



SMARTTIRE®

**Full Function Display
User's Manual**





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Notices

FCC NOTICE

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.

This equipment has been tested and found to comply with the limits for a Class B digital device, pursuant to Part 15 of the FCC Rules. These limits are designed to provide reasonable protection against harmful interference in a residential installation. This equipment generates, uses and can radiate radio frequency energy and, if not installed and used in accordance with the instructions, may cause harmful interference to radio communications. However, there is no guarantee that interference will not occur in a particular installation.

If this equipment does cause harmful interference to radio or television reception, which can be determined by turning the equipment off and on, the user is encouraged to try to correct the interference by one or more of the following measures:

- Reorient or relocate the receiving antenna.
- Increase the separation between the equipment and receiver.
- Connect the equipment into an outlet on a circuit different from that to which the receiver is connected.
- Consult the dealer or an experienced radio/TV technician for help.

Changes or modifications to this device without the express approval of SmarTire Systems Inc. may void the user's authority to use this device.

EUROPEAN REGULATIONS

This device complies with all European Electromagnetic compatibility regulations (95/54/EC and EN300 220-1). The equipment has been tested and found to comply with the above regulations, and in addition it meets the requirements for low powered transmitters/receivers as defined by the relevant radio approval authority. The regulations are designed to provide reasonable protection against harmful interference or susceptibility. Changes made to this device without the express approval of SmarTire Europe Ltd. may void the user's authority to use this device.

SYSTEM SCOPE OF USE AND WARNINGS

The SmarTire® System and Tire Maintenance

This system is a sensing device designed to identify and display tire operating data and activate an alert or warning when pressure or temperature irregularities are detected. It is the responsibility of the driver to react promptly and with discretion to alerts and warnings. Abnormal tire inflation pressures should be corrected at the earliest opportunity.

System Installation and Usage

Use of the SmarTire® system requires that it has been properly installed and programmed by qualified personnel according to SmarTire Systems Inc. documentation. This includes the Owner's Manual and any supplementary installation instructions included with system components.

Warnings

1. When an alert or warning condition is detected, reduce vehicle speed to an appropriate safe level and proceed to a safe stopping location or facility where the tire can be inspected and serviced.
2. The pressure deviation alert indicates that the pressure has dropped a selected amount below the required pressure for that level of tire temperature.
3. The low pressure warning indicates that the air pressure has dropped to a selected minimum.
4. The high temperature warning indicates that the contained air temperature has exceeded the selected maximum. A tire temperature buildup can be caused by a number of factors including severe under inflation, hard sustained braking, vehicle overload and sustained high speeds.

Introduction

FULL FUNCTION DISPLAY FEATURES

The Full Function Display adds additional features to a previously installed SmarTire system (refer to the Tire Pressure Monitoring System Owner's Manual). It provides digital tire pressure and temperature data for up to 20 tire positions as well as enabling warning level adjustment to suit driver needs.

The system's modular design offers two digital display units. One clips onto the basic receiver, while the other can be remotely located with an interconnecting cable.

