Газоанализаторы 1101

Руководство по эксплуатации

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ANALOX 1101 OXYGEN ANALYSER
OPERATOR INSTRUCTIONS

1.0 INTRODUCTION

1.1 The ANALOX 1101 Oxygen Analyser is a Multi - Purpose Instrument, which may be supplied, configured for specific applications. The part number quoted, at time of order determines the actual configuration.

1.2 The following configurations are available :

a) SA1 R01 DH1101-5A 0-25.00% Measuring Range, 4-20mA Output ≡ 0-5.00% 120vAC
b) SA1 R01 DH1101-5A2 0-25.00% Measuring Range, 4-20mA Output ≡ 0-5.00% 230vAC

c) SA1 R01 DH1101-5B 0-25.00% Measuring Range, 0-5v Output ≡ 0-5.00% 120vAC
d) SA1 R01 DH1101-5B2 0-25.00% Measuring Range, 0-5v Output ≡ 0-5.00% 230vAC

e) SA1 R01 DH1101-20A 0-2500 ppm Measuring Range, 4-20mA Output ≡ 0-2000ppm 120vAC
f) SA1 R01 DH1101-20A2 0-2500 ppm Measuring Range, 4-20mA Output ≡ 0-2000ppm 230vAC

g) SA1 R01 DH1101-20B 0-2500 ppm Measuring Range, 0-5v Output ≡ 0-2000ppm 120vAC
h) SA1 R01 DH1101-20B2 0-2500 ppm Measuring Range, 0-5v Output ≡ 0-2000ppm 230vAC

i) SA1 R01 DH1101-2A 0-2500 ppm Measuring Range, 4-20mA Output ≡ 0-200ppm 120vAC
j) SA1 R01 DH1101-2A2 0-2500 ppm Measuring Range, 4-20mA Output ≡ 0-200ppm 230vAC

k) SA1 R01 DH1101-2B 0-2500 ppm Measuring Range, 0-5v Output ≡ 0-200ppm 120vAC
l) SA1 R01 DH1101-2B2 0-2500 ppm Measuring Range, 0-5v Output ≡ 0-200ppm 230vAC

2.0 MEASURING RANGE

2.1 For ppm instruments, the display indicates 0.0 to 999.9 and 1000 to 2500 ppm. Scale changeover is automatic at 1000 ppm.

2.2 For Percent instruments, the display indicates 0.00 to 25.00%

Note that values may appear on the display in excess of the normal ranges. This depends on the specific output of each particular sensor and the calibration points specified. The display will flash ‘Over’ if the measuring circuits reach their upper limit.

3.0 ANALOG OUTPUT

3.1 The instrument is factory configured for either a 4-20mA output or a 0-5V output. The range of the analog output is also factory set to represent 200ppm, 2000ppm or 5.00%.

4.0 ALARM SYSTEM

4.1 The instrument provides a high oxygen alarm. This is annunciated via a RED LED on the front panel of the instrument and an alarm relay, which provides Common (COM), Normally Open (NO) and Normally Closed (NC) volt-free contacts. A facility is included to allow connection of an external 5 Volt buzzer, via the screw terminals on the rear panel of the Instrument.

4.2 The relay is configured for fail safe operation. When the instrument is switched off, or is subject to a power failure, the relay is de-energised, effectively indicating an alarm.

4.3 When the instrument is switched on, the relay remains de-energised for a brief 'warm up' period. The relay operation is then dependant on the Oxygen level and the Alarm High Setpoint. If the Oxygen reading is higher than the Alarm Setpoint, the alarm relay is de-energised, the LED starts to flash, and the audible buzzer, if fitted, is pulsed.

4.4 The alarm is set as non-latching. Therefore, if the oxygen level falls (to below 95% of the setpoint), the alarm will automatically cancel. The LED will switch off, the buzzer, if fitted, will silence and the relay will energise.

