

Laboratory Electrochemistry Products

pH
Conductivity
Dissolved Oxygen



Measuring up...

Easy operation

Results Storage

Ergonomic Design

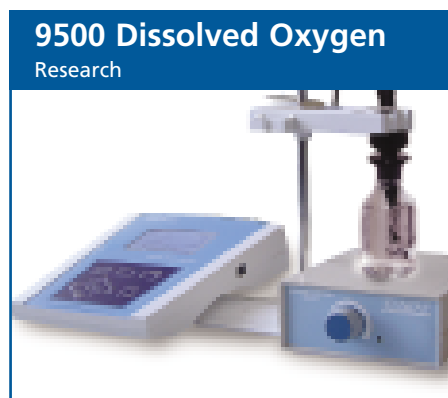
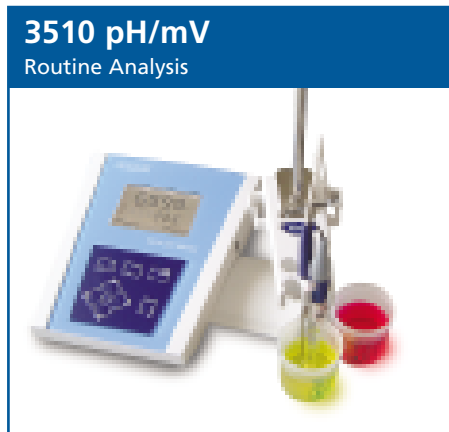
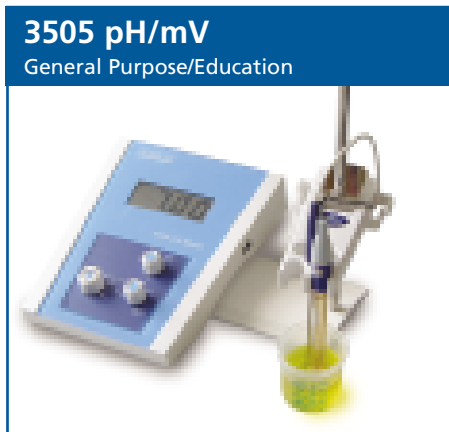
Multi-parameter displays

Environmentally protected casework

... to your requirements



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The new laboratory electrochemistry range of products is designed to provide the user with flexibility in a multitude of applications, from general purpose and educational use, through to routine laboratory and research situations.

The new range includes three pH meters, two conductivity meters and a dissolved oxygen meter. Each model comes complete with a robust electrode holder that makes measurement and calibration safe and comfortable.

Within the range are meters that offer comprehensive support for GLP. Innovative features include infra-red data communication. This adds flexibility by enabling cable-free interfacing to the meters.

Each meter is fitted with a dual purpose bracket which can be used with the meter to raise the viewing angle or alternatively, as a wall mounting fixture. This provides the added benefit of space saving in the laboratory.

Model 3505 pH/mV/Temperature
Designed for customers who prefer conventional rotary controls. With a large display this model is ideal for educational applications where readings can be clearly seen by all participants in demonstrations and group experiments.

Model 3510 pH/mV/Temperature
The working life of a modern pH meter can be many years, during which time most user requirements will change. The 3510 is designed to overcome this need to improve by offering the most comprehensive package of features and functions available in a low cost laboratory pH meter.

Model 3520 pH/mV/Temperature
For laboratories where GLP is an integral part of their daily routine, this model will compliment existing procedures, while adding new possibilities that will ensure the integrity and validity of measurements and results.

The 3520 supports Supervisor Security, User ID and Batch ID* as well as having programmable calibration control with audible and visual warnings. A comprehensive choice of auto-read and data logging functions makes this the most versatile pH meter currently available.

(*also available on the 4520 and 9500)

Model 4510 Conductivity/TDS
The automatic range selection on the 4510 ensures that the widest range of applications can be covered by this multi-purpose unit. From pure water to concentrated or contaminated samples the 4510 will resolve most conductivity measurement problems with ease.

Model 4520 Conductivity/TDS
With full GLP support the 4520 includes Resistivity and Salinity ranges as well as the standard Conductivity and TDS modes. Up to three standard solutions can be used to calibrate the 4520 ensuring accurate results over the measuring range.

