

## NLII-RH | Combined humidity/temperature sensor

Room sensor NLII-RH is used to continuously monitor the air quality inside buildings and then control ventilation (HVAC) systems according to current levels of air pollution. The sensor measures the relative humidity (RH) and temperature (T). It is suitable for living rooms, bathrooms, warehouses, ateliers etc.

- > measures RH and temperature
- > 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	RH output	T output	Relay
NLII-RH-R	0-10 V/0-20 mA/4-20 mA <sup>1)</sup>	-	1x NO/C/NC
NLII-RH+T	0-10 V/0-20 mA/4-20 mA <sup>1)</sup>	0-10 V/0-20 mA/4-20 mA <sup>1)</sup>	-
NLII-RH+T-R	0-10 V/0-20 mA/4-20 mA <sup>1)</sup>	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.

### Description

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 temperature and the other for the actual 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.

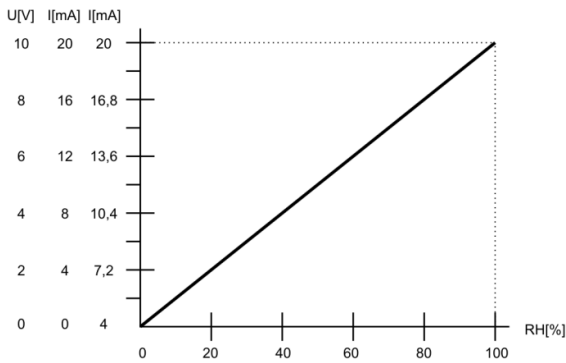
### Technical data

Parameter	Value	Unit
Supply voltage range	12 – 35	V DC
	12 – 24	V AC
Average consumption	0,5	W
RH measuring range	0 – 100 %	RH
RH accuracy 0 – 90 %	± 5 %	RH
RH accuracy 90 – 100 %	± 6 %	RH
RH switching hysteresis	5 %	RH
T measuring range	0 – 50	°C
T accuracy	± 0,4	°C
T switching hysteresis relay	0,5	°C
Max. switching voltage	250/30	V AC / V DC
Max. switching current	5/5	A AC / A DC
Working humidity non condensing	0 – 90 %	RH
Working temperature	0 to +50	°C
Storage temperature	-20 to +60	°C
Expected lifetime	min. 10	years
Ingress protection	IP20	
Dimensions	90x80x31	mm

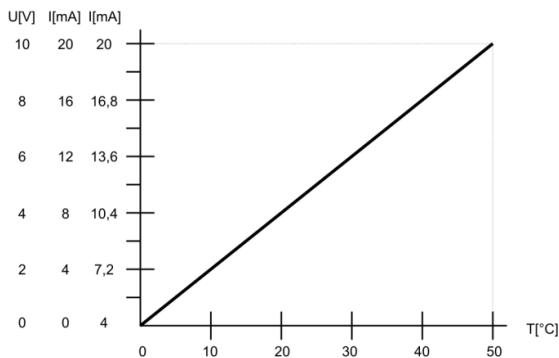


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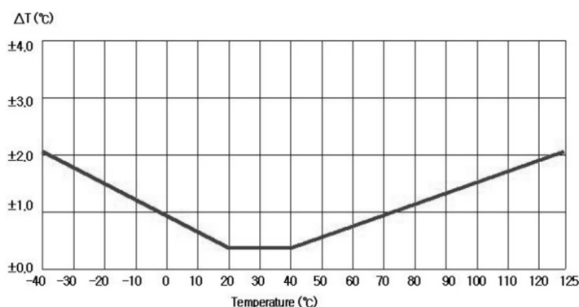
### Analog output values versus actual RH



### Analog output values versus actual T



### Typical T measurement accuracy



### LED indication description

#### White LED lights:

- Less than 40 % RH or less than 18 °C.  
(according to the quantity selected for indication)
- — 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
- — low temperature and its higher fluctuation is not economically profitable

#### Green LED lights:

- More than or equal to 40 % RH or 18 °C, less than or equal to 60 % RH or 22 °C.  
(according to the quantity selected for indication)
- — optimal relative humidity for humans
- — optimal balance of air quality and energy efficiency of ventilation and air conditioning

