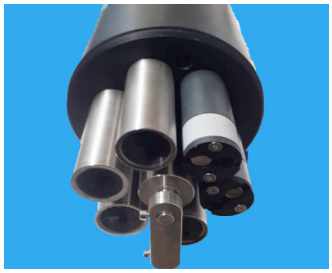
Keynes Controls Ltd

Water Quality Sensors & Systems



Multiparameter System

3 PORT SONDE

7 PORT SONDE

- **Multiparameter Housings**
- **Real-time and Stand-alone Data Recording**
- **Solid State Selection-ion Sensors**
- **High Performance Fluorometers**
- **pH / Conductivity Sensors**
- **Free Windows Applications Software**

Keynes Controls Sensors

Water quality sensors available from Keynes Controls Ltd that can be used individually or as part of a multiparameter solution.

Fluorometers	Selective-Ion-Sensors
CDOM/fDOM	Ammonia
Chlorophyll in vivo	Ammonium
Fluorescein Dye	Bromide
Hydrocarbon	Calcium
Phycoerythrin	Chloride
Phycocyanin	Cyanide
PTSA Dye	Cupric
Rhodamine Dye	Dissolved-Oxygen
Tryptophan	Fluoride
Turbidity	Fluoroborate
	Lead
	Nitrate
	Nitrite
	Perchlorate
	Potassium
	pH

The images below show polluted waterways where the Keynes ARGES Instruments have been deployed, and in some cases actively recording effluent leaking into waterways in the south west UK.

The Keynes Controls water quality sensors and systems are perfectly aligned for easy use and are ideal tools for monitoring and tracing the sources of effluent release from treatment works, broken sewers, to accidental contamination from agricultural processes. The wide range of water quality sensors available from Keynes Controls and the ease in which they can be connected to the Internet ready data recorders makes the remote monitoring of water treatment wetlands a very easy task.

The Keynes Controls ARGES multiparameter systems from the real-time systems, single sensor, and the stand-alone multiparameter loggers are available for hire and are offered with training, to enable users to make their own surveys and measurements. The equipment can be used to track misconnections between untreated sewage and wastewater that is discharged into surface water systems.

The ARGES range of chemical sensors can be used in the laboratory or in automatic batch testing systems.

Standard Features

Measurement Integrity

The key to any successfull measurement solution is the accuracy of the measurement and the traceability of all the sensors and calibration processes involved. The Keynes Controls chemical sensors have all parameters built-in. The user can download the sensor detail at any time and these cannot be adjusted or deleted.

All of the ARGEs sensor range has the serial numbers and the last calibration date stored internally. The user can access this information for reporting purposes. The sensors can be redeployed at any time with the calibration and serial number records are retained in the sensor.

Construction

Multiparameter Housing - Solid PVC Plastic block with stainless steel inserts and bolts. Stainless steel strain relief cable supports fitted to the base unit. Gold plated high pressure rated water mate sensor sockets.
ARGES Selection-ION Sensors - Solid state device. Made from Solid PVC tube with 2 km pressure rated gold pin network connector.
ARGES Fluorometers - All of the ARGES range of fluorometers are constructed from high performance stainless steel tub with 2 km pressure rated wet mate network connector. The optics have a moisture rejection coating to ensure the highest quality of measurements are made.

Sensor Care

Please avoid leaving the selective ion sensors in a high concentration of interference ions, as this can cause permanent damage to the sensor.

Measurement Integrity

All of the ARGES chemical sensors have been designed with the highest level of measurement integrity as standard. The sensor stores the latest calibration date and User code. The code is limited to 30 alpha-numeric characters and this can be used to store a name or reference number. The calibration details are stored within the sensor and can be downloaded by the User at any time.

Calibration Date: DD-MM-YR Calibrated By 30xAlpha-numeric string

Isolation

The sensor elements used in all of the selective-ion-sensor range., conductivity and pH sensors are isolated and when not required for any measurements. This operation prevents contamination of the sensor elements and maintains the long active life of the device. When no measurement is being made the sensor is in low power mode.

Built-in Digital Networks

All of the ARGES Sensors have SDI12, RS485 and MODBUS digital communications built in by default. The SDI12 network operation is ideal for low cost stand-alone data recorders.

The RS485 digital network is ideal for connecting the sensors onto local area networks and Wi-Fi using many third party interfaces available for this operation. MODBUS communication is a popular communication option for many plant wide SCADA applications and is used to communicate with many industrial sensors and systems. The sensors support 16 and 32 bit MODBUS registers.

Fluorometers

All of the ARGES fluorometers can have an analogue output proportional to the chemical being measured. The analogue output is in the range 0 - 2 V DC. The analogue output is only fitted on request.

Additional Information

1 milligram per liter (mg/L) = 1 part per million (ppm)
1 microgram per liter (ug/L) = 1 part per billion (ppb) and 1 ppm = 1,000 ppb

Temperature Sensors

All of the ARGES Chemical sensors regardless of type have a built in precision temperature sensor fitted close to the measurement point.

Selective-ION Sensor Calibration

All of the ARGES selective ion sensors use a 2 point calibration procedure as standard. A high level and a low level which is often zero.

The high level calibration point is taken close to, but greater than the maximum expected measurement level. The lower calibration point is often taken as zero as would be expected when using distilled water as the calibration solution.

The user has full access to the calibration points and these can be adjusted to suit the sensor range under investigation.

All of the sensors are factory calibrated and will be good for immediate deployment.

Temperature Compensated Measurements

All of the selective-ion-sensors have built-in temperature compensation with both raw measurement, and temperature compensated measurement available to the user. The temperature compensation is undertaken using a precision thermistor mounted as close as possible to the sensing element of the sensor. This makes sure that the temperature of the water being measured is as close to the measurement point used by the sensing element.

The temperature compensation level has been carefully determined based upon testing in laboratory conditions set inside an environmental chamber. The compensation varies from scalar factor in conductivity to exponential corrections for some of the other complex chemicals.

Fluorometer Measurements Integrity

The integrity of a sensor measurement is key to the success of any monitoring application and justified the time taken to make accurate calibration and deployment. Fluorometers depend upon light levels to make accurate measurements. Too much light contaminates the fluorometer results and will lead to considerable errors in any measurement reported by them. To ensure that the fluorometer measurements have been taken correctly then the ARGES fluorometers can report the background light level as a parameter detailed by keynes as LUX.

