SRC-C1T1 Indoor CO2+Temperature transmitter

Features

- Indoor CO2 and temperature measurement
- CO2 – level indication with three colours led
- Minimum and maximum value memory
- 0…10 V or 2…10 V measuring signals selectable with jumper
- 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
- Indoor temperature 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 and 2-10 VDC. 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.

Temperature transmitter

The transmitter measures the temperature by the use of a precision sensing element. The microprocessor samples the temperature once per second. It calculates an averaging signal over a preset number of seconds and generates an output signal based on lower and upper signal range values. Standard range is -40…60°C (-40…140°F) and 10 seconds average. The measuring range and the averaging samples may be customized with the programming tool.

Standard output signal range and types may be selected by jumpers. Standard signal ranges are: 0…10 VDC and 2…10 VDC. Other ranges can be defined by using a programming tool (OPA-S).

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. The display of minimum maximum values for the CO2 sensor is limited to 2550. They may only be shown and memorized in steps of 10 ppm. This limitation does not apply for the current measurement of the CO2 value.

Indication of CO2 concentration:

A three colour LED is used to indicate levels of CO2-concentration: 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.

The LED lights up for 0.5 seconds in a 5 second interval. The indication light may be disabled through parameter IP05.

Ordering

Item Name	Item code	Description/Option	
SRC-C1T1	40-300198	CO2+temperature transmitter	
SRC-C1T1	40-300198		**Signal range: 0…2000 ppm, -40…60°C (-40…140°F) (Default)**
SRC-C1T1-W1	40-300198-1	1	Signal range: 0…2000 ppm, -35…35°C (-31…95°F)
SRC-C1T1-W2	40-300198-2	2	Signal range: 0…2000 ppm, 0…50°C (32…122°F)
SRC-C1T1-W3	40-300198-3	3	Customer specific signal range

Accessories

| Item name	Item code	Description/Option
OPA-S	40-500006	External display module square housing **Note: For the correct display of values V1.7 and later is required.**
OPU-S	40-500030	External display module rectangular housing **Note: For the correct display of values V1.7 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 ± 10%, 24 VDC ± 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
	Response time (90%)	2 Minutes
	Measurement range	0 - 2000 ppm $_{vol.}$
	Repeatability	± 20 ppm ± 1 % of measured value
	Accuracy	± 40 ppm ± 3 % of measured value
	Pressure dependence	+ 1.6 % reading per kPa deviation from normal pressure, 100 kPa
Temperature - measurement	Accuracy: 0…50°C (32…122°F): 50…60°C (122…158°F):	 0.5 K 1 K
	Note on accuracy: allow one hour after power up for compensation swing in	
Signal outputs	Analog outputs Output signal Resolution Maximum load	 DC 0-10 V, 2-10 V 10 bit, 9.7 mV Voltage signal: ≥1kΩ, current signal: ≤500Ω
Environment	Operation Climatic conditions Temperature Humidity	To IEC 721-3-3 class 3 K5 0…50° C (32…122° F) <95% RH non-condensing
	Transport & storage Climatic conditions Temperature Humidity Mechanical conditions	To IEC 721-3-2 and IEC 721-3-1 class 3 K3 and class 1 K3 -30…70° C (-22…158° F) <95% RH non-condensing class 2M2
General	Degree of protection	IP30 to EN 60 529
	Safety class	III (IEC 60536)
	Material: Cover Mounting plate	Fire proof ABS plastic Aluminium
	Dimensions (H x W x D)	88 x 88 x 21 mm (3.5 x 3.5 x 0.8 in)
	Weight (including package)	130 g (4.6 oz)

