



INSTALLATION MANUAL

HARLEY-DAVIDSON V-ROD DESTROYER

DATA ACQUISITION SYSTEM

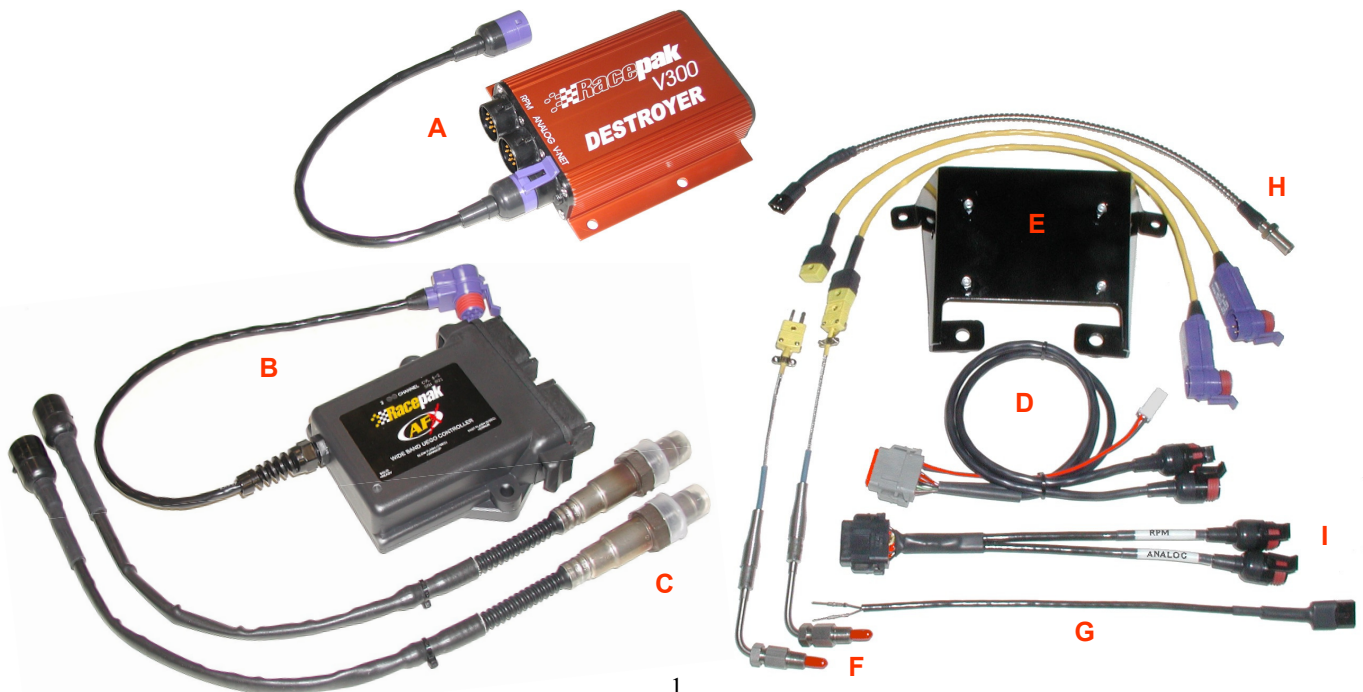
(Part Number 200-KT-V300D)

The Racepak data acquisition system you have purchased for your Harley-Davidson Destroyer has been developed as a joint project between Harley-Davidson Engineering and Racepak Data Systems. It has been designed specifically for your motorcycle as a plug-and-play system. Harley-Davidson has built your motorcycle with a number of features already installed that will greatly ease the job of installing this Racepak system. It should be noted that, although similar in appearance, the components in this kit are purpose built and are not interchangeable with components from other Racepak data acquisition systems.

