



# AIRSON

## 5 GAS ANALYSER

### OM - 1100



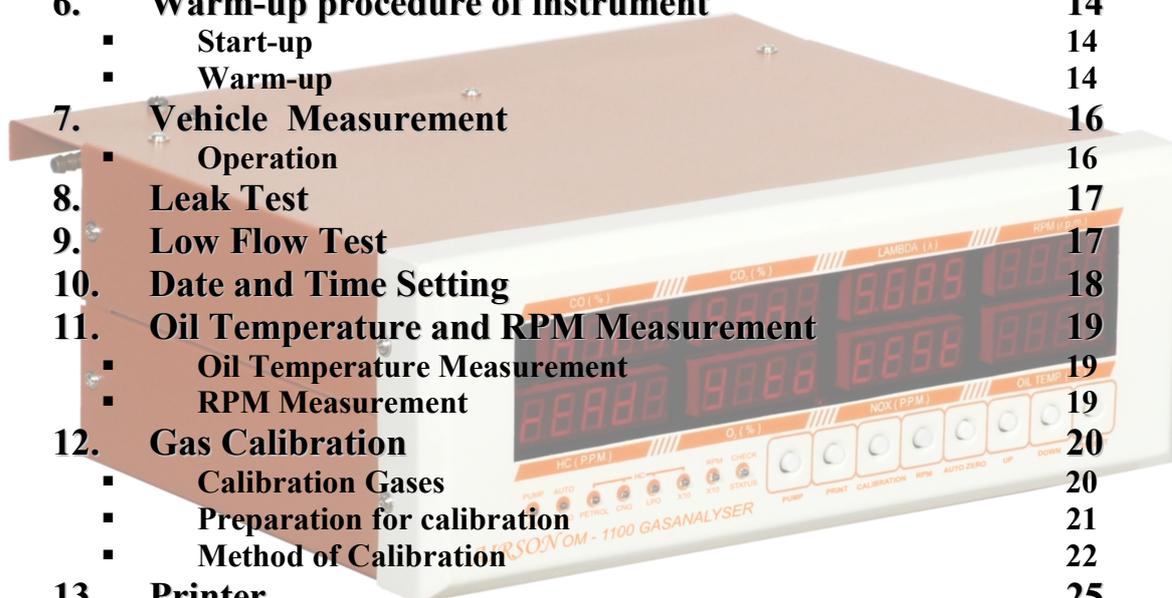
## OPERATING MANUAL

*AIRSON ELECTRONICS*

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**-: IMPORTANT NOTICES :-**

**Notice**

This manual contains important Warning and Safety instructions to be observed by the user. This product is only intended for one certain area of application which is prescribed in the instructions. Furthermore the most important necessary prerequisites for application and operation as well as the safety measures are explained to ensure smooth operation. No warranty or liability will be granted if the product is applied in areas other than those described or if the necessary prerequisites and safety measures are not been taken.

This product is to be operated and used only by qualified and trained personnel capable of observing the required safety measures.

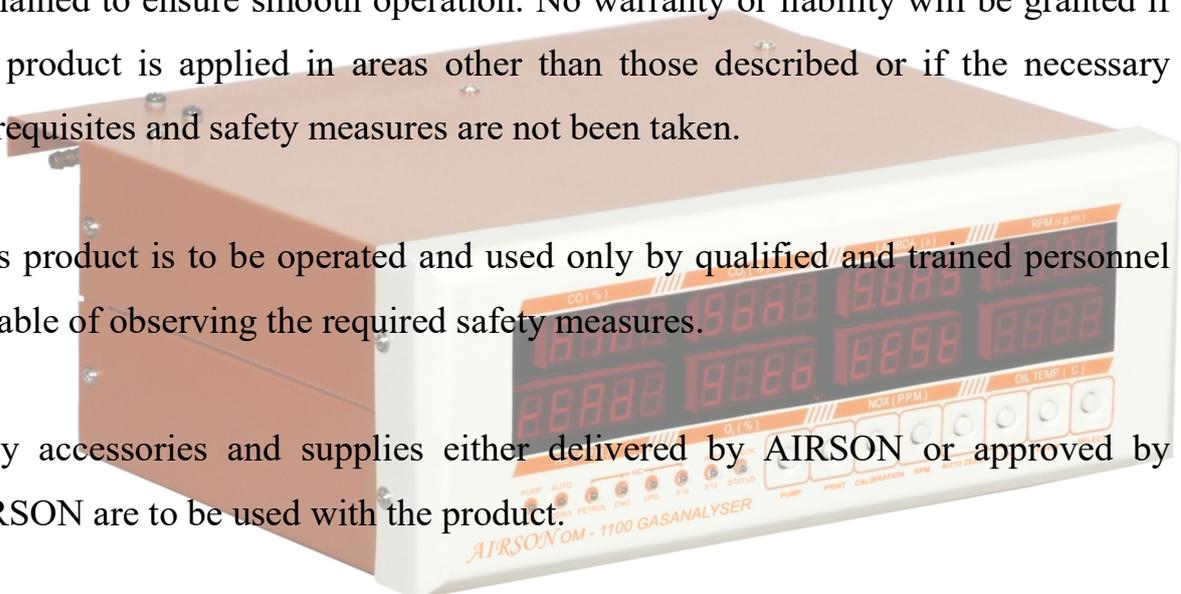
Only accessories and supplies either delivered by AIRSON or approved by AIRSON are to be used with the product.

Adjustment and maintenance of instrument are only to be carried out by a professional technician who is being aware of the dangers involved.

Only the manufacturer authorised service personnel can carry out the repairs of the product.

For

AIRSON ELECTRONICS



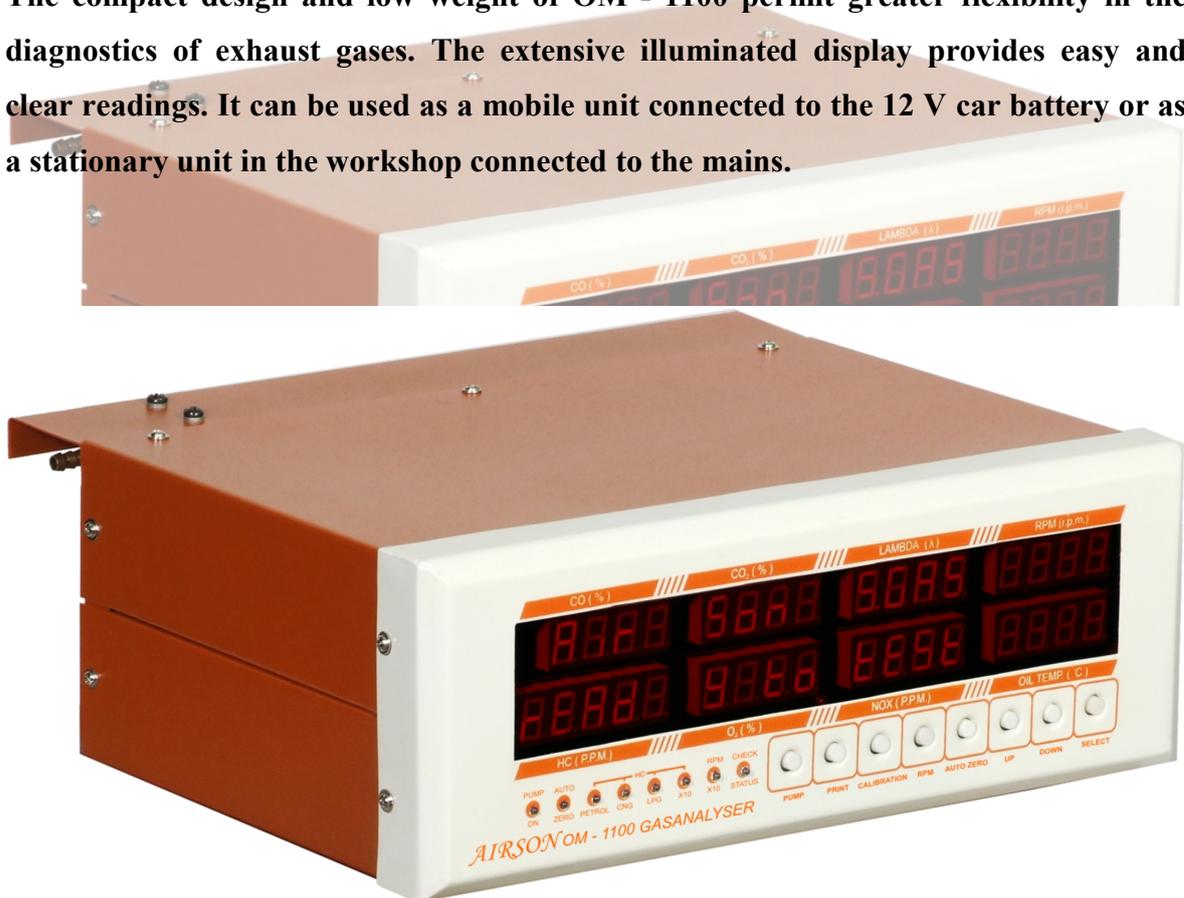
**-: Introduction :-**

■ **AIRSON OM - 1100**

The AIRSON OM - 1100 is an 5 gas analyzer designed, using the latest infra-red microprocessor based technology to measure accurate values of carbon monoxide (CO), carbon dioxide (CO<sub>2</sub>), oxygen (O<sub>2</sub>), hydrocarbons (HC) and NO<sub>x</sub> coming from exhaust emission of vehicles.

This fully digital analyser is specifically designed to meet or exceed nationwide performance specifications for automotive emissions measurement.

The compact design and low weight of OM - 1100 permit greater flexibility in the diagnostics of exhaust gases. The extensive illuminated display provides easy and clear readings. It can be used as a mobile unit connected to the 12 V car battery or as a stationary unit in the workshop connected to the mains.



**AIRSON OM – 1100 FIVE GAS ANALYSER**

## ■ Operating Principle

The AIRSON OM - 1100 based on a single-beam NDIR (Non-dispersive Infrared) measurement technology. It uses an internal proprietary optical bench using a NDIR technique for gas analysis.

The infrared light source filters and detectors are thermally stabilized under micro-processor control.

The internal microprocessor is responsible for the overall management of the instrument. The major functions performed by microprocessor are:

- Auto-zeroing.
- Gas related parameters computation.
- Smoothing Interpolation of gas curves.
- Man machine interface.

