Self-Study Program 861603
Tire Pressure Monitoring Systems
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This Self-Study Program covers information on the Tire Pressure Monitoring Systems. This Self-Study Program is not a Repair Manual. This information will not be updated. For testing, adjustment and repair procedures, always refer to the latest electronic service information.
Course Introduction

Tire Pressure Monitoring Systems (TPMS) monitor the inflation pressure of the tires. They can warn the driver about dangerous changes in pressure and send a signal when the actual tire pressure deviates from the specified tire pressure. Tire pressure affects:

- Road safety
- Comfort
- Service life of the tires
- Fuel consumption

In Volkswagen vehicles, the tire pressure is monitored using two different systems:

- The Tire Pressure Monitoring System (TPMS) with wheel position recognition in the Touareg and Phaeton
- The TPMS without wheel position recognition in the Passat, Jetta, GTI, Rabbit, and Eos
Introduction

Tire Pressure

Correct Tire Pressure

A tire with the correct tire pressure contacts the road using the full tread surface. The tread wears evenly and the full amount of grip is provided. This has the following advantages:

- Improved tire mileage
- Minimum braking distance
- Optimum stabilization during cornering
- Best ride comfort

Tire Pressure Too High

When the tire pressure is too high, only the center of the tread provides optimum power transmission. This has the following disadvantages:

- Uneven tread wear
- Reduced tire life
- Reduced ride comfort

Tire Pressure Too Low

If the tire pressure is too low, the tire will be slightly concave in the middle so that only the outside surface transfers the power properly to the road surface. This has the following disadvantages:

- Considerable heating up of tires and thus a risk of damage to the tire structure
- Longer braking distances
- Shortened tire life
Introduction

Influences on Tire Pressure

The volume of air inside a tire remains approximately the same. Therefore, temperature changes inside the tire directly affect the tire pressure.

The tire pressure is increased or decreased by approximately 1½ psi (0.1 bar) for every 18 degrees Fahrenheit (°F) (10 degrees Celsius (°C)) change in the temperature.

The inside temperature of the tire is subject to various influences:

- Outside temperature or sunlight
- Heat emitted from the brake discs
- Flexing of the tires

Significant ambient temperature differences may affect the TPMS system

The threshold of tire pressure deflation for some TPMS systems is 6 PSI (0.4 bar). Therefore, a temperature difference of 72°F (40°C) (such as 65°F inside workshop and -7°F outside) may cause the TPMS light to illuminate.

Dangerously Low Tire Pressure

Low tire pressure often causes blow-outs. If the pressure in a tire is too low over a long period, the temperature inside the tire increases due to the flexing of the tires and not enough air volume to dissipate the heat. This causes damage to the tire structure. If the tire structure becomes too badly damaged, the tire may suddenly and violently explode.
Introduction

Overview of TPMS

The following applies for both TPMS:

Tire pressures are monitored constantly and compared with reference values. Both systems issue tire pressure warnings.

Tire Pressure Monitor with Wheel Position Recognition

In the Touareg and Phaeton, the TPMS with wheel position recognition has the following features:

- Tire pressure monitoring sensors
- Antennas
  - For contact-free transfer of the sensor data from the tire pressure monitoring sensors
  - A control module

It is the responsibility of the driver to inflate the tires to the correct pressures and store them in the system.

Tire Pressure Monitor Without Wheel Position Recognition

The software for the TPMS used in the Passat, Jetta, GTI, Rabbit, and Eos does not include wheel position recognition. This system is integrated in the Convenience System Central Control Module J393. The central locking and anti-theft alarm system antenna receives the data from the tire pressure monitoring sensors.

In this system, the specified tire pressure is preset in the factory.
Introduction

Procedure Following Tire Pressure Warning

If a warning is issued from the TPMS, the driver should reduce speed immediately and avoid sharp steering and braking. The driver should stop at the next opportunity and check the tires.

It is the responsibility of the driver to make sure the tires are properly inflated and checked at regular intervals.

