# User Manual

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# 1 SYSTEM ARCHITECTURE

## 1.1 Overall Architecture

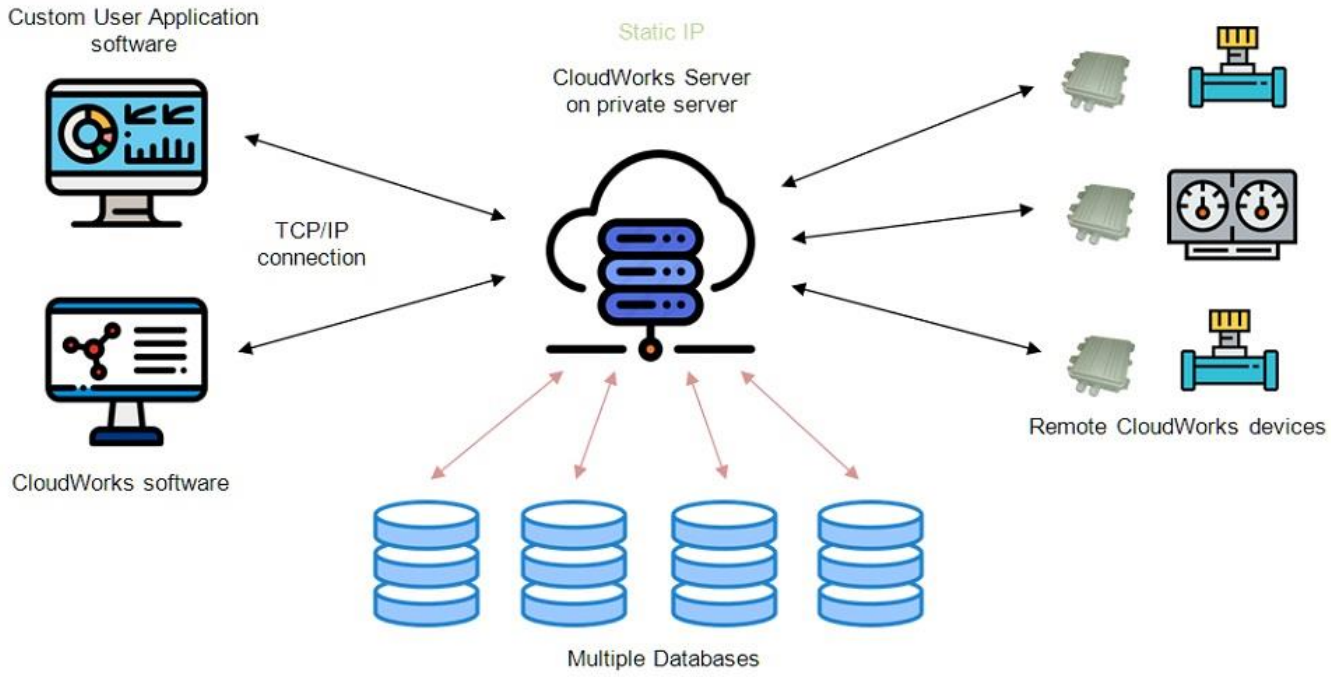
The Cloudworks suite of programs consists of two modules, **Cloudworks Server** and **Cloudworks Client** (known just as **Cloudworks**).

**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.

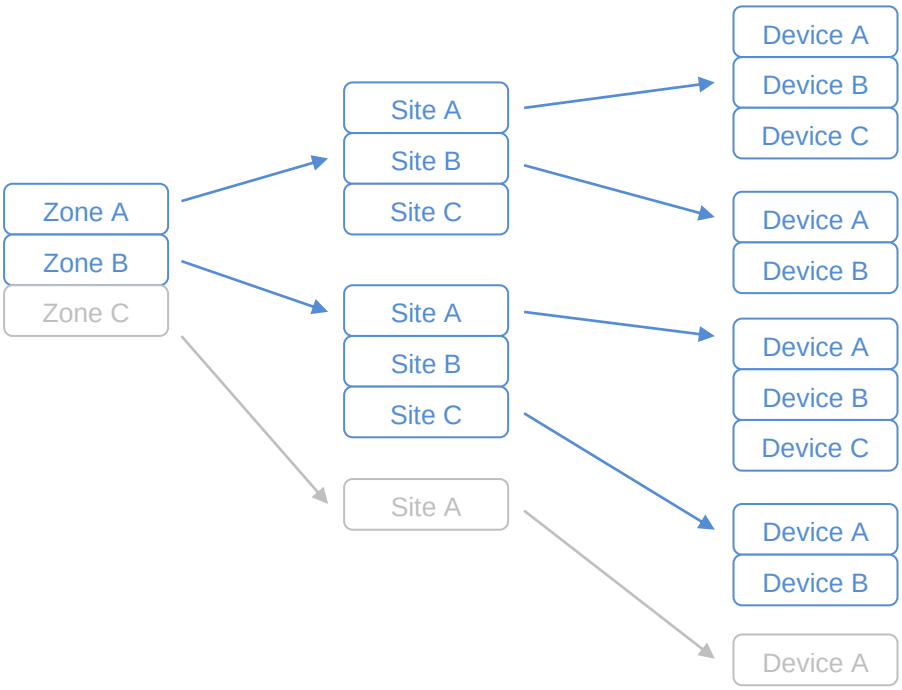
**Cloudworks** can be installed by registering and installing from the Cloudworks website at http://cloudworks.systems/




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:

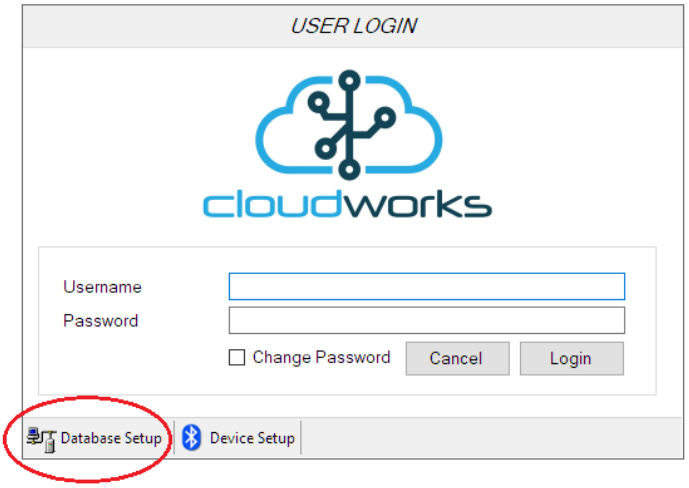
The Cloudworks Server software supports multiple databases. What this means is that the server will automatically populate the database that is associated with a specific device. Each database and device has a Vendor Code assigned to it. Data is matched between these systems using that code. This code 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

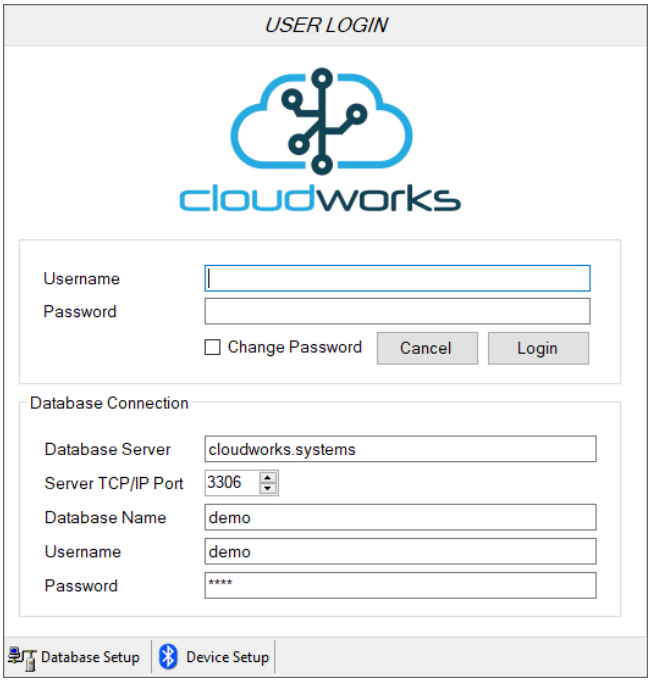
Once Cloudworks has been installed, it can be run and the user can log in and establish a connection into the system. Each time the software is run, it will automatically access the Cloudworks server and check if there is not perhaps a newer version available. Should a newer version be found, you will 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.

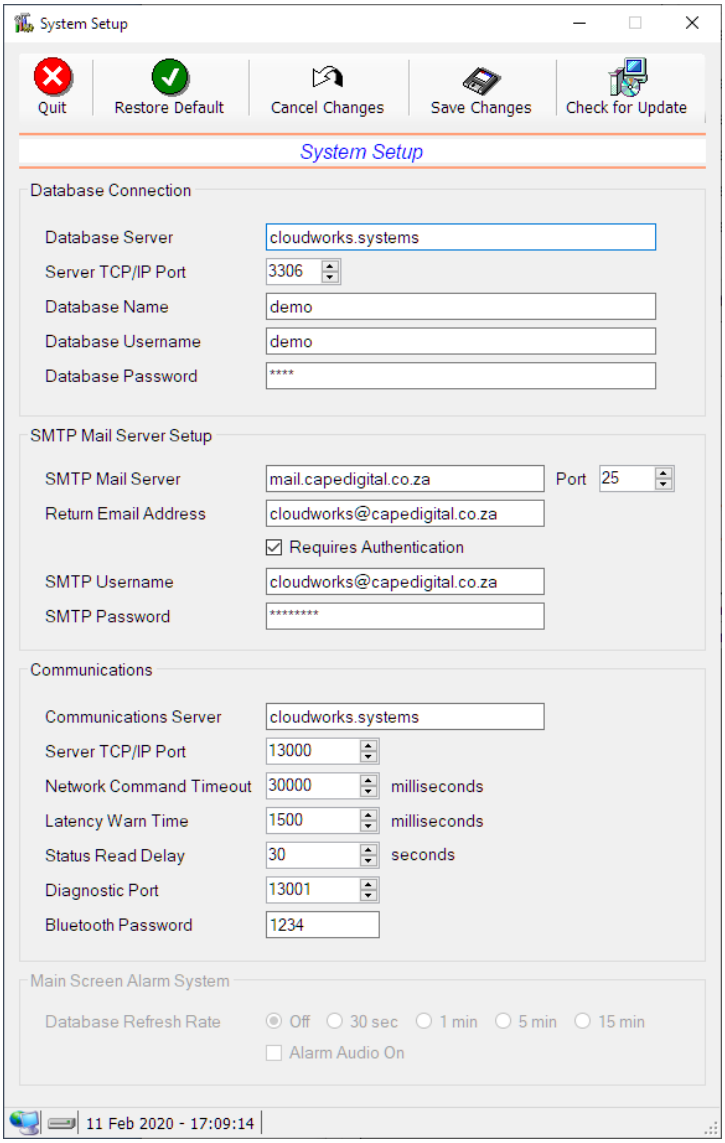



The first time your user details are sent to you, they will include a generated password that may be a little difficult to remember. This password can be changed by ticking the 'Change Password' box on the User Login screen. When this block is ticked, further entry fields will pop up that need your new 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.



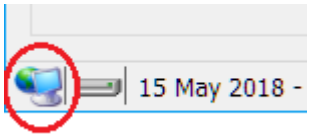

The first thing to do is to check that your software is fully up to date. Although the Cloudworks software goes and checks the server for updates every time it is run, it is also possible to do a direct check by pressing the 'Check for Update' button in the toolbar. If a new update is available, you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

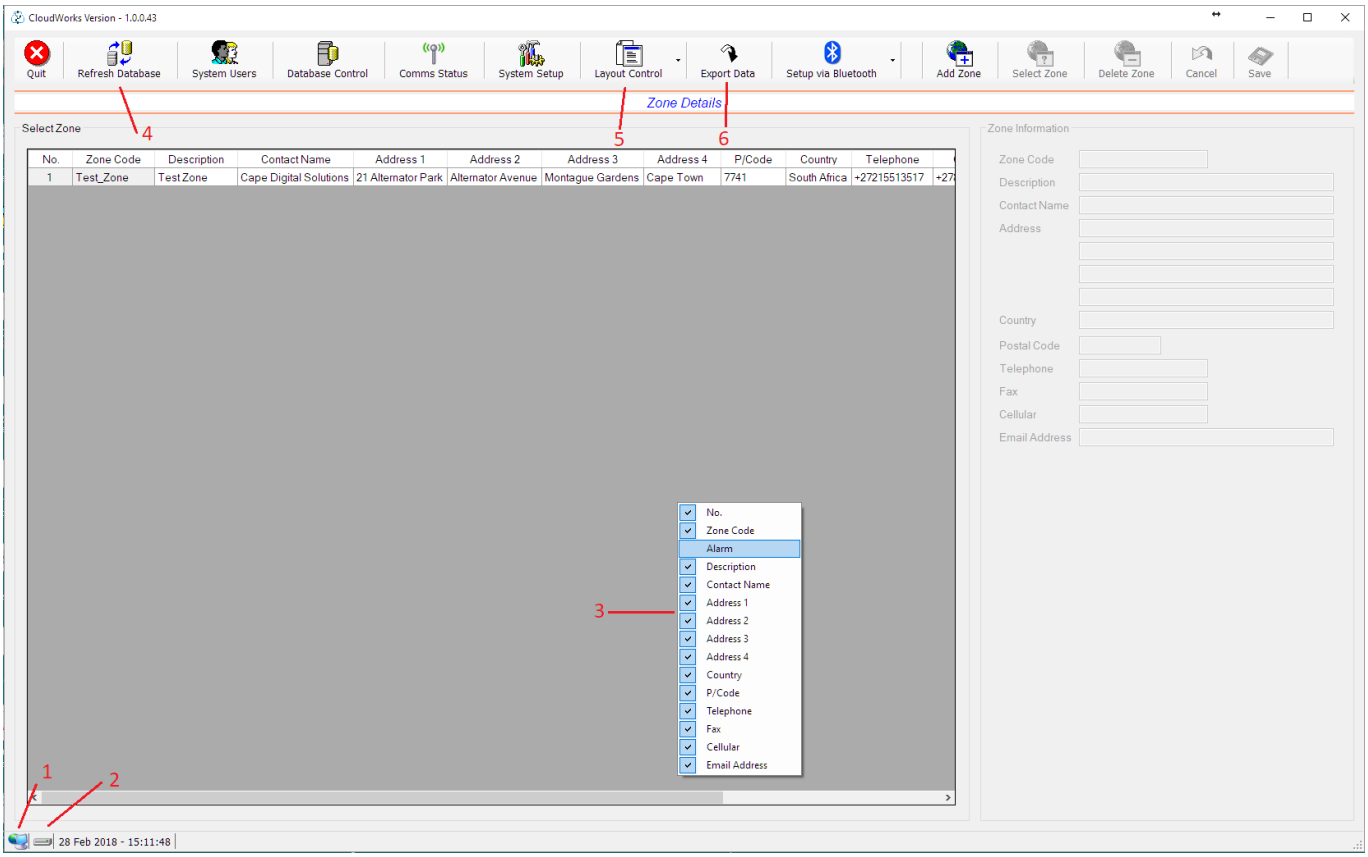
Parameter definitions:-

| Parameter | Notes |
|---|---|
| **Database Server** | The Server Name or IP address of the server that is hosting your database. |
| **Server TCP/IP Port** | 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. |
| **Database Name** | 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. |
| **Database Username** | Database Username under which you have access to the database. |
| **Database Password** | Password for the above Username. |
| **SMTP Mail Server** | The Server Name or IP address of the server that is hosting your SMTP Mail server. |
| **Return Email Address** | 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. |

| | |
|---|---|
| **Requires Authentication** | 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. |
| **SMTP Username** | Your Username for the SMTP Server. |
| **SMTP Password** | Your Password for the SMTP Server. |
| **Communications Server** | 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. |
| **Server TCP/IP Port** | 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. |
| **Network Command Timeout** | Time allowed for a command to propagate the whole system before it is considered to have failed. Parameter is in milliseconds. |
| **Latency Warn Time** | 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. |
| **Status Read Delay** | 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. |
| **Diagnostic Port** | 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. |
| **Bluetooth Password** | 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.

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.

## 2.4 Managing Users

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

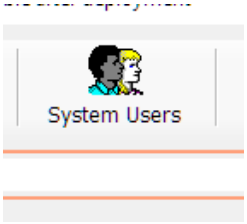
1. Administrator
2. Technician
3. Supervisor
4. Normal

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.

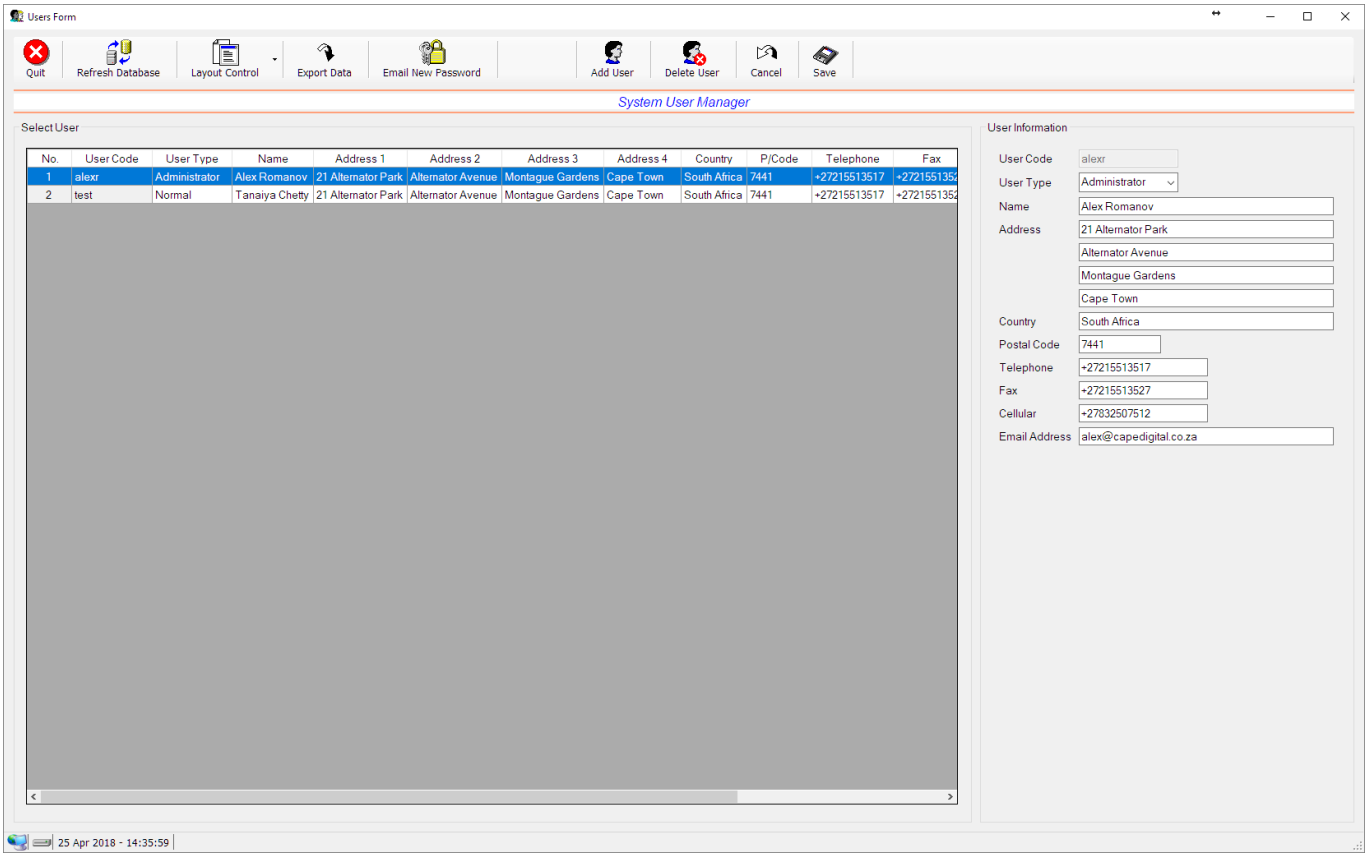
| User | Notes |
|---|---|
| **Administrator** | The Administrator has full control of the system. They are able to add and delete users, as well alter any aspect of the system. There needs to be at least one administrator on the system for the user system to operate. |
| **Technician** | The Technician has no access to :-<br>• User control system - cannot add or delete users.<br>• Direct database control.<br>• Protocol Explorer. |
| **Supervisor** | The Supervisor has no access to :-<br>• User control system - cannot add or delete users.<br>• Direct database control.<br>• Protocol Explorer.<br>• System setup parameters.<br>• Remote/Offline configuration of devices.<br>• Remote configuration of equipment connected to the remote device. |
| **Normal** | The Normal user has no access to :-<br>• User control system - cannot add or delete users.<br>• Direct database control.<br>• Protocol Explorer.<br>• System setup parameters.<br>• Remote/Offline configuration of devices.<br>• Remote configuration of equipment connected to the remote device.<br>• Adding or deleting zones.<br>• Adding or deleting sites.<br>• Adding, deleting,replacing or reloading configs of remote devices.<br>• Remote switching of outputs on or off. |

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.

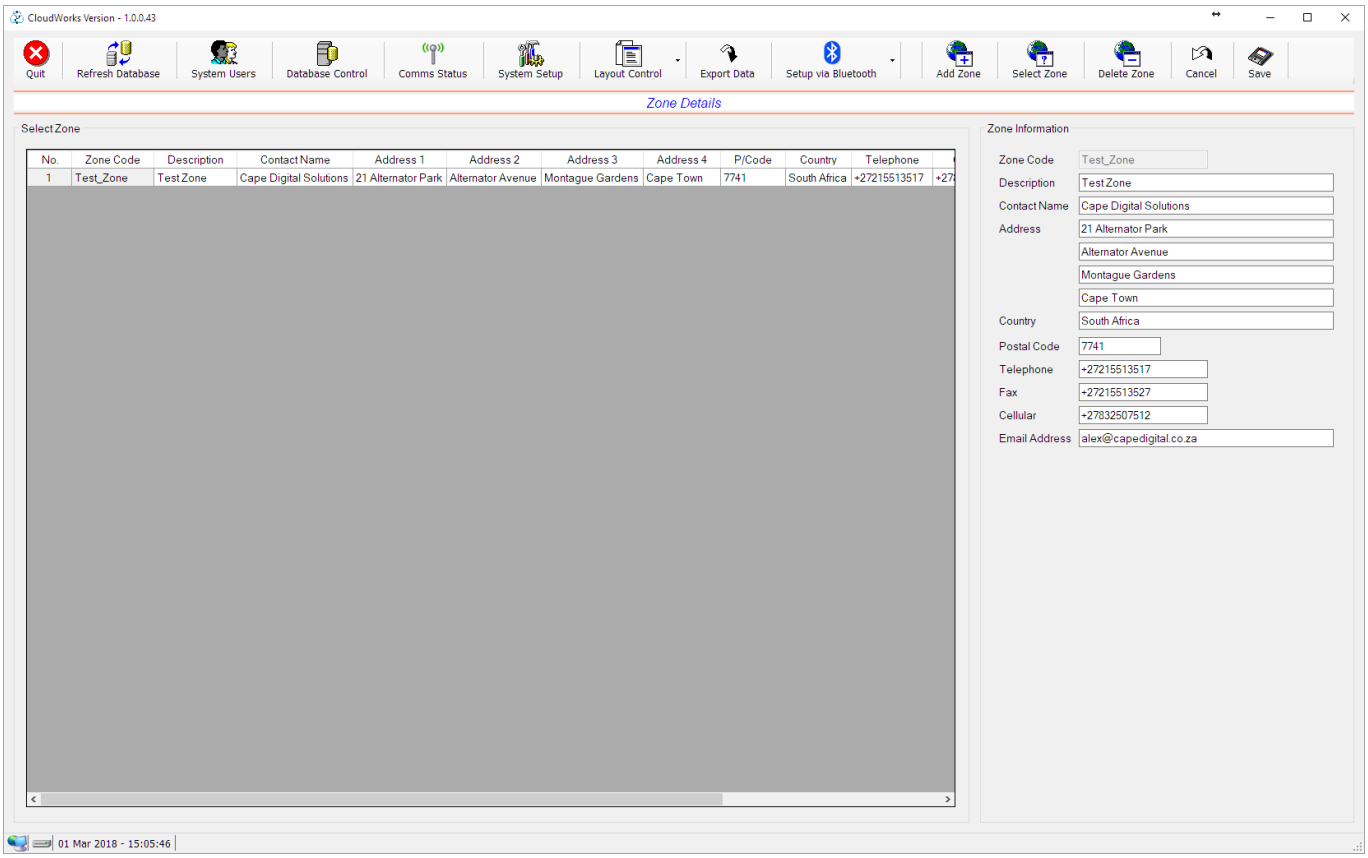
Deleting is also achieved by selecting the user in the table and pressing the 'Delete User' button. After some prompts, the user and their associated data will be removed from the database. Care should be taken to not accidently delete a user as there is no recovering from this operation.

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.

## 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 accidently delete a live zone as there is no recovering from this operation.

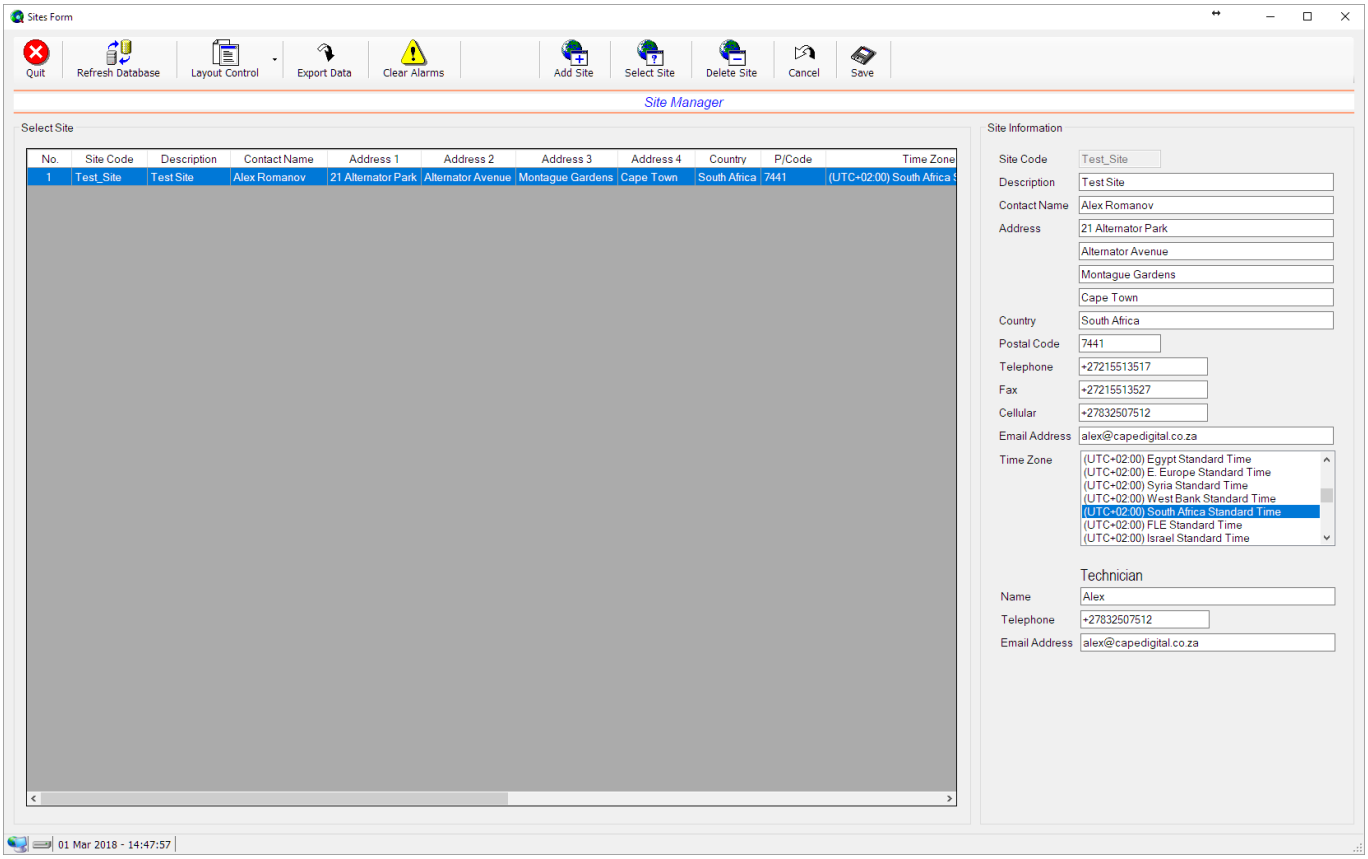
To select a zone, simply double click on the zone in the table or click once and hit the 'Select Zone' button. Both of these methods will open up a 'Site Details' screen and show you all the sites present in that zone.

## 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.

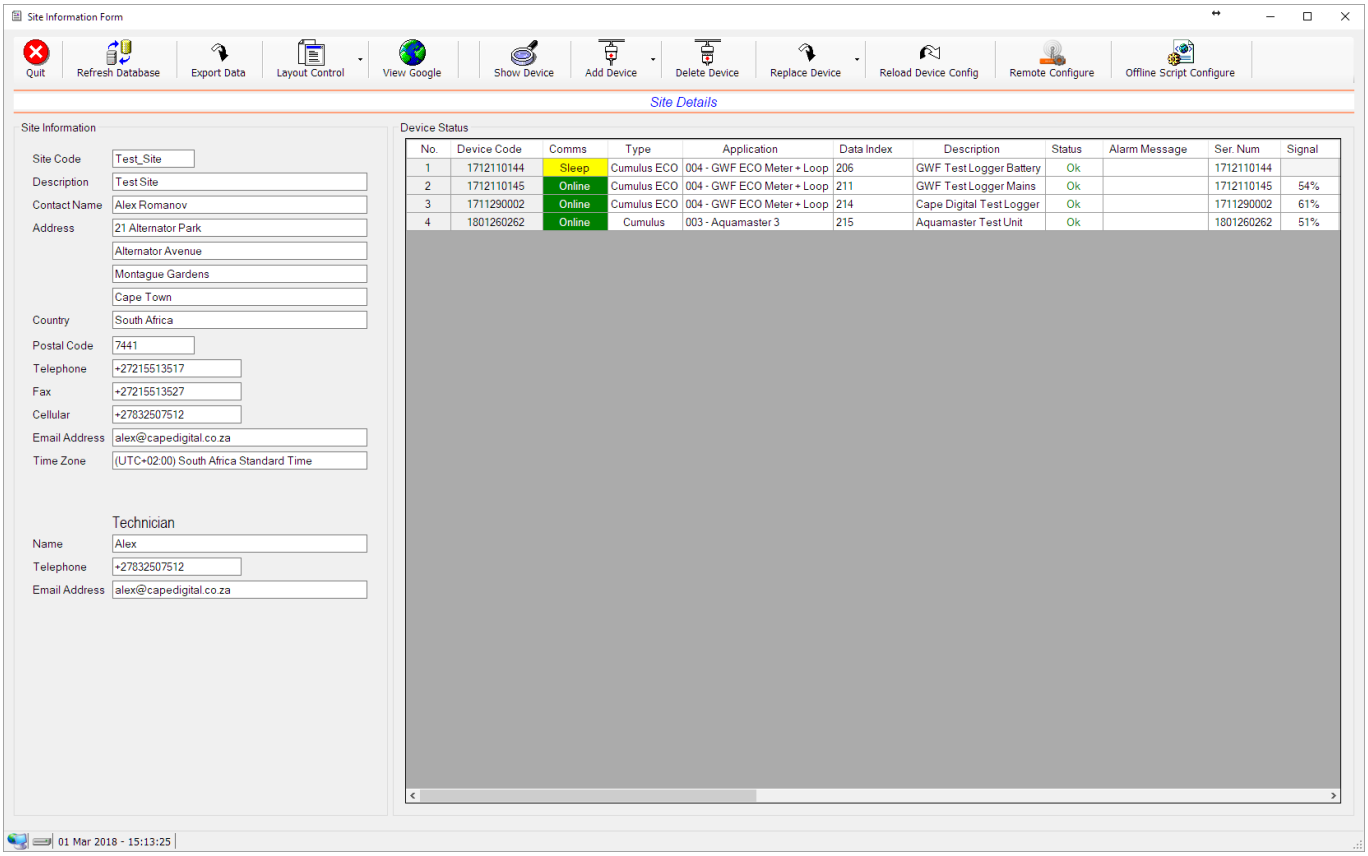
The only other variation on this screen would be the addition of a 'Clear Alarms' button. Some devices generate alarms which can be acknowledged from this screen. Selecting the alarmed sites on the table and pressing the 'Clear Alarms' button will remove the alarm flags from the database, ready for a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

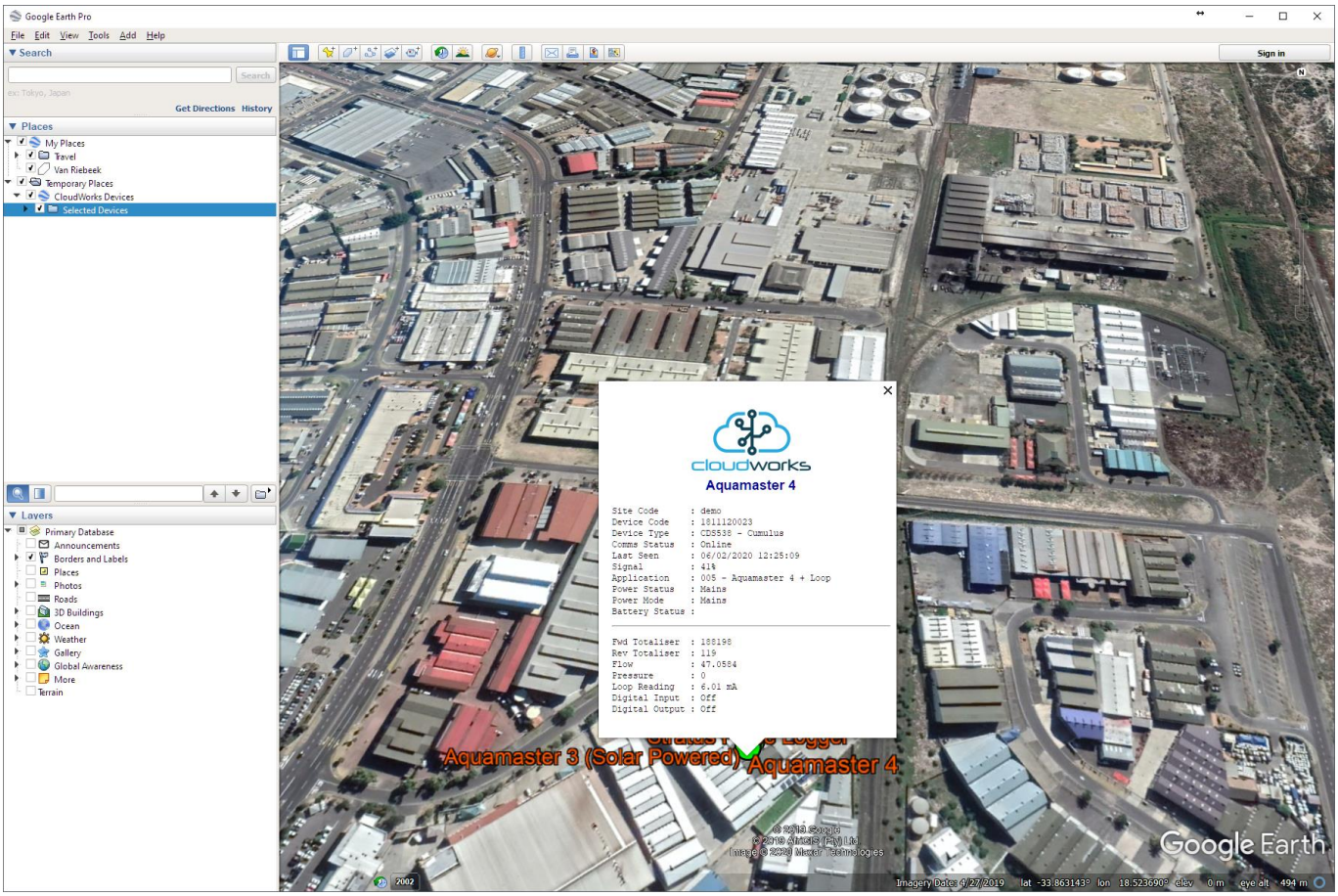
### 2.6.1 Site Detail

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.



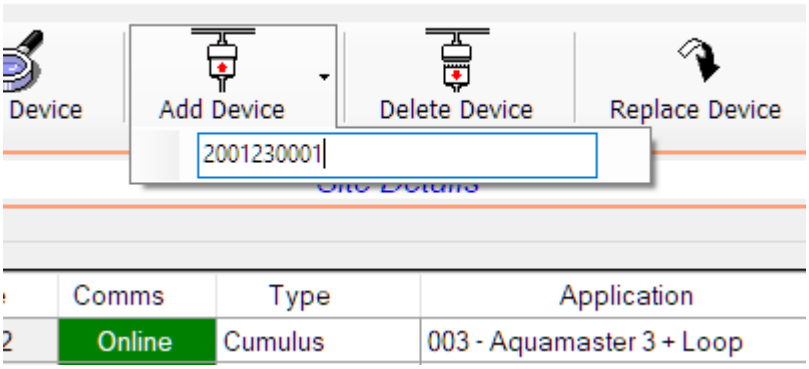

You can select a single device or multiple devices when displaying on Google Earth. If Google Earth has not been installed on your computer a pop up message box will alert you to the problem. Google Earth can be installed from [Google Earth download](Google Earth download).

## 2.7 Managing Devices

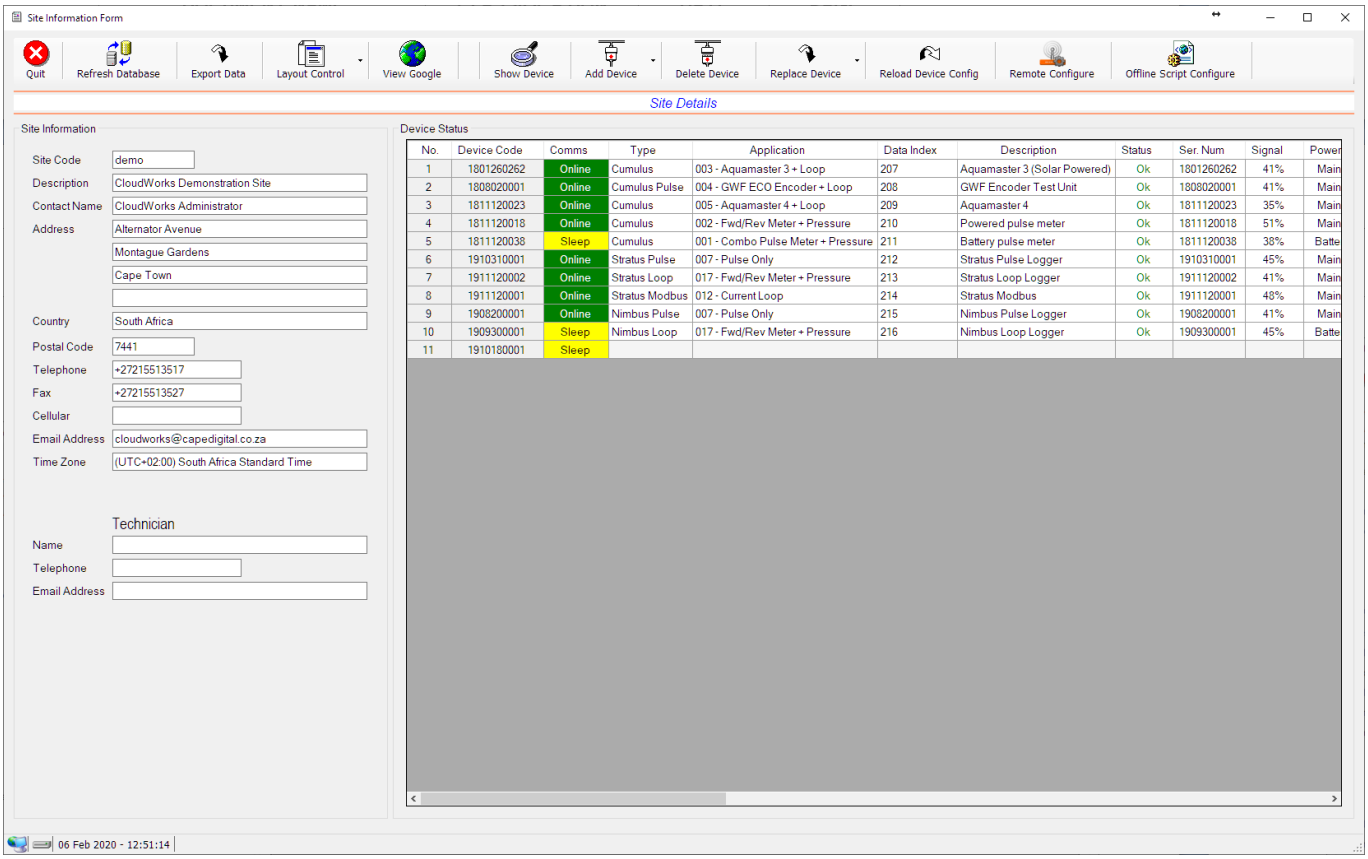
Before we go into the management of devices there needs to be some clarification regarding the information stored on a device as opposed to information stored in the database. All configuration data regarding a remote device is stored on the device itself. The setup can be done locally through a Bluetooth 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.

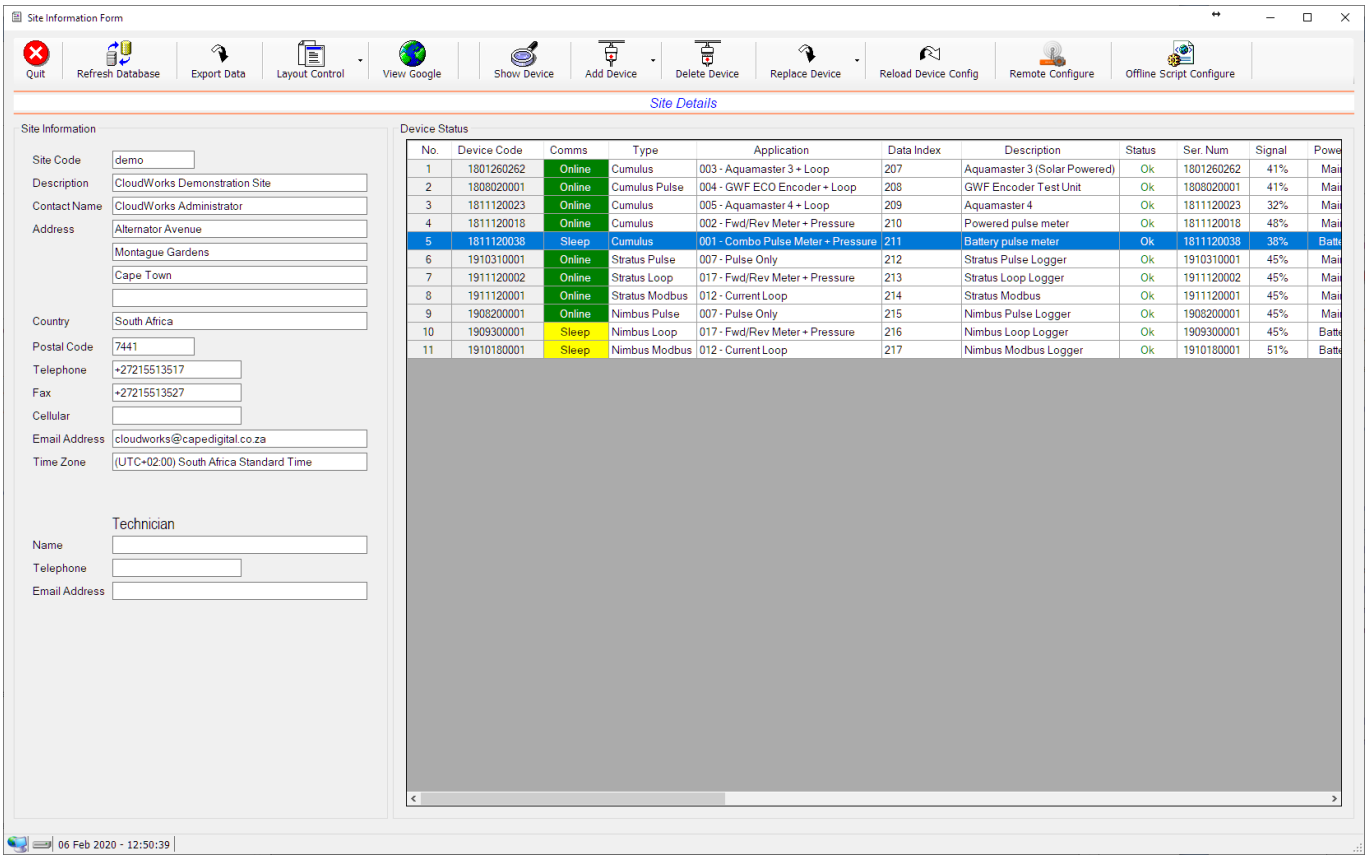
To add a device to the site, simply click the 'Add Device' dropdown button and fill in the Device Code in the given space and hit 'enter'.



Next you will see a blank entry line appear.




The 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.




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:-

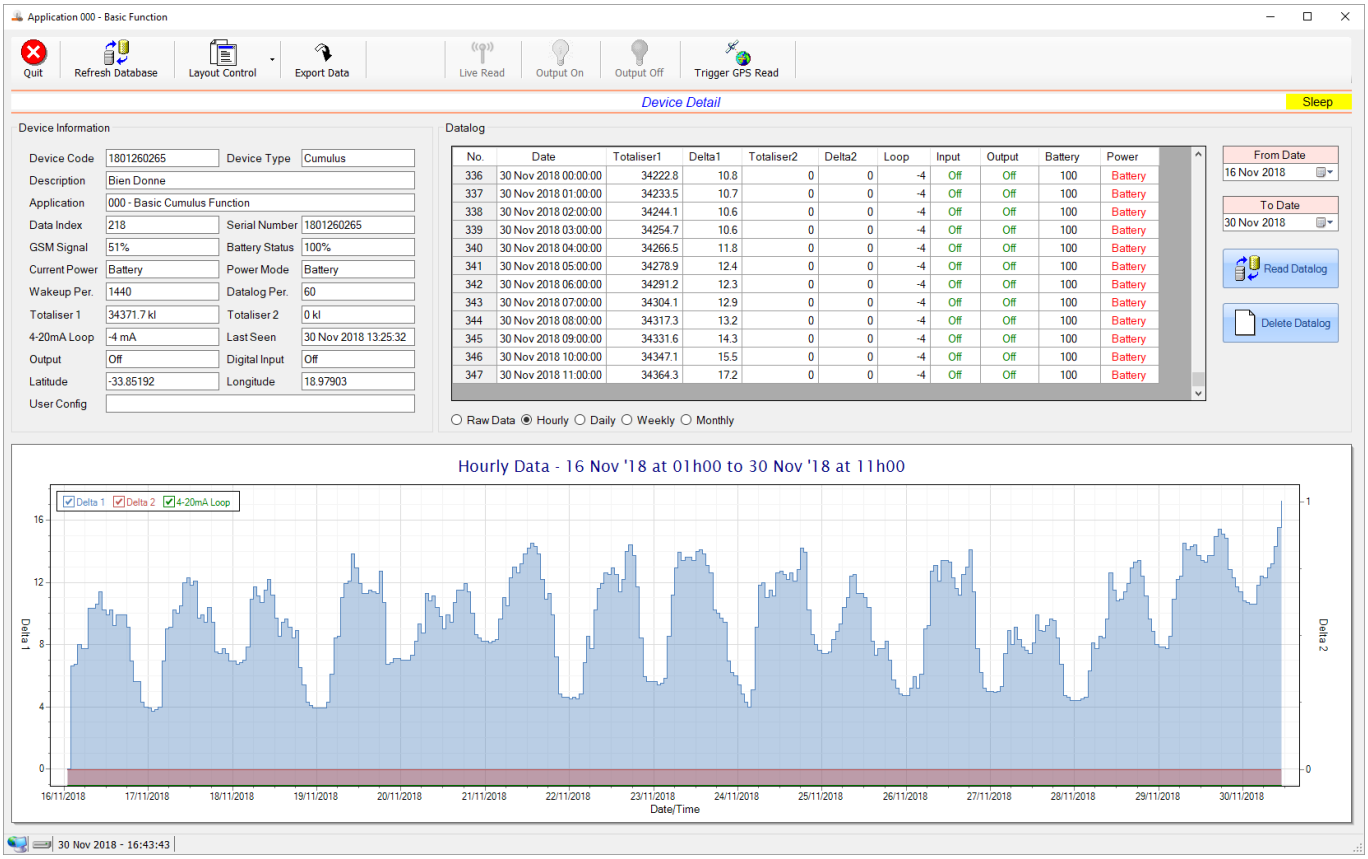
| Description | Devices | Notes |
|---|---|---|
| **000 - Basic Cumulus Function** | CDS538,CDS541 | Used for the basic Cumulus Logging functions. Will include the pulse inputs, outputs and current loop. |
| **001 - Combo Pulse Water Meter + Pressure** | CDS538,CDS541 | Used for water meter applications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

| | | |
|---|---|---|
| **011 - GWF Sonico** | CDS543,CDS549 | This application is currently under development and not ready for release. |
| **012 - Current Loop** | CDS545,CDS547 | Used for applications that just require a reading from the 4-20mA current loop. |
| **013 - Aquamaster 3** | CDS545,CDS547 | Used when the logger Modbus is connected to an ABB Aquamaster 3 water meter. |
| **014 - Aquamaster 4** | CDS545,CDS547 | Used when the logger Modbus is connected to an ABB Aquamaster 4 water meter. |
| **015 - Basic Pulse + Loop** | CDS546,CDS548 | Used on applications that require basic pulse inputs together with a 4-20mA current loop device. |
| **016 - Combo Pulse Meter + Pressure** | 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. |
| **017 - Fwd/Rev Meter +Pressure** | 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

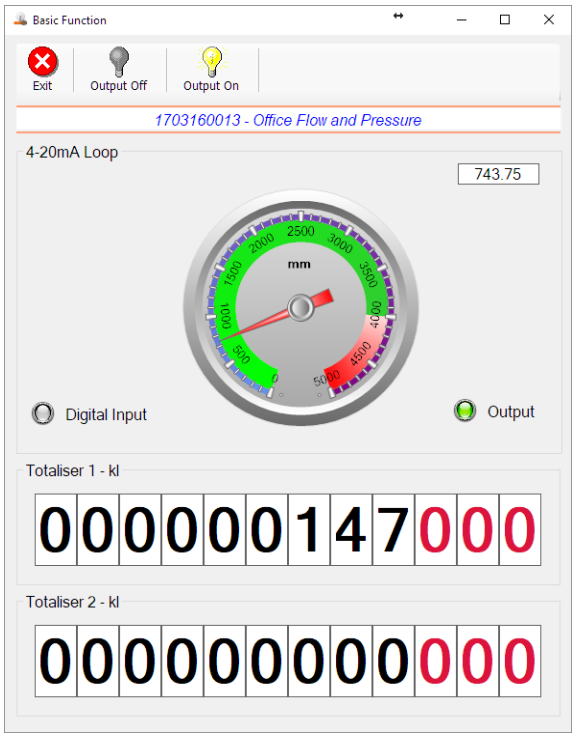



This application type would be selected where you are using the basic core functions of the Cumulus logger. Functions such as the 4-20mA current loop and/or pulse inputs without a specific consumption type of application. it is ideally suited for an application where there are two meters (say water and 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 |
|---|---|
| **Device Code** | 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. |
| **Device Type** | Type of Remote Device. eg CDS538 Cumulus Logger etc |
| **Description** | 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. |
| **Application** | Selected device application. Application 000 - Basic Cumulus function in this case. |
| **Data Index** | 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. |
| **Serial Number** | Serial number of this device - assigned in the factory. |
| **GSM Signal** | Signal strength of the last GSM communications, expressed as a percentage. |
| **Battery Status** | 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). |
| **Current Power** | 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. |
| **Power Mode** | Selected Power Mode under which the remote device is operating. This can be Battery, Mains or Dual power modes. |
| **Wakeup Per.** | The Wakeup Period set in minutes. Refer to the device configuration chapter for an explanation of this parameter. |
| **Datalog Per.** | The Datalog Period set in minutes. Refer to the device configuration chapter for an explanation of this parameter. |
| **Totaliser 1** | The current Totaliser 1 reading with its relevant pulse weight implemented including the unit of measure. |
| **Totaliser 2** | The current Totaliser 2 reading with its relevant pulse weight implemented including the unit of measure. |
| **4-20mA Loop** | The 4-20mA current loop reading with its calibration data implemented including the unit of measure. |
| **Last Seen** | The date and time the remote device was last seen connecting into the server. |
| **Output** | Digital output status. |
| **Digital Input** | Digital input status. |
| **Latitude** | Last seen remote device Latitude. |
| **Longitude** | 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.

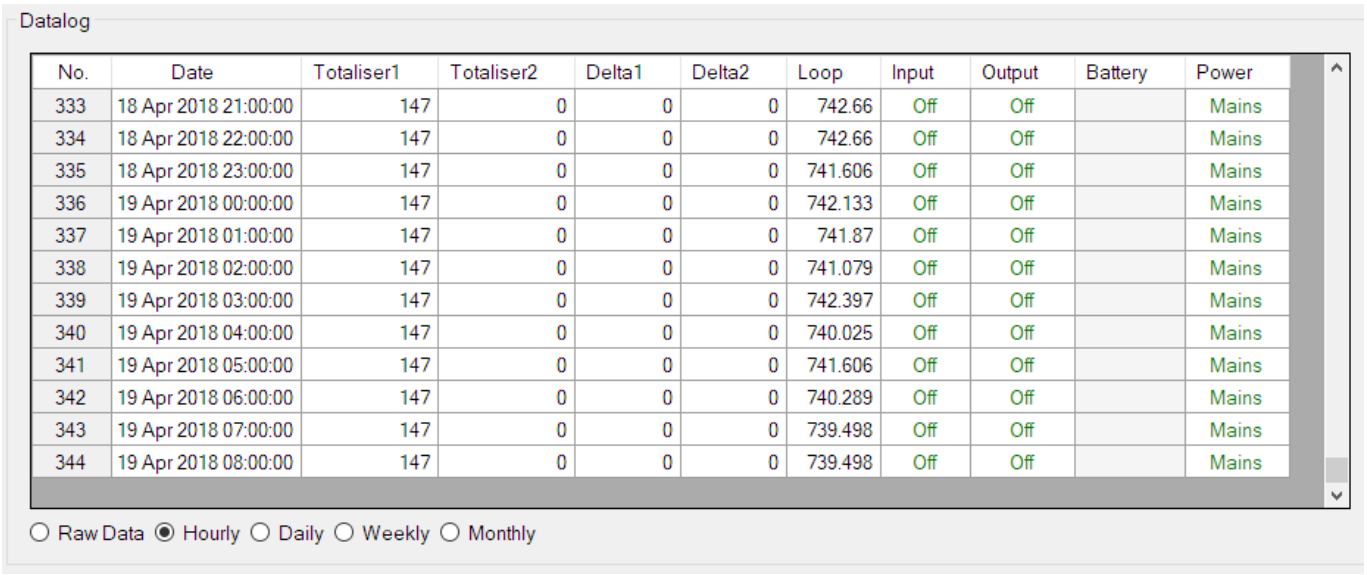
The onboard GPS of the remote device uses a substantial amount of power and is therefore automatically switched off on battery powered devices. When the GPS is first powered up, it will take a couple of minutes before it is able to lock on to the position of the device. For this reason, battery powered 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.

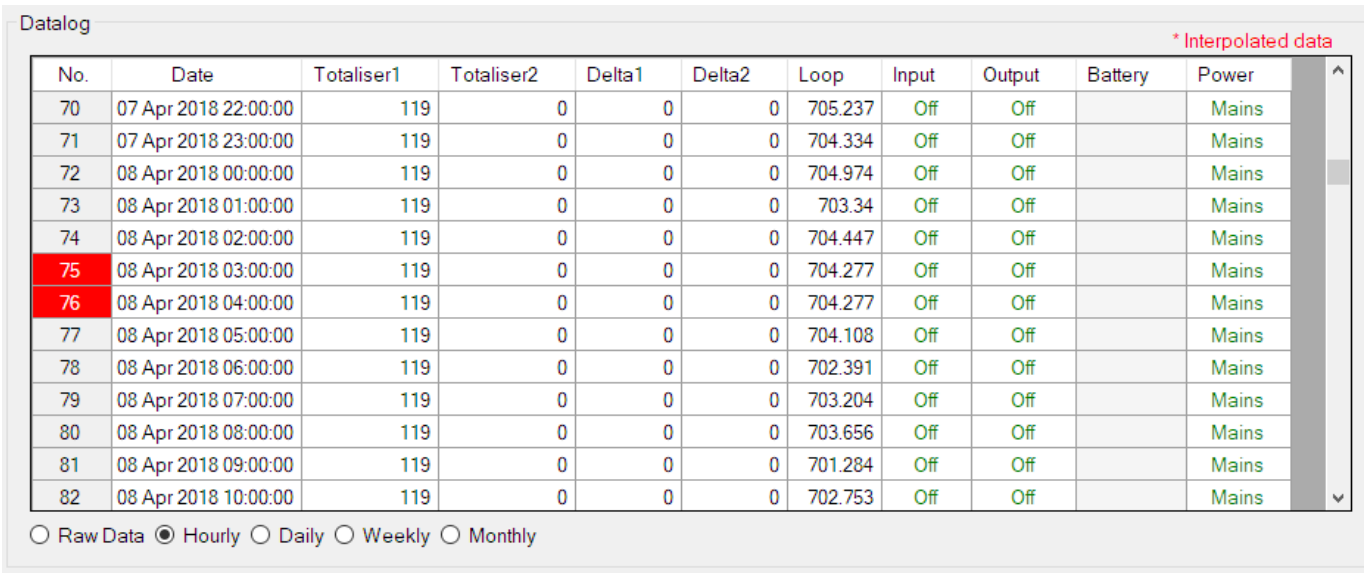
This application will record the following data in the datalog.




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

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

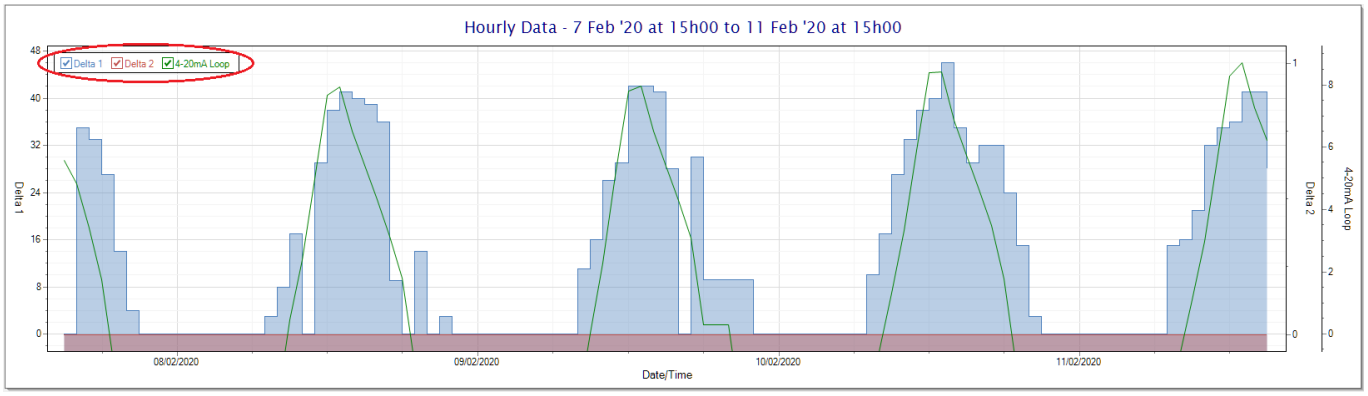
| No. | Date | Totaliser1 | Totaliser2 | Delta1 | Delta2 | Loop | Input | Output | Battery | Power |
|---|---|---|---|---|---|---|---|---|---|---|
| 70 | 07 Apr 2018 22:00:00 | 119 | 0 | 0 | 0 | 705.237 | Off | Off | | Mains |
| 71 | 07 Apr 2018 23:00:00 | 119 | 0 | 0 | 0 | 704.334 | Off | Off | | Mains |
| 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

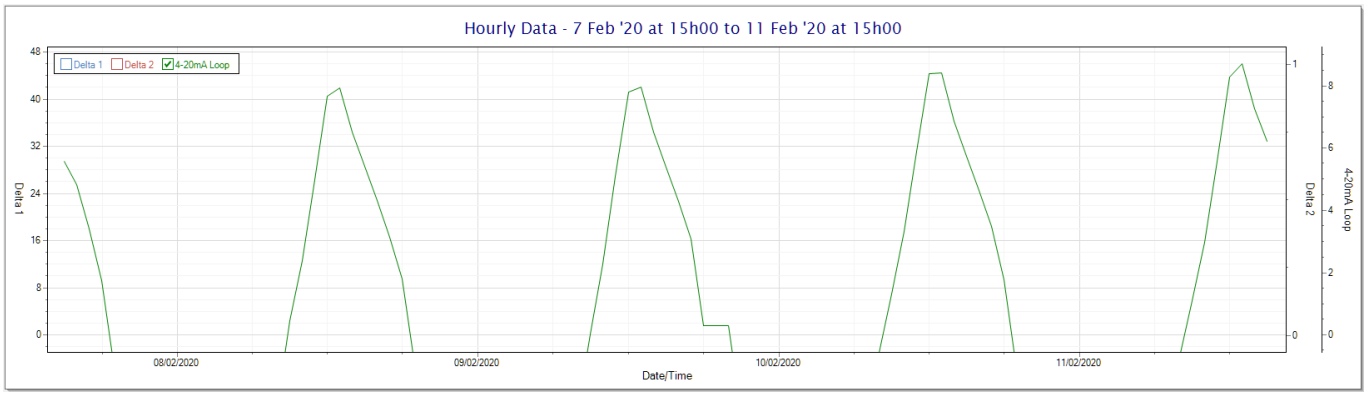
As per the previously explained functions throughout the Cloudworks suite, columns can be switched off/on and re-ordered to the users requirements. The exporting will be as per the layout presented on the screen.

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.

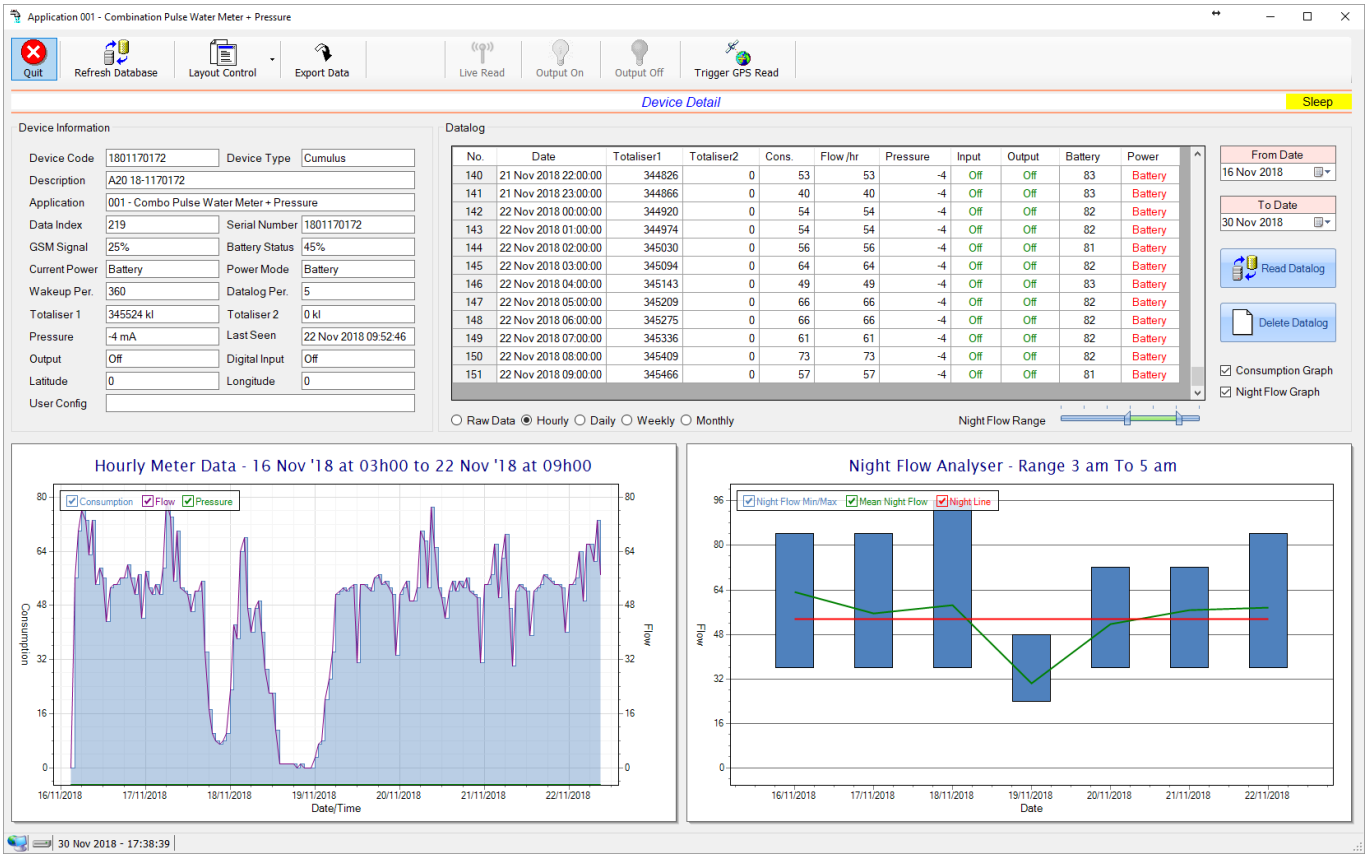
Data that is displayed in the table will also be represented in the graph at the bottom of the screen. Individual graph series can be switched off/on by selecting the ticks at the top left of the graph.




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



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

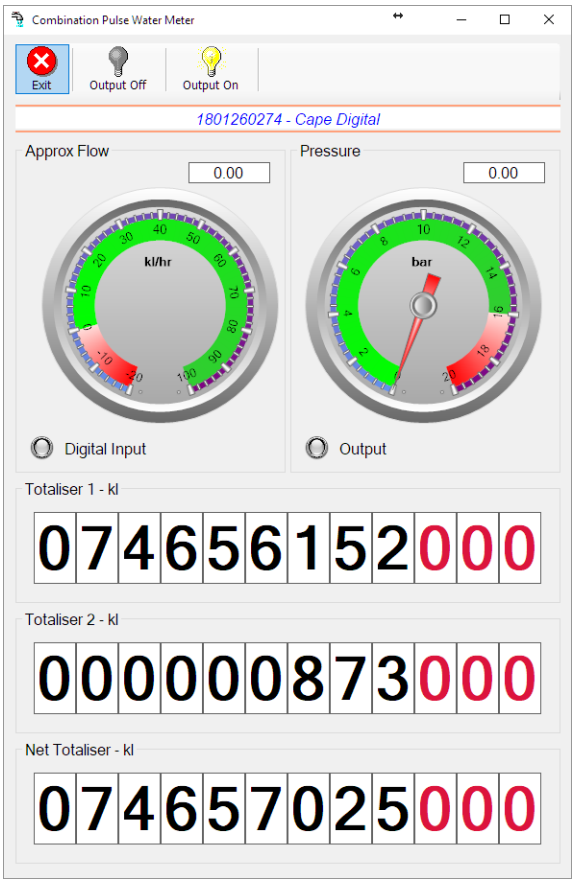


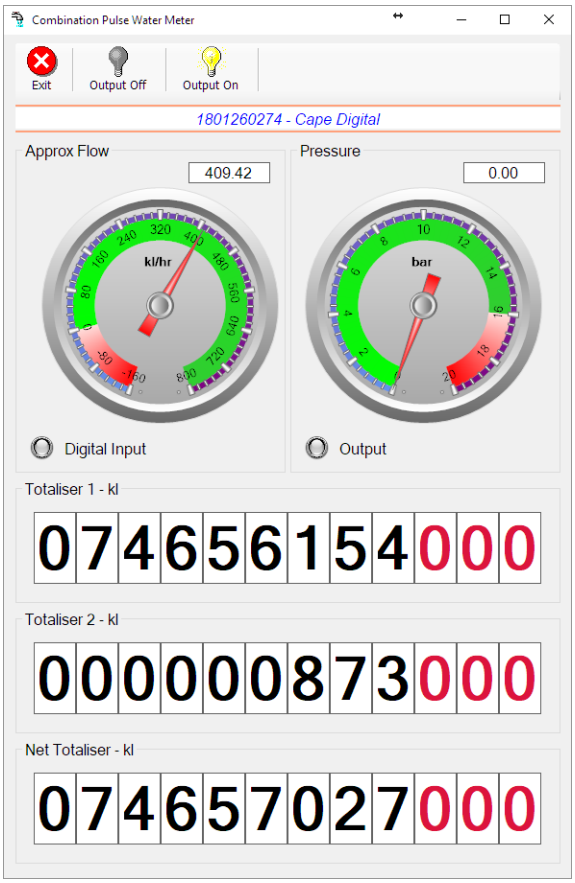

This application type is used in combination water meter type sites. A combination meter normally consists of a water measurement point consisting of two water meters. A larger meter for measuring the bulk flow of the water and a smaller one to measure the lower flows which are normally missed on large 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 |
|---|---|
| **Device Code** | 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. |
| **Device Type** | Type of Remote Device. eg CDS538 Cumulus Logger etc |
| **Description** | 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. |
| **Application** | Selected device application. Application 001 - Combination Pulse Water Meter + Pressure function in this case. |
| **Data Index** | 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. |
| **Serial Number** | Serial number of this device - assigned in the factory. |
| **GSM Signal** | Signal strength of the last GSM communications, expressed as a percentage. |
| **Battery Status** | 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). |
| **Current Power** | 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. |
| **Power Mode** | Selected Power Mode under which the remote device is operating. This can be Battery, Mains or Dual power modes. |
| **Wakeup Per.** | The Wakeup Period set in minutes. Refer to the device configuration chapter for an explanation of this parameter. |
| **Datalog Per.** | The Datalog Period set minutes. Refer to the device configuration chapter for an explanation of this parameter. |
| **Totaliser 1** | The current Totaliser 1 reading with its relevant pulse weight implemented including the unit of measure. |
| **Totaliser 2** | The current Totaliser 2 reading with its relevant pulse weight implemented including the unit of measure. |

| | |
|---|---|
| **Pressure (4-20mA Loop)** | The 4-20mA current loop reading with its calibration data implemented including the unit of measure. |
| **Last Seen** | The date and time the remote device was last seen connecting into the server. |
| **Output** | Digital output status. |
| **Digital Input** | Digital input status. |
| **Latitude** | Last seen remote device Latitude. |
| **Longitude** | 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.