## ■ Features of AIRSON OM - 1100

### ▪ Gas measurements

- Carbon Mono Oxide (CO)
- Hydro Carbon (HC) for PETROL engines
- Hydro Carbon (HC) for CNG engines
- Hydro Carbon (HC) for LPG engines
- Carbon Dioxide (CO<sub>2</sub>)
- Oxygen (O<sub>2</sub>)
- Nitrogen Oxides (NO<sub>x</sub>) (Optional)

### ▪ Lambda( $\lambda$ ) Value

### ▪ Oil temperature

### ▪ RPM

### ▪ Computer compatibility

### ▪ Microprocessor controlled gas calibration procedure for higher performance.

### ▪ Calculates and outputs gas concentration directly as digital data via an RS-232C serial interface

### ▪ Automatically requests zero calibration to ensure maximum gas measurement accuracy

### ▪ Red high efficiency LED display



- **Compact design**
- **Portable and highly mobile.**
- **Car Battery (12 V D.C.).**
- **Printer port (standard centronic port) to connect the printer**
- **Standard date & time display**
- **Leak test**
- **Flow absence detection (Low flow check)**



**-: SPECIFICATIONS :-****■ General Specifications of AIRSON OM - 1100**

1. ***CO, CO<sub>2</sub> & HC Measurement:*** The analyzer uses single Beam NDIR (non-dispersive infrared) measurement technology to provide fully corrected HC, CO, and CO<sub>2</sub> gas concentrations.
2. ***O<sub>2</sub> Measurement:*** O<sub>2</sub> concentration measurement is supported via external O<sub>2</sub> sensors.
3. ***NOx Measurement:*** NOx concentration measurement is supported via external NOx sensors.
4. ***Lambda ( $\lambda$ ) Measurement:*** Lambda value is calculated with the gas measurement to find out the efficiency of the fuel burn.
5. ***RPM Measurement:*** RPM is measured by using the RPM inductive cord.
6. ***Oil Temperature Measurement:*** Oil temperature is measured by using a separate temperature transducer provided inside the Temperature Probe.
7. ***LED Displays:*** High efficiency RED LED Display.
8. ***Filtering Devices:*** Centered Bronze Filters are provided externally on the rear panel of analyser, to filter the gas and to avoid water vapors, oil etc. coming by the exhaust.
9. ***Leakage detection:*** Leakage is achieved by means of an internal differential pressure transducer. When this occurs LED displays "LEA" for leakage.

10. **Low Flow detection:** Low flow is measured by means of an internal differential pressure transducer. When this occurs LED displays “LOFL” for low flow.

11. **Auto-Zeroing feature:** Red LED glows in case of auto zeroing required, press Auto-zeroing switch.

12. **RS-232 standard Interface Module:** The RS-232 is used to connect the computer with the instrument.

13. **Printer Port:** A standard centronic printer port is used to connect the printer of user’s choice.

14. **Battery Operation:** Portable and highly mobile-can be connected to a car battery (12 V D.C.).

■ **Technical Specifications**

*Measuring Parameters:*



| S.No. | Measuring Quantity | Measurement Range  | Resolution                      | Accuracy                |
|-------|--------------------|--|---------------------------------|-------------------------|
| 1.    | CO                 | 0-9.999% by Vol.<br>10.00 - 12.00%                                     | 0.001% by Vol.<br>0.01% by Vol. | 0.03% abs /<br>±3%rel.  |
| 2.    | HC                 | 0-9999 ppm (n-hexane) by Vol.<br>10000-30000 ppm (n-hexane)<br>by Vol. | 1 ppm by Vol.<br>10 ppm by Vol. | 10 ppm abs /<br>±5%rel. |
| 3.    | CO <sub>2</sub>    | 0-20% by Vol.  | 0.01% by Vol.                   | 0.4%abs /<br>±4%rel.    |
| 4.    | O <sub>2</sub>     | 0-21.7% by Vol.  | 0.01 by Vol.                    | 0.1abs /<br>±3%rel.     |
| 5.    | NO <sub>x</sub> *  | 0-5000 ppm   | 1 ppm                           |                         |
| 6.    | RPM                | 0-9999 rpm<br>10000-40000 rpm  | 1 rpm<br>10 rpm                 | ±1 rpm<br>±10 rpm       |
| 7.    | Oil temp.          | 0-150 °C   | 0.1 °C                          | ±1°C                    |
| 8.    | Lambda (λ)         | 0-9.999  | 0.001                           | ±0.3%                   |

|  |                             |
|--|-----------------------------|
| <b>Measurement Principle (CO, HC &amp; CO<sub>2</sub>)</b> | <b>Infrared Measurement</b> |
| <b>Measurement Principle (O<sub>2</sub> &amp; NOX)</b>     | <b>Electro Chemical.</b>    |

|                  |               |
|------------------|---------------|
| <b>Interface</b> | <b>RS-232</b> |
|------------------|---------------|

|                |                                      |
|----------------|--------------------------------------|
| <b>Display</b> | <b>8*4 Seven segment LED display</b> |
|----------------|--------------------------------------|

|                        |                             |
|------------------------|-----------------------------|
| <b>Power supply AC</b> | <b>230V A.C. 50 Hz ±15%</b> |
|------------------------|-----------------------------|

|                        |                        |
|------------------------|------------------------|
| <b>Power supply DC</b> | <b>12 Volt DC ±10%</b> |
|------------------------|------------------------|

|                          |                    |
|--------------------------|--------------------|
| <b>Power Consumption</b> | <b>Aprox. 40 W</b> |
|--------------------------|--------------------|

|                              |                   |
|------------------------------|-------------------|
| <b>Operating temperature</b> | <b>5°C -45 °C</b> |
|------------------------------|-------------------|

|                                       |                            |
|---------------------------------------|----------------------------|
| <b>Operating Atmospheric Pressure</b> | <b>860 hPa to 1060 hPa</b> |
|---------------------------------------|----------------------------|

|                                    |                   |
|------------------------------------|-------------------|
| <b>Operating Relative Humidity</b> | <b>up to 90 %</b> |
|------------------------------------|-------------------|

|                      |                     |
|----------------------|---------------------|
| <b>Response Time</b> | <b>&lt; 10 sec.</b> |
|----------------------|---------------------|

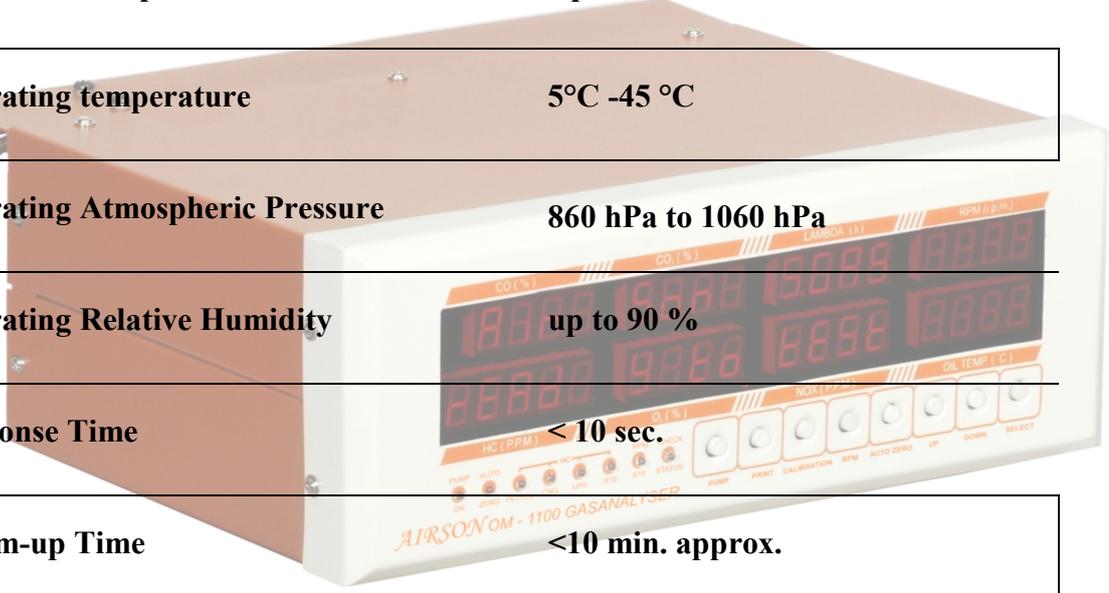
|                     |                            |
|---------------------|----------------------------|
| <b>Warm-up Time</b> | <b>&lt;10 min. approx.</b> |
|---------------------|----------------------------|

|                            |                          |
|----------------------------|--------------------------|
| <b>Storage temperature</b> | <b>-10 °C to + 60 °C</b> |
|----------------------------|--------------------------|

|                |   |
|----------------|---|
| <b>Filters</b> | <b>Bronze filters (&lt; 5 micron) to avoid water vapors, oil, etc. coming with exhaust.</b> |
|----------------|---|

