ECT

-Engine Temperature sensor

Technical Spec

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

Product: **Engine Temperature Sensor**

Part#: **ET-EC202**

Note: All data given in this document are nominal values and might be subject of change at any time

Index	Page	Revision	Date	Note
1	----	**First Edition**	11.26.2013	V1.3
2	----	**Second Edition**	12.16.2013	V1.3.1
3	----	**Third Edition**	12.20.2013	V1.3.2
4	----	**Fourth Edition**	4.8.2014	V1.3.3
5	----	**Fifth Edition**	2.15.2017	V1.3.4

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General Description

ECT sensor is the short name of Engine Coolant temperature sensor. It is a standard abbreviation of SAE J1979. Our ECT sensor is actually a cylinder head temperature (CHT) sensor. Since ECT is so widely used, we also use it. Our ECT sensor is designed to be bolted on the engine cylinder head, and measures the temperature directly, since most small engines are air cooled, and there is no coolant.

ECT sensor signal is used as an important input for an engine control unit (ECU) to adjust the fuel metering and AFR control; and also finely tune the other control parameters in variant operating conditions. It is also used as a measurement value which is logged in a data acquisition system.

This ECT sensor has a NTC sensing element, which means Negative Temperature Characteristics. This means, with the temperature rising, the resistance of the sensing element drops.

1 Characteristic

1.1 Sensor Picture



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1.2 Characteristics Parameters

Zero power resistance	R25=2KΩ+1%	25 °C
B-value	B25/50=3470k±1%	
Thermal time constant	7s max	in static air
Dissipation constant	0.6mW/°C ~0.95mW/ °C	in static air
Power rating	3mW	
Operating temperature range	-40 °C ~150 °C	
Storage temperature range	0~120 °C	
Weight	11g	

1.3 Characteristic data

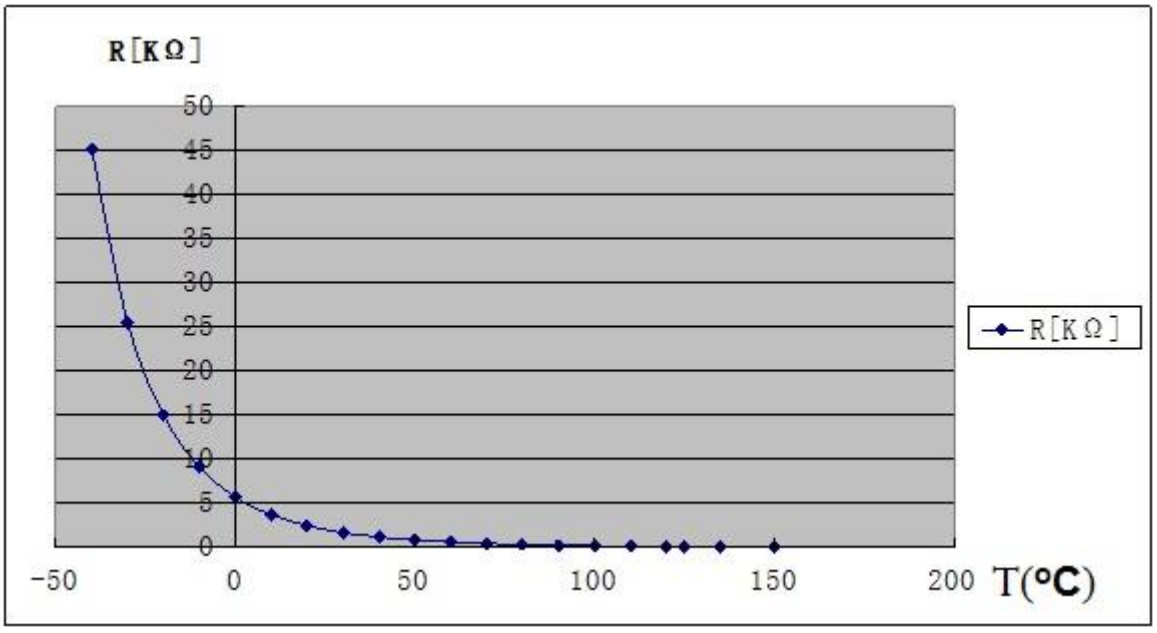
Rnor: nominal resistance
R+1%: nominal resistance with +1 % error.
R-1%: nominal resistance with -1 % error.

