

## NLII-CO2-R-5-A | Room sensor CO<sub>2</sub> with sound alarm

Room sensor NLII-CO<sub>2</sub> is used to continuously monitor air quality inside buildings and then control ventilation (HVAC) systems according to current levels of internal air quality. The sensor measures concentration of carbon dioxide (CO<sub>2</sub>) in air. It is suitable for schools, offices, classrooms, shopping centers, homes, restaurants, fitness centers, commercial buildings, etc.

- > measures CO<sub>2</sub>
- > analog voltage/current output
- > 2x output relay – 2x NO/C
- > sound signalization – alarm
- > two modes of relay switching
- > maintenance during operation not required
- > long life and stability



Type of sensor / Order code	CO <sub>2</sub> output	Relay
NLII-CO2-R-5-A	0-10 V/0-20 mA/4-20 mA <sup>1)</sup>	1x NO/C
NLII-CO2-2R-5-A	0-10 V/0-20 mA/4-20 mA <sup>1)</sup>	2x NO/C

<sup>1)</sup> It is possible to select the desired type of analog output by a jumper on the electronics board. Minimum achievable output value corresponds to minimum value of the measuring range.

### Description

The measuring of CO<sub>2</sub> is based on the principle of infrared radiation attenuation dependence on the CO<sub>2</sub> concentration in the air (NDIR). Built-in auto-calibration function ensures very good long term stability.

The sensor has built-in one analog output for the actual concentration of CO<sub>2</sub>. Relay trigger level can be set by SET POINT rotary switch.

Relay switching is indicated simultaneously with a short (1,5s) audible signal and yellow LED light.

The way of relay switching can be set by a jumper – 5s or 1s pulses when the CO<sub>2</sub> concentration exceeds and falls below the set CO<sub>2</sub> level for e.g. opening and closing a skylight, or standard switching, where relays are closed until the measured CO<sub>2</sub> concentration drops under the set CO<sub>2</sub> level. So the sensor efficiently manages ventilation and heat recovery units, based on current room air quality.

The current air quality can easily be determined by looking at the three LED indicators. The **eco** level means good indoor air quality necessary to achieve a sense of well-being and at the same time optimal energy costs for heating, ventilation or air conditioning.

Explanation of abbreviations and technical terms can be found on our website in the [Glossary](#) section.

### Technical data

Parameter	Value	Unit
Supply voltage range	12 – 35	V DC
	12 – 24	V AC
Average consumption	0,5	W
CO <sub>2</sub> measuring range	400 – 5000	ppm
CO <sub>2</sub> accuracy	± 35 ppm ± 5 % of reading	
CO <sub>2</sub> relay - hysteresis	100	ppm
CO <sub>2</sub> rate rise	max 1	min
CO <sub>2</sub> step response	(90 %) 80	s
Max. switching voltage	250/30	V AC / V DC
Max. switching current	5/5	A AC / A DC
Working humidity no condensing	5 – 95 %	RH
Working temperature	0 to +50	°C
Storage temperature	-20 to +60	°C
Expected lifetime	min. 10	years
Ingress protection	IP20	
Dimensions	90x80x31	mm

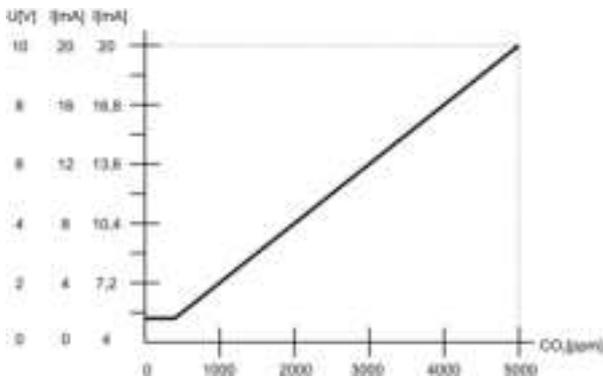


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### CO<sub>2</sub> sensor autocalibration function

[Autocalibration](#) compensates for long-term aging of the key components of the sensor. This function is available only when sensor power supply is continuous and uninterrupted. Calibration during operation is not necessary.