Main Features Comparison

<table>
<thead>
<tr>
<th>Software</th>
<th>TPMS with Wheel Position Recognition</th>
<th>TPMS without Wheel Position Recognition</th>
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<tr>
<td></td>
<td>Separate Tire Pressure Monitoring Control Module J502</td>
<td>Tire Pressure Monitoring Control Module J502 inside the Comfort System Central Control Module J393</td>
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<tr>
<td>Tire Pressure Monitoring Sensors</td>
<td>One per wheel</td>
<td>One per wheel</td>
</tr>
<tr>
<td>Antennas</td>
<td>One per wheel housing</td>
<td>Not installed. Signals from tire pressure monitoring sensors are received by the central locking and anti-theft alarm system antenna</td>
</tr>
<tr>
<td>Specified Tire Pressures</td>
<td>Need to be inflated by driver and stored in the system</td>
<td>Preset in factory</td>
</tr>
<tr>
<td>Operation</td>
<td>Via “Convenience Setup” in the MFI (Touareg) or the infotainment system (Phaeton)</td>
<td>No driver input needed</td>
</tr>
<tr>
<td>Learning Process</td>
<td>The learning process needs to be started after the tires have been inflated to the correct pressure</td>
<td>New tire pressure monitoring sensors are learned, the specified tire pressures remain the same</td>
</tr>
</tbody>
</table>
TPMS with Wheel Position Recognition

Design

The TPMS with wheel position recognition is currently used in the Phaeton and Touareg. It has the same basic configuration for both vehicles. The diagram below shows the Phaeton.

The TPMS with wheel position recognition constantly monitors the tire pressure while the car is being driven. When the car is stationary, tire pressure monitoring continues for a short period. The tire pressure monitoring sensors mounted on the tires measure the tire temperature and tire pressure. This data is sent from the tire pressure monitoring sensors to the antennas in the wheel housings at regular intervals. The antennas are connected to the tire pressure monitor control module via shielded high-frequency (HF) lines. The data is evaluated in the tire pressure monitor control module and forwarded to the control module in the dash panel insert and also the infotainment system in the Phaeton.

The tires need to be inflated to the correct pressures by the driver and accepted as specified tire pressures by Tire Pressure Monitoring Control Module J502. In the Phaeton, this process is initiated by the driver via the Infotainment system. In the Touareg the driver initiates the process via the “Convenience Setup” menu of the Driver Information Display in the instrument cluster.

Messages and warnings are indicated by a lamp in the instrument cluster and text in the Driver Information Display or Infotainment screen, depending on the vehicle type..
What is Detected?

The TPMS with wheel position recognition recognizes the following tire conditions:

- Slow loss of pressure
  - The driver is informed to check the tire pressure and correct it if necessary
- Sudden loss of pressure
  - The driver is warned immediately
- Pressure loss when vehicle is stationary
  - The driver is warned immediately after the ignition is turned On

Using the four antennas, changes in pressure of any tire can be immediately identified by the system control module.

Spare Tire

In both the Phaeton and Touareg, the spare tire is equipped with a tire pressure monitoring sensor. In the Phaeton, the signals are received by the antennas and assigned to the spare tire.

The spare tire on the Phaeton must be inflated to the maximum pressure on the B-pillar label. If the pressure is lower, the TPMS may recognize the system as “not ready”.

The spare tire on the Touareg is not monitored when it is not in use.

In order to avoid system interference, a spare tire mounted to the optional external carrier of the Touareg must not have a tire pressure monitoring sensor.
Operation

In the Touareg, the TPMS functions can be found in the “Tire Pressure Control” menu in the “Convenience Setup” main menu in the Driver Information System. The “Convenience Setup” menu can only be accessed when the car is stationary.

The following functions can be accessed:

- MON. PRESS: Displays the monitoring pressure stored by the driver
- STORE: Starts the learning process. This must be done after correcting the tire pressures or replacing the wheels (e.g., using winter tires)

In the Phaeton, the TPMS is operated using the infotainment system in the “Vehicle” menu.

