



INSTRUCTIONS

Wireless Air / Fuel Meter Instructions (P/N 170301, 170302)

Thank you for choosing FAST® products. We are proud to be your manufacturer of choice. Please read this instruction sheet carefully before beginning installation, and also take a moment to review the included limited warranty information. Contact us toll free at 1.877.334.8355 or at www.fuelairspark.com under Tech Help with any questions.

Product Description

The FAST™ Wireless Air / Fuel Meter Kit consists of a wideband oxygen sensor connected to a Wireless Air / Fuel Meter Module. The Wireless Air / Fuel Meter is a microprocessor controlled module that gathers information from the wideband oxygen sensors and sends that information to the “FAST AFM” App. This module can also output a 0-5v signal to an ECU (Engine Control Unit), Data Logging Module or gauge. The module also controls a relay based on RPM, Air / Fuel Ratio, or signal from a smart phone or other Bluetooth device.

Kit Components

Wireless Air / Fuel Meter Module

This module is responsible for communicating between the sensor and the app. It also processes the RPM signal and controls the output relay and analog signal.

P/N 170301: Single Wideband Lead

P/N 170302: Dual Wideband Lead

Wideband Oxygen Sensor

The Wideband Oxygen Sensor measures the Air / Fuel ratio in the exhaust and sends it to the module.

P/N 170301: One (1) Wideband Oxygen Sensor

P/N 170302: Two (2) Wideband Oxygen Sensors

Oxygen Sensor Bung

The Oxygen sensor bung is welded into the exhaust.

P/N 170301: One (1) Oxygen Sensor Bung

P/N 170302: Two (2) Oxygen Sensor Bungs

Relay Harness

This harness will connect to the two pin connector already on the Wireless Air / Fuel Meter Module.

P/N 170301 & 170302: One Relay Harness



Installation

Oxygen Sensor Installation

O2 sensor location

For maximum accuracy, install the oxygen sensor at least 18 inches downstream of a cylinder head or turbocharger, upstream of the catalytic converter, and as far away from the outlet as possible. To avoid premature sensor failure, do **not** install the oxygen sensor in bottom half of the exhaust pipe. This can cause condensation to pool on top of the sensor inside the exhaust pipe, and short the electronics.

Routing of cable

Ensure all components are installed away from spark plug wires, the distributor, ignition coil, and hot engine components. This will help to reduce electrical interference and ensure no components are damaged by excessive heat.

Use of leaded fuel

The use of leaded fuel will significantly reduce the lifespan of the oxygen sensor. Depending on the leaded fuel that is used, the sensor will provide 50-500 hours of accurate reading. When the sensor begins to read inaccurately, simply replacing the sensor with a new one will return the unit's accuracy.

Un-powered sensor

When an engine is running and the oxygen sensor, or sensors, are installed in the exhaust, it is advisable to have power supplied to the Wireless Air / Fuel Meter. By doing this, power is applied to the heating element of the oxygen sensor. This will reduce build-up of exhaust deposits on the measuring element, maximizing its life expectancy and accuracy.

Mounting the Wireless Air Fuel Meter

The Wireless Air Fuel Meter Module has 2 holes in it to fit up to a #10 or M5 machine screw. Install the module away from sources of high heat or electrical interference such as distributors, ignition coils, or spark plug wires. The module is water resistant and safe to install under the hood. Be sure all wires reach their necessary components.

Wiring the Wireless Air / Fuel Meter

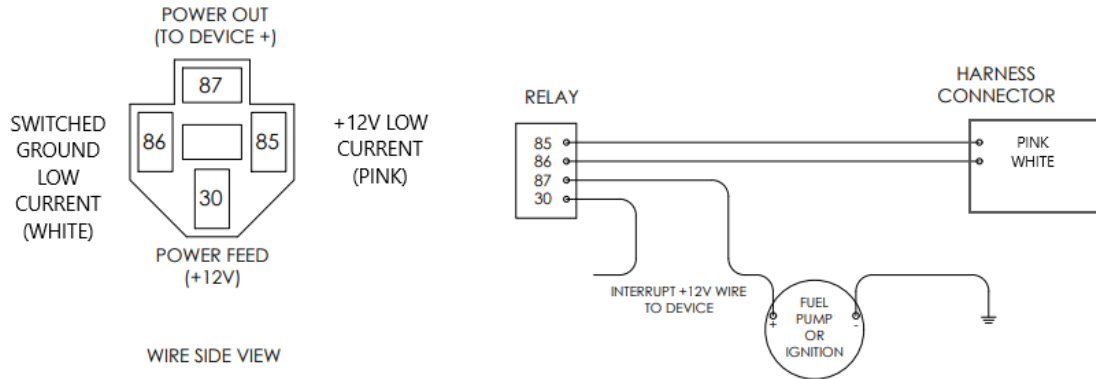
To properly install the Wireless Air / Fuel Meter, attach the un-terminated wires and connector as described below: (NOTE: Wire Colors in bold text are required for basic app operation.)