FULL FUNCTION DISPLAY



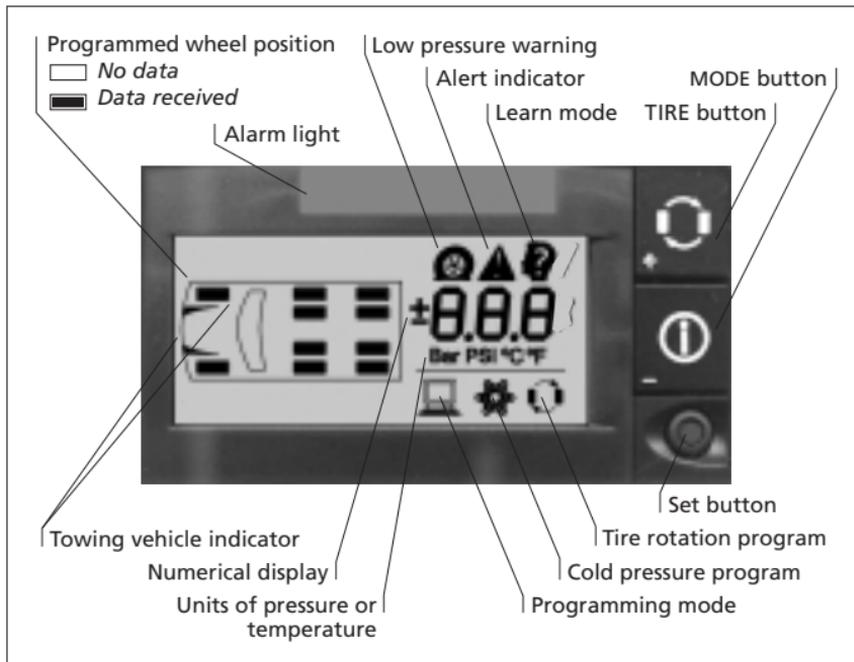
FULL FUNCTION REMOTE DISPLAY



POWER STAGES

The Full Function Display has an energy saving feature that turns lights on to full intensity (Active stage) only when required to display alert conditions or program the unit. The unit automatically switches to lower power stages when no control activity is detected.

Full Function Display Controls and Indicators

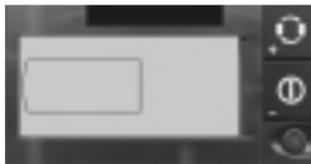


Operation

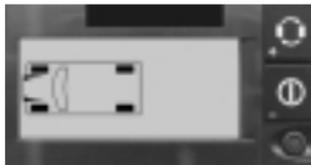
GETTING STARTED



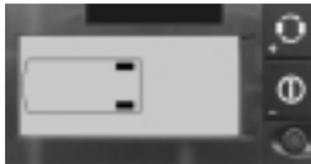
Mount the display unit and connect to power source. When power is applied to the receiver, the Full Function Display momentarily turns on all icons, beeps, and the alarm light blinks once. The unit then goes into stand-by mode waiting for data from the wheel transmitters.



Until the vehicle is in motion no data will be received from any installed transmitter. The display will remain blank as shown.



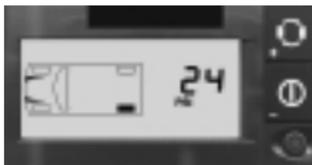
The respective tire icon is filled in as soon as data from its transmitter is received. The windshield/louver is shown for any towing vehicle transmitter. After data from all transmitters is received the display will be in the state shown at left until an alert or warning condition is detected. (Normal Mode)



Data from a towed vehicle is indicated by tire icons with no windshield/louver icon.

Note: The system will alternate views between the towing and towed vehicle when operating with this configuration.

CHECKING TIRE CONDITIONS



24 PSI = 1.65 Bar



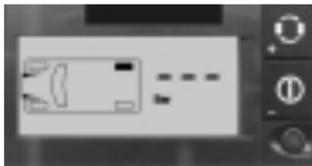
Press the TIRE button to scroll through the tires.



Press the MODE button to scroll through the pressure, temperature, and pressure deviation readings for a selected tire.



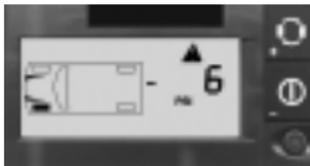
Press SET button to return to normal mode.



No data received from a selected tire is shown as dashes "----".

Alerts and Warnings

PRESSURE DEVIATION ALERT



-6 PSI = -.41 Bar

 The Pressure Deviation Alert is initiated when the measured tire pressure deviates from the required pressure by more than the pre-set level.

The alarm light turns on and alert indicator flashes on and off. The audible alarm sounds once and the digital readout displays the amount of deviation e.g. -6 PSI from required pressure.

Press any button to acknowledge the alert and stop the flashing; the alarm light remains on and the system returns to normal mode.

Example:

Pressure Deviation Alert Level = ± 6 PSI (0.41 Bar)

Required Pressure = 35 PSI (2.40 Bar)

Actual Pressure in a wheel drops to 29 PSI (2 Bar)

Pressure Deviation reading (as shown) will be -6 PSI (0.41 Bar)

When the alert occurs, reduce speed and proceed to a safe location to check tires.

The Pressure Deviation Alert is cancelled when the tires are properly re-inflated to correct levels.

LOW PRESSURE WARNING



18 PSI = 1.25 Bar

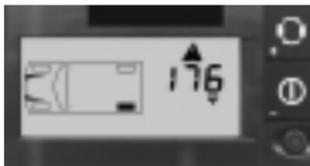
 A Low Pressure Warning is initiated when the pressure drops below the programmed level.

