

n-Core[®]

n-Core[®] Sirius IOn D-E-M User Manual

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1. Introduction

The *Sirius IOn* (models *D*, *E* and *M*) is a flexible expansion board that offers full access to the I/O and programming interfaces of the *n-Core Sirius Quantum* and *RadIOn* devices. The *Sirius IOn* is also compatible with the *n-Core Sirius B* and *D* devices.



Sirius IOn-D



Sirius IOn-E



Sirius IOn-M

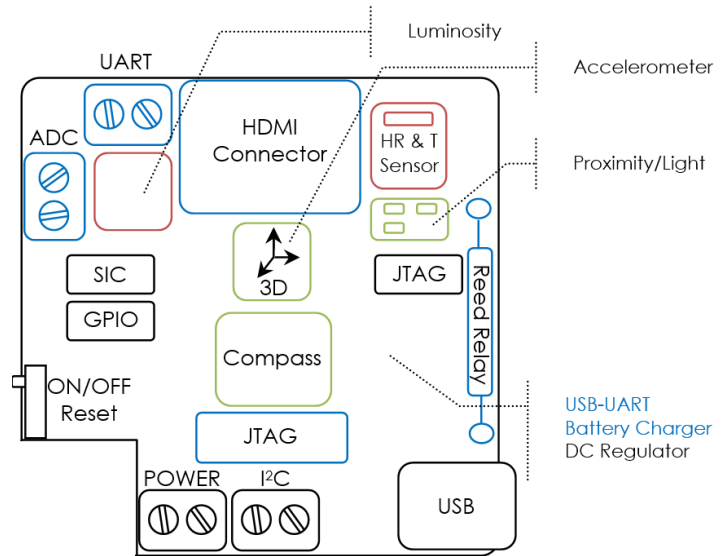
Its adaptable design provides an extraordinary versatility to suit a wide range of applications, especially those where I/O connectivity are key factors. It offers several communication ports and I/O interfaces that allow integrating a great number of external devices, such as sensors, actuators or even computers, among many others.

The *Sirius IOn* device is part of the *n-Core* platform, developed by Nebusens. The *n-Core* platform offers a complete set of hardware and software tools that can fit all your necessities when developing and deploying wireless networks based on the IEEE 802.15.4/ZigBee international standard.

For more information about *n-Core*, please visit www.nebusens.com

2. General characteristics

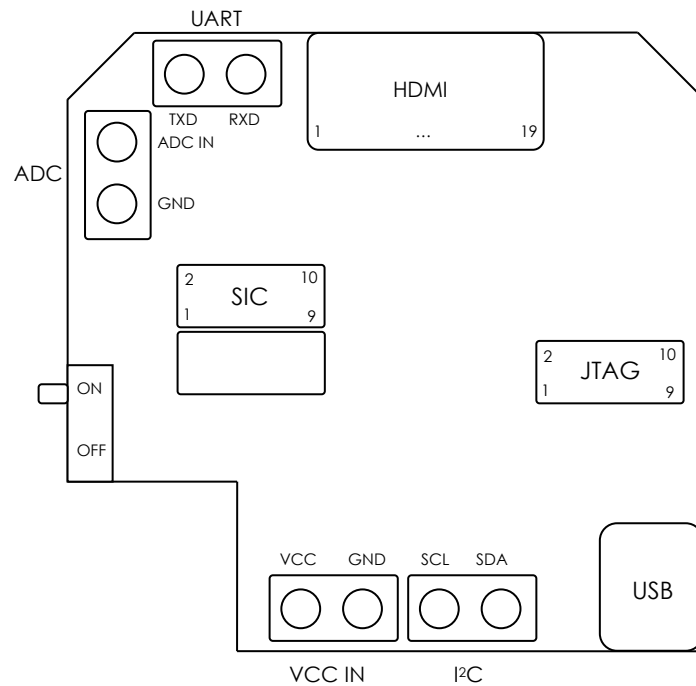
n-Core Sirius IOn (Development)	
Electrical features	
External Power Supply	3.7V – 9V
Reset Button	-
Power Switch	ON/OFF
Physical characteristics	
Dimensions (mm)	41 x 42 x 15
Connectivity	
<ul style="list-style-type: none"> I²C SPI * UART ADC Power Supply 	SIC / USB / Screw connector * SPI not available via screw connector
<ul style="list-style-type: none"> JTAG 	HDMI type A / mini JTAG header / JTAG connector
<ul style="list-style-type: none"> I²C SPI UART ADC JTAG GPIO IRQ Device reset Power Supply 	HDMI type A
<ul style="list-style-type: none"> USB – UART 	(CP2103) USB via SIC, HDMI or Screw connector
<ul style="list-style-type: none"> Sensors: 	Reed Relay