T(°C)	R +1%(kΩ)	Rnor(kΩ)	R -1%(kΩ)
-40	47.0831	45.186	43.361
-30	26.47022	25.54894	24.65726
-20	15.4542	14.996	14.54994
-10	9.33748	9.10596	8.87928
0	5.82072	5.70302	5.58714
10	3.73668	3.67722	3.61834
20	2.46434	2.43514	2.40604
30	1.67186	1.65214	1.6325
40	1.16396	1.14604	1.12828
50	0.82814	0.81258	0.79724

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60	0.59836	0.5852	0.57228
70	0.43878	0.42778	0.41702
80	0.32624	0.31712	0.30822
90	0.24658	0.239	0.23164
100	0.18846	0.18218	0.17608
110	0.14578	0.14056	0.1355
120	0.11404	0.10968	0.10548

1.4 Nominal characteristic curve plotted



R-T characteristics

2 Applications

2.1 Typical Applications

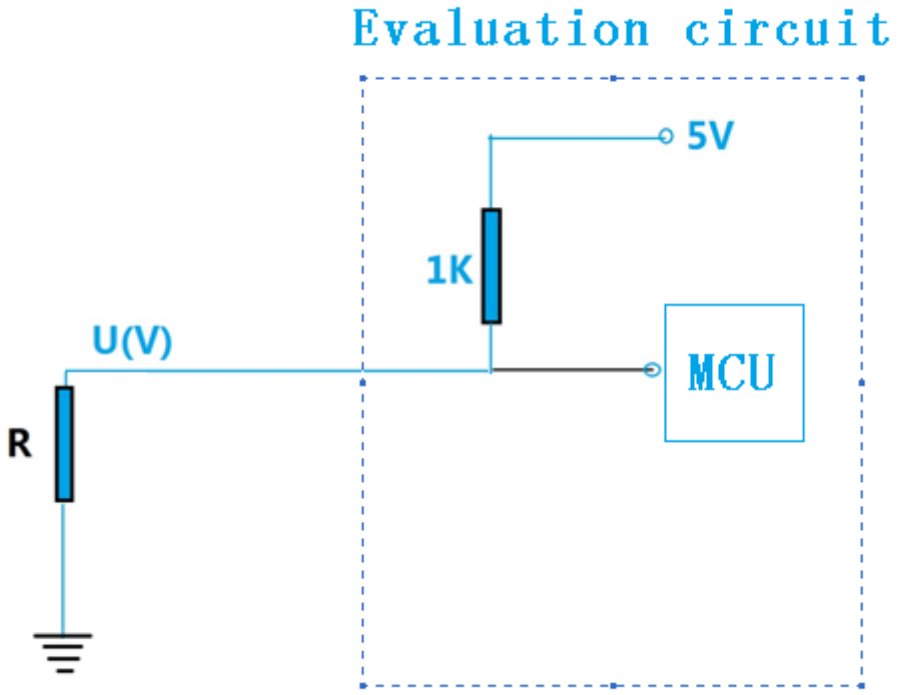
This ECT sensor is normally used with an “Air Cooled” engine. It should be bolted on the engine cylinder head, where the heat is mostly reflecting the real engine temperature. It can also be used with a “liquid cooled” engine, ECT does

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not measure the coolant temperature, but the cylinder head temperature.

2.2 Electrical application notes

Here is a reference design of the circuit to be used for the ECT sensor:



R: the resistance of ECT sensor
U (V): the voltage of ECT sensor to input ECU

$$U(V) = \frac{R}{R+1} * 5$$

20 °C: R_{20}=2.43514 $U_{20}(V) = \frac{2.43514}{2.43514+1} * 5\,V = 3.5445V$

100 °C: R_{100}= 0.18218 $U_{100}(V) = \frac{0.18218}{0.18218+1} * 5\,V = 0.77053V$

(B25/50=3470K ±1%)

