G610

Wall Mounting Oxygen Analyser

130-0076-6

Instruction Manual

This manual contains Important Health & Safety Information.

G610 WALL MOUNTING OXYGEN ANALYSER HANDBOOK

1.0 GENERAL DESCRIPTION

This system comprises a G610 oxygen analyser a sample flow meter and a flow adjustment/control valve mounted in an IP65 rated wall-mounting enclosure.

The G610 is a microprocessor controlled oxygen analyser, which provides a performance and a range of features without parallel for an analyser of this type and cost. The display autoranges over a span of approximately 5 decades depending on the particular cell that is fitted, and the alarm and analogue outputs are user programmable.

2.0 SPECIFICATION

Display
Multi digit LCD - character height 12.7mm

Display ranges and resolution

E cell model - Display range 0.01% to 100.0%. Resolution: 0.1% from 10% to 100%; 0.01% below 10%. Suitable for samples containing mildly acidic gases. e.g. Carbon dioxide, hydrogen sulphide etc.

N cell model - Display range 1ppm to 50%. Resolution: 0.1% from 10% to 50%; 0.01% from 0.50% to 9.99%; 10ppm from 500ppm to 4999ppm; 1ppm from 0ppm to 499ppm

L cell model - Display range 0.1ppm to 10%. Resolution: 0.01% from 0.50% to 9.99%; 1ppm from 50ppm to 4999ppm; 0.1ppm from 0.0ppm to 49.9ppm

H cell model - Display range 1ppm to 10%. Resolution: 0.01% from 0.50% to 9.99%; 10ppm from 500ppm to 4999ppm; 1ppm from 0ppm to 499ppm
Special cell used for samples containing hydrogen. The output is not affected by normal changes in atmospheric pressure. Unless otherwise specified treat as L cell

Stability
Better than 2% of full-scale per month

Cell life
E cell - up to 5 years
N, L and H cells - up to 18 months

Sample flow
Between 100 and 300 ml/min for optimum operation. Max. 1 l/min

Sample pressure
The pressure applied to the cell is determined by the vent pressure which should be atmospheric for quoted accuracy. *Note: The sensor must not be subjected to rapid pressure changes.*

Sample temperature
-5 to +40 °C (non condensing)

Sample connections
Integral cell - Inlet and outlet: captive seal compression fittings suitable for 0.25 inch (or 6mm) o/d tube

Remote cell – Standard inlet and outlet captive seal compression fittings suitable for 0.25 inch (or 6mm) o/d tube

Speed of response
T90 - variable depending on sensor and concentration. Approximately 3s at % levels and 20s at ppm levels. The ppm figure assumes that the sensor is purged down.

Analogue outputs
0 to 5 volts (min. load 10kΩ) standard, 4 to 20mA (max. load 300Ω) option.

User programmable top-scale oxygen value between the following concentrations.

E type cell instruments 5% to 100% - Setting resolution: 0.1% from 10% to 100%; 0.01% below 10%.

N type cell instruments 50ppm to 50% - Setting resolution: 0.1% from 10% to 50%; 0.01% from 0.50% to 9.99%; 10ppm from 500ppm to 4999ppm; 1ppm from 50ppm to 499ppm

L type cell instruments 50ppm to 10% - Setting resolution: 0.01% from 0.50% to 9.99%; 1ppm from 50ppm to 4999ppm

H type cell instruments 50ppm to 10% - Setting resolution: 0.01% from 0.50% to 9.99%; 10ppm from 500ppm to 4999ppm; 1ppm from 50ppm to 499ppm

Alarm outputs
2 alarms each user programmable for: **Mode** - HIGH, LOW or OFF; **Level** - over full display range of instrument and **Hysteresis** - 0% to 10% of set point. **Volt free C/O contacts** rated at 48v ac or dc, 0.5A, normally energised. The resolution when setting the alarms is the same as for the analogue output except that the minimum setting is as the display range.

Ambient temperature
0 to 40 °C - continuous
-5 to + 50 °C - intermittent

Supply voltage
110/120 v or 220/240 v 50/60 Hz, 24v DC, ±10% including ripple and noise. Max power consumption 6VA

Mounting
Wall mounting

Dimensions
See Figure 1

This instrument has been designed to meet the requirements of the EMC Directive 89/336/EEC and the requirements of the Low Voltage Directive 73/23/EEC when installed in accordance with these instructions.

