Measuring:

- Ammonia
- ATP (Adenosine Triphosphate)
- Bacteria
- Bacterial DNA
- BTX
- Chloramine (Monochloramine)
- Chlorine/Free Chlorine
- COD/BOD/TOC/DOC/SAC
- Colour/Hazen
- Conductivity
- Dissolved Oxygen
- Dry Solids Measurements
- E. Coli / Total Coliforms
- Greenhouse Gas (N_2O)
- Hydrocarbons
- Level
- Manganese
- Microbes
- Nitrate/Nitrite
- Oil/Grease in Water
- Ortho-Phosphate
- pH/ORP (Redox)
- Sulphite
- Sludge Blanket
- Suspended Solids
- TDS
- Total Nitrogen
- Total Phosphorus

Royce Water Technologies

Product Catalogue

2023

Innovative Technologies:

- Algae Control in Ponds and Lakes
- Automatic Water & Wastewater Samplers
- Methane Potential Analysis Systems for Biomass
- Sonication - Denitrification Improvement
- Sonication - Anaerobic Digestion Improvement
- Sonication - Reduction of Foaming in Activated Sludge Basins
- Aeration for Lagoons
- Aeration for Bioreactors
- Aeration for Wet Wells
- Wastewater Sludge Dewatering Optimisation

www.roycewater.com.au

Royce RWT Water Technologies

Company Background

After 20 years of service in the Australian water and wastewater marketplace, Royce Water Technologies has established an envied position as a quality supplier of innovative solutions.

We take great pride in offering only the best available solutions in analytical monitoring, control and process improvement in Australia's diverse water and wastewater industry.

Royce Water Technologies has a nationwide team of dedicated water and wastewater professionals. Our team services Queensland, New South Wales and Victoria. We have an expert team of partner distributors covering Tasmania, South Australia, Western Australia and New Zealand.

"Our aim is to provide accurate & reliable measurements of process parameters with the lowest overall cost of ownership - which leads to improved process quality & reduced energy consumption."

We are backed by industry expertise from across the globe in our ongoing relationships with the most innovative manufacturers and commitment to professional development. Royce Water Technologies is able to deliver the best possible expert advice and solutions to our clients throughout Australia.

Directors:

Rod Wellings
Tim Curtis

www.roycewater.com.au

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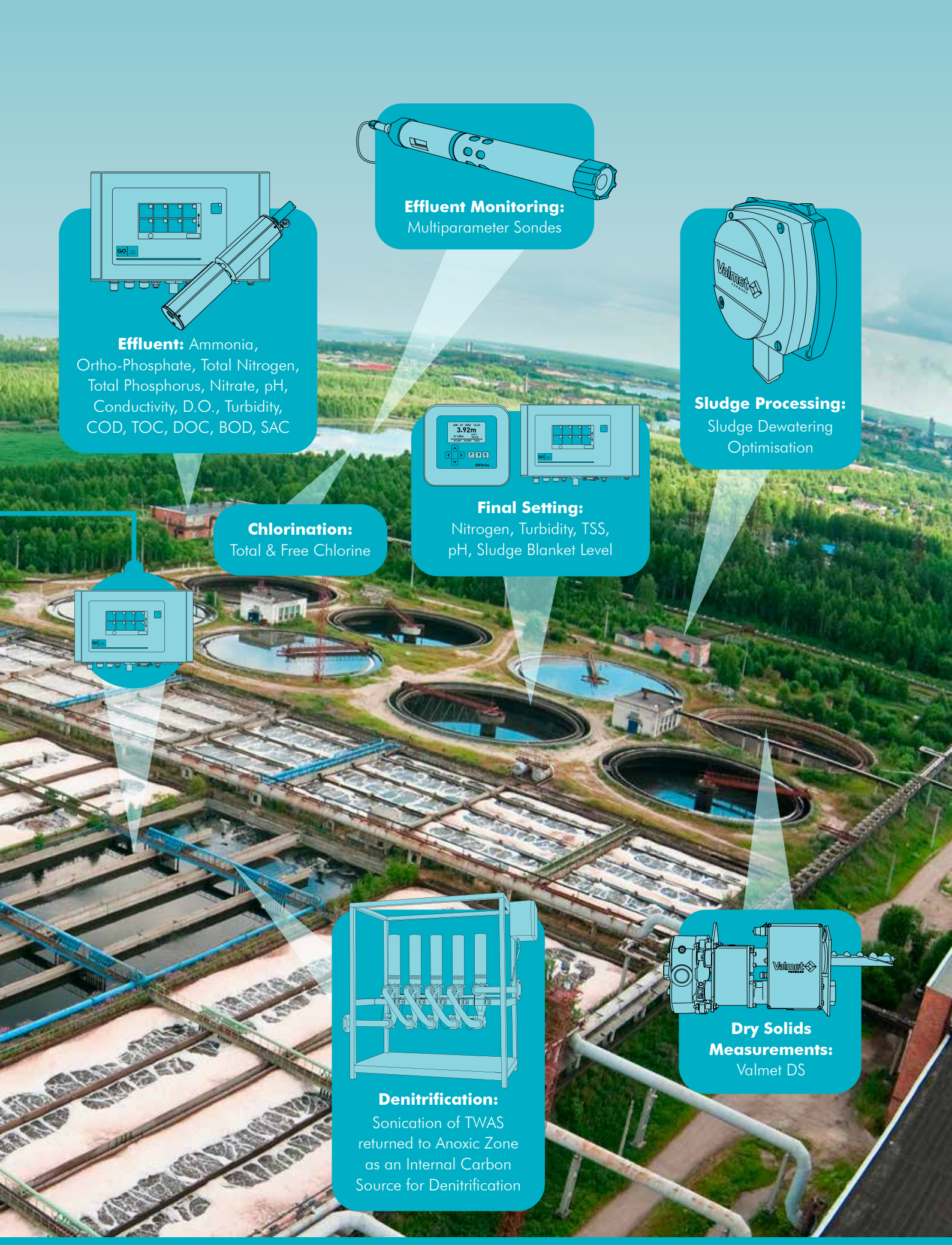
1/2023

Waste Water Treatment Plant Process Monitoring & Control


Effluent: Ammonia, Ortho-Phosphate, Total Nitrogen, Total Phosphorus, Nitrate, pH, Conductivity, D.O., Turbidity, COD, TOC, DOC, BOD, SAC
Effluent Monitoring: Multiparameter Sondes
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Chlorination: Total & Free Chlorine
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Denitrification: Sonication of TWAS returned to Anoxic Zone as an Internal Carbon Source for Denitrification
Dry Solids Measurements: Valmet DS

MXD 73/75

Multi-function Analyser

Measuring: Temperature / pH / ORP(Redox) / Conductivity / Salinity / TDS / Dissolved Oxygen / Turbidity / Suspended Solids (TSS)

The innovative MXD70 series of process instruments brings a new dimension to analytical process measurements with the modular design to meet ever changing process requirements.

- MXD73 Compact 96 DIN IP66 Panel mount option
- MXD75 IP66 Surface / Pipe mount version
- 3 3/4" QVGA Backlit LCD display provides clear indication as single or multiple measurements
- Parameters include: Contacting and Electrodeless Conductivity, pH / Redox or Dissolved Oxygen measurement, Salinity/ TDS/Turbidity/TSS
- Up to 3 measured parameters with temperature readings can be displayed together
- Accurate at zero DO
- User selectable bar graph display option
- Plug and play card detection for simple measurement and output expansion upgrades
- SD card interface allows trouble free saving of configuration and simplifies software updates
- Base models include 2 relay outputs and a single isolated 4-20mA current output
- Can be expanded up to 6 relay outputs and 6 isolated 4-20mA current outputs
- Relays are fully configurable including on/off, time or pulse proportional operation
- 8 Independent programmable digital inputs with user selectable operations
- Dedicated error page provides up to date controller status
- 85-265v or 18-32v Supply options (AC or DC)
- SD Card data logging
- Three separate live trend screens
- Add to existing MXD70 series controllers

MXD70 Series

	MXD73	MXD75
Input Expansion Slots	3 slots, user configurable with any combination of available input add-in cards.	3 slots, user configurable with any combination of available input add-in cards.
Output Expansion Slots	1 slot, user configurable with an additional output option add-in card.	1 slot, user configurable with an additional output option add-in card.
Operating Temperature	-20°C to +50°C	-20°C to +50°C
Current Output Adjustment	±0.01mA, 3 point 0/4-20 mA for remote monitor calibration.	±0.01mA, 3 point 0/4-20 mA for remote monitor calibration.
Buttons	3¾" QVGA back lit LCD module.	3¾" QVGA back lit LCD module.
SD Card Interface	Enables backing up and restoring of instrument configuration, logging of the sensor readings and instrument status (optional extra) and on-site upgrading of instrument software. SD, SDHC and SDXC-FAT32 cards supported	Enables backing up and restoring of instrument configuration, logging of the sensor readings and instrument status (optional extra) and on-site upgrading of instrument software. SD, SDHC and SDXC-FAT32 cards supported
EMC	2004/108/ECing BS EN 61326-1: 2013	2004/108/ECing BS EN 61326-1: 2006
Low Voltage Directive	2006/95/EC using BS EN 61010-1: 2010	2006/95/EC using BS EN 61010-1: 2010
Instrument Housing	UL 94-V0 PC/ABS	UL 94-V0 PC/ABS
Weight	880g	2.7kg
Dimensions	Front - 128 x 116 x 23 mm (H, W, D) Rear - 89 x 89 x 161 mm (H, W, D)	331 x 242 x 110 mm (H, W, D)

Hundreds of installations in Australia!

MXD70 Series - SD Card Data Logging with Live Trending

The Data logging additional software function expands the capabilities of the MXD70 series by allowing the user to record over time the status of the instrument. It consists of two separate sections, Live Trending and SD Card Data Logging, which together help the user to analyse and improve the performance of their application.

The MXD70 series features optional software functions which when purchased will expand the instrument's capabilities. These functions by default are locked. They can be unlocked by LTH or your local distributor at the time of order. Alternatively the functions may be ordered after purchase by supplying LTH or your local distributor the serial number of your instrument. In return they will supply you with an 8 digit unlock code that is unique to the instrument and the required function to be unlocked.

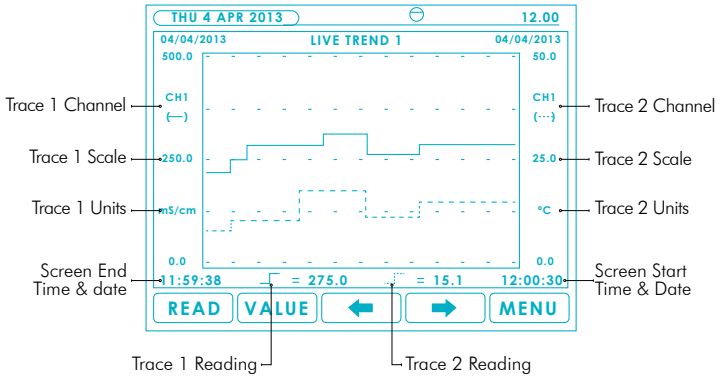
Live Trending provides the user with three separate live trend screens adjacent to the front screen with each showing two readings. This enables the user to instantly view the last 50 samples of each reading. The live trend screen also features a review mode where by the user can further analyse the last 200 samples of each reading, If the user finds something of note the software provides the facility to save these 200 readings to an excel compatible file on the SD card.

Further analysis is provided by optionally displaying the minimum, maximum and average value of the 200 samples. The number of readings, the source of the readings, the displayed scale and the sample interval rate are all configurable by the user.

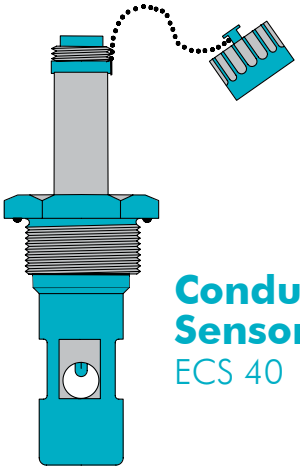
The SD Card Data Logging enables the user to log over long periods the status of the instrument. Variables logged include: the primary sensor readings, any secondary readings, set point status, the current output readings, digital input status and any error messages. This data can be viewed either on the MXD70 series instrument or removed and viewed in Microsoft Excel on a PC. The user can configure which channels are logged and the logging interval. When logging three inputs at one sample per second a 1GB card will allow 40 days of recording.

Once removed place the SD card in a card reader connected to the PC. Open the SD card in the file explorer and browse to either the Data logging folder to view the SD card data logging or the Live Trend folder to view the live trend log saves.

Each file is limited to 65535 logs; when this limit is reached the instrument will automatically create a new file. The instrument will also automatically create a new file if the configuration of the instrument is changed whilst the data logging is active. Each file name contains the date and time of when it was created. The data is stored as a comma separated variable (csv), which can be read by Microsoft Excel.

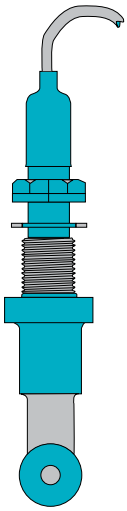


Sensors for MXD & BXD

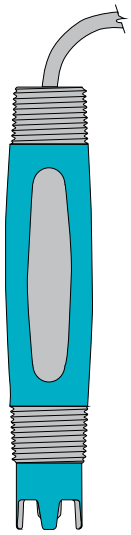


Conductivity Sensor
ECS 40

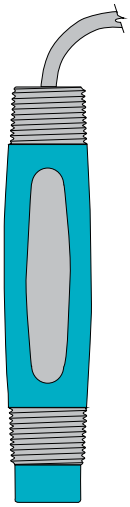
Galvanic Dissolved Oxygen Sensor
RWT G95A



Conductivity Sensor
ECS 20

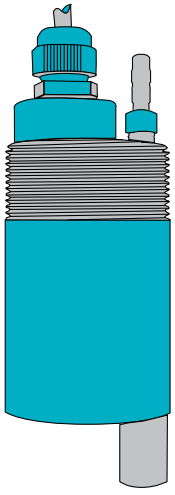


ORP Sensor
S 400

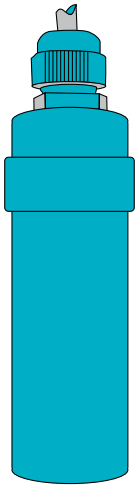


pH Sensor
S 410

Optical Dissolved Oxygen Sensor
RWT O95A

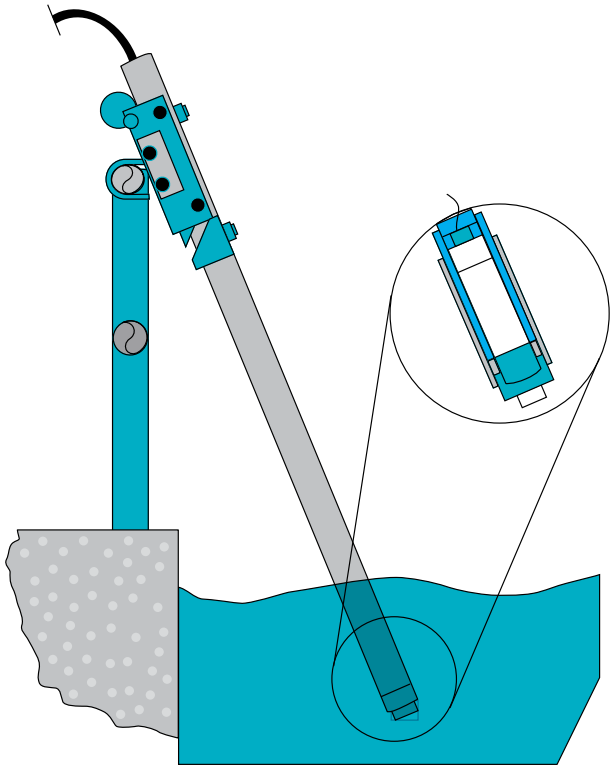


Turbidity/ TSS (MLSS)
TU 8355
TU 8555

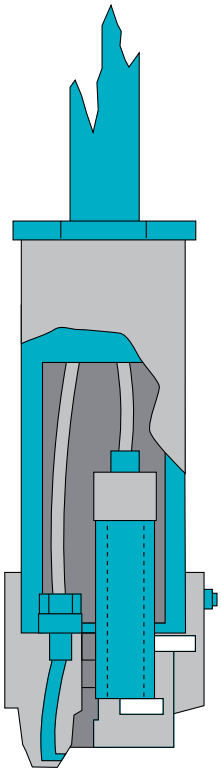


Turbidity
TU 8325
TU 8525

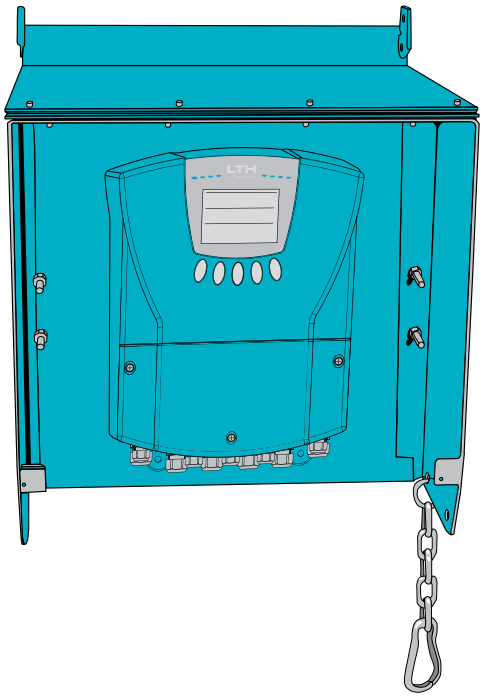
Sensor Mountings & Enclosures



Handrail Bracket



Jethead



Marine Grade Aluminium Enclosure

BXD17

Single Input Controller

Measuring: pH / ORP(Redox) / Conductivity / Salinity / TDS / Dissolved Oxygen / Total Suspended Solids (MLSS) / Turbidity Transmitter

The BXD17 is a microprocessor controlled instrument range offering individual controllers for the measurement parameters Electrodeless (Inductive) and Contact Conductivity, pH/Redox and Dissolved Oxygen. To achieve this the instrument utilises a clear multifunction LCD to display the primary reading and temperature, show operational status and to provide an intuitive user interface.

As standard the instrument is simple to install with a new custom 144x144mm IP66 rated Wall-mount instrument, however with the addition of a suitable mounting kit it can either be installed as a Panel-mount or Pipe-mount instrument.

The instrument has two onboard volt-free normally open-relays with adjustable setpoint value and hysteresis. Either one can be set to activate on a High, Low or Band operation allowing the instrument to be used in a variety of dosing and or control applications. Additional setpoint functions include delayed activation and dose alarm timer, whilst the status of the relays can be seen via the main screen of the instrument. The set points relays may also be given the function as a clean initiator to provide automatic sensor cleaning, the clean duration, recovery time and interval period all programmable.

Additionally, the instrument features one industry standard, isolated, 0/4-20mA current output that features adjustable scaling and selectable on-error states, allowing the instrument to transmit the primary reading for remote monitoring purposes. Also fitted are two digital inputs operating on either closed or open contact which allow the instrument to be triggered by No Flow, Low Tank Level, Interlock or Off-line functions that forces the relays to deactivate and the current output to a pre-defined state.

Depending upon version purchased the instrument may be powered by either 85-265V AC or 12-30V DC.

Features

- Power supply 85-265vAC (24vDC option)
- 2 off Independent digital inputs
- Accurate at zero DO
- Measurement and Temperature input
- 2 off Programmable relay outputs
- 2 off Isolated scaleable 0/4-20mA output
- Software Upgrade via Micro(SD) Card
- Available for Galvanic Dissolved Oxygen (BGD17) and pH (BPD17)

Technical specifications

Enclosure	**Front panel:** 144 x 144mm **Panel cut out:** 138 x 138mm **Depth behind panel:** 77mm maximum
Cable Glands/Connectors	Maximum of 5, 2 x M20, 3 x M16
Material	ABS – Coloured Pantone 281C
Protection	IP66 using BS EN 60529: 1992
Equipment Safety	2006/95/EC using BS EN 61010-1: 2010
Ambient temperature	-20 +55°C Relative Humidity 5 to 95%, non-condensing.
Power Supply	85-265v, maximum 15 Watts. Low voltage option available – 12-30vDC
EMC	2004/108/EC using BS EN 61326-1: 2013
Modes	High, Low, Band, Delay, Hysteresis, Dose Alarm, Initial Charge

PROUDLY MADE IN AUSTRALIA

NOW WITH DISPOSABLE CARTRIDGE

RWT G95A

Galvanic Dissolved Oxygen Sensor

The Australian made RWT G95A is the next generation in Dissolved Oxygen measurement. We have taken a sensor that was already good and made it better. Galvanic Dissolved Oxygen Sensor are part of Australia's most proven range of Dissolved Oxygen Systems with excellent measurement at the low end of the measurement range at zero. They are the preferred choice at many wastewater treatment authorities.

The Model RWT G95A Sensor utilises proven galvanic sensing technology – without a question the most accurate and reliable Dissolved Oxygen sensing technology ever developed. The pure platinum cathode makes the sensor incapable of being poisoned by other gases often found in impure waters, such as hydrogen sulfide.

This sensor utilises the only DO sensing technology that is successful in continuous de-nitrification monitoring and control applications. It is also the only sensor design that can be used continuously in very violent pure liquid oxygen injection systems.

Features

- Accurate at zero DO
- Ground loop elimination
- 3 year warranty
- Platinum cathode, lead anode
- Automatic temperature compensation
- Easily refurbished in the field
- Jet-cleaning available
- No special tools required

This sensor can be used with MXD73/75 Analyser on page 6 and BXD17 Analyser on page 10

Technical specifications

Measuring principal	Galvanic
Cathode material	99.5% Platinum
Anode material	Lead Plate
Electrolyte	Potassium Chloride gel
Repeatability	± 1% (at constant temperature)
Response time	Using 1 mil membrane - PPM 99% of actual, from air calibration < 30 seconds
Temperature accuracy	± 0.2°C

NOW WITH DISPOSABLE CARTRIDGE

RWT O95A

Fluorescence Dissolved Oxygen Sensor

The RWT O95A is the latest development in Dissolved Oxygen technology, where engineers prefer fluorescent dissolved oxygen measurement. We have redesigned a fluorescent Sensor to be compatible with existing Royce Water Technologies assemblies and mounting systems.

The RWT O95A is a SMART optical dissolved oxygen (DO) sensor for use in water and wastewater

applications. Combines high reliability with low maintenance. Standard 12 x 120 mm design.

Features

- Compatible with Royce Jet Head
- Can be calibrated at zero DO
- 12 month warranty
- Automatic temperature compensation
- Easily refurbished in the field
- No special tools required
- No Electrolyte requirement
- No Flow requirement
- No oxygen consumption
- Plug-and-Play with SMART calibration
- Retains calibration history
- Retains user metadata for tracking

Technical specifications

Operating Range	0 – 300% SAT (0 – 30 PPM) 5°– 50° C 0 – 5 bar
Accuracy	Within 1% full range (%SAT or PPM)
Digital Output	Process Variable: 0 – 300 % SAT (0 – 30 PPM) Temperature Compensated Phase Angle: Range 10°–100° PA Operational Temp: 5°– 50° C Amplitude (diagnostic for Sensing Surface Health)
Response Time	T98 < 15 seconds @37° C; N2 to AIR T98 < 15 seconds @37°C; AIR to N2
Wetted Materials	Sensor Body and Cap: Anodized Aluminium O-rings: EPDM Sensing Surface: PES and Silicone Rubber
Termination	Fixed cable standard 10M length
Power Supply	5.0 VDC supplied by Power Module or Transmitter
Design Features	Easily Replaced Optical Cap Rugged PCV Coated Cable w/ Ferrules

Note: Temperature, pressure and solution composition will influence the life expectancy of the measurement sensor.

This sensor can be used with MXD73/75 Analyser on page 6 and BXD17 Analyser on page 10

OD 8325/8525

Fluorescence Dissolved Oxygen Sensors

These sensors are designed for measuring dissolved oxygen using the fluorescence phenomenon. OD 8325 sensor is for submersible installation. OD 8525 sensor is for overflow and in-line installation. Thanks to the analog and digital outputs, the sensors can be connected to the most common PLC's or data acquisition boards. B&C Electronics offers MC 6587 and MC 7687 multi-channel controllers that allow complete management of up to three sensors, displaying the measurements and the messages that guide calibration and configuration.

Measuring method:

A light pulse of a specific wavelength its a special substancedeposited on a transparent layer in contact with the liquid (or air). The light energy is absorbed and partially re-emitted in the form of a light pulse at a longer wavelength. This phenomenon is called fluorescence. The oxygen molecules in contact with the sensitive layer attenuate the fluorescence (quenching) in relations to their concentration. The digital processing of the fluorescence allows the measurement of oxygen concentration. The measuring method does not require electrolytes.

OD 8325

TU 910

OD 8525

Technical Specifications

Ranges	0/200.0 % air saturation – 0/20.00 ppm
Scalability factor 4/20 mA	10/150 %
Resolution	0.1 % sat. – 0.01 ppm
Power supply	9/36 VDC
Accuracy	± 1.0 % sat. < 10.0 % sat. ± 2.0 % sat. > 10.0 % sat.
Repeatability	± 0.5 % of the scale
Drift	< 1 % year
Response time	95 % < 60 seconds
Load	600 Ohm max. a 24 Vdc
Digital output	RS 485 isolated
Protocols	0/50 °C
Dual filter software	2/220 seconds
Current loop	4/20 mA isolated
Protocols	B&C ASCII e Modbus RTU (03, 06, 16 functions)
Baud rate	2400 / 4800 / 9600 / 19200 baud
Probes ID	01/99 (B&C protocol) 01/243 (Modbus protocol)
Probes network	32 max.
Operating temperature	60 °C max.
Operating pressure	6 bar at 25 °C (OD 8525) 1 bar at 25 °C (OD 8325)
Dimensions OD 8525	L=143 mm, D=40 mm
Dimensions OD 8325	L=165 mm, D=60 mm
Weight OD 8525	Body 160 g, cable 640 g
Weight OD 8325	Body 420 g, cable 640 g
Body	PVC-C
Cable	10 m (100 m max.), PVC sheath
Protection	IP 68

LTH Electronics

S400 Series

pH and redox sensors for the process industries

The S400 sensors have been designed for rugged service in submersion or inline process applications. The reference cell features a double junction design for extended service life in harsh applications. The high quality sensors are constructed of corrosion resistant wetted materials including Ryton®, Teflon® and glass. They can be supplied with built in temperature compensation and a solution ground connection.

Sensor Tip Options

Coaxial Teflon Reference

Designed to withstand tough industrial applications. Best overall performance with rugged dome bulb.

Flat pH Bulb Self Cleaning

Designed for obstructionless contact with the sample stream for self cleaning service and for use with a spraywash system. Features coaxial porous teflon junction.

Dual Ceramic Pin Junction

For use in highly alkaline processes. Best choice for use at high pressures.

Features

- Choice of body styles
- Can be used with virtually any pH meter
- Competitive price
- Choice of temperature compensators
- Optional built in solution ground
- Sealed double junction reference
- 0.75" or 1" Male NPT threaded connection
- Wide range of mounting options
- Moulded from chemical resistant Ryton®

PROUDLY MADE IN AUSTRALIA

Technical specifications

pH range	0 - 14 pH
Redox range	± 5000 mV
Temperature range	0 - 105°C
Maximum pressure	10 bar at 100°C
Glass	HT-3 standard, HT-4 high pH available (above 13 pH)
Temperature sensor	Standard Pt1000*
Wetted materials pH	Ryton, PTFE or ceramic & glass
Wetted materials	Redox Ryton, PTFE or ceramic & platinum
Standard cable length	6 metres with ferrule connections*

Note:Temperature, pressure & solution composition will influence the life expectancy of the measurement sensor.

*Other variants available. Please contact our sales department for details.

S500 Series

pH sensors

This sensor can be used with MXD73/75 Analyser on page 6 and BXD17 Analyser on page 10

PH 3436

pH / ORP transmitter 4-20 mA and RS485

The transmitter can be configured for the measurement of pH or ORP and it can also work with the antimony pH electrodes. The measured values, along with support and instruction messages, are also visualized on an alphanumeric display. The transmitter displays the temperature value measured by a Pt100 and performs the manual/automatic compensation (pH only). The extractable terminal blocks and DIN rail mounting make easy the maintenance and the installation in the field.

Main Features

- 4-20 mA isolated 2-wire current loop
- RS485 isolated interface
- B&C and Modbus protocols
- Alphanumeric LCD 8x1 characters
- pH or ORP measurement
- Manual/automatic temperature compensation °C or °F temperature display
- Digital input with hold function Recognition of the standard solution Password at two levels
- Last calibration date
- Totalization of operating hours Power 9/36 Vcc
- Extractable terminal block DIN rail enclosure

Analog Mode

The transmitter can be connected to a PLC or instruments BC 7335 - BC 7635 - BC 7635.010 or BC 7687 - BC 6587 which provide the Vdc power supply, measuring values, two set point and the alarm. The digital input can place the current loop on hold.

Digital Mode

When in digital mode, the transmitter is a slave device interrogated by a master device with protocol B&C (ASCII) or Modbus (function 03).

Technical Specifications

Display	alphanumeric LCD 8x1 characters
Inputs	pH electrode (glass/ref) pH electrode (antimony/ref) ORP electrode (Pt/rif o Au/rif) digital input (free voltage contact)
pH scale	0/14.00 pH
ORP scales	0/1000 0/-1000 -1000/1000/0/2000 0/-2000 mV
Temperature scales	-10.0/110.0 °C, 14.0/230.0 °F
Temperature compensation	manual/automatic (pH)
Zero	± 2 pH, ± 100 mV
Sensitivity	80/110 % (glass and ORP electrodes)
Sensitivity	70/140 % (antimony electrode)
Zero temperature	± 5.0 °C, ± 9.0 °F
Input current	< 2 pA
Input resistance	> 1012 ohm
Analog output	4-20 mA two wires isolated
Digital output	RS485 isolated
B&C ID protocol	01 - 32
Modbus address	0 - 243
Ambient temperature	0/50 °C
Humidity	95% without condensation
Power supply	9/36 Vcc
Consumption	< 4 mA with loop disabled
Isolation	500 Vdc input/output
Enclosure	DIN rail in polycarbonate
Terminal blocks	extractable
Weight	250 g
Dimensions	71 x 95 x 58 mm (4 DIN rail modules)
EMC/RFI conformity	EN 61326
Registered design	002564666-001

ECS-20 Series

Low Cost Electrodeless Conductivity Sensors

The ECS20 Series of Electrodeless conductivity sensors have been developed and engineered to produce a very low cost sensor, without sacrificing performance or quality. This has been achieved by injection moulding the sensor in glass loaded polypropylene.

The sensor provides all of the benefits that the method of Electrodeless conductivity measurement provides. It is extremely tolerant of coating on the sensor, probably the greatest problem with conventional conductivity measurement.

The ECS20T incorporates temperature compensation and can be mounted inline, in a tank wall or large bore pipe or in an open tank using a range of adapters.

Features

- Low cost
- Low Maintenance
- Inline, Dip and Tank Mounting Options
- Ideal for use with the BC9 series Controllers and the MTD53 Cooling Tower Monitor
- Ideal for Cooling Tower Bleed, Rinse Water & Solution Concentration Applications

Technical Specifications

ECS 20T

Operating temp	-5 to 60°C (not freezing)
Wetted Material	Glass filled polypropylene
Temp Comp	2 wire Pt1000
Cable	Standard 5 metres 54G terminated with tag ends, extended to instrument limit, via junction box
Connection	0.5" BSP male

ECS 22T Dip Assembly

Material	PVC
Operating Temp	-5 to 60°C (not freezing)
Dip Length	600mm or 1200mm
Mounting	Standard bracket or flange option
Protection	IP68

ECS 24T In-Line Assembly

Material	PVC with Viton seal
Operating Temp	-5 to 60°C (not freezing)
Size	1.5" plain tee with 0.5"BSP option
Operating Pressure	Vacuum to 6.5 bar (100psi)

ECS 27T Tank Mount/Insertion Assembly

Material	PVC with Viton seal
Operating Temp	-5 to 60°C (not freezing)
Size	1.25" BSP
Operating Pressure	Vacuum to 6.5 bar (100psi)

This sensor can be used with MXD73/75 Analyser on page 6 and BXD17 Analyser on page 10

LTH Electronics

ECS-40 Series

Electrodeless Conductivity Sensors

The Electrodeless method of measuring conductivity has many advantages over conventional methods. In particular the sensors will operate with virtually zero maintenance and provide reliable measurements over extended periods of time.

The ECS40 series can be mounted inline, in a tank wall, large bore pipe or in an open tank using a variety of fittings. The option of several different hygienic flanges caters for the majority of applications.

The sensor is manufactured in PEEK™ a food grade material with excellent chemical resistance and high temperature performance. The construction of the sensor allows it to operate at 100°C continuously and withstand thermal shocks, commonly associated with CIP applications and can be steam sterilised up to 135°C.

The sensors are fitted with Pt1000 temperature sensors and are compatible with all LTH Electrodeless conductivity instruments. The temperature sensor is mounted in direct contact with the medium via a stainless steel jacket, an alternative PEEK jacket is available where stainless steel might be unacceptable. Connection is made via an IP67 plug which simplifies installation and maintenance.

Features

- Low Maintenance
- Hygenic inline, Dip and Tank Mounting Options
- Ideal for Process, Dairy, Brewing and Food Applications
- Conductivity and Solution Concentration Measurements
- Steam Sterilisable to 135°C, Thermal Shock Resistant
- IP67 Connection Simplifies Installation and Maintenance
- Fast Temperature Response t_{90} < 10 secs

Notes: Flanges for the ECS49 sensors must be ordered separately. Minimum pipe size for insertion sensors 2.5", 63.5 mm. Optional PEEK temperature pocket available. Temperature, pressure and solution composition will influence the life expectancy of the measurement sensor. Varivent® is the registered trademark of Tuchenhagen Gmbh.

This sensor can be used with MXD73/75 Analyser on page 6 and BXD17 Analyser on page 10

Technical Specifications

ECS 42T Dip Sensor

Wetted Material	Peek, 316 stainless steel temperature pocket, 316 stainless steel stem
Order Code	8515 600mm dip 8516 1200mm dip

ECS 49T Hygenic Insertion Sensor

Wetted Material	Peek, 316 stainless steel temperature pocket, 316 stainless steel flange, ordered separately. EPDM seal
Maximum pressure	100 psi (6.5 bar).
Order Code	8527

ECS 43T In-Line Sensor

Wetted Material	Peek, 316 stainless steel temperature pocket, PVC EPDM seal
Maximum pressure	100 psi (6.5 bar)
Maximum Temperature	60 °C (PVC Tee)
Order Code	8523

ECS 45T In-Line Sensor

Wetted Material	Peek, 316 stainless steel temperature pocket and tee. EPDM seal.
Maximum pressure	100 psi (6.5 bar)
Order Code	8525

ECS 47T Insertion Sensor

Wetted Material	Peek, 316 stainless steel temperature pocket and screwed fitting. EPDM seal.
Maximum pressure	150 psi (10 bar)
Order Code	8526

ECS 48T Hygienic Insertion Sensor

Wetted Material	Peek, 316 stainless steel temperature pocket, 316 stainless steel flange, ordered separately. EPDM seal.
Maximum pressure	100 psi (6.5 bar)
Order Code	8528

ST 3254.X - ST 3214.X

Electrodeless 4-20mA Loop Conductivity Sensors

ST 3254.1 0/10 mS range
ST 3254.2 0/100 mS range
ST 3254.3 0/1000 mS range
ST 3214.4 0/20 mS range
ST 3214.5 0/200 mS range
ST 3214.6 0/2000 mS range

On request it is available a model with range 0/300 mS

This E. Conductivity sensor consists of a loop powered transmitter and an electrodeless conductivity sensor in a single package. Temperature compensation is accomplished with a built-in sensor. Applications include water tratment, cooling tower and water monitoring.

Six models are available for specific measuring range.

Principle of operation

When the electrodeless conductivity sensor is immersed in the sample to be measured, a conductive loop is created through the two toroidally wound coils. An alternating current is applied to one of the coils which induces a current in the conductive loop. The second coil is used to measure the conductivity which is proportional to the induced current in the solution. The advantages of he electrodeless method are more apparent in measurement applications in which electrodes contamination and polarization of a conventional conductivity system can lead to erroneous readings.

Each sensor contains:
- two measuring toroidal coils
- temperature sensor
- 4-20 mA current loop amplifier

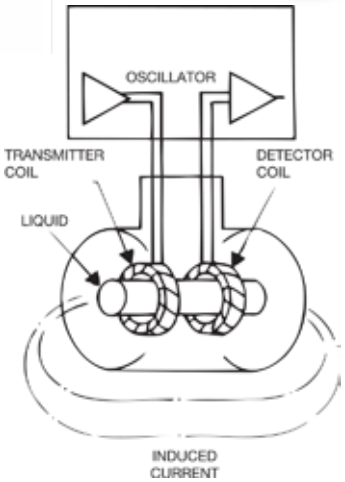
Technical specifications

Measuring method	toroidal
Power supply	11/30 Vdc
Temperature sensor	built-in
Load	600 ohm max. at 24 Vdc
Max. temperature	50 °C part in contact with liquid
Temperature coefficient	2.2 %/°C (2.0 for ST 3214.X)
Temperature reference	25 °C (20 °C for ST 3214. X)
Max. pressure	10 bar at 25 °C
Length	207 mm
Thread	1 1/2" MNPT (both sides)
Body	PVC-C
Cable length	3 m
Installation	in-line or submersible

C 8825.4

Electrodeless 4-20 mA Loop Conductivity Sensor with RS485 - Modbus RTU

This sensor measures electrical conductivity and TDS using the inductive method. Thanks to the analog and digital outputs, the sensor can be connected to the most common PLC's or data acquisition boards. MC 6587 and MC 7687 multi-channel controllers allow complete management of up to three sensors, displaying the measurements and the messages that guide calibration and configuration.



