

SRC-C1 Indoor CO2 transmitter

Features

- Indoor CO2 measurement
- Indication with three colours led
- Minimum and maximum value memory
- 0...10 V, 0...20 mA or 2...10 V, 4...20 mA measuring signals selectable with jumpers
- Optional alternative signal ranges programmable
- May be used as simple P-controller
- Selectable averaging signal
- Optional external display (OPA-S)
- Status LED

Applications

- Indoor CO2 measurement
- 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 external display and programming module. (OPA-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 deactivate 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 & 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.

Indication of air quality indication:

A three colour LED is used to indicate air quality: Green light for low CO2 concentration, orange light for medium and red light for high concentration. The levels for low-medium-high may be programmed. Default settings are 0 ppm < low < 800 ppm < medium < 1500 ppm < high.

Ordering

Item name	Item code	Description/Option
SRC-C1	40-300079	CO2 transmitter

Accessories

Item name	Item code	Description/Option
OPA-S	40-500006	External display module. For the correct display of values V1.4 and later is required.

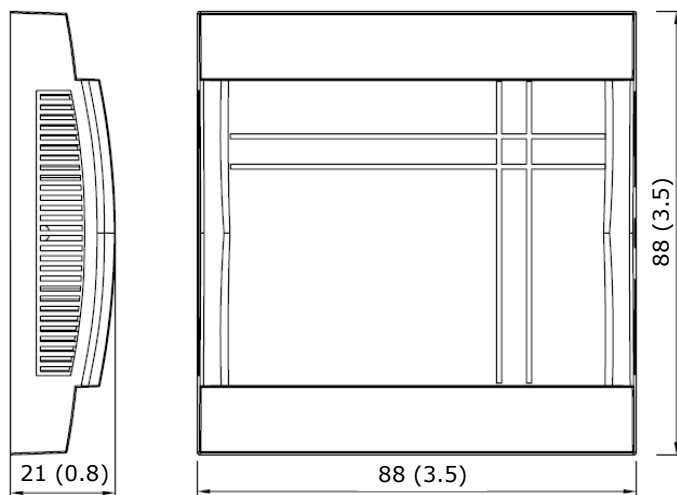
Technical Specifications

Important notice and safety advice

This device is for use as a 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.

Power supply	Operating voltage	24 V AC 50/60 Hz \pm 10%, 24 VDC \pm 10% SELV to HD 384, class II transformer, 48 VA max.
	Power consumption	Max. 2 VA
Connection	Terminal connectors	For wire 0.34...2.5 mm ² (AWG 24...12)
CO2 measurement	Sensing method	Non-dispersive infrared (NDIR) waveguide technology with ABC automatic background calibration algorithm
	Sampling method	Diffusion
	Response time (T _{1/e})	40 sec 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
Signal outputs	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 signal: \geq 1k Ω , current signal: \leq 500 Ω
Environment	Operation	To IEC 721-3-3
	Climatic conditions	class 3 K5
	Temperature	0...50° C (32...122° F)
	Humidity	<95% RH non-condensing
	Transport & storage	To IEC 721-3-2 and IEC 721-3-1
	Climatic conditions	class 3 K3 and class 1 K3
	Temperature	-30...70° C (-22...158° F)
	Humidity	<95% RH non-condensing
	Mechanical conditions	class 2M2
Standards	conformity EMC directive 2004/108/EC	EN 61 000-6-1/ EN 61 000-6-3
	Degree of protection	IP30 to EN 60 529
	Safety class	III (IEC 60536)
Housing materials	Cover	Fire proof ABS plastic
	Mounting plate	Galvanized steel
General	Dimensions (H x W x D)	21 x 88 x 88 mm (0.8 x 3.5 x 3.5 in)
	Weight (including package)	175 g (6.2 oz.)

Dimension mm (inch)



Mounting location

- On a flat, easily accessible inner wall
- The following installation locations should be avoided:
 - Protect from direct exposure to sunlight
 - Do not install near heat sources, e.g. radiators or other heat-generating devices
 - Air storage spaces and niches, e.g. behind doors or shelves
 - Outside walls insufficiently insulated
 - In the direct sphere of influence of ventilation openings and fans

Mounting instruction

See installation sheet no. 70-000572 (www.vectorcontrols.com).