#### Yellow LED lights:

- More than 60 % RH or more than 22 °C.  
(according to the quantity selected for indication)
- — too high humidity, the risk of mold growth and associated health complications
- — higher temperature T - high temperature can cause fatigue, restlessness, headache and feeling hot

### 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:

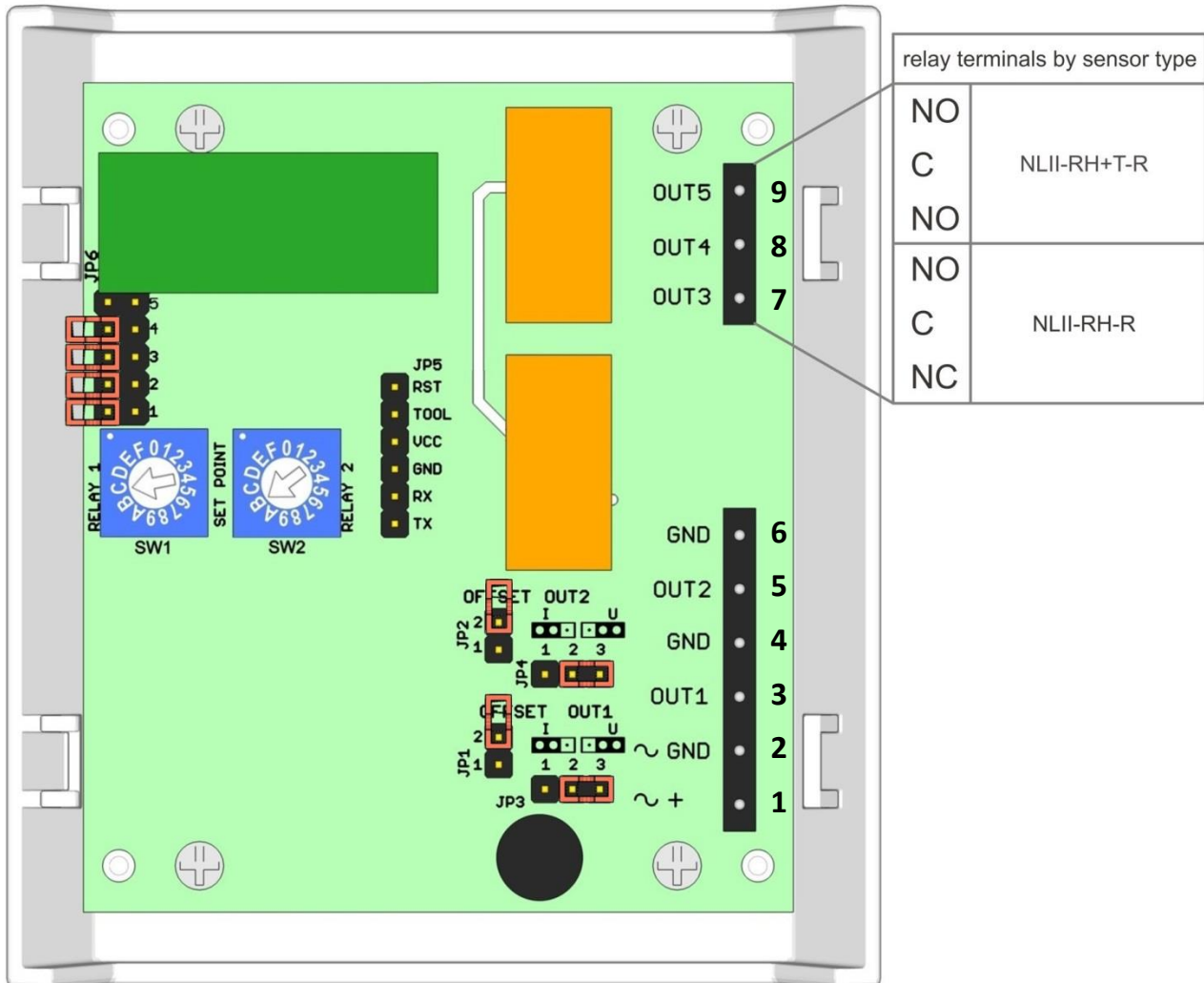
Warm-up: operational after 1 minute since power on. The declared accuracy is reached after 4 days of continuous power supply.