Measuring Method

The electodeless conductivity sensor consists of two windings on toroidal coils, placed side by side, embedded in a plastic material and therefore not in contact with the sample. A through hole allows the solution to close an imaginary electrical circuit around them. An alternating voltage is applied to the transmitter coil while a current proportional to the conductivity of the sample is measured on the detector coil. The TDS value is calculated by applying a programmable conversion factor.

Technical Specifications

Conductivity scale	0/4.000-0/40.00-0/400.0 mS e 0/20.00-0/200.0-0.2000 mS
TDS scales	0/2.000-0/20.00-0.200.0 ppt e 0/10.00-0/100.0-0/1000 ppt
TDS/EC factor	0.450/1.000 1/S
Scalability factor 4/20 mA	10/100%
Sensitivity	60/160%
Zero	± 10% of the full-scale
Resolution	1 digit
Temperature limit	-5/+50 °C
Reference temperature	20/25 °C
Temperature coefficient	0.00/3.50 %/ °C
Power supply	9/36 Vdc
Current loop	4/20 mA isolated
Load	600 Ohm max. a 24 Vdc
Digital output	RS 485 isolated
Protocols	B&C ASCII and Modbus RTU (03, 06, 16 functions)
Baud rate	2400 / 4800 / 9600 / 19200 baud
Operating temperature	60 °C
Operating relative humidity	95% without condensation
Operating pressure	10 bar at 25 °C / 5 bar at 50 °C
Dimensions	L = 165 mm, D = 60 mm
Thread/connection	1.5" MNPT
Body	PVC-C
Weight	Body 520 g, cable 640 g
Cable	10 m (100 m max.), PVC sheath
Protection	IP 68
EMC/RFI conformity	EN 61326-2-3/2013 - EN55011/2009

BC 6587 & BC 7687

Universal 4-20mA Input Controllers

These instruments are used when there is a need to add display functions, control, alarm, and / or automatic cleaning of the sensor to a transmitter capable of performing any type of measurement.

These instruments provide

- ABS watertight enclosure, with Polycarbonate front panel
- Measuring display in the selectable range from -9999 to 9999, corresponding to the 0-20 mA or 4-20 mA input
- VDC power to power the 4-20 mA loop of the transmitter
- Automatic measurement control function
- Alarm from the low/high measurement, the set point overtime operation and the logic input
- Programmable dual analog output for recording and acquisition of the measurement values or PID regulation
- Hold / alarm function activated by two external volt free contacts
- Automatic /manual autoclean function

This unit allows a differential measurement, by using two 0-20 mA or 4-20 mA transmitters featuring the same measurement scale.

Turbidity Probes

TU 8355 High Turbidity and Suspended Solids sensor
TU 8325 Turbidity sensor, submersible with autoclean
TU 8555 High Turbidity and Suspended Solids sensor
TU 8525 Turbidity sensor

Dissolved Oxygen Probes

OD 8325 In-line DO sensor
OD 8525 Submersible DO sensor with autoclean

Conductivity Probes

C 8825.4 Conductivity sensor
ST 3254.X - ST 3214.X Conductivity sensors

Aquameta Sensors

CR420-0.5NPU Hydrostatic water level sensor
CR420-x.xVFA Hydrostatic diesel level sensor
CR420-0.5VPU Hydrostatic level sensor for salt and chlorinated water

Technical Specifications

Display	Multi-line graphic
Input from	0-20 or 4-20 mA single or differential
Scale	- 9999 / +9999 with selectable decimal point
Measuring unit	Electable and 4 digit configurable 2 set-point with min/max function, hysteresis and delay time programmable
Analog output	0-20 or 4-20 mA isolated for PID regulation or measure transmission Min/max alarm relay, activate/deactivate function selectable Parameters configuration on two levels with access code selected by the operator Two logic digital input for hold or alarm function, selectable
Power supply	85/264 Vac - 50/60 Hz, 5 VA
Protection	IP 65
Dimensions	256x230x89 mm
Registered design	002564666-002
Options	
091.428	Power supply 9/36 VDC - 24 Vac

MC 6587 & MC 7687

Multi-channel Modbus Controllers for B&C Modbus Sensors

MC 6587 and MC 7687 can control up to three B&C Electronics digital probes and transmitters. If necessary, the user can connect two or three devices of the same kind, so to have a double or triple validation.

The available parameters are:

- Turbidity and suspended solids
- Dissolved oxygen
- Conductivity and TDS

Turbidity Sensors

TU 8355 High Turbidity and Suspended Solids sensor
TU 8325 Turbidity sensor, submersible with autoclean
TU 8555 High Turbidity and Suspended Solids sensor
TU 8525 Turbidity sensor

Dissolved Oxygen Sensors

OD 8325 In-line DO sensor
OD 8525 Submersible DO sensor with autoclean

Conductivity Sensors

C 8825.4 Conductivity sensor

Technical Specifications

Inputs for digital probes	• C 8825.4 • C 8325.5 • C 8520.5 • OD 8325 • OD 8525 • TU 8325 • TU 8355 • TU 8525 • TU 8525.5 • TU 8555 • TU 8555.5
Inputs for transmitters	• C 3436 conductivity/TDS transmitter for 2 or 4-wire cells • CL 3436 free/combined/total/dioxide chlorine, d.ozone transmitter • PH 3436 pH/ORP transmitter
MC 6587 Keyboard	8 keys
MC 7687 Keyboard	4 keys double function
Display	multiline graphic
Dual analog output	0-20 mA / 4-20 mA Rmax 600 Ω
Digital output	isolated RS485. B&C ASCII and Modbus RTU protocols (03 function)
Dual set point HI/ LO	ON/OFF - PID - PFM – PWM, SPST relays
Hysteresis	0 ÷ 10 % of the scale
Delay	0 ÷ 100.0 seconds
Alarm	SPDT relay, 0 ÷ 100.0 seconds delay
Cleaning function	off / autoclean / manual, SPDT relay repetition time 0.1 ÷ 100.0 hours cleaning time 1.0 ÷ 60.0 seconds holding time 0.0 ÷ 20.0 minutes
SPST and SPDT relay contacts	220V - 5 A resistive load
Operating temperature	-10 ÷ 60 °C
Humidity	95% without condensation
Power supply	85 ÷ 264Vac - 50/60 Hz
Low voltage power supply	9 ÷ 36 Vdc, 12 ÷ 24 Vac (option 091.42x)
Terminal blocks	removable
Weight	1360 g (MC 6587) 450 g (MC 7687)
Enclosure	ABS, IP 65 protection (MC 6587) Metallic, IP 65 front panel only (MC 7687)
Dimensions	256x230x89 mm (MC 6587) 98x98x104 mm, 90x90x95 mm panel cutout (MC 7687)
EMC/RFI conformity	EN 61326-2-3/2013 – EN 55011/2009
Ornamental design nbr.	002564666-002 (MC 6587) - 002564666-003 (MC 7687)

TU 8325 & TU 8525

Turbidity Sensors

These unique sensors have been designed to measure Turbidity based on nephelometric method (ISO 7027 - EN 27027). The sensors are available for submersible and in-pipe installations.

The measuring system consists of:

- Infrared light source
- 90 degree scattered light detector
- Detector of the clean lens status
- 2-wire 4/20 mA analog output
- Modbus Output
- Nozzle for the autoclean by external pressured air (TU 8325)

Principle of operation

The Turbidity follows the nephelometric method (ISO 7027 - EN 27027). A light beam is sent to the sample through an optical lens. The 90 degree scattered light by suspended particle is collected by the sensor through a second lens and it is converted in an electric signal proportional to the Turbidity of the sample. The probe uses an infrared light and the measuring is not affected by the color of the sample.

Accessories for TU 8555 / TU 8525

- **TU 910** Overflow cell

TU 910

TU 8325

TU 8525

Technical Specifications

Turbidity ranges	0/4.000 – 0/40.00 – 0/400.0 NTU
Scalability factor 4/20 mA	10/100 %
Sensitivity	70/130 %
Zero	± 0.400 NTU
Resolution	0.001 FTU
Power supply	9/36 VDC
Accuracy	0.2 % of the full-scale selected
Repeatability	0.1%
Non-linearity	0.1 %
Check signal	0/200.0 %
Load	600 Ohm max. a 24 Vdc
Digital output	RS 485 isolated
Temperature limit	0/50 °C
Dual filter software	2/220 seconds
Current loop	4/20 mA isolated
Protocols	B&C ASCII e Modbus RTU (03, 06, 16 functions)
Baud rate	2400 / 4800 / 9600 / 19200 baud
Probes ID	01/99 (B&C protocol) 01/243 (Modbus protocol)
Probes network	32 max.
Operating temperature	60 °C max.
Operating pressure	6 bar at 25 °C (TU 8525) 1 bar at 25 °C (TU 8325)
Dimensions TU 8525	L=143 mm, D=40 mm
Dimensions TU 8325	L=165 mm, D=60 mm
Weight TU 8525	Body 160 g, cable 640 g
Weight TU 8325	Body 420 g, cable 640 g
Body	PVC-C (TU 8525.5 model in PVDF is available)
Cable	10 m (100 m max.), PVC sheath
Protection	IP 68

TU 8355 & TU 8555

Suspended Solids Sensors

These unique sensors have been designed to measure high Turbidity and Suspended Solids based on back scattering technology. The sensors are available for submersible and in-pipe installations.

The measuring system consists of:

- Infrared light source
- Detector of scattered light by suspended particles
- Detector of the clean lens status
- 2-wire 4/20 mA analog output
- Modbus Output
- Nozzle for the autoclean by external pressured air (TU 8355)

Principle of operation

The Turbidity and suspended solid measurement follows the back scattering method. A light beam is sent in the sample through an optical lens. The back scattered light by suspended particle is collected by the sensor through a second lens, detected and converted in an electric signal proportional to the Turbidity of the sample. The probe uses an infrared light and the measuring is not affected by the color of the sample.

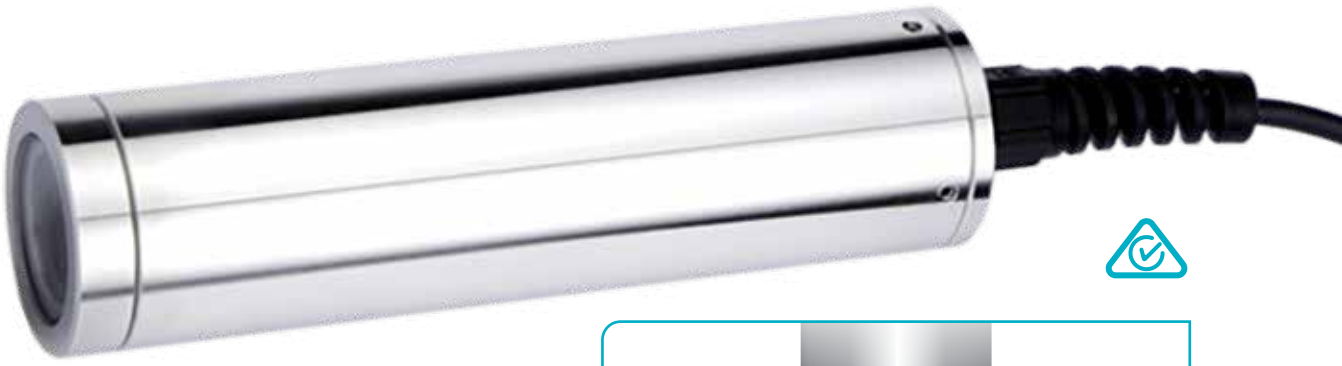
TU 8355

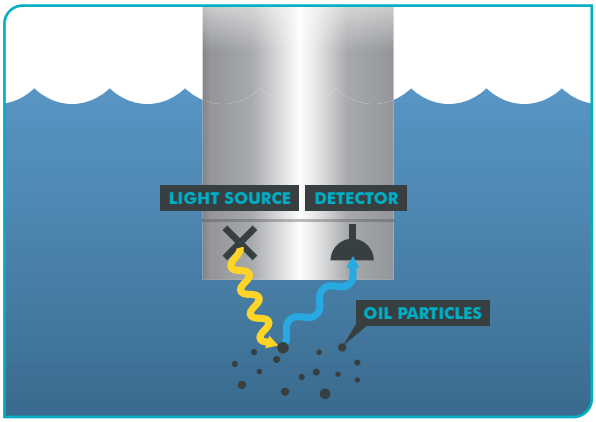
TU 910

TU 8555

Technical Specifications

Turbidity ranges	0/100.0 – 0/1000 – 0/10000 FTU
TSS/FTU factor	0.010 ÷ 10.000
TSS unit measure	%, ppt, ppm, ppb, g/l, mg/l, µg/l
Scalability factor 4/20 mA	10/100 %
Sensitivity	70/130 %
Zero	± 10 FTU all scales
Resolution	0.001 FTU
Power supply	9/36 VDC
Accuracy	0.2 % of the full-scale selected
Repeatability	0.1%
Non-linearity	0.1 %
Check signal	0/200.0 %
Load	600 Ohm max. a 24 Vdc
Digital output	RS 485 isolated
Temperature limit	50 °C
Dual filter software	2/220 seconds
Current loop	4/20 mA isolated
Protocols	B&C ASCII e Modbus RTU (03, 06, 16 functions)
Baud rate	2400 / 4800 / 9600 / 19200 baud
Probes ID	01/99 (B&C protocol) 01/243 (Modbus protocol)
Probes network	32 max.
Operating temperature	60 °C max.
Operating pressure	6 bar at 25 °C (TU 8555) 1 bar at 25 °C (TU 8355)
Dimensions TU 8355	L=165 mm, D= 60 mm
Dimensions TU 8555	L=143 mm, D=40 mm
Weight TU 8355	Body 420 g, cable 640 g
Weight TU 8555	Body 160 g, cable 640 g
Body	PVC-C (TU 8555.5 model in PVDF is available)
Cable	10 m (100 m max.), PVC sheath
Protection	IP 68





BlueTrace

Oil in Water Sensor

Fluorescence Sensor for Refined Oils/BTEX

When light of a certain wavelength hits an oil particle, the oil emits light of a different wavelength shortly after excitation. This effect is called fluorescence.

Fluorescence occurs not only in oils, but also in other substances. The BlueTrace oil in water sensor uses this effect to determine the concentration of refined oils in water.

A transmitter installed in the sensor emits light at around 280 nm. The oil particles in the water absorb this energy and then emit light in a range from 300 to 400 nm. This light is measured by a detector.

The Jablonski diagram shows the fluorescence effect in detail. The oil particle absorbs the energy of the light, changes to a higher, unstable energy level and then falls back to the lower energy level. Part of the energy is released by the fluorescence effect. The intensity of the fluorescence is directly dependent on the concentration (see equation). By measuring the intensity at the detector, the concentration of the oil in the water can be determined.

Fluorescence spectral data

There is no universal fluorescence spectrum for all oils. Rather, the spectrum depends on the composition of the oil. Refined oils consist mainly of aromatic hydrocarbons, which in solution in water are often indicated in the BTEX collection parameter. There is a graph available that shows examples for typical fluorescence spectra of some refined oils. The BlueTrace oil in water sensor is suitable for the measurement of refined oils, BTEX and aromatic hydrocarbons.

Features & Benefits

- **Easy calibration:** The BlueTrace can easily be optimally calibrated to the specific application. All you have to do is hold the sensor in the prepared samples and then perform a multi-point calibration.
- **Selectable Measuring Range:** The sensitivity of the receiver can easily be changed either directly on the controllers of GO Systemelektronik, or with the help of the freely available PC program.
- **Modbus Interface:** The BlueTrace features a Modbus RTU interface. This means that the sensor can not only be connected to a GO Systemelektronik controller, but can also be integrated into third-party controllers or directly to a PLC.
- **Robust Design:** Settings or calibrations are stored directly on the sensor and can be adapted with the freely available PC program.

Applications

- **Wastewater:** Influent of WWTP, Monitoring of wastewater of industrial plants
- **Drinking Water:** Influent of dirnking water plants, Influent to desalination plants
- **Environmental Monitoring:** Detection of contamination, Maritime applications
- **Process Monitoring:** Cooling water, Leakage detection

BlueTrace

Turbidity Sensor (ISO 7027)

The BlueTrace - Turbidity Sensor is a compact probe for the measurement of Turbidity, Total Suspended Solids (TSS) and Temperature in water. The sensor works according to the scattered light measuring prin- ciple and features an integrated temperature compensation.

Applications

- Drinking Water
  - Quality control
  - Alarm systems
- Wastewater
  - Effluent monitoring
  - Trend analysis
  - Early detection of discharge
- Process Measurement & Control Technology
  - Process monitoring in industrial facilities
  - Control of process water treatment
  - Process optimization
- Environmental Monitoring
  - River water
  - Surface water

Parameters

- Turbidity (FNU)
- Total Suspended Solids (TSS)
- Temperature

Functions & Features

- Adaptable measuring range
- Integrated TSS estimation
- 90 degree scattered light
- Temperature compensation
- Easy calibration
- Robust & non-corrosive

Technical Specifications

Power supply	10 - 32 V DC
Power consumption (typical)	0.5 W
Light source	860 nm
Material	Stainless steel 1.4404 / Titanium [optional]
Operation temperature range	-5 °C to +55 °C
Weight	0.6 kg
Dimensions	Length 146.1 mm; Ø 36 mm
Maximum pressure	6 bar
Interface	Modbus [RTU]
Measuring principle	90° scattered light
Measuring range (Turbidity)	0 - 50 / 100 / 1000 / 4000 FNU
Measuring range (TSS)	0 - 5 g/l
Measuring range (Temperature)	0 - 60 °C
Measuring accuracy (typical)	3 % FS
Detection limit (typical)	0.1 FNU
Measuring interval	≥ 1 s

Multi Parameter Probes

Analysis of liquids

Designed for multiparamater analysis of liquids, our probes are the result of 40 years of expertise in the field of electrochemical measurement.

The various available models allow to measure the following:

- Depth
- Temperature
- E. Conductivity
- pH
- O.R.P.
- Dissolved Oxygen (optical or polarographic)
- Turbidity (option)
- ISE (option)

The probes provide the measures in digital format with standard protocols. Data transmission has been made as flexible as possible, allowing Customers to use B&C Electronics connecting software, or their own software, or any standard data analysis software.

- Environmental monitoring
- Undergroud water
- Rivers, lakes and sea monitoring
- Waste water treatments
- Fish farming supervision
- Depth profile analysis
- Boreholes and wells

Benefits

- Up to 7 parameters
- Max. depth 350 meters
- Easy to replace sensors
- Internal or external power supply
- Managing software
- Wide range of models

Models

SA 8060.101: Model with 6 sensors: Depth, Temperature, E. Conductivity, pH, ORP, D. Oxygen. Max depth 20 m, data logger and internal battery.

SA 8060.104: Model with 6 sensors: Depth, Temperature, E. Conductivity, pH, ORP, D. Oxygen. Max depth 350 m, data logger and internal battery.

SA 8065.101: Model with 6 sensors: Depth, Temperature, E. Conductivity, pH, ORP, D. Oxygen. Max depth 20 m, without data logger, external power supply.

SA 8065.104: Model with 6 sensors: Depth, Temperature, E. Conductivity, pH, ORP, D. Oxygen. Max depth 350 m, without data logger, external power supply.

SA 8265.106: Model with 6 sensors: Depth, Temperature, E.Conductivity, pH, ORP, D. Oxygen. With differential pressure sensor for atmospheric pressure compensation, sealed cable, without data logger, external power supply. Max depth: 20 m

Options

091.181: Option Turbidity. Scale 0/4000.0 NTU

091.161: Option Optical Dissolved Oxigen.

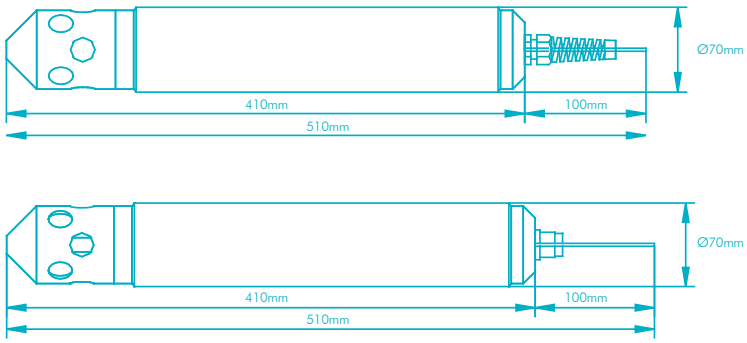
ISE OPTION: NH4+ , Cl-, others on request

PROTOCOL OPTION: MODBUS

NON STANDARD MODELS: B&C offers the possibility to have custom models, with only certain parameters and cables up to 100 meters.

Accessories

- SA 8000 Connecting software
- To be installed on the P.C. for the following functions:
- Connection to sites and probes in network
- Continuous data and messages display
- Storage and printing of data



- Sensor calibration
- Operation mode programming of the probe (time or depth based data logging)
- Data transfer from the data logger of the probe
- Transfer of the sensors calibration parameter stored in the probe
- Graphics and data analysis.

Measures and Data Managing

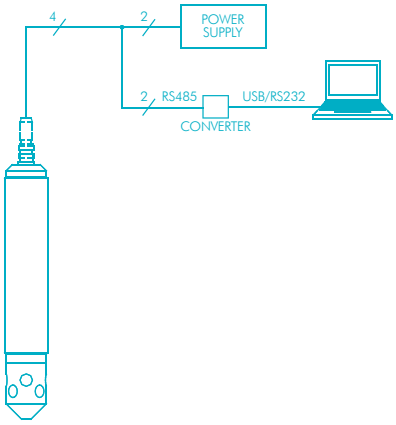
The new SA8000 software release has been developed to work with Windows and Internet Explorer. When the probe is connected to a PC, he user-friendly and intuitive software allows for calibration of all installed sensors, to download data and print graphs. Furthermore, the graphic interface has an Help menu that links the user to specific chapter of Instruction Manual.

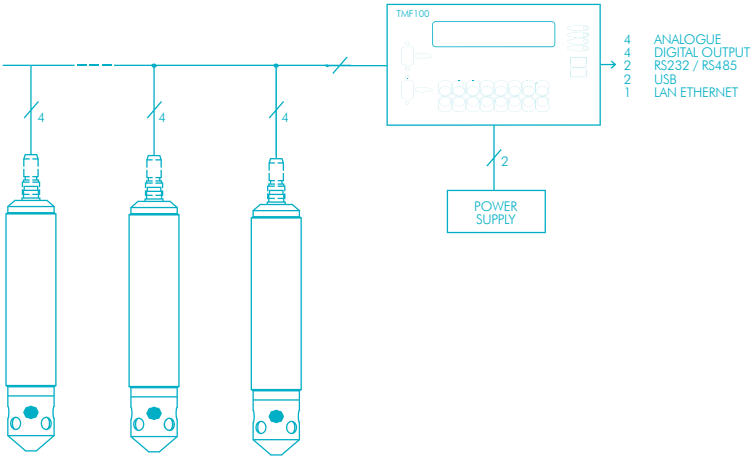
WQM System

For more complex installations and monitoring applications, with more than one measuring points, the TMF data logger allows to connect up to 10 probes on an RS385 line. The system can be programmed to acquire data from each probe and to send them via FTP to various Acquisition and Monitoring Centers It is also possible to send alarms or relay activations via SMS to a list of mobile phones.

Technical Specifications

Level	0/20.000 m (SA806x.101and SA8265.106) 0/350.00 m max. (SA806x.104)
Temperature	-5.00/+55.00 °C
Conductivity	0/6.000 mS autorange / 0/60.000 mS
Temperature Coefficient	0/3.50 %/°C
Reference Temperature	0/14.000 pH
pH	10/30 °C
Redox	± 1100.0 mV
Dissolved Oxygen	0/200.00 mmHg / 0/200.00 %air / 0/20.000 ppm / 0/20.000 mg/l
Secondary parameters	**Pressure /** 500/800 mmHg
	Salinity / 0/60000 ppm
	Relative Humidity / 0/100 %
Power supply	**Models with built-in data logger /** Ni/Cd rechargeable 1800 mAh
	Models without data logger / External 9/14 Vdc - 60mA
Interface	serial RS485 - ASCII Protocol
Operating Pressure	35 bar max.
Material	PVC
Length	510 mm
Diameter	70 mm max.
Weight	X
Weight	2 kg max.
Connector	IP 68 oceanographic





ChemScan MPX4 Multiparameter Sonde

Cost-effective multiprobe with portable wireless data

The ChemScan MPX4 is a cost effective multiprobe that integrates with plant control systems for long term installation using a local controller, direct connection or wireless telemetry. The probe can also be used for spot checking utilising Bluetooth data collection.

With interchangeable sensors, the probe replaces multiple instruments reducing overall monitoring costs. Highly stable sensors require minimal maintenace and calibration.

Benefits

Reduces monitoring costs: With ultra-stable sensors that minimise calibration and maintenance needs, the multiprobe reduces total cost of ownernship.

Saves hours on fieldwork: The VuSitu mobile app records data directly from the probe for spot checks. Interfaces with ChemScan Control Point providing local display and connection to plant control system. Telemetry integration with HydroVu platform provides realtime access to remote monitoring data.

Delivers higher quality data: Drift-resistant sensors with simplified calibration provde accurate, reliable data - no messy field notebooks required.

When using the instrument as a handheld, our mobile app walks you through SOPs to minimise errors. Rugged design with optional antifouling wiper ensures performance in harsh environments for longer deployments.

Ease of use: Streamlined data collection and automatic environmental compensation mean zero-processing, while our mobile app lets you tag sites and track GPS coordinates.

Features

- Interchangeable sensor, wet-mateable
- Optional 2" antifouling wiper for higher quality data in long-term deployment
- Wireless moble Bluetooth® connection for iOS/ Android (UvSitu app), and Win-Situ 5 for laptop
- Site tagging and GPS coordinates functions available via app
- LCD display gives snapshot of instruments health and connectivity
- Wide sensor range for performance in a variety of applications
- Automatic environmental compensation - no data post processing

Parameters

ChemScan
An In-Situ Brand

ChemScan Control Point 2.0 Monitor
Interfaces with all ChemScan family sensors. Systems can be created by the use of expansion boxes.

- Temperature/Conductivity
- Pressure
- Level
- Salinity
- pH/ORP
- Nitrate (NO3-)
- Rhodamine WT Fluorescence Intensity
- Ammonium (NH4+)
- Chloride (Cl-)
- Turbidity
- Total Suspended Solids
- Dissolved Oxygen (RDO)
- Blue Green AlgaePhycocerythrin
- Easy integration with PLC/SCADA control systems, data loggers, and telemetry - no adaptors or confusing communication protocols
- Redesigned pH and ISE reference for 3X sensor stability
- Corrosion-resistant housing and abrasion-resistant RDO sensor
- Compatible with Low-Flow system (sold seperately)

Applications

- Long-term drinking water and wastewater process monitoring

Technical Specifications

Operating Temp. (Non-Freezing)	-5 to 50°C (23 to 122°F) ISE: Ammonium and Nitrate 0 - 40°C, Chloride 0 - 50°C
Storage Temp.	Components Without Fluid -40°C to + 65°C (Non Freezing Water) pH/ORP Sensors -5°C to +65°C Ammonium/Nitrate: 0 - 40°C Chloride: 0 - 50°C
Dimensions	Length: 46 cm (includes connector). With bail: 59 cm / Diameter: 4.7 cm
Weight	0.978 kg (includes instrument, sensors, restrictor and bumpers)
Wetted Materials	0.050, 1.3 mm
Environmental Rating	IP68 with all sensors and cable attached IP67 without the sensors or cable attached
Max Pressure Rating	Up to 150 PSI Ammonium/Nitrate up to 30PSI
Output Options	RS-485/MODBUS, SDI-12, Bluetooth, 4-20 mA, Control Point 2.0
External Power Voltage	8-36 VDC; Required for normal operation Sleep: < 0.2 mA typical; Measurement: 40 mA typical, 75 mA Max
Internal Memory & Data Logging	Control Point 2.0 or telemetry
Reading Rates	1 reading every 2 seconds
Communication Device	Wireless TROLL Com, Control Point 2.0
Certifications	CE, FCC, WEEE, RoHS Compliant

RWT S73D

Submersible MLSS Sensor

The Australian designed and built S73D submersible sensor has been optimised for measuring mix liquor suspended solids (MLSS) in aeration basins commonly found in biological wastewater treatment plants.

The sensor can be mounted in your process via a hand rail mount, as seen in the diagram, or by chain/cable suspended vertically into the tank.

It also has an in-built nozzle for automatic air or water cleaning. Minimising the requirement for mechanical cleaning by maintenance staff.

The RWT S73D comes with a base calibration from the factory. However, It can be calibrated to your laboratory MLSS test when combined with a MXD73/75.

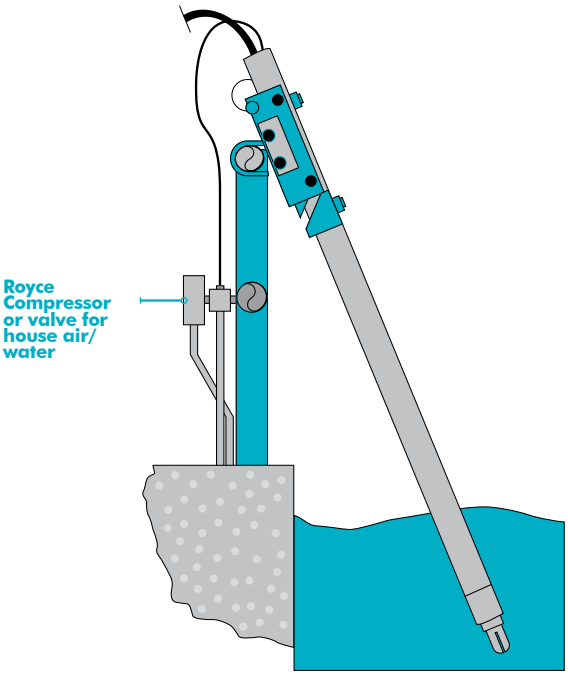
While the sensor is commonly used for continuous measurement of suspended solids in aeration basins the S73D it is not limited to this application. Other applications include return sludge lines and pits, SBR systems, primary clarifier effluent and wastewater monitoring for industrial plants.

Features

- Inbuilt air/water jet cleaning - compressed air or town water supply
- Pressure - up to 4 bar
- Made from PVC, so no corrosion as with aluminium or stainless steel sensors
- Would you like MLSS with your DO? RWT S73D can be retrofitted into existing MXD73/75 analysers.

Technical Specifications

Type	Single Gap, Optical; self cleaning
Range	0 - 20,000 mg/l
Accuracy	± 0.5% of FS reading or ± 100 mg/l, whichever is greater
Repeatability	±1% of reading or ± 20 mg/l, whichever is greater
Operating Limits	Temperature: 0 - 50°C
Pressure	0 - 4bar
Dimensions	Ø = 60mm, L= 110mm
Material	PVC



These sensors can be used with MXD73/75 Analyser on page 6

RWT S73P

In Pipe Low Range TSS Sensor

The Australian designed and built S73P In Pipe Low Range TSS Sensor has the same technical specifications as our S73D MLSS Sensor used in Waste Water Treatment Plant Aeration Basins.

The RWT S73P Sensor can be mounted directly into a pipe via a taping band or weld in socket arrangement.

It also has an in-built nozzle for automatic air or water thus minimising the requirement for mechanical cleaning by maintenance staff. The RWT S73P comes with a base calibration from the factory. However, it can be calibrated to your laboratory sample test when combined with a MXD73/75.

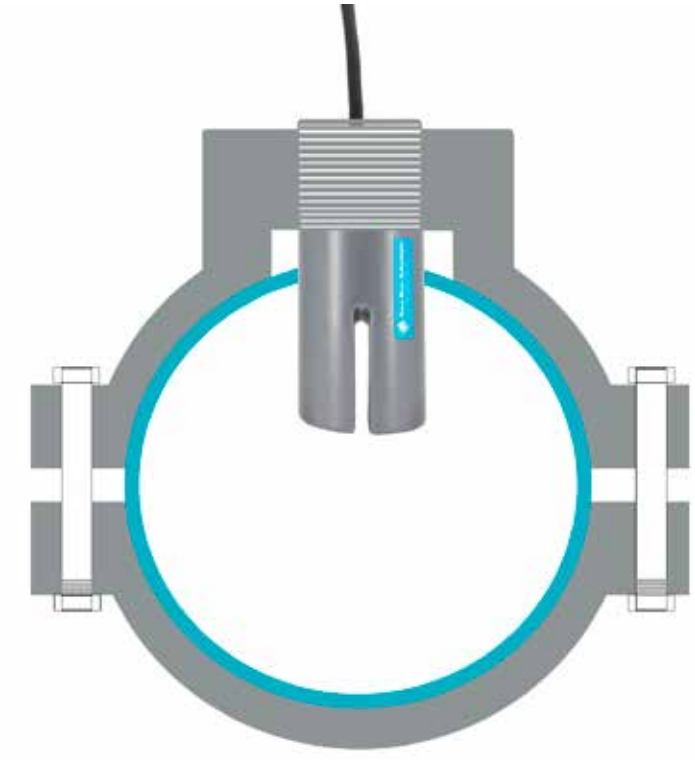
Applications include return sludge lines and pits, SBR systems, primary clarifier effluent and wastewater monitoring for industrial plants.

Features

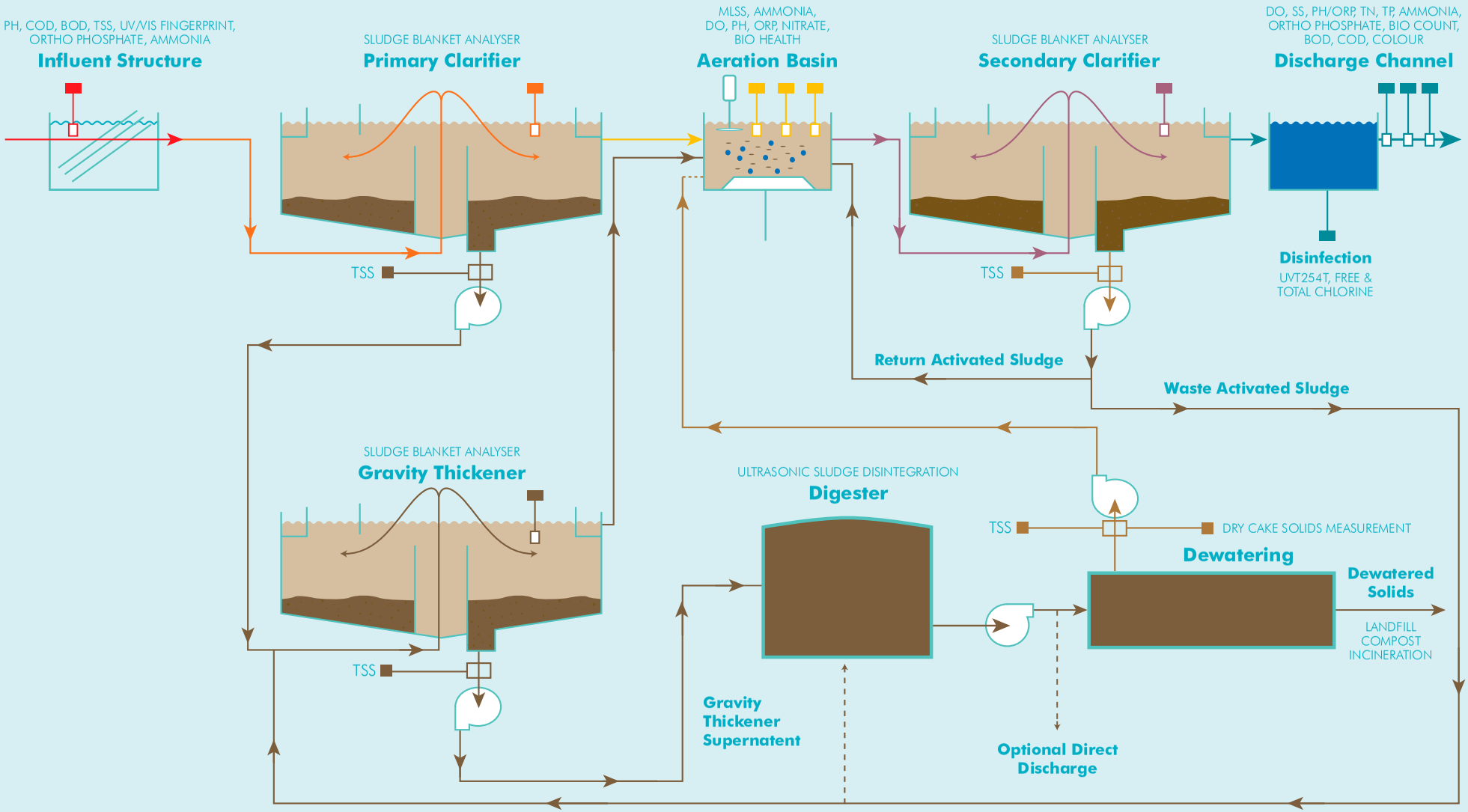
- Range 0 - 18,000mg/L
- Accuracy - better than 2% of range
- Repeatability - +/- 1% of range
- Air/water cleaning available
- Inbuilt air/water jet cleaning - compressed air or town water supply

TECHNICAL SPECIFICATIONS

Type	Single Gap, Optical; self cleaning
Range	0 - 18,000 mg/l
Accuracy	± 0.5% of FS reading or ± 100 mg/l, whichever is greater
Repeatability	±1% of reading or ± 20 mg/l, whichever is greater
Operating Limits	Temperature: 0 - 50°C
Pressure	0 - 3bar
Dimensions	Ø = 60mm, L= 600mm
Material	PVC



Process Control Instrumentation at a Wastewater Treatment Plant



ENV200

Ultrasonic Sludge Density Meter

The ENV200 is an ultrasonic instrument that measures the density of suspended solid in liquid. It comprises of sensors, a controller, and a junction box. ENV200 with PCM(Process Condition Monitoring) algorithm measures not only the size of received signal, which is often measured by conventional ultrasonic density meters but also observes changes in sound velocity and temperatures in the process. As it monitors operational status and water status in pipe and then decides the validity of each measurement, it contributes to increasing stability and reliability of the measurement.

