TIRE MONITOR SYSTEM

A M Bromley Limited

Datasheet Addendum

Sensors: External Canister

TmsDatasheetAddendumV4

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Important Notices

It is your responsibility to fully consider the implications of installing TMS sensors, and take adequate precautions to ensure the installation does not compromise the integrity of the wheel or the overall safety of the vehicle. In addition, you must accept responsibility for carrying out inspection and testing of the sensors to ensure they remain suitable for use. TMS is not a safety device and does not replace the need for regular tire maintenance.

Please do not remove any labels or identification marks on the products you have purchased, as these will help us to identify them if you should need to contact us or return them.

Warning: do not modify the product supplied.

TMS23:

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

Caution per 47 CFR 15.21: changes or modifications not expressly approved by the party responsible for compliance could void the user's authority to operate the equipment.

550mAh TMS23, TMS24
contain one non-rechargeable lithium battery.

1. External Sensors for Large Bore Valve

TMS sensors measure pressure and temperature and estimate their own battery condition. Every sensor has a unique identity code (ID). The four-digit ID code is printed on the product. Periodically and on certain conditions, each sensor broadcasts its ID and measurements as a radio transmission.

The TMS Canister can be screwed directly onto a large bore valve without the need to remove the valve stem. The key features are:

TMS24, our standard sensor:

- 433.92MHz
- compliant with ETS 300-220
- for mounting externally
- large bore
- for use in clean dry tires

TMS23, standard except:

- like the TMS24A except that it has reduced transmission power for compliance with FCC Part15.231.
- lower transmission range.

1.1. Fitting

Due to the wide variety of applications, our customers have used different methods of fitting sensors. You should conduct tests to determine the best method for your application.

1.1.1. TMS23 and TMS24A external sensors

The brass adapter of the canister fits onto standard large bore valve thread (0.482-26THD). There is no need to remove the valve core; simply screw on the sensor.

Do not exceed a torque of 5 N m when tightening the canister to the valve stem. You can use a locking nut to secure the canister onto the valve stem, maximum torque 8 N m.

Although the canister housing is tough, it must be protected from knocks to help protect the valve stem. Some of our customers have designed brackets to further support and protect external sensors.

1.2. Operating environment

Parameter description	Sensor	Min	Typical	Max	Units
Operating temperature	All	-25[(1)]		+80	°C
OTR tire sizes, rim diameter	All	24		63	inch
OTR tire speed	All			50	Km/h
Chemical resistance	All	use with clean dry air, no corrosive gasses.			

Note 1: Sensors do not transmit below this temperature

1.3. Measurements

We calibrate each sensor's pressure measurement during manufacture.

Sensors need to measure temperature in order to make an accurate pressure reading. The measurement may be of use depending on where sensors are mounted, bearing in mind that it is the temperature at the sensor PCB, not necessarily the air or tire.

Parameter description		Sensor	Min	Typical	Max	Units
Pressure range		All	0.42 6.0		13 185	bar (1) psi (1)
Pressure resolution		All		0.07 1.0		bar psi
Pressure accuracy up to 150psi		All		+/-0.14 +/-2.0		bar (1) psi (1)
Pressure accuracy 150psi to 185psi		All		+/-0.21 +/-3.0		bar (1) psi (1)
Pressure long term drift		All		+/-0.014 +/-0.2		bar /Year psi/Year
Temperature range		All	-25		+80(2)	°C
Temperature resolution		All		1.0		°C
Temperature accuracy	at 25°C(3)	TMS23 TMS24		+/-2.0		°C

Note 1: Absolute pressures, relative to a vacuum. To convert to gauge pressure, subtract atmospheric pressure, typically 14.7psi.

2: Sensors attempt to measure up to 125°C, but we cannot guarantee they will work outside the operating temperature, see 1.2.

3: Temperature accuracy will deteriorate as the temperature deviates from 25°C.

1.4. Hibernation

We ship all sensors in a state of 'hibernation'. This means they do not transmit until they are pressurised. Once pressurised, sensors will remain active until you return them to hibernation. You can return them to hibernation by reading them with a Sensor Reader. If you use a Sensor Reader to read a sensor that is pressurised the sensor will hibernate but immediately become active again.

You can also put sensors into a state of 'deep hibernation' by subjecting them to a partial vacuum. This may improve sensor life (see 1.7) if the sensor is kept in storage.

Parameter description	Sensor	Min	Typical	Max	Units
Leave hibernation and deep hibernation above pressure	All		1.38 20.0		bar (1) psi (1)
Time to leave hibernation	All	0		10	Seconds
Time to leave deep hibernation	All	0		90	Seconds
Enter deep hibernation below pressure	All		0.49 7.0		bar (1) psi (1)

Note 1: Absolute pressures, relative to a vacuum. To convert to gauge pressure, subtract atmospheric pressure, which is typically 14.7psi at sea level.

1.5. Periodic transmissions

When sensors are not hibernating, they transmit periodically.

Parameter description	Sensor	Min	Typical	Max	Units
Periodic transmission interval	All	280	300	320	Seconds

1.6. Transmit on change

In addition to the periodic transmissions, sensors also transmit if there has been a 'change of pressure': an increase or a decrease, since the previous transmission.

When a sensor detects a change, it transmits the new pressure once immediately and then makes a number of 'extra transmissions' at subsequent sample intervals.

Parameter description	Sensor	Min	Typical	Max	Units
Change of pressure	All		0.35 5.0		bar psi
Reaction time: this is time between change of pressure and first transmission.	TMS23A		1.3	12	Seconds
	TMS24		1.3	3.2	
Extra transmissions	All		3		
Gap between extra transmissions (1)	TMS23	10	11	12	Seconds
	TMS24	1.8	2.5	3.2	

Note 1: Sensors have a deliberate random time variation between transmissions.

1.7. Sensor life

Sensors have a limited life because they have an integrated battery that you cannot replace when it has discharged. When the battery is discharged the sensor stops transmitting.

Life depends on many factors including the number of transmissions and the temperature throughout the sensors life.

The sensors estimate their remaining life and, after every 11 normal transmissions, they transmit their remaining life.

Parameter description	Sensor	Min	Typical	Max	Units
Sensor life	All		2.0(1)		Years

Note 1: This is time in service, not including hibernation. Each year, a sensor is in hibernation reduces its service life by approximately 0.3 years. Maybe less in deep hibernation.

1.8. Radio transmissions

Parameter description	Sensor	Min	Typical	Max	Units
Transmission frequency					MHz
	All		433.92		
Modulation type	All		FSK		
Emission compliance	TMS23	FCC Part15.231			
	TMS24	EN 300-220			
Effective radiated power (ERP) approximate	TMS23		1		µW
	TMS24		100		
Burst duration	All		52	60	ms
Burst gap duration	All		19	20	ms
Total duration (2 bursts)	All		123	140	ms

1.9. Physical characteristics

Mass	70	g
Enclosure material	Glass filled nylon 66 30% glass filled	