GREENSPAN ANALYTICAL

WATER QUALITY MONITORING

Single Parameter Sensors

tyco Flow Control | Environmental Systems

Single Parameter Sensors

Greenspan Analytical's range of single parameter water quality sensors are available in a wide variety of configurations to meet the diverse demands of monitoring sites. Double O-ring seals and moulded cable glands on all models ensure long-term reliability. The sensors can provide loop powered 4-20mA (100/200 series) or SDI-12 (1200 series) outputs, and the 300 series offers on-board data logging capability (0.5Mb memory upgradeable to 1Mb) with RS232 communication.

With all the features of a conventional data acquisition system in one compact package, the Greenspan Analytical 300 Series intelligent sensors provide the most cost-effective solution available today where combined measurement and data collection functions are required.

A Detachable Cable Set is available as an option which can be used on all Greenspan sensors.

Software

Logging parameters and schedules are set up using an easy to use graphical software package, Smartcom, which runs on IBM compatible PCs.

Graphical representation of data can be made using our AquaGraph software. The software makes graphing your data simple and allows data to be exported in different formats.

Integrated Installation and Technical Support

Technical SupportThe correct choice of sensor is essential to the long-term success of an installation. Professional commissioning and dedicated technical support is equally important. We offer the reassurance of integrated expert field advice, via its affiliation with sister technical services company Greenspan.

Greenspan TS is intimately familiar with our complete range of sensors and analysers, with numerous successful installations throughout the world.

Greenspan Analytical and Greenspan can offer customers real value by packaging the supply of instruments with installation, commissioning, technical support and even data acquisition into a complete 'turnkey' solution.

Dissolved Oxygen Sensors DO100, DO300 and DO1200

The Dissolved Oxygen Sensors provide accurate long-term measurements under a wide range of environmental conditions.

The patented Australian CSIRO diffusion cell technology developed by Greenspan Analytical, provides a simple, effective and robust means of obtaining continuous in-situ dissolved oxygen measurements with minimum maintenance requirements.

Accuracy

A combination of innovative membrane and sensor technology characterise the design of the Greenspan Analytical Dissolved Oxygen Sensor. The new generation chemical sensor provides inherently greater stability than conventional polarographic technology. Compared to conventional membrane designs, the large surface area of the Greenspan Analytical diffusion membrane substantially reduces errors caused by surface contamination. Signal conditioning electronics are designed with temperature compensation to provide true output in ppm of dissolved oxygen or percent saturation.

Range	0 - 20 ppm or 0 - 200% Sat
Linearity	+/- 0.2 ppm or +/- 1% FS
Response Time	T_{90} 40 mins (1M/min flow rate)
Accuracy @	
Atmospheric pressure	+/- 0.3 ppm (@25°C)
Supply Voltage	10 - 14V
Dimensions	L= 510mm O.D.= 47mm

Key Benefit

Membrane specifically designed for long-term deployment with minimal user intervention for cleaning and maintenance.

Product Features

DO100

- Sensor design requires no moving parts, ensuring long term reliable field operation and low power consumption.
- New generation chemical sensor provides excellent linearity and repeatability.
- Sensor output includes supplementary water temperature reading.
- A response time (T) of 40 minutes is achievable by the sensor when deployed in minimum flow

DO300

- Storage of measured data within the sensor for long periods.
- Easy configuration of logging parameters and uploading of logged data.
- Automatic transfer of data to a central office 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 measuring equipment.
- Lithium battery pack option for fully self-contained operation.

DO1200

- Offers SDI-12 communication and control for use with external data loggers.
- Sensors can be linked to minimise cable usage.

Applications

- Ground water monitoring
- Tidal and estuarine studies
- Effluent monitoring
- River and stream measurements

Specifications

	Model DO100	Model DO300	Model DO1200
Dissolved oxygen range	0-20ppm or 0-200% saturated	Same as DO100	Same as DO100
Temperature range	0-55°C	Same as DO100	Same as DO100
Dissolved oxygen linearity	0.2 ppm or ±1% FS	Same as DO100	Same as DO100
Dissolved oxygen accuracy	+/- 0.3 ppm (@25°C)	Same as DO100	Same as DO100
Temperature accuracy	+1°C	Same as DO100	Same as DO100
Output	DO 4-20mA / Temperature 4-20mA RS232		SDI-12
Supply voltage	10 - 14V Reverse polarity protected Surge protected to 2kV	Same as DO100	Same as DO100
Warm up time to stable reading	1 sec	1 sec	1 sec
Response time (T)	40 mins	40 mins	40 mins
Dimensions	Length 510mm OD 47mm (Stainless Steel or Delrin)	Length 510mm OD 47mm (Stainless Steel or Delrin) Optional battery pack adds extra 260mm to length	Same as DO100
Weight	1.66kg (Stainless Steel) 850g (Delrin)	Same as DO100	Same as DO100
Sensor type	Galvanic Cell	Same as DO100	Same as DO100
Wetted materials	316 Stainless Steel, Delrin, Silicon Diffusion Membrane	Same as DO100	Same as DO100
Software supplied	N/A	AQUAGRAPH, SMARTCOM	N/A

