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TYRE PRESSURE MONITORING SYSTEMS
TPMS HANDBOOK 2020/21

TPMS, an overview

General overview and legislation

A tyre pressure monitoring system constantly monitors the pressure and

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TPMS Tyre Pressure Monitoring Systems

TPMS General information

A tyre pressure monitoring system constantly monitors the pressure and temperature of a vehicle's tyres. If the tyre pressure drops or is below the recommended minimum pressure, the driver is alerted either by an audible signal and/or warning symbol lighting up on the dash, depending on vehicle model. The TPMS system helps to prevent accidents, improve fuel economy and decrease carbon emissions.

Overview of TPMS

Tyre Pressure Monitoring and the Law in Europe

Commission Directive 2010/48EC confirmed that since November 2012 all NEW type M1 vehicles will be required by law to have a pressure based TPMS (Tyre Pressure Monitoring System) installed.

From November 2014 all type M1 vehicles sold in Europe are required by law to have a TPMS system installed (Category M1: Vehicles designed and constructed for the carriage of passengers and comprising no more than eight seats in addition to the driver's seat).

TPMS is part of the European National Car test, for all newly registered cars from January 1st 2012.

TPMS and the MOT Test

TPMS is now being tested as part of the MOT road worthiness test. At present, any vehicle manufactured before 2012 that has been fitted with a TPMS will receive an 'advisory' on their test if a fault is detected or the TPMS dashboard light is illuminated. This will be recorded on the MOT test certificate.

The inspection of the tyre pressure monitoring system (TPMS) is for M1 vehicles first used on or after 1 January 2012.

The TPMS warning lamp can operate in many ways depending on the vehicle type. You must only reject vehicles if it's clear that the lamp indicates a system malfunction and not simply indicating that one or more of the tyre pressures is low. (www.mot-testing.service.gov.uk)



THE TPMS WARNING LAMP CAN OPERATE IN MANY WAYS DEPENDING ON THE VEHICLE TYPE. **YOU MUST ONLY REJECT VEHICLES IF IT'S CLEAR THAT THE LAMP INDICATES A SYSTEM MALFUNCTION AND NOT SIMPLY INDICATING THAT ONE OR MORE OF THE TYRE PRESSURES IS LOW.**

Direct or Indirect

Direct and Indirect TPMS provide contrasting functionality. Which is the more effective?

Direct TPMS monitors tyre pressure to 1.5 kpa. (Kilopascals) (1 bar = 100 kpa)



UK CARS WITH TPMS ARE
MADE UP OF:

40% Indirect TPMS

60% Direct TPMS



active system?

1000 Kpa) It is very accurate.

TPMS CAN BE DIVIDED INTO TWO DIFFERENT TYPES – **DIRECT (DTPMS)** AND **INDIRECT (ITPMS)**. TPMS ARE PROVIDED BOTH AT AN OEM (FACTORY) LEVEL AS WELL AS AN AFTERMARKET SOLUTION.

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Direct or Indirect TPMS - What's the difference?

Indirect TPMS

Indirect TPMS measures the rotational speeds diagonally of each tyre using the ABS speed sensors.

An under-inflated tyre will rotate slower than the correctly inflated one, giving a tyre pressure warning.

Direct TPMS

Each wheel of the vehicle has a sensor fixed to monitor the changes in pressure from the tyre.

If low pressure or a leak is detected (generally 25% less than operating pressure) the driver is alerted by the in-car system.

Direct or Indirect TPMS - The PROs and CONs



Indirect TPMS - PROs

- The system works from the ABS speed sensors already installed in the vehicle.
- It is low cost.
- There is no chance of sensors needing to be replaced or being damaged in any tyre related work.



Indirect TPMS - CONs

- It is not accurate.
- The system needs to be re-set when tyres are replaced, inflated or positions changed.
- It is possible to TRICK the system. For example, four underinflated or flat tyres will not set off a warning as they are still rotating at the same speeds.
- A puncture after parking is not identified.



Direct TPMS - PROs

- Direct TPMS monitors tyre pressure to 1.5 kpa (Kilopascals) (1 bar = 1000 Kpa) so is very accurate.
- Sensors send their signal approximately every 30 seconds whilst driving. Low pressure will be identified very quickly.
- Tyre sensors can identify leaking air.
- At start up a tyre with low pressure is immediately identified.
- It can also measure temperature unlike the ABS system.



