



# **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 <a href="http://cloudworks.systems/">http://cloudworks.systems/</a>

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.

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# 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.

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### 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.

	USER LOGIN
Username Password	
Database Setup	Device Setup

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.

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C		5
Username		
Password		
	Change Password Can	cel Login
Database Connection		
Database Server	cloudworks.systems	
Server TCP/IP Port	3306 🜩	
Database Name	demo	
Username	demo	
Password	***	
💵 Database Setup 🛛 🚷 D	evice Setup	

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.

	USER LOGIN	
C	loudworks	
Username		
Password		
New Password		
Retype Password		
	✓ Change Password Cancel Login	
asswords not the same		
Database Connection		
Database Server	cloudworks.systems	
Server TCP/IP Port	3306 🖨	
Database Name	demo	
Username	demo	
Password	***	

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.

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### 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.

Quit	Restore Default	Cancel Changes	Save Changes	Check f	or Update
		System S	Setup		
Databa	se Connection				
Datab	base Server	cloudworks.sys	tems		
Serve	er TCP/IP Port	3306 🜩			
Datab	oase Name	demo			
Datab	oase Username	demo			
Datab	base Password	****			
SMTP	Mail Server Setup				
SMT	<sup>o</sup> Mail Server	mail.capedigita	l.co.za	Port 25	•
Retur	n Email Address	cloudworks@c	apedigital.co.za		
		Requires Au	thentication		
SMT	<sup>o</sup> Username	cloudworks@c	apedigital.co.za		
SMTF	Password	******			
Commu	nications				
Comr	nunications Server	cloudworks svs	toms		
Serve	r TCP/IP Port	13000	tomo		
Netwo	ork Command Timeout	30000	milliseconds		
Laten	cy Warn Time	1500	milliseconds		
Status	Read Delav	30	seconds		
Diagr	nostic Port	13001			
Blueto	ooth Password	1234			
/ain Sc	reen Alarm System				
Datak	aso Pofrash Pata	0 Off 0 20 a	0.0 1 min 0.5	min 0.1E	min
Datat	Jase Reliesii Rale			11111 0 15	11101

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

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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.

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<b>Requires Authentication</b>	Tick this box if your mail server requires authentication when sending mails.
	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.

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# 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.

(2) CloudWorks Version - 1.0.0.43	** – 🗆 X
Image: Control Quit	Tone Select Zone Delete Zone Cancel Save
Zone Details	
SelectZone 4	Zone Information
No. Zone Code Description Contact Name Address 1 Address 2 Address 3 Address 4 P/Code Country Telephone	Zone Code
1 Test_Zone TestZone Cape Digital Solutions 21 Alternator Park Alternator Avenue Montague Gardens Cape Town 7741 South Africa +27215513517 +27	Description
	Contact Name
	Address
	Country
	Postal Code
	Telephone
	Fax
	Cellular
	Email Address
No.	
Alam	
✓ Description	
Contact Name	
3 Address I	
Address 3	
Address 4	
V P/Cde	
Fax	
The second	
$t^{2}$	
28 Feb 2018 - 15:11:48	

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.

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

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

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# 2.4 Managing Users

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

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

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

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

User	Notes
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	<ul> <li>The Technician has no access to :-</li> <li>User control system - cannot add or delete users.</li> <li>Direct database control.</li> <li>Protocol Explorer.</li> </ul>
Supervisor	<ul> <li>The Supervisor has no access to :-</li> <li>User control system - cannot add or delete users.</li> <li>Direct database control.</li> <li>Protocol Explorer.</li> <li>System setup parameters.</li> <li>Remote/Offline configuration of devices.</li> <li>Remote configuration of equipment connected to the remote device.</li> </ul>
Normal	<ul> <li>The Normal user has no access to :-</li> <li>User control system - cannot add or delete users.</li> <li>Direct database control.</li> <li>Protocol Explorer.</li> <li>System setup parameters.</li> <li>Remote/Offline configuration of devices.</li> <li>Remote configuration of equipment connected to the remote device.</li> <li>Adding or deleting zones.</li> <li>Adding or deleting sites.</li> <li>Adding, deleting,replacing or reloading configs of remote devices.</li> <li>Remote switching of outputs on or off.</li> </ul>

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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.

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

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

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### 2.5 Managing Zones

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

2 CloudWorks Version - 1.0.043	* – 🗆 ×
Image: System Users         Image: System Users	ne Select Zone Delete Zone Cancel Save
Zone Details	
SelectZone	Zone Information
No. Zone Code Description ContactName Address1 Address2 Address3 Address4 P/Code Country Telephone	Zone Code Test_Zone
1 Test_Zone TestZone Cape Digital Solutions 21 Alternator Park Alternator Avenue Montague Gardens Cape Town 7741 South Africa +27215513517 +27	Description Test Zone
	Contact Name Cape Digital Solutions
	Address 21 Alternator Park
	Alternator Avenue
	Montague Gardens
	Cape Town
	Country South Africa
	Postal Code 7741
	lelephone +2/21551351/
	Pax +2/21001002/
	Email Address alex@canedigital.co.za
( · · · · · · · · · · · · · · · · · · ·	

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.

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### 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.

Q Sites Form	** – 🗆 ×
Quit         Refresh Database         Layout Control         Export Data         Clear Alarms         Add Site         Select Site         Delete Site         Cancel         Save	
Site Manager	
Select Site	Site Information
No. Site Code Description Contact Name Address 1 Address 2 Address 3 Address 4 Country P/Code Time Zone	Site Code Test_Site
1 Test_Site Test Site Alex Romanov 21 Alternator Park Alternator Avenue Montague Gardens Cape Town South Africa 7441 (UTC-02:00) South Africa 5	Description Test Site
	Contact Name Alex Romanov
	Address 21 Alternator Park
	Alternator Avenue
	Montague Gardens
	Cape Town
	Country South Africa
	Postal Code 7441
	Telephone +27215513517
	+ax +2/21551352/
	Cellular +27832507512
	Email Address a liexted capedigital to 23 Time Zone (UTC+0200) Egypt Standard Time (UTC+0200) Syina Standard Time (UTC+0200) West Bank Standard Time (UTC+0200) West Bank Standard Time (UTC+0200) FLE Standard Time (UTC+0200) Fixed Standard Time
	Technician
	Name Alex
	Telephone +27832507512
	Email Address alex@capedigital.co.za
<>	

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.

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### 2.6.1 Site Detail

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

Device Status         Description       Test_Site       No.       Device Code       Communic Status       Alam Message         Contact Name       Alex Romanov       1       1712110144       Slee pC       Cumulus ECO       04 - GWF ECO Meter + Loop       206       GWF Test Logger Batery       0k         2       1712110144       Slee pC       Cumulus ECO       04 - GWF ECO Meter + Loop       211       GWF Test Logger Mains       0k         3       171120002       Online       Cumulus ECO       04 - GWF ECO Meter + Loop       214       Cape Digital Test Logger       0k         Address       21 Alternator Park       4       1801260262       Online       Cumulus       003 - Aquamaster 3       215       Aquamaster Test Unit       0k	ssage Ser. Num Sig 1712110144 1712110145 E 171120002 6 1801260262 E
No.     Description     Type     Application     Data Index     Description     Status     Alarm Messar       Description     Test Site     1     17/1210144     Site po     Cumulus ECO     004 - GWF ECO Meter - Loop     206     GWF Test Logger Mains     Ok       Contact Name     Alarm Avenue     2     17/1210145     Online     Cumulus ECO     004 - GWF ECO Meter - Loop     211     GWF Test Logger Mains     Ok       2     171210104     Online     Cumulus ECO     004 - GWF ECO Meter - Loop     211     GWF Test Logger Mains     Ok       3     1711290002     Online     Cumulus ECO     004 - GWF ECO Meter - Loop     214     Cape Digital Test Logger     Ok       4     1801260262     Online     Cumulus     003 - Aquamaster 3     215     Aquamaster Test Unit     Ok	ssage Ser. Num Sig 1712110144 1712110145 5 1711290002 6 1801260262 5
Site Code         Lest_Site         1         1712110144         Sleep         Cumulus ECO         04/- GWF ECO Meter + Loop         206         GWF TestLogger Batery         Ok           Description         Test Site         1         1712110145         Online         Cumulus ECO         04/- GWF ECO Meter + Loop         211         GWF TestLogger Mains         Ok           Contact Name         Alex Romanov         3         1711290002         Online         Cumulus ECO         04/- GWF ECO Meter + Loop         214         Cape Digital TestLogger         Ok           Address         Altemator Park         4         1801260262         Online         Cumulus         003 - Aquamaster 3         215         Aquamaster Test Unit         Ok	1712110144 1712110145 5 1711290002 6 1801260262 5
Description         Lest site         2         17/21/10/45         Online         Cumulus ECO         004 - GWF ECO Meter - Loop         211         GWF Test Logger Mains         Ok           Contact Name         Alex Romanov         3         171/290002         Online         Cumulus ECO         004 - GWF ECO Meter - Loop         214         Cape Digital Test Logger         Ok           Address         21 Altemator Park         4         1801260262         Online         Cumulus         003 - Aquamaster 3         215         Aquamaster Test Unit         Ok	1712110145 5 1711290002 6 1801260262 5
Contact Name     Alex Komanov     3     17/1290002     Online     Cumulus ECU     004 - GWP ECU Meter - Loop / 214     Cape Digital rest: Ogger / 0k       Address     21 Alternator Park     4     1801260262     Online     Cumulus     003 - Aquamaster 3     215     Aquamaster Test Unit     Ok	1801260262 5
Address [21 Alternator Park Avenue Alternator Park Avenue	
Alternator Avenue	
Montague Gardens	
Cape Town	
Country South Africa	
Postal Code 7441	
Telephone +27215513517	
Fax +27215513527	
Cellular +27832507512	
Email Address alex@capedigital.co.za	
Time Zone (UTC+02.00) South Africa Standard Time	
Time Zone (UTC-02:00) South Africa Standard Time	
Time Zone (UTC-02:00) South Africa Standard Time	
Time Zone (UTC-02:00) South Africa Standard Time Technician	
Time Zone UUTC-0200) South Africa Standard Time Technician Name Alex	
Time Zone UUTC-02:00) South Africa Standard Time Technician Name Alex Telephone -27832507512	
Time Zone UUTC-02:00) South Africa Standard Time Technician Name Alex Telephone 27832507512 Email Address alex@capedigital.co.za	
Time Zone UUTC-02:00) South Africa Standard Time Technician Name Alex Telephone ±27832507512 Email Address slex@capedigital.co.za	
Time Zone UTC-02:00) South Africa Standard Time Technician Name Alex Telephone +27832507512 Email Address alex@capedigital.co.za	
Time Zone UUTC-02:00, South Africa Standard Time Technician Name Alex Telephone -27832507512 Email Address alex@capedigital co.za	
Time Zone UUTC-02:00) South Africa Standard Time Technician Name Alex Telephone 127832507512 Email Address alex@capedigital.co.za	
Time Zone UUTC-02:00 South Africa Standard Time Technician Name Alex Telephone 127832507512 Email Address alex@capedigitat.co.za	
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Time Zone UUTC-02:00) South Africa Standard Time Technician Name Alex Telephone -27832507512 Email Address alex@capedigital co.za	

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.

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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 <u>Google Earth</u> <u>download</u>.

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# 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'.

<b>J</b> Devi	ce Add	Device Del 001230001	ete Device	Replace Device
	Comms	Туре	Арг	plication
2	Online	Cumulus	003 - Aquamas	ster 3 + Loop

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Next you will see a blank entry line appear.

uit Refres	h Database Export Data Layout Control	View Google	Show De	vice Ado	d Device De	lete Device Replace Device	Reload Device	Config Remote Configure	Offline S	Script Configure		
					Site De	ətails						
e Information		Device S	atus									
ito Codo	dama	No.	Device Code	Comms	Туре	Application	Data Index	Description	Status	Ser. Num	Signal	Po
ite Code		1	1801260262	Online	Cumulus	003 - Aquamaster 3 + Loop	207	Aquamaster 3 (Solar Powered)	Ok	1801260262	41%	
scription	CloudWorks Demonstration Site	2	1808020001	Online	Cumulus Pulse	004 - GWF ECO Encoder + Loop	208	GWF Encoder Test Unit	Ok	1808020001	41%	
ntact Name	CloudWorks Administrator	3	1811120023	Online	Cumulus	005 - Aquamaster 4 + Loop	209	Aquamaster 4	Ok	1811120023	35%	_
dress	Alternator Avenue	4	1811120018	Online	Cumulus	002 - Fwd/Rev Meter + Pressure	210	Powered pulse meter	Ok	1811120018	51%	-
	Montague Gardens	C 6	1011120030	Onlino	Stratue Pulco	007 - Ruleo Only	211	Stratus Pulse Leager	Ok	1011120030	30%	-
	Cape Town	7	1911120002	Online	Stratus Loon	017 - Fwd/Rev Meter + Pressure	213	Stratus Loop Logger	Ok	1911120002	41%	+
		8	1911120001	Online	Stratus Modbus	012 - Current Loop	214	Stratus Modbus	Ok	1911120001	48%	+
	Coult Africa	9	1908200001	Online	Nimbus Pulse	007 - Pulse Only	215	Nimbus Pulse Logger	Ok	1908200001	41%	
untry	South Africa	10	1909300001	Sleep	Nimbus Loop	017 - Fwd/Rev Meter + Pressure	216	Nimbus Loop Logger	Ok	1909300001	45%	-
stal Code	7441	11	1910180001	Sleep								
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all Address	cioudworks@capedigital.co.za											
ne Zone	(UTC+U2:00) South Africa Standard Time											
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me lephone 1ail Address	Technician											

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.

