AQUAREAD
water monitoring instruments

LeveLine-MINI
Water Level sensors

The LeveLine-Mini is a highly accurate water level and temperature sensor. It can be used in a wide range of groundwater and surface water applications. Housed inside the sealed body is a temperature and level sensor.

The LeveLine-Mini Absolute uses a piezoresistive ceramic pressure sensor to provide excellent durability and long-term stability whilst delivering an impressive accuracy of 0.05% FS. A variety of level ranges are available and all of them are temperature compensated across a scale of -20 to 80 deg. C. A wide variety of cable configurations are available as well as an absolute or gauge option.

Across the range of LeveLine water level loggers we use an all Titanium body. Titanium is widely regarded as the best material to use in any water level logger but especially important when deploying into harsh or saline environments ensuring dependable long-term deployment.

Features

- 0.05% FS accuracy.
- Titanium body.
- 2 year warranty.
- SDI-12, RS485/MODBUS direct out communications.
- Vented option available
- LeveLine Mini-CTD version available for salinity and EC measurements.

Applications

- Groundwater level monitoring, pump tests, slug tests etc.
- Stream, lake and reservoir water level measurement.
- Wetland and flood water monitoring.
- Coastal monitoring.
- Tank level measurement.
- Long term continuous monitoring in boreholes, surface water and seawater applications.
- Process applications.
- Flood warning systems.

Deployment and Communication

The LeveLine-Mini is a transducer so it outputs level and temperature readings automatically once connected to a suitable data logger, display or other controller which utilises SDI-12, MODBUS/RS485 protocols.

Absolute and gauge versions are available along with vented and non vented cable options.

LeveLine Mini – CTD

The LeveLine-Mini can be purchased with a conductivity sensor included to give level, temperature, conductivity and salinity readings. This sensor comes with a connector on the back end of the probe so it can be connected to the Leveline PC kit for calibration using the LeveLink PC software.

The LeveLine-Mini-CTD uses the same 4 ring stainless steel conductivity as our multiparameter water quality probes for robust EC and salinity measurements.

LeveLine-Mini Water Level sensor Specifications

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		LeveLine-Mini	LeveLine-Mini-CTD
GENERAL	Temperature ranges	Operational: -20-80° C (-4-176° F) Storage: -40-80° C (-40-176° F) Compensated: -20-80° C (-4-176° F)	Operational: -20-80° C (-4-176° F) Storage: -40-80° C (-40-176° F) Compensated: -20-80° C (-4-176° F)
	Diameter	22mm	22mm
	Length	87mm	146mm
	Weight	120g	210g
	Materials	Titanium body, Delrin nose cone	Titanium body, Delrin nose cone
	Output options	Modbus/RS485, SDI-12, Aquaread proprietary	Modbus/RS485, SDI-12, Aquaread proprietary
	Battery type & life	3.6V lithium; up to 10 years (see note 1)	N/A
	External power	6 - 24 VDC	6 - 24 VDC
MEMORY	Size	N/A	N/A
	Data records	N/A	N/A
	Log types	N/A	N/A
	Fastest logging rate & Modbus rate	10 per second	1 per second
	Fastest SDI-12 output rate	1 per second	1 per second
	Real-time clock	N/A	N/A
SENSOR	Type / Material	Piezoresistive; ceramic	Piezoresistive; ceramic
	Range (Gauge & Absolute)	10.0M (32.8 ft) 50.0M (164 ft), 20.0M (65.6 ft), 100M (326 ft)	10.0M (32.8 ft) 50.0M (164 ft), 20.0M (65.6 ft), 100M (326 ft)
	Maximum pressure	Max 2x range, Burst 2.5x range	Max 2x range, Burst 2.5x range
	Accuracy @ 15° C (note 2)	±0.05% FS	±0.05% FS
	Accuracy (FS) (note 3)	±0.1% FS	±0.1% FS
	Resolution	0.002% FS or 1mm whichever is greater	0.002% FS or 1mm whichever is greater
	Units of measure	Pressure: mbar (psi, kPa, bar, mbar, mmHg, inHg, cmH2O, inH2O, Level: in, ft, mm, cm and m available in LeveLink	Pressure: mbar (psi, kPa, bar, mbar, mmHg, inHg, cmH2O, inH2O, Level: in, ft, mm, cm and m available in LeveLink
Electrical Conductivity	Range	NA	0 - 200mS/cm (0 - 200,000µS/cm)
	Resolution	NA	1µS
	Accuracy	NA	± 1% reading or ±1µS whichever is greater (see note 5)
Salinity (note 4)	Range	NA	0 - 70 PSU / 0 - 70 ppt (g/Kg)
	Resolution	NA	0.01PSU / 0.01 ppt
	Accuracy	NA	±1% reading or ± 0.1 unit if greater
Temperature sensor	Accuracy & resolution	±0.1° C; 0.01° C	±0.1° C; 0.01° C
	Units of measure	Celsius (fahrenheit available in LeveLink)	Celsius (fahrenheit available in LeveLink)
Warranty	Standard	2 years on all LeveLine-Mini versions	2 years on all LeveLine-Mini versions
	Extended	Options Available	Options Available

