



# Car park access control

RFID UHF & Bluetooth® Reader

SPECTRE  
NANO





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# 1- General principles of Bluetooth® technology

Bluetooth® is a communication standard using radio waves on a frequency band of 2.4 to 2.5 GHz.

The STid Mobile ID® solution uses this technology to authenticate a user by an application installed on their smartphone.

For access control applications, reading distances are a primary concern. With Bluetooth® technology, reading distances presented are indicative and basically define a detection range. The actual reading distance depends on the smartphone in use and its positioning relative to the reader. For example, a smartphone held in the hand or a smartphone inside a pocket will not be detected at the same distance.

# 2- General principles of UHF technology

## 2.1 How it works

Passive RFID applications are authorized to use radio frequencies in the range of 860 MHz to 960 MHz. The precise limitations on authorized frequency use vary from one country to another. Globally, the two major frequency bands that are in use are 865-868 MHz and 902-928 MHz.

Depending on the power of the reader, the gain and the orientation of its antenna, and the characteristics of the tag to be read, the actual read range of a passive (battery-less) UHF RFID system can extend from approximately 10 centimeters to about 10 meters (33 ft).

## 2.2 Uses and limitations, environmental perturbations, tips

Certain physical rules apply to this technology that can influence the operation and performance in terms of both distance and speed.

The following salient points should be kept in mind:

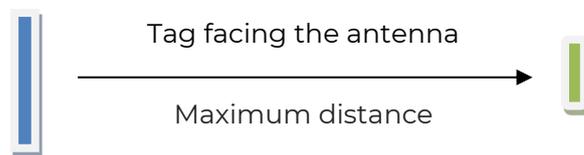
- **The influence of the materials** surrounding the tag is considerable. Tags (and their antenna) may require adaptation to their environment in order to produce the best results.
- At the UHF frequency, waves do not pass-through **liquids** well. Human bodies between the reader and the tag can form an obstacle that prevents the tag from being read properly.
- Radio waves do not travel through **metal**, RFID does not work well with athermal windshields or armored vehicles.
- Radio waves reflect on the surface of objects (metal, concrete, the ground, etc.) and the presence of **obstacles** in the reading area can impact the results.



- **UHF technology can be sensitive:** plan its installation taking into account the reading zone of the antenna, according to its characteristics.
- **A UHF tag can also be orientation sensitive.** “Linear” tags are susceptible performance loss as a result of their orientation compared to the reader. They might be better read horizontally than vertically, for example.

## 2.3 Optimal orientation

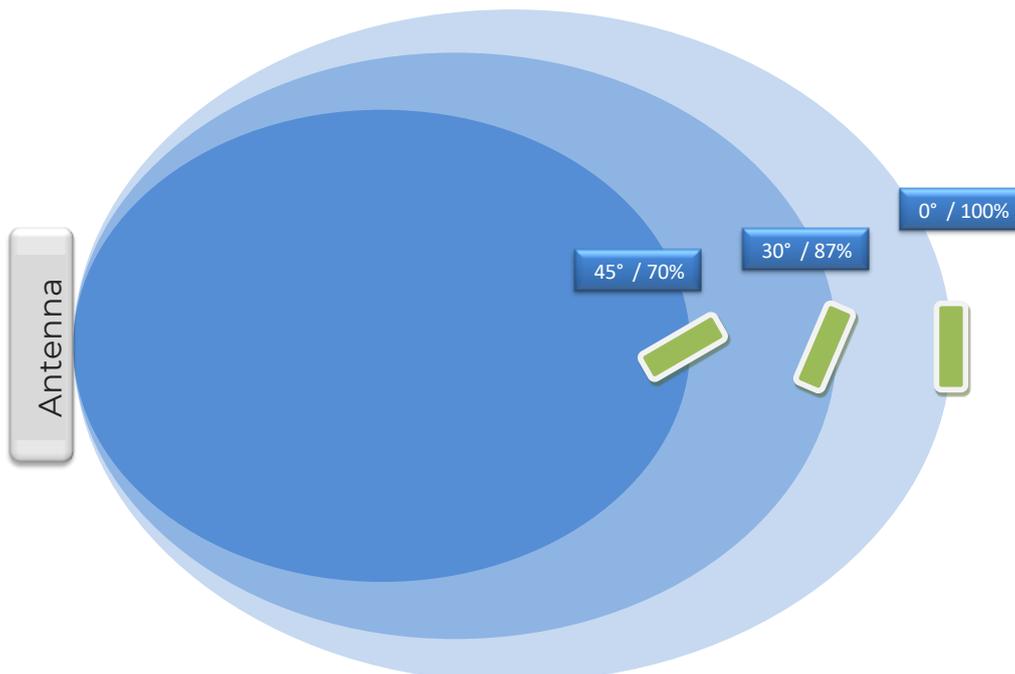
In view of the above-mentioned factors, it is preferable to find the conditions of implementation that optimize system performance, i.e., the best possible position between the antenna and the tag.



The distances in the technical specifications of readers are specified based on the assumption that the tag is facing the reader, with the tag parallel to the antenna.

An angle may be applied horizontally or vertically, depending on:

- the height of the antenna relative to the vehicle,
- the offset of the antenna on the side relative to the road.





## 2.4 Positioning the tags

The position of the hardened [TeleTag®](#) or the adhesive label [ETA v2](#) on the windshield affects the performance and depends on the type of windshield.

**TeleTag®: tag UHF EPC1 GEN2 movable**



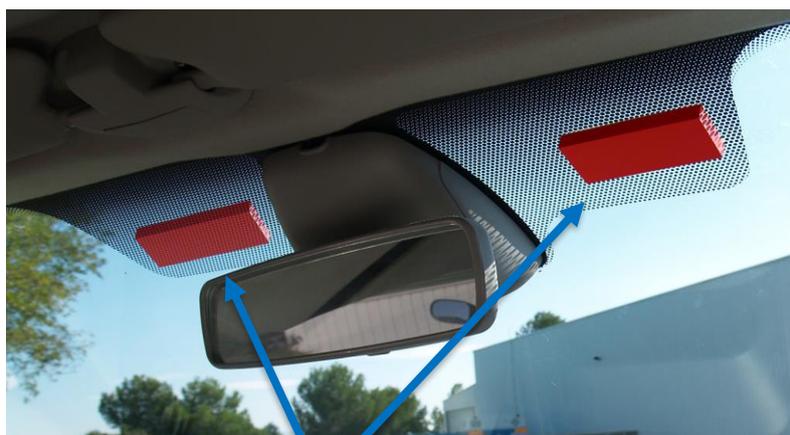
**ETA v2: destructible UHF EPC1 GEN2 adhesive tag**



**Goal:** position the tag for optimal quality/performance of reading.

### **Standard light vehicles**

- Put the tag at the top of the windshield, behind the central rear-view mirror, and on the side where the reader antenna is, if possible.
- Position the tag so that it does not adhere to the upper edge of the windshield.



Choose the side according to the *position* of the antenna / reader



## **Heavy vehicles / trucks / Buses**

### **Two solutions:**

- TeleTag® model (TLTA) interior tag or an ETA tag on the windshield. The rules for positioning the tag are the same as for light vehicles.
- Exterior tag for metal supports installed on the bodywork. Put the tag in a position where it is positioned as parallel as possible to the reader antenna and in the required reading zone.

### **Installing the TeleTag®**

Once you have selected the position, install the tag using the guidelines provided:

- Insert the tag using the method of your choice:
  - You can take the TeleTag® out of its mounting support and keep it with you or install it on another vehicle.



- The TeleTag® is permanently fixed.



- Fix the mounting support horizontally to the windshield using the two-sided adhesive strips provided.

Caution: Please consider the angle of certain windshields, remember to leave sufficient space to insert the tag in the mounting support when choosing a position.



## 2.5 Athermal windshields

Athermal windshields are made of sheets of metal in order to partially reduce the heat inside the vehicle's passenger compartment.

### 2.5.1 Impact of athermal windshields on operation

Athermal windshields influence the performance of the system, because the metal blocks the radio waves. Most athermal windshields have a non-athermal section (see the non-exhaustive list in the Appendix). This section is intended for radio-based systems (GPS, toll payment badges, RFID, etc.). At other locations the reading distances may be considerably shorter.

**Therefore, it is important to take this parameter into consideration before installation and to execute tests in order to find the most optimal position for the readers.**

### 2.5.2 How to recognize an athermal windshield?

The majority of motorists are able to identify an athermal windshield with the naked eye. This type of glazing has a purple, blue or petrol blue reflection in daylight. However, this way of determining the type of windshield remains quite subjective and is not always reliable.

There are other methods to identify an athermal windshield.

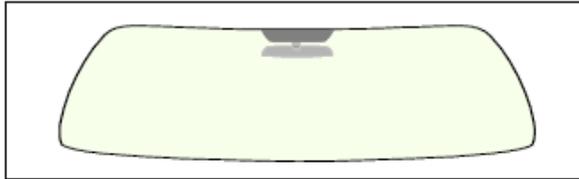
Some models show dotted lines on certain parts of the glazing. These marks delimit the untreated surface and this area reacts like ordinary glazing.

Located under the serial number, the symbols inscribed by the manufacturers also enable recognition of an athermal windshield. Usually, a small icon with a thermometer is a clear indication that the window is athermal.



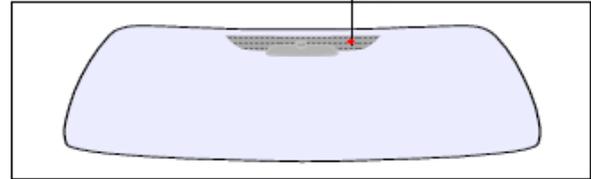


Type A



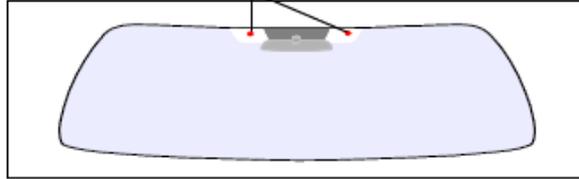
verre teinté (non athermique)

Type B



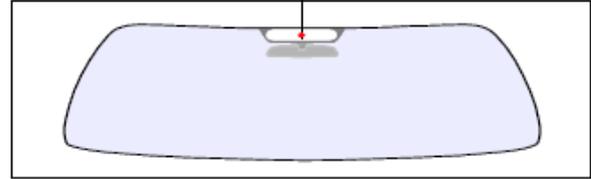
verre athermique    épargne

Type C



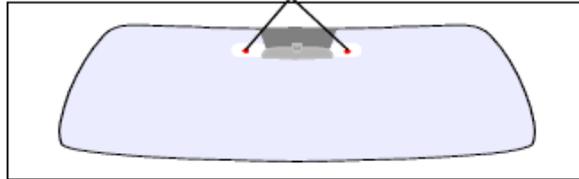
verre athermique

Type D



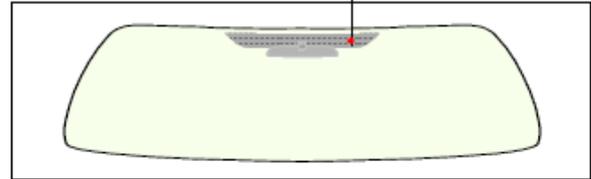
verre athermique

Type E



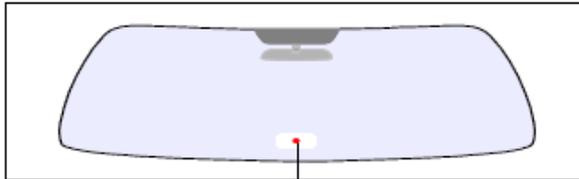
verre athermique

Type F



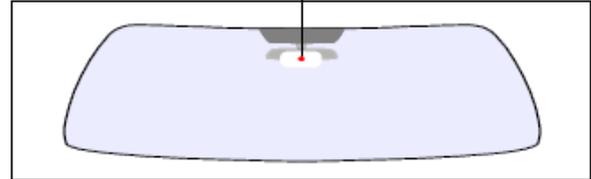
verre athermique de couleur neutre    épargne