4.5 If the oxygen level remains above the setpoint, the audible buzzer can be silenced by pressing the ENTER switch momentarily. The LED will continue to flash, and the relay will remain de-energised until the oxygen level falls to a value, below 95% of the alarm setpoint. For example, if the alarm setpoint is 10% the alarm function will trigger when the measured value reaches 10.00% and will reset when the measured value reduces to 95% of 10% ie 9.50%.

4.6 The alarm Setpoint can be altered by the operator, using the keys on the front panel.

5.0 INSTALLATION

5.1 The Instrument is designed to be panel mounted in an aperture approximately 92 mm x 92 mm. The retaining clamps provided with the Instrument, can accommodate panel thickness up to 30 mm. Remove the retaining clamps from the side panels of the Instrument and insert the Instrument through the panel. Refit the side clamps and tighten the locking screws.

5.2 Refer to the Label on the rear panel of the Instrument (See Drawing Below) and connect the appropriate signal wiring to the 12 way two part screw terminal strip. (Sensor, Analog Output, Horn, Inhibit, Relay)

1	Sensor Scr.
2	Sensor +
3	Sensor -
4	An.Out +
5	An.Out -
6	Horn +
7	Horn -
8	Inhibit
9	Inhibit
10	Relay NC
11	Relay COM
12	Relay NO
13	Earth
14	AC Neut
15	AC Live

5.3 Ensure that the Oxygen Sensor connections are of correct polarity : **RED Sensor +** should be connected to **Terminal 2** and **BLUE Sensor -** , to **Terminal 3**. The screen of the sensor lead, should be connected to Terminal 1, **Sensor Scr**.

5.4 If the Analogue output signal is to be used, the necessary connections should be made at Terminals 4 and 5 of the 12 way connector. Reference to the Instrument Part Number and the configuration data on Page 1, will indicate if the Instrument has been configured for a voltage (0 - 5 Volts) or Current (4 - 20 mA) Output. If the character at the end of the Part Number is '**A**' then the Instrument is configured for Current Output and if '**B**', the instrument is configured for Voltage Output.

5.5 If the Alarm relay is to be used, then connections should be made to Terminals 10, 11 and 12 as appropriate. Note that under normal operating conditions ie no alarm present, the Relay **COM** and Relay **NO** will form a closed circuit, since the Relay is normally energised. An alarm condition will cause the relay contacts to change over, breaking the circuit between **COM and NO** and closing **COM** and **NC.**

5.6 If an external Audible warning device is to be used, then it should be connected to **Horn +** and **Horn-** observing polarity. The Device should be capable of operating from 5 Volts DC and should not draw current in excess of 50 milliamps.

5.7 Connect the AC Power supply to the 3 way, two part screw terminal strip. Check that the Power supply within the system (120v AC or 230v AC) agrees with the stated voltage on the rear panel label of the Instrument and the Part Number / configuration data on Page 1.

5.8 The Oxygen sensor should be fitted into the system pipework at an appropriate position, using the 'T' piece compression fitting provided. A typical arrangement is shown in Fig. 1 below. It is very important that the effect of backward diffusion of ambient Oxygen is avoided, particularly with a PPM measuring system. This effect can be overcome by fitting a pipe, having a length of at least 300 millimetres, to the gas exhaust port of the 'T' piece compression fitting.

