Product: IOT Neuron-Air

Documentation : 25 fev 2019

Use this documentation with the product:
Neuron-Air Gateway / Sensor

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INTRODUCTION

Neuron-Air

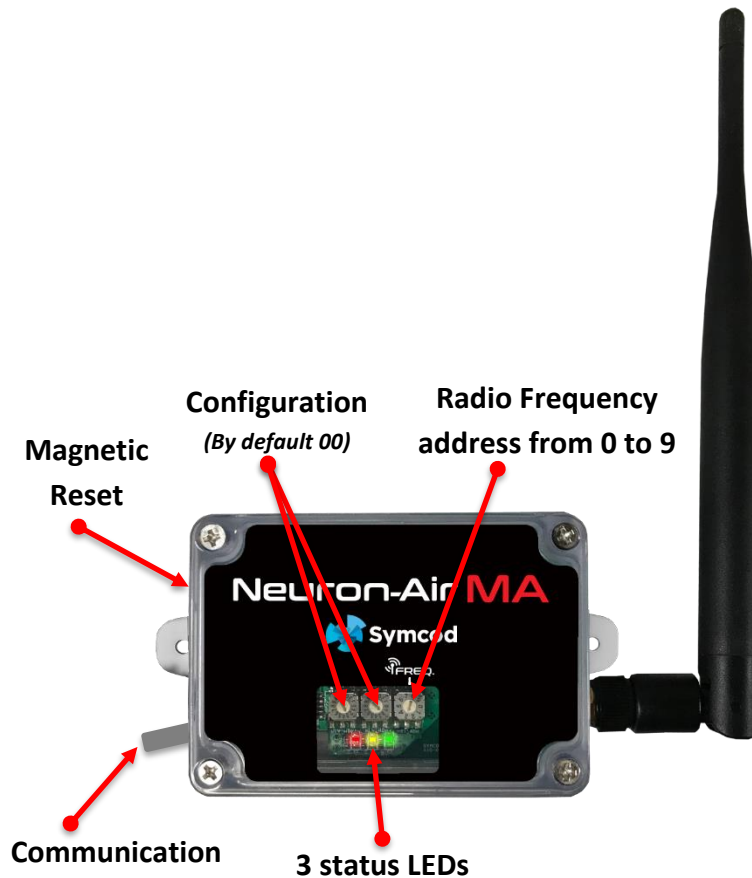**Wireless
temperature sensor**

Gateway

The Neuron-Air is a wireless IOT temperature sensor monitor, long range 900 mhz. Each Neuron-Air gateway can communicate with up to 50 Neuron-Air wireless temperature sensors. A maximum of 9 gateway can be present on the same site to reach 450 wireless temperature sensors. The maximum distance between a Neuron-Air wireless temperature sensor and the gateway can reach 6349 linear feet without obstacle. The wireless temperature sensors are powered by two AA batteries that give it autonomy for more than 5 years (sending the temperature every 10 minutes). With his IP65 waterproof ABS case, the wireless temperature sensor can resist to harsh industrial environments while offering an accuracy of + - .5 degrees Celsius (no calibration required). Several types of interfaces are available such as RS232 / USB HID VCP (Virtual Com Port FTDI) / Ethernet (Intranet or Cloud) / Modbus TCP Slave / Cellular / MQTT. To facilitate your installations, no software configuration is necessary, the addresses and the various parameters are chosen via rotary switches directly on the Neuron-Air. The Neuron-Air wireless temperature sensor can be placed directly in a freezer or in a refrigerator, the long-range radio wave can pass through most metal or stainless-steel walls. No additional hardware, software or subscription is required.

Neuron-Air gateway description

Magnetic Reset

Configuration
(By default 00)

Radio Frequency address from 0 to 9

Communication

3 status LEDs

Neuron-Air gateway description:

- The RF frequency address can be from 0-9 it is set via the rotary switch.