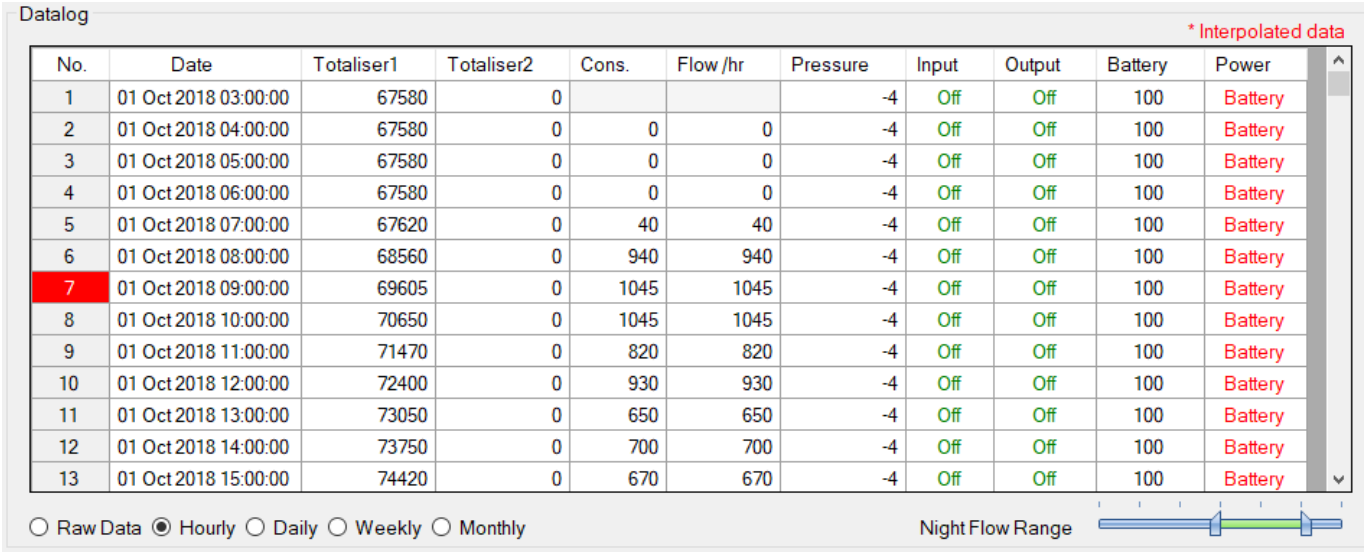
Datalog

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



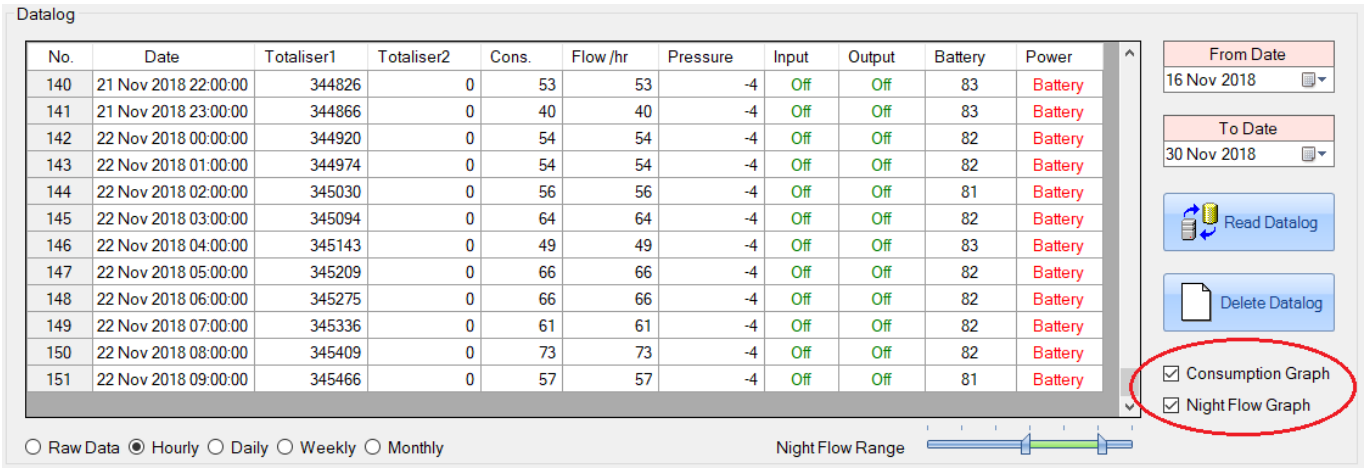

| No. | Date | Totaliser1 | Totaliser2 | Cons. | Flow /hr | Pressure | Input | Output | Battery | Power |
|---|---|---|---|---|---|---|---|---|---|---|
| 1 | 01 Oct 2018 03:00:00 | 67580 | 0 | | | -4 | Off | Off | 100 | Battery |
| 2 | 01 Oct 2018 04:00:00 | 67580 | 0 | 0 | 0 | -4 | Off | Off | 100 | 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 |

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.

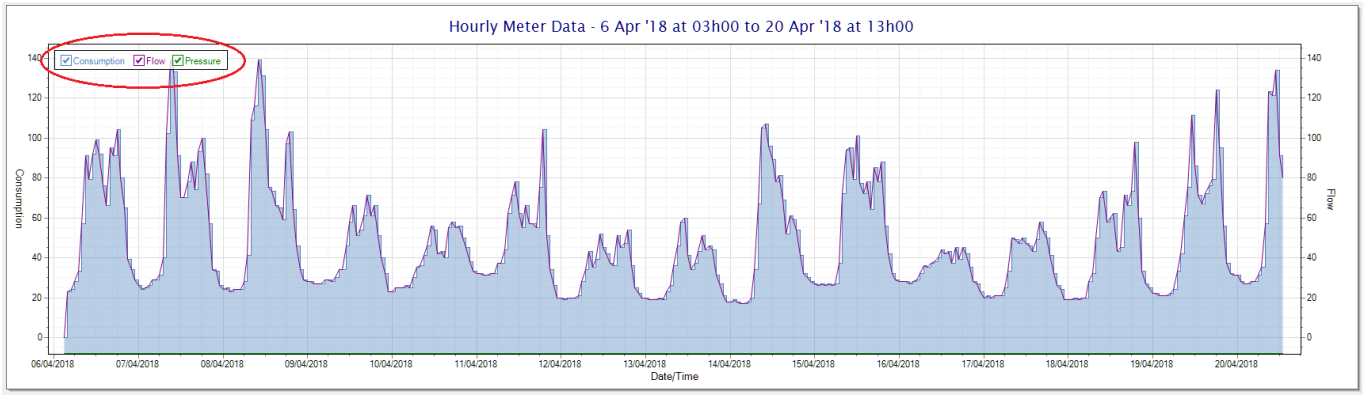
Deleting the datalog or removing a range of records can be easily done by using the 'Delete Datalog' button. To delete a range, simply select the range in the datalog table and press the 'Delete Datalog' button. If no range is selected, it will be assumed that you wish to delete the entire datalog. There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

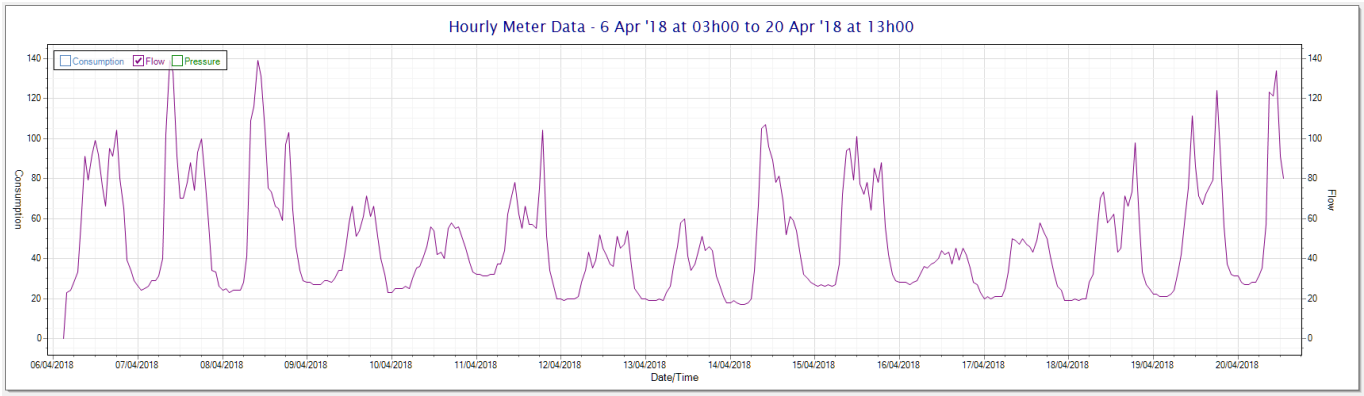



| No. | Date | Totaliser1 | Totaliser2 | Cons. | Flow /hr | Pressure | Input | Output | Battery | Power |
|---|---|---|---|---|---|---|---|---|---|---|
| 140 | 21 Nov 2018 22:00:00 | 344826 | 0 | 53 | 53 | -4 | Off | Off | 83 | Battery |
| 141 | 21 Nov 2018 23:00:00 | 344866 | 0 | 40 | 40 | -4 | Off | 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 |

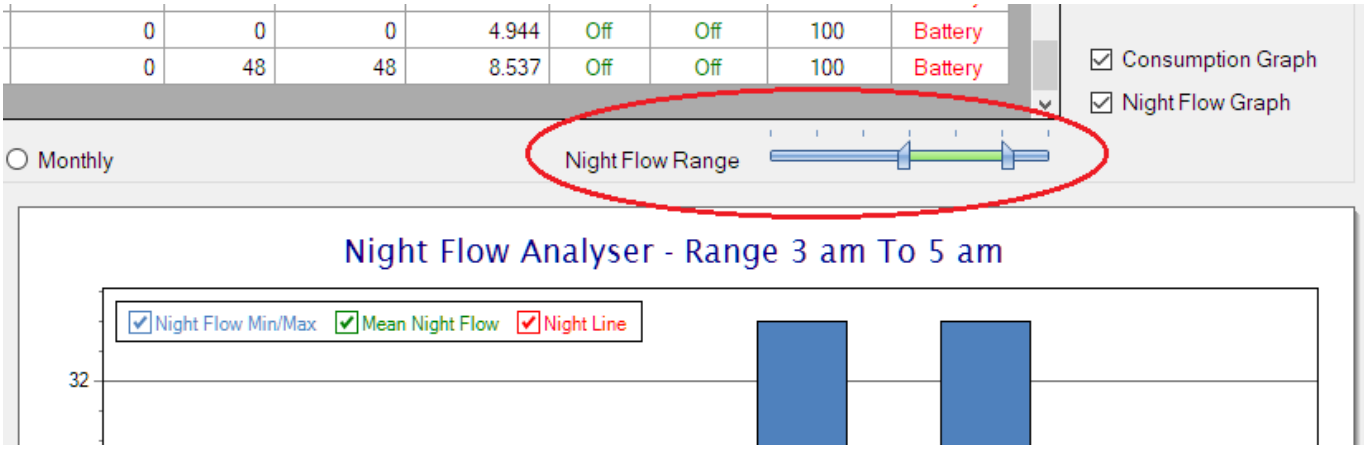
The Consumption Graph displays the consumption, pressure and flow related data. Individual graph series can be switched off/on by selecting the ticks at the top left of the graph.




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.



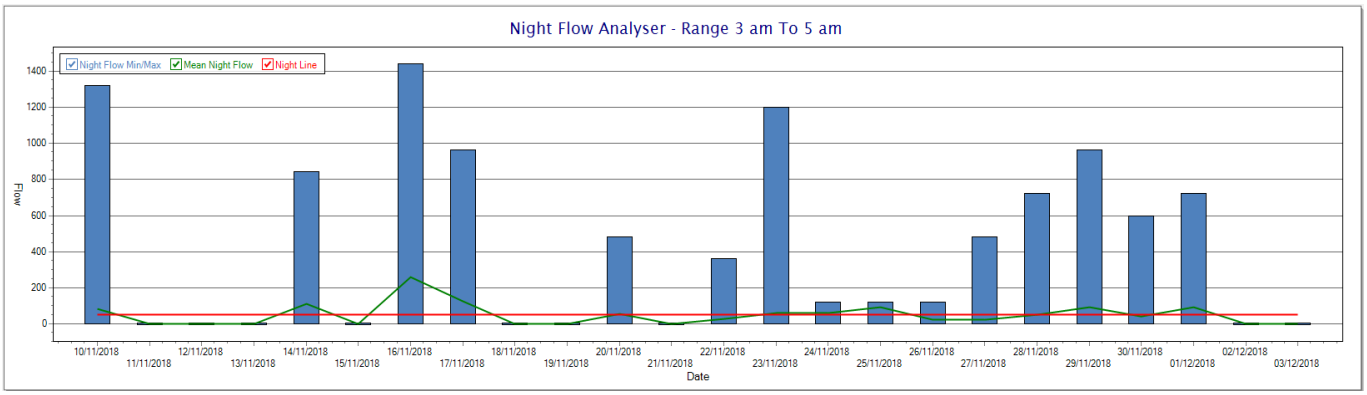

The graph will show a couple of different series.

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

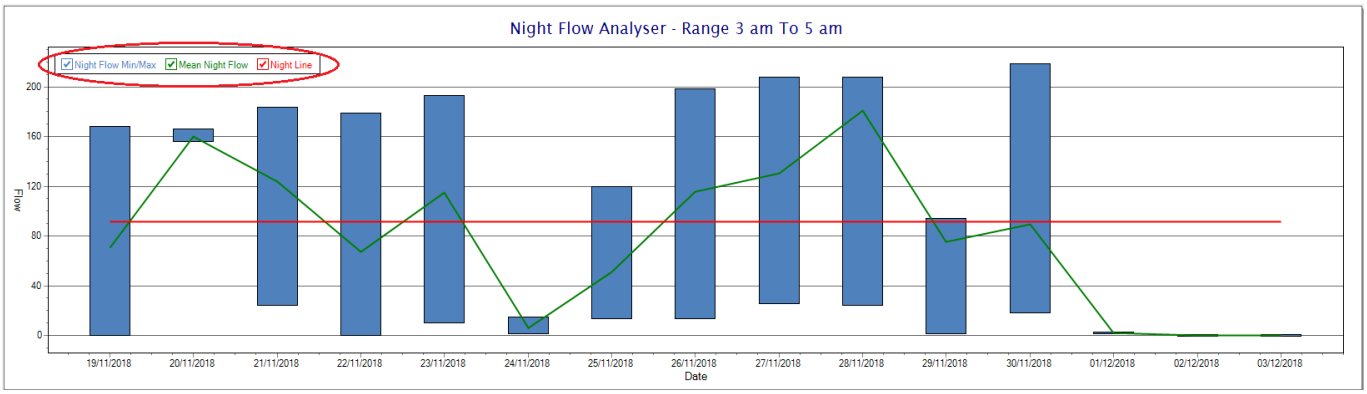
therefore sit on the base of the graph. The maximum flow would simply indicate some consumption during the period of measure and is not really a concern unless that was not expected.

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:-

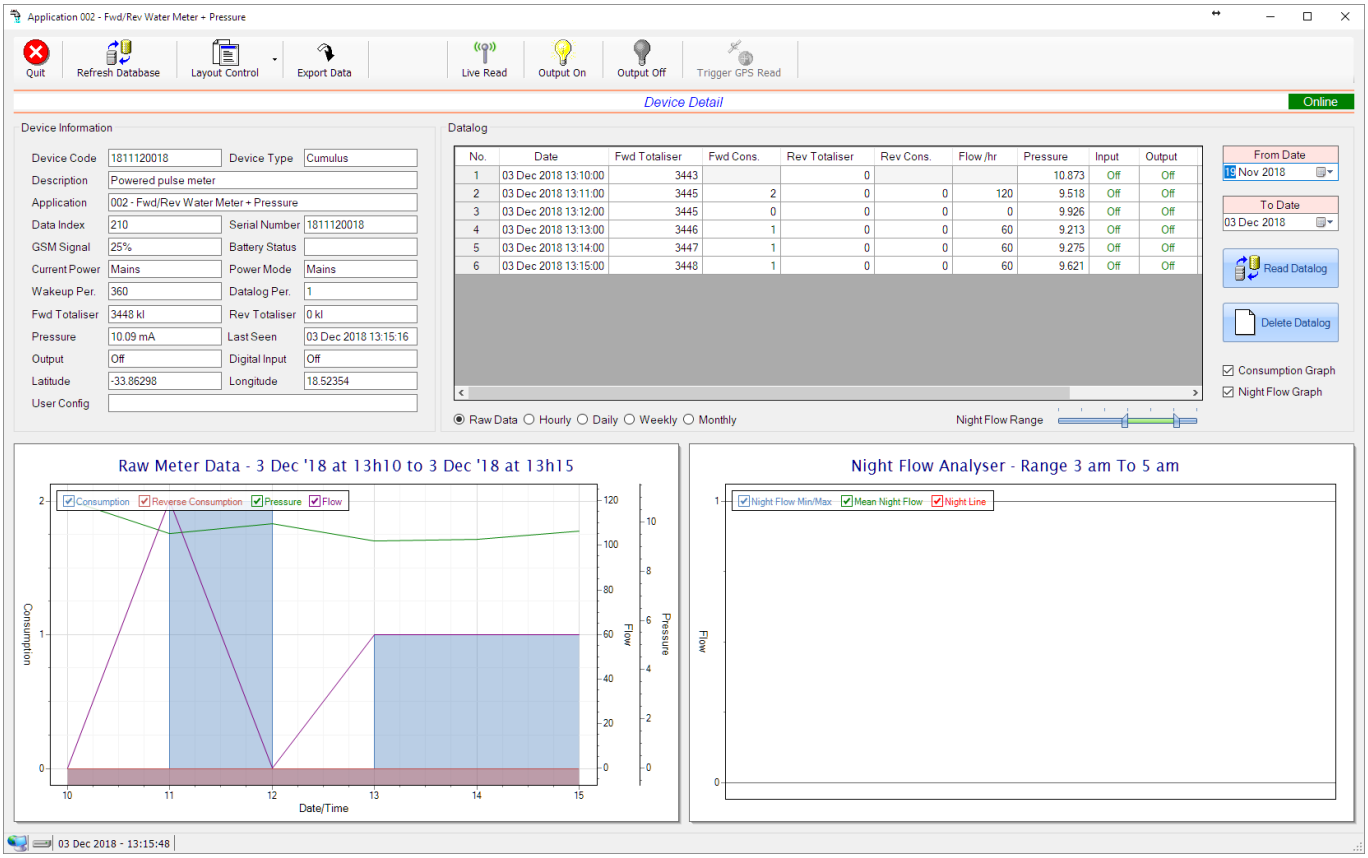



During a possible leak situation, the minimum night flow does not return to zero and the graph will appear to bounce off the bottom.




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.

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

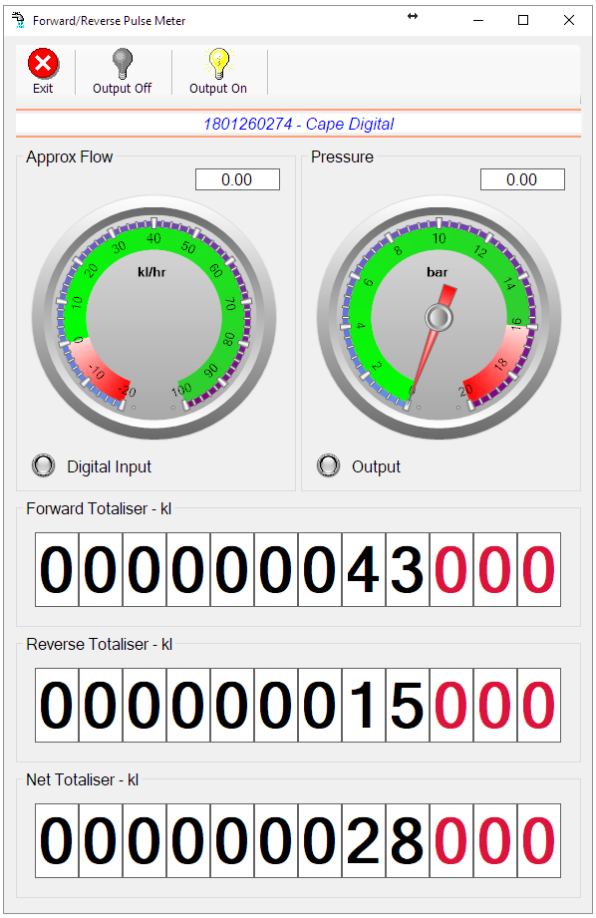


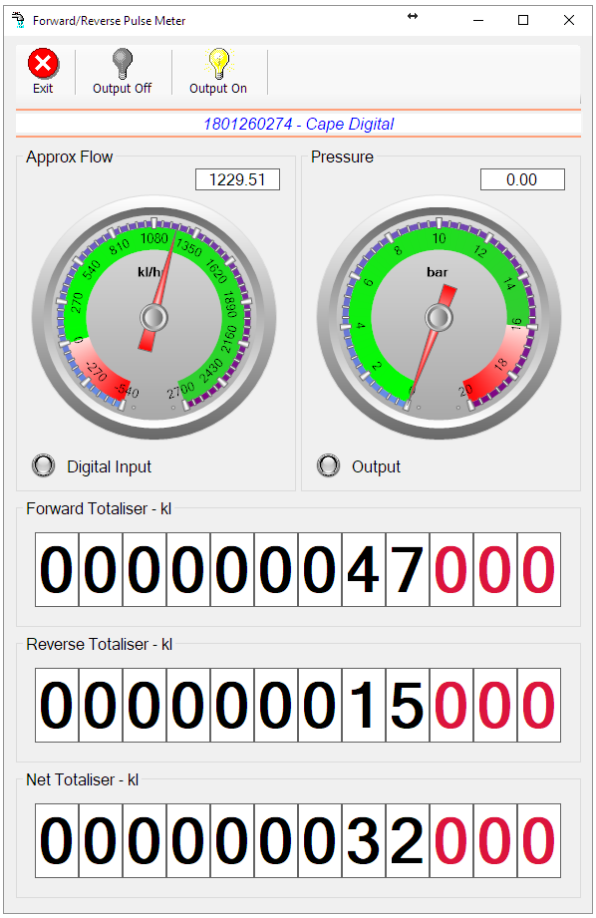

This type would be selected for applications that are used on a forward/reverse pulse water meter. The actual consumption is normally the difference of the two totaliser readings and are handled as such in this application type. Included here is the 4-20mA current loop interface for pressure measurement 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 |
|---|---|
| **Device Code** | 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. |
| **Device Type** | Type of Remote Device. eg CDS538 Cumulus Logger etc |
| **Description** | 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. |
| **Application** | Selected device application. Application 002 - Forward/Reverse Pulse Water Meter + Pressure function in this case. |
| **Data Index** | 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. |
| **Serial Number** | Serial number of this device - assigned in the factory. |
| **GSM Signal** | Signal strength of the last GSM communications, expressed as a percentage. |
| **Battery Status** | 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). |
| **Current Power** | 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. |
| **Power Mode** | Selected Power Mode under which the remote device is operating. This can be Battery, Mains or Dual power modes. |
| **Wakeup Per.** | The Wakeup Period set in minutes. Refer to the device configuration chapter for an explanation of this parameter. |
| **Datalog Per.** | The Datalog Period set minutes. Refer to the device configuration chapter for an explanation of this parameter. |
| **Fwd Totaliser** | The current Forward Totaliser reading with its relevant pulse weight implemented including the unit of measure. |
| **Rev Totaliser** | The current Reverse Totaliser reading with its relevant pulse weight implemented including the unit of measure. |

| | |
|---|---|
| **Pressure (4-20mA Loop)** | The 4-20mA current loop reading with its calibration data implemented including the unit of measure. |
| **Output** | Digital output status. |
| **Digital Input** | Digital input status. |
| **Last Seen** | The date and time the remote device was last seen connecting into the server. |
| **Latitude** | Last seen remote device Latitude. |
| **Longitude** | 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.

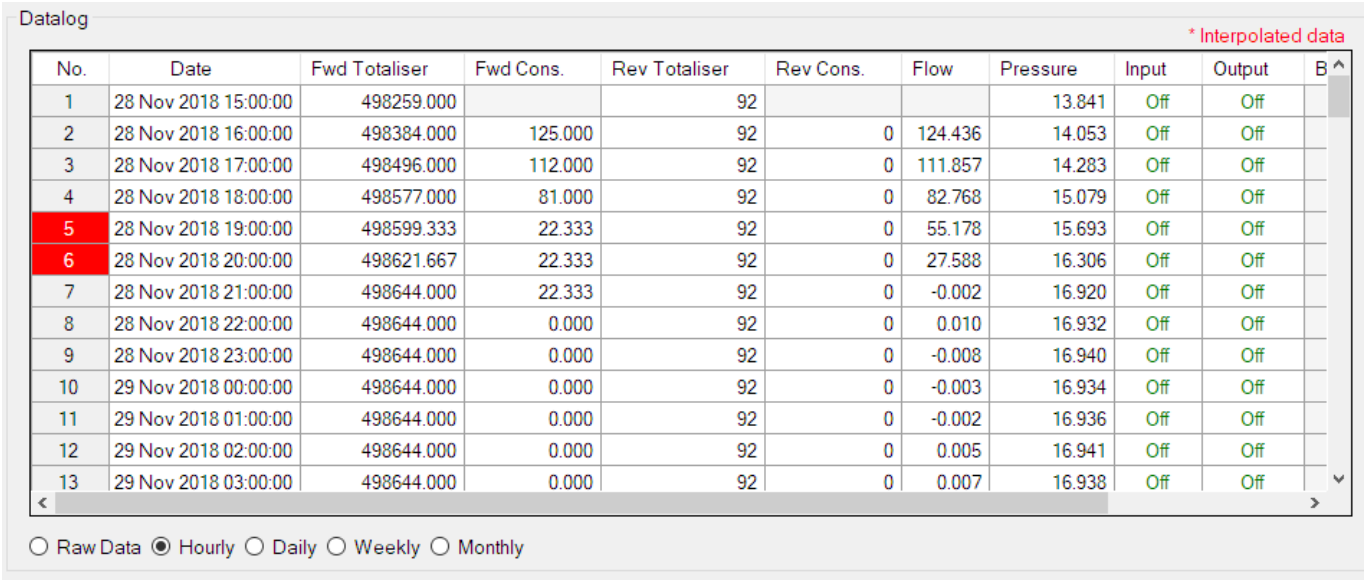
This application will record the following data in the datalog.

| No. | Date | Fwd Totaliser | Fwd Cons. | Rev Totaliser | Rev Cons. | Flow /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 |
|---|---|
| **Date/Time** | Date and time of the datalog record. |
| **Fwd Totaliser** | Forward Totaliser reading. |
| **Rev Totaliser** | Reverse Totaliser reading. |
| **Fwd Cons.** | The Forward consumption reading. |
| **Rev Cons.** | The Reverse consumption Reading. |
| **Flow/hr** | Flow rate calculated as volume per hour. |
| **Pressure** | Current Pressure reading read from the 4-20mA input. |
| **Input** | Digital input status at the time of recording this record. |
| **Output** | Digital output status at the time of recording this record. |
| **Battery** | Battery level in percentage. Only displayed on battery powered devices. |
| **Power** | 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.

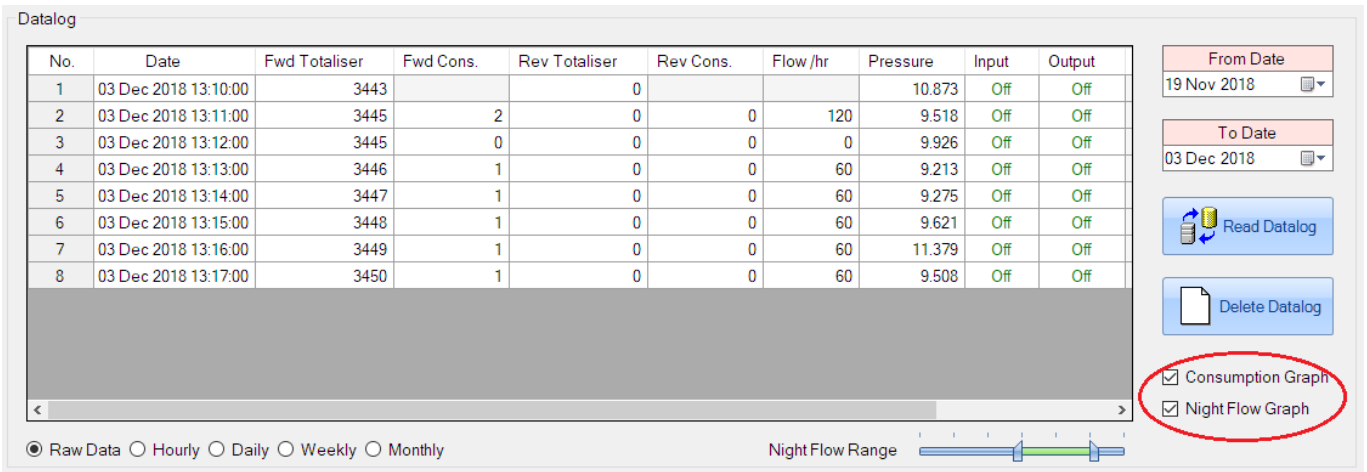



As per the previously explained functions throughout the Cloudworks suite, columns can be switched off/on and re-ordered to the users requirements. The exporting will be as per the layout presented on the screen.

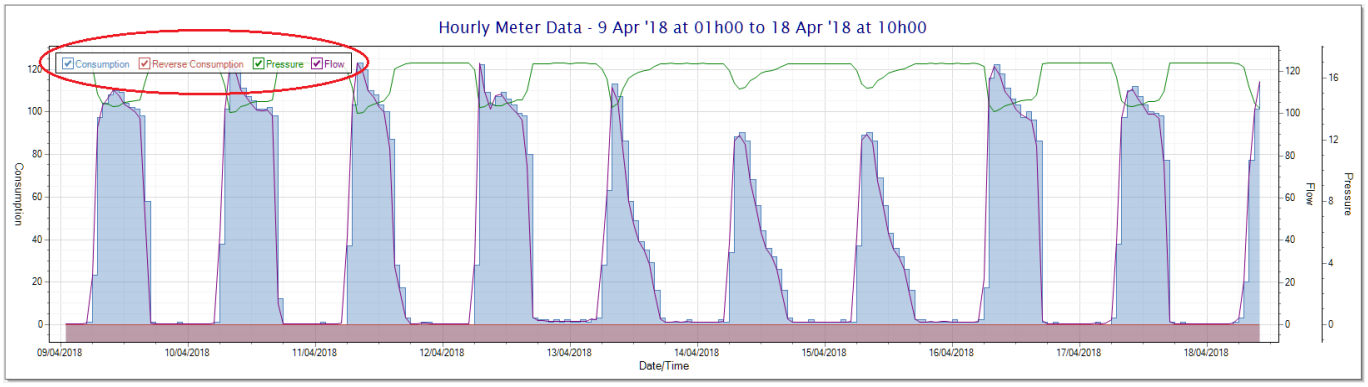
You can zoom into a range of the data by simply selecting those records in the table. This will result in the graph at the bottom being updated to display only those readings.

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.

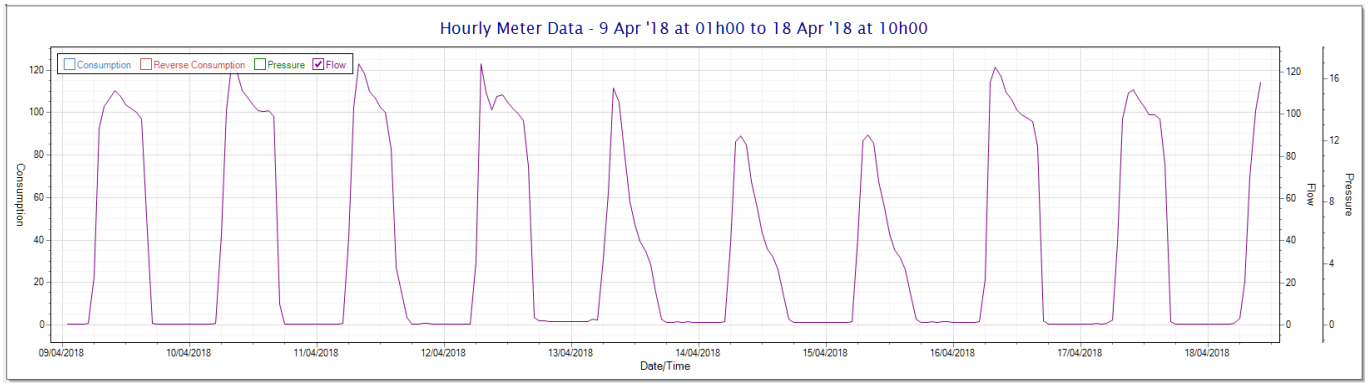
Data that is displayed in the table will also be represented in the graph at the bottom of the screen. There are two graphs displayed, namely the Consumption Graph (consumption/pressure/flow), and a Night Flow graph. These graphs can be selectively switched on/off by clicking the ticks at the bottom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



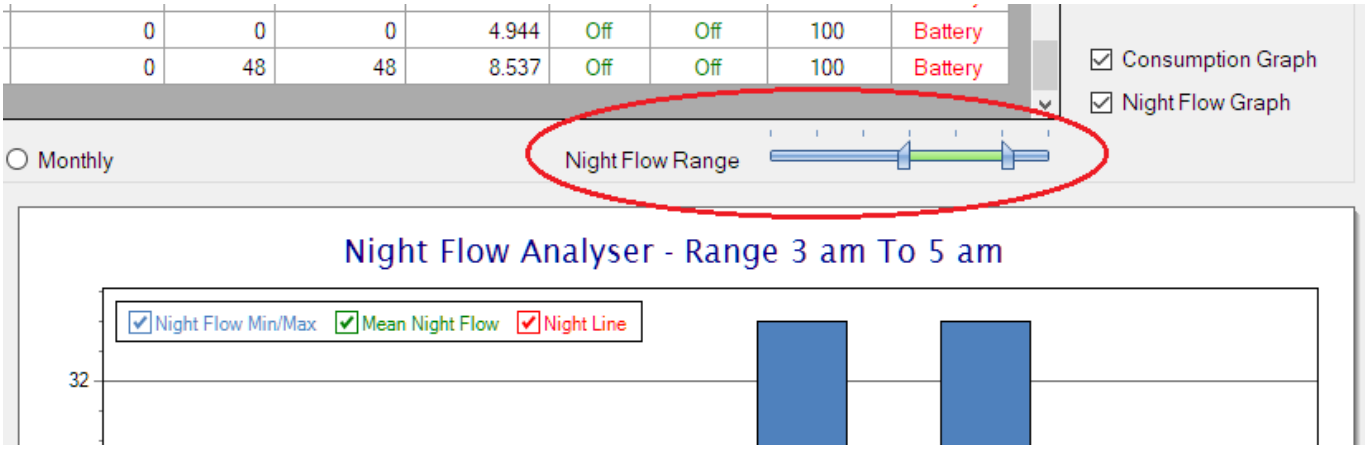
The Consumption Graph displays the consumption, pressure and flow related data. Individual graph series can be switched off/on by selecting the ticks at the top left of the graph.




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.



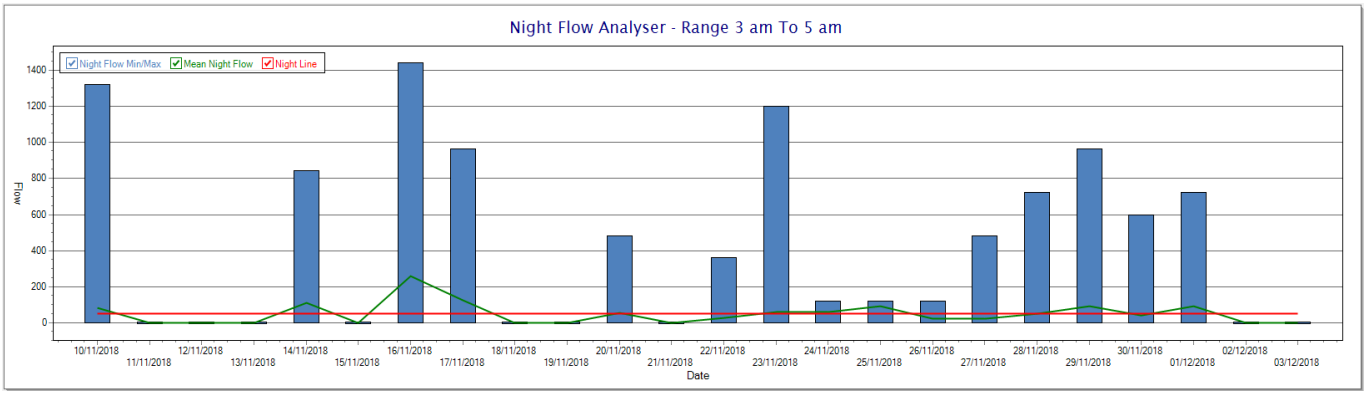

The graph will show a couple of different series.

4. 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

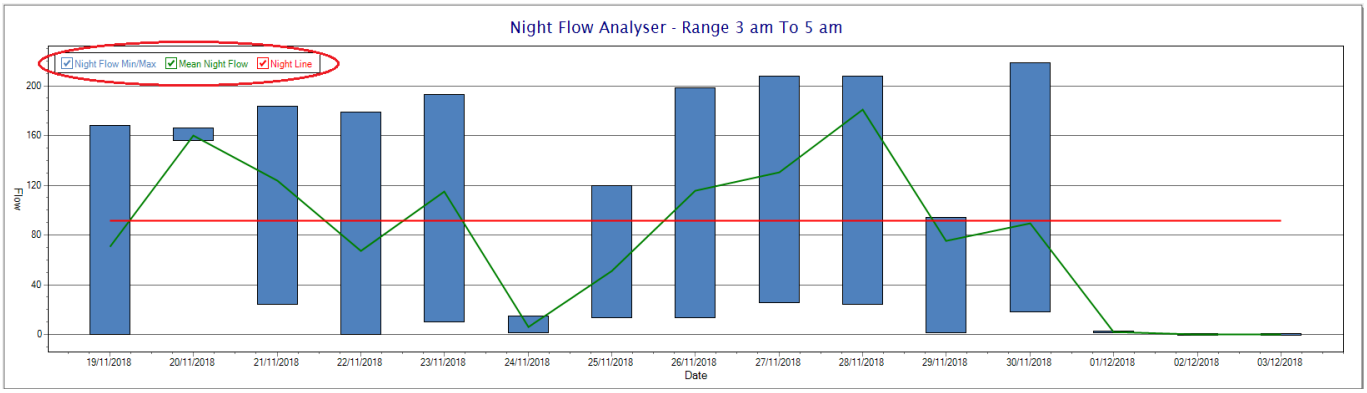
therefore sit on the base of the graph. The maximum flow would simply indicate some consumption during the period of measure and is not really a concern unless that was not expected.

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:-

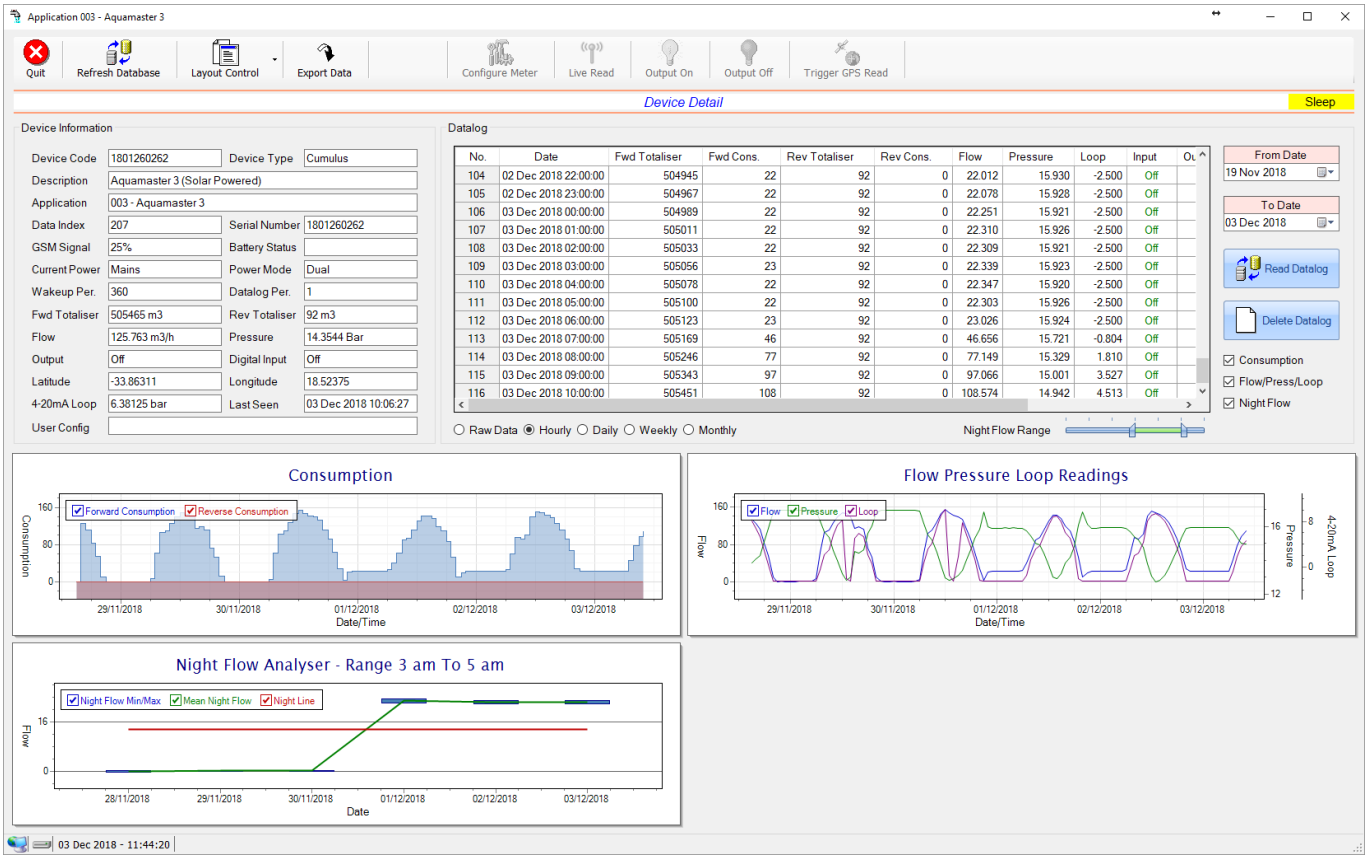



During a possible leak situation, the minimum night flow does not return to zero and the graph will appear to bounce off the bottom.




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



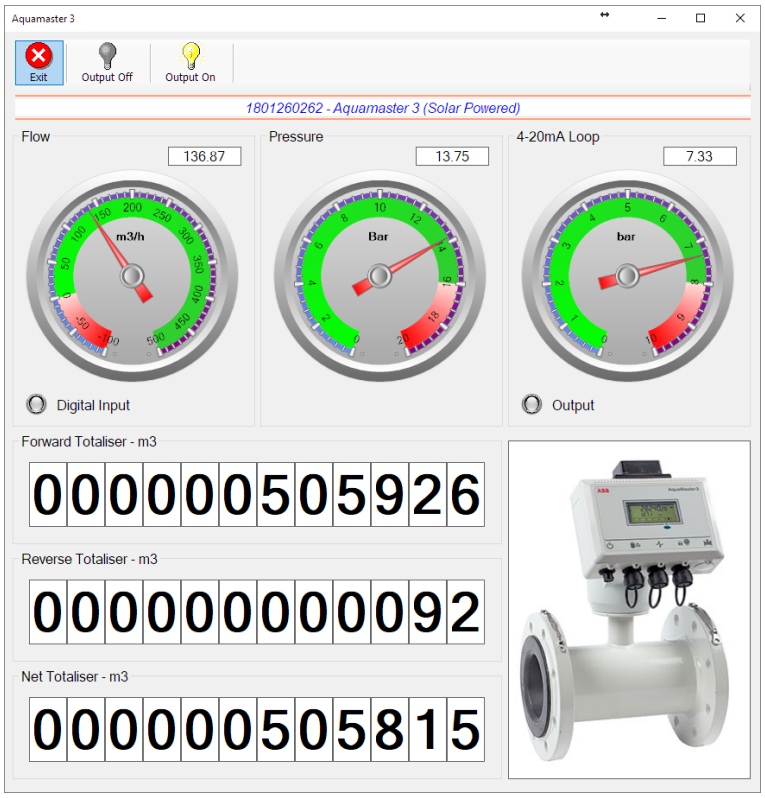

This type would be selected for applications that are used on an ABB Aquamaster 3 water meter connected to the Modbus interface. Forward/Reverse Totals, Flow and Pressure are read directly from the interface of the meter.

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.




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 |
|---|---|
| **Device Code** | 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. |
| **Device Type** | Type of Remote Device. eg CDS538 Cumulus Logger etc |
| **Description** | 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. |
| **Application** | Selected device application. Application 003 - Aquamaster 3 function |

| | |
|---|---|
| | in this case. |
| **Data Index** | 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. |
| **Serial Number** | Serial number of this device - assigned in the factory. |
| **GSM Signal** | Signal strength of the last GSM communications, expressed as a percentage. |
| **Battery Status** | 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). |
| **Current Power** | 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. |
| **Power Mode** | Selected Power Mode under which the remote device is operating. This can be Battery, Mains or Dual power modes. |
| **Wakeup Per.** | The Wakeup Period set in minutes. Refer to the device configuration chapter for an explanation of this parameter. |
| **Datalog Per.** | The Datalog Period set minutes. Refer to the device configuration chapter for an explanation of this parameter. |
| **Fwd Totaliser** | The current Forward Totaliser reading. |
| **Rev Totaliser** | The current Reverse Totaliser reading. |
| **Flow** | Current flow reading. |
| **Pressure** | Current pressure reading. |
| **4-20mA Current Loop** | The 4-20mA current loop reading with its calibration data implemented including the unit of measure. |
| **Output** | Digital output status. |
| **Digital Input** | Digital input Status. |
| **Last Seen** | The date and time the remote device was last seen connecting into the server. |
| **Latitude** | Last seen remote device Latitude. |
| **Longitude** | 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.

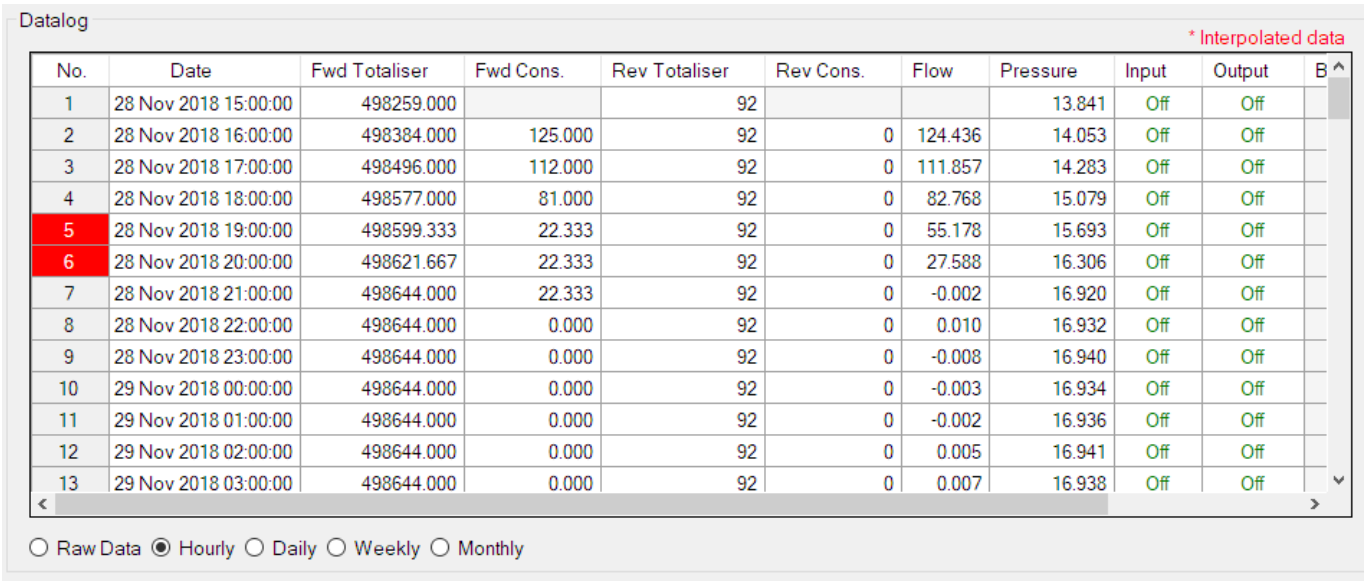
| No. | Date | Fwd Totaliser | Fwd Cons. | Rev Totaliser | Rev Cons. | Flow | Pressure | Loop | Input | Output | Battery | Power |
|---|---|---|---|---|---|---|---|---|---|---|---|---|
| 107 | 03 Dec 2018 01:00:00 | 505011.000 | 22.000 | 92 | 0 | 22.310 | 15.926 | -2.500 | Off | Off | | Mains |
| 108 | 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 |
|---|---|
| **Date/Time** | Date and time of the datalog record. |
| **Fwd Totaliser** | Forward Totaliser reading. |
| **Rev Totaliser** | Reverse Totaliser reading. |
| **Fwd Cons.** | The Forward consumption reading. |

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

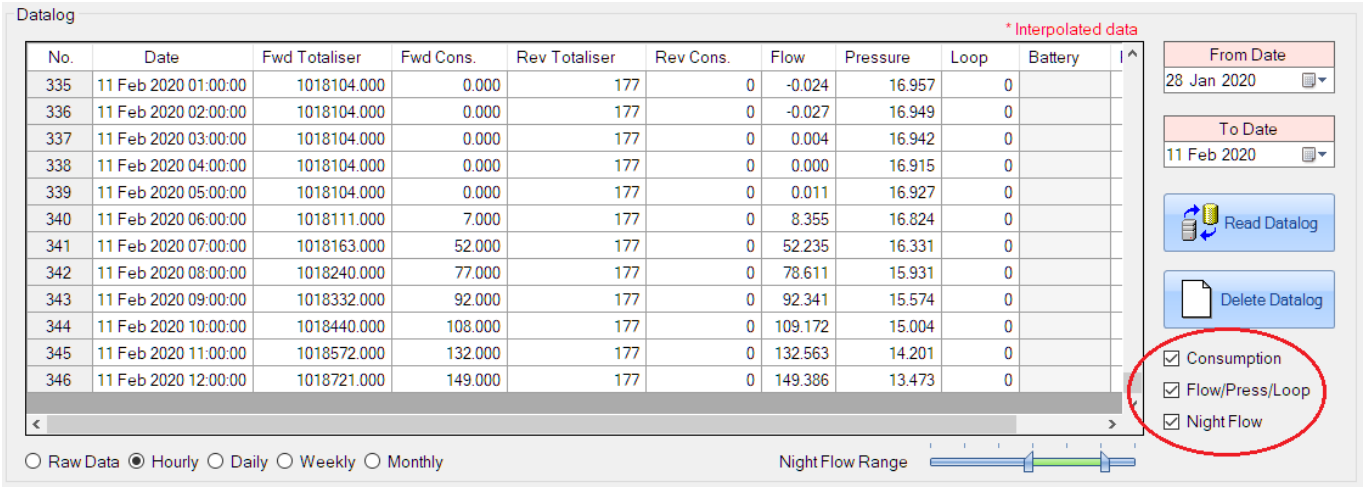
Raw Data Hourly Daily Weekly Monthly

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.

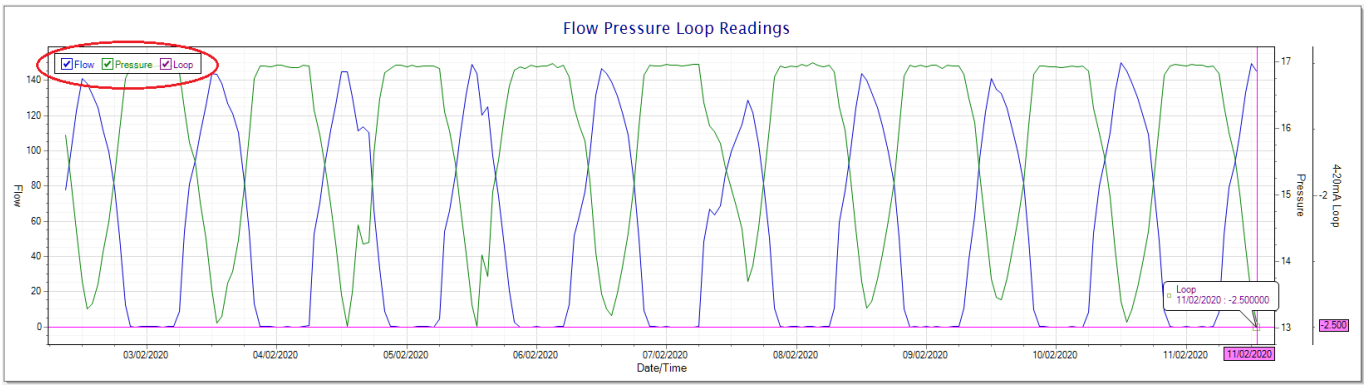
Deleting the datalog or removing a range of records can be easily done by using the 'Delete Datalog' button. To delete a range, simply select the range in the datalog table and press the 'Delete Datalog' button. If no range is selected, it will be assumed that you wish to delete the entire datalog. There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

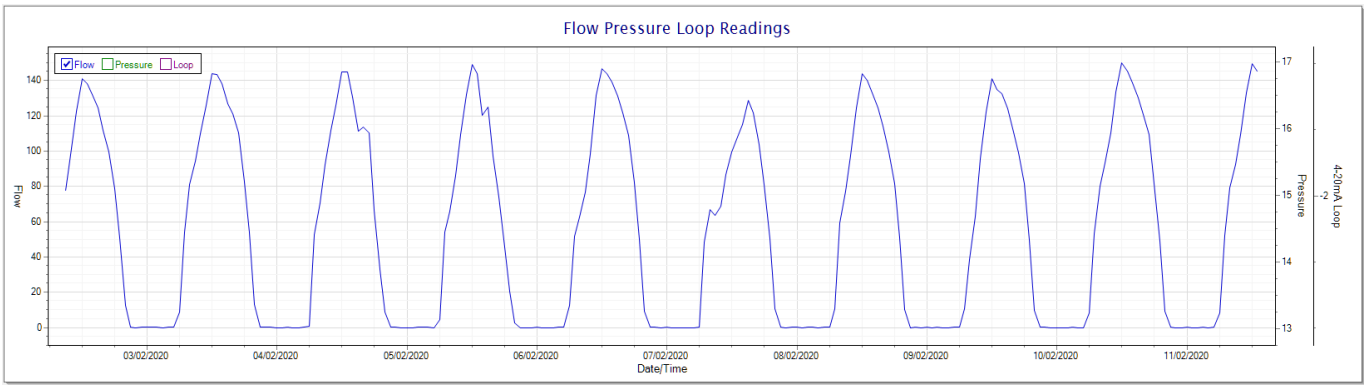



| No. | Date | Fwd Totaliser | Fwd Cons. | Rev Totaliser | Rev Cons. | Flow | Pressure | Loop | Battery |
|---|---|---|---|---|---|---|---|---|---|
| 335 | 11 Feb 2020 01:00:00 | 1018104.000 | 0.000 | 177 | 0 | -0.024 | 16.957 | 0 | |
| 336 | 11 Feb 2020 02:00:00 | 1018104.000 | 0.000 | 177 | 0 | -0.027 | 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 | |

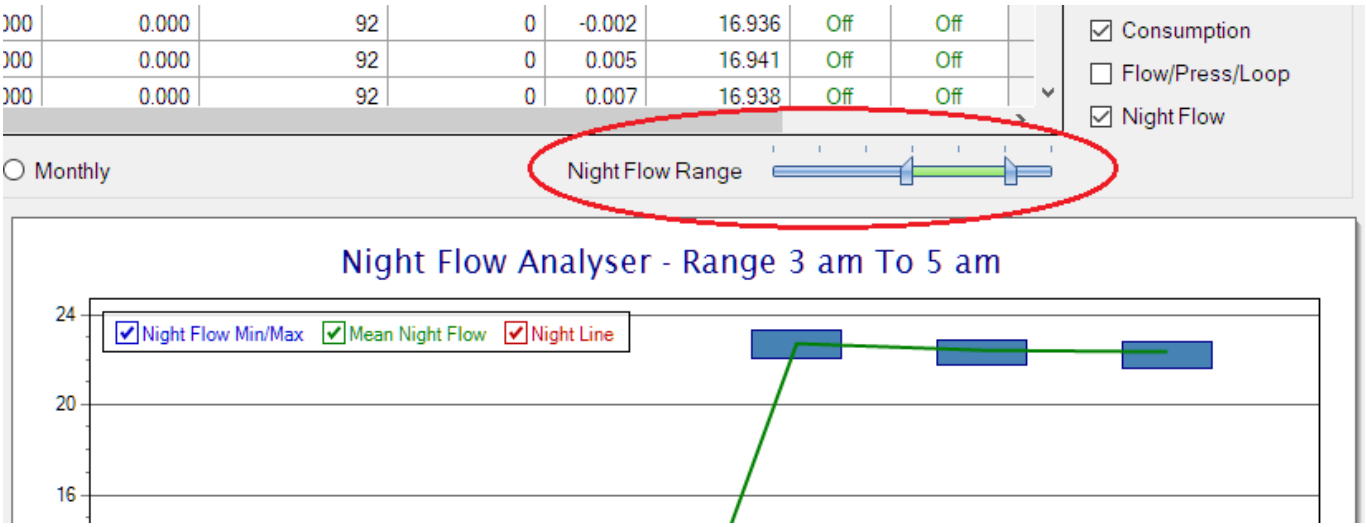
The various series on each graph can be toggled on and off by selecting the series tick in the upper left hand corner.




To view the flow only would look like this:-



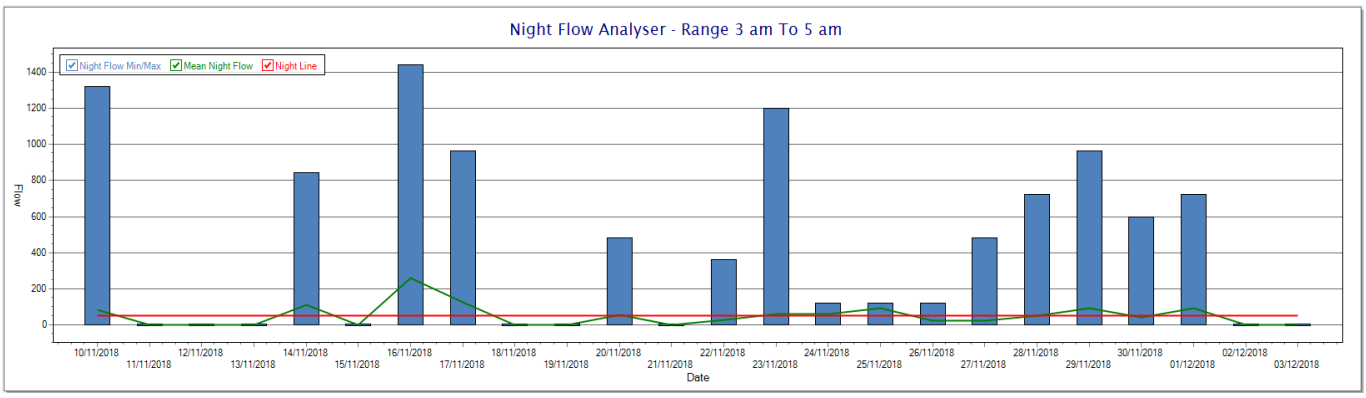

Also displayed is the Night Flow graph. The function of this graph is to specifically analyse the night time water flows at an installation. This analysis is done based on the data received during a specific time period during the night (normally from 3am to 5am). This period for analysis can be adjusted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



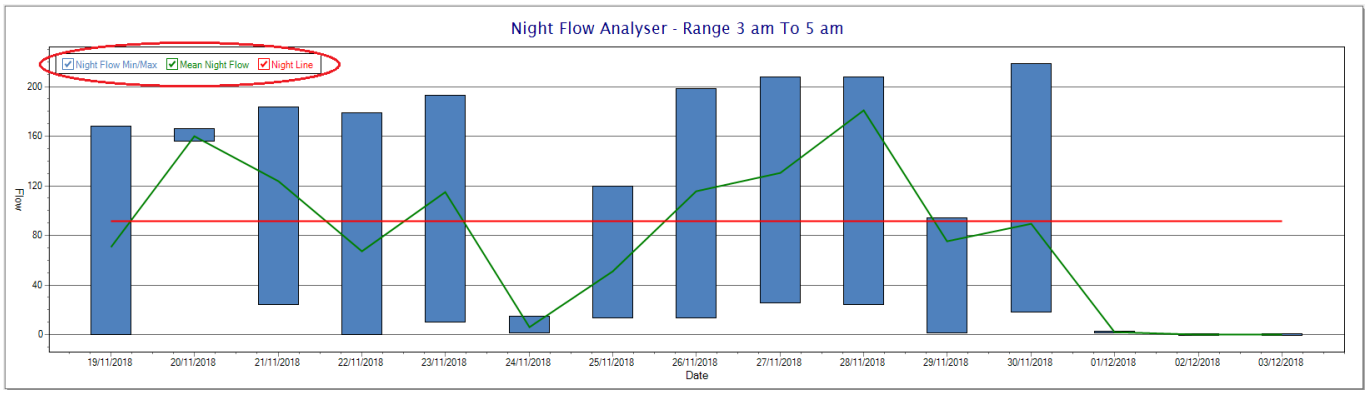

The graph will show a couple of different series.

7. 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.
8. 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.
9. 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:-

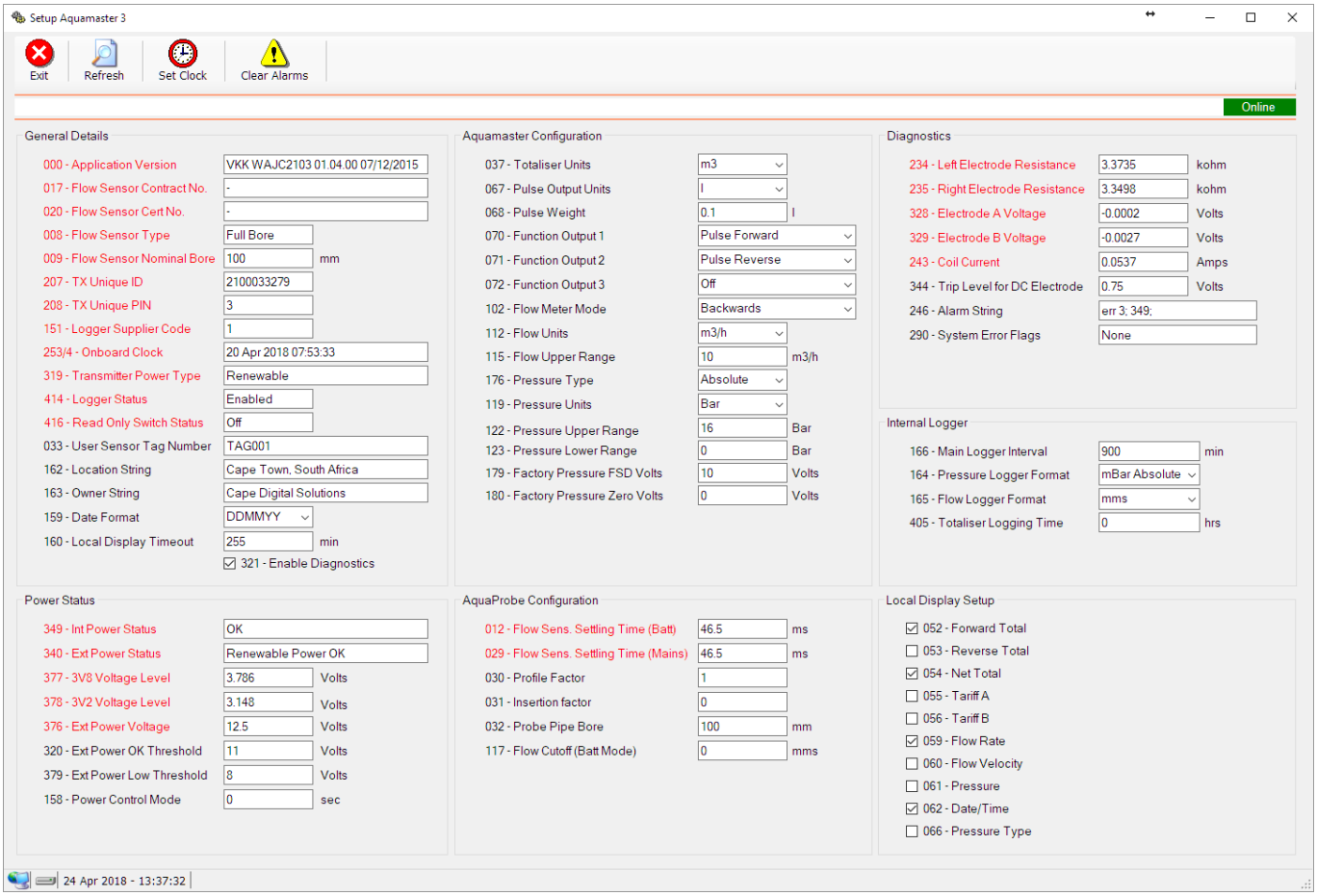


During a possible leak situation, the minimum night flow does not return to zero and the graph will appear to bounce off the bottom.



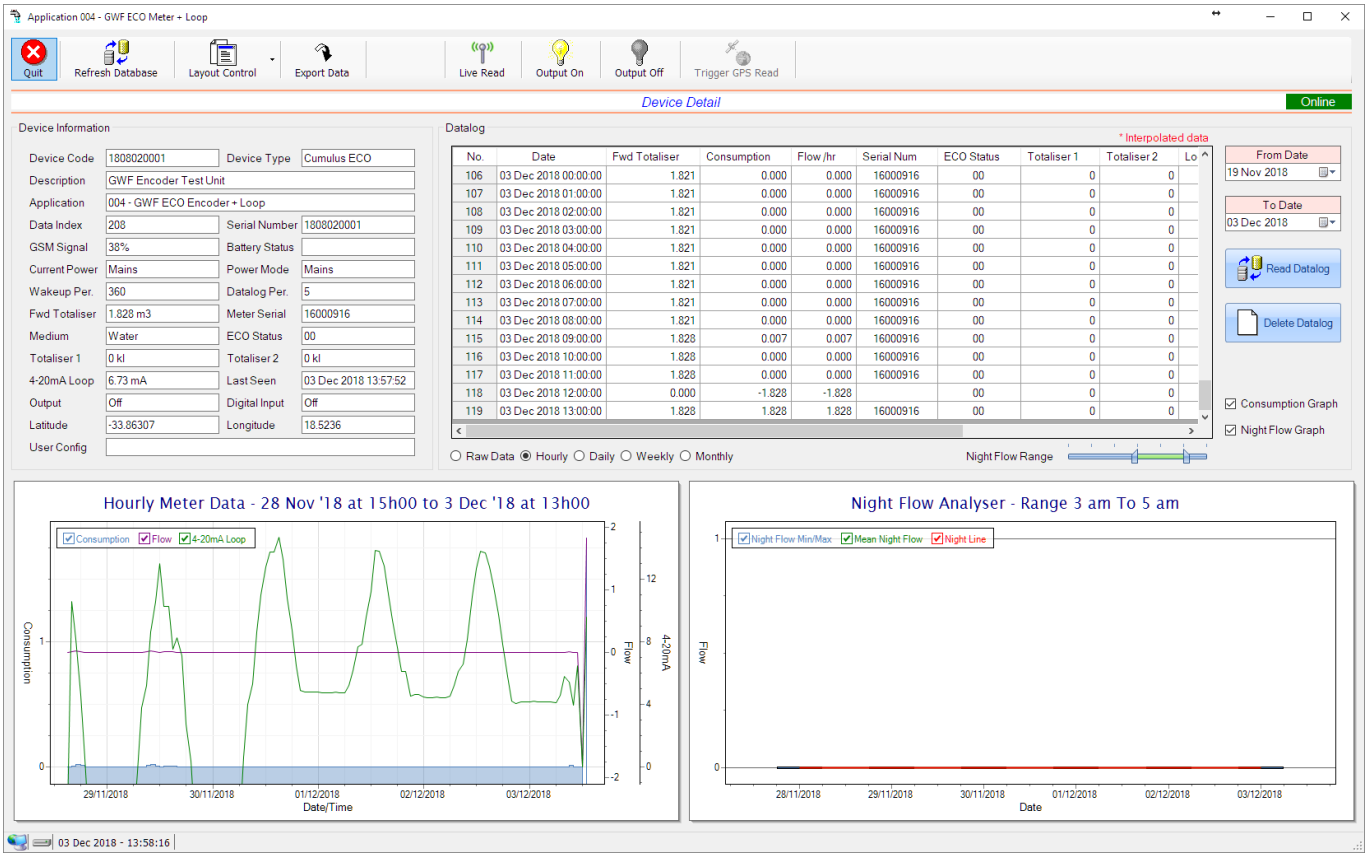

So, at a quick glance it is possible to see if there is a problem at this installation. As per the Consumption Graph, the different graph series can be switched off/on by clicking the series ticks on the top left hand corner.

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



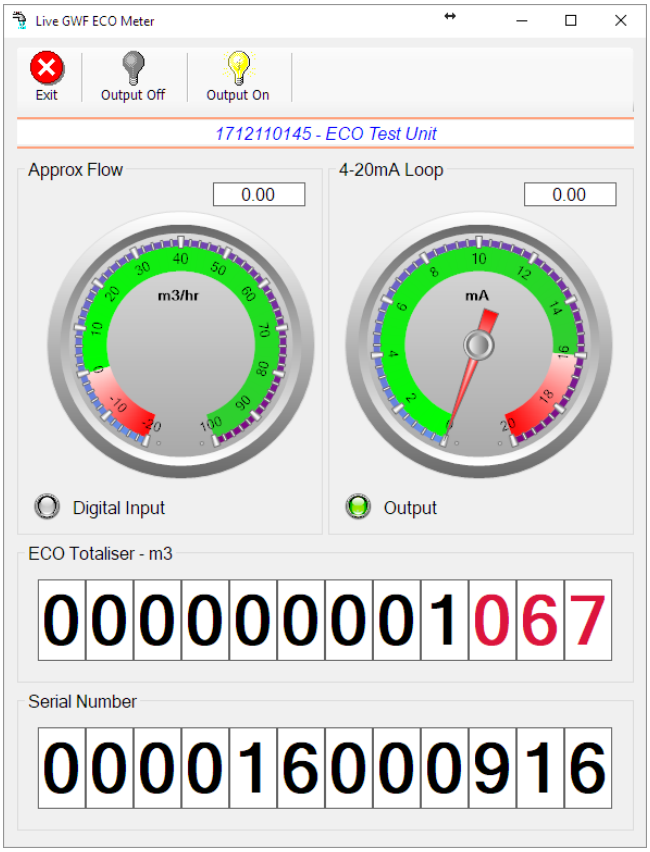

This type would be selected for applications that are using GWF ECO interface type meters. Included here is the 4-20mA current loop interface for pressure measurement of the pipeline or a similar type function.

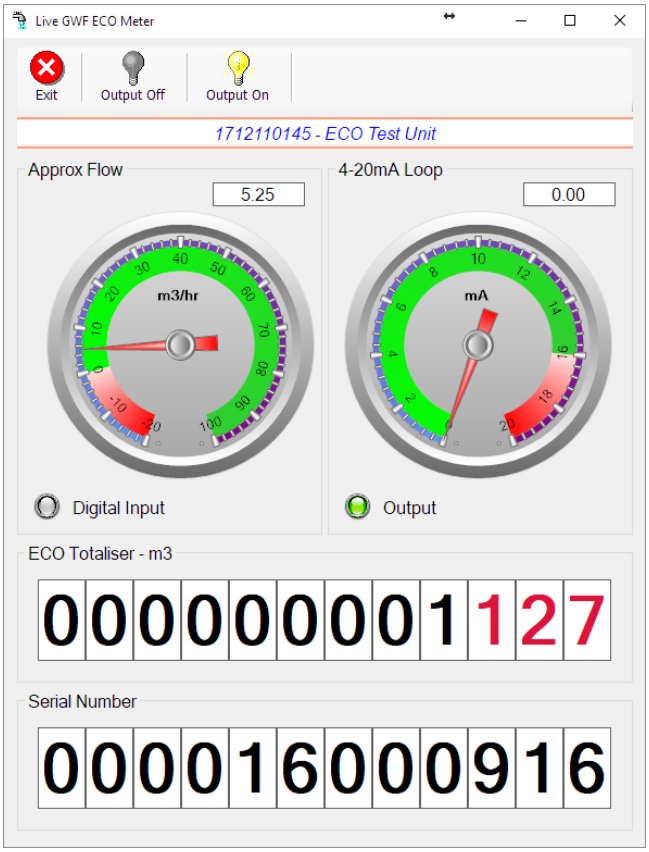
Functions on the top menu bar are mostly as per previous screens within the Cloudworks suite. These would be the 'Refresh Database', 'Layout Control' and 'Export Data' buttons which have been explained earlier. Added functionality is the 'Live Read', 'Output On/Off' and 'Trigger GPS Read'.

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 |
|---|---|
| **Device Code** | 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. |
| **Device Type** | Type of Remote Device. eg CDS538 Cumulus Logger etc |
| **Description** | 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. |
| **Application** | Selected device application. Application 004 - GWF ECO Meter + Loop function in this case. |
| **Data Index** | 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. |
| **Serial Number** | Serial number of this device - assigned in the factory. |
| **GSM Signal** | Signal strength of the last GSM communications, expressed as a percentage. |
| **Battery Status** | 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). |
| **Current Power** | 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. |
| **Power Mode** | Selected Power Mode under which the remote device is operating. This can be Battery, Mains or Dual power modes. |
| **Wakeup Per.** | The Wakeup Period set in minutes. Refer to the device configuration chapter for an explanation of this parameter. |
| **Datalog Per.** | The Datalog Period set minutes. Refer to the device configuration chapter for an explanation of this parameter. |
| **Forward Totaliser** | Meter forward totaliser read from the ECO interface. |
| **Meter Serial** | Meter serial number read from the ECO interface. |
| **Totaliser 1** | The current Totaliser 1 reading with its relevant pulse weight |

| | |
|---|---|
| | implemented including the unit of measure. |
| **Totaliser 2** | The current Totaliser 2 reading with its relevant pulse weight implemented including the unit of measure. |
| **Medium** | Measurement medium (eg water, hot water etc) read from the ECO interface. |
| **4-20mA Loop** | The 4-20mA current loop reading with its calibration data implemented including the unit of measure. |
| **Last Seen** | The date and time the remote device was last seen connecting into the server. |
| **Output** | Digital output status. |
| **Digital Input** | Digital input status. |
| **Latitude** | Last seen remote device Latitude. |
| **Longitude** | 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.

