CDS538 Cumulus Logger User Manual

Document Number:	CDS538 Cumulus Logger User Manual
Client:	User
Date:	28 February 2018
Issue:	V2.0
Status:	Draft
Classification:	Confidential
S/W File Name	CDS538 Cumulus Logger User Manual.docx

AMENDMENT HISTORY

Issue	Date	Amendment Details	Amended By
V01	28 Feb 2018	Compile document	Alex Romanov
V02	25 Jul 2019	Updated modem technology specs	Alex Romanov
V03	19 Jan 2021	New configuration text	Alex Romanov

Table of Contents

1   CDS538 CUMULUS LOGGER

1.1   Introduction

The Cumulus logger is a robust, sophisticated 3G GSM logger/controller with a wide range of input/output capabilities, making it ideal for a large number of uses including utility and remote control/measurement applications. Standard in this logger is a GPS receiver allowing for the precise location determination needed in large networks.

Communication to your own server and database can be achieved via the internet or a private APN. The software running on these servers is supplied free of charge. The Cumulus Logger has been designed to allow for easy installation and setup without the need for a complicated server infrastructure. Setup and management software (CloudWorks) is also supplied free of charge to allow clients to manage their own networks and data. There are no monthly charges for collecting and hosting data as the client can provide this service themselves.

1.2   Features

- Uses 3G GSM (UMTS/HSPA) technology. This has become essential as many cellular network providers around the world will soon no longer be supporting older GPRS technologies, rendering legacy GPRS dataloggers obsolete. This has already started happening in many countries around the world.
- Onboard GPS. Networks are plotted automatically on Google Earth giving the client a precise location of assets in the field.
- Bluetooth interface - setup and manual data collection can be achieved through the Bluetooth interface negating the need for cables that invariable fail during continuous use.
- Battery or mains operated with battery failover in dual mode.
- Uses standard off-the-shelf alkaline batteries. This logger uses 3x standard D Cell alkaline batteries that can last in excess of 5 years under normal usage. Many other loggers use lithium batteries that are expensive and difficult to obtain. Other problems involving lithium batteries are the restrictions when shipping using airfreight. All lithium batteries need to be shipped as hazardous cargo that is becoming increasingly difficult to achieve as many airlines are no longer allowing these batteries on their aircraft.
- Isolated Modbus/RS485 interface. The isolated Modbus/RS485 interface can be used on a large number applications or sensing equipment. This port is also well protected against large voltage transients.
- Isolated 4-20mA interface. Used for any sensing device with a 4-20mA output.

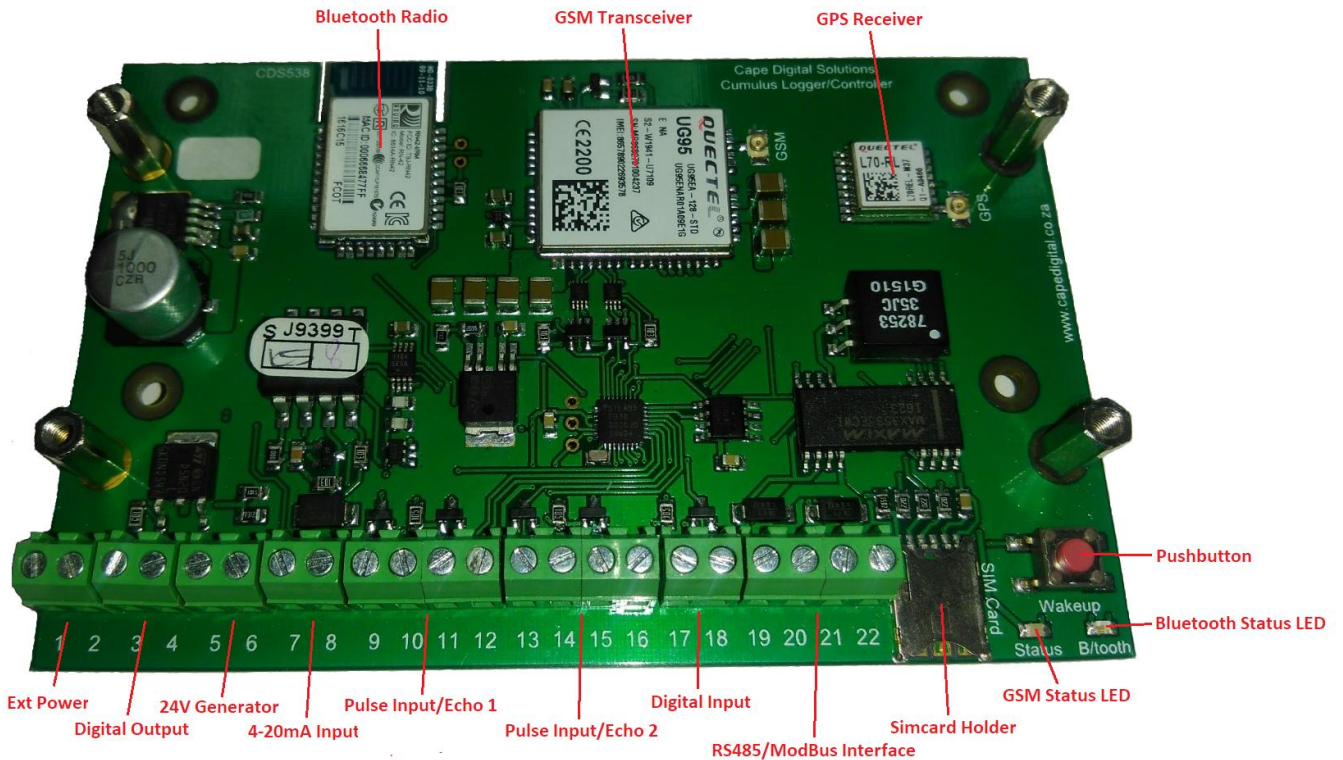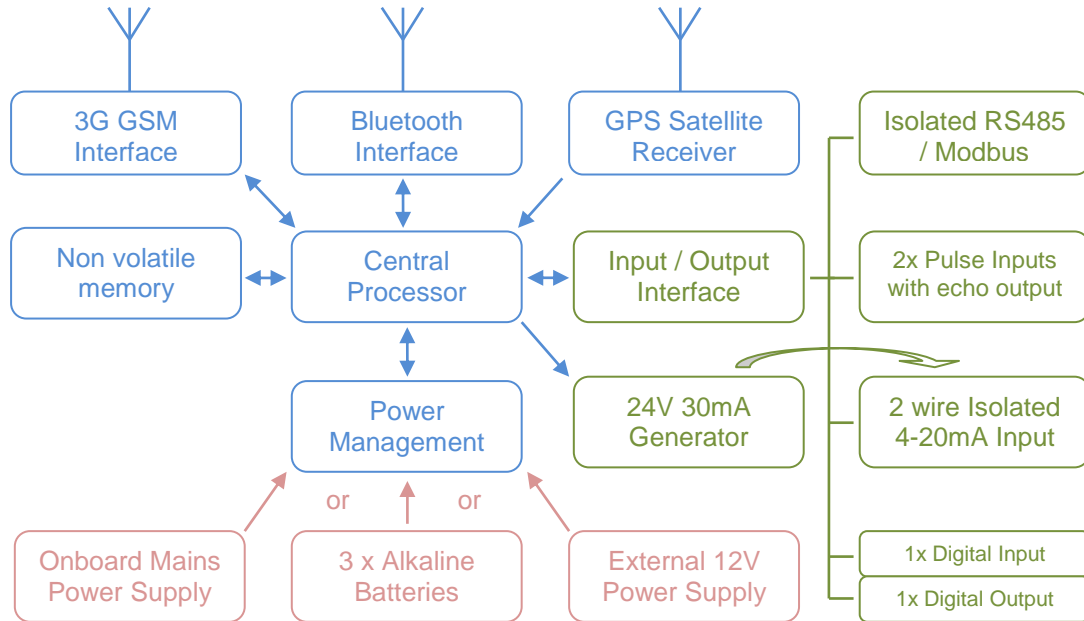| DOCUMENT NAME	CLASSIFICATION	DATE	PAGE
CDS538 CUMULUS LOGGER USER MANUAL	CONFIDENTIAL	15-JUL-21	4 OF 31

- Onboard 24V 30mA power generator. The Cumulus logger can generate a stable 24V output at a maximum of 30mA allowing for the powering of an external piece of equipment or current loop device eliminating the need for a secondary power supply. This option will also function under battery operation.
- 2 x Pulse inputs with echo output - Pulse inputs are used on metering devices that supply a pulse output for a measured amount of product. The echo output will allow this logger to be connected in conjunction with another device requiring use of the same pulse output.
- 1 x Digital input - Used for general input application.
- 1 x Digital output (max 500mA at 50V) - This output can be used to operated a valve, solenoid or similar device.
- Large onboard non-volatile memory - This logger can record in excess of 5600 records for later download.
- Logging intervals from 1 minute to 1 month. Information is internally logged, time and date stamped and transmitted at programmable intervals.
- Remote programming of all setup parameters via GPRS link or SMS.
- Ideal for leak detection, alarming and water shut-off control to prevent water loss.
- Onboard Bluetooth can stream diagnostic information about signal strength, network status etc.
- Pushbutton and LED's for manual wakeup to server and diagnostic purposes etc.

