DIVEAIR 2

Diving air analyser

OPERATING MANUAL

Geotechnical Instruments (UK) Ltd
Sovereign House
Queensway
Leamington Spa
Warwickshire
CV31 3JR
England
Tel: +44 (0)1926 338111
Fax: +44 (0)1926 338110
Email: sales@geotech.co.uk
www.geotech.co.uk

1 Introduction

> ⚠ The Geotechnical Instruments range of gas analysers are sensitive pieces of scientific equipment, and should be treated as such.

The Diveair 2 Diving Air Analyser has been designed to measure the composition of compressed air used to fill gas cylinders for underwater diving operations. As well as being able to measure the concentrations of Carbon Dioxide and Oxygen, the analyser can also measure possible contamination due to Carbon Monoxide and VOCs.

The Diveair 2 Analyser will measure Carbon Dioxide, Oxygen, Carbon Monoxide, and VOCs.

Main Features include:–

- Portable with robust construction.
- Easy to operate
- Display of all gas values on screen
- User adjustable audible and visual alarms on all gases
- Latching or non latching alarms
- Internal pump
- Temperature compensated Back-lit LCD display
- Single gas calibration

1.1 Physical Characteristics of the Analyser

2 Normal Use

2.1 Switching on

Switch on the Diveair by pressing the power key.

If required the display contrast can be adjusted by means of the scroll keys (1↑ and 6↓) before entering the main gas reading screen. It is possible to return to this screen at any time by pressing key '0' from the main gas screen.

Otherwise press key '0' to enter the gas read screen.

> ⚠ It is recommended that a zero and span is performed on first receipt of the instrument. On receipt of the instrument, or when the instrument has not been used for some time, a zero and span calibration **should not** be carried out until the VOC sensor has normalised. The instrument should be on for a minimum of 1hour before calibration.

2.2 Switching off

Switch off the Diveair by pressing the Power key at any time.

Remember to always purge the instrument with clean air before switching off. This will help preserve the life of the sensors fitted to your instrument.

2.3 Keys

The numeric keys can be used to enter data and select functions as indicated on the screen. The '0' key acts as an exit key to step back one screen in the menu system.
When entering numeric data, holding down the '0' key will act as a backspace.

2.4 Connecting gas supply

> ⚠ Always use the particulate filter in the line before the analyser. Failure to do so could result in dirt entering the analyser which could cause damage to the optics.

> ⚠ When the Gas Analyser is in use, ensure the exhaust port is clear and unblocked at all times. If the exhaust port is blocked while the Gas Analyser pump is running, or the analyser is being checked for accuracy with a regulated gas supply, the analyser could become over-pressurised. Such over-pressurisation could lead to damage of internal components, which in turn might result in a build up of gas within the case of the analyser.

Connect the inlet hose to the inlet of the analyser. The inlet port is a simple barbed connector on the right-hand side of the analyser.

2.5 Types of sample hose

The sample hose material is important. The analyser measures low concentrations of VOCs. Some types of hose will outgas and cause an offset in the VOC reading. Other types may absorb VOCs and re-emit them later, again causing spurious readings. The hose supplied with the instrument is made from PVC and this will not affect the VOC reading. Hoses made from FEP or Viton could also be used.
Do not use hoses made of Silicone or rubber.

2.6 Gas Read Screen

The gas read screen displays the real time concentrations of the gases. Please note that until the instrument has completed it's minimum warm-up (45 seconds), stars "**.*" will be shown in place of the gas values. Chevrons ">>.>" may also be displayed in place of gas value during over-range or under-range conditions.

2.7 Alarms

Whilst in the main gas screen the analyser monitors the gases levels and will alarm if any of the pre-set levels are triggered. The alarm consists of an alarm light on the top of the instrument, an audible beep and an indication on the LCD display. The alarm can be set as either latching or non latching. In the latching mode the alarm continues even if the gas concentration falls below the alarm level. A latching alarm must be manually reset. In the non-latching mode the alarm ceases when the gas concentration falls below the alarm level.

If an alarm has been set as latching, it can be cleared by pressing the 'f' key. This displays a screen that indicates which channel the alarm was triggered by, and allows the user to reset the alarm by entering a confirmation code '0102'.

