Dynojet

DynoWare RT

Air Fuel Ratio Module Installation and User Guide

P/N 98200062.01

Air Fuel Ratio Module Installation and User Guide.

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Printed in USA.

Part Number: 98200062 Version 1 (06/2014)

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CHAPTER 1

AIR FUEL RATIO MODULE INSTALLATION

This document provides instructions for installing and using the Air Fuel Ratio (AFR) module with your Dynojet dynamometer and Power Core software. To ensure safety and accuracy in the procedures, perform the procedures as they are described.

This manual will walk you through installation and set up procedures, sampling and viewing air fuel ratios, and how to maintain your air pump.

Document Part Number: 98200062

Version 1

Last Updated: 06-30-14

This chapter is divided into the following categories:

INTRODUCTION

The Air Fuel Ratio (AFR) module is designed to accurately sample air fuel ratios from engines burning petroleum based fuels. Be sure to read and follow all warnings found throughout this manual.

WARNINGS

WARNING

The sensor and the copper sample tube are hot. Before touching the sensor or the sample tube, make sure it has cooled.

CAUTION

Leaded racing fuels and two-stroke applications will contaminate the sensor and dramatically shorten its service life.

The sensor is not covered by a warranty. Be sure to read and understand the Air Fuel Ratio Module Installation and User manual.

Before turning the pump on, verify there is no water in the compressed air hose or the sample tube.

Warm up the vehicle before placing the copper sample tube in the exhaust to avoid drawing excess water through the pump assembly.

Keep the AFR assembly upright. Tipping the assembly may result in damage to the sensor.

Leaks in the system will result in erroneous readings. Verify there are no cracks or holes in the hose. Verify the sensor is seated properly in the sensor block.

To ensure accurate readings, pump maintenance should be performed every six months, or sooner, depending on usage. Refer to “Pump Maintenance—Stand Alone” on page 2-7 and “Pump Maintenance—On Dyno” on page 2-10 for more information.

CONVENTIONS USED IN THIS MANUAL

The conventions used in this manual are designed to protect both the user and the equipment.

example of convention	description
	The Caution icon indicates a potential hazard to the dynamometer equipment. Follow all procedures exactly as they are described and use care when performing all procedures.
	The Warning icon indicates potential harm to the person performing a procedure and/or the dynamometer equipment.
Bold	Highlights items you can select on in the software interface, including buttons and menus.
➤	The arrow indicates a menu choice. For example, "select **File ➤Open**" means "select the **File** menu, then select the **Open** choice on the **File** menu."

TECHNICAL SUPPORT

For assistance, please contact Dynojet Technical Support at 1-800-992-3525, or write to Dynojet at 2191 Mendenhall Drive, North Las Vegas, NV 89031.

Visit us on the World Wide Web at www.dynojet.com and www.winpep.com where Dynojet provides state of the art technical support, on-line shopping, product images, and press releases about our latest product line.

STAND ALONE AIR FUEL RATIO MODULE ASSEMBLY

This section describes how to set up the stand alone Air Fuel Ratio module assembly. Refer to “On Dyno Air Fuel Ratio Module Assembly” on page 1-6 for on dyno installation instructions.

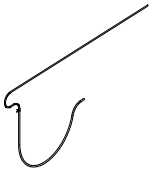
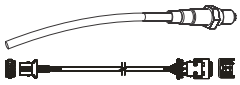
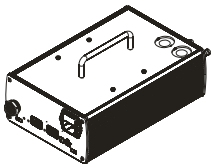
COMPRESSED AIR REQUIREMENTS

The following requirements are needed for the AFR module:

- Clean and dry air, 60-100 psi regulated, 5 CFM or better flow
- 1/4-inch NPT pipe thread compressed air connector
- optional air regulator

PARTS LIST

The following table lists the parts included with the stand alone Air Fuel Ratio module kit (P/N 77000008).

part	description	part	description
	power cord, 125V, 10A P/N 318110301		cable, CAN dyno user, 20' P/N 76950531
	AFR wand assembly P/N 64193011		AFR sensor kit P/N 78100029
	air fuel ratio module assembly P/N 66100017		air flow meter test kit P/N 78191001

INSTALLING THE AIR FUEL RATIO MODULE

1. Attach the power cable to your 110 or 220 VAC power source and to the AFR module.
2. Route the CAN dyno user cable (P/N 76950531) from the AFR module to the front of the DynoWare RT main module.
3. Insert the O2 sensor(s) into the AFR module.
4. Attach the sensor cable to the sensor and the AFR module. Use the ties on the AFR module to secure the sensor cables.

   Note: The sensor 1 and sensor 2 positions correspond to Heater 1 and Heater 2 in the Dyno Control software.
5. Attach the silicone hose and copper sample tube to the AFR module.

   Note: If only one sensor and sample tube is being used, the second sensor hole and sample port must be plugged.
6. Attach your clean, dry 60-100 psi regulated compressed air supply to the fitting on the AFR module.

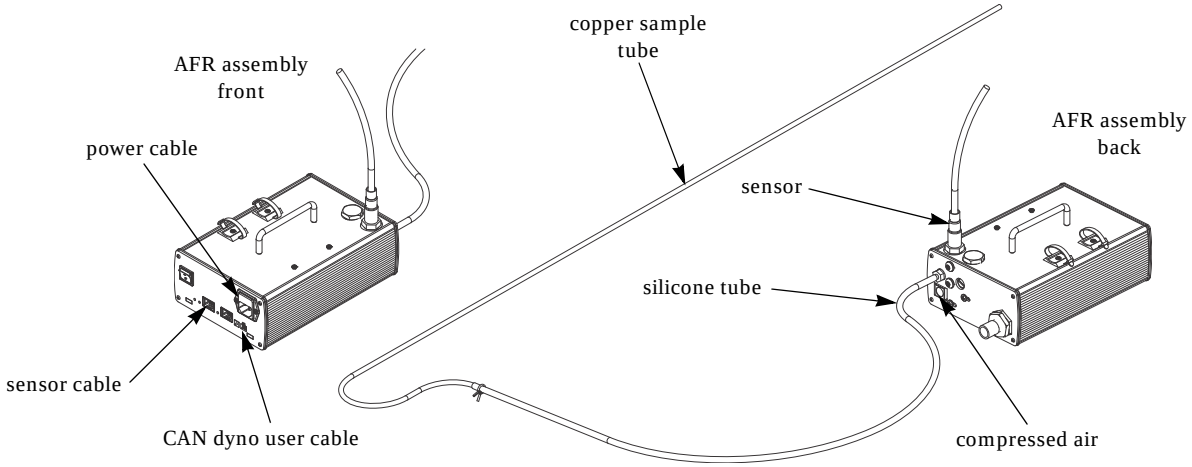


Figure 1-1: Stand Alone Installation

ON DYNO AIR FUEL RATIO MODULE ASSEMBLY

This section describes how to install the Air Fuel Ratio module assembly on your above ground motorcycle dynamometer (i-dyno).