Notes: 1) Dependent on logging rate. 2) Across factory-calibrated pressure range at a constant temperature. 3) Across factory-calibrated pressure and temperature ranges. 4) Readings calculated from EC and temperature values. 5) At the calibration point at 25°C

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LeveLine Water Level Loggers

The LeveLine records highly accurate water level and temperature measurements in groundwater and surface water applications. Housed inside an all titanium body is a ceramic level sensor, temperature sensor, 10-year lithium battery and a versatile datalogger with capacity for 500,000 data points.

The LeveLine Absolute uses a piezoresistive ceramic pressure sensor to provide excellent durability and long-term stability whilst delivering an impressive accuracy of 0.05% FS. A variety of level ranges are available and all of them are temperature compensated across a scale of -20 to 80 deg. C.

Features

- 0.05% FS accuracy.
- 500,000 data point memory.
- 10 year battery life.
- Replaceable battery.
- Titanium body.
- 5 year warranty.
- Included LeveLink PC Software for basic and advanced data compensation.
- SDI-12, RS485/MODBUS direct out communications.
- 22mm x 186mm.

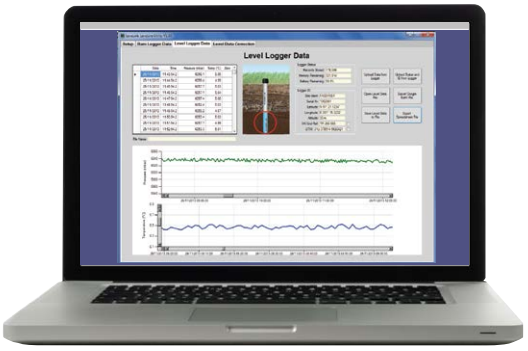
Applications

- Groundwater level monitoring, pump tests, slug tests etc.
- Stream, lake and reservoir water level measurement.
- Wetland and flood water monitoring.
- Coastal monitoring.
- Tank level measurement.
- Long term continuous monitoring in boreholes, surface water and seawater applications.

Leveline Battery and Logging

The LeveLine is set up using the LeveLink PC Software, LeveLine Meter or Quick Deploy Key. A variety of logging types are available these include Linear, Event Based, Schedule, Future Start, Future Stop, Deployed Start and Real Time View.

The LeveLine can record as much as 10 readings per second to once every 24 hours. Event based logging can be used to respond to a set level or temperature change with the option of scheduling logging which is faster or slower for a defined time frame to maximise memory and battery usage.



LeveLink PC Application

Data Management, Viewing and Export

Data is downloaded into the LeveLink PC application. This intuitive software allows for data to be compensated and then exported. Basic compensation can be carried out by using a LeveLine-Baro file to correct the level data for atmospheric pressure.

Advanced features include, density correction, manual barometric pressure correction, salinity and EC correction, field zero correction, averaging and automatic depth to water corrections. A bulk data correction facility is also available to compensate multiple LeveLine files at once.

Data can be exported in raw or compensated formats into .csv formats for further processing outside of the LeveLink application.