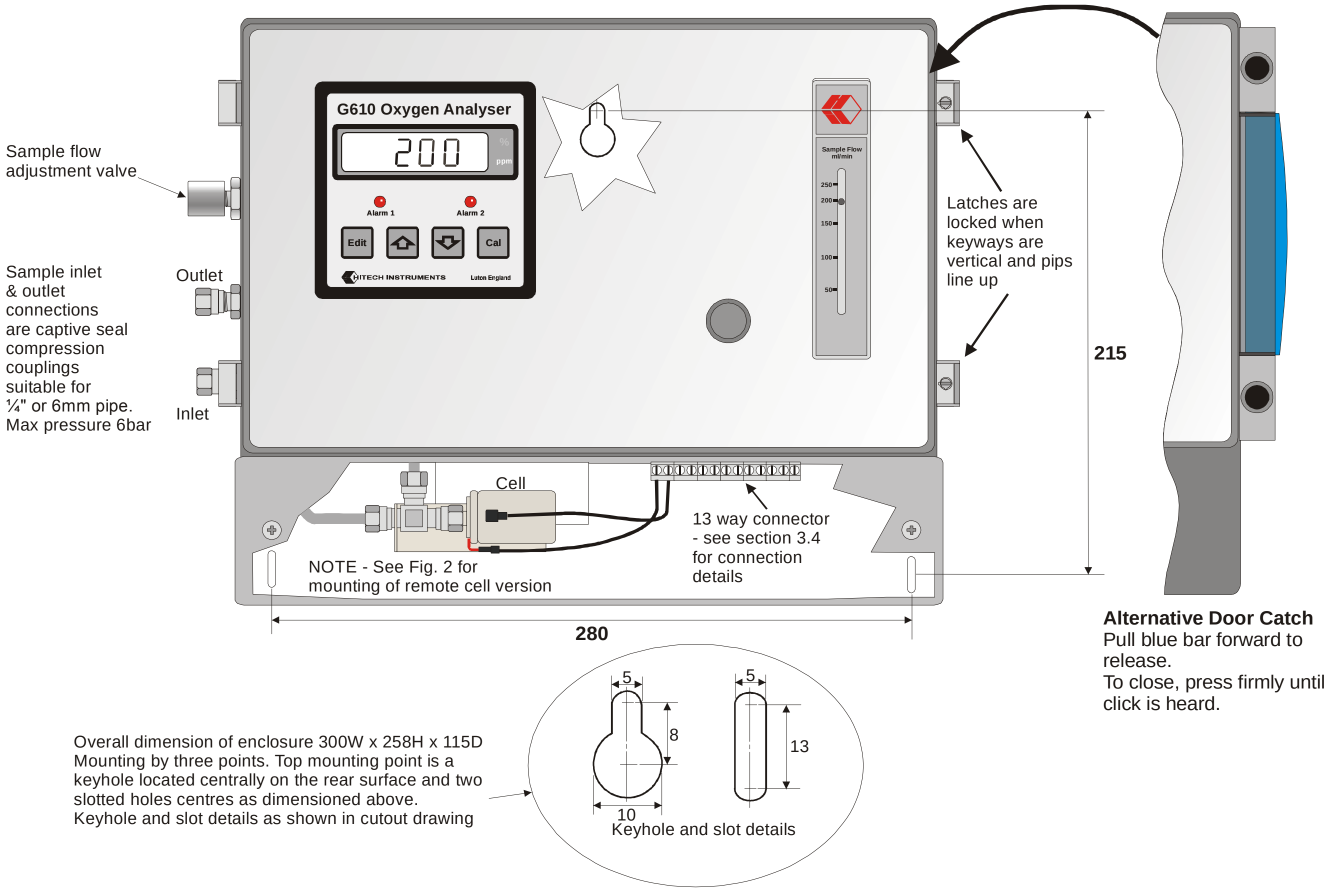
3.0 INSTALLATION

3.1 Unpacking and visual checking

Take all standard precautions when opening packages. In particular avoid the use of long bladed cutters. Search packing before discarding it and make sure that all of the components are removed. Check that all pipe connections have captive seal nuts.

3.2 Mounting

Chose a site where the ambient temperature is between 0°C and 40° C, and where the analyser will not be subjected to vibration, knocks or jolts. It may be tilted etc. in any attitude.   See figure 1 for other details.



G610 mounting and connection details **Fig. 1**

See Fig. 2 for remote sensor version

3.3 Power supply

The standard options are 240V AC, or 110V AC or 24V DC. Refer to the serial number plate located on the side of the instrument for details.

3.4 Connections

The sensor, output signals and the supply should be connected as shown below. See section 3.8 for details of optional remote sensor version.