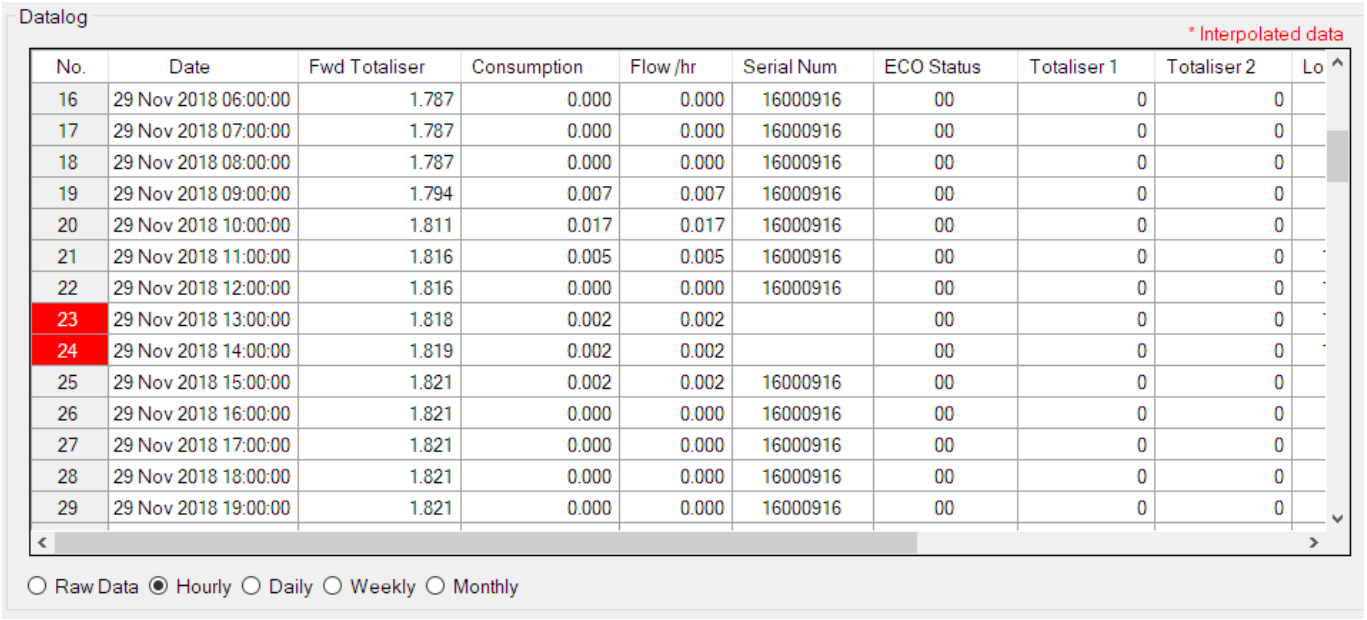
This application will record the following data in the datalog.

| No. | Date | Fwd Totaliser | 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 | | 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 |
|---|---|
| **Date/Time** | Date and time of the datalog record. |
| **Fwd Totaliser** | Forward Totaliser reading. |
| **Consumption** | The effective 'consumption' as the difference between this current reading and the previous reading. |
| **Flow/hr** | Flow rate calculated as volume per hour. |
| **Serial Number** | Serial Number of the meter at the time of the read. |
| **Totaliser 1** | Totaliser 1 reading. |
| **Totaliser 2** | Totaliser 2 reading. |
| **Loop** | The 4-20mA loop reading with the calibration applied. |
| **ECO Status** | Status of the ECO interface at time of read. (OK or ECO Error) |
| **Input** | Digital input status at the time of recording this record. |
| **Output** | Digital output status at the time of recording this record. |
| **Battery** | Battery level in percentage. Only displayed on battery powered devices. |
| **Power** | 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 | |

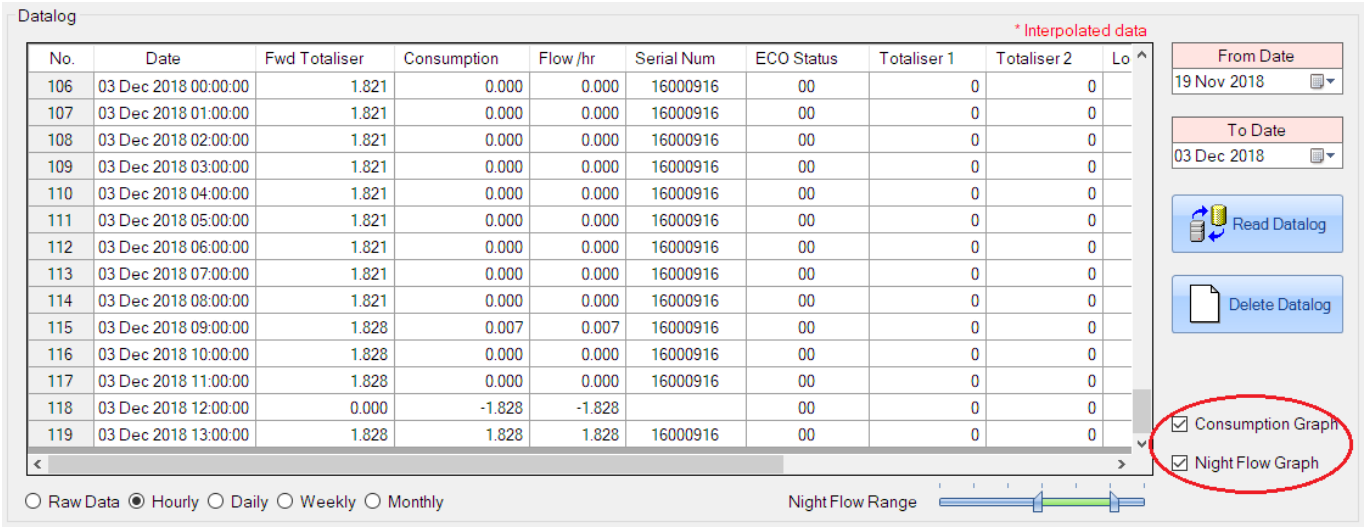
Raw Data (•) Hourly ( ) Daily ( ) Weekly ( ) Monthly

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.

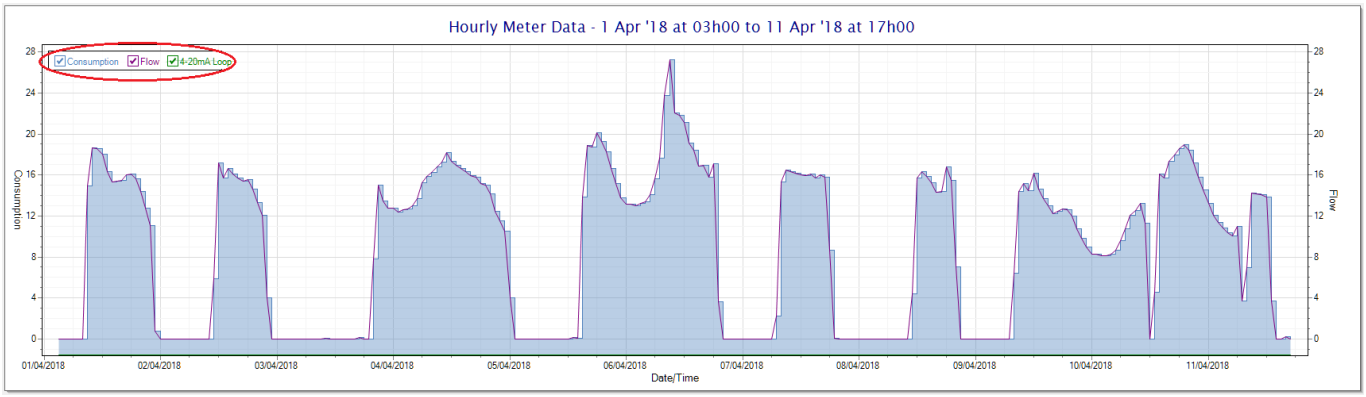
Deleting the datalog or removing a range of records can be easily done by using the 'Delete Datalog' button. To delete a range, simply select the range in the datalog table and press the 'Delete Datalog' button. If no range is selected, it will be assumed that you wish to delete the entire datalog. There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

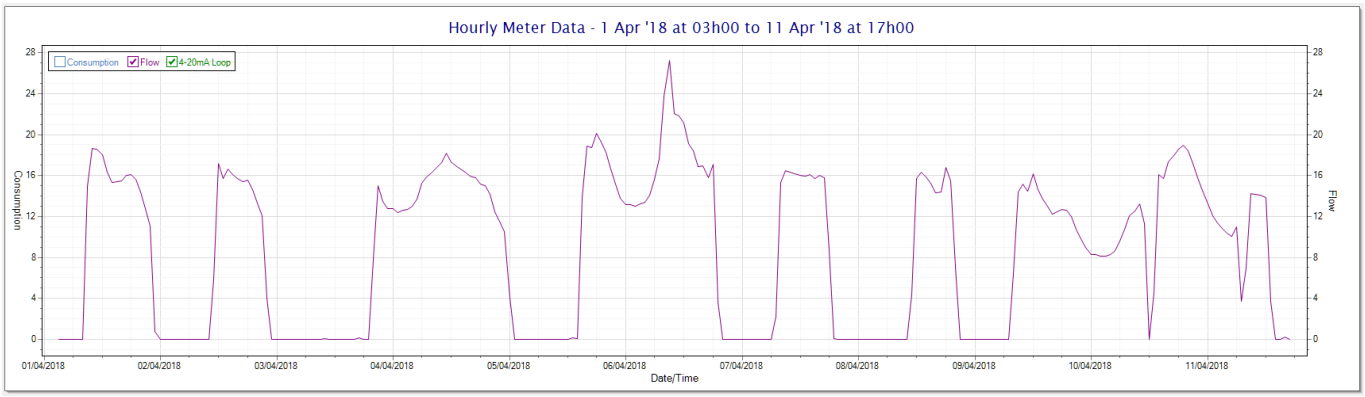



| No. | Date | Fwd Totaliser | Consumption | Flow /hr | Serial Num | ECO Status | Totaliser 1 | Totaliser 2 | Lo |
|---|---|---|---|---|---|---|---|---|---|
| 106 | 03 Dec 2018 00:00:00 | 1.821 | 0.000 | 0.000 | 16000916 | 00 | 0 | 0 | |
| 107 | 03 Dec 2018 01:00:00 | 1.821 | 0.000 | 0.000 | 16000916 | 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 | |

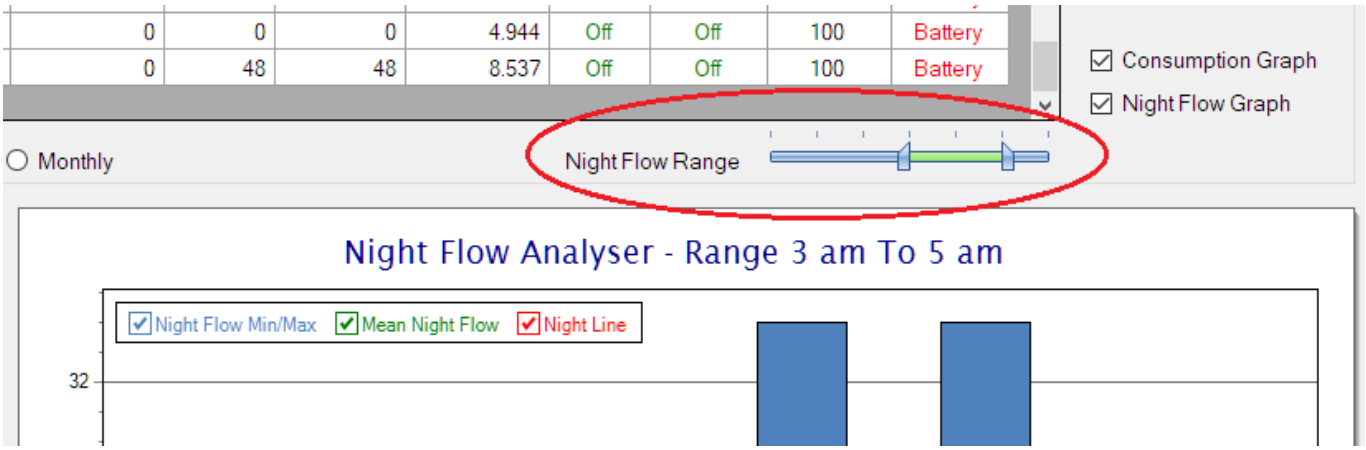
The Consumption Graph displays the consumption, pressure and flow related data. Individual graph series can be switched off/on by selecting the ticks at the top left of the graph.




To view the flow only would look like this:-



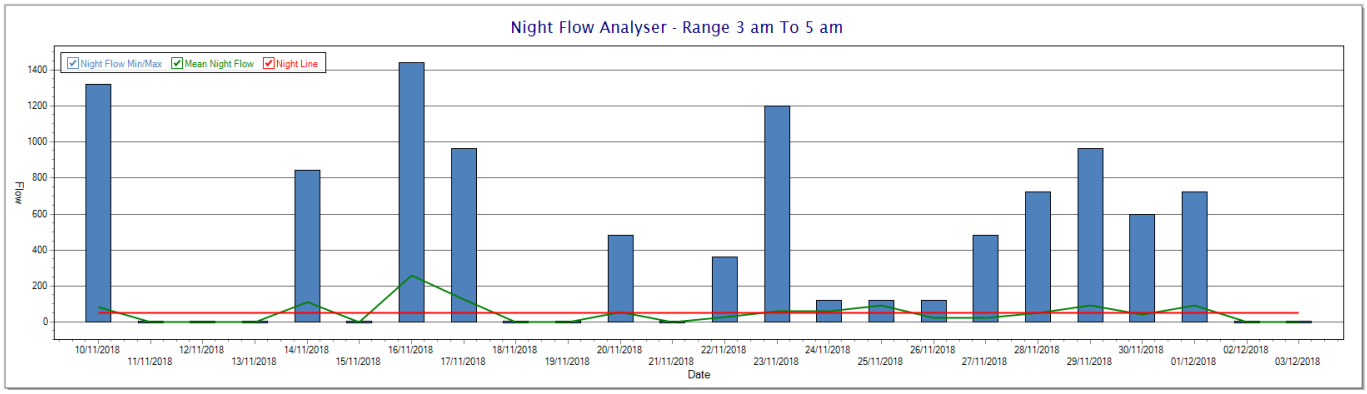
Also displayed is the Night Flow graph. The function of this graph is to specifically analyse the night time water flows at an installation. This analysis is done based on the data received during a specific time period during the night (normally from 3am to 5am). This period for analysis can be adjusted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



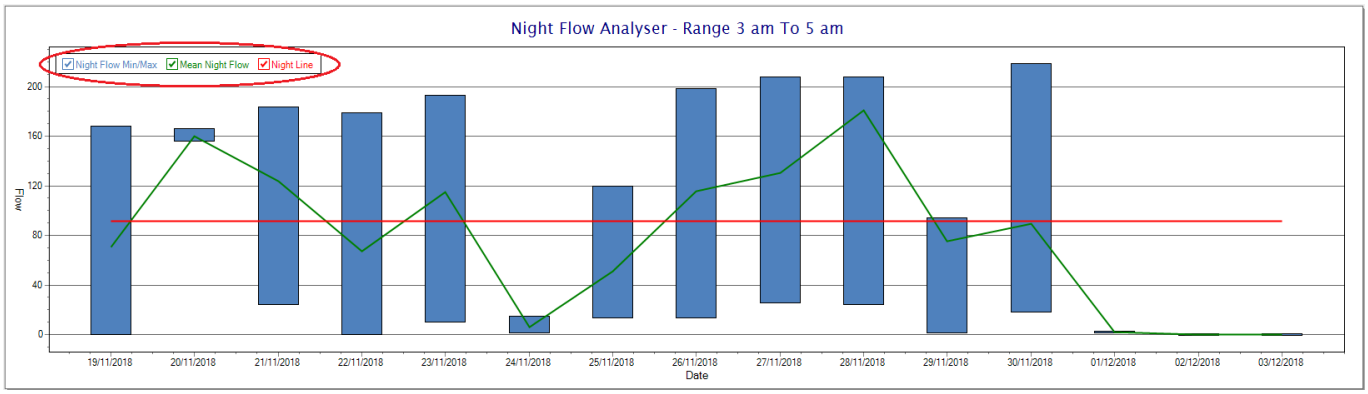

The graph will show a couple of different series.

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:-

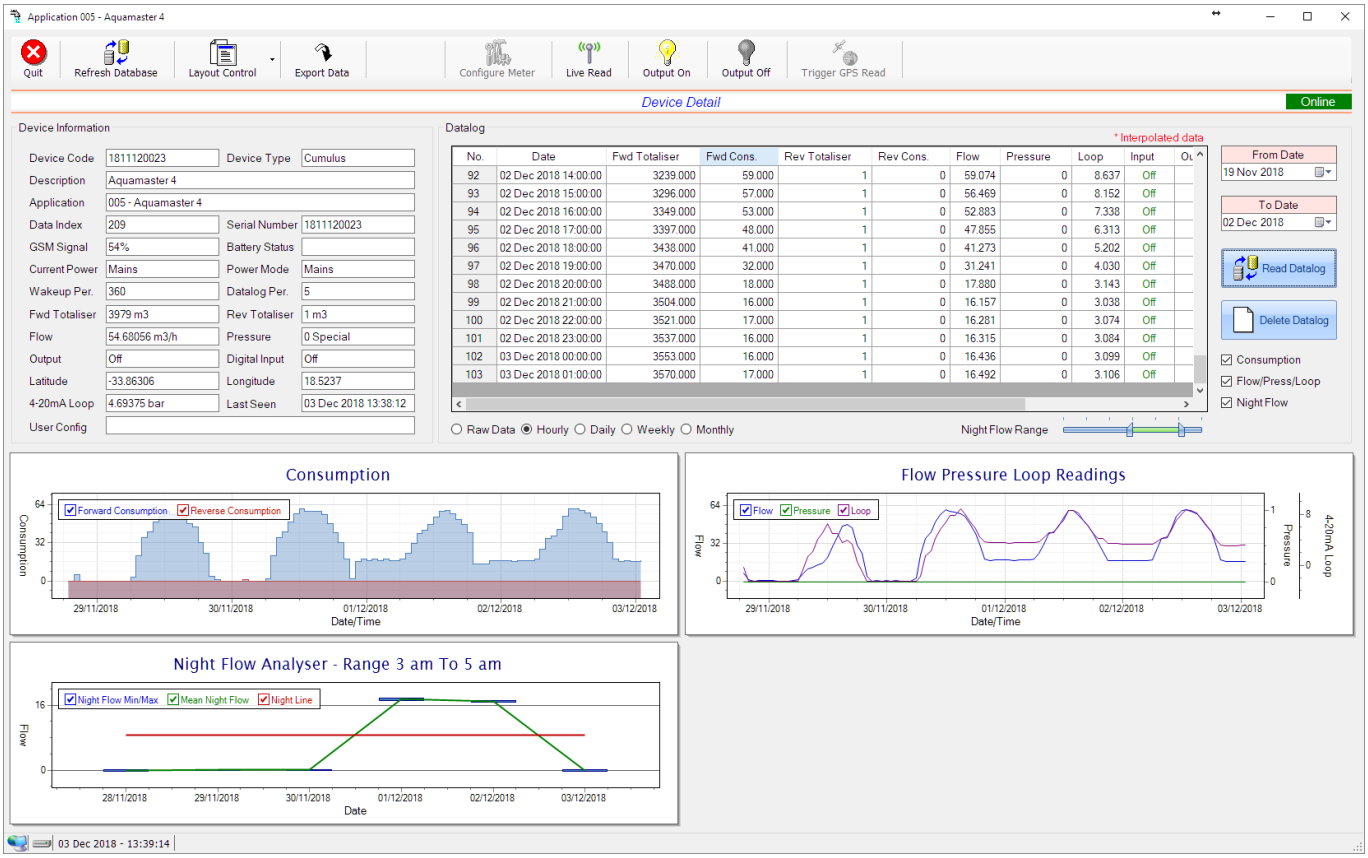


During a possible leak situation, the minimum night flow does not return to zero and the graph will appear to bounce off the bottom.




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



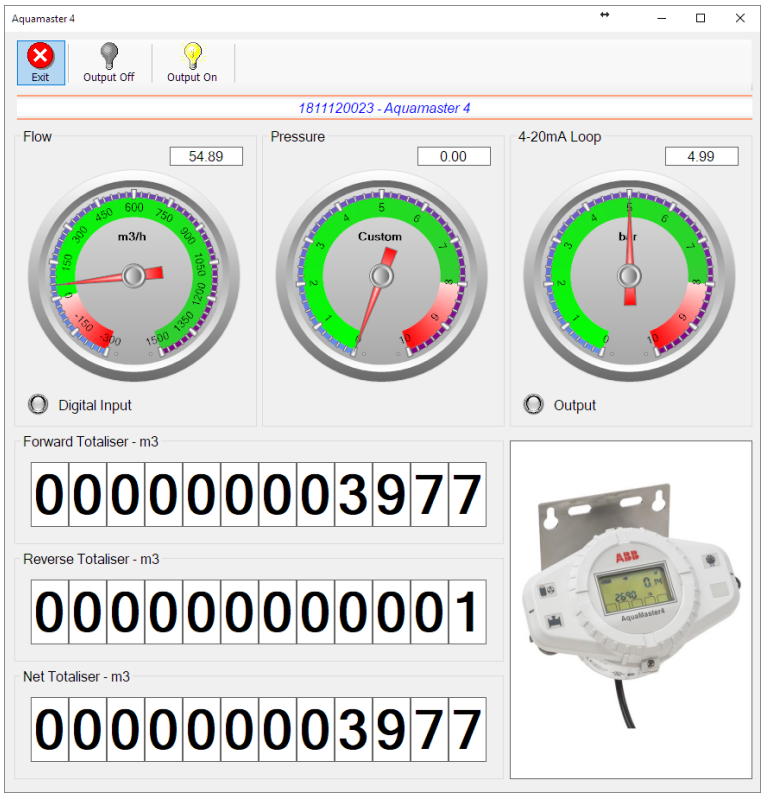

This type would be selected for applications that are used on an ABB Aquamaster 4 water meter connected to the Modbus interface. Forward/Reverse Totals, Flow and Pressure are read directly from the interface of the meter.

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 |
|---|---|
| **Device Code** | 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. |
| **Device Type** | Type of Remote Device. eg CDS538 Cumulus Logger etc |
| **Description** | 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. |
| **Application** | Selected device application. Application 003 - Aquamaster 3 function |

| | |
|---|---|
| | in this case. |
| **Data Index** | 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. |
| **Serial Number** | Serial number of this device - assigned in the factory. |
| **GSM Signal** | Signal strength of the last GSM communications, expressed as a percentage. |
| **Battery Status** | 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). |
| **Current Power** | 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. |
| **Power Mode** | Selected Power Mode under which the remote device is operating. This can be Battery, Mains or Dual power modes. |
| **Wakeup Per.** | The Wakeup Period set in minutes. Refer to the device configuration chapter for an explanation of this parameter. |
| **Datalog Per.** | The Datalog Period set minutes. Refer to the device configuration chapter for an explanation of this parameter. |
| **Fwd Totaliser** | The current Forward Totaliser reading. |
| **Rev Totaliser** | The current Reverse Totaliser reading. |
| **Flow** | Current flow reading. |
| **Pressure** | Current pressure reading. |
| **4-20mA Current Loop** | The 4-20mA current loop reading with its calibration data implemented including the unit of measure. |
| **Output** | Digital output status. |
| **Digital Input** | Digital input Status. |
| **Last Seen** | The date and time the remote device was last seen connecting into the server. |
| **Latitude** | Last seen remote device Latitude. |
| **Longitude** | 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.

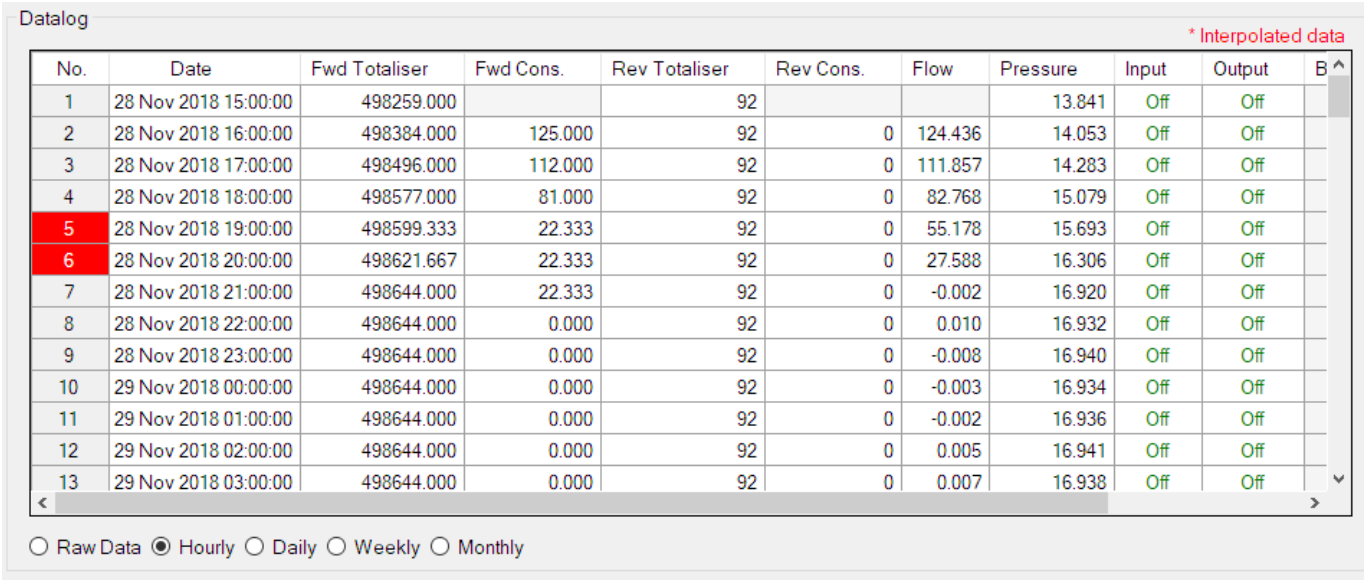
| No. | Date | Fwd Totaliser | Fwd Cons. | Rev Totaliser | Rev Cons. | Flow | Pressure | Loop | Input | Output | Battery | Power |
|---|---|---|---|---|---|---|---|---|---|---|---|---|
| 107 | 03 Dec 2018 01:00:00 | 505011.000 | 22.000 | 92 | 0 | 22.310 | 15.926 | -2.500 | Off | Off | | Mains |
| 108 | 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 |
|---|---|
| **Date/Time** | Date and time of the datalog record. |
| **Fwd Totaliser** | Forward Totaliser reading. |
| **Rev Totaliser** | Reverse Totaliser reading. |
| **Fwd Cons.** | The Forward consumption reading. |
| **Rev Cons.** | The Reverse consumption Reading. |

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

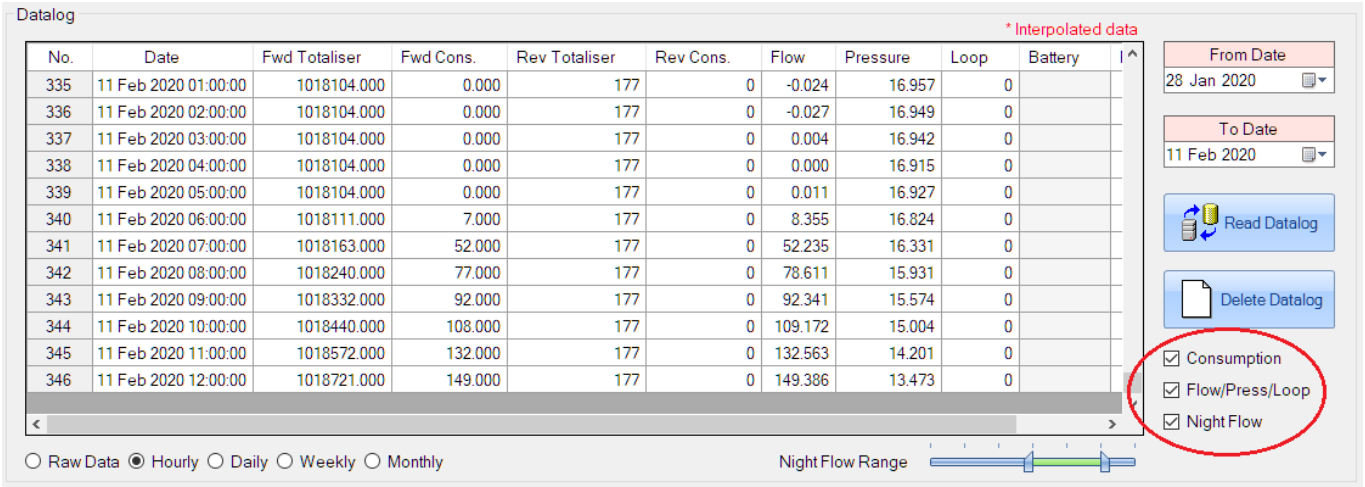
Raw Data (•) Hourly ( ) Daily ( ) Weekly ( ) Monthly

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.

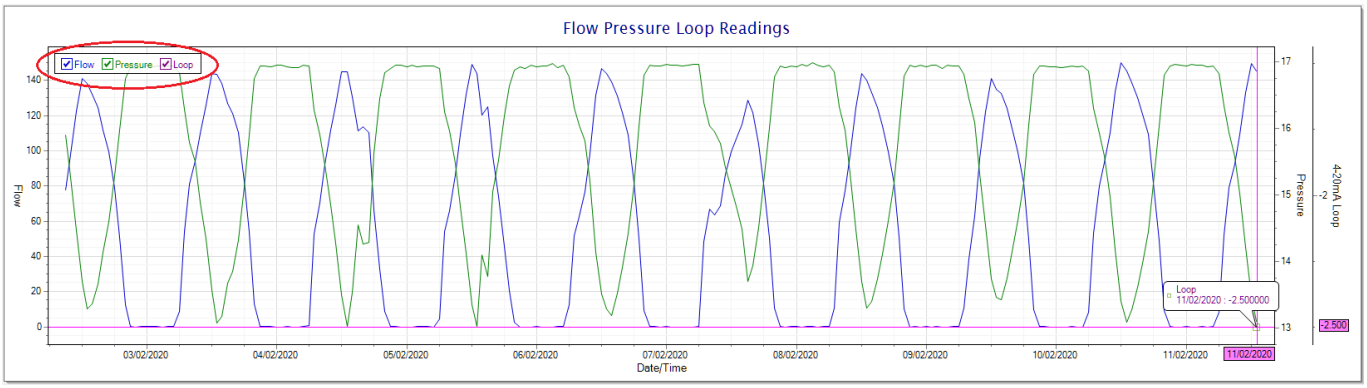
Deleting the datalog or removing a range of records can be easily done by using the 'Delete Datalog' button. To delete a range, simply select the range in the datalog table and press the 'Delete Datalog' button. If no range is selected, it will be assumed that you wish to delete the entire datalog. There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

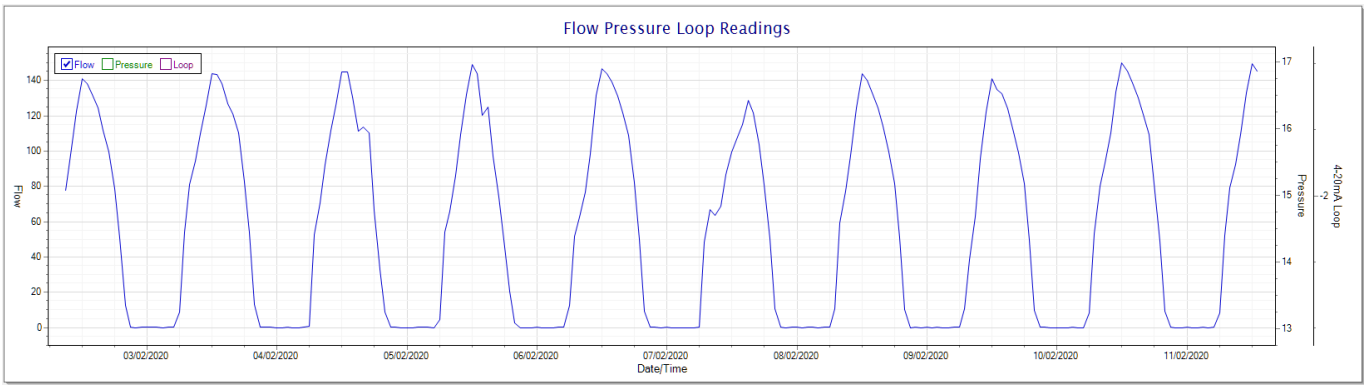



| No. | Date | Fwd Totaliser | Fwd Cons. | Rev Totaliser | Rev Cons. | Flow | Pressure | Loop | Battery |
|---|---|---|---|---|---|---|---|---|---|
| 335 | 11 Feb 2020 01:00:00 | 1018104.000 | 0.000 | 177 | 0 | -0.024 | 16.957 | 0 | |
| 336 | 11 Feb 2020 02:00:00 | 1018104.000 | 0.000 | 177 | 0 | -0.027 | 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 | |

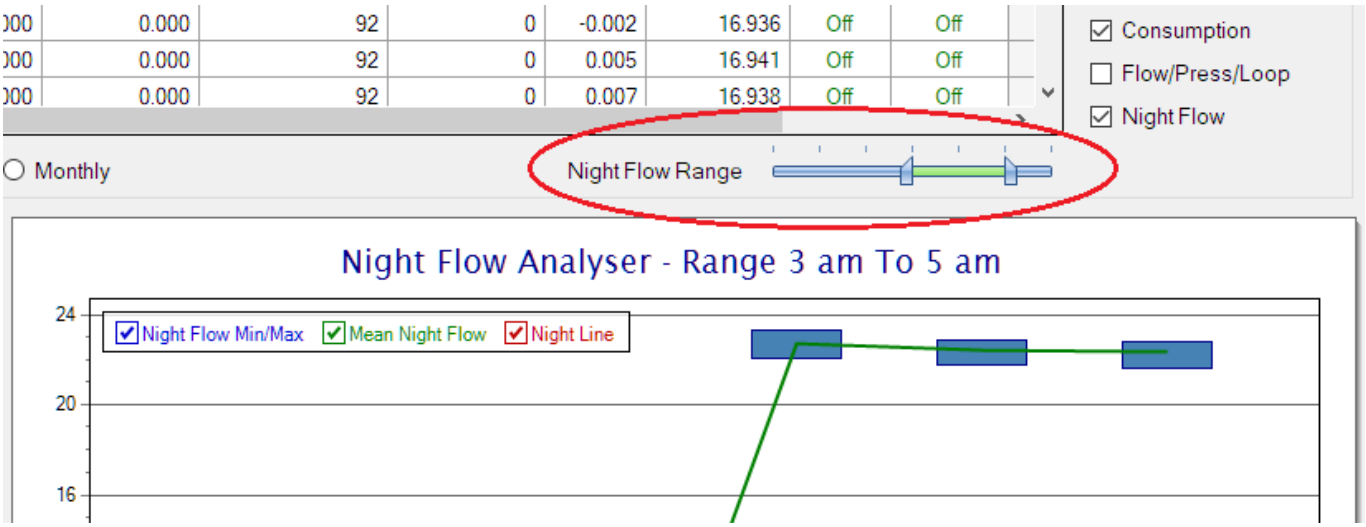
The various series on each graph can be toggled on and off by selecting the series tick in the upper left hand corner.




To view the flow only would look like this:-



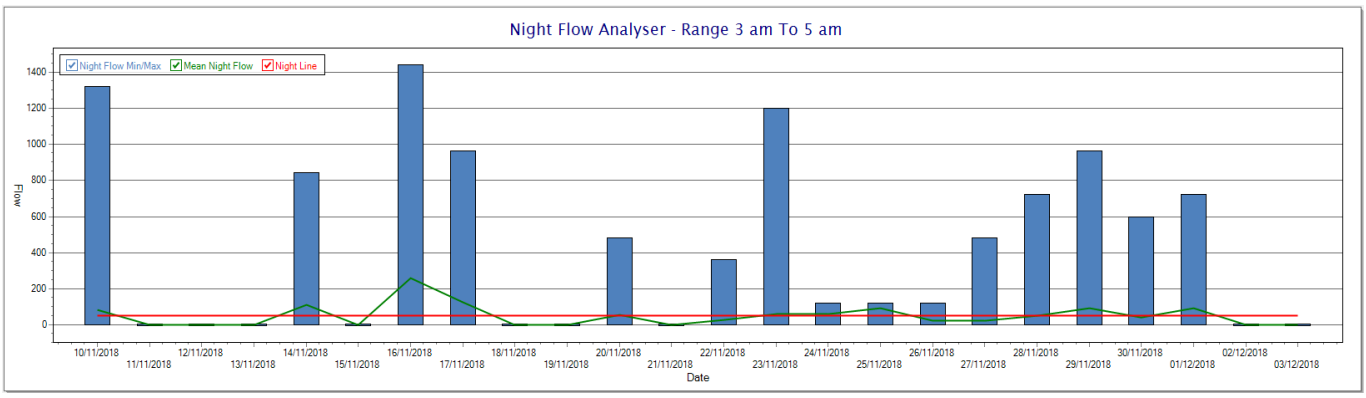

Also displayed is the Night Flow graph. The function of this graph is to specifically analyse the night time water flows at an installation. This analysis is done based on the data received during a specific time period during the night (normally from 3am to 5am). This period for analysis can be adjusted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



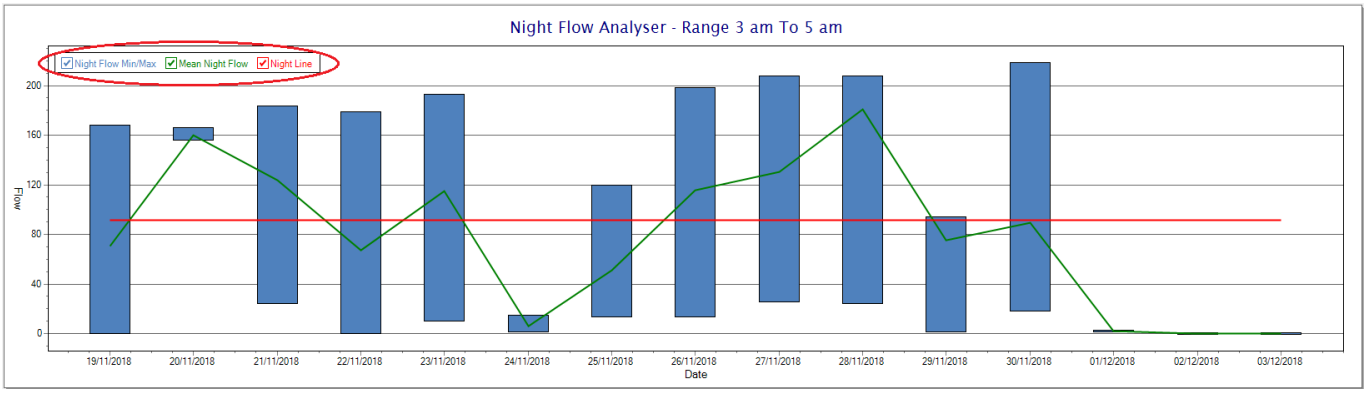

The graph will show a couple of different series.

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.

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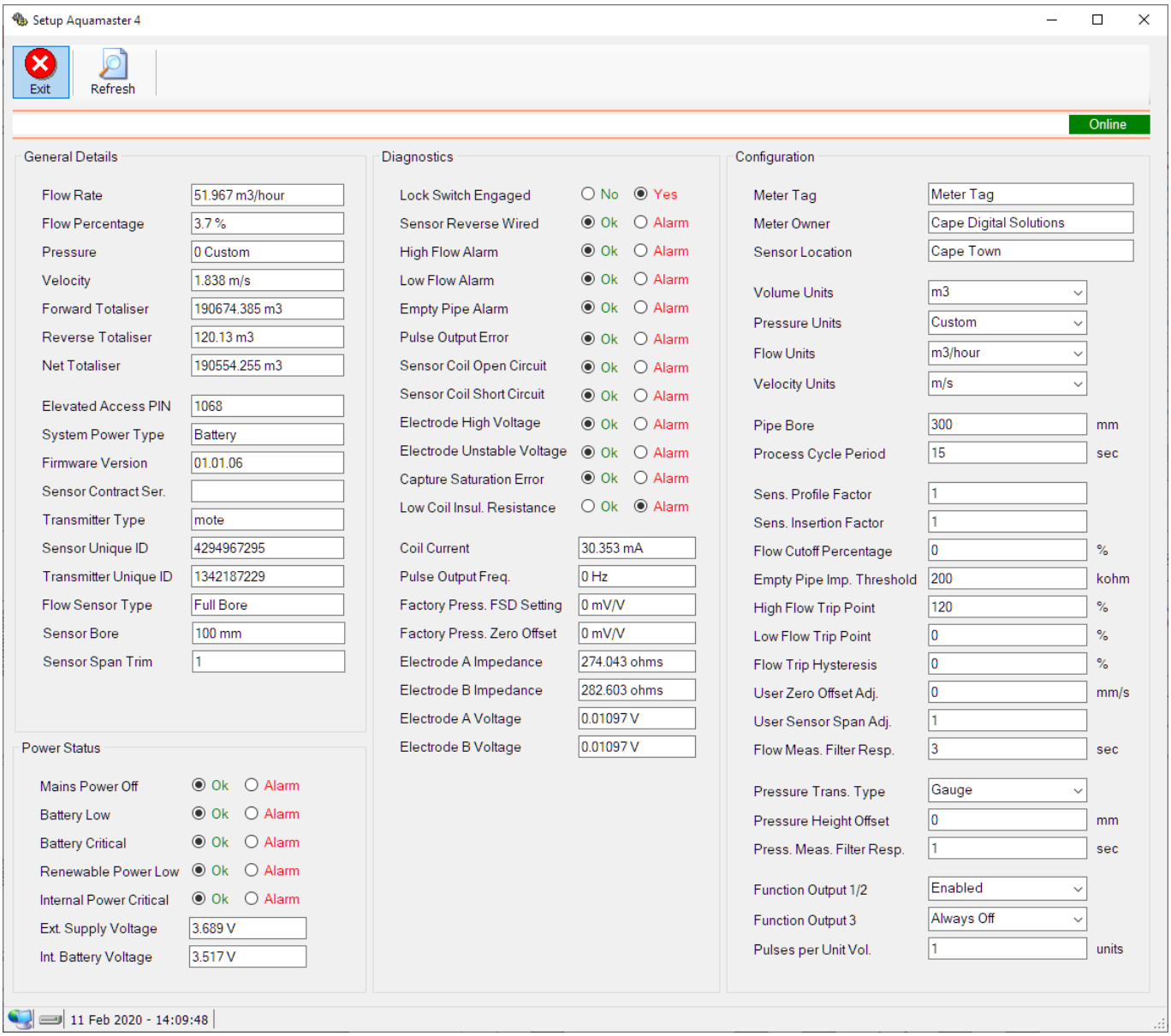
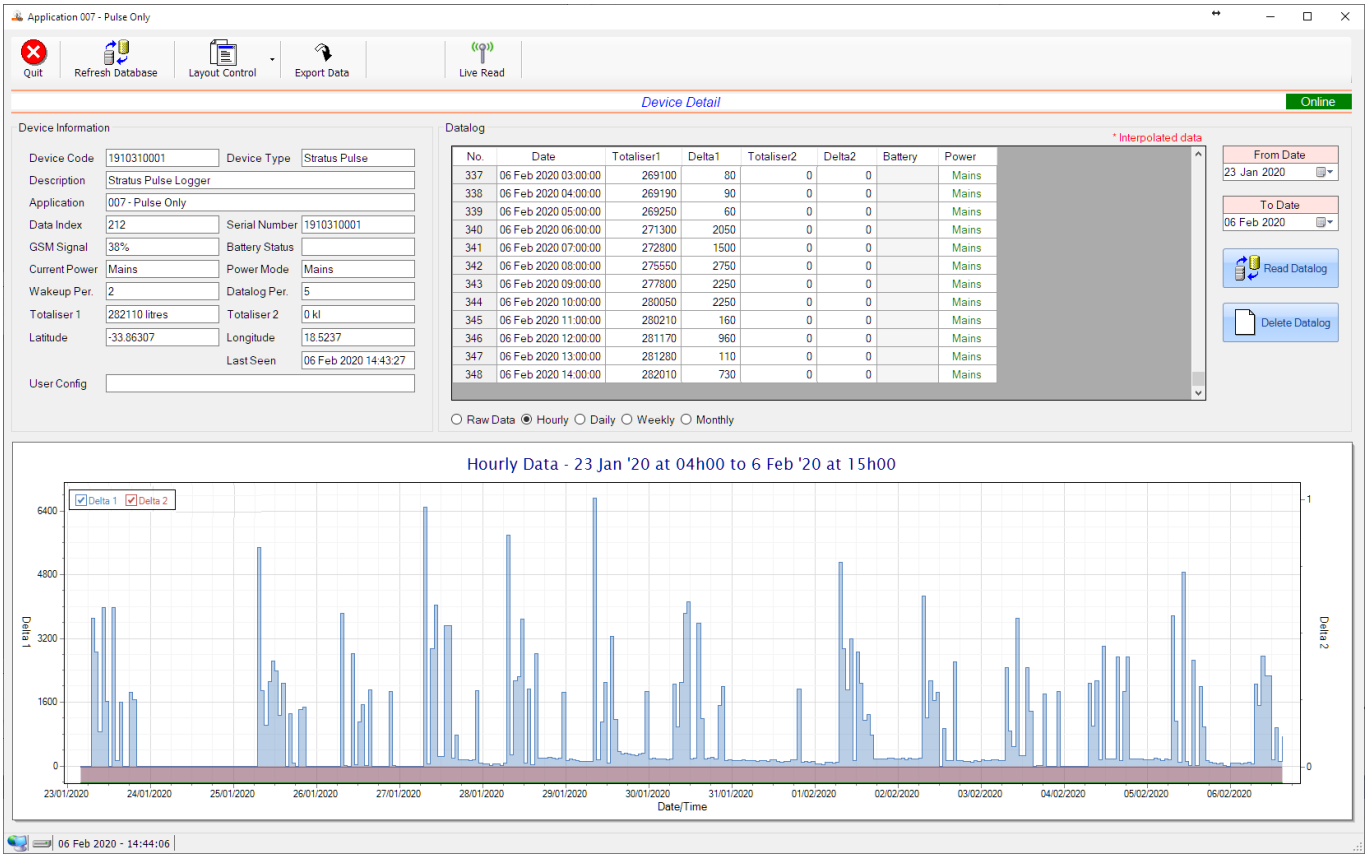



While the system is online, these parameters can be changed and will immediately be updated on the remote meter via its ModBus connection.

### 2.8.7 Application 006 - GWF Sonico + Loop

This application is currently under development.

## 2.8.8 Application 007 - Pulse Only

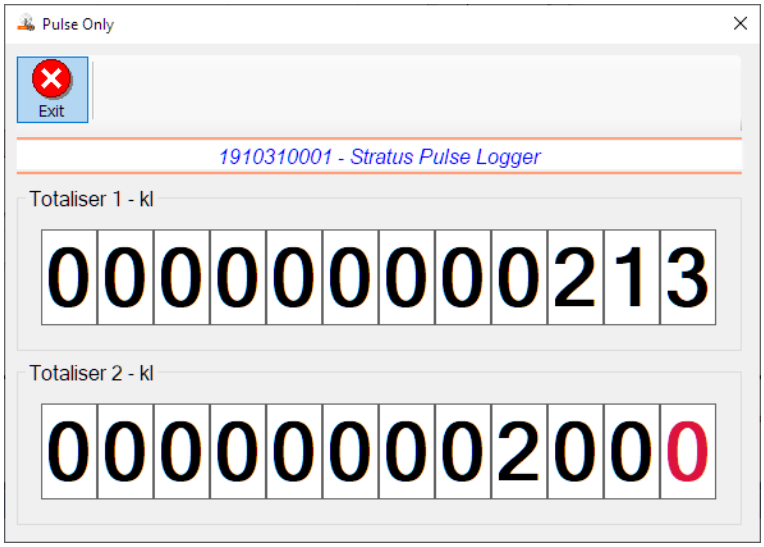



This application type would be selected where you are using basic pulse output devices which generally translate consumption to pulse output. This could, for instance, be a water or electricity meter.

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:-

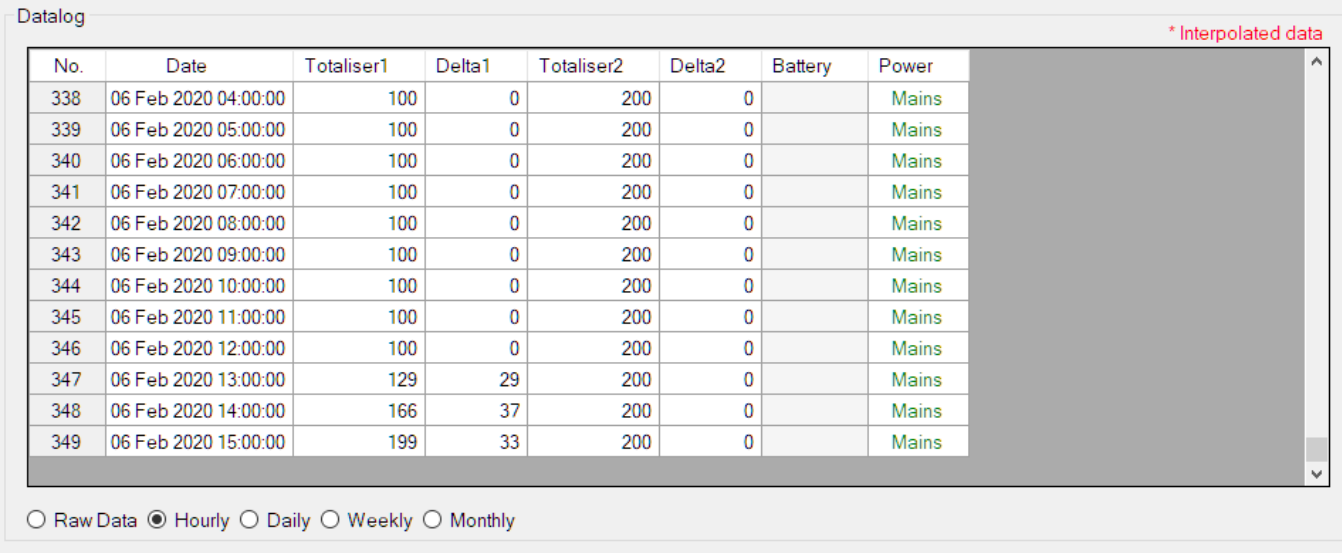
| Information | Notes |
|---|---|
| **Device Code** | The Device Code assigned to this particular remote device. All communications are initiated by addressing this code. This code is unique to all remote devices and is assigned at the time of manufacture. |
| **Device Type** | Type of Remote Device. eg CDS538 Cumulus Logger etc |
| **Description** | 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. |
| **Application** | Selected device application. Application 007 - Pulse Only function in this case. |
| **Data Index** | 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. |
| **Serial Number** | Serial number of this device - assigned in the factory. |
| **GSM Signal** | Signal strength of the last GSM communications, expressed as a |

| | |
|---|---|
| | percentage. |
| **Battery Status** | 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). |
| **Current Power** | 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. |
| **Power Mode** | Selected Power Mode under which the remote device is operating. This can be Battery, Mains or Dual power modes. |
| **Wakeup Per.** | The Wakeup Period set in minutes. Refer to the device configuration chapter for an explanation of this parameter. |
| **Datalog Per.** | The Datalog Period set in minutes. Refer to the device configuration chapter for an explanation of this parameter. |
| **Totaliser 1** | The current Totaliser 1 reading with its relevant pulse weight implemented including the unit of measure. |
| **Totaliser 2** | The current Totaliser 2 reading with its relevant pulse weight implemented including the unit of measure. |
| **Last Seen** | The date and time the remote device was last seen connecting into the server. |
| **Latitude** | Captured device Latitude. |
| **Longitude** | 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

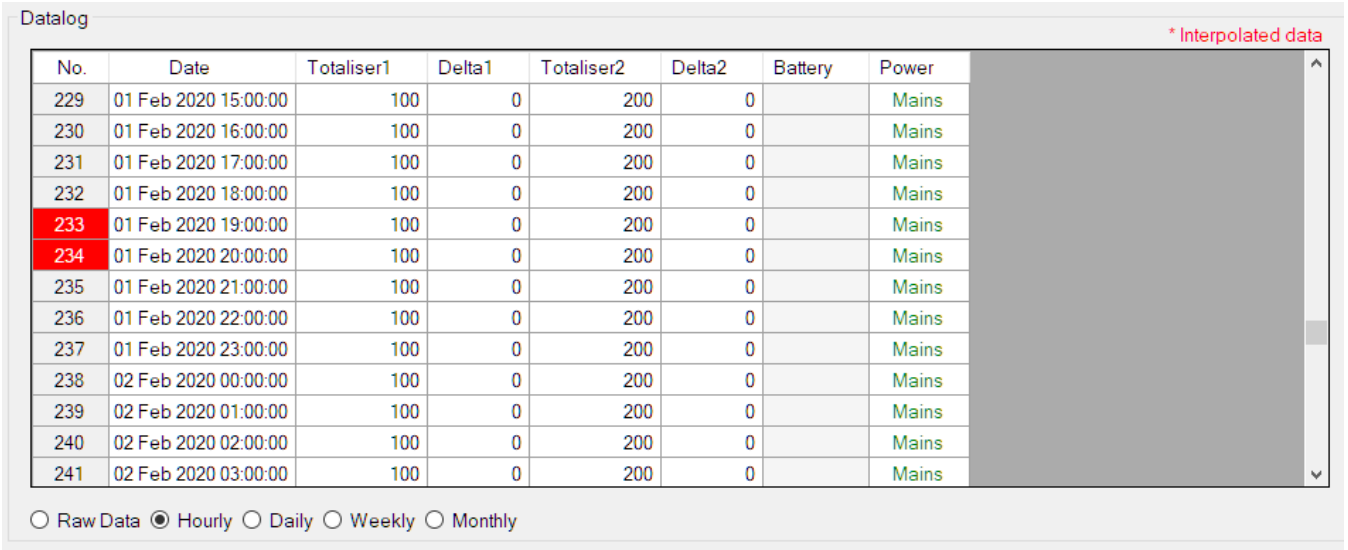
* Interpolated data

| 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 |
|---|---|
| **Date/Time** | Date and time of the datalog record. |
| **Totaliser 1** | Totaliser 1 reading. |
| **Totaliser 2** | Totaliser 2 reading. |
| **Delta 1** | The effective 'consumption' of the Totaliser 1 reading. This is the difference between this current reading and the previous reading. |
| **Delta 2** | The effective 'consumption' of the Totaliser 2 reading. This is the difference between this current reading and the previous reading. |
| **Battery** | Battery level in percentage. Only displayed on battery powered devices. |
| **Power** | 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 |

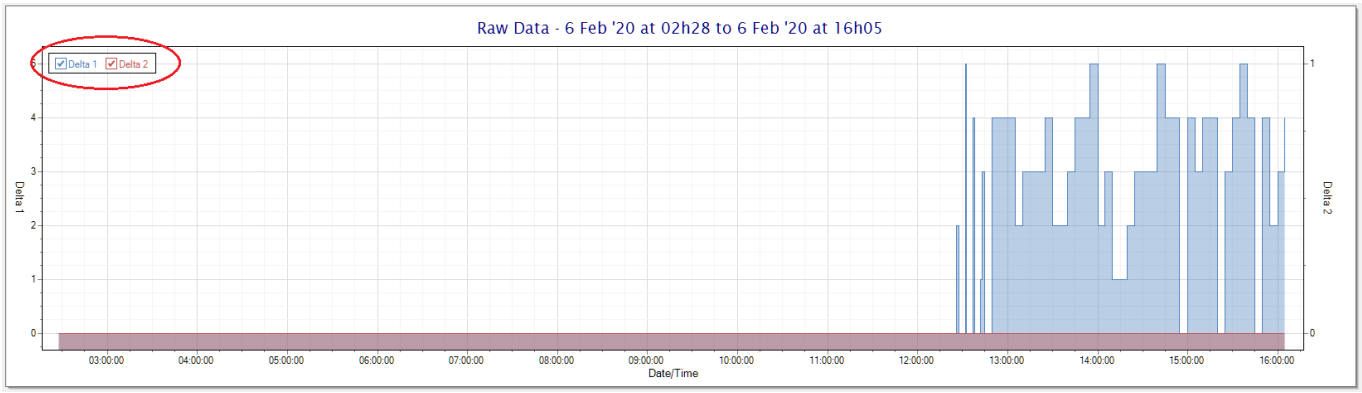
Raw Data Hourly Daily Weekly Monthly

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.

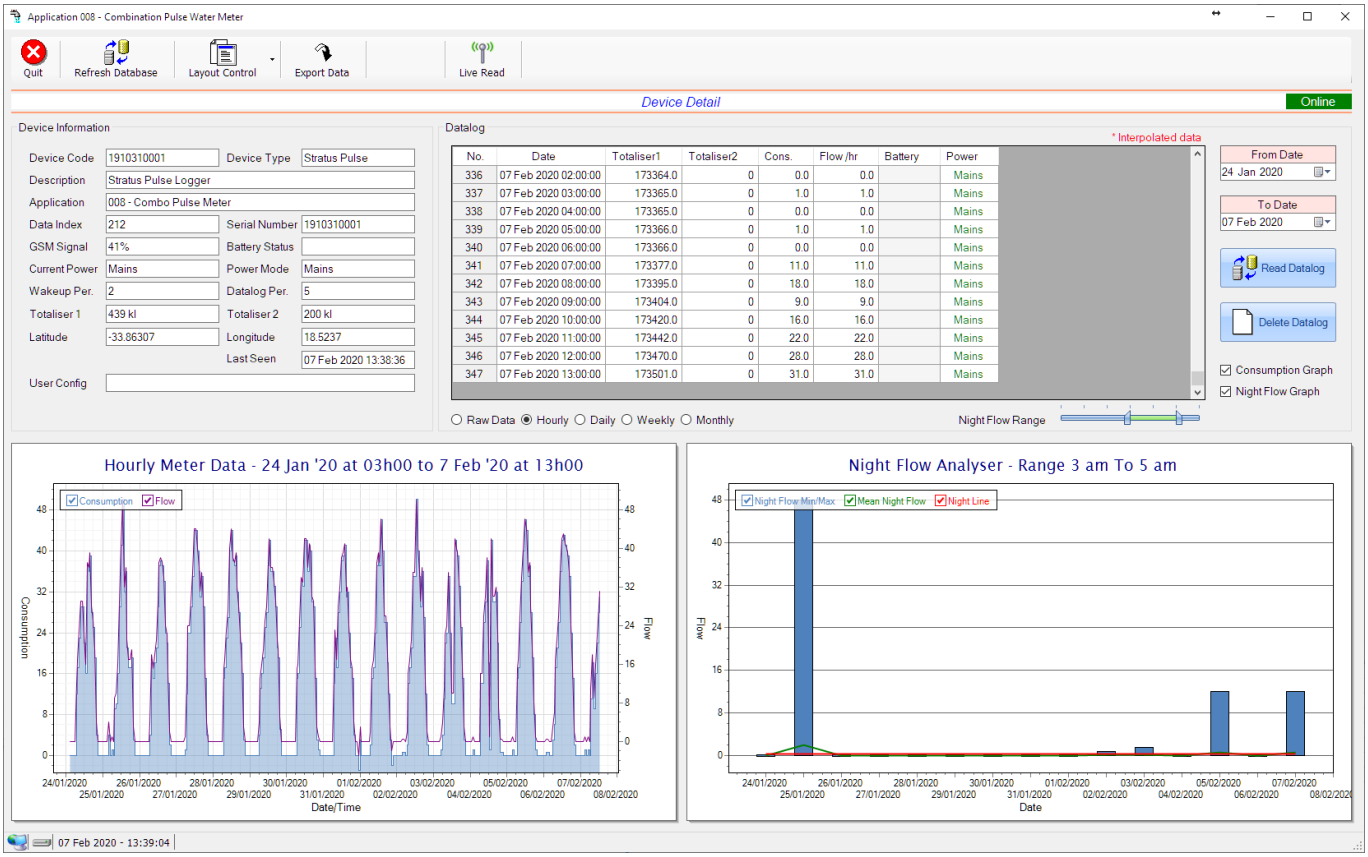
You can zoom into a range of the data by simply selecting those records in the table. This will result in the graph at the bottom being updated to display only those readings.

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

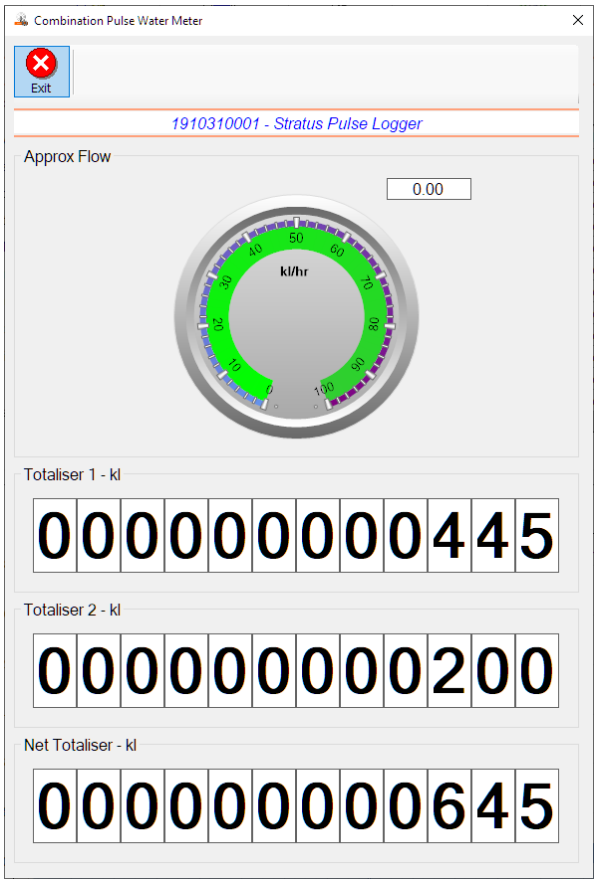


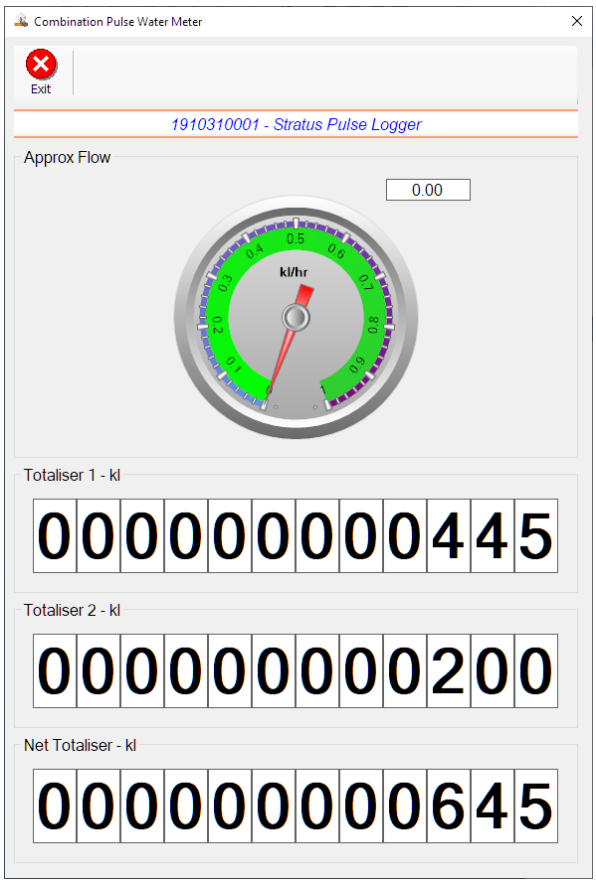

This application type is used in combination water meter type sites. A combination meter normally consists of a water measurement point consisting of two water meters. A larger meter for measuring the bulk flow of the water and a smaller one to measure the lower flows which are normally missed on large 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:-

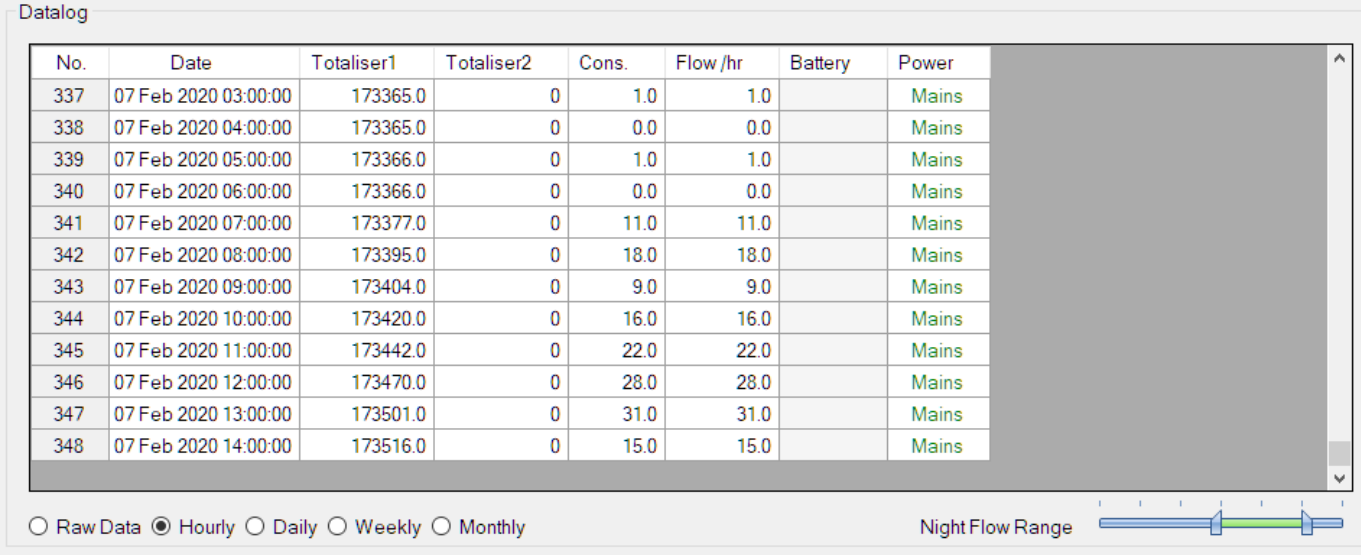
| Information | Notes |
|---|---|
| **Device Code** | The Device Code assigned to this particular remote device. All communications are initiated by addressing this code. This code is unique to all remote devices and is assigned at the time of manufacture. |
| **Device Type** | Type of Remote Device. eg CDS538 Cumulus Logger etc |
| **Description** | 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. |
| **Application** | Selected device application. Application 008 - Combination Pulse Water Meter function in this case. |
| **Data Index** | 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. |
| **Serial Number** | Serial number of this device - assigned in the factory. |
| **GSM Signal** | Signal strength of the last GSM communications, expressed as a percentage. |
| **Battery Status** | 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). |
| **Current Power** | 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. |
| **Power Mode** | Selected Power Mode under which the remote device is operating. This can be Battery, Mains or Dual power modes. |
| **Wakeup Per.** | The Wakeup Period set in minutes. Refer to the device configuration chapter for an explanation of this parameter. |
| **Datalog Per.** | The Datalog Period set minutes. Refer to the device configuration chapter for an explanation of this parameter. |
| **Totaliser 1** | The current Totaliser 1 reading with its relevant pulse weight implemented including the unit of measure. |
| **Totaliser 2** | The current Totaliser 2 reading with its relevant pulse weight implemented including the unit of measure. |
| **Last Seen** | The date and time the remote device was last seen connecting into the server. |
| **Latitude** | Captured device Latitude. |
| **Longitude** | 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.

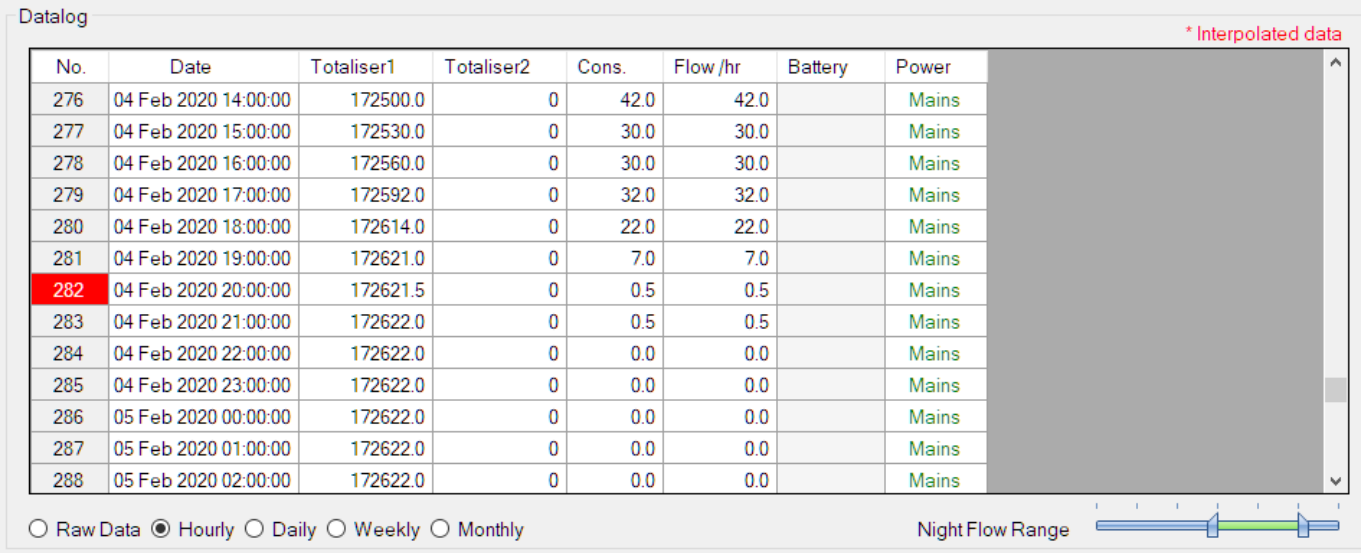
This application will record the following data in the datalog.




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



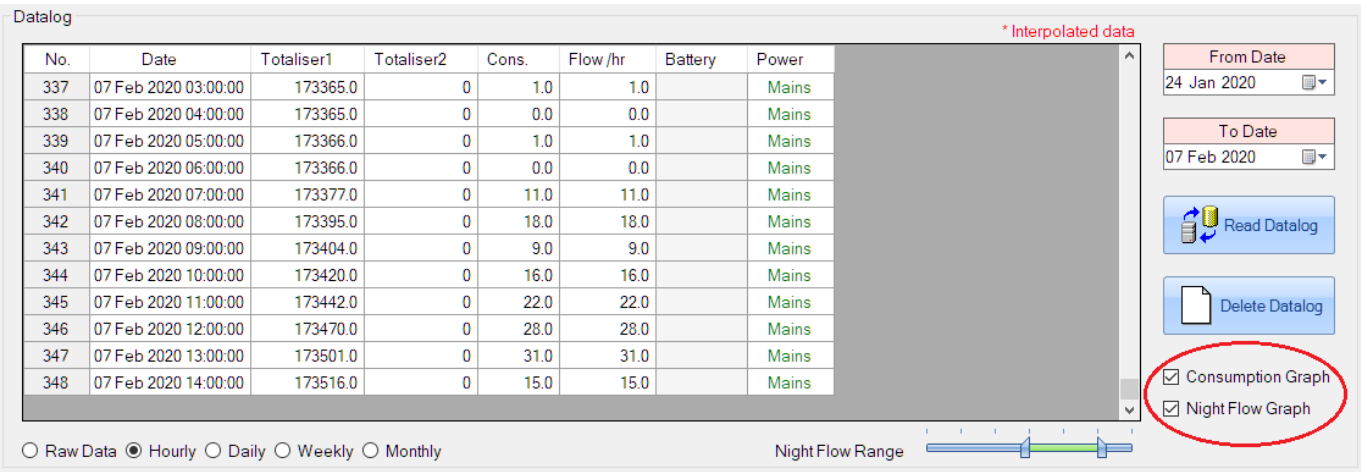

| No. | Date | Totaliser1 | Totaliser2 | Cons. | Flow /hr | Battery | Power |
|---|---|---|---|---|---|---|---|
| 276 | 04 Feb 2020 14:00:00 | 172500.0 | 0 | 42.0 | 42.0 | | Mains |
| 277 | 04 Feb 2020 15:00:00 | 172530.0 | 0 | 30.0 | 30.0 | | Mains |
| 278 | 04 Feb 2020 16:00:00 | 172560.0 | 0 | 30.0 | 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 |

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.

