NLII-CO2-R-5 | Combined sensor CO_2/RH

Room sensor NLII-CO2 is used to continuously monitor air quality inside buildings and then control ventilation (HVAC) systems according to current levels of air internal air quality. The sensor measures concentration of carbon dioxide (CO_2) and relative humidity (RH) in air. It is suitable for offices, classrooms, shopping centers, homes, restaurants, fitness centers, commercial buildings, etc.

- measures CO_2 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
- not required maintenance during operation
- long life and stability

Type of sensor / order code	CO_2 output	RH output	Relay
NLII-CO2-R-5	0-10 V/0-20 mA/4-20 mA[1)]	-	1x NO/C/NC
NLII-CO2+RH-R-5	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 CO_2 is based on the principle of infrared radiation attenuation dependence on the CO_2 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 CO_2 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. Based on these measurements, ventilation, air conditioning and heat recovery units can be controlled directly in an efficient manner.

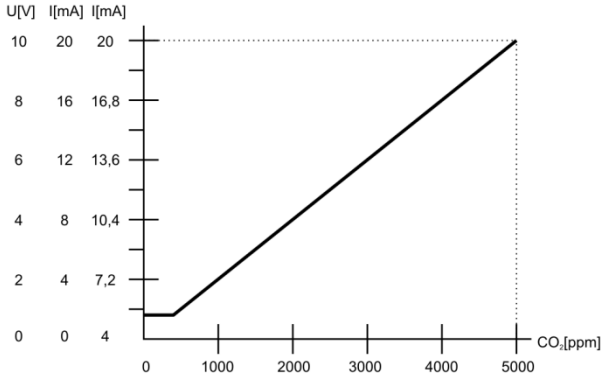
Explanation of abbreviations and technical terms can be found on our website in the Glossary section.

NLII-CO2-R-5 | Combined sensor CO_2/RH

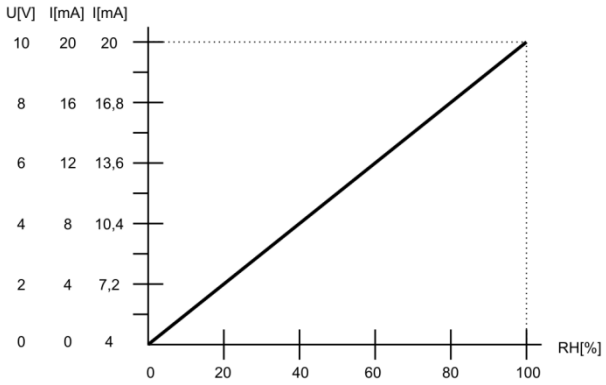
Table of parameters

Parameter	Value	Unit
Supply voltage range	12 – 35 12 – 24	V DC V AC
Average consumption	0,5	W
CO_2 measuring range	400 – 5000	ppm
CO_2 accuracy	± 35 ppm ±5 % 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 %	± 5 %	RH
RH accuracy 90 – 100 %	± 6 %	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

Selected analog output values versus actual CO_2 concentration



Selected analog output values versus actual RH



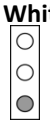
CO_2 sensor autocalibration function

Autocalibration compensates for long-term aging of the key components of the sensor. This function is available only during permanent power sensor.
Calibration during operation is not necessary.

NLII-CO2-R-5 | Combined sensor CO_2/RH

LED indication description

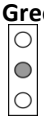
White LED lights:



Less than 40 % RH or less than 600 ppm CO_2.
(according to the quantity selected for indication)

- maintaining low concentrations of CO_2 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

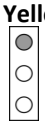
Green LED lights:



More than or equal to 40 % RH or 600 ppm CO_2, less than or equal to 60 % RH or 1200 ppm CO_2.
(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 60 % RH or more than 1200 ppm CO_2.
(according to the quantity selected for indication)

- higher concentration of CO_2 - further increase of CO_2 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

