



## User Manual

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# 1 SYSTEM ARCHITECTURE

## 1.1 Overall Architecture

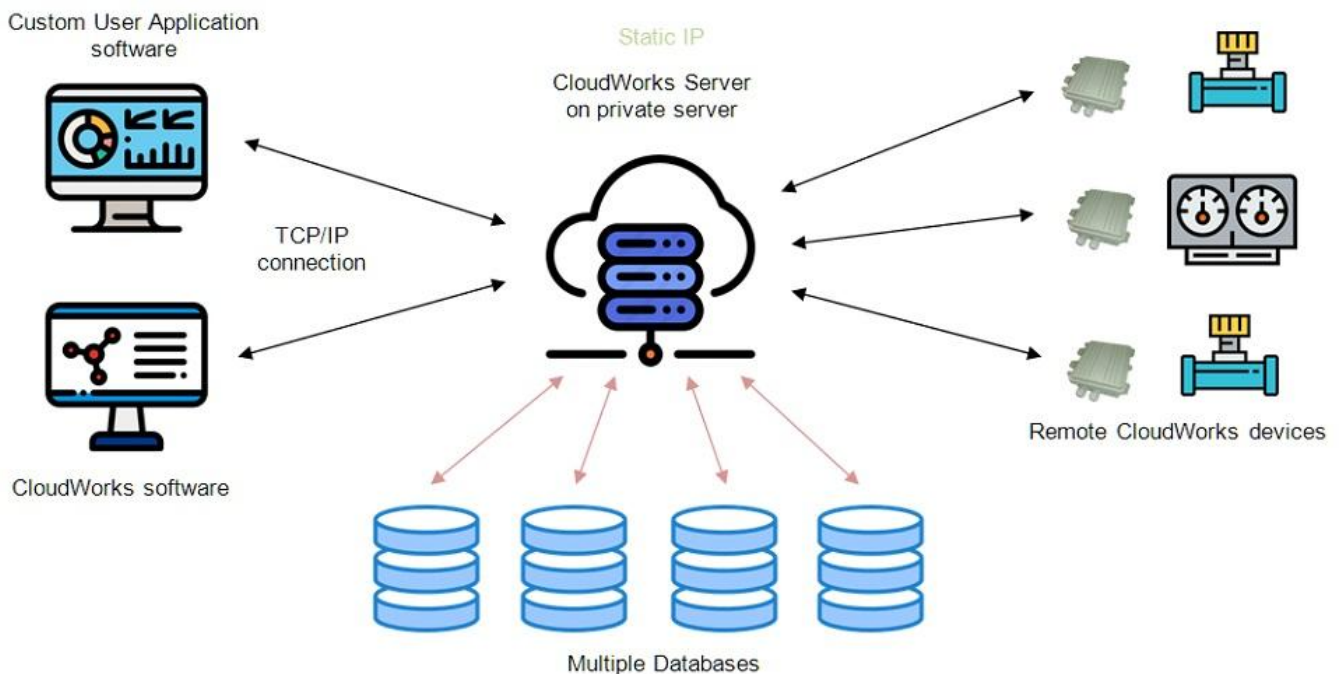
The Cloudworks suite of programs consists of two modules, **Cloudworks Server** and **Cloudworks Client** (known just as **Cloudworks**).

**Cloudworks Server** runs on a server with a static IP and manages all the communications between the users and the remote devices, as well as the data collection and insertion into their respective databases. Other functions include management of clocks and communications heartbeats throughout the system. **Cloudworks Server** can be installed by registering and installing from the Cloudworks website at <http://cloudworks.systems/>

The second software module is **Cloudworks Client** (referred to as only **Cloudworks**). This module is run on each client computer (multiple sessions allowed) providing a wide range of functions for different applications in the field. Instead of using **Cloudworks**, developers are able to integrate the data into their own systems by communicating straight to the database or directly to the remote devices through the **Cloudworks Server** communications port. The protocols for direct communications to the remote devices are available in the **Cloudworks Server Protocols** document.

As explained earlier, the Cloudworks system is designed to communicate through a server with a static IP. This architecture allows the remote devices to operate on networks that provide only dynamic IP's - such as most mobile operators. In order for them to communicate correctly to the user software, they need to connect via this server. The server can be on a private network or simply on an internet exposed connection. Fully private networks can be established using VPN's etc.

**Cloudworks** can be installed by registering and installing from the Cloudworks website at <http://cloudworks.systems/>

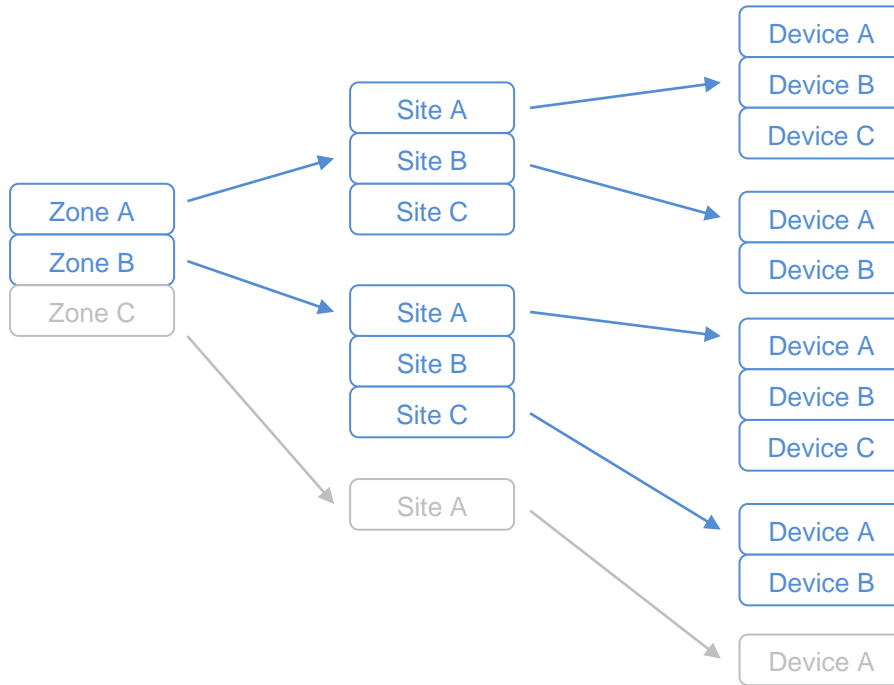


This document serves to describe the Cloudworks application software and functions. Most of the time the Cloudworks software is merely interacting with the database on the server but for certain functions, a direct communication link is established to the remote equipment and commands are carried out in real time.



## 1.2 MySQL Database Architecture

Before logging into the system it would be best to discuss the architecture of the database. In order for it to be easier to navigate the devices in the field, the database has been divided in 3 groups at different levels. At the top most level are the zones. Zones could be geographical areas such as cities/countries or non-geographical entities such as clients etc. Within a zone there are sites. A site would be an installation within a zone, such as a building or basically a sub section of a zone. Contained in a site are all the devices associated with that site. For example a remote pump station with three loggers would have those three loggers listed within that site.



MySQL Database Architecture

**Important Note:**

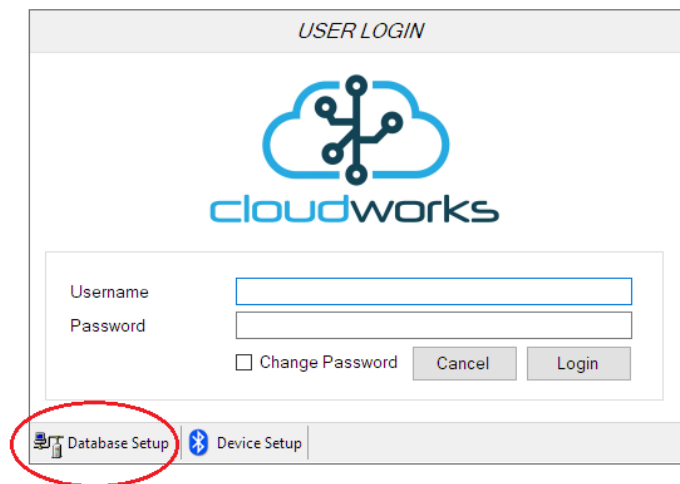
The Cloudworks Server software supports multiple databases. What this means is that the server will automatically populate the database that is associated with a specific device. Each database and device has a Vendor Code assigned to it. Data is matched between these systems using that code. This code is also used to separate communications between different vendors, preventing the cross accessing of devices by unauthorised users.

## 2 USING CLOUDWORKS

### 2.1 Logging in to Cloudworks

Once Cloudworks has been installed, it can be run and the user can log in and establish a connection into the system. Each time the software is run, it will automatically access the Cloudworks server and check if there is not perhaps a newer version available. Should a newer version be found, you will be prompted to install. Cloudworks is being continuously upgraded with new applications etc, so it would be advisable to always accept the newer version.

For a new system, there is no Username or Password and you can simply log in directly. You will be alerted that no System User has been assigned so it would be advisable to create an Administrator user as soon as possible to secure access. Users are defined in the database so access will require a proper connection in order to authenticate the user.



If this is the first time you are connecting to the system, it will be necessary to set the database server and connection details in order for the system to access the database. Failing this would result in the software reporting a 'Cannot connect to database' error or 'invalid login' as the user cannot be authenticated.

To open the database connection settings, click the icon on the bottom left of the screen. This will expose the database setup parameters. These settings are available from your system administrator and are normally sent to you by email from the **Cloudworks Server** module. Once they are setup and you log in, they will be committed to memory and will not need to be set again unless you change to another database/server. The 'Device Setup' icon is used for the Bluetooth configuration of a local device without actually authenticating into the Cloudworks system. This will be explained later on in this document.



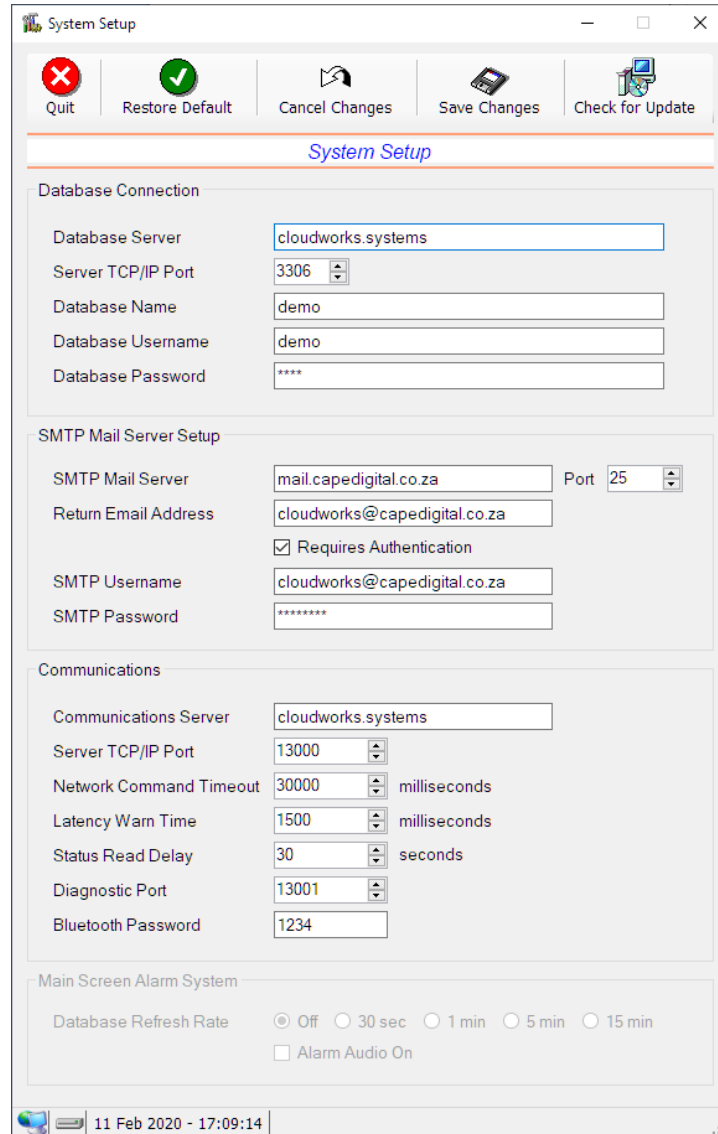
The first time your user details are sent to you, they will include a generated password that may be a little difficult to remember. This password can be changed by ticking the 'Change Password' box on the User Login screen. When this block is ticked, further entry fields will pop up that need your new password entered twice. The Login button will only be available if the two newly entered passwords are the same and not blank.



Once you have entered these, you can press the 'Login' button to enter the system. The new password will now be committed to the database.

## 2.2 System Setup

Before starting to use the Cloudworks software, it will be necessary to check the system setup parameters to ensure that the rest of the software will function correctly. The System Setup screen is accessed by pressing the 'System Setup' button in the tool bar. There are a few parameters that need to be setup under this section for the Cloudworks software to operate correctly.



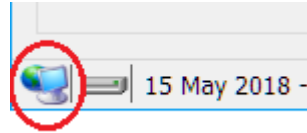
The first thing to do is to check that your software is fully up to date. Although the Cloudworks software goes and checks the server for updates every time it is run, it is also possible to do a direct check by pressing the 'Check for Update' button in the toolbar. If a new update is available, you will be prompted through the whole update process.

The database connection details can be entered under the Database Connection heading. Ordinarily, these would already have been setup at the Login Screen used to enter the system. Again, these would have been emailed to you by your system administrator.

There are two other major parameter groups that need to be configured. One of them is the SMTP Mail Server Setup. The Cloudworks software uses a direct connection to your mail server for the sending of access data to newly captured users via email. SMTP protocols are used to send these mails and settings can be obtained from either your internet service provider

or IT department. Please note that emails can normally only be sent through an SMTP server when you are connected to the particular network associated with that service provider. Sending an email from an external network is called 'relaying' and is blocked by most SMTP servers. This is to prevent SPAM mails being sent from an unknown user. If your mails are not being delivered, it will probably be for this reason.

The second set of parameters are important for the communications between the Cloudworks software and the server. If you are missing the Server Connection icon on the bottom left of the screen, then it is because the setup here is incorrect. It will also provide information with regard to the current communication status of all the remote devices (Online/Offline/Sleep etc).



The 'Communications Server' parameter is the server name or IP address through which your remote devices would normally communicate. It is almost always the same as the 'Database Server' and is the server on which **Cloudworks Server** software is running. It is possible to host the databases on a completely separate server to the one through which the remote devices communicate. By allowing this, it means that you can manage the communications for a client while populating databases on their own server. Policy in many companies require this for data ownership or security reasons.

The remaining parameters are used for advanced tweaking of the communications and should probably be left at their default values.

The Main Screen Alarm system functionality will be included in Cloudworks at a later stage. Once all these parameters have been set, press 'Save Changes' and restart the program when prompted.

Parameter definitions:-

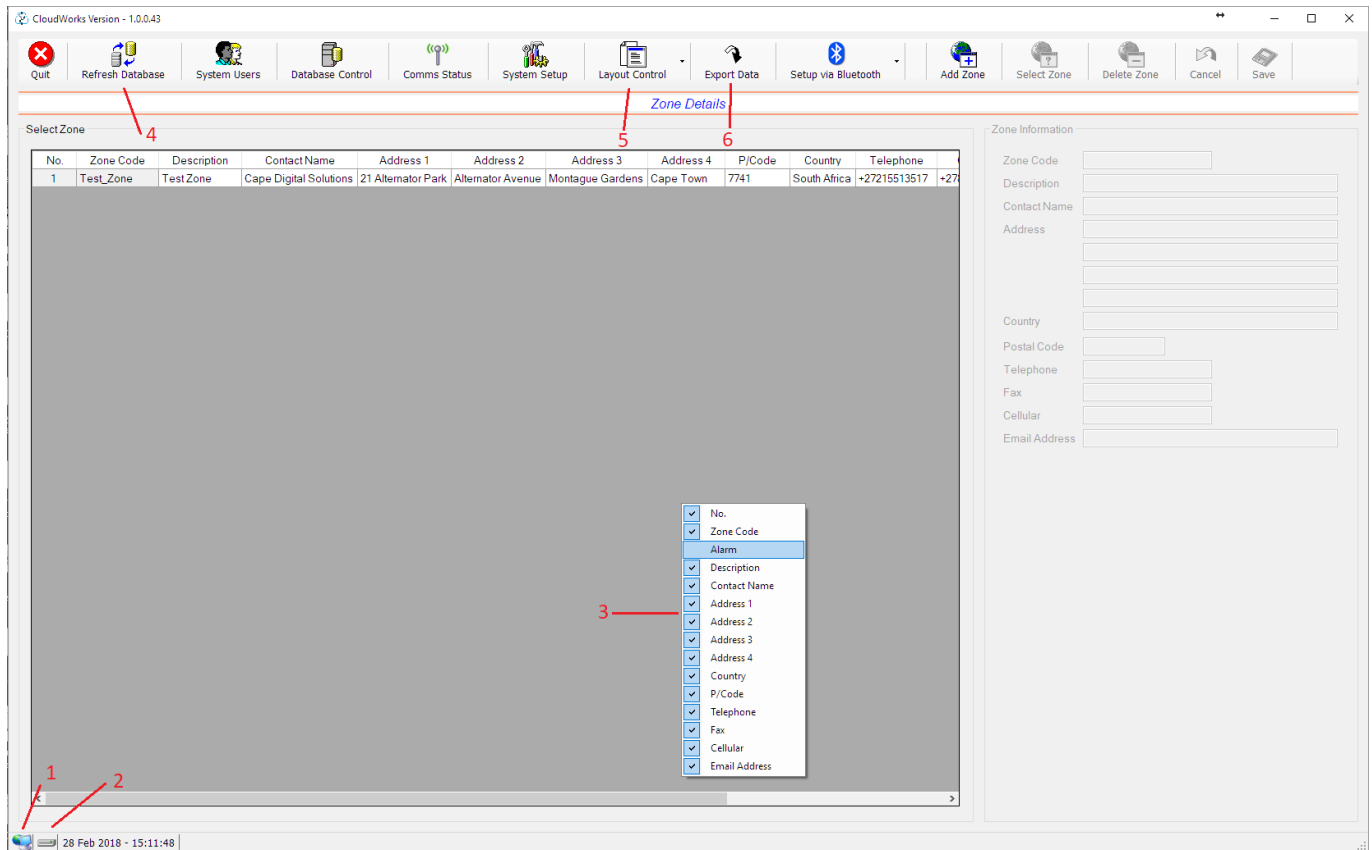
Parameter	Notes
<b>Database Server</b>	The Server Name or IP address of the server that is hosting your database.
<b>Server TCP/IP Port</b>	Computers make a connection to the Database Manager software on the server through a TCP/IP communications port. MySQL uses the port number 3306 as a default. This can be changed to another port in case of a clash or for enhanced security reasons. Please note that both the server and Cloudworks need to be operating on the same port for the connection to function.
<b>Database Name</b>	The name of the database to which you are connecting. This will be a database assigned to you by the Cloudworks administrator and is associated with your Vendor Code.
<b>Database Username</b>	Database Username under which you have access to the database.
<b>Database Password</b>	Password for the above Username.
<b>SMTP Mail Server</b>	The Server Name or IP address of the server that is hosting your SMTP Mail server.
<b>Return Email Address</b>	When mails are sent out to an SMTP mail server, one of its prerequisites to sending is to also have a return email address (sender address) to which it can report if a mail has not been sent. The mail server also uses this to determine if this is a valid mail and not a SPAM mailer.



<b>Requires Authentication</b>	Tick this box if your mail server requires authentication when sending mails. Many SMTP servers do not require this as you are sending from their own networks and they would already be familiar with who you are.
<b>SMTP Username</b>	Your Username for the SMTP Server.
<b>SMTP Password</b>	Your Password for the SMTP Server.
<b>Communications Server</b>	The Server Name or IP address for the server that is running Cloudworks Server. All the remote and user communications will be processed through this server.
<b>Server TCP/IP Port</b>	Cloudworks connects to the Communications server through a TCP/IP connection. This port number is by default 13000 but can be changed if it clashes with other systems. The server will also need to have this port number changed.
<b>Network Command Timeout</b>	Time allowed for a command to propagate the whole system before it is considered to have failed. Parameter is in milliseconds.
<b>Latency Warn Time</b>	The latency time is the delay between the server sending a command to a remote device on the GSM network and the time it takes for a response to be received. This gives a good indicator to the level of congestion on the GSM network. When displaying the comms status any latency time greater than the Latency Warn Time will be displayed in red. Settings are in milliseconds.
<b>Status Read Delay</b>	The Communications server keeps a register of the remote device comms statuses. This includes information as to whether that device is online etc. Cloudworks will periodically go fetch this register in order to display within the software. Status Read Delay is the number of seconds between each read of this register from the server.
<b>Diagnostic Port</b>	There is a local TCP/IP diagnostic port available to monitor data traffic etc. This port number is defined in this parameter. Used for advanced features only.
<b>Bluetooth Password</b>	The global Bluetooth Password used in the accessing of devices for local configuration. This is explained further in the 'Device Setup via Bluetooth' sections of each device type.

### 2.3 General Information

Now that you have logged in, the next screen that will appear is the 'Zone Details' screen. **Important to note is that some of the buttons on this screen may be disabled based on your user authority.** User security levels are discussed at a later stage in this document.



There are elements to this screen that are carried throughout the entire software suite and are important to know. They have been numbered 1 to 6.

1. Server connection icon. This icon will be present if the connection to the communications module of the server is active and functioning. It will allow the Cloudworks software to communicate directly to the remote devices as well as determine the current communications status. Should this icon not be present, go check the settings in the System Setup screen.
2. Database Connection icon. While an active and valid connection to the database is present, this icon will indicate as such.
3. Right clicking on any of the on screen tables in Cloudworks will produce a selection window as per the example. Selecting items on this list will result in the display or removal of that column in the table. This allows for the customising of these tables which becomes important when exporting data. These columns can also be ordered by dragging the column left or right. Clicking the header of the column will result in the column being sorted in an ascending or descending order.
4. Since this system is referencing a database that can be changed by another user, pressing the 'Refresh Database' button will force the software to go and fetch the most recent data from the database. Much like reloading a webpage.
5. Customised layouts can be saved and reloaded using the 'Layout Control'. Expanding this button will give you the options of saving, loading and resetting the layouts. These layouts refer to the columns display and order of the on screen tables.

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6. The most important aspect of being able to customise the on screen table is for the export of data. Data is exported to a .csv file in the same layout and order as per the current screen layout. This allows for customisable .csv files. Data can be exported as a whole or as per a selected range.

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## 2.4 Managing Users

User access on the Cloudworks suite of programs follows a four level approach.

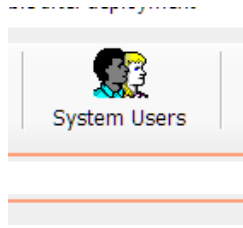
1. Administrator
2. Technician
3. Supervisor
4. Normal

If there is no administrator user present in the database, the software will allow access without any username or password. This is typical after a newly generated database. There will be a prompt at the login stage alerting the user to capture at least one administrative user.

Each user type has been granted different levels of access while navigating the software.

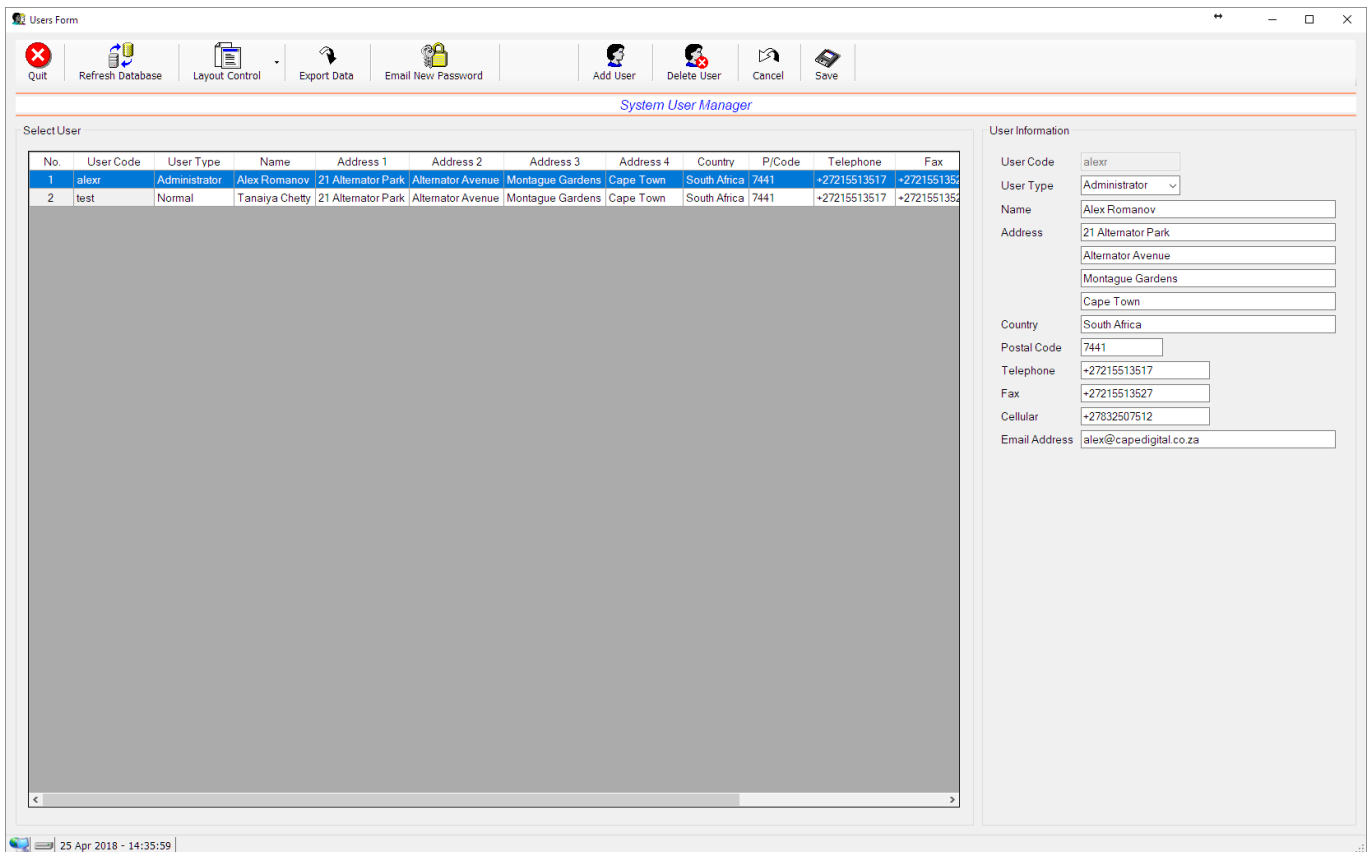
User	Notes
<b>Administrator</b>	The Administrator has full control of the system. They are able to add and delete users, as well alter any aspect of the system. There needs to be at least one administrator on the system for the user system to operate.
<b>Technician</b>	The Technician has no access to :- <ul style="list-style-type: none"> <li>• User control system - cannot add or delete users.</li> <li>• Direct database control.</li> <li>• Protocol Explorer.</li> </ul>
<b>Supervisor</b>	The Supervisor has no access to :- <ul style="list-style-type: none"> <li>• User control system - cannot add or delete users.</li> <li>• Direct database control.</li> <li>• Protocol Explorer.</li> <li>• System setup parameters.</li> <li>• Remote/Offline configuration of devices.</li> <li>• Remote configuration of equipment connected to the remote device.</li> </ul>
<b>Normal</b>	The Normal user has no access to :- <ul style="list-style-type: none"> <li>• User control system - cannot add or delete users.</li> <li>• Direct database control.</li> <li>• Protocol Explorer.</li> <li>• System setup parameters.</li> <li>• Remote/Offline configuration of devices.</li> <li>• Remote configuration of equipment connected to the remote device.</li> <li>• Adding or deleting zones.</li> <li>• Adding or deleting sites.</li> <li>• Adding, deleting, replacing or reloading configs of remote devices.</li> <li>• Remote switching of outputs on or off.</li> </ul>

The user control system is accessed from the main screen by selecting the 'System Users' button.



Adding, editing or deleting users is as simple as using the relevant buttons in the main tool bar. When adding a user, the 'User Information' box on the right of the screen will become active allowing for the relevant data to be populated. The most important thing here is to choose a unique User Code which works best as a variation of the users name (max 10 characters). Very importantly, select the user type from the drop down options box.

The other data is supplementary but should be populated as far as possible. Passwords are mailed to the user so there should preferably be an email address populated. Once you are happy with the user information press 'Save' and that user will be added to the database.



To edit a user, simply click on the user in the table and its data will be populated in the right hand side of the screen. Edit and press 'Save' to apply the changes. Pressing 'Cancel' will ignore any editing you have done and revert to the original data.

Deleting is also achieved by selecting the user in the table and pressing the 'Delete User' button. After some prompts, the user and their associated data will be removed from the database. Care should be taken to not accidentally delete a user as there is no recovering from this operation.

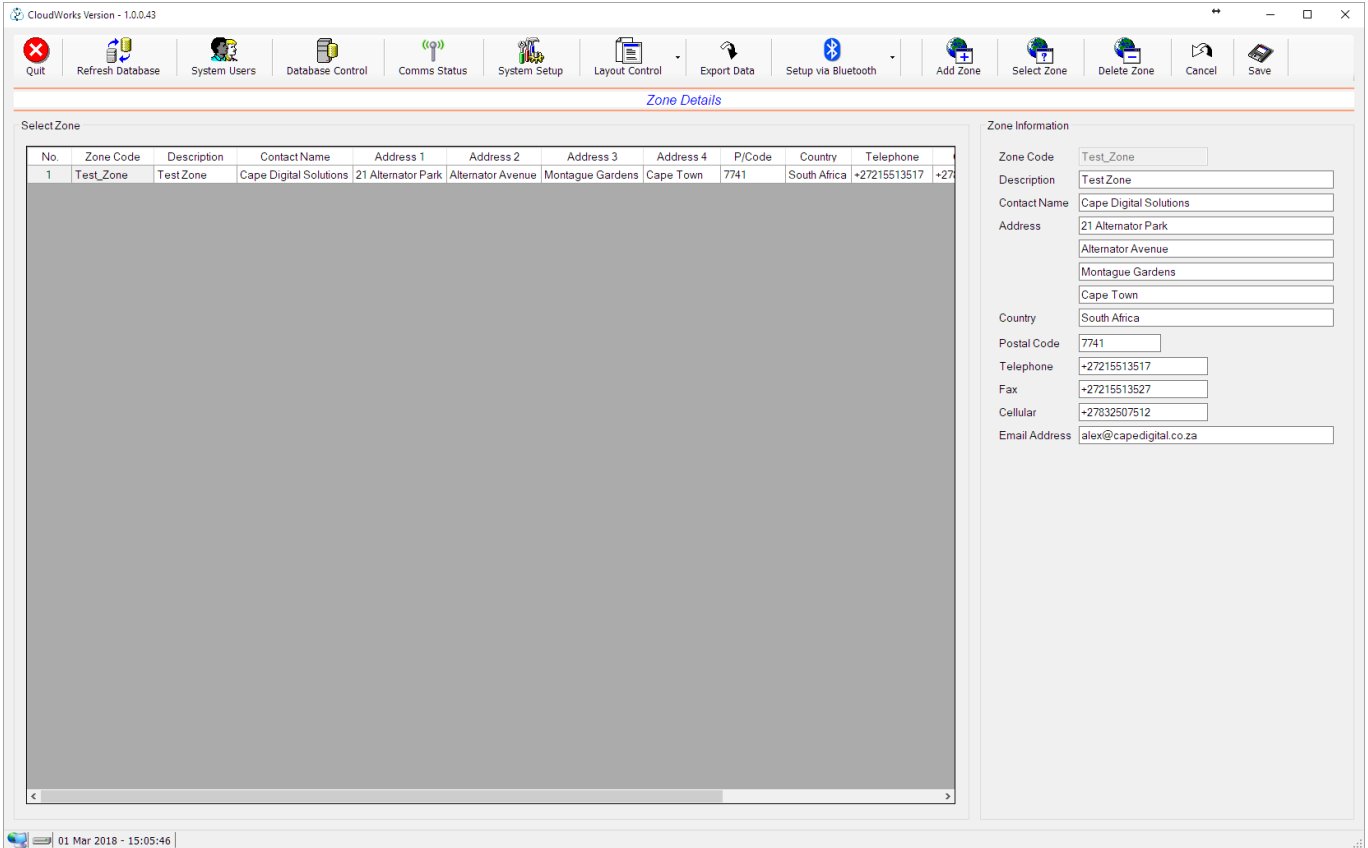
New users, or users that have lost their passwords, can have these details resent to them via email by pressing the 'Email New Password' button in the main toolbar. **Each time an email is sent, the user is sent a new password.** Try and encourage users to log in immediately and reset the password to something they would find easier to remember.

The email system is reliant on the SMTP server settings in the 'System Setup' being correctly set up. Should an email fail to send, a warning will be flashed onto the screen showing the failure message as well as the new password. At the same time, the mail that would have been sent will be populated into the clipboard. This can then be copied into a mail using an external mail program and sent from there.

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## 2.5 Managing Zones

Adding, editing or deleting zones is as simple as using the relevant buttons in the main tool bar. When adding a zone, the 'Zone Information' box on the right of the screen will become active allowing for the relevant data to be populated. The most important thing here is to choose a unique 'Zone Code' which would best describe that zone. The other data is supplementary but should be populated as far as possible. Once you are happy with the zone information press 'Save' and that zone will be added to the database.



To edit a zone, simply click on the zone in the table and its data will be populated in the right hand side of the screen. Edit and press 'Save' to apply the changes. Pressing 'Cancel' will ignore any editing you have done and revert to the original data.

Deleting is also achieved by selecting the zone in the table and pressing the 'Delete Zone' button. After some prompts, the zone and its associated data will be removed from the database. Care should be taken to not accidentally delete a live zone as there is no recovering from this operation.

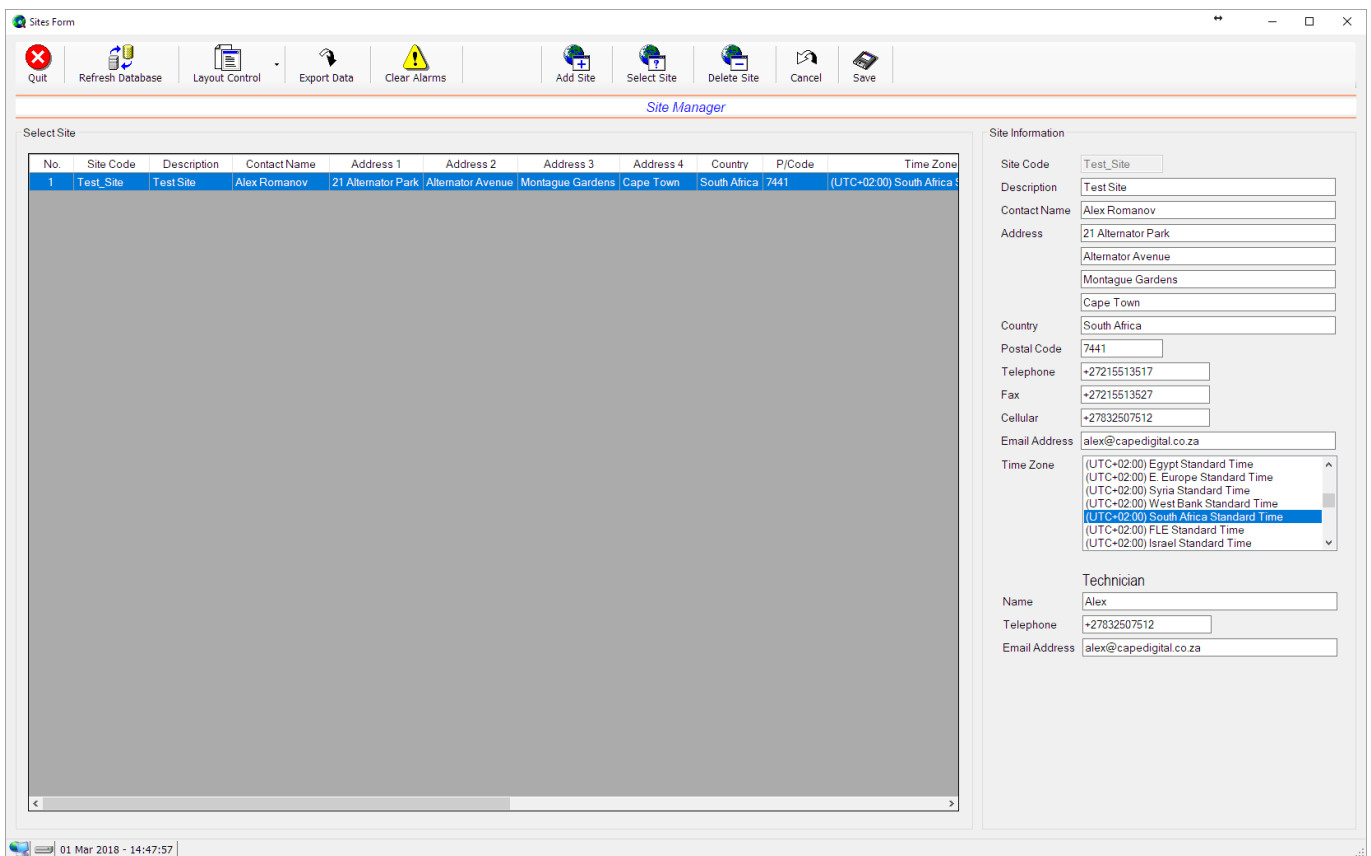
To select a zone, simply double click on the zone in the table or click once and hit the 'Select Zone' button. Both of these methods will open up a 'Site Details' screen and show you all the sites present in that zone.

## 2.6 Managing Sites

Sites are managed in much the same way as zones. Adding, editing etc is done in exactly the same manner. Parameters for these sites are self explanatory so we won't go into detail.

There is, however, one parameter that is very important, and that is the 'Time Zone' parameter. All of the remote devices run onboard clocks set to UTC Time. This clock is automatically updated by the communications server as part of the heartbeat system and cannot be altered. Because of this, all data that is logged by these devices is time stamped at UTC time. In order to correct the time to local time, it is important to tell the system to which time zone this site belongs. Displayed data will automatically be corrected to this time zone. This also allows for the automatic and correct application of daylight saving and any other time shifts.

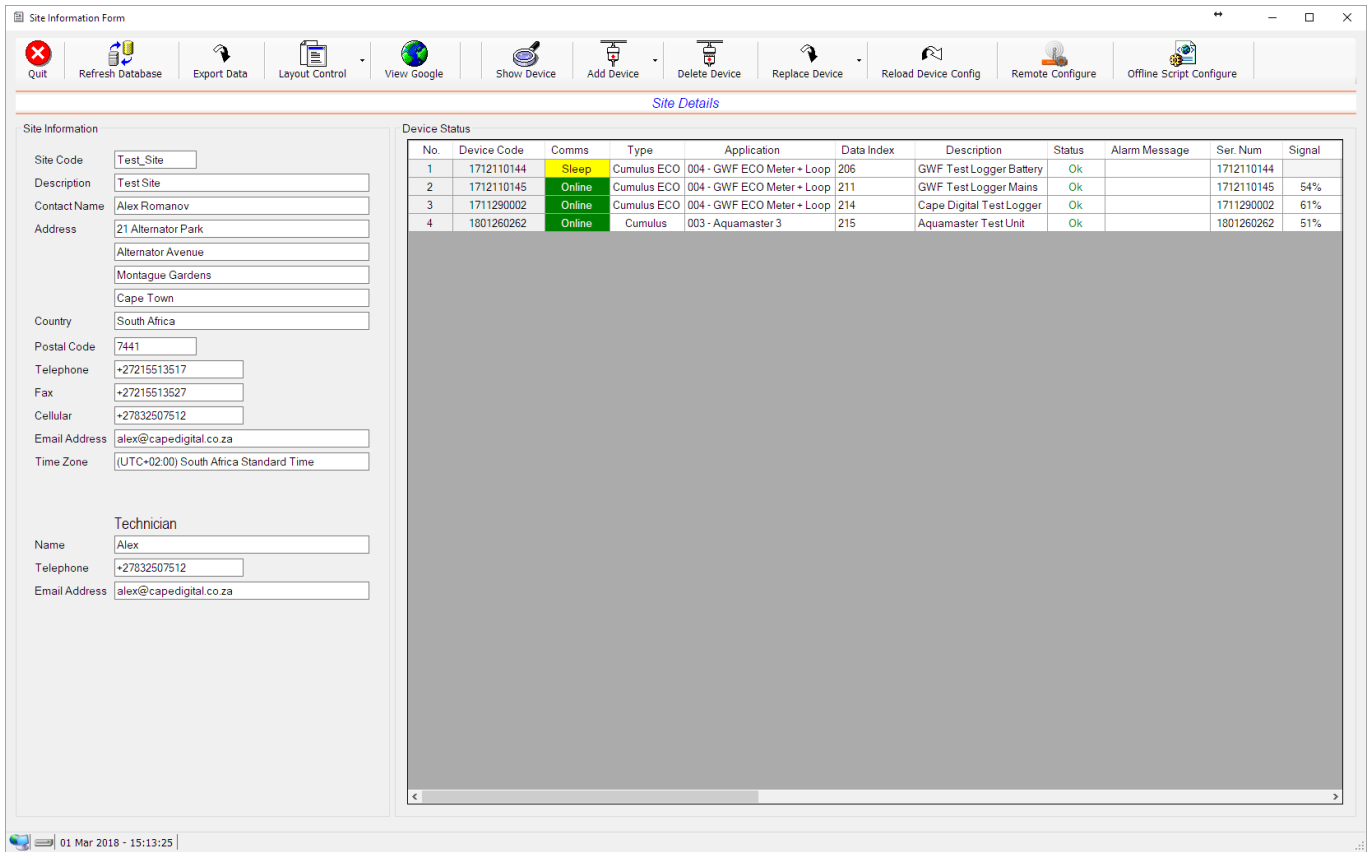
The only other variation on this screen would be the addition of a 'Clear Alarms' button. Some devices generate alarms which can be acknowledged from this screen. Selecting the alarmed sites on the table and pressing the 'Clear Alarms' button will remove the alarm flags from the database, ready for a new alarm trigger.



Again, double clicking on a site on the table or selecting the site and pressing the 'Select Site' button will bring you to the 'Site Details' screen.

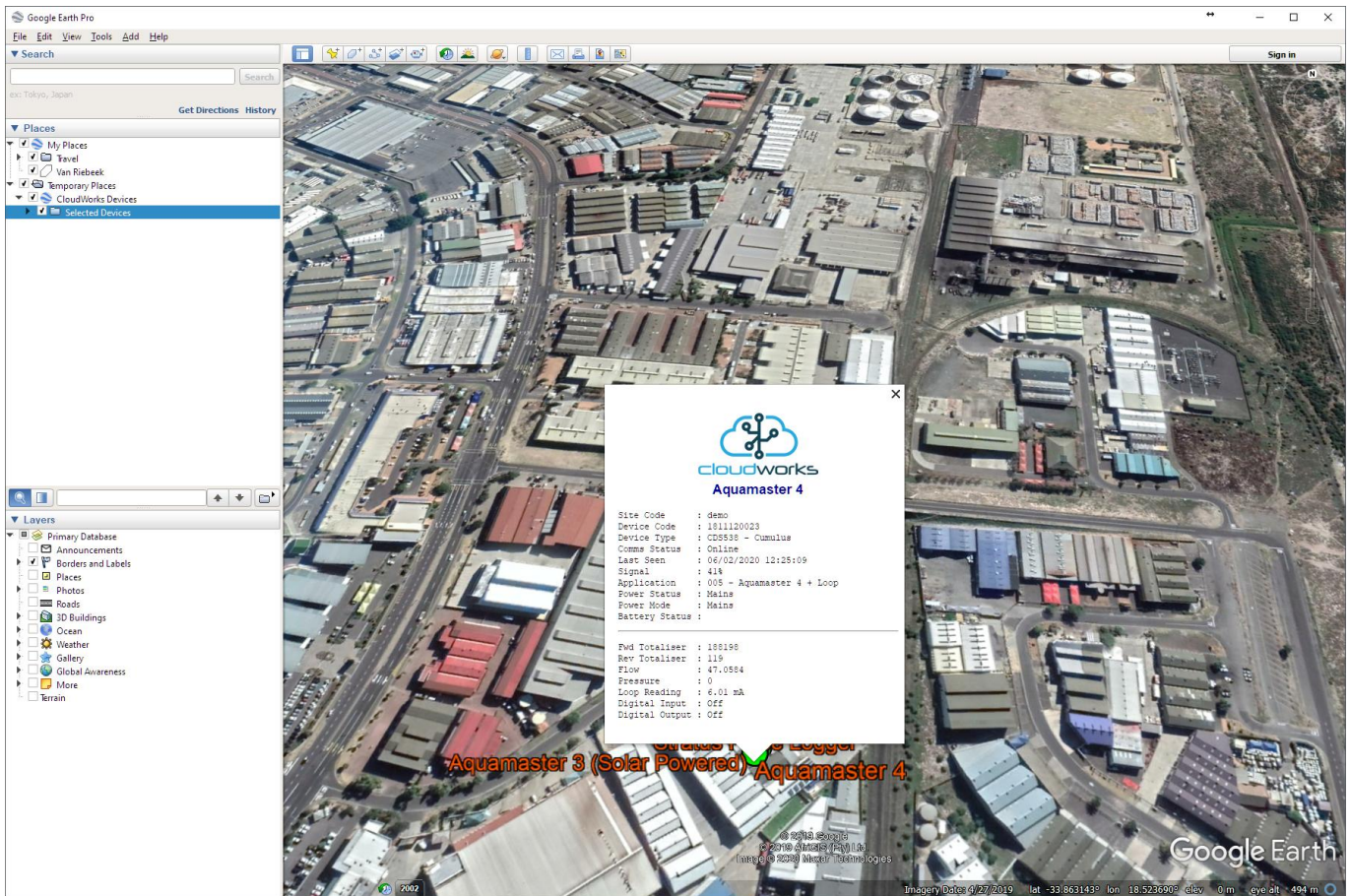
### 2.6.1 Site Detail

The 'Site Details' screen displays information that is specific to the site you have selected.



Listed on this screen is the general information about the site ('Site Information' box on the left). In the table on the right are all the devices associated with this site, together with the latest known information extracted from the database. Apart from the usual buttons on the main tool bar there are a few new functions.

To view the devices and their locations in Google Earth, simply select the devices in the 'Device Status' table and press the 'View Google' button. This will then launch Google Earth (must be installed on your PC) and superimpose these devices on the globe.



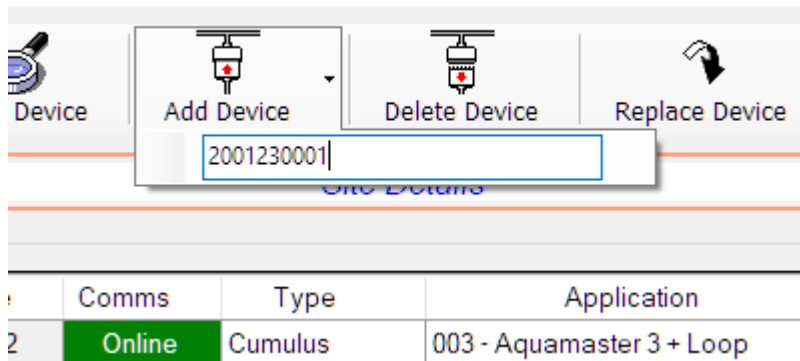
You can select a single device or multiple devices when displaying on Google Earth. If Google Earth has not been installed on your computer a pop up message box will alert you to the problem. Google Earth can be installed from [Google Earth download](#).

## 2.7 Managing Devices

Before we go into the management of devices there needs to be some clarification regarding the information stored on a device as opposed to information stored in the database. All configuration data regarding a remote device is stored on the device itself. The setup can be done locally through a Bluetooth interface or remotely on devices that are already connected to the network. In order to make this configuration data available to end users without the need to continually read it from the remote device itself (not possible for sleeping devices), it is also stored in the database. However, since changes can be made in the field (through the Bluetooth interface) this database will need to be manually triggered to read the configuration data from the remote device and insert it into the database. Once in the database, the end user can have access to this information.

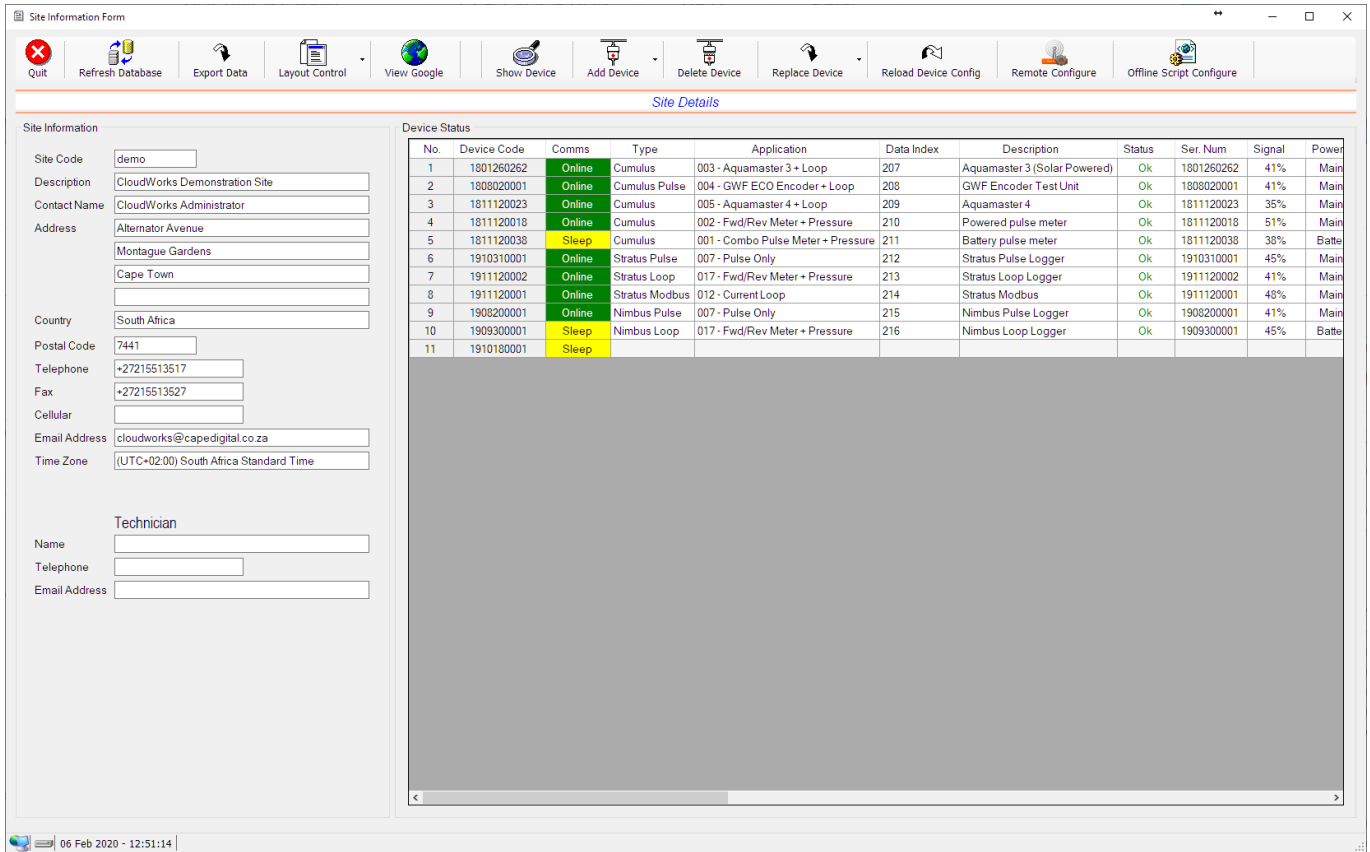
When a new device is added, the Device Code is captured and an entry is opened in the site to allow for this device. At this point, Cloudworks has no information regarding the type of device, configuration or application. This is the reason why the line appears to be greyed out. As soon as this device connects to the server, all this information is read back and inserted into the database for later display. This can take a couple of minutes for online powered devices and for battery devices, only when it wakes up and connects to the server. Battery devices can be forced to wake up by pressing and holding the pushbutton for 3 seconds or more.

To add a device to the site, simply click the 'Add Device' dropdown button and fill in the Device Code in the given space and hit 'enter'.





Next you will see a blank entry line appear.



The screenshot shows the 'Site Information Form' application window. The title bar reads 'Site Information Form'. The interface includes a menu bar with options like 'Quit', 'Refresh Database', 'Export Data', 'Layout Control', 'View Google', 'Show Device', 'Add Device', 'Delete Device', 'Replace Device', 'Reload Device Config', 'Remote Configure', and 'Offline Script Configure'. Below the menu bar is a 'Site Details' section with a 'Site Information' form on the left and a 'Device Status' table on the right.

**Site Information Form Fields:**

- Site Code: demo
- Description: CloudWorks Demonstration Site
- Contact Name: CloudWorks Administrator
- Address: Alternator Avenue, Montague Gardens, Cape Town
- Country: South Africa
- Postal Code: 7441
- Telephone: +27215513517
- Fax: +27215513527
- Cellular:
- Email Address: cloudworks@capedigital.co.za
- Time Zone: (UTC+02:00) South Africa Standard Time
- Technician Name:
- Technician Telephone:
- Technician Email Address:

**Device Status Table:**

No.	Device Code	Comms	Type	Application	Data Index	Description	Status	Ser. Num	Signal	Power
1	1801260262	Online	Cumulus	003 - Aquamaster 3 + Loop	207	Aquamaster 3 (Solar Powered)	Ok	1801260262	41%	Main
2	1808020001	Online	Cumulus Pulse	004 - GWF ECO Encoder + Loop	208	GWF Encoder Test Unit	Ok	1808020001	41%	Main
3	1811120023	Online	Cumulus	005 - Aquamaster 4 + Loop	209	Aquamaster 4	Ok	1811120023	35%	Main
4	1811120018	Online	Cumulus	002 - Fwd/Rev.Meter + Pressure	210	Powered pulse meter	Ok	1811120018	51%	Main
5	1811120038	Sleep	Cumulus	001 - Combo Pulse Meter + Pressure	211	Battery pulse meter	Ok	1811120038	38%	Batte
6	1910310001	Online	Stratus Pulse	007 - Pulse Only	212	Stratus Pulse Logger	Ok	1910310001	45%	Main
7	1911120002	Online	Stratus Loop	017 - Fwd/Rev.Meter + Pressure	213	Stratus Loop Logger	Ok	1911120002	41%	Main
8	1911120001	Online	Stratus Modbus	012 - Current Loop	214	Stratus Modbus	Ok	1911120001	48%	Main
9	1908200001	Online	Nimbus Pulse	007 - Pulse Only	215	Nimbus Pulse Logger	Ok	1908200001	41%	Main
10	1909300001	Sleep	Nimbus Loop	017 - Fwd/Rev.Meter + Pressure	216	Nimbus Loop Logger	Ok	1909300001	45%	Batte
11	1910180001	Sleep								

The server will now automatically go and extract the configuration data from the remote device and populate it into the database. Press the 'Refresh Database' button periodically to see if this data has been extracted. Once complete, the entry will include all of its configuration information. If this is a battery powered device, this data will be collected the next time that device wakes up and connects to the server.



Site Information Form

Quit Refresh Database Export Data Layout Control View Google Show Device Add Device Delete Device Replace Device Reload Device Config Remote Configure Offline Script Configure

*Site Details*

**Site Information**

Site Code:

Description:

Contact Name:

Address:

Country:

Postal Code:

Telephone:

Fax:

Cellular:

Email Address:

Time Zone:

**Technician**

Name:

Telephone:

Email Address:

**Device Status**

No.	Device Code	Comms	Type	Application	Data Index	Description	Status	Ser. Num	Signal	Power
1	1801260262	Online	Cumulus	003 - Aquamaster 3 + Loop	207	Aquamaster 3 (Solar Powered)	Ok	1801260262	41%	Ma
2	1808020001	Online	Cumulus Pulse	004 - GWF ECO Encoder + Loop	208	GWF Encoder Test Unit	Ok	1808020001	41%	Ma
3	1811120023	Online	Cumulus	005 - Aquamaster 4 + Loop	209	Aquamaster 4	Ok	1811120023	32%	Ma
4	1811120018	Online	Cumulus	002 - Fwd/Rev Meter + Pressure	210	Powered pulse meter	Ok	1811120018	48%	Ma
5	1811120038	Sleep	Cumulus	001 - Combo Pulse Meter + Pressure	211	Battery pulse meter	Ok	1811120038	38%	Batt
6	1910310001	Online	Stratus Pulse	007 - Pulse Only	212	Stratus Pulse Logger	Ok	1910310001	45%	Ma
7	1911120002	Online	Stratus Loop	017 - Fwd/Rev Meter + Pressure	213	Stratus Loop Logger	Ok	1911120002	45%	Ma
8	1911120001	Online	Stratus Modbus	012 - Current Loop	214	Stratus Modbus	Ok	1911120001	45%	Ma
9	1908200001	Online	Nimbus Pulse	007 - Pulse Only	215	Nimbus Pulse Logger	Ok	1908200001	45%	Ma
10	1909300001	Sleep	Nimbus Loop	017 - Fwd/Rev Meter + Pressure	216	Nimbus Loop Logger	Ok	1909300001	45%	Batt
11	1910180001	Sleep	Nimbus Modbus	012 - Current Loop	217	Nimbus Modbus Logger	Ok	1910180001	51%	Batt

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To delete a device, simply select the device to delete in the selection table and press the 'Delete Device' button. Please note that this will also delete all the data in the datalog linked to this device.

Replacing a device is similar to adding a new device. Simply select the device to replace and enter the new Device Code in the displayed box. When a device is replaced, the datalog from the old device will now be attached to this new device. Hence, the datalog will continue uninterrupted.

Should a device have any configuration data changed, it is important to trigger a 'Reload Device Config' to reread the full device configuration and insert it into the database. This will again display a blank entry until such time that the data has been read.

The two device configuration options at the top of the screen will be discussed later. To view a device in detail simply double click the entry on the table or select the device and press the 'Show Device' button. This will then launch an application specific screen to show the information linked to this device.

## 2.8 Device Applications

There are numerous different types of devices that can be connected to the Cloudworks system. Each device, can have associated with it, a number of different applications. Applications are set during the device configuration stage and tell the device how it needs to react to the data supplied to it. For instance, a Cumulus logger set to an 'Aquamaster 3' application, will automatically retrieve the relevant data from an ABB Aquamaster 3 meter via its Modbus connection and populate the database accordingly. Whereas a 'Basic Cumulus Function' application will store the basic pulse inputs and 4-20mA data only.

Current application types are as follows:-

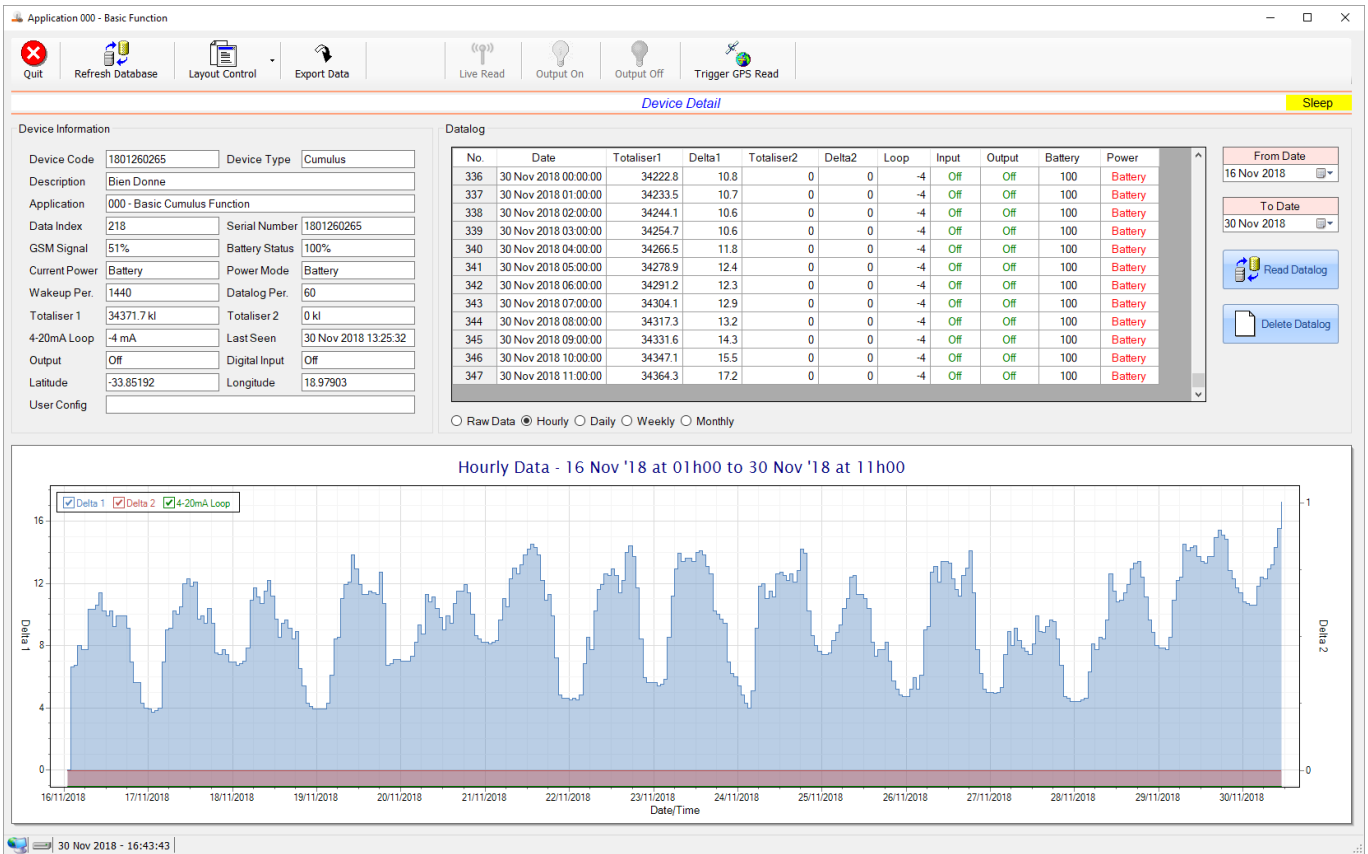
Description	Devices	Notes
<b>000 - Basic Cumulus Function</b>	CDS538,CDS541	Used for the basic Cumulus Logging functions. Will include the pulse inputs, outputs and current loop.
<b>001 - Combo Pulse Water Meter + Pressure</b>	CDS538,CDS541	Used for water meter applications where there is a combination of a high flow and a low flow water meter. Included as well is a 4-20mA pressure sensor.
<b>002 - Fwd/Rev Water Meter + Pressure</b>	CDS538,CDS541	Used for water meter applications where the meter has a forward pulse and a separate reverse pulse. Included as well is a 4-20mA pressure sensor.
<b>003 - Aquamaster 3</b>	CDS538	Used when the logger Modbus is connected to an ABB Aquamaster 3 water meter. Also supports an external 4-20mA loop.
<b>004 - GWF ECO Meter + Loop</b>	CDS541	Used when the logger is connected to a GWF Mbus ECO meter interface with external loop logging as well.
<b>005 - Aquamaster 4</b>	CDS538	Used when the logger Modbus is connected to an ABB Aquamaster 4 water meter. Also supports and external 4-20mA loop.
<b>006 - GWF Sonico + Loop</b>	CDS541	This application is currently under development and not ready for release.
<b>007 - Pulse Only</b>	CDS543,CDS549	Used for simple pulse meter type applications.
<b>008 - Combo Pulse Meter</b>	CDS543,CDS549	Used for water meter applications where there is a combination of a high flow and a low flow water meter.
<b>009 - Fwd/Rev Meter</b>	CDS543,CDS549	Used for water meter applications where the meter has a forward pulse and a separate reverse pulse.
<b>010 - GWF ECO Encoder</b>	CDS543,CDS549	Used when the logger is connected to a GWF MBus ECO meter interface.

<b>011 - GWF Sonico</b>	CDS543,CDS549	This application is currently under development and not ready for release.
<b>012 - Current Loop</b>	CDS545,CDS547	Used for applications that just require a reading from the 4-20mA current loop.
<b>013 - Aquamaster 3</b>	CDS545,CDS547	Used when the logger Modbus is connected to an ABB Aquamaster 3 water meter.
<b>014 - Aquamaster 4</b>	CDS545,CDS547	Used when the logger Modbus is connected to an ABB Aquamaster 4 water meter.
<b>015 - Basic Pulse + Loop</b>	CDS546,CDS548	Used on applications that require basic pulse inputs together with a 4-20mA current loop device.
<b>016 - Combo Pulse Meter + Pressure</b>	CDS546,CDS548	Used for water meter applications where there is a combination of a high flow and a low flow water meter. Included as well is a 4-20mA pressure sensor.
<b>017 - Fwd/Rev Meter +Pressure</b>	CDS546,CDS548	Used for water meter applications where the meter has a forward pulse and a separate reverse pulse. Included as well is a 4-20mA pressure sensor.

When viewing a specific device, a different application screen will open according to the application code selected for that device.

For this reason, there will be no screen opened if Cloudworks does not know the configured application of that device. This will be the case before the configuration data has been downloaded such as when adding a new device or selecting a 'Reload Device Config'.

### 2.8.1 Application 000 - Basic Cumulus Function

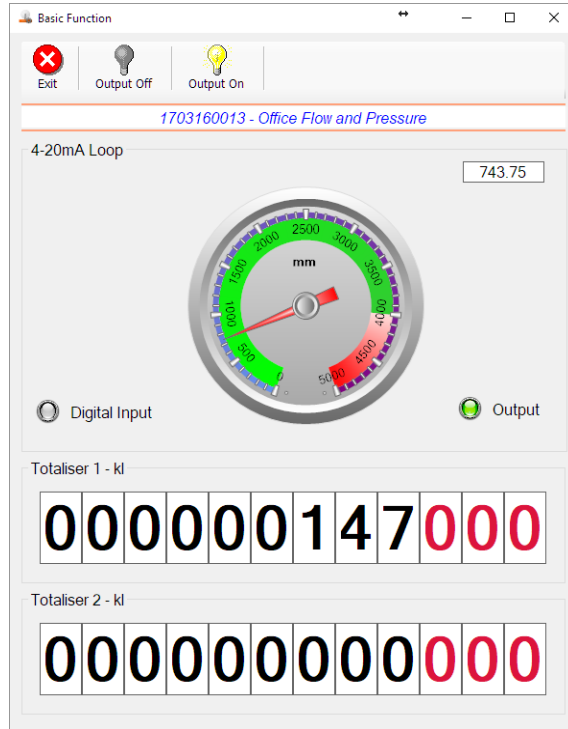


This application type would be selected where you are using the basic core functions of the Cumulus logger. Functions such as the 4-20mA current loop and/or pulse inputs without a specific consumption type of application. It is ideally suited for an application where there are two meters (say water and electricity) and a 4-20mA device such as a pressure sensor. It can also be used where you only need for the 4-20mA current loop input for instance.

Functions on the top menu bar are mostly as per previous screens within the Cloudworks suite. These would be the 'Refresh Database', 'Layout Control' and 'Export Data' buttons which have been explained earlier. Added functionality is the 'Live Read', 'Output On/Off' and 'Trigger GPS Read'.

If a device is powered and permanently connected to the server (and online), then the 'Live Read' Button will be active allowing you to stream live data directly from that device in real time. **Bear in mind that, while this live streaming screen is active, the cellular data consumption of that device will be much greater than the usual background periodic read used to update the database.** The current communications status of the device will be displayed on the top right of the screen.

Remote devices that are offline or sleeping cannot be accessed for streaming data. This status will be automatically updated while on this screen without the need for pressing the 'Refresh Database' button. Pressing the 'Live Read' button will launch the live streaming data screen for that device. **All the data on this screen is fetched directly from the remote device and not the database.**



The data displayed are the two totalisers as digital readouts and the 4-20mA input as a needle type dial. This particular device has been connected to a submerged current loop pressure sensor that is indicating water level in a tank in millimetres. The digital input and output statuses are indicated in the form of illuminated LED's.

On both the Application screen and Live Read screen are buttons to allow for the switching of the output on or off. When using this function on the Live Read screen, there will be a short delay between changing the output status and the indication on the output LED. This is because the indicator will only update on confirmation from the remote device, ensuring that the action has actually been successful.

Returning to the applications screen, data is displayed in various groups. On the top left is grouped the 'Device Information' block. This information is data relevant to the remote device and is really displaying data that is present within the database. Mostly data that is populated during the 'Reload Device Config' process. This data is as follows:-

Information	Notes
<b>Device Code</b>	The Device Code assigned to this particular remote device. All communications are initiated by addressing this code. This code is unique to all remote devices and is assigned at the time of manufacture.
<b>Device Type</b>	Type of Remote Device. eg CDS538 Cumulus Logger etc
<b>Description</b>	The description is a user defined parameter that is captured during the setup of each device. This would normally be something that would describe the location or application of this particular device.
<b>Application</b>	Selected device application. Application 000 - Basic Cumulus function in this case.
<b>Data Index</b>	As each device is captured onto Cloudworks system, it is assigned a



	unique data index. This index is used when externally extracting the log data from the database as each record in the global datalog would be labelled with this index number.
<b>Serial Number</b>	Serial number of this device - assigned in the factory.
<b>GSM Signal</b>	Signal strength of the last GSM communications, expressed as a percentage.
<b>Battery Status</b>	Battery status for devices that are powered by battery, expressed as a percentage. It is important to note that this will be the battery status read while the device is under full load (GSM communications active). It would normally indicate lower than the recorded battery status in the datalog (which is read while the device is essentially idle).
<b>Current Power</b>	An indicator as to how this remote device is being powered. Normally the same as the Power Mode but can vary for systems on Dual Power mode. For devices in a dual power mode, this parameter will display the current power status of the remote device. Battery or Mains.
<b>Power Mode</b>	Selected Power Mode under which the remote device is operating. This can be Battery, Mains or Dual power modes.
<b>Wakeup Per.</b>	The Wakeup Period set in minutes. Refer to the device configuration chapter for an explanation of this parameter.
<b>Datalog Per.</b>	The Datalog Period set in minutes. Refer to the device configuration chapter for an explanation of this parameter.
<b>Totaliser 1</b>	The current Totaliser 1 reading with its relevant pulse weight implemented including the unit of measure.
<b>Totaliser 2</b>	The current Totaliser 2 reading with its relevant pulse weight implemented including the unit of measure.
<b>4-20mA Loop</b>	The 4-20mA current loop reading with its calibration data implemented including the unit of measure.
<b>Last Seen</b>	The date and time the remote device was last seen connecting into the server.
<b>Output</b>	Digital output status.
<b>Digital Input</b>	Digital input status.
<b>Latitude</b>	Last seen remote device Latitude.
<b>Longitude</b>	Last seen remote device Longitude.
<b>User Config</b>	The user defined data recorded on the remote device. Refer to the device configuration chapter for an explanation of this parameter.



To get the latest update of this data, you will need to press the 'Refresh Data' button which will then update this screen from the database.

The onboard GPS of the remote device uses a substantial amount of power and is therefore automatically switched off on battery powered devices. When the GPS is first powered up, it will take a couple of minutes before it is able to lock on to the position of the device. For this reason, battery powered devices by default do not power up the GPS at each wakeup. In order to get a GPS lock on the device, it is necessary to selectively power the GPS on a wakeup, get a lock, and go back to sleep. This is achieved by pressing the 'Trigger GPS Read' button.

By doing this, a flag is placed into the database telling the server to power the GPS at the next wakeup, wait a couple of minutes for a GPS lock, record it, and put the remote device back to sleep. This will only happen at the next wakeup and can keep the remote device awake for a couple of minutes. **This process should only be triggered when the GPS position needs to be updated because of the expense of battery power.**

The server will only keep the device awake for a couple of minutes (typically 5 minutes - set in the server software) in order to get a fix. If this takes too long, the remote device will be put back to sleep without updating the position. This is done to protect the battery should the remote device not be in a position to ever get a GPS signal. You can at a later stage attempt the process again if it was unsuccessful the first time.

To the right of screen is the Datalog information box. This box will be populated with the most recent data from the recorded datalog of this remote device (**read from the database**). By default, when the screen opens, the last two weeks' worth of data will be displayed in this table. To select a different range of data, you can select the 'From Date' and 'To Date' values and press the 'Read Datalog' button.

This application will record the following data in the datalog.

Datalog

No.	Date	Totaliser1	Totaliser2	Delta1	Delta2	Loop	Input	Output	Battery	Power
333	18 Apr 2018 21:00:00	147	0	0	0	742.66	Off	Off		Mains
334	18 Apr 2018 22:00:00	147	0	0	0	742.66	Off	Off		Mains
335	18 Apr 2018 23:00:00	147	0	0	0	741.606	Off	Off		Mains
336	19 Apr 2018 00:00:00	147	0	0	0	742.133	Off	Off		Mains
337	19 Apr 2018 01:00:00	147	0	0	0	741.87	Off	Off		Mains
338	19 Apr 2018 02:00:00	147	0	0	0	741.079	Off	Off		Mains
339	19 Apr 2018 03:00:00	147	0	0	0	742.397	Off	Off		Mains
340	19 Apr 2018 04:00:00	147	0	0	0	740.025	Off	Off		Mains
341	19 Apr 2018 05:00:00	147	0	0	0	741.606	Off	Off		Mains
342	19 Apr 2018 06:00:00	147	0	0	0	740.289	Off	Off		Mains
343	19 Apr 2018 07:00:00	147	0	0	0	739.498	Off	Off		Mains
344	19 Apr 2018 08:00:00	147	0	0	0	739.498	Off	Off		Mains

Raw Data 
  Hourly 
  Daily 
  Weekly 
  Monthly

Information	Notes
<b>Date/Time</b>	Date and time of the datalog record.
<b>Totaliser 1</b>	Totaliser 1 reading.
<b>Totaliser 2</b>	Totaliser 2 reading.
<b>Delta 1</b>	The effective 'consumption' of the Totaliser 1 reading. This is the difference between this current reading and the previous reading.





<b>Delta 2</b>	The effective 'consumption' of the Totaliser 2 reading. This is the difference between this current reading and the previous reading.
<b>Loop</b>	4-20mA Loop reading with its applied calibration.
<b>Input</b>	Digital input status at the time of recording this record.
<b>Output</b>	Digital output status at the time of recording this record.
<b>Battery</b>	Battery level in percentage. Only displayed on battery powered devices.
<b>Power</b>	Current power status. Mains/Battery

The data in this datalog table can be displayed (and graphed) in a number of different ways. These are selected by choosing the option at the bottom of the datalog table. Options include Raw Data and averaged hourly, daily, weekly and monthly data. When the averaging options are chosen, missing data is automatically interpolated to fill in the missing gaps. Interpolated data will have the number column entries highlighted in red with a small 'Interpolated data' message at the top right of the datalog table.

Datalog \* Interpolated data

No.	Date	Totaliser1	Totaliser2	Delta1	Delta2	Loop	Input	Output	Battery	Power
70	07 Apr 2018 22:00:00	119	0	0	0	705.237	Off	Off		Mains
71	07 Apr 2018 23:00:00	119	0	0	0	704.334	Off	Off		Mains
72	08 Apr 2018 00:00:00	119	0	0	0	704.974	Off	Off		Mains
73	08 Apr 2018 01:00:00	119	0	0	0	703.34	Off	Off		Mains
74	08 Apr 2018 02:00:00	119	0	0	0	704.447	Off	Off		Mains
75	08 Apr 2018 03:00:00	119	0	0	0	704.277	Off	Off		Mains
76	08 Apr 2018 04:00:00	119	0	0	0	704.277	Off	Off		Mains
77	08 Apr 2018 05:00:00	119	0	0	0	704.108	Off	Off		Mains
78	08 Apr 2018 06:00:00	119	0	0	0	702.391	Off	Off		Mains
79	08 Apr 2018 07:00:00	119	0	0	0	703.204	Off	Off		Mains
80	08 Apr 2018 08:00:00	119	0	0	0	703.656	Off	Off		Mains
81	08 Apr 2018 09:00:00	119	0	0	0	701.284	Off	Off		Mains
82	08 Apr 2018 10:00:00	119	0	0	0	702.753	Off	Off		Mains

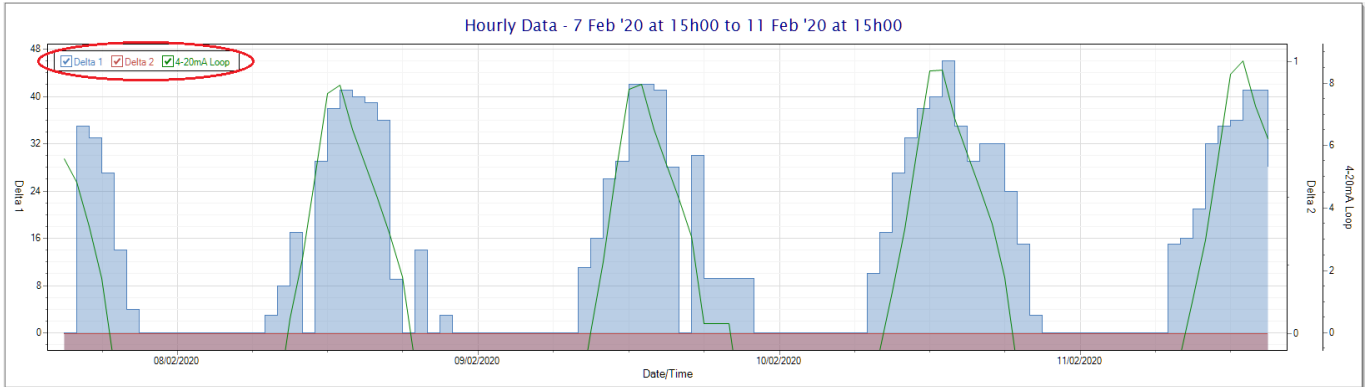
Raw Data 
  Hourly 
  Daily 
  Weekly 
  Monthly

As per the previously explained functions throughout the Cloudworks suite, columns can be switched off/on and re-ordered to the users requirements. The exporting will be as per the layout presented on the screen.

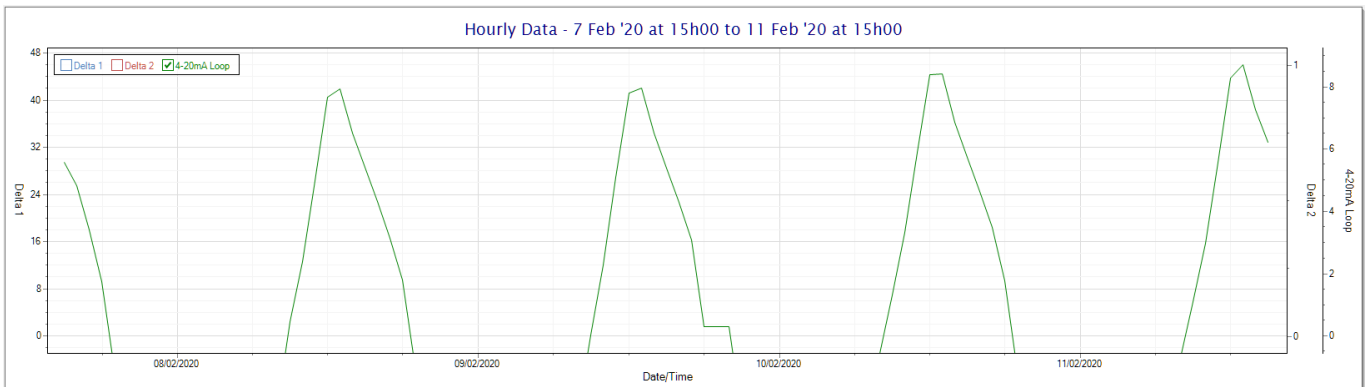
You can zoom into a range of the data by simply selecting those records in the table. This will result in the graph at the bottom being updated to display only those readings.