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



## NLII-RH | Combined humidity/temperature sensor

### Electronic board controls and terminals



#### Terminals

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

#### SET POINT rotary switches for setting the relays switching levels

- RELAY 1** – switching level for RH
- RELAY 2** – switching level for T








#### Jumpers

- JP1** – Current output offset RH
- JP2** – Current output offset T
- JP3** – Voltage/current output T
- JP4** – Voltage/current output RH
- JP6** – LED indication setting, switching mode setting and temperature switching level range setting



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### Jumpers on the electronics board

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



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<p><b>JP6 - 2</b> <b>JP6 - 3</b></p> <p><b>Switching mode setting - standard/cascade. Selecting the sensor for switching and LED indication - T or RH.</b></p> <p>- if standard switching is selected, T and RH sensor control its own relay</p> <p>- 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 - T or RH, is applied)</p>	<p>■ ■ 5</p> <p>■ ■ 4</p> <p>■ ■ 3</p> <p>■ ■ 2</p> <p>■ ■ 1</p> <p>standard mode switching switching and LED indication by RH</p>
	<p>■ ■ 5</p> <p>■ ■ 4</p> <p>■ ■ 3</p> <p>■ ■ 2</p> <p>■ ■ 1</p> <p>standard mode switching switching and LED indication by T</p>
	<p>■ ■ 5</p> <p>■ ■ 4</p> <p>■ ■ 3</p> <p>■ ■ 2</p> <p>■ ■ 1</p> <p>cascade mode switching switching and LED indication by RH</p>
	<p>■ ■ 5</p> <p>■ ■ 4</p> <p>■ ■ 3</p> <p>■ ■ 2</p> <p>■ ■ 1</p> <p>cascade mode switching switching and LED indication by T</p>
	<p>■ ■ 5</p> <p>■ ■ 4</p> <p>■ ■ 3</p> <p>■ ■ 2</p> <p>■ ■ 1</p> <p>temperature switching level range set up to 25°C</p>
<p><b>JP6 - 4</b></p> <p><b>Temperature switching level range setting</b></p> <p>- for all adjustable values of both ranges see <b>Setting the switching levels</b> further in this manual</p>	<p>■ ■ 5</p> <p>■ ■ 4</p> <p>■ ■ 3</p> <p>■ ■ 2</p> <p>■ ■ 1</p> <p>temperature switching level range set up to 25°C</p>
	<p>■ ■ 5</p> <p>■ ■ 4</p> <p>■ ■ 3</p> <p>■ ■ 2</p> <p>■ ■ 1</p> <p>temperature switching level range set up to 40°C</p>
<p><b>JP6 - 5</b></p> <p><b>This position is not intended for user setting.</b></p>	<p>■ ■ 5</p> <p>■ ■ 4</p> <p>■ ■ 3</p> <p>■ ■ 2</p> <p>■ ■ 1</p>