### Selected analog output values versus CO<sub>2</sub> concentration



### LED indication description

#### White LED lights:

- Less than 600 ppm CO<sub>2</sub>.
  - maintaining low concentrations of CO<sub>2</sub> is not cost-effective - slightly increased concentration does not cause any health complications

#### Green LED lights:

- More than or equal to 600 ppm CO<sub>2</sub>, less than or equal to 1200 ppm CO<sub>2</sub>.
  - optimal balance of air quality and energy efficiency of ventilation and air conditioning

#### Yellow LED lights + sound alarm:

- When the measured CO<sub>2</sub> concentration exceeds the level set by SET POINT rotary switch.
  - yellow LED lights always when the measured CO<sub>2</sub> concentration exceeds the level set by SET POINT rotary switch (min 1000ppm), simultaneously the sound alarm is triggered and the relay contacts close. Sensor remains in this state for 2 minutes – see relay switching graph below.
  - CO<sub>2</sub> concentration higher than 1200 ppm can cause fatigue, restlessness, headache and feeling uncomfortable, hot etc.

### Sensor start after power on

All three LEDs flash simultaneously until the first readings are available, but no longer than 10 seconds.

### Sensor failure indication

All three LEDs are shining permanently.

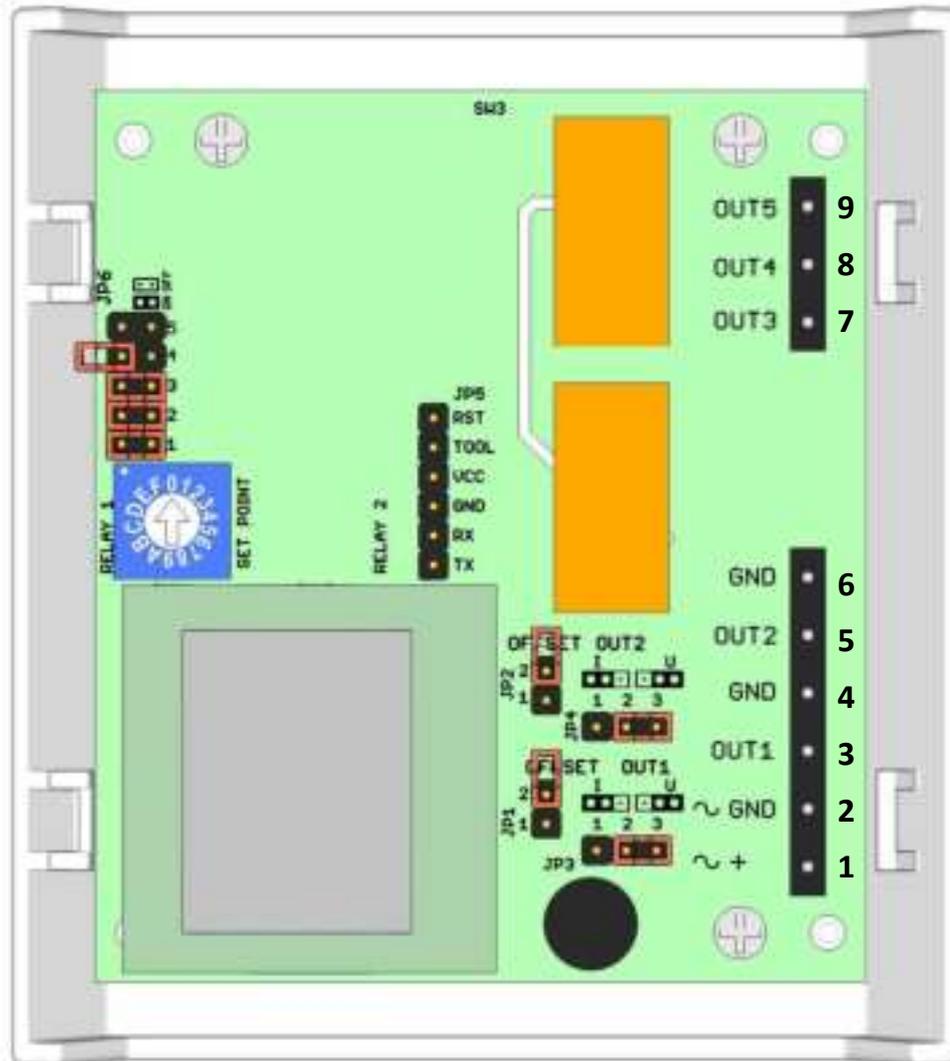
### CAUTION:

Warm-up: operational after 1 minute since power on. The declared accuracy is reached after 4 days of continuous power supply.



