EGT CONTROLLER

Version 1.01

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1. Introduction

1.1 Overview

The AMPEFI EGT (Exhaust Gas Temperature) system utilizes specialized 16-Bit hardware and internal cold junction compensation to provide accurate and fast temperature data. The temperature data is shared to other devices or dataloggers via CAN-Bus. Each controller can accept up to 4 K-type thermocouples. Multiple EGT systems can be used together to acquire data from more than 4 thermocouples.

This manual provides detailed instructions for safe installation, configuration, operation, and maintenance of the EGT 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 EGT system is to monitor the exhaust gas temperature accurately with low latency. This EGT data can be used for closed-loop tuning, diagnostics, and advanced engine protection strategies.

The benefits of this system include:

- Fast response time for real-time tuning and safety cutoffs
- Modular CAN integration with other AMP EFI devices and MS3Pro ECUs
- Durable design for harsh engine bay environments

System Components

Your EGT system will be comprised of the following core components when purchased as a kit:

- **Exhaust Gas Oxygen (EGT) 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.
- **K-Type Thermocouple:** The system is designed around the k-type thermocouple, these can be used for exhaust temperature and come in designs that allow reading of CHT, IAT, and fluid temperature readings.
- **Wiring Harness:** Connector and clearly labeled wiring designed for quick, secure installation, connecting the wideband sensor to the controller.

1.1.1 Warning Labels

⚠ Safety Warnings and Precautions

The EGT system is designed for accurate temperature monitoring in high-performance and motorsport environments. Improper installation, wiring, or use can lead to engine damage, fire hazards, or inaccurate readings. All installers and service personnel must read and understand this manual before installing or servicing the system.

Signal Word Definitions

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

- **DANGER**: Imminent hazardous situation which, if not avoided, *will* result in death or serious injury.
- **WARNING**: Potentially hazardous situation which, if not avoided, *could* result in death or serious injury.
- **CAUTION:** Potentially hazardous situation which, if not avoided, *may* result in minor or moderate injury or equipment damage.
- **NOTICE:** Indicates important information that is not hazard-related but must be followed for proper operation and system longevity.

General Warnings

Installation and Maintenance

- **WARNING:** Installation must be performed by qualified personnel familiar with automotive electrical systems and proper thermocouple wiring practices.
- **WARNING:** Do not modify or alter the EGT controller or its wiring outside of the specifications in this manual.
- **CAUTION:** Route thermocouple and harness wiring away from ignition components, high-current cables, and other sources of electrical noise to prevent signal interference.
- **NOTICE:** Do not use powered test lights or apply external voltage to any thermocouple or signal wires. This can damage the controller's input circuitry.

Operational Precautions

- **WARNING:** Always verify that EGT sensor wiring is secure and properly insulated to prevent shorts or accidental contact with high-temperature exhaust components.
- **CAUTION:** Regularly inspect thermocouples and harnesses for heat damage, chafing, or corrosion. Replace any damaged components immediately.
- **NOTICE:** Calibrate and log baseline EGT readings after initial installation to ensure the system is functioning accurately.

1.1.2 Technical Support

We are committed to providing you with expert support to ensure your EGT 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
- Datalog file as appropriate

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 powered up and communicating with the tuning software.
3. **Review the Manual**
   Double-check wiring diagrams, installation steps, and any calibration procedures outlined in this manual. Also see section 5, 'Troubleshooting'.
4. **Update Firmware (if applicable)**
   Visit www.ampefi.com/downloads to ensure your system firmware is current

