MAP Sensor

-Manifold Absolute Pressure Sensor

Technical Spec

ECOTRONS LLC

Note: If you are not sure about any specific details, please contact us at info@ecotrons.com.

Product: **MAP Sensor**

Part #: **EPM100**

Note: All data given in this document are nominal values and might be subject of change at any time

Index	Page	Revision	Date	Note
1	----	**First Edition**	11.26.2013	V1.3
2	----	**Second Edition**	12.16.2013	V1.3.1
3	----	**Third Edition**	12.20.2013	V1.3.2
4	----	**Fourth Edition**	4.8.2014	V1.3.3
5	----	**Fifth Edition**	7.11.2014	V1.3.4
6	----	**Sixth Edition**	2.17.2017	V1.3.5

Table of Contents

1 Characteristic

2 Applications

3 Installation instructions

4 MAP sensor calibrations

5 Diagnostics and Service (with Ecotrons EFI)

6 Appendixes: Mechanical CAD Drawing

General Description

This MAP sensor uses MEMS technology and Application Specific Integrated Circuit (ASIC) technology, and it is specifically designed for small engine electronic fuel injection system to continuously monitor the manifold pressure or Barometric pressure, and send the analog voltage signal for the absolute pressure measured to the Electronic Control Unit (ECU). It is used as main input for the ECU to calculate the injection quantity or the pulse width duration.

Most small engines have one or two cylinders and the manifold is small and short. The manifold pressure is very dynamic and has a lot of pulsations with the engine running. This requires the MAP sensor has a high resolution and accuracy to measure the dynamic manifold pressure. This MAP sensor has a fast response rate and high accuracy. For small engine fuel injection system, the pulsation of the MAP sensor signal is often used to indicate the phase of the engine; therefore the Camshaft phase sensor can be saved. This is a common practice in the industry, especially for single cylinder engines.

For small engines, manifold is small and short, some time there is no manifold, simply a throttle body and a boot that is used to connect to the engine. So there is often no room for regular automotive MAP sensor to mount. This MAP sensor is small and easy to mount with a little hose. It can be mounted anywhere close to the throttle body. All you need is a little hole and a tube to connect this MAP sensor to the manifold or downstream the throttle plate.

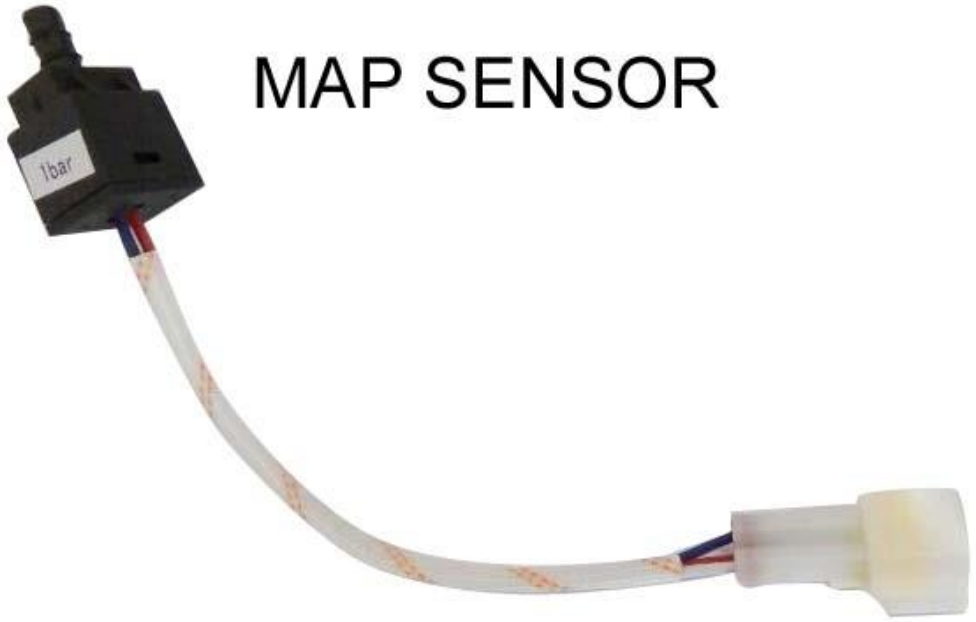
This product is small size, and easy to assemble.

1 Characteristic

1.1 Electrical connection

This MAP sensor requires a +5v power supply, and a ground return and has an analog voltage output.

The sensor output is in 0-5v range. It is linear proportional to the pressure measured.



