Product specification

Senseair A ONE

Ethanol Sensor

1. General

The purpose of Senseair A ONE is to determine breath alcohol concentration in human exhalation. Senseair A ONE is designed to be integrated into breath alcohol detection systems to reduce the risk of driving under the influence of alcohol.

Table of contents:

2. Key technical specification

Item	Senseair A ONE Article No. 008-15-0003
Measurement unit	BrAC, mg/L [1]
Measurement method	Contactless (mouthpiece-free)
Acceptable distance to sensor	0 – 40 cm
Operating principle	Non-dispersive infrared (NDIR)
Operating range	-40 – +85 °C, 0 – 95%[2] RH (non-condensing)
Measurement range, BrAC	0 – 3.2 mg/L [3]
Accuracy BrAC	±7.5% of reading or ±0.015 mg/L, whichever is larger [4]
Precision BrAC	5% of reading or 0.015 mg/L, whichever is larger [4]
Warm-up time at 20°C [5]	<15 sec
Pressure dependence	Internally compensated in the range 80 kPa... 110kPa
Power supply	12VDC nominal, ±20% [6]
Peak current	10A at start-up (120W)
Average current, typical	Less than 0.8A (10W)
Dimensions (L x W x H)	174.5 x 56 x 28mm
Weight	240g
Communication interface	CAN
HMI (Human to Machine Interface) options	Digital I/O, low voltage CMOS levels
Compliance measurement performance	SAE-J3214
Compliance EMC	E-mark

Table 1: Key technical specification

Note 1: BrAC: Breath Alcohol Concentration (mg/L): This is the primary means of expressing the breath alcohol concentration. The mass concentration of ethanol, expressed in mg/L (milligram of ethanol per litre breath air)

Note 2: See detailed specification on temperature and humidity range in chapter 3.2.

Note 3: Higher values MAY be measured for breathes from a distance, i.e., for dilution factors > 1.

Note 4: Accuracy and precision are defined according to chapter 7 of SAE J3214.
Note 5: Time from power up to indication of sensor ready for breath. See detailed specification in chapter 4.
Note 6: See detailed specification on functionality vs supply voltage in chapter 3.

3. Operating Environment specification

3.1. Electrical operating condition

Symbol	Typical / range	Unit	Description
Vin	+12	V	Supply voltage, sensor operates in the supply range of 9.5 to 16V. Sensor goes into protective mode without stabilisation and measurement at supply voltages above approximately 17.2V and returns to normal operation when supply voltage drops back within recommended range.

Table 2: Recommended operating conditions

3.2. Electrical absolute maximum ratings

Note: Stresses beyond those listed under Absolute maximum ratings may cause permanent damage to the device. These are stress ratings only, which do not imply functional operation of the device at these or any other conditions beyond those indicated under Recommended Operating conditions. Exposure to absolute-maximum-rated conditions for extended periods may affect device reliability.

Over operating temperature range (unless otherwise noted); all voltages are with respect to GND**.**

Symbol	Description	Min	Max	Unit
Vin	Supply voltage (Reverse voltage protected)	-27	+27	V
INT_L2, INT_L1	CAN I/O [1]	-58	+58	V
VCC_IO	Output voltage from Sensor, 5V nominal	-0.3	(Vin – 0.3V) or 5.3V Whichever is less	V
I_IO	Maximum output current from VCC_IO (shall be limited externally to sensor) [2]	Internally limited to less than 200		mA
GND_IO	Instantaneous maximum current allowed through this pin	-200	200	mA
RxD_STM, TxD_STM		-0.3	(Vin – 0.3V) or 3.6V Whichever is less	V
HMI_IO_0 thru HMI_IO_6		-0.3	(Vin – 0.3V) or 3.6V Whichever is less	V

Table 3: Electrical Absolute maximum ratings

Note 1: DC voltage is provided after specification of CAN driver. Transient voltages are tested according to applicable standards.

Note 2: Internal resistance of this VCC_IO voltage source is provided by series 25 Ohm / 1.5W resistor chain providing voltage drop proportional to the consumed current in addition to thermal and overcurrent protection of 5V regulator.