- **Pink Wire - Switched +12V Power:** This wire should be spliced into a circuit that only has power when the key is switched on. This is due to the fact that when power is applied to the Wireless Air / Fuel Meter, the oxygen sensor heater circuit is active and draws current to maintain the Oxygen sensor's temperature. This can drain a car battery.
- **Black - Module Ground:** This wire should be connected to a proper engine ground, chassis ground or directly to the negative battery terminal. NOTE: Be sure to remove paint/ corrosion from any surface to which a ground will be connected.
- **Yellow - RPM Input:** This wire should be connected to the negative side of a conventional coil, the "Tach" output of a coil, or the signal wire in a Coil-Over-Plug system.
- **Violet - 0-5v Signal Output:** This wire may be connected to an ECU, Data Logger or Gauge. See "Analog Output Configuration" for setup details.
- **Black / White Wire - Sensor Ground:** This wire should be connected to a dedicated sensor or ECU ground, if the vehicle is equipped. If not, connect to a standard engine or chassis ground.

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Wiring the Output Relay

- Pink - Hot at all times: Run this wire to pin 85 of a relay.
- White - Switched ground: Run this wire to pin 86 of a relay.
- Run the positive side of the interrupted circuit to pin 30 and the other half of the interrupted circuit to pin 87.



Setup of the Wireless Air / Fuel Meter

App Installation

Android Devices

To download the app go to:

<https://play.google.com/store/apps/details?id=com.pe.comp.dualwideband>

Search the Google Play Store for “FAST Wireless Air Fuel Meter”

Or scan the upper QR code to the right:



Apple Devices

To download the app go to:

<https://itunes.apple.com/us/app/fast-wireless=air-fuel-meter/id1478299555>

Search the App Store for “FAST Wireless Air Fuel Meter”

Or scan the lower QR code to the right:



Initial Connection

App Notes

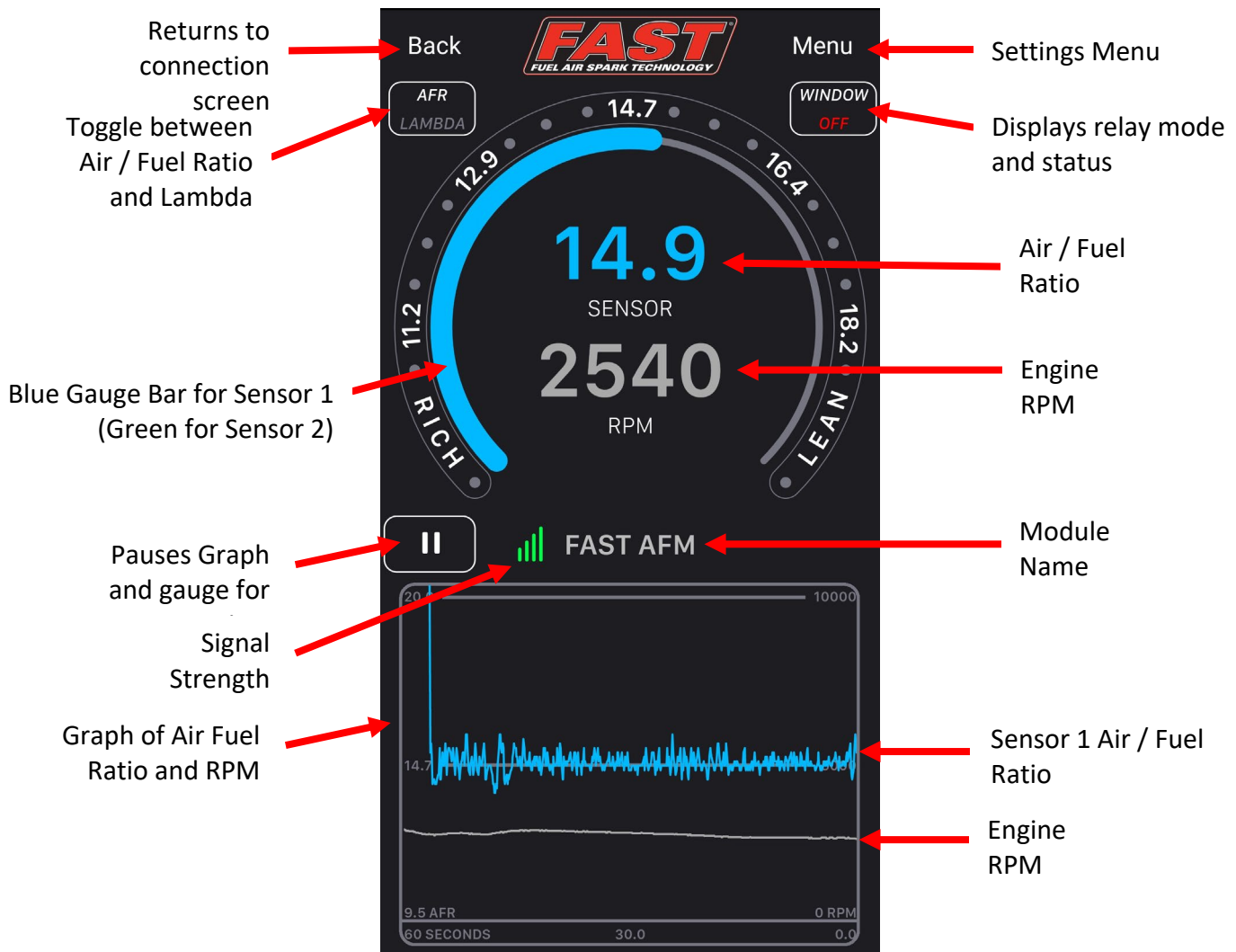
- The app works via Bluetooth connection. The device used must have Bluetooth enabled.
- To make changes to the Wireless Air / Fuel Meter Module, the module must be powered by turning the ignition on. Leaving the key on for an extended period of time may cause the battery to die. Be sure to start the vehicle during extended periods of app configuration.
- Making changes to the calibration while driving may be necessary. Be sure to follow all traffic safety laws. The driver should not be operating the app while driving.

Connecting to the Bluetooth Module

1. Switch on the ignition. The LED on the Bluetooth module should blink red approximately once per second.
2. Press and hold the pairing button on Bluetooth module for several seconds until the LED quickly blinks blue. Pairing mode is now active for 10 seconds.
3. Launch the FAST AFM app on mobile device, and tap on the module name listed.
4. If successful, the app will go to the main menu screen. Module name and signal strength will be displayed in the middle of the screen.
5. When connection to app is active, the Bluetooth Module will blink red, then blue, approximately once per second.
6. After the first connection, the app will automatically reconnect to the module whenever the module is turned on and the app is open on the Bluetooth device.

Main Screen

Single sensor app screenshot shown, dual is similar.



Module Settings

Click this menu to configure:

Air Fuel Ratio – Select the stoichiometric air / fuel ratio of the fuel used. Common fuels are listed.

Module Name – Edit the name of the module which is displayed in the middle of the screen and when connecting.

Sensor Enable – Allows Sensor 1 and Sensor 2 to be enabled or disabled.

Analog Output Operation – Allows selection of Sensor 1, Sensor 2, or an Average of both sensors to send its signal over the analog output wire. (Violet Wire)

Pulses per Cycle – Select the number of pulses per cycle of the engine. Click the question mark to the right for more information.

Display Settings

Click this menu to configure:

Set AFR / Lambda Range for Gauge and Plot – Selects Air / Fuel or Lambda range to be displayed on graph.

Set Length of History Displayed by Plot – Selects amount of time to be displayed on graph.

Wideband Sensor Display – Selects which sensors will be displayed on gauge and graph.

Enable / Disable RPM Display – Toggle RPM display on and off.

Connection Settings

Click this menu to configure:

Auto-Connect Enable / Disable – Toggle auto-connect on and off

Clear Remembered Devices – This will clear all remembered devices from the module's memory. All previously connected devices will have to go through "Initial Connection" again.