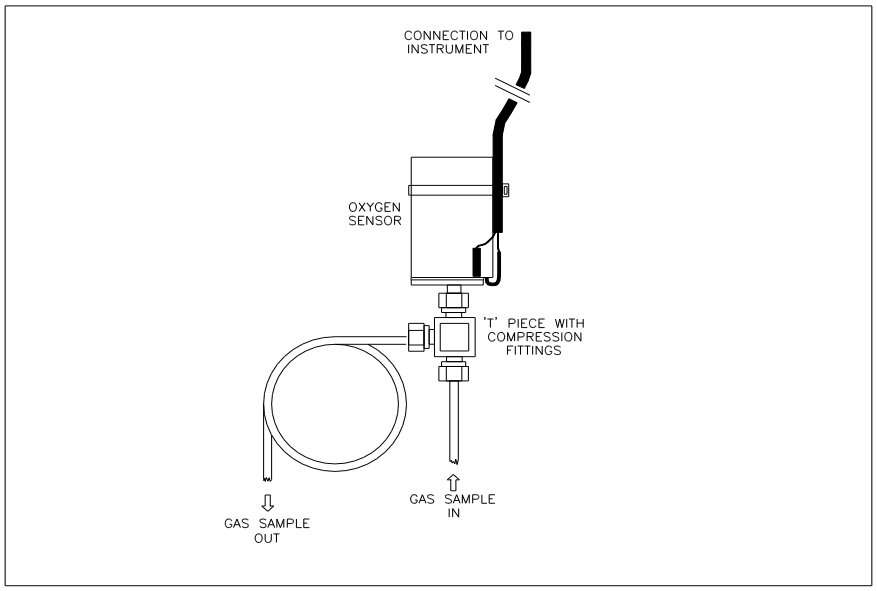

FIG.1. Typical Sampling arrangement

5.9 The pipework used to deliver the gas to the PPM sensor, must be made of a hard, non-porous material , such as stainless steel, Nylon, PTFE, unplasticised PVC etc. Any other devices, such as pumps or flowmeters installed in the pipework leading to the sensor input, must be of a type suitable for use at low PPM levels.

5.10 It is very important that the gas delivery pressure and flow to the sensor, is kept constant, since variations in pressure will result in erratic output signals and hence unstable readings on the Instrument display. Vibrating diaphragm pumps should not be used to deliver the gas sample, unless the pulsating output can be smoothed. It is also important that the gas sample outlet from the cell adapter, is not restricted in any way - it must vent to atmospheric pressure.

5.11 It is important that the gas sample being fed to the sensor is clean and of a non-corrosive nature. If it is possible that contaminants or particulate may be present in the gas sample, then the gas should be passed through filters and/or chemical absorbers, before being presented to the sensor.

5.12 Sample temperature should be in the range -5°C to +40°C and its Dew Point should always be **below** Ambient temperature.

5.13 Refer to **Section 7** for details of Sensor Installation/Replacement

6.0 OPERATION

6.1 FRONT PANEL KEYS

When the system is switched on, key functions, from LEFT to RIGHT, are as follows:

MENU ⋈ Press for 2 seconds to access Menu Functions (refer below)

UP ▲ Press to display the current Alarm Setpoint.

DOWN ▼ No action until Menu is selected.

ENTER ↵ Press to Accept/Acknowledge alarms (silence buzzer, if fitted.)

6.2 PASSWORD AND MENU SYSTEM

When the instrument is operating normally, press the MENU key for 2 seconds to access the Menu facilities. These features are password protected. The password protection is always implemented, when the instrument is first switched on.

6.3 ENTERING PASSWORD

a) From normal measuring mode, press MENU for 2 seconds. The display will show the text 'PASS'. The password is 1066.
b) Press ENTER. The display will show 1000.
c) Pressing UP or DOWN key will either increase or decrease the number on the display. Maintain either switch pressed to change the value more rapidly. When the number is equal to the pre-set password, press ENTER. If the password is entered correctly, the display will change to display the first menu option 'ALHi'. If the password is entered incorrectly, repeat the procedure again.

When the correct password has been entered, the instrument will allow the user to access the menu, for a further 30 minutes, without needing the password. This assumes that the instrument is not switched off during the 30 minute period.

6.4 MENU SYSTEM

6.4.1 The following options exist in the menu system.

a)	ALHi	Alarm High Setpoint
b)	CALS	Span Calibration
c)	CAL0	Zero Calibration
d)	inh	Inhibit Output

6.4.2 Having entered the menu system, press UP or DOWN to move forwards or backwards through the menu options. Each option is then selected by pressing ENTER. Pressing MODE at any time will revert back to normal measuring mode. If no keys are pressed for 60 seconds, the instrument will also revert to normal measuring mode. Whilst in the menu system, the oxygen alarm function is disabled.

