

NLII-CO2 | Combined CO₂/RH sensor

Room sensor NLII-CO2 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 (CO₂) and relative humidity (RH) in air. It can be effectively used in offices, classrooms, shopping centers, homes, restaurants, fitness centers, commercial buildings, etc.



- › measures CO₂ and RH
- › LED indication with automatic turn off according to ambient light (at night)
- › 2x analog voltage/current output
- › 2x output relay – 2x NO/C
- › option for cascade relay switching
- › maintenance during operation is not required
- › long life and stability

Type of sensor	CO ₂ output	RH output	Relay
NLII-CO2	0-10 V/0-20 mA/4-20 mA ¹⁾	-	-
NLII-CO2-R	0-10 V/0-20 mA/4-20 mA ¹⁾	-	1x NO/C/NC
NLII-CO2+RH	0-10 V/0-20 mA/4-20 mA ¹⁾	0-10 V/0-20 mA/4-20 mA ¹⁾	-
NLII-CO2+RH-R	0-10 V/0-20 mA/4-20 mA ¹⁾	0-10 V/0-20 mA/4-20 mA ¹⁾	2x NO/C

¹⁾ It is possible to select the desired type of analog output by a jumper. Minimum achievable output value corresponds to minimum value of the measuring range.

Description

The measuring of CO₂ is based on the principle of infrared radiation attenuation dependence on the CO₂ concentration in the air (NDIR). Built-in auto-calibration function ensures very good long term stability.

Measurement of the relative humidity is based on the principle of capacitive polymer sensor.

The sensor has built-in two separate analog outputs - one for the actual concentration of CO₂ and the other for the current relative humidity.

If the sensor contains 2 relays, it can be set to two switching modes: standard (each relay switches according to its assigned quantity), a cascade mode (both relays switch according to one selected quantity

and each one can be set to different switching level). Cascade switching, for example, can be used to two-step switching of ventilation units output power. Relay trigger levels can be set independently by two rotary elements.

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.



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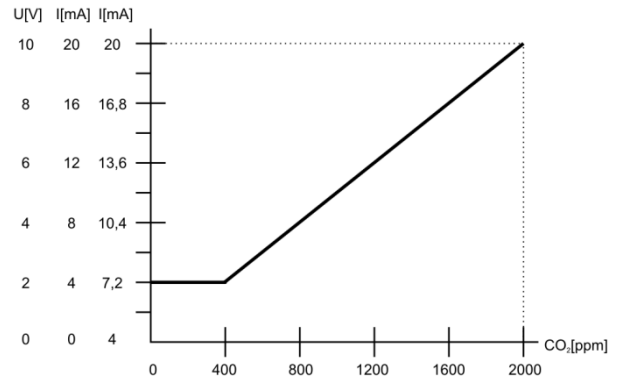
Technical data

Parameter	Value	Unit
Supply voltage range	12 – 35	V DC
	12 – 24	V AC
Average consumption	0,5	W
CO ₂ measuring range	400 – 2000	ppm
CO ₂ accuracy	± 40 ppm ± 4 % of reading	
CO ₂ relay - hysteresis	100	ppm
CO ₂ rate rise	max 1	min
CO ₂ step response	(90 %) 80	s
RH measuring range	0 – 100 %	RH
RH accuracy 0 – 90 %	± 4 %	RH
RH accuracy 90 – 100 %	± 5 %	RH
RH switching hysteresis	5 %	RH
Max. switching voltage	250/30	V AC / V DC
Max. switching current	5/5	A AC / A DC
Working humidity non condensing	0 – 95 %	RH
Working temperature no condensing	0 to +50	°C
Storage temperature	-20 to +60	°C
Expected lifetime	min. 10	years
Ingress protection	IP20	
Dimensions	90x80x31	mm

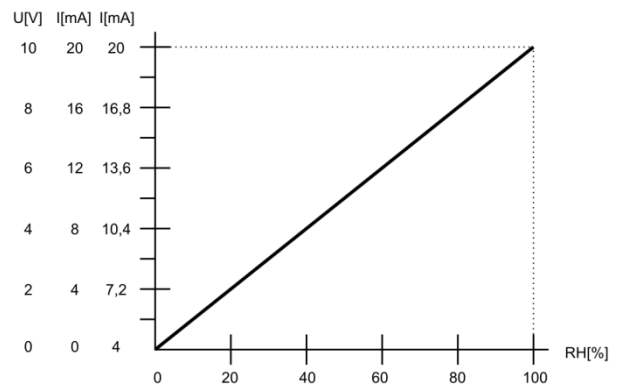
CO₂ sensor autocalibration function

[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 actual CO₂ concentration




Selected analog output values versus actual RH




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LED indication description


White LED lights:

- 
- Less than 600 ppm CO₂ or less than 40 % RH.
(according to the quantity selected for indication)
 - maintaining low concentrations of CO₂ is not cost-effective - slightly increased concentration does not cause any health complications
 - low concentrations of RH. Too dry air feels cooler as compared to equally hot but more humid air – risk of drying of the mucous membranes - respiratory problems

Green LED lights:

- 
- More than or equal to 600 ppm CO₂ or 40 % RH,
less than or equal to 1200 ppm CO₂ or 60 % RH.
(according to the quantity selected for indication)
 - optimal balance of air quality and energy efficiency of ventilation and air conditioning
 - optimal relative humidity for humans

Yellow LED lights:

- 
- More than 1200 ppm CO₂ or more than 60 % RH.
(according to the quantity selected for indication)
 - higher concentration of CO₂ - further increase of CO₂ concentrations above this level can cause fatigue, restlessness, headache
 - too high humidity - the risk of mold growth and associated health complications

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:

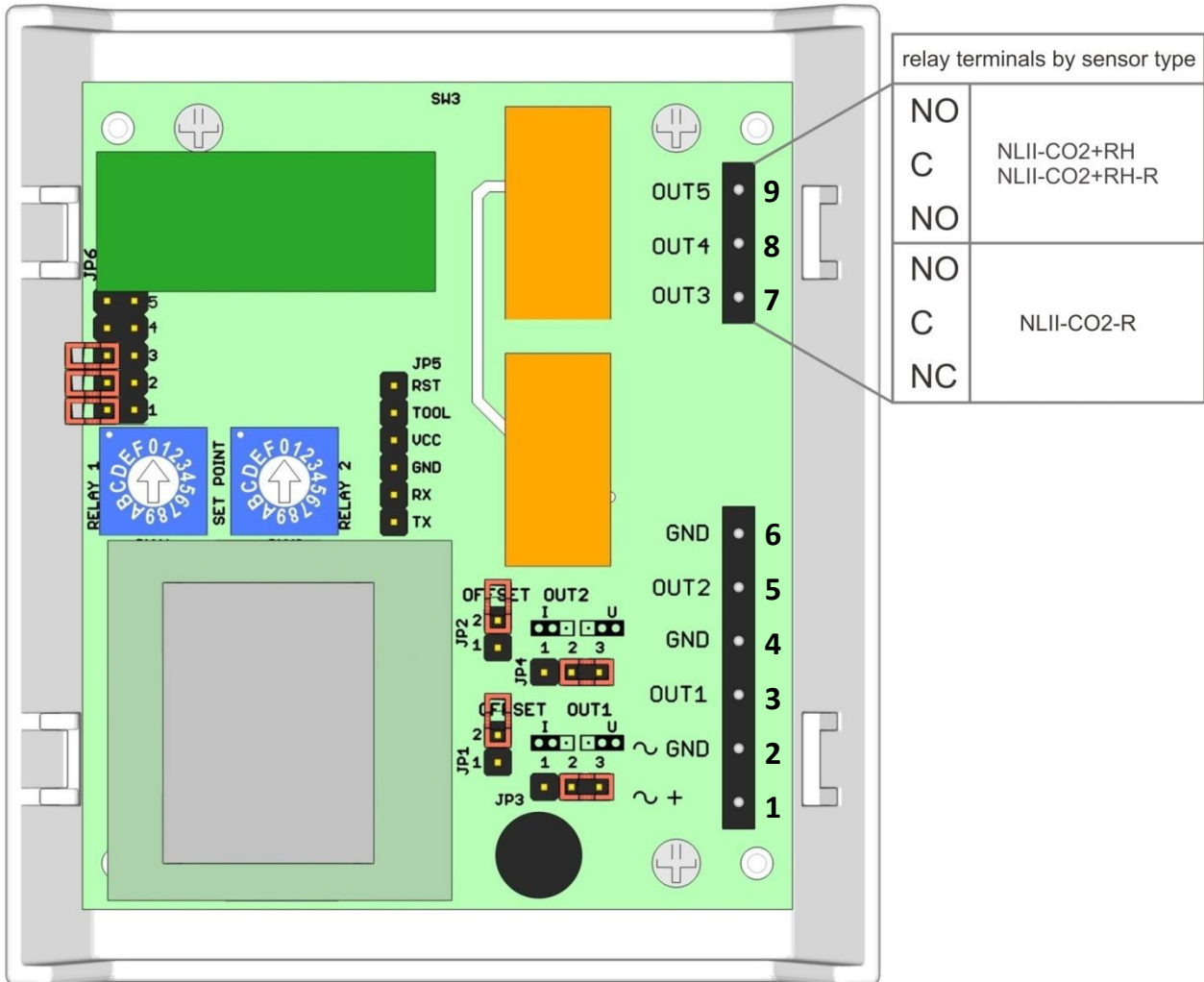
Warm-up: operational after 1 minute since power on.
The declared accuracy is reached after 4 days of continuous power supply.

