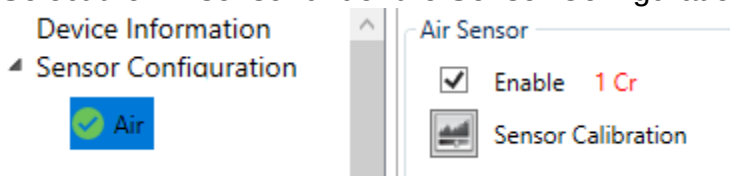
Air Temperature Sensor

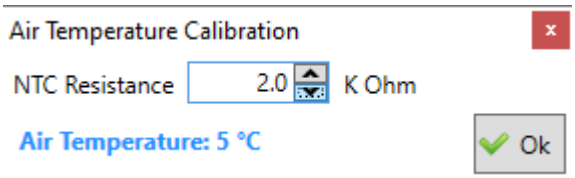
The Air temperature sensor is required to compensate for density changes in warm or cold air by changing fuel amount and spark timing. Not all engines have air temperature sensors mounted on them. Most sensors were incorporated in the MAS meter. Some are built into the map sensor like the Golf series. This sensor deviates between manufacturers so it is difficult to cater for all manufacturers. However, an aftermarket sensor can be installed and utilized effectively. Use a 10K NTC (Negative Temperature Coefficient) resistor. It has a fixed calibration curve which is programmed in the firmware and it cannot be altered. The ECU has a couple of ranges that can be selected. If the firmware is engine specific then the right calibration curve would be programmed for it.

Settings

Select the Air sensor under the Sensor Configuration Tab.



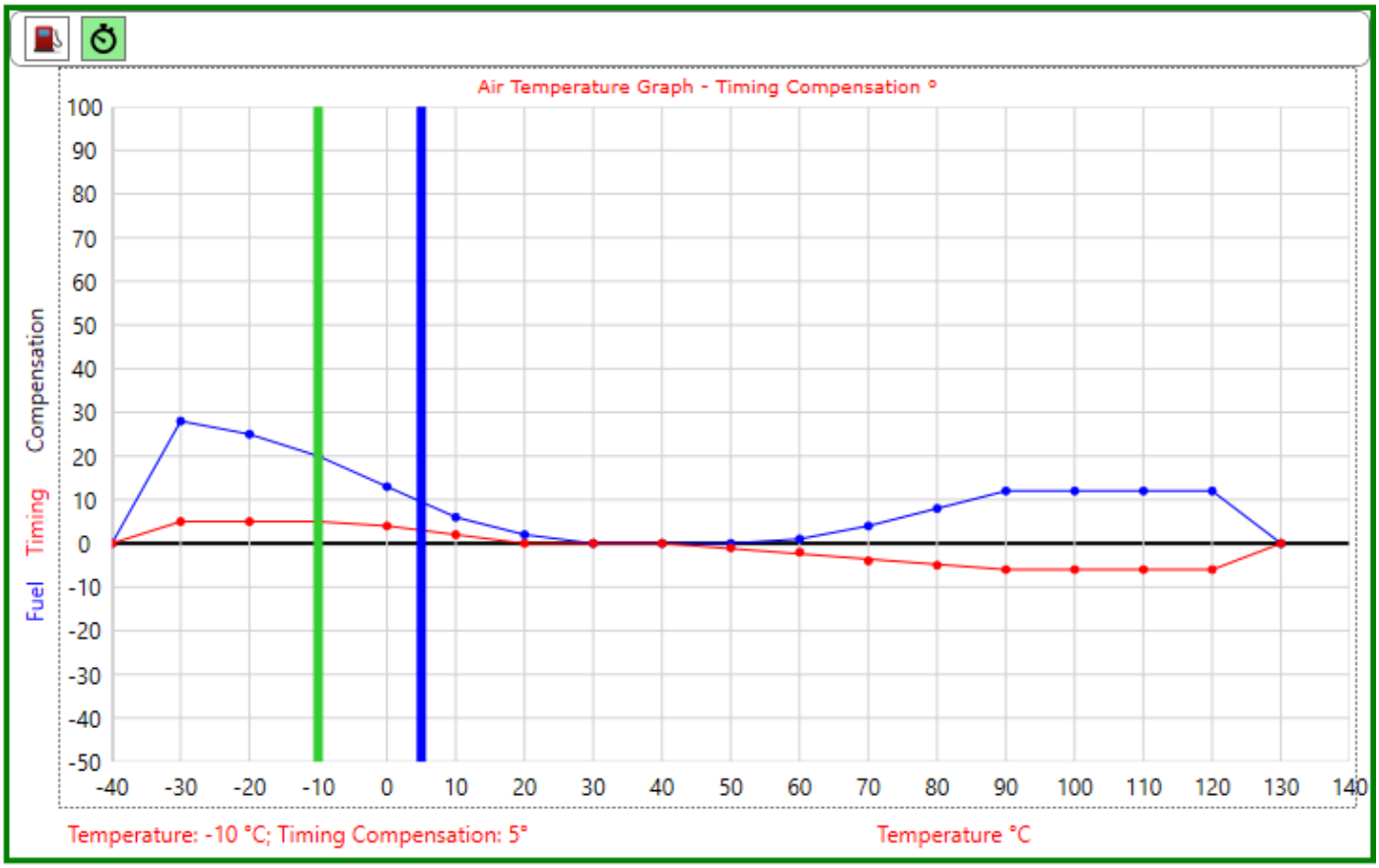
Select the right range for it with the lite Arrows.



Not that this will load a new curve and refresh the screen. Above a 2K curve is selected. This is the resistance of the sensor at 25°C. You can verify if you have the right curve if the sensor reading reflects the same value as your ambient temperature.

