



## READ ME FIRST

### Disclaimer

**This product is intended for race vehicles used on closed courses, and not for use on roads or vehicles otherwise subject to emission control requirements. In California, this product must not be used on any vehicle that is registered or licensed for use on public roads.**

Actual results from the installation of the XIED's may vary between individual bikes. S&P MULLEN Enterprises, Inc warrants Nightrider.com Performance Products against defects in factory workmanship and material for 30 days from the date of purchase with proof of purchase or until ownership in the part is transferred. The manufacturer and seller make no warranties express or implied which extend beyond the description of the goods contained herein. Any description of this product is for the purpose of identifying it and shall not be deemed to create an express warranty. S&P MULLEN Enterprises, Inc. shall not be responsible for any consequential, special or incidental damages of any nature, including but not limited to the loss of use of any vehicle on which the unit may be installed and the cost of obtaining substitute components.

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**By opening this package and beginning to install the components of this product on your vehicle, the purchaser agree to abide by the terms of this agreement.**

Air Fuel Ratio's (AFR) represented for these products are approximations and based on exhaust gas temperatures (EGT) of 1200 F. Lower EGT during startup, cooler weather or during some Dyno testing with cooling fans can result in .5 to .8 leaner AFR's. This is normal due to the way unheated narrow band O2 sensors react to changing EGT's. The "hotter" the engine gets, the better the XIED's may actually work.

AFR readings observed on the typical chassis Dyno tail pipe probe will seldom provide fuel ratio readings accurate enough to show the results of XIED operation. Improper WBO2 free air calibration, reversion bring fresh air into the exhaust system and the fact that the sensor is not located at the exhaust port all contribute to decreased accuracy on the typical tail pipe probe. Readings need to be taken with a WBO2 sensor in the OEM O2 bung.

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## Performance Products

### BMW-AF-XIED®

Inline Fuel Mixture Enhancement w/AFR Display

### Fits many BMW® Motorcycles

Models with OEM 4-wire O2 sensors

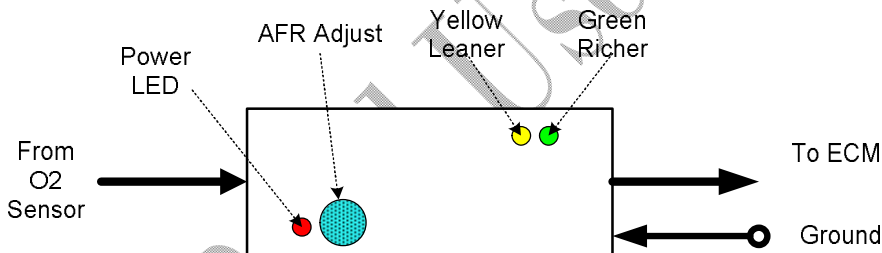
Protected by U.S. Pat. No. 7,805,236

Made in the USA

An experimental 'plug-n-play' upgrade for Oxygen Sensor equipped motorcycles to create a variable air fuel ratio in closed loop mode approximating richer mixtures of 14.5:1-13.6:1, depending upon exhaust temperatures. An improved air fuel mixture has generally shown one of more of the following positive results:

- Improved Throttle Response
- Lower Engine Temperature
- Less Engine Surge
- Reduced Engine Ping
- Stronger Mid-Range Roll-on
- Ride 1 Higher Gear

A two LED AFR display has been added to standard XIED technology to assist in monitoring closed loop fuel ratios by indicating 4 general fuel ratio areas: Lean, Normal, Normal Rich, Very Rich.



### General Installation Instructions Wiring Harness (R1100/R1150)

- O2 Connector is located under fuel tank
  - Drain fuel tank for safety purposes
  - Follow BMW procedure for tank removal
- Located O2 sensor connector(s)
  - On right side frame rail
  - Cut any tie wraps holding the connectors in place
- Unplug weather-tight connectors
  - Be careful of fragile tabs on connectors
- Plug the BMW-AF-XIED harness adapter between O2 sensor and OEM wiring
  - Make sure connectors 'click' into place
- Tie wrap the connectors in place to prevent moving around
  - Make sure wiring is clear of fuel tank



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### Locate the BMW-AF-XIED controller unit

- On top of air box is suitable
- Connect AF-XIED to Wiring Harness Adapter (white connectors)
  - Wiring Harness Extenders available for other locations
- Connect Black ground wire to (-) negative battery terminal
  - Chassis ground also acceptable
- Tie wrap additional wiring in place
  - Ensure wiring and controller is clear of obstructions

### Power Wire (RED) Installation Instructions

- Power is taken from +12V O2 Heater lead
  - No specific power wiring required

Off Road Use Only



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Approximate AFR's for the adjustment are as follows in the shaded cells:

14.7	14.7	14.7	14.7	14.6	14.1	14.0	13.9	13.5	13.7	13.6
1	2	3	4	5	6	7	8	9	10	11

<p><b>Full Counter Clockwise is 13.6:1</b></p> <p style="text-align: center; font-size: 24px; font-weight: bold;">Richer</p>		<p><b>Full Clockwise is 14.6:1</b></p> <p style="text-align: center; font-size: 24px; font-weight: bold;">Leaner</p>
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### Observed AFR's at settings for various model bikes

Settings> Model-V	5	6	7	8	9
<b>R1100</b>	14.4	14.1	13.8	13.5	13.5
<b>R1150</b>	14.6	14.4	14.1	13.8	>13.5
<b>R1200</b>	14.6	14.4	14.1	13.8	>13.5
<b>K1200</b>					
<b>F800</b>	14.6	14.4	14.1	13.8	>13.5



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### Notes:

Richer closed loop AFR values cannot be achieved if any exhaust leaks exist. Even the smaller exhaust leak can cause check engine lights to occur. It is common for leaks to occur after slip on muffler or exhaust system upgrades have been done on the bike.