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3 Sensor testing

3.1 Mechanical testing

Items	Test condition	Requirement
vibration	Vibration frequency:50±10Hz; Vibration acceleration: 10±1g; Vibration direction: horizontal and vertical Vibration time: one hour in two directions	No visible damage, parameters are within definition
impact	Impact frequency: 50±10 times/min; Impact acceleration:100±10g; Impact direction: horizontal and vertical; Impact cycles: 1000 times in two directions	No visible damage, parameters are within definition
Free fall	Free fall from height of 1m on glass surface for 15 times	No visible damage, parameters are within definition

3.2 Environmental testing

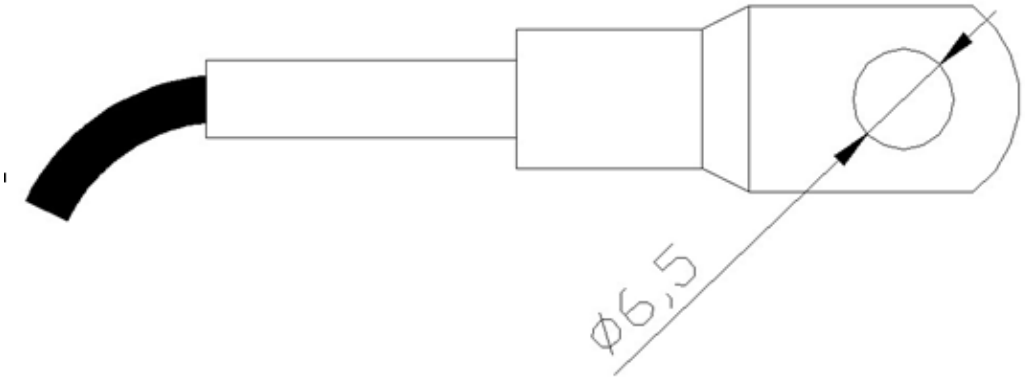
items	Test condition	Requirement
High temp	T=175 °C±2 °C, t=96h	R25<=±3% R25/50<=±2%
Low temp	T= -30 °C±2 °C, t=96h	R25<=±3% R25/50<=±2%
Temperature cycling	-30 °C~150 °C 30 minutes per cycle, 5 cycles total	No visible damage, parameters are within definition
Humidity test	60 °C, 95%R.H, 1000 hour	R25<=±3% R25/50<=±2%

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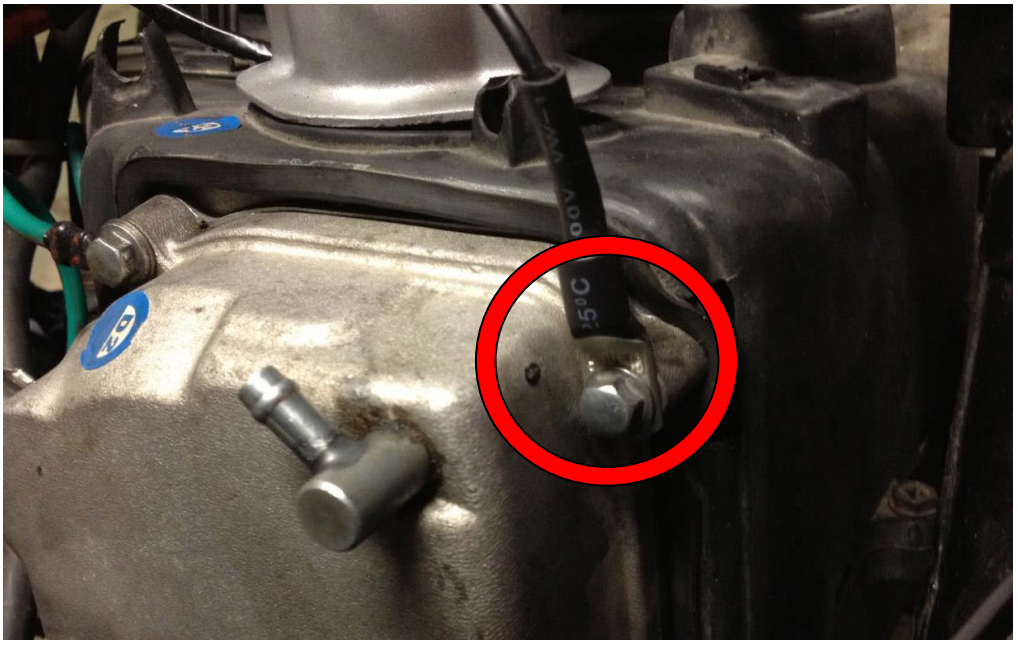
3.3 Other testing