2.8 Peak readings

The Diveair can be used to record peak readings. Typically this would be the start and end of a gas cylinder fill. This allows the operator to monitor the gases used to fill a particular gas cylinder. To start the peak reading feature press key '6-Start' from the main gas reading screen. The monitor then starts recording the peak readings.

Pressing key 6 again (now labelled as '6-stop'), stops the peak feature and displays a summary of the peak readings obtained during that interval.
Exit from the peak review screen using the '0' key.

2.9 Batteries

The Diveair analyser is powered by internal NiMH batteries. An approximate indication of the current charge state can be seen by pressing key '9-Batt' from the main gas reading screen (press any key to exit). It is recommend that you wait at least five minutes (after powering on) before checking this graph to give the battery output time to stabilise after powering up.

If the analyser is used infrequently the battery capacity may be reduced. To restore the battery to full capacity, the unit should be totally discharged and then charged fully.

The batteries must be charged only with the battery charger supplied with the unit.
If the unit is to be stored for a long period it should be charged beforehand and at intervals of two months.

2.10 External power

The Diveair analyser can be powered from an external mains power supply by means of an optional power supply.

The batteries will not be recharged when powered externally.

2.11 Pump

The Diveair analyser is fitted with an internal pump. This can be turned on and off from the main gas screen by pressing the '5-pump' key.

The status of the pump is indicated on the main gas screen by highlighting the pump indicator when it is running. If activated the pump will continue to run in all screens except for the main title screen.

The pump can be used to draw sample air into the analyser or to purge the analyser with fresh air after use. It is possible for the pump to flow fail and switch off automatically to protect the instrument in certain conditions. This usually indicates a restriction in the inlet, for example kinks in the tubing.

If the inlet pipe is connected to a source of gas under pressure the pump should be turned off. The pressure of the gas will force it through the analyser. In this circumstance it is important that the pressure be regulated to give a flow no higher than 400 mL/min.

3 Advanced Features

3.1 Main Menu

The main menu is pass-code protected to prevent access to the advanced features by un-trained operators.

After pressing key 1-Menu from the main gas screen the analyser will prompt for a pass-code. Enter '0102' and press key '0' to confirm. If entered correctly the main menu will be displayed otherwise you will be returned to the main gas screen. To exit this screen press key '0'. From the main menu you can select from the following four options :-

1-Calibration
2-Alarm Settings
3-Battery
4-Data Logging

3.2 Calibration

The Geotechnical Instruments range of Gas Analysers are calibrated during manufacture and when returned for service. However, to improve accuracy between services a user / field calibration can be performed. This section sets out the correct procedures to achieve an accuracy user calibration. If this calibration is completed incorrectly it may decrease the accuracy of the Gas Analyser.

Two important terms that are used within this section are "Zero" and "Span".

Zero: The point at which the Gas Analyser is calibrated when there is none of the target gas present.
Span: The point at which the Gas Analyser is calibrated when a known quantity of the target gas is present.

Prior to making a measurement, to achieve optimum performance, it is recommended that the zero and span is checked.

It is recommended that a zero and span is performed on first receipt of the instrument

On receipt of the instrument, or when the instrument has not been used for some time, a zero and span calibration **should not** be carried out until the VOC sensor has normalised. The instrument should be on for a minimum of 1hour before calibration.

3.2.1 Zeroing

The Diveair analyser can be zeroed by using VOC free Nitrogen gas. All channels will be zeroed at the same time. The instrument should be switched ON and fully warmed-up. If the instrument is still in it's warm-up phase with stars on the main reading screen the instrument will not allow calibration.

A flow adjuster will be required to set the flow to 300 ml/min.

1 Turn on the gas cylinder and adjust the flow.
2 If required, connect the exhaust port of the analyser to a suitable discharge point.
3 Connect the gas cylinder and flow adapter to the inlet port of the analyser.
4 Allow the gas to flow for 3 minutes.
5 While in the read screen check that the readings have stabilised
6 From the calibration menu Press key '1-Zero channels'. A brief warning screen is displayed advising caution. Press key '1' to acknowledge the caution and continue the calibration.
7 The message "Please wait..." is displayed while the instrument completes the calculations. When complete a summary screen will be shown that displays the status for each channel either okay or FAILED! There are a number of reasons for a particular channel to fail to zero (see troubleshooting).
8 Turn off the gas and remove the hoses when finished.

