# Content

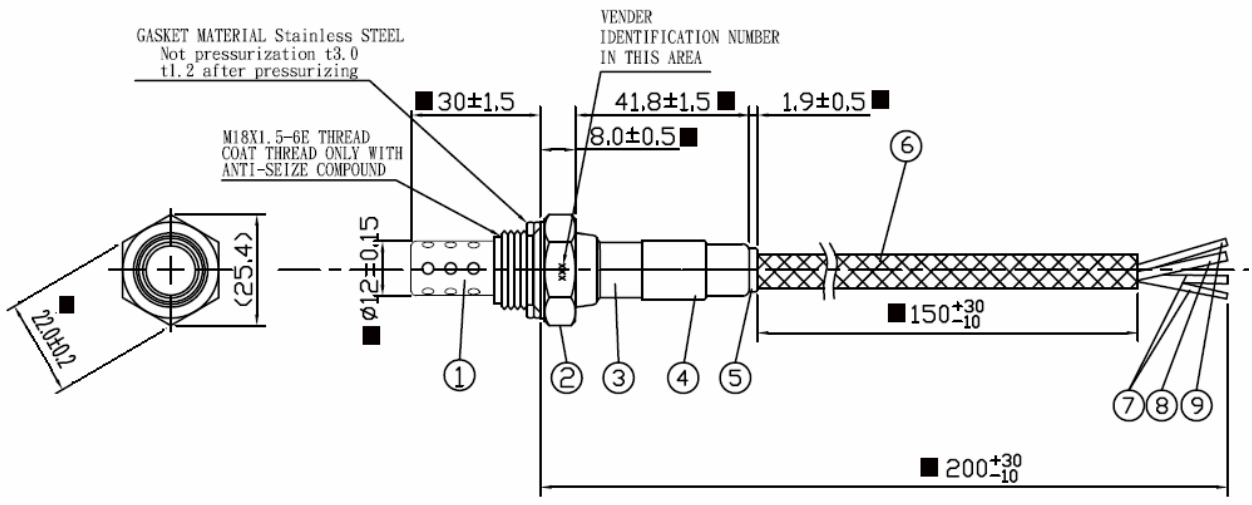


## 1.APPLICATION

This technical specifications of an $o_2$ sensors which is a 3/4 wire zirconium dioxide ($zro_2$) heated oxygen sensor for engine management system use.

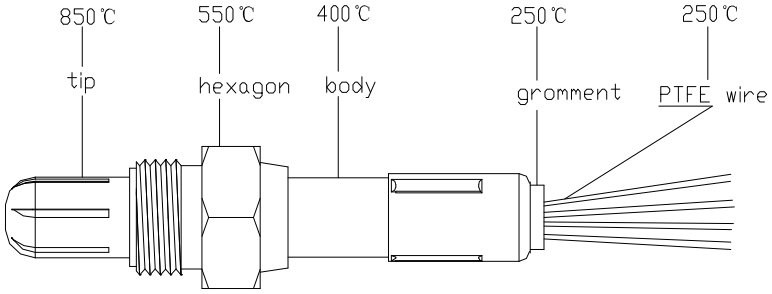
Application sensor type is as following

- Element
- 9 ohm-heater 9W
- 6-hole protection tube



## 2. TECHNICAL DATA

| ITEM | CONDITION |
|---|---|
| Storage temperature | -40℃ to +100℃ |
| Exhaust temperature | ≤900℃<br>≤950℃ max 50hrs |
| Min exhaust temperature | ≥250℃ |
| Hexagon temperature of the sensor housing | ≤500℃ |
| Cable grommet temperature (PTFE formed house)<br>Sensor side<br><br>cable side | <br><br>≤250℃<br>≤300℃ Max.4hrs<br>≤200℃ |
| Cable and protective sleeve temperature | ≤250℃ |




## 3.FUNCTIONAL TESTS

### 3.1 Burner tests

The sensor shall be measured property on a Argon burner exhaust gas test fixture at the condition of 375℃.

Requirements:

| Electrical Property Burner 375℃ | Lower Toler limit | Upper Toler limit |
|---|---|---|
| a) New sensor | | |
| Rich Voltage | 750mv | --- |
| R-to-L Response | --- | 350ms |
| Lean Voltage | --- | 100mv |
| L-to-R Response | --- | 250ms |
| Internal Resistance | --- | 5KΩ |
| Heater Static Current | 0.5A | 1.0A |
| b) After Aged (Life Cycle/High Temperature) | | |
| Rich Voltage | 680mv | --- |
| R-to-L Response | --- | 400ms |
| Lean Voltage | --- | 150mv |
| L-to-R Response | --- | 300ms |
| Internal Resistance | --- | 15KΩ |
| Heater Static Current | 0.5A | 1.0A |

## 4. MECHANICAL TEST

### 4.1 Vibration Test

a. Vibration stress (<1300m/s$^2$)

b. By engine vibration (<5kHz)

c. By pulsation of the exhaust gas (<±300 mbar)

d. By ambient wind (cable, <10Hz)

### 4.2 Thread Torque Test

a. Mount the sensor in a steel test fixture with M18 ×1.5×6e threads.

b. Tighten to 50±2Nm with the torque applied the Hex.

c. Take off the sensor from the test fixture.