The ENV200 utilises the EEA (Envelope Energy Average) method that saves reception signal envelop and then calculates its energy, rather than using the reception signal's amplitude change. ENV200 offers three types of sensors, such as spool-piece, tank-mount, and Clamp-on type to accommodate all field demands at installation.

Features

- Continuous and real-time measurement
- Reliable signal control EEAM(Envelope Energy Average Method) algorithm
- Various types of sensors to accommodate all field demands at installation
- Offer several density units, %, g/l, ppm, kg/m^3, g/cm^3
- Maximum 400 days data logging and monitoring
- In-situ measurement and calibration

Applications

- Water / Wastewater Treatment
- Pulp and Paper
- Food and Beverage
- Power Plant
- Chemical
- Mining

Measuring Algorithm

EEAM

Conventional ultrasonic attenuation density meter just determines density with amplitude of received signals. Unlike this, ENV200 is able to measure changes of concentration in a more sophisticated manner by adopting the patented EEAM (envelope energy averaging method), which measures not only the amplitude of received signals but also observes the shape of signal. It takes all energy as envelope and then convert it into density

PCM (Process Condition Monitoring)

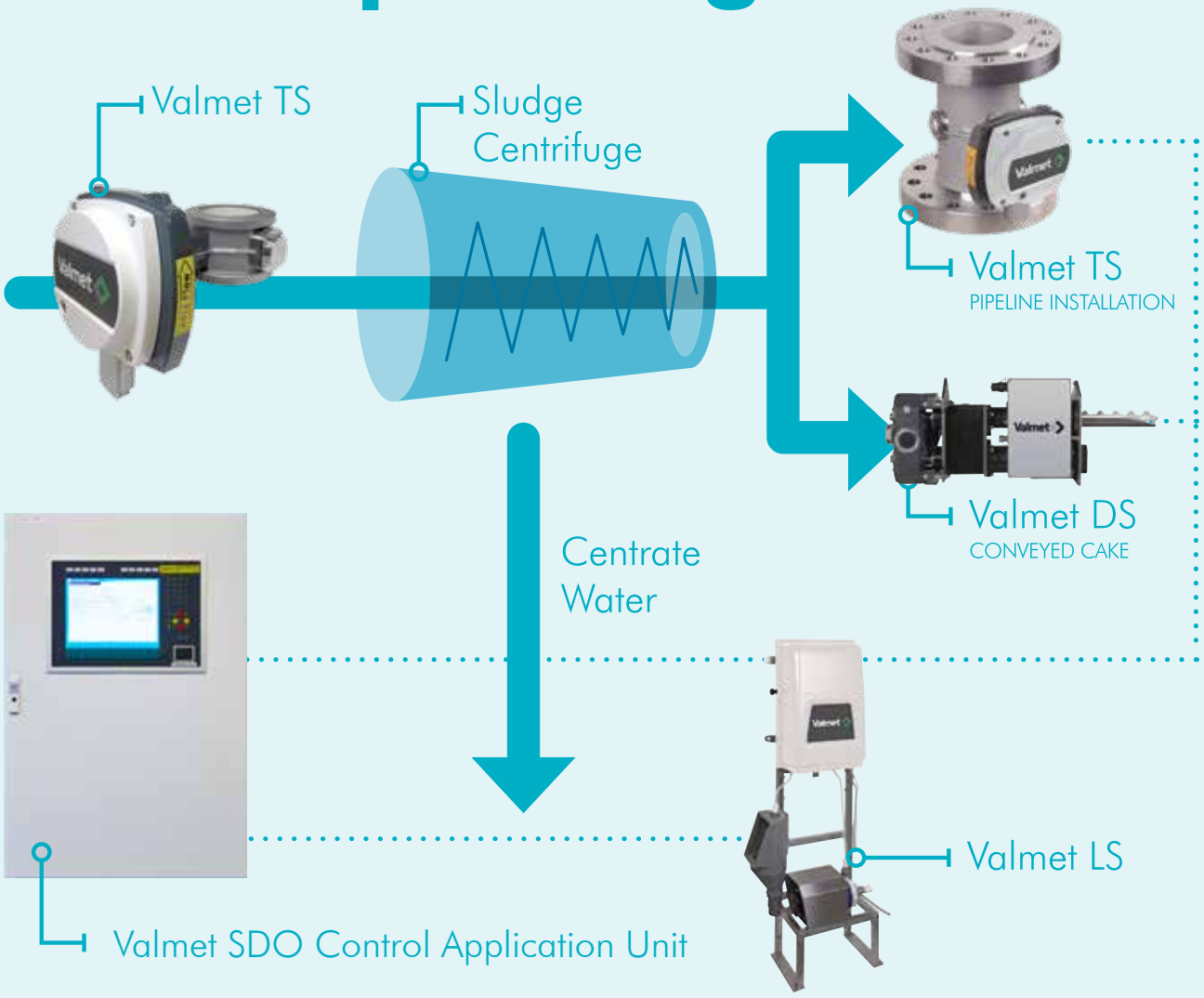
PCM algorithm consists of SOS filter that measures sound velocity of measuring fluid (S.S. mixed water); temp filter that measures temperature; and signal filter that monitors quality of received signals. Operational status (process run/stop, pipe full/empty) is determined by the combination of SOS filter and Temp filter. Signal filter helps to decide the valid S.S. distribution.

Since the PCM algorithm assimilates many measurements identifying changes of process condition (water status in pipe, and S.S. distribution pattern), its intelligence is designed to measure only valid S.S. concentration. Consequently, the performance is much more reliable and accurate, compare to conventional measurement.

Technical Specifications

Measuring Principle	Ultrasonic Attenuation and EEAM(Envelope Energy Average Method)
Measuring Range	STD. 0 ~ 200,000mg/l (0~20%) OPT. 0 ~ 400,000mg/l (0~40%)
Resolution	0.1% or 0.01% (Selectable)
Measuring Mode	Process Mode, Real-time Mode
Accuracy	+/- 1% of F.S.
Repeatability	+/-1% of reading
Operating Temp.	-20 ~ +70°C
Outputs	Current : 4~20mA, nom. Load 250Ω (load range : 100 ~ 750Ω) Relay : 3 SPDT(5A, 250VAC) –"ER" "R1" "R2" Digital: RS232(STD.), RS485(Option)
Power Supply	STD. 100 ~ 240V AC, 50~60Hz, ≤6W OPT.1 10 ~ 14VDC, OPT.2 22 ~ 26VDC
Enclosure Material	Polycarbonate
Dimension	252(W) x 238(H) x 124(D)mm
Mounting	Hole center 152(W) x 236(H) mm (Ø8 x 4ea)
Weight	2.2 kg
IP Rating	IP67

Effective Management of Sludge Reduces Capital & Operating Costs



Notable savings in energy

Microwave transmitters have given excellent results in the total solids and polymer measurement of wastewater plants. The achieved energy savings alone are enough to ensure a short investment payback period, ranging from a few weeks to a few months according to the size of the plant.

Valmet TS

Microwave Solids Sensor

For more than ten years Valmet's microwavebased solid content transmitters have been used in the process industry for highly demanding applications. Valmet TS has been developed from third generation microwave solids transmitters, combining cost-efficiency with the extreme accuracy of microwave technology. The new transmitter meets the needs of wastewater treatment plants – with no compromises in accuracy. The 500 references in global waste water industry speak for the excellence.

Applications

Sludge pumping from primary & secondary sedimentations / Feed to Thickening: Sludge pumping control based on reliable total solids measurement, and thus optimising sludge quality early on in the process, is vital for the whole sludge handling procedure.

Digester feed: Maintaining a high, optimised total solids content in the sludge entering the digesters helps to achieve better process control and significant savings. Sludge digestion time can be increased to produce more biogas.

Dewatering: Significant savings can be achieved through better dewatering control: a reliable total solids measurement helps to optimise polymer dosing and thus reduce polymer costs.

Dry Cake: The Valmet TS can be installed in the feed line to the incinerator, immediately after the sludge cake pump.

Benefits

- Lower energy consumption in dewatering, better utilisation rate in energy production
- Higher pumping capacity means higher water processing volumes and helps to postpone investments
- Better utilisation of solids transportation capacity
- Lower polymer onsumption
- Highly efficient use of dewatering centrifuges
- Less laboratory analysis
- Provides higher solids content in sludge

Technical Specifications

Measuring range	0 – 40 % TS. If more than 16 % TS
Repeatability	±0.01%Cs
Sensitivity	0.001 %Cs
Damping	1 to 99 s
Ambient temperature	–20…+70 °C (–4…+158 °F), protect from direct heat radiation
Sensor sizes:	PN16 DN50, 80, 100, 150, 200, 250, 300 PN 100 DN100, 150, 200
ATEX Certificate	No. VTT 12 ATEX 058X, II 3G Ex nR IIC T6 Gc
Options	Glass-lined versions available
Enclosure class	IP 65 (NEMA 4)
Operating voltage	90…260 VAC / 0.1 A
Wetted materials	WFT sensors AISI 316, AISI 316L, Ceramic gasket EPDM, Simrit 483
Current output	Total solids 4 – 20 mA + HART® 18 to 35 VDC
Secondary output	Process temperature/Conductivity 4 – 20 mA 18 – 35 VDC
Binary inputs	2 inputs, isolated 12 – 48 VDC
Communication	PC-connection RS-232 PROFIBUS PA Support for Valmet FieldCare
pH-range	2.5 – 11.5
Process temperature	0…+100 °C (+32…+212 °F)
Operating pressure	Recommended minimum process pressure >1.5 bar (22 psi), No entrained air. If less than1.5 bar (22 psi), please consult Royce Water Technologies.
Vibration max.	20 m/s2, 10 – 200 Hz
Pressure rating	PN16 bar (232 psi) standard. PN100 bar (1440 psi) option for FT100/150/200 (4"/6"/8") sensors

Valmet DS

Post De-Watering Dry Cake Solids Measurement

Solids measurement of dried wastewater sludge (dry cake) at waste water treatment plants contributes to significant savings in polymer dosage, energy and dewatered solids transportation.

Valmet dry solids measurement (Valmet DS) utilizes microwave technology, requiring no special certification or safety procedures, to make a stable and accurate solids measurement for dewatering control in waste water treatment. DS extracts a continuous sample from the falling cake flow after a centrifuge or screw press and measures the solid content before returning the sample back to the process.

Feedback control using the accurate dry solids measurement provided by DS can fully optimize polymer dosage and provide energy savings through better torque control of the centrifuge.

Maximizing drying efficiency to a target dry cake solids content can provide additional savings with reduced transportation costs and improved power boiler combustion.

- Reliable screw based sampling
- Solids range of 15–35 %
- Built-in calibration routine
- Industrial Internet remote access

In addition to full remote access of DS functions, measurement data, alarms and diagnostics via the Industrial Internet, the Valmet DS Ethernet connection can be used for local control with a laptop or tablet computer during commissioning.

Operation

Valmet DS is typically located in the downfall section of the dry cake. A sample retrieval screw feeds a return screw which compresses and pushes the sample through the microwave sensor chamber before being returned to the process. The DS measurement is based on multivariable microwave resonance, compensated for varations in material temperature and calibrated during commissioning with samples taken from the screw and oven dried.

Continuous stable measurements

The necessity for time-consuming manual laboratory measurements can be significantly reduced with Valmet DS. Also, uniquely to Valmet DS's measurement technology, the sample is extracted from falling cake flow after a centrifuge or screw press, before returning the sample material back to the process. Continuous measurements mean the results can be immediately utilized without needless delay from manual sampling and laboratory analysis. This offers better feedback control and real-time assessment of dewatering efficiency.

The solutions to trust

Valmet's measurement and automation solutions perform, so your staff and resources can be better focused on reaching your business goals. We have the experience and know-how in technology to give your plant measurable results, when you need them – bringing significant savings and a speedy return on investment for your business.

Benefits

- Minimised transportation costs of dry cake
- Optimised polymer dosage and torque of the centrifuge
- Reduced fuel consumption at combustion plant
- Optimization of total solids value of dry cake
- Better oversight of dewatering and process efficiency

Features

- 100% safe microwave technology
- Up to 25% or more polymer reduction

Technical Specifications

Sensor material	Ceramics / Body Aisi 317L
Measuring range	15…35 % Solids-%
Material measured	Material measured Municipal dried wastewater (sewage) cake
Temperature-range	+0…65 °C
Repeatability	0,01 %
Resolution	0,001 %
Mill system interface	4…20 mA, Ethernet
Power	24 VDC (measuring elecronics) 3 phase AC (sample screws)*
IP-classification	IP65

PROUDLY MADE IN AUSTRALIA

AQUAMETA™
Easy water tank level display and control

Hydrostatic Level Sensors

Aquameta - Australian Made

The 420 series of 4-20mA pressure transducers are a cost effective and robust solution designed for continuous water level measurement where a 4-20mA output is required. It may be used with other liquids that are compatible with its wetting materials which are UPVC, Nitrile and Aluminum Oxide. Different choice of seals is available for other applications. The sensor includes temperature and barometric pressure compensation.

Transducer Construction

This state of the art pressure sensor uses a flush Aluminum Oxide Ceramic diaphragm in conjunction with on-board signal conditioning to measure pressures. Pressure and temperature calibration is done electronically with the internal applicationspecific integrated circuit (ASIC). When pressures and temperatures change, the electronics provide an offset and span correction. It also includes aging detection and compensation. This new method guarantees good precision and long term stability. The sensor is encapsulated in a UPVC body that is filled with an epoxy. The sensor cable is molded into the transducer eliminating problems associated with threaded plugs. This design ensures a very high level of reliability.

Output Signals

The 420 transducer uses a two wire 4-20mA output signal. The signal is linear with pressure. The sensor will operate with a supply voltage that can range from 9V to 30V DC. The Aquameta Junction box may be used to extend the transducer cable with any other cable. The vented junction box has a Gortex covered opening that allows venting to atmosphere to take place whilst restricting the ingress of moisture.

Features

- 4-20mA output
- Power Supply 9 to 30V DC
- Temperature compensated
- Barometric pressure compensation via vented cable
- High linearity and low hysteresis values
- EMI Certified
- Excellent resistance to corrosion and abrasion
- Automated offset and span correction
- Age compensation

Applications

- Dams
- Resevoirs
- Storage Tanks

This sensor can be used with BXD17 controller on page 10

Technical Specifications Aquameta Sensors

For the entire range of Hydrostatic Sensors visit www.roycewater.com.au

Part #	Description	Medium	Pressure Range	Power Supply	Output	Medium Temp.	Accuracy	Cable Length
PF420-x. xVPU	Hydrostatic level sensor, semi-flush face with standard PVC cable	General water and wastewater sensor	0.5, 5.0, 10.0 bar	9 - 30 VDC	4-20 mA	-25/+65[°C]	+/- 0.5% FSO	10.0 m Custom available
PF420-x. xEPU	Hydrostatic level sensor, semi-flush face with standard PVC cable	Sodium Hydroxide	0.5, 5.0, 10.0 bar	9 - 30 VDC	4-20 mA	-25/+65[°C]	+/- 0.5% FSO	10.0 m Custom available
CR420-x. xVFU	Hydrostatic diesel level sensor	Compatible with its wetting materials which are Acetyl, Viton, FEP and Aluminum Oxide	0.5, 5.0, 10.0 bar	9 - 30 VDC	4-20 mA	-25/+65[°C]	+/- 0.5% FSO	2.0 m Custom available
CR420-x. xVPU	Hydrostatic level sensor for salt and chlorinated water	Compatible with its wetting materials which are UPVC, Viton and Aluminum Oxide	0.5, 5.0, 10.0 bar	9 - 30 VDC	4-20 mA	0/+65[°C]	+/- 0.5% FSO	10.0 m Custom available

ENV120

Ultrasonic Sludge Blanket Monitoring System

The ENV120 Ultrasonic Sludge Blanket Level Meter, utilises enhanced ultrasonic technology to measure the sludge interface level in various types of clarifiers, settling tanks and thickeners with superior accuracy and reliability.

The instrument continuously provides the user with important information which includes numeric and graphic screens representing the distance to the blanket, an echo profile image to ensure correct configuration during commissioning and saved data analysis. Additional features such as ASF (Abnormal Signal Filter), allows elimination of irregular field noise which can result from moving structures intermittently obscuring the signal. The ENV120 technology additionally incorporates a compressed air cleaning system to maintain the sensor in optimum condition and guarantee maintenance-free measurement. Specially designed mounting kits are also available.

ENV120 FEATURES

- Continuous and Real-time Measurement
- 4 Sensors Measurement with One Controller Enables Economic Operation
- Maximum 400 Days Data Logging and Monitoring
- Wireless Option Avoids Cabling Cost
- Automatic Sensor Cleaning Guarantee Maintenance-free Measurement
- Built-in Unique Algorithm Eliminates Stationary and Moving Structures
- Free WESSWARE Software Enables Field Data Analysis and Menu Setup

APPLICATIONS

The ENV120 is designed to monitor the levels of solid contents (sludge) in various types of liquids (water, liquor, etc.), to control the pumps engaged in the processes, and to initiate events based on measured process conditions.

SOME APPLICATIONS

- Water & wastewater treatment clarifiers
- Water & wastewater gravity & DAF thickeners
- Raw water clarifiers
- Sumps, lagoons, settling ponds
- Industrial process thickeners
- Salt brine tanks
- Material inventory tanks
- Process thickeners

PRODUCT FEATURES

1. VARIOUS SCREENS: The instrument continuously provides the user with important information which includes numeric and graphic screens representing sludge level, current output, temperature, and an echo profile image to ensure correct configuration.

2. HIGH TEMPERATURE SENSOR & CHEMICAL RESISTANCE SENSOR

3. LIGHT SLUDGE LEVEL MEASUREMENT: The ENV120 is designed to measure not only heavy sludge (above 2,000mg/l) but light sludge at a drinking water sedimentation tank by selecting type of sludge from a menu section.

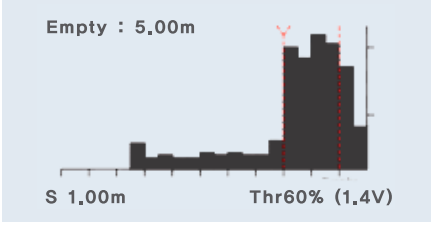
4. DATA ANALYSIS SOFTWARE: Free WESSWARE that can analyze the logged data and download the set parameters.

5. WIRELESS BLUETOOTH MODULE(WESS-RF): WESS-RF is a Bluetooth based wireless data communication system consisting of a master and a transmitter module. This system can be applied along with a controlling part of our measuring instruments such as ultrasonic sludge blanket level meter, density meter, level meter, etc. The WESS-RF system is normally used to reduce cabling cost and to apply where the bridge (walkway) moves. The WESS-RF offers not only mA output but also RS232 output.

Numeric

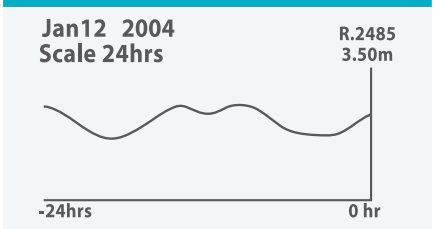
NUMERIC SCREEN
LEVEL, TEMPERATURE, CURRENT OUTPUT, TIME, ETC.

Echo Profile



ECHO SCREEN
SLURRY SETTLEMENT PROFILE

Trend Screen



DATA TREND SCREEN
LOGGED DATA TREND

OPTIONS

SWING BRACKET
The swing bracket is to secure skimmer passage at clarifiers. Once it has passed, the bracket is free to fall, re-immersing the sensor into the clarifier water by a damper. The swing bracket is needed when the rotating skimmer hits a sensor. It has limited guarantee period since it's mechanical device.

CLEANING UNIT
Periodical sensor cleaning is recommended as a precaution since floating debris and biological material are in contact with the ultrasonic sensor. The cleaning unit consists of a 10-meter length Ø6 air hose and an air compressor with terminal connection. The AC power source is given by a controller. For DC operation, additional power source or solenoid valve may be required for independent usage.

CABLE LENGTH
The standard cable length of sensor is 10m(33ft). To accept field requirements, the cable can be extended to 100m(330ft).

WIRELESS MODULE
The blue-tooth based wireless module is needed where additional cabling costs is much higher than wireless network. The communication range is maximum 200m at an open field. Since transceiver module is mounted inside of a controller, no additional enclosure is required for outdoor installation. The WESS-RF offers not only analog output but also RS232 output.

MOUNTING KITS
We offers several types of mounting kits, such as sensor mounting kit, controller mounting kit, and cleaning unit mounting kit.

DIGITAL COMMUNICATION
ENV120 provides RS232C digital communication as standard. RS485 and Profibus-DP are available as an option.

INSTALLATION

PROBE

Do not inflict impact or unnecessary external force on the probe during handling. The ultrasonic head, which transmits and receives sound waves, should be handled with extra care and stored wrapped in sponge or other soft materials to absorb the impact of an external blow.

Attach and secure the probe using the 3/4" PF male thread located on the upper section of the probe. Pipe length selection should be based on the lowest liquid level. The pipe's material should be chosen in consideration for material strength or application fluid characteristics. STS 304 20A, 10S pipe is the preferred choice in most applications. The cleaning air supply tube connects to the probe's one- touch fitting only if the cleaning device is used.

Position the probe at a location where the ultrasonic signal from the bottom of the pool or tank is not blocked by surrounding structures (agitator, pipe, etc.). Additionally, to ensure stable measurement, the probe should be positioned away from air bubbles and active floating solids resulting from sudden changes in velocity. For tank or rectangular pool applications, maintain at least 1m of separation distance from the wall to minimize interference and try to avoid a hopper area where the shape of sludge blanket varies upon pumping activity.

CONTROLLER

Protect the controller from impact and unnecessary external force until it is installed. Install the controller on a panel/handrail or wall using the mounting holes (Φ 8) located at the back of controller.
Located on the bottom of the controller are four cable glands the user can use selectively for his/her specific application. Each cable gland should be connected using a cable of correct diameter (Φ 4.5 ~ 10mm) to ensure IP67.

Most products generally use the direct cable connection method, in which stripped wires connect directly to a terminal block (TB). This makes for a difficult wiring process because of the sheer number of wires in a confined space.

ENV100, on the other hand, utilizes a new wiring method that uses an additional plug connector for the primary wiring and then it connects to TB stationed on PCB.

POWER, WIRING & CONNECTIONS

POWER REQUIREMENTS

AC 100 to 240V, 50/60Hz, <6W. Use copper conductors only. A user-supplied disconnect switch on a separate 15A circuit breaker should be located near the processor unit. Power line noise and interference are filtered by a built-in EMI filter.

PROBE WIRING

A 10m (33ft) of probe telemetry cable is supplied as standard. Contact your authorized distributor for extensions. The maximum length of cable extension is up to 100m (33ft) when authorized cable is in use.

USER CONNECTIONS

The controller supports up to 5 parts of connections. Connections include Probe, mA and Serial Outputs, Relay Output, Cleaning Device, and Power. The controller accommodates up to 5 parts of connections.

PROBE CONNECTION

Connect the five respective colored wires from the probe cable to a 5- position PHOENIX connector and then put it into the PCB board.

SERIAL COMMUNICATION

Serial communication (RS232/485) users may connect the serial wires to a 5-position PHOENIX connector and put it into the PCB board. The 5-position connector is composed of serial communication and analog output connections.

ANALOG OUTPUT

4 to 20mA current output users may connect the wires to a 5-position PHOENIX type connector and put it into the PCB Board.

RELAY OUTPUT

Relay users may connect the wires to a 9-position PHOENIX type connector and put it into the PCB board.

CLEANING DEVICE

The cleaning device is activated using the controller's power source. Connection is made using a 2-position PHOENIX connector. Use AC power.

POWER CONNECTION

An external power source (100 to 240V, 50 to 60Hz) activates the ENV100. Connection is made using a 3-position PHOENIX connector.

SPECIFICATIONS

CONTROLLERS

The control device has two types. One is for single measurement and the other is for multi measurements.

C1-S (1CHANNEL)
C1-M (4CHANNELS)

MODEL	C1-S	C1-M
Measuring Principle	Ultrasonic echo flight time	Ultrasonic echo flight time
Measuring Range	0.35~10m	0.35~10m
Resolution	1cm	1cm
Measuring Pulse	5~25 times/sec	5~25 times/sec
Measuring Density	Heavy/ Light	Heavy/ Light
Accuracy	+/- 1 % of measuring range	+/- 1 % of measuring range
Operational Temp.	-20 ~ 10°c	-20 ~ 10°c
Sensor Control	1 channel	Multiple channel (Max. 4 channel)
Data Logging	Max. 400 days	Max. 400 days
Screen	Numeric, Echo Profile, Data Trend, Parameter	Numeric, Echo Profile, Data Trend, Parameter
Display	Level.Distance, Temperature, Time, Current, Echo profile, Measuring status	Level,Distance, Temperature, Time, Current, Echo profile
Outputs	Current: 4~20mA, nom. Load 250Ω (load range : 100 ~ 750Ω) Relay : 3 SPDT (5A, 250VAC) Digital: RS232C(Standard), RS485	Current: 4~20mA, nom. Load 250Ω (load range : 100 ~ 750Ω) Relay : 3 SPDT (5A, 250VAC) Digital: RS232C(Standard), RS485
Power Supply	Standard : 100 ~ 240V AC, 50~60Hz, ≤6W Option : 20~30V DC	Standard : 100 ~ 240V AC, 50~60Hz, ≤6W Option : 20~30V DC
Enclosure Material	Body/Cover : Polycarbonate	Body / Cover : ABS Window : Polycarbonate
Weight	3 kg	3.2 kg
IP Rating	IP67	IP67
Certificate	CE	CE

SENSORS

ENV100 has 3 types of sensors to accommodate most field demands. S1G is one of the most widely used sensor model. S1T is used to corrosive chemicals and S1H is used to high temperature liquid.

S1/G/T

S1/H

MODEL	S1G/T		S1H
Material	S1G Body: S.S. 304 Head: Epoxy	S1T Body: S.S. 316 Head: Teflon	Sensor Body: Teflon Head: Teflon
Cleaning	Air-jet (built-in cleaning nozzle)		Air-jet (built-in cleaning nozzle)
Mounting Thread	3/4" PF Female Thread		Optional
Cable Length	10m		10m
Operational Temp.	-10~60°C		-10~100°C
Beam Angle	3 degree		3 degree
Frequency	160/380kHz		160/380kHz
Weight	2.2kg (incl.10m Cable)		4kg (incl.Junction Box)
IP Rating	IP68		IP68

CL 6587.103

Free Chlorine Controller

The CL 6587.103 triple input analyzer belongs to the latest series of instruments developed by B&C Electronics.The instrument includes our 40 years' experience and knowledge in the measurement and control of residual chlorine, pH and ORP. The pH, ORP and temperature sensors in our catalog allow the simultaneous display of these measures in addition to the fourth value provided by one of the sensors of the main oxidizing substances, such as residual free chlorine, combined and total chlorine, chlorine dioxide, dissolved ozone, hydrogen peroxide and peracetic acid, which are compatible with the analyzer. All these possible solutions make the controller suitable for virtually any application and type of sample.

Main Features

Range
0 ÷ 200.0 ppb / µg/l
0 ÷ 2.000 ppm / mg/l
0 ÷ 20.00 ppm / mg/l
0 ÷ 200.0 ppm / mg/l
0 ÷ 2000 ppm / mg/l
0 ÷ 14.00 pH
-2000 ÷ 2000 mV
-10.0 ÷ 110.0 °C, 14.0 ÷ 230.0 °F

Technical Specifications

Inputs	potentiostatic sensors polarographic membraned sensors pH electrodes (glass/antimony) ORP Pt100 / Pt1000
Zero	± 20%, ± 5.0°C, ± 9°F
Sensitivity	12.5 ÷ 250 %
Resolution	1 digit
Accuracy	0.2%
Repeatability	0.1%
Non linearity	0.1%
Dual filter software	0.4 ÷ 50.0 seconds for small and large variations
Dual analog output	0-20 mA / 4-20 mA Rmax 600 Ω
Digital output	RS485 isolated, protocol B&C ASCII and MODBUS (function 03)
Dual set point HI/LO	ON/OFF - PID - PFM - PWM, SPST relays
Hysteresis	0 ÷ 10 %
Delay	0 ÷ 100.0 seconds
Alarm	SPDT relay with delay 0 ÷ 100.0 seconds
Cleaning function	off / autoclean / manual, relay SPDT repetition time 0.1 ÷ 100.0 hours cleaning time 1.0 ÷ 60.0 seconds holding time 0.0 ÷ 20.0 minutes
SPST and SPDT relay contacts	220V - 5 A resistive load
Operating temperature	-10 ÷ 60 °C
Humidity	95% without condensation
Power supply	85 ÷ 264 Vac - 50/60 Hz 9 ÷ 36Vdc, 12 ÷ 24Vac (option 091.42x)
Terminal blocks	removable
Weight	1360 g
Enclosure	ABS, IP 65 protection
Dimensions	256 x 230 x 89 mm
EMC/RFI conformity	EN 61326
Registered design	002564666-002

SZ 283
Free Chlorine Sensor

Technical specifications

Electrodes	2 Platinum rings
Reference	gel with annular junction
Body	glass
Cable	3 m
Max pressure	10 bar at 20°C
Dimensions	110x12 mm

SZ 7261

SZ 7231

SZ 72x3
Free Chlorine Flow Cells

This series of cells is made for the measurement of Free residual chlorine, Chlorine dioxide and dissolved Ozone with a potentiostatic sensor SZ 283. The cell's manufacturing characteristics allow the sample to run through the potentiostatic electrode site with a constant velocity. The in-flow can be regulated through a check valve. The models SZ 72x1 cell is for the potentiostatic electrode and the Temperature sensor, while the SZ 72x3 cell is also for additional pH and O.R.P. electrodes. The supply includes the necessary tubing for grabbing the sample, along with wall mounting accessories.

SZ 7263

SZ 7233

Technical Specifications

Material	clear acrylic resin
Inlet	1/4" fitting
Outlet	fitting for 10x14 mm tubing
Connection tubing	2 m 4x6 tubing
Flow	about 10/30 litre/hour approx
Temperature	0/50°C
SZ 7263 dimensions	diameter 65 x 150 mm
SZ 7261 dimensions	diameter 55 x 150 mm
SZ 7233 dimensions:	150 x 120 x 40 mm
SZ 7231 dimensions:	150 x 90 x 40 mm
Sensors site	diameter 12 mm for pH/ORP/Cl diameter 5 mm for temperature
Suggested sensors	pH = SZ 165 ORP = SZ 275 Cl2 = SZ 283

Krypton® Multi

Reagentless Free and Total Chlorine Measurement with pH Compensation

Controlled and reliable measurements driven by Kuntze Krypton® systems. The measuring system includes all customers need for disinfectant measurement: instrument, sensors, assembly and cables. The Krypton® Multi is a measuring system for disinfectant, pH and temperature - optional ORP and 5th measuring input (Cl2, TCl or conductivity).

Kuntze Krypton® Multi are delivered fully assembled and ready to use.

All Kuntze products are made in Germany.

StabiFlow®

StabiFlow® is an assembly for precise measurement of disinfectants. Values are:

- Constant flow of approx. 30 l/h
- Stable, precise and reliable measurements
- Increased life expectancy of the electrodes

Cloud Connect®

Controlled water measurement process at any time, from any place, on any device. The solution is Kuntze Cloud Connect® service.

- Optimised asset utilisation
- Increased productivity
- Reduced maintenance costs
- Simple usability and precise control

ASR®

ASR® is their patented automatic sensor cleaning process:

- It keeps the electrode surfaces clean and reduces maintenance efforts automatically
- ASR® is available for measurement of free chlorine, chlorine dioxide, ozone and hydrogen peroxide

Cost reduction due to less maintenance:

- No manual cleaning
- No refill of chemical or physical agents
- Strongly reduced calibration demand

Technical Specifications

Disinfectants	Free chlorine, chlorine dioxide: 0.. 5.00 / 10.00 / 20.00 mg/l Ozone: 0.. 5.00 / 10.00 mg/l Hydrogen peroxide: 0.. 30.00 mg/l pH: 0-14.00 pH
Temperature	0.. 50.0 °C / 32.0.. 122 °F
ORP (optional)	-1500.. +1500 mV
5th measuring input (optional)	Total Chlorine: 0.. 10.00 mg/l, or Conductivity: 0 - 100,0 mS/cm
Digital Inputs	Flow control External controller stop 2x level control, activation 2nd or 3rd control parameter set

Sensors

Zirkon® DIS Total

TOTAL CHLORINE - Zirkon® DIS Total is an open potentiostatic sensor for measuring chlorine compounds

- No exchange of membrane
- No exchange of electrolyte
- No delicate plastic membrane
- Immune to air bubbles

Zirkon® DIS

FREE CHLORINE - Zirkon® DIS is a potentiostatic sensor for measuring Free Chlorine

- Low maintenance and robust
- Stable zero point
- Reliable measuring values
- Long operating life due to auto sensor cleaning by ASR®

Krypton® DIS

Free Chlorine Monitoring System without pH Compensation

Controlled and reliable measurements driven by Kuntze Krypton® systems. The measuring system includes all customer needs for disinfectant measuretment: instrument, sensors, assembly and cables. The Kuntze Krypton® DIS is used to measure free chlorine, chlorine dioxide, ozone or hydrogen peroxide, and temperature. Measuring parameter and range can be chosen via menu.

Kuntze Krypton® DIS are delivered fully assembled and ready to use.

All Kuntze products are Made in Germany.

StabiFlow®

StabiFlow® is an assembly for precise measurement of disinfectants. Values are:

- Constant flow of approx. 30 l/h
- Stable, precise and reliable measurements
- Increased life expectancy of the electrodes

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- ASR® is available for measurement of free chlorine, chlorine dioxide, ozone and hydrogen peroxide

Cost reduction due to less maintenance:

- No manual cleaning
- No refill of chemical or physical agents
- Strongly reduced calibration demand

Technical Specifications

Disinfectants	Free Chlorine/Chlorine dioxide/Total Chlorine: Up to 1000µg/l, up to 5.00 / 10.00 / 20.00 mg/l Cl_2 or ClO_2 Ozone: Up to 1000µg/l, up to 5.00 / 10.00 mg/l O3 Hydrogen peroxide: Up to 30.00 mg/l H2O2
Temperature	-30°.. +140°C (-22°..+284°F)
Digital Inputs	For external controller stop, low-water indication, or level monitoring Display text can be selected according to intended function Input can be set to N/O or N/C contact via menu

Total Chlorine Measurement now available

UNISENSE ENVIRONMENT

Greenhouse Gas Sensor

World's only sensor for dissolved N_2O direct from Bioreactor

Empowering Deammonification Process Controls with Direct N_2O Monitoring

The new possibility of measuring nitrous oxide (N_2O) in the deammonification process yields important insights about the anammox bacteria substrate availability. N_2O is tightly linked to the nitrite (NO_2-) concentration, the key substrate besides ammonium (NH_4+). To address the challenging control of the deammonification process, wastewater companies have invested in measurement technology from Unisense Environment. This enables them to measure N_2O levels directly in the process tanks, balance anammox bacteria substrates, and additionally document and minimize the climate impact of the deammonification process.

- **Cost effective** compared to off-gas equipment
- **Robust** sensor for 24/7 operation
- **Fast responding** in less than one minute
- **Independent** of airflow during denitrification

Large impact of N_2O on carbon footprint

N_2O is a product of both nitrification and denitrification during the biological treatment of wastewater. Through aeration it is subsequently striped and released into the atmosphere. N_2O is a highly disregarded greenhouse gas with a global warming potential 300 times higher than CO_2. Traditionally, N_2O emission from wastewater treatment plants has been estimated by use of the IPCC emission factor of 3.2 g/PE/year N_2O-N. This factor is an underestimate and studies in the Netherlands, France, USA, and Australia have shown, that for some wastewater treatment plants, the N_2O emission can account for up to 90% of their total carbon footprint.

Real-time emission estimation

Long term studies have documented a high level of performance, sensitivity, and durability of the N_2O Wastewater Sensor qualifying it as the perfect and reliable tool for continuous online measurements of dissolved N_2O. Moreover, direct comparison with well-controlled off-gas data has proven and validated the real-time emission data based on our N_2O sensor output.

N_2O wastewater system

- Measuring and assessing the amounts of N_2O being produced during wastewater treatment
- Minimising the large climate effect of N_2O by implementing new process strategies
- Reporting of greenhouse gas emissions from N_2O

True carbon footprint

In modern wastewater treatment the primary focus on energy savings and energy production has resulted in an increase in the production of N_2O leading to an increase in CO_2 equivalent emission. Therefore it is essential to look at the whole process to document the true carbon footprint.

Breakthrough bioprocess control with N_2O sensor

Combining today's wastewater bioprocess control know-how with the new industrial sensor for N_2O provides a significant potential in reducing the environmental load caused by this potent greenhouse gas. New state-of-the-art bioprocess controls can be developed, using input from the N_2O Wastewater System, yielding a clear environmental advantage over standard control regimes.