GETTING STARTED

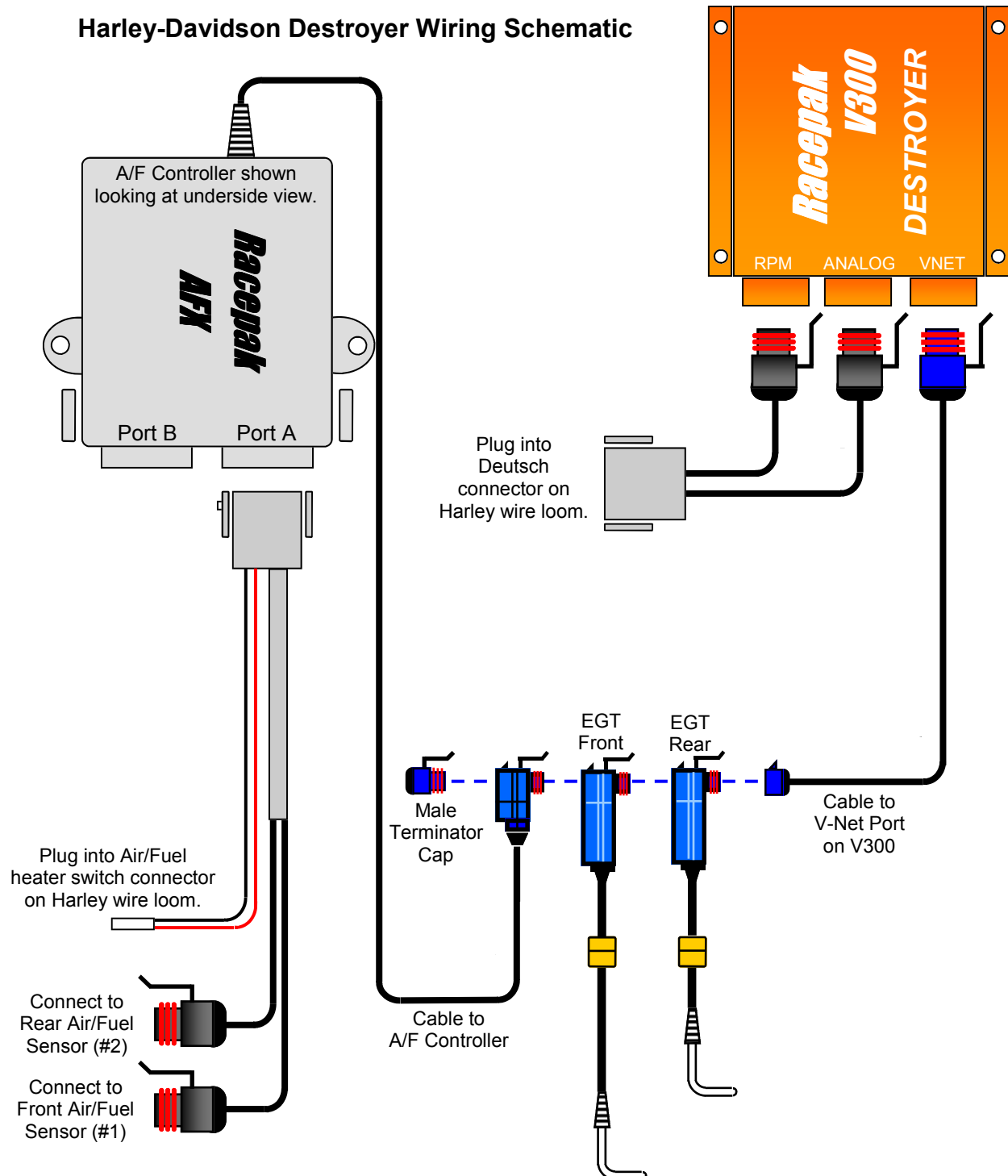
One of the first things you should do is to insure that you have received all of the components needed to complete this installation. Racepak suggests that you lay out all of the items that you have received so you can identify and check off each of them from the list below. This will also help to familiarize you with each of the components in the kit. Your kit should include the following items:

- (1) V300 Harley-Davidson Destroyer Data Recorder. **A**
- (1) Two Channel Air/Fuel Controller. **B**
- (2) Air/Fuel Sensors with Cable. **C**
- (1) Wire Harness, Air/Fuel Controller to Sensors with Heater Wire. **D**
- (1) Mounting Bracket. **E**
- (2) V-Net Modules with Exhaust Gas Temperature Sensors. **F**
- (1) Adapter Cable, Wire Harness to Clutch RPM Sensor. **G**
- (1) Clutch RPM Sensor with Pigtail Cable. **H**
- (1) Wire Harness, with RPM & Analog Cable. **I**
- (1) Installation Manual.



