

TECHNICAL NEWSLETTER

# PEDAL POSITION SENSORS



## SENSORS:

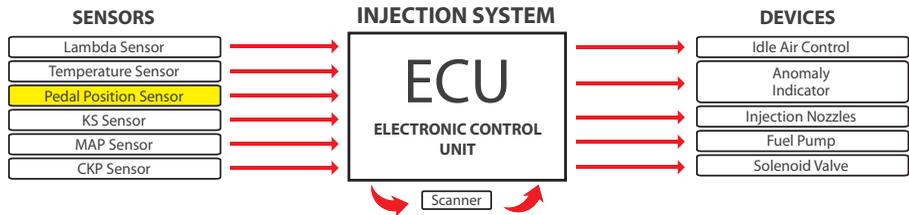
- Accelerator Pedal Position
- Cluth and Brake Pedal Position



AUTOMOTIVE TECHNOLOGY

**CONCEPT:**

Drive by Wire, also known as Electronic Throttle, was first used in Formula One by the McLaren team. This system uses an electronic complex (pedal position sensor, motorized throttle body and the ECU) to accelerate the engine, thus eliminating the old and problematic throttle cable. Such system ensures comfort to the driver, with a smooth drive, providing fuel economy and lower pollutant emissions.



**PRINCIPLE:**

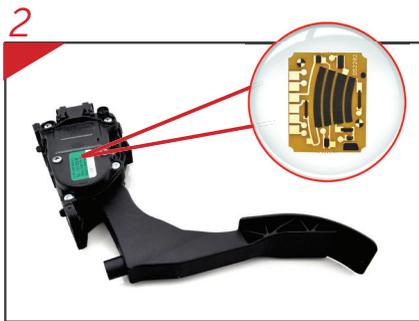
The accelerator pedal position sensor includes two potentiometers, the main potentiometer, and the safety potentiometer, integrated in the same space. Both are supplied with 5 V on an independent basis. The output voltage of the first potentiometer ranges from 0 to 5 V, depending on the position of the accelerator pedal. On the other hand, the instantaneous value of the output voltage of the second potentiometer is equal to half the output voltage of the first potentiometer. This redundancy increases the level of reliability of the information sent by the sensor. When the pedal is pressed, the electrical signal of the sensor is used by the ECU, which, on its turn, identifies the position of the pedal. With data sent by the other sensors (sensor of water temperature of the engine, MAP sensor...), the ECU makes some corrections and manages the demand for torque through the throttle plate, so it has an exact opening. The throttle plate is controlled by an electric motor that can reach its total opening, obtaining total acceleration and a perfect idle. Manufactured with magnetic technology, the DS Acceleration Pedal Position Sensor avoids corrosion problems related to humidity, wear, and poor contact, and it also ensures greater accuracy and durability.

**LOCATION:**

The sensor may be fixed to a device that connects the throttle cable to the electric wiring harness or the pedal, as shown in the images below:



**1. 2201 Sensor (Renault) connected to the throttle cable.**



**2. Acceleration pedal with embedded potentiometer (no cables).**

**PROCEDURE FOR INSTALLATION OF THE CARD:**



Remove the set screws from the lid very carefully in order to avoid damage to the contact pads that connect with the card;

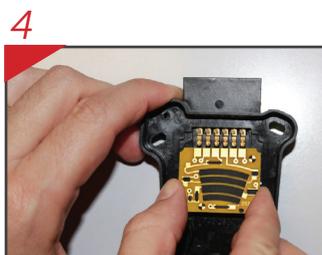


Remove the damaged card;

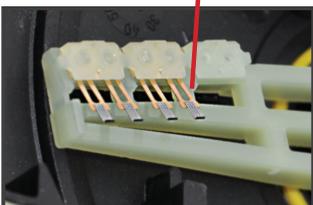


Remove the lid very carefully, keeping the knuckle contact;

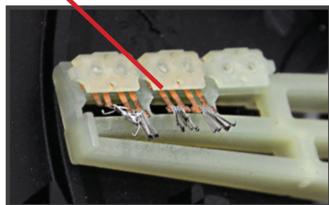
**WARNING:**  
If they are damaged, we recommend the replacement of the whole pedal.