Frequency table :

0	1	2	3	4	5	6	7	8	9
905 MHz	907 MHz	909 MHz	911 MHz	913 MHz	915 MHz	917 MHz	919 MHz	921 MHz	923 MHz

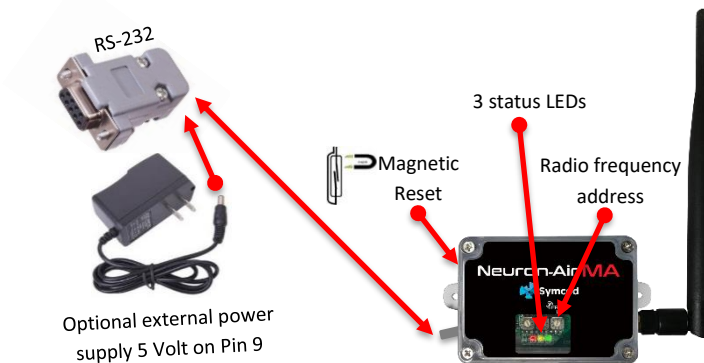** The recommended frequency is 915 MHz (default).*
* You must make a Magnetic Reset after changing the RF address.

- The three LEDs are used to display the status of the gateway:
  - The yellow LED indicates that the gateway is functional and waiting for packets.
  - The green LED will flash for each received packet.
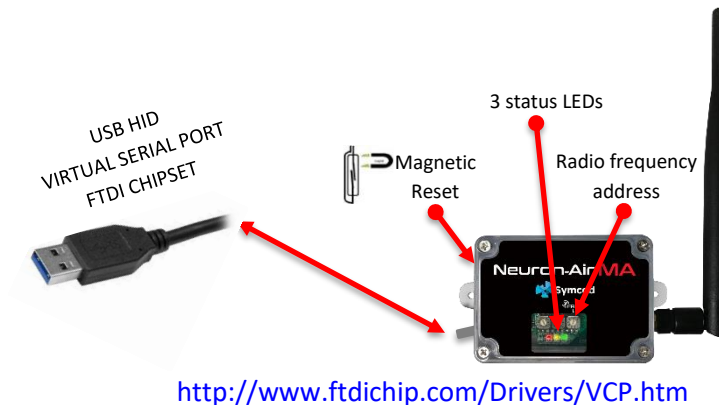 - The red LED will light up if there is an error.

Neuron-Air gateway communication
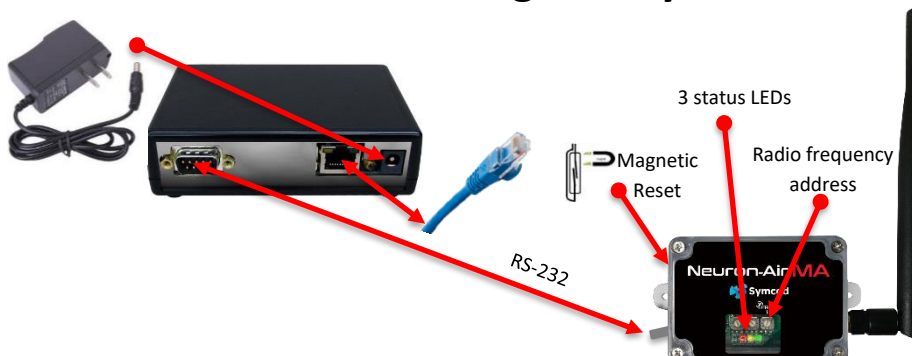# RS232 / USB / Ethernet

Neuron-Air gateway version RS-232

RS-232

3 status LEDs

Magnetic Reset

Radio frequency address

Optional external power supply 5 Volt on Pin 9

Neuron-Air gateway USB *(Virtual Serial Port)*

USB HID
VIRTUAL SERIAL PORT
FTDI CHIPSET

3 status LEDs

Magnetic Reset

Radio frequency address

http://www.ftdichip.com/Drivers/VCP.htm

Neuron-Air gateway Ethernet TCP

3 status LEDs

Magnetic Reset

Radio frequency address

RS-232

Neuron-Air gateway
RS232 / USB / Ethernet

RS-232 configuration:

Bauds	Parity	Databits	StopBit
115200	None	8	1

TCP Port : 1024

- The P20 status packet syntax:

  PacketType; GatewayNo; SensorNo; date; hour; PaquetNo; TempRaw; TempCels; Battery; DbRf; SensorVer; [CR]
    - o PacketType : This type of packet is identified by P20.
    - o GatewayNo : Gateway identification number from 0 to 9 with which you communicate *(configured with rotary switch).*
    - o SensorNo : Neuron-Air sensor identification number from 00 to FF from where the data comes, *(configured with 2 rotary switches on each wireless temperature sensor).*
    - o Date : Use reserved for Symcod.
    - o Hour : Use reserved for Symcod.
    - o PaquetNo : Incremental number of the packet for each sensor from 0 to FFFFFFFF.
    - o TempRaw : Gross value of the LMT01 temperature sensor.
    - o TempCels : Value in degrees Celsius of the LMT01 temperature sensor.
    - o Battery : Approximate evaluation of the remaining power of the battery in Volt.
      *** The wireless temperature sensor will stop working if the battery is below 2.3 Volt.
      *** At full capacity the battery will be around 3.5 Volt.
    - o DbRf : RF signal strength in DB of the Neuron-Air sensor (from -14 dB to -125 dB).
      *** For a good communication, it is recommended to have a value above -110 db.
    - o SensorVer : Wireless temperature sensors Version from 1 to FF.
    - o [CR] : Packet end of character: 13 ASCII.

  Example : P20;0;B;2018/06/18;18:36:32;6B7;1195;24.44;3.542;-18;1[CR]

  * The packets are sent in real time without accumulation in the gateway.
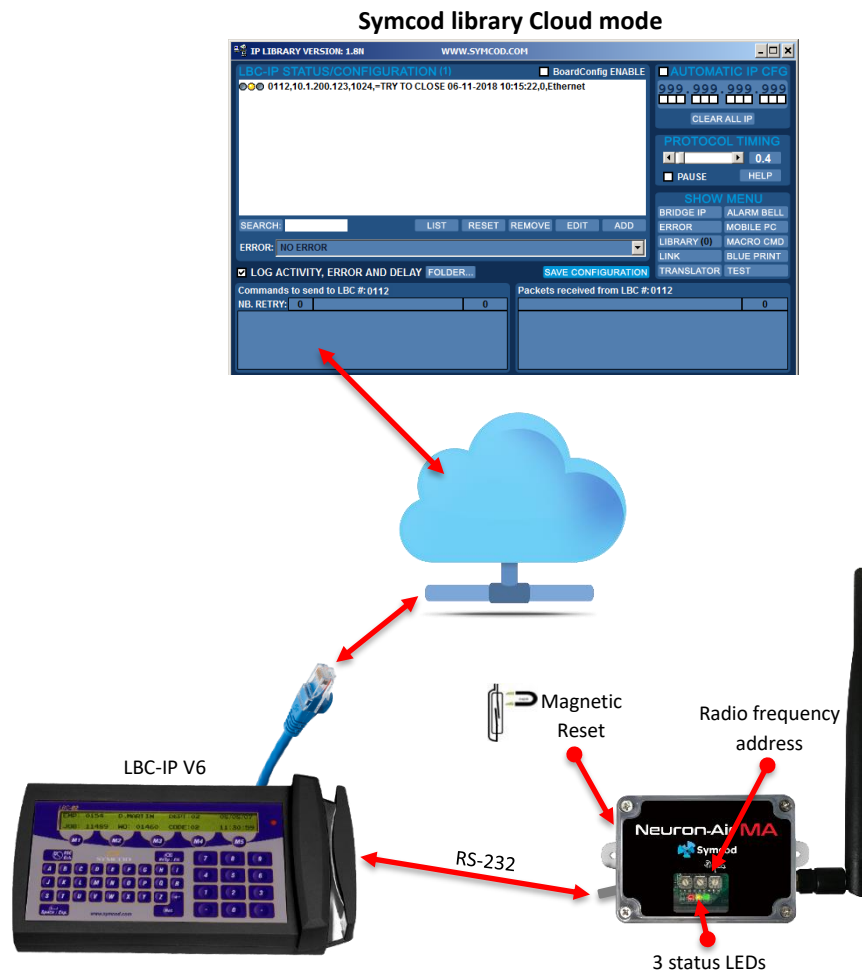
- The P01 startup or reset packet syntax:

  PacketType;GatewayNo;ProductName;GatewayVer;GatewayState[CR]
    - o PacketType : This type of packet is identified by P01.
    - o GatewayNo : Gateway identification number from 0 to 9 with which you communicate *(configured with rotary switch).*
    - o ProductName : SYMCOD NEURON-AIR MASTER.
    - o GatewayVer : Gateway Version format : V9.9X.
    - o GatewayState : POWER_ON.
    - o [CR] : Packet end of character: 13 ASCII.