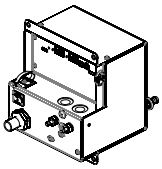
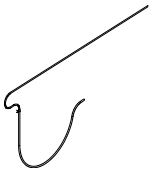
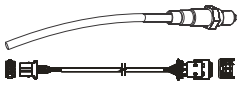
COMPRESSED AIR REQUIREMENTS

The following requirements are needed for the on dyno AFR assembly:

- Clean and dry air, 60-100 psi regulated, 5 CFM or better flow
- 1/4-inch NPT pipe thread compressed air connector

PARTS LIST

The following table lists the parts included with the on dyno Air Fuel Ratio module kit (P/N 77000007).

part	description	part	description
	air fuel ratio module assembly P/N 64100008		cable, power P/N 76950646
	AFR wand assembly P/N 64193011		AFR sensor kit P/N 78100028
	cable, CAN dyno user, 20' P/N 76950531		air flow meter test kit P/N 78191001

INSTALLING THE AIR FUEL RATIO MODULE ON THE DYNO

1. Remove the eight screws securing the drum module side panel to the dyno. Set the screws and the panel aside. For more information on removing the panel, refer to your dyno installation guide.
2. Remove the four screws securing the blanking plate and set aside.
3. Secure the AFR module to the dyno using the four screws removed earlier.
4. Run the provided air hose from the AFR module to the front of your dyno. If your dyno is equipped with an air brake, refer to “Installing the Air Hose with the Air Brake” on page 1-8.

   You will need to remove the carriage assembly and top center cover to route the air hose. Refer to your dyno installation guide for instruction on removing the top cover.
5. Route the air hose through the air access hole in the front of the dyno.

6 Attach the hose to your clean, dry, 60-100psi regulated air supply.

7 Insert the O2 sensor(s), plug sensor connectors into AFR module and tie the sensor cables.

Note: The sensor 1 and sensor 2 positions correspond to Heater 1 and Heater 2 in the Dyno Control software.

8 Route the CAN dyno user cable (P/N 76950531) from the AFR module, through the dyno, to the front of the DynoWare RT main module.

9 Attach the silicone hose and copper sample tube to the AFR module.

Note: If only one sensor and sample tube is being used, the second sensor hole and sample port must be plugged.

10 Attach power cord to the AFR module.

11 If the power cable is not already installed, attach the brown, blue, and green wires from the AFR power cable to the top of the DIN rail in the same terminals as the DynoWare RT power cable. These will be the terminals that already have small gauge brown, blue, and green wires.

Note: Refer to the DynoWare RT installation guide (P/N 98200050) for more information on accessing the DIN rail.

12 Replace the top center cover and carriage assembly, if removed.

13 Replace the drum module side panel using the screws removed earlier.

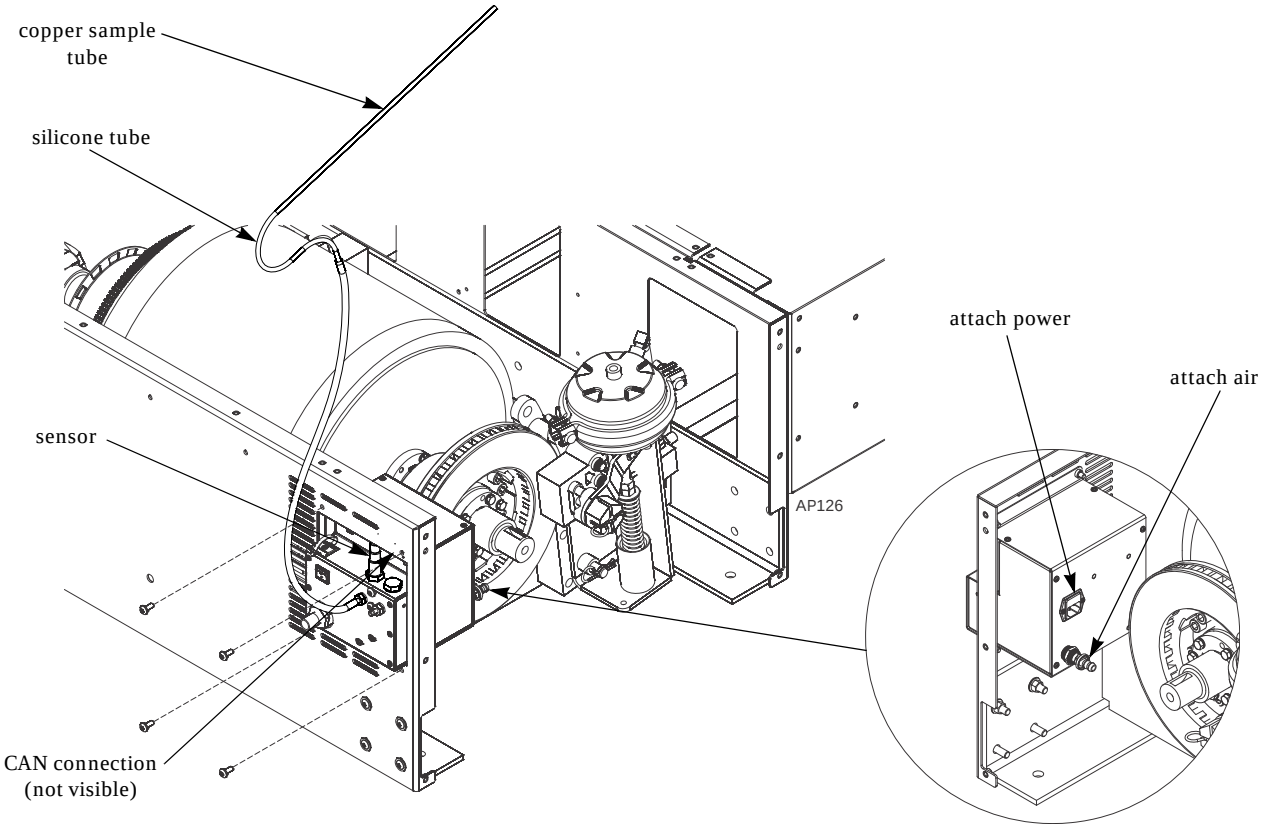


Figure 1-2: On Dyno Installation

INSTALLING THE AIR HOSE WITH THE AIR BRAKE

Use the following instructions to install the air hose when the air brake is installed.

1 Install the tee.
   1a Locate the existing hose running from the air brake as shown in Figure 1-3.
   1b Cut this hose about two inches from the air brake.
   1c Slide a hose clamp over each piece of hose.
   1d Insert the tee.
   1e Secure the hose clamps.
2 Measure the distance from the tee to the AFR module and cut a piece of hose.
3 Attach the hose to the AFR module. This connection does not require a hose clamp.
4 Slide a hose clamp over the hose.

   Note: The hose clamp is only needed on the tee end.
5 Slide the hose over the tee.
6 Secure the hose clamp.