Terminal	1	Cell +ve (red wire)
"	2	Cell -ve (black wire)
"	3	Analogue Output +ve
"	4	" " -ve
"	5	Alarm 1 common terminal
"	6	" " N/C terminal
"	7	" " N/O terminal
"	8	Alarm 2 common terminal
"	9	" " N/C terminal
"	10	" " N/O terminal
"	11	Mains Live (or DC +ve)
"	12	Mains Neutral (or DC -ve)
"	13	Mains Earth

Note: 1) Terminal 1 is at the left-hand end of the connector. 2) N/C= Normally closed N/O= Normally open, 3)"Normal" refers to the alarm status, not the electrical rest position of the relay.

3.5 Sample connections

Refer to Figure 1. It is important that the sample being supplied to the analyser is clean and non-corrosive. Filters or chemical absorbers will be necessary for those samples that contain particulate matter or corrosive components. Additionally the dew point of the sample should not be above the ambient temperature.

If site or process conditions require that the process is isolated from the analyser when the cell is changed then shut-off valves should be fitted to the inlet and outlet of the measuring cell. The inclusion of a three-way valve on the inlet side can also be used to allow easy connection of a standard gas for calibration checks. It is particularly important that good pipework connections are made when low levels of oxygen are being measured.

For all parts per million (ppm) measurements the pipework should be all metal or hard plastic (Nylon, un-plasticised P.V.C. etc.) up to the inlet connector of the analyser. Pumps etc. if placed before the sample inlet, must be suitable for handling ppm levels. Note that the cell is shipped with its inlet tube plugged. Do not remove this plug until you are ready to fit the cell to the instrument. This is particularly important for instruments fitted with L cells, irrespective of the positioning of pumps etc.

The pressure at the sample outlet determines the pressure applied to the measuring sensor; in most cases this would be atmospheric. When discharging the outlet in such a way as to pressurise the cell the pressure must not exceed 0.25BAR gauge or less than (-)250mm water gauge. Rapid pressure changes could also damage the cell, and pulsation will give an erratic display.

3.6 Cell installation

3.6.1 N and L type cells

The cells are shipped with the leads shorted and the sample tube plugged with a rubber bung. This ensures that a cell is purged down to low levels and ready to be applied to the measurement of low levels of oxygen (less than 1000ppm) with the minimum of delay. The bung should be left in place until the system is ready for the cell to be fitted. If it is intended to apply the cell immediately to the measurement of low oxygen concentrations then the sample should be left flowing during the cell change operation. **The bung should be removed from the cell and the cell coupled to the holder as rapidly as possible. THIS ASSUMES THAT THE SAMPLE THAT WILL INEVITABLY ESCAPE WILL NOT CONSTITUTE ANY SORT OF HAZARD. IT IS THE RESPONSIBILITY OF THE USER TO ENSURE THIS.**

To fit the cell, first slacken the compression nut on the cell sample tube. Remove the rubber bung from the inlet tube, and put the inlet tube into the compression fitting. Tighten the compression nut - **do not over tighten,** ½ to ¾ of a turn beyond finger tightness is adequate. Finally connect the cell signal leads to the terminal block - see Fig. 1 and section 3.4 for details.

WARNING - Do not leave an L cell exposed to oxygen concentrations above 5% connected to the instrument for extended periods, as this will cause premature depletion of the cell. Instead, leave the cell disconnected or apply a sample of low oxygen concentration. This applies whether the instrument is on or off. When fitting a cell intended for immediate use at concentrations of 1000ppm or less it is advisable to:

A) Have low level gas flowing through the system prior to fitting the cell.

B) Unseal and fit the cell as fast as possible.

