Texense TPMS user guide

Table of contents

1. Introduction

Texense TPMS kit comprises of TPMS-IR21 or TPMS-RS21 wheel sensors, car receiver and the remote handheld unit. This document presents information about TPMS functionalities and how to use the remote handheld controller.

Warning: all sensors provided by Texys are paired with a unique customer ID ensuring that data are not readable by other customers. Only Texys can change pairing of sensors.

2. System description

A. TPMS-RH21 <-> TPMS-IR21 or TPMS-RS21

After unpacking, you should test each wheel sensor (IR21 or RS21) with the TPMS-RH21 controller. To do so, power the TPMS-RH21 and click on "ON" button with the remote controller close to (less than 60 cm) one or several sensors. Any sensors within range will wake up and display data. The four last digits of their serial number is displayed to confirm identification of sensors.

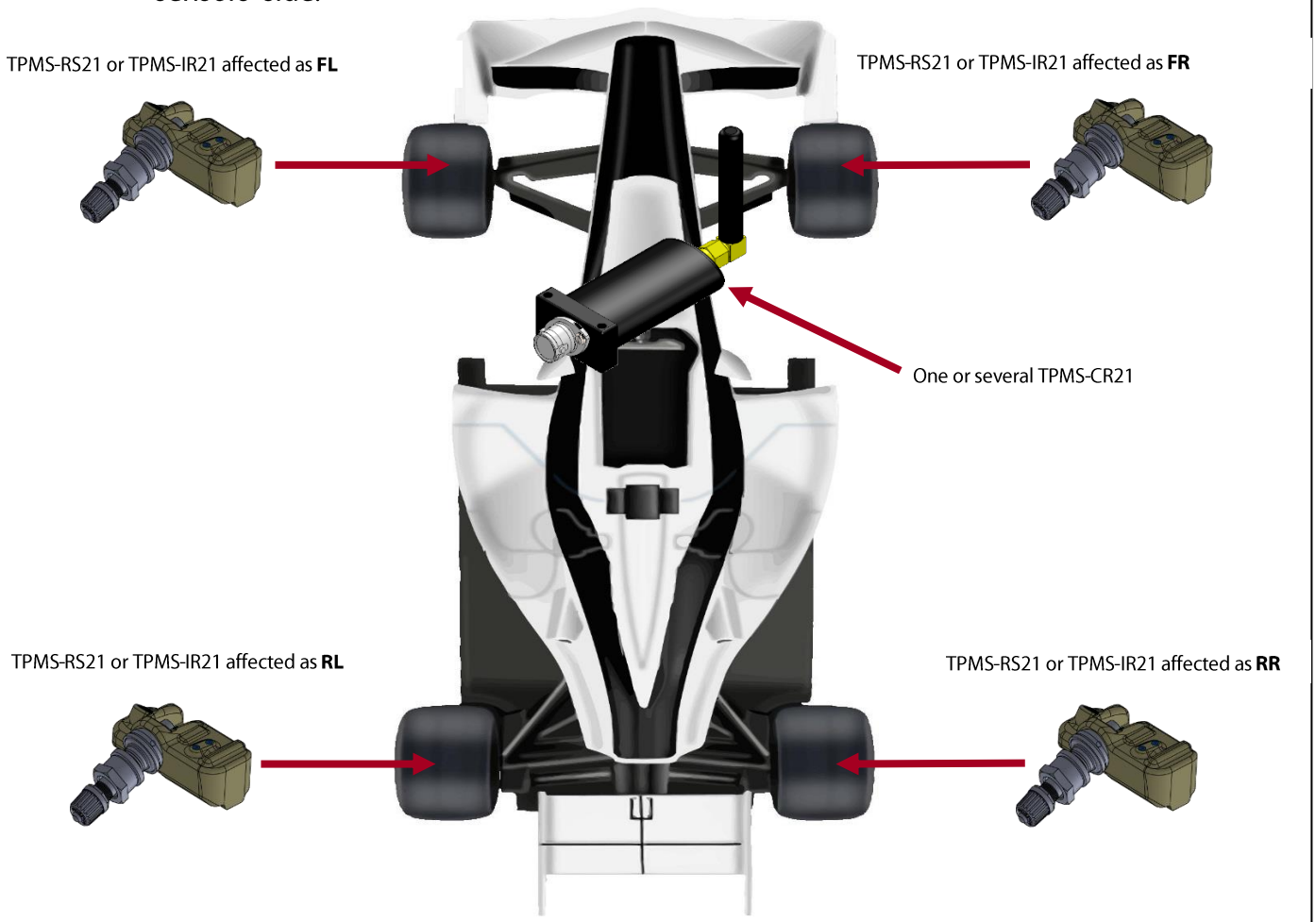
A. TPMS receiver <-> TPMS-IR21 or TPMS-RS21

The TPMS-CR21 and TPMS-WR21 are the receivers. Their role is to forward data collected wirelessly to the CAN bus of the car. Depending on the corner allocation you want to use, you will have TPMS-WR21(automatic corner recognition) or TPMS-CR21(manual corner allocation).

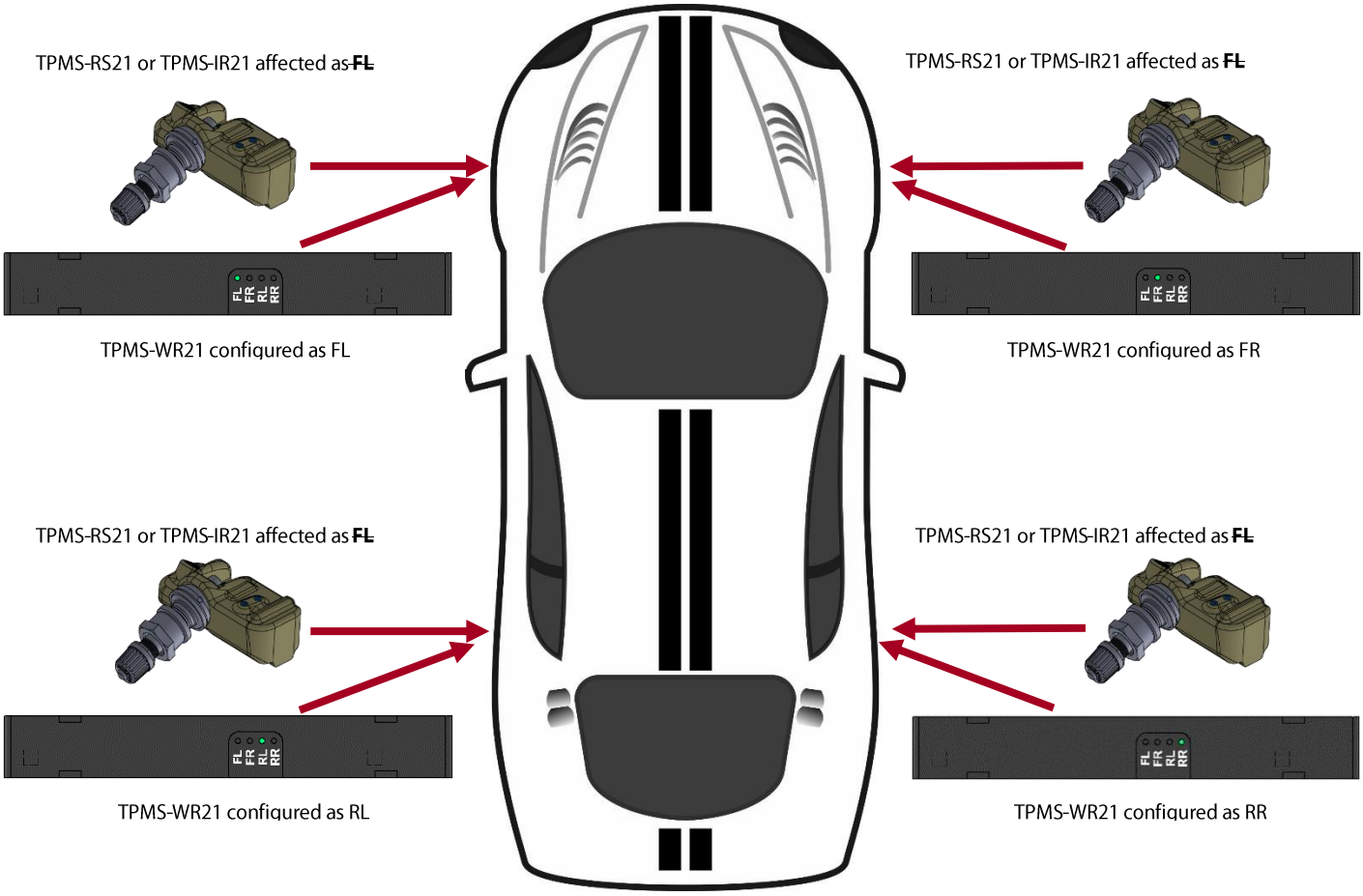
1. Corner selection

TPMS system can work in two ways:

