Nexelec

D976A_Technical guide

AIR+, AIR

LORAWAN

15/05/2024

I. Product overview

1. Main functionalities

This document describes the technical operation of the LoRaWAN-connected, interconnected, NFC-configurable carbon monoxide detector. The range comprises 2 products, depending on the temperature/humidity sensor integration.

Model	Name	CO	T°/Hum
X850LS	Air+	●	●
X845LS	Air	●	

This guide is common to all products. Depending on your product, the dedicated sections may not be applicable.

Electronic maintenance certificate	**Indoor air quality**	**Compatible with the boiler cut-off**	**Temperature/Humidity**
After each maintenance operation, a unique certificate is recorded in the detector's secure NFC chip	The detector continuously monitors ambient CO levels and alerts you when it's time to check that the gas boiler is operating correctly.	If an alarm is triggered, the detector wirelessly interconnects with the RELAY accessory to shut down the gas boiler	For a better indoor comfort, measures home environment parameters

Anti-tear detection
Triggers an alert message in the application if the detector is removed from its mounting base

10-years battery[1]
Sealed and welded lithium battery

Test/Silence button
Large, easy-to-reach touch button on front panel

Silence function
Stops the alarm and/or puts the detector on standby for 5 minutes without removing it from its base

Compact mounting base
Only 3 cm in diameter to avoid damaging the installation surface

Air 360°
Exclusive detection technology. Simplifies detector maintenance

Insect barrier
Pest protection grid integrated into the detector

Signal light
Discreet LED indicator in standby mode, powerful in alarm mode

Powerful audible alarm
85 dB at 3 metres to quickly alert occupants

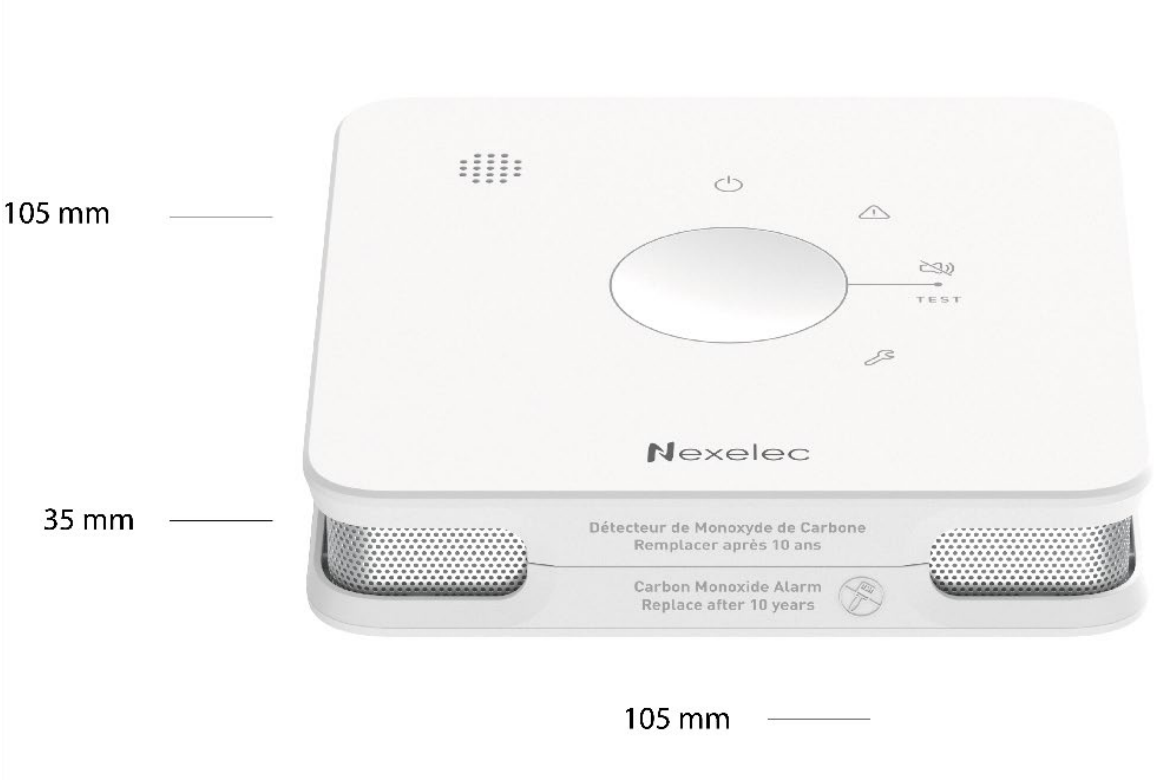
12-hour beep delay
Temporarily silences fault beeps until detector is replaced

Remote surveillance compatible
To report alarms, carry out troubleshooting or arrange on-site intervention by an approved company

Calibration certificate
Temperature and humidity measurement accuracy validated by an independent COFRAC-accredited laboratory

2. Product scheme

DIMENSIONS & WEIGHT



150g (including battery and stand)

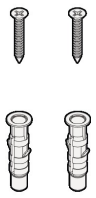
3. Set contents

1x Detector

1x BASE+ mounting base

1x FIX adhesive fastener

1x FLEX removable stand



2x nylon screws and plugs

4. Product terms of use and certifications

CONDITIONS OF USE

> Indoor household environment
> Temperature: -10°C to + 50°C
> Relative humidity: from 10 to 95% RH (no condensation)

CERTIFICATIONS

Applicable certifications and associated declarations of conformity are available on the Nexelec support website support.nexelec.fr.