n-Core Sirius IOn (Environment)	
Electrical features	
External Power Supply	3.7V – 9V
Reset Button	-
Power Switch	ON/OFF
Physical characteristics	
Dimensions (mm)	41 x 42 x 15
Connectivity	
<ul style="list-style-type: none"> Power Supply 	SIC / USB / Screw connector
<ul style="list-style-type: none"> Sensors 	Luminosity, Humidity and Temperature via SIC and I ² C screw connectors

n-Core Sirius IOn (Motion)	
Electrical features	
External Power Supply	3.7V – 9V
Reset Button	-
Power Switch	ON/OFF
Physical characteristics	
Dimensions (mm)	41 x 42 x 15
Connectivity	
<ul style="list-style-type: none"> Power Supply 	SIC / USB / Screw connector
<ul style="list-style-type: none"> Sensors 	Accelerometer, Compass and Proximity via SIC and I ² C screw connectors

3. Pinout



HDMI	
1	JTAG TDI
2	UART TXD
3	JTAG TDO
4	SPI MISO
5	JTAG TMS
6	SPI MOSI
7	JTAG TCK
8	SPI CLK
9	ADC 1
10	UART RTS
11	VCC OUT
12	UART CTS
13	GND
14	UART RXD
15	I ² C SCL
16	Reed Relay OUT
17	Not Used
18	I ² C SDA
19	RESET (<i>Sirius Quantum and RadlOn</i>)

SIC	
1	I ² C SCL
2	SPI SCK
3	I ² C SDA
4	SPI MOSI
5	VCC OUT
6	SPI MISO
7	UART RXD
8	UART TXD
9	ADC (wired to ADC block)
10	GND

JTAG	
1	TCK
2	GND
3	TDO
4	3.3 V output (<i>permanent</i>)
5	TMS
6	RESET
7	N/C
8	N/C
9	TDI
10	GND

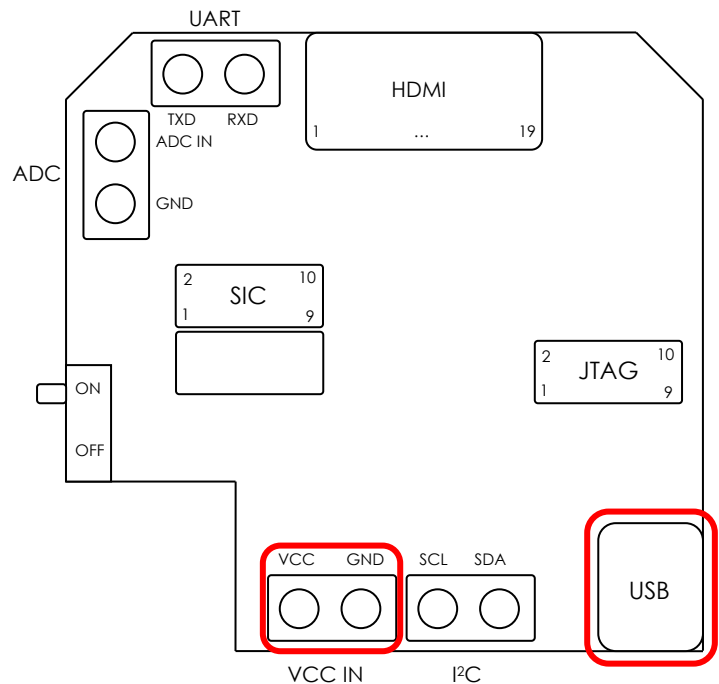
4. Power supply

Sirius IOn device has two alternatives for power supply:

- 2-pole connector (VCC_IN):
 - 5 – 9V DC (*Sirius Quantum* or *Sirius RadIOn* connected via the HDMI).
 - 3.7V – 9V DC (*Sirius RadIOn* connected via SIC).
 - 5V – 9V DC (*Sirius B* or *Sirius D* connected via SIC).
- Type-B Mini USB connector: 5V DC.