1.1.3 Copyrights

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 EGT Hardware

2.1 Overview

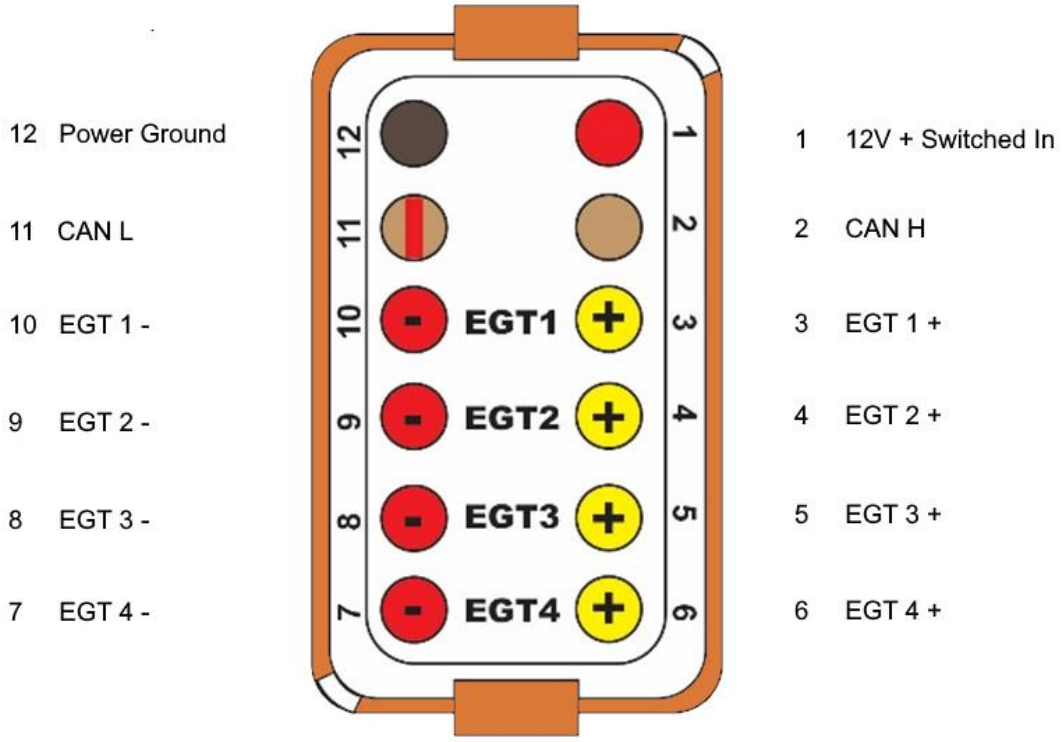
The AMP EFI EGT Package consists of the EGT Controller (with integrated 12-Pin DT Connector), the EGT Wiring Harness with mating 12-Pin DT Controller connector, thermocouple connectors, and flying lead wires.

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!

3. Wiring

EGT 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 CAN-Bus Signal Output (to ECU)

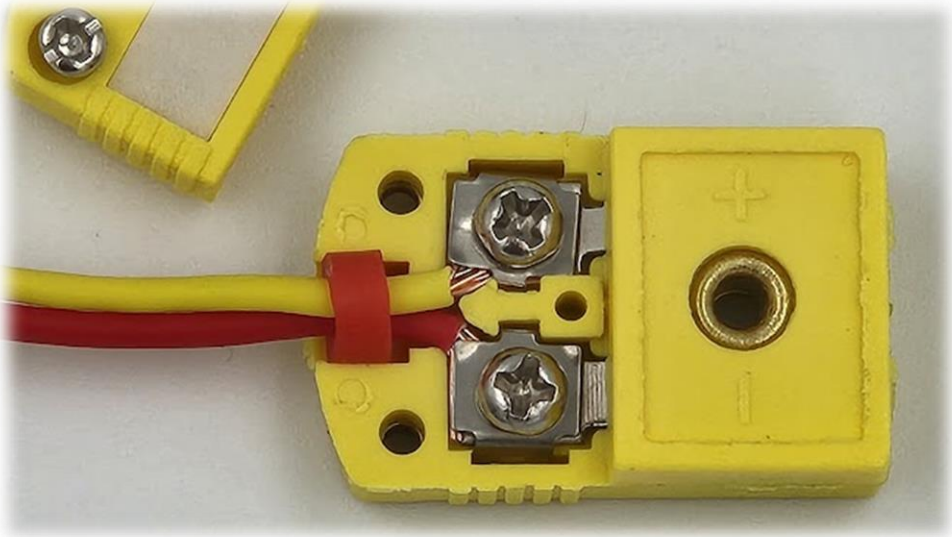
- Pin 2 – CAN High (CAN H) Brown Wire
- Pin 11 – CAN Low (CAN L) Brown with Red Stripe Wire

3.3 Thermocouple Connection

Each thermocouple is color coded by type, k-type thermocouples are yellow/red. The yellow wire is positive (+) and the red wire is negative (-). The length of the wire does not matter, and you can cut the leads down before installing the mini k-type connector.

