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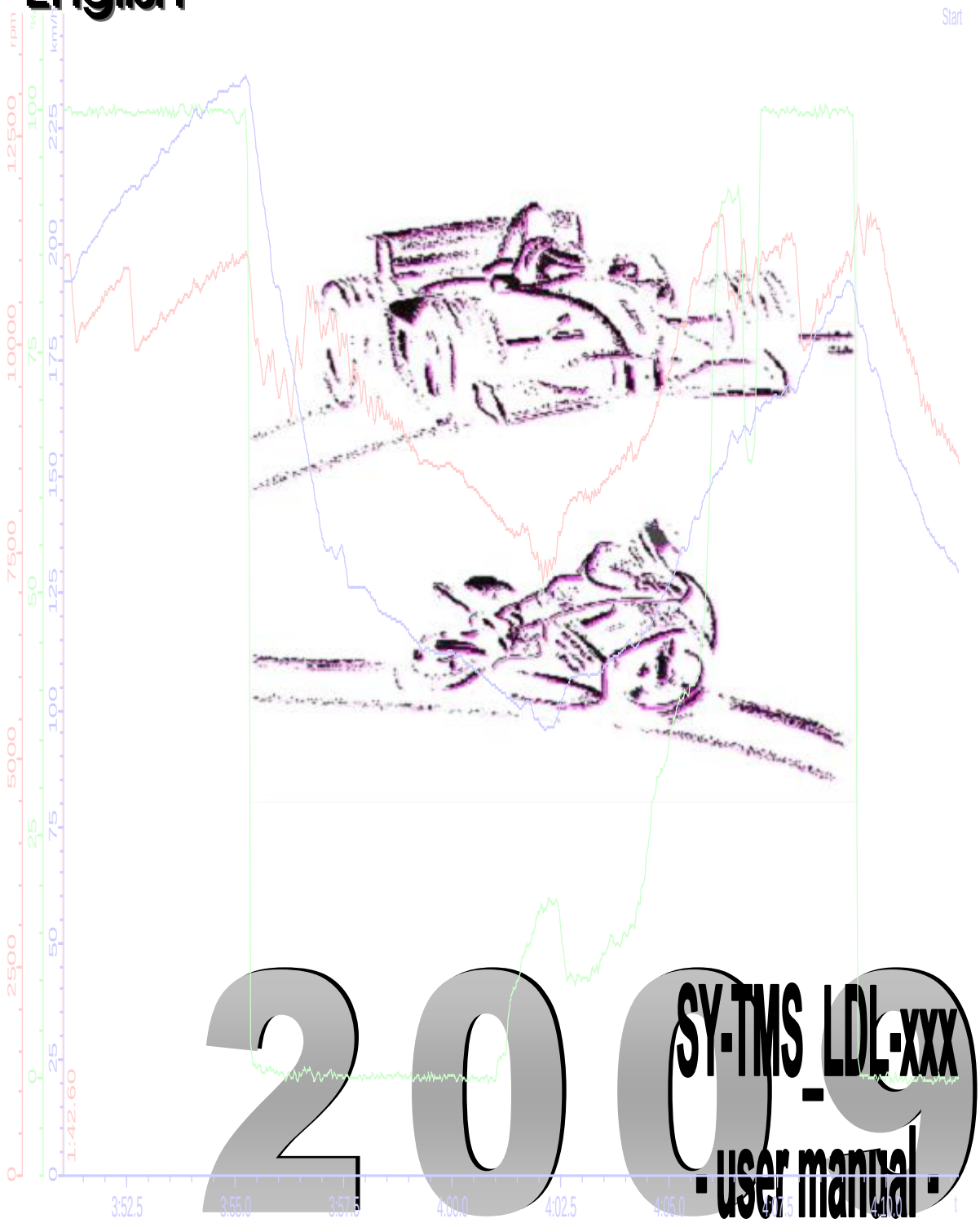
- English -



SY-TMS_LDL-xxx

- user manual -

2009

Art.No.: AC-DOC_SY-TMS_LDL-xxx

modified 02.05.2012

Preface

Symbols used in the text

In the paragraphs highlighted with this symbol, you will find tips and practical advice to help you work with the 2D-Software.

In the paragraphs highlighted with this symbol, you will find additional information and it is very important that you follow the instructions given.

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Table of contents

1. System overview

1.1 General

In summary two kinds of systems can be differentiated:

1. A system with an exclusive RF transmission (shown in chapter 1.3.1)
2. A system with a RF transmission (based on the system shown in chapter 1.3.1) extended by forwarding the received measured data (from the WUS) onto the CAN-Bus. In this system (shown in chapter 1.3.2) all 2D CAN modules (also external) can be used which process the received WUS measured data. (e.g. memory module, display units and so on). The interface between WUS and CAN is represented by the 2D TMS receiver (BC-TMS_LDL_Rec-000)

The basic Tyre monitoring system consists of 3 components:

- Battery powered wireless sensors (called Wheel Unit Sensors – WUS) fitted to a wheel rim which send data over an RF link to a compact receiver placed within the vehicle. A radio transmission of pressure and temperature on a frequency of 433,92 MHz over a distance of max 15 meters is possible.
- For a fast and simple monitoring of pressure and temperature, a handheld receiver is used (=AC-TMS_LDL_Watch).
- For controlling the WUS and for “teaching purposes” of the handheld receiver a remote control is used and completes this (small) system

The advanced system consists of the basic system plus a TMS receiver. The receiver sends the values (Temperature, Pressure, Status and RSSI information) via CAN-line to a connected recording unit (e.g. a 2D memory module for example).

In the appendix you can find general CAN bus setting information. A simple possibility to configure all 2D CAN modules via USB is achieved with the IN-USB2CAN module.

1.2 Basic module information

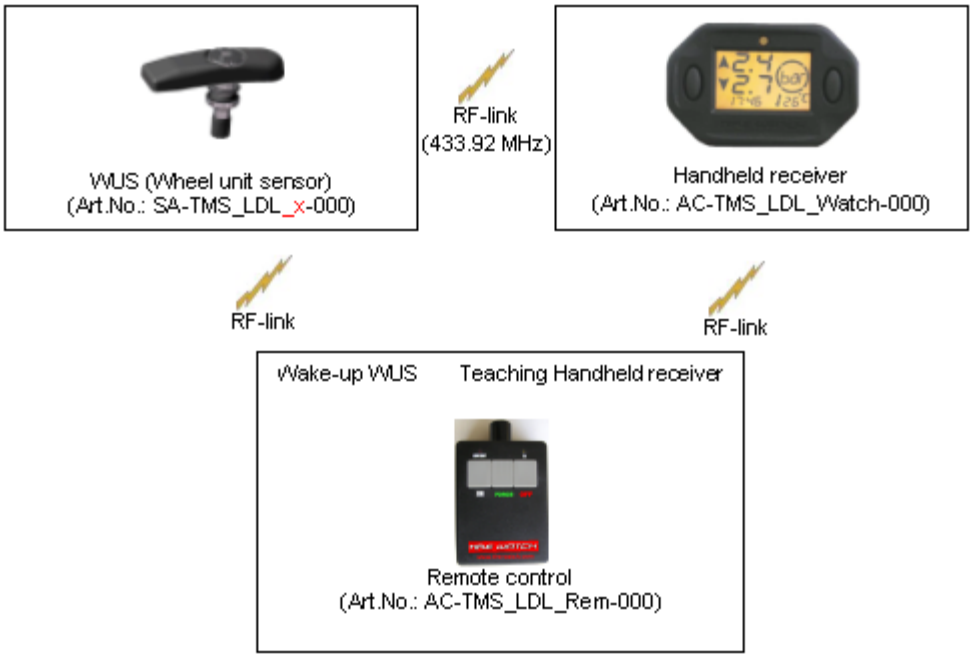
A tyre monitoring system (TMS) consists basically of the following components

	Components	Features
BC-TMS_LDL_Rec-000	TMS Receiver 	• Real time data capture of temperature, pressure, status and RSSI* on 433.92 MHz using FSK (frequency shift keying) • Suitable for measurement on bikes and cars by using different wheel unit sensors (WUS) • Easy CAN identifier setup and configurable by WinIt 2D software • Compact, robust, lightweight modular concept. → refer chapter 4 *) RSSI: **R**eceived **S**ignal **S**trength **I**ndication
SA-TMS_LDL_x-000	WUS Sensors  -000: ∅8,5mm -001: ∅11,5mm _b: for bikes _c: for cars	• Tyre pressure sensors including RF transmitter • Simple and robust concept to adapt the sensor on all types of rims • Total mass of less than 45g allows easy wheel balancing • Self-powered by integral battery • Power-save management controlled by "Wake up function" of the tyre monitoring sensors with LF trigger function (refer AC-TMS_LDL_Rem-000) → refer chapter 2
AC-TMS_LDL_Rem-000	Remote control 	• "Wake up" wheel unit sensors (WUS) with remote control • Used to assign WUS to handheld receiver • 3 Buttons • LED for LOW BAT / TX • Internal 9V battery • Size (H x L x D): 83 x 64 x 28 mm → refer chapter 3
AC-TMS_LDL_Watch-000	Handheld receiver 	• Display of front & rear tyre pressure and temperature remotely on a 45 x 35mm LCD screen – simple to operate • Pressure and temperature on the same display, can be fixed (e.g. on the mechanics wrist) with switchable display unit (bar/psi or °C/°F) • Check any spare wheels' pressure in the paddock & just before a race for last minute control • Alert mode via an LED, adjustable thresholds for Temperature & Pressure and back light setting → refer chapter 3

The following chapters explain the start-up of the TMS as a step by step guide.

1.3 System examples

1.3.1 TMS with an exclusive RF transmission



When using this system configuration, you should follow this sequence:

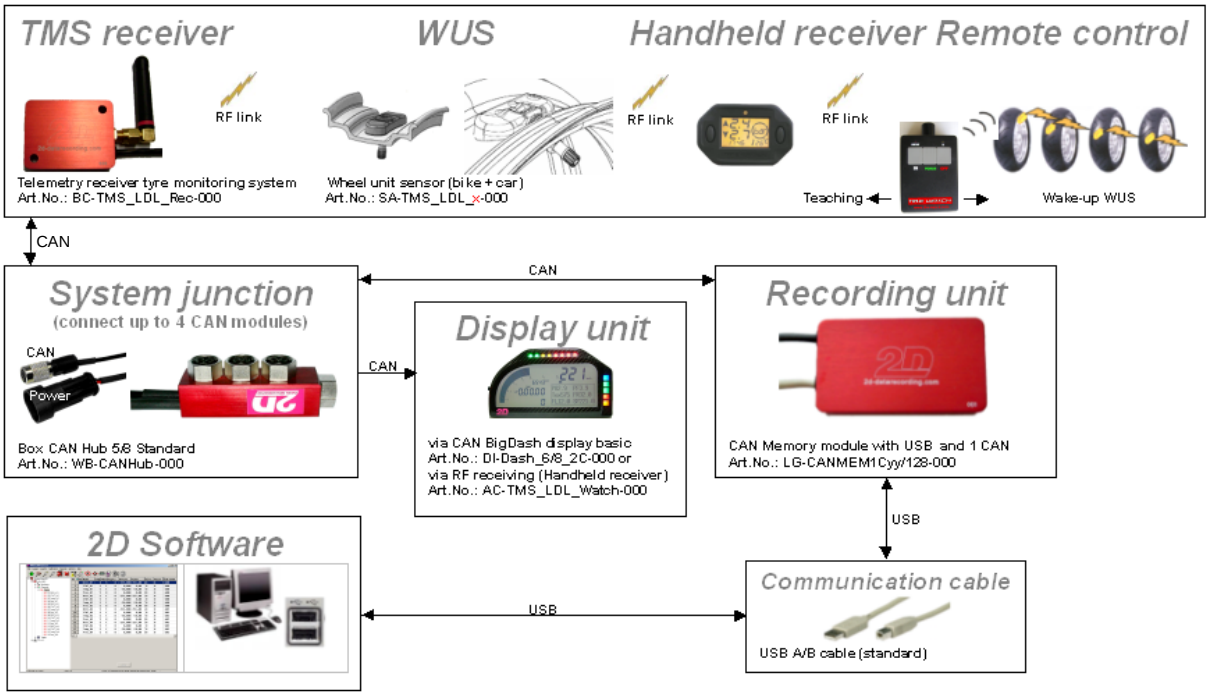
1.) Mounting the WUS (bike or car) → refer chapter 2
2.) How to operate the Remote control → refer chapter 3.1
3.) Setting the Handheld receiver → refer chapter 3.2

→ Chapter 4 is not relevant for this system and is omitted !

1.3.2 TMS with RF transmission and additional forwarding of the data via CAN

In the case of using this system you should keep the following chapter sequence.

