NAW_7S User Manual

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Important Stuff:

Do not cut off the sensor plug and try to wire the sensor directly to the NAW_7S, there is a laser cut calibration resistor inside the plastic connector of the Bosch LSU Sensor.

NAW_7S will only work with the Bosch LSU 4.2 sensor. The Bosch part # is 17053 and 17014. The only difference between the 17053 and the 17014 is the length of the cable between the plug and the actual sensor.

Be sure to place NAW_7S in a well ventilated place, something like a glove compartment will not be sufficient.

Use 22 or lower gauge multi conductor wires for all wiring

**Connect and disconnect the Bosch Sensor only when NAW_7S is turned off**

**Use 22 or lower gauge multi conductor wires for the Wideband Cable**

Take your wire, put a rubber grommet on it then solder the wire to a female contact. You will need to trim the back tab of the female contact so that it fits into the housing. Do this six times.

Insert the female contact into the plastic housing, when you hear a "click" the contact is secure. Do this 6 times.
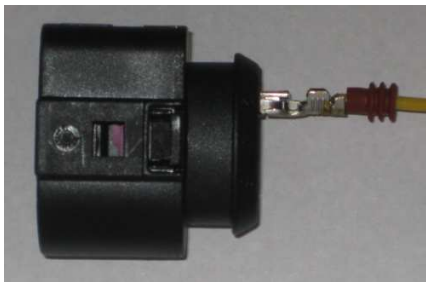
Once all the contacts have been inserted into the plastic housing, push the purple lock to secure the contacts in place.
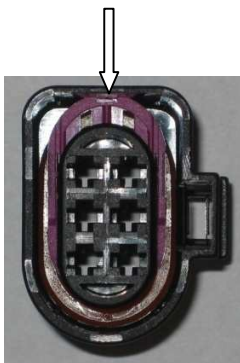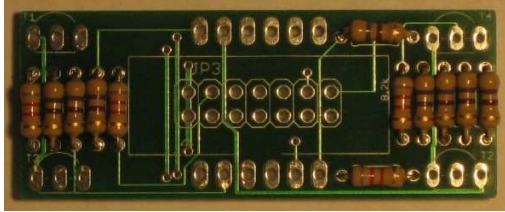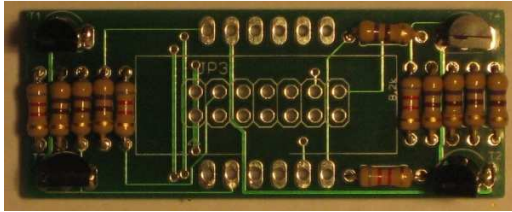

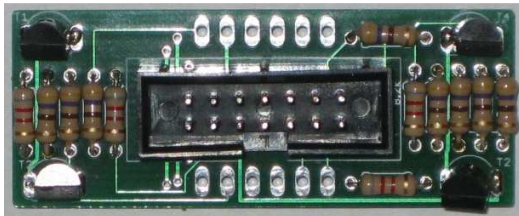You are done.

Step 1:

Solder the resistors

Step 2:

Solder the Transistors

Step 3:

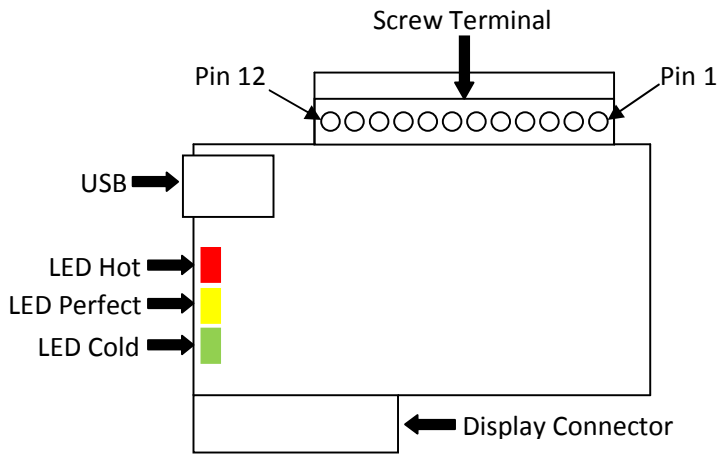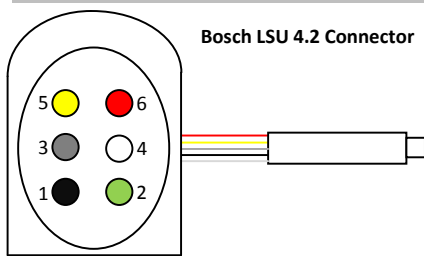Solder the 14 Pin IDC header, make sure the orientation is correct.