Direct TPMS - CONs

- More expensive solution.
- Requires maintenance.
- Requires additional diagnostic equipment to reset and service.

TPMS service benefits

Road safety, environmentally friendly, improves fuel consumption, peace of mind and

TPMS improves road safety / Protects the environment / Saves money /

efits

and legal benefits

reduces CO2 emissions / MOT

DEPARTMENT
FOR TRANSPORT
(DFT) REVEALED
THAT ILLEGAL,
DEFECTIVE AND
UNDER-INFLATED
TYRES WERE
RESPONSIBLE FOR
MORE THAN **1,210**
ROAD CASUALTIES
IN GREAT BRITAIN
DURING 2010.

SOURCE:
TYRESAFE.ORG

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Fully functioning TPMS improves road safety

Increased road safety.

The TPMS system is constantly monitoring the pressures of the tyres. Addressing potential TPMS warnings will decrease the potential for:

- BLOW OUTS
- AQUAPLANING
- BRAKING DEFICIENCY



Protects the environment

Improves fuel consumption.

Correct tyre inflation also leads to optimising miles per gallon for a vehicle. Driving with under-inflated tyres can consume more fuel.

Reduces CO2 emissions



Reduces tyre wear

Reduces tyre wear and prolongs tyre life.

Incorrect pressure in tyres will lead to uneven tyre wear, meaning the tyres will need replacing sooner.



TPMS legal benefits

Avoid MOT failure.

A faulty Tyre Pressure Monitoring System (TPMS) is now an automatic MOT fail on cars registered after 1 January 2012.



Saves the customer money

Cheaper to service than full replacement.

Regular maintenance can reduce long term service costs.

Detection and test

The inspection process is important. It determines that TPMS exists and that it is

Whatever the service requirement, make it your business to check the



sting

functioning correctly.

customer's vehicle for TPM

WHATEVER
THE SERVICE
REQUIREMENT
- **MAKE IT YOUR
BUSINESS TO**
FIRST CHECK THE
CUSTOMER'S
VEHICLE FOR
TPMS.

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Vehicle service

Whatever the service requirement - make it your business to check the customer's vehicle for TPMS.

Establishing if TPMS is present...

- Using the TPMS Inspection tool, conduct a search on the vehicle make and model.
- No record signifies that the vehicle either has indirect TPMS or the vehicle does not have an active TPMS system present.
- A listed entry on the diagnostic tool signifies that the vehicle is equipped with direct TPMS.

TPMS Inspection tool

- REMA TIP TOP recommends the Hamaton H47 or Hamaton H46 (powered by ATEQ) - TPMS/diagnostic tool for detection, inspection, diagnosis and relearn capability.
- **Enquire about our latest offers and TPMS bundles - 0113 2770044**



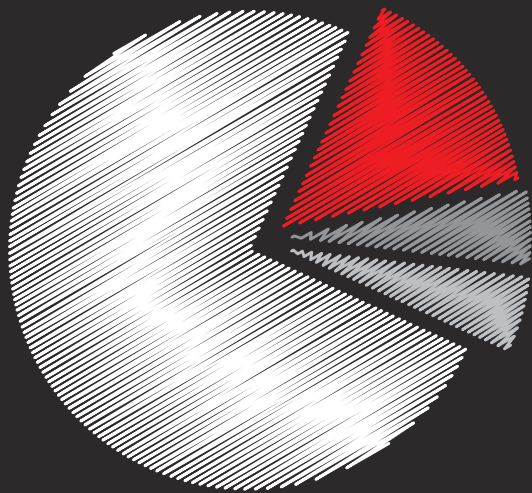
HAMATON H47 - (powered by ATEQ)

The cost-effective H47 - manufactured in partnership with ATEQ - packs an abundance of features, including integrated OBDII module into a compact, ergonomic design.

- Provides many simple methods to configure all EU-Pro/T-Pro generations and program Hybrid 3.5 sensors: create, clone, manually enter or (from the vehicle's ECU) retrieve ID's.
- Reads 100% of OE and aftermarket sensors.
- Displays sensor data: ID, tyre pressure, tyre temperature, battery status and sensor frequency.
- Provides manual, auto and OBDII relearn procedures.
- Built-in OBDII module performs ECU reset in under 2 minutes.
- Ever-increasing vehicle coverage due to frequent database updates.
- User-friendly navigation, multi-language interface and bright colour display.
- Comes with shock-resistant rubber boot, USB cable, power adapters (EU, UK and US), quick start guide and carry case.