3.2.2 Span gas composition

All channels of the analyser can be span calibrated by using a single gas mixture. The default gas composition has been specified as follows :-

O2	21%
CO2	1000 ppm
CO	20 ppm
Isobutylene	10 ppm
Balance	N2

However these can be changed by the operator to match exactly with the certified calibration gas supplied. From the calibration menu press key '4-Check/Set gases". This screen shows the existing calibration gas target values for each of the four calibration gases. Use keys '1-4' to select the require gas and follow the on-screen instructions. Leading zeros should be entered where necessary i.e. 0999ppm.

3.2.3 Span

The span calibration procedure is as follows.

1 Turn on the gas cylinder and adjust the flow.
2 If required, connect the exhaust port of the analyser to a suitable discharge point.
3 Connect the gas cylinder and flow adapter to the inlet port of the analyser.
4 Allow the gas to flow for 3 minutes.
5 While in the read screen check that the readings have stabilised.
6 From the calibration screen press key '2-Span Channels'. A brief warning screen is displayed advising caution. Press key '1' to acknowledge the caution and continue the calibration.
7 The message "Please wait..." is displayed while the instrument completes the calculations. When complete a summary screen will be shown that displays the status for each channel either okay or FAILED! There are a number of reasons for a particular channel to fail to span calibration (see troubleshooting).
8 Turn off the gas and disconnect the hoses
9 Switch the pump on and purge the analyser with ambient air for 5 minutes.

3.2.4 Trouble Shooting

Zero calibration failed - A possible reason for this is because the instrument is trying to zero to a level which is outside the pre-determined range set when the unit was first calibrated at the factory. To rectify this, first ensure the unit contains absolutely none of the gas which is being zeroed. Repeat the zeroing process but extend the time that Nitrogen is flowing. If it will not zero, then refer to the instructions given in the 'Factory Settings' section. If the Gas Analyser continues to fail in zeroing then the unit must be returned to Geotechnical Instruments (UK) Ltd for investigation.

Span calibration failed - Firstly, check the span gas targets are set to the correct values and match those of the certified calibration gas. If not, correct and retry. Repeat the entire procedure, including zeroing the channel and then calibrate the span. Ensure the reading is stable before spanning the channel. This message may also appear if attempting to span when not using a gas containing concentrations of all four calibration gases.

3.2.5 Return to factory settings

The calibration factors for each channel can be returned to the initial factory settings via the calibration menu. This can be used if an incorrect calibration has been performed. This default calibration will not be as accurate as a good user calibration.

3.3 Alarm Settings

Whilst in the main gas screen the analyser monitors the gases levels and will alarm if any of the pre-set levels are triggered. The alarm can be set as either latching or non latching.

3.3.1 Setting alarm limits

From the main menu press key '2-Alarm settings' to display the alarm screen. Then press key '2-Alarm levels". This screen shows the existing alarm levels for each of the four gas type. Use keys '1-4' to select the required gas and follow the on-screen instructions. Leading zeros should be entered where necessary i.e. 0999ppm.

3.3.2 Setting alarm mode

To set the alarm to either latching or non latching mode, select option '2-Alarm settings' from the main menu. Then use key '1' to toggle alarm latching ON or OFF. Exit from this screen by pressing key '0'.

3.4 Storing and reviewing readings

The analyser allows readings to be stored at preset intervals. The logged readings can then be downloaded to computer or reviewed on the screen. This facility allows the operator to review gas concentrations before an alarm condition to see if they are acceptable. Each logged reading contains an ID code (fixed at time of manufacture), a time/date stamp and readings for each of the four gases. From the main menu press key '4-Data Logging' this displays the data logging menu. From the logging menu you can select from the following four options:-

1-Logging Options
2-View Data
3-Clear Memory
4-Download data

3.4.1 Logging Options

This is the principle control menu for setting or reviewing all data logging options. From here the operator can check or set the instruments internal clock. It is important that this is set correctly as every reading logged includes the time and date at which it was recorded. To do this press key '1-Check time/date' and follow the simple on-screen instructions. The logging interval time can also be set between 1 and 60 minutes. From the logging menu press key '2-Set interval' and follow the instructions.