Step 4:

Flip the Display board over and solder the 7 Segment display on the other side. Make sure the orientation of the 7 segment display matches with the "8.8.8.8." label on the PCB.

Screw Terminal

Pin 12

Pin 1

USB

LED Hot

LED Perfect

LED Cold

Display Connector

Bosch LSU 4.2 Pin Diagram

Bosch LSU 4.2 Connector

5   6

3   4

1   2

Screw Terminal Pin #	Name	Connects to	Note
		NAW_7S Connection Table	
1	System Power	10-18v Positive supply	Should be connected to switched supply that is "live" when key is in "on" position. Close to battery +ve terminal.
2	System Ground	–ve battery terminal	Close to battery –ve terminal unless you have a device connected to the linear output, if so you should ground this pin to where the device is grounded.
3	LSU Heater Power	10-18v Positive supply	Should be connected to switched supply that is "live" when key is in "on" position. Atleast 30cm farther away from where Pin2 is connected.
4	LSU Heater Ground	–ve battery terminal	Atleast 30cm farther away from where Pin2 is connected.
5		LSU Terminal 3	
6		LSU Terminal 4	
7		LSU Terminal 5	
8		LSU Terminal 1	
9		LSU Terminal 2	
10		LSU Terminal 6	
11	Simulated Narrowband Output	Stock ECU	
12	0-5v Linear Output	Datalogger, Aftermarket ECU, etc…	

*Use 22 or lower gauge multi conductor wires for all wiring
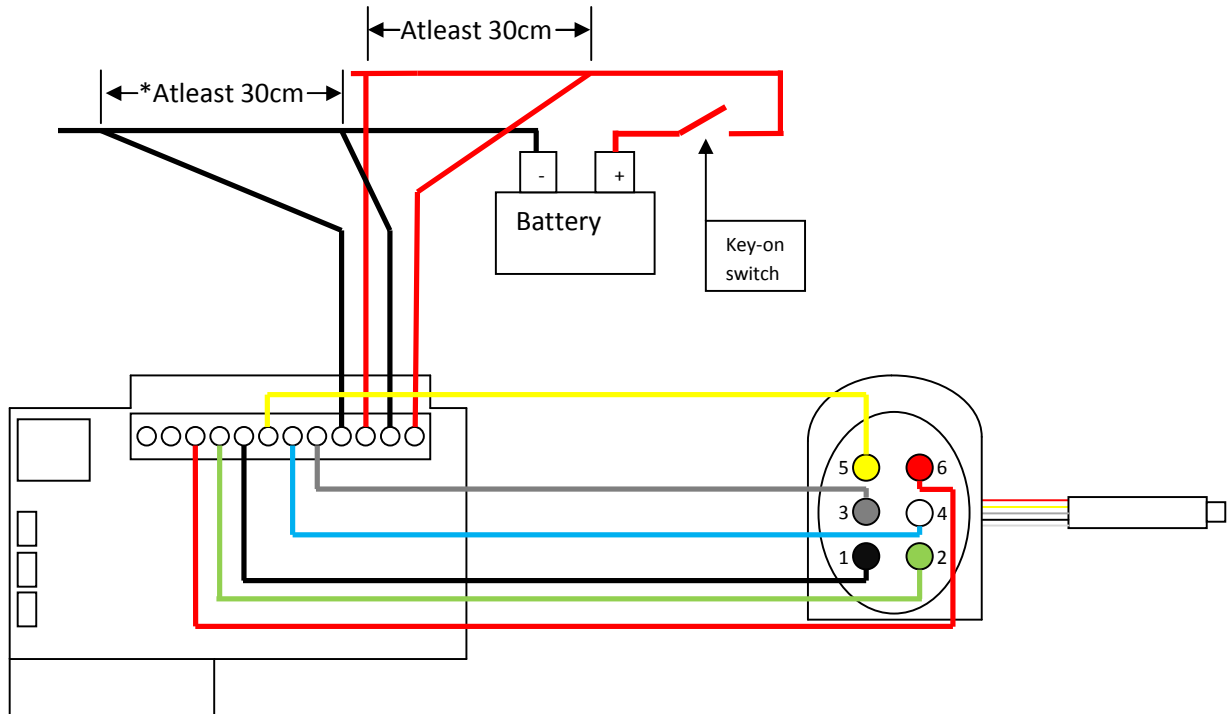
*If you have a device connected to the linear output (Pin12), the "System Ground" (Pin2) should be grounded to where the device is grounded, this will minimize any voltage offset seen by the device.