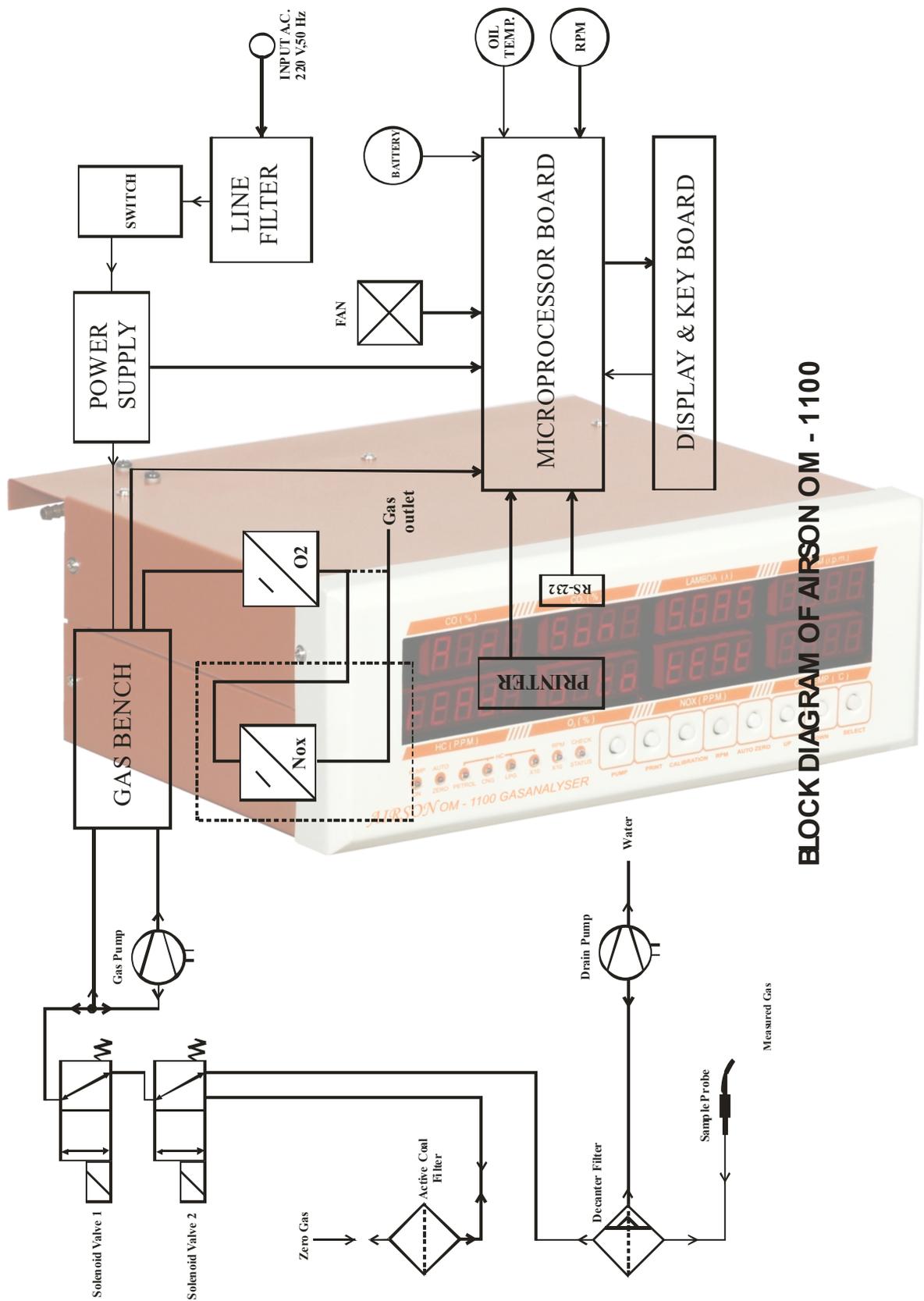
|                           |                       |
|---------------------------|-----------------------|
| <b>Dimensions (w*h*l)</b> | <b>32.5*12*27 cm.</b> |
|---------------------------|-----------------------|

|               |                       |
|---------------|-----------------------|
| <b>Weight</b> | <b>Approx 5.0 kg.</b> |
|---------------|-----------------------|



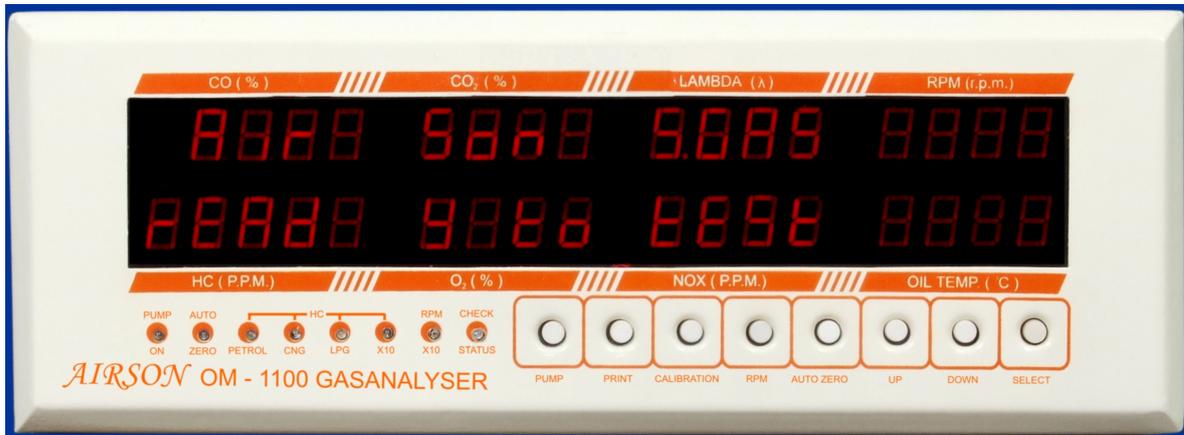
**:- DESCRIPTION :-**

▪ Block Diagram



**BLOCK DIAGRAM OF AIRSON OM - 1100**

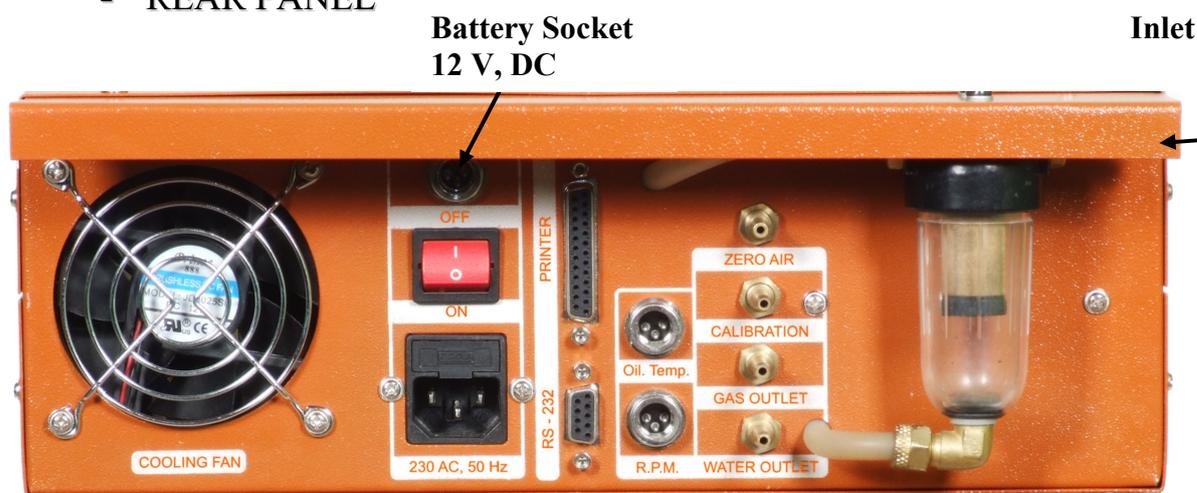
▪ FRONT PANEL



| <u>DISPLAY PANEL</u> |   |  |
|----------------------|---|--|
| CO                   | Display Carbon-mono-oxide (CO) gas value directly in %.             |  |
| HC                   | Display Hydro-carbon (HC) gas value directly in ppm.                |  |
| CO2                  | Display Carbon-di-oxide (CO <sub>2</sub> ) gas value directly in %. |  |
| O2                   | Display Oxygen (O <sub>2</sub> ) gas value directly in %            |  |
| LAMBDA               | Display lambda value directly.                                      |  |
| NOX                  | Display Nitrogen- oxide ( NOX) gas value directly in ppm.           |  |
| RPM                  | Display rotation per minute (rpm) value directly in r/min.          | Display the others value like pef, rpm, oil.temp., cell pressure, low flow, status check |
| Oil. Temp.           | Display oil. temp value directly in deg.C .                         | Abbreviation like pef, rpm, oil.temp., cell pressure, low flow, status check             |

| <b><u>LED INDICATOR</u></b> |   |   |
|-----------------------------|---|---|
| <b>PUMP</b>                 | <b>Yellow Led glow when gas suction pump is in on condition</b>           |   |
| <b>AUTO ZERO</b>            | <b>Red led glow when auto zero is required or at auto zeroing process</b> | <b>In calibration mode when fast increment key is selected</b>                        |
| <b>HC PETROL</b>            | <b>Green led glow when HC is selected for PETROL</b>                      |   |
| <b>HC CNG</b>               | <b>Green led glow when HC is selected for CNG</b>                         |   |
| <b>HC LPG</b>               | <b>Green led glow when HC is selected for LPG</b>                         |   |
| <b>HC X10</b>               | <b>Yellow led glow when HC value above then 9999 ppm</b>                  |   |
| <b>RPM X10</b>              | <b>Yellow led glow when RPM value above then 9999</b>                     |   |
| <b>STATUS CHECK</b>         | <b>Red led glow when status of gas channel is required check</b>          | <b>Red led glow during the leak test for hold the cap closed till led is glowing.</b> |
| <b>KEY CONTROLS</b>         |   |   |
| <b>PUMP</b>                 | <b>To ON and OFF the PUMP.</b>  |   |
| <b>PRINT</b>                | <b>To take the print out.</b>   |   |
| <b>CALIBRATION</b>          | <b>During measurement select the HC channel for PETROL/CNG/LPG.</b>       | <b>To select calibration mode.</b>  |
| <b>RPM</b>                  | <b>To select the rpm table.</b>   |   |
| <b>AUTO ZERO</b>            | <b>To auto zeroing the gas value expect O<sub>2</sub>.</b>                |   |
| <b>UP</b>                   | <b>Up the values in calibration mode.</b>                                 | <b>Up the values in date set mode.</b>  |
| <b>DOWN</b>                 | <b>Down the values in calibration mode.</b>                               | <b>Down the values in date set mode.</b>  |
| <b>SELECT</b>               | <b>During measurement mode select the pef , rpm, oil.temp., pressure.</b> | <b>During date and calibration mode select the options.</b>                           |