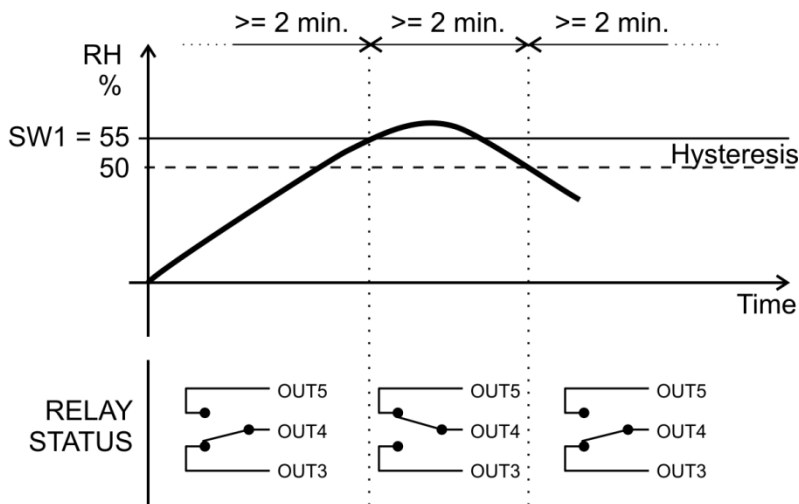


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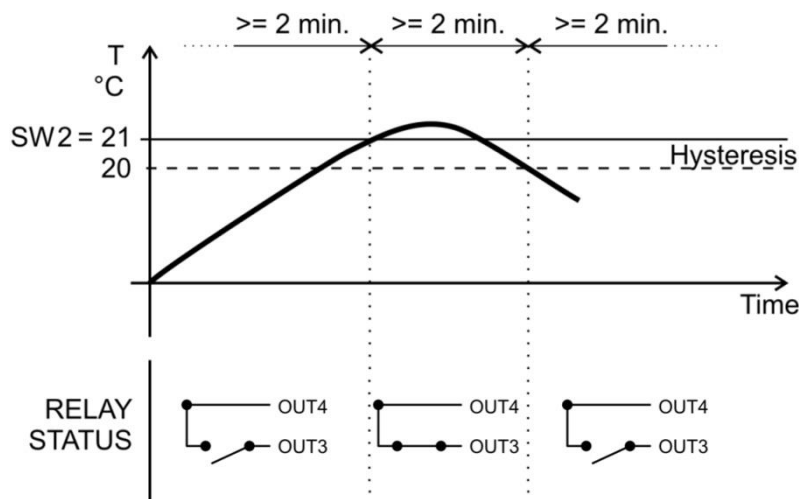
### Setting the relay switching using rotary switch SET POINT

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 5 % RH.  
Minimal delay between changes in relays state is 2 minutes.

### Standard switching with one relay (NLII-RH-R)

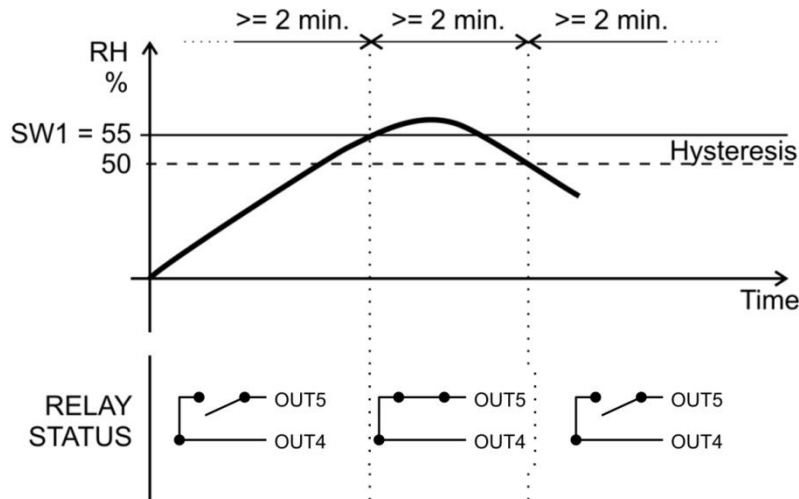


### Standard switching with two relays by T (NLII-RH+T-R)

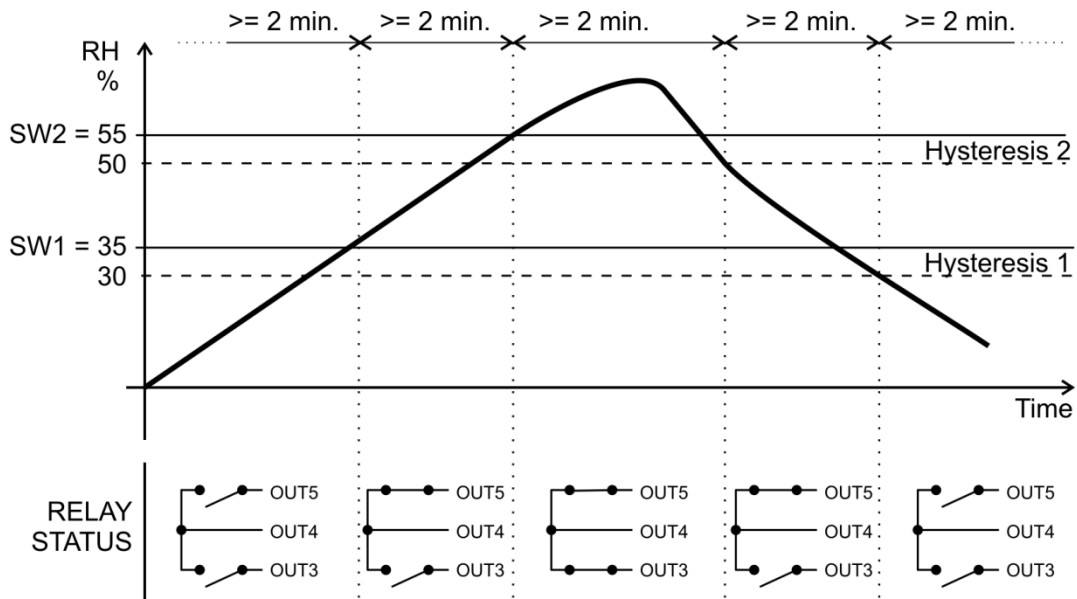


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### Standard switching with two relays by RH (NLII-RH+T-R)