Type G



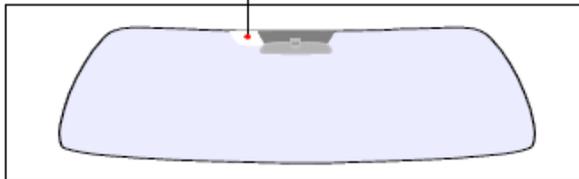
verre athermique

Type H



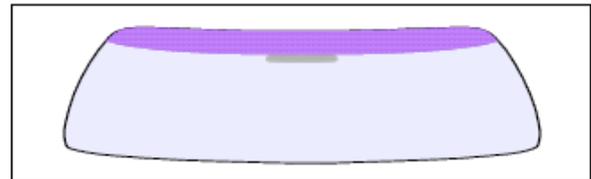
verre athermique

Type I



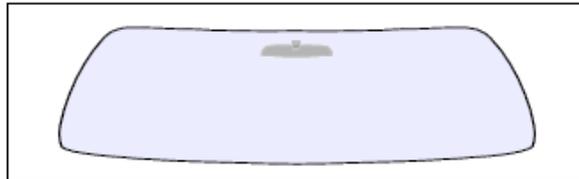
verre athermique

Type J



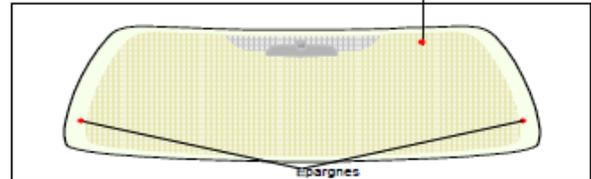
verre athermique (sans épargne)    verre athermique de couleur dégradée

Type K



verre athermique (sans épargne)

Type L



verre athermique de couleur neutre    verre chauffant



## 3- Approach to projects

A number of steps must be followed when equipping a site with a SPECTRE Access configuration.

### 3.1 Site analysis

Collect the basic information required to define the configuration to be installed:

- Site map
- Direction of the traffic flow
- Dimensions
- Types of vehicles to be identified.

### 3.2 Definition of the targets

Identification zones: choose the location where the vehicles are to be identified:

- Positions
- Dimensions.

### 3.3 Choice of the hardware

Based on the objectives and restrictions identified in the preceding steps, the first hardware choices can be made (type of reader, number of readers, type of tag, etc.) ...

The available technical options are restricted by the constraints. This analysis results in a clear vision of the feasibility of the preferred configuration and any arrangements or compromises that may be necessary.

### 3.4 Definition of the validation tests

It is advisable to, at an early stage, clearly define the tests required to validate the configuration with the customer. Make sure that representative vehicles (vehicles with athermic and non-athermic windshields) and the necessary equipment for the validation testing are available.



## 4- Examples of configurations

Some conventional vehicle access configurations are described below, including an indication of the typical positions of the readers.

These configurations are just provided as examples. They are generic and intended to provide food for thought. The operational performance may be influenced by other external parameters beyond the scope of this application note.

### 4.1 Vehicle identification

#### 4.1.1 Application case

Vehicle identification with the UHF tag mounted on the windshield.

#### 4.1.2 Implementation

It is recommended to place the reader and determine the detection zone sufficiently far from the barrier. This makes the detection more reliable and it gives the system sufficient time to open the barrier.



- A SPECTRE nano reader installed laterally on a mast offset at 45° (2.5 m high).
- Positioned before the barrier so that detection occurs sufficiently early.
- TeleTag® tag or ETA v2 adhesive label positioned to the left of the central mirror.





### 4.1.3 Configuration with Ultrys software

 <b>Bluetooth</b> <input type="checkbox"/> Off	No Bluetooth® activation required.
<b>Power</b>	<div style="background-color: #2c3e50; color: white; padding: 10px;"> <h4 style="margin: 0;">Advanced settings</h4> <hr/> <p><b>Power</b> <span style="float: right;">ⓘ ◀ 100% ▶</span></p> <p>Scan time after triggering the UHF RFID reading /Bluetooth <span style="float: right;">ⓘ — 1 s</span></p> <p><b>EPC filter</b></p> <p>EPC mask (Hexadecimal) <span style="float: right;">████████████████████</span></p> <p>EPC mask position (byte) <span style="float: right;">— 0 B</span></p> <p><input type="checkbox"/> Filter inversion: the reader will only send to the system the EPCs without the filter</p> <p><b>RSSI filter</b></p> <p>RSSI value <span style="float: right;">— Disabled</span></p> <p><input type="checkbox"/> Filter inversion: the reader will only send to the system the EPCs for credentials with an RSSI below the defined value</p> <div style="display: flex; justify-content: space-around; margin-top: 10px;"> <span>Cancel</span> <span>Confirm</span> </div> </div>
<b>Input / Output</b>	<div style="background-color: #2c3e50; color: white; padding: 10px;"> <div style="text-align: right; margin-bottom: 10px;"> <span style="border: 1px solid white; padding: 2px 5px;">1</span> <span style="border: 1px solid white; padding: 2px 5px;">2</span> <span style="border: 1px solid white; padding: 2px 5px;">3</span> </div> <h4 style="margin: 0;">Input management</h4> <hr/> <p>RFID reader behavior options based on external events (detector, ground loop etc.)</p> <p>RFID/Bluetooth® reading mode selection <span style="float: right;">Continuous reading without using the input ▼</span></p> <p><b>Input option selection used to activate an external action</b></p> <ul style="list-style-type: none"> <li><input type="checkbox"/> Activation of the LED and/or custom buzzer (triggered by the event)</li> <li><input type="checkbox"/> Output activation (triggered by the event)</li> <li><input type="checkbox"/> Relay activation (triggered by the event)</li> </ul> <div style="display: flex; justify-content: space-between; margin-top: 10px;"> <span>Cancel</span> <span>Next &gt;&gt;</span> </div> </div>



#### 4.1.4 Detection area

The detection distance, L, depends on the identifiers used and the type of regulation<sup>(1)</sup> that is applicable in the region:

	L (in meters or feet, for a non-thermal windshield)	
	ETSI	FCC
TeleTag® P/N STid TLTA-W75B	0 < L < 15 m (49 ft)	0 < L < 15 m (49 ft)
ETA v2 label P/N STid ETA-W75B	0 < L < 15 m (49 ft)	0 < L < 16 m (20 ft)
Label P/N STid ETA-W83	0 < L < 7 m (23 ft)	0 < L < 4 m (13 ft) <sup>(2)</sup>

(1): the detection distances depend on the environment in which the reader is installed. External disturbances can cause reading distance variations.

(2): possibility of reading beyond the distance indicated depending on the environment.



## 4.2 Driver identification on a side lane

### 4.2.1 Applications case

- Driver identification with presentation of the UHF card or by Bluetooth® virtual badge (BLE) without opening the window

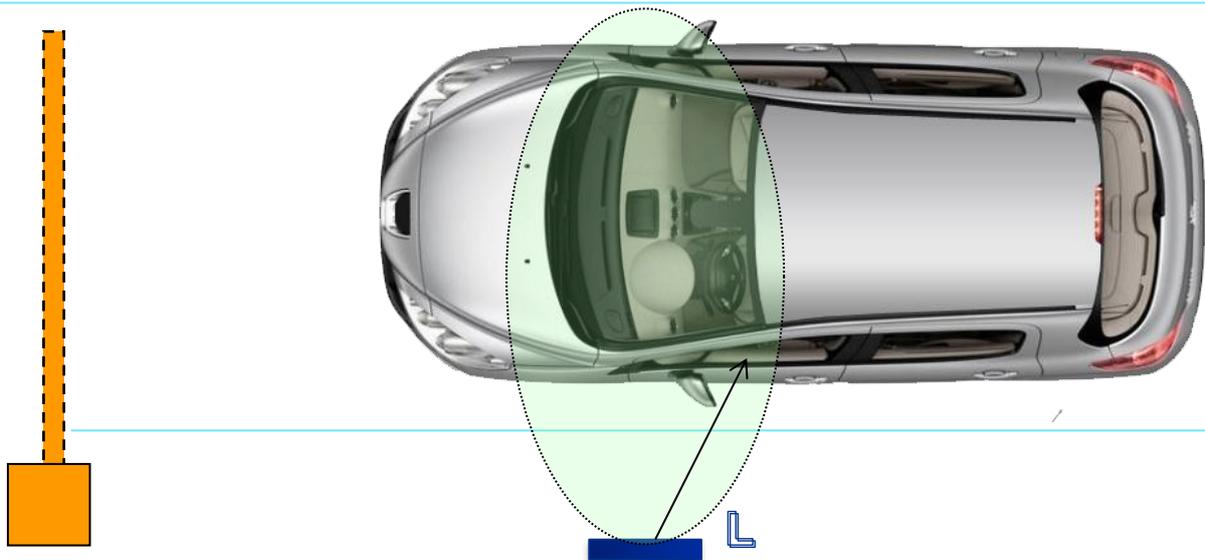
### 4.2.2 Implementation

It is recommended to position the reader and define the detection zone sufficiently upstream of the barrier, making detection more reliable and giving the system sufficient time to open the barrier.

The reading of the tag is not influenced by the side window, so there is no need to open it for the card to be detected. Just present it to the reader.



Since metal blocks radio waves, if the vehicle is fitted with athermal or armored windows, detection will only be possible by opening the window.



- A SPECTRE nano reader installed laterally; the bottom of the antenna being positioned approximately 1m10 (3.7 ft) from the ground. Reader positioned before the barrier so that detection occurs early enough.
- Identifiers: ISO card UHF (part numbers: CCTW490, CCTW360 or CCTR270) presented to the reader in hand in front of the closed side window.