WIRING SCHEMATIC

The installation of the Racepak Destroyer data acquisition system will be easier to understand if you first study the wiring schematic shown below. This schematic spreads everything out so you can see how each sensor and connector are integrated into the system. The written instructions that follow will give you detailed guidance on each component of the installation.



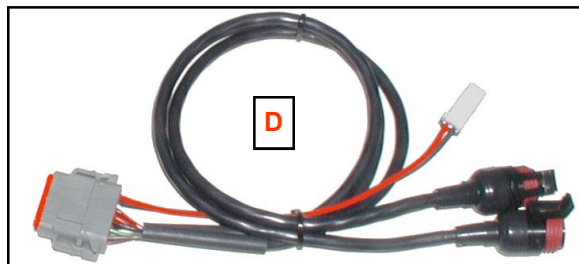
INSTALLING THE AIR/FUEL CONTROLLER

Locate the Air/Fuel Controller box (B) and the black mounting bracket (E) in the kit. Both the A/F Controller and the V300 recorder will ultimately both be attached to the mounting bracket. The controller will be bolted to the underside of the bracket, while the recorder will be mounted on the top. Mounting holes have been provided on your Destroyer to mount the bracket to the forward area of the rear fender below the seat. Mount the A/F controller to the bracket first, then lift the seat and install the mounting bracket and A/F controller to the fender. The cable on the A/F controller with the blue connector will point toward the rear of the bike, and the two Deutsch connector plugs will face forward. The cable with the blue connector on it's end will not be attached to anything at this time, but it is suggested that the cable be routed alongside of the A/F controller, inside the bracket, when bolting the bracket to the bike.



After the A/F Controller has been mounted you will want to remove the tie wraps on the cables that Harley-Davidson has bundled together just in front of the controller.

Your kit will contain a cable assembly with a large gray Deutsch connector (D). Attached to the connector are two black cables with connector plugs, plus a white two pin connector with red and black wires. This is the Air/Fuel harness. Plug the gray Deutsch connector into the gray port (Port A) of the controller. With the controller mounted upside down under the bracket, the gray port will be on the right hand side as you look at the end of the controller with the two ports.



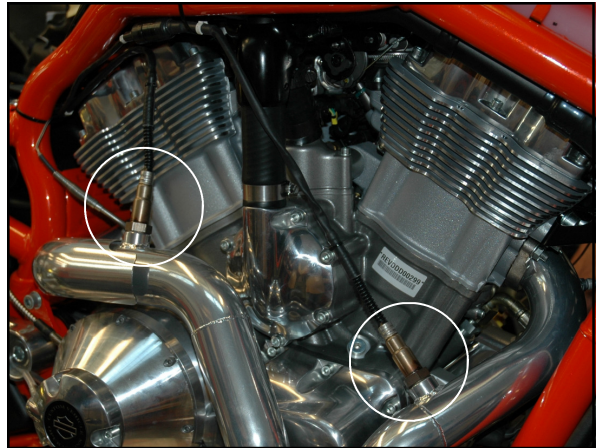
Plug the white male 2 pin heater switch connector (with red and black wire) into the matching female connector of the bike's wire loom.



INSTALLING THE AIR/FUEL SENSORS

Remove the plugs that are inserted into the large A/F weldments in the two exhaust pipes. Install an Air/Fuel sensor into each of the weldments using an anti-seize lubricant on the threads of the sensor.

Route the cable from the front cylinder's Air/Fuel sensor to the male plug of the long cable from the A/F controller. Connect the male and female plugs of these two cables together. Attach the rear cylinder's sensor cable to the short controller cable in the same manner.



NOTE: Detailed information about the calibration and use of the A/F sensors can be found on page 8 of this manual.

MOUNTING THE V300 DATA RECORDER

Bolt the V300 data recorder onto the top side of the mounting bracket. The three ports (RPM, ANALOG, VNET) of the V300 will be facing the front of the motorcycle.



Locate the harness in the kit with the black Deutsch connector and two black cables. One cable will be labeled 'RPM', and the other 'ANALOG'. Plug the cable marked RPM into the port on the left side of the V300. This port will be identified with 'RPM' engraved above it on the recorder case. The Analog cable will then be attached to the center 'ANALOG' port of the V300. Do not plug the Deutsch connector into the Harley wire loom at this time. There is work still to be done with the Harley connector.

