

# TECHNICAL NEWSLETTER

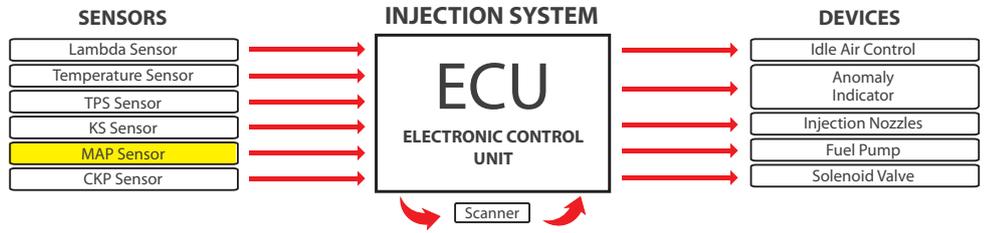
## Manifold Absolute Pressure Sensor (MAP)



Worldwide Exporter  
of Automotive Technology

### ELECTRONIC CONTROL UNIT (ECU):

Through the sensors, the ECU monitors the system operation all the time and, through the actuators, it corrects its operation.



### CONCEPT:

What is absolute pressure?

Absolute pressure is the total pressure exerted on a surface, i.e., it is the pressure measured in the pressure gauge plus the atmospheric pressure. Therefore, absolute pressure shall always be positive or null. The pressure we measure in the vacuum pump is a gauge pressure under the influence of atmospheric pressure. Therefore, the operator must pay attention, as most reference tables for values of MAP represent the atmospheric pressure at sea level. The higher the altitude of the region, the lower the voltage displayed in the sensor, which leads to a mistaken diagnosis, affecting the part.

### LOCATION:

In older vehicles, the MAP sensor is fixed next to the engine and connected to the intake manifold through a hose. As for more modern vehicles, which use the integrated MAP, the sensor is screwed directly in the intake manifold (it does not need a pressure outlet hose).

### PRINCIPLE:

The manifold absolute pressure sensor (MAP) informs the electronic control unit (ECU) the absolute pressure measured inside the intake manifold under the several operation conditions of the engine. The value obtained is added to the information of air temperature. With these data, the system identifies the air mass that is coming in, calculates the progress of the ignition and the time for opening the injection nozzle, always looking for the ideal air/fuel ratio.

Another function of the MAP sensor is to measure the local atmospheric pressure every time the ignition is turned on. This type of information helps the system to automatically adjust to altitude changes.

#### Integrated MAP sensor

In more modern vehicles, the MAP sensor is integrated and its function is to inform the pressure in the intake manifold and the temperature of the air.

Air temperature is measured by using a thermistor integrated to the MAP sensor.

This thermistor is an element with negative temperature coefficient, which electrical resistance decreases as the air temperature increases.

### HOW CAN I TEST THE MAP SENSOR OF ASTRA 2.0 8V?

#### 1 – Check the sensor supply

- Turn on the ignition without starting the engine;
- Disconnect the wiring harness from the MAP sensor;

- Adjust the multimeter to the VDC scale;
- Insert the test leads into terminals 1 and 3 of the wiring harness;
- The voltage observed should be around 5 V.

**Note:** The operator should not forget to check the battery voltage before starting the tests.

#### 2 – Analyze the MAP sensor signal

##### Engine off

- Connect the MAP sensor wiring harness again;
- With the multimeter in the VDC scale and the ignition still on, check the voltage in terminals 1 and 4;
- The voltage should be approximately 3.8 V.

##### Engine on

- Start the engine and let it idle;
- Check the sensor signal in terminals 1 and 4 again;
- The voltage should be close to 1.2 V.

**Note:** The tests should be performed with the air conditioning off.

**Option:** The operator can also use a vacuum pump to analyze the operation of the MAP sensor. Therefore, the value of the depression applied and the voltage value in the table are compared.

Depression (mmHg)	0	100	200	300	400	500	600
Voltage (VDC)	3,8	3,3	2,7	2,2	1,7	1,2	0,7

#### IDLE CONDITIONS

\*The table above is suitable for Astra 2.0 8V models

#### 3 – Measure the resistance of the air temperature sensor

- Remove the sensor from the intake manifold;
  - Adjust the multimeter to read the ohmic resistance;
  - Analyze the electrical resistance in terminals 1 and 2;
  - The resistance should be approximately 2 KΩ at 25°
- \* The thermistor (temperature sensor) is a NTC thermistor, i.e., as the air temperature increases, its electrical resistance decreases.



**WARNING:** A bad sensor has a direct impact on the calculation of the air mass supplied to the engine and, consequently, the volume of fuel injected, making the mixture poor or rich, and also affects idle control, acceleration response, and fuel consumption.

A good MAP sensor may be doomed after a misdiagnosis, as it suffers direct electrical and mechanical influence. This is the reason why, while analyzing the operation of the sensor, the operator should check:

- 1 - If the sensor pressure outlet hose (if any) is pierced, folded or clogged;
- 2 - False air inlets;

- 3 - Lack of timing belt synchronism;
- 4 - Stuck valves;
- 5 - Clogged catalytic converter;

- 6 - Last, but not the least, if the MAP sensor hose is positioned in the vacuum outlet port below the throttle plate.