  Example : P01;0;SYMCOD NEURON-AIR MASTER;V1.0A;POWER_ON;[CR]

  * The packets are sent in real time without accumulation in the gateway.

Neuron-Air gateway
compatible with SOH LBC-IP V6 Cloud

Symcod library Cloud mode

Magnetic Reset

Radio frequency address

LBC-IP V6

RS-232

3 status LEDs

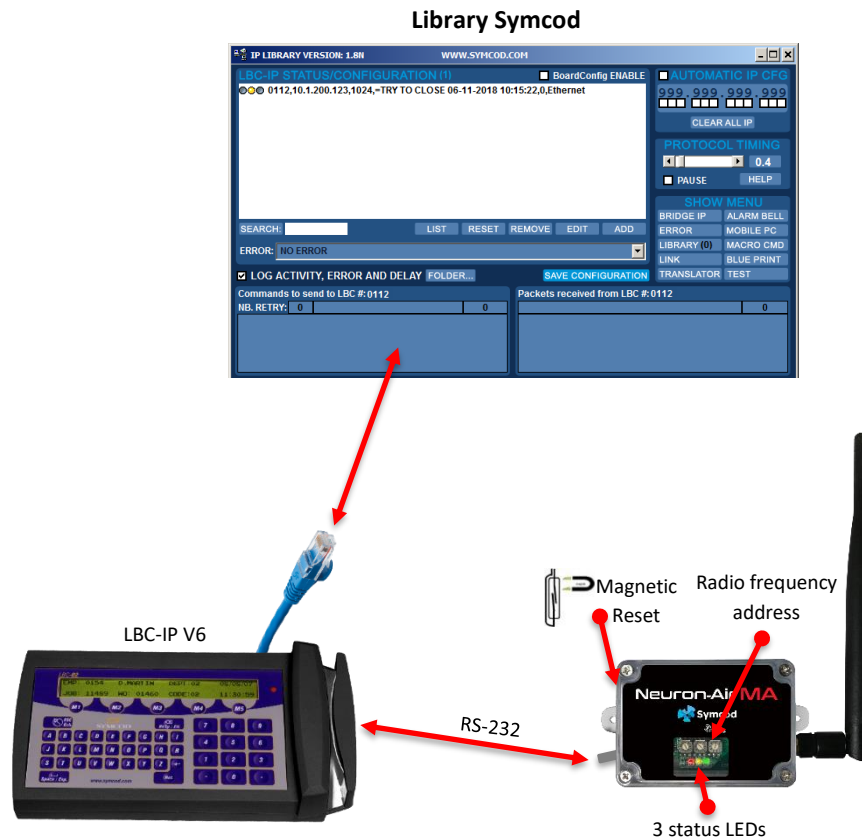## Packet description :

0004, [STX]5N0712180851520401,P20;5;2;1905/05/05;19:29:49;1;1171;22.94;3.542;-81;1,D8[ETX]

0004, [STX]6N0712180851549801,P20;5;2;1905/05/05;19:29:52;2;1171;22.94;3.496;-94;1,E2[ETX]

0004, [STX]7N0712180851570401,P20;5;1;1905/05/05;19:29:55;1;1173;23.06;3.140;-80;1,D0[ETX]

0004, [STX]<N0712180852120401,P20;5;3;1905/05/05;19:30:10;2;1175;23.19;3.140;-71;1,C5[ETX]

** The date and time are in the LBC-IP packet (071218 = MMDDAA 085212 = HHMMSS).

Neuron-Air gateway
compatible with SOH LBC-IP V6 Cloud
(local network)

Library Symcod

Magnetic Reset

Radio frequency address

LBC-IP V6

RS-232

3 status LEDs

Packet description:

0004, **[STX]**5N0712180851520401,**P20;5;2;1905/05/05;19:29:49;1;1171;22.94;3.542;-81;1**,D8**[ETX]**

0004, **[STX]**6N0712180851549801,**P20;5;2;1905/05/05;19:29:52;2;1171;22.94;3.496;-94;1**,E2**[ETX]**

0004, **[STX]**7N0712180851570401,**P20;5;1;1905/05/05;19:29:55;1;1173;23.06;3.140;-80;1**,D0**[ETX]**

0004, **[STX]**<N**071218085212**0401,**P20;5;3;1905/05/05;19:30:10;2;1175;23.19;3.140;-71;1**,C5**[ETX]**

** The date and time are in the LBC-IP packet (**071218** = MMDDAA **085212** = HHMMSS).

Neuron-Air gateway
Modbus TCP Slave
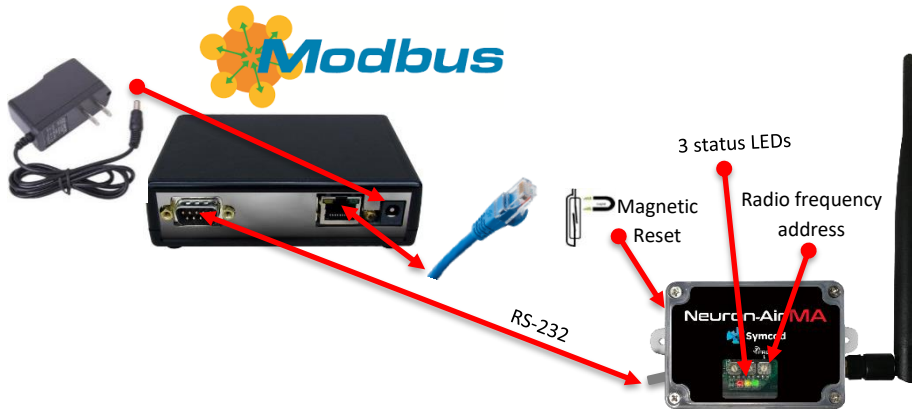
- In Modbus the address 00 cannot be used in the Neuron-Air wireless temperature sensor.
- You must use the Modbus 03 command *"HOLDING REGISTER"* to receive the data.
- The IP address must be set with the Board Config software. The Modbus port is 502.

Modbus Holding Register description:

| Register	Description	Format	Operation to do	Value if disconnected
0001 to 0050	Temperature in degrees Celsius	integer signed	Divided by 100	-200
0101 to 0150	Radio frequency RF en DB	integer signed	No operation	0
0201 to 0250	Remaining battery power in Volt	integer signed	Divided by 1000	0
0301 to 0350	Version of Neuron-Air sensor	integer signed	No operation	0
0401 to 0450	Delay in seconds since the last data	integer signed	If Slave Adresse 01 to 49 = No operation F6 to FB = -695 FC to FE = -705 FF = -714	>720

- The registers 0050 / 0150 / 0250 / 0350 / 0450 are reserved for the Neuron-Air sensor FF address *(see section: Neuron-Air wireless temperature sensor).*
- If the Neuron-Air sensor address is from FC to FE then the Modbus registers will be 0001 for FC, 0002 for FD and 0003 for the Neuron-Air sensor address FE.
- If the Neuron-Air sensor address is from F6 to FB then the Modbus registers will be 0001 for F6, 0002 for F7 ... 0006 for the Neuron-Air sensor address FB.

Examples : If a Neuron-Air sensor use the address 01 then her:
- Temperature in degrees Celsius, will be in register 0001 .
- Radio frequency signal strength in DB, will be in register 0101.
- Remaining battery power in Volt, will be in register 0201 .
- Version of Neuron-Air sensor, in register 0301.
- Delay in seconds since the last data received, will be in register 0401.

Neuron-Air gateway
MQTT communication protocol
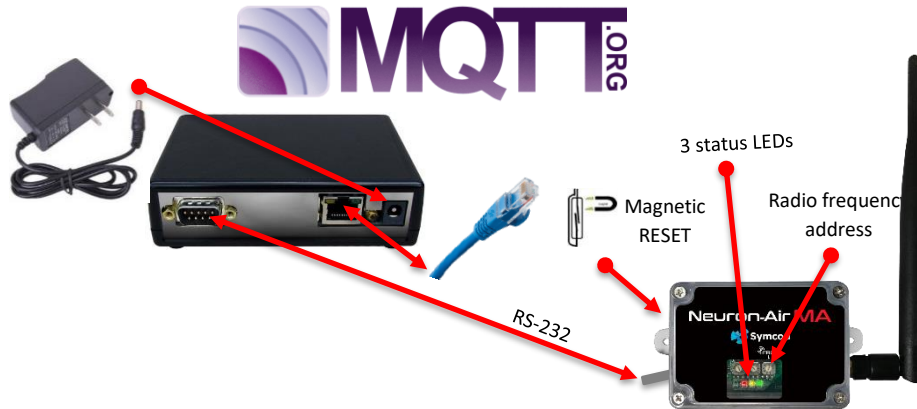
- Compatible with Domoticz open source home automation system.Neuron-Air Domoticz documentation:
  http://www.symcod.com/upload/Attach/neuron-air_domoticz_configuration_mqtt_en.pdf