It is necessary to avoid severe mechanical shock of the sensor.



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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 CO₂ sensor analog output, 0-10 V or 0-20 mA or 4-20 mA
- 4. GND CO₂ sensor output GND
- 5. OUT2 RH sensor analog output, 0-10 V or 0-20 mA or 4-20 mA
- 6. GND RH sensor output GND
- 7. OUT3 NO relay 2 output, normally open (RH) (for NLII-CO2-R it is a NC contact)
- 8. OUT4 C output relay, common contact
- 9. OUT5 NO relay 1 output, normally open (CO₂)

SET POINT rotary switches for setting the relays switching levels

- RELAY 1 – switching level for CO₂
- RELAY 2 – switching level for RH

Jumpers

- JP1 – Current output offset RH
- JP2 – Current output offset CO₂
- JP3 – Voltage/current output CO₂
- JP4 – Voltage/current output RH
- JP6 – LED indication and switching mode settings



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Jumpers on the electronics board

Mark	Description	Settings	Meaning
JP1	Current output offset RH - shift quiescent current from 0 mA to 4 mA	2 <input type="checkbox"/> 1 <input type="checkbox"/>	current output RH 0-20 mA
		2 <input checked="" type="checkbox"/> 1 <input type="checkbox"/>	current output RH 4-20 mA
JP2	Current output offset CO₂ - shift quiescent current from 0 mA to 4 mA	2 <input type="checkbox"/> 1 <input type="checkbox"/>	current output CO ₂ 0-20 mA
		2 <input checked="" type="checkbox"/> 1 <input type="checkbox"/>	current output CO ₂ 4-20 mA
JP3	Voltage/current output CO₂ - select the type of analog output - if the selected voltage output is CO ₂ , JP2 must not be shorted	1 <input type="checkbox"/> 2 <input type="checkbox"/> 3 <input type="checkbox"/> <input checked="" type="checkbox"/> <input type="checkbox"/> <input type="checkbox"/>	voltage output CO ₂
		1 <input type="checkbox"/> 2 <input type="checkbox"/> 3 <input type="checkbox"/> <input type="checkbox"/> <input checked="" type="checkbox"/> <input type="checkbox"/>	current output CO ₂
JP4	Voltage/current output RH - select the type of analog output - if the selected voltage output is RH, JP1 must not be shorted	1 <input type="checkbox"/> 2 <input type="checkbox"/> 3 <input type="checkbox"/> <input checked="" type="checkbox"/> <input type="checkbox"/> <input type="checkbox"/>	voltage output RH
		1 <input type="checkbox"/> 2 <input type="checkbox"/> 3 <input type="checkbox"/> <input type="checkbox"/> <input checked="" type="checkbox"/> <input type="checkbox"/>	current output RH
JP6 - 1	LED indication - LED indication according to ambient light - when ambient light is dimmed (at night), LED indicators turn off automatically.	<input type="checkbox"/> <input type="checkbox"/> 5 <input type="checkbox"/> <input type="checkbox"/> 4 <input type="checkbox"/> <input type="checkbox"/> 3 <input type="checkbox"/> <input type="checkbox"/> 2 <input checked="" type="checkbox"/> <input type="checkbox"/> 1	permanent LED indication enabled
		<input type="checkbox"/> <input type="checkbox"/> 5 <input type="checkbox"/> <input type="checkbox"/> 4 <input type="checkbox"/> <input type="checkbox"/> 3 <input type="checkbox"/> <input type="checkbox"/> 2 <input type="checkbox"/> <input type="checkbox"/> 1	LED indication according to ambient light