1. Manual corner selection: in this case you select on which corner each sensor (TPMS-RS21 or TPMS-IR21) will be affected manually thanks to the TPMS-RH. You need to use TPMS-CR21 for this use case. In this case, corner allocation is saved on the sensors' side.



2. Automatic corner selection: in this case the selected corner in the sensor (TPMS-RS or TPMS-IR21) is not taken into account, only the corner affected to the TPMS-WR21 is used to determine on which corner the sensor is located. In this case, corner allocation is saved on the TPMS-WR21 side.



2. Car ID selection

Each receiver has a ***Car ID***. This parameter should be unique per vehicle. It ensures that 2 different cars will not receive data of TPMS mounted on another car. ***Car ID*** can be set at the factory on customer's request or directly by the customer thanks to the Texense tSIB (smart interface box). To know the address of ***Car ID*** parameter, please refer to the Specification sheet delivered with the receiver.

After you chose and set up your ***Car ID*** on the TPMS-CR21 side, you should modify the ***CAR ID*** on the TPMS-IR21 or TPMS-RS21 wheel sensor. TPMS-RH must be used to modify a sensor's parameter. Please consult TPMS-RH21 remote controller for further help.

3. Corner allocation on TPMS-CR21

TPMS-CR21 does not know which sensor will be mounted on which corner. For example, if you decided to mount the sensor with serial number SN20062020 on front left position, it will not be aware of it.
The corner setup is written within the sensors (TPMS-IR21 or TPMS-RS21) parameters. It is very important to modify ***Corner*** parameter of each TPMS-IR21 or TPMS-RS21 to have consistent data on the CAN bus. The corner setup is done with TPMS-RH, with the same procedure as the ***Car ID***.

If the wheel has been fitted with a TPMS-IR21 or TPMS-RS21 and you decided to change the corner afterward, there is no problem, you can change corner parameter on fitted wheel with the TPMS-RH21.

When the parameters ***Car ID*** and ***Corner*** are set up on all your wheel sensors, the TPMS-CR21 is ready to receive data. To test your setup with TPMS-CR21, ensure the TPMS sensors are awake by pressing "ON" button of the TPMS-RH21. You should see the same sensors on the TPMS-RH and the TPMS-CR21 except the TPMS-CR21 filters out TPMS with a different ***Car ID***.

4. Corner recognition on TPMS-WR21

TPMS-WR21 provides automatic corner recognition, allowing teams to swap tires without reprogramming sensors with TPMS-RH21. To do so, one TPMS-WR21 must be mounted on each wheel, as close as possible from the wheel sensor.
Each TPMS-WR21 is allocated to a corner, please refer to the TPMS-WR21 specification sheet to learn more about corner programming on TPMS-WR21.

To communicate with a sensor, TPMS-WR21 and sensor must have the same **Car ID**. If TPMS-WR21 receives frames from a sensor with a different **Car ID**, frame will be dismissed as it is supposed to be a sensor mounted on a different car.

3.TPMS sensor

In order to optimize the battery lifetime, a power management strategy is used that takes into account the environment of the sensor (acceleration, pressure, temperature).

A. Status diagram

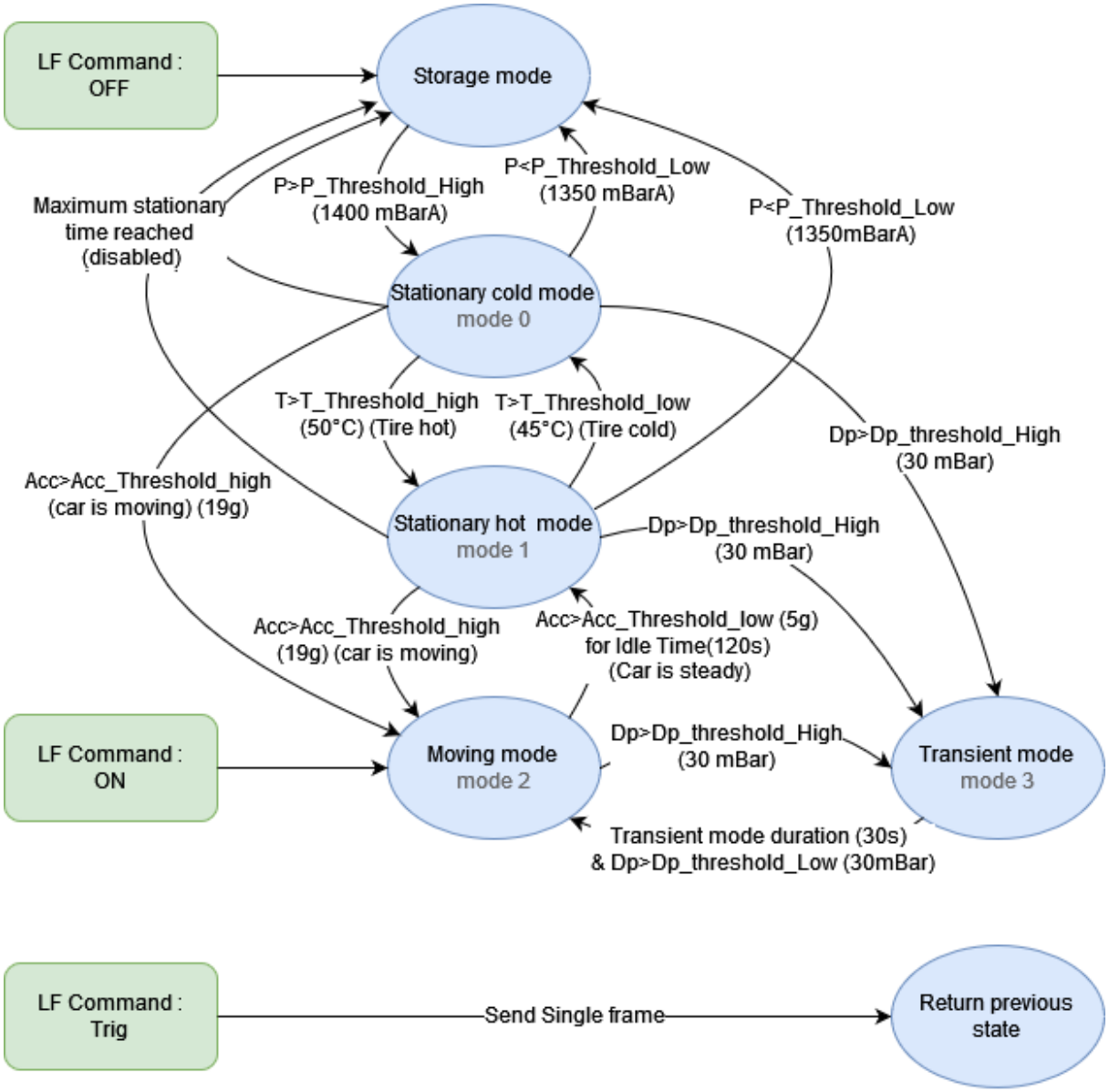


Figure 1: Power modes transitions, phase diagram

Power mode	Condition	Data sent (TPMS-RS21)	Data sent (TPMS-IR21)
Storage	Deflated tyre	No Transmission	No Transmission
Stationary, cold wheel	Inflated tyre, no movement, Temperature <= 50°C	Every 10 seconds: AT, BT, P, RH	Every 10 seconds: AT, BT, P, RH
Stationary, hot wheel	Inflated tyre, no movement, Temperature > 50°C	Every 10 seconds: AT, BT, P, RH	Every 10 seconds: AT, BT, P, RH, RT, TT
Moving	Inflated tyre, movement, Temperature > 50°C	Every 1 second: AT, BT, P, RH	Every 1 second: AT, BT, P, RH, RT, TT
Transient	Puncture detected	Every 0.5 second: AT, BT, P, RH	Every 0.5 second: AT, BT, P, RH, RT, TT

