ 0°C … 60°C
Warm up time	Instant on
Recommended recalibration interval	No need for recalibration
Operating temperature and humidity	-40°C …60°C. Resistant to condensing environment
Storage temperature	-40°C … 60°C
Measuring principle	Piezoresistive pressure sensor.



HYBRID COMMON SPECIFICATIONS

Specification, electrical:

Description	Specification
Supply voltage	12VDC (8V … 15V), protected against overvoltage and reverse polarity
Current consumption @12VDC	Peak < 60mA, average <10mA
RS485 driver and circuit	60V max protected.
Miss wiring	No damage

Serial communication:

Name	Type	Description	Specification
2-wire Modbus RTU	RS485	RS 485 communication channel Modbus communication protocol	9600, 19200 or 115000 bit/sec SW selectable

Electrical connection:

Name	Function
Integrated Deutsch DT04-receptacle. DT06-plug and cable/wire pins: (www.deutsch.net)	1: 12V 2: 0V / GND 3: com A 4: com B

Mechanical specs:

Description	Specification
Mounting	Two holes (diameter 6 mm) with 54 mm from center to center for rivet or screw
Mechanical external dimensions	See the pictures / drawings for dimensional indication. W, L, H: 52.5 x 52.5 x 36.5 mm
IP class	67, measuring cuvettes protected by 1µm pore PTFE hydrophobic and oleophobic filter membrane

EMC

Description
EN61000-6-3 Emission, Domestic
EN61000-6-2 Immunity, Industrial: HF 10 Veff, FT ±4kV, ESD ±8kV air, ±4kV contact
CE component declaration will be signed.

Vibration and chock

Description	
IEC 60068-2-64	Test Fc 18Hz to 1kHz 3g rms 3 x 2 hours in each direct x-y-z
Description	
IEC 60068-2-27	6 directions (X-Y-Z both ways): Half sine wave 11ms with peak at 6g, 30 shocks each direction. Vertical: 5 shocks half sine wave 11ms peak at 70g

Salt spray

Description	
ASTM B117	Test time 168 hours No visible corrosions after test

Disclaimer

Description	
Exposure to aggressive gases	Exposure to VOC's and other aggressive gases, like SO2, NH3, HCl and alcohol, especially in combination with condensing environment, may adversely influence the sensors' measuring accuracy and reduce the lifetime. https://www.sensirion.com, Humidity_Sensors_Handling_Instructions.pdf