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Mark	Description	Settings	Meaning
JP6 - 2 JP6 - 3	<p>Switching mode setting - standard/cascade. Selecting the sensor for switching and LED indication - CO₂ or RH.</p> <p>- if standard switching is selected, CO₂ and RH sensor control its own relay - if cascade switching is selected, the one chosen sensor controls both relays according to the levels set by the SET POINT rotary switches (for both switches the according switching levels table - CO₂ or RH, is applied)</p>	<p>■ ■ 5 ■ ■ 4 ■ ■ 3 ■ ■ 2 ■ ■ 1</p>	switching and LED indication by CO ₂ standard mode switching
		<p>■ ■ 5 ■ ■ 4 ■ ■ 3 ■ ■ 2 ■ ■ 1</p>	switching and LED indication by RH standard mode switching
		<p>■ ■ 5 ■ ■ 4 ■ ■ 3 ■ ■ 2 ■ ■ 1</p>	switching and LED indication by CO ₂ cascade mode switching
		<p>■ ■ 5 ■ ■ 4 ■ ■ 3 ■ ■ 2 ■ ■ 1</p>	switching and LED indication by RH cascade mode switching
JP6 - 4 JP6 - 5	<p>These positions are not intended for user setting.</p>	<p>■ ■ 5 ■ ■ 4 ■ ■ 3 ■ ■ 2 ■ ■ 1</p>	

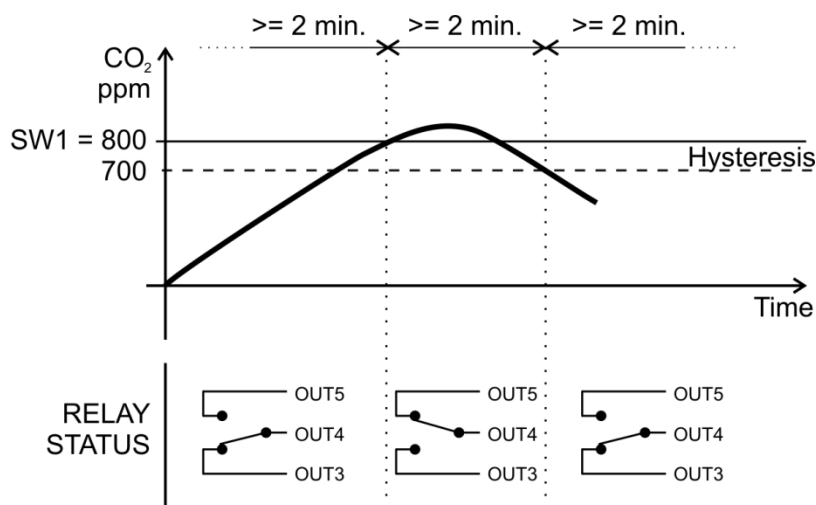


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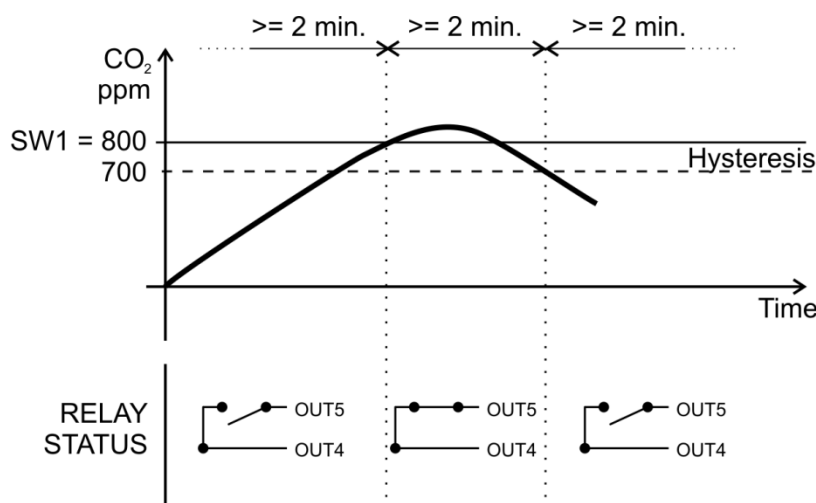
Setting the relay switching using rotary switch SET POINT

The relay switches on when the measured variable level rises above the level of the rotary switch SET POINT.
The relay switches off when the measured variable level falls below the level of the rotary switch SET POINT minus hysteresis value of 100 ppm.
Minimal delay between changes in relays state is 2 minutes.