1.3   Specifications

- GPRS multi-slot class 12/ EDGE multi-slot class 12/ 3G (UMTS/HSPA) Modem Technology
- Onboard GPS
- Bluetooth interface
- Powered by battery, mains or external 12V supply
- Option of mains/solar power with battery failover and sleep
- All management software supplied free
- Standard Alkaline Batteries - 3 x D cells
- Isolated Modbus/RS485 Port
- 24V 30mA Generated power output
- 2 x Pulse inputs with echo out
- 1 x Digital input
- 1 x 500mA max 50V Output
- Isolated 4-20mA Input port
- 5600 Record datalog memory
- Full SMS driven command set
- Logging intervals 1 minute to 1 month
- Rugged housing with padlock eye
- Pushbutton and LED Diagnostics
- Configuration and diagnostics through Bluetooth interface
- Fully configurable remotely
- Stream data in real-time when powered by mains or 12V supply
- Size 175mm x 180mm x 78mm (including cable glands)
- Housing Protection Class - IP65
- Simcard format - Nano sim

1.4 Architecture

1.5   Power Modes

 The Cumulus Logger can operate in one of three power configurations.

- Mains powered - in this mode the logger can be continuously connected to the server allowing for the streaming of live data.
- Battery powered - The Cumulus logger uses standard 'D' Cell alkaline batteries that will last several years depending on the operation. In this mode, the logger will 'wakeup' (adjustable - normally 6 hourly) and upload its recorded data to a remote database.
- External 12V (8-15V) 2A supply - same as a mains operated logger. In this mode, batteries can be fitted and the logger will automatically switch to battery mode should the power fail. This is known as the 'Dual' mode.

1.6   LED Functions

LED's indicate the following:

Blue LED - Bluetooth status

- Flashing indicates the Bluetooth is ready to receive an incoming connection
- Solid light indicates and active connection

Red LED - GSM status

- Solid - Logger is in Command Mode (normally accompanied by an active Bluetooth connection)
- Fast flash - Logger is currently initiating a connection to the server
- Slow Flash - Connection has been established to the server

1.7   Pushbutton Functions

The Cumulus logger has a pushbutton to allow for local functions. Mostly used in the Battery mode, the button works as follows.

- Single short push will turn the Bluetooth radio on and off (normally permanently on in Mains mode).
- A push of more than 3 seconds will result in the logger establishing a connection to the server.

1.8   Connections

Connections are available on a series of terminal connectors labelled from 1 to 22.
These connections are as follows:

1. External Power Supply / Solar system ground (optional)
2. External 12V Power Supply / Solar system (optional)
3. Digital output connection (switch to ground)
4. Ground connection for the digital output
5. 24V 30mA max power generator output (used for powering a current loop device)
6. Ground for the 24V generator
7. Negative connection for 4-20mA isolated loop input
8. Positive connection for 4-20mA isolated loop input
9. Pulse 1 input
10. Ground for Pulse 1 input
11. Ground for Pulse 1 output (pulse splitter output)
12. Pulse 1 pulse splitter output (switch to ground)
13. Pulse 2 input
14. Ground for Pulse 2 input
15. Ground for Pulse 2 output (pulse splitter output)
16. Pulse 2 pulse splitter output (switch to ground)
17. Digital input
18. Ground for digital input
19. Isolated Modbus/RS485 Data positive input (D+)
20. Isolated Modbus/RS485 Data negative input (D-)
21. Isolated ground for Modbus/RS485 input
22. Earthing connection Modbus/RS485 input (transient voltage protection)

1.8.1 External Power Supply / Solar System Connection

The CDS538 Cumulus logger can be powered entirely from an external 12V (8-15V) 2A power supply or solar power source. Using a solar power source and also populating the logger with alkaline batteries means that the logger can be put into dual mode. In this mode, while there is solar power available, the logger will remain online with the server. Should the solar power fail, the logger will automatically switch to 'battery' mode until the solar power source is restored. This is ideal for remote applications where there is no mains power available and streaming data is required.
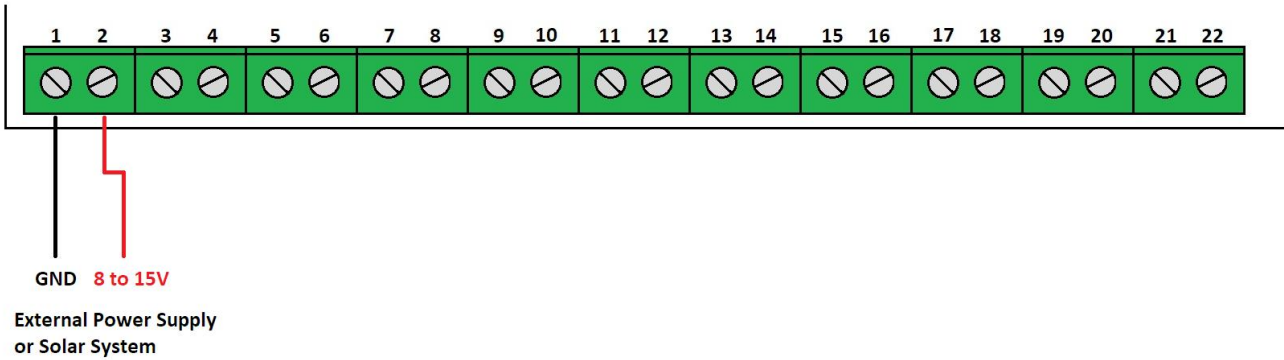
1.8.2 Using the Digital Output

The output on the CDS538 Logger can be used to switch a DC device of up to 500mA at a maximum of 50V. This output is an open drain output that will switch to ground. This output is protected by a 500mA resettable fuse so it will trip if overloaded. Should this happen, please disconnect all the power, wait for 1 minute and the fuse will reset itself. Repeated overloading could cause the fuse to eventually fail.
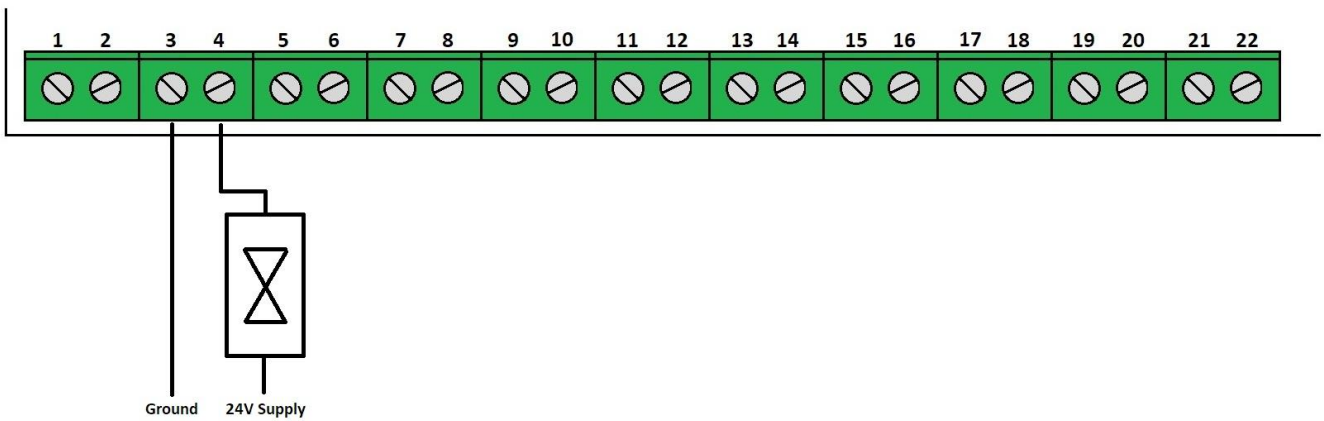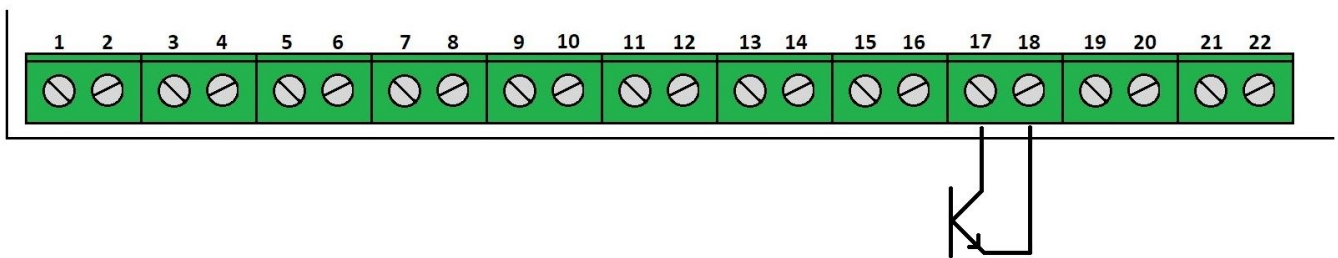

Example configuration for operating a 24V Valve

1.8.3 Using the Digital Input

The input of the Cumulus logger is designed to connect to a volt free mechanical or electronic switch. The logger has its own internal pullup resistor.
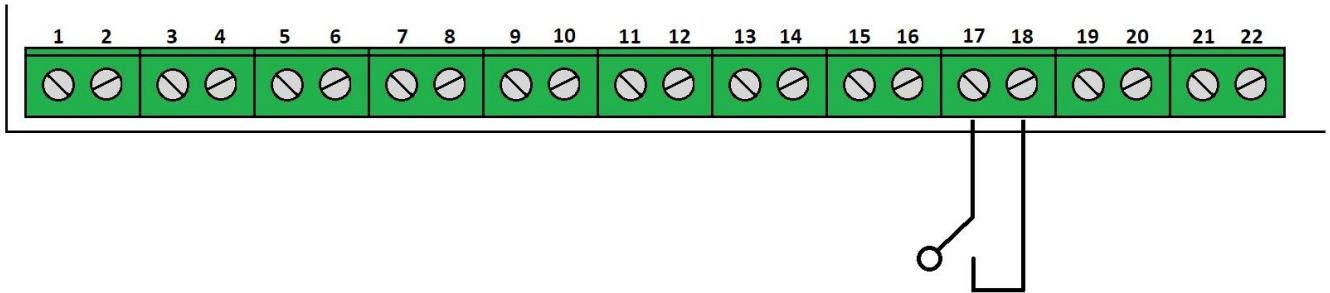
Example for connecting to a volt free contact