The configuration of the MQTT gateway is done with the help of the BoardConfig software:
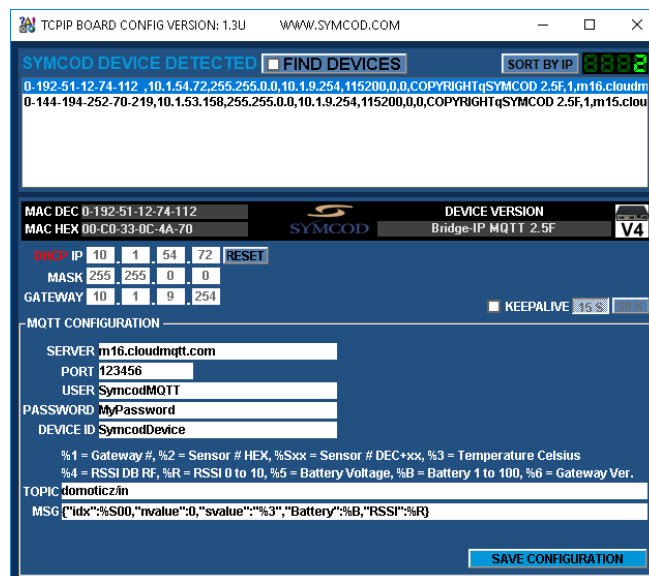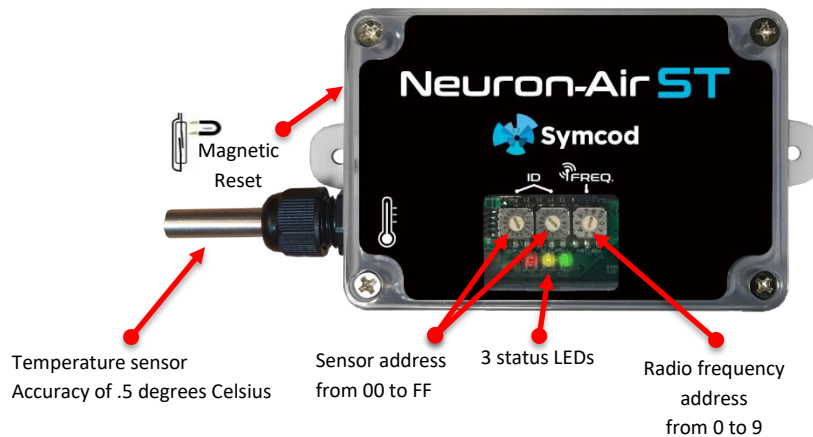

- DHCP IP: The Neuron-Air IP address address is obtained automatically via DHCP on your network.

MQTT CONFIGURATION :

- **SERVER: IP or DNS address of the MQTT server where the data will be sent.**
- **PORT: The port number of the MQTT server where the data will be sent.**
- **USER : Username to authenticate on the MQTT server.**
- **PASSWORD : Password to authenticate on the MQTT server.**
- **DEVICE ID : Name that will be used to identify the Neuron-Air gateway on the MQTT server**
- **TOPIC : Configuration of the Subject syntax that will be used when the data is sent.**
- **MSG : Configuration of the Message syntax that will be used for sending the data.**

9

Neuron-Air wireless temperature sensor

(Waterproof IP65)

Magnetic Reset

Temperature sensor
Accuracy of .5 degrees Celsius

Sensor address
from 00 to FF

3 status LEDs

Radio frequency
address
from 0 to 9

Neuron-Air wireless temperature sensor description:

