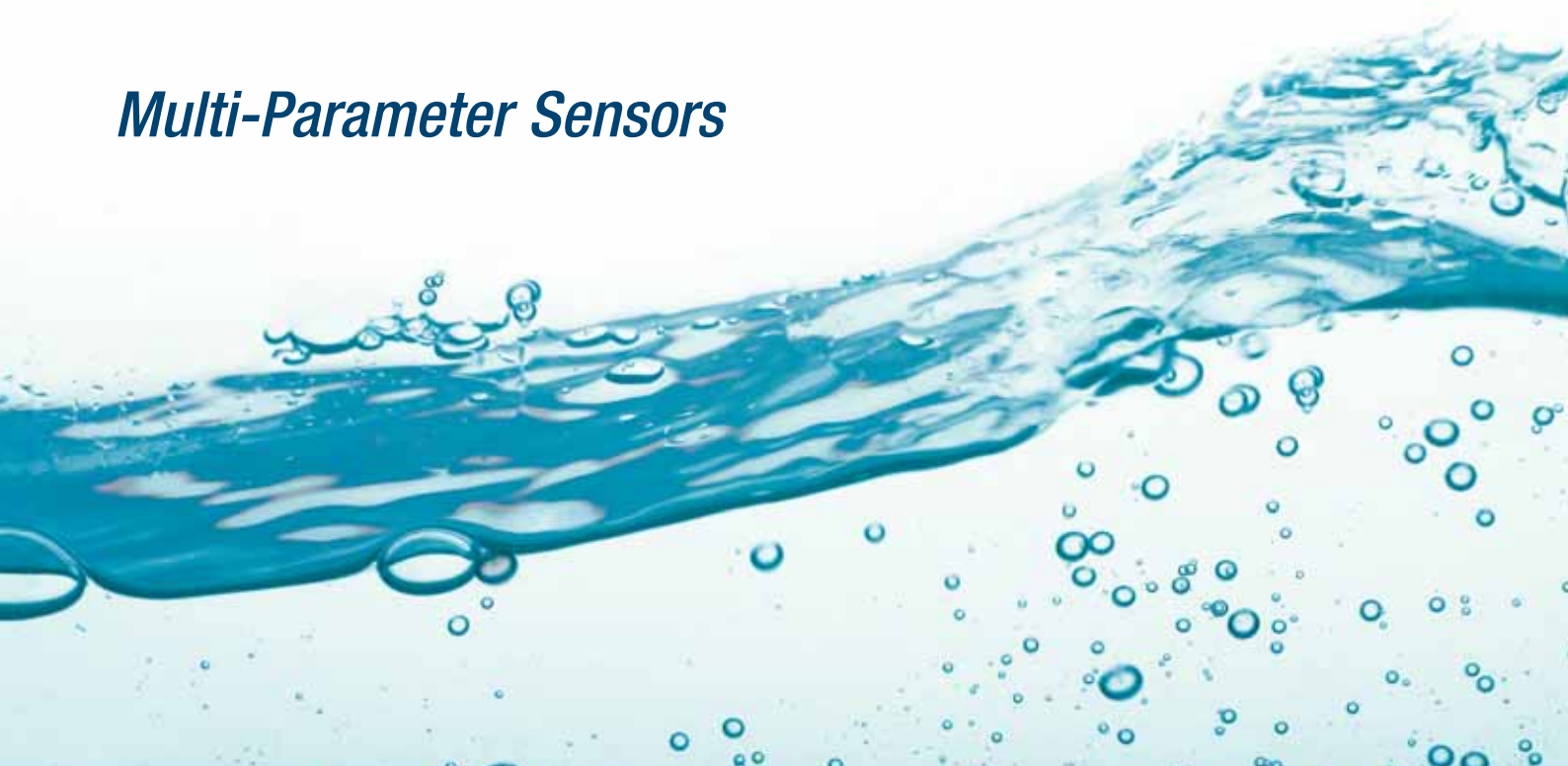




## *Multi-Parameter Sensors*



## Multi-Parameter Sensors

The Greenspan multi-parameter range of sensors provides a choice of combinations of water quality and level parameters to meet the majority of environmental monitoring requirements.