The alarm light, low pressure warning icons and the audible alarm turn on and off continuously. Press any button to acknowledge and stop the flashing. The alarm light remains on and the display reverts to a normal mode.

When the alert occurs, reduce speed and proceed to a safe location to check tires.

The Pressure Deviation Alert is cancelled when the tires are properly re-inflated to correct levels.

HIGH TEMPERATURE ALERT



176 °F = 80 °C

 The High Temperature Alert is initiated when the air temperature within a tire exceeds the programmed level.

The temperature alert icon and audible alarm turn on and off continuously. Press any button to acknowledge the alert and stop the flashing. The alarm light remains on and the display reverts to a normal mode.

When the alert occurs, reduce speed and proceed to a safe location to check tires.

The Pressure Deviation Alert is cancelled when the tires are properly re-inflated to correct levels.

Programming

TO ENTER PROGRAMMING MODE



1. Ensure power is turned on.
2. Press and hold Set button in normal mode to enter programming mode;
 - a. 2 seconds to Level 1
 - b. 5 seconds for Level 2
 - c. 10 seconds for Level 3

DISPLAY ICONS

Level 1



Cold Pressure



Pressure Deviation



Tire Rotation



High Temperature Alert



Low Pressure Warning

Bar PSI °C °F

Units Selection

Level 2



Slope



Learn Transmitter ID

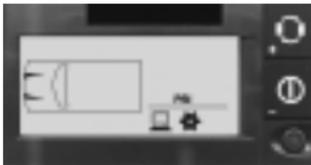
Level 3



Low Pressure Alert

OPERATING SETTINGS – LEVEL 1**COLD INFLATION PRESSURE** 

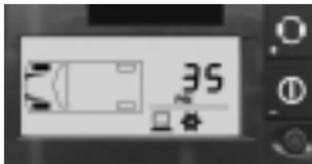
Factory default 30 PSI = 2.08 Bar



This function changes the cold inflation pressure for each axle.

Programming Steps

1. Enter Level 1 Programming Mode (see page 12)
-  2. Press the TIRE button to scroll to the desired axle. The tires of the selected axle are filled in.
-  3. Press the MODE button to view the current value.
-  4. Press the TIRE button to increase the value.
-  5. Press the MODE button to decrease the value.
-  6. Press the SET button to save when the desired value is reached.



35 PSI = 2.40 Bar

Repeat programming steps 2-6 until Cold Inflation Pressure levels are set for all axles as desired.

-  7. Press the SET button to exit.
-  8. Press the SET button again to revert to normal view.

LOW-PRESSURE WARNING

Factory default 18 PSI = 1.25 Bar



This function changes the low-pressure warning threshold for each axle.

Programming Steps

1. Enter Level 1 Programming Mode (see page 12)

 2. To enter this function press the MODE button until the flat tire icon and pressure units are displayed.

 3. Press the TIRE button to scroll to the desired axle. The tires of the selected axle are filled in.

 4. Press the MODE button to view the current value.

 5. Press the TIRE button to increase the value.

 6. Press the MODE button to decrease the value.

 7. Press the SET button to save when the desired value is reached.

Repeat programming steps 2-7 until Low-Pressure warning levels are set for all axles as desired.

 8. Press the SET button to exit.

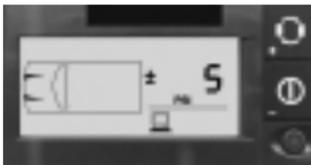
 9. Press the SET button again to revert to normal view.



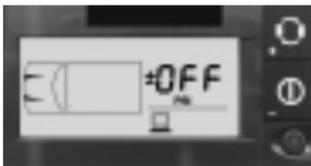
18 PSI = 1.25 Bar

PRESSURE DEVIATION ALERT ±

Factory default 5 PSI = .35 Bar



5 PSI = .35 Bar



This function sets the pressure deviation alert threshold for all tires.

Programming Steps

1. Enter Level 1 Programming Mode (see page 12)
2. To enter this function press the MODE button until the +/- icon and pressure units are displayed.
3. Press the TIRE button to enter and display the current value.
4. Press the TIRE button to increase the value.
5. Press the MODE button to decrease the value.
6. Press the MODE button until the display shows OFF to disable this feature.
7. Press the SET button to save when the desired value is reached.
8. Press the SET button again to revert to normal view.