Bikes with very free flowing exhaust (read this as loud) may actually work better with slightly leaner AFR settings due to air reversion.

Do not expose the AF-XiED to high pressure water streams.

AF-XiED size is 2.5"L x 0.9"W x 0.7"H.

We have found settings in the 14.3:1 (6) to 14.0:1 (8) range tend to work best. Because of the way that the O2 sensors, AF-XiED and ECM actually interact, higher settings do not always result in the best results. The settings are the approximate AFR based on an average bias values in the ECM. The bias value is the "centering" voltage that the ECM uses to determine if it needs to make injector pulses longer or shorter based feedback it receives from the O2 sensor.

The recommended setting for the BMW-AF-XiED is a "7". Testing indicates this setting is adequate for most normal riding situations.

Estimated Exhaust Gas Temperatures (normal riding):

Bosch 4-Wire Heated Sensor: 850 F

Replacing the fuel tank on many BMW models can create interference with the throttle cables. Be careful replacing your fuel tank.

### BMW-AF-XiED SUPPORT:

Support for this product is available through several BMW Rider Forums. Specific forums are as follows:

- BMWMOA [www.bmwmoa.com/forum](http://www.bmwmoa.com/forum)
- BMW Sporttouring [www.bmw sporttouring.com/ubbthreads](http://www.bmw sporttouring.com/ubbthreads)
- **ADVRider** [www.advrider.com/forums](http://www.advrider.com/forums)  
Gear > Vendors > BMW-AF-XiED by Nightrider

This community support will be the primary venue for detailed installation and operational support for all Nightrider.com BMW-AF-XiED products.



### AFR Adjustment Instructions

- The BMW-AF-XIED has an adjustable mixture control
- Use a Jeweler's screwdriver to make adjustments to the AF-XIED
- Do not force the variable dial adjustment
- Set the initial value based on the table of known working AFRs
- Recommended Setting 5 through 9
- Verify new setting by counting blinks at engine startup
- If you get transient Check Engine lights, set the AFR approximately .1 AFR leaner

### AFR LEDs Display Pattern

#### Startup

Green/Yellow LED's will go on indicating startup sequence for 2 seconds.

The AFR Display module will then check the current mixture setting by reading the dial, providing a "blink" indicator from 1 to 11 blinks indicating the target AFR. Count the yellow blinks on startup to verify the dial settings are correct. Target AFR and Observed AFR can be different.

LAMBDA	Target AFR	Blink
1.000	14.7	1
0.993	14.6	2
0.986	14.5	3
0.980	14.4	4
<b>0.973</b>	<b>14.3</b>	<b>5</b>
<b>0.966</b>	<b>14.2</b>	<b>6</b>
<b>0.959</b>	<b>14.1</b>	<b>7</b>
<b>0.946</b>	<b>14.0</b>	<b>8</b>
<b>0.939</b>	<b>13.8</b>	<b>9</b>
0.925	13.6	10
0.918	13.5	11

After the mixture setting is displayed, the display will wait until voltage sensed from O2 sensor. This will usually occur in 120-180 seconds cold and almost immediately on a warm/hot bike.



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### Normal Running Light Patterns

- Yellow – under 400 mV from O2 sensor – Leaner than 14.8:1 AFR
- No Lights – Between 400 and 750 mV from O2 sensor – 14.7-14.2:1 AFR
- Green – over 750 mV, but less than 1100 mV – 14.2-13.8:1 AFR
- Yellow/Green – over 1100 mV – Richer than 13.2:1 AFR

Do not read too much into the light pattern of the AFR gauge. This is intended to be a general indicator of the mixture, not instant reading of the fuel mixture at any point in time. Even with some smoothing, it is not uncommon for the pattern to constantly change from blink yellow-no lights-green. This is a normal cycling of the closed loop ECM. The pattern should tend to stabilize more on “no lights” to “green” light. You will normally only see both lights on during startup or during full throttle acceleration.

Normal cycling of the ECM and reversion in the exhaust system are enough to create yellow light (lean spikes) in the display pattern. This is expected behavior.

Please **DO NOT WATCH the AFR lights WHILE THE BIKE IS IN MOTION.**

### Universal Wiring Harness Adapter

The universal wiring harness adapter can be used with any OEM connectors to make your own harness (including non-listed bikes).

<u>Signal</u>	<u>Wire Color</u>	<u>Notes</u>
O2 IN (+)	White/Blue	From O2 Sensor
O2 IN (-)	Yellow/Green	From O2 sensor
O2 OUT (+)	Blue	To (Motronics or BMSK) ECM
O2 OUT (-)	Yellow	Typically open on BMW
O2 Heater (+)	Red	<u>Provides +12V</u> , Straight through
O2 Heater (-)	Gray	Straight through
Ground	Black	Chassis Ground or N/C



### NBO2 mVolt at AFR (typical)