LeveLine Water Level Loggers

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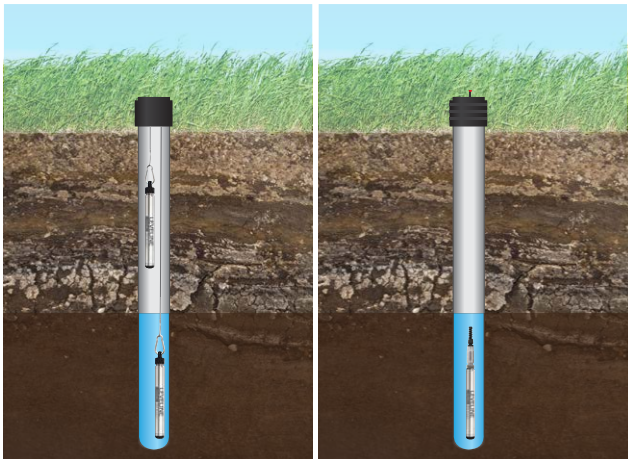
Deployment Options

The LeveLine is designed to be deployed using our rugged deploy cord, which is available in 10, 20, 30 and 100 meter lengths and is easily cut to size and secured to the eyelet in the Delrin cap and attached to a suitable well cap assembly.



Example LeveLine Deployments

Direct read cables are available in set or customisable lengths up to 500 meters. This convenient method keeps the LeveLine in a fixed place and removes the need to remove the LeveLine to extract the data.

Direct Out SDI-12 RS485/MODBUS

communication is available across the range of LeveLine water level loggers when used with a direct read cable. This in-built feature removes the need for an external converter saving time and minimising the footprint of the deployment on site.

As power is drawn from the third-party device the internal battery is switched off enhancing the versatility of the LeveLine. The LeveLine is compatible with any third-party data logger or telemetry device supporting these protocols.

Communication Options.

LeveLine PC Kit

Data is downloaded from the LeveLine via a USB PC Kit connected the LeveLink application.

LeveLine Meter

is available to remove the need to take your computer into the field. Data can be gathered from multiple LeveLine's and later downloaded to your PC for compensation.

See exactly where the LeveLine logger came from, in Google Earth with the completely unique GPS embedding feature

In addition, the LeveLine meter can embed the GPS co-ordinates to your data, allow your to configure the LeveLine logging rates, view live data and calibrate the conductivity sensor when using a LeveLine-CTD.

Quick Deploy Key

The Quick Deploy Key is a simple device which allows the safe initiation of a pre-programmed logging scheme at the time of deployment. The Quick Deploy Key can also zero the depth and zero the logger to start it in the field if no scheme has been pre-programmed in LeveLink. An LED displays battery level, memory capacity and performs a self-test on the LeveLine.

LeveLine-BARO Atmospheric Pressure Logger

The LeveLine-BARO Logger records atmospheric pressure in mbar, psi, kPa, bar, mbar, mmHg, inHg, cmH2O and inH2O. It is the preferred method to compensate the absolute data recorded by the LeveLine using the LeveLink PC application. This LeveLine-BARO data can be downloaded and exported separately for further analysis of site conditions.

The LeveLine-BARO is deployed onsite away from the highest water level. One LeveLine-BARO is suitable for multiple LeveLine's within a 10km radius.