Standard switching with one relay (NLII-CO2-R)

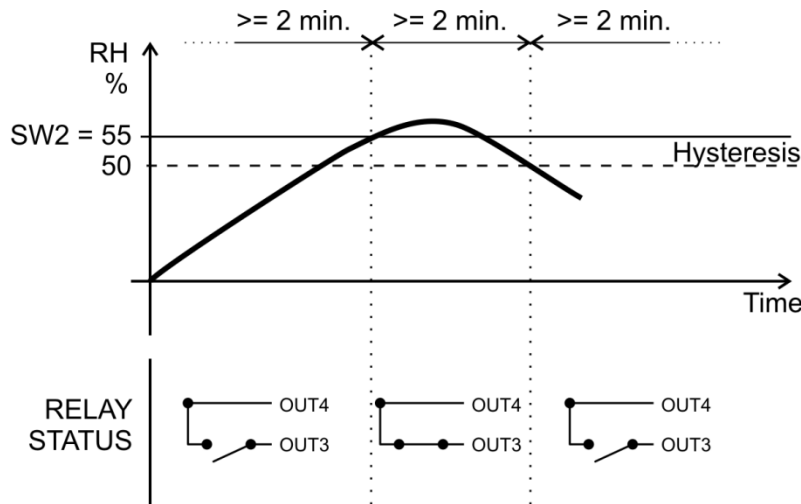


Standard switching with two relays by CO₂ (NLII-CO2+RH-R)

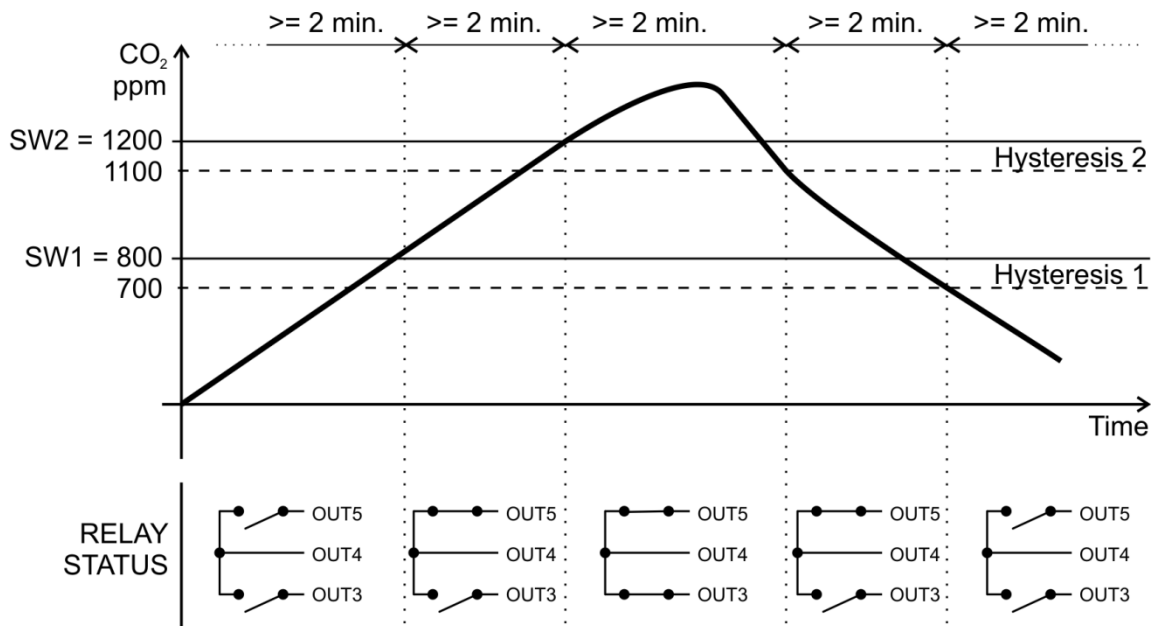


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Standard switching with two relays by RH (NLII-CO2+RH-R)