Example for connecting to an Open Collector electronic switch - note that pin 18 must be the ground connection

1.8.4 Using the 4-20mA loop input and 24V loop power generator

The Cumulus logger is equipped with a fully isolated (optical) 4-20mA interface. This interface is configured for 2 wire applications and should be connected as below. Please take note of the polarity of the loop connections.
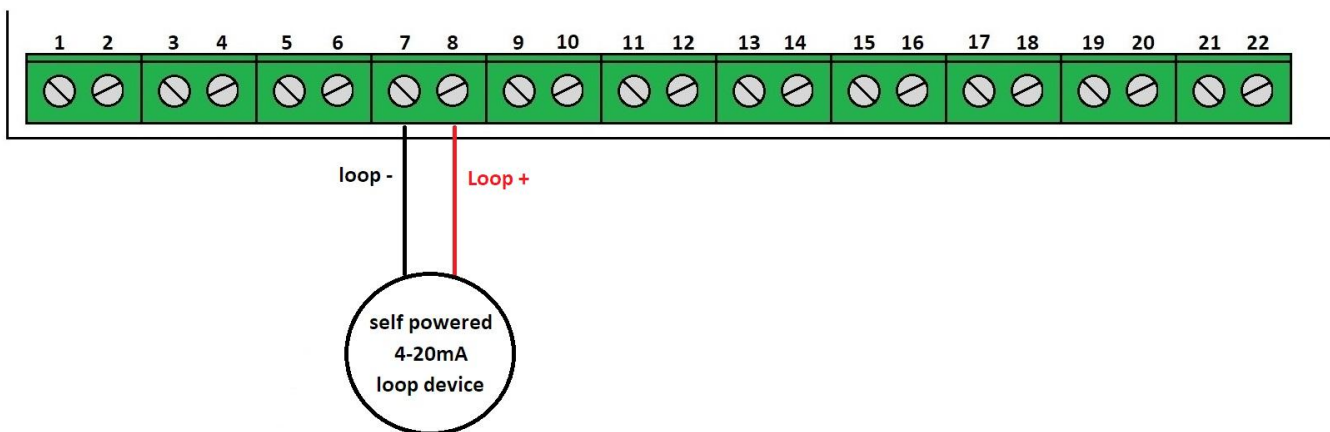
To assist with the powering of loop devices, the Cumulus logger is equipped with an onboard 24V loop power generator. This generator is designed to provide the power for devices that source this directly off the loop. Since the maximum power to flow on a 4-20mA loop, should be 20mA, the generator has been designed to supply a maximum of 30mA. Please note,

using the 24V power generator to power a loop device, uses a substantial amount of power. For this reason, in battery operated devices, the loop should only be powered each time the device needs to be read. This can be achieved by setting the generator into 'loop power' mode.
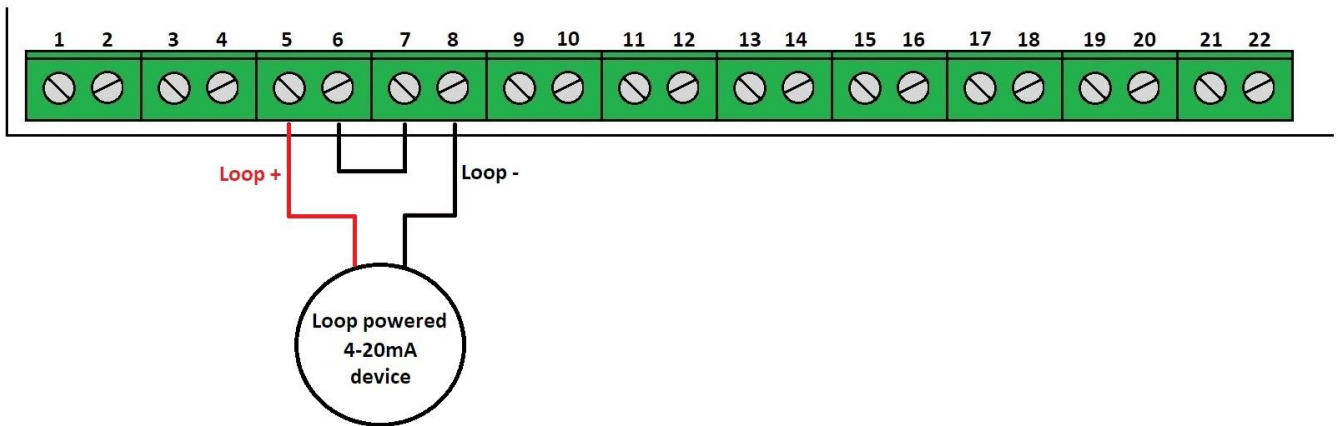
Example configuration of the generator supplying power to a loop powered device

1.8.5   Using the Pulse Input with echo output

Onboard the Cumulus logger are 2 pulse inputs. These pulse inputs will echo the pulses onto an output to allow for multiple devices to be connected to the same pulse source. Pulse inputs are used by metering type devices (eg water or energy meter) to measure consumption.
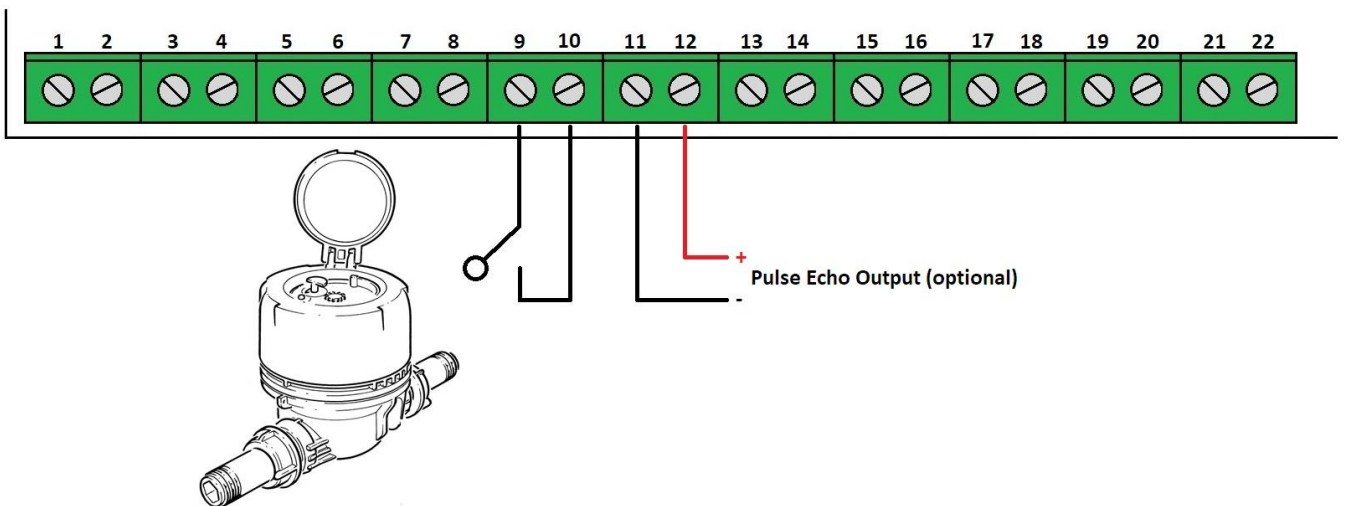
Example configuration of water meter with a volt free switch (e.g. reedswitch)
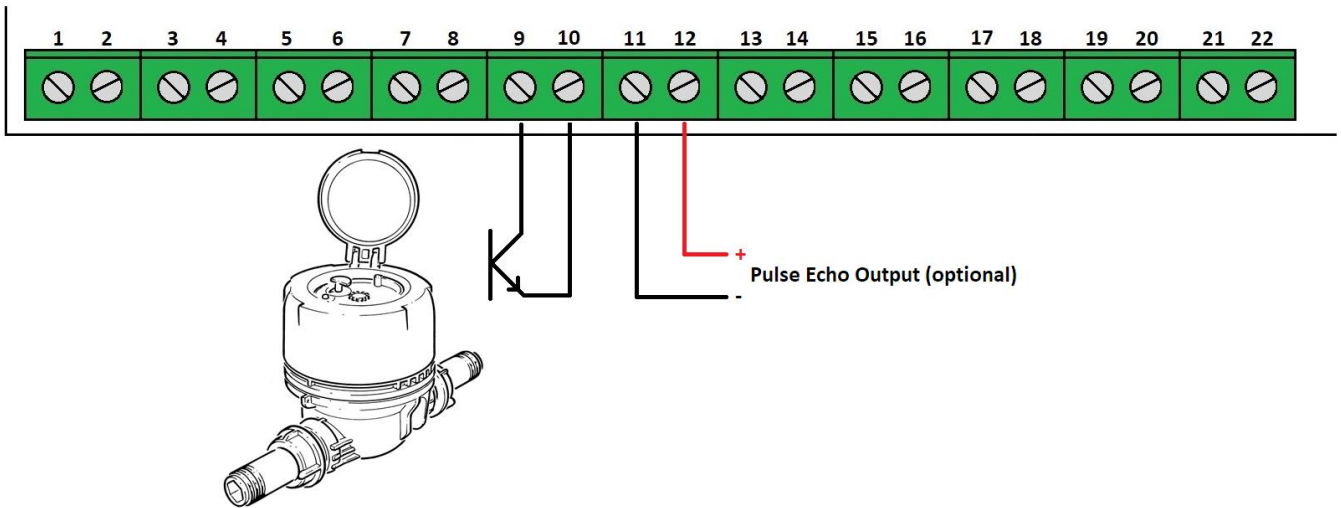
Example configuration of water meter with electronic interface. Please note the polarity of the interface. Ground connection to pin 10.