Model 9500 Dissolved Oxygen
DO₂ and BOD measurements have become an important indicator of surface water contamination for environmental and water treatment monitoring. The model 9500 offers simple measurement of dissolved oxygen and, through its internal memory, enables storage and calculation of BOD values.

pH/mV/Temperature

3505 – General Purpose/Education

Rotary controls for buffer and slope together with a large LCD makes the 3505 an ideal product for both general purpose and educational use

Accidental calibration change is prevented during measurements by using a dedicated pH Cal mode. Buffer and slope values can only be adjusted when this mode is selected.

Manual or Automatic temperature compensation of the sample / calibrant can be set using the rotary controls or, actual temperature can be displayed if the ATC probe is used.

Battery/mains operation
The 3505 has the flexibility to be battery or mains powered. Mains operation is via an optional power supply.



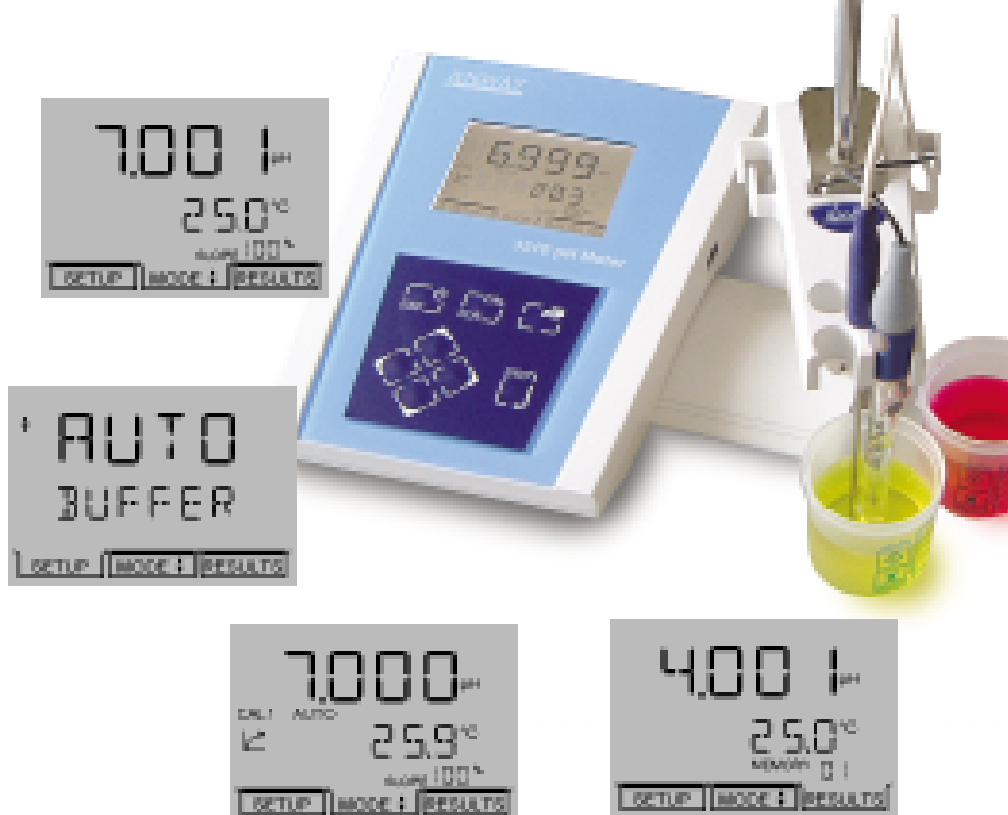
3510 – Routine Analysis

3 decimal place resolution places the 3510 in a class of it's own and provides added flexibility in laboratory environments where greater accuracy is required.

A choice of pH calibration buffers to DIN, JIS and NIST standards can be used for calibration, as well as manually entered buffer values.

1, 2 or 3 point calibration
For improved accuracy up to 3 calibration points can be selected when working with a wide range of expected results.

Results display and storage
The 3510 features on-board memory for results display and storage. pH and temperature readings can be stored in internal memory for recall and display, in addition to loading to a computer or printer.