5. Support and integration tools

Documentation and tools for this product can be found on our website support.nexelec.fr
Here you'll find :

- CODEC, Javascript code for decoding LoRaWAN messages:
  https://support.nexelec.fr/en/support/solutions/articles/80001141531--codec-air-air-format-lora-alliance

- Online decoding tool for LoRaWAN messages :
  https://nexelec-support.fr/n/decoder/

- Online downlink calculation tool for remote product reconfiguration:
  https://nexelec-support.fr/n/downlink/

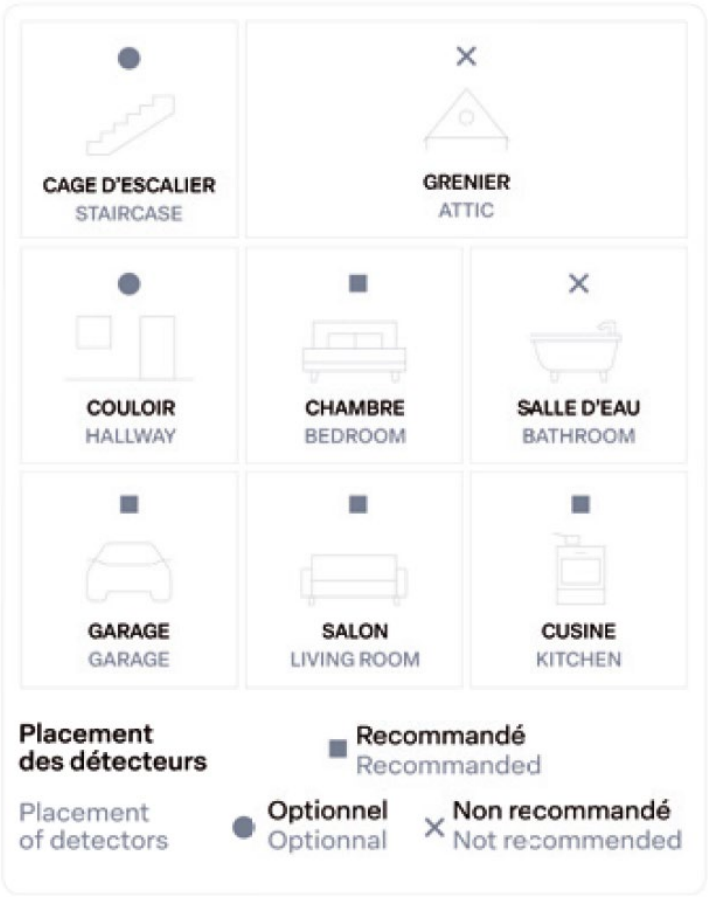
- VOTL: Online product autonomy calculator :
  https://nexelec-support.fr/n/volt/

If you have any questions, our support team can be contacted by e-mail at support@nexelec.fr

II. Product installation

1. Installation sites

Depending on the layout and the surface area of the dwelling, several CO detectors may be required to ensure minimum protection and guarantee efficient detection, the range of the alarm and quick evacuation of the dwelling.



STANDARD INSTALLATION

> One detector per floor
> In rooms with combustion appliances
> In rooms with a heating duct (even if the duct is encased)

RECOMMENDED INSTALLATION

> In the busiest living areas
> In each room

PREFERRED LOCATION

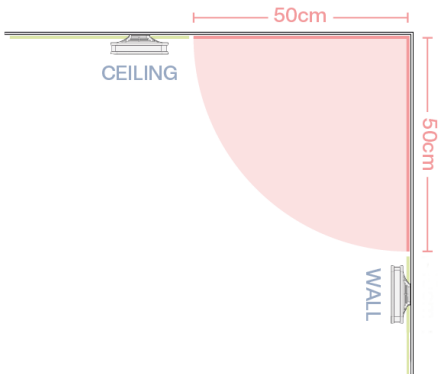
> At a distance of more than 2 meters from combustion appliances and ideally at a maximum distance of 4 meters
> In a place where the alarm can be heard from all rooms
> At a maximum of 1 meter from the floor if the detector is placed on a piece of furniture or a shelf
> At most 1.5 meters from the floor if the detector is fixed to the wall

LOCATIONS TO AVOID

Do not install the Air detector:

> Less than 30 cm from the ceiling
> Outside
> In a place where the alarm would be difficult to hear (room with closed door)
> In a place where the detector would be difficult to reach, especially for testing purposes
> In a place where the temperature is below 10°C or above 40°C
> In a place where the humidity is below 30% or more than 90% (bathroom, kitchen, laundry room, etc)
> In a place subject to large and/or rapid variations in temperature, pressure or humidity.
> In a dusty or dirty place (garage,workshop, etc.)
> In a room with toxic vapors.
> Less than 1 m from doors and windows, heating, cooling or ventilation air vents
> In a passageway where it could be damaged
> In an enclosed space (for example, in a closet or behind a curtain)
> Where it may be obstructed (e.g. by furniture)
> In the immediate vicinity of cooking appliances

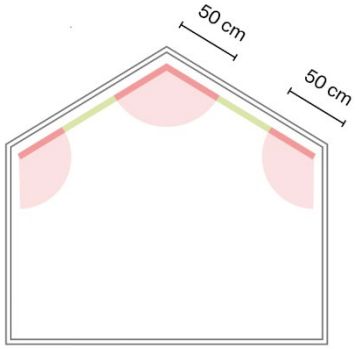
WALL OR CEILING MOUNTING



Install the detector on the ceiling in the center of the room, at least 50 cm from corners, walls, beams or any other obstacle.

Wall-mount the detector at a distance of more than 50 cm from the ceiling

FIXING TO A SLOPING CEILING

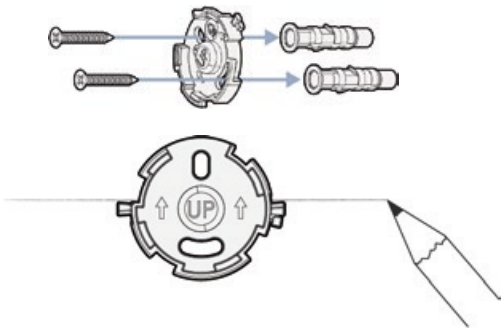


Install the detector more than 50 cm away from the corners of the room

2. Detector mounting

Choose a suitable location for mounting the detector: on the ceiling or wall.

FITTING THE BASE/BASE+ BASE WITH SCREWS AND PLUGS

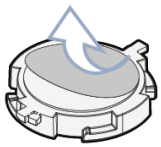


To secure the base to the wall or ceiling:

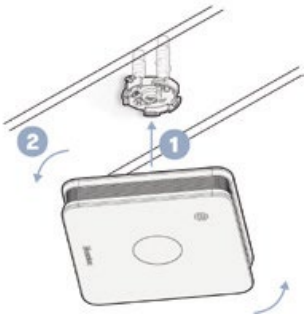
> Use a level to draw a 5 cm line on the wall
> Position the base on the line with the “UP” marking and arrows pointing upwards. The small ears on either side of the base should be on the lower edge of the line
> Mark the screw holes with a pencil, then drill the holes
> Insert the nylon plugs supplied and screws on the mounting base

FITTING THE BASE/BASE+ BASE WITH FIX ADHESIVE FASTENER (OPTIONAL)

FIX adhesive fasteners are to be used exclusively with BASE and BASE+ bases.