LUX is the background light level for which the measurement has been taken. Above a preset limit then errors in the fluorometer measurement are to be expected. Each fluorometer model has a different sensitivity and as such each sensor will have a different operating LUX level for which the measurements should not be accepted.

It is not possible to post-process the fluorometer measurements in order to determine the integrity of the reading to determine if the results that have been recorded are correct, or in error due to light pollution getting into the sensor.

Industry Standard Commands

All of the ARGES Chemical Sensors use the industry standard SDI12 instructions aM0! and aD0! commands to start a measurement cycle and return values to the data recorder.

0M0! - start a measurement for an instrument with ID = 0
0D0! - returns Concentration, temperature corrected reading, temperature (Deg C)

The measurements are returned in SI units and the order for which the parameters are sent across the network is user defined.

Multiparameter Housings

The *Sonde Multiparameter Housing by Keynes Controls* is used to group the ARGES range of chemical sensors and brush units to form a dedicated measurement solution. Any of the ARGES range of sensors can be fitted into any port. A submersible brush unit can be fitted to clean the fluorometer optics between measurements.

The *Sonde Multiparameter Housing by Keynes Controls* shown on this page have been designed to simplify real-time monitoring applications by creating a dedicated measurement solution. A stand-alone logger version of the multiparameter housing storing up to 2 million records is available.

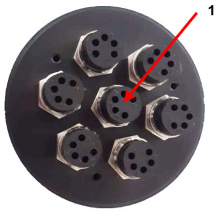
The stand-alone version of the multiparameter housing contains an internal data recorder. The housing records internally the results from the different sensor types at a user set interval. The instruments are configured using an Android APP available on the google store. The Bluetooth connection between a mobile phone and the housing is used to download the results.

The housings are manufactured from solid PVC plastic making them hard wearing and corrosion resistant. All models are suitable for deployment into any waterway such as rivers and estuaries. The multiparameter housings are constructed of three main parts. A base use unit, a sensor casing and a shade cap. The shade cap prevents detritus in the waterway from damaging the sensors and corrupting measurements. The shade cap simply screws onto the housing and enables the complete system to be stood vertically. Ideal for placing water samples for final testing before deployment.

Currently Keynes Controls have 7 port and 3 port housings in stock. Additional housings offering different sensor numbers can be suppliedPhoto of the 7 port and 3 port housings.

Part Numbers: SONDE-7-PORT-RT **SONDE-3-PORT-RT**

The images above show sensors fitted into the 3 and 7 port housings but excludes the shade cap.



Base Sockets

Base Unit

Sensors in Shield

Shade Cap

Strain Relief Eyelet

Base Unit

There are different models of the multiparameter housing, realtime models that are purely passive and stand-alone logger versions. All models have a base unit. Regardless of the model chosen, the base unit contains the sensor ports which have gold pins and depth rated to 2 km depth. Two stainless steel eyelets are provided for strain relief enabling the housing to be suspended from a secure point to any waterway.

Sensor Shield

A protective shield surrounds the sensors for added protection. The shield is a physical barrier that prevents debris from damaging the sensors.

Shade Cap

The shade cap screws onto the front of the housings. The cap keeps detritus away from the delicate fluorometer optics, minimises light entry and mains the correct amount of water in front

Submersible Brush Unit

A submersible brush unit is available for use with the ARGES fluorometers fitted to any of the multiparameter housings.
The ARGES Brush unit is used to clean the optical head of the fluorometers between measurements. The angular range and number of scans is user programmable. The device is used for applications when a multiparameter system is to be deployed for long term applications.

The ARGES Brush unit is fully integrated into the QLOG applications software and real-time applications can be activated by the user at any time. The submersible brush unit is manufactured for high performance stainless steel and is corrosion resistant.

Submersible Brush Unit

Part No: ARGES BRUSH

Systems Deployment

All of the multiparameter housings have cable strain relief eyelets built into the base unit and used to secure the instruments onto a structure, or on location directly into a waterway.

3 Port Multiparameter Housing

The 3 port sensor housing can be deployed directly into waterways directly from the network cable so long as the cable is secured correctly. Stand-alone deployment using the network cable only is suitable for short term real time applications, but is not recommended for long term systems deployment. Secure the sensor using a strain relief cable to the eyelets built into the multiparameter housing.

7 Port Multiparameter Housing

The 7 port multiparameter housing is heavier than the smaller models and as such should always be deployed using a strain relief cable attached to the base eyelets. The network connection should not be used as the sole method of deploying the housing into a river or estuary.

Real-time Measurements

The Keynes Controls Real-time Multiparameter housing can be directly connected to a Windows PC using the optional USB interface. The USB interface powers the housing directly from the USB port without any requirement for an external power supply or battery. The real-time measurements can be passed directly to a Windows PC, data recorder or Internet based data acquisition systems can be transmitted across the internet and presented in real-time web pages.

Real-time measurements

SONDE Deployment

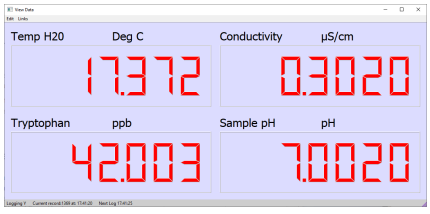
Hardened Carry Case

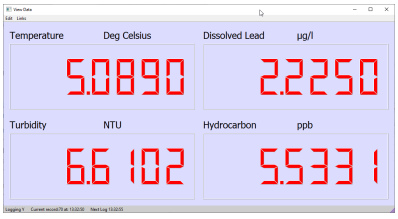
Sensor USB Interface

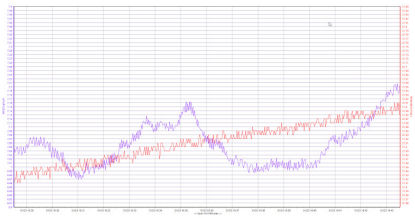
Real-time Measurements using a Windows PC

All of the ARGES chemical sensors can be directly connected to a Windows PC and measurements made and presented using the free **QLOG** applications software. The software presents the measurements in a series of user defined panels-meters and charts.