Use 22 or lower gauge multi conductor wires for all wiring

It is recommended that the wires connecting NAW_7S to the Bosch LSU sensor be arranged in a "twisted pair", this will add some noise immunity. Referencing the wire colors in the above diagram; "grey" and "blue" should be twisted together, "yellow" and "black" should be twisted together, "green" and "red" should be twisted together.
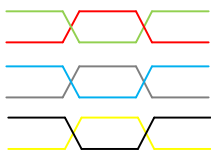
Linear and Simulated Narrowband Output

Linear Output:

Pin 12 on the screw terminal is the 0-5v Linear Output, the output is linear to the AFR/Lambda of the exhaust gas. The default range is 10-20 AFR, 0.68-1.36 Lambda, but you can change this through the NAW_7S Edit PC application.

Whenever NAW_7S is powered up the module goes through a 30 second heatup routine to gently bring the Bosch LSU sensor up to proper temperature. During the first 15 seconds the Linear output is programmed to output 5/3=1.66667 [volts]. From 15 to 30 seconds the output is programmed to output 10/3=3.33333[volts]. For advanced users, this information allows you to determine what offset and linear errors there are on the voltage output. During programming I calibrate the voltage output to remove majority of the offset and linear errors, what errors are left over is due to temperature and your vehicle's electrical system, supply voltage.

Simulated Narrowband Output:

Pin 11 on the screw terminal is the Simulated Narrowband output, the default switch point is 14.7 AFR, 1 Lambda.

Temperature LED Display

There are 3 color coded LEDs to indicate the temperature of the Bosch LSU sensor. During normal operations the Heater Status LEDs should almost always show that the sensor temperature is "perfect".

Whenever the NAW_7S is powered up the unit goes through a 30 second heatup routine to gently bring the Bosch LSU sensor up to proper temperature. During the Heatup routine, the Temperature LEDs will cycle from Cold to Hot. Once the heatup routine is finished the yellow LED should be light to indicate that the sensor is at proper temperature. There may be some oscillations from red to yellow immediately after the heatup routine is over, this is normal.
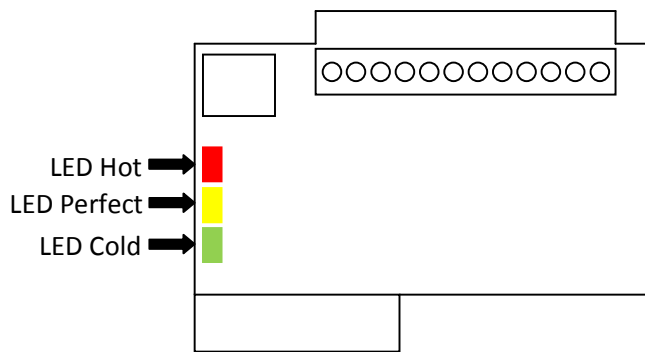
NAW_7S cannot be powered by USB, you must supply external power to the unit.

Before writing a piece of data (Free Air Calibration, Linear Voltage Output, AFR Conversion Factor) to NAW_7S, you should hit the "Query Info" button to ensure that the ComPort is available.

Each time a piece of data (Free Air Calibration, Linear Voltage Output, AFR Conversion Factor) is written from PC to NAW_7S, you must restart NAW_7S by cycling power for the new settings to become active.