### 4.2.3 Configuration with Ultrys software



- 1- Import of the SECard configuration file for the Bluetooth® part.
- 2- Select: UHF or Bluetooth®:

1
2
3
4

**Bluetooth® configuration**

---

**Name**  
Configuration name (14 characters max.)

**Reading mode**

UHF or Bluetooth®

UHF then Bluetooth®

Bluetooth® then UHF

**Bluetooth® reading mode**

 Private ID  
 Private ID else CSN  
 CSN only

**Site code**  
 (Hexadecimal on 2 bytes)

**Bluetooth® data format**

Bluetooth® ID size  4 B

Offset  0 B

 Reverse

- 3- Select the identification mode(s):

1
2
3
4

**Bluetooth® configuration**

---

**Identification modes and communication ranges**

Card  
 Up to ≈0,5m

Bluetooth® communication activation by sensor / ground loop  
 Up to ≈1m

TapTap  
 Up to ≈5m

Hands-free  
 Up to ≈5m

Remote  
 Up to ≈5m

Remote button active  
 Remote 1  Remote 2

**Reader options**

LED activation at Bluetooth® connection
  Unlocking smartphone required by the reader

Cancel
« Previous
Next »

Remote: remote control mode recommended.

Card: Present the smartphone in front of the reader like a card.

Tap Tap: Dashboard-mounted smartphone.



<p>Power</p>	<p>For detection distances of less than 4 meters (13 ft), we recommend setting the power to 20% so that tags in neighboring traffic lanes are not read.</p> <p>Higher power normally results in longer reading distances.</p> <div style="border: 1px solid black; background-color: #333; color: #fff; padding: 10px; margin: 10px 0;"> <p><b>Advanced settings</b></p> <hr/> <p>Power <span style="float: right;">ⓘ ◀ 20% ▶</span></p> <p>Scan time after triggering the UHF RFID reading /Bluetooth <span style="float: right;">ⓘ — 1 s</span></p> <p><b>EPC filter</b></p> <p>EPC mask (Hexadecimal) <span style="float: right;">████████████████████</span></p> <p>EPC mask position (byte) <span style="float: right;">▬ 0 B</span></p> <p><input type="checkbox"/> Filter inversion: the reader will only send to the system the EPCs without the filter</p> <p><b>RSSI filter</b></p> <p>RSSI value <span style="float: right;">▬ Disabled</span></p> <p><input type="checkbox"/> Filter inversion: the reader will only send to the system the EPCs for credentials with an RSSI below the defined value</p> <p style="text-align: center;"> <span style="border: 1px solid #ccc; padding: 5px 15px; margin: 0 10px;">Cancel</span> <span style="border: 1px solid #ccc; padding: 5px 15px; margin: 0 10px;">Confirm</span> </p> </div>
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#### 4.2.4 Detection zone

The driver is identified in an area of 0 to 4 meters (13 ft) with the UHF card (1). Bluetooth® detection depends on the identification mode selected.

**Between two BLE authentications, there is a waiting time of about 3 seconds.**

(1): the detection distances depend on the environment in which the reader is installed. External disturbances can cause reading distance variations.



## 4.3 Identification of vehicle OR driver

### 4.3.1 Applications case

- Identification of users with different profiles: employees, visitors, service providers ...
- Identification of a mixed fleet of light vehicles and two-wheelers

### 4.3.2 Implementation

It is recommended to place the reader and determine the detection position upstream of the barrier, this makes detection more reliable and gives the system time to open the barrier.



- A SPECTRE nano reader installed laterally on a mast offset at 45° (at a height of 2.5 m). Reader positioned before the barrier so that detection occurs early enough.
- Identifiers TeleTag® or ETA v2 label positioned to the left of the central mirror.
- Smartphone with STid Mobile ID® application storing a virtual Bluetooth® card.



### 4.3.3 Configuration with Ultrys software



**Bluetooth**

On 



- 1- Import of the SECard configuration file for the Bluetooth® part.
- 2- Select: UHF or Bluetooth®:

1
2
3
4

**Bluetooth® configuration**

---

**Name**  
Configuration name (14 characters max.)

**Reading mode**

UHF or Bluetooth®

UHF then Bluetooth®

Bluetooth® then UHF

**Bluetooth® reading mode**

 Private ID  
 Private ID else CSN  
 CSN only

**Site code**  
 (Hexadecimal on 2 bytes)

**Bluetooth® data format**

Bluetooth® ID size  4 B

Offset  0 B

 Reverse

- 3- Select the identification mode(s):

1
2
3
4

**Bluetooth® configuration**

---

**Identification modes and communication ranges**

Card  
 Up to ≈0,5m

Hands-free  
 Up to ≈5m

Bluetooth® communication activation by sensor / ground loop  
 Up to ≈1m

Remote  
 Up to ≈5m

TapTap  
 Up to ≈5m

Remote button active

 Remote 1  Remote 2 

**Reader options**

LED activation at Bluetooth® connection
  Unlocking smartphone required by the reader

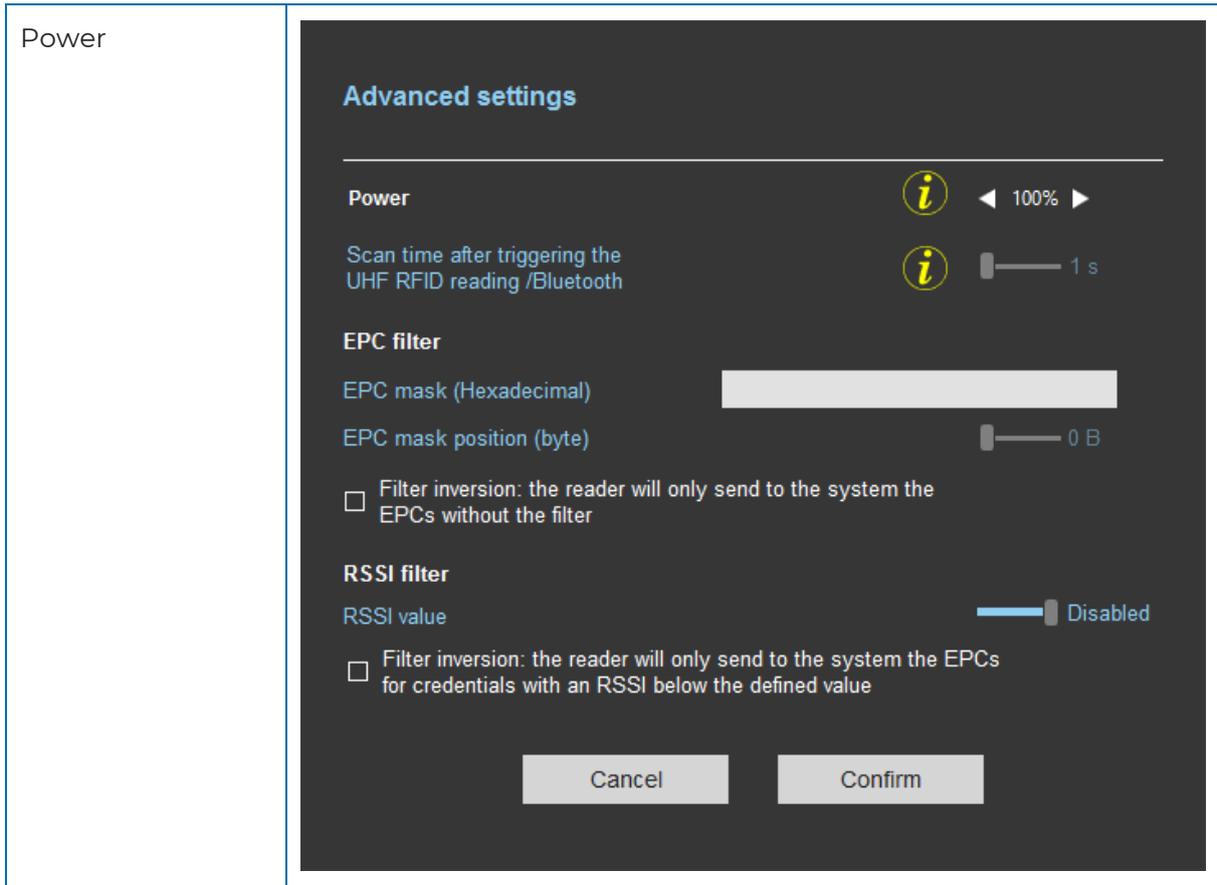
Cancel
« Previous
Next »

Remote: remote control mode recommended.

Tap Tap: Dashboard-mounted smartphone.

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#### 4.3.4 Detection zone

The detection distance, L, depends on the identifiers used and the type of regulation<sup>(1)</sup> that is applicable in your region:

	L (in meters or feet, for a non-thermal windshield)	
	ETSI	FCC
TeleTag® P/N STid TLTA-W75B	0 < L < 15 m (49 ft)	0 < L < 15 m (49 ft)
Label ETA v2 P/N STid ETA-W75B	0 < L < 15 m (49 ft)	0 < L < 16 m (20 ft)
Label P/N STid ETA-W83	0 < L < 7 m (23 ft)	0 < L < 4 m (13 ft) <sup>(2)</sup>

(1): the detection distances depend on the environment in which the reader is installed. External disturbances can cause reading distance variations.

(2): possibility of reading beyond the distance indicated depending on the environment.

**Between two BLE authentications, there is a waiting time of about 3 seconds.**

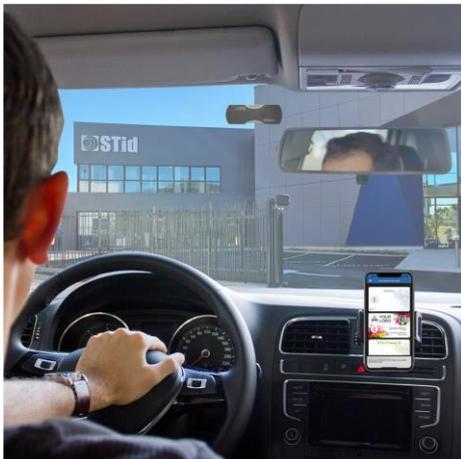


## 4.4 Identification of the vehicle then of the driver

### 4.4.1 Applications case

- Shared vehicles
- Sensitive sites
- Bus stations

### 4.4.2 Implementation



The vehicle is identified using a UHF windscreen tag or label and the driver by presenting the smartphone and the Bluetooth® virtual card.

It is recommended to position the reader and the detection zone sufficiently far ahead of the barrier. This makes the detection more reliable and gives the system sufficient time to open the barrier.



- A SPECTRE nano reader installed laterally on a mast offset at 45° (at a height of 2.5 m). Reader positioned before the barrier so that detection occurs early enough.
- TeleTag® or label positioned to the left of the central mirror.
- Smartphone with STid Mobile ID® application storing a Bluetooth® virtual card.



### 4.4.3 Configuration with Ultrys software



1- Import of the SECard configuration file for the Bluetooth® part.  
 2- Select: UHF then Bluetooth®:

1
2
3
4

**Bluetooth® configuration**

**Name**  
Configuration name (14 characters max.)

**Reading mode**

UHF or Bluetooth®
  **UHF then Bluetooth®**
 Bluetooth® then UHF

**Bluetooth® reading mode**
 Private ID
  Private ID else CSN
  CSN only

**Site code**  (Hexadecimal on 2 bytes)

**Bluetooth® data format**  
 Bluetooth® ID size  4 B  
 Offset  0 B  
 Reverse

3- Select the identification mode(s):

1
2
3
4

**Bluetooth® configuration**

**Identification modes and communication ranges**

Card  Hands-free



Up to ≈0,5m



Up to ≈5m

Bluetooth® communication activation by sensor / ground loop
  Remote



Up to ≈1m



Up to ≈5m

TapTap Remote button active



Up to ≈5m

Remote 1
  Remote 2
 

**Reader options**

LED activation at Bluetooth® connection
  Unlocking smartphone required by the reader

Cancel
« Previous
Next »

Remote: remote control mode recommended.  
Tap Tap: Dashboard-mounted smartphone.