3.3. Power consumption

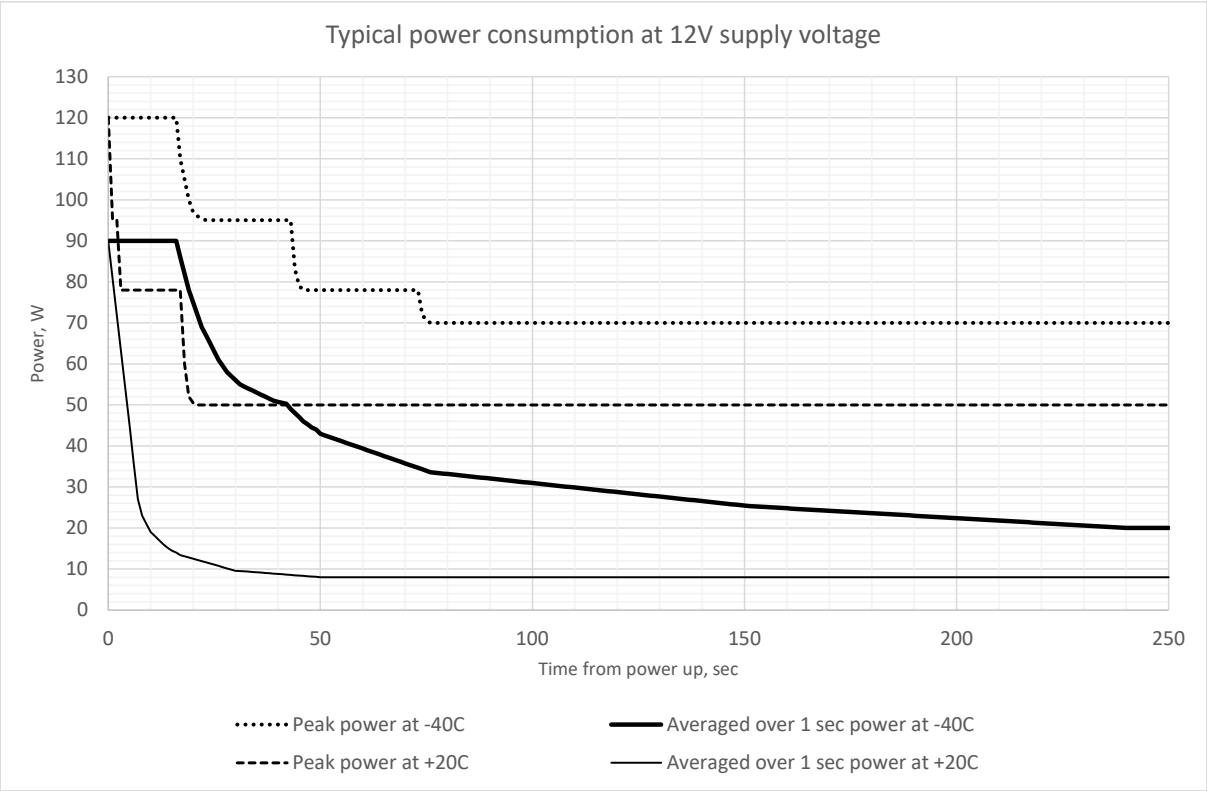

Figure 1: Power consumption

3.4. Temperature and humidity operating range

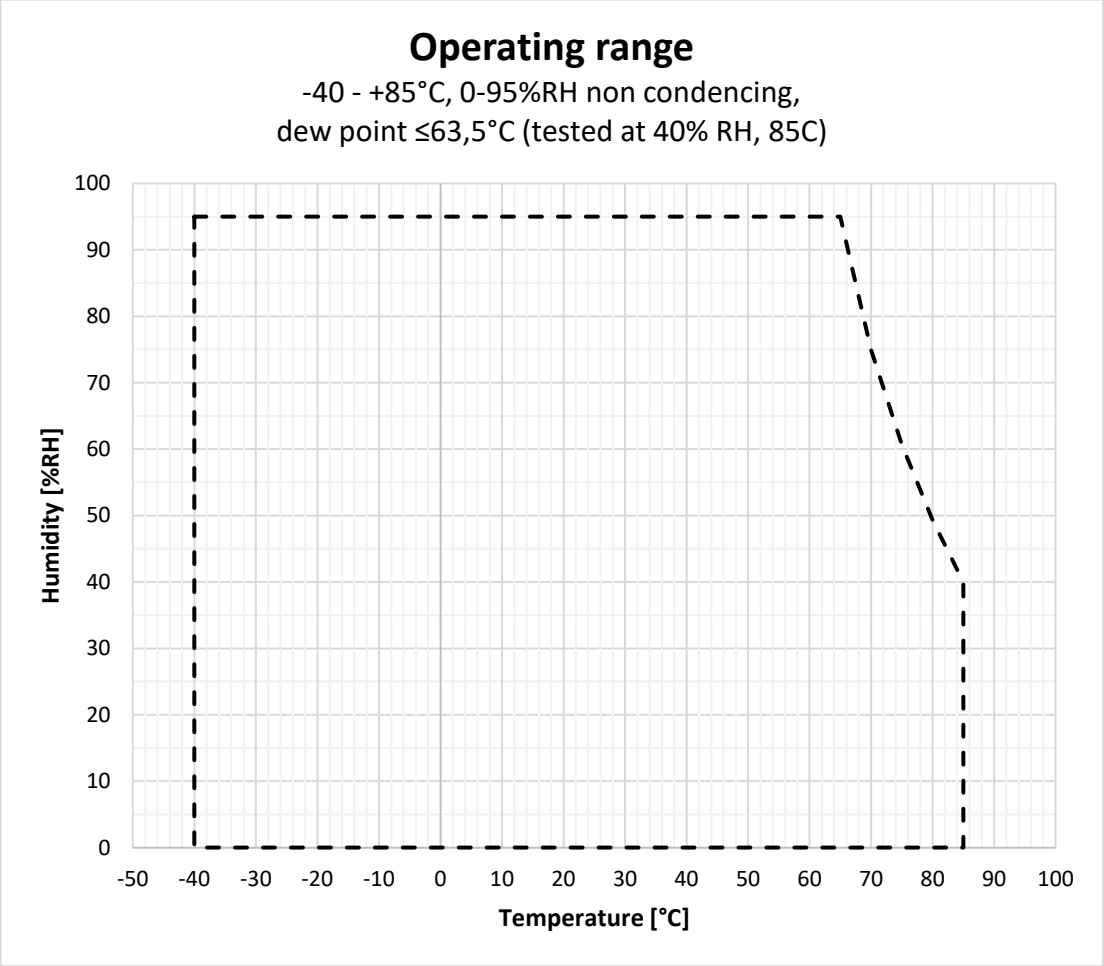

Figure 2: Operating temperature range with tested limit of dew point. Sensor MAY work at larger humidity at higher temperatures

