# SPARTAN Lite v2

1. Warning

- **Do not connect or disconnect the Lambda Sensor while Spartan 3 Lite is powered.**
- **The Lambda Sensor will get very hot during normal operation, please be careful when handling it.**
- **Do not install the Lambda Sensor in such a manner that the unit is powered before your engine is running. An engine start can move condensation in your exhaust system to the sensor, if the sensor is already heated this can cause thermal shock and cause the ceramic internals inside the sensor to crack and deform.**
- **While the Lambda Sensor is in an active exhaust stream, it must be controlled by Spartan 3 Lite. Carbon from an active exhaust can easily build up on an unpowered sensor and foul it.**
- **Lambda sensor life when used with leaded fuels is between 100-500 hrs.**

2. Package Contents

1x Spartan 3 Lite, 1x blade fuse holder, 2x 5 Amp blade fuse, 1x LED

3. Exhaust Installation

The Lambda sensor should be installed between the 10 o'clock and the 2 o'clock position, less than 60 degrees from vertical, this will allow gravity to remove water condensation from the sensor.
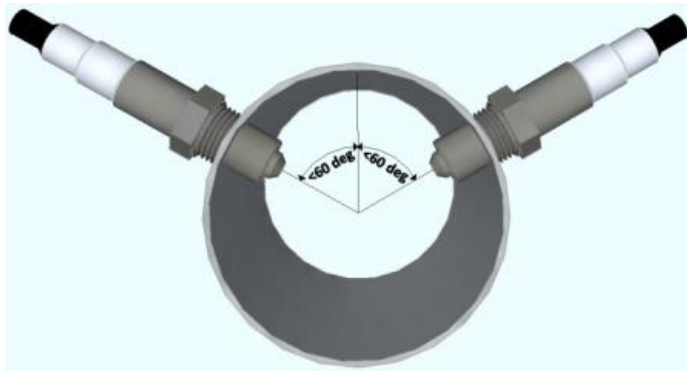
For all Oxygen sensor installations, the sensor must be installed before the catalytic converter.

For normally aspirated engines the sensor should be installed about 2ft from the engine exhaust port. For Turbocharged engines the sensor should be installed after the turbocharger. For Supercharged engines the sensor should be installed 3ft from the engine exhaust port.

4. Fuse
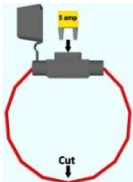
Insert 5 amp fuse into fuse holder, cut wire at midpoint, and secure lid. One end of the fuse holder connects to Spartan 3 Lite red wire the other end of the fuse holder connects to a switched 12[v] source, fuel pump relay is normally recommended.

5. Wiring

Wire Color	Name	Connects to	Note
Red	Power	Switched 12[v]	Use fuse holder, 12[v] should be live only when engine is running.
Black	Electronics Ground	Ground	Ground where interfacing device is grounded
White	Heater Ground	Ground	Ground to chassis or engine block
Green	Linear Output	Interfacing device; ECU/Gauge/datalogger/etc…	0[v] @ 0.68 [Lambda] Linear to 5[v] @ 1.36 [Lambda], equivalent to 10-20 [AFR] for gasoline fuel
Brown	Simulated Narrowband Output	Stock ECU if Lambda sensor replaces stock Narrowband sensor	Stops Stock ECU from throwing out a Check Engine Light when Narrowband sensor is not detected. Switch point @ 1 [Lambda], equivalent to 14.7 [AFR] for gasoline fuel
Blue	Sensor Temperature LED Output	Long lead on LED to Blue wire. Short lead on LED to ground.	Very Slow – 1 blink every 8 seconds: waiting for exhaust gas to heat sensor to 350C before heating sensor Slow – 1 blink every 2 seconds: Sensor is heating up/ Sensor is cold Fast – 2 blinks every second: Sensor is too hot Steady – LED is light and not blinking: Sensor is at operating temperature
Orange	UART TX	RX of interfacing device	5v, 9600 Baud, 8 Data Bits, 1 Stop Bit, No Parity, No Flow Control
Yellow	UART RX	TX of interfacing device	5v, 9600 Baud, 8 Data Bits, 1 Stop Bit, No Parity, No Flow Control