Panel Meters





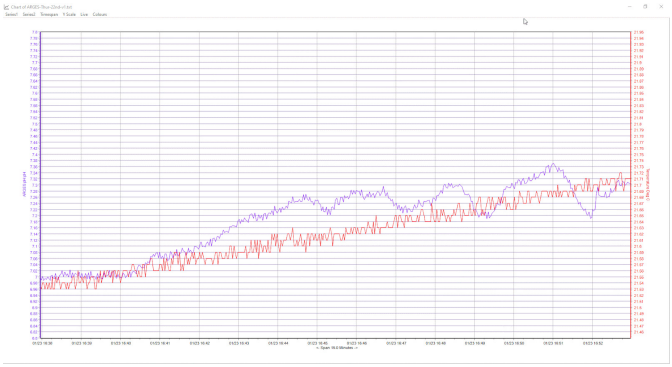


The QLOG software panel meters are fully integrated into the SDI12 1.4 network protocol and automatically detect the SI unit for the sensor under investigation.

The chart feature of QLOG application software enables two individual sensors to be directly compared using the same time frame

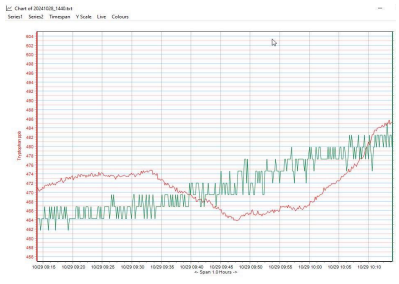
enabling a simple, yet direct comparison of features in the measurements. Perfect for looking for phenomena in sensor results. The axis automatically zooms to follow the range on the traces.

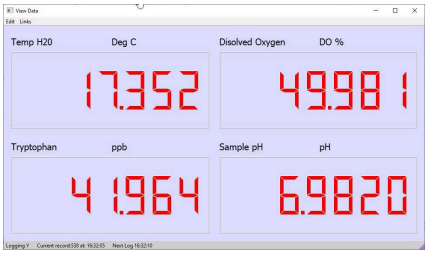
Dual Y Axis Charts

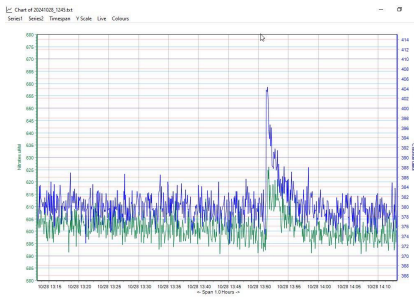


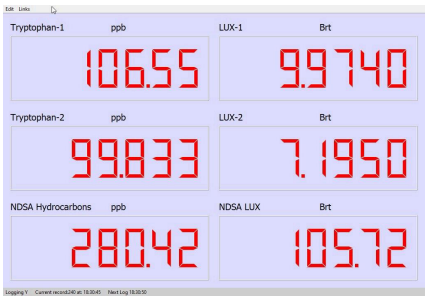
Sample Real Results

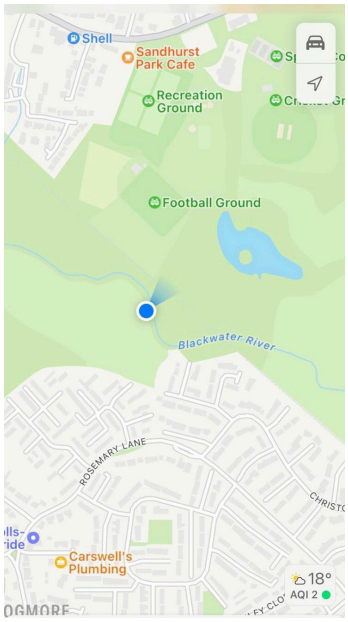
Here you can view accurate, real-time results from the ARGES Chemical Sensors, crafted at our Manufacturing Assembly and Testing Facility in Reading, UK. Our sensors have been deployed across various locations throughout the UK.











When measuring concentrations of metals and minerals in water:

1 milligram per liter (mg/L) = 1 part per million (ppm)
1 microgram per liter (ug/L) = 1 part per billion (ppb) and 1 ppm = 1,000 pp

Optional USB Interface

All of the ARGES chemical sensor and multi parameter systems can be directly connected to a Windows PC using the optional USB Interface.
The ARGES chemical sensors all have a standard 5 pin connector for connection to a digital network. A dedicated network cable connects the sensor to the media converter. The network cable is terminated at the sensor end with a high pressure rated 5 pin socket and securing ring. The securing ring locks the sensor, or housing to the network cable and prevents the sensor system from parting.

A USB type A network cable used to connect the USB-SDI12-AG1 to the PC USB port. A port status LED Indicator illuminates to show the USB Port is operating to specification.

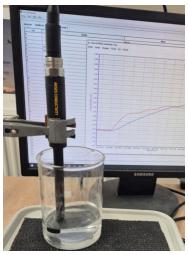
The USB-SDI12-AG1 media converter contains a USB Type A port for connection to a Windows PC / Laptop. A 5 pin self aligning IP68 rated bayonet connector links the sensor network cable to the media converter as shown above.

The USB-SDI12-AG1 media converter powers the multiparameter housing, or individual sensor directly from the USB Port without any requirement for an external power supply. The media converter has status LED indicators that show the status of the PC USB port, and the transmission of measurements across the SDI12 network.

When using any combination of ARGEs sensor, be that a single sensor or multiparameter system for real-time measurements then it is easy to observe that the measurements are being taken since the media converter flashes to when measurements are being made.

Network Port Bayonet Connector

USB cable connected to a laptop.



Selected-ION Sensor network connection

Multiparameter SONDE network connection.

The USB-SDI12-AG1 media converter is available from the online shop at **www.Keynes-controls.co.uk.**

ARGES ™ Chloride Sensor

The Intelligent Submersible ARGES Chloride Sensor is a high performance solid state instrument that has been designed to simplify the acquisition of water quality measurement parameters into any platform that supports data logging operations using digital network communications. The sensor is solid state and does not require any reagents. All measurements are transmitted digitally and in SI Units. The sensor is SDI12 1.4 compatible and automatically assigns the engineering units to similar data loggers and acquisition soultions. The ARGES sensor can be directly connected to a Windows PC or installed into a multiparameter SONDE.

The number of parameters measured, and the order they are sent across a network are user defined in the instrument setup.

Construction

The ARGES Chloride sensor is constructed using a PVC and stainless steel body with a wet mate gold 5-pin network connector. The complete sensor is corrosion resistive and suitable to deploy in fresh and sea water.