4.3 Wire Pull Test

a.The mounted sensor has to withstand an axial force of >70N when assembled.

b. Handling (shock load up to 1000g).

4.4 Leakage Test-Element and Seal sensor

a. Mount the zero leak plug in a pressure chamber with leak tester.

b. Set the leak tester pressure to 392±40kPa(4.0±0.4kgf/cm$^2$)

c. Measure the blank value of leak tester. Blank value should be measured for every measurement times.

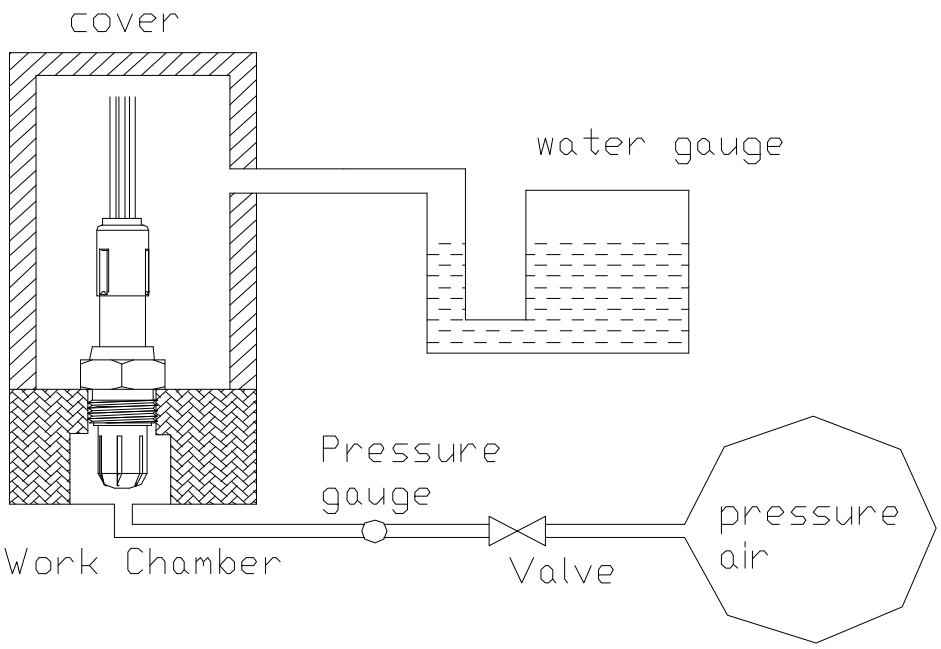
d. Take off the zero leak plug from the chamber.

e. Mount the sensor in pressure chamber.

f. Measure the leak volume.

g. Test shall be conducted at room temperature(25±5℃).

h. The leakage rate must be smaller than 0.2ml/min.



# 5.ENVIRONMENTAL TEST

## 5.1 Thermal Shock Test

The sensor shall be exposed to temperature cycle as in figure below.

a. Heater is powered up by supplying 12 ±0.2V DC power throughout the test.

b. Repeat the test cycle 4 times.

## 5.2 Salt mist test

a. Heater off

b. Testing time: 2 days

c. The sensor heating is switched on 5 minutes before and during testing. In order to prevent water from reaching the sensor ceramic a stainless steel sleeve is screwed onto the sensor thread for proper sealing.

d. Test condition

- Temperature : 35-50℃
- Salt concentration : 5±0.5%wt
- Spray quantity : 1.5±0.5cc/hrs
- PH : 6.7±0.5