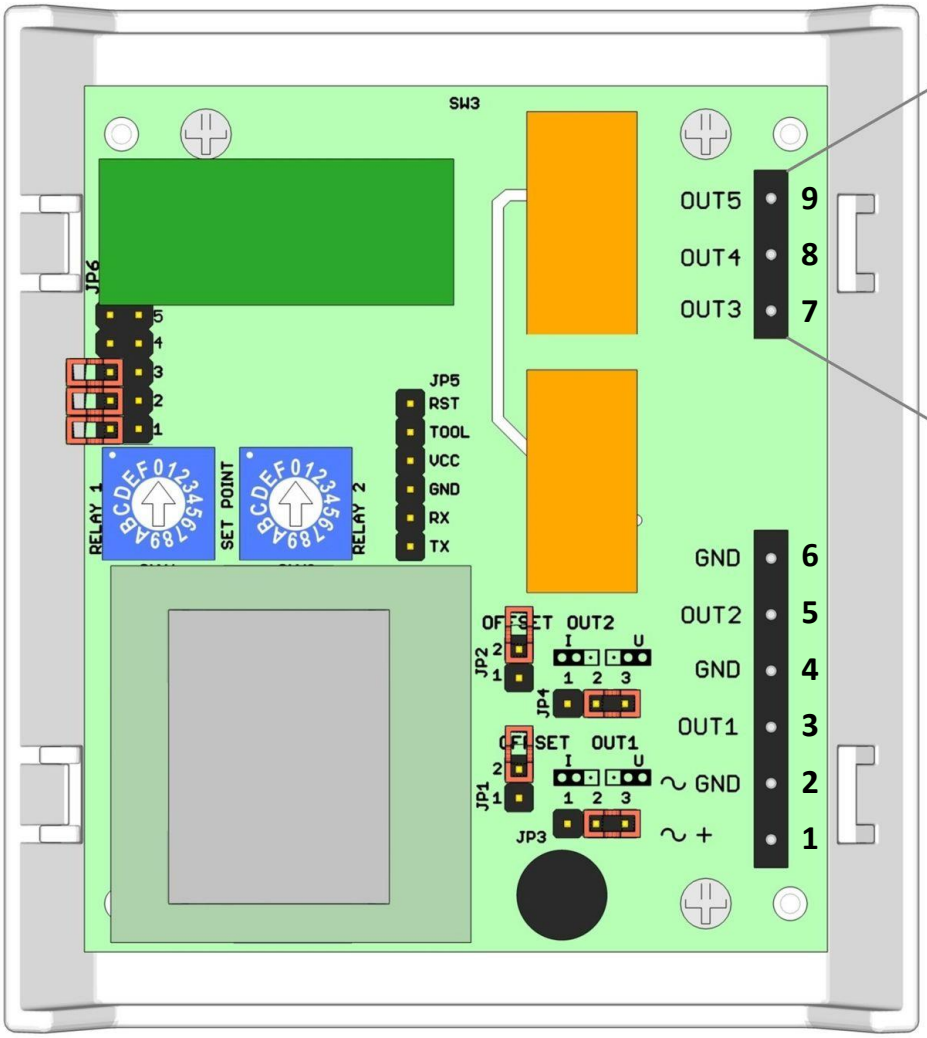
All three LEDs are shining permanently.

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.

NLII-CO2-R-5 | Combined sensor CO_2/RH

Electronic board controls and terminals



relay terminals by sensor type	
NO C NO	NLII-CO2+RH-R-5
NO C NC	NLII-CO2-R-5

Terminals

1. ~ +	power AC or DC (+) plus pole
2. ~ GND	power AC or DC (-) minus pole, GND
3. OUT1	CO_2 sensor analog output, 0-10 V or 0-20 mA or 4-20 mA
4. GND	CO_2 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-5 it is a NC contact)
8. OUT4	relay C output, common contact
9. OUT5	NO relay 1 output, normally open (CO_2)

SET POINT rotary switches for setting the relays switching levels

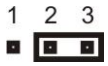
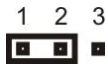
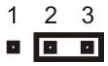
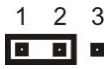
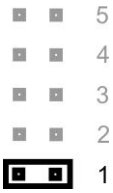
RELAY 1 – switching level for CO_2
RELAY 2 – switching level for RH