- The temperature sensor we use is calibrated by the manufacturer with an accuracy of plus or minus .5 degrees Celsius.
- The sensor operating temperature is -40 to 60 degrees Celsius.
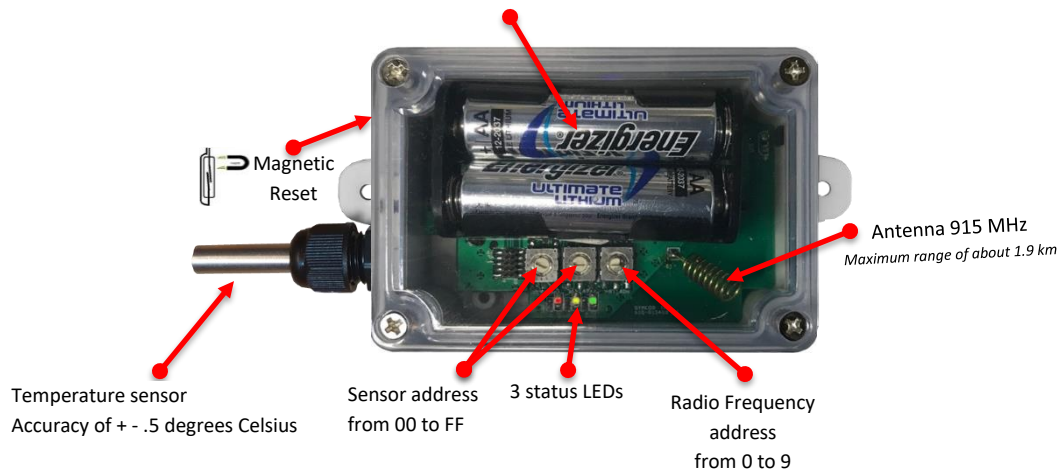- The two rotary switches correspond to the unique hexadecimal address of each sensor from 00 to 31.
  *** You must make a Magnetic Reset after changing the address.*
  - NORMAL MODE, SEND EVERY 10 MINUTES *(maximum 50 sensors)*:
    - To access this mode, the address of the sensor must be from 00 to 31
    - The status is sent every 10 minutes.
    - Battery life: 5 years *(theoretical value evaluated at 10 years).*
  - RF TEST MODE, SEND EVERY 4 SECONDS (FF):
    - To access this mode the sensor address must be at FF.
    - Only one sensor can be present in this mode.
    - The status is sent every 4 seconds.
    - The 3 status LEDs are always activated.
  - DEMO MODE, SEND EVERY 10 SECONDS (FC to FE):
    - To access this mode the sensor address must be FC, FD or FE.
    - The status is sent every 10 seconds.
    - Battery life: + - 40 days *(theoretical value evaluated at 80 days).*
  - DEMO MODE, SEND EVERY 20 SECONDS (F6 to FB):
    - To access this mode the sensor address must be F6 to FB.
    - The status is sent every 20 seconds.
    - Battery life: + - 80 days *(theoretical value evaluated at 160 days).*

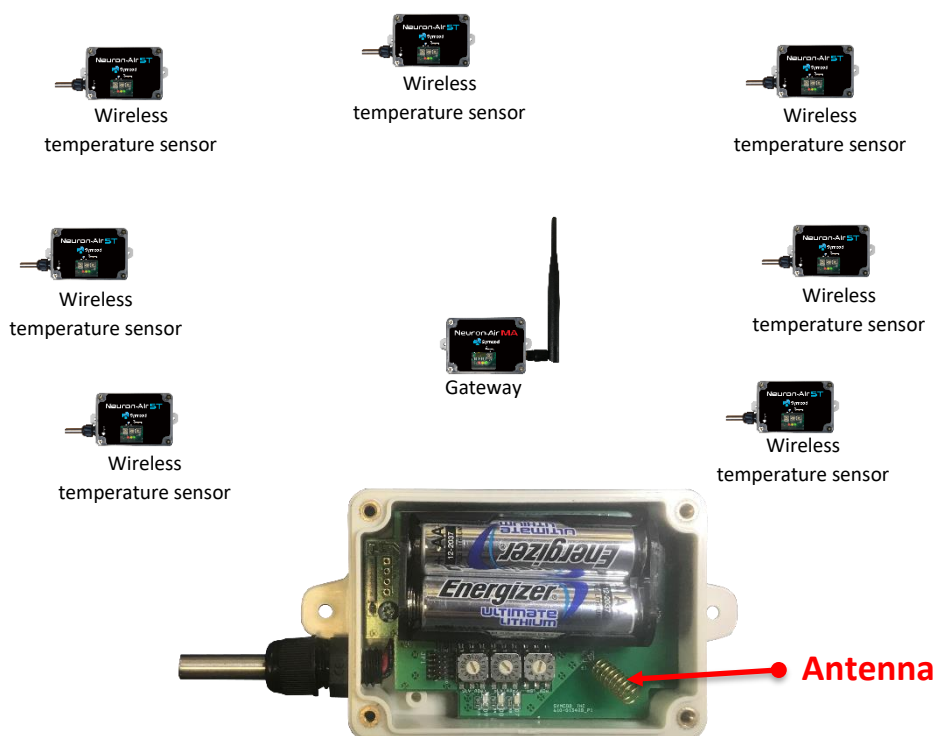# Neuron-Air wireless temperature sensors *(continuation)*