The final option on this menu allows the user to start and stop data-logging. Upon return to the main reading screen the word 'LOGGING' is displayed in-place of the '9-Batt' text (although key '9' still works). Once enabled the analyser continues to log at the requested interval until stopped by the operator.

It is important that data-logging is stopped before viewing or downloading logged data. It is possible to corrupt stored readings if either of these options are used whilst still logging.

3.4.2 View data

View data allows the operator to review previously logged data. Using this option logged data can be viewed on the screen or output to printer via RS-232. When viewing data use the scroll keys (1↑ and 6↓) to step through the readings. Holding down a key speeds up the viewing process.

The print option can output formatted ASCII data via the instruments RS-232 port directly to a suitable printer or PC running suitable software (i.e. Windows HyperTerminal). To receive data the printer or PC should be set to 2400baud, 8 data-bits, 1 stop-bit with No parity. Hardware handshaking should be enabled when downloading large amounts of data.

3.4.3 Clear Memory

The analyser can store up to 600 data sets (readings). The clear memory option allows the operator to view the number of free readings available and to clear them if required. Once cleared the readings are permanently deleted and cannot be recovered. Therefore, before the readings can be cleared the user must first acknowledge a warning and enter a pass-code as directed.

3.4.4 Download Data

This option allows the operator to download previously logged data to a PC using UNICOM (PC software supplied by Geotechnical Instruments). Once selected the analyser awaits commands from the PC software. Exit from this screen by pressing key '0'.

3.5 Internal VOC filter

VOCs can affect the reading from the CO sensor. To get over this problem the Diveair analyser has a filter to remove the VOCs before the gas reaches the CO sensor. The filter is situated within the monitor and should not normally need replacing between services.

The lifetime of the filter is dependent on the amount of VOCs that it is required to remove. If contamination of the filter is suspected it can be examined and changed by opening the case. The case should be opened only in a clean and dry environment. Replacement filters can be obtained from Geotechnical Instruments.

4 Servicing and Maintenance

It is recommended that instruments are serviced regularly by the manufacturer.

There are no user serviceable components within the analyser apart from those mentioned below.

4.1 Particulate Filter Change

The analyser contains a particulate filter located within the instrument. The filter is changed as follows:–

1. Remove the sampling tube from the analyser by carefully removing the inlet nozzle.
2. The filter inlet nozzle is removed by using an Allen key to unscrew the inlet nozzle. When the nozzle is removed, the old filter will be attached to the rear of the nozzle. This filter can be removed by hand.
3. Carefully locate a new filter onto the rear of the nozzle, ensuring it is firmly located. Carefully reposition the nozzle, ensuring the sealing O-ring is in place, in the nozzle housing and tighten using the Allen key.

4.2 VOC Filter Change

The VOC filter consists of a cartridge that has push on tube fittings at either end.
To change the filter:-

1. Open the analyser. This may required the removal of the security tags before the analyser can be opened. The analyser should only be opened in a clean and dry environment.
2. Carefully remove the plastic tube from both ends of the filter tube.
3. Insert the new filter and push the tubes onto the hose barb connectors on the filter.
4. Close the analyser and replace the security tags.
5. Dispose of the old cartridge.

If the contents of the filter escape: No special disposal procedures required
Wash hands after handling
Consult medical advice if ingested

4.3 Battery Replacement

Although unlikely it may be necessary to replace the battery :-

1. Ensure the analyser is switched off.
2. Open the analyser. This may require the removal of the security tags before the analyser can be opened. The analyser should only be opened in a clean and dry environment.
3. Locate the flying lead from the battery pack. Unplug it from the printed circuit board.
4. Undo the two screws holding the battery pack in place. The battery can now be removed from its holder.
5. Slide the new battery in and plug the flying lead into the printed circuit board.
6. Tighten the two retaining screws, ensuring that they are not overtightened
7. Close the analyser and replace the security tags.
8. Dispose of the old battery following NiMH guidelines.

4.4 Spare Parts

The following are user serviceable spare parts -

	Order Code
Inlet port filters - pack of 10	GA2.1
In-line water trap elements - pack of 5	GA2.2
VOC filter	GA6.4

Please contact Geotechnical Instruments (UK) Ltd., or your distributor for availability and up-to-date prices and information.

4.5 Cold start

A cold start should only be carried out if no other course of action has proved successful, as this function will clear the instrument memory entirely, reset all factory settings and reset the internal time and date to a default setting. A cold start of the unit can be performed by holding down the '3' key while switching the unit on.