Sensor malfunction

A depleted battery and physical damage are the most common reasons for TPMS sensor malfunction.



Main causes of sensor malfunction:

- 75% BATTERY DEPLETED
- 15% CORROSION
- 5% PHYSICAL DAMAGE
- 5% OTHER

on

sensor malfunction.

dition to the spare wheel s



A FAILED SENSOR
BATTERY MEANS
THE TPMS UNIT
IS REDUNDANT
AND NO LONGER
PROVIDING
PROTECTION TO
THE DRIVER OR
PASSENGERS.

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Sensor malfunction and replacement?

A depleted battery is the most common reason for sensor malfunction. On newer cars the lithium ion batteries inside TPMS sensors may last anywhere from five to ten years. A failed sensor battery means the TPMS unit is redundant and no longer providing protection to the driver or passengers.

Recommended advice to the customer

We advise the replacement of all four TPMS sensors at the same time in addition to the spare wheel sensor if no previous maintenance work has been undertaken.

- Replacing all sensors of the same age negates the need to re-visit the dealer and incur additional charges for a secondary service.
- It could avoid the TPMS warning light appearing while on a trip or in traffic.
- It would eliminate the worry of dealing with a failed sensor.
- Illuminated TPMS Malfunction Indicator Lamp (MIL) now results in an immediate MOT failure.
- Replacing all sensors, before or when one fails, helps avoid a last-minute issue while preparing for inspection.



Replacing the sensor to manufacturer's specification

Installing the replacement sensor will require tyre removal by a professional tyre fitter. The old sensor should be disposed by the technician and a replacement sensor fitted correctly according to the manufacturer's specifications.



Cloning the sensor

You will need to install the new sensor using a diagnostic tool. You simply capture the sensor data and make a **CLONE** or a **COPY** like the original. Programmable sensors can be programmed more than once. And it can be programmed whilst in the tyre.

01100
10110
11110

Relearn procedure

If the TPMS sensor is not transmitting a signal, a new sensor will need to be programmed following the car's relearn procedure. **Relearn procedures can be obtained from www.tiptoptpms.com** using your account ID to log in.

The **ATEQ TPMS/Diagnostic tools** are compatible with EU-Pro Hybrid programmable sensors.

Clamp-in sensor



Snap-in sensor



Valve stem service

Valve stem components are prone to corrosion and fatigue.

Manufacturers highly recommend, that the TPMS valve is serviced (alloy)

GALVANIC
CORROSION,
OCCURS WHEN
**TWO DIFFERENT
METALS** ARE
IN CONTACT IN
A CORROSIVE
ENVIRONMENT:
ONE OF THE
METALS
EXPERIENCES AN
**ACCELERATED
CORROSION RATE.**

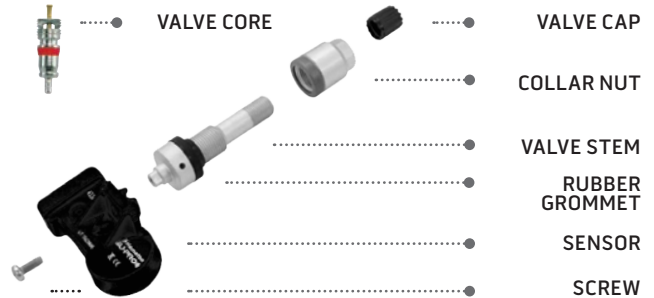


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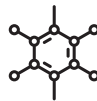
Best practice

All OE manufacturers highly recommend, that the TPMS valve is serviced (alloy) or replaced (snap-In) each time a tyre is removed.



Why service a TPMS valve?

- To prevent valve failure due to corrosion and fatigue.
- To prevent failure due to rubber parts deteriorating.
- To prolong the life of the sensor.
- To create an air tight tyre / rim / valve seal.
- Servicing a TPMS metal valve is slightly different as you have to replace the serviceable parts...or replace the valve completely.



Galvanic Corrosion: the hidden enemy

Galvanic corrosion is the scientific term to describe the usual occurrence of corrosion in a TPMS valve assembly. This phenomenon occurs when two different metals are in contact in a corrosive environment: one of the metals experiences an accelerated corrosion rate.



Here's the geeky bit

Galvanic corrosion occurs when the **aluminium** valve stem reacts with the **brass** (copper and zinc) valve core in the presence of moisture - due to differences in their electrode potentials.

