



AQUA^{Plus}TM
Optical DO † EC † GPS

AQUA *Plus*™

Optical Dissolved Oxygen + Conductivity + Salinity + GPS

Introducing the Aquaread™ AquaPlus™, the world's most advanced portable Optical Dissolved Oxygen measurement system for field use.

“The Aquaread™ AquaPlus™ is the only Optical DO system that measures salinity directly. Whilst our competitors' units will correct DO measurements for salinity, they ask for the salinity value to be entered manually. Unless the operator is carrying a separate EC meter or is good at guessing, this method introduces a massive opportunity for inaccuracy.”

Why Optical?

Traditionally, DO measurement in portable field equipment has been done using membrane covered detectors known as Clark Cells. This type of cell suffers from problems including membrane fouling, calibration instability and worst of all, oxygen consumption. During measurement, a Clark Cell will consume oxygen making it necessary to have a constant flow of water over the cell.

Optical technology eliminates all these problems allowing high precision, membrane-free, long-term stability along with infrequent calibration and immunity to fouling by sulphides and other gases.

Why include other parameters in a DO meter?

To accurately calculate the DO content in a sample of water, it is essential to know the temperature and salinity of the sample as well as the atmospheric pressure.

The AquaPlus™ Meter includes a precision barometric pressure sensor. The AquaPlus™ Probe contains the optical DO sensor, *plus* a precision temperature sensor and an electrical conductivity (EC) sensor. From measurements taken by the EC sensor, the salinity of the sample can be accurately determined.



Four ring EC cell allows direct salinity measurement

Another *plus* gained by including direct EC measurement is that Resistivity (RES), Total Dissolved Solids (TDS) and Seawater Specific Gravity (SSG) can be calculated. These useful parameters are also displayed on the AquaPlus™ Meter.

Why include GPS?

The inclusion of GPS in the AquaPlus™ Meter is extremely important for fieldwork. Data collected in the field is meaningless if the locations at which the readings were taken are not accurately known.

With the AquaPlus™ system, up to 3000 sets of readings tagged with time, date and position can be taken, then downloaded from the AquaPlus™ Meter onto a PC using the included USB cable and Oxilink™ software utility.

Once the data is transferred, Oxilink™ can produce a comprehensive analytical report in text format, or export the logged data to most popular spreadsheets as well as Google™ Maps and Google™ Earth, where the readings can be overlaid on either maps or satellite photos.

AquaPlus™ Meter

- Integral GPS receiver for position tagging in Lat/Long or British OSGB format (UTC coordinates can be calculated in Oxilink)
- Non GPS version available
- Integral atmospheric pressure sensor
- Tough, high impact, IP67 waterproof case with sure-grip rubber gasket
- Large rubber keypad for ease of use with cold, wet hands
- Large, high contrast display for perfect sunlight readability
- Display of DO in mg/L and % Saturation, Temperature, Atmospheric Pressure, EC, TDS, Resistivity, Salinity, SSG, Time, Date, Position, Altitude and Probe GLP data
- For clarity, readings are spread over several easy-to-read screens
- Automatic or single shot data logging
- Lanyard for easy hands-free operation
- Rugged, waterproof connector for Probe and USB cables
- Extremely simple, intuitive operating system



The AquaPlus™ GPS Meter



The AquaPlus™ probe with sleeve removed for cleaning (left) and fully assembled (right)

AquaPlus™ Probe

- Fast response time
- No cross sensitivity to sulphides, sulphates, chloride, carbon dioxide or ammonia
- No water flow or stirring required
- No soaking or conditioning required prior to use, no warm up time
- Membrane and electrolyte free operation
- User replaceable DO sensor cap
- Up to two year DO sensor cap life
- Four ring, variable frequency EC sensor
- Extremely rugged stainless steel and marine grade aluminium construction
- Resin filled and sealed to IP68 for permanent immersion
- Threaded mounting boss with nuts
- Removable protective sleeve
- Just 24mm (0.94") diameter with sleeve fitted
- 3m (10') cable as standard extendable up to 100m (330')
- Calibration data stored on the Probe to allow mix & match of Probes and Meters
- Compatible with existing Aquaread™ Aquameters™
- Rugged Flowcell available
- Data converter available for stand-alone telemetry use or integration to industrial control systems
- Two year warranty*