4.6 Replacement of the Oxygen Cell.

1. Remove the 2 security tags, open the 2 latches on the monitor and open the case.
2. Ensure the monitor is switched off.
3. Un-latch the inline oxygen cell connector and remove the 2 Allen screws securing the cell manifold to the PCB.
4. Carefully lift the manifold up this will also remove the CO cell from the PCB.
5. Unscrew the oxygen cell c/w o ring from the manifold.
6. Refit the new oxygen cell c/w o ring to the manifold.
7. Refit the manifold to the PCB ensuring the CO cell pins go into their relevant sockets on the PCB.
8. Fit and tighten the 2 Allen screws to secure the manifold.
9. Check that the 2 tubes are still connected to the manifold and are not loose.
10. Re-connect the inline oxygen cell connector.
11. Ensuring that no wires or tubes are trapped close the monitor case and lock the latches.
12. Perform a cold start and factory set, then a zero and span calibration to fully re-calibrate the oxygen cell.
13. Finally check the oxygen cell again with the span gas to confirm calibration is ok then re fit new security tags.

5 Specification

5.1 Physical and Environmental

Dimensions	Height 240mm, Width 270mm, Depth 125m
Weight	Approx. 2.8Kg (readout only, excluding inlet/outlet fittings)
Material	Polypropylene
Temperature	0 ºC to 50 ºC
Relative humidity	0 – 100% non condensing (ambient)
Sealing	Splash proof

5.2 Batteries and Charger

Charge time	approx. 4 hours
Type (main battery)	NiMH
Capacity	minimum 8 hours from full charge, typically 12.
Life	minimum of 1000 charge / discharge cycles
Charger Input Voltage	110V or 240V AC Operation (to be stated at time of order)

5.3 Display

Type	LCD Graphic (120X32 Pixels), Built-in temperature compensation.
Backlight	Woven mesh fibre optic backlight

5.4 Ports

Inlet	Tube Nozzle with internal fibre filter
Outlet	Tube nozzle
Electrical	7-Pin Lemo sealed communications connector
Power	6-Pin Lemo charger socket

5.5 Filters

Inlet	0.01µm FIBRE filter (operator changeable)
Internal	0.2µm PTFE hydrophobic filter (not field changeable) Geotechnical Instrument VOC filter (not field changeable)

5.6 Carbon Dioxide Sensor

Type	Infra-Red Absorption
Range	0-5000ppm
Resolution	1ppm
Repeatability (within 30 minutes)	±5% of reading or ±50ppm – whichever is greater
Accuracy	±20% of reading or ±250ppm – whichever is greater, over measurement and temperature ranges within 8 hrs of calibration
T90 Response Time	Approx. 60 seconds
Cross Gas Effects	No cross gas effects are known in a normal operating environment
Drift	Corrected by ratiometric comparison to reference
Pressure Compensation	No pressure compensation
Calibration	User span re-calibration facility

5.7 Oxygen Sensor

Type	Acid electrolyte
Range	Range 0-21% calibrated. Will read up to 100%
Resolution	0.1%
Repeatability (within 30 minutes)	±2% of reading or ±0.2% – whichever is greater
Accuracy	±4% of reading or ±1% by volume – whichever is greater, over measurement and temperature ranges within 8 hrs of calibration
T90 Response Time	Approx. 40 seconds
Cross Gas Effects	Unaffected by CO2 or CO
Pressure Compensation	Pressure compensated by separate pressure transducer
Anticipated Life	900,000 % Hours (5 years @ 21%)
Calibration	User zero/span re-calibration facility

5.8 Carbon Monoxide Sensor

Type	Electrochemical cell
Range	0-500ppm
Resolution	1ppm
Repeatability (within 30 minutes)	±5% of reading or ±1ppm – whichever is greater
Accuracy	±20% of reading or ±3ppm – whichever is greater over measurement and temperature ranges within 8 hrs of calibration
T90 Response Time	<20 seconds
Cross Gas Effects	Unaffected by CO2
Drift	<5% signal loss / year
Pressure Compensation	Diffusion sensor – atmospheric ±10%
Anticipated Life	Two years in air
Maximum Overload	1,500ppm
Humidity Range	10% - 90% non condensing
Calibration	User zero/span re-calibration facility