4. Warm-up time vs operating temperature

4.1. Warm-up time

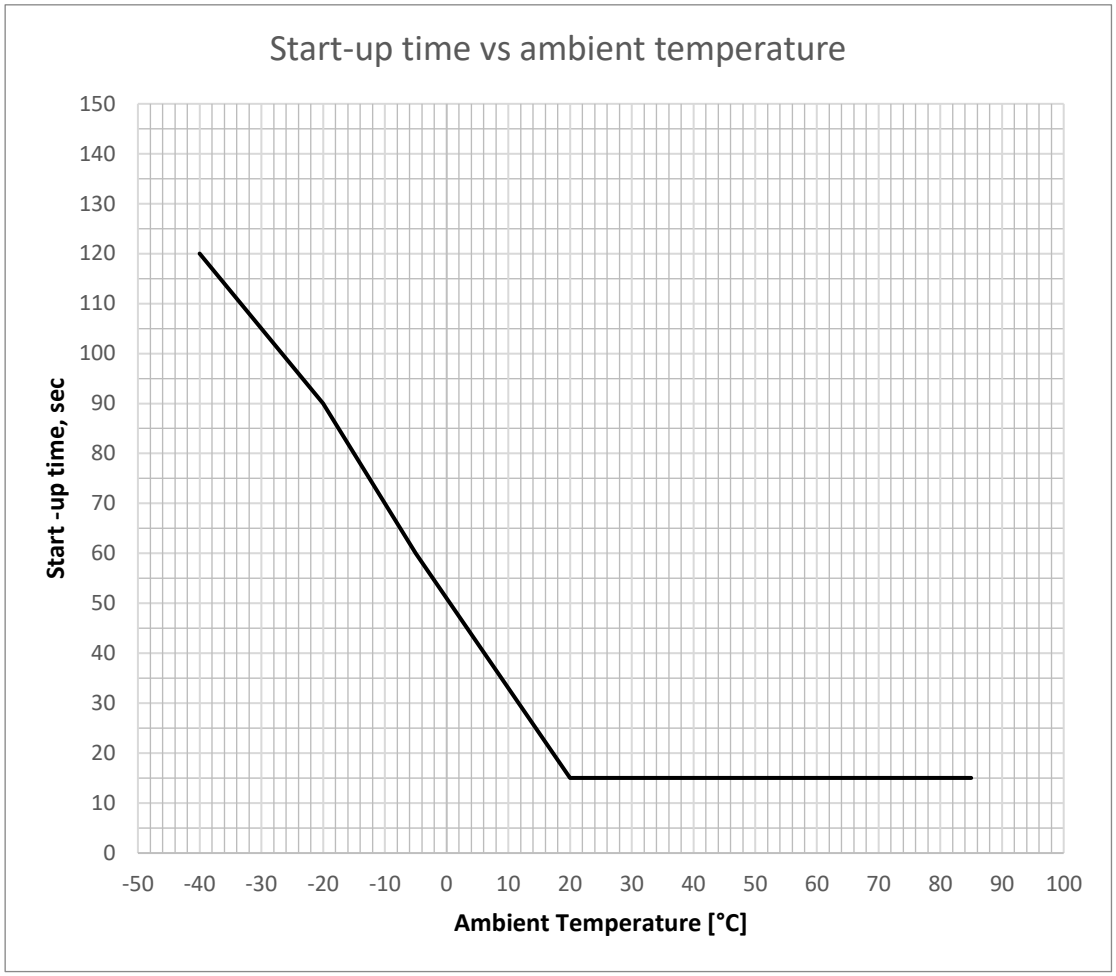

Figure 3: Warm up times vs operating temperature

Note: The sensor will go in standby mode after 10 minutes of inactivity as default to save sensor lifelength. The start-up time from standby mode is equivalent to Figure 3 and the start-up time within 10 minutes of activity is significantly shorter.