LeveLine Water Level Loggers Specifications

AQUAREAD
water monitoring instruments

		LEVELINE (Abs & Gauge)	LEVELINE - BARO
General	Temperature ranges (non freezing)	Operational: -20-80° C (-4-176° F) Storage: -40-80° C (-40-176° F) Compensated: -20-80° C (-4-176° F)	Operational: -20-80° C (-4-176° F) Storage: -40-80° C (-40-176° F) Compensated: -20-80° C (-4-176° F)
	Diameter	22mm (0.866 in)	22mm (0.866 in)
	Length	186mm (7.32 in)	186mm (7.32 in)
	Weight	150g (5.3oz)	160g (5.6oz)
	Materials	Titanium body, Delrin nose cone	Titanium body, Delrin nose cone
	Output options	Modbus/RS485, SDI-12, Aquaread proprietary	Modbus/RS485, SDI-12, Aquaread proprietary
	Battery type & life	3.6V lithium; up to 10 years (see note 1)	3.6V lithium; up to 10 years (see note 1)
	External power	6 - 24 VDC	6 - 24 VDC
Memory	Size	8.0 MB	2.0 MB
	Data Records	500,000	150,000
	Log types	Linear, Event & User-Selectable Schedule with Future Start, Future Stop, Deploy Start and Real Time View	Linear, Event & User-Selectable Schedule with Future Start, Future Stop, Deploy Start and Real Time View
	Fastest logging rate & Modbus rate	10 per second	1 per minute (logging) 5 per second (Modbus)
	Fastest SDI-12 output rate	1 per second	1 per second
	Real-time clock	Accurate to 1 second/24-hr period (± 6 minutes/year)	Accurate to 1 second/24-hr period (± 6 minutes/year)
Pressure Sensor	Type / Material	Piezoresistive; ceramic	Piezoresistive; ceramic
	Range (Absolute)	10.0m (32.8 ft) 20.0m (65.6 ft) 50.0m (164 ft), 100m (326 ft)	0 to 16.7 psi; 0 to 1.15 bar
	Range (Gauge)	10.0m (32.8 ft) 20.0m (65.6 ft) 50.0m (164 ft), 100m (326 ft)	N/A
	Maximum pressure	Max 2x range, Burst 2.5x range	Max 2x range, Burst 2.5x range
	Accuracy @ 15° C (see note 2)	±0.05% FS	±0.1% FS
	Accuracy (FS) (see note 3)	±0.1% FS	±0.2% FS
	Resolution	0.002% FS or 1mm whichever is greater	0.1mb
	Units of measure	Pressure: mbar (psi, kPa, bar, mmHg, inHg, cmH2O, inH2O, Level: in, ft, mm, cm and m available in LeveLink)	Pressure: mbar (psi, kPa, bar, mbar, mmHg, inHg, cmH2O and inH2O available in LeveLink)
Temperature Sensor	Accuracy Resolution	±0.1° C 0.01° C	±0.1° C 0.01° C
	Output Units	Celsius (fahrenheit available in LeveLink)	Celsius (fahrenheit available in LeveLink)

Notes: 1) Dependent on logging rate. 2) Across factory-calibrated pressure range at a constant temperature. 3) Across factory-calibrated pressure and tempera ure ranges

LeveLine Early Warning System (EWS) Using the LeveLine-Mini and AquaTelemetry

• Water Level • Temperature • Alerts • Remote data capture

"Flood prevention may not be possible but with an early flood warning system you can alert your household / community / business of rising water levels giving you the chance to protect your assets from flood damage."

LeveLine-Mini

The LeveLine-Mini features the same great specification as its larger counterpart the LeveLine. (see back pages for Sensor Specifications) This mini water level and temperature sensor is made from high quality titanium and is the same diameter at 22mm. It outputs directly in SDI-12 or Modbus (RS-485) meaning you can connect it to any SDI-12 ready logging device as well as our AquaTelemetry system.

It has no internal power or memory, it's simply a sensor that will send data to your chosen logging device.

LeveLine-Mini Features:

- High quality stainless steel body
- Features a Delrin nose cone
- Uses the same Piezoresistive pressure sensor found in the LeveLine for highest accuracy
- Impressive accuracy of 0.1% FS
- Sensor can log as fast as 10 times per second
- Cable is hard wired into the sensor, various lengths available to suit every deployment
- SDI-12 / Modbus output as standard
- Sensors come with a 2 year warranty

LeveLine-Mini Mechanical Specification

	LeveLine-Mini
Dimensions (L x Dia)	87 x 22.2mm
Material	Titanium
Memory and battery	No
Output options	SDI-12, Modbus, Proprietary

EARLY FLOOD WARNING SYSTEM PREVENTS VILLAGE FROM A POTENTIALLY DEVASTATING FLOOD

Aquaread's LeveLine-EWS system proving to be a huge success story for Essex Village

Parish councillor and local residents comment on their experiences with their new flood alert system, provided by Aquaread, as it issues it's first alerts to the community.