### Cascade switch with two relays by RH (NLII-RH+T-R)



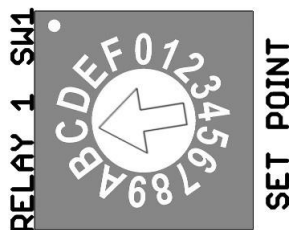
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### Setting the switching levels

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

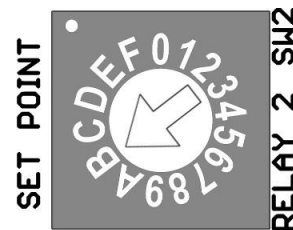
Example for setting a relative humidity of 55%:



Required temperature T

SET POINT	T [°C] JP6-4 open	T [°C] JP6-4 closed
0	10	25
1	11	26
2	12	27
3	13	28
4	14	29
5	15	30
6	16	31
7	17	32
8	18	33
9	19	34
A	20	35
B	21	36
C	22	37
D	23	38
E	24	39
F	25	40

Example for setting the temperature to 21 °C in range up to 25°C:



### Factory settings

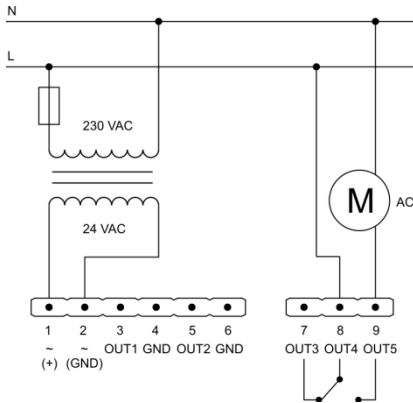
LED indication: by RH, indication turns off when ambient light dims  
 T analog output: voltage output  
 RH analog output: voltage output  
 Relay switching mode: Standard  
 Switching level T: 21 °C  
 Switching level RH: 55%



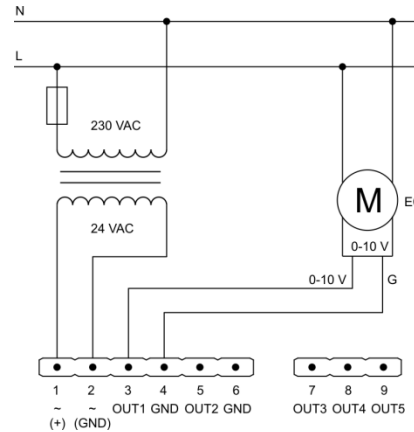


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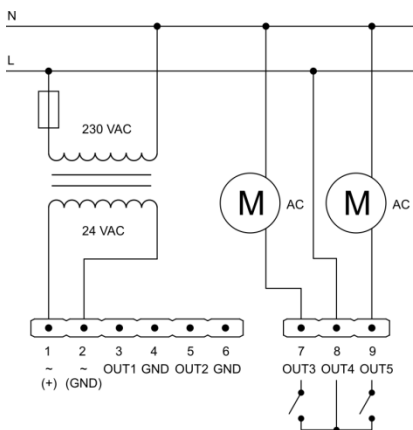
Example of RH sensor connection by one relay (1x switching contact)