> Place the adhesive on the base and press firmly with your fingers for 10 seconds
> Remove the adhesive backing and stick the mounting base to the wall or ceiling
> Press firmly with your fingers for 10 seconds and wait 30 seconds



Place the detector on the mounting base, then turn it a quarter-turn to the right to secure it.

You should hear a “click”, indicating that the detector is secured to the base. Check that the detector is securely fixed to the wall or ceiling.

Warning - If the detector is fixed with the adhesive mount, do not turn it too much, as this may twist the mount.

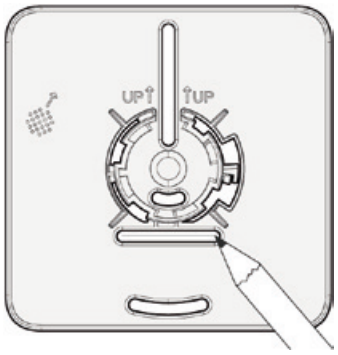
Compatible mounting accessories: FIX, BASE, BASE+, TAPE, MOUNT, MOUNT+. Use of any accessory other than those listed above will invalidate product certification.

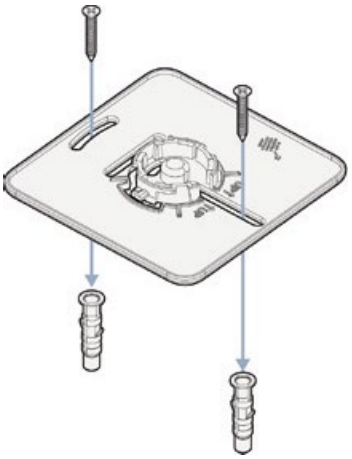
MOUNT / MOUNT+ BASE INSTALLATION WITH SCREWS AND PLUGS (OPTIONAL)

The MOUNT base can be installed on existing wall plugs, so there’s no need to drill new holes in the base. It is ideal for replacing older smoke detectors.

To secure the base to the wall or ceiling:

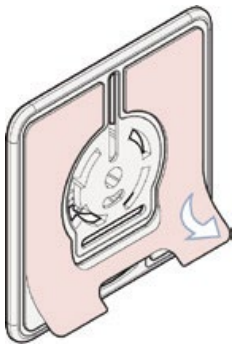
> Use a level to draw a 5 cm line on your wall
> Position the base on the line with the “UP” marking and arrows pointing upwards. The 3 cm hole in the center of the detector should be on the line.
> Mark the screw holes with a pencil, then drill the holes
> Insert the nylon plugs supplied and screw on the mounting base





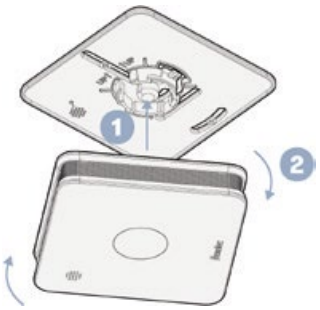
MOUNT / MOUNT+ BASE INSTALLATION WITH TAPE ADHESIVE FASTENER (OPTIONAL)

TAPE adhesive fasteners are to be used exclusively with MOUNT and MOUNT+ bases. They are not supplied with the product, and are available as accessories.



> Place the adhesive on the mounting base and press firmly with your fingers for 10 seconds
> Remove the adhesive backing and stick the mounting base to the wall or ceiling
> Press firmly with your fingers for 10 seconds and wait 30 seconds

Place the detector on the mounting base, then turn it a quarter-turn to the right to secure it. You should hear a “click”, indicating that the detector is secured in its base. Check that the detector is securely fastened to the wall or ceiling.

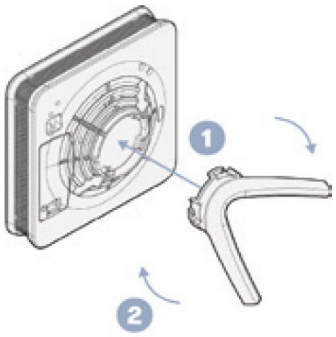


Warning - If the detector is fixed with the adhesive mount, do not turn it too much, as this may twist the mount.

Compatible mounting accessories: FIX, BASE, BASE+, TAPE, MOUNT, MOUNT+. Use of any accessory other than those listed above will invalidate product certification.

FREE-STANDING

Use the FLEX removable bracket supplied with the sensor. Follow the procedure below:



> Place the sensor on a piece of furniture or a shelf, ideally less than one meter from the floor, to avoid damage in the event of accidental dropping of the sensor.
> Place the removable bracket on the back of the sensor, then turn it a quarter-turn to the right to secure it.

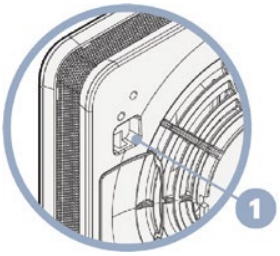
You should hear a “click”, indicating that the sensor is correctly attached to its removable support.

3. Anti-tear detection

The product is fitted with a magnet to check whether the product is installed on its mounting base or not. This function ensures that product has not been removed from its base. As soon as the product is inserted or removed from its base, a LoRaWAN “Product Status” message is transmitted (Refer to section X.4.1. Product status).

