Wideband EGO Controller

Version 1.03

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1. Introduction

1.1 Overview

The AMPEFI standalone wideband controller is a high accuracy device designed to control a heated exhaust gas oxygen sensor which provides combustion exhaust feedback to the engine control unit (ECU) and/or user to aid in tuning the fuel delivery to the engine.

This manual provides detailed instructions for safe installation, configuration, operation, and maintenance of the EGO system. Users must familiarize themselves with the contents of this manual to ensure safe and effective use.

Purpose of the System

The primary function of the EGO system is to rapidly monitor and report back the amount of free oxygen present in the exhaust stream. Excess free oxygen indicates lean combustion, while little free oxygen represents a rich condition.

The benefits of this system include:

- Standalone operation with BOTH analog and CANbus outputs
- Tuning flexibility
- Fast and precise measurement of exhaust EGO
- Accurate sensor temperature sensor control

System Components

Your Wideband EGO system includes the following core components when purchased as a kit:

- **Wideband EGO controller:** The controller is packaged in a water-resistant enclosure that can be mounted either in the vehicle interior or in the engine bay, provided it is in an area protected from high exhaust temperatures.
- **Wideband O2 sensor:** The system is designed around the popular LSU 4.9 Lambda sensor (https://www.bosch-motorsport.com/content/downloads/Raceparts/en-GB/51865867208058251.html) The sensor should be mounted into the exhaust stream at the 3 o'clock or 9 o'clock position, at least 12 inches after the turbo outlet or exhaust valves.
- **Wiring Harnesses:** Connector and clearly labeled wiring designed for quick, secure installation, connecting the wideband controller to the sensor and to (not included) ECU or datalogger

1.2 Warning Labels

⚠ Safety Warnings and Precautions ⚠

This wideband EGO system is an important component of vehicle engine control. Improper installation, use, or maintenance can lead to serious injury, death, or property damage. All users, installers, and service personnel must read and understand this manual before interacting with the system.

Signal Word Definitions

The following signal words are used throughout this manual to indicate the severity of potential hazards:

- **WARNING**: Indicates a potentially hazardous situation which, if not avoided, could result in death or serious injury
- **CAUTION**: Indicates a potentially hazardous situation which, if not avoided, may result in minor or moderate injury
- **NOTICE**: Indicates important information that is not hazard-related but should be followed for optimal operation

General Warnings

Installation and Maintenance

- **WARNING**: Installation and maintenance must be performed by qualified personnel familiar with engine control systems and their appropriate wiring.
- **WARNING**: Do not modify or alter the EGO system or its components in any way not specified in this manual
- **CAUTION**: Avoid routing the EGO harness near high-voltage or "noisy" components to prevent electromagnetic interference

Operational Precautions

- **WARNING**: Closed-loop feedback fueling should NOT be used unless the Wideband system is in good working order, and fault limits should be set in the ECU in case of wideband system failure to avoid engine damage due to a faulty AFR reading.
- **CAUTION**: Regularly inspect the system for wear or damage and contact an authorized dealer if any issues are observed

1.3 Technical Support

Troubleshooting Steps Before Contacting Support

Before reaching out, we recommend performing the following basic checks:

1. **Verify All Connections**
   Ensure every connector is fully seated and all wiring is free of damage or corrosion
2. **Check Power Supply**
   Confirm that the system is receiving the correct voltage (e.g., 12V+ Power Input)
3. **Review the Manual**
   Double-check wiring diagrams, installation steps, and any calibration procedures outlined in this manual

AMP EFI Technical Support

We are committed to providing you with expert support to ensure your Wideband (EGO) system performs reliably and safely in your application. If you experience any issues during installation, configuration, or use, please reach out to our technical support team.

You can contact AMP EFI technical support using the following methods:

- **Email:** support@ampefi.com
- **Website:** www.ampefi.com
- **Phone:** 678-261-8789 (Available Monday – Friday, 9:00 AM – 5:00 PM EST)

When reaching out, please have the following information ready to help us assist you quickly:

- Order Number
- Detailed description of the issue
- Relevant photos or videos (if applicable)
- Configuration/tune file
- Short datalog showing issue as relevant

1.4 Copyrights

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Intended Use

This product is designed and sold exclusively for **off-road use, closed-course racing, or sanctioned competition vehicles**. It is **not legal for use on public roads or street vehicles**, and **any such use is strictly prohibited** under the **United States Environmental Protection Agency (EPA) Clean Air Act (42 U.S.C. § 7522)**.

WARNING: Use of this product on vehicles driven on public roads or highways may violate federal emissions laws and can subject the user to civil penalties. It is the sole responsibility of the installer and end user to ensure compliance with all applicable local, state, and federal laws.

AMP EFI assumes no liability for misuse, illegal installation, or operation of this product in violation of the law.

2. AMP EFI EGO Hardware

2.1 Overview

The AMP EFI EGO kit consists of the wideband controller (with integrated 12-pin connector), the wiring harness (with mating 12-pin controller connector, pigtail with sensor connector, and flying lead wires for power and comms), and a Bosch LSU 4.9 wideband sensor.

2.2 Enclosure Mounting

The controller enclosure and connector are sealed with gaskets and therefore water resistant. It can be mounted either inside the vehicle or in the engine bay, provided it is kept away from direct exhaust heat. The aluminum enclosure provides adequate heat sinking for the electrical components by itself and therefore does not necessarily need to be mounted to a metal substrate. Mounting to a structurally weak surface however, such as upholstery or headliner, is NOT recommended!

2.3 LSU 4.9 Sensor

The **LSU 4.9** wideband sensor uses a zirconia dual-cell element with an **integrated heater** for fast warm-up and stable accuracy. It provides a smooth (monotonic) output that tracks mixture from **rich (~λ = 0.65)** to **free air (very lean)**, with precise measurement at **stoichiometric (λ = 1)**.

Lambda vs. AFR

Lambda (λ) is a **normalized** air-fuel ratio. **λ = 1** is stoichiometric for *any* fuel; **λ < 1** is rich, **λ > 1** is lean.

AFR is the actual mass ratio, and its stoichiometric value **depends on the fuel** (e.g., Gasoline **14.7:1**, Ethanol **9.0:1**, Methanol **6.5:1**, Diesel **~14.5:1**).

2.4 LSU 4.9 Sensor installation instructions

This section outlines **placement and installation guidelines** for the Bosch LSU 4.9 wideband lambda sensor to ensure accurate readings and long sensor life.

2.4.1 Sensor Placement – General Rules

- **Before the catalytic converter:** Install the sensor **upstream of any catalyst** to avoid delayed/filtered readings.
- **After the collector/merge:** For multi-cylinder engines, place the sensor **in the collector** (or just downstream of the merge) so it samples mixed exhaust.
- **Keep it out of reversion zones:** Avoid locations extremely close to the tailpipe exit or where fresh air can be drawn in (can cause false-lean readings).
- **Protect from liquid contamination:** Do **not** place the sensor tip where raw fuel, oil, or condensation can routinely contact it.