UNDERSTANDING TEMPERATURE COMPENSATED PRESSURE READINGS

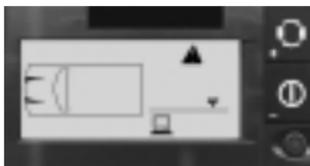
An important feature of the SmarTire Full Function Display system is that pressure deviation alerts are initiated from a comparison of the temperature compensated pressure to the measured tire pressure read by the sensor.

The reference pressure, or “cold pressure” is the air pressure inside the tire inflated at room temperature (64° F or 18° C) to the vehicle manufacturer’s recommendation. When a tire heats up, the air pressure inside the tire can also be expected to increase. For example, a normal or “required” pressure at 64° F or 18° C may be 34 PSI or 2.35 Bar and a normal pressure at 120° F or 49° C may be 39 PSI or 2.7 Bar. Both pressure readings are correct at their respective temperatures.

The amount of deviation from the required pressure (at any temperature) can be read by using the Pressure Deviation mode of this SmarTire product. If at any time you are uncertain that the Actual Pressure reading on the display indicates the correct tire pressure, switch to the Pressure Deviation (+-) readout. A blank display indicates that the reading on the display is the correct one. Any (+) or (-) value indicates the tire pressure is incorrect by that value. This value can then be used to correctly inflate the tire.

HIGH TEMPERATURE ALERT °C/°F

Factory default 176° F = 80° C



This function changes the high-temperature alert threshold.

Programming Steps

1. Enter Level 1 Programming Mode (see page 12)

 2. To enter, press the MODE button until the alert icon and temperature unit are displayed.

 3. Press the TIRE button to enter and display the current value of High Temperature Alert.

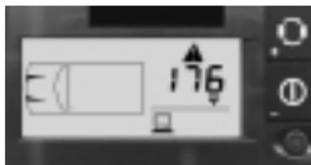
 4. Press the TIRE button to increase the value.

 5. Press the MODE button to decrease the value.

 6. To disable this feature press the MODE button until the display reads OFF.

 7. Press the SET button to save and exit this mode when the desired value is reached.

 8. Press the SET button again to revert to normal mode.



176° F = 80° C



METRIC OR IMPERIAL MEASUREMENT SELECTION

Unit combinations

Bar – °C, Bar – °F, PSI – °C, PSI – °F



Use this mode to select the combination of pressure and temperature units.

Programming Steps

1. Enter Level 1 Programming Mode (see page 12)



2. To enter this function press the MODE button until the pressure and temperature units are displayed (PSI | Bar, °C | °F).



3. Press the TIRE button to enter.



4. Use the TIRE or MODE button to scroll through the four combinations of unit settings.

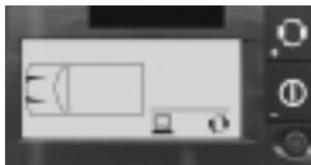


5. When the desired combination is displayed press the SET button to save and exit this mode.



6. Press the SET button again to revert to normal mode.

TIRE ROTATION



This function is used after tires are rotated and the new positions need to be updated. This procedure is valid for four tire locations only.

Programming Steps

1. Enter Level 1 Programming Mode (see page 12)

 2. To enter, press the MODE button until the tire rotation icon is displayed.

 3. Press the TIRE button to scroll to a tire position.

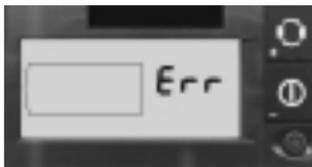
 4. Press the MODE button to select it for editing.

5. Note the color of the washer on the physical tire at the currently selected position.

6. Use table 1 provided to determine the number corresponding to color noted in step 5.

  7. Use the TIRE or MODE button to adjust the value to the number determined in step 6.

 8. Press the SET button when the number representing the desired sensor is achieved. This returns the display to the tire selection menu. Scroll to a different tire location and edit the sensor numbers as above.



9. Press SET button to save and exit this mode.

If more than one tire location contain the same sensor number, the display will prompt an error with the conflicting tires filled in and the associated sensor number. Press any button to return the tire selection menu and make necessary corrections.