3.3.1 Connector Installation

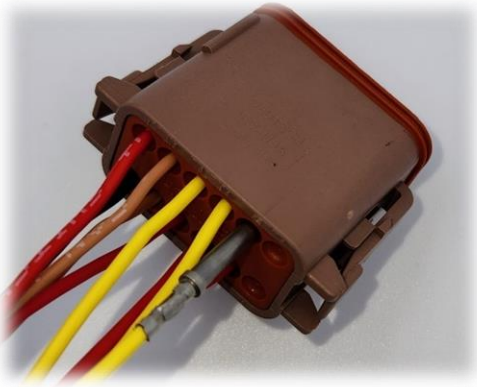
Mini K-type Connector



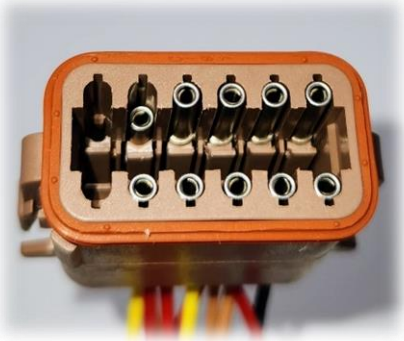
- Yellow to (+) Terminal
- Red to (–) Terminal
- The seal at base of wires is optional

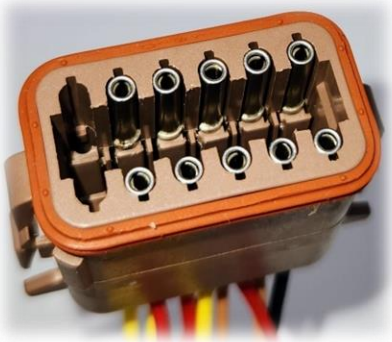
DT 12-pin Connector

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

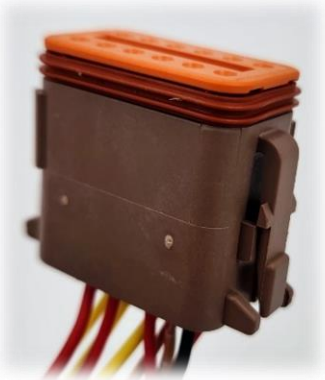


- **Ensure the pin is fully seated in the connector, pull back on the wire lightly to ensure the pin has locked into place**





- **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**



Step-by-Step Instructions

1. **Connect to the Sensor**
    - Begin by plugging Mini K-Type connector into the thermocouple.
    - Ensure the connector seats into place securely
2. **Route the conductors**
    - Carefully route the wiring from the sensor location to the EGT Controller
    - The wiring is provided as a **flying lead with crimped terminals** (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)
3. **Terminate the conductors at the Controller**
    - Once the conductors are fully routed, refer to the **"EGT Hardware Pinout"** chart and insert each pre-crimped terminal into the appropriate cavity of the **supplied connector** shell.
        - Now is a good time to cover the wiring before permanently installing.
    - 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 CAN-Bus Configuration

The AMP/EFI EGT Controller comes with CAN-Bus communication support, making integration with your ECU and other modules fast and reliable.

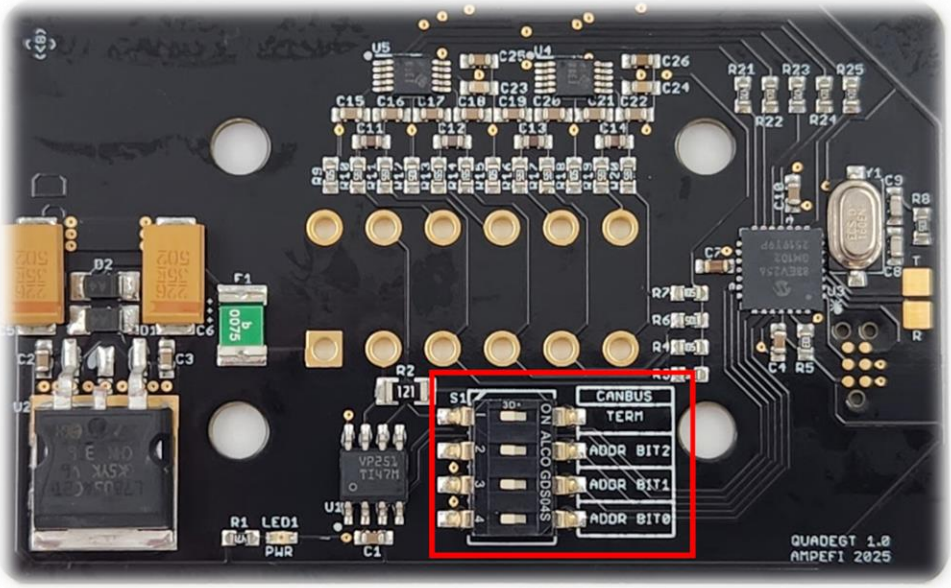
4.1.1 Termination Resistor

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 and Address switch** — positioned as shown below.