1.8.6   Using the RS485/Modbus interface

The Cumulus logger is equipped with a fully isolated RS485/Modbus interface. This interface is used for the connection to specific equipment with these kinds of output interfaces. e.g. ABB Aquamaster flow meters. These available devices are normally listed in the CloudWorks software as specific applications. Below are the connections for a Aquamaster flow meter.
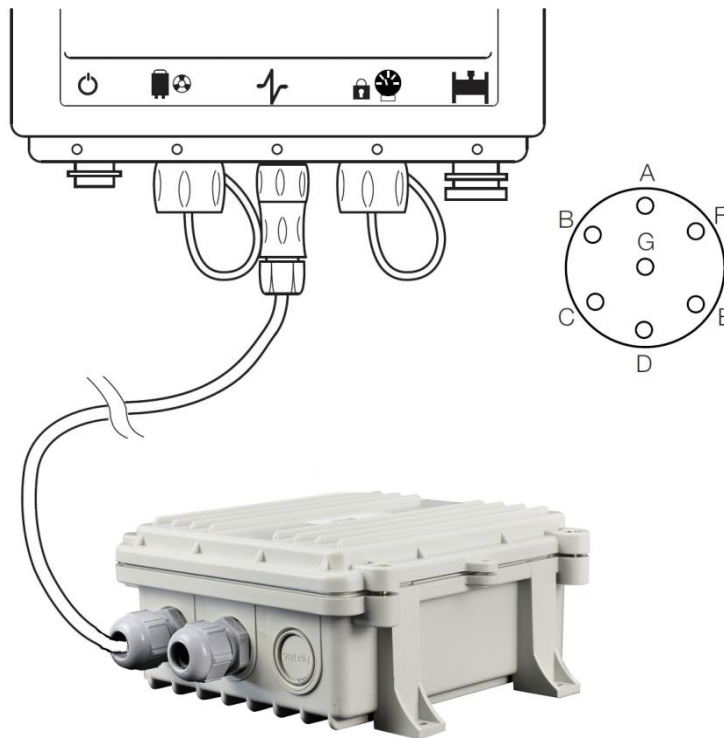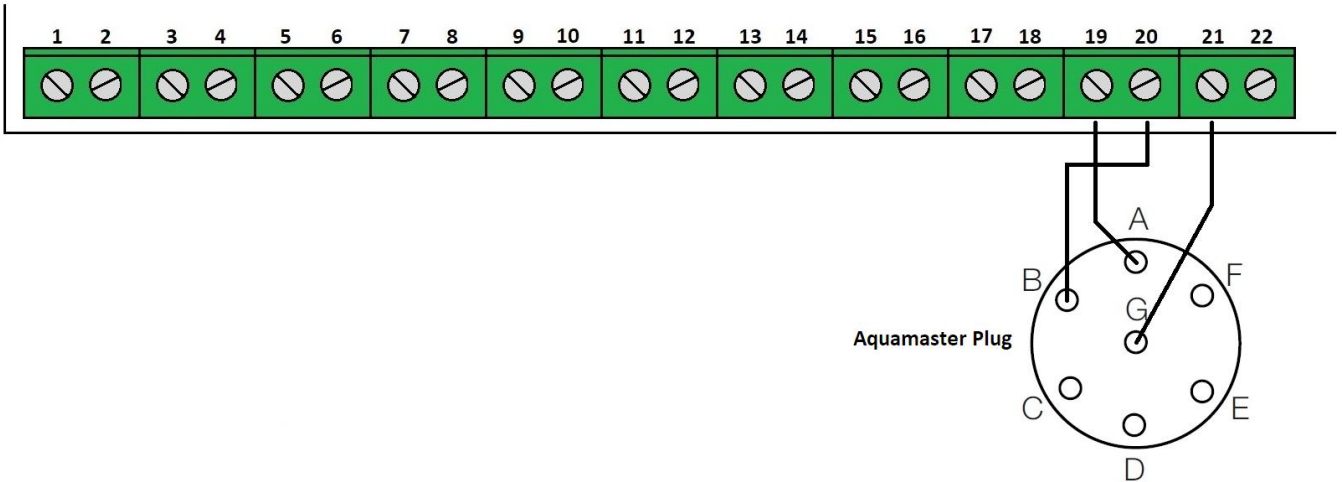
Example configuration for connection to an Aquamaster flow meter

Aquamaster Modbus Setup = 19200 baud, 8 bits, Even parity, 1 stop bit
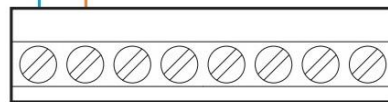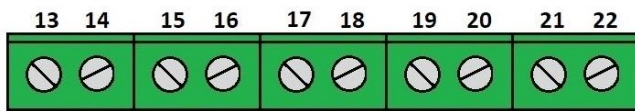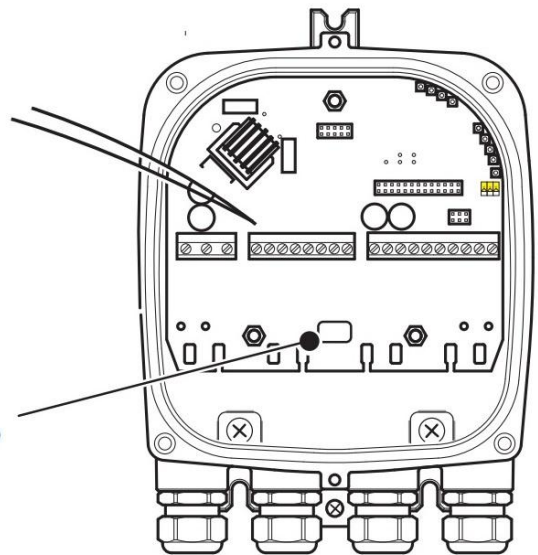
Example configuration for connection to an Watermaster flow meter

Watermaster Modbus Setup = 115200 baud, 8 bits, None parity, 1 stop bit
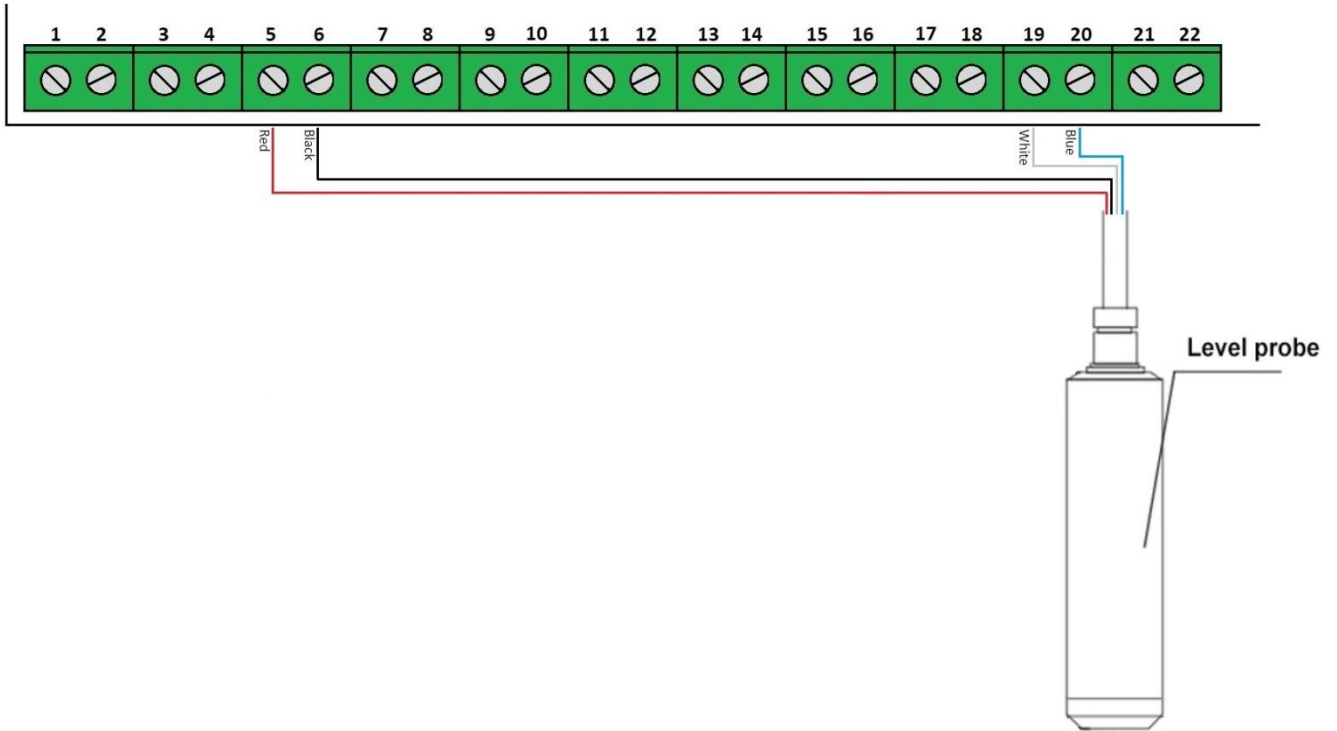
Example configuration for connection of the Cloudworks Hydrostatic BGT sensor