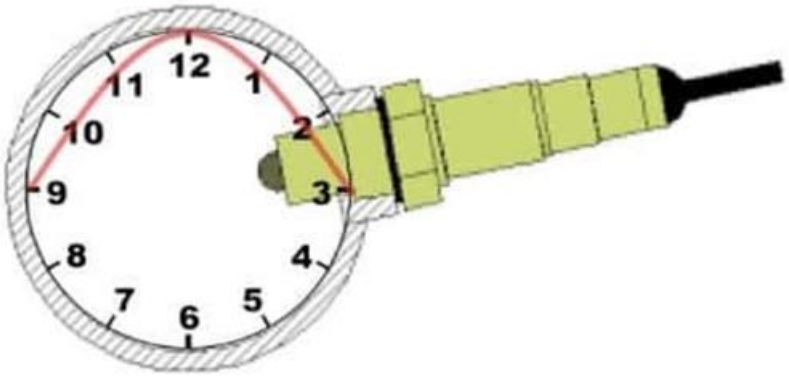
2.4.2 Distance from Heat Sources

- **Naturally aspirated:** Target **18–36 in (450–900 mm)** from the exhaust port.
- **Turbocharged:** Install **12–24 in (300–600 mm) after the turbine outlet**.
- If the location runs very hot (e.g., near a turbo outlet or extremely short header), use **heat shielding** or a **heat-sink bung/extension** to keep the sensor body within safe temperature limits.

Tip: Excessive heat shortens sensor life; excessive cooling (far downstream) can slow response and increase condensation risk. Aim for a balanced location.

2.4.3 Orientation to Prevent Condensation Damage

- **Clock position:** Weld the bung so the sensor sits near the **3 o'clock or 9 o'clock** position on the tube.



- **Upright angle:** Angle the bung so the sensor elements are **at least 10° above horizontal**.

2.4.4 Bung and Threading

- **Thread spec:** M18×1.5 bung (standard wideband size).
- **Weld bung to clean, thick material:** Use a suitable **steel or stainless bung** welded fully around to prevent air leaks.
- **Clock the bung** so harness routing is strain-free and away from moving parts/road debris.
- **Deburr and clean** the tube interior after welding so debris cannot contact the sensor tip.

2.4.5 Installation & Torque

1. Allow the exhaust to **cool** before installation.
2. Verify the bung threads are clean. Many LSU sensors ship with **pre-applied anti-seize**—if not, use a **small amount of high-temp nickel anti-seize**, keeping it **off the sensor tip and vents**.
3. Thread the sensor **by hand** to avoid cross-threading.
4. **Tighten to manufacturer torque** (commonly **~30–40 N·m / 22–30 lb-ft**).

2.4.6 Electrical & Harness Routing

- Keep the sensor harness **away from ignition coils, HT leads, and alternator B+** to minimize electrical noise.
- Avoid close contact with the exhaust components—use additional **heat sleeves** near hot zones.

2.4.7 Operating Considerations

- **Cold/condensation caution:** Avoid long key-on periods with the engine off in cold, damp conditions. A hot, powered sensor exposed to condensation can crack. Power the heater with the engine running.
- **Leaded fuels and additives:** Lead, silicone, and certain fuel/oil additives **shorten sensor life**. Expect more frequent replacement in race-fuel applications.
- **Exhaust leaks:** Upstream leaks pull in fresh air and cause **false-lean** readings—seal any leaks before tuning.

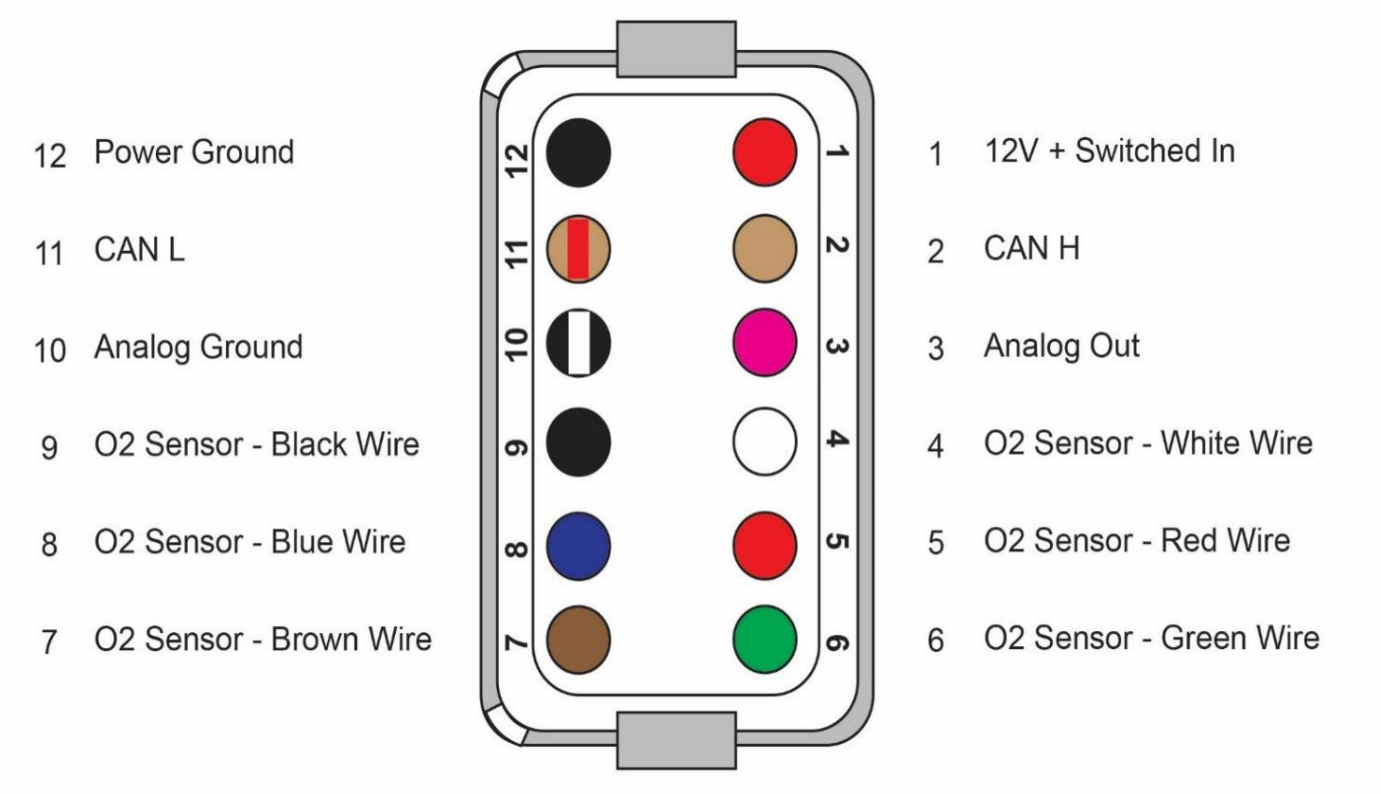
2.4.8 Verification After Installation

- Confirm the controller completes its **power-on sequence** (Section 3.2.1) and transitions to valid readings within the expected warm-up time.
- Check for **plausible lambda/AFR** at idle and under light load.
- Inspect for **exhaust leaks** near the bung (listen/feel or use soapy water when safe).