10. Press the SET button again to revert to normal mode.

11. If the system has more than four tires, refer to "Learn" section on page 22.

ID 1 programmed in two locations

TABLE 1

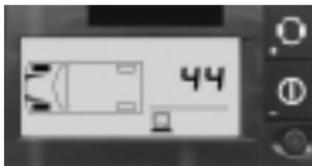
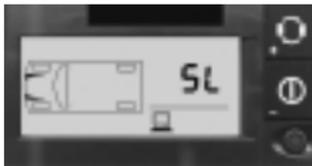
Color	Tire Number
Green	1
Red	2
Blue	3
Yellow	4

ADVANCED PROGRAMMING – LEVEL 2**SLOPE SL**

Factory default 44

Do not change the factory setting for this mode without first contacting your SmarTire retailer.

The Slope is a value corresponding to the rate of pressure change due to temperature for a particular tire. This value affects the calculation to determine pressure deviation value.

**Programming Steps**

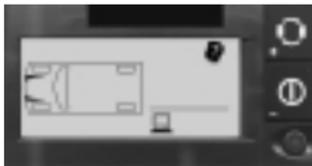
1. Enter Level 2 Programming Mode (see page 12)
2. Press the TIRE button to scroll to the desired axle, the tires of the selected axle are filled in.
3. Press the MODE button to display the current value of slope for the selected axle.
4. Press the TIRE button to increase the value.
5. Press the MODE button to decrease the value. The minimum value is 10 and the maximum is 160.
6. Press the SET button to save the value.

Repeat steps 2-6 until the slope level is set for all axles as desired.

slope - cont'd

7. Press the SET button to exit.
8. Press the SET button again to revert to normal mode.

LEARN



This mode is used to add or remove transmitters from the system.

Programming Steps

1. Enter Level 2 Programming Mode (see page 12)
-  2. Press the MODE button to select the learn mode icon.
-  3. Press the TIRE button to display the ten possible wheel positions for the towing vehicle. The currently installed transmitter positions are now indicated with a filled in tire indicator.
-  4. Use the TIRE button to scroll to the desired position. The outline of the wheel position to be programmed will flash.
5. A new transmitter identification can be learned in two ways:
 - Vigorously shake the transmitter to provoke a transmission.

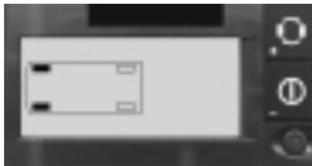


learn – cont'd

- By inflating or deflating the tire by more than 3 PSI (0.2 Bar).

This method must be carried out while the transmitters are in “gauge fill” mode. This mode is entered for 15 minutes after the vehicle has been driven above 6 mph (10 kph). Each transmitter “learn operation” must be carried out at least 90 seconds apart. If it is not possible to complete the learn operation for all transmitters within 15 minutes, the vehicle must again be driven above 6 mph (10 kph) and then the process can be continued.

Note: To prevent the last identification being erased, scroll to next tire position before driving. A beep and rapid flashing of the alarm light indicate a transmission was received. The new ID is stored.



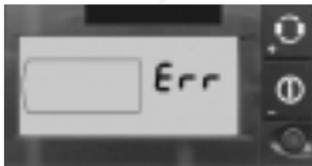
6. To *remove* the transmitter from the selected tire location, press the MODE button.



7. Press TIRE button to scroll to another position and repeat step 4 or 5 as required.



8. Press the SET button to save and exit.



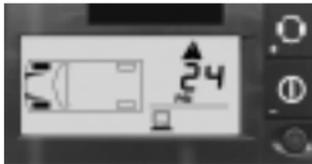
If no error is found, the system will reset and go to normal mode.

learn – cont'd

If more than one tire location contains the same sensor ID, the display will prompt an error and flash between this message and the display, with the conflicting tires filled in. If so indicated repeat the programming procedure above.

RECEIVER PROGRAMMING MODE – LEVEL 3**LOW PRESSURE ALERT** 

Factory default 22 PSI = 1.53 Bar



24 PSI = 1.65 Bar

This Low Pressure Alert is used only by the Basic Receiver.

Programming Steps

1. Enter Level 3 Programming Mode (see page 12)
-  2. Press the TIRE button to scroll to the desired axle. The tires of the selected axle are filled in.
-  3. Press the MODE button to view the current value.
-  4. Press the TIRE button to increase the value.
-  5. Press the MODE button to decrease the value.

The value should be above the setting of the Low Pressure Warning.