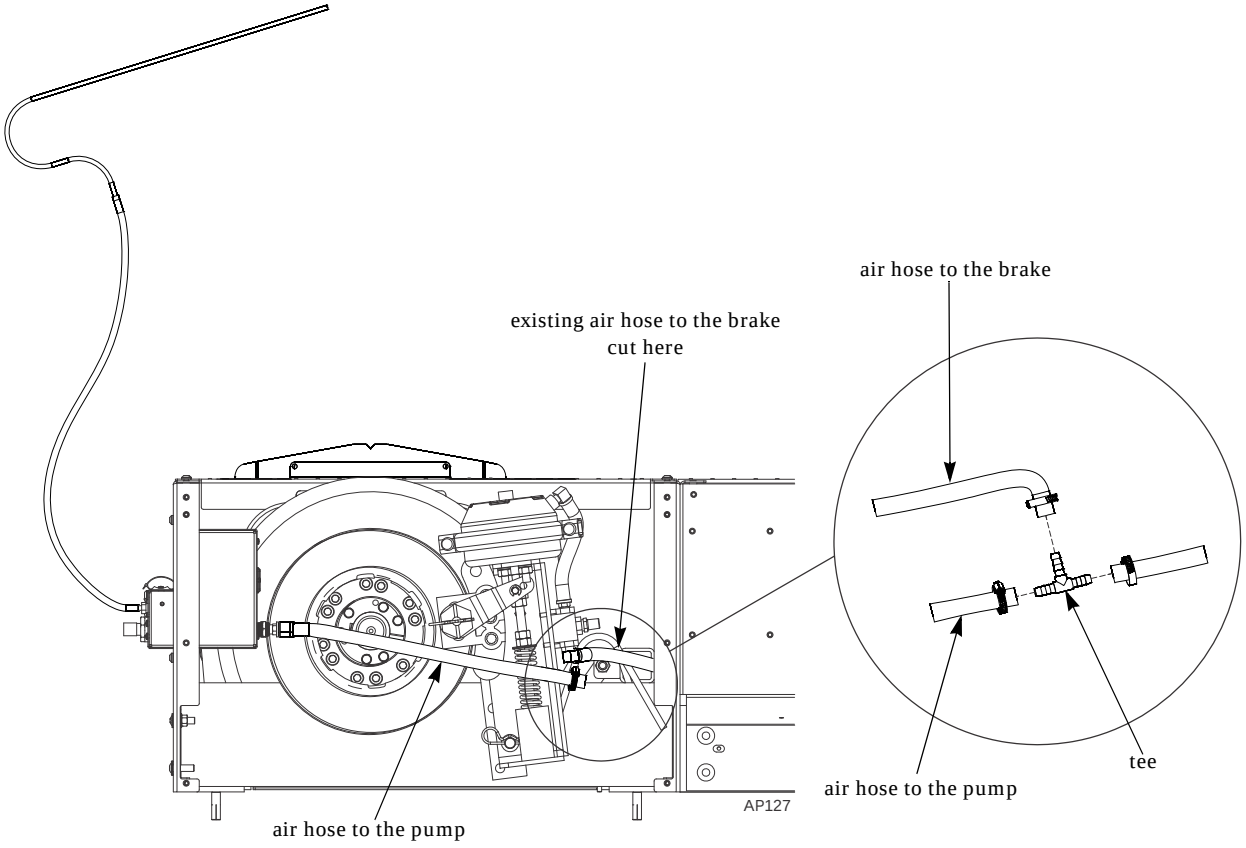


Figure 1-3: Installing the Air Hose with the Air Brake

ADJUSTING THE AIR FLOW

To ensure accurate readings, adjust the air flow as necessary to maintain 35L/min. If you are unable to adjust the air flow to 35L/min., clean the pump then try to adjust the air flow again. Refer to “Pump Maintenance—Stand Alone” on page 2-7 or “Pump Maintenance—On Dyno” on page 2-10 for more information.

ADJUSTING THE AIR FLOW—STAND ALONE

Adjust the air flow at the end of each exhaust probe to 35 L/min.

1 Attach six inches of the silicone tubing from the top port on the flow meter to the copper sample tube.

2 Loosen the lock nut.

Note: If two sensors and sample tubes are installed, plug or pinch the sample tube that the air flow meter is not attached to.

3 Turn on the air pump using the control panel or click the air pump button  in the Dyno Control Software.

4 Rotate the vacuum generator exhaust port until the flow meter reads 35 L/min.

5 Tighten the lock nut.

Note: Make sure not to rotate the vacuum generator exhaust port when tightening the lock nut.

6 Remove the air flow meter and the six inches of silicone tube.

Note: Periodically check the air flow and adjust as necessary to maintain 35 L/min.

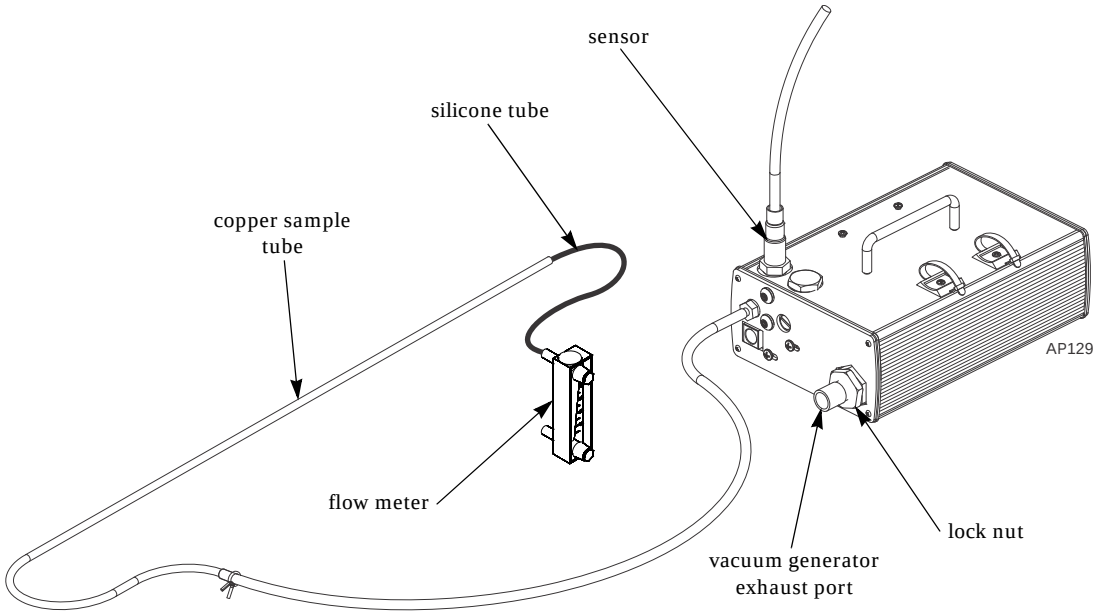


Figure 1-4: Adjusting the Air Flow—Stand Alone

ADJUSTING THE AIR FLOW—ON DYNO

Adjust the air flow at the end of the exhaust probe to 35 L/min.

1 Attach six inches of the silicone tubing from the top port on the flow meter to the copper sample tube.

2 Loosen the lock nut.

Note: If two sensors and sample tubes are installed, plug or pinch the sample tube that the air flow meter is not attached to.

3 Turn on the air pump using the control panel or click the air pump button  in the Dyno Control Software.

4 Rotate the vacuum generator exhaust port until the flow meter reads 35 L/min.

5 Tighten the lock nut.

Note: Make sure not to rotate the vacuum generator exhaust port when tightening the lock nut.