Summary:
Install the LSU 4.9 **upstream of the catalyst**, **after the collector**, at a **3 or 9 o'clock** position with a **≥10° upward angle**, and at a **sensible distance** from the port/turbo to balance heat and response. Use an **M18×1.5 welded bung**, torque per spec, and route the harness **cool, clean, and secure**. These practices maximize accuracy and sensor life.

3. Wiring

Wideband EGO Hardware Pinout



*Note: Pin Orientation is shown from **BACK** of connector*

3.1 Power Connection

Function	Pin #	Wire Color	Description
12V+ Switched In	Pin #1	Red	Clean Ignition/Switched +12V
Power Ground	Pin #12	Black	Clean Main Chassis Ground

3.2 Signal Output Options (to ECU)

The Wideband EGO controller supports two methods for sending data to the ECU: **analog voltage** or **CANbus**. Choose the method your ECU or logger supports.

3.2.1 Power-On Sequence (System Initialization)

At power-up, the controller runs a brief initialization sequence to help you confirm wiring and input scaling in your ECU/datalogger.

- The controller outputs **test values** at approximately **3-second intervals**.
- Use these values to verify your ECU's analog or CAN scaling before normal operation begins.

Scale	~ 3 s	~ 6 s	~ 9 s
Lambda	0.680	1.000	1.224
AFR (gasoline)	10.0	14.7	18.0

After the sequence is completed, the controller begins outputting live exhaust readings.

- The reading may show **full-lean** until the sensor reaches operating temperature
- A healthy sensor typically begins reporting valid readings **about 15 seconds** after startup

3.2.2 Analog Output

- Pin 3 – Analog Out: Sends a 0–5V analog signal representing air/fuel ratio to the ECU
- Pin 10 – Analog Ground: Electrically isolated ground dedicated solely to the wideband analog output
  - **Important: This must be connected to your ECU's sensor/signal ground, not chassis ground**
  - This isolation ensures accurate readings and prevents electrical noise or ground loop issues

3.2.3 CANbus Output

- Pin 2 – CAN High (CAN H)
- Pin 11 – CAN Low (CAN L)

Wire either the analog or CAN output to your ECU depending on which input method is supported by your device.

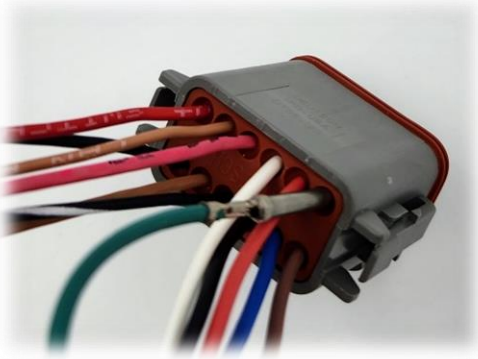
3.3 Lambda Sensor Connection

The remaining six wires connect directly to the Bosch LSU 4.9 Lambda sensor. Most sensors are pre-wired from the factory; you will typically insert the pre-terminated leads into the corresponding controller connector positions as shown below.

3.3.1 Connector Installation

DT 12-pin Connector

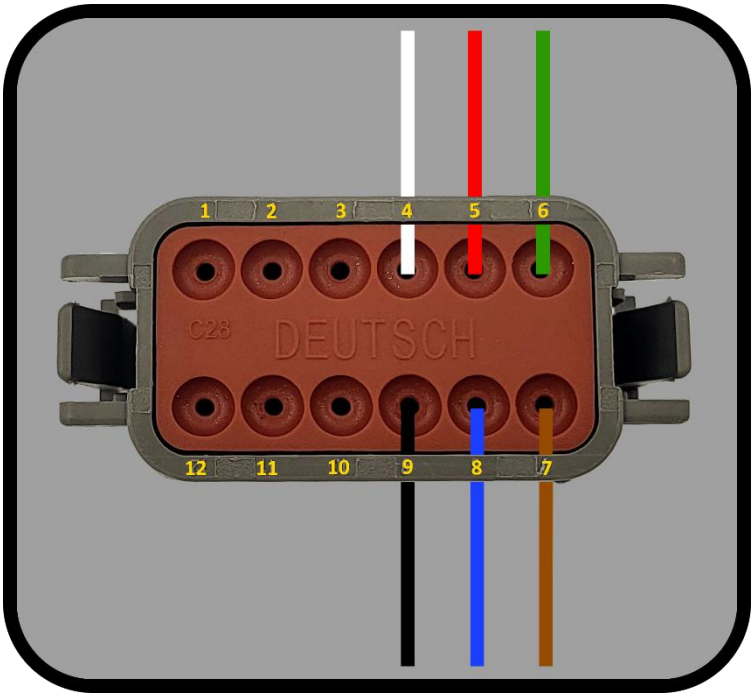
- Terminals are installed from the backside of the connector
- Push terminal through the seal in the appropriate location as shown in Section 3 Wideband EGO Hardware Pinout



- Ensure the pin is fully seated in the connector, pull back on the wire lightly to ensure the pin has locked into place

- Check that the seal is in place on the connector before installing the lock
- Insert the lock into the connector and press down until fully seated

3.3.1.1 LSU 4.9 Cable Pinout



Wideband Cable	Wideband Controller
Wire #1 – Brown	Pin #7
Wire #2 – Green	Pin #6
Wire #3 – Blue	Pin #8
Wire #4 – Red	Pin #5
Wire #5 – Black	Pin #9
Wire #6 – White	Pin #4

*Note: Pin Orientation is shown from **BACK** of connector*

3.3.2 LSU 4.9 Sensor Cable Installation

The LSU 4.9 cable is designed to give you maximum flexibility for installation, especially when routing through firewalls or tight spaces. Follow these steps to properly install and terminate the cable:

Step-by-Step Instructions

1. **Connect to the Sensor**
   - Begin by plugging the 6-pin end of the LSU 4.9 cable into your LSU 4.9 wideband oxygen sensor
   - Ensure the connector clicks into place securely
2. **Route and Secure the Cable**
   - Carefully route the cable from the sensor location to the Wideband EGO Controller
   - The cable is provided as a **flying lead with crimped terminals only** (no housing installed). This allows you to route it through tight passages or the vehicle firewall without obstruction.
   - Avoid routing near high-heat components (like headers or turbo housings) and ensure the cable is secured using zip ties or loom clamps as needed to prevent chafing or movement.