The following function can be accessed:

- NEW SPEC. PRESSURES: starts the learning process. This function must be used after correcting the tire pressures or replacing the wheels (e.g., using winter tires)

Messages and warnings from the TPMS with wheel position recognition are indicated by two icons (marker and warning symbol) in the center display of the instrument cluster.
TPMS with Wheel Position Recognition

Tire Pressure Warning Messages

With a tire pressure loss of 4 to 6 psi (0.3 to 0.4 bar) there is a soft warning. The yellow display appears with a warning tone for 5 seconds and then also each time the ignition is switched On. The large symbol is hidden after 5 seconds. The smaller icon remains until the tire or tires are inflated to the correct pressure.

**Important:** Some models may not have the soft warning threshold.

There is a hard warning at a pressure loss greater than 6 psi (0.4 bar) or a fast pressure loss of at least 3 psi (0.2 bar) per minute. This icon will not disappear by pressing a button.

If there is a pressure loss when the vehicle is stationary, the adjacent message will be displayed when the ignition is switched On.

Within the next 5 to 7 minutes, the system will check again whether the tire pressures are correct. If the tire pressures are correct, the icons will disappear.

When the system is in learning mode, the adjacent display will appear as an indication that the TPMS is temporarily unavailable. The large icon will disappear after 5 seconds, the small icon remains displayed until the learning process is completed.

The “System Fault” condition is indicated by the same icons.
TPMS with Wheel Position Recognition

System Learning Process

Any time there is a change to a tire on a car, the system learning process needs to be initiated. This is done by using the “STORE” menu item (Touareg) or “New Spec. Pressures” (Phaeton).

Changes to the tires can include:

- Correction of the tire pressure due to installation of different types of tires
- Installation of other tire pressure monitoring sensors on one or all wheels (e.g., winter wheels or changing a damaged wheel)

The learning process only starts when the vehicle is driven faster than 3 mph (5 km/h). It takes approximately 7 to 10 minutes if the data is received without interference.

When the learning process is completed, the icon in the instrument cluster disappears.

The learning process involves:

- Detection of the actual tire pressures
- Acceptance of the actual tire pressures as specified tire pressures
- Check whether the previous tire pressure monitoring sensors are still installed in the vehicle. If they have been changed, they will be learned again
- Check whether the positions of the tire pressure monitoring sensors have changed. If this is the case, the new positions will be stored

More information on Tire Pressure Monitoring with wheel position recognition in SSP 893303 “The Phaeton – Chassis” and SSP 89H303 “The Touareg – Chassis and 4XMOTION Systems”
Function Requirements

The following conditions need to be met so that the TPMS works properly:

1. The driver has to inflate the tires to the correct pressure.
2. External radio interference sources should not interfere with the wireless connection between tire pressure monitoring sensors and antennas.
3. The batteries in the tire pressure monitoring sensors should not be discharged. The life of the batteries is approximately 10 years.

Phaeton System Overview
TPMS with Wheel Position Recognition

Touareg System Overview

Model Comparison

<table>
<thead>
<tr>
<th>Phaeton</th>
<th>Touareg</th>
</tr>
</thead>
<tbody>
<tr>
<td>Operation via “Vehicle” in Infotainment System</td>
<td>Operation via multi-function steering wheel or steering column switch in the “Convenience Setup” menu</td>
</tr>
<tr>
<td>Monitors the spare tire, if present</td>
<td>Spare tire monitoring not available</td>
</tr>
</tbody>
</table>
TPMS with Wheel Position Recognition

Electrical Components

Tire Pressure Sensors G222-G226

Set-up
The tire pressure monitoring sensors are threaded to the metal valve stems and can be used again when the wheels or tires are changed.

The following components are integrated in the tire pressure monitoring sensors:

- Transmission antenna
- Pressure and temperature sensor
- Measuring and control electronics
- Battery

To compensate for the thicker walls of the Touareg tires, the transmission power of the tire pressure sensors has been increased. The Touareg sensors are identified by the eight white stars on the top.