6.4.3 **Note** there is also a fifth option (**dFLt**-Default Settings). This is only accessible if the ENTER switch is held pressed while the instrument is switched on. (See 6.4.7 'Default Settings' below)

6.5 ALARM HIGH SETPOINT

6.5.1 Select **ALHi** in the menu and press the ENTER key. Press UP/DOWN until the display shows the required alarm setpoint. On Percent instruments, the setpoint can be varied from 00.00 to 99.99. On ppm instruments the setpoint can be varied from 0000 to 9999 ppm. Press ENTER to select the new setting or press MENU to revert to the previous setting.

6.6 PPM INSTRUMENT SPAN CALIBRATION

6.6.1 Before any calibration routines are carried out, consideration should be given to any peripheral equipment which is connected or being controlled by the Instrument. A facility for disabling an external PLC is incorporated in the Instrument. Refer to Paragraphs 6.10 through 6.10.2 for details.

6.6.2 Calibration of the PPM Instrument involves setting two reference points in the instrument's internal memory. These points are normally referred to as 'SPAN' and 'ZERO'. Routine calibration only requires adjustment of the 'SPAN' point. The 'ZERO' point will generally only need to be calibrated, when a new sensor is fitted to the Instrument.

6.6.3 Calibration gas is normally a mixture of Oxygen and Nitrogen , whose Oxygen concentration is certified. For best accuracy, the calibration gas Oxygen concentration, used to set the SPAN point, should be as near as possible to the normally expected measuring concentration. The flow rate for the calibration gas should be between 400 and 750 millilitres/minute

6.6.4 Ensure that the sensor has been subjected to the calibration gas, and that the reading on the display has stabilised. If the calibration gas Oxygen concentration is considerably lower than the last measured sample gas, it will take some time for the system to be purged to the lower level and the Instrument reading to settle. **The calibration procedure should NOT be carried out until the display reading is steady.**

6.6.5 Access the MENU system and if necessary, enter the password as described in Paragraphs 6.2 and 6.3 above. Select **CALS** in the menu and press ENTER. The instrument's internal digital reading, at the time ENTER key is pressed, is stored temporarily and the display will freeze at the last measured value. The UP/DOWN keys should then be used to alter the display, until it shows the oxygen concentration of the calibration gas, being used. When the value displayed is correct, press ENTER. Span calibration data will then be written into the Instrument's memory for use in all subsequent measurements. Exit the calibration mode by pressing the MENU key. The Gas input connections to the Instrument sensor may now be reconfigured to the normal measuring system.

6.6.6 Pressing MENU at any time during the above process, will cause the Instrument to revert to the previous settings. (Note calibration data is retained even when the instrument is switched off.)

6.7 PERCENT INSTRUMENT SPAN CALIBRATION

6.7.1 Before any calibration routines are carried out, consideration should be given to any peripheral equipment which is connected or being controlled by the Instrument. A facility for disabling an external PLC is incorporated in the Instrument. Refer to Paragraphs 6.10 through 6.10.2 for details.

6.7.2 Calibration of the Percent Instrument involves setting two reference points in the instrument's internal memory. These points are normally referred to as 'SPAN' and 'ZERO'. Routine calibration only requires adjustment of the 'SPAN' point. The 'ZERO' point will generally only need to be calibrated, when a new sensor is fitted to the Instrument.

6.7.3 The calibration gas, used to set the SPAN point, may be normal atmospheric Oxygen or any other source of Oxygen/Nitrogen mixture, whose Oxygen concentration is known. Calibration gas should be in the range 1% to 25% as near as possible to the normal measurement range.

6.7.4 Ensure that the sensor has been subjected to the calibration gas, and that the reading on the display has stabilised. The calibration procedure should NOT be carried out until the display reading is steady.