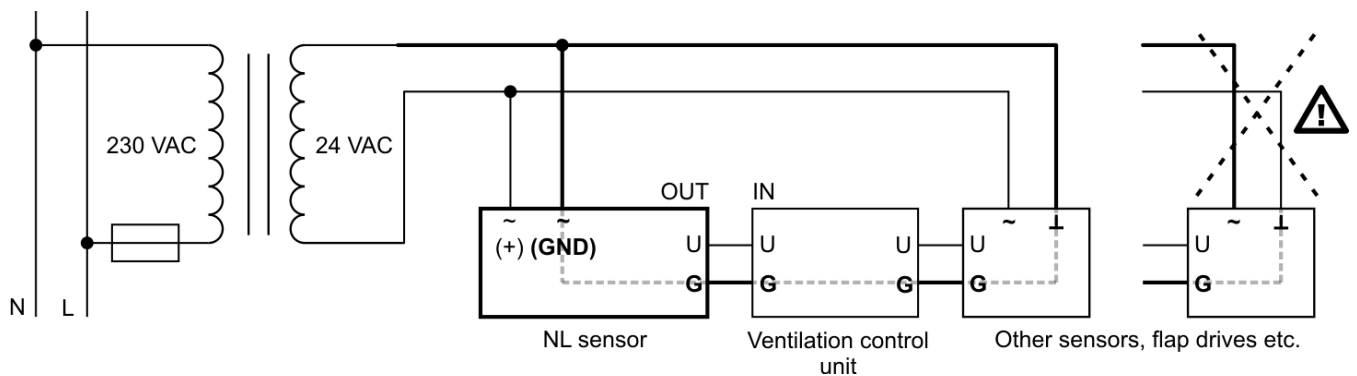
Example of RH sensor connection for direct EC motor control using signal 0-10 V



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



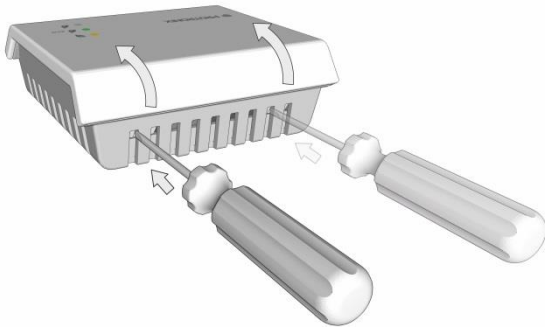
If you connect other devices to the same AC power source as the NL sensor, it is necessary to meet GND wiring of all analog inputs and outputs, as well as power wires.



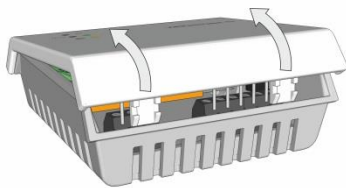
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### Sensor box disassembly

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.

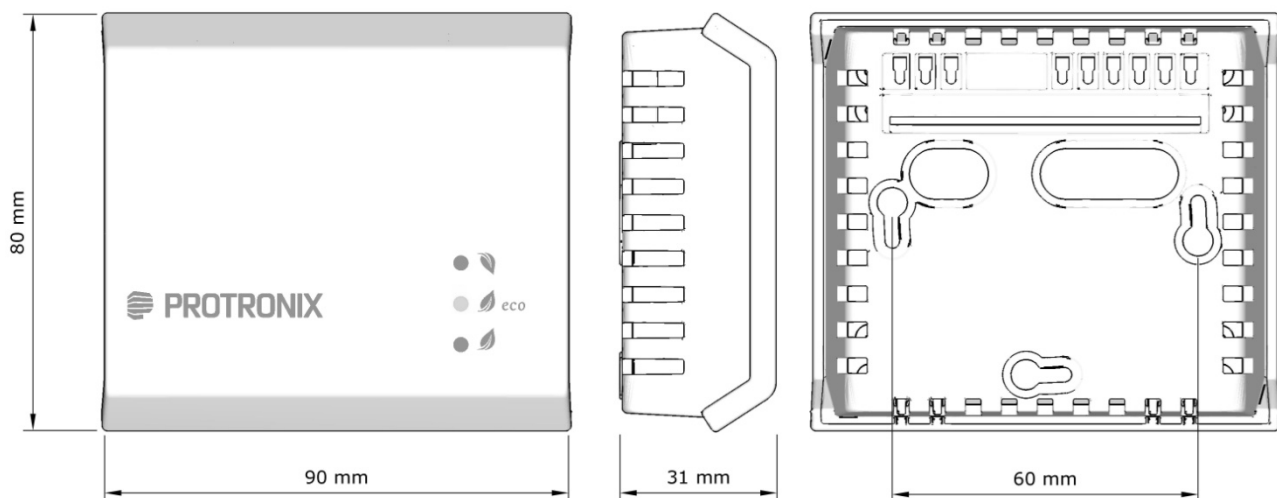
### CAUTION:

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.*