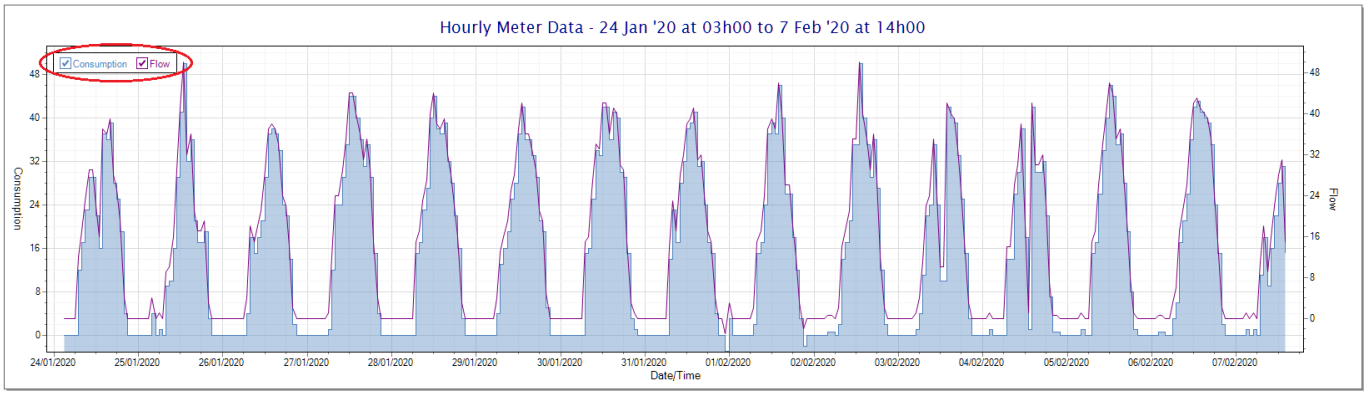
Deleting the datalog or removing a range of records can be easily done by using the 'Delete Datalog' button. To delete a range, simply select the range in the datalog table and press the 'Delete Datalog' button. If no range is selected, it will be assumed that you wish to delete the entire datalog. There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

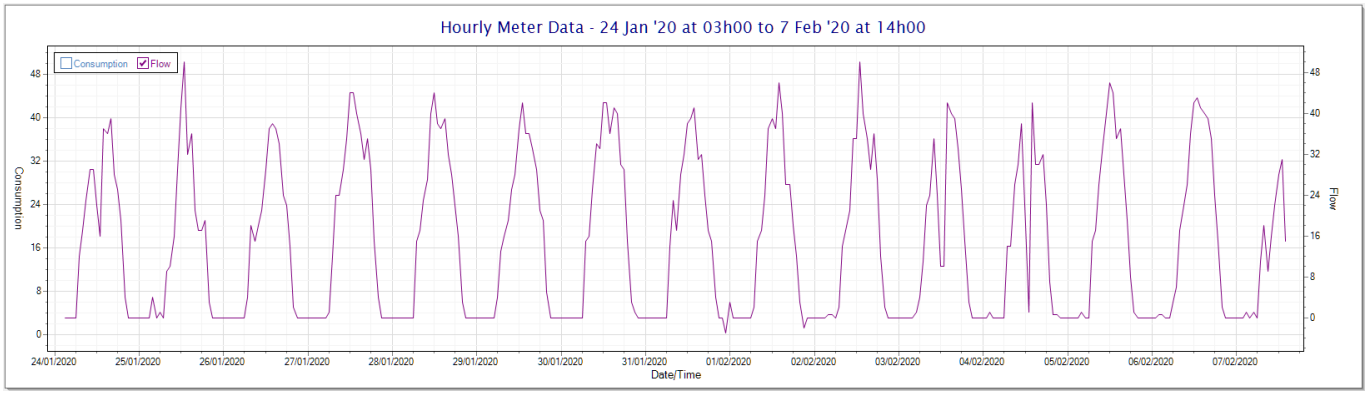



| No. | Date | Totaliser1 | Totaliser2 | Cons. | Flow /hr | Battery | Power |
|---|---|---|---|---|---|---|---|
| 337 | 07 Feb 2020 03:00:00 | 173365.0 | 0 | 1.0 | 1.0 | | Mains |
| 338 | 07 Feb 2020 04:00:00 | 173365.0 | 0 | 0.0 | 0.0 | | Mains |
| 339 | 07 Feb 2020 05:00:00 | 173366.0 | 0 | 1.0 | 1.0 | | 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 |

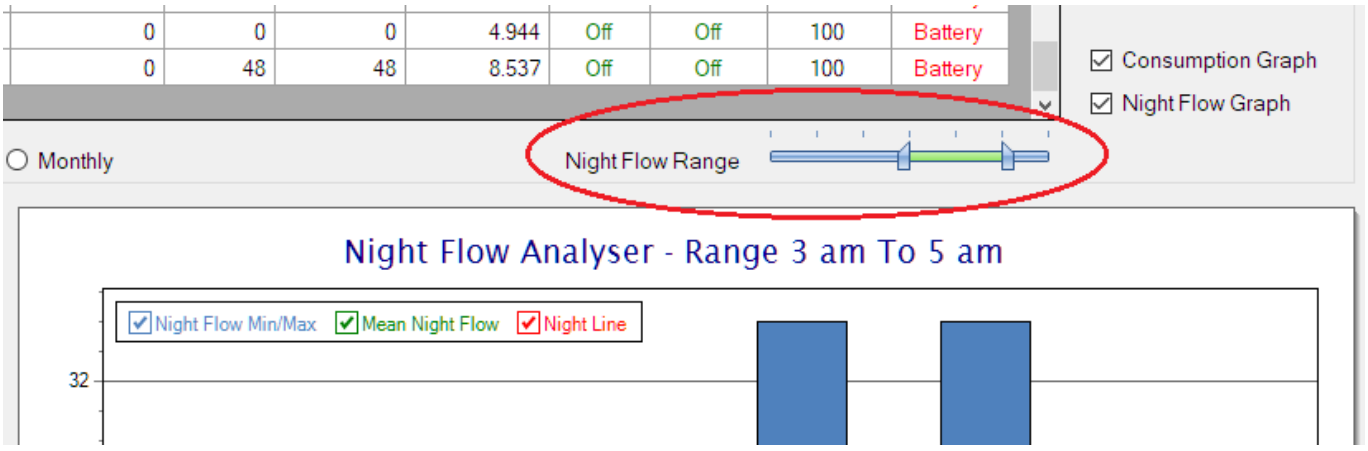
The Consumption Graph displays the consumption and flow related data. Individual graph series can be switched off/on by selecting the ticks at the top left of the graph.




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.



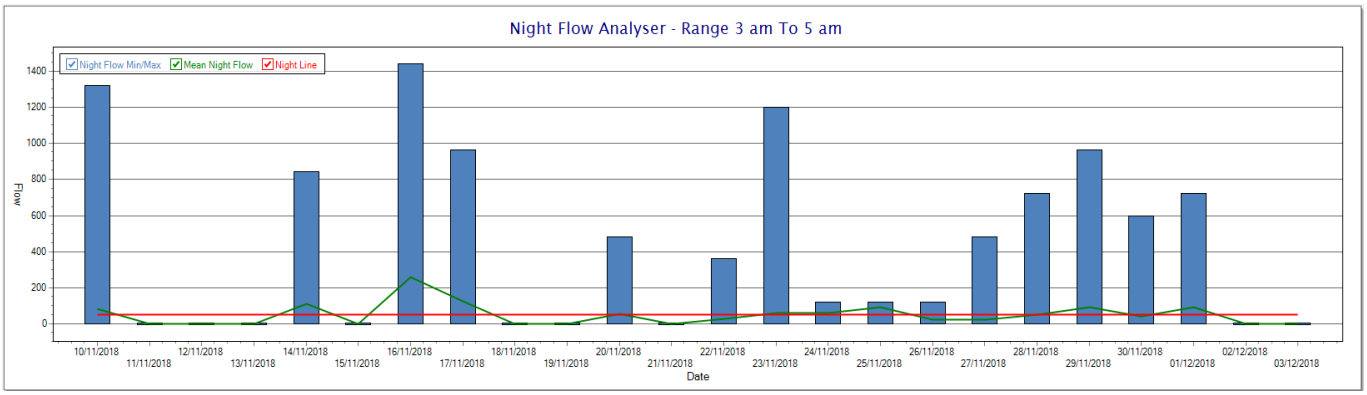

The graph will show a couple of different series.

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

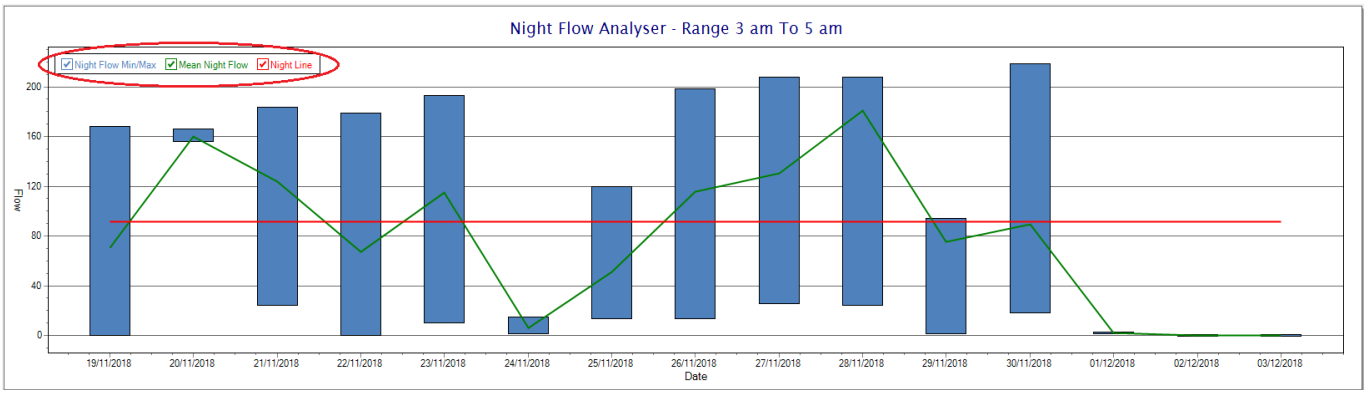
therefore sit on the base of the graph. The maximum flow would simply indicate some consumption during the period of measure and is not really a concern unless that was not expected.

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:-

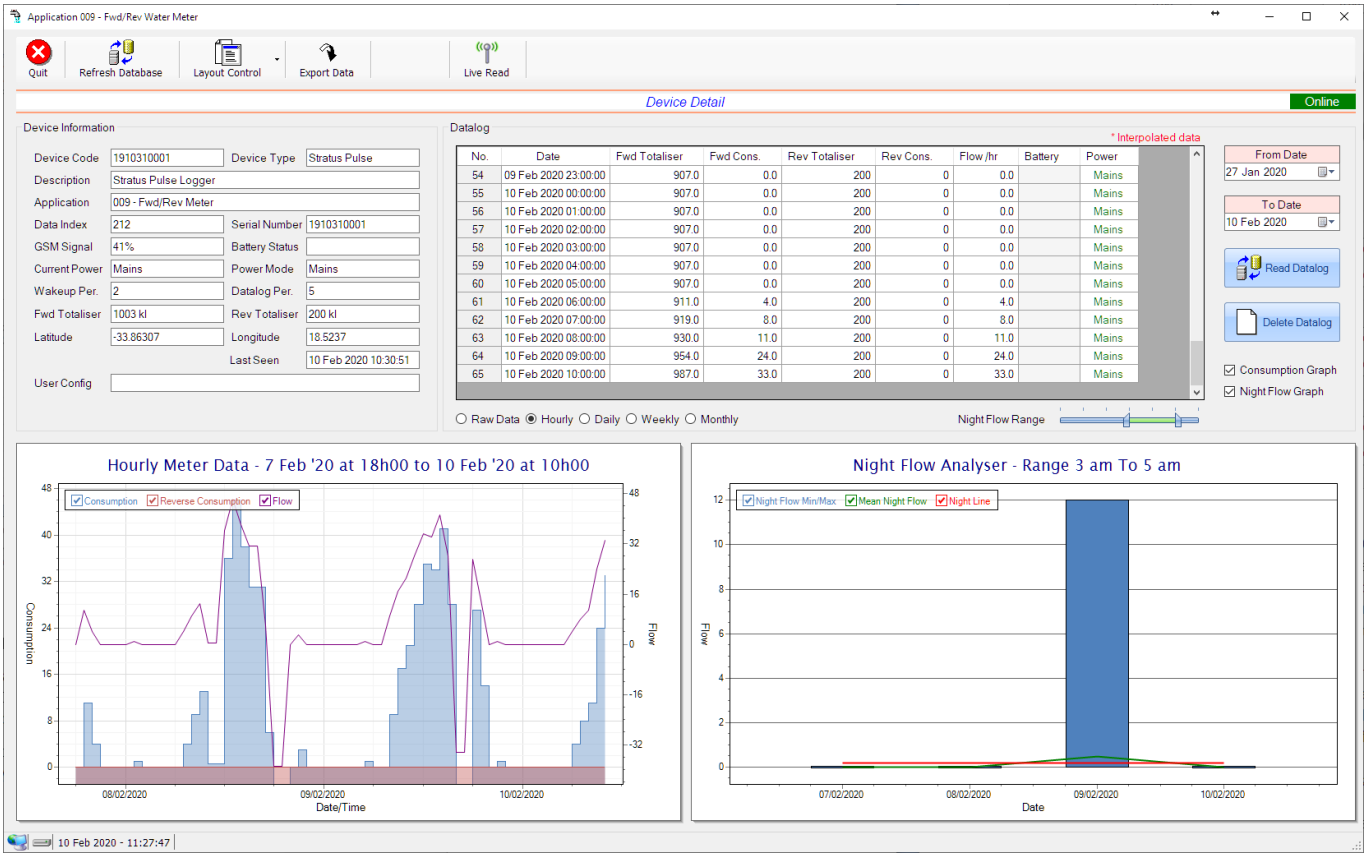



During a possible leak situation, the minimum night flow does not return to zero and the graph will appear to bounce off the bottom.




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

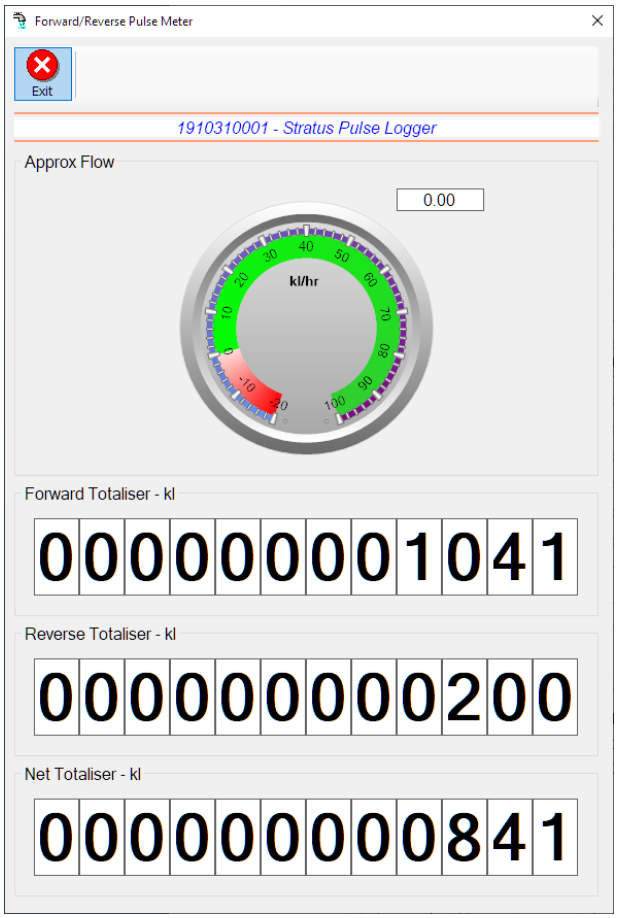


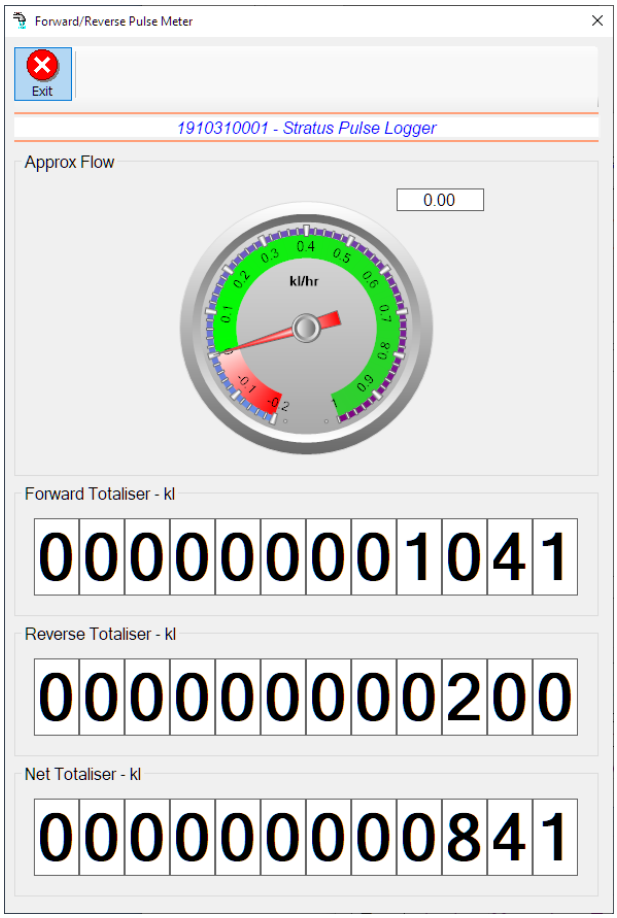

This type would be selected for applications that are used on a forward/reverse pulse water meter. The actual consumption is normally the difference of the two totaliser readings and are handled as such in this application type.

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.

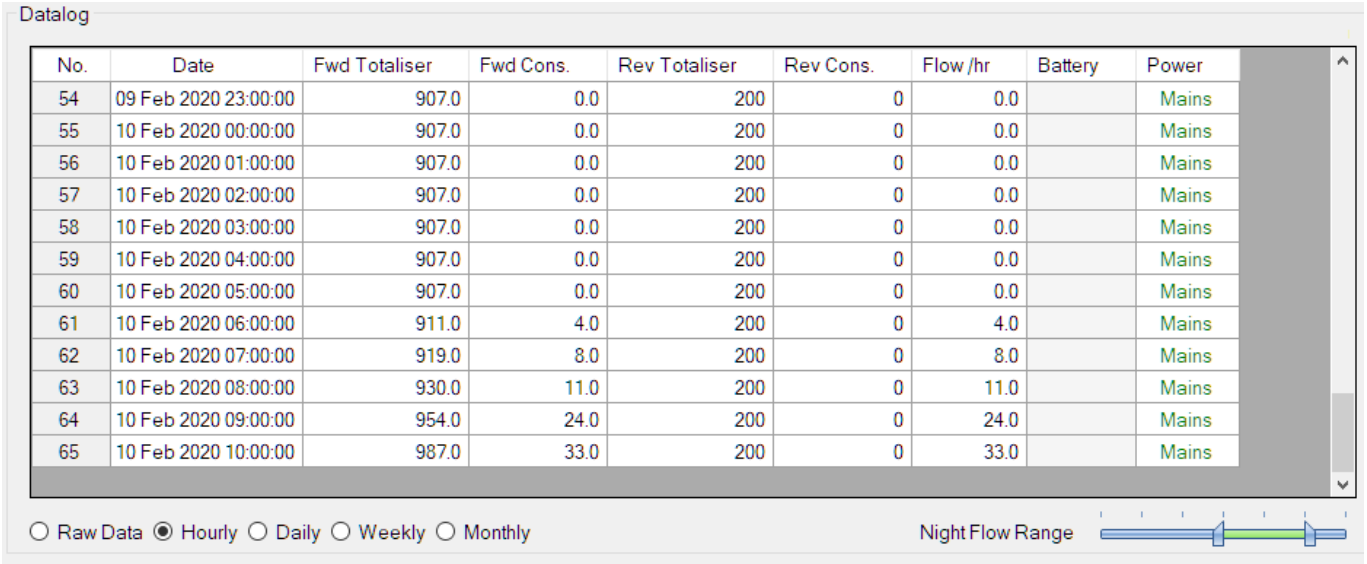
This data is as follows:-

| Information | Notes |
|---|---|
| **Device Code** | 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. |
| **Device Type** | Type of Remote Device. eg CDS538 Cumulus Logger etc |
| **Description** | 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. |
| **Application** | Selected device application. Application 002 - Forward/Reverse Pulse Water Meter + Pressure function in this case. |
| **Data Index** | 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. |
| **Serial Number** | Serial number of this device - assigned in the factory. |
| **GSM Signal** | Signal strength of the last GSM communications, expressed as a percentage. |
| **Battery Status** | 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). |
| **Current Power** | 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. |
| **Power Mode** | Selected Power Mode under which the remote device is operating. This can be Battery, Mains or Dual power modes. |
| **Wakeup Per.** | The Wakeup Period set in minutes. Refer to the device configuration chapter for an explanation of this parameter. |
| **Datalog Per.** | The Datalog Period set minutes. Refer to the device configuration chapter for an explanation of this parameter. |
| **Fwd Totaliser** | The current Forward Totaliser reading with its relevant pulse weight implemented including the unit of measure. |
| **Rev Totaliser** | The current Reverse Totaliser reading with its relevant pulse weight implemented including the unit of measure. |
| **Last Seen** | The date and time the remote device was last seen connecting into the server. |
| **Latitude** | Captured device Latitude. |
| **Longitude** | 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 | 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 |

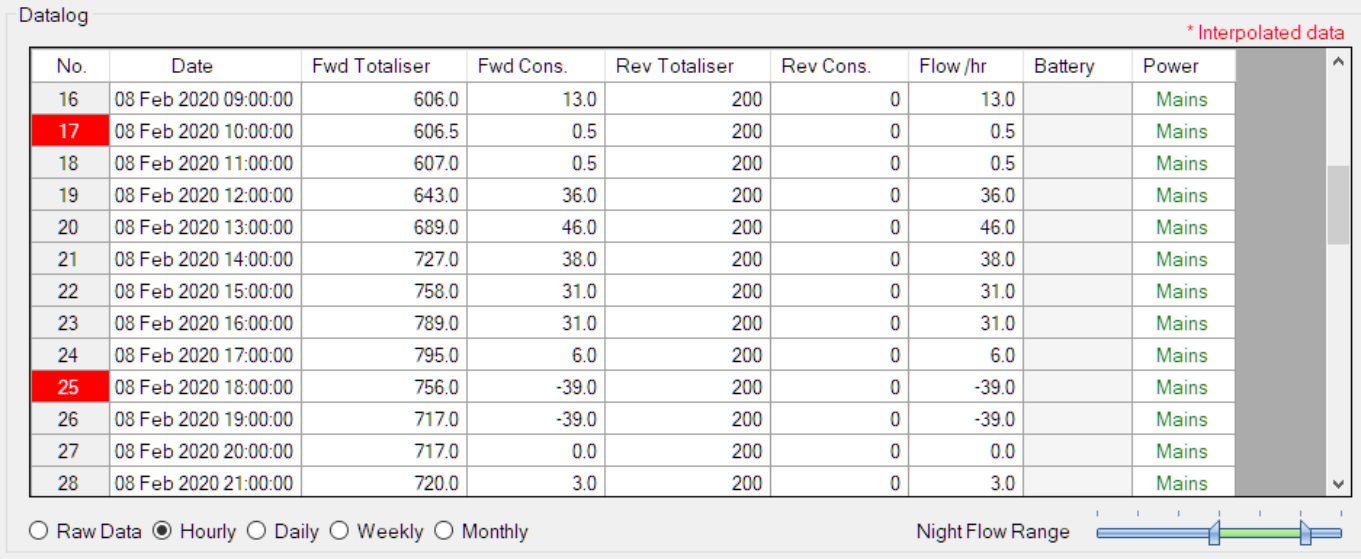
Raw Data Hourly Daily Weekly Monthly

Night Flow Range

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



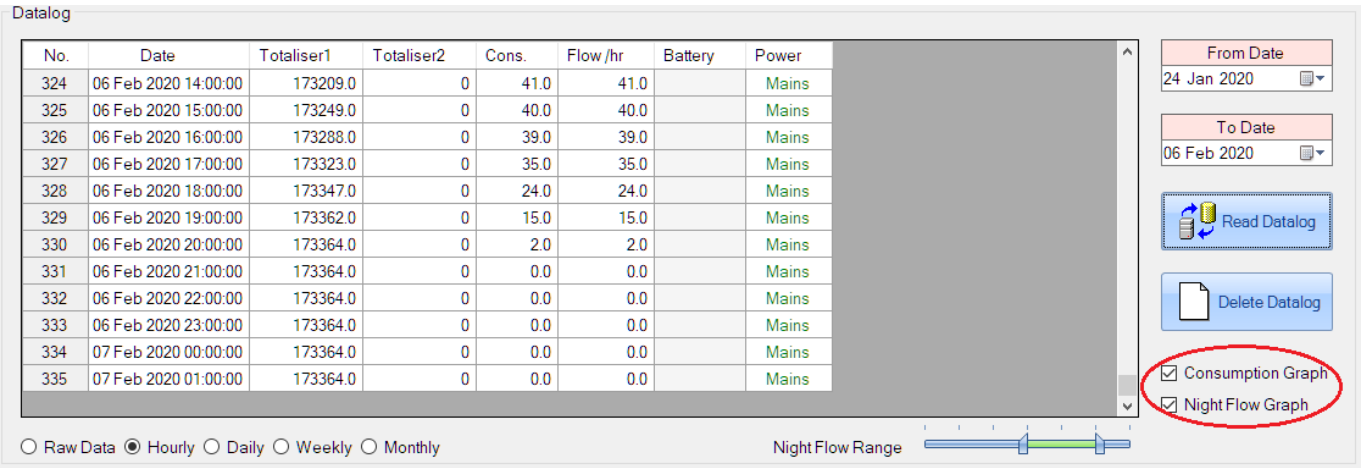

| No. | Date | Fwd Totaliser | Fwd Cons. | Rev Totaliser | Rev Cons. | Flow /hr | Battery | Power |
|---|---|---|---|---|---|---|---|---|
| 16 | 08 Feb 2020 09:00:00 | 606.0 | 13.0 | 200 | 0 | 13.0 | | Mains |
| 17 | 08 Feb 2020 10:00:00 | 606.5 | 0.5 | 200 | 0 | 0.5 | | Mains |
| 18 | 08 Feb 2020 11:00:00 | 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 |

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.

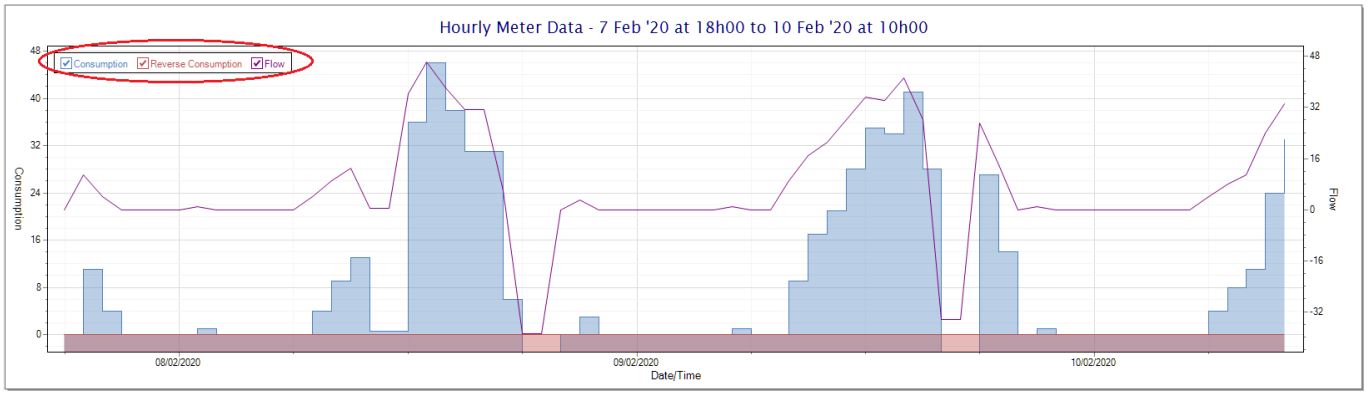
Deleting the datalog or removing a range of records can be easily done by using the 'Delete Datalog' button. To delete a range, simply select the range in the datalog table and press the 'Delete Datalog' button. If no range is selected, it will be assumed that you wish to delete the entire datalog. There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

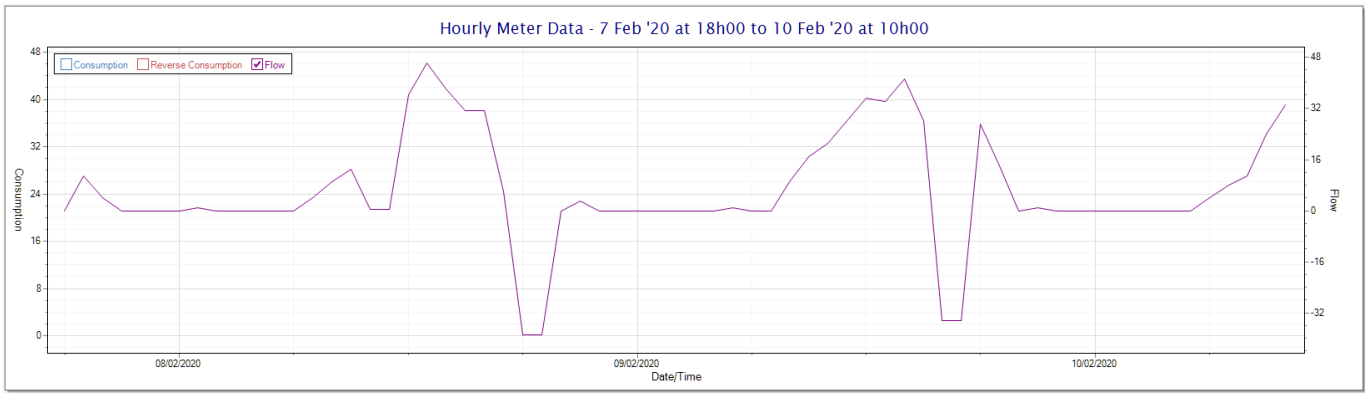



| No. | Date | Totaliser1 | Totaliser2 | Cons. | Flow /hr | Battery | Power |
|---|---|---|---|---|---|---|---|
| 324 | 06 Feb 2020 14:00:00 | 173209.0 | 0 | 41.0 | 41.0 | | Mains |
| 325 | 06 Feb 2020 15:00:00 | 173249.0 | 0 | 40.0 | 40.0 | | Mains |
| 326 | 06 Feb 2020 16:00:00 | 173288.0 | 0 | 39.0 | 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 |

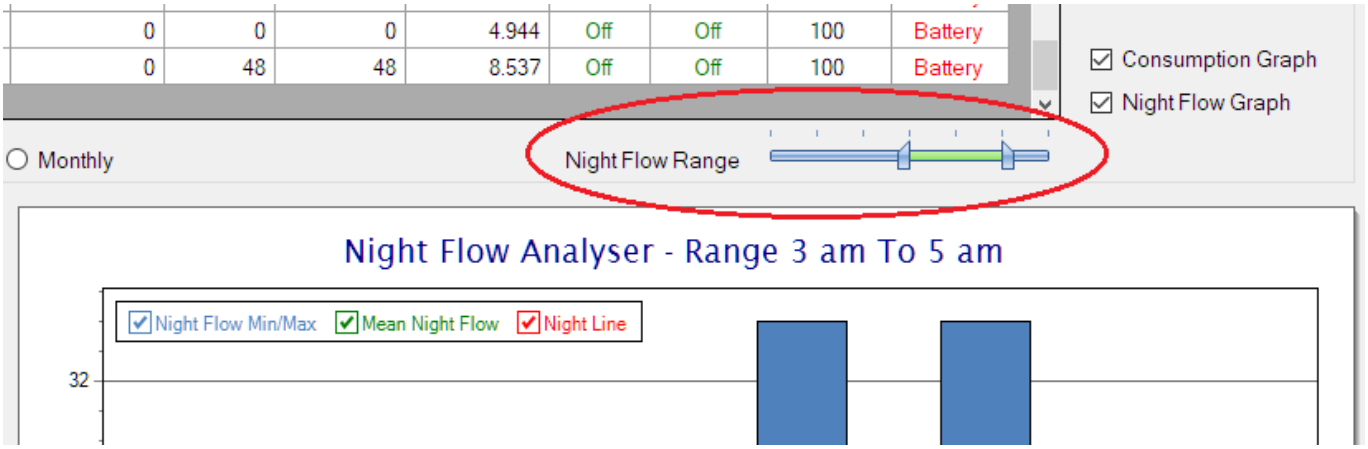
The Consumption Graph displays the consumption, pressure and flow related data. Individual graph series can be switched off/on by selecting the ticks at the top left of the graph.




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.



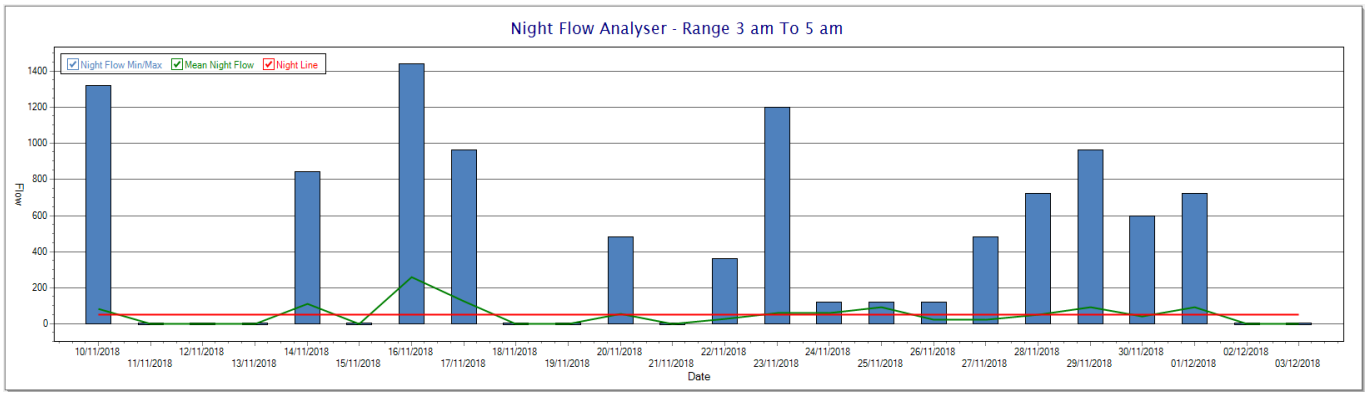

The graph will show a couple of different series.

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

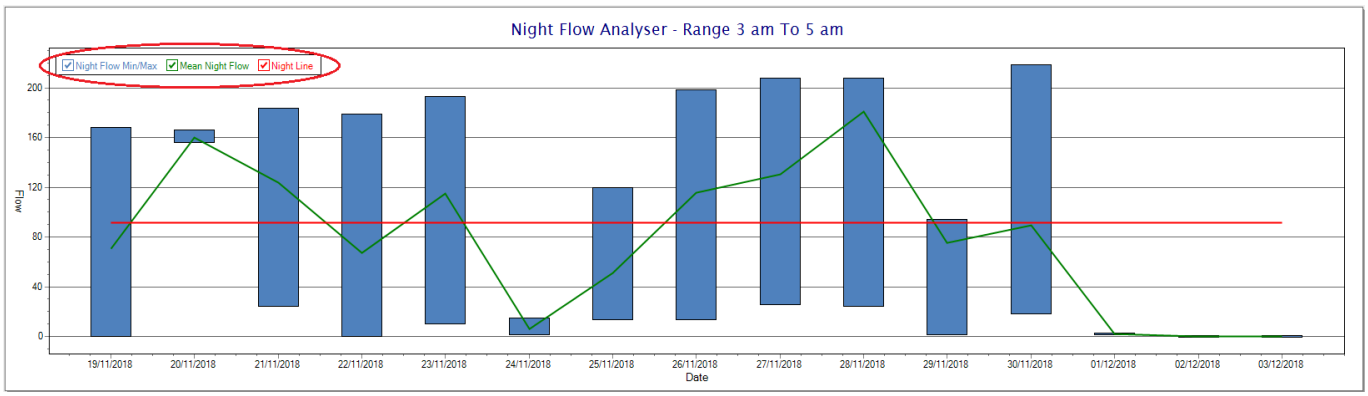
therefore sit on the base of the graph. The maximum flow would simply indicate some consumption during the period of measure and is not really a concern unless that was not expected.

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:-

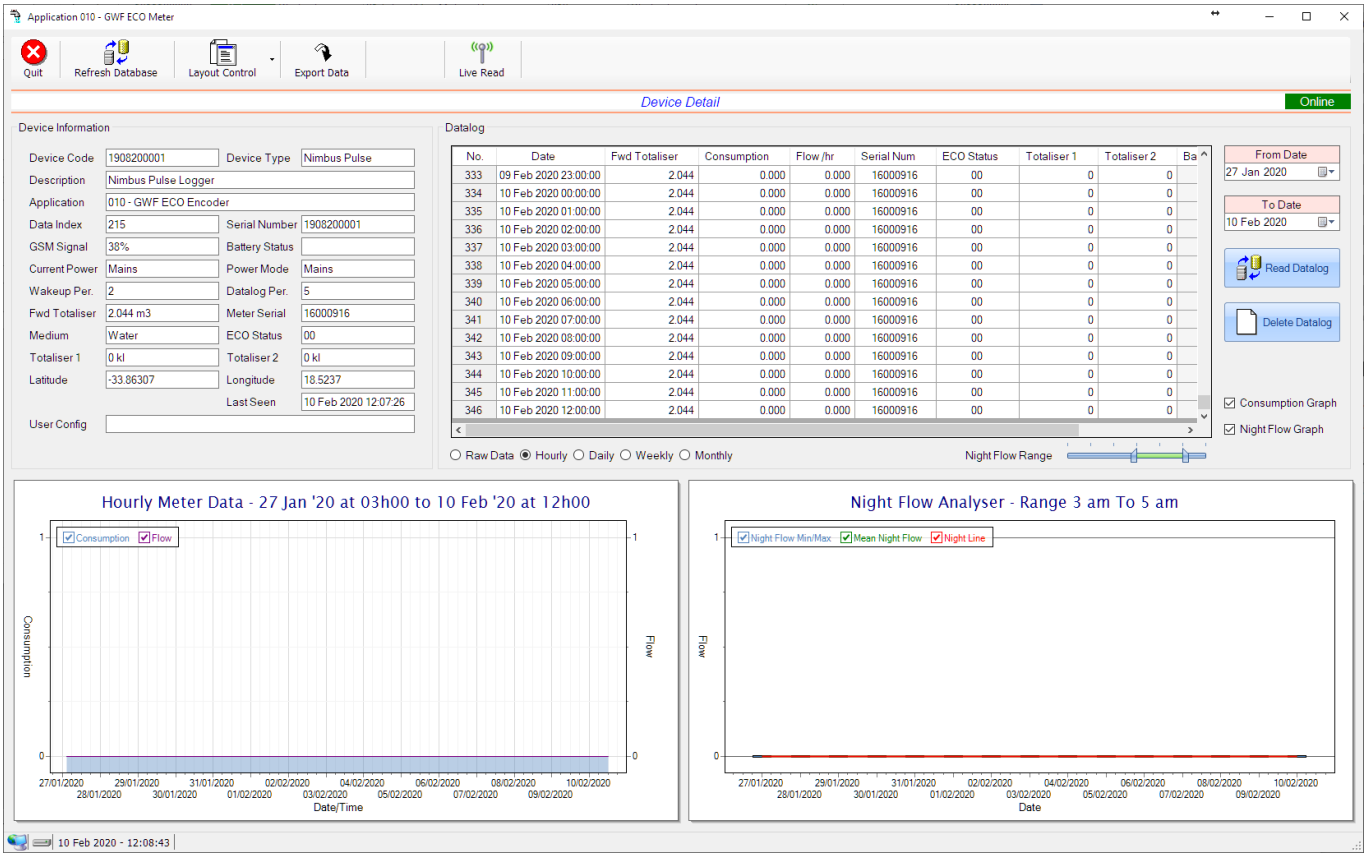



During a possible leak situation, the minimum night flow does not return to zero and the graph will appear to bounce off the bottom.




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.

## 2.8.11 Application 010 - GWF ECO Encoder Meter



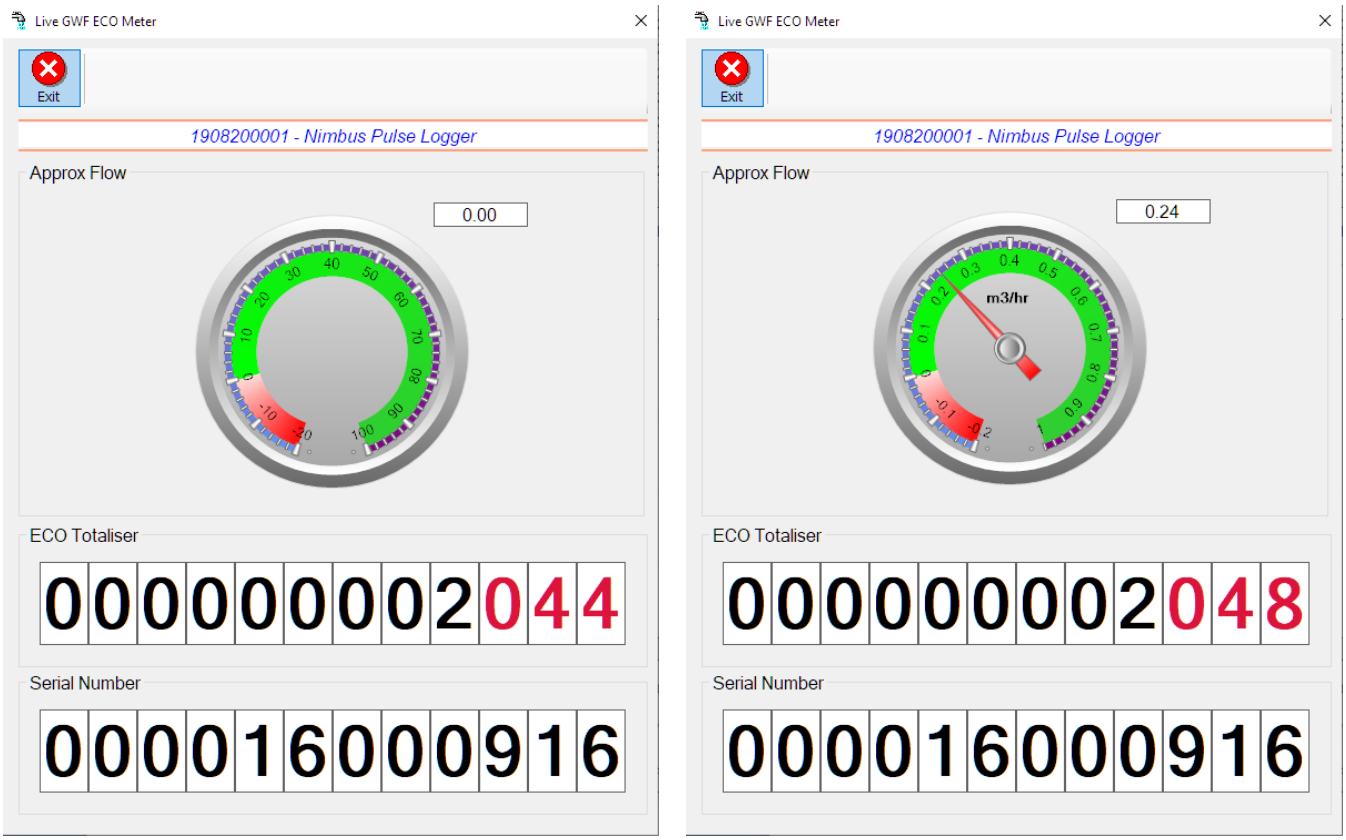

This type would be selected for applications that are using GWF ECO interface type meters.

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 |
|---|---|
| **Device Code** | 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. |
| **Device Type** | Type of Remote Device. eg CDS538 Cumulus Logger etc |
| **Description** | The description is a user defined parameter that is captured during the setup of each device. This would normally be something that |

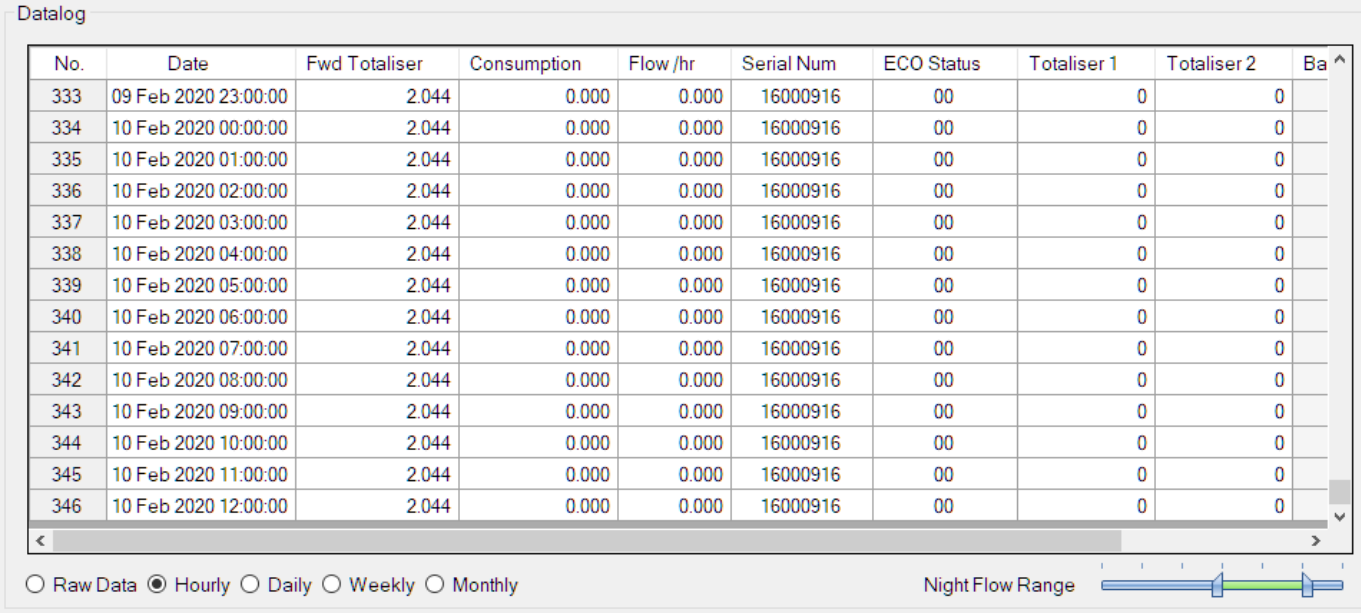
| | |
|---|---|
| | would describe the location or application of this particular device. |
| **Application** | Selected device application. Application 004 - GWF ECO Meter + Loop function in this case. |
| **Data Index** | As each device is captured on to Cloudworks system, it is assigned a unique data 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. |
| **Serial Number** | Serial number of this device - assigned in the factory. |
| **GSM Signal** | Signal strength of the last GSM communications, expressed as a percentage. |
| **Battery Status** | 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). |
| **Current Power** | 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. |
| **Power Mode** | Selected Power Mode under which the remote device is operating. This can be Battery, Mains or Dual power modes. |
| **Wakeup Per.** | The Wakeup Period set in minutes. Refer to the device configuration chapter for an explanation of this parameter. |
| **Datalog Per.** | The Datalog Period set minutes. Refer to the device configuration chapter for an explanation of this parameter. |
| **Forward Totaliser** | Meter forward totaliser read from the ECO interface. |
| **Meter Serial** | Meter serial number read from the ECO interface. |
| **Totaliser 1** | The current Totaliser 1 reading with its relevant pulse weight implemented including the unit of measure. |
| **Totaliser 2** | The current Totaliser 2 reading with its relevant pulse weight implemented including the unit of measure. |
| **Medium** | Measurement medium (eg water, hot water etc) read from the ECO interface. |
| **Last Seen** | The date and time the remote device was last seen connecting into the server. |
| **Latitude** | Captured device Latitude. |
| **Longitude** | 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

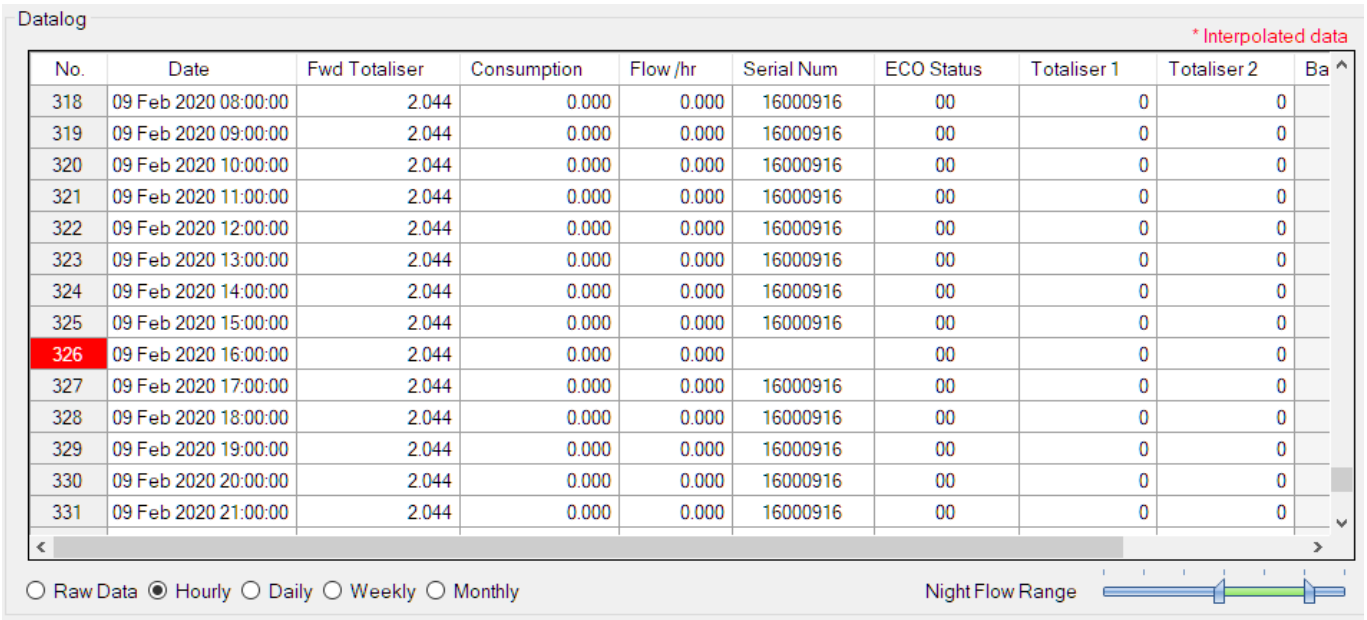
| No. | Date | Fwd Totaliser | Consumption | Flow /hr | Serial Num | ECO Status | Totaliser 1 | Totaliser 2 | Ba |
|---|---|---|---|---|---|---|---|---|---|
| 333 | 09 Feb 2020 23:00:00 | 2.044 | 0.000 | 0.000 | 16000916 | 00 | 0 | 0 | |
| 334 | 10 Feb 2020 00:00:00 | 2.044 | 0.000 | 0.000 | 16000916 | 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 |
|---|---|
| **Date/Time** | Date and time of the datalog record. |
| **Fwd Totaliser** | Forward Totaliser reading. |
| **Consumption** | The effective 'consumption' as the difference between this current reading and the previous reading. |
| **Flow/hr** | Flow rate calculated as volume per hour. |
| **Serial Number** | Serial Number of the meter at the time of the read. |
| **Totaliser 1** | Totaliser 1 reading. |
| **Totaliser 2** | Totaliser 2 reading. |
| **ECO Status** | Status of the ECO interface at time of read. (OK or ECO Error) |
| **Battery** | Battery level in percentage. Only displayed on battery powered devices. |
| **Power** | 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.

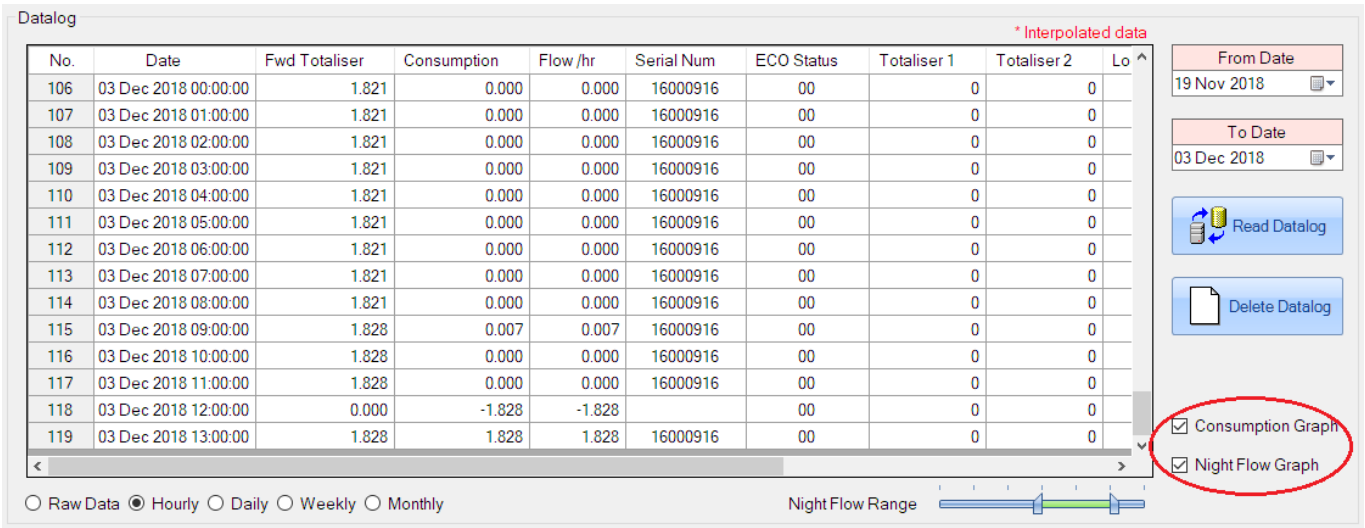



As per the previously explained functions throughout the Cloudworks suite, columns can be switched off/on and re-ordered to the users requirements. The exporting will be as per the layout presented on the screen.

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.

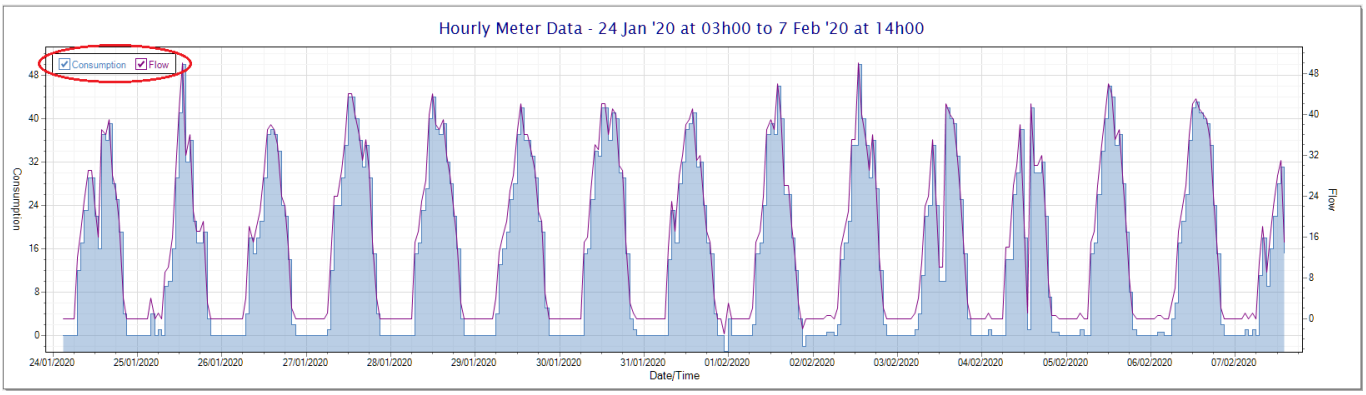
Deleting the datalog or removing a range of records can be easily done by using the 'Delete Datalog' button. To delete a range, simply select the range in the datalog table and press the 'Delete Datalog' button. If no range is selected, it will be assumed that you wish to delete the entire datalog. There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

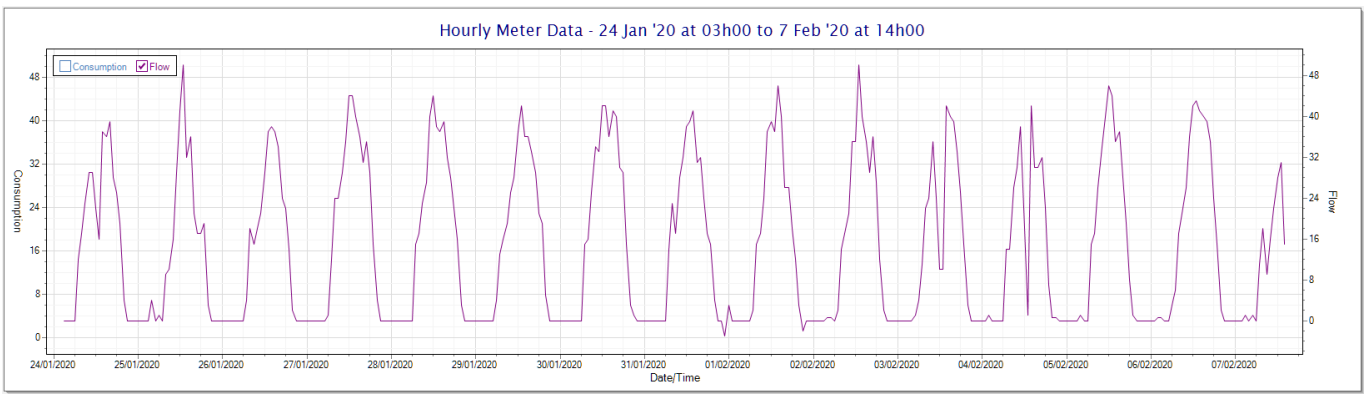



| No. | Date | Fwd Totaliser | Consumption | Flow /hr | Serial Num | ECO Status | Totaliser 1 | Totaliser 2 | Lo |
|---|---|---|---|---|---|---|---|---|---|
| 106 | 03 Dec 2018 00:00:00 | 1.821 | 0.000 | 0.000 | 16000916 | 00 | 0 | 0 | |
| 107 | 03 Dec 2018 01:00:00 | 1.821 | 0.000 | 0.000 | 16000916 | 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 | |

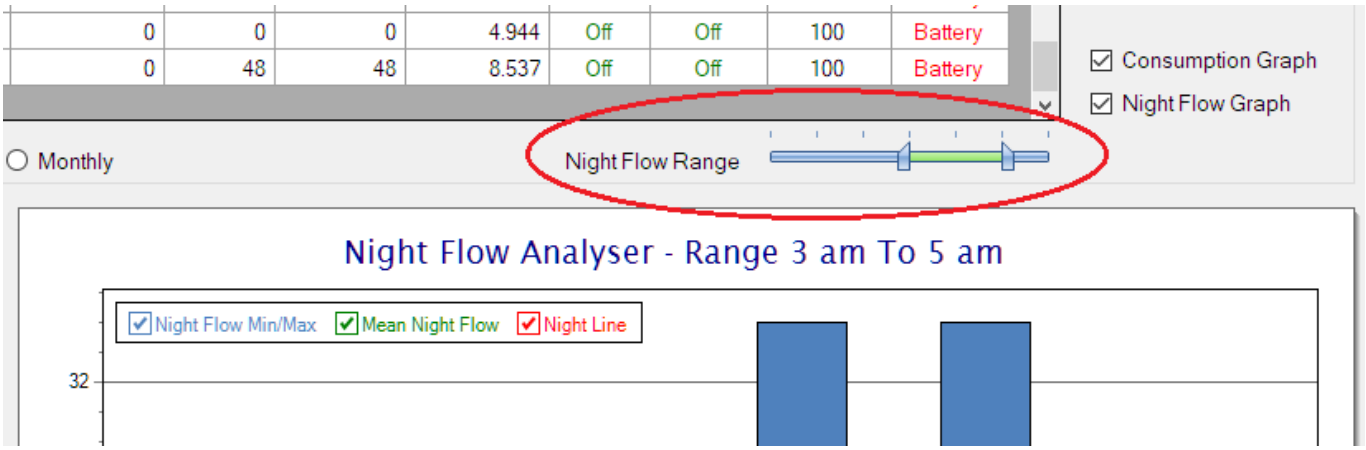
The Consumption Graph displays the consumption, pressure and flow related data. Individual graph series can be switched off/on by selecting the ticks at the top left of the graph.




To view the flow only would look like this:-



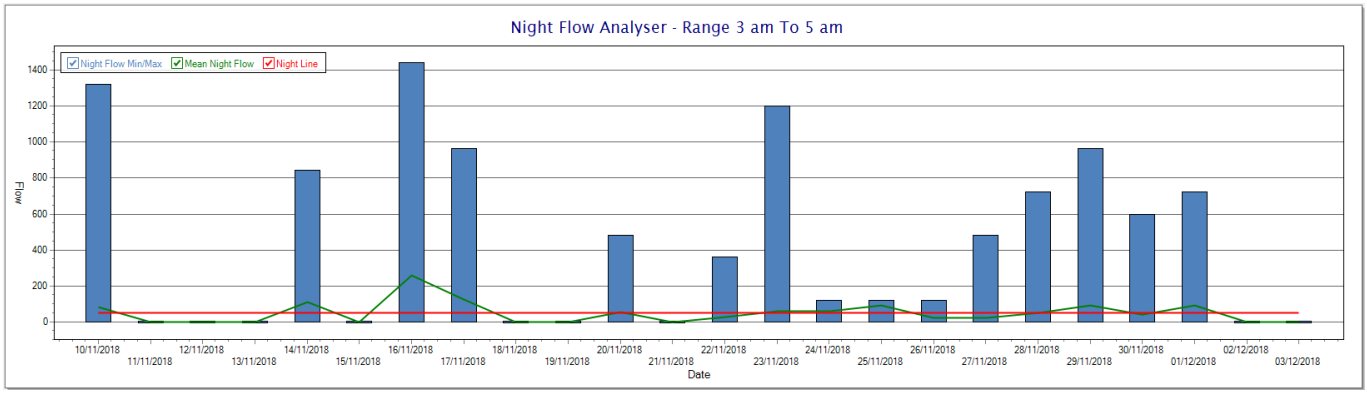
Also displayed is the Night Flow graph. The function of this graph is to specifically analyse the night time water flows at an installation. This analysis is done based on the data received during a specific time period during the night (normally from 3am to 5am). This period for analysis can be adjusted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



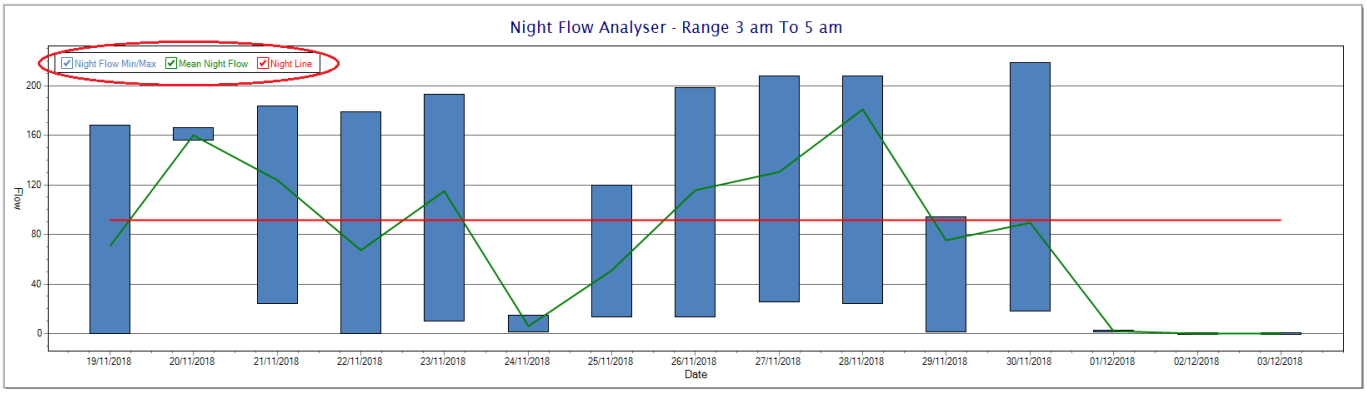

The graph will show a couple of different series.

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.

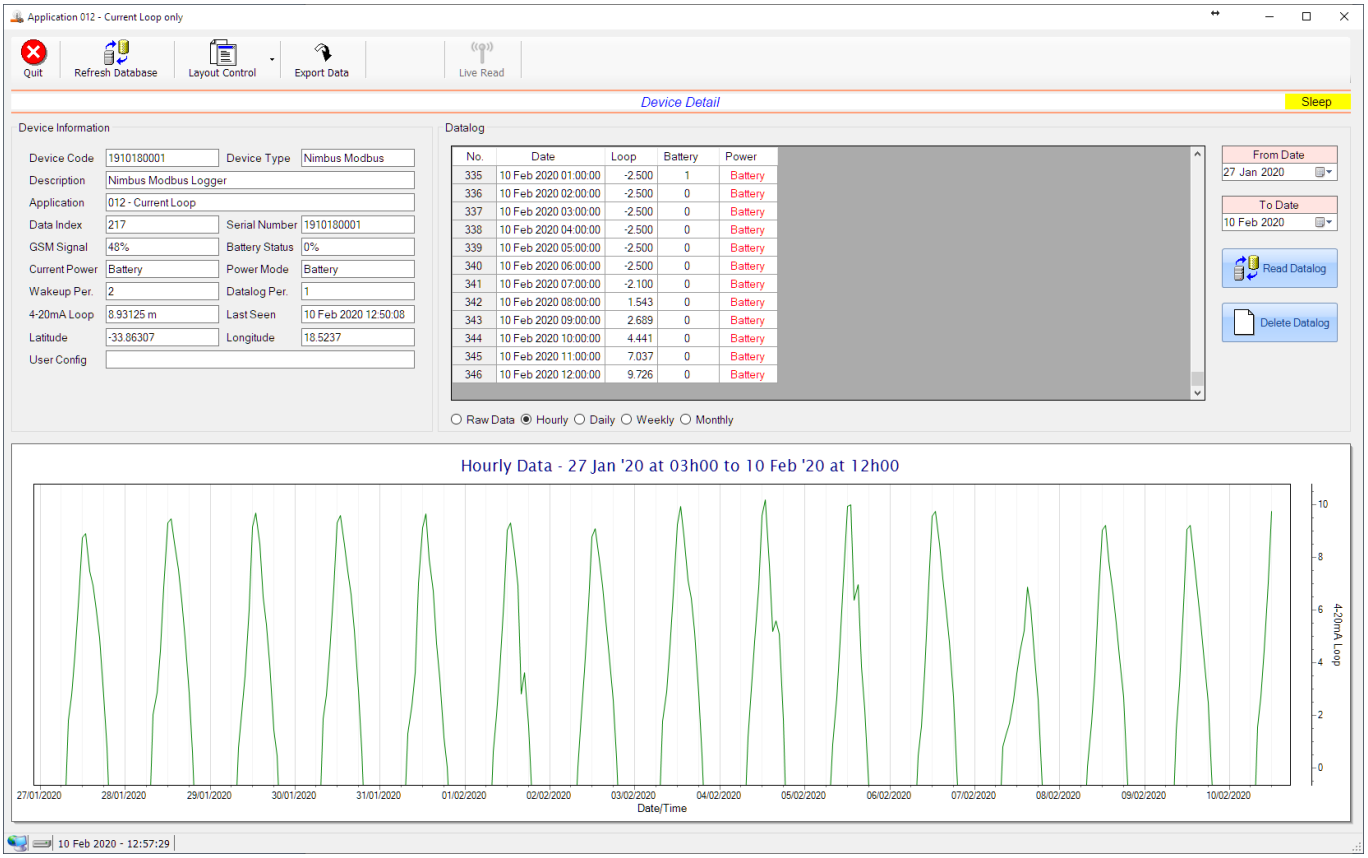



So, at a quick glance it is possible to see if there is a problem at this installation. As per the Consumption Graph, the different graph series can be switched off/on by clicking the series ticks on the top left hand corner.

### 2.8.12 Application 011 - GWF Sonico Meter

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

### 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.

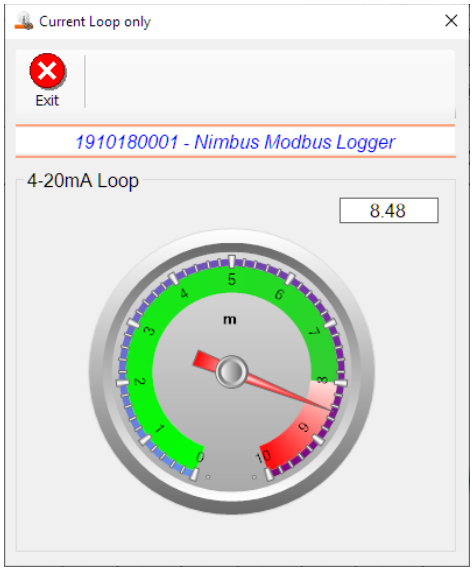
Functions on the top menu bar are mostly as per previous screens within the Cloudworks suite. These would be the 'Refresh Database', 'Layout Control' and 'Export Data' buttons which have been explained earlier. Added functionality is the 'Live Read', button.

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:-

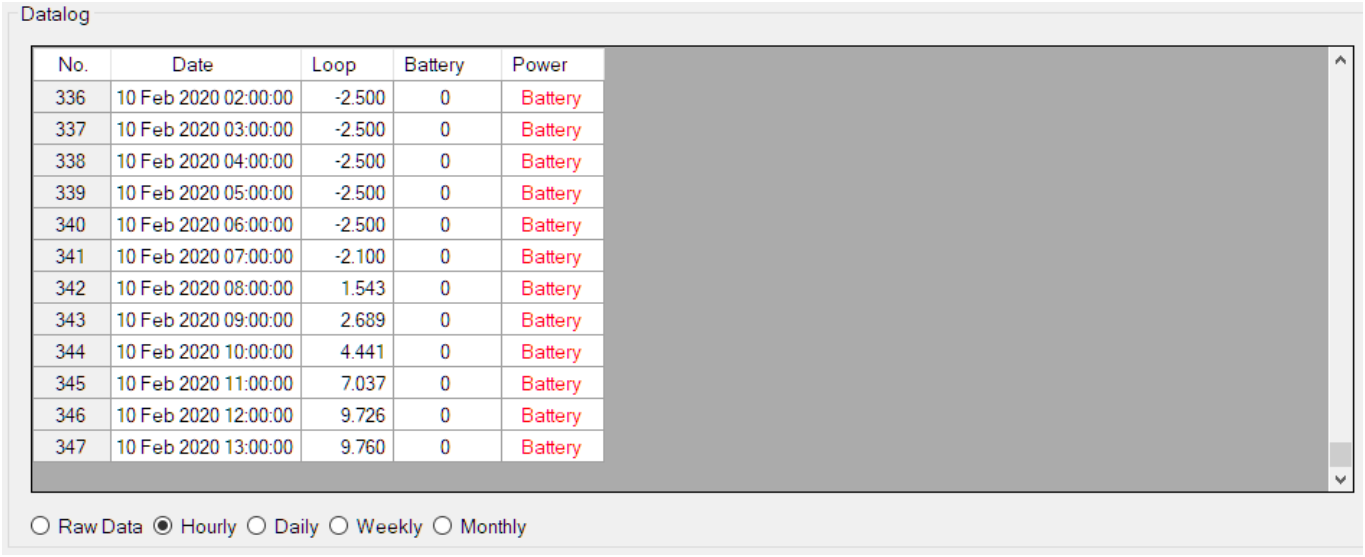
| Information | Notes |
|---|---|
| **Device Code** | The Device Code assigned to this particular remote device. All communications are initiated by addressing this code. This code is unique to all remote devices and is assigned at the time of manufacture. |
| **Device Type** | Type of Remote Device. eg CDS538 Cumulus Logger etc |
| **Description** | 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. |
| **Application** | Selected device application. Application 000 - Basic Cumulus function in this case. |
| **Data Index** | 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. |
| **Serial Number** | Serial number of this device - assigned in the factory. |
| **GSM Signal** | Signal strength of the last GSM communications, expressed as a percentage. |

| | |
|---|---|
| **Battery Status** | 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). |
| **Current Power** | 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. |
| **Power Mode** | Selected Power Mode under which the remote device is operating. This can be Battery, Mains or Dual power modes. |
| **Wakeup Per.** | The Wakeup Period set in minutes. Refer to the device configuration chapter for an explanation of this parameter. |
| **Datalog Per.** | The Datalog Period set in minutes. Refer to the device configuration chapter for an explanation of this parameter. |
| **4-20mA Loop** | The 4-20mA current loop reading with its calibration data implemented including the unit of measure. |
| **Last Seen** | The date and time the remote device was last seen connecting into the server. |
| **Latitude** | Captured device Latitude. |
| **Longitude** | 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.

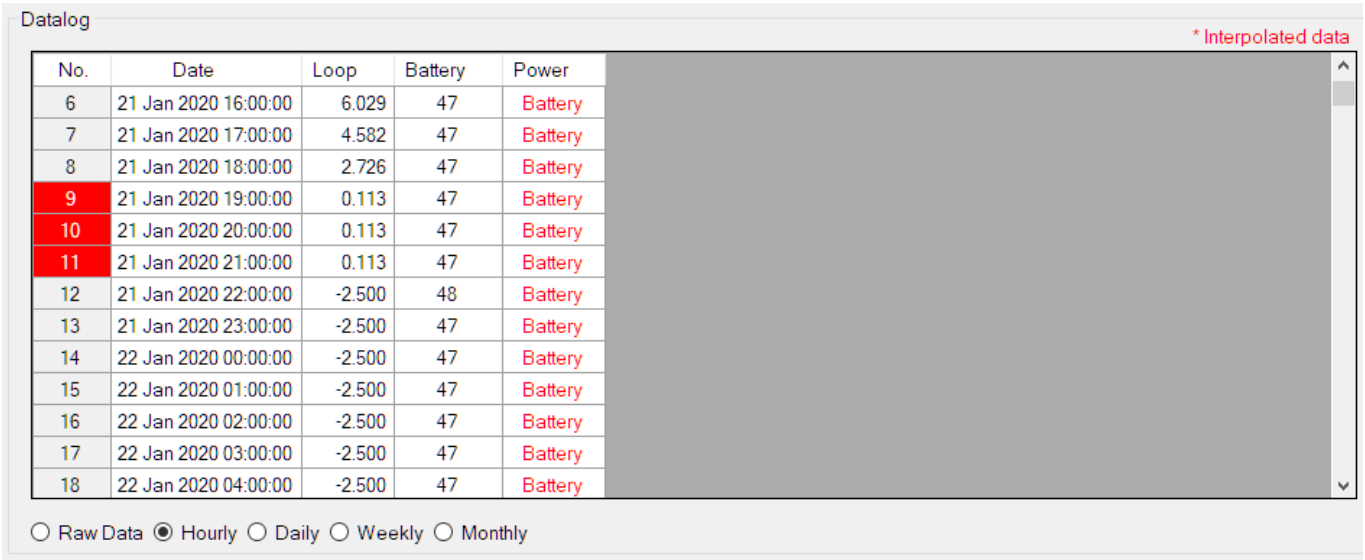
To the right of screen is the Datalog information box. This box will be populated with the most recent data from the recorded datalog of this remote device (read from the database). By default, when the screen opens, the last two weeks' worth of data will be displayed in this table. To select a different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




| Information | Notes |
|---|---|
| **Date/Time** | Date and time of the datalog record. |
| **Loop** | 4-20mA Loop reading with its applied calibration. |
| **Battery** | Battery level in percentage. Only displayed on battery powered devices. |
| **Power** | 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.