▪ **REAR PANEL**



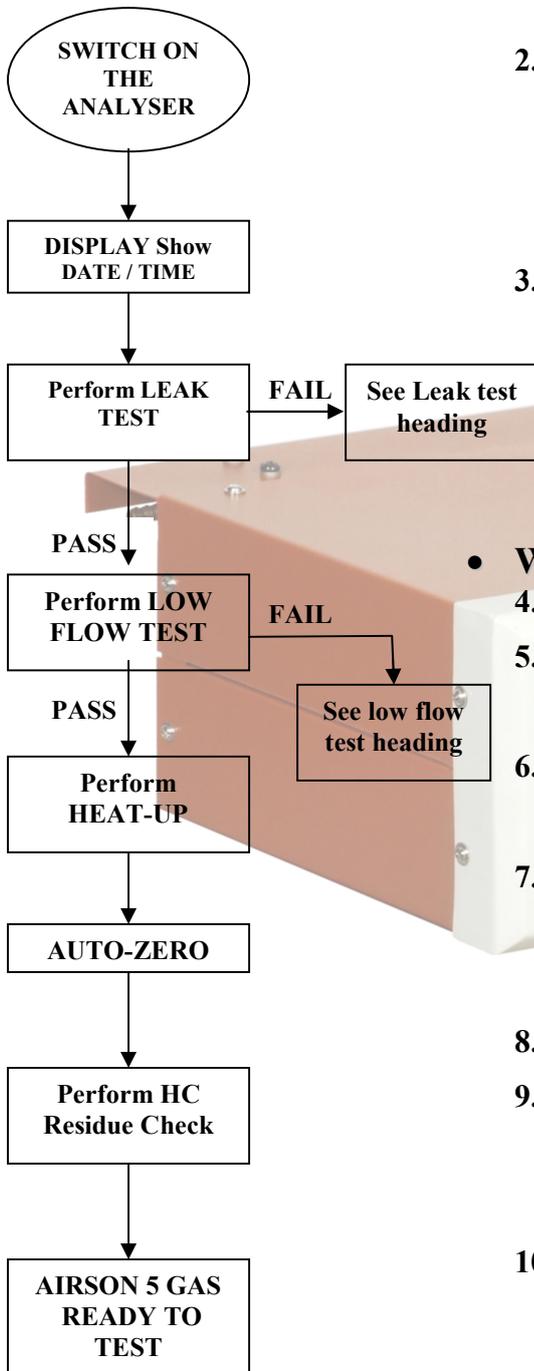
| <u><b>REAR PANEL</b></u>          |  |
|-----------------------------------|--|
| <b>COOLING FAN</b>                | Keep cool the instrument.  |
| <b>AC SOCKET (230V AC, 50 Hz)</b> | AC socket to connect the electrical supply.                        |
| <b>ON-OFF Switch</b>              | To Switch ON and Off the power of instrument.                      |
| <b>12V DC Socket</b>              | To connect the 12V dc power supply or Car battery (12V).           |
| <b>RS- 232 Connector</b>          | Standard RS- 232 port for the computer compatibility.              |
| <b>Printer Connector</b>          | To connect the external print (LX-800)                             |
| <b>R.P.M Socket</b>               | To connect the inductive pick up or vibration sensor cord.         |
| <b>Oil Temp. Socket</b>           | To connect the oil temp. Sensor cord.                              |
| <b>ZERO AIR</b>                   | Fresh air inlet.   |
| <b>CALIBRATION</b>                | Connect the calibration gas cylinder.                              |
| <b>GAS OUTLET</b>                 | Exhaust or calibration gas outlet.                                 |
| <b>WATER OUTLET</b>               | Condensed water outlet   |
| <b>EXHAUST INLET</b>              | To connect the silicon pipe for exhaust gas measurement.           |
| <b>FILTER UNIT</b>                | Used to remove the particulate matter from the exhaust gas sample. |

**-: SAFETY INSTRUCTIONS :-**

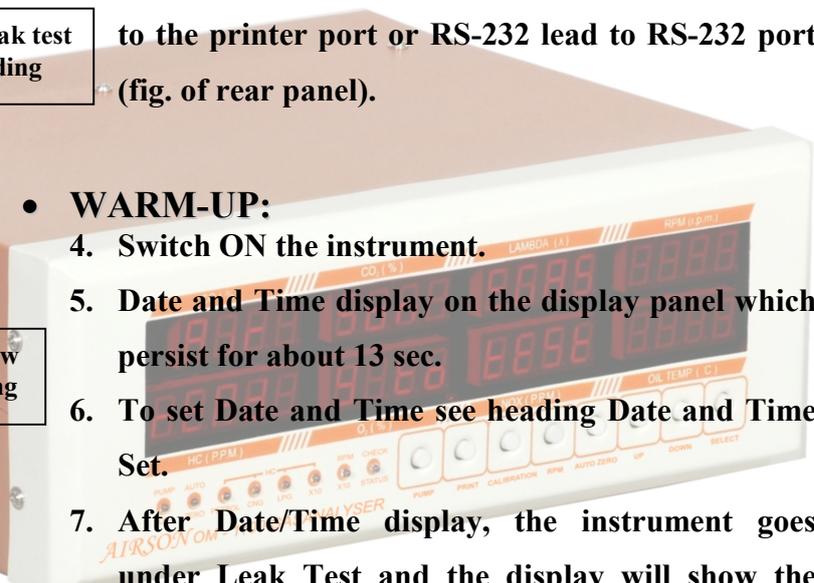
|   |   |
|---|---|
| ◇ | The measurement gas outlet, inlet and water outlet at the rear of the unit should be checked before using the instrument that they should not be closed.  |
| ◇ | Make sure that the instrument did not draw exhaust gases for an unnecessarily long time.  |
| ◇ | Probe should insert into the exhaust pipe only when it is necessary for the measurement.  |
| ◇ | Never let the probe lie on the floor or let liquids or any other impurity be drawn into the instrument through the probe.   |
| ◇ | Never bent the exhaust gas probe.   |
| ◇ | The instrument should never be placed in hot sun, rain, snow, corrosive atmospheres, or atmospheres contaminated with petrol fumes.   |
| ◇ | Make sure that within the radius of about 5 mt. of the instrument no equipment is used that caused serious electromagnetic interference (such as radio, telephone, electronic welding equipment, large electric motors etc.). |
| ◇ | Standard AIRSON exhaust probe should be used.   |
| ◇ | Regular maintenance of the filters is essential to ensure long service life and correct functioning of the measuring instrument.  |
| ◇ | The measuring instrument unit should be purged with clean ambient air with the pump running for at least 10 min. before switching OFF the instrument.   |
| ◇ | The instrument must be calibrated with reference test gas every 6 months.   |

**:- WARM -UP PROCEDURE OF INSTRUMENT :-****• START UP:**

1. Connect the power supply cable and the exhaust pipe and probe to the Instrument (fig. of rear panel).
2. If rpm and oil temperature measurement is required then also connect the rpm and oil temperature sensor cable to the Instrument (fig. of rear panel).
3. If printout or computerized P.U.C. certificate is required then connect the printer (Wipro LX 800) to the printer port or RS-232 lead to RS-232 port (fig. of rear panel).

**• WARM-UP:**

4. Switch ON the instrument.
5. Date and Time display on the display panel which persist for about 13 sec.
6. To set Date and Time see heading Date and Time Set.
7. After Date/Time display, the instrument goes under Leak Test and the display will show the 'LEA TEST'.
8. For Leak test see Leak test heading.
9. After Leak test pass then Instrument goes to Low Flow test. For Low Flow test see Low Flow test heading.
10. After Low Flow Test is Pass then the readings of all the gases start display on display panel and "HEAT UP " is display on the right side of the display panel (if required i.e. it depends on the atmospheric condition) and the
11. This is the Warm-up period of the instrument.



◇ **Auto-Zero:**

12. After Warm-Up the AUTO ZERO will display on the right side of the display panel.

13. And the Auto – Zero RED LED glows.

14. The Auto – Zero process takes about 30 sec.

◇ **HC-Residue Check:**

15. After Auto – Zero the instrument will undergo HC-Residue Check and HC Residue check will display on the right side of the display panel.

16. The HC Residue check process takes about 30 sec.

17. After HC-residue check Instrument show AIRSON 5 GAS READY TO TEST on display panel.

18. Now Instrument is in normal mode and from here you can perform

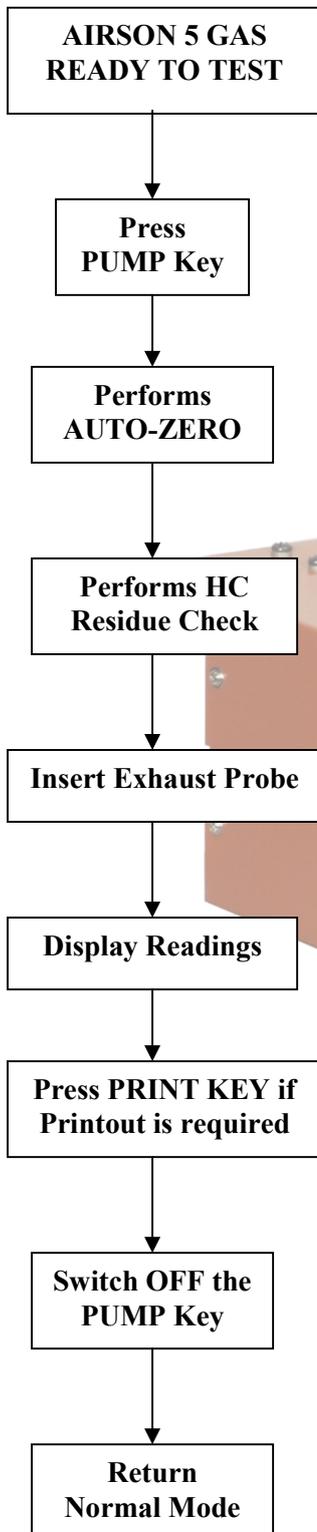
3 operations:

- **Vehicle Measurement**
- **Calibration**
- **Leak Test**



## -: Vehicle Measurement :-

### ▪ Operation



- ◇ If instrument is showing AIRSON 5 GAS READY TO TEST that means Instrument is ready for Vehicle test.
- ◇ Now press the pump key to start measurement. **(NOTE: make sure exhaust probe is not inserted to the vehicle exhaust tail pipe).**
- ◇ After pressing pump key pump is ON (pump Yellow Led glows) and Instrument performs Auto-Zero and then HC-Residue check (For HC Residue check see HC Residue heading).
- ◇ If HC Residue doesn't detected then the instrument is ready for the measurement and now insert the exhaust probe into the tail pipe of vehicle and wait for 10 seconds.
- ◇ Instrument will show the reading of all the measuring quantities like CO, HC, CO<sub>2</sub>, O<sub>2</sub>, NO<sub>x</sub>, Lambda Value, Oil temperature and RPM of Vehicle.
- ◇ Press the calibration key to select the HC value for PETROL / CNG / LPG (Selection will be indicate by LED indicator like :Petrol/CNG/LPG).
- ◇ If Auto-zero LED glows or when zero is required then press Auto-zero key.
- ◇ If low flow is detected then instrument shows low flow.
- ◇ For having the printout press Print key **(Only two print out can be taken)**. Now take off the probe from the exhaust tail of vehicle. If further measurement doesn't required press pump key again to switch OFF the pump. The instrument is now start the gases to be flush out. When gases flush out the instrument is switch OFF the Pump and come to the normal condition.