3.6.2 E type cell

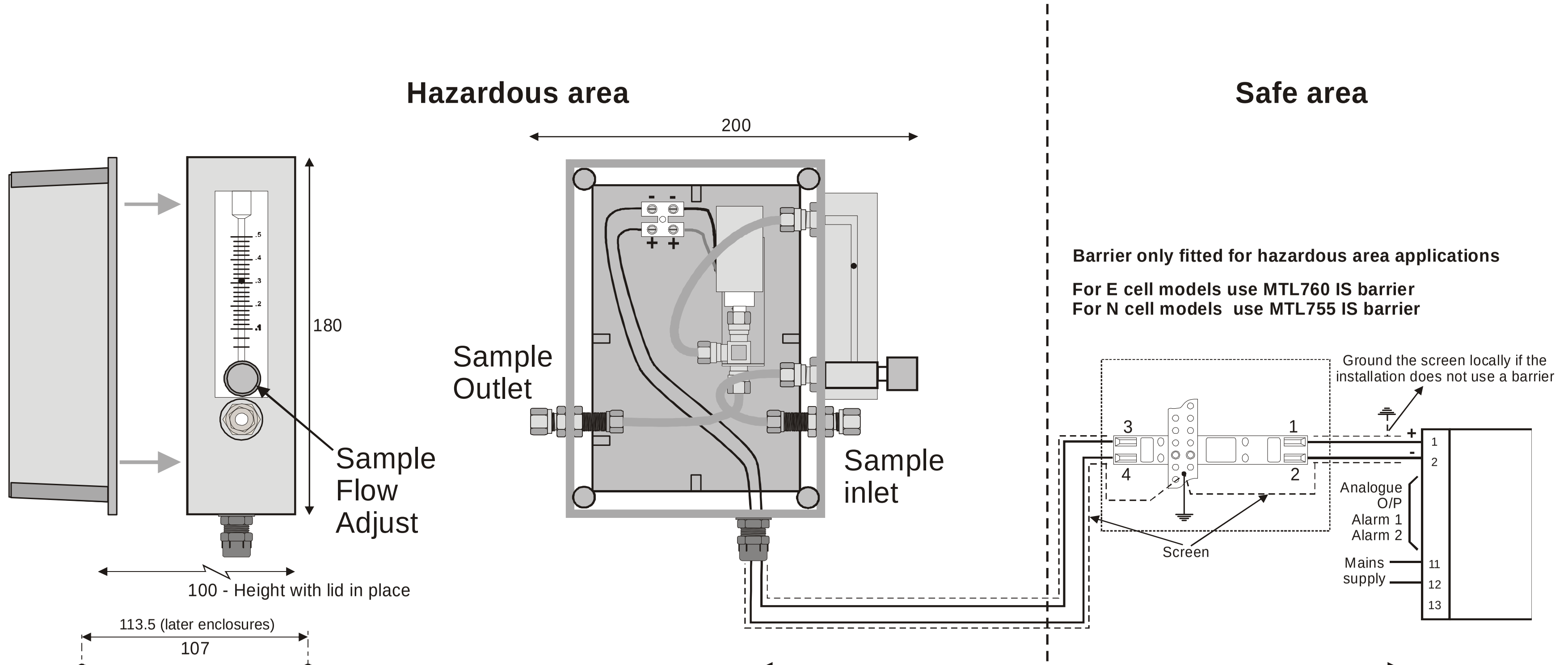
The E type cell is shipped with the connecting port open and with the connecting wires insulated; ***they should not be shorted.*** The method of installation is the same as for N and L type cells.

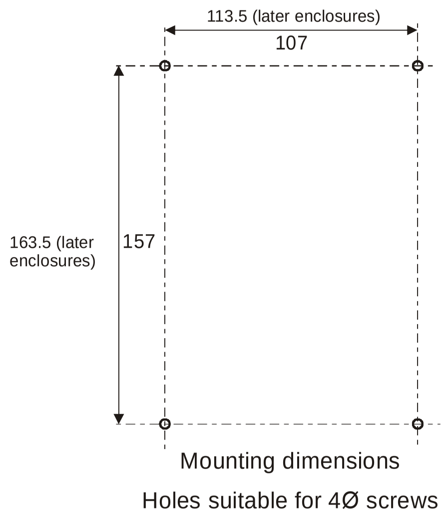
3.7 Alarm contacts

The contacts are rated for signal applications. Where AC voltages are to be switched, the use of suitable snubbers across the contacts is recommended to ensure reasonable contact life. Typical values are 0.047μF to 0.22μF with 47 ohms to 100 ohms in series with the capacitors. **N.B. Mains rated capacitors must be used.**

3.8 Mounting and connecting remote sensor version

Dimensional and electrical connection details are shown in the following diagram. The G610X version is supplied with a suitable zener barrier to allow the cell to be installed in a hazardous area. The cell conforms to the requirements of “simple apparatus” as defined by EN50020. The maximum distance between the cell housing and the display unit should not be greater than 10 metres to reduce the risk of electrical noise interference. A screened connecting cable is preferable, the outer screen being connected to the +ve on the terminal block and to terminal 1 at the rear of the instrument. The inner of the cable should then be connected to the -ve terminal block and to terminal 2 at the rear of the instrument. This version is not available as standard for instruments fitted with L cells. For low ppm measurements or where the distance between sensor and the electronics is long, a version with a head transmitter in the sensor unit is available; this is referred to as the Tx version.





