

## SDC-C1 Duct CO2 transmitter

### Features

- CO2 measurement for air ducts
- Minimum and maximum value memory
- 0...10V, 0...20mA or 2...10V, 4...20mA measuring signals selectable with jumpers
- Optional alternative signal ranges programmable
- May be used as simple P-controller
- Selectable averaging signal
- Optional internal or external display (-OP or OPU-S)
- Status LED

### Applications

- Demand based ventilation for homes and offices based on measurement of the CO2 concentration
- Preset standard measuring range 0...2000 ppm, max. possible range 0...5000 ppm
- Recording of minimum and maximum limits for critical environments
- Direct control of extraction fan



### CO2 transmitter

The CO2 concentration is measured through non-dispersive infrared (NDIR) waveguide technology with ABC automatic background calibration algorithm. The applied measuring technology guarantees excellent reliability and long-term stability. The microprocessor samples the CO2 once per second. It calculates an averaging signal over a preset number of seconds and generates the output signal.

The output signal range and type may be customized by jumpers and if required by a programming tool. Standard signal ranges are 0...10 VDC, 2...10 VDC, 4...20 mA and 0...20 mA. These ranges can be set by jumpers. Other ranges can be set by using the internal or external display and programming module. (-OP or OPU-S)

### Automatic baseline calibration ABC

The ABC background calibration constantly supervises the measured CO2 concentrations. The calibration function expects the CO2 values sink to 400 ppm when the room is not occupied. Over a period of several days the controller tries to reach this value step by step through recalibration of 30ppm per day max. In order to reach the given accuracy, it is required that the Sensor is for at least 3 weeks in operation.

### Note

The ABC calibration works only in those applications where the CO2 concentration sinks regularly to fresh air levels of 400 ppm. For special applications such as green houses, animal farms, etc. the ABC calibration should be de-activated and the sensor should be manually calibrated. The automatic calibration can be deactivated through the external operation terminal. The Sensor can be calibrated by the client and does not need to be sent in for calibration. See last page for details.

### Minimum and maximum values

Using a display and programming accessory, the user has the option to read out and reset minimum and maximum values. The minimum and maximum values may as well be used as output signals. The minimum and maximum values are saved into the EEPROM and are available after a power interruption.

## Ordering

Item name	Item code	Description/Option
SDC-C1-16-1	40-300152	CO2 transmitter for air ducts, 160 mm probe, incl. cable gland AMC-1
SDC-C1-16-OP	40-300094	CO2 transmitter for air ducts, 160 mm probe, incl. display

### Accessories

Item name	Item code	Description/Option
OPU-S	40-500030	External display module
AMC-2	40-500074	Conduit connector: NPT thread

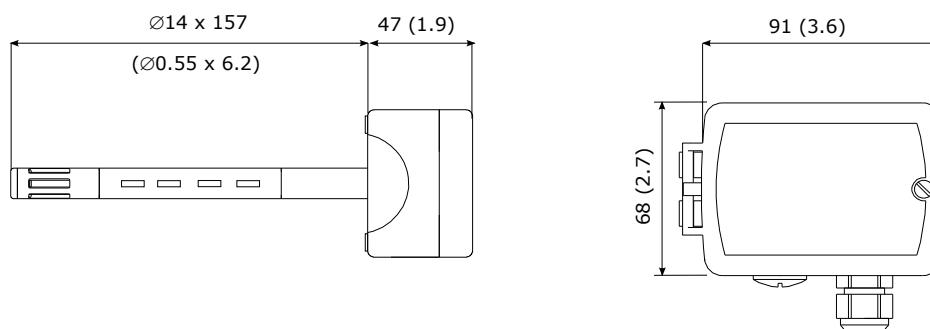
## Technical Specifications

### Important notice and safety advice

This device is for use as a CO<sub>2</sub>-transmitter. It is not a safety device. Where a device failure could endanger human life and property, it is the responsibility of the client, installer and system designer to add additional safety devices to prevent such a device failure. Ignoring specifications and local regulations may cause equipment damage and endangers life and property. Tampering with the device and misapplication will void warranty.