Deleting the datalog or removing a range of records can be easily done by using the 'Delete Datalog' button. To delete a range, simply select the range in the datalog table and press the 'Delete Datalog' button. If no range is selected, it will be assumed that you wish to delete the entire datalog. There will be a prompt to ensure that you are aware of the action you are about to take.

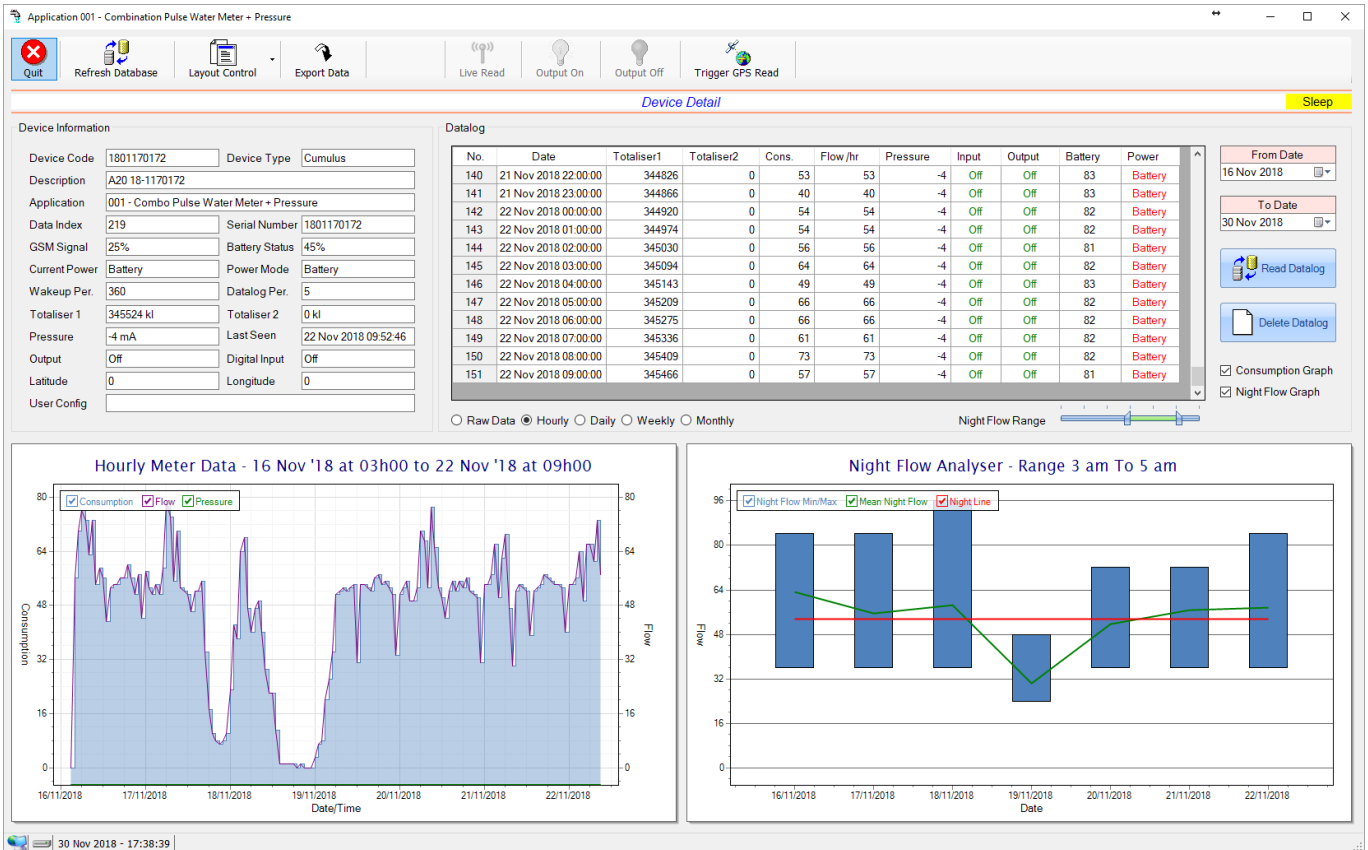
Data that is displayed in the table will also be represented in the graph at the bottom of the screen. Individual graph series can be switched off/on by selecting the ticks at the top left of the graph.



Displaying only the 4-20mA loop would look like this:-



## 2.8.2 Application 001 - Combination Pulse Water Meter + Pressure

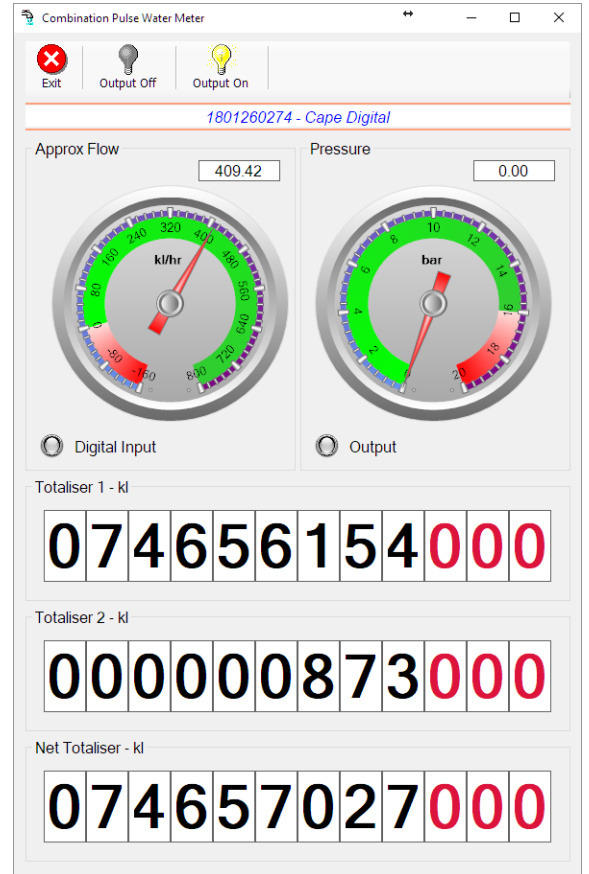
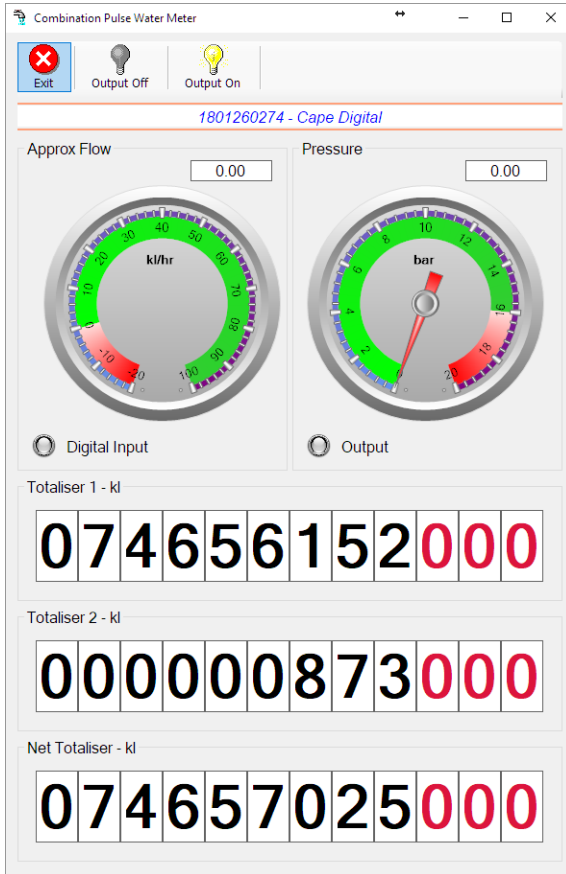


This application type is used in combination water meter type sites. A combination meter normally consists of a water measurement point consisting of two water meters. A larger meter for measuring the bulk flow of the water and a smaller one to measure the lower flows which are normally missed on large meters. The actual consumption is normally a combination of these two meter readings and are handled as such in this application type. Included here is the 4-20mA current loop interface for pressure measurement of the pipeline.

Functions on the top menu bar are mostly as per previous screens within the Cloudworks suite. These would be the 'Refresh Database', 'Layout Control' and 'Export Data' buttons which have been explained earlier. Added functionality is the 'Live Read', 'Output On/Off' and 'Trigger GPS Read'.

If a device is powered and permanently connected to the server (and online), then the 'Live Read' Button will be active allowing you to stream live data directly from that device in real time. **Bear in mind that, while this live streaming screen is active, the cellular data consumption of that device will be much greater than the usual background periodic read used to update the database.** The current communications status of the device will be displayed on the top right of the screen.

Remote devices that are offline or sleeping cannot be accessed for streaming data. This status will be automatically updated while on this screen without the need of pressing the 'Refresh Database' button. Pressing the 'Live Read' button will launch the streaming data screen for that device. **All the data on this screen is fetched directly from the remote device and not the database.**



The data displayed are the two totalisers and combined volume (Net Totaliser) as digital readouts and two needle type displays showing pressure (4-20mA input) and approximate flow. It is important to note that flow is calculated as a difference between two successive readings. For this reading, the data stream will need to see at least two changes in the volume amount before it can calculate the approximate flow. That is why the flow dial **will initially appear blank (as per the left display)** and then only become active after those two reading changes have been received. The digital input and output statuses are indicated in the form of illuminated LED's.

On both the Application screen and Live Read screen are buttons to allow for the switching of the output on or off. When using this function on the Live Read screen, there will be a short delay between changing the output status and the indication on the output LED. This is because the indicator will only update on confirmation from the remote device, ensuring that the action has actually been successful.

Returning to the applications screen, data is displayed in various groups. On the top left is grouped the Device Information block. This information is data relevant to the remote device and is really displaying data that is present within the database. Mostly data that is populated during the 'Reload Device Config' process.

This data is as follows:-

Information	Notes
<b>Device Code</b>	The Device Code assigned to this particular remote device. All communications are initiated by addressing this code. This code is unique to all remote devices and is assigned at the time of manufacture.
<b>Device Type</b>	Type of Remote Device. eg CDS538 Cumulus Logger etc
<b>Description</b>	The description is a user defined parameter that is captured during the setup of each device. This would normally be something that would describe the location or application of this particular device.
<b>Application</b>	Selected device application. Application 001 - Combination Pulse Water Meter + Pressure function in this case.
<b>Data Index</b>	As each device is captured on to Cloudworks system, it is assigned a unique data index. This index is used when externally extracting the log data from the database as each record in the global datalog would be labelled with this index number.
<b>Serial Number</b>	Serial number of this device - assigned in the factory.
<b>GSM Signal</b>	Signal strength of the last GSM communications, expressed as a percentage.
<b>Battery Status</b>	Battery status for devices that are powered by battery, expressed as a percentage. It is important to note that this will be the battery status read while the device is under full load (GSM communications active). It would normally indicate lower than the recorded battery status in the datalog (which is read while the device is essentially idle).
<b>Current Power</b>	An indicator as to how this remote device is being powered. Normally the same as the power mode but can vary for systems on Dual Power mode. For devices in a dual power mode, this parameter will display the current power status of the remote device. Battery or Mains.
<b>Power Mode</b>	Selected Power Mode under which the remote device is operating. This can be Battery, Mains or Dual power modes.
<b>Wakeup Per.</b>	The Wakeup Period set in minutes. Refer to the device configuration chapter for an explanation of this parameter.
<b>Datalog Per.</b>	The Datalog Period set minutes. Refer to the device configuration chapter for an explanation of this parameter.
<b>Totaliser 1</b>	The current Totaliser 1 reading with its relevant pulse weight implemented including the unit of measure.
<b>Totaliser 2</b>	The current Totaliser 2 reading with its relevant pulse weight implemented including the unit of measure.

<b>Pressure (4-20mA Loop)</b>	The 4-20mA current loop reading with its calibration data implemented including the unit of measure.
<b>Last Seen</b>	The date and time the remote device was last seen connecting into the server.
<b>Output</b>	Digital output status.
<b>Digital Input</b>	Digital input status.
<b>Latitude</b>	Last seen remote device Latitude.
<b>Longitude</b>	Last seen remote device Longitude.
<b>User Config</b>	The user defined data recorded on the remote device. Refer to the device configuration chapter for an explanation of this parameter.

To get the latest update of this data, you will need to press the 'Refresh Data' button which will then update this screen from the database.

The onboard GPS of the remote device uses a substantial amount of power and is therefore automatically switched off on battery powered devices. When the GPS is first powered up, it will take a couple of minutes before it is able to lock on to the position of the device. For this reason, battery powered devices by default do not power up the GPS at each wakeup. In order to get a GPS lock on the device, it is necessary to selectively power the GPS on a wakeup, get a lock, and go back to sleep. This is achieved by pressing the 'Trigger GPS Read' button.

By doing this, a flag is placed into the database telling the server to power the GPS at the next wakeup, wait a couple of minutes for a GPS lock, record it, and put the remote device back to sleep. This will only happen at the next wakeup and can keep the remote device awake for a couple of minutes. **This process should only be triggered when the GPS position needs to be updated because of the expense of battery power.**

The server will only keep the device awake for a couple of minutes (typically 5 minutes - set in the server software) in order to get a fix. If this takes too long, the remote device will be put back to sleep without updating the position. This is done to protect the battery should the remote device not be in a position to ever get a GPS signal. You can at a later stage attempt the process again if it was unsuccessful the first time.

To the right of screen is the Datalog information box. This box will be populated with the most recent data from the recorded datalog of this remote device (**read from the database**). By default, when the screen opens, the last two weeks' worth of data will be displayed in this table. To select a different range of data, you can select the 'From Date' and 'To Date' values and press the 'Read Datalog' button.

This application will record the following data in the datalog.

Datalog

No.	Date	Totaliser1	Totaliser2	Cons.	Flow /hr	Pressure	Input	Output	Battery	Power
140	21 Nov 2018 22:00:00	344826	0	53	53	-4	Off	Off	83	Battery
141	21 Nov 2018 23:00:00	344866	0	40	40	-4	Off	Off	83	Battery
142	22 Nov 2018 00:00:00	344920	0	54	54	-4	Off	Off	82	Battery
143	22 Nov 2018 01:00:00	344974	0	54	54	-4	Off	Off	82	Battery
144	22 Nov 2018 02:00:00	345030	0	56	56	-4	Off	Off	81	Battery
145	22 Nov 2018 03:00:00	345094	0	64	64	-4	Off	Off	82	Battery
146	22 Nov 2018 04:00:00	345143	0	49	49	-4	Off	Off	83	Battery
147	22 Nov 2018 05:00:00	345209	0	66	66	-4	Off	Off	82	Battery
148	22 Nov 2018 06:00:00	345275	0	66	66	-4	Off	Off	82	Battery
149	22 Nov 2018 07:00:00	345336	0	61	61	-4	Off	Off	82	Battery
150	22 Nov 2018 08:00:00	345409	0	73	73	-4	Off	Off	82	Battery
151	22 Nov 2018 09:00:00	345466	0	57	57	-4	Off	Off	81	Battery

Raw Data 
  Hourly 
  Daily 
  Weekly 
  Monthly


Information	Notes
<b>Date/Time</b>	Date and time of the datalog record.
<b>Totaliser 1</b>	Totaliser 1 reading.
<b>Totaliser 2</b>	Totaliser 2 reading.
<b>Cons.</b>	The effective 'consumption' of the sum of the two Totaliser readings. This is the difference between this current reading and the previous reading.
<b>Flow/hr</b>	Flow rate calculated as volume per hour.
<b>Pressure</b>	Current Pressure reading read from the 4-20mA input.
<b>Input</b>	Digital input status at the time of recording this record.
<b>Output</b>	Digital output status at the time of recording this record.
<b>Battery</b>	Battery level in percentage. Only displayed on battery powered devices.
<b>Power</b>	Current power status. Mains/Battery

The data in this datalog table can be displayed (and graphed) in a number of different ways. These are selected by choosing the option at the bottom of the datalog table. Options include Raw Data and averaged hourly, daily, weekly and monthly data. When the averaging options are chosen, missing data is automatically interpolated to fill in the missing gaps. Interpolated data will have the number column entries highlighted in red with a small 'Interpolated data' message at the top right of the datalog table.

Datalog \* Interpolated data

No.	Date	Totaliser1	Totaliser2	Cons.	Flow /hr	Pressure	Input	Output	Battery	Power
1	01 Oct 2018 03:00:00	67580	0			-4	Off	Off	100	Battery
2	01 Oct 2018 04:00:00	67580	0	0	0	-4	Off	Off	100	Battery
3	01 Oct 2018 05:00:00	67580	0	0	0	-4	Off	Off	100	Battery
4	01 Oct 2018 06:00:00	67580	0	0	0	-4	Off	Off	100	Battery
5	01 Oct 2018 07:00:00	67620	0	40	40	-4	Off	Off	100	Battery
6	01 Oct 2018 08:00:00	68560	0	940	940	-4	Off	Off	100	Battery
7	01 Oct 2018 09:00:00	69605	0	1045	1045	-4	Off	Off	100	Battery
8	01 Oct 2018 10:00:00	70650	0	1045	1045	-4	Off	Off	100	Battery
9	01 Oct 2018 11:00:00	71470	0	820	820	-4	Off	Off	100	Battery
10	01 Oct 2018 12:00:00	72400	0	930	930	-4	Off	Off	100	Battery
11	01 Oct 2018 13:00:00	73050	0	650	650	-4	Off	Off	100	Battery
12	01 Oct 2018 14:00:00	73750	0	700	700	-4	Off	Off	100	Battery
13	01 Oct 2018 15:00:00	74420	0	670	670	-4	Off	Off	100	Battery

Raw Data 
  Hourly 
  Daily 
  Weekly 
  Monthly

Night Flow Range 

As per the previously explained functions throughout the Cloudworks suite, columns can be switched off/on and re-ordered to the users requirements. The exporting will be as per the layout presented on the screen.

You can zoom into a range of the data by simply selecting those records in the table. This will result in the graph at the bottom being updated to display only those readings.

Deleting the datalog or removing a range of records can be easily done by using the 'Delete Datalog' button. To delete a range, simply select the range in the datalog table and press the 'Delete Datalog' button. If no range is selected, it will be assumed that you wish to delete the entire datalog. There will be a prompt to ensure that you are aware of the action you are about to take.


Data that is displayed in the table will also be represented in the graph at the bottom of the screen. There are two graphs displayed, namely the Consumption Graph (consumption/pressure/flow), and a Night Flow graph. These graphs can be selectively switched on/off by clicking the ticks at the bottom right of the datalog table.


Datalog

No.	Date	Totaliser1	Totaliser2	Cons.	Flow /hr	Pressure	Input	Output	Battery	Power
140	21 Nov 2018 22:00:00	344826	0	53	53	-4	Off	Off	83	Battery
141	21 Nov 2018 23:00:00	344866	0	40	40	-4	Off	Off	83	Battery
142	22 Nov 2018 00:00:00	344920	0	54	54	-4	Off	Off	82	Battery
143	22 Nov 2018 01:00:00	344974	0	54	54	-4	Off	Off	82	Battery
144	22 Nov 2018 02:00:00	345030	0	56	56	-4	Off	Off	81	Battery
145	22 Nov 2018 03:00:00	345094	0	64	64	-4	Off	Off	82	Battery
146	22 Nov 2018 04:00:00	345143	0	49	49	-4	Off	Off	83	Battery
147	22 Nov 2018 05:00:00	345209	0	66	66	-4	Off	Off	82	Battery
148	22 Nov 2018 06:00:00	345275	0	66	66	-4	Off	Off	82	Battery
149	22 Nov 2018 07:00:00	345336	0	61	61	-4	Off	Off	82	Battery
150	22 Nov 2018 08:00:00	345409	0	73	73	-4	Off	Off	82	Battery
151	22 Nov 2018 09:00:00	345466	0	57	57	-4	Off	Off	81	Battery

From Date  
16 Nov 2018

To Date  
30 Nov 2018


 Read Datalog

 Delete Datalog

Consumption Graph

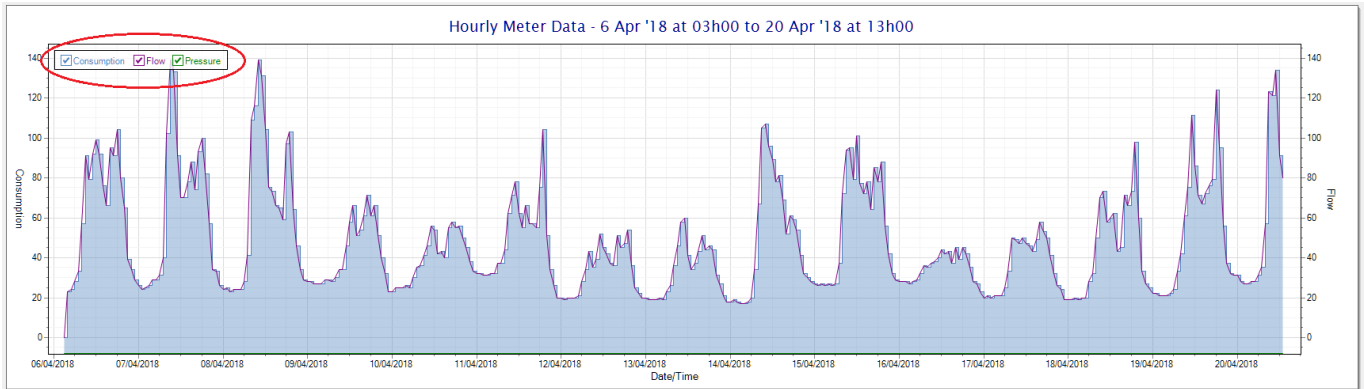
Night Flow Graph

Raw Data 
  Hourly 
  Daily 
  Weekly 
  Monthly

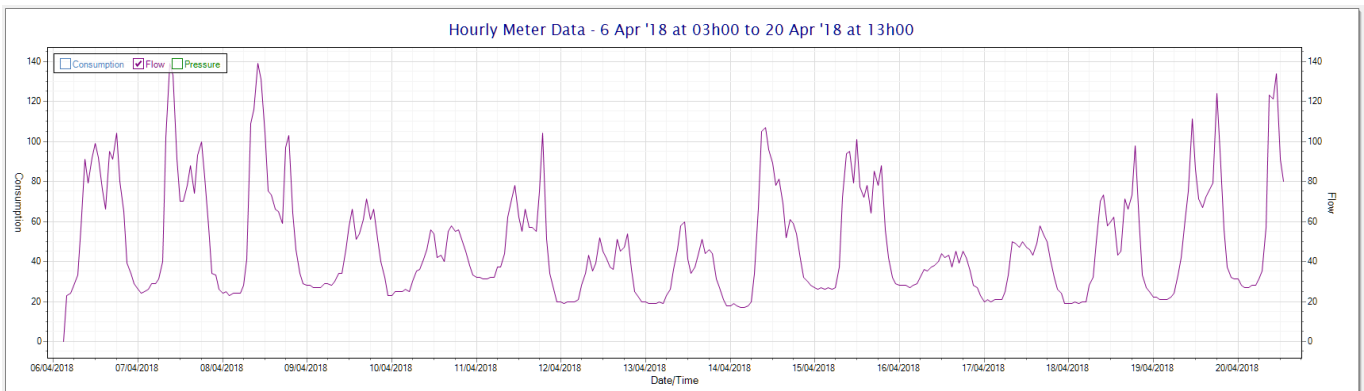
Night Flow Range 



The Consumption Graph displays the consumption, pressure and flow related data. Individual graph series can be switched off/on by selecting the ticks at the top left of the graph.



To view the flow only would look like this:-



Also displayed is the Night Flow graph. The function of this graph is to specifically analyse the night time water flows at an installation. This analysis is done based on the data received during a specific time period during the night (normally from 3am to 5am). This period for analysis can be adjusted by sliding the elements of the slider on the top right of the graph.

0	0	0	4.944	Off	Off	100	Battery
0	48	48	8.537	Off	Off	100	Battery

Consumption Graph  
 Night Flow Graph

Monthly
 Night Flow Range

### Night Flow Analyser - Range 3 am To 5 am

Night Flow Min/Max  
  Mean Night Flow  
  Night Line

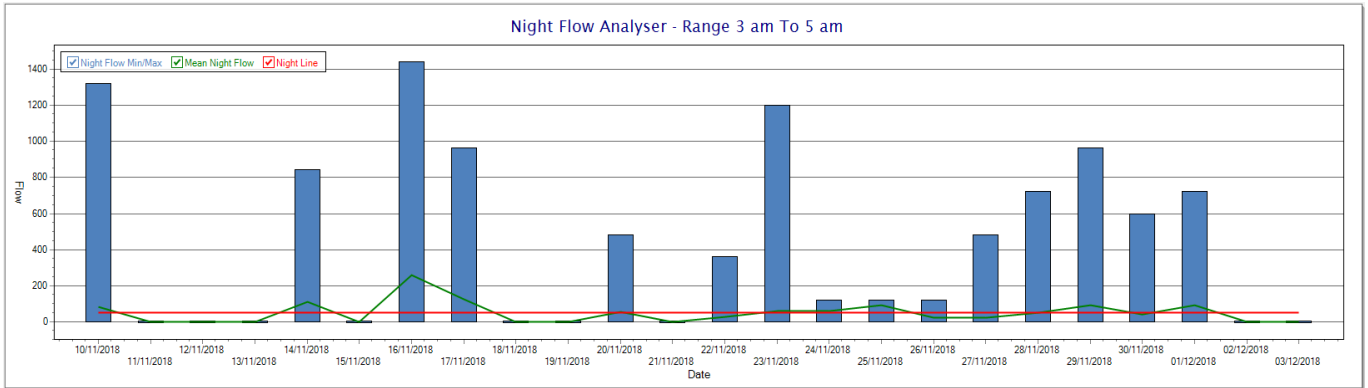
The graph will show a couple of different series.

1. Night Flow Min/Max - this will be a bar series indicating the minimum and maximum flows during the measurement period. The base of the block is the minimum flow and the top, the maximum flow. Depending on the type of installation, during this period you would expect the minimum flow point to come to zero and

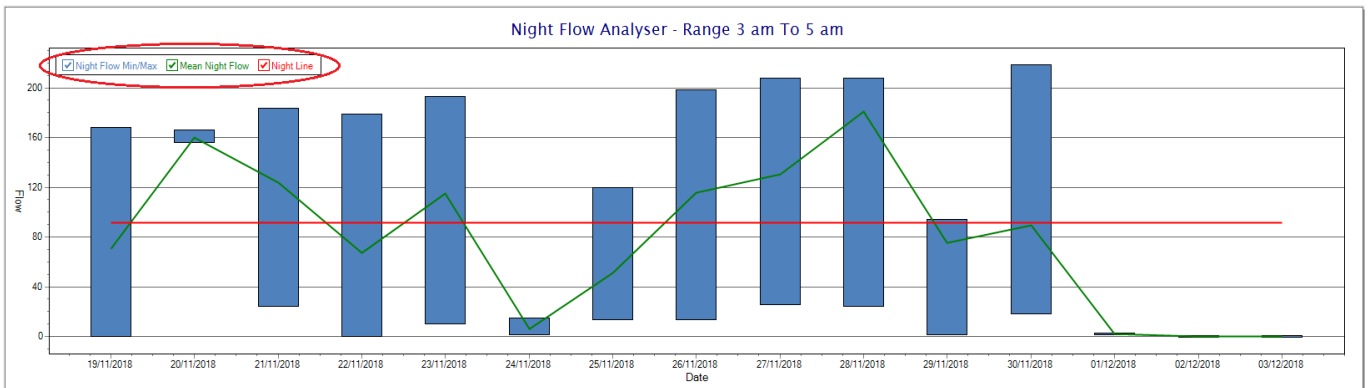
therefore sit on the base of the graph. The maximum flow would simply indicate some consumption during the period of measure and is not really a concern unless that was not expected.

2. Mean Night Flow - this will show the average night flow during that period. Shown in green and would normally simply be the midpoint between the minimum and maximum flows.
3. Night Line - the night line shows the average flow for the entire range of data being measured. Shown in red, this is useful for determining the average night usage over different data ranges.

The Night Flow graph is particularly useful in giving a quick graphical indication of the possibility of a leak scenario. In most case, where there should be no continuous use of water at night, the graph would look as below:-



During a possible leak situation, the minimum night flow does not return to zero and the graph will appear to bounce off the bottom.



So, at a quick glance it is possible to see if there is a problem at this installation. As per the Consumption Graph, the different graph series can be switched off/on by clicking the series ticks on the top left hand corner.

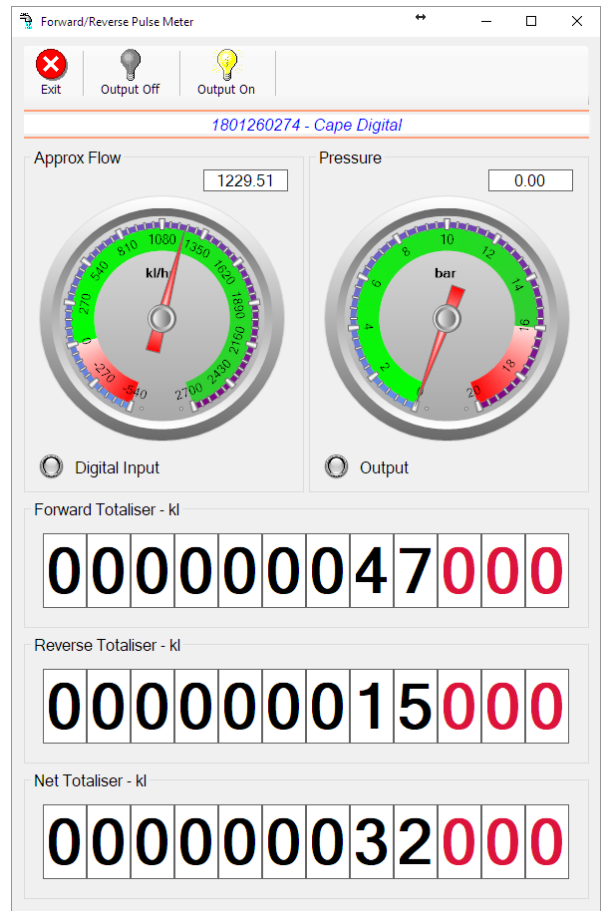
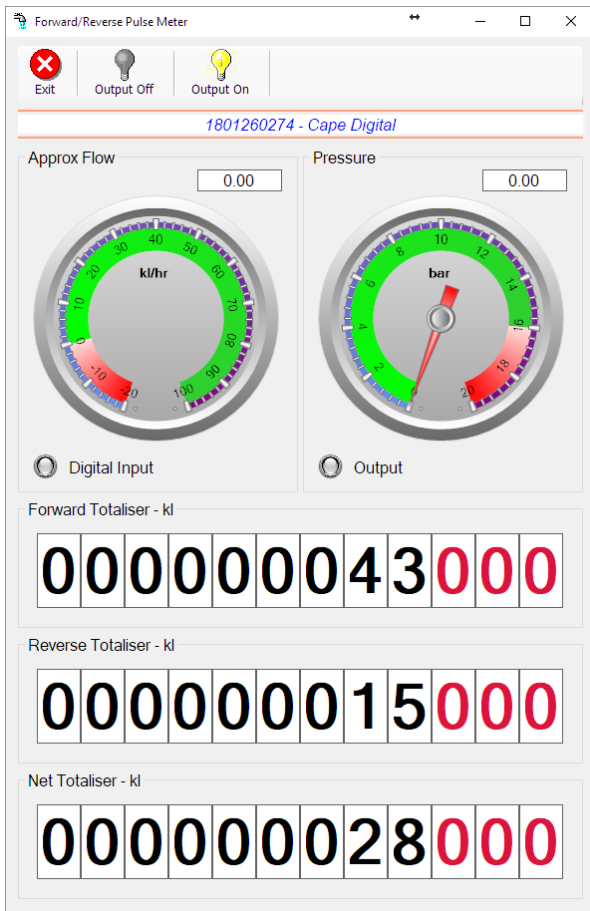
### 2.8.3 Application 002 - Forward/Reverse Pulse Water Meter + Pressure

This type would be selected for applications that are used on a forward/reverse pulse water meter. The actual consumption is normally the difference of the two totaliser readings and are handled as such in this application type. Included here is the 4-20mA current loop interface for pressure measurement of the pipeline.

Functions on the top menu bar are mostly as per previous screens within the Cloudworks suite. These would be the 'Refresh Database', 'Layout Control' and 'Export Data' buttons which have been explained earlier. Added functionality is the 'Live Read', 'Output On/Off' and 'Trigger GPS Read'.

If a device is powered and permanently connected to the server (and online), then the 'Live Read' Button will be active allowing you to stream live data directly from that device in real time. **Bear in mind that, while this live streaming screen is active, the cellular data consumption of that device will be much greater than the usual background periodic read used to update the database.** The current communications status of the device will be displayed on the top right of the screen.

Remote devices that are offline or sleeping cannot be accessed for streaming data. This status will be automatically updated while on this screen without the need of pressing 'Refresh Database' button. Pressing the 'Live Read' will launch the streaming live data screen for that device. All the data on this screen is fetched directly from the remote device and not the database.



The data displayed are the two totalisers (forward/reverse) and combined volume (Net Totaliser) as digital readouts and two needle type displays showing pressure (4-20mA input) and approximate flow. It is important to note that flow is calculated as a difference between two successive readings. For this reading, the data stream will need to see at least two changes in the volume amount before it can calculate the approximate flow. That is why the flow dial will initially appear blank (as per the left display) and then only become active after those two reading changes have been received. The digital input and output statuses are indicated in the form of illuminated LED's.

On both the Application screen and Live Read screen are buttons to allow for the switching of the output on or off. When using this function on the Live Read screen, there will be a short delay between changing the output status and the indication on the output LED. This is because the indicator will only update on confirmation from the remote device, ensuring that the action has actually been successful.

Returning to the applications screen, data is displayed in various groups. On the top left is grouped the Device Information block. This information is data relevant to the remote device and is really displaying data that is present within the database. Mostly data that is populated during the 'Reload Device Config' process.

This data is as follows:-

Information	Notes
<b>Device Code</b>	The Device Code assigned to this particular remote device. All communications are initiated by addressing this code. This code is unique to all remote devices and is assigned at the time of manufacture.
<b>Device Type</b>	Type of Remote Device. eg CDS538 Cumulus Logger etc
<b>Description</b>	The description is a user defined parameter that is captured during the setup of each device. This would normally be something that would describe the location or application of this particular device.
<b>Application</b>	Selected device application. Application 002 - Forward/Reverse Pulse Water Meter + Pressure function in this case.
<b>Data Index</b>	As each device is captured on to Cloudworks system, it is assigned a unique data index. This index is used when externally extracting the log data from the database as each record in the global datalog would be labelled with this index number.
<b>Serial Number</b>	Serial number of this device - assigned in the factory.
<b>GSM Signal</b>	Signal strength of the last GSM communications, expressed as a percentage.
<b>Battery Status</b>	Battery status for devices that are powered by battery, expressed as a percentage. It is important to note that this will be the battery status read while the device is under full load (GSM communications active). It would normally indicate lower than the recorded battery status in the datalog (which is read while the device is essentially idle).
<b>Current Power</b>	An indicator as to how this remote device is being powered. Normally the same as the power mode but can vary for systems on Dual Power mode. For devices in a dual power mode, this parameter will display the current power status of the remote device. Battery or Mains.
<b>Power Mode</b>	Selected Power Mode under which the remote device is operating. This can be Battery, Mains or Dual power modes.
<b>Wakeup Per.</b>	The Wakeup Period set in minutes. Refer to the device configuration chapter for an explanation of this parameter.
<b>Datalog Per.</b>	The Datalog Period set minutes. Refer to the device configuration chapter for an explanation of this parameter.
<b>Fwd Totaliser</b>	The current Forward Totaliser reading with its relevant pulse weight implemented including the unit of measure.
<b>Rev Totaliser</b>	The current Reverse Totaliser reading with its relevant pulse weight implemented including the unit of measure.

<b>Pressure (4-20mA Loop)</b>	The 4-20mA current loop reading with its calibration data implemented including the unit of measure.
<b>Output</b>	Digital output status.
<b>Digital Input</b>	Digital input status.
<b>Last Seen</b>	The date and time the remote device was last seen connecting into the server.
<b>Latitude</b>	Last seen remote device Latitude.
<b>Longitude</b>	Last seen remote device Longitude.
<b>User Config</b>	The user defined data recorded on the remote device. Refer to the device configuration chapter for an explanation of this parameter.

To get the latest update of this data, you will need to press the 'Refresh Data' button which will then update this screen from the database.

The onboard GPS of the remote device uses a substantial amount of power and is therefore automatically switched off on battery powered devices. When the GPS is first powered up, it will take a couple of minutes before it is able to lock on to the position of the device. For this reason, battery powered devices by default do not power up the GPS at each wakeup. In order to get a GPS lock on the device, it is necessary to selectively power the GPS on a wakeup, get a lock, and go back to sleep. This is achieved by pressing the 'Trigger GPS Read' button.

By doing this, a flag is placed into the database telling the server to power the GPS at the next wakeup, wait a couple of minutes for a GPS lock, record it, and put the remote device back to sleep. This will only happen at the next wakeup and can keep the remote device awake for a couple of minutes. **This process should only be triggered when the GPS position needs to be updated because of the expense of battery power.**

The server will only keep the device awake for a couple of minutes (typically 5 minutes - set in the server software) in order to get a fix. If this takes too long, the remote device will be put back to sleep without updating the position. This is done to protect the battery should the remote device not be in a position to ever get a GPS signal. You can at a later stage attempt the process again if it was unsuccessful the first time.

To the right of screen is the Datalog information box. This box will be populated with the most recent data from the recorded datalog of this remote device (**read from the database**). By default, when the screen opens, the last two weeks' worth of data will be displayed in this table. To select a different range of data, you can select the 'From Date' and 'To Date' values and press the 'Read Datalog' button.

This application will record the following data in the datalog.

No.	Date	Fwd Totaliser	Fwd Cons.	Rev Totaliser	Rev Cons.	Flow /hr	Pressure	Input	Output	Battery	Power
1	03 Dec 2018 13:10:00	3443		0			10.873	Off	Off		Mains
2	03 Dec 2018 13:11:00	3445	2	0	0	120	9.518	Off	Off		Mains
3	03 Dec 2018 13:12:00	3445	0	0	0	0	9.926	Off	Off		Mains
4	03 Dec 2018 13:13:00	3446	1	0	0	60	9.213	Off	Off		Mains
5	03 Dec 2018 13:14:00	3447	1	0	0	60	9.275	Off	Off		Mains
6	03 Dec 2018 13:15:00	3448	1	0	0	60	9.621	Off	Off		Mains
7	03 Dec 2018 13:16:00	3449	1	0	0	60	11.379	Off	Off		Mains
8	03 Dec 2018 13:17:00	3450	1	0	0	60	9.508	Off	Off		Mains

Raw Data 
  Hourly 
  Daily 
  Weekly 
  Monthly

Information	Notes
<b>Date/Time</b>	Date and time of the datalog record.
<b>Fwd Totaliser</b>	Forward Totaliser reading.
<b>Rev Totaliser</b>	Reverse Totaliser reading.
<b>Fwd Cons.</b>	The Forward consumption reading.
<b>Rev Cons.</b>	The Reverse consumption Reading.
<b>Flow/hr</b>	Flow rate calculated as volume per hour.
<b>Pressure</b>	Current Pressure reading read from the 4-20mA input.
<b>Input</b>	Digital input status at the time of recording this record.
<b>Output</b>	Digital output status at the time of recording this record.
<b>Battery</b>	Battery level in percentage. Only displayed on battery powered devices.
<b>Power</b>	Current power status. Mains/Battery

The data in this datalog table can be displayed (and graphed) in a number of different ways. These are selected by choosing the option at the bottom of the datalog table. Options include Raw Data and averaged hourly, daily, weekly and monthly data. When the averaging options are chosen, missing data is automatically interpolated to fill in the missing gaps. Interpolated data will have the number column entries highlighted in red with a small 'Interpolated data' message at the top right of the datalog table.

Datalog \* Interpolated data

No.	Date	Fwd Totaliser	Fwd Cons.	Rev Totaliser	Rev Cons.	Flow	Pressure	Input	Output	B
1	28 Nov 2018 15:00:00	498259.000		92			13.841	Off	Off	
2	28 Nov 2018 16:00:00	498384.000	125.000	92	0	124.436	14.053	Off	Off	
3	28 Nov 2018 17:00:00	498496.000	112.000	92	0	111.857	14.283	Off	Off	
4	28 Nov 2018 18:00:00	498577.000	81.000	92	0	82.768	15.079	Off	Off	
5	28 Nov 2018 19:00:00	498599.333	22.333	92	0	55.178	15.693	Off	Off	
6	28 Nov 2018 20:00:00	498621.667	22.333	92	0	27.588	16.306	Off	Off	
7	28 Nov 2018 21:00:00	498644.000	22.333	92	0	-0.002	16.920	Off	Off	
8	28 Nov 2018 22:00:00	498644.000	0.000	92	0	0.010	16.932	Off	Off	
9	28 Nov 2018 23:00:00	498644.000	0.000	92	0	-0.008	16.940	Off	Off	
10	29 Nov 2018 00:00:00	498644.000	0.000	92	0	-0.003	16.934	Off	Off	
11	29 Nov 2018 01:00:00	498644.000	0.000	92	0	-0.002	16.936	Off	Off	
12	29 Nov 2018 02:00:00	498644.000	0.000	92	0	0.005	16.941	Off	Off	
13	29 Nov 2018 03:00:00	498644.000	0.000	92	0	0.007	16.938	Off	Off	

Raw Data 
  Hourly 
  Daily 
  Weekly 
  Monthly

As per the previously explained functions throughout the Cloudworks suite, columns can be switched off/on and re-ordered to the users requirements. The exporting will be as per the layout presented on the screen.

You can zoom into a range of the data by simply selecting those records in the table. This will result in the graph at the bottom being updated to display only those readings.

Deleting the datalog or removing a range of records can be easily done by using the 'Delete Datalog' button. To delete a range, simply select the range in the datalog table and press the 'Delete Datalog' button. If no range is selected, it will be assumed that you wish to delete the entire datalog. There will be a prompt to ensure that you are aware of the action you are about to take.

Data that is displayed in the table will also be represented in the graph at the bottom of the screen. There are two graphs displayed, namely the Consumption Graph (consumption/pressure/flow), and a Night Flow graph. These graphs can be selectively switched on/off by clicking the ticks at the bottom right of the datalog table.

Datalog

No.	Date	Fwd Totaliser	Fwd Cons.	Rev Totaliser	Rev Cons.	Flow /hr	Pressure	Input	Output
1	03 Dec 2018 13:10:00	3443		0			10.873	Off	Off
2	03 Dec 2018 13:11:00	3445	2	0	0	120	9.518	Off	Off
3	03 Dec 2018 13:12:00	3445	0	0	0	0	9.926	Off	Off
4	03 Dec 2018 13:13:00	3446	1	0	0	60	9.213	Off	Off
5	03 Dec 2018 13:14:00	3447	1	0	0	60	9.275	Off	Off
6	03 Dec 2018 13:15:00	3448	1	0	0	60	9.621	Off	Off
7	03 Dec 2018 13:16:00	3449	1	0	0	60	11.379	Off	Off
8	03 Dec 2018 13:17:00	3450	1	0	0	60	9.508	Off	Off

From Date: 19 Nov 2018

To Date: 03 Dec 2018


[Read Datalog](#)

[Delete Datalog](#)

Consumption Graph

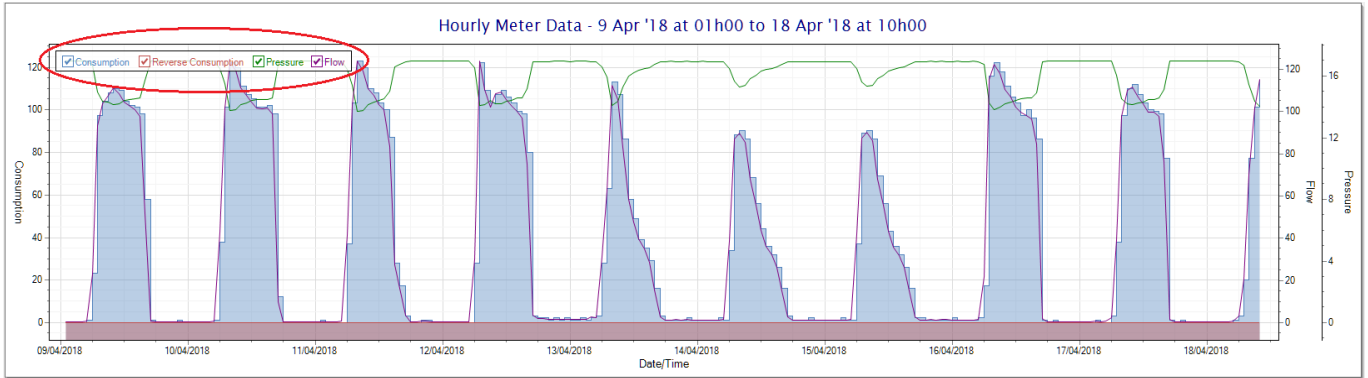
Night Flow Graph

Raw Data 
  Hourly 
  Daily 
  Weekly 
  Monthly

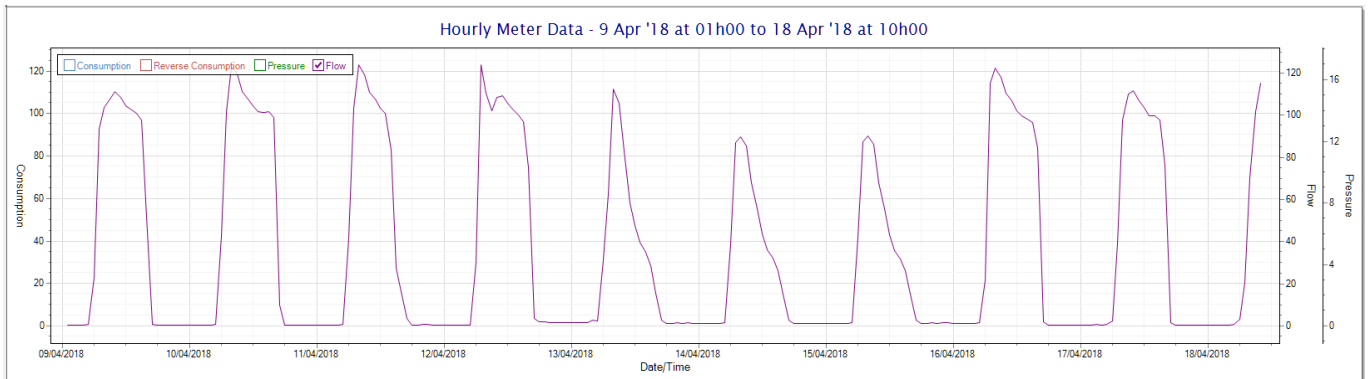
Night Flow Range: 



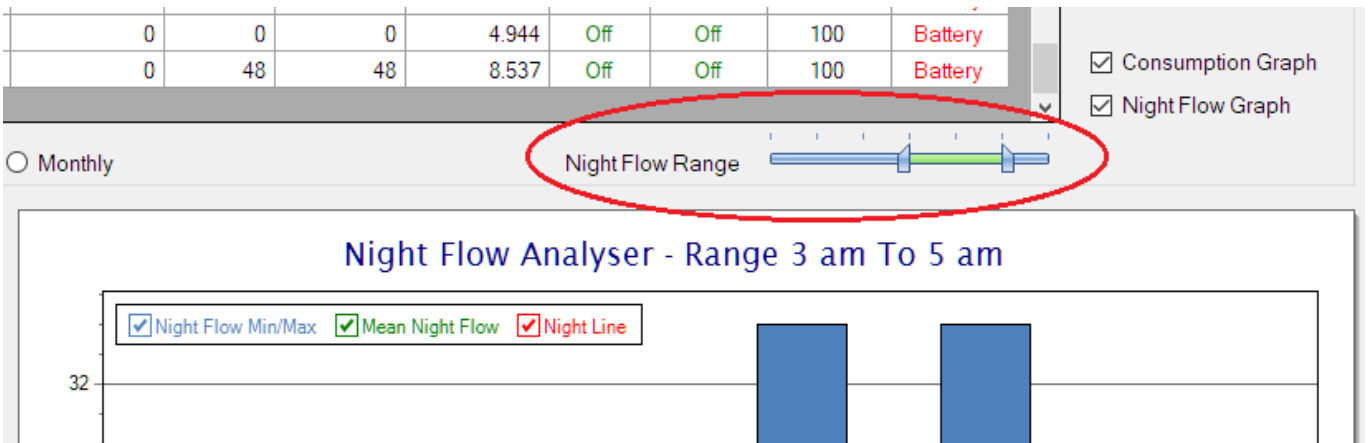
The Consumption Graph displays the consumption, pressure and flow related data. Individual graph series can be switched off/on by selecting the ticks at the top left of the graph.



To view the flow only would look like this:-



Also displayed is the Night Flow graph. The function of this graph is to specifically analyse the night time water flows at an installation. This analysis is done based on the data received during a specific time period during the night (normally from 3am to 5am). This period for analysis can be adjusted by sliding the elements of the slider on the top right of the graph.



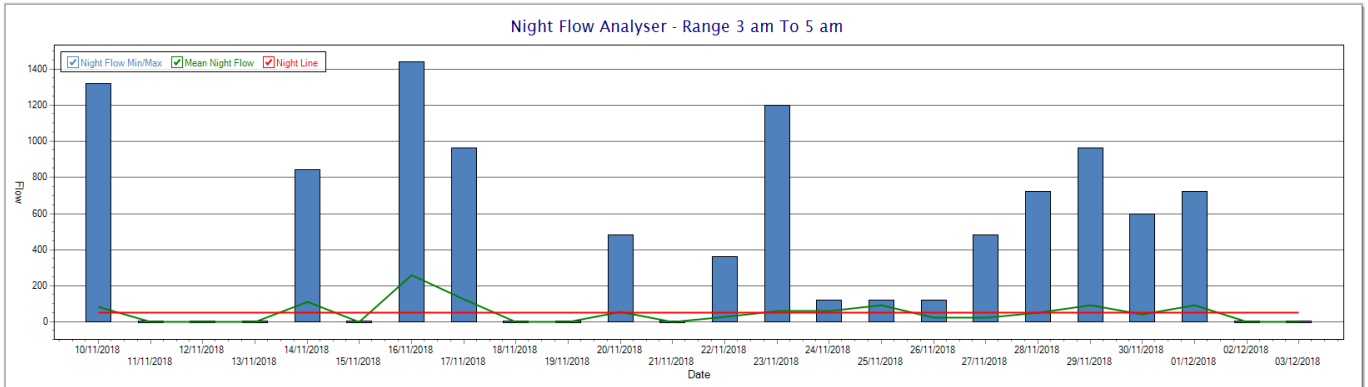
The graph will show a couple of different series.

- Night Flow Min/Max - this will be a bar series indicating the minimum and maximum flows during the measurement period. The base of the block is the minimum flow and the top, the maximum flow. Depending on the type of installation, during this period you would expect the minimum flow point to come to zero and

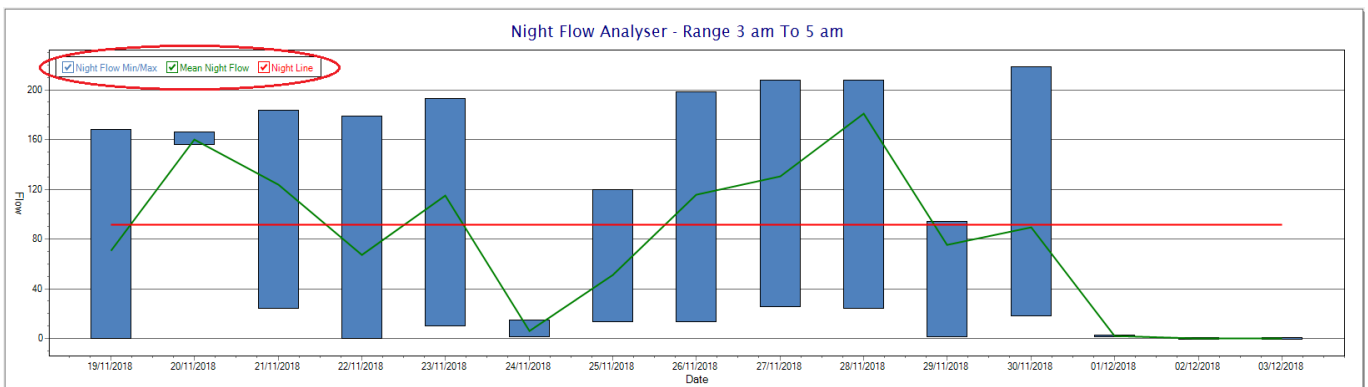
therefore sit on the base of the graph. The maximum flow would simply indicate some consumption during the period of measure and is not really a concern unless that was not expected.

5. Mean Night Flow - this will show the average night flow during that period. Shown in green and would normally simply be the midpoint between the minimum and maximum flows.
6. Night Line - the night line shows the average flow for the entire range of data being measured. Shown in red, this is useful for determining the average night usage over different data ranges.

The Night Flow graph is particularly useful in giving a quick graphical indication of the possibility of a leak scenario. In most case, where there should be no continuous use of water at night, the graph would look as below:-



During a possible leak situation, the minimum night flow does not return to zero and the graph will appear to bounce off the bottom.



So, at a quick glance it is possible to see if there is a problem at this installation. As per the Consumption Graph, the different graph series can be switched off/on by clicking the series ticks on the top left hand corner.

### 2.8.4 Application 003 - Aquamaster 3 + Loop

This type would be selected for applications that are used on an ABB Aquamaster 3 water meter connected to the Modbus interface. Forward/Reverse Totals, Flow and Pressure are read directly from the interface of the meter.

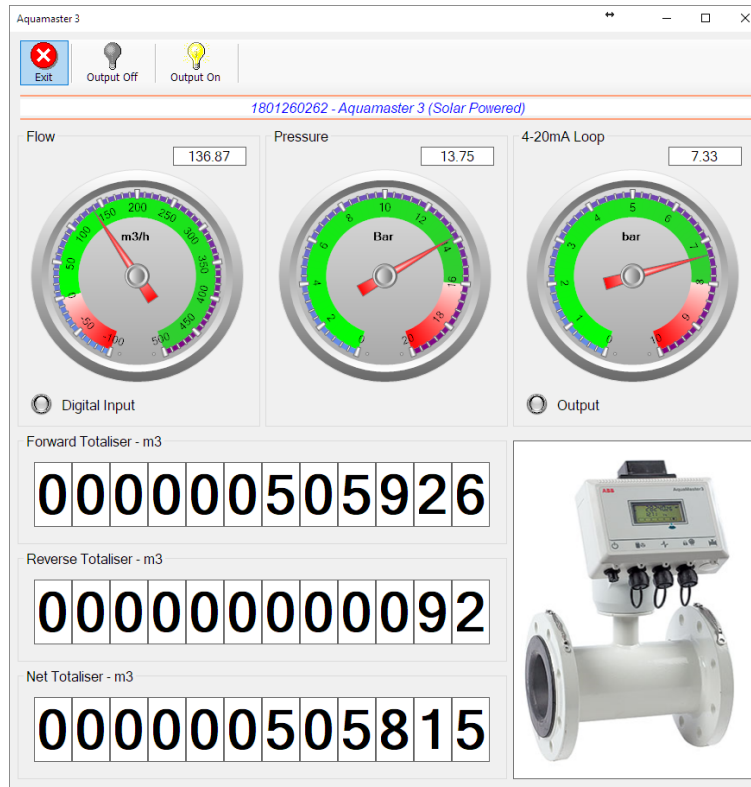
Functions on the top menu bar are mostly as per previous screens within the Cloudworks suite. These would be the 'Refresh Database', 'Layout Control' and 'Export Data' buttons which have been explained earlier. Added functionality is the 'Live Read', 'Output On/Off' and 'Trigger GPS Read'.

If a device is powered and permanently connected to the server (and online), then the 'Live Read' Button will be active allowing you to stream live data directly from that device in real time. **Bear in mind that, while this live streaming screen is active, the cellular data consumption of that device will be much greater than the usual background periodic read used to update the database.**

The current communications status of the device will be displayed on the top right of the screen.

Remote devices that are offline or sleeping cannot be accessed for streaming data. This status will be automatically updated while on this screen without the need of hitting 'Refresh Database' function. Pressing the 'Live Read' will launch the streaming live data screen for that device. **All the data on this screen is fetched directly from the remote device and not the database.**

<b>DOCUMENT NAME</b>	<b>CLASSIFICATION</b>	<b>DATE</b>	<b>PAGE</b>
CLOUDWORKS CLIENT USER MANUAL	CONFIDENTIAL	15-JUL-21	47 OF 201



The data displayed are the two totalisers (forward/reverse) and combined volume (net totaliser) as digital readouts and three needle type displays showing flow and pressure (read directly from the meter) and the current loop reading. The digital input and output statuses are indicated in the form of illuminated LED's.

On both the Application screen and Live Read screen are buttons to allow for the switching of the output on or off. When using this function on the Live Read screen, there will be a short delay between changing the output status and the indication on the output LED. This is because the indicator will only update on confirmation from the remote device, ensuring that the action has actually been successful.

Returning to the applications screen, data is displayed in various groups. On the top left is grouped the Device Information block. This information is data relevant to the remote device and is really displaying data that is present within the database. Mostly data that is populated during the 'Reload Device Config' process.

This data is as follows:-

Information	Notes
<b>Device Code</b>	The Device Code assigned to this particular remote device. All communications are initiated by addressing this code. This code is unique to all remote devices and is assigned at the time of manufacture.
<b>Device Type</b>	Type of Remote Device. eg CDS538 Cumulus Logger etc
<b>Description</b>	The description is a user defined parameter that is captured during the setup of each device. This would normally be something that would describe the location or application of this particular device.
<b>Application</b>	Selected device application. Application 003 - Aquamaster 3 function



<b>Data Index</b>	in this case. As each device is captured on to Cloudworks system, it is assigned a unique data index. This index is used when externally extracting the log data from the database as each record in the global datalog would be labelled with this index number.
<b>Serial Number</b>	Serial number of this device - assigned in the factory.
<b>GSM Signal</b>	Signal strength of the last GSM communications, expressed as a percentage.
<b>Battery Status</b>	Battery status for devices that are powered by battery, expressed as a percentage. It is important to note that this will be the battery status read while the device is under full load (GSM communications active). It would normally indicate lower than the recorded battery status in the datalog (which is read while the device is essentially idle).
<b>Current Power</b>	An indicator as to how this remote device is being powered. Normally the same as the power mode but can vary for systems on Dual Power mode. For devices in a dual power mode, this parameter will display the current power status of the remote device. Battery or Mains.
<b>Power Mode</b>	Selected Power Mode under which the remote device is operating. This can be Battery, Mains or Dual power modes.
<b>Wakeup Per.</b>	The Wakeup Period set in minutes. Refer to the device configuration chapter for an explanation of this parameter.
<b>Datalog Per.</b>	The Datalog Period set minutes. Refer to the device configuration chapter for an explanation of this parameter.
<b>Fwd Totaliser</b>	The current Forward Totaliser reading.
<b>Rev Totaliser</b>	The current Reverse Totaliser reading.
<b>Flow</b>	Current flow reading.
<b>Pressure</b>	Current pressure reading.
<b>4-20mA Current Loop</b>	The 4-20mA current loop reading with its calibration data implemented including the unit of measure.
<b>Output</b>	Digital output status.
<b>Digital Input</b>	Digital input Status.
<b>Last Seen</b>	The date and time the remote device was last seen connecting into the server.
<b>Latitude</b>	Last seen remote device Latitude.
<b>Longitude</b>	Last seen remote device Longitude.



**User Config**

The user defined data recorded on the remote device. Refer to the device configuration chapter for an explanation of this parameter.

To get the latest update of this data, you will need to press the 'Refresh Data' button which will then update this screen from the database.

The onboard GPS of the remote device uses a substantial amount of power and is therefore automatically switched off on battery powered devices. When the GPS is first powered up, it will take a couple of minutes before it is able to lock on to the position of the device. For this reason, battery powered devices by default do not power up the GPS at each wakeup. In order to get a GPS lock on the device, it is necessary to selectively power the GPS on a wakeup, get a lock, and go back to sleep. This is achieved by pressing the 'Trigger GPS Read' button.

By doing this, a flag is placed into the database telling the server to power the GPS at the next wakeup, wait a couple of minutes for a GPS lock, record it, and put the remote device back to sleep. This will only happen at the next wakeup and can keep the remote device awake for a couple of minutes. **This process should only be triggered when the GPS position needs to be updated because of the expense of battery power.**

The server will only keep the device awake for a couple of minutes (typically 5 minutes - set in the server software) in order to get a fix. If this takes too long, the remote device will be put back to sleep without updating the position. This is done to protect the battery should the remote device not be in a position to ever get a GPS signal. You can at a later stage attempt the process again if it was unsuccessful the first time.

To the right of screen is the Datalog information box. This box will be populated with the most recent data from the recorded datalog of this remote device (**read from the database**). By default, when the screen opens, the last two weeks' worth of data will be displayed in this table. To select a different range of data, you can select the 'From Date' and 'To Date' values and press the 'Read Datalog' button.

This application will record the following data in the datalog.

No.	Date	Fwd Totaliser	Fwd Cons.	Rev Totaliser	Rev Cons.	Flow	Pressure	Loop	Input	Output	Battery	Power
107	03 Dec 2018 01:00:00	505011.000	22.000	92	0	22.310	15.926	-2.500	Off	Off		Mains
108	03 Dec 2018 02:00:00	505033.000	22.000	92	0	22.309	15.921	-2.500	Off	Off		Mains
109	03 Dec 2018 03:00:00	505056.000	23.000	92	0	22.339	15.923	-2.500	Off	Off		Mains
110	03 Dec 2018 04:00:00	505078.000	22.000	92	0	22.347	15.920	-2.500	Off	Off		Mains
111	03 Dec 2018 05:00:00	505100.000	22.000	92	0	22.303	15.926	-2.500	Off	Off		Mains
112	03 Dec 2018 06:00:00	505123.000	23.000	92	0	23.026	15.924	-2.500	Off	Off		Mains
113	03 Dec 2018 07:00:00	505169.000	46.000	92	0	46.656	15.721	-0.804	Off	Off		Mains
114	03 Dec 2018 08:00:00	505246.000	77.000	92	0	77.149	15.329	1.810	Off	Off		Mains
115	03 Dec 2018 09:00:00	505343.000	97.000	92	0	97.066	15.001	3.527	Off	Off		Mains
116	03 Dec 2018 10:00:00	505451.000	108.000	92	0	108.574	14.942	4.513	Off	Off		Mains
117	03 Dec 2018 11:00:00	505579.000	128.000	92	0	128.814	14.305	-1.776	Off	Off		
118	03 Dec 2018 12:00:00	505697.000	118.000	92	0	118.306	14.564	-2.500	Off	Off	100	Battery
119	03 Dec 2018 13:00:00	505842.000	145.000	92	0	145.431	13.221	6.135	Off	Off		

Raw Data 
  Hourly 
  Daily 
  Weekly 
  Monthly

Information	Notes
<b>Date/Time</b>	Date and time of the datalog record.
<b>Fwd Totaliser</b>	Forward Totaliser reading.
<b>Rev Totaliser</b>	Reverse Totaliser reading.
<b>Fwd Cons.</b>	The Forward consumption reading.



<b>Rev Cons.</b>	The Reverse consumption Reading.
<b>Flow</b>	Flow rate calculated as volume per hour.
<b>Pressure</b>	Current Pressure reading read from the 4-20mA input.
<b>Loop</b>	4-20mA Loop reading with its applied calibration.
<b>Input</b>	Digital input status at the time of recording this record.
<b>Output</b>	Digital output status at the time of recording this record.
<b>Battery</b>	Battery level in percentage. Only displayed on battery powered devices.
<b>Power</b>	Current power status. Mains/Battery

The data in this datalog table can be displayed (and graphed) in a number of different ways. These are selected by choosing the option at the bottom of the datalog table. Options include Raw Data and averaged hourly, daily, weekly and monthly data. When the averaging options are chosen, missing data is automatically interpolated to fill in the missing gaps. Interpolated data will have the number column entries highlighted in red with a small 'Interpolated data' message at the top right of the datalog table.

Datalog \* Interpolated data

No.	Date	Fwd Totaliser	Fwd Cons.	Rev Totaliser	Rev Cons.	Flow	Pressure	Input	Output	B
1	28 Nov 2018 15:00:00	498259.000		92			13.841	Off	Off	
2	28 Nov 2018 16:00:00	498384.000	125.000	92	0	124.436	14.053	Off	Off	
3	28 Nov 2018 17:00:00	498496.000	112.000	92	0	111.857	14.283	Off	Off	
4	28 Nov 2018 18:00:00	498577.000	81.000	92	0	82.768	15.079	Off	Off	
5	28 Nov 2018 19:00:00	498599.333	22.333	92	0	55.178	15.693	Off	Off	
6	28 Nov 2018 20:00:00	498621.667	22.333	92	0	27.588	16.306	Off	Off	
7	28 Nov 2018 21:00:00	498644.000	22.333	92	0	-0.002	16.920	Off	Off	
8	28 Nov 2018 22:00:00	498644.000	0.000	92	0	0.010	16.932	Off	Off	
9	28 Nov 2018 23:00:00	498644.000	0.000	92	0	-0.008	16.940	Off	Off	
10	29 Nov 2018 00:00:00	498644.000	0.000	92	0	-0.003	16.934	Off	Off	
11	29 Nov 2018 01:00:00	498644.000	0.000	92	0	-0.002	16.936	Off	Off	
12	29 Nov 2018 02:00:00	498644.000	0.000	92	0	0.005	16.941	Off	Off	
13	29 Nov 2018 03:00:00	498644.000	0.000	92	0	0.007	16.938	Off	Off	

Raw Data 
  Hourly 
  Daily 
  Weekly 
  Monthly

As per the previously explained functions throughout the Cloudworks suite, columns can be switched off/on and re-ordered to the users requirements. The exporting will be as per the layout presented on the screen.

You can zoom into a range of the data by simply selecting those records in the table. This will result in the graph at the bottom being updated to display only those readings.

Deleting the datalog or removing a range of records can be easily done by using the 'Delete Datalog' button. To delete a range, simply select the range in the datalog table and press the 'Delete Datalog' button. If no range is selected, it will be assumed that you wish to delete the entire datalog. There will be a prompt to ensure that you are aware of the action you are about to take.



Data that is displayed in the table will also be represented in the graph at the bottom of the screen. There are two graphs displayed, namely the Consumption Graph (consumption/pressure/flow), and a Night Flow graph. These graphs can be selectively switched on/off by clicking the ticks below the datalog table.

Datalog \* Interpolated data

No.	Date	Fwd Totaliser	Fwd Cons.	Rev Totaliser	Rev Cons.	Flow	Pressure	Loop	Battery
335	11 Feb 2020 01:00:00	1018104.000	0.000	177	0	-0.024	16.957	0	
336	11 Feb 2020 02:00:00	1018104.000	0.000	177	0	-0.027	16.949	0	
337	11 Feb 2020 03:00:00	1018104.000	0.000	177	0	0.004	16.942	0	
338	11 Feb 2020 04:00:00	1018104.000	0.000	177	0	0.000	16.915	0	
339	11 Feb 2020 05:00:00	1018104.000	0.000	177	0	0.011	16.927	0	
340	11 Feb 2020 06:00:00	1018111.000	7.000	177	0	8.355	16.824	0	
341	11 Feb 2020 07:00:00	1018163.000	52.000	177	0	52.235	16.331	0	
342	11 Feb 2020 08:00:00	1018240.000	77.000	177	0	78.611	15.931	0	
343	11 Feb 2020 09:00:00	1018332.000	92.000	177	0	92.341	15.574	0	
344	11 Feb 2020 10:00:00	1018440.000	108.000	177	0	109.172	15.004	0	
345	11 Feb 2020 11:00:00	1018572.000	132.000	177	0	132.563	14.201	0	
346	11 Feb 2020 12:00:00	1018721.000	149.000	177	0	149.386	13.473	0	

From Date: 28 Jan 2020

To Date: 11 Feb 2020

Consumption

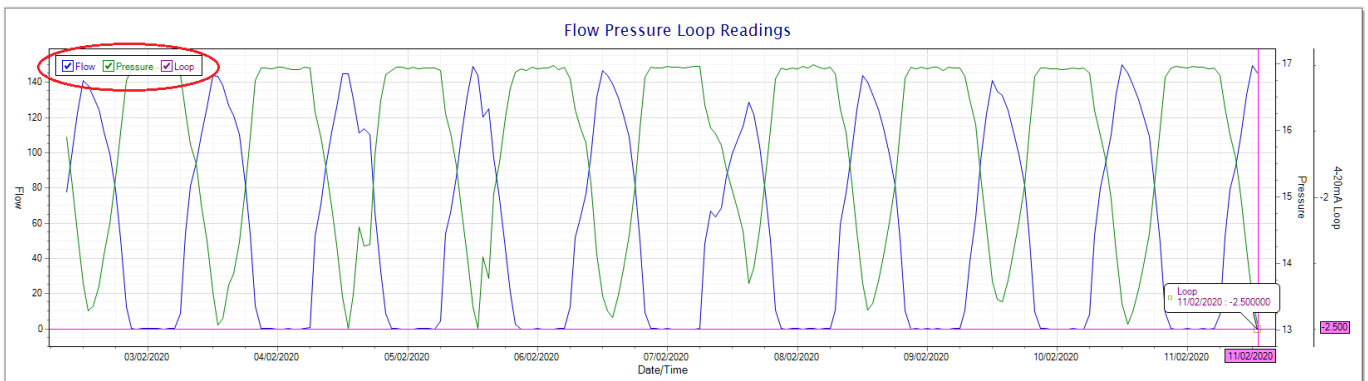
Flow/Press/Loop

Night Flow

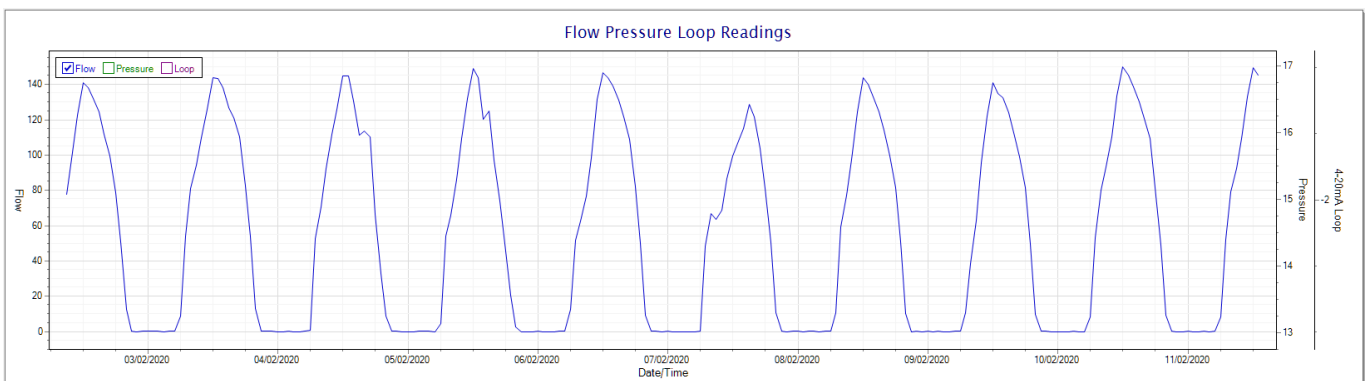
Raw Data 
  Hourly 
  Daily 
  Weekly 
  Monthly

Night Flow Range [Slider]

The various series on each graph can be toggled on and off by selecting the series tick in the upper left hand corner.



To view the flow only would look like this:-



Also displayed is the Night Flow graph. The function of this graph is to specifically analyse the night time water flows at an installation. This analysis is done based on the data received during a specific time period during the night (normally from 3am to 5am). This period for analysis can be adjusted by sliding the elements of the slider on the top right of the graph.

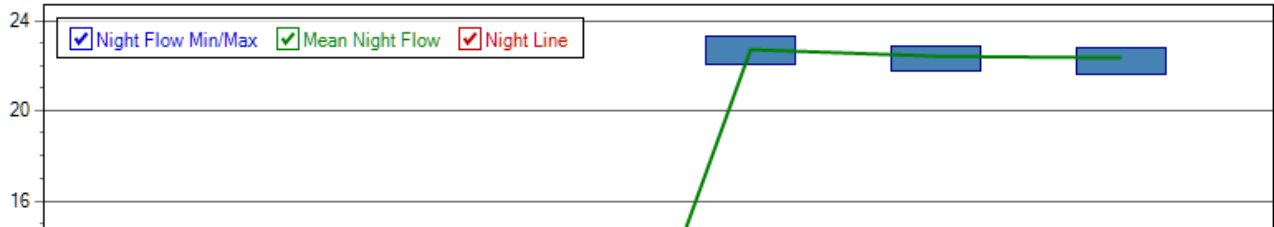


000	0.000	92	0	-0.002	16.936	Off	Off	<input checked="" type="checkbox"/> Consumption
000	0.000	92	0	0.005	16.941	Off	Off	<input type="checkbox"/> Flow/Press/Loop
000	0.000	92	0	0.007	16.938	Off	Off	<input checked="" type="checkbox"/> Night Flow

Monthly



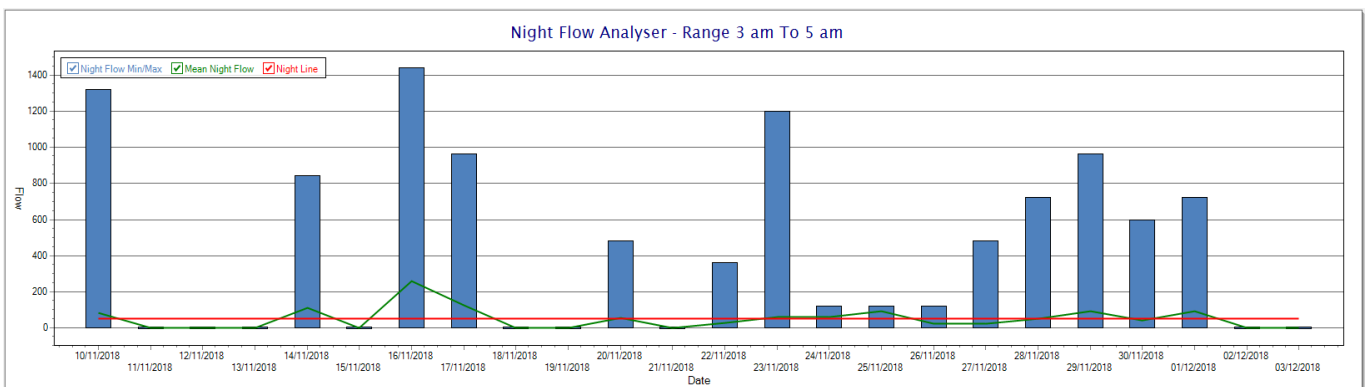
### Night Flow Analyser - Range 3 am To 5 am



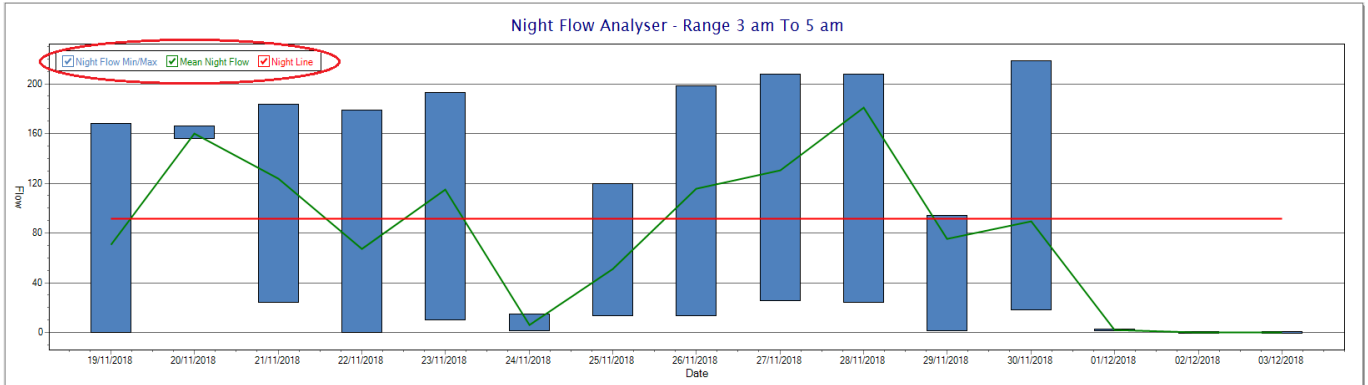
The graph will show a couple of different series.

- Night Flow Min/Max - this will be a bar series indicating the minimum and maximum flows during the measurement period. The base of the block is the minimum flow and the top, the maximum flow. Depending on the type of installation, during this period you would expect the minimum flow point to come to zero and therefore sit on the base of the graph. The maximum flow would simply indicate some consumption during the period of measure and is not really a concern unless that was not expected.
- Mean Night Flow - this will show the average night flow during that period. Shown in green and would normally simply be the midpoint between the minimum and maximum flows.
- Night Line - the night line shows the average flow for the entire range of data being measured. Shown in red, this is useful for determining the average night usage over different data ranges.

The Night Flow graph is particularly useful in giving a quick graphical indication of the possibility of a leak scenario. In most case, where there should be no continuous use of water at night, the graph would look as below:-

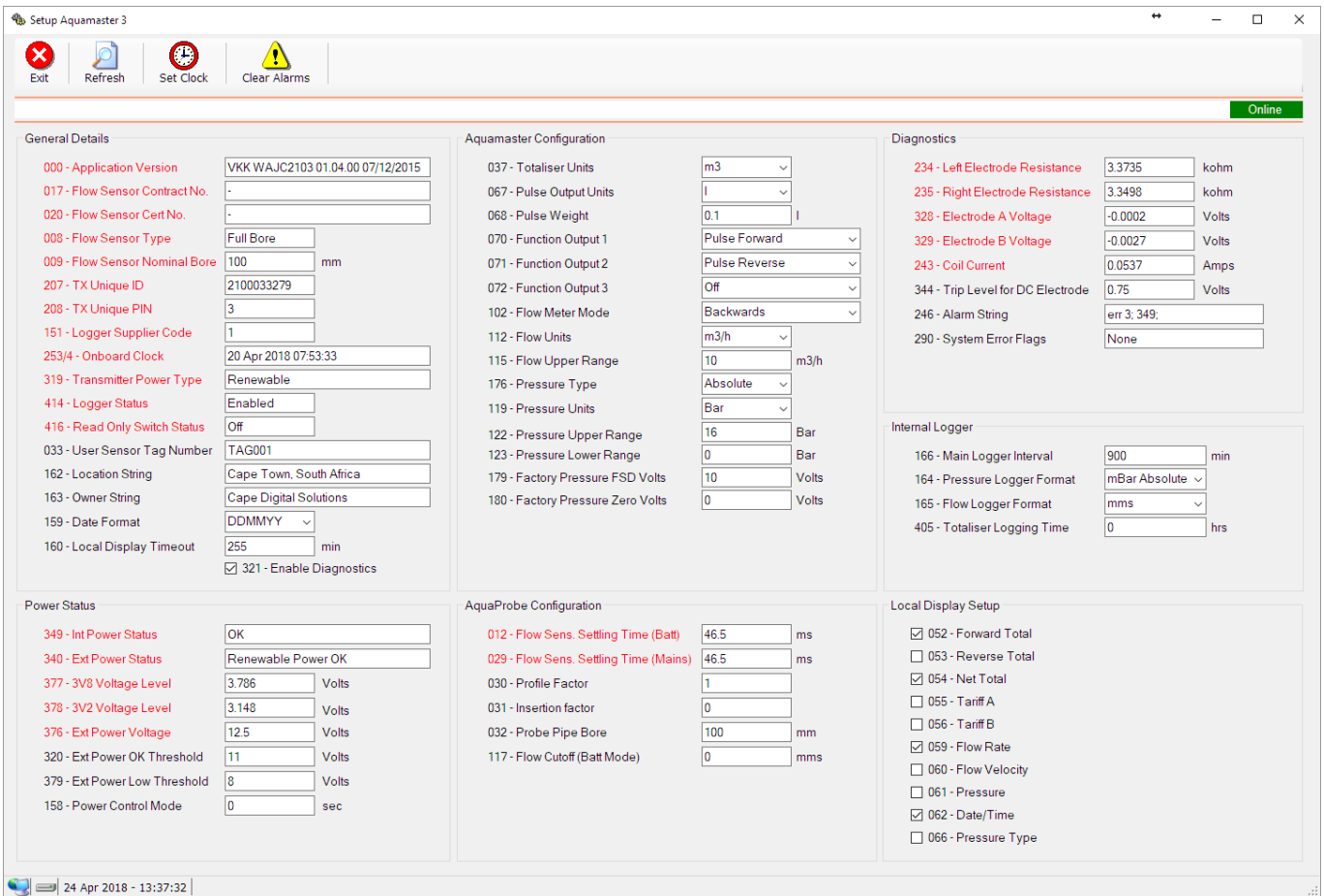


During a possible leak situation, the minimum night flow does not return to zero and the graph will appear to bounce off the bottom.