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Ouit Refresh	Database Export Data Lavout Control	View Google	Show De	vice Add	Device Dele	te Device Replace Device	Reload Device Co	nfig Remote Configure	Offline Sc	Fipt Configure	-	U
					Site De	tails						
Site Information		Device S	tatus									
Site Code	domo	No.	Device Code	Comms	Туре	Application	Data Index	Description	Status	Ser. Num	Signal	Pow
Site Code		1	1801260262	Online	Cumulus	003 - Aquamaster 3 + Loop	207	Aquamaster 3 (Solar Powered)	Ok	1801260262	41%	Ma
Description	CloudWorks Demonstration Site	2	1808020001	Online	Cumulus Pulse	004 - GWF ECO Encoder + Loop	208	GWF Encoder Test Unit	Ok	1808020001	41%	Ma
Contact Name	CloudWorks Administrator	3	1811120023	Online	Cumulus	005 - Aquamaster 4 + Loop	209	Aquamaster 4	Ok	1811120023	32%	Ma
Address	Alternator Avenue	4	1811120018	Online	Cumulus	002 - Fwd/Rev Meter + Pressure	210	Powered pulse meter	Ok	1011120018	48%	Ret
	Montague Gardens	6	1910310001	Online	Stratus Pulse	007 - Pulse Only	212	Stratus Pulse Logger	Ok	1910310001	45%	Ma
	Cape Town	7	1911120002	Online	Stratus Loop	017 - Fwd/Rev Meter + Pressure	213	Stratus Loop Logger	Ok	1911120002	45%	Ma
		8	1911120001	Online	Stratus Modbus	012 - Current Loop	214	Stratus Modbus	Ok	1911120001	45%	Ma
Country	Courte Africa	9	1908200001	Online	Nimbus Pulse	007 - Pulse Only	215	Nimbus Pulse Logger	Ok	1908200001	45%	Ma
Country	South Africa	10	1909300001	Sleep	Nimbus Loop	017 - Fwd/Rev Meter + Pressure	216	Nimbus Loop Logger	Ok	1909300001	45%	Bat
Postal Code	7441	11	1910180001	Sleep	Nimbus Modbus	012 - Current Loop	217	Nimbus Modbus Logger	Ok	1910180001	51%	Bat
Telephone	+27215513517											
Fax	+27215513527											
Collular												
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Email Address	cloudworks@capedigital.co.za											
Time Zone	(UTC+02:00) South Africa Standard Time											
	lechnician											
Name												
Telephone												
Email Address												
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To delete a device, simply select the device to delete in the selection table and press the 'Delete Device' button. Please note that this will also delete all the data in the datalog linked to this device.

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

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

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

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# 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.

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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'.

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### 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.

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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			

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	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.		

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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.

٧o.	Date	Totaliser1	Totaliser2	Delta1	Delta2	Loop	Input	Output	Battery	Power
333	18 Apr 2018 21:00:00	147	0	0	0	742.66	Off	Off		Mains
334	18 Apr 2018 22:00:00	147	0	0	0	742.66	Off	Off		Mains
335	18 Apr 2018 23:00:00	147	0	0	0	741.606	Off	Off		Mains
336	19 Apr 2018 00:00:00	147	0	0	0	742.133	Off	Off		Mains
337	19 Apr 2018 01:00:00	147	0	0	0	741.87	Off	Off		Mains
338	19 Apr 2018 02:00:00	147	0	0	0	741.079	Off	Off		Mains
339	19 Apr 2018 03:00:00	147	0	0	0	742.397	Off	Off		Mains
340	19 Apr 2018 04:00:00	147	0	0	0	740.025	Off	Off		Mains
341	19 Apr 2018 05:00:00	147	0	0	0	741.606	Off	Off		Mains
342	19 Apr 2018 06:00:00	147	0	0	0	740.289	Off	Off		Mains
343	19 Apr 2018 07:00:00	147	0	0	0	739.498	Off	Off		Mains
344	19 Apr 2018 08:00:00	147	0	0	0	739.498	Off	Off		Mains

This application will record the following data in the datalog.

○ 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.

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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.

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.

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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:-



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# 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.

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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.

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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.

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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.

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This application will record the following data in the datalog.

No.	Date	Totaliser1	Totaliser2	Cons.	Flow /hr	Pressure	Input	Output	Battery	Power
40	21 Nov 2018 22:00:00	344826	0	53	53	-4	Off	Off	83	Battery
41	21 Nov 2018 23:00:00	344866	0	40	40	-4	Off	Off	83	Battery
42	22 Nov 2018 00:00:00	344920	0	54	54	-4	Off	Off	82	Battery
43	22 Nov 2018 01:00:00	344974	0	54	54	-4	Off	Off	82	Battery
44	22 Nov 2018 02:00:00	345030	0	56	56	-4	Off	Off	81	Battery
45	22 Nov 2018 03:00:00	345094	0	64	64	-4	Off	Off	82	Battery
46	22 Nov 2018 04:00:00	345143	0	49	49	-4	Off	Off	83	Battery
47	22 Nov 2018 05:00:00	345209	0	66	66	-4	Off	Off	82	Battery
48	22 Nov 2018 06:00:00	345275	0	66	66	-4	Off	Off	82	Battery
49	22 Nov 2018 07:00:00	345336	0	61	61	-4	Off	Off	82	Battery
50	22 Nov 2018 08:00:00	345409	0	73	73	-4	Off	Off	82	Battery
51	22 Nov 2018 09:00:00	345466	0	57	57	-4	Off	Off	81	Battery

 $\bigcirc$  Raw Data O Hourly  $\bigcirc$  Daily  $\bigcirc$  Weekly  $\bigcirc$  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

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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 dat	ta
No.	Date	Totaliser1	Totaliser2	Cons.	Flow /hr	Pressure	Input	Output	Battery	Power	^
1	01 Oct 2018 03:00:00	67580	0			-4	Off	Off	100	Battery	
2	01 Oct 2018 04:00:00	67580	0	0	0	-4	Off	Off	100	Battery	
3	01 Oct 2018 05:00:00	67580	0	0	0	-4	Off	Off	100	Battery	
4	01 Oct 2018 06:00:00	67580	0	0	0	-4	Off	Off	100	Battery	
5	01 Oct 2018 07:00:00	67620	0	40	40	-4	Off	Off	100	Battery	
6	01 Oct 2018 08:00:00	68560	0	940	940	-4	Off	Off	100	Battery	
7	01 Oct 2018 09:00:00	69605	0	1045	1045	-4	Off	Off	100	Battery	
8	01 Oct 2018 10:00:00	70650	0	1045	1045	-4	Off	Off	100	Battery	
9	01 Oct 2018 11:00:00	71470	0	820	820	-4	Off	Off	100	Battery	
10	01 Oct 2018 12:00:00	72400	0	930	930	-4	Off	Off	100	Battery	
11	01 Oct 2018 13:00:00	73050	0	650	650	-4	Off	Off	100	Battery	
12	01 Oct 2018 14:00:00	73750	0	700	700	-4	Off	Off	100	Battery	
13	01 Oct 2018 15:00:00	74420	0	670	670	-4	Off	Off	100	Battery	¥
◯ Raw	Data 🖲 Hourly 🔿 Da	ily 〇 Weekly (	O Monthly				Night Flo	ow Range			

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

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

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

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

No.	Date	Totaliser1	Totaliser2	Cons.	Flow /hr	Pressure	Input	Output	Battery	Power	^	From Date
140	21 Nov 2018 22:00:00	344826	0	53	53	-4	Off	Off	83	Battery		16 Nov 2018
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		To Date
143	22 Nov 2018 01:00:00	344974	0	54	54	-4	Off	Off	82	Battery		30 Nov 2018
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		Read Datalog
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		Delete Datalog
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		Consumption Graph
											~	🗹 Night Flow Graph

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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

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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.

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## 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.

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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.

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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.				

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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.

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## 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

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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 -								,	Interpolate	d data
No.	Date	Fwd Totaliser	Fwd Cons.	Rev Totaliser	Rev Cons.	Flow	Pressure	Input	Output	в^
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	~
<										>

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	Dete	Fund Totaliaan	Fued Cone	Poy Totalisor	Roy Cone	Elow /br	Progettee	Input	Output	From Date
INU.	Date	i wu i otalisei	r wu cons.	Nev Totaliser	Rev Colls.	1 IOW /III	Flessule	input	Ouipui	
1	03 Dec 2018 13:10:00	3443		0			10.873	Off	Off	19 Nov 2018
2	03 Dec 2018 13:11:00	3445	2	0	0	120	9.518	Off	Off	
3	03 Dec 2018 13:12:00	3445	0	0	0	0	9.926	Off	Off	To Date
4	03 Dec 2018 13:13:00	3446	1	0	0	60	9.213	Off	Off	03 Dec 2018
5	03 Dec 2018 13:14:00	3447	1	0	0	60	9.275	Off	Off	
6	03 Dec 2018 13:15:00	3448	1	0	0	60	9.621	Off	Off	Read Datalog
7	03 Dec 2018 13:16:00	3449	1	0	0	60	11.379	Off	Off	
8	03 Dec 2018 13:17:00	3450	1	0	0	60	9.508	Off	Off	
Delete Datalog										
										Consumption Grap
									>	🛛 Night Flow Graph
Raw [	Data O Hourly O Dai	ily 〇 Weekly 〇 M	Monthly			Night Flow R	ange 🚞			

e Naw Data	Oriouny	Obally	U Weekiy	

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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

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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.

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## 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.

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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

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	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.

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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.

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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.

No.	Date	Fwd Totaliser	Fwd Cons.	Rev Totaliser	Rev Cons.	Flow	Pressure	Input	Output	В
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	
										>

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.

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

Datalog								*	nterpolated	data	
No.	Date	Fwd Totaliser	Fwd Cons.	Rev Totaliser	Rev Cons.	Flow	Pressure	Loop	Battery	^	From Date
335	11 Feb 2020 01:00:00	1018104.000	0.000	177	0	-0.024	16.957	0			28 Jan 2020 🔍 🔍
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			To Date
338	11 Feb 2020 04:00:00	1018104.000	0.000	177	0	0.000	16.915	0			11 Feb 2020
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			Read Datalog
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			Delete Datalog
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			Consumption
346	11 Feb 2020 12:00:00	1018721.000	149.000	177	0	149.386	13.473	0		1	Elow/Press/Loop
										- K	Niekt Fleur
<										> _	
O Raw	/Data 🖲 Hourly 🔿 Da	ily $\bigcirc$ Weekly $\bigcirc$ I	Monthly			Night FI	ow Range 🗧				

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



To view the flow only would look like this:-



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

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000	0.000	92	0	-0.002	16.936	Off	Off		
)00	0.000	92	0	0.005	16.941	Off	Off		
000	0.000	92	0	0.007	16.938	Off	Off	×	Night Flow
⊖ Montł	O Monthly Night Flow Range → → → → → → → → → → → → → → → → → → →								

# Night Flow Analyser - Range 3 am To 5 am

The graph will show a couple of different series.