5.9 VOC Detector

Type	Photoionisation detector
Range	0 – 20ppm isobutylene equivalent
Resolution	1ppm
Repeatability (within 30 minutes)	±5% of reading or ±0.5ppm – whichever is greater
Accuracy	±20% of reading or ±2ppm – whichever is greater over measurement and temperature ranges within 8 hrs of calibration
T90 Response Time	<40 seconds
Lifetime	6000 Hours operation, cleaning may be required before this time, depending on sample gas.
Substances detected	Any VOC with ionisation potential <10.6 eV

5.10 Pressure

Type	Silicon bridge transducer Absolute pressure type (barometric pressure measurement)

5.11 Pump

Type	DC motor, diaphragm
Flow	Average 350cc/minute
Vacuum	Maximum – 400mbar

6 List of detected VOCs

The Diveair analyser will detect all VOCs with an ionisation potential less than 10.6eV. The table below lists common VOCs that will be detected, together with their ionisation potential.

The analyser is calibrated for isobutylene.

** Indicates chemicals with ionisation potentials less than 10.6 but that have exhibited other properties that restrict their detection capabilities.*

Chemical	IP
Acetaldehyde	10.23
Acetamide	9.77
Acetic acid	10.37
Acetic anhydride	10
Acetone	9.67
Acetophenone	9.27
Acetyl bromide	10.55
Acrolein	10.1
Acrylamide	9.5
Allyl alcohol	9.67
Allyl chloride	9.9
Amino(2) pyridine	8
* Ammonia	10.15
Aniline	7.7
Anisidine	7.44
Anisole	8.22
Arsine	9.89
Benzaldehyde	9.53
Benzene	9.25
Benzenethiol	8.33
Benzonitrile	9.71
Benzotrifluoride	9.71
Biphenyl	8.27
Bromine	10.55
Bromo(1)-2-methylpropane	10.09
Bromo(1)-4-fluorobenzene	8.99
Bromo(2)-2-methylpropane	9.89
Bromobenzene	8.98
Bromobutane(1)	10.13
Bromobutane(2)	9.98
Bromoform	10.48
Bromopentane(1)	10.1
Bromopropane(1)	10.18
Bromopropane(2)	10.08
Bromopropene(1)	9.3
Bromopropene(3)	9.7
Bromothiophene(2)	8.63
Bromotoluene(m)	8.81
Bromotoluene(o)	8.79
Bromotoluene(p)	8.67
Butadiene	9.07
Butadione(2,3)	9.23
Butanethiol(1)	9.14
nitrile(3)	10.39
Butene(1)	9.58
Butene(cis-2)	9.13
Butene(trans-2)	9.13
Butyl acetate(n)	10
Butyl acetate(sec)	9.9
Butyl alcohol(n)	10.06
Butyl alcohol(sec)	9.88
Butyl benzene(n)	8.69
Butyl benzene(s)	8.68
Butyl benzene(t)	8.68
Butyl formate(n)	10.5

Chemical	IP
Butyl mercaptan	9.15
Butylamine	8.71
Butylamine(s)	8.7
Butylamine(t)	8.64
Butyltoluene(tert)	8.28
Butyne(1)	10.18
Butyraldehyde(n)	9.86
Butyric(n) acid	10.16
Camphor	8.76
Carbon disulfide	10.07
Chlorine dioxide	10.36
Chloro(1)-2-fluorobenzene	9.16
Chloro(1)-3-fluorobenzene	9.21
Chloroacetophenone	9.44
Chlorobenzene	9.07
Chloropropene(3)	10.04
Chlorothiophene(2)	8.68
Chlorotoluene(m)	8.83
Chlorotoluene(o)	8.83
Chlorotoluene(p)	8.7
Chrysene	7.59
Cresol	8.14
Crotonaldehyde	9.73
Cumene	8.75
Cyclohexane	9.98
Cyclohexanol	9.75
Cyclohexanone	9.14
Cyclohexene	8.95
Cyclo-octatetraene	7.99
Cyclopentadiene	8.56
Cyclopentane	10.53
Cyclopentanone	9.26
Cyclopentene	9.01
Cyclopropane	10.06
Decaborane	9.88
Diazomethane	9
Dibromochloromethane	10.59
Dibromoethane(1,1)	10.19
Dibromoethene(1,2)	9.45
Dibromomethane	10.49
Dibromopropane(1,3)	10.07
Dibutylamine	7.69
Dichlorobenzene(m)	9.12
Dichlorobenzene(o)	9.07
Dichlorobenzene(p)	8.94
Dichloroethene(cis)	9.65
Dichloroethene(trans)	9.66
Dichloropropene	9.82
Diethoxymethane	9.7
Diethyl ether	9.53
Diethyl ketone	9.3
Diethyl sulfate	9.68
Diethyl sulfide	8.43
Diethyl(n,n) acetamide	8.6
Diethyl(n,n) formamide	8.89
Diethylamine	8.01
Dihydropyran	8.34
Diiodomethane	9.34
Diisopropylamine	7.73
Dimethoxyethane(1,1)	9.65
Dimethoxymethane	10
Dimethyl acetamide	8.8
Dimethyl ether	10
Dimethyl phthalate	9.64
Dimethyl sulfide	8.69
Dimethyl(2,2) butane	10.06
Dimethyl(2,2) propane	10.35