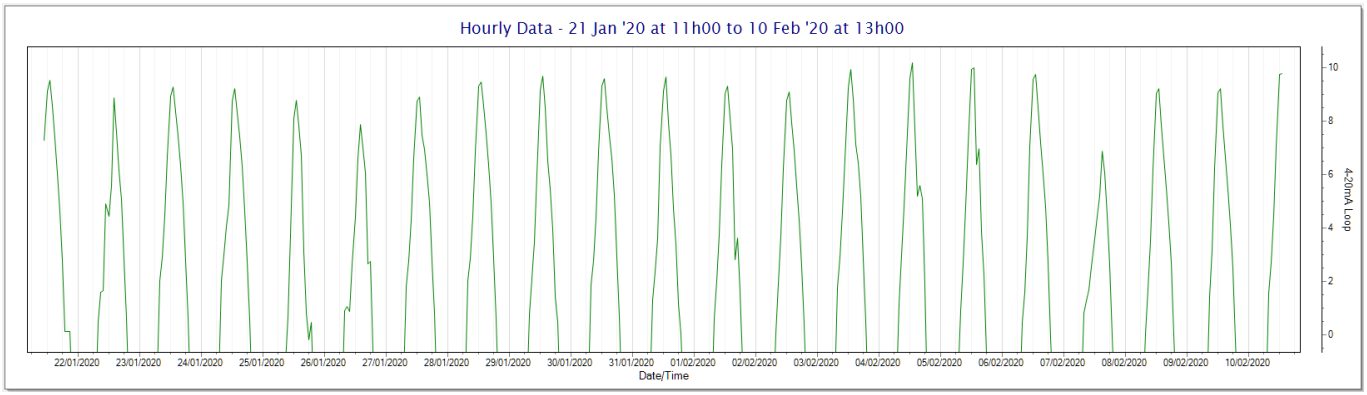


As per the previously explained functions throughout the Cloudworks suite, columns can be switched off/on and re-ordered to the users requirements. The exporting will be as per the layout presented on the screen.

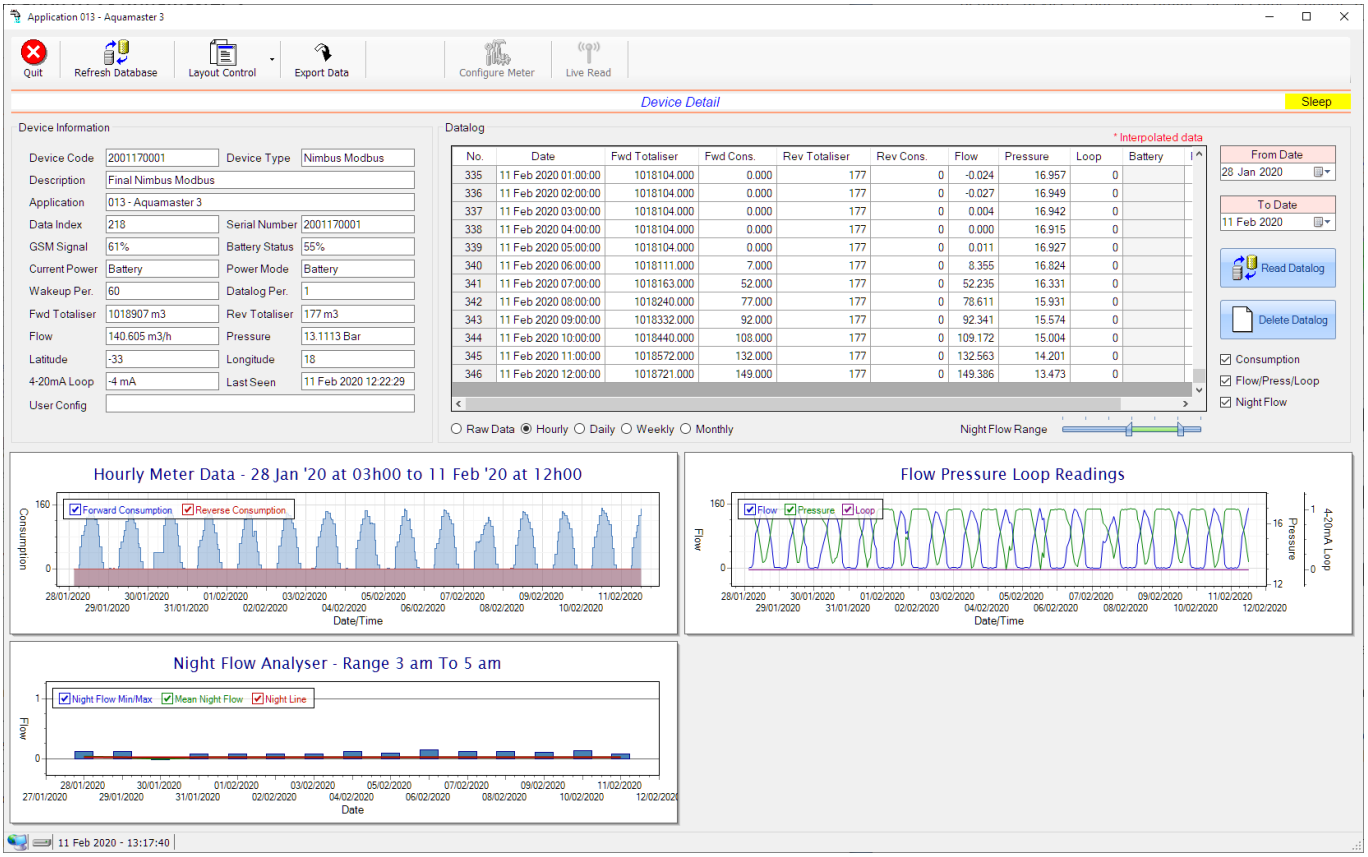
You can zoom into a range of the data by simply selecting those records in the table. This will result in the graph at the bottom being updated to display only those readings.

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



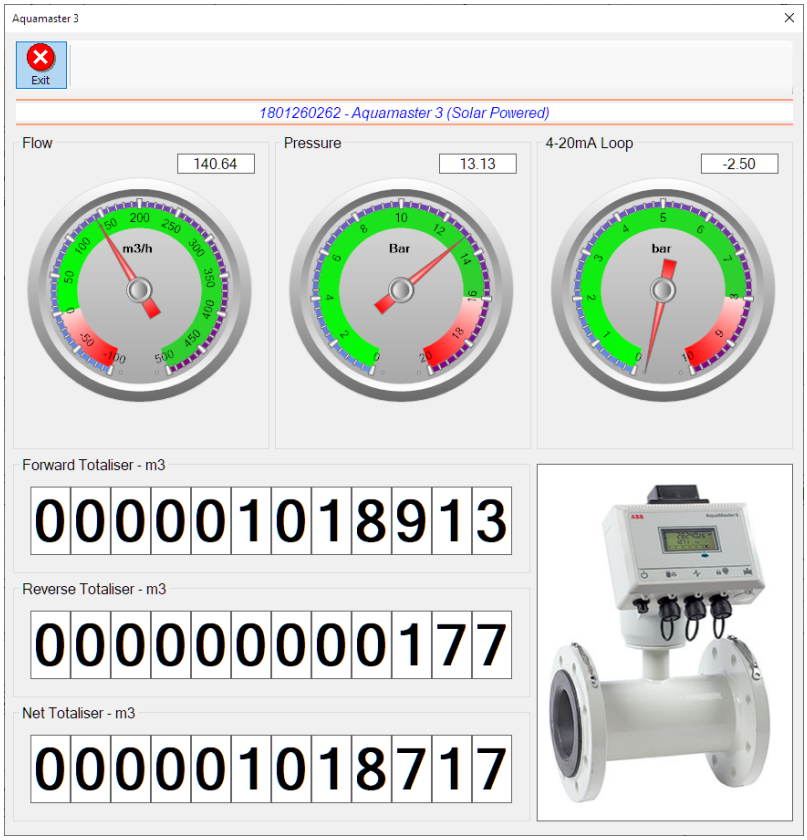

This type would be selected for applications that are used on an ABB Aquamaster 3 water meter connected to the Modbus interface. Forward/Reverse Totals, Flow and Pressure are read directly from the interface of the meter.

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:-

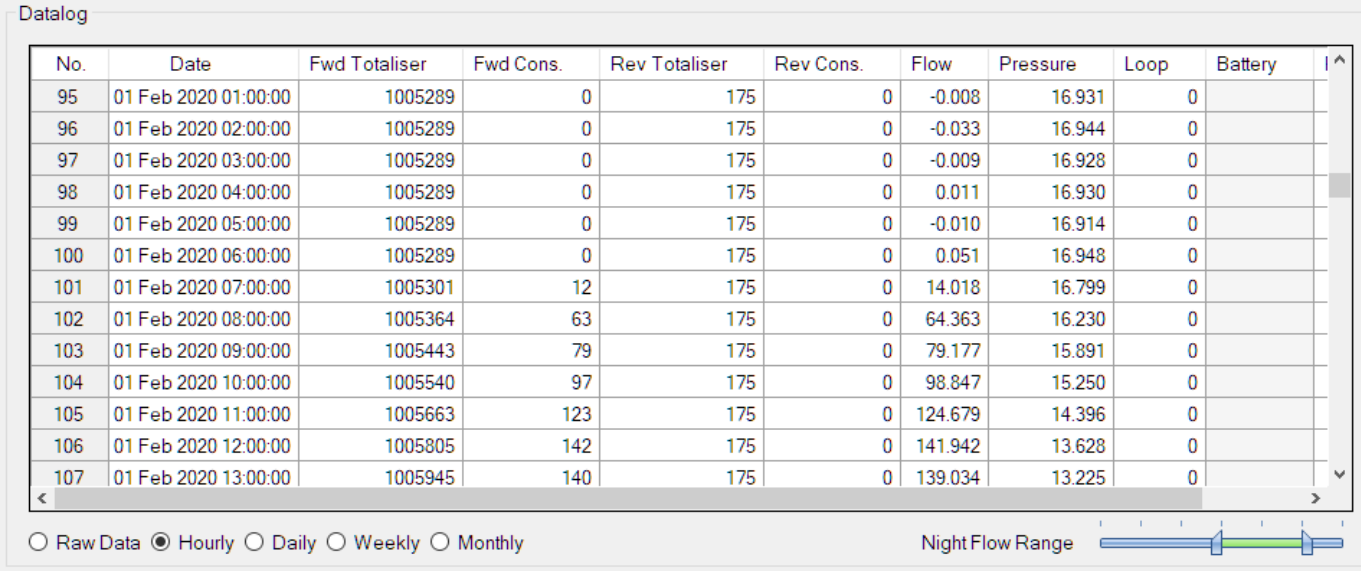
| Information | Notes |
|---|---|
| **Device Code** | The Device Code assigned to this particular remote device. All communications are initiated by addressing this code. This code is unique to all remote devices and is assigned at the time of manufacture. |
| **Device Type** | Type of Remote Device. eg CDS538 Cumulus Logger etc |
| **Description** | 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. |
| **Application** | Selected device application. Application 003 - Aquamaster 3 function in this case. |

| | |
|---|---|
| **Data Index** | 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. |
| **Serial Number** | Serial number of this device - assigned in the factory. |
| **GSM Signal** | Signal strength of the last GSM communications, expressed as a percentage. |
| **Battery Status** | 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). |
| **Current Power** | 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. |
| **Power Mode** | Selected Power Mode under which the remote device is operating. This can be Battery, Mains or Dual power modes. |
| **Wakeup Per.** | The Wakeup Period set in minutes. Refer to the device configuration chapter for an explanation of this parameter. |
| **Datalog Per.** | The Datalog Period set minutes. Refer to the device configuration chapter for an explanation of this parameter. |
| **Fwd Totaliser** | The current Forward Totaliser reading. |
| **Rev Totaliser** | The current Reverse Totaliser reading. |
| **Flow** | Current flow reading. |
| **Pressure** | Current pressure reading. |
| **4-20mA Current Loop** | The 4-20mA current loop reading with its calibration data implemented including the unit of measure. |
| **Last Seen** | The date and time the remote device was last seen connecting into the server. |
| **Latitude** | Captured device Latitude. |
| **Longitude** | 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.

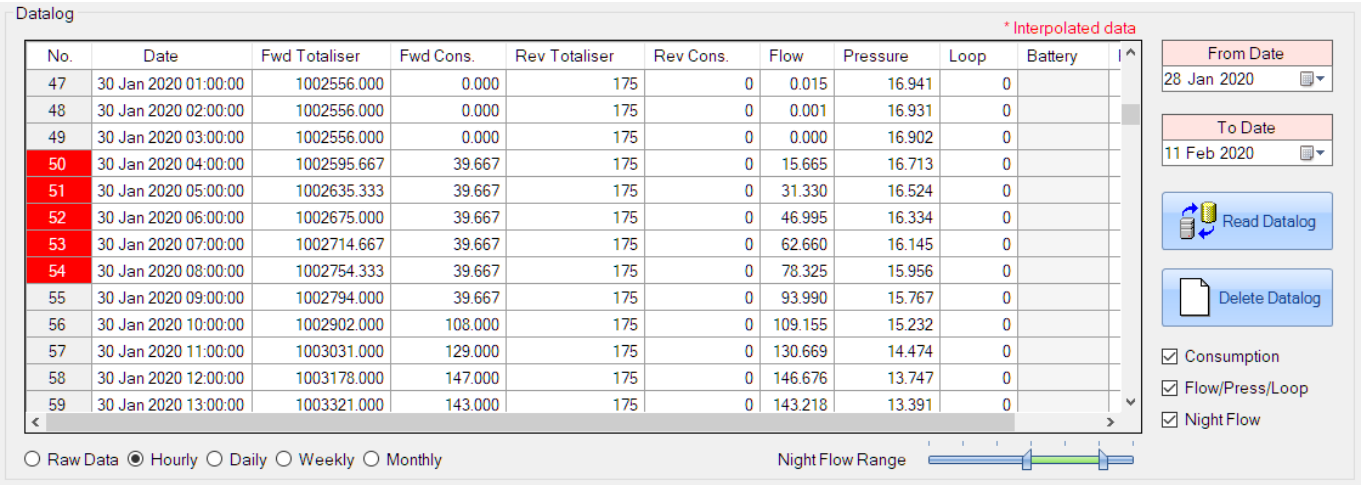
This application will record the following data in the datalog.




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



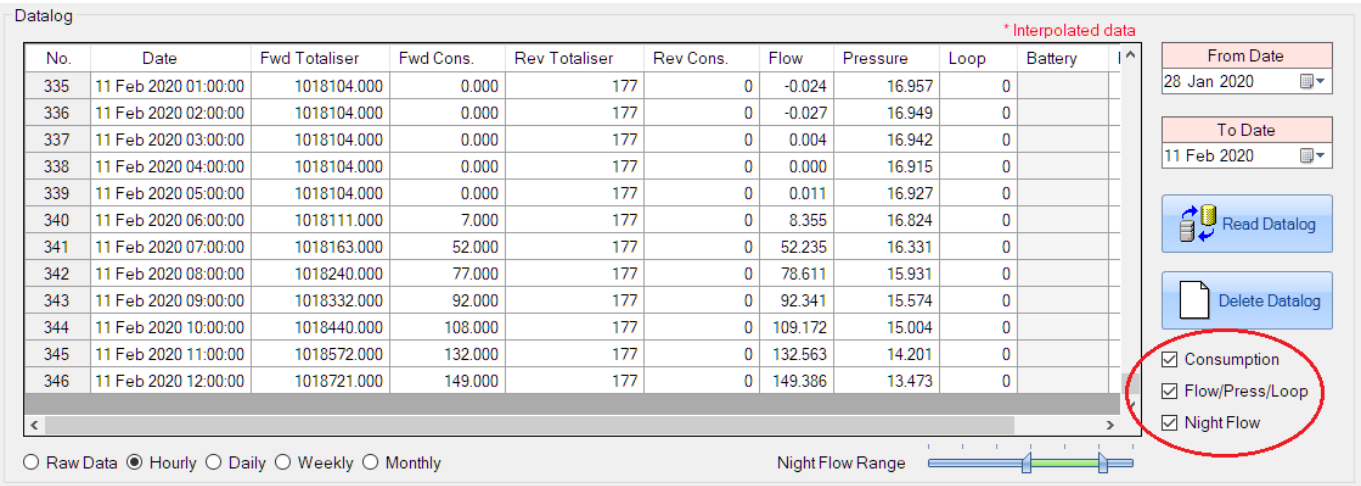

| No. | Date | Fwd Totaliser | Fwd Cons. | Rev Totaliser | Rev Cons. | Flow | Pressure | Loop | Battery |
|---|---|---|---|---|---|---|---|---|---|
| 47 | 30 Jan 2020 01:00:00 | 1002556.000 | 0.000 | 175 | 0 | 0.015 | 16.941 | 0 | |
| 48 | 30 Jan 2020 02:00:00 | 1002556.000 | 0.000 | 175 | 0 | 0.001 | 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.

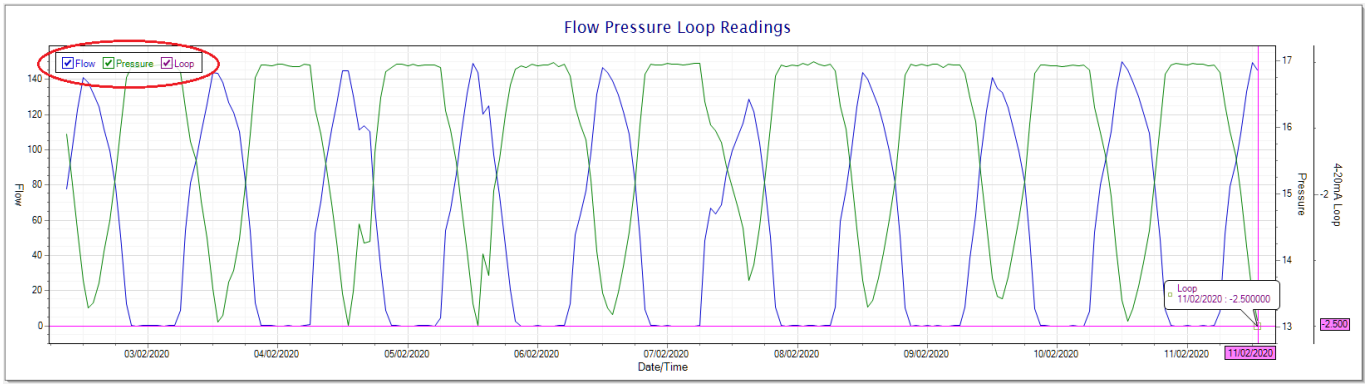
Deleting the datalog or removing a range of records can be easily done by using the 'Delete Datalog' button. To delete a range, simply select the range in the datalog table and press the 'Delete Datalog' button. If no range is selected, it will be assumed that you wish to delete the entire datalog. There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

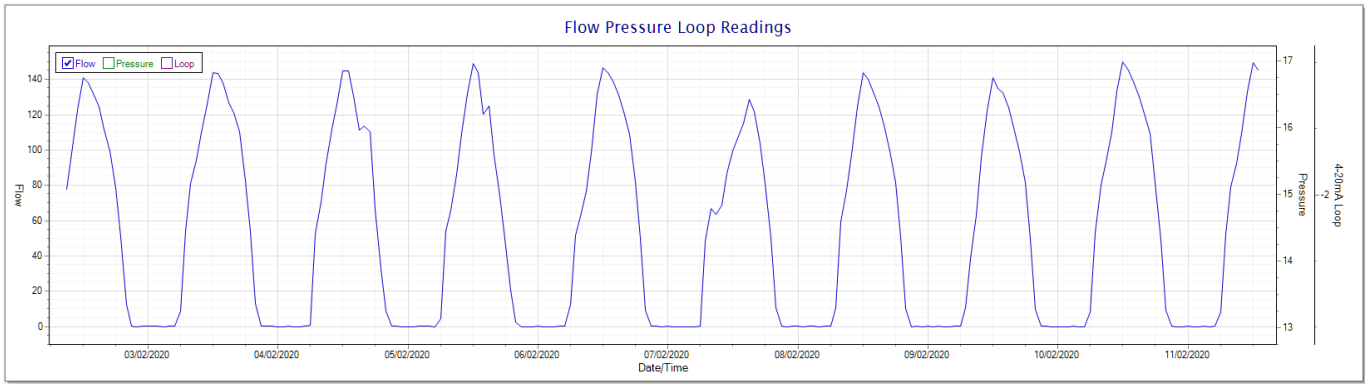



| No. | Date | Fwd Totaliser | Fwd Cons. | Rev Totaliser | Rev Cons. | Flow | Pressure | Loop | Battery |
|---|---|---|---|---|---|---|---|---|---|
| 335 | 11 Feb 2020 01:00:00 | 1018104.000 | 0.000 | 177 | 0 | -0.024 | 16.957 | 0 | |
| 336 | 11 Feb 2020 02:00:00 | 1018104.000 | 0.000 | 177 | 0 | -0.027 | 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 | |

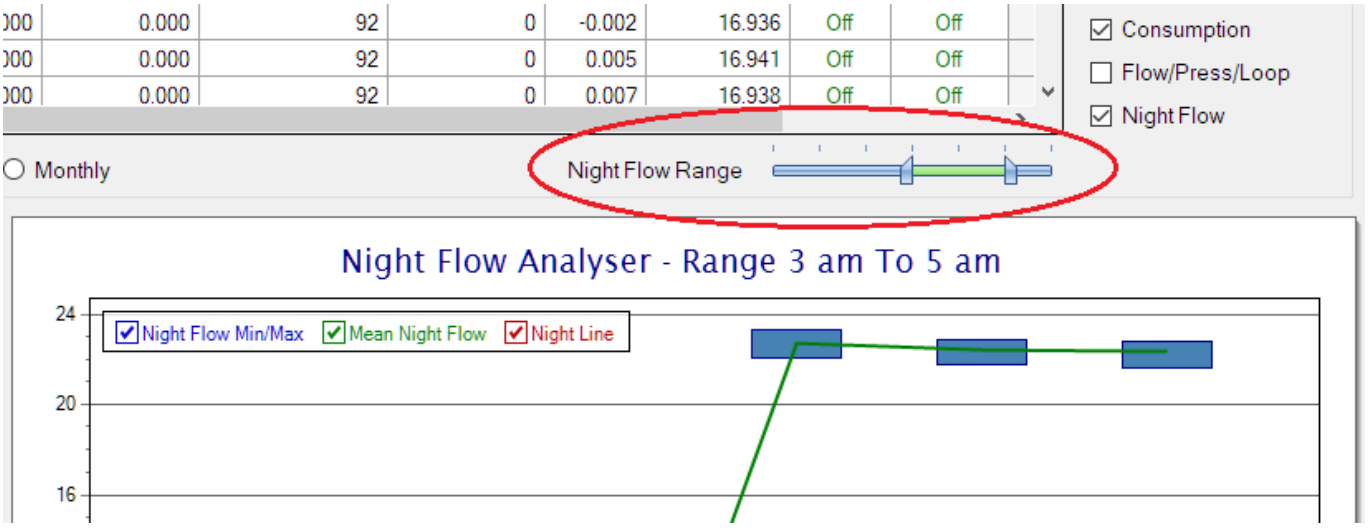
The various series on each graph can be toggled on and off by selecting the series tick in the upper left hand corner.




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.



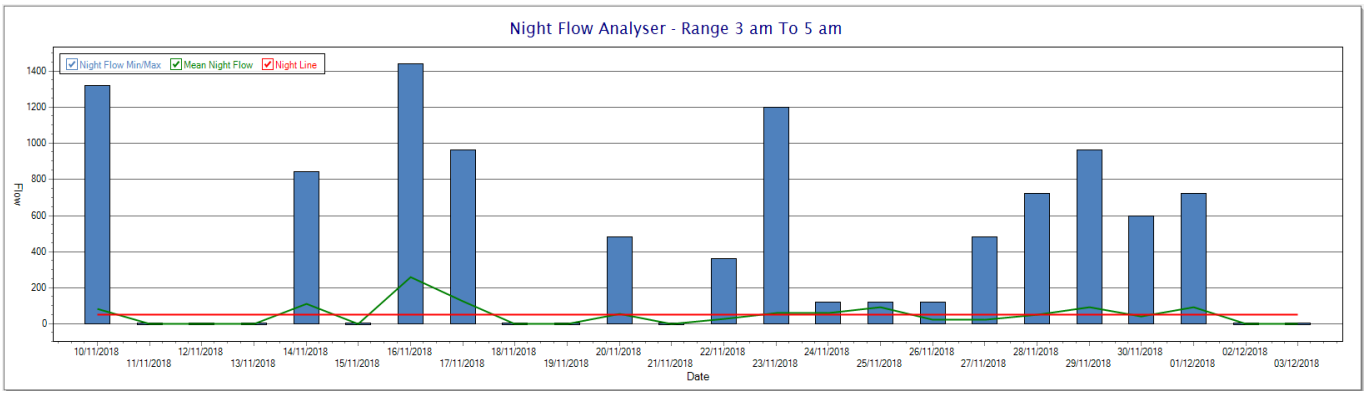

The graph will show a couple of different series.

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

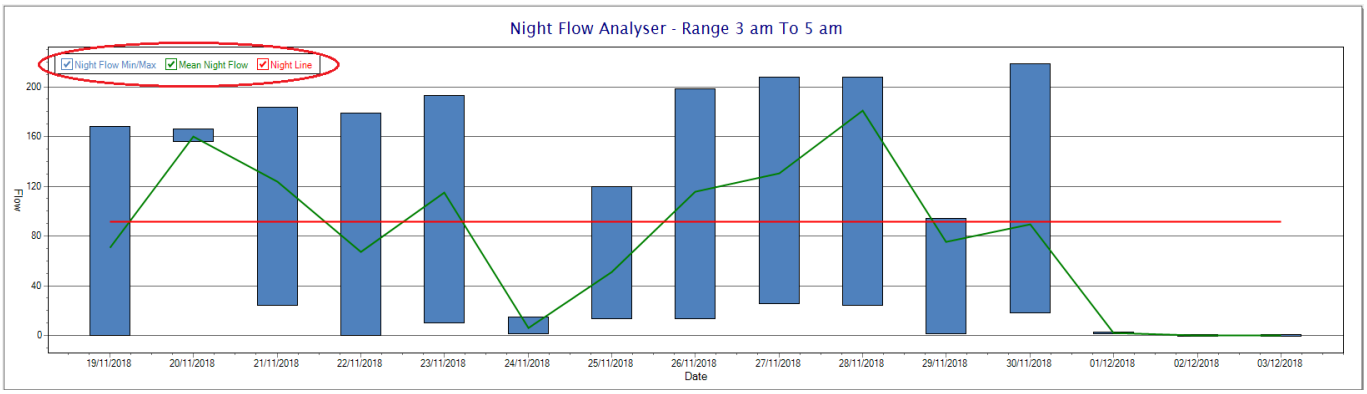
the type of installation, during this period you would expect the minimum flow point to come to zero and therefore sit on the base of the graph. The maximum flow would simply indicate some consumption during the period of measure and is not really a concern unless that was not expected.

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:-

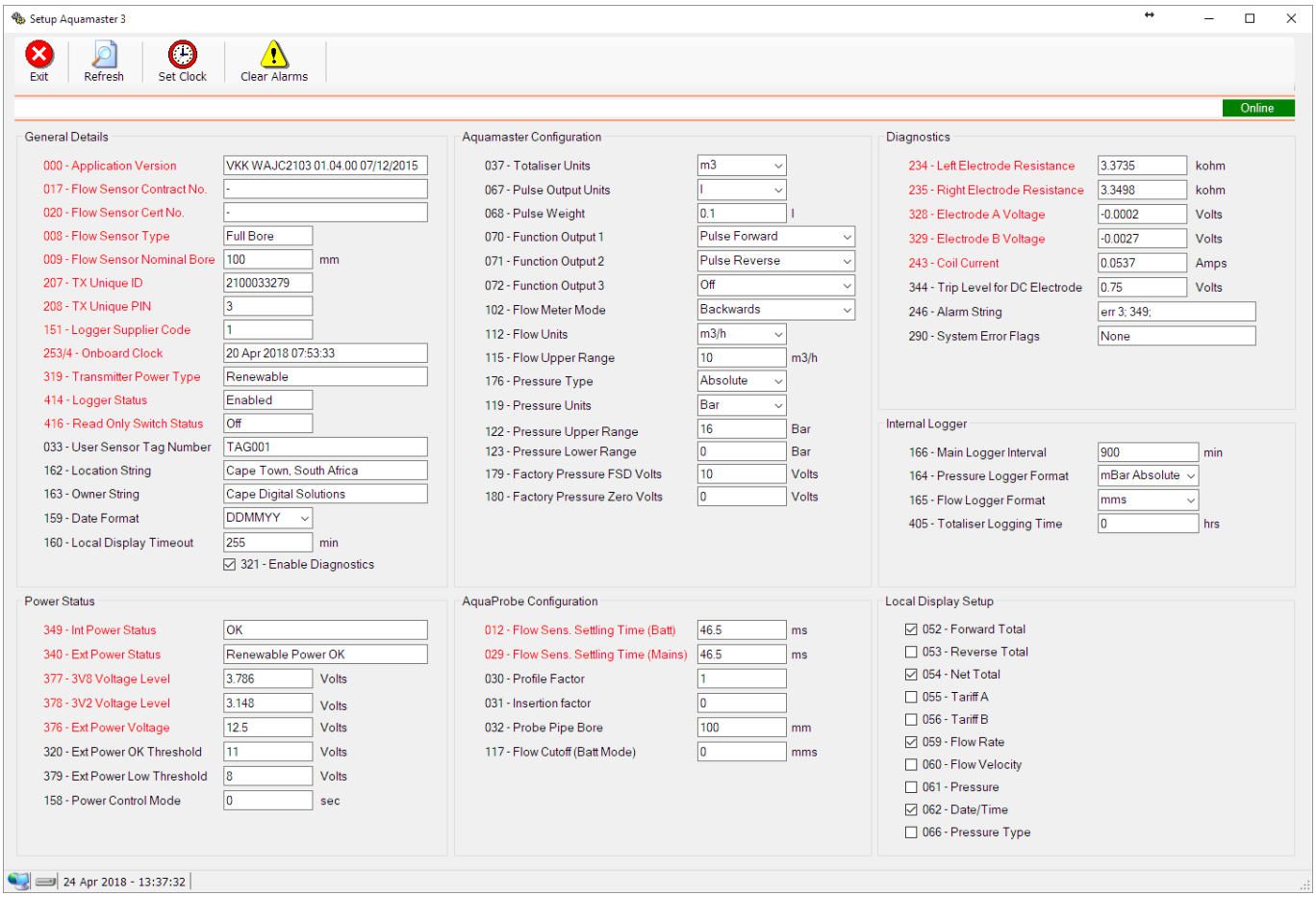



During a possible leak situation, the minimum night flow does not return to zero and the graph will appear to bounce off the bottom.



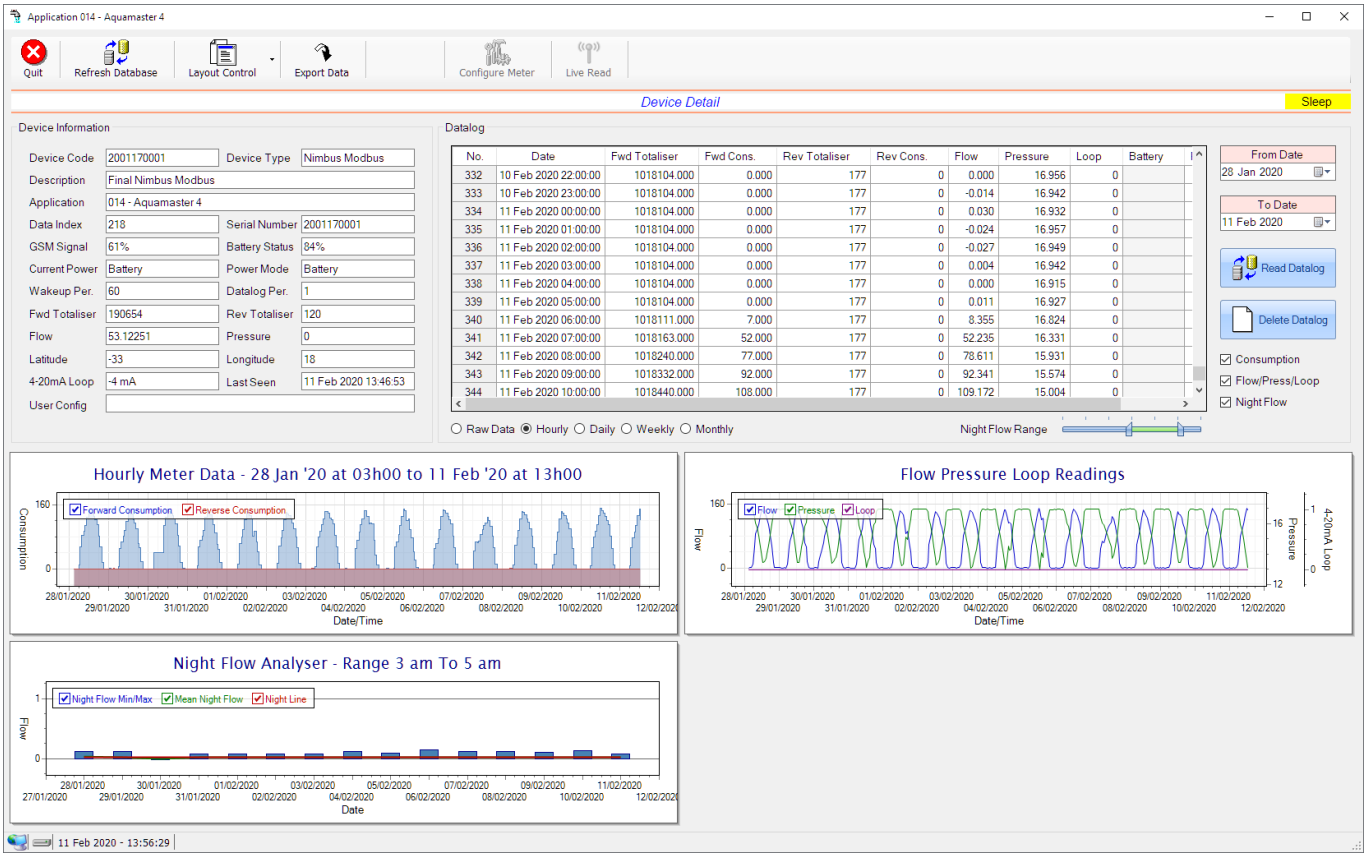

So, at a quick glance it is possible to see if there is a problem at this installation. As per the Consumption Graph, the different graph series can be switched off/on by clicking the series ticks on the top left hand corner.

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.




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.

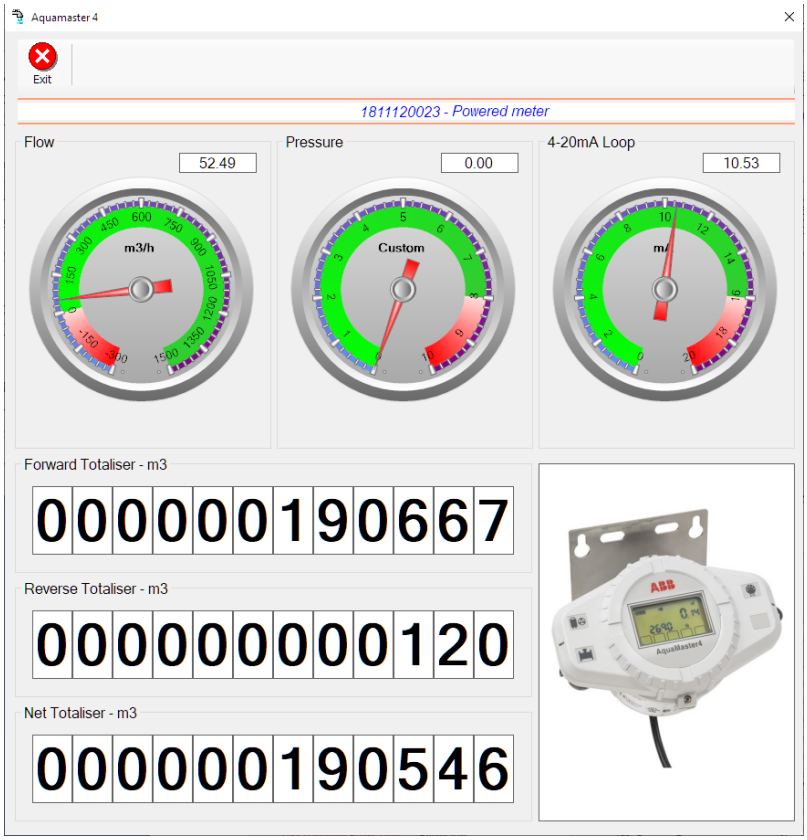
Functions on the top menu bar are mostly as per previous screens within the Cloudworks suite. These would be the 'Refresh Database', 'Layout Control' and 'Export Data' buttons which have been explained earlier. Added functionality is the 'Live Read' button.

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.

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:-

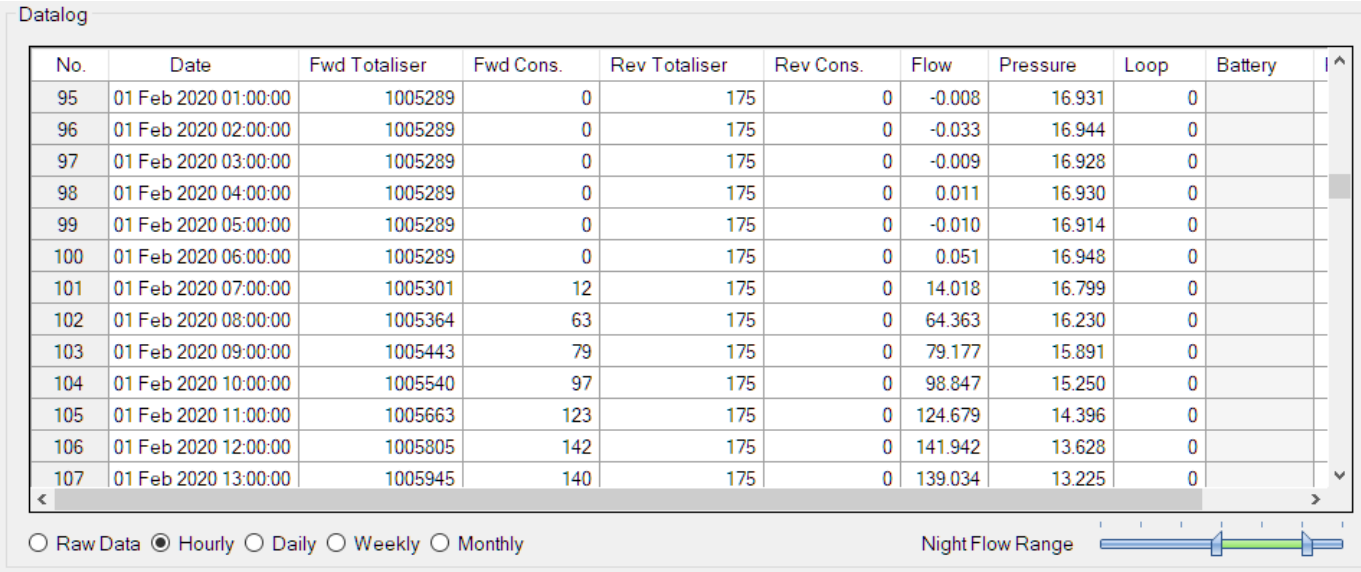
| Information | Notes |
|---|---|
| **Device Code** | The Device Code assigned to this particular remote device. All communications are initiated by addressing this code. This code is unique to all remote devices and is assigned at the time of manufacture. |
| **Device Type** | Type of Remote Device. eg CDS538 Cumulus Logger etc |
| **Description** | 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. |
| **Application** | Selected device application. Application 003 - Aquamaster 3 function in this case. |

| | |
|---|---|
| **Data Index** | 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. |
| **Serial Number** | Serial number of this device - assigned in the factory. |
| **GSM Signal** | Signal strength of the last GSM communications, expressed as a percentage. |
| **Battery Status** | 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). |
| **Current Power** | 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. |
| **Power Mode** | Selected Power Mode under which the remote device is operating. This can be Battery, Mains or Dual power modes. |
| **Wakeup Per.** | The Wakeup Period set in minutes. Refer to the device configuration chapter for an explanation of this parameter. |
| **Datalog Per.** | The Datalog Period set minutes. Refer to the device configuration chapter for an explanation of this parameter. |
| **Fwd Totaliser** | The current Forward Totaliser reading. |
| **Rev Totaliser** | The current Reverse Totaliser reading. |
| **Flow** | Current flow reading. |
| **Pressure** | Current pressure reading. |
| **4-20mA Current Loop** | The 4-20mA current loop reading with its calibration data implemented including the unit of measure. |
| **Last Seen** | The date and time the remote device was last seen connecting into the server. |
| **Latitude** | Captured device Latitude. |
| **Longitude** | 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.

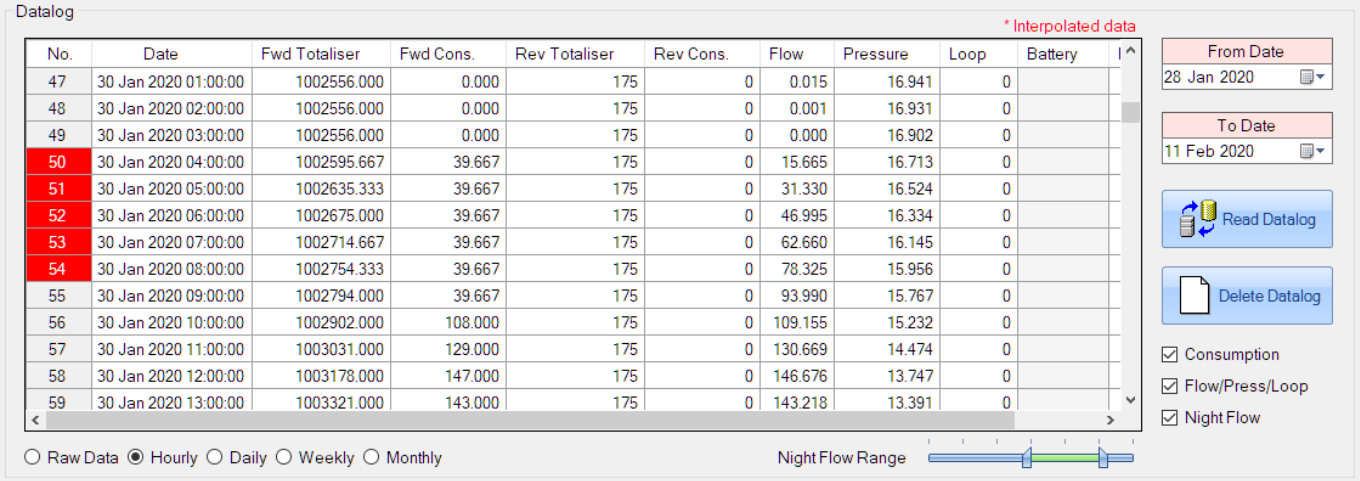
To the right of screen is the Datalog information box. This box will be populated with the most recent data from the recorded datalog of this remote device (read from the database). By default, when the screen opens, the last two weeks' worth of data will be displayed in this table. To select a different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




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



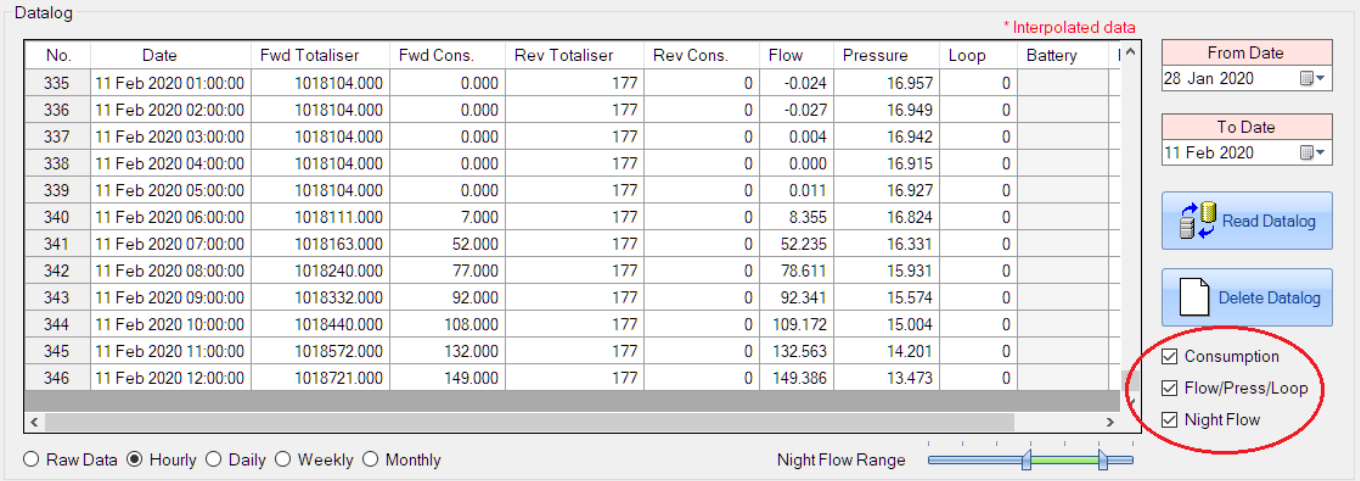

| No. | Date | Fwd Totaliser | Fwd Cons. | Rev Totaliser | Rev Cons. | Flow | Pressure | Loop | Battery |
|---|---|---|---|---|---|---|---|---|---|
| 47 | 30 Jan 2020 01:00:00 | 1002556.000 | 0.000 | 175 | 0 | 0.015 | 16.941 | 0 | |
| 48 | 30 Jan 2020 02:00:00 | 1002556.000 | 0.000 | 175 | 0 | 0.001 | 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.

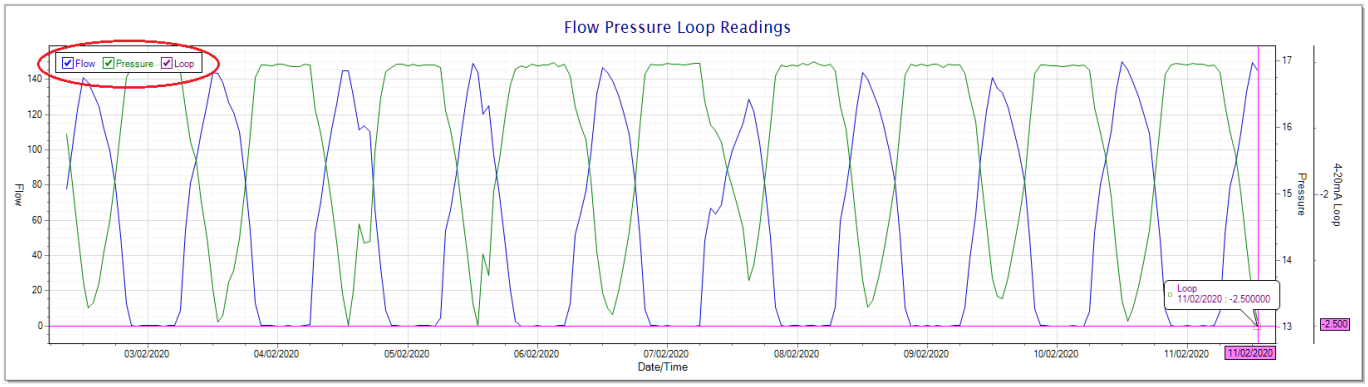
Deleting the datalog or removing a range of records can be easily done by using the 'Delete Datalog' button. To delete a range, simply select the range in the datalog table and press the 'Delete Datalog' button. If no range is selected, it will be assumed that you wish to delete the entire datalog. There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

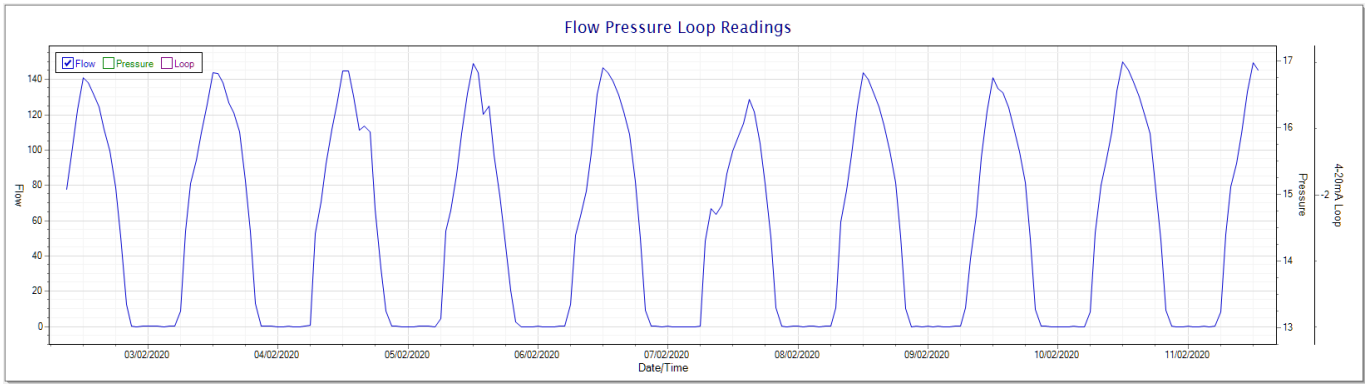



| No. | Date | Fwd Totaliser | Fwd Cons. | Rev Totaliser | Rev Cons. | Flow | Pressure | Loop | Battery |
|---|---|---|---|---|---|---|---|---|---|
| 335 | 11 Feb 2020 01:00:00 | 1018104.000 | 0.000 | 177 | 0 | -0.024 | 16.957 | 0 | |
| 336 | 11 Feb 2020 02:00:00 | 1018104.000 | 0.000 | 177 | 0 | -0.027 | 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 | |

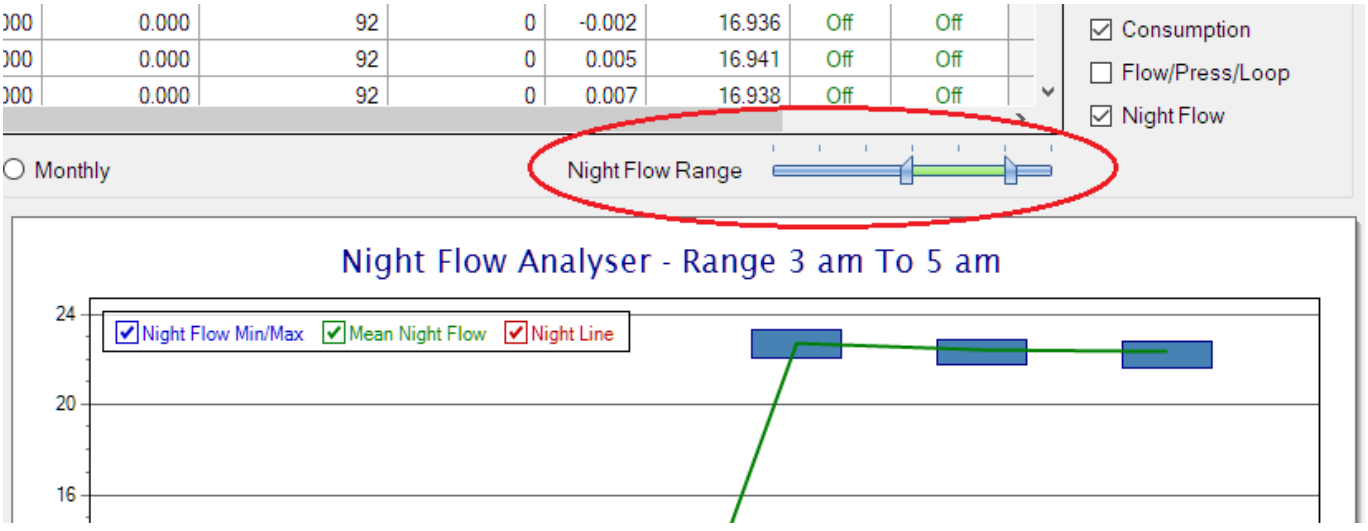
The various series on each graph can be toggled on and off by selecting the series tick in the upper left hand corner.




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.



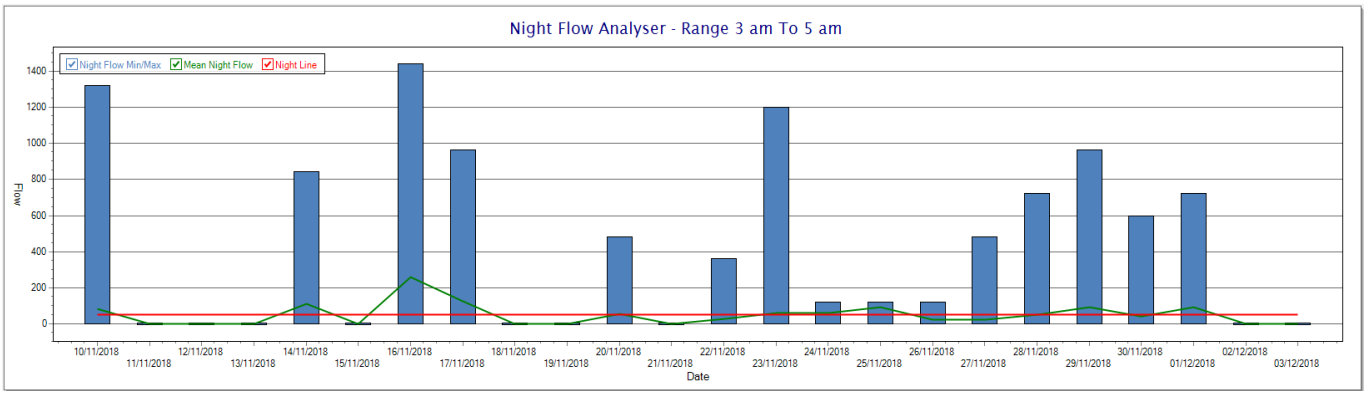

The graph will show a couple of different series.

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

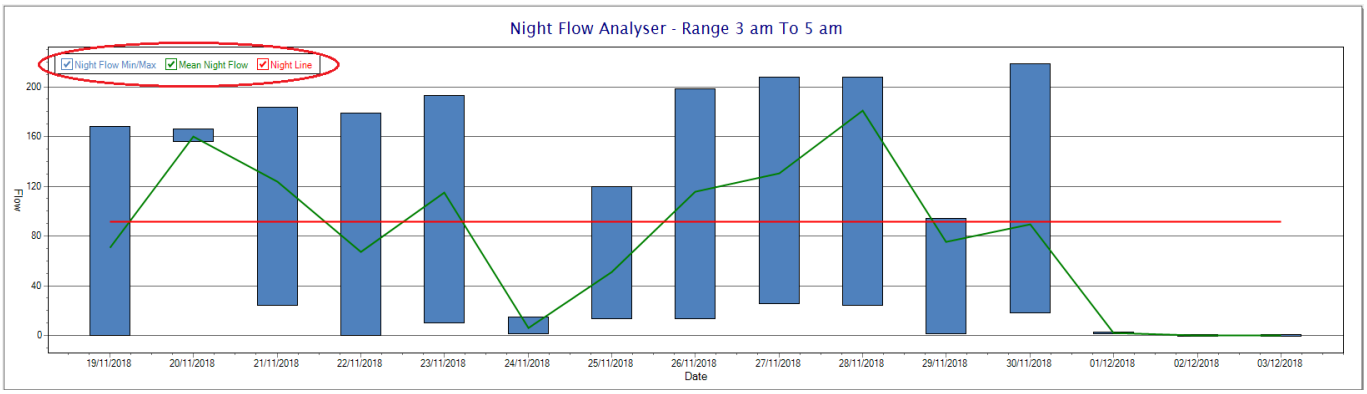
the type of installation, during this period you would expect the minimum flow point to come to zero and therefore sit on the base of the graph. The maximum flow would simply indicate some consumption during the period of measure and is not really a concern unless that was not expected.

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:-

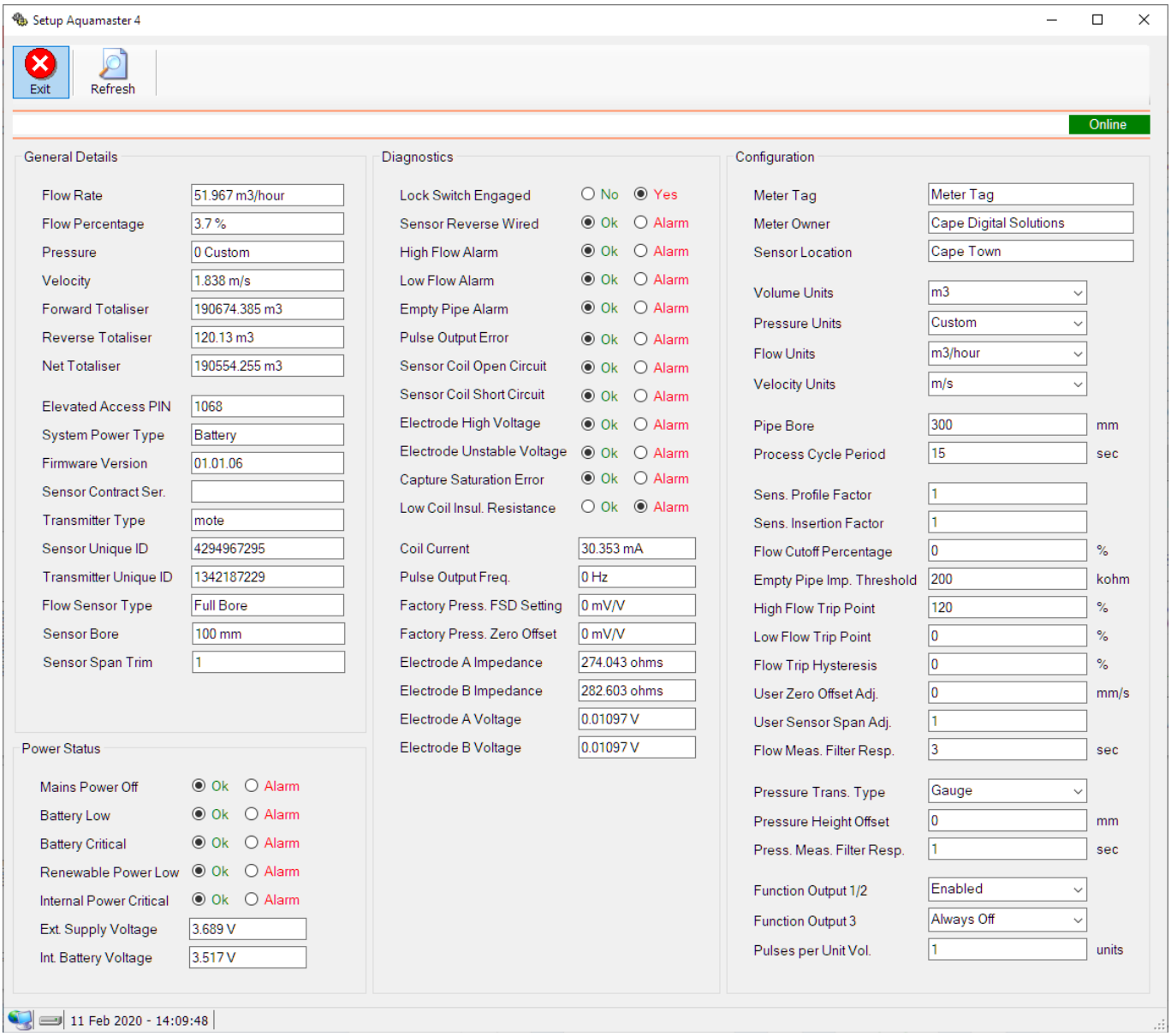



During a possible leak situation, the minimum night flow does not return to zero and the graph will appear to bounce off the bottom.



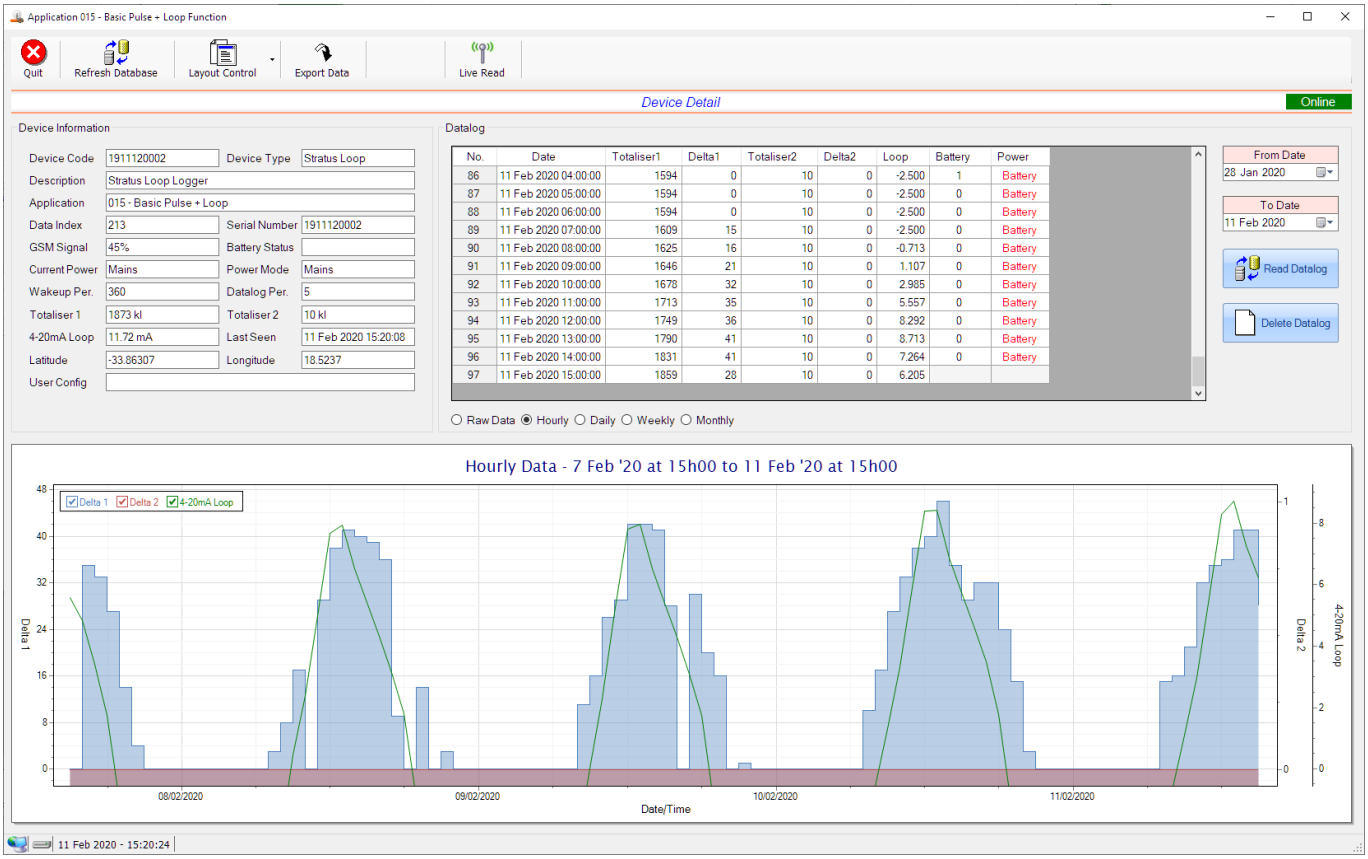

So, at a quick glance it is possible to see if there is a problem at this installation. As per the Consumption Graph, the different graph series can be switched off/on by clicking the series ticks on the top left hand corner.

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.




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

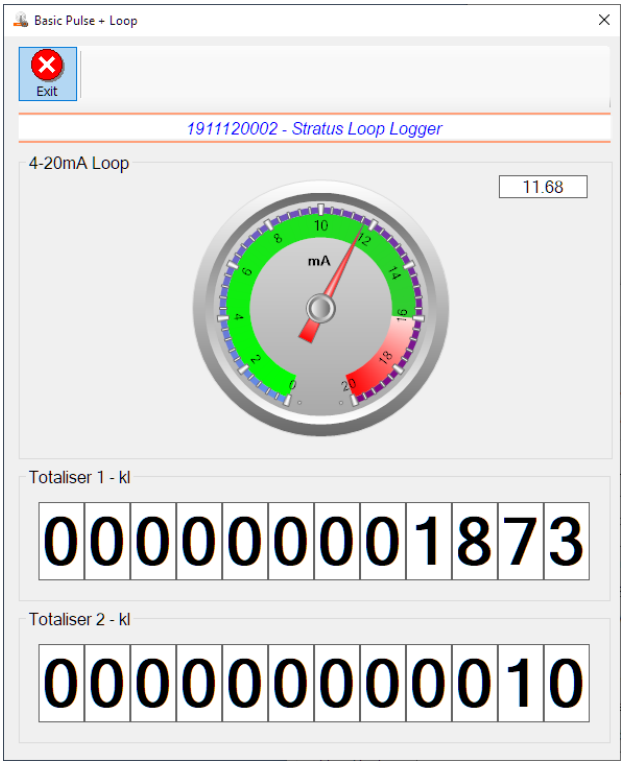



This application type would be selected where you are using the basic core functions of the Stratus Loop and Nimbus Loop loggers. Functions such as the 4-20mA current loop and/or pulse inputs without a specific consumption type of application. it is ideally suited for an application where there are two 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:-

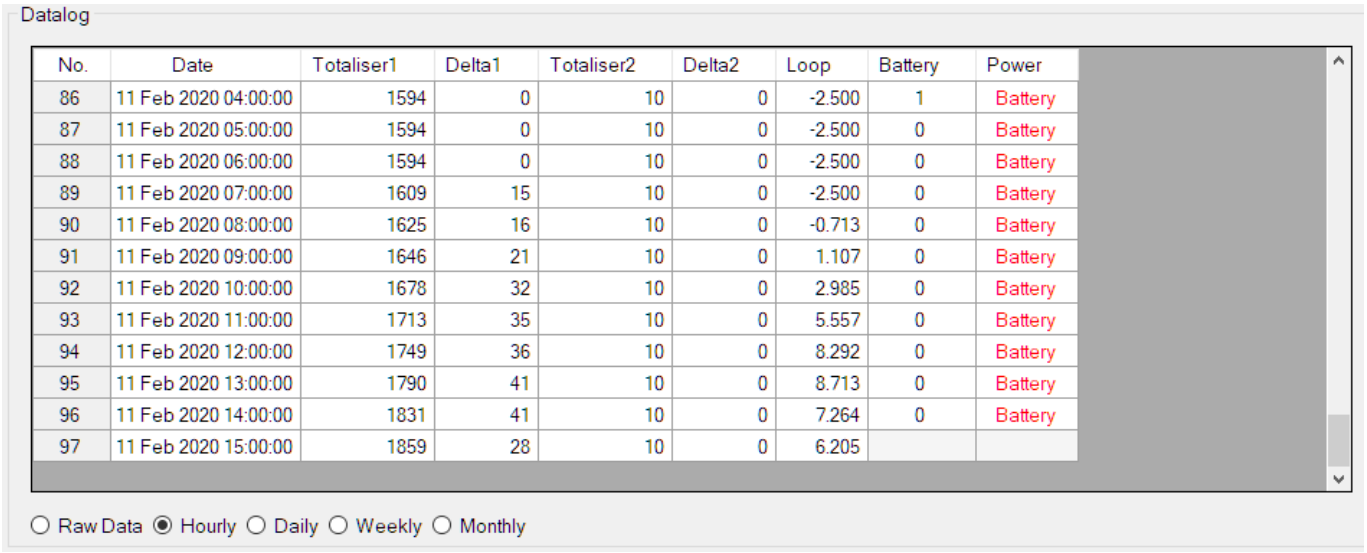
| Information | Notes |
|---|---|
| **Device Code** | The Device Code assigned to this particular remote device. All communications are initiated by addressing this code. This code is unique to all remote devices and is assigned at the time of manufacture. |
| **Device Type** | Type of Remote Device. eg CDS538 Cumulus Logger etc |
| **Description** | 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. |
| **Application** | Selected device application. Application 000 - Basic Cumulus function in this case. |

| | |
|---|---|
| **Data Index** | 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. |
| **Serial Number** | Serial number of this device - assigned in the factory. |
| **GSM Signal** | Signal strength of the last GSM communications, expressed as a percentage. |
| **Battery Status** | 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). |
| **Current Power** | 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. |
| **Power Mode** | Selected Power Mode under which the remote device is operating. This can be Battery, Mains or Dual power modes. |
| **Wakeup Per.** | The Wakeup Period set in minutes. Refer to the device configuration chapter for an explanation of this parameter. |
| **Datalog Per.** | The Datalog Period set in minutes. Refer to the device configuration chapter for an explanation of this parameter. |
| **Totaliser 1** | The current Totaliser 1 reading with its relevant pulse weight implemented including the unit of measure. |
| **Totaliser 2** | The current Totaliser 2 reading with its relevant pulse weight implemented including the unit of measure. |
| **4-20mA Loop** | The 4-20mA current loop reading with its calibration data implemented including the unit of measure. |
| **Last Seen** | The date and time the remote device was last seen connecting into the server. |
| **Latitude** | Captured device Latitude. |
| **Longitude** | 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.

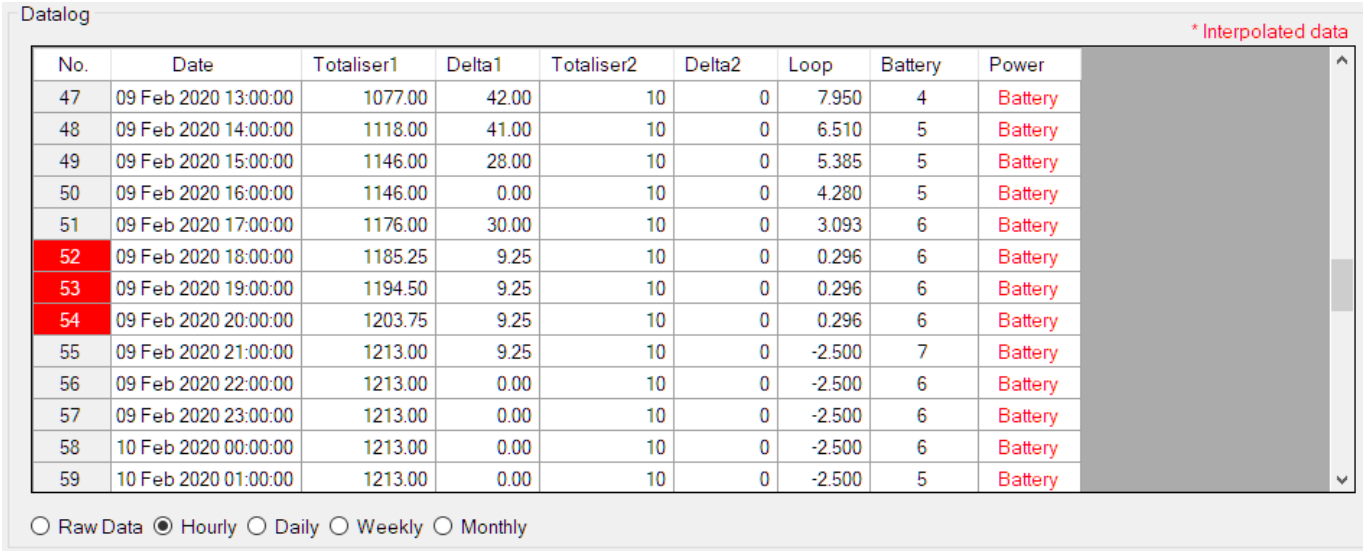

Datalog

| No. | Date | 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 |
|---|---|
| **Date/Time** | Date and time of the datalog record. |
| **Totaliser 1** | Totaliser 1 reading. |
| **Totaliser 2** | Totaliser 2 reading. |
| **Delta 1** | The effective 'consumption' of the Totaliser 1 reading. This is the difference between this current reading and the previous reading. |
| **Delta 2** | The effective 'consumption' of the Totaliser 2 reading. This is the difference between this current reading and the previous reading. |
| **Loop** | 4-20mA Loop reading with its applied calibration. |
| **Battery** | Battery level in percentage. Only displayed on battery powered devices. |
| **Power** | 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 |

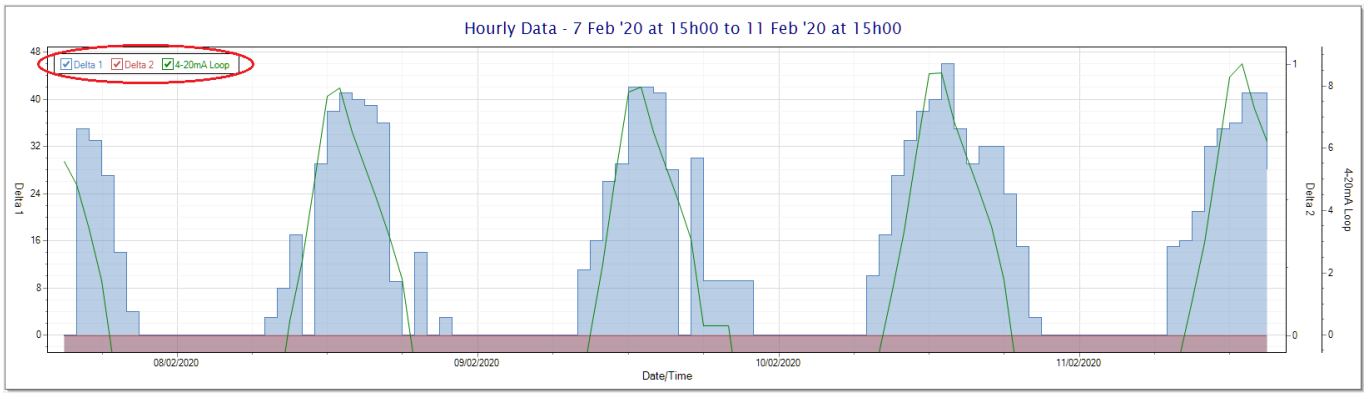
Raw Data Hourly Daily Weekly Monthly

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.