Electrical Conductivity Sensors EC250, EC350 and EC1200

The Electrical Conductivity Sensors provide highly accurate conductivity measurements in a wide range of hydrological applications.

Exceptional reliability and chemical resistance are guaranteed by the state of the art toroidal measuring system. Advanced microprocessor technology provides highly accurate temperature compensated measurements..

Accuracy

Field conductivity measurements in ionised solutions have traditionally been fraught with inaccuracy due to temperature and electrode effects. The EC Sensor substantially eliminates these conventional sources of error. A larger sized toroidal sensor element uses the free ions in solution as a conductive path between two shielded ferrite transformer cores. This system eliminates errors caused by electrode degradation. An advanced compensation algorithm in the on-board microprocessor substantially reduces system non-linearity and temperature drift errors.

Range	Up to 70,000uS
Linearity	+/- 0.2% FS
Accuracy	Normalised +/- 1% FS (@25°C) Non-Normalised +/- 0.7% FS (@25°C)
Supply Voltage	10 - 14V
Dimensions	L= 442mm O.D.= 47mm

Key Benefit

Toroidal conductivity sensing technology eliminates electrode corrosion effects, guaranteeing long life and reduced field service.

Product Features

EC250

- Toroidal sensing technology eliminates electrode corrosion effects guaranteeing long life and reduced field service.
- On-board temperature measurement and microprocessor controlled temperature compensation and linearisation ensure highly accurate readings in demanding conditions.
- Sensor can be field calibrated with Greenspan Analytical's user-friendly state of the art graphical calibration software.
- Separate conductivity and temperature outputs deliver raw conductivity or on-board normalisation of conductivity to 25°C.

EC350

- A complete, self-contained electrical conductivity measurement and data logging system.
- Storage of measured data within the sensor for long periods.
- Easy configuration of logging parameters and uploading of logged data.
- Automatic transfer of data to a central office 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 measuring equipment.
- Lithium battery pack option for fully self-contained operation.
- Compact sensor body eliminates the added deployment costs of a separate data logger.

Applications

- STP aeration tanks
- Borehole observations
- Tidal and estuarine studies
- Effluent monitoring
- River and stream measurement

Specifications

	Model EC250	Model EC350	Model EC1200
Standard EC ranges available	0-1000µS/cm, 0-2000µS/cm, 0-5000µS/cm, 0-10000µS/cm, 0-20000µS/cm, 0-60000µS/cm & 0-70000µS/cm Other ranges are available to order. A calibration charge applies to non-standard ranges.		
Linearity	Temperature 0.2%, EC 0.2%	Same as EC250	Same as EC250
Temperature accuracy	0.2ºC	Same as EC250	Same as EC250
EC accuracy, normalised to 25ºC	1% FS @ 25ºC	Same as EC250	Same as EC250
EC accuracy, non-normalised	0.7% FS @ 25ºC	Same as EC250	Same as EC250
Outputs	EC: 4-20mA, 0-2.5V, or 0-1V Temperature: 4-20mA, 0-2.5V, or 0-1V	RS232	SDI-12
Supply voltage	10 - 14V Reverse polarity protected Surge protected to 2kV	Same as EC250	Same as EC250
Warm up / reading time	1 sec	Same as EC250	Same as EC250
Dimensions	Length 442mm OD 47mm (Stainless Steel or Delrin)	Same as EC250 Optional battery pack adds extra 260mm to length	Same as EC250
Weight	1.76kg (Stainless Steel) 950g (Delrin)	Same as EC250	Same as EC250
Wetted materials	316 Stainless Steel, Delrin, Acrylic	Same as EC250	Same as EC250
Cable	12 core Polyurethane sheathed	12 core Polyurethane sheathed	Same as EC250
Software supplied	ECFA	AQUAGRAPH, SMARTCOM	N/A

pH Sensors
PH100, PH300 and PH1200

The pH Sensors are versatile instruments offering superior features to provide un-paralleled reliability while tolerating rough treatment in the tough environments where they are deployed.