Important note: Use only the following combinations when powering the *Sirius Quantum* and *RadIOn* devices:

- Via the HDMI connector:
 - VCC_IN or USB can be used.
 - The USB charges the internal battery of the *Sirius Quantum* (or an external battery directly connected to the *Sirius RadIOn*).
- Via the SIC connector:
 - **VCC IN or USB can be used ONLY if there is not a battery or external power supply directly connected to the Sirius device.**

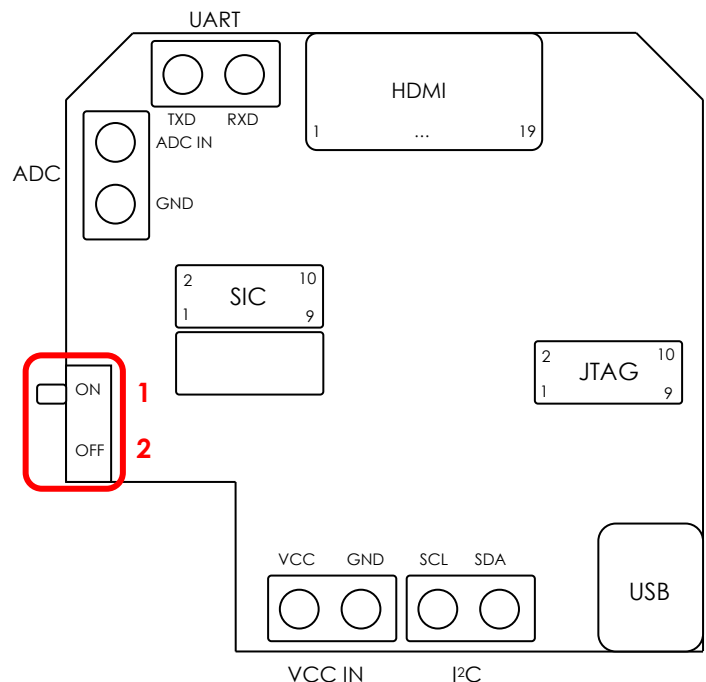


Important note: be sure to respect the power polarity or the device may be damaged permanently.

4.1. On/Off mode

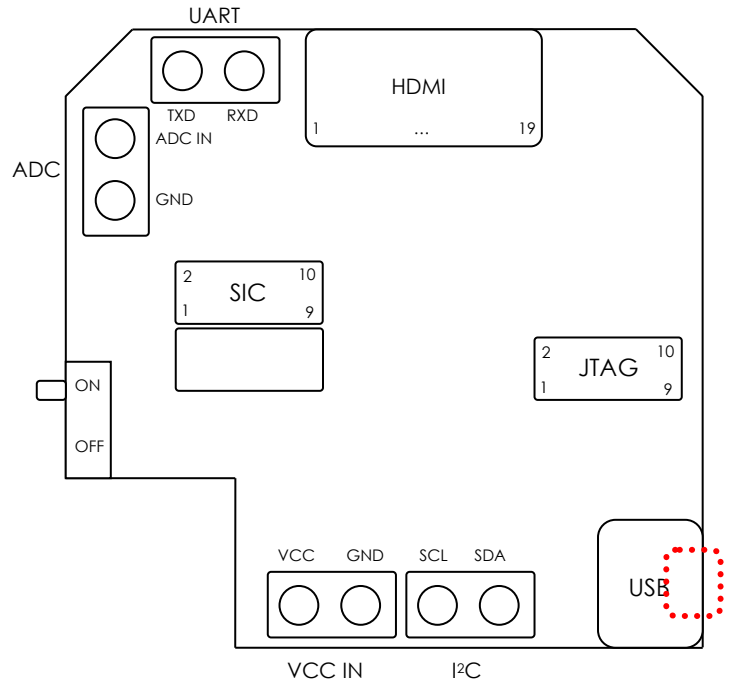
The On/Off button is placed on left side of the device. This switch allows eliminating completely the power supply of the *Sirius IOn* device and also the power supply of the *Sirius B, D, Quantum RadIOn* and devices attached to it.

1. Device switched on.
2. Device switched off.



4.2. Reset

The Reset button is placed at the opposite layer of the USB connector. This button allows resetting the *Sirius Quantum* or *RadION* devices when they are attached via the HDMI connector.



5. Input and output interfaces

The *Sirius IOn* device has the following input and output interfaces:

- **UART/USB** (UART, SIC and HDMI connectors). Allows accessing the *Sirius B, D, Quantum* and *RadION* UART.
- **ADC** (SIC and HDMI connectors).
- **I²C** (SIC and HDMI connectors).
- **HDMI connector**. It allows:
 - Accessing the *Sirius Quantum* and *RadION* input and output interfaces: ADC, I²C, SPI, GPIO, UART and JTAG.
 - Powering the *Sirius B, D, Quantum* and *RadION* devices.
 - Updating the firmware on the *Sirius Quantum* and *RadION* devices.
- **SIC**. It allows:
 - Accessing the *Sirius B, D, Quantum* and *RadION* input and output interfaces: ADC, I²C and UART.
 - Powering the *Sirius B, D, Quantum* and *RadION* devices.