Configuration

Output signal configuration

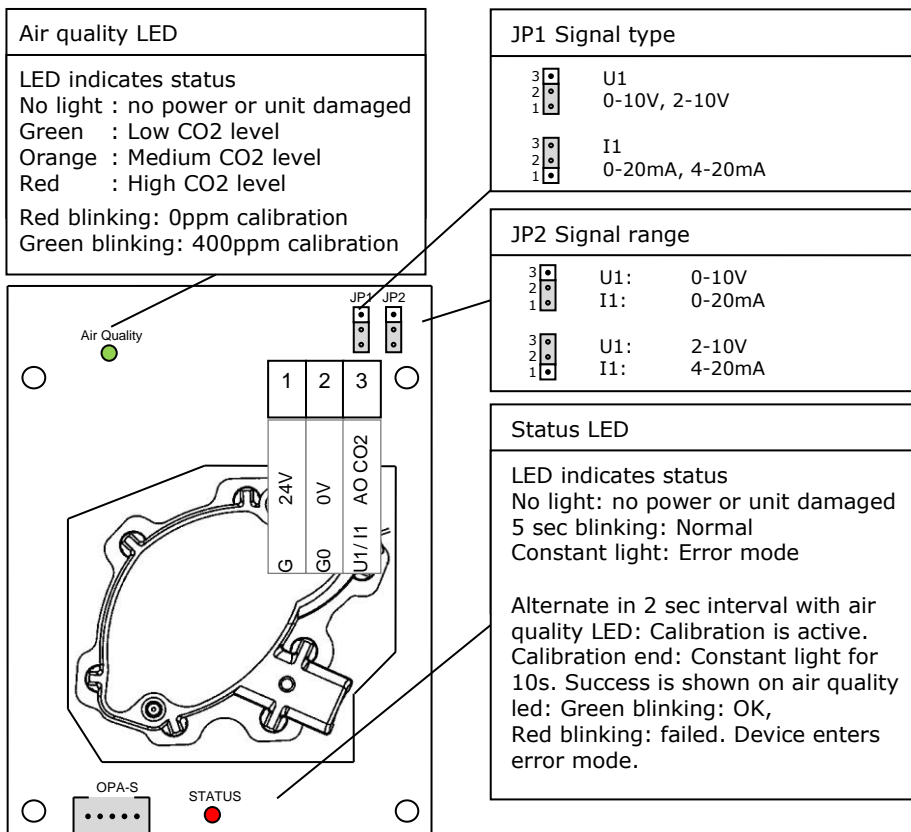
The analog output signal type may be configured with a jumper for 0-10 VDC or 0-20 mA control signals. The jumpers are located next to the terminal connector of each analog output. See table below for jumper placement. The factory setting is to 0-10 VDC.

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

The signal range may be set with JP2 for both analog outputs. JP2 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 JP2 has no influence and the range defined with the output parameters applies.

Signal range	JP2
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 OPA-S. The OPA-S may also be used as remote indicator. For correct display version 1.4 of OPA-S 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%

Error messages shown on OPA-S

Err1: Communication error: Verify cable connections, cable type and maximum distance.

Err2: CO2 sensor error: Make sure the sensor is not miss-calibrated. If possible, make a 0-ppm or 400 ppm calibration. (See below). Make sure JP3 is removed or placed in middle position (2-3).
If error cannot be removed by calibrating the sensor, replace product.

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.

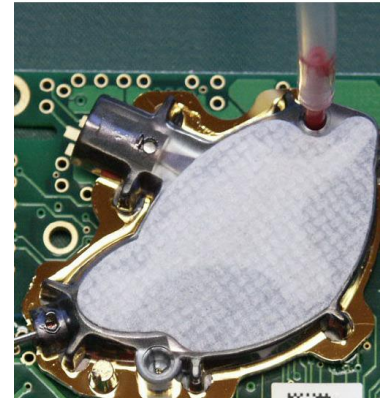
Calibration

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 400 ppm 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.

Calibration to 0 ppm with CO₂ free gas

1. Connect the sensor on top with a tube (soft tubing 2 x 4 mm) and a nipple (nylon tubing 30 x 0.8 x 2.2 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 0.3 – 1.0 litre/minute during 3 minutes. Keeps the gas mixtures flowing during the whole procedure.
3. Connect OPA-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 OPA-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 sec 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 OPA-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 OPA-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!

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