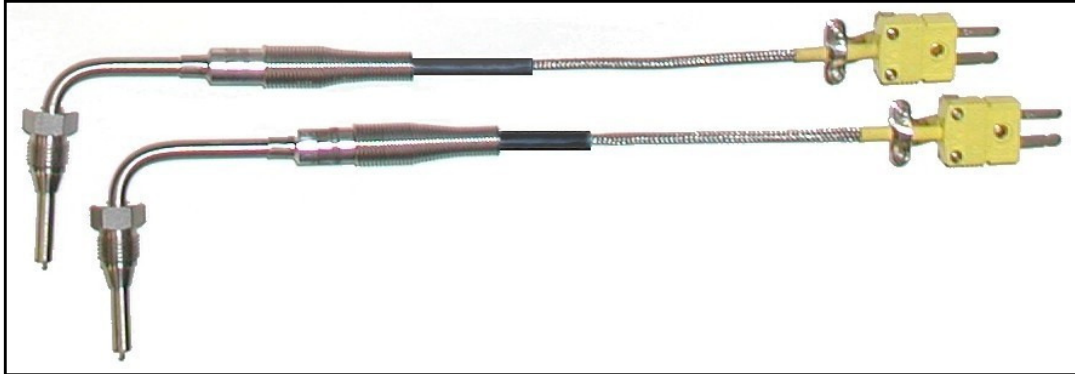


The V300 should have a 12" long cable attached to the V-Net port of the recorder. If the male plug of this cable is not attached to the V-Net port, install it in this manner now. Do not attach the blue female connector at the end of this cable to anything at this time.

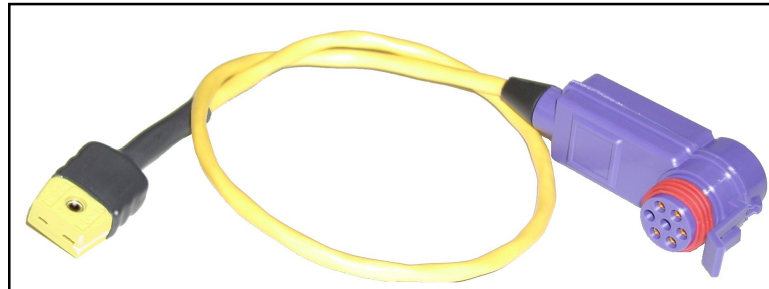
INSTALLING THE EXHAUST GAS TEMPERATURE SENSORS

Remove the caps that are covering the EGT weldment bungs on each header pipe.

Locate the two exhaust gas thermocouples (sensors) in the kit and install one in each of the weldments. Make sure that you have the two piece ferrule and nut on the thermocouple and some anti-seize on the threads of the weldment. Do not tighten the nut firmly. Tighten the nut only finger tight at this time.



Attach the appropriate blue V-Net EGT module to each thermocouple using the yellow two prong connector. The V-Net modules will have EGT #1 or EGT #2 engraved on the back of the module. The #1 module should be attached to the front cylinder exhaust thermocouple, and #2 to the rear cylinder thermocouple.



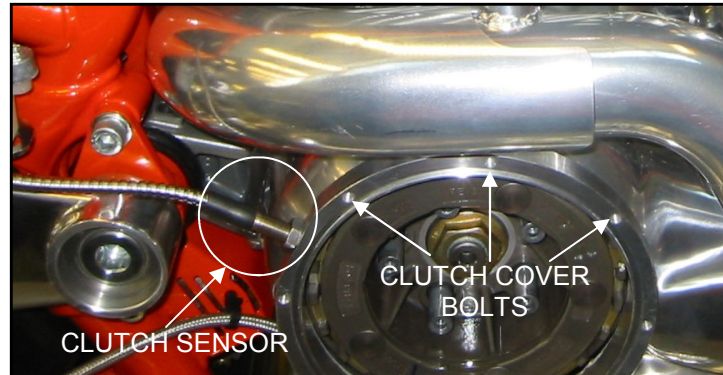
Route the EGT modules and cables so the V-Net modules will lay on the fender directly under the front of the Air/Fuel controller. Snap the two EGT modules together by inserting the male connector of one module into the female side of the other module.