✓ Night Flow Min/Max ✓ Mean Night Flow ✓ Night Line

24

20

16

- 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:-



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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.

tup Aquamaster 3							-	U
t Refresh Set Clock	Clear Alarms							
neral Details		Aquamaster Configuration			Diagnostics			Onli
000 - Application Version 017 - Flow Sensor Contract No. 020 - Flow Sensor Cert No. 020 - Flow Sensor Type 009 - Flow Sensor Type 009 - Flow Sensor Type 009 - Flow Sensor Nominal Bore 207 - TX Unique ID 208 - TX Unique PIN 151 - Logger Supplier Code 253/4 - Onboard Clock 319 - Transmitter Power Type 414 - Logger Status 416 - Read Only Switch Status 033 - User Sensor Tag Number 162 - Location String 163 - Owner String 159 - Date Format	VKK WAJC2103 01.04.00 07/12/2015           -           -           Full Bore           100           200033279           3           1           20 Apr 2018 07:53:33           Renewable           Enabled           Off           TAG001           Cape Town, South Africa           Cape Digital Solutions           DDMMYY	037 - Totaliser Units         067 - Pulse Output Units         068 - Pulse Weight         070 - Function Output 1         071 - Function Output 2         072 - Flow Meter Mode         112 - Flow Units         115 - Flow Upper Range         176 - Pressure Type         119 - Pressure Units         122 - Pressure Upper Range         176 - Pressure Upper Range         176 - Pressure Upper Range         179 - Factory Pressure FSD Volts         180 - Factory Pressure Zero Volts	m3            I            0.1         I           Pulse Forward         Pulse Reverse           Off         Backwards           m3/h            10         n           Absolute         Bar           16         B           0         B           10         V           0         V	→ → → 3/h ar ar olts olts	234 - Left Electrode Resistance 235 - Right Electrode Resistance 328 - Electrode A Voltage 329 - Electrode B Voltage 243 - Coil Current 344 - Trip Level for DC Electrode 246 - Alarm String 290 - System Error Flags	3.3735         3.3498         0.0002         0.0027         0.0537         0.75         err 3.349:         None         900         mBar Absolute         mms         0	kohm kohm Volts Volts Volts	
160 - Local Display Timeout	255 min 321 - Enable Diagnostics							
wer Status 349 - Int Power Status 340 - Ext Power Status 377 - 3V8 Voltage Level 378 - 3V2 Voltage Level 376 - Ext Power Voltage 320 - Ext Power Voltage 329 - Ext Power Volt Threshold 379 - Ext Power Low Threshold 158 - Power Control Mode	OK           Renewable Power OK           3.786         Volts           3.148         Volts           12.5         Volts           11         Volts           8         Volts           0         sec	AquaProbe Configuration 012 - Flow Sens. Settling Time (Batt) 029 - Flow Sens. Settling Time (Mains) 030 - Profile Factor 031 - Insertion factor 032 - Probe Pipe Bore 117 - Flow Cutoff (Batt Mode)	46.5 n 46.5 n 1 0 100 n 0 n	is is im	Local Display Setup			

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

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## 2.8.5 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.

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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.

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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

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

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## 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

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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	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	
							1		>

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.

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

Datalog								* 1 - 1		
								^ Interpolate	d data	
No.	Date	Fwd Totaliser	Consumption	Flow /hr	Serial Num	ECO Status	Totaliser 1	Totaliser 2	Lo ^	From Date
106	03 Dec 2018 00:00:00	1.821	0.000	0.000	16000916	00	0	0		19 Nov 2018
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		To Date
109	03 Dec 2018 03:00:00	1.821	0.000	0.000	16000916	00	0	0		03 Dec 2018
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		Read Datalog
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		Delete Datalog
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	~	Consumption Graph
								🖂 Night Flow Graph 🦯		
O Raw Data   Hourly O Daily O Weekly O Monthly										

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:-



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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:-



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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.

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## 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.

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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

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	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.

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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.

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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.

No.	Date	Fwd Totaliser	Fwd Cons.	Rev Totaliser	Rev Cons.	Flow	Pressure	Input	Output	В ^
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	<b></b>

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.

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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.

Da	talog								*	nterpolated o	data	
Γ	No.	Date	Fwd Totaliser	Fwd Cons.	Rev Totaliser	Rev Cons.	Flow	Pressure	Loop	Battery	1^	From Date
	335	11 Feb 2020 01:00:00	1018104.000	0.000	177	0	-0.024	16.957	0			28 Jan 2020 🔲 🔻
	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			To Date
	338	11 Feb 2020 04:00:00	1018104.000	0.000	177	0	0.000	16.915	0			11 Feb 2020
	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			Read Datalog
	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			Delete Datalog
	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			Consumption
	346	11 Feb 2020 12:00:00	1018721.000	149.000	177	0	149.386	13.473	0		[	Elow/Press/Loon
4											<u>&gt; </u>	
С	O Raw Data   Hourly O Daily O Weekly O Monthly  Night Flow Range											

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



To view the flow only would look like this:-



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

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000	0.000	92	0	-0.002	16.936	Off	Off		Consumption
000	0.000	92	0	0.005	16.941	Off	Off		
000	0.000	92	0	0.007	16.938	Off	Off	×	
	Might Flow								
⊖ Montł	O Monthly Night Flow Range								

# Night Flow Analyser - Range 3 am To 5 am

The graph will show a couple of different series.

✓ Night Flow Min/Max ✓ Mean Night Flow ✓ Night Line

24

20

16

- 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:-



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



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

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

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

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xit Refresh							
anaral Dataila		Diagnostics			Configuration	I	Onlin
Flaw Data	<b>51.007</b>	Leel Quiteb Faces ed			Mataz	Motor Too	
Flow Rate	2.7 %	Somer Boyerse Wired			Meter Tag	Cape Digital Solutions	
Provencentage	0.Custom	High Elow Alorm			Separate eaction	Cape Digital Solutions	
Volocity	1 828 m/o				Sensor Location		
Velocity	1.030 m/s	Event Dire Alarm			Volume Units	m3	~
Porward Totaliser	1906/4.305 m3	Empty Pipe Alarm	© OK		Pressure Units	Custom	~
Reverse i otaliser	120.13 m3		Ok	O Alarm	Flow Units	m3/hour	~
Net I otaliser	190554.255 m3	Sensor Coll Open Circuit	Ok	O Alarm	Velocity Units	m/s	5
Elevated Access PIN	1068	Sensor Coll Short Circuit	Ok	O Alarm			_
System Power Type	Battery	Electrode High Voltage	● Ok	O Alarm	Pipe Bore	300	mm
Firmware Version	01.01.06	Electrode Unstable Voltage	Ok		Process Cycle Period	15	sec
Sensor Contract Ser.		Capture Saturation Error	Ok	O Alarm	Sens. Profile Factor	1	7
Transmitter Type	mote	Low Coil Insul. Resistance	() Ok	Alarm	Sens. Insertion Factor	1	Ē
Sensor Unique ID	4294967295	Coil Current	30.353 r	nA	Flow Cutoff Percentage	0	%
Transmitter Unique ID	1342187229	Pulse Output Freq.	0 Hz		Empty Pipe Imp. Threshold	200	koh
Flow Sensor Type	Full Bore	Factory Press. FSD Setting	0 mV/V		High Flow Trip Point	120	%
Sensor Bore	100 mm	Factory Press. Zero Offset	0 mV/V		Low Flow Trip Point	0	%
Sensor Span Trim	1	Electrode A Impedance	274.043	ohms	Flow Trip Hysteresis	0	%
		Electrode B Impedance	282.603	ohms	User Zero Offset Adj.	0	 mm
		Electrode A Voltage	0.01097	V	User Sensor Span Adj.	1	Ĩ
wer Status		Electrode B Voltage	0.01097	V	Flow Meas. Filter Resp.	3	sec
Mains Power Off	Ok O Alarm				Pressure Trans Type	Gauge	~
Battery Low	● 0k O Alarm				Pressure Height Offect	0	 mm
Battery Critical	Ok O Alarm				Press Maga Filter Page	1	
Renewable Power Low	● 0k O Alarm				Fress. Weas, Filter Resp.		sec
Internal Power Critical	● 0k O Alarm				Function Output 1/2	Enabled	~
Ext. Supply Voltage	3.689 V				Function Output 3	Always Off	~
Int. Battery Voltage	3.517 V				Pulses per Unit Vol.	1	units

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

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# 2.8.7 Application 006 - GWF Sonico + Loop

This application is currently under development.

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## 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.

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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

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	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.

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This application will record the following data in the datalog.

Datalog								* Interpolated da	ita
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

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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.

atalog -								* Interpolated d
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.



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## 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.

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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 Application	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. Selected device application. Application 008 - Combination Pulse
Data Index	Water Meter function in this case. As each device is captured on to Cloudworks system, it is assigned a

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	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.

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This application will record the following data in the datalog.

D	ata	log	

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

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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.

Datalo	g								*	nterpolated data
N	. Date	Totaliser1	Totaliser2	Cons.	Flow /hr	Battery	Power			^
27	6 04 Feb 2020 14:00:00	172500.0	0	42.0	42.0		Mains			
27	7 04 Feb 2020 15:00:00	172530.0	0	30.0	30.0		Mains			
27	04 Feb 2020 16:00:00	172560.0	0	30.0	30.0		Mains			
27	04 Feb 2020 17:00:00	172592.0	0	32.0	32.0		Mains			
28	04 Feb 2020 18:00:00	172614.0	0	22.0	22.0		Mains			
28	04 Feb 2020 19:00:00	172621.0	0	7.0	7.0		Mains			
28	2 04 Feb 2020 20:00:00	172621.5	0	0.5	0.5		Mains			
28	04 Feb 2020 21:00:00	172622.0	0	0.5	0.5		Mains			
28	4 04 Feb 2020 22:00:00	172622.0	0	0.0	0.0		Mains			
28	5 04 Feb 2020 23:00:00	172622.0	0	0.0	0.0		Mains			
28	6 05 Feb 2020 00:00:00	172622.0	0	0.0	0.0		Mains			
28	7 05 Feb 2020 01:00:00	172622.0	0	0.0	0.0		Mains			
28	05 Feb 2020 02:00:00	172622.0	0	0.0	0.0		Mains			~
O Ra	aw Data 💿 Hourly 🔿 Da	ily 🔿 Weekly	O Monthly				Night Flo	ow Range		

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

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

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

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

Datalog * Interpolated data												
No.	Date	Totaliser1	Totaliser2	Cons.	Flow /hr	Battery	Power			^	From Date	
337	07 Feb 2020 03:00:00	173365.0	0	1.0	1.0		Mains				24 Jan 2020 🔍 🔍	
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				To Date	
340	07 Feb 2020 06:00:00	173366.0	0	0.0	0.0		Mains				07Feb 2020	
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				Read Datalog	
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				Delete Datalog	
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				Consumption Graph	
										¥	🗹 Night Flow Graph	
() Raw	Data 🖲 Hourly 🔿 Da	ily () Weekly	O Monthly				Night Flow	v Range		_	$\smile$	

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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

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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.

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## 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.

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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

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	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.

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

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

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

○ Raw Data ● Hourly ○ Daily ○ Weekly ○ Monthly

Night Flow Range 🛛 💳

Information	Notes
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.

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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								* Inter	rpolated data	
No.	Date	Fwd Totaliser	Fwd Cons.	Rev Totaliser	Rev Cons.	Flow /hr	Battery	Power	^	
16	08 Feb 2020 09:00:00	606.0	13.0	200	0	13.0		Mains		
17	08 Feb 2020 10:00:00	606.5	0.5	200	0	0.5		Mains		
18	08 Feb 2020 11:00:00	607.0	0.5	200	0	0.5		Mains		
19	08 Feb 2020 12:00:00	643.0	36.0	200	0	36.0		Mains		
20	08 Feb 2020 13:00:00	689.0	46.0	200	0	46.0		Mains		
21	08 Feb 2020 14:00:00	727.0	38.0	200	0	38.0		Mains		
22	08 Feb 2020 15:00:00	758.0	31.0	200	0	31.0		Mains		
23	08 Feb 2020 16:00:00	789.0	31.0	200	0	31.0		Mains		
24	08 Feb 2020 17:00:00	795.0	6.0	200	0	6.0		Mains		
25	08 Feb 2020 18:00:00	756.0	-39.0	200	0	-39.0		Mains		
26	08 Feb 2020 19:00:00	717.0	-39.0	200	0	-39.0		Mains		
27	08 Feb 2020 20:00:00	717.0	0.0	200	0	0.0		Mains		
28	08 Feb 2020 21:00:00	720.0	3.0	200	0	3.0		Mains	×	
() Rawl	C Raw Data   Hourly  Daily  Weekly  Monthly Night Flow Range									

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

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

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

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

atalog											
No.	Date	Totaliser1	Totaliser2	Cons.	Flow /hr	Battery	Power			^	From Date
324	06 Feb 2020 14:00:00	173209.0	0	41.0	41.0		Mains				24 Jan 2020
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				To Date
327	06 Feb 2020 17:00:00	173323.0	0	35.0	35.0		Mains				06 Feb 2020
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				Read Dat
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				Delete Da
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			1	Consumption (
										~	Night Flow Gra
) Raw [	Data 🖲 Hourly 🔿 Da	ily () Weekly	O Monthly				Night Flo	w Range		þ	

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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

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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.

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# 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.

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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

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	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.

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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.

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	
									>

Night Flow Range 🛛 📼

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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.

Datalog								* Interpolate	d data
No.	Date	Fwd Totaliser	Consumption	Flow /hr	Serial Num	ECO Status	Totaliser 1	Totaliser 2	Ba ^
318	09 Feb 2020 08:00:00	2.044	0.000	0.000	16000916	00	0	0	
319	09 Feb 2020 09:00:00	2.044	0.000	0.000	16000916	00	0	0	
320	09 Feb 2020 10:00:00	2.044	0.000	0.000	16000916	00	0	0	
321	09 Feb 2020 11:00:00	2.044	0.000	0.000	16000916	00	0	0	
322	09 Feb 2020 12:00:00	2.044	0.000	0.000	16000916	00	0	0	
323	09 Feb 2020 13:00:00	2.044	0.000	0.000	16000916	00	0	0	
324	09 Feb 2020 14:00:00	2.044	0.000	0.000	16000916	00	0	0	
325	09 Feb 2020 15:00:00	2.044	0.000	0.000	16000916	00	0	0	
326	09 Feb 2020 16:00:00	2.044	0.000	0.000		00	0	0	
327	09 Feb 2020 17:00:00	2.044	0.000	0.000	16000916	00	0	0	
328	09 Feb 2020 18:00:00	2.044	0.000	0.000	16000916	00	0	0	
329	09 Feb 2020 19:00:00	2.044	0.000	0.000	16000916	00	0	0	
330	09 Feb 2020 20:00:00	2.044	0.000	0.000	16000916	00	0	0	
331	09 Feb 2020 21:00:00	2.044	0.000	0.000	16000916	00	0	0	
<		1				1			>
O Rav	O Raw Data  Hourly O Daily O Weekly O 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.

