SENSEAIR SUNRISE DT

CO_2 sensing in permanently occupied environments

Engineered for demanding 24/7 applications, Senseair Sunrise DT combines a robust optical architecture with integrated dual-technology to eliminate the need for calibration in permanently occupied environments.

The optical design ensures that any drift or aging effects are automatically compensated. Meanwhile, the integrated dual technology continuously adapts to component aging throughout the sensor's lifetime.

Product overview *

Article number	006-0-0020
Operating principle	Non-dispersive infrared (NDIR)
Measured gas	CO_2
Measurement range	0–10 000 ppm
Accuracy	±(30 ppm + 3 % of reading)
Operating conditions	0–50 °C 0–85 %RH
Power supply	3.05–5.5 V
Average current	1–34 µA
Communication	UART, I^2C
Maintenance	Maintenance free
Life expectancy	> 10 years
Dimensions	34 x 21 x 12 mm

* Preliminary specifications. May be changed without notice.

Key benefits

- No ABC/ASC or field calibration required
- Dual Technology, integrated
- Very low power consumption
- True NDIR high precision sensor
- Proven design in the field
- Compliant with building standards:
  - ANSI/ASHRAE Standard 62.1-2025
  - RESET grade A
  - WELL Building Standard® (WELL v2™)
  - Title 24 of the California Building Code

Applications

- Indoor air quality monitoring
- Demand-controlled ventilation (DCV)
- 24/7 occupied environment e.g.
  - Hospitals
  - Nursing homes
  - Control rooms

1.Sensor performance

1.1. Sensing performance

Parameter	Conditions	Value
Target gas	-	Carbon dioxide (CO_2)
Operating principle	-	Non-dispersive infrared (NDIR)
Gas sampling method	-	Diffusion
Measurement range	Standard	0–3000 ppm
	Extended	3001–10 000 ppm
Accuracy [1, 2, 3]	0 ppm – 3000 ppm	±(30 ppm + 3 % of reading)
	3001 ppm – 10 000 ppm	±10 % of reading
Output resolution	-	1 ppm
Measurement interval	Default	16 s; Configurable
Sampling	Default	8 samples; Configurable 1 to 1024
Response time	$T_{63\%}$	21 s
Compensation [4]	Temperature	On-board sensor element
	Pressure	Pressure value must be provided by host system. Otherwise, dependency is 1.6 % reading per kPa deviation from normal pressure

1. The accuracy for the complete operating conditions is specified in chapter 4.2. Specification is referenced to uncertainty of calibration gas mixtures ±1 %. Sensor is calibrated to meet product specifications within standard range 15–35 °C.
2. Shipping, rough handling and assembly can temporarily affect the accuracy of the sensor. Accuracy can be fully restored by zero or target calibration.
3. Senseair Sunrise complies with ANSI/ASHRAE Standard 62.1-2025, concentrations 600, 1000, and 2500 ppm measured at sea level at 25 °C.
4. CO_2 readings are temperature compensated. Optional host system can provide an ambient pressure value for pressure compensated CO_2 readings. The Sunrise does not have an integrated pressure sensor.

1.2. General performance

Parameter	Conditions	Value
Operating temperature [1]		0–50 °C
Operating humidity	Non-condensing	0–85 %RH
Power supply		3.05–5.5 V
Peak current [2]		< 125 mA
Average Current [3]		≥ 1 µA, default settings 34 µA
Dimensions	(L x W x H)	34 x 21 x 12 mm
Life expectancy		> 10 years
Storage temperature		-40–70 °C
Weight		5 g
Communication interface		UART / I^2C
Maintenance		Maintenance-free

1. Sensor is calibrated to meet product specifications within standard range 15–35 °C, extended range 0–50 °C. Sensor can survive temperatures outside of operating range, but measurement accuracy is not guaranteed.
2. At sampling start/stop there is a fast transient current. See “Customer Integration Guideline Senseair Sunrise and Sunlight CO2” (TDE7318) for details.
   To guarantee the functionality of the sensor, the voltage supply must be kept, and the maximum current must be considered.
3. The average current consumption depends on configured measurement period and number of samples per measurement, see chapter 4.3 for further information’s and dependency between configuration and average current consumption.