Tuning

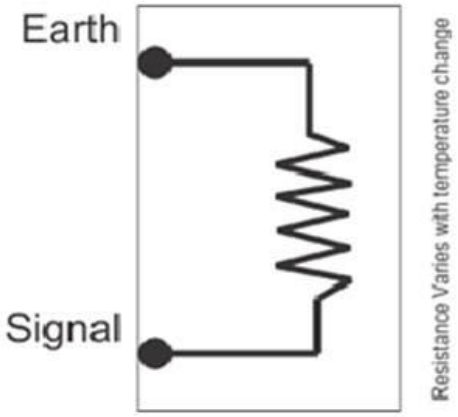
The Air Sensor is difficult to tune as you need controlled environment to do so effectively. Cold air is denser and requires more fuel and timing. You may be required to do adjustment tuning in the winter and then in the summer. The air temperature sensor is situated just before the throttle body (if installed). Remember to enable it on the active sensors page. When the engine is used in the winter, you may advance the timing slightly as the fuel burns at a slower rate. It may even require a richer mixture for these conditions. In the hot summer the engine may tend to detonate as a hot mixture burns more rapidly and the air is thinner. Then you may require to retard the timing slightly and lean out the air-fuel ratio. Remember if you tuned in the winter or summer your graph may tend to slope just on one side.



When air is cold it is denser and requires more fuel for the same AFR readings. When air gets hot you can lean out the fuel a bit on the blue line. The timing can also be advanced a bit for cold air and retarded for warm air. For Turbo engines hat air sometimes is cooled off by adding fuel to prevent melting the pistons. Notice the first and last digits are set to zero. This helps if the sensor breaks to disable compensation.

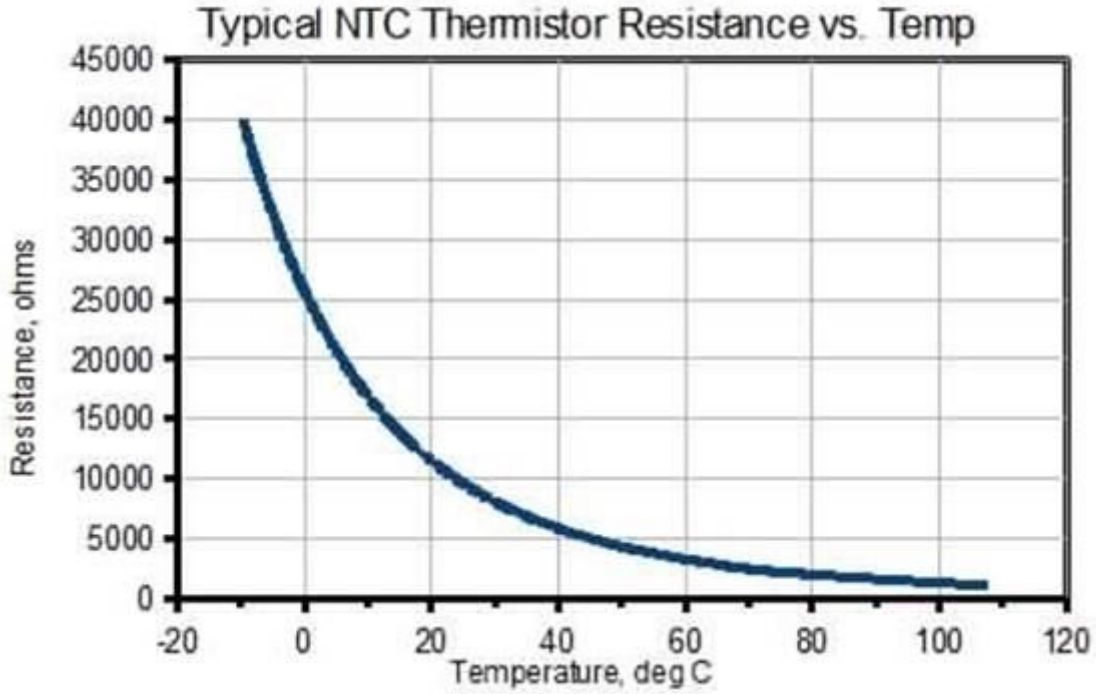
Sensors Description

The air temperature sensor is used by the ECU to correct air density changes due to air temperature variation. This input can also be used for general purpose output controls like Intercooler fans or water spray pumps.



Operation

The resistance of the temperature sensor changes in relation to the temperature it senses. It has a negative temperature resistance co-efficiency, (NTC). Each sensor has a preprogrammed curve to indicate its resistance to temperature. Note that the Spitronics ECU uses a 10K resistance NTC and this value is measured at 25°C.(See below for a sample of such a curve.)



Electronics sensors

Spitronics build and supply small sensors for customers to build into their own units. There are 2 sizes, both do the same work. Note: These sensors require a pull-up resistor to enable a constant current through them. (See below a picture of what these sensors look like in their raw form.)

How to measure a sensor

Use a multi-meter set to the 20,000 Ohm (20 K) range. With the sender unit at approximately 25°c, measure the resistance. It should be between 8000ohm and 12000ohm at 25°c.

Multiple Devices on One Sender Unit

Do not share temperature sender units between two devices. Only one device may be coupled onto a sender unit at any one time. Both devices will excite the sensor with current which in turn will change the signal value and then both will display the wrong temperature. In such a case you may need to add an extra sensor for the Spitronics ECU. The only exception for this rule is when a data logging device is used that has no internal pull up resistor. Example: Race Technology DL1.

Sensor Location

The ideal sensor location is before the butterfly and after the intercooler if turbo charged. Mount away from fuel “stand-off” to avoid the sensor being cooled by the fuel vapor. Use a High Speed Air Temp sensor on turbo applications where the intercooler comes out as temperature varies quickly.