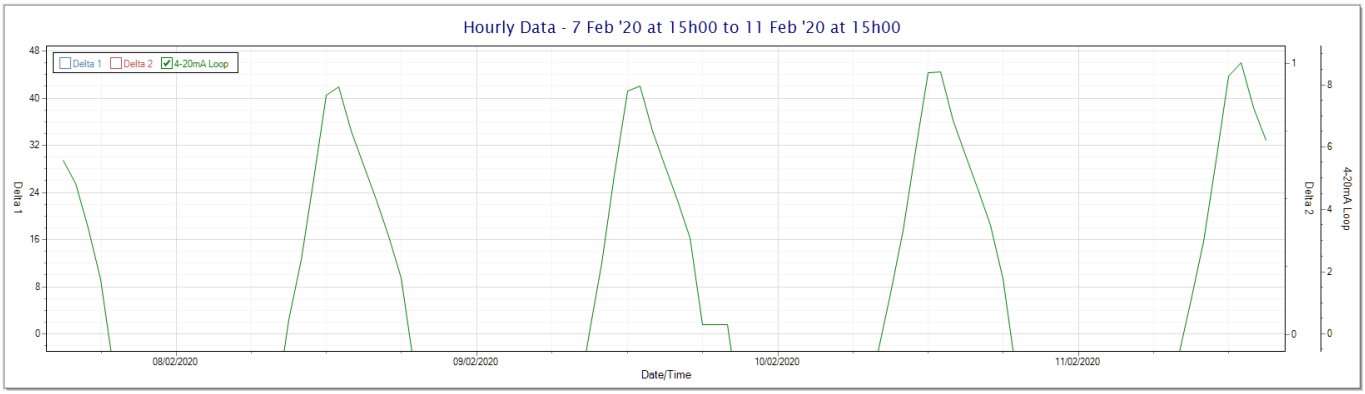
You can zoom into a range of the data by simply selecting those records in the table. This will result in the graph at the bottom being updated to display only those readings.

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.

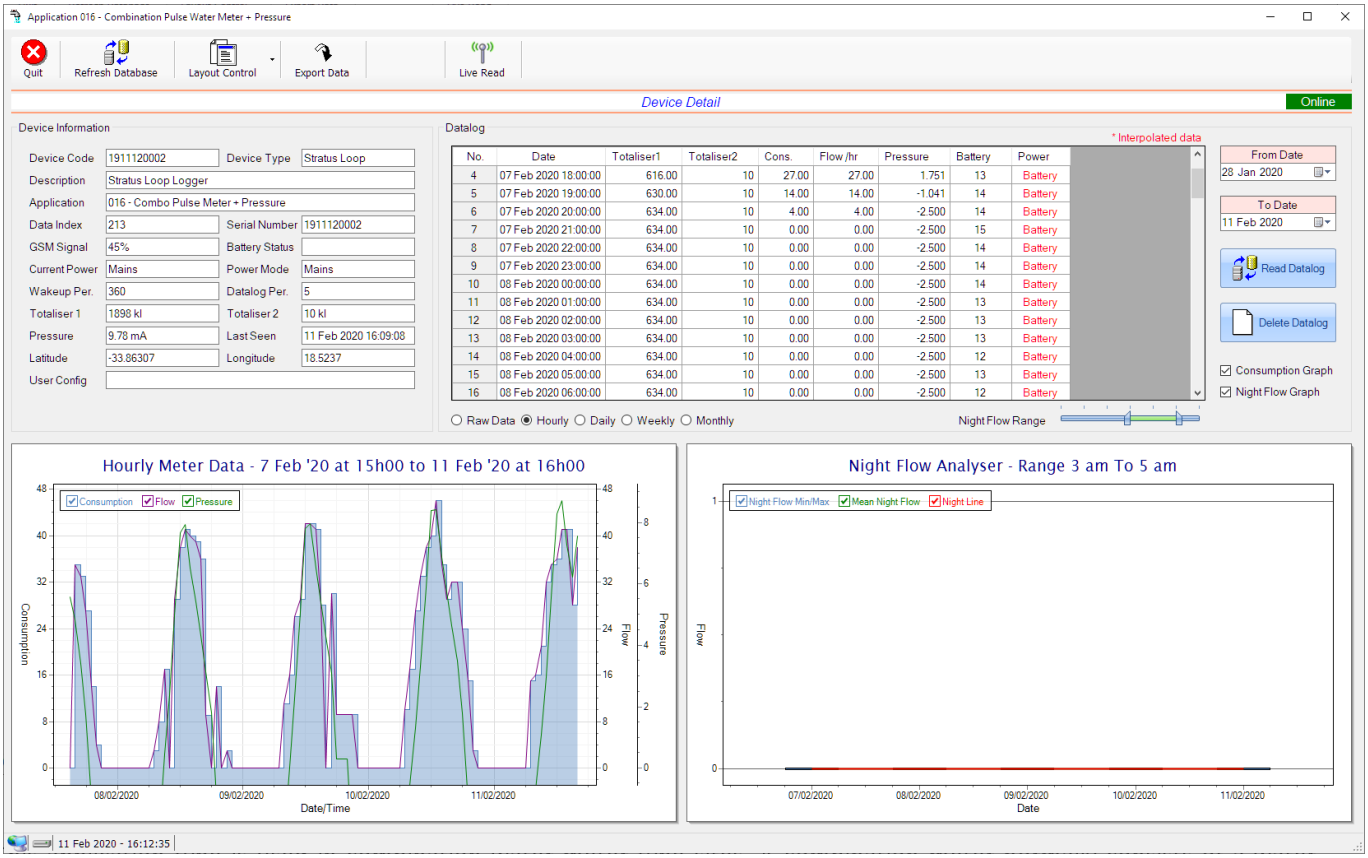
Data that is displayed in the table will also be represented in the graph at the bottom of the screen. Individual graph series can be switched off/on by selecting the ticks at the top left of the graph.



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



## 2.8.17 Application 016 - Combo Pulse Meter + Pressure



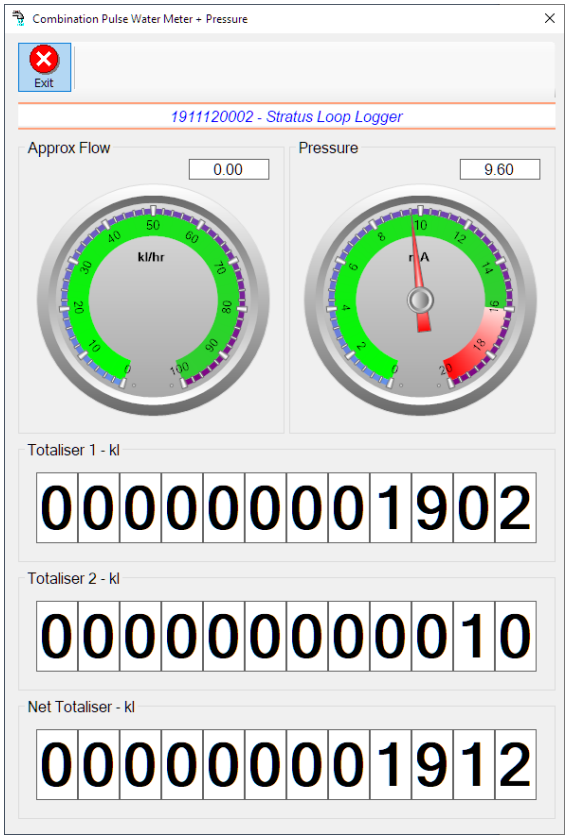

This application type is used in combination water meter type sites. A combination meter normally consists of a water measurement point consisting of two water meters. A larger meter for measuring the bulk flow of the water and a smaller one to measure the lower flows which are normally missed on large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

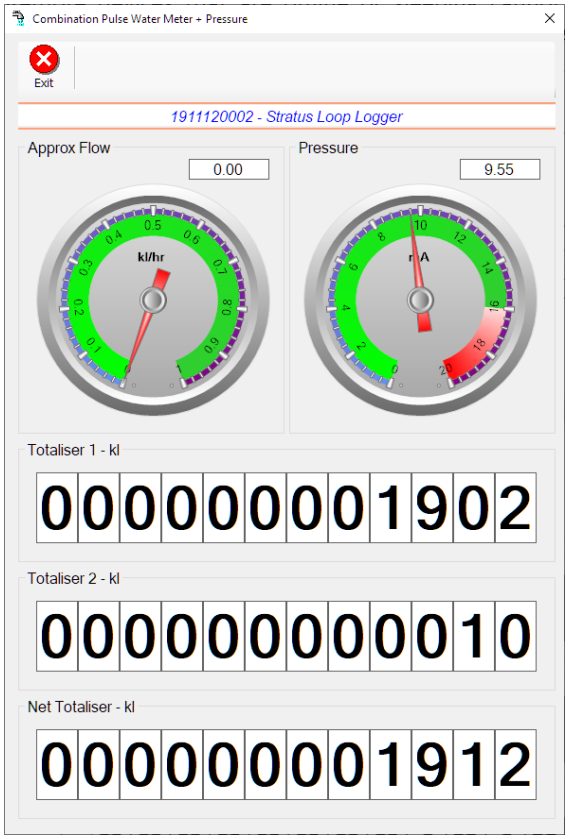
Functions on the top menu bar are mostly as per previous screens within the Cloudworks suite. These would be the 'Refresh Database', 'Layout Control' and 'Export Data' buttons which have been explained earlier. Added functionality is the 'Live Read' button.

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 |
|---|---|
| **Device Code** | 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. |
| **Device Type** | Type of Remote Device. eg CDS538 Cumulus Logger etc |
| **Description** | 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. |
| **Application** | Selected device application. Application 001 - Combination Pulse Water Meter + Pressure function in this case. |

| | |
|---|---|
| **Data Index** | 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. |
| **Serial Number** | Serial number of this device - assigned in the factory. |
| **GSM Signal** | Signal strength of the last GSM communications, expressed as a percentage. |
| **Battery Status** | 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). |
| **Current Power** | 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. |
| **Power Mode** | Selected Power Mode under which the remote device is operating. This can be Battery, Mains or Dual power modes. |
| **Wakeup Per.** | The Wakeup Period set in minutes. Refer to the device configuration chapter for an explanation of this parameter. |
| **Datalog Per.** | The Datalog Period set minutes. Refer to the device configuration chapter for an explanation of this parameter. |
| **Totaliser 1** | The current Totaliser 1 reading with its relevant pulse weight implemented including the unit of measure. |
| **Totaliser 2** | The current Totaliser 2 reading with its relevant pulse weight implemented including the unit of measure. |
| **Pressure (4-20mA Loop)** | The 4-20mA current loop reading with its calibration data implemented including the unit of measure. |
| **Last Seen** | The date and time the remote device was last seen connecting into the server. |
| **Latitude** | Captured device Latitude. |
| **Longitude** | Captrued 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 | 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 |

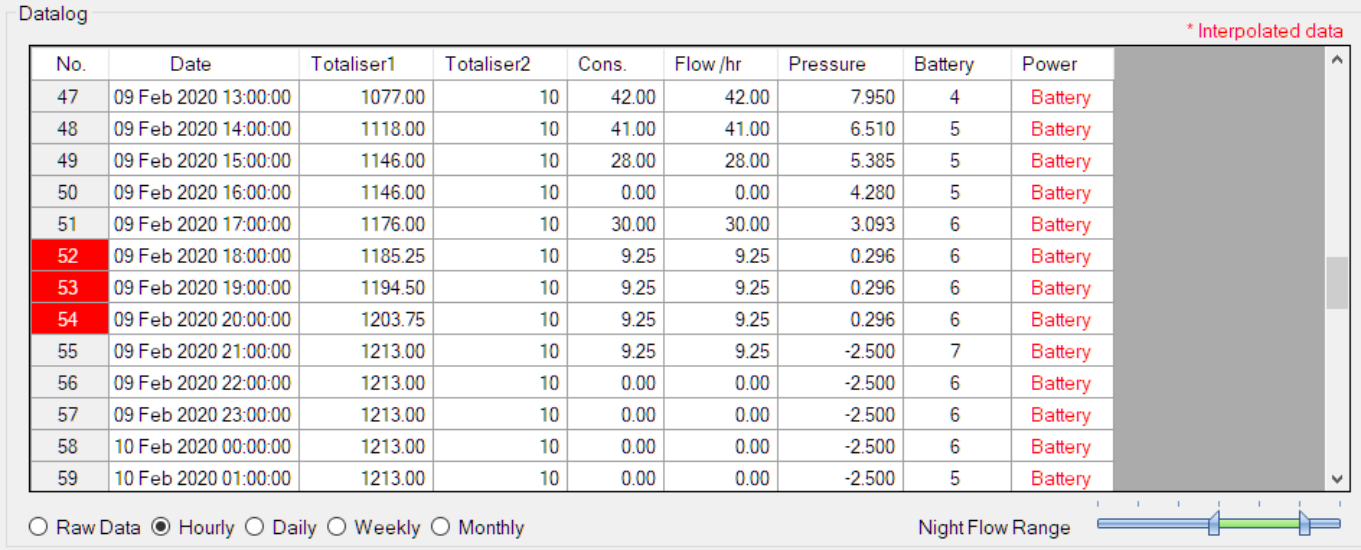
Raw Data Hourly Daily Weekly Monthly

Night Flow Range

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



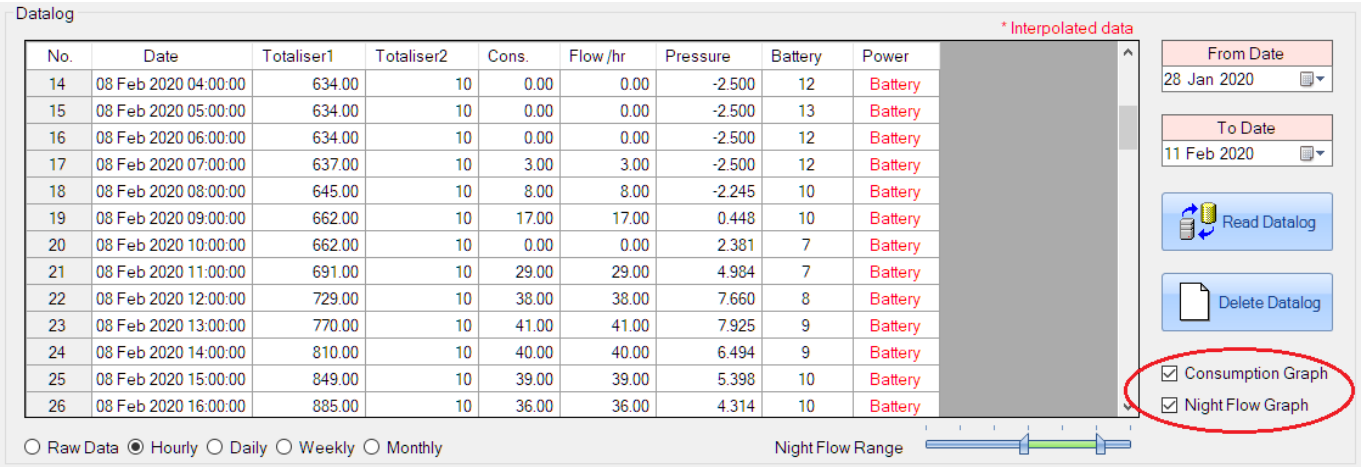

| No. | Date | Totaliser1 | Totaliser2 | Cons. | Flow /hr | Pressure | Battery | Power |
|---|---|---|---|---|---|---|---|---|
| 47 | 09 Feb 2020 13:00:00 | 1077.00 | 10 | 42.00 | 42.00 | 7.950 | 4 | Battery |
| 48 | 09 Feb 2020 14:00:00 | 1118.00 | 10 | 41.00 | 41.00 | 6.510 | 5 | Battery |
| 49 | 09 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 |

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.

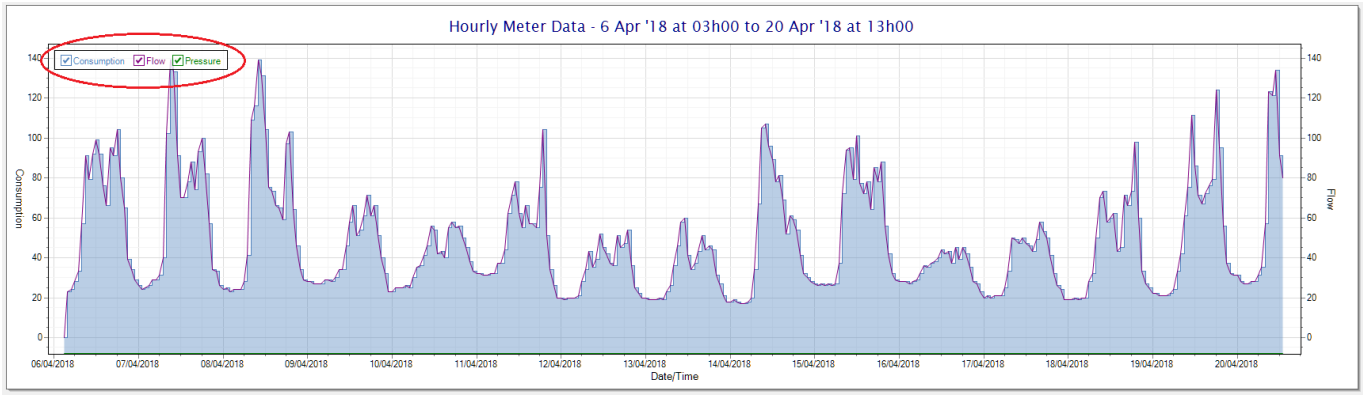
Deleting the datalog or removing a range of records can be easily done by using the 'Delete Datalog' button. To delete a range, simply select the range in the datalog table and press the 'Delete Datalog' button. If no range is selected, it will be assumed that you wish to delete the entire datalog. There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

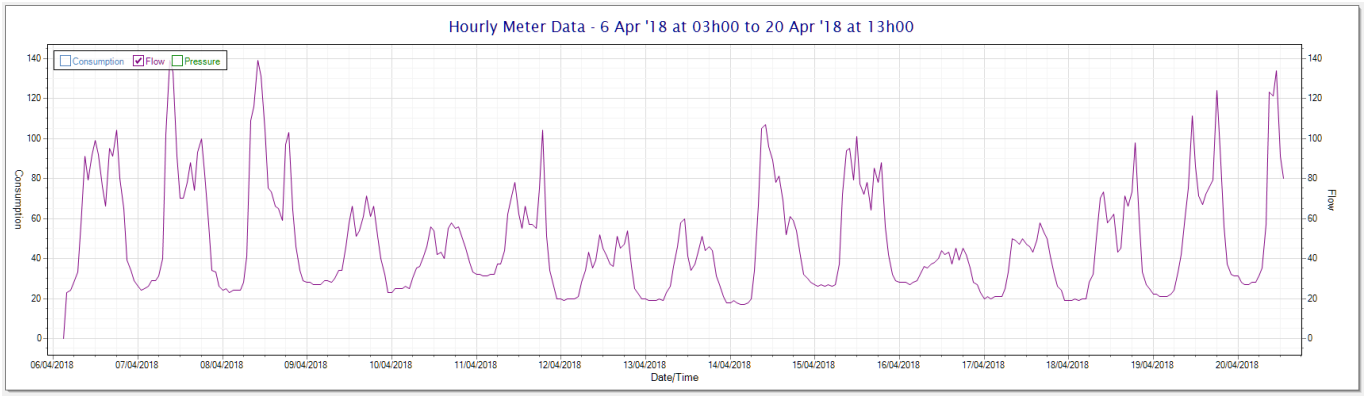



| No. | Date | Totaliser1 | Totaliser2 | Cons. | Flow /hr | Pressure | Battery | Power |
|---|---|---|---|---|---|---|---|---|
| 14 | 08 Feb 2020 04:00:00 | 634.00 | 10 | 0.00 | 0.00 | -2.500 | 12 | Battery |
| 15 | 08 Feb 2020 05:00:00 | 634.00 | 10 | 0.00 | 0.00 | -2.500 | 13 | Battery |
| 16 | 08 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 |

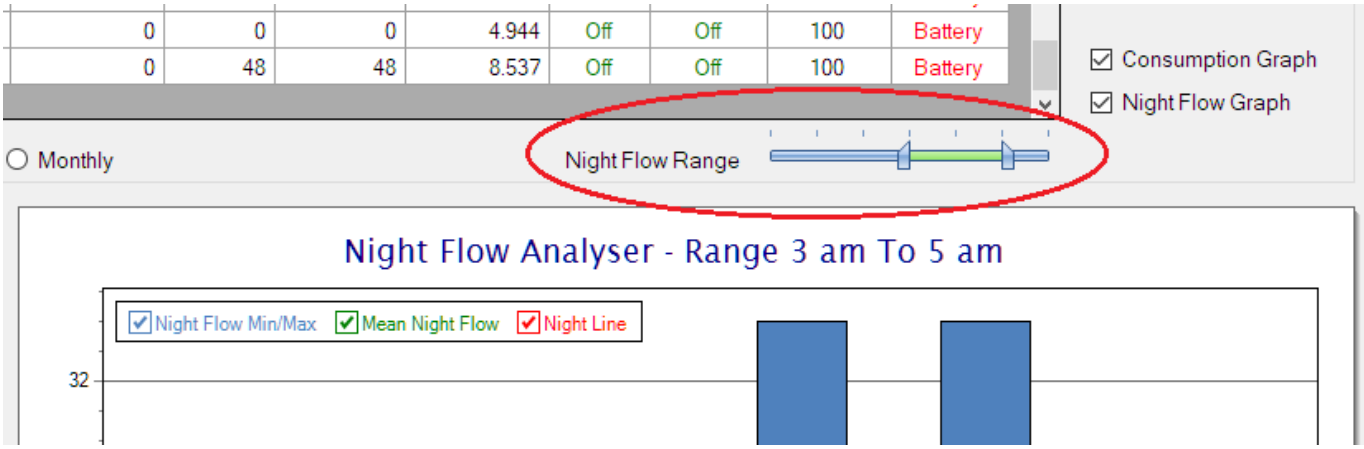
The Consumption Graph displays the consumption, pressure and flow related data. Individual graph series can be switched off/on by selecting the ticks at the top left of the graph.




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.



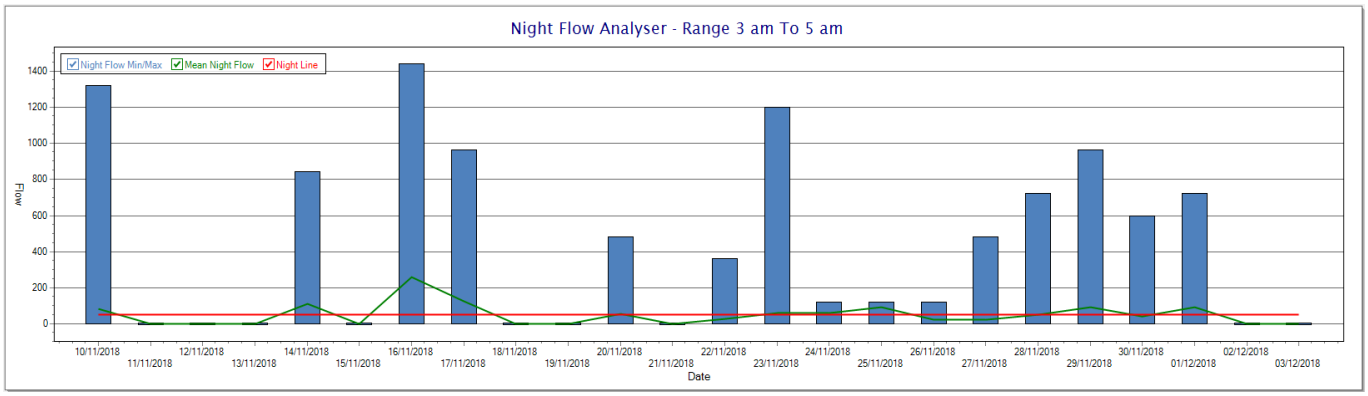

The graph will show a couple of different series.

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

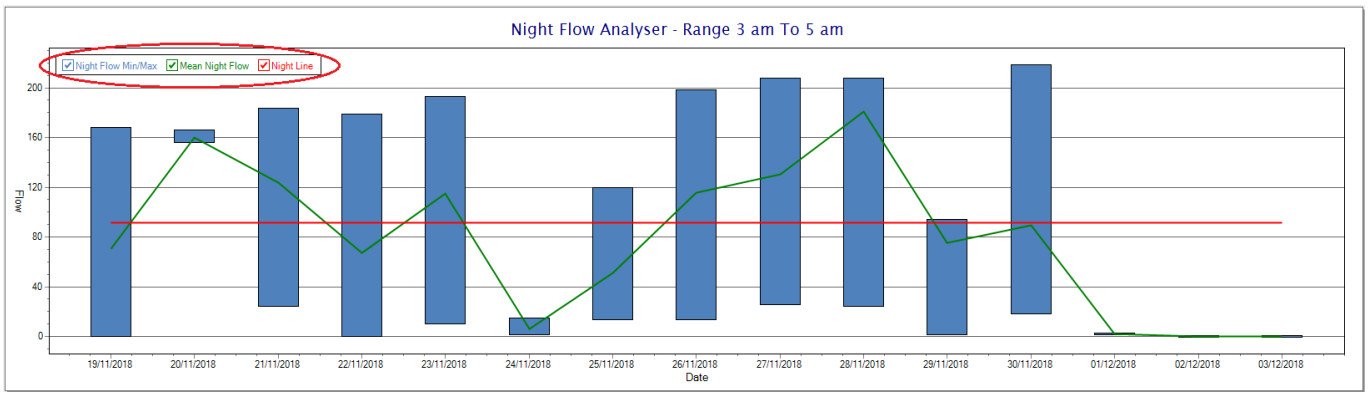
therefore sit on the base of the graph. The maximum flow would simply indicate some consumption during the period of measure and is not really a concern unless that was not expected.

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:-

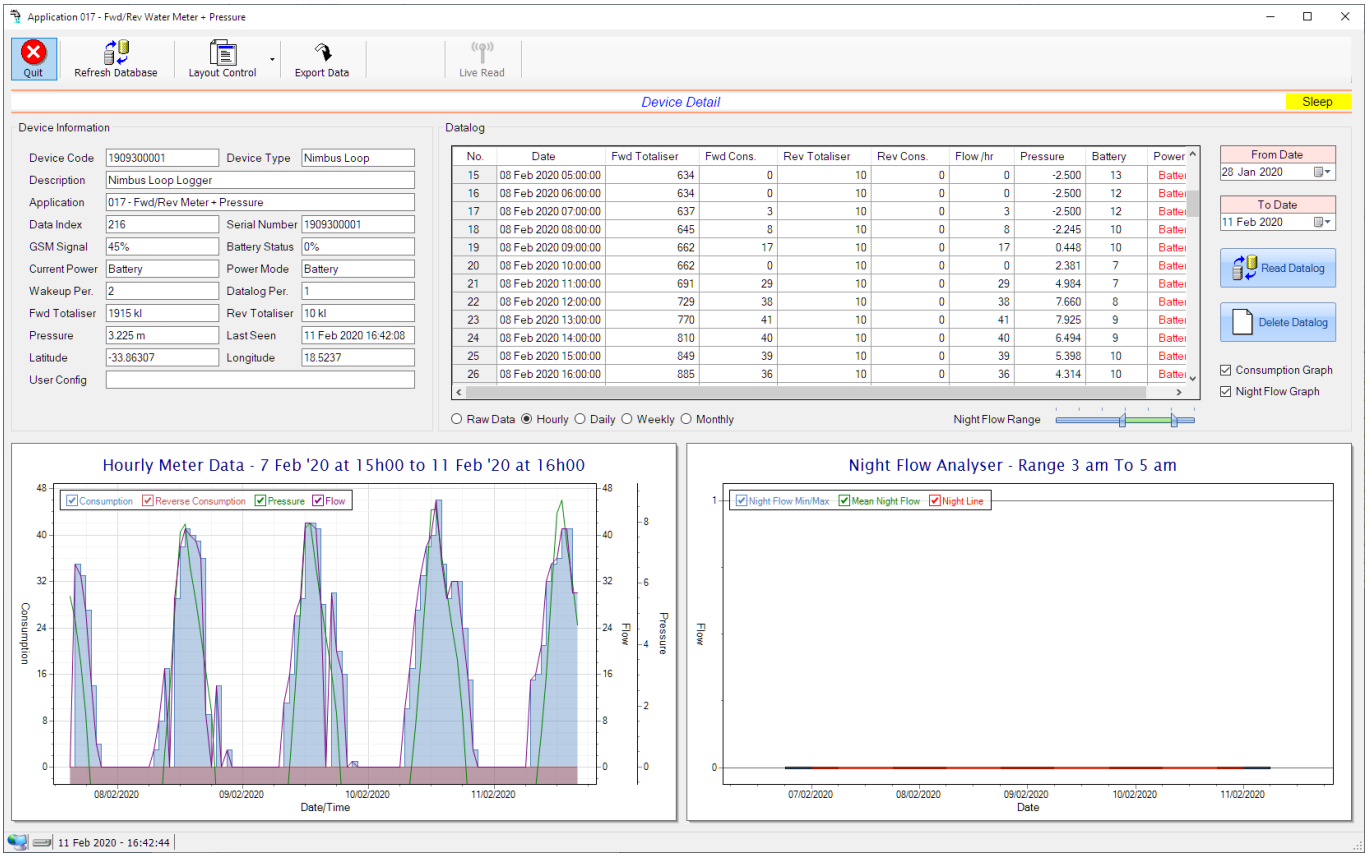



During a possible leak situation, the minimum night flow does not return to zero and the graph will appear to bounce off the bottom.




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.

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



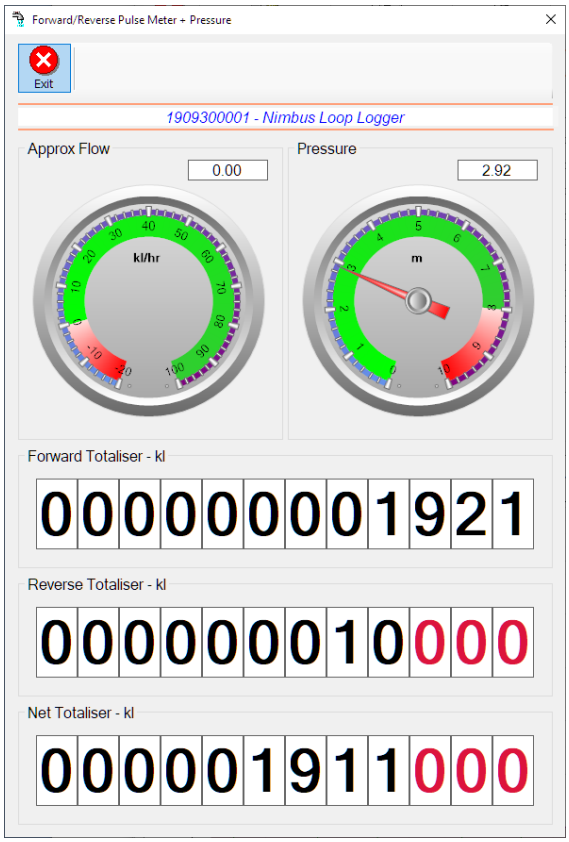

This type would be selected for applications that are used on a forward/reverse pulse water meter. The actual consumption is normally the difference of the two totaliser readings and are handled as such in this application type. Included here is the 4-20mA current loop interface for pressure measurement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

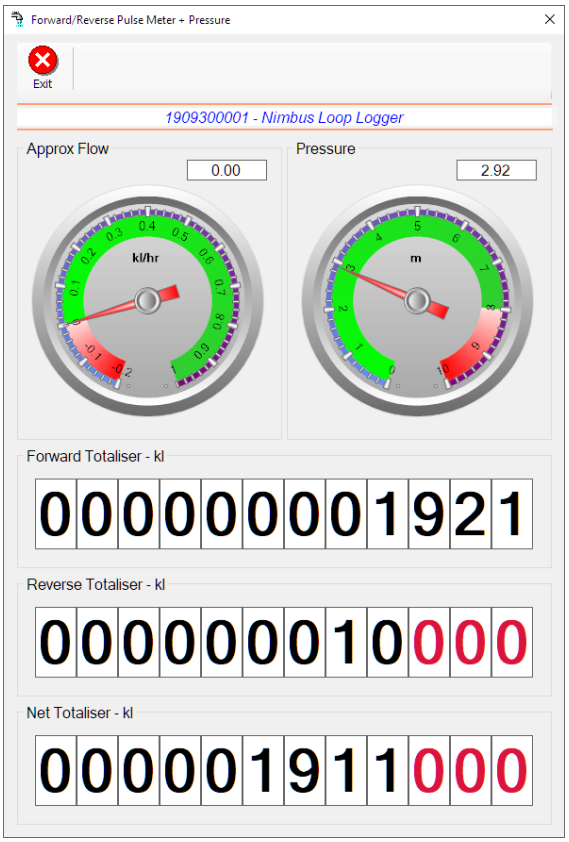
Functions on the top menu bar are mostly as per previous screens within the Cloudworks suite. These would be the 'Refresh Database', 'Layout Control' and 'Export Data' buttons which have been explained earlier. Added functionality is the 'Live Read' button.

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:-

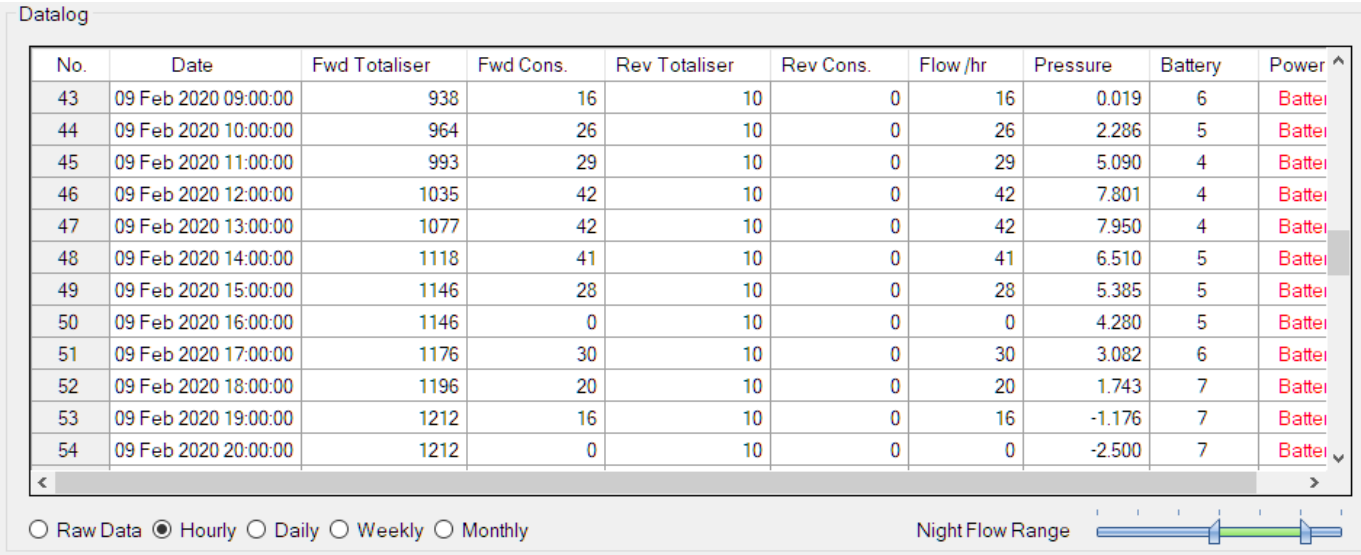
| Information | Notes |
|---|---|
| **Device Code** | The Device Code assigned to this particular remote device. All communications are initiated by addressing this code. This code is unique to all remote devices and is assigned at the time of manufacture. |
| **Device Type** | Type of Remote Device. eg CDS538 Cumulus Logger etc |
| **Description** | 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. |

| | |
|---|---|
| **Application** | Selected device application. Application 002 - Forward/Reverse Pulse Water Meter + Pressure function in this case. |
| **Data Index** | 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. |
| **Serial Number** | Serial number of this device - assigned in the factory. |
| **GSM Signal** | Signal strength of the last GSM communications, expressed as a percentage. |
| **Battery Status** | 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). |
| **Current Power** | 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. |
| **Power Mode** | Selected Power Mode under which the remote device is operating. This can be Battery, Mains or Dual power modes. |
| **Wakeup Per.** | The Wakeup Period set in minutes. Refer to the device configuration chapter for an explanation of this parameter. |
| **Datalog Per.** | The Datalog Period set minutes. Refer to the device configuration chapter for an explanation of this parameter. |
| **Fwd Totaliser** | The current Forward Totaliser reading with its relevant pulse weight implemented including the unit of measure. |
| **Rev Totaliser** | The current Reverse Totaliser reading with its relevant pulse weight implemented including the unit of measure. |
| **Pressure (4-20mA Loop)** | The 4-20mA current loop reading with its calibration data implemented including the unit of measure. |
| **Last Seen** | The date and time the remote device was last seen connecting into the server. |
| **Latitude** | Captured device Latitude. |
| **Longitude** | 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.

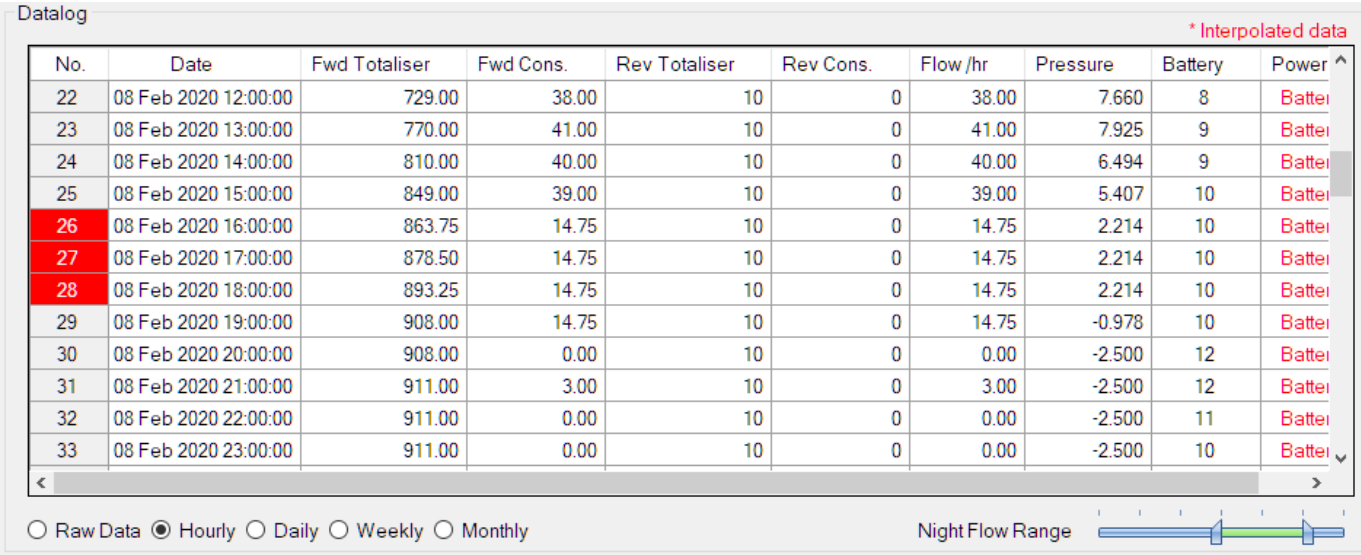
This application will record the following data in the datalog.




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

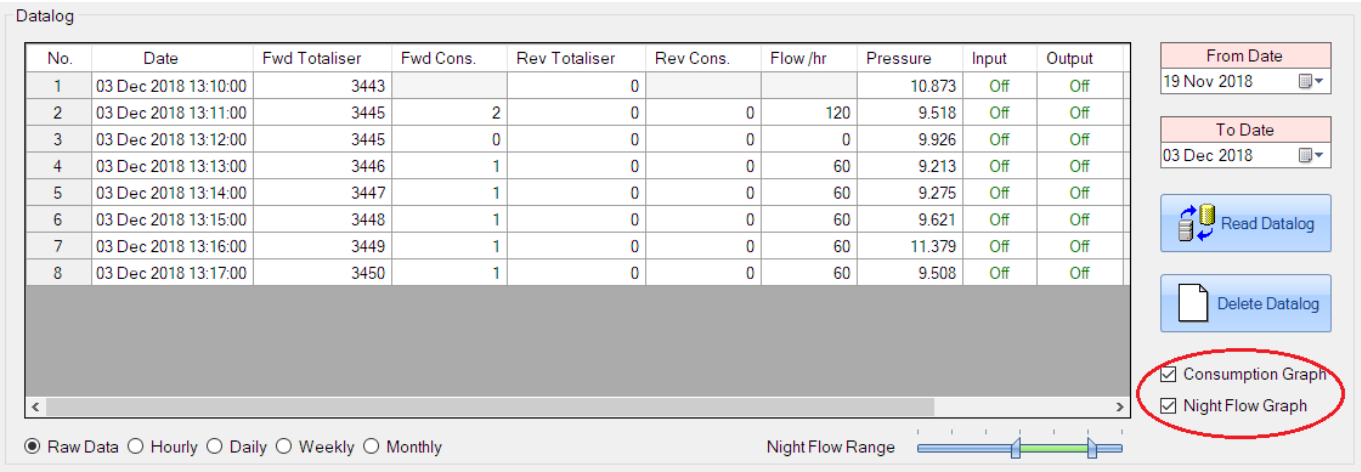



As per the previously explained functions throughout the Cloudworks suite, columns can be switched off/on and re-ordered to the users requirements. The exporting will be as per the layout presented on the screen.

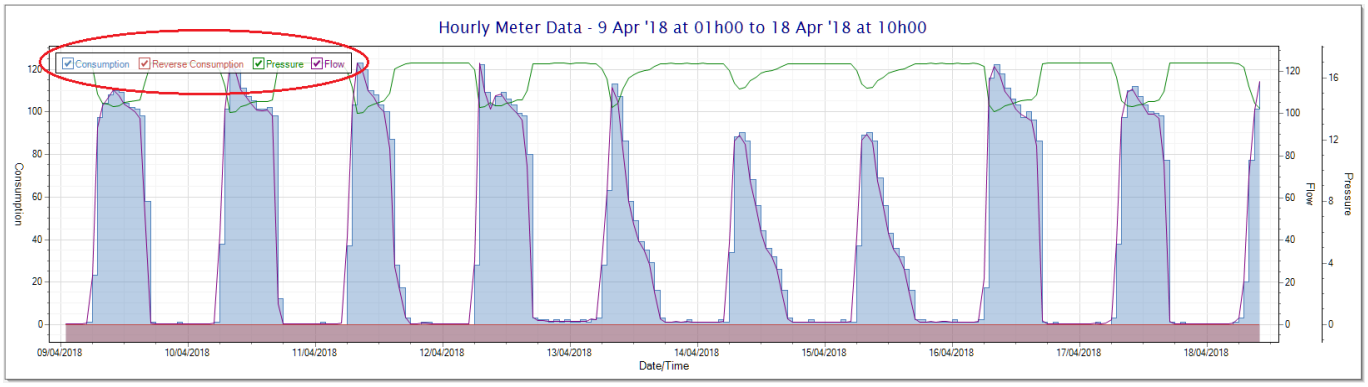
You can zoom into a range of the data by simply selecting those records in the table. This will result in the graph at the bottom being updated to display only those readings.

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.

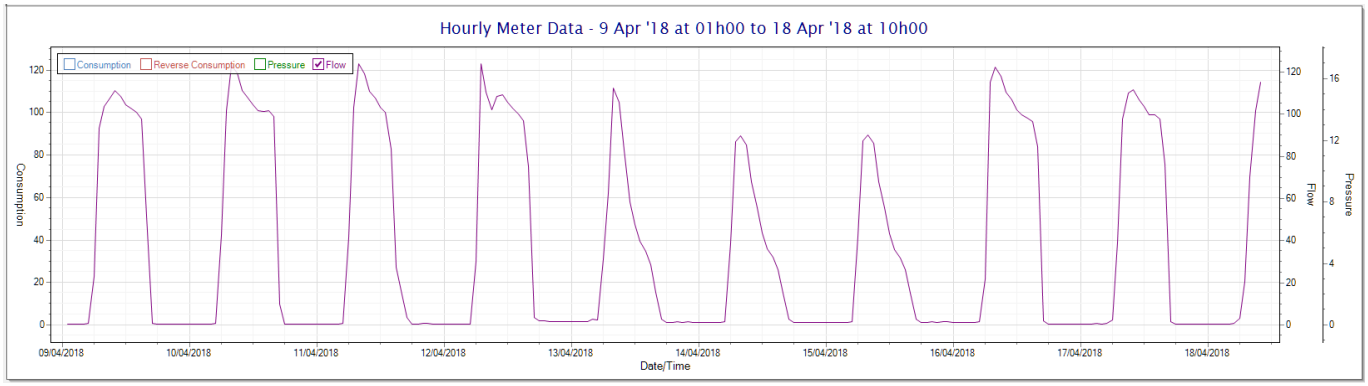
Data that is displayed in the table will also be represented in the graph at the bottom of the screen. There are two graphs displayed, namely the Consumption Graph (consumption/pressure/flow), and a Night Flow graph. These graphs can be selectively switched on/off by clicking the ticks at the bottom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



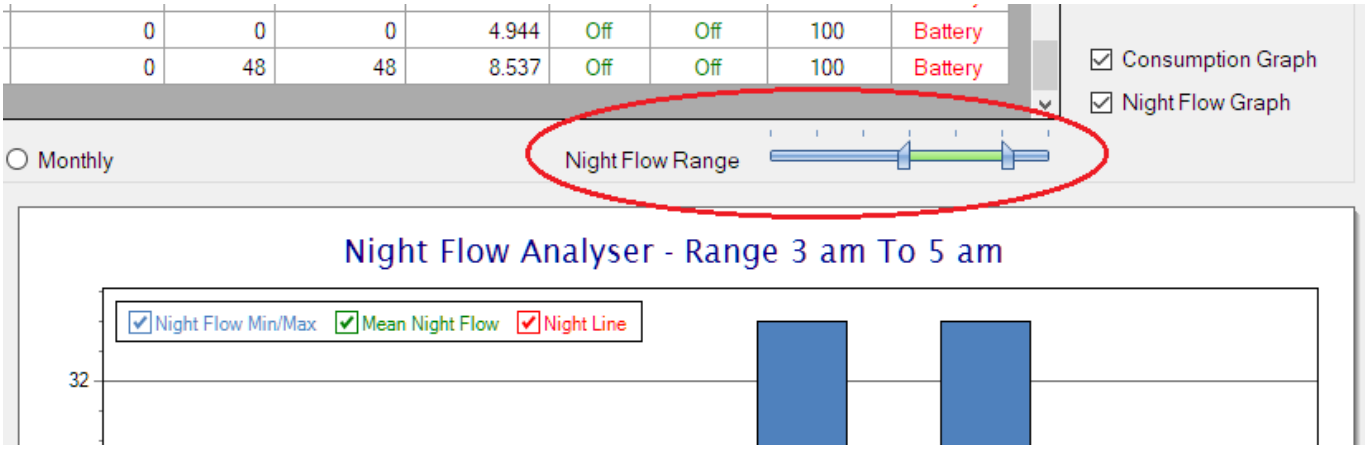
The Consumption Graph displays the consumption, pressure and flow related data. Individual graph series can be switched off/on by selecting the ticks at the top left of the graph.




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.



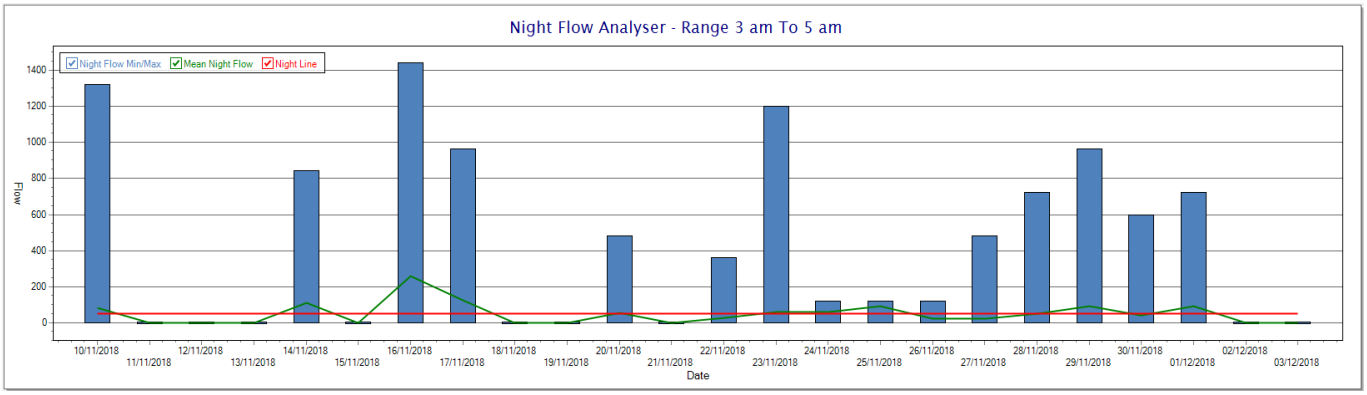

The graph will show a couple of different series.

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

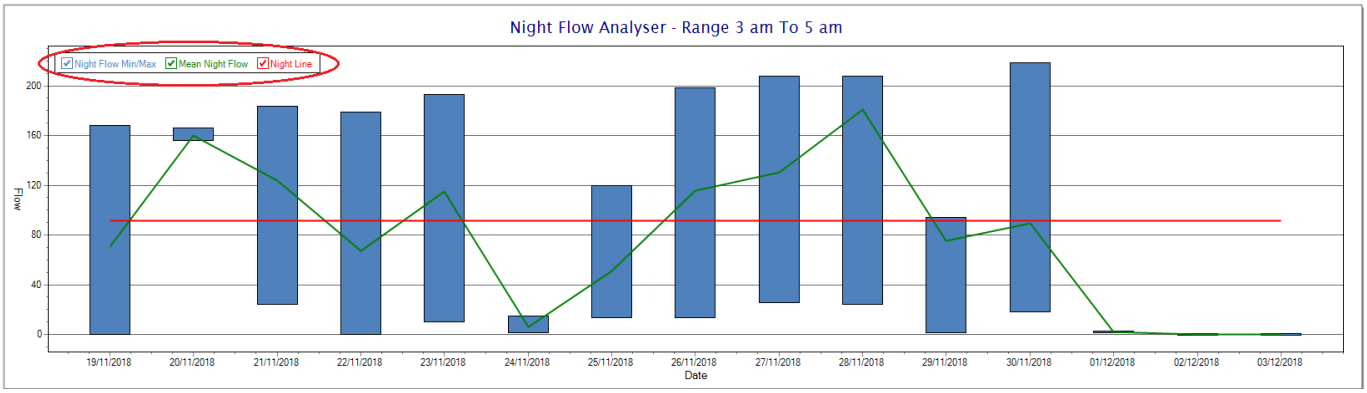
therefore sit on the base of the graph. The maximum flow would simply indicate some consumption during the period of measure and is not really a concern unless that was not expected.

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:-

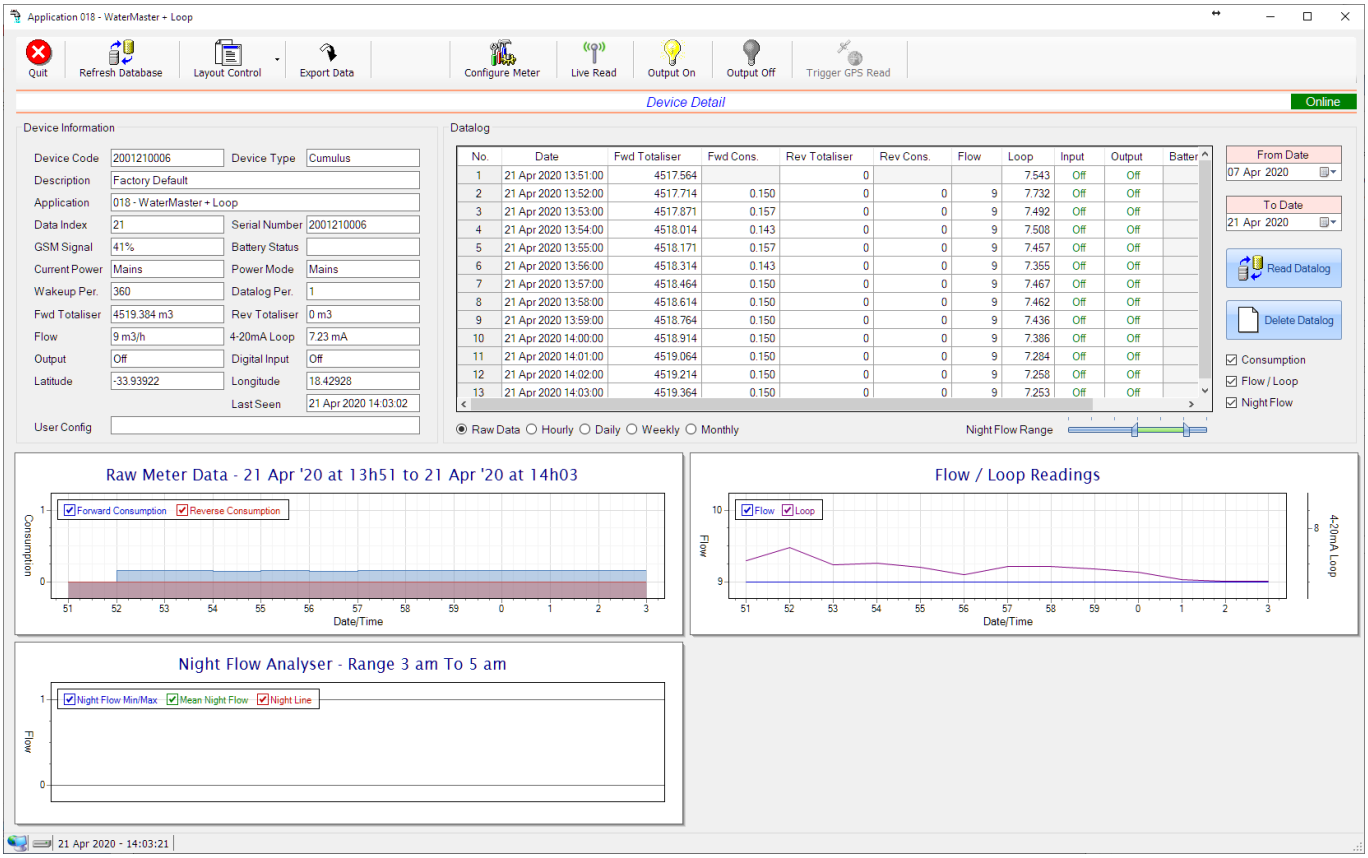



During a possible leak situation, the minimum night flow does not return to zero and the graph will appear to bounce off the bottom.




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



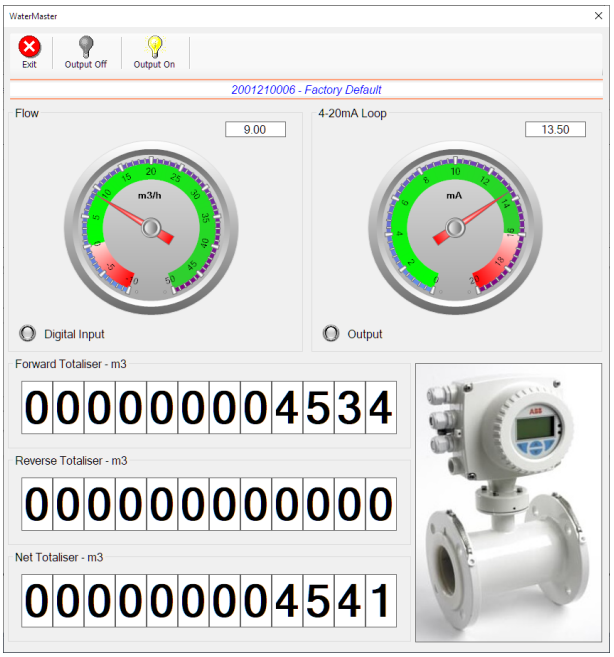

This type would be selected for applications that are used on an ABB WaterMaster water meter connected to the Modbus interface. Forward/Reverse Totals and Flow are read directly from the interface of the meter.

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 |
|---|---|
| **Device Code** | 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. |
| **Device Type** | Type of Remote Device. eg CDS538 Cumulus Logger etc |
| **Description** | 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. |
| **Application** | Selected device application. Application 018 - WaterMaster + Loop function in this case. |
| **Data Index** | 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. |

| | |
|---|---|
| **Serial Number** | Serial number of this device - assigned in the factory. |
| **GSM Signal** | Signal strength of the last GSM communications, expressed as a percentage. |
| **Battery Status** | 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). |
| **Current Power** | 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. |
| **Power Mode** | Selected Power Mode under which the remote device is operating. This can be Battery, Mains or Dual power modes. |
| **Wakeup Per.** | The Wakeup Period set in minutes. Refer to the device configuration chapter for an explanation of this parameter. |
| **Datalog Per.** | The Datalog Period set minutes. Refer to the device configuration chapter for an explanation of this parameter. |
| **Fwd Totaliser** | The current Forward Totaliser reading. |
| **Rev Totaliser** | The current Reverse Totaliser reading. |
| **Flow** | Current flow reading. |
| **4-20mA Current Loop** | The 4-20mA current loop reading with its calibration data implemented including the unit of measure. |
| **Output** | Digital output status. |
| **Digital Input** | Digital input Status. |
| **Last Seen** | The date and time the remote device was last seen connecting into the server. |
| **Latitude** | Last seen remote device Latitude. |
| **Longitude** | 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.

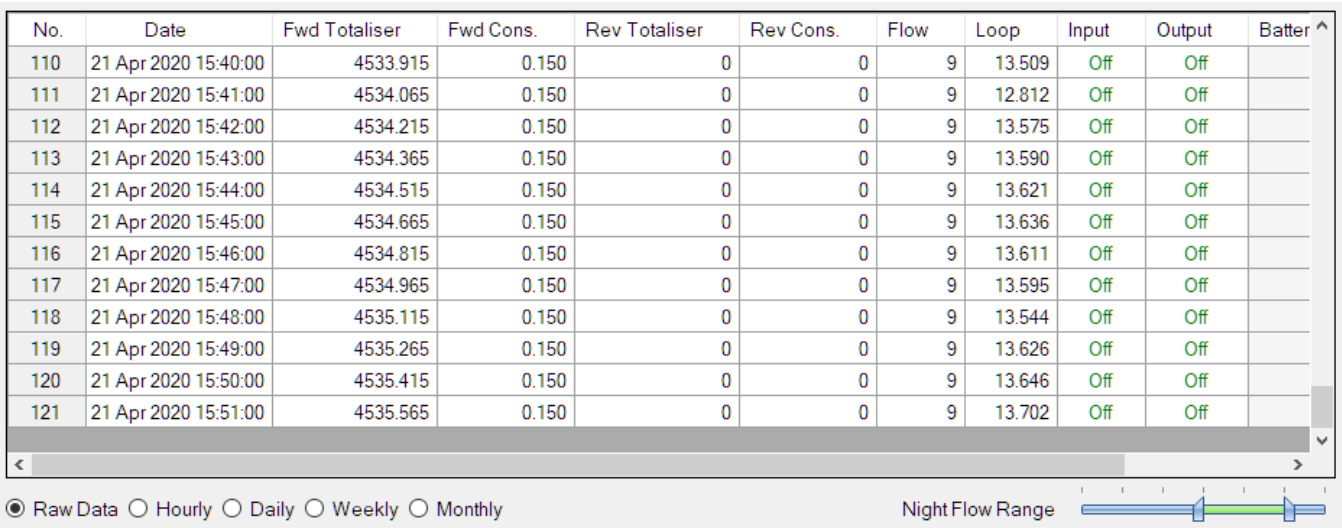
The onboard GPS of the remote device uses a substantial amount of power and is therefore automatically switched off on battery powered devices. When the GPS is first powered up, it will take a couple of minutes before it is able to lock on to the position of the device. For this reason, battery powered 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.



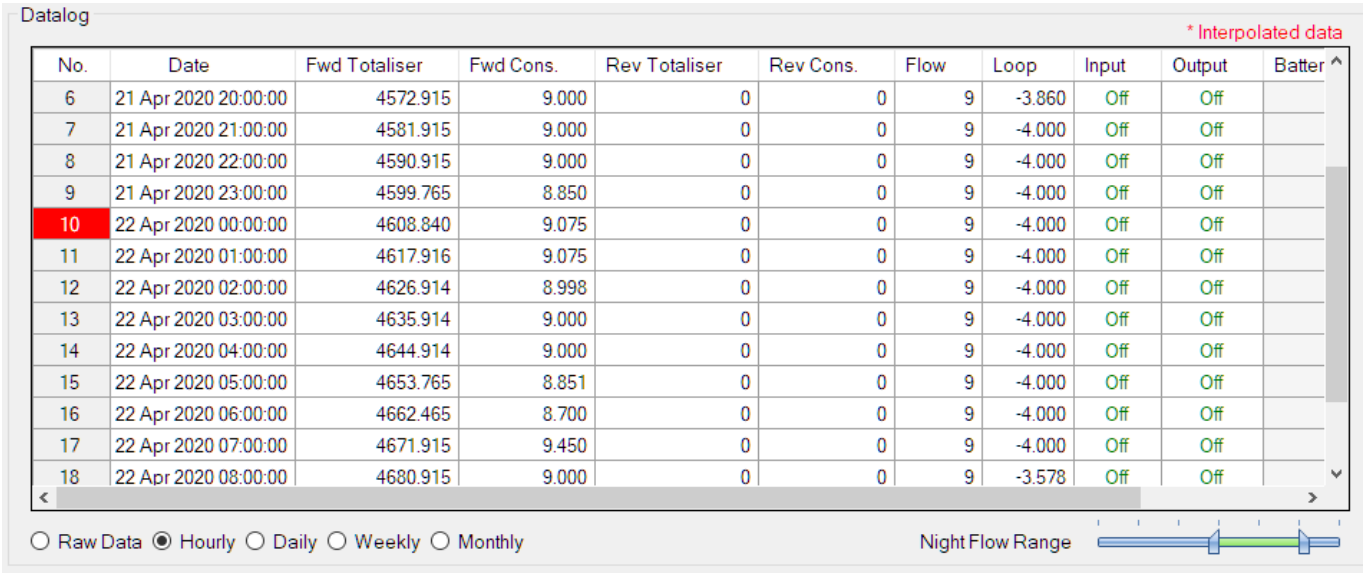
| No. | Date | Fwd Totaliser | Fwd Cons. | Rev Totaliser | Rev Cons. | Flow | Loop | Input | Output | Batter |
|---|---|---|---|---|---|---|---|---|---|---|
| 110 | 21 Apr 2020 15:40:00 | 4533.915 | 0.150 | 0 | 0 | 9 | 13.509 | Off | Off | |
| 111 | 21 Apr 2020 15:41:00 | 4534.065 | 0.150 | 0 | 0 | 9 | 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 | |



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

| | |
|---|---|
| **Input** | Digital input status at the time of recording this record. |
| **Output** | Digital output status at the time of recording this record. |
| **Battery** | Battery level in percentage. Only displayed on battery powered devices. |
| **Power** | 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

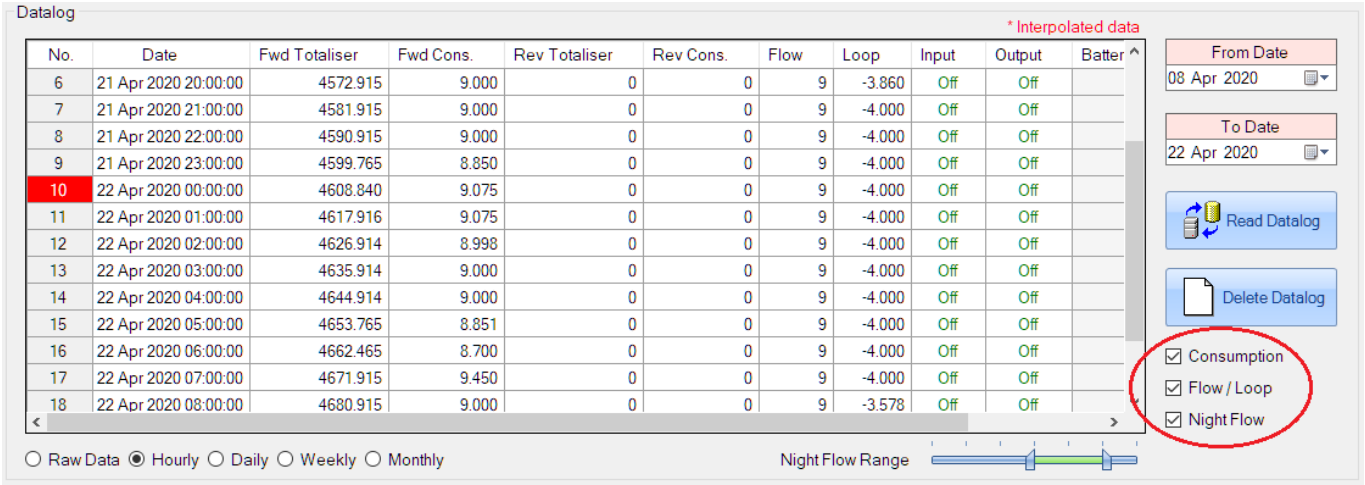
Night Flow Range

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.

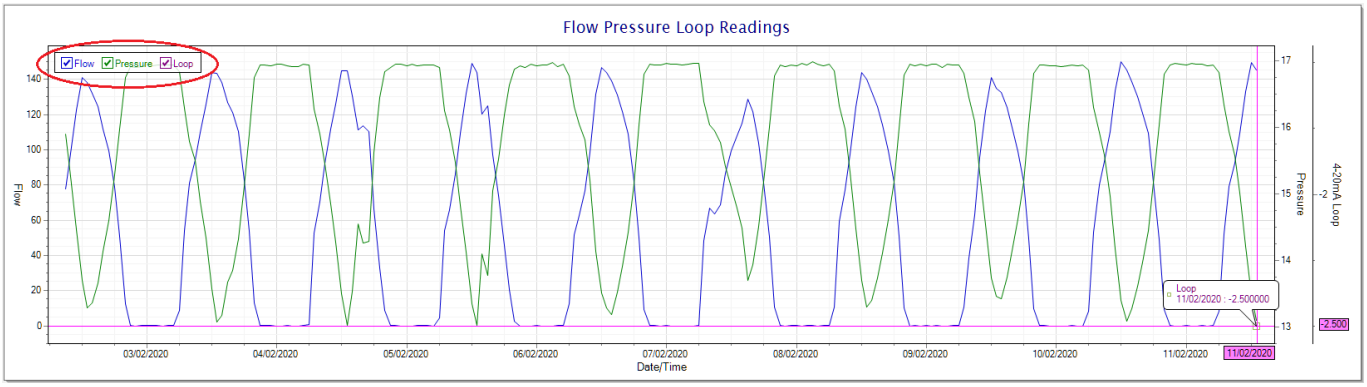
Deleting the datalog or removing a range of records can be easily done by using the 'Delete Datalog' button. To delete a range, simply select the range in the datalog table and press the 'Delete Datalog' button. If no range is selected, it will be assumed that you wish to delete the entire datalog. There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

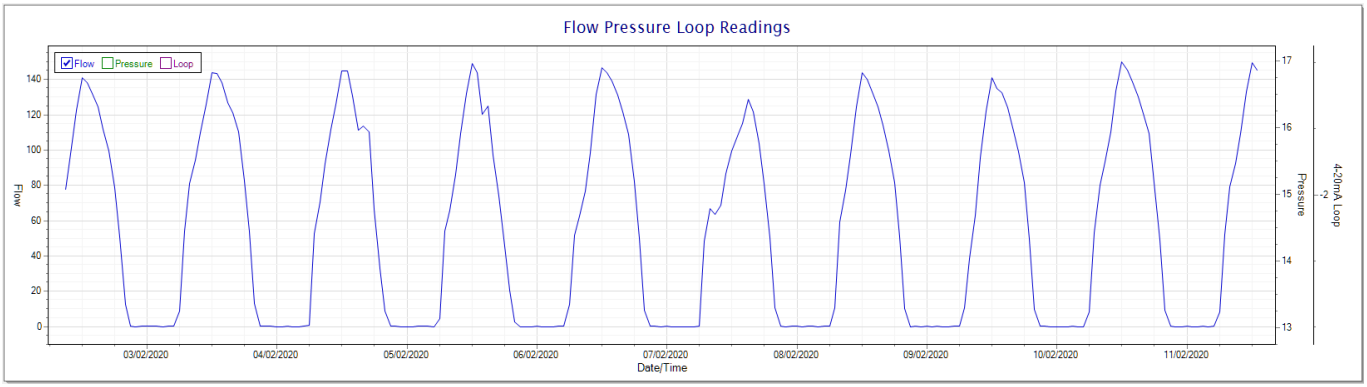



| No. | Date | Fwd Totaliser | Fwd Cons. | Rev Totaliser | Rev Cons. | Flow | Loop | Input | Output | Batter |
|---|---|---|---|---|---|---|---|---|---|---|
| 6 | 21 Apr 2020 20:00:00 | 4572.915 | 9.000 | 0 | 0 | 9 | -3.860 | Off | Off | |
| 7 | 21 Apr 2020 21:00:00 | 4581.915 | 9.000 | 0 | 0 | 9 | -4.000 | 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 | |

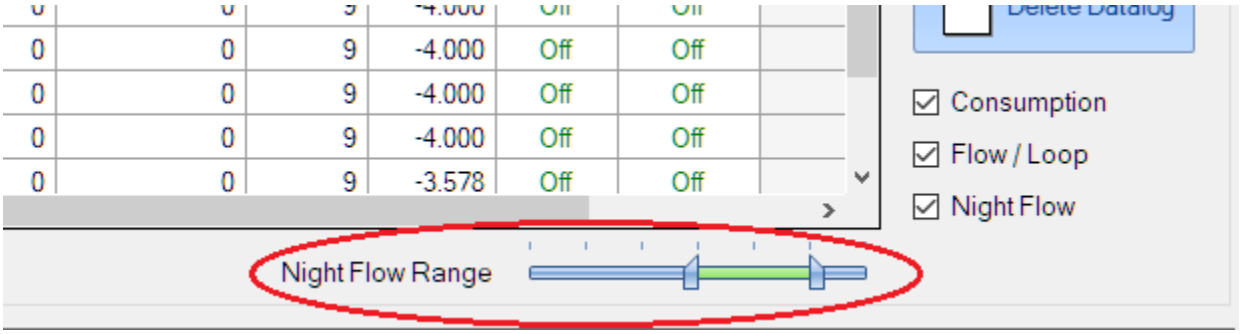
The various series on each graph can be toggled on and off by selecting the series tick in the upper left hand corner.