BGT Sensor Modbus Setup = 9600 baud, 8 bits, None parity, 1 stop bit

2   LOGGER SETUP

As explained earlier, the CDS538 Cumulus logger has an onboard Bluetooth interface which allows for the device configuration to be done locally. There are two different places in the software to activate the Bluetooth connection option. The first option is from the log in screen at start up.
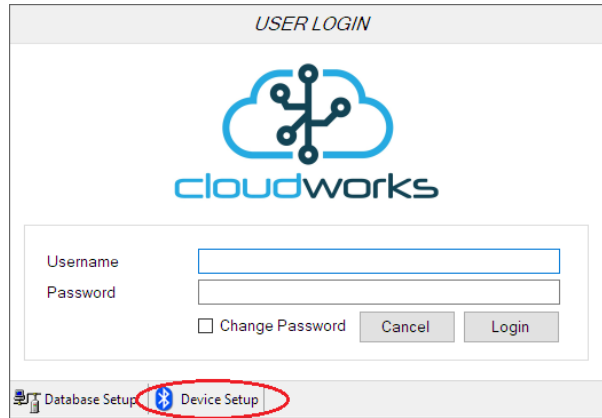
The purpose of having it here is to allow the user to access the Bluetooth setup option without needing to connect to the server and authenticating. This is useful in instances where there is no internet connection available in the field.

The second option is on the Zone screen by pressing the 'Device Setup' button.
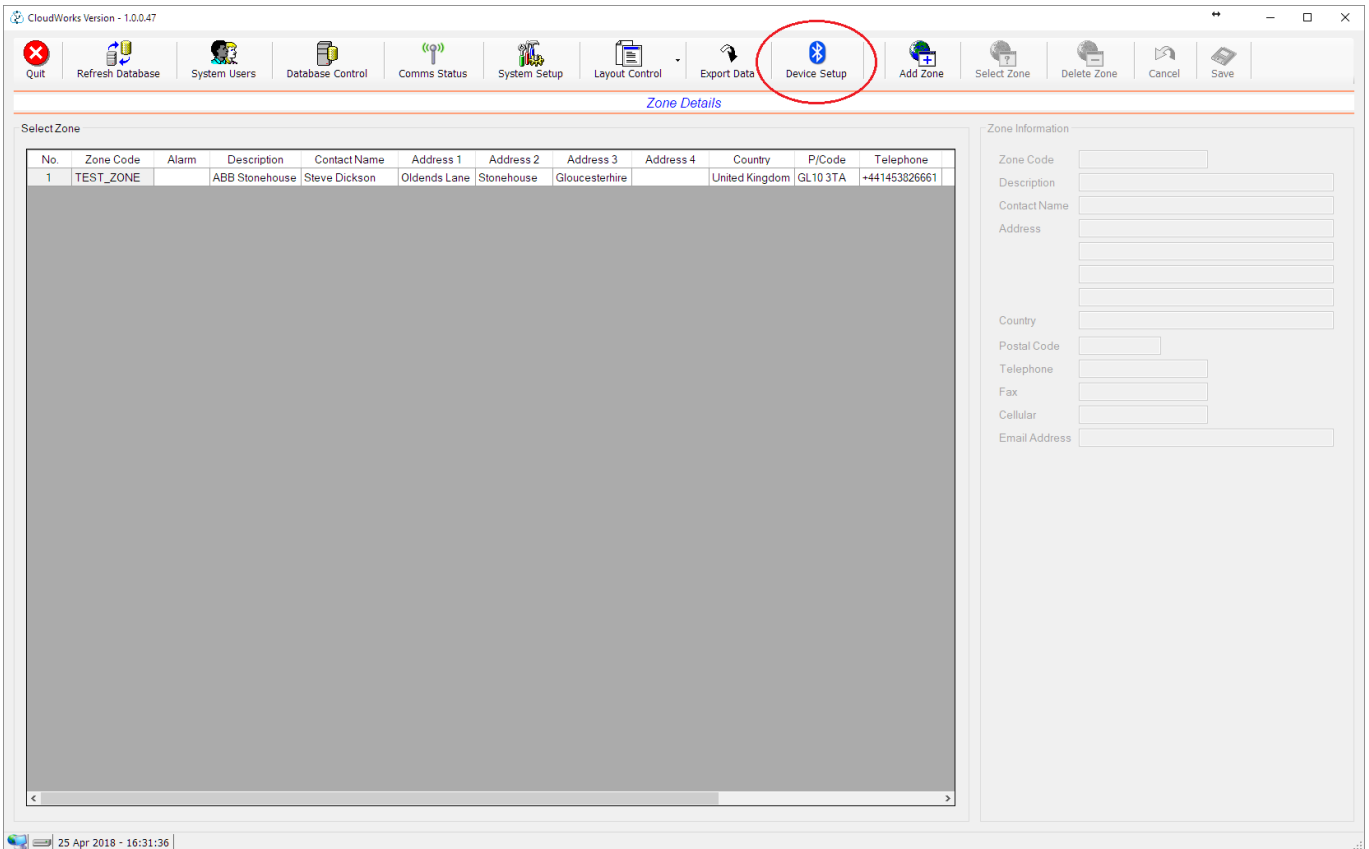
Activating this function will launch the Bluetooth Server which will search for the available remote devices in the immediate vicinity.
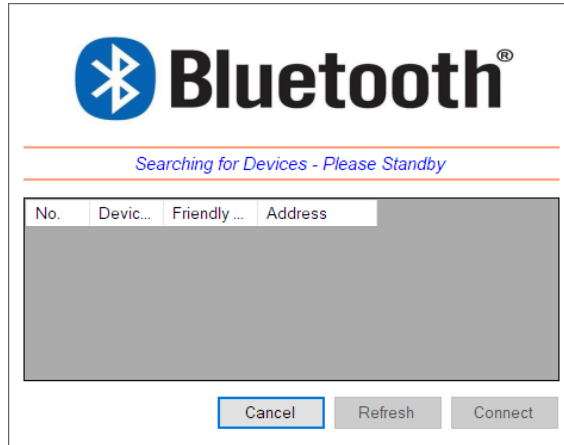
Once the search has been completed, a list of the available devices will be displayed. Should the device you are looking for, not appear in the list, press the 'Refresh' button to start the search again. Please remember that battery operated devices will need the Bluetooth interface activated before it will be found by the Bluetooth Server. This is normally done by giving the onboard pushbutton a short press and releasing. The blue LED will flash to indicate that the interface is active and waiting for a connection.
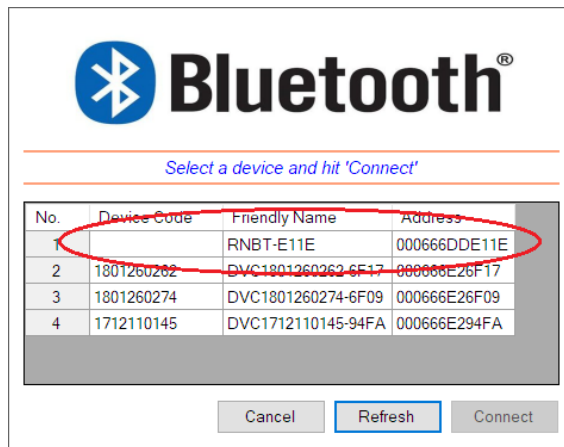
On some of the legacy equipment you might see an entry that has no listed Device Code. This is because the Bluetooth interface 'Friendly Name' needs to be updated before it is correctly recognised. This can be done in the configuration screen once you are connected. This entry is a valid device and can be selected if you cannot see the device you are expecting listed as an option.

To make a connection, select the device from the list and press the 'Connect' button. Alternatively, double clicking on the device in the list will initiate a connection immediately.

Incidentally, once the connection is established the Blue indicator LED on the logger will be permanently illuminated denoting a connection.

Bluetooth LED status	Notes
Off **Flash** **Solid On**	Interface is off. Interface is on and waiting for a connection. Connected to computer.

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.

The Bluetooth interface 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 - it will only remain active for 60 seconds. This is to prevent the Bluetooth interface from being inadvertently left on and draining the battery.