Next route the cable from the V-Net port of the V300 to the two EGT modules and snap it onto the cluster (as shown in the schematic). Follow that by routing the cable with the blue connector on the A/F controller to the same location and snap it to the other side of the cluster of V-Net modules .

You should now have an open end on one side of the four module cluster. Locate the male V-Net terminator cap and install it on the open end of the cluster of V-Net modules. This will close the V-Net loop. Your system will not operate properly if this terminator cap is not installed. This cluster of V-Net modules will rest directly under the front of the Air/Fuel controller. If you are happy with the routing of the cables, and the alignment of the EGT thermocouples, you can now finish tightening the nuts securing the EGT thermocouples to the header pipes.

INSTALLING THE CLUTCH RPM SENSOR AND MAGNET

Remove the 8 bolts on the clutch housing side cover and disassemble the cover. Also remove the small plug that is in the fitting for the clutch RPM sensor. This fitting is located on the outer diameter of the housing at the 10 o'clock position.

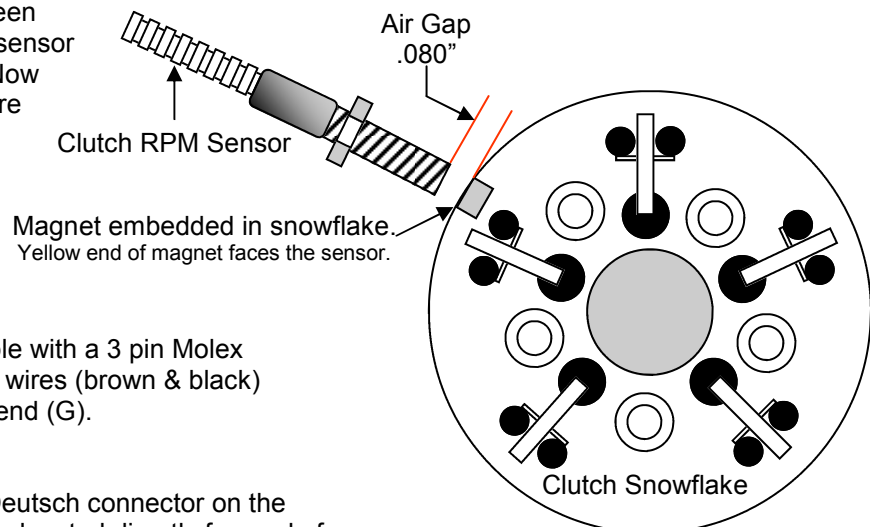


Remove the 'snowflake' from the clutch assembly.

In the outer perimeter of the snowflake you will find a 1/4" O.D. hole. This is where the magnet that is used to trigger the sensor for the clutch RPM will be installed. Use a dial caliper to measure both the magnet and the hole for compatibility before proceeding to the next step. Mix the two part epoxy per the instruction on the packet and put some of the mixture into the hole. With the yellow end of the magnet facing outward, toward the sensor, press the magnet into the hole until it is flush with the outer surface of the snowflake. Wipe off any excess epoxy that has pushed out of the hole when the magnet was pressed in. Allow this epoxy to dry for 24 hours before starting the engine.

Re-install the snowflake per the manufacturer's recommendations.

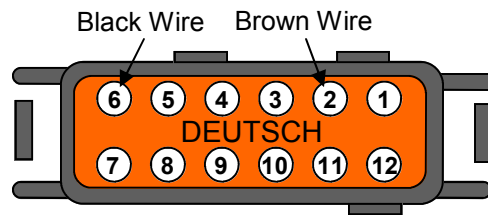
Before re-installing the clutch assembly cover housing install the clutch sensor into the hole in the housing. Adjust the depth of the sensor so the air gap between the sensor and the magnet is .080". When the proper air gap has been set, tighten the lock nut on the sensor to hold the sensor in position. Now rotate the engine slowly to insure that there is no interference between the sensor and the clutch assembly. You may now reinstall the clutch cover housing.



In the kit locate the cable with a 3 pin Molex connector on one end, and two wires (brown & black) with crimped pins on the other end (G).