Maximum cable length 30 metres for E and N cells
1 metre for L cells

Sample inlet/outlet
Standard - Captive seal compression fittings suitable for 6mm or ¼" pipe.
Stainless Steel - Double ferrule compression suitable for 1/8” O.D. pipe.
Maximum inlet pressure - 5 bar

Enclosure
Grey polycarbonate to IP67 - dimensions are in millimetres
Overall dimensions are approximate

Remote Sensor Details Fig. 2

4.0 COMMISSIONING

4.1 Switching on

When the analyser is fully connected, it may be switched on. When switched on, the analyser briefly sets the alarms and analogue output to the fault condition – both alarms on and analogue output at approximately 115% (~5.6V or 22.5mA) – and then automatically enters normal measurement mode. Depending on which cell is fitted, the analyser may initially indicate a high oxygen reading. After a few minutes the reading will settle to a level dependent on the sample being supplied to the cell. The analyser is calibrated prior to shipment and may be used immediately. To check calibration see section 5.

4.2 Programming

The user programmable features are accessed by pressing and holding the **Edit** button for approximately 8 seconds when the instrument is in normal measurement mode. Each subsequent momentary press of the **Edit** button scrolls the display through a sequence of adjustable parameters. The order of the sequence is as follows:

Alarm 1 Set point → Alarm 1 Mode → Alarm 1 Hysteresis → Alarm 2 Set point → Alarm 2 Mode → Alarm 2 Hysteresis → Analogue Output top scale value → Return to measurement mode.

ALARM 1 - Set point

This is the first parameter to be displayed when the **Edit** button is pressed and held for eight seconds. The display will show "E xxxx", and the Alarm 1 LED will flash. "xxxx" is the value of the alarm set point and the flashing LED indicates that it is the set point of alarm 1. To the right of the display a % or ppm symbol is displayed to indicate the units of the value displayed. To change the value of the set point, press the up/down arrows until the display shows the required value. Observe the "%" and "ppm" symbols to ensure the correct setting. When the buttons are first pressed, the value changes slowly and the least significant number can be changed by giving the buttons a short "click". If the button is kept depressed the rate accelerates rapidly to enable large changes in value to be achieved quickly. Once the required value is displayed, press the **Edit** button once to store the value in the analyser's memory. Simultaneously the display will change to show "E x" and the Alarm 1 LED will continue to flash.

ALARM 1 - Mode

The symbol displayed in the "x" position indicates the mode of the alarm as follows;
0 - Alarm off; H - High; L - Low. Press the arrow buttons to change the mode and press the **Edit** button once to store the setting. The display will change to show "EH xx" and the Alarm 1 LED will continue to flash.

ALARM 1 - Hysteresis

The number displayed In the "xx" position indicates the value of the hysteresis for alarm 1. The value is given in percentage of the set-point or alarm level and is variable from zero to 10%. Press the arrow buttons to set the required value and then **Edit** button to store the value. The display will then change to repeat the above sequence for **alarm 2**; indicated by the **alarm 2 LED flashing.**

ANALOGUE OUTPUT - Top scale value

When the **EDIT** button is pressed following alarm 2 hysteresis entry, the display will show "EPxxxx", where "xxxx" is the oxygen concentration at which the analogue output (0 to 5v or 4 to 20mA) is at top scale. Neither alarm LED is flashing. Press the up/down arrow keys to change the value of oxygen concentration equivalent to the top scale value of the analogue output. The range of values depend on the particular model as shown below. Once the required value is selected, press the **Edit** button to store the value and return to measurement mode.