The technology employed in the design and construction of the sensors allows for long-term deployment with a minimum requirement for field visits.

All sensors have on-board data loggers and are capable of communicating data direct to your office PC from remote locations.

Linked to a rain gauge and auto-sampler, the sensors can provide complete site monitoring and the capture of critical events

## Features

- All Multi-parameter sensors are provided with an on board data-logger with 0.5Mb memory upgradeable to 1Mb. Typically, with 1Mb of memory a four-parameter sensor can log 15 months data when sampling at 15-minute intervals.
- SDI-12 output available with CTDP300 and CS304 configurations.
- Double O-ring seals and moulded cable gland to ensure long-term reliability.
- Toroidal conductivity sensing technology eliminates electrode corrosion effects, guaranteeing long life and reduced field service.
- On-board microprocessor controlled temperature compensation and linearisation delivers accurate conductivity data normalised to 25°C. Alternatively, raw data may also be provided.
- Ceramic capacitor pressure sensing transducer offers unmatched reliability.
- Innovative optically isolated signal conditioning electronics ensure true and accurate pH readings at all times.
- Field proven gel-filled double junction pH electrode provides long-term stability.
- The DO membrane design is suitable for long-term deployment with minimal user intervention for cleaning and maintenance. Improved response time (T in 60 mins) when in minimum flow conditions (1mtr/min).



- Software calibration allows users to quickly and accurately recalibrate the sensor, eliminating the down time required when sensors have to be returned for factory calibration. Easy to use Windows based calibration software runs on a Laptop PC.
- A Detachable cable set is available as an option and this can be used on all Greenspan sensors.

## Intelligent Features and Data Acquisition

Greenspan's Multi-parameter sensors offer a range of water quality parameters together with a data logging system. The sensors provide sophisticated and versatile data acquisition, control and communications capabilities. Standard features include:

- Storage of measured data within the sensor for long periods.
- Easy configuration of logging parameters and uploading of logged data
- Automatic data transfer to a central station simply by attaching a data modem and mobile phone.
- Improved linearity and accuracy through the use of microprocessor based compensation.
- Facility to set alarm conditions which can trigger additional monitoring equipment such as water samplers or by calling one of four preset phone numbers.

## Conductivity Sensor CTD350

### Technical Features

- Toroidal conductivity sensing technology that eliminates electrode corrosion effects, guaranteeing long life and reduced field service.
- On-board microprocessor controlled temperature compensation and linearisation delivering accurate conductivity data normalised to 25°C. Alternatively, raw conductivity data may also be provided.
- Rugged ceramic pressure transducer offering unmatched reliability and performance.
- Depth readings regardless of atmospheric changes by means of a large diameter venting tube.
- A closed vent system is provided in multiples of units to accommodate varying lengths of vented cable. One unit will be sufficient for cable lengths of up to 70 metres. By completely isolating the vent tube from atmospheric air by means of a partially inflated polymer sack, the CVS allows barometric pressure to exist within the vent tube without allowing moisture in to condense.



### Specification

Parameter	Range		
EC	0 to 1,000, 2,000, 5,000, 10,000, 20,000, 40,000, or 100,000 S/cm		
Temp	0 to 50°C		
Pressure	0 to 2.5, 5, 10, 20, 40, 75, or 100m gauge pressure 0 to 10, 20, 40, 75, or 100m absolute pressure		
Channel	Linearity	Accuracy	Temperature Stability
<b>EC</b>	+/- 0.2% FS		
Normalised		+/- 0.5% FS @ 25°C	+/- 0.4%
Temperature		+/- 0.15°C	
Pressure		+/- 0.1% FS @ 25°C	+/- 0.1% @ FS atmospheric pressure
Quiescent current		0.5µmA	
Supply Voltage		10-14V	
Warm up time to stable reading		6 seconds	
Memory		2Mb	
Data storage		Over 166,000 readings	
Operating temperature		0 to 50°C	
Storage temperature		-5 to 60°C	
Output		RS232 & SDI12	
Software calibration		Allows users to reset zero and adjust full scale	
Wetted materials		Delrin, ceramic, passivated 316 Stainless Steel, acrylic, Viton	
Vented cable		12 core polyurethane sheathed cable with internal 3mm vent tube	
Software supplied		SmartCom: Allows users to set up logging schedules and alarm levels. Aquagraph: Graphical data presentation software	
Length x Diameter		437 x 47mm	
Weight (Delrin Body)		1.2kg	
Weight (S/S Body)		1.9kg	
Optional battery pack		275mm x 47mm	