USB Driver Installation

When NAW_7S is first connected to your PC's USB port, you will be prompted to install a driver.
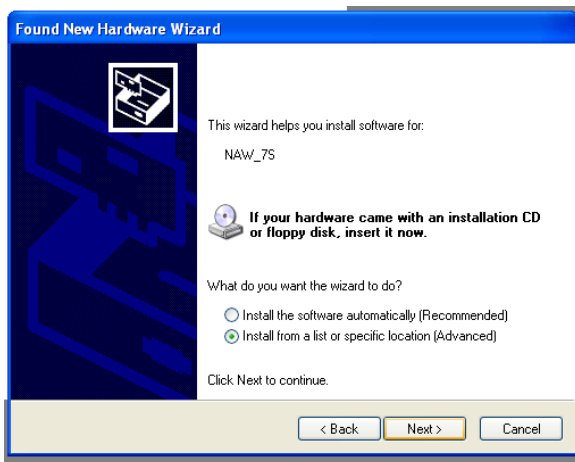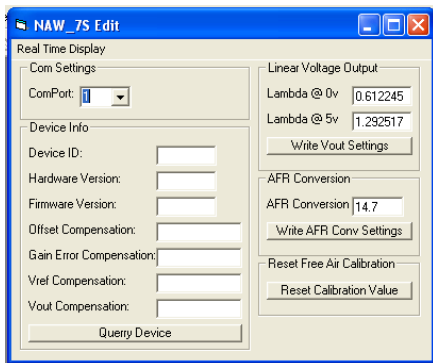

When prompted for the location of the driver, select "Install from a list or specific location"
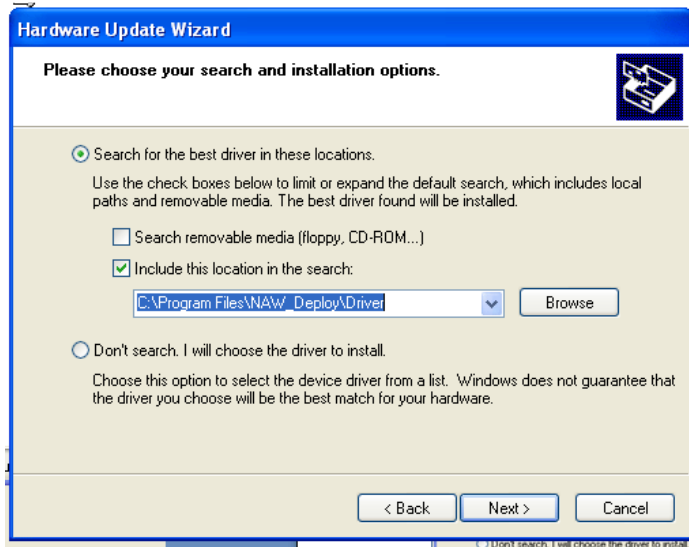
The driver is located in the "Driver" directory of where you installed NAW_Deploy. Most likely it will be "C:\Program Files\NAW_Deploy\Driver"
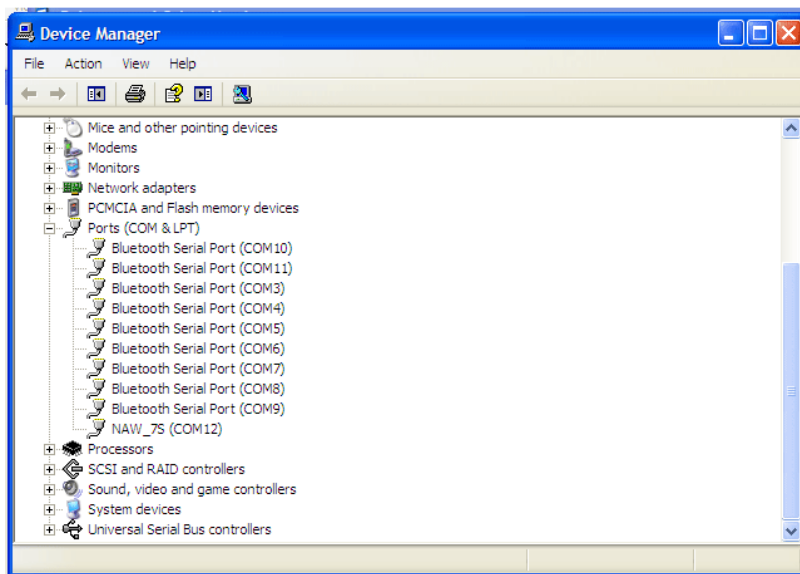
ComPort:

When you connect NAW_7S to your PC, the unit enumerates as a USB to serial device, that is it will appear as a serial port on your computer. As with any serial port, you must set the correct ComPort to be able to communicate with the device.

In windows XP you can find which comport to select by opening your "Device Manager"

In the picture above, "12" is the correct Comport.