(Waterproof IP65)

2 Energizer Ultimate Lithium batteries
(non-rechargeable)

Magnetic Reset

Antenna 915 MHz
Maximum range of about 1.9 km

Temperature sensor
Accuracy of + - .5 degrees Celsius

Sensor address
from 00 to FF

3 status LEDs

Radio Frequency
address
from 0 to 9

- The RF frequency address can be 0-9 and is set via the rotary switch.
  * The recommended value is 5 which corresponds to the frequency 915 MHz (default value).
  * You must make a Magnetic Reset after changing the address.
- A magnetic switch can be activated by passing a magnet on the side of the case.
  When activated, the Neuron-Air sensor does the following:
    - Reset of the Neuron-Air sensor (red LED lights up).
    - Synchronization with the Neuron-Air gateway.
        - Watch the three status LEDs to see if does work.
    - Sending the status of the Neuron-Air sensor to the Neuron-Air gateway:
        - Packet P20.
- The three LEDs are used to display the status of the sensor on power up or after a RESET:
    - Yellow in waiting for a response from the gateway.
    - The green LED will blink once to indicate that the connection is established with the gateway and that sensor is functional. Subsequently, no more LEDs will come on to save the battery.
    - Red if there is a collision or connection error. Please wait for the green LED to flash.
- The temperature probe will be sampled and sent to the gateway every 10 minutes in NORMAL MODE.
- You must use: Energizer Ultimate Lithium Batteries (non-rechargeable):
  http://www.energizer.ca/fr/energie/les-piles-energizer-ultimate-lithium
    - Operating temperature from -40 to 60 degrees Celsius.
    - Standard format AA.
    - Available across Canada.
    - Anti-leakage construction.
    - Lifetime of more than 5 years in NORMAL MODE *(theoretical value evaluated at 10 years).*
- ABS housing with IP65 waterproof polycarbonate cover.

Neuron-Air installation

Wireless temperature sensor

Wireless temperature sensor

Wireless temperature sensor

Wireless temperature sensor

Wireless temperature sensor

Wireless temperature sensor

Wireless temperature sensor

Gateway

Antenna

- The gateway module must be installed at an equal distance from all sensors.
- Keep the gateway antenna away from metal sources as much as possible.
- Install the gateway as high as possible (near the ceiling).
- VERY IMPORTANT: The water absorbs the waves so it is necessary to keep the sensors away from any liquid, ice and or food containing a lot of water.
- Install the sensor as high as possible while staying away from the power cable, fluorescent light, motor, compressor, metal.
- Use a sensor with FF address to find the location that gives the best RF signal. For good communication, it is recommended to have a value above -100 dB.
- If you use several gateway each must have a unique Radio Frequency number selectable with the rotary switch from 0 to 9.
- Because we do not know what is in the wall, we must move it away from them.
- The maximum distance between the gateway and the sensor is 1.9 km without obstacle *(the distance may vary according to the environment).*

Neuron-Air our distance test

- Height of Neuron-Air during the test: 8 feet.
- Environment: without obstacles (the distance may vary depending on the environment)
- Distance reached: 6349 linear feet without obstacle.