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

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

Datalog								* Interpolate	d data		
No.	Date	Fwd Totaliser	Consumption	Flow /hr	Serial Num	ECO Status	Totaliser 1	Totaliser 2	Lo ^	From Date	;
106	03 Dec 2018 00:00:00	1.821	0.000	0.000	16000916	00	0	0		19 Nov 2018	
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		To Date	_
109	03 Dec 2018 03:00:00	1.821	0.000	0.000	16000916	00	0	0		03 Dec 2018	
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		Read Da	talog
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		Delete Da	atalog
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		60.0	
119	03 Dec 2018 13:00:00	1.828	1.828	1.828	16000916	00	0	0	~	Consumption	Graph
<									>	🔽 Night Flow Gr	aph 🦯
	/ Data	ily $\bigcirc$ Weekly $\bigcirc$ N	Monthly			Night Flow	Range				

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



To view the flow only would look like this:-



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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:-



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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.

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# 2.8.12 Application 011 - GWF Sonico Meter

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

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# 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.

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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.

Current Loop only	×
1910180001 - Nimbus Modbus Logger	
4-20mA Loop 8.48	]

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.

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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.

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This application will record the following data in the datalog.

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	-	•			э	

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

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.

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

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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.



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## 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.

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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.

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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.

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

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

This application will record the following data in the datalog.

Datalog –										
No.	Date	Fwd Totaliser	Fwd Cons.	Rev Totaliser	Rev Cons.	Flow	Pressure	Loop	Battery	1^
95	01 Feb 2020 01:00:00	1005289	0	175	0	-0.008	16.931	0		
96	01 Feb 2020 02:00:00	1005289	0	175	0	-0.033	16.944	0		
97	01 Feb 2020 03:00:00	1005289	0	175	0	-0.009	16.928	0		
98	01 Feb 2020 04:00:00	1005289	0	175	0	0.011	16.930	0		
99	01 Feb 2020 05:00:00	1005289	0	175	0	-0.010	16.914	0		
100	01 Feb 2020 06:00:00	1005289	0	175	0	0.051	16.948	0		
101	01 Feb 2020 07:00:00	1005301	12	175	0	14.018	16.799	0		
102	01 Feb 2020 08:00:00	1005364	63	175	0	64.363	16.230	0		
103	01 Feb 2020 09:00:00	1005443	79	175	0	79.177	15.891	0		
104	01 Feb 2020 10:00:00	1005540	97	175	0	98.847	15.250	0		
105	01 Feb 2020 11:00:00	1005663	123	175	0	124.679	14.396	0		
106	01 Feb 2020 12:00:00	1005805	142	175	0	141.942	13.628	0		
107	01 Feb 2020 13:00:00	1005945	140	175	0	139.034	13.225	0		×
<										>

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	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

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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.

Da	atalog								*	nterpolated d	ata	
Γ	No.	Date	Fwd Totaliser	Fwd Cons.	Rev Totaliser	Rev Cons.	Flow	Pressure	Loop	Battery		From Date
	47	30 Jan 2020 01:00:00	1002556.000	0.000	175	0	0.015	16.941	0			28 Jan 2020 🔲 🔻
	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			To Date
	50	30 Jan 2020 04:00:00	1002595.667	39.667	175	0	15.665	16.713	0			11 Feb 2020
	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			Read Datalog
	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			Delete Datalog
	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			Consumption
	58	30 Jan 2020 12:00:00	1003178.000	147.000	175	0	146.676	13.747	0			Elow/Press/Loop
	59	30 Jan 2020 13:00:00	1003321.000	143.000	175	0	143.218	13.391	0		~	
Ľ	C									3	•	✓ Night Flow
C	Raw	Data 🖲 Hourly 🔿 Da	ily $\bigcirc$ Weekly $\bigcirc$ I	Monthly			Night Fl	ow Range 🖷			_	

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

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

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

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

Datalog								*	Interpolated	data	
No.	Date	Fwd Totaliser	Fwd Cons.	Rev Totaliser	Rev Cons.	Flow	Pressure	Loop	Battery	$\uparrow$	From Date
335	11 Feb 2020 01:00:00	1018104.000	0.000	177	0	-0.024	16.957	0			28 Jan 2020 🔲 🔻
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			To Date
338	11 Feb 2020 04:00:00	1018104.000	0.000	177	0	0.000	16.915	0			11 Feb 2020
339	11 Feb 2020 05:00:00	1018104.000	0.000	177	0	0.011	16.927	0		T	
340	11 Feb 2020 06:00:00	1018111.000	7.000	177	0	8.355	16.824	0			Read Datalog
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			Delete Datalog
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			Consumption
346	11 Feb 2020 12:00:00	1018721.000	149.000	177	0	149.386	13.473	0		1	Elow/Press/Loon
										- K	Night Flow
<								1 1		<u>&gt; </u>	MIGHTEROW
⊖ Rav	Data 🖲 Hourly 🔿 Da	ily $\bigcirc$ Weekly $\bigcirc$ I	Monthly			Night Fl	ow Range 🗧				$\sim$

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

To view the flow only would look like this:-



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

000	0.000	92	0	-0.002	16.936	Off	Off		Consumption
000	0.000	92	0	0.005	16.941	Off	Off		Elow/Press/Loop
000	0.000	92	0	0.007	16.938	Off	Off	×	Night Flow
0 N	Nonthly		(	Night Flo	ow Range 🖕	1 1	1		
		Nig	iht Flow Ai	nalyser	- Range	3 am T	°o 5 am		
	24 Night F	ilow Min/Max 🔽 Mean	n Night Flow 🔽 Ni	ight Line		<b></b>			
	20				/				

The graph will show a couple of different series.

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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

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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.

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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.

t   Refresh   Set Clock	Clear Alarms							Onl
eral Details		Aquamaster Configuration			Diagnostics			
000 - Application Version 017 - Flow Sensor Contract No. 020 - Flow Sensor Cert No. 008 - Flow Sensor Type 009 - Flow Sensor Nominal Bore 207 - TX Unique ID 208 - TX Unique ID 208 - TX Unique PIN 151 - Logger Supplier Code 253/4 - Onboard Clock 319 - Transmitter Power Type 414 - Logger Status 416 - Read Only Switch Status 033 - User Sensor Tag Number 162 - Location String 159 - Date Format 160 - Local Display Timeout	VKK WAJC2103 01.04.00 07/12/2015         ·         Full Bore         100         mm         2100033279         3         1         20 Apr 2018 07:53:33         Renewable         Enabled         Off         TAG001         Cape Town, South Africa         Cape Digital Solutions         DDMMYY ↓         255       min         ☑ 321 - Enable Diagnostics	037 - Totaliser Units 067 - Pulse Output Units 068 - Pulse Weight 070 - Function Output 1 071 - Function Output 2 072 - Function Output 3 102 - Flow Meter Mode 112 - Flow Units 115 - Flow Upper Range 176 - Pressure Type 119 - Pressure Units 122 - Pressure Units 122 - Pressure Units 123 - Pressure Lower Range 179 - Factory Pressure FSD Volts 180 - Factory Pressure Zero Volts	m3            0.1         I           Pulse Forward           Pulse Reverse           Off           Backwards           m3/h           10           Absolute           Bar           16           E           0           10           0           V           0           V	v v v 13/h lar folts folts	234 - Left Electrode Resistance 235 - Right Electrode Resistance 328 - Electrode A Voltage 239 - Electrode B Voltage 243 - Coil Current 344 - Trip Level for DC Electrode 246 - Alarm String 290 - System Error Flags	3 3735 3 3498 -0.0002 -0.0027 0.0537 0.75 err 3, 349, None 900 mBar Absolute mms 0	kohm kohm Volts Volts Amps Volts min Y hrs	
ver Status		AquaProbe Configuration			Local Display Setup			
349 - Int Power Status 340 - Ext Power Status 377 - 3V8 Voltage Level 378 - 3V2 Voltage Level 376 - Ext Power Voltage 320 - Ext Power Cok Threshold 379 - Ext Power Low Threshold 158 - Power Control Mode	OK           Renewable Power OK           3.786         Volts           3.148         Volts           12.5         Volts           11         Volts           8         Volts           0         sec	012 - Flow Sens. Settling Time (Batt) 029 - Flow Sens. Settling Time (Mains) 030 - Profile Factor 031 - Insertion factor 032 - Probe Pipe Bore 117 - Flow Cutoff (Batt Mode)	46.5     n       46.5     n       1     0       100     n       0     n	ns ns nm	<ul> <li>✓ 052 - Forward Total</li> <li>○ 053 - Reverse Total</li> <li>◇ 054 - Net Total</li> <li>○ 055 - Tariff A</li> <li>○ 056 - Tariff B</li> <li>✓ 059 - Flow Rate</li> <li>○ 060 - Flow Velocity</li> <li>○ 061 - Pressure</li> <li>✓ 062 - Date/Time</li> <li>○ 062 - Pressure Type</li> </ul>			

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

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### 2.8.15 Application 014 - Aquamaster 4



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

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

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

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

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

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



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

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

This data is as follows:-

Information	Notes
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.

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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.

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

This application will record the following data in the datalog.

Datalog										
No.	Date	Fwd Totaliser	Fwd Cons.	Rev Totaliser	Rev Cons.	Flow	Pressure	Loop	Battery	1
95	01 Feb 2020 01:00:00	1005289	0	175	0	-0.008	16.931	0		T
96	01 Feb 2020 02:00:00	1005289	0	175	0	-0.033	16.944	0		
97	01 Feb 2020 03:00:00	1005289	0	175	0	-0.009	16.928	0		
98	01 Feb 2020 04:00:00	1005289	0	175	0	0.011	16.930	0		
99	01 Feb 2020 05:00:00	1005289	0	175	0	-0.010	16.914	0		
100	01 Feb 2020 06:00:00	1005289	0	175	0	0.051	16.948	0		
101	01 Feb 2020 07:00:00	1005301	12	175	0	14.018	16.799	0		
102	01 Feb 2020 08:00:00	1005364	63	175	0	64.363	16.230	0		T
103	01 Feb 2020 09:00:00	1005443	79	175	0	79.177	15.891	0		
104	01 Feb 2020 10:00:00	1005540	97	175	0	98.847	15.250	0		
105	01 Feb 2020 11:00:00	1005663	123	175	0	124.679	14.396	0		
106	01 Feb 2020 12:00:00	1005805	142	175	0	141.942	13.628	0		
107	01 Feb 2020 13:00:00	1005945	140	175	0	139.034	13.225	0		~
<										>
O Rawl	Data 🖲 Hourly 🔿 Da	ily 〇 Weekly 〇 I	Monthly			Night Fl	ow Range 🗧	1	1	

○ 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	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

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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.

Da	atalog –								*	nterpolated c	lata	
Γ	No.	Date	Fwd Totaliser	Fwd Cons.	Rev Totaliser	Rev Cons.	Flow	Pressure	Loop	Battery	$ \uparrow $	From Date
	47	30 Jan 2020 01:00:00	1002556.000	0.000	175	0	0.015	16.941	0			28 Jan 2020 🔲 🔻
	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			To Date
	50	30 Jan 2020 04:00:00	1002595.667	39.667	175	0	15.665	16.713	0			11 Feb 2020
	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			Read Datalog
	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			Delete Datalog
	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			Consumption
	58	30 Jan 2020 12:00:00	1003178.000	147.000	175	0	146.676	13.747	0			Elow/Press/Loop
	59	30 Jan 2020 13:00:00	1003321.000	143.000	175	0	143.218	13.391	0		~	Night Flow
O Raw Data   Hourly O Daily O Weekly O Monthly  Night Flow Range												

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

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

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

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

Datalog								*	nternolated	data	
No.	Date	Fwd Totaliser	Fwd Cons.	Rev Totaliser	Rev Cons.	Flow	Pressure	Loop	Battery	1^	From Date
335	11 Feb 2020 01:00:00	1018104.000	0.000	177	0	-0.024	16.957	0			28 Jan 2020 🔲 🔻
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			To Date
338	11 Feb 2020 04:00:00	1018104.000	0.000	177	0	0.000	16.915	0			11 Feb 2020
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			Read Datalog
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			Delete Datalog
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		Т	Consumption
346	11 Feb 2020 12:00:00	1018721.000	149.000	177	0	149.386	13.473	0		1	Elow/Press/Loop
<	< Night Flow										
() Rav	O Raw Data   Hourly O Daily O Weekly O Monthly  Night Flow Range										

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

To view the flow only would look like this:-



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

000 000	0.000	92 92	0	-0.002 0.005	16.936 16.941	Off Off	Off Off		Consumption
000	0.000	92	0	0.007	16.938	Off	Off	<b>`</b> ~	☑ Night Flow
0 N	O Monthly Night Flow Range								
Night Flow Analyser - Range 3 am To 5 am									
	24 Vight Flow Min/Max V Mean Night Flow V Night Line								

The graph will show a couple of different series.