1.) Mounting the WUS (bike or car) → refer chapter 2
2.) How to operate the Remote control → refer chapter 3.1
3.) Setting the Handheld receiver → refer chapter 3.2
4.) Start up of the 2D TMS receiver → refer chapter 4



2. Mounting and connecting the sensors

2.1 WUS mounting (bike)

2.1.1. Precautions

- Do NOT use WUS after a drop of more than 1 metre on a hard surface
- Do NOT generate an electrostatic discharge higher than 6 Kilovolts by air onto the WUS, during mounting and dismounting of the WUS or at any time while using (avoid the use of nylon worksuits, and generally avoid any textile rubbing before handling WUS)
- When removing the core from the valve, it has to be replaced by a new short core (brass and viton) of the same type, as per V0.07.1 ETRTO core chamber specification.
- The valve cap must always be in place (except for inflating, pressure release or pressure checks).

2.1.2 Mounting the WUS

Before any installation, check the external surface of the rim for cleanliness; remove any grit or paint marks etc.

For mounting the WUS you should keep the to the following chapter sequence.
→ for detailed information refer chapter 2.1.4

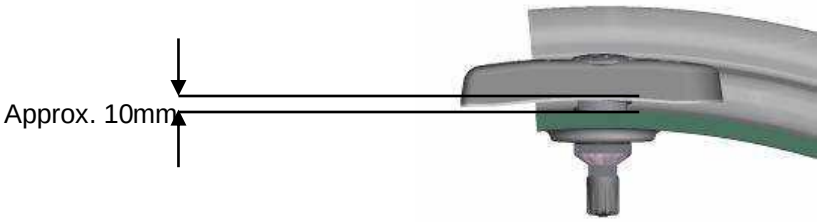
2.1.3 WUS fixing recommendations

Make sure the following recommendations are respected

- Apply a torque of max. 4.2 Nm +/- 0.2 Nm.
- Use a suitable torque tool
- The valve and the nut must be located by at least by 5 complete threads (5 nut rotations)

The sensor element must be able to rotate slightly after tightening ; without touching the rim surface.

Once mounted, the WUS must be spaced from the rim as illustrated below ; the gap can exceed 10mm.

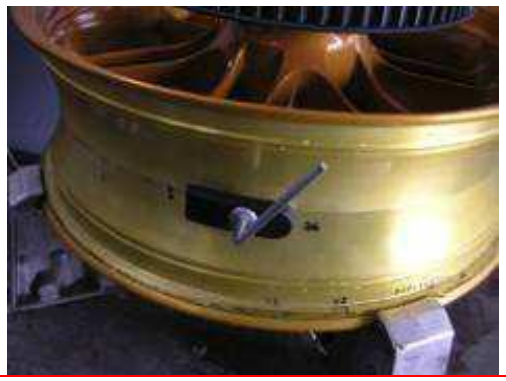


Sensor element including the spring. This part is situated inside the Tyre.

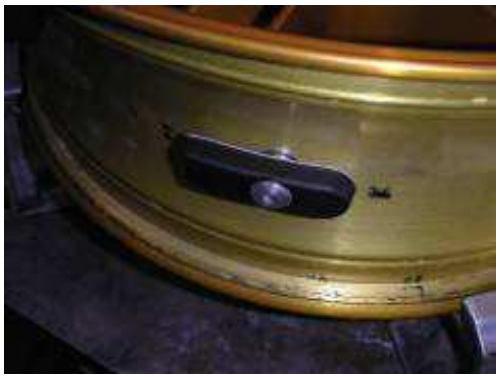
Valve including the seal; situated on the external part of the tire.

2.1.4 Detailed view of WUS assembly

Step N°1		The white cover must face the rim.
Step N°2		The valve seal must face the rim valve hole.
Step N°3		• The sensor body must be presented in front of the valve hole, inside the rim. • Place the spring on the flat surface around the valve hole
Step N°4		While pushing on the nut keep it centred in the valve hole; then introduce the valve in the valve hole.

Step N°5		While pushing on the nut start screwing the valve until the seal touches with the rim.
Step N°6		• Screw the nut with a allen key (5mm). • Final torque 4.2 Nm +/- 0.2 Nm.

AVOID FIXING IF THE PLASTIC HOUSING IS IN CONTACT WITH THE RIM
Make sure to leave a gap between sensor and rim of at least 0.1mm !

Step N°7		• Check that the external part of the valve does not meet any obstacle during rim rotation (it can be the case on some scooters) • Check that the external seal is correctly fitted and that the valve is in contact with the metallic part of the rim.
Step N°8		• The flat surface of the valve must face the flat surface of rim valve hole. • The plastic parts must be free from rim constraints (no contact) • The plastic parts must be able to slightly turn around its nut. (no constraints on plastic parts caused by the rim sides after tightening)

2.1.5 Method to verify the locating torque

- The measurement of the residual torque is done by retightening the valve by a ¼ turn slowly (1/4 of turn in 10 seconds). A torque-controlled tool is recommended which is able to memorise the maximum torque.
- The retightening torque must not be less than 3.8 Nm

It is recommend to verify the locating torque every time the sensor is mounted.

2.2 Tyre mounting (bike)

2.2.1 Precautions

- Before any mounting operation of the tyre, ensure that the Wheel Unit Sensor has been correctly mounted and tightened to the rim.
- The tire must be lubricated so as to facilitate its mounting. Please follow the tyre manufacturer's recommendations.
- Ensure that no lubrication product or any other debris can partially or completely cover the pressure measuring hole or the inflation hole of the wheel unit sensor.
- The tyre must never be allowed to put mechanical strain onto the Wheel Unit Sensor during the mounting operation.
- Make sure that the tyre does not get trapped between the rim and the Wheel Unit Sensor.
- It's recommended to check the locating torque before any tyre fitting.

2.2.2 Fitting the tyre

- The bead of the tyre must be engaged approximately 30 centimetres beyond the valve.
- Do not introduce a mounting tool between the valve and the point of engagement of the tyre.
- Tyre fitting must be done moving away from the valve.
- The final fitting of the tyre finishes close to the valve. During this phase, any load or force on the Wheel Unit Sensor by the tyre is not allowed


Clockwise tyre mounting machine

2.2.3 Detailed view of Tyre assembly

First sidewall

Step N°1		Start putting the tyre on the rim on the opposite side to the valve
Step N°2		The first sidewall is pushed over the rim

Second sidewall

Step N°3		Start introducing the second sidewall in front of the valve
Step N°4		Turn the rim to introduce the second sidewall into the rim with the roller

Step N°5	 

At the end of the mounting process, the second sidewall is fitted to the rim when the shoe is in front of the valve

2.3 WUS mounting (car)

2.3.1 Precautions

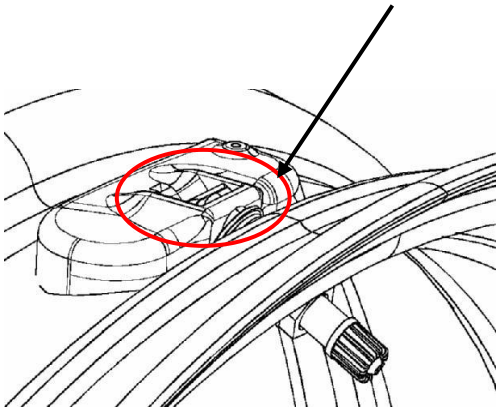
- Do NOT use Wheel Unit Sensor after a drop of more than 1 metre
- Do NOT generate an electrostatic discharge higher than 6 Kilovolts by air onto the WUS, during mounting and dismounting of the WUS or at any time while using (avoid the use of nylon worksuits, and generally avoid any textile rubbing before handling WUS) .
- Do NOT store the Wheel Unit Sensors at temperatures higher than 100°C.
- When removing the core from the valve, it has to be replaced by a new zamac short core of the same type (7442 ISO standard). Using brass cores is not allowed.

To change the seal you follow these steps:

- Cut the old seal with an appropriate tool, pull out the seal and its washer.
- Place the valve into the 12° position (clipped position).
- Insert the new seal with a new washer, be careful that the valve doesn't move or drop out.
- Check that the seal and washer are fitted correctly and that there is no damage to the antenna.
- Refer to the next chapter for illustrations.
- The valve cap must be always in place (except for inflating, pressure release or pressure checks).
- It is **ESSENTIAL** ro replace the nut with it's plastic washer after 4 installations.
- It is **ESSENTIAL** to replace the wheel unit after 24 Installations.
- It is **ESSENTIAL** to replace the rubber seal every time the WUS is removed from the RIM.

2.3.2 Mounting the WUS

- To orientate the Wheel Unit Sensor in the rim : the side with the polyurethane foam must face towards the rim, the hole for pressure measurement towards the tyre.
- The valve must be presented in front of the valve hole, then positioned with the seal before any fixing by can begin. The seal must stay partially inside the valve hole (in order to avoid it being pinched during tightening).
- Manually screw the nut onto the valve.
- While tightening keep the WUS in place pressed against the valve hole.
- While tightening keep valve in place inside the housing. No rotation between the valve and housing is permitted until finally torqued.
- Make sure that the tightening tool stays aligned with the valve and the valve hole during the tightening process.
- When finger tight, check (visually) the plastic link on the top of the housing which surrounds the valve. If this part is whitening of broken; The housing is destroyed; replace the housing immediately. Redo the visual inspection after the tyre fitting and before the inflating.

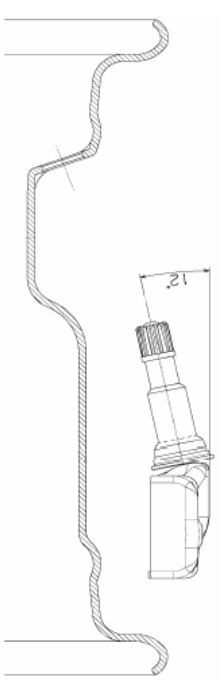


2.3.3 WUS tightening recommendations

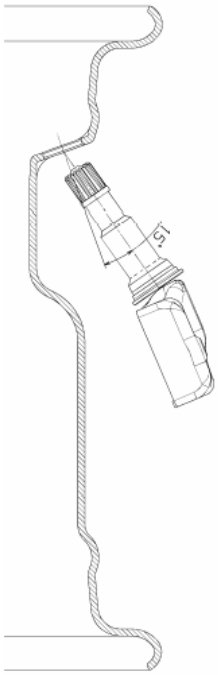
Make sure the following recommendations are adhered to

- Apply a torque of 6.5Nm +/-0.5 slowly when passing 3.5Nm. This is the fixing requirement for which the specification of our wheel unit is based.
- Use a torque-controlled tool.