Transmission power
- Phaeton: 10 μW–30 μW (μW is a microwatt, one millionth of a watt)
- Touareg: approximately 100 μW
TPMS with Wheel Position Recognition

**Sent Information**

The tire pressure sensors G222-G226 transfer the following data via the individual integrated sensors:

- Tire pressure
- Tire temperature
- Specific identification numbers (ID)
- State of the integrated battery
- Status, synchronization, and control information required for safe data transfer

**Transmission Intervals**

- Transmission interval of tire pressure monitoring sensors in normal operation:
  - Every 54 seconds
- Transmission interval of tire pressure monitoring sensors in fast transmission mode (if pressure loss is greater than 3 psi (0.2 bar) per minute)
  - Every 850 milliseconds

**Signal Use**

The signals from the tire pressure sensors contain the current measured tire pressure. The tire pressure monitor control module can recognize critical tire situations and can inform the driver.

**Sensor Failure**

When a sensor fails, a fault message is displayed in the instrument cluster.
TPMS with Wheel Position Recognition

Tire Pressure Monitoring Antennas
R59-R62

Function
Each antenna receives the radio signals from all tire pressure sensors within its range. If more than one signal is received, the system measures signal strength to determine the closest signal.

Signal Use
The antennas forward the received signals for further processing to the tire pressure monitor control module.

They are connected to the control module via high frequency antenna cables and assigned in the control module according to their location.

Effects Upon Failure
When one antenna fails, the system still works because the other three antennas receive the signals from the tire pressure monitoring sensors and can assign the positions accordingly.

If two antennas fail at the same time, the system will not be able to perform a learning process and wheel position recognition will no longer be possible.

In this case, the “System Fault” message will be issued when the learning process is started.
TPMS with Wheel Position Recognition

Functional Diagram

G222  Left Front Tire Pressure Monitoring Sensor
G223  Right Front Tire Pressure Monitoring Sensor
G224  Left Rear Tire Pressure Monitoring Sensor
G225  Right Rear Tire Pressure Monitoring Sensor
G226  Spare Tire Pressure Monitoring Sensor*
J218  Instrument Cluster Combination Processor
J453  Multi-function Steering Wheel Control Module**
J502  Tire Pressure Monitoring Control Module
J523* Front Information Display Control Head Control Module*

R59   Left Front Tire Pressure Monitoring Antenna
R60   Right Front Tire Pressure Monitoring Antenna
R61   Left Rear Tire Pressure Monitoring Antenna
R62   Right Rear Tire Pressure Monitoring Antenna
S     Fuse

Color Code
- **Input Signal**
- **Positive**
- **Negative (Ground)**
- **CAN Data Bus**
- **Wireless Connection**

* Phaetoon Only
** Touareg Only
Service

Diagnosis

Tire Pressure Monitor Control Module J502 can be diagnosed with the VAS Scan Tools.

Detecting Faulty Tire Pressure Monitoring Sensors

If one sensor fails in a functional system, its location will be displayed.

If a system has one or more faulty sensors, a learning cycle cannot be completed. In that case, the position of the faulty tire pressure monitoring sensor will not be displayed.

In this case, determine the faulty tire pressure monitoring sensor as follows:

1. Go to Address Word 65, Measuring Value Block 16. The identification number (ID) of the tire pressure monitoring sensor that last sent a data transmission is entered here.
2. Change pressure on a tire by at least 3 psi (0.2 bar) per minute (e.g., release pressure). With properly functioning sensors, this pressure change will be displayed in data block 16 with status 02 (the tire pressure monitoring sensor sends a signal due to a fast pressure change). If this is the case, the tire pressure monitoring sensor is not faulty. The procedure should then be repeated with the next wheel.
TPMS with Wheel Position Recognition

3. If the data block entry is not changed despite the change to the pressure of one tire, it is necessary to verify operation of the signal reception from the respective tire pressure monitoring sensor. Do this by moving the vehicle to change the position of the valve slightly.

4. If the entry for the last tire pressure monitoring sensor signal received still has not changed, the corresponding sensor is faulty.

Replacing Tire Pressure Monitor Control Module J502

The following procedures must be done after replacing Tire Pressure Monitoring Control Module J502:

- Active coding of system with a VAS Scan Tool
- Inflating tires to pressure specified on the tire pressure label on the B-Pillar
- Acceptance of new specified pressures
  - “Vehicle” menu in the Infotainment system in the Phaeton
  - “Convenience Setup” in the MFI in the Touareg
- Starting the system learning process by driving the vehicle
TPMS without Wheel Position Recognition

Design

Tire pressure monitoring sensors are mounted on each wheel in the TPMS used in the Passat, Jetta, GTI, Rabbit, and Eos.