Wastewater Sensor Technical Specifications

Size	Robust design in 44 mm aluminum alloy casing (6063-T6) and black POM acetyl copolymer
Response Time	<45 sec
Built-in Temperature Sensory	Yes, N2O signal is temperature compensated
Calibration	2-point calibration, every second month
Guaranteed Lifetime	4 months
Expected Lifetime	>6 months
N²O Sensor Head	Replaceable
Cable Length	5 meter standard | Optional: Extension to 100 m

Wastewater Controller Technical Specifications

Controller	TFT touch screen controller
Box Size and Weight	301.5 x 283.2 x 120.5mm, 3.2 kg
Housing	Surface-mounted case made of plastic (ABC) | IP67 - dust-resistant and waterproof
Mounting	Multiple holes for surface or pipe mounting - mounting plates and weather protection canopy available
Electrical Safety	According to EN 61010, part 1: Overvoltage category III, pollution degree 2
Power Supply	AC 110 to 240 V + 10/15%; 48 to 63 Hz
Sensor Inputs	2 x N2O Wastewater Sensor with built-in temperature sensor
Other Inputs	Optional: Air flow (m3/h), 4..20 mA | Optional: 2 x Air flow ON/OFF (Binary input - potential-free contact)
Sensor Output	2 x temperature compensated N2O value (N2O-N[mg/L])
Sensor Emission Output	2 x Emission calculations (N2O-N [mg/m3/d]) with standard fixed model parameters | Optional: Dynamic input parameters
Other Outputs	Internet, ModBus (serial or TCP) | Optional: 2 x N2O Wastewater temp. sensor | Optional: PROFIBUS-DP | Optional: USB datalogging - software required

Portable Instruments

Optical Dissolved Oxygen Meter - HI98198

The HI98198 Optical Dissolved Oxygen Meter makes measuring the concentration of dissolved oxygen hassle-free. Optical DO technology doesn't require a minimum flow rate, so there is less drift in your readings. Perfect for the field or for the laboratory, the Quick Connect probe requires no membranes, no filling solution, and no warm-up time so you can measure without hesitation. Your meter comes complete in a rugged, custom carrying case for easy transportation.

Benefits

- Optical DO technology for fast and stable readings, even in tough environments
- Digital probe with Smart Cap Technology eliminates costly, tiresome membranes and solutions
- An IP67-rated waterproof, rugged body makes this portable meter ideal for field use

Multi Parameter - HI98194

pH/ORP/EC/TDS/Salinity/DO/Pressure Meter

The HI98194 is a waterproof portable logging multiparameter meter that monitors up to 12 different water quality parameters including 6 measured and 6 calculated. The microprocessor based multi-sensor probe allows for the measurement of key parameters including pH, ORP, conductivity, dissolved oxygen, and temperature. The probe transmits readings digitally to the meter, where data points can be displayed and logged. The HI98194 is supplied with all necessary accessories and packaged in a durable carrying case

Benefits

- Auto-sensor Recognition
- Automatic Temperature Compensation
- Standard or Quick Calibration
- Data Logging

Portable pH/ORP Meter - HI98190

Bring the performance of a benchtop pH meter with you when you use the HI98190 handheld pH meter. This professional, waterproof meter accurately measures pH, ORP and temperature. Built-in diagnostic features for the most precise measurements and logging so you never miss a measurement, the HI98190 is the perfect tool for environmental and industrial testing..

Benefits

- CAL Check™ electrode diagnostics system alerts you to potential calibration problems so that you know your results are trustworthy every time
- Everything you need for field testing in one compact, durable carrying case
- Great for environmental and industrial testing

Royce Aqua 22

Portable MLSS and Sludge Blanket Level Meter

Features & Benefits

- Range - 0 to 20,000 mg/L
- Depth - 0 to 10 metres
- Save data to 9 locations - date and time stamped
- Cable length 10 metres (length to order if required)
- A hydrostatic level sensor is used to provide easy depth measurement of the interface layer.
- Smart serialised sensors holds calibration data internally. This means that sensor can be interchanged between handheld meters without the requirement to be calibrated.
- Light, ergonomically designed handheld with a pistol grip to facilitate one handed operations.
- Front cluster buttons in easy reach of a thumb resulting in easy selection of functions.
- The LCD display is optimised to provide excellent clarity in bright sunlight with or without Polaroid glasses.

Instrument Technical Specifications

Protection	IP65
Body Materials	ABS/Polycarbonate/ Acrylic
Weight	320g
Width	110mm
Length	240mm

Sensor Technical Specifications

Cable Material	Polyurethane
Cable Length	10m
Body Materials	UPVC/Nylon
Protection	IP68
Diameter	60mm
Overall Length	180mm
Weight	420g

Overall Technical Specifications

Measuring	MLSS and Sludge Blanket Analysis Interface Layer Analysis
Sensing Technology - MLSS	IR Absorption
Sensing Technology - Depth	Depth Hydrostatic Level Sensor
TSS Range	0 - 20,000mg/l
Accuracy	+-5%
Repeatability	1%

Sludge Watch 715

Portable Sludge Blanket Detector

Benefits

- Reliable, repeatable measurement
- Not operator dependent
- Improved tank desludging
- No user adjustment required
- Cable management
- Uses standard 9V battery

Applications

- Sewage treatment: final tanks and primary tanks
- Water treatment - clarifiers and thickens
- Lamella separators

The Sludge Watch 715 provides a simple, low cost method of spot checking the sludge blanket level in a wide variety of settlement tanks. The cable reel design removes the need for any additional carrying bag.

The Sludge Watch 715 uses a range of infrared sensors to make the sludge interface detection. Infrared attenuation has been selected as it is ideally suited to detecting the sludge present in the interface zone. This tends to be considerably 'thinner' than the sludge that is present at the bottom of a settlement tank.

This method of sludge blanket detection offers major improvement over traditional Sludge Judge type systems in terms of both repeatability and importantly health and safety - no more manhandling 4 metre tubes full of contaminated wastewater.

Technical Specifications

Dimensions	280 x 230 x 130mm
Weight	1.7kg including sensor and 10 metres
Protection Class	Electronics: IP54 Sensor: IP68 Sensor: IP68
Enclosure Material	Dark Blue Nylon
Cable Length	10 metres standard, 15 metres maximum
Power Supply	9V Battery (PP3)
Battery Life	6 months typical use
Operating Temperature	0 to 50°C, limited by risk of ice formation interfering with measurement
Display	Front Panel LED - 'ON' in Sludge
Audible Output	Short Tone in Water Long Tone in Sludge
Accuracy	+/- 1 cm of interface
Principal of Operation	Light Attenuation
Wavelength	960nm Infrared
Resolution	Standard cable markings every 1.0 metres
Units of Measurement	Metres
Response Time	0.5 seconds

750w² Portable Monitor

Portable MLSS & Dissolved Oxygen Meter

The 750w² portable monitor makes it easy to gather and record data on water quality parameters. Using high-quality cable connectors to connect a variety of interchangeable water quality sensors, including TSS, dissolved oxygen and temperature.

Simple, robust & accurate

- The 750w² handheld water quality monitor gathers data in real-time making it easy to check online systems or monitor operations when no online output is available.
- The rugged unit has a built-in data recorder for storing a minimum of 500 data points per sensor.

Market Leader

- The monitor's easy-to-use interface, multiple sensor options and a field-ready design makes the 750w² the market leader for on-site monitoring of TSS, Turbidity, Sludge Level and Dissolved Oxygen.
- Four choices of TSS sensor provide the flexibility and accuracy required for TSS measurement in different applications.

Self-Linking Sensors

- The Partech 750w² Portable Monitor is designed for simplicity. Connected sensors are discovered automatically and readings are displayed immediately.

Onboard Calibration Assistant

- Step by step calibration assistance simplifies in-field operations.

Easy Data Collection

- No software, internet or wirelessc onnection needed. Data is stored on the device for later use.

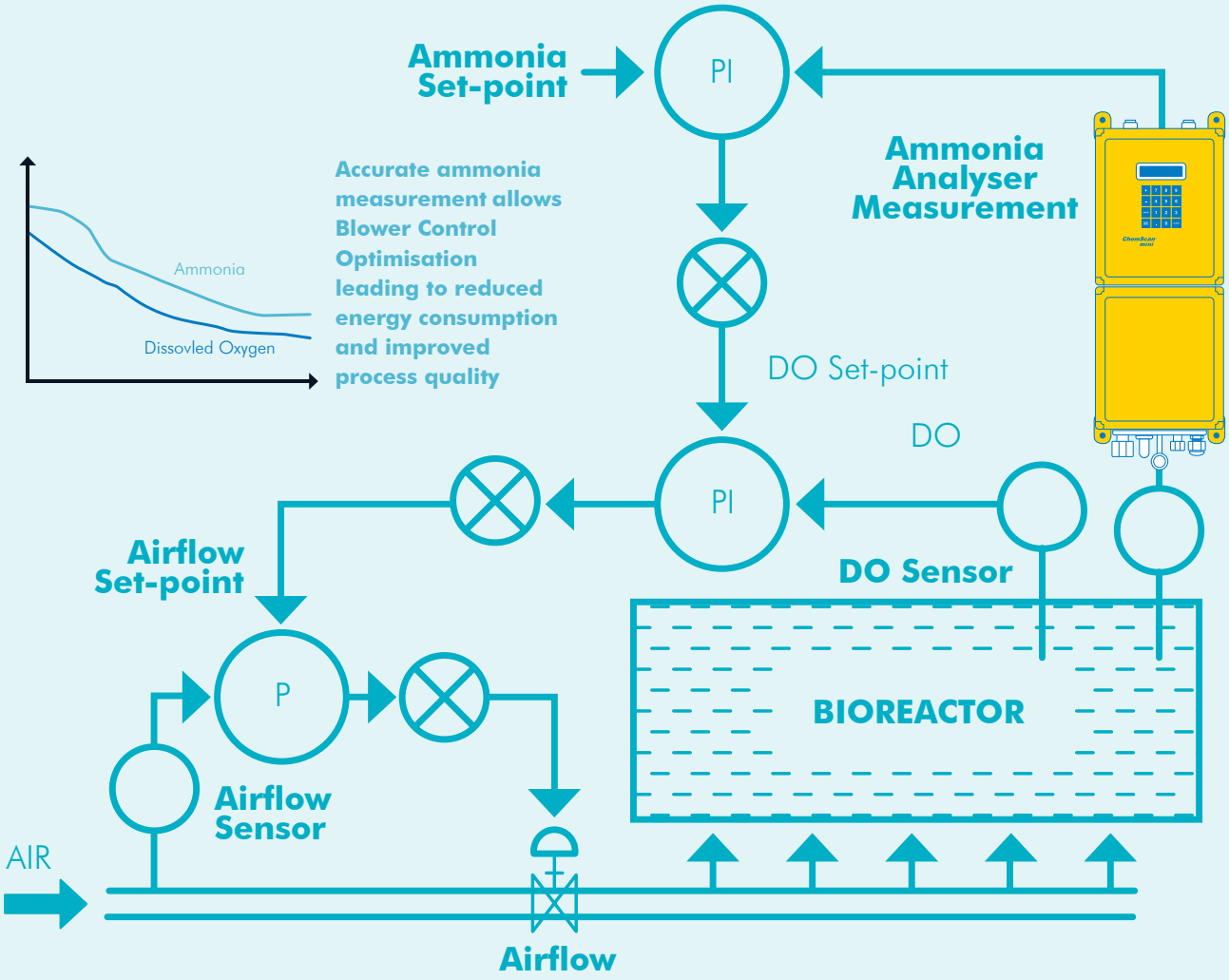
Multi-Site Capable

- Up to 10 specific TSS calibrations are supported, allowing the same sensor to be used across multiple locations.

Technical Specifications

Dimensions	220mm(8.6")x110mm(4.3") x39mm(1.5")(HxWxD)
Weight	0.75 kg (1.65 lbs)
Protection Class	IP65
Enclosure Material	ABS
Cable Connection	4 Way Circular Plug - For Sensor 5 Way Circular Plug - For Charger
Power Source	Internal Rechargeable Battery Pack
Battery Life	Sufficient for 1 week normal use (30 measurements per day), under normal operating conditions, e.g. normal, contrast and brightness settings.
Operating Temperature	0 to 60°C (32 to 140°F)
Display	Sunlight-readable graphical LCD
Setup	Via 7-button membrane keypad
Data Recorder	Minimum 500 points per sensor, actual capacity will depend on configuration.
Interface to PC	USB cable for data download

Accurate Ammonia Measurement



Water & Wastewater Monitoring

Royce Water Technologies also offers the ChemScan mini for single-parameter, single-sample line analysis - parameters include: Ortho Phosphate, UV254 Percent Transmittance, Ammonia, Manganese, Chlorine, Sulfite, Monochloramine and Free Ammonia.

ChemScan
An In-Situ Brand

Mini LowAm

Ammonia analyser

The single parameter in-line analyser family from ChemScan® utilises years of experience and proven technology to provide reliable and accurate analysis of water and waste water.

This device has been designed from the ground up to reduce maintenance requirements, includes large ID sample tubing to minimise plugging and only needs quarterly reagent refills.

Features

- Automatic Analysis Utilising ChemScan's Proprietary Method
- Low Maintenance
- Proven Sample Handling with Large I.D. Flow Paths
- Simple Field Adjustable Calibration
- Sample Blank to Eliminate Backgound Interference
- Automatic Cleaning

Benefits

- High Reliability
- Low Capital Cost
- High Accuracy
- Low Operating Cost

Capabilities

- Automatic Analysis
- Continuous Output
- Multiple Data Communication Interface Options

Applications

- Wastewater Effluent
- Wastewater Bioreactor

Technical Specifications

Range	0.1 - 10.0 mg/L (ppm)
Accuracy	2% of value or 2x detection limit (whichever greater)
Cycle Time	10 minutes to 9999 minutes (field programmable)
Environment	5 - 50 degrees C (method dependent)
Power	100 - 240 VAC, 50 W
Enclosure	NEMA 4x
Safety Approval	CSA-US
Sample Requirements	<150 mg/L TSS, <60 NTU >150mg/L use Royce Wand Filter
Maintenance	Reagent replacement every 3 months, pump kit yearly
Relay Contacts	1 SPDT Concentration, 1 SPDT Programmable
Serial Interface	RS-232 Maintenance Port
Analog Output	Isolated 4-20 mA

Mini UV254

% Transmittance analyser

The new single parameter in-line analyser family from ChemScan® utilises years of experience and proven technology to provide reliable and accurate analysis of water and waste water. This device has been designed from the ground up to reduce maintenance requirements, includes large ID sample tubing to minimise plugging.

Features

- UV-LED Light Source
- Low Maintenance
- Automatic Zeroing and Cleaning
- Proven Sample Handling with Large I.D. Flow Paths
- Simple Field Adjustable Calibration
- Direct Photodiode Detection
- Temperature Stabilised Light
- Source and Detector
- Sealed Electronics Enclosure
- Sealed Flow Cell

Benefits

- High Reliability
- Low Capital Cost
- High Accuracy
- Low Operating Cost

Capabilities

- Continuous, Real Time Analysis of Constant Flow Sample Stream
- Isolated Analog Output
- High and Low Alarms
- Diagnostic Alarms
- LED Digital Display
- Universal AC Power Options
- Data Log

Applications

- Municipal Water and Wastewater
- Industrial Water and Wastewater

Technical Specifications

Range	1.0 - 100% T, 0.0 - 2.0 AU
Accuracy	2% of value or 2x detection limit (whichever greater)
Cycle Time	Continuous
Environment	5 - 50 degrees C (method dependent)
Power	100 - 240 VAC, 50 W
Enclosure	NEMA 4x
Safety Approval	CSA-US
Sample Requirements	5 - 20 psi
Maintenance	Monthly replenish zero/clean solution
Relay Contacts	1 SPDT Concentration, 1 SPDT Programmable
Serial Interface	RS-232 Maintenance Port
Analog Output	Isolated 4-20 mA

Mini oP

Ortho-phosphate analyser

The single parameter in-line analyser family from ChemScan® utilises years of experience and proven technology to provide reliable and accurate analysis of water and waste water. This device has been designed from the ground up to reduce maintenance requirements, includes large ID sample tubing to minimise plugging and only needs quarterly reagent refills.

Features

- Automatic Analysis Utilising ChemScan's Proven VMo Method
- Low Maintenance
- Proven Sample Handling with Large I.D. Flow Paths
- Simple Field Adjustable Calibration
- Sample Blank to Eliminate Backgound Interference
- Automatic Cleaning

Benefits

- High Reliability
- Low Capital Cost
- High Accuracy
- Low Operating Cost
- EPA Recognised Analysis Method

Capabilities

- Automatic Analysis
- Continuous Output
- Multiple Data Communication
- Interface Options

Applications

- Potable Water
- Waste Water Effluent
- Wastewater Inlet

Technical Specifications

Range (as PO4)	0.09 - 9.0 mg/L (ppm) (Std), 0.3 - 18.0 ppm
Range (as PO4 - P)	0.03 - 3.0 mg/L (ppm) (Std), 0.1 - 6.0 ppm
Accuracy	2% of value or 2x detection limit (whichever greater)
Cycle Time	5 minutes to 9999 minutes (field programmable)
Environment	5 - 50 degrees C (method dependent)
Power	100 - 240 VAC, 50 W
Enclosure	NEMA 4x
Safety Approval	CSA-US
Sample Requirements	0.5 - 1 Liter/analysis, pressure 5 ft to 10 psi, <150 mg/L TSS, <60 NTU
Maintenance	Reagent replacement every 3 months, pump kit yearly
Relay Contacts	1 SPDT Concentration, 1 SPDT Programmable
Serial Interface	Serial, RS-232 Maintenance Port
Analog Output	Isolated 4-20 mA

Mini Mn

Manganese analyser

The new single parameter in-line analyser family from ChemScan® utilises years of experience and proven technology to provide reliable and accurate analysis of water and waste water. This device has been designed from the ground up to reduce maintenance requirements, includes large ID sample tubing to minimise plugging and only needs quarterly reagent refills.

Features

- Automatic Analysis Utilising Proven Formaldoxime Method
- Low Maintenance
- Proven Sample Handling with Large I.D. Flow Paths
- Simple Field Adjustable
- Calibration
- Sample Blank to Eliminate Backgound Interference
- Automatic Cleaning

Benefits

- High Reliability
- Low Capital Cost
- High Accuracy
- Low Operating Cost

Capabilities

- Automatic Analysis
- Continuous Output
- Multiple Data Communication Interface Options

Applications

- Potable Water
- Wastewater Effluent

Technical Specifications

Range	0.002 - 8.0 mg/L
Accuracy	2% of value or 2x detection limit (whichever greater)
Cycle Time	5 minutes to 9999 minutes (field programmable)
Environment	5 - 50 degrees C (method dependent)
Power	100 - 240 VAC, 50 W
Enclosure	NEMA 4x
Safety Approval	CSA-US
Sample Requirements	0.5 - 1 Liter/analysis, pressure 2 to 10 psi, <150 mg/L TSS, <60 NTU
Maintenance	Reagent replacement every 3 months, pump kit yearly
Relay Contacts	1 SPDT Concentration, 1 SPDT Programmable
Serial Interface	RS-232 Maintenance Port
Analog Output	Isolated 4-20 mA

Mini Mono & FreeAm

Monochloramine analyser

The single parameter in-line analyser family from ChemScan® utilises years of experience and proven technology to provide reliable and accurate analysis of water and waste water.

This device has been designed from the ground up to reduce maintenance requirements, includes large ID sample tubing to minimise plugging and only needs quarterly reagent refills.

Features

- Automatic Analysis Utilising Proven Method
- Low Maintenance
- Proven Sample Handling with Large I.D. Flow Paths
- Simple Field Adjustable Calibration
- Sample Blank to Eliminate Backgound Interference
- Automatic Cleaning

Benefits

- High Reliability
- Low Capital Cost
- High Accuracy
- Low Operating Cost

Capabilities

- Automatic Analysis
- Continuous Output
- Multiple Data Communication Interface Options

Applications

- Potable Water
- Wastewater Effluent

Technical Specifications

Range	0.02 - 10.0 mg/L (ppm)
Accuracy	5% of value or 2x detection limit (whichever is greater)
Cycle Time	5 minutes to 9999 minutes (field programmable)
Environment	5 - 50 degrees C (method dependent)
Power	100 - 240 VAC, 50 W
Enclosure	NEMA 4x
Safety Approval	CSA-US
Sample Requirements	0.5 - 1 Liter/analysis, pressure 2 to 10 psi, <150 mg/L TSS, <60 NTU
Maintenance	Reagent replacement every 3 months, pump kit yearly
Relay Contacts	1 SPDT Concentration, 1 SPDT Programmable
Serial Interface	RS-232 Maintenance Port
Analog Output	Isolated 4-20 mA

Mini LowChlor

Low Chlorine Analyser

The ChemScan mini LowChlor analyzer provides operators with reliable process chemistry measurements. The analyzer data ensures proper control of chlorination treatment processes. This reduces the need for frequent manual sampling or laboratory analysis while producing the best water quality.

Features

- Unique sample line cleaning minimizes biological interferences
- Robust design for demanding operating environments
- Blockage resistant internal sample tubing
- No filtration required on samples with low solids
- Minimal replacement parts for low maintenance
- Sample Blank eliminates electrical/optical drift
- Simple field adjustable calibration
- Separate enclosures for electronic and sample handling
- LED Light source for 10+ years design life
- Self-Cleaning to eliminate internal fouling
- Separate external sample line cleaning available
- Full range of sampling accessories available for all applications

Benefits

- Assure process conformance
- Control energy and chemical costs
- Confi rm plant compliance in real-time
- Improve process performance
- Low reagent and maintenance costs

Applications

- Analysis of LowChlor in potable water, wastewater and industrial processes

Technical Specifications

Range	Method 1030 0.005 - 2.0 mg/L
Accuracy	2% of value or 2x detection limit (whichever is greater) Per EPA SP 846 (The detection limit is the low concentration stated in ranges below)
Response Time	4 minutes minimum
Environment	5° - 45°C (Indoor or Sheltered)
Power	120-240 VAC ±10%, 50-60 Hz, 70 VA
Enclosure	Upper Enclosure: NEMA 4X Fiberglass Reinforced Polyester, Acrylic window Lower Enclosure NEMA 4X Fiberglass Reinforced Polyester
Sample Temperature	10° - 60°C
Sample Pressure	Pressurised sample line required regulated to 2-10 psi (15-70 kPa), (sample conditioning and pressurizing accessories available)
Maintenance	Auto clean
Data Communications	4-20 mA (2 outputs)
Size	26" tall x 9.5" wide x 7" deep (66 cm tall x 24 cm wide x 18 cm deep)
Weight	27 lbs (12.25 kg)

Mini ChlorAm

Chloramination Analyser

The ChemScan mini ChlorAm Chloramination Analyzer provides operators with timely process chemistry measurements to optimize the challenging chloramination process. The analyzer provides data to ensure proper disinfectant while minimizing disinfection by-products (DBPs) and nitrifi cation potential in drinking water distrubution systems. This reduces the need for frequent manual sampling or laboratory analysis while producing the best water quality. The mini ChlorAm Analyzer is well suited for drinking water and wastewater chloramination applications.

The mini ChlorAm Analyzer monitors multiple parameters in the Chloramination process; Monochloramine, Total Ammonia, and Free Ammonia, while calculating the Cl2:N ratio.

The analyzer utilizes 15 years of ChemScan Chloramination experience and proven technology. Unlike other analyzers, discharge is non-toxic and no mandatory service contract is required.

Features

- Low maintenance
- Proven sample handling with large sample lines to minimize blocking
- Easy to maintain with intuitive sample fl ow
- Components are designed for easy accessibility
- Integrated self cleaning to remove buildup in flow cell and sample lines
- Simplified analysis cycle reduces the number of moving parts
- Field analysis utilizing proven methods
- Sample blank to eliminate backgound interference
- Simple field adjustable calibration

Benefits

- Reliable chloramination process control to minimize DBP's
- Miminized dichloramine to reduce taste and odor complaints
- Reduced need for frequent laboratory analysis
- Lowest capital and operational cost
- No service contract required

Technical Specifications

Range	Monochloramine 0.02 - 5.00 mg/L Total Ammonia 0.02 - 3.00 mg/L Free Ammonia 0.025 - 2.00 Mg/L Cl2:NH3-N Ratio 0-25
Accuracy	2% of value or 2x detection limit (whichever is greater)
Response Time	19 minutes with 9 minute updates
Environment	5° - 45°C (Temperature-Controlled Oudoor Enclosure Optional
Power	120-240 VAC ±10%, 50-60 Hz, 70 VA
Enclosure	Upper Enclosure: NEMA 4X (Fiberglass Reinforced Plastic) Polyester, Acrylic window. Lower Enclosure NEMA 4X (Fiberglass Reinforced Plastic) Polyester
Sample Temperature	10° - 60°C
Sample Pressure	Pressurised Sample Line Required Regulated to 2-10 psi (15-70 kPa), (For wastewater, sample extraction accessory available – Pump and Sample Circulation Loop Assembly)
Maintenance	Automatic Flow Cell and Sample Line Cleaning
Data Communications	4-20 mA (4 outputs)
Size	26" tall x 9.5" wide x 7" deep (66 cm tall x 24 cm wide x 18 cm deep)
Weight	27 lbs (12.25 kg)

Process Analyser

Measuring: Ammonia / Ortho-Phosphate / Nitrate / Nitrite / Manganese / MonoChloramine / Chlorine / Free Ammonia / UVT 254

The ChemScan® on-line analysers provide operators and control systems with timely process chemistry measurements. This data is used to control and optimise the process; resulting in increased plant capability, reduced energy and chemical usage along with monitoring the process.

ChemScan Features

- Configured to monitor samples and/or parameters
- Real-time spectrographic chemical analysis using advanced pattern recognition techniques
- Easily interfaced to SCADA systems (4-20mA, MODBUS or Ethernet)
- Extensive internal data logging
- Self monitored diagnostics and alarms
- Internal manifold with inlets for auto zeroing, auto cleaning and calibration samples

Potable Water Monitoring

- Chloramination Monitoring
- Water Blending
- Organics Detection
- Nitrification Avoidance

Wastewater Nutrient Monitoring

- Nitrification Analysis
- De-Nitrification Control
- Chem or Bio Phosphorous Removal
- Nutrient Deficiency Analysis
- SBR End Point Detection
- Toxicity/Rapid BOD Analysis

ChemScan® Process Analysers

Model	Up to	Parameters	
UV-2250	Four Sample Lines*	Analysis of one reagent-assisted parameter such as ammonia or phosphate	
UV-4200	Two Sample Lines*	Analysis of up to four compatable parameters using primary and secondary analysis	

* If samples are unfilitered

Specialty Analysers

ChemScan® UV-2250/S Chloramination Suite

- Number of Sample Lines: 1 or 2 through Internal Manifold

Range

- Free Ammonia 0.02 - 1.00 mg/l as N
- Total Ammonia 0.02 - 2.00 mg/l as N
- Monochloramine 0.01 - 5.0 mg/l as Cl2
- Total Chlorine 0.05 - 5.0 mg/l as Cl2

Chemscan® UV-2250/N Ammonia & Nitrate

- Number of Sample Lines: 1 or 2 through Internal Manifold

Range

- Nitrate and Ammonia Parameter/Site Dependent

Chemscan® UV-2250/DC Chlorination/De-Chlorination

- Designed for Chlorination and De-Chlorination measurements in Contact Tanks
- Online UV Absorbance measuring principal
- Measures Total Chlorine Residual (0.05 to 5.00 as CL2 Influent) and De-chlorination Agent Residual (0.005 to 0.5 as CL2 Effluent)
- Accuracy 2% to 5% of range
- Continuous Online Monitoring of 2 Sample Lines
- Benign, inexpensive non-proprietary reagents used

Chemscan® UV-2250/NoP Nitrate & Ortho-Phosphate

- Number of Sample Lines : 1 or 2 through Internal Manifold

Range

- Nitrate and Ortho-Phosphate Parameter/Site Dependent

ChemScan® UV-2250/NHoP Ammonia & Ortho-Phosphate

- Number of Sample Lines : 1 or 2 through Internal Manifold

Range

- Ammonia and Ortho-Phosphate Parameter/Site Dependent

Nitrite & Nitrate Analyser

Real-time nitrate and nitrite based monitoring & process control for water and wastewater treatment

Aquamonitrix® is a new breed of autonomous in situ analyser, capable of measuring nitrate and nitrite with laboratory-quality accuracy and specificity in real-time. It is incredibly robust in wastewater environments, delivering high accuracy (~95% in wastewater) with low-biofouling and blockage potential and minimal need for intervention. This makes it an extremely user-friendly analyser for monitoring wastewater effluent in real-time. The ability to simultaneously measure nitrate and nitrite with laboratory accuracy and specificity also makes Aquamonitrix® a powerful tool for optimisation of biological nitrogen removal (BNR) processes to control nitrous oxide emissions and/or signifcantly reduce aeration energy requirements through short-cut BNR.

Virtually plug n' play for instant deployment

On arriving on site, your Aquamonitrix® unit can be installed and operating in just over an hour:

- No need for site preparation
- The only connections required are mains power and the sample inlet and outlet. (Solar/battery option available)
- The device is portable, lightweight and smaller than an airline carry-on case

Low life-time costs

- Simple setup and operation
- Equally simple, vendor-neutral servicing. Can be carried out in-house or by a local, agnostic service company
- Low skills requirement
- Low cost, non hazardous sodium chloride (NaCl) reagent

How Aquamonitrix® delivers superior performance in wastewater

Aquamonitrix® innovatively combines ion chromatography with proprietary, low-power-requirement UV-LED detection and microfluidic sample-handling technology. This provides laboratory performance from a compact and robust, field-based instrument. Due to lower ionic attraction,the nitrite ions can travel more quickly through the chromatography column than nitrate, so they reach the UV-LED detector first, allowing both anions to be measured separately. The column also acts as a trap for organics, colour, turbidity, air bubbles and other common sources of interference in wastewater. Because only microfluidic sample volumes are required, the sample-handling challenges are greatly reduced, and the use of large bore, anti-fouling intake tubing further minimises the potential for blockages and bio-fouling.

Key Performance Parameters

- No requirements for recalibration - even if the analyser is moved to a new matrix – e.g. wastewater to fresh or saline water
- Only minor inventions required between services - such as topping up eluent or changing the sample syringe
- Servicing is straight-forward and vendor-neutral

Technical Specifications

Analyser technology	Ion chromatography and UV-LED
Maximum sampling frequency	10 minutes
Accuracy	Fresh water ~99% Wastewater & Saline Water ~95%
Precision	95%
Analytical Range for Fresh Water and Wastewater*	Nitrate: 0.6 – 500 mg/L NO3 (0.14 to 113 mg/L as N) Nitrite: 0.05 – 100 mg/L NO2 (0.01 to 23 mg/L as N) * In 35 ppt saline water, the lower limits of detection are 1.0 mg/L nitrate as NO3 – (0.23 mg/L as N) and 0.5 mg/L nitrite as NO2 – (0.15 mg/L as N)
Power Source	15 - 25 V dc input power, 50W max. rated power Integrated battery for backup Solar/battery version available for mobile and off-grid use
Dimensions & Features	External size: 23cm X 36cm X 57cm (enclosure size, without supporting cradle) Weight: 12 kg

Reagents

PH BUFFERS

- pH 4 Buffer
- pH 7 Buffer
- pH 10 Buffer

POTASSIUM CHLORIDE (KCL) GEL

- Electrolyte for Royce Galvanic Dissolved Oxygen Sensors

UV/VIS SENSOR LENS CLEANER

- Cleaner to maintain clean UV/Vis quartz lens. Easily disperses oil, grease, bacteria and dirt build-up on quartz Lens.

TURBIDITY, PHOSPHATE & AMMONIA STANDARD SOLUTIONS

CHEMSCAN MINI REAGENTS

- Ortho Phosphate
- Ammonia

CHEMSCAN UV PROCESS ANALYSER REAGENTS

WASTE WATER ANALYSERS

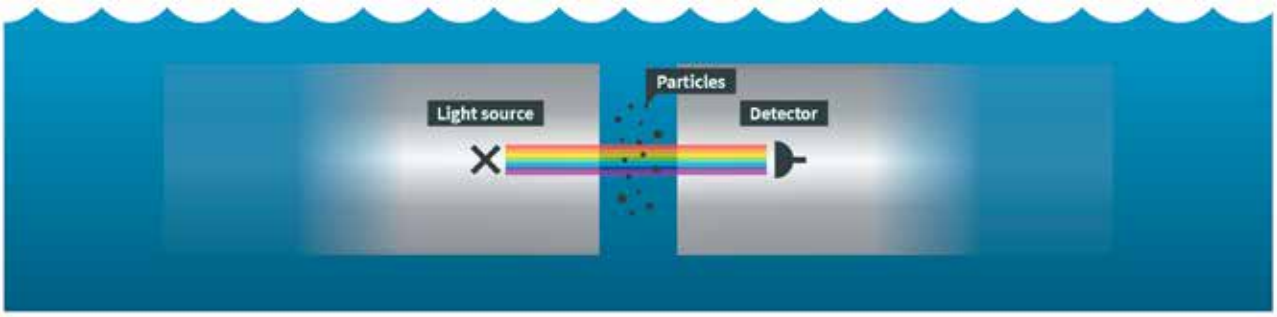
- EDTA/Sodium Hydoxide
- Sodium Hypochlorite
- Molybdovanadate

MONOCHLORAMINE ANALYSERS

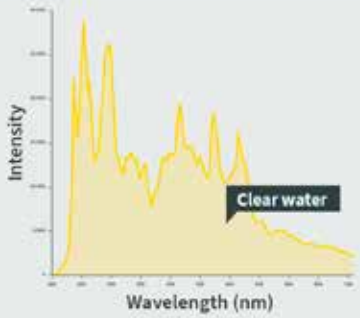
- Ammonia
- Sulphiric Acid Solution
- Potassium Iodide

Introduction to UV/Vis Spectrometry

When light radiates onto a medium - such as water - various effects such as reflection, scattering or absorption occur. Lambert-Beer's law states that the absorption of light at a certain wavelength depends on the concentration of the substance to be measured. UV/Vis spectrometers make use of this effect. Light with wavelengths in the UV and visual range radiates onto the medium, hence the name UV/Vis spectrometry. The substances in the water absorb light of different wavelengths and with different intensity. The remaining light is measured by a detector. The specific absorption per wavelength can then be used to calculate the concentration.

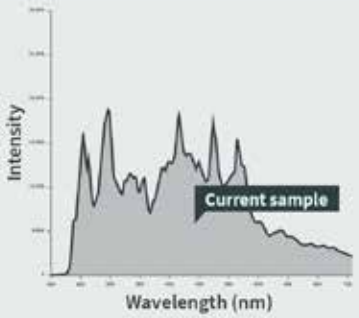


Clear Water Calibration



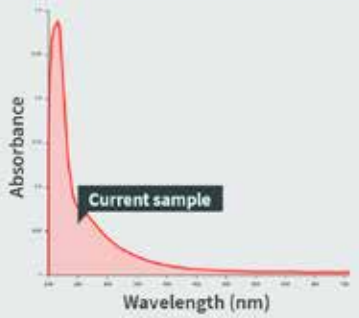
In order to correctly determine the absorption in water, a reference must first be defined. For this purpose, the intensity of the emitted light is recorded for the entire wavelengths in clear water. In order to calculate the ingredients correctly later on, double-distilled water should be used if possible. The clear water spectrum is stored as reference intensity I_0.

Current Raw Spectrum



With each measurement, the detector measures the remaining light that has not been absorbed by the measuring medium. This spectrum is also known as the raw spectrum and is stored as intensity I.

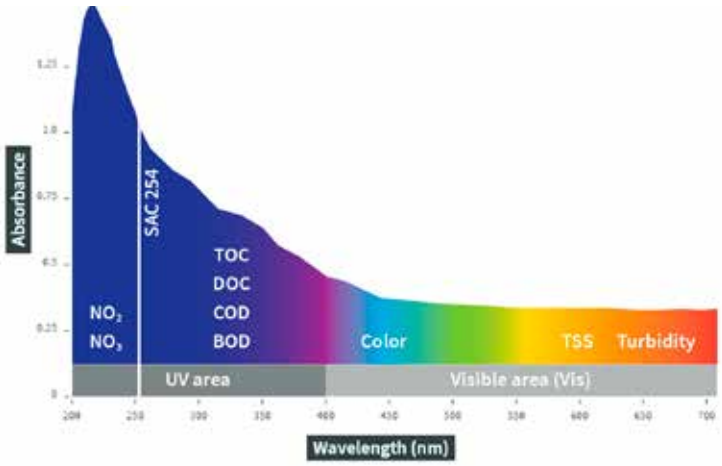
Absorption Spectrum



From the clear water calibration and the current raw spectrum, the absorption is finally calculated for each individual wavelength $A = lg(\frac{I_0}{I})$. With the calculated values the whole absorption spectrum can be determined.