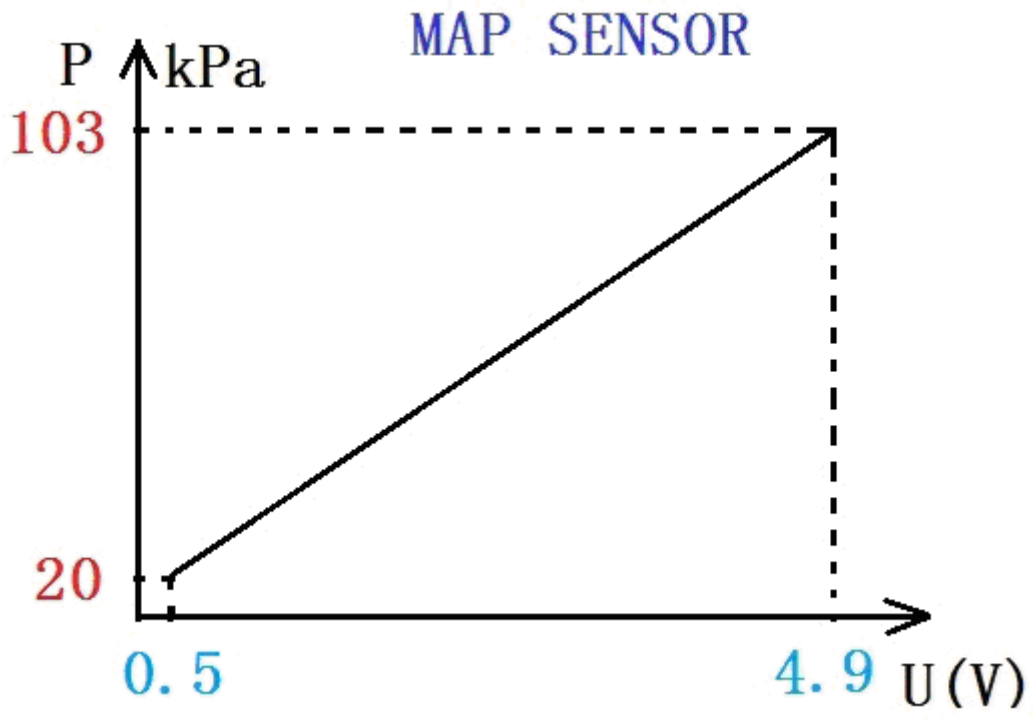
Pin1:	Signal wire	Output	Blue
Pin2:	Ground wire	Ground	White
Pin3:	Power wire	+5V	Red

1.2 Sensor electrical parameters

Working current	<10mA
Response time	<2ms
Static accuracy	±1.8%FS
Pressure Range	20～103kPa
Operating Temperature	－40 °C ~ 120 °C
Compensated Temperature	0 °C ~ 80°C
Storage Temperature	－40 ~ 130 °C
Max. Voltage	7 VDC
Supply Voltage	5±0.5 VDC
Output Voltage	0.5~4.9VDC
Pressure Port size	4mm hose (fuel resistant)
Overload Pressure	300kPaA

Output Type	0-5V
Pressure Cycles	30,000kms or more than one year
Media Compatibility	Air
Weight	16g

1.3 Nominal characteristic curve



The MAP sensor output is an analog voltage, in 0-5V. The voltage is linear proportional to the absolute pressure measured. The above figure shows the linear relation between the voltage and the pressure.

The MAP sensor actual output voltage is between 0.5v to 4.9v. The top room and bottom room are reserved for diagnosis purpose. This means, if you see a MAP sensor voltage below 0.5v or above 4.9v; there is something wrong with your wire connections or the sensor is shorted.

2 Applications

2.1 Typical Applications

A: Small engine Intake Absolute Pressure Measurement
B: Barometric Pressure Measurement