The tire pressure monitoring sensors send data transmissions at regular intervals to the central locking and anti-theft alarm system antenna and then forwarded to the Tire Pressure Monitor Control Module J502.

The control module has its own diagnosis address in the Comfort System Central Control Module J393.

The pressures are valid for a set of approved original wheels and tires, as specified on the B-pillar sticker. The specified tire pressures for Wheel Set 1 can only be changed using the VAS Scan Tools. A special access code, obtained from the Volkswagen Dealer’s Technician Helpline, is necessary before the adaptation can be made.

A second set of wheels and tires – Wheel Set 2 (e.g., winter tires) can also be monitored by the Tire Pressure Monitoring System. The monitoring pressures for Wheel Set 2 can be changed using the VAS Scan Tools.

Messages and warnings are indicated by the lamp in the instrument cluster and text in the Driver Information display.
TPMS without Wheel Position Recognition

What is Detected?

The TPMS without wheel position recognition recognizes two critical tire conditions. Warnings for the driver are indicated by the lamps and the display in the instrument cluster:

- Large, but not sudden deviation of the actual tire pressures from the specified tire pressures above 6 psi (0.4 bar), (hard warning with gong)

- Sudden, great deviation of actual tire pressures from the specified tire pressures in the range of more than 3 psi (0.2 bar) per minute (hard warning with gong)

If a component of the TPMS without wheel position recognition fails or radio interference is detected, the tire pressure warning lamp in the instrument cluster will inform the driver.
TPMS without Wheel Position Recognition

Spare Tire

Tire pressure monitoring sensors can be installed on a full-size spare tire. As long as the spare tire is not installed, the sensor will not transmit any signals. However, if the tire pressure monitoring sensor recognizes centrifugal acceleration above 1.6 oz (5 g) and approximately 16 mph (25 km/h) vehicle speed, it will send data transmissions that are received by the tire pressure monitor control module. The control module then stores the data and the identification number of the new tire pressure monitoring sensor integrated in the system.

Tire Pressure Warning Messages

<table>
<thead>
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<th>Visual Signals</th>
<th>Acoustic Signals</th>
<th>Text Messages in MFI</th>
</tr>
</thead>
<tbody>
<tr>
<td>Ignition ON</td>
<td><img src="image" alt="Warning icon" /></td>
<td>None</td>
<td>None</td>
</tr>
<tr>
<td></td>
<td>2 seconds</td>
<td></td>
<td></td>
</tr>
<tr>
<td>Warning with gong: Deviation from specified tire pressure (over 6 psi (0.4 bar))</td>
<td><img src="image" alt="Warning icon" /></td>
<td>Gong once</td>
<td>“Tire pressures too low” (hide with the MFI controls)</td>
</tr>
<tr>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>Warning with warning sound: Sudden change to the tire pressure (more than 3 psi (0.2 bar) per minute)</td>
<td><img src="image" alt="Warning icon" /></td>
<td>Gong once</td>
<td>“Low tire”</td>
</tr>
<tr>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>System fault or radio interference</td>
<td><img src="image" alt="Warning icon" /></td>
<td>None</td>
<td>None</td>
</tr>
<tr>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
</tbody>
</table>

Until the fault or the interference has been rectified

Until specified tire pressure is restored

Until specified tire pressure is restored
TPMS without Wheel Position Recognition

System Learning Process

If any wheels are changed, the tire pressure monitoring control module needs to switch into learning mode before it can automatically recognize the tire pressure monitoring sensors.

To go into learning mode, the vehicle needs to be stationary for 20 minutes with the ignition switched on (or 5 minutes, after a tire pressure warning).

If the vehicle is not stationary, the system will not go into learning mode. The system will only recognize radio interference at this time. The control module will only begin the learning procedure after the vehicle has been stationary for 20 minutes.