Jumpers

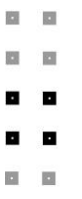
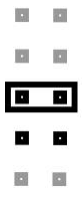
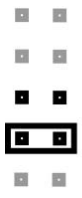
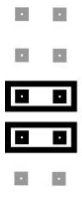
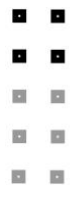
JP1 – Current output offset RH
JP2 – Current output offset CO_2
JP3 – Voltage/current output CO_2
JP4 – Voltage/current output RH
JP6 – LED indication and switching mode settings

NLII-CO2-R-5 | Combined sensor CO_2/RH

Jumpers on the electronics board

Mark	Description	Settings	Meaning
JP1	**Current output offset RH** - shift quiescent current from 0 mA to 4 mA		current output RH 0-20 mA
			current output RH 4-20 mA
JP2	**Current output offset CO_2** - shift quiescent current from 0 mA to 4 mA		current output CO_2 0-20 mA
			current output CO_2 4-20 mA
JP3	**Voltage/current output CO_2** - select the type of analog output - if the selected voltage output is CO_2, JP2 must not be shorted		voltage output CO_2
			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		voltage output RH
			current output RH
JP6 - 1	**Enabling LED indication** - LED indication according to ambient light - when ambient light is dimmed (at night), LED indicators turn off automatically.		permanent LED indication enabled
			LED indication according to ambient light

NLII-CO2-R-5 | Combined sensor CO_2/RH

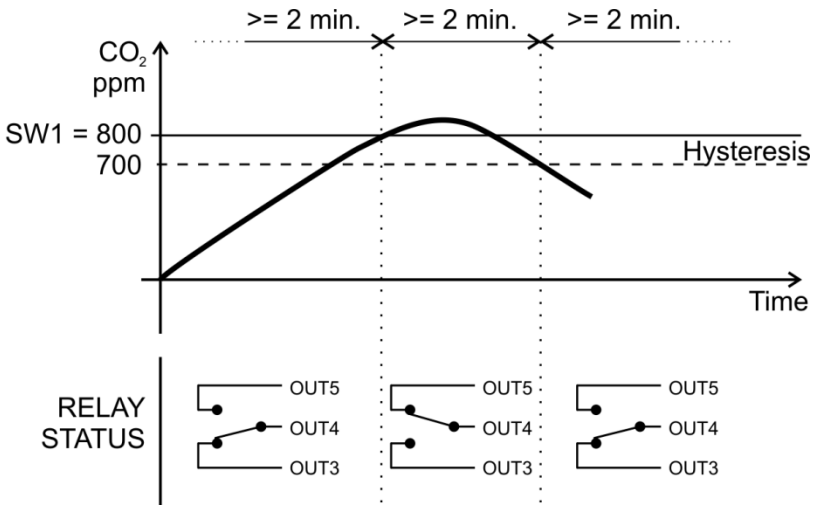
Mark	Description	Settings	Meaning
JP6 - 2 **JP6 - 3**	**Switching mode setting - standard/cascade. Selecting the sensor for switching and LED indication - CO_2 or RH.** - if the standard switching is selected, CO_2 and RH sensor control their own relay - if cascade switching is selected, the one chosen sensor controls both relays according to the levels set by the SET POINT rotary switches (for both switches the according switching levels table - CO_2 or RH, is applied)		switching and LED indication by CO_2 standard mode switching
			switching and LED indication by RH standard mode switching
			switching and LED indication by CO_2 cascade mode switching
			switching and LED indication by RH cascade mode switching
JP6 - 4 **JP6 - 5**	**These positions are not intended for user setting.**		

NLII-CO2-R-5 | Combined sensor CO_2/RH

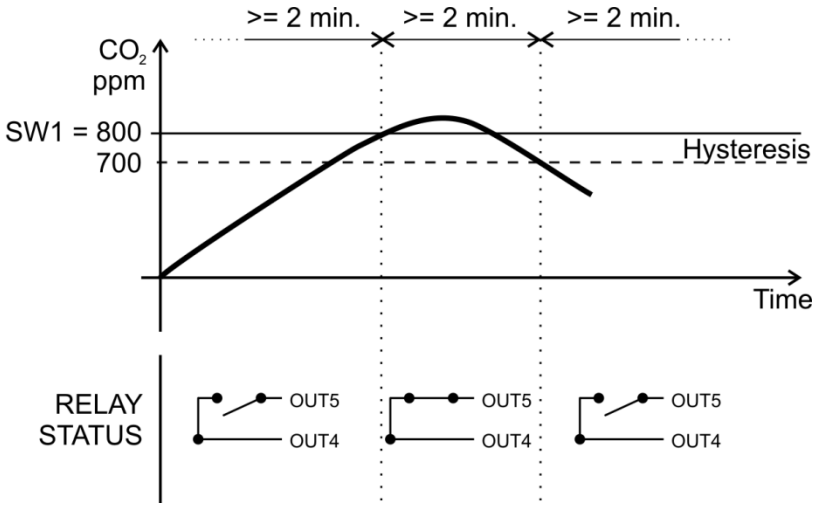
Setting the relay switching using rotary switch SET POINT