Place DS card according to the direction of the contact pads, always holding it by the sides. Avoid contact with the signal traces and conducting wires as much as possible;



**PRESERVED**



**DAMAGED**



Place the lid in the center of the oblong space and tighten the screws;

**OBLONG SPACE FOR DISPLACEMENT AND ADJUSTMENT OF THE LID**

Reinstall the pedal in the vehicle.

HOW DO YOU TEST THE ACCELERATOR PEDAL POSITION SENSOR OF A FOX 1.0 (DS2202):

PEDAL PINS	FUNCTION
1	Supply of the 2 <sup>nd</sup> potentiometer
2	Supply of the 1 <sup>st</sup> potentiometer
3	Grounding of the 1 <sup>st</sup> potentiometer
4	Sign of the 1 <sup>st</sup> potentiometer
5	Grounding of the 2 <sup>nd</sup> potentiometer
6	Sign of the 2 <sup>nd</sup> potentiometer



1 - Check the sensor supply:

- Turn on the ignition without starting the engine;
- Adjust the multimeter to the VDC scale (DC voltage);
- Insert the test leads into pins 1 and 5 to check the supply of the 2<sup>nd</sup> potentiometer;
- The voltage obtained should be around 5 V ±0.1;
- Insert the test leads into pins 2 and 3 to check the supply of the 1<sup>st</sup> potentiometer;
- The voltage obtained should be around 5 V ±0.1.

2° Analyze the sensor signal:

PERFECT CONDITION

1



Place the cap of the pedal in the center of the oblong space. (Ideal position for adjustment). Still with the multimeter at the VDC scale (DC voltage) and the ignition on, check the sensor signal as follows:

PINS	PEDAL AT REST
3 and 4	0,70V to 0,80V
5 and 6	0,35V to 0,40V

**Note:** In this condition, we have the perfect idle speed at 900 rpm with a good pedal response time

ACCEPTABLE CONDITION

2



If the cap is in the total clockwise position, it will show the following:

PINS	PEDAL AT REST
3 and 4	0,50V
5 and 6	0,25V

**Note:** In this condition, we have the perfect idle at 900 rpm, but the pedal response time will be longer.

IRREGULAR CONDITION

3



If the cap is in a total counterclockwise position, it will show the following:

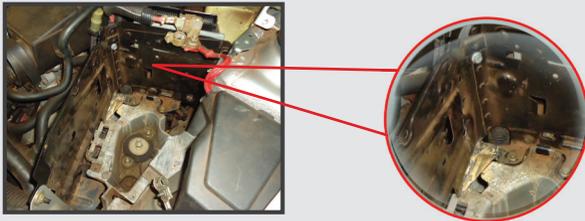
PINS	PEDAL AT REST
3 and 4	0,90V
5 and 6	0,45V

**Note:** In this condition, we have a high idle at 1,500 rpm as, in pins 3 and 4; the limit for adjustment is 0.85V. If it is higher than that, there will be an error when we increase the idle.

PROCEDURE FOR INSTALLATION OF THE DS 2201 – RENAULT CLIO 1.6 16V 2006:

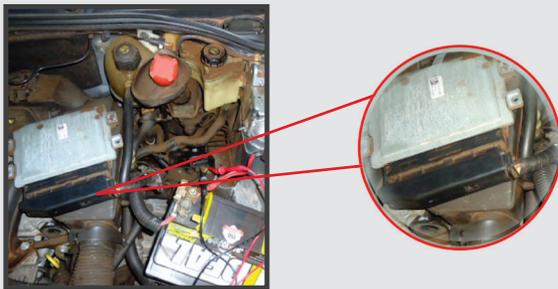
**Step 1:** Disconnect and remove the battery;