The wheel sensors will send data as soon as the vehicle speed is more than 16 mph (25 km/h). The identification numbers of the new wheel sensors are read automatically. The acceleration data is also checked with the vehicle speed.

This procedure may take between 2 and 15 minutes. After the new sensors are recognized, the warning light in the instrument cluster will go out.
TPMS without Wheel Position Recognition

Function Requirements

As with the TPMS with wheel position recognition in the Phaeton and Touareg, the following requirements need to be met for the system in the Passat, Jetta, GTI, Rabbit, and Eos to work properly:

1. The tires must be inflated to the proper pressure.
2. External radio interference sources must not interfere with the wireless connection between tire pressure monitoring sensors and antennas.
3. The batteries in the tire pressure monitoring sensors must have enough power to send a signal. The life of the batteries is approximately 10 years.

System Overview
TPMS without Wheel Position Recognition

Electrical Components

Tire Pressure Monitoring Sensors G222-G226

Set-up

The tire pressure monitoring sensors of the TPMS without wheel position recognition have a different configuration than the TPMS used in the Touareg and Phaeton. They have the following components:

- Pressure sensor
- Temperature sensor
- Acceleration sensor
- Battery
- Measuring and control electronics
- Transmission antenna

The valve is used as an antenna so that the signals are not shielded by the tire materials. The valve is connected to the measuring and control electronics for the tire pressure monitoring sensors.

Transmission Intervals

- Transmission interval of tire pressure monitoring sensors when driving above 16 mph (25 km/h)
  - At first, 30 data transmissions at 15 second intervals
  - Subsequent data transmissions at 60 second intervals
- Transmission interval of tire pressure monitoring sensors in fast transmission mode (if pressure loss greater than 3 psi (0.2 bar) per minute)
  - Every 15 seconds

Technical Data

- Power supplied from high-temperature resistant lithium-ion batteries (life approximately 10 years)
- Transmission frequency 315 MHz
- Weight approximately 1.6 oz. (45 g) with valve
- Operating temperature -40°F to 248°F (-40°C to 120°C)
TPMS without Wheel Position Recognition

The wheel sensors constantly measure internal tire temperature, inflation pressure, and the centrifugal acceleration of the respective tire. The data transmissions are sent depending on the state of the vehicle.

When the car is stationary or travelling below 16 mph (25 km/h), no data transmissions are sent unless the sensors recognize a fast change in pressure of more than 3 psi (0.2 bar) per minute.

When stationary: No data transmissions without fast pressure change

If the tire pressure monitoring sensors recognize centrifugal acceleration above 1.6 oz (5 g) corresponding with a vehicle speed above approximately 16 mph (25 km/h), 30 data transmissions will be sent at 15 second intervals.

Above approximately 16 mph (25 km/h): 30 data transmissions at 15 second intervals

After that, in normal driving, the tire pressure monitoring sensors send one data transmission per minute.

Normal driving: One data transmission per minute

After any fast pressure change of more than 3 psi (0.2 bar) per minute, the tire pressure monitoring sensors send a data transmission every 15 seconds.
Data pertaining tire pressure sensors can be accessed via Tire Pressure Monitoring Control Module J502, using diagnosis address word 65.

**Sent Information**
The tire pressure monitoring sensors transfer the following information via the integrated individual sensors:

- Tire pressure
- Tire air temperature
- Wheel acceleration
- Their own identification numbers (ID)
- A control bit
- Their own status

**Signal Use**
The signals from the tire pressure monitoring sensors are used by the Tire Pressure Monitoring Control Module J502 to analyze the tire pressures and inform or warn the driver, if necessary.

**Sensor Failure**
Failure of tire pressure monitoring sensors is registered by the control module. It creates a DTC in the fault memory and sends a message for the driver.
TPMS without Wheel Position Recognition

Use of the Individual Information from the Tire Pressure Monitoring Sensors

**Tire Pressure**
Pressure changes in the tires are recognized using the tire pressure data.

**Tire Air Temperature**
The tire air temperature is used to evaluate the measured tire pressure.

**Wheel Acceleration**
The wheel acceleration data is compared with the current vehicle speed.

Comparing the acceleration should prevent the Tire Pressure Monitoring Control Module J502 from recognizing tire pressure monitoring sensors from other vehicles as its own.