Output Relay Settings

The output relay can be configured to act as an Anti-theft, window switch, OR AFR / λ Safety Switch. It cannot perform multiple functions at the same time. Selecting any of the functions will enter a sub-menu where settings specific to that feature can be configured. Disable leaves the relay turned off at all times.

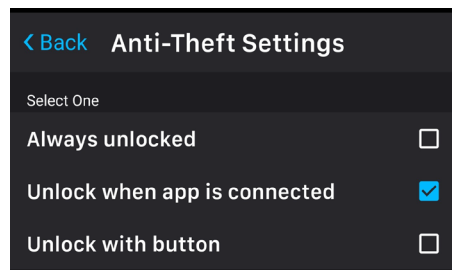
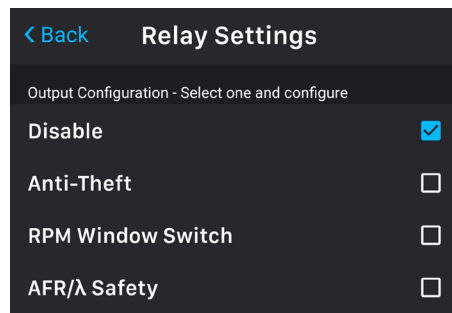
Anti-Theft Settings

Anti-Theft has 3 modes listed below. **The anti-theft can also be manually over-ridden by turning the key on, then holding the Bluetooth button for 30 seconds.** Once the red LED lights up, release the button. The anti-theft has been manually overridden and the relay will be active.

Always Unlocked: This mode disables the anti-theft feature completely.

Unlock when app is connected: This mode will unlock the anti-theft when the mobile device is in range, the app is launched and connected to the Wireless Air Fuel Meter Module, and the Bluetooth unit is receiving 12v (ignition switched on).

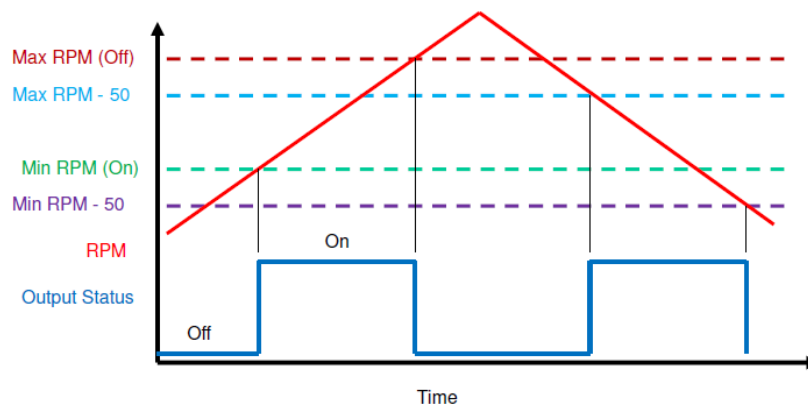
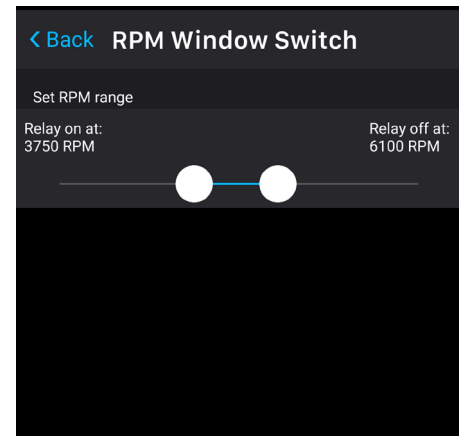
Unlock with button: This mode unlocks the anti-theft only when the button in the top right corner of the main screen is pressed. This allows full control over the anti-theft feature.