So, at a quick glance it is possible to see if there is a problem at this installation. As per the Consumption Graph, the different graph series can be switched off/on by clicking the series ticks on the top left hand corner.

Finally, the Aquamaster application screen has a function to allow the setup of the remote meter via a specialised interface screen. Details of the parameters setup can be obtained from the Aquamaster specifications datasheet supplied by ABB limited. The setup screen includes the below parameters.



While the system is online, these parameters can be changed and will immediately be updated on the remote meter via its ModBus connection.

### 2.8.5 Application 004 - GWF ECO Meter + Loop

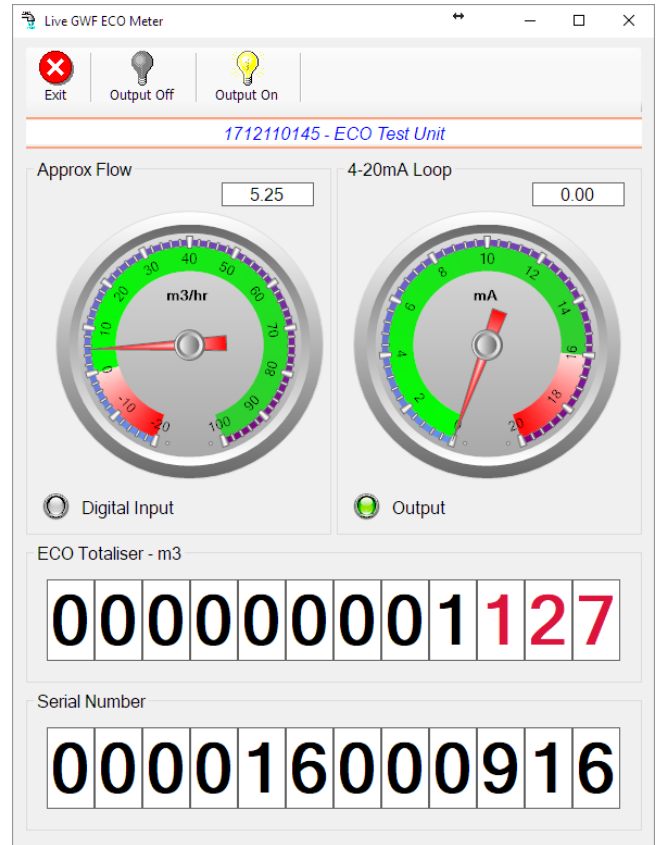
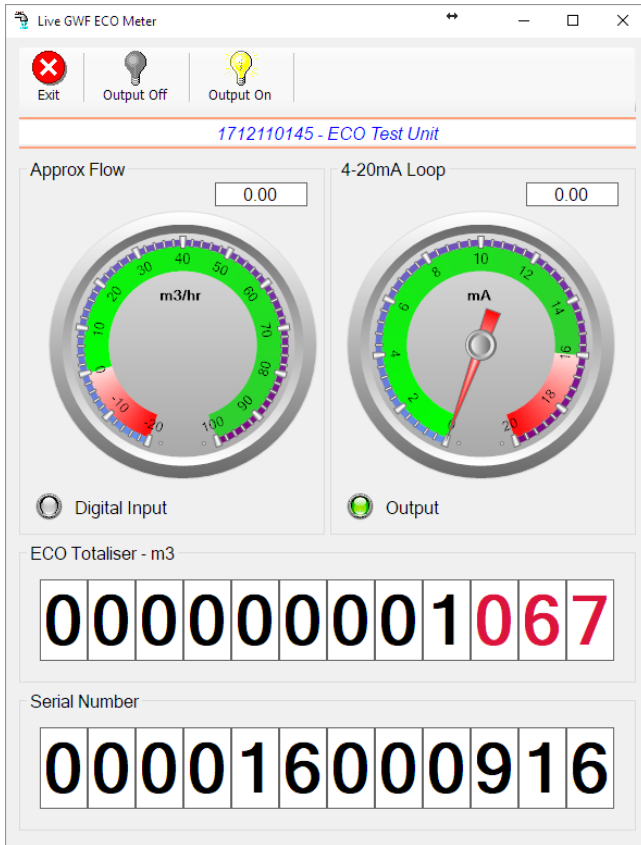
This type would be selected for applications that are using GWF ECO interface type meters. Included here is the 4-20mA current loop interface for pressure measurement of the pipeline or a similar type function.

Functions on the top menu bar are mostly as per previous screens within the Cloudworks suite. These would be the 'Refresh Database', 'Layout Control' and 'Export Data' buttons which have been explained earlier. Added functionality is the 'Live Read', 'Output On/Off' and 'Trigger GPS Read'.

If a device is powered and permanently connected to the server (and online), then the 'Live Read' Button will be active allowing you to stream live data directly from that device in real time. **Bear in mind that, while this live streaming screen is active, the cellular data consumption of that device will be much greater than the usual background periodic read used to update the database.**

The current communications status of the device will be displayed on the top right of the screen.

Remote devices that are offline or sleeping cannot be accessed for streaming data. This status will be automatically updated while on this screen without the need of hitting 'Refresh Database' function. Pressing the 'Live Read' will launch the streaming live data screen for that device. **All the data on this screen is fetched directly from the remote device and not the database.**



The data displayed is the totaliser and serial number of the meter as digital readouts and two needle type displays showing the 4-20mA input and approximate flow. It is important to note that flow is calculated as a difference between two successive readings. For this reading, the data stream will need to see at least two changes in the volume amount before it can calculate the approximate flow. That is why the flow dial **will initially appear blank (as per the left display)** and then only become active after those two reading changes have been received. The digital input and output statuses are indicated in the form of illuminated LED's.

On both the Application screen and Live Read screen are buttons to allow for the switching of the output on or off. When using this function on the Live Read screen, there will be a short delay between changing the output status and the indication on the output LED. This is because the indicator will only update on confirmation from the remote device, ensuring that the action has actually been successful.

Returning to the applications screen, data is displayed in various groups. On the top left is grouped the Device Information block. This information is data relevant to the remote device and is really displaying data that is present within the database. Mostly data that is populated during the 'Reload Device Config' process.

This data is as follows:-

Information	Notes
<b>Device Code</b>	The Device Code assigned to this particular remote device. All communications are initiated by addressing this code. This code is unique to all remote devices and is assigned at the time of manufacture.
<b>Device Type</b>	Type of Remote Device. eg CDS538 Cumulus Logger etc
<b>Description</b>	The description is a user defined parameter that is captured during the setup of each device. This would normally be something that would describe the location or application of this particular device.
<b>Application</b>	Selected device application. Application 004 - GWF ECO Meter + Loop function in this case.
<b>Data Index</b>	As each device is captured on to Cloudworks system, it is assigned a unique data index. This index is used when externally extracting the log data from the database as each record in the global datalog would be labelled with this index number.
<b>Serial Number</b>	Serial number of this device - assigned in the factory.
<b>GSM Signal</b>	Signal strength of the last GSM communications, expressed as a percentage.
<b>Battery Status</b>	Battery status for devices that are powered by battery, expressed as a percentage. It is important to note that this will be the battery status read while the device is under full load (GSM communications active). It would normally indicate lower than the recorded battery status in the datalog (which is read while the device is essentially idle).
<b>Current Power</b>	An indicator as to how this remote device is being powered. Normally the same as the power mode but can vary for systems on Dual Power mode. For devices in a dual power mode, this parameter will display the current power status of the remote device. Battery or Mains.
<b>Power Mode</b>	Selected Power Mode under which the remote device is operating. This can be Battery, Mains or Dual power modes.
<b>Wakeup Per.</b>	The Wakeup Period set in minutes. Refer to the device configuration chapter for an explanation of this parameter.
<b>Datalog Per.</b>	The Datalog Period set minutes. Refer to the device configuration chapter for an explanation of this parameter.
<b>Forward Totaliser</b>	Meter forward totaliser read from the ECO interface.
<b>Meter Serial</b>	Meter serial number read from the ECO interface.
<b>Totaliser 1</b>	The current Totaliser 1 reading with its relevant pulse weight

<b>Totaliser 2</b>	implemented including the unit of measure. The current Totaliser 2 reading with its relevant pulse weight implemented including the unit of measure.
<b>Medium</b>	Measurement medium (eg water, hot water etc) read from the ECO interface.
<b>4-20mA Loop</b>	The 4-20mA current loop reading with its calibration data implemented including the unit of measure.
<b>Last Seen</b>	The date and time the remote device was last seen connecting into the server.
<b>Output</b>	Digital output status.
<b>Digital Input</b>	Digital input status.
<b>Latitude</b>	Last seen remote device Latitude.
<b>Longitude</b>	Last seen remote device Longitude.
<b>User Config</b>	The user defined data recorded on the remote device. Refer to the device configuration chapter for an explanation of this parameter.

To get the latest update of this data, you will need to press the 'Refresh Data' button which will then update this screen from the database.

The onboard GPS of the remote device uses a substantial amount of power and is therefore automatically switched off on battery powered devices. When the GPS is first powered up, it will take a couple of minutes before it is able to lock on to the position of the device. For this reason, battery powered devices by default do not power up the GPS at each wakeup. In order to get a GPS lock on the device, it is necessary to selectively power the GPS on a wakeup, get a lock, and go back to sleep. This is achieved by pressing the 'Trigger GPS Read' button.

By doing this, a flag is placed into the database telling the server to power the GPS at the next wakeup, wait a couple of minutes for a GPS lock, record it, and put the remote device back to sleep. This will only happen at the next wakeup and can keep the remote device awake for a couple of minutes. **This process should only be triggered when the GPS position needs to be updated because of the expense of battery power.**

The server will only keep the device awake for a couple of minutes (typically 5 minutes - set in the server software) in order to get a fix. If this takes too long, the remote device will be put back to sleep without updating the position. This is done to protect the battery should the remote device not be in a position to ever get a GPS signal. You can at a later stage attempt the process again if it was unsuccessful the first time.

To the right of screen is the Datalog information box. This box will be populated with the most recent data from the recorded datalog of this remote device (**read from the database**). By default, when the screen opens, the last two weeks' worth of data will be displayed in this table. To select a different range of data, you can select the 'From Date' and 'To Date' values and press the 'Read Datalog' button.



This application will record the following data in the datalog.

No.	Date	Fwd Totaliser	Consumption	Flow /hr	Serial Num	ECO Status	Totaliser 1	Totaliser 2	Loop	Input	Output	Battery	Power
105	02 Dec 2018 23:00:00	1.821	0.000	0.000	16000916	00	0	0	4.114	Off	Off		Mains
106	03 Dec 2018 00:00:00	1.821	0.000	0.000	16000916	00	0	0	4.121	Off	Off		Mains
107	03 Dec 2018 01:00:00	1.821	0.000	0.000	16000916	00	0	0	4.158	Off	Off		Mains
108	03 Dec 2018 02:00:00	1.821	0.000	0.000	16000916	00	0	0	4.130	Off	Off		Mains
109	03 Dec 2018 03:00:00	1.821	0.000	0.000	16000916	00	0	0	4.145	Off	Off		Mains
110	03 Dec 2018 04:00:00	1.821	0.000	0.000	16000916	00	0	0	4.148	Off	Off		Mains
111	03 Dec 2018 05:00:00	1.821	0.000	0.000	16000916	00	0	0	4.110	Off	Off		Mains
112	03 Dec 2018 06:00:00	1.821	0.000	0.000	16000916	00	0	0	4.100	Off	Off		Mains
113	03 Dec 2018 07:00:00	1.821	0.000	0.000	16000916	00	0	0	4.547	Off	Off		Mains
114	03 Dec 2018 08:00:00	1.821	0.000	0.000	16000916	00	0	0	5.739	Off	Off		Mains
115	03 Dec 2018 09:00:00	1.828	0.007	0.007	16000916	00	0	0	5.409	Off	Off		Mains
116	03 Dec 2018 10:00:00	1.828	0.000	0.000	16000916	00	0	0	3.935	Off	Off		Mains
117	03 Dec 2018 11:00:00	1.828	0.000	0.000	16000916	00	0	0	6.464	Off	Off		Mains
118	03 Dec 2018 12:00:00	0.000	-1.828	-1.828	16000916	00	0	0	0.000				
119	03 Dec 2018 13:00:00	1.828	1.828	1.828	16000916	00	0	0	9.575	Off	Off		Mains

Raw Data  Hourly  Daily  Weekly  Monthly

Information	Notes
<b>Date/Time</b>	Date and time of the datalog record.
<b>Fwd Totaliser</b>	Forward Totaliser reading.
<b>Consumption</b>	The effective 'consumption' as the difference between this current reading and the previous reading.
<b>Flow/hr</b>	Flow rate calculated as volume per hour.
<b>Serial Number</b>	Serial Number of the meter at the time of the read.
<b>Totaliser 1</b>	Totaliser 1 reading.
<b>Totaliser 2</b>	Totaliser 2 reading.
<b>Loop</b>	The 4-20mA loop reading with the calibration applied.
<b>ECO Status</b>	Status of the ECO interface at time of read. (OK or ECO Error)
<b>Input</b>	Digital input status at the time of recording this record.
<b>Output</b>	Digital output status at the time of recording this record.
<b>Battery</b>	Battery level in percentage. Only displayed on battery powered devices.
<b>Power</b>	Current power status. Mains/Battery

The data in this datalog table can be displayed (and graphed) in a number of different ways. These are selected by choosing the option at the bottom of the datalog table. Options include Raw Data and averaged hourly, daily, weekly and monthly data. When the averaging options are chosen, missing data is automatically interpolated to fill in the missing gaps. Interpolated data will have the number column entries highlighted in red with a small 'Interpolated data' message at the top right of the datalog table.

Datalog \* Interpolated data

No.	Date	Fwd Totaliser	Consumption	Flow /hr	Serial Num	ECO Status	Totaliser 1	Totaliser 2	Lo
16	29 Nov 2018 06:00:00	1.787	0.000	0.000	16000916	00	0	0	
17	29 Nov 2018 07:00:00	1.787	0.000	0.000	16000916	00	0	0	
18	29 Nov 2018 08:00:00	1.787	0.000	0.000	16000916	00	0	0	
19	29 Nov 2018 09:00:00	1.794	0.007	0.007	16000916	00	0	0	
20	29 Nov 2018 10:00:00	1.811	0.017	0.017	16000916	00	0	0	
21	29 Nov 2018 11:00:00	1.816	0.005	0.005	16000916	00	0	0	
22	29 Nov 2018 12:00:00	1.816	0.000	0.000	16000916	00	0	0	
23	29 Nov 2018 13:00:00	1.818	0.002	0.002		00	0	0	
24	29 Nov 2018 14:00:00	1.819	0.002	0.002		00	0	0	
25	29 Nov 2018 15:00:00	1.821	0.002	0.002	16000916	00	0	0	
26	29 Nov 2018 16:00:00	1.821	0.000	0.000	16000916	00	0	0	
27	29 Nov 2018 17:00:00	1.821	0.000	0.000	16000916	00	0	0	
28	29 Nov 2018 18:00:00	1.821	0.000	0.000	16000916	00	0	0	
29	29 Nov 2018 19:00:00	1.821	0.000	0.000	16000916	00	0	0	

Raw Data 
  Hourly 
  Daily 
  Weekly 
  Monthly

As per the previously explained functions throughout the Cloudworks suite, columns can be switched off/on and re-ordered to the users requirements. The exporting will be as per the layout presented on the screen.

You can zoom into a range of the data by simply selecting those records in the table. This will result in the graph at the bottom being updated to display only those readings.

Deleting the datalog or removing a range of records can be easily done by using the 'Delete Datalog' button. To delete a range, simply select the range in the datalog table and press the 'Delete Datalog' button. If no range is selected, it will be assumed that you wish to delete the entire datalog. There will be a prompt to ensure that you are aware of the action you are about to take.



Data that is displayed in the table will also be represented in the graph at the bottom of the screen. There are two graphs displayed, namely the Consumption Graph (consumption/pressure/flow), and a Night Flow graph. These graphs can be selectively switched on/off by clicking the ticks below the datalog table.

Datalog \* Interpolated data

No.	Date	Fwd Totaliser	Consumption	Flow /hr	Serial Num	ECO Status	Totaliser 1	Totaliser 2	Lo ^
106	03 Dec 2018 00:00:00	1.821	0.000	0.000	16000916	00	0	0	
107	03 Dec 2018 01:00:00	1.821	0.000	0.000	16000916	00	0	0	
108	03 Dec 2018 02:00:00	1.821	0.000	0.000	16000916	00	0	0	
109	03 Dec 2018 03:00:00	1.821	0.000	0.000	16000916	00	0	0	
110	03 Dec 2018 04:00:00	1.821	0.000	0.000	16000916	00	0	0	
111	03 Dec 2018 05:00:00	1.821	0.000	0.000	16000916	00	0	0	
112	03 Dec 2018 06:00:00	1.821	0.000	0.000	16000916	00	0	0	
113	03 Dec 2018 07:00:00	1.821	0.000	0.000	16000916	00	0	0	
114	03 Dec 2018 08:00:00	1.821	0.000	0.000	16000916	00	0	0	
115	03 Dec 2018 09:00:00	1.828	0.007	0.007	16000916	00	0	0	
116	03 Dec 2018 10:00:00	1.828	0.000	0.000	16000916	00	0	0	
117	03 Dec 2018 11:00:00	1.828	0.000	0.000	16000916	00	0	0	
118	03 Dec 2018 12:00:00	0.000	-1.828	-1.828		00	0	0	
119	03 Dec 2018 13:00:00	1.828	1.828	1.828	16000916	00	0	0	

From Date: 19 Nov 2018

To Date: 03 Dec 2018

Read Datalog

Delete Datalog

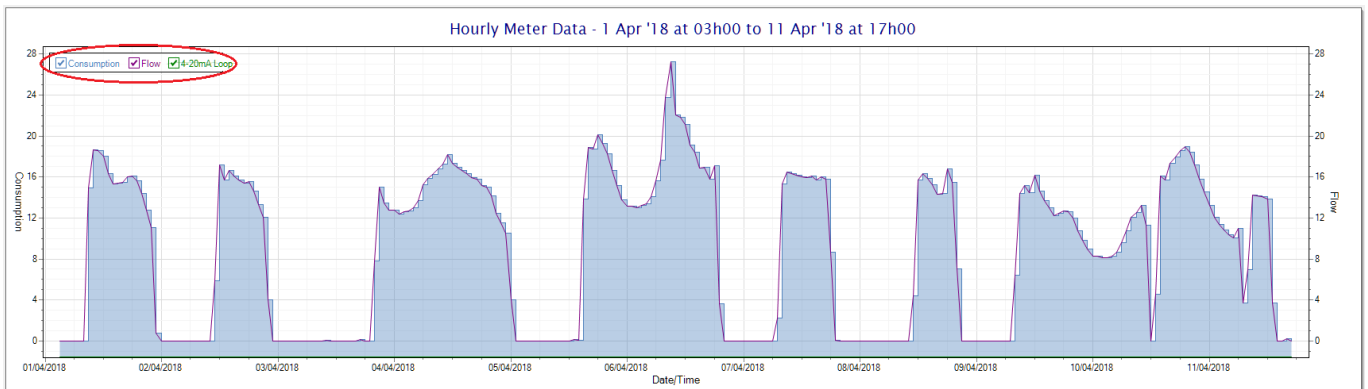
Consumption Graph

Night Flow Graph

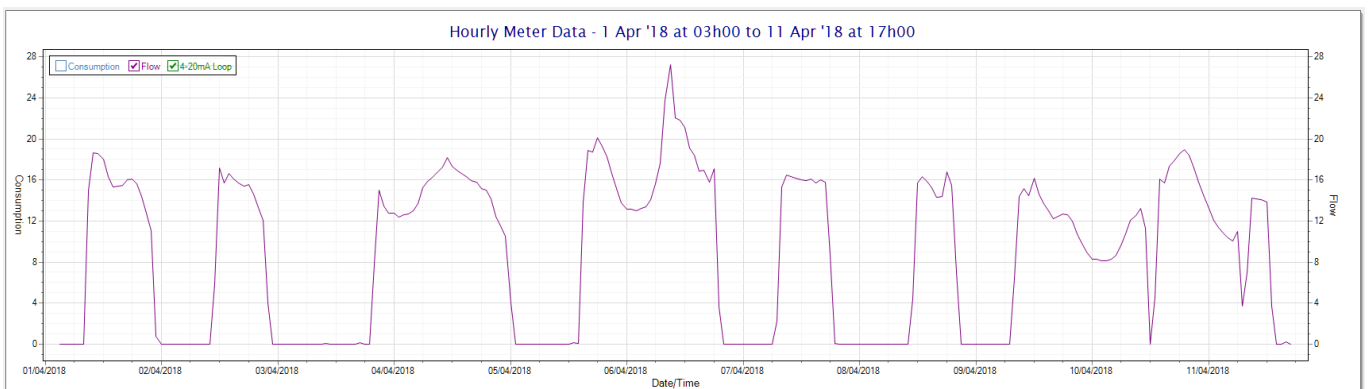
Raw Data 
  Hourly 
  Daily 
  Weekly 
  Monthly

Night Flow Range

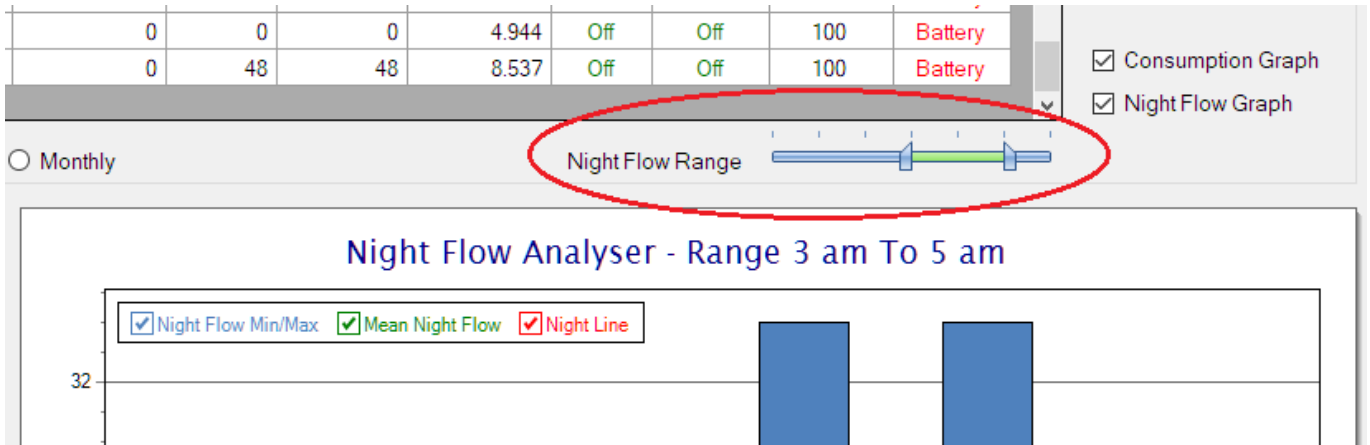
The Consumption Graph displays the consumption, pressure and flow related data. Individual graph series can be switched off/on by selecting the ticks at the top left of the graph.



To view the flow only would look like this:-



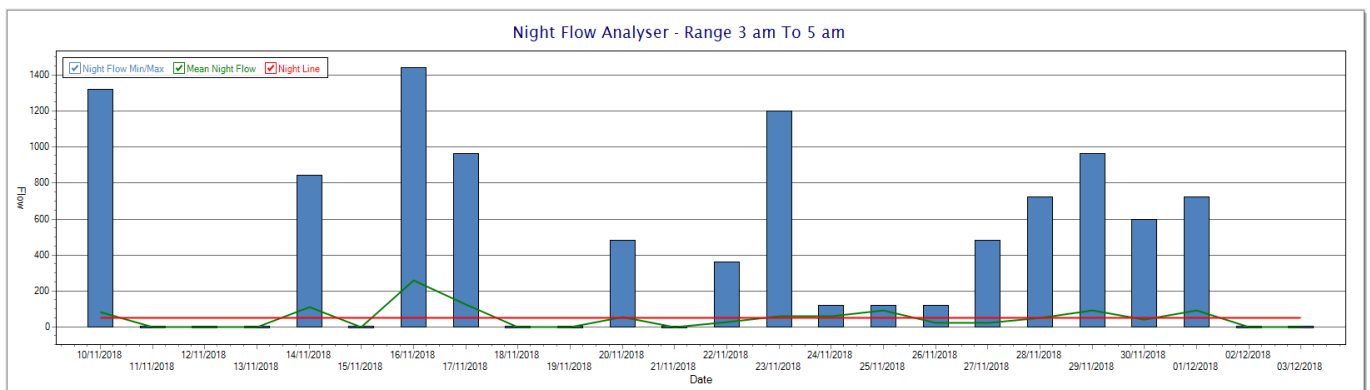
Also displayed is the Night Flow graph. The function of this graph is to specifically analyse the night time water flows at an installation. This analysis is done based on the data received during a specific time period during the night (normally from 3am to 5am). This period for analysis can be adjusted by sliding the elements of the slider on the top right of the graph.



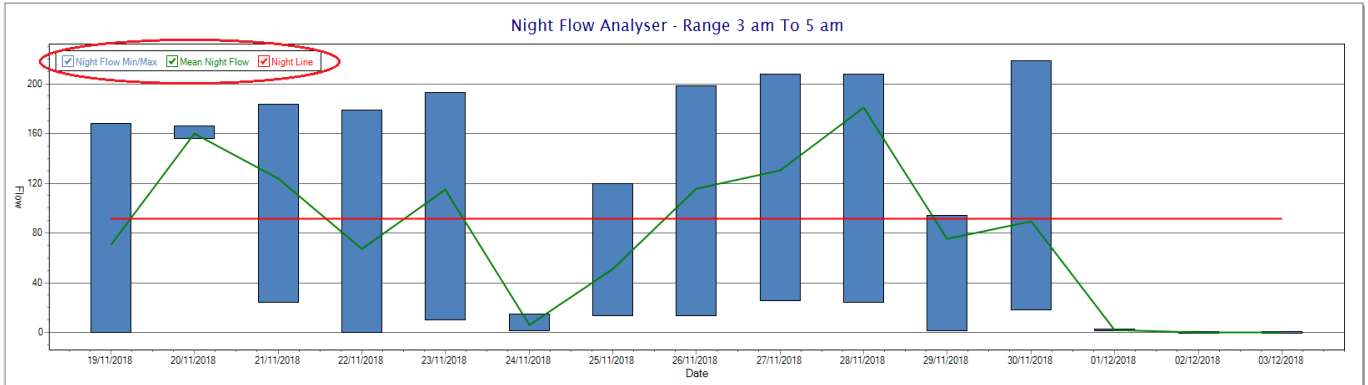
The graph will show a couple of different series.

10. Night Flow Min/Max - this will be a bar series indicating the minimum and maximum flows during the measurement period. The base of the block is the minimum flow and the top, the maximum flow. Depending on the type of installation, during this period you would expect the minimum flow point to come to zero and therefore sit on the base of the graph. The maximum flow would simply indicate some consumption during the period of measure and is not really a concern unless that was not expected.
11. Mean Night Flow - this will show the average night flow during that period. Shown in green and would normally simply be the midpoint between the minimum and maximum flows.
12. Night Line - the night line shows the average flow for the entire range of data being measured. Shown in red, this is useful for determining the average night usage over different data ranges.

The Night Flow graph is particularly useful in giving a quick graphical indication of the possibility of a leak scenario. In most case, where there should be no continuous use of water at night, the graph would look as below:-



During a possible leak situation, the minimum night flow does not return to zero and the graph will appear to bounce off the bottom.



So, at a quick glance it is possible to see if there is a problem at this installation. As per the Consumption Graph, the different graph series can be switched off/on by clicking the series ticks on the top left hand corner.

### 2.8.6 Application 005 - Aquamaster 4 + Loop

The screenshot displays the 'Device Detail' screen for 'Application 005 - Aquamaster 4'. The top menu bar includes buttons for 'Quit', 'Refresh Database', 'Layout Control', 'Export Data', 'Configure Meter', 'Live Read', 'Output On', 'Output Off', and 'Trigger GPS Read'. The device status is 'Online'.

**Device Information:**

- Device Code: 1811120023
- Device Type: Cumulus
- Description: Aquamaster 4
- Application: 005 - Aquamaster 4
- Data Index: 209
- Serial Number: 1811120023
- GSM Signal: 54%
- Battery Status: [ ]
- Current Power: Mains
- Power Mode: Mains
- Wakeup Per: 360
- Datalog Per: 5
- Fwd Totaliser: 3979 m<sup>3</sup>
- Rev Totaliser: 1 m<sup>3</sup>
- Flow: 54.68056 m<sup>3</sup>/h
- Pressure: 0 Special
- Output: Off
- Digital Input: Off
- Latitude: -33.86306
- Longitude: 18.5237
- 4-20mA Loop: 4.69375 bar
- Last Seen: 03 Dec 2018 13:38:12

**Datalog Table:**

No	Date	Fwd Totaliser	Fwd Cons.	Rev Totaliser	Rev Cons.	Flow	Pressure	Loop	Input	Out
92	02 Dec 2018 14:00:00	3239.000	59.000	1	0	59.074	0	8.637	Off	
93	02 Dec 2018 15:00:00	3296.000	57.000	1	0	56.469	0	8.152	Off	
94	02 Dec 2018 16:00:00	3349.000	53.000	1	0	52.883	0	7.338	Off	
95	02 Dec 2018 17:00:00	3397.000	48.000	1	0	47.855	0	6.313	Off	
96	02 Dec 2018 18:00:00	3438.000	41.000	1	0	41.273	0	5.202	Off	
97	02 Dec 2018 19:00:00	3470.000	32.000	1	0	31.241	0	4.030	Off	
98	02 Dec 2018 20:00:00	3488.000	18.000	1	0	17.880	0	3.143	Off	
99	02 Dec 2018 21:00:00	3504.000	16.000	1	0	16.157	0	3.038	Off	
100	02 Dec 2018 22:00:00	3521.000	17.000	1	0	16.281	0	3.074	Off	
101	02 Dec 2018 23:00:00	3537.000	16.000	1	0	16.315	0	3.084	Off	
102	03 Dec 2018 00:00:00	3553.000	16.000	1	0	16.436	0	3.099	Off	
103	03 Dec 2018 01:00:00	3570.000	17.000	1	0	16.492	0	3.106	Off	

**Consumption Chart:** Shows Forward Consumption (blue) and Reverse Consumption (red) over time from 29/11/2018 to 03/12/2018.

**Flow Pressure Loop Readings Chart:** Shows Flow (blue), Pressure (green), and Loop (red) readings over time from 29/11/2018 to 03/12/2018.

**Night Flow Analyser - Range 3 am To 5 am:** Shows Night Flow Min/Max (blue), Mean Night Flow (green), and Night Line (red) over time from 29/11/2018 to 03/12/2018.

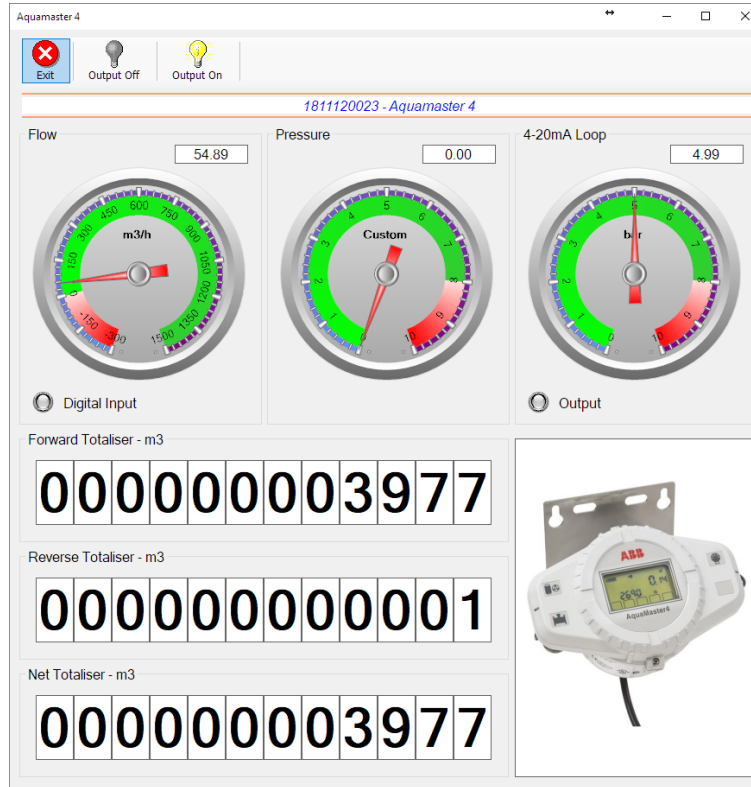
This type would be selected for applications that are used on an ABB Aquamaster 4 water meter connected to the Modbus interface. Forward/Reverse Totals, Flow and Pressure are read directly from the interface of the meter.

Functions on the top menu bar are mostly as per previous screens within the Cloudworks suite. These would be the 'Refresh Database', 'Layout Control' and 'Export Data' buttons which have been explained earlier. Added functionality is the 'Live Read', 'Output On/Off' and 'Trigger GPS Read'.

If a device is powered and permanently connected to the server (and online), then the 'Live Read' Button will be active allowing you to stream live data directly from that device in real time. **Bear in mind that, while this live streaming screen is active, the cellular data consumption of that device will be much greater than the usual background periodic read used to update the database.**

The current communications status of the device will be displayed on the top right of the screen.

Remote devices that are offline or sleeping cannot be accessed for streaming data. This status will be automatically updated while on this screen without the need of hitting 'Refresh Database' function. Pressing the 'Live Read' will launch the streaming live data screen for that device. **All the data on this screen is fetched directly from the remote device and not the database.**



The data displayed are the two totalisers (forward/reverse) and combined volume (net totaliser) as digital readouts and three needle type displays showing flow and pressure (read directly from the meter) and the current loop reading. The digital input and output statuses are indicated in the form of illuminated LED's.

On both the Application screen and Live Read screen are buttons to allow for the switching of the output on or off. When using this function on the Live Read screen, there will be a short delay between changing the output status and the indication on the output LED. This is because the indicator will only update on confirmation from the remote device, ensuring that the action has actually been successful.

Returning to the applications screen, data is displayed in various groups. On the top left is grouped the Device Information block. This information is data relevant to the remote device and is really displaying data that is present within the database. Mostly data that is populated during the 'Reload Device Config' process. This data is as follows:-

Information	Notes
<b>Device Code</b>	The Device Code assigned to this particular remote device. All communications are initiated by addressing this code. This code is unique to all remote devices and is assigned at the time of manufacture.
<b>Device Type</b>	Type of Remote Device. eg CDS538 Cumulus Logger etc
<b>Description</b>	The description is a user defined parameter that is captured during the setup of each device. This would normally be something that would describe the location or application of this particular device.
<b>Application</b>	Selected device application. Application 003 - Aquamaster 3 function

<b>Data Index</b>	in this case. As each device is captured on to Cloudworks system, it is assigned a unique data index. This index is used when externally extracting the log data from the database as each record in the global datalog would be labelled with this index number.
<b>Serial Number</b>	Serial number of this device - assigned in the factory.
<b>GSM Signal</b>	Signal strength of the last GSM communications, expressed as a percentage.
<b>Battery Status</b>	Battery status for devices that are powered by battery, expressed as a percentage. It is important to note that this will be the battery status read while the device is under full load (GSM communications active). It would normally indicate lower than the recorded battery status in the datalog (which is read while the device is essentially idle).
<b>Current Power</b>	An indicator as to how this remote device is being powered. Normally the same as the power mode but can vary for systems on Dual Power mode. For devices in a dual power mode, this parameter will display the current power status of the remote device. Battery or Mains.
<b>Power Mode</b>	Selected Power Mode under which the remote device is operating. This can be Battery, Mains or Dual power modes.
<b>Wakeup Per.</b>	The Wakeup Period set in minutes. Refer to the device configuration chapter for an explanation of this parameter.
<b>Datalog Per.</b>	The Datalog Period set minutes. Refer to the device configuration chapter for an explanation of this parameter.
<b>Fwd Totaliser</b>	The current Forward Totaliser reading.
<b>Rev Totaliser</b>	The current Reverse Totaliser reading.
<b>Flow</b>	Current flow reading.
<b>Pressure</b>	Current pressure reading.
<b>4-20mA Current Loop</b>	The 4-20mA current loop reading with its calibration data implemented including the unit of measure.
<b>Output</b>	Digital output status.
<b>Digital Input</b>	Digital input Status.
<b>Last Seen</b>	The date and time the remote device was last seen connecting into the server.
<b>Latitude</b>	Last seen remote device Latitude.
<b>Longitude</b>	Last seen remote device Longitude.



**User Config**

The user defined data recorded on the remote device. Refer to the device configuration chapter for an explanation of this parameter.

To get the latest update of this data, you will need to press the 'Refresh Data' button which will then update this screen from the database.

The onboard GPS of the remote device uses a substantial amount of power and is therefore automatically switched off on battery powered devices. When the GPS is first powered up, it will take a couple of minutes before it is able to lock on to the position of the device. For this reason, battery powered devices by default do not power up the GPS at each wakeup. In order to get a GPS lock on the device, it is necessary to selectively power the GPS on a wakeup, get a lock, and go back to sleep. This is achieved by pressing the 'Trigger GPS Read' button.

By doing this, a flag is placed into the database telling the server to power the GPS at the next wakeup, wait a couple of minutes for a GPS lock, record it, and put the remote device back to sleep. This will only happen at the next wakeup and can keep the remote device awake for a couple of minutes. **This process should only be triggered when the GPS position needs to be updated because of the expense of battery power.**

The server will only keep the device awake for a couple of minutes (typically 5 minutes - set in the server software) in order to get a fix. If this takes too long, the remote device will be put back to sleep without updating the position. This is done to protect the battery should the remote device not be in a position to ever get a GPS signal. You can at a later stage attempt the process again if it was unsuccessful the first time.

To the right of screen is the Datalog information box. This box will be populated with the most recent data from the recorded datalog of this remote device (**read from the database**). By default, when the screen opens, the last two weeks' worth of data will be displayed in this table. To select a different range of data, you can select the 'From Date' and 'To Date' values and press the 'Read Datalog' button.

This application will record the following data in the datalog.

No.	Date	Fwd Totaliser	Fwd Cons.	Rev Totaliser	Rev Cons.	Flow	Pressure	Loop	Input	Output	Battery	Power
107	03 Dec 2018 01:00:00	505011.000	22.000	92	0	22.310	15.926	-2.500	Off	Off		Mains
108	03 Dec 2018 02:00:00	505033.000	22.000	92	0	22.309	15.921	-2.500	Off	Off		Mains
109	03 Dec 2018 03:00:00	505056.000	23.000	92	0	22.339	15.923	-2.500	Off	Off		Mains
110	03 Dec 2018 04:00:00	505078.000	22.000	92	0	22.347	15.920	-2.500	Off	Off		Mains
111	03 Dec 2018 05:00:00	505100.000	22.000	92	0	22.303	15.926	-2.500	Off	Off		Mains
112	03 Dec 2018 06:00:00	505123.000	23.000	92	0	23.026	15.924	-2.500	Off	Off		Mains
113	03 Dec 2018 07:00:00	505169.000	46.000	92	0	46.656	15.721	-0.804	Off	Off		Mains
114	03 Dec 2018 08:00:00	505246.000	77.000	92	0	77.149	15.329	1.810	Off	Off		Mains
115	03 Dec 2018 09:00:00	505343.000	97.000	92	0	97.066	15.001	3.527	Off	Off		Mains
116	03 Dec 2018 10:00:00	505451.000	108.000	92	0	108.574	14.942	4.513	Off	Off		Mains
117	03 Dec 2018 11:00:00	505579.000	128.000	92	0	128.814	14.305	-1.776	Off	Off		
118	03 Dec 2018 12:00:00	505697.000	118.000	92	0	118.306	14.564	-2.500	Off	Off	100	Battery
119	03 Dec 2018 13:00:00	505842.000	145.000	92	0	145.431	13.221	6.135	Off	Off		

Raw Data  Hourly  Daily  Weekly  Monthly

Information	Notes
<b>Date/Time</b>	Date and time of the datalog record.
<b>Fwd Totaliser</b>	Forward Totaliser reading.
<b>Rev Totaliser</b>	Reverse Totaliser reading.
<b>Fwd Cons.</b>	The Forward consumption reading.
<b>Rev Cons.</b>	The Reverse consumption Reading.



<b>Flow</b>	Flow rate calculated as volume per hour.
<b>Pressure</b>	Current Pressure reading read from the 4-20mA input.
<b>Loop</b>	4-20mA Loop reading with its applied calibration.
<b>Input</b>	Digital input status at the time of recording this record.
<b>Output</b>	Digital output status at the time of recording this record.
<b>Battery</b>	Battery level in percentage. Only displayed on battery powered devices.
<b>Power</b>	Current power status. Mains/Battery

The data in this datalog table can be displayed (and graphed) in a number of different ways. These are selected by choosing the option at the bottom of the datalog table. Options include Raw Data and averaged hourly, daily, weekly and monthly data. When the averaging options are chosen, missing data is automatically interpolated to fill in the missing gaps. Interpolated data will have the number column entries highlighted in red with a small 'Interpolated data' message at the top right of the datalog table.

Datalog \* Interpolated data

No.	Date	Fwd Totaliser	Fwd Cons.	Rev Totaliser	Rev Cons.	Flow	Pressure	Input	Output	B
1	28 Nov 2018 15:00:00	498259.000		92			13.841	Off	Off	
2	28 Nov 2018 16:00:00	498384.000	125.000	92	0	124.436	14.053	Off	Off	
3	28 Nov 2018 17:00:00	498496.000	112.000	92	0	111.857	14.283	Off	Off	
4	28 Nov 2018 18:00:00	498577.000	81.000	92	0	82.768	15.079	Off	Off	
5	28 Nov 2018 19:00:00	498599.333	22.333	92	0	55.178	15.693	Off	Off	
6	28 Nov 2018 20:00:00	498621.667	22.333	92	0	27.588	16.306	Off	Off	
7	28 Nov 2018 21:00:00	498644.000	22.333	92	0	-0.002	16.920	Off	Off	
8	28 Nov 2018 22:00:00	498644.000	0.000	92	0	0.010	16.932	Off	Off	
9	28 Nov 2018 23:00:00	498644.000	0.000	92	0	-0.008	16.940	Off	Off	
10	29 Nov 2018 00:00:00	498644.000	0.000	92	0	-0.003	16.934	Off	Off	
11	29 Nov 2018 01:00:00	498644.000	0.000	92	0	-0.002	16.936	Off	Off	
12	29 Nov 2018 02:00:00	498644.000	0.000	92	0	0.005	16.941	Off	Off	
13	29 Nov 2018 03:00:00	498644.000	0.000	92	0	0.007	16.938	Off	Off	

Raw Data 
  Hourly 
  Daily 
  Weekly 
  Monthly

As per the previously explained functions throughout the Cloudworks suite, columns can be switched off/on and re-ordered to the users requirements. The exporting will be as per the layout presented on the screen.

You can zoom into a range of the data by simply selecting those records in the table. This will result in the graph at the bottom being updated to display only those readings.

Deleting the datalog or removing a range of records can be easily done by using the 'Delete Datalog' button. To delete a range, simply select the range in the datalog table and press the 'Delete Datalog' button. If no range is selected, it will be assumed that you wish to delete the entire datalog. There will be a prompt to ensure that you are aware of the action you are about to take.



Data that is displayed in the table will also be represented in the graph at the bottom of the screen. There are two graphs displayed, namely the Consumption Graph (consumption/pressure/flow), and a Night Flow graph. These graphs can be selectively switched on/off by clicking the ticks below the datalog table.

Datalog \* Interpolated data

No.	Date	Fwd Totaliser	Fwd Cons.	Rev Totaliser	Rev Cons.	Flow	Pressure	Loop	Battery
335	11 Feb 2020 01:00:00	1018104.000	0.000	177	0	-0.024	16.957	0	
336	11 Feb 2020 02:00:00	1018104.000	0.000	177	0	-0.027	16.949	0	
337	11 Feb 2020 03:00:00	1018104.000	0.000	177	0	0.004	16.942	0	
338	11 Feb 2020 04:00:00	1018104.000	0.000	177	0	0.000	16.915	0	
339	11 Feb 2020 05:00:00	1018104.000	0.000	177	0	0.011	16.927	0	
340	11 Feb 2020 06:00:00	1018111.000	7.000	177	0	8.355	16.824	0	
341	11 Feb 2020 07:00:00	1018163.000	52.000	177	0	52.235	16.331	0	
342	11 Feb 2020 08:00:00	1018240.000	77.000	177	0	78.611	15.931	0	
343	11 Feb 2020 09:00:00	1018332.000	92.000	177	0	92.341	15.574	0	
344	11 Feb 2020 10:00:00	1018440.000	108.000	177	0	109.172	15.004	0	
345	11 Feb 2020 11:00:00	1018572.000	132.000	177	0	132.563	14.201	0	
346	11 Feb 2020 12:00:00	1018721.000	149.000	177	0	149.386	13.473	0	

From Date: 28 Jan 2020


To Date: 11 Feb 2020

Consumption

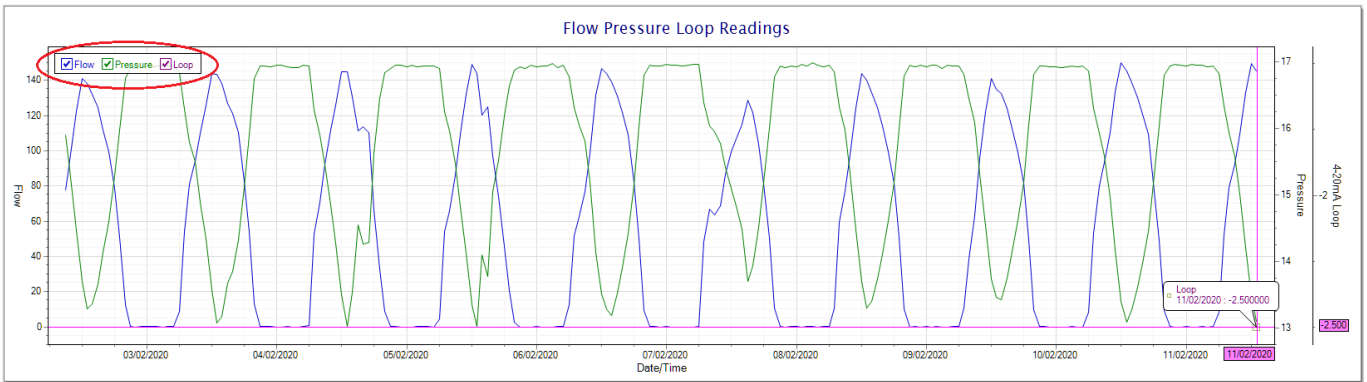
Flow/Press/Loop

Night Flow

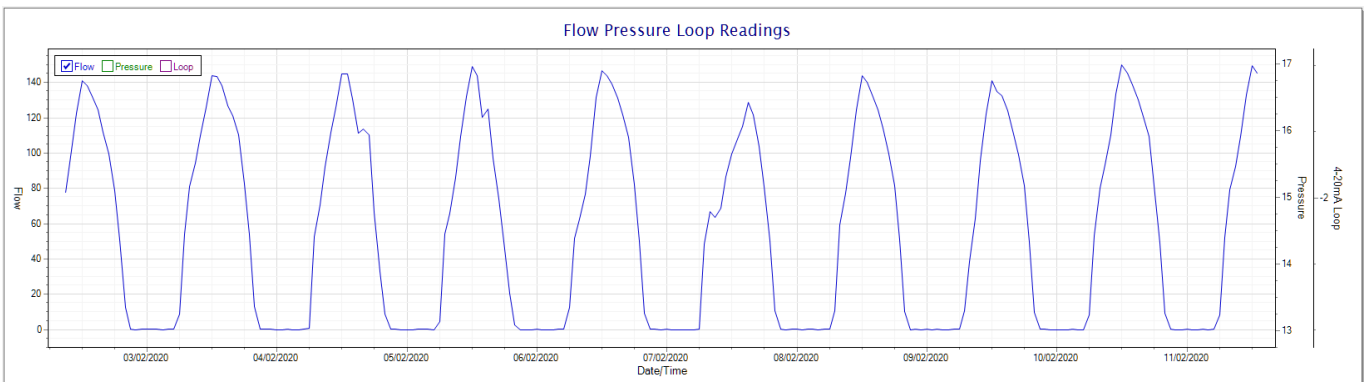
Raw Data  Hourly  Daily  Weekly  Monthly

Night Flow Range: 

The various series on each graph can be toggled on and off by selecting the series tick in the upper left hand corner.



To view the flow only would look like this:-



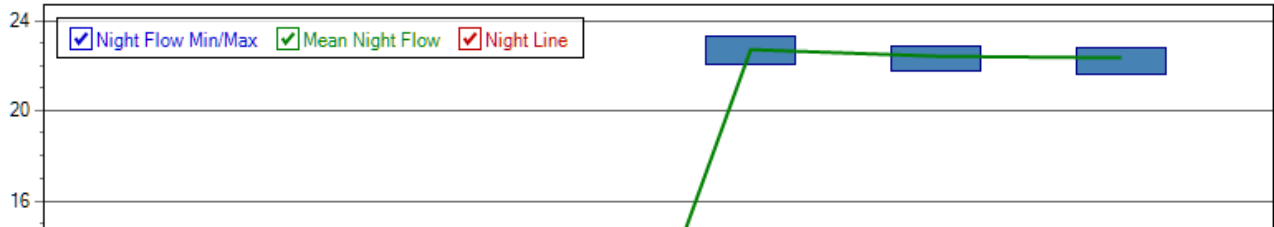
Also displayed is the Night Flow graph. The function of this graph is to specifically analyse the night time water flows at an installation. This analysis is done based on the data received during a specific time period during the night (normally from 3am to 5am). This period for analysis can be adjusted by sliding the elements of the slider on the top right of the graph.

100	0.000	92	0	-0.002	16.936	Off	Off	<input checked="" type="checkbox"/> Consumption
100	0.000	92	0	0.005	16.941	Off	Off	<input type="checkbox"/> Flow/Press/Loop
100	0.000	92	0	0.007	16.938	Off	Off	<input checked="" type="checkbox"/> Night Flow

Monthly



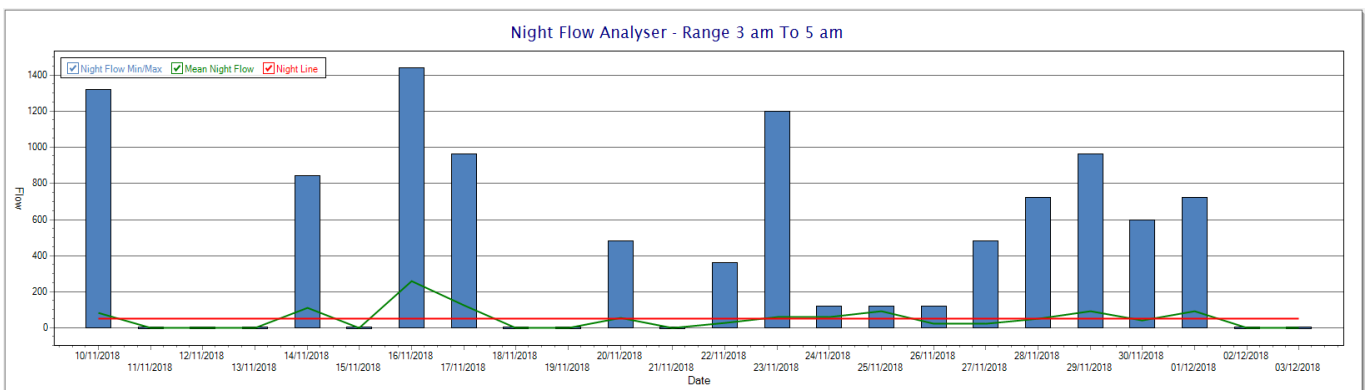
### Night Flow Analyser - Range 3 am To 5 am



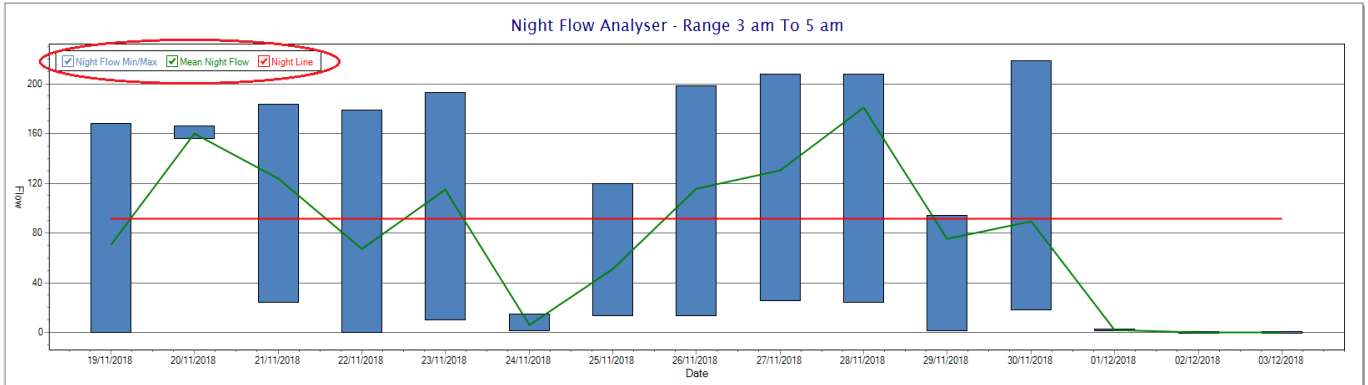
The graph will show a couple of different series.

1. Night Flow Min/Max - this will be a bar series indicating the minimum and maximum flows during the measurement period. The base of the block is the minimum flow and the top, the maximum flow. Depending on the type of installation, during this period you would expect the minimum flow point to come to zero and therefore sit on the base of the graph. The maximum flow would simply indicate some consumption during the period of measure and is not really a concern unless that was not expected.
2. Mean Night Flow - this will show the average night flow during that period. Shown in green and would normally simply be the midpoint between the minimum and maximum flows.
3. Night Line - the night line shows the average flow for the entire range of data being measured. Shown in red, this is useful for determining the average night usage over different data ranges.

The Night Flow graph is particularly useful in giving a quick graphical indication of the possibility of a leak scenario. In most case, where there should be no continuous use of water at night, the graph would look as below:-



During a possible leak situation, the minimum night flow does not return to zero and the graph will appear to bounce off the bottom.



So, at a quick glance it is possible to see if there is a problem at this installation. As per the Consumption Graph, the different graph series can be switched off/on by clicking the series ticks on the top left hand corner.

Finally, the Aquamaster application screen has a function to allow the setup of the remote meter via a specialised interface screen. Details of the parameters setup can be obtained from the Aquamaster specifications datasheet supplied by ABB limited. The setup screen includes the below parameters.

Finally, the Aquamaster application screen has a function to allow the setup of the remote meter via a specialised interface screen. Details of the parameters setup can be obtained from the Aquamaster specifications datasheet supplied by ABB limited. The setup screen includes the below parameters.

Setup Aquamaster 4 - □ ×

Exit Refresh Online

General Details	Diagnostics	Configuration
Flow Rate: <input type="text" value="51.967 m3/hour"/>	Lock Switch Engaged: <input type="radio"/> No <input checked="" type="radio"/> Yes	Meter Tag: <input type="text" value="Meter Tag"/>
Flow Percentage: <input type="text" value="3.7 %"/>	Sensor Reverse Wired: <input checked="" type="radio"/> Ok <input type="radio"/> Alarm	Meter Owner: <input type="text" value="Cape Digital Solutions"/>
Pressure: <input type="text" value="0 Custom"/>	High Flow Alarm: <input checked="" type="radio"/> Ok <input type="radio"/> Alarm	Sensor Location: <input type="text" value="Cape Town"/>
Velocity: <input type="text" value="1.838 m/s"/>	Low Flow Alarm: <input checked="" type="radio"/> Ok <input type="radio"/> Alarm	Volume Units: <input type="text" value="m3"/>
Forward Totaliser: <input type="text" value="190674.385 m3"/>	Empty Pipe Alarm: <input checked="" type="radio"/> Ok <input type="radio"/> Alarm	Pressure Units: <input type="text" value="Custom"/>
Reverse Totaliser: <input type="text" value="120.13 m3"/>	Pulse Output Error: <input checked="" type="radio"/> Ok <input type="radio"/> Alarm	Flow Units: <input type="text" value="m3/hour"/>
Net Totaliser: <input type="text" value="190554.255 m3"/>	Sensor Coil Open Circuit: <input checked="" type="radio"/> Ok <input type="radio"/> Alarm	Velocity Units: <input type="text" value="m/s"/>
Elevated Access PIN: <input type="text" value="1068"/>	Sensor Coil Short Circuit: <input checked="" type="radio"/> Ok <input type="radio"/> Alarm	Pipe Bore: <input type="text" value="300"/> mm
System Power Type: <input type="text" value="Battery"/>	Electrode High Voltage: <input checked="" type="radio"/> Ok <input type="radio"/> Alarm	Process Cycle Period: <input type="text" value="15"/> sec
Firmware Version: <input type="text" value="01.01.06"/>	Electrode Unstable Voltage: <input checked="" type="radio"/> Ok <input type="radio"/> Alarm	Sens. Profile Factor: <input type="text" value="1"/>
Sensor Contract Ser.: <input type="text"/>	Capture Saturation Error: <input checked="" type="radio"/> Ok <input type="radio"/> Alarm	Sens. Insertion Factor: <input type="text" value="1"/>
Transmitter Type: <input type="text" value="mote"/>	Low Coil Insul. Resistance: <input type="radio"/> Ok <input checked="" type="radio"/> Alarm	Flow Cutoff Percentage: <input type="text" value="0"/> %
Sensor Unique ID: <input type="text" value="4294967295"/>	Coil Current: <input type="text" value="30.353 mA"/>	Empty Pipe Imp. Threshold: <input type="text" value="200"/> kohm
Transmitter Unique ID: <input type="text" value="1342187229"/>	Pulse Output Freq.: <input type="text" value="0 Hz"/>	High Flow Trip Point: <input type="text" value="120"/> %
Flow Sensor Type: <input type="text" value="Full Bore"/>	Factory Press. FSD Setting: <input type="text" value="0 mV/V"/>	Low Flow Trip Point: <input type="text" value="0"/> %
Sensor Bore: <input type="text" value="100 mm"/>	Factory Press. Zero Offset: <input type="text" value="0 mV/V"/>	Flow Trip Hysteresis: <input type="text" value="0"/> %
Sensor Span Trim: <input type="text" value="1"/>	Electrode A Impedance: <input type="text" value="274.043 ohms"/>	User Zero Offset Adj.: <input type="text" value="0"/> mm/s
	Electrode B Impedance: <input type="text" value="282.603 ohms"/>	User Sensor Span Adj.: <input type="text" value="1"/>
	Electrode A Voltage: <input type="text" value="0.01097 V"/>	Flow Meas. Filter Resp.: <input type="text" value="3"/> sec
	Electrode B Voltage: <input type="text" value="0.01097 V"/>	Pressure Trans. Type: <input type="text" value="Gauge"/>
		Pressure Height Offset: <input type="text" value="0"/> mm
		Press. Meas. Filter Resp.: <input type="text" value="1"/> sec
		Function Output 1/2: <input type="text" value="Enabled"/>
		Function Output 3: <input type="text" value="Always Off"/>
		Pulses per Unit Vol.: <input type="text" value="1"/> units

**Power Status**

Mains Power Off:  Ok  Alarm

Battery Low:  Ok  Alarm

Battery Critical:  Ok  Alarm

Renewable Power Low:  Ok  Alarm

Internal Power Critical:  Ok  Alarm

Ext. Supply Voltage:

Int. Battery Voltage:

11 Feb 2020 - 14:09:48

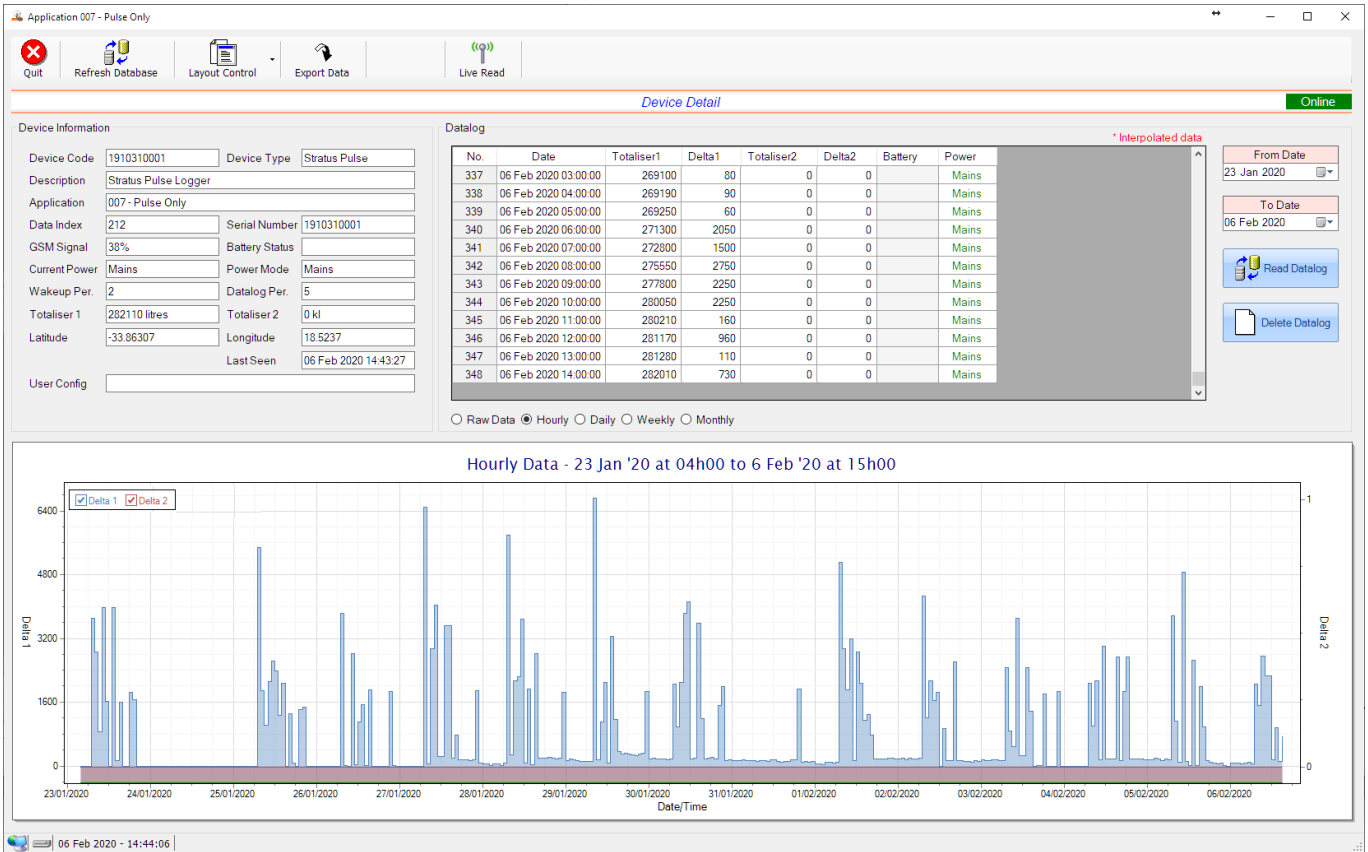
While the system is online, these parameters can be changed and will immediately be updated on the remote meter via its ModBus connection.

### 2.8.7 Application 006 - GWF Sonico + Loop

This application is currently under development.

DOCUMENT NAME	CLASSIFICATION	DATE	PAGE
CLOUDWORKS CLIENT USER MANUAL	CONFIDENTIAL	15-JUL-21	73 OF 201

### 2.8.8 Application 007 - Pulse Only

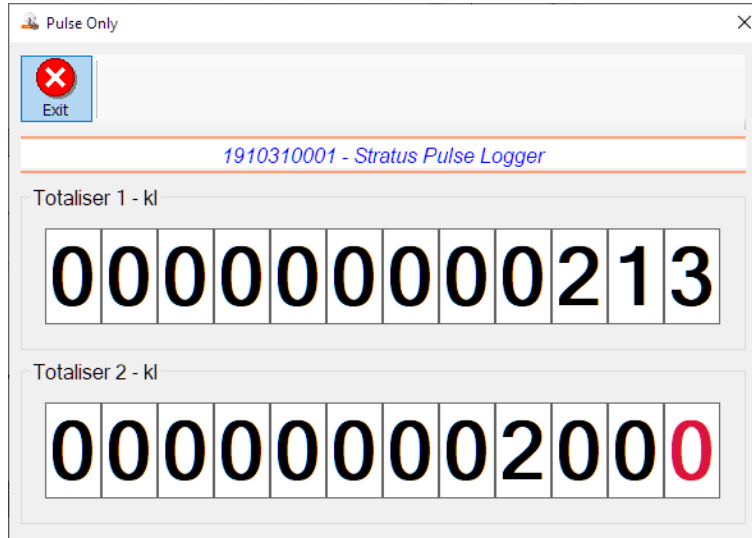


This application type would be selected where you are using basic pulse output devices which generally translate consumption to pulse output. This could, for instance, be a water or electricity meter.

Functions on the top menu bar are mostly as per previous screens within the Cloudworks suite. These would be the 'Refresh Database', 'Layout Control' and 'Export Data' buttons which have been explained earlier. Added functionality is the 'Live Read' button.

If a device is powered and permanently connected to the server (and online), then the 'Live Read' Button will be active allowing you to stream live data directly from that device in real time. **Bear in mind that, while this live streaming screen is active, the cellular data consumption of that device will be much greater than the usual background periodic read used to update the database.** The current communications status of the device will be displayed on the top right of the screen.

Remote devices that are offline or sleeping cannot be accessed for streaming data. This status will be automatically updated while on this screen without the need for pressing the 'Refresh Database' button. Pressing the 'Live Read' button will launch the live streaming data screen for that device. **All the data on this screen is fetched directly from the remote device and not the database.**



The data displayed are only the two totalisers as digital readouts.

Returning to the applications screen, data is displayed in various groups. On the top left is grouped the 'Device Information' block. This information is data relevant to the remote device and is really displaying data that is present within the database. Mostly data that is populated during the 'Reload Device Config' process. This data is as follows:-

Information	Notes
<b>Device Code</b>	The Device Code assigned to this particular remote device. All communications are initiated by addressing this code. This code is unique to all remote devices and is assigned at the time of manufacture.
<b>Device Type</b>	Type of Remote Device. eg CDS538 Cumulus Logger etc
<b>Description</b>	The description is a user defined parameter that is captured during the setup of each device. This would normally be something that would describe the location or application of this particular device.
<b>Application</b>	Selected device application. Application 007 - Pulse Only function in this case.
<b>Data Index</b>	As each device is captured onto Cloudworks system, it is assigned a unique data index. This index is used when externally extracting the log data from the database as each record in the global datalog would be labelled with this index number.
<b>Serial Number</b>	Serial number of this device - assigned in the factory.
<b>GSM Signal</b>	Signal strength of the last GSM communications, expressed as a



<b>Battery Status</b>	percentage.  Battery status for devices that are powered by battery, expressed as a percentage. It is important to note that this will be the battery status read while the device is under full load (GSM communications active). It would normally indicate lower than the recorded battery status in the datalog (which is read while the device is essentially idle).
<b>Current Power</b>	An indicator as to how this remote device is being powered. Normally the same as the Power Mode but can vary for systems on Dual Power mode. For devices in a dual power mode, this parameter will display the current power status of the remote device. Battery or Mains.
<b>Power Mode</b>	Selected Power Mode under which the remote device is operating. This can be Battery, Mains or Dual power modes.
<b>Wakeup Per.</b>	The Wakeup Period set in minutes. Refer to the device configuration chapter for an explanation of this parameter.
<b>Datalog Per.</b>	The Datalog Period set in minutes. Refer to the device configuration chapter for an explanation of this parameter.
<b>Totaliser 1</b>	The current Totaliser 1 reading with its relevant pulse weight implemented including the unit of measure.
<b>Totaliser 2</b>	The current Totaliser 2 reading with its relevant pulse weight implemented including the unit of measure.
<b>Last Seen</b>	The date and time the remote device was last seen connecting into the server.
<b>Latitude</b>	Captured device Latitude.
<b>Longitude</b>	Captured device Longitude.
<b>User Config</b>	The user defined data recorded on the remote device. Refer to the device configuration chapter for an explanation of this parameter.

To get the latest update of this data, you will need to press the 'Refresh Data' button which will then update this screen from the database.

To the right of screen is the Datalog information box. This box will be populated with the most recent data from the recorded datalog of this remote device (read from the database). By default, when the screen opens, the last two weeks' worth of data will be displayed in this table. To select a different range of data, you can select the 'From Date' and 'To Date' values and press the 'Read Datalog' button.



This application will record the following data in the datalog.

Datalog \* Interpolated data

No.	Date	Totaliser1	Delta1	Totaliser2	Delta2	Battery	Power
338	06 Feb 2020 04:00:00	100	0	200	0		Mains
339	06 Feb 2020 05:00:00	100	0	200	0		Mains
340	06 Feb 2020 06:00:00	100	0	200	0		Mains
341	06 Feb 2020 07:00:00	100	0	200	0		Mains
342	06 Feb 2020 08:00:00	100	0	200	0		Mains
343	06 Feb 2020 09:00:00	100	0	200	0		Mains
344	06 Feb 2020 10:00:00	100	0	200	0		Mains
345	06 Feb 2020 11:00:00	100	0	200	0		Mains
346	06 Feb 2020 12:00:00	100	0	200	0		Mains
347	06 Feb 2020 13:00:00	129	29	200	0		Mains
348	06 Feb 2020 14:00:00	166	37	200	0		Mains
349	06 Feb 2020 15:00:00	199	33	200	0		Mains

Raw Data 
  Hourly 
  Daily 
  Weekly 
  Monthly

Information	Notes
<b>Date/Time</b>	Date and time of the datalog record.
<b>Totaliser 1</b>	Totaliser 1 reading.
<b>Totaliser 2</b>	Totaliser 2 reading.
<b>Delta 1</b>	The effective 'consumption' of the Totaliser 1 reading. This is the difference between this current reading and the previous reading.
<b>Delta 2</b>	The effective 'consumption' of the Totaliser 2 reading. This is the difference between this current reading and the previous reading.
<b>Battery</b>	Battery level in percentage. Only displayed on battery powered devices.
<b>Power</b>	Current power status. Mains/Battery

The data in this datalog table can be displayed (and graphed) in a number of different ways. These are selected by choosing the option at the bottom of the datalog table. Options include Raw Data and averaged hourly, daily, weekly and monthly data. When the averaging options are chosen, missing data is automatically interpolated to fill in the missing gaps. Interpolated data will have the number column entries highlighted in red with a small 'Interpolated data' message at the top right of the datalog table.

Datalog \* Interpolated data

No.	Date	Totaliser1	Delta1	Totaliser2	Delta2	Battery	Power
229	01 Feb 2020 15:00:00	100	0	200	0		Mains
230	01 Feb 2020 16:00:00	100	0	200	0		Mains
231	01 Feb 2020 17:00:00	100	0	200	0		Mains
232	01 Feb 2020 18:00:00	100	0	200	0		Mains
233	01 Feb 2020 19:00:00	100	0	200	0		Mains
234	01 Feb 2020 20:00:00	100	0	200	0		Mains
235	01 Feb 2020 21:00:00	100	0	200	0		Mains
236	01 Feb 2020 22:00:00	100	0	200	0		Mains
237	01 Feb 2020 23:00:00	100	0	200	0		Mains
238	02 Feb 2020 00:00:00	100	0	200	0		Mains
239	02 Feb 2020 01:00:00	100	0	200	0		Mains
240	02 Feb 2020 02:00:00	100	0	200	0		Mains
241	02 Feb 2020 03:00:00	100	0	200	0		Mains

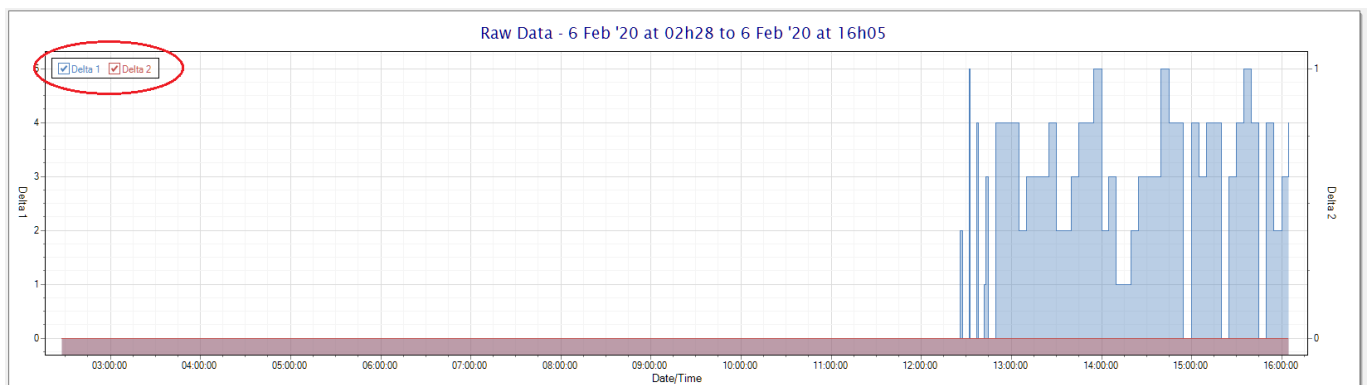
Raw Data 
  Hourly 
  Daily 
  Weekly 
  Monthly

As per the previously explained functions throughout the Cloudworks suite, columns can be switched off/on and re-ordered to the users requirements. The exporting will be as per the layout presented on the screen.

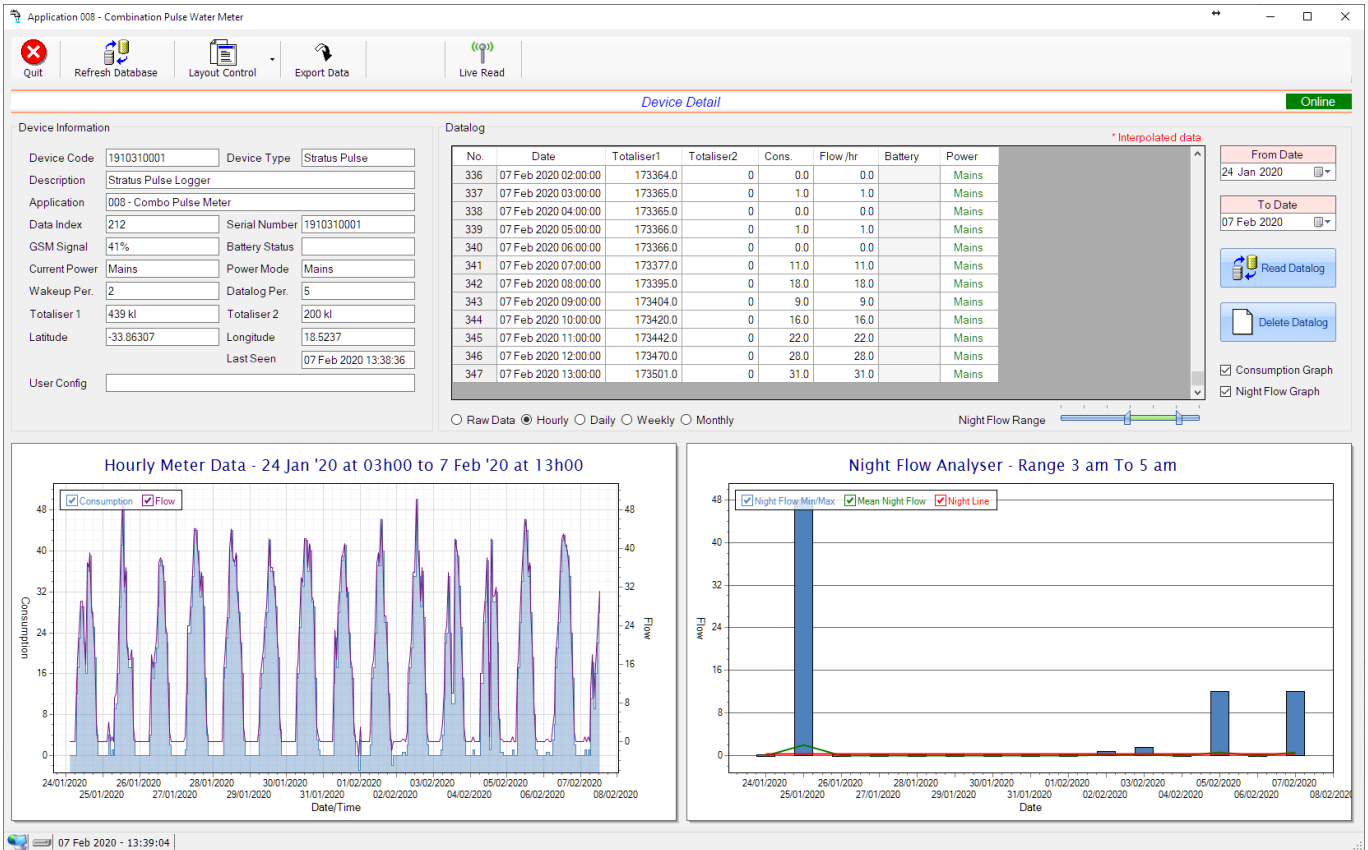
You can zoom into a range of the data by simply selecting those records in the table. This will result in the graph at the bottom being updated to display only those readings.

Deleting the datalog or removing a range of records can be easily done by using the 'Delete Datalog' button. To delete a range, simply select the range in the datalog table and press the 'Delete Datalog' button. If no range is selected, it will be assumed that you wish to delete the entire datalog. There will be a prompt to ensure that you are aware of the action you are about to take.

Data that is displayed in the table will also be represented in the graph at the bottom of the screen. Individual graph series can be switched off/on by selecting the ticks at the top left of the graph.