Table 1: Power mode definition

Data acronym:

- **AT:** Air Temperature
- **BT:** Board Temperature
- **P:** Pressure
- **RH:** Relative humidity
- **RT:** Rim Temperature (TPMS-IR only)
- **TT:** Tyre Temperature (TPMS-IR only: 5 Infrared spots available amongst 14)

B. Transition definitions

(1) **Inflated tire:** Absolute pressure is higher than a ***High-pressure threshold***. (default 1400mbarA (20.3PSI) ±100mbar for more than 6 minutes.)

(2) **Deflated tire:** Absolute pressure is less than a ***Low-pressure threshold*** (default 1350mbarA (19.58PSI) ±100mbar for more than 1 minute.)

(3) **Car is moving:** At least one accelerometer axis is higher than ***High acceleration threshold***. (*default value= 19G)*.

(4) **Car is steady:** accelerometer's 3 axis slopes lower than the ***Low acceleration threshold***. *(default value=5G)* for xx seconds where xx is the configurable ***inactivity timer*** *(default value=120s)*.

(5) **Puncture detected:** the pressure variation is higher than ***Pressure variation threshold*** PSI/min *(default value=2.9PSI/min)*.

(6) **Puncture timer elapsed:** a timer is launched when we enter the puncture mode. When the timer has elapsed after **Puncture timer** *(default value=30s)*, this condition becomes true.

All thresholds and parameters in bold are user-configurable thanks to the remote controller. They can also be set in factory upon customer request.

C. Pressure thresholds

Pressure thresholds are meant to switch sensors OFF, as soon as no pressure has been detected. This mode is intended to be used when the wheels are stacked and not used.
There are two thresholds:

- The ***pressure high threshold*** determines when a sensor will switch from Storage state to Stationary cold state.
- The ***pressure low threshold*** determines when a sensor will switch from Stationary cold state or Stationary hot state to Storage state.

User can modify the threshold values with the TPMS-RH21 to match their inflation pressure. You must **always** have ***Pressure high threshold*** > ***Pressure low threshold***. Otherwise, the sensor will send a wrong parameter diagnostic bit and will stay in Moving mode to prevent data loss.

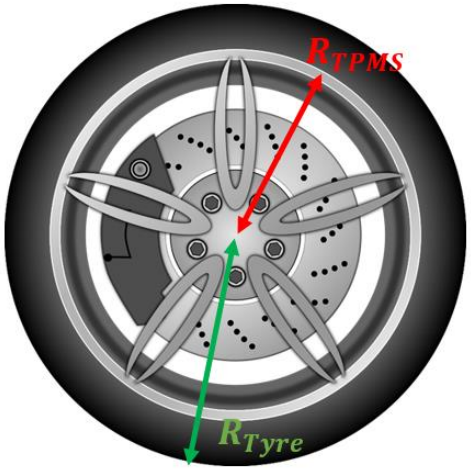
D. Temperature thresholds

Temperature thresholds are used to switch between Stationary cold and Stationary hot modes. There is no difference in behavior between these two modes for TPMS-RS21, but they are used to keep consistency with TPMS-IR21 behavior. For TPMS-IR21, the sensor will send only restricted data when in Stationary cold mode, whereas it will send all data in Stationary hot mode. Please refer to Table 1: Power mode definition for further information.

Stationary hot mode is meant to be entered when the wheels are steady in the oven or under a blanket, ready to be mounted. Temperature thresholds should be modified to match user pre-heating temperature.
You must **always** have ***Temperature high threshold*** > ***Temperature low threshold***. Otherwise, the sensor will send a wrong parameter diagnostic bit and will stay in Moving mode to prevent data loss.

E. Acceleration thresholds

Sensors monitor acceleration value to detect when the race starts. This is used to enter the higher consumption mode, which provides more data. The main acceleration the sensor endures is the centrifugal acceleration. It can be calculated depending on wheel radius and wheel speed:



$$Acceleration = \frac{Speed^2}{9.81}.\frac{R_{TPMS}}{{R_{Tyre}}^2}$$

With Speed in m/s, radius in m and acceleration in g.

Or:

$$Acceleration = \frac{Speed^2}{127.1}.\frac{R_{TPMS}}{{R_{Tyre}}^2}$$

With Speed in km/h, radius in m and acceleration in g.

Or:

$$Acceleration = \frac{Speed^2}{49}.\frac{R_{TPMS}}{{R_{Tyre}}^2}$$

With Speed in mph, radius in m and acceleration in g.

Example:

$R_{TPMS} = 0.21m$ $R_{Tyre} = 0.28m$

Start speed: 30km/h

$$Acc\_high\_threshold = \frac{30^2}{127.1}.\frac{0.21}{0.28^2} = 19g$$

Stop speed: 15km/h

$$Acc\_low\_threshold = \frac{15^2}{127.1}.\frac{0.21}{0.28^2} = 5g$$

The sensor will quit moving state if measured acceleration is lower than ***Acceleration low threshold*** for ***Inactivity timer*** duration.

You must **always** have ***Acceleration high threshold*** > ***Acceleration low threshold***. Otherwise, the sensor will send a wrong parameter diagnostic bit and will stay on Moving mode to prevent data loss. The ***Acceleration low threshold*** should not be lower than 5g to ensure that noise measurement will not prevent power mode transition.

F. Transient mode thresholds

Transient mode is intended to provide more data in case of puncture. To do so, the system monitors pressure variation between each sample. If pressure variation is higher than ***Dp threshold high***, the sensor will go to transient mode for the ***Transient mode duration***. If the pressure variation threshold is reached while in Transient mode, the time counter will restart from zero to maintain transient state longer.

G. Maximum stationary time

If wheels are not deflated after a race, sensors will stay in Stationary state as long as they are not manually switched off with TPMS-RH. User can define a maximum duration for the stationary state to preserve battery in case the TPMS is accidentally left on and pressured. This feature is disabled by default (***Maximum stationary timer*** is zero, meaning it is disabled).

There are two options to wake up the sensor if this feature is triggered and a sensor goes into storage state whilst inflated:

- **Send "ON" signal with TPMS-RH.**
- **Deflate tyre under *Pressure low threshold* for 10 minutes, inflate it back, higher than *Pressure high threshold,* and wait again 10 minutes.**

H. Diagnostics

Two bytes are sent by TPMS-IR21 and TPMS-RS21 to help troubleshooting. The **StartDiag** byte provides details on why a sensor woke up. The description of this byte is available in TPMS-CR21 Specification sheet.

The **Diagnostic** Byte warns user of important error.

- ***Invalid parameters*** bit is set if the parameters set by the user is not consistent. The user must check that each high threshold value is higher than corresponding lower value with the TPMS-RH21.
- Other failure code means there is a hardware failure on the TPMS. User can try to restart the sensor with the TPMS-RH21 to remove the error.