3. **Terminate the Cable at the Controller**
    - Once the cable is fully routed, refer to the **“LSU 4.9 Cable Pinout”** chart and insert each pre-crimped terminal into the appropriate cavity of the **supplied connector** shell.
    - Make sure each terminal is fully seated and matches the correct pin location as outlined in the chart or connector diagram.
4. **Double Check Your Work**
    - Before plugging the completed connector into the Wideband EGO Controller, double-check your pinning against the chart to ensure accuracy.
    - Incorrect placement of pins can result in sensor errors or damage to the controller.

4. Setup and Tuning

This device has no direct connection to Tuner Studio

Configuration options may change depending on ECU and firmware version.

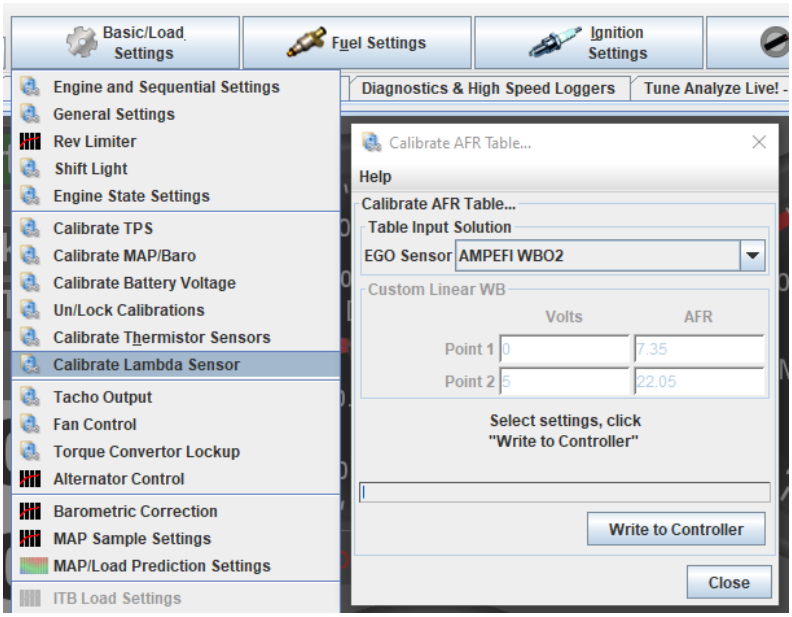
4.1 Analog Input Configuration

MegaSquirt ECU quick configuration

This wideband controller is designed with seamless integration in mind, particularly for users running an MS3Pro ECU. If that's your setup, configuration is quick and straightforward.

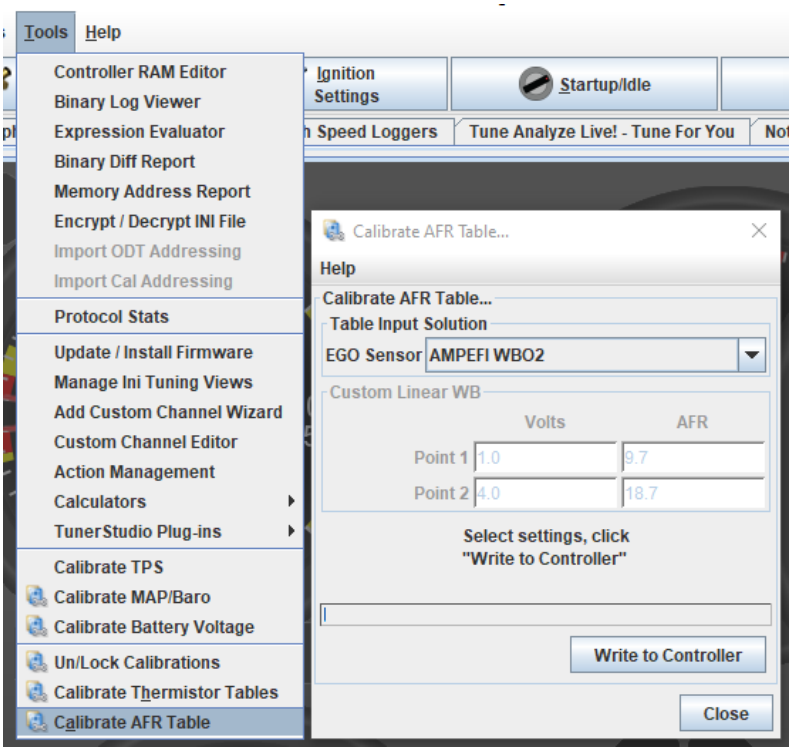
Example: FW version 1.6.2

- Navigate to **Calibrate Lambda Sensor**.
- From the EGO Sensor dropdown, select **AMPEFI WBO2**.
    - This requires TunerStudio update 3.2.06 or newer.
    - Or the use of TunerStudio beta 3.2.05.10



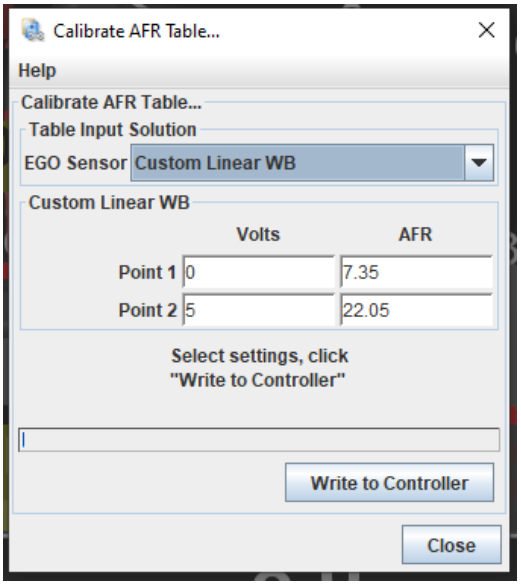
Example: FW version 1.6.1 and older

- Navigate to **Calibrate AFR Table**.
- From the EGO Sensor dropdown, select **AMPEFI WBO2**.
    - This requires TunerStudio update 3.2.06 or newer.
    - Or the use of TunerStudio beta 3.2.05.10 or newer



Example: set as Custom Linear Wideband

- Navigate to **Calibrate AFR Table**.
- From the EGO Sensor dropdown, select **Custom Linear WB**.