4.1.2 CAN Addressing – Outbound Messages

Thermocouple messages are sent in two formats.

CAN address 1670-1677 as RAW temperature values in *C

Message	Base ID (dec)	Offset	Size	Multiply	Divide	Add
Thermocouple 1	1670	0	B2U	1	1	0
Thermocouple 2	1670	2	B2U	1	1	0
Thermocouple 3	1670	4	B2U	1	1	0
Thermocouple 4	1670	6	B2U	1	1	0

CAN address 1680-1687 as ADC values. (0-1250*C = 0-1023 ADC counts)

Message	Base ID (dec)	Offset	Size	Multiply	Divide	Add
Thermocouple 1	1680	0	B2U	1	1	0
Thermocouple 2	1680	2	B2U	1	1	0
Thermocouple 3	1680	4	B2U	1	1	0
Thermocouple 4	1680	6	B2U	1	1	0

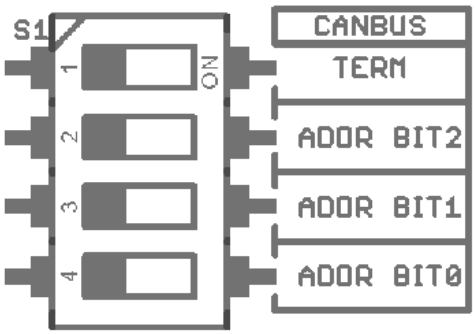
4.1.3 CAN Address Settings

The CAN EGT Controller transmits messages on dual address groups.

1670-1677 for raw temperature values in *C

1680-1687 for messages scaled appropriately for MS3 devices.

The default CAN address is **1680**. You can adjust this address from **1680 to 1687** using the three address switches, which work in binary. From bottom to top, the switches add:



For example:

- Turning on only **BIT0** (bottom switch) sets the address to **1681**.
- Enabling **BIT2 and BIT0** (sw2 and sw4) adds 4 + 1 = **5**, resulting in a CAN address of **1685**.

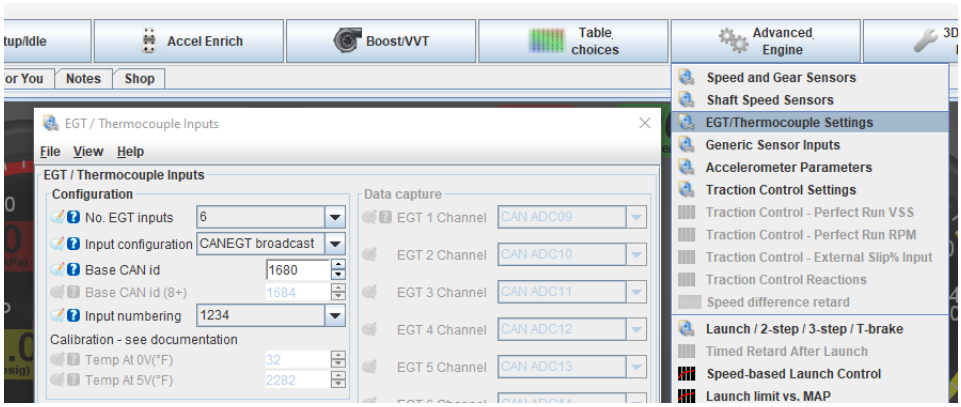
Be sure to match your ECU or CAN logger configuration to this address to ensure proper communication.

SW2 (+4)	SW3 (+2)	SW4 (+1)	Binary	CAN Address
OFF	OFF	OFF	0000	1670 / 1680
OFF	OFF	ON	0001	1671 / 1681
OFF	ON	OFF	0010	1672 / 1682
OFF	ON	ON	0011	1673 / 1683
ON	OFF	OFF	0100	1674 / 1684
ON	OFF	ON	0101	1675 / 1685
ON	ON	OFF	0110	1676 / 1686
ON	ON	ON	0111	1677 / 1687