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**Electronic board controls and terminals**



**Terminals**

- 1. ~ + power AC or DC (+) plus pole
- 2. ~ GND power AC or DC (-) minus pole, GND
- 3. OUT1 CO<sub>2</sub> sensor analog output, 0-10 V or 0-20 mA or 4-20 mA
- 4. GND CO<sub>2</sub> sensor output GND
- 5. OUT2 unused
- 6. GND unused
- 7. OUT3 NO relay 2 output, normally open (RH)
- 8. OUT4 C output relay, common contact
- 9. OUT5 NO relay 1 output, normally open (CO<sub>2</sub>)

**SET POINT** rotary switch for setting the relays switching level

**RELAY 1** – switching level for CO<sub>2</sub> setting

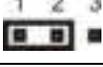
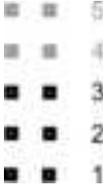
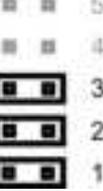
**Jumpers**

- JP1 – unused
- JP2 – Current output offset CO<sub>2</sub>
- JP3 – Voltage/current output CO<sub>2</sub>
- JP4 – unused
- JP6 – LED indication and switching mode settings



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**Jumpers on the electronics board**

Mark	Description	Settings	Meaning
JP2	<b>Current output offset CO<sub>2</sub></b>  - shift quiescent current from 0 mA to 4 mA		current output CO <sub>2</sub> 0-20 mA
			current output CO <sub>2</sub> 4-20 mA
JP3	<b>Voltage/current output CO<sub>2</sub></b>  - select the type of analog output - if the selected voltage output is CO <sub>2</sub> , JP2 must not be shorted		voltage output CO <sub>2</sub>
			current output CO <sub>2</sub>
JP6 - 1 JP6 - 2 JP6 - 3	<b>Switching mode, signalization and alarm</b>		relays contacts closed until concentration drops sound alarm disabled LED indication disabled
			relays switching in 5s pulses (see JP6-4) sound alarm enabled LED indication enabled
JP6 - 4	<b>Duration of closed relay contacts when switching with pulses is selected (JP6-3 closed)</b>		relay contacts closed for 5s
			relay contacts closed for 1s
JP6 - 5	<b>This position is not intended for user setting.</b>		



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### Setting the relay switching mode using jumper JP6-3 and SET POINT rotary switch

If the jumper JP6-3 is closed, relay 1 contacts close for 5s (or 1s, according to JP6-4 setting) always, when the measured concentration of CO<sub>2</sub> rises above the level set by the SET POINT rotary switch.

When the measured concentration of CO<sub>2</sub> drops below the level set by SET POINT switch minus the hysteresis value of 100 ppm, relay 2 contacts close for 5s (or 1s).

If the jumper JP6-3 is open, both relays contacts close, when the measured concentration of CO<sub>2</sub> rises above the level set by the SET POINT rotary switch and stay close until the measured concentration drops below the level set by SET POINT switch minus the hysteresis value of 100 ppm.

Minimum delay between changes of relays state is 2 minutes.

### Setting the switching levels

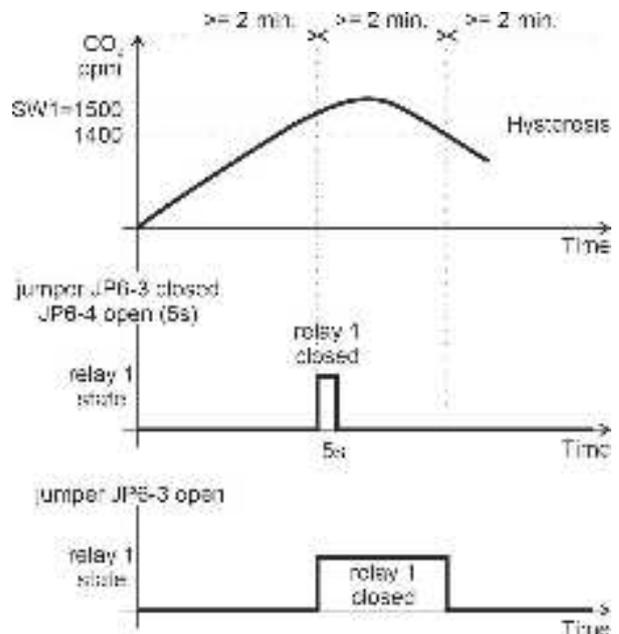
Required concentration of CO<sub>2</sub>