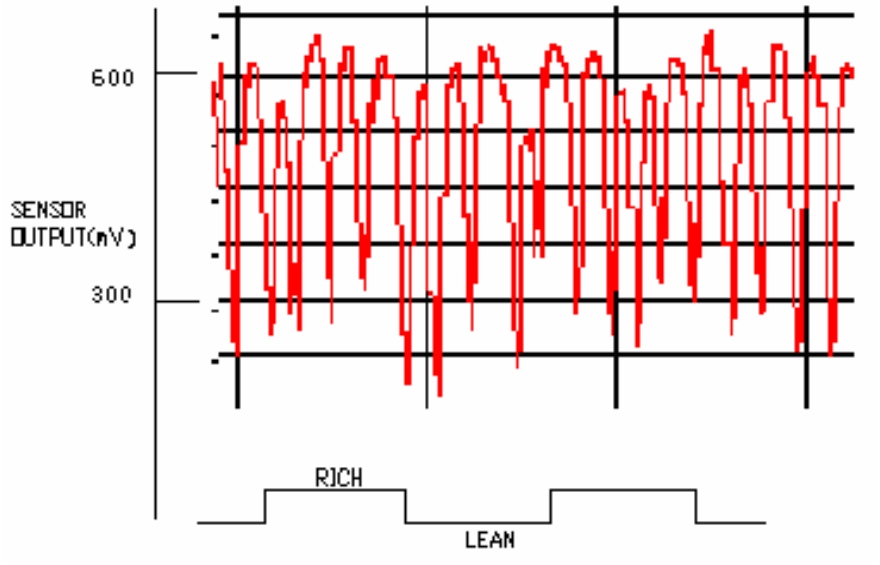
# 6.ENGINE DURABILITY TEST

## 6.1 On Car Test

a. Install sensors in exhaust system of the engine which runs as the cycle defined in following figure for 20000Km.

b. Each sensor is connected to circuit specified in following figure.

c. Supply 12 ±0.2V DC to heater terminal for the test.




Measurement Method of Burner Tests - (350℃ measurement)

1. The sensor shall be tested on a propane burner test fixture. The test fixture shall be adjusted to operate the sensor with the EGO sensor tip temperature of 350±10℃.

2. Supply 12±0.2V DC to the heater terminals of the sensor with the DC power supply.

3. Measure each sensor output voltage under lean and rich A/F condition with 1 MΩ input impedance recorder.

A/F conditions:

Lean : λ=1.1±0.02

Rich : λ=0.9±0.02

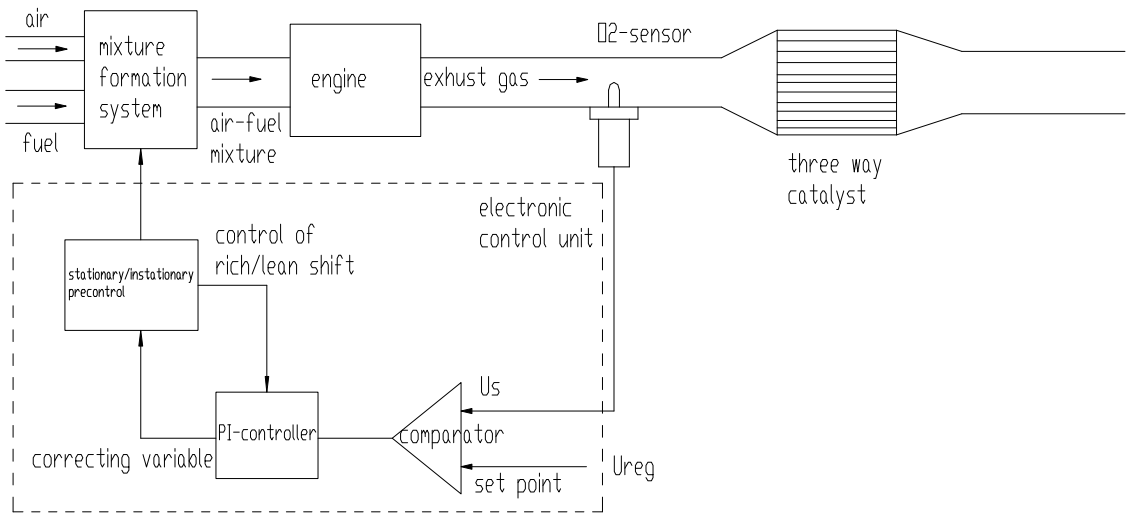
4. Measure the sensor output voltage at rich condition with 10 kΩ external shunt resistance. Sensor internal resistance is calculated by following equation. When internal resistance is measured, tip temperature shall be around 700℃.

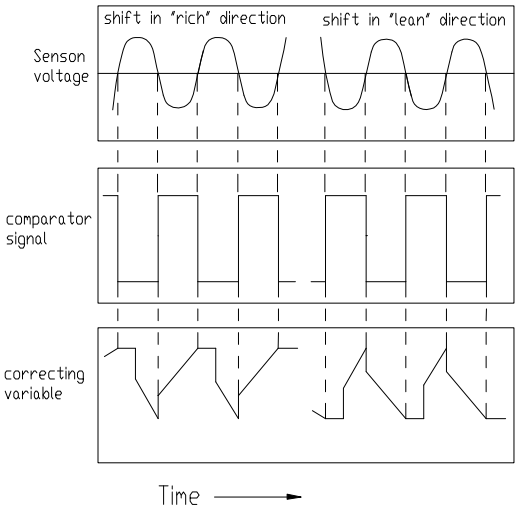
Rin=(Vr-V2)/(V2/9.9-Vr/1000) (kΩ)

Where Vr : rich voltage, input impedance=1MΩ

V2: rich voltage, external shunt resistance=10kΩ

5. Record sensor output voltages with a digital voltage counter at the switching between rich level and lean level with the intervals of one second. Measure lean to rich to lean response time between 300mV and 600mV output level.




## Respond time