-  6. Press the SET button to save when the desired value is reached.

Repeat steps 2-6 until the Low Pressure Alert Levels have been set for all axles as desired.

-  7. Press the SET button to exit this mode.
-  8. Press the SET button again to return to normal mode.

Installation and Service

INSTALLATION

The Full Function Display is installed by removing the front bezel of the Basic Receiver, and install as below.

The Full Function Remote Display is connected to the Receiver via a cable as shown below.

REMOVE BEZEL FROM RECEIVER



FULL FUNCTION DISPLAY ONTO FRONT OF RECEIVER



FULL FUNCTION REMOTE DISPLAY RECEIVER CABLE END PLUG



FULL FUNCTION REMOTE DISPLAY CABLE END CONNECTION



FULL FUNCTION DISPLAY SPECIFICATIONS

Power Consumption	80 ma. nominal, 110 ma. maximum during alert (with Receiver)
-------------------	--------------------------------------------------------------

Operating Temperature Range	-20° F to 185° F (-29° C to 85° C)
-----------------------------	------------------------------------

Size	2.8" W x 0.74" D x 1.64" H (71mm x 19mm x 42mm)
------	----------------------------------------------------

Weight	1.5oz AV (43gm.)
--------	------------------

Operating Humidity	100 % non condensing
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Function	Range
Cold Inflation Pressure	10 – 76 PSI (.70 – 5.20 Bar)
Low Pressure Warning	5 – 92 PSI (.33 – 6.35 Bar)
Pressure Deviation Alert	Off – 2 – 20 PSI (.15 – 1.40 Bar)
High Temperature Alert	Off – 86 – 248° F (30° C – 120° C)
Slope	10 – 160
Units of temperature	°F °C
Units of pressure	Bar Psi
Number of tires monitored	20 (10 towing vehicle, 10 towed vehicle)

Service and Warranty

SYSTEM DIAGNOSTICS

Error code on display	Component failing	Fault	Action(s)
E1	Sensor(s) Receiver	Not transmitting RF section malfunction	If no transmission received within 5 minutes of driving, contact dealer
E2	Receiver and/or Display	EEPROM fault	Contact dealer
E3	Receiver and/or Display	Oscillator fault	Contact dealer
E4	Receiver and/or Display	Internal bus fault	Contact dealer

TROUBLESHOOTING

E1 Error

This error may occur in certain vehicles where the receiver unit is powered even when the ignition is turned off. Cases include vehicles where the cigarette lighter outlet is powered without the vehicle running. Other possible causes may be broken tire sensors or a malfunctioning Receiver unit. Mismatches in tire sensor ID may also cause this problem.

E2 Error

This error indicates that there is a problem with the data in the Receiver and/or Display units. Causes of this error can include:

- Corrupted custom profile
- Corrupted factory profile

The following may help identify the problem better.

Power the unit on and off.

If error has cleared → Operating with incorrect settings. Contact dealer.

If error persists → Receiver (or Display) may have to be replaced.

E3 & E4 Errors

These errors will usually represent an internal fault. Try powering the unit on and off to clear these errors. If these errors continuously occur the unit may have to be replaced.

REPLACING A FULL FUNCTION DISPLAY

1. Disconnect the power cable from the receiver.
2. Unplug the existing display.
3. Plug the new one in its place.
4. Reconnect the power plug to the receiver.

PART NUMBERS

Full Function Display	200.0060
Full Function Remote Display	200.0068
Spare cable	260.0096

US WARRANTY

This Warranty covers substantial manufacturer's defects in workmanship and materials. It does not cover any unit that is damaged beyond normal usage, was not properly installed, was subjected to chemical contact, or other acts or omissions not sanctioned by the Owner's Manual.

All components are covered for one (1) year and unlimited mileage following the date of installation.

The SmarTire® warranty will be honoured by any authorized SmarTire® dealer. The owner is required to provide dated proof of purchase. The authorized dealer will determine if there is a warrantable condition associated with materials and/or manufacturing workmanship. If a warrantable condition exists, the component will be replaced free of charge, shipping prepaid. The owner is responsible for any labor and installation charges.

A completed Warranty Claim Form must be sent, postage prepaid, with the defective unit to SmarTire USA Inc., PMB 309, 566 White Pond Dr. C., Akron, OH 44320-1116 USA. Phone 330-497-0236 or 888-982-3001.