Power

Advanced settings

---

Power

i ◀ 100% ▶

Scan time after triggering the UHF RFID reading /Bluetooth

i ◀ 1 s ▶

**EPC filter**

EPC mask (Hexadecimal)

EPC mask position (byte) ◀ 0 B ▶

Filter inversion: the reader will only send to the system the EPCs without the filter

**RSSI filter**

RSSI value ◀ Disabled ▶

Filter inversion: the reader will only send to the system the EPCs for credentials with an RSSI below the defined value

Cancel

Confirm

Note: if the reading is effective on another channel, adapt the power for reading on the desired lane.

#### 4.4.4 Detection zone

The detection distance, L, depends on the tags used and the type of regulation <sup>(1)</sup>:

	L (in meters or feet, for a non-thermal windshield)	
	ETSI	FCC
TeleTag® P/N STid TLATA-W75B	7 m (23 ft) < L < 15 m (49 ft)	7 < L < 15 m (49 ft)
ETA v2 Label P/N STid ETA-W75B	7 m (23 ft) < L < 15 m (49 ft)	7 < L < 16 m (20 ft)
Label P/N STid ETA-W83	7 m (23 ft) < L < 7 m (23 ft)	0 < L < 4 m (13 ft) <sup>(2)</sup>

(1): the detection distances depend on the environment in which the reader is installed. External disturbances can cause reading distance variations.

(2): possibility of reading beyond the distance indicated depending on the environment.

**The authentication time of the two technologies combined is around two seconds. Between two Bluetooth® authentications, there is a waiting time of approximately 3 seconds.**

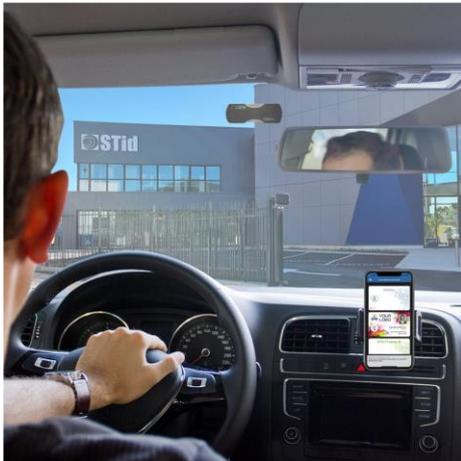


## 4.5 Identification of the driver then of the vehicle

### 4.5.1 Applications case

- Shared vehicles
- Sensitive sites
- Bus stations

### 4.5.2 Implementation



The vehicle is identified using a UHF windscreen tag or label and the driver by presenting the smartphone containing the Bluetooth® virtual card.

It is recommended to place the reader and determine the detection position upstream of the barrier, this makes detection more reliable and gives the system time to open the barrier.



- A SPECTRE nano reader installed laterally on a mast offset at 45° (at a height of 2.5 m). Reader positioned before the barrier so that detection occurs early enough.
- UHF TeleTag® or label positioned to the left of the central mirror.
- Smartphone with STid Mobile ID® application storing a Bluetooth® virtual card.



### 4.5.3 Configuration with Ultrys software



**Bluetooth**

On 



- 1- Import of the SECard configuration file for the Bluetooth® part.
- 2- Select: Bluetooth® then UHF:

1
2
3
4

**Bluetooth® configuration**

---

**Name**  
Configuration name (14 characters max.)

**Reading mode**

UHF or Bluetooth®     
  UHF then Bluetooth®     
  Bluetooth® then UHF

**Bluetooth® reading mode**      **Site code**      **Bluetooth® data format**

Private ID     
  Private ID else CSN     
  CSN only     
  (Hexadecimal on 2 bytes)     
 Bluetooth® ID size  4 B  
 Offset  0 B  
 Reverse

- 3- Select the identification mode(s):

1
2
3
4

**Bluetooth® configuration**

---

**Identification modes and communication ranges**

Card       Hands-free  
 Up to ≈0,5m     
  Up to ≈5m

Bluetooth® communication activation by sensor / ground loop     
  Remote  
 Up to ≈1m     
  Up to ≈5m

TapTap     
 Remote button active  
 Up to ≈5m     
 Remote 1     
 Remote 2

**Reader options**

LED activation at Bluetooth® connection     
 Unlocking smartphone required by the reader

Remote: remote control mode recommended.

Tap Tap: Dashboard-mounted smartphone.



Power

Advanced settings

---

**Power** i

Scan time after triggering the UHF RFID reading /Bluetooth i

**EPC filter**

EPC mask (Hexadecimal)

EPC mask position (byte)

Filter inversion: the reader will only send to the system the EPCs without the filter

**RSSI filter**

RSSI value

Filter inversion: the reader will only send to the system the EPCs for credentials with an RSSI below the defined value

◀ 100% ▶

1 s

Cancel

Confirm

Note: if the reading is effective on another channel, adapt the power for reading on the desired lane.

#### 4.5.4 Detection aera

The detection distance, L, depends on the tags used and the type of regulation <sup>(1)</sup> applicable in your region

	L (in meters or feet, for a non-thermal windshield)	
	ETSI	FCC
TeleTag® P/N STid TLATA-W75B	7 m (23 ft) < L < 15 m (49 ft)	7 m (23 ft) < L < 15 m (49 ft)
ETA v2 label P/N STid ETA-W75B	7 m (23 ft) < L < 15 m (49 ft)	7 < L < 16 m (20 ft)
Label P/N STid ETA-W83	7 m (23 ft) < L < 7 m (23 ft)	0 < L < 4 m (13 ft) <sup>(2)</sup>

(1): the detection distances depend on the environment in which the reader is installed. External disturbances can cause reading distance variations.

(2): possibility of reading beyond the distance indicated depending on the environment.

**The authentication time of the two technologies combined is around two seconds. Between two Bluetooth® authentications, there is a waiting time of approximately 3 seconds.**



## 5- Input / Output / Relay settings

### 5.1 Introduction

The SPECTRE nano reader is equipped with an input (IN), an output (OUT) and a power relay. Therefore, the readers support:

- Configure read triggering. For example: by means of a photoelectric barrier or a detection loop on the ground.
- Trigger an action when the reader exits by reading specific labels, for example.

Their operation can be configured using the ULTRYS software.





1 2 3

### Input management

---

RFID reader behavior options based on external events (detector, ground loop etc.)

RFID/Bluetooth® reading mode selection Continuous reading without using the input

Input option selection used to activate an external action

- Activation of the LED and/or custom buzzer (triggered by the event)
- Output activation (triggered by the event)
- Relay activation (triggered by the event)

Cancel
Next >>

1 2 3

### Output management

---

Output type selection Pull up to V+ (V out)

Output status

	Open	Closed	Maintain during detection
Output 1	<input checked="" type="radio"/>	<input type="radio"/>	<input type="checkbox"/>

Cancel
<< Previous
Next >>

1 2 3

### Relay management

---

Activate the relay when a tag is detected Off

Cancel
<< Previous
Confirm



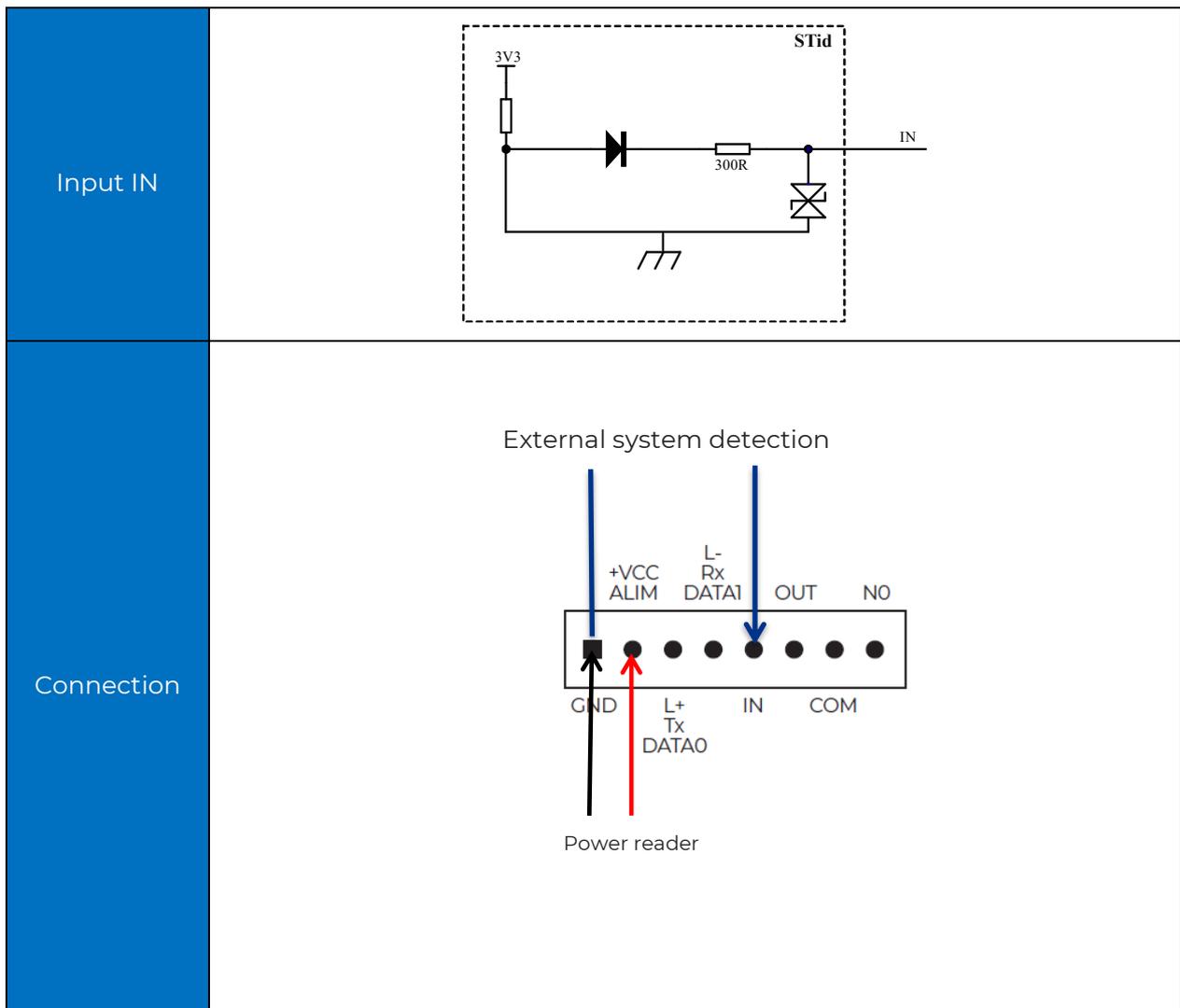
## 5.2 Input

The reader checks the inputs every 50 ms.

When the input is detected, the reader executes the configured action.