4. Product commissioning

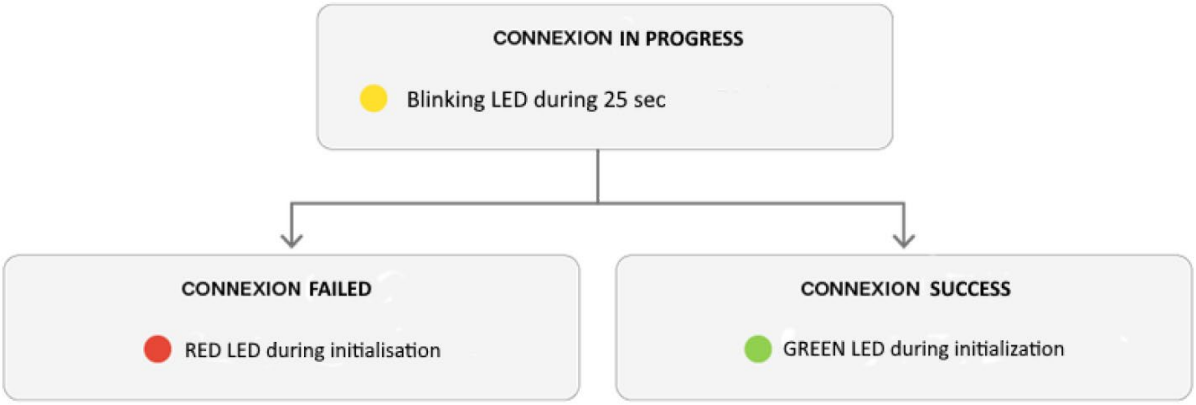
To commission your monitor, turn on single-purpose switch located at the rear of the product (1).



Once powered, the product:

> Initializes for approx. 5 seconds: steady front green LED
> Automatically attempts to connect to the LoRaWAN network

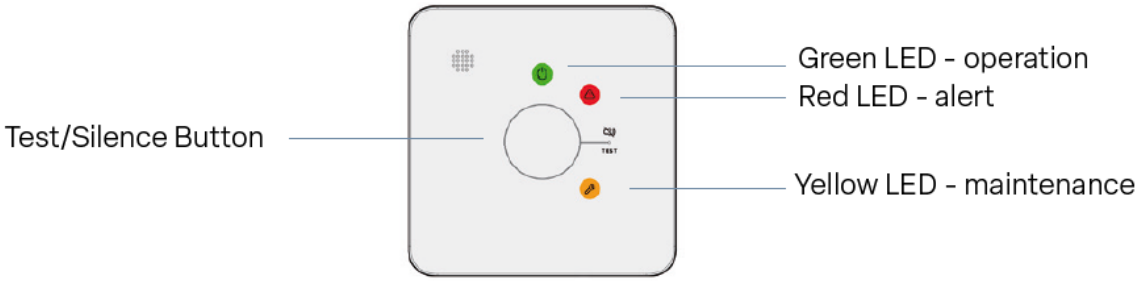
The reverse LED displays the stages of the product initialization and connection phase:



At the end of the connection phase (approx. 30 seconds), the product is ready for use. In the event of failure, the product will immediately attempt a second connection to the network and then periodically (more information is available in section X.2. Network connection).

III. Main buttons and LEDs

The main button is located on the front of the product.



Mode	Press type	Actions generated
Normal	Long press	• Manual test • Remote & local network status indication on reverse LED*
Alarm	Short press	• Alarm paused during 5 minutes
Default	Short press	• Default product paused during 12 hours

* Local network : LoRa connection
Remote network : Connection to accessories

— 01. Short press

Short press is used to stop the carbon monoxide alarm. After 5 minutes, your product automatically resumes normal operation.

When the product detects a fault, it emits a fault-specific signal (Refer to section V.Product operation). It is possible to pause it during 12 hours by pressing the main button.

— 02. Long press

To test your alarm, press the main button (> 3 seconds) until the alarm sounds then release. The 3 LEDs (green, orange, red) are ON during the test.

A “CO Alarm status” message is sent to indicate a test has been done (Refer to section X.4.2. Carbon monoxide alarm status).

At the end of the product test, the remote and local network status are indicated by the reverse LED by 2 successive blinks, repeated 5 times:

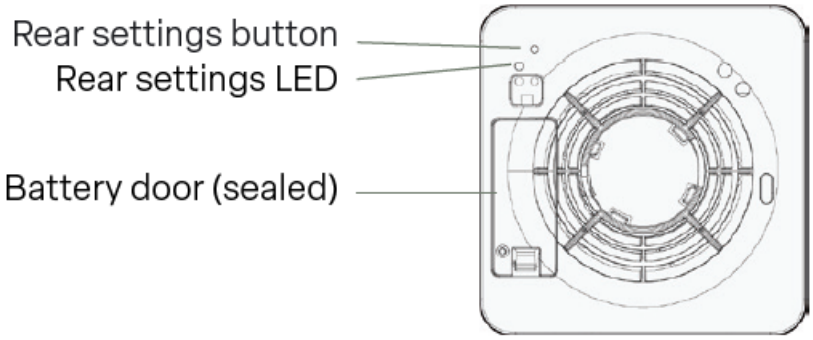
- Local network OK, Remote network OK
- Local network OK, Remote network NOK
- Local network NOK, Remote network OK
- Local network NOK, Remote network NOK

Specific to AIR+ product

"Periodic data" message containing temperature, humidity, CO concentration and air quality level is sent (Refer to section X.4.3. Periodic data). Temperature, humidity and CO data measured after a product test are also available in NFC.

IV. Reverse buttons and LEDs

The secondary button is located at the rear of the product. An object (pen, paper clip, etc.) is required to activate the button. The sequence of actions induced by the use of the reverse button can be observed on the reverse LED, located next to the reverse button.



Press type	Actions generated	Reverse LED
Short press	Manual attempt to connect to LoRaWAN network (Join)	Blinking 🟡 : Connection attempt in progress 🟢 : Successful connection 🔴 : Failed connection
Triple push	Accessory pairing	🟡 : Accessory pairing in progress 🟢 : Successful accessory pairing 🔴 : Failed accessory pairing
Long press	Accessory disconnection	🟢 : Successful accessory disconnection 🔴 : Failed accessory disconnection

V. Product operation

Mode				
Normal	60 seconds			
Alarm	60 seconds		Every second	4 consecutive beeps every 5 seconds
Alarm pause	60 seconds		Every second	
Alarm memory	60 seconds		60 seconds	
Low battery		1 blink every 60 seconds		1 beep every 60 seconds
Sensor fault	60 seconds	2 blinks every 60 seconds		2 beeps every 60 seconds
End of life	60 seconds	3 blinks every 60 seconds		3 beeps every 60 seconds
Test	Fixed	Fixed	Blinking	Beeps during the test

1. Pre-Alarm

The pre-alarm is intended to help the user to get an early indication of increasing CO level before the alarm triggering. As soon as 40 ppm is detected by the sensor, the red LED blinks every 30 seconds.