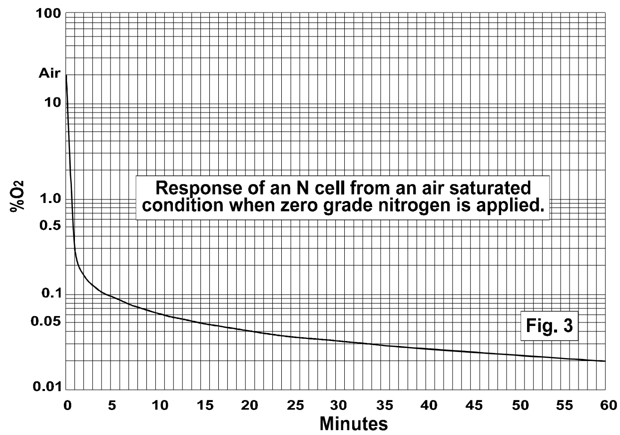
E type cell instruments 5% to 100%

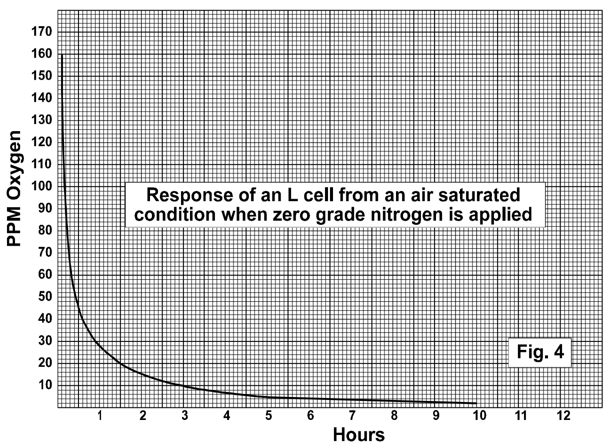
N type cell instruments 50ppm to 50%

L type cell instruments 50ppm to 10%

4.3 Turning on the sample
Establish a sample flow of between 100 and 300ml/min. The analyser will respond immediately and move towards displaying the concentration of oxygen in the sample. Refer to Figs 3 & 4 that show the typical response time from an air condition for N and L type cells. Once the cell is purged down, it responds in a few seconds to large changes of oxygen concentration within the instrument's span. Short time excursions to high levels of oxygen, such as may be experienced during calibration, are recovered from in a matter of a few minutes.

4.4 Cell failure detection
All types of cell used on the G610 fail to a low output or concentration reading. By setting one of the alarms to a “Low” configuration and a concentration that the process could not reach in normal operation, an effective cell failure alarm can be set up.





5.0 MAINTENANCE AND CALIBRATION CHECKS

CAUTION: VARIOUS PROCEDURES ASSOCIATED WITH MAINTENANCE AND CALIBRATION AFFECTS THE OUTPUTS OF THE ANALYSER. ANY OF THESE OUTPUTS THAT ARE BEING USED FOR CONTROL, OR THE ASSOCIATED CONTROL LOOP SHOULD BE DISABLED BEFORE COMMENCING.

5.1 Cell life

The E cell has a life of 5 years in ideal conditions - (moist inert gas at 15°C). Typically 2 to 3 years can be expected as a minimum. The N cells have a life of 100,000 oxygen % hours or 18 months - whichever is the sooner; and the L type cells a life of 16,000 oxygen % hours or 18 months whichever is the sooner. Each cell is date labelled (see the Storage of the Measuring Cell section 6.2 for the code) when supplied. This date should be used to establish the expiry date.

5.1.1 Cell failure modes

All known cell failure modes result in a loss or lowering of output. Thus applications that look for oxygen depletion are automatically fail safe and vice-versa.

5.2 Calibration interval

It is recommended that the calibration be verified every month. This frequency of verification is for typical industrial applications. When the application is critical, the frequency of verification should be increased in line with local safety standards.

5.3 Calibration gas level

The level of oxygen in the calibration gas depends on the particular model and in particular the type of cell fitted. In general, for optimum accuracy, it is best to calibrate with a gas with the same composition and oxygen concentration as the normal sample. If you calibrate on air, the response time for the cell to stabilise back to its normal working level after being exposed to air should be taken into account. Moreover if an air calibration is performed, it should be borne in mind that most air taken from the atmosphere is moist. The normal figure of 20.95% for the oxygen content of air is for dry air. Ambient air contains nearer 20.7% because of dilution effect of the moisture. It is this figure that should be used when calibrating in this way.

5.4 Calibration of a percent range instrument

See section 5.5 for instruments scaled in PPM

5.4.1 Piping

Ideally the flow rate of the gas should be the same as the flow rate of the sample from the process. Also, the pressure at the sample outlet must be the same as that when the analyser is measuring the sample. This avoids any errors due to the pressure at the cell.

5.4.2 Calibration method

Isolate the analyser from the process gas and pass the calibration gas through it. A full calibration requires two calibration points referred to as upper and lower, although the lower point can be omitted except when replacing a cell. Safeguards are built into the instrument to prevent the calibration being set outside of the cell's operational limits.

It should be noted that it will take time for the calibration gas to flush the previous gas out of any filters etc. upstream of the analyser. This means that the reading will take time to stabilise. Refer to the response graphs (Figs. 3&4) for guidance on this. When the reading is stable, press and hold the **Calibrate** button for approximately 8 seconds. The display will go blank for a moment and then show “H   xxxx”; where H indicates that the high calibration point is selected. Use the up/down arrow buttons to set the reading to that of the calibration gas, and then press the **Edit** button momentarily to reset the calibration. The display will now show “H xxxx”, where xxxx is the correct concentration of the test gas. Unless a low-level calibration is required, normally done only when a new cell is fitted, press the **Calibrate** button momentarily to return to measurement mode. To access the low calibration mode, press and hold the **Calibrate** button for 8 seconds. The display will now show “Lxxxx” where “L” indicates that the low calibration point is selected and “XXXX” is the measured value of the calibration gas.   Lower point calibration is performed in the same way as the high calibration, however it may be necessary to allow a longer time for the reading to stabilise.