By applying a potential 0V to the input IN, the information on the presence of a signal on the input is transmitted to the reader.

If no potential is applied to the input IN, the input is considered inactive.





### 5.2.1 Example: reading activated when the presence of a vehicle is detected with detector OPTEX

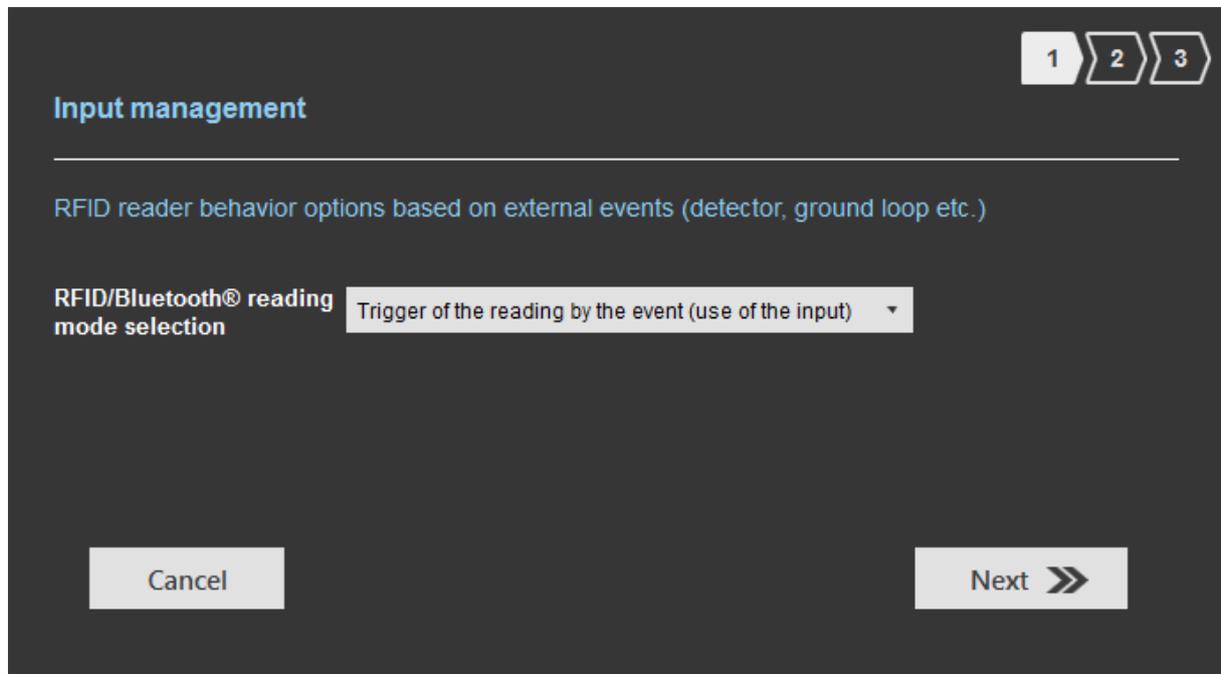
#### Presence detection equipment



P/N: DETECT-VEHICLE-01

The OPTEX presence detector is designed to reliably detect the presence of a vehicle when it is stopped or moving at up to 20 km/h. Combining microwave detection and ultrasonic sensor, it offers 5 levels of sensitivity adjustment. This accessory connects easily to the SPECTRE nano reader, allowing to activate the tag reading during the passage of the vehicle.

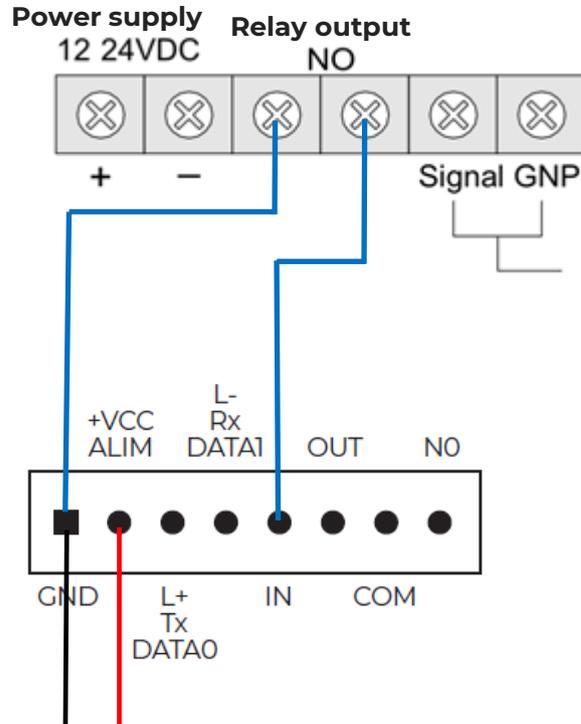
#### ULTRYS settings





## Connection

### OPTEX terminal block



Power reader 12Vdc

## Operation

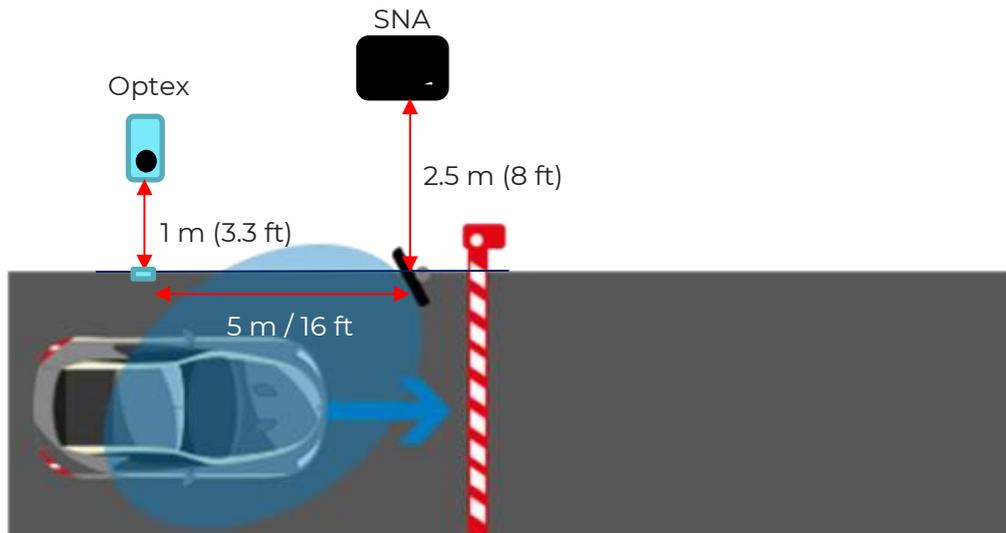
When a vehicle is detected by the OPTEX detector, the detector relay switches to "closed", the information is sent to the reader via the IN input. The reader will continue reading as long as the input is active



### Implantation 1

The OPTEX sensor is located 5 m upstream of the SPECTRE nano reader with the following configuration:

- Sensitivity = 5 (max)
- Detection distance set to 4 m (13 ft)
- Oriented perpendicular to the direction of traffic.



The identifiers used are:

- Label or TeleTag®
- Virtual card (hands-free mode, dashboard-mounted smartphone)



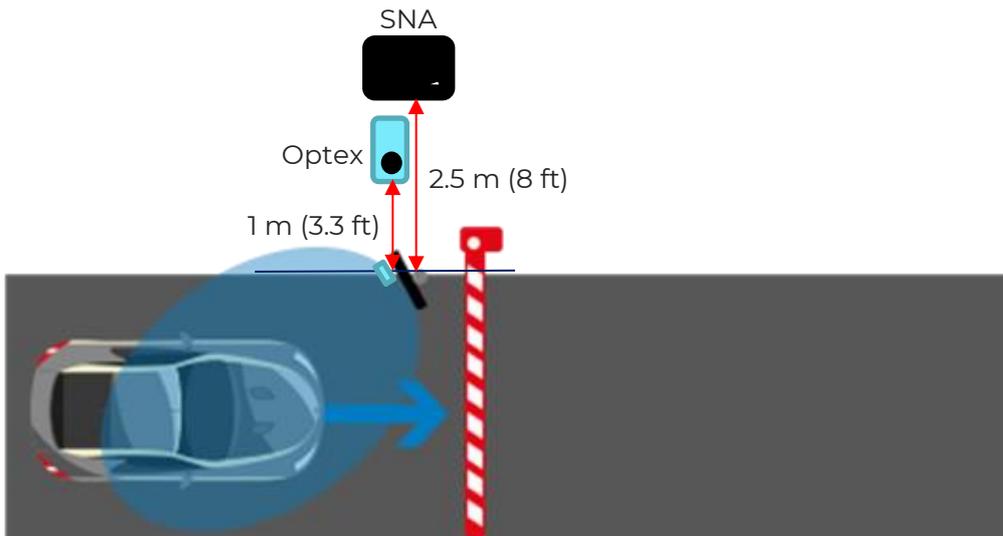
UHF detection: 2 meters (6.6 ft) upstream of the SPECTRE nano, driving at a walking pace.

Bluetooth® detection in hands-free mode: 1 meter (3.3 ft) before the reader, driving at a walk.

## Implantation 2

The OPTEX sensor is located under the SPECTRE nano reader with the following configuration:

- Sensitivity = 5 (max)
- Detection distance set to 5.5 m (18 ft)
- Oriented in the direction of traffic.



UHF detection: 6 meters (20 ft) upstream of the SPECTRE nano, driving at a walking speed.

Bluetooth® detection in hands-free mode: 1 meter (3.3 ft) before the reader, driving at a walking speed.

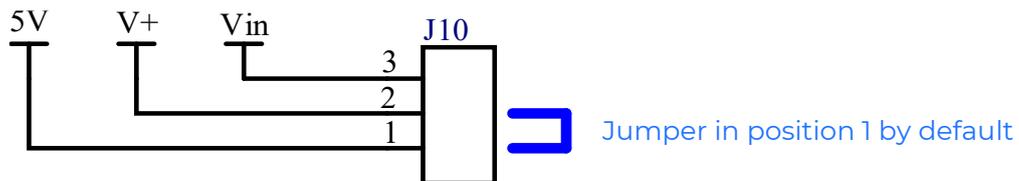


### 5.3 Output

The output OUT behaves like an open/closed switch. The rest state (Normally Open NO or Normally Closed NC) is configured by the ULTRYS software. A normally open output will be closed by the action of the reader and vice versa (refer to the ULTRYS user manual).

Depending on the selected option, the output will be:

- Connected to an internal Pull-up: the pull-up voltage,  $V+$ , is set by jumper J10 ( $V_{IN}$  or +5V).



- Left unconnected (open collector).