If one bit of ***Diagnostic*** Byte is set, the sensor will stay in moving mode to prevent data loss.

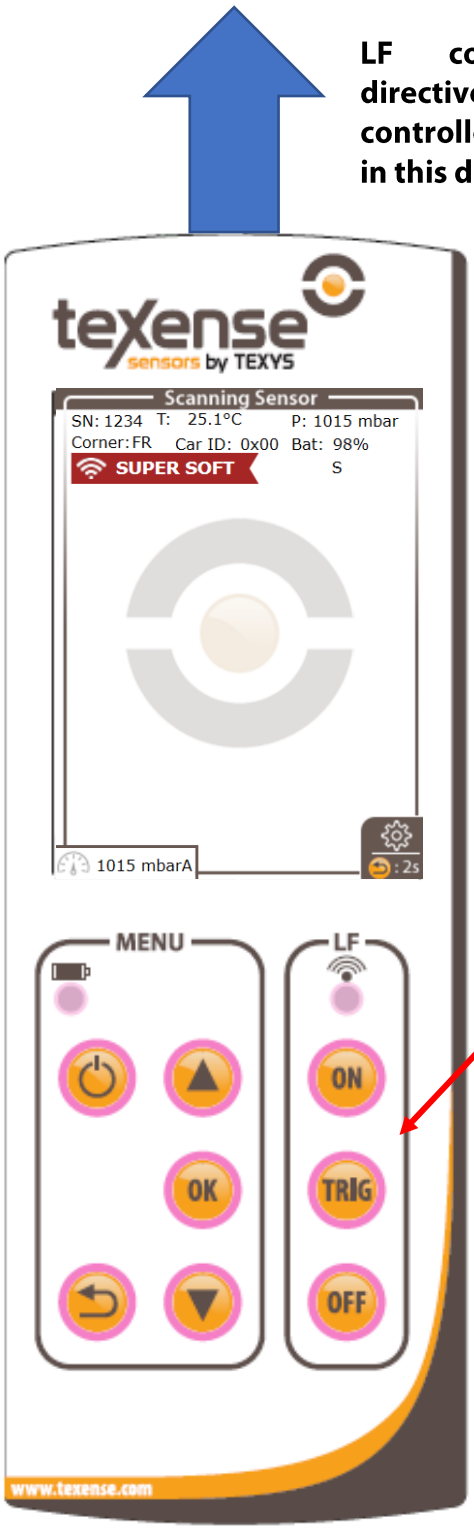
I. Forced ON or Forced OFF state (LF command)

Force ON - When a sensor is forced ON by the ON button of TPMS-RH21, it will go in moving state without checking pressure, acceleration or temperature thresholds. The sensor will automatically go back into stationary cold or stationary hot mode if it is steady for more than inactivity timer seconds.

Force OFF – To force the sensor OFF the user sends the OFF command using TPMS-RH21. The sensor will go into production storage mode, without checking pressure, temperature or acceleration thresholds. **It will stay in Production storage mode until it is woken up with an ON command with TPMS-RH21**. It will also leave Production storage mode if the tyre is deflated (Pressure < Low-pressure threshold) for more than 6 minutes and inflated again (Pressure > High-pressure threshold).

4. TPMS-RH21 remote controller

A. Scanning page



Scanning page is the default page accessible after start-up. All sensors are displayed line by line with the following data:

- Affected corner: corresponding to the position of the sensor.
- Serial number of the sensor.
- CarID of the sensor.
- Internal temperature of the sensor (in °C or °F)
- Type of sensor (TPMS-IR21 or TPMS-RS21)
- Tire pressure in absolute (in mbar or PSI), (can be absolute or relative depending on TPMS-RH configuration, see Main menu)
- Remaining battery life of the sensors in % and battery voltage in V.

From scanning page, user can go to data page to see more information regarding a specific sensor.

Two methods are available to access the data mode of a sensor:

1. Either with the touch screen:

   Clicking on a "sensor" line in the drop-down list.

2. Or with the buttons:

These buttons allow to go up and down in the drop-down list.

This button validates the choice of sensor in the drop-down list and allows access to the data sensor page.

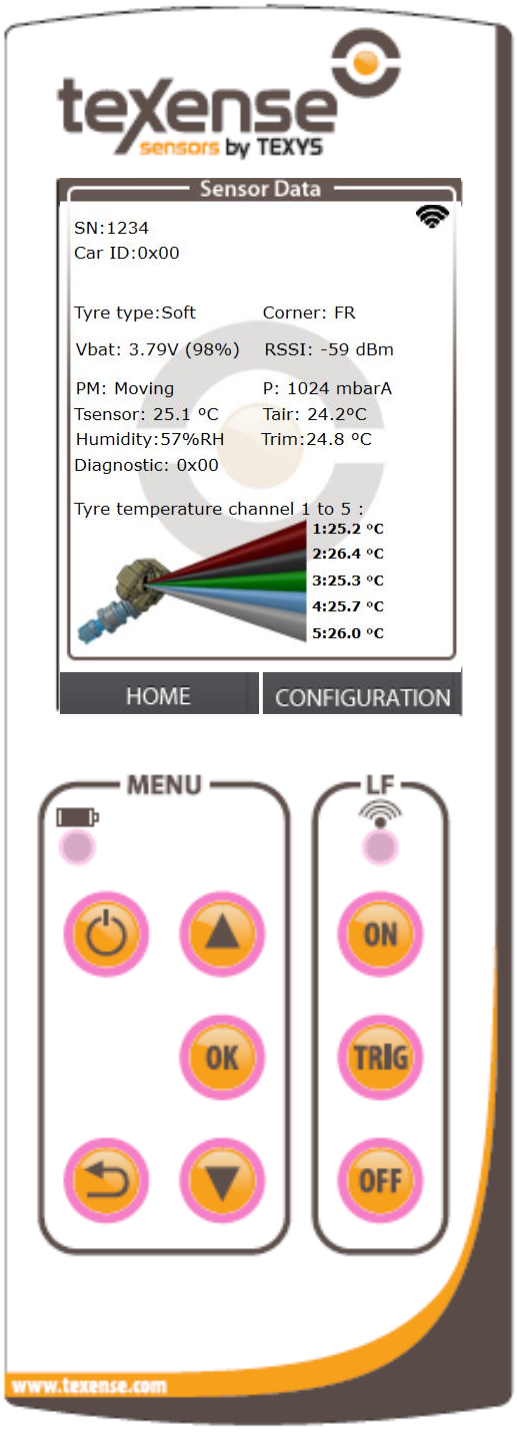
These buttons turn the selected sensor ON or OFF. The ON button turns on all the sensors in range of the remote control and belonging to the team. The OFF button turns off the sensor highlighted in the list.

This button turns the TPMS-RH on or off. A short press turns off the remote controller. It is possible to force a hardware shutdown by pressing  for 5 seconds.

This button clears and refreshes all the data in the sensor list.
Hold this button for 2 s to access main menu.

User can also access main menu of the TPMS-RH from scan page, either with touchscreen, by clicking on the gear  on bottom right of the screen, or by holding the  button for 2 seconds.
Atmospheric pressure measurement is displayed on bottom left corner if available.

B. Data page


Sensor Data
SN:1234
Car ID:0x00
Tyre type:Soft
Corner: FR
Vbat: 3.79V (98%)
RSSI: -59 dBm
PM: Moving
P: 1024 mbarA
Tsensor: 25.1 °C
Tair: 24.2°C
Humidity:57%RH
Trim:24.8 °C
Diagnostic: 0x00
Tyre temperature channel 1 to 5 :
1:25.2 °C
2:26.4 °C
3:25.3 °C
4:25.7 °C
5:26.0 °C
HOME
CONFIGURATION
MENU
LF
ON
OK
TRIG
OFF
www.texense.com

This page displays:

- Serial number.
- CarID.
- RSSI.
- Tyre type.
- Corner.
- Temperature of the sensor (in ° C or °F).
- VBat (in % and V)
- Pressure (can be absolute or relative depending on TPMS-RH configuration, see Main menu)
- Power mode.
- Diagnostics (value different from 0x00 indicates an error, please see specification sheet of product for more information)
- Humidity (in %RH).
- Air temperature (in ° C or °F).