6 Remove the air flow meter and the six inches of silicone tube.

Note: Periodically check the air flow and adjust as necessary to maintain 35 L/min.

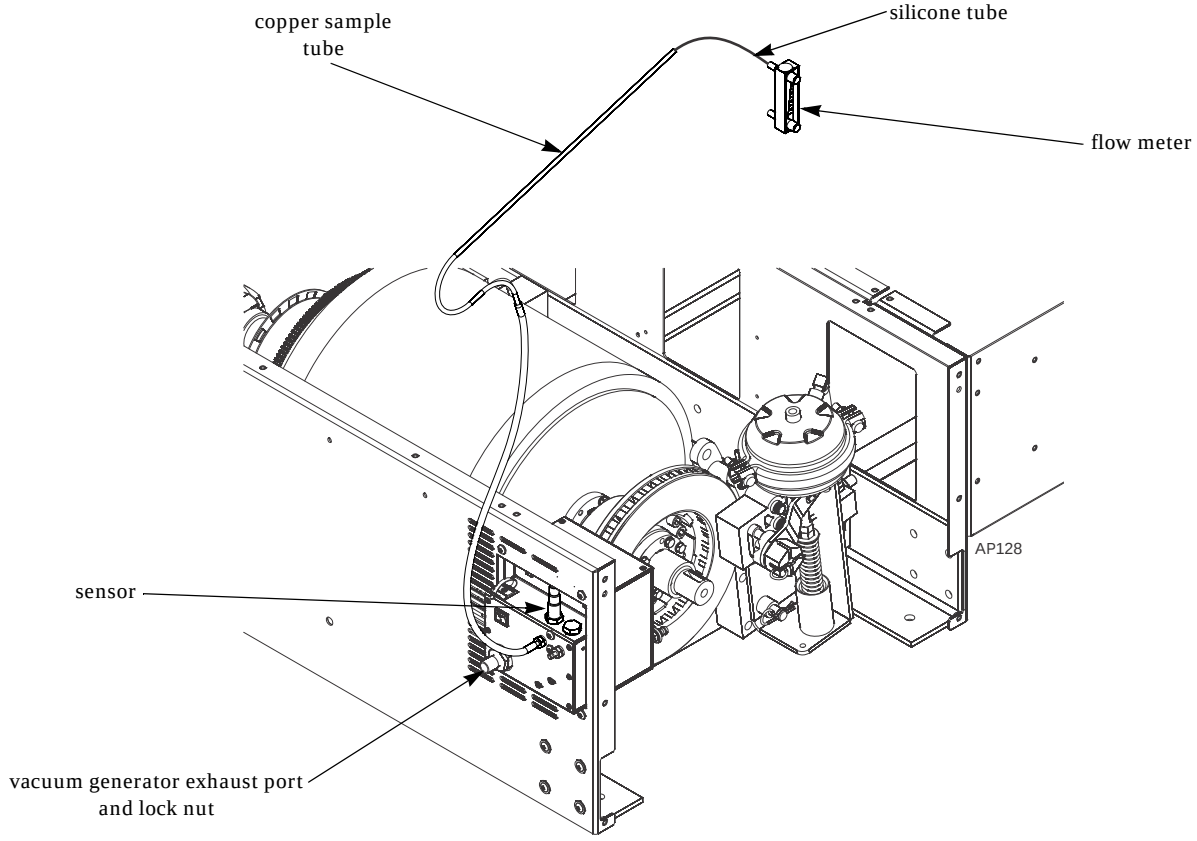


Figure 1-5: Adjusting the Air Flow—On Dyno

CHAPTER 2

USING THE AIR FUEL RATIO MODULE

This chapter will walk you through the set up procedures, sampling and viewing air fuel ratios, and how to maintain and troubleshoot your Air Fuel Ratio (AFR) module assembly. To ensure safety and accuracy in the procedures, perform the procedures as they are described.

This chapter is divided into the following categories:

AIR FUEL RATIO MODULE SET UP

This section describes the set up procedures for the Air Fuel Ratio module.

1 Run the vehicle and allow the vehicle to warm up. Excess condensed water is produced during warm up which can damage the Air Fuel Ratio module. Allowing the vehicle to warm up removes this excess water.

2 Place the copper sample tube(s) in the exhaust pipe(s) of the test vehicle.

Note: The oxygen sensor can also be inserted into a bung in the exhaust if one is available.

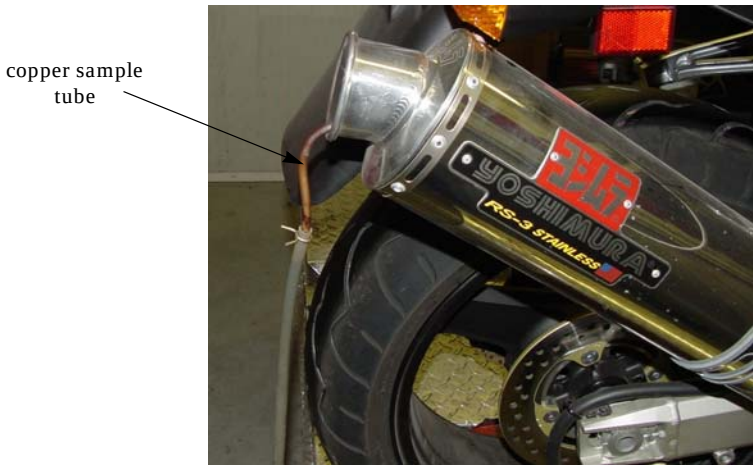


Figure 2-1: Sample Tube Placement

3 Turn on the DynoWare RT power.

4 Turn on the Air Fuel Ratio module.

SAMPLE AND VIEW AIR FUEL RATIOS

This section describes the procedures to sample and view air fuel ratios using the Power Core software.

Note: Allow the sensor to preheat before making a run. When the sensors are heated, the sensor heater lights on the Air Fuel Ratio module will light up continuously and the Air/Fuel gauge in Dyno Control will be full scale.

SAMPLING AIR FUEL RATIOS

1 Open the Power Core software.
2 Open the WinPEP 8 Dyno Control software.
3 Verify you are connected to the DynoWare RT module.
4 From the Configuration ribbon, click the **Air Fuel Configuration** button 

.
5 Select the Air/Fuel type from the drop down list or enter a custom fuel type by clicking the **Air/Fuel Editor** button 
.

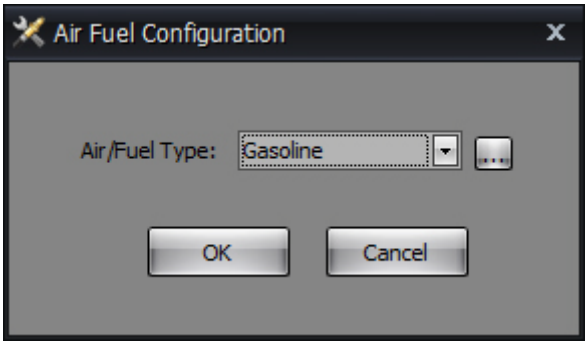


Figure 2-2: Air Fuel Configuration Window

6 From the Home ribbon, click the **Heater 1/Heater 2** button 

.
7 From the Home ribbon, click the **Air Pump** button 

.