#### 5.3.1 PULL UP to $V+$

ULTRYS settings

Pull up to  $V+$

1
2
3

**Output management**

Output type selection Pull up to  $V+$  ( $V$  out) ▾

Output status

Output 1

Open 
Closed 
Maintain during detection

Cancel
« Previous
Next »

Output OUT to external system

Power reader

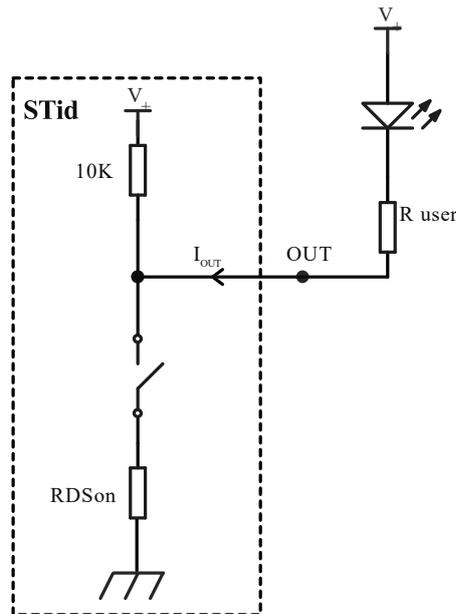
The operating diagram is given for output configured as Normally Open in ULTRYS.

The system is represented by a LED for better understanding, the value of the Ruser resistor is to be determined according to the client "system" connected.

**Caution:  $I_{OUT}$  max 200mA**

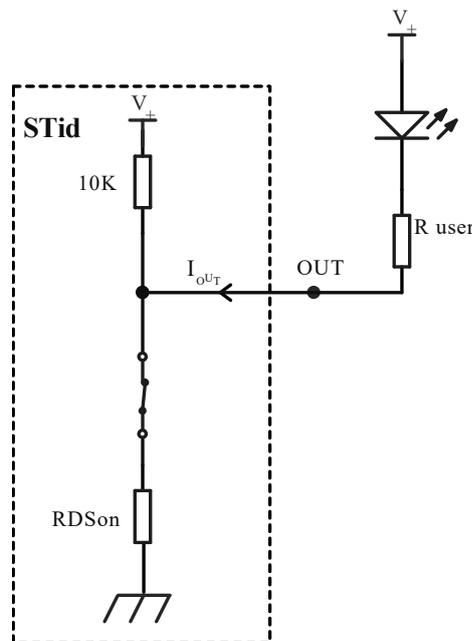
Operating diagram

No tag returned:



OUT is pull up to  $V+$  ( $V_{IN}$  or +5V).  
LED OFF

Tag returned:



OUT is pull up to the ground.  
LED ON.

Note:  $R_{DSon}$  max =  $2\Omega$ , the maximum residual voltage is therefore 0.4Volts.



### 5.3.2 Open drain

If the system is not compatible with the  $V_{OUT}$  voltage used by the pull up, use the open drain setting and bring a voltage that we will call  $V_{system}$ .

ULTRYS  
settings  
Open drain

1
2
3

#### Output management

---

Output type selection Open drain

Output status

Output 1 Open  Closed  Maintain during detection

Cancel
« Previous
Next »

Connection  
Open drain

Output OUT to external system

Power reader

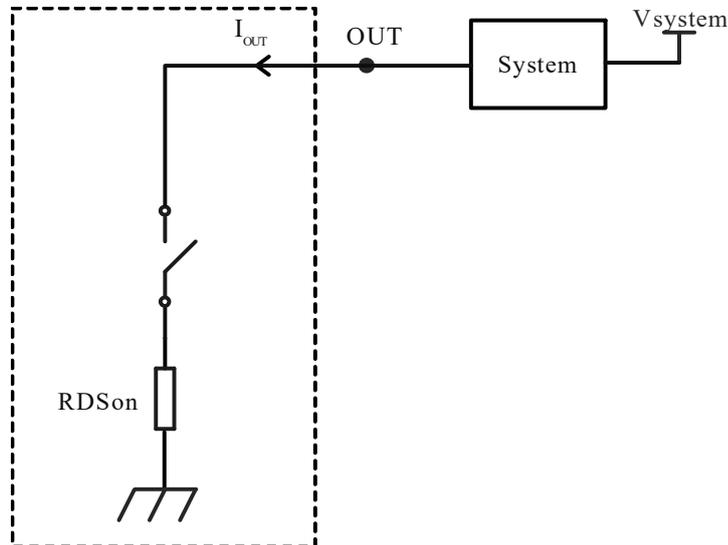
The operating diagram is given for output configured as Normally Open in ULTRYS.

**Caution:  $I_{OUT}$  max 200mA**

**Operating diagram 1:**

Without pull up to  $V_{system}$

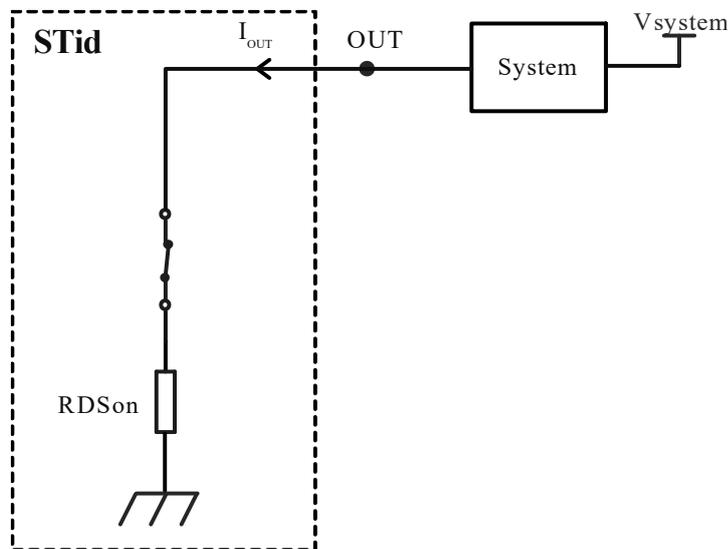
No tag returned:



OUT is not connected.

The system is not powered.

Tag returned :



OUT is pull up to the ground.

The system is powered

Note:  $R_{DSon}$  max =  $2\Omega$ , the maximum residual voltage is therefore 0.4Volts.

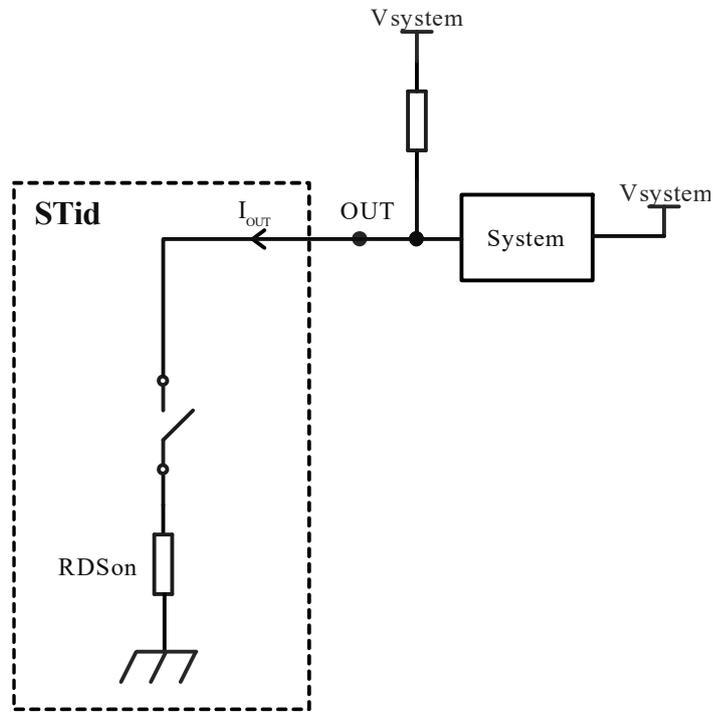


The operating diagram is given for output configured as Normally Open in ULTRYS.

**Caution:  $I_{OUT}$  max 200mA**

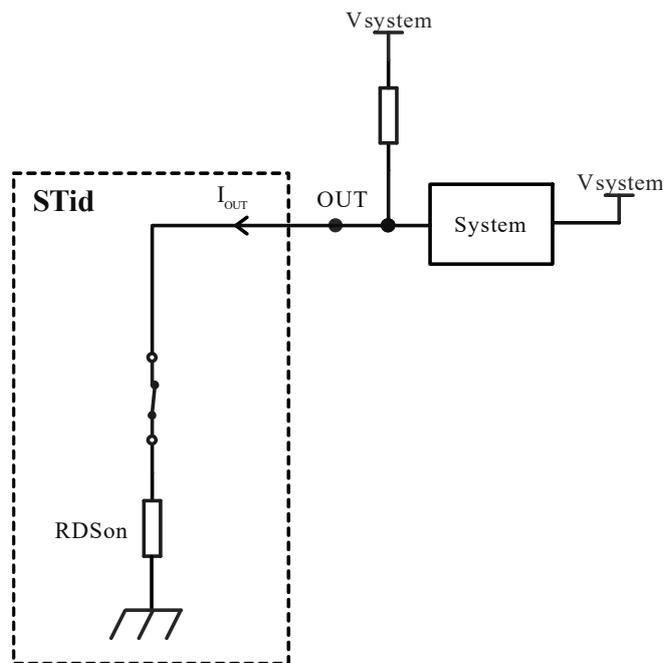
**Operating diagram 2:**  
with pull up to  $V_{system}$ .

No tag returned:



OUT is pull up to  $V_{system}$   
The system is not powered

Tag returned:



OUT is pull up to the ground.  
The system is powered

Note:  $R_{DSon}$  max =  $2\Omega$ , the maximum residual voltage is therefore 0.4Volts..



### 5.3.3 Example: Activation of an external optical warning

#### ULTRYS settings

1
2
3

### Input management

---

RFID reader behavior options based on external events (detector, ground loop etc.)

**RFID/Bluetooth® reading mode selection**
Continuous reading without using the input

**Input option selection used to activate an external action**
 Activation of the LED and/or custom buzzer (triggered by the event)  
 Output activation (triggered by the event)  
 Relay activation (triggered by the event)

Cancel
Next >>

1
2
3

### Output management

---

**Output type selection**
Pull up to V+ (V out)

**Output status**

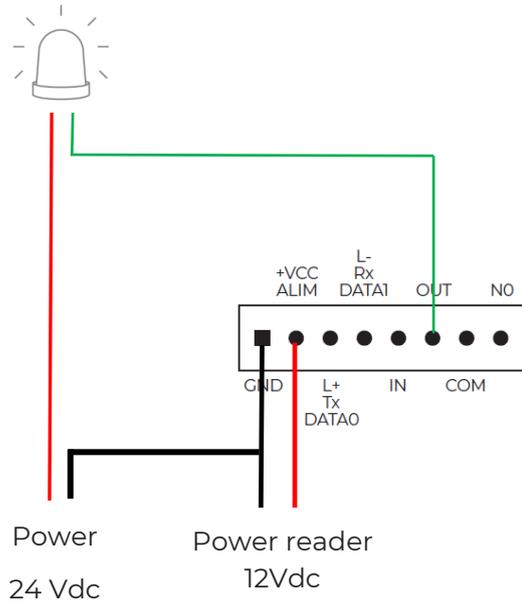
	Open	Closed	Maintain during detection
Output 1	<input checked="" type="radio"/>	<input type="radio"/>	<input type="checkbox"/>

Cancel
<< Previous
Next >>



### Connection

In this example, the optical warning operates at 24 Vdc.