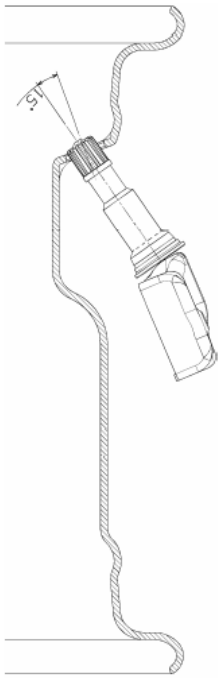
2.3.4 Detailed view of WUS assembly



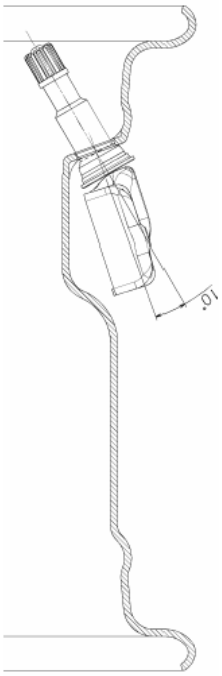
Step 1



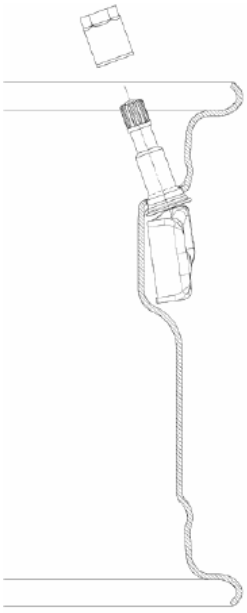
Step 2



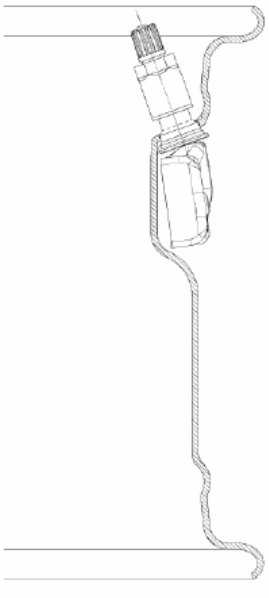
Step 3



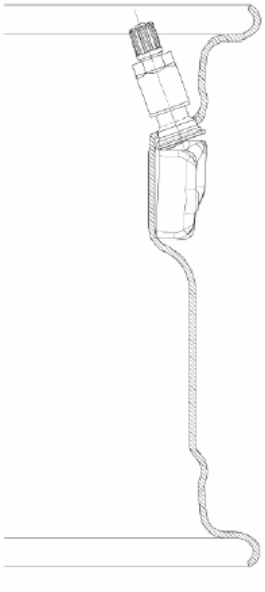
Step 4



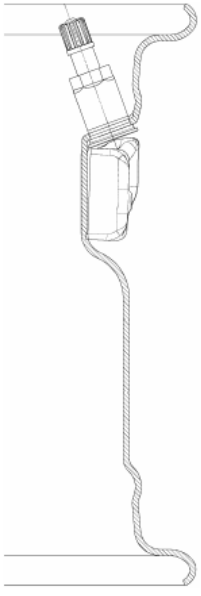
Step 5



Step 6

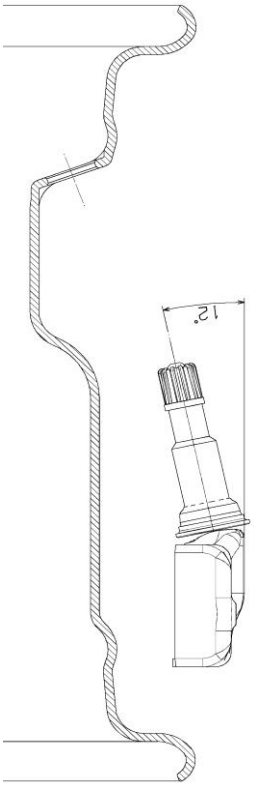


Step 7



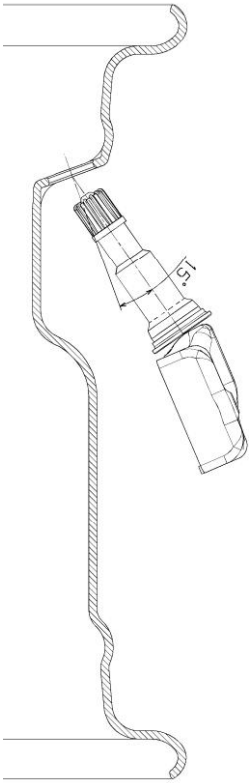
Step 8

Step 1



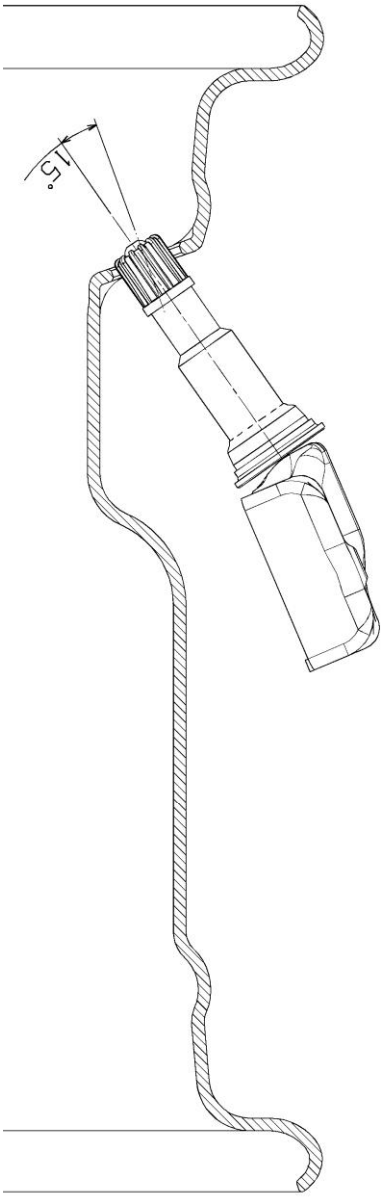
Check the 12° position of the wheel unit valve.

Step 2



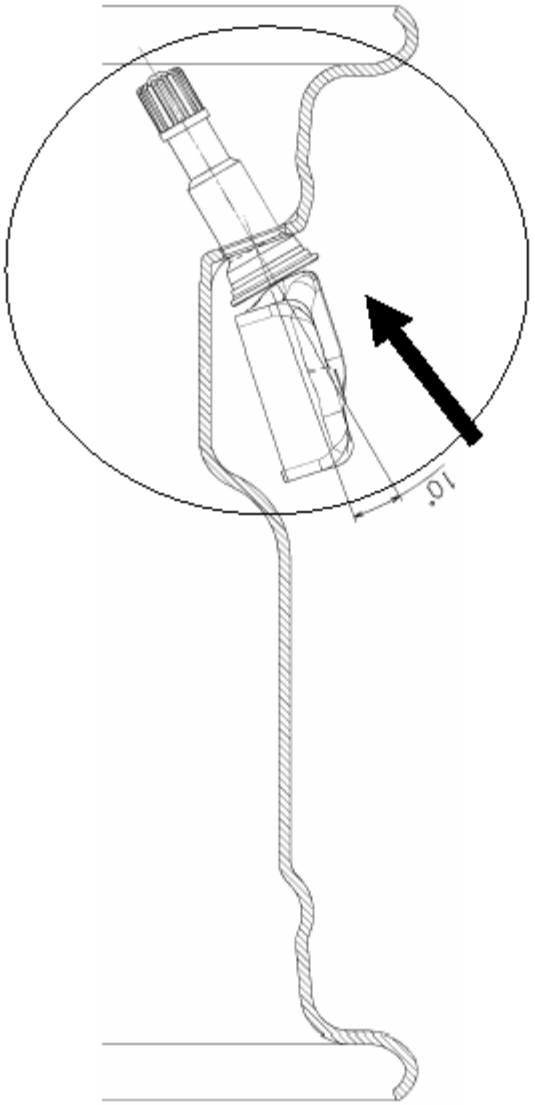
Present the valve of wheel unit with a 15° angle in front of a valve hole.

Step 3

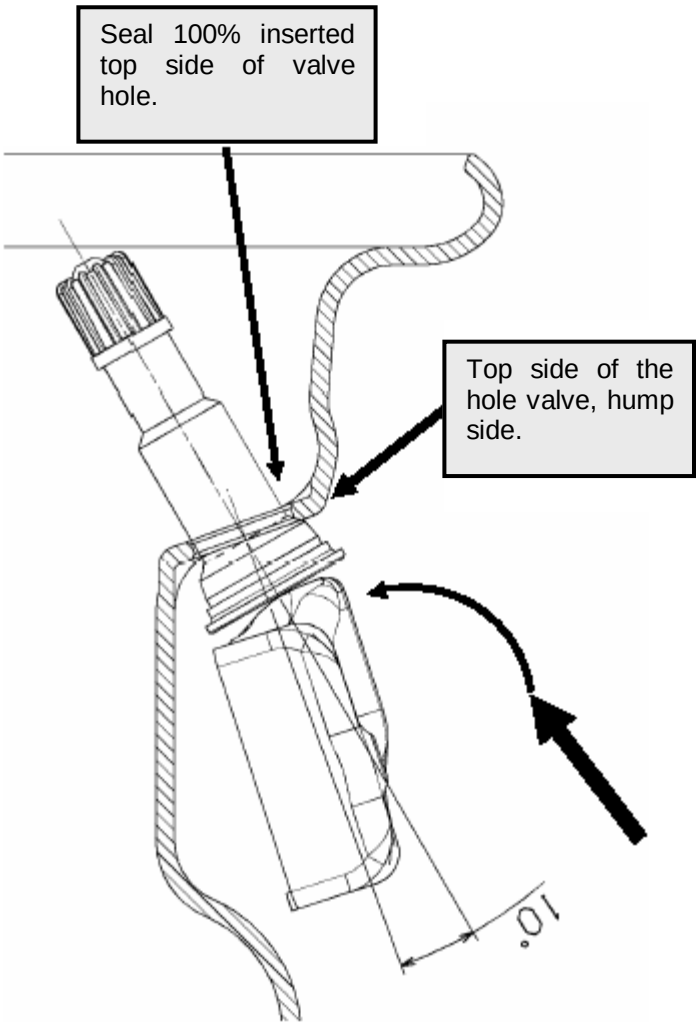


Guide the valve into valve hole keeping the 15° angle.

Step 4

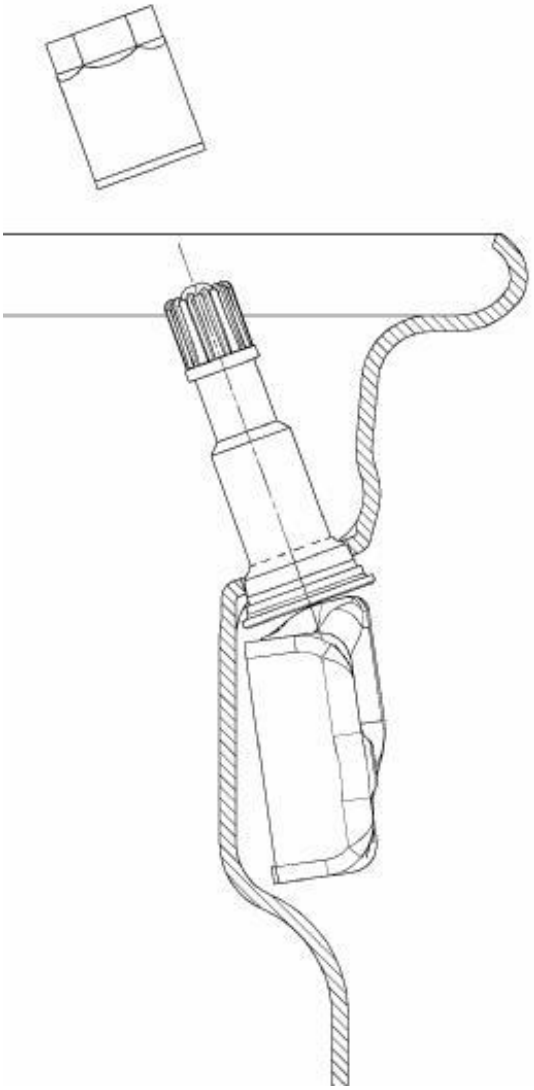


Push straight on the WUS as shown, until the seal is completely inserted through the top side of the hole, hump side.



Keep the WUS in its position and tighten the bolt until the seal is inserted.

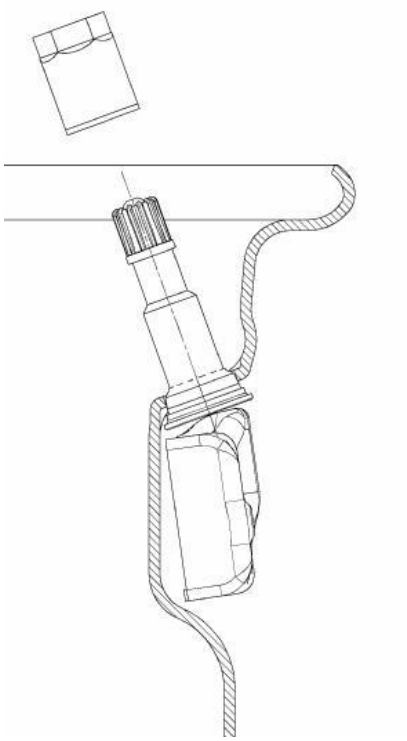
Step 5

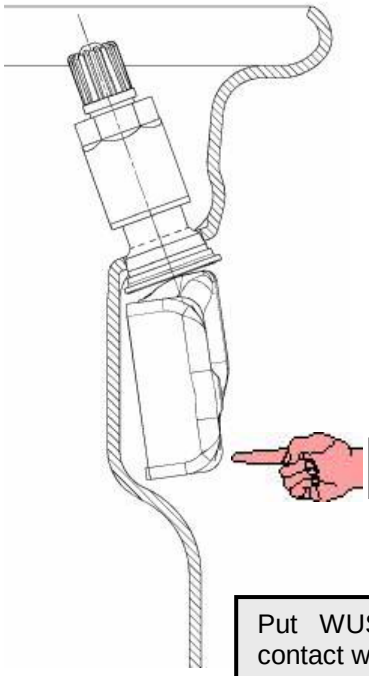


Positioning of wheel unit and seal before pushing and torqueing it in place.

2.3.4 Detailed view of wheel unit tightening

Start tightening the nut by hand, for at least 2 threads keeping the Wheel unit in place.