- 350 501 Model 3505 supplied with epoxy combination electrode (924 001), ATC probe (027 500), electrode holder, 4, 7 and 10 pH buffer sachets, BNC shorting plug (009 146), battery (PP3), condensed operating instructions and manual.
- 351 001 Model 3510 supplied with glass combination pH electrode (924 005), ATC probe (027 500), electrode holder, 4, 7 and 10 pH buffer sachets, BNC shorting plug (009 146), UK power supply, condensed operating instructions and manual.
- 351 101 Model 3510 supplied as above with US power supply.
- 351 201 Model 3510 supplied as above with European power supply.
- 351 301 Model 3510 supplied as above with 230V leaded power supply.

pH/mV/Temperature

There are three models available for the measurement of pH/mV and Temperature:

- 3505 basic meter with a large 25mm liquid crystal display and easy-to-use conventional rotary controls, making it ideal for use in educational and general purpose applications.
- 3510 mid-range meter offering many useful features including 1 to 3 point calibration, auto buffer selection, results display and storage. This product is designed for use in routine laboratory applications.
- 3520 designed for use in a research environment, the 3520 is ideal for quality control and good laboratory practice (GLP) applications where strict controls are required. In addition to the features of the 3510, this model includes security code data protection, operator and sample identification coding, calibration due reminder, calibration status information, alarm outputs and an IrDA link.

3520 – Research

Set-up menus

The menu shown allows the number of calibration points (up to 3) to be set. Automatic selection (to Jenway, DIN, NIS and JIS standards) or manual buffer entry is available.

GLP menus

A supervisor security code can be enabled to lock all the set up menu parameters. This ensures no unauthorised changes can be made during routine operation. Results are stored with a date and time stamp that cannot be changed.

1, 2 or 3 point calibration

With the Cal tab selected the display clearly shows the calibration values. Prompts guide the user through the routine for a 1, 2 or 3 point calibration.

Calibration status

This menu provides the user with an accurate reference point for details of the number of calibration points, electrode potentials, buffer values, temperatures, calibration data, date and time of calibration. These are all essential requirements for GLP.



- 352 001 Model 3520 supplied with glass combination pH electrode (924 005), ATC probe (027 500), electrode holder, 4, 7 and 10 pH buffer sachets, BNC shorting plug (009 146), UK power supply, condensed operating instructions and manual.
- 352 101 Model 3520 supplied as above with US power supply.
- 352 201 Model 3520 supplied as above with European power supply.
- 352 301 Model 3520 supplied as above with 230V leaded power supply.

Conductivity/TDS

Jenway introduced auto-ranging conductivity meters in the 1980's to simplify the process of selecting the best range for each measurement. These original techniques have been further developed and integrated with the operating systems demanded by the modern laboratory. Designed and produced on this solid foundation the new model 4510 is a low cost conductivity meter for all standard applications.

4510 - Routine Analysis

Choice of set-up parameters

The model 4510 is designed to offer a flexibility that will enable it to meet the broadest range of applications. Set-up menu options include cell constant, temperature co-efficient, and reference temperature.

Calibration

Entering the cell constant for the conductivity cell supplied enables quick and easy calibration without the need to use additional reagents. For applications where a more accurate, traceable calibration is required the 4510 has automatic conductivity standard recognition (10 μ S, 84 μ S, 1413 μ S and 12.88mS).

Measurement

With automatic range selection and endpoint detection, readings can be taken quickly and with minimum intervention. A simple key-press can switch the display from conductivity to TDS measurement.

Results Display and Storage

Each result can be stored in the internal memory for recall to printer or transfer to computer using the RS232 serial interface. An analogue recorder output is also provided to monitor and record changing trends on a chart recorder.



451 001

Model 4510 supplied with glass conductivity cell with ATC K=1 (027 013), electrode holder, UK power supply, condensed operating instructions and instruction manual.

451 101

Model 4150 supplied as above with US power supply.

451 201

Model 4510 supplied as above with European power supply.

451 301

Model 4510 supplied as above with 230V leaded power supply.

Conductivity/TDS

Conductivity measurement is the source for the TDS, Resistivity and Salinity values that are available on the Model 4520. For additional accuracy this product offers calibration on up to three standards across the wide measurement range from 0 to 19.99S. The integrity and traceability of results is maintained by comprehensive GLP support. A special 'pure water' mode ensures the optimum accuracy for this exacting application.

4520 - Research

Set-up menus

All set-up parameters are clearly laid out in an easy-to-use menu system. Once set they are held in non-volatile memory, so remain set without battery back-up and regardless of power connection.

1, 2 or 3 Point Calibration

A simple calibration using the cell constant of the conductivity cell supplied is possible, but for greater accuracy calibration can be carried out at 1, 2 or 3 of the selected conductivity standard values.