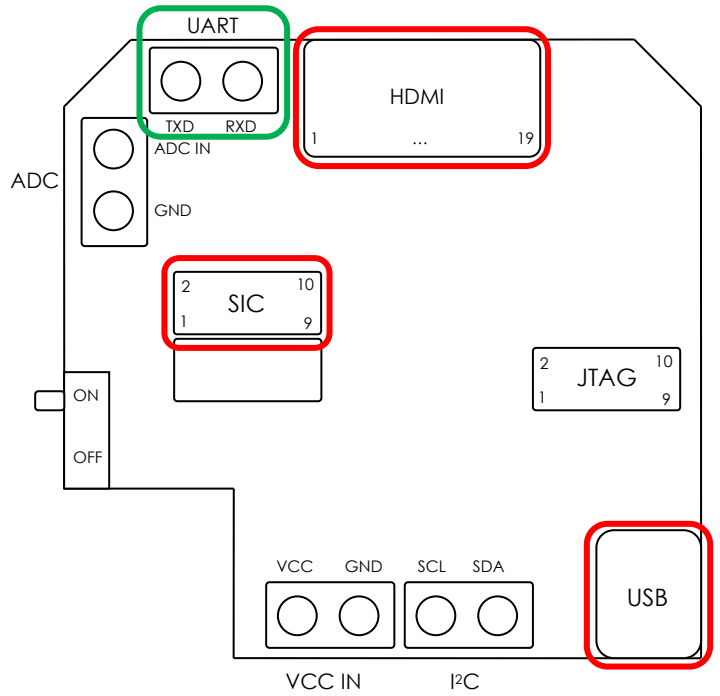
5.1. UART to USB bridge

This interface uses the Silabs CP2103 and is recognized by the operating system (e.g., Windows) as a virtual serial port (*Virtual Com Port*).

The UART of the *Sirius* devices can be accessed via the SIC, HDMI and UART connectors.

It allows:

- Communicating with the *Sirius B, D, Quantum* and *RadlOn* via their UART.
 - *Sirius B* and *D*: USART0 (0x1E, 0x1F) of the ATmega1281V.
 - *Sirius Quantum* and *RadlOn*: USART1 (0x13, 0x14) of ATmega128RFA1.
- Powering the *Sirius B, D, Quantum* and *RadlOn* devices.



Note: the UART side of the CP2103 can be also accessed by using the UART connector (green).

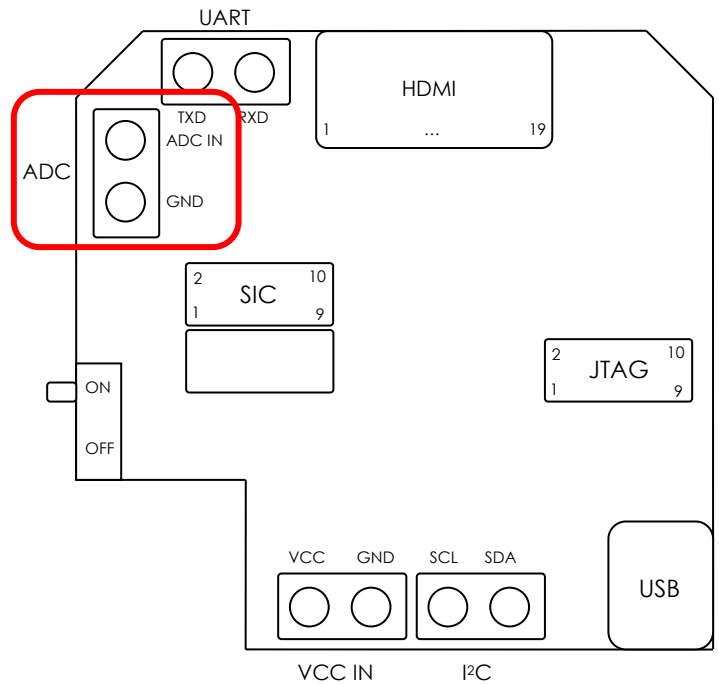
5.2. ADC

The ADC can be accessed via:

- ADC connector.
- SIC connector.
- HDMI connector.

