

# **TPS SENSOR**

-Throttle Position Sensor

## **Technical Spec**

## ECOTRONS LLC

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

Product: Throttle Position Sensor

## Part #: ETS28X

**Comment:** All data given in this document are nominal values and

might be subject of change at any time

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1		First Edition	11.26.2013	V1.3
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- 5 Appendixes: Mechanical CAD Drawing



## **1** Characteristic

#### **General description**

This throttle position sensor (TPS) is mechanically linked to the throttle plate and the sensing element has an arm that rotates with the throttle plate. The arm has a contact point on the potentiometer which acts like a voltage divider.

The potentiometer has a +5V supply and ground return. The middle point is the output voltage point. The voltage is proportional to the rotational angle of the throttle plate.

This TPS sensor is designed for small engines. It is small in size, easy to install. It has a long life and high reliability.

The sensor is also designed for water splashing proof and dust proof, meeting the IP63 standards.

## 1.1 Circuit diagram of TPS



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## **1.2 Electrical connection**



From left to right: Signal, GND, VCC

## **1.3 Output characteristics**





## **2** Applications

## 2.1Sensor specifications

#### 1) Basic specifications

NO.	Item	Criteria
1	Electrical rotation angle	100°
2	Mechanical rotation angle	125°
3	supply voltage	DC +5V
4	Storage temperature	-40 °C120 °C
5	Operating temperature	-40 °C120 °C
6	Total resistance	3kΩ±20%
7	Output Linearity	±2%
8	Installation torque	49.03 mN.m(MAX)
9	Weight	16g

#### 2) Durability:

Rotation life cycles:	500 million, Cycle	
Vibration durability:	50~2000Hz, Max 25G	
Thermal shock:	-40 °C ~120 °C,	
Water resistance	JIS D0203	
Oil resistance:	Gasoline, Oil, 24Hr	

## 2.2 Typical application

The TPS sensor is used for small engine mechanical throttle bodies.

## 2.3 Electrical diagnostic design (reference)

#### ECU Diagnostic circuit





Note: a pull up resistor is recommended in the ECU circuit. This will be used for electrical diagnosis of the sensor wires.

## **3 Installation instructions**

## 3.1 Install the TPS sensor on the throttle body

Install the TPS sensor on the throttle body with a supplied screw tight.

## 3.2 Connect the TPS sensor to ECU harness

Note: Ecotrons EFI system is used as reference. If you are using other EFI system, please make sure if the wire colors and pin-outs are matching to your EFI system.

#### 1) Electrical connector installation:



#### Definition of TPS connector:

From left to right White wire: output signal (TPS) Green wire: ground wire (GND) Yellow wire: power Vcc (+5V DC)

**Note**: When you plug in the sensor mating connector from the harness, make sure the connector is fully latched, you should hear a "snap" noise if it is fully plugged in. It could require some force, since there is a rubber seal inside for water proof. The rubber seal usually creates some resistance for latch.

#### 2) Double check after installation

You can use a voltage meter or simply Ecotrons EcoCAL software to check the TPS sensor, after installed with EFI.

"uTps is the voltage of the TPS sensor output in EcoCAL software"

a) When the throttle fully closed (idle position), check the voltage of TPS, by

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EcoCAL (0.3V < uTps < 1V).



b) When the throttle is fully open (WOT position), check the voltage. (4V < uTps < 4.8V)



c) If the voltage of throttle sensor is not between 0.3V to 4.8V, you can rotate the sensor to adjust the voltage.



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**Note:** The voltage of throttle sensor is normally in the range from 0.3 to 4.8V

### 3.3 Installation Notes

a) TPS sensor is not water submersible proof.

b) Avoid the sensor in a dusty or muddy environment. The dust or debris that might get into sensing element will cause deficiency of the sensor.

c) Every time a new sensor is installed or a new ECU is installed in Ecotrons EFI system, the TPS sensor idle position and WOT position will be self-adapted. To trigger this learning process is to create a "power fail" of ECU, meaning, with Key On, disconnect the ECU and then key off, then reconnect the ECU.

d) Sensor mounting torque should not exceed 49.03mN \* m (MAX), to prevent the sensor damaging.

## **4 Diagnostics and Services**

You can use Ecotrons EcoCAL software to run the diagnosis of the TPS sensor. Power on the EFI system, and if the MIL lamp (LED) is on, it means there is an error in the system. Please use EcoCAL to read DTC if ECU reports a DTC code for TPS sensor failure.

Go to menu->Diagnostic:



Diagnostic				<b>E</b>
Diagnostic Tro	uble Code			
Component	DTC Code (HEX)	Error	Whether the error has been healed	History
MAP	0102	Working Properly	YES	NO
TPS	020B	Max error;	YES	NO
CKP	0302	Working Properly	YES	NO
IAT	0402	Working Properly	YES	NO
ECT	0502	Working Properly	YES	NO
Battery	0602	Working Properly	YES	NO
02 sensor1	0800	Working Properly	YES	NO
02 sensor2	0900	Working Properly	YES	NO
Read D	DTC	Clear DTC	Exit	

"There is something wrong with the TPS sensor!" This means there is an error of TPS sensor in the system.

Throttle body position sensor error, please check the TPS connection, and see the sensor voltage of fully closed and wide opened (4.8V>uTps>0.2V)

A quick check with the EcoCAL is to read the TPS position gauge as in the below window: 0% when throttle is fully closed. And 100% at WOT.

More information, please refer to the chapter 8.2.1 of EFI Tuning Guide. You can find the EFI Tuning Guide from the link. http://www.ecotrons.com/support/