Features

Type	Range
Measurement Range	5 to 35000 ppm - mg/L - Autoscale readings
Resolution	0.01 ppm - mg/L
Accuracy	+/- 10 Reading or 2 ppm
Temperature (Deg C)	-5 to 60 Deg C
Resolution	0.01 Deg C
Accuracy	0.2 % of Reading
Sensor recalibration Period	2 months continuous use - 720 hours
pH range	2 - 12
Operation	Stand-alone / Multiparameter system
Store dry for long lifetime	
Sensor Type	Solid state
Built-in Digital Networks	SDI12 1.4 / RS485 / MODBUS
Calibration Details	Embedded - Last calibration Date / User
Calibration Points	2 Point - others on request
Settling time	30 seconds from dry - 5 seconds typically.
Sensor Isolation	Reference cells isolated between measurements
Interference IONS	S^{2-} Ag CN^- I^- Br^-

Like all other ARGES range chemical sensors the calibration factors, date of the last calibration and a user assigned 30 character identifier string are stored into the sensor. The calibration details are moved with the sensor no matter how it is deployed into additional multiparameter systems. The calibration information can be accessed on demand.

Calibration Date Serial No. Calibrated By

Calibration Parameters

The ARGES Chloride sensor can be fully configured in the free issue QLOG Windows applications software that can be downloaded from the company website. Only a 2 point calibration is required to obtain accurate results.

Measurement Operation

The ARGES Chloride sensor isolates the reference and chloride cells between measurements to maintain the longest possible life of the sensor. The isolation prevents the build up of contamination of the measurement bridge that forms the active part of the sensor. The sensor automatically switches to low power mode in between measurements.

Storage

The ARGES Chloride sensor can be stored dry for long periods without any degradation in performance.

ARGES Ammonium Sensor by Keynes Controls

The Intelligent Submersible ARGES Ammonium sensor, is a high performance submersible instrument that has been designed to simplify the acquisition of water quality measurement parameters into any platform that supports data logging operations using digital network communications. The sensor is solid state and does not require any reagents. All measurements are transmitted digitally and in SI Units. The sensor is SDI12 1.4 compatible and automatically assigns the engineering units when used with compatible data loggers and acquisition soultions. The ARGES sensor can be directly connected to a Windows PC or installed into a multiparameter SONDE.

The *ARGUS Ammonium Sensor* by Keynes Controls directly supports SDI12, RS485 and MODBUS digital networks. An optional USB interface is available for direct connection to a Windows PC.

Features

Type	Range
Measurement Range	0.9 - 9000 ppm - auto ranging
Resolution	0.01 - parts per million
Accuracy	+/- 5 % reading - accurate solid state sensor
Temperature (Deg C)	-5 to 60 Deg C
Sensor recalibration Period	2 months continuous use - 720 hours
pH range	0 - 8.5
Operation	Stand-alone / Multiparameter system
Store dry for long lifetime	
Sensor Type	Solid state
Built-in Digital Networks	SDI12 1.4 / RS485 / MODBUS
Calibration Details	Embedded - Last calibration date / User
Calibration Points	2 Point - others on request
Sensor Isolation	Reference cells isolated between measurements
Interference IONS	K^+ Na^+

Like all other ARGES range chemical sensors the calibration factors, date of the last calibration and a user assigned 30 character identifier string are stored into the sensor. The calibration details are moved with the sensor no matter how it is deployed into additional multiparameter systems. The calibration information can be accessed on demand.

Calibration Date Serial No. Calibrated By

Deployed With

The ARGES Ammonium sensor is often deployed with the pH sensor. Calibration is undertaken in collaboration with a pH and temperature sensor.

Storage

The ARGES Ammonium sensor can be stored dry for long periods without any degradation in performance.

ARGES Ammonia Sensor by Keynes Controls

The Intelligent Submersible ARGES Ammonium sensor, is a high performance submersible sensor that has been designed to simplify the acquisition of water quality measurement parameters into any platform that supports data logging operations using digital network communications. The sensor is solid state and does not require any reagents. All measurements are transmitted digitally and in SI Units. The sensor is SDI12 1.4 compatible and automatically assigns the engineering units when used with compatible data loggers and acquisition soultions.

The ARGES Ammonium sensor can be directly connected to a Windows PC using the optional USB interface, or installed into a multiparameter SONDE

The order for which the measurement parameters are returned by the sensor can be user defined in the sensor setup using the QLOG application software. The *ARGUS Ammonium Sensor* supports SDI12, RS485 and MODBUS digital networks. The sensor supports 16 and 32 bit MODBUS registers.

Features

Type	Range
Concentration Range	0.02 to 17000 ppm autoscale
Resolution	0.01 - parts per million
Accuracy	+/- 5% reading - accurate solid state sensor
Temperature (Deg C)	0-50 Deg C
Sensor recalibration Period	2 months continuous use - 720 hours
pH range	2-14
Operation	Stand-alone / Multiparameter system
Store dry for long lifetime	
Sensor Type	Solid state
Built-in Digital Networks	SDI12 1.4 / RS485 / MODBUS
Calibration Details	Embedded - Last calibration date / User
Calibration Points	2 Point - others on request
Settling time	10-30 Secs from submergence
Sensor Isolation	Reference cells isolated between measurements
Interference IONS	Volatile Amines

Like all other ARGES range chemical sensors the calibration factors, date of the last calibration and a user assigned 30 character identifier string are stored into the sensor. The calibration details are moved with the sensor no matter how it is deployed into additional multiparameter systems. The calibration information can be accessed on demand.

Calibration Date Serial No. Calibrated By

Calibration Parameters

Standard 2 point calibration is used for this sensor. The user can adjust the calibration range at any time to optimize the measurements for a specific task. The easiest way to make sensor calibration factor changes is to use the free issue QLOG application software. The sensor uses industry standard commands that can be used with data loggers etc..

Evidence of Ammonia - Foul Odour | Presence of Organic waste | Presence of organic suspended solids.

Storage

The ARGES Ammonia sensor can be stored dry for long periods without any degradation in performance.

ARGES Nitrate Sensor by Keynes Controls

The ARGES Nitrate Sensor by Keynes Controls, is a submersible sensor that has been designed to simplify the acquisition of water quality measurement parameters into any platform that supports real-time reporting, data logging operations. The Intelligent Submersible Nitrate Sensor measures the charged nitrate ions in the water.