SET POINT	CO <sub>2</sub> [ppm]
0	1000
1	1100
2	1200
3	1300
4	1400
5	1500
6	1600
7	1700
8	1800
9	1900
A	2000
B	2100
C	2200
D	2300
E	2400
F	2500

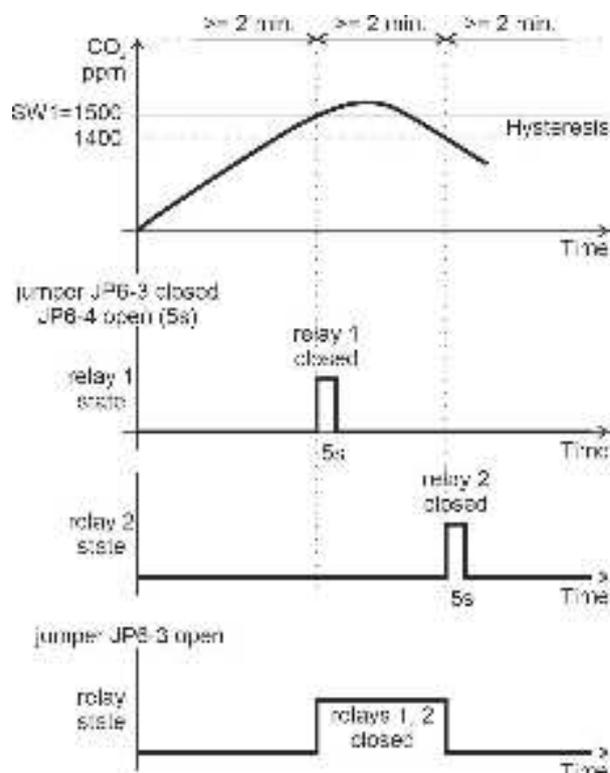
Example for setting the concentration of 1500 ppm



### Relay switching graph with 1 relay (NLII-CO2-R-5-A)

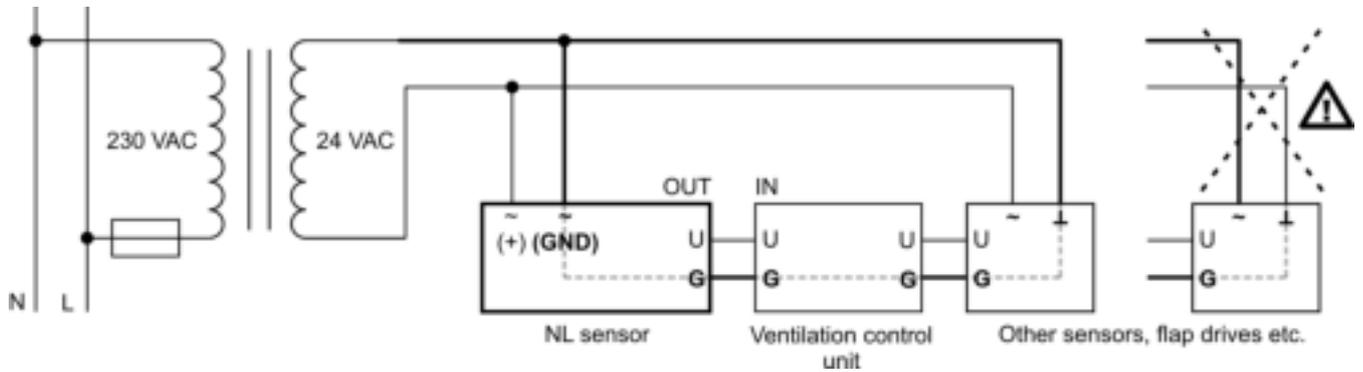


### Relay switching graph with 2 relays (NLII-CO2-2R-5-A)



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If you connect other devices to the same AC power source as the NL sensor, it is necessary to meet GND wiring of all analog inputs and outputs, as well as power wires.