### ▪ CALIBRATION:

For calibrating the instrument see heading CALIBRATION.

### ▪ LEAK TEST:

For Leak test see heading LEAK TEST.

**:- LEAK TEST :-**

- ◇ During Leak test, Instrument checks the leakage in sample handling system.
- ◇ Make sure during leak test, *cap of the probe* fitted tightly.
- ◇ After 20 sec., the pump gets set OFF and STATUS CHECK LED (RED) glows for approx. 10 se.
- ◇ During this period the cap of the probe must be closed.
- ◇ After this the instrument will show is there any leakage in the system or not.
- ◇ If displays PASS, it means there is no leakage in the system.
- ◇ If displays FAIL, it means there is some leakage in the system, and to rectify the leakage see Maintenance heading.
- ◇ When leakage is removed then press pump key to again check the Leak test.
- ◇ If Leak test fails then **Instrument will not do any function** till you rectify leakage in the system.
- ◇ After leak test pass remove the probe cap.

**:- LOW FLOW TEST :-**

- ◇ During Low Flow test, Instrument checks the flow rate of sampling tube.
- ◇ Low Flow test performs on start-up and during the measurement.
- ◇ Make sure during low flow test, *cap of the probe* must be open.
- ◇ The test takes approx. 20 sec and after that the instrument will show that low flow is present in the system or not.
- ◇ If displays PASS, means the system flow rate is fine.
- ◇ If displays FAIL, means the flow rate of the system is not uniform. To rectify it see Maintenance heading.
- ◇ When Low Flow is removed then press Pump key to again check the Low Flow test.
- ◇ If Low Flow test fails then Instrument will not function till you rectify Low Flow in the system.

**:- DATE AND TIME SETTING :-**

- ◇ To set Date and Time, press Select button, DATE will display on the right side of the display. Now the Date is in select mode.
- ◇ By using UP & DOWN keys we set the date.
- ◇ Again press the select button, MONTH will display on the right side of the display.
- ◇ Again the month is set by using UP & DOWN keys.
- ◇ In the same way year, hour and minute is set.
- ◇ To exit from this mode use AUTO ZERO button.



## **:- OIL TEMPERATURE AND RPM MEASUREMENT :-**

### ■ Oil Temperature Measurement

- ◇ For measuring oil temperatures put the oil temperature sensor into the oil chamber of the vehicle and attach the other end of it to the Instrument.

- Always adjust the length of the oil temperature sensor to the length of the original dip stick so that the temperature can be measured correctly.
- Do not measure the oil temperature of 2-stroke engine when it is running.

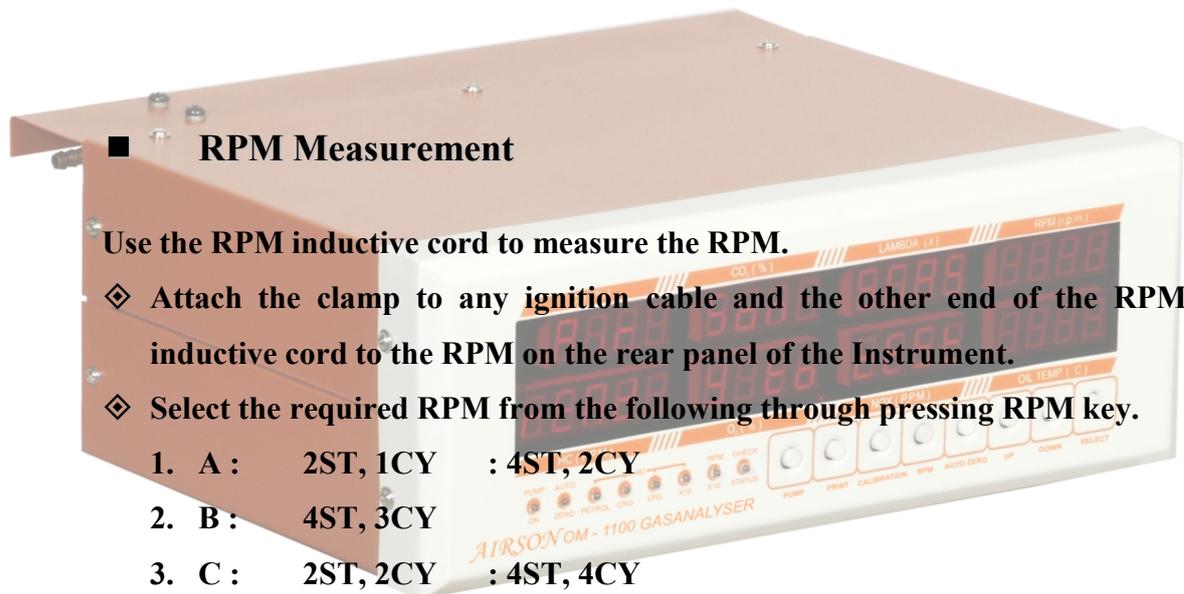
### ■ RPM Measurement

Use the RPM inductive cord to measure the RPM.

- ◇ Attach the clamp to any ignition cable and the other end of the RPM inductive cord to the RPM on the rear panel of the Instrument.
- ◇ Select the required RPM from the following through pressing RPM key.

1. A : 2ST, 1CY : 4ST, 2CY
2. B : 4ST, 3CY
3. C : 2ST, 2CY : 4ST, 4CY
4. D : 2ST, 3CY : 4ST, 6CY
5. E : 4ST, 1CY
6. F : 4ST, 5CY
7. G : 2ST, 4CY : 4ST, 8CY

ST : Stroke  
CY : Cylinder

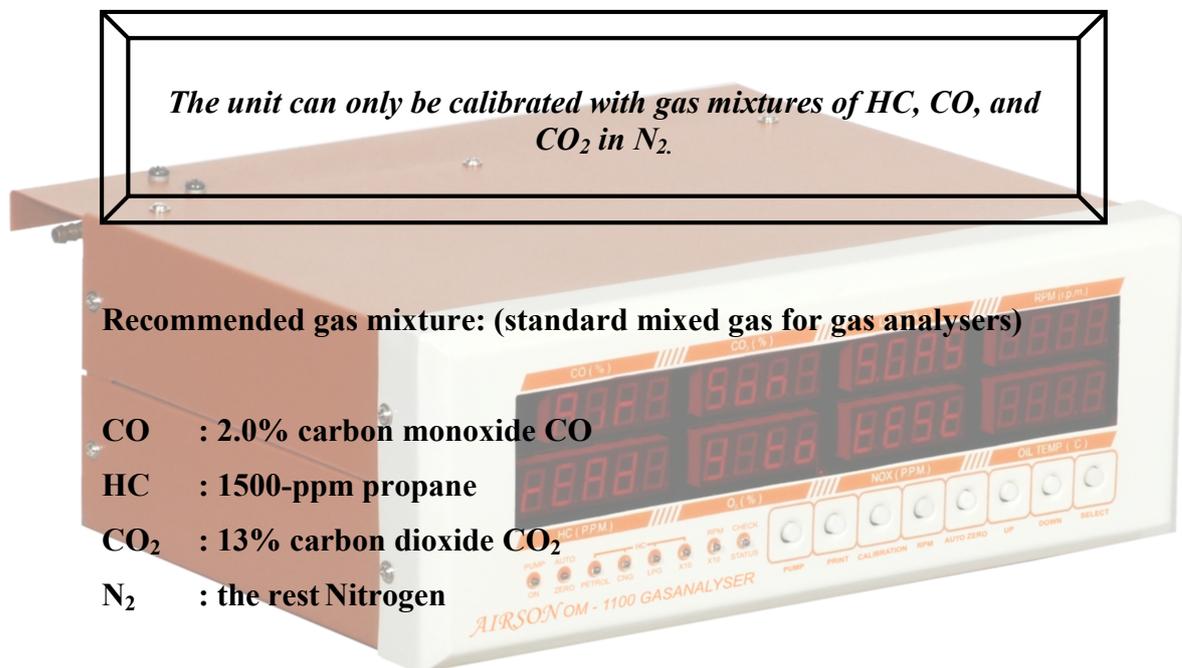


## -: GAS CALIBRATION :-

**Calibration** is “the process of standardizing (as a measuring instrument) by determining the deviation from a standard so as to ascertain the proper correction factors.”