4.2 CAN-Bus Settings in MS3

4.2.1 Example Set – CANEGT broadcast

Under **Advanced/Engine** select **EGT/Thermocouple Settings**



Select the number of **EGT Inputs** you have

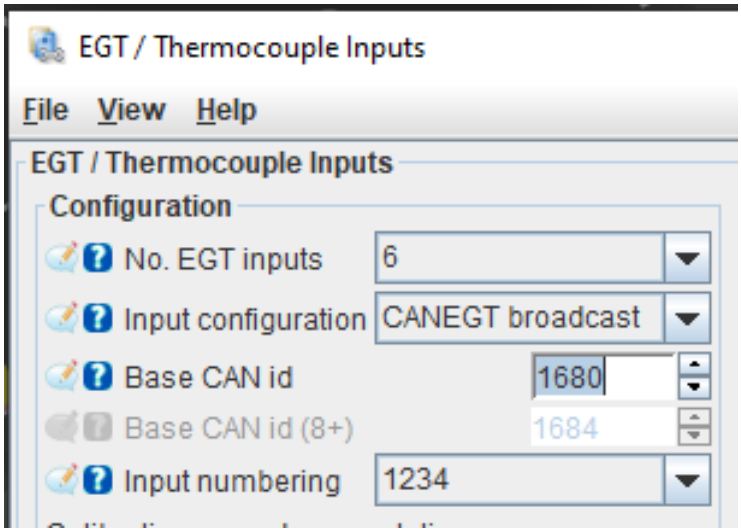
Set the **Input configuration** to **CANEGT broadcast**

Base CAN id is going to be **1680** by default

Example setup: In our E30 we have an inline 6-cylinder engine, this requires 2 EGT controllers.

- **EGT controller 1** is by default **CAN id 1680** and will have EGT probes 1-4 connected to it.

- **EGT controller 2** will have **SW4 (bit0)** switch enabled to set it to **CAN id 1681** and will have EGT probes 5-6 connected to it.



Starting in FW version 1.6.2 you have the option to select **EGT input numbering.** This is helpful when installing EGT on a V8 engine**.**