The ARGES Nitrate sensor can be used stand-alone, or be installed into a ARGES Multiparameter SONDE.The ARGES Nitrate Sensor by Keynes Controls directly supports SDI12, RS485 and MODBUS digital networks including both 16 and 32 bit registers.

Features

Type	Range
Measurement range:	1.0 - 62000 mg/L - Autoranging
Nitrate Resolution:	0.01- parts per million
Nitrate Accuracy:	+/- 5 % of Reading
Temperature (Deg C)	0-50 Deg C
Sensor recalibration Period	2 months continuous use - 720 hours
pH range	2-14
Operation	Stand-alone / Multiparameter system
Store dry for long lifetime	
Sensor Type	Solid state
Built-in Digital Networks	SDI12 1.4 / RS485 / MODBUS
Calibration Details	Embedded - Last calibration date / User
Calibration Points	2 Point - others on request
Sensor Isolation	Reference cells isolated between measurements
Interference IONS	ClO^{4-}, ClO^{5-},I^-, CN^-, BF^{4-}

Like all other ARGES range chemical sensors the calibration factors, date of the last calibration and a user assigned 30 character identifier string are stored into the sensor. The calibration details are moved with the sensor no matter how it is deployed into additional multiparameter systems. The calibration information can be accessed on demand.

Calibration Date Serial No. Calibrated By

Calibration Parameters

The Standard 2 point calibration is used for this sensor.

Additional Information

The majority of nitrate in groundwater in the UK is derived from diffuse pollution from agriculture, with the rest from sewage sludge disposal to land, atmospheric deposition and point sources. Nitrate levels in our water resources have increased in many areas due to applications of inorganic fertiliser and animal manure in agricultural areas. The regulatory limit for nitrate in public drinking water supplies was set to protect against infant methemoglobinemia, but other health effects have not been considered.

Commonly deployed with:

The ARGES Nitrate is commonly deployed with the pH, Tryptophan, Ammonia sensors when used for monitoring effluent outlets and investigating the sources of accidental discharges into fresh waterways. The sensors make ideal tools for investigating water quality measurements.

ARGES Nitrite Sensor by Keynes Controls

The Intelligent Submersible Nitrite Sensor By Keynes Controls, is a solid state submersible sensor that has been designed to simplify the acquisition of water quality measurement parameters into any platform that supports real-time reporting, data logging operations. The sensor elements are isolated between measurements in order to prolong its active life and reduce power. The sensor returns measurements directly in engineering units and supports communication across the SDI12, RS485 and MODBUS digital networks.

The sensor is factory calibrated for immediate use. The order and number or returned parameters from the sensor is user defined in the device setup.

The ARGES Nitrite Sensor by Keynes Controls can be used for statutory limit monitoring applications.

Features

Type	Range
Measurement range:	0.5 to 460 ppm
Nitrate Resolution:	0.05 ppm
Nitrate Accuracy:	+/- 5% of Reading or 2 ppm
Temperature (Deg C)	0-50 Deg C
Sensor recalibration Period	2 months continuous use - 720 hours
pH range	4.5 - 8
Temperature Sensor	Stand-alone / Multiparameter system
Store dry for long lifetime	
Sensor Type	Solid state
Built-in Digital Networks	SDI12 / RS485 / MODBUS (16 & 32 Bit Registers)
Calibration Details	Embedded - Last calibration date / User
Calibration Points	2 Point - others on request
Sensor Isolation	Reference cells isolated between measurements
Interference IONS	CN-

Calibration Date Calibrated By

Calibration Parameters

The sensor is factory calibrated before shipment and ready for immediate deployment . The ARGES Nitrite Sensor by Keynes Controls is typically calibrated at 2 points. A Zero point which uses distilled water, and the high end calibration point using one of the calibration standard solutions. The overall accuracy of the sensor will depend upon how well the sensor is calibrated. For optimum results calibrate the sensor at the same temperature as the solution under test. The free issue QLOG software enables the calibration points to be entered into the sensor.

Like all other ARGES range chemical sensors the calibration factors, date of the last calibration and a user assigned 30 character identifier string are stored into the sensor. The calibration details are moved with the sensor no matter how it is deployed into additional multiparameter systems. The calibration information can be accessed on demand.

Nitrite Pollution in drinking-water

The most common sources of both nitrate and nitrite in water include agricultural activities (in organic fertilisers and manure), wastewater treatment, nitrogenous waste products from humans and discharges from industrial processes and motor vehicles.Nitrate and nitrite are naturally occurring ions that are ubiquitous in the environment. Both are products of the oxidation of nitrogen, as part of the cycle required by all living systems for the production of complex organic molecules, such as enzymes and other proteins.

When present in rivers, nitrite is well known to be toxic to almost all living creatures. This is due to its impact in decreasing the oxygen-carrying capacity of blood. In infants, this phenomenon is called blue baby syndrome; in fish, it is known as brown blood disorder.

ARGES Potassium Sensor by Keynes Controls

The Intelligent Submersible Potassium Sensor By Keynes Controls, is a submersible solid state sensor that has been designed to simplify the acquisition of water quality measurement parameters into any platform that supports real-time reporting, data logging operations. No filling solutions required. The sensor cells are all solid and isolated between measurements, in order to prolong the sensor active life, reduce contamination and power. The ARGEs Potassium sensor like all of the ARGES chemical sensors are low power devices.

Features

Type	Range
Measurement range:	0.04 to 39000 ppm - autoscaling
Potassium Resolution:	0.05 ppm
Potassium Accuracy:	+/- 5% of Reading or 2 ppm
Temperature (Deg C)	5-50 Deg C
Sensor recalibration Period	2 months continuous use - 720 hours
pH range	1 - 9
Settling Time	10-60 Secs from dry
Potential drift	2 mV / Day
Store dry for long lifetime	
Sensor Type	Solid state reference and half cell
Built-in Digital Networks	SDI12 V1.4 / RS485 / MODBUS (16 & 32 Bit Registers)
Calibration Details	Embedded - Last calibration date / User
Calibration Points	2 Point - others on request
Sensor Isolation	Reference cells isolated between measurements
Interference IONS	Ammonium, Caesium

Additional Information

Like all other ARGES range chemical sensors the calibration factors, date of the last calibration and a user assigned 30 character identifier string are stored into the sensor. The calibration details are moved with the sensor no matter how it is deployed into additional multiparameter systems. The calibration information can be accessed on demand.