### 2.8.9 Application 008 - Combo Pulse Meter

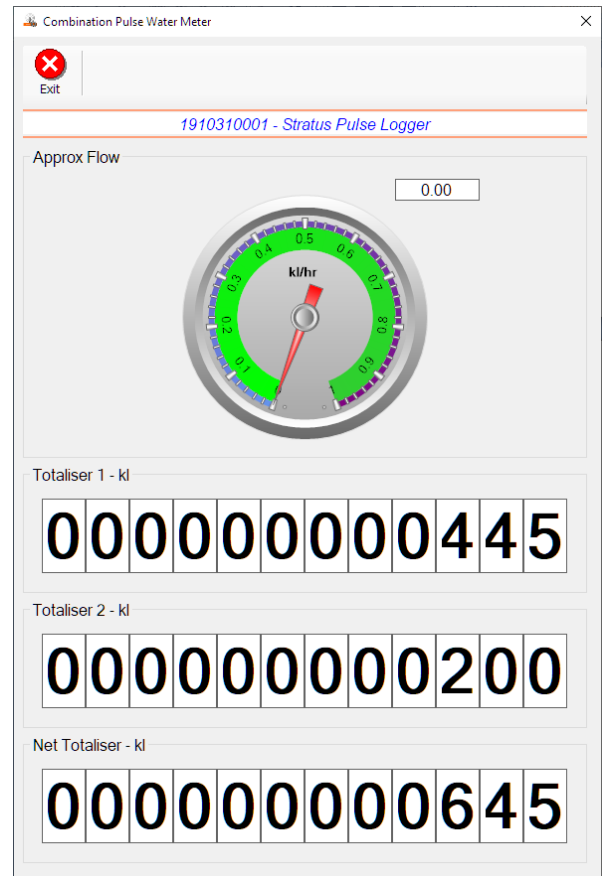
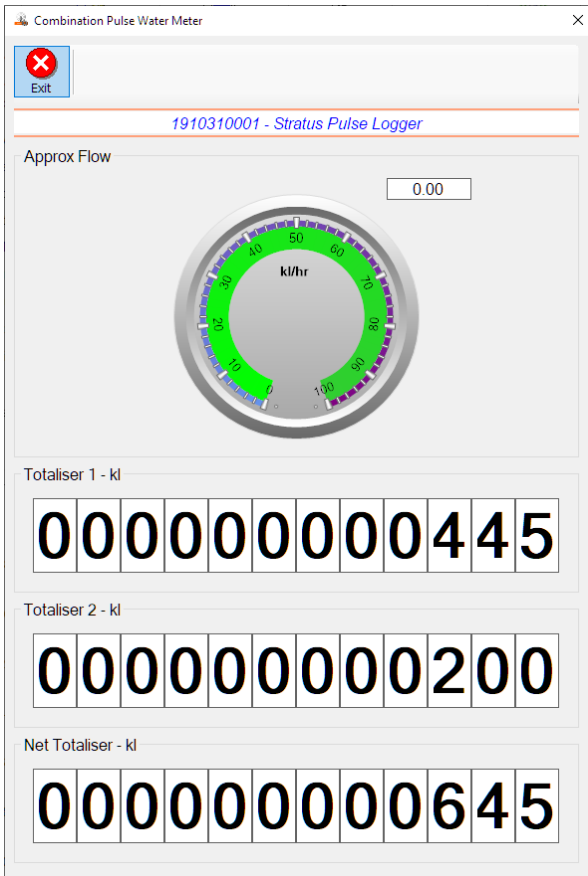


This application type is used in combination water meter type sites. A combination meter normally consists of a water measurement point consisting of two water meters. A larger meter for measuring the bulk flow of the water and a smaller one to measure the lower flows which are normally missed on large meters. The actual consumption is normally a combination of these two meter readings and are handled as such in this application type.

Functions on the top menu bar are mostly as per previous screens within the Cloudworks suite. These would be the 'Refresh Database', 'Layout Control' and 'Export Data' buttons which have been explained earlier. Added functionality is the 'Live Read' button.

If a device is powered and permanently connected to the server (and online), then the 'Live Read' Button will be active allowing you to stream live data directly from that device in real time. **Bear in mind that, while this live streaming screen is active, the cellular data consumption of that device will be much greater than the usual background periodic read used to update the database.** The current communications status of the device will be displayed on the top right of the screen.

Remote devices that are offline or sleeping cannot be accessed for streaming data. This status will be automatically updated while on this screen without the need of pressing the 'Refresh Database' button. Pressing the 'Live Read' button will launch the streaming data screen for that device. **All the data on this screen is fetched directly from the remote device and not the database.**



The data displayed are the two totalisers and combined volume (Net Totaliser) as digital readouts and a single needle type display showing the approximate flow. It is important to note that flow is calculated as a difference between two successive readings. For this reading, the data stream will need to see at least two changes in the volume amount before it can calculate the approximate flow. That is why the flow dial will initially appear blank (as per the left display) and then only become active after those two reading changes have been received.

Returning to the applications screen, data is displayed in various groups. On the top left is grouped the Device Information block. This information is data relevant to the remote device and is really displaying data that is present within the database. Mostly data that is populated during the 'Reload Device Config' process. This data is as follows:-

Information	Notes
<b>Device Code</b>	The Device Code assigned to this particular remote device. All communications are initiated by addressing this code. This code is unique to all remote devices and is assigned at the time of manufacture.
<b>Device Type</b>	Type of Remote Device. eg CDS538 Cumulus Logger etc
<b>Description</b>	The description is a user defined parameter that is captured during the setup of each device. This would normally be something that would describe the location or application of this particular device.
<b>Application</b>	Selected device application. Application 008 - Combination Pulse Water Meter function in this case.
<b>Data Index</b>	As each device is captured on to Cloudworks system, it is assigned a



	unique data index. This index is used when externally extracting the log data from the database as each record in the global datalog would be labelled with this index number.
<b>Serial Number</b>	Serial number of this device - assigned in the factory.
<b>GSM Signal</b>	Signal strength of the last GSM communications, expressed as a percentage.
<b>Battery Status</b>	Battery status for devices that are powered by battery, expressed as a percentage. It is important to note that this will be the battery status read while the device is under full load (GSM communications active). It would normally indicate lower than the recorded battery status in the datalog (which is read while the device is essentially idle).
<b>Current Power</b>	An indicator as to how this remote device is being powered. Normally the same as the power mode but can vary for systems on Dual Power mode. For devices in a dual power mode, this parameter will display the current power status of the remote device. Battery or Mains.
<b>Power Mode</b>	Selected Power Mode under which the remote device is operating. This can be Battery, Mains or Dual power modes.
<b>Wakeup Per.</b>	The Wakeup Period set in minutes. Refer to the device configuration chapter for an explanation of this parameter.
<b>Datalog Per.</b>	The Datalog Period set minutes. Refer to the device configuration chapter for an explanation of this parameter.
<b>Totaliser 1</b>	The current Totaliser 1 reading with its relevant pulse weight implemented including the unit of measure.
<b>Totaliser 2</b>	The current Totaliser 2 reading with its relevant pulse weight implemented including the unit of measure.
<b>Last Seen</b>	The date and time the remote device was last seen connecting into the server.
<b>Latitude</b>	Captured device Latitude.
<b>Longitude</b>	Captured device Longitude.
<b>User Config</b>	The user defined data recorded on the remote device. Refer to the device configuration chapter for an explanation of this parameter.

To get the latest update of this data, you will need to press the 'Refresh Data' button which will then update this screen from the database.


To the right of screen is the Datalog information box. This box will be populated with the most recent data from the recorded datalog of this remote device ([read from the database](#)). By default, when the screen opens, the last two weeks' worth of data will be displayed in this table. To select a different range of data, you can select the 'From Date' and 'To Date' values and press the 'Read Datalog' button.

This application will record the following data in the datalog.

Datalog

No.	Date	Totaliser1	Totaliser2	Cons.	Flow /hr	Battery	Power
337	07 Feb 2020 03:00:00	173365.0	0	1.0	1.0		Mains
338	07 Feb 2020 04:00:00	173365.0	0	0.0	0.0		Mains
339	07 Feb 2020 05:00:00	173366.0	0	1.0	1.0		Mains
340	07 Feb 2020 06:00:00	173366.0	0	0.0	0.0		Mains
341	07 Feb 2020 07:00:00	173377.0	0	11.0	11.0		Mains
342	07 Feb 2020 08:00:00	173395.0	0	18.0	18.0		Mains
343	07 Feb 2020 09:00:00	173404.0	0	9.0	9.0		Mains
344	07 Feb 2020 10:00:00	173420.0	0	16.0	16.0		Mains
345	07 Feb 2020 11:00:00	173442.0	0	22.0	22.0		Mains
346	07 Feb 2020 12:00:00	173470.0	0	28.0	28.0		Mains
347	07 Feb 2020 13:00:00	173501.0	0	31.0	31.0		Mains
348	07 Feb 2020 14:00:00	173516.0	0	15.0	15.0		Mains

Raw Data 
  Hourly 
  Daily 
  Weekly 
  Monthly

Night Flow Range 


Information	Notes
<b>Date/Time</b>	Date and time of the datalog record.
<b>Totaliser 1</b>	Totaliser 1 reading.
<b>Totaliser 2</b>	Totaliser 2 reading.
<b>Cons.</b>	The effective 'consumption' of the sum of the two Totaliser readings. This is the difference between this current reading and the previous reading.
<b>Flow/hr</b>	Flow rate calculated as volume per hour.
<b>Battery</b>	Battery level in percentage. Only displayed on battery powered devices.
<b>Power</b>	Current power status. Mains/Battery

The data in this datalog table can be displayed (and graphed) in a number of different ways. These are selected by choosing the option at the bottom of the datalog table. Options include Raw Data and averaged hourly, daily, weekly and monthly data.

When the averaging options are chosen, missing data is automatically interpolated to fill in the missing gaps. Interpolated data will have the number column entries highlighted in red with a small 'Interpolated data' message at the top right of the datalog table.

Datalog \* Interpolated data

No.	Date	Totaliser1	Totaliser2	Cons.	Flow /hr	Battery	Power
276	04 Feb 2020 14:00:00	172500.0	0	42.0	42.0		Mains
277	04 Feb 2020 15:00:00	172530.0	0	30.0	30.0		Mains
278	04 Feb 2020 16:00:00	172560.0	0	30.0	30.0		Mains
279	04 Feb 2020 17:00:00	172592.0	0	32.0	32.0		Mains
280	04 Feb 2020 18:00:00	172614.0	0	22.0	22.0		Mains
281	04 Feb 2020 19:00:00	172621.0	0	7.0	7.0		Mains
282	04 Feb 2020 20:00:00	172621.5	0	0.5	0.5		Mains
283	04 Feb 2020 21:00:00	172622.0	0	0.5	0.5		Mains
284	04 Feb 2020 22:00:00	172622.0	0	0.0	0.0		Mains
285	04 Feb 2020 23:00:00	172622.0	0	0.0	0.0		Mains
286	05 Feb 2020 00:00:00	172622.0	0	0.0	0.0		Mains
287	05 Feb 2020 01:00:00	172622.0	0	0.0	0.0		Mains
288	05 Feb 2020 02:00:00	172622.0	0	0.0	0.0		Mains

Raw Data 
  Hourly 
  Daily 
  Weekly 
  Monthly
 Night Flow Range 

As per the previously explained functions throughout the Cloudworks suite, columns can be switched off/on and re-ordered to the users requirements. The exporting will be as per the layout presented on the screen.

You can zoom into a range of the data by simply selecting those records in the table. This will result in the graph at the bottom being updated to display only those readings.

Deleting the datalog or removing a range of records can be easily done by using the 'Delete Datalog' button. To delete a range, simply select the range in the datalog table and press the 'Delete Datalog' button. If no range is selected, it will be assumed that you wish to delete the entire datalog. There will be a prompt to ensure that you are aware of the action you are about to take.


Data that is displayed in the table will also be represented in the graph at the bottom of the screen. There are two graphs displayed, namely the Consumption Graph, and a Night Flow graph. These graphs can be selectively switched on/off by clicking the ticks at the bottom right of the datalog table.


Datalog \* Interpolated data

No.	Date	Totaliser1	Totaliser2	Cons.	Flow /hr	Battery	Power
337	07 Feb 2020 03:00:00	173365.0	0	1.0	1.0		Mains
338	07 Feb 2020 04:00:00	173365.0	0	0.0	0.0		Mains
339	07 Feb 2020 05:00:00	173366.0	0	1.0	1.0		Mains
340	07 Feb 2020 06:00:00	173366.0	0	0.0	0.0		Mains
341	07 Feb 2020 07:00:00	173377.0	0	11.0	11.0		Mains
342	07 Feb 2020 08:00:00	173395.0	0	18.0	18.0		Mains
343	07 Feb 2020 09:00:00	173404.0	0	9.0	9.0		Mains
344	07 Feb 2020 10:00:00	173420.0	0	16.0	16.0		Mains
345	07 Feb 2020 11:00:00	173442.0	0	22.0	22.0		Mains
346	07 Feb 2020 12:00:00	173470.0	0	28.0	28.0		Mains
347	07 Feb 2020 13:00:00	173501.0	0	31.0	31.0		Mains
348	07 Feb 2020 14:00:00	173516.0	0	15.0	15.0		Mains

From Date  
24 Jan 2020


To Date  
07 Feb 2020

 Read Datalog

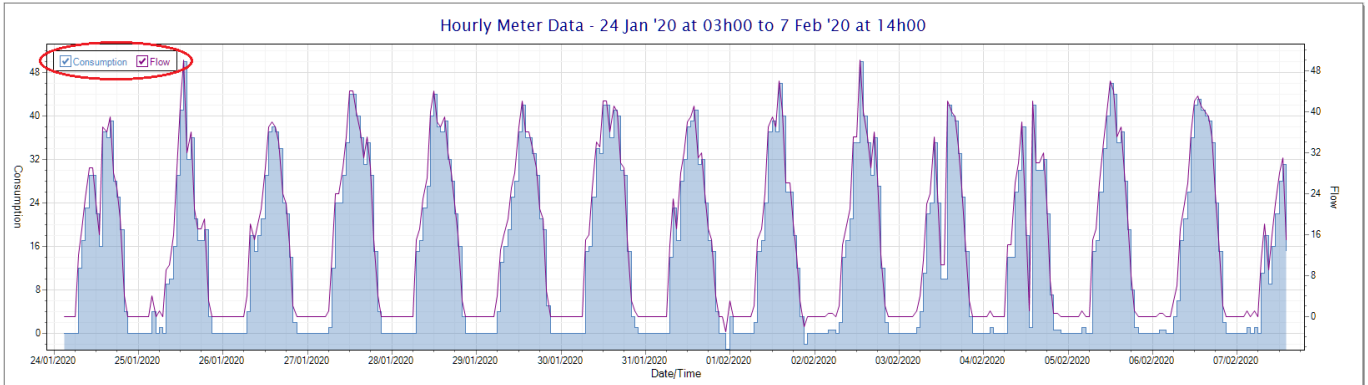
 Delete Datalog

Consumption Graph

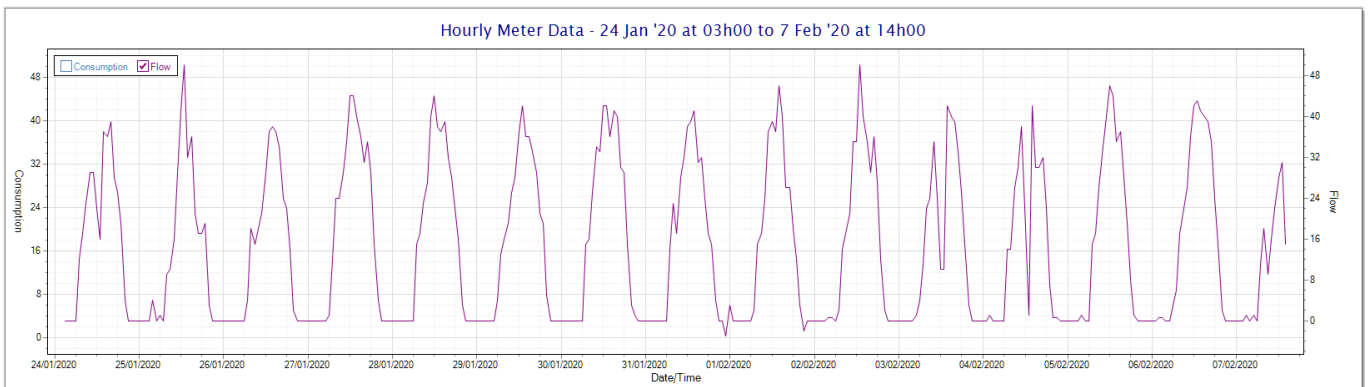
Night Flow Graph

Raw Data 
  Hourly 
  Daily 
  Weekly 
  Monthly
 Night Flow Range 

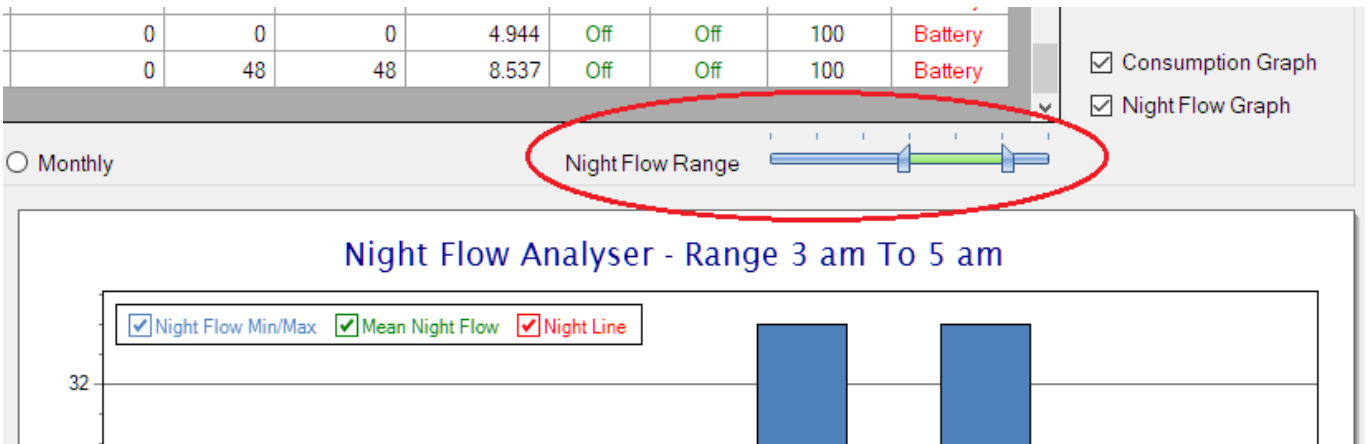
The Consumption Graph displays the consumption and flow related data. Individual graph series can be switched off/on by selecting the ticks at the top left of the graph.



To view the flow only would look like this:-



Also displayed is the Night Flow graph. The function of this graph is to specifically analyse the night time water flows at an installation. This analysis is done based on the data received during a specific time period during the night (normally from 3am to 5am). This period for analysis can be adjusted by sliding the elements of the slider on the top right of the graph.



The graph will show a couple of different series.

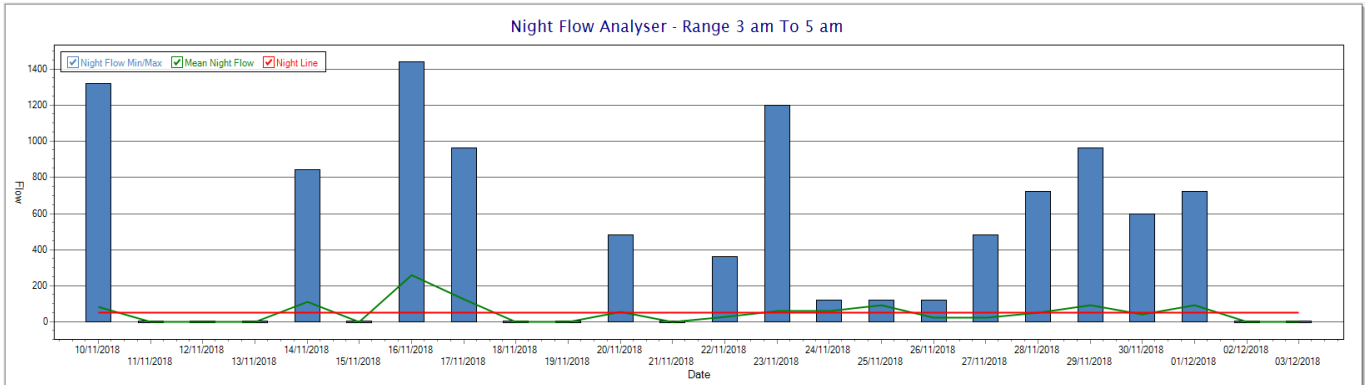
1. Night Flow Min/Max - this will be a bar series indicating the minimum and maximum flows during the measurement period. The base of the block is the minimum flow and the top, the maximum flow. Depending on the type of installation, during this period you would expect the minimum flow point to come to zero and



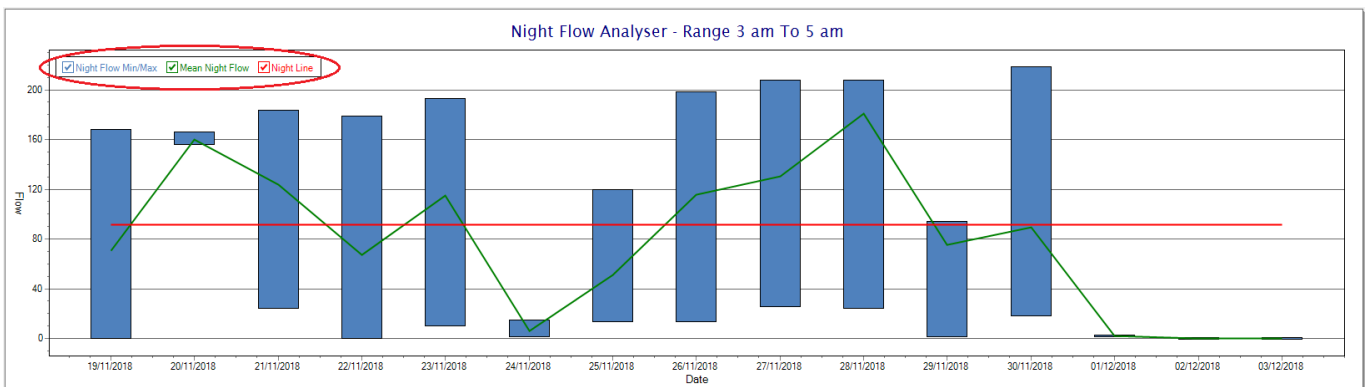
therefore sit on the base of the graph. The maximum flow would simply indicate some consumption during the period of measure and is not really a concern unless that was not expected.

2. Mean Night Flow - this will show the average night flow during that period. Shown in green and would normally simply be the midpoint between the minimum and maximum flows.
3. Night Line - the night line shows the average flow for the entire range of data being measured. Shown in red, this is useful for determining the average night usage over different data ranges.

The Night Flow graph is particularly useful in giving a quick graphical indication of the possibility of a leak scenario. In most case, where there should be no continuous use of water at night, the graph would look as below:-



During a possible leak situation, the minimum night flow does not return to zero and the graph will appear to bounce off the bottom.



So, at a quick glance it is possible to see if there is a problem at this installation. As per the Consumption Graph, the different graph series can be switched off/on by clicking the series ticks on the top left hand corner.

### 2.8.10 Application 009 - Fwd/Rev Pulse Meter

**Device Information**

Device Code: 1910310001 | Device Type: Stratus Pulse  
 Description: Stratus Pulse Logger  
 Application: 009 - Fwd/Rev Meter  
 Data Index: 212 | Serial Number: 1910310001  
 GSM Signal: 41% | Battery Status:   
 Current Power: Mains | Power Mode: Mains  
 Wakeup Per: 2 | Datalog Per: 5  
 Fwd Totaliser: 1003 kl | Rev Totaliser: 200 kl  
 Latitude: -33.86307 | Longitude: 18.5237  
 Last Seen: 10 Feb 2020 10:30:51

No.	Date	Fwd Totaliser	Fwd Cons.	Rev Totaliser	Rev Cons.	Flow /hr	Battery	Power
54	09 Feb 2020 23:00:00	907.0	0.0	200	0	0.0		Mains
55	10 Feb 2020 00:00:00	907.0	0.0	200	0	0.0		Mains
56	10 Feb 2020 01:00:00	907.0	0.0	200	0	0.0		Mains
57	10 Feb 2020 02:00:00	907.0	0.0	200	0	0.0		Mains
58	10 Feb 2020 03:00:00	907.0	0.0	200	0	0.0		Mains
59	10 Feb 2020 04:00:00	907.0	0.0	200	0	0.0		Mains
60	10 Feb 2020 05:00:00	907.0	0.0	200	0	0.0		Mains
61	10 Feb 2020 06:00:00	911.0	4.0	200	0	4.0		Mains
62	10 Feb 2020 07:00:00	919.0	8.0	200	0	8.0		Mains
63	10 Feb 2020 08:00:00	930.0	11.0	200	0	11.0		Mains
64	10 Feb 2020 09:00:00	954.0	24.0	200	0	24.0		Mains
65	10 Feb 2020 10:00:00	987.0	33.0	200	0	33.0		Mains

**Hourly Meter Data - 7 Feb '20 at 18h00 to 10 Feb '20 at 10h00**

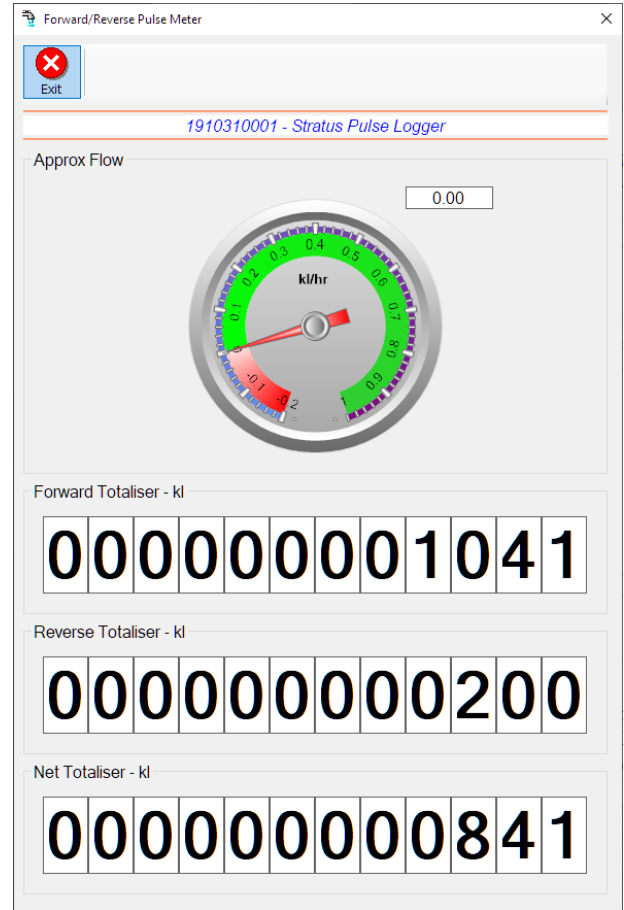
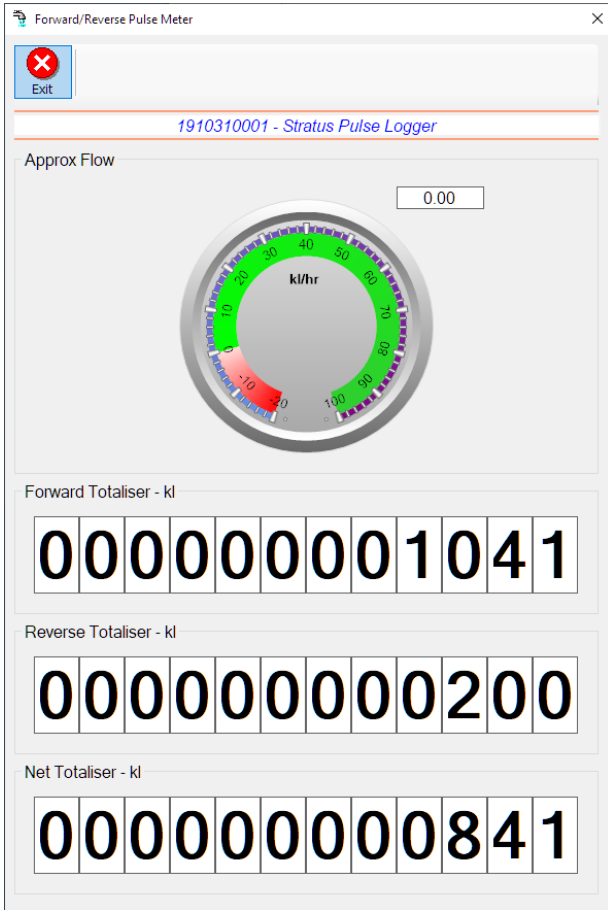
**Night Flow Analyser - Range 3 am To 5 am**

This type would be selected for applications that are used on a forward/reverse pulse water meter. The actual consumption is normally the difference of the two totaliser readings and are handled as such in this application type.

Functions on the top menu bar are mostly as per previous screens within the Cloudworks suite. These would be the 'Refresh Database', 'Layout Control' and 'Export Data' buttons which have been explained earlier. Added functionality is the 'Live Read'.

If a device is powered and permanently connected to the server (and online), then the 'Live Read' Button will be active allowing you to stream live data directly from that device in real time. **Bear in mind that, while this live streaming screen is active, the cellular data consumption of that device will be much greater than the usual background periodic read used to update the database.** The current communications status of the device will be displayed on the top right of the screen.

Remote devices that are offline or sleeping cannot be accessed for streaming data. This status will be automatically updated while on this screen without the need of pressing 'Refresh Database' button. Pressing the 'Live Read' will launch the streaming live data screen for that device. **All the data on this screen is fetched directly from the remote device and not the database.**



The data displayed are the two totalisers (forward/reverse) and combined volume (Net Totaliser) as digital readouts and a needle type display showing the approximate flow. It is important to note that flow is calculated as a difference between two successive readings. For this reading, the data stream will need to see at least two changes in the volume amount before it can calculate the approximate flow. That is why the flow dial **will initially appear blank (as per the left display)** and then only become active after those two reading changes have been received.

Returning to the applications screen, data is displayed in various groups. On the top left is grouped the Device Information block. This information is data relevant to the remote device and is really displaying data that is present within the database. Mostly data that is populated during the 'Reload Device Config' process.

This data is as follows:-

Information	Notes
<b>Device Code</b>	The Device Code assigned to this particular remote device. All communications are initiated by addressing this code. This code is unique to all remote devices and is assigned at the time of manufacture.
<b>Device Type</b>	Type of Remote Device. eg CDS538 Cumulus Logger etc
<b>Description</b>	The description is a user defined parameter that is captured during




<b>Application</b>	the setup of each device. This would normally be something that would describe the location or application of this particular device.  Selected device application. Application 002 - Forward/Reverse Pulse Water Meter + Pressure function in this case.
<b>Data Index</b>	As each device is captured on to Cloudworks system, it is assigned a unique data index. This index is used when externally extracting the log data from the database as each record in the global datalog would be labelled with this index number.
<b>Serial Number</b>	Serial number of this device - assigned in the factory.
<b>GSM Signal</b>	Signal strength of the last GSM communications, expressed as a percentage.
<b>Battery Status</b>	Battery status for devices that are powered by battery, expressed as a percentage. It is important to note that this will be the battery status read while the device is under full load (GSM communications active). It would normally indicate lower than the recorded battery status in the datalog (which is read while the device is essentially idle).
<b>Current Power</b>	An indicator as to how this remote device is being powered. Normally the same as the power mode but can vary for systems on Dual Power mode. For devices in a dual power mode, this parameter will display the current power status of the remote device. Battery or Mains.
<b>Power Mode</b>	Selected Power Mode under which the remote device is operating. This can be Battery, Mains or Dual power modes.
<b>Wakeup Per.</b>	The Wakeup Period set in minutes. Refer to the device configuration chapter for an explanation of this parameter.
<b>Datalog Per.</b>	The Datalog Period set minutes. Refer to the device configuration chapter for an explanation of this parameter.
<b>Fwd Totaliser</b>	The current Forward Totaliser reading with its relevant pulse weight implemented including the unit of measure.
<b>Rev Totaliser</b>	The current Reverse Totaliser reading with its relevant pulse weight implemented including the unit of measure.
<b>Last Seen</b>	The date and time the remote device was last seen connecting into the server.
<b>Latitude</b>	Captured device Latitude.
<b>Longitude</b>	Captured device Longitude.
<b>User Config</b>	The user defined data recorded on the remote device. Refer to the device configuration chapter for an explanation of this parameter.

To get the latest update of this data, you will need to press the 'Refresh Data' button which will then update this screen from the database.

To the right of screen is the Datalog information box. This box will be populated with the most recent data from the recorded datalog of this remote device ([read from the database](#)). By default, when the screen opens, the last two weeks' worth of data will be displayed in this table. To select a different range of data, you can select the 'From Date' and 'To Date' values and press the 'Read Datalog' button. This application will record the following data in the datalog.

No.	Date	Fwd Totaliser	Fwd Cons.	Rev Totaliser	Rev Cons.	Flow /hr	Battery	Power
54	09 Feb 2020 23:00:00	907.0	0.0	200	0	0.0		Mains
55	10 Feb 2020 00:00:00	907.0	0.0	200	0	0.0		Mains
56	10 Feb 2020 01:00:00	907.0	0.0	200	0	0.0		Mains
57	10 Feb 2020 02:00:00	907.0	0.0	200	0	0.0		Mains
58	10 Feb 2020 03:00:00	907.0	0.0	200	0	0.0		Mains
59	10 Feb 2020 04:00:00	907.0	0.0	200	0	0.0		Mains
60	10 Feb 2020 05:00:00	907.0	0.0	200	0	0.0		Mains
61	10 Feb 2020 06:00:00	911.0	4.0	200	0	4.0		Mains
62	10 Feb 2020 07:00:00	919.0	8.0	200	0	8.0		Mains
63	10 Feb 2020 08:00:00	930.0	11.0	200	0	11.0		Mains
64	10 Feb 2020 09:00:00	954.0	24.0	200	0	24.0		Mains
65	10 Feb 2020 10:00:00	987.0	33.0	200	0	33.0		Mains

Raw Data 
  Hourly 
  Daily 
  Weekly 
  Monthly

Night Flow Range 

Information	Notes
<b>Date/Time</b>	Date and time of the datalog record.
<b>Fwd Totaliser</b>	Forward Totaliser reading.
<b>Rev Totaliser</b>	Reverse Totaliser reading.
<b>Fwd Cons.</b>	The Forward consumption reading.
<b>Rev Cons.</b>	The Reverse consumption Reading.
<b>Flow/hr</b>	Flow rate calculated as volume per hour.
<b>Battery</b>	Battery level in percentage. Only displayed on battery powered devices.
<b>Power</b>	Current power status. Mains/Battery


The data in this datalog table can be displayed (and graphed) in a number of different ways. These are selected by choosing the option at the bottom of the datalog table. Options include Raw Data and averaged hourly, daily, weekly and monthly data.

When the averaging options are chosen, missing data is automatically interpolated to fill in the missing gaps. Interpolated data will have the number column entries highlighted in red with a small 'Interpolated data' message at the top right of the datalog table.

Datalog \* Interpolated data

No.	Date	Fwd Totaliser	Fwd Cons.	Rev Totaliser	Rev Cons.	Flow /hr	Battery	Power
16	08 Feb 2020 09:00:00	606.0	13.0	200	0	13.0		Mains
17	08 Feb 2020 10:00:00	606.5	0.5	200	0	0.5		Mains
18	08 Feb 2020 11:00:00	607.0	0.5	200	0	0.5		Mains
19	08 Feb 2020 12:00:00	643.0	36.0	200	0	36.0		Mains
20	08 Feb 2020 13:00:00	689.0	46.0	200	0	46.0		Mains
21	08 Feb 2020 14:00:00	727.0	38.0	200	0	38.0		Mains
22	08 Feb 2020 15:00:00	758.0	31.0	200	0	31.0		Mains
23	08 Feb 2020 16:00:00	789.0	31.0	200	0	31.0		Mains
24	08 Feb 2020 17:00:00	795.0	6.0	200	0	6.0		Mains
25	08 Feb 2020 18:00:00	756.0	-39.0	200	0	-39.0		Mains
26	08 Feb 2020 19:00:00	717.0	-39.0	200	0	-39.0		Mains
27	08 Feb 2020 20:00:00	717.0	0.0	200	0	0.0		Mains
28	08 Feb 2020 21:00:00	720.0	3.0	200	0	3.0		Mains

Raw Data 
  Hourly 
  Daily 
  Weekly 
  Monthly

Night Flow Range 

As per the previously explained functions throughout the Cloudworks suite, columns can be switched off/on and re-ordered to the users requirements. The exporting will be as per the layout presented on the screen.

You can zoom into a range of the data by simply selecting those records in the table. This will result in the graph at the bottom being updated to display only those readings.

Deleting the datalog or removing a range of records can be easily done by using the 'Delete Datalog' button. To delete a range, simply select the range in the datalog table and press the 'Delete Datalog' button. If no range is selected, it will be assumed that you wish to delete the entire datalog. There will be a prompt to ensure that you are aware of the action you are about to take.

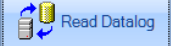
Data that is displayed in the table will also be represented in the graph at the bottom of the screen. There are two graphs displayed, namely the Consumption Graph (consumption/ flow), and a Night Flow graph. These graphs can be selectively switched on/off by clicking the ticks at the bottom right of the datalog table.

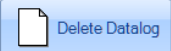
Datalog

No.	Date	Totaliser1	Totaliser2	Cons.	Flow /hr	Battery	Power
324	06 Feb 2020 14:00:00	173209.0	0	41.0	41.0		Mains
325	06 Feb 2020 15:00:00	173249.0	0	40.0	40.0		Mains
326	06 Feb 2020 16:00:00	173288.0	0	39.0	39.0		Mains
327	06 Feb 2020 17:00:00	173323.0	0	35.0	35.0		Mains
328	06 Feb 2020 18:00:00	173347.0	0	24.0	24.0		Mains
329	06 Feb 2020 19:00:00	173362.0	0	15.0	15.0		Mains
330	06 Feb 2020 20:00:00	173364.0	0	2.0	2.0		Mains
331	06 Feb 2020 21:00:00	173364.0	0	0.0	0.0		Mains
332	06 Feb 2020 22:00:00	173364.0	0	0.0	0.0		Mains
333	06 Feb 2020 23:00:00	173364.0	0	0.0	0.0		Mains
334	07 Feb 2020 00:00:00	173364.0	0	0.0	0.0		Mains
335	07 Feb 2020 01:00:00	173364.0	0	0.0	0.0		Mains

From Date  
24 Jan 2020

To Date  
06 Feb 2020


 Read Datalog

 Delete Datalog

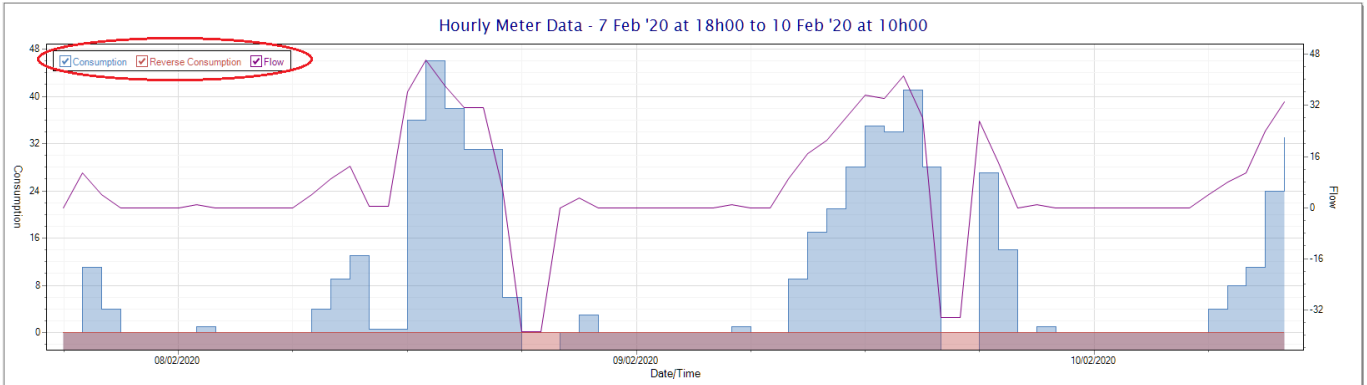
Consumption Graph

Night Flow Graph

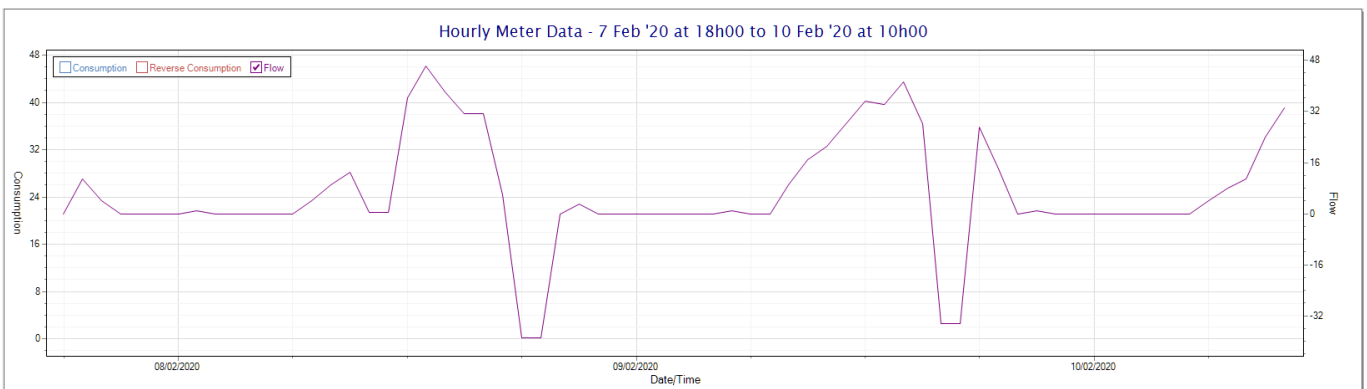
Raw Data 
  Hourly 
  Daily 
  Weekly 
  Monthly

Night Flow Range 

The Consumption Graph displays the consumption, pressure and flow related data. Individual graph series can be switched off/on by selecting the ticks at the top left of the graph.



To view the flow only would look like this:-



Also displayed is the Night Flow graph. The function of this graph is to specifically analyse the night time water flows at an installation. This analysis is done based on the data received during a specific time period during the night (normally from 3am to 5am). This period for analysis can be adjusted by sliding the elements of the slider on the top right of the graph.

0	0	0	4.944	Off	Off	100	Battery
0	48	48	8.537	Off	Off	100	Battery

Consumption Graph  
 Night Flow Graph

Monthly
 Night Flow Range

**Night Flow Analyser - Range 3 am To 5 am**

Night Flow Min/Max  
  Mean Night Flow  
  Night Line

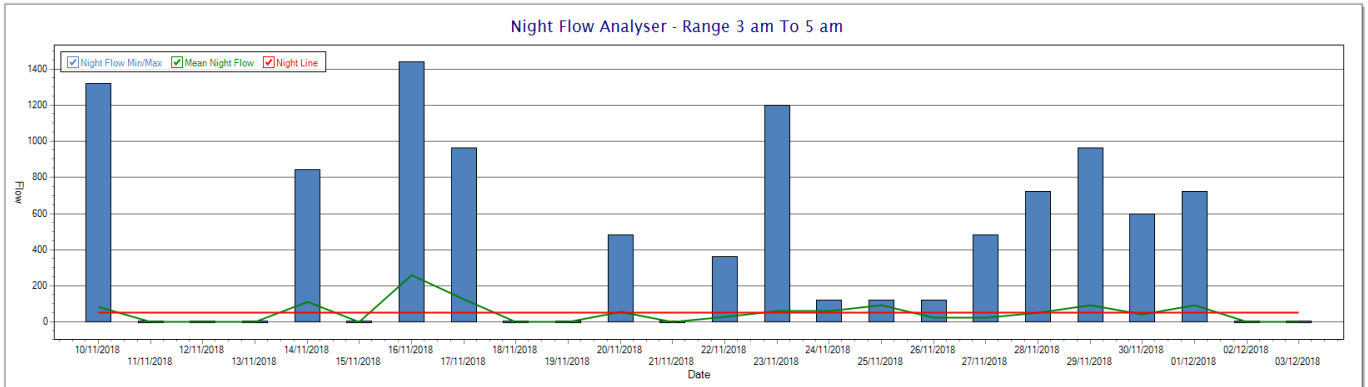
The graph will show a couple of different series.

1. Night Flow Min/Max - this will be a bar series indicating the minimum and maximum flows during the measurement period. The base of the block is the minimum flow and the top, the maximum flow. Depending on the type of installation, during this period you would expect the minimum flow point to come to zero and

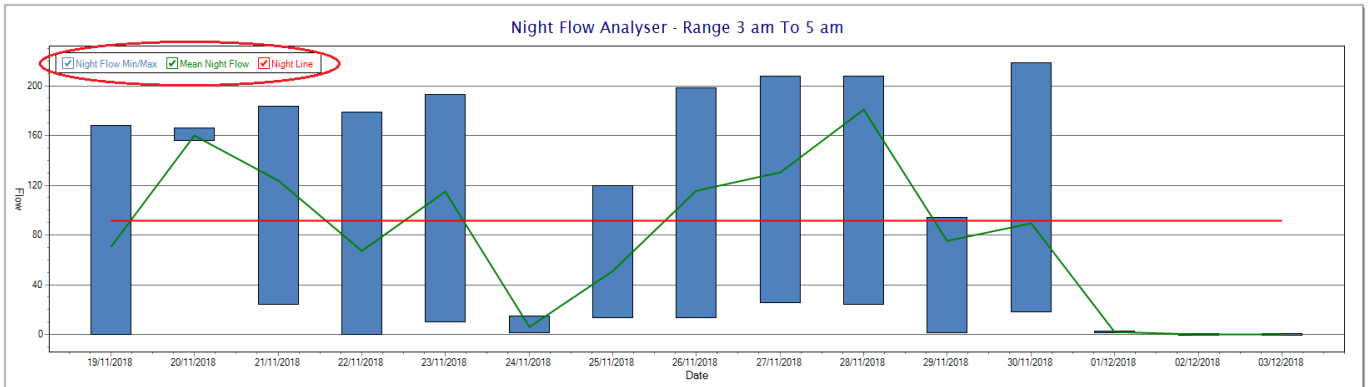
therefore sit on the base of the graph. The maximum flow would simply indicate some consumption during the period of measure and is not really a concern unless that was not expected.

2. Mean Night Flow - this will show the average night flow during that period. Shown in green and would normally simply be the midpoint between the minimum and maximum flows.
3. Night Line - the night line shows the average flow for the entire range of data being measured. Shown in red, this is useful for determining the average night usage over different data ranges.

The Night Flow graph is particularly useful in giving a quick graphical indication of the possibility of a leak scenario. In most case, where there should be no continuous use of water at night, the graph would look as below:-



During a possible leak situation, the minimum night flow does not return to zero and the graph will appear to bounce off the bottom.



So, at a quick glance it is possible to see if there is a problem at this installation. As per the Consumption Graph, the different graph series can be switched off/on by clicking the series ticks on the top left hand corner.



### 2.8.11 Application 010 - GWF ECO Encoder Meter

**Device Information**

Device Code: 1908200001 | Device Type: Nimbus Pulse  
 Description: Nimbus Pulse Logger  
 Application: 010 - GWF ECO Encoder  
 Data Index: 215 | Serial Number: 1908200001  
 GSM Signal: 38% | Battery Status:   
 Current Power: Mains | Power Mode: Mains  
 Wakeup Per: 2 | Datalog Per: 5  
 Fwd Totaliser: 2.044 m3 | Meter Serial: 16000916  
 Medium: Water | ECO Status: 00  
 Totaliser 1: 0 kl | Totaliser 2: 0 kl  
 Latitude: -33.86307 | Longitude: 18.5237  
 Last Seen: 10 Feb 2020 12:07:26

**Datalog**

No	Date	Fwd Totaliser	Consumption	Flow/hr	Serial Num	ECO Status	Totaliser 1	Totaliser 2	Ba
333	09 Feb 2020 23:00:00	2.044	0.000	0.000	16000916	00	0	0	
334	10 Feb 2020 00:00:00	2.044	0.000	0.000	16000916	00	0	0	
335	10 Feb 2020 01:00:00	2.044	0.000	0.000	16000916	00	0	0	
336	10 Feb 2020 02:00:00	2.044	0.000	0.000	16000916	00	0	0	
337	10 Feb 2020 03:00:00	2.044	0.000	0.000	16000916	00	0	0	
338	10 Feb 2020 04:00:00	2.044	0.000	0.000	16000916	00	0	0	
339	10 Feb 2020 05:00:00	2.044	0.000	0.000	16000916	00	0	0	
340	10 Feb 2020 06:00:00	2.044	0.000	0.000	16000916	00	0	0	
341	10 Feb 2020 07:00:00	2.044	0.000	0.000	16000916	00	0	0	
342	10 Feb 2020 08:00:00	2.044	0.000	0.000	16000916	00	0	0	
343	10 Feb 2020 09:00:00	2.044	0.000	0.000	16000916	00	0	0	
344	10 Feb 2020 10:00:00	2.044	0.000	0.000	16000916	00	0	0	
345	10 Feb 2020 11:00:00	2.044	0.000	0.000	16000916	00	0	0	
346	10 Feb 2020 12:00:00	2.044	0.000	0.000	16000916	00	0	0	

**Hourly Meter Data - 27 Jan '20 at 03h00 to 10 Feb '20 at 12h00**

**Night Flow Analyser - Range 3 am To 5 am**

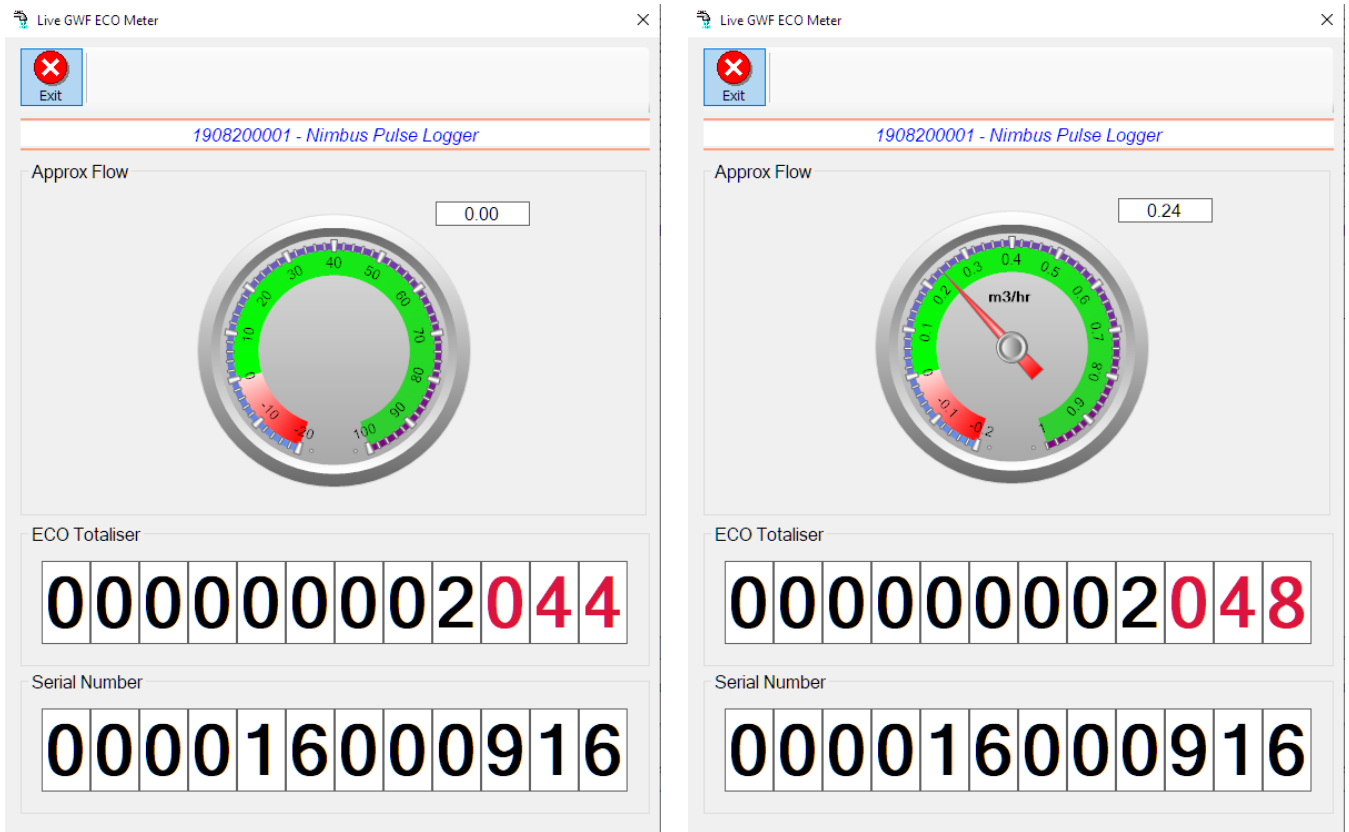
This type would be selected for applications that are using GWF ECO interface type meters.

Functions on the top menu bar are mostly as per previous screens within the Cloudworks suite. These would be the 'Refresh Database', 'Layout Control' and 'Export Data' buttons which have been explained earlier. Added functionality is the 'Live Read' button.

If a device is powered and permanently connected to the server (and online), then the 'Live Read' Button will be active allowing you to stream live data directly from that device in real time. **Bear in mind that, while this live streaming screen is active, the cellular data consumption of that device will be much greater than the usual background periodic read used to update the database.**

The current communications status of the device will be displayed on the top right of the screen.

Remote devices that are offline or sleeping cannot be accessed for streaming data. This status will be automatically updated while on this screen without the need of hitting 'Refresh Database' function. Pressing the 'Live Read' will launch the streaming live data screen for that device. **All the data on this screen is fetched directly from the remote device and not the database.**



The data displayed is the totaliser and serial number of the meter as digital readouts and a needle type display showing the approximate flow. It is important to note that flow is calculated as a difference between two successive readings. For this reading, the data stream will need to see at least two changes in the volume amount before it can calculate the approximate flow. That is why the flow dial **will initially appear blank (as per the left display)** and then only become active after those two reading changes have been received.

Returning to the applications screen, data is displayed in various groups. On the top left is grouped the Device Information block. This information is data relevant to the remote device and is really displaying data that is present within the database. Mostly data that is populated during the 'Reload Device Config' process.

This data is as follows:-

Information	Notes
<b>Device Code</b>	The Device Code assigned to this particular remote device. All communications are initiated by addressing this code. This code is unique to all remote devices and is assigned at the time of manufacture.
<b>Device Type</b>	Type of Remote Device. eg CDS538 Cumulus Logger etc
<b>Description</b>	The description is a user defined parameter that is captured during the setup of each device. This would normally be something that



<b>Application</b>	would describe the location or application of this particular device. Selected device application. Application 004 - GWF ECO Meter + Loop function in this case.
<b>Data Index</b>	As each device is captured on to Cloudworks system, it is assigned a unique data index. This index is used when externally extracting the log data from the database as each record in the global datalog would be labelled with this index number.
<b>Serial Number</b>	Serial number of this device - assigned in the factory.
<b>GSM Signal</b>	Signal strength of the last GSM communications, expressed as a percentage.
<b>Battery Status</b>	Battery status for devices that are powered by battery, expressed as a percentage. It is important to note that this will be the battery status read while the device is under full load (GSM communications active). It would normally indicate lower than the recorded battery status in the datalog (which is read while the device is essentially idle).
<b>Current Power</b>	An indicator as to how this remote device is being powered. Normally the same as the power mode but can vary for systems on Dual Power mode. For devices in a dual power mode, this parameter will display the current power status of the remote device. Battery or Mains.
<b>Power Mode</b>	Selected Power Mode under which the remote device is operating. This can be Battery, Mains or Dual power modes.
<b>Wakeup Per.</b>	The Wakeup Period set in minutes. Refer to the device configuration chapter for an explanation of this parameter.
<b>Datalog Per.</b>	The Datalog Period set minutes. Refer to the device configuration chapter for an explanation of this parameter.
<b>Forward Totaliser</b>	Meter forward totaliser read from the ECO interface.
<b>Meter Serial</b>	Meter serial number read from the ECO interface.
<b>Totaliser 1</b>	The current Totaliser 1 reading with its relevant pulse weight implemented including the unit of measure.
<b>Totaliser 2</b>	The current Totaliser 2 reading with its relevant pulse weight implemented including the unit of measure.
<b>Medium</b>	Measurement medium (eg water, hot water etc) read from the ECO interface.
<b>Last Seen</b>	The date and time the remote device was last seen connecting into the server.
<b>Latitude</b>	Captured device Latitude.
<b>Longitude</b>	Captured device Longitude.

**User Config**

The user defined data recorded on the remote device. Refer to the device configuration chapter for an explanation of this parameter.

To get the latest update of this data, you will need to press the 'Refresh Data' button which will then update this screen from the database.


To the right of screen is the Datalog information box. This box will be populated with the most recent data from the recorded datalog of this remote device ([read from the database](#)). By default, when the screen opens, the last two weeks' worth of data will be displayed in this table. To select a different range of data, you can select the 'From Date' and 'To Date' values and press the 'Read Datalog' button.

This application will record the following data in the datalog.

Datalog

No.	Date	Fwd Totaliser	Consumption	Flow /hr	Serial Num	ECO Status	Totaliser 1	Totaliser 2	Ba ^
333	09 Feb 2020 23:00:00	2.044	0.000	0.000	16000916	00	0	0	
334	10 Feb 2020 00:00:00	2.044	0.000	0.000	16000916	00	0	0	
335	10 Feb 2020 01:00:00	2.044	0.000	0.000	16000916	00	0	0	
336	10 Feb 2020 02:00:00	2.044	0.000	0.000	16000916	00	0	0	
337	10 Feb 2020 03:00:00	2.044	0.000	0.000	16000916	00	0	0	
338	10 Feb 2020 04:00:00	2.044	0.000	0.000	16000916	00	0	0	
339	10 Feb 2020 05:00:00	2.044	0.000	0.000	16000916	00	0	0	
340	10 Feb 2020 06:00:00	2.044	0.000	0.000	16000916	00	0	0	
341	10 Feb 2020 07:00:00	2.044	0.000	0.000	16000916	00	0	0	
342	10 Feb 2020 08:00:00	2.044	0.000	0.000	16000916	00	0	0	
343	10 Feb 2020 09:00:00	2.044	0.000	0.000	16000916	00	0	0	
344	10 Feb 2020 10:00:00	2.044	0.000	0.000	16000916	00	0	0	
345	10 Feb 2020 11:00:00	2.044	0.000	0.000	16000916	00	0	0	
346	10 Feb 2020 12:00:00	2.044	0.000	0.000	16000916	00	0	0	

Raw Data 
  Hourly 
  Daily 
  Weekly 
  Monthly

Night Flow Range 



Information	Notes
<b>Date/Time</b>	Date and time of the datalog record.
<b>Fwd Totaliser</b>	Forward Totaliser reading.
<b>Consumption</b>	The effective 'consumption' as the difference between this current reading and the previous reading.
<b>Flow/hr</b>	Flow rate calculated as volume per hour.
<b>Serial Number</b>	Serial Number of the meter at the time of the read.
<b>Totaliser 1</b>	Totaliser 1 reading.
<b>Totaliser 2</b>	Totaliser 2 reading.
<b>ECO Status</b>	Status of the ECO interface at time of read. (OK or ECO Error)
<b>Battery</b>	Battery level in percentage. Only displayed on battery powered devices.
<b>Power</b>	Current power status. Mains/Battery

The data in this datalog table can be displayed (and graphed) in a number of different ways. These are selected by choosing the option at the bottom of the datalog table. Options include Raw Data and averaged hourly, daily, weekly and monthly data. When the averaging options are chosen, missing data is automatically interpolated to fill in the missing gaps. Interpolated data will have the number column entries highlighted in red with a small 'Interpolated data' message at the top right of the datalog table.

Datalog \* Interpolated data

No.	Date	Fwd Totaliser	Consumption	Flow /hr	Serial Num	ECO Status	Totaliser 1	Totaliser 2	Ba
318	09 Feb 2020 08:00:00	2.044	0.000	0.000	16000916	00	0	0	
319	09 Feb 2020 09:00:00	2.044	0.000	0.000	16000916	00	0	0	
320	09 Feb 2020 10:00:00	2.044	0.000	0.000	16000916	00	0	0	
321	09 Feb 2020 11:00:00	2.044	0.000	0.000	16000916	00	0	0	
322	09 Feb 2020 12:00:00	2.044	0.000	0.000	16000916	00	0	0	
323	09 Feb 2020 13:00:00	2.044	0.000	0.000	16000916	00	0	0	
324	09 Feb 2020 14:00:00	2.044	0.000	0.000	16000916	00	0	0	
325	09 Feb 2020 15:00:00	2.044	0.000	0.000	16000916	00	0	0	
326	09 Feb 2020 16:00:00	2.044	0.000	0.000		00	0	0	
327	09 Feb 2020 17:00:00	2.044	0.000	0.000	16000916	00	0	0	
328	09 Feb 2020 18:00:00	2.044	0.000	0.000	16000916	00	0	0	
329	09 Feb 2020 19:00:00	2.044	0.000	0.000	16000916	00	0	0	
330	09 Feb 2020 20:00:00	2.044	0.000	0.000	16000916	00	0	0	
331	09 Feb 2020 21:00:00	2.044	0.000	0.000	16000916	00	0	0	

Raw Data 
  Hourly 
  Daily 
  Weekly 
  Monthly

Night Flow Range

As per the previously explained functions throughout the Cloudworks suite, columns can be switched off/on and re-ordered to the users requirements. The exporting will be as per the layout presented on the screen.

You can zoom into a range of the data by simply selecting those records in the table. This will result in the graph at the bottom being updated to display only those readings.

Deleting the datalog or removing a range of records can be easily done by using the 'Delete Datalog' button. To delete a range, simply select the range in the datalog table and press the 'Delete Datalog' button. If no range is selected, it will be assumed that you wish to delete the entire datalog. There will be a prompt to ensure that you are aware of the action you are about to take.

Data that is displayed in the table will also be represented in the graph at the bottom of the screen. There are two graphs displayed, namely the Consumption Graph (consumption/flow), and a Night Flow graph. These graphs can be selectively switched on/off by clicking the ticks below the datalog table.

Datalog \* Interpolated data

No.	Date	Fwd Totaliser	Consumption	Flow/hr	Serial Num	ECO Status	Totaliser 1	Totaliser 2	Lo
106	03 Dec 2018 00:00:00	1.821	0.000	0.000	16000916	00	0	0	
107	03 Dec 2018 01:00:00	1.821	0.000	0.000	16000916	00	0	0	
108	03 Dec 2018 02:00:00	1.821	0.000	0.000	16000916	00	0	0	
109	03 Dec 2018 03:00:00	1.821	0.000	0.000	16000916	00	0	0	
110	03 Dec 2018 04:00:00	1.821	0.000	0.000	16000916	00	0	0	
111	03 Dec 2018 05:00:00	1.821	0.000	0.000	16000916	00	0	0	
112	03 Dec 2018 06:00:00	1.821	0.000	0.000	16000916	00	0	0	
113	03 Dec 2018 07:00:00	1.821	0.000	0.000	16000916	00	0	0	
114	03 Dec 2018 08:00:00	1.821	0.000	0.000	16000916	00	0	0	
115	03 Dec 2018 09:00:00	1.828	0.007	0.007	16000916	00	0	0	
116	03 Dec 2018 10:00:00	1.828	0.000	0.000	16000916	00	0	0	
117	03 Dec 2018 11:00:00	1.828	0.000	0.000	16000916	00	0	0	
118	03 Dec 2018 12:00:00	0.000	-1.828	-1.828	16000916	00	0	0	
119	03 Dec 2018 13:00:00	1.828	1.828	1.828	16000916	00	0	0	


From Date: 19 Nov 2018

To Date: 03 Dec 2018

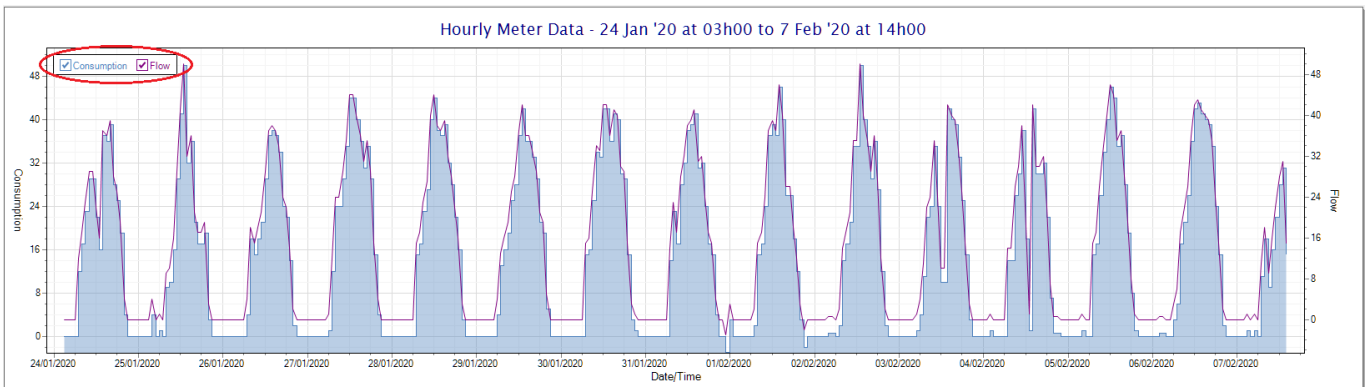
Consumption Graph

Night Flow Graph

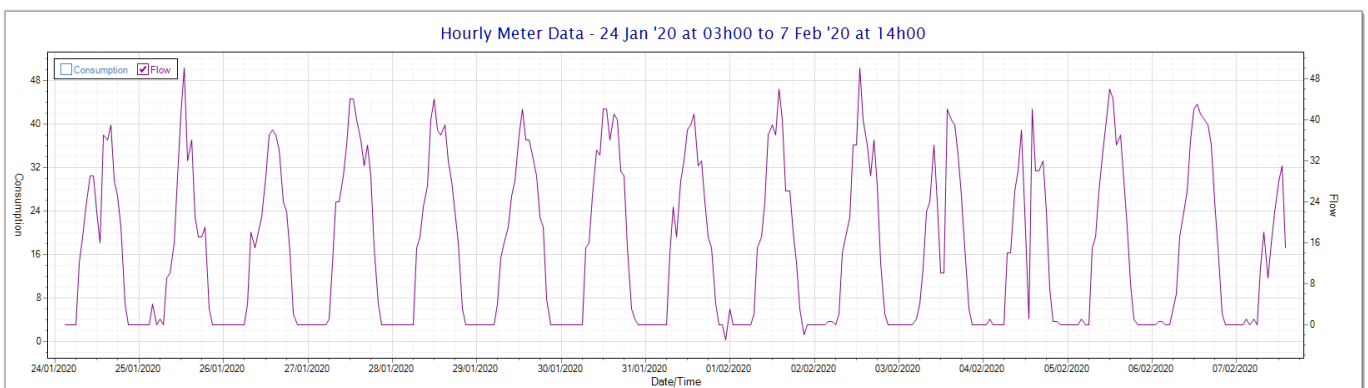
Raw Data 
  Hourly 
  Daily 
  Weekly 
  Monthly

Night Flow Range: 

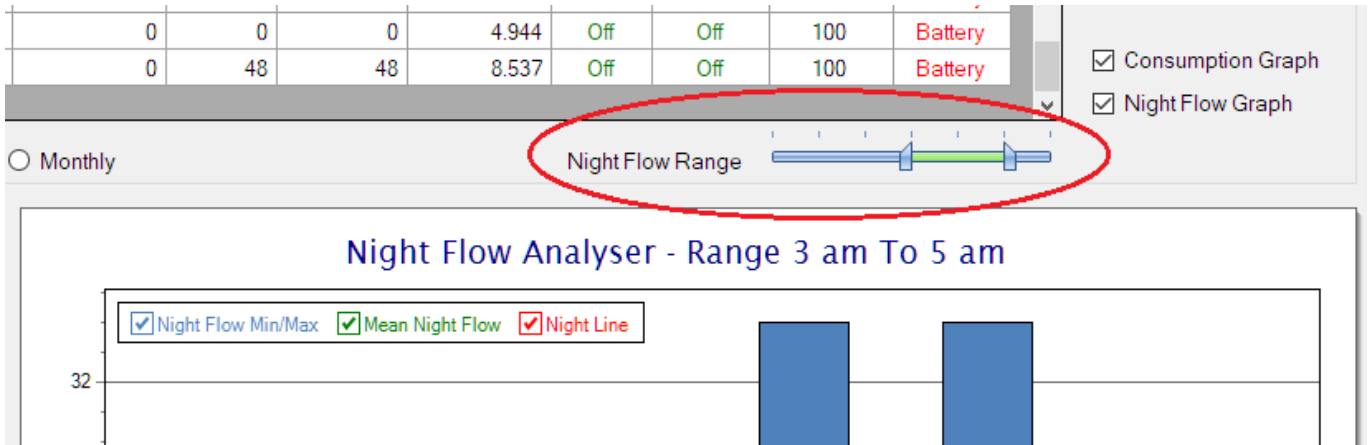
The Consumption Graph displays the consumption, pressure and flow related data. Individual graph series can be switched off/on by selecting the ticks at the top left of the graph.



To view the flow only would look like this:-



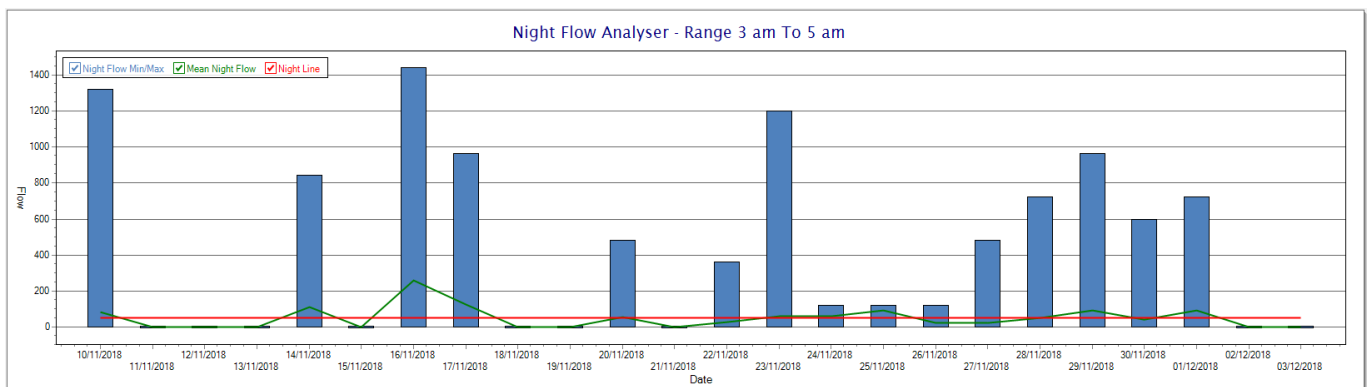
Also displayed is the Night Flow graph. The function of this graph is to specifically analyse the night time water flows at an installation. This analysis is done based on the data received during a specific time period during the night (normally from 3am to 5am). This period for analysis can be adjusted by sliding the elements of the slider on the top right of the graph.



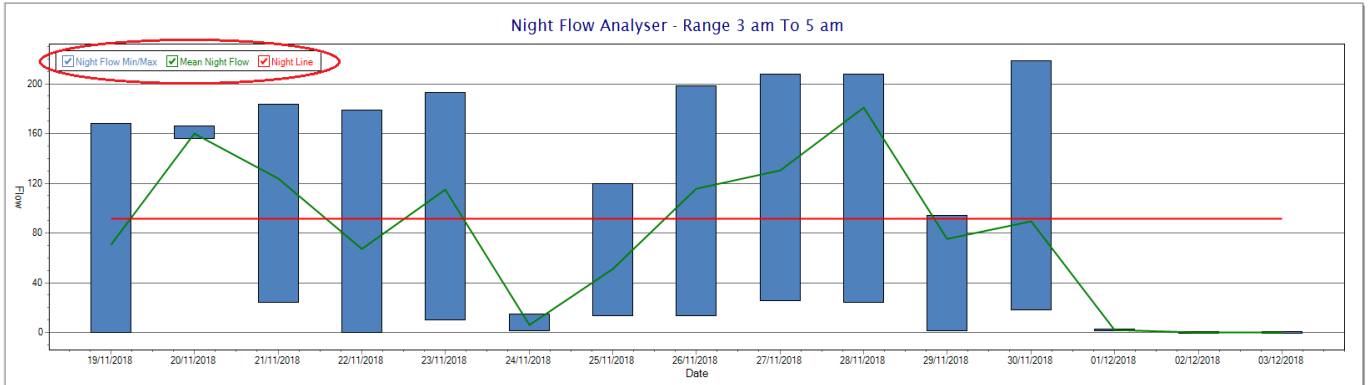
The graph will show a couple of different series.

1. Night Flow Min/Max - this will be a bar series indicating the minimum and maximum flows during the measurement period. The base of the block is the minimum flow and the top, the maximum flow. Depending on the type of installation, during this period you would expect the minimum flow point to come to zero and therefore sit on the base of the graph. The maximum flow would simply indicate some consumption during the period of measure and is not really a concern unless that was not expected.
2. Mean Night Flow - this will show the average night flow during that period. Shown in green and would normally simply be the midpoint between the minimum and maximum flows.
3. Night Line - the night line shows the average flow for the entire range of data being measured. Shown in red, this is useful for determining the average night usage over different data ranges.

The Night Flow graph is particularly useful in giving a quick graphical indication of the possibility of a leak scenario. In most case, where there should be no continuous use of water at night, the graph would look as below:-



During a possible leak situation, the minimum night flow does not return to zero and the graph will appear to bounce off the bottom.



So, at a quick glance it is possible to see if there is a problem at this installation. As per the Consumption Graph, the different graph series can be switched off/on by clicking the series ticks on the top left hand corner.

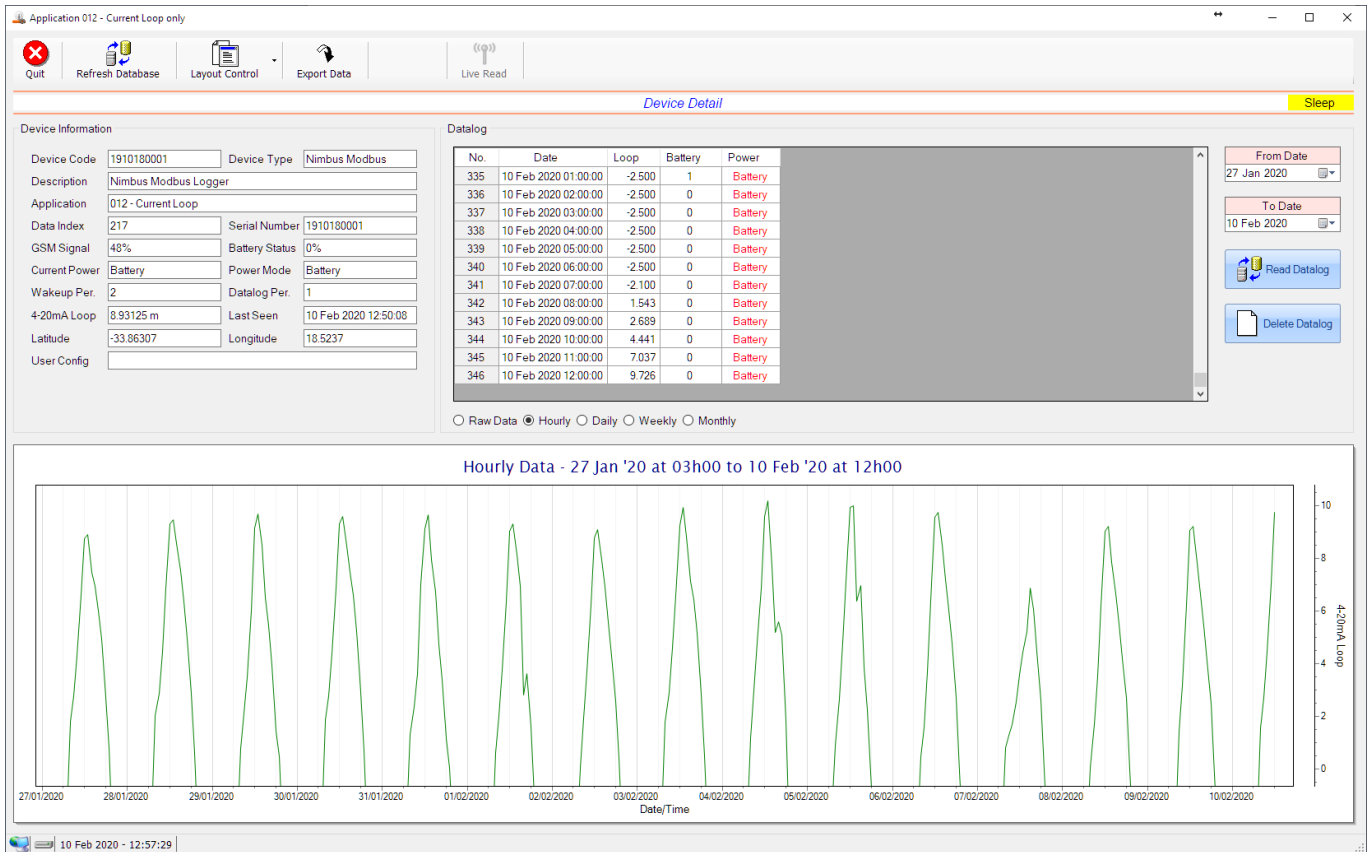


### 2.8.12 Application 011 - GWF Sonico Meter

This application is currently still under development and is not ready for release.

DOCUMENT NAME	CLASSIFICATION	DATE	PAGE
CLOUDWORKS CLIENT USER MANUAL	CONFIDENTIAL	15-JUL-21	101 OF 201

### 2.8.13 Application 012 - Current Loop only



This application type would be selected where you are only using the 4-20mA current loop interface. This application is ideally suited for the remote reading of analog sensors such as pressure and temperature etc.

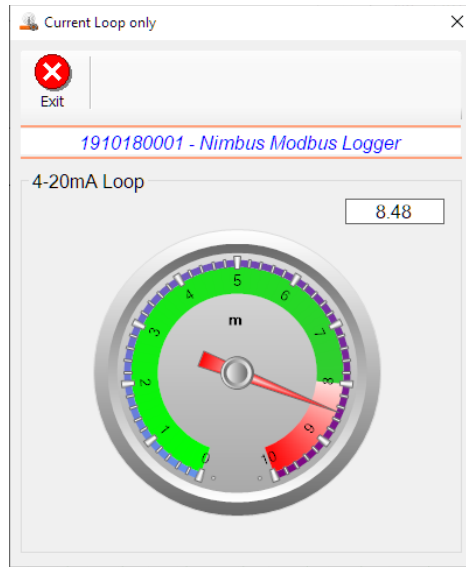
Functions on the top menu bar are mostly as per previous screens within the Cloudworks suite. These would be the 'Refresh Database', 'Layout Control' and 'Export Data' buttons which have been explained earlier. Added functionality is the 'Live Read', button.

If a device is powered and permanently connected to the server (and online), then the 'Live Read' Button will be active allowing you to stream live data directly from that device in real time. **Bear in mind that, while this live streaming screen is active, the cellular data consumption of that device will be much greater than the usual background periodic read used to update the database.**

The current communications status of the device will be displayed on the top right of the screen.

Remote devices that are offline or sleeping cannot be accessed for streaming data. This status will be automatically updated while on this screen without the need for pressing the 'Refresh Database' button.

Pressing the 'Live Read' button will launch the live streaming data screen for that device. All the data on this screen is fetched directly from the remote device and not the database.



The data is displayed as a needle type dial. This particular device has been connected to a submerged current loop hydrostatic sensor that is indicating the water level in a tank in metres.