Next locate the black Deutsch connector on the motorcycle's wire loom. It will be located directly forward of the V300 (Do not confuse this with the black Deutsch connector that is on the end of the cables that attaches to the RPM and Analog ports of the V300). The brown and black wires on the clutch cable need to be installed into the rear of the Harley-Davidson Deutsch connector (the end with other wires already installed by Harley). To install these two wires first remove the orange insert on the end of the Deutsch connector that plugs into the

cable from the V300. Using the illustration below as a guide, install the pin of the black wire in position #6 at the rear of the Deutsch connector, and the pin on the brown wire in position #2. Once the brown and black wires are installed you can reinsert the orange plug in the front of the Deutsch connector.



Insert the male Deutsch connector on the RPM / Analog cable into the female Deutsch connector on the loom. Note that there is a single alignment tab on one side of the connector, and two alignment tabs on the other side. These tabs will help you insert the Deutsch connector in the proper alignment orientation.

| Should replacement components be required at any time you can use the part number chart below to order the individual components for your V300 Destroyer data acquisition kit. | | |
|--------------------------------------------------------------------------------------------------------------------------------------------------------------------------------|------|----------------------------------------------------------------|
| Part Number | Qty. | Description |
| 200-MS-V300D | 1 | Recorder Only, V300D Destroyer |
| 220-VP-TC-EGT1D | 1 | Exhaust Gas Temperature Module & Sensor, Front Cylinder |
| 220-VP-TC-EGT2D | 1 | Exhaust Gas Temperature Module & Sensor, Rear Cylinder |
| 800-TC-S4-18MMC | 2 | EGT Thermocouple Only, 1/4" Dia., 18' Length w/ Mini-Connector |
| 800-TX-NF4 | 2 | Nut & Ferrule Only, EGT Thermocouple |
| 220-VM-LSU12D | 1 | Air/Fuel Ratio Controller Only (Sensors not included) |
| 810-SN-AFLSU | 2 | Air/Fuel Ratio Sensor Only |
| 280-CA-LSUAD | 1 | Harness, Air/Fuel w/Heater Cable |
| 280-CA-HDDRPMA | 1 | Harness, RPM/Analog |
| 280-CA-HDCLUTCH | 1 | Clutch Extension Cable |
| 800-SS-ZX-3 | 1 | Sensor Only, Clutch RPM |
| 800-MG-SM-25 | 1 | Magnet, Clutch |
| 280-CA-VM-012 | 1 | V-Net Cable, 12" |
| 280-CA-VM-TCAPM | 1 | Terminator Cap, V-Net, Male |
| 280-CA-SR-V300 | 1 | Serial Cable, V300 |
| BRKT-HDD | 1 | Mounting Bracket, V300D |

Racepak Air Fuel Ratio Controller Operation

The LED on the top of the box is a status indicator. A solid LED indicates that both sensors are ready. A flashing LED means one or more sensors are warming up or have a problem depending on how fast the LED is flashing.

Solid LED

Indicates that both sensors are warmed up and ready.

Slow flashing LED (1 flash per second)

Indicates that one or more sensors are warming up or performing a calibration. At least one sensor is not yet ready. No action is required, the LED should go solid within a few minutes.

Fast flashing LED (5 flashes per second)

Indicates that one or more sensors has an error. The problem must be resolved before the air fuel sensor(s) can take data. Follow the troubleshooting instructions below.

Calibration:

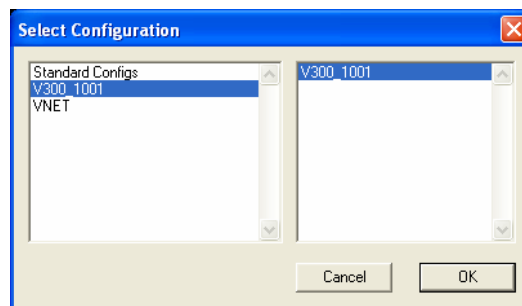
There are two types of calibrations required for the sensor to output accurate data.

Zero Calibration – After installing a new sensor a heater calibration is required. This will “zero” the current sensor calibration table from memory. A heater calibration will perform first, then a free air calibration. Before starting a zero calibration, the sensor must be removed from the exhaust and exposed to open air.

Free Air Calibration – It is recommend that you periodically perform a free air calibration. A free air calibration is needed correct for changes in atmospheric pressure and sensor wear caused by leaded fuels and aging. Before starting a free air calibration, the sensor must be removed from the exhaust and exposed to open air. A free air calibration must be initiated manually by following the instructions below.