### ■ Calibration Gases:

*The unit can only be calibrated with gas mixtures of HC, CO, and CO<sub>2</sub> in N<sub>2</sub>.*



**Recommended gas mixture: (standard mixed gas for gas analysers)**

CO : 2.0% carbon monoxide CO

HC : 1500-ppm propane

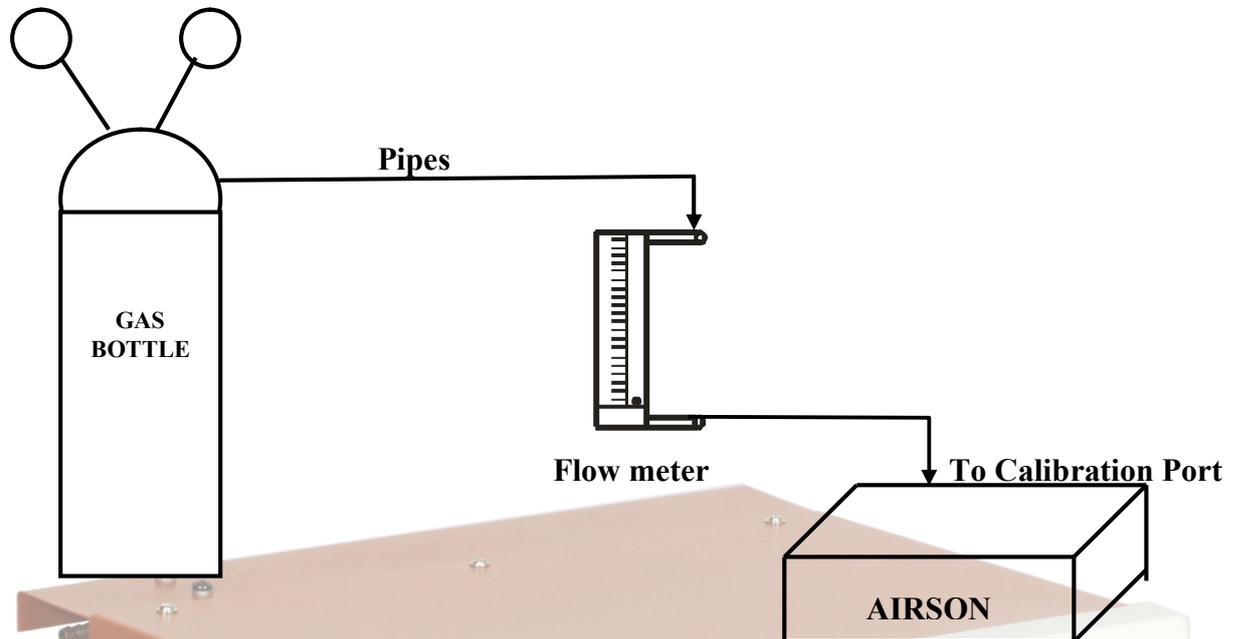
CO<sub>2</sub> : 13% carbon dioxide CO<sub>2</sub>

N<sub>2</sub> : the rest Nitrogen

CO<sub>2</sub> should be present in the calibration gas to minimize the CO/CO<sub>2</sub> Quench effect by molecular collision processes.

Composition accuracy of the gas: approx. 5 to 10% of the recommended concentration  
 Analysis accuracy of the gas: 1 to 2% of the true value in the gas mixture, preferably 1%.

## ■ PREPARATION FOR CALIBRATION



- ◇ The instrument should have warm-up to operating temperature before the calibration and be stable.
- ◇ Ambient temperature for the calibration: in the range from 20 to 25°C, (min 15°C, and max. 30°C).
- ◇ Hoses must be attached to the gas outlet of the meter to carry away the calibration gases, which should, where possible, be removed by extractor fan. The hoses must be as short as possible and their inside diameter should be such that there is no backpressure effect on the analyser.
- ◇ During the calibration, calibration gas must be fed slightly pressurized into the analyser. A flow meter is required for the measurement and adjustment of the necessary gas flow into the measuring cell of approx. 2.5 to 3 l/m (preferably in a ball type flow meter calibrated flow range of up to 5 l/m of a working ball type flow meter).
- ◇ The gas flow is adjusted by means of a needle valve.

The calibration gas that flows out of the meter is highly toxic (CO: 2.0% = 20000 ppm) and must be properly disposed off.

### ■ METHOD OF CALIBRATION:

1. For calibration press CAL key after the normal display mode i.e. AIRSON 5 GAS READY TO TEST.
2. The display will show the following options:
  - All
  - CO
  - CO2
  - HC
  - HC High
  - RESET CAL
  - NOx
3. We can choose any option through SELECT button.

### CALIBRATION OF ALL:

- When all option is selected through SELECT button, display will show the default values of all the gases.
- And the right side of display CO TAG, which indicates that this value is in set mode and you can increase/decrease the value by using UP-DOWN key.
- For rapid increase/decrease of values press AUTO ZERO key. Auto Zero LED glow which indicates that you are in *fast mode* and now you can increase/decrease the values by using UP-DOWN key.

Set CO: 2.00%

Set CO2: 13.00%

Set HC: 1400 ppm propane value

\*Note: n-hexane value = propane value \* P.E.F.

i.e.: Propane value = 1400 PPM P.E.F. = 0.499

699 PPM (n-hexane value) = 1400 PPM (propane value)\*0.499(P.E.F.)



- To exit from fast mode press **AUTO ZERO** key again.
- To change the tag value press **SELECT** key.
- After setting all the values, press **CAL** key to freeze the entered values.
- The instrument will perform **AUTO-ZERO** automatically and show the content of gases on display.
- The instrument then waits for calibration gas to be inserted into it.
- Now open the gas bottle valve and set the pressure regulator to a backpressure of **0.5 bar ± 0.1 bar**. Open the needle valve slowly until a gas flow of approx. **2.5 to 3 l/m** is measured at the flow meter. Gas now flows through the measuring cell and the meter displays the measured value. Let the gas flow for approx. **1 min** through the measuring cell.
- Wait till measurement values are stable and no longer fluctuate.
- When the readings are not in the limit given in the calibration gas bottle press **Select** key again to recalibrate the values. The right side of display shows **calibrating SPAN**.
- After few seconds the new values appear on the display.
- When the readings are within the limit and if printout is required press **PRINT** key.
- Remove the gas bottle wait for gas flush out from the analyser.
- To exit from this mode press **RPM** key, the instrument will again come back in its normal mode i.e. **AIRSON 5 GAS READY TO SET**.

### **CALIBRATION OF CO, CO2, HC & HC HIGH:**

- Select the respective option through **SELECT** button, display will show the default values of all the gases.
- And the right side of display **CO/CO2/HC/HC HIGH TAG**, which indicates only that value, is in set mode and you can increase/decrease the value by using **UP-DOWN** key.
- For rapid increase/decrease of values press **AUTO ZERO** key. **AUTO ZERO LED** glows which indicates that you are in fast mode and now you can increase/decrease the values by using **UP-DOWN** key.
- For **CO** set : **2.00%**
- For **CO2** set : **13.00%**

- For HC set : 1400 ppm propane value
- To exit from fast mode press AUTO ZERO key again.
- After setting the value, press CAL key to freeze the entered value.
- The instrument will perform AUTO-ZERO automatically and show the content of gases on display.
- The instrument then waits for calibration gas to be inserted into it.
- Now open the gas bottle valve and set the pressure regulator to a backpressure of 0.5 bar  $\pm$  0.1 bar. Open the needle valve slowly until a gas flow of approx. 2.5 to 3 l/m is measured at the flow meter. Gas now flows through the measuring cell and the meter displays the measured value. Let the gas flow for approx.1 min through the measuring cell.
- Wait till measurement values are stable and no longer fluctuate.
- When the readings are not in the limit given in the calibration gas bottle press Select key again to recalibrate the values. The right side of display shows calibrating SPAN.
- After few seconds the new values appear on the display.
- When the readings are within the limit and if printout is required press PRINT key.
- Remove the gas bottle wait for gas flush out from the analyser.
- To exit from this mode press RPM key, the instrument will again come back in its normal mode i.e. AIRSON 5 GAS READY TO TEST.

### RESET CAL:

- Select the RESET CAL by using SELECT key.
- Press CAL key to reset the calibration.
- The calibration is reset after few seconds and instrument automatically comes back into its normal mode i.e. AIRSON 5 GAS READY TO TEST.

***NOTE: Avoid this function in the field as the instrument again has to be calibrated for correct readings.***

**-: PRINTER :-**

**AIRSON OM - 1100** has a parallel printer port (Max. two printouts).

- ❖ **LX-800 (Recommended Printer)**
- ❖ **Any printer which support MS-DOS mode.**
- ❖ **Printout of vehicle measurement contains the following data:**

**TEST REPORT BY  
AIRSON OM - 1100  
GAS ANALYSER**

**DATE: 08/11/04 10:52**  
**FUEL : PETROL**  
**VEHICLE NO. \_\_\_\_\_**  
 \*\*\*\*\*  
**CO : 02.00 %**  
**HC : 0695 ppm p.e.f. 0.499**  
**CO2 : 12.93 %**  
**O2 : 00.53 %**  
**NOx : 0000 ppm**  
**RPM : 0000 A**  
**A : 2ST,1CY : 4ST,2CY**  
**Oil Temp. : -023.0 deg.C**  
 \*\*\*\*\*

**CHECKED BY: -**

- ❖ **Calibration printout contains the following data:**

**CALIBRATION  
TEST REPORT BY  
AIRSON OM - 1100  
GAS ANALYSER**

**CALIBRATION  
TEST REPORT BY  
AIRSON OM - 1100  
GAS ANALYSER**

**DATE: 08/11/04 10:52**  
 \*\*\*\*\*  
**CO : 00.00 % cyl**  
**CO : 00.00%**  
 \*\*\*\*\*

**CHECKED BY: -**

**CALIBRATION  
TEST REPORT BY  
AIRSON OM - 1100  
GAS ANALYSER**

**DATE: 08/11/04 10:52**  
 \*\*\*\*\*  
**CO<sub>2</sub> : 00.03 % cyl**  
**CO<sub>2</sub> : 00.03 %**  
 \*\*\*\*\*  
**CHECKED BY: -**

**DATE: 08/11/04 10:52**  
 \*\*\*\*\*  
**HC : 1000 propane cyl**  
**HC : 0515 ppm P.E.F. 0.503**  
 \*\*\*\*\*

**CHECKED BY: -**

**CALIBRATION  
TEST REPORT BY  
AIRSON OM - 1100  
GAS ANALYSER**

**DATE: 08/11/04 10:52**  
 \*\*\*\*\*  
**O<sub>2</sub> : 20.92 % cyl**  
**O<sub>2</sub> : 20.92 %**  
 \*\*\*\*\*  
**CHECKED BY: -**

**∴ CONSUMABLE ITEMS ∴**

| S.No. | ITEM                 | DESCRIPTION   |
|-------|----------------------|---|
| 1.    | Probe                | 30-cm. Long exhaust probe that is inserted into the exhaust tail pipe of a vehicle to take gas samples. |
| 2.    | Silicon Pipe         | 5-mts. long gas sampling pipe.  |
| 3.    | Oil temperature cord | 10-mts. long oil temp. sensor cord.   |
| 4.    | R.P.M. cord          | 10-mts. long RPM inductive cord for RPM measurement.  |
| 5.    | Filter unit          | Used to remove the particulate matter from the exhaust gas sample.                                      |
| 6.    | Oxygen Sensor        | Electro chemical sensor decay with time and uses.   |
| 7.    | NOX Sensor           | Electro chemical sensor decay with time and uses.   |
| 8.    | Supply Cord          | 3 Pin Main Lead to connect the analyser.  |

Note: - Consumable items are not covered under warranty.