The relay contact close when the measured quantity level rises above the level set on the SET POINT rotary switch. The relay contact open when the measured quantity level falls below the level set on the SET POINT rotary switch minus hysteresis value of 100 ppm.
Minimal delay between relays state change is 2 minutes.

Standard switching one relay (NLII-CO2-R-5)

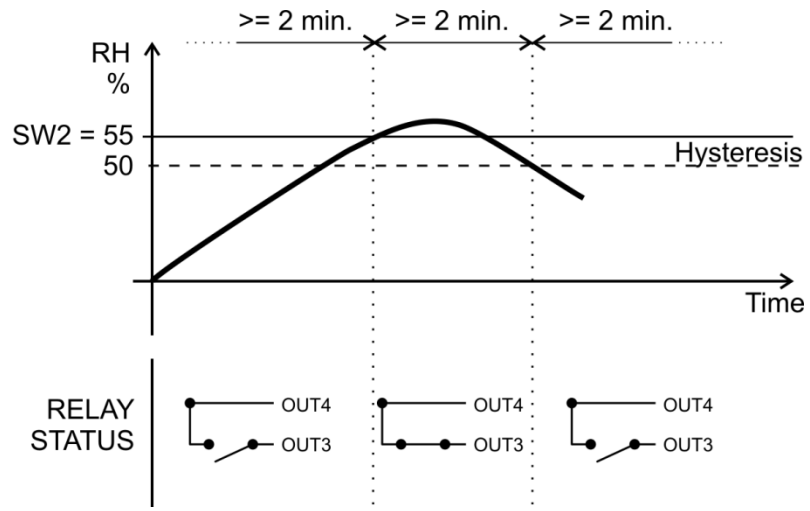


Standard switching with two relays by CO_2 (NLII-CO2+RH-R-5)