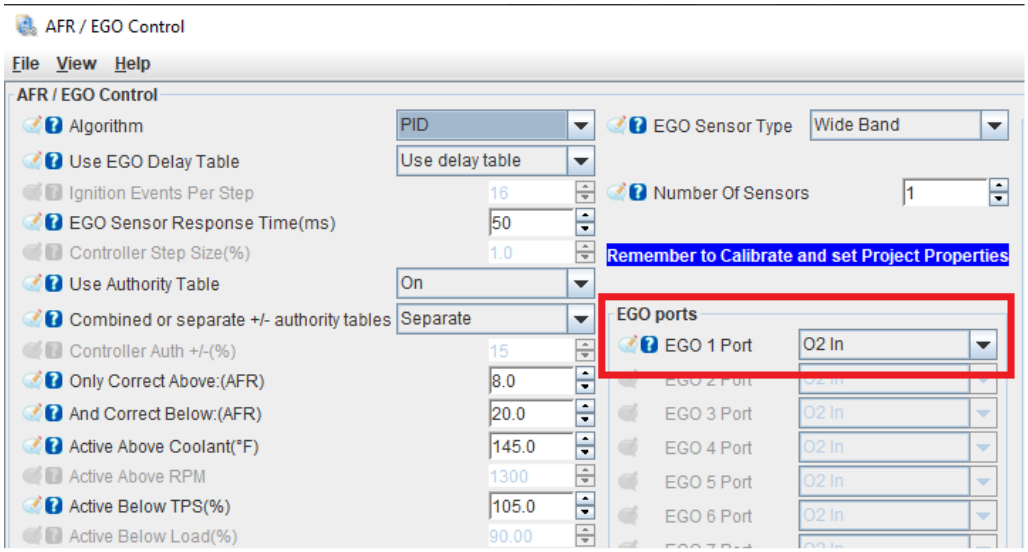


AFR (Gasoline Scale)

- **0.0V** = **7.35 AFR**
- **5.0V** = **22.05 AFR**

Next, go to **Fuel Settings** and open the **AFR/EGO Control** section:

- Set the **EGO Port** to match the **analog input** you've connected the wideband output to
- By default, this is the dedicated O2 input on many AMPEFI products


AFR / EGO Control
File View Help
AFR / EGO Control
Algorithm
PID
Use EGO Delay Table
Use delay table
Ignition Events Per Step
16
EGO Sensor Response Time(ms)
50
Controller Step Size(%)
1.0
Use Authority Table
On
Combined or separate +/- authority tables
Separate
Controller Auth +/-(%)
15
Only Correct Above:(AFR)
8.0
And Correct Below:(AFR)
20.0
Active Above Coolant(°F)
145.0
Active Above RPM
1300
Active Below TPS(%)
105.0
Active Below Load(%)
90.00
EGO Sensor Type
Wide Band
Number Of Sensors
1
Remember to Calibrate and set Project Properties
EGO ports
EGO 1 Port
O2 In
EGO 3 Port
O2 In
EGO 4 Port
O2 In
EGO 5 Port
O2 In
EGO 6 Port
O2 In

Universal configuration

If you're using a different standalone ECU or older firmware, configure the analog input to match the wideband controller's output scale:

Lambda Scale

- **0.0V** = **0.5 Lambda**
- **5.0V** = **1.5 Lambda**

AFR (Gasoline Scale)

- **0.0V** = **7.35 AFR**
- **5.0V** = **22.05 AFR**

Refer to your ECU's documentation for instructions on setting up analog input calibration using one of the above scales.

4.2 CANbus Configuration

The AMPEFI Wideband Controller comes with CANbus communication support, making integration with your ECU and other modules fast and reliable.

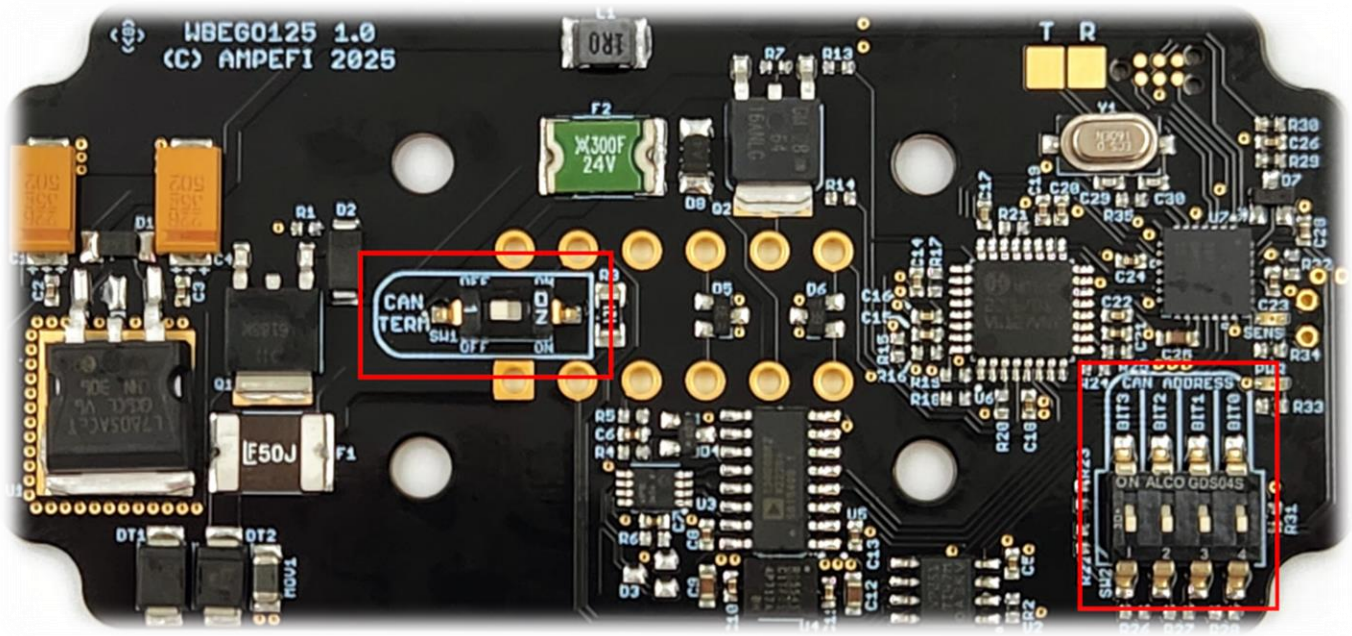
Termination Resistor

The unit includes a 120-ohm CAN termination resistor, which is enabled from the factory. This is controlled via an internal microswitch. If your system requires the termination to be disabled (for example, if the controller is *not* at the end of the CAN bus), you can toggle this switch as needed. See the instructions below.

Accessing Internal Switches

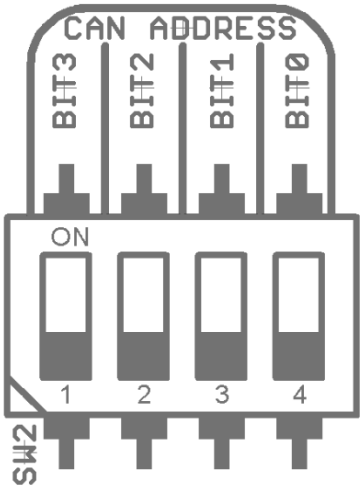
To configure the CAN termination resistor or change the CAN address, follow these steps:

1. **Remove the four Phillips screws** located at the corners of the enclosure lid.
   ⚠ *Do not remove the two screws near the connector—these secure the internal connector assembly.*
2. **Carefully lift the top cover** out of the enclosure. The lid, connector, and circuit board will come out together as one unit.
3. With the assembly out, locate the following on the circuit board:
   - The **CAN termination resistor switch** — positioned between the two rows of connector pins near the center.
   - The four **CAN address switches** — grouped in one corner of the board.