Range and Status Indicators

Ranges can be selected by a simple key-press. All measurements are displayed with the sample temperature, (except Salinity, which is displayed with the equivalent conductivity value). Measurement progress and instrument settings are shown on the status bar at the bottom of the display.

Memory and Data-Logging

Up to 500 readings can be stored in the internal memory manually. Options include a timed data logging function and automatic logging on the endpoint stability indication.

Comprehensive GLP Support

The dedicated GLP menu enables the entry of a supervisor security code that locks all the critical settings so no changes can be made in normal operation. Calibration reminder, User ID and Sample ID can also be entered.



- 452 001 Model 4520 supplied with glass conductivity cell with ATC K=1 (027 013), electrode holder, UK power supply, condensed operating instructions and instruction manual.
- 452 101 Model 4520 supplied as above with US power supply.
- 452 201 Model 4520 supplied as above with European power supply.
- 452 301 Model 4520 supplied as above with 230V leaded power supply.

Dissolved Oxygen

Dissolved Oxygen is a vital measurement in an increasing number of applications, from fish farming/breeding and all forms of aquaculture, to environmental analysis, pollution control and effluent management. Where BOD is also part of the required monitoring or control profile then the Model 9500 can fulfil all the requirements. Designed for ease of use but with all the safe-guards of comprehensive GLP support.

9500 - Research

Set-Up and Go

A simple menu enables the calibration levels, pressure and salinity correction to be entered. These are then stored in non-volatile memory, secure from changes in battery or power supply levels, until future changes are input.

Memory and Data-logging

Up to 250 readings can be stored in the internal memory manually or automatically. In addition, a further 20 BOD sets (10 samples per set) can also be logged.

BOD Measurement

The BOD test is a measure of the amount of oxygen that is consumed by bacteria as they decompose the organic compounds of waste. BOD values are calculated from stored results of the initial dissolved oxygen level and the level following the 5 day incubation period. Correction is made for the blank and dilution effects. A simple batch processing system ensures easy data entry and calculation.

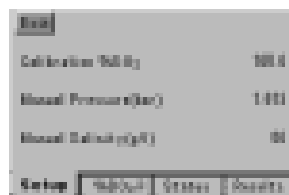
The 9500 uses two international standards for BOD calculation: EN 1899-1:1998 and EN 1899-2:1998.

Set Up parameters

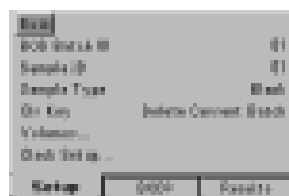
A specific set up menu for BOD enables Batch and Sample ID entry, Sample Type and Volumes to be input.

Warning Messages

If conditions are not met during the process, warning messages will be displayed giving details of the error conditions.



Date	Time	DO	SpO2	BOD	DO Mem
1	0:00	0.00	0.00	0.00	0:00
2	0:00	0.00	0.00	0.00	0:00
3	0:00	0.00	0.00	0.00	0:00
4	0:00	0.00	0.00	0.00	0:00
5	0:00	0.00	0.00	0.00	0:00
6	0:00	0.00	0.00	0.00	0:00
7	0:00	0.00	0.00	0.00	0:00
8	0:00	0.00	0.00	0.00	0:00
9	0:00	0.00	0.00	0.00	0:00
10	0:00	0.00	0.00	0.00	0:00



- 950 001 Model 9500 supplied with DO₂ probe with ATC (522 008), electrode holder, UK power supply, condensed operating instructions and instruction manual.
- 950 101 Model 9500 supplied as above with US power supply.
- 950 201 Model 9500 supplied as above with European power supply.
- 950 301 Model 9500 supplied as above with 230V leaded power supply.

G.L.P., Data Logging, Interfacing & IrDA

G.L.P

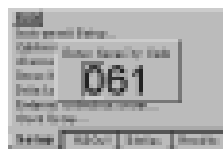
For laboratories where GLP is an integral part of the daily routine, the 3520, 4520 and 9500 will compliment existing procedures, ensuring the integrity and validity of measurements and results.

Security Code

A three digit security code can be entered and set to restrict access to critical settings. This ensures that routine tests are carried out without risk of unauthorised changes.

Operator and Batch Identification Codes

These can be entered and set before each analysis / batch to identify the type or source of the sample.



Calibration Due Reminder

A time period can be set (and locked) after which no further measurement can be made unless a re-calibration is performed.



Date and Time Stamp

This is printed for all measurement and calibration activity, thus giving full traceability for reported results.