According to the Met Office, December was the wettest month the UK has seen in over a century. As a result flooding has affected thousands of homes and businesses, particularly across the North of England. It is estimated by the BBC that the cost of this flooding will breach the £5bn barrier, creating a £1.5bn burden on UK insurance companies.

Whilst there are many things that can be done to prevent flooding such as installing barriers, dredging rivers or more natural approaches like digging ditches in fields to divert the flood waters to open land, most of these activities are out of reach for local communities in the short term.

In some cases having more time to defend against rising flood waters can be enough to prevent substantial damage, giving people adequate warning at any time of day or night to deploy their defences and safeguard their assets. This is the approach that was recently taken by the local parish council for the village of Stansted Mountfitchet near the Hertfordshire border.

Stansted Mountfitchet has suffered from flooding in the past, but in 2014 the village experienced the worst flooding any of the local residents could remember in recent years. Ruth Clifford of the local parish council recalls *"In previous years various local roads that run close to the brook have flooded. Damage caused to property from these floods, whilst devastating for those involved, was actually very limited. However, the 2014 flood affected many businesses and a few homes. Two businesses were closed for about a year to enable the properties to dry out and be refurbished."*

Ruth was tasked with finding out if it was possible to have a flood warning system installed to warn of rising water levels to alert the local flood wardens to action. After some searches on Google she came across a number of potential suppliers, one of them being Aquaread. *"I read about your products on your web page and discussed it with your sales team. Having done the same with two other companies, I considered that your system best met our requirements."* Said Ruth when asked about why she chose the LeveLine-EWS.

Two systems were subsequently installed, by Aquaread, in November along the brook that runs through the village. Deployment locations were discussed in detail with the local residents who were most familiar with the normal level of water seen in the brook. The first system was set up on a small bridge that residents often use to gauge the brook's height and the second deployed downstream by a trash screen sitting in front of a culvert, as seen in the images that follow.

With further input from the local residents the alert levels were set at 36cm, a level equivalent to the water height reaching the underside of the bridge; a marker for action for the flood warden team.

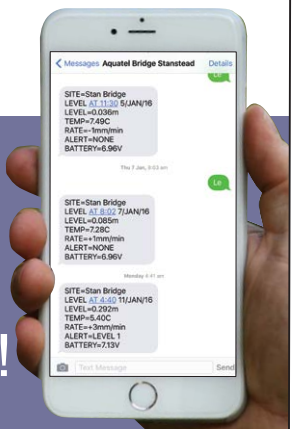
Less than a month after installation the UK was awash with the wettest December in over one hundred years. With flood wardens across the country on high alert the residents and wardens of Stansted Mountfitchet slept a little easier knowing that they would receive an alert should the brook water levels rise suddenly.

In the early hours of the 11th January 2016 at 3:50am the LeveLine-EWS deployed at the trash screen gave its first alert by distributing SMS messages. The alert was received by a local resident, being first on the scene he began to clear the trash screen of the debris that had built up following the rise in level. Once the screen was clear the flow of water was initially eased but remained high.

"We monitored the water level using the text messaging feature until around 5:20 when it became clear that there was a real problem." Stated the local resident.

More residents soon arrived to assist in further clearing of the brook, amid fears of the banks being breached. At 6:30, with persisting rain, the decision was made to deploy property based flood protection.

Thanks to the novel SMS (text messaging) communication utilised by the LeveLine-EWS, residents were able to constantly check the level whilst they carried out their usual morning activities.



Simple text message communications can be used by **Anyone!**

Local residents simply have to send the device an SMS message saying the word ‘Level’ or ‘Le’ for short, as pictured above, to get an instant reading of the current level and also the rate of change in level since the last reading.

The feature can be an advantage allowing the user to easily check the level when they have other commitments to take care of, or when it’s the middle of the night and heavy rain can be heard outside. In addition to the SMS messaging, all data is recorded by the device and stored for daily distribution via email to an administrator for the device; should you wish to plot the historical trend in water and temperature level.

“Without the system in place I am almost certain that the road along the brook would have flooded this morning.” States the resident first to attend the deployment site.