CAN Address Settings

The default CAN address is **80**. You can adjust this address from **80 to 95** using the three address switches, which work in binary. From **right to left**, the switches add:



For example:

- Turning on only **BIT0** (rightmost switch) sets the address to **81**.
- Enabling **BIT2 and BIT0** (sw2 and sw4) adds 4 + 1 = **5**, resulting in a CAN address of **85**.

Be sure to match your ECU or CAN logger configuration to this address to ensure proper communication.

SW1 (+8)	SW2 (+4)	SW3 (+2)	SW4 (+1)	Binary	CAN Address
OFF	OFF	OFF	OFF	0	80
OFF	OFF	OFF	ON	1	81
OFF	OFF	ON	OFF	10	82
OFF	OFF	ON	ON	11	83
OFF	ON	OFF	OFF	100	84
OFF	ON	OFF	ON	101	85
OFF	ON	ON	OFF	110	86
OFF	ON	ON	ON	111	87
ON	OFF	OFF	OFF	1000	88
ON	OFF	OFF	ON	1001	89
ON	OFF	ON	OFF	1010	90
ON	OFF	ON	ON	1011	91
ON	ON	OFF	OFF	1100	92
ON	ON	OFF	ON	1101	93
ON	ON	ON	OFF	1110	94
ON	ON	ON	ON	1111	95

4.2.1 Standard CAN Addressing – Outbound Messages

Messages are sent at the base address unless otherwise set with section CAN Address Settings

Message	Base ID (dec)	Offset	Size	Multiply	Divide	Add
Lambda	80	0	B2U	10	1	0
RI (Sensor Temp)	80	2	B2U	1	1	0
Fault Flash Code	80	4	B2U	1	1	0
Controller State	80	6	1U	1	1	0
Heater Duty Cycle	80	7	1U	1	1	0

Fault Flash Code Message Reference

Code	Bit VALUE	Description
1	1	Heater short (V/G)
2	2	Heater open
3	3	VM fault
4	4	UN fault
5	5	IA fault
6	6	Low supply voltage
7	7	RI calibration fault
8	8	Lambda calibration fault
9	9	Warmup fault
10	10	Heater supply low
11	11	Cold sensor during operation

4.3 CANbus settings in MS3

4.3.1 Example Set up for using CAN EGO (Recommended Setup)

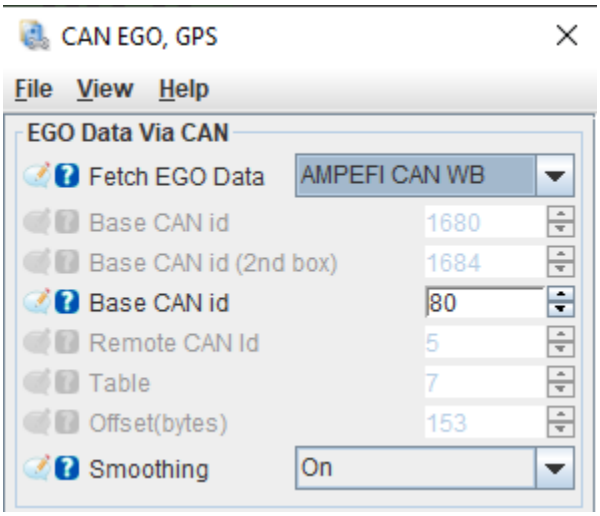
Starting with firmware version 1.6.2

Open **CANbus Testmodes** and select **CAN EGO, GPS**

Set the **Base CAN id** using CAN Address Settings

- The default **Base CAN id** is **80**

Under **Fetch EGO data** select **AMPEFI CAN WB**



AFR/EGO Control (CAN EGO)

- Open **Fuel Settings → AFR/EGO Control**.
- Set the **EGO Port** input source to **CAN EGO**.

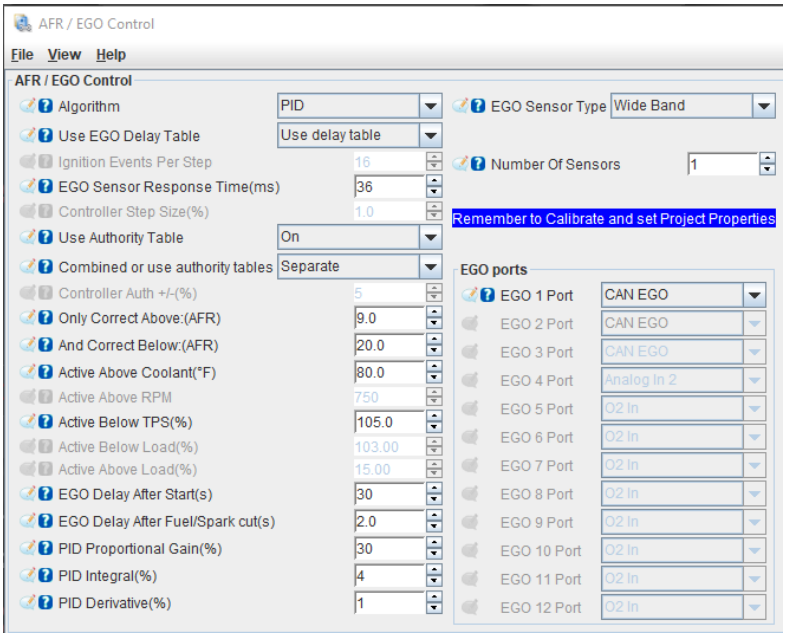
Multiple widebands on CAN:
If more than one AMP WBO2 is present on the CAN bus, the ECU automatically assigns **CAN EGO** ports in ascending CAN ID order.

Example (two controllers):

CAN ID	Assigned EGO Port	Source
80	Port 1	CAN EGO
81	Port 2	CAN EGO

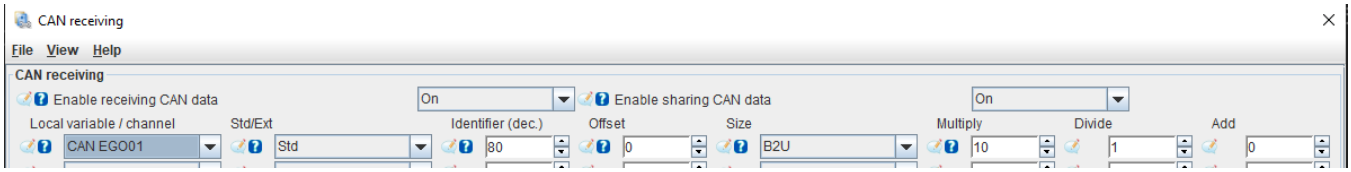
So in this case:

- **EGO Port 1** receives from **CAN ID 80**
- **EGO Port 2** receives from **CAN ID 81**