Audible and Visible "out of limit" alarms

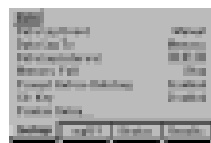
High and low limits can be set. Any reading outside these limits will trigger visible and audible alarms. Warning messages will be stored and printed with the measurement data if these functions are enabled.



Data Logging

There are a variety of options relating to the storage of data:

Data can be logged manually or automatically and stored either to internal memory or computer. Results can be logged on time and interval set by using the Data Log Interval option.



When the memory is full there are two options available regarding any additional logging:

1. Stop - is the default and no further data logging can occur until some locations are deleted.
2. Overwrite - will overwrite data from the earlier storage point.

To prevent the accidental erasure of data the "Prompt Before Deleting" option can be either enabled or disabled.

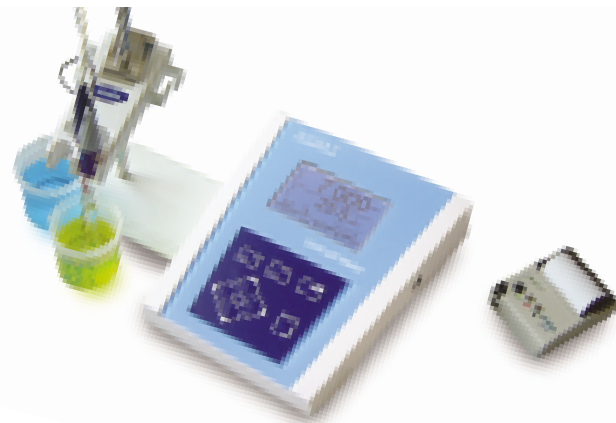


Analogue Output

All models are fitted with 2 x 4mm sockets on the rear panel for analogue output to chart recorders.

RS232 Output

RS232 connection is via a 9 way D type socket on the rear panel for cable links to printers and computers.



Serial/IrDA Printer

A 32 column serial printer (037 701) is available for use with all models (except 3505). Connection is made via the serial cable supplied to the rear panel socket. Models 3520, 4520 and 9500 have the additional feature of an IrDA link. The IrDA sensor on the printer is placed in line with the Ir window on the side of the product. This provides the user with the option of cable free access to data.

Electrodes, Accessories & Consumables

924 001 General purpose, epoxy bodied, combination pH



Standard measurements of general solutions

924 002 12mm stem spear type, glass bodied, combination pH



Measurement of soil and slurry samples

924 003 Redox (platinum), glass bodied, combination pH



Redox measurements

924 004 Micro, 4.5mm diameter, glass bodied, combination pH



Measurements of liquids in small test tubes and eppendorf vessels

924 005 General purpose, glass bodied, combination pH



Standard measurements of general solutions

924 006 12mm flat head-surface, epoxy bodied, combination pH



Measurements of paper and surfaces

924 007 4.5mm semi-micro, 90mm reach, glass bodied, combination pH



Small volume liquid samples

924 010 Spear type, 6mm stem, glass bodied, combination pH



Small volume soil and slurry samples

924 011 Spear type, 4mm stem, glass bodied, combination pH



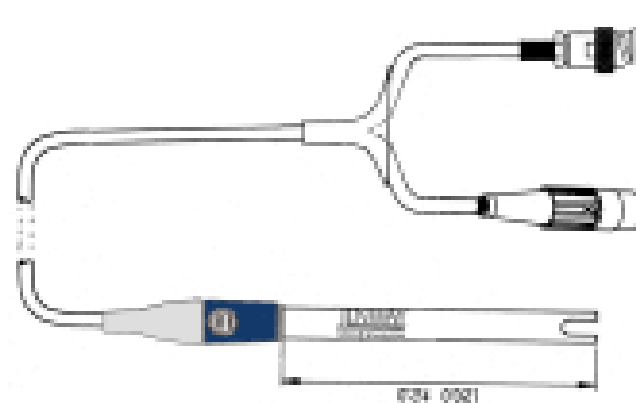
Small volume soil and slurry samples

924 030 Tris buffer, 90mm reach, glass bodied, combination electrode pH



pH measurement in blood and protein

924 070 3 in 1 pH/Temperature, epoxy bodied, combination electrode pH



924 049 Life Science, 6mm micro, 150mm reach, glass bodied, combination electrode pH