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

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

2.1   Setup via Bluetooth Configure

Once the Bluetooth connection has been established, Cloudworks will automatically activate the correct configuration screen needed for each device type. This device will immediately be placed into Command Mode and the current setup data retrieved and displayed on the right hand screen.
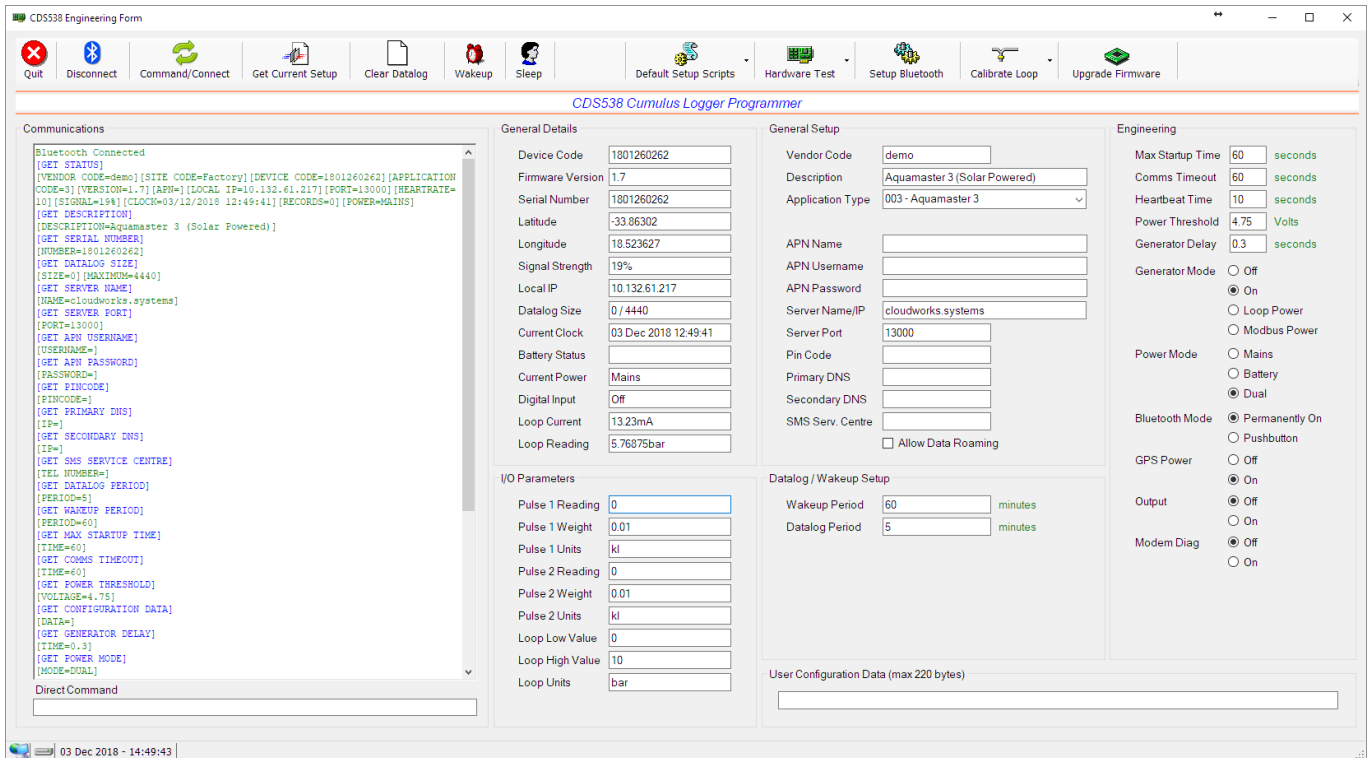
Data update commands are sent to the device only after the parameter setup field has been left. What this means is that while adjusting a parameter in its input box, no commands are sent to the logger. Once you have completed entering the field and leave it for the next function, only then will the command be sent.

Datalogging functions are suspended while a logger is in Command Mode. At any point, with the logger in Command Mode, the settings can be reread by pressing the 'Get Current Setup' button in the top menu.

An important thing to note is that if a logger is in Command Mode for longer than 60 seconds without any commands being sent from the software, it will automatically exit Command Mode and re-establish a connection to the server, or in the case of a battery powered logger, go back to sleep. This is to prevent a logger accidently being left in this mode and therefore not reconnecting to the server.
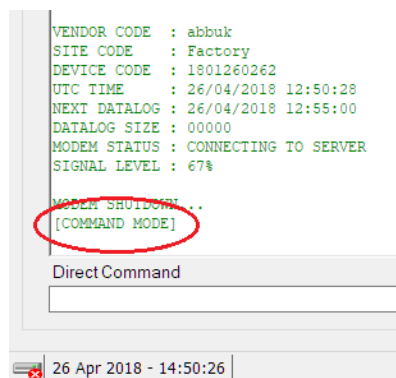
To switch between the Diagnostic Mode and Command Mode, simply press the 'Command/Connect' button. Switching from the Diagnostic Mode to Command Mode can take several seconds depending on what the logger is currently executing. Command Mode is shown with the [COMMAND MODE] text in the communications block. All commands and responses will be displayed in the 'Communications' block. This information can be cleared by right clicking in this box and selecting the 'Clear Screen' option.

The logger must be in 'Command Mode' before any of the settings changes or other instructions are accepted. Sending a command in Diagnostic Mode will cause the logger to switch to Command Mode but that last instruction will fail.

The information on this screen is ordered in various groups. The 'General Details' box holds information that is not alterable and is general information about the logger. This information consists of the following data:

Information	Notes
Device Code	The Device Code assigned to this particular logger. All communications are initiated by addressing this code. This code is unique to all loggers and is assigned at the time of manufacture.
Firmware Version	Firmware version of the software loaded on the logger
Serial Number	Serial number of this logger - assigned in the factory.
Latitude	Current logger latitude - read if the GPS is on.
Longitude	Current logger longitude - read if the GPS is on.
Signal Strength	Signal strength of the last GSM communications, expressed as a percentage.
Local IP	Local IP address assigned by the GSM network. This data is important when using a static IP system to ensure that the correct IP has been assigned to the logger.
Datalog Size	Number of records in the datalog/maximum number possible for the selected application type.

Current Clock	Current Date/Time on the logger. This is automatically set by the server to be UTC time. The logger does need to have connected to the server for the time to have been updated.
Battery Status	Battery status for loggers that are powered by battery, expressed as a percentage. It is important to note that this will be the battery status read while the logger is under larger than normal load (Bluetooth communications active). It would normally indicate lower than the recorded battery status in the datalog (which is read while the logger is essentially idle).
Current Power	An indicator as to how this logger is being powered. Normally the same as the power mode but can vary for systems on Dual Power mode. For loggers in a dual power mode, this parameter will display the current power status of the logger. Battery or Mains.
Digital Input	Digital input status.
Loop Current	Current 4-20mA loop current reading in milliamps.
Loop Reading	The 4-20mA current loop reading with its calibration data implemented including the unit of measure.

The 'I/O Parameter' block is the data used to setup the I/O functions of the logger. This is the place where you would be able to synchronise the volume readings for Pulse input 1 and 2, as well as setup the configuration data for the 4-20mA interface.

When entering the new Totaliser readings (the Pulse Readings), the pulse weights are automatically calculated and processed in the setting of the Pulse count on the logger.

Pulse weights refer to the volume of measurement for each pulse on the input. This volume is as a ratio of the measurement unit. For instance, if measuring cubic metres (Pulse Units=m3) and each pulse represents 100 litres, then the pulse weight would be 0.1 - however if measuring in litres (Pulse Units=litres) and each pulse is still 100 litres, then the pulse weight would be 100. The Pulse Reading, Pulse Weight and Pulse Units can all be entered in the 'I/O Parameter' box.

Current loop interfaces (4-20mA) work by reading the current running through a particular sensor or device. As the reading on the sensor changes (e.g. pressure), the sensor will adjust the amount of current flowing through the interface. This current ranges from 4mA to 20mA (max) with 4mA being the lowest reading the sensor can read (e.g. 0 bar on a pressure sensor) and 20mA representing the highest reading (e.g. 10 bar on a 0-10 bar pressure sensor). This is a function of the sensing device.

The interface on the logger needs to be told what the parameters are for the type of sensor attached, as well as, what that sensor is measuring. This is done through the Loop Low Value, Loop High Value and Loop Units parameters. The Loop Low Value would be the lowest reading for that sensor (i.e. 4mA reading), the Loop High Value, the highest reading (i.e. 20mA reading) and the Loop Units, the unit of measure.
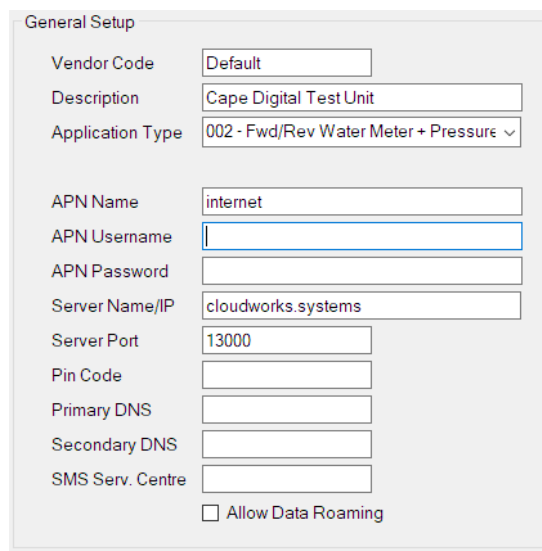
An example of a submersible 4-20mA level pressure sensor that reads up to 10 metres.

Loop Low Value = 0

Loop High Value = 10

Loop Units = metres

Next are the 'General Setup' parameters. These are parameters that are used for the communications, descriptions and applications of the logger.

Very important here is the 'Vendor Code'. The Cloudworks System supports multiple databases. What this means is that the server will automatically populate the database that is associated with a specific logger. Each database and logger 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 loggers by unauthorised users. The Vendor Code is assigned to the relevant subsystem by the administrator during the creation of the database on the server.

The description is a simple string of data that is stored by the logger and used to identify that logger in simple terms. Here, it is best to use wording that might explain something about where this logger has been applied.

Application types are explained in detail earlier in this document. To select an application type, simply click the dropdown arrow on the right of the entry field and select the application type you wish to apply.