Cascade switching with two relays by CO₂ (NLII-CO2+RH-R)



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Setting the switching levels

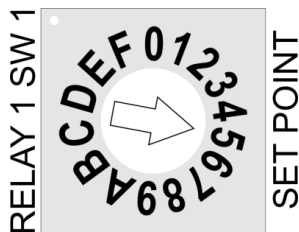
Required concentration of CO₂

SET POINT	CO ₂ [ppm]
0	500
1	600
2	700
3	800
4	900
5	1000
6	1100
7	1200
8	1300
9	1400
A	1500
B	1600
C	1700
D	1800
E	1900
F	2000

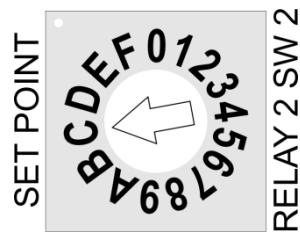
Required relative humidity (RH)

SET POINT	RH [%]
0	relay off
1	10
2	20
3	30
4	40
5	50
6	60
7	70
8	80
9	90
A	35
B	45
C	55
D	65
E	75
F	85

Example for setting the concentration of 1000 ppm:



Example for setting a relative humidity of 55%:



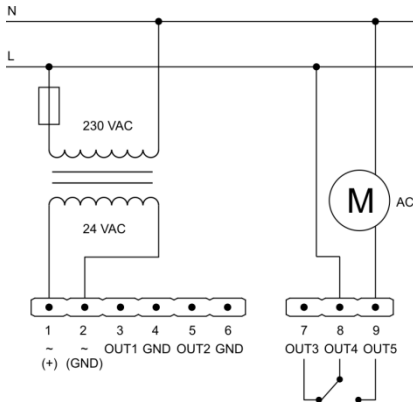
Factory settings

LED indication: by CO₂, indication turns off when ambient light dims
 CO₂ analog output: voltage output
 RH analog output: voltage output
 Relay switching mode: Standard
 Switching level CO₂: 1000 ppm
 Switching level RH: 55%

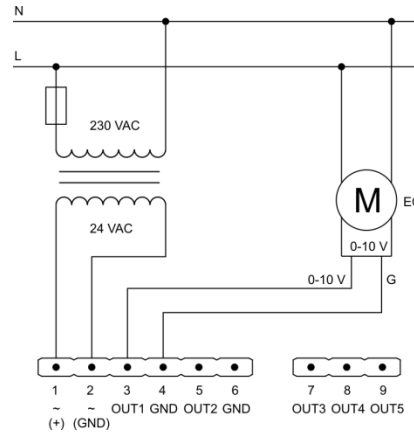


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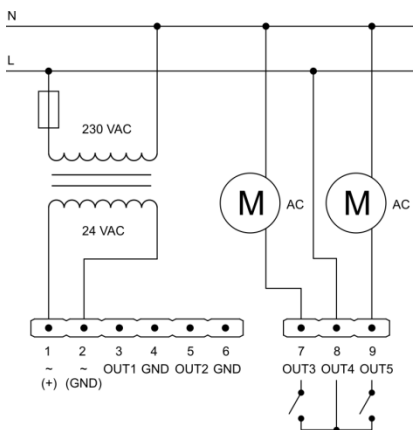
Example of CO₂ sensor connection with one relay (1x switching contact)