RPM Window Switch:

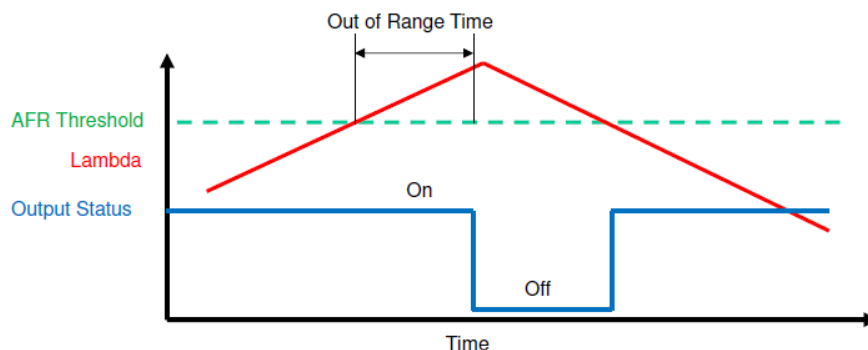
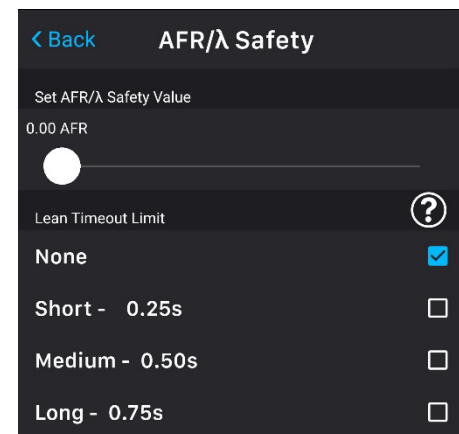
The RPM window switch is turned on (Pin 86 is grounded) when RPM is in between the “Min RPM” and “Max RPM” as shown in the chart below. This can be used to control nitrous, water / meth injection, intercooler sprayers, active aero etc. Simply drag the sliders to select desired RPM set-points. After the engine exceeds “Relay off at:” and the relay is turned off, it will turn back on when engine speed falls 50 RPM below “Relay off at” RPM. After being turned on, the relay will deactivate when engine speed falls 50 RPM below “Relay On at:” RPM.

NOTE: Be sure RPM is configured properly before setting up this function! Failure to do so may cause premature activation of the relay.



AFR / λ Safety:

The AFR / λ Safety switch is made to help save an engine if it were to run lean under load. This will turn the relay OFF when the Air / Fuel ratio raises above “Set AFR / λ Safety Value”. This could be used to interrupt ignition coil power, nitrous solenoid power, or any other source which, when turned off, could stop the engine from being damaged. The “Lean Timeout Limit” allows the relay to delay for a specified amount of time before being turned off. The relay will re-activate immediately once back in range. Clicking on the question mark will provide more details on the operation of this function.



Operation of the Wireless Air / Fuel Meter

When power is applied to the unit, the Wireless Air / Fuel Meter Module turns on the sensor heater circuit and begins the warm-up process. This process takes up to 20 seconds, depending on the temperature of the sensor at start up. During this “warm-up” time, the unit will output 0.4V to the analog output wire and the app will show “Heating”. After the sensor is up to temperature, the unit will automatically start outputting the air / fuel signal to the app and to the data acquisition system.

Diagnostics

The module can communicate certain faults with blink codes. If the module is not working properly, check to see if the LED is blinking in any of the following patterns to help determine the problem.

LED Blink Pattern	Module Status	App Message	Description
	Sensor Heating	'Heating'	During about the first 20 seconds of operation, the sensor(s) will heat up to function properly.
	Normal Operation	--None--	Normal operation with no errors. No active Bluetooth communication.
	Normal Operation + Relay On	--None--	Normal operation with no errors and relay output active. No active Bluetooth communication.
	Bluetooth Pairing	--None--	Module is ready to pair to a mobile device. This is initiated by holding the pair button for at least 5 sec.
	Bluetooth Active	--None--	Normal operation with no errors and active Bluetooth communication.
	Bluetooth Active + Relay On	--None--	Normal operation with no errors, relay output active, and active Bluetooth communication.
	Device Identify	--None--	Rapid color sequence to identify the connected device. Initiated from the app.
	Error	'Error'	No sensor or bad sensor. Check the connection between the sensor and module.
	Error	'Over Temp'	The module itself is too hot. If hotter than 176°F (80°C), Bluetooth may stop functioning.

If a sensor error occurs, 0.20 Volts will be output on the violet analog output wire.

Analog Output Configuration

If use of the 0-5V analog output is desired, be sure both the violet and black/white wires are connected properly, then simply input the calibration numbers or formula corresponding to the correct fuel type from one of the charts below. When the “Test Analog Output” button is pressed in the Diagnostics menu, the number in the Grey column for the fuel used should show on the ECU or data acquisition device.

