

IRTPTMS V3 Wheel Sensor

The bf1systems InfraRed Tyre Pressure & Temperature Monitoring System (IRTPTMS) wheel sensor is an evolution of bf1systems' existing Tyre Pressure Monitoring System (TPMS) technology.

The IRTPTMS V3 wheel sensor introduces the ability to measure the tyre carcass temperature in real time via an infrared element mounted in the wheel sensor.

The inner tyre carcass measurement is a measure of the tyre's bulk temperature, which provides information on the mechanical grip available from the tyre, which relates to the long term behaviour of the tyre.

The infrared element has a 35° Field Of View (FOV) and is angled to measure the temperature of the tyre carcass specified by the customer. The sensor can be angled to measure part of the main tread, or even a sidewall temperature if required. This temperature is then transmitted along with the internal air temperature, tyre pressure, sensor serial number, remaining battery life and other diagnostic data on a 433MHz RF link to antennas that are mounted on the vehicle, or to a handheld tool such as the Mini Analyser.



The wheel sensor also contains a 125kHz Low Frequency (LF) receiver, meaning that on closed wheel race cars a learning system can be fitted which automatically detects where a sensor is fitted on the car. The LF receiver is also used by handheld tools such as the Mini Trigger and Mini Analyser which use this feature to request data on demand from the wheel sensor.

When the wheel assembly does not have a tyre fitted, the wheel sensor enters a 'sleep' mode where it does not transmit, to preserve battery life. When a tyre is fitted and pressurised, the sensor transmits typically a datagram once every four minutes, allowing the sensor to be monitored by the Garage Monitoring System. If the faster or slower stationary transmit rate is required, this can be changed at sensor build time. If the

wheel sensor detects a pressure change greater than or equal to 200mbar/minute at any time it will enter a fast transmit mode where it transmits 255 datagrams at a rate of 1Hz.

When the wheel sensor detects that it is rotating at a speed greater than approximately 40kph it enters its moving mode and starts transmitting datagrams at 1Hz. The sensor remains in this mode until it stops rotating. The sensor can also be setup at build time to enter this mode if its ambient temperature is above a pre-defined threshold, and it remains in this mode until the temperature drops back below the threshold.

Each wheel sensor is identified by a unique serial number, and customers are supplied with a permit list containing all of their wheel sensors. This permit list is loaded into their ECUs and handheld devices to ensure that teams can only receive their own wheel sensors.



Specification

Electrical

- Supply Voltage – Internal 6V
- Lifetime (typical) – 1 year

Pressure

25mbar/bit Sensor

- Pressure Range – 0 – 5.375bar gauge
- Pressure Resolution – 25mbar/bit
- Accuracy - ± 25.0 mbar

14.7mbar/bit Sensor

- Pressure Range – 0 – 3.631bar gauge
- Pressure Resolution – 14.7mbar/bit
- Accuracy - ± 29.4 mbar

12.5mbar/bit Sensor

- Pressure Range – 0 – 3.1625bar gauge
- Pressure Resolution – 12.5mbar/bit
- Accuracy - ± 25.0 mbar

Tyre Carcass Temperature

- Temperature Range – -40°C – $+215^{\circ}\text{C}$
- Temperature Resolution – $0.25^{\circ}\text{C}/\text{bit}$
- Accuracy (worst case) – $\pm 3.0^{\circ}\text{C}$
- Accuracy (best case) – $\pm 0.5^{\circ}\text{C}$

Internal Temperature

- Temperature Range – -2°C – 125°C
- Temperature Resolution – $0.125^{\circ}\text{C}/\text{bit}$
- Accuracy – $\pm 0.5^{\circ}\text{C}$

General

- Transmit Rate (moving) – 1Hz
- Operating Temperature Range – 0°C – $+125^{\circ}$
- Mass – 44 ± 1 g
- RF Transmit Frequency – 433.92MHz