6.7.5 Access the MENU system and if necessary, enter the password as described in Paragraphs 6.2 and 6.3 above. Select **CALS** in the menu and press ENTER. The instrument's internal digital reading, at the time ENTER key is pressed, is stored temporarily and the display will freeze at the last measured value.

6.7.6 The UP/DOWN keys should then be used to alter the display, until it shows the oxygen concentration of the calibration gas, being used. If normal atmospheric air is being used, the display should be set to **20.70** , allowing for effect of normal moisture content. If Instrument Air from a cylinder is being used, the display should be set to **20.95** since this gas will normally be much drier than atmospheric air.

6.7.7 When the value displayed is correct, press ENTER. Span calibration data will then be written into the Instrument's memory for use in all subsequent measurements. Exit the calibration mode by pressing the MENU key. The Gas input connections to the Instrument sensor may then be reconfigured to the normal measuring system.

6.7.8 Pressing MENU at any time during the above process, will cause the Instrument revert to the previous settings. (Note the calibration data is not lost when the instrument is switched off.)

6.8 PPM INSTRUMENT ZERO POINT SETTING

6.8.1 Each PPM sensor has been characterised by the supplier, to determine the very small residual signal output, when no Oxygen is present at the sensor gas input port. To obtain best accuracy of measurement, particularly at very low PPM levels of Oxygen, the effect of this residual output, requires a compensation process within the measuring Instrument. Individual PPM sensors are marked with a PPM equivalent of this residual signal.

6.8.2 Zero point setting is normally only required when a replacement sensor is fitted to the Instrument.

6.8.3 Access the MENU system and if necessary, enter the password as described in Paragraphs 6.2 and 6.3 above. Select **CAL0** and press the ENTER key. For a period of about 3 seconds, the display will show a rapidly varying reading while the instrument carries out its internal electrical zero adjustment. At the end of this period, the display will show a value between 0.0 and 9.9

6.8.4 Use the UP/DOWN keys to adjust the display, until it agrees with the offset value shown on the label of the sensor connected to the Instrument. When the correct value has been established, press the ENTER key to confirm the operation - the display will show **CAL0**. Press the MENU key to return to normal operational mode.

6.9 PERCENT INSTRUMENT ZERO POINT SETTING

6.9.1 There will be a residual signal output from a Percent Oxygen sensor, when no Oxygen is present at the gas input port. However, compared to the measuring range, the magnitude of this signal is so small, as to be insignificant. Therefore, the Percent Oxygen sensors are not characterised for an Offset value.

6.9.2 Zero point setting is normally only required when a replacement sensor is fitted to the Instrument.

6.9.3 Access the MENU system and if necessary, enter the password as described in Paragraphs 6.2 and 6.3 above. Select **CAL0** and press the ENTER key. For a period of about 3 seconds, the display will show a rapidly varying reading while the instrument carries out its internal electrical zero adjustment.

6.9.4 At the end of this period, the display will revert to show **CAL0** . Press the MENU key to return to the normal operational mode.

6.10 INHIBIT OUTPUT

6.10.1 The inhibit output is intended to allow the instrument to indicate to an external device that its output signal should not be interpreted ; for example, during a calibration procedure, or long term purge down of a system. The inhibit relay contacts are presented externally, on the screw terminals, on the rear panel of the Instrument. This function must be deliberately set by the user.

6.10.2 Select the 'inh' option within the menu and press ENTER. Pressing UP/DOWN will toggle the display from **On** to **OFF**. (**OFF** indicates the inhibit relay will not be energised and the relay contacts will remain Open. **On** indicates the inhibit relay will be energised and the contacts Closed). Pressing ENTER sets the relay in the desired state.