The Warranty does not include any further obligation whatsoever, including but not limited to actual installation of the replacement unit on the customer's vehicle.

All other Warranties, express or implied, are disclaimed. All collateral agreements, which purport to modify this Limited Warranty are of no effect. The absolute limit of liability is the purchase price of the unit. SmarTire Systems Inc. is not liable for any direct, consequential, indirect or punitive damages of any kind.

SOME STATES DO NOT ALLOW LIMITATIONS ON THE VALIDITY OR LENGTH OF IMPLIED WARRANTIES, SO THE ABOVE LIMITATIONS MAY NOT APPLY TO YOU.

SOME STATES DO NOT ALLOW THE EXCLUSION OR LIMITATION OF INCIDENTAL OR CONSEQUENTIAL DAMAGES, SO THE ABOVE LIMITATION OR EXCLUSION MAY NOT APPLY TO YOU.

THIS WARRANTY GIVES YOU SPECIFIC LEGAL RIGHTS, AND YOU MAY HAVE OTHER RIGHTS WHICH VARY FROM STATE TO STATE

CANADIAN WARRANTY

This Warranty covers substantial manufacturer's defects in workmanship and materials. It does not cover any unit that is damaged beyond normal usage, was not properly installed, was subjected to chemical contact, or other acts or omissions not sanctioned by the Owner's Manual.

All components are covered for one (1) year and unlimited mileage.

The SmarTire® Warranty will be honoured by any authorized SmarTire® dealer. The owner is required to provide dated proof of purchase. The authorized dealer will determine if there is a warrantable condition associated with materials and/or manufacturing workmanship. If a warrantable condition exists, the component will be replaced free of charge, shipping prepaid, if within the applicable warranty period. The owner is responsible for any labor and installation charges.

This notice must be sent, postage prepaid, with the defective unit to SmarTire Systems Inc., 13151 Vanier Place, Suite 150, Richmond, British Columbia, Canada, V6V 2J1. Phone 604-276-9884.

The Warranty does not include any further obligation whatsoever, including but not limited to actual installation of the replacement unit on the customer's vehicle.

ALL OTHER WARRANTIES AND CONDITIONS, EXPRESS OR IMPLIED, INCLUDING WARRANTIES AND CONDITIONS FOR MERCHANTABILITY, DURABILITY OR FITNESS FOR PURPOSE, ARE DISCLAIMED. ALL COLLATERAL AGREEMENTS, WHICH MODIFY THIS SOLE WARRANTY ARE OF NO EFFECT. SMARTIRE SYSTEMS INC. IS NOT LIABLE FOR ANY DIRECT, CONSEQUENTIAL, INDIRECT OR PUNITIVE DAMAGES. THE ABSOLUTE LIMIT TO LIABILITY IS THE PURCHASE PRICE OF THE UNIT.

EUROPEAN WARRANTY

SmarTire Europe Limited (“SmarTire”) hereby warrants that this SmarTire wireless tyre pressure monitoring system shall be free from material defects in workmanship and/or materials until the expiry of twelve months from its purchase by the end user and unlimited mileage, EXCEPT WHERE any such defect has been caused by:

1. Improper installation;
2. Improper or non-normal use;
3. Contact with any corrosive or otherwise harmful substance; or
4. Any other act or omission not sanctioned by the Owner’s Manual or any failure to follow any other reasonable instructions given by SmarTire in relation to the system.

The above warranty will be honoured by the retailer from which it was purchased, provided that the owner can provide dated proof of purchase.

The retailer shall at SmarTire’s cost send any unit which is defective as described in the above warranty to SmarTire at Park 34, Didcot, Oxfordshire OX11 7WB, England.

In the event that any defect in the unit is covered by the above warranty, SmarTire will replace the affected components free of charge, shipping prepaid. The owner shall be responsible for any labour and installation costs incurred in removing the defective parts and/or installing the replacements.

SAVE AS SET OUT HEREIN SMARTIRE SHALL HAVE NO FURTHER LIABILITY OR OBLIGATION UNDER THE ABOVE WARRANTY. THIS WARRANTY SHALL BE GOVERNED AND CONSTRUED IN ACCORDANCE WITH ENGLISH LAW.

YOUR STATUTORY RIGHTS ARE NOT AFFECTED.