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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

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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.

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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.

xit Refresh						Online
eneral Details		Diagnostics		Configuration		
Flow Rate	51.967 m3/hour	Lock Switch Engaged	○ No	Meter Tag	Meter Tag	
Flow Percentage	3.7 %	Sensor Reverse Wired	● Ok O Alarm	Meter Owner	Cape Digital Solutions	
Pressure	0 Custom	High Flow Alarm	Ok O Alarm	Sensor Location	Cape Town	
Velocity	1.838 m/s	Low Flow Alarm	● Ok O Alarm	Velume Linite	m3	1
Forward Totaliser	190674.385 m3	Empty Pipe Alarm	● Ok O Alarm	Volume Onlis		J
Reverse Totaliser	120.13 m3	Pulse Output Error	● Ok O Alarm	Pressure Units	Custom ~	]
Net Totaliser	190554.255 m3	Sensor Coil Open Circuit	● Ok O Alarm	Flow Units	m3/hour ~	_
		Sensor Coil Short Circuit	● Ok O Alarm	Velocity Units	m/s ~	
Elevated Access PIN	1068	Electrode High Voltage	● Ok O Alarm	Pipe Bore	300	mm
System Power Type	Battery	Electrode Unstable Voltage	Ok O Alarm	Process Cycle Period	15	] sec
Firmware Version	01.01.06	Capture Saturation Error	Ok O Alarm			_
Sensor Contract Ser.		Low Coil Insul. Resistance	◯ Ok	Sens. Profile Factor	1	_
Transmitter Type	mote			Sens. Insertion Factor	1	
Sensor Unique ID	4294967295	Coil Current	30.353 mA	Flow Cutoff Percentage	0	%
Transmitter Unique ID	1342187229	Pulse Output Freq.	0 Hz	Empty Pipe Imp. Threshold	200	kohi
Flow Sensor Type	Full Bore	Factory Press. FSD Setting	0 mV/V	High Flow Trip Point	120	] %
Sensor Bore	100 mm	Factory Press. Zero Offset	0 mV/V	Low Flow Trip Point	0	%
Sensor Span Trim	1	Electrode A Impedance	274.043 ohms	Flow Trip Hysteresis	0	%
		Electrode B Impedance	282.603 ohms	User Zero Offset Adj.	0	mm
		Electrode A Voltage	0.01097 V	User Sensor Span Adj.	1	]
wer Status		Electrode B Voltage	0.01097 V	Flow Meas. Filter Resp.	3	sec
Mains Power Off	● Ok O Alarm			Pressure Trans. Type	Gauge ~	
Battery Low	● Ok O Alarm			Pressure Height Offset	0	] 
Battery Critical	● 0k O Alarm			Press, Meas, Filter Resp	1	sec
Renewable Power Low	● 0k O Alarm					
Internal Power Critical	● Ok O Alarm			Function Output 1/2	Enabled ~	
Ext. Supply Voltage	3.689 V			Function Output 3	Always Off ~	
Int. Battery Voltage	3.517 V			Pulses per Unit Vol.	1	units

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

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# 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.

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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.

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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.

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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.

٧o.	Date	Totaliser1	Delta1	Totaliser2	Delta2	Loop	Battery	Power	
36	11 Feb 2020 04:00:00	1594	0	10	0	-2.500	1	Battery	
37	11 Feb 2020 05:00:00	1594	0	10	0	-2.500	0	Battery	
38	11 Feb 2020 06:00:00	1594	0	10	0	-2.500	0	Battery	
39	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			

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

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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	¥

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.



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



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## 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.

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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.

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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.

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

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

This application will record the following data in the datalog.

No.	Date	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.

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

Datalog									* Interpolated data
No.	Date	Totaliser1	Totaliser2	Cons.	Flow /hr	Pressure	Battery	Power	^
47	09 Feb 2020 13:00:00	1077.00	10	42.00	42.00	7.950	4	Battery	
48	09 Feb 2020 14:00:00	1118.00	10	41.00	41.00	6.510	5	Battery	
49	09 Feb 2020 15:00:00	1146.00	10	28.00	28.00	5.385	5	Battery	
50	09 Feb 2020 16:00:00	1146.00	10	0.00	0.00	4.280	5	Battery	
51	09 Feb 2020 17:00:00	1176.00	10	30.00	30.00	3.093	6	Battery	
52	09 Feb 2020 18:00:00	1185.25	10	9.25	9.25	0.296	6	Battery	
53	09 Feb 2020 19:00:00	1194.50	10	9.25	9.25	0.296	6	Battery	
54	09 Feb 2020 20:00:00	1203.75	10	9.25	9.25	0.296	6	Battery	
55	09 Feb 2020 21:00:00	1213.00	10	9.25	9.25	-2.500	7	Battery	
56	09 Feb 2020 22:00:00	1213.00	10	0.00	0.00	-2.500	6	Battery	
57	09 Feb 2020 23:00:00	1213.00	10	0.00	0.00	-2.500	6	Battery	
58	10 Feb 2020 00:00:00	1213.00	10	0.00	0.00	-2.500	6	Battery	
59	10 Feb 2020 01:00:00	1213.00	10	0.00	0.00	-2.500	5	Battery	~
() Rawl	○ Raw Data ● Hourly ○ Daily ○ Weekly ○ Monthly Night Flow Range								

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

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

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

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

Datalog –									* Interpolated da	ata	
No.	Date	Totaliser1	Totaliser2	Cons.	Flow /hr	Pressure	Battery	Power		^	From Date
14	08 Feb 2020 04:00:00	634.00	10	0.00	0.00	-2.500	12	Battery			28 Jan 2020 🔍 🐨
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			To Date
17	08 Feb 2020 07:00:00	637.00	10	3.00	3.00	-2.500	12	Battery			11 Feb 2020
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			Read Datalog
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			Delete Datalog
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		1	Consumption Graph
26	08 Feb 2020 16:00:00	885.00	10	36.00	36.00	4.314	10	Battery		2	Night Flow Graph
O Raw [	Data 🖲 Hourly 🔿 Da	ily () Weekly	O Monthly				Night Flov	v Range 📛			

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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

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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.

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## 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.

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Forward/Reverse Pulse Meter + Pressure Forward/Reverse Pulse Meter + Pressure Exit Exit 1909300001 - Nimbus Loop Logger 1909300001 - Nimbus Loop Loggei Approx Flow Approx Flow Pressure Pressure 0.00 2.92 0.00 2.92 Forward Totaliser Forward Totaliser 00000001921 00000001921 Reverse Totaliser - k 0000001000 00000010000 Net Totaliser - k Net Totaliser -000001911000 000001911000

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.

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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.

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

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

This application will record the following data in the datalog.

Datalog									
No.	Date	Fwd Totaliser	Fwd Cons.	Rev Totaliser	Rev Cons.	Flow /hr	Pressure	Battery	Power ^
43	09 Feb 2020 09:00:00	938	16	10	0	16	0.019	6	Batter
44	09 Feb 2020 10:00:00	964	26	10	0	26	2.286	5	Batter
45	09 Feb 2020 11:00:00	993	29	10	0	29	5.090	4	Batter
46	09 Feb 2020 12:00:00	1035	42	10	0	42	7.801	4	Batter
47	09 Feb 2020 13:00:00	1077	42	10	0	42	7.950	4	Batter
48	09 Feb 2020 14:00:00	1118	41	10	0	41	6.510	5	Batter
49	09 Feb 2020 15:00:00	1146	28	10	0	28	5.385	5	Batter
50	09 Feb 2020 16:00:00	1146	0	10	0	0	4.280	5	Batter
51	09 Feb 2020 17:00:00	1176	30	10	0	30	3.082	6	Batter
52	09 Feb 2020 18:00:00	1196	20	10	0	20	1.743	7	Batter
53	09 Feb 2020 19:00:00	1212	16	10	0	16	-1.176	7	Batter
54	09 Feb 2020 20:00:00	1212	0	10	0	0	-2.500	7	Batter 🗸
<		1			1				>

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.
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.

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Datalog								* Interp	olated data
No.	Date	Fwd Totaliser	Fwd Cons.	Rev Totaliser	Rev Cons.	Flow /hr	Pressure	Battery	Power ^
22	08 Feb 2020 12:00:00	729.00	38.00	10	0	38.00	7.660	8	Batter
23	08 Feb 2020 13:00:00	770.00	41.00	10	0	41.00	7.925	9	Batter
24	08 Feb 2020 14:00:00	810.00	40.00	10	0	40.00	6.494	9	Batter
25	08 Feb 2020 15:00:00	849.00	39.00	10	0	39.00	5.407	10	Batter
26	08 Feb 2020 16:00:00	863.75	14.75	10	0	14.75	2.214	10	Batter
27	08 Feb 2020 17:00:00	878.50	14.75	10	0	14.75	2.214	10	Batter
28	08 Feb 2020 18:00:00	893.25	14.75	10	0	14.75	2.214	10	Batter
29	08 Feb 2020 19:00:00	908.00	14.75	10	0	14.75	-0.978	10	Batter
30	08 Feb 2020 20:00:00	908.00	0.00	10	0	0.00	-2.500	12	Batter
31	08 Feb 2020 21:00:00	911.00	3.00	10	0	3.00	-2.500	12	Batter
32	08 Feb 2020 22:00:00	911.00	0.00	10	0	0.00	-2.500	11	Batter
33	08 Feb 2020 23:00:00	911.00	0.00	10	0	0.00	-2.500	10	Batter 🗸
<	< > > >							>	
O Raw I	○ Raw Data    Hourly ○ Daily ○ Weekly ○ Monthly								

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.

lo.	Date	Fwd Totaliser	Fwd Cons.	Rev Totaliser	Rev Cons.	Flow /hr	Pressure	Input	Output	From Date
1	03 Dec 2018 13:10:00	3443		0			10.873	Off	Off	19 Nov 2018 🔲
2	03 Dec 2018 13:11:00	3445	2	0	0	120	9.518	Off	Off	
3	03 Dec 2018 13:12:00	3445	0	0	0	0	9.926	Off	Off	To Date
4	03 Dec 2018 13:13:00	3446	1	0	0	60	9.213	Off	Off	03 Dec 2018
5	03 Dec 2018 13:14:00	3447	1	0	0	60	9.275	Off	Off	
6	03 Dec 2018 13:15:00	3448	1	0	0	60	9.621	Off	Off	Read Datalog
7	03 Dec 2018 13:16:00	3449	1	0	0	60	11.379	Off	Off	
8	03 Dec 2018 13:17:00	3450	1	0	0	60	9.508	Off	Off	
										Delete Datalo
								_	>	Night Flow Graph

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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

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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.

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### 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.

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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.

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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.

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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	
										*
<										>

 ${\small \textcircled{\sc only}}$  Raw Data  $\bigcirc$  Hourly  $\bigcirc$  Daily  $\bigcirc$  Weekly  $\bigcirc$  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	Flow rate calculated as volume per hour.
Loop	4-20mA Loop reading with its applied calibration.

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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.

Data	alog									* Interpo	plated 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	¥
<											>
0	○ Raw Data						low 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.