<b>Power supply</b>	Operating voltage	24 VAC 50/60 Hz $\pm$ 10%, 24 VDC $\pm$ 10% SELV to HD 384, Class II transformer, 48 VA max
	Power consumption	Max 2 VA
<b>Connection</b>	Terminal connectors	For wire 0.34...2.5 mm <sup>2</sup> (AWG 22...13)
<b>CO<sub>2</sub> measurement</b>	Sensing method	Non-dispersive infrared (NDIR) waveguide technology with ABC automatic background calibration algorithm
	Sampling method	Diffusion
	Response time (T <sub>1/e</sub> )	40 s diffusion time
	Measurement range	0 - 5000 ppm vol.
	Repeatability	$\pm$ 20 ppm $\pm$ 1 % of measured value
	Accuracy	$\pm$ 30 ppm $\pm$ 3 % of measured value
	Pressure dependence	+ 1.6% reading per kPa deviation from normal pressure, 100 kPa
<b>Signal outputs</b>	Analog outputs	
	Output signal	DC 0...10 V or 0...20 mA
	Resolution	10 Bit, 9.7 mV, 0.019.5 mA
	Maximum load	Voltage: $\geq$ 1k $\Omega$ , Current: $\leq$ 250 $\Omega$
<b>Environment</b>	Operation	To IEC 721-3-3
	Climatic conditions	class 3K5
	Temperature	0...50 °C (32...122 °F)
	Humidity	<95% RH non-condensing
	Transport and storage	To IEC 721-3-2 and IEC 721-3-1
	Climatic conditions	class 3K3 and class 1K3
	Temperature	-30...70 °C (-22...158 °F)
<b>General</b>	Humidity	<95% RH non-condensing
	Mechanical conditions	class 2M2
	Degree of protection	IP30 to EN 60 529
	Safety class	III (IEC 60536)
	Housing materials	PC+ABS (UL94 class V-0)
	Dimensions (H x W x D): Transmitter:	68 x 91 x 47 mm (2.7 x 3.7 x 1.9 in)
	Probe:	$\varnothing$ 14 x 157 mm ( $\varnothing$ 0.55 x 6.2 in)
	Weight (incl. package)	290 g (10.2 oz.)

### Dimensions mm (inch)



### Installation

See installation sheet no. 70-000573 ([www.vectorcontrols.com](http://www.vectorcontrols.com))

## Configuration

### Output signal configuration

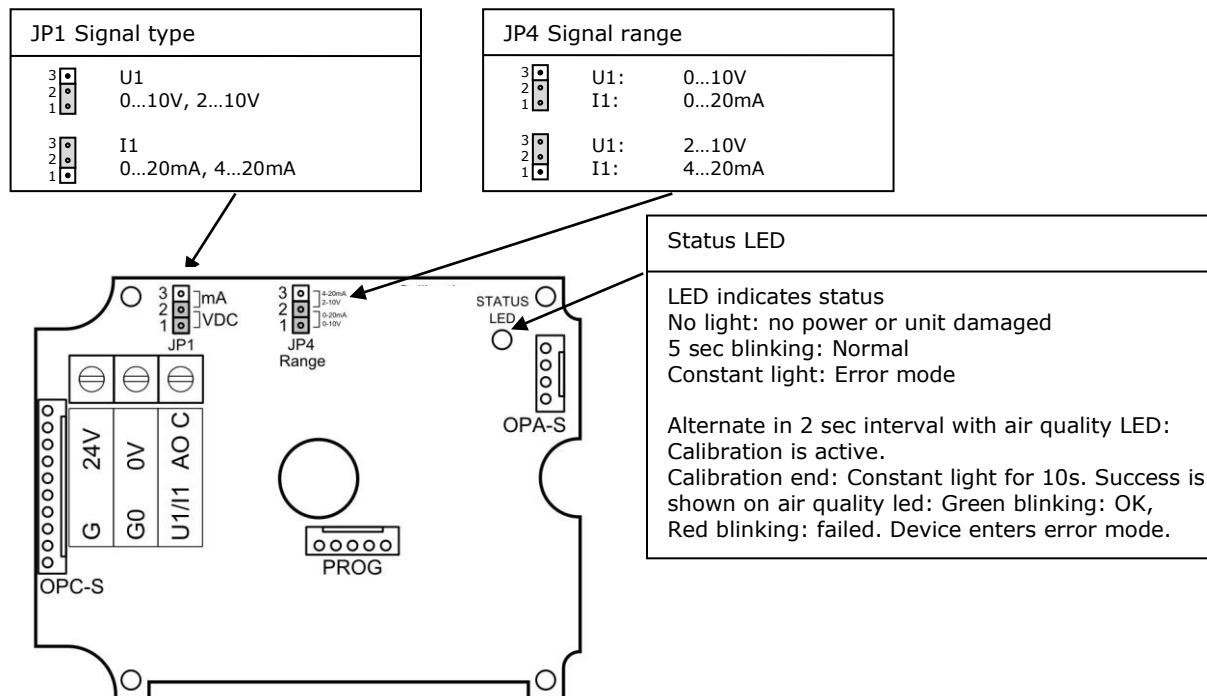
The analog output signal type may be configured with a jumper for 0...10 VDC or 0...20 mA control signals. The jumpers are located next to the terminal connector of each analog output. See table below for jumper placement. The factory setting is to 0...10 VDC.