Returning to the applications screen, data is displayed in various groups. On the top left is grouped the 'Device Information' block. This information is data relevant to the remote device and is really displaying data that is present within the database. Mostly data that is populated during the 'Reload Device Config' process. This data is as follows:-

Information	Notes
<b>Device Code</b>	The Device Code assigned to this particular remote device. All communications are initiated by addressing this code. This code is unique to all remote devices and is assigned at the time of manufacture.
<b>Device Type</b>	Type of Remote Device. eg CDS538 Cumulus Logger etc
<b>Description</b>	The description is a user defined parameter that is captured during the setup of each device. This would normally be something that would describe the location or application of this particular device.
<b>Application</b>	Selected device application. Application 000 - Basic Cumulus function in this case.
<b>Data Index</b>	As each device is captured onto Cloudworks system, it is assigned a unique data index. This index is used when externally extracting the log data from the database as each record in the global datalog would be labelled with this index number.
<b>Serial Number</b>	Serial number of this device - assigned in the factory.
<b>GSM Signal</b>	Signal strength of the last GSM communications, expressed as a percentage.

<b>Battery Status</b>	Battery status for devices that are powered by battery, expressed as a percentage. It is important to note that this will be the battery status read while the device is under full load (GSM communications active). It would normally indicate lower than the recorded battery status in the datalog (which is read while the device is essentially idle).
<b>Current Power</b>	An indicator as to how this remote device is being powered. Normally the same as the Power Mode but can vary for systems on Dual Power mode. For devices in a dual power mode, this parameter will display the current power status of the remote device. Battery or Mains.
<b>Power Mode</b>	Selected Power Mode under which the remote device is operating. This can be Battery, Mains or Dual power modes.
<b>Wakeup Per.</b>	The Wakeup Period set in minutes. Refer to the device configuration chapter for an explanation of this parameter.
<b>Datalog Per.</b>	The Datalog Period set in minutes. Refer to the device configuration chapter for an explanation of this parameter.
<b>4-20mA Loop</b>	The 4-20mA current loop reading with its calibration data implemented including the unit of measure.
<b>Last Seen</b>	The date and time the remote device was last seen connecting into the server.
<b>Latitude</b>	Captured device Latitude.
<b>Longitude</b>	Captured device Longitude.
<b>User Config</b>	The user defined data recorded on the remote device. Refer to the device configuration chapter for an explanation of this parameter.

To get the latest update of this data, you will need to press the 'Refresh Data' button which will then update this screen from the database.

To the right of screen is the Datalog information box. This box will be populated with the most recent data from the recorded datalog of this remote device ([read from the database](#)). By default, when the screen opens, the last two weeks' worth of data will be displayed in this table. To select a different range of data, you can select the 'From Date' and 'To Date' values and press the 'Read Datalog' button.

This application will record the following data in the datalog.

Datalog

No.	Date	Loop	Battery	Power
336	10 Feb 2020 02:00:00	-2.500	0	Battery
337	10 Feb 2020 03:00:00	-2.500	0	Battery
338	10 Feb 2020 04:00:00	-2.500	0	Battery
339	10 Feb 2020 05:00:00	-2.500	0	Battery
340	10 Feb 2020 06:00:00	-2.500	0	Battery
341	10 Feb 2020 07:00:00	-2.100	0	Battery
342	10 Feb 2020 08:00:00	1.543	0	Battery
343	10 Feb 2020 09:00:00	2.689	0	Battery
344	10 Feb 2020 10:00:00	4.441	0	Battery
345	10 Feb 2020 11:00:00	7.037	0	Battery
346	10 Feb 2020 12:00:00	9.726	0	Battery
347	10 Feb 2020 13:00:00	9.760	0	Battery

Raw Data 
  Hourly 
  Daily 
  Weekly 
  Monthly

Information	Notes
<b>Date/Time</b>	Date and time of the datalog record.
<b>Loop</b>	4-20mA Loop reading with its applied calibration.
<b>Battery</b>	Battery level in percentage. Only displayed on battery powered devices.
<b>Power</b>	Current power status. Mains/Battery

The data in this datalog table can be displayed (and graphed) in a number of different ways. These are selected by choosing the option at the bottom of the datalog table. Options include Raw Data and averaged hourly, daily, weekly and monthly data. When the averaging options are chosen, missing data is automatically interpolated to fill in the missing gaps. Interpolated data will have the number column entries highlighted in red with a small 'Interpolated data' message at the top right of the datalog table.

Datalog \* Interpolated data

No.	Date	Loop	Battery	Power
6	21 Jan 2020 16:00:00	6.029	47	Battery
7	21 Jan 2020 17:00:00	4.582	47	Battery
8	21 Jan 2020 18:00:00	2.726	47	Battery
9	21 Jan 2020 19:00:00	0.113	47	Battery
10	21 Jan 2020 20:00:00	0.113	47	Battery
11	21 Jan 2020 21:00:00	0.113	47	Battery
12	21 Jan 2020 22:00:00	-2.500	48	Battery
13	21 Jan 2020 23:00:00	-2.500	47	Battery
14	22 Jan 2020 00:00:00	-2.500	47	Battery
15	22 Jan 2020 01:00:00	-2.500	47	Battery
16	22 Jan 2020 02:00:00	-2.500	47	Battery
17	22 Jan 2020 03:00:00	-2.500	47	Battery
18	22 Jan 2020 04:00:00	-2.500	47	Battery

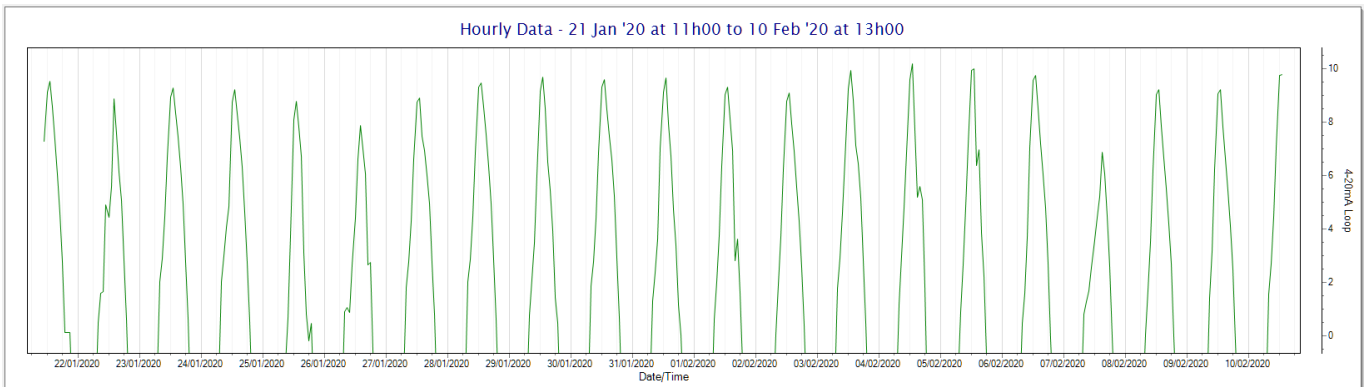
Raw Data 
  Hourly 
  Daily 
  Weekly 
  Monthly

As per the previously explained functions throughout the Cloudworks suite, columns can be switched off/on and re-ordered to the users requirements. The exporting will be as per the layout presented on the screen.

You can zoom into a range of the data by simply selecting those records in the table. This will result in the graph at the bottom being updated to display only those readings.

Deleting the datalog or removing a range of records can be easily done by using the 'Delete Datalog' button. To delete a range, simply select the range in the datalog table and press the 'Delete Datalog' button. If no range is selected, it will be assumed that you wish to delete the entire datalog. There will be a prompt to ensure that you are aware of the action you are about to take.

Data that is displayed in the table will also be represented in the graph at the bottom of the screen.



### 2.8.14 Application 013 - Aquamaster 3

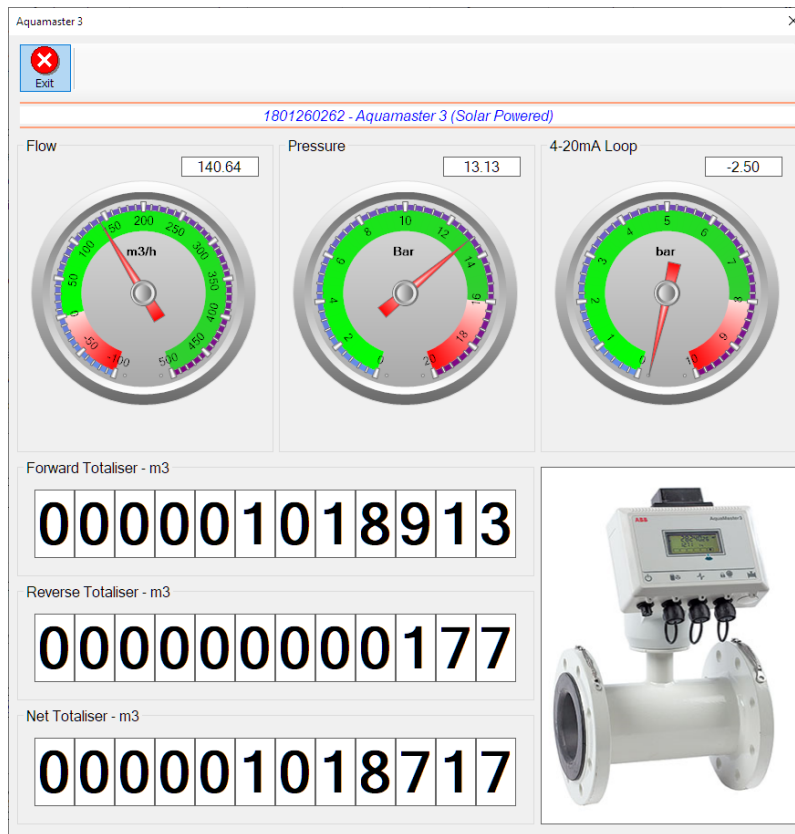
This type would be selected for applications that are used on an ABB Aquamaster 3 water meter connected to the Modbus interface. Forward/Reverse Totals, Flow and Pressure are read directly from the interface of the meter.

Functions on the top menu bar are mostly as per previous screens within the Cloudworks suite. These would be the 'Refresh Database', 'Layout Control' and 'Export Data' buttons which have been explained earlier. Added functionality is the 'Live Read' button.

If a device is powered and permanently connected to the server (and online), then the 'Live Read' Button will be active allowing you to stream live data directly from that device in real time. **Bear in mind that, while this live streaming screen is active, the cellular data consumption of that device will be much greater than the usual background periodic read used to update the database.**

The current communications status of the device will be displayed on the top right of the screen.

Remote devices that are offline or sleeping cannot be accessed for streaming data. This status will be automatically updated while on this screen without the need of hitting 'Refresh Database' function. Pressing the 'Live Read' will launch the streaming live data screen for that device. **All the data on this screen is fetched directly from the remote device and not the database.**



The data displayed are the two totalisers (forward/reverse) and combined volume (net totaliser) as digital readouts and three needle type displays showing flow and pressure (read directly from the meter) and the current loop reading.

Returning to the applications screen, data is displayed in various groups. On the top left is grouped the Device Information block. This information is data relevant to the remote device and is really displaying data that is present within the database. Mostly data that is populated during the 'Reload Device Config' process.

This data is as follows:-

Information	Notes
<b>Device Code</b>	The Device Code assigned to this particular remote device. All communications are initiated by addressing this code. This code is unique to all remote devices and is assigned at the time of manufacture.
<b>Device Type</b>	Type of Remote Device. eg CDS538 Cumulus Logger etc
<b>Description</b>	The description is a user defined parameter that is captured during the setup of each device. This would normally be something that would describe the location or application of this particular device.
<b>Application</b>	Selected device application. Application 003 - Aquamaster 3 function in this case.





<b>Data Index</b>	As each device is captured on to Cloudworks system, it is assigned a unique data index. This index is used when externally extracting the log data from the database as each record in the global datalog would be labelled with this index number.
<b>Serial Number</b>	Serial number of this device - assigned in the factory.
<b>GSM Signal</b>	Signal strength of the last GSM communications, expressed as a percentage.
<b>Battery Status</b>	Battery status for devices that are powered by battery, expressed as a percentage. It is important to note that this will be the battery status read while the device is under full load (GSM communications active). It would normally indicate lower than the recorded battery status in the datalog (which is read while the device is essentially idle).
<b>Current Power</b>	An indicator as to how this remote device is being powered. Normally the same as the power mode but can vary for systems on Dual Power mode. For devices in a dual power mode, this parameter will display the current power status of the remote device. Battery or Mains.
<b>Power Mode</b>	Selected Power Mode under which the remote device is operating. This can be Battery, Mains or Dual power modes.
<b>Wakeup Per.</b>	The Wakeup Period set in minutes. Refer to the device configuration chapter for an explanation of this parameter.
<b>Datalog Per.</b>	The Datalog Period set minutes. Refer to the device configuration chapter for an explanation of this parameter.
<b>Fwd Totaliser</b>	The current Forward Totaliser reading.
<b>Rev Totaliser</b>	The current Reverse Totaliser reading.
<b>Flow</b>	Current flow reading.
<b>Pressure</b>	Current pressure reading.
<b>4-20mA Current Loop</b>	The 4-20mA current loop reading with its calibration data implemented including the unit of measure.
<b>Last Seen</b>	The date and time the remote device was last seen connecting into the server.
<b>Latitude</b>	Captured device Latitude.
<b>Longitude</b>	Captured device Longitude.
<b>User Config</b>	The user defined data recorded on the remote device. Refer to the device configuration chapter for an explanation of this parameter.



To get the latest update of this data, you will need to press the 'Refresh Data' button which will then update this screen from the database.

To the right of screen is the Datalog information box. This box will be populated with the most recent data from the recorded datalog of this remote device ([read from the database](#)). By default, when the screen opens, the last two weeks' worth of data will be displayed in this table. To select a different range of data, you can select the 'From Date' and 'To Date' values and press the 'Read Datalog' button.

This application will record the following data in the datalog.

Datalog

No.	Date	Fwd Totaliser	Fwd Cons.	Rev Totaliser	Rev Cons.	Flow	Pressure	Loop	Battery
95	01 Feb 2020 01:00:00	1005289	0	175	0	-0.008	16.931	0	
96	01 Feb 2020 02:00:00	1005289	0	175	0	-0.033	16.944	0	
97	01 Feb 2020 03:00:00	1005289	0	175	0	-0.009	16.928	0	
98	01 Feb 2020 04:00:00	1005289	0	175	0	0.011	16.930	0	
99	01 Feb 2020 05:00:00	1005289	0	175	0	-0.010	16.914	0	
100	01 Feb 2020 06:00:00	1005289	0	175	0	0.051	16.948	0	
101	01 Feb 2020 07:00:00	1005301	12	175	0	14.018	16.799	0	
102	01 Feb 2020 08:00:00	1005364	63	175	0	64.363	16.230	0	
103	01 Feb 2020 09:00:00	1005443	79	175	0	79.177	15.891	0	
104	01 Feb 2020 10:00:00	1005540	97	175	0	98.847	15.250	0	
105	01 Feb 2020 11:00:00	1005663	123	175	0	124.679	14.396	0	
106	01 Feb 2020 12:00:00	1005805	142	175	0	141.942	13.628	0	
107	01 Feb 2020 13:00:00	1005945	140	175	0	139.034	13.225	0	

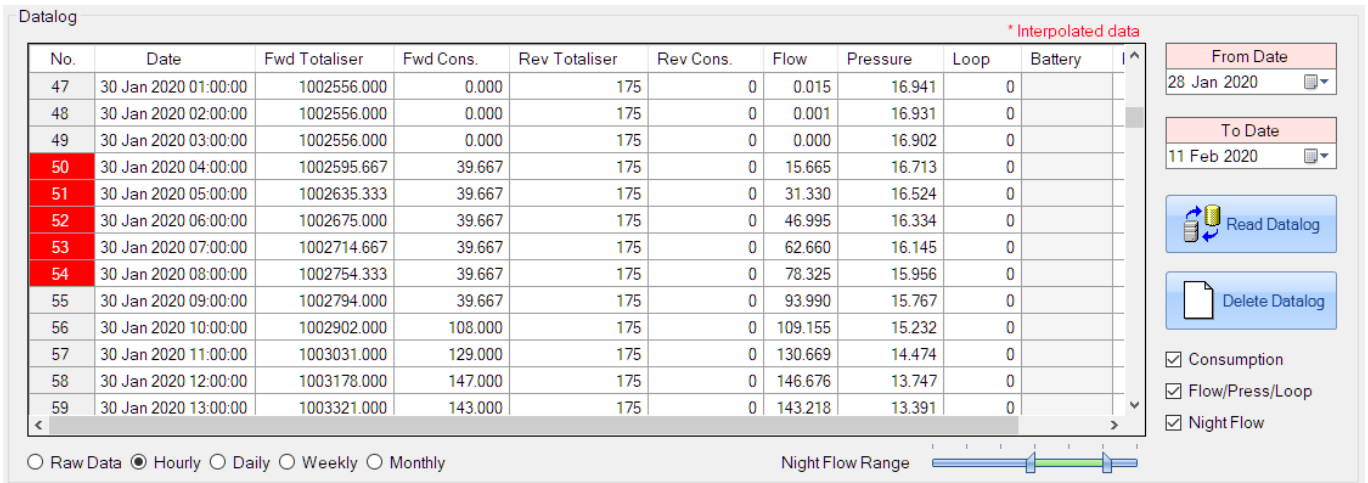
Raw Data 
  Hourly 
  Daily 
  Weekly 
  Monthly

Night Flow Range

Information	Notes
<b>Date/Time</b>	Date and time of the datalog record.
<b>Fwd Totaliser</b>	Forward Totaliser reading.
<b>Rev Totaliser</b>	Reverse Totaliser reading.
<b>Fwd Cons.</b>	The Forward consumption reading.
<b>Rev Cons.</b>	The Reverse consumption Reading.
<b>Flow</b>	Flow rate calculated as volume per hour.
<b>Pressure</b>	Current Pressure reading read from the 4-20mA input.
<b>Loop</b>	4-20mA Loop reading with its applied calibration.
<b>Battery</b>	Battery level in percentage. Only displayed on battery powered devices.
<b>Power</b>	Current power status. Mains/Battery

The data in this datalog table can be displayed (and graphed) in a number of different ways. These are selected by choosing the option at the bottom of the datalog table. Options include Raw Data and averaged hourly, daily, weekly and monthly

data. When the averaging options are chosen, missing data is automatically interpolated to fill in the missing gaps. Interpolated data will have the number column entries highlighted in red with a small 'Interpolated data' message at the top right of the datalog table.



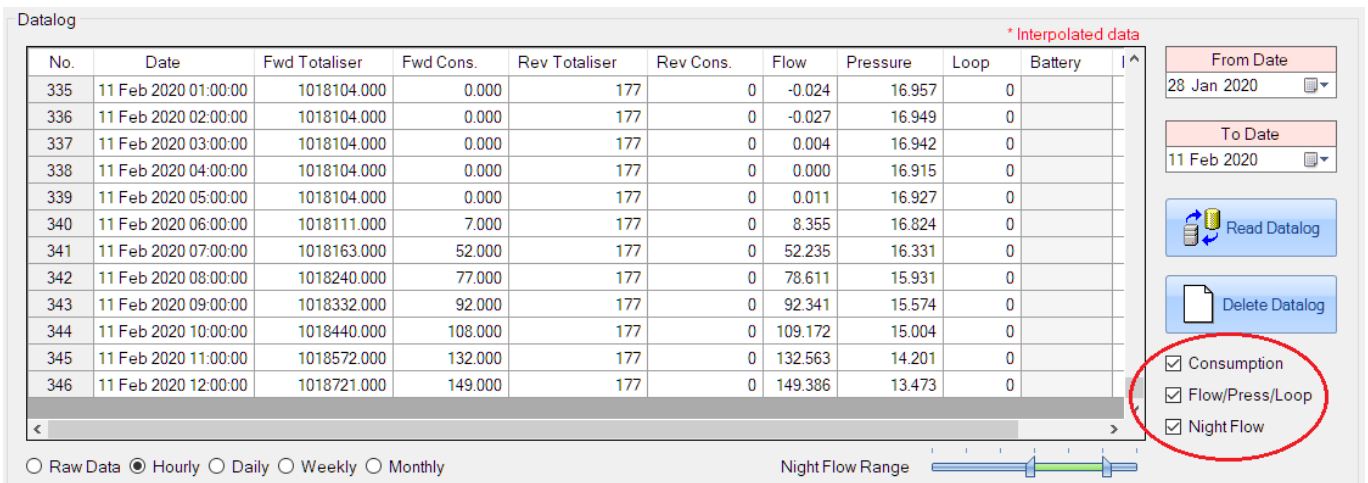
No.	Date	Fwd Totaliser	Fwd Cons.	Rev Totaliser	Rev Cons.	Flow	Pressure	Loop	Battery
47	30 Jan 2020 01:00:00	1002556.000	0.000	175	0	0.015	16.941	0	
48	30 Jan 2020 02:00:00	1002556.000	0.000	175	0	0.001	16.931	0	
49	30 Jan 2020 03:00:00	1002556.000	0.000	175	0	0.000	16.902	0	
50	30 Jan 2020 04:00:00	1002595.667	39.667	175	0	15.665	16.713	0	
51	30 Jan 2020 05:00:00	1002635.333	39.667	175	0	31.330	16.524	0	
52	30 Jan 2020 06:00:00	1002675.000	39.667	175	0	46.995	16.334	0	
53	30 Jan 2020 07:00:00	1002714.667	39.667	175	0	62.660	16.145	0	
54	30 Jan 2020 08:00:00	1002754.333	39.667	175	0	78.325	15.956	0	
55	30 Jan 2020 09:00:00	1002794.000	39.667	175	0	93.990	15.767	0	
56	30 Jan 2020 10:00:00	1002902.000	108.000	175	0	109.155	15.232	0	
57	30 Jan 2020 11:00:00	1003031.000	129.000	175	0	130.669	14.474	0	
58	30 Jan 2020 12:00:00	1003178.000	147.000	175	0	146.676	13.747	0	
59	30 Jan 2020 13:00:00	1003321.000	143.000	175	0	143.218	13.391	0	

As per the previously explained functions throughout the Cloudworks suite, columns can be switched off/on and re-ordered to the users requirements. The exporting will be as per the layout presented on the screen.

You can zoom into a range of the data by simply selecting those records in the table. This will result in the graph at the bottom being updated to display only those readings.

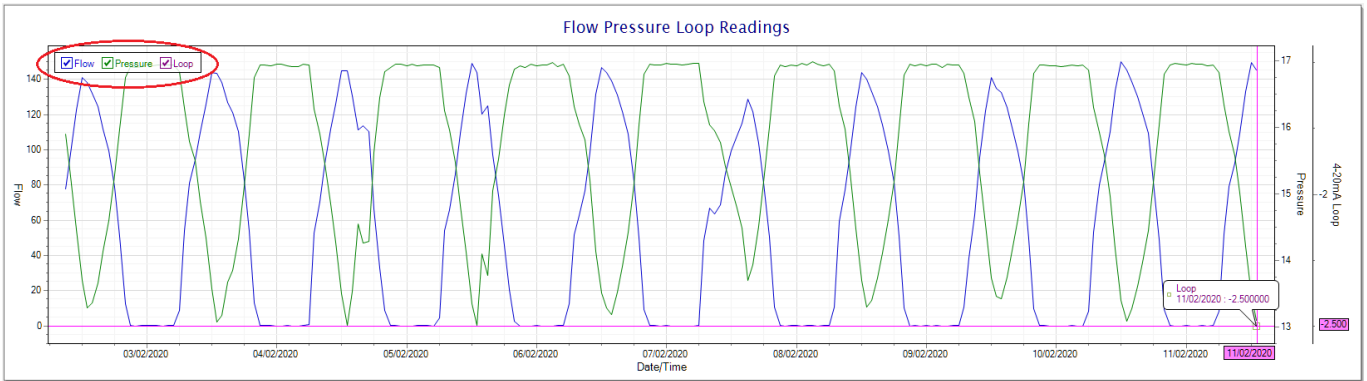
Deleting the datalog or removing a range of records can be easily done by using the 'Delete Datalog' button. To delete a range, simply select the range in the datalog table and press the 'Delete Datalog' button. If no range is selected, it will be assumed that you wish to delete the entire datalog. There will be a prompt to ensure that you are aware of the action you are about to take.

Data that is displayed in the table will also be represented in the graph at the bottom of the screen. There are two graphs displayed, namely the Consumption Graph (consumption/pressure/flow), and a Night Flow graph. These graphs can be selectively switched on/off by clicking the ticks below the datalog table.

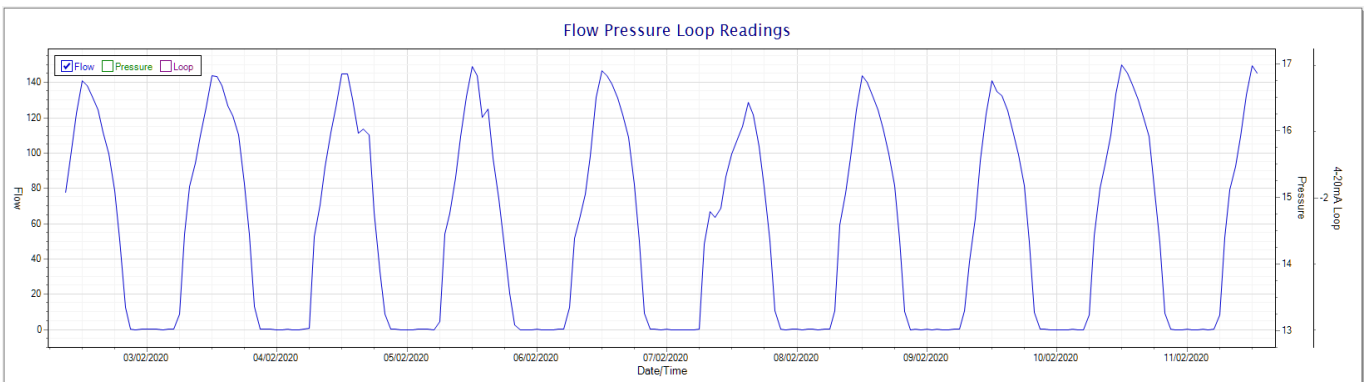


No.	Date	Fwd Totaliser	Fwd Cons.	Rev Totaliser	Rev Cons.	Flow	Pressure	Loop	Battery
335	11 Feb 2020 01:00:00	1018104.000	0.000	177	0	-0.024	16.957	0	
336	11 Feb 2020 02:00:00	1018104.000	0.000	177	0	-0.027	16.949	0	
337	11 Feb 2020 03:00:00	1018104.000	0.000	177	0	0.004	16.942	0	
338	11 Feb 2020 04:00:00	1018104.000	0.000	177	0	0.000	16.915	0	
339	11 Feb 2020 05:00:00	1018104.000	0.000	177	0	0.011	16.927	0	
340	11 Feb 2020 06:00:00	1018111.000	7.000	177	0	8.355	16.824	0	
341	11 Feb 2020 07:00:00	1018163.000	52.000	177	0	52.235	16.331	0	
342	11 Feb 2020 08:00:00	1018240.000	77.000	177	0	78.611	15.931	0	
343	11 Feb 2020 09:00:00	1018332.000	92.000	177	0	92.341	15.574	0	
344	11 Feb 2020 10:00:00	1018440.000	108.000	177	0	109.172	15.004	0	
345	11 Feb 2020 11:00:00	1018572.000	132.000	177	0	132.563	14.201	0	
346	11 Feb 2020 12:00:00	1018721.000	149.000	177	0	149.386	13.473	0	

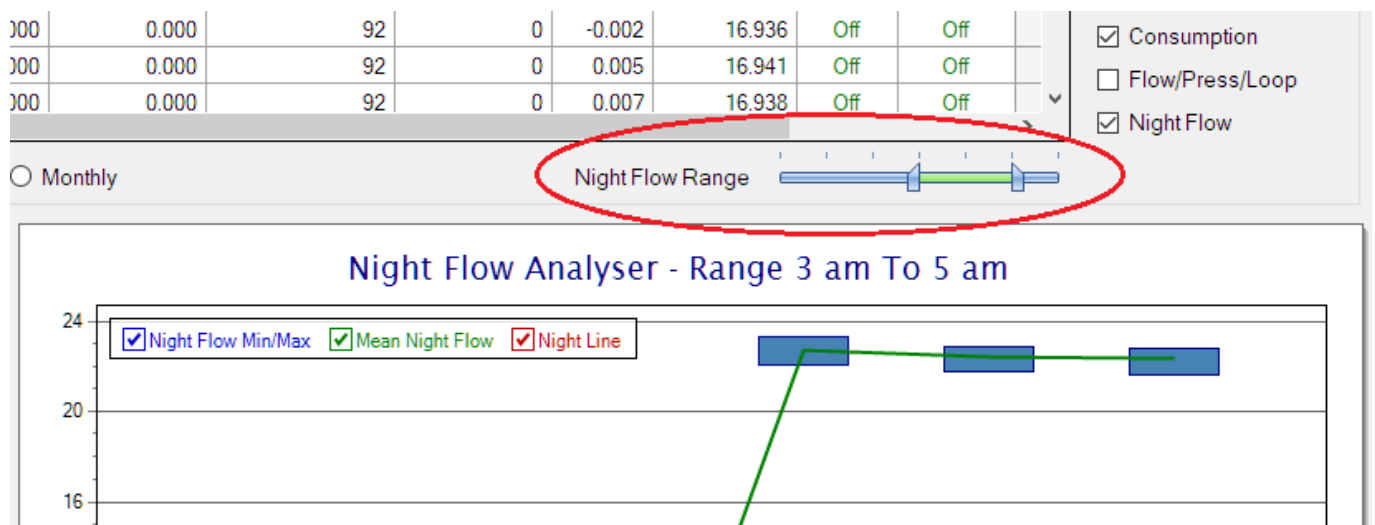
The various series on each graph can be toggled on and off by selecting the series tick in the upper left hand corner.



To view the flow only would look like this:-



Also displayed is the Night Flow graph. The function of this graph is to specifically analyse the night time water flows at an installation. This analysis is done based on the data received during a specific time period during the night (normally from 3am to 5am). This period for analysis can be adjusted by sliding the elements of the slider on the top right of the graph.



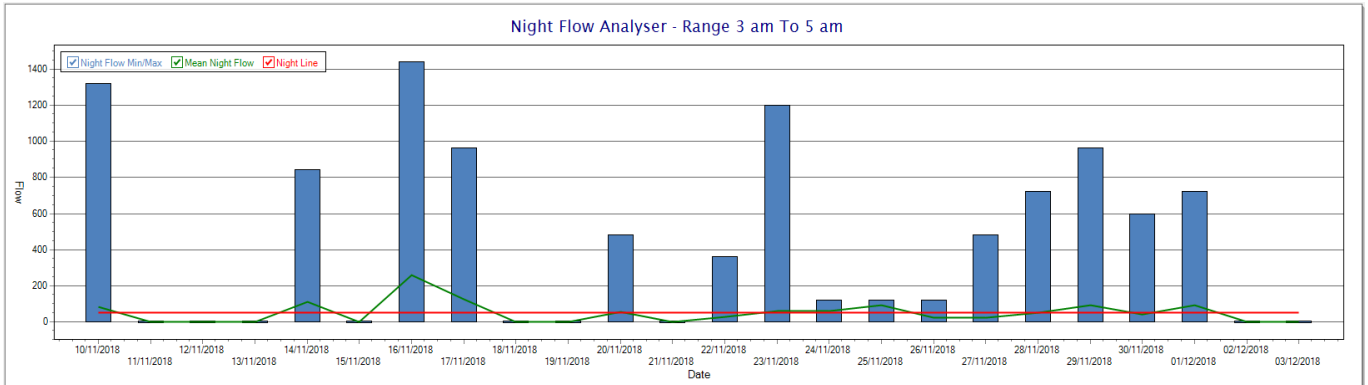
The graph will show a couple of different series.

1. Night Flow Min/Max - this will be a bar series indicating the minimum and maximum flows during the measurement period. The base of the block is the minimum flow and the top, the maximum flow. Depending on

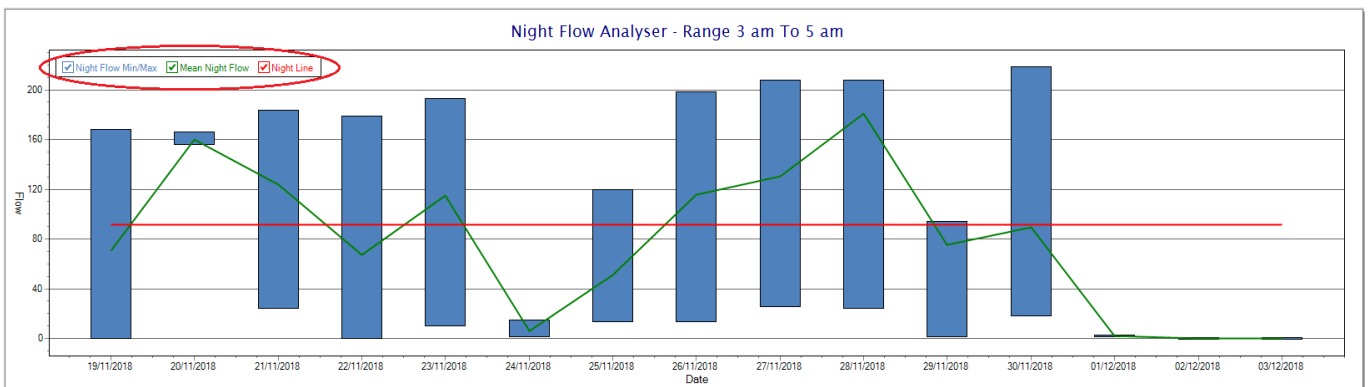
the type of installation, during this period you would expect the minimum flow point to come to zero and therefore sit on the base of the graph. The maximum flow would simply indicate some consumption during the period of measure and is not really a concern unless that was not expected.

2. Mean Night Flow - this will show the average night flow during that period. Shown in green and would normally simply be the midpoint between the minimum and maximum flows.
3. Night Line - the night line shows the average flow for the entire range of data being measured. Shown in red, this is useful for determining the average night usage over different data ranges.

The Night Flow graph is particularly useful in giving a quick graphical indication of the possibility of a leak scenario. In most case, where there should be no continuous use of water at night, the graph would look as below:-

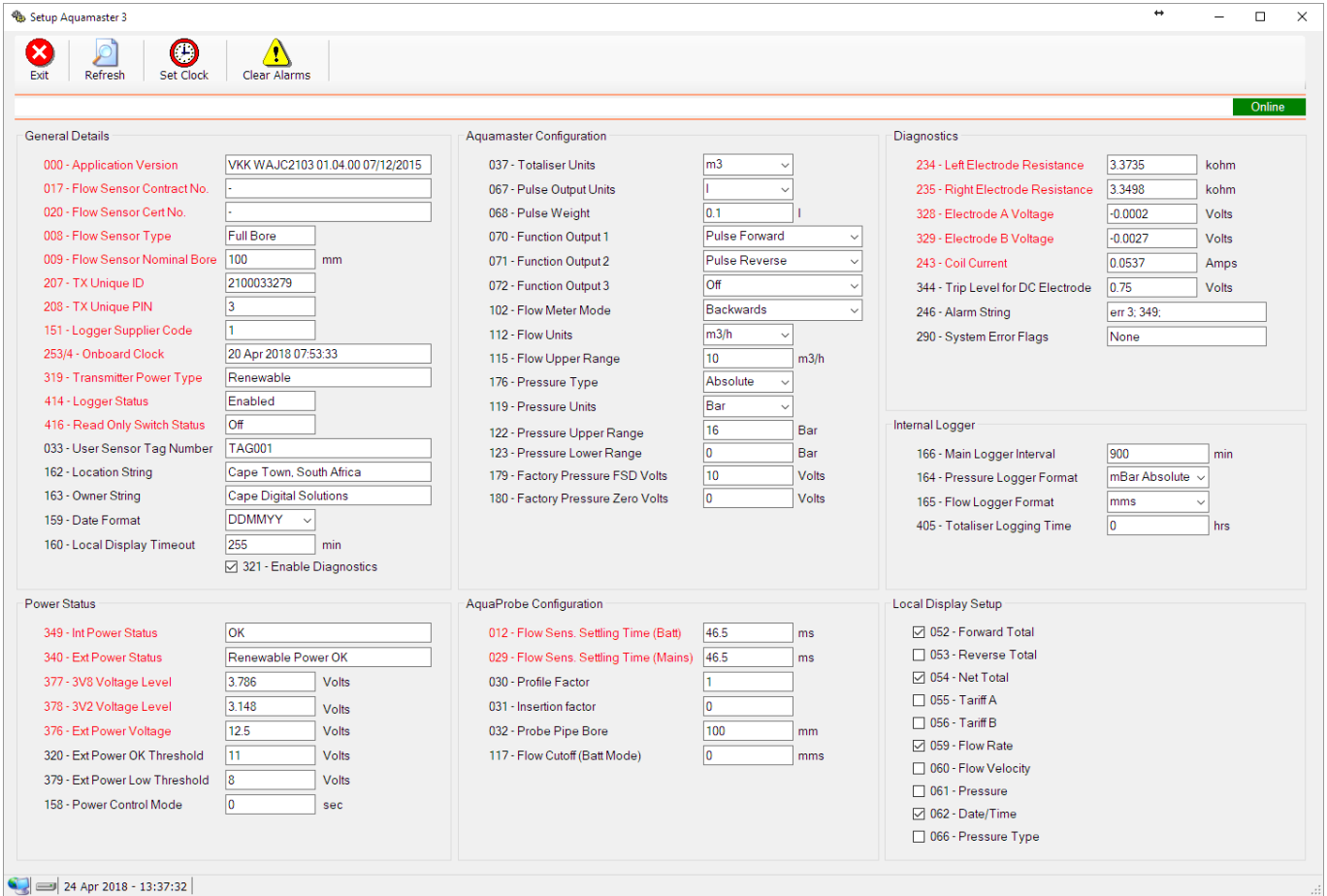


During a possible leak situation, the minimum night flow does not return to zero and the graph will appear to bounce off the bottom.



So, at a quick glance it is possible to see if there is a problem at this installation. As per the Consumption Graph, the different graph series can be switched off/on by clicking the series ticks on the top left hand corner.

Finally, the Aquamaster application screen has a function to allow the setup of the remote meter via a specialised interface screen. Details of the parameters setup can be obtained from the Aquamaster specifications datasheet supplied by ABB limited. The setup screen includes the below parameters.



The screenshot shows the 'Setup Aquamaster 3' application window. At the top, there are control buttons: Exit, Refresh, Set Clock, and Clear Alarms. A status bar on the right indicates 'Online'. The main area is divided into several panels:

- General Details:** Includes fields for Application Version (VKK WAJC2103 01.04.00 07/12/2015), Flow Sensor Contract No., Cert No., Type (Full Bore), Nominal Bore (100 mm), TX Unique ID (2100033279), TX Unique PIN (3), Logger Supplier Code (1), Onboard Clock (20 Apr 2018 07:53:33), Transmitter Power Type (Renewable), Logger Status (Enabled), Read Only Switch Status (Off), User Sensor Tag Number (TAG001), Location String (Cape Town, South Africa), Owner String (Cape Digital Solutions), Date Format (DDMMYY), and Local Display Timeout (255 min). A checkbox for '321 - Enable Diagnostics' is checked.
- Aquamaster Configuration:** Includes Totaliser Units (m3), Pulse Output Units (l), Pulse Weight (0.1 l), Function Output 1 (Pulse Forward), Function Output 2 (Pulse Reverse), Function Output 3 (Off), Flow Meter Mode (Backwards), Flow Units (m3/h), Flow Upper Range (10 m3/h), Pressure Type (Absolute), Pressure Units (Bar), Pressure Upper Range (16 Bar), Pressure Lower Range (0 Bar), Factory Pressure FSD Volts (10 Volts), and Factory Pressure Zero Volts (0 Volts).
- Diagnostics:** Shows Left Electrode Resistance (3.3735 kohm), Right Electrode Resistance (3.3498 kohm), Electrode A Voltage (-0.0002 Volts), Electrode B Voltage (-0.0027 Volts), Coil Current (0.0537 Amps), Trip Level for DC Electrode (0.75 Volts), Alarm String (err 3: 349), and System Error Flags (None).
- Power Status:** Shows Int Power Status (OK), Ext Power Status (Renewable Power OK), 3V8 Voltage Level (3.786 Volts), 3V2 Voltage Level (3.148 Volts), Ext Power Voltage (12.5 Volts), Ext Power OK Threshold (11 Volts), Ext Power Low Threshold (8 Volts), and Power Control Mode (0 sec).
- AquaProbe Configuration:** Shows Flow Sens. Settling Time (Batt) (46.5 ms), Flow Sens. Settling Time (Mains) (46.5 ms), Profile Factor (1), Insertion factor (0), Probe Pipe Bore (100 mm), and Flow Cutoff (Batt Mode) (0 mms).
- Internal Logger:** Shows Main Logger Interval (900 min), Pressure Logger Format (mBar Absolute), Flow Logger Format (mms), and Totaliser Logging Time (0 hrs).
- Local Display Setup:** Includes checkboxes for 052 - Forward Total, 053 - Reverse Total, 054 - Net Total, 055 - Tariff A, 056 - Tariff B, 059 - Flow Rate, 060 - Flow Velocity, 061 - Pressure, 062 - Date/Time, and 066 - Pressure Type.

While the system is online, these parameters can be changed and will immediately be updated on the remote meter via its ModBus connection.

### 2.8.15 Application 014 - Aquamaster 4

This type would be selected for applications that are used on an ABB Aquamaster 4 water meter connected to the Modbus interface. Forward/Reverse Totals, Flow and Pressure are read directly from the interface of the meter.

Functions on the top menu bar are mostly as per previous screens within the Cloudworks suite. These would be the 'Refresh Database', 'Layout Control' and 'Export Data' buttons which have been explained earlier. Added functionality is the 'Live Read' button.

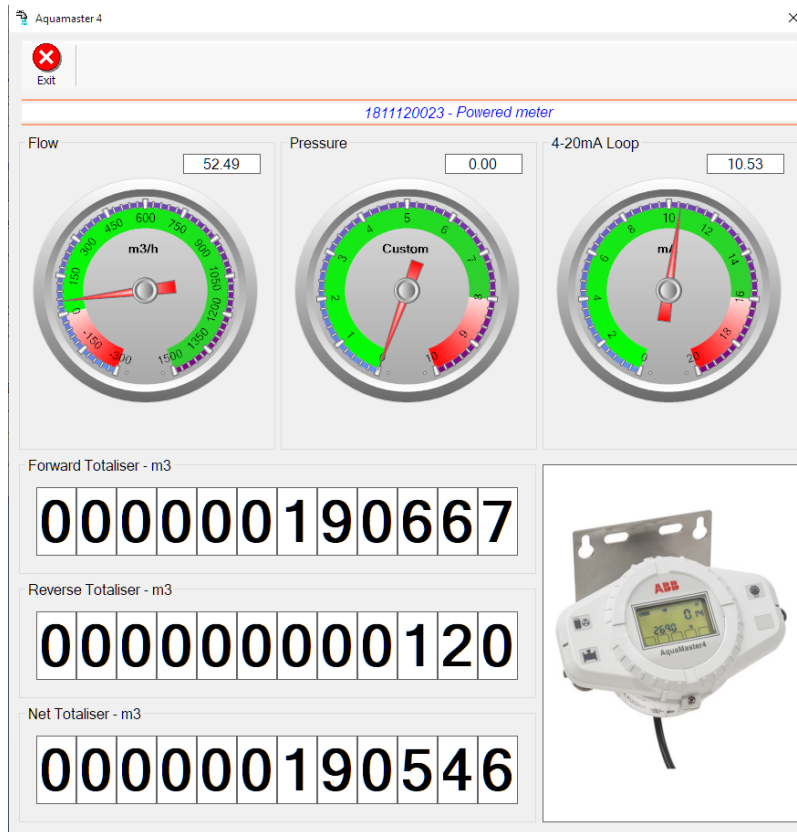
If a device is powered and permanently connected to the server (and online), then the 'Live Read' Button will be active allowing you to stream live data directly from that device in real time. **Bear in mind that, while this live streaming screen is active, the cellular data consumption of that device will be much greater than the usual background periodic read used to update the database.**

The current communications status of the device will be displayed on the top right of the screen.

Remote devices that are offline or sleeping cannot be accessed for streaming data. This status will be automatically updated while on this screen without the need of hitting 'Refresh Database' function.

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Pressing the 'Live Read' will launch the streaming live data screen for that device. All the data on this screen is fetched directly from the remote device and not the database.



The data displayed are the two totalisers (forward/reverse) and combined volume (net totaliser) as digital readouts and three needle type displays showing flow and pressure (read directly from the meter) and the current loop reading.

Returning to the applications screen, data is displayed in various groups. On the top left is grouped the Device Information block. This information is data relevant to the remote device and is really displaying data that is present within the database. Mostly data that is populated during the 'Reload Device Config' process.

This data is as follows:-

Information	Notes
<b>Device Code</b>	The Device Code assigned to this particular remote device. All communications are initiated by addressing this code. This code is unique to all remote devices and is assigned at the time of manufacture.
<b>Device Type</b>	Type of Remote Device. eg CDS538 Cumulus Logger etc
<b>Description</b>	The description is a user defined parameter that is captured during the setup of each device. This would normally be something that would describe the location or application of this particular device.
<b>Application</b>	Selected device application. Application 003 - Aquamaster 3 function in this case.



<b>Data Index</b>	As each device is captured on to Cloudworks system, it is assigned a unique data index. This index is used when externally extracting the log data from the database as each record in the global datalog would be labelled with this index number.
<b>Serial Number</b>	Serial number of this device - assigned in the factory.
<b>GSM Signal</b>	Signal strength of the last GSM communications, expressed as a percentage.
<b>Battery Status</b>	Battery status for devices that are powered by battery, expressed as a percentage. It is important to note that this will be the battery status read while the device is under full load (GSM communications active). It would normally indicate lower than the recorded battery status in the datalog (which is read while the device is essentially idle).
<b>Current Power</b>	An indicator as to how this remote device is being powered. Normally the same as the power mode but can vary for systems on Dual Power mode. For devices in a dual power mode, this parameter will display the current power status of the remote device. Battery or Mains.
<b>Power Mode</b>	Selected Power Mode under which the remote device is operating. This can be Battery, Mains or Dual power modes.
<b>Wakeup Per.</b>	The Wakeup Period set in minutes. Refer to the device configuration chapter for an explanation of this parameter.
<b>Datalog Per.</b>	The Datalog Period set minutes. Refer to the device configuration chapter for an explanation of this parameter.
<b>Fwd Totaliser</b>	The current Forward Totaliser reading.
<b>Rev Totaliser</b>	The current Reverse Totaliser reading.
<b>Flow</b>	Current flow reading.
<b>Pressure</b>	Current pressure reading.
<b>4-20mA Current Loop</b>	The 4-20mA current loop reading with its calibration data implemented including the unit of measure.
<b>Last Seen</b>	The date and time the remote device was last seen connecting into the server.
<b>Latitude</b>	Captured device Latitude.
<b>Longitude</b>	Captured device Longitude.
<b>User Config</b>	The user defined data recorded on the remote device. Refer to the device configuration chapter for an explanation of this parameter.

To get the latest update of this data, you will need to press the 'Refresh Data' button which will then update this screen from the database.



To the right of screen is the Datalog information box. This box will be populated with the most recent data from the recorded datalog of this remote device ([read from the database](#)). By default, when the screen opens, the last two weeks' worth of data will be displayed in this table. To select a different range of data, you can select the 'From Date' and 'To Date' values and press the 'Read Datalog' button.

This application will record the following data in the datalog.

Datalog

No.	Date	Fwd Totaliser	Fwd Cons.	Rev Totaliser	Rev Cons.	Flow	Pressure	Loop	Battery
95	01 Feb 2020 01:00:00	1005289	0	175	0	-0.008	16.931	0	
96	01 Feb 2020 02:00:00	1005289	0	175	0	-0.033	16.944	0	
97	01 Feb 2020 03:00:00	1005289	0	175	0	-0.009	16.928	0	
98	01 Feb 2020 04:00:00	1005289	0	175	0	0.011	16.930	0	
99	01 Feb 2020 05:00:00	1005289	0	175	0	-0.010	16.914	0	
100	01 Feb 2020 06:00:00	1005289	0	175	0	0.051	16.948	0	
101	01 Feb 2020 07:00:00	1005301	12	175	0	14.018	16.799	0	
102	01 Feb 2020 08:00:00	1005364	63	175	0	64.363	16.230	0	
103	01 Feb 2020 09:00:00	1005443	79	175	0	79.177	15.891	0	
104	01 Feb 2020 10:00:00	1005540	97	175	0	98.847	15.250	0	
105	01 Feb 2020 11:00:00	1005663	123	175	0	124.679	14.396	0	
106	01 Feb 2020 12:00:00	1005805	142	175	0	141.942	13.628	0	
107	01 Feb 2020 13:00:00	1005945	140	175	0	139.034	13.225	0	

Raw Data 
  Hourly 
  Daily 
  Weekly 
  Monthly

Night Flow Range

Information	Notes
<b>Date/Time</b>	Date and time of the datalog record.
<b>Fwd Totaliser</b>	Forward Totaliser reading.
<b>Rev Totaliser</b>	Reverse Totaliser reading.
<b>Fwd Cons.</b>	The Forward consumption reading.
<b>Rev Cons.</b>	The Reverse consumption Reading.
<b>Flow</b>	Flow rate calculated as volume per hour.
<b>Pressure</b>	Current Pressure reading read from the 4-20mA input.
<b>Loop</b>	4-20mA Loop reading with its applied calibration.
<b>Battery</b>	Battery level in percentage. Only displayed on battery powered devices.
<b>Power</b>	Current power status. Mains/Battery

The data in this datalog table can be displayed (and graphed) in a number of different ways. These are selected by choosing the option at the bottom of the datalog table. Options include Raw Data and averaged hourly, daily, weekly and monthly data. When the averaging options are chosen, missing data is automatically interpolated to fill in the missing gaps. Interpolated data will have the number column entries highlighted in red with a small 'Interpolated data' message at the top right of the datalog table.

Datalog \* Interpolated data

No.	Date	Fwd Totaliser	Fwd Cons.	Rev Totaliser	Rev Cons.	Flow	Pressure	Loop	Battery
47	30 Jan 2020 01:00:00	1002556.000	0.000	175	0	0.015	16.941	0	
48	30 Jan 2020 02:00:00	1002556.000	0.000	175	0	0.001	16.931	0	
49	30 Jan 2020 03:00:00	1002556.000	0.000	175	0	0.000	16.902	0	
50	30 Jan 2020 04:00:00	1002595.667	39.667	175	0	15.665	16.713	0	
51	30 Jan 2020 05:00:00	1002635.333	39.667	175	0	31.330	16.524	0	
52	30 Jan 2020 06:00:00	1002675.000	39.667	175	0	46.995	16.334	0	
53	30 Jan 2020 07:00:00	1002714.667	39.667	175	0	62.660	16.145	0	
54	30 Jan 2020 08:00:00	1002754.333	39.667	175	0	78.325	15.956	0	
55	30 Jan 2020 09:00:00	1002794.000	39.667	175	0	93.990	15.767	0	
56	30 Jan 2020 10:00:00	1002902.000	108.000	175	0	109.155	15.232	0	
57	30 Jan 2020 11:00:00	1003031.000	129.000	175	0	130.669	14.474	0	
58	30 Jan 2020 12:00:00	1003178.000	147.000	175	0	146.676	13.747	0	
59	30 Jan 2020 13:00:00	1003321.000	143.000	175	0	143.218	13.391	0	

From Date: 28 Jan 2020  
To Date: 11 Feb 2020

Buttons: Read Datalog, Delete Datalog

Checkboxes:  Consumption,  Flow/Press/Loop,  Night Flow

Raw Data  Hourly  Daily  Weekly  Monthly

Night Flow Range:

As per the previously explained functions throughout the Cloudworks suite, columns can be switched off/on and re-ordered to the users requirements. The exporting will be as per the layout presented on the screen.

You can zoom into a range of the data by simply selecting those records in the table. This will result in the graph at the bottom being updated to display only those readings.

Deleting the datalog or removing a range of records can be easily done by using the 'Delete Datalog' button. To delete a range, simply select the range in the datalog table and press the 'Delete Datalog' button. If no range is selected, it will be assumed that you wish to delete the entire datalog. There will be a prompt to ensure that you are aware of the action you are about to take.

Data that is displayed in the table will also be represented in the graph at the bottom of the screen. There are two graphs displayed, namely the Consumption Graph (consumption/pressure/flow), and a Night Flow graph. These graphs can be selectively switched on/off by clicking the ticks below the datalog table.

Datalog \* Interpolated data

No.	Date	Fwd Totaliser	Fwd Cons.	Rev Totaliser	Rev Cons.	Flow	Pressure	Loop	Battery
335	11 Feb 2020 01:00:00	1018104.000	0.000	177	0	-0.024	16.957	0	
336	11 Feb 2020 02:00:00	1018104.000	0.000	177	0	-0.027	16.949	0	
337	11 Feb 2020 03:00:00	1018104.000	0.000	177	0	0.004	16.942	0	
338	11 Feb 2020 04:00:00	1018104.000	0.000	177	0	0.000	16.915	0	
339	11 Feb 2020 05:00:00	1018104.000	0.000	177	0	0.011	16.927	0	
340	11 Feb 2020 06:00:00	1018111.000	7.000	177	0	8.355	16.824	0	
341	11 Feb 2020 07:00:00	1018163.000	52.000	177	0	52.235	16.331	0	
342	11 Feb 2020 08:00:00	1018240.000	77.000	177	0	78.611	15.931	0	
343	11 Feb 2020 09:00:00	1018332.000	92.000	177	0	92.341	15.574	0	
344	11 Feb 2020 10:00:00	1018440.000	108.000	177	0	109.172	15.004	0	
345	11 Feb 2020 11:00:00	1018572.000	132.000	177	0	132.563	14.201	0	
346	11 Feb 2020 12:00:00	1018721.000	149.000	177	0	149.386	13.473	0	

From Date: 28 Jan 2020  
To Date: 11 Feb 2020

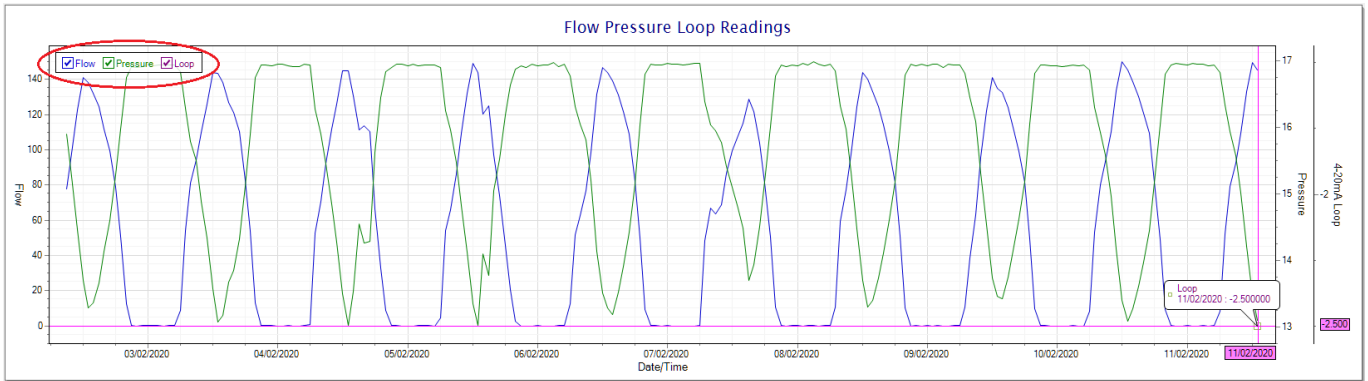
Buttons: Read Datalog, Delete Datalog

Checkboxes:  Consumption,  Flow/Press/Loop,  Night Flow

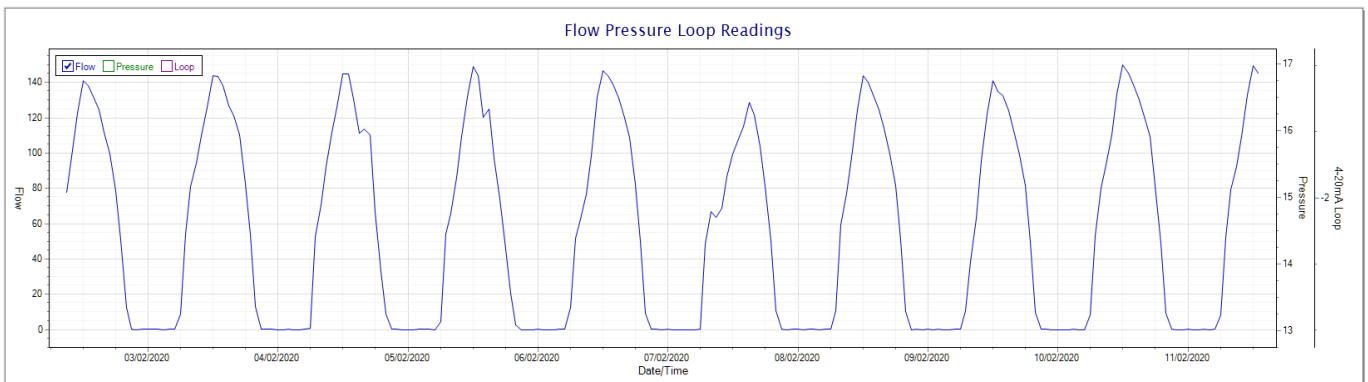
Raw Data  Hourly  Daily  Weekly  Monthly

Night Flow Range:

The various series on each graph can be toggled on and off by selecting the series tick in the upper left hand corner.



To view the flow only would look like this:-



Also displayed is the Night Flow graph. The function of this graph is to specifically analyse the night time water flows at an installation. This analysis is done based on the data received during a specific time period during the night (normally from 3am to 5am). This period for analysis can be adjusted by sliding the elements of the slider on the top right of the graph.

000	0.000	92	0	-0.002	16.936	Off	Off
000	0.000	92	0	0.005	16.941	Off	Off
000	0.000	92	0	0.007	16.938	Off	Off

Consumption  
 Flow/Press/Loop  
 Night Flow

Monthly
 Night Flow Range

### Night Flow Analyser - Range 3 am To 5 am

Night Flow Min/Max  Mean Night Flow  Night Line

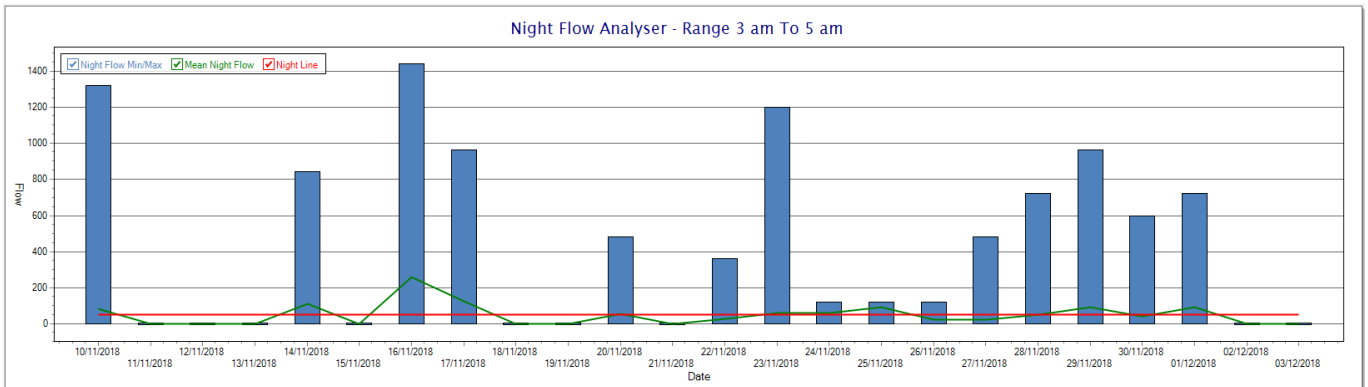
The graph will show a couple of different series.

1. Night Flow Min/Max - this will be a bar series indicating the minimum and maximum flows during the measurement period. The base of the block is the minimum flow and the top, the maximum flow. Depending on

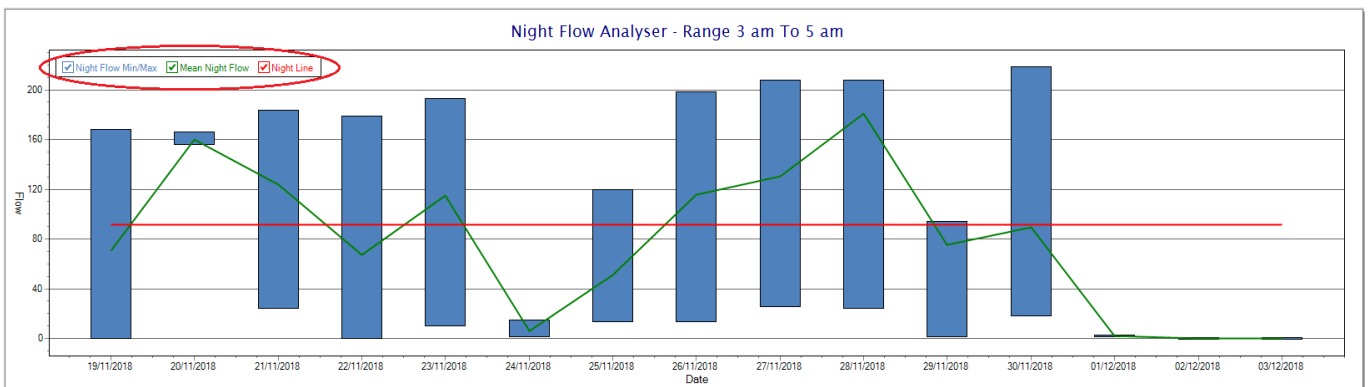
the type of installation, during this period you would expect the minimum flow point to come to zero and therefore sit on the base of the graph. The maximum flow would simply indicate some consumption during the period of measure and is not really a concern unless that was not expected.

2. Mean Night Flow - this will show the average night flow during that period. Shown in green and would normally simply be the midpoint between the minimum and maximum flows.
3. Night Line - the night line shows the average flow for the entire range of data being measured. Shown in red, this is useful for determining the average night usage over different data ranges.

The Night Flow graph is particularly useful in giving a quick graphical indication of the possibility of a leak scenario. In most case, where there should be no continuous use of water at night, the graph would look as below:-

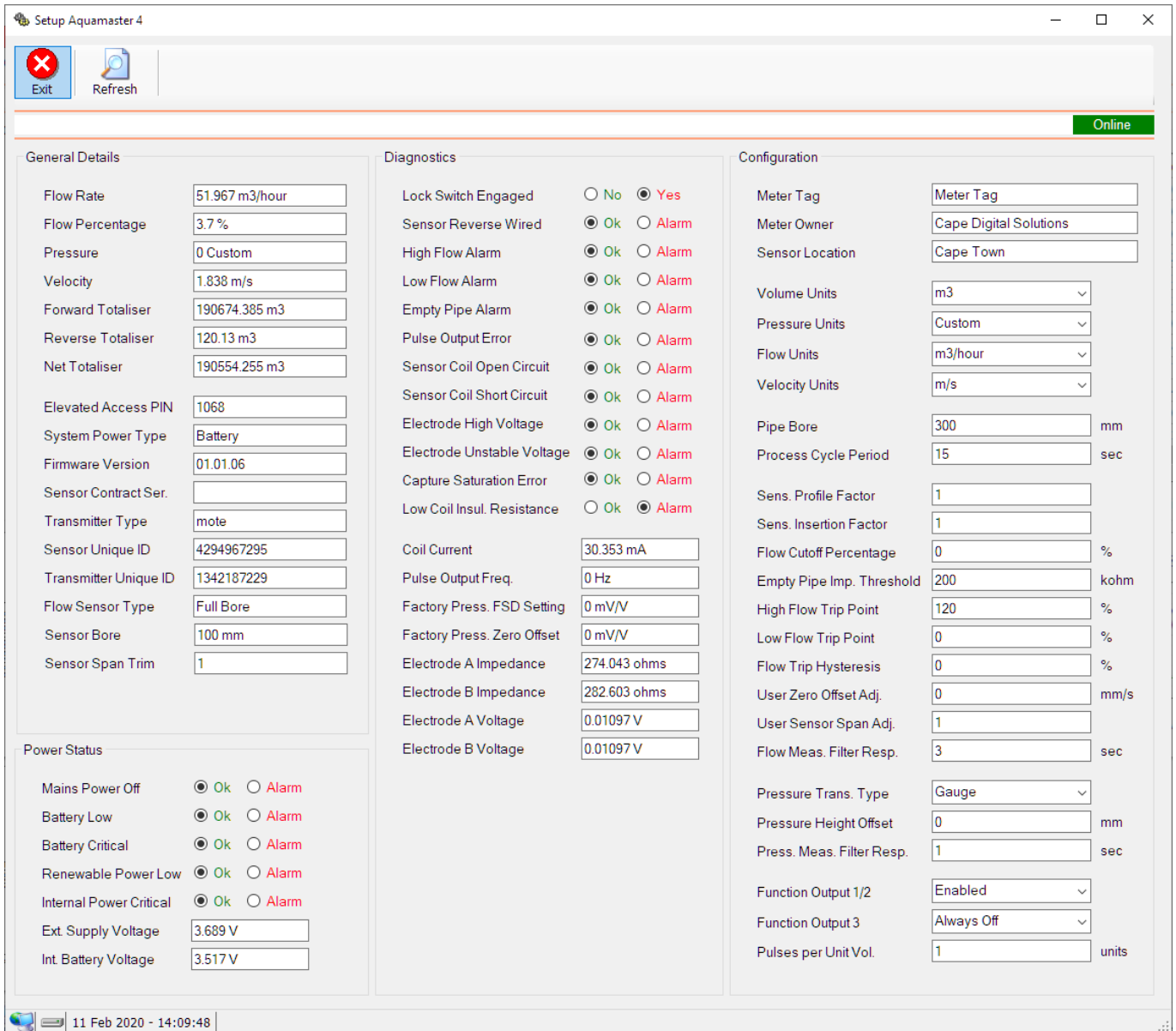


During a possible leak situation, the minimum night flow does not return to zero and the graph will appear to bounce off the bottom.



So, at a quick glance it is possible to see if there is a problem at this installation. As per the Consumption Graph, the different graph series can be switched off/on by clicking the series ticks on the top left hand corner.

Finally, the Aquamaster application screen has a function to allow the setup of the remote meter via a specialised interface screen. Details of the parameters setup can be obtained from the Aquamaster specifications datasheet supplied by ABB limited. The setup screen includes the below parameters.



The screenshot shows the 'Setup Aquamaster 4' application window. At the top right, there is a green 'Online' status indicator. The interface is divided into three main sections: General Details, Diagnostics, and Configuration.

**General Details:**

- Flow Rate: 51.967 m3/hour
- Flow Percentage: 3.7%
- Pressure: 0 Custom
- Velocity: 1.838 m/s
- Forward Totaliser: 190674.385 m3
- Reverse Totaliser: 120.13 m3
- Net Totaliser: 190554.255 m3
- Elevated Access PIN: 1068
- System Power Type: Battery
- Firmware Version: 01.01.06
- Sensor Contract Ser.:
- Transmitter Type: mote
- Sensor Unique ID: 4294967295
- Transmitter Unique ID: 1342187229
- Flow Sensor Type: Full Bore
- Sensor Bore: 100 mm
- Sensor Span Trim: 1

**Power Status:**

- Mains Power Off:  Ok  Alarm
- Battery Low:  Ok  Alarm
- Battery Critical:  Ok  Alarm
- Renewable Power Low:  Ok  Alarm
- Internal Power Critical:  Ok  Alarm
- Ext. Supply Voltage: 3.689 V
- Int. Battery Voltage: 3.517 V

**Diagnostics:**

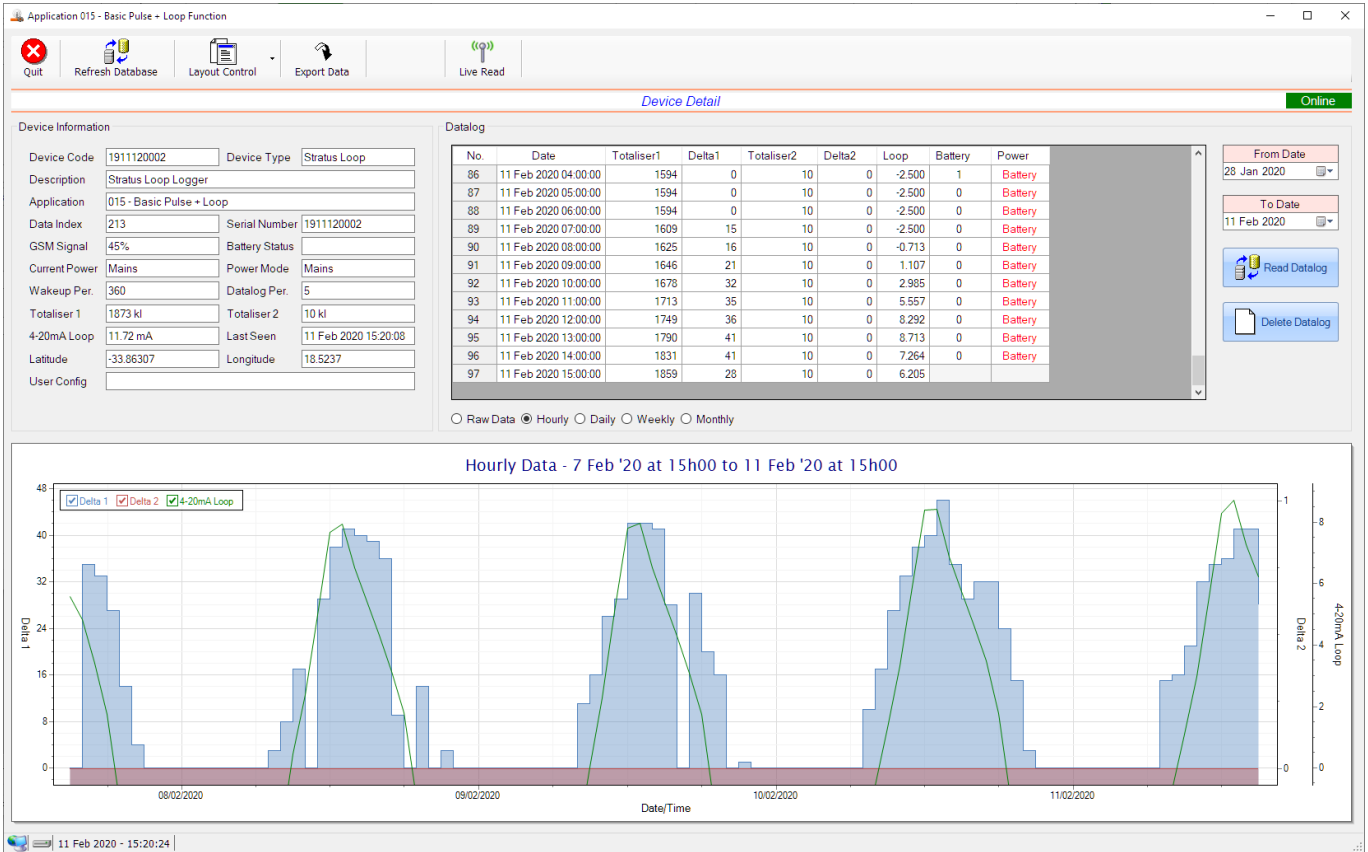
- Lock Switch Engaged:  No  Yes
- Sensor Reverse Wired:  Ok  Alarm
- High Flow Alarm:  Ok  Alarm
- Low Flow Alarm:  Ok  Alarm
- Empty Pipe Alarm:  Ok  Alarm
- Pulse Output Error:  Ok  Alarm
- Sensor Coil Open Circuit:  Ok  Alarm
- Sensor Coil Short Circuit:  Ok  Alarm
- Electrode High Voltage:  Ok  Alarm
- Electrode Unstable Voltage:  Ok  Alarm
- Capture Saturation Error:  Ok  Alarm
- Low Coil Insul. Resistance:  Ok  Alarm
- Coil Current: 30.353 mA
- Pulse Output Freq.: 0 Hz
- Factory Press. FSD Setting: 0 mV/V
- Factory Press. Zero Offset: 0 mV/V
- Electrode A Impedance: 274.043 ohms
- Electrode B Impedance: 282.603 ohms
- Electrode A Voltage: 0.01097 V
- Electrode B Voltage: 0.01097 V

**Configuration:**

- Meter Tag: Meter Tag
- Meter Owner: Cape Digital Solutions
- Sensor Location: Cape Town
- Volume Units: m3
- Pressure Units: Custom
- Flow Units: m3/hour
- Velocity Units: m/s
- Pipe Bore: 300 mm
- Process Cycle Period: 15 sec
- Sens. Profile Factor: 1
- Sens. Insertion Factor: 1
- Flow Cutoff Percentage: 0 %
- Empty Pipe Imp. Threshold: 200 kohm
- High Flow Trip Point: 120 %
- Low Flow Trip Point: 0 %
- Flow Trip Hysteresis: 0 %
- User Zero Offset Adj.: 0 mm/s
- User Sensor Span Adj.: 1
- Flow Meas. Filter Resp.: 3 sec
- Pressure Trans. Type: Gauge
- Pressure Height Offset: 0 mm
- Press. Meas. Filter Resp.: 1 sec
- Function Output 1/2: Enabled
- Function Output 3: Always Off
- Pulses per Unit Vol.: 1 units

While the system is online, these parameters can be changed and will immediately be updated on the remote meter via its ModBus connection.

### 2.8.16 Application 015 - Basic Pulse and Loop

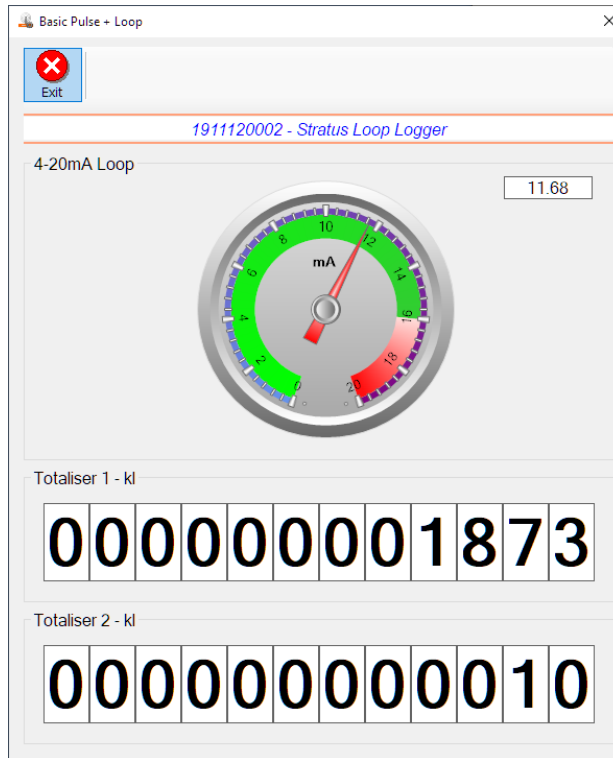


This application type would be selected where you are using the basic core functions of the Stratus Loop and Nimbus Loop loggers. Functions such as the 4-20mA current loop and/or pulse inputs without a specific consumption type of application. It is ideally suited for an application where there are two meters (say water and electricity) and a 4-20mA device such as a pressure sensor. It can also be used where you only need for the 4-20mA current loop input for instance.

Functions on the top menu bar are mostly as per previous screens within the Cloudworks suite. These would be the 'Refresh Database', 'Layout Control' and 'Export Data' buttons which have been explained earlier. Added functionality is the 'Live Read' button.

If a device is powered and permanently connected to the server (and online), then the 'Live Read' Button will be active allowing you to stream live data directly from that device in real time. **Bear in mind that, while this live streaming screen is active, the cellular data consumption of that device will be much greater than the usual background periodic read used to update the database.** The current communications status of the device will be displayed on the top right of the screen.

Remote devices that are offline or sleeping cannot be accessed for streaming data. This status will be automatically updated while on this screen without the need for pressing the 'Refresh Database' button. Pressing the 'Live Read' button will launch the live streaming data screen for that device. **All the data on this screen is fetched directly from the remote device and not the database.**



The data displayed are the two totalisers as digital readouts and the 4-20mA input as a needle type dial. This particular device has been connected to a current loop sensor and is indicating the current in milliamps.

Returning to the applications screen, data is displayed in various groups. On the top left is grouped the 'Device Information' block. This information is data relevant to the remote device and is really displaying data that is present within the database. Mostly data that is populated during the 'Reload Device Config' process.

This data is as follows:-

Information	Notes
<b>Device Code</b>	The Device Code assigned to this particular remote device. All communications are initiated by addressing this code. This code is unique to all remote devices and is assigned at the time of manufacture.
<b>Device Type</b>	Type of Remote Device. eg CDS538 Cumulus Logger etc
<b>Description</b>	The description is a user defined parameter that is captured during the setup of each device. This would normally be something that would describe the location or application of this particular device.
<b>Application</b>	Selected device application. Application 000 - Basic Cumulus function in this case.





<b>Data Index</b>	As each device is captured onto Cloudworks system, it is assigned a unique data index. This index is used when externally extracting the log data from the database as each record in the global datalog would be labelled with this index number.
<b>Serial Number</b>	Serial number of this device - assigned in the factory.
<b>GSM Signal</b>	Signal strength of the last GSM communications, expressed as a percentage.
<b>Battery Status</b>	Battery status for devices that are powered by battery, expressed as a percentage. It is important to note that this will be the battery status read while the device is under full load (GSM communications active). It would normally indicate lower than the recorded battery status in the datalog (which is read while the device is essentially idle).
<b>Current Power</b>	An indicator as to how this remote device is being powered. Normally the same as the Power Mode but can vary for systems on Dual Power mode. For devices in a dual power mode, this parameter will display the current power status of the remote device. Battery or Mains.
<b>Power Mode</b>	Selected Power Mode under which the remote device is operating. This can be Battery, Mains or Dual power modes.
<b>Wakeup Per.</b>	The Wakeup Period set in minutes. Refer to the device configuration chapter for an explanation of this parameter.
<b>Datalog Per.</b>	The Datalog Period set in minutes. Refer to the device configuration chapter for an explanation of this parameter.
<b>Totaliser 1</b>	The current Totaliser 1 reading with its relevant pulse weight implemented including the unit of measure.
<b>Totaliser 2</b>	The current Totaliser 2 reading with its relevant pulse weight implemented including the unit of measure.
<b>4-20mA Loop</b>	The 4-20mA current loop reading with its calibration data implemented including the unit of measure.
<b>Last Seen</b>	The date and time the remote device was last seen connecting into the server.
<b>Latitude</b>	Captured device Latitude.
<b>Longitude</b>	Captured device Longitude.
<b>User Config</b>	The user defined data recorded on the remote device. Refer to the device configuration chapter for an explanation of this parameter.

To get the latest update of this data, you will need to press the 'Refresh Data' button which will then update this screen from the database.

To the right of screen is the Datalog information box. This box will be populated with the most recent data from the recorded datalog of this remote device (**read from the database**). By default, when the screen opens, the last two weeks' worth of data will be displayed in this table. To select a different range of data, you can select the 'From Date' and 'To Date' values and press the 'Read Datalog' button.

This application will record the following data in the datalog.