5.5 Calibration of a ppm range instrument

Piping

See section 3.5 for advice on pipe work etc. If there are regulators in the gas stream they should have a low volume and a metal diaphragm. Most pressure gauges etc. contain cavities that entrain air or oxygen and can take several hours to purge down. For this reason they should be avoided.

Calibration gas level for L cells

Ideally the calibration gas level should be as near to the normal working concentration as possible. However it is possible to use concentrations up to 5% oxygen in nitrogen. Beyond 5% the cell begins to deviate from its standard output equation. **N.B. Air may be used for convenience if nothing else is available. In this case, to correct for the deviation from the standard equation, the reading should be set to read 19.4% - NOT 20.9%.**
N.B. H Cells: The measured oxygen concentration will very with the proportion of Hydrogen. Calibration gas levels should include hydrogen appropriate to application.

Calibration method

Isolate the analyser from the process gas and pass the calibration gas through it. It should be noted that it will take time for the calibration gas to flush the previous gas out of any filters etc. upstream of the analyser, which will increase the time taken to stabilise.

WARNING: Care must be taken not to expose an L type cell to ambient air for more than a few minutes while changing pipes etc. The time taken to purge the cell down to low ppm levels depends on how much oxygen the cell has absorbed. If the cell has only been exposed briefly to air, the purge time will be quite short. If, however, the cell has been exposed to air for several hours, the purge time may become far longer. See Fig. 5.

5.6 Cell replacement - overview

Before proceeding identify which cell is to be replaced, then read and fully understand the following appropriate procedure.

For best accuracy it is necessary to re-calibrate the instrument following a cell change. The calibration procedure depends on the type of cell fitted to the instrument. *See sections 5.3 to 5.5 for additional information on calibration before proceeding*.

Each instrument is built to accept a particular type of cell and for the most part cannot be used with one of a different type.

For instruments fitted with L and E type cells it is necessary to reset the cell zero offset before replacing the cell as detailed in the following sections. For instruments fitted with N cells proceed to section 5.7.

5.6.1 Setting zero offset on instruments fitted with an L type cell

The label on the L cell is marked with the cell's offset at zero oxygen concentration. The offset figure is given in units of parts per million (PPM) oxygen and is negative; for example (-)3.5PPM. To set the zero offset proceed as follows:

a) Disconnect the signal leads of the old cell from terminals 1 and 2 of the instrument's terminal block and leave the input open circuit, i.e. with nothing connected to terminals 1 and 2.

b) Apply power to the instrument if it has been disconnected, and allow 2 minutes, or until the reading is steady, for the electronics to stabilise.

c) Press the **Calibrate** button for approximately 8 seconds until the display shows "H xxxx". Release the button and then press it for another 8 seconds approximately until the display shows "L xxxx". "L" indicates that the lower concentration calibration is selected and xxxx is an oxygen concentration figure; note it probably will have a negative sign in front of it. Next use the up/down arrow buttons to set the display to read the cell oxygen concentration offset figure given on the new cell - note that this a negative figure and it is important that the display is set accordingly. When the correct figure has been set on the display, press the **Edit** button once for approximately 2 seconds and release. This puts the figure into the instrument's memory and the "L" will disappear and instrument will return to ordinary measurement mode. Refer to section 5.7 for details of how to replace and connect the cell.

5.6.2 Setting zero offset on instruments fitted with an E cell

The label on the E cell is marked with the cell's offset at zero oxygen concentration. A short length of wire is also supplied with the cell, the use of which is described later. The offset figure is given in units of percent oxygen and is negative; for example
(-)0.35%.

To set the zero offset proceed as follows:

a) Disconnect the signal leads of the old cell from terminals 1 and 2 of the instrument's terminal block and connect the short length of wire across the terminals so as to form a shorting link.

b) Apply power to the instrument if it has been disconnected, and allow 30 seconds for the electronics to stabilise.

c) Press the **Calibrate** button for approximately 8 seconds until the display shows "H xxxx" . Release the button and then press it for another 8 seconds approximately until the display shows "L xxxx". "L" indicates that the lower concentration calibration is selected and xxxx is an oxygen concentration figure; note it probably will have a negative sign in front of it. Next use the up/down arrow buttons to set the display to read the cell oxygen concentration offset figure given on the new cell - note that this a negative figure and it is important that the display is set accordingly. When the correct figure has been set on the display, press the **Edit** button once for approximately 2 seconds and release. This puts the figure into the instrument's memory, the "L" will disappear and instrument will return to ordinary measurement mode. Remove the shorting link and discard it. Refer to section