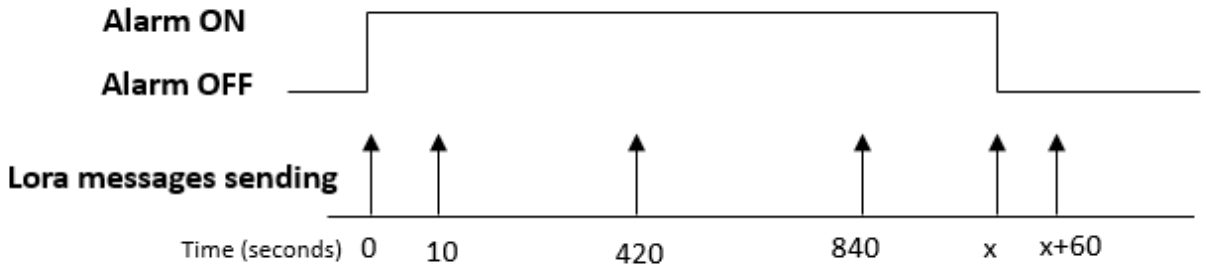
A "Carbon monoxide alarm status" message is sent with the "pre-alarm" field activated as soon as the CO level reaches 40 ppm (refer to section X.4.2. Carbon monoxide alarm status).

2. Carbon Monoxide Alarm

The carbon monoxide alarm will be triggered in the following situations:

CO concentration (ppm)	Alarm before (min)
50	90
100	40
300	3

A “Carbon monoxide alarm status” message (refer to section X.4.2. Carbon monoxide alarm status) is sent twice at 10 seconds intervals after the CO alarm activation occurs. Then, the message is sent once every 5 minutes until carbon monoxide alarm deactivation. The alarm deactivation will also trigger a message sent twice at 1-minute intervals.



3. Alarm memory

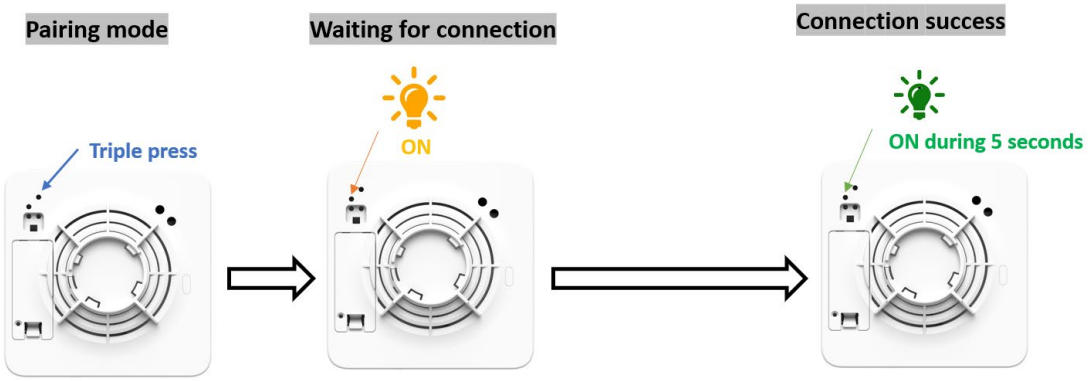
If carbon monoxide alarm is triggered, the memory function will keep the red light flashing every minute until the button is pressed or 7 days have passed.

VI. Interconnection with DAACO and accessories

The detectors provide an interconnection function that allows to connect accessories (e.g remote control, terminals, signaling products).

1. Pairing with accessories

Air+ / Air product



Accessory

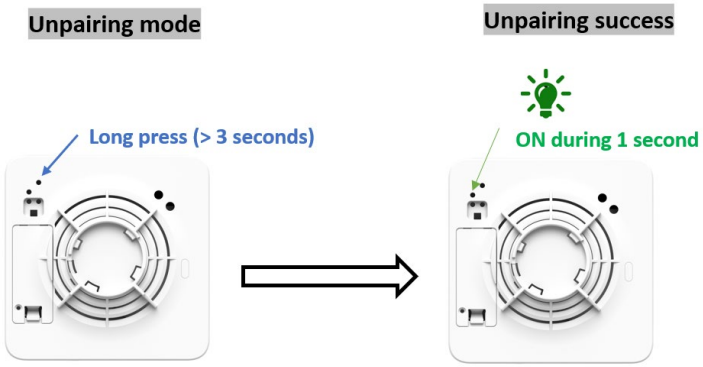
Refer to the accessory manual to find out how to set it to pairing mode

> Press the reverse button (3 times) to enter in pairing mode. The reverse orange LED will remain ON.
> Refer to the accessory manual to find out how to set it to pairing mode.
> After few seconds the 2 devices entered in pairing mode, the reverse green LED of the detector will remain ON during 5 seconds indicating the success of the pairing process. A product configuration message is sent with the corresponding network ID (Refer to section X.4.4. Configuration of product function)

Note: The product automatically exits pairing mode after 5 minutes. To exit the pairing mode manually, press the reverse button (> 3 seconds).

It's also possible to connect a product via NFC TOUCH smartphone application or via downlink command.

2. Unpairing



Press the reverse button (> 3 seconds) of the product to disconnect from the accessories. The reverse green LED will remain ON during 1 second indicating the success of the unpairing.

It's also possible to disconnect a product via NFC TOUCH smartphone application or via downlink command.

VII. Air quality analysis

The product measures the CO data at least every minute.

Air+ embeds a temperature/humidity sensor that enables air quality analysis. The product measures temperature and humidity data every 10 minutes.