For TPMS-IR21 only:

- Rim temperature (in °C or °F)
- 5 infrared spots of internal tyre temperature (in °C or °F).

Many functions are available:

1. Either with the touch screen:

HOME This button allows to return to Scanning Mode menu.

CONFIGURATION This button allows to enter sensor configuration menu.

2. Or with the buttons:

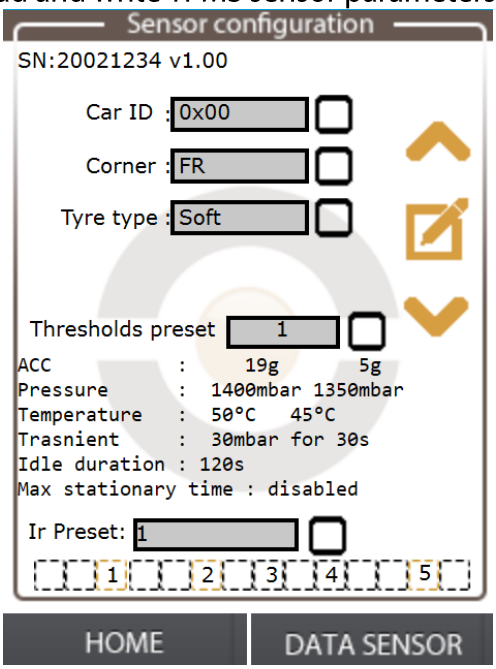
These buttons allow to wake up or turn off only the current sensor.
if the sensor successfully falls asleep, then the remote control returns to the main menu


This button allows to go back in Scanning Mode menu.

This button allows to go to the configuration page of the currently selected sensor.

C. Configuration page

This page is intended to read and write TPMS sensor parameters.



Change a value with keyboard:

1. Use ▼ and ▲ to change selected field.
2. Press OK to enter in edit mode. The box colour of the edited field turns white, indicating you entered in edit mode.
3. Use ▼ and ▲ to change the value of the selected field.
4. Press OK to validate your modification. Ensure you are within 60cm of sensor when sending new parameter.

Change a value with touchscreen:

1. Click on the field you want to modify.
2. Use ^ and ˅ arrows on screen to change field's value.
3. Validate your modification by clicking on ✎.

In any case:

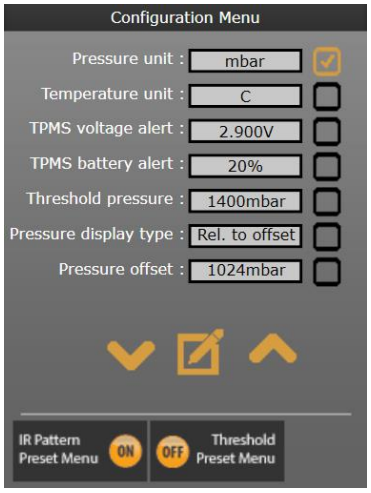
The box will turn orange to indicate that a communication is ongoing. If the parameter has successfully been modified, the box turns green. If the box turns red, the remote controller was not able to change the parameter, you should try closer to the sensor.

Numbers indicated in IR preset and thresholds preset correspond to the user-defined presets. These presets can be edited in the corresponding menu, accessible from main menu.

⚠ **Warning: The writing operation uses LF functions so it is necessary to be close to the tyre (60cm max) to have this functionality working.**

D. Main menu

Main menu is accessible from scan page, either with touchscreen, by clicking on the gear on bottom right of the screen, or by holding the button of the keyboard.



All configurable items of this menu will configure the behavior of the TPMS-RH21 only, it will not affect the sensors (TPMS-IR21 or TPMS-RS21).

This menu contains the following settings:

- Pressure unit (mbar or PSI) corresponds to the pressure unit displayed on the remote controller.
- Temperature unit (°C or °F) corresponds to temperature unit displayed on the remote controller.
- Battery thresholds are used to define the limit values for TPMS-IR and TPMS-RS21 sensors. If battery of a sensor is below one of those thresholds, the battery voltage and remaining percentage will be displayed in red. Texys recommends to use 20% and 2.9V as battery thresholds.
- Pressure threshold is used to display pressure in red if the readout pressure of a sensor is lower than this threshold.
- Pressure display type enables to display all sensor's pressures in relative or absolute. It can be relative to the atmospheric pressure measured by TPMS-RH (if available) or relative to a fixed offset.
- Pressure offset only appear if pressure type is relative to offset. This field sets the offset value to be used.

Change a value with keyboard:

1. Use and to change selected field.
2. Press to enter in edit mode. The box colour of the edited field turns white, indicating you entered in edit mode.
3. Use and to change the value of the selected field.
4. Press to validate your modification.

Change a value with touchscreen:

1. Click on the field you want to modify.
2. Use and arrows on screen to change field's value.
3. Validate your modification with by clicking on .

Validation:

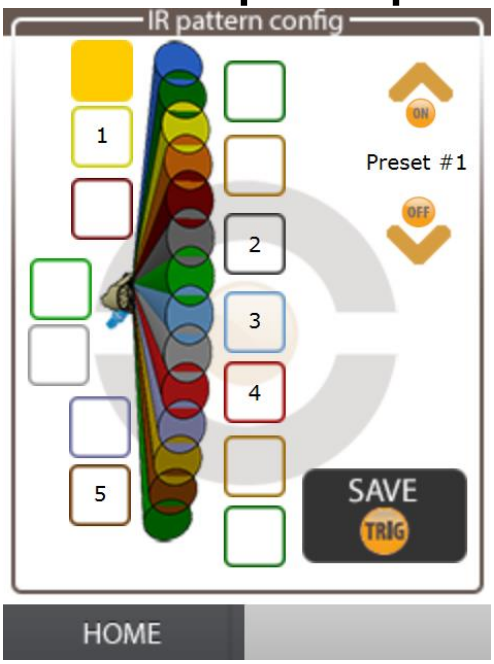
The box will turn orange to indicate that a communication is ongoing. If the parameter has successfully been modified, the box turns green.

Two other menus are accessible from this screen:

- IR pattern presets menu: this menu is used to configure the 4 infrared presets available for TPMS-IR. You can access this screen either by clicking on screen or by clicking on the button of the keyboard.

- Threshold preset menu: this menu is used to configure the 4 power mode thresholds presets available. You can access this screen either by clicking on screen or by clicking on the OFF button of the keyboard.

E. IR pattern presets menu



TPMS-IR has 14 channels infrared sensor to monitor inner liner temperature of the tyre. Only 5 channels among the 14 available are sent over RF for monitoring. In the IR pattern presets menu, you can define up to 4 different infrared pattern presets corresponding to different mounting.

In a TPMS-IR configuration's screen you will be able to choose which pattern among the 4 predefined has to be used.

A pattern should always be composed by 5 different spots. Those 5 spots are automatically numbered from 1 to 5 with the same order as the 14 channels.