**Control Bit**
The control bit allows the sensor to signal it has recognized an internal fault.

**Status Information**
Information on the tire pressure monitoring sensors mode and the cause of a data transmission.

**Identification Number**
Each tire pressure monitoring sensor module has a ten-figure identification number (ID). This is included in each data transmission so that the information from the respective tire pressure monitoring sensor can be assigned.
TPMS without Wheel Position Recognition

Tire Pressure Monitoring Sensor Modes

The tire pressure monitoring sensors have the following modes:

- **Park mode (energy saving mode)**
  - No data transmissions are sent, but the tire pressure monitoring sensors are measuring and ready

- **30B (30-block mode)**
  - While in this mode, the tire pressure monitoring sensors will send 30 data transmissions at 15 second intervals

- **Drive mode**
  - The tire pressure monitoring sensors are active and send a data transmission every minute

- **Sleep mode (test mode)**
  - When the vehicle is stationary for an extended period, the tire pressure monitoring sensors will switch to sleep mode. The sensors will no longer send data telegrams.
  - The tire pressure monitoring sensors will switch back to drive mode if a sudden pressure loss is recognized, or when the vehicle is driven faster than 16 mph (25 km/h) for at least 4 minutes
TPMS without Wheel Position Recognition

Tire Pressure Monitoring Control Module J502

The Tire Pressure Monitoring Control Module J502 is integrated in the Comfort System Central Control Module J393 and has its own diagnosis address with the address word 65.

If the Tire Pressure Monitoring Control Module J502 fails and does not send data to the Control Area Network (CAN) data bus, the Tire Pressure Monitoring Warning Lamp K230 will be illuminated.

The replacement of the Comfort System Central Control Module J393 may affect the immobilizer function, as well as other control modules.

When the Comfort System Central Control Module J393 is updated or replaced (only TCM without wheel position recognition), the following entries need to be made:

- Coding of the system
- Entry of the specified tire pressures
Functional Diagram

G222  Left Front Tire Pressure Monitoring Sensor
G223  Right Front Tire Pressure Monitoring Sensor
G224  Left Rear Tire Pressure Monitoring Sensor
G225  Right Rear Tire Pressure Monitoring Sensor
H3    Warning Buzzer
J119  Multi-function Indicator
      (vehicles with multi-function display only)
J285  Instrument Cluster Control Module
J393  Comfort System Central Control Module
J502  Tire Pressure Monitoring Control Module
J533  Data Bus On Board Diagnostic Interface
K230  Tire Pressure Monitoring Warning Lamp
R47   Central Locking and Anti-Theft Alarm System Antenna

Color Code
- Green: Input Signal
- Red: Positive
- Brown: Negative (Ground)
- Orange: CAN Data Bus
- Wireless Connection
TPMS without Wheel Position Recognition

Service

Sets of Tires with Different Tire Pressure Specifications

The specified tire pressures (monitoring pressures) for Wheel Set 1 are preset at the factory. If the monitoring tire pressure for Wheel Set must be changed (e.g., after-market tires), please contact the Volkswagen Technical Helpline.

A second set of tires – Wheel Set 2 (e.g., winter tires) can also be monitored with the tire pressure monitor. Tire pressures for the second set of tires need to be set in the system using the VAS Scan Tools. The tire pressure monitoring sensors in the second set of wheels will not be recognized and learned automatically by the tire pressure monitor (like sensors on the original set of wheels).

Procedure for Switching to Wheel Set 2

1. Read Identification Numbers (IDs) of tire pressure monitoring sensors before installing them on the wheel.
2. Using Vehicle Self Diagnosis, address word 65, adaptation code 2, switch the TPMS to Wheel Set 2.
3. Using adaptation codes 5-8, enter the specific tire pressures (monitoring pressures) for Wheel Set 2.
4. Using adaptation codes 10-12, enter the IDs for the each specific tire pressure monitoring sensor.