Type	Unit	Range	Resolution	Precision		Measuring period
				Typ.	Max.	
Temperature	°C	-30 .. +70	0.1	±0.2 °C	±0.4 °C	10 minutes
Humidity	%RH	0 - 100	0.5	±2 %RH	±3 %RH	10 minutes
CO	ppm	0 - 1000	1	± 20 %		1 minute if no CO

30 seconds if CO detection

VIII. NFC access to temperature/humidity/CO measurements

The data measured by the product (temperature, humidity, CO) are available via the NFC TOUCH application. This function is particularly useful for

- Viewing the current values of environmental parameters
    - Temperature (AIR+ product only)
    - Relative humidity (AIR+ product only)
    - Carbon monoxide
- View product status information
    - Status of sensors, battery etc.
    - Software and hardware version

To access data measured by the product via NFC TOUCH:

- Long press on the product's main button (the product will launch a test and then measure environmental data)
- Use the NFC TOUCH smartphone application

IX. Autonomy

The product is powered by two non-chargeable and non-replaceable batteries. When batteries are empty, the product must be replaced. The product is designed for an autonomy of 10 years in its standard configuration.

1. Estimating my product's autonomy

An online calculation tool is available : https://nexelec-support.fr/n/volt/

It allows you to evaluate product autonomy according to transmission modes, network parameters. You can also access it by scanning the Qr Code:

2. Factors influencing product autonomy

— 01. Data transmission frequency

The product consumes energy when its transmits the data measured by the sensors. The lower the number of transmissions, the greater the product's autonomy.

— 02. LoRaWAN network coverage quality

LoRaWAN technology uses a mechanism called ADR, which adapts radio transmission parameters according to the level of network coverage. A product placed in an environment with very good radio coverage can consume up to 20 times less energy than a sensor placed in a less favorable environment. Your product's radio coverage is therefore a decisive factor in determining its autonomy.

X. LoRaWAN parameters

1. Recommended LoRaWan parameters

LoRaWAN protocol version : Product compatible with version 1.0.2
Regional parameters : Product compatible with parameters RP001 rev B
Profile: Class A (RX2SF9 or RX2SF12)
Available frequencies : EU868
Join type : OTAA
AppEUI : 0x70B3D540F43B155D
DevEUI : Unique identifier for each product. Information available on the label and provided on product delivery.
AppKey : Unique security key for each product. Information provided on product delivery.
Application port (uplink / downlink) : 56
ADR : Yes

2. Network connection

— 01. Automatic commissioning on power-up

When the device is switched on, 2 commissionings are launched.

If the process has been successful, the product will send its status (refer to section X.4.1. Product status) and its configuration (Refer to section X.4.4. Configuration of product function).

— 02. Commissioning strategy in case of initial failure

If the initial commissioning process failed, the product will automatically try to join the network with an increasing period between each try:

1st retry will occur 20 minutes after initial commissioning.
2nd retry will occur 40 minutes after 1st try.
3rd retry will occur 80 minutes after 2nd try.
….
In case of failure, the product will then try to join the network every 24h.

— 03. Schedule a recommissioning

You can schedule a join request via a downlink command. The typical use case is when you want to switch from a server to another. A configuration message is sent to confirm the activation of the scheduling (Refer to section X.4.4. Configuration of product function, “Pending Join” field set to 1).

It’s also possible to launch a join request via the NFC TOUCH smartphone application.

— 04. Periodic check of the network connection

The product checks its network connection every day by sending the “Product status” message via the standardized LoRaWan system “Linkcheck”. After 3 attempts without any answer from the network, the product will automatically try to join the network as described in the previous section “Commissioning strategy in case of initial failure”.

3. Description of the data transmission mode

“Periodic data” mode enables periodic transmission of data measured by the product. The data transmission period is configurable. By default, it’s 60 minutes.

Between these periodic transmissions, the product continues to measure the various parameters. If a significant change is observed, a message is sent immediately. The value of this significant change is configurable and called "delta". The default values are :

- Delta CO: 15 ppm
- Delta Temperature: 1°C

This function makes it possible to set a fairly low periodic transmission time (e.g 60 minutes), while ensuring that changes in values can be observed with a high degree of reactivity.

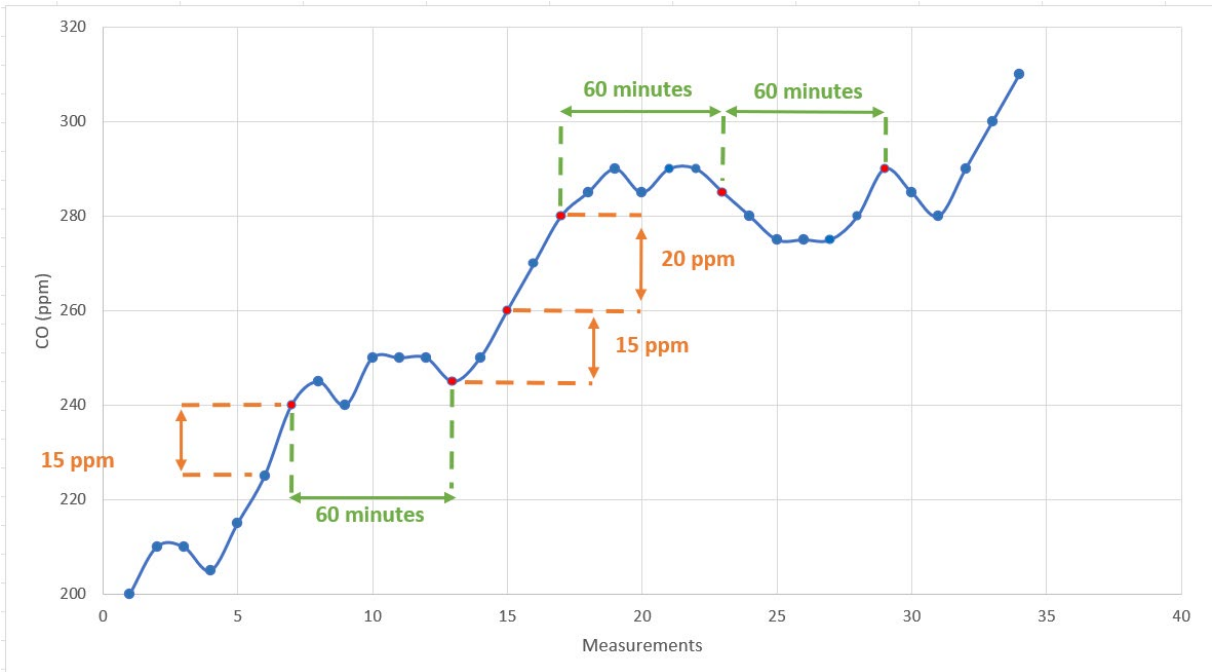
Example:

The chart below shows the evolution of the CO data and the associated sending of messages.