2. Pin configuration and functions

Pin #	Symbol	I/O Type	Description
1	GND	Power	Ground
2	VBB	Power	Supply voltage
3	VDDIO	Power	I/O supply voltage for TxD/SCL and nRDY
4	RxD / SDA	I/O	UART receive input / I^2C bidirectional serial data. True open drain when operating as output.
5	TxD / SCL	I/O	UART transmit output / I^2C clock input. True open drain when operating as output. 100kΩ internal pull-up to VDDIO
6	COMSEL	Input	Communication select – Valid at power-up. High = UART (Internal pull-up, can be left floating Low = I^2C (Connect to GND)
7	nRDY	Output	Measurement ready output. True open drain, active low, 1 MΩ internal pull-up to VDDIO
8	DVCC	Power	Internal supply voltage output. Not intended to supply external system. Leave floating if not used.
9	EN	Input	Enable sensor (active high). Drive this pin >1.2 V to turn on the sensor. Drive this pin <0.4 V to shut down the sensor. Do not leave floating. Connect to VBB if not used.

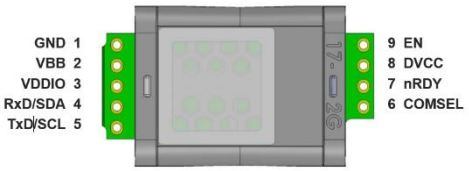

Figure 1. Pin configuration of Senseair Sunrise DT

3. Drawing - Dimensions – Handling

Dimensional drawing of sensor with dimensions and their tolerances in millimetres. Note that the black particle filter on top of the sensor must not be removed or modified to ensure specified sensor performance over the sensor's lifetime.

Additional information about the integration and handling can be found in the *"Senseair Sunrise and Sunlight Handling Manual" (ANO4947)* at the Senseair webpage.

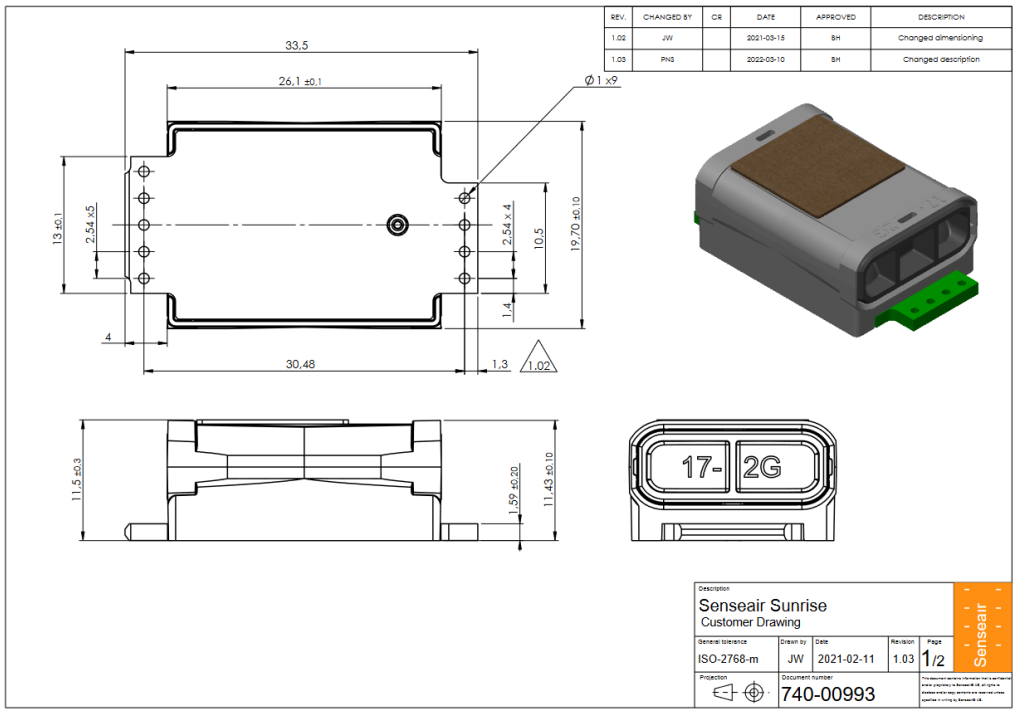

Figure 2. Dimensions of Senseair Sunrise DT

4. Specifications

4.1.Recommended operating conditions

Over operating temperature range, unless otherwise noted.