Electrode potentials relate to the metal's capacity of losing electrons. In the valve situation, aluminium is likely to lose electrons, turning from solid aluminium to an aqueous solution of dissolved aluminium ions. The net result is corrosion and potentially catastrophic valve failure.



Accentuating the problem

The problem can even be accentuated further as customers or garages retrofit valve caps. The introduction of an additional cathode in the form of a steel valve cap can cause damage to the aluminium valve stem on the external thread as well as the inside section.



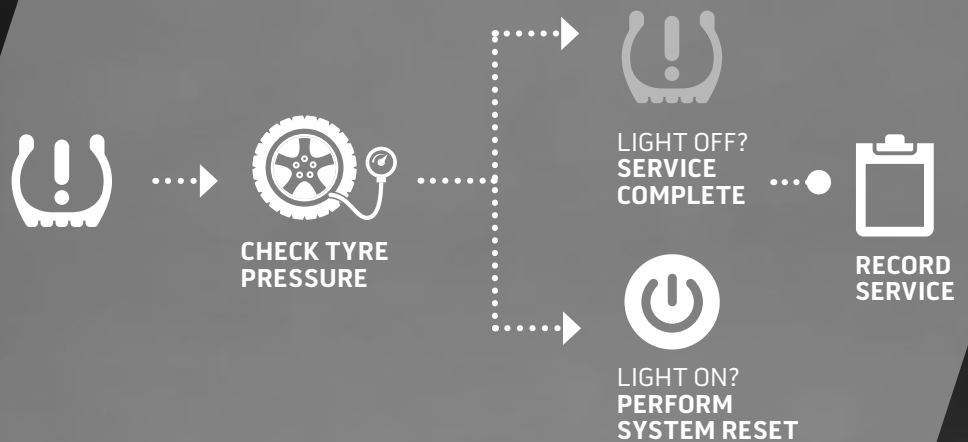
NOTE: EU Pro Hybrid Sensors and service kit valve cores are nickel plated to reduce the risk of galvanic corrosion.

Assess, discuss, serve

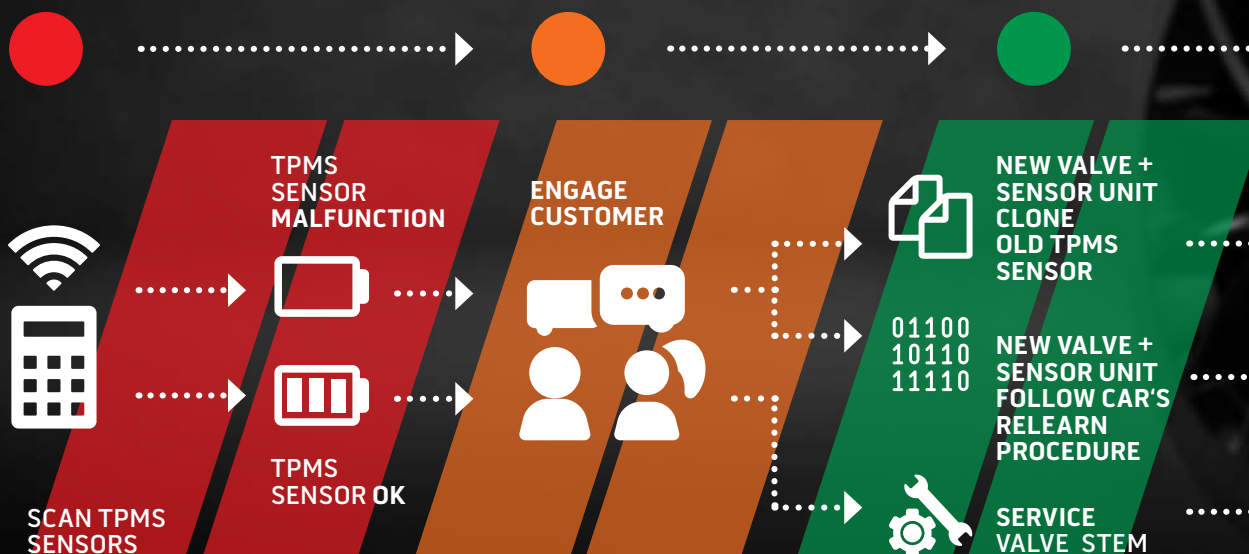
TPMS Inspection? Follow these key steps to ensure you've covered all the bases in



1 INDIRECT TPMS



2 DIRECT TPMS



Service...

in every scenario.