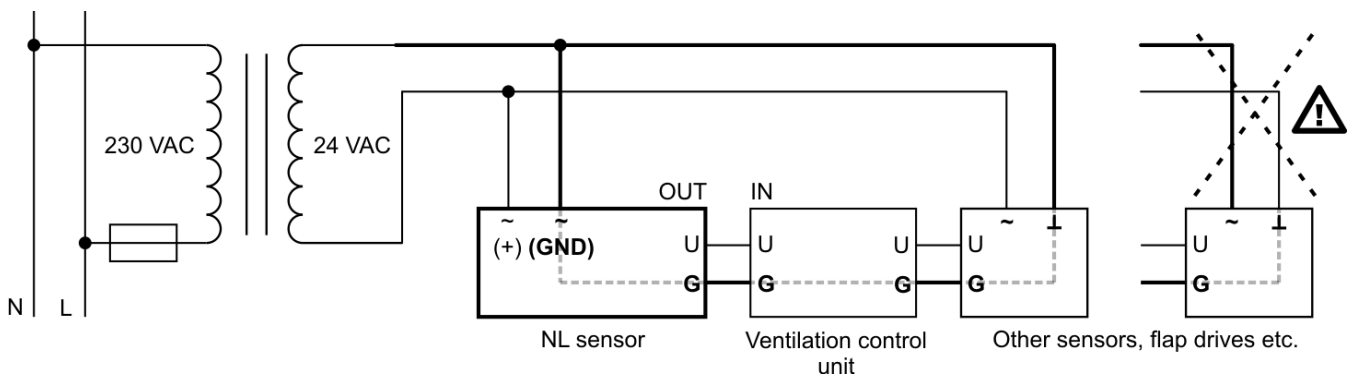
Example of CO₂ sensor connection for direct EC motor control using signal 0-10 V



Example of CO₂ sensor connection with two relays (2x NO/C)



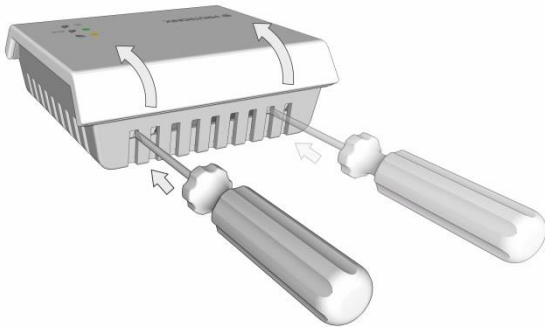
If you connect other devices to the same AC power source as the NL sensor, it is necessary to meet GND wiring of all analog inputs and outputs, as well as power wires.



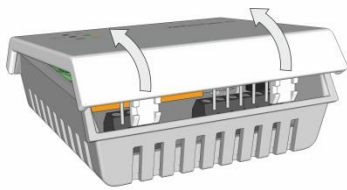
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Sensor box disassembly

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.

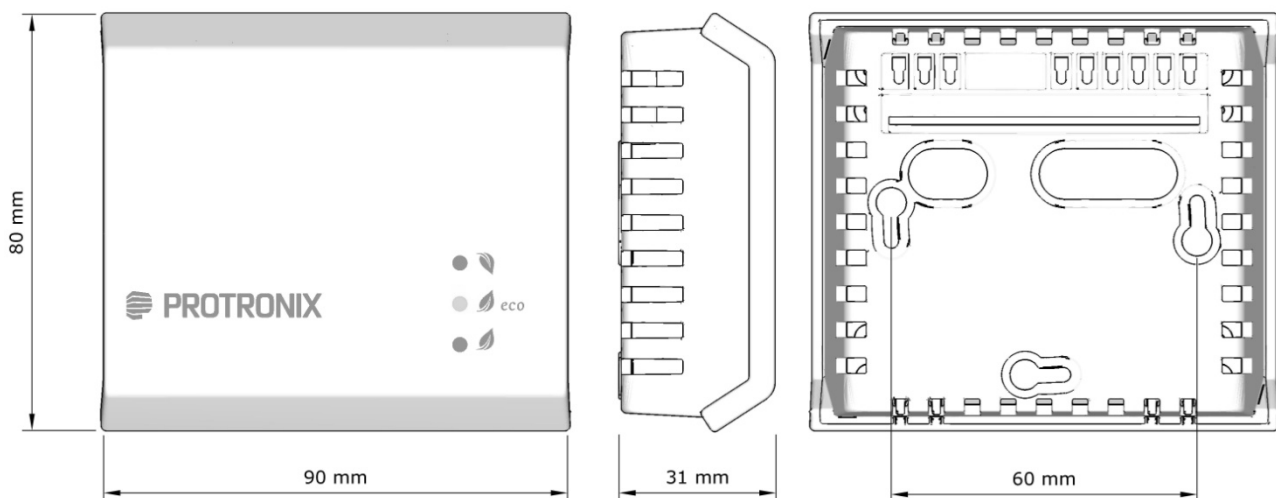
CAUTION:

It is necessary to avoid severe mechanical shock of the sensor

End of product life

Discard the product in according to 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.