Datalog

No.	Date	Totaliser1	Delta1	Totaliser2	Delta2	Loop	Battery	Power
86	11 Feb 2020 04:00:00	1594	0	10	0	-2.500	1	Battery
87	11 Feb 2020 05:00:00	1594	0	10	0	-2.500	0	Battery
88	11 Feb 2020 06:00:00	1594	0	10	0	-2.500	0	Battery
89	11 Feb 2020 07:00:00	1609	15	10	0	-2.500	0	Battery
90	11 Feb 2020 08:00:00	1625	16	10	0	-0.713	0	Battery
91	11 Feb 2020 09:00:00	1646	21	10	0	1.107	0	Battery
92	11 Feb 2020 10:00:00	1678	32	10	0	2.985	0	Battery
93	11 Feb 2020 11:00:00	1713	35	10	0	5.557	0	Battery
94	11 Feb 2020 12:00:00	1749	36	10	0	8.292	0	Battery
95	11 Feb 2020 13:00:00	1790	41	10	0	8.713	0	Battery
96	11 Feb 2020 14:00:00	1831	41	10	0	7.264	0	Battery
97	11 Feb 2020 15:00:00	1859	28	10	0	6.205		

Raw Data 
  Hourly 
  Daily 
  Weekly 
  Monthly

Information	Notes
<b>Date/Time</b>	Date and time of the datalog record.
<b>Totaliser 1</b>	Totaliser 1 reading.
<b>Totaliser 2</b>	Totaliser 2 reading.
<b>Delta 1</b>	The effective 'consumption' of the Totaliser 1 reading. This is the difference between this current reading and the previous reading.
<b>Delta 2</b>	The effective 'consumption' of the Totaliser 2 reading. This is the difference between this current reading and the previous reading.
<b>Loop</b>	4-20mA Loop reading with its applied calibration.
<b>Battery</b>	Battery level in percentage. Only displayed on battery powered devices.
<b>Power</b>	Current power status. Mains/Battery

The data in this datalog table can be displayed (and graphed) in a number of different ways. These are selected by choosing the option at the bottom of the datalog table. Options include Raw Data and averaged hourly, daily, weekly and monthly data. When the averaging options are chosen, missing data is automatically interpolated to fill in the missing gaps. Interpolated data will have the number column entries highlighted in red with a small 'Interpolated data' message at the top right of the datalog table.

Datalog \* Interpolated data

No.	Date	Totaliser1	Delta1	Totaliser2	Delta2	Loop	Battery	Power
47	09 Feb 2020 13:00:00	1077.00	42.00	10	0	7.950	4	Battery
48	09 Feb 2020 14:00:00	1118.00	41.00	10	0	6.510	5	Battery
49	09 Feb 2020 15:00:00	1146.00	28.00	10	0	5.385	5	Battery
50	09 Feb 2020 16:00:00	1146.00	0.00	10	0	4.280	5	Battery
51	09 Feb 2020 17:00:00	1176.00	30.00	10	0	3.093	6	Battery
52	09 Feb 2020 18:00:00	1185.25	9.25	10	0	0.296	6	Battery
53	09 Feb 2020 19:00:00	1194.50	9.25	10	0	0.296	6	Battery
54	09 Feb 2020 20:00:00	1203.75	9.25	10	0	0.296	6	Battery
55	09 Feb 2020 21:00:00	1213.00	9.25	10	0	-2.500	7	Battery
56	09 Feb 2020 22:00:00	1213.00	0.00	10	0	-2.500	6	Battery
57	09 Feb 2020 23:00:00	1213.00	0.00	10	0	-2.500	6	Battery
58	10 Feb 2020 00:00:00	1213.00	0.00	10	0	-2.500	6	Battery
59	10 Feb 2020 01:00:00	1213.00	0.00	10	0	-2.500	5	Battery

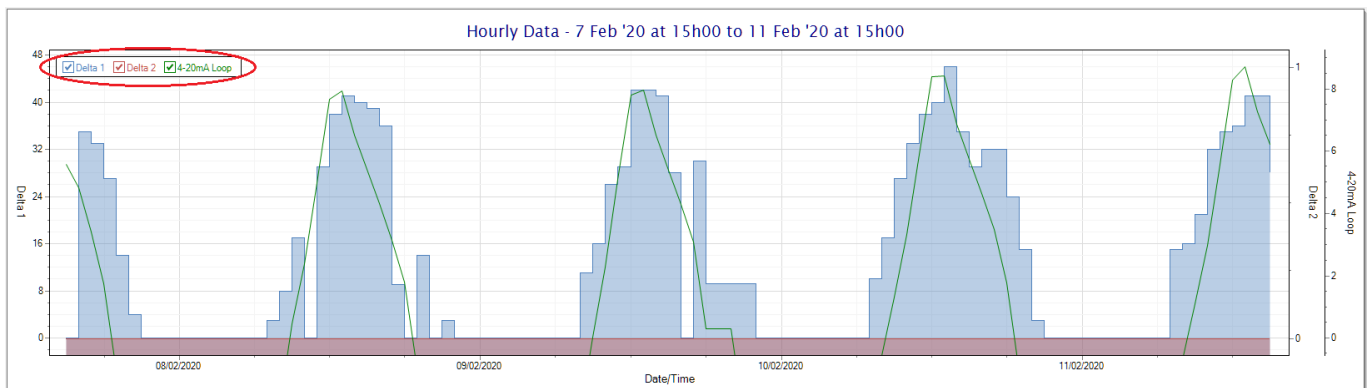
Raw Data 
  Hourly 
  Daily 
  Weekly 
  Monthly

As per the previously explained functions throughout the Cloudworks suite, columns can be switched off/on and re-ordered to the users requirements. The exporting will be as per the layout presented on the screen.

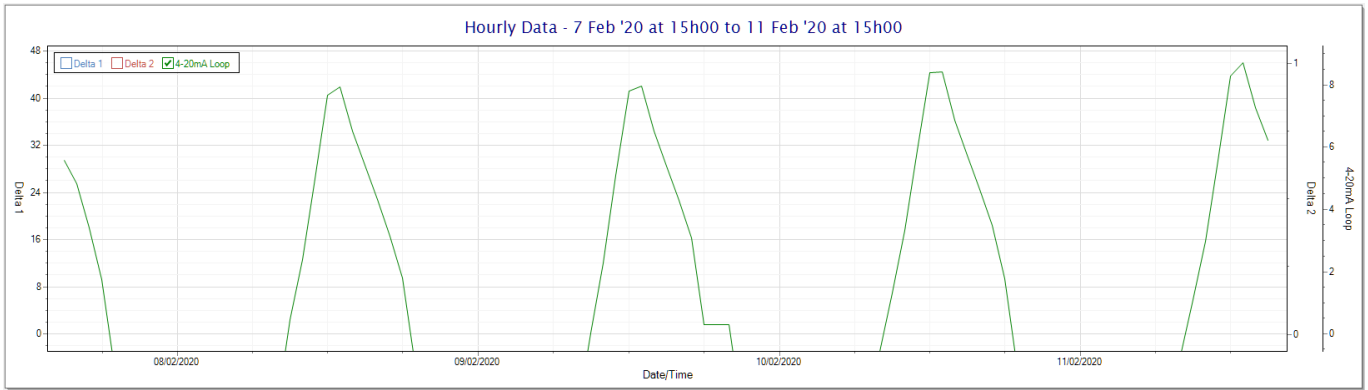
You can zoom into a range of the data by simply selecting those records in the table. This will result in the graph at the bottom being updated to display only those readings.

Deleting the datalog or removing a range of records can be easily done by using the 'Delete Datalog' button. To delete a range, simply select the range in the datalog table and press the 'Delete Datalog' button. If no range is selected, it will be assumed that you wish to delete the entire datalog. There will be a prompt to ensure that you are aware of the action you are about to take.

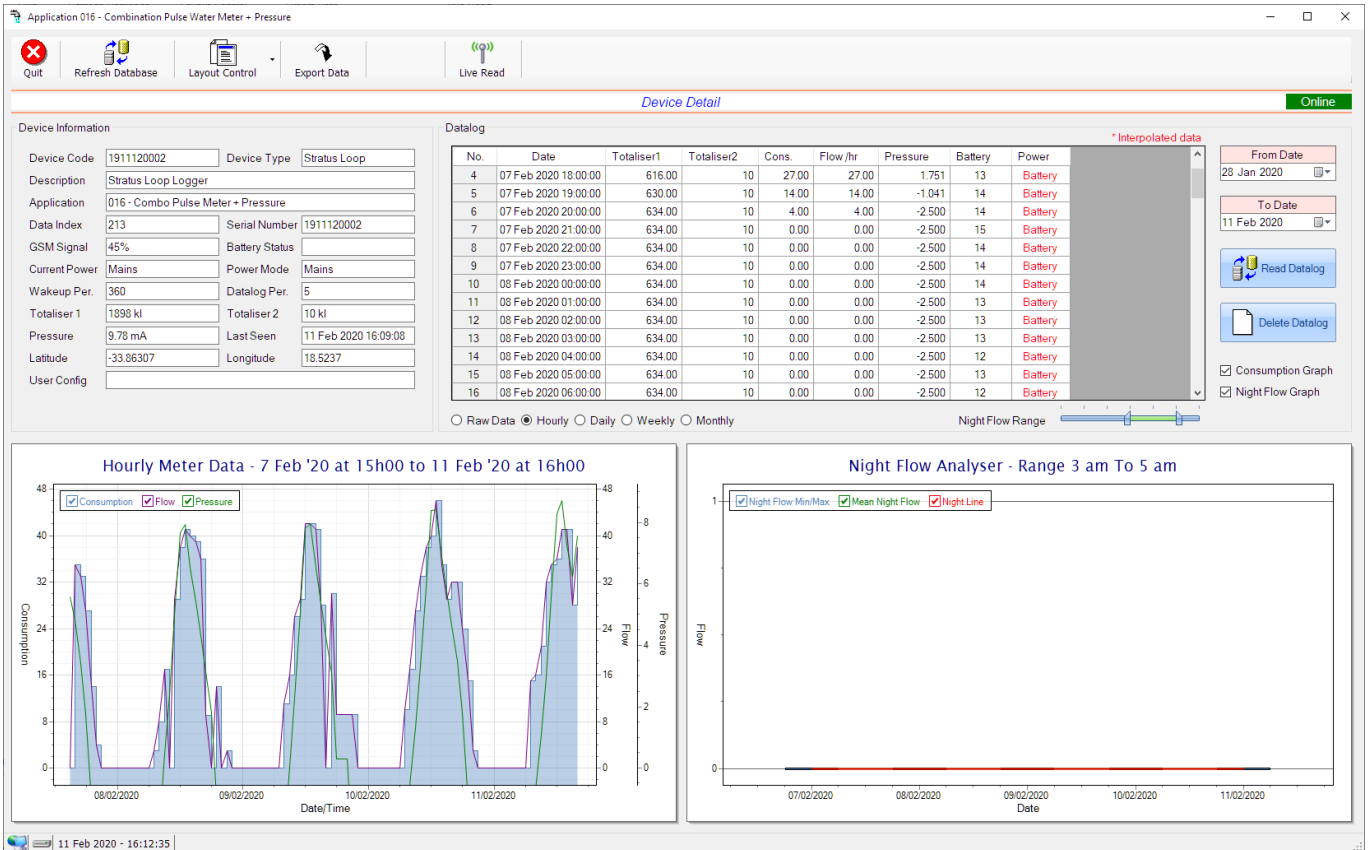
Data that is displayed in the table will also be represented in the graph at the bottom of the screen. Individual graph series can be switched off/on by selecting the ticks at the top left of the graph.



Displaying only the 4-20mA loop would look like this:-



2.8.17 Application 016 - Combo Pulse Meter + Pressure



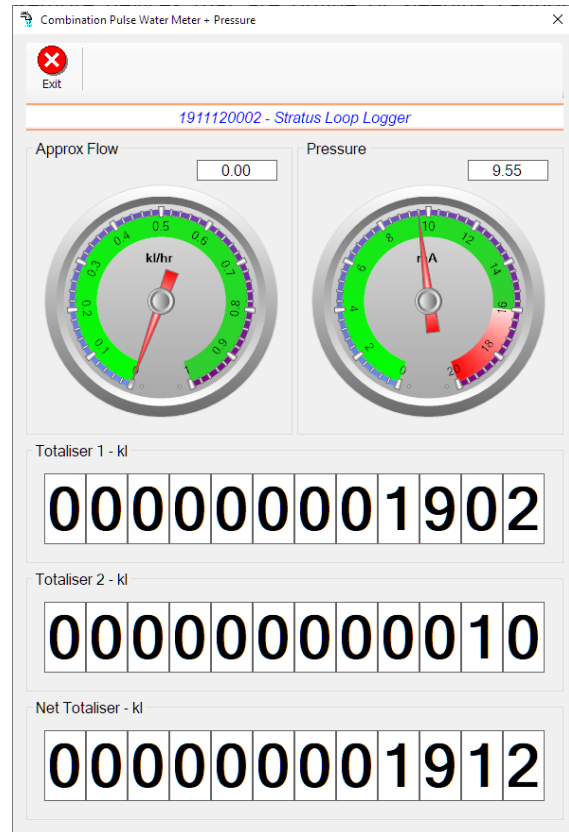
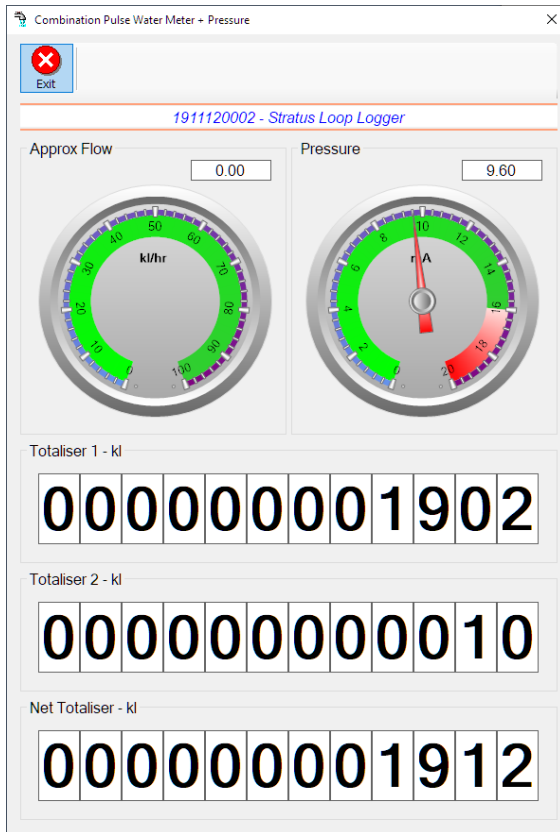
This application type is used in combination water meter type sites. A combination meter normally consists of a water measurement point consisting of two water meters. A larger meter for measuring the bulk flow of the water and a smaller one to measure the lower flows which are normally missed on large meters. The actual consumption is normally a combination of these two meter readings and are handled as such in this application type. Included here is the 4-20mA current loop interface for pressure measurement of the pipeline.

Functions on the top menu bar are mostly as per previous screens within the Cloudworks suite. These would be the 'Refresh Database', 'Layout Control' and 'Export Data' buttons which have been explained earlier. Added functionality is the 'Live Read' button.

If a device is powered and permanently connected to the server (and online), then the 'Live Read' Button will be active allowing you to stream live data directly from that device in real time. **Bear in mind that, while this live streaming screen is active, the cellular data consumption of that device will be much greater than the usual background periodic read used to update the database.** The current communications status of the device will be displayed on the top right of the screen.

Remote devices that are offline or sleeping cannot be accessed for streaming data. This status will be automatically updated while on this screen without the need of pressing the 'Refresh Database' button.

Pressing the 'Live Read' button will launch the streaming data screen for that device. All the data on this screen is fetched directly from the remote device and not the database.



The data displayed are the two totalisers and combined volume (Net Totaliser) as digital readouts and two needle type displays showing pressure (4-20mA input) and approximate flow. It is important to note that flow is calculated as a difference between two successive readings. For this reading, the data stream will need to see at least two changes in the volume amount before it can calculate the approximate flow. That is why the flow dial will initially appear blank (as per the left display) and then only become active after those two reading changes have been received.

Returning to the applications screen, data is displayed in various groups. On the top left is grouped the Device Information block. This information is data relevant to the remote device and is really displaying data that is present within the database. Mostly data that is populated during the 'Reload Device Config' process. This data is as follows:-

Information	Notes
<b>Device Code</b>	The Device Code assigned to this particular remote device. All communications are initiated by addressing this code. This code is unique to all remote devices and is assigned at the time of manufacture.
<b>Device Type</b>	Type of Remote Device. eg CDS538 Cumulus Logger etc
<b>Description</b>	The description is a user defined parameter that is captured during the setup of each device. This would normally be something that would describe the location or application of this particular device.
<b>Application</b>	Selected device application. Application 001 - Combination Pulse Water Meter + Pressure function in this case.



<b>Data Index</b>	As each device is captured on to Cloudworks system, it is assigned a unique data index. This index is used when externally extracting the log data from the database as each record in the global datalog would be labelled with this index number.
<b>Serial Number</b>	Serial number of this device - assigned in the factory.
<b>GSM Signal</b>	Signal strength of the last GSM communications, expressed as a percentage.
<b>Battery Status</b>	Battery status for devices that are powered by battery, expressed as a percentage. It is important to note that this will be the battery status read while the device is under full load (GSM communications active). It would normally indicate lower than the recorded battery status in the datalog (which is read while the device is essentially idle).
<b>Current Power</b>	An indicator as to how this remote device is being powered. Normally the same as the power mode but can vary for systems on Dual Power mode. For devices in a dual power mode, this parameter will display the current power status of the remote device. Battery or Mains.
<b>Power Mode</b>	Selected Power Mode under which the remote device is operating. This can be Battery, Mains or Dual power modes.
<b>Wakeup Per.</b>	The Wakeup Period set in minutes. Refer to the device configuration chapter for an explanation of this parameter.
<b>Datalog Per.</b>	The Datalog Period set minutes. Refer to the device configuration chapter for an explanation of this parameter.
<b>Totaliser 1</b>	The current Totaliser 1 reading with its relevant pulse weight implemented including the unit of measure.
<b>Totaliser 2</b>	The current Totaliser 2 reading with its relevant pulse weight implemented including the unit of measure.
<b>Pressure (4-20mA Loop)</b>	The 4-20mA current loop reading with its calibration data implemented including the unit of measure.
<b>Last Seen</b>	The date and time the remote device was last seen connecting into the server.
<b>Latitude</b>	Captured device Latitude.
<b>Longitude</b>	Captrued device Longitude.
<b>User Config</b>	The user defined data recorded on the remote device. Refer to the device configuration chapter for an explanation of this parameter.

To get the latest update of this data, you will need to press the 'Refresh Data' button which will then update this screen from the database.

To the right of screen is the Datalog information box. This box will be populated with the most recent data from the recorded datalog of this remote device ([read from the database](#)). By default, when the screen opens, the last two weeks' worth of data will be displayed in this table. To select a different range of data, you can select the 'From Date' and 'To Date' values and press the 'Read Datalog' button.

This application will record the following data in the datalog.

Datalog

No.	Date	Totaliser1	Totaliser2	Cons.	Flow/hr	Pressure	Battery	Power
4	07 Feb 2020 18:00:00	616.00	10	27.00	27.00	1.751	13	Battery
5	07 Feb 2020 19:00:00	630.00	10	14.00	14.00	-1.041	14	Battery
6	07 Feb 2020 20:00:00	634.00	10	4.00	4.00	-2.500	14	Battery
7	07 Feb 2020 21:00:00	634.00	10	0.00	0.00	-2.500	15	Battery
8	07 Feb 2020 22:00:00	634.00	10	0.00	0.00	-2.500	14	Battery
9	07 Feb 2020 23:00:00	634.00	10	0.00	0.00	-2.500	14	Battery
10	08 Feb 2020 00:00:00	634.00	10	0.00	0.00	-2.500	14	Battery
11	08 Feb 2020 01:00:00	634.00	10	0.00	0.00	-2.500	13	Battery
12	08 Feb 2020 02:00:00	634.00	10	0.00	0.00	-2.500	13	Battery
13	08 Feb 2020 03:00:00	634.00	10	0.00	0.00	-2.500	13	Battery
14	08 Feb 2020 04:00:00	634.00	10	0.00	0.00	-2.500	12	Battery
15	08 Feb 2020 05:00:00	634.00	10	0.00	0.00	-2.500	13	Battery
16	08 Feb 2020 06:00:00	634.00	10	0.00	0.00	-2.500	12	Battery

Raw Data 
  Hourly 
  Daily 
  Weekly 
  Monthly

Night Flow Range 

Information	Notes
<b>Date/Time</b>	Date and time of the datalog record.
<b>Totaliser 1</b>	Totaliser 1 reading.
<b>Totaliser 2</b>	Totaliser 2 reading.
<b>Cons.</b>	The effective 'consumption' of the sum of the two Totaliser readings. This is the difference between this current reading and the previous reading.
<b>Flow/hr</b>	Flow rate calculated as volume per hour.
<b>Pressure</b>	Current Pressure reading read from the 4-20mA input.
<b>Battery</b>	Battery level in percentage. Only displayed on battery powered devices.
<b>Power</b>	Current power status. Mains/Battery

The data in this datalog table can be displayed (and graphed) in a number of different ways. These are selected by choosing the option at the bottom of the datalog table. Options include Raw Data and averaged hourly, daily, weekly and monthly data.




When the averaging options are chosen, missing data is automatically interpolated to fill in the missing gaps. Interpolated data will have the number column entries highlighted in red with a small 'Interpolated data' message at the top right of the datalog table.

Datalog \* Interpolated data

No.	Date	Totaliser1	Totaliser2	Cons.	Flow /hr	Pressure	Battery	Power
47	09 Feb 2020 13:00:00	1077.00	10	42.00	42.00	7.950	4	Battery
48	09 Feb 2020 14:00:00	1118.00	10	41.00	41.00	6.510	5	Battery
49	09 Feb 2020 15:00:00	1146.00	10	28.00	28.00	5.385	5	Battery
50	09 Feb 2020 16:00:00	1146.00	10	0.00	0.00	4.280	5	Battery
51	09 Feb 2020 17:00:00	1176.00	10	30.00	30.00	3.093	6	Battery
52	09 Feb 2020 18:00:00	1185.25	10	9.25	9.25	0.296	6	Battery
53	09 Feb 2020 19:00:00	1194.50	10	9.25	9.25	0.296	6	Battery
54	09 Feb 2020 20:00:00	1203.75	10	9.25	9.25	0.296	6	Battery
55	09 Feb 2020 21:00:00	1213.00	10	9.25	9.25	-2.500	7	Battery
56	09 Feb 2020 22:00:00	1213.00	10	0.00	0.00	-2.500	6	Battery
57	09 Feb 2020 23:00:00	1213.00	10	0.00	0.00	-2.500	6	Battery
58	10 Feb 2020 00:00:00	1213.00	10	0.00	0.00	-2.500	6	Battery
59	10 Feb 2020 01:00:00	1213.00	10	0.00	0.00	-2.500	5	Battery

Raw Data 
  Hourly 
  Daily 
  Weekly 
  Monthly

Night Flow Range 

As per the previously explained functions throughout the Cloudworks suite, columns can be switched off/on and re-ordered to the users requirements. The exporting will be as per the layout presented on the screen.

You can zoom into a range of the data by simply selecting those records in the table. This will result in the graph at the bottom being updated to display only those readings.


Deleting the datalog or removing a range of records can be easily done by using the 'Delete Datalog' button. To delete a range, simply select the range in the datalog table and press the 'Delete Datalog' button. If no range is selected, it will be assumed that you wish to delete the entire datalog. There will be a prompt to ensure that you are aware of the action you are about to take.

Data that is displayed in the table will also be represented in the graph at the bottom of the screen. There are two graphs displayed, namely the Consumption Graph (consumption/pressure/flow), and a Night Flow graph. These graphs can be selectively switched on/off by clicking the ticks at the bottom right of the datalog table.

Datalog \* Interpolated data


No.	Date	Totaliser1	Totaliser2	Cons.	Flow /hr	Pressure	Battery	Power
14	08 Feb 2020 04:00:00	634.00	10	0.00	0.00	-2.500	12	Battery
15	08 Feb 2020 05:00:00	634.00	10	0.00	0.00	-2.500	13	Battery
16	08 Feb 2020 06:00:00	634.00	10	0.00	0.00	-2.500	12	Battery
17	08 Feb 2020 07:00:00	637.00	10	3.00	3.00	-2.500	12	Battery
18	08 Feb 2020 08:00:00	645.00	10	8.00	8.00	-2.245	10	Battery
19	08 Feb 2020 09:00:00	662.00	10	17.00	17.00	0.448	10	Battery
20	08 Feb 2020 10:00:00	662.00	10	0.00	0.00	2.381	7	Battery
21	08 Feb 2020 11:00:00	691.00	10	29.00	29.00	4.984	7	Battery
22	08 Feb 2020 12:00:00	729.00	10	38.00	38.00	7.660	8	Battery
23	08 Feb 2020 13:00:00	770.00	10	41.00	41.00	7.925	9	Battery
24	08 Feb 2020 14:00:00	810.00	10	40.00	40.00	6.494	9	Battery
25	08 Feb 2020 15:00:00	849.00	10	39.00	39.00	5.398	10	Battery
26	08 Feb 2020 16:00:00	885.00	10	36.00	36.00	4.314	10	Battery


Raw Data 
  Hourly 
  Daily 
  Weekly 
  Monthly

Night Flow Range 

From Date  
28 Jan 2020

To Date  
11 Feb 2020

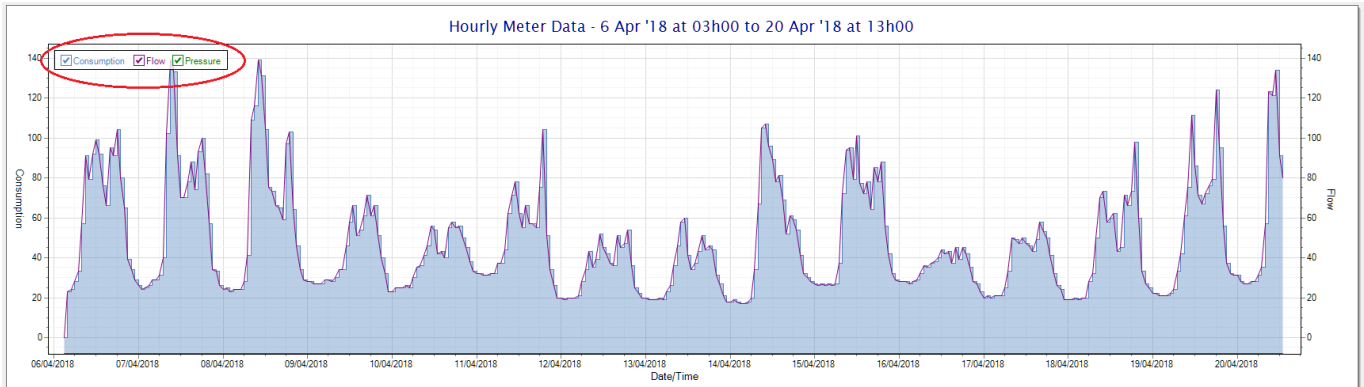
 Read Datalog

 Delete Datalog

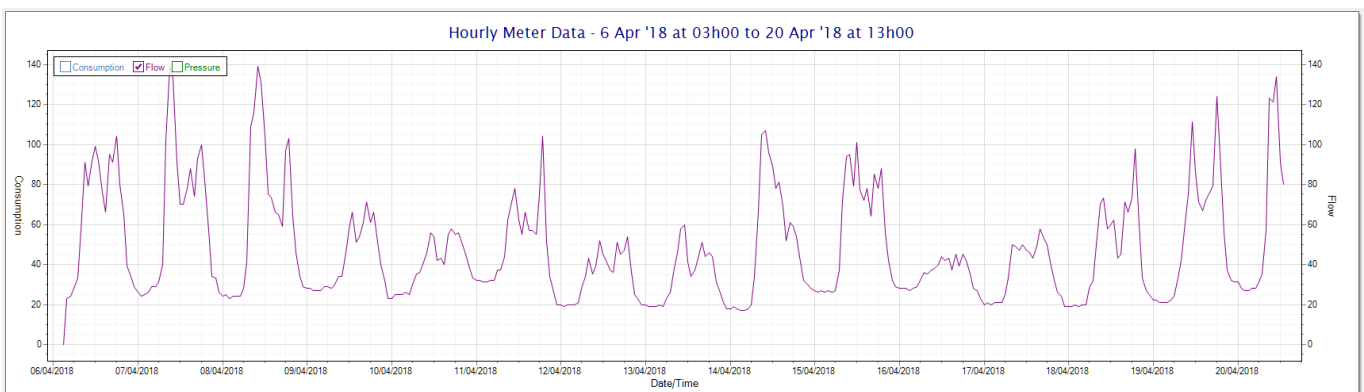
Consumption Graph

Night Flow Graph

The Consumption Graph displays the consumption, pressure and flow related data. Individual graph series can be switched off/on by selecting the ticks at the top left of the graph.



To view the flow only would look like this:-



Also displayed is the Night Flow graph. The function of this graph is to specifically analyse the night time water flows at an installation. This analysis is done based on the data received during a specific time period during the night (normally from 3am to 5am). This period for analysis can be adjusted by sliding the elements of the slider on the top right of the graph.

0	0	0	4.944	Off	Off	100	Battery
0	48	48	8.537	Off	Off	100	Battery

Consumption Graph  
 Night Flow Graph

Monthly
 Night Flow Range

### Night Flow Analyser - Range 3 am To 5 am

Night Flow Min/Max  
  Mean Night Flow  
  Night Line

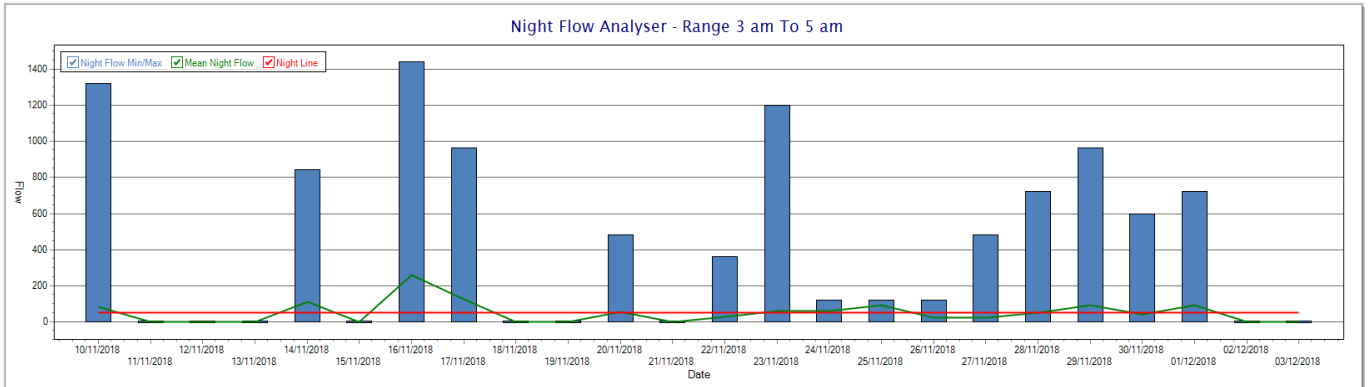
The graph will show a couple of different series.

1. Night Flow Min/Max - this will be a bar series indicating the minimum and maximum flows during the measurement period. The base of the block is the minimum flow and the top, the maximum flow. Depending on the type of installation, during this period you would expect the minimum flow point to come to zero and

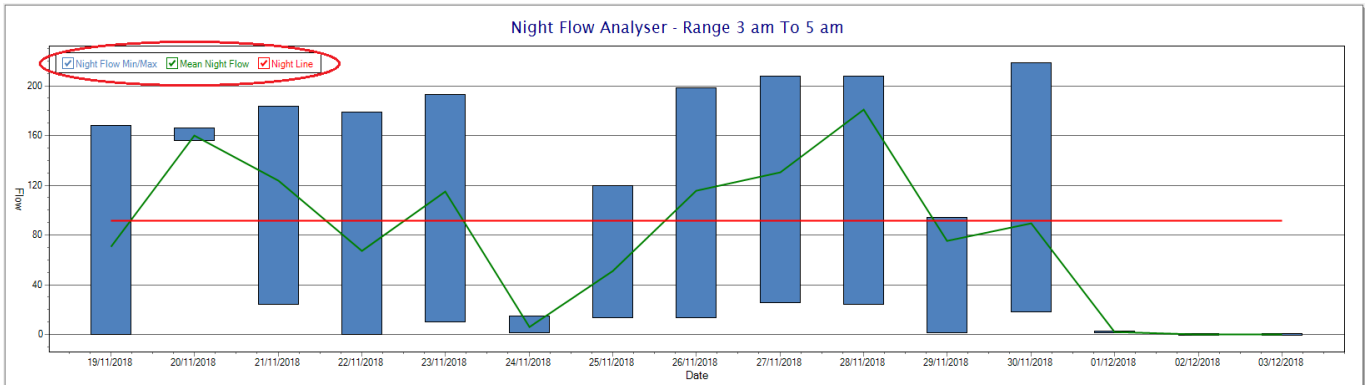
therefore sit on the base of the graph. The maximum flow would simply indicate some consumption during the period of measure and is not really a concern unless that was not expected.

2. Mean Night Flow - this will show the average night flow during that period. Shown in green and would normally simply be the midpoint between the minimum and maximum flows.
3. Night Line - the night line shows the average flow for the entire range of data being measured. Shown in red, this is useful for determining the average night usage over different data ranges.

The Night Flow graph is particularly useful in giving a quick graphical indication of the possibility of a leak scenario. In most case, where there should be no continuous use of water at night, the graph would look as below:-



During a possible leak situation, the minimum night flow does not return to zero and the graph will appear to bounce off the bottom.



So, at a quick glance it is possible to see if there is a problem at this installation. As per the Consumption Graph, the different graph series can be switched off/on by clicking the series ticks on the top left hand corner.

### 2.8.18 Application 017 - Fwd/Rev Meter + Pressure

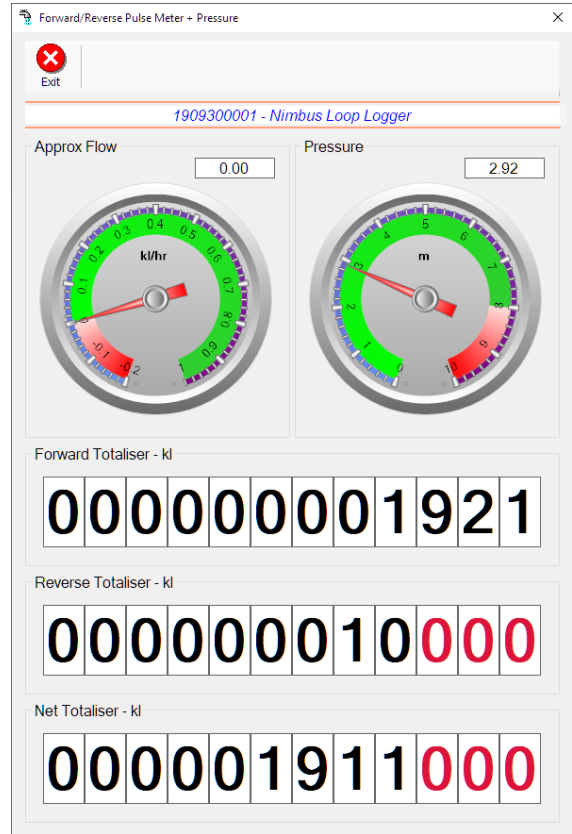
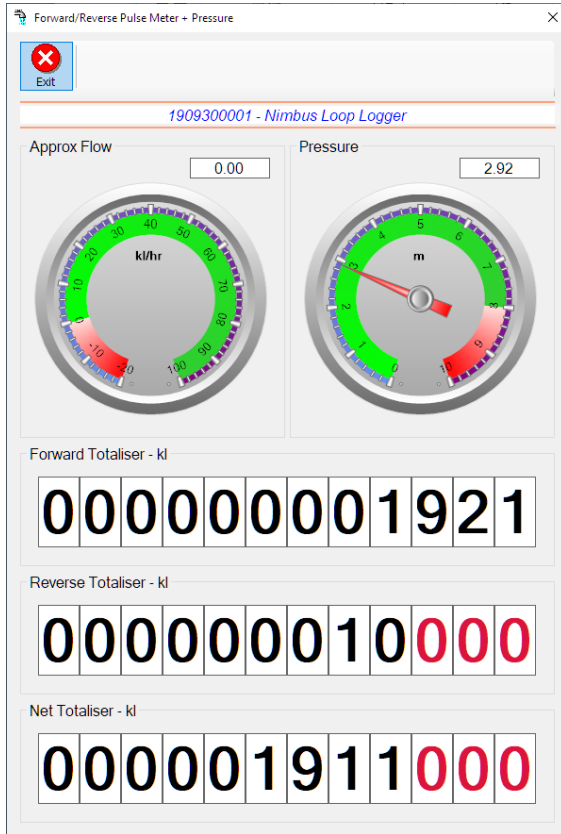
This type would be selected for applications that are used on a forward/reverse pulse water meter. The actual consumption is normally the difference of the two totaliser readings and are handled as such in this application type. Included here is the 4-20mA current loop interface for pressure measurement of the pipeline.

Functions on the top menu bar are mostly as per previous screens within the Cloudworks suite. These would be the 'Refresh Database', 'Layout Control' and 'Export Data' buttons which have been explained earlier. Added functionality is the 'Live Read' button.

If a device is powered and permanently connected to the server (and online), then the 'Live Read' Button will be active allowing you to stream live data directly from that device in real time. **Bear in mind that, while this live streaming screen is active, the cellular data consumption of that device will be much greater than the usual background periodic read used to update the database.** The current communications status of the device will be displayed on the top right of the screen.

Remote devices that are offline or sleeping cannot be accessed for streaming data. This status will be automatically updated while on this screen without the need of pressing 'Refresh Database' button.

Pressing the 'Live Read' will launch the streaming live data screen for that device. All the data on this screen is fetched directly from the remote device and not the database.



The data displayed are the two totalisers (forward/reverse) and combined volume (Net Totaliser) as digital readouts and two needle type displays showing pressure (4-20mA input) and approximate flow. It is important to note that flow is calculated as a difference between two successive readings. For this reading, the data stream will need to see at least two changes in the volume amount before it can calculate the approximate flow. That is why the flow dial will initially appear blank (as per the left display) and then only become active after those two reading changes have been received.

Returning to the applications screen, data is displayed in various groups. On the top left is grouped the Device Information block. This information is data relevant to the remote device and is really displaying data that is present within the database. Mostly data that is populated during the 'Reload Device Config' process.

This data is as follows:-

Information	Notes
<b>Device Code</b>	The Device Code assigned to this particular remote device. All communications are initiated by addressing this code. This code is unique to all remote devices and is assigned at the time of manufacture.
<b>Device Type</b>	Type of Remote Device. eg CDS538 Cumulus Logger etc
<b>Description</b>	The description is a user defined parameter that is captured during the setup of each device. This would normally be something that would describe the location or application of this particular device.



<b>Application</b>	Selected device application. Application 002 - Forward/Reverse Pulse Water Meter + Pressure function in this case.
<b>Data Index</b>	As each device is captured on to Cloudworks system, it is assigned a unique data index. This index is used when externally extracting the log data from the database as each record in the global datalog would be labelled with this index number.
<b>Serial Number</b>	Serial number of this device - assigned in the factory.
<b>GSM Signal</b>	Signal strength of the last GSM communications, expressed as a percentage.
<b>Battery Status</b>	Battery status for devices that are powered by battery, expressed as a percentage. It is important to note that this will be the battery status read while the device is under full load (GSM communications active). It would normally indicate lower than the recorded battery status in the datalog (which is read while the device is essentially idle).
<b>Current Power</b>	An indicator as to how this remote device is being powered. Normally the same as the power mode but can vary for systems on Dual Power mode. For devices in a dual power mode, this parameter will display the current power status of the remote device. Battery or Mains.
<b>Power Mode</b>	Selected Power Mode under which the remote device is operating. This can be Battery, Mains or Dual power modes.
<b>Wakeup Per.</b>	The Wakeup Period set in minutes. Refer to the device configuration chapter for an explanation of this parameter.
<b>Datalog Per.</b>	The Datalog Period set minutes. Refer to the device configuration chapter for an explanation of this parameter.
<b>Fwd Totaliser</b>	The current Forward Totaliser reading with its relevant pulse weight implemented including the unit of measure.
<b>Rev Totaliser</b>	The current Reverse Totaliser reading with its relevant pulse weight implemented including the unit of measure.
<b>Pressure (4-20mA Loop)</b>	The 4-20mA current loop reading with its calibration data implemented including the unit of measure.
<b>Last Seen</b>	The date and time the remote device was last seen connecting into the server.
<b>Latitude</b>	Captured device Latitude.
<b>Longitude</b>	Captured device Longitude.
<b>User Config</b>	The user defined data recorded on the remote device. Refer to the device configuration chapter for an explanation of this parameter.



To get the latest update of this data, you will need to press the 'Refresh Data' button which will then update this screen from the database.

To the right of screen is the Datalog information box. This box will be populated with the most recent data from the recorded datalog of this remote device (read from the database). By default, when the screen opens, the last two weeks' worth of data will be displayed in this table. To select a different range of data, you can select the 'From Date' and 'To Date' values and press the 'Read Datalog' button.

This application will record the following data in the datalog.

Datalog

No.	Date	Fwd Totaliser	Fwd Cons.	Rev Totaliser	Rev Cons.	Flow /hr	Pressure	Battery	Power
43	09 Feb 2020 09:00:00	938	16	10	0	16	0.019	6	Batter
44	09 Feb 2020 10:00:00	964	26	10	0	26	2.286	5	Batter
45	09 Feb 2020 11:00:00	993	29	10	0	29	5.090	4	Batter
46	09 Feb 2020 12:00:00	1035	42	10	0	42	7.801	4	Batter
47	09 Feb 2020 13:00:00	1077	42	10	0	42	7.950	4	Batter
48	09 Feb 2020 14:00:00	1118	41	10	0	41	6.510	5	Batter
49	09 Feb 2020 15:00:00	1146	28	10	0	28	5.385	5	Batter
50	09 Feb 2020 16:00:00	1146	0	10	0	0	4.280	5	Batter
51	09 Feb 2020 17:00:00	1176	30	10	0	30	3.082	6	Batter
52	09 Feb 2020 18:00:00	1196	20	10	0	20	1.743	7	Batter
53	09 Feb 2020 19:00:00	1212	16	10	0	16	-1.176	7	Batter
54	09 Feb 2020 20:00:00	1212	0	10	0	0	-2.500	7	Batter

Raw Data 
  Hourly 
  Daily 
  Weekly 
  Monthly

Night Flow Range

Information	Notes
<b>Date/Time</b>	Date and time of the datalog record.
<b>Fwd Totaliser</b>	Forward Totaliser reading.
<b>Rev Totaliser</b>	Reverse Totaliser reading.
<b>Fwd Cons.</b>	The Forward consumption reading.
<b>Rev Cons.</b>	The Reverse consumption Reading.
<b>Flow/hr</b>	Flow rate calculated as volume per hour.
<b>Pressure</b>	Current Pressure reading read from the 4-20mA input.
<b>Battery</b>	Battery level in percentage. Only displayed on battery powered devices.
<b>Power</b>	Current power status. Mains/Battery

The data in this datalog table can be displayed (and graphed) in a number of different ways. These are selected by choosing the option at the bottom of the datalog table. Options include Raw Data and averaged hourly, daily, weekly and monthly data. When the averaging options are chosen, missing data is automatically interpolated to fill in the missing gaps.

Interpolated data will have the number column entries highlighted in red with a small 'Interpolated data' message at the top right of the datalog table.

Datalog \* Interpolated data

No.	Date	Fwd Totaliser	Fwd Cons.	Rev Totaliser	Rev Cons.	Flow /hr	Pressure	Battery	Power
22	08 Feb 2020 12:00:00	729.00	38.00	10	0	38.00	7.660	8	Batter
23	08 Feb 2020 13:00:00	770.00	41.00	10	0	41.00	7.925	9	Batter
24	08 Feb 2020 14:00:00	810.00	40.00	10	0	40.00	6.494	9	Batter
25	08 Feb 2020 15:00:00	849.00	39.00	10	0	39.00	5.407	10	Batter
26	08 Feb 2020 16:00:00	863.75	14.75	10	0	14.75	2.214	10	Batter
27	08 Feb 2020 17:00:00	878.50	14.75	10	0	14.75	2.214	10	Batter
28	08 Feb 2020 18:00:00	893.25	14.75	10	0	14.75	2.214	10	Batter
29	08 Feb 2020 19:00:00	908.00	14.75	10	0	14.75	-0.978	10	Batter
30	08 Feb 2020 20:00:00	908.00	0.00	10	0	0.00	-2.500	12	Batter
31	08 Feb 2020 21:00:00	911.00	3.00	10	0	3.00	-2.500	12	Batter
32	08 Feb 2020 22:00:00	911.00	0.00	10	0	0.00	-2.500	11	Batter
33	08 Feb 2020 23:00:00	911.00	0.00	10	0	0.00	-2.500	10	Batter

Raw Data 
  Hourly 
  Daily 
  Weekly 
  Monthly
 Night Flow Range

As per the previously explained functions throughout the Cloudworks suite, columns can be switched off/on and re-ordered to the users requirements. The exporting will be as per the layout presented on the screen.

You can zoom into a range of the data by simply selecting those records in the table. This will result in the graph at the bottom being updated to display only those readings.

Deleting the datalog or removing a range of records can be easily done by using the 'Delete Datalog' button. To delete a range, simply select the range in the datalog table and press the 'Delete Datalog' button. If no range is selected, it will be assumed that you wish to delete the entire datalog. There will be a prompt to ensure that you are aware of the action you are about to take.

Data that is displayed in the table will also be represented in the graph at the bottom of the screen. There are two graphs displayed, namely the Consumption Graph (consumption/pressure/flow), and a Night Flow graph. These graphs can be selectively switched on/off by clicking the ticks at the bottom right of the datalog table.

Datalog

No.	Date	Fwd Totaliser	Fwd Cons.	Rev Totaliser	Rev Cons.	Flow /hr	Pressure	Input	Output
1	03 Dec 2018 13:10:00	3443		0			10.873	Off	Off
2	03 Dec 2018 13:11:00	3445	2	0	0	120	9.518	Off	Off
3	03 Dec 2018 13:12:00	3445	0	0	0	0	9.926	Off	Off
4	03 Dec 2018 13:13:00	3446	1	0	0	60	9.213	Off	Off
5	03 Dec 2018 13:14:00	3447	1	0	0	60	9.275	Off	Off
6	03 Dec 2018 13:15:00	3448	1	0	0	60	9.621	Off	Off
7	03 Dec 2018 13:16:00	3449	1	0	0	60	11.379	Off	Off
8	03 Dec 2018 13:17:00	3450	1	0	0	60	9.508	Off	Off

From Date: 19 Nov 2018

To Date: 03 Dec 2018

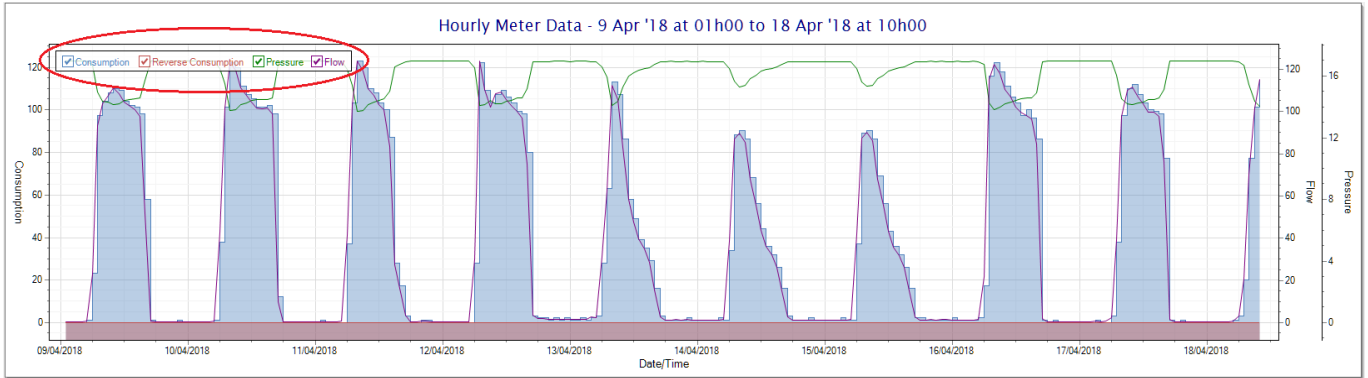
Consumption Graph

Night Flow Graph

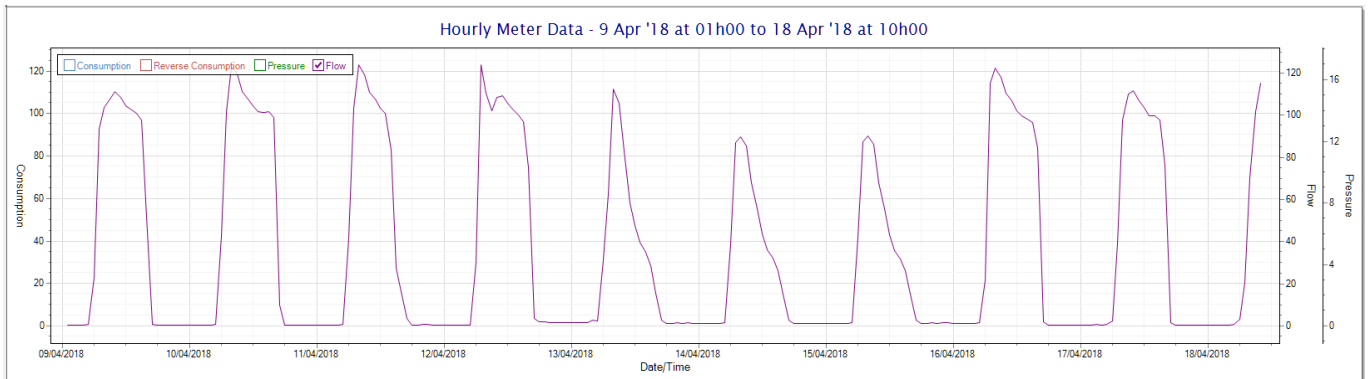
Raw Data 
  Hourly 
  Daily 
  Weekly 
  Monthly
 Night Flow Range



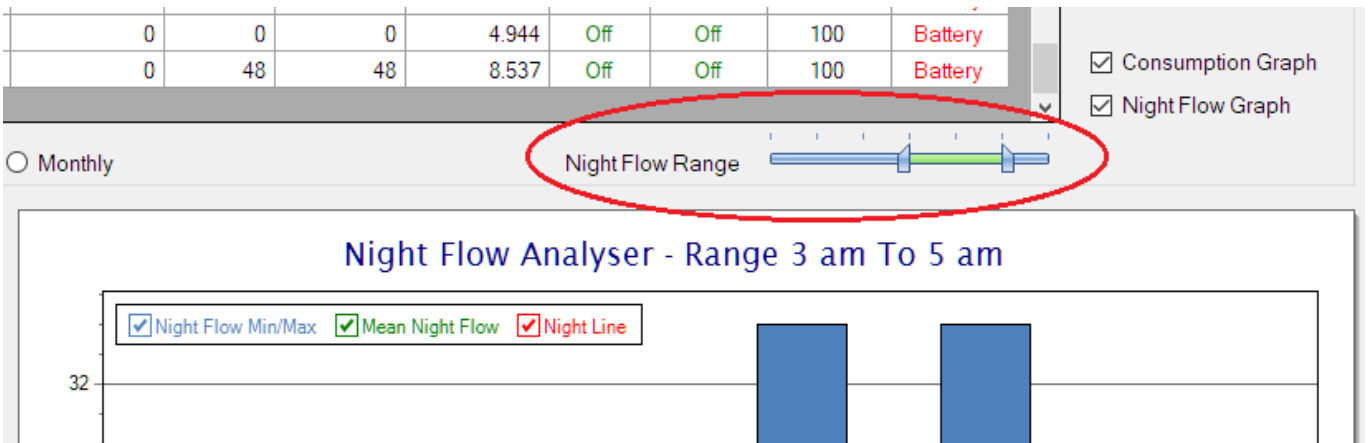
The Consumption Graph displays the consumption, pressure and flow related data. Individual graph series can be switched off/on by selecting the ticks at the top left of the graph.



To view the flow only would look like this:-



Also displayed is the Night Flow graph. The function of this graph is to specifically analyse the night time water flows at an installation. This analysis is done based on the data received during a specific time period during the night (normally from 3am to 5am). This period for analysis can be adjusted by sliding the elements of the slider on the top right of the graph.



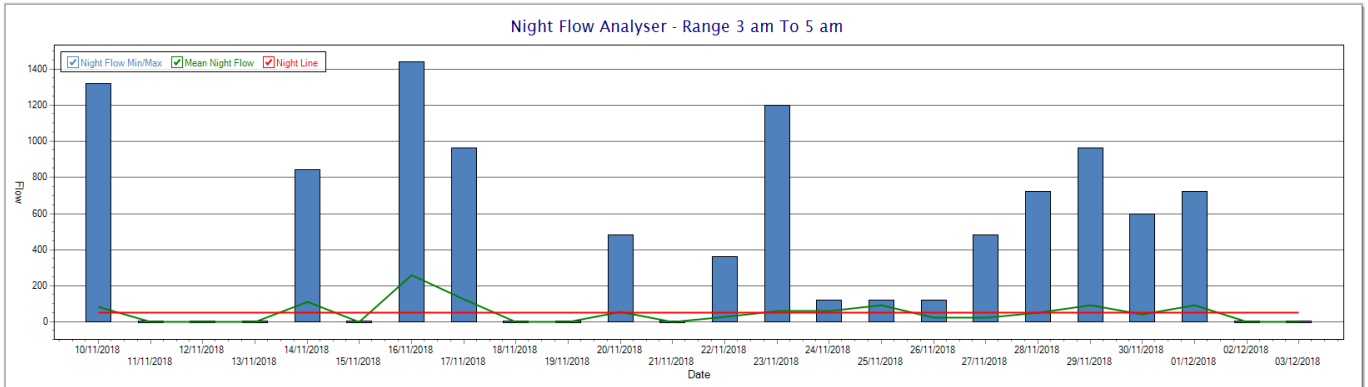
The graph will show a couple of different series.

1. Night Flow Min/Max - this will be a bar series indicating the minimum and maximum flows during the measurement period. The base of the block is the minimum flow and the top, the maximum flow. Depending on the type of installation, during this period you would expect the minimum flow point to come to zero and

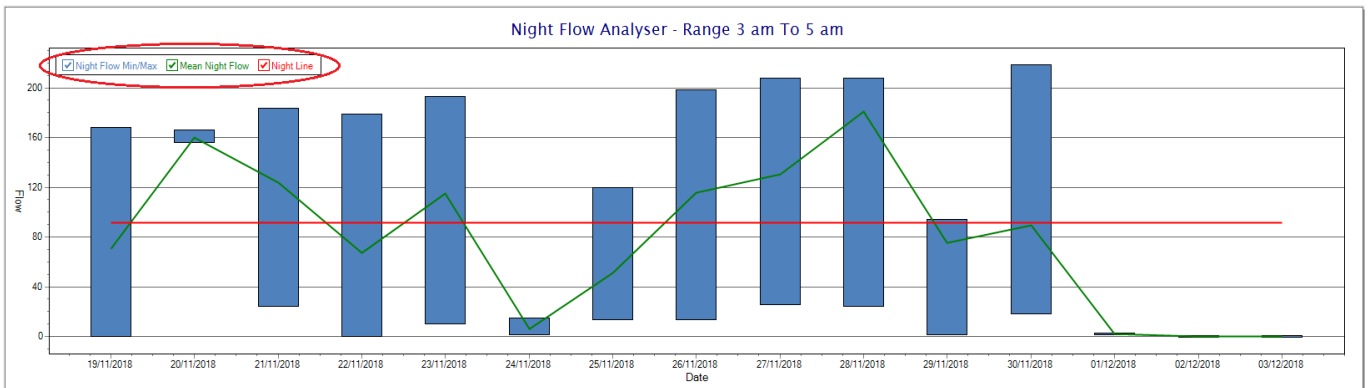
therefore sit on the base of the graph. The maximum flow would simply indicate some consumption during the period of measure and is not really a concern unless that was not expected.

2. Mean Night Flow - this will show the average night flow during that period. Shown in green and would normally simply be the midpoint between the minimum and maximum flows.
3. Night Line - the night line shows the average flow for the entire range of data being measured. Shown in red, this is useful for determining the average night usage over different data ranges.

The Night Flow graph is particularly useful in giving a quick graphical indication of the possibility of a leak scenario. In most case, where there should be no continuous use of water at night, the graph would look as below:-



During a possible leak situation, the minimum night flow does not return to zero and the graph will appear to bounce off the bottom.



So, at a quick glance it is possible to see if there is a problem at this installation. As per the Consumption Graph, the different graph series can be switched off/on by clicking the series ticks on the top left hand corner.

### 2.8.19 Application 018 - WaterMaster + Loop

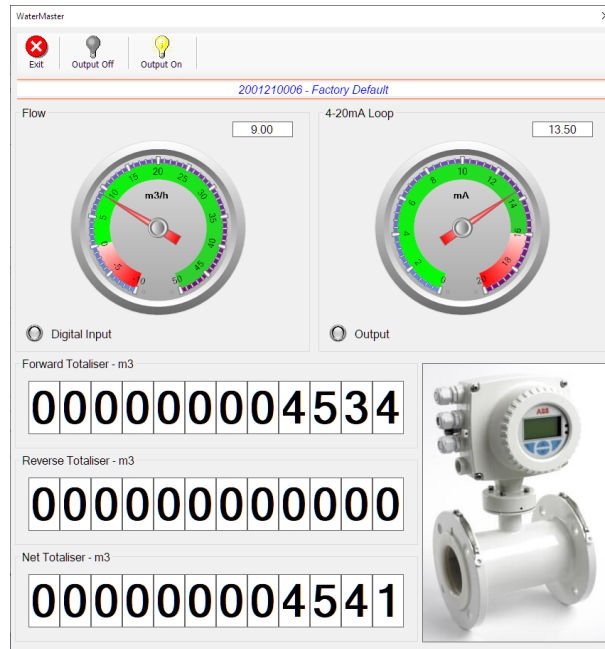
This type would be selected for applications that are used on an ABB WaterMaster water meter connected to the Modbus interface. Forward/Reverse Totals and Flow are read directly from the interface of the meter.

Functions on the top menu bar are mostly as per previous screens within the Cloudworks suite. These would be the 'Refresh Database', 'Layout Control' and 'Export Data' buttons which have been explained earlier. Added functionality is the 'Configure Meter', 'Live Read', 'Output On/Off' and 'Trigger GPS Read'.

If a device is powered and permanently connected to the server (and online), then the 'Live Read' Button will be active allowing you to stream live data directly from that device in real time. **Bear in mind that, while this live streaming screen is active, the cellular data consumption of that device will be much greater than the usual background periodic read used to update the database.**

The current communications status of the device will be displayed on the top right of the screen.

Remote devices that are offline or sleeping cannot be accessed for streaming data. This status will be automatically updated while on this screen without the need of hitting 'Refresh Database' function. Pressing the 'Live Read' will launch the streaming live data screen for that device. **All the data on this screen is fetched directly from the remote device and not the database.**



The data displayed are the two totalisers (forward/reverse) and combined volume (net totaliser) as digital readouts and two needle type displays showing flow and current loop reading. The digital input and output statuses are indicated in the form of illuminated LED's.

On both the Application screen and Live Read screen are buttons to allow for the switching of the output on or off. When using this function on the Live Read screen, there will be a short delay between changing the output status and the indication on the output LED. This is because the indicator will only update on confirmation from the remote device, ensuring that the action has actually been successful.

Returning to the applications screen, data is displayed in various groups. On the top left is grouped the Device Information block. This information is data relevant to the remote device and is really displaying data that is present within the database. Mostly data that is populated during the 'Reload Device Config' process.

This data is as follows:-

Information	Notes
<b>Device Code</b>	The Device Code assigned to this particular remote device. All communications are initiated by addressing this code. This code is unique to all remote devices and is assigned at the time of manufacture.
<b>Device Type</b>	Type of Remote Device. eg CDS538 Cumulus Logger etc
<b>Description</b>	The description is a user defined parameter that is captured during the setup of each device. This would normally be something that would describe the location or application of this particular device.
<b>Application</b>	Selected device application. Application 018 - WaterMaster + Loop function in this case.
<b>Data Index</b>	As each device is captured on to Cloudworks system, it is assigned a unique data index. This index is used when externally extracting the log data from the database as each record in the global datalog would be labelled with this index number.



<b>Serial Number</b>	Serial number of this device - assigned in the factory.
<b>GSM Signal</b>	Signal strength of the last GSM communications, expressed as a percentage.
<b>Battery Status</b>	Battery status for devices that are powered by battery, expressed as a percentage. It is important to note that this will be the battery status read while the device is under full load (GSM communications active). It would normally indicate lower than the recorded battery status in the datalog (which is read while the device is essentially idle).
<b>Current Power</b>	An indicator as to how this remote device is being powered. Normally the same as the power mode but can vary for systems on Dual Power mode. For devices in a dual power mode, this parameter will display the current power status of the remote device. Battery or Mains.
<b>Power Mode</b>	Selected Power Mode under which the remote device is operating. This can be Battery, Mains or Dual power modes.
<b>Wakeup Per.</b>	The Wakeup Period set in minutes. Refer to the device configuration chapter for an explanation of this parameter.
<b>Datalog Per.</b>	The Datalog Period set minutes. Refer to the device configuration chapter for an explanation of this parameter.
<b>Fwd Totaliser</b>	The current Forward Totaliser reading.
<b>Rev Totaliser</b>	The current Reverse Totaliser reading.
<b>Flow</b>	Current flow reading.
<b>4-20mA Current Loop</b>	The 4-20mA current loop reading with its calibration data implemented including the unit of measure.
<b>Output</b>	Digital output status.
<b>Digital Input</b>	Digital input Status.
<b>Last Seen</b>	The date and time the remote device was last seen connecting into the server.
<b>Latitude</b>	Last seen remote device Latitude.
<b>Longitude</b>	Last seen remote device Longitude.
<b>User Config</b>	The user defined data recorded on the remote device. Refer to the device configuration chapter for an explanation of this parameter.

To get the latest update of this data, you will need to press the 'Refresh Data' button which will then update this screen from the database.



The onboard GPS of the remote device uses a substantial amount of power and is therefore automatically switched off on battery powered devices. When the GPS is first powered up, it will take a couple of minutes before it is able to lock on to the position of the device. For this reason, battery powered devices by default do not power up the GPS at each wakeup. In order to get a GPS lock on the device, it is necessary to selectively power the GPS on a wakeup, get a lock, and go back to sleep. This is achieved by pressing the 'Trigger GPS Read' button.

By doing this, a flag is placed into the database telling the server to power the GPS at the next wakeup, wait a couple of minutes for a GPS lock, record it, and put the remote device back to sleep. This will only happen at the next wakeup and can keep the remote device awake for a couple of minutes. **This process should only be triggered when the GPS position needs to be updated because of the expense of battery power.**

The server will only keep the device awake for a couple of minutes (typically 5 minutes - set in the server software) in order to get a fix. If this takes too long, the remote device will be put back to sleep without updating the position. This is done to protect the battery should the remote device not be in a position to ever get a GPS signal. You can at a later stage attempt the process again if it was unsuccessful the first time.

To the right of screen is the Datalog information box. This box will be populated with the most recent data from the recorded datalog of this remote device (**read from the database**). By default, when the screen opens, the last two weeks' worth of data will be displayed in this table. To select a different range of data, you can select the 'From Date' and 'To Date' values and press the 'Read Datalog' button.

This application will record the following data in the datalog.

No.	Date	Fwd Totaliser	Fwd Cons.	Rev Totaliser	Rev Cons.	Flow	Loop	Input	Output	Batter ^
110	21 Apr 2020 15:40:00	4533.915	0.150	0	0	9	13.509	Off	Off	
111	21 Apr 2020 15:41:00	4534.065	0.150	0	0	9	12.812	Off	Off	
112	21 Apr 2020 15:42:00	4534.215	0.150	0	0	9	13.575	Off	Off	
113	21 Apr 2020 15:43:00	4534.365	0.150	0	0	9	13.590	Off	Off	
114	21 Apr 2020 15:44:00	4534.515	0.150	0	0	9	13.621	Off	Off	
115	21 Apr 2020 15:45:00	4534.665	0.150	0	0	9	13.636	Off	Off	
116	21 Apr 2020 15:46:00	4534.815	0.150	0	0	9	13.611	Off	Off	
117	21 Apr 2020 15:47:00	4534.965	0.150	0	0	9	13.595	Off	Off	
118	21 Apr 2020 15:48:00	4535.115	0.150	0	0	9	13.544	Off	Off	
119	21 Apr 2020 15:49:00	4535.265	0.150	0	0	9	13.626	Off	Off	
120	21 Apr 2020 15:50:00	4535.415	0.150	0	0	9	13.646	Off	Off	
121	21 Apr 2020 15:51:00	4535.565	0.150	0	0	9	13.702	Off	Off	

Raw Data 
  Hourly 
  Daily 
  Weekly 
  Monthly

Night Flow Range

Information	Notes
<b>Date/Time</b>	Date and time of the datalog record.
<b>Fwd Totaliser</b>	Forward Totaliser reading.
<b>Rev Totaliser</b>	Reverse Totaliser reading.
<b>Fwd Cons.</b>	The Forward consumption reading.
<b>Rev Cons.</b>	The Reverse consumption Reading.
<b>Flow</b>	Flow rate calculated as volume per hour.
<b>Loop</b>	4-20mA Loop reading with its applied calibration.

<b>Input</b>	Digital input status at the time of recording this record.
<b>Output</b>	Digital output status at the time of recording this record.
<b>Battery</b>	Battery level in percentage. Only displayed on battery powered devices.
<b>Power</b>	Current power status. Mains/Battery

The data in this datalog table can be displayed (and graphed) in a number of different ways. These are selected by choosing the option at the bottom of the datalog table. Options include Raw Data and averaged hourly, daily, weekly and monthly data. When the averaging options are chosen, missing data is automatically interpolated to fill in the missing gaps. Interpolated data will have the number column entries highlighted in red with a small 'Interpolated data' message at the top right of the datalog table.

Datalog \* Interpolated data

No.	Date	Fwd Totaliser	Fwd Cons.	Rev Totaliser	Rev Cons.	Flow	Loop	Input	Output	Batter
6	21 Apr 2020 20:00:00	4572.915	9.000	0	0	9	-3.860	Off	Off	
7	21 Apr 2020 21:00:00	4581.915	9.000	0	0	9	-4.000	Off	Off	
8	21 Apr 2020 22:00:00	4590.915	9.000	0	0	9	-4.000	Off	Off	
9	21 Apr 2020 23:00:00	4599.765	8.850	0	0	9	-4.000	Off	Off	
10	22 Apr 2020 00:00:00	4608.840	9.075	0	0	9	-4.000	Off	Off	
11	22 Apr 2020 01:00:00	4617.916	9.075	0	0	9	-4.000	Off	Off	
12	22 Apr 2020 02:00:00	4626.914	8.998	0	0	9	-4.000	Off	Off	
13	22 Apr 2020 03:00:00	4635.914	9.000	0	0	9	-4.000	Off	Off	
14	22 Apr 2020 04:00:00	4644.914	9.000	0	0	9	-4.000	Off	Off	
15	22 Apr 2020 05:00:00	4653.765	8.851	0	0	9	-4.000	Off	Off	
16	22 Apr 2020 06:00:00	4662.465	8.700	0	0	9	-4.000	Off	Off	
17	22 Apr 2020 07:00:00	4671.915	9.450	0	0	9	-4.000	Off	Off	
18	22 Apr 2020 08:00:00	4680.915	9.000	0	0	9	-3.578	Off	Off	

Raw Data 
  Hourly 
  Daily 
  Weekly 
  Monthly

Night Flow Range

As per the previously explained functions throughout the Cloudworks suite, columns can be switched off/on and re-ordered to the users requirements. The exporting will be as per the layout presented on the screen.

You can zoom into a range of the data by simply selecting those records in the table. This will result in the graph at the bottom being updated to display only those readings.

Deleting the datalog or removing a range of records can be easily done by using the 'Delete Datalog' button. To delete a range, simply select the range in the datalog table and press the 'Delete Datalog' button. If no range is selected, it will be assumed that you wish to delete the entire datalog. There will be a prompt to ensure that you are aware of the action you are about to take.

Data that is displayed in the table will also be represented in the graph at the bottom of the screen. There are two graphs displayed, namely the Consumption Graph, Flow/Loop graph and a Night Flow graph. These graphs can be selectively switched on/off by clicking the ticks below the datalog table.

Datalog

No.	Date	Fwd Totaliser	Fwd Cons.	Rev Totaliser	Rev Cons.	Flow	Loop	Input	Output	Batter
6	21 Apr 2020 20:00:00	4572.915	9.000	0	0	9	-3.860	Off	Off	
7	21 Apr 2020 21:00:00	4581.915	9.000	0	0	9	-4.000	Off	Off	
8	21 Apr 2020 22:00:00	4590.915	9.000	0	0	9	-4.000	Off	Off	
9	21 Apr 2020 23:00:00	4599.765	8.850	0	0	9	-4.000	Off	Off	
10	22 Apr 2020 00:00:00	4608.840	9.075	0	0	9	-4.000	Off	Off	
11	22 Apr 2020 01:00:00	4617.916	9.075	0	0	9	-4.000	Off	Off	
12	22 Apr 2020 02:00:00	4626.914	8.998	0	0	9	-4.000	Off	Off	
13	22 Apr 2020 03:00:00	4635.914	9.000	0	0	9	-4.000	Off	Off	
14	22 Apr 2020 04:00:00	4644.914	9.000	0	0	9	-4.000	Off	Off	
15	22 Apr 2020 05:00:00	4653.765	8.851	0	0	9	-4.000	Off	Off	
16	22 Apr 2020 06:00:00	4662.465	8.700	0	0	9	-4.000	Off	Off	
17	22 Apr 2020 07:00:00	4671.915	9.450	0	0	9	-4.000	Off	Off	
18	22 Apr 2020 08:00:00	4680.915	9.000	0	0	9	-3.578	Off	Off	

\* Interpolated data

From Date: 08 Apr 2020  
To Date: 22 Apr 2020

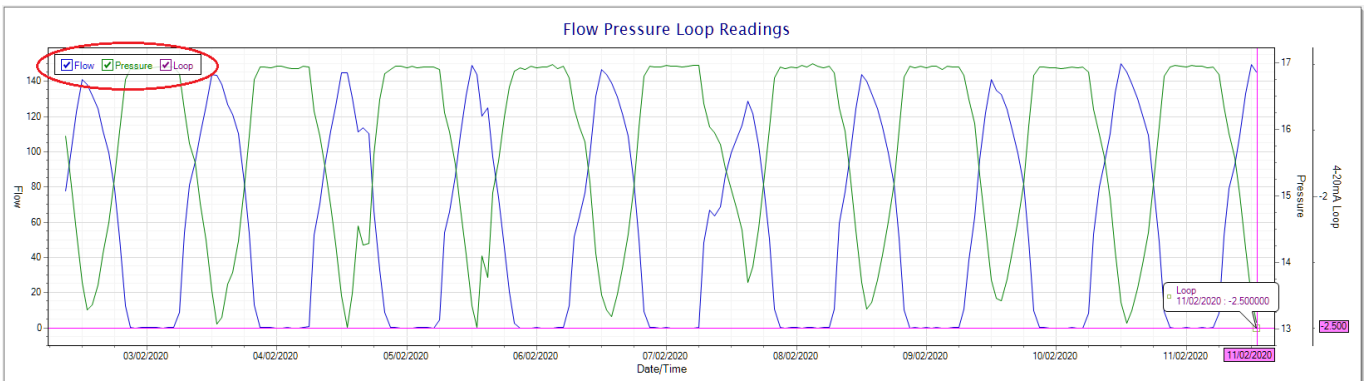
Read Datalog  
Delete Datalog

Consumption  
 Flow / Loop  
 Night Flow

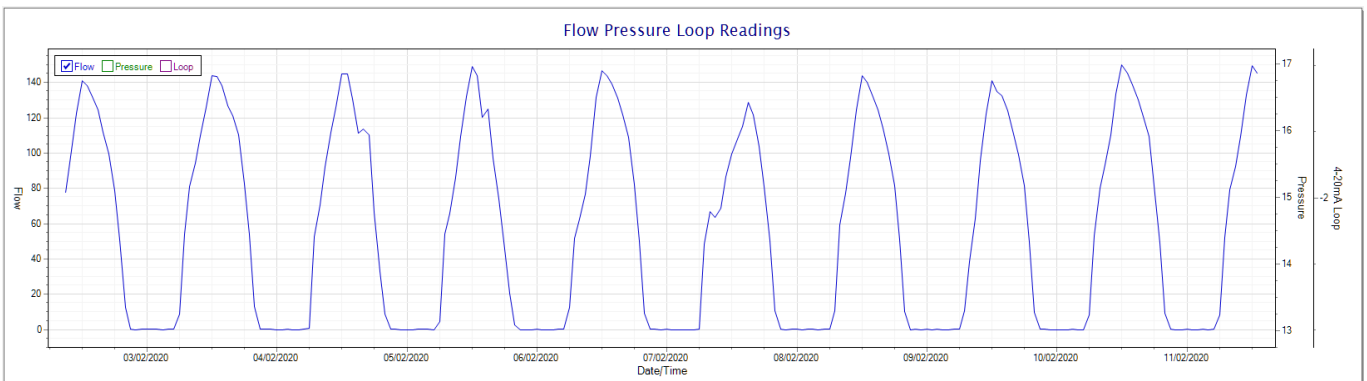
Raw Data  Hourly  Daily  Weekly  Monthly

Night Flow Range: [Slider]

The various series on each graph can be toggled on and off by selecting the series tick in the upper left hand corner.

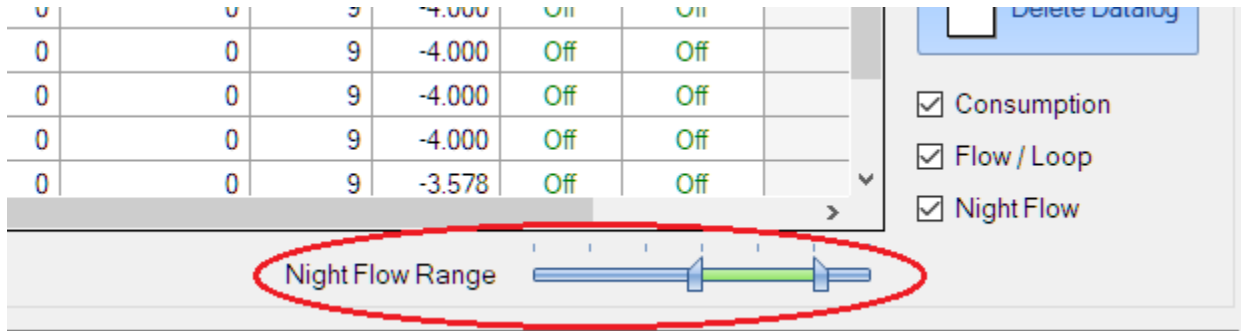


To view the flow only would look like this:-



Also displayed is the Night Flow graph. The function of this graph is to specifically analyse the night time water flows at an installation. This analysis is done based on the data received during a specific time period during the night (normally from 3am to 5am). This period for analysis can be adjusted by sliding the elements of the slider on the top right of the graph.

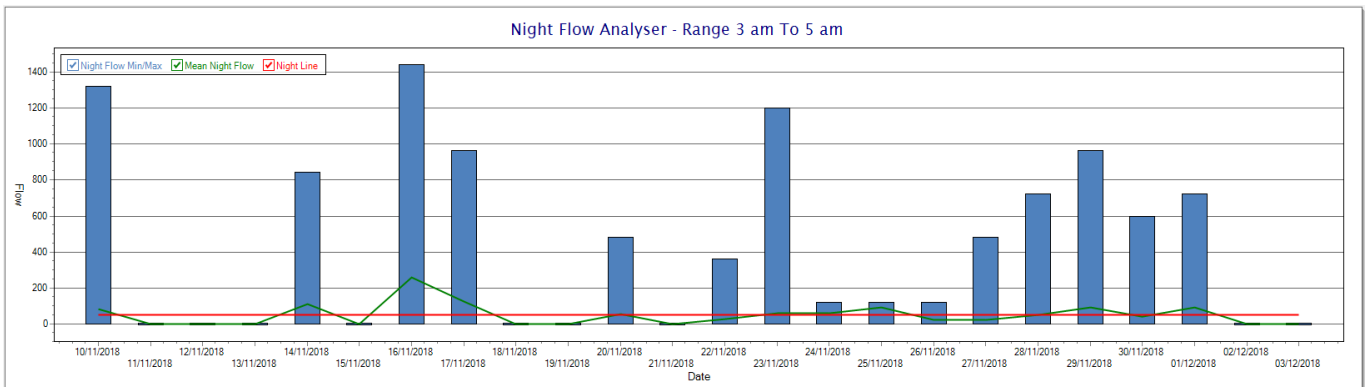




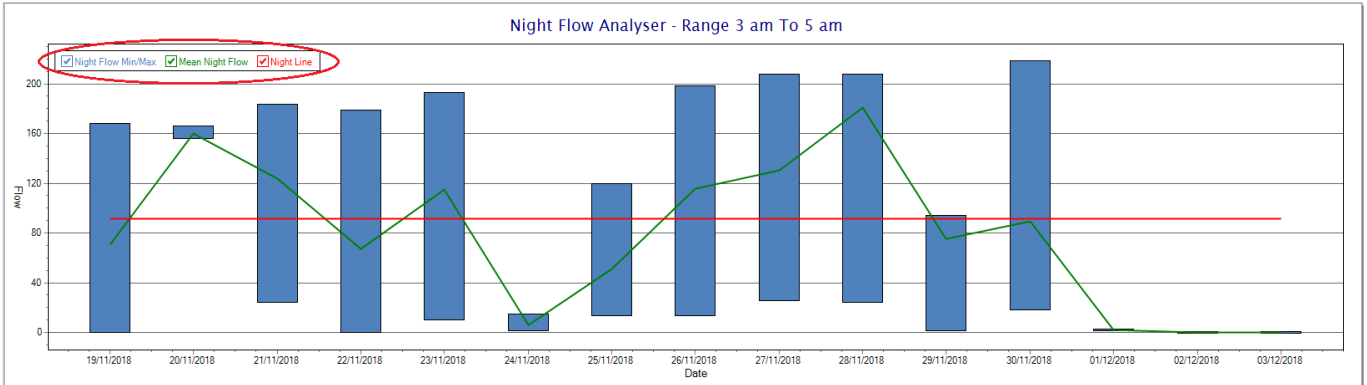
The graph will show a couple of different series.

1. Night Flow Min/Max - this will be a bar series indicating the minimum and maximum flows during the measurement period. The base of the block is the minimum flow and the top, the maximum flow. Depending on the type of installation, during this period you would expect the minimum flow point to come to zero and therefore sit on the base of the graph. The maximum flow would simply indicate some consumption during the period of measure and is not really a concern unless that was not expected.
2. Mean Night Flow - this will show the average night flow during that period. Shown in green and would normally simply be the midpoint between the minimum and maximum flows.
3. Night Line - the night line shows the average flow for the entire range of data being measured. Shown in red, this is useful for determining the average night usage over different data ranges.