items	Test condition	requirement
Lead wire welding ability	Soak lead wires with flux, immerse into flux at 230-260 ^{o}C, for 3 to 5 seconds	Tim covered area should be larger than 90%
Lead wire stretching test	Fix the product and apply 1.5kg force on axial direction of each lead wire, for 10 seconds.	----------
Lead wire bending test	Fix the product and apply 250g force on axial direction of each lead wire, then bend both lead wires to same direction slowly, before bending them back to original location, for 3 times.	No visible damage, parameters are within definition

4 Installation instructions



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Find a suitable place on the cylinder header, where it has the lowest air flow (usually the backside of the engine), attach the sensor to be bolted tight.

5 Sensor diagnostics

With an Ecotrons EFI system, you can use EcoCAL software to do quick diagnosis on the ECT sensor.

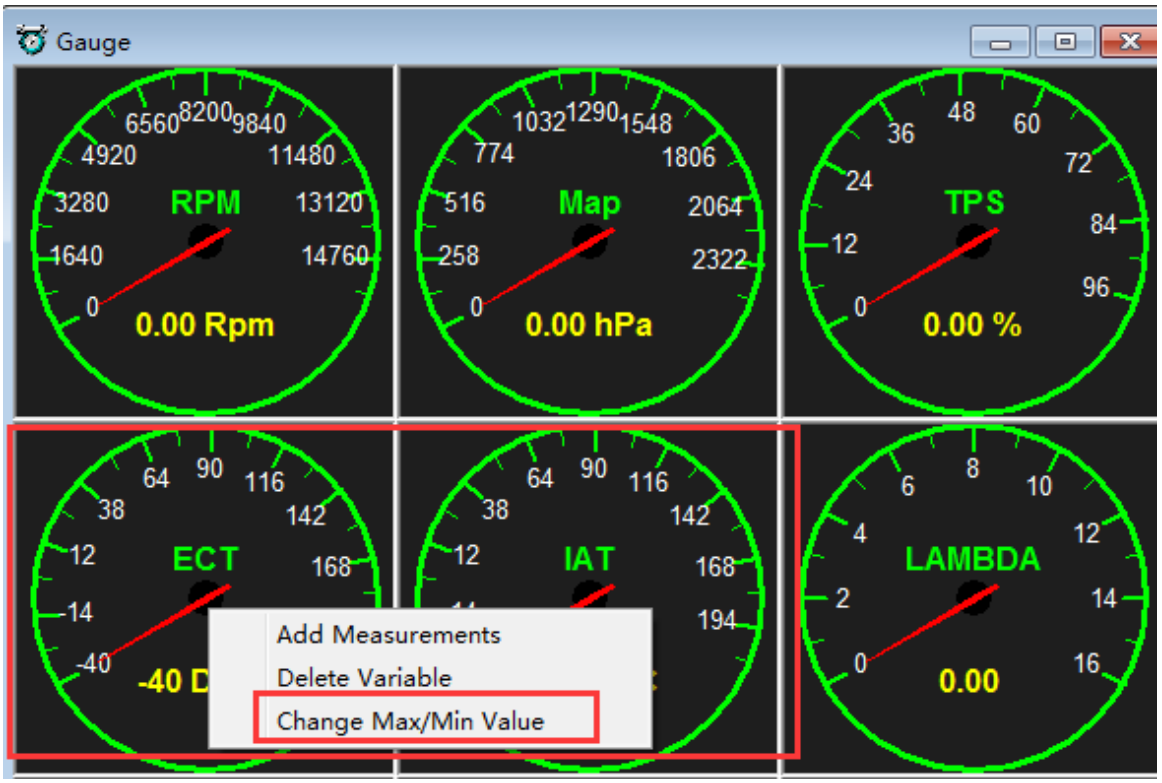
Here is the link to get the EcoCAL user Manual .

http://www.ecotrons.com/support/

EcoCAL screen, by default, shall show a group of the gauges, one is the ECT gauge. You can read the gauge to determine whether it makes sense or not. For example, before you start the engine in the morning, the ECT should read as the ambient temperature.