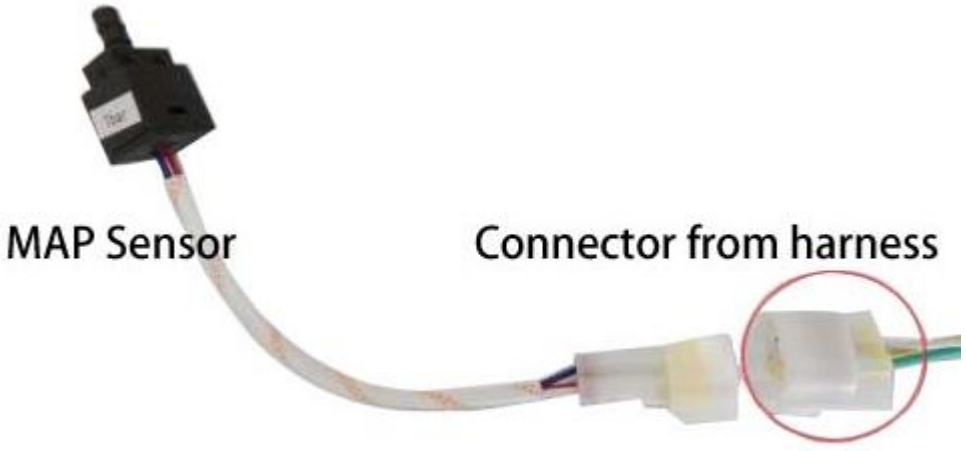
2.2 Main characteristics

1) Programmable ASIC which Enhanced Reliability
2) Amplified Signal with Temperature Compensated
3) Electro-Magnetic Interference (EMI) Protection
4) Wide working temperature range
5) Vibration resistant
6) Anti-thermal shock
7) Small size and easy to assemble

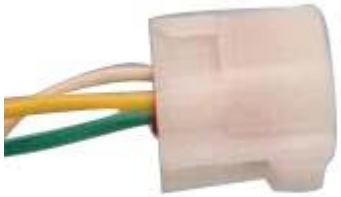
3 Installation instructions

There is a mating connector from Ecotrons ECU harness. When using Ecotrons EFI system with this MAP sensor, you just need to plug in, you cannot miss it.

If using this MAP sensor with the third party EFI system, you must make sure the pin-out of the MAP sensor matches the third party ECU/harness pin-out definitions.



Definition of pin-out of the MAP sensor connector on the Ecotrons Harness:
Note, the wire color coding is different on the harness side than the sensor side.



Green wire: GND
Yellow wire: VCC
White wire: Signal

Connect the MAP sensor to the intake manifold with a small hose (6mm diameter) in 4 stroke engine, this hose needs to be fuel resistant, and it can not be too soft. Here is a sample picture:

The example to install the MAP sensor

Important Notes for installation of the MAP sensor:

- Connect the Map sensor to the manifold or the throttle body (downstream

of the throttle pate), and make sure it is air tight! MAP sensor is meant to measure the pressure between the throttle plate and the intake valve.

- You need a short hose to connect; less than 2 inches or 5cm long, no longer than 4 inches or 10cm. too long a hose can cause big deviation of the sensor reading.
- The MAP sensor should not be too closed to the engine block. Air cooled engine block can get to 200 C degree which is much higher than the MAP sensor working temperature. This can damage the Map sensor.
- MAP sensor itself is not fuel proof. You shall avoid fuel getting into the MAP sensor chamber. This means you shall install the MAP sensor on top of the throttle body or manifold, so that the gravity will pull the fuel down to the manifold, in case the fuel gets into the tube.
- Make sure the MAP sensor hose is not severely bent, or not routed in circle; there could be a pocket that the fuel puddle stuck. Fuel puddle could damage the MAP sensor.

Incorrect installation of the MAP sensor can cause not-able-to-start engine, or it can short the MAP sensor life.

4 MAP sensor calibrations

Calibration with Ecotrons EFI system

Abbreviation and Acronym

P: pressure of Map sensor measured (hPa)
U: output voltage of Map sensor
VAL_PmapGrd: "gradient / slope for manifold pressure sensor characteristics, pressure = voltage * gradient + offset" (hPa)
VAL_PmapOfs: "offset for manifold pressure sensor characteristics"(hPa)

P=U* VAL_PmapGrd+ VAL_PmapOfs

Calculation:
20kPa=200hPa…….U=0.5V
103kPa=1030hPa…….U=4.9V
VAL_PmapGrd= 188.641(hPa)
VAL_PmapOfs= 105.664(hPa)

5 Diagnostics and Service (with Ecotrons EFI)

When you first get the MAP sensor, if you notice the Map sensor is physically damaged or broken, whether it is because of shipping or defect, contact us for warranty info. Please take a picture of the damaged sensor.

After you connect the MAP sensor to harness, when ECU power is on, and the MIL-lamp is on. You can use Ecotrons EcoCAL software to read the (diagnostic trouble code) DTC (see details here: http://www.ecotrons.com/support/). If the DTC is for MAP sensor, you can use EcoCAL to read the voltage of MAP sensor (uMap). If uMap is either 5V or 0V, please check the harness and MAP sensor connector, likely somewhere it is shorted. If all wires are correct, the MAP sensor might be faulty one. Contact us for warranty info.

EcoCAL screen, by default, shall show a group of the gauges, one is the MAP gauge. You can read the gauge to determine whether it makes sense or not. For example, before you start the engine, the MAP should read as nearly the ambient pressure.
Note, the gauge, by default, reads metric pressure ("kPa").
You can go to the "Menu → Setting →Toggle Units" to change to "Imperial units".

6 Appendixes: Mechanical CAD Drawing **(Unit: mm)**