The Tech Behind AquaPlus™

The Aquaread™ AquaPlus™ works on the principle of Dynamic Luminescence Quenching. A gas-permeable material known as a luminophore is excited with short bursts of blue light, which causes molecules in the luminophore to emit red photons. By measuring the delay of the returned red photons with respect to the blue excitation, the level of dissolved oxygen present can be determined.

Housed in a resin filled, aluminium body that measures just 8mm (0.3") diameter by 13mm (0.5") long, the fully waterproof AquaPlus™ Sensor Module contains blue excitation and red reference LEDs, optical filters, a photon detector, temperature sensor, driver circuitry and high gain amplification circuitry.

The incredibly small Sensor Module fits comfortably into the end of a standard 12mm diameter electrode leaving ample space for the inclusion of a four-ring EC cell. The EC cell allows direct salinity measurement, which is essential for accurate DO calculation. The addition of a replaceable cap containing a lens coated with the luminophore material completes the AquaPlus™ electrode.



The Nano Engineered AquaPlus™ Sensor Module

* Excludes sensor cap

Specification

AquaPlus™ System Measurement Specification

DO % Saturation	Range	0 – 500.0 %
	Resolution	0.1%
	Accuracy	0 - 200%: ± 1% of reading. 200% - 500%: ± 10% of reading
DO mg/L	Range	0 – 50.00 mg/L
	Resolution	0.01mg/L
	Accuracy	0 – 20mg/L: ± 1% of reading. 20mg/L – 50mg/L ± 10% of reading
Conductivity	Range	0 – 200 mS/cm [0 - 200,000 µS/cm]
	Resolution	3 Auto -range scales: 0 – 9999 µS/cm, 10.00 – 99.99 mS/cm, 100.0 – 200.0mS/cm
	Accuracy	± 1% of reading or ± 1µS/cm if greater
TDS	Range	0 – 100,000 mg/L (ppm)
	Resolution	2 Auto -range scales: 0 – 9999mg/L, 10.00 – 100.00g/L
	Accuracy	± 1% of reading or ± 1mg/L if greater
Resistivity	Range	5 Ω•cm – 1 MΩ•cm
	Resolution	2 Auto -range scales: 5 – 9999 Ω•cm, 10.0 – 1000.0 K Ω•cm
	Accuracy	± 1% of reading or ± 1 Ω•cm if greater
Salinity	Range	0 – 70 PSU / 0 – 70 ppt (g/Kg)
	Resolution	0.01 PSU / 0.01 ppt
	Accuracy	± 1% of reading or ± 0.1 unit if greater
SSG	Range	0 – 50 s _t
	Resolution	0.1 s _t
	Accuracy	± 1.0 s _t
Temperature	Range	-5°C – +50°C (23°F – 122°F)
	Resolution	0.1° C/F
	Accuracy	± 0.5° C

AquaPlus™ Probe Mechanical Specification

Protection Class	IP68 (permanent immersion at 10m)
Immersion Depth	Min 75mm [3"]. Max 30m* [100']
Operating Temperature	-5°C – +50°C (23°F – 122°F)
Storage Temperature	-10°C – +60°C (14°F – 140°F)
Dimensions (L x Dia)	250 mm x 24 mm [9.8" x 0.94"]
Weight (including cable)	400g [14oz]

*AquaPlus™ Probes are supplied as standard with a 3m cable and are limited to 10m immersion depth by the integrity of the connector. Custom cable lengths can be fitted at the time of ordering to eliminate extension cables and in-line connectors thereby allowing use down to 30m depth.