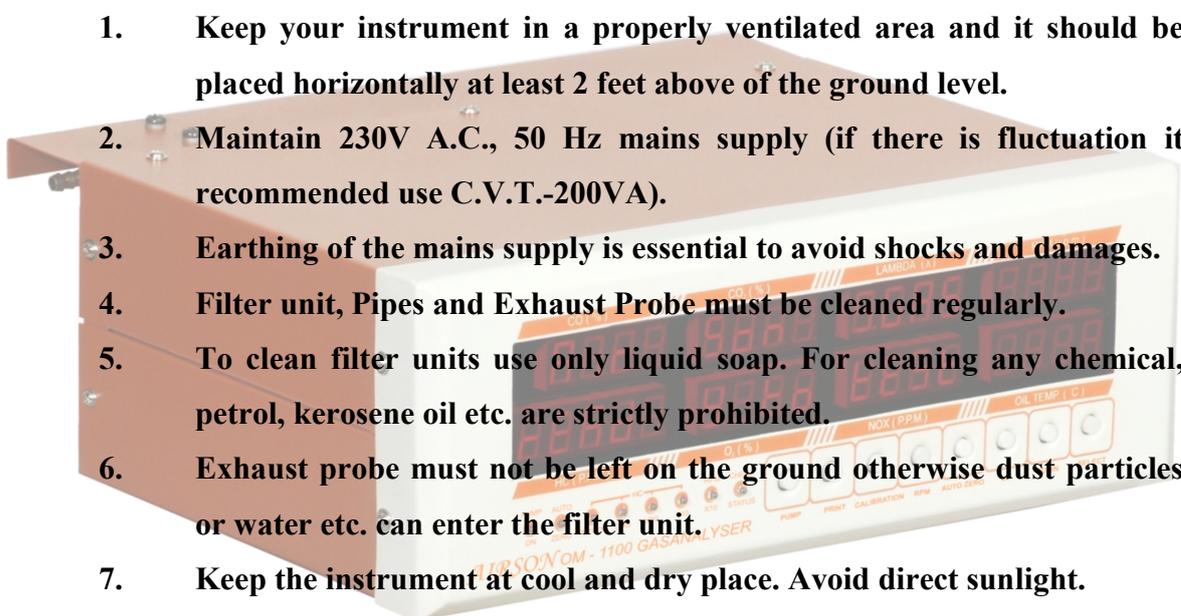


**-: WARNING AND ERRORS :-**

*AIRSON OM - 1100* has been manufactured with the latest NDIR technology combining with practical needs of the users. The technology has been developed to make the instrument users friendly with minimum maintenance and trouble free service to the customers.

However for efficient working of the instrument following measures are essential:

1. Keep your instrument in a properly ventilated area and it should be placed horizontally at least 2 feet above of the ground level.
2. Maintain 230V A.C., 50 Hz mains supply (if there is fluctuation it recommended use C.V.T.-200VA).
3. Earthing of the mains supply is essential to avoid shocks and damages.
4. Filter unit, Pipes and Exhaust Probe must be cleaned regularly.
5. To clean filter units use only liquid soap. For cleaning any chemical, petrol, kerosene oil etc. are strictly prohibited.
6. Exhaust probe must not be left on the ground otherwise dust particles or water etc. can enter the filter unit.
7. Keep the instrument at cool and dry place. Avoid direct sunlight.

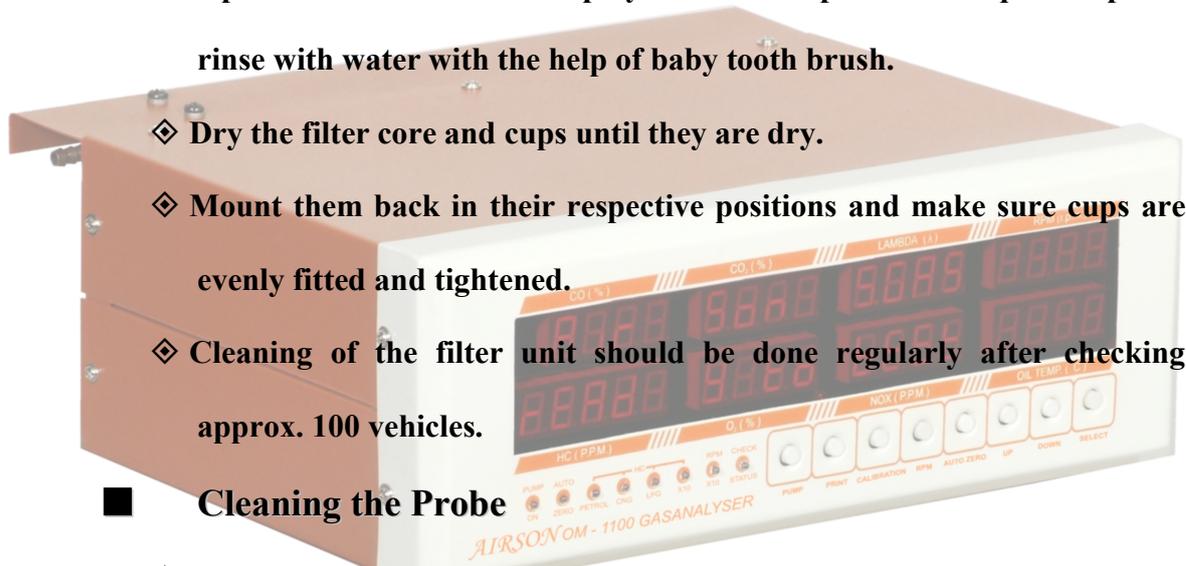


**-: MAINTENANCE :-****■ Gas Calibration**

A Gas calibration must be carried out by a service engineer after every 6 months.

**■ Input Filter Cartridge Replacement**

- ◇ Remove the filter cups from bracket by unscrewing anti-clock wise.
- ◇ Unscrew the filter core.
- ◇ Dip the filter core as well as polycarbonate cups into the liquid soap and rinse with water with the help of baby tooth brush.
- ◇ Dry the filter core and cups until they are dry.
- ◇ Mount them back in their respective positions and make sure cups are evenly fitted and tightened.
- ◇ Cleaning of the filter unit should be done regularly after checking approx. 100 vehicles.

**■ Cleaning the Probe**

- ◇ Disconnect the probe and hose from the INSTRUMENT.
- ◇ Loosen any residues in the probe by tapping it gently.
- ◇ Clean the probe and the hose with compressed air.

Reassemble the hose and the probe and connect to the INSTRUMENT..

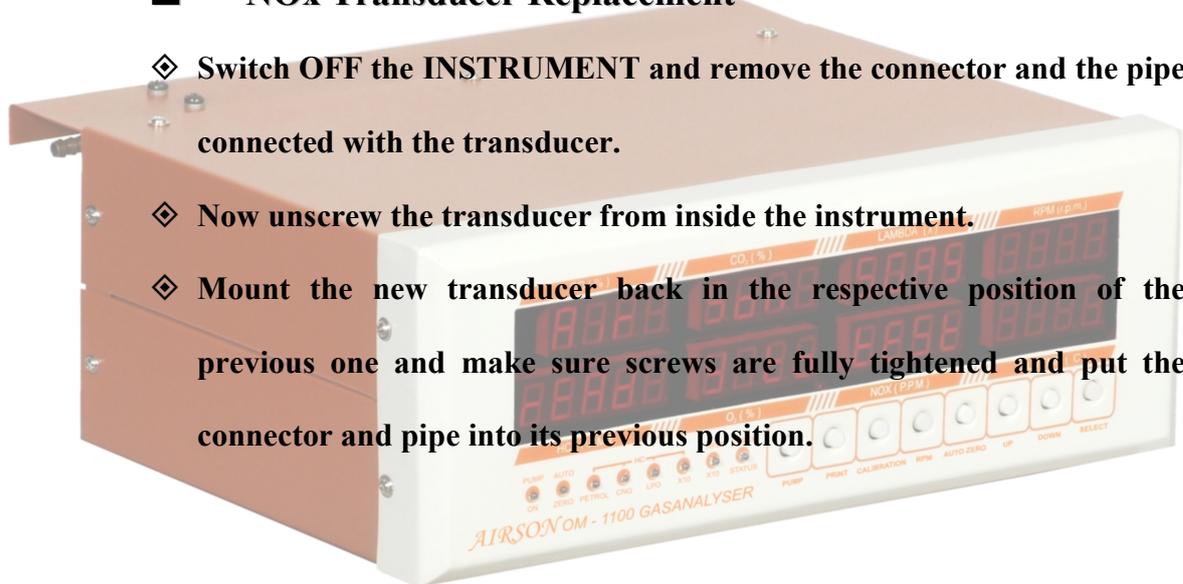
**Note: Disconnect the probe from the INSTRUMENT before using compressed air to avoid any possible damage to the INSTRUMENT.  
Do not bend the probe!**

### ■ Oxygen Transducer Replacement

- ◇ Switch OFF the INSTRUMENT and remove the connector and the pipe connected with the transducer.
- ◇ Now unscrew the transducer from the rear side of the instrument.
- ◇ Mount the new transducer back in the respective position of the previous one and make sure screws are fully tightened and put the connector and pipe into its previous position.

### ■ NOx Transducer Replacement

- ◇ Switch OFF the INSTRUMENT and remove the connector and the pipe connected with the transducer.
- ◇ Now unscrew the transducer from inside the instrument.
- ◇ Mount the new transducer back in the respective position of the previous one and make sure screws are fully tightened and put the connector and pipe into its previous position.