Signal type	JP1
0...10 V	(1-2)
0...20 mA	(2-3)

The signal range may be set with JP4 for both analog outputs. JP4 will only operate if the output range specified with OP01 and OP02 is left at the default position of 0...100%. With any other setting the position of JP4 has no influence and the range defined with the output parameters applies.

Signal range	JP4
0...10 V, 0...20 mA	(1-2)
2...10 V, 4...20 mA	(2-3)

### Jumper settings



### Parameter configuration

The transmitter can be adapted to fit perfectly into any application by adjusting the software parameters. The parameters are set with the operation terminals OPC-S or OPU-S. The OPU-S may also be used as remote indicator. For correct display version 1.4 is required.

### Input configuration

Parameter	Description	Range	Default
IP 00	Enable display of air quality LED on front	ON, OFF	ON
IP 01	Samples taken for averaging control signal	1...255	10
IP 02	Calibration	-10...10%	0
IP 03	Minimum CO2 range ppm (concentration when output is at its minimum)	0...5000 ppm	0 ppm
IP 04	Maximum CO2 range ppm (concentration when output is at maximum)	0...5000 ppm	2000 ppm
IP 05	Level for medium CO2 concentration (orange light)	0...5000 ppm	800 ppm
IP 06	Level for high CO2 concentration (red light)	0...5000 ppm	1500 ppm
IP 07	Enable ABC automatic background calibration	ON, OFF	ON
IP 08	Calibrate CO2 sensor. Note: For normal operation, calibration is not required. Only experts should calibrate the sensor. 0 = No calibration (default) 1 = Calibrate to gas (0 ppm) 2 = Calibrate to fresh air (400 ppm)	0..2	0

## Output configuration

Parameter	Description	Range	Default
OP 00	AO1: CO2: Configuration of output signal: 0 = Feedback CO2 input 1 = Feedback CO2 minimum value 2 = Feedback CO2 maximum value	0...2	0
OP 01	AO1: CO2: Minimum limitation of output signal	0...Max %	0%
OP 02	AO1: CO2: Maximum limitation of output signal	Min...100%	100%

## Use as P-controller

The CO2-transmitter may be converted into a proportional fresh air controller through a simple change of two parameter settings:

Set a minimum concentration when the fresh air fan should start to run at its minimum speed; for example, 500 ppm. Set this as the minimum value in IP03 parameter. Then define the value when the fan should run at full speed, for example 1000 ppm and set this value in IP04. Your transmitter has now been converted into an air quality P-controller! The fan will start to run if the CO2 concentration is higher than 500 ppm. It increases to its maximum when CO2 concentration reaches 1000 ppm.