Chemical	IP
Dimethyl(2,3) butane	10.02
Dimethyl(3,3) butanone	9.17
Dimethyl(n,n) acetamide	8.81
Dimethyl(n,n) formamide	9.12
Dimethylamine	8.24
Dimethylaniline	7.13
Dimethylformamide	9.18
Dimethylhydrazine(1,1)	7.28
Dioxane	9.13
Diphenyl	7.95
Dipropyl sulfide	8.3
Dipropylamine	7.84
Durene	8.03
Epichlorohydrin	10.2
Ethanethiol	9.29
Ethanolamine	8.96
* Ethene	10.52
Ethyl acetate	10.11
Ethyl alcohol	10.48
Ethyl benzene	8.76
Ethyl bromide	10.29
Ethyl disulfide	8.27
Ethyl ether	9.51
Ethyl iodide	9.33
Ethyl isothiocyanate	9.14
Ethyl mercaptan	9.29
Ethyl methyl sulfide	8.55
Ethyl propionate	10
Ethyl thiocyanate	9.89
Ethylamine	8.86
Ethylene chlorohydrin	10.52
Ethylene dibromide	10.37
Ethylene oxide	10.57
Ethylenediamine	8.6
Ethylenelmine	9.2
Ethynylbenzene	8.82
Fluorophenol(o)	8.66
Fluorotoluene(m)	8.92
Fluorotoluene(o)	8.92
Fluorotoluene(p)	8.79
Flurobenzene	9.2
Formamide	10.25
Furaldehyde(2)	9.21
Furan	8.89
Furfural	9.21
Heptane	10.08
Heptanone(2)	9.33
Hexane	10.18
Hexanone(2)	9.35
Hexene(1)	9.46
Hydrazine	8.1
Hydrogen iodide	10.38
Hydrogen selenide	9.88
Hydrogen sulfide	10.46
Hydrogen telluride	9.14
Hydroquinone	7.95
Iodine	9.28
Iodo(1)-2-methylpropane	9.18
Iodobenzene	8.73
Iodobutane(1)	9.21
Iodobutane(2)	9.09
Iodopentane(1)	9.19
Iodopropane(1)	9.26
Iodopropane(2)	9.17
Iodotoluene(m)	8.61
Iodotoluene(o)	8.62
Iodotoluene(p)	8.5