### Factory settings

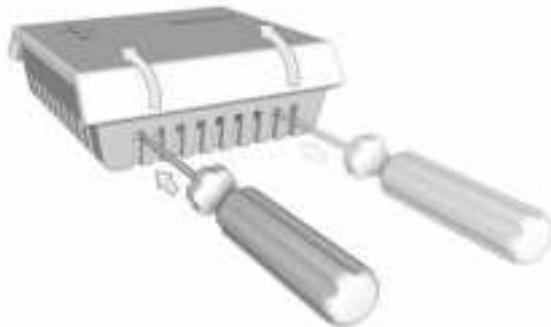
LED indication:	enabled
CO <sub>2</sub> analog output:	voltage output
Relay switching mode:	relays switching in 5s pulses
Switching level CO <sub>2</sub> :	1500 ppm
Sound alarm:	enabled



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### Sensor box disassembly

Push on the two locks with a flat head screwdriver to release the upper part of the box. Then, tilt it in the indicated direction (see the picture below).



Continue to move the upper part with all the electronics until it is separated from the lower part.



### Box color

White – RAL9016.

### Way to use

The product is intended for indoor use only. You can read the [recommendations for sensor placement](#) on our web pages.

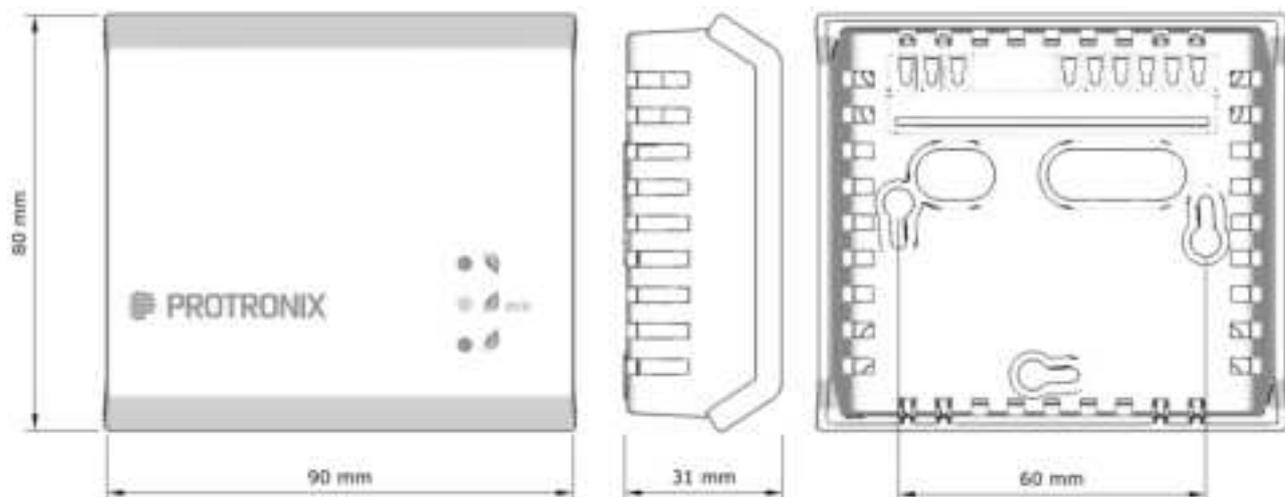
### Safety warning

- The connection and operation of the product must be carried out by a professionally qualified person according to the procedures and information provided in this manual.
- Comply with the given storage and operating conditions of the product. Failure to comply with these conditions may result in damage to the product and possibly loss of warranty.
- Violent mechanical shocks to the sensor must be avoided.
- In case of a defect, do not try to repair the product yourself; instead contact the supplier or the manufacturer directly.

### End of product life

Discard the product in accordance with the electronic waste law and the EU directives.

### Dimensions



*The producer reserves the right of technical changes in order to product improvements its properties and functions without previous notice.*