Dimension mm (inch)
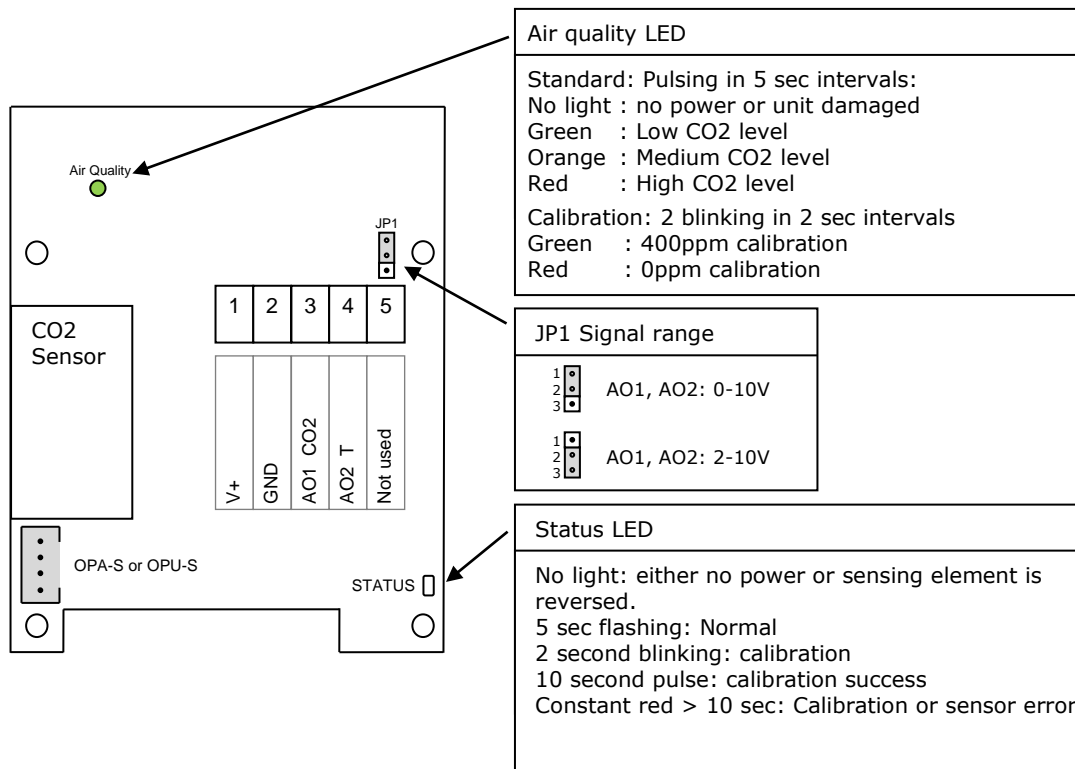
21 (0.8) 88 (3.5) 88 (3.5)
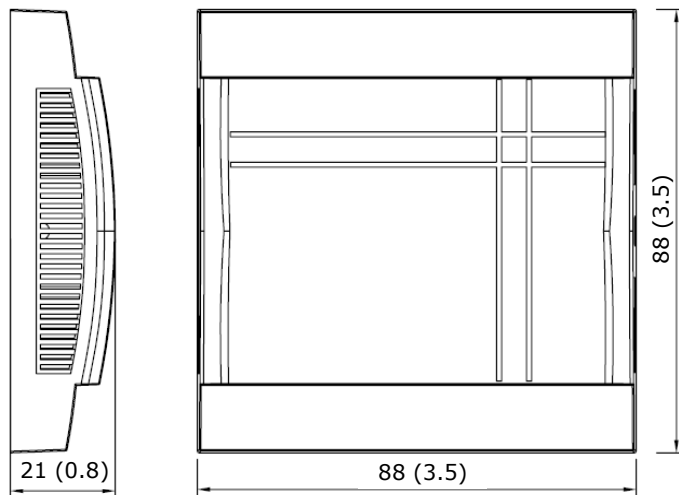
Mounting location

- 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).

Jumper settings and indication lights

Air quality LED

Standard: Pulsing in 5 sec intervals:
No light : no power or unit damaged
Green : Low CO_2 level
Orange : Medium CO_2 level
Red : High CO_2 level

Calibration: 2 blinking in 2 sec intervals
Green : 400ppm calibration
Red : 0ppm calibration

JP1 Signal range

AO1, AO2: 0-10V

AO1, AO2: 2-10V

Status LED

No light: either no power or sensing element is reversed.
5 sec flashing: Normal
2 second blinking: calibration
10 second pulse: calibration success
Constant red > 10 sec: Calibration or sensor error

Air Quality

JP1

| 1 | 2 | 3 | 4 | 5 |

CO2 Sensor

V+ | GND | AO1 CO2 | AO2 T | Not used

OPA-S or OPU-S

STATUS

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.
Note: For correct display version 1.7 of OPA-S is required.