**Step 2:** Disconnect the ECU wiring harness and remove it with the support;



**Step 4:** For required adjustments, you will need to place the battery back and connect it. At this moment, you do not need to fix it in the correct position;

**Step 5:** Remove the ECU from the support and connect the harness;



**Step 6:** Install the DS 2201 in the center of the oblong space. Tighten it slightly, only to fit the part so that it spins in the device. Connect the harness;

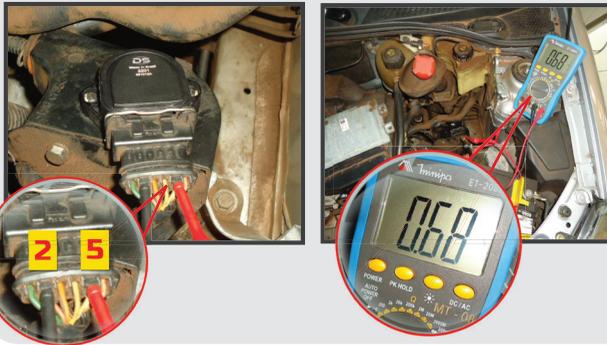
**Step 3:** You may verify the device now. Pull it up and remove the bad sensor;



**Step 7:** Adjust the multimeter at the continuous voltage scale (20 V) and check pins 2 and 6. The voltage obtained should be 0.35 ( $\pm 0.05$  volts). If not, spin the part in the device until you get the correct reading;

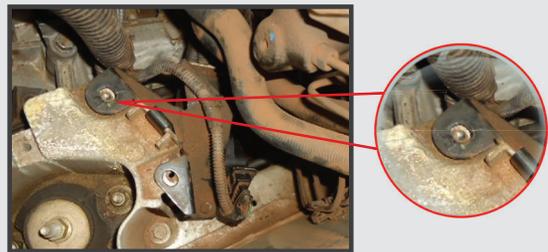


**Step 8:** Keep the part position and check pins 2 and 5. The voltage obtained should be 0.70 ( $\pm 0.05$  volts), in other words, it should double pin 6;



**Step 9:** With the part correctly positioned, tighten the screws very well;

**Step 10:** Place the sensor device correctly and temporarily fix it with one screw, so that the device does not move in the next step;



**Step 11:** Start the engine and check the throttle response. If you can, check it with the scanner;



**WARNING:**

If the throttle cable is stretched (out of position), throttle will not work.

**Step 12:** If the throttle response is correct, stop the engine. Remove the ECU and the battery from the temporary place and correctly assemble all items in their proper places



**ADVANTAGES OF THE ELECTRONIC THROTTLE:**

- Better performance;
- Total control of the acceleration;
- Great engine response;
- Better control of the idle;
- Soft acceleration;
- Better resumption;
- Saving of fuel.

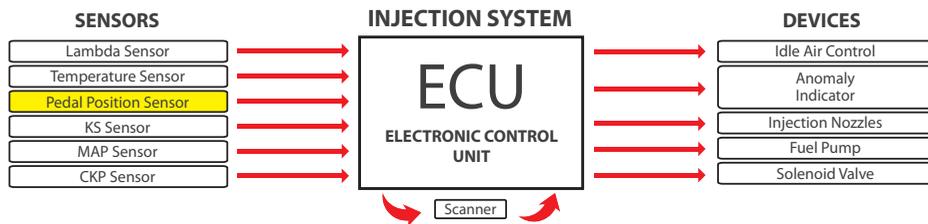


**WARNING:**

- Fix the screws tightly;
- Evaluate the conservation state of the electric wiring harness;
- If possible, apply a seal paint on the screws;
- A low battery results in a loss of synchronism (pedal/ECU/throttle body).

**CONCEPT:**

The pedal switch, used in older vehicles, goes out and gives space to a resistive sensor with dual function – more appropriate to modern vehicles. The position sensors of the DS Pedal are electronic, providing durability and more accurate and instantaneous information for the ECU (ELECTRONIC COMMAND UNIT).