6. Serial Commands (For advanced users only)

Serial Command	Usage Note	Purpose	Example	Factory Default
GETHW		Gets Hardware Version		
GETFW		Gets Firmware version		
SETTYPEx	If x is 0 then Bosch LSU 4.9 If x is 1 then Bosch LSU ADV		SETTYPE1	X=0, LSU 4.9
GETTYPE		Gets LSU sensor type		
SETPERFx	If x is 0 then standard performance of 20ms. If x is 1 then high performance of 10ms. If x is 2 then optimize for lean operation.		SETPERF1	x=0, standard performance
GETPERFx		Gets performance		
SETLAMFIVEVx.xx	x.xx is a decimal exactly 4 characters long including decimal point. Minimum value is 0.60, maximum value is 3.40	Sets Lambda at 5[v] for the linear output	SETLAMFIVEV1.36	x=1.36[Lambda]
GETLAMFIVEV		Gets Lambda at 5[v]		
SETLAMZEROVx.xx	x.xx is a decimal exactly 4 characters long including decimal point. Minimum value is 0.60, maximum value is 3.40	Sets Lambda at 0[v] for the linear output	SETLAMZEROV0.68	x=0.68[Lambda]
GETLAMZEROV		Gets Lambda at 0[v]		
SETNBSWLAMx.xxx	x.xxx is a decimal exactly 5 characters long including decimal point.	Sets the Simulated Narrowband Switch Point in Lambda	SETNBSWLAM1.005	x.xxx=1.000
GETNBSWLAM		Gets the Simulated Narrowband switch point in Lambda		
SETLINOUTx.xxx	Where x.xxx is a decimal exactly 5 characters long including decimal point, greater than 0.000 and less than 5.00. Linear Output will resume normal operation on reboot.	Allows the user to set the High Perf Linear Output to a specific voltage	SETLINOUT2.500	
SETSLOWHEATx	If x is 0 then sensor is heated at normal rate during initial power up. If x is 1 then sensor is heated at 1/3 the normal rate during initial power up. If x is 3 then wait, a max of 10 min, for exhaust gas to heat sensor to 350C before heating		SETSLOWHEAT1	X=0, normal sensor heatup rate
GETSLOWHEAT		Gets slowheat setting		
DOCAL		Do Free Air Calibration and display the value. Recommended for clone sensors only.		
GETCAL		Gets Free Air Calibration value		
RESETCAL		Resets Free Air Calibration value to 1.00		
SETCANFORMAT0		Sets Linear Output to Lambda		SETCANFORMAT0
SETCANFORMAT4		Sets Linear Output to %O2: 0v@0%O2 linear to 5v@21%O2		SETCANFORMAT0
GETCANFORMAT		Gets CAN format		
SETAFRMxx.x	xx.x is a decimal exactly 4 characters long including decimal point	Sets AFR Multiplier for Android Torque app	SETAFM14.7 SETAFM1.00	xx.x=14.7
GETAFRM		Gets AFR Multiplier for Android Torque app		
MEMRESET		Reset to factory settings.		

*All commands are in ASCII, upper/lower case does not matter.

7. Bootloader

When Spartan 3 Lite is powered up without the LSU Heater Ground connected, it will enter bootloader mode. Powering up Spartan 3 Lite with the Heater Ground connected will not trigger the bootloader and Spartan 3 Lite will work as normal.

8. Warranty

14Point7 warrants Spartan 3 Lite to be free from defects for 2 years.

9. Disclaimer

14Point7 is liable for damages only up to the purchase price of its products. 14Point7 products should not be used on public roads.