Chemical	IP
Isobutane	10.57
Isobutyl acetate	9.97
Isobutyl alcohol	10.12
Isobutyl formate	10.46
Isobutylamine	8.7
Isobutyraldehyde	9.74
Isobutyric acid	10.02
Isopentane	10.32
Isophorone	9.07
Isoprene	8.85
Isopropyl acetate	9.99
Isopropyl alcohol	10.16
Isopropyl benzene	8.69
Isopropyl ether	9.2
Isopropylamine	8.72
Isovaleraldehyde	9.71
Ketene	9.61
Lutidine(2,3)	8.85
Lutidine(2,4)	8.85
Lutidine(2,6)	8.85
Mesityl oxide	9.08
Mesitylene	8.4
Methanethiol	9.44
Methy bromide	10.2
Methyl acetate	10.27
Methyl acetylene	10.37
Methyl acrylate	9.9
Methyl bromide	10.53
Methyl butyl ketone	9.34
Methyl butyrate	10.07
Methyl cellosolve	9.6
Methyl disulfide	8.46
Methyl ethyl ketone	9.53
Methyl iodide	9.54
Methyl isobutyl ketone	9.3
Methyl isobutyrate	9.98
Methyl isocyanate	10.2
Methyl isopropyl ketone	9.32
Methyl isothiocyanate	9.2
Methyl mercaptan	10.2
Methyl methacrylate	9.74
Methyl propionate	10.15
Methyl propyl ketone	9.39
Methyl styrene	8.35
Methyl thiocyanate	10.15
Methyl(1) napthalene	7.96
Methyl(2) furan	8.39
Methyl(2) napthalene	7.96
Methyl(2) propene	9.23
Methyl(2)-1-butene	9.12
Methyl(3)-1-butene	9.51
Methyl(3)-2-butene	8.67
Methyl(n) acetamide	8.9
Methylal	9.5
Methylamine	8.97
Methylcyclohexane	9.85
Methylcyclohexene(4)	8.91
Methyl-n-amyl ketone	9.3
Methylpentane(2)	10.12
Methylpentane(3)	10.08
Monomethyl hydrazine	7.67
Monomethylaniline	7.32
Morpholine	8.2
Naphthalene	8.12
Nickel carbonyl	8.27
Nitric oxide(NO)	9.25
Nitrobenzene	9.92

Chemical	IP
Nitrochloro(p) benzene	9.96
Nitrogen dioxide	9.75
Nitrotoluene	9.45
Octane	9.82
Pentaborane	10.4
Pentane	10.35
Pentanedione(2,4)	8.87
Pentanone(2)	9.38
Pentene(1)	9.5
Perchloroethylene	9.32
Phenol	8.5
Phenyl ether	8.47
Phenyl isocyanate	8.77
Phenyl isothiocyanate	8.52
Phenylene diamine	6.89
Phenylhydrazine	7.64
Phosphine	9.87
Phosphorus trichloride	9.91
Phthalic anhydride	10
Picoline(2)	9.02
Picoline(3)	9.02
Picoline(4)	9.04
Propanethiol(1)	9.2
Propargyl alcohol	10.51
Propiolactone	9.7
Propionaldehyde	9.98
Propionic acid	10.24
Propyl acetate	10.04
Propyl alcohol	10.2
Propyl benzene	8.72
Propyl ether	9.27
Propyl formate	10.54
Propylamine	8.78
Propylene	9.73
Propylene imine	9
Propyne	10.36
Proylene oxide	10.22
Pyridine	9.32
Pyrrole	8.2
Quinone	10.04
Stibine	9.51
Styrene	8.47
Sulfur monochloride	9.66
Terphenyls	7.78
Tetrahydrofuran	9.54
Thiolacetic acid	10
Thiophene	8.86
Toluene	8.82
Toluidine(o)	7.44
Tribromoethene	9.27
Tribromomethane	10.51
Trichloroethylene	9.47
Triethylamine	7.5
Trimethyl(2,2,4) pentane	9.86
Trimethylamine	7.52
Tripropylamine	7.23
Valeraldehyde	9.82
Vinyl acetate	9.19
Vinyl bromide	9.8
Vinyl chloride	10
Vinyl methyl ether	8.93
Vinyl toluene	8.2
Xylene(m)	8.56
Xylene(o)	8.56
Xylene(p)	8.45
Xylidine(2,4)	7.65

7 Disposal of Instrument

WEEE COMPLIANT

The wheelie bin symbol now displayed on equipment supplied by Geotechnical Instruments signifies that the apparatus must not be disposed of through the normal municipal waste stream but through a registered recycling scheme.

The Waste Electrical and Electronic Equipment directive (WEEE) makes producers responsible from July 1st 2007 in meeting their obligations, with the fundamental aim of reducing the environmental impact of electrical and electronic equipment at the end of its life.

Geotechnical is now registered with the Environmental Agency as a producer and has joined a recycling scheme provider who will manage and report on our electrical waste on our behalf.

Our Producer Registration Number is WEE/GB0052TQ

So when your instrument is at the end of it's life, contact our Sales team who will advise you on the next step in order to help us meet our obligations.