When using a simcard to connect to a GSM network, there are a couple of parameters that your GSM service provider will need from you in order to connect to their network. These are sometimes not necessary as the card will automatically connect but most will require them. The parameters are the APN Name, Username and Password.

Networks generally require you to enter the APN Name but the Username and Password are not necessary. These details are obtained directly from your GSM service provider and most are published on their websites.

Cloudworks devices are also designed to allow for the connection to custom private APN's for purposes of security. Entering the APN details here will result in the device connecting to your private network. These networks normally issue a static IP address which will be shown in the 'Local IP' field in the 'General Details' box.

All Cloudworks devices connect to a server with a static IP or domain name. They usually use UDP/IP protocols and connect, by default, on port 13000. If you are running your own server, the Server Name or IP address as well as Server Port

number need to be entered here. Just a note, it is always better to rather use the IP address than the domain name. This will mean that the logger will not have to execute a domain name lookup before connecting to your server.

Cloudworks loggers support the use of simcard pin codes. How this works is - should a simcard have a pincode activated, it will request the pincode when the modem powers up and starts connecting to the network. If the pincode field here is populated, the logger will offer this code to the network, allowing it to connect. Failure of the pincode will cause the logger to abort the connection attempt and shutdown.

With regards to Domain Name Servers (DNS), most service providers will use their own predetermined DNS servers so these entries are normally left blank. However, should you require your own DNS servers, you can capture their Names/IP addresses in the Primary and Secondary DNS fields.

Similarly, SMS Service Centre number is normally not required as your network will default this value. This can be customised using the 'SMS Serv. Centre' field.

If you are using a foreign simcard on a network, the logger will need to be told that it is allowed to use data roaming. Without that, the logger will shutdown communications if it detects a roaming data connection. This can be done by ticking the option box.

The Wakeup Period refers to the time a logger remains asleep before waking and connecting to the server to upload its data. The Datalog Period is the time between each recorded datalog entry.

Datalog timings are calculated forward from midnight of the day on which they are set. What this means is that if the datalog period is set to 5 minutes for instance, the next log time will be calculated as 5 minute intervals starting from midnight. This means that each entry would appear on the 5 minute interval of an hour.

Wakeup timings are calculated forward from the moment a logger goes back to sleep and not from the midnight point.

Stored locally on each logger is a 220 byte 'User Configuration Data' scratchpad area. This information is eventually carried back into the database and can be used for numerous functions. An example would be the storage of meter serial numbers on a water metering application etc. This area could also contain a complex code that would perhaps give the backend software more information as to how the data from this logger needs to be handled. For example, it could contain a code which has the meter serial number plus other digits indicating whether it is a bulk or zonal meter.

Also, if there are multiple meters attached it could contain multiple serial numbers separated by a comma for instance. Any data that is useful could be stored here.

The 'Engineering' box contains parameters involved with the setup of onboard functions of the logger. The are several communications monitoring parameters that are set to ensure that the communications to the logger are functional and stable.

Battery operated loggers will wake up, connect to the server and upload their data. Should this fail, it would be a large drain on the battery of the logger to continually try and connect. For this reason, the logger has a single chance to wake up and establish a connection. If that fails, it will return to sleep and a only reconnect at the next wakeup period. At the start of a wake up, the 'Max Start Time' timer will be started. Should the connection to the server take longer than this preset time, the connection will be aborted and the logger will be put back to sleep. For powered loggers, the modem will be powered down and the process to connect will be restarted from scratch until a connection is established.

There are two other timers that ensure the communications are functioning correctly. First is the 'Comms Timeout'. When a logger communicates with the server, there is continuous communications between the two. Should this stall for a period longer than this timeout value (in seconds), the logger will abort the connection and go back to sleep (battery) or re-establish a connection (powered).

The second is the 'Heartbeat Time'. This is for powered loggers only. The server will continuously ping the logger at the interval set by this timer. The logger will respond to the ping and the two will remain in communications. Should the logger not receive two heartbeat pings in a row, it will assume there has been a failure in the communications and abort the connection and go back to sleep (battery) or re-establish a connection (powered).

This logger can operate in one of three power configurations.

Mode	Notes
Mains	In this mode the logger will be continuously connected to the server allowing for the streaming of real time data.
Battery	In this mode, the logger will 'wakeup' (normally 6 hourly) and upload its recorded data to a remote database and then go to sleep.
Dual	External 12V supply + Battery. In this mode the logger will automatically switch to battery mode should the power fail.

Each power mode can be selected from the items under 'Power Mode'. When a logger is in Dual Mode, the voltage point at which the logger will switch from Mains to Battery mode is defined by the 'Power Threshold' voltage. This should only under special circumstances be adjusted from 4.75V.

Fitted onto each logger is an onboard 24V 30mA power generator. The Cumulus Logger can generate a stable 24V output at a maximum of 30mA, allowing for the powering of an external piece of equipment or current loop device eliminating the need for a secondary power supply. This option will also function under battery operation.

Operation Modes are as follows and are selected in the 'Generator Modes' options.

Mode	Notes
Off	In this mode the generator is permanently off.
On	In this mode the generator is permanently on.
Loop Power	Under Loop Power control, the generator will be turned on for a specific period of time (Generator Delay) before the 4-20mA interface is read.
Modbus Power	Under Modbus Power control, the generator will be turned on for a specific period of time (Generator Delay) before the Modbus interface is read.

To expand on the Loop/Modbus Power options - when using the generator to power a 4-20mA loop device or Modbus device, the power is turned on each time that interface is activated to read. Depending on the device you are powering, there is a preset amount of time it will need to be powered before it has 'settled' and the reading has become stable enough to sample. This varies from device to device and can be adjusted using the 'Generator Delay' time.

The Bluetooth interface 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 loggers.
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. Again, this is to prevent the Bluetooth interface from being inadvertently left on and draining the battery. The Bluetooth power option can be selected in the 'Bluetooth Mode' list.

Third last setting is the GPS power mode. In these options, the GPS can be powered on or turned off. For powered devices it is advisable to keep this GPS on so that the loggers' co-ordinates can be read back and fed into the database.

The onboard GPS of the remote device uses a substantial amount of power and is therefore automatically switched off on battery powered loggers. When the GPS is first powered up, it will take a couple of minutes before it is able to lock onto 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 in the various application screens.

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 logger 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 logger 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.

Second last, the output can be manually switched on and off at the 'Output' option. And lastly, an advanced function showing the modem diagnostics can be switched on or off. What this will do is stream all the modem commands to the diagnostic screen for analysis. This is really only for advanced troubleshooting and should be kept off by default.

On the top of this page are several tool bar options. Briefly their functions are as follows:-

Function	Notes
Bluetooth Connect/Disconnect	Connecting and disconnecting to the Bluetooth interface can be done multiple times from this screen. This is especially useful since in battery mode, if the connection is idle for more than 60 seconds, then the logger will automatically disconnect from the Bluetooth connection.
Command/Connect	Used to switch between the Command Mode and the Connected to server Mode with streaming diagnostics. In battery mode the logger might simply go to sleep rather than connect to the server.
Get Current Setup	When in Command Mode, pressing this button will get the software to go and read all the configuration data from the logger and display it on the right hand side of the screen.
Clear Datalog	When in Command Mode, pressing this button will send a command to clear the onboard datalog.
Wakeup	Forces the logger to wake up and connect to the server. This will also force a battery logger to connect to the server.
Sleep	Applies only to battery loggers and will force the logger to sleep rather than connect to the server.
Default Setup Scripts	Dropdown menu giving to options for factory default settings of either battery or powered loggers.
Hardware Test	Dropdown menu to activate various hardware tests. Selecting these options will send the appropriate command to the logger and display the result in the diagnostic screen.
Setup Bluetooth	Bluetooth interfaces are set to default 'Friendly Names' that include the current Device Code for the logger. This makes it easier to select the correct

|	
	device when connecting to a Bluetooth interface. Should the Device Code not appear on the list of devices when connecting to the Bluetooth interface (legacy devices), then pressing this button will reset the interface and correct the naming system. This function can also be used to reset the Bluetooth interface to the correct setup.
Calibrate Loop	Used to calibrate the 4-20mA. This is explained in further detail below.
Upgrade Firmware	The onboard firmware can be upgraded through the Bluetooth interface. The process is explained in further detail below.

Sometimes it is necessary to re-calibrate the 4-20mA loop to correct it or to re-calibrate for a completely different set of values. This can be easily achieved by following the below procedure.

1. Apply a fixed accurate 4mA source to the current loop interface.
2. Dropdown the 'Calibrate Loop' menu and select 'Set 4mA Point'.
3. Change the source current on the interface to an accurate 20mA.
4. Dropdown the 'Calibrate Loop' menu and select the 'Set 20mA Point'.
5. Change the loop current to any random value between 4mA and 20mA.
6. Press the 'Get Current Setup' button and read back the settings.
7. This random loop current should now display correctly in the 'General Details' box as 'Loop Current'.
8. Disconnect loop current.

Upgrading firmware on the logger can be done through the Bluetooth interface. Newer versions of the software for each type of device is embedded into the Cloudworks software so will not need an internet connection to collect the data.

When in Command Mode, press the 'Upgrade Firmware' button. The first thing the software will do is to determine the current firmware version on the logger and see if there is an upgrade available. Should the firmware be up to date, you will be prompted as such and given an option to re-flash the firmware. Re-flashing can happen if your last upgrade failed and you would like to try again.