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

Datalog									* Interpol	ated data	
No.	Date	Fwd Totaliser	Fwd Cons.	Rev Totaliser	Rev Cons.	Flow	Loop	Input	Output	Batter ^	From Date
6	21 Apr 2020 20:00:00	4572.915	9.000	0	0	9	-3.860	Off	Off		08 Apr 2020
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		To Date
9	21 Apr 2020 23:00:00	4599.765	8.850	0	0	9	-4.000	Off	Off		22 Apr 2020
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		Read Datalog
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		Delete Datalog
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		Consumption
17	22 Apr 2020 07:00:00	4671.915	9.450	0	0	9	-4.000	Off	Off	1	Elew / Leep
18	22 Apr 2020 08:00:00	4680.915	9.000	0	0	9	-3.578	Off	Off	L (	
<										>	✓ Night Flow
⊖ Raw	Data 🖲 Hourly 🔿 Da	aily $\bigcirc$ Weekly $\bigcirc$	Monthly			Night F	low Range				

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



To view the flow only would look like this:-



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

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USER MANUAL : CLOUDWORKS									
0       0       3       -4.000       On       On         0       0       9       -4.000       Off       Off         0       0       9       -3.578       Off       Off         Vight Flow Range       Vight Flow Range       Vight Flow Range       Vight Flow Range	sumption / Loop t Flow								

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:-



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



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

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

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

Setup WaterMaster								· · · · · · · · · · · · · · · · · · ·	+	-	
Exit Refresh											Online
Device Setup			Local Display Setup		Pulse Setup		Sensor Information		Diagnostics		
Meter Mode	Forward and Re	verse ~	Volume Format	x.xxx ~	Pulse Mode	Pulse/Unit ~	Туре	WM Reduced Throat	Electr. Resistance E1	1500	kohms
Flow Indicator	Normal	~	Flow Rate Format	x.xxx ~	Pulse Width	35 ms	Size	DN40	Electr. Resistance E2	1500	kohms
Volume Units	m3	~	Date Format	DD-MM-YYYY ~	Pulses/Unit	1	Identification	05056308	DC Back Off Voltage	0.747	Volts
Flow Rate Units	m3/h	~	Language	English ~	Limit Frequency	13.8889 Hz	Qmax DN	25	Coil + Cable Resistance	33.25	ohms
Velocity Units	m/s	~	Operator Page 1		Full Scale Frequency	0.25 Hz	Term. board SW	02.00.00 17'08'2011	Coil Inductance	51.56	mH
Mains Frequency	50Hz ~	]	Display Mode	3x9 ~	D01/D02 Function	Pulse F/Logic ~	Calibration Mode	WaterMaster	Sensor Inductance Shift	2.1	%
QMax	25	Units	Line 1	Volume Forward 🗸	D01 Output Setup		First Calib. Date	18:31:20 15/01/2019	Trans. Avg Gain Shift	0.11	%
Damping	3	secs	Line 2	Volume Flowrate 🗸	Logic Signal Source	F/R Signal 🗸	Last Calib. Date	18:31:22 15/01/2019	Electr. Voltage +Limit	1.8	Volts
Low Flow Cutoff	0	%	Line 3	Volume Net v	General Alarm	On v	Last Calib. Location	Stonehouse	Electr. Voltage -Limit	-1.5	Volts
Low Flow Cutoff Hyst.	20	%	Operator Page 2		Mininum Alarm	Off ~	Calib. Cert. Number	19/1/3/011853	Electr. Voltage Diff Limit	0.5	Volts
Flow Rate Min Alarm	20	%	Display Mode	Off ~	Maximum Alarm	Off ~	MID Status	Non-MID	Coil Current Alarm Band	1	%
Flow Rate Max Alarm	110	%	Line 1	Volume Forward 🗸	Empty Pipe Alarm	On ~	Electrode Material	Stainless Steel	Coil O/C Resist Limit	500	ohms
User Span	100	%	Line 2	Velocity ~	Logic Action State	Normally Closed 🗸	Lining Material	Elastomer	Coil S/C Resist Limit	5	ohms
User Zero	0	mm/s	Line 3	Volume Net ~	D02 Output Setup		Run Hours	292hrs 17465mins	D01 Pulses	0.0025	Hz
Electr. Resist. Al. Max EP	200	kohms	Operator Page 3		Logic Signal Source	F/R Signal ~			DO2 Pulses	0	Hz
Electr. Resist. Al. Min	0.1	kohms	Display Mode	Off ~	General Alarm	On ~			D01 State	Closed	
			Line 1	Volume Forward 🗸	Mininum Alarm	On ~	Transmitter Informatio	n	DO2 State	Closed	
			Line 2	Velocity ~	Maximum Alarm	On ~	Туре	WaterMaster	D03 State	Open	
			Line 3	Volume Reverse 🗸	Empty Pipe Alarm	On ~	Identification	09003205			
					Logic Action State	Normally Closed 🗸 🗸	Transmitter PIN	24			
					D03 Output Setup		SW Version	WAJC2547 V01.02.00			
					Logic Signal Source	No Function ~	Application CRC	0x49			
					General Alarm	On ~	First Calibr. Date	13:36:03 30/01/2017			
					Mininum Alarm	On v	Last Calib. Date	13:36:03 30/01/2017			
					Maximum Alarm	Off ~	Bootloader Version	03.00.01 10/05/2010			
					Empty Pipe Alarm	Off ~	Hardware Version	01.00.03			
					Logic Action State	Normally Open ~	Run Hours	582hrs 11776mins			

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

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### 2.8.20 Application 019 - WaterMaster



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.

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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.

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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.

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

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

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

This application will record the following data in the datalog.

Datalog

No.	Date	Fwd Totaliser	Fwd Cons.	Rev Totaliser	Rev Cons.	Flow	Loop	Battery	Power
9	20 Apr 2020 22:00:00	4374.921	9.000	0	0	9	-5.000		Mains
10	20 Apr 2020 23:00:00	4383.921	9.000	0	0	9	-5.000		Mains
11	21 Apr 2020 00:00:00	4392.921	9.000	0	0	9	-5.000		Mains
12	21 Apr 2020 01:00:00	4401.921	9.000	0	0	9	-5.000		Mains
13	21 Apr 2020 02:00:00	4410.920	8.999	0	0	9	-5.000		Mains
14	21 Apr 2020 03:00:00	4419.920	9.000	0	0	9	-5.000		Mains
15	21 Apr 2020 04:00:00	4428.927	9.007	0	0	9	-5.000		Mains
16	21 Apr 2020 05:00:00	4437.920	8.993	0	0	9	-5.000		Mains
17	21 Apr 2020 06:00:00	4446.927	9.007	0	0	9	-5.000		Mains
18	21 Apr 2020 07:00:00	4455.920	8.993	0	0	9	-5.000		Mains
19	21 Apr 2020 08:00:00	4464.920	9.000	0	0	9	-4.566		Mains
20	21 Apr 2020 09:00:00	4473.920	9.000	0	0	9	1.284		Mains
21	21 Apr 2020 10:00:00	4482.920	9.000	0	0	9	8.406		Mains
22	21 Apr 2020 11:00:00	4491 926	300.0	0	0	۵	15 323		Maine

O Raw Data	۲	Hourly	Ο	Daily	Ο	Weekly	Ο	Monthly
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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

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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									* Interpolate	ed 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	٩	11 783		Maine	~
○ Raw Data							low 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.

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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.

D	atalog -											
										* Interpolated	data	
	No.	Date	Fwd Totaliser	Fwd Cons.	Rev Totaliser	Rev Cons.	Flow	Loop	Battery	Power	^	From Date
	11	21 Apr 2020 00:00:00	4392.921	9.000	0	0	9	-5.000		Mains		08 Apr 2020
	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		To Date
	14	21 Apr 2020 03:00:00	4419.920	9.000	0	0	9	-5.000		Mains		22 Apr 2020
	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		Read Datalog
	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		Delete Datalog
	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		Consumption
	22	21 Apr 2020 11:00:00	4491.926	9.006	0	0	9	15.323		Mains	1	Elow/Loop
	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	٥	11 783		Maine	× 1	
(	) Rawl	Data 🖲 Hourly 🔿 Da	aily () Weekly ()	Monthly			Night F	low Range		-1		$\sim$

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.

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USER MANUAL : CLOUDWORKS										
0       0       3       -4.000       On       On         0       0       9       -4.000       Off       Off         0       0       9       -3.578       Off       Off         Vight Flow Range       Vight Flow Range       Vight Flow Range       Vight Flow Range	sumption / Loop t Flow									

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:-



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



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

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

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

🐌 Setup WaterMaster										+	-	
Exit Refresh												
												Online
Device Setup			Local Display Setup		Pulse Setup			Sensor Information		Diagnostics		
Meter Mode	Forward and Re	verse ~	Volume Format	x.xxx ~	Pulse Mode	Pulse/Unit ~		Туре	WM Reduced Throat	Electr. Resistance E1	1500	kohms
Flow Indicator	Normal	~	Flow Rate Format	X.XXX ~	Pulse Width	35 m	ns	Size	DN40	Electr. Resistance E2	1500	kohms
Volume Units	m3	~	Date Format	DD-MM-YYYY ~	Pulses/Unit	1		Identification	05056308	DC Back Off Voltage	0.747	Volts
Flow Rate Units	m3/h	~	Language	English ~	Limit Frequency	13.8889 H	łz	Qmax DN	25	Coil + Cable Resistance	33.25	ohms
Velocity Units	m/s	~	Operator Page 1		Full Scale Frequency	0.25 H	łz	Term. board SW	02.00.00 17'08'2011	Coil Inductance	51.56	mH
Mains Frequency	50Hz v		Display Mode	3x9 ~	D01/D02 Function	Pulse F/Logic 🗸 🗸		Calibration Mode	WaterMaster	Sensor Inductance Shift	2.1	%
QMax	25	Units	Line 1	Volume Forward 🗸	D01 Output Setup			First Calib. Date	18:31:20 15/01/2019	Trans. Avg Gain Shift	0.11	%
Damping	3	secs	Line 2	Volume Flowrate 🗸	Logic Signal Source	F/R Signal v		Last Calib. Date	18:31:22 15/01/2019	Electr. Voltage +Limit	1.8	Volts
Low Flow Cutoff	0	%	Line 3	Volume Net 🗸	General Alarm	On v		Last Calib. Location	Stonehouse	Electr. Voltage -Limit	-1.5	Volts
Low Flow Cutoff Hyst.	20	%	Operator Page 2		Mininum Alarm	Off ~		Calib. Cert. Number	19/1/3/011853	Electr. Voltage Diff Limit	0.5	Volts
Flow Rate Min Alarm	20	%	Display Mode	Off ~	Maximum Alarm	Off ~		MID Status	Non-MID	Coil Current Alarm Band	1	%
Flow Rate Max Alarm	110	%	Line 1	Volume Forward 🗸	Empty Pipe Alarm	On ~		Electrode Material	Stainless Steel	Coil O/C Resist Limit	500	ohms
User Span	100	%	Line 2	Velocity ~	Logic Action State	Normally Closed 🗸 🗸		Lining Material	Elastomer	Coil S/C Resist Limit	5	ohms
User Zero	0	mm/s	Line 3	Volume Net 🗸	D02 Output Setup			Run Hours	292hrs 17465mins	DO1 Pulses	0.0025	Hz
Electr. Resist. Al. Max EP	200	kohms	Operator Page 3		Logic Signal Source	F/R Signal v				DO2 Pulses	0	Hz
Electr. Resist. Al. Min	0.1	kohms	Display Mode	Off ~	General Alarm	On ~				D01 State	Closed	
			Line 1	Volume Forward 🗸	Mininum Alarm	On ~		Transmitter Information	1	DO2 State	Closed	
			Line 2	Velocity ~	Maximum Alarm	On ~		Туре	WaterMaster	D03 State	Open	
			Line 3	Volume Reverse 🗸	Empty Pipe Alarm	On v		Identification	09003205			
					Logic Action State	Normally Closed 🗸 🗸		Transmitter PIN	24			
					D03 Output Setup			SW Version	WAJC2547 V01.02.00			
					Logic Signal Source	No Function ~		Application CRC	0x49			
					General Alarm	On ~		First Calibr. Date	13:36:03 30/01/2017			
					Mininum Alarm	On ~		Last Calib. Date	13:36:03 30/01/2017			
					Maximum Alarm	Off ~		Bootloader Version	03.00.01 10/05/2010			
					Empty Pipe Alarm	Off ~		Hardware Version	01.00.03			
					Logic Action State	Normally Open ~		Run Hours	582hrs 11776mins			
	1											

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

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



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

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

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

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

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

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

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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

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	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.

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This application will record the following data in the datalog.

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_	-			э

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

 $\bigcirc$  Raw Data O Hourly  $\bigcirc$  Daily  $\bigcirc$  Weekly  $\bigcirc$  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

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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.

Power	Battery	Output	Input	Prod Volume	Prod Level	Date	0.
Mains		Off	Off	2.0375	1.153	28 Aug 2020 01:00:00	6
Mains		Off	Off	2.0375	1.153	28 Aug 2020 02:00:00	7
Mains		Off	Off	2.0375	1.153	28 Aug 2020 03:00:00	8
Mains		Off	Off	2.0375	1.153	28 Aug 2020 04:00:00	9
Mains		Off	Off	2.0375	1.153	28 Aug 2020 05:00:00	0
Mains		Off	Off	2.0375	1.153	28 Aug 2020 06:00:00	1
Mains		Off	Off	2.0372	1.153	28 Aug 2020 07:00:00	2
Mains		Off	Off	2.0369	1.153	28 Aug 2020 08:00:00	3
Mains		Off	Off	2.0366	1.153	28 Aug 2020 09:00:00	4
Mains		Off	Off	2.0363	1.152	28 Aug 2020 10:00:00	5
Mains		Off	Off	2.0360	1.152	28 Aug 2020 11:00:00	6
Mains		Off	Off	2.0357	1.152	28 Aug 2020 12:00:00	7

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.