Probes must be installed to match cylinder number

Example: Ford V8

Input numbering 1234

EGT box 1 will have probes on CYL 1-2-3-4

EGT box 2 will have probes on CYL 5-6-7-8

Example: Chevy V8

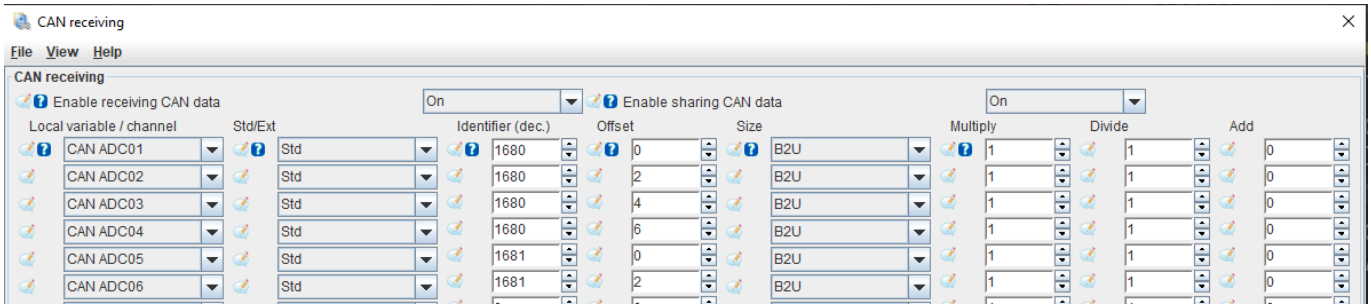
Input numbering 1357

EGT box 1 will have probes on CYL 1-3-5-7

EGT box 2 will have probes on CYL 2-4-6-8

4.2.2 Example CAN receiving

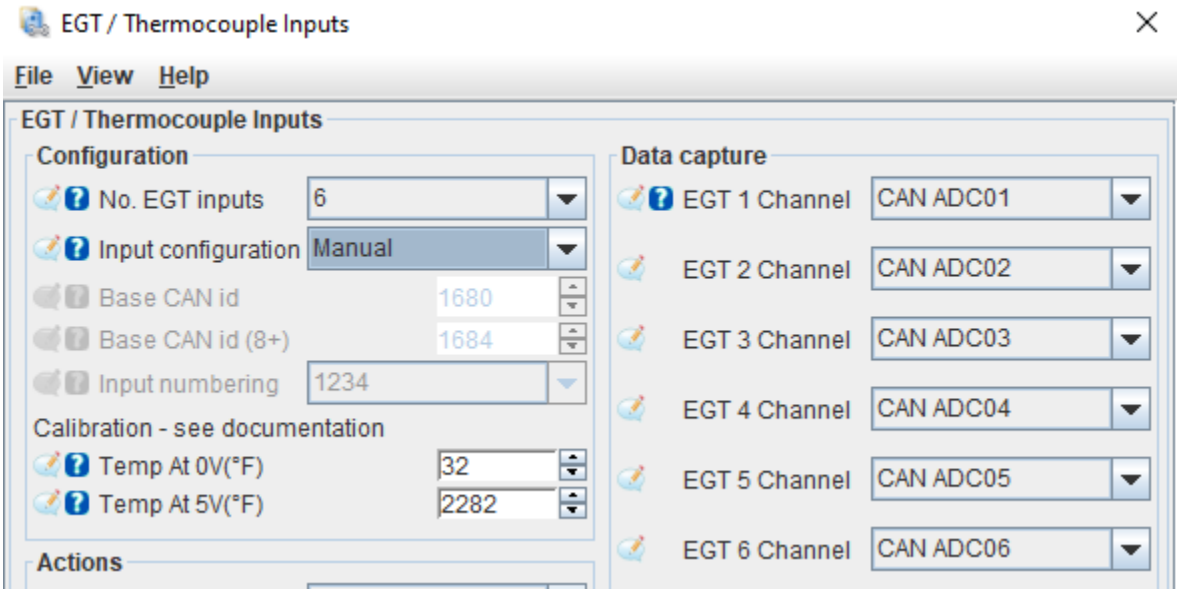
CAN receiving can be used to bring the Thermocouple signal in manually (this is not recommended unless you are trying to use the input as a thermocouple rather than an EGT input)



4.2.3 Example Set – Manual input configuration

First setup **CAN receiving** the **EGT inputs** are going to be brought in as **CAN ADC** channels.

A benefit to this setup is in **Pre 1.6.2 FW** it will allow you to match the **EGT channel** to the appropriate CYL.



5. Troubleshooting

The unit has Open circuit and fault detection.

Open circuit [probe not connected] – An open circuit will be indicated by a full-scale value (or -1) if using signed numbers. This means that the signal will either be a non-moving value of -1 or a non-moving value at full scale 2282*F (1250*C).

Probe wires shorted [wires touching] – A short circuit between the input pair will indicate the cold-junction compensation temperature (controller ambient). This is likely to be the temperature of the cab or engine bay of the vehicle depending on where the controller is located.

Probe wired backwards – A sensor wired backwards will indicate a temperature between -1 and controller ambient.

5.1 Troubleshooting Checklist – No Function / No Data Output

If the EGT controller appears non-functional (e.g., no sensor data output, no CAN activity), follow these steps to diagnose the issue:

Power & Ground Verification

Check for +12V on Pin 1 (Red Wire) using a multimeter.

Confirm clean chassis ground on Pin 12 (Black Wire).

Ensure ignition-switched power is present when the ECU is powered on.

If power is not present, the controller will not operate or communicate.

CANbus Connection Check

Verify correct wiring polarity:

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

Ensure CAN High is connected to CAN High on Datalogger or ECU. CAN Low must be connected to CAN Low on ECU or datalogger. Do not cross the connections (IE, do not wire CAN H on one device to CAN L on the other).

Confirm CAN wires are routed as a twisted pair and are properly shielded.

Ensure only two 120-ohm termination resistors are present on the CAN network. The EGT Controller has one enabled internally by default.

Disable the termination resistor if this controller is not located at the end of the CAN bus.

CAN Address Conflict

Confirm that no other devices on the network are using the same base CAN address (1680–1687).

Double-check address switch positions and compare to the CAN address chart in Section 4.1.2.

Sensor Input Status

Inspect for:

Open Circuit: Displays maximum temperature 2282*F (1250*C) or -1 (based on firmware).

Short Circuit: Displays controller ambient temperature.

Reversed Wiring: Displays values between -1 and ambient temperature.

ECU / Datalogger Configuration

For **MS3Pro** users:

- Confirm CANEGT broadcast is enabled and set to the correct base CAN ID.
- Ensure EGT channels are mapped according to physical cylinder layout.
- Firmware & Configuration
- For manual CAN receiving, double-check that byte offsets, IDs, and data scaling are entered correctly.

For third-party systems:

Verify CAN message format

Environmental Considerations

Inspect for corrosion or moisture at the controller connector.

Ensure controller placement avoids extreme heat sources like headers or turbochargers.

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 (CAN or analog) 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)