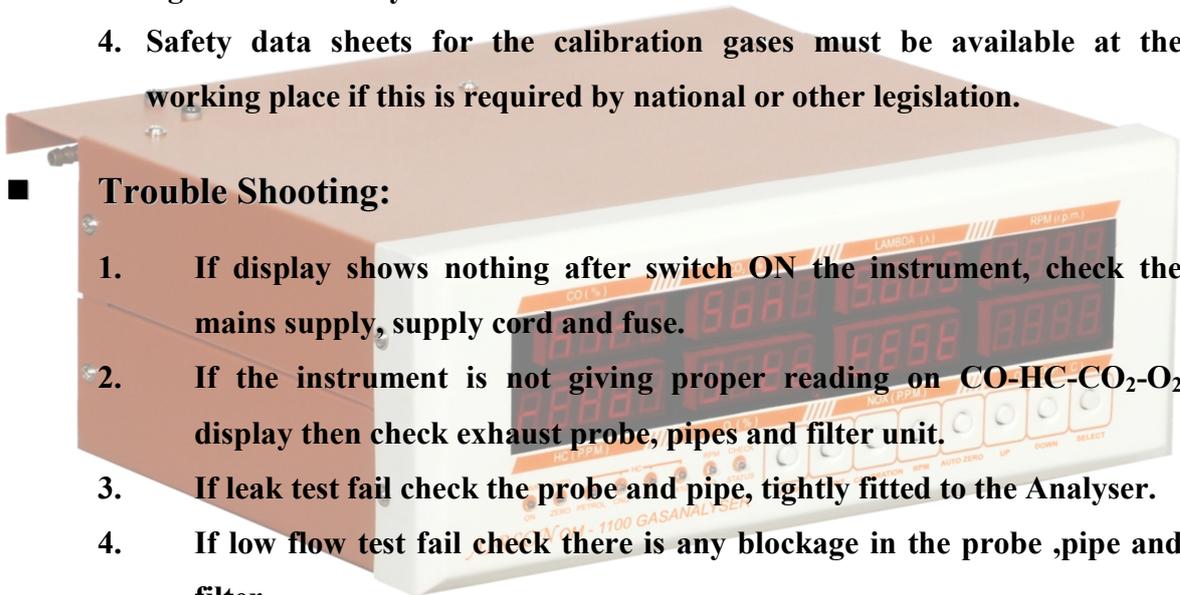


**-: SAFETY PRECAUTIONS AND TROUBLESHOOTING :-****■ Safety Precautions:**

1. The calibration gas that flows out of the meter is highly toxic (CO: 2.0% = 20000 ppm) and must be properly disposed of.
2. The local safety regulations relating to the calibration gases, disposal of the gases and handling of calibration gas bottles must always be observed.
3. Measuring instruments to monitor the CO content of the ambient air is required for the safety of the calibration personnel. The instruments must measure the gas in relation to the statutory limit values and output alarm signals should they be exceeded.
4. Safety data sheets for the calibration gases must be available at the working place if this is required by national or other legislation.

**■ Trouble Shooting:**

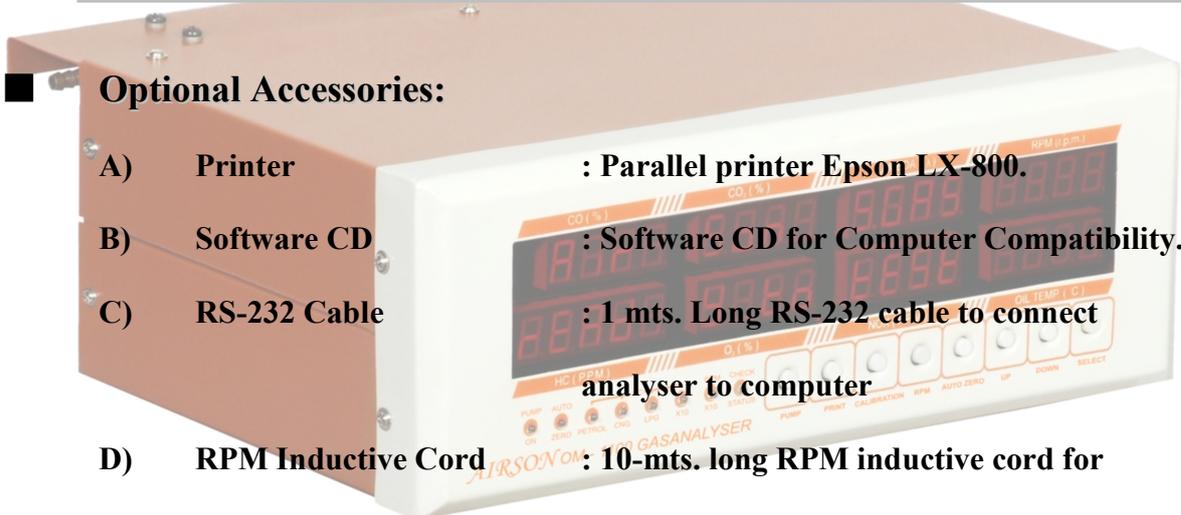
1. If display shows nothing after switch ON the instrument, check the mains supply, supply cord and fuse.
2. If the instrument is not giving proper reading on CO-HC-CO<sub>2</sub>-O<sub>2</sub> display then check exhaust probe, pipes and filter unit.
3. If leak test fail check the probe and pipe, tightly fitted to the Analyser.
4. If low flow test fail check there is any blockage in the probe ,pipe and filter.



**:- ACCESSORIES :-****■ Standard Accessories:**

|                     |   |
|---------------------|---|
| ◆ Equipment         | : Airson 5-Gas Analyser model OM - 1100.  |
| ◆ Gas Sampling Pipe | : 5-mts. long gas sampling pipe.  |
| ◆ Supply Cord       | : One fully tested and standard power cord.   |
| ◆ Exhaust Probe     | : 30-cm. Long exhaust probe that is inserted into the exhaust tail pipe of a vehicle to take gas samples. |
| ◆ User Manual       | : One manual, which contains all the necessary instruction about the instrument.                          |

**■ Optional Accessories:**

- 
- A) Printer : Parallel printer Epson LX-800.
- B) Software CD : Software CD for Computer Compatibility.
- C) RS-232 Cable : 1 mts. Long RS-232 cable to connect analyser to computer
- D) RPM Inductive Cord : 10-mts. long RPM inductive cord for RPM measurement.
- E) Oil Temperature Sensor : 10-mts. long oil temp. Sensor cord.
- F) Extension Pipe : Suitable Extension Pipes, covering all Vehicle types, to be provided where insertion of 300 mm probe length in the exhaust is not possible.
- G) Battery Lead : To connect the analyser with battery.

**:- STATUS CHECK TABLE :-**

During the measurement status can be checked by pressing DOWN key. Exit from this mode press UP key.

**Binary coded decimal**

(B7,B6,B5,B4, B3,B2,B1,B0)  
( X X X X )

**EB-1:**

|        |                         |   |
|--------|-------------------------|---|
| Bit -1 | Detector temp O.O.R.    | 1 |
| Bit -2 | Ambient temp O.O.R.     | 2 |
| Bit -3 | Pressure O.O.R.         | 4 |
| Bit -4 | Calibration Required    | 8 |
| Bit -5 | Calibration in progress | 1 |
| Bit -6 | Warm – up in progress   | 2 |
| Bit -7 | Zero required           | 4 |
| Bit -8 | Zero in progress        | 8 |

**EB-2:**

|        |                        |   |
|--------|------------------------|---|
| Bit -1 | Vacuum O.O.R.          | 1 |
| Bit -2 | RPM O.O.R.             | 2 |
| Bit -3 | Oil temp O.O.R.        | 4 |
| Bit -4 | NOX O.O.R.             | 8 |
| Bit -5 | O <sub>2</sub> O.O.R.  | 1 |
| Bit -6 | CO <sub>2</sub> O.O.R. | 2 |
| Bit -7 | CO O.O.R.              | 4 |
| Bit -8 | HC O.O.R.              | 8 |

**EB-4:**

|        |                           |   |
|--------|---------------------------|---|
| Bit -1 | Lamp error                | 1 |
| Bit -2 | New RPM                   | 2 |
| Bit -3 | New Gas Data              | 4 |
| Bit -4 | Initial Zero in progress  | 8 |
| Bit -5 | Bad NOX sensor            | 1 |
| Bit -6 | Detector Low Signal       | 2 |
| Bit -7 | Bad O <sub>2</sub> sensor | 4 |
| Bit -8 | EEPROM failed             | 8 |

Note: Bad O<sub>2</sub>, Bad NOX and Calibration required are also prompt directly on display.

**WARRANTY CARD**

Customer Copy

NAME:

ADDRESS:

PHONE:

MODEL NO.:        MACHINE NO.:       INVOICE NO.:

DATE OF INSTALLATION:

(I accept the terms & conditions of warranty)

For AIRSON ELECTRONICS

Customer's Signature & Date

Authorised Signatory

**WARRANTY** **TERMS AND CONDITIONS**

1. This is to certify that AIRSON OM - 1100 stands under warranty for any manufacturing defect for a period of 12 months from the date of installation/commissioning.
2. This warranty does not cover any damages due to accidents, transportation, misuse, negligence, natural disaster, voltage fluctuations or any operation procedure not covered as mentioned in the operating / instruction manual.
3. This warranty extends only to the original using purchaser and is not assignable to transferable either voluntarily or by operation of law.
4. This warranty shall not apply to consumable items including filters, calibration gas, probe, pipe, O<sub>2</sub> Sensor, NOX Sensor and printer etc.
5. Warranty will avoid if instrument tempered by unauthorised person

AIRSON reserves the right to make changes in design and/or improvements to its product without any obligation to include these changes in previously manufactured product. Correction of defects by repair or replacement shall constitute fulfillment of all warranty obligations on the part of AIRSON.

**- : The warranty does not cover : -**

- Defects arising from accidents, alteration, misuse, neglect, substitution of original components with unauthorized components, fire, flood or other acts of God.
- Normal wear and tear of parts.
- Liability for consequential loss or damage is neither accepted nor implied.
- The cost of transporting the machine to the manufacturer or his authorised service centre and back shall be borne by purchaser.
- Parts repaired or replaced under this warranty are warranted for the remainder of the original warranty period.
- For any outdoor service under this warranty beyond 40 kms. from the nearest company authorized service centre, there will be a charge for the cost of transportation and traveling expenses for the excess distance.

**WARRANTY CARD**

Office Copy

NAME:

ADDRESS:

PHONE:

MODEL NO.:        MACHINE NO.:       INVOICE NO.:

DATE OF INSTALLATION:

(I accept the terms & conditions of warranty)

For AIRSON ELECTRONICS

Customer's Signature & Date

Authorised Signatory

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- The cost of transporting the machine to the manufacturer or his authorised service centre and back shall be borne by purchaser.
- Parts repaired or replaced under this warranty are warranted for the remainder of the original warranty period.
- For any outdoor service under this warranty beyond 40 kms. from the nearest company authorized service centre, there will be a charge for the cost of transportation and traveling expenses for the excess distance.