To view the flow only would look like this:-



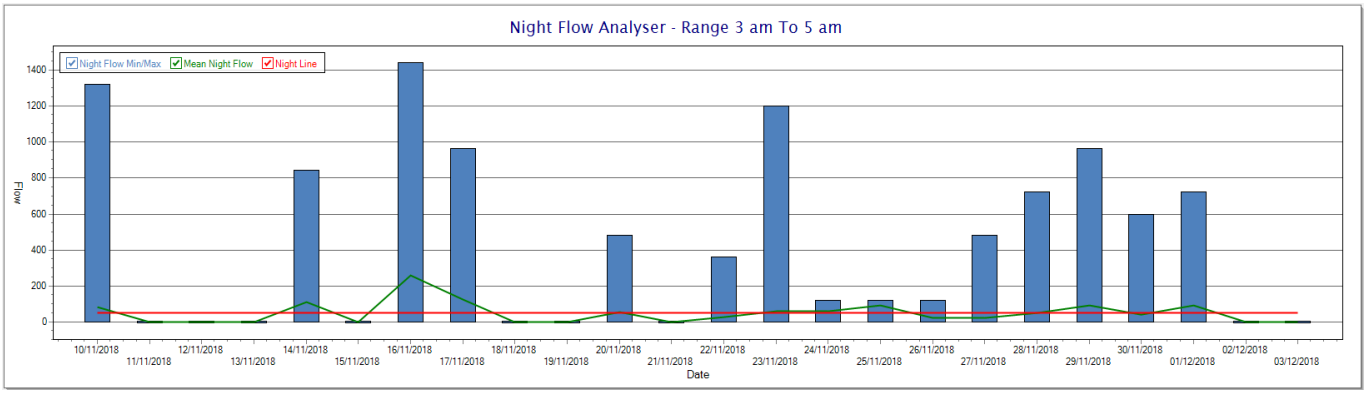

Also displayed is the Night Flow graph. The function of this graph is to specifically analyse the night time water flows at an installation. This analysis is done based on the data received during a specific time period during the night (normally from 3am to 5am). This period for analysis can be adjusted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



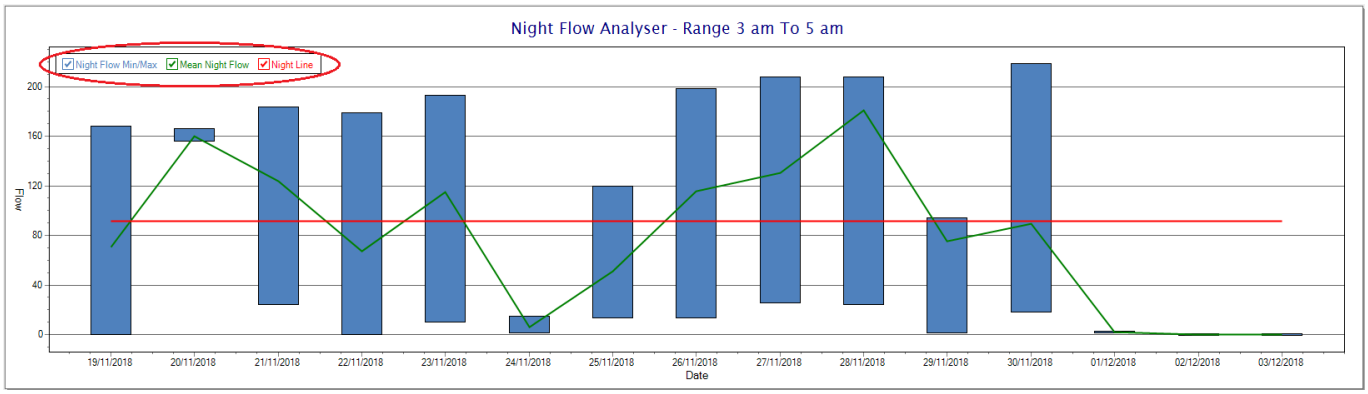

The graph will show a couple of different series.

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.

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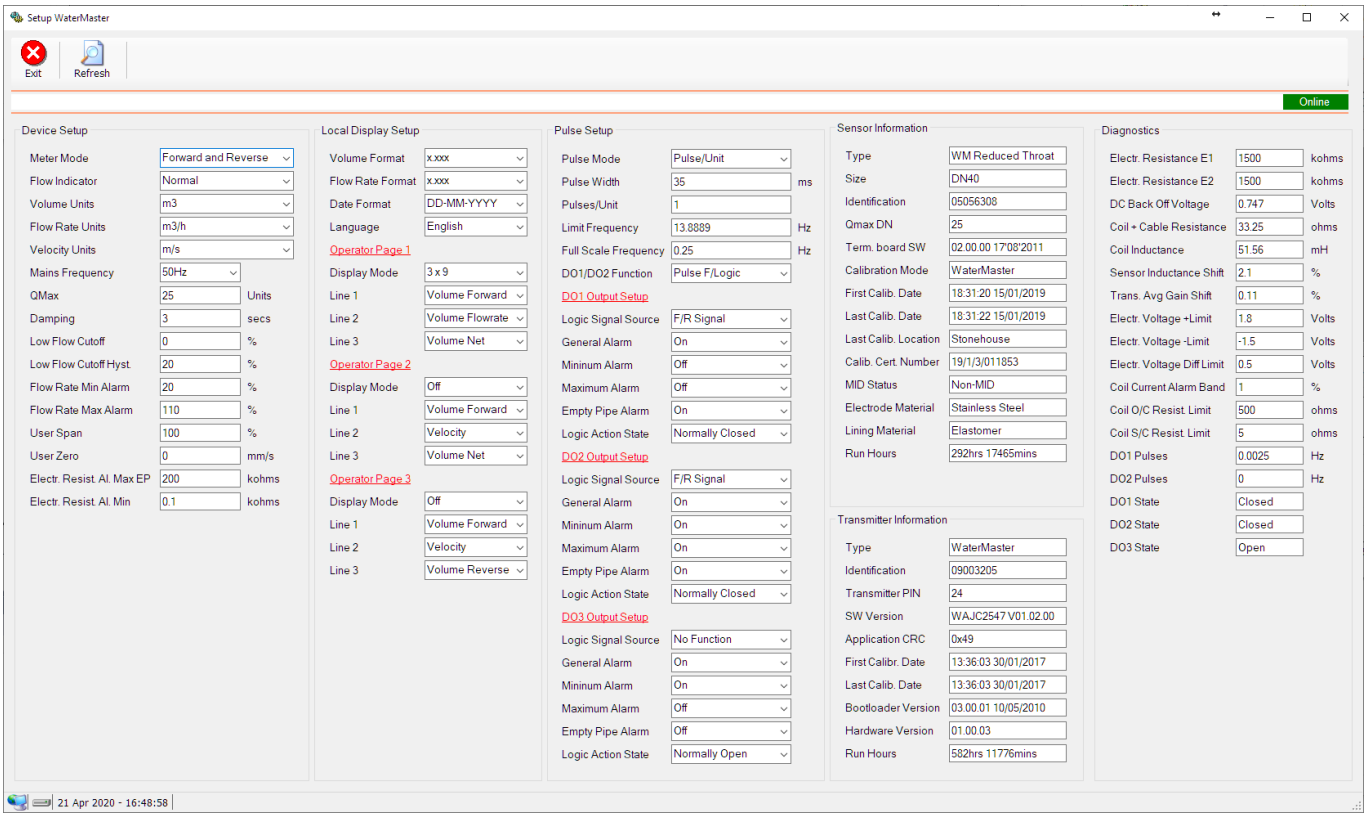
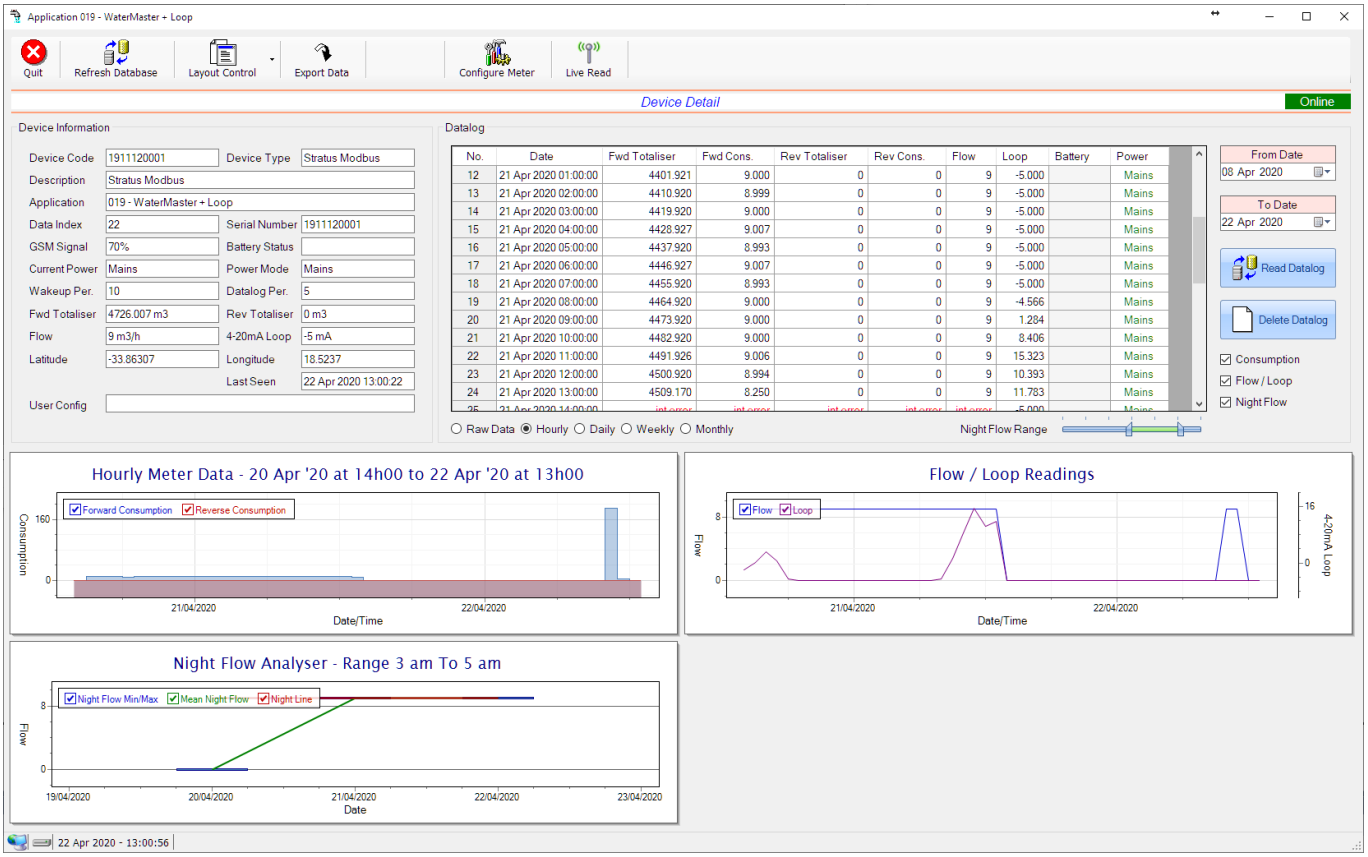



While the system is online, these parameters can be changed and will immediately be updated on the remote meter via its ModBus connection.

## 2.8.20 Application 019 - WaterMaster



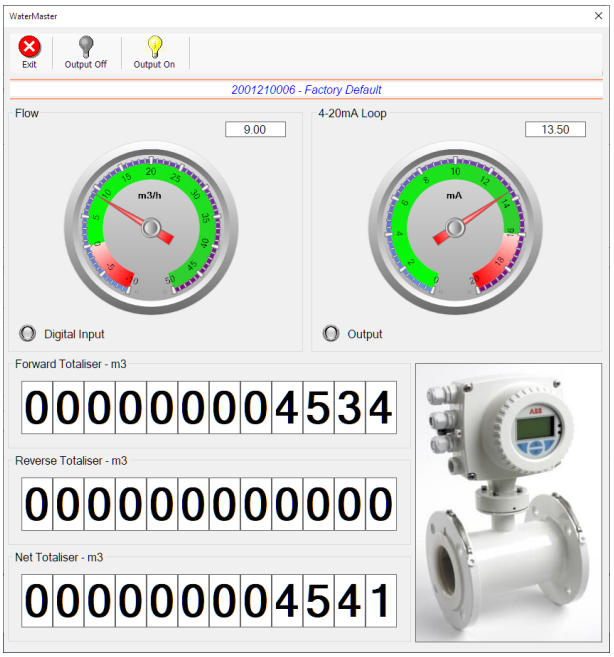

This type would be selected for applications that are used on an ABB WaterMaster water meter connected to the Modbus interface. Forward/Reverse Totals and Flow are read directly from the interface of the meter.

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 |
|---|---|
| **Device Code** | 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. |
| **Device Type** | Type of Remote Device. eg CDS538 Cumulus Logger etc |
| **Description** | 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. |
| **Application** | Selected device application. Application 018 - WaterMaster + Loop function in this case. |
| **Data Index** | 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. |

| | |
|---|---|
| **Serial Number** | Serial number of this device - assigned in the factory. |
| **GSM Signal** | Signal strength of the last GSM communications, expressed as a percentage. |
| **Battery Status** | 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). |
| **Current Power** | 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. |
| **Power Mode** | Selected Power Mode under which the remote device is operating. This can be Battery, Mains or Dual power modes. |
| **Wakeup Per.** | The Wakeup Period set in minutes. Refer to the device configuration chapter for an explanation of this parameter. |
| **Datalog Per.** | The Datalog Period set minutes. Refer to the device configuration chapter for an explanation of this parameter. |
| **Fwd Totaliser** | The current Forward Totaliser reading. |
| **Rev Totaliser** | The current Reverse Totaliser reading. |
| **Flow** | Current flow reading. |
| **4-20mA Current Loop** | The 4-20mA current loop reading with its calibration data implemented including the unit of measure. |
| **Last Seen** | The date and time the remote device was last seen connecting into the server. |
| **Latitude** | Captured Latitude. |
| **Longitude** | Captured 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.

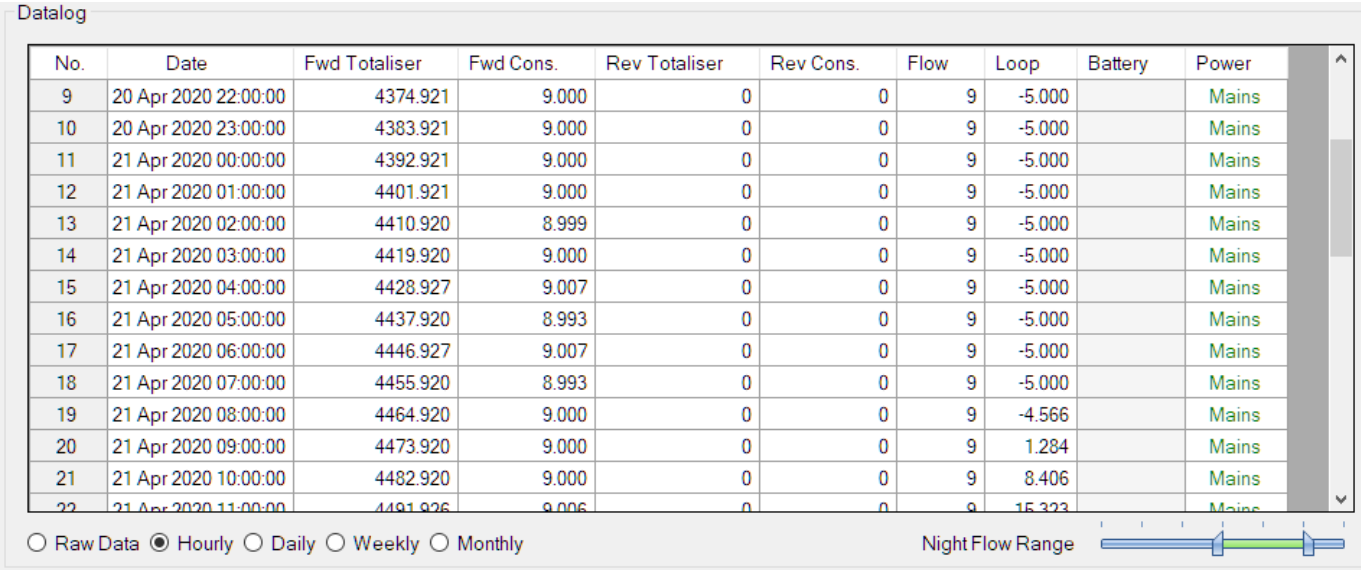
The onboard GPS of the remote device uses a substantial amount of power and is therefore automatically switched off on battery powered devices. When the GPS is first powered up, it will take a couple of minutes before it is able to lock on to the position of the device. For this reason, battery powered 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.

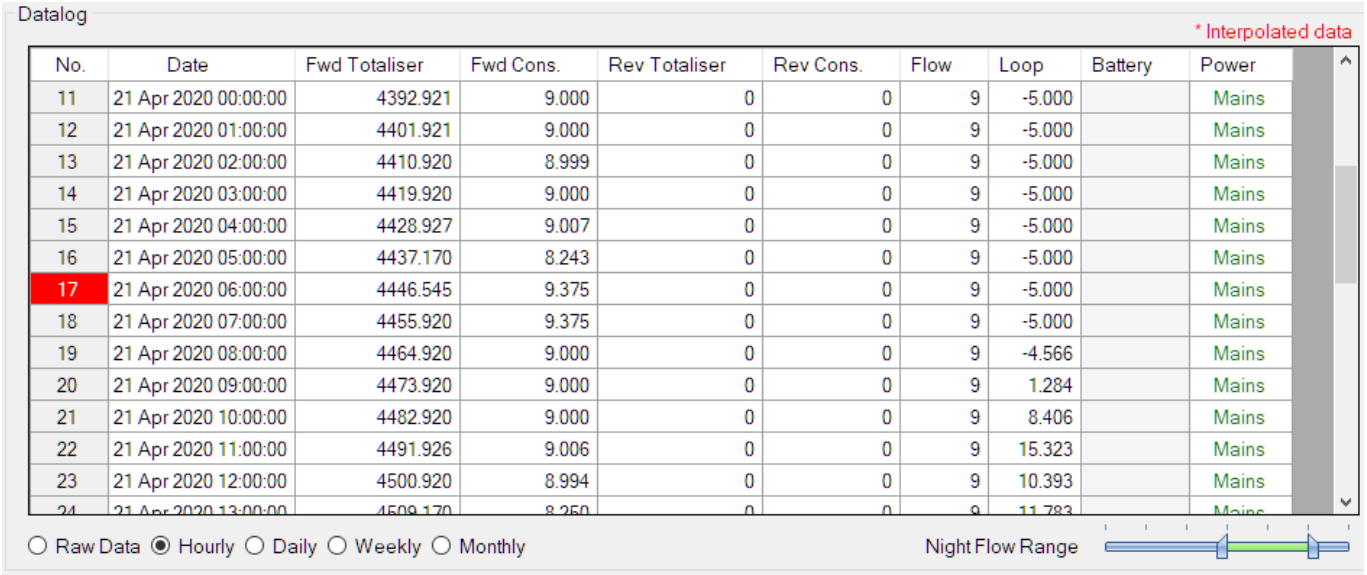
To the right of screen is the Datalog information box. This box will be populated with the most recent data from the recorded datalog of this remote device (read from the database). By default, when the screen opens, the last two weeks' worth of data will be displayed in this table. To select a different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




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

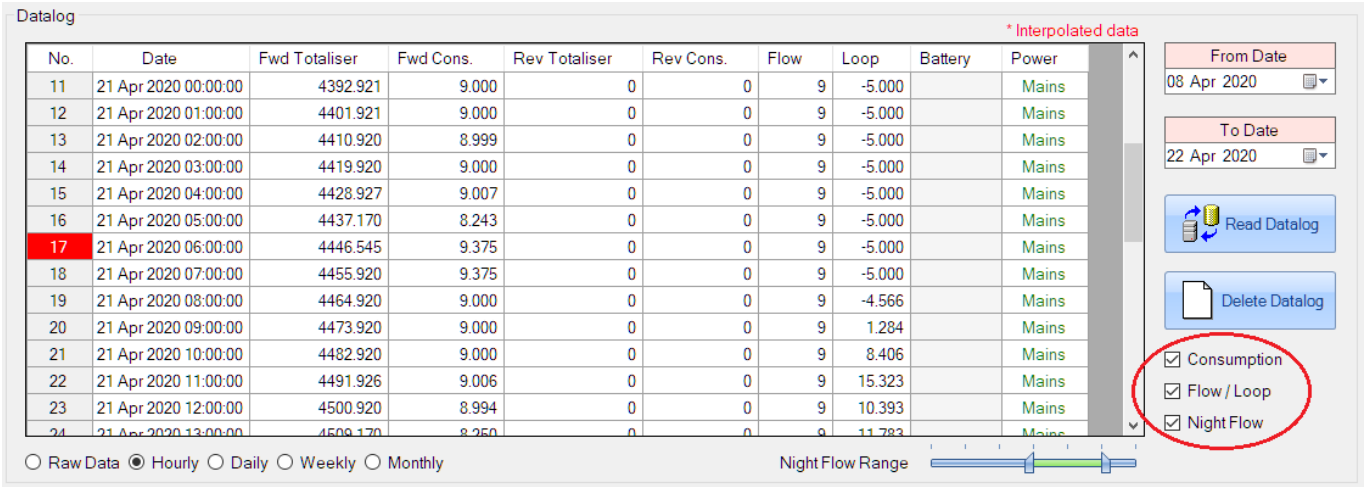
Night Flow Range

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.




| 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 |
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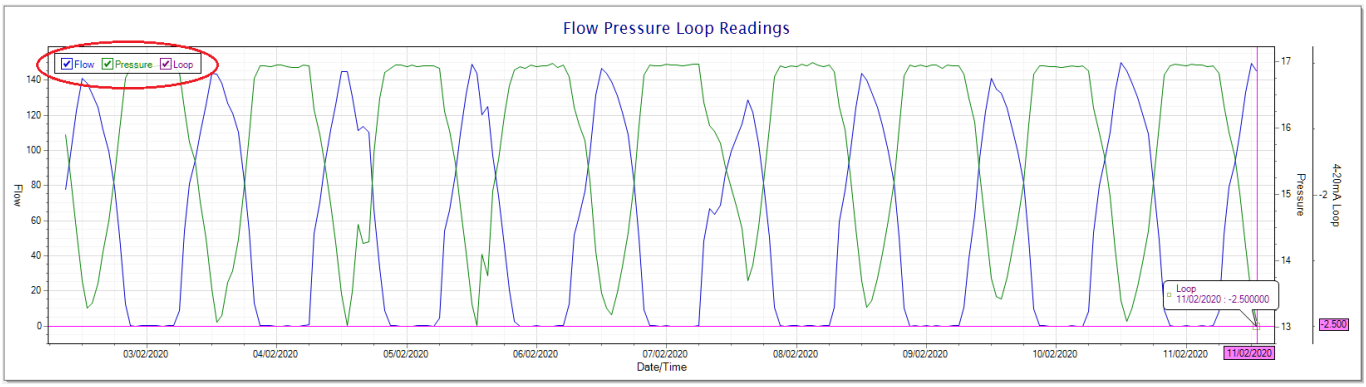
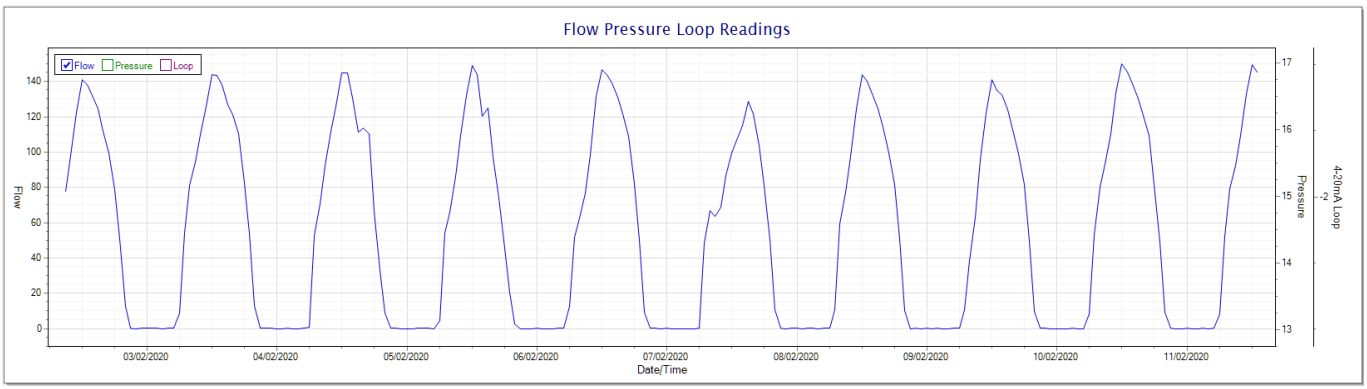
| 18 | 21 Apr 2020 07:00:00 | 4455.920 | 9.375 | 0 | 0 | 9 | -5.000 | | Mains |
| 19 | 21 Apr 2020 08:00:00 | 4464.920 | 9.000 | 0 | 0 | 9 | -4.566 | | Mains |
| 20 | 21 Apr 2020 09:00:00 | 4473.920 | 9.000 | 0 | 0 | 9 | 1.284 | | Mains |
| 21 | 21 Apr 2020 10:00:00 | 4482.920 | 9.000 | 0 | 0 | 9 | 8.406 | | 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 |

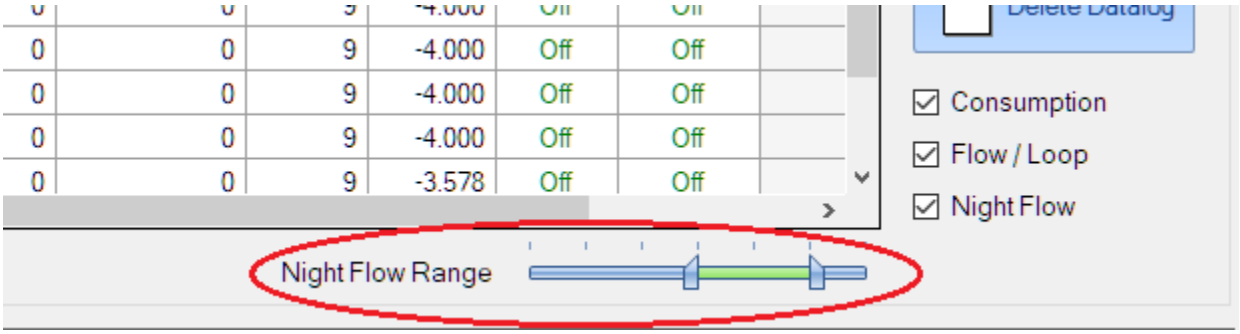
The various series on each graph can be toggled on and off by selecting the series tick in the upper left hand corner.




To view the flow only would look like this:-



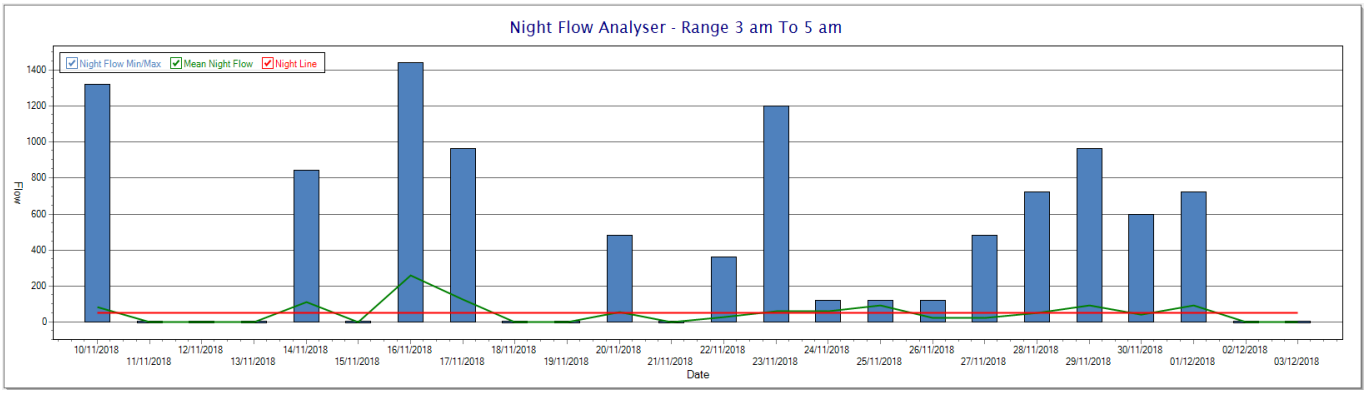

Also displayed is the Night Flow graph. The function of this graph is to specifically analyse the night time water flows at an installation. This analysis is done based on the data received during a specific time period during the night (normally from 3am to 5am). This period for analysis can be adjusted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



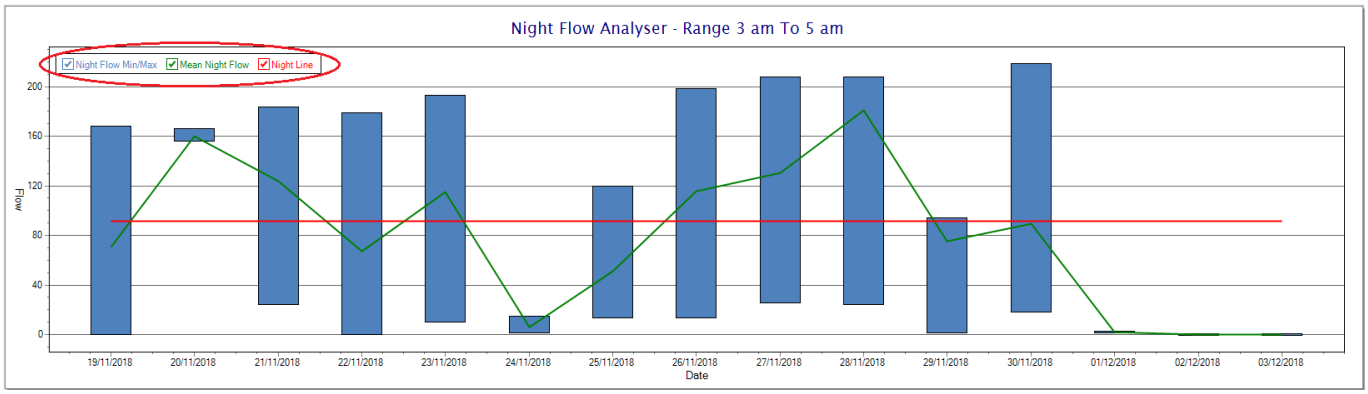

The graph will show a couple of different series.

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.

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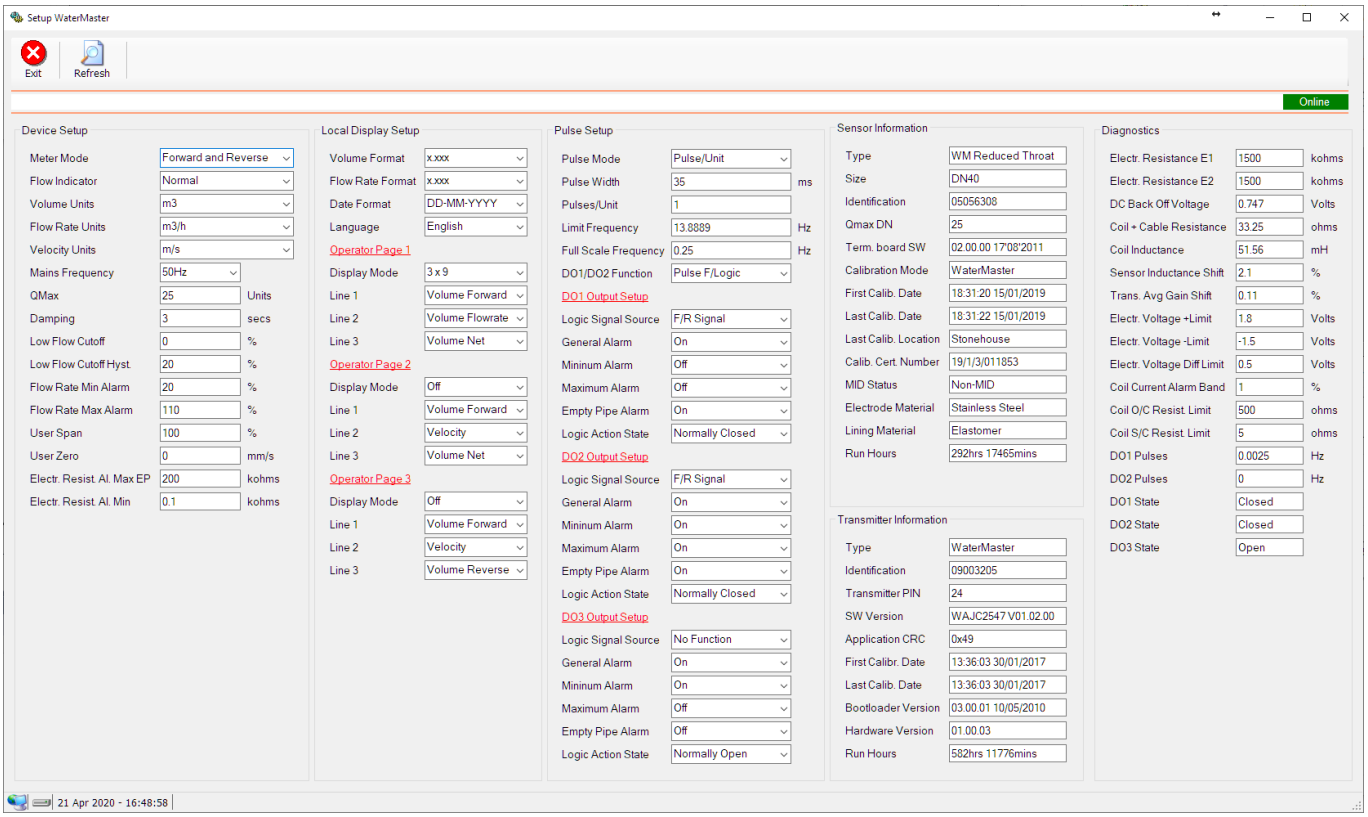
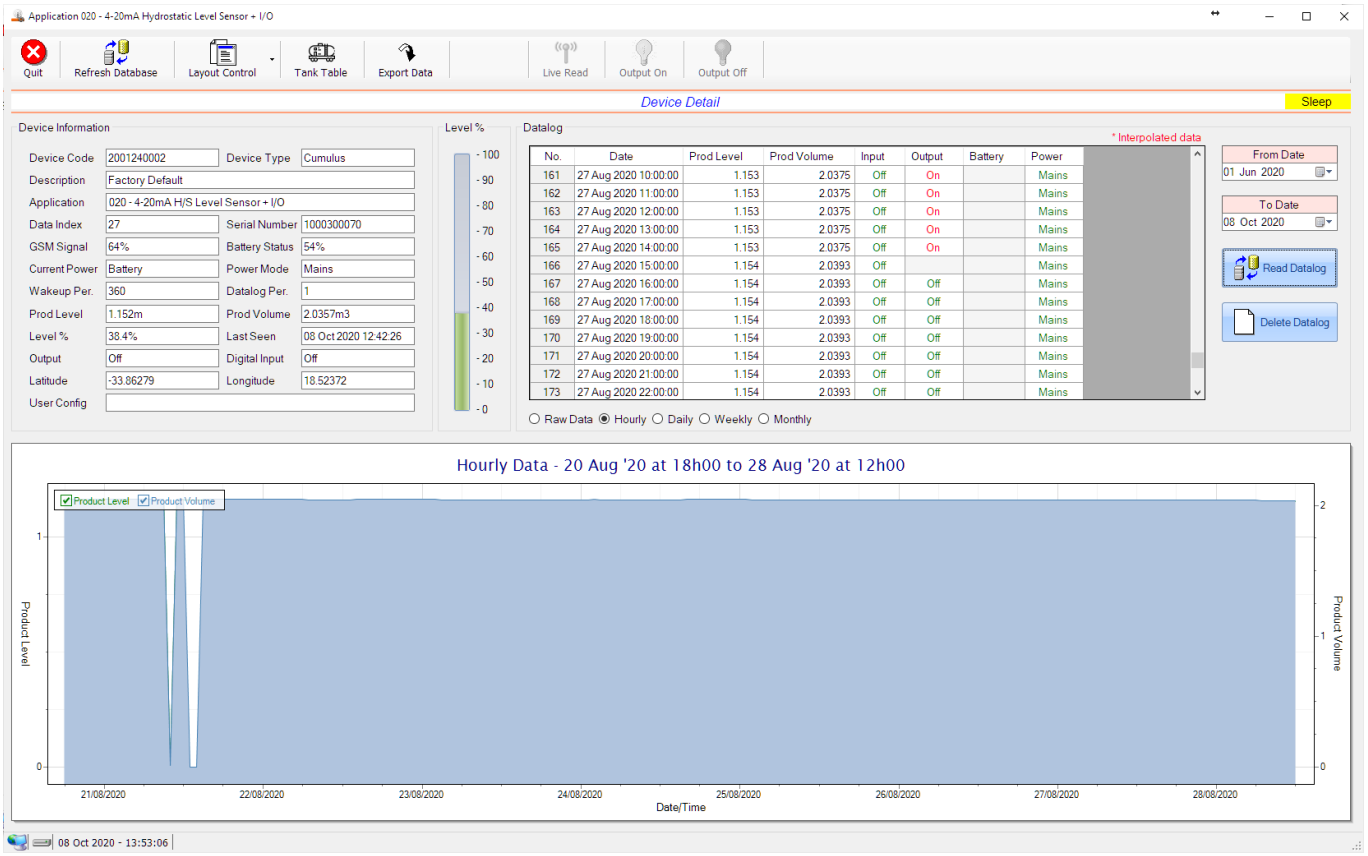



While the system is online, these parameters can be changed and will immediately be updated on the remote meter via its ModBus connection.

## 2.8.21 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.

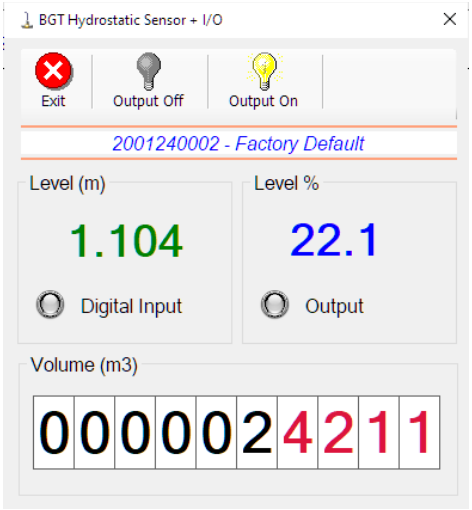
Functions on the top menu bar are mostly as per previous screens within the Cloudworks suite. These would be the 'Refresh Database', 'Layout Control' and 'Export Data' buttons which have been explained earlier. Added functionality is the 'Live Read' button and 'Tank Table' buttons.

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 |
|---|---|
| **Device Code** | 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. |
| **Device Type** | Type of Remote Device. eg CDS538 Cumulus Logger etc |
| **Description** | 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. |
| **Application** | Selected device application. Application 000 - Basic Cumulus function in this case. |
| **Data Index** | 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. |
| **Serial Number** | Serial number of this device - assigned in the factory. |
| **GSM Signal** | Signal strength of the last GSM communications, expressed as a percentage. |
| **Battery Status** | 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). |
| **Current Power** | 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. |
| **Power Mode** | Selected Power Mode under which the remote device is operating. This can be Battery, Mains or Dual power modes. |
| **Wakeup Per.** | The Wakeup Period set in minutes. Refer to the device configuration chapter for an explanation of this parameter. |
| **Datalog Per.** | The Datalog Period set in minutes. Refer to the device configuration chapter for an explanation of this parameter. |
| **Product Level** | The level of the product in the tank in metres |
| **Product Volume** | The volume of the product in the tank. This is read directly from the tank table and is in cubic metres. |
| **Level %** | The percentage of the tank f. Calculated from the max tank reading in the tank table. |
| **Last Seen** | The date and time the remote device was last seen connecting into the server. |
| **Digital Input** | Digital input status |
| **Output** | Digital output status |
| **Latitude** | Captured device Latitude. |
| **Longitude** | 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 | 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 |
|---|---|
| **Date/Time** | Date and time of the datalog record. |
| **Product Level** | Product level in the tank. |
| **Product Volume** | Product volume read from the tank table. |
| **Input** | Digital input status |
| **Output** | Digital output status |
| **Battery** | Battery level in percentage. Only displayed on battery powered devices. |
| **Power** | 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 |

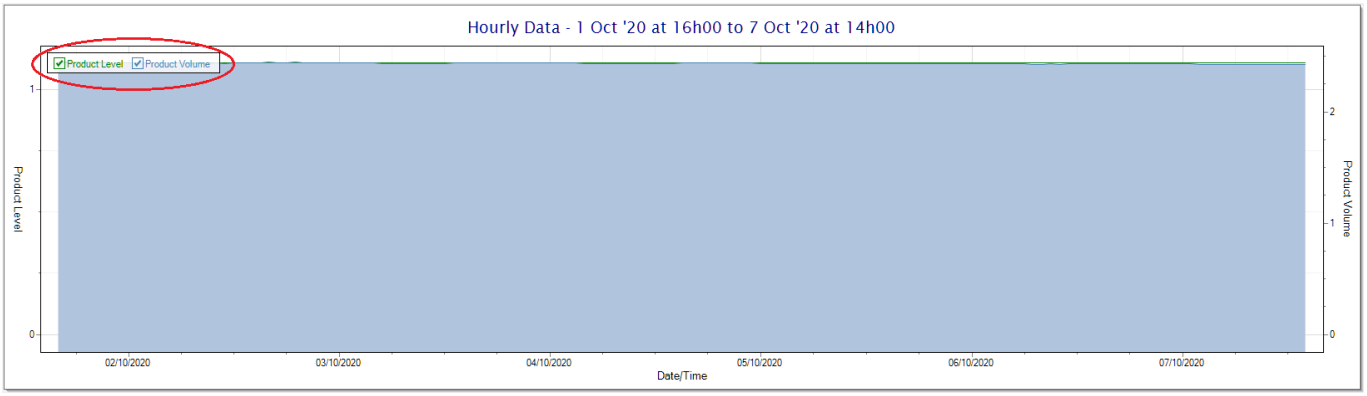
○ Raw Data ◉ Hourly ○ Daily ○ Weekly ○ Monthly

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.

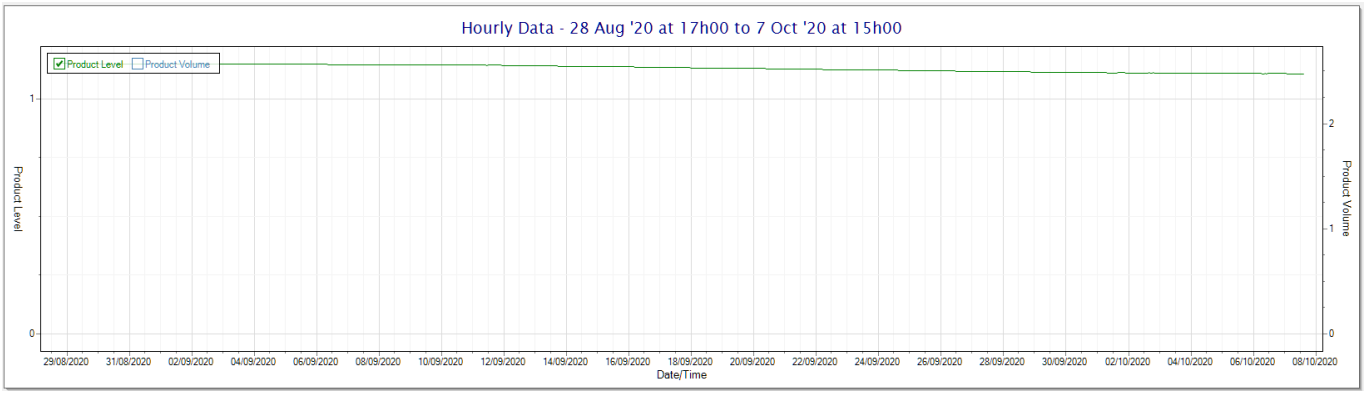
You can zoom into a range of the data by simply selecting those records in the table. This will result in the graph at the bottom being updated to display only those readings.

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.

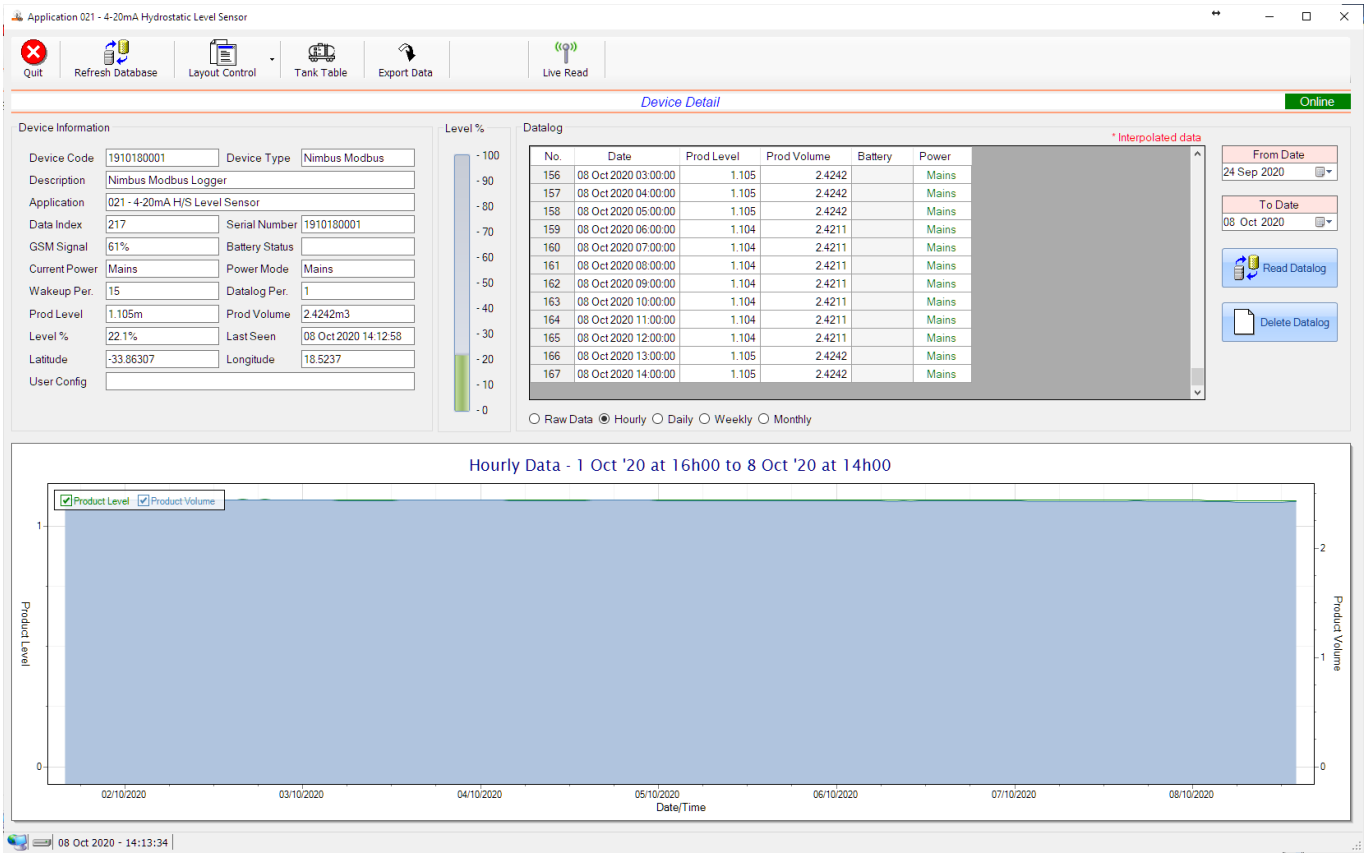
Data that is displayed in the table will also be represented in the graph at the bottom of the screen. The various series on each graph can be toggled on and off by selecting the series tick in the upper left hand corner.



To view the flow only would look like this:-



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




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.

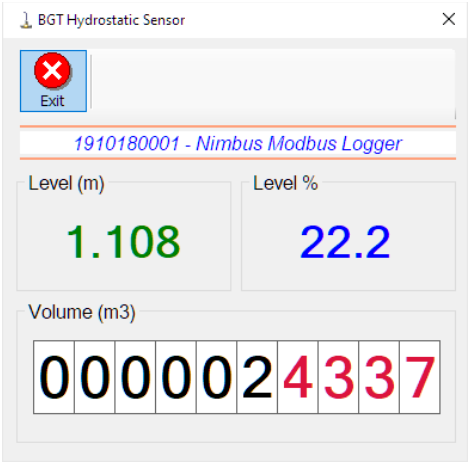
Functions on the top menu bar are mostly as per previous screens within the Cloudworks suite. These would be the 'Refresh Database', 'Layout Control' and 'Export Data' buttons which have been explained earlier. Added functionality is the 'Live Read' button and 'Tank Table' buttons.

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:-

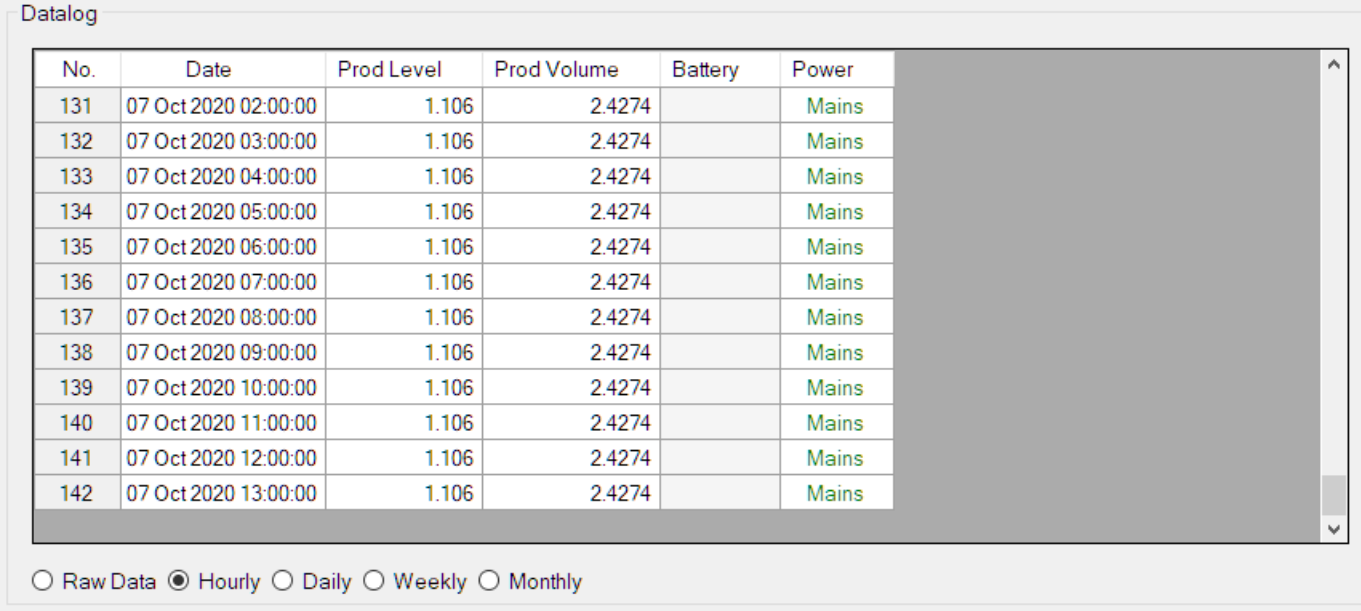
| Information | Notes |
|---|---|
| **Device Code** | The Device Code assigned to this particular remote device. All communications are initiated by addressing this code. This code is unique to all remote devices and is assigned at the time of manufacture. |
| **Device Type** | Type of Remote Device. eg CDS538 Cumulus Logger etc |
| **Description** | 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. |
| **Application** | Selected device application. Application 000 - Basic Cumulus function in this case. |
| **Data Index** | 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. |
| **Serial Number** | Serial number of this device - assigned in the factory. |
| **GSM Signal** | Signal strength of the last GSM communications, expressed as a percentage. |
| **Battery Status** | 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). |
| **Current Power** | 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. |
| **Power Mode** | Selected Power Mode under which the remote device is operating. This can be Battery, Mains or Dual power modes. |
| **Wakeup Per.** | The Wakeup Period set in minutes. Refer to the device configuration chapter for an explanation of this parameter. |
| **Datalog Per.** | The Datalog Period set in minutes. Refer to the device configuration chapter for an explanation of this parameter. |
| **Product Level** | The level of the product in the tank in metres |
| **Product Volume** | The volume of the product in the tank. This is read directly from the tank table and is in cubic metres. |
| **Level %** | The percentage of the tank f. Calculated from the max tank reading in the tank table. |
| **Last Seen** | The date and time the remote device was last seen connecting into the server. |
| **Latitude** | Captured device Latitude. |
| **Longitude** | 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.




| Information | Notes |
|---|---|
| **Date/Time** | Date and time of the datalog record. |
| **Product Level** | Product level in the tank. |
| **Product Volume** | Product volume read from the tank table. |
| **Battery** | Battery level in percentage. Only displayed on battery powered devices. |
| **Power** | 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 |

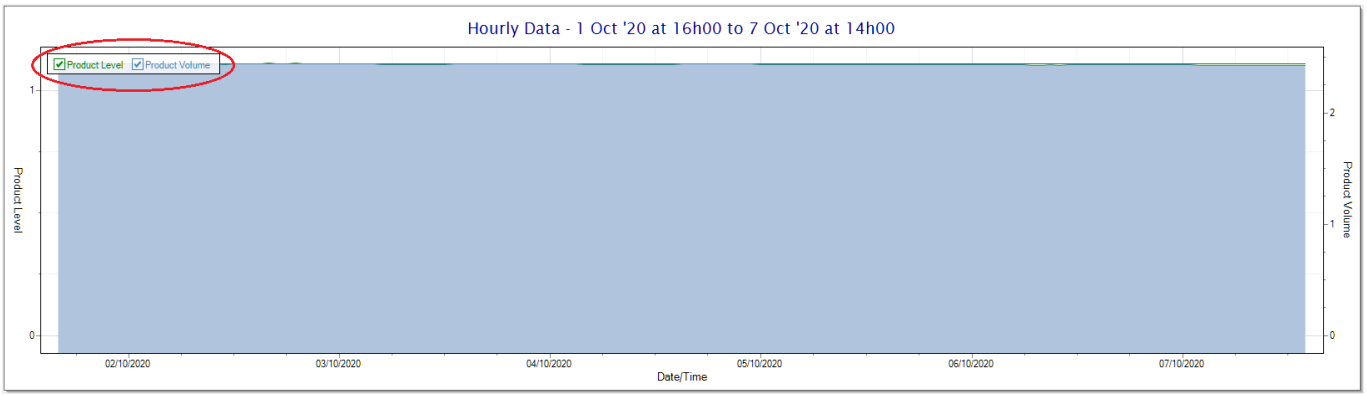
○ Raw Data ◉ Hourly ○ Daily ○ Weekly ○ Monthly

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.

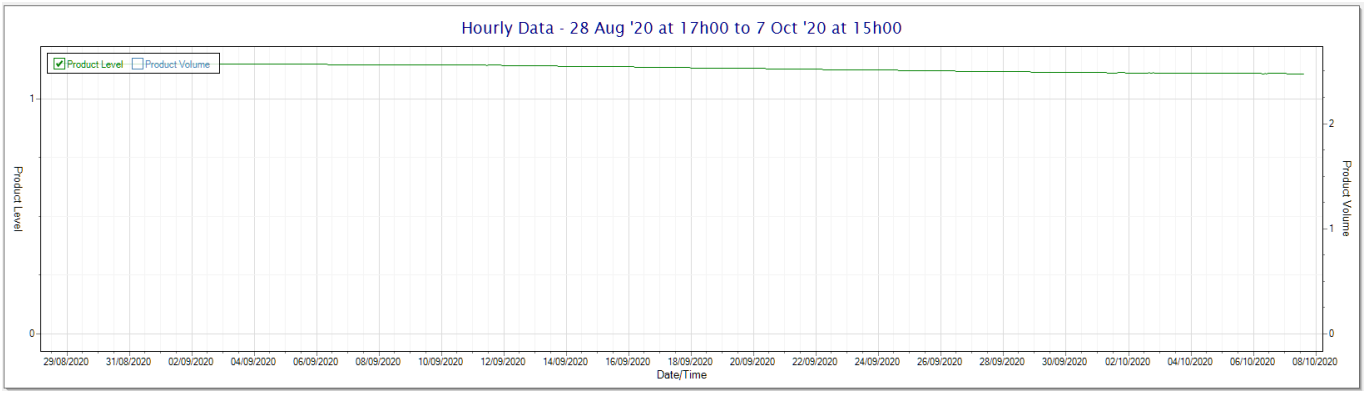
You can zoom into a range of the data by simply selecting those records in the table. This will result in the graph at the bottom being updated to display only those readings.

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.

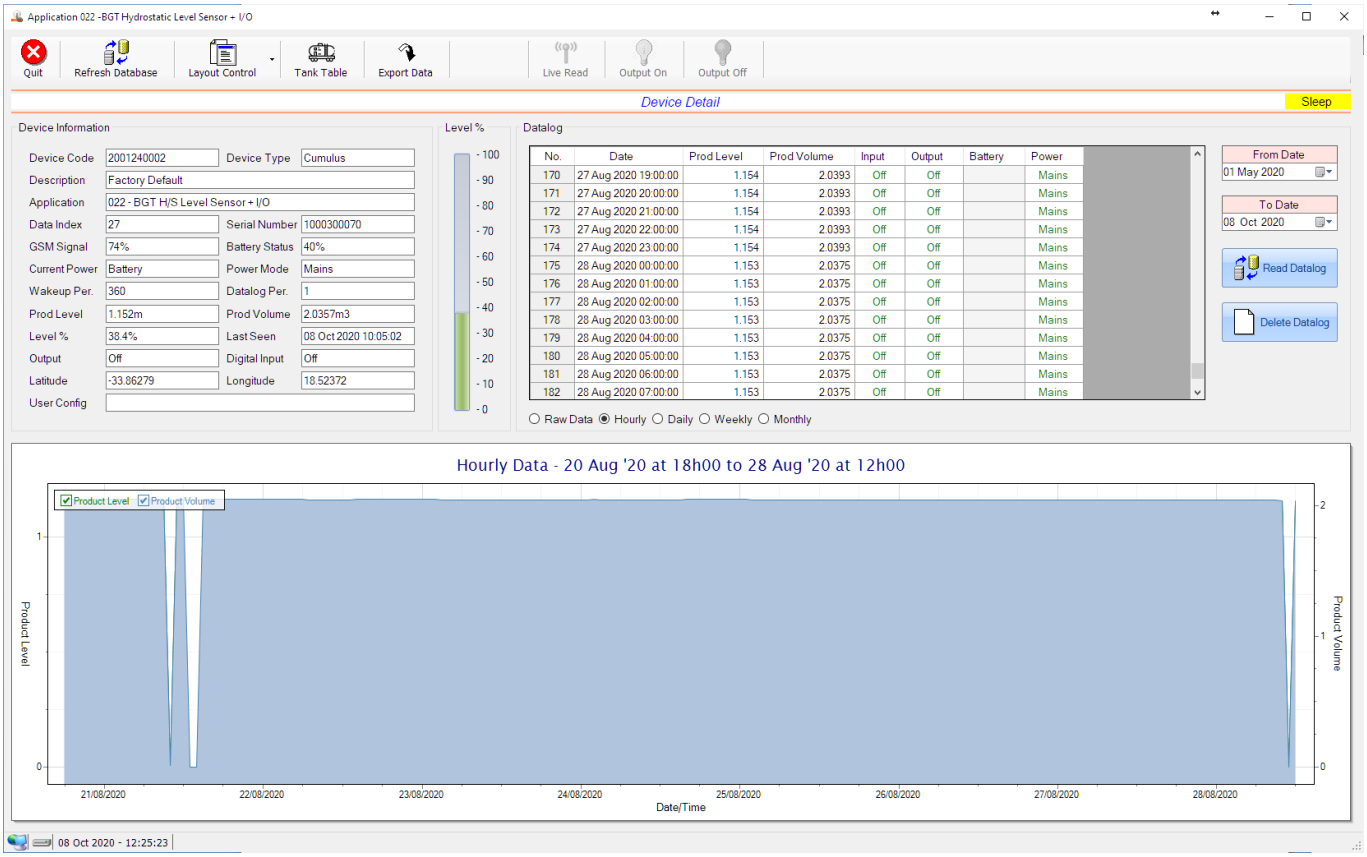
Data that is displayed in the table will also be represented in the graph at the bottom of the screen. The various series on each graph can be toggled on and off by selecting the series tick in the upper left hand corner.



To view the flow only would look like this:-



## 2.8.23 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.

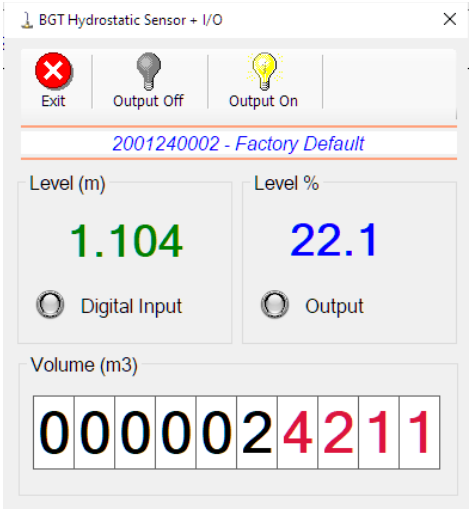
Functions on the top menu bar are mostly as per previous screens within the Cloudworks suite. These would be the 'Refresh Database', 'Layout Control' and 'Export Data' buttons which have been explained earlier. Added functionality is the 'Live Read' button and 'Tank Table' buttons.

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 |
|---|---|
| **Device Code** | 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. |
| **Device Type** | Type of Remote Device. eg CDS538 Cumulus Logger etc |
| **Description** | 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. |
| **Application** | Selected device application. Application 000 - Basic Cumulus function in this case. |
| **Data Index** | 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. |
| **Serial Number** | Serial number of this device - assigned in the factory. |
| **GSM Signal** | Signal strength of the last GSM communications, expressed as a percentage. |
| **Battery Status** | 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). |
| **Current Power** | 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. |
| **Power Mode** | Selected Power Mode under which the remote device is operating. This can be Battery, Mains or Dual power modes. |
| **Wakeup Per.** | The Wakeup Period set in minutes. Refer to the device configuration chapter for an explanation of this parameter. |
| **Datalog Per.** | The Datalog Period set in minutes. Refer to the device configuration chapter for an explanation of this parameter. |
| **Product Level** | The level of the product in the tank in metres |
| **Product Volume** | The volume of the product in the tank. This is read directly from the tank table and is in cubic metres. |
| **Level %** | The percentage of the tank f. Calculated from the max tank reading in the tank table. |
| **Last Seen** | The date and time the remote device was last seen connecting into the server. |
| **Digital Input** | Digital input status |
| **Output** | Digital output status |
| **Latitude** | Captured device Latitude. |
| **Longitude** | 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.

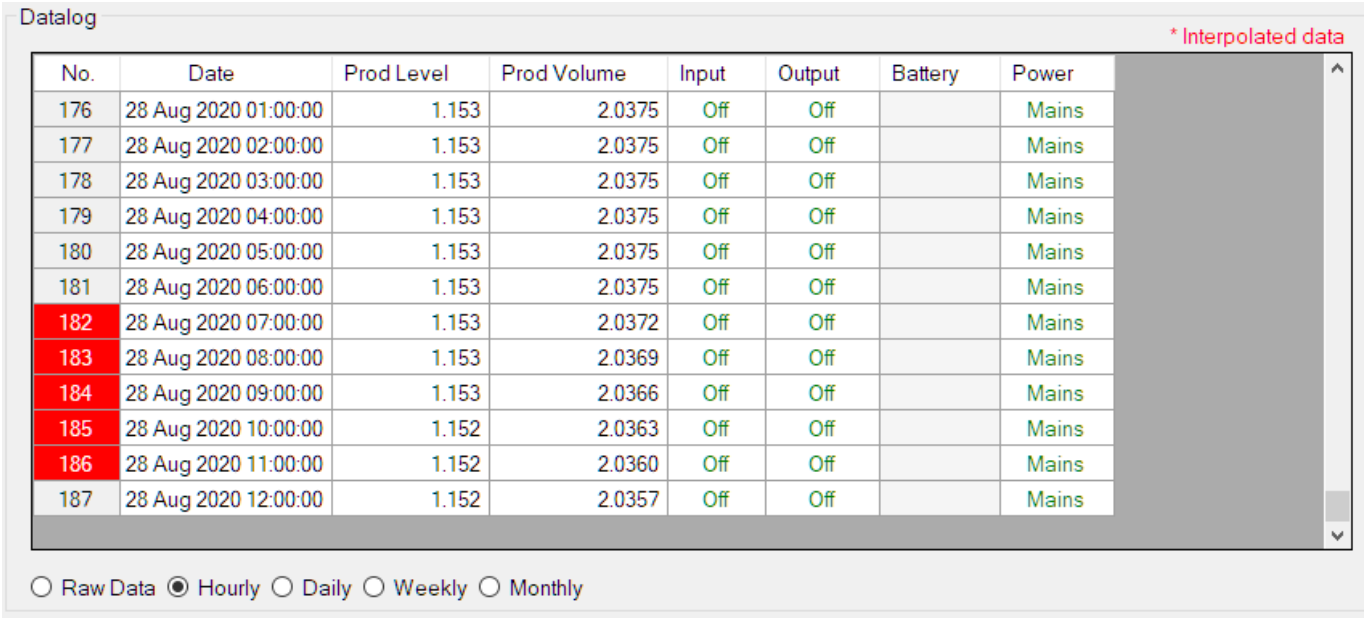
Datalog

| No. | Date | 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 |
|---|---|
| **Date/Time** | Date and time of the datalog record. |
| **Product Level** | Product level in the tank. |
| **Product Volume** | Product volume read from the tank table. |
| **Input** | Digital input status |
| **Output** | Digital output status |
| **Battery** | Battery level in percentage. Only displayed on battery powered devices. |
| **Power** | 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.

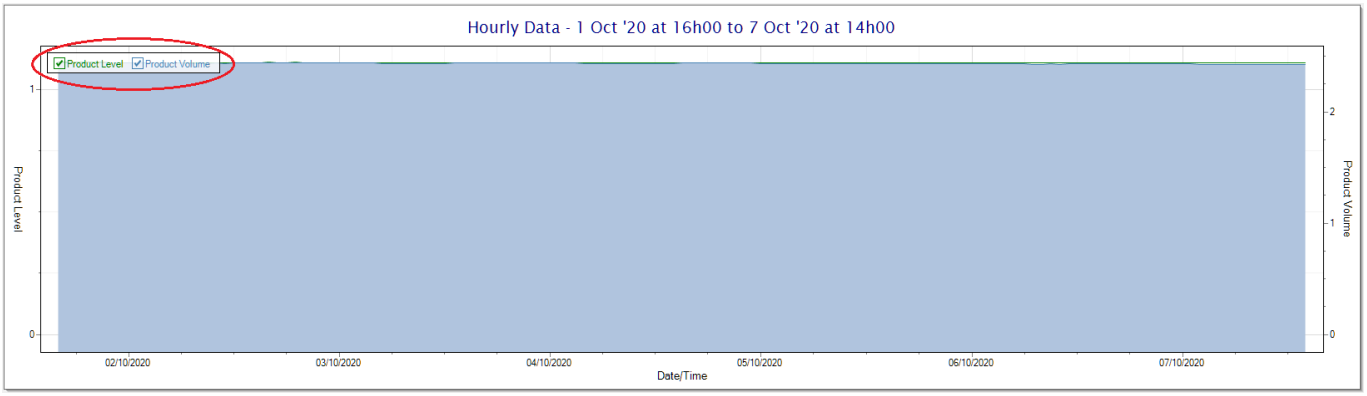



As per the previously explained functions throughout the Cloudworks suite, columns can be switched off/on and re-ordered to the users requirements. The exporting will be as per the layout presented on the screen.

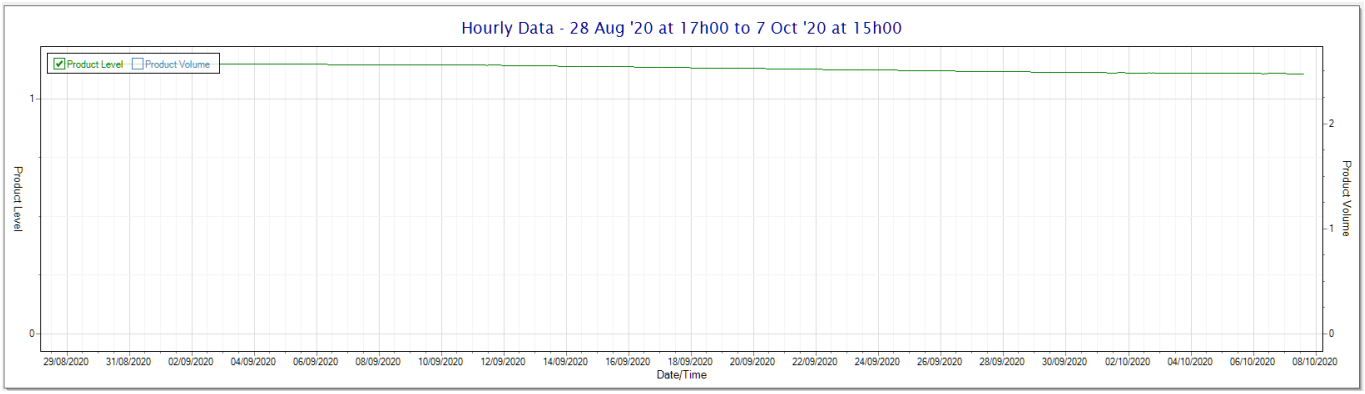
You can zoom into a range of the data by simply selecting those records in the table. This will result in the graph at the bottom being updated to display only those readings.

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.

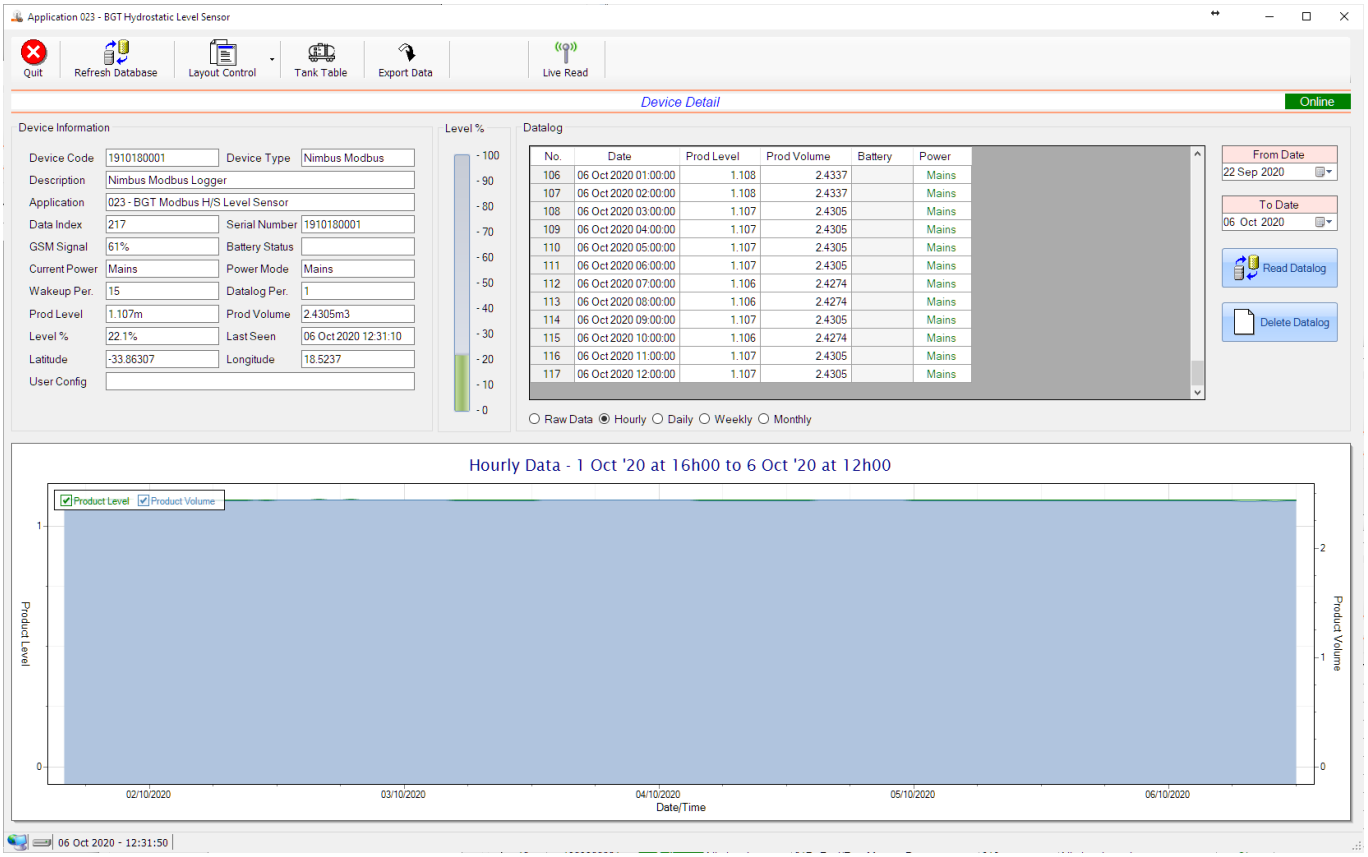
Data that is displayed in the table will also be represented in the graph at the bottom of the screen. The various series on each graph can be toggled on and off by selecting the series tick in the upper left hand corner.



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.