Configuration:

- Sending period = 60 minutes
- Delta CO: 15 ppm

Each blue dot corresponds to a measurement. Each red dot corresponds to the sending of a message.



4. General description

The different messages types are described below:

Details of the function	ID message	Transmission of message	Can be deactivated	Configurable
Product Status	0x00	On event + Periodic	No	No
Carbon monoxide alarm status	0x01	On event	No	No
Periodic data	0x02	On event + Periodic	Yes	Yes
Product Function Configuration	0x03	On event + Periodic	No	No

— 01. Product status

This message is sent when product is powered on, every day or when one of this information changes:

- Battery level indication is defined using 4 levels:
  - High level: More than 50% remaining battery capacity
  - Medium level: 20-50% remaining battery capacity
  - Low level: 1-10% remaining battery capacity
  - Critical level: Less than 1% remaining battery capacity
- Product HW status: Carbon monoxide sensor status, Temperature/Humidity sensor status, Memory fault
- End of product life (10 years)
- Default hush mode
- Magnetic base detection

Offset	Size (bit)	Bit-range	Data	Description	Valid Range	Scale	Unit
0	8	DB0.7 – DB0.0	Type of product	Product model	Air+ : 0xAE Air : 0xAF		
8	8	DB1.7 – DB1.0	Type of message	Product Status	0x00		
16	8	DB2.7 – DB2.0	HW revision	Hardware revision	1 - 255	1:V001 … 255: V255	
24	8	DB3.7 – DB3.0	SW revision	Software revision	10 - 255	10 = V01.0 … 255 = V25.5	
32	8	DB4.7 – DB4.0	Remaining product lifetime	Countdown time in months until	0-120	0-120	Month

				product end of life			
40	1	DB5.7	CO sensor status	Status of the CO sensor	0: OK 1: CO sensor fault		
41	1	DB5.6	Temperature / humidity sensor status	Status of the temperature / humidity sensor	0: OK 1: T°/humidity Sensor fault		
42	1	DB5.5	Memory fault	Status of the internal product memory	0: OK 1: Memory fault		
43	1	DB5.4	Default hush	Hush status for HW fault	0: Default hush mode non activated 1: Default hush mode activated		
44	2	DB5.3 – DB5.2	Energy status	Battery Level	0: high 1: Medium 2: Low 3: Critical		
46	1	DB5.1	Magnetic base detection	Flag indicating if the product detects a magnetic base	0: No magnetic base detected 1: Magnetic base detected		
47	1	DB5.0	Not used	Not used	Not used		

— 02. Carbon monoxide alarm status

This message is sent whenever any information changes.

Data are sent in the following format:

Offset	Size (bit)	Bit-range	Data	Description	Valid Range	Scale	Unit
0	8	DB0.7 – DB0.0	Type of product	Product model	Air+ : 0xAE Air : 0xAF		
8	8	DB1.7 – DB1.0	Type of message	Carbon monoxide Alarm message	0x01		
16	10	DB2.7 DB3.6	CO concentration	CO concentration, increment = 1 ppm	0 - 1000	0 - 1000	ppm
					1023	Error	

26	1	DB3.5	Pre-Alarm	Status of CO pre-alarm	0: Pre-alarm non-activated 1: Pre-alarm activated		
27	1	DB3.4	Alarm	Status of CO-alarm	0: Alarm non-activated 1: Alarm activated		
28	1	DB3.3	CO Alarm Hush	CO Alarm Hush	0: Alarm hush not activated 1: Alarm hush activated		
29	1	DB3.2	Reserved	Reserved	Reserved		
30	1	DB3.1	Product Test	Flag indicating if a product test is running	0: Product test Off 1: product test was done		
31	1	DB3.0	Reserved	Reserved	Reserved		
32	8	DB4.7 DB4.0	Time since last test	Number of weeks since last test	0 – 255	0 – 255	weeks

— 03. Periodic data

The product measures and sends a message containing environmental data in the following format:

Offset	Size (bit)	Bit-range	Data	Description	Valid Range	Scale	Unit
0	8	DB0.7 – DB0.0	Type of product	Product model	Air+ : 0xAE Air : 0xAF		
8	8	DB1.7 – DB1.0	Type of message	Periodic data	0x02		
16	10	DB2.7 DB3.6	CO concentration	CO concentration, increment = 1 ppm	0 - 1000	0 - 1000	ppm
					1023	Error	
26	10	DB3.5 DB4.4	Temperature	Temperature (linear), increment =0.1 °C Offset 30°C *(ex : 0 = -30°C, 300 = 0°C, 1000 = 70°C)*	0-1000	-30 .. 70	°C
					1023	Error	
					1022	Sensor not present	
36	8				0-200	0-100	%RH

		DB4.3 DB5.4	Relative Humidity	Relative humidity (linear), increment = 0.5%RH	255	Error
					254	Sensor not present
44	3	DB5.3 – DB5.1	Indoor Air Quality level (IAQ_GLOBAL)	Air quality level	0: Excellent 1: Good 2: Fair 3: Poor 4: Bad 5-6: Not used 7: Error	
Reserved	Reserved	Reserved	Reserved	Reserved	Reserved	
51	5	DB6.4 – DB6.0	Not used	Not used	Not used	

— 04. Configuration of product function

A message confirming the current product configuration is sent:

- At the start-up product phase
- During each reconfiguration
- Every 7 days

Offset	Size (bit)	Bit-range	Data	Description	Valid Range	Scale	Unit
0	8	DB0.7 DB0.0	Type of product	Product model	Air+ : 0xAE Air : 0xAF		
8	8	DB1.7 DB1.0	Type of message	Product general Configuration	0x03		
16	3	DB2.7 DB2.5	Reconfiguration source	Source of the reconfiguration process	0 : NFC 1 : Applicative Downlink 2 : Start-up product 3-4 : Reserved 5 : Local 6-8 : Reserved		
19	2	DB2.4 DB2.3	Reconfiguration state	Result of the reconfiguration process	0 : Total success 1 : Partial success 2 : Total failure		

