Spitronics - Coolant Temperature Sensor - Guide

1. Overview

The water temperature sensor is mainly used for cold-start compensation in fuel and ignition timing.

It is also used for:

- Idle control
- Accelerator pump compensation
- Prime pulse adjustment

⚠ If the sensor is not connected, the engine may not be drivable when cold

Most fuel-injected engines have a water temperature sensor mounted near the thermostat housing. Not all sensors are compatible with the Spitronics ECU, but suitable aftermarket sensors are available.

👉 Spitronics ECUs use a **2K NTC (Negative Temperature Coefficient) sensor**

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2. Sensor Characteristics

- Type: NTC resistor
- Nominal value: **2 kΩ at 25°C**
- Fixed calibration curve (cannot be changed in firmware)

The reading can be slightly adjusted using a calibration offset.

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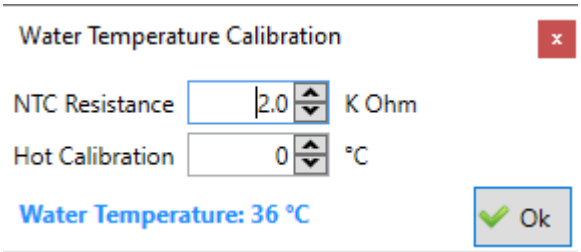
3. Calibration

Click the **Calibrate** button next to the Coolant Sensor checkbox.



Procedure

- Start with **Hot Calibration** at the default value = 0°C
- If selectable, choose the NTC resistance chart that correlates with your sensor reading
  👉 The software will refresh after each selection to reload the calibration chart
- Bring the engine up to normal operating temperature

- Compare the software reading with the actual sensor temperature
- Adjust the **Hot Temperature** value until the software reading matches the sensor temperature
- Click **OK**, then save the calibration to the ECU

If the Error is Large

- Replace the sensor, or choose a different curve if available
- Use the **2K sensor supplied by Spitronics**

👉 Use **Save to ECU** to make changes permanent

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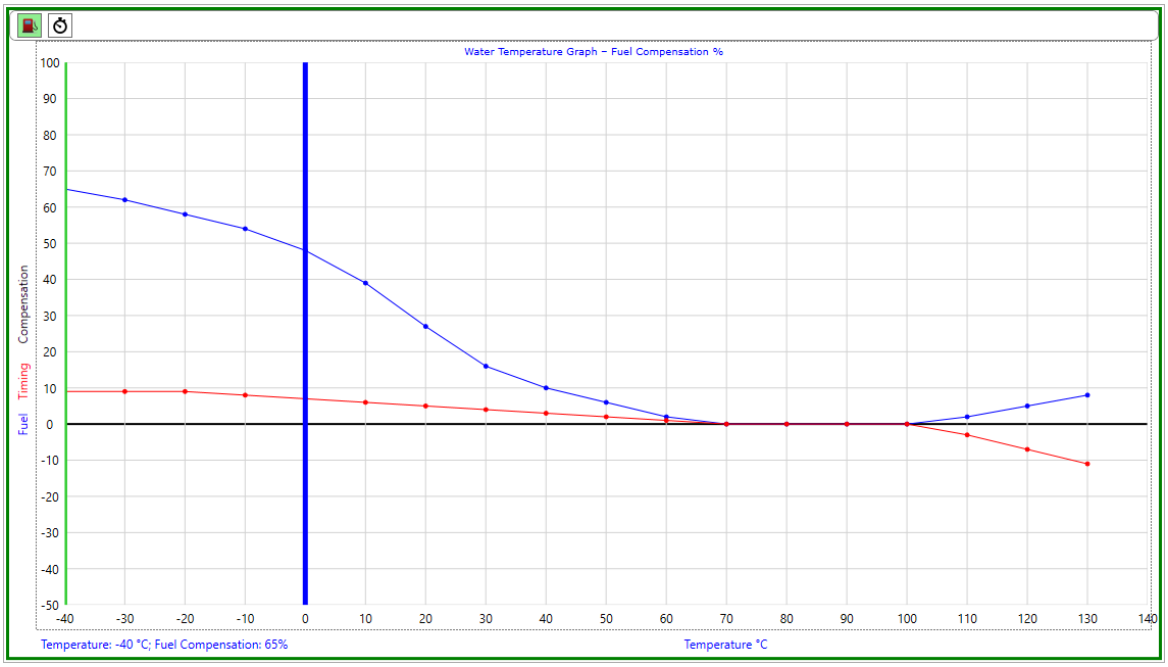
4. Seasonal Tuning

Adjustments may be required between winter and summer.