NOTE : When the Inhibit function is set to **On**, the front panel Red LED will be turned on, to provide visual indication that the Inhibit output is enabled. All Alarm functions are disabled when the Inhibit output is **On.**

6.11 DEFAULT SETTINGS

6.11.1 This function allows an instrument which has been incorrectly calibrated and therefore possibly inoperable, to be restored to a useable condition, without using calibration gas. The Zero and Span calibration points will be based on theoretical conversion factors, which will be correct for an Ideal Oxygen sensor. However, since there are variations in signal output between sensors, **this facility should only be considered a temporary solution and the Instrument should be correctly calibrated as soon as possible.**

6.11.2 To Select this option, the Instrument should be switched off and then switched on again whilst holding the ENTER key pressed, **until the RED Alarm LED has flashed 4 times**. Release the ENTER key.

6.11.3 Press the MENU key for 2 seconds and then the UP or DOWN key until the display shows **dFLt**. Press ENTER, and the display will show **OFF**. Use UP or DOWN key to toggle **OFF** to **On**. Pressing ENTER when the display shows '**On**', will load default calibration constants.

7.0 SENSOR INSTALLATION / REPLACEMENT

7.1 All sensors are supplied fitted with a metal flow adapter tube, suitable for interfacing with a ¼" compression gas fitting. A neoprene stopper is fitted into the flow adapter to prevent ingress of atmospheric Oxygen. This precaution is particularly important for the PPM sensors and will maintain the sensor in a such a condition, that it does not require very long purge times, before measurements can be taken.

IT IS VERY IMPORTANT THAT THE NEOPRENE STOPPER IS NOT REMOVED FROM A PPM SENSOR, EVEN FOR A SHORT PERIOD, UNTIL THE ACTUAL INSTALLATION PROCESS TAKES PLACE.

7.2 When a new Instrument is ordered, it will be supplied with its sensor attached to the electrical screw terminal strip, on the rear of the Instrument. If possible, **the sensor should remain connected during installation**. If this is not practical, it should be disconnected from the Instrument for the shortest possible period. New Instruments with sensor are also supplied with a ¼" 'T' piece compression fitting.

7.3 Replacement sensors will be supplied with the connecting leads shorted together. The time period between unshorting the leads and connecting to the instrument terminals, should be kept as short as possible.

7.4 To install a sensor into the pipework, refer to Figure 1. on Page 5 of this manual. Fit the ¼" compression fitting into the system pipework, at a convenient position and tighten the fitting nuts. Avoid over tightening the nuts - about ½ a turn beyond finger tight is sufficient to provide a good seal.

7.5 If the Instrument is required to be in an operational condition shortly after sensor installation, then either the sample gas or a low ppm Oxygen concentration gas should be flowing during the sensor installation into the pipework. Ensure the 'T' piece nut which accommodates the sensor flow adapter is slackened. Remove the Neoprene stopper from the sensor flow adapter. **Quickly** fit the sensor flow adapter into the 'T' piece and tighten the compression nut. Again, avoid over tightening the nuts - about ½ a turn beyond finger tight is sufficient to provide a good seal.

7.6 To replace a sensor in an existing system, slacken the compression nut which retains the old sensor and remove the sensor from the 'T' piece. Unplug the 12 way screw terminal block from the rear of the Instrument. Undo the screws in positions 1, 2 and 3 of the terminal block and remove the old sensor wires from the block. Remove the shorting wire from the RED and BLUE sensor wires and fit the connecting wires of the replacement sensor into the terminal block, Screen (Earth) to position 1, RED to position 2 and BLUE to position 3. Tighten the retaining screws and refit the terminal block into the 12 way plug on the rear of the Instrument.

7.7 Carry out the procedure detailed in Paragraph 7.5 to fit the sensor into the pipework.

8.0 RESPONSE TIME

8.1 The T_{95} time of the PPM sensor, ie the time it takes from the onset of a step change **in PPM Oxygen** concentration at its gas input port, until the sensor output reaches 95% of its final value, is approximately 20 Seconds.