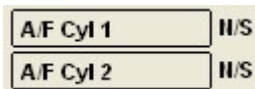
When you initially purchase the controller and sensors together as kit, they are pre-calibrated at the factory. As long as you plug each sensor into the correct cable you should not need to perform either calibration. However, if you replace a sensor or do not connect each sensor to the correct cable you will need to perform the following calibration procedure. You will need to perform this calibration once for each sensor in the controller.

Connect your PC to your data logger via the serial interface cable that was provided with your data logger. Turn the power on to the data logger and the air/fuel sensor controller. Start the DataLink program on your PC. Open the data logger configuration file by selecting **Open Car Configuration** under **File** from the menu bar. The following dialog box will appear.

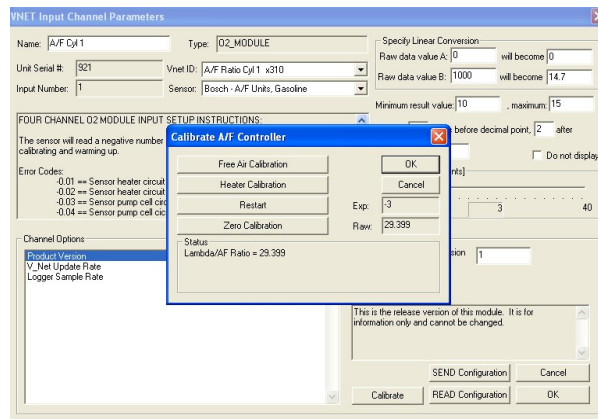


Select "V300_Destroyer"

Right click on the channel button of the A/F channel you wish to calibrate.



The VNET Channel Input Parameters dialog box will open. Click on the 'Calibrate' button at the bottom of the dialog box.



The status of the A/F channel will be displayed at the bottom of the 'Calibrate A/F Controller' dialog box that will appear. Before performing a calibration, make sure the sensor is not warming up or already performing a heater calibration. Also, make sure that there are no errors. If you have installed a new sensor in this channel first perform a zero calibration. Otherwise, perform a free air calibration. When you have finished click on the OK button to exit.

Troubleshooting

There are two method used to indicate that there is an error on one or more channels.

The channel will output a negative value to indicate an error. If the recorded data shows a negative value, the data is invalid. Use the chart on page 10 to determine the cause of the error and the recommended action that should be taken to correct the problem.

The LED on top of the controller does not go solid after a few minutes and is flashing at the rate of about 5 flashes per second. This indicates that an errors has occurred on one or more channels. Use the chart on page 10 to determine the cause of the error and the recommend action that should be taken to correct the problem.

Error Codes

| Error Code | Error | Possible Cause |
|------------|--------------------------------------------|--------------------------------------------------------------------------------------------------------------------------------------------|
| -0.01 | Sensor heater circuit shorted | Defective sensor or wire harness. |
| -0.02 | Sensor heater circuit open | Defective sensor or wire harness. Sensor not plugged in. |
| -0.03 | Sensor pump cell circuit shorted | Defective sensor or wire harness. |
| -0.04 | Sensor pump cell circuit open | Defective sensor or wire harness. |
| -0.05 | Sensor reference cell circuit shorted | Defective sensor or wire harness. |
| -0.06 | Sensor reference cell circuit open | Defective sensor or wire harness. |
| -0.07 | Module software error | Defective controller. Contact Racepak |
| -0.08 | Sensor timing error | Defective sensor or wire harness. |
| -0.09 | Supply voltage is too low | Supply voltage is too low. Bad power connections. |
| -0.10 | Sensor is warming up | You need to turn the power on at least 1 minute before the beginning of a run. |
| -0.11 | Sensor heater calibration is in progress | The controller has determined that a heater calibration was required. This usually means the a new or different sensor has been installed. |
| -0.12 | Sensor free air calibration is in progress | Wait for free air calibration to finish. Usually within 5 seconds. |
| -0.13 | Sensor free air calibration is required | This usually means the a new or different sensor has been installed. A free air calibration must be performed to clear this error. |
| -0.14 | Module busy | Defective controller. Contact Racepak |
| -0.15 | Module busy | Defective controller. Contact Racepak |
| -0.16 | Module hardware error | Defective controller. Contact Racepak |
| -0.17 | Channel is disabled or not present | The channel mode is set to disabled. |



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