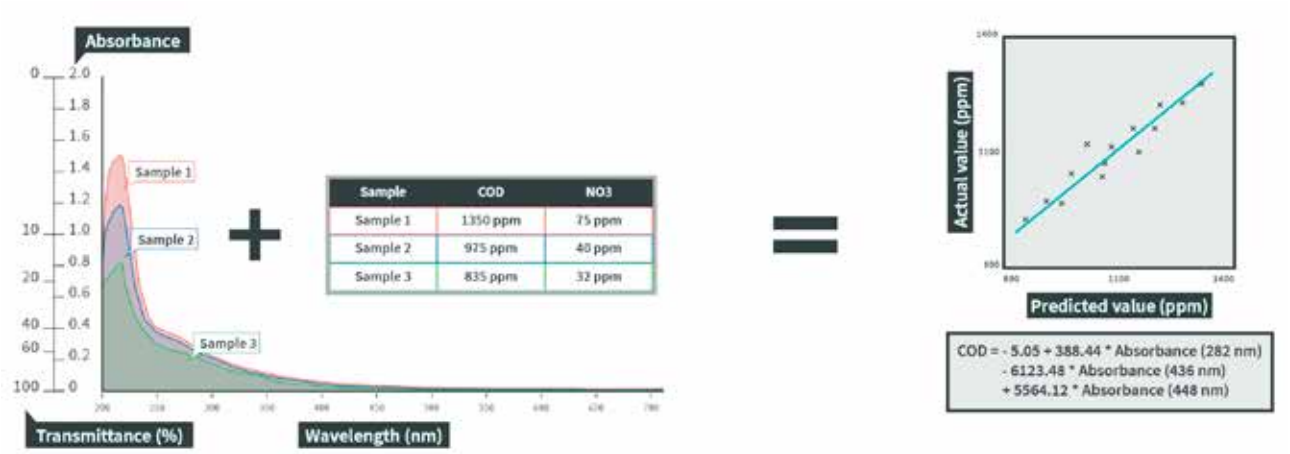
Possible parameters with UV/Vis spectrometers

With a UV/Vis spectrometer different parameters can be measured simultaneously. The best parameters for the measurement are, of course, those that have an absorption of light in the UV/Vis range. Nitrate or COD values, for example, are often determined. However, other parameters that do not show any absorption themselves can also be detected under certain conditions. For a specific calibration, the concentration can also be determined as a function of the absorption of the entire water matrix and not on the basis of the absorption of the substance itself.



Specific calibration to various parameters

To calculate the concentration of individual parameters based on absorption, a specific calibration must be performed. For the calibration it is necessary to take reference samples from which the laboratory values and absorption spectra are determined. From this data, a chemometric model can then be used to create a formula for calculating the respective parameter. The more reference values are available for the calibration, the better measurement accuracy can be achieved with this formula. The variance of different concentrations also optimizes the calibration.



Parameters & Measurement Ranges - UV/Vis

The Intelligent Spectral Analyser (ISA) is a compact UV/Vis spectrometer that allows the simultaneous determination of a variety of parameters with a single optical sensor.

Parameter	Measurement Range*	Measurement Principle
Spectral Absorption Coefficient (SAC)	0.0 - 1,500 1/m	Absorption single wavelength (254 nm)
UV-Transmittance (UVT)	0 - 100 %	Absorption single wavelength (254 nm)
Biological Oxygen Demand (BOD)	0.0 - 15,000 mg/l	Absorption UV/Vis Spectrum (200 - 720 nm)
Chemical Oxygen Demand (COD)	0.0 - 25,000 mg/l	Absorption UV/Vis Spectrum (200 - 720 nm)
Total Organic Carbon (TOC)	0.0 - 25,000 mg/l	Absorption UV/Vis Spectrum (200 - 720 nm)
Dissolved Organic Carbon (DOC)	0.0 - 15,000 mg/l	Absorption UV/Vis Spectrum (200 - 720 nm)
Total Suspended Solids(TSS)	0.0 - 5,000 mg/l	Absorption UV/Vis Spectrum (200 - 720 nm)
Total Nitrogen (TN)	0.0 - 200 mg/l	Absorption UV/Vis Spectrum (200 - 720 nm)
Nitrate (NO3)	0.0 - 150 mg/l	Absorption UV/Vis Spectrum (200 - 720 nm)
Nitrite (N02)	0.0 - 75 mg/l	Absorption UV/Vis Spectrum (200 - 720 nm)
Color	0 - 500 Hazen	Absorption UV/Vis Spectrum (200 - 720 nm)
Turbidity	0 - 2,000 FNU	Absorption UV/Vis Spectrum (200 - 720 nm)
Ammonium (NH4)	5.0 - 100 mg/l	Absorption UV/Vis Spectrum (200 - 720 nm)
Orthophosphate	5.0 - 100 mg/l	Absorption UV/Vis Spectrum (200 - 720 nm)

Single wavelength:

The absorption of individual wavelengths can be calculated with a UV/Vis Spectrometer. Thereby, it is possible to directly determine parameters like SAC or UVT without the need for a calibration.

Absorption UV/Vis:

Moreover, the measurement of the absorption across the entire UV/Vis range allows to develop chemometric models. With the help of these models it is possible to simultaneously determine a multitude of parameters. The UV/Vis Spectrometers of GO Systemelektronik continuously monitor the quality of these models and ensure the reliability of calculation.

* The mentioned measurement ranges present typical upper and lower limits. The specific measurement ranges and achievable accuracies depend on the composition of the water and the quality of the reference samples.

Calibration Monitoring (SQI)

The Calibration Monitoring feature provides a real-time evaluation of the trustworthiness of measurement readings by means of a Spectral Quality Index (SQI). The SQI indicates how well the calibration fits to the current water matrix. The lower the SQI value the better the calibration will fit to the water matrix. A calibration with a SQI above the threshold value of 4 leads to a lower measurement accuracy. The feature enables the determination of the Validity of the Calibration and allows for the Automatic Selection of the most Suitable Calibration. With this unique feature for all of our UV/Vis Spectrometer Systems, it is possible to obtain an on-line quality detection of the spectrometer results and ensure the proper operability of the system.

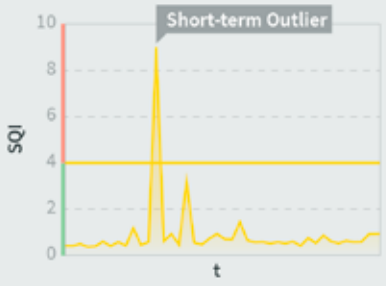
Available for the Following Products

- ISA - UV/Vis Spectrometer

Validity of the Calibration

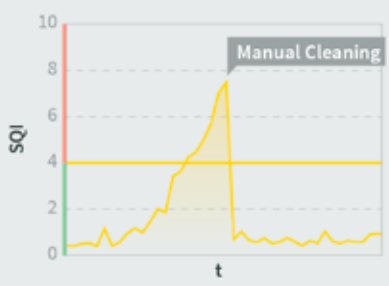
The SQI serves as a quality index that allows to determine how likely it is that the calibration is correct. Based on this information it is possible to distinguish between the occurrence of 3 potential cases and to assess whether action is required.

Short-term Measurement Error



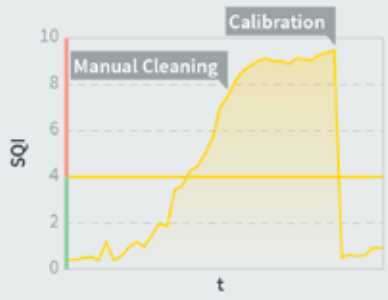
A **temporary spike** in the SQI can occur as a result of **air or particles caught in the measurement path.** The Calibration Monitoring feature allows to effortlessly identify short-term outliers and gives the opportunity to ignore measurements exhibiting a higher SQI.

Contamination



A **prolonged exceedance** of the SQI threshold value may be an indication for a **contamination of the measuring head.** In these instances, it is advisable to perform a **manual cleaning** of the measurement head. If the cleaning resolves the issue the SQI should drop back down to a lower level.

Changing Water Matrix



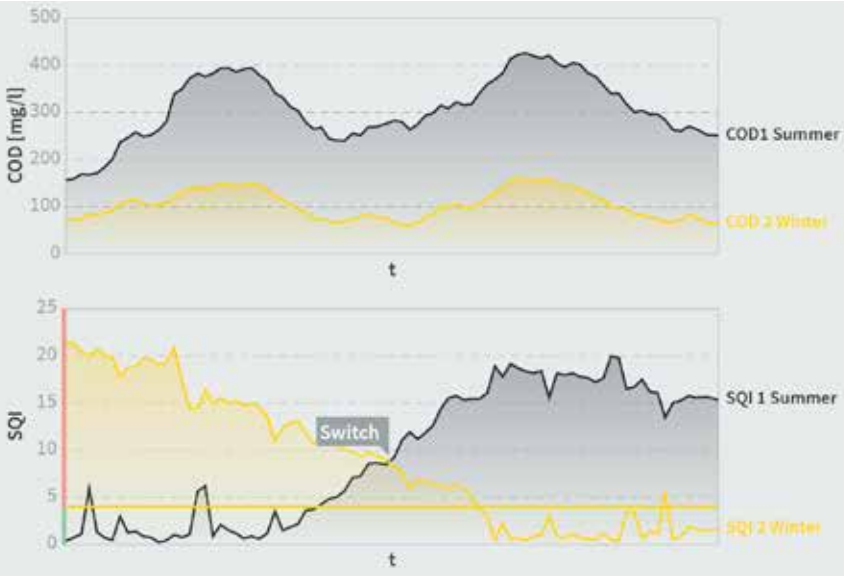
If the SQI remains at an elevated level, even after a **manual cleaning**, it may be an indication that the current calibration does not cover the water matrix anymore. The issue can be resolved either by **improving the existing calibration** through the **addition of reference values** or by **creating a new calibration.**

Automatic Selection of the most Suitable Calibration

Based on the SQI it is possible to set up an automatic selection of the best suitable calibration settings. Thus, ensuring the optimal adaption of the system to changing conditions, by enabling the intelligent switch between different calibrations for different water matrices.

Calibration Monitoring for COD Measurement

The SQI serves as a quality index that allows to determine how likely it is that the calibration is correct. Based on this information it is possible to distinguish between the occurrence of 3 potential cases and to assess whether action is required.



In this example, the UV/Vis Spectrometer simultaneously measures the COD using two calibrations. The measurement values of the COD1 Summer calibration are shown in grey and the values of the COD2 Winter calibration are shown in yellow.

The system also tracks the SQI for both calibrations and is able to automatically determine the most suitable calibration for the current water matrix. In the example, the automatic switch occurs once SQI 1 Summer exceeds the value of SQI 2 Winter.

Configuration of the Automatic Switch

The associated software offers the opportunity to set up individual decision rules to configure the switch between the stored calibrations. Hereby, it is possible to automate the selection of the best fitting calibration. The decision rules can be defined according to the desired specifications by using simple formulas. The formulas can, for example, be based on the simple exceedance or number of instances and may include time delays, set events, etc.

Example: Simple Exceedance

```
COD_1_Summer = [ISA011073];
SQI_1_Summer = [ISA011073.SQI];

COD_2_Winter = [ISA011074];
SQI_2_Winter = [ISA011074.SQI];
COD_opt = 0;

if (SQI_1_Summer < SQI_2_Winter) COD_opt =
[ISA011073];
if (SQI_1_Summer > SQI_2_Winter) COD_opt =
[ISA011074];

COD_opt;
```

ISA UV/VIS Spectrometer

The only Site Specific Calibration UV/Vis Spectrometer System

The intelligent spectral analyser ISA provides the simultaneous acquisition of multiple parameters with only one sensor in a small form factor. This compact UV/VIS sensor provides both standard water quality parameters and additional substances and water properties applying modern chemometrical methods.

The detection is not limited to a few bands, instead the whole spectrum from ultraviolet to near-infrared (200-720nm) is detected and analysed. Solutes, suspended matter and other water properties can be characterised thoroughly. This is not limited to common values like e.g. nitrate, organic carbon (TOC) or chemical and biological oxygen demand (COD, BOD) since modern chemometrical methods are permitting the assay of various other components.

The calibration monitoring feature based on a spectral quality index (SQI) is a new technology introduced to absorption spectroscopy by Go-Systemelektronik. This allows an automatic adaptation to water matrix variances. With this there is a significant increase in measurement reliability and with this a lower risk of false alerts in water monitoring systems. Another unique feature is the possibility to quickly mechanically adjust the optical path length, without special tools.

Benefits

- One Sensor - Wide range of parameters
- Simplest calibration
- Measurement path length 0.5 - 20 mm continuously adjustable
- ATEX Category 3 [Category 2 optional]
- Ready for network based data processing and control technology [BlueGate]
- Monitoring function
- Calibration monitoring (SQI)
- Intelligent event handling
- Quality control
- Alarm systems
- Analysis of trends
- Control of water treatment
- Early detection of discharge (fingerprint)
- Process optimisation

Parameters

- Ammonium
- Biochemical oxygen demand (BOD)
- Chemical oxygen demand (COD)
- Total organic carbon (TOC)
- Dissolved organic carbon (DOC)
- Total suspended solids (TSS)
- Nitrate
- Orthophosphate
- SAC 254nm

Product Variants

The ISA UV/Vis Spectrometer is available in different variants. The ISA complete systems in combination with a BlueBox TS measuring- and control system allow for a stand-alone operation. GO Systemelektronik also offers a portable mobile version for flexible applications. The battery-powered system is designed for an autonomous operation on-site. ISA Module variants can be integrated into existing measuring systems and enable their expansion through the CAN bus interface. Depending upon the application requirements the ISA UV/Vis Spectrometer is available either as an in situ measuring head for immersion measurements or as a flow through fitting.

Functions & Features

Application Areas

Drinking Water
Quality control
Alarm systems

Wastewater
Influent Monitoring
Bioreactor Monitoring
Effluent Monitoring

Process Measurement & Control Technology
Process monitoring in industrial facilities
Control of process water treatment

Environmental Monitoring
River water
Surface water

Technical Specifications

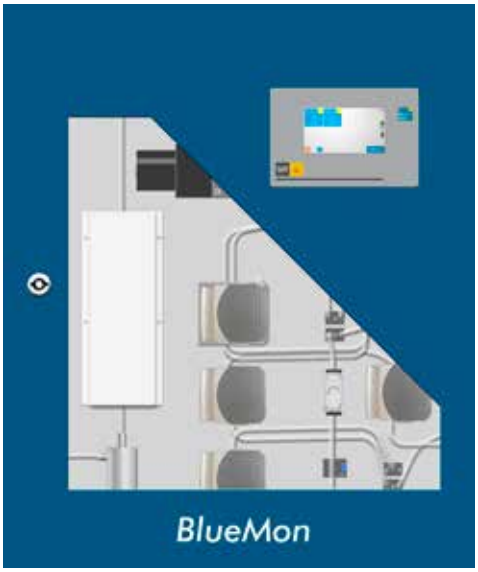
System	UV/Vis spectrum 200 - 720 nm
Measuring principle	Spectral analysis
Optical measuring path length	0.5 - 20 mm
Sampling rate	≥ 3 s
Light source	Xenon pulse light

Measuring head

Material	Stainless steel 1.4404 / Titanium [optional]
Operation temperature range	0 °C to +110 °C
Weight	1.5 kg
Dimensions	Length approx. 230 mm; Ø 44 mm
IP protection class	IP 68

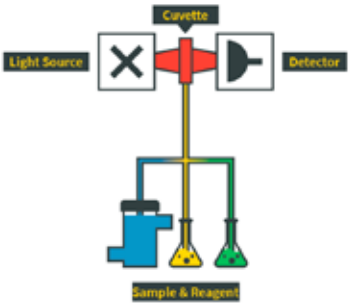
Introduction to Colorimetry

DIN Standard

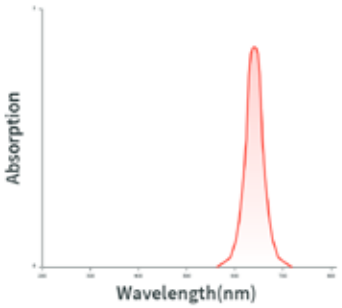


If you mix water with chemicals, different effects can occur depending on the mixture. In colorimetry, these effects are used to determine a parameter. The addition of reagents causes a color change or a change in the absorption behavior of the sample. For measurement, light of a certain wavelength is radiated onto the sample and the absorption of this light is measured in transmitted light. The concentration of the substance to be measured can then be calculated directly from the absorption.

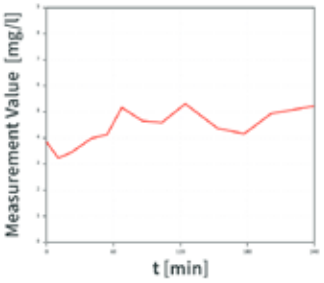
Chemical Reaction



Measurement of Absorption

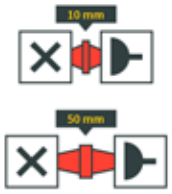


Determination of Concentration



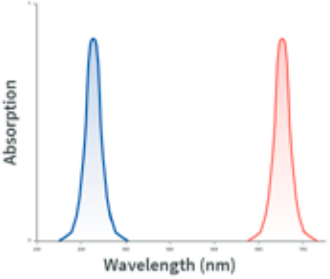
Cuvette Size

During photometric measurement, the cuvette serves as a sample container through which the light is radiated. In addition to the chemical reaction, the correct light source and the appropriate detector, the path length of the cuvette is also important. High concentrations lead to high absorption and therefore require a small path length. Low concentrations, on the other hand, require a longer path length in order to obtain ideal measurement results. By using different cuvette sizes it is possible to cover different measuring ranges.



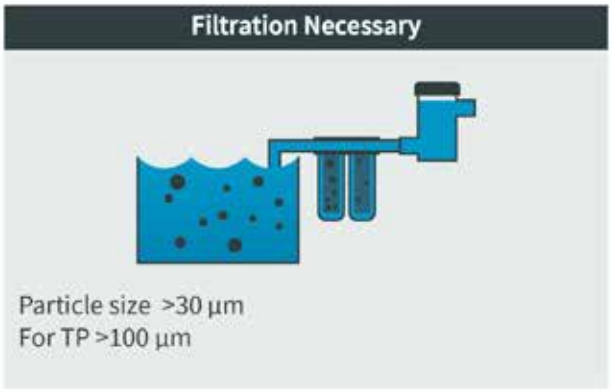
Wavelengths

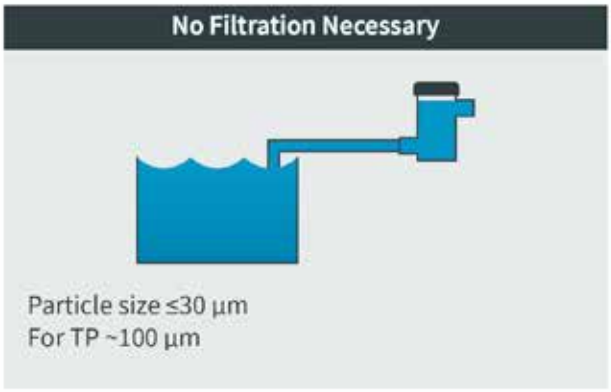
The chemical method used is parameter-specific. These differ not only in the reagents used, but also in the optical behavior of the sample after the chemical reaction. Therefore, depending on the parameter, a specific wavelength is used in the photometric measurement to determine the absorption of the sample. For example, total phosphorus is measured at 643 nm and total nitrogen at 230 nm.



Sample Preparation

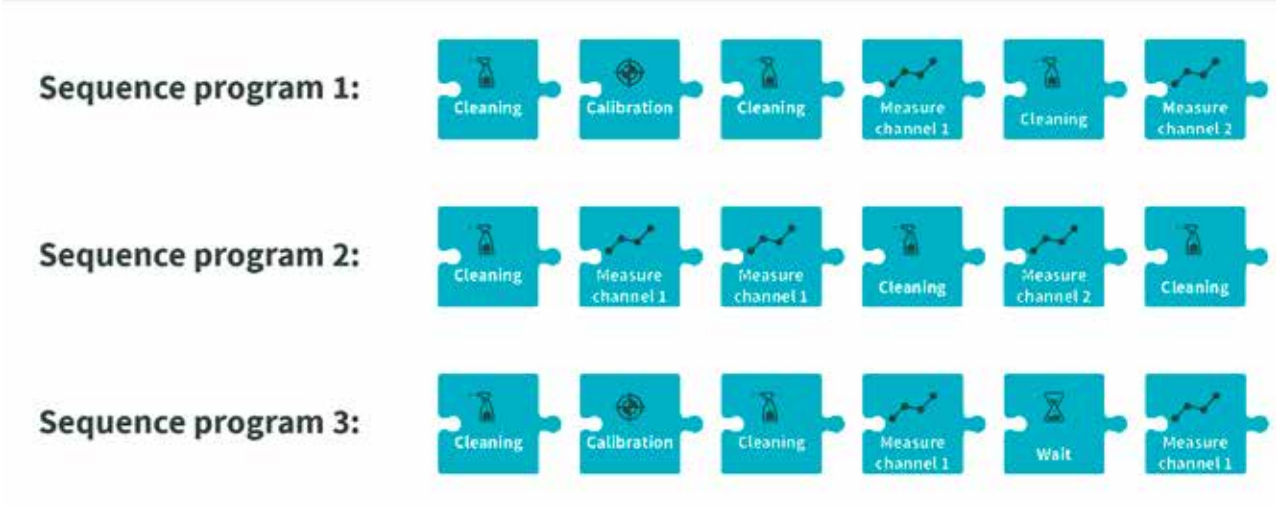
Before mixing the medium with chemicals, it is important to ensure that only particles that can be pumped through the entire flow path without causing blockages get into the BlueMon Analyser. Therefore, depending on the medium, it may be necessary to install a filtration upstream of the analyser. The required particle size depends on the respective parameter. For example, TP should not be filtered too strongly, otherwise no representative measurement is possible.





General Measurement Procedure

The sequence program of the BlueMon Analysers is specific for each parameter. The various subprograms are started and repeated cyclically. If required, the sequence of the program can be individually adapted and optimized to the local conditions. In the simplest case, the calibration and cleaning intervals can be adjusted. In addition, if several measuring channels are used, it is easy to determine when and how often each channel is measured. Even more complex adjustments such as the integration of a customer-specific program are possible without any problems.



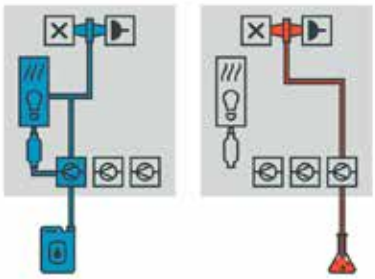
BlueMon On-line Analyser

The **BlueMon** analyser is a powerful measurement device for wet-chemical on-line analysis methods. The analyser allows for a fully automated and self-calibrating operation of up to six sample lines. Thereby it enables the on-line monitoring of parameters that previously required time-consuming and costly manual lab work. The BlueMon Analyser also features extensive control functions, as well as the possibility for remote access and control via internet and mobile networks.

Sample Sequence for the Measurement of TP & OP

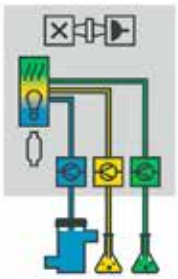
Calibration and Cleaning

The calibration of the BlueMon is an automated process. To ensure the measurement accuracy, the calibration is continuously monitored. Should the calibration fail for example due to contamination, it is repeated. If this happens several times in a row, the operator is alerted. In addition, the BlueMon Analyser has an automated cleaning cycle that can be adapted according to the application. Thus negative effects of contamination or carry-over can be eliminated.



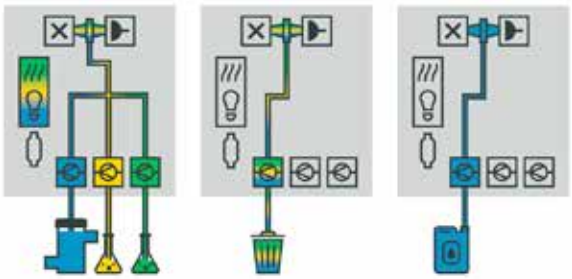
Digestion of Total Phosphorus

First, the sample is pumped together with the necessary reagents into a digestion vessel. In this container, the mixture is irradiated with UV light and heated during this process. This converts the free and bound phosphorus into orthophosphate (OP). The mixture is then pumped into a sample container where it cools down.



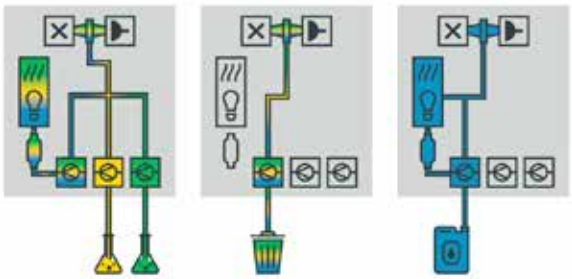
Measurement of Orthophosphate

During the sample digestion the measurement of orthophosphate is carried out. For this purpose, a water sample with the corresponding reagents is pumped directly into the cuvette. The water reacts with the reagents, causing the mixture to change color. In the photometer, the intensity of this color is measured and the concentration of orthophosphate is calculated. The sample is then pumped into the drain and the BlueMon Analyser is cleaned.

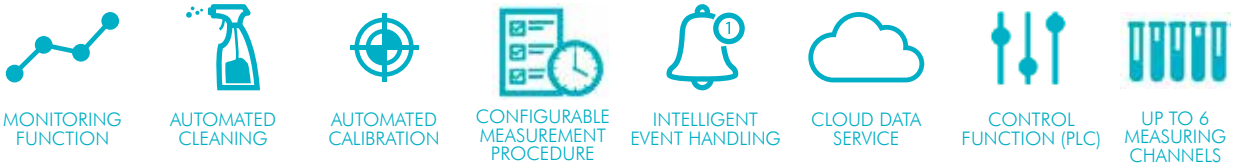


Measurement of Total Phosphorus

The prepared sample is pumped from the sample vessel into the photometer and mixed with additional reagent. Again the color change is measured, the concentration calculated and the sample discarded. The BlueMon Analyser is finally cleaned and ready for the next measuring cycle of total phosphorus and orthophosphate.



Functions & Features



Technical Data

Power supply	230 VAC (90 - 260 V)
Power consumption (typical)	42 W
Dimensions (wxhxd)	60 x 70 x 30 cm
IP protection class	IP 54 / IP 65 [optional]
Number of measuring channels	2 / up to 4 [optional]
Sample pressure	0 bar (max. 0.05 bar overpressure)
Sample temperature	+10 to +40 °C
Ambient temperature	+15 to +35 °C

Interfaces

1x RS-232, RS-485, var. protocols e.g. Modbus

1x CAN bus for connection of additional modules, sensors & actuators

1x Ethernet [TCP/IP], Modbus [TCP/IP]

Profibus [optional]

GPRS / UMTS / LTE modem [optional]

Inputs

1x Current input 4-20 mA (Example: Turbidity Sensor TU 8xxx)

4x Digital-In (static) potential-free contacts

1x Connection for pH glass electrode

1x Connection for temperature (PT1000) 0-80 °C

1x Connection for Redox/ORP electrode

1x Connection for leakage sensor

Outputs

2x Current output 4-20 mA expandable to 6x 4-20 mA

4x Digital-Out

6x Relay with a switching capacity of 24 V AC/DC; 0,5 A

Total Nitrogen

Measuring principle	spectrophotometric
Measuring range	0.0 - 6.0 / 20.0 / 100(d) mg/l
Measuring accuracy	± 5 %

Total Phosphorus

Measuring principle	spectrophotometric
Measuring range	0.0 - 2.0 / 10.0 / 100(d) mg/l
Measuring accuracy	± 3 %

Ammonium

Measuring principle	photometric
Measuring range	0.0 - 1.0 / 8.0 / 20 / 100(d) mg/l
Measuring accuracy	± 3 %

NO_3

Measuring principle	spectrophotometric
Measuring range	0.0 - 1.0 / 20.0 / 100(d) mg/l
Measuring accuracy	± 5 %

Chlorine

Measuring principle	photometric
Measuring range	0.0 - 0.2 / 1.0 / 3.0 mg/l
Art. no.	488 1FC0

Ortho-phosphate

Measuring principle	photometric
Measuring range	0.0 - 0.5 / 2.0 / 6.0 / 50(d) mg/l
Art. no.	488 1FP0

Silica

Measuring principle	photometric
Measuring range	0.0 - 0.02 / 2.0 mg/l
Art. no.	488 1FS0

Application Areas

Drinking Water

Quality control

Alarm systems

Wastewater

Trend analysis

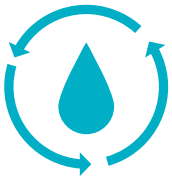
Effluent Monitoring

Process Measurement & Control Technology

Process monitoring in industrial facilities

Control of process water treatment

Process optimisation



Environmental Monitoring

River water

Surface water

BlueSense Analyser

ISE Measurement: Nitrate / Ammonia

The BlueSense analyser facilitates the processing and calculation of measurement values of physical and chemical sensors. In addition, the analyser features a full controller function that can cover all process-oriented tasks. The BlueSense analyser is compatible with analogue and digital sensors and actuators of all manufacturers.

Sensor

ION-SELECTIVE ELECTRODE (ISE) Nitrate / Ammonia

- Plastic shaft
- Slope 57 ± 2 mV/p NH_4^+
- Flexible ammonium selective membrane
- Organic ion exchanger in a special solvent, homogeneously distributed in PVC

Functions & Features

- Cloud Data Service
- SD Card Data Logger
- Modular & Expandable
- Monitoring Function PID-Controller Function
- Intelligent Event Handling CAN bus, Modbus & Profibus

Parameters

- Conductivity
- Dissolved organics
- Dissolved oxygen
- ISE
- Level
- Oil in water
- pH
- Redox (ORP)
- Salinity
- Temperature
- Turbidity

Application Areas

Drinking Water
Quality control
Alarm systems

Wastewater
Influent monitoring
Effluent monitoring
Trend analysis
Early detection of discharge

Process Measurement & Control Technology
Process monitoring in industrial facilities
Control of process water treatment
Process optimization

Environmental Monitoring
River water
Surface water

The ISE sensors can be used with the Handrail Bracket enclosure on page 9

BlueConnect Module

Digitisation of standard process sensors in your water or wastewater treatment plant

The BlueConnect module enables the conversion of standard analogue sensors into the digital world. In addition to the simple connection of sensors to the BlueBox system via CAN bus, sensors can also be integrated directly into a PLC via Modbus. The necessary protocol is freely available and all necessary settings can be configured via the associated free of charge PC software.

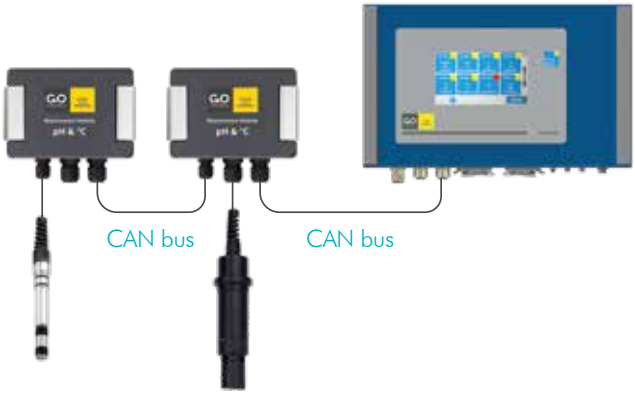
This means that Water and Wastewater Treatment Plants are no longer restricted to Vendor Proprietary Systems when integrating various Vendor Sensors to Instruments, PLC's and other Control Systems.

For example, a standard pH or DO Sensor can be connected to a small BlueConnect Module and the Output signal sent via Modbus direct to the PLC or other Supervisory Control System.

Alternatively, the BlueConnect can send a CAN bus signal direct to a Royce GO BlueBox Analyser/ Controller which accepts up to 200 Inputs.

Currently available Sensor Inputs for BlueConnect are:

- Analogue pH with/without Temperature (LTH S410)
- Analogue ISE (NH4 or NO3)
- Analogue Redox / ORP (LTH S400)
- Galvanic Dissolved Oxygen (Royce G95A)
- Selective Turbidity (B&C TU8325)
- Selective MLSS (B&C TU8355)
- Selective EC (GO SYS)



Digitisation of analogue sensors:

The BlueConnect module effortlessly brings an analogue sensor into the digital world. Once the sensor has been connected, the converted data can be read out via Modbus RTU (RS485). The associated protocol is freely available, enabling a direct connection to a PLC or a Modbus master. If a sensor is used that must be calibrated at certain intervals, the BlueConnect can be connected to a laptop and calibrated with the associated free of charge PC software.

Functions & Features

CANBUS/MODBUS INTERFACE
SENSOR INPUT
PLUG & PLAY SMART SENSOR
DIGITISATION OF SENSORS
IP 66 WEATHERPROOF
PLC INTEGRATION
OPEN PROTOCOL
COMPACT DESIGN

Model TP5 C - Passive

Portable Sampler with Passive Ice Block Cooling

Suspension bar for use in sewers with suspension harness

Dosing system Vacuum container

- **Vacuum or Peristaltic pump options**
- New, direct connection via USB of an external multi-parameter portable meter pH/Cond/Temp (Option)
- Highly accurate sample volume
- Minimal effort for calibration (Peristaltic pump)
- Transport trolley (Option)
- Clear operating structure and simple programming
- LAN/GPRS/Web communication (Option)
- Easy cleaning
- Modern and ergonomic design
- Long battery run-time thanks to »sleep mode«
- 2nd dosing tube for changing the sample volume (Vacuum)
- Sample cooling with ice packs/dry ice

Technical Specifications

Housing	PE/PC (GF10) Doublewalled, insulated lower part
Control	Microprocessor control, foil keypad, back lit display Option: with PC software or LAN/GPRS/WEB communication (2 year ring memory FIFO at 1 min interval)
Programming	12 freely programmable programs, user-friendly software
Interface	MiniUSB, optional: Ethernet RJ45, SDI-12
Signal Inputs	2 x analog: 0/4–20 mA, max. working restistance 500 Ohm 8 x digital (Flow, Event, 1 x free programmable) Impulse length 60 ms, switching level 7–24 V
Signal Outputs	8 digital outputs, 1x of them as collective malfunction message
Sampling Method	Vacuum 20–350 ml
Suction Height	6,5 m (at 1000 hPa)
Pumping Speed	> 0,5 ms at suction height up to 5 m (at 1000 hPa)
Suction Hose	PVC, L=5 m, ID=10 mm (max. hose length 20m
Sampling Modes	Time, flow, event-related and manual sample
Bottle Variants	24 x 1 L PE (standard version) 1 x 10 L; 1 x 25 L, 2 x 13 L; 4 x 5 L; 16 x 1 L PE incl. freezer packs
Overall Dimensions	787 x 510 x 468 mm (hxwxd)/Insulating box passive
Weight	approx. 25 kg: Isobox with passive cooling (24 x 1 L)
Power Supply	sampler 12 V/10 Ah battery/with charger IP44 oder IP67
Ambient Temperature	0° to +50° C
Sample Temperature	0° to +40° C
Standards	CE, sampling according to ISO 5667-10, EN 16479

Model TP5 C - Active

Portable Sampler with Active Compressor Cooling

Active cooling 12/115/230 V variant 24 x 1 L

Charger IP44 (Indoor) and IP67 (Outdoor)

- **Vacuum or Peristaltic pump options**
- New, direct connection via USB of an external multiparameter portable meter pH/Cond/Temp (Option)
- Vacuum system
- Clear operating structure and simple programming
- LAN/GPRS/Web communication (Option)
- Easy cleaning
- Modern and ergonomic design
- Transport trolley (Option)
- Highly accurate sample volume
- Minimal effort for calibration (Peristaltic pump)
- Integrated pump replacement tube (Peristaltic pump)
- Long battery run-time thanks to »sleep mode«
- 2nd dosing tube for changing the sample volume

Technical Specifications

Housing	PE/PC (GF10) Doublewalled, insulated lower part
Thermostatic Control	compressor cooling (12 V/115 V/230 V)
Control	Microprocessor control, foil keypad, back lit display Option: with PC software or LAN/GPRS/Web communication. (2 year ring memory FIFO at 1 min interval)
Programming	12 freely programmable programs, user-friendly software
Interface	MiniUSB, optional: Ethernet RJ45, SDI-12
Signal Inputs	2 x analogue: 0/4–20 mA, max. working resistance 500 Ohm 8 x digital (Flow, Event, 1 x free programmable) Impulse length 60 ms, switching level 7–24 V
Signal Outputs	8 digital outputs, 1x of them as collective malfunction message
Sampling Method	Vacuum 20–350 ml
Suction Height	6,5 m (at 1000 hPa)
Pumping Speed	> 0,5 ms at suction height up to 5 m (at 1000 hPa)
Suction Hose	PVC, L=5 m, ID=10 mm (max. hose length 20m
Sampling Modes	Time, flow, event-related and manual sample Option: variable flow-proportional sampling
Bottle Variants	24 x 1 L PE (standard version) 1 x 10 L; 1 x 25 L, 2 x 13 L; 4 x 5 L; 16 x 1 L PE incl. freezer packs
Overall Dimensions	1.028 x 550 x 468 mm (hxwxd)/Insulating box active
Weight	approx. 40 kg; Isobox with active cooling (24 x 1 L)
Power Supply	Sampler 12 V/ 10 Ah battery/charger IP44 or IP67 active box 230 V–50 Hz/115 V–60 Hz/12 V battery
Ambient Temperature	0° to +50° C
Sample Temperature	0° to +40° C
Standards	CE, sampling according to ISO 5667-10, EN 16479

Model P6 Non-Cooling

Portable Sampler without Cooling

- **Peristaltic Pump**
- New, direct connection via USB of an external multi-parameter portable meter pH/Cond/Temp (Option)
- Innovative measuring device for volume determination
- Minimal effort for calibration
- Highly accurate sample volume
- Clear operating structure and simple programming
- LAN/GPRS/Web communication (Option)
- Easy cleaning
- Modern and ergonomic design
- Long battery run-time thanks to »sleep mode«
- Integrated pump replacement tube
- Pumping speed > 0.5 ms at suction height up to 5 m