Range Benefits

- Optically isolated signal conditioning electronics ensure true and accurate readings at all times.
- Built in temperature compensation removes temperature related errors.
- Field proven gel-filled double junction electrode provides long-term stability.
- Optical isolation of signal conditioning electronics enables operation in combination with other sensors without compromising performance.
- The low power energy saving design enables long-term operation in remote data logging applications.
- All sensors are packaged in Delrin (plastic) body, which can sustain harsh environmental conditions or as an option, passivated 316 Stainless Steel.

Range	2 - 12
Linearity	+/- 0.1 pH
Accuracy	+/- 0.2 pH
Supply Voltage	10 - 14V
Dimensions	L= 435mm O.D.= 47mm

Key Benefit

Innovative optically isolated signal conditioning electronics ensuring true and accurate pH readings at all times.

Applications

- STP aeration tanks
- Borehole observations
- Tidal and estuarine studies
- Effluent monitoring
- River and stream measurement

Product Features

PH100
- Current (4-20mA / 3 wire) output.

PH300
- Built in data logger for storage of measured parameters, capable of holding 42,600 records or a reading every 15 minutes for 15 months.
- Logging parameters and schedules are set up using Greenspan Analytical's easy to use Smartcom software package, which runs on a PC.
- Data can be reviewed in tabular of graphical format by using Greenspan Analytical's Aquagraph software package.
- Automatic transfer of data to a central office can be simply achieved by attaching a data modem.
- Improved linearity and accuracy through the use of microprocessor based compensation.

PH1200
- Serial data interface that provides a linearised signal output that may be transmitted further than RS232 output.
- SDI-12 (serial data interface operating at 1200 baud) is intended for applications which demand low power and minimal current drain. Data can be transmitted up to 100 feet between sensor and data logger. Multiple sensors will function with only one data logger producing a low cost of ownership.

Specifications

		Model PH100	Model PH300	Model PH1200
Standard ranges	PH	2 - 12	2 - 12	2 - 12
Optional parameters		0-50ºC	Same as pH100	Same as pH100
Linearity	PH	+/- 0.1pH	Same as pH100	Same as pH100
	Temp	N/A	+/- 0.2ºC	+/- 0.2ºC
Accuracy	PH	+/- 0.2pH (+/- 0.2mA)	Same as pH100	Same as pH100
	Temp	N/A	+/- 1ºC	+/- 1ºC
Temperature compensation		0 - 50ºC	Same as pH100	Same as pH100
Supply voltage 10 -14VDC		Reverse polarity protected Surge protected to 2kV	Same as pH100	Same as pH100
Warm up / reading time		2 sec	Same as pH100	Same as pH100
Electrode type		Glass membrane with Gel illed Ag/AgCl internal reference type	Same as pH100	Same as pH100
Dimensions		Length 435mm OD 47mm	Length 435mm OD 47mm	Length 435mm OD 47mm
Weight (Potted)		1.48kg (Stainless Steel) 680g (Delrin)	Same as pH100	Same as pH100
Memory		N/A	0.5Mb Upgradeable to 1Mb	N/A
Output		4-20mA	RS232	SDI-12 protocol
Software supplied		N/A	AQUAGRAPH, SMARTCOM	N/A
Standard configuration		Sensor calibrated to 2 - 12 pH	Same as pH100	Same as pH100
Wetted material		316 Stainless Steel or Delrin	Same as pH100	Same as pH100
Standard cable lengths		1m, 3m, 5m, 10m, 15m, 20m, 30m, 50m, & 100m Non-standard cable lengths available on request.		
Maximum depth		100m	Same as pH100	Same as pH100

Turbidity Sensors TS100, TS300 and TS1200

The Turbidity Sensors provide accurate and precise turbidity reading over a range of adverse environmental conditions.

An innovative optical system provides accurate measurements even at low turbidity, while the advanced optical surface treatment resists fouling. The system transmits an infrared beam of 860nm and detects the backscatter intensity to determine turbidity.

Accuracy

Accurate and stable turbidity readings are ensured through the use of Greenspan Analytical's advanced filtering techniques to eliminate interfering light sources. Temperature compensation is achieved with a sophisticated digital sampling technique to respond instantly to possible temperature induced errors.

Range	up to 2000 NTU
Linearity	+/- 3.0% FS (0 - 50 NTU)
	+/- 12% FS (0 - 2000 NTU)
Accuracy	+/- 3.0% FS
Supply Voltage	10 - 14V
Dimensions	L= 344mm O.D.= 47mm

Key Benefit

Low cost infrared backscatter technique with optional lens cleaning pump-allowing deployment with minimal user intervention for cleaning and maintenance.