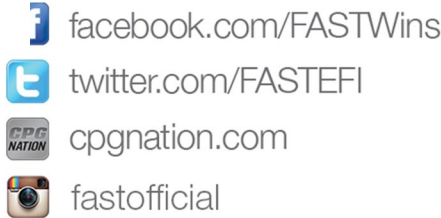
2 – Point Voltage Calibration					
Fuel	Voltage				
	0.00V	0.50 V	3.00V	4.50V	5.00V
Lambda (λ)	0.58	0.65	1.00	1.21	1.28
Gasoline	8.53 : 1	9.56 : 1	14.70 : 1	17.79 : 1	18.82 : 1
Diesel	8.41 : 1	9.43 : 1	14.50 : 1	17.55 : 1	18.56 : 1
LPG	8.99 : 1	10.08 : 1	15.50 : 1	18.76 : 1	19.84 : 1
Methanol	3.75 : 1	4.21 : 1	6.47 : 1	7.83 : 1	8.28 : 1
CNG	9.86 : 1	11.05 : 1	17.00 : 1	20.57 : 1	21.76 : 1
E100	5.22 : 1	5.85 : 1	9.00 : 1	10.89 : 1	11.52 : 1
E85	5.72 : 1	6.41 : 1	9.86 : 1	11.93 : 1	12.62 : 1
E10	8.20 : 1	9.18 : 1	14.13 : 1	17.10 : 1	18.09 : 1
Custom	Multiply Lambda (λ) Value By Stoich. Air Fuel Ratio				

Gain and Offset Based Calibration		
Fuel	Gain	Offset
Lambda (λ)	0.14	0.58
Gasoline	2.06	8.53
Diesel	2.03	8.41
LPG	2.17	8.99
Methanol	0.91	3.75
CNG	2.38	9.86
E100	1.26	5.22
E85	1.38	5.72
E10	1.98	8.20
Custom	Multiply Lambda (λ) Gain and Rate Value By Stoich. Air Fuel Ratio	

Formula Based Calibration	
Fuel	Formula
Lambda (λ)	= 0.14 * Voltage + 0.58
Gasoline	= 2.058 * Voltage + 8.526
Diesel	= 2.03 * Voltage + 8.41
LPG	= 2.17 * Voltage + 8.99
Methanol	= 0.9058 * Voltage + 3.7526
CNG	= 2.38 * Voltage + 9.86
E100	= 1.26 * Voltage + 5.22
E85	= 1.3804 * Voltage + 5.7188
E10	= 1.9782 * Voltage + 8.1954
Custom	= Gain * Voltage + Offset

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FAST® warrants that its EZ-EFI® and CD Ignition boxes are free from defects in material and workmanship for the lifetime of the product. This **Limited Lifetime Warranty** shall cover **only** the original purchaser. All other FAST® products are covered by a **Limited Warranty** which covers defects in material and workmanship for a period of **one year** from the date of purchase.

FAST®'s obligation under this warranty is limited to the repair or replacement of its product. To make a warranty claim, the part must be returned directly to FAST® at the address listed below with a valid Return Merchant Authorization Number (RMA), freight prepaid. Items covered under warranty will be returned to you freight collect. To obtain an RMA, call 877-334-8355 to report the issue you are experiencing. At that time, FAST® will attempt to troubleshoot your issue.

It is the responsibility of the installer to ensure that all of the components are correct before installation. We assume no liability for any errors made in tolerances, component selection or installation.

There is absolutely no warranty on the following:

- A. Any parts used in racing applications or subject to excessive wear;**
- B. Any product used in marine applications, unless that product is listed by FAST® as a specific marine product**
- C. Any product that has been physically altered improperly installed or maintained;**
- D. Any product used in improper applications, abused, or not used in conjunction with the proper parts.**

There are no implied warranties of merchantability or fitness for a particular purpose. There are no warranties which extend beyond the description of the face hereof. **FAST® will not be responsible for incidental and consequential damages, property damage or personal injury damages.** Where required by law, implied warranties or merchantability and fitness are limited to terms outline above.

This warranty gives you specific legal rights and you may also have other legal rights which vary from state to state.

CALIFORNIA PROPOSITION 65 WARNING

This product may contain one or more substances or chemicals known to the state of California to cause cancer, birth defects or other reproductive harm.