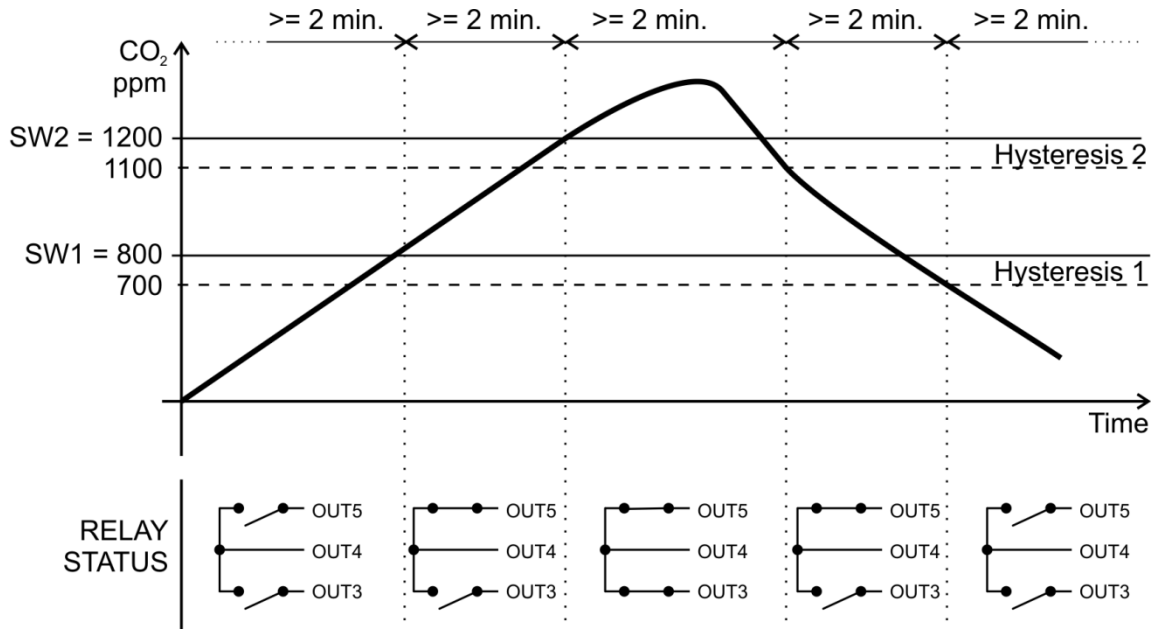


NLII-CO2-R-5 | Combined sensor CO_2/RH

Standard switching with two relays by RH (NLII-CO2+RH-R-5)



Cascade switching with two relays by CO_2 (NLII-CO2+RH-R-5)



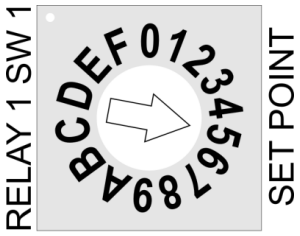
NLII-CO2-R-5 | Combined sensor CO_2/RH

Setting switching levels

Required concentration of CO_2

SET POINT	CO_2 [ppm]
0	500
1	800
2	1100
3	1400
4	1700
5	2000
6	2300
7	2600
8	2900
9	3200
A	3500
B	3800
C	4100
D	4400
E	4700
F	5000

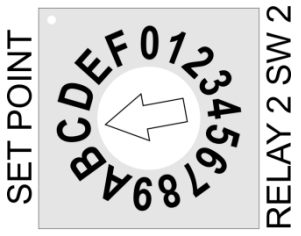
Example for setting the concentration of 2000 ppm:



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 a relative humidity of 55%:

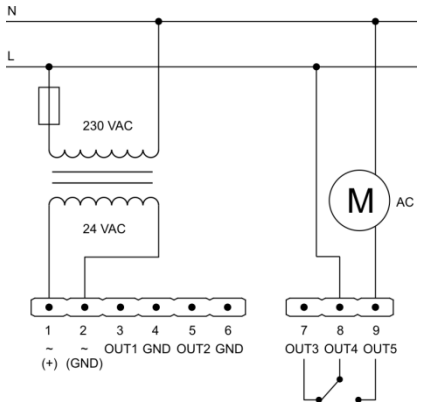


Factory settings

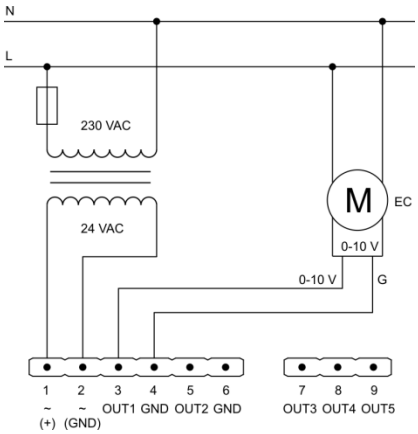
LED indication:	by CO_2, indication turns off when ambient light dims
CO_2 analog output:	voltage output
RH analog output:	voltage output
Relay switching mode:	Standard
Switching level CO_2:	2000 ppm
Switching level RH:	55%

NLII-CO2-R-5 | Combined sensor CO_2/RH

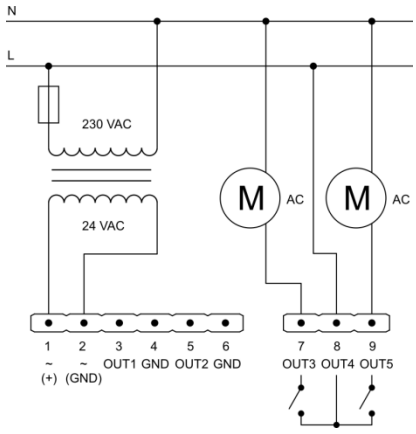
Example of sensor connection CO_2 by one relay (1x switching contact)