Input configuration

Parameter	Description	Range	Default
IP 00	TI1: Celsius or Fahrenheit, C = OFF, F = ON	ON, OFF	OFF
IP 01	TI1: Samples taken for averaging control signal	1…255	10
IP 02	TI1: Calibration	-10…10	0
IP 03	TI1: Minimum temperature	-40…215 °C/F	-40 °C
IP 04	TI1: Maximum temperature	-40…215 °C/F	60 °C
IP 05	CI1: Enable display of air quality LED on front.	ON, OFF	ON
IP 06	CI1: Samples taken for averaging control signal	1…255	10
IP 07	CI1: Calibration	-10…10%	0
IP 08	CI1: Minimum CO_2 range ppm (concentration when output is at its minimum)	0…5000 ppm	0 ppm
IP 09	CI1: Maximum CO_2 range ppm (concentration when output is at maximum)	0…5000 ppm	2000 ppm
IP 10	CI1: Level for medium CO_2 concentration (orange light)	0…5000 ppm	800 ppm
IP 11	CI1: Level for high CO_2 concentration (red light)	0…5000 ppm	1500 ppm
IP 12	CI1: Enable ABC automatic background calibration	ON, OFF	ON
IP 13	CI1: Calibrate CO_2 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: CO_2: Configuration of output signal: 0 = Feedback CO_2 input, 1 = Feedback CO_2 minimum value 2 = Feedback CO_2 maximum value	0 – 2	0
OP 01	AO1: CO_2: Minimum limitation of output signal	0 – Max. %	0%
OP 02	AO1: CO_2: Maximum limitation of output signal	Min. – 100%	100%
OP 03	AO2: Temperature: Configuration of output signal: 0 = Feedback temperature input, 1 = Feedback temperature minimum value 2 = Feedback temperature maximum value	0 – 2	0
OP 04	AO2: Temperature: Minimum limitation of output signal	0 – Max %	0%
OP 05	AO2: Temperature: Maximum limitation of output signal	Min – 100%	100%

Output signal configuration

The signal range may be set with JP1 for both analog outputs. JP1 will only operate if the output range specified with OP01/OP02 or OP04/OP05 is left at the default position of 0…100%. With any other setting the position of JP1 has no influence and the range defined with the output parameters applies.

Signal range	JP1
0 – 10 V	(1-2)
2 – 10 V	(2-3)

Error messages shown on OPA-S

Err1: Communication error: Verify cable connections, cable type and maximum distance.
Err2: Temperature sensor error (element damaged or missing)
Err3: CO_2 sensor error: Make sure the sensor is not miss-calibrated. If possible, execute 400 ppm calibration. (See below). 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 IP08 parameter. Then define the value when the fan should run at full speed, for example 1000 ppm and set this value in IP09. 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, manual calibration may be activated using following procedure. There are two calibration possibilities: 0 ppm and 400 ppm. Only one calibration needs to be performed.

Calibration to 400 ppm (Fresh air)

1. Connect OPA-S and expose the active sensor for at least 5 minutes to fresh outside air. It is important to expose the sensor to only fresh air. An open window close to the sensor with a higher level of CO2 could prevent a stable signal. Observe the CO2 value on the OPA-S.
2. Once the CO2 value has stabilized, login with the OPA-S and set IP13 = 2, then exit configuration mode. The air quality led will blink green colour 2 times 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 status LED will stay constantly on red in error mode. Recalibrate or restart device to stop error mode.
4. You may additionally verify the calibration using the OPA-S. If successful IP13 will change to 0. If unsuccessful the value of IP13 changes to 4.
5. If unsuccessful, wait at least 1 minute before repeating the procedure again. Make sure that the sensor environment is steady and calm!

Calibration to 0 ppm with CO2 free gas

1. Connect OPA-S and place the sensor in a container filled with a gas mixture which is free from CO2 (i.e. Nitrogen or Soda Lime CO2 scrubbed air). Observe the CO2 value on the OPA-S.
2. Once the CO2 value has stabilized, login with the OPA-S and set IP13 = 1, then exit configuration mode. The air quality LED will blink in red colour 2 times 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 status LED will stay constantly on red in error mode. Recalibrate or restart device to stop error mode.
4. You may additionally verify the calibration using the OPA-S. If successful IP13 will change to 0. If unsuccessful the value of IP13 changes to 4.
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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