P6 MINI MAXX with composite

P6 MINI MAXX with suspension harness

Technical Specifications

Housing	Made of ABS and PP Doublewalled, insulated lower part
Control	Microprocessor control, foil keypad, back lit display. Option: with PC software or LAN/GPRS/WEB communication. (2 year ring memory FIFO at 1 min interval)
Programming	12 freely programmable programs, user-friendly software
Interface	MiniUSB, optional: Ethernet RJ45, SDI-12
Signal Inputs	2 x analog: 0/4–20 mA , max. working restistance 500 Ohm 8 x digital (Flow, Event, 1 x free programmable) Impulse length 60 ms, switching level 7–24 V
Signal Outputs	8 x digital, one of them as collective malfunction message
Dosing System	Peristaltic pump 20–10.000 ml
Suction Height	max. 8,5 m (at 1000 hPa)
Sampling Modes	Time (CT, CV), Flow (VT, CV) or (CT, W), variable flow (Flow modes are controlled by an external flowmeter signal) Event and manual sampling
Bottle Variants	P6 L PE: 24 x 1 L/1 x 10 L/4 x 4 L/8 x 2 L Glass: 24 x 350 ml/12 x 950 ml/8 x 2 L P6 Mini Maxx: PE: 1 x 10 L; glass: 1 x 4 L
Overall Dimensions	P6 L: 500 x 805 mm (diam. x h) P6 Mini Maxx: 400 x 605 mm (diam. x h)
Weight	P6 L approx. 13 kg (without battery) P6 MINI MAXX approx. 9 kg (without battery)
Power Supply	12 V/7.2 Ah battery with charger IP44 or IP67
Ambient Temperature	0° to +50° C
Sample Temperature	0° to +40° C
Standards	CE, sampling according to ISO 5667-10, EN 16479

Model SP5B

Stationary Refrigerated Auto-Sampler

- **Vacuum or Peristaltic pump options**
- Compact device in plastic housing, especially suitable for corrosive environment
- Unrivaled measuring device for volume determination (Peristaltic pump)
- Highly accurate sample volume
- Minimal effort for calibration
- Clear operating structure and simple programming
- LAN/W-LAN/GPRS communication (Option)
- Easy cleaning
- Modern and ergonomic design
- Big variant of bottle configuration
- Well insulated

Technical Specifications

Housing	PE with 50 mm insulation/PS/PC (GF10)
Control	Microprocessor control, foil keypad, back lit display
Thermostatic Control	Self-contained, controlled cooling (ice-free), heating, 4° C (adjustable)
Programming	12 freely programmable user programs, user-friendly software
Interface	Mini-USB, optional: Ethernet RJ45, SDI-12 Optional: Modbus, Profibus DP
Communication	Optional in combination with PC software or LAN/ WLAN /GPRS (2 year ring memory FIFO at 1 min interval)
Signal Inputs	2 x analogue: 0/4-20 mA, max. working resistance 500 Ohm. 8 x digital (flow, event, 1 inputs can be programmed freely). Impulse length 60 ms, switching level 7–24 V. Option: expandable with 4 x digital, 3 inputs can be programmed freely, and 8 x analogue 0-20 mA or 0-10 V
Signal Outputs	8 digital outputs, 1x of them as collective malfunction message Option: expandable with 8 digital, 5 are freely programmable
Sampling Method	Peristaltic pump 20–10.000 ml/Vacuum 20–350 ml (in PC: option glass)
Sampling Modes	Time (CT, CV), Flow (VT, CV) or (CT, VV), variable Flow only peristaltic pump (Flow modes are controlled by an external flowmeter signal) or option for vacuum-system; Event, and Manual sampling
Suction Height	Vacuum 7,5 m (at 1000 hPa), option: 8,5 m or up to 15m. Peristaltic pump 8,5 m (at 1000 hPa)
Bottle Variants	Plastic: 1 x 25 L; 4 x 14 L; 4 x 10 L;12 x 3,0 L; 24 x 1 L; 24 x 1 L. Glass: 12 x 2 L; 24 x 1L
Overall Dimensions	1100 h (1640 with opened top) x 760 w x 775 d mm
Weight	approx. 75 kg with composite container, higher weight when using several bottles and/or glass bottles
Ambient Temperature	-20° to +50° C
Sample Temperature	0° to +40° C
Standards	CE, sampling according to ISO 5667-10, EN 16479

Model TP5 W

Wall-mounted Device

- **Vacuum Pump Only**
- New, direct connection via USB of an external multiparameter portable meter pH/Cond/Temp (Option)
- Flexible application and combination possibilities
- Highly accurate sample volume
- Clear operating structure and simple programming
- LAN/GPRS/WEB communication (Option)
- Easy cleaning
- Modern and ergonomic design

TP5 W in combination with optional fridge 1 x 25 L

Non-contact filling levelsensor (Option)

Technical Specifications

Housing	PS/PC (GF10)
Thermostatic Control	no; option: refrigerator
Control	Microprocessor control, foil keypad, back lit display Option: with PC software or LAN/GPRS/WeEB communication (2 year ring memory FIFO at 1 min interval)
Programming	12 freely programmable programs, user-friendly software
Interface	MiniUSB, optional: Ethernet RJ45, SDI-12
Signal Inputs	2 x analogue: 0/4–20 mA, working resistance 500 Ohm 8 x digital (flow, event, 1 inputs can be programmed freely) Impulse length 60 ms, switching level 7–24 V
Signal Outputs	8 digital outputs, 1x of them as collective malfunction message
Sampling Method	Vacuum 20–350 ml
Suction Height	6,5 m (opt. up to 8,5 m) (at 1000 hPa)
Pumping Speed	> 0,5 ms at suction height up to 5 m (at 1000 hPa)
Suction Hose	PVC, L = 5 m, ID = 10 mm (max. hose length 20 m)
Sampling Modes	Time, Flow, Event-related and manual sample
Bottle Variants	composite container (Option)
Overall Dimensions	362 x 442 x 222 mm (hxwxd)
Weight	approx. 10 kg
Power Supply	230 V/115 V/AC
Ambient Temperature	0° to +45° C
Sample Temperature	0° to +40° C
Standards	CE, sampling according to ISO 5667-10, EN 16479

AQUAMATIC
Wastewater Samplers for the World

AQUA CELL

Portable Samplers

P2-COMPACT / P2-COOLBOX / P2-MULTIFORM

Aquamatic's range of three Portable Wastewater Samplers gives complete sampling flexibility. Like all the models in Aquamatic's Aquacell Sampler range, the tiny P2-COMPACT, the versatile P2-MULTIFORM and the temperaturecontrolled P2-COOLBOX all feature the unique, high-performance Aquacell Module. All can be powered by mains electricity or via an integrated battery that can provide up to 350 samples on a full charge.

The air pump vacuum sampling system featured within every Aquacell Module provides for a reliable, representative and repeatable sample without the weaknesses that can be associated with alternative sampling techniques. Programming set-up is simplicity itself, with sample volumes from 50 - 500ml (and above, using multiple shots/sample events) and sample intervals from 1 minute to almost 100 hours. Sample extraction frequency can be time based or triggered by external sources such as flow meters, level sensors, pH meters, PLC's etc. ALL Aquacell Sampler models are certified to the UK Environment Agency's MCERTs standard for Automatic Wastewater Sampling Equipment and also the International Standard for Wastewater Samplers ISO 5667-10.

All Aquamatic portable Samplers can extract samples from a pressurised effluent source, when specified with a Pressurised Pipeline Interface - Standard.

P2-COMPACT

Ideal when samplers are transported between sites, the Aquacell P2-COMPACT takes up minimal space and yet offers all the benefits of the high-performance Aquacell module. Supplied complete with with a compact, low profile 5 litre HDPE Sample Collection Vessel.

P2-COOLBOX

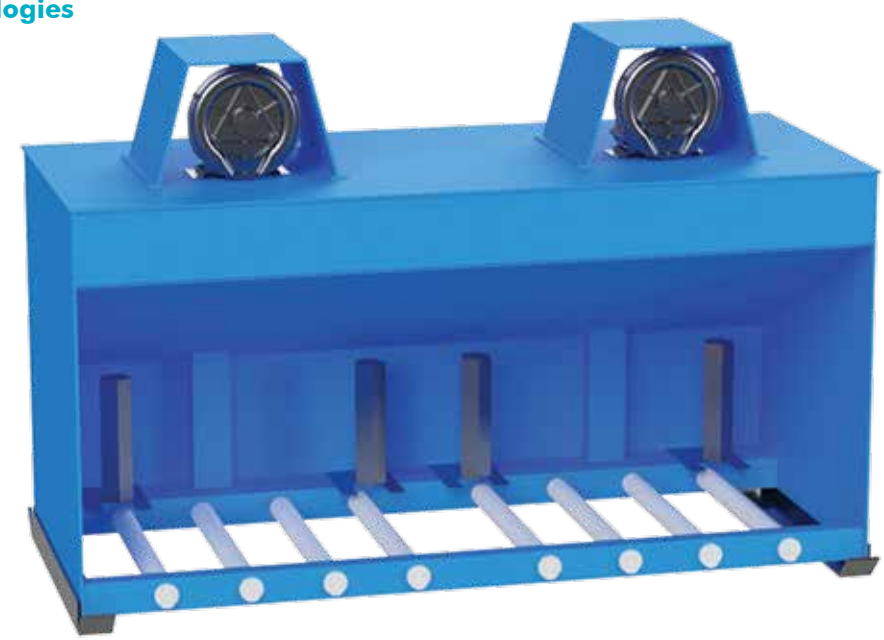
Designed for sampling biologically active wastewater, the Aquacell P2-COOLBOX features a high-performance passive Sample Temperature Control System that maintains samples at an optimal temperature of 0 - 5°C for up to five days. The passive temperature control system requires no power, therefore maximising on-board battery life. Sample temperatures can be measured and logged for subsequent download. Supplied complete with 5 litre Sample Collection Vessel and Cooling Elements.

P2-MULTIFORM

Combining the convenience and reliability of a portable Aquacell Sampler with the versatility of single or multiple bottle Sample Collection Vessels, the P2-MULTIFORM Sampler features a simple 'lift-off' design for access to easily visible Sample Collection Vessels. Like all Aquacell Samplers, the P2-MULTIFORM can be connected to and controlled by external equipment such as flow meters, pH meters or PLC's etc.

Technical Specifications

MODEL	COMPACT	COOLBOX	MULTIFORM
MCERTS Certified	Yes	Yes	Yes
Sample temperature control	No	Passive	No
Sample frost protection	No	Passive	No
Suitable for outdoor use	Yes	Yes	Yes
Dimensions (mm)	H430 W320 D375	H835 W430 D430	H780 W445 D445
Weight (kg)	7.3	17.5	8.5
IP Rating	55	55	55
Minimum ambient working temperature °C	-10	-10	-10
Maximum ambient working temperature °C	50	50	50
5 litre container	Yes	Yes	No
25 litre container	No	No	Opt
12 x 1 litre PET Bottler	No	No	Opt
12 x 1 litre glass Bottler	No	No	Opt
24 x 1 litre HDPE Bottler	No	No	Opt
Ancilliary Signal Connection (for flowmeters, pH meters, PLC's etc)	Opt	Opt	Opt
Bottler Connection	N/A	N/A	Opt
Data Download Connection	Opt	Opt	Opt
Sample Temperature Monitoring	Opt	Opt	Opt
Transportation Truck	Opt	Opt	Opt



Royce Lagoon Aerator

A new aeration concept for wastewater lagoons and algae control

The use of wastewater treatment lagoons, or stabilisation ponds, is a common practice for rural municipalities and industrial facilities. Through the years there have been numerous designs for these 'sludge settling basins,' ranging from facultative, partial aerated, and fully aerated systems. But the primary reason for these systems is to utilise relatively shallow earthen ponds, or lagoons, for the purpose of sludge settling and stabilisation. Over the years, the technologies for these lagoons has changed little except to line them to protect groundwater from contamination and the addition of multi-celled lagoon systems for the purpose of adding mechanical oxidation for quicker treatment and effluent water polishing.

The other things that have changed are the encroachment of growing populations and plant expansions that often pose problems for both the lagoons and the populations around them. Noxious odours, which are caused by the insufficient digestion and buildup of the sludge on the bottom of aerated lagoons, become a primary problem. Space limitations become a major problem as populations grow, and new, or larger, cells are required in the lagoon system. The efficiency of these lagoons is dependent on a myriad of conditions that range from environmental to design limitations. Sludge reducing bacteria populations must constantly be assessed, sludge depth and water temperatures are usually in constant flux and aeration equipment and the energy to run them is expensive and causes ever increasing maintenance and maintenance costs. Post the treatment lagoon, in the effluent holding ponds, blue green algae (BGA) is often a problem in warmer areas. The use of a Royce Lagoon Aerator in this pond can de-stratify the lagoon and make it difficult for the BGA to exist.

The Lagoon Aeration Process

In the more advanced waste lagoon systems there is an aeration process that is supposed to:

1. Provide oxygen to aerobic bacteria that convert and oxidise the organic material in the wastewater.
2. Provide mixing in order to distribute dissolved oxygen and bring aerobic organisms into contact with organic sludge.
3. Provide enough mixing to allow solids to become suspended for quicker digestion and oxidation by the aerobic bacteria. If this does not take place, solids will build up on the bottom, eventually requiring the very expensive process of sludge removal from the lagoon bottom.

Over the years the methods of aerating these lagoons has changed little. The primary aeration techniques used for earthen waste lagoons are:

- Hose bubbler systems that utilise large, housed, industrial blowers.
- Diffused air grids that also utilise large industrial blowers.
- Low horsepower spray aerators.
- Paddle-wheel, or brush, aerators.
- Large circular surface mixers.
- Floating air induction aerators.
- Solar powered mixers.

There are other less-used technologies found in waste lagoons for the purpose of providing dissolved oxygen and mixing, but these are so seldom used that they will not be addressed here.

The primary positives and negatives of the above listed aeration technologies are:

- Hose bubbler systems are very common in lagoon aeration because of their relatively low initial cost, and initially they seem to work fine. But, the blowers required

to drive these systems are very expensive to operate and maintain; the hoses themselves require occasional replacement for optimum efficiency, and finally, but most importantly, their inefficiency in mixing and getting dissolved oxygen into the sludge, especially in older lagoons, allow for sludge buildup and the eventual cost of sludge removal.

- Diffused air grids are used in an effort to make the waste lagoon work like the extended aeration process commonly used in urban municipal wastewater systems. These are expensive installations, especially when manmade liners are utilised. The blowers are very expensive to operate and maintain, and finally, the diffusers used cannot be located as efficiently as extended aeration designs because of their cost and expense of sludge removal when sludge depths rise above the diffuser heads.
- Spray aerators are inexpensive to install and do not use much energy, but their efficiency in providing mixing and dissolved oxygen to the sludge is minimal.
- Paddlewheel, or brush aerators, are simple and inexpensive to install, but they are quite expensive to operate and their continual maintenance requirements are costly. These aerators do move water, so they will mix bottom sludge, but their cost of operation is always their major drawback.
- Large surface mixers, or aerators, were initially introduced in extended aeration plants in the first half of the 20th century, and are primarily used in large industrial waste lagoon systems. They are very expensive to acquire, and take large amounts of energy to run. But these aerators, if properly designed, do mix the bottom sludge and will allow dissolved oxygen to provide the oxidation of suspended solids that is required to reduce solids buildup on the lagoon bottom.
- Floating air induction aerators do move water well and they do add dissolved oxygen somewhat efficiently, but they are restricted to deeper and lined lagoons. They also possess an inefficient water moving capability so many are required for even small lagoons.
- Solar powered mixers are the newest entry to the lagoon aeration market. But, due to the very low amount of energy available, via solar panels, effective mixing, especially in older lagoons, is deficient. They are very costly and soon require as much maintenance as other devices mentioned above. Ragging of the impellor is a frequent problem.

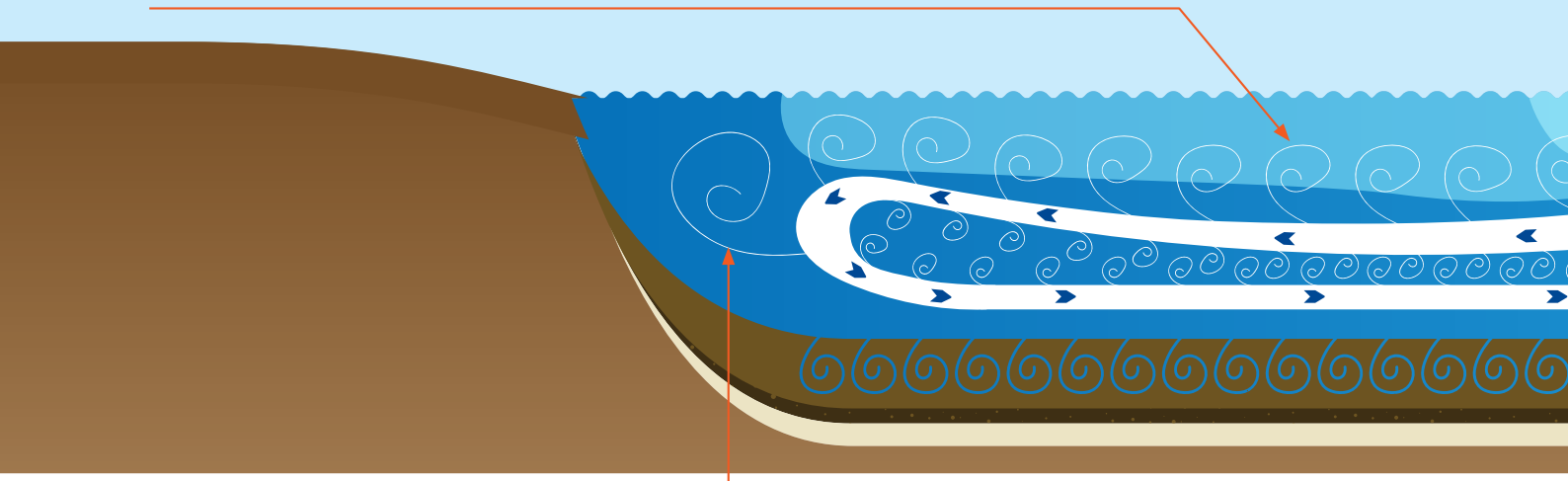
A New & Better Lagoon Aerator

The idea of 'blended aeration' was conceived in 2004 in order to improve the aeration and growth conditions of fish being raised in earthen ponds. The idea of the blended aerator was to allow the fish to return to its genetically coded preference of living in moving water. Moving water provides the organisms that live there with:

- A flow that usually cleans the bottom of noxious sediments.
- The ability of the fish to get to the bottom to scavenge for food.

ROYCE LAGOON AERATOR

Quiescent water forces turbulant surface flowing water to fall until it hits the sludge on the bottom. This turbulance on the bottom begins sludge fluidisation.



Opposite shores turns water back toward the intake of the model Lagoon Aerator, which pulls 37,000 cubic metres of water through itself per day. This flowing water completes the fluidisation of the sludge.

How the Lagoon Aerator is different from other surface aerators

- A relatively constant level of dissolved oxygen throughout the water column.
- And, recent studies have identified that a fish that swims into a current experiences a more efficient food conversion ratio.

One concept that must be recognised in attempting to understand the blended aerator is that water is a heavy natural material. Once a measure of water begins to move, it is very hard to stop and will take a long time to do so on its own. During the process of moving, the water will naturally fall to the lowest level it can reach, normally moving anything lighter than itself in the process – like sludge.

The Royce Lagoon Aerator is a second generation of the aerator used for the fish farming industry. Due to the corrosive nature of many wastewaters there are no metals used in the construction. Some use a metal frame or submersible components. The Royce Lagoon Aerator is made from ridged and durable recycled HDPE without any submerged metal components. One Royce Lagoon Aerator effectively recycles 4,500 2L milk bottles or 34,450 plastic shopping bags.

The Royce Lagoon Aerator uses one 1.5kW regenerative blower to move over 37,000 cubic metres of water through itself in a 24 hour period. Once that surface water begins to move it will fall to the bottom, on a continual basis, bringing the bottom sediments, or sludge, into the water column where the nutrients will oxidise and aerobic organisms will thrive. A second 1.5kW regenerative blower feeds into industrial grade fine bubble diffusers for the addition of dissolved oxygen, and this blower can be automatically controlled to turn on only when DO is required.

This aerator design can be customised for your lagoon system and manufactured in Brisbane, QLD.

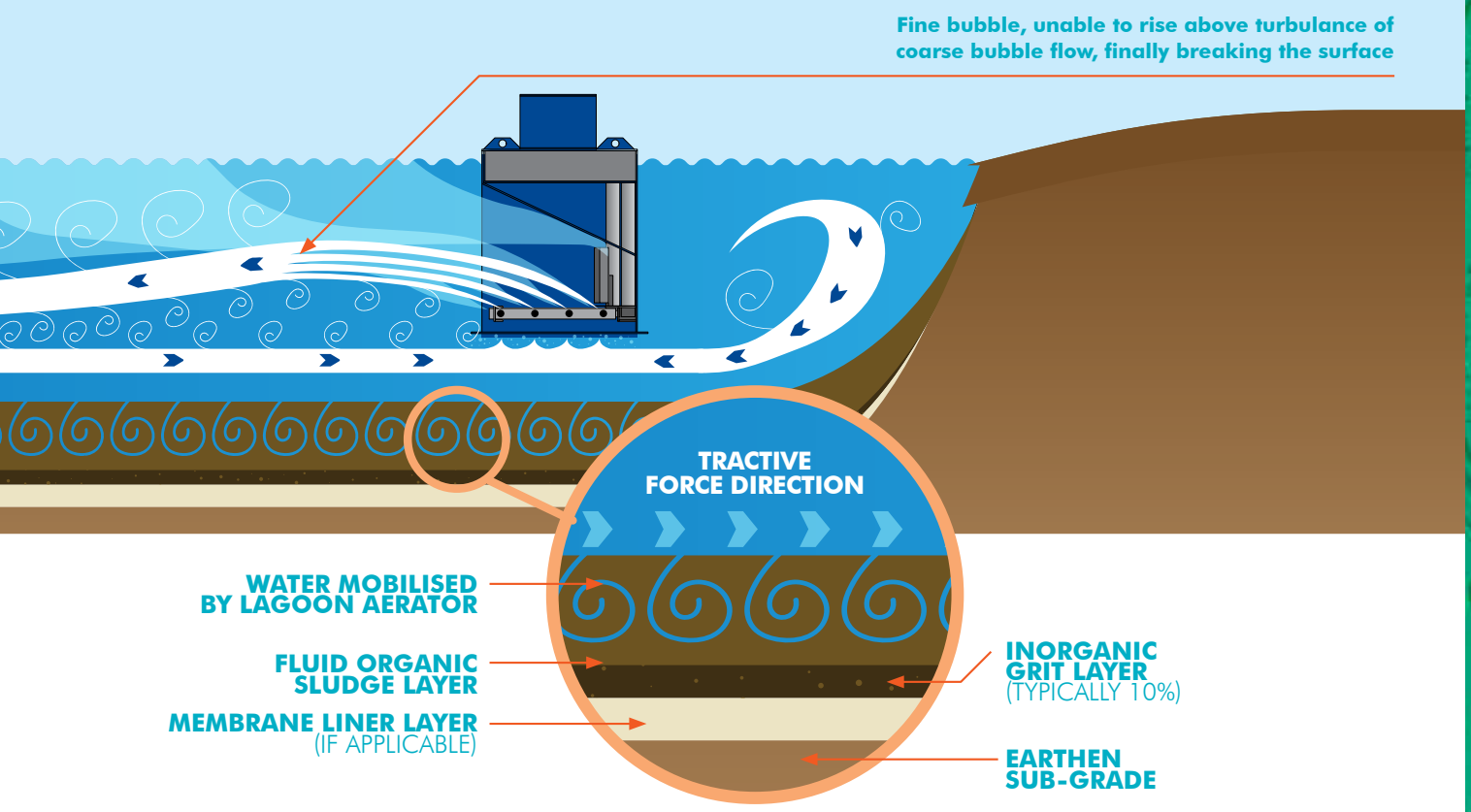
Features

- Only 3kW at maximum energy use
- No propellers or shafts to foul
- No belts or gearboxes to break or require maintenance
- Non-corrosive materials of construction - Anodized aluminum, HDPE, Stainless Steel
- The addition of up to 9.0kg O_2/hr

Benefits

- Continuously moves the lagoon or pond water via vertical mixing, for complete destratification, algae bloom reduction, and natural sludge digestion.
- Delivers more dissolved oxygen to the water per hour
- Lowers energy costs by up to 80%
- Practically maintenance free for years
- Eliminates trapped nitrogen and ammonia gases, and improves BOD/COD counts

Can also be used with Kuh Kai Water Aerator on page 82



	BLOWER 1 - KUH KAI	BLOWER 2 - FINE AIR DIFFUSERS	
Power Consumption (kW)	*1.50*	*1.50*	kWatt Consumption of each Blower
Airflow (l/h)	*155,000.00*	*155,000.00*	Airflow from 1.5kW Blower
Oxygen Supplied (l)	*32,550.00*	*32,550.00*	Airflow x 21% of Oxygen in Air Average
Bubble Path length (M) - Due to unique shape	*3.00*	*3.00*	Estimated minimal horizontal distance that the air travels from bottom to surface (+-20%)
Kuh Kai total uptake (%)	*6.00*		
Mass of dissolved oxygen transferred (kg) (SOTR)	*2.57*	*6.51*	
O_2kg/kW/hr of delivery	*1.71*	*4.34*	
Total O_2kg/kW/hr	*3.03 +-20%*		
Total O_2kg/hr (SOTR)	*9.08 +-20%*		

Unique Design causes longer Sub Surface Bubble Travel Time = Increased Contact Time of Diffused Air with Water. Design of Aerator can be considered an Air-Water Interface Generator for Oxygen Transfer Enhancer in Diffused Aeration System - Passaworn Warunyuwong & Tsuyoshi Imai et al.

Kuh Kai Water Aerator

Unique design creates both coarse, fine and micro-bubble aeration

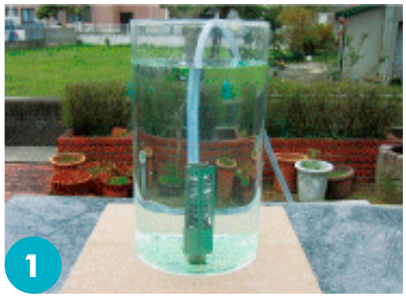
KUH KAI is an innovative product that collides, stirs and breaks down sludge and air into fine particles in a pentagonal cylinder 65cm in length, to accelerate the purification of waste water. Air jetted from a pentagonal cylinder diffuses and radiates outward while eddying in a non-conventional approach.

Features

- Applicable when the water is 1m or deeper
  - Applicable to existing or new equipment as long as the water tank or lagoon pond is 1m or deeper.
- No clogging (Pentagonal tube opening 80mm × 130mm)
  - No need to worry about clogging due to the large-diameter opening particularly with intermittent processes during denitrification.
- Power cost reduction (20% to 40%)
  - With a small pressure loss between the air in-take and discharge, power costs can be substantially reduced.
- No sludge flocculation on the tank bottom and the oxygen transfer rate is high due to its “air lift effects”.
  - Sludge on the tank bottom is drawn into the pentagonal cylinder and the sludge and air are broken down into fine particles which increases the oxygen transfer rate while colliding, being stirred, and rotating. This how the KUH KAI effectively purifies the water.
- Easy maintenance and management due to its simple structure
  - The main body is made of stainless steel and the inside is made of molded resin = Virtually maintenance free. Also, the main body material and the installation method can be changed according to needs.

Can also be used with Lagoon Aerator on page 82.

MIXING DEMONSTRATION IN A CLEAR WATER TANK



Whole tank volume: 170L

Sludge drawn into a cylinder rises and rotates while colliding against and being mixed with air.

Sludge stirred in the cylinder churns in a spiral and circulates in the tank for purification.

Figure 1 Petagon with collision plates

Discharge of Air

Operation in a aeration tank running condition

DEVELOPMENT

Treatment of Organic Waste using the Activated Sludge Method with micro-organisms has become a standard method in wastewater treatment. In recent years, there has been an increase in technology to reduce the footprint of Wastewater Treatment Plants whilst still maintaining and improving the efficiency of the process.

One area where there can be an improvement relates to higher efficiency of the Aerator (air diffuser). Some current systems use the bubble type generation utilizing porous materials that can clog through deposits of sludge due to the restrictions on their location and positioning. Often, a large vortex flow utilizing a large amount of energy is required to prevent this occurring.

An Aerator was required to prevent the depositing of sludge clogging the Aerator pores without using large amounts of energy. The Kuh Kai Pentagonal Air Lift Aerator was developed to fulfill this need.

EQUIPMENT DESCRIPTION

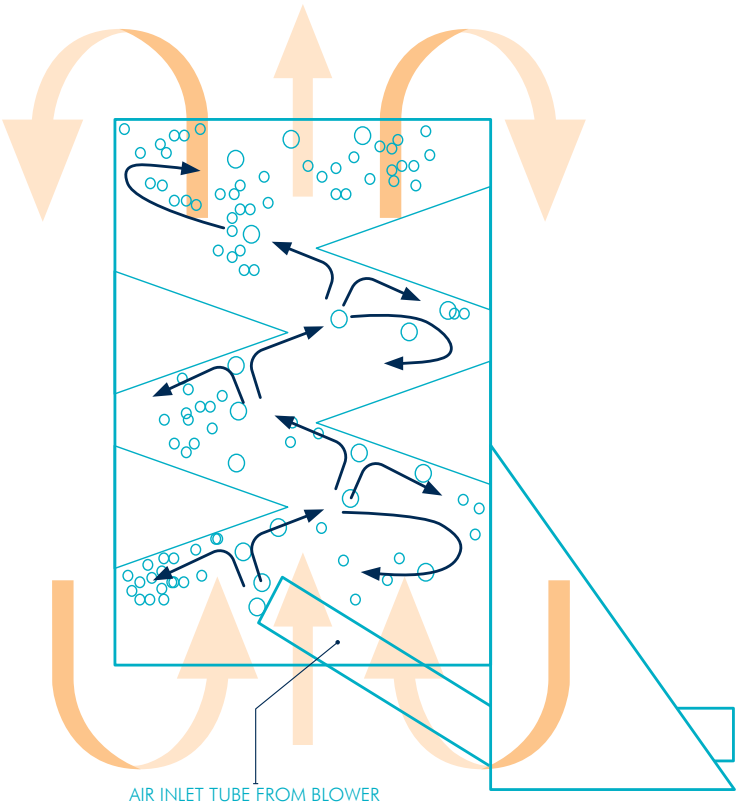
This system, in which the waste water and solids or gases are mixed, was introduced with a view to efficiently dissolve oxygen into wastewater as well as completely mixing it. A pentagon was developed whereby each pentagon section could be placed on top of one another in multiple stages in a vertical direction (**Figure 1**) with an opening impingement plate, and having a clearance between the cylindrical portion and the gas ejection nozzle with an Air inlet in a location at the bottom of the tube (**Figure 3** on the next page).

The effects of the aerator are shown in **Figure 3** and **Figure 4** (on the next page) with the discharge of actual air. It rises in the cylindrical body while colliding with the collision plate and the liquid and then forcibly discharging due to the increased pressure of the gas in the cylinder. As a result, the three parties to complete mixing - liquid, gas and solid coexist inside the cylindrical body, with the gas stage being finer due to the effects of the collision plates.

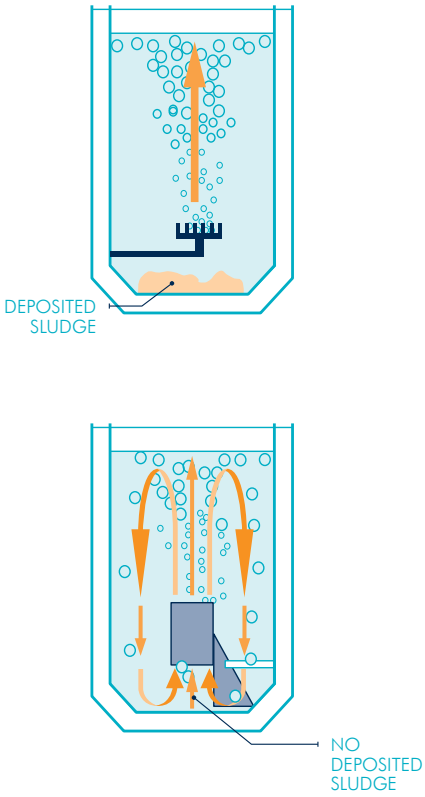
If a collision plate shown in **Figure 1** was a shape close to a circle, due to the fluid flowing along the circumference, turbulent flow in the circumferential direction would be less likely to occur. If you have polygonal shape, turbulence is likely to occur due to flow impinges on each side. On the other hand, the flow itself in the circumferential direction does not generate a large enough resistance when you use a square shape such as a triangle, and the flow would be short-circuited and only go upwards. A Pentagon has been determined as the optimum shape as a result. Moreover, from results of a study of the flow in the vertical direction for the number of stages of the impingement plate, the optimum number of stages was determined to be five stages.

SELECTION CRITERIA OF THE AERATOR IN WASTEWATER TREATMENT FACILITIES IS AS FOLLOWS:

In the aeration tank, the primary objective is the provision of adequate oxygen to activate the sludge. Design criteria is usually 2% - 17% depending on the depth, of the oxygen dissolution efficiency. The Kuh Kai aerator, is a deviation from typical design criteria due to its efficiency of oxygen and agitation capabilities as can be seen from these results. In an activated sludge aeration tank, these methods are shown in the **Figure 4** (on the next page) comparing typical porous aerator versus the Kuh Kai aerator.



Aerator Internal Gas-liquid mixing in **Figure 3**



Sludge Deposit Effects in **Figure 4**

AERATOR PERFORMANCE COMPARISON

CATEGORY	ITEM	AIR BUBBLE TYPE	MECHANICAL TYPE	KUH KAI
Oxygen transfer rate	No clogging of porous diffusers in intermittent processes during settling (denitrification)	×	✓	✓
	Complete mixing of water column of solids, liquids and air	×	×	✓
	No sludge flocculation on the tank bottom	×	×	✓
	Efficient uptake by micro-organisms by using full Biomass available	×	×	✓
Maintenance	Power saving (small pressure loss)	×	×	✓
	Facility Cost savings (easy installation and piping)	×	×	✓
	Easy Operation and Maintenance (parts replacement)	×	×	✓
	Proven Long Life Durability	×	×	✓

DATA

MODEL	MATERIAL		CONNECTION	WEIGHT	AIR SUPPLY VOLUME [M³/MIN]			COVERED AREA [M³]	ADAPTABLE WATER DEPTH [M]
	MAIN BODY	PIPING			LOWER LIMIT	SUGGESTED	UPPER LIMIT		
KA-L	Stainless steel (POM)	SUS	40A	7.2	0.4	1.1	1.5	6~12	1~
KA-M	Stainless steel (POM)	20A	20A	4.8	0.1	0.3	0.5	4~5	1~

Assists in removing FATS, OILS, GREASES and odour from wet wells and pump lift stations.

Kuh Kai Wet Well FOG Blitzer

Water Aerator

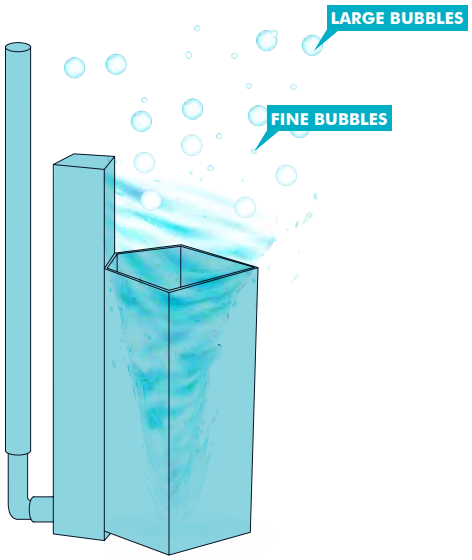
- Helps Dissolve FOG within hours
- Helps Eliminates odours
- Simple to Install

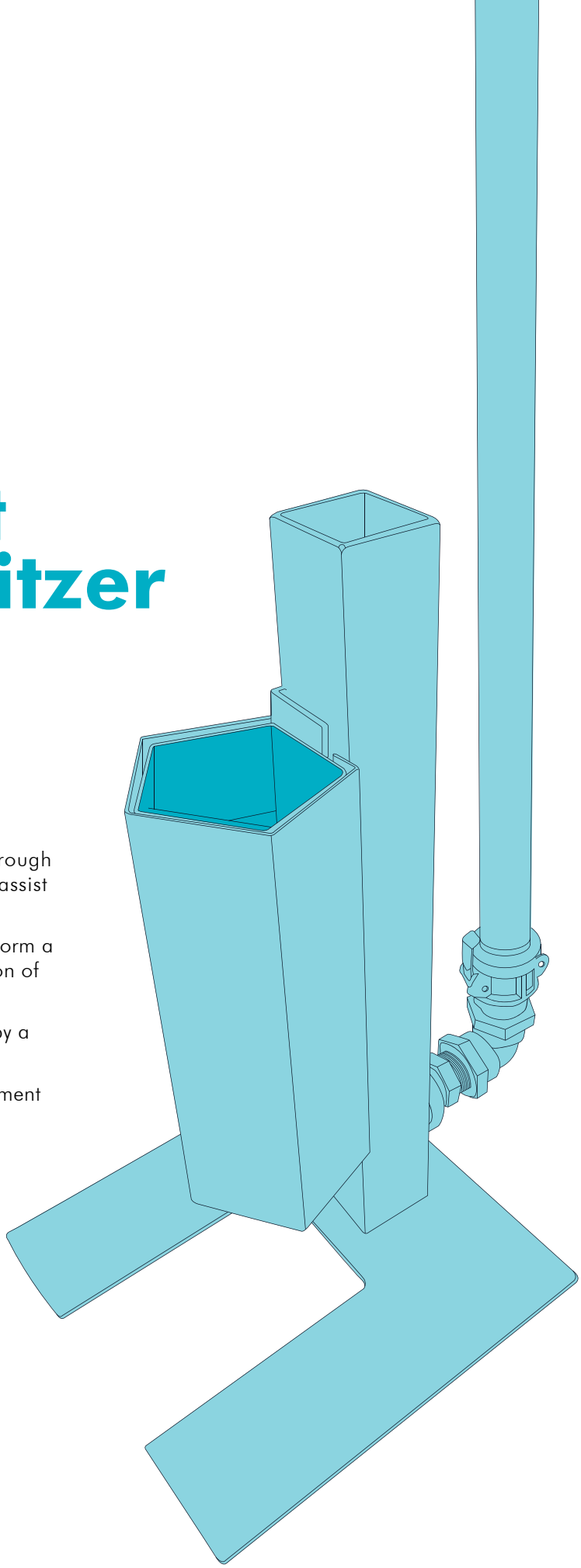
Utilising both coarse and fine Aeration bubbles through the patented Kuh Kai Aerator, the coarse bubbles assist in breaking up the FOG "scum" in the well.