5.7 for details of how to replace and connect the cell

5.7 Replacing/Connecting the cell
Read section 5.6 before proceeding
Before replacing/connecting a cell please note:

a) **SOME OF THESE PROCESSES ASSUME THAT THE SAMPLE WILL NOT CONSTITUTE ANY SORT OF HAZARD, ASPHYXIATION ETC., IF IT ESCAPES INTO THE ATMOSPHERE. IT IS THE RESPONSIBILITY OF THE USER TO ENSURE THIS. IF A HAZARD WILL RESULT THEN THE METHOD SHOULD BE MODIFIED ACCORDINGLY. CONSULT HITECH OR THEIR REPRESENTATIVES FOR ADVICE IF IN DOUBT.**

b) **That any control loop using the outputs from the unit is disabled.**

5.7.1 General points when replacing a cell
Disconnect the old cell's signal leads from terminals 1 and 2 of the connector on the rear of the instrument. Slacken the compression nut on the cell sample tube and withdraw the old cell. ***See warning 5.7 a).*** Replacement is the reverse of removal; refer to the following instructions for details of each type of cell. The instrument does not have to be turned off during this operation, although care should be taken to ensure that any control equipment that is attached is disabled.

5.7.2 Replacing and connecting N and L cells - N and L cells are shipped with the leads shorted and the sample tube plugged with a rubber bung. This ensures that the cell is purged down to low levels and ready to be applied to the measurement of low levels of oxygen (less than 1000ppm) with the minimum of delay. The bung should be left in place until the system is ready for the cell to be fitted. If the cell is to be immediately applied to the measurement of low oxygen concentrations, the sample should be left flowing during the cell change operation. **The bung should be removed from the cell and the cell coupled to the holder as quickly as possible.**

5.7.3 Replacing and connecting E cells
E cells are shipped with the sample port open and the leads insulated to prevent them touching. The insulation sleeve must be removed before the signal leads are connected to the input of the instrument.

5.8 Gas calibration following replacement
Refer to sections 5.3 to 5.5 for method of calibrating the cell at higher levels (span).

5.9 Safety and Disposal of old cells
The cells contain a 4-molar potassium acetate solution that is corrosive. Normally this solution only leaks out as a result of mechanical damage (crushing or piercing) or by electrical misuse; e.g. by attempting to input an electrical charge. The cells also contain small amounts of lead, lead oxide, platinum, silver, carbon and antimony, some of which are toxic and/or mutagenic. If the contents of the cells come into contact with the skin or other parts of the body, the affected area should be washed with copious amounts of water and medical advice sought.

As the cells contain some toxic compounds, they must be disposed of according to local waste management requirements and environmental legislation, irrespective of their physical condition. They must not be burnt, as they will evolve toxic fumes.

5.9.1 Error 'HELP' Messages

If a data error is detected by the microprocessor it is reported by displaying 'HELP' followed by a number. The meaning of these messages is as follows.

HELP 1 - After finding user calibration data corrupt the backup was found to be corrupt too. Return to factory.

HELP 2 - Will not be seen. Factory calibration data is corrupt. If the backup is OK it will be silently restored.

HELP 3 - After finding factory setup data corrupt the backup was found to be corrupt too. Return to factory.

HELP 4 - User calibration and/or setup data is corrupt. Press the UP (↑) key to recover. Factory default values are loaded for alarms, output range, cell calibration etc. After a few seconds the instrument will automatically go into the EDIT menu. After working through the edit screens (alarm settings and output range) in the normal way, the instrument goes automatically into the CALIBRATE mode. After calibrating at the high and low points, the instrument reverts to normal operation.

6.0 SPARES AND REPAIRS

6.1 Ordering parts

The replacement cell is the only user serviceable part. All other parts are designed for a MTBF of 100,000 hours. Should any failure occur, the instrument should be returned to Hitech Instruments Ltd or their local representative for repair. When ordering spare cells or raising queries on the instrument, it is important that the serial number or job number is quoted. These numbers are found on the data label on the right-hand side of the instrument.

6.2 Storage of measuring cell

The E cells have a maximum useful life of 5 years including any storage time. The oxygen cells type N and L have a maximum storage life of 6 months if the full usable life is to be realised. Each cell is dated in manufacture and "storage" starts from that time. The first two digits give the month and the second two the year. I.e. 1086 is October 1986. Ideally the cell should be stored in a refrigerator and the seal over the sample connector should be intact and undamaged. It is advisable, when the projected replacement date can be anticipated, to order a new cell from Hitech or their agents one month prior to this date. This ensures that a fresh cell is available at replacement time