8.2 The T_{95} time of the Percent sensor is approximately 10 Seconds.

8.3 These times do not take into account the effect of extended pipework connected to the sensor gas input port, in the monitoring system, particularly when using a PPM sensor. For example, assume the initial monitored gas flowing in the pipework has a concentration of say 500 ppm Oxygen. If the gas at the input of the pipework is changed to 10 ppm Oxygen, it will take some considerable time for the reading on the Instrument to correctly indicate the new concentration. This is due to mixing of the original and new gas within the pipework, causing gradual dilution of the original gas. Furthermore, if the pipework is made of a plastic material, the Oxygen molecules can become trapped within the inner wall structure of the pipework and be released slowly into a low concentration Oxygen gas stream, resulting in longer purge-down times.

ANALOX 1101 SPECIFICATION

1. Instrument Type : Oxygen measurement

2. Ranges : 0 – 2500 ppm , 0 – 25.00%

3. Display : 4 Digit LCD Character Height 12.7 mm

4. Resolution : PPM Version 0 – 999ppm : 0.1ppm 1000 –2500ppm : 1ppm
: Resolution Changeover is Automatic as value changes 999.9 to1000 PPM
: % Version 0 – 25.00% : 0.01%

5. Analog Output : PPM Version 0 – 5 Volt ≡ 0 – 2000PPM or
: 4 - 20mA ≡ 0 - 2000 PPM or
: 0 – 5 Volt ≡ 0 – 200 PPM or
: 4 - 20mA ≡ 0 - 200 PPM
: % Version 0 – 5 Volt ≡ 0 – 5.00% or
: 4 - 20mA ≡ 0 - 5.00%
: (Output Option to be specified at time of order.)
:NOTE : 4-20mA Maximum Load Resistor - 100 Ohm
: 0-5 Volt Load minimum - 10K Ohm

6. Alarms : One High Going Alarm trip User adjustable
: Visual Indication by Red LED on Front Panel.

7. Relays : One Volt free Changeover type - contacts rated 250vAC 8 Amp
: Configured as Fail-Safe and linked to Alarm function
: One Volt free Normally Open Contacts to provide 'Inhibit' signal to
: an external device. Relay controlled by user via Menu option.

8. Audible Alarm : Provision for external connection to a 5 Volt Sounder. The
: audible alarm to be Muted by operation of the front panel
: 'ENTER' switch.

9. Calibration : % Version to use N_2 and 20.95% for two points in linear
: interpolation routine.
: PPM Version will rely on Electrical Zero, Characterised Offset
: for individual sensors and a suitable PPM Calibration Gas.

10. Password : Instrument incorporates a simple Password Protection to prevent
: unauthorised alteration of parameters.

11. Connections : All external connections are made via a 2 part Screw terminal strip,
: on the rear panel of the Instrument.

12. Supply Voltage : 110v or 230v AC 50/60 Hz (to be specified at time of order)
: Maximum Power Consumption 3 VA

13. Supply Tolerance : + 10% - 15% of nominal voltage.

14. Dimensions	: 96 mm x 96 mm x 150 mm Overall
15. Panel Cutout	: 91.5 mm x 91.5 mm - Unit retained by 2 screw clamps behind panel.
16. Sample Flow	: Optimum 150 - 750 ml/min Maximum 1 Ltr/min : Sample exit must vent to atmospheric pressure.
17. Sample temperature	:-5°C to +40°C Dew point should always be below Ambient : Temperature
18. Sensor Life	: PPM Version - Up to 18 months if sensor is maintained at PPM : Levels of Oxygen. : % Version - 1 Year in Air - extended if Oxygen concentration : is normally less than 20.95%.
19. Sensor Gas Connection	: Short Aluminium pipe suitable for ¼" Compression fitting.
20. Response Time	: T_{95} of PPM Sensor only approximately 20 Seconds. : T_{95} of % Sensor only approximately 10 Seconds : See Section 8 in this manual

По вопросам продаж и поддержки обращайтесь:

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Орел (4862)44-53-42
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Пенза (8412)22-31-16
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Саранск (8342)22-96-24
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Ставрополь (8652)20-65-13
Сургут (3462)77-98-35
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