The team at Aquaread will continue to fully support the community in order for them to achieve the best results from their deployments. When asked, Ruth described the installation team as *“Simply amazing, the culvert device was a particularly tricky installation and you went above and beyond to install it!”*

The LeveLine-EWS system is designed to buy you extra time to react. That is exactly what Ruth from the parish council at Stansted Mountfitchet has helped to provide to the local residents, who had one final thing to say,*“Many thanks for this piece of kit which will, I am sure, prove invaluable and already has.”*

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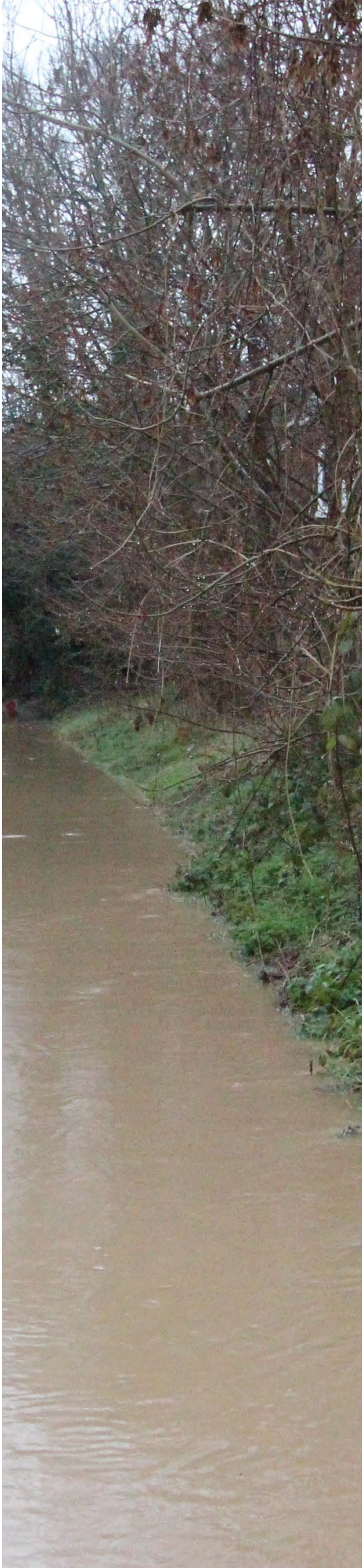

AquaTelemetry System

3G, GPRS telemetry device with SMS and email communications

No remote server means no annual subscriptions, you Own Your Data

The AquaTelemetry unit is a logging and telemetry device with a built in air pressure sensor that is designed to interface to a variety of measuring devices to provide remote control, data logging and data retrieval via the mobile phone networks. The device works seamlessly with all Aquaprobes and LeveLine measuring instruments along with up to 5 third party SDI-12 sensors.

Why Choose AquaTelemetry?

Because with AquaTelemetry there are no annual subscriptions meaning the only recurring cost is the minimal cost to send data and SMS via the mobile networks.

Because the data is sent directly to you, it is not stored on a server owned by someone else potentially in a different country meaning you truly do Own Your Data.

Because its easy to operate, just send it an SMS message and get instant readings on all parameters being measured or wait for the daily Email containing the days full dataset.

Because it is easy to securely install in the field with the optional mounting bracket. You can be sure you have a good connection to the mobile network using the internal LED system giving indication of signal strength or by using the optional internal display screen.

AquaTelemetry Features

Simple but secure bracket holds AquaTelemetry unit in place. All screw fixings are hidden when the AquaTelemetry device is fitted within the bracket.

- Tamper proof housing with secure wall mountable bracket available
- Small subtle size 90 x 90 x 160mm
- Powered by internal Lithium batteries or an external 12v supply as standard
- Built in pressure sensor for barometric compensation of water quality and water level parameters
- For use with all LeveLine-Mini sensors
- No annual subscriptions required, data is sent direct via SMS or Email
- Internal memory to store logged data between uploads
- Configurable alarm settings that lead to SMS or Email notifications direct from the device
- Communicate directly with the unit via pre-defined SMS or Email commands