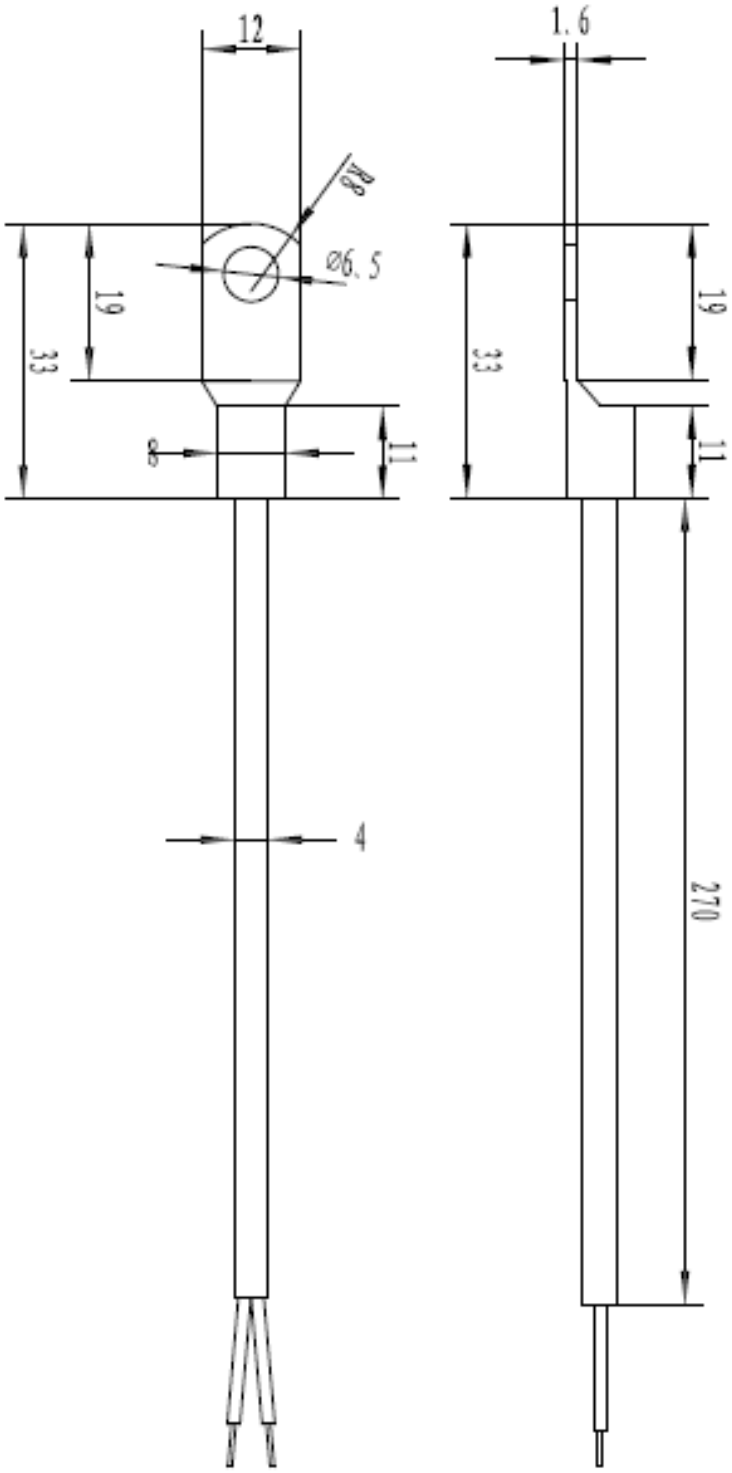
Note, the gauge, by default, reads Celsius temperature. You can go to the "Menu → Setting →Toggle Units" to change to "Imperial units". You also can change Max /Min Value of ECT Gauge, please Right click on the ECT Gauge, choose "Change Max /Min Value".

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Gauge
RPM
0.00 Rpm
Map
0.00 hPa
TPS
0.00 %
ECT
IAT
LAMBDA
0.00
Add Measurements
Delete Variable
Change Max/Min Value

6 Appendixes: Mechanical CAD Drawing

Unit: mm



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