Note: If the sensor(s) is directly in a bung in the vehicle exhaust, the air pump can remain off.

Note: To ensure repeatable and accurate measurements, the Air/Fuel Heater must be allowed to heat up to temperature. When the sensors are heated, the sensor heater lights on the Air Fuel Ratio module will light up continuously and the Air/Fuel gauge in Dyno Control will be full scale.

8 Verify the air pump assembly is on.

9 Press the green sample button on the pendant to begin recording data.

Note: For more information on how to make a run, refer to the Power Core Help.

10 Press the sample button a second time to stop sampling.

Figure 2-3: Air/Fuel Ratio Gauge

CAUTION

Be sure to turn the Air Fuel Heater off when not in use for long periods of time.

VIEWING AND GRAPHING AIR/FUEL RUNS

For more information about graph functions and displays, refer to the Power Core Help.

1 Open the Power Core software.
2 Open the WinPEP 8 Data Center application.
3 Using the Tree View, browse to the directory and double-click a run file.
4 The run information is displayed in the File View along with a graph of the run.
5 Click on the axis channel label and choose Air/Fuel from the list.

Note: Available channels may differ depending on your dyno model and configuration.

The graph will now display the run with air/fuel readings.

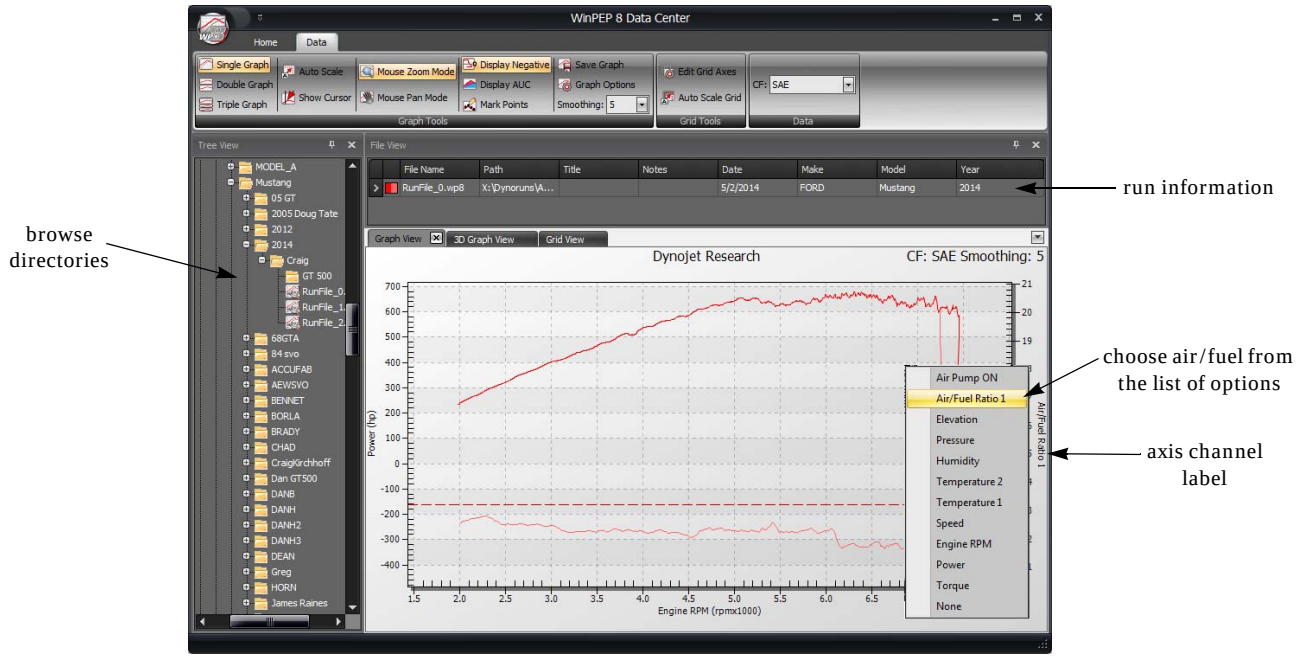


Figure 2-4: Graph Display with Air/Fuel

AIR FUEL RATIO MODULE MAINTENANCE AND TROUBLESHOOTING

This section contains sensor information and describes the procedures for maintaining and troubleshooting the Air Fuel Ratio module.

Make sure you are aware of the following items:

- Keep the Air Fuel Ratio module upright. Tipping the Air Fuel Ratio module may result in damage to the sensor.
- Leaks in the system will result in erroneous readings. Verify there are no cracks or holes in the hoses. Verify the sensor is seated properly in the sensor block.

SENSOR INFORMATION

Under optimal conditions, the sensor life can exceed 1500 hours. When using leaded race fuel, 2.5 grams of lead per gallon of fuel will reduce the expected life of the sensor to less than 100 hours.

The sensor is not covered by a warranty. Be sure to read and understand the Air Fuel Ratio Module Installation and User manual.

CORRECTING LEAN AIR FUEL READINGS

Refer to the instructions below if you are experiencing air fuel ratio readings that are leaner than you expected.

1 Verify the pump is on.
2 Check the system for restrictions in the air flow such as a kinked hose or dirty pump.
3 Verify the copper sample tube is not kinked or clogged and is inserted into the exhaust as far as possible. Refer to Figure 2-1.
4 Check for leaks in the system.
  4a Verify all hoses are securely attached to the fittings.
  4b Verify there are no cracks or holes in the hoses.
  4c Verify the sensor is seated properly in the sensor block.

PUMP MAINTENANCE—STAND ALONE

To ensure accurate readings, pump maintenance should be performed every six months, or sooner, depending on usage. Periodically check the air flow and adjust as necessary to maintain 35 L/min for each sample tube. If you are unable to adjust the air flow to 35 L/min, clean the pump. Use a solvent to clean all pump pieces very carefully.

1 Remove the sensor(s) from the sensor block.
2 Remove the four screws securing the front panel and remove the front panel.
3 Loosen the vacuum generator lock nut.
4 Remove the vacuum generator exhaust port.