Cold Conditions

- Slightly advance timing
- Increase fuel
- Richer mixture may be required (especially with racing fuel)

Hot Conditions

- Retard timing
- Increase fuel slightly

👉 A richer mixture helps cool the engine

⚠ The thermostat regulates maximum temperature, so tuning changes may be subtle

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5. Cold Start Setup

Water temperature correction must be set when the engine is cold.

Procedure:

1. Start with a base graph
2. Start the engine and let it idle
3. Adjust AFR to be slightly rich
4. Fine-tune:
    - Prime pulse
    - Start enrichment
    - Accelerator pump

👉 Aim for smooth starting and pull-off when cold

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6. Sensor Operation

The sensor resistance changes with temperature.

- Type: NTC (resistance decreases as temperature increases)
- Each sensor has a predefined resistance curve
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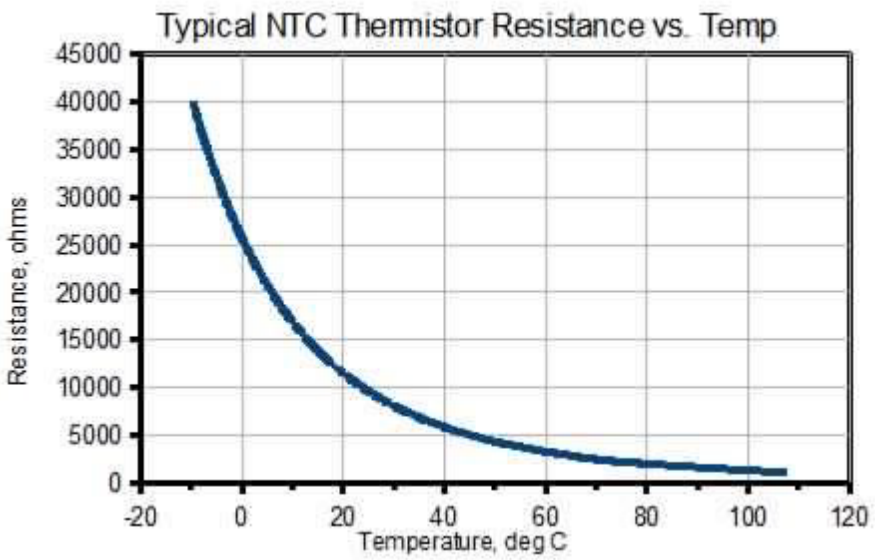

👉 The Spitronics ECU expects **2K at 25°C**

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7. Measuring the Sensor

Use a multimeter set to the **10 kΩ range**.

1. Measure resistance at approximately 25°C
2. Expected value: **1800–2200 Ω**

👉 These two pins are used by the ECU

Additional pins (if present):

- Typically used for dash cluster
- Around **3500 Ω at 25°C**

Multiple Sensors Example

Some engines (e.g. Toyota 1UZ-FE) have multiple temperature senders.

👉 Use resistance measurement to identify the correct sensor

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8. Multiple Devices on One Sensor

⚠ Do NOT connect multiple devices to the same sensor
- Each device supplies current
- This alters the signal
- Results in incorrect readings on both devices

👉 Use a separate sensor for the Spitronics ECU

Exception:
Data loggers without internal pull-up resistors (e.g. Race Technology DL1)

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9. Sensor Location

👉 Best location:
- Engine side of the thermostat

This provides:
- Accurate temperature
- Faster response

⚠ Radiator side will:
- Show lower temperatures
- React slower

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10. Air-Cooled Engines

For air-cooled engines:

👉 Measure **cylinder head temperature**, not oil temperature

Reason:
- Oil heats up too slowly

A simple sensor can be made by:

- Mounting a 2K NTC thermistor on a lug terminal
- Bolting it to the cylinder head

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11. Spitronics Sensors

Spitronics supplies small temperature sensors for custom installations.

- Available in two sizes
- Same functionality

⚠ These sensors require a **pull-up resistor** for correct operation

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💡 Notes

- Always enable the sensor in the **Active Sensors** page
- Incorrect sensor type will result in incorrect readings
- Always verify resistance before installation