Applications

- Effluent monitoring,
- River and stream measurements
- Estuaries and runoff studies
- Forestry and catchment monitoring

Product Features

TS100

- Highly sensitive system based on array of high gain infrared optics provides excellent accuracy at low turbidities.
- Exceptional ambient light rejection is achieved with infrared transmission modulation.
- Advanced polymer coating of optical system resists fouling and minimises field maintenance requirements.
- Digital temperature compensation technology ensures stable performance over a wide temperature range.

TS300

- Storage of measured data within the sensor for long periods.
- Easy configuration of logging parameters and uploading of logged data.
- Automatic transfer of data to a central office simply by attaching a data modem or mobile phone.
- Improved linearity and accuracy through the use of microprocessor based compensation.
- Facility to set alarm conditions which trigger additional measuring equipment.
- Lithium battery pack option for fully self-contained operation.
- Compact sensor body eliminates the added deployment costs of a separate data logger.

Specifications

	Model TS100	Model TS300	Model TS1200
Standard ranges available	0-50NTU, 0-100NTU, 0-250NTU, 0-500NTU, 0-1000NTU & 0-2,000NTU Other ranges available on request		
Linearity	+/- 3% FS	Same as TS100	Same as TS100
Temperature compensation	0-50°C	Same as TS100	Same as TS100
Supply voltage	10 - 14V Reverse polarity protected Surge protected to 2kV	Same as TS100	Same as TS100
Warm up / reading time	2 sec	Same as TS100	Same as TS100
Outputs	4-20mA, 0-1V or 0-2.5V	RS232	SDI-12
Dimensions	Length 344mm OD 47mm (Stainless Steel or Delrin)	Same as TS100	Same as TS100
Weight	1.47kg (Stainless Steel) 650g (Delrin)	Same as TS100	Same as TS100
Wetted materials	316 Stainless Steel, Delrin, Acrylic	Same as TS100	Same as TS100
Software supplied	N/A	AQUAGRAPH, SMARTCOM	N/A

Oxidation Reduction Potential Sensors ORP100 and ORP300

The Oxidation Reduction Potential Sensors are versatile instruments offering superior features to provide unparalleled reliability while tolerating rough treatment in the tough environments where they are deployed.

Range Benefits

- Optically isolated signal conditioning electronics ensure true and accurate readings at all times.
- Built in temperature compensation removes temperature related errors.
- Field proven platinum electrode provides long-term stability.
- Optical isolation of signal conditioning electronics enables operation in combination with other sensors without compromising performance.
- The low power energy saving design enables long-term operation in remote data logging applications.
- All sensors are packaged in Delrin (plastic) bodies, which can sustain harsh environmental conditions or as an option, passivated 316 Stainless Steel.

Range	- 1000mV to + 1000mV
Linearity	+/- 10mV
Accuracy	+/- 2% of span
Supply Voltage	10 - 14V
Dimensions	L= 435mm O.D.= 47mm

Key Benefit

Offers robust and reliable ORP data collection with a minimum requirement of operator intervention.

Product Features

ORP100

- Current (4-20mA / 3 wire) output
- Electrode constructed from robust Platinum for long-term field deployment.

ORP300

- Built in data logger for storage of measured parameters, capable of holding 42,600 records or a reading every 15 minutes for 15 months.
- Logging parameters and schedules are set up using Greenspan Analytical's easy to use Smartcom software package, which runs on IBM compatible PCs.
- Data can be reviewed in tabular or graphical format by using Greenspan Analytical's AquaGraph software package.
- Automatic transfer of data to a central office can be simply achieved by attaching a data modem.
- Improved linearity and accuracy through the use of microprocessor based compensation.

Applications

- Borehole and pipeline monitoring
- River and stream measurements
- Effluent monitoring

Specifications

	Model TS100	Model TS300
Standard range	±1000mV	Same as ORP100
Operational parameters	0 - 40°C	Same as ORP100
Linearity	±10mV	Same as ORP100
Accuracy	± 2% of span	Same as ORP100
Supply voltage 1	0 - 14V	Same as ORP100
Warm up / reading time	2 seconds	Same as ORP100
Electrode type	Platinum, silver / silver-chloride	Same as ORP100
Dimensions	Length 435mm OD 47mm	Same as ORP100
Weight	1.48kg (Stainless Steel) 680g (Delrin)	Same as ORP100
Memory	N/A	0.5Mb Upgradeable to 1Mb
Output	4 - 20 mA	RS232
Software supplied	N/A	AQUAGRAPH, SMARTCOM
Wetted material	316 Stainless Steel or Delrin	
Standard cable lengths	1m, 3m, 5m, 10m, 15m, 20m, 30m, 50m, 100m & 200m Non-standard cable lengths available on request.	