The Night Flow graph is particularly useful in giving a quick graphical indication of the possibility of a leak scenario. In most case, where there should be no continuous use of water at night, the graph would look as below:-



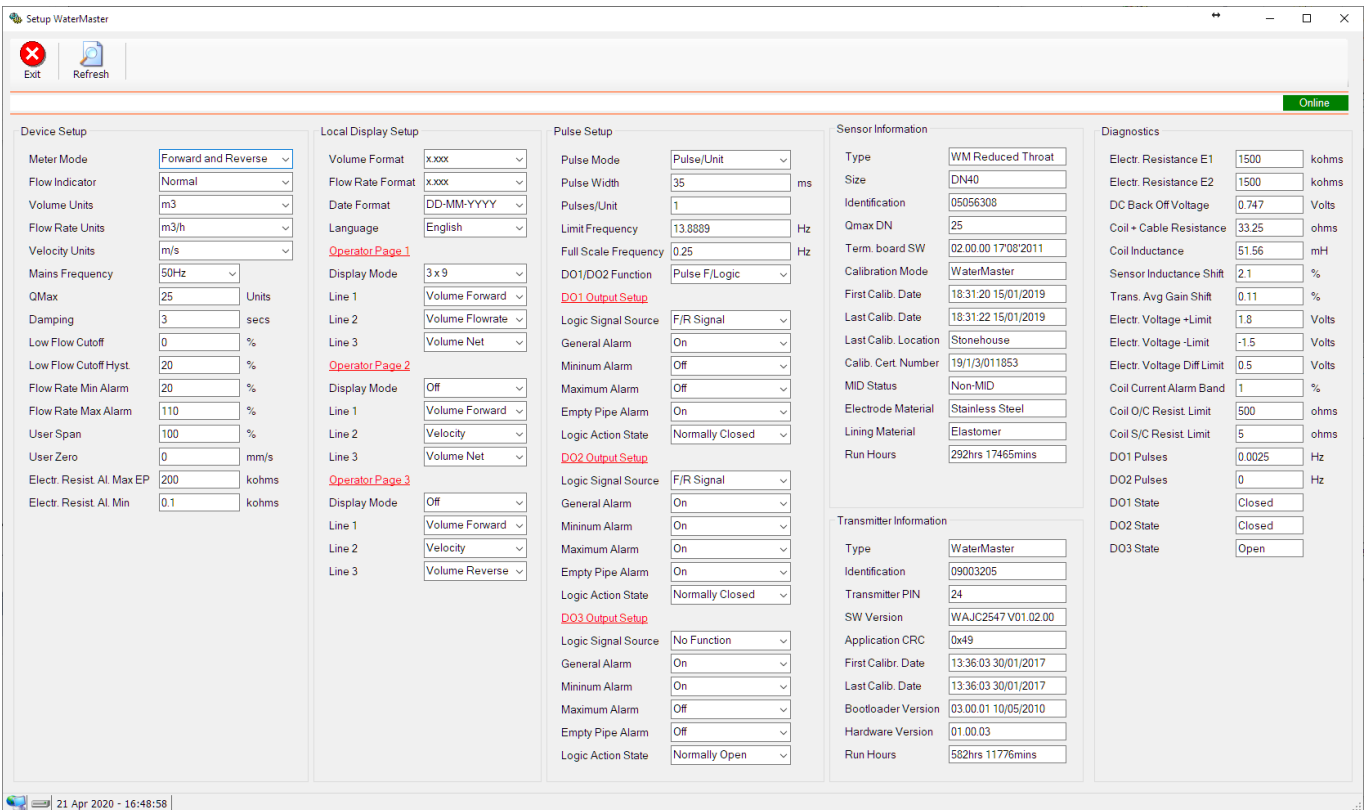
During a possible leak situation, the minimum night flow does not return to zero and the graph will appear to bounce off the bottom.



So, at a quick glance it is possible to see if there is a problem at this installation. As per the Consumption Graph, the different graph series can be switched off/on by clicking the series ticks on the top left hand corner.

Finally, the WaterMaster application screen has a function to allow the setup of the remote meter via a specialised interface screen. Details of the parameters setup can be obtained from the WaterMaster specifications datasheet supplied by ABB limited. The setup screen includes the below parameters.

Finally, the WaterMaster application screen has a function to allow the setup of the remote meter via a specialised interface screen. Details of the parameters setup can be obtained from the WaterMaster specifications datasheet supplied by ABB limited. The setup screen includes the below parameters.



While the system is online, these parameters can be changed and will immediately be updated on the remote meter via its ModBus connection.

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### 2.8.20 Application 019 - WaterMaster

The screenshot displays the 'Device Detail' screen for 'Application 019 - WaterMaster + Loop'. The device is online. The top menu bar includes 'Quit', 'Refresh Database', 'Layout Control', 'Export Data', 'Configure Meter', and 'Live Read'. The 'Device Information' section shows details for device code 1911120001, a Stratus Modbus device, with various parameters like GSM signal, current power, and flow. The 'Datalog' table shows a list of readings from 21/04/2020 01:00:00 to 21/04/2020 14:00:00, including forward and reverse totals, flow, loop, battery, and power. Below the datalog are three charts: 'Hourly Meter Data' showing consumption, 'Flow / Loop Readings' showing flow and loop status, and 'Night Flow Analyser' showing night flow metrics.

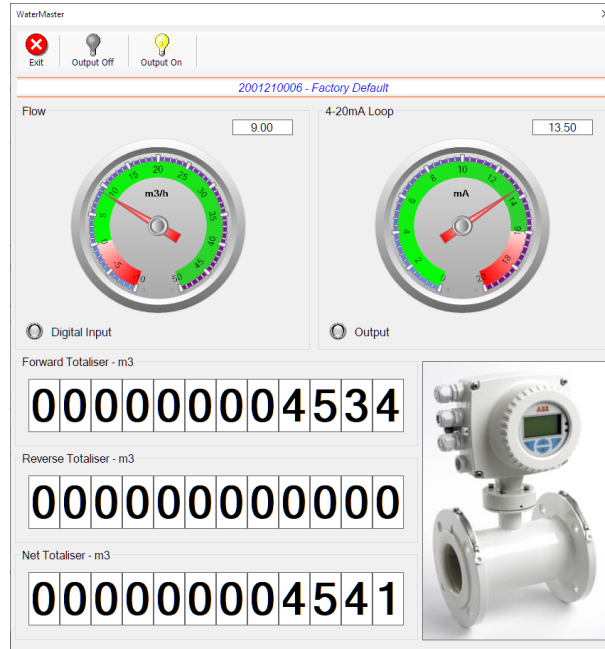
This type would be selected for applications that are used on an ABB WaterMaster water meter connected to the Modbus interface. Forward/Reverse Totals and Flow are read directly from the interface of the meter.

Functions on the top menu bar are mostly as per previous screens within the Cloudworks suite. These would be the 'Refresh Database', 'Layout Control' and 'Export Data' buttons which have been explained earlier. Added functionality is the 'Live Read' and 'Configure Meter'.

If a device is powered and permanently connected to the server (and online), then the 'Live Read' Button will be active allowing you to stream live data directly from that device in real time. **Bear in mind that, while this live streaming screen is active, the cellular data consumption of that device will be much greater than the usual background periodic read used to update the database.**

The current communications status of the device will be displayed on the top right of the screen.

Remote devices that are offline or sleeping cannot be accessed for streaming data. This status will be automatically updated while on this screen without the need of hitting 'Refresh Database' function. Pressing the 'Live Read' will launch the streaming live data screen for that device. **All the data on this screen is fetched directly from the remote device and not the database.**



The data displayed are the two totalisers (forward/reverse) and combined volume (net totaliser) as digital readouts and two needle type displays showing flow and current loop reading. The digital input and output statuses are indicated in the form of illuminated LED's.

On both the Application screen and Live Read screen are buttons to allow for the switching of the output on or off. When using this function on the Live Read screen, there will be a short delay between changing the output status and the indication on the output LED. This is because the indicator will only update on confirmation from the remote device, ensuring that the action has actually been successful.

Returning to the applications screen, data is displayed in various groups. On the top left is grouped the Device Information block. This information is data relevant to the remote device and is really displaying data that is present within the database. Mostly data that is populated during the 'Reload Device Config' process.

This data is as follows:-

Information	Notes
<b>Device Code</b>	The Device Code assigned to this particular remote device. All communications are initiated by addressing this code. This code is unique to all remote devices and is assigned at the time of manufacture.
<b>Device Type</b>	Type of Remote Device. eg CDS538 Cumulus Logger etc
<b>Description</b>	The description is a user defined parameter that is captured during the setup of each device. This would normally be something that would describe the location or application of this particular device.
<b>Application</b>	Selected device application. Application 018 - WaterMaster + Loop function in this case.
<b>Data Index</b>	As each device is captured on to Cloudworks system, it is assigned a unique data index. This index is used when externally extracting the log data from the database as each record in the global datalog would be labelled with this index number.



<b>Serial Number</b>	Serial number of this device - assigned in the factory.
<b>GSM Signal</b>	Signal strength of the last GSM communications, expressed as a percentage.
<b>Battery Status</b>	Battery status for devices that are powered by battery, expressed as a percentage. It is important to note that this will be the battery status read while the device is under full load (GSM communications active). It would normally indicate lower than the recorded battery status in the datalog (which is read while the device is essentially idle).
<b>Current Power</b>	An indicator as to how this remote device is being powered. Normally the same as the power mode but can vary for systems on Dual Power mode. For devices in a dual power mode, this parameter will display the current power status of the remote device. Battery or Mains.
<b>Power Mode</b>	Selected Power Mode under which the remote device is operating. This can be Battery, Mains or Dual power modes.
<b>Wakeup Per.</b>	The Wakeup Period set in minutes. Refer to the device configuration chapter for an explanation of this parameter.
<b>Datalog Per.</b>	The Datalog Period set minutes. Refer to the device configuration chapter for an explanation of this parameter.
<b>Fwd Totaliser</b>	The current Forward Totaliser reading.
<b>Rev Totaliser</b>	The current Reverse Totaliser reading.
<b>Flow</b>	Current flow reading.
<b>4-20mA Current Loop</b>	The 4-20mA current loop reading with its calibration data implemented including the unit of measure.
<b>Last Seen</b>	The date and time the remote device was last seen connecting into the server.
<b>Latitude</b>	Captured Latitude.
<b>Longitude</b>	Captured Longitude.
<b>User Config</b>	The user defined data recorded on the remote device. Refer to the device configuration chapter for an explanation of this parameter.

To get the latest update of this data, you will need to press the 'Refresh Data' button which will then update this screen from the database.

The onboard GPS of the remote device uses a substantial amount of power and is therefore automatically switched off on battery powered devices. When the GPS is first powered up, it will take a couple of minutes before it is able to lock on to the position of the device. For this reason, battery powered devices by default do not power up the GPS at each wakeup. In order to get a GPS lock on the device, it is necessary to selectively power the GPS on a wakeup, get a lock, and go back to sleep. This is achieved by pressing the 'Trigger GPS Read' button.



By doing this, a flag is placed into the database telling the server to power the GPS at the next wakeup, wait a couple of minutes for a GPS lock, record it, and put the remote device back to sleep. This will only happen at the next wakeup and can keep the remote device awake for a couple of minutes. **This process should only be triggered when the GPS position needs to be updated because of the expense of battery power.**

The server will only keep the device awake for a couple of minutes (typically 5 minutes - set in the server software) in order to get a fix. If this takes too long, the remote device will be put back to sleep without updating the position. This is done to protect the battery should the remote device not be in a position to ever get a GPS signal. You can at a later stage attempt the process again if it was unsuccessful the first time.

To the right of screen is the Datalog information box. This box will be populated with the most recent data from the recorded datalog of this remote device (**read from the database**). By default, when the screen opens, the last two weeks' worth of data will be displayed in this table. To select a different range of data, you can select the 'From Date' and 'To Date' values and press the 'Read Datalog' button.

This application will record the following data in the datalog.

Datalog

No.	Date	Fwd Totaliser	Fwd Cons.	Rev Totaliser	Rev Cons.	Flow	Loop	Battery	Power
9	20 Apr 2020 22:00:00	4374.921	9.000	0	0	9	-5.000		Mains
10	20 Apr 2020 23:00:00	4383.921	9.000	0	0	9	-5.000		Mains
11	21 Apr 2020 00:00:00	4392.921	9.000	0	0	9	-5.000		Mains
12	21 Apr 2020 01:00:00	4401.921	9.000	0	0	9	-5.000		Mains
13	21 Apr 2020 02:00:00	4410.920	8.999	0	0	9	-5.000		Mains
14	21 Apr 2020 03:00:00	4419.920	9.000	0	0	9	-5.000		Mains
15	21 Apr 2020 04:00:00	4428.927	9.007	0	0	9	-5.000		Mains
16	21 Apr 2020 05:00:00	4437.920	8.993	0	0	9	-5.000		Mains
17	21 Apr 2020 06:00:00	4446.927	9.007	0	0	9	-5.000		Mains
18	21 Apr 2020 07:00:00	4455.920	8.993	0	0	9	-5.000		Mains
19	21 Apr 2020 08:00:00	4464.920	9.000	0	0	9	-4.566		Mains
20	21 Apr 2020 09:00:00	4473.920	9.000	0	0	9	1.284		Mains
21	21 Apr 2020 10:00:00	4482.920	9.000	0	0	9	8.406		Mains
22	21 Apr 2020 11:00:00	4491.926	9.006	0	0	9	15.323		Mains

Raw Data 
  Hourly 
  Daily 
  Weekly 
  Monthly

Night Flow Range


Information	Notes
<b>Date/Time</b>	Date and time of the datalog record.
<b>Fwd Totaliser</b>	Forward Totaliser reading.
<b>Rev Totaliser</b>	Reverse Totaliser reading.
<b>Fwd Cons.</b>	The Forward consumption reading.
<b>Rev Cons.</b>	The Reverse consumption Reading.
<b>Flow</b>	Flow rate calculated as volume per hour.
<b>Loop</b>	4-20mA Loop reading with its applied calibration.
<b>Battery</b>	Battery level in percentage. Only displayed on battery powered devices.
<b>Power</b>	Current power status. Mains/Battery

The data in this datalog table can be displayed (and graphed) in a number of different ways. These are selected by choosing the option at the bottom of the datalog table. Options include Raw Data and averaged hourly, daily, weekly and monthly data. When the averaging options are chosen, missing data is automatically interpolated to fill in the missing gaps. Interpolated data will have the number column entries highlighted in red with a small 'Interpolated data' message at the top right of the datalog table.

Datalog \* Interpolated data

No.	Date	Fwd Totaliser	Fwd Cons.	Rev Totaliser	Rev Cons.	Flow	Loop	Battery	Power
11	21 Apr 2020 00:00:00	4392.921	9.000	0	0	9	-5.000		Mains
12	21 Apr 2020 01:00:00	4401.921	9.000	0	0	9	-5.000		Mains
13	21 Apr 2020 02:00:00	4410.920	8.999	0	0	9	-5.000		Mains
14	21 Apr 2020 03:00:00	4419.920	9.000	0	0	9	-5.000		Mains
15	21 Apr 2020 04:00:00	4428.927	9.007	0	0	9	-5.000		Mains
16	21 Apr 2020 05:00:00	4437.170	8.243	0	0	9	-5.000		Mains
17	21 Apr 2020 06:00:00	4446.545	9.375	0	0	9	-5.000		Mains
18	21 Apr 2020 07:00:00	4455.920	9.375	0	0	9	-5.000		Mains
19	21 Apr 2020 08:00:00	4464.920	9.000	0	0	9	-4.566		Mains
20	21 Apr 2020 09:00:00	4473.920	9.000	0	0	9	1.284		Mains
21	21 Apr 2020 10:00:00	4482.920	9.000	0	0	9	8.406		Mains
22	21 Apr 2020 11:00:00	4491.926	9.006	0	0	9	15.323		Mains
23	21 Apr 2020 12:00:00	4500.920	8.994	0	0	9	10.393		Mains
24	21 Apr 2020 13:00:00	4509.170	8.250	0	0	9	11.783		Mains

Raw Data 
  Hourly 
  Daily 
  Weekly 
  Monthly

Night Flow Range 

As per the previously explained functions throughout the Cloudworks suite, columns can be switched off/on and re-ordered to the users requirements. The exporting will be as per the layout presented on the screen.

You can zoom into a range of the data by simply selecting those records in the table. This will result in the graph at the bottom being updated to display only those readings.

Deleting the datalog or removing a range of records can be easily done by using the 'Delete Datalog' button. To delete a range, simply select the range in the datalog table and press the 'Delete Datalog' button. If no range is selected, it will be assumed that you wish to delete the entire datalog. There will be a prompt to ensure that you are aware of the action you are about to take.

Data that is displayed in the table will also be represented in the graph at the bottom of the screen. There are two graphs displayed, namely the Consumption Graph, Flow/Loop graph and a Night Flow graph. These graphs can be selectively switched on/off by clicking the ticks below the datalog table.

Datalog \* Interpolated data

No.	Date	Fwd Totaliser	Fwd Cons.	Rev Totaliser	Rev Cons.	Flow	Loop	Battery	Power
11	21 Apr 2020 00:00:00	4392.921	9.000	0	0	9	-5.000		Mains
12	21 Apr 2020 01:00:00	4401.921	9.000	0	0	9	-5.000		Mains
13	21 Apr 2020 02:00:00	4410.920	8.999	0	0	9	-5.000		Mains
14	21 Apr 2020 03:00:00	4419.920	9.000	0	0	9	-5.000		Mains
15	21 Apr 2020 04:00:00	4428.927	9.007	0	0	9	-5.000		Mains
16	21 Apr 2020 05:00:00	4437.170	8.243	0	0	9	-5.000		Mains
17	21 Apr 2020 06:00:00	4446.545	9.375	0	0	9	-5.000		Mains
18	21 Apr 2020 07:00:00	4455.920	9.375	0	0	9	-5.000		Mains
19	21 Apr 2020 08:00:00	4464.920	9.000	0	0	9	-4.566		Mains
20	21 Apr 2020 09:00:00	4473.920	9.000	0	0	9	1.284		Mains
21	21 Apr 2020 10:00:00	4482.920	9.000	0	0	9	8.406		Mains
22	21 Apr 2020 11:00:00	4491.926	9.006	0	0	9	15.323		Mains
23	21 Apr 2020 12:00:00	4500.920	8.994	0	0	9	10.393		Mains
24	21 Apr 2020 13:00:00	4509.170	8.250	0	0	9	11.783		Mains

Raw Data 
  Hourly 
  Daily 
  Weekly 
  Monthly

NightFlow Range

From Date: 08 Apr 2020

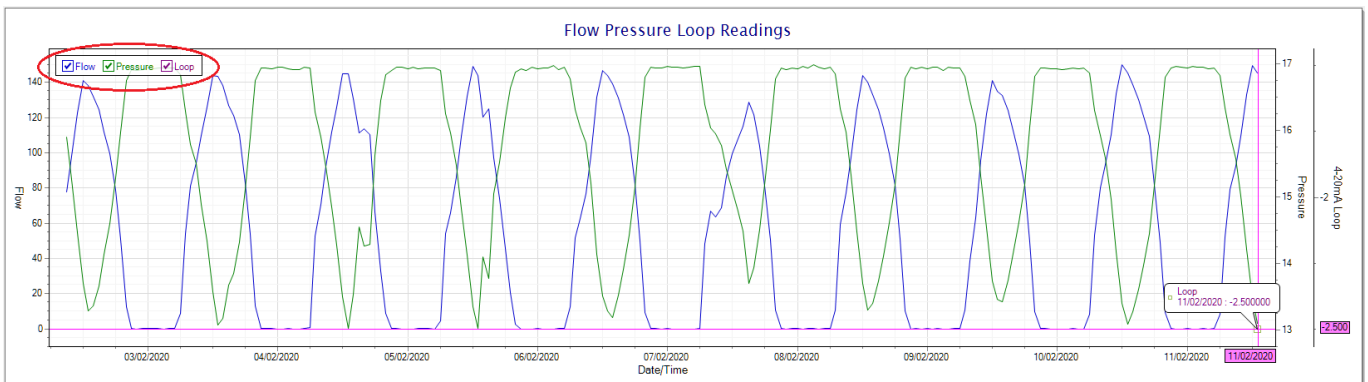
To Date: 22 Apr 2020

[Read Datalog](#)

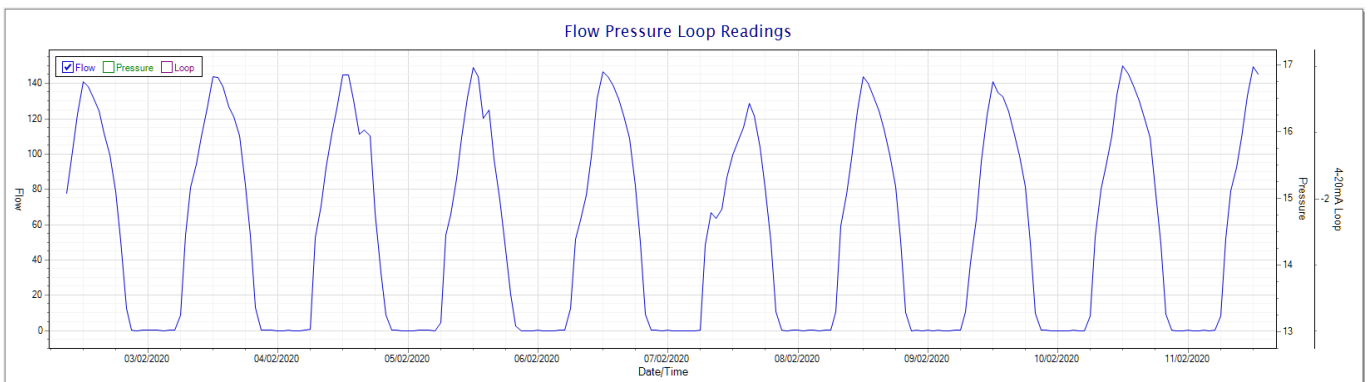
[Delete Datalog](#)

Consumption  
 Flow / Loop  
 Night Flow

The various series on each graph can be toggled on and off by selecting the series tick in the upper left hand corner.

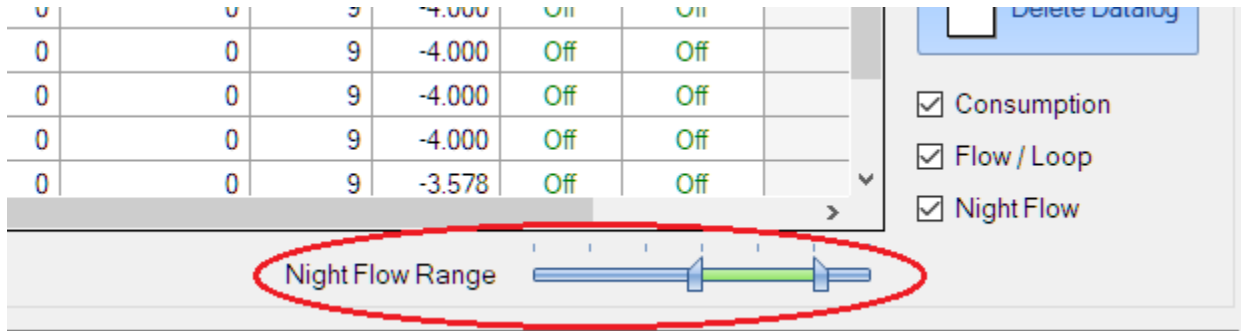


To view the flow only would look like this:-



Also displayed is the Night Flow graph. The function of this graph is to specifically analyse the night time water flows at an installation. This analysis is done based on the data received during a specific time period during the night (normally from 3am to 5am). This period for analysis can be adjusted by sliding the elements of the slider on the top right of the graph.

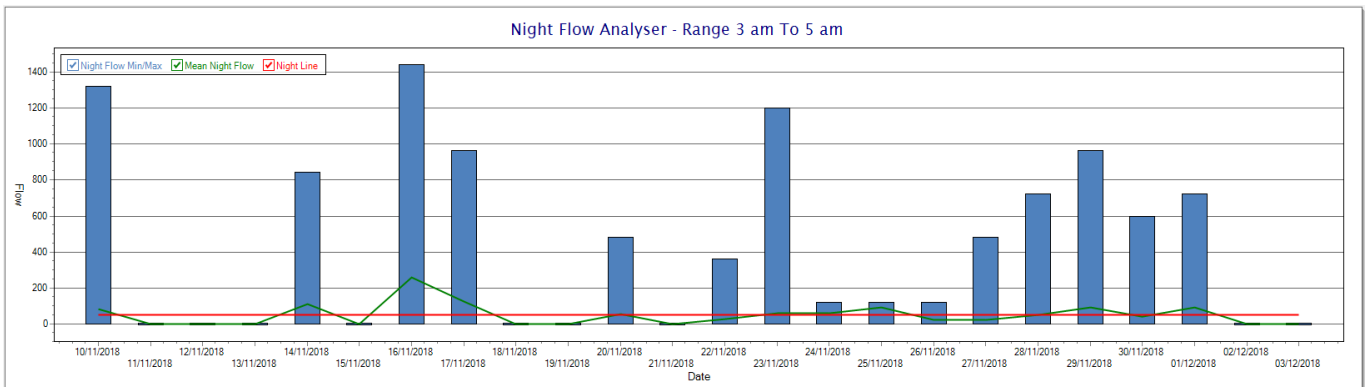




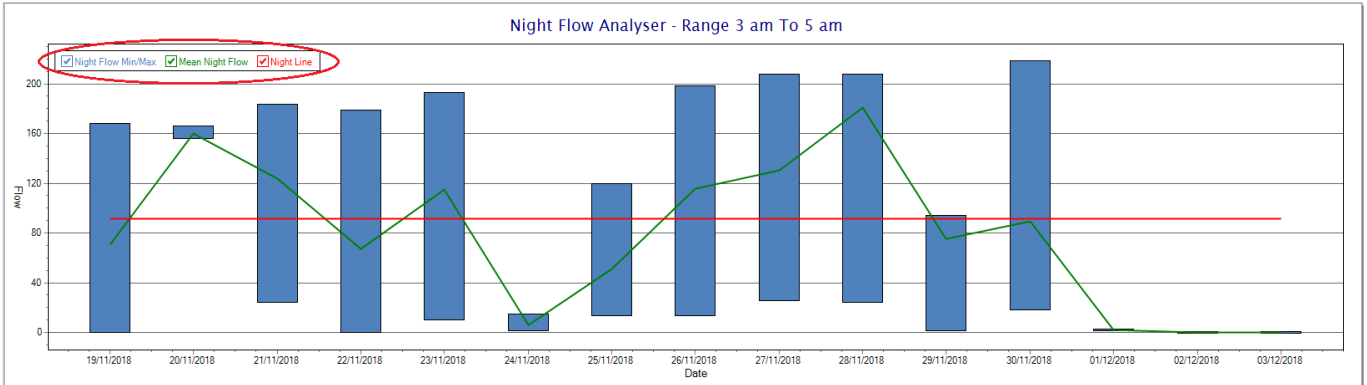
The graph will show a couple of different series.

1. Night Flow Min/Max - this will be a bar series indicating the minimum and maximum flows during the measurement period. The base of the block is the minimum flow and the top, the maximum flow. Depending on the type of installation, during this period you would expect the minimum flow point to come to zero and therefore sit on the base of the graph. The maximum flow would simply indicate some consumption during the period of measure and is not really a concern unless that was not expected.
2. Mean Night Flow - this will show the average night flow during that period. Shown in green and would normally simply be the midpoint between the minimum and maximum flows.
3. Night Line - the night line shows the average flow for the entire range of data being measured. Shown in red, this is useful for determining the average night usage over different data ranges.

The Night Flow graph is particularly useful in giving a quick graphical indication of the possibility of a leak scenario. In most case, where there should be no continuous use of water at night, the graph would look as below:-



During a possible leak situation, the minimum night flow does not return to zero and the graph will appear to bounce off the bottom.



So, at a quick glance it is possible to see if there is a problem at this installation. As per the Consumption Graph, the different graph series can be switched off/on by clicking the series ticks on the top left hand corner.

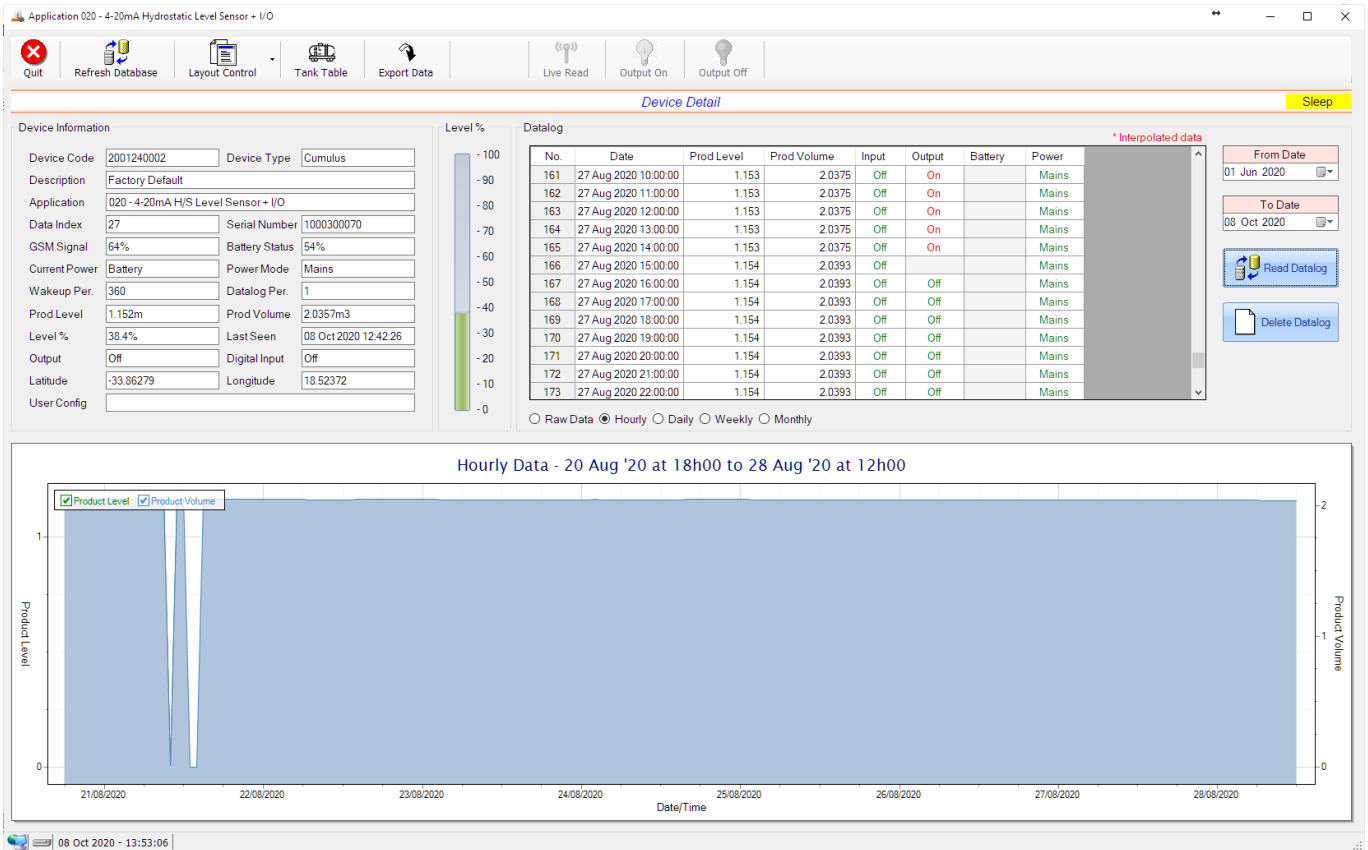
Finally, the WaterMaster application screen has a function to allow the setup of the remote meter via a specialised interface screen. Details of the parameters setup can be obtained from the WaterMaster specifications datasheet supplied by ABB limited. The setup screen includes the below parameters.

Finally, the WaterMaster application screen has a function to allow the setup of the remote meter via a specialised interface screen. Details of the parameters setup can be obtained from the WaterMaster specifications datasheet supplied by ABB limited. The setup screen includes the below parameters.

While the system is online, these parameters can be changed and will immediately be updated on the remote meter via its ModBus connection.

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### 2.8.21 Application 020 - 4-20mA H/S Level Sensor + I/O



This application type would be selected if you are using a 4-20mA hydrostatic sensor for the measurement of water level in a tank, reservoir or dam. It functions by measuring the pressure at the bottom of the tank and from that it can determine the level. An 4-20mA hydrostatic sensor uses the current loop interface of the logger and can be powered by the onboard 24V generator.

The volume value is read from a tank table which is determined by the level in metres (1mm resolution). Tanks come in various shapes and sizes, so this table can be manually captured or automatically generated from example tank shapes. See the section 'Managing Tank Tables' for more details.

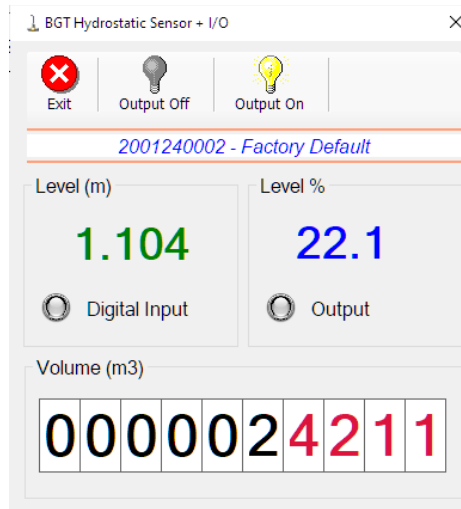
Functions on the top menu bar are mostly as per previous screens within the Cloudworks suite. These would be the 'Refresh Database', 'Layout Control' and 'Export Data' buttons which have been explained earlier. Added functionality is the 'Live Read' button and 'Tank Table' buttons.

If a device is powered and permanently connected to the server (and online), then the 'Live Read' Button will be active allowing you to stream live data directly from that device in real time. **Bear in mind that, while this live streaming screen is active, the cellular data consumption of that device will be much greater than the usual background periodic read used to update the database.**

The current communications status of the device will be displayed on the top right of the screen.

Remote devices that are offline or sleeping cannot be accessed for streaming data. This status will be automatically updated while on this screen without the need for pressing the 'Refresh Database' button.

Pressing the 'Live Read' button will launch the live streaming data screen for that device. All the data on this screen is fetched directly from the remote device and not the database.



Levels are always measured in metres (1mm resolution), and the volume in cubic metres. A percentage filled of tank capacity is also represented.

Returning to the applications screen, data is displayed in various groups. On the top left is grouped the 'Device Information' block. This information is data relevant to the remote device and is really displaying data that is present within the database. Mostly data that is populated during the 'Reload Device Config' process. This data is as follows:-

Information	Notes
<b>Device Code</b>	The Device Code assigned to this particular remote device. All communications are initiated by addressing this code. This code is unique to all remote devices and is assigned at the time of manufacture.
<b>Device Type</b>	Type of Remote Device. eg CDS538 Cumulus Logger etc
<b>Description</b>	The description is a user defined parameter that is captured during the setup of each device. This would normally be something that would describe the location or application of this particular device.
<b>Application</b>	Selected device application. Application 000 - Basic Cumulus function in this case.
<b>Data Index</b>	As each device is captured onto Cloudworks system, it is assigned a unique data index. This index is used when externally extracting the log data from the database as each record in the global datalog would be labelled with this index number.
<b>Serial Number</b>	Serial number of this device - assigned in the factory.
<b>GSM Signal</b>	Signal strength of the last GSM communications, expressed as a percentage.
<b>Battery Status</b>	Battery status for devices that are powered by battery, expressed as a percentage. It is important to note that this will be the battery



<b>Current Power</b>	status read while the device is under full load (GSM communications active). It would normally indicate lower than the recorded battery status in the datalog (which is read while the device is essentially idle).  An indicator as to how this remote device is being powered. Normally the same as the Power Mode but can vary for systems on Dual Power mode. For devices in a dual power mode, this parameter will display the current power status of the remote device. Battery or Mains.
<b>Power Mode</b>	Selected Power Mode under which the remote device is operating. This can be Battery, Mains or Dual power modes.
<b>Wakeup Per.</b>	The Wakeup Period set in minutes. Refer to the device configuration chapter for an explanation of this parameter.
<b>Datalog Per.</b>	The Datalog Period set in minutes. Refer to the device configuration chapter for an explanation of this parameter.
<b>Product Level</b>	The level of the product in the tank in metres
<b>Product Volume</b>	The volume of the product in the tank. This is read directly from the tank table and is in cubic metres.
<b>Level %</b>	The percentage of the tank f. Calculated from the max tank reading in the tank table.
<b>Last Seen</b>	The date and time the remote device was last seen connecting into the server.
<b>Digital Input</b>	Digital input status
<b>Output</b>	Digital output status
<b>Latitude</b>	Captured device Latitude.
<b>Longitude</b>	Captured device Longitude.
<b>User Config</b>	The user defined data recorded on the remote device. Refer to the device configuration chapter for an explanation of this parameter.

To get the latest update of this data, you will need to press the 'Refresh Data' button which will then update this screen from the database.

To the right of screen is the Datalog information box. This box will be populated with the most recent data from the recorded datalog of this remote device (read from the database). By default, when the screen opens, the last two weeks' worth of data will be displayed in this table. To select a different range of data, you can select the 'From Date' and 'To Date' values and press the 'Read Datalog' button.

This application will record the following data in the datalog.

Datalog

No.	Date	Prod Level	Prod Volume	Input	Output	Battery	Power
170	27 Aug 2020 19:00:00	1.154	2.0393	Off	Off		Mains
171	27 Aug 2020 20:00:00	1.154	2.0393	Off	Off		Mains
172	27 Aug 2020 21:00:00	1.154	2.0393	Off	Off		Mains
173	27 Aug 2020 22:00:00	1.154	2.0393	Off	Off		Mains
174	27 Aug 2020 23:00:00	1.154	2.0393	Off	Off		Mains
175	28 Aug 2020 00:00:00	1.153	2.0375	Off	Off		Mains
176	28 Aug 2020 01:00:00	1.153	2.0375	Off	Off		Mains
177	28 Aug 2020 02:00:00	1.153	2.0375	Off	Off		Mains
178	28 Aug 2020 03:00:00	1.153	2.0375	Off	Off		Mains
179	28 Aug 2020 04:00:00	1.153	2.0375	Off	Off		Mains
180	28 Aug 2020 05:00:00	1.153	2.0375	Off	Off		Mains
181	28 Aug 2020 06:00:00	1.153	2.0375	Off	Off		Mains
182	28 Aug 2020 07:00:00	1.153	2.0375	Off	Off		Mains

Raw Data 
  Hourly 
  Daily 
  Weekly 
  Monthly

Information	Notes
<b>Date/Time</b>	Date and time of the datalog record.
<b>Product Level</b>	Product level in the tank.
<b>Product Volume</b>	Product volume read from the tank table.
<b>Input</b>	Digital input status
<b>Output</b>	Digital output status
<b>Battery</b>	Battery level in percentage. Only displayed on battery powered devices.
<b>Power</b>	Current power status. Mains/Battery

The data in this datalog table can be displayed (and graphed) in a number of different ways. These are selected by choosing the option at the bottom of the datalog table. Options include Raw Data and averaged hourly, daily, weekly and monthly data. When the averaging options are chosen, missing data is automatically interpolated to fill in the missing gaps. Interpolated data will have the number column entries highlighted in red with a small 'Interpolated data' message at the top right of the datalog table.

Datalog \* Interpolated data

No.	Date	Prod Level	Prod Volume	Input	Output	Battery	Power
176	28 Aug 2020 01:00:00	1.153	2.0375	Off	Off		Mains
177	28 Aug 2020 02:00:00	1.153	2.0375	Off	Off		Mains
178	28 Aug 2020 03:00:00	1.153	2.0375	Off	Off		Mains
179	28 Aug 2020 04:00:00	1.153	2.0375	Off	Off		Mains
180	28 Aug 2020 05:00:00	1.153	2.0375	Off	Off		Mains
181	28 Aug 2020 06:00:00	1.153	2.0375	Off	Off		Mains
182	28 Aug 2020 07:00:00	1.153	2.0372	Off	Off		Mains
183	28 Aug 2020 08:00:00	1.153	2.0369	Off	Off		Mains
184	28 Aug 2020 09:00:00	1.153	2.0366	Off	Off		Mains
185	28 Aug 2020 10:00:00	1.152	2.0363	Off	Off		Mains
186	28 Aug 2020 11:00:00	1.152	2.0360	Off	Off		Mains
187	28 Aug 2020 12:00:00	1.152	2.0357	Off	Off		Mains

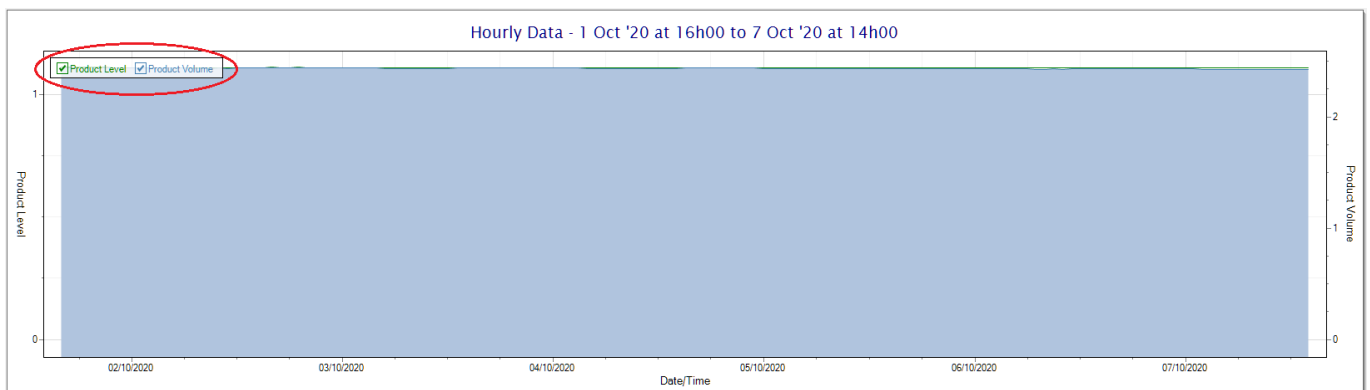
Raw Data 
  Hourly 
  Daily 
  Weekly 
  Monthly

As per the previously explained functions throughout the Cloudworks suite, columns can be switched off/on and re-ordered to the users requirements. The exporting will be as per the layout presented on the screen.

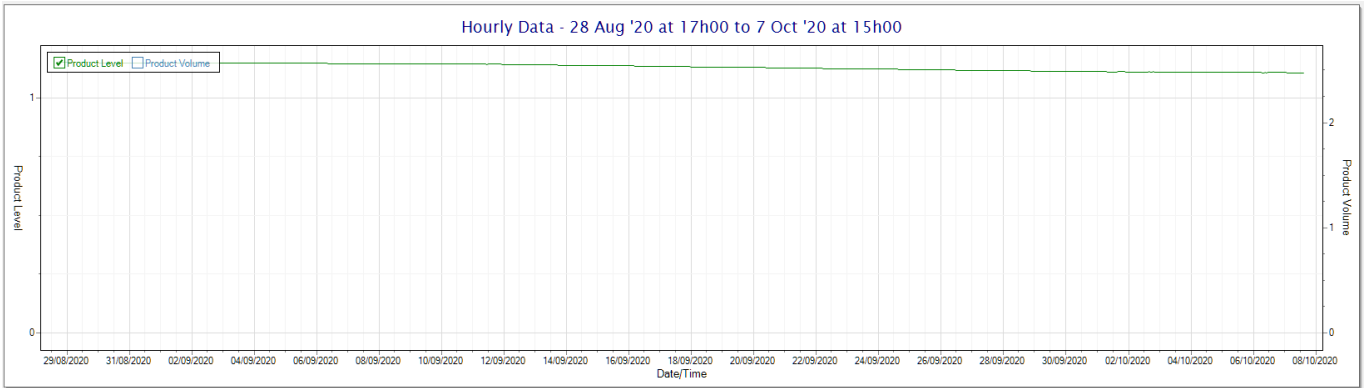
You can zoom into a range of the data by simply selecting those records in the table. This will result in the graph at the bottom being updated to display only those readings.

Deleting the datalog or removing a range of records can be easily done by using the 'Delete Datalog' button. To delete a range, simply select the range in the datalog table and press the 'Delete Datalog' button. If no range is selected, it will be assumed that you wish to delete the entire datalog. There will be a prompt to ensure that you are aware of the action you are about to take.

Data that is displayed in the table will also be represented in the graph at the bottom of the screen. The various series on each graph can be toggled on and off by selecting the series tick in the upper left hand corner.

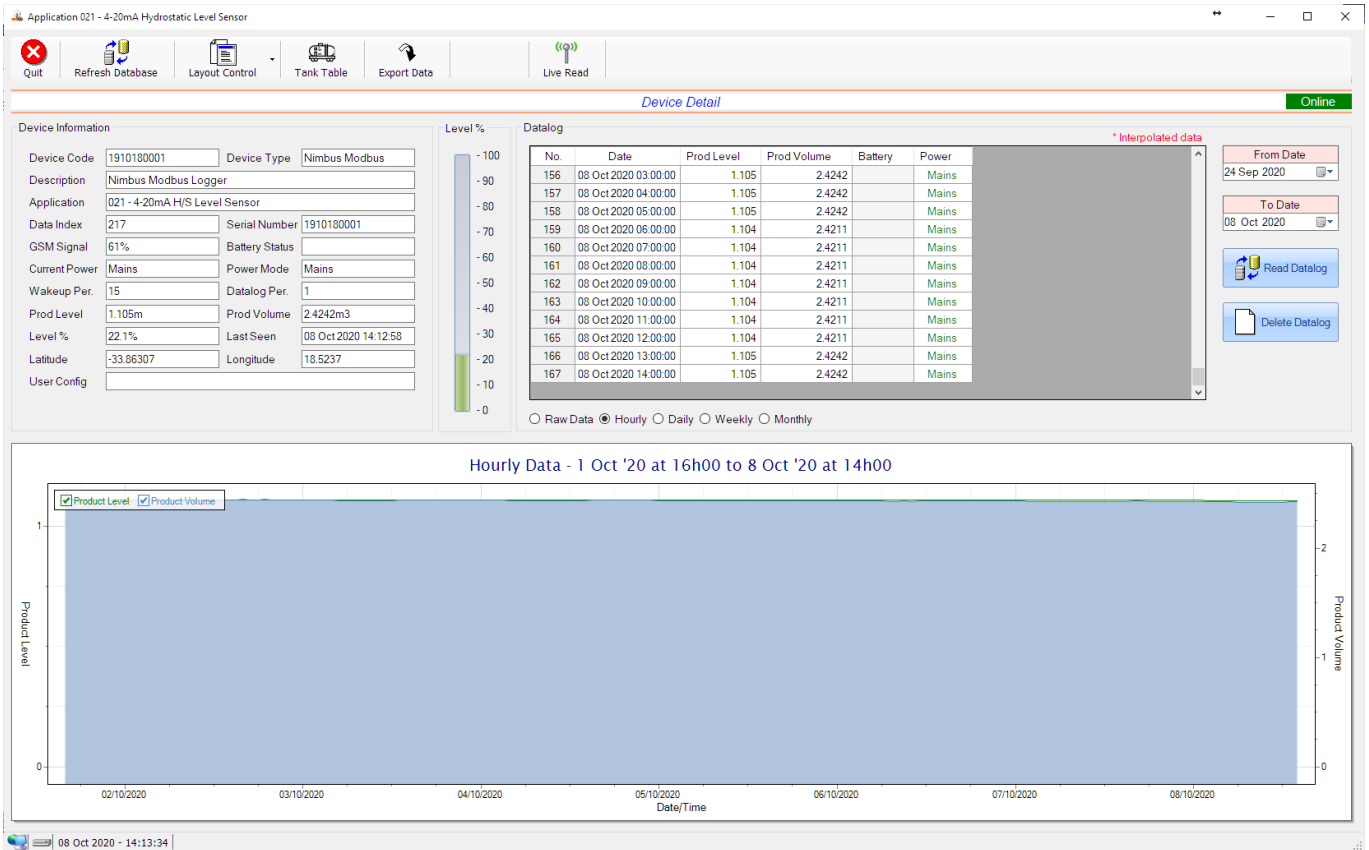


To view the flow only would look like this:-





### 2.8.22 Application 021 - 4-20mA H/S Level Sensor



The screenshot displays the 'Device Detail' window for 'Application 021 - 4-20mA Hydrostatic Level Sensor'. The window is titled 'Device Detail' and shows the device is 'Online'. The interface includes a top menu bar with buttons for 'Quit', 'Refresh Database', 'Layout Control', 'Tank Table', 'Export Data', and 'Live Read'. The main area is divided into three sections: 'Device Information', 'Datalog', and a 'Level %' gauge.

**Device Information:**

- Device Code: 1910180001
- Device Type: Nimbus Modbus
- Description: Nimbus Modbus Logger
- Application: 021 - 4-20mA H/S Level Sensor
- Data Index: 217
- Serial Number: 1910180001
- GSM Signal: 61%
- Battery Status: [Empty]
- Current Power: Mains
- Power Mode: Mains
- Wakeup Per: 15
- Datalog Per: 1
- Prod Level: 1.105m
- Prod Volume: 2.4242m3
- Level %: 22.1%
- Last Seen: 08 Oct 2020 14:12:58
- Latitude: -33.86307
- Longitude: 18.5237
- User Config: [Empty]

**Datalog Table:**

No	Date	Prod Level	Prod Volume	Battery	Power
156	08 Oct 2020 03:00:00	1.105	2.4242		Mains
157	08 Oct 2020 04:00:00	1.105	2.4242		Mains
158	08 Oct 2020 05:00:00	1.105	2.4242		Mains
159	08 Oct 2020 06:00:00	1.104	2.4211		Mains
160	08 Oct 2020 07:00:00	1.104	2.4211		Mains
161	08 Oct 2020 08:00:00	1.104	2.4211		Mains
162	08 Oct 2020 09:00:00	1.104	2.4211		Mains
163	08 Oct 2020 10:00:00	1.104	2.4211		Mains
164	08 Oct 2020 11:00:00	1.104	2.4211		Mains
165	08 Oct 2020 12:00:00	1.104	2.4211		Mains
166	08 Oct 2020 13:00:00	1.105	2.4242		Mains
167	08 Oct 2020 14:00:00	1.105	2.4242		Mains

**Hourly Data - 1 Oct '20 at 16h00 to 8 Oct '20 at 14h00:**

The graph shows 'Product Level' (left Y-axis, 0 to 1) and 'Product Volume' (right Y-axis, 0 to 2) over time (X-axis, 02/10/2020 to 08/10/2020). Both metrics are plotted as a solid blue area, indicating constant values over the period shown.

This application type would be selected if you are using a 4-20mA hydrostatic sensor for the measurement of water level in a tank, reservoir or dam. It functions by measuring the pressure at the bottom of the tank and from that it can determine the level. An 4-20mA hydrostatic sensor uses the current loop interface of the logger and can be powered by the onboard 24V generator.

The volume value is read from a tank table which is determined by the level in metres (1mm resolution). Tanks come in various shapes and sizes, so this table can be manually captured or automatically generated from example tank shapes. See the section 'Managing Tank Tables' for more details.

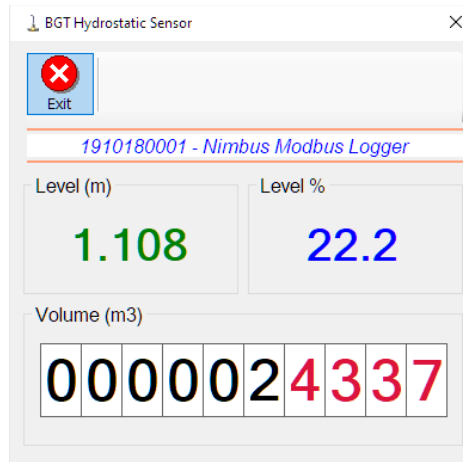
Functions on the top menu bar are mostly as per previous screens within the Cloudworks suite. These would be the 'Refresh Database', 'Layout Control' and 'Export Data' buttons which have been explained earlier. Added functionality is the 'Live Read' button and 'Tank Table' buttons.

If a device is powered and permanently connected to the server (and online), then the 'Live Read' Button will be active allowing you to stream live data directly from that device in real time. **Bear in mind that, while this live streaming screen is active, the cellular data consumption of that device will be much greater than the usual background periodic read used to update the database.**

The current communications status of the device will be displayed on the top right of the screen.

Remote devices that are offline or sleeping cannot be accessed for streaming data. This status will be automatically updated while on this screen without the need for pressing the 'Refresh Database' button.

Pressing the 'Live Read' button will launch the live streaming data screen for that device. All the data on this screen is fetched directly from the remote device and not the database.



Levels are always measured in metres (1mm resolution), and the volume in cubic metres. A percentage filled of tank capacity is also represented.

Returning to the applications screen, data is displayed in various groups. On the top left is grouped the 'Device Information' block. This information is data relevant to the remote device and is really displaying data that is present within the database. Mostly data that is populated during the 'Reload Device Config' process. This data is as follows:-

Information	Notes
<b>Device Code</b>	The Device Code assigned to this particular remote device. All communications are initiated by addressing this code. This code is unique to all remote devices and is assigned at the time of manufacture.
<b>Device Type</b>	Type of Remote Device. eg CDS538 Cumulus Logger etc
<b>Description</b>	The description is a user defined parameter that is captured during the setup of each device. This would normally be something that would describe the location or application of this particular device.
<b>Application</b>	Selected device application. Application 000 - Basic Cumulus function in this case.
<b>Data Index</b>	As each device is captured onto Cloudworks system, it is assigned a unique data index. This index is used when externally extracting the log data from the database as each record in the global datalog would be labelled with this index number.
<b>Serial Number</b>	Serial number of this device - assigned in the factory.
<b>GSM Signal</b>	Signal strength of the last GSM communications, expressed as a percentage.
<b>Battery Status</b>	Battery status for devices that are powered by battery, expressed as a percentage. It is important to note that this will be the battery status read while the device is under full load (GSM communications



<b>Current Power</b>	active). It would normally indicate lower than the recorded battery status in the datalog (which is read while the device is essentially idle).  An indicator as to how this remote device is being powered. Normally the same as the Power Mode but can vary for systems on Dual Power mode. For devices in a dual power mode, this parameter will display the current power status of the remote device. Battery or Mains.
<b>Power Mode</b>	Selected Power Mode under which the remote device is operating. This can be Battery, Mains or Dual power modes.
<b>Wakeup Per.</b>	The Wakeup Period set in minutes. Refer to the device configuration chapter for an explanation of this parameter.
<b>Datalog Per.</b>	The Datalog Period set in minutes. Refer to the device configuration chapter for an explanation of this parameter.
<b>Product Level</b>	The level of the product in the tank in metres
<b>Product Volume</b>	The volume of the product in the tank. This is read directly from the tank table and is in cubic metres.
<b>Level %</b>	The percentage of the tank f. Calculated from the max tank reading in the tank table.
<b>Last Seen</b>	The date and time the remote device was last seen connecting into the server.
<b>Latitude</b>	Captured device Latitude.
<b>Longitude</b>	Captured device Longitude.
<b>User Config</b>	The user defined data recorded on the remote device. Refer to the device configuration chapter for an explanation of this parameter.

To get the latest update of this data, you will need to press the 'Refresh Data' button which will then update this screen from the database.

To the right of screen is the Datalog information box. This box will be populated with the most recent data from the recorded datalog of this remote device ([read from the database](#)). By default, when the screen opens, the last two weeks' worth of data will be displayed in this table. To select a different range of data, you can select the 'From Date' and 'To Date' values and press the 'Read Datalog' button.

This application will record the following data in the datalog.

Datalog

No.	Date	Prod Level	Prod Volume	Battery	Power
131	07 Oct 2020 02:00:00	1.106	2.4274		Mains
132	07 Oct 2020 03:00:00	1.106	2.4274		Mains
133	07 Oct 2020 04:00:00	1.106	2.4274		Mains
134	07 Oct 2020 05:00:00	1.106	2.4274		Mains
135	07 Oct 2020 06:00:00	1.106	2.4274		Mains
136	07 Oct 2020 07:00:00	1.106	2.4274		Mains
137	07 Oct 2020 08:00:00	1.106	2.4274		Mains
138	07 Oct 2020 09:00:00	1.106	2.4274		Mains
139	07 Oct 2020 10:00:00	1.106	2.4274		Mains
140	07 Oct 2020 11:00:00	1.106	2.4274		Mains
141	07 Oct 2020 12:00:00	1.106	2.4274		Mains
142	07 Oct 2020 13:00:00	1.106	2.4274		Mains

Raw Data 
  Hourly 
  Daily 
  Weekly 
  Monthly

Information	Notes
<b>Date/Time</b>	Date and time of the datalog record.
<b>Product Level</b>	Product level in the tank.
<b>Product Volume</b>	Product volume read from the tank table.
<b>Battery</b>	Battery level in percentage. Only displayed on battery powered devices.
<b>Power</b>	Current power status. Mains/Battery

The data in this datalog table can be displayed (and graphed) in a number of different ways. These are selected by choosing the option at the bottom of the datalog table. Options include Raw Data and averaged hourly, daily, weekly and monthly data. When the averaging options are chosen, missing data is automatically interpolated to fill in the missing gaps. Interpolated data will have the number column entries highlighted in red with a small 'Interpolated data' message at the top right of the datalog table.

Datalog \* Interpolated data

No.	Date	Prod Level	Prod Volume	Battery	Power
1	01 Oct 2020 16:00:00	1.110	2.4400		Mains
2	01 Oct 2020 17:00:00	1.110	2.4400		Mains
3	01 Oct 2020 18:00:00	1.110	2.4400		Mains
4	01 Oct 2020 19:00:00	1.110	2.4400		Mains
5	01 Oct 2020 20:00:00	1.110	2.4400		Mains
6	01 Oct 2020 21:00:00	1.110	2.4389		Mains
7	01 Oct 2020 22:00:00	1.109	2.4379		Mains
8	01 Oct 2020 23:00:00	1.109	2.4368		Mains
9	02 Oct 2020 00:00:00	1.109	2.4368		Mains
10	02 Oct 2020 01:00:00	1.109	2.4368		Mains
11	02 Oct 2020 02:00:00	1.109	2.4368		Mains
12	02 Oct 2020 03:00:00	1.109	2.4368		Mains
13	02 Oct 2020 04:00:00	1.109	2.4368		Mains

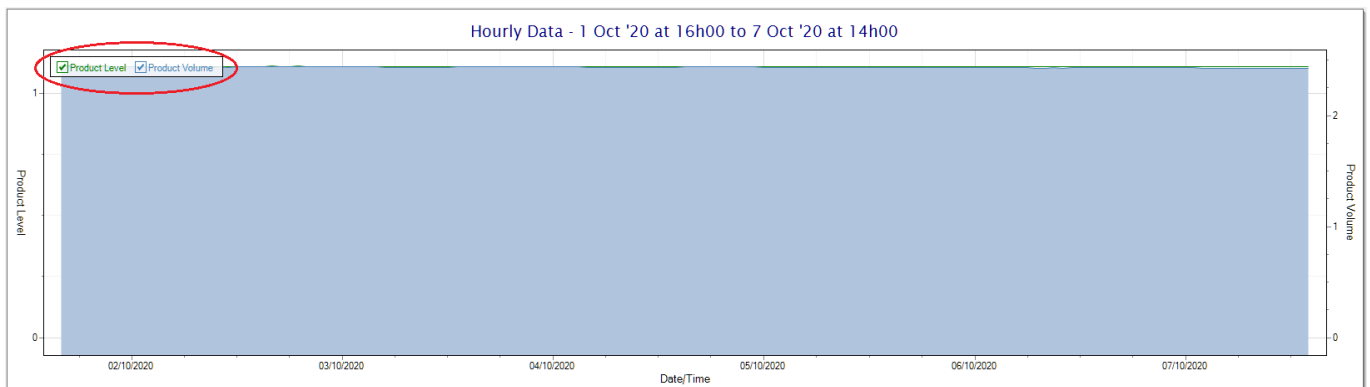
Raw Data 
  Hourly 
  Daily 
  Weekly 
  Monthly

As per the previously explained functions throughout the Cloudworks suite, columns can be switched off/on and re-ordered to the users requirements. The exporting will be as per the layout presented on the screen.

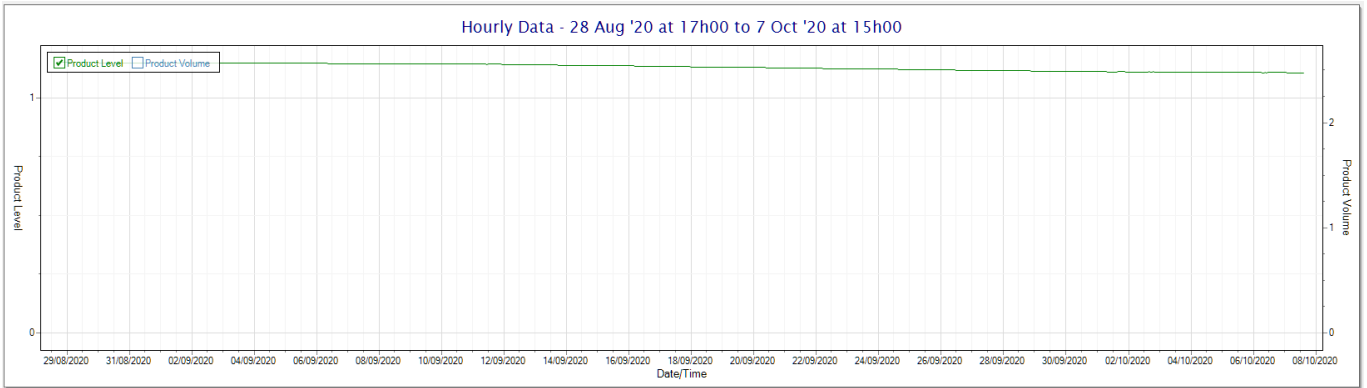
You can zoom into a range of the data by simply selecting those records in the table. This will result in the graph at the bottom being updated to display only those readings.

Deleting the datalog or removing a range of records can be easily done by using the 'Delete Datalog' button. To delete a range, simply select the range in the datalog table and press the 'Delete Datalog' button. If no range is selected, it will be assumed that you wish to delete the entire datalog. There will be a prompt to ensure that you are aware of the action you are about to take.

Data that is displayed in the table will also be represented in the graph at the bottom of the screen. The various series on each graph can be toggled on and off by selecting the series tick in the upper left hand corner.

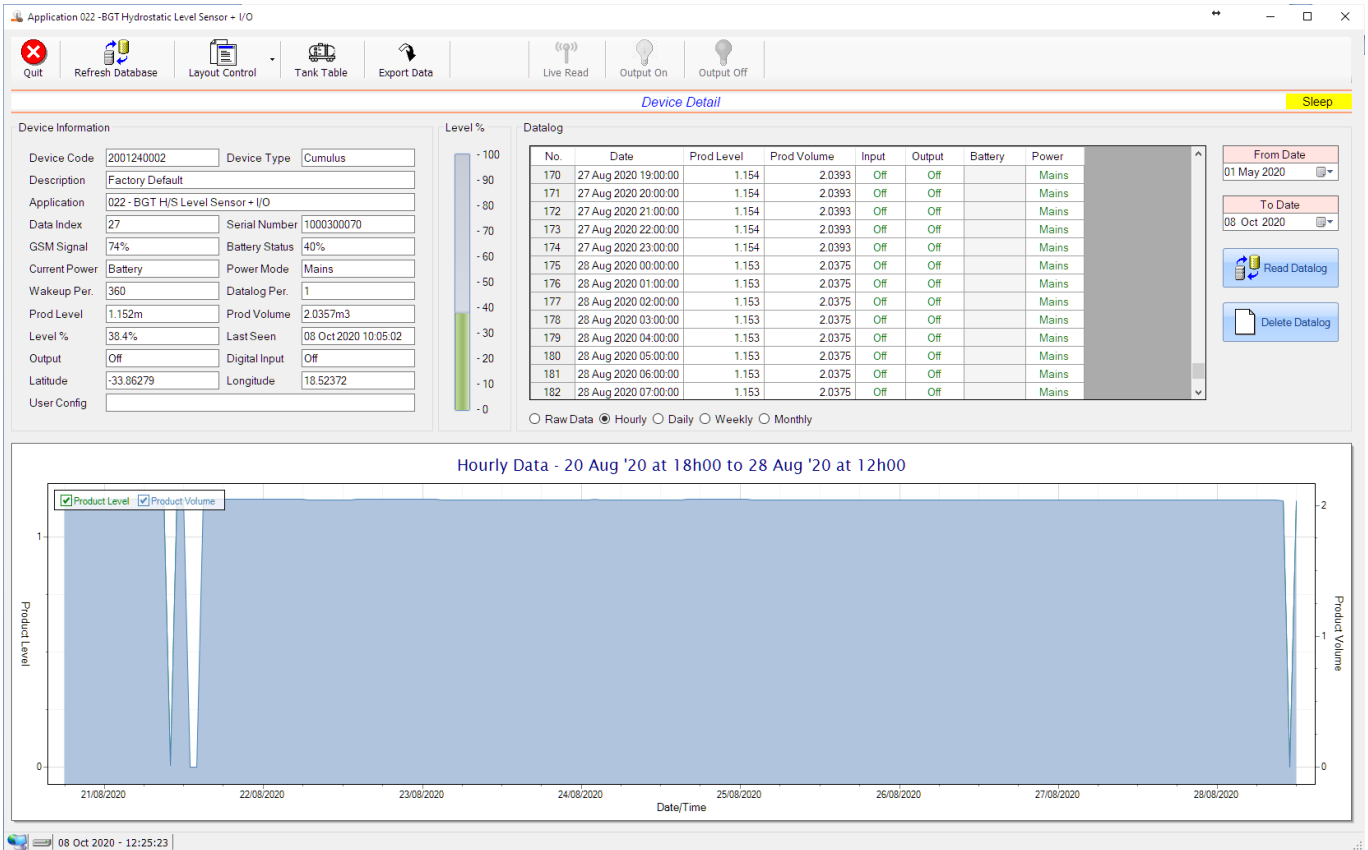


To view the flow only would look like this:-



DOCUMENT NAME	CLASSIFICATION	DATE	PAGE
CLOUDWORKS CLIENT USER MANUAL	CONFIDENTIAL	15-JUL-21	170 OF 201

### 2.8.23 Application 022 - BGT H/S Level Sensor + I/O



This application type would be selected if you are using the CloudWorks BGT hydrostatic sensor for the measurement of water level in a tank, reservoir or dam. It functions by measuring the pressure at the bottom of the tank and from that it can determine the level. The CloudWorks BGT hydrostatic sensor uses the modbus port of the logger and can be powered by the onboard 24V generator.

The volume value is read from a tank table which is determined by the level in metres (1mm resolution). Tanks come in various shapes and sizes, so this table can be manually captured or automatically generated from example tank shapes. See the section 'Managing Tank Tables' for more details.

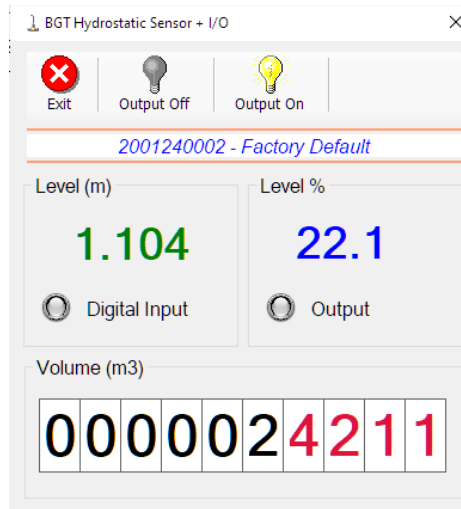
Functions on the top menu bar are mostly as per previous screens within the Cloudworks suite. These would be the 'Refresh Database', 'Layout Control' and 'Export Data' buttons which have been explained earlier. Added functionality is the 'Live Read' button and 'Tank Table' buttons.

If a device is powered and permanently connected to the server (and online), then the 'Live Read' Button will be active allowing you to stream live data directly from that device in real time. **Bear in mind that, while this live streaming screen is active, the cellular data consumption of that device will be much greater than the usual background periodic read used to update the database.**

The current communications status of the device will be displayed on the top right of the screen.

Remote devices that are offline or sleeping cannot be accessed for streaming data. This status will be automatically updated while on this screen without the need for pressing the 'Refresh Database' button.

Pressing the 'Live Read' button will launch the live streaming data screen for that device. All the data on this screen is fetched directly from the remote device and not the database.



Levels are always measured in metres (1mm resolution), and the volume in cubic metres. A percentage filled of tank capacity is also represented.

Returning to the applications screen, data is displayed in various groups. On the top left is grouped the 'Device Information' block. This information is data relevant to the remote device and is really displaying data that is present within the database. Mostly data that is populated during the 'Reload Device Config' process. This data is as follows:-

Information	Notes
<b>Device Code</b>	The Device Code assigned to this particular remote device. All communications are initiated by addressing this code. This code is unique to all remote devices and is assigned at the time of manufacture.
<b>Device Type</b>	Type of Remote Device. eg CDS538 Cumulus Logger etc
<b>Description</b>	The description is a user defined parameter that is captured during the setup of each device. This would normally be something that would describe the location or application of this particular device.
<b>Application</b>	Selected device application. Application 000 - Basic Cumulus function in this case.
<b>Data Index</b>	As each device is captured onto Cloudworks system, it is assigned a unique data index. This index is used when externally extracting the log data from the database as each record in the global datalog would be labelled with this index number.
<b>Serial Number</b>	Serial number of this device - assigned in the factory.
<b>GSM Signal</b>	Signal strength of the last GSM communications, expressed as a percentage.
<b>Battery Status</b>	Battery status for devices that are powered by battery, expressed as a percentage. It is important to note that this will be the battery



<b>Current Power</b>	status read while the device is under full load (GSM communications active). It would normally indicate lower than the recorded battery status in the datalog (which is read while the device is essentially idle).  An indicator as to how this remote device is being powered. Normally the same as the Power Mode but can vary for systems on Dual Power mode. For devices in a dual power mode, this parameter will display the current power status of the remote device. Battery or Mains.
<b>Power Mode</b>	Selected Power Mode under which the remote device is operating. This can be Battery, Mains or Dual power modes.
<b>Wakeup Per.</b>	The Wakeup Period set in minutes. Refer to the device configuration chapter for an explanation of this parameter.
<b>Datalog Per.</b>	The Datalog Period set in minutes. Refer to the device configuration chapter for an explanation of this parameter.
<b>Product Level</b>	The level of the product in the tank in metres
<b>Product Volume</b>	The volume of the product in the tank. This is read directly from the tank table and is in cubic metres.
<b>Level %</b>	The percentage of the tank f. Calculated from the max tank reading in the tank table.
<b>Last Seen</b>	The date and time the remote device was last seen connecting into the server.
<b>Digital Input</b>	Digital input status
<b>Output</b>	Digital output status
<b>Latitude</b>	Captured device Latitude.
<b>Longitude</b>	Captured device Longitude.
<b>User Config</b>	The user defined data recorded on the remote device. Refer to the device configuration chapter for an explanation of this parameter.

To get the latest update of this data, you will need to press the 'Refresh Data' button which will then update this screen from the database.

To the right of screen is the Datalog information box. This box will be populated with the most recent data from the recorded datalog of this remote device (read from the database). By default, when the screen opens, the last two weeks' worth of data will be displayed in this table. To select a different range of data, you can select the 'From Date' and 'To Date' values and press the 'Read Datalog' button.

This application will record the following data in the datalog.

Datalog

No.	Date	Prod Level	Prod Volume	Input	Output	Battery	Power
170	27 Aug 2020 19:00:00	1.154	2.0393	Off	Off		Mains
171	27 Aug 2020 20:00:00	1.154	2.0393	Off	Off		Mains
172	27 Aug 2020 21:00:00	1.154	2.0393	Off	Off		Mains
173	27 Aug 2020 22:00:00	1.154	2.0393	Off	Off		Mains
174	27 Aug 2020 23:00:00	1.154	2.0393	Off	Off		Mains
175	28 Aug 2020 00:00:00	1.153	2.0375	Off	Off		Mains
176	28 Aug 2020 01:00:00	1.153	2.0375	Off	Off		Mains
177	28 Aug 2020 02:00:00	1.153	2.0375	Off	Off		Mains
178	28 Aug 2020 03:00:00	1.153	2.0375	Off	Off		Mains
179	28 Aug 2020 04:00:00	1.153	2.0375	Off	Off		Mains
180	28 Aug 2020 05:00:00	1.153	2.0375	Off	Off		Mains
181	28 Aug 2020 06:00:00	1.153	2.0375	Off	Off		Mains
182	28 Aug 2020 07:00:00	1.153	2.0375	Off	Off		Mains

Raw Data 
  Hourly 
  Daily 
  Weekly 
  Monthly

Information	Notes
<b>Date/Time</b>	Date and time of the datalog record.
<b>Product Level</b>	Product level in the tank.
<b>Product Volume</b>	Product volume read from the tank table.
<b>Input</b>	Digital input status
<b>Output</b>	Digital output status
<b>Battery</b>	Battery level in percentage. Only displayed on battery powered devices.
<b>Power</b>	Current power status. Mains/Battery

The data in this datalog table can be displayed (and graphed) in a number of different ways. These are selected by choosing the option at the bottom of the datalog table. Options include Raw Data and averaged hourly, daily, weekly and monthly data. When the averaging options are chosen, missing data is automatically interpolated to fill in the missing gaps. Interpolated data will have the number column entries highlighted in red with a small 'Interpolated data' message at the top right of the datalog table.

Datalog \* Interpolated data

No.	Date	Prod Level	Prod Volume	Input	Output	Battery	Power
176	28 Aug 2020 01:00:00	1.153	2.0375	Off	Off		Mains
177	28 Aug 2020 02:00:00	1.153	2.0375	Off	Off		Mains
178	28 Aug 2020 03:00:00	1.153	2.0375	Off	Off		Mains
179	28 Aug 2020 04:00:00	1.153	2.0375	Off	Off		Mains
180	28 Aug 2020 05:00:00	1.153	2.0375	Off	Off		Mains
181	28 Aug 2020 06:00:00	1.153	2.0375	Off	Off		Mains
182	28 Aug 2020 07:00:00	1.153	2.0372	Off	Off		Mains
183	28 Aug 2020 08:00:00	1.153	2.0369	Off	Off		Mains
184	28 Aug 2020 09:00:00	1.153	2.0366	Off	Off		Mains
185	28 Aug 2020 10:00:00	1.152	2.0363	Off	Off		Mains
186	28 Aug 2020 11:00:00	1.152	2.0360	Off	Off		Mains
187	28 Aug 2020 12:00:00	1.152	2.0357	Off	Off		Mains

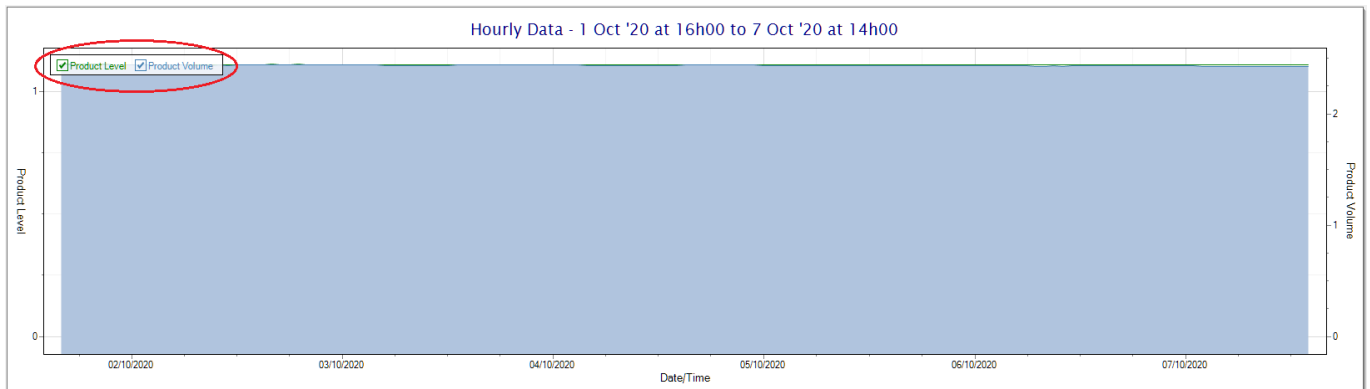
Raw Data 
  Hourly 
  Daily 
  Weekly 
  Monthly

As per the previously explained functions throughout the Cloudworks suite, columns can be switched off/on and re-ordered to the users requirements. The exporting will be as per the layout presented on the screen.

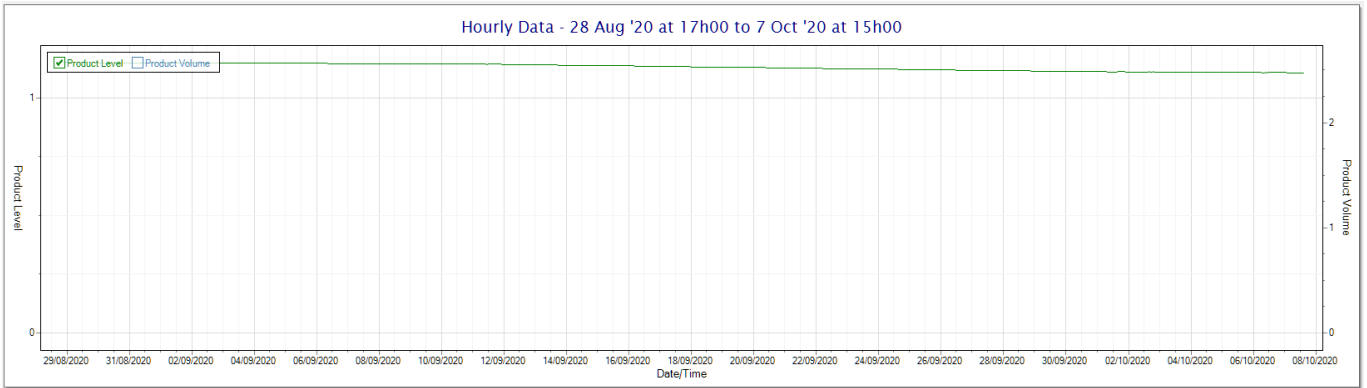
You can zoom into a range of the data by simply selecting those records in the table. This will result in the graph at the bottom being updated to display only those readings.

Deleting the datalog or removing a range of records can be easily done by using the 'Delete Datalog' button. To delete a range, simply select the range in the datalog table and press the 'Delete Datalog' button. If no range is selected, it will be assumed that you wish to delete the entire datalog. There will be a prompt to ensure that you are aware of the action you are about to take.

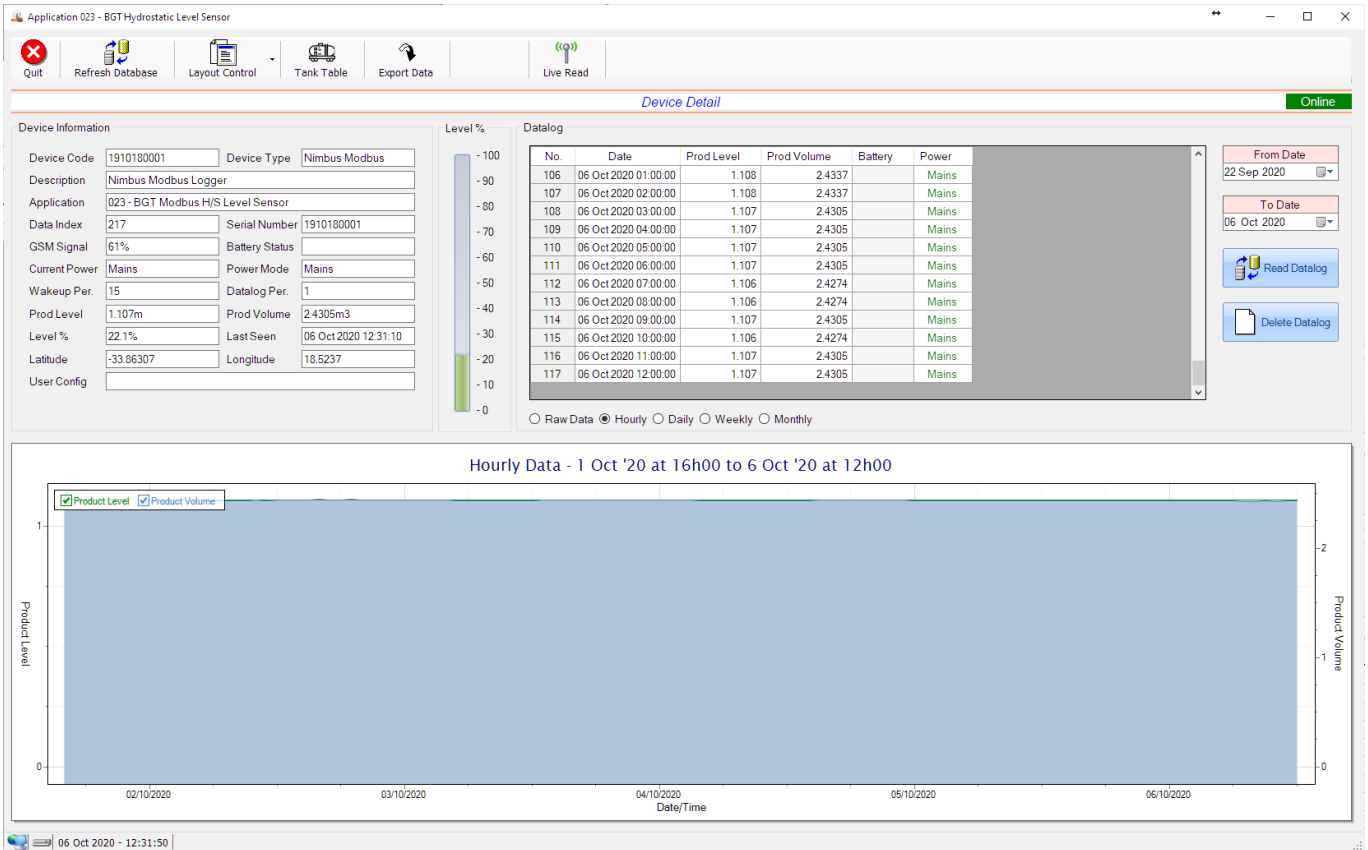
Data that is displayed in the table will also be represented in the graph at the bottom of the screen. The various series on each graph can be toggled on and off by selecting the series tick in the upper left hand corner.