DO-Flow
Heavy duty Flow-Through cell



BLK-BOX†
Black Box data converter outputs
analogue and SDI-12 serial data
for standalone AquaPlus™ and
Aquaprobe™ use

AquaPlus™ Meter Specification

Meter Model	DO-200	DO-100
Dimensions (W x H x D)	90mm x 180mm x 39mm (3.5" x 7" x 1.5")	90mm x 180mm 39mm (3.5" x 7" x 1.5")
Weight (including batteries)	450g [15.9oz]	440g [15.5oz]
Display	80 character FSTN LCD with backlight	80 character FSTN LCD with backlight
Data Memory	3000 full sets including GLP data	3000 full sets including GLP data
GPS Receiver	12 channel, internal antenna	–
GPS Accuracy	+/- 10 metres in all 3 dimensions	–
Atmospheric Pressure	150mb – 1150mb Accuracy +/- 1mb	150mb – 1150mb Accuracy +/- 1mb
Languages	English / French / German	English / French / German
PC Interface	USB (cable provided)	USB (cable provided)
Power Supply	5 x AA cells. Alkaline or Ni-MH rechargeable	5 x AA cells. Alkaline or Ni-MH rechargeable
Battery Life	Alkaline > 20 hours Ni-MH > 40 hours	Alkaline > 40 hours Ni-MH > 60 hours
Operating Temperature	-20°C to +70°C	-20°C to +70°C
Protection Class	IP67 (30 mins at 1m)	IP67 (30 mins at 1m)

The accuracy figures quoted represent the equipment's capability at the calibration points at 25°C. These figures do not take into account errors introduced by variations in the accuracy of calibration solutions and errors beyond the control of the manufacturer that may be introduced by environmental conditions in the field. Aquaread reserves the right to change specifications without notice.

Ordering Information

Item No.	Name	Description
DO-200	AquaPlus GPS Meter	AquaPlus GPS Meter shipped with 5AA Alkaline Cells, Lanyard, USB cable, 'Getting Started' cards and CD containing Oxilink software, USB drivers and full Manual
DO-100	AquaPlus Meter	AquaPlus Non-GPS Meter shipped with 5AA Alkaline Cells, Lanyard, USB cable, 'Getting Started' cards and CD containing Oxilink software, USB drivers and full Manual
AquaPlus	AquaPlus Probe	AquaPlus Probe shipped with sensor cap, a 3 meter cable and a 'Getting Started' card
DO-Flow	Flow-through Cell	Heavy duty Flow-Through Cell
BLK-BOX †	Black Box Data Converter	Data converter to allow stand-alone AquaPlus Probe operation. Outputs analogue and SDI-12 serial data (see separate brochure for full specification)
EX- 5	Extension Cable	5m AquaPlus Probe extension cable (connectors submersible to 10m)
EX-10	Extension Cable	10m AquaPlus Probe extension cable (connectors submersible to 10m)
EX-30	Extension Cable	30m AquaPlus Probe extension cable (connectors submersible to 10m)
DO-CAP	AquaPlus Sensor Cap	Replacement AquaPlus Sensor Cap (two year shelf life)
AM-LAN	Meter Lanyard	AquaPlus Meter Lanyard
AR-BAG	Shoulder Bag	Aquaread fabric shoulder carrying bag
DO-CASE	Hard Carrying Case	AquaPlus standard hard carrying case with foam inserts (includes space for a DO Flowcell)
DO-RCASE	Rugged Explorer hard carrying case	AquaPlus rugged Explorer hard carrying case with foam inserts (includes space for a DO Flowcell)
AP-BKT	Probe Hanger	Probe hanger bracket allows suspension of probes on steel cables, comes complete with carabiner clip
Calibration Solutions		Please see our website (www.aquaread.co.uk) for our range of calibration solutions

† Available late 2010