The fine micro bubbles activate aerobic bacteria to form a healthy colony of bacteria that enable biodegradation of organic matter and thus also eliminating odours.

The Kuh Kai Wet Well FOG Blitzer is easy to install by a suspension chain and air hose.

A low energy Blower can also be supplied to compliment the System Package.

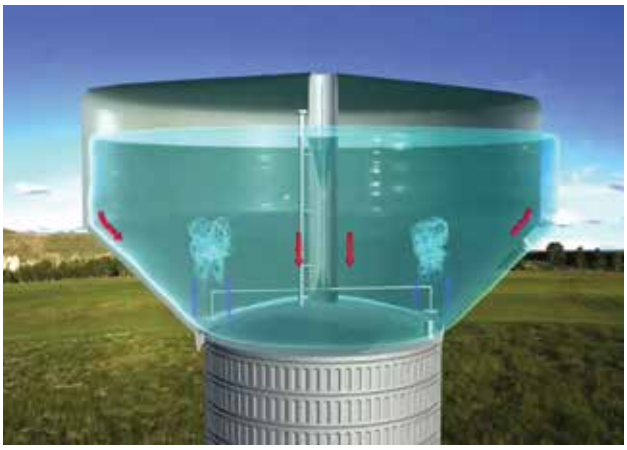




We can build a custom Aerator for your application!

Large Bubble Air Mixing

Cleans wet wells, mixes water storage reservoirs (aiding Disinfection By-Products Reduction) and increases Dissolved Oxygen concentration in wastewater aerobic tanks by causing water column inversion thus lengthening diffuser air contact time.



Pulsed Hydraulics is a proven mixing technology for water and wastewater, cutting the energy used for mixing by 50% over traditional mechanical mixing equipment. The PHi mixing system is designed for use in:

- Anoxic and Aeration Basins
- Water Storage Reservoirs
- Sludge Holding Tanks
- Chemical Mixing
- Polymer and Alum Mixing
- Lift Stations
- Distilled Spirits
- EQ Basins
- Belt Press Sludge
- Backwash Basins

Pulsed Hydraulics, Inc. provides water and wastewater plant operations with a totally unique "Hydro-Pulse" system that mixes without in-basin moving parts, is infinitely adjustable, yet simple to install, operate and maintain. The result is significant power savings over traditional mixers.

Our patented process mixes the entire contents of the tank. The PHi mixing process is non-shear and does not entrain oxygen into tank contents. There are no moving parts within the tank, which keeps the system's reliability high and maintenance costs low.

Pulsed Hydraulics' mixing technology is well accepted in the petroleum, chemical, food, wine and other industries. There are thousands of installations worldwide. This proven mixing solution, is finding wide acceptance for potable water mixing and multiple applications in the wastewater industry.

Benefits

- No Moving Parts in Basin or Tank
- Power Savings over Traditional Mixers
- 100% Online Standby
- Greatly Reduces Costs
- Variable Speed and Intensity Mixing
- Complete Tank Mixing
- Scalable to Any Size Basin or Tank
- Significantly Less Sediment Buildup
- SCADA Interface
- Eliminates FOG, Ragging and Odors in Lift Stations
- Enhances Aeration Efficiency
- Eliminates Temperature Stratification in Potable Water Tanks
- Prevents Ice Build-up
- NSF-61 Approved

How it works: PHi Hydro-Pulse Mixing Technology

Pulsed Hydraulics' Mixing technology Hydro-Pulses compressed air through 316 stainless steel forming plates on the bottom of the tank, forming very large bubbles that rise at 1.5 metres per second to the surface. As they rise, they drag tank contents with them. When the bubbles break the surface and exit to the atmosphere, the tank contents move horizontally until they meet a tank wall, or meet a wave of contents coming from another forming plate bubble. The contents move down until they hit the tank bottom, where they move sideways to the forming plate which results in a circular mixing action in the tank.

The PHi mixing system is not like diffuser or coarse-air mixers, which use a continuous stream of air. The Hydro-Pulses are released 2-4 times per minute depending on the mixing application. Each pulse is approximately 1 cubic metre in size. Both the pulse times and sizes are adjustable. This allows PHi to use the minimum amount of energy necessary to keep solids in suspension.

Replace your floats in a half day or less - with no rewiring of your control system.

Keep it simple with FOGRod®

Wastewater level sensor

- 10% of the maintenance of floats
- 10x easier than ultrasonics
- Unbreakable - 10 year warranty

This failsafe lift station level device is almost as simple as floats, but with much less maintenance; way simpler than ultrasonics; and can't fail like pressure transducers.

Why not free up some of your valuable time with the FOGRod®?

- No moving parts, sensors or electronics in the wetwell
- Failsafe
- Simple and quick to install
- No rewiring of your control system
- No configuration or calibration
- As easy to understand as floats

The FOGRod comes in three lengths - 7.5 ft, 5ft and a special 3ft (with only 6 contacts, 6" apart). If you need a 10ft FOGRod we supply 2x 5ft FOGRods (and 1 LIT). Each FOGRod has the option of two cable lengths - 50 ft or 100 ft. If you don't already have D.C power in the panel (e.g. powering a PLC or telemetry supply) you will need a mains to D.C. power supply.

Benefits

The Level Device that keeps on working as well as much lower maintenance, the FOGRod has a number of additional benefits that you don't get with floats.

- More reliable solution - there is a failsafe feature where faults in the FOGRod or the cable cause an alert (unlike floats)
- Better cleaning of the well - the FOGRod can be positioned much lower in the well than a float - which allows a much lower pump stop point
- Safety - you can see the well level on the unit without opening the well cover, making a much safer working environment
- Remote monitoring of level and faults - the well level is indicated and communicated in 10 steps - allowing your PLC or RTU to communicate the level to your SCADA/telemetry system

FOGRod at installation

FOGRod still working fine

You can't afford the time to clean floats, or to work out why transducers are giving false readings.

Technical Specifications

Construction	CPVC (a stronger and more corrosion resistant form of PVC)
Metal contacts	AL6XN (super-austenitic steel for very high corrosion resistance)
Dimensions	Diameter - 35mm FOG-5 - Length 5ft (1525mm), Separation between contacts 6 in (152mm) FOG-7.5 - Length 7ft 3in (2217mm), Separation between contacts 9 in (229mm)
Weight	FOG-5: 5.5 lbs (2.5kg), excluding cable FOG-7.5: 7.7 lbs (3.5kg), excluding cable
Rating	Nema 6P / IP68
Temperature rating	Operating: -40 °F to 158 °F (-40 °C to +70 °C Storage: -40 °F to 185 °F (-40 °C to +85 °C)
Cable	Custom 11-core cable with braided shield PVC insulation & outer jacket Conductor size 20 AWG or greater
Mounting bracket	Aluminum (powder coated) with polyurethane cleaning pad (anchors, S-hook and cable tie included)

Sonication

- Improve Denitrification Process by using sonicated sludge as carbon source
- Increase Biogas in Anaerobic Digesters
- Reduce Foaming in Activated Sludge Processes and Anaerobic Digesters

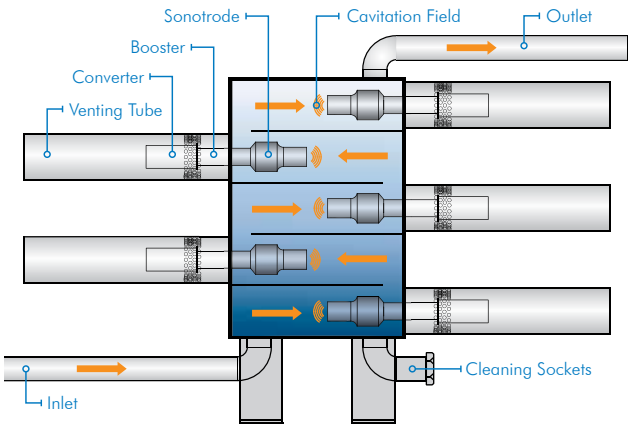
The Ultrawaves Sonication System

World Leading Technology using High-power ultrasound to break down biomass through cavitation

The principle

Ultrasound is sound with frequencies beyond audible sound, i.e. from 20 kHz up to the megahertz range. In aqueous media ultrasound waves cause periodic compression and extension of the water phase. High-intensity ultrasound is necessary to tear apart water molecules during the rarefaction phase, which results in the formation of microscopically small voids in the liquid. These voids become bubbles filled with water vapour or gas. They grow in extension phases and shrink in compression phases, until they implode.

This event is called cavitation, a process under extreme (adiabatic) conditions. On a micro scale, pressures of 500 bar and a temperature of 5,000°C are produced. Particularly large cavitation bubbles are produced within the frequency range from 20 to 100 kHz; when these bubbles collapse they cause extreme mechanical shear forces. These forces produced by ultrasound are capable of destroying even the most robust surfaces.



How it works

Extensive empirical studies have led to the development of a patented high-power ultrasound system, which is optimally tuned to the disintegration of biomass. Our ultrasound reactors operate as a plug flow system. Ultrasound within the lower frequency range (20 and 35 kHz) and high intensity is applied. Our ultrasound systems can be used for volumetric flow rates of up to 2 m3/h, which means that the resulting sonication time for the medium is very short viz. only one minute. It is not necessary to recirculate the medium. The flow rate can even be higher for less concentrated suspensions.

Sludge treatment

Degradation of the organic sludge fraction by conventional anaerobic sludge stabilisation is limited by the rate-determining hydrolysis step. Degrees of volatile solids degradation of 50% are rarely achieved. The cause of this lies in the difficult to access and degrade bacterial biomass of the waste activated (excess) sludge. By applying the high- power Ultrawaves ultrasound technology this limiting hydrolysis step is overcome. Therefore the sonicated excess sludge biomass is more readily available for the subsequent biological enzymatic degradation process.

Ultrasound causes disintegration of the sludge floc structure and release of exo-enzymes even with small energy inputs. This also creates more interface between the solid and liquid phase and there- fore facilitates the enzymatic attack of the active micro-organisms. A higher energy input results in the breakdown of bacteria cells, causing the cell contents and endo-enzymes to be released. These enzymes further accelerate the degradation process. The entire digestion process is intensified and the organic fraction is further degraded. An important advantage from this is a significantly increased production of biogas and reduction in the quantity of residual sludge to be disposed of. As a result of the smaller quantity of residual organic matter, the dewaterability of the digested sludge is also facilitated (less flocculent addition) and increased (higher degree of dewatering).

This disintegration of the sludge reduces its viscosity.

This is important for practical operation, as this facilitates mixing the fermenter content, which in turn results in noticeable energy savings. With the help of ultrasound technology, digesters which are at the limit of their capacity can easily continue to be operated long-term. In new installations the digesters can be designed with a shorter retention period.

Bulking sludge and foam

Seasonal bulking sludge problems often occur in wastewater treatment plants. These are usually caused by filamentous organisms. Foaming in digester tanks is also a familiar occurrence and can cause substantial operational problems.

Sonication of a small quantity of the return activated sludge or returned excess sludge exposes this bacterial biomass to permanent stress through cavitation and fluctuating pressure in the liquid medium. Ultrawaves has proven that this process causes filamentous micro-organisms to particularly suffer and therefore forces them to be permanently eliminated. Use of high-power ultrasound can therefore prevent the formation of bulking sludge and stable wastewater treatment plant operation is maintained again.

Wastewater Treatment

Nitrogen degradation: The biological nitrogen degradation takes place through nitrification and denitrification. A successful degradation process requires an additional carbon supply to be provided for the denitrification stage. Normally, methanol or another external carbon source is bought in and added to the process for this purpose.

Sonication of the excess sludge with ultrasound breaks down the biomass. This releases the cell contents - i.e. ideal carbon carriers - which are then available as an internal source of carbon in the denitrification stage. Biological nitrogen degradation in the wastewater treatment plant can therefore be maintained or even intensified. If part of the sonicated sludge is returned to the biological phase, the quantity of sludge to be disposed of is automatically reduced. Use of ultrasound for the degradation of nitrogen was successfully tested in practice and, for example, has been in operation in Bünde municipal wastewater treatment plant since 2006.

Reduction in greenhouse gas emissions - Positive CO_2 balance due to ultrasound

Electricity produced from biogas is climate-neutral, which is particularly positive for the greenhouse gas balance. Therefore, by using the Ultrawaves ultrasound systems, the CO_2-neutral energy production can be further increased.

The mathematical model drawn up by Ultrawaves calculates the emission reduction achieved by using ultrasound, as the following example shows: In a wastewater treatment plant with 100,000 p.e. ultrasound achieves a 10% relative increase in anaerobic sludge degradation. As a further consequence the dewaterability of the digested sludge is increased by 4% (relative). These effects result in a reduction in the annual greenhouse gas emissions by 1.5 kg CO_2 equivalents per p.e. This corresponds to a reduction of around 150 tonnes CO_2 equivalents per year for this wastewater treatment plant.

Further and more detailed descriptions of case studies as well as our reference list are presented on our website.

Royce Water Technologies Pilot Plant used for Trials

Royce Water Technologies has placed a significant investment into a Pilot Plant to introduce this technology to the Australian Wastewater market and invites progressive engineers and stakeholders at waste water facilities to partner us in this endeavor.

Installed Ultrasonic Reactors

CASE STUDY

Ultrasound System For Improvement Of Anaerobic Digestion On Wastewater Treatment Plants

Bamberg WWTP, Germany

Brief Snapshot of the Plant

- Design capacity 230,000 PE
- Actual loading 280,000 PE
- Sludge treatment: Primary sludge (PS) and thickened waste activated sludge (TWAS)
- Separate WAS thickening: Centrifuge
- Anaerobic sludge stabilisation: 3 digesters (2 x 2,000 m^3, 1 x ,.000 m^3)
- Hydraulic retention time: 18 days (2003)
- Degradation of volatile solids (VS): 34% (2003)
- Sludge disposal: Incineration after dewatering

Objective of the ultrasound application

- Intensification of anaerobic digestion process
- Reduction of volatile solids concentration
- Increase of biogas production

Installation of the Ultrawaves ultrasound system

- Installation of 2 Ultrawaves ultrasound systems (2 x 5 kW) for test in May 2002
- 30% of total TWAS flow treated with ultrasound

Results of ultrasound treatment

- Construction of a new digester (est. investment costs: 2.5 million euros) was avoided
- Intensification of sludge digestion: degradation of VS increased from 34% to 58% (see figure 2)
- Quality of digested sludge: reduction of the VS (as per cent of DS) from 60% to 54%
- Biogas production: increase of 29%

Full-scale installation

Two Ultrawaves ultrasound systems (2 x 5 kW) are in operation since August 2004. In the beginning the recommended stream (30% of the total TWAS flow) was treated during 8 hours a day. The thickening process was automated to operate 24 hours a day. Today the treated stream amounts to 80% of the total TWAS flow.

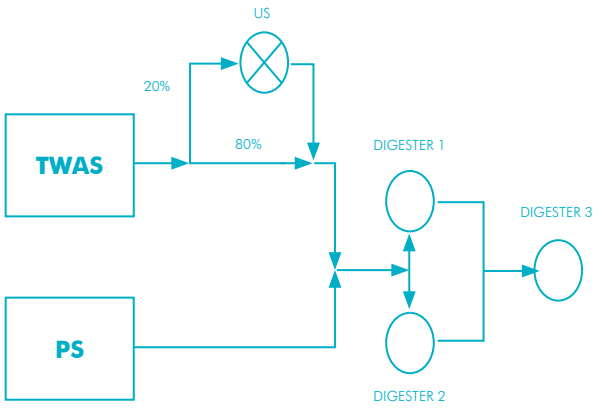


FIGURE 1
Sludge flow sheet of Bamberg WWTP and integration of ultrasound system (US)

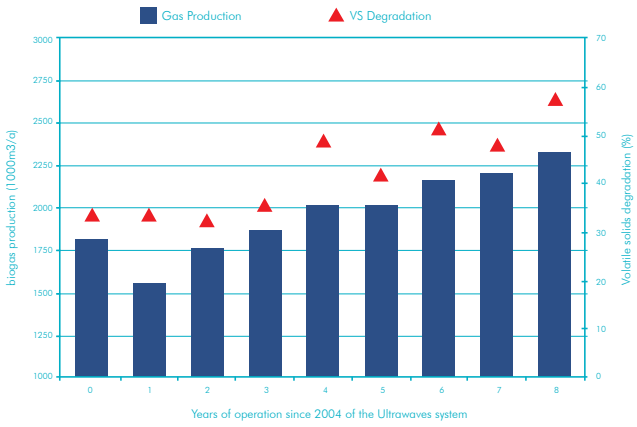


FIGURE 2
Biogas production and degradation of volatile solids

Installed ULTRAWAVES ultrasonic system with thickener at WWTP Bünde

CASE STUDY

Ultrasound Sludge Disintegration Of Sewage Sludge Used As Internal Carbon Source For Denitrification

Bünde WWTP, Germany

Brief snapshot of the plant

- Design capacity: 40,000 PE
- Actual loading: 54,000 PE
- Biological wastewater treatment
  - P-elimination
  - Alternating nitrification and denitrification at a sludge age of about 22 days
  - Addition of methanol as external carbon source
  - Secondary clarifier
- Sludge treatment
  - No primary sludge
  - Thickened waste activated sludge
- Separate waste activated sludge thickening
  - Belt press (operating 24 hours)
- Anaerobic sludge stabilisation
  - 2 digester, mesophilic
  - HRT: 40 days
- Digested sludge dewatering: Centrifuge
- Sludge disposal: Incineration

Objective of the ultrasound sludge disintegration

- Use of disintegrated TWAS as an internal carbon source for the improvement of the denitrification process.

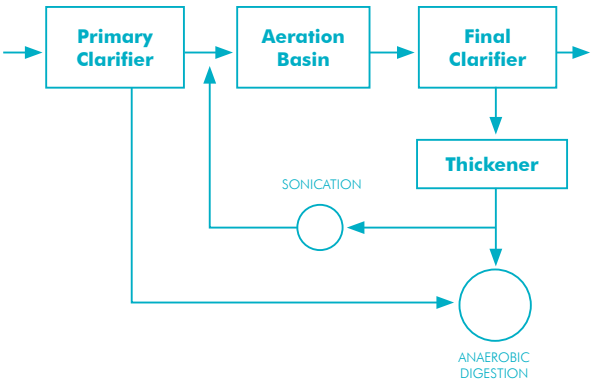


FIGURE 1
Scheme of sludge treatment on WWTP Bünde and Ultrasound system with thickener

Preliminary trial of the ultrasound disintegration system

- Test phase of four months (March 2006 - June 2006)
- 50% of the total TWAS flow were treated with 1 ULTRAWAVES US unit 5 kW, operating 24 hours per day and feed in denitrification basin (Fig. 1)

Results

- A significant reduction of the nitrogen concentration in the effluent (N < 3 mg/L)
- Avoid of methanol as external carbon source
- Waste activated sludge: Reduction of the sludge mass by 13%
- Reduction of the organic fractions
- Improvements in dewaterability of the sludge by 2%
- No foaming or bulking sludge in the activated sludge tank

Payback time

Immediate cost savings due to the reduced usage of methanol.

Full-scale installation

In September 2006 the ULTRAWAVES ultrasound system was implemented on WWTP Bünde. And since is in operation 24 hours per day. WWTP Bünde bought a second ULTRAWAVES ultrasound system for the improvement of anaerobic digestion in 2007.

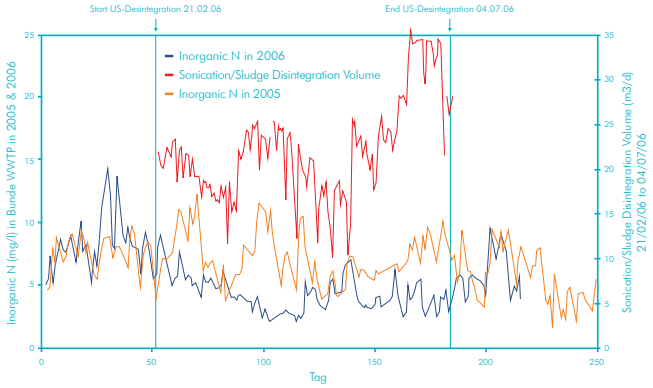


FIGURE 2
Comparison of N-concentration in effluent before (2005) and during (2006) the US test, and Volume of sonicated sludge fed in denitrification basin.

Increase the revenue from your waste & sludge

Bioprocess Control offer unique instruments which also study the dynamics of the degradation process, so that you can more easily find ways to maximise digestion. Our smart testing equipment minimises workloads by turning testing into an efficient and simple routine procedure that removes the most common human errors associated with more traditional approaches.

AMPTS II

Methane potential analysis made easier

The Automatic Methane Potential Test System (AMPTS) II allows users to determine the true biochemical methane potential and dynamic degradation profile of any biomass substrate. This in turn will allow users to more easily determine the optimal retention time and mix of substrates for co-digesting, screen proper pre-treatment methods, and evaluate the need for additives.

Features & Benefits

- Determine the true bio-methane potential
- Significantly reduce your labour demands
- Standardise and compare results
- Get access to highly precise & accurate data

CSTR Bioreactors

Simulate with a continuous stirred tank reactors

Bioprocess Control has developed a series of continuous stirred tank reactors (CSTR) especially designed for scientists and process engineers to simulate full scale fermentation processes in laboratory- or small pilot-scale. Today, the company offers 2 size options (5 and 10 liters) and 3 different configurations. The CSTR bioreactors are well engineered to meet the needs of the most demanding biogas labs.

Features & Benefits

- High quality & robust
- A series of CSTR bioreactors
- Easy to run and maintain
- Offering a flexible and modular design

CSTR-5G

CSTR-10S

bioprocess CONTROL

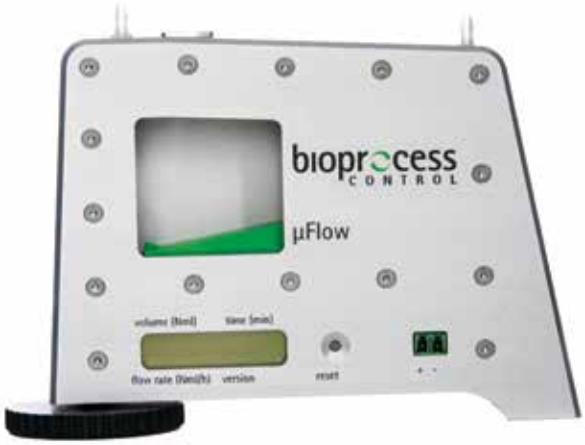
Gas Endeavour

Low gas volume and flow analysis

The Biogas Endeavour allows users to determine the biogas potential and dynamic degradation profile of any biomass substrate. This in turn will facilitate for users to select and price a substrate according to its true energy content of biomass, thus helping to ensure a good control of substrate economy for biogas plants.

Features & Benefits

- Determine a substrates true energy content
- Explore the potential of available substrates
- Compare your results and reports
- Take control of selecting and pricing substrates



µFlow

Low gas flow measurements made easy

The µFlow is a compact and elegant instrument for measuring ultra-low gas flows with high precision. The µFlow has been designed for the on-line, real-time monitoring of all inert and slightly aggressive gases, over a wide detection range and for most indoor laboratory scale applications. Suitable applications include biogas process studies, ethanol fermentation, dark fermentation for bio-hydrogen, and leak rate detection.

Features & Benefits

- A compact and elegant solution
- A low gas flow meter with zero labour requirements
- An entirely new level of precision
- Normalisation of key measurements

BioReactor Simulator

A simulation platform in the cloud

The BioReactor Simulator is a universal platform for simulating at laboratory scale anaerobic fermentation processes in a continuous mode of operation. The system is controlled by a web-based software running on an efficient cloud computing solution accessible from any computer or mobile device with an internet connection.

Features & Benefits

- Simulate continuous processes
- Obtain deeper knowledge and experience
- Standardise and compare results
- Significantly reduce your labour demands

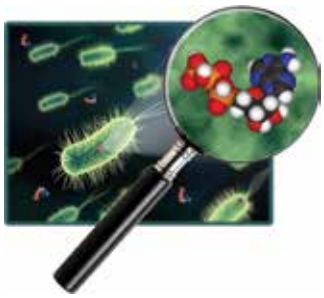
The LuminUltra Solution
Rapid Microbial Monitoring

Regardless of the situation, LuminUltra's advanced 2nd Generation ATP technology provides fast, complete, and accurate insight into microbiological activity. Both portable and easy to use, our test kits provide an interference-free indication of total microbial quantity within minutes of sample collection allowing you to save valuable time, help you better manage risk and reduce operating costs.

What is ATP?

ATP or Adenosine Triphosphate, is the main energy carrying molecule for all forms of life. This makes the measurement of ATP a direct indication of total microorganisms!

How is it Measured?



If you have seen a firefly at night, then you have seen the ATP measurement process in action. Simply put, ATP recovered from microorganisms is mixed with the enzyme Luciferase to produce light which is measured in a luminometer. More microorganisms = more ATP = more light!

ATP + Luciferase Enzyme Luminase™ **= Light**

THE REACTION

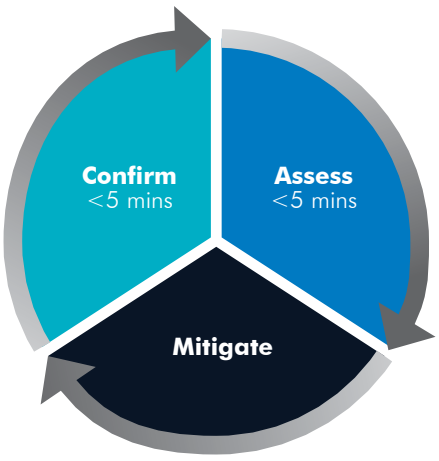
What can ATP testing do for me?

The measurement of ATP detects all living microorganisms, rather than just a fraction of the total population. As well, ATP testing is extremely fast - it provides results in minutes instead of days. These two critical advantages over traditional counting techniques can help you save time, manage risk, and reduce cost!

The LuminUltra Difference:

What makes LuminUltra's 2nd Generation products different from traditional plate counts and other ATP test kit suppliers? LuminUltra's technology is…

- **Rapid:** Provides results in minutes rather than hours, days or weeks.
- **Accurate:** LuminUltra's 2nd Generation ATP test kits are designed specifically for water, organic, and wastewater samples.
- **Complete:** Achieves total recovery of all microorganisms in the sample rather than a small fraction.
- **Quantitative:** Includes a built-in standard to normalise results for valid historical and site-to-site comparisons.
- **Reliable:** LuminUltra's products meet the highest of quality standards and our expert staff provides unparalleled support for all applications.



STRATEGY FOR USE

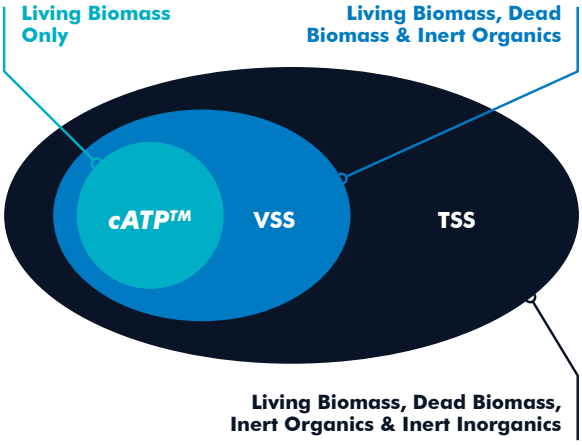
Portable & Complete Microbial Detection

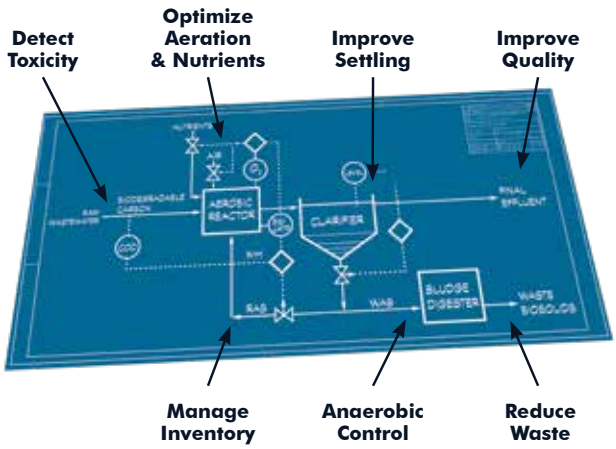
For use in multiple markets – including drinking water, wastewater, industrial manufacturing and oil & gas – LuminUltra's 2nd Generation ATP-based operator-friendly solutions enable you to take the microbiology laboratory into the field to achieve same-shift problem solving.

WASTEWATER

It's the most fundamental aspect of biological wastewater treatment. Are you monitoring the Biomass?

LuminUltra's biological monitoring solution provides direct insight into the health of your biomass, allowing you to observe how it responds to environmental and process changes. The ability to differentiate between, and quantify, both living and dead cells within 5 minutes, allows cause-and-effect relationships to be established with all key process parameters giving you better control.





Our tool will help you realize a new level of process stability and efficiency… in 5 minutes!

- Optimize F/M, Dissolved Oxygen, and other key process variables
- Eliminate excess solids and minimize sludge handling costs
- Detect sludge bulking well in advance of conventional parameters (i.e. SVI)
- Diagnose deflocculation and other settling issues
- Detect toxic influent and its impact on your bioreactor
- Assess damage done by upsets and speed up the recovery process
- Pace dosing of nutrient blends and biostimulants
- Assess treatability of challenging substrates through bench scale jar tests

Wastewater treatment is typically very expensive and seen as a pure cost; the less that is understood about the process, the more expensive it becomes. LuminUltra's QuenchGone21™ Wastewater test kit closes that gap, giving you the information you need to troubleshoot and optimize the process, saving you both time and money.

INDUSTRIAL WATER

Quantify microbial content in any industrial process water application.

DRINKING WATER

Are you in control of microorganisms in your drinking water system?

CULTURE TEST > Days to weeks for Results in Lab by specialised staff

SERIAL DILUTION > Days to weeks for Results in Lab by specialised staff

2ND GEN ATP > < 5 minutes for Results at site, no specialised training required

2nd Generation ATP® - Your 1st Line of Defense

2nd Generation ATP monitoring offers a powerful combination of speed, versatility, portability, and accuracy for microbiological testing in any industry concerned with water. All living cells contain ATP regardless of whether they are bacteria, fungi, or any other type of microbe. As such, its measurement is a direct indication of the microbiological content in your sample. All-inclusive results in minutes provide enhanced monitoring capabilities for superior control of microorganisms in your process.

Side-by-Side Comparison

Method	2nd Generation ATP	Culture Tests	Microscopic Examination	Molecular Biology Methods	Particulate Analysis	Respirometry
What is detected?	Total Microorganisms	Culturable Microorganisms	Total or Specific Microorganisms	Specific Microorganisms	Suspended Solids	Metabolic Activity
Interferences in detecting total living biomass	None	UNABLE TO MEASURE	Dead biomass; non-biological particles	UNABLE TO MEASURE	Dead biomass; non-biological particles	Respiration Type
How long to get results?	Minutes	Days to Weeks	Minutes to Hours	Minutes to Days	Minutes to Hours	Minutes to Hours
Can give results onsite?	Yes	No	Yes (but difficult)	Yes (in some cases)	Yes	Yes
What types of samples can be tested?	Fluids & Solids	Fluids, Re-suspended Solids	Fluids & Solids	Fluids, Re-suspended Solids	Fluids only	Fluids only
How much skill is required?	Low	Moderate	High	Moderate to High	Low	Moderate
What is the capital cost?	Low	Low	High	Moderate to High	Low	Moderate to High
What is the cost per test?	Moderate	Moderate	Low	Moderate to High	Low to Moderate	Low
What is its best use?	**Total microbiological concentration**	**Specific microbiological concentration**	**Population diversity**	**Population diversity & specific concentration**	**Total particles**	**Specific metabolic activity**

GeneCount™ In-Field qPCR solution

DNA-based analyser for measuring legionella and sulfur reducing bacteria

Microorganisms cost the oil & gas, water, and manufacturing industries billions of dollars in damage annually by corroding metal, degrading product, and inhibiting processes.

Quantitative Polymerase Chain Reaction (qPCR) is a highly sensitive DNA-based analysis that can be used to detect and quantify those microbes or groups of microbes that are known to be significant in your process. Results of this analysis can help you to quickly understand if you are at risk so you can take action faster, while making better decisions.

Now imagine having access to this kind of DNA data while in the field. LuminUltra's GeneCount™ in-field qPCR solution gives you the tools you need to run DNA analysis on your samples, review the results, and make immediate targeted treatment decisions based on that feedback, all in approximately 2 hours and while onsite. Because there is no need to get samples back to a lab for testing, samples don't need to be preserved. This is a huge benefit for remote or offshore locations – where shipping samples is costly and not always readily available.

Why use LuminUltra's solution?

Here's the GeneCount advantage:

- Uses state-of-the-art assays that target microbial DNA ensuring high specificity and maximum coverage of damaging or beneficial organisms
- DNA purification kits are optimized for target applications, designed to remove interferences, and enable you to extract DNA on-site
- Can run multiple samples at a time - up to 14 simultaneously plus controls depending on the device
- Rapid results in approximately 2 hours
- Optimized qPCR workflow designed for immediate use out of the box
- Training and ongoing support from DNA and Applications experts
- qPCR complements 2nd Generation ATP testing by allowing for specific, target microbe quantification after rapid, total biomass quantification.

Getting started

Everything you'll need, and available from LuminUltra:

- LuminUltra's GeneCount™ Q-8 and Q-16 real-time quantitative PCR devices deliver high performance in a compact and portable package. Q-8 and Q-16 (8 and 16 wells, respectively)
- DNA purification kits
- Targeted qPCR reagent/assay panels. Ask us for a complete list of pre-developed assays.

Implementing qPCR testing into your routine microbiological testing plans can help prevent costly problems caused by microorganisms. Now it's available for in-field applications.

The process is simple. The results are actionable. Implement qPCR testing today.

Alert System V2

In situ E. Coli & Total Coliforms Microbiology Lab

- Autonomous, remotely-controllable analyser for quantifying E.coli and Total Coliforms.
- Suitable for environmental and water treatment process monitoring.
- Uses innovative disposable cartridge concept to provide unprecedented accuracy and repeatability while greatly simplifying maintenance procedures.
- Installed in situ, the ALERT SYSTEM V2 measures bacteria concentration and provides automatic alerts in real time.

A fully-automated in-situ microbiology lab

The ALERT System V2 is a unique analyser capable of automatic contamination-free sampling in situ, reagent mixing and incubation, optical detection (absorbance and fluorescence), bacterial quantification (E.coli and total coliforms) and wireless data transmission. It uses a unique disposable measurement cartridge concept, which greatly simplifies field maintenance operations, and eliminates any potential for contamination or human error.

On-demand remote analysis in any aquatic environment

The ALERT System V2 is used for obtaining bacterial concentration time series in lakes, rivers, coastal waters, drinking water reservoirs, Combined Sewer Overflows (CSO) sites, irrigation pools or in wastewater treatment plants. It can float like a buoy or can be installed on a rail at field locations or in a facility, and can operate without an external power supply under the most unforgiving weather conditions. The instrument is quick to install, can be remotely controlled from a mobile phone or web interface, and supplies data to the operator wirelessly via a cloud-based data analytics and visualisation interface. The ALERT System V2 is capable of performing seven measurements on a single battery charge and has minimal maintenance requirements (less than 5 minutes in the field).

The ALERT System V2 can also connect to a wide range of water quality probes (single or multi-parameter), which can provide complete water quality parameters in real time (sensors available for temperature, turbidity, conductivity, pH, nitrate, ammonia, chlorophyll, phycocyanin, fDOM, dissolved oxygen, ORP). This data can be used for adaptive sampling, by rapidly recognising water quality degradation phenomena and triggering microbiology measurements when certain conditions are met.

A reliable response

The ALERT System V2 provides a quantified response in terms of bacteria/100 ml present in the sampled water, and has been validated through numerous side-by-side studies with approved laboratories. Sampling in the disposable measurement cartridges is controlled by an internal vacuum module and the instrument implements Fluidion's multispectral optical detection technology, which ensures consistent, uncontaminated sampling and measurements. Triggered via a mobile phone or web interface, the analyser can quantify a wide range of bacterial concentrations and issue automatic alerts if a threshold is exceeded, enabling greater operator responsiveness in case of pollution events.