It allows:

- Accessing the ADC_1 (0x01) of the ATmega1281 on *Sirius B* and *D*.
- Accessing the ADC_1 (0x01) of the ATmega128RFA1 on *Sirius Quantum* and *RadlOn*. **The input voltage must be between 0V and 1.5V.**



5.3. I²C

The I²C can be accessed via:

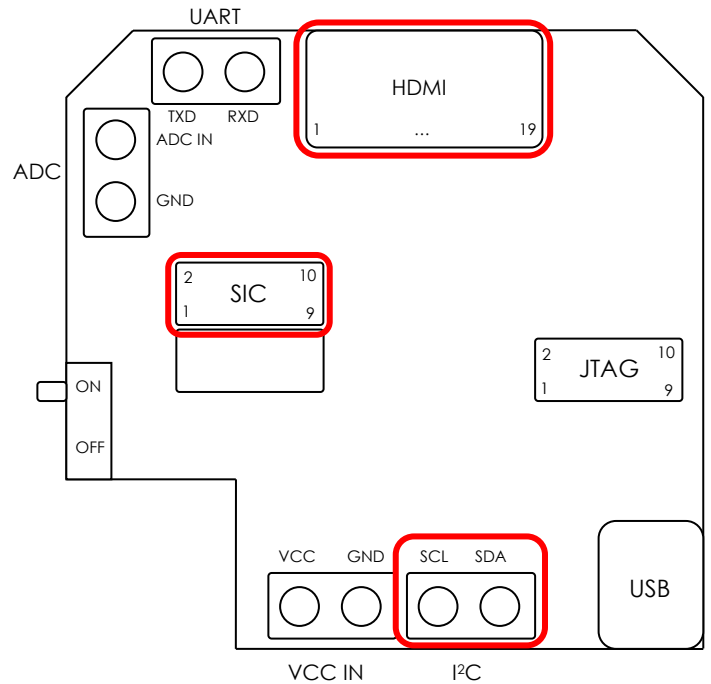
- I²C connector.
- SIC connector.
- HDMI connector.

It allows:

- Accessing to the I²C of the ATmega1281 on *Sirius B* and *D*
- Accessing to the I²C of the ATmega128RFA1 on *Sirius Quantum* and *RadlOn*.

I²C is also connected to several sensors¹ depending on the *Sirius IOn* model:

- *Sirius IOn-E*
 - Humidity/Temperature (SHT25).
 - Light (TSL2561).
- *Sirius IOn-M*
 - 2D-Axis magnetometer (HMC6352).
 - 3D-Axis accelerometer (MMA8452Q).
 - Light/Proximity (VCNL4000).

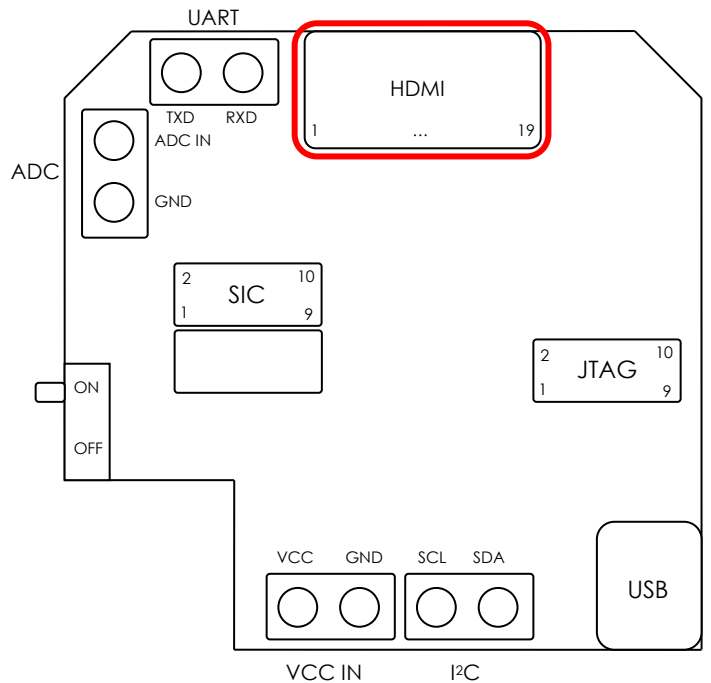


5.4. HDMI connector

This is a multipurpose connector. It allows:

- Accessing the *Sirius Quantum* and *RadlOn* internal interfaces: I²C, ADC, UART, IRQ and JTAG.
- Resetting the *Sirius Quantum* and *RadlOn* devices.
- Recharging the *Sirius Quantum* integrated battery (or an external battery connected to the *Sirius RadlOn*).