5. Integration

5.1. Dimensions

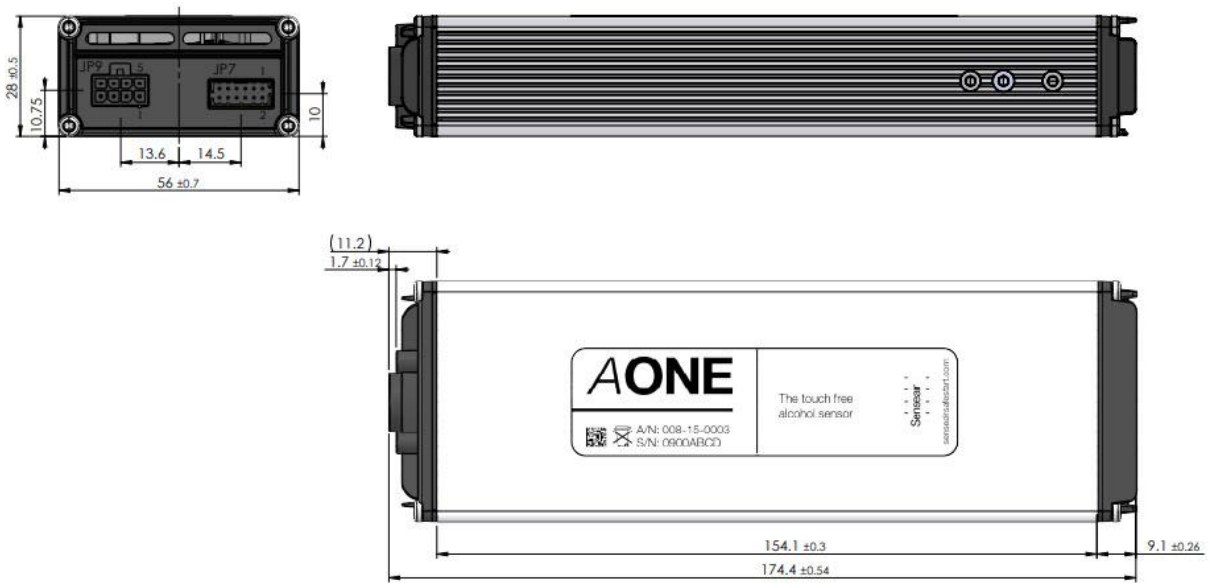

Figure 4: Physical dimensions

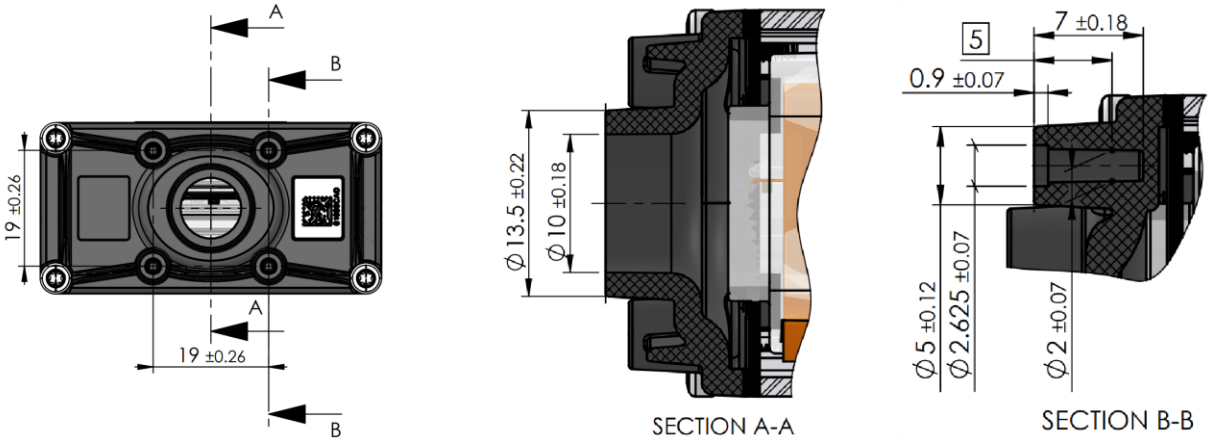

Figure 5: Inlet interface dimensions. Screw tower dimensions correspond with screw EJOT Delta PT®, diameter 2.5 mm.

5.2. Electrical integration requirements

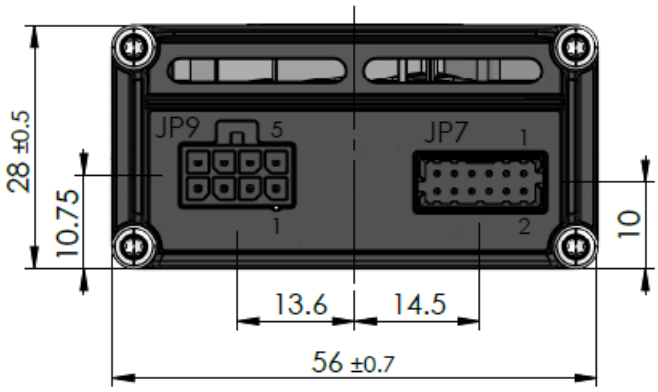

Figure7: Sensor rear side, connectors pin configuration

#	Function	Integration component	Description
1	Power / CAN connection to JP9	Mating part	Connector type used in sensor is: Molex 0430450800 Recommended mating parts are: Molex Micro-Fit 0430250800, 0430250808 Molex Micro-Fit TPA 1729520801
2	HMI connection to JP7	Mating part	Connector type used in sensor is: Molex 0878331231 Recommended mating parts are: Molex 511101250, 511101260
3	Power / CAN connection to JP9	Cabling	All available GND and Vin pins shall be used in cabling to fit into current rating of connector pins at warm up. Recommended 0.5mm^2 wires for Vin and GND

			The largest proper for connector wire diameter shall be used for GND and Vin cabling.

Table 4: Electrical integration requirements and ideas

5.3. Power and CAN connector

Pin #	Symbol	I/O Type	Description
1	GND	Power	Power supply minus. Connected with sensor enclosure. All pins shall be used in parallel to assure peak current consumption without exceeding connector pin current rating
2	GND	Power	
3	GND	Power	
4	LIN_IO	I/O	Reserved for LIN communication line. Do not connect this pin!
5	Vin	Power	Power supply Plus. All pins shall be used in parallel to assure peak current consumption without exceeding connector pin current rating
6	Vin	Power	
7	INT_L2	I/O	CANL
8	INT_L1	I/O	CANH

Table 5: JP9, power and CAN connector pinout

5.4. HMI (Human-Machine Interface) connector

Pin #	Symbol	I/O Type	Description
1	HMI_IO_0	I/O	I/O pin Reserved alternate function: ADC, DAC, SPI_NSS NOT 5V tolerant!
2	HMI_IO_1	I/O	I/O pin Reserved alternate function: ADC, DAC, SPI_SCK