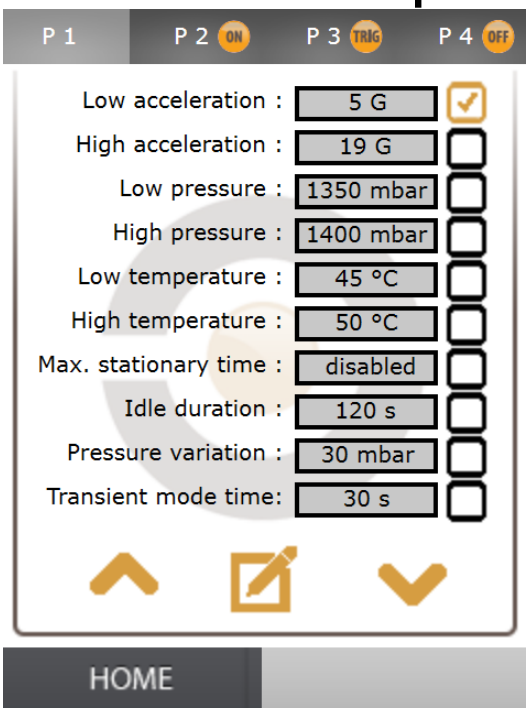
Add / remove a spot with keyboard:

1. Use ▼ and ▲ to change selected spot.
2. Press OK to toggle spot state. You cannot enable more than 5 spots.
3. Press TRIG to save your modification in current preset.
4. Use ON and OFF to change current preset.

Add / remove a spot with touchscreen:

1. Directly click on a spot to toggle its state. You cannot enable more than 5 spots.
2. Click on save button to save your modification in current preset.
3. Use ^ and v to change current preset.

F. Thresholds preset menu



Power management of sensors are ruled by some physical thresholds as described in Transition definitions. The remote can store up to 4 different presets of power mode thresholds. Those 4 different presets can be configured in Threshold preset menu.

Power mode thresholds preset will not be saved if it contains inconsistent value, for example if high threshold is lower than low threshold of a same physical value.

Change a value with keyboard:

1. Use ▼ and ▲ to change selected field.
2. Press OK to enter in edit mode. The box colour of the edited field turns white, indicating you entered in edit mode.
3. Use ▼ and ▲ to change the value of the selected field.
4. Press OK to validate your modification.
5. Use ON, TRIG or OFF to change the current preset you want to edit.

Change a value with touchscreen:

1. Click on the field you want to modify.
2. Use ^ and v arrows on screen to change field's value.
3. Validate your modification with by clicking on ✎.
4. To change the current preset you want to modify, click on its number on the button located on the top of the screen.

Validation:

The box will turn orange to indicate that a communication is ongoing. If the parameter has successfully been modified, the box turns green.

G. Configuration of TPMS-RH21 parameters

The remote controller can be configured through USB. It is seen as a USB storage device when you connect it through the USB port. In this USB storage device, an editable file called "config.ini" allows to change the configuration of the remote control. It may also be useful to quickly copy a configuration from one TPMS-RH21 to another.

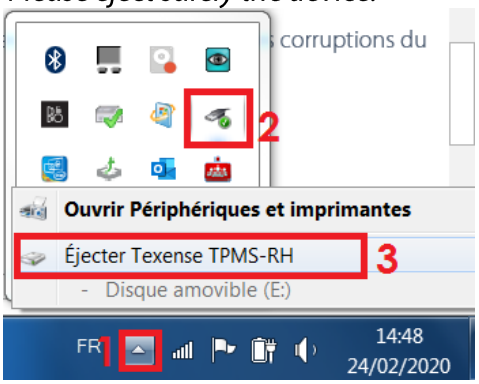
Warning: ***It is highly important to follow the following procedure to connect through USB:***

1. Turn OFF the remote controller.
2. Connect it to a computer through USB.
3. Open the config.ini file
4. Modify the file with your parameters:

```
/*
 * TPMS_RH Configuration file
 */

/*
 * Pressure unit : specify either mbar or psi to get pressures in mbar or psi.
 */
pressureunit:mbar

/*
 * Temperature unit : specify either C or F to get temperatures in °C or °F.
 */
temperatureunit:C

/*
 * Battery threshold for TPMS-RS : specify the critic threshold in V.
 * TPMS-RS with VBat lower than this threshold will appear in red.
 * For example 2.9 sets thresholds to 2.9V.
 */
batterythresholdRS:2.9

/*
 * Battery threshold for TPMS-S : specify the critic threshold in V and the critic threshold in percent of battery life.
 * TPMS-S with VBat lower than the Vbat threshold or with battery life lower than battery life threshold will appear in red.
 * For example 2.9:20 sets thresholds to 2.9V and 20.
 */
batterythresholdS:2.9:20

/*
 * Pressure threshold : specify the critic pressure threshold. Unit depends on pressure unit above :
 * If pressure unit is mbar, threshold should be specified in mbars for example 1350 for 1350mbar.
 * If pressure unit is PSI, threshold should be specified in PSI for example 19.6 for 19.6PSI.
 * TPMS with pressure lower than the pressure threshold will appear in red.
 */
thresholdpressure:1400

/*
 * Car ID mask : specify if the TPMS-RH should receive TPMS from all car or for a specific car ID :
 * To receive all Car ID, write "carmask:all".
 * To receive only TPMS with Car ID 1, write "carmask:1".
 */
carmask:all

/*
 * IR pattern presets : specify up to 4 prefered infrared pattern setup :
 * In order to make IR pattern preset #2 Ch3 Ch5 Ch7 Ch 10 Ch14, write IR_Preset_2:3,5,7,10,14
 * Each preset should have exactly 5 spots.*/
IR_Preset_1:3,6,8,10,13
IR_Preset_2:3,6,8,10,13
IR_Preset_3:3,6,8,10,13
IR_Preset_4:3,6,8,10,13

/*
 * Powermodes thresholds presets : specify up to 4 prefered powermode thresholds presets :
 */


/* Power Mode Threshold :
 *                                  Preset #1 */
PWR_Mode_Preset_1.Pressure:1400,1350
PWR_Mode_Preset_1.Acceleration:19,5
PWR_Mode_Preset_1.Temperature:50,45
PWR_Mode_Preset_1.Puncture_threshold:30
PWR_Mode_Preset_1.Transient_mode_duration:30
PWR_Mode_Preset_1.Auto_sleep_time:0
PWR_Mode_Preset_1.Idle_timeout:120
```

```
/* Power Mode Threshold :
 *                              Preset #2 */
PWR_Mode_Preset_2.Pressure:1400,1350
PWR_Mode_Preset_2.Acceleration:19,5
PWR_Mode_Preset_2.Temperature:50,45
PWR_Mode_Preset_2.Puncture_threshold:30
PWR_Mode_Preset_2.Transient_mode_duration:30
PWR_Mode_Preset_2.Auto_sleep_time:0
PWR_Mode_Preset_2.Idle_timeout:120


/* Power Mode Threshold :
 *                              Preset #3 */
PWR_Mode_Preset_3.Pressure:1400,1350
PWR_Mode_Preset_3.Acceleration:19,5
PWR_Mode_Preset_3.Temperature:50,45
PWR_Mode_Preset_3.Puncture_threshold:30
PWR_Mode_Preset_3.Transient_mode_duration:30
PWR_Mode_Preset_3.Auto_sleep_time:0
PWR_Mode_Preset_3.Idle_timeout:120


/* Power Mode Threshold :
 *                              Preset #4 */
PWR_Mode_Preset_4.Pressure:1400,1350
PWR_Mode_Preset_4.Acceleration:19,5
PWR_Mode_Preset_4.Temperature:50,45
PWR_Mode_Preset_4.Puncture_threshold:30
PWR_Mode_Preset_4.Transient_mode_duration:30
PWR_Mode_Preset_4.Auto_sleep_time:0
PWR_Mode_Preset_4.Idle_timeout:120
```

5. *Save the file*
6. *Close the file*
7. *Please eject safely the device:*



8. *Turn OFF the remote controller*
9. *Disconnect physically the remote controller*
10. *Turn ON the controller **<u>without</u>** the USB connection.*

When under the thresholds, the values are displayed in red characters on the screen.

H. Charging

It is possible to charge the remote controller by plugging the provided USB type B cable. The full charge time is around 4 hours. Battery lifetime in nominal condition is around 5 hours.