## Calibration

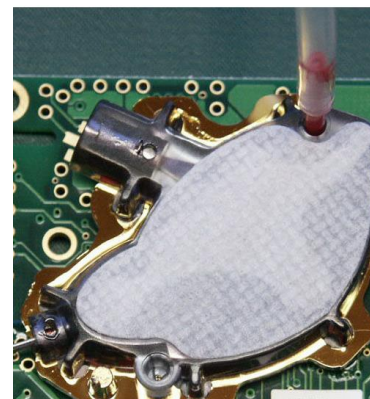
The default sensor OEM unit is maintenance free in normal environments thanks to the built-in self-correcting ABC algorithm (Automatic Baseline Correction). This algorithm constantly keeps track of the sensor's lowest reading over a 7 days interval and slowly corrects for any long-term drift detected as compared to the expected fresh air value of 400ppm CO2.

Rough handling and transportation might, however, result in a reduction of sensor reading accuracy. With time, the ABC function will tune the readings back to the correct numbers. The default "tuning speed" is however limited to about 30 ppm/week. For post calibration convenience, in the event that one cannot wait for the ABC algorithm to cure any calibration offset, jumper 3 is provided for the operator to choose calibration options. There are two calibration possibilities: 0 ppm and 400 ppm. Only one calibration needs to be performed.

Advice: If you decided that a calibration is required and the duct sensor is placed in the fresh air stream, observe that the Sensor housing is closed and that the openings on the sensor face the air stream. The sensor is located inside the cover. Only placing the probe in the air stream with the cover open, will not provide fresh air on the sensor.

### Calibration to 0 ppm with CO2 free gas

1. Connect the sensor on top with a tube (soft tubing 2x4 mm) and a nipple (nylon tubing 30x0.8x2.2 mm), see picture on the right side. There are 2 alternative positions for nipple attachment.
2. Let a gas mixture which is free from CO2 (i.e. Nitrogen or Soda Lime CO2 scrubbed air) flow into the sensor through the applied tube. The flow shall be in the range of 0...1.0 litre/minute during 3 minutes. Keep the gas mixtures flowing during the whole procedure.
3. Connect OPU-S, Login and set IP08 = 1 and exit configuration mode. The air quality LED will blink in red colour alternating with the status led in 2 second intervals.
4. The sensor will now wait for a stable concentration. Once the calibration has been executed, the status LED will show constant RED and the green air quality led will blink for 10s if successful. If calibration is not successful (no stability of concentration for 5 min, no communication with sensor) the red air quality led will blink instead and the sensor enters error mode. Recalibrate or restart device to stop error mode.
5. Verify the zero-calibration using the OPU-S or the analog outputs. They should show 0 ppm CO2.
6. If zero calibration is not executed (sensor detected unstable gas concentration) wait 10 seconds and repeat steps 3 and 4 again. Do not breathe on the sensor!



### Calibration to 400 ppm (fresh air)

1. Expose the active sensor for at least 5 minutes to fresh outside air.
2. Connect OPU-S, Login and set IP08 = 2 and exit configuration mode. The air quality led will blink in green colour alternating with the status led in 2 second intervals.
3. The sensor will now wait for a stable concentration. Once the calibration has been executed, the status LED will show constant RED and the green air quality led will blink for 10s if successful. If calibration is not successful (no stability of concentration for 5 min, no communication with sensor) the red air quality led will blink instead and the sensor enters error mode. Recalibrate or restart device to stop error mode.
4. Verify the calibration using the OPU-S or the analog outputs. They should show 400 ppm CO2.
5. If unsuccessful, wait at least 1 minute before repeating the procedure again. Make sure that the sensor environment is steady and calm!

## **Smart Sensors and Controls Made Easy!**

### **Quality - Innovation – Partnership**

Vector Controls LLC  
USA

[infous@vectorcontrols.com](mailto:infous@vectorcontrols.com)  
[www.vectorcontrols.com](http://www.vectorcontrols.com)