3

NO TPMS



CHECK TYRE
PRESSURE



CHECK TYRE
PRESSURE



RECORD
SERVICE



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Indirect TPMS, Direct TPMS or No TPMS

The quick TPMS guide illustrates the three main vehicle scenarios.

Approx 60% of cars fitted with TPMS today will have a Direct TPMS. This will present the technician with their greatest opportunity to undertake volume service work and realise the vast proportion of TPMS service revenues.



Assess...

Detect the presence of TPMS sensors (Direct TPMS), and record status in all four wheels before beginning any service activity to the Tyre/Wheel Assembly.



Discuss: Engaging the customer...

Servicing **Direct TPMS** provides a unique opportunity to inform and educate the customer about their vehicle's TPMS. This is an important phase during the service that forms part of our best practice TPMS guide.

The area highlighted in orange illustrates the opportunity window to inform and influence the customer before the recommended service work and present the various service options which are identified from TPMS detection and inspection.

TPMS is still very new and many customers do not understand the reasons why it is necessary to service sensors, nor the complexities of the cloning and relearn procedures.

Effective dialogue with the customer will lead to well informed service choices and ultimately provide additional tyre bay service revenues.



Service work

The service work is determined by the status of the TPMS inspection and consultation with the customer. See pages 10-13 for further information.



Check tyre pressure and record service

Correct tyre pressures should be observed in accordance with manufacturer specifications.

The condition of the TPMS system should always be recorded.

Hit new heights...

TPMS service maintenance can boost service overhead recovery and increase work

TPMS generates more revenue per garage than windscreen wipers, electronic diagnostics, ignition parts and spark plugs, or cooling system parts.

**IN THE USA, TPMS
GENERATES MORE
REVENUE PER
GARAGE THAN
WINDSCREEN
WIPERS,
ELECTRONIC
DIAGNOSTICS,
IGNITION PARTS
AND SPARK
PLUGS, OR
COOLING SYSTEM
PARTS.**

WWW.TIPTOPTPMS.COM



workshop profits

electronic diagnostics, ignition

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Your revenues could hit new heights...

In 2015 approximately 6.5million sensors were fitted to new UK vehicles, these have a life expectancy of 5 to 7 years or 100k miles.

So by the beginning of 2020 we will begin to see a large rise in sensor replacement.

Replacing a sensor:

revenue £50.00 to £95.00.

When a sensor valve is serviced or the valve is replaced:

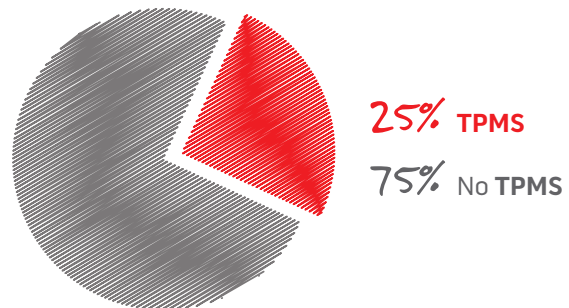
revenue £5.00 to £25.00.

In the USA, TPMS generates more revenue per garage than windscreen wipers, electronic diagnostics, ignition parts and spark plugs, or cooling system parts.



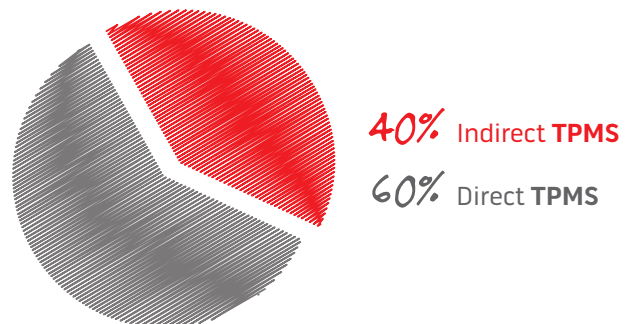
UK cars with TPMS

In 2016, 25% of vehicles in the UK had **TPMS**. The growing global tyre pressure monitoring systems (TPMS) market is projected to reach \$3 billion by the year 2017.



UK: Direct TPMS Vs Indirect TPMS Market

In 2016 **Direct TPMS** contributed to 60% of vehicles fitted with a TPMS systems. **Indirect TPMS** contributed to the remaining 40% of vehicles.