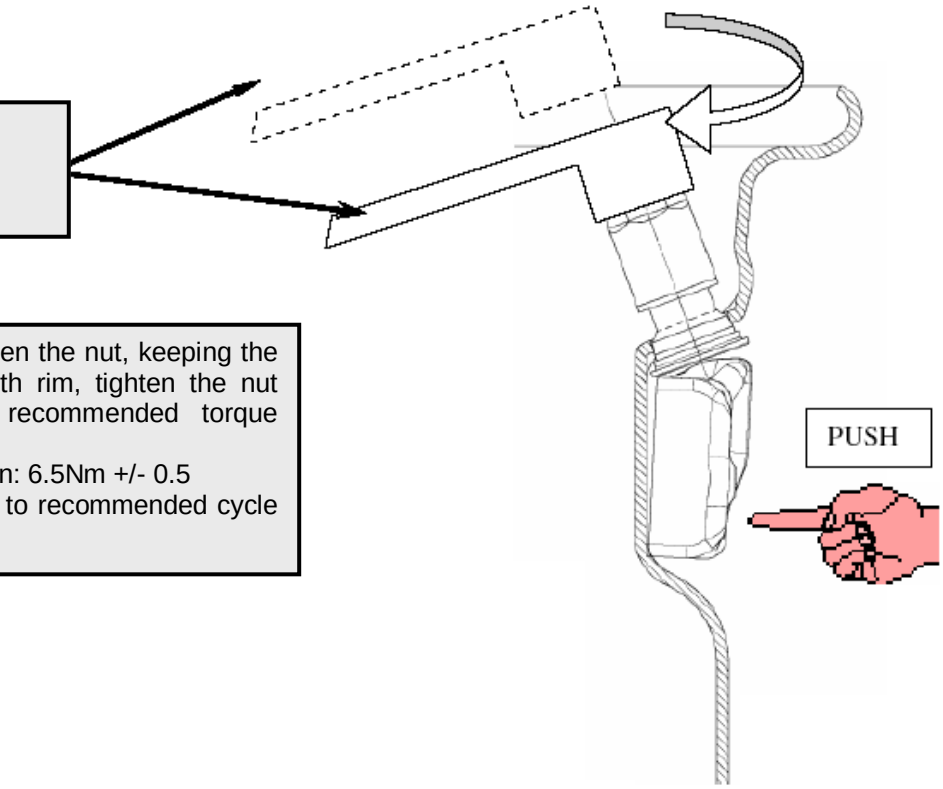


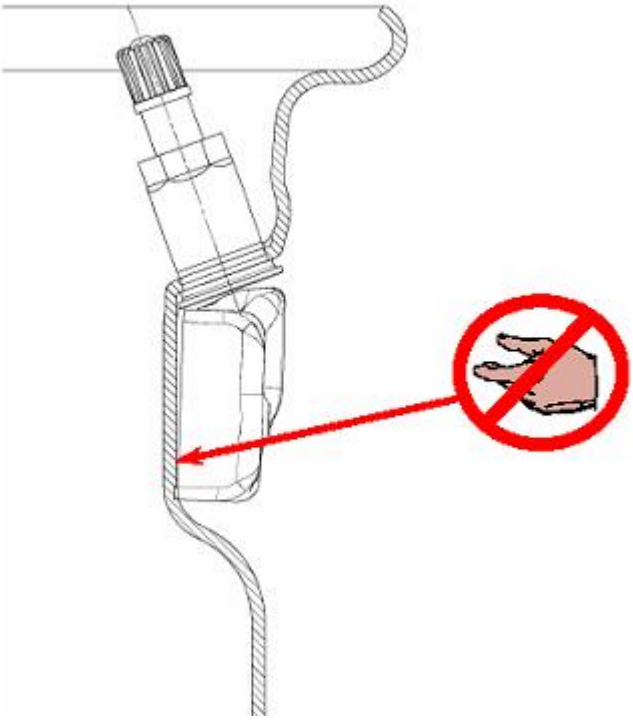


Put WUS housing in contact with RIM.

Tightening tool.

Use the tool to tighten the nut, keeping the WUS in contact with rim, tighten the nut according to the recommended torque values:
Manual torque action: 6.5Nm +/- 0.5
Automatic tool: set to recommended cycle (8Nm +/- 0.5).





2.3.5 Method to verify the fixing torque

- The measurement of the residual torque is done by the slow retightening of the valve nut by a ¼ turn. Use a torque-controlled tool which is able to memorise the maximum torque. During rotation, the torque must reach a constant value (which is the residual torque value).
  If this is not the case, the operation has been performed too fast.
- The tightening torque stabilises itself over 48 hours. The retightening torque after 24 hours must not be less than 4.0 Nm.

2.3.6 Verification of correct mounting of the wheel unit

- The lower parts of the wheel unit must touch the rim.

- The highest parts of the wheel unit may not be any higher than the hump of the rim.

2.4 WUS mounting (Racing system car)

The Wheel Unit Sensor (WUS) with bracket of TIRE WATCH RACING system is pressure sensor composed by.

- A moulded black and white plastic housing,
- An anodized aluminium nut with BTR cavity for hexagonal key (5mm.), clipped in housing with a stainless steel spring
- A bracket with a crimped inox nut
- A hexagon socket cheese head screw
- A washer
- A 11,5mm seal
- An anodized aluminium valve : short core mechanism / black cap / a O'ring seal /a nut

2.4.1 Rules of utilisation

The Wheel Unit Sensor with bracket can be mounted on all automotive rims that present a lateral valve hole.

Specifications:

- Screwing torque for valve core mechanism: 0.6 ± 0.1 Nm
- Screwing torque for valve cap: 0.2 a' 0.35 Nm
- Manual screwing torque for nut: 4.2 Nm ± 0.2 Nm
- Environmental temperature range: -20°C to +60°C
- Pressure range: 0 to 4 bars
- Used inflating fluid: Air or Nitrogen
- Anti-puncture utilisation Utilisation without any consequence.

2.4.2 Precautions during mounting operation

- Do NOT use WUS after a drop of more than 1 meter on a hard ground
- Do NOT generate an electrostatic discharge higher than 6 Kilovolts by air onto the WUS, during mounting and disassembly of the WUS or at any time during utilization (avoid the use of nylon worksuit, and in general way, avoid all textile rubbing before handling WUS)
- Do NOT store the TIRE WATCH at temperatures higher than 30°C and lower than 0°C
- When removing the core from the valve, it has to be replaced by a new short core (brass and viton) of the same type, according to V0.07.1 ETRTO core chamber specification.
- The valve cap must always be in place (except for inflating, pressure release or pressure checks).

2.4.2.1 Hexagon socket cheese head screw screwing recommendations

Please make sure that following recommendations are respected:

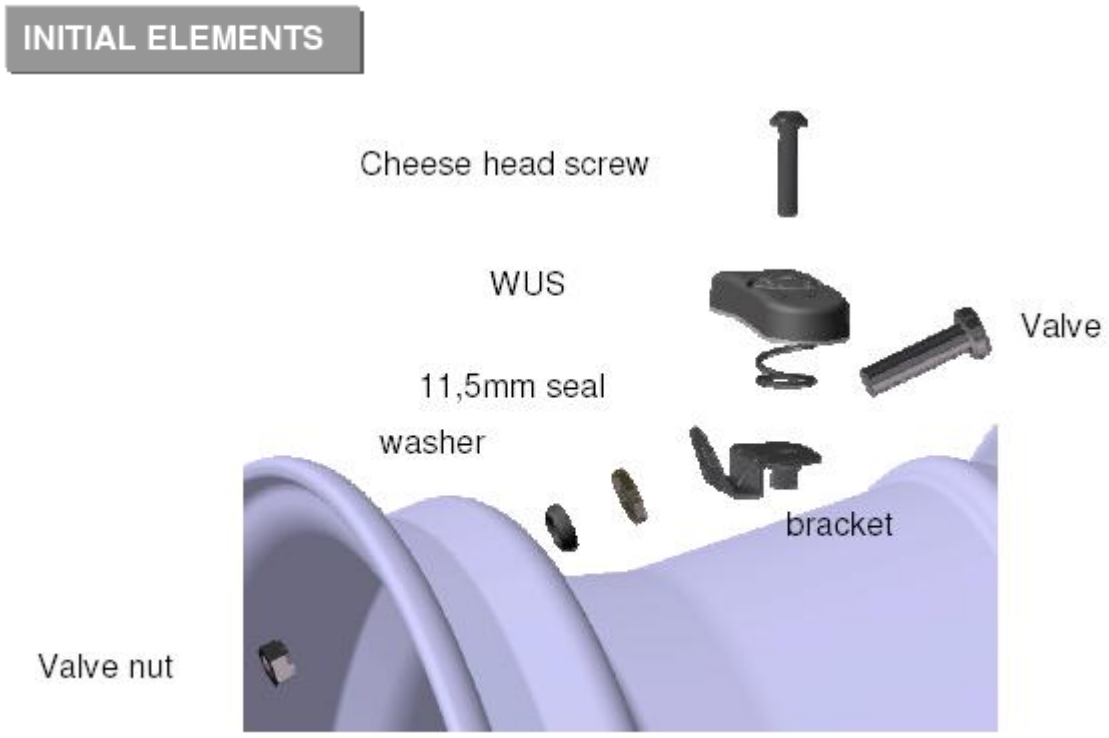
- Apply a torque of 4.5 Nm +/- 0,2 Nm.
- For the manual process it is recommended to use a torque controlled tool.
- The plastic part of the WUS must slightly be able to turn around its nut after tightening.
- Once mounted, the WUS must be distant from the rim as illustrated below.

2.4.2.2 Valve nut screwing recommendations

Please make sure that following recommendations are respected:

- Screwing speed: max of 2 turns in 1 second.
- Apply a torque of 4.2 Nm +/- 0,2 Nm.
- For the manual process it is recommended to use a torque controlled tool.
- The valve and the nut have to be screwed on 5 complete threads (5 nut rounds).

2.4.3 Detailed views of WUS and bracket assembly



STEP N°1

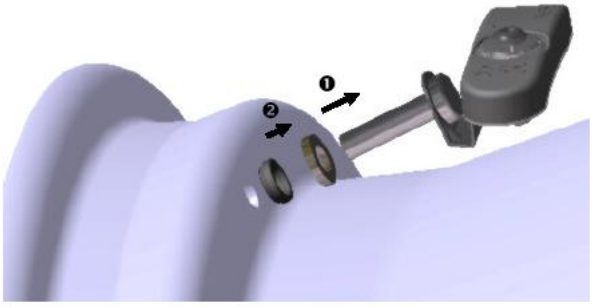
❶ Insert the valve into the bracket hole

STEP N°2

❶ make the screw go through the nut, the electronic and the bracket

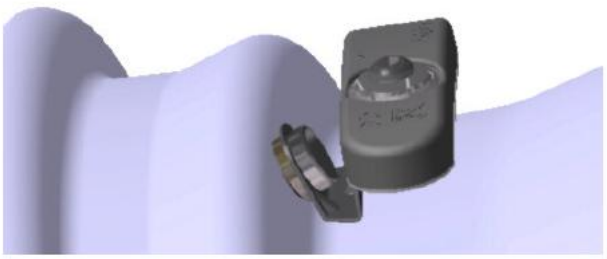
❷ screw into the bracket respecting screwing torque 4,5 Nm

STEP 3

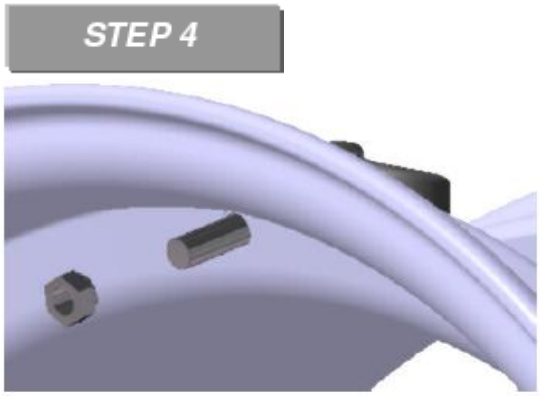


❶ insert the washer onto the valve

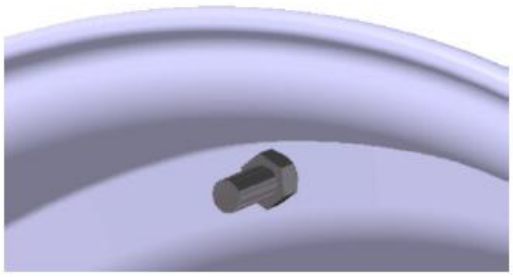
❷ insert the 11,5mm seal onto the valve respecting the side



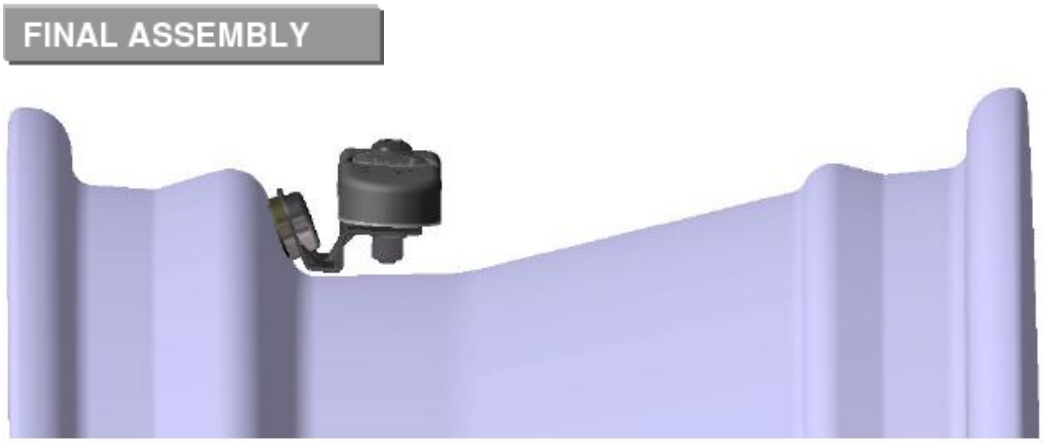
The seal must fit correctly into the washer



❶ screw the nut onto the valve respecting screwing recommendations. For a correct positioning, check that the flat surface of the nut faces the rim



❷ Final position



2.4.4 Method to verify the screwing torque

- The measurement of the residual torque is done by retightening the valve nut by a ¼ turn in reduced speed (1/4 of a turn in 10 seconds). Therefore please use a torque-controlled tool which is able to memorize the maximum torque.
- The retightening torque may not be smaller than 3.8Nm.