Before continuing, the following prompt will flash on the screen.
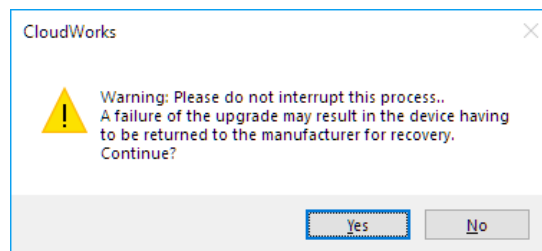
Please do not at any stage interrupt the process while the firmware is downloading as this may leave the logger inoperable and necessitate that it get sent back to the manufacturer for recovery.

Selecting 'Yes' will start the upgrade process. The diagnostic screen will display the progress of the upgrade.
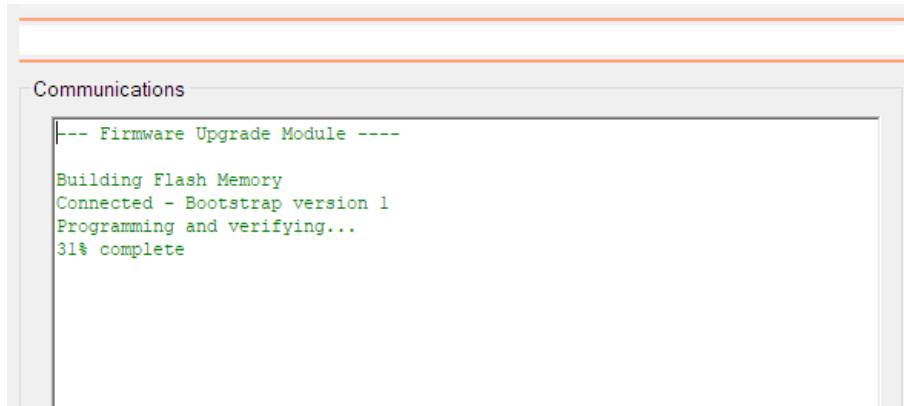
Once the upgrade is complete, the following message will be displayed.
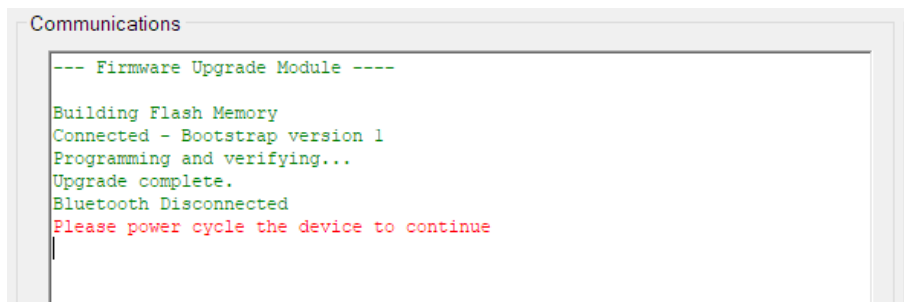
Please power cycle the logger and then reconnect the Bluetooth interface if you wish to carry out further configurations.

A note about power cycling a logger - when a logger is in battery mode and asleep, disconnecting the battery will not cycle the device. A battery logger in sleep mode can remain powered for up to 5 minutes before the onboard capacitors discharge enough for the device to reset. To speed this process up, press the pushbutton for more than 3 seconds forcing the device to try and connect to the server and therefore draining the capacitors.

Should the upgrade fail for some reason, please power cycle the logger, reconnect the Bluetooth, go into Command Mode and try again.

If the upgrade process fails to start, try the following recovery.

1. Connect with the Bluetooth interface and switch the logger to Mains Mode (if battery logger).
2. Disconnect the Bluetooth and power cycle the logger properly.
3. Re-connect the Bluetooth and retry the upgrade process.
4. Disconnect Bluetooth and power cycle the logger properly.
5. Re-connect the Bluetooth and switch the logger back into Battery mode (if battery logger).

2.2 Setup via Remote Configure

Once the remote connection has been established, Cloudworks will automatically download the current setup data and display it on the screen. This data can be refreshed at any time by pressing the 'Refresh' button in the top menu.
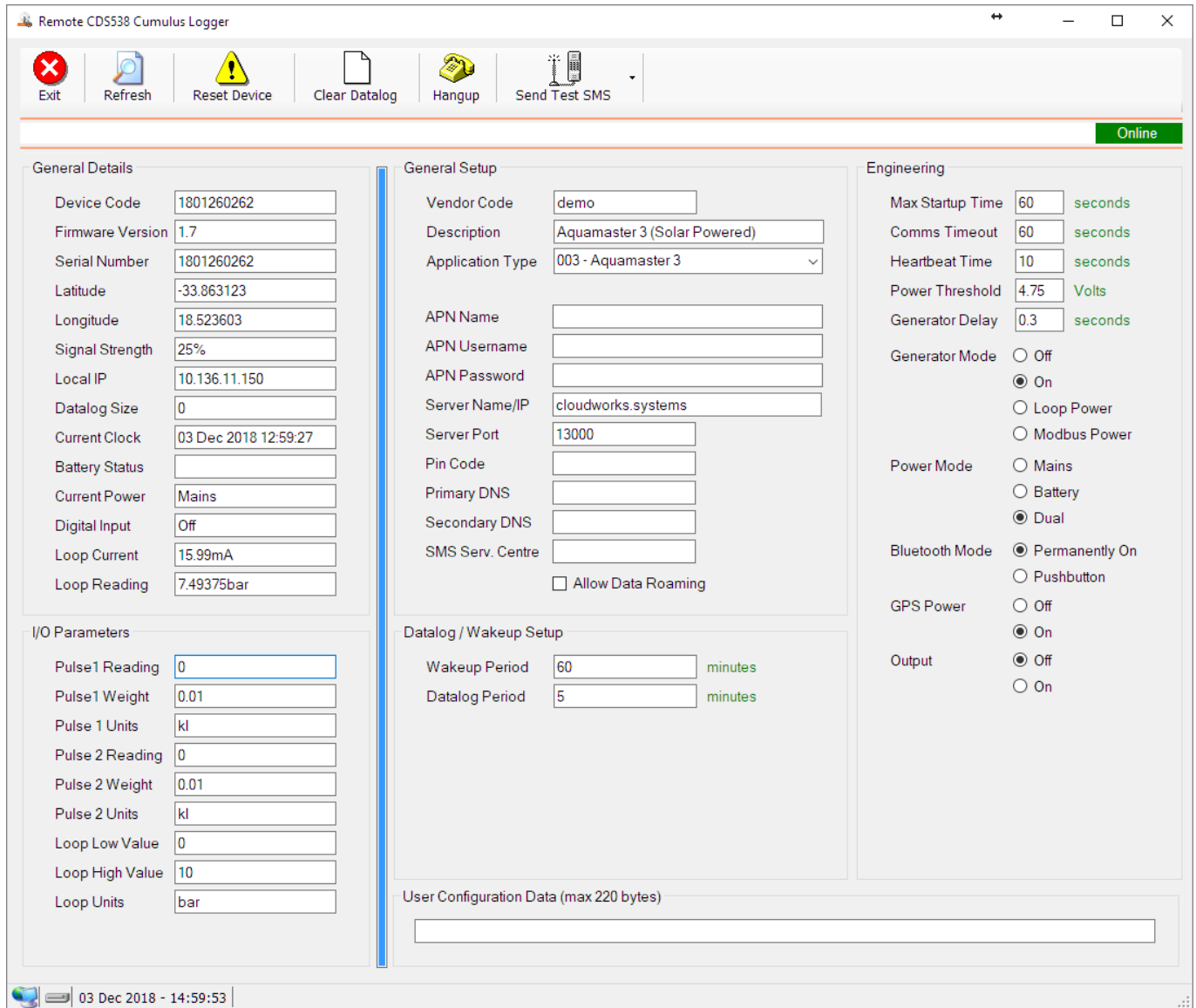
As you can see the parameters are the same as when you configure via the Bluetooth setup option. Again, data update commands are sent to the device only after the parameter setup field has been left. What this means is that while adjusting a parameter in its input box, no commands are sent to the logger. Once you have completed entering the field and leave it for the next function, only then will the command be sent.

Should the instruction fail to send or not be acknowledged by the logger, you will get a prompt alerting you to the failed command. This parameter change should be attempted again.

Apart from that, functions are the same as the Bluetooth Setup with the exception of three buttons on the top tool bar. The 'Reset Device' button is self explanatory and will initiate a reset of the logger. This would really only be used if there has been some really unexplained behaviour linked to the loggers operation.

If you make changes to the connection parameters (i.e. APN details or Server details), you can force the logger to disconnect from the server and reconnect using the new connection parameters by pressing the 'Hangup' button. This will

DOCUMENT NAME	CLASSIFICATION	DATE	PAGE
CDS538 CUMULUS LOGGER USER MANUAL	CONFIDENTIAL	15-JUL-21	28 OF 31

cause the connection to re-establish. Bear in mind, if these parameters have changed, the logger may re-connect to a completely different server so will go offline here preventing you from making any further changes.

The 'Remote Configure' screen has one further tool available in its arsenal, and that is the 'Send Test SMS' function. The purpose of this function is to not only test the SMS system, but also to determine the telephone number assigned to that simcard (if the card supports SMS's). Using this function is as simple as pressing the button and entering the destination telephone number in the provided input box - and pressing ENTER.

The logger will then send an SMS to that number. The message should read, 'Hello from Cumulus Logger CDS538 - Device Code xxxxxxxxxx'. The receiving number can then be used to send sms commands to that logger.

If you have made changes to configuration data and the logger is present in the database, please remember to trigger a 'Reload Device Config