For test tubes with small amounts of sample

924 050 Environmental, glass bodied, combination pH



Suitable for low ionic strength solution and waters

924 051 Food, epoxy bodied, combination pH



Ideal for measurements of food extracts

Electrodes, Accessories & Consumables

027 013 Conductivity cell with ATC K=1, glass bodied



027 113 Pure water conductivity cell K=0.1



027 177 Flow through conductivity cell with ATC K=1



027 211 Epoxy bodied conductivity cell with ATC K=0.1



027 212 Epoxy bodied conductivity cell with ATC K=1



027 213 Epoxy bodied conductivity cell with K=10



Accessories

Order Code	Description
060 406	Dust cover
037 701	IrDA/Serial printer supplied with roll of thermal paper, protective pouch, serial connection lead, power supply and three power connection leads. Not for use with Model 3505
037 702	Paper roll, thermal
037 801	Interface cable kit. Not for use with Model 3505
050 002	Serial communication software (3 1/2" disk) Not for use with Model 3505



037 901 Bench stirrer (battery operated)

903 311 Extended length electrode rod (recommended for use with the bench stirrer)



552 050 BOD Kit
 903 300 Electrode Holder
 021 030 UK 230V power supply
 021 031 European 230V power supply
 021 032 US 115V power supply
 021 033 230V leaded power supply

Consumables

pH Buffer Sachets & Solutions

Order Code	Description
025 179	pH 4 buffer sachets (pack of 10)
025 180	pH 7 buffer sachets (pack of 10)
025 181	pH 10 buffer sachets (pack of 10)
025 037	pH 4 coloured buffer solution (red) (500ml)
025 038	pH 7 coloured buffer solution (yellow) (500ml)
025 039	pH 10 coloured buffer solution (blue) (500ml)
025 162	pH 9.22 buffer solution (500ml)
025 163	pH 2 buffer solution (500ml)

Miscellaneous

025 160	3M KCl electrode fill solution
025 161	Electrode cleaning solution (pH)
025 157	Redox standard (200mV) (500ml)
025 158	Redox standard (300mV) (500ml)
025 159	Redox standard (465mV) (500ml)

Conductivity standards (500ml)

025 139	Calibration standard 10µS
025 138	Calibration standard 1413µS
025 156	Calibration standard 12.88mS
025 164	Calibration standard 84µS
025 165	TDS standard

Dissolved Oxygen

983 030 Vial of zero salts

Technical Specification

ALYS Technologies SA
Labware Business Unit
Tel : +41 21 312 42 60
Fax : +41 21 312 42 61
labware@alys-technologies.com

Model	3505	3510	3520
pH Range	-2.00 to 16.00pH	-2.000 to 19.999pH	-2.000 to 20.000pH
Resolution	0.01pH	0.001/0.01pH/0.1pH	0.001/0.01/0.1pH
Accuracy	±0.02pH	±0.003pH	±0.003pH
mV Range	-1999 to 1999mV	-1999.9 to 1999.9mV	-1999.9 to 1999.9mV
Resolution	1mV	0.1mV	0.1/1mV
Accuracy	±1mV	±0.2mV	±0.2mV
Input Impedance	>10 ¹² ohms	>10 ¹² ohms	>10 ¹² ohms
Temperature Range	-10 to 105°C	-10 to 105°C (14 to 221°F)	-10 to 105°C (14 to 221°F)
Resolution	0.1°C	0.1°C (1°F)	0.1°C (1°F)
Accuracy	±0.5°C	±0.5°C (±1°F)	±0.5°C (±1°F)
ATC Range	-10 to 105°C	0 to 100°C (32 to 212°F)	0 to 100°C (32 to 212°F)
Man. Temp. Comp.	-10 to 105°C	0 to 100°C (32 to 212°F)	0 to 100°C (32 to 212°F)
Calibration	Manual	1, 2 or 3 point	1, 2 or 3 point
Auto buffer selection	none	Jenway (2.00, 4.00, 7.00, 9.20, 10.00) DIN (3.06, 4.65, 6.79, 9.25, 12.75) NIST & JIS (1.68, 4.01, 6.87, 9.18, 12.45)	Jenway (2.00, 4.00, 7.00, 9.20, 10.00) DIN (3.06, 4.65, 6.79, 9.25, 12.75) NIST & JIS (1.68, 4.01, 6.87, 9.18, 12.45)
Outputs	Analogue (buffered)	Analogue & RS232 serial interface	Analogue, RS232, IrDA printer interface
Data logging	none	32 reading storage	500 reading storage
Clock	-	--	24 hour, hrs/min/sec or day/month/year, leap year corrected. (European & US date format)
GLP	-	--	Calibration reminder interval (1 to 999 hours) Alarm outputs (open collector and audible) Security code protected user data
Languages	English	English	English, French, German, Italian, Spanish, Portuguese
Display	25mm 3 1/2 digit LCD	Back lit custom LCD	Back lit 1/8 VGA monochrome LCD
Power	9V PP3 battery /optional power supply	Power supply	Power supply
Size / Weight	210x250x55mm / 850g	210x250x55mm / 850g	210x250x55mm / 850g