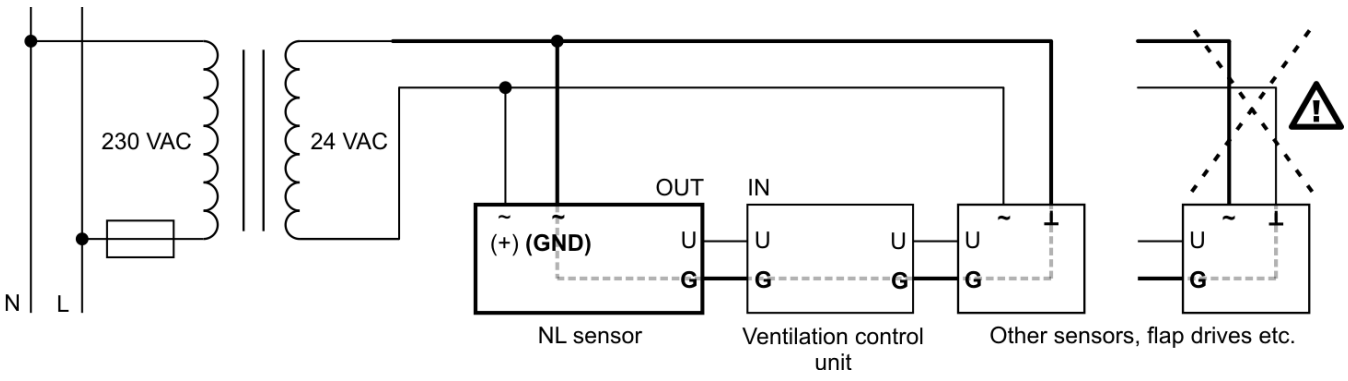
Example of sensor connection CO_2 for direct EC motor control using signal 0-10 V



Example of sensor connection CO_2 with two relays (2x NO/C)

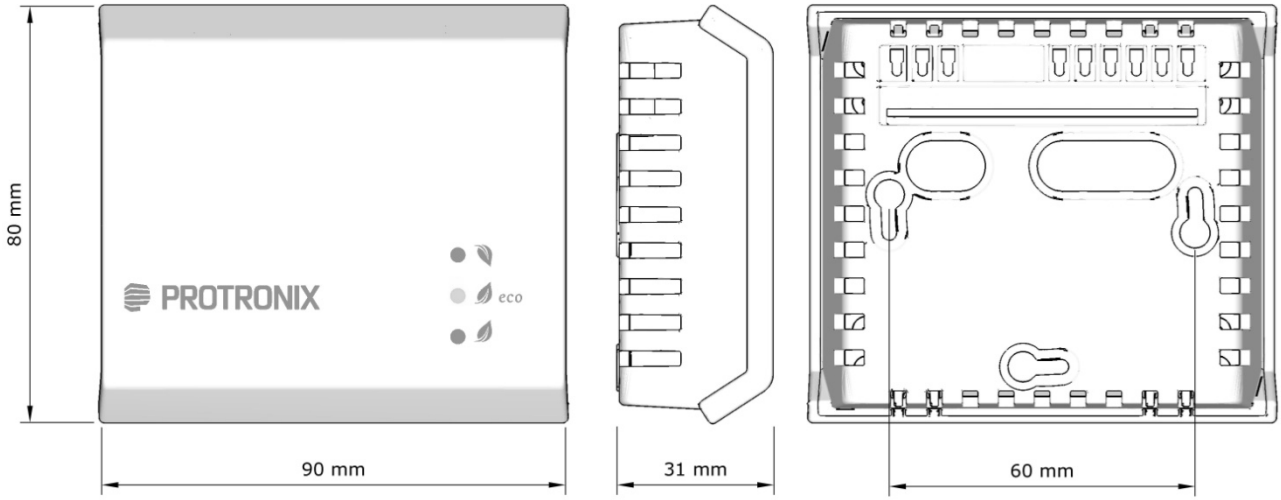


If you connect other devices to the same AC power source as the NL sensor, it is necessary to meet GND wiring of all analog inputs and outputs, as well as power wires.



NLII-CO2-R-5 | Combined sensor CO_2/RH

Dimensions



Sensor assembly

Box color

Front: white - RAL9016
Base: gray - RAL7035

Way to use

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

End of product life

Discard the product according to the electronic waste law and the EU directives.

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