It is recommended to verify the screwing torque at each time mounting.

2.5 Tyre mounting (car)

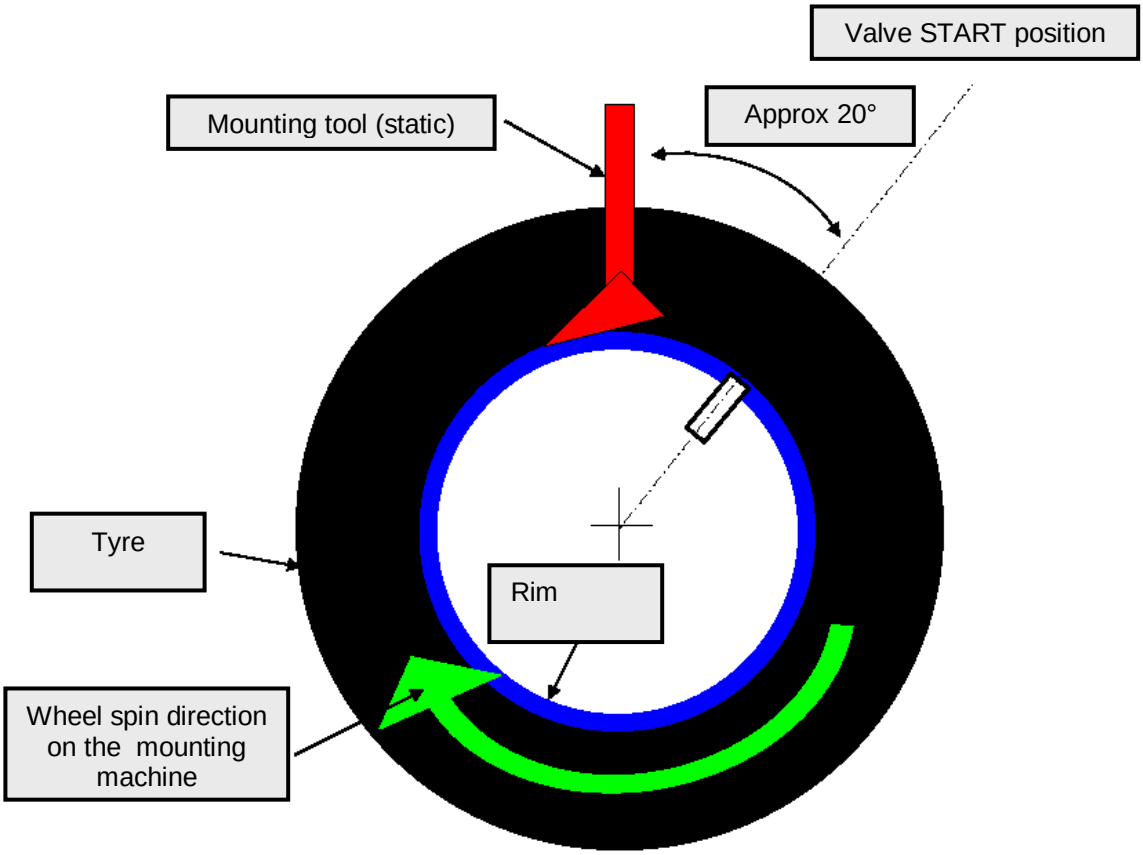
2.5.1 Precautions

- Before any mounting operation of the tyre, make sure that the wheel unit has been correctly mounted and tightened to the rim.
- The tyre must be lubricated so as to ease its mounting.
- Ensure that no lubrication product or any other debris can partially or completely cover the pressure measuring hole or the inflation hole of the wheel unit sensor.
- The tyre must never be allowed to put mechanical load or force onto the wheel unit during the fitting operation.
- Make sure that the tyre does not get trapped between the rim and the wheel unit.

2.5.2 Mounting the tyre

- The bead of the tyre must be engaged approximately 20 degrees beyond the valve (refer to next page).
- Do not introduce a mounting tool between the valve and the point of engagement of the tyre.
- Tyre mounting must be done while moving away from the valve.
- The point of extreme tension of the tire is oposite to the point of engagement of the bead.
- The final fitting of the tyre finishes close to the valve.

During this phase, any load or force on the Wheel Unit Sensor is not allowed.


Valve START position
Mounting tool (static)
Approx 20°
Tyre
Rim
Wheel spin direction on the mounting machine

3. Operation and Setting

3.1 How to operate the Remote control - RF Trigger (=AC-TMS_LDL_Rem-000)

The Remote control enables you to switch **ON** and **OFF** the wheel unit sensor (WUS) in order to preserve battery life.
For reference the following durability can be expected: > 2160 operating hours (theoretical value) with constant transmission. In practice the following arithmetical example can be used. 8 hours per day → 3 days per week → 4 weeks per month → results in approximately 22.5 months lifetime.

To use the trigger most effectively, place yourself as close as you can to the wheel unit sensor in line with the external side of the rim. Then push the ON or OFF button for 20 seconds continuously.

❶ ON Button:

ON button will force the WUS to transmit at rest every 5 seconds (parking mode) and 1 sec transmission if vehicle speed is >20km/h (driving mode). The Handheld receiver (AC-TMS_LDL_Watch-000) will display data as soon as it receives the desired data frame.

❷ Force Button:

This button will force the WUS to transmit every second. This Button is only useful in combination with a handheld receiver. With this button, the "WUS teaching" process will be initiated. >>> refer next chapter 3.2.1

❸ OFF Button:

This button will switch off the wheel unit sensor (no RF transmission). At this time, the pressure and temperature information will not be available on the LCD display on the handheld receiver after more than 20 seconds.

Note: If WUS are switched on with the trigger, they will automatically fall asleep after 13 hours – Do not forget to switch WUS OFF to save batteries.

3.2 Setting of the Handheld receiver (=AC-TMS_LDL_Watch-000)

3.2.1 Teaching the Handheld receiver – Learning of the WUS ID numbers

All WUS (wheel unit sensors) have an unique product ID. This ID is imprinted directly on the sensor (in hexadecimal notification). This simplifies the identification and position of the sensors substantially. For the teaching procedure the last 2 digits of this ID are important.
Preparation step: Make a note all your WUS identifiers and assign them to a position on the vehicle.

Step 1:
From ON MODE → Hold down Button 1 until you reach the following menu that corresponds to the learning of the sensors' ID number.

Step 2:
To activate the learning process → **short** push on Button 2.
The arrows are blinking in a rotation order; the display is waiting for an RF frame. Push the FORCE FRAME BUTTON of the LF Trigger. (→ refer to chapter3.1)

Force Frame Button

+

Step 3:
As soon as the RF frame is received by the display, the two last digits of the ID are shown (you can stop pushing on the button).

If **no** frame is received within 4 minutes, the display returns to figure 1 (shown in step 1). You have to trigger the sensor again.

The ID is received. You have to accept or cancel the ID learning (in case you have triggered a sensor already learned)

To accept the ID learning <<y>>
YES (default value) → short push on Button1

To cancel the ID learning, short push on Button2 to display <<n>>
NO Validate <<n>> → short push on Button1

Once the ID has been learned, FL (Front Left) is blinking → > You have to teach the display the final position on the vehicle.

The different positions are:

FL:	Front Left	N°1 / 2 / 3 / 4
RL:	Rear Left	N°1 / 2 / 3 / 4
FR:	Front Right	N°1 / 2 / 3 / 4
RR:	Rear Right	N°1 / 2 / 3 / 4

Choose the position and validate Choose the wheel rim set number and validate

The positions will appear in the following order. FL1 (Front Left 1), RL1 (Rear Left 1), FR1 (Front Right 1) and RR1 (Rear Right 1). Then it will automatically assign the set n°2: FL2, RL2, FR2 and RR2 and so on.

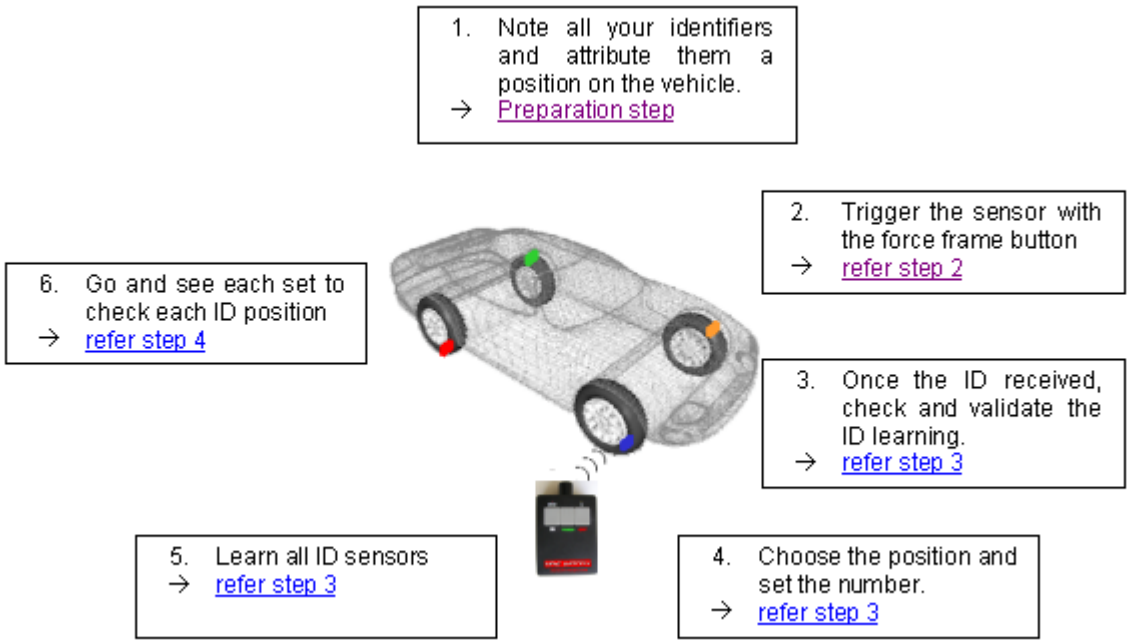
❶ To change and choose a different position → short push on Button2.
To validate the position → short push on Button1
❷ To change and choose the set number → short push on Button2.
To validate the choice → short push on Button1

Once the first ID is learned the display returns to the figure shown in step1 or step2. Repeat this procedure for all sensors.

Step 4:
Once you have learned all sensors' IDs, a short push on Button1 enables you to see all IDs learned their position and their set number.

To see the set 2 → short push on Button2 and so on for all sets

3.2.1.1 Summary



When you change a wheel, you have to strictly observe the positions you have attributed to this wheel during the learning procedure. The display will then recognise automatically the wheel which was changed and will show the correct wheel information. If you have to invert one wheel (e.g. change rear right wheel with front right wheel) you will have to re-learn again by using the FORCE FRAME BUTTON.

3.3 Operating or the handheld receiver (AC-TMS_LDL_Watch-000)

Please note: The menu view and in particular the alarm threshold setting (for temperature & pressure) is dependant on the Tyre Watch firmware. In case you have ordered a bike package the display offers 2 input modes.
Accordingly you will get 4 input modes if you ordered a car package. In the following example a bike package is used.

3.3.1 Tyre Watch: Turning ON

→ Push Button1 or Button2 → standard mode is displayed (WUS sleeping)

3.3.2 Tyre Watch: Turning OFF

→ Long push on Button2 or 7 minutes without any reception

3.3.3 Button operating modes

There are 3 different button operating modes:
1.) Short push on Button1 → Menu choice/confirmation
2.) Long push on Button1 → Menu scrolling
3.) Short Push on Button2 → Change value
→ Long push on Button2 will always switch off the Tire Watch !