140 Days unattended logging @ 60 minute intervals.

## Conductivity/Temperature/ Pressure/pH Sensor CTD300 and CTD1200

### Technical Features

- Toroidal conductivity sensing technology that eliminates electrode corrosion effects, guaranteeing long life and reduced field service.
- On-board microprocessor controlled temperature compensation and linearisation delivering accurate conductivity data normalised to 25°C. Alternatively, raw conductivity data may also be provided.
- Innovative, optically isolated signal conditioning electronics ensure true and accurate pH readings at all times.
- Field proven gel-filled double junction pH electrode provides long-term accuracy
- Rugged ceramic pressure transducer offering unmatched reliability and performance.

- Depth readings regardless of atmospheric changes by means of a large diameter venting tube.
- A closed vent system is provided in multiples of units to accommodate varying lengths of vented cable. One unit will be sufficient for cable lengths of up to 70 metres. By completely isolating the vent tube from atmospheric air by means of a partially inflated polymer sack, the CVS allows barometric pressure to exist within the vent tube without allowing moisture in to condense.



### Specifications

Parameter	Range		
EC	0 to 1,000, 2,000, 5,000, 10,000, 20,000, 40,000, or 70,000	S/cm	
pH	2 to 12		
Temp	0 to 50°C		
Pressure	0 to 2.5, 5, 10, 20, 40, 75, or 100m gauge pressure 0 to 10, 20, 40, 75, or 100m absolute pressure		
Channel	Linearity	Accuracy	Temperature Stability
<b>EC</b>	+/- 0.2% FS		
Normalised		+/- 1% FS @ 25°C	+/- 0.35% @FS
Non-Normalised		+/- 0.7% FS @ 25°C	+/- 0.5% @ FS
pH	+/- 0.1 pH	+/- 0.2 pH (0 - 50°C)	
Temperature		+/- 0.2°C	
Pressure		+/- 0.12% FS @ 25°C	+/- 0.1% FS @ atmospheric pressure
Quiescent current		30µ A - 60mA	
Supply Voltage		10 - 14V	
Warm up time to stable reading		6 seconds	
Memory		0.5Mb (Upgradeable to 1Mb)	
Data storage		Over 21,000 readings for each measured parameter	
Operating temperature		0 to 50°C	
Storage temperature		-5 to 60°C	
Software calibration		Allows users to reset zero and adjust full scale	
Output		RS232 or SDI-12	
Wetted materials		Delrin, ceramic, passivated 316 Stainless Steel, acrylic, Viton	
Vented cable		12 core polyurethane sheathed cable with internal 3mm vent tube	
Software supplied		SmartCom: Allows users to set up logging schedules and alarm levels. Aquagraph: Graphical data presentation software	
Length x Diameter		555 x 65mm	
Weight (Delrin Body)		1.85 kg	
Weight (S/S Body)		2.66 kg	
Optional battery pack		275mm x 47mm	

12 months unattended logging @ 15 minute intervals

## Conductivity/Temperature/Dissolved Oxygen/pH Sensors CS304 and CS4-1200

### Technical Features

- Toroidal conductivity sensing technology that eliminates electrode corrosion effects, guaranteeing long life and reduced field service.
- On-board microprocessor controlled temperature compensation and linearisation delivering accurate conductivity data normalised to 25°C. Alternatively, raw conductivity data may also be provided.
- Innovative, optically isolated signal conditioning electronics ensure true and accurate pH readings at all times.
- Field proven gel-filled double junction pH electrode provides long-term accuracy.
- Patented diffusion rod sensor technology providing

excellent linearity and repeatability.

- Sensor design requires no moving parts, ensuring long term reliable field operation and low power consumption.
- A response time of 60 minutes is achievable by the sensor when deployed in minimum flow conditions of 1 metre per minute.