Led is orange in charge, turning green if charge complete

5. TPMS-RS21 and TPMS-IR21 mounting

A. Valve installation

Valve kit

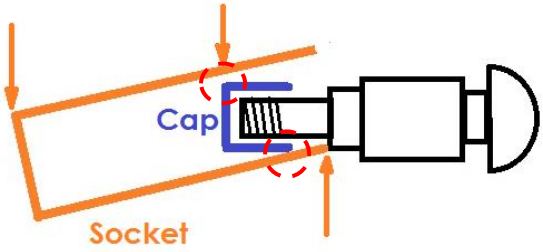
Inside rim Outside rim

Valve mounting tool

Remove traces of grease from the TPMS installation area, especially the hole.

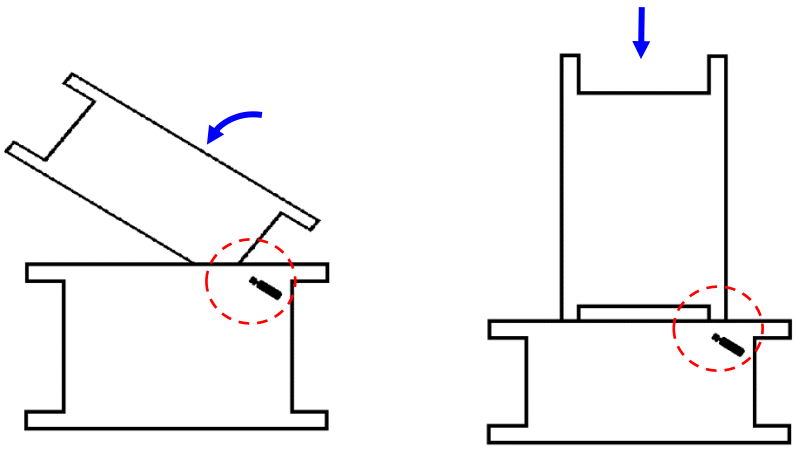
Place the valve and lock it with the mounting rod. Screw the valve with a long 14mm wrench. The specified torque is **10 N.m**.

Warning: please remove the cap during valve tightening to avoid to stress the valve with the socket:



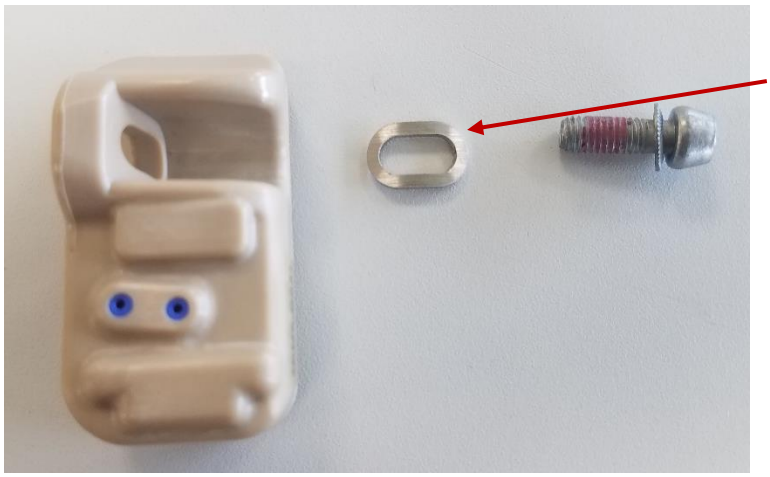
Then fit cap.

Warning: please take care not to damage the valve while stacking the rims:



B. TPMS-RS21 installation (basic sensor)

TPMS kit:



Place the oblong washer on the sensor. Please take care it is positioned correctly.
Ensure the sensor is in contact with the rim.
Tighten the screw with a torx T20. The recommended torque is **4N.m**. Make sure the sensor is well placed on the rim and that it did not twist during tightening.

We advise to add some silicon to both sides of the sensor to improve fixation and reduce vibration.

C. TPMS-IR21 installation (advanced sensor)

The TPMS-IR21 includes a rim temperature measurement. To provide accurate measurements, user must fill the gap between thermal pad and the rim with thermal foam to optimize thermal conduction between the rim and the thermal pad.

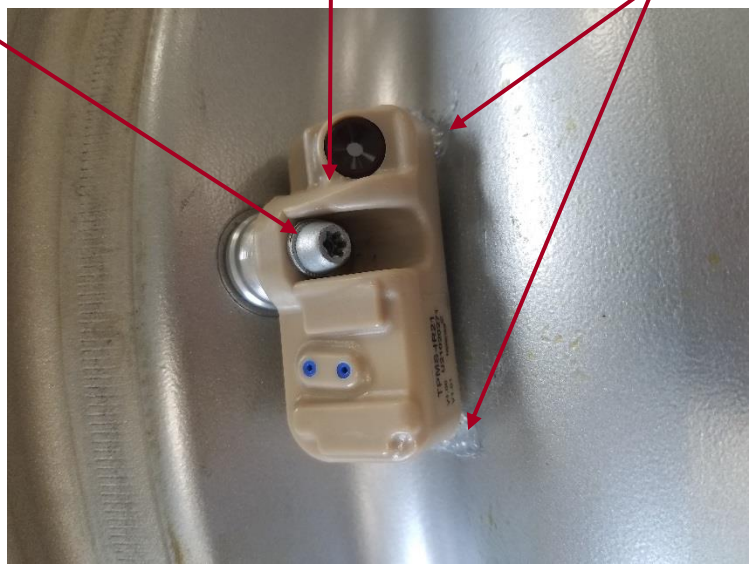
Thermal pad, place thermal foam here

Place the oblong washer on the sensor. Please take care it is positioned correctly.

Place the sensor in contact with the rim and tighten onto the valve with a torx T20. The recommended torque is **4N.m**. Make sure the sensor is well placed on the rim and that it did not twist during tightening.

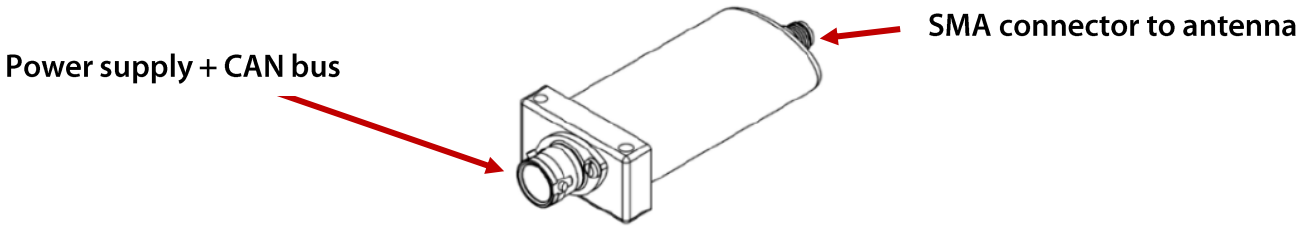
Silicone

Oblong washer **Thermal foam (below)**



We advise to add some silicon to both sides of the sensor to improve fixation and reduce vibrations.

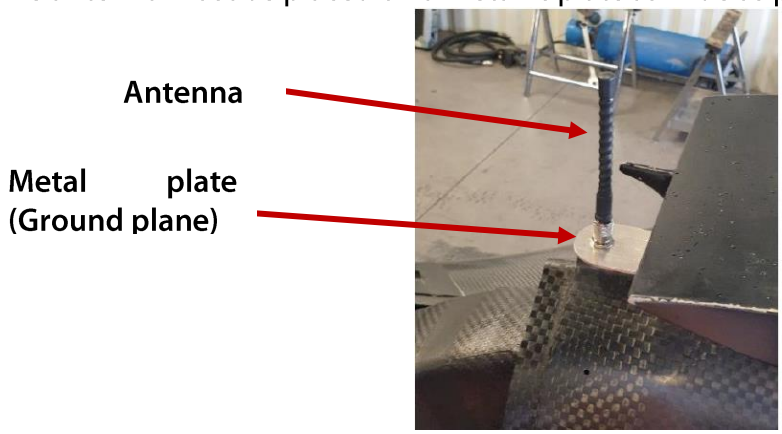
D. TPMS-CR21 installation (Car receiver)



An antenna needs to be plugged on the SMA connector of the TPMS-CR21.
Several antennas are available on request:

1. **TNC whip antenna**

The antenna must be placed on a metallic plate as wide as possible.



