

TEMPERATURE SENSOR

TECHNICAL INFORMATION

Operation

They are "Thermometers" that convert temperature into electric signals in order to be interpreted by on-board electronic systems.

Application

Used in on-board electronic systems for the following measurements:

- **Engine Temperature:** In the injection/ignition electronic systems, measuring the cooling fluid's temperature in engines cooled by water or the oil's temperature in engines cooled by air.
- **Air Temperature:** In the injection/ignition electronic systems, measuring the temperature of the inlet air.
- **Environment Temperature, inner and outer:** In the electronic climatic systems, measuring the air temperature.
- **Battery Temperature:** In the integrated alternator control systems, measuring the battery temperature.

Operation Principle

The main component used on Temperature Sensors for automotive systems are thermistors (NTC type resistors). These Sensors are composed by a capsule or support, where the NTC element is assembled. (Fig. 1). As showed in (Fig. 2), the main feature of the thermistor (NTC: Negative Temperature Coefficient) is presenting an accentuated variation of its electric resistance in relation to its the temperature.

Temperature increase → resistance reduction

Temperature reduction → resistance increase

The Sensor assembly depends on the application intended. When intended for engine's temperature measurement, the NTC element is located inside a protection capsule, isolating it from the cooling fluid.

For Sensors destined to air temperature measurement (air cooling, outer/inner air), the NTC element remains exposed to air flow.

Note: The air cooling temperature (ACT) can be associated to the manifold pressure Sensor (MAP) forming a combined sensor, which in some cases is identified as MAT.

Location

Engine Temperature Sensor: In the Thermostatic Valve, in the engine block or in the intake manifold base, in cases where the cooling fluid flows through it (engines powered by alcohol).

Air cooling Temperature Sensor: In the intake manifold (multipoint systems) or in the cap of the butterfly body (monopoint systems).

Use

Engine Temperature Sensor - Used to:

- Adjust the fuel mixture: enriching mixture while engine is cold.
- Adjust timing: causes delays when engine is hot in order to avoid detonation.
- Control the radiator's fan.

Air cooling Temperature Sensor - Used to:

- Adjust the Ignition point.
- Calculate the admission's cooling air mass in "speed/density" systems.

When it does not work

- Engine Temperature Sensor: Increases consumption and causes hesitation. In early ignition systems can cause engine choking.
- Air Temperature Sensor: Detonation; irregular idle speed, overheating.

Maintenance

Important actions when to changing the Temperature Sensor:

- Avoid excessive tightening.
- Bleed the air (remove air bubbles) from the cooling system.

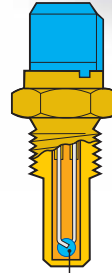
Diagnostic

For these Sensors there are three failure types:

1. The Sensor sends the wrong information, but inside the working range.
2. The Sensor sends the wrong information out of the working range (Sensor in short or open).
3. The information is wrong (short or open) for certain temperatures (intermittent failure).

Fig. 1

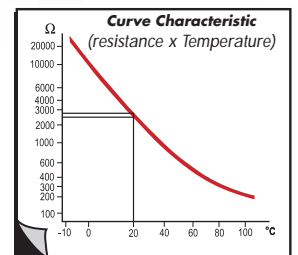
TEMPERATURE SENSOR



NTC TERMISTOR



Fig. 2



In all cases, the diagnostic can be accomplished with the use of test equipment ("scanner") or voltmeter.

For case 1: Use mode "visualization of operation parameters" and compare with the actual engine's temperature or cooling air temperature.

For case 2: Use mode "Read stored failures".

For case 3: With the Sensor connected and using a voltmeter, check the presence of eventual non continuity (tension peaks) in the sensor's signal measurement, while the engine heats from environment temperature until normal working temperature. The Sensor analysis (short or open) is performed with the use of an ohmmeter. To check the calibration, in addition to the ohmmeter, it is indispensable to have in hands the calibration schedule supplied by the manufacturer.

Cares

- Always check the correct electronic Temperature Sensor for each vehicle model.
- Never perform a maintenance repair while the cooling system is hot. There is a great risk of burning traumas.
- At any symptom of excessive temperature, park the vehicle in a safe place and turn off the engine immediately.
- Check the cooling fluid level weekly, with the engine cold.
- Always use the specified cooling fluid and the correct rate.
- Do not complete the cooling system with pure water, because this will dilute the ethylene glycol concentration.
- Any reduction in the cooling fluid level indicates a leaking in the cooling system.
- Perform the preventive maintenance of the Temperature Sensor every 30.000 Km.

Warranty

- The MTE-THOMSON products are warranted by 01 year against manufacture or material defects, starting from the purchase date, by the final user.
- The warranty is not valid for parts damaged due to installation errors, wrong application or accident.
- The replacement will occur in the purchase place, by means of the presentation of the purchase bill, according to the description on the Warranty Procedures.
- This warranty is valid only for MTE-THOMSON products.