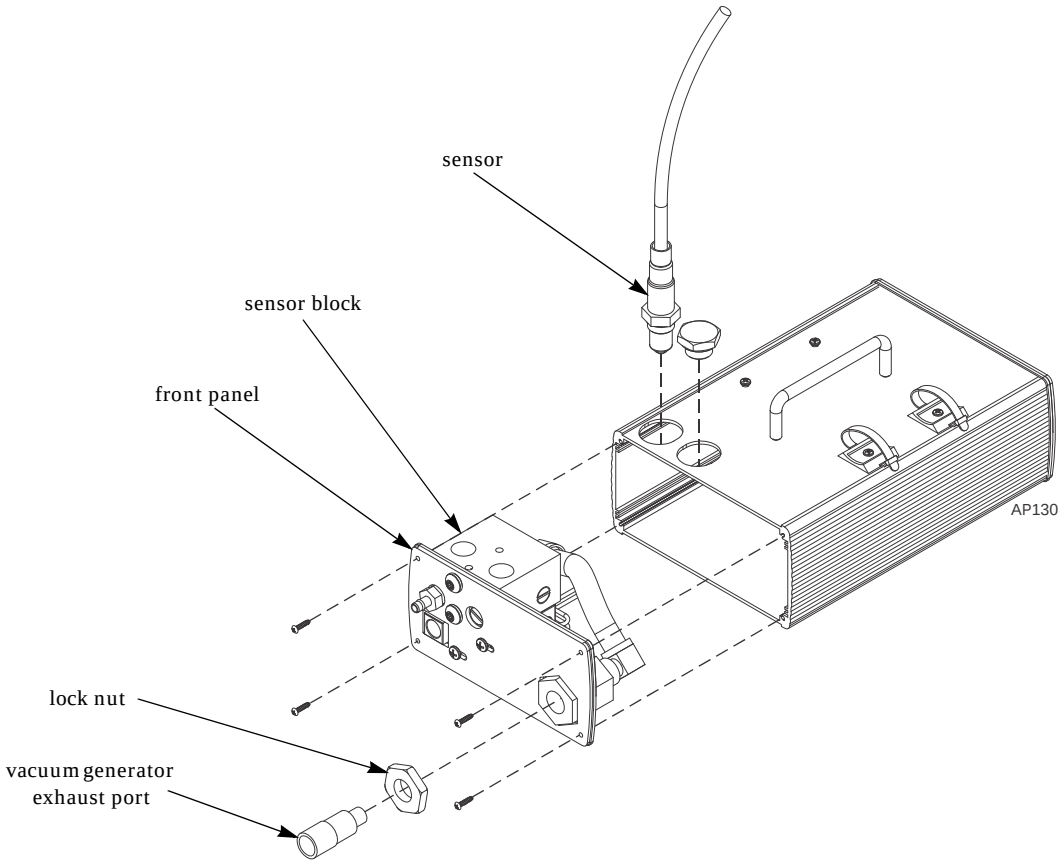


Figure 2-5: Stand Alone—Remove the Front Panel

5 Remove the two screws securing the solenoid to the front panel.

6 Unscrew the solenoid and venturi body from the sensor block hose fitting by rotating the sensor block and hose out of the venturi body.

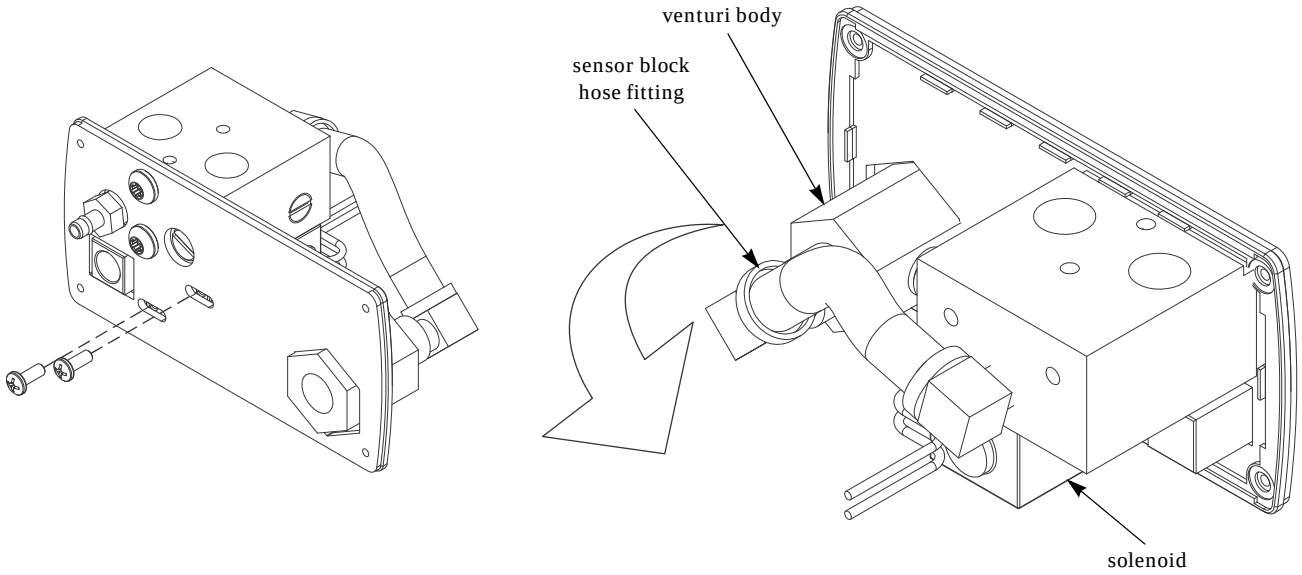


Figure 2-6: Stand Alone—Remove the Solenoid and Venturi Body

7 Unscrew the venturi body from the solenoid.

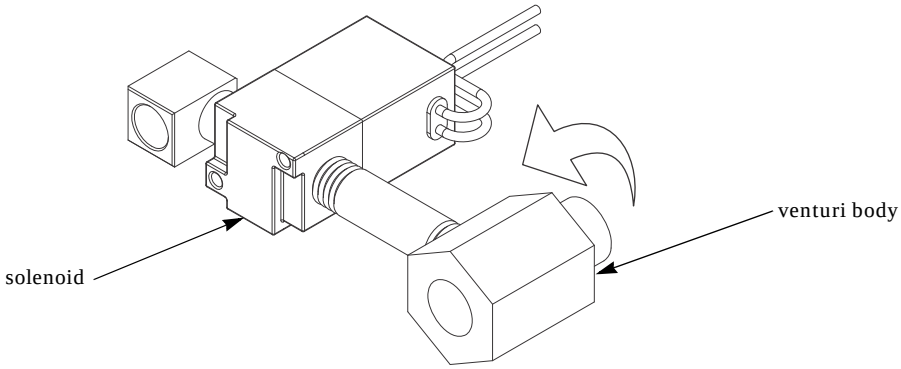


Figure 2-7: Stand Alone—Remove the Venturi Body

8 Use a solvent to carefully clean the vacuum generator exhaust port, venturi body, and sensor block.

Note: Be careful not to damage the internal structure of the venturi body.

9 Install the venturi body.

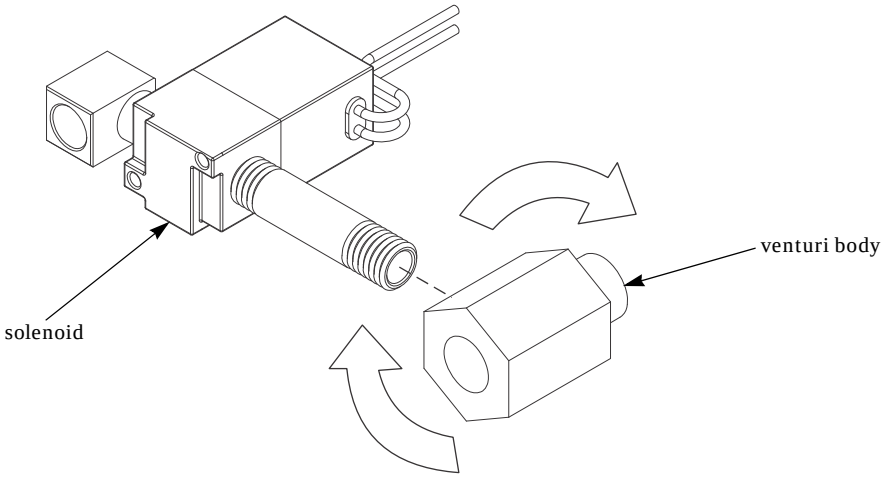


Figure 2-8: Stand Alone—Replace the Venturi Body

10 Secure the solenoid and venturi body to the sensor block hose fitting.

Note: Use new teflon tape or pipe sealant on all fittings to avoid air leaks.