### Specifications

Parameter	Range		
EC	0 to 1,000, 2,000, 5,000, 10,000, 20,000, 40,000, or 70,000 S/cm		
pH	2 to 12		
Temp	0 to 50°C		
DO	0 to 200% Sat or 0 to 20ppm		
Channel	Linearity	Accuracy	Temperature Stability
<b>EC</b>	+/- 0.2% FS		
Normalised		+/- 1% FS @ 25°C	+/- 0.35% @FS
Non-Normalised		+/- 0.7% FS @ 25°C	+/- 0.5% @ FS
pH	+/- 0.1 pH	+/- 0.2 pH (0 - 50°C)	
Temperature		+/- 0.2 °C	
<b>Dissolved Oxaen</b>			
ppm	+/- 0.2 ppm	+/- 0.3ppm (5 - 35°C)	
% Sat	+/- 1% FS	+/- 2% FS (0 - 50°C)	
DO Response Time T	60 mins minimum flow 1 metre/min		
Quiescent current		30 A - 60mA	
Supply Voltage		10 - 14V	
Warm up time to stable reading		6 seconds	
Memory		0.5Mb (Upgradeable to 1Mb)	
Data storage		Over 21,000 readings for each measured parameter	
Operating temperature		0 to 50°C	
Storage temperature		-5 to 60°C	
Software calibration		Allows users to reset zero and adjust full scale	
Output		RS232 or SDI-12	
Wetted materials		Delrin, ceramic, passivated 316 Stainless Steel, acrylic, Viton	
Vented cable		12 core polyurethane sheathed cable with internal 3mm vent tube	
Software supplied		SmartCom: Allows users to set up logging schedules and alarm levels. Aquagraph: Graphical data presentation software	
Length x Diameter		590 x 65mm	
Weight (Delrin Body)		2.26 kg	
Weight (S/S Body)		3.22 kg	
Optional battery pack		275mm x 47mm	

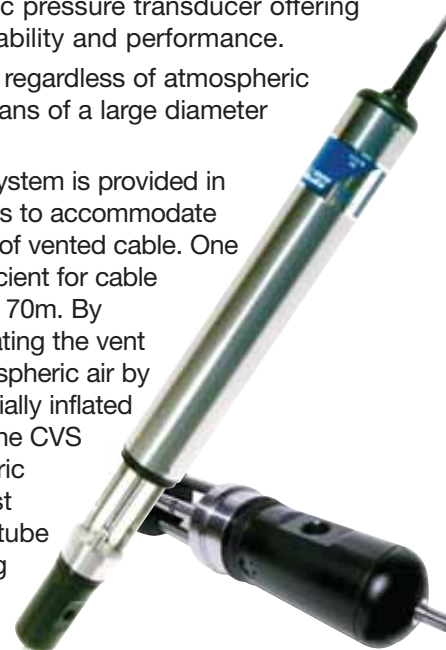
12 months unattended logging @ 15 minute intervals

## Conductivity/Temperature/Pressure/ Dissolved Oxygen Sensor CS305

### Technical Features

- Toroidal conductivity sensing technology that eliminates electrode corrosion effects, guaranteeing long life and reduced field service.
- On-board microprocessor controlled temperature compensation and linearisation delivering accurate conductivity data normalised to 25°C. Alternatively, raw conductivity data may also be provided.
- Patented diffusion rod sensor technology providing excellent linearity and repeatability.
- A response time of 60 mins is achievable by the sensor when deployed in minimum flow conditions of 1 metre per minute.
- Sensor design requires no moving parts, ensuring long term reliable field operation and low power consumption.

- Rugged ceramic pressure transducer offering unmatched reliability and performance.
- Depth readings regardless of atmospheric changes by means of a large diameter venting tube.
- A closed vent system is provided in multiples of units to accommodate varying lengths of vented cable. One unit will be sufficient for cable lengths of up to 70m. By completely isolating the vent tube from atmospheric air by means of a partially inflated polymer sack, the CVS allows barometric pressure to exist within the vent tube without allowing moisture in to condense.