### Operation

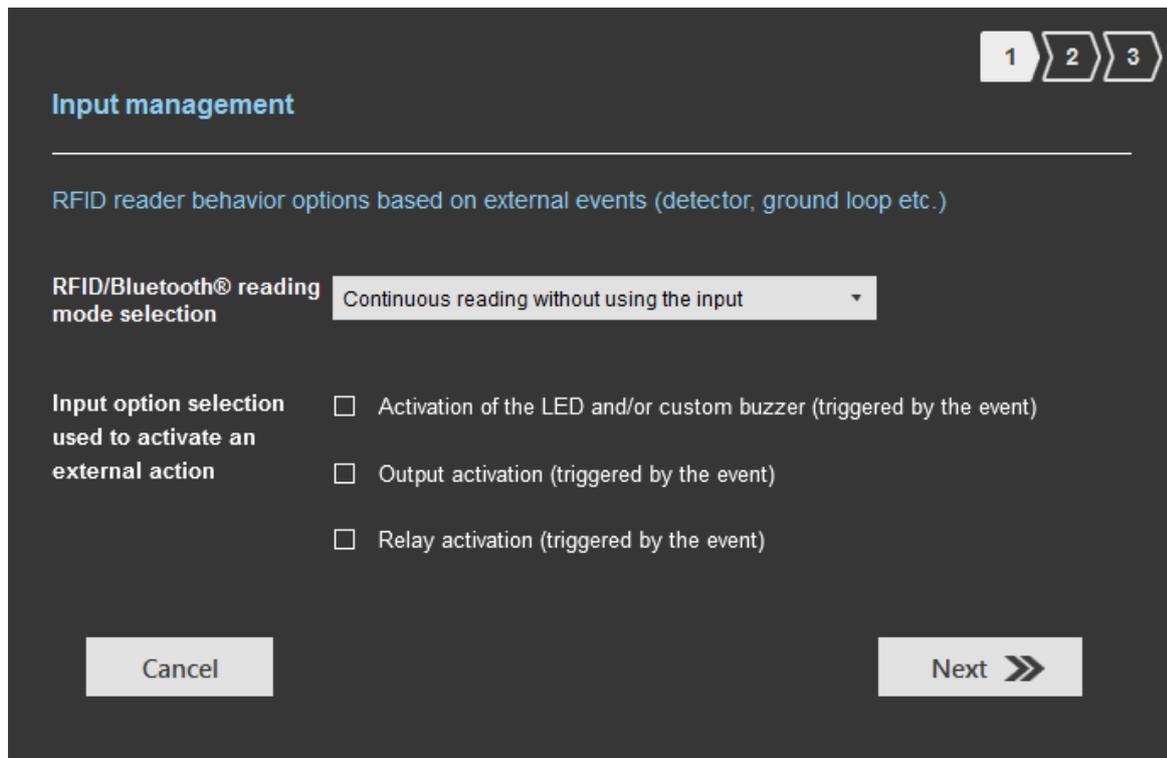
The reader reads continuously. In this example, when the reader sends a tag to the system, the state of output changes for 200 ms and returns to its normally open default position.



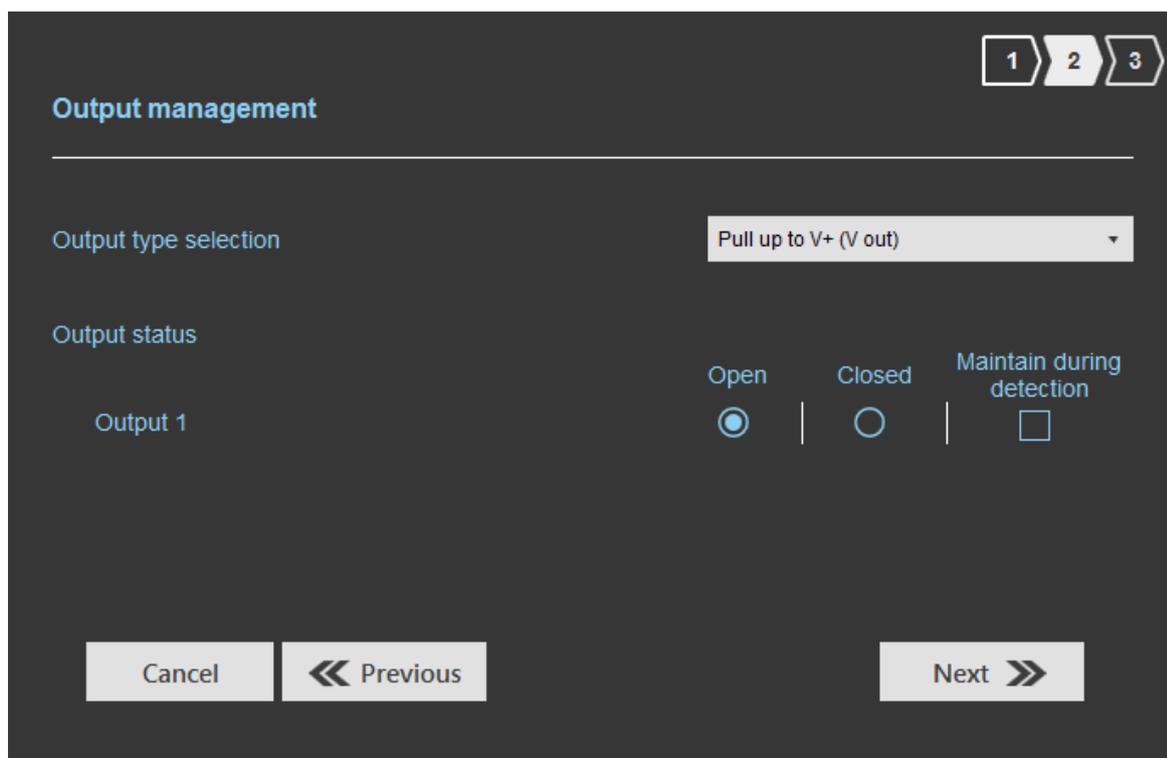
## 5.4 Internal relay

### 5.4.1 Activation of the relay on TAG detection

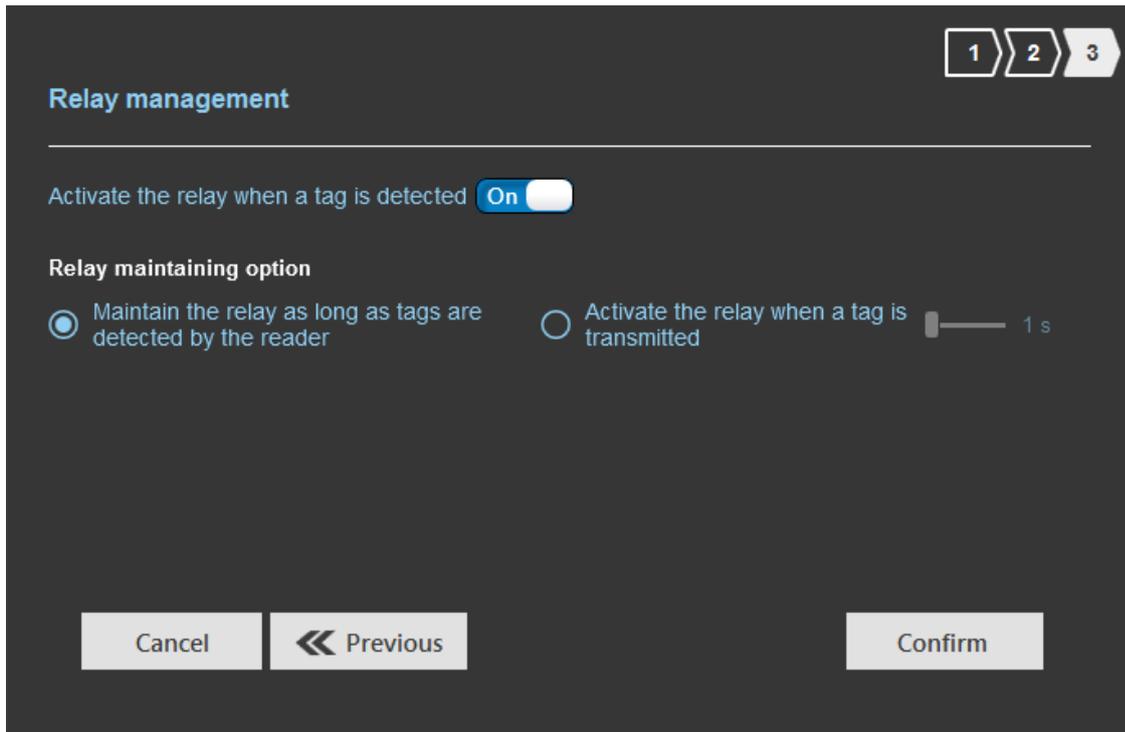
#### ULTRYS settings



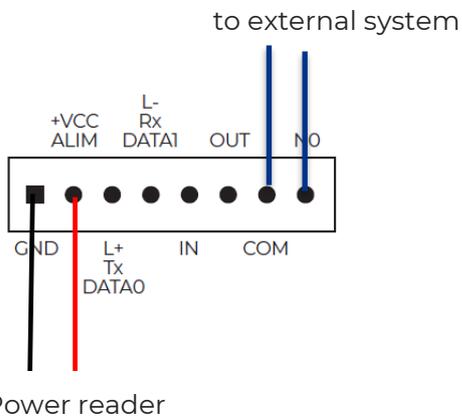
The screenshot shows the 'Input management' settings screen. At the top right, there are three numbered steps: 1, 2, and 3, with step 1 highlighted. The title 'Input management' is at the top left. Below the title is a horizontal line. The text 'RFID reader behavior options based on external events (detector, ground loop etc.)' is displayed. There is a dropdown menu for 'RFID/Bluetooth® reading mode selection' with the value 'Continuous reading without using the input'. Below this is a section titled 'Input option selection used to activate an external action' with three checkboxes: 'Activation of the LED and/or custom buzzer (triggered by the event)', 'Output activation (triggered by the event)', and 'Relay activation (triggered by the event)'. At the bottom, there are 'Cancel' and 'Next >>' buttons.



The screenshot shows the 'Output management' settings screen. At the top right, there are three numbered steps: 1, 2, and 3, with step 2 highlighted. The title 'Output management' is at the top left. Below the title is a horizontal line. The text 'Output type selection' is followed by a dropdown menu with the value 'Pull up to V+ (V out)'. Below this is a section titled 'Output status' with three radio buttons: 'Open', 'Closed', and 'Maintain during detection'. Under 'Output 1', the 'Open' radio button is selected. At the bottom, there are 'Cancel', '<< Previous', and 'Next >>' buttons.



### Connection



### Operation

The reader reads continuously. When a tag is sent back to the system by the reader, the relay is activated.

The duration of the relay being activated depends on the needs and requirement of the installation and it is configured in ULTRYS:

- maintain the relay as long as tags are detected by the reader
- maintain the relay for a period defined by the user.



## 5.4.2 Activation of the relay on event

### ULTRYS settings

1 2 3

#### Input management

RFID reader behavior options based on external events (detector, ground loop etc.)