					3 : Reserved		
21	1	DB2.2	Periodic data	Periodic data activated ?	0: Non-active; 1: Active		
22	2	DB2.1 DB2.0	NFC status	Status of the NFC configuration interface	0: discoverable 1: Not discoverable 2..3: RFU		
28	4	DB3.3 DB3.0	Periodic data sending period	Maximum time between two "Periodic data" messages	1-9	10-90	min
32	8	DB4.7 DB4.0	Delta Temperature	Temperature delta: Evolution of the temperature leading to an instantaneous "periodic data" message	0-99	0°C +9,9°C	°C
40	8	DB5.7 DB5.0	Delta CO	CO delta: Evolution of the CO leading to an instantaneous "periodic data" message	0-200	0-1000	ppm
48	17	DB6.7 DB8.7	D2D ID	D2D Network Identifier	0 - 131071		
65	1	DB8.6	D2D ping	Compatibility with signalling products	0: Not compatible 1: Compatible		
66	1	DB8.5	Pending join	Join request scheduled	0: No join request scheduled 1: Join request scheduled		
67	5	DB8.4 DB8.0	Not used	Not used	Not used		
72	16	DB9.7 DB10.0	Downlink counter	Downlink counter	0 - 65535		

XI. Product configuration and remote commands

An online downlink calculation tool is available : https://nexelec-support.fr/n/downlink

The product can be reconfigured to best fit each use case. This reconfiguration can be done :

- Locally, using a smartphone or a tablet via the NFC TOUCH application
- Remotely, via the LoRaWAN connection interface

1. Configurations for “periodic data” function

Configuration type	Default value	Possible configuration
Periodic data function	On	On | Off
Sending period of periodic data	60 minutes	10 – 90 minutes
Evolution of the temperature leading to an instantaneous transmission	1°C	0 – 9.9 °C
Evolution of the CO concentration leading to an instantaneous transmission	15 pm	0 – 999 ppm

2. Configurations for product maintenance, reliability and security

Configuration type	Possible configuration
NFC interface accessibility	Discoverable | Not discoverable
Product restart	-
Product restart and restore to factory configuration	-
LoRaWAN Join request	Delay before connection attempt : 10 – 10080 minutes*

*: Via NFC TOUCH smartphone application, this parameter is not reconfigurable and the join request is immediate.

3. Configurations related to interconnection

Configuration type	Default value	Possible configuration
Interconnection network ID	0	1 - 131071
Remove product from interconnected network	-	-

XII. Product reconfiguration via downlink message

Product can be reconfigured via downlink message in response to any uplink message. The downlink message must be sent on port 56.

1. Reconfiguration acknowledgement

After reconfiguration, the product will send a message with its updated configuration (Refer to section X.4.4. Configuration of product function).

2. Downlink message structure

First byte is the header: 0x55.

Then the following bytes can be used to reconfigure the product with respect to the format: Command ID and DATA.

Note: Downlink functionalities will certainly progress in the future. To ensure backwards-compatibility, Nexelec recommends sending the IDs from the lowest to the highest value.

ID	Data length (byte)	Range	Scale	Description
0x01	0	-	-	Ask for general configuration of the product (message Configuration of product functions)
0x05	1	0 / 1	0 : disabled 1 : enabled	Activation / Deactivation of periodic data transmission
0x0A	1	0 / 1	0 : disabled 1 : enabled	NFC interface enable

0x0E	1	0 - 99	0 – 9.9 °C	Temperature delta : Evolution of the temperature leading to an instantaneous data transmission, 0.1 °C step
0x1C	2	1 - 1008	10 – 10080 minutes	Schedule a join request in x minutes
0x49	1	1-9	10 – 90 minutes	Sending period of periodic data
0x4A	1	1	-	Product re-starting
0x4B	1	1	-	Product re-starting and restore to factory configuration
0x4F	3	1 - 131071	D2D network ID: 1 - 131071	Join the D2D network of ID x
0x50	1	1	1 : D2D unpairing request	Delete the product from the D2D network
0x51	1	0 - 200	0 – 1000 ppm	CO delta: Evolution of the CO leading to an instantaneous data transmission, 5ppm step

Example:

> CO delta = 50 ppm

Frame structure from LSB to MSB:

Byte	Value	Info
0	0x55	Header for 1- message reconfiguration
1	0x51	ID CO delta
2	0x0A	Value for CO delta = 50 ppm

XIII. NFC configuration

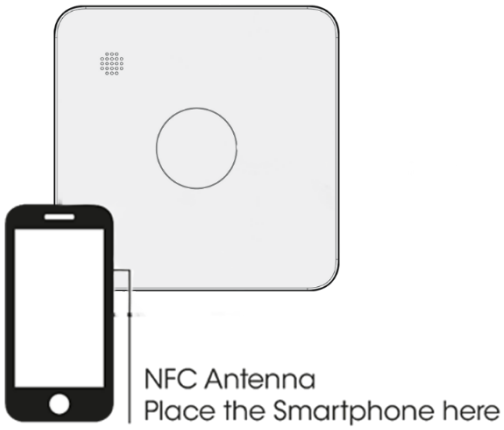
The product has a NFC interface that allows communication with a smartphone equipped with the TOUCH application. This interface allows to:

> Configure the product according to your use case
> Access the latest CO data
> Only for AIR+ product: Access the latest temperature and humidity data

> Update the product software

The NFC interface can be remotely activated or deactivated via a LoRaWAN downlink message. By this way, the NFC memory is no more discoverable by a phone, preventing reconfiguration of the product once deployed.

1. NFC antenna location



2. Application download

The *TOUCH* product reconfiguration application is available on Android and iOS for devices (mobile, tablet) equipped with NFC interface.

3. Access to TOUCH Android application documentation

Documentation for the TOUCH application is available on the support site :
https://support.nexelec.fr/fr/support/solutions/folders/80000680573

XIV. Traceability and markings

QR Code format : Serial_number;Testbench;Date;LoRadevEUI

Example : X850LS23-0000AA0001;1M-2F;160124; 70B3D540F000000

QR Code format : LW:Device_schema_version:LoRa_AppEUI:LoRa_DevEUI :Owner_Token:SSerial_number

Example : LW:D0: 70B3D540F43B155D: 70B3D540F000000:FFFF0870:SX850LS24-0000AA0001

XV. Revision history

Document revision	Details	Date
A	Created	15/12/2023