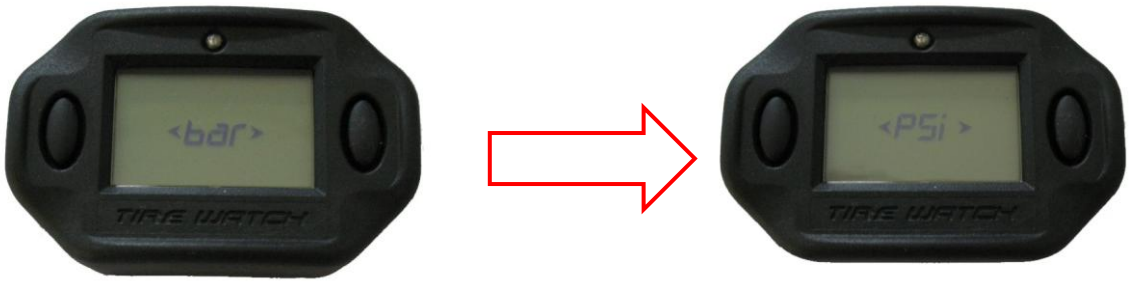
3.3.3.1 Menu choice/confirmation

The procedure which is described in the next chapter is always the same.
Short push on Button1 → Menu choice/confirmation
Short push on Button2 → Change value

3.3.3.2 Menu scrolling (Long push on Button1)

Following is an overview of all the available menu levels.

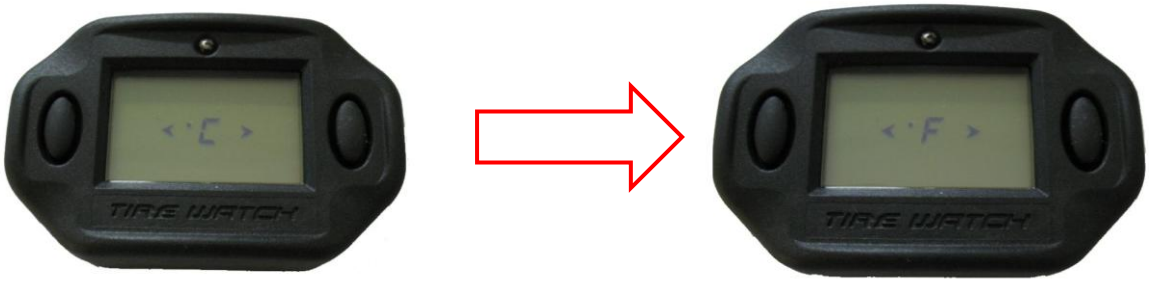
→ Long push on Button1 → second menu level (Changing the dimension)



Press Button1 until the dimension view starts blinking.

It is possible to change the dimensions for the pressure in [bar] or in [PSI] (pound per square inch)

❶ Short push on Button2:



→ toggles the value from <bar> to <PSi>
❷ Short push on Button1:
→ Confirmation (and storage) of the selected dimension
❸ Short push on Button1
→ The dimension for the temperature from [°C] → [°F] is set in a similar way
→ repeat step ❶ and ❷

→ Long push on Button1 → third menu level (Alarm threshold setting)

Keep Button1 pressed until the following menu is displayed !

Front Tyre Pressure Threshold Setting Menu

Setting range values for wheels displayed as front wheel: 0.1 bar to 3.5 bar

Maximum alert pressure:

pre-programmed at 3.5bar
(→ Alarm if tyre pressure exeeds 3.5 bar)

Minimum alert pressure:

pre-programmed at 0.1bar
(→ Alarm if tyre pressure falls below .1bar)

❶ Short push on Button2
→ changes the value (only the flashing value is changed !)

❷ Short push on Button1
→ Changes the value before and after comma

❸ Repeat step ❶
→ to set the new value

❹ Short push on Button1
→ Confirmation (and storage) of the viewed pressure threshold → change to next value

Rear Tyre Pressure Threshold Setting Menu

Setting range values for wheels displayed as rear wheel: 0.1 bar to 3.5 bar

Maximum alert pressure:

pre-programmed at 3.5 bar
(→ Alarm if tyre pressure exeeds 3.5 bar)

Minimum alert pressure:

pre-programmed at 0.1 bar
(→ Alarm if tyre pressure falls below .1bar)

❺ Short push on Button1 until the following menu is displayed

Front Tyre Temperature Threshold Setting Menu
Setting range values for wheels displayed as front wheel: -19°C to 99°C

Maximum alert temperature:
pre-programmed at 99°C
(→ Alarm if tyre temperature exceeds 99°C)

Minimum alert temperature:
pre-programmed at 0.3°C
(→ Alarm if tyre temperature falls below .3°C)

Rear Tyre Temperature Threshold Setting Menu
Setting range values for wheels displayed as rear wheel: -19°C to 99°C

Maximum alert temperature
pre-programmed at 99°C
(→ Alarm if rear tyre temperature exeeds 99°C)

Minimum alert temperature:
pre-programmed at 0.3°C
(→ Alarm if tyre temperature falls below 0.3°C)

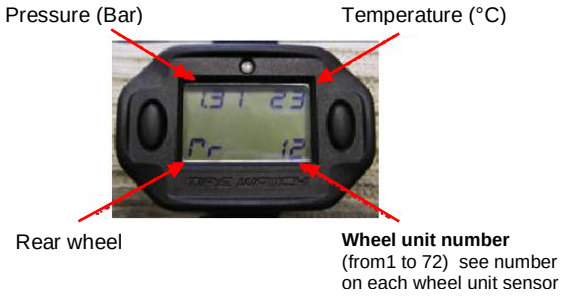
If temperature or pressure falls below the selected threshold, the handheld receiver will display this alarm. In this example a rear tyre pressure has a critical value. Having programmed the sensor number (in the example 22) the user can recognise immediately which sensor and which tyre triggered the alarm. The sensor ID allocation should be done accurately!

→ Long push on Button1 → fourth menu level (WUS ID Setting)

Information about learning of the WUS ID numbers are described in detail in chapter 3.2.1

3.4 Wheel unit reception (WUS transmitting)

When the learning procedure (refer chapter 3.2.1) is finalised the following conditions must be set so that the receiver can receive the appropriate information (pressure, temperature and sensor identification – refer the next figure).
The WUS must be switched on (these must be "woken up") by pressing "ON" for 20s on the remote control. After "Wake-up" the transmission will be activated. The handheld receiver will be updated every second if the vehicle speed is > 20km/h and every 5 seconds (parking mode) is speed is lower.



3.4.1 WUS operating modes

Each WUS transmits pressure and temperature on 433,92 MHz over a distance of max 15 metres.

Operating modes of the sensor:	
Driving mode	Transmission rate 1 sec / transmission occurs only if vehicle speed is over 20km/h. Otherwise, the sensor will not send any frames.
Parking mode	Transmit interval 1 sec for 7 minutes after driving mode period (returns to automatic sleep mode to save batteries).
Sleeping mode	Power save –> Idle

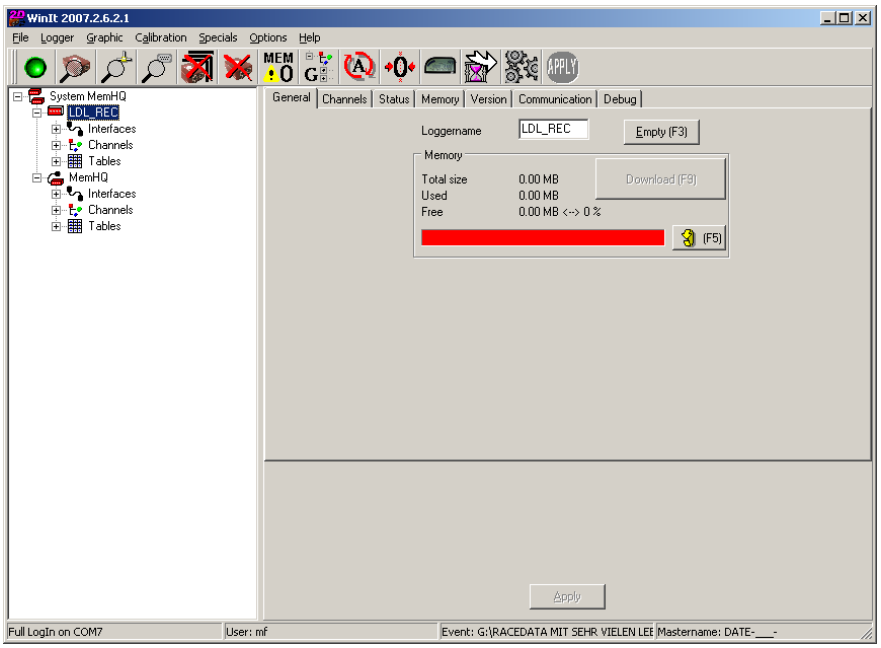
4. Startup of 2D TMS receiver

4.1 General

The TMS receiver represents the interface between WUS and CAN and forwards the received RF data (from the WUS) onto the CAN-Bus. Other 2D CAN modules can process these data e.g. recording units (such as logger or memory module) and/or display units. Many other CAN modules can be integrated to extend the system.

4.2 Start WinIt in Setting mode

After connecting the system (as shown in the example in chapter 1.3.2) start WinIt in "Setting mode". Select the button <Logger (F2)> from the 2D Front-end WinARace.



The only setting the user must do is the allocation of the wheel unit sensors (WUS) to the appropriate TMS receiver (BC-TMS_LDL_Rec-000). Chapter 4.3.2 contains detailed set up instructions.

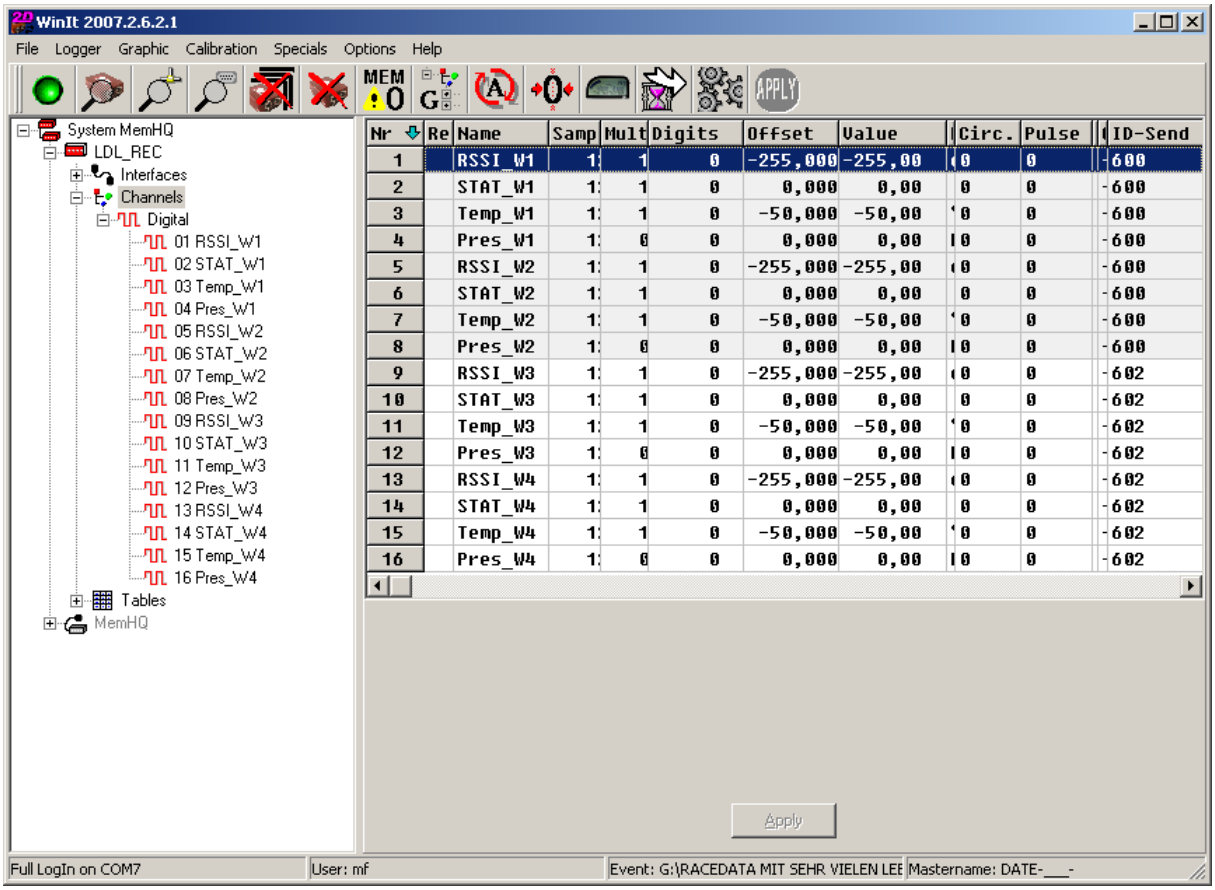
The 2D TMS receiver is pre-configured and operates without any configuration by the user apart from allocating the WUS. The user can check the incoming channel values in the channel matrix in WinIt (refer chapter 4.3). To check the formulas. (refer chapter 4.3.1.1 Formulas)

The receiver receives only channel values:

1.) If WUS sensors are allocated to the used receiver
2.) If these are in operating distance (<15m)
3.) If these were switched on before (refer chapter 3.4) or wheel speed is above 20 km/h

4.3. Parameter Setting of the Telemetry receiver (BC-TMS_LDL_Rec-000)

A WUS sensor sends a list of channel values every second, **only** if some conditions are preset. These conditions are explained in chapter 4.2.3 (WUS operating modes). You can monitor and check the selected channels in WinIt if you open the “node tree” <LDL_REC> <Channels> <Digital>.