Water Quality Monitoring

Increased potassium levels can signal broader water quality issues and may indicate the presence of other pollutants, such as nitrate and phosphate, derived from agricultural runoff. The ARGES Potassium sensor

Sewage Treatment

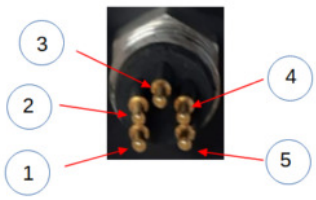
Sewage treatment plants typically don't remove all potassium ions, allowing some to pass through into surface waters. The ARGES Potassium sensor can be used to check the levels passing into the water source, and assist in tracking down any accidental sewage leakages into rivers and estuaries.

Commonly deployed with:

The ARGES Potassium sensor is commonly deployed with the **Tryptophan** fluorometer and **pH** sensor when being used to trace accidental sewage spills. The sensors can be used to locate the source of any spillage. The combined sensors fitted into a multiparameter housing make the perfect tool for tracing and recording contamination of the waterways.

ARGES Sensor Pin-out

All the ARGES chemical sensors have the same network connector pin-out regardless of the model.



Simply connect the sensor to the network type of choice. The sensor will detect the network traffic and automatically start communications. It is now possible to make configuration changes and measurements.
Only the ARGES Fluorometers have the option to fit an analogue output that operates proportional to the concentration of the sample under investigation. The analogue output is 0 to 2 V DC.

1 = +RS485 2 = -RS485 3 = SDI12 4 = Gnd 5 = 12V DC

SDI12 Network Connection

SDI12 is a simple 3 wire network used with many low power data loggers for remote recording operations

The ARGUS chemical sensors support SDI12 V1.4 and are backward compatible with V1.3. Data loggers supporting SDI12 V1.4 will automatically detect the SI unit for which the sensor has been assigned. The QLOG free application software supplied with the sensors, supports SDI12 V1.4 and can be used to detect and assign the SI units automatically.

Each sensor on the SDI12 network has its own address. For standard SDI12 sensor operation the address is an integer in the range of 0..9.
The Keynes Controls ARGEs sensors all support enhanced address mode giving up to 32 sensors on the network.

Sensor Pin	Data Logger Connection
3 - SDI12 Data	SDI12 Data
4 - Ground	Gnd / 0V
5 - 12 V DC	12V DC

RS485 Network Connection

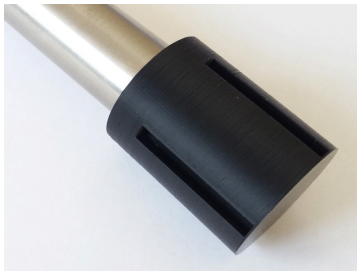
Simply connect the sensor to the RS485 network and it will automatically detect the network traffic and start operating.

Sensor Pin	Data Logger Connection
1 + RS485	+ RS485
2 - RS485	- RS485
4 - Ground	Gnd / 0V
5 - 12 V DC	12V DC

Single Sensor Deployment - Shade Cap

All of the ARGES chemical sensors can be deployed singularly. The fluorometers depend upon light to take measurements and as such have to be protected against stray light that can affect the readings.

A shade cap is fitted onto the fluorometer optics as shown opposite. Apart from preventing stray light, the shade cap also prevents damage to the optics when deploying the sensor and debris from entering into the light sensitive area.



Shade Cap fitted to a fluorometer

ARGES Hydrocarbon Sensor by Keynes Controls

The ARGES Hydrocarbon Sensor has been designed to detect Anthracene, Fluoranthene, Pyrene, Naphthalene, Acenaphthylene, Fluorene, Phenanthrene, Benzanthracene and Chrysene etc.. other PAHs. The ARGES Hydrocarbon Sensor by Keynes Controls measures the sum of hydrocarbons present in a water sample, such as a river or drain. These PAHs are present in petroleum products and therefore form an excellent tracer for determining the amount of hydrocarbon pollution in water. Hydrocarbons are a class of contaminants that can cause a severe threat to human health and cause direct or indirect harm to aquatic organisms and ecosystems.

The ARGES Hydrocarbon Sensor by Keynes Controls has been designed to be used as a stand-alone laboratory instrument, and as part of a multi-parameter device inside a multi-parameter SONDE which is an ideal tool for Ideal for fixed installation monitoring applications.

Type	Range
Concentration range:	0.0 to 2000 NDSA ppb - Other ranges on request.
Resolution:	0.01 NDSA ppb
Excitation	365 nm
Temperature (Deg C)	0-50 Deg C
Sensor recalibration Period	Recommended 2 years
pH range	0 - 14
Temperature Sensor	NTC 0 - 50 Deg C / 0.2 % accuracy
Store dry for long lifetime	
Sensor Type	Fluorometer
Built-in Digital Networks	SDI12 / RS485 / MODBUS Digital Communications
Calibration Details	Embedded - Last calibration date / User
Calibration Points	2 Point - others on request

Calibration Parameters

To properly calibrate The ARGES Hydrocarbon Sensor by Keynes Controls, use a 10 ppm calibration solution of 1-5 naphthalenedisulfonic acid disodium salt. This solution contains naphthalene, an aromatic hydrocarbon with fluorescence characteristics similar to many refined oils.

The 10 ppm calibration solution should be freshly prepared by serial dilution from pure 1-5, naphthalenedisulfonic acid disodium salt. When calibrating the hydrocarbon sensor with naphthalenedisulfonic acid disodium salt, the readings given will be in µg/L (ppb) naphthalene
A two point calibration procedure is used with this sensor. Enter a low level and high level parameters directly into the sensor. The instrument stores the calibration factors and undertakes the measurement conversion into the SI units

Advantages	Applications
Direct results in Engineering (SI) Units	Water Quality Measurements
Real-time measurements	Pollution reporting applications
Automatic temperature compensated readings	Biological Treatment Plant Protection
Built-in Digital Networks	PAH measurements in process water

ARGES ™ Turbidity Sensor by Keynes Controls

The ARGES Turbidity Sensor by Keynes Controls is a single-channel instrument that can detect and report turbidity levels in the range of 0.5 - 2000 NTU. The ARGES Turbidity Sensor has been designed to be used as a stand-alone laboratory instrument, as part of a multi-parameter device inside a Keynes Controls SONDE, and can be connected directly into a plant-wide SCADA system using the MODBUS protocol.