**WORKING PRINCIPLE:**

The Clutch Sensor sends the signal to the ECU, which upon receiving this information cuts off the acceleration so that the engine speed decreases and the driver is able to easily perform the gearshift of the vehicle. This strategy reduces the emission of pollutants and, consequently, improves the fuel consumption. The brake sensor sends the signal to the ECU, which, upon receiving this information, activates the brake lights. This information is also used on vehicles equipped with autopilot. When the driver touches the brake, the sensor sends the signal to the ECU. The unit then activates the brake lights and disables the autopilot.

**LOCATION:**

Attached to the bracket, pedals are interconnected by means of a pedal pin engaged on the sensor guide.



**HOW TO TEST THE CLUTCH SENSOR OF A MONTANA 1.4 VEHICLE (DS 2217):**



**Attention**

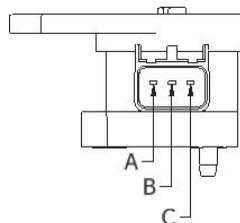
DS Pedal Sensors are electronic, ie it has no resistive track. Hence, THE OHMIC RESISTANCE IS NOT TESTED.

**1° Step:** Check sensor supply

- Turn on the ignition key;
- Set the multimeter on the Vdc (Continuous Voltage) scale;
- Insert the probes into terminals A (red tip) and C (black tip);
- The voltage checked should be around 5 volts.

**2° Step:** Analyze the pedal sensor signal

- Still with the Vdc (Continuous Voltage) scale and the ignition on, check the voltage at terminals B and C;
- The read voltage should fit the range of the table below:



A: 5,0 (Vdd) Positive  
B: Signal (Vdd)  
C: Ground Negative

SITUATION	PEDAL WITHOUT ACTIVATION (REST)	FULLY ACTIVATED PEDAL
Screwed to the pedal	3,90 to 4,20 volts	0,50 to 1,10 volts

### INSTALLATION PROCEDURE:

Clutch Pedal Sensor Replacement Procedure:

**1** - With the ignition off, remove the defective sensor from the pedal;

**2** - Install the DS Pedal sensor and connect the sensor harness;

**3** - Run the diagnostic scanner to eliminate all malfunctions;  
If the faults are not eliminated directly, the calibration procedure must be carried out, as follows:

\* Procedure performed on an Onyx 2014, Automatic, with the help of a PDL 5500 Scanner.

**1° Step:** Connect the PDL 5500 scanner to the vehicle;

**2° Step:** Select the Scanner option;

**3° Step:** Select the vehicle manufacturer;

**4° Step:** Select the year of the vehicle;

**5° Step:** Select the vehicle;

**6° Step:** Select the vehicle engine (the engine description can be found easily in the vehicle document);

**7° Step:** Confirm the data;

**8° Step:** Select the "Engine" option;

**9° Step:** Select the type of transmission of the vehicle;

**10° Step:** Select the "Functional Tests" option;

**11° Step:** Select the "Output Control" position;

**12° Step:** Select the option to learn the clutch pedal sensor / learn the brake pedal.

**4** - Start the engine and check the proper operation.



### CARE:

The cross reference (Original code x DS code) is the best way to identify the model corresponding to the vehicle. The pedal sensor may be damaged if mounted on a pedal other than its application. Some procedural errors lead the applicator to deception. Therefore, you should be aware of:

- Incorrect sensor attachment (sensor fork in relation to the support pin);
- Electric harness with problem;
- The height of the brake and clutch pedals must always be the same (aligned). Any deviation may have an effect on the sensor malfunction.

The most common defects caused by failures in the Pedal Sensor circuit are:

- Injection light on;
- Difficulty in carrying out the gear engagement;
- High fuel consumption;
- Loss of activation of the rear brake lights;
- Loss of autopilot drive.