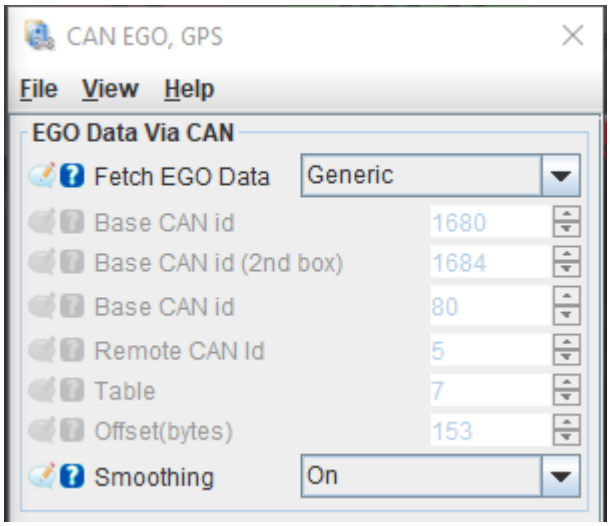


Generic CAN EGO for MS3Pro firmware version 1.6.1 and older

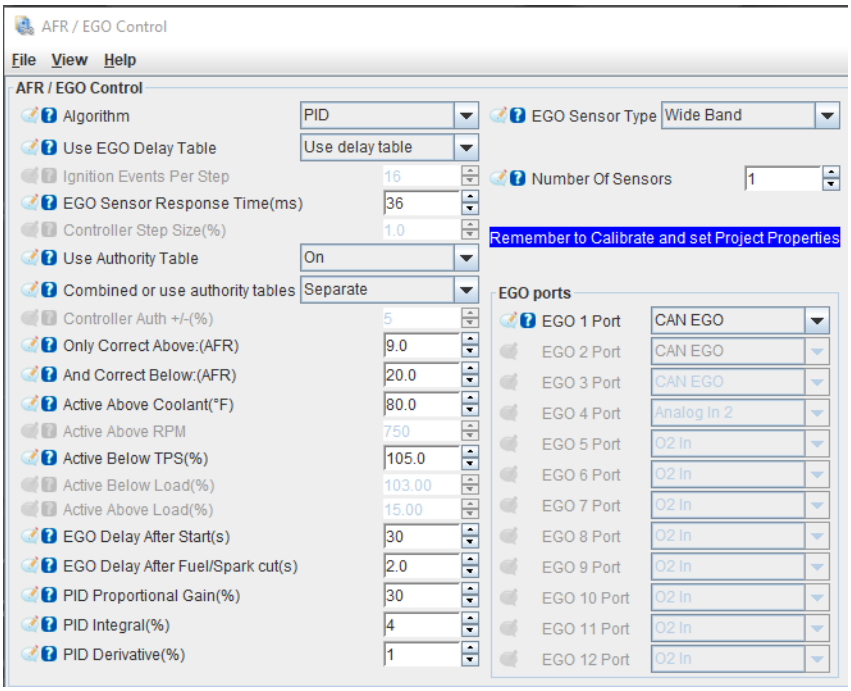
First set up **CAN Receiving** for **CAN EGO** We must multiply the signal by 10 to get a proper reading



Now set up **CAN EGO** to **Fetch Generic EGO Data**

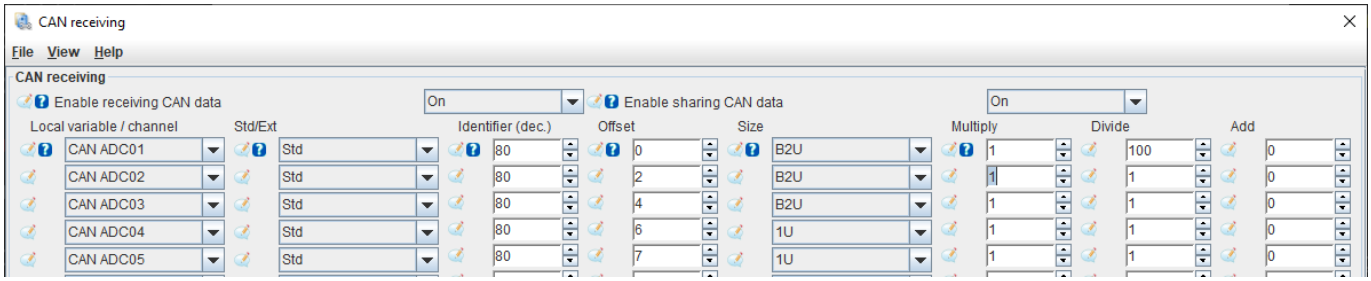


Set the **AFR/EGO control** to **CAN EGO**

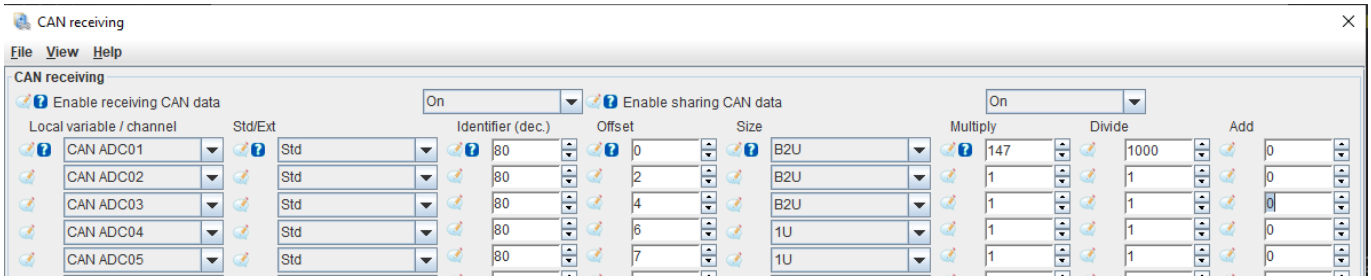


4.3.2 Example CAN receiving (EGO as generic sensor – NOT Recommended)

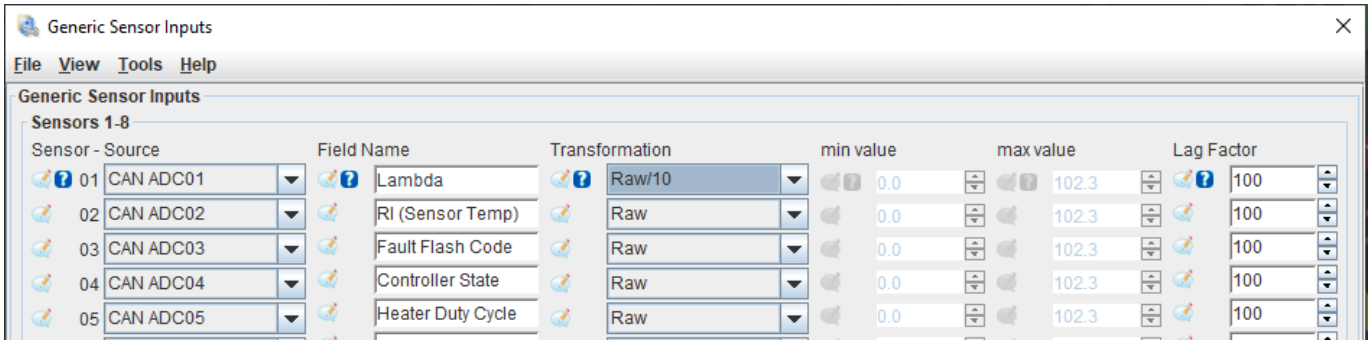
Offset 0 set as Lambda for using Generic Sensor Inputs



Offset 0 set as AFR for using Generic Sensor Inputs



To view the data and use it in your tune you can set them up as generic sensors.