Accessories

SL300 Data Logger

The SL300 Smart Logger is a stand-alone, four-channel data logger. The logger is based upon the same type of logger used in all Greenspan 300 series Smart Sensors. SmartCom software allows for setup, logging and data recovery.

Three input channels accept a standard 4-20mA output from a sensor and a rain gauge channel (input 4) is available that accepts a switch closure type input.

- 512K to 1Mbyte of battery backed data storage, providing approximately 42,600 to 83,000 date and time stamped readings for a single channel.
- Real time clock accurate to 5 seconds a month
- Sampling interval 5 sec to 1 Hour
- Record interval 5 sec to 24 Hours
- Sensor Turn On Time is 2 seconds
- 16 Bit analogue to digital converter
- ASCII data output
- Alarm functions for high and low levels, battery levels, sampler and memory full
- Ability to upgrade firmware in the field
- Mobile phone alarm output and four telephone numbers
- Up to four input channels
- Range of logging options:event logging,averaging and time
- Intelligent interface software SmartCom for Windows for PCs
- Graph, view and convert utility Aquagraph, accessible from SmartCom.
- Reverse polarity and transient protection
- Power consumption - 35mA

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

MA300 Interface Adaptor
The MA300 Interface Adaptor was developed to enable data logging of 4-20mA Greenspan sensors. Two input channels are provided.

The MA300 provides the full complement of functions available on the Smart Sensor on nine individual connectors. These are:

- External 4-20mA Inputs (2)
- Sampler or Trigger Output
- Rain Gauge
- Auxiliary or Pump Output
- System Power Input,
- Modem
- Ext Modem, switched Cell Phone and Modem Power Outputs
- Comms RS232

The MA300 can be configured for use with a cell phone transmitter, cell to line interface and modem. All signal lines are protected (up to 2KV) against electromagnetic transients. The MA300 has the ability to determine if a modem or computer is connected and automatically switches the communication lines to either the modem port or the RS232 port. This feature ensures modem connection once the computer is removed. The unit is fused on all supply lines, including the auxiliary input switched supply. When the external inputs are activated an indicator will light to show channel use.

A status indicator, controlled by software to indicate microprocessor activity will pulse at regular intervals. A second indicator will light up if pulsed by the sampler/pump output line when programmed.

The housing is sealed to IP65 and includes internal moisture protection against condensation.

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/Mn02, 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.

GREENSPAN ANALYTICAL

WATER QUALITY MONITORING

Australia

Head Office

Goyen Controls Co Pty Ltd
268 Milperra Road
Milperra, NSW 2214

Telephone: 1800 805 372
Facsimile: 1300 658 799

Queensland

Telephone: 1800 805 372
Facsimile: 1300 658 799

Victoria

Telephone: 1800 805 372
Facsimile: 1300 658 799

South Australia

Telephone: 1800 805 372
Facsimile: 1300 658 799

Western Australia

Telephone: 1800 805 372
Facsimile: 1300 658 799

Asia

Goyen Controls Co Pty Ltd
Shanghai Representative Office
1209 Greenland Business Centre
1258 Yu Yuan Road
Shanghai PC200050 CHINA

Telephone: 86 21 5239 8810
Facsimile: 86 21 5239 8812

Goyen Controls Co Pty Ltd
73-M Jalan Mega Mendung
Kompleks Bandar OUG
58200 Kuala Lumpur MALAYSIA

Telephone: 60 37 987 6839
Facsimile: 60 37 987 7839

Office

Singapore

Telephone: 65 6457 4549
Facsimile: 65 6457 4549

Europe

Goyen Controls Co UK Ltd
Unit 3B Beechwood
Chineham Business Park
Basingstoke, Hampshire, RG24 8WA
UNITED KINGDOM

Telephone: 44 1256 817 800
Facsimile: 44 1256 843 164

Tyco Umwelttechnik GmbH
Im Petersfeld 6
D-65624 Altendiez
GERMANY

Telephone: 49 6432 1001/1002
Facsimile: 49 6432 63810

USA

Goyen Valve Corporation
1195 Airport Road
Lakewood
New Jersey 08701 USA

Telephone: 1 732 364 7800
Facsimile: 1 732 364 1356

www.cleanairsystems.com

Single Parameter
REV2 - 7/07