Note: It is necessary to use a HDMI male to micro HDMI male cable or adapter.



¹ Please read *AppNote n-Core ConfTool Sensors* for more information.

5.5. SIC connector

It is a multipurpose connector. It allows:

- Accessing the *Sirius B, D, Quantum* and *RadlOn* internal interfaces: I²C, ADC and UART.

6. Sensors

6.1. Humidity and Temperature (SHT25)

Precision relative humidity and temperature I²C sensor with auto-calibration.

Can be accessed using:

- I²C connector.
- SIC connector.
- HDMI connector.

6.2. Light (TSL2561)

Ambient light I²C sensor.

Can be accessed using:

- I²C connector.
- SIC connector.
- HDMI connector.

6.3. Light/Proximity (VCNL4000)

Ambient light and infrared proximity I²C sensor.

Can be accessed using:

- I²C connector.
- SIC connector.
- HDMI connector.

6.4. 2D-Axis magnetometer (HMC6352)

2D-Axis I²C magnetometer and digital compass.

Can be accessed using:

- I²C connector.
- SIC connector.
- HDMI connector.

6.5. 3D-Axis accelerometer (MMA8452Q)

3D-Axis I²C accelerometer.

Can be accessed using:

- I²C connector.
- SIC connector.

- HDMI connector.

6.6. Reed relay

Digital On/Off magnetic sensor (0x22 in *Sirius B/D*). Internal pull-up must be activated.

7. Recommendations of use and security

Please, follow the next indications in order to obtain the maximum performance and to use the *Sirius IOn* device in a safe way:

- Avoid placing metallic objects near the device as far as possible.
- Architectonic elements, such as metallic walls, doors, railings, pipes, concrete walls, among many others, can affect signal quality and, therefore, the maximum distance of communication between devices.
- Do not wet the device.
- Do not store or make use of the device in atmospheres with a high humidity rate (70% as maximum).
- Do not expose the device to heat sources or directly to the sun.
- Avoid short-circuiting connections.
- Do not use cables longer than 3 meters.
- Pay special attention to relay output connections, because it could cause a short circuit in the device to be controlled.
- Do not apply to the device voltages and currents out of maximum and minimum rates recommended in this manual (both in power supply and input/output ports, as well as communication buses).
- Use an appropriate external power supply. The product must only work with the type of power supply indicated in this manual. If you are not sure about the type of the required power supply, please consult the manufacturer.
- Avoid manipulating any element of the device not described in this manual, because the warranty could be invalidated and the equipment could be damaged permanently.
- Do not use this product in gas stations, fuel tanks, chemical plants or places where demolition operations are being carried out or near potentially explosive atmospheres, such as re-fuelling areas, fuel tanks, under boat decks, chemical plants, facilities of transference or storage of fuel or chemical agents and areas where the air contains chemistries or particles, such as grain, metallic dust or dust. Please, consult the pertinent preventive measures before using this device in these kinds of zones.
- The use of accessories unapproved by the manufacturer could damage the equipment, break local laws and invalidate the warranty.
- Use only the antenna that is delivered with the device. The use of modified or unauthorized antennas can reduce the quality of the communication and damage the equipment, besides break local regulations of your country.

8. Additional information

Disclaimer

Nebusens believes that all information is correct and accurate at the time of issue. Nebusens reserves the right to make changes to this product without prior notice. Please visit the Nebusens website (www.nebusens.com) for the latest available version.

Nebusens does not assume any responsibility for the use of the described product or convey any license under its patent rights.

Nebusens warrants performance of its products to the specifications applicable at the time of sale in accordance with the sale and use conditions of n-Core. You can check these conditions on the Nebusens website (www.nebusens.com).

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Technical Support

Technical support is provided by Nebusens, S.L. on demand and in accordance to sale and use conditions agreed. You can check these conditions on the Nebusens website (www.nebusens.com).

We provide you with a support forum (support.nebusens.com) for any question related to the n-Core platform.

Waste and recycling

When the device reaches the end of its life cycle, it will have to be deposited in a point of recycling for electronic equipment. The equipment will not have to be deposited in the points of urban garbage collection. Please, go to a specialized point. Your distributor will indicate the most appropriate way to proceed with the recycle of the device.





www.n-core.info