			NOT 5V tolerant!
3	HMI_IO_2	I/O	I/O pin Reserved alternate function: ADC, SPI_MISO, PWM 5V tolerant
4	HMI_IO_3	I/O	I/O pin Reserved alternate function: ADC, SPI_MOSI, PWM 5V tolerant
5	NC		This pin is used for diagnostics and test. Do not connect this pin!
6	HMI_IO_5	I/O	I/O pin Reserved alternate function: I2C_SCL 5V tolerant
7	HMI_IO_6	I/O	I/O pin Reserved alternate function: I2C_SDA 5V tolerant
8	NC		This pin is used for diagnostics and test. Do not connect this pin!
9	VCC_IO	Power	Output from Sensor, 5V nominal Internal 25 Ohm / 1.5W resistor in series to limit inrush currents
10	GND_IO	Power	Connected to power supply minus line via ferrite beads
11	RxD_STM	I/O	I/O pin Reserved alternate function: UART RxD **NOT** 5V tolerant!
12	TxD_STM	I/O	I/O pin Reserved alternate function: USRT TxD

			NOT 5V tolerant!

Table 6: JP7, HMI connector pinout

6. Communication

6.1. CAN protocol

#	Function	Specification	Description
1	Standard	ISO 11898-2	
2	Termination	Termination 120R on each sensor	
3	Baud rate	500 kbps	
	Use Extended ID	False	Supports only 11-bit identifier
	Default UNID_CAN_ID	0x300	Unit listens on frame 0x320 Unit transmits on frame 0x30F and 0x31F

Table 7: CAN specification summary

6.2. A ONE Customer User Interface CAN

The CAN communication is documented in TDE13412 Detailed frames description

7. Maintenance

The sensor requires a yearly service.

8. Handling

See Handling Manual ANO12827.

IMPORTANT NOTICE

1. Senseair reserves the right to make changes to the information contained in this document without notice. When you consider any use or application of Senseair product stipulated in this document ("Product"), please make inquiries the sales office of Senseair or authorised distributors as to current status of the Products.
2. All information included in this document are provided only to illustrate the operation and application examples of Senseair Products. Senseair neither makes warranties or representations with respect to the accuracy or completeness of the information contained in this document nor grants any license to any intellectual property rights or any other rights of Senseair or any third party with respect to the information in this document. You are fully responsible for use of such information contained in this document in your product design or applications. Senseair ASSUMES NO LIABILITY FOR ANY LOSSES INCURRED BY YOU OR THIRD PARTIES ARISING FROM THE USE OF SUCH INFORMATION IN YOUR PRODUCT DESIGN OR APPLICATIONS.
3. The Product is neither intended nor warranted for use in equipment or systems that require extraordinarily high levels of quality and/or reliability and/or a malfunction or failure of which may cause loss of human life, bodily injury, serious property damage or serious public impact, including but not limited to, equipment used in nuclear facilities, equipment used in the aerospace industry, medical equipment, equipment used for automobiles, trains, ships and other transportation, traffic signaling equipment, equipment used to control combustions or explosions, safety devices, elevators and escalators, devices related to electric power, and equipment used in finance-related fields. Do not use Product for the above use unless specifically agreed by Senseair in writing.
4. Though Senseair works continually to improve the Product's quality and reliability, you are responsible for complying with safety standards and for providing adequate designs and safeguards for your hardware, software and systems which minimise risk and avoid situations in which a malfunction or failure of the Product could cause loss of human life, bodily injury or damage to property, including data loss or corruption.
5. Do not use or otherwise make available the Product or related technology or any information contained in this document for any military purposes, including without limitation, for the design, development, use, stockpiling or manufacturing of nuclear, chemical, or biological weapons or missile technology products (mass destruction weapons). When exporting the Products or related technology or any information contained in this document, you should comply with the applicable export control laws and regulations and follow the procedures required by such laws and regulations. The Products and related technology may not be used for or incorporated into any products or systems whose manufacture, use, or sale is prohibited under any applicable domestic or foreign laws or regulations.
6. Please contact Senseair sales representative for details as to environmental matters such as the RoHS compatibility of the Product. Please use the Product in compliance with all applicable laws and regulations that regulate the inclusion or use of controlled substances, including without limitation, the EU RoHS Directive. Senseair assumes no liability for damages or losses occurring as a result of noncompliance with applicable laws and regulations.
7. Resale of the Product with provisions different from the statement and/or technical features set forth in this document shall immediately void any warranty granted by Senseair for the Product and shall not create or extend in any manner whatsoever, any liability of Senseair.
8. This document may not be reproduced or duplicated, in any form, in whole or in part, without prior written consent of Senseair.