RFID/Bluetooth® reading mode selection Continuous reading without using the input

Input option selection used to activate an external action

- Activation of the LED and/or custom buzzer (triggered by the event)
- Output activation (triggered by the event)
- Relay activation (triggered by the event)

Cancel Next >>

1 2 3

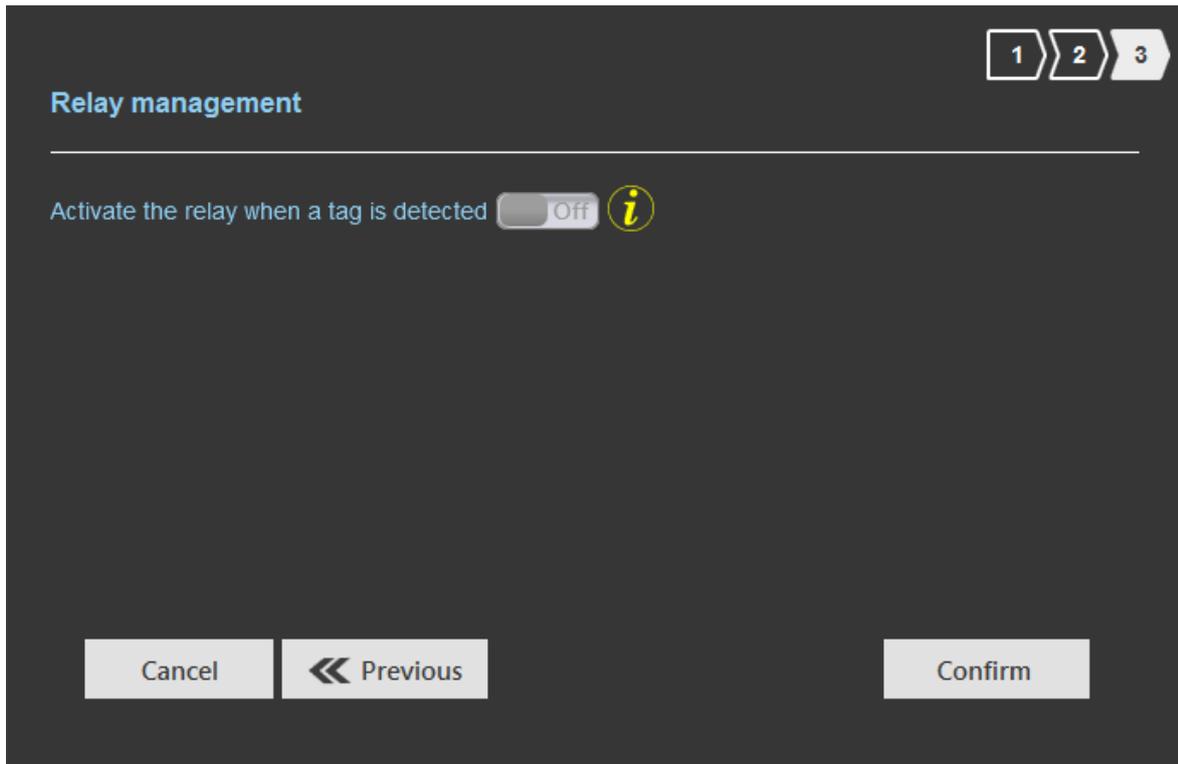
#### Output management

Output type selection Pull up to V+ (V out)

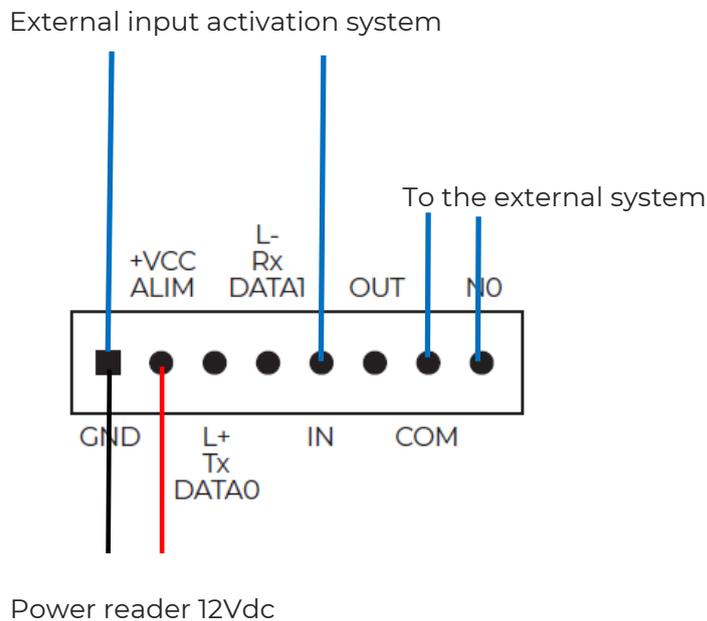
Output status

	Open	Closed	Maintain during detection
Output 1	<input checked="" type="radio"/>	<input type="radio"/>	<input type="checkbox"/>

Cancel << Previous Next >>



### Connection



### Operation

The reader reads continuously. Activation of the input IN by an external system triggers the activation of the relay.

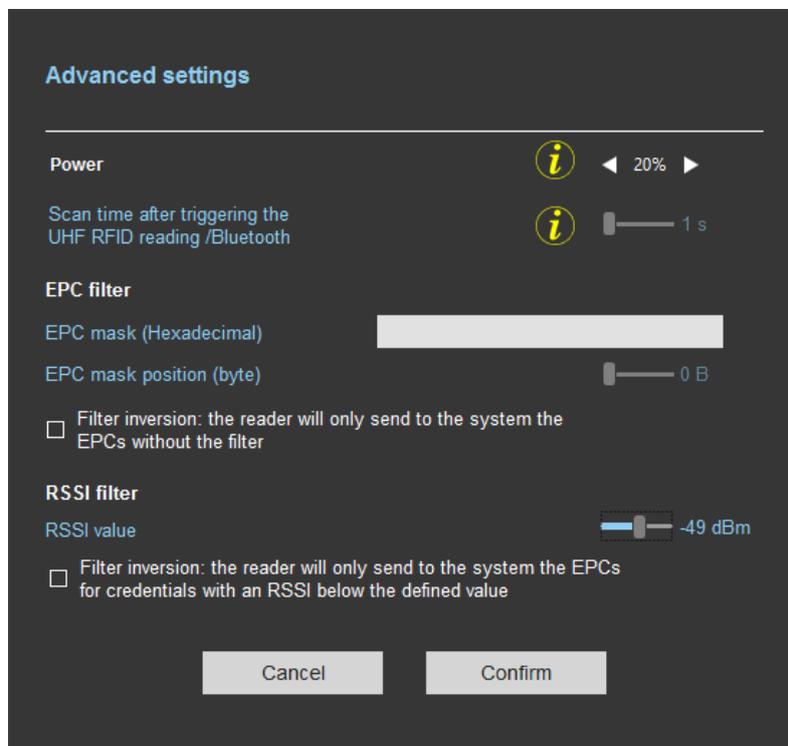


## 6- RSSI FILTERING

### 6.1 Introduction

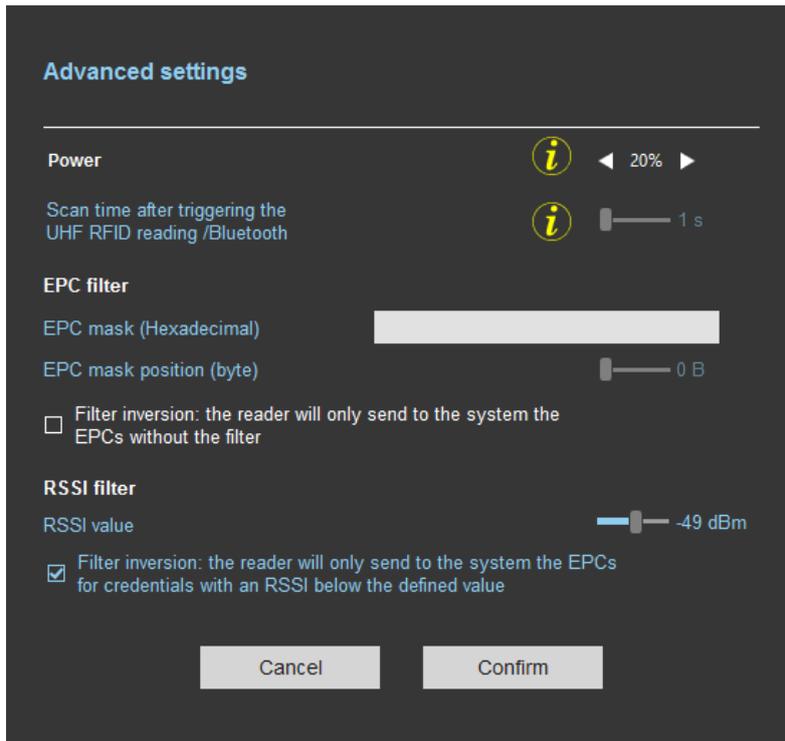
RSSI, or “Received Signal Strength Indication”, is a measurement indicating the strength of the response received from the tag. The value provided by the reader is proportional to the amplitude of the received signal.

### 6.2 Example

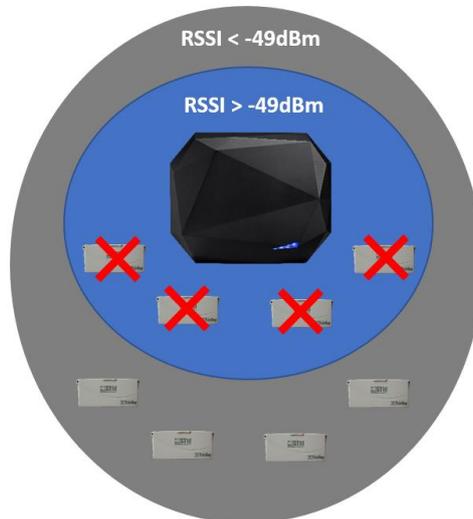


Tags with an RSSI higher than -49dBm are sent to the system. The others are not.





When “Inversion” is activated, tags with an RSSI lower than -49dBm are sent to the system. The others are not.





## 7- Installation methodology

- Position the tag inside the vehicle. **Do not hold the tag in your hand when performing validation tests.**
- Position the vehicle in the typical / preferred identification zone.
- Adjust the height and direction of the antenna until a reading is obtained successfully.
- Test the configuration with the vehicle in motion.
- Adjust the antenna until it produces an optimal result.

This configuration is optimized for the test vehicle. Ideally, these settings must also be configured using an alternative vehicle that is very different from the first one (higher windshield, LCV, etc.). This procedure will allow of support of as many use cases as possible.



## 8- FAQ

Question	Cause	Recommendation
My reader does not start up.	Insufficient voltage. Incorrect wiring.	Check the voltage at the terminals of the reader.  Use a regulated power supply.
Tags are not read even at a short distance.	Wrong configuration.	Check the configuration (ground loop, EPC filter or RSSI)
My tag cannot be identified due to an athermic windshield.	The tag is not positioned in a non-athermic section or the reader is too far from the vehicle.	Position the tag correctly in the non-athermic section or change the position of the reader.
The vehicle does not have a non-athermic section.		Change the position or the type of the tag.



## 9- VERSION

Date	Version	Description
24/03/2022	1.0	New document

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