TECHNICAL SPECIFICATIONS

Dimensions	*H: 49cm (19.3"), D: 28cm (11")*	**Total Measurements**	*7 per charge*
Weight	*16kg (35lbs)*	**Response Time**	*2 h-12 h*
Measurement Trigger	*On-demand, pre-program, inline sensor (optional)*	**Environmental Conditions**	*0°C-40°C*
Parameters	*E.coli, Total Coliforms*	**Communication**	*Global SIM card, USB*
Measurement Range	*2 CFU - 1x106 CFU/100 mL*	**Installation Type**	*Floating or Rail-based*
Materials	*PVC, PMMA, Acetal, SST 316L*	**Autonomy**	*2 weeks to 2 months, depends on operation and environmental conditions*
Data Interface	*Cloud visualisation and analytics interface, API, real-time email alert*	**External Probe Integration (optional)**	*T, Conductivity, Turbidity, pH, DO, ORP, fDOM, NO3, NH4, chlorophyll, phycocyanin*
Battery Type	*Li Ion, 12V, 20.4Ah*	**GPS Capability**	*Yes (GNSS}*
Waterproof rating	*IP68*	**Data Reporting**	*Automated report generation (PDF), export (CSV), archival*

ALERT System V2 disposable cartridge concept

The ALERT System V2 uses Fluidion's innovative disposable measurement cartridge concept. By integrating all the required components for performing a measurement (check valves, filters, mixers, reagent storage, optical cell, vacuum port), the disposable cartridge greatly simplifies operations: field maintenance is now reduced to simply swapping the battery and installing new cartridges, which requires only a couple of minutes and can be performed by minimally-trained personnel. In addition to gaining precious time, this new design eliminates potential for human error, improving the system's reliability and the measurement repeatability and accuracy characteristics.

ALERT System V2 remote control and data visualization

The ALERT System V2 uses a network-hopping global SIM card that allows it to operate and communicate out of the box, anywhere in the world. The instrument's control interface is accessible online, through a secure portal, and measurement data is supplied wirelessly via a cloud-based data analytics and visualisation interface. Automatic measurement report generation and complete archival functionality provide complete documentation of water quality measurements. Automatic alerts can be configured and sent to the operator once bacterial quantification is completed.

Alert Lab

Portable E.coli & Total Coliforms Analyser

- Fully portable, autonomous and remotely-controllable analyser for the measurement of E.coli and other bacteria.
- Suitable for source water and environmental monitoring at a field location, in a moving vehicle, or in a lab.
- Performs six measurements using a 12V power source or battery.
- The ALERT LAB enables rapid bacterial enumeration immediately following water sampling by field personnel.

A miniaturized mobile microbiology lab

The ALERT LAB from Fluidion is a unique analyser capable of automatic processing and measurement of a manually-collected fluid sample. It performs automatic incubation, optical monitoring (multispectral absorbance and fluorescence) and wireless data transmission, providing rapid bacterial enumeration. The ALERT LAB greatly simplifies measurement logistics, eliminates the need for sample refrigeration during transportation prior to standard laboratory measurements, and minimizes errors due to sample degradation between collection and measurement. It has been shown to have similar accuracy and repeatability to an approved laboratory using MPN methods.

On-demand analysis in the field, on-the-go, or in a lab

The ALERT LAB can be used in a variety of settings for quantifying E.coli, Total Coliforms or Enterococci presence in lakes, rivers, coastal water, catchment sites or in water treatment plants. It can be operated on a rechargeable battery at a remote field location, powered via a vehicle's power on-the-go, or plugged into an electrical outlet in a laboratory setting. Capable of carrying out six independent measurements on a battery charge, full water quality monitoring at remote field locations is considerably simplified while minimising cost and time-to result. The mobile ALERT LAB is extremely portable and fully operational out-of-the-box. A fully-automated floating version (ALERT System V2) is also available, which can be installed directly in situ, thus eliminating the need for expensive infrastructure (piping, pumps, cabinets, communication equipment etc.).

A fast and reliable response

The ALERT LAB provides a quantified response in terms of bacteria/100 ml present in the sampled water, that has been validated through numerous side-by-side studies with approved laboratories. The system implements Fluidion's multispectral optical detection technology, which ensures high accuracy consistent measurements and rapid time-to result. Triggered via mobile phone through an online command portal, the analyser measures a wide range of concentrations, sends data wirelessly and can generate automatic alerts if a control threshold is exceeded in order to enable greater operator responsiveness.

TECHNICAL SPECIFICATIONS

Dimensions	*26cm X 24cm X 17cm 10.2" X 9.6" X 6.6"*	**Total Measurements**	*6 in parallel*
Weight	*3.7kg; 8 lbs*	**Response Time**	*2 h-14 h*
Measurement Trigger	*On-demand*	**Environmental Conditions**	*-10 °C to 40 °C*
Parameters	*E.coli, Total Coliforms; Enteroccoci*	**Communication**	*Global SIM card, USB*
Measurement Range	*4 CFU - 5x1a5 CFU/100 ml*	**Antenna**	*Internal/External (opt.)*
Materials	*PMMA, PVC, Aceto/, SST 316L*	**Power source**	*Li Ion battery, AC power, 12V car socket*

ALERT command portal and cloud interface

The ALERT LAB uses a wireless communication protocol based on the mobile network for both system configuration and data management. The system can be fully configured from an operator mobile phone using an intuitive online command portal, and can generate email alerts. Real-time data is sent via the mobile network to a secure cloud-based data analytics and visualisation server (installation in client data centre possible as an option). In case there is no mobile coverage in the installation area, the system can be pre-configured from a PC via the USB interface, and data can be sent via serial protocols such as RS232 (optional).

Left: ALERT LAB being used in a water quality analysis laboratory. *Middle:* The equipment during a field operation, analysing six samples simultaneously. *Right:* ALERT LAB as used by regulatory agency agent in the field.

FloPro XCi

Flow Measurement System

Multiple cards for multiple sensor applications

The FloPro XCi (multiple card interface) allows the user to efficiently monitor a vast array of water quantity and quality sensors plus vital mining, municipal and industrial equipment and assets. It's a smart packaged monitoring solution that provides remote data access with alerts and alarms. It's also telemetry-ready for effective low cost control and rapid response. Users can install any combination of the cards shown, in the five available card slots. Choose the right card/s for your application to tailor the FloPro to your exact monitoring requirements now and in the future.

Doppler Card
This card supports one Doppler ultrasonic sensor.

I/O Card
This card supports seven sensor inputs and four control outputs including 4-20mA, voltage and digital. The card also supplies 12V to power your add-on sensors.

Pulse I/O Card
This card powers (+5VDC or + 12VDC) a single pulsing flow sensor and provides a pulse output. This allows FloPro XCi the ability to sense pulses from flow sensors.

SDI-12 Master Card
This card provides FloPro XCi with the ability to control/log In-Situ and 3rd party SDI-12 compliant sensors.

SCADA

FloSI Card
This card provides an SDI-12 or ModBus output to interface FloPro XCi to SCADA systems.

Remote Access

WebComm Card
Provides FloPro XCi the ability to remotely configure the device and run diagnostics as well as upload internal logged data to a web-based data server via GSM/3G cell networks.

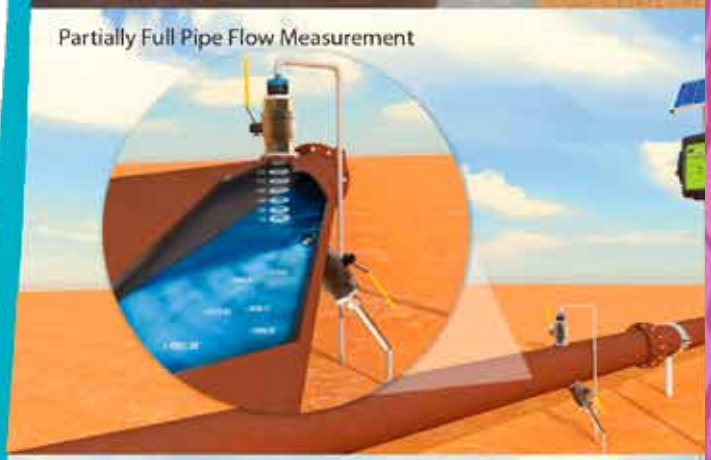
Doppler Ultrasonic Insert Velocity Sensor
For use in full pipes or partially full pipes (when used in conjunction with an EchoFlo depth sensor).

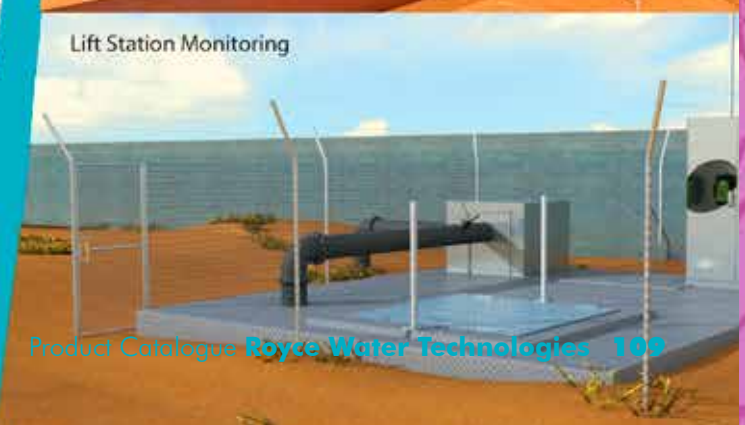
Doppler Ultrasonic Velocity Sensor
ZX SnapStrap mounted, velocity sensor for use in full pipes or open channels (when used in conjunction with a depth sensor).

Doppler Ultrasonic Area/Velocity Sensor
ZX SnapStrap mounted, combined velocity and depth sensor for use in partially full pipes or open channels.

Add-on Sensors
FloPro XCi can be configured to monitor a diverse range of water quantity and quality sensors and devices.
For example:
- In-Situ Aqua TROLL 600 multiparameter sonde
- In-Situ Level TROLL (depth/temp.) sensors
- Water sampler
- Pond/dam/tank level measurement
- Pumps/engines (RPM, pressure, temperature)

Solutions using FloPro XCi

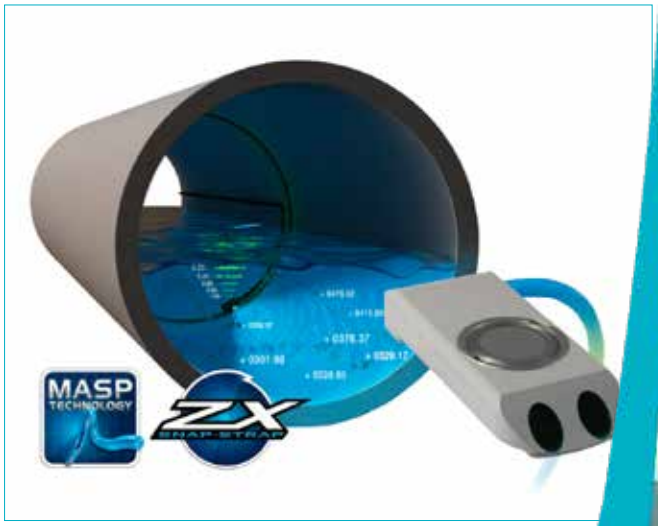




Features

- Doppler ultrasonic area/ velocity sensor with MASP technology
- Easy to install in existing pipe work with an XCi ZX SnapStrap
- Operates in regular and irregular cross-sections
- Reliable under difficult hydraulic conditions
- Replaceable ceramic diaphragm depth sensor

The FloPro XCi can be used to monitor just about any water quantity and quality sensor together with vital mining, municipal and industrial equipment and assets. Whether you need to measure flow as well as conductivity, pH and rainfall or utilize a downward looking ultrasonic depth sensor to measure pond levels the FloPro is fully expandable to your needs. Furthermore, FloPro is easily interfaced to SCADA/telemetry systems. FloPro XCi is easy to install, easy to use and virtually maintenance free. Utilizing state of the art XCi Doppler ultrasonic velocity sensors, FloPro has no moving parts and provides minimal obstruction to the flow. XCi Doppler ultrasonic velocity sensors produce superior results under a wide range of hydraulic operating conditions such as those encountered in wastewater and stormwater flows. Even when the pipe slope is unknown, in surcharge, or flowing in reverse, the FloPro produces accurate repeatable data every time.



Torpee Mag

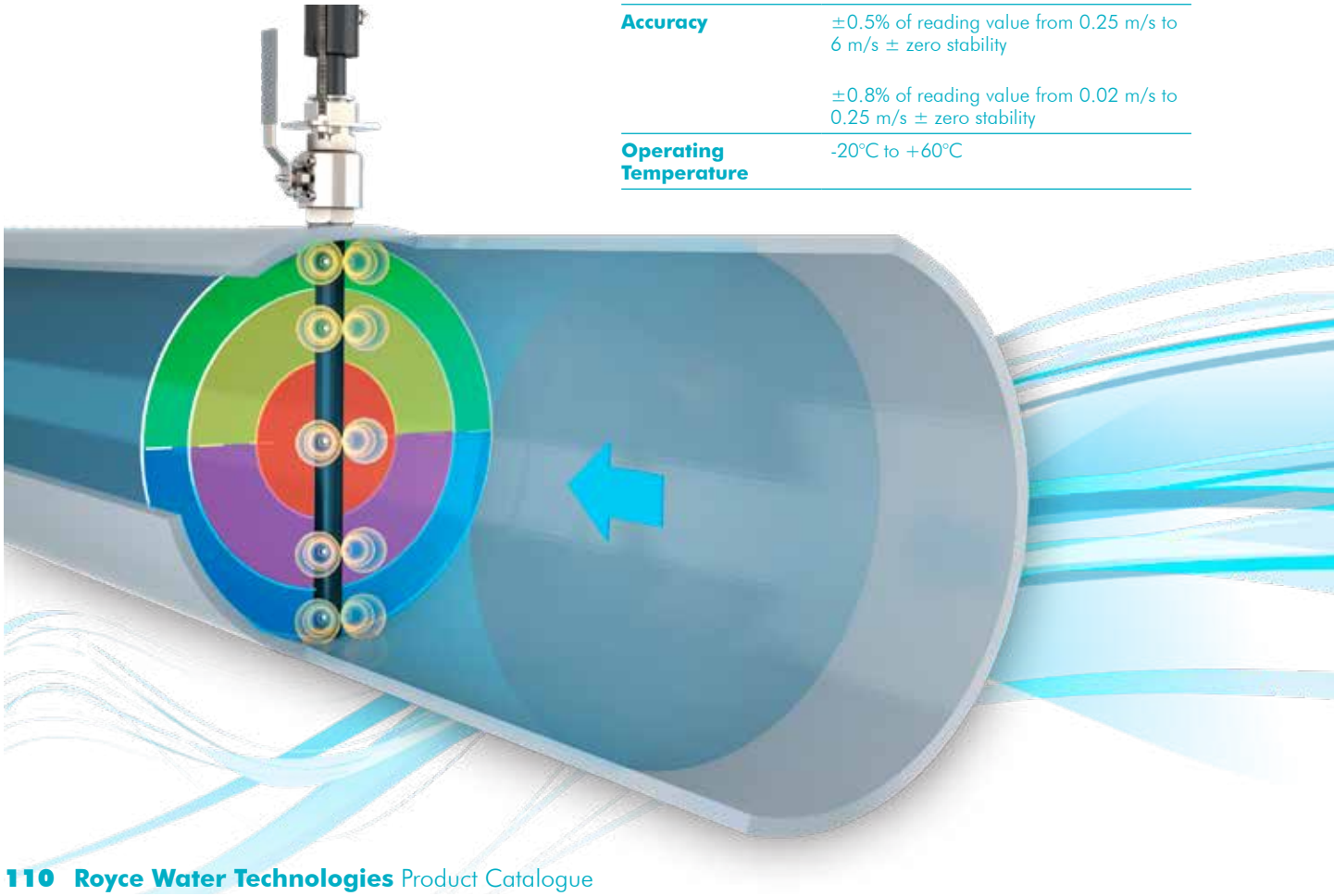
Pipe Insertion Mag Flow Meter

The TORPEE-MAG is a hot tap full profile electromagnetic insertion flow meter. The measurement method is based on Faraday's Law of Electromagnetic Induction: when a conductive liquid moves through a magnetic field, it produces a voltage. The voltage is directly proportional to the velocity of the conductive medium.

The TORPEE-MAG has multiple electrode pairs placed along the axis of the sensor at equal area of the pipe. The velocity measurements are averaged together providing the average velocity across the pipe. Flow is calculated by multiplying the average velocity by the cross-sectional area of the pipe.

Technical Specifications

Size	TORPEE-MAG 1.5" from DN100 to DN1525 (inner Ø) – 2 to 5 electrodes TORPEE-MAG 2" from DN500 to DN2500 (inner Ø) – 5 to 7 electrodes
Weight	Depending on size of sensor
Materials	Robust sensor body: 316 stainless steel, fiberglass derivate, carbon NSF-61 certified epoxy coating available as an option. Insertion hardware: 316 stainless steel Compression seal: silicone rubber (EPDM) Sensor electrodes: graphite
Cable Lengths	Available from 10 m to 200 m
Protection	IP68/NEMA 6P (sensor is submersible)
Method	Electromagnetic
Range	0 m/s to 6 m/s (bidirectional) (max. velocity possible depending from pipe Ø and sensor type)
Accuracy	±0.5% of reading value from 0.25 m/s to 6 m/s ± zero stability ±0.8% of reading value from 0.02 m/s to 0.25 m/s ± zero stability
Operating Temperature	-20°C to +60°C



Raven Eye 2

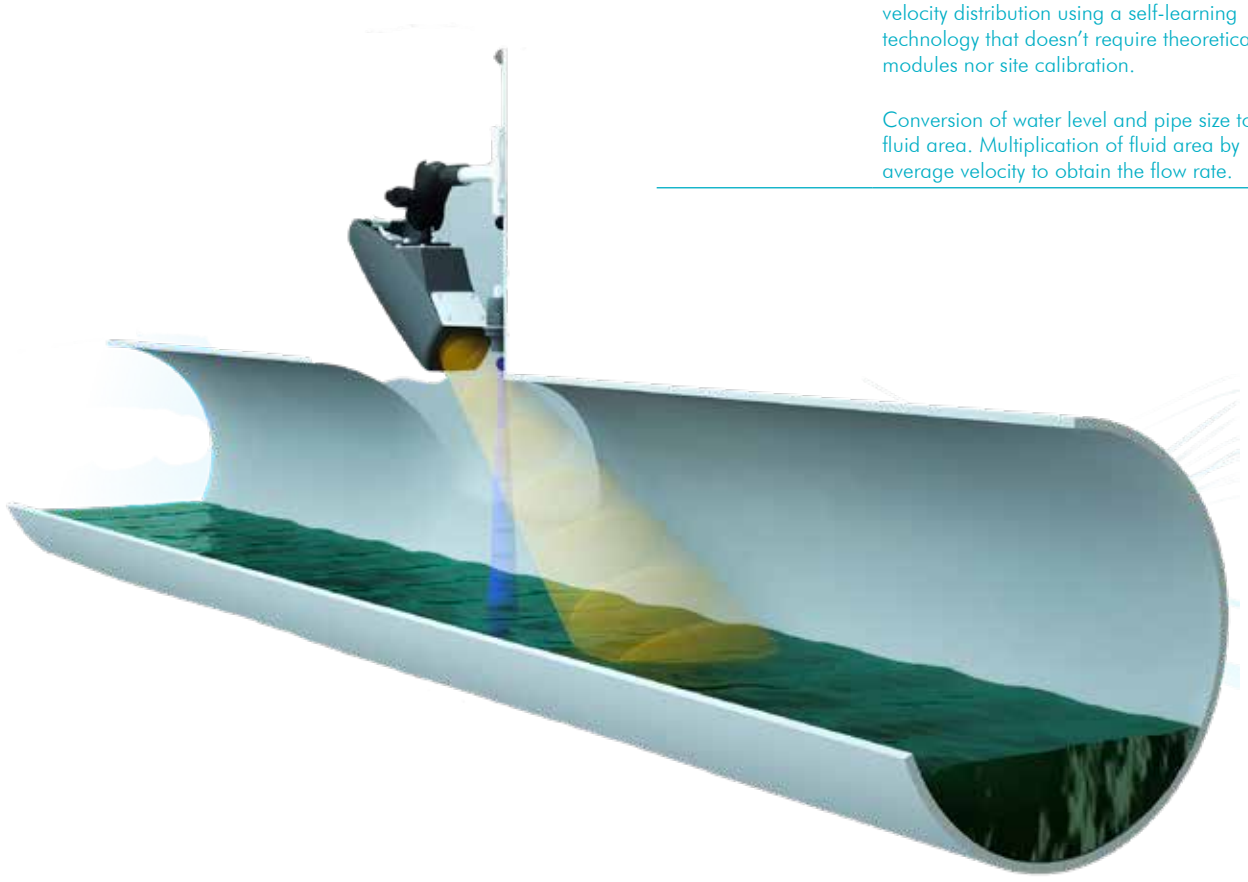
Non-Contact Radar Air/Velocity Flow Meter

The RAVEN-EYE® is the newest non-contact RADAR area/velocity flow meter for open channel flow measurements from Flow-Tronic. It combines state of the art non-contact radar measuring technology which measures flow from above the water surface with easy integration into existing SCADA or telemetry systems.

The RAVEN-EYE® has been designed for flow measurement in municipal wastewater and storm water sewers and easily adapts to a wide range of applications. Being positioned above the water surface, the RAVEN-EYE® avoids thereby all problems (grease, fouling, corrosive liquids) associated with traditional flow meters where the sensor is immersed in the fluid.

Technical Specifications

Size	183 x 140 x 422 mm
Weight	3,65 kg (without cable, level sensor and mounting accessories)
Materials	Enclosure: Polyurethane (PU), stainless steel Cable: Polyurethane jacketed
Cable Lengths	10, 20, 30 or length as needed up to 300m
Protection	IP68
Outputs	1 passive analog 4-20 mA (velocity only)
Measurement Range	±0,08 m/s to ±15 m/s
Flow Accuracy	±5% of reading (typical : assumes pipe is 0 to 90% full)
Temperature Range	Operating: -30 to 70 °C Storage: -30 to 80 °C
Flow Measurement Method	Conversion from surface velocity to average velocity by analyzing surface velocity distribution using a self-learning technology that doesn't require theoretical modules nor site calibration. Conversion of water level and pipe size to fluid area. Multiplication of fluid area by average velocity to obtain the flow rate.



Agent G2+

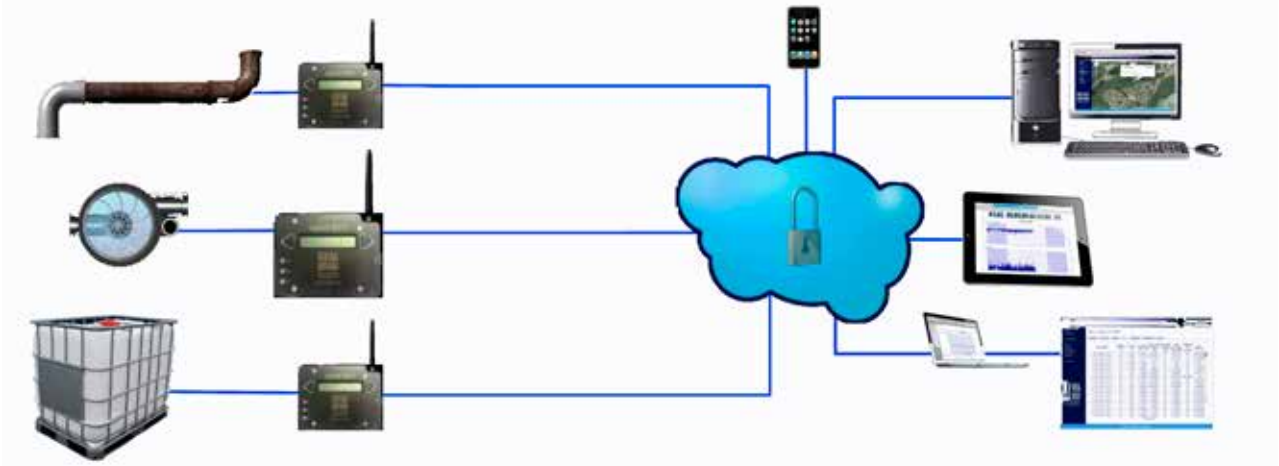
Wireless monitoring and control made simple

The AgentG2+ links the rich web-based monitoring, control and configurability of the cloud-based Pervasive Portal with the physical world. A comprehensive set of real-world IO including Digital and pulse-capable Inputs and Outputs, Analog Inputs, RS232 and Modbus over RS485, 1-Wire, SDI-12 and a built-in solar-capable battery charger.

The Agent is pre-configured to communicate securely with the Portal managed service for remote monitoring and reporting, alerts and alarms, and super-simple configuration without clumsy code. Get your IoT application up and active in Minutes, not Months.

Technical Specifications

Analog Inputs	16 Channels Software Selectable Range 0-5V, 4-20mA, 0-20mA 12Bit	**Uplink GSM / LTE / Ethernet**	Each AgentG2+ is supplied with one of the following: GSM GPRS/3G: Bands 850/900/1800/1900/2100 MHz 4G/LTE: Bands 1, 2, 3, 4, 5, 8, 12, 13, 17, 18, 19 20, 26, 28 Ethernet 10/100
Digital Inputs	6 Channels (3 Channels with pulse capture)	**Housing**	6061 Aluminium Machined Clear Anodised
Digital Outputs	6 Channels open drain protected FET switches	**Mounting**	Din Rail Mount (35mm Top Hat)
1-Wire	Support for up to 6 x 1-Wire Temperature Sensors	**Size**	117mm x 93mm x 20mm
SDI-12	Environmental Data Recorder	**Weight**	225g
ModBus	RS485 or RS232	**Temperature**	Operational -10°C to 55°C Non Operational -20°C to 65°C
Sim Card	Embedded – supplied with subscription	**Humidity**	Relative Humidity 5% to 95% non condensing.
Antenna	SMA Female Connector	**IP**	IP40
Battery	12V Lead Acid Battery Connection Battery Charger (Solar MPPT)		
Power Supply	6-35 Vdc (Recommended) @1.5 Amps		
Screen	16 x 2 Character LCD LED Backlight		



Dumo Algaecleaner

Algae removal with ultrasounds

Algae mitigation and growth inhibition using ultrasound, avoids the use of chemicals and does not generate waste. Therefore it is a clean technology that meet the legislative requirements of environmental policy.

Algae growth inhibition by ultrasound

The propagation of sound in a medium such as water is carried out by a continuous transition of pressure waves. In the case of ultrasound, alternating between increasing and decreasing pressure in relation to a normal pressure is produced at a rate higher than 20,000 times per second (20kHz).

DUMO Algaecleaner emits ultrasonic pulses that causes damage to the internal structure of cells. Under the effect of ultrasound, the vacuoles - that provide buoyancy to algae - breaks, in addition of further damages in the pores of the cell wall, which makes the acquisition of vital nutrients to the algae.

DUMO system emits different frequencies that generate different wave fronts effective against algae. This covers a wide range of applications over various species, by the combination of frequency, power and pulse sequence.

Depending on environmental conditions, nutrients in water, the effects of destruction and inhibition as well as the type and characteristics of existing algae populations, the effect of DUMO Algaecleaner begins to be felt from fourth to eighth week from its application.

The most effective and environmentally friendly way to eliminate algae

Now it is possible to alleviate algae blooms in your irrigation reservoir, pond, lake, fountain, etc, without the need for chemicals.

Our ultrasonic system will ensure algae control with the most sustainable method. Installation is simple and easy. All you need to do is place the device in the water and connected it to the power or energy source.

Advantages

- Ecological
- Non-toxic: It does not cause harm to people, animals or plants.
- Clean: No need for chemical products
- Minimal maintenance
- Easy to install
- 24/7
- Low power consumption

Specifications

- Ultrasonic waves generator: multifrequency digital generator with automatic sequence programs.
- Alarm output for emission fault: relay output (3A, 250V).
- Protections: overload, overheating and breakage of the transmitter cable.
- Pilot lights: ultrasound emission, power ON.

Biological Nutrient Reduction

At a sewage treatment plant naturally occurring micro-organisms - bacteria and protozoa - convert many of the substances found in sewage into forms that do not harm the environment. There are millions of micro-organisms of a thousand or more different species in the reactor tank.

The micro-organisms are responsible for several chemical transformations:

Heterotrophic bacteria convert molecules containing carbon into carbon dioxide and water: CHO + O_2 → CO_2 + H_2O

Phosphorus accumulating bacteria have the ability to take up phosphorus.

Nitrifying bacteria turn ammonia into nitrates and water: NH_3 + O_2 → NO_3 + H_2O

Denitrifying bacteria turn nitrates into nitrogen, carbon dioxide and water: NO_3 + CHO → N_2 + CO_2 + H_2O

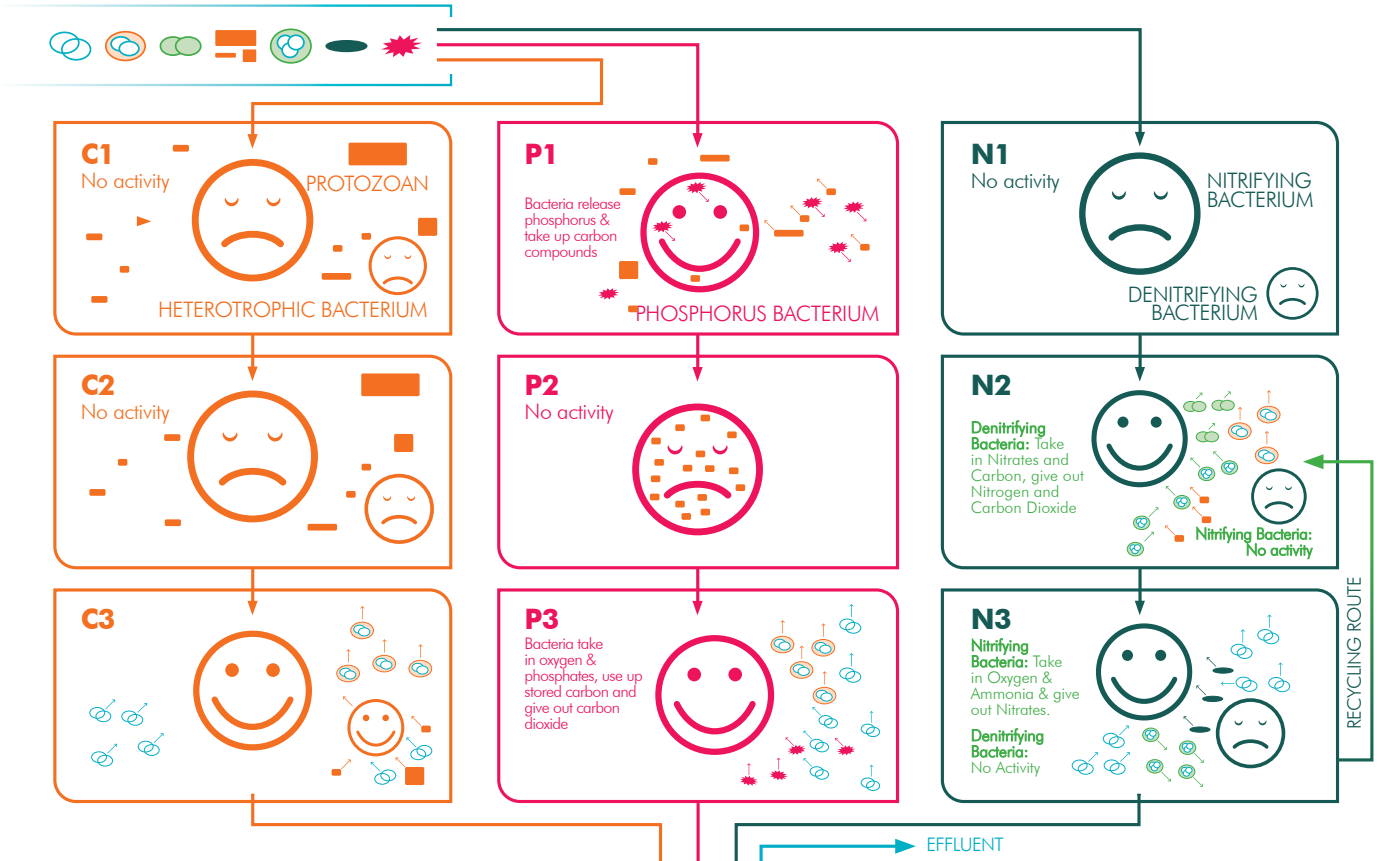
REACTOR TANK

In the reactor tank, the sewage passes through a series of zones in which different conditions are provided so as to promote the activities of the various species.

Anaerobic: No oxygen present, either dissolved in the water or combined with other molecules.

Anoxic: No oxygen dissolved in water but it is present combined with other molecules (eg. nitrate - NO_3).

Aerobic: An abundance of oxygen present, dissolved in water and combined with other molecules.



Clarifier

The heavier particles settle to the bottom as sludge that contains millions of bacteria and protozoa, both alive and dead.

Effluent

The water at the top of the clarifier is clear and usually disinfected before it is discharged.

RAS - Returned Activated Sludge

The main part of the sludge is recycled back to the reactor tank. This ensures that a high concentration of active micro-organisms stays in the system. The sewage is recycled through the system many times.

WAS - Waste Activated Sludge

The smaller stream of sludge receives further treatment to stabilise the phosphorus compounds in it and thicken it before disposal or re-use.

ZONES

Compounds containing carbon are food for heterotrophic bacteria. Bacteria, in turn, become food for protozoa. The carbon-containing compounds are converted to carbon dioxide that escapes into the air. The microorganisms need oxygen in order to be able to do this, so activity takes place only in the aerobic zone, C3.

Specialised phosphorus accumulating bacteria are responsible for depositing phosphorus compounds in the sludge. They have to have the right conditions to do this efficiently. In the anaerobic zone, P1, they are starved of oxygen but there is an abundance of small carbon containing molecules. The bacteria are stressed in these conditions. They release any phosphorus they have already absorbed and take in carbon. The bacteria pass through the anoxic zone, P2, to the aerobic zone, P3. Here they use oxygen and some of the carbon they have stored as energy, and take in lavish amounts of phosphorus. These form long chains that stick together so the bacteria become heavy and, in the clarifier, sink into the sludge, taking the phosphorus with them.

In the aerobic zone, N3, nitrifying bacteria use oxygen and nitrogen containing molecules as a source of energy to convert the ammonia form of nitrogen into nitrates. This process is called `nitrification'. In the anoxic zone, N2, denitrifying bacteria take in carbon compounds and use nitrates as a source of oxygen. The nitrates are broken down to form nitrogen gas and carbon dioxide. The gases escape into the air. Neither the nitrifying nor the denitrifying bacteria are active in the anaerobic zone, N1.

KEY

Different species of micro-Organisms require specific conditions for growth.

'Animated' having suitable conditions for growth.

Sleepy' awaiting favourable conditions.

The chemicals involved are:

Oxygen O_2

Carbon Dioxide CO_2

Nitrogen gas N_2

Compounds containing nitrogen as nitrate NO3

Compounds containing carbon (CHO), some large and complex, others small and simple

Compounds containing phosphorus mostly as phosphate (PO4)

Compounds containing nitrogen in the ammonia form (NH3)

ACKNOWLEDGEMENTS: Peter Griffiths, Dr. Helen Stratton & Jenifer Simpson

V11 2/2022

Royce Water Technologies Pty Limited
Policy Summary

Inclusion and Diversity

At Royce Water Technologies, we believe in and are committed to Inclusion and Diversity. We value each individual's unique capabilities, backgrounds and values. We rely on these diverse perspectives to drive our Innovation and Teamwork, to deliver the best outcomes for our Company in facing the challenges of the future. We strive to create an inclusive environment with equality of opportunity regardless of people's gender, age, cultural background, religion, sexual orientation, gender identity, disability or family status.

Cultural Heritage and Beliefs

Royce Water Technologies operates within the traditional country of the Turrbal peoples. We recognise and deeply value their cultural heritage and beliefs and, in particular, their custodianship of the land that is now Banyo, for more than 40,000 years.

Sustainability

At Royce Water Technologies, Sustainability is central to our business. We support sustainable outcomes not only for the Company but also for our Clients and the local Communities in which we operate. We reduce our Environmental impact through careful Supplier resourcing as well as Innovative manufacturing processes. Routine monitoring of these operations ensures improved sustainability business practises.

Modern Slavery

Royce Water Technologies respects human rights and is committed to limiting the risk of modern slavery within our supply chains and operations. The Company does not condone or use child or forced labour in any of our operations or premises and will work to ensure these practices are not present in our operations or supply chain. We expect that all organisations we engage with to do the same. We declare that our workforce is voluntarily and entitled to leave the work whenever they desire. Workers are not required to post a deposit or bond, and salaries are not withheld for any reason. The Company will follow all laws and regulations regarding employment practices and if made aware of modern slavery practices in its own business, or within its supply chain, will resolve the issue in line with the values expressed in this policy. It is expected that suppliers have similar values to the Company concerning modern slavery.

Quality
ISO 9001: 2015

Royce Water Technologies is committed to promoting the use of a process-based approach to quality management and that decisions made within the company are considered using risk-based thinking. Royce Water Technologies will ensure that the effective mix of resources is made available to achieve the outputs required against our customers' requirements. We are committed to the identification, evaluation, reporting of non-conformances, management review and communication to all workers to ensure quality objectives are met, and procedures are effective in promoting continual improvement.

OH&S
ISO 45001: 2018

Royce Water Technologies is committed to the prevention of work-related injury and ill health of its staff, contractors and visitors within its working environment. It is our policy to ensure that any work carried out within the scope of the business is conducted in compliance with our OH & S System and complies with all applicable regulatory requirements. Emphasis will be placed on effective management ensuring a systematic approach to the identification of risks using a hierarchy of controls and, the allocation of financial and physical resources to control these risks.

Environmental
ISO 14001:2015

Royce Water Technologies is committed to managing the environmental impact of our business processes. It is our policy to ensure that any work carried out within the scope of the business is conducted in an environmentally aware and responsible manner and complies with all applicable regulatory requirements. This commitment extends to ensuring that operations do not unnecessarily endanger flora, fauna, sensitive areas, sites of heritage importance or present concerns to members of the public and community.

* Royce Water Technologies appreciates the artwork that features throughout this catalogue contributed by Indigenous Artist, Laurie Anno.

Royce Water Technologies is a proud Australian manufacturer and supplier to our diverse water and wastewater market.

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