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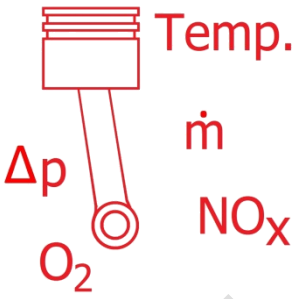


Installation instructions for exhaust gas temperature sensors M-TS Part.-No. 80010, 80012, 80013

Content:

Status August 2014

1. Installation

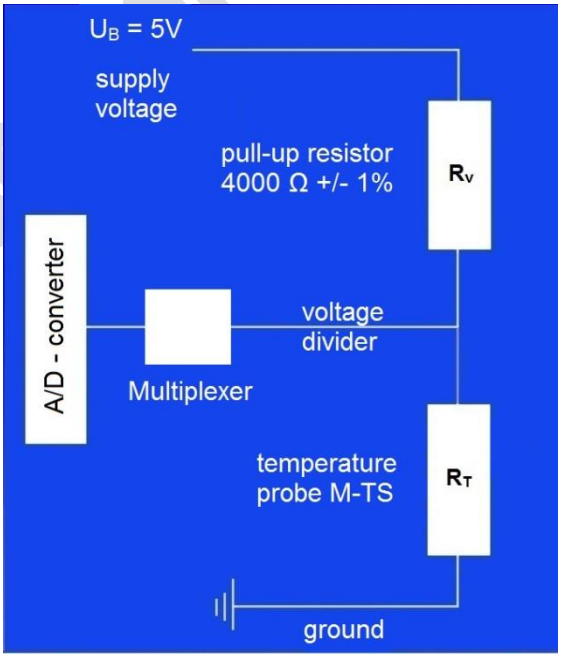
The temperature sensor M-TS is an exhaust gas temperature sensor or intake temperature probe in closed housing design. In contrast to "open types" no restrictions regarding the installation have to be considered. It is possible to equip the product with male or female threads. The standard nut size is 17 mm and the recommended fixing torque is 45 Nm. Every 50,000 km a visual inspection should check proper and tight fit of the probe. Also check the cable and connectors. Ideally the measuring element that is located ca. 3 mm from the tip of the protection tube hits the hottest zone of the gas flow.

2. The signal

EngineSens offers a gauge that fits directly to PRTD Pt1000 of the M-TS. To read the sensor signal of the M-TS in a separate circuit board or to compute the signal in programmable software, the use of a voltage divider circuit is inevitable. The signal output is equivalent to the characteristic curve described in DIN EN 60751 tolerance class B.

3. Electrical connection: voltage divider circuit

We recommend the connection to a supply voltage of 5 V DC stabilized, as it is common use in the automotive industry. Usually each ECU provides such a power source. The white wire is to be connected to the ground whereas the gray wire leads to the voltage divider circuit. This is a standard in automotive wiring. Interchanging the connectors is allowed and will not show any negative influences. Unlike other exhaust gas temperature sensors, the polarity of the M-TS does not matter. If only a 12 V DC electrical system is available, this voltage has to be transformed to 5V DC and to be stabilized. Use positive voltage regulators (e. g. STMicroelectronics L7800 series) to transform and to stabilize at 5 V DC. Do not forget to use a heat sink. The maximum allowable current of the sensor element is 1.3 mA. The voltage divider circuit should be designed as follows:



4. Characteristic curve of the temperature sensor M-TS

The temperature sensor changes its electrical resistance as a function of the temperature at the sensor tip. The max. permitted temperature at the tip is 400°C.

The used PRTD Pt1000 generates a resistance of 1000 Ω at 0°C. At a tip temperature of 400°C the resistance value increases to 2471 □□ The R-T curve starting from 0 ° C follows the mathematical term:

R (T) = 1000 □ (1 + α * T * T + β ²)

Here T is the temperature at the sensor tip

α = 3.9083 * 10-3 C-1
β = -5.775 * 10-7 C-2

This results in the following table:

T [°C]	R [Ω]
-40	842,5
0	1000,0
50	1194,0
100	1385,1
150	1573,3
200	1758,6
250	1941,0
300	2120,5
350	2297,2
400	2470,6

The curve corresponds to the DIN EN 60751 Class B.

5. Processing the voltage divider circuit signal

In a PCB designed to the layout of 1.1 the generated signal voltage value represents the measured temperature at the sensor tip.

Temperature [°C]	**Signal Voltage**
-40	0,87 Volt
0	1,00 Volt
50	1,15 Volt
100	1,29 Volt
150	1,41 Volt
200	1,53 Volt
250	1,63 Volt
300	1,73 Volt
350	1,82 Volt
400	1,91 Volt

In case of questions contact us.

Always good success!

Your Team

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