Lambda and AFR require Raw/10 Transformation to be set to obtain decimal value.

5. Troubleshooting

5.1 Fault Codes and LED Diagnostics

The wideband controller reports faults two ways:

- Internal status LED (inside the enclosure)
- CANbus as a numeric Fault Flash Code (see Section 4.2.1; “Fault Flash Code” at offset 4)

Viewing the LED

To see the internal LED, open the enclosure:

1. Remove the four Phillips screws at the lid corners.
2. Lift the lid; the connector and PCB will come out together.
3. Power the unit and observe the LED on the PCB.

The LED indicates faults as a series of flashes followed by a pause, then repeats.
Example: **two flashes, pause** = Code 2.

Fault Code Reference

Code	LED Flashes	Description
1	1	Heater short (V/G)
2	2	Heater open
3	3	VM fault
4	4	UN fault
5	5	IA fault
6	6	Low supply voltage
7	7	RI calibration fault
8	8	Lambda calibration fault
9	9	Warmup fault
10	10	Heater supply low
11	11	Cold sensor during operation

Notes

- The same numeric Fault Flash Code is transmitted over CAN; log or display this value in your ECU/datalogger to diagnose without opening the enclosure.
- After correcting the underlying issue, the fault indication will stop once the condition clears. If a code persists, proceed with the troubleshooting steps in Section 5.

5.2 Troubleshooting Checklist – No Function / No Data Output

If your wideband controller is not powering on, not outputting expected values, or not communicating via analog or CAN, follow the checklist below to isolate the issue.

Power and Ground Verification

Confirm **+12V Switched Power** is present at **Pin 1 (Red Wire)** using a multimeter.

Verify a solid **chassis ground** at **Pin 12 (Black Wire)**.

Ensure power is only applied with ignition on, and that the fuse (if installed) is not blown.

If power is not present or unstable, the controller will not operate or transmit data.

Analog Output Diagnostics

Verify that **Pin 3 (Analog Out)** is connected to an appropriate analog input on your ECU.

Confirm that **Pin 10 (Analog Ground)** is connected to your ECU's **sensor/signal ground** (not chassis ground).

Using a voltmeter, check that the controller is outputting a valid analog voltage (0–5V range). Refer to the Lambda or AFR scale in Section 4.1 for expected values.

If analog output is stuck at 0V or 5V:

Check sensor connection and orientation.

Confirm that the controller is powered and sensor heater is operating.

CAN Bus Communication Check

Confirm correct polarity:

- Pin 2 = CAN High
- Pin 11 = CAN Low

Ensure the CAN wiring is twisted pair and shielded where possible.

Verify that the **termination resistor is correctly enabled/disabled** depending on the controller's position on the CAN bus.

Make sure only *two* 120-ohm termination resistors are present on the network.

Check for CAN address conflicts:

- Default base address is **80**.
- Use **Section 4.2** to verify address switch settings and ensure no duplicates.

LSU 4.9 Sensor Connection Verification

Check sensor wiring carefully, especially if installed using flying leads:

- Use the LSU 4.9 Pinout table in Section 3.3.1 to verify each wire is inserted into the correct controller pin.
- Confirm **sensor is fully seated** and clicked into the LSU connector.
- Inspect the cable for damage, heat exposure, or pulled terminals.

Incorrect sensor wiring can cause:

- No heater activation (no warm-up)
- Stuck or invalid Lambda readings
- Fault or flash code errors on CAN output

ECU / Datalogger Configuration

If using **MS3Pro**, ensure:

- EGO port is set to the correct analog input (if using analog mode).
- CAN EGO mode is enabled, and the **CAN Base ID matches** the controller address.
- The AFR/EGO control section is configured for CAN EGO or AMPEFI CAN WB.

If using a third-party ECU or logger, verify:

- Input scaling matches the wideband's output (see Lambda/AFR table).
- CAN message ID, scaling, and offset match Section 4.2.1.

Controller State and Sensor Health via CAN

If using CAN output, monitor the following:

- **Lambda value** at CAN ID offset 0
- **Sensor temperature (RI)** at offset 2
- **Fault flash code** at offset 4
- **Heater duty cycle** at offset 7

Unexpected values (e.g., 0, 65535, -1) may indicate:

- Open or reversed sensor wiring
- Faulty LSU sensor
- Internal controller fault

Still Not Working?

If the issue persists after these steps:

- Recheck all wiring and connector pinouts.
- Take detailed photos of the installation and wiring.
- Collect a datalog if possible.

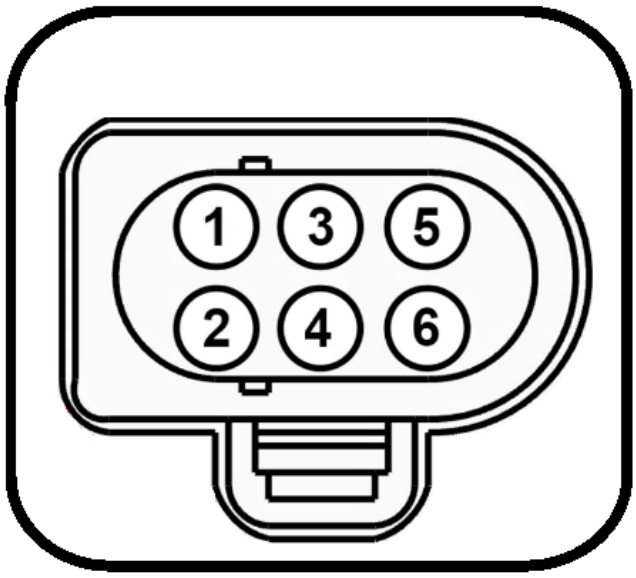
Then contact AMP EFI Technical Support with:

- Your order number
- Description of the issue
- Configuration/tune file (if applicable)
- Photos, logs, or screenshots as needed

Contact Support

Email: support@ampefi.com
Phone: 678-261-8789 (Mon–Fri, 9:00 AM – 5:00 PM EST)

5.3 LSU Sensor Pinout (for reference only)



*Note: Pin Orientation is shown from **BACK** of connector on the harness side*

EGO Controller Pin	LSU 4.9 Pin	Function
Pin #7	Pin #1	Pump Current
Pin #6	Pin #2	Virtual Ground
Pin #8	Pin #3	Heater Ground
Pin #5	Pin #4	Heater +12v
Pin #9	Pin #5	Trim Resistor
Pin #4	Pin #6	Nerst Voltage