11 Secure the solenoid to the front panel using the two screws removed earlier.

12 Replace the vacuum generator exhaust port and lock nut.

13 Secure the front panel using the four screws removed earlier.

14 Install the sensors.

15 Replace the silicone and copper tubing if necessary.

16 Recalibrate the pump using the flow meter. Refer to page 1-9 for more information.

PUMP MAINTENANCE—ON DYNO

To ensure accurate readings, pump maintenance should be performed every six months, or sooner, depending on usage. Periodically check the air flow and adjust as necessary to maintain 35 L/min for each sample tube. If you are unable to adjust the air flow to 35 L/min, clean the pump. Use a solvent to clean all pump pieces very carefully.

1 Remove the eight screws securing the drum module side panel to the dyno. Set the screws and the panel aside. For more information on removing the panel, refer to your dyno installation guide.
2 Disconnect the air supply, CAN cable, and power cable from the AFR module.
3 Remove the four screws securing the pump assembly to the dyno.
4 Remove the pump assembly from the dyno.

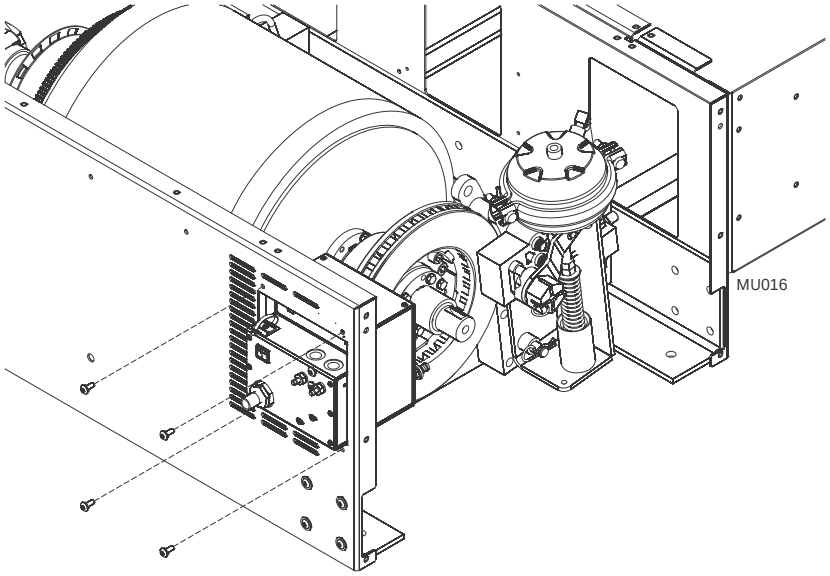


Figure 2-9: On Dyno—Remove the Pump Assembly from the Dyno

5 Remove the sensor(s) from the sensor block.

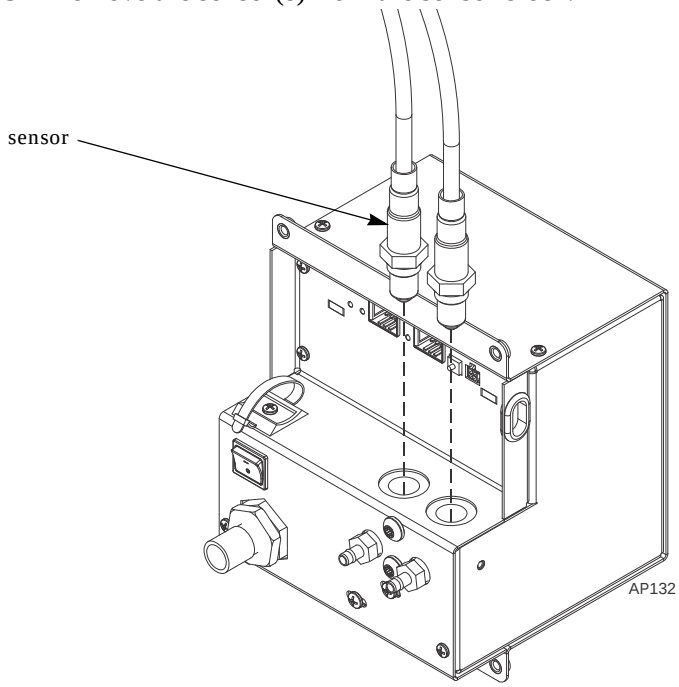


Figure 2-10: On Dyno—Remove the Sensor(s)

6 Remove the side panel.

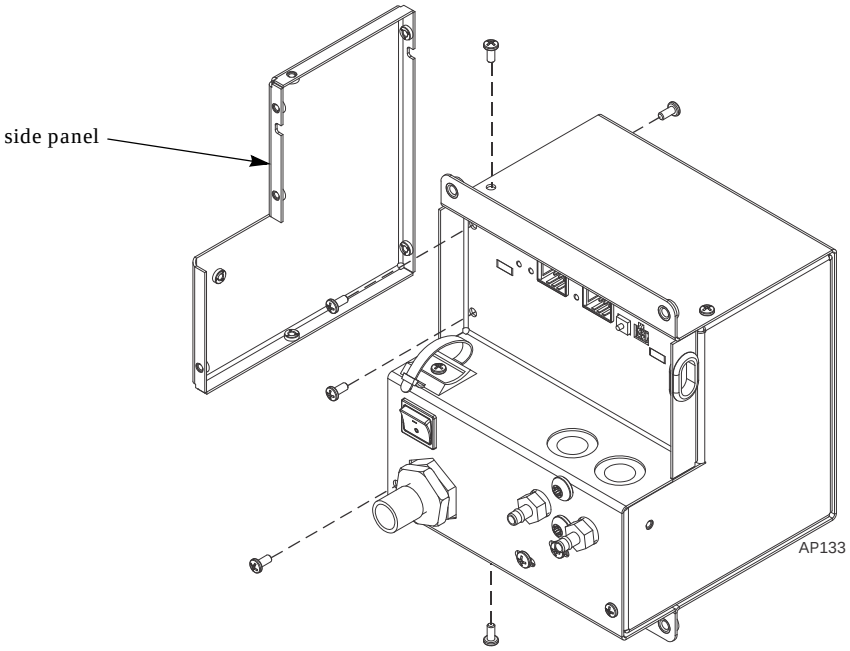


Figure 2-11: On Dyno—Remove the Side Panel

7 Remove the nut and washer securing the air bulkhead fitting on the back of the pump.
8 Remove the remaining three screws securing the front cover.
9 Separate the front of the assembly.