Query Info:

Hitting the Query Device button will display information about your NAW_7S unit. Compensation data is hardware calibration data set during programming.

Linear Voltage Output:

You set the Linear Voltage Output by setting the "Lambda" at 0[volts] and the "lambda" at 5[volts], all points in between are automatically linearly interpolated. The default curve is 0.68 Lambda to 1.36 Lambda, this is equivalent to 10:1 AFR to 20:1 AFR for gasoline engines.

Before writing a piece of data (Free Air Calibration, Linear Voltage Output, AFR Conversion Factor) to NAW_7S, you should hit the "Query Info" button to ensure that the ComPort is available.

Each time a piece of data (Free Air Calibration, Linear Voltage Output, AFR Conversion Factor) is written from PC to NAW_7S, you must restart NAW_7S by cycling power for the new settings to become active.

AFR Conversion:

This sets the AFR Conversion for the LED display. AFR = Lambda * AFR Conversion. The AFR conversion for gasoline is "14.7".

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Each time a piece of data (Free Air Calibration, Linear Voltage Output, AFR Conversion Factor) is written from PC to NAW_7S, you must restart NAW_7S by cycling power for the new settings to become active.

Reset Free Air Calibration:

This resets the Free Air Calibration value stored onboard the NAW_7S .

Before writing a piece of data (Free Air Calibration, Linear Voltage Output, AFR Conversion Factor) to NAW_7S, you should hit the "Query Info" button to ensure that the ComPort is available.

Each time a piece of data (Free Air Calibration, Linear Voltage Output, AFR Conversion Factor) is written from PC to NAW_7S, you must restart NAW_7S by cycling power for the new settings to become active.

Reset NAW_7S Memory:

Sometimes downloading a new piece of data (Free Air Calibration, Linear Voltage Output, AFR Conversion Factor) will result in memory corruption onboard NAW_7S. Hitting the "Reset NAW_7S Memory" button will restore the memory to safe default values. After Resetting the memory you must cycle power to NAW_7S.
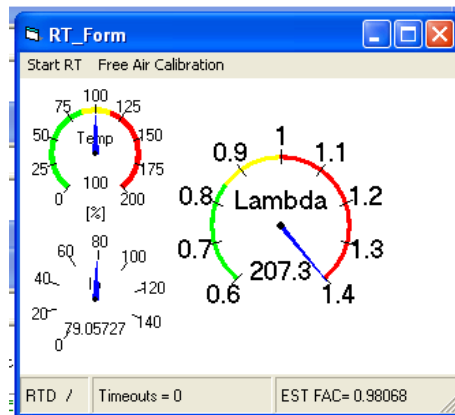
Start RT:

This will start and stop the Real Time Display

Lambda Gauge:

This displays the Lambda of the exhaust gas

Temp Gauge:

This displays the Temperature of the Bosch LSU sensor.

Ip Gauge:

This displays the pump current going to the Bosch LSU sensor, this information is primarily for diagnostic purposes and not meaningful for end users.

EST FAC:

This is the Estimated Free Air Calibration. While the real time display is running, the Estimated Free Air Calibration will be continuously updated and shown. The Estimated Free Air Calibration is only meaningful when the sensor is in Free Air and properly heated.

Free Air Calibration:

This will write the Estimated Free Air Calibration to NAW_7S. Free Air Calibration can only be triggered when the sensor temperature is in the yellow shaded portion of the Temperature Gauge. You must ensure that the Bosch LSU sensor is in "Free Air" and away from exhaust gases before you trigger Free Air Calibration, preferably you should pull the sensor out of your exhaust system before triggering Free Air Calibration.

Before writing a piece of data (Free Air Calibration, Linear Voltage Output, AFR Conversion Factor) to NAW_7S, you should hit the "Query Info" button to ensure that the ComPort is available.

Each time a piece of data (Free Air Calibration, Linear Voltage Output, AFR Conversion Factor) is written from PC to NAW_7S, you must restart NAW_7S by cycling power for the new settings to become active.

Warranty and Liability

There is a 6 month warranty on the NAW_7S unit only. There is no warranty on the; LED Display, sensor if supplied, display cable, or LSU cable parts.

The warranty does not cover damages due to; improper ventilation, improper wiring, improper handling, improper usage, physical damage, water damage.

Liability extends only upto your original purchase price