To view the flow only would look like this:-



### 2.8.24 Application 023 - BGT H/S Level Sensor



This application type would be selected if you are using the CloudWorks BGT hydrostatic sensor for the measurement of water level in a tank, reservoir or dam. It functions by measuring the pressure at the bottom of the tank and from that it can determine the level. The CloudWorks BGT hydrostatic sensor uses the modbus port of the logger and can be powered by the onboard 24V generator.

The volume value is read from a tank table which is determined by the level in metres (1mm resolution). Tanks come in various shapes and sizes, so this table can be manually captured or automatically generated from example tank shapes. See the section 'Managing Tank Tables' for more details.

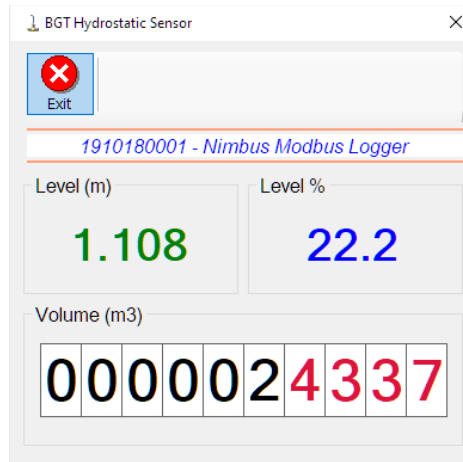
Functions on the top menu bar are mostly as per previous screens within the Cloudworks suite. These would be the 'Refresh Database', 'Layout Control' and 'Export Data' buttons which have been explained earlier. Added functionality is the 'Live Read' button and 'Tank Table' buttons.

If a device is powered and permanently connected to the server (and online), then the 'Live Read' Button will be active allowing you to stream live data directly from that device in real time. **Bear in mind that, while this live streaming screen is active, the cellular data consumption of that device will be much greater than the usual background periodic read used to update the database.**

The current communications status of the device will be displayed on the top right of the screen.

Remote devices that are offline or sleeping cannot be accessed for streaming data. This status will be automatically updated while on this screen without the need for pressing the 'Refresh Database' button.

Pressing the 'Live Read' button will launch the live streaming data screen for that device. All the data on this screen is fetched directly from the remote device and not the database.



Levels are always measured in metres (1mm resolution), and the volume in cubic metres. A percentage filled of tank capacity is also represented.

Returning to the applications screen, data is displayed in various groups. On the top left is grouped the 'Device Information' block. This information is data relevant to the remote device and is really displaying data that is present within the database. Mostly data that is populated during the 'Reload Device Config' process. This data is as follows:-

Information	Notes
<b>Device Code</b>	The Device Code assigned to this particular remote device. All communications are initiated by addressing this code. This code is unique to all remote devices and is assigned at the time of manufacture.
<b>Device Type</b>	Type of Remote Device. eg CDS538 Cumulus Logger etc
<b>Description</b>	The description is a user defined parameter that is captured during the setup of each device. This would normally be something that would describe the location or application of this particular device.
<b>Application</b>	Selected device application. Application 000 - Basic Cumulus function in this case.
<b>Data Index</b>	As each device is captured onto Cloudworks system, it is assigned a unique data index. This index is used when externally extracting the log data from the database as each record in the global datalog would be labelled with this index number.
<b>Serial Number</b>	Serial number of this device - assigned in the factory.
<b>GSM Signal</b>	Signal strength of the last GSM communications, expressed as a percentage.
<b>Battery Status</b>	Battery status for devices that are powered by battery, expressed as a percentage. It is important to note that this will be the battery status read while the device is under full load (GSM communications

<b>Current Power</b>	active). It would normally indicate lower than the recorded battery status in the datalog (which is read while the device is essentially idle).  An indicator as to how this remote device is being powered. Normally the same as the Power Mode but can vary for systems on Dual Power mode. For devices in a dual power mode, this parameter will display the current power status of the remote device. Battery or Mains.
<b>Power Mode</b>	Selected Power Mode under which the remote device is operating. This can be Battery, Mains or Dual power modes.
<b>Wakeup Per.</b>	The Wakeup Period set in minutes. Refer to the device configuration chapter for an explanation of this parameter.
<b>Datalog Per.</b>	The Datalog Period set in minutes. Refer to the device configuration chapter for an explanation of this parameter.
<b>Product Level</b>	The level of the product in the tank in metres
<b>Product Volume</b>	The volume of the product in the tank. This is read directly from the tank table and is in cubic metres.
<b>Level %</b>	The percentage of the tank f. Calculated from the max tank reading in the tank table.
<b>Last Seen</b>	The date and time the remote device was last seen connecting into the server.
<b>Latitude</b>	Captured device Latitude.
<b>Longitude</b>	Captured device Longitude.
<b>User Config</b>	The user defined data recorded on the remote device. Refer to the device configuration chapter for an explanation of this parameter.

To get the latest update of this data, you will need to press the 'Refresh Data' button which will then update this screen from the database.

To the right of screen is the Datalog information box. This box will be populated with the most recent data from the recorded datalog of this remote device ([read from the database](#)). By default, when the screen opens, the last two weeks' worth of data will be displayed in this table. To select a different range of data, you can select the 'From Date' and 'To Date' values and press the 'Read Datalog' button.

This application will record the following data in the datalog.

Datalog

No.	Date	Prod Level	Prod Volume	Battery	Power
131	07 Oct 2020 02:00:00	1.106	2.4274		Mains
132	07 Oct 2020 03:00:00	1.106	2.4274		Mains
133	07 Oct 2020 04:00:00	1.106	2.4274		Mains
134	07 Oct 2020 05:00:00	1.106	2.4274		Mains
135	07 Oct 2020 06:00:00	1.106	2.4274		Mains
136	07 Oct 2020 07:00:00	1.106	2.4274		Mains
137	07 Oct 2020 08:00:00	1.106	2.4274		Mains
138	07 Oct 2020 09:00:00	1.106	2.4274		Mains
139	07 Oct 2020 10:00:00	1.106	2.4274		Mains
140	07 Oct 2020 11:00:00	1.106	2.4274		Mains
141	07 Oct 2020 12:00:00	1.106	2.4274		Mains
142	07 Oct 2020 13:00:00	1.106	2.4274		Mains

Raw Data 
  Hourly 
  Daily 
  Weekly 
  Monthly

Information	Notes
<b>Date/Time</b>	Date and time of the datalog record.
<b>Product Level</b>	Product level in the tank.
<b>Product Volume</b>	Product volume read from the tank table.
<b>Battery</b>	Battery level in percentage. Only displayed on battery powered devices.
<b>Power</b>	Current power status. Mains/Battery



The data in this datalog table can be displayed (and graphed) in a number of different ways. These are selected by choosing the option at the bottom of the datalog table. Options include Raw Data and averaged hourly, daily, weekly and monthly data. When the averaging options are chosen, missing data is automatically interpolated to fill in the missing gaps. Interpolated data will have the number column entries highlighted in red with a small 'Interpolated data' message at the top right of the datalog table.

Datalog \* Interpolated data

No.	Date	Prod Level	Prod Volume	Battery	Power
1	01 Oct 2020 16:00:00	1.110	2.4400		Mains
2	01 Oct 2020 17:00:00	1.110	2.4400		Mains
3	01 Oct 2020 18:00:00	1.110	2.4400		Mains
4	01 Oct 2020 19:00:00	1.110	2.4400		Mains
5	01 Oct 2020 20:00:00	1.110	2.4400		Mains
6	01 Oct 2020 21:00:00	1.110	2.4389		Mains
7	01 Oct 2020 22:00:00	1.109	2.4379		Mains
8	01 Oct 2020 23:00:00	1.109	2.4368		Mains
9	02 Oct 2020 00:00:00	1.109	2.4368		Mains
10	02 Oct 2020 01:00:00	1.109	2.4368		Mains
11	02 Oct 2020 02:00:00	1.109	2.4368		Mains
12	02 Oct 2020 03:00:00	1.109	2.4368		Mains
13	02 Oct 2020 04:00:00	1.109	2.4368		Mains

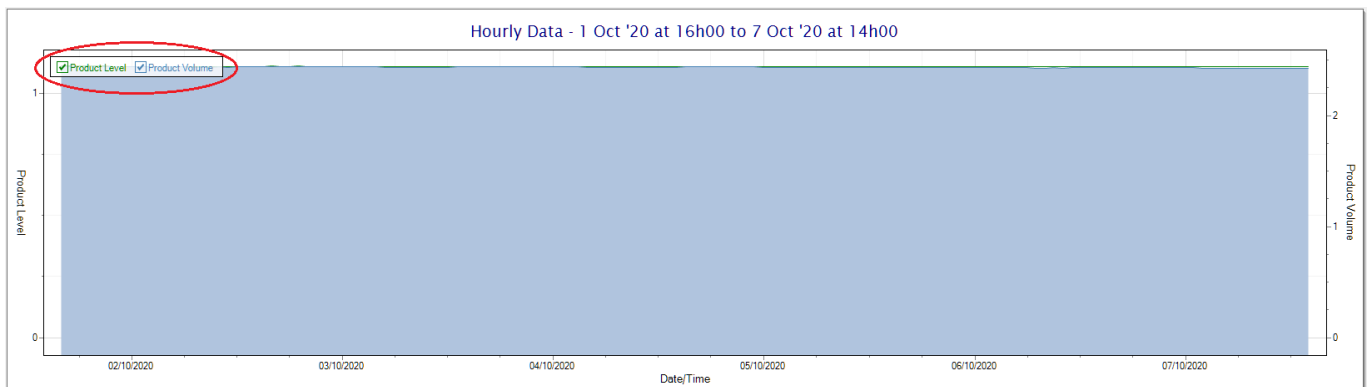
Raw Data 
  Hourly 
  Daily 
  Weekly 
  Monthly

As per the previously explained functions throughout the Cloudworks suite, columns can be switched off/on and re-ordered to the users requirements. The exporting will be as per the layout presented on the screen.

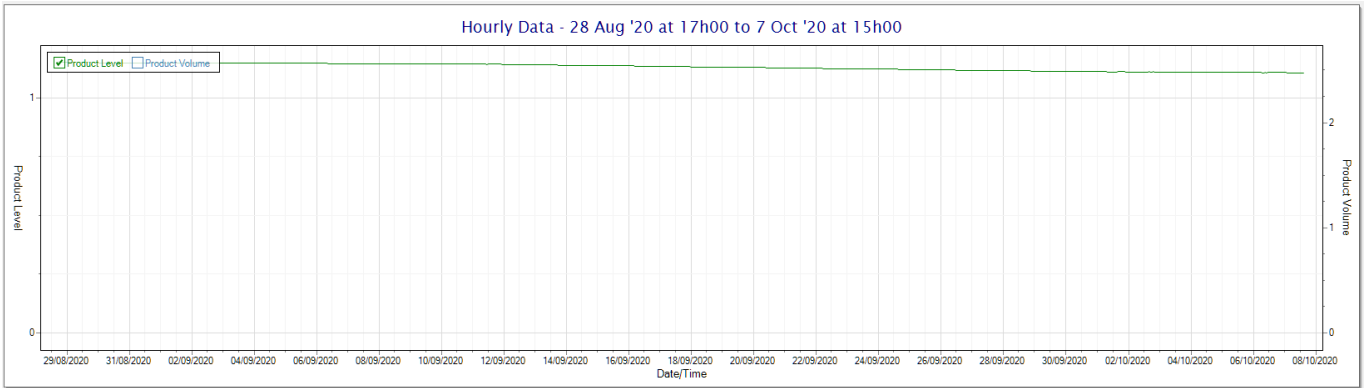
You can zoom into a range of the data by simply selecting those records in the table. This will result in the graph at the bottom being updated to display only those readings.

Deleting the datalog or removing a range of records can be easily done by using the 'Delete Datalog' button. To delete a range, simply select the range in the datalog table and press the 'Delete Datalog' button. If no range is selected, it will be assumed that you wish to delete the entire datalog. There will be a prompt to ensure that you are aware of the action you are about to take.

Data that is displayed in the table will also be represented in the graph at the bottom of the screen. The various series on each graph can be toggled on and off by selecting the series tick in the upper left hand corner.



To view the flow only would look like this:-



## 2.9 Managing Tank Tables

To be determined.

DOCUMENT NAME	CLASSIFICATION	DATE	PAGE
CLOUDWORKS CLIENT USER MANUAL	CONFIDENTIAL	15-JUL-21	183 OF 201

## 2.10 Device Configuration/Setup

Cloudworks devices can be configured in three different ways:-

1. Bluetooth interface.
2. Remote Configure.
3. Offline Script Configure.

For details regarding the configuration of each logger type, please refer to the relevant User Manual on our website at <http://cloudworks.systems/documentation.html>.

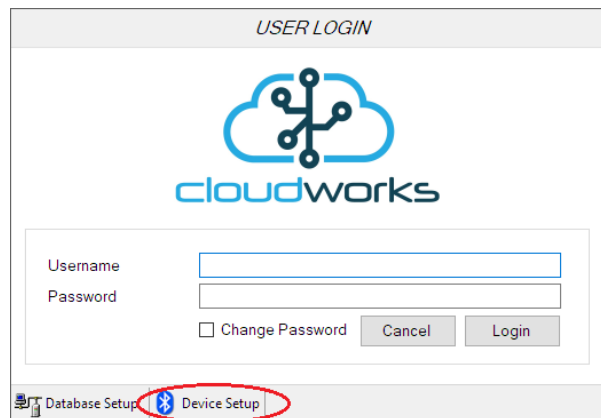
### 2.10.1 Bluetooth Interface Basics

Most Cloudworks devices have an onboard Bluetooth interface which allows for the device configuration to be done locally. **Each new device needs to be setup via this interface.** Once it has been setup and is connected to the server network, the option of a remote configuration becomes available to the user.

Devices that are permanently connected to the server and are streaming data can be setup using the remote setup option, while battery operated devices can have their configurations loaded into a script that will run when the device wakes up and connects to the server. This latter option is known as offline script configuration.

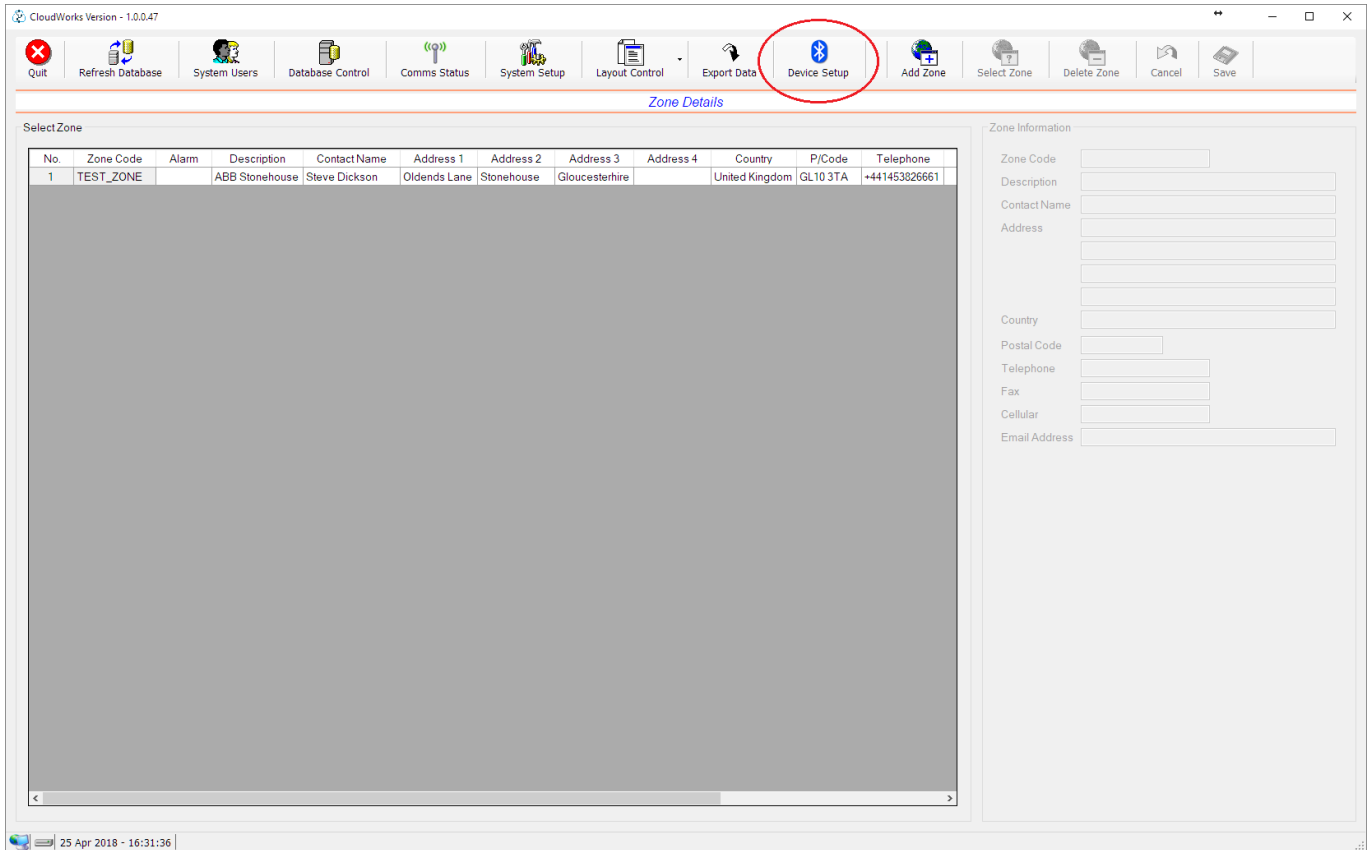
The online option will only be available if the server is currently seeing the remote device as online. **It is quite acceptable to use the offline scripting option to setup online devices since the server will simply run the script immediately as though the device has just woken up and connected.** This is useful for mass configuration of devices by directly embedding the scripts into the database from an external application.

There are two different places in the software to activate the Bluetooth connection option. The first option is from the log in screen at start up.

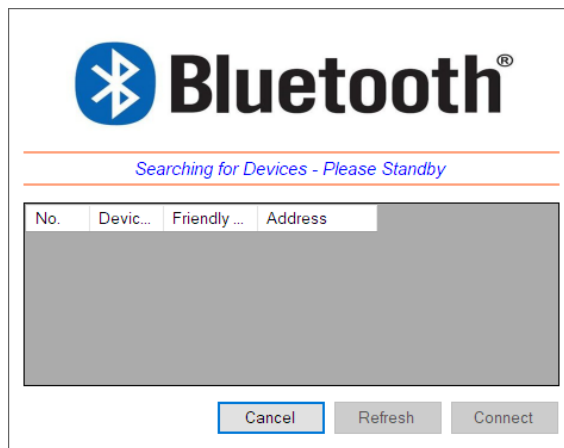


The purpose of having it here is to allow the user to access the Bluetooth setup option without needing to connect to the server and authenticating. This is useful in instances where there is no internet connection available in the field.

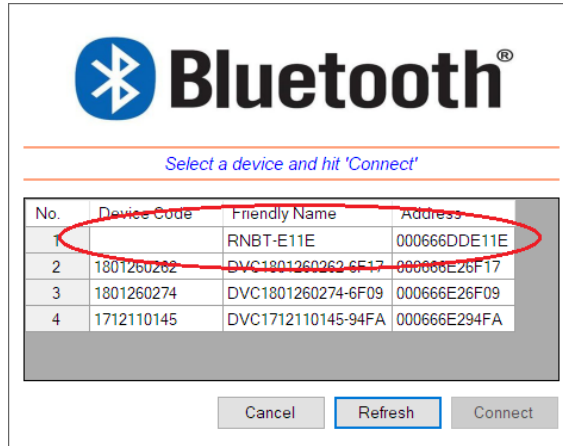
The second option is on the Zone screen by pressing the 'Device Setup' button.



Activating the Bluetooth 'Device Setup' function will launch the Bluetooth Server triggering a search for the available devices in the immediate vicinity.



Once the search has been completed, a list of the available devices will be displayed. Should the device you are looking for not appear in the list, press the 'Refresh' button to start the search again. Please remember that battery operated devices will need the Bluetooth interface activated before it will be found by the Bluetooth Server. This is normally done by giving the onboard pushbutton or external Bluetooth touch button a short press and release. The blue LED will flash to indicate that the interface is active and waiting for a connection.



On some of the legacy equipment you might see an entry that has no listed Device Code. This is because the Bluetooth interface 'Friendly Name' needs to be updated before it is correctly recognised. This can be done in the configuration screen once you are connected. This entry is a valid device and can be selected if you cannot see the device you are expecting listed as an option.

To make a connection, select the device from the list and press the 'Connect' button. Alternatively, double clicking on the device in the list will initiate a connection immediately. The Bluetooth Server will then establish a connection, place the device into Command Mode and automatically determine to what kind of device it has connected. The correct configuration screen will then be automatically launched.

Bluetooth status LED statuses are indicated as follows:

Bluetooth LED status	Notes
<b>Off</b>	Interface is off.
<b>Flash</b>	Interface is on and waiting for a connection.
<b>Solid on</b>	Connected to computer.
<b>Slow double flash</b>	Connected to computer for some devices.

The Bluetooth interface on the logger provides for two different functions. Firstly, it will stream diagnostic information while the logger is operating. This will be information like the GSM signal strength, next wakeup time etc, as well as, information while the logger is initiating a connection to the server.

Secondly, it can be switched into a Command Mode which allows the software to send configuration commands to the logger.

- Cumulus Logger Bluetooth operation

The Bluetooth interface on the Cumulus can operate in two different modes. It can be permanently on or activated by means of a short push of the pushbutton on the logger. Battery powered loggers are always in the pushbutton mode whereas this mode is optional on mains powered devices.

Another important thing to note is that, in pushbutton mode, the Bluetooth interface will automatically switch off if no data is being sent from the software for more than 60 seconds. This includes the diagnostic streaming mode which will only remain active for 60 seconds. This is to prevent the Bluetooth interface from being inadvertently left on and draining the battery.

- Other Logger Bluetooth operation

The Bluetooth operation on all other loggers operate only in the pushbutton mode. Meaning that, the Bluetooth interface is always off and needs to be activated before trying to establish a connection. This is normally done by

giving the onboard pushbutton or external Bluetooth touch button a short press and release. The blue LED will flash to indicate that the interface is active and waiting for a connection.

If no connection is established within 90 seconds of activation, the Bluetooth interface will automatically power down and will need to be re-activated should you wish to connect again.

Bluetooth connections are optionally protected by means of a global password that is configured in your local 'System Setup' screen. When establishing a connection, the software will determine whether the logger has the password protection activated, and, if so, offer the global password. Should this fail, the connection will be terminated and a message displayed. Loggers are shipped by default with no password protection active. This password can be activated after making the initial Bluetooth connection and configuring the Bluetooth interface with 'System Password' option under the 'Bluetooth Setup' section in the configuration screen. This is explained further in the setup of each device. The password used for the setup will be the same as the global Bluetooth password set in the 'System Setup' screen.

The Bluetooth interface will remain active for as long as there is a connection present. Should this connection be terminated or broken in any way, the interface will again go into the 90 second standby mode.

The Red Status LED on the logger will indicate its current status.

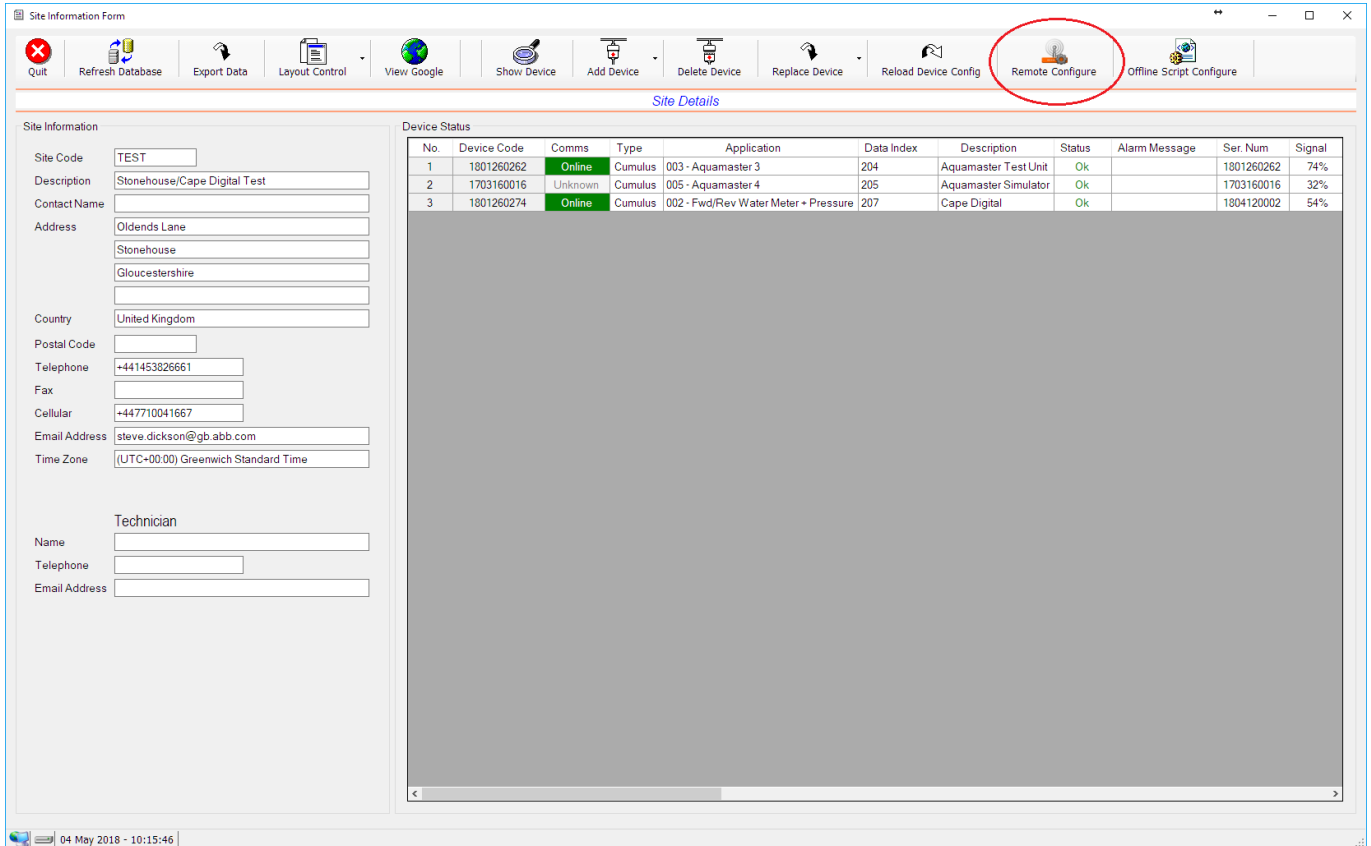
Red LED status	Notes
<b>Off</b>	Device is sleeping.
<b>Fast Flash</b>	Connecting to the server.
<b>Slow Flash</b>	Connected to the server and communicating.
<b>Solid On</b>	Command Mode.

For details regarding the configuration of each logger type, please refer to the relevant User Manual on our website at <http://cloudworks.systems/documentation.html>.

### 2.10.2 Remote Configuration Basics

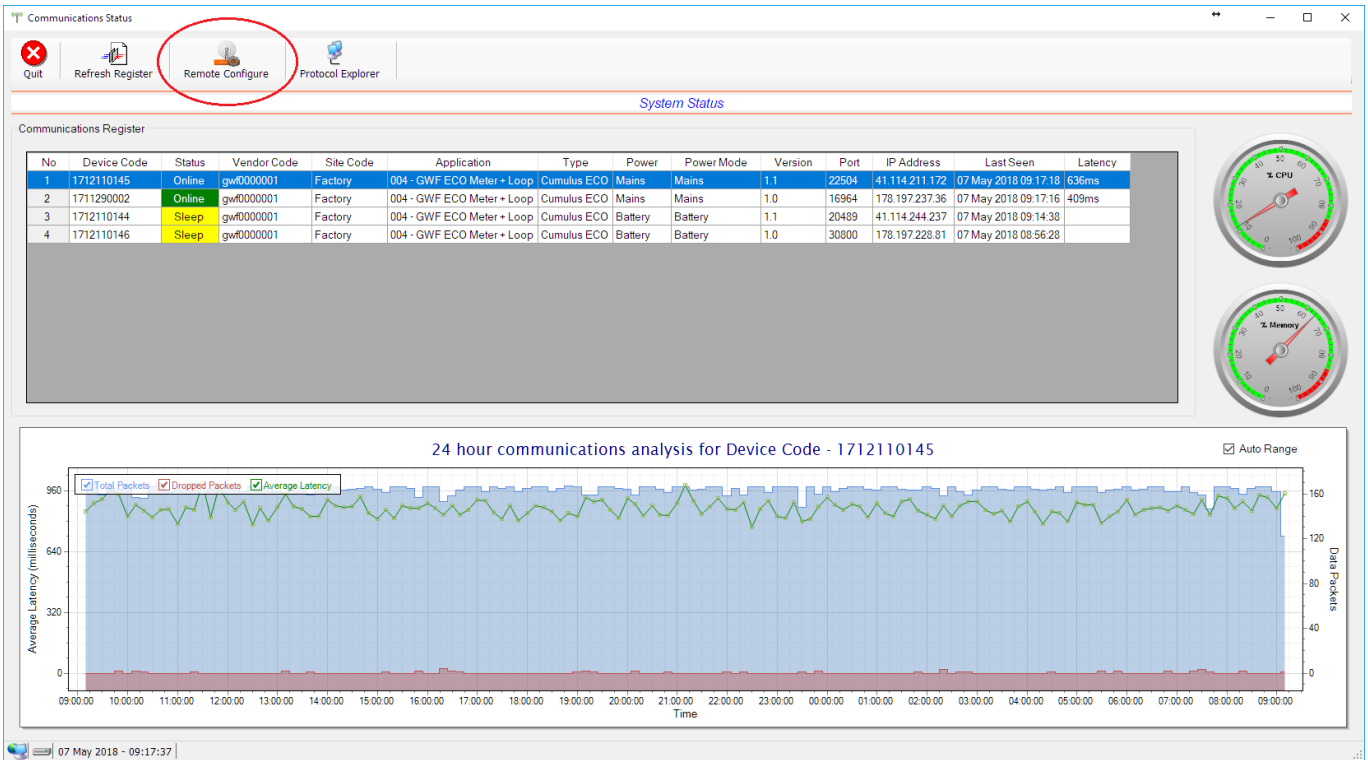
As per the Bluetooth setup , the logger can be configured via the online GSM network (Remote Configure). **This only applies to powered loggers that are currently online and connected to the server.** Should the logger be battery powered and asleep, please use the 'Offline Script Configure' option described later in this chapter.

The 'Remote Configure' option can be reached in two different points in the software. Firstly, under the 'Site Details' screen with the listed devices.





And secondly, in the 'Communications Status' screen accessible from the 'Zones' Screen.



To activate the setup screen, select the logger in the list of devices and press the 'Remote Configure' button. This will automatically launch the correct configuration screen for that device.

Please note, if a device has not yet been added to a site it will only be available to configure from the 'Communications Status' screen as it will not appear on the site device list.

If the device is currently offline, you will be prompted as such and the system will be unable to launch that configuration screen.

Once launched, the first thing the configuration module will do is to go and fetch the configuration data **directly** from that logger.

This will take a minute or so but its progress will be displayed on the information line of that screen. Should there be a failure to read, please hit the 'Refresh' button to retry the download. Once all the data has been read, it will be populated on the screen.

Note that, unlike in the Bluetooth Command Mode, datalogging functions operate normally during this operation.

For details regarding the configuration of each logger type, please refer to the relevant User Manual on our website at <http://cloudworks.systems/documentation.html>.

### 2.10.3 Offline Script Configure Basics

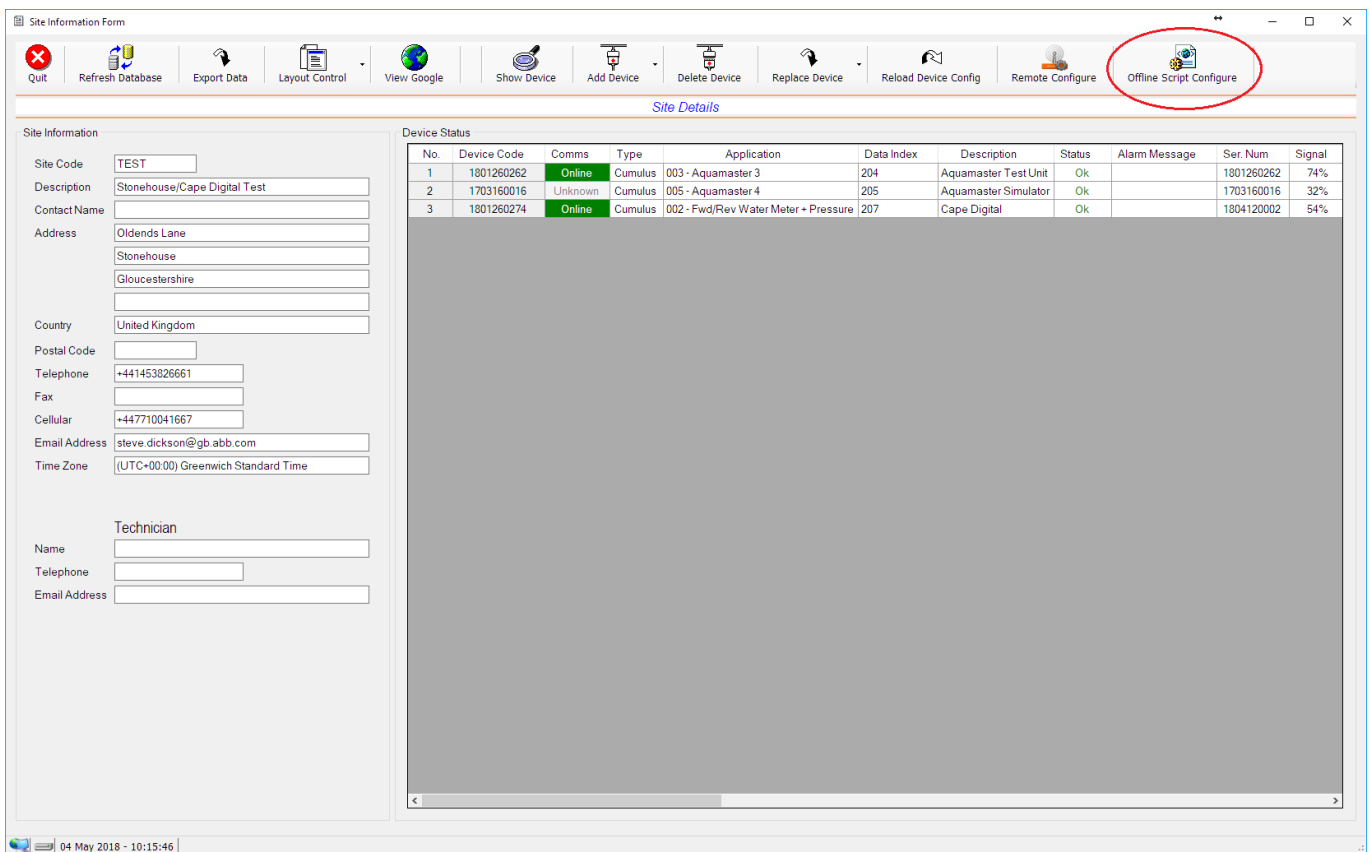
One of the problems with battery powered loggers is that, since they are asleep, you are unable to make configuration changes without actually visiting the logger and making the changes via the Bluetooth interface.

This problem has been solved in Cloudworks by means of a scripting system. A script is a list of commands that are processed one after another. Essentially what this means is that a script is created for all the parameter changes you wish to make and stored in the database. When that logger wakes up and connects to the server, after the download of its data, the script is run, making all the changes before it is told to go back to sleep.

Although this function is ideally suited for loggers that are asleep, it is quite acceptable to use it for online loggers since the script will simply be run immediately. This will, at a later stage, also allow for bulk configuration changes.

The setup parameters for the logger are the same as when done via the Bluetooth interface. Please familiarise yourself with the information described in the Setup via Bluetooth chapter. In this chapter, we will only be describing the differences involved with the 'Offline Script Configure' option.

The 'Offline Script Configure' option can only be reached in the 'Site Details' screen. The reason is because the Logger needs to be assigned to a database in which the script is stored.



To activate the setup screen, select the logger in the list of devices and press the 'Offline Script Configure' button. This will automatically launch the correct configuration screen for that device.

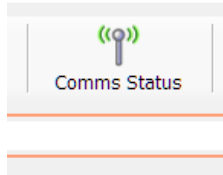
For details regarding the configuration of each logger type, please refer to the relevant User Manual on our website at <http://cloudworks.systems/documentation.html>.

## 2.11 Advanced Features and Tools

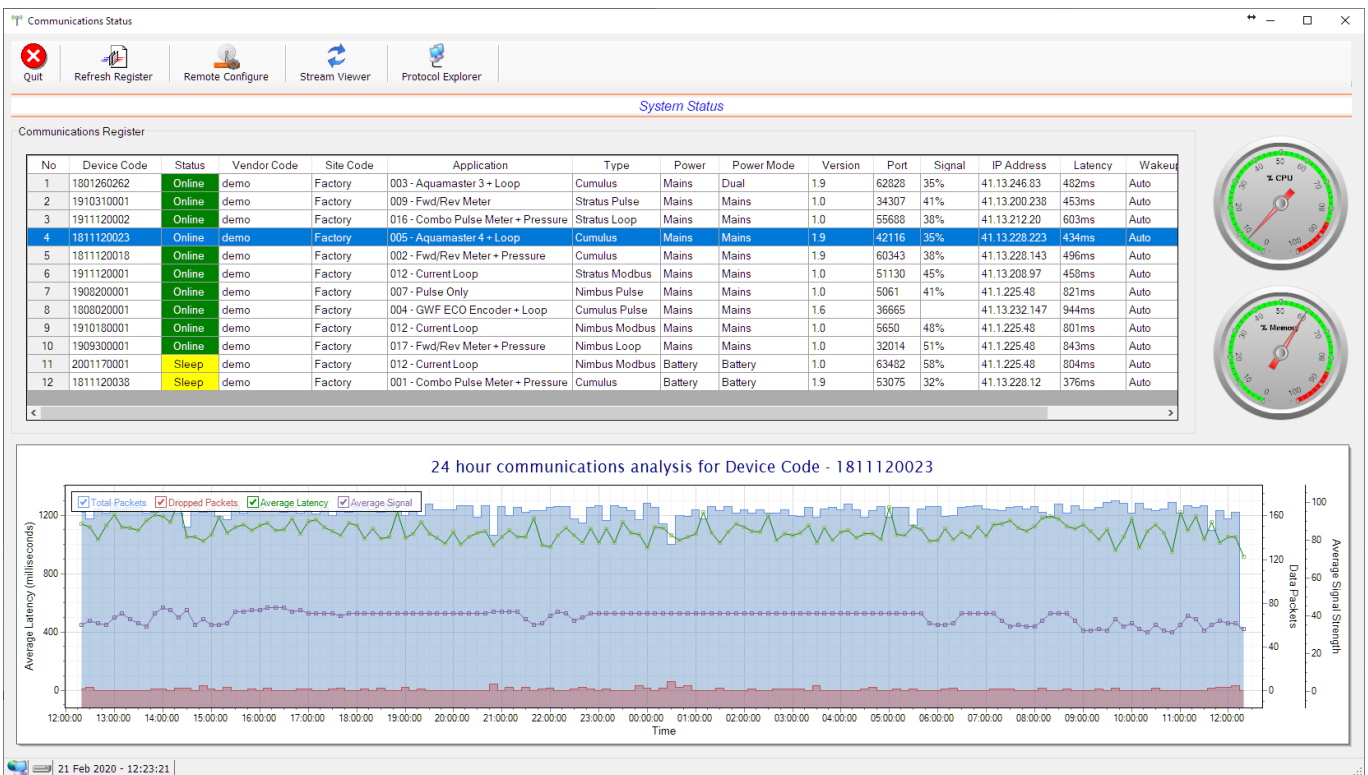
The Cloudworks suite of software has a number of advanced features that facilitated the maintenance and diagnostics of the system. These features are not normally available to the average user.

### 2.11.1 Communications Status

The 'Communications Status' module is a set of software tools that provide valuable information regarding the communications of devices on the Cloudworks system. This module is accessible from the 'Zone Details' screen by pressing the 'Comms Status' button.



This will launch the 'Communications Status' Screen.



In order for the server to keep track of the various dynamic IP's and communications statuses of the remote devices, it keeps a register containing this information. On launching this screen the Communications Register is requested from the server and displayed in the main table. The register can be requested at any time by pressing the 'Refresh Register' button.

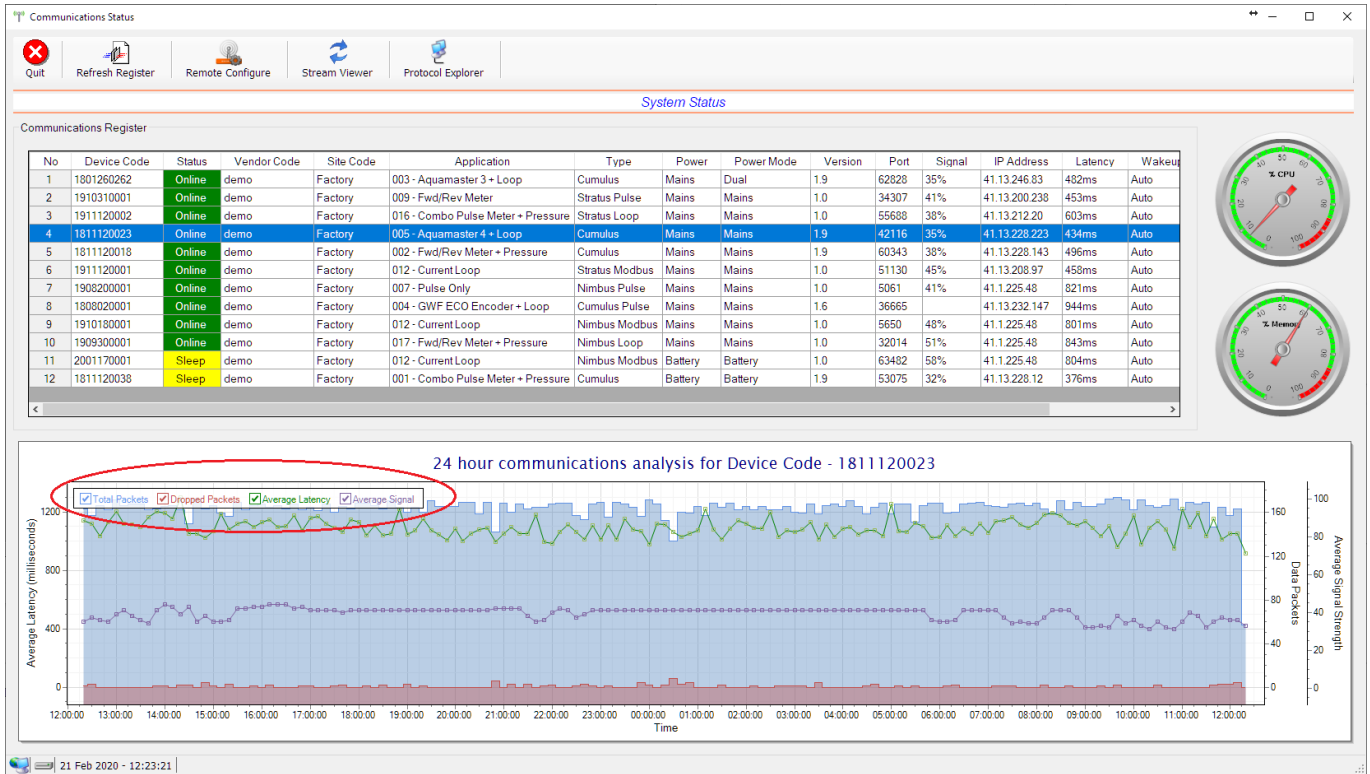
This register is continually kept updated by the remote heartbeat system or each time a battery device connects to the server. **In order for a device to be present in the register, it will have needed to connect at some stage to the server.**

The data stored in the register is as follows:-

Parameter	Notes
<b>Device Code</b>	Device Code for the respective devices within the register
<b>Status</b>	Current communications status Offline/Online or Sleep. Note, when battery powered devices go offline, they are assumed to be asleep.
<b>Vendor Code</b>	Communications/Database Vendor Code assigned to the device.
<b>Site Code</b>	The Site Code is an independent coding system that is not currently used in the Cloudworks system.
<b>Application</b>	Application type assigned to this device. Application types are explained in detail earlier in this document.
<b>Type</b>	Type of device. Eg Cumulus logger CDS538 etc
<b>Power</b>	Current power status for the device. This is normally the same as the Power Mode except for Dual power devices that switch between mains and battery. This would be Mains or Battery.
<b>Power Mode</b>	Power Mode for the device. Mains/Battery/Dual.
<b>Version</b>	Onboard firmware version of device.
<b>Port</b>	Current connection Port number.
<b>Signal</b>	GSM signal strength at the remote device.
<b>IP Address</b>	Local GSM network IP address. For devices on a VPN with a static IP would show that static IP.
<b>Last Seen</b>	Date and time the device was last seen by the server.
<b>Latency</b>	When a data packet is sent from the server to a remote device and a response is received, there is a delay that is called the latency time (in milliseconds). This time varies for different GSM networks and may alter during different periods of the day. By displaying the time here, it gives the user a fair indicator of how busy the GSM network is currently and possibly an explanation for communications that may be failing. These values are highlighted in red for readings greater than the value setup in the 'System Setup' screen.

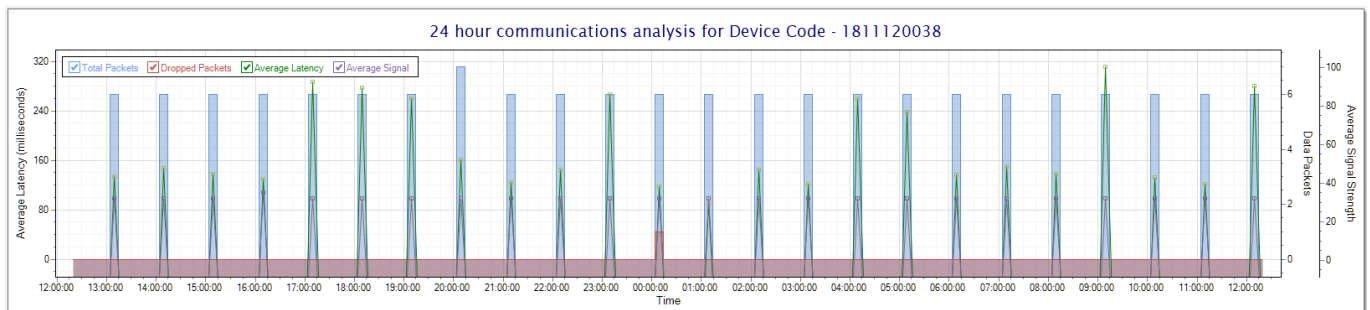
Included in the register is a record of the data packet communications statuses for the previous 24 hours. Again, restarted if the server software is restarted or the register cleared. This record is divided into 10 minute intervals and holds the Total Number of Packets sent, the number of dropped packets (no response packets) and the average Latency time over that 10 minute period.

Selecting a device in the table will result in that record being plotted on the graph below.

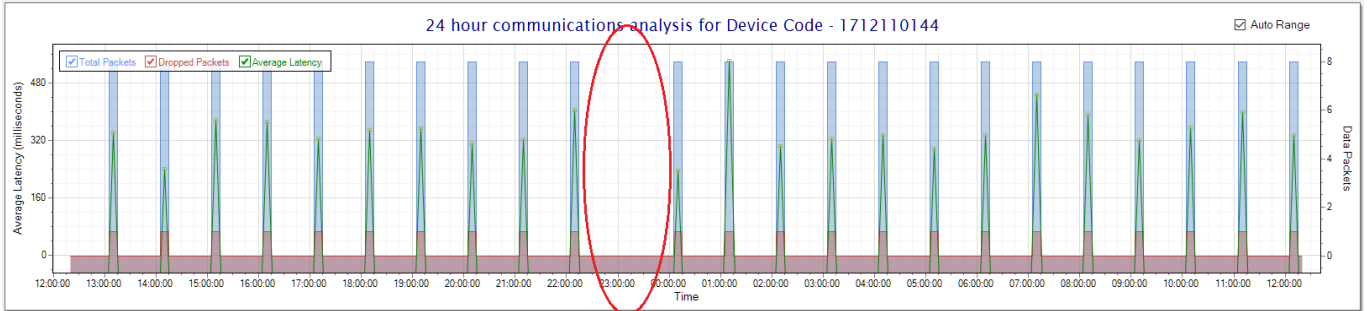


The example here is of a powered logger that is continually communicating with the server. As per the previous graphing options, individual series in the graph can be switched off/on by clicking the tick option on the top left of the graph. This information can be useful to ascertain how well the communications have been performing over the last 24 hours.

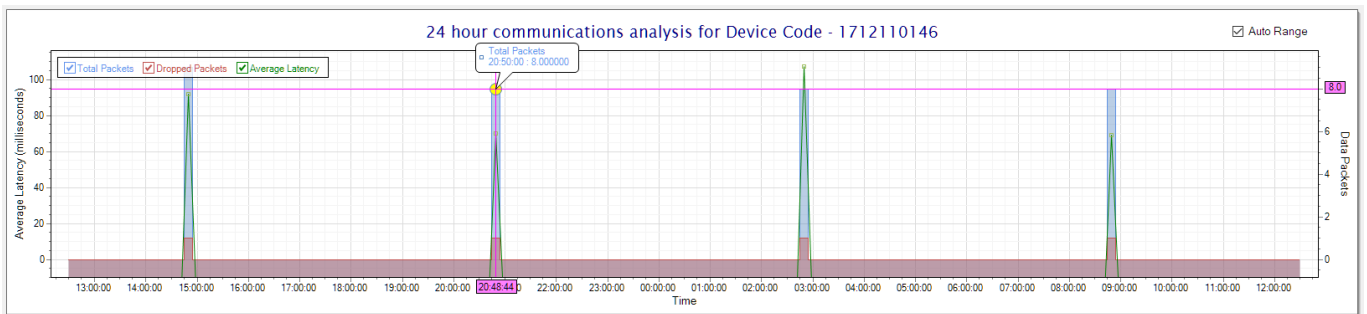
Especially useful is the graphing of a battery powered device. As seen below, it will indicate the times at which this device has successfully accessed the server.



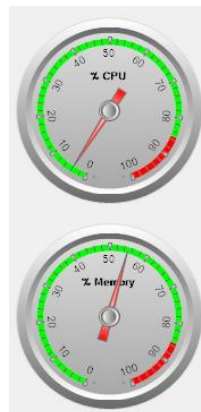
An interesting thing to note with this battery logger below is that it was unable to connect at 23h00 (scheduled every hour), hence the missing comms block.



Battery loggers are normally set to wake up every 6 hours so their comms graphs would look like this.

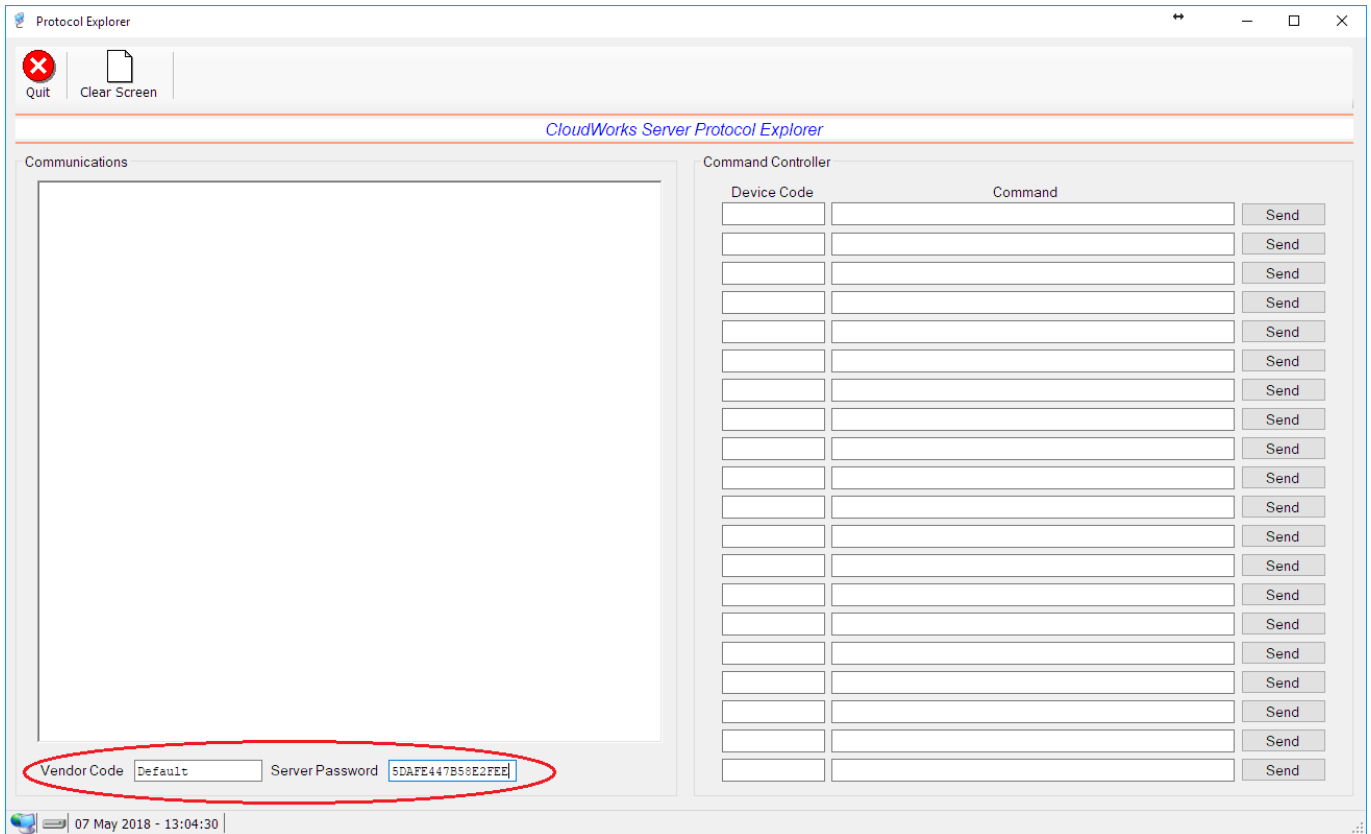


Communications to and from remote devices are time sensitive in so much as a device that takes too long to reply will be considered non-responsive. To have a quick visual as to whether this is the remote device or simply the computer that is currently overloaded with other tasks there are two needle dials representing the CPU and memory usage.



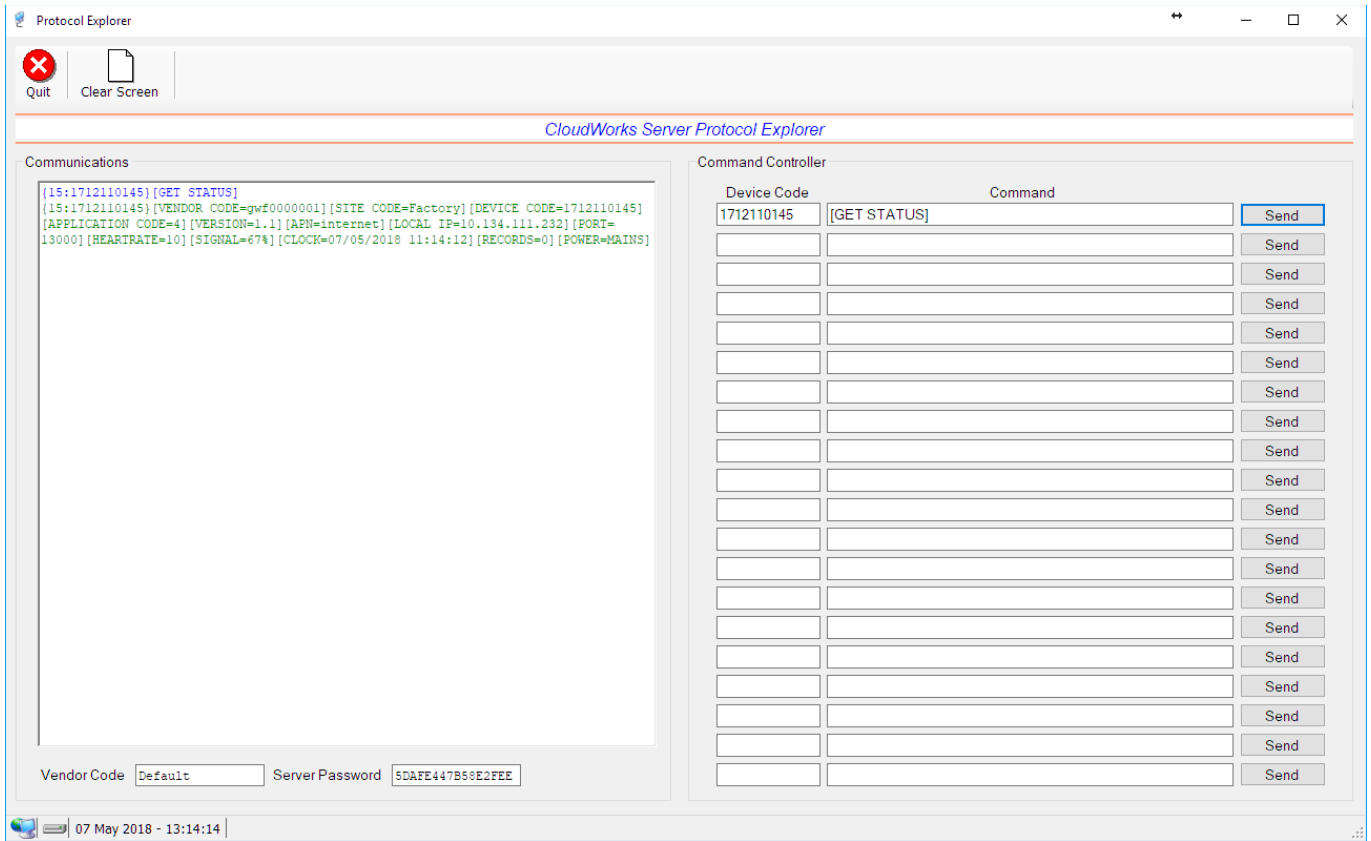
Also available on the 'Communications Status' screen is the 'Protocol Explorer'. This is a function only available to Administrators. You are able to communicate directly to all Cloudworks devices to allow for integration into other systems other than the **Cloudworks Client** software. See the [Cloudworks Server Protocol](#) for details in this regard.

In order to facilitate the development of these platforms, Cloudworks has provided a 'Protocol Explorer' module in which the developer can test the various commands and responses detailed in the above document. Pressing the 'Protocol Explorer' button will launch the explorer screen.

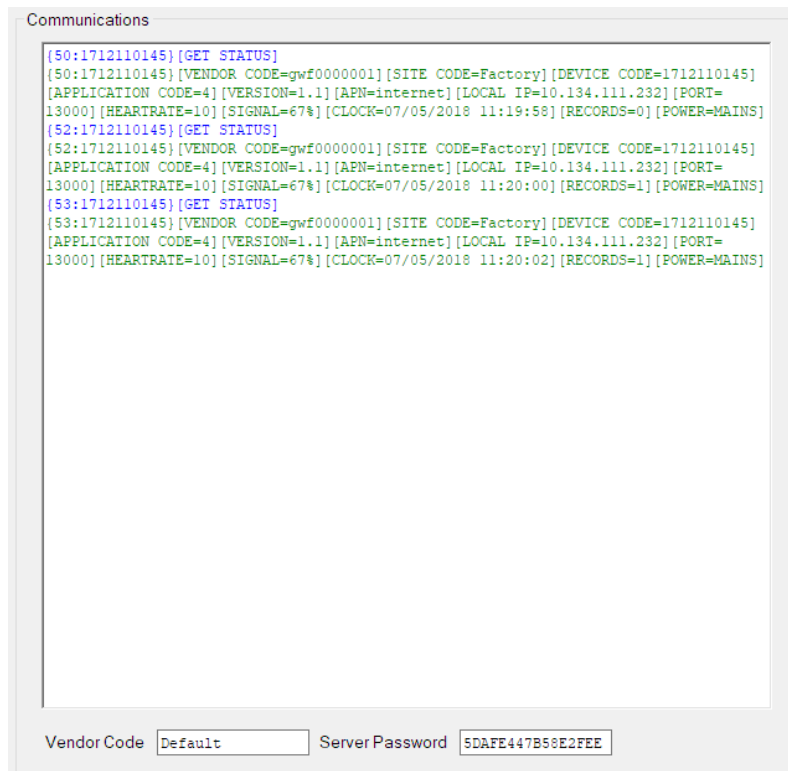


This screen really just consists of a communications window on the left and a range of containers for the test commands (command controller) with send buttons on the right. This module will automatically log into the server with the Vendor Code and Password highlighted at the bottom. [The generated password for each database can be obtained from here for future usage in other platforms.](#)

As detailed earlier, all devices are addressed by means of their Device Codes. This Device Code is captured in the 'Device Code' field together with the command in the 'Command' field. Pressing 'Send' will send the command.

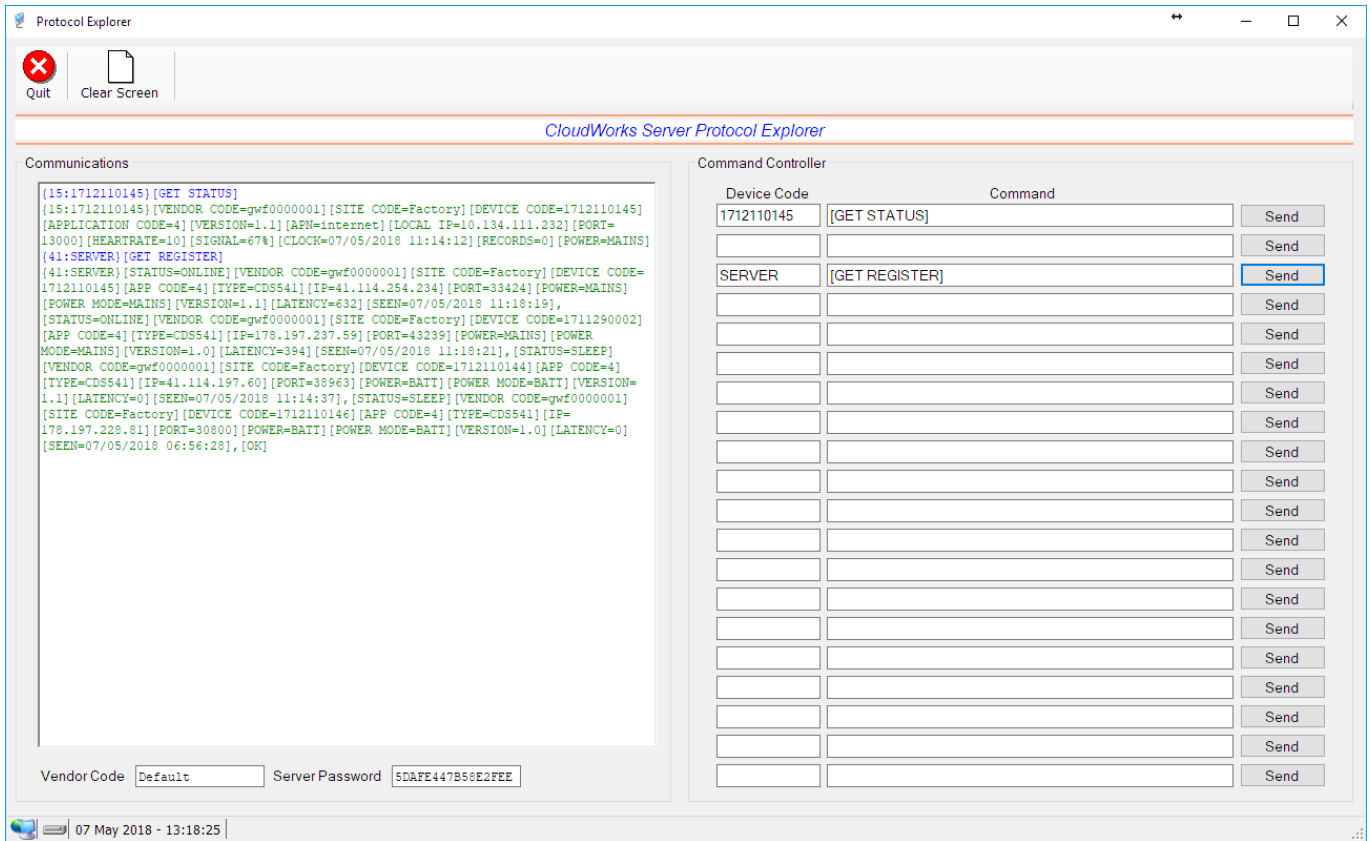


Here you can see the command sent in blue and the response received in green.





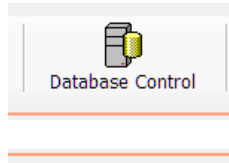
When sending a command to the server, use 'SERVER' as a Device Code.



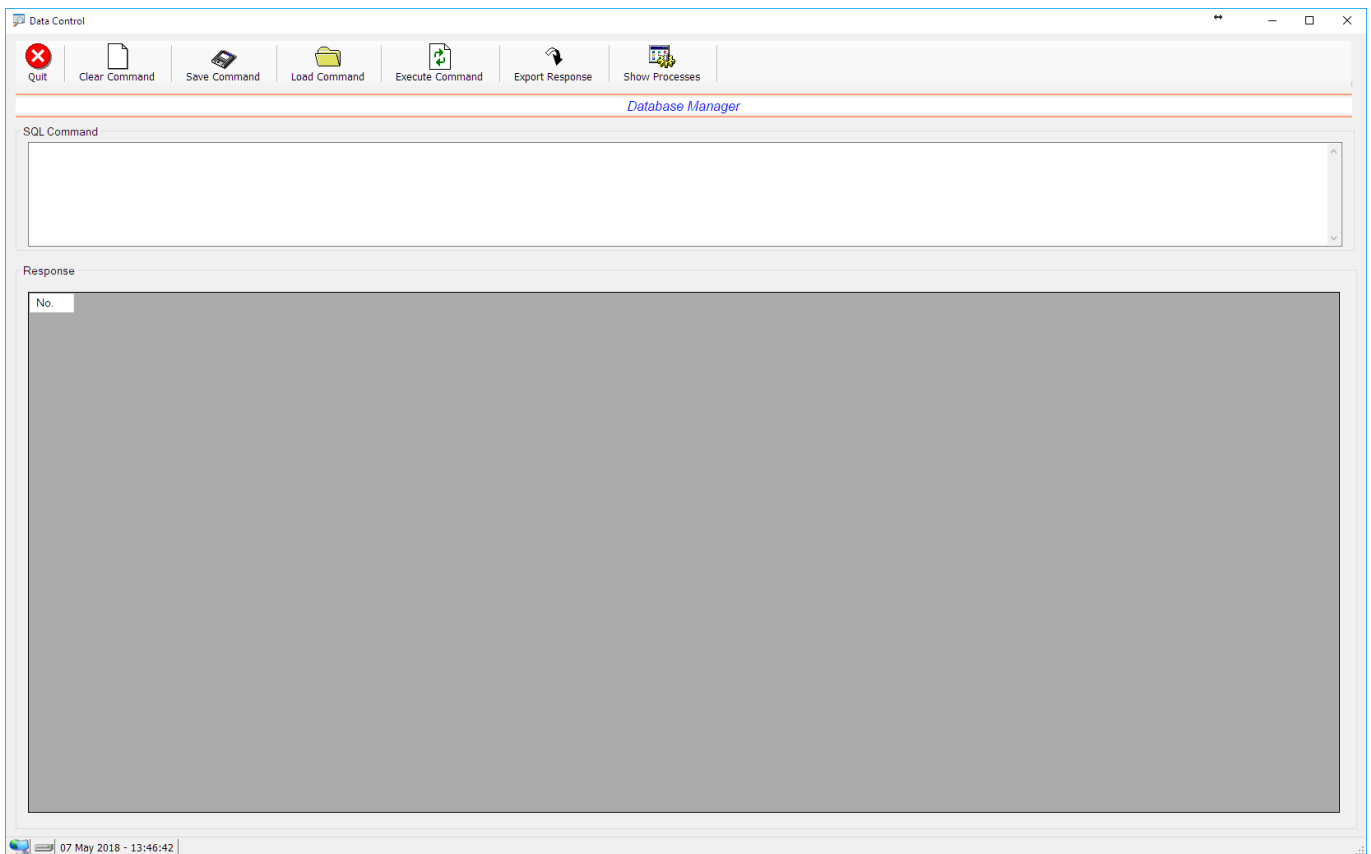
Right clicking on the Communications window or pressing the 'Clear Screen' button will clear this window. Multiple commands can be captured on this screen.

### 2.11.2 Database Controller

The 'Database Controller' module, accessible from the 'Zone Details' screen by pressing the 'Database Control' button, provides the system Administrator direct access to the database for a variety of uses.

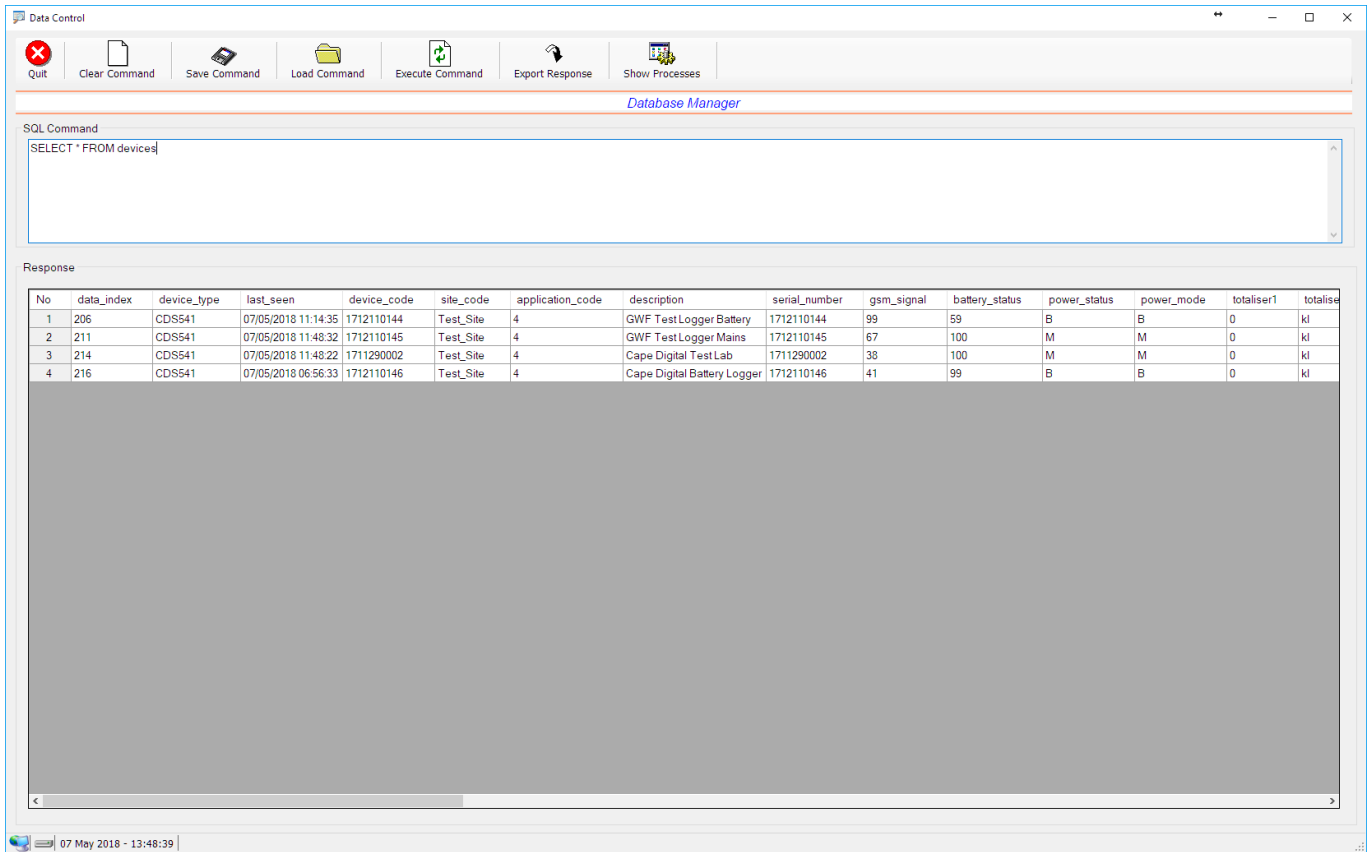


The main use for this module is for the maintenance of the database as well as the running of specific MySQL commands/queries for the generating of custom reports.



The screen consists of a SQL command window in which the MySQL command is entered, and a response window into which the results of a queries would be populated. You are able to save a command to disk using the 'Save Command' button and retrieve a saved command using the 'Load Command' button. Clearing the screen can be done by pressing the 'Clear Command' button.

Once the command has been entered, press the 'Execute Command' button for the action to take place.



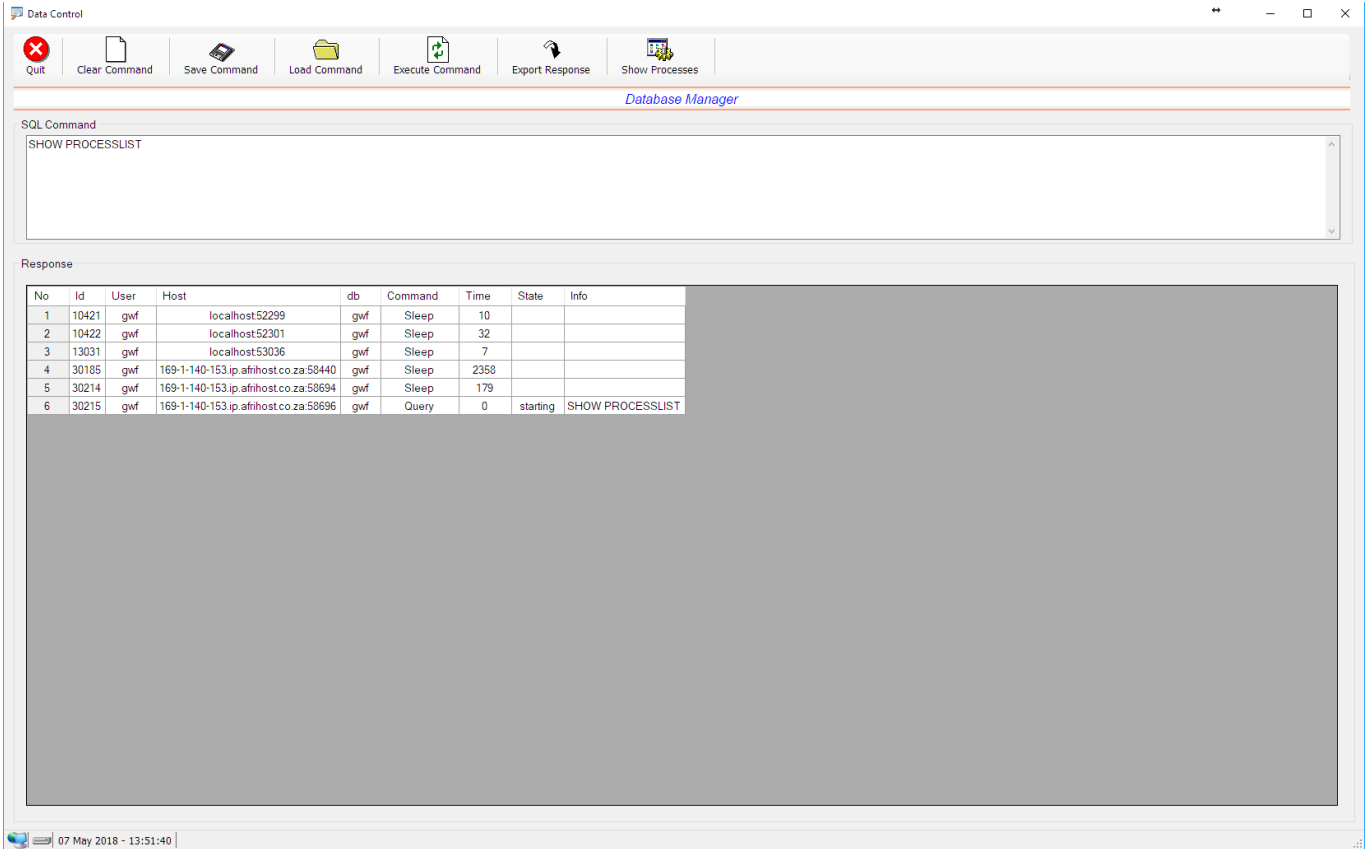
The screenshot shows the 'Data Control' window with the following components:

- Toolbar:** Quit, Clear Command, Save Command, Load Command, Execute Command, Export Response, Show Processes.
- SQL Command:** `SELECT * FROM devices`
- Response Table:**

No	data_index	device_type	last_seen	device_code	site_code	application_code	description	serial_number	gsm_signal	battery_status	power_status	power_mode	totaliser1	totalise
1	206	CDS541	07/05/2018 11:14:35	1712110144	Test_Site	4	GWF Test Logger Battery	1712110144	99	59	B	B	0	kl
2	211	CDS541	07/05/2018 11:48:32	1712110145	Test_Site	4	GWF Test Logger Mains	1712110145	67	100	M	M	0	kl
3	214	CDS541	07/05/2018 11:48:22	1711290002	Test_Site	4	Cape Digital Test Lab	1711290002	38	100	M	M	0	kl
4	216	CDS541	07/05/2018 06:56:33	1712110146	Test_Site	4	Cape Digital Battery Logger	1712110146	41	99	B	B	0	kl

As you can see, the results are populated in the table below. This data can now be exported as a .csv file using the 'Export Response' button. The data is exported in the same order as displayed.

One last function is the 'Show Processes' button which will fetch the current processes/connections being carried out by the Database Manager on the server.



This will give the Administrator a look into the current load on the Database Manager on the server.

### 2.11.3 Modbus Register Map

To be determined.

DOCUMENT NAME	CLASSIFICATION	DATE	PAGE
CLOUDWORKS CLIENT USER MANUAL	CONFIDENTIAL	15-JUL-21	201 OF 201