			Hourly Data - 1 Oct '2	0 at 16h00 to 7 Oct '20 at 14	h00		
1-	Product Level Product Volume						-2
Product Level							-1 Product Volume
0-	02/10/2020	03/10/2020	04/10/2020	05/10/2020	06/10/2020	07/10/2020	-0

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To view the flow only would look like this:-



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

uit Refre	sh Database Layor	LE - Export Date	a	((o)) Live Rea	d						
					Device	Detail					On
vice Information	on		Level %	Datalog						* Internelated data	
Device Code	1910180001	Device Type Nimbus Modbus	- 100	No.	Date	Prod Level	Prod Volume	Battery P	ower	*	From Date
escription	Nimbus Modbus Log	liger	- 90	156 0	8 Oct 2020 03:00:00	1.105	2.4242		Mains		24 Sep 2020
onlication	021 - 4-20mA H/S Lev	vel Sensor		157 0	8 Oct 2020 04:00:00	1.105	2.4242		Mains		Ta Data
ate ledou	017	Soviel Number 1010190001	- 80	158 0	8 Oct 2020 05:00:00	1.105	2.4242		Mains		08 Oct 2020
ata muex	217		- 70	159 0	8 Oct 2020 06:00:00	1.104	2.4211		Mains		00 000 2020
M Signal	61%	Battery Status	- 60	160 0	8 Oct 2020 07:00:00	1.104	2.4211		Mains		<b>*</b>
rent Power	Mains	Power Mode Mains	- 50	162 0	8 Oct 2020 08:00:00	1.104	2.4211		Mains		Read Data
keup Per.	15	Datalog Per. 1	50	163 0	8 Oct 2020 10:00:00	1.104	2.4211		Mains		
d Level	1.105m	Prod Volume 2.4242m3	- 40	164 0	8 Oct 2020 11:00:00	1.104	2.4211		Mains		Delete Date
el %	22.1%	Last Seen 08 Oct 2020 14:12:58	- 30	165 0	8 Oct 2020 12:00:00	1.104	2.4211		Mains		
tude	-33.86307	Longitude 18.5237	- 20	166 0	8 Oct 2020 13:00:00	1.105	2.4242		Mains		
v Config				167 0	8 Oct 2020 14:00:00	1.105	2.4242		Mains		
			Hourly	O Raw Da	ta ● Hourly ○ Da	ly O Weekly (	Oct '20 at 1	4600			
			Hourly	O Raw Da Data - 1	ta ◉ Hourly ○ Da Oct '20 at 1	ly O Weekly ( Sh00 to 8	O Monthly Oct '20 at 1	4h00			
Produc	t Level Product Volum	e	Hourly	O Raw Da	ta ම Hourly ○ Da Oct '20 at 1	ly () Weekly ( 5h00 to 8	⊃ Monthly Oct '20 at 1	4h00			
Produc	t Level Product Volume	e	Hourly	O Raw Da	ta ® Hourly O Da Oct '20 at 1	ly O Weekly ( Sh00 to 8	O Monthly Oct '20 at 1	4h00			
Produc	st Level 🕑 Product Volume	8	Hourly	O Raw Da	ta  Hourly O Da Oct '20 at 1	by O Weekly ( 5h00 to 8	O Monthly Oct '20 at 1	4h00			
Produc	st Level 🗹 Product Volume	e]	Hourly	O Raw Da	ta ® Hourly O Da Oct '20 at 1	ly O Weekly ( 5h00 to 8	O Monthly Oct '20 at 1	4h00			
Produc	tt Level 🗹 Product Volume	· · · · · · · · · · · · · · · · · · ·	Hourly	O Raw Da	ta  Hourly  Da	ly O Weekly (	O Monthly Oct '20 at 1	4h00			
Produ	et Level I Product Volume	e]	Hourly	O Raw Da	ta ® Hourly O Da	ly O Weekly (	O Monthly Oct '20 at 1	4h00			
Produc	st Level 🗹 Product Volume	8	Hourly	O Raw Da	ta  Hourly O Da	ly O Weekly (	O Monthly Oct '20 at 1	4h00			
Produc	at Level 🕑 Product Volume	<u>.</u>	Hourly	O RawDa Data - 1	ta  Hourly O Da	ly O Weekly (	Oct '20 at 1	4h00			
Product	st Level 🕑 Product Volum	g	Hourly	O Raw Da	ta  Hourly O Da	ly O Weekly (	O Monthly	4h00			
Produc	at Level 🗹 Product Volume	6	Hourly	O Raw Da	ta  Hourly O Da	ly O Weekly (	O Monthly	4h00	_		
Produc	st Level 🗹 Product Volume	o	Hourly	O Raw Da	ta  Hourly O Da	IV O Weekly (	O Monthly Oct '20 at 1	4h00			
Produc	t Level 🕑 Product Volume	c	Hourly	O Raw Da	ta  Hourly O Da	IV O Weekly (	O Monthly	4h00			
Produc	t Level 🗹 Product Volume	S	Hourly	O Raw Da	ta  Hourly O Da Oct '20 at 1	IV O Weekly (	O Monthly Oct '20 at 1	4h00			

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.

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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.

🛓 BGT Hydrostatic Sensor	×
Exit	
1910180001 - Nimi	bus Modbus Logger
Level (m)	Level %
1.108	22.2
Volume (m3)	

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

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	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.

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This application will record the following data in the datalog.

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

 $\bigcirc$  Raw Data O Hourly  $\bigcirc$  Daily  $\bigcirc$  Weekly  $\bigcirc$  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.
Battery	Battery level in percentage. Only displayed on battery powered devices.
Power	Current power status. Mains/Battery

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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	~ ~

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.

			Hourly Data - 1 Oct '	20 at 16h00 to 7 Oct '20 at 14h	100	
1-	Product Level Product Volume	)				-2
Product Level						Product Volume
0-	02/0/2020	03/10/2020	04/10/2020	nerojana.	0000000	-0
				Date/Time		

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# 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.

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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

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	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.

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This application will record the following data in the datalog.

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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

 $\bigcirc$  Raw Data O Hourly  $\bigcirc$  Daily  $\bigcirc$  Weekly  $\bigcirc$  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

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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.

Power	Battery	Output	Input	Prod Volume	Prod Level	Date	0.
Mains		Off	Off	2.0375	1.153	28 Aug 2020 01:00:00	6
Mains		Off	Off	2.0375	1.153	28 Aug 2020 02:00:00	7
Mains		Off	Off	2.0375	1.153	28 Aug 2020 03:00:00	8
Mains		Off	Off	2.0375	1.153	28 Aug 2020 04:00:00	9
Mains		Off	Off	2.0375	1.153	28 Aug 2020 05:00:00	0
Mains		Off	Off	2.0375	1.153	28 Aug 2020 06:00:00	1
Mains		Off	Off	2.0372	1.153	28 Aug 2020 07:00:00	2
Mains		Off	Off	2.0369	1.153	28 Aug 2020 08:00:00	3
Mains		Off	Off	2.0366	1.153	28 Aug 2020 09:00:00	4
Mains		Off	Off	2.0363	1.152	28 Aug 2020 10:00:00	5
Mains		Off	Off	2.0360	1.152	28 Aug 2020 11:00:00	6
Mains		Off	Off	2.0357	1.152	28 Aug 2020 12:00:00	7

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.

			Hourly Data - 1 Oct '2	0 at 16h00 to 7 Oct '20 at 14h	100		
	Product Level Product Volume						-2
Product Level							Product Volume
0-	02/10/2020	03/10/2020	04/10/2020	05/10/2020	06/10/2020	07/10/2020	-0

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

Refres	sh Database Layou	ut Control	Tank Table Expor	🕻		((ရ)) Live Re	ead								
							Device	Detail							On
ce Informatio	in			Leve	el % — D	atalog									
vice Code	1910180001	Device Type	Nimbus Modbus		- 100	No.	Date	Prod Level	Prod Volume	Battery F	ower		^	From D	Date
scription	Nimbus Modbus Logo	ger		=	- 90	106	06 Oct 2020 01:00:00	1.108	2.4337		Mains		2	2 Sep 2020	
plication	023 - BGT Modbus H/	/S Level Sensor		=	- 80	107	06 Oct 2020 02:00:00	1.108	2.4337		Mains			To Da	ate
Ita Index	217	Serial Number	1910180001	=		108	06 Oct 2020 03:00:00	1.107	2.4305		Mains			6 Oct 2020	
Misianal	61%	Battery Status		5	- 70	110	06 Oct 2020 04:00:00	1.107	2.4305		Mains				
rent Power	Mains	Power Mode	Mains	=	- 60	111	06 Oct 2020 06:00:00	1.107	2.4305		Mains			g Bear	Data
oup Bor	15	Dotolog B	1	-	- 50	112	06 Oct 2020 07:00:00	1.106	2.4274		Mains			U V Nouc	. Jun
eup Per.	10	Datalog Per.			- 40	113	06 Oct 2020 08:00:00	1.106	2.4274		Mains			-	
Level	1.10/m	Prod Volume	2.4305m3		20	114	06 Oct 2020 09:00:00	1.107	2.4305		Mains			Delet	e Dat
el %	22.1%	LastSeen	06 Oct 2020 12:31:10		- 30	115	06 Oct 2020 10:00:00	1.106	2.4274		Mains				
ude	-33.86307	Longitude	18.5237		- 20	116	06 Oct 2020 11:00:00	1.107	2.4305		Mains				
					-0	-		-	_						
					Hourly [	O Raw E Data -	)ata ● Hourly ○ Da 1 Oct '20 at 1	ily O Weekly ( 6h00 to 6	⊃ Monthly Oct '20 at 1	2h00					
Product	t Level Product Volume				Hourly [	O Raw E	aaa ⊛ Hourly O Da	ily O Weekly 6	Oct '20 at 1	2h00					

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.

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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.

🛓 BGT Hydrostatic Sensor	×
Exit	
1910180001 - Nimi	bus Modbus Logger
Level (m)	Level %
1.108	22.2
Volume (m3)	

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			

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	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.

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This application will record the following data in the datalog.

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

 $\bigcirc$  Raw Data O Hourly  $\bigcirc$  Daily  $\bigcirc$  Weekly  $\bigcirc$  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.					
Battery	Battery level in percentage. Only displayed on battery powered devices.					
Power	Current power status. Mains/Battery					

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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	×

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.

			Hourly Data - 1 Oct '	20 at 16h00 to 7 Oct '20 at 14h	100	
1-	Product Level Product Volume	)				-2
Product Level						Product Volume
0-	0210/2020	03/10/2020	04/10/2020	nerojana.	0000000	-0
				Date/Time		

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To view the flow only would look like this:-



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# 

# 2.9 Managing Tank Tables

To be determined.

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# 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 <u>http://cloudworks.systems/documentation.html</u>.

# 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.

	cloudworks
Username Password	
<b>副</b> 了 Database Setup	Change Password Cancel Login

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.

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

(2) CloudWorks Version - 1.0.0.47	* – 🗆 X
Image: Control Control Image: Control Control Image: Control Control Image: Control Control Control Image: Control Control Control Control Image: Control Co	Select Zone Delete Zone Cancel Save
Zone Details	
SelectZone	Zone Information
No. Zone Code Alarm Description Contact Name Address 1 Address 2 Address 3 Address 4 Country P/Code Telephone	Zone Code
1 TEST_ZONE ABB Stonehouse Steve Dickson Oldends Lane Stonehouse Gloucesterhine United Kingdom GL10.3TA +441453826661	Description
	Contact Name
	Address
	Country
	Postal Code
	Telephone
	Fax
	Cellular
	Email Address
S Apr 2018 - 16:31:36	

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

Bluetooth <sup>®</sup> Searching for Devices - Please Standby					
No.	Devic	Friendly	Address		
		С	ancel	Refresh	Connect

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.

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	😵 Bluetooth						
	Selec	t a device and hit 'Conn	ect'				
No.	Device Code	Friendly Name	Address				
$\sim$		RNBT-E11E	000666DDE11E				
2	1801260262	DVC1801260262 6F17	000066E26F17				
3	1801260274	DVC1801260274-6F09	000666E26F09				
4	1712110145	DVC1712110145-94FA	000666E294FA				
		Cancel Refr	esh Connect				

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.

#### • <u>Cumulus Logger Bluetooth operation</u>

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

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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 <u>http://cloudworks.systems/documentation.html</u>.

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# 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.