Model	4510	4520
Conductivity Ranges	6 switched ranges 0 to 1999mS	6 switched ranges (19.999S with x10 cell) 0 to 1999mS
Resolution	0.01uS to 1mS*	0.01uS to 1mS*
Accuracy	±0.5% ±2 digits	±0.5% ±2 digits
TDS Ranges	6 switched ranges 0 to 1999g/l	6 switched ranges 0 to 1999g/l
Resolution	0.01mg/l to 1g/l*	0.01mg/l to 1g/l*
Accuracy	±0.5% ±2 digits	±0.5% ±2 digits
Temperature Ranges	-10 to 105°C (14 to 221°F)	-10 to 105°C (14 to 221°F)
Resolution	0.1°C (1°F)	0.1°C (1°F)
Accuracy	±0.5°C (1°F)	±0.5°C (1°F)
ATC Range	0 to 100°C (32 to 212°F)	0 to 100°C (32 to 212°F)
Man. Temp. Comp.	0 to 100°C (32 to 212°F)	0 to 100°C (32 to 212°F)
Auto Standard Recognition	10uS, 84uS, 1413uS, 12.88mS	10uS, 84uS, 1413uS, 12.88mS
Cell constant	0.010 to 19.999	0.010 to 19.999
Temp. Coefficient	0.00% to 4.00%	0.00% to 4.00%
Reference Temp.	18°C, 20°C, 25°C	18°C, 20°C, 25°C
EC Ratio	0.50 to 0.80	0.50 to 0.80
Outputs	Analogue/RS232	Analogue, RS232, IrDA printer interface
Data logging	32 reading memory	500 reading storage
Clock	none	24 hour, hrs/min/sec or day/month/year, leap year corrected (European & US date format)
GLP	-	Calibration reminder interval (1 to 999 hours) Alarm outputs (open collector and audible) Security code protected user data
Languages	English	English, French, German, Italian, Spanish, Portuguese
Display	Back lit LCD	Back lit 1/8 VGA monochrome LCD
Power	Power supply	Power supply
Size / Weight	210x250x55mm / 850g	210x250x55mm / 850g

Model	9500
DO ₂ Ranges	0 to 199%/0 to 25.0%/0 to 19.99mg/l
Resolution	1%/0.1%/0.01mg/l
Accuracy	±2% within 10°C of cal. temperature
Temperature Range	-10 to 60°C (14 to 140°F)
Resolution	0.1°C (1°F)
Accuracy	±0.5°C (±1°F)
ATC Range	0 to 60°C (32 to 140°F)
Man. Temp. Comp.	0 to 60°C (32 to 140°F)
Calibration	Automatic
Outputs	Analogue, RS232, IrDA printer interface
Data logging	250 reading storage plus 20 BOD sets (10 samples per set)
Clock	24 hour, hrs/min/sec or day/month/year, leap year corrected. (European & US date format)
GLP	Calibration reminder interval (1 to 999 hours) Alarm outputs (open collector and audible) Security code protected user data
Languages	English, French, German, Italian, Spanish, Portuguese
Display	Back lit 1/8 VGA monochrome LCD
Power	Power supply
Size / Weight	210x250x55mm / 850g

Jenway
Gransmore Green
Felsted, Dunmow
Essex CM6 3LB UK
tel: 01371 820122
fax: 01371 821083
email: sales@jenway.com

Techne Inc.
3 Terri Lane
Suite 10
Burlington
NJ 08016 USA
tel: 609-589-2560
fax: 609-589-2571
toll free: 800 225-9243

Jenway Middle East Overseas Limited
P.O. Box 27842
Engomi 2433
Nicosia Cyprus
tel: 357 22 660423
fax: 357 22 660424
e-mail: jenwayme@spidernet.com.cy