All of the Keynes Controls manufactured fluorometers supply measurements directly in engineering units. The stainless steel construction enables the sensors to be long-term deployed for remote applications. The turbidity sensor optics should be cleaned before a new measurement using the ARGES Brush interface. The ARGES Brush unit can be fitted into any of the multi-parameter housings.

Type	Range
Concentration range:	0 to 2000 NTU - Other ranges on request
Resolution:	0.01 NTU
Accuracy:	+/- 2 % of reading. +/- 0.5 NTU whichever is greater
Temperature (Deg C)	0-50 Deg C
Sensor recalibration Period	1 year
pH range	0 - 14
Operation	Fluorometer
Store dry for long lifetime	
Sensor Type	Solid state
Built-in Digital Networks	SDI12 / RS485 / MODBUS Digital Communications
Calibration Details	Embedded - Last calibration date / User
Calibration Points	2 Point - others on request depending on range of interest.

Calibration Parameters

All of the sensors are factory-calibrated before shipment. The advanced design of the sensors means that the time between re-calibration of an instrument is minimised. Keynes Controls recommends a check calibration every 2 years. The user can adjust the calibration for a specified range to improve accuracy for dedicated tasks.

A range of calibration solutions manufactured by Keynes Controls are available from the online shop. There are two standard units for reporting turbidity - Formazin Nephelometric Units (FNU) and Nephelometric Turbidity Units (NTU). The ARGES Turbidity Sensor by Keynes Controls is set to use NTU by default.

Sensor Deployment

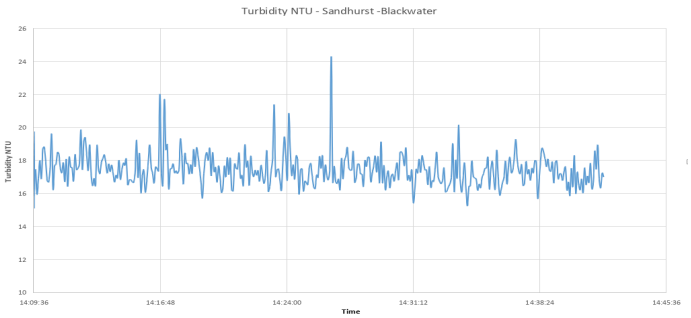
The ARGES Turbidity Sensor by Keynes Controls can be installed into any of the SONDE ports and used in collaboration with any of the other supported sensors. This sensor is commonly deployed with the ARGES Brush unit.

Additional Information

Like all other ARGES range chemical sensors the calibration factors, date of the last calibration and a user assigned 30 character identifier string are stored into the sensor. The calibration details are moved with the sensor no matter how it is deployed into additional multiparameter systems. The calibration information can be accessed on demand.

Practical Results

The ARGES Turbidity sensor measures the clarity of the water regardless of colour.The results below are taken from the Blackwater River in Berkshire UK.



The results above were taken using the real-time version of the multiparameter housing with the turbidity sensor installed. The location used for the measurements being opposite an effluent output from a water treatment centre.

ARGES ™ CDOM/fDOM Sensor by Keynes Controls

The ARGES CDOM/fDOM (Dissolved Organic Material)

Dissolved Organic Material originates from many forms including secretions from organisms and humic acids. Concentrations of CDOM can have significant effect on many different biological activities in water systems such as rivers, reservoirs, bays. Very high concentrations of CDOM will have a limiting effect on photosynthesis and inhibit the growth of phytoplankton. Variations in CDOM levels are primarily the results of natural processes such as precipitation levels due to rain, human activities such as agriculture and effluent discharge. Fluorescent dissolved organic matter, or fDOM, is the fraction of CDOM that fluoresces. Not all the components of CDOM fluorescence, so fDOM measurements are used instead of CDOM directly.

The ARGES CDOM/fDOM Sensor by Keynes Controls is a single-channel instrument that can detect and report CDOM levels in the range of 0 - 1000 QSU and water temperature in Degrees Celsius. The sensor has been designed to be used as a stand-alone laboratory instrument, or as part of a multiparameter device inside a Keynes Controls SONDE. The QLOG applications software enables the sensor to be fully configured. All measurements are sent across the different networks directly in SI Engineering units. The order and number of the measurements sent out by the sensor is user defined in the sensor configuration.

The sensor can be connected directly into a plant-wide SCADA system using the in-built MODBUS protocol. The SDI12 and RS485 digital networks enable the sensors to be directly connected to Web based data loggers, Wi-Fi and Local Area Networks.

Features

Type	Range
Concentration range:	0.- 100 QSU / 0 - 100 ppb - other range on request
Resolution:	Five auto range scales: 0.00 - 999.9mg/l.
Accuracy:	+/- 1% of reading.
Sensor Warranty	2 years
pH range	0 - 14
Operation	Fluorometer
Response Time	1 Sec
Temperature Sensor	NTC 0 - 50 Deg C / 0.2 % accuracy
Built-in Digital Networks	SDI12 / RS485 / MODBUS Digital Communications
Simple Calibration	Multi point Calibration Point Option
Sensor Information	User interrogation Serial Number and Last Calibration date
Optional Analog Output	0-2 Volts DC proportional to concentration
SI Units	Raw / QSU / ppb
Analogue Output	0-2 V DC - proportional to concentration

Calibration Date Calibrated By

Calibration Parameters

All of the sensors are factory-calibrated before shipment. The advanced design of the sensors means that the time between re-calibration of an instrument is minimised. Keynes Controls recommends a check calibration every 2 years. The user can adjust the calibration for a specified range to improve accuracy for dedicated tasks. A range of calibration solutions manufactured by Keynes Controls are available from the online shop. There are two standard units for reporting turbidity - Formazin Nephelometric Units (FNU) and Nephelometric Turbidity Units (NTU). The ARGES Turbidity Sensor by Keynes Controls is set to use NTU by default.

For long term applications where any of the ARGES fluorometers are being used, then a submersible brush unit is used to clean the sensor optics before a measurement is taken. Any contamination of the optics due to debris in the water source can affect the results.

Connection to a Windows PC

The ARGES CDOM/fDOM sensor can be connected directly to a Windows PC using the optional USB-SDI12-AG1 media converter.