The adjacent chart is a schematic diagram of tire pressure monitoring sensor ID in the corresponding adjustment channels.

For example, when installing a tire pressure monitoring sensor with ID 2147491186, on wheel number 3:

- Channel 10: 30021
- Channel 11: 04749
- Channel 12: 01186

Adjustment channels 10-12 are available only when Wheel Set 2 is selected.
TPMS without Wheel Position Recognition

Adaptation Channels
- Adaptation channel 2:
  - Switch monitoring from Wheel Set 1 to 2 and back
- Adaptation channels 10 - 12:
  - Enter tire pressure monitoring sensor IDs for Wheel Set 2
- Adaptation channel 5*:
  - Specified pressure full load axle 1*
- Adaptation channel 6:
  - Specified pressure partial load axle 1
- Adaptation channel 7*:
  - Specified pressure full load axle 2*
- Adaptation channel 8:
  - Specified pressure partial load axle 2

* Only the partial load specified pressure is used for North America.

Measured Value Blocks
- MVB 25:
  - Entry for which wheel set is being monitored
- MVB 23:
  - Specified pressures Wheel Set 1
- Data block 24:
  - Specified pressures Wheel Set 2

When the original set of tires is re-installed on the vehicle, the TPMS must be switched to monitor the Wheel Set 1. The wheels with sensors are learned automatically. The IDs do not have to be entered.
Detecting Faulty Tire Pressure Monitoring Sensors

In the TPMS without wheel position recognition, the signals from the tire pressure monitoring sensors are received centrally by the central locking and anti-theft alarm system antenna. Position assignment of the tire pressure monitoring sensors is not possible.

The following signs indicate a faulty wheel tire pressure monitoring sensor:

• A TPMS fault is displayed
• “No Signal/Communication Tire Pressure Sensor”, “Tire Pressure Sensor Faulty”, or “Tire Pressure Sensor Not Recognized” is read from the fault memory

To test one tire pressure monitoring sensor, you can proceed as follows:

1. Inflate the four tires to four different pressures (minimum of 4 psi difference) and note the respective tire pressures with the wheel position.
2. Move the car for approximately one minute at more than 16 mph (25 km/h).
3. Read data block 16 on address word 65.
   - If no tire inside temperature and no current inflation pressure is included in the data block, the tire pressure monitoring sensor is faulty

Refer to ElsaWeb for detailed information on the procedure.
Service

Handling the Tire Pressure Monitoring Sensors (TPMS with/without Wheel Position Recognition)

Installing Tire Pressure Monitoring Sensors
The tire pressure monitoring sensors are inserted from the inside through the wheel valve hole and securely fastened.

Tire Changes with Tire Pressure Monitoring Sensors
When changing tires, to avoid damage to the tire pressure monitoring sensors, ensure the removal levers are not placed near the valves.

Changing the Tire Pressure Monitoring Sensors
The tire pressure monitoring sensors need to be replaced in the following situations:

- Battery is discharged
- Tire pressure monitoring sensor is faulty
- Valves are faulty (TPMS without wheel position recognition)

It is recommended to change the tire pressure monitoring sensor if a tire sealing fluid has been used. The fluid can block the pressure sensor opening.

Please use only approved valve inserts and original valve caps (no special caps) for the tire pressure monitoring sensors.

The wheels should not be cleaned in cleaning machines that use ultrasound, as ultrasound can damage the tire pressure monitoring sensors.

The valves are made from a specially coated aluminium (for corrosion protection) and can break off if too much force is used. The entire tire pressure monitoring sensor needs to be replaced in this case.
An on-line Knowledge Assessment (exam) is available for this Self-Study Program

You can find this Knowledge Assessment on your Certification Resource Center

at:

www.vwwwebsource.com

From the vwwwebsource.com homepage, do the following:

1. Click on the Certification tab
2. Click on “My Certification” tab
3. Click the Fulfill link next to this SSP
4. Click “Launch Assessment”

For assistance, please call:

Volkswagen Academy Concierge
1 – 877 – 791 – 4838
(8:00 a.m. to 8:00 p.m. EST)

Or, E-Mail:
concierge@volkswagenacademy.com