Tools, kits and services

REMA TIP TOP supply everything you need to effectively service TPMS sensors and

TPMS online support



Diagnostic Tool - Hamaton H47



Tyre pressure gauge



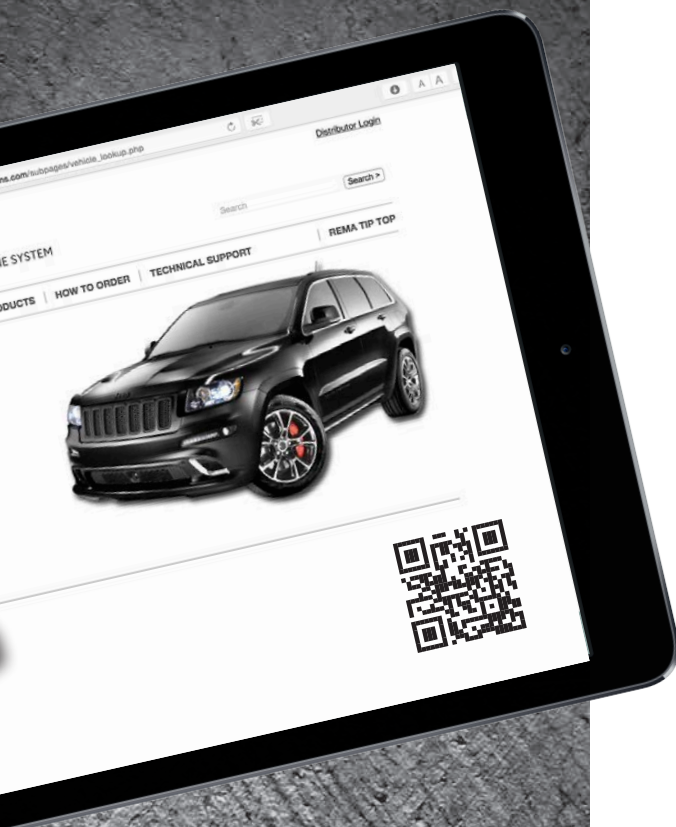
EU PRO Hybrid Sensors



TPMS Tool kit

vice

d valve assemblies



ure/inflation tools



Service kit box

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Diagnostic Tool - Hamaton H46 (powered by ATEQ)

- Easy to operate with Hamaton's icon interface and bright colour display
- Activates and reads TPMS sensors of all light vehicle brands globally
- Programs all leading universal aftermarket sensors
- Displays all sensor data in seconds: ID, tyre pressure, tyre temperature, battery status, etc.
- Provides indirect, manual and auto relearn procedure information
- Selects vehicles via make, model, year look-up
- Provides TPMS sensor part numbers
- Checks Remote Keyless Entry signal
- Frequent database updates via PC desktop software
- Interface and relearn procedures in 24 languages
- The optional OBDII module gives access to OBD relearns for 60% of all car models worldwide

EU Pro HYBRID - Sensors

- The fastest configurable universal sensor in the market boasts higher vehicle coverage besides programmable technology.
- 99% coverage of new European direct TPMS-enabled vehicles plus the opportunity to future-proof stock with programmable protocols.
- Pre-programmed with a time-saving multi-app code so, they come ready to fit a wide selection of BMW and Mercedes-Benz models without programming.
- Auto-location functionality for LOS, WAL, PAL and SAL.

REMA TIP TOP TPMS service kit box

Each service kit contains all necessary replaceable components:

- Deeper Box
- 40 Replacement Parts
- 28 Bolt In Valves
- 12 Rubber snap-in Valves

REMA TIP TOP TPMS service kits are made from the highest quality materials according to OE standards. The unique anti-corrosion technology protects them perfectly against weather and environmental influences. The service kit box contains 36 of the most common types of service kits as well as 25 TPMS valve cores and valve caps each.

TPMS tool kits

When installing and servicing TPMS sensors and valves it is imperative to observe the torque tightening and fitting instructions of the manufacturers. Considering the different torques, attachment designs and fitting details, a kit of special TPMS hand tools is a must.

TPMS web portal

To find the sensor required for a specific car easily and conveniently, please refer to our up-to-date TPMS sensor database. **Relearn procedures can also be obtained from** → <http://www.tiptoptpms.com> using your account ID to log in.

Tyre pressure/inflation tools

REMA TIP TOP stock a vast range of tyre pressure and inflation tools and accessories. Speak to our sales representatives for more details.



WINNERS
2014, 2015, 2016, 2017



WINNERS
2011, 2018



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