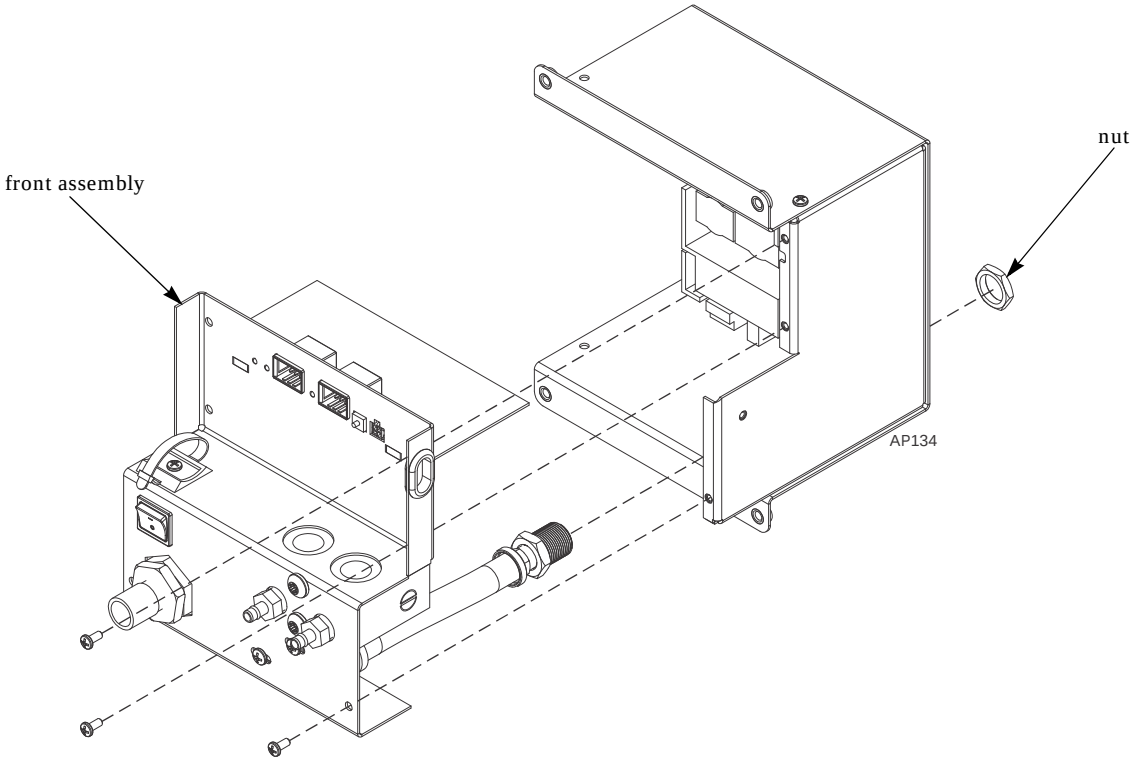


Figure 2-12: On Dyno—Remove the Front Cover

10 Loosen the vacuum generator lock nut.
11 Remove the vacuum generator exhaust port.
12 Remove the two screws securing the solenoid to the front of the pump assembly.
13 Remove the two screws securing the sensor block to the front of the pump assembly.
14 Remove the sensor block assembly.
15 Unscrew the sensor block and hose from the venturi body by rotating the sensor block around the venturi body.
16 Unscrew the venturi body from the solenoid.
17 Use a solvent to carefully clean the vacuum generator exhaust port, venturi body, and sensor block.
18 Be careful not to damage the internal structure of the venturi body.

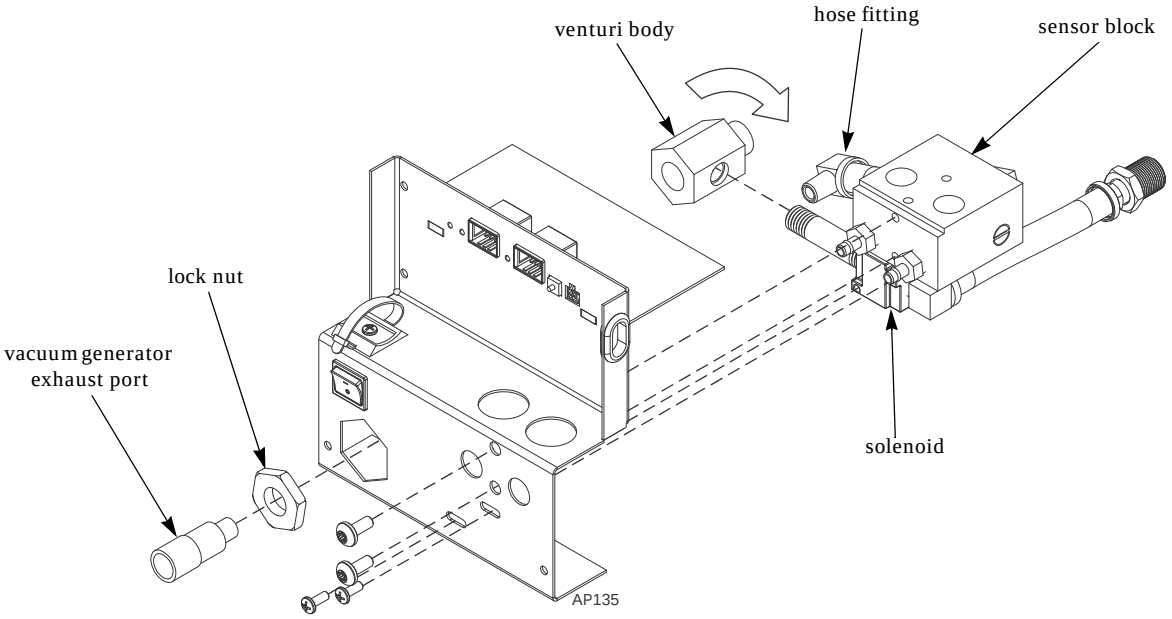


Figure 2-13: On Dyno—Pump Maintenance

19 Secure the venturi body to the solenoid.
20 Thread the sensor block and hose into the venturi body.

Note: Use new teflon tape or pipe sealant on all fittings to avoid air leaks.

21 Secure the sensor block to the pump housing using the two screws removed earlier.
22 Secure the solenoid to the pump housing using the two screws removed earlier.
23 Install the vacuum generator exhaust port to the venturi body.
24 Install the front panel using the three screws removed earlier. Verify the bulkhead fitting protrudes through the rear panel.
25 Replace the bulkhead fitting nut and washer.
26 Secure the side panel using the six screws removed earlier.
27 Secure the pump assembly to the dyno using the four screws removed earlier.
28 Attach the air supply hose, CAN cable, and power cord.
29 Install the drum module side panel to the dyno using the eight screws removed earlier.
30 Install the sensor(s).
31 Replace the silicone tube and copper tubing if necessary.
32 Recalibrate the pump using the flow meter. Refer to page 1-10 for more information.

DOMESTIC
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