ARGES ™ Tryptophan

Many instruments available for measuring fluorescence of Tryptophan are old-fashioned, complex to use, expensive, and require a high degree of proficiency to operate. These instruments may also require expensive additional housings and accessories before they can be deployed for any monitoring task. End users who are looking for a simple instrument to make fluorescence measurements of Tryptophan need look no further than the ARGES Tryptophan Sensor by Keynes Controls.

The ARGES Tryptophan Sensor by Keynes Controls is a single-channel instrument that can detect and report Tryptophan levels in the range of 0.5 - 2000 ppb. The sensor has been designed to be used as a stand-alone laboratory instrument, as part of a multiparameter device inside a multiparameter housing, and can be connected directly into a plant-wide SCADA system using the in-built MODBUS protocol.

The SDI12 and RS485 digital networks enable the sensors to be directly connected to Web based data loggers, Wi-Fi and Local Area Networks. This sensor is supplied with free Windows application software that can be used for configuration, data recording and display in user defined panels meters and charts.

This sensor has an optional USB interface that connects and powers the sensor from a Windows PC or laptop.

Features

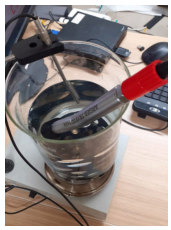
Type	Range
Measurement range:	0.5 to 2000 ppb - others ranges on request
Resolution:	0.01 ppb - 6 digits 2 decimal places
Accuracy:	+/- 1 ppb% of reading - Typical
Temperature	0-50 Deg C
Response	1 Sec Typically
Sensor recalibration Period	approximately 2 year between Calibration
pH range	0 - 14
Temperature Sensor	NTC 0 - 50 Deg C / 0.2 % accuracy
Store dry for long lifetime	
Sensor Type	Fluorometer
Built-in Digital Networks	SDI12 / RS485 / MODBUS Digital Communications
Calibration Details	Embedded - Last calibration date / User
Calibration Points	2 Point - others on request
Sensor Isolation	Reference cells isolated between measurements
Detection	300 - 400 nm

Additional Information

Like all other ARGES range chemical sensors the calibration factors, date of the last calibration and a user assigned 30 character identifier string are stored into the sensor. The calibration details are moved with the sensor no matter how it is deployed into additional multiparameter systems. The calibration information can be accessed on demand.

Calibration Parameters

All of the sensors are factory calibrated before shipment. The advanced design of the sensors means that the time between re-calibration of an instrument is minimised. Keynes Controls recommends a check calibration every 2 years. The User can adjust the calibration for a specified range to improve accuracy for dedicated tasks. The ARGES Tryptophan fluorometer is a very sensitive device. The normal factory calibration settings are suitable for general operations. The calibration range can be User adjusted to suit the measurement application, for example 0 - 50 ppb for low concentration applications.

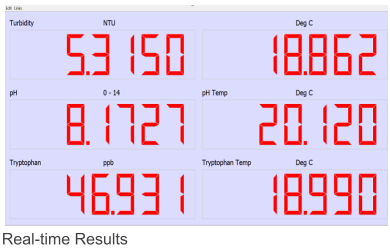


Real Sensor Test Results

River Thames Reading 19th August 2024

The ARGES Tryptophan, Turbidity and pH sensors were deployed on August 19th 2024 at the sites shown in red on the image. The QLOG results screen shows the typical levels as recorded by the sensors. The sites were chosen as they are popular for river users for all types of sailing activity at the Thames Valley Park in Reading UK.

Test Site



Real-time Results

ARGES Dissolved Oxygen

The ARGES Dissolved Oxygen Sensor by Keynes Controls is a single-channel instrument that can detect and report dissolved oxygen levels in the range of 0 - 100 %. The dissolved oxygen sensor uses fluorescence to detect the presence of dissolved oxygen in water and as such does not require any reagent. The sensor can be deployed for long term measurements without any significant change in performance. The sensor is easy to re-calibrate when necessary.

The instrument is fully integrated into the free issue QLOG Windows applications software that is supplied with this device. The QLOG software offers the user full configuration, stores measurements, displays measurements in charts and panel meters.

The ARGES Dissolved Oxygen is purely digital in operation and as such does not vary significantly with variations in temperature that is a common effect with other sensor designs. The sensor can be used stand-alone or part of a multiparameter solution and is fully integrated into the QLOG applications software.

The sensor

Features

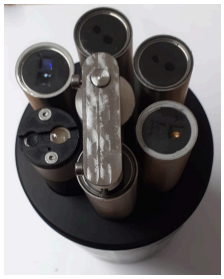
Description	Range
Solid state Fluorometer	Optical Fluorescent
Concentration range:	0. to 10 mg/L 0-100%
Response Time	1 Sec
Resolution:	0.001 mg/L
Accuracy:	+/- 5 % of reading - Typical
Calibration Period:	Approximately 1 year between Calibration
Sensor Material	Stainless-steel body - Gold plated Connector pins
pH Range	0 - 14
Temperature Sensor	NTC 0 - 50 Deg C / 0.2 % accuracy
Simple Calibration	Two points - Multipoint Calibration Point Option
SI Units	**Dissolved H^20** mg/L / % Dissolved H20 - **Temperature** Deg C
Analogue Output	Optional 0 - 2 V DC Proportional to concentration
Built-in Digital Networks	SDI12 V 1.4 / RS485 / MODBUS 16 and 32 bit registers

Optional USB Interface

The ARGES Dissolved Oxygen sensor is offered with an optional USB interface. The USB interface connects and powers the sensor to a Windows PC or laptop. The sensor supports SDI12 V1.4 and can automatically assign the SI units when connected to suitable data loggers. The number and order of the parameters returned by the sensor to the data recorder can be user assigned. SDI12 V1.4 sensors can automatically assign the SI unit when connected to suitable data acquisition systems.

Digital Communications

The in-built digital networks enable the sensor to be used directly with many 3rd applications. The sensor can be easily connected to Wi-Fi and LAN networks using the RS485 communication, and into many site based SCADA applications using MODBUS.



Sensor fitted 7 Port SONDE with brush unit.

Dissolved Oxygen sensor fitted into 3 Port SONDE.

The images opposite show the Dissolved Oxygen sensor fitted inside the multiparameter housings.

For long term projects the 7 port device with built-in brush unit is recommended. For short term applications then the 3 port housing offers a perfect solution.

The Dissolved Oxygen sensor is just one of the many sensors Keynes supplies for water quality measurements.