### Specifications

Parameter	Range		
EC	0 to 1,000, 2,000, 5,000, 10,000, 20,000, 40,000, or 70,000 S/cm		
DO	0 to 200% Sat or 0 to 20ppm		
Temp	0 to 50°C		
Pressure	0 to 2.5, 5, 10, 20, 40, 75, or 100m gauge pressure 0 to 10, 20, 40, 75, or 100m absolute pressure		
Channel	Linearity	Accuracy	Temperature Stability
<b>EC</b>	+/- 0.2% FS		
Normalised		+/- 1% FS @ 25°C	+/- 0.35% @FS
Non-Normalised		+/- 0.7% FS @ 25°C	+/- 0.5% @ FS
<b>Dissolved Oxygen</b>			
ppm	+/- 0.2 ppm	+/- 0.3ppm (5 - 35°C)	
% Sat	+/- 1% FS	+/- 2% FS (0 - 50°C)	
DO Response Time T	60 mins minimum flow 1M/min		
Temperature		+/- 0.2 °C	
Pressure		+/- 0.12% FS @ 25°C	+/- 0.1% FS @ atmospheric pressure
Quiescent current		30 A - 60mA	
Supply Voltage		10 - 14V	
Warm up time to stable reading		6 seconds	
Memory		0.5Mb (Upgradeable to 1Mb)	
Data storage		Over 21,000 readings for each measured parameter	
Operating temperature		0 to 50°C	
Storage temperature		-5 to 60°C	
Software calibration		Allows users to reset zero and adjust full scale	
Output		RS232	
Wetted materials		Delrin, ceramic, passivated 316 Stainless Steel, acrylic, Viton	
Vented cable		12 core polyurethane sheathed cable with internal 3mm vent tube	
Software supplied		SmartCom: Allows users to set up logging schedules and alarm levels. Aquagraph: Graphical data presentation software	
Length x Diameter		590 x 65mm	
Weight (Delrin Body)		2.26 kg	
Weight (S/S Body)		3.22 kg	
Optional battery pack		275mm x 47mm	

12 months unattended logging @ 15 minute intervals

## Multi-Parameter Sensor



## Accessories

### SA100 Communication Interface

The SA100 Interface Adaptor was developed to expand the connection options available on the series of Smart Sensors.

SA100 - This interface divides the 18 pin Smart Sensor output into separate connectors.

- System Power, optional Rain Gauge and Output access,
- Comms RS232
- Status Indicator
- Grounding wire

## Optional Battery Pack

The Greenspan range of Smart Sensors may be factory fitted with a non-rechargeable long life battery pack. This enables the sensor to be independent of above surface power supplies, (no cable connection) and allows for discreet applications. It also functions as a backup power supply in the event of a surface disturbance to the main supply.

The unit is designed to allow easy access to the battery compartments for cell replacements and is housed in a cylindrical body of approximately the same dimensions as the sensor housing, thus doubling the length of the sensor.

The type of battery used in the battery pack is Li/MnO<sub>2</sub>, Lithium Thionyl Chloride 3.6V AA cells. A total of nine batteries are required for each sensor battery pack. This configuration supplies a maximum 10.8 volts at 5.2A/Hr and a useful field life, depending on sensor type and logging frequency, of up to 12 months.



## Software

SmartCom for Windows allows you to communicate with the 300 series of sensors. SmartCom provides full configuration, monitoring and data retrieval for all Greenspan's Smart Sensors using either Direct Connection cable or remote communications via Landline or Cellular Phone modem

### New features of SmartCom for Windows include:

- Logical organisation of instruments into groups and locations for easy sensor management.
- Wizard for adding new locations to the group.
- Viewing of location properties off-line.
- Integrated data collection and graphical viewing of data.
- Structured directories for storing collected data from locations.
- Location connection information stored in local database.
- More intuitive layout of sensor properties and functionality.
- Use of standard windows modem (tapi) control panel settings for remote access.
- Automatic periodic data retrieval using SmartPoll program.
- Automatic alarm dial back notification using SmartStandby program.
- Graphical representation of data can be made using Greenspan Analytical's AquaGraph software. The software makes graphing your data simple and allows data to be exported in different formats.



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