4.1.1. Operating conditions for voltage

Symbol	Description	Min	Typ	Max	Unit	Test conditions
VBB	Supply voltage	3.05	3.3	5.5	V	
VDDIO	I/O supply voltage TxD/SCL and nRDY	-	-	5.5	V	
COMSEL	Communication select	-	-	DVCC	V	
EN	Enable	-	-	VBB	V	
RxD/SDA	UART / I²C	-	-	VDDIO	V	
TxD/SCL	UART / I²C	-	-	VDDIO	V	

4.1.2. Operating conditions for current

Symbol	Description	Min	Typ	Max	Unit	Test conditions
I_{COMSEL} [1]	DC injection current	-2	-	2	mA	(V_{IN}<GND, V_{IN}>DVCC)
I_{DVCC} [1,2]	Internal supply current	0	-	25	mA	

1. Limited to the value specified
2. Leave floating if unused

4.2. Sensor accuracy over the nominal operating range

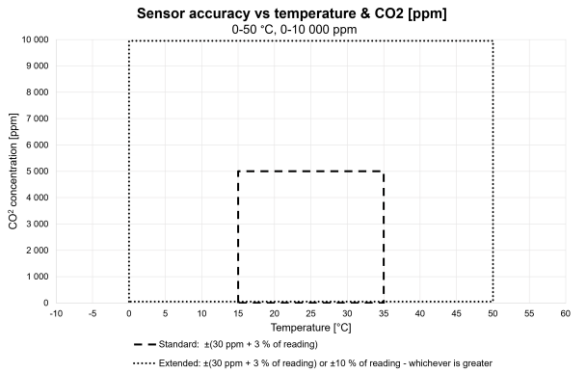

Figure 3: Accuracy over temperature and CO_2

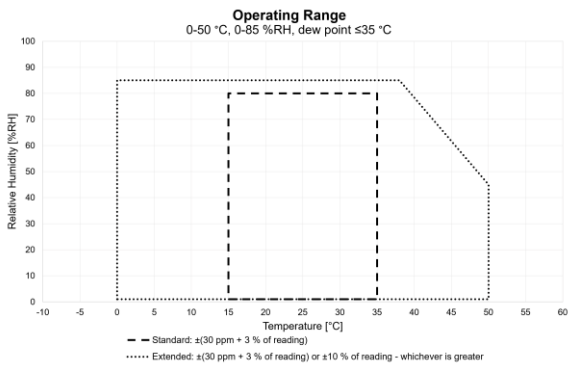

Figure 4: Operating range

4.3. Average current consumption depending on sensor configuration

4.3.1. Average current consumption at different measurement intervals

Measurement period [s]	2 samples		8 samples		32 samples	
	Continuous	Single	Continuous	Single	Continuous	Single
16	22 µA	-	34 µA[1]	-	-	-
60	18 µA	7 µA	21 µA	17 µA	35 µA	27 µA
300	16 µA	1 µA	17 µA	3 µA	20 µA	5 µA

1. Default setting.

5. Sensor documentation

5.1. Measurement mode

The Senseair Sunrise supports two modes of operation:

1. Continuous measurement mode
2. Single measurement mode

The **default** operation mode for Senseair Sunrise is **Continuous measurement mode**.

1) In Continuous measurement mode, the sensor measures at regular intervals (measurement period, default setting 16 s). The host can read measurement data after each measurement and does not need to send any command to trigger measurements.

2) In Single measurement mode, the sensor waits for the hosts command to measure. The host needs to send a command sequence to trigger each measurement. By using this function, the current consumption can be further optimized and gives more flexibility how often the sensor should start a measurement without changing basic settings of the sensor.

See *"Customer Integration Guidelines Senseair Sunrise and Sunlight CO_2" (TDE7318)* for details.

5.2. Communication

Refer to *"Modbus on Senseair Sunrise and Sunlight" (TDE5514)* and *"I2C on Senseair Sunrise and Sunlight" (TDE5531)*. Follow the *"Customer Integration Guidelines Senseair Sunrise and Sunlight CO_2" (TDE7318)* for additional instructions.

5.3. Maintenance

No maintenance is required for Senseair Sunrise DT.

5.4. User- and integration-guide

Further and detailed information for the use and integration of the sensor are described in *"Customer Integration Guidelines Senseair Sunrise and Sunlight CO_2" (TDE7318)* which can be download from the Senseair webpage.

5.5. Handling

Additional information about the handling can be found in the *"Senseair Sunrise and Sunlight Handling Manual" (ANO4947)* which can be download from the Senseair webpage.

6. Revision History

Date	Version	Page(s)	Changes
May 2026	1	All	Initial release of document.

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