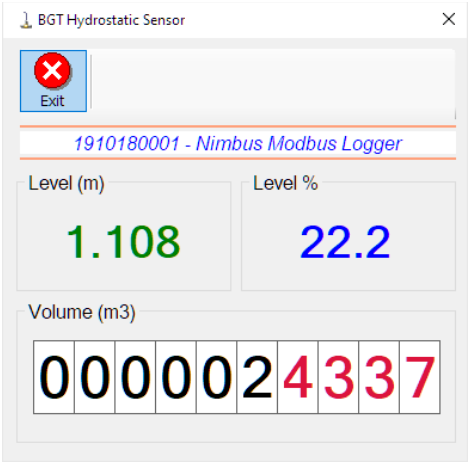
Functions on the top menu bar are mostly as per previous screens within the Cloudworks suite. These would be the 'Refresh Database', 'Layout Control' and 'Export Data' buttons which have been explained earlier. Added functionality is the 'Live Read' button and 'Tank Table' buttons.

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:-

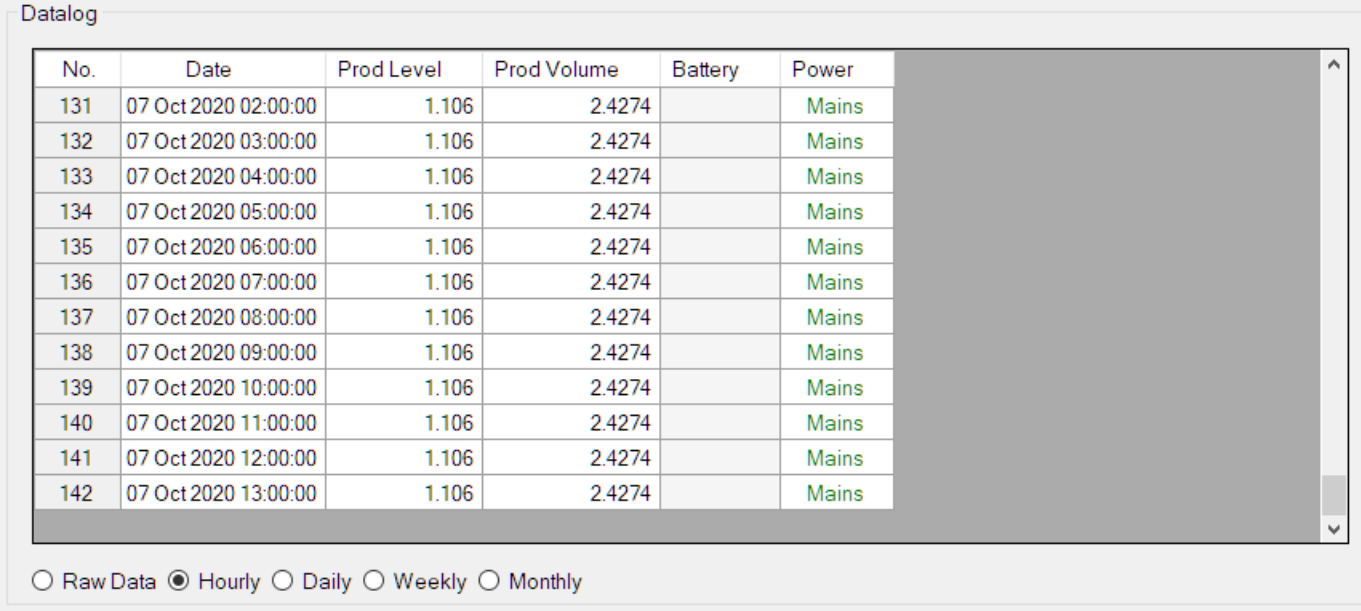
| Information | Notes |
|---|---|
| **Device Code** | The Device Code assigned to this particular remote device. All communications are initiated by addressing this code. This code is unique to all remote devices and is assigned at the time of manufacture. |
| **Device Type** | Type of Remote Device. eg CDS538 Cumulus Logger etc |
| **Description** | 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. |
| **Application** | Selected device application. Application 000 - Basic Cumulus function in this case. |
| **Data Index** | 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. |
| **Serial Number** | Serial number of this device - assigned in the factory. |
| **GSM Signal** | Signal strength of the last GSM communications, expressed as a percentage. |
| **Battery Status** | 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). |
| **Current Power** | 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. |
| **Power Mode** | Selected Power Mode under which the remote device is operating. This can be Battery, Mains or Dual power modes. |
| **Wakeup Per.** | The Wakeup Period set in minutes. Refer to the device configuration chapter for an explanation of this parameter. |
| **Datalog Per.** | The Datalog Period set in minutes. Refer to the device configuration chapter for an explanation of this parameter. |
| **Product Level** | The level of the product in the tank in metres |
| **Product Volume** | The volume of the product in the tank. This is read directly from the tank table and is in cubic metres. |
| **Level %** | The percentage of the tank f. Calculated from the max tank reading in the tank table. |
| **Last Seen** | The date and time the remote device was last seen connecting into the server. |
| **Latitude** | Captured device Latitude. |
| **Longitude** | 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.

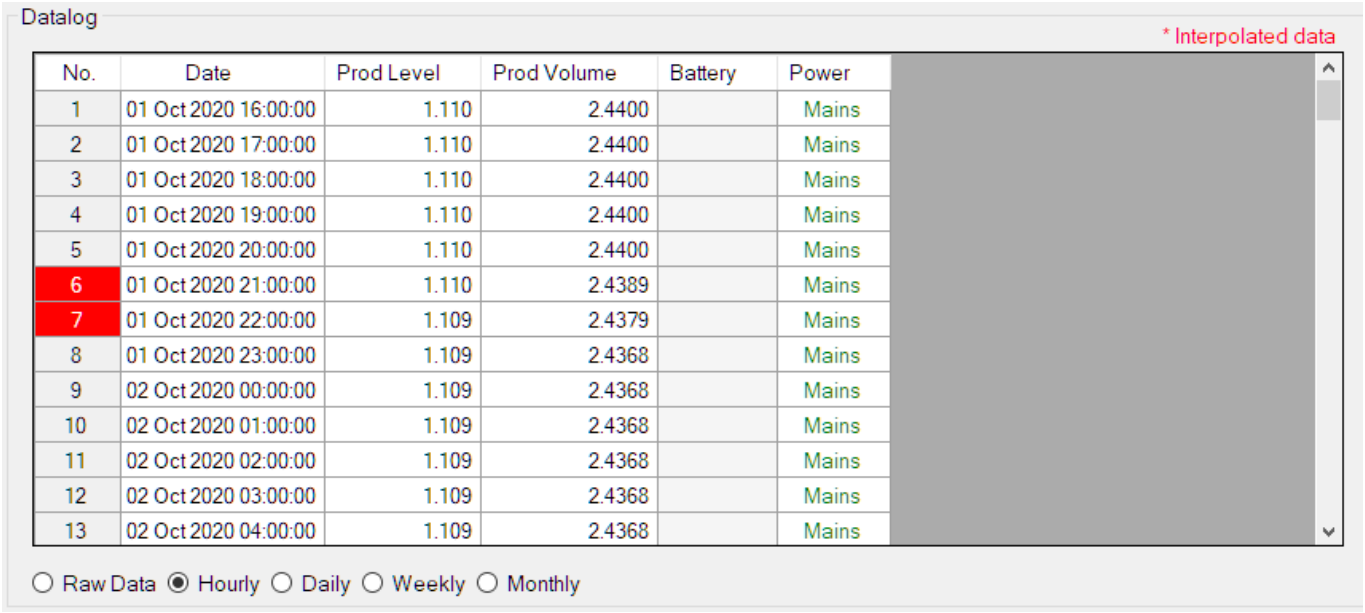
To the right of screen is the Datalog information box. This box will be populated with the most recent data from the recorded datalog of this remote device (read from the database). By default, when the screen opens, the last two weeks' worth of data will be displayed in this table. To select a different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




| Information | Notes |
|---|---|
| **Date/Time** | Date and time of the datalog record. |
| **Product Level** | Product level in the tank. |
| **Product Volume** | Product volume read from the tank table. |
| **Battery** | Battery level in percentage. Only displayed on battery powered devices. |
| **Power** | 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 |

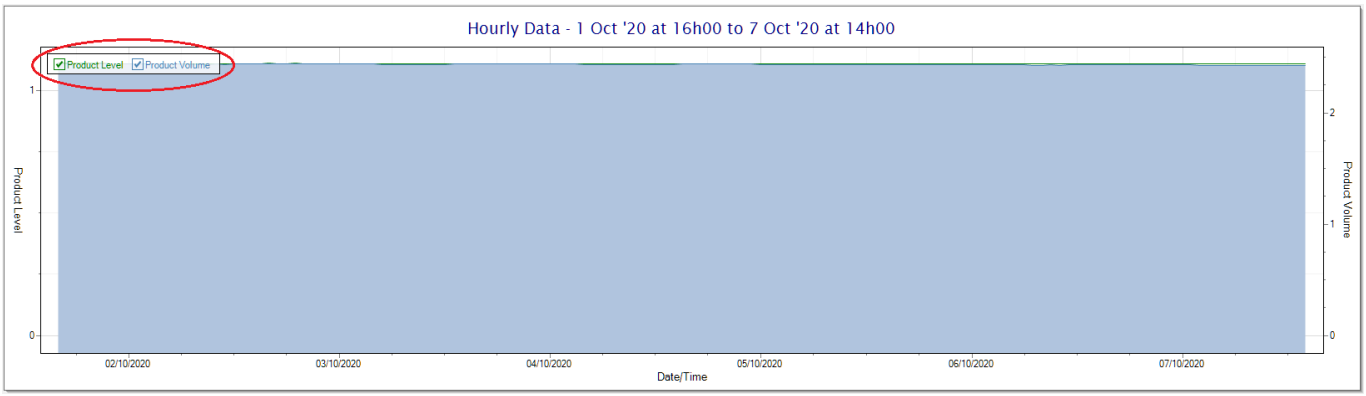
Raw Data Hourly Daily Weekly Monthly

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.

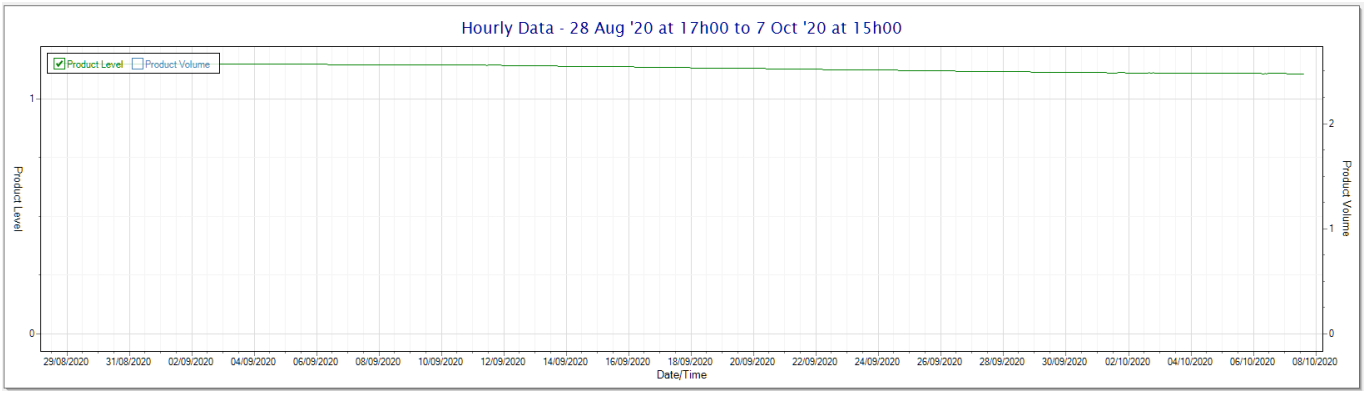
You can zoom into a range of the data by simply selecting those records in the table. This will result in the graph at the bottom being updated to display only those readings.

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.

## 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.

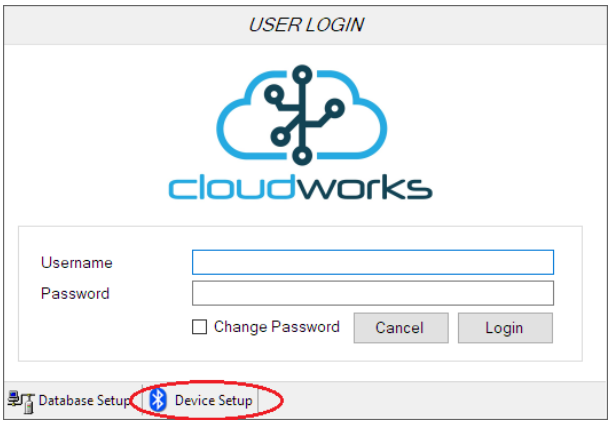
### 2.10.1 Bluetooth Interface Basics

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.

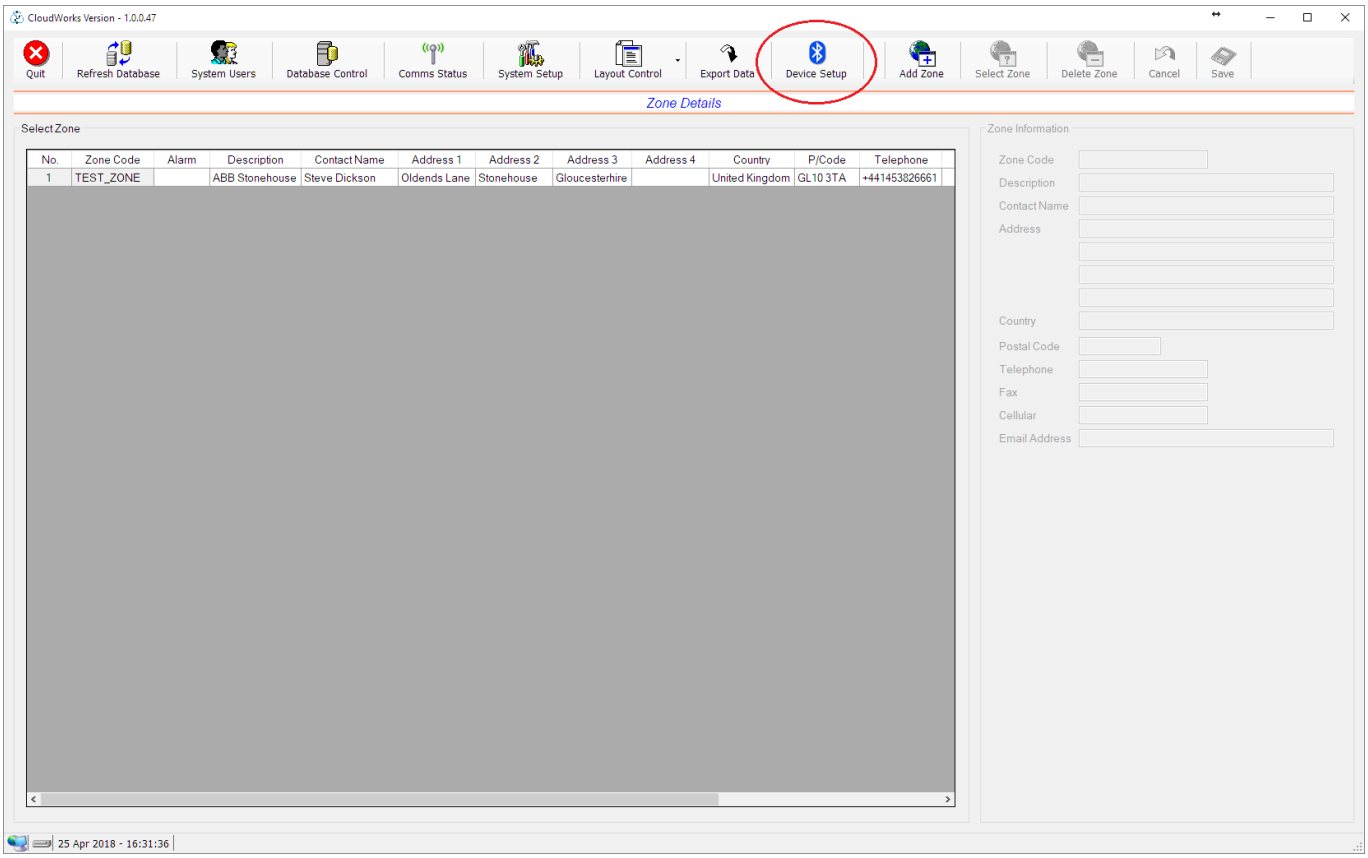
The online option will only be available if the server is currently seeing the remote device as online. It is quite acceptable to use the offline scripting option to setup online devices since the server will simply run the script immediately as though the device has just woken up and connected. This 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.

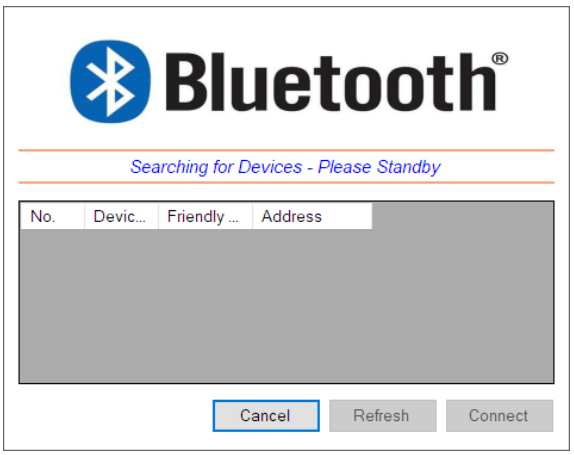



The purpose of having it here is to allow the user to access the Bluetooth setup option without needing to connect to the server and authenticating. This is useful in instances where there is no internet connection available in the field.

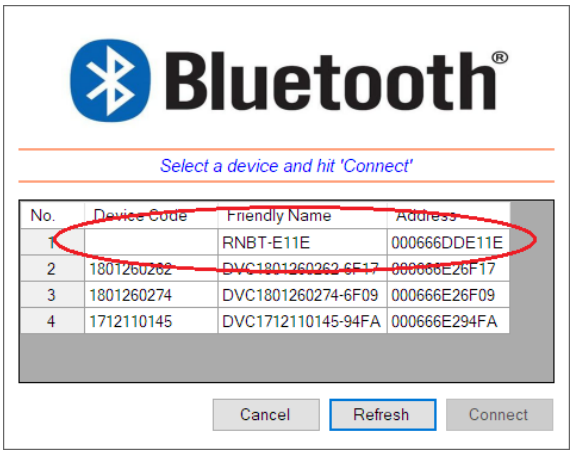
The second option is on the Zone screen by pressing the 'Device Setup' button.




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 |
|---|---|
| **Off** | Interface is off. |
| **Flash** | Interface is on and waiting for a connection. |
| **Solid on** | Connected to computer. |
| **Slow double flash** | 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.

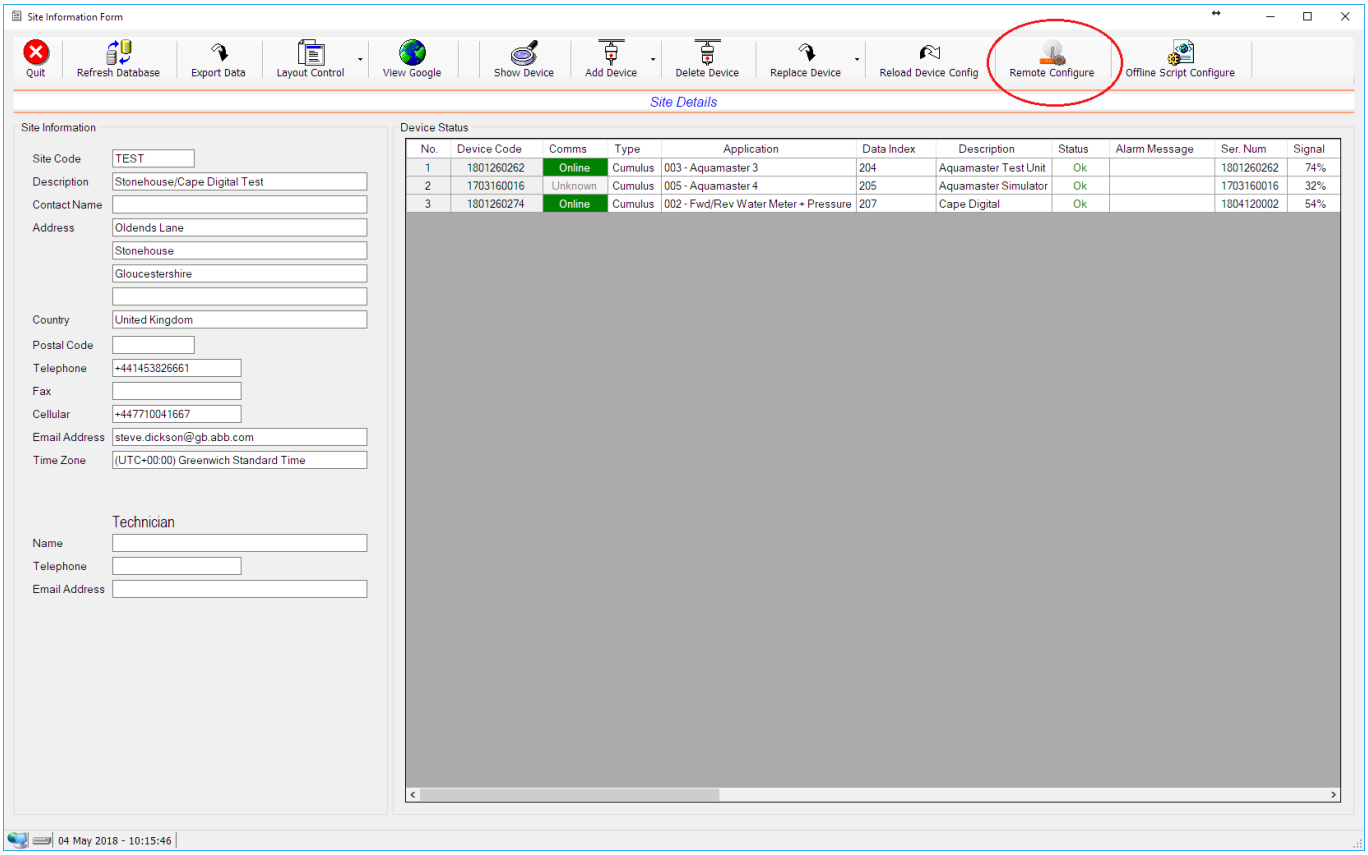
| Red LED status | Notes |
|---|---|
| **Off** | Device is sleeping. |
| **Fast Flash** | Connecting to the server. |
| **Slow Flash** | Connected to the server and communicating. |
| **Solid On** | Command Mode. |

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.

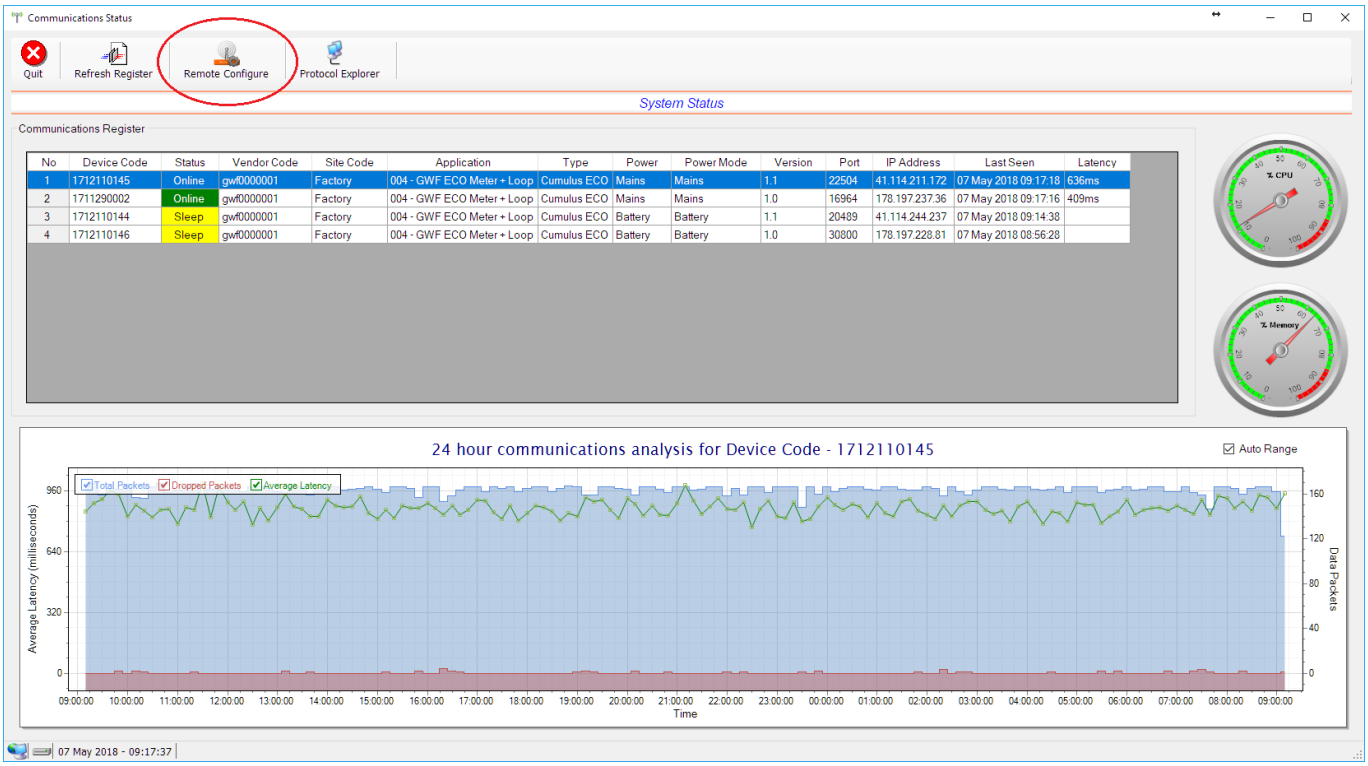
### 2.10.2 Remote Configuration Basics

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

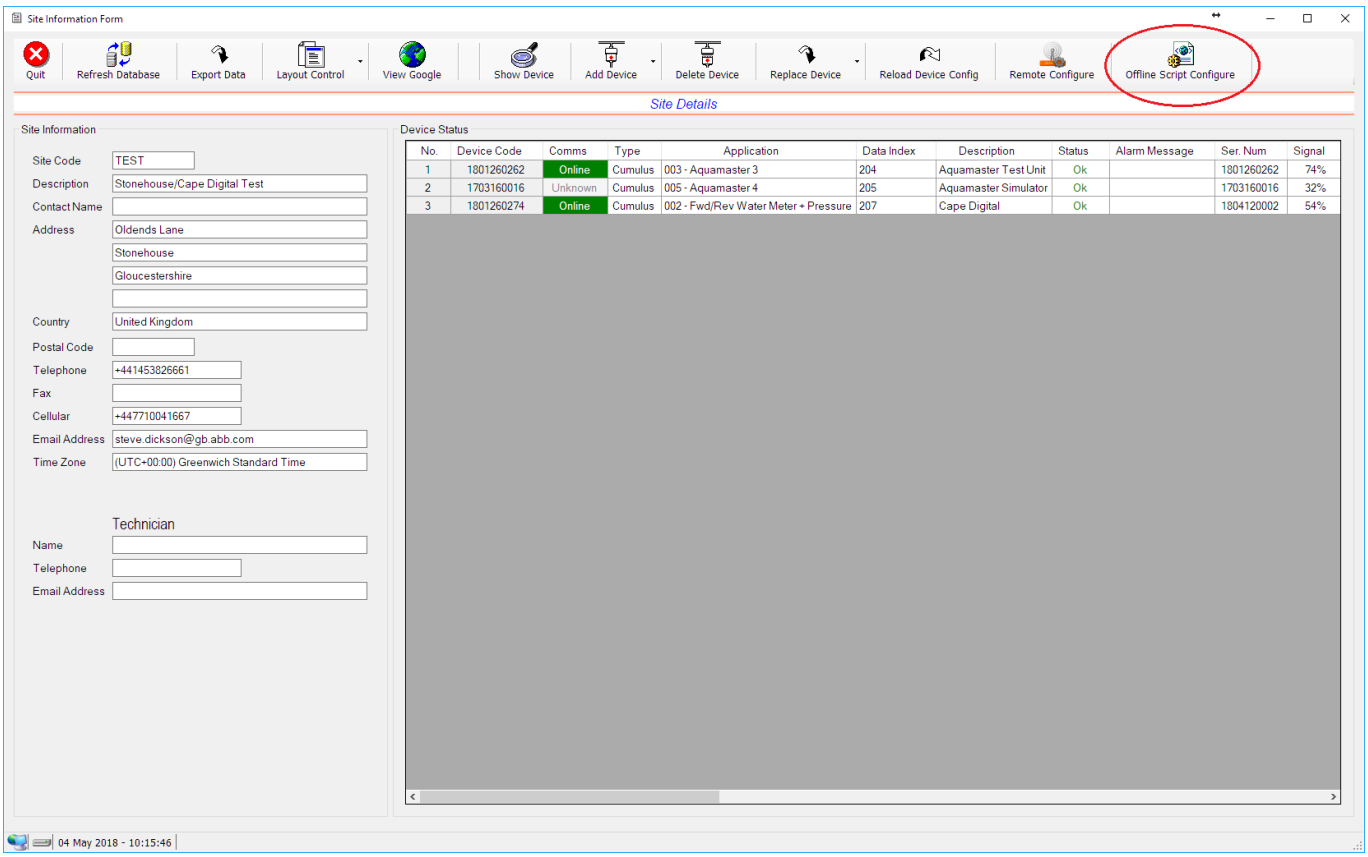
One of the problems with battery powered loggers is that, since they are asleep, you are unable to make configuration changes without actually visiting the logger and making the changes via the Bluetooth interface.

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.

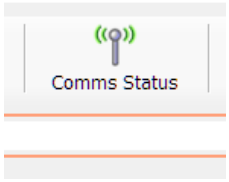
For details regarding the configuration of each logger type, please refer to the relevant User Manual on our website at http://cloudworks.systems/documentation.html.

## 2.11 Advanced Features and Tools

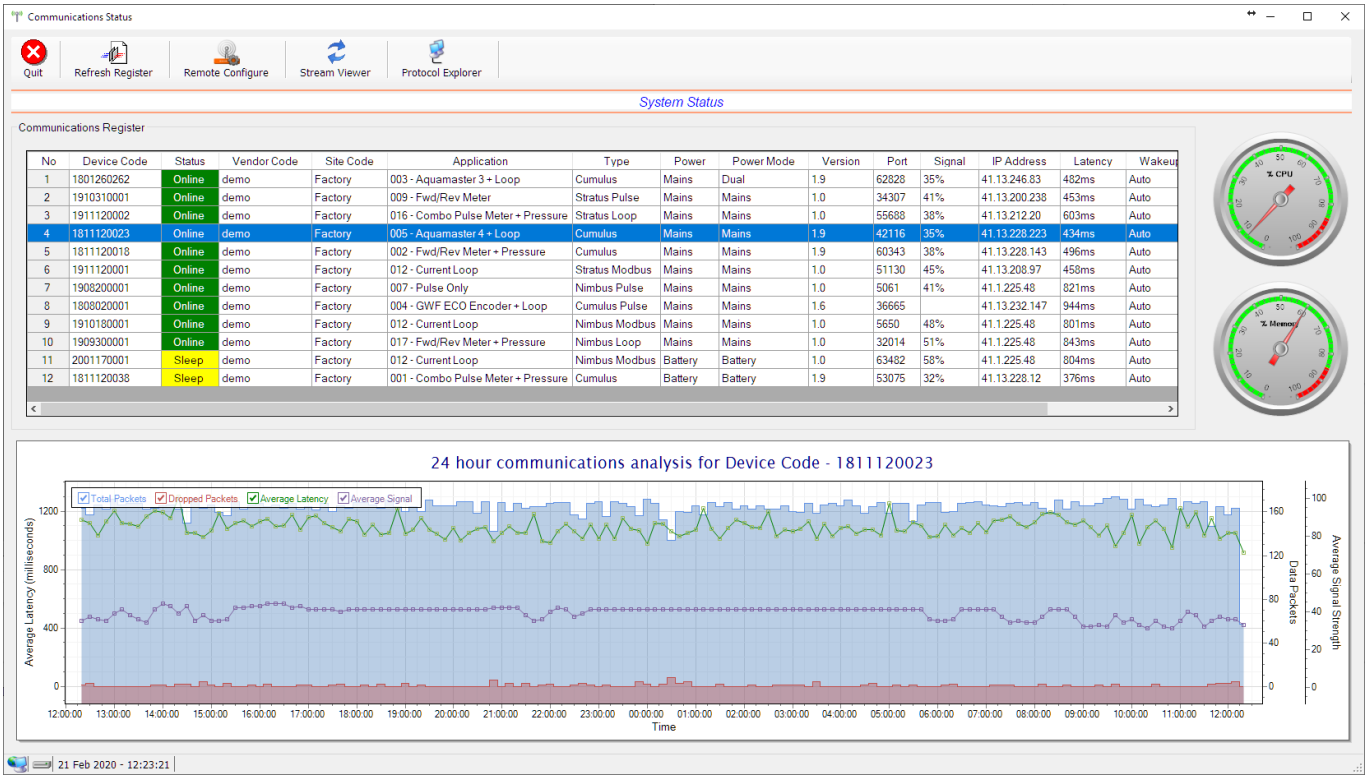
The Cloudworks suite of software has a number of advanced features that facilitated the maintenance and diagnostics of the system. These features are not normally available to the average user.

### 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 'Communcations Status' Screen.




| No | Device Code | Status | Vendor Code | Site Code | Application | Type | Power | Power Mode | Version | Port | Signal | IP Address | Latency | Wakeup |
|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|
| 1 | 1801260262 | Online | demo | Factory | 003 - Aquamaster 3 + Loop | Cumulus | Mains | Dual | 1.9 | 62828 | 35% | 41.13.246.83 | 482ms | Auto |
| 2 | 1910310001 | Online | demo | Factory | 009 - Fwd/Rev Meter | Stratus Pulse | Mains | Mains | 1.0 | 34307 | 41% | 41.13.200.238 | 453ms | Auto |
| 3 | 1911120002 | Online | demo | Factory | 016 - Combo Pulse Meter + Pressure | Stratus Loop | Mains | Mains | 1.0 | 55688 | 38% | 41.13.212.20 | 603ms | Auto |
| 4 | 1811120023 | Online | demo | Factory | 005 - Aquamaster 4 + Loop | Cumulus | Mains | Mains | 1.9 | 42116 | 35% | 41.13.228.223 | 434ms | Auto |
| 5 | 1811120018 | Online | demo | Factory | 002 - Fwd/Rev Meter + Pressure | Cumulus | Mains | Mains | 1.9 | 60343 | 38% | 41.13.228.143 | 496ms | Auto |
| 6 | 1911120001 | Online | demo | Factory | 012 - Current Loop | Stratus Modbus | Mains | Mains | 1.0 | 51130 | 45% | 41.13.208.97 | 458ms | Auto |
| 7 | 1908200001 | Online | demo | Factory | 007 - Pulse Only | Nimbus Pulse | Mains | Mains | 1.0 | 5061 | 41% | 41.1.225.48 | 821ms | Auto |
| 8 | 1808020001 | Online | demo | Factory | 004 - GWF ECO Encoder + Loop | Cumulus Pulse | Mains | Mains | 1.6 | 36665 | | 41.13.232.147 | 944ms | Auto |
| 9 | 1910180001 | Online | demo | Factory | 012 - Current Loop | Nimbus Modbus | Mains | Mains | 1.0 | 5650 | 48% | 41.1.225.48 | 801ms | Auto |
| 10 | 1909300001 | Online | demo | Factory | 017 - Fwd/Rev Meter + Pressure | Nimbus Loop | Mains | Mains | 1.0 | 32014 | 51% | 41.1.225.48 | 843ms | Auto |
| 11 | 2001170001 | Sleep | demo | Factory | 012 - Current Loop | Nimbus Modbus | Battery | Battery | 1.0 | 63482 | 58% | 41.1.225.48 | 804ms | Auto |
| 12 | 1811120038 | Sleep | demo | Factory | 001 - Combo Pulse Meter + Pressure | Cumulus | Battery | Battery | 1.9 | 53075 | 32% | 41.13.228.12 | 376ms | Auto |

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.

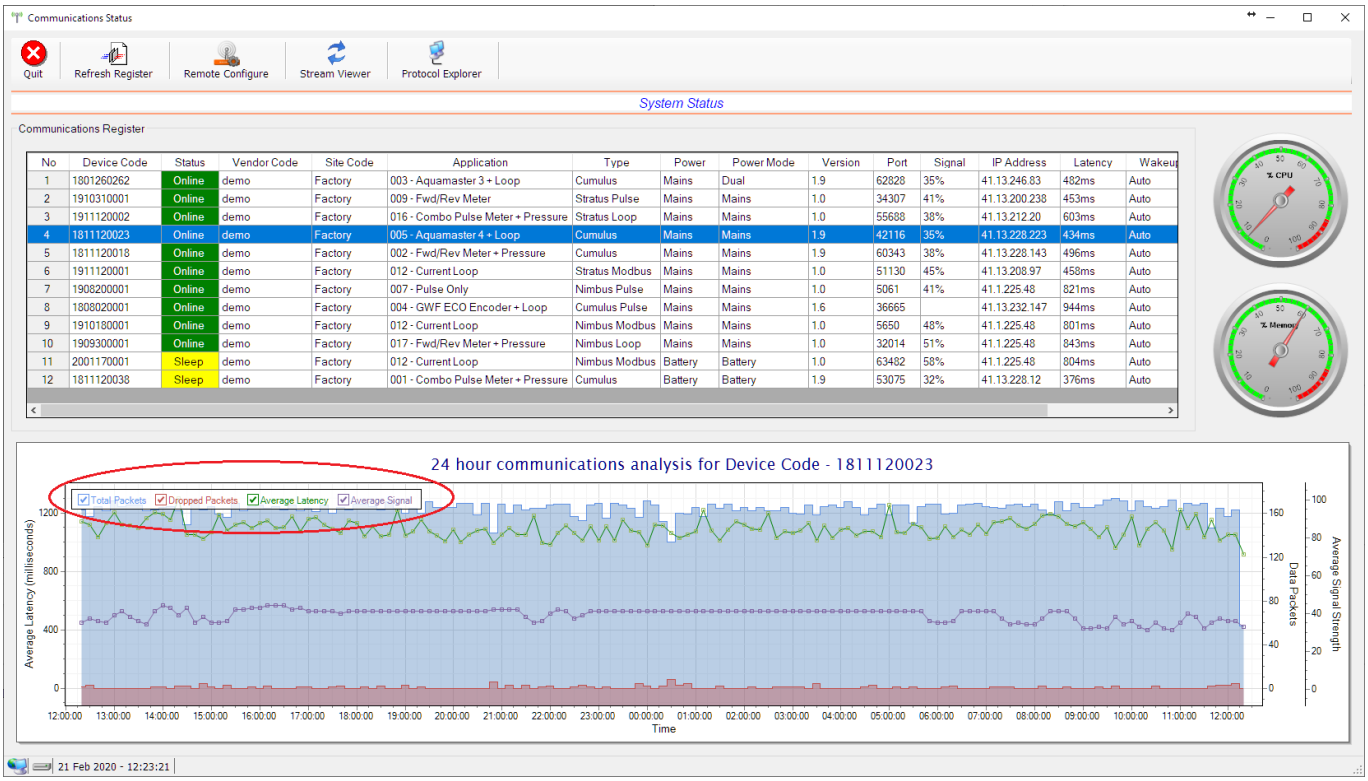
This register is continually kept updated by the remote heartbeat system or each time a battery device connects to the server. In order for a device to be present in the register, it will have needed to connect at some stage to the server.

The data stored in the register is as follows:-

| Parameter | Notes |
|---|---|
| **Device Code** | Device Code for the respective devices within the register |
| **Status** | Current communications status Offline/Online or Sleep. Note, when battery powered devices go offline, they are assumed to be asleep. |
| **Vendor Code** | Communications/Database Vendor Code assigned to the device. |
| **Site Code** | The Site Code is an independent coding system that is not currently used in the Cloudworks system. |
| **Application** | Application type assigned to this device. Application types are explained in detail earlier in this document. |
| **Type** | Type of device. Eg Cumulus logger CDS538 etc |
| **Power** | 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. |
| **Power Mode** | Power Mode for the device. Mains/Battery/Dual. |
| **Version** | Onboard firmware version of device. |
| **Port** | Current connection Port number. |
| **Signal** | GSM signal strength at the remote device. |
| **IP Address** | Local GSM network IP address. For devices on a VPN with a static IP would show that static IP. |
| **Last Seen** | Date and time the device was last seen by the server. |
| **Latency** | 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.

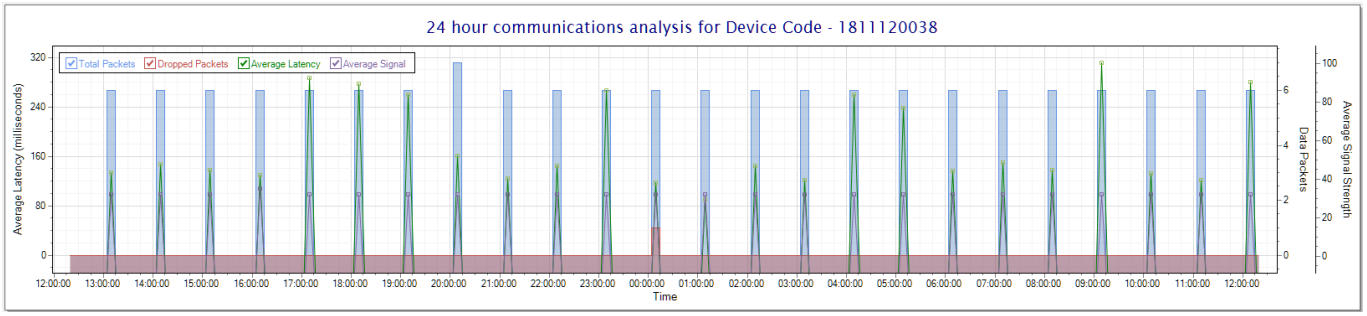
Selecting a device in the table will result in that record being plotted on the graph below.



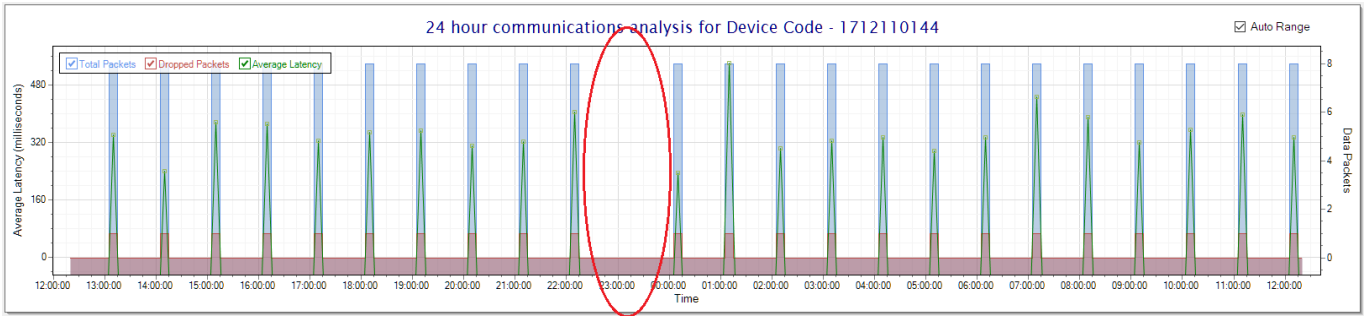

| No | Device Code | Status | Vendor Code | Site Code | Application | Type | Power | Power Mode | Version | Port | Signal | IP Address | Latency | Wakeup |
|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|
| 1 | 1801260262 | Online | demo | Factory | 003 - Aquamaster 3 + Loop | Cumulus | Mains | Dual | 1.9 | 62828 | 35% | 41.13.246.83 | 482ms | Auto |
| 2 | 1910310001 | Online | demo | Factory | 009 - Fwd/Rev Meter | Stratus Pulse | Mains | Mains | 1.0 | 34307 | 41% | 41.13.200.238 | 453ms | Auto |
| 3 | 1911120002 | Online | demo | Factory | 016 - Combo Pulse Meter + Pressure | Stratus Loop | Mains | Mains | 1.0 | 55688 | 38% | 41.13.212.20 | 603ms | Auto |
| 4 | 1811120023 | Online | demo | Factory | 005 - Aquamaster 4 + Loop | Cumulus | Mains | Mains | 1.9 | 42116 | 35% | 41.13.228.223 | 434ms | Auto |
| 5 | 1811120018 | Online | demo | Factory | 002 - Fwd/Rev Meter + Pressure | Cumulus | Mains | Mains | 1.9 | 60343 | 38% | 41.13.228.143 | 496ms | Auto |
| 6 | 1911120001 | Online | demo | Factory | 012 - Current Loop | Stratus Modbus | Mains | Mains | 1.0 | 51130 | 45% | 41.13.208.97 | 458ms | Auto |
| 7 | 1908200001 | Online | demo | Factory | 007 - Pulse Only | Nimbus Pulse | Mains | Mains | 1.0 | 5061 | 41% | 41.1.225.48 | 821ms | Auto |
| 8 | 1808020001 | Online | demo | Factory | 004 - GWF ECO Encoder + Loop | Cumulus Pulse | Mains | Mains | 1.6 | 36665 | | 41.13.232.147 | 944ms | Auto |
| 9 | 1910180001 | Online | demo | Factory | 012 - Current Loop | Nimbus Modbus | Mains | Mains | 1.0 | 5650 | 48% | 41.1.225.48 | 801ms | Auto |
| 10 | 1909300001 | Online | demo | Factory | 017 - Fwd/Rev Meter + Pressure | Nimbus Loop | Mains | Mains | 1.0 | 32014 | 51% | 41.1.225.48 | 843ms | Auto |
| 11 | 2001170001 | Sleep | demo | Factory | 012 - Current Loop | Nimbus Modbus | Battery | Battery | 1.0 | 63482 | 58% | 41.1.225.48 | 804ms | Auto |
| 12 | 1811120038 | Sleep | demo | Factory | 001 - Combo Pulse Meter + Pressure | Cumulus | Battery | Battery | 1.9 | 53075 | 32% | 41.13.228.12 | 376ms | Auto |

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.

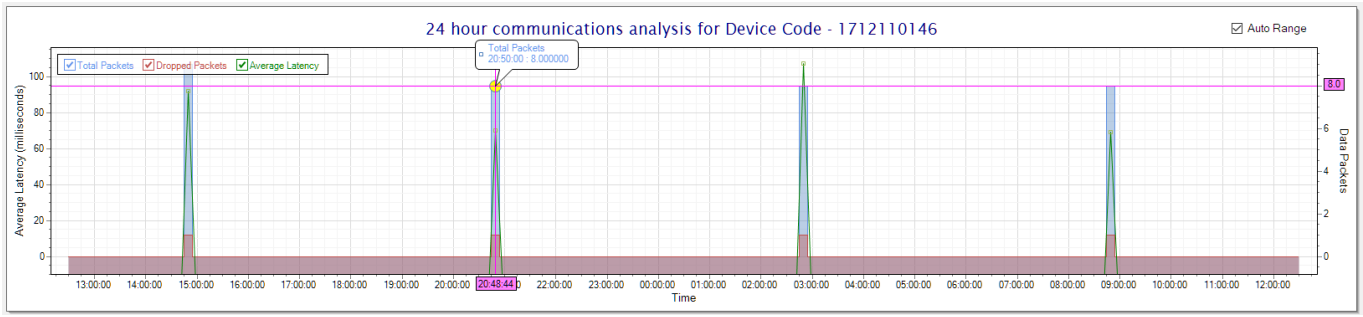
Especially useful is the graphing of a battery powered device. As seen below, it will indicate the times at which this device has successfully accessed the server.



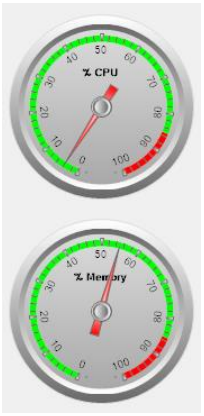
An interesting thing to note with this battery logger below is that it was unable to connect at 23h00 (scheduled every hour), hence the missing comms block.




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

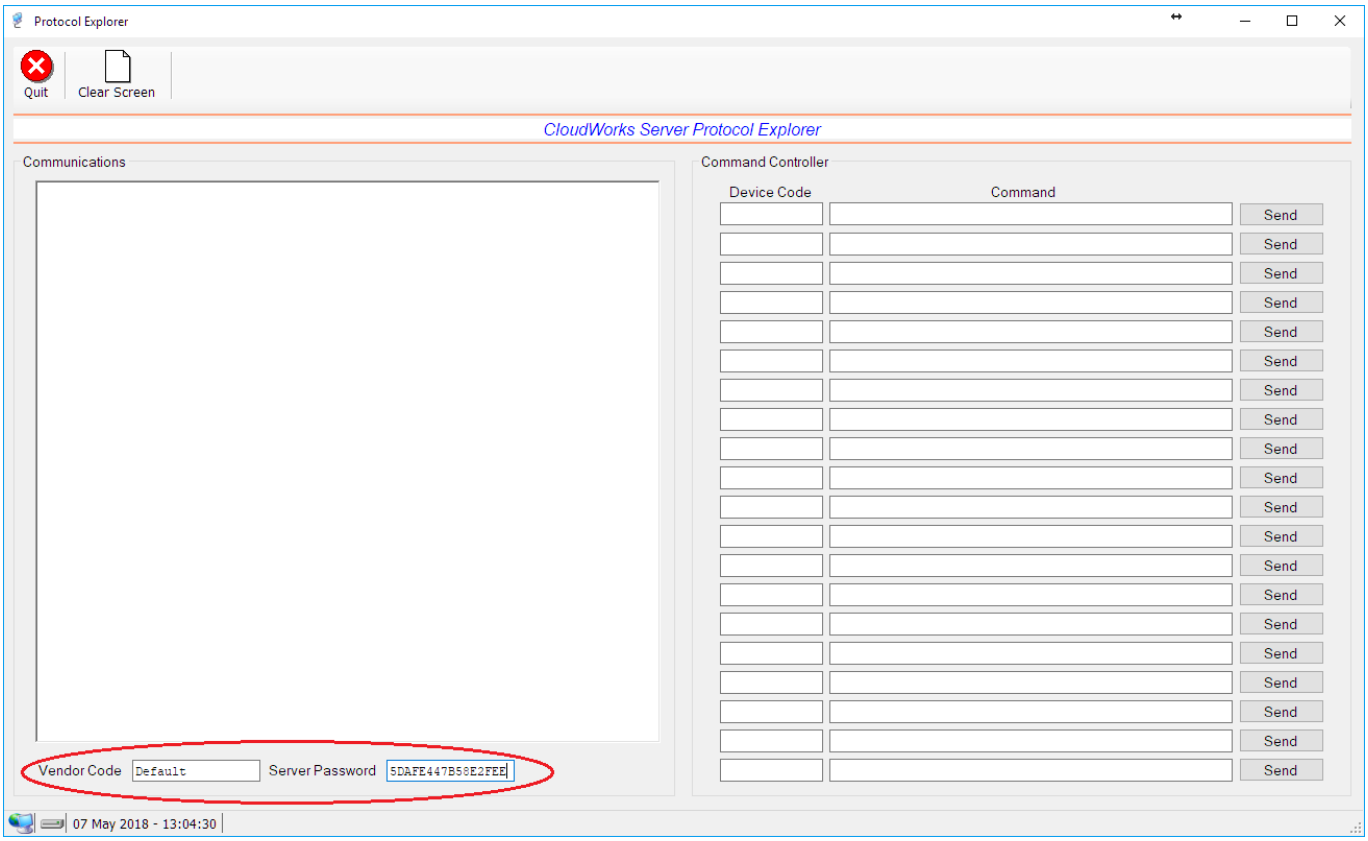



Communications to and from remote devices are time sensitive in so much as a device that takes too long to reply will be considered non-responsive. To have a quick visual as to whether this is the remote device or simply the computer that is currently overloaded with other tasks there are two needle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



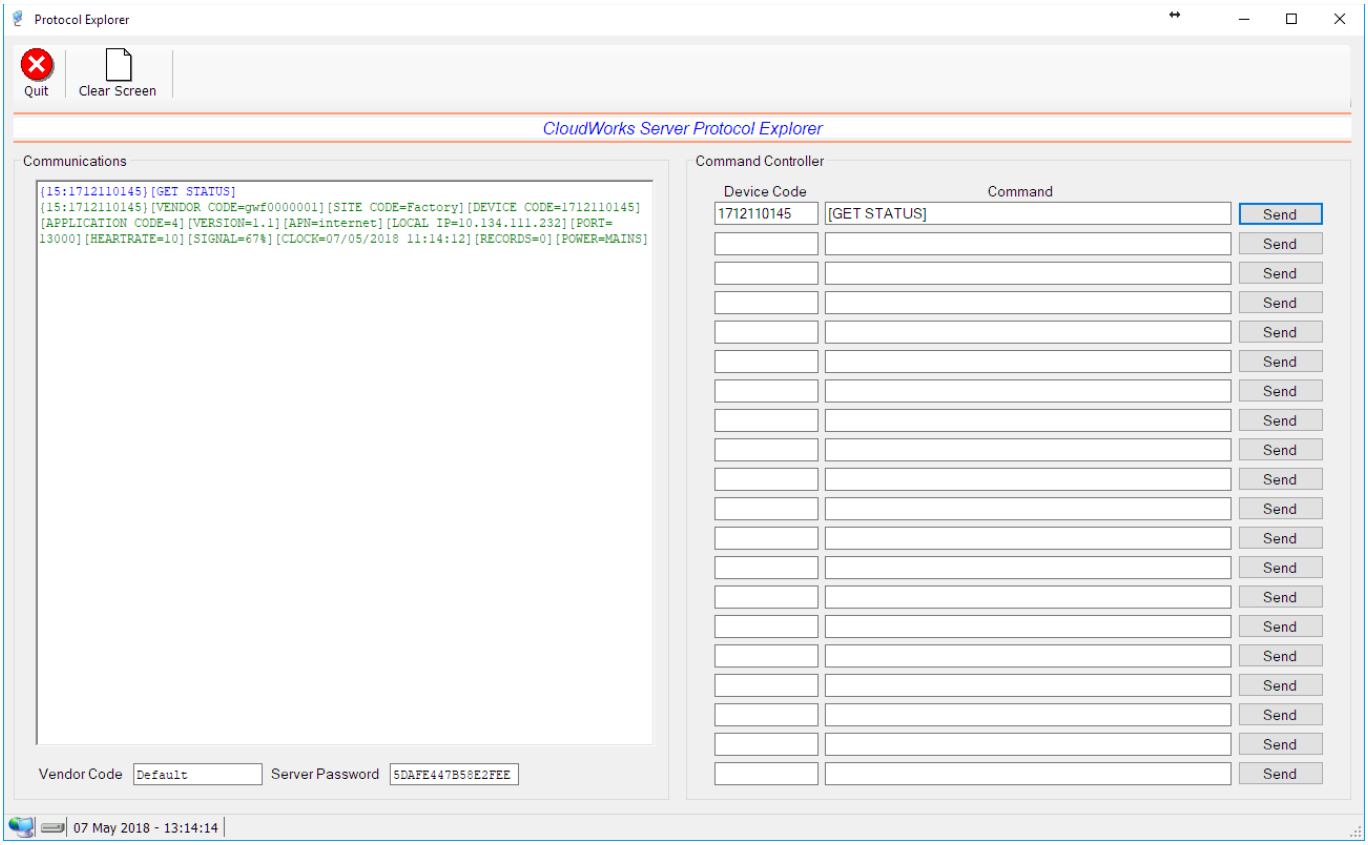

Also available on the 'Communications Status' screen is the 'Protocol Explorer'. This is a function only available to Administrators. You are able to communicate directly to all Cloudworks devices to allow for integration into other systems other than the **Cloudworks Client** software. See the Cloudworks 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.

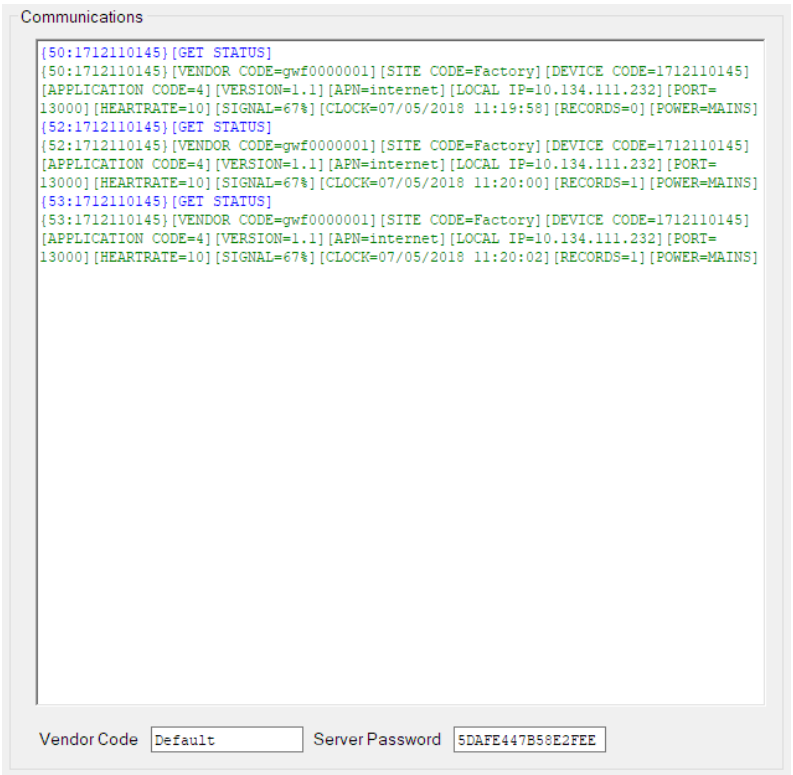



This screen really just consists of a communications window on the left and a range of containers for the test commands (command controller) with send buttons on the right. This module will automatically log into the server with the Vendor Code and Password highlighted at the bottom. The generated password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

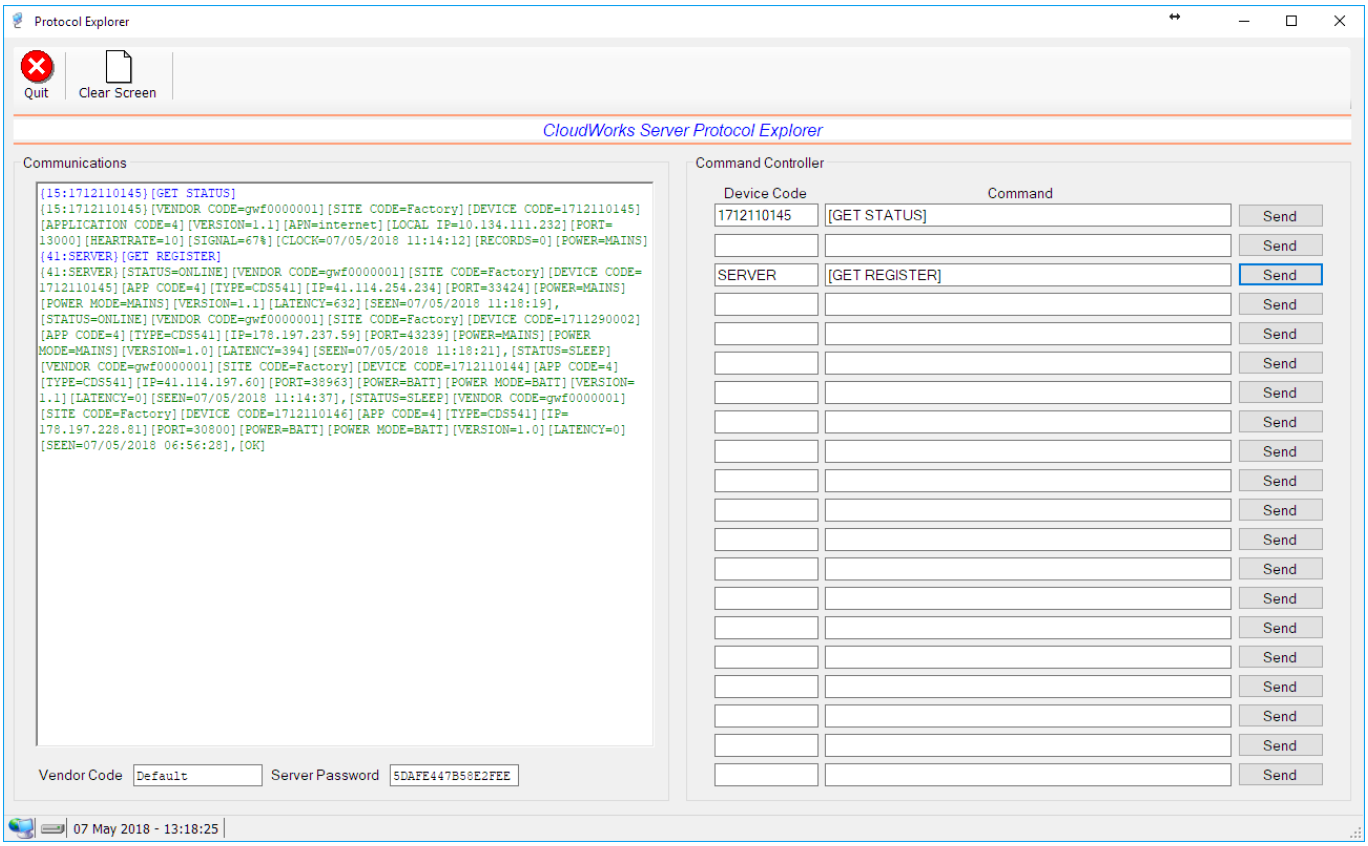
As detailed earlier, all devices are addressed by means of their Device Codes. This Device Code is captured in the 'Device Code' field together with the command in the 'Command' field. Pressing 'Send' will send the command.




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



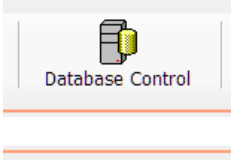
When sending a command to the server, use 'SERVER' as a Device Code.



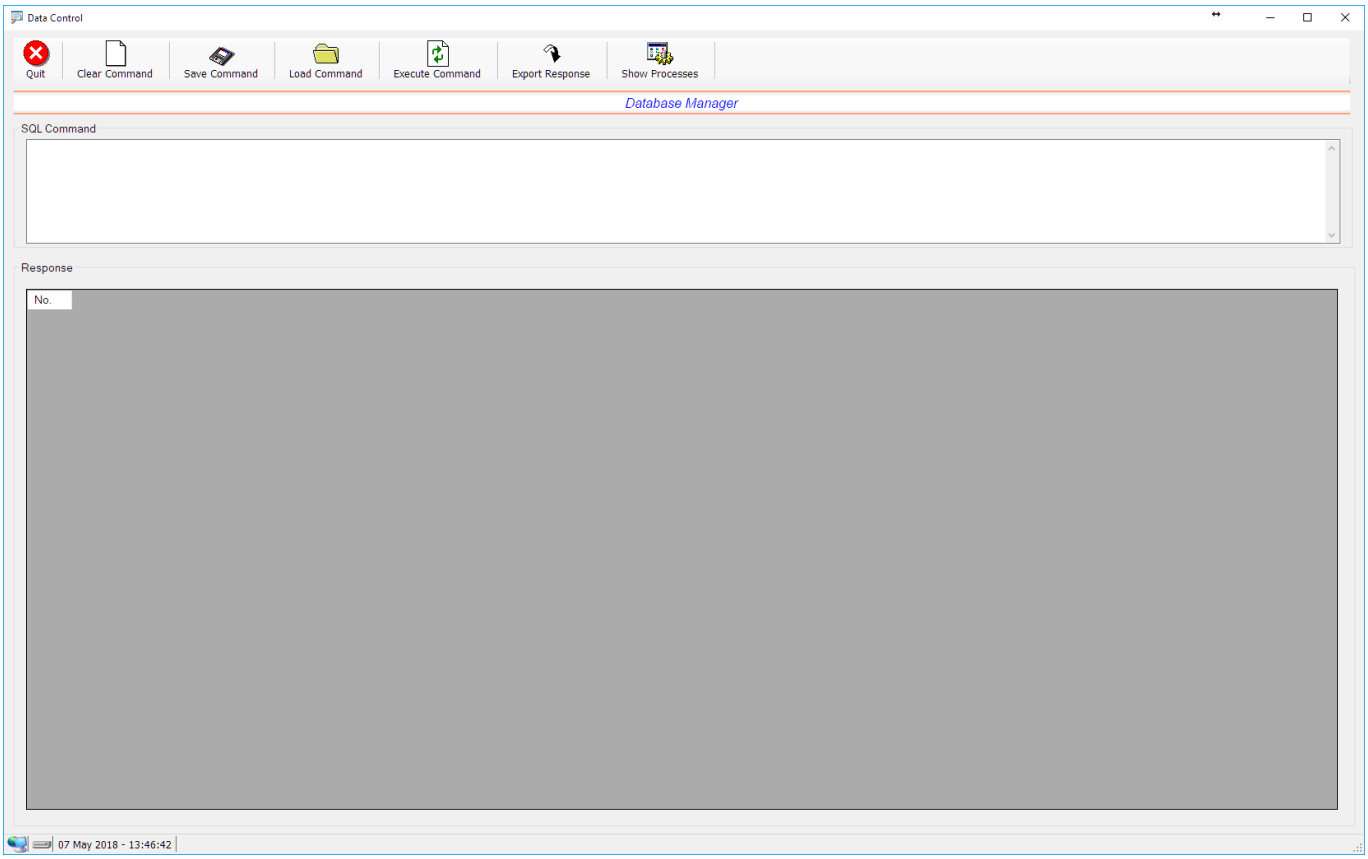

Right clicking on the Communications window or pressing the 'Clear Screen' button will clear this window. Multiple commands can be captured on this screen.

### 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.

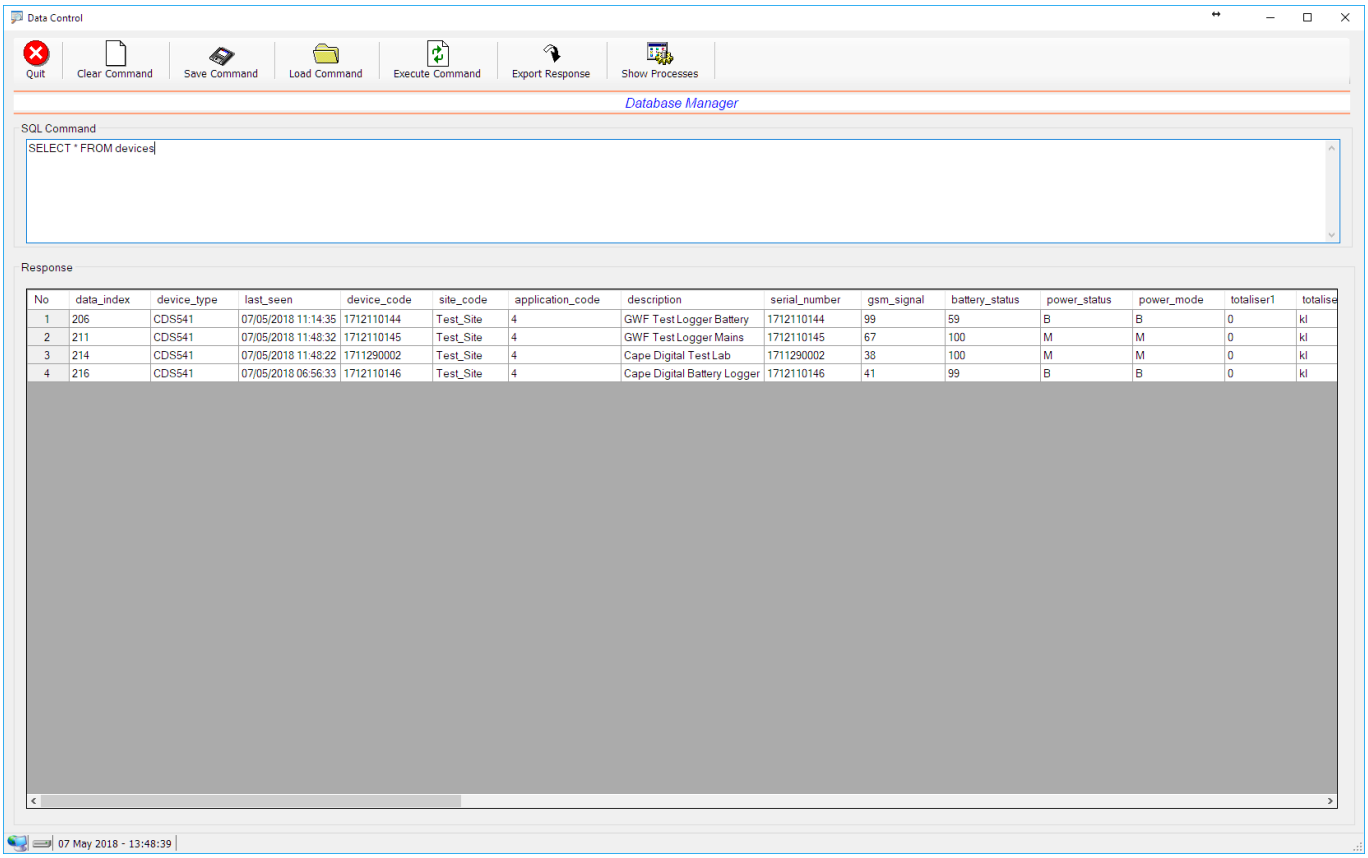



The main use for this module is for the maintenance of the database as well as the running of specific MySql commands/queries for the generating of custom reports.




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.

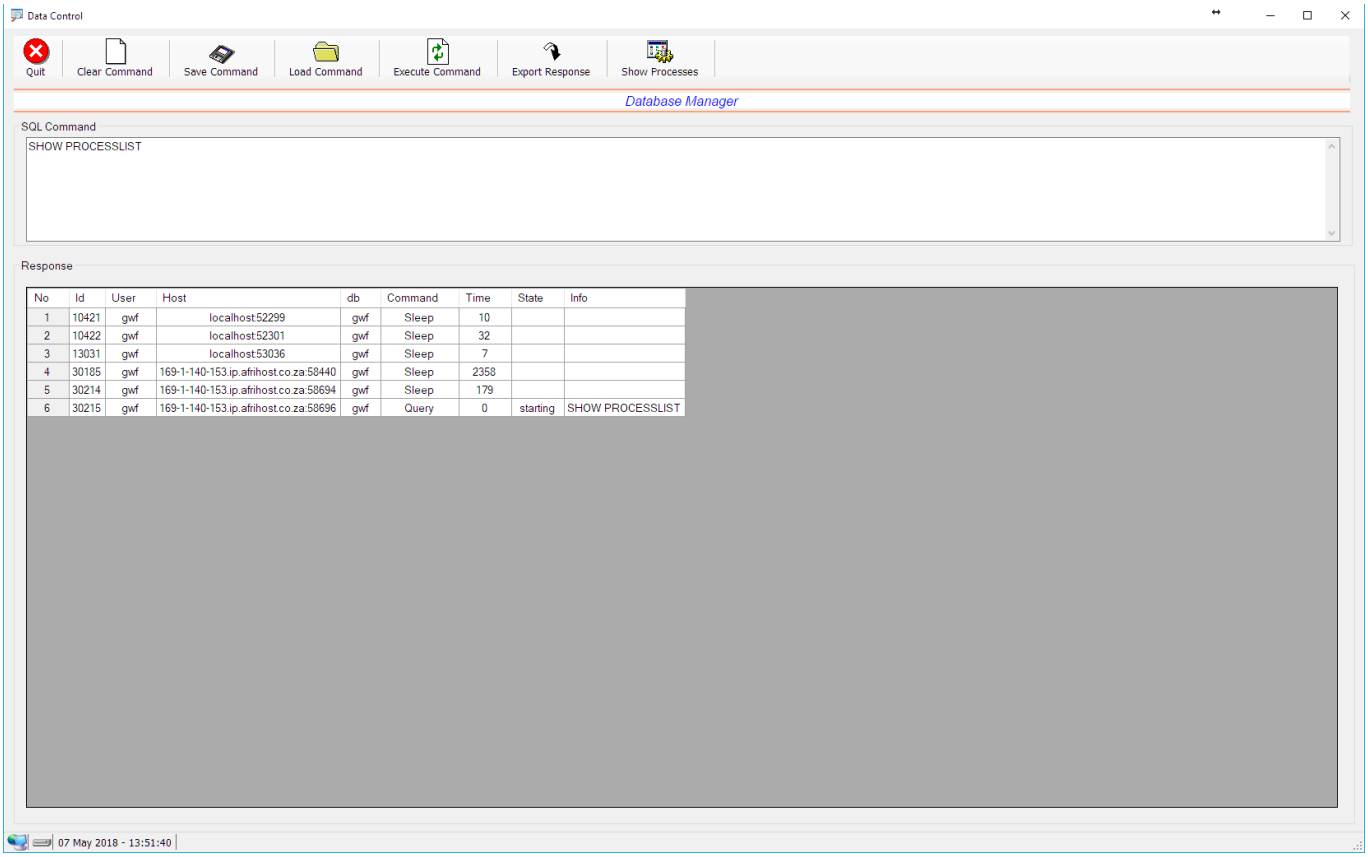
Once the command has been entered, press the 'Execute Command' button for the action to take place.




| 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 is 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.