An extension cord must be used between the TPMS-CR21 and the antenna to place the antenna in the best place. Keep the antenna far from carbon and metallic parts as much as possible. Only metal plate beneath the antenna is recommended. To obtain best performance, keep the antenna in clear field compared to the TPMS sensors.

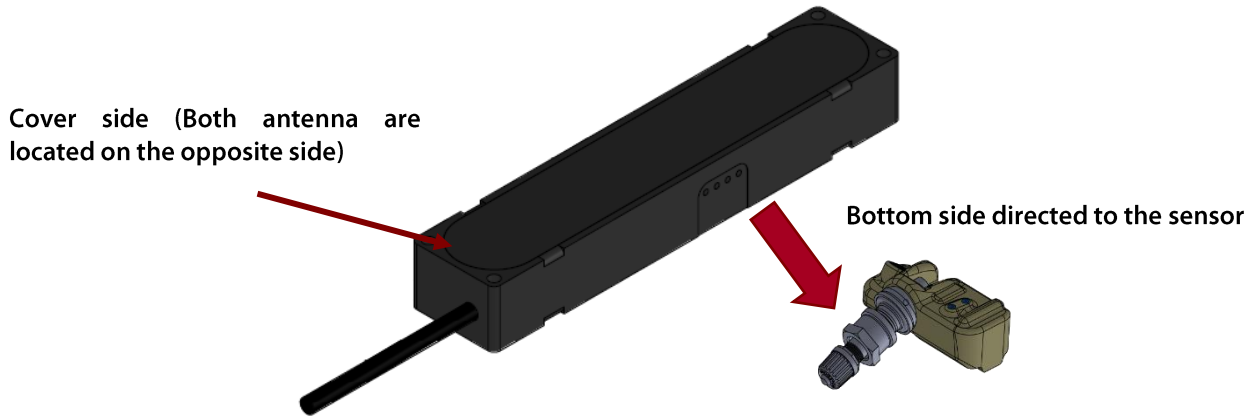
2. **Straight antenna**

The straight antenna directly mounts on the TPMS-CR21. It is adapted on setup where the TPMS-CR21 can be placed on a clear area.

3. **Elbow antenna**

The elbow antenna directly mounts on the TPMS-CR21. It is adapted on setup where the TPMS-CR21 can be placed on a clear area.

E. TPMS-WR21 installation (Wheel Receiver)



TPMS-WR21 is composed of two integrated antennas: one RF antenna to receive frames from sensors and one LF antenna to check if a sensor is nearby. If TPMS-WR21 receives frames from a sensor on RF but is not able to communicate with it with LF antenna, the data will not be forwarded to the CAN bus.

This is why the TPMS-WR21 must be mounted as close as possible to the TPMS-RS21 or TPMS-IR21. Moreover, orientation of the TPMS-WR21 is very important and must be as close as possible to the following:

To ensure best RF performance:
The TPMS-WR21 must be kept parallel to the wheel axis. Inside the housing, antennas are located on the opposite from the cap. Place the TPMS-WR21 so as to direct the antenna to the TPMS-RS21 or TPMS-IR21.

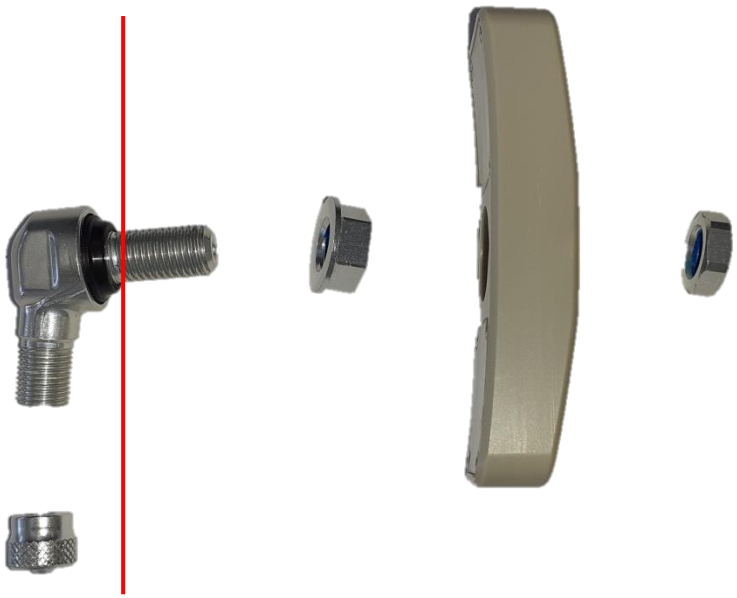
Example of mounting:

F. Motorbike TPMS-RS21

1. Valve installation

Valve kit + TPMS

Outside Rim **Inside Rim**



Mounting tool

A 12mm socket is required, the specified torque is **4 N.m**

Valve positioning

It is important to correctly place the valve with the correct seal in the hole rim.
There are 2 diameters of seals available: one fitting a Ø11,3mm hole (high seal) and one fitting a Ø8,5mm hole (low seal).

2. Motorbike TPMS installation

Make sure there is a gap between the TPMS and the rim and some thread left on the valve.

6. Replacing battery on TPMS sensors

Battery replacement shall be made by Texys as part of the servicing, please contact your reseller for further information. Warranty will be void if user replaced the battery by himself.

Batteries shall be replaced if voltage is below 2.9V. Please consider that the battery voltage is lower with higher consumption power mode. Thus, we recommend to monitor voltage on moving mode, which can easily be activated with the ON button of the TPMS-RH21.

7. FCC compliance

1. General

This device complies with Part 15 of the FCC Rules. Operation is subject to the following two conditions: (1) this device may not cause harmful interference, and (2) this device must accept any interference received, including interference that may cause undesired operation.

2. Modifications

Changes or modifications not expressly approved by the party responsible for compliance could void the user's authority to operate the equipment.

3. Interference

This equipment has been tested and found to comply with the limits for a Class B digital device, pursuant to part 15 of the FCC Rules. These limits are designed to provide reasonable protection against harmful interference in a residential installation. This equipment generates, uses and can radiate radio frequency energy and, if not installed and used in accordance with the instructions, may cause harmful interference to radio communications. However, there is no guarantee that interference will not occur in a particular installation. If this equipment does cause harmful interference to radio or television reception, which can be determined by turning the equipment off and on, the user is encouraged to try to correct the interference by one or more of the following measures:

—Reorient or relocate the receiving antenna.
—Increase the separation between the equipment and receiver.
—Connect the equipment into an outlet on a circuit different from that to which the receiver is connected.
—Consult the dealer or an experienced radio/TV technician for help

4. Radiation exposure

This equipment complies with FCC's radiation exposure limits set forth for an uncontrolled environment under the following conditions:

1. This equipment should be installed and operated such that a minimum separation distance of 20cm is maintained between the radiator (antenna) and user's/nearby person's body at all times.
2. This transmitter must not be co-located or operating in conjunction with any other antenna or transmitter.

8. Recycling / waste disposal

We recommend you to follow a "Reduce, Reuse, Recycle" approach. Our policy at Texys Group is to reduce waste & to recycle any product that cannot be used again, such as through repairs.
One way of avoiding waste would be to send us back any sensor which you would like to dispose of. In that sense, we would take care of reusing what can be reused, else recycle all parts & components ourselves.
Otherwise, reach out to companies who can handle the recycling of your electronics.

Please note that many electronic products store data. To erase data before disposing or recycling equipment, memory should be wiped thoroughly.
The best is either to send parts back to Texys Group or reach out to professionals who can assist with removing software.