4.3.1 Channel description

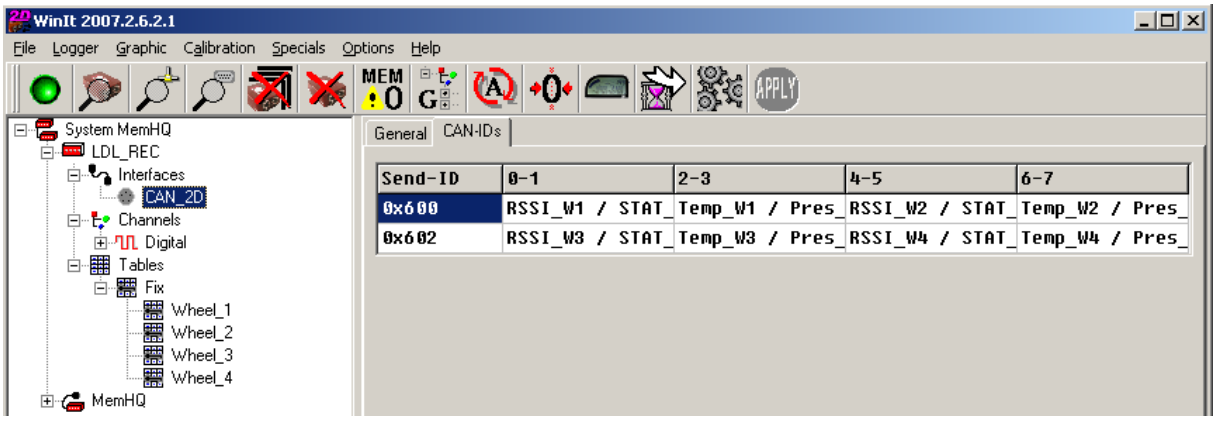
The following table shows the data structure of the CAN information being sent.

Temp_ = Temperature –20° to 125°C (measuring range) 1°C / bit
Pres_ = Pressure 0 to 3.5bar (rel. ambient pressure) 13.7mbar / bit
STAT_ = Status
RSSI_ = **R**eceived **S**ignal **S**trength **I**dentification (RSSI)

W1 = Wheel 1
W2 = Wheel 2
W3 = Wheel 3
W4 = Wheel 4

Identifier	Data 0	Data 1	Data 2	Data 3	Data 4	Data 5	Data 6	Data 7
0x600h	RSSI_W1	STAT_W1	Temp_W1	Pres_W1	RSSI_W2	STAT_W2	Temp_W2	Pres_W2

0x602h	RSSI _W3	STAT_W3	Temp_W3	Pres_W3	RSSI _W4	STAT _W4	Temp _W4	Pres_W4



4.3.1.1 Formulas

The formulas for each channel are pre-programmed, and can be checked by selecting the corresponding channel (in this example the temperature channel for the first wheel) followed by the selection of the tab <Analyse>

→ The formula of the temperature channel is:
[°C] = 1 * Digits - 50 (corresponds with 1°C/bit and an offset of -50)

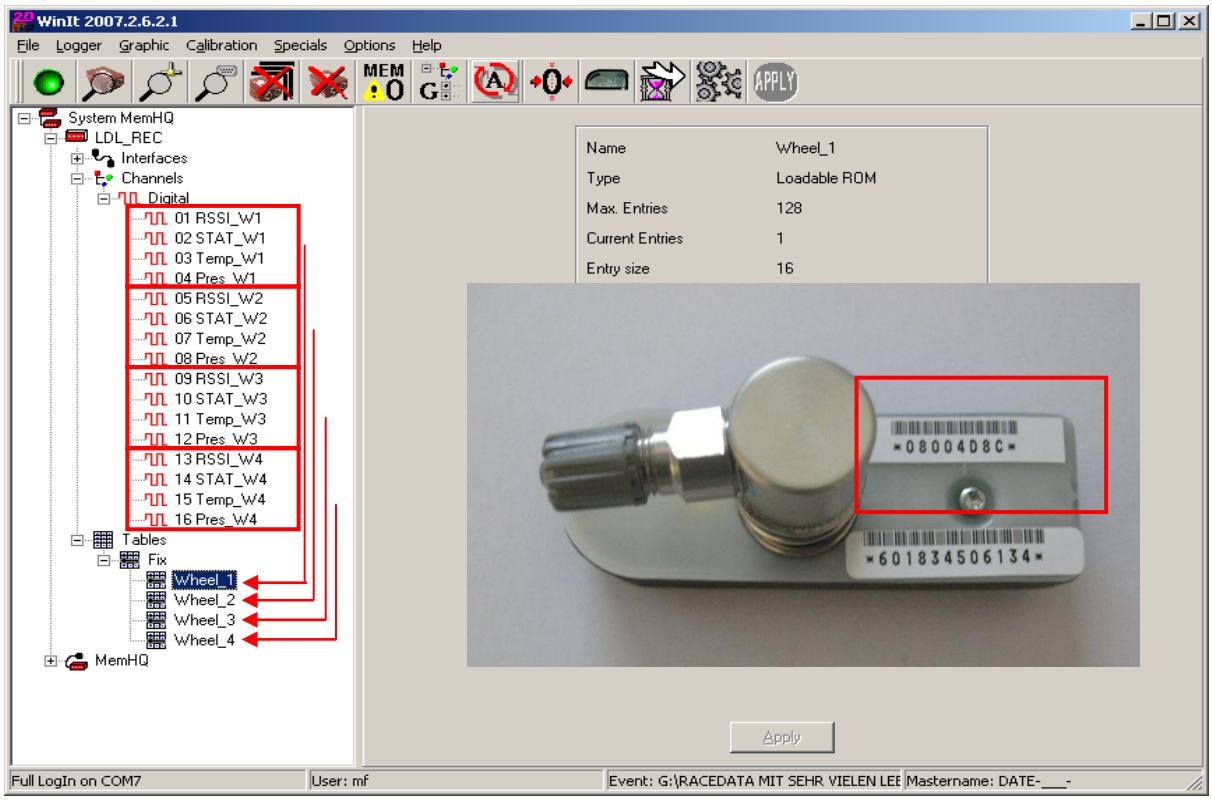
→ The formula of the pressure channel is:
[Bar] = 0.0136901 * Digits - 0 (corresponds with 13.7mbar / bit)

→ The resolution of each channel is 8bit.

4.3.2 Tables

With the tables function it is possible to define and administrate a list of a maximum 128 WUS (per wheel), which can be assigned to the TMS receiver.

Example: A team has two drivers and additionally both have two complete tyre monitoring systems. This requires at least one 2D TMS receiver (BC-TMS_LDL_Rec-000), a certain number of WUS and a remote control.
All sensors from team A should communicate exclusively with the TMS receiver of team A (and accordingly WUS team B with TMS receiver of team B).
Therefore the user must give the TMS receiver the information as to which WUS are in use by which receiver. This information (product ID of the WUS) are stored in a table (one table per wheel and one entry per WUS Product ID)
The method to edit each table will be explained in the next chapter 4.3.2.1

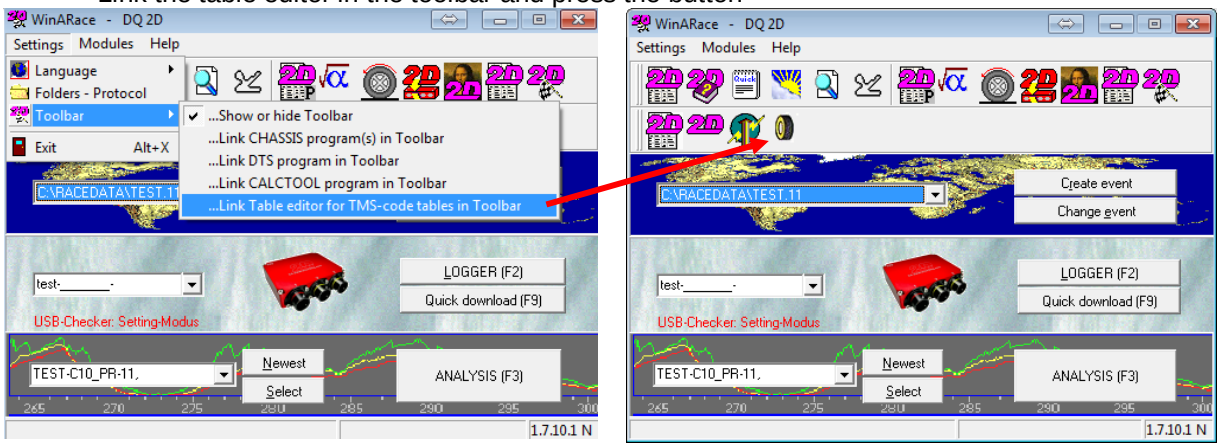


The user needs to insert a new entry in the table to add a WUS. The entry corresponds with the last 4 digits of the WUS product ID (as hexadecimal value!)
Each WUS has a unique product ID. This product ID is imprinted on each WUS (refer figure above). The product ID code starts “ID:” followed by an 8 digit character string. In the following chapter 4.3.2.1 you will get an instruction how to assign these product ID’s with the help of the table editor (=Tabled.exe) which is part of the 2D software.

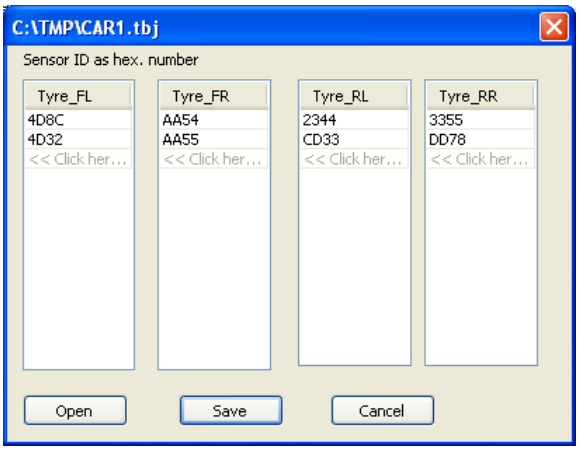
4.3.2.1 Assigning WUS to individual wheels with the 2D table editor (Tabled.exe)

The tire pressure sensors are assigned to the wheels via tables. A project combines the 4 tables needed for a 4 wheeled vehicle.

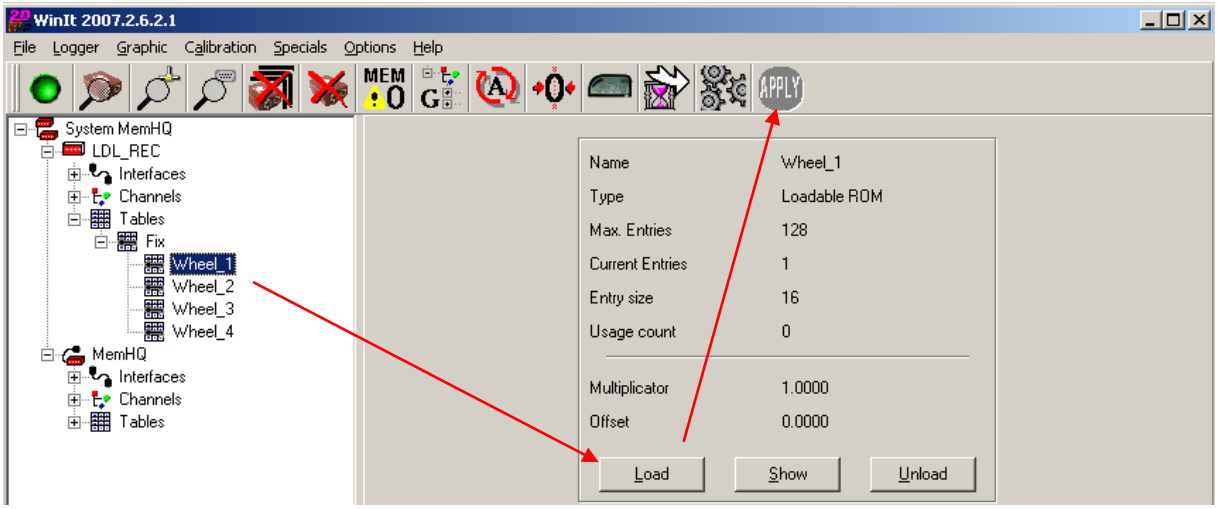
- Link the table editor in the toolbar and press the button



- Assign the last 4 digits of the sensors ID to the corresponding wheels and save the project. 2D recommends to save your project in your Race installation folder e.g. C:/Racexx.x/Tables
- 4 tables will be created in the same folder with the project name (first 6 digits) plus an attachment for the assigned wheel. e.g. CAR1FL



- Start communication to the TMS receiver via Winit.
- Go to <Tables> and load the corresponding tables of the project to each wheel and press <Apply> afterwards
- Wheel_1 = FL, 2=FR, 3=RL, 4=RR



- To change sensors in individual tables (*.tbl) open the whole project (*.tbj) via the WinARace button, edit the individual sensor, save the project and assign the changed table to the corresponding wheel as shown above.