Site Information Formation	orm								-		↔ _	
			Cheve D	\$ 	÷.		. Calcad Da	Si Canfia			Reure	
Quit Refres	an Database   Export Data   Edyout Control	view Google	Show D	evice Add	Device	Delete Device   Replace Device	Kelodu De	wice coning Remote i	conngure	Offine Script Con	ngure	
					S	ite Details			-			
Site Information		Device S	Status									
Site Code	TEST	No.	Device Code	Comms	Туре	Application	Data Index	Description	Status	Alarm Message	Ser. Num	Signal
Description	Stonehouse/Cape Digital Test		1801260262	Online	Cumulus	003 - Aquamaster 3	204	Aquamaster Test Unit	Ok		1703160016	74%
Contact Name		3	1801260274	Online	Cumulus	002 - Fwd/Rev Water Meter + Pressure	203	Cape Digital	Ok		1804120002	54%
Address												
Address	Chancheves											
	Stonenouse											
	Gloucestershire											
Country	United Kingdom											
Postal Code												
Telephone	+441453826661											
Fax												
Cellular	+447710041667											
Email Address	steve.dickson@gb.abb.com											
Time Zone	(UTC+00:00) Greenwich Standard Time											
	Technician											
Name												
Telephone												
- Email Address												
		<										>
🔍 💷 04 May 20	18 - 10:15:46											

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(\* Communications Statu Refresh Reg 3 Remote Co al Evolor System Status Communications Registe No Device Code Status Vendor Code Site Code Application Type Power Power Mode Version Port IP Address Last Seen Latency 16964 178.197.237.36 07 May 2018 09:17:16 409ms 004 - GWF ECO Meter + Loop Cumulus ECO Mains Mains gwf0000001 1711290002 Factory 1.0 Online Factory 004 - GWF ECO Meter + Loop Cumulus ECO Battery 004 - GWF ECO Meter + Loop Cumulus ECO Battery Battery Battery 20489 41.114.244.237 07 May 2018 09:14:38 30800 178.197.228.81 07 May 2018 08:56:28 1712110144 wf0000001 1712110146 Factory gwf000000 24 hour communications analysis for Device Code - 1712110145 Auto Range **∠**A 160 120 640 Data Packets - 80 verage Latency 320 -40 10:00:00 11:00:00 12:00:00 13:00:00 14:00:00 15:00:00 16:00:00 17:00:00 18:00:00 19:00:00 20:00:00 21:00:00 22:00:00 23:00:00 Time 00:00:00 01:00:00 02:00:00 03:00:00 04:00:00 06:00:00 07:00:00 08:00:00 09:00:0 🧐 페 07 May 2018 - 09:17:37

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 <a href="http://cloudworks.systems/documentation.html">http://cloudworks.systems/documentation.html</a>.

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# 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.

Site Information	Form									+ _	
Quit Refr	esh Database Export Data Layout Control	View Google	Show Device A	dd Device	Delete Device Replace Device	Reload Dev	Vice Config Remote	Configure	Offline Script Con	nfigure	
				8	Site Details						
Site Information		Device Status									
Site Code	TEST	No. De	avice Code Comms	Туре	Application	Data Index	Description	Status	Alarm Message	Ser. Num	Signal
Description	Stonehouse/Cape Digital Test	1	1801260262 Online 1703160016 Upknow	Cumulus n Cumulus	003 - Aquamaster 3 005 - Aquamaster 4	204	Aquamaster Test Unit	Ok		1801260262	74%
Contact Name	e	3	1801260274 Online	Cumulus	002 - Fwd/Rev Water Meter + Pressure	207	Cape Digital	Ok		1804120002	54%
Address	Oldends Lane										
	Stonehouse										
	Gloucestershire										
Country	United Kingdom										
Postal Code											
Telephone	+441453826661										
Fax											
Cellular	+44//10041667										
Email Addres	(UTC: 00:00) Conservation Standard Time										
Time Zone	(010400.00) Greenwich Standard Time										
	Technician										
Name											
Telephone											
Email Addres	35										
		<									

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 <a href="http://cloudworks.systems/documentation.html">http://cloudworks.systems/documentation.html</a>.

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# 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.



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.

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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.
Туре	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.

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



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

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



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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 <u>Cloudworks Server Protocol</u> for details in this regard.

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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.

Clear Screen			
CloudWorl	ks Server Protocol Explorer		
nmunications	Command Controller		
	Device Code	Command	
			Send

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.

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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.

nications	Command Controlle	er	
1712110145)[GET_STATUS]	Device Code	Command	
<pre>ITI2110145 [VENDOR CODE=GwE0000001][SITE CODE=Factory][DEVICE CODE=1712110145] LICATION CODE=4][VERSION=1.1][APN=internet][LOCAL IP=10.134.111.232][PORT=</pre>	1712110145	[GET STATUS]	Send
0][HEARTRATE=10][SIGNAL=67%][CLOCK=07/05/2018 11:14:12][RECORDS=0][POWER=MAINS]		]	Send
		]	Send
			Send
		]	Send
			Send
		]	Send
		]	Send
			Send

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

{50:171211	0145)[GET STATUS	]		
{50:171211 [APPLICATI	0145)[VENDOR COD ON CODE=4][VERSI	E=gwf0000001][SITE C ON=1.1][APN=internet	DDE=Factory][DEVICE CODE ][LOCAL IP=10.134.111.23	=1712110145] 2][PORT=
13000][HEA {52:171211	RTRATE=10][SIGNA 0145}[GET STATUS	L=67%][CLOCK=07/05/2) ]	018 11:19:58][RECORDS=0]	[POWER=MAINS]
{52:171211 [APPLICATI 13000][HEA	0145}[VENDOR COD ON CODE=4][VERSI RTRATE=10][SIGNA	E=gwf0000001][SITE C( ON=1.1][APN=internet] L=67%][CLOCK=07/05/2]	DDE=Factory][DEVICE CODE ][LOCAL IP=10.134.111.23 D18 11:20:00][RECORDS=1]	=1712110145] 2][PORT= [POWER=MAINS]
{53:171211 {53:171211	0145)[GET STATUS 0145)[VENDOR COD	] E=gwf0000001][SITE C	DDE=Factory][DEVICE_CODE	=1712110145]
[APPLICATI 13000][HEA	ON CODE=4][VERSI RTRATE=10][SIGNA	ON=1.1][APN=internet L=67%][CLOCK=07/05/2]	][LOCAL IP=10.134.111.23 018 11:20:02][RECORDS=1]	2][PORT= [POWER=MAINS]
[				

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

CloudWorks Serv	er Protocol Explore	er		
nmunications	Command Control	ler		
15:1712110145) [GET STATUS] 15:1712110145) [VENDOR CODE=Gwf00000011 [SITE CODE=Factory] [DEVICE CODE=1712110145]	Device Code	Command		
PPLICATION CODE=4] [VERSION=1.1] [APN=internet] [LOCAL IP=10.134.111.232] [PORT=	1712110145		Send	id
1:SERVER} [GET REGISTER]			Send	id
1:SERVER) [SIAROS=ONDINE] [VENDOR CODE=GWIDOUDOUT] [SITE CODE=Factory [DEVICE CODE= 12110145] [APP CODE=4] [TYPE=CDS541] [IP=41.114.254.234] [PORT=33424] [POWER=MAINS]	SERVER		Send	d
<pre>OWER MODE=MAINS][VERSION=1.1][LAIENCT=632][SEEN=07/05/2018 11:18:19], TATUS=ONLINE][VENDOR CODE=gwf0000001][SITE CODE=Factory][DEVICE CODE=1711290002]</pre>			Send	d
PP CODE=4)[TYPE=CDS541][IP=178.197.237.59][PORT=43239][POWER=MAINS][POWER DE=MAINS][VERSION=1.0][LATENCY=394][SEEN=07/05/2018 11:18:21],[STATUS=SLEEP]			Send	id
ENDOR CODE=gwf0000001][SITE CODE=Factory][DEVICE CODE=1712110144][APP CODE=4] YPE=CDS541][IP=41.114.197.60][PORT=38963][POWER=BATT][POWER MODE=BATT][VERSION=			Send	d
<pre>1][LATENCY=0][SEEN=07/05/2018 11:14:37],[STATUS=SLEEP][VENDOR CODE=gwf0000001] ITE CODE=Factory][DEVICE CODE=1712110146][APP CODE=4][TYPE=CDS541][IP=</pre>			Send	a
8.197.228.81][PORT=30800][POWER=BATT][POWER MODE=BATT][VERSION=1.0][LATENCY=0] EEN=07/05/2018 06:56:28],[OK]			Send	a a
			Send	.a
			Send	u d
			Sen	u d
			Send	u d
			 Son	u d
			Sen	nd ad
			Son	nd
			Sen	nd nd
			Son	nd nd
			Son	nd nd
			Send	Ju .

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

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# 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.

Data Control	÷ .	- 0	×
Quit     Clear Command     Save Command     Load Command     Execute Command     Export Response     Show Processes			
Database Manager			
SQL Command			
			^
			~
Response			
No.			
💱 🗐 07 May 2018 - 13:46:42			

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.

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

No.     No. <th>🗊 Data</th> <th>Control</th> <th></th> <th>+</th> <th>-</th> <th>□ ×</th>	🗊 Data	Control											+	-	□ ×
Database Manager       SQL Command       SELECT ' FROM deviced       Response       No     data_index     device_tope     tat_seen     device_code     tat_seen     <	Quit	Clear Comma	nd Save Com	mand Load Com	mand Execute	Command	Export Response	Show Processes							
542.Command SELECT FROM device) Response								Database Manager							
SELECT * FROM devices       Freponse       No     data_index     device_type     list_seen     device_code     stelia_inumber     stelia_inumber     gam_signal     badtery_status     power_status     power_status<	SQL	Command													
No     data_index     device_type     lst_seen     device_code     sie_code     application_code     description     serial_number     gsm_stipnal     battery_status     power_status     power_index     totaliser     totaliser       1     206     CDSS41     0705/2018111432     T12110144     Test_Site     4     GWF TestLogger Baney     172110144     99     59     B     B     0     kl       3     214     CDSS41     0705/2018114322     T11120002     Test_Site     4     Cape Digital TestLab     71120002     30     M     M     0     kl       4     216     CDSS41     0705/201814822     T11210002     Test_Site     4     Cape Digital Battery Logger     171210146     41     99     B     B     0     kl	SEI	ECT * FROM devic	es												<
No     data_index     device_type     last_seen     device_code     ste_code     application_code     desciption     serial_number     gsm_signal     battery_status     power_status     power_mode     totaliser       1     206     CDS541     07/05/2018111435     171210144     Test_Site     4     CWF TestLogen Mains     56     B     B     0     ki       3     214     CDS541     07/05/201811432     171210145     Test_Site     4     Cape Digital TestLab     171210145     67     100     M     M     0     ki       3     214     CDS541     07/05/2018014322     171210045     Test_Site     4     Cape Digital TestLab     171210045     41     99     B     B     0     ki       4     216     CDS541     07/05/2018 065633     171210146     Test_Site     4     Cape Digital Battery Logger     171210146     41     99     B     B     0     ki	Resp	onse													
1     266     CDS\$41     070652018 11.432     1721101.44     Test_Site     4     CWF TestLogger Batery     1721101.44     99     59     B     B     0     Ki       2     211     CDS\$41     070652018 11.432     1721101.45     Test_Site     4     Cape Digital TestLab     1712101.45     67     100     M     M     0     Ki       3     214     CDS\$41     070652018 11.432     171210002     Test_Site     4     Cape Digital TestLab     171120002     180     M     M     0     Ki       4     216     CDS\$41     070652018 0658.33     17121101.46     Test_Site     4     Cape Digital Battery Logger     17121101.46     41     99     B     B     0     Ki	N	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
2     211     CDSS41     0706j20131148.32     171210145     Test_Site     4     Cape Digital Test_bal     771210145     67     100     M     M     0     ki       4     205541     0706j2013148.32     171290002     Test_Site     4     Cape Digital Test_bal     77120002     38     100     M     M     0     ki       4     216     CDS541     0706j2018 065633     1772110146     Test_Site     4     Cape Digital Battery Logger     171210146     41     99     B     B     0     ki		206	CDS541	07/05/2018 11:14:35	1712110144	Test_Site	4	GWF Test Logger Battery	1712110144	99	59	В	В	0	kl
3   214   CDSS41   07/05/2018 114.822   1711290002   Test_Ske   4   Cape Digital TestLab   1711290002   38   100   M   M   0   kl     4   216   CDSS41   07/05/2018 06.56.33   1712110146   Test_Ske   4   Cape Digital Battery Logger   1712110146   41   99   B   B   0   kl		211	CDS541	07/05/2018 11:48:32	1712110145	Test_Site	4	GWF Test Logger Mains	1712110145	67	100	м	М	0	kl
+     216     CDSS+1     07/05/2016/05/35/33     171/2110146     1ESCSNE     4     Cdape Lingna battery Logger 171/2110146     141     193     16     16     0     16		214	CDS541	07/05/2018 11:48:22	1711290002	Test_Site	4	Cape Digital Test Lab	1711290002	38	100	M	M	0	kl
<u>ر</u> >	¢														2

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.

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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.

Data Control +										
Quit	Clear	Command	Save Command Load Comm	nand	Execute Comr	mand	Export Res	ponse Show Proces	ses	
								Database	Manager	
QL Co	mmand									
SHOW	PROCE	SSLIST								
espon	se									
No	Id	User	Host	db	Command	Time	State	Info		_
1	10421	gwf	localhost52299	gwf	Sleep	10				
2	10422	gwf	localhost52301	gwf	Sleep	32				
3	13031	gwf	localhost53036	gwf gwf	Sleep	7				
5	30214	gwf	169-1-140-153.jp.afrihost.co.za:58694	gwf	Sleep	179				
6	30215	gwf	169-1-140-153.ip.afrihost.co.za:58696	gwf	Query	0	starting	SHOW PROCESSLIST		
	)7 May 20	18 - 13:5:	1:40							

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

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# 2.11.3 Modbus Register Map

To be determined.

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