5. TMS receiver antenna

2D recommends using the delivered antenna for best signal reception. However it is possible to use a self build cable antenna to go through shielding carbon parts and to place the head antenna closer to the WUS.

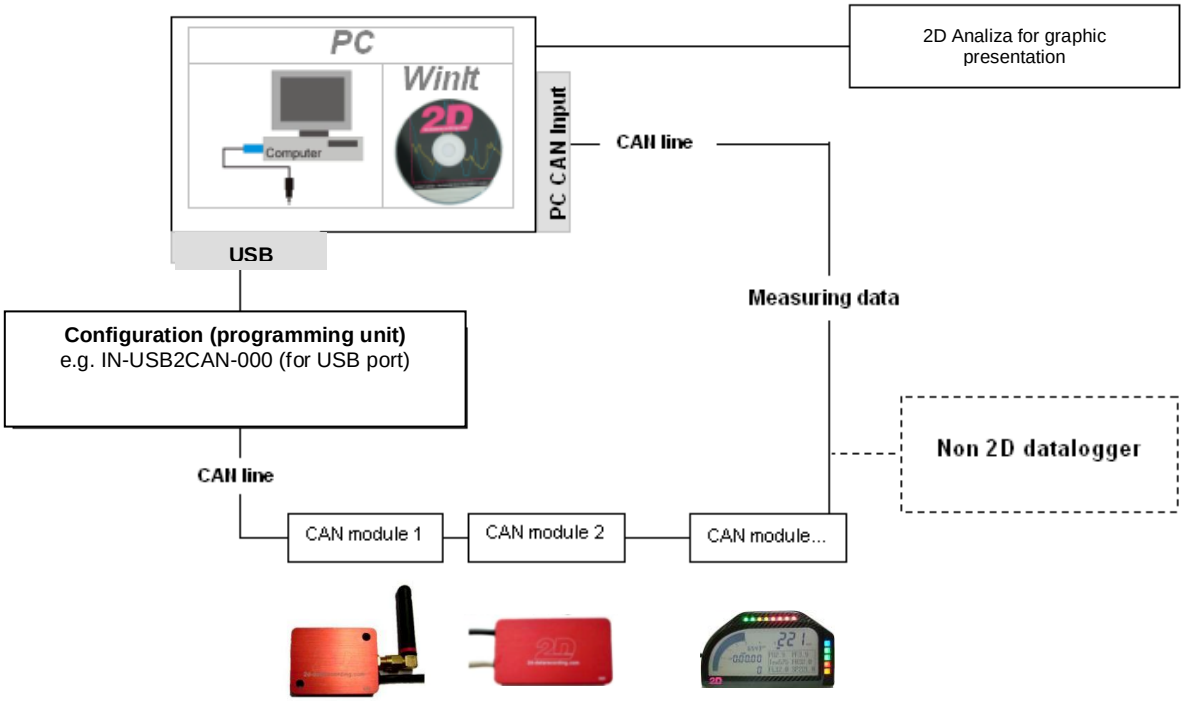
1. Use an antenna cable with a connector fitting to the 2D tire pressure receiver. (e.g. GPS Antenna cable)
2. Cut it to the desired length
3. Remove the outer plastic seal and metal shielding on a length of roughly 18cm.

4. Cut the unshielded cable to precisely 17.3cm (Lambda/4)

Appendix A: General CAN Bus Setting

Configuration of 2D CAN modules

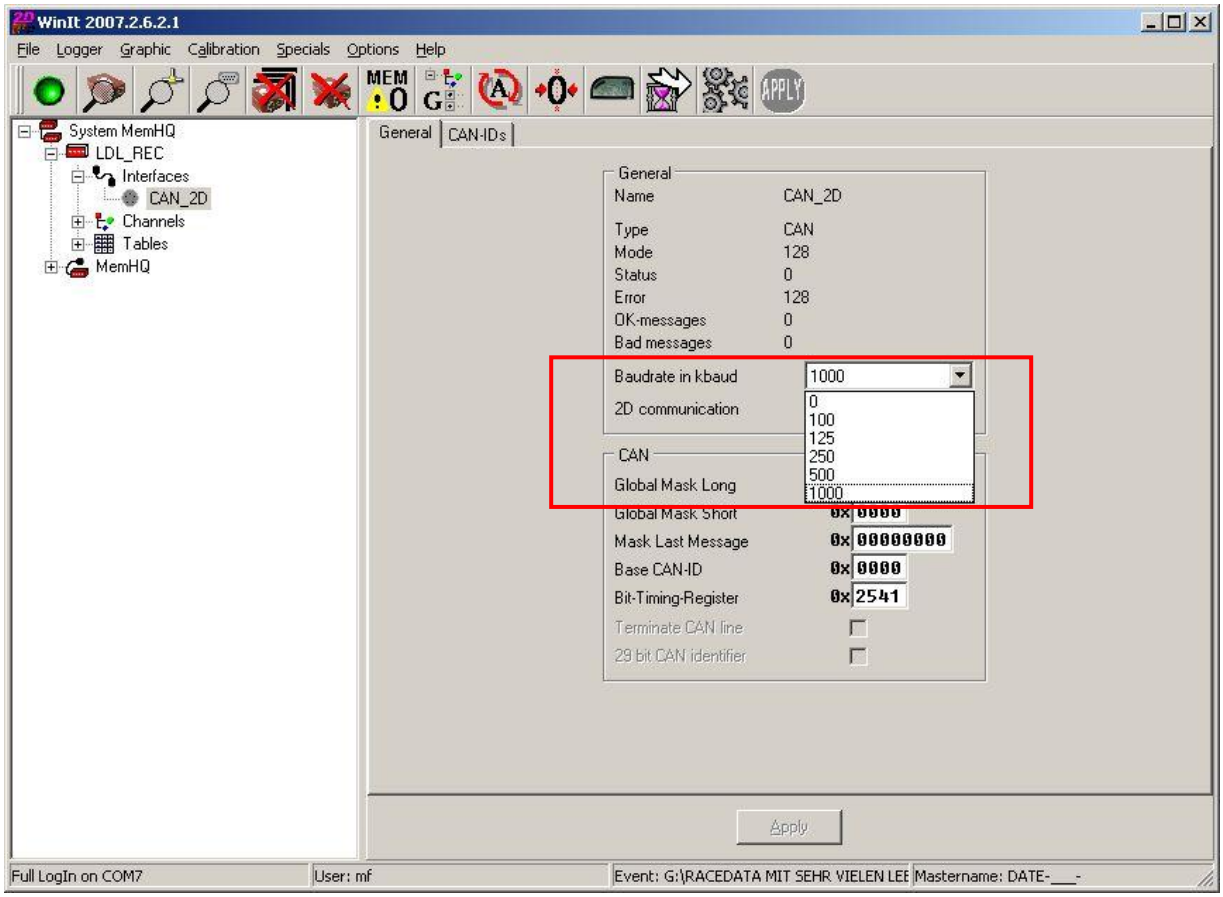
If using a 2D TMS receiver, connect it as shown in the next figure. For easy configuration of all 2D CAN modules (e.g. TMS Receiver, for example) use the programm WinIt with the IN-USB2CAN-000 module. It is possible to programm all 2D CAN-Modules via USB-port. Chapter 4 shows the start-up with an example of a complete measurement system consisting of:
Data aquisition: → e.g. BC-TMS_LDL_Rec-000 + SA-TMS_LDL_x-000
Data recording: → e.g. LG-CANMEM1Cyy-128-000
Visualization: → e.g. AC-TMS_LDL_Watch-000 or DI-Dash_6-8_2C-000
Control: → e.g. AC-TMS_LDL_Rem-0000



Changing the CAN Bus baudrate

To adjust the CAN Bus baudrate, select the CAN Bus node (CAN_2D). In the tree <Interfaces> and go to tab <General>. The required Baudrate can be set in the drop down box as shown below.

All 2D modules have a default communication baud rate of 1Mbaud (1000kbaud).
If you change the baudrate make sure that all modules connected to the same CAN Bus are set to the same baudrate!



Changing the CAN IDs

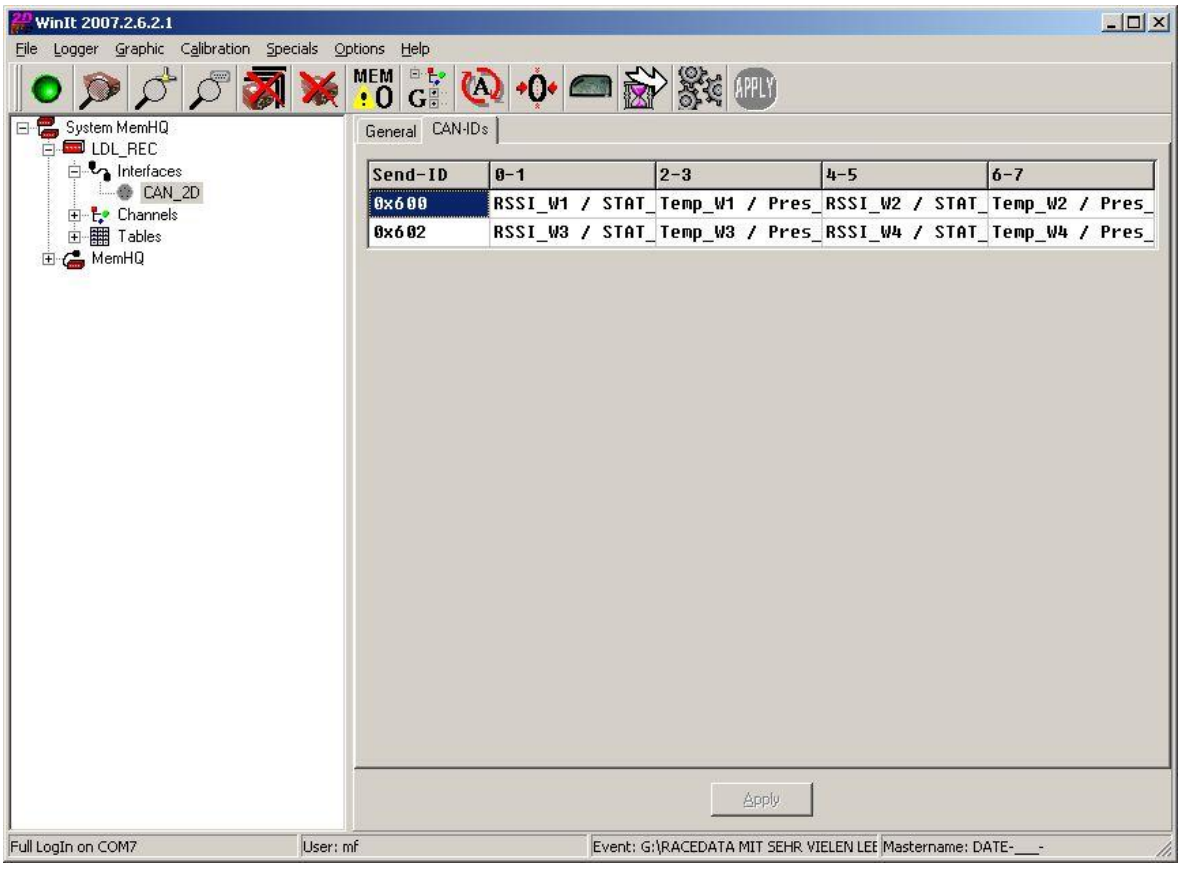
When it is necessary to assign/change CAN Send ID's ?

In a CAN Bus network it is necessary that each channel has a unique CAN address (CAN Send ID) to ensure error free communication of all connected CAN modules to the network.
The 2D BC-TMS_LDL_Rec-000 has pre set CAN ID's: 0x600h and 0x602h

Manual CAN ID assignment

To use more than one TMS receiver, the CAN Send ID's of one module have to be changed.

- Open the "CAN_2D" node by double clicking on the "Interface node"
- Enter the page <CAN-ID's>
- Check/change CAN Send ID's (by double clicking on the grid)



- Apply the settings to the modules by using the button <Apply>

Appendix B: What's new?

Chapter	Changed to ?
Chapter4.3.2.1: Assigning WUS to individual wheels with the 2D table editor Note: Tabled.exe has to be newer than 17.09.2008 to use this function! You can download this version from 2D website: → [Support] [Download] [2D add on programs] or use direct link http://www.2d-datarecording.com/home.php?frame=Downloads/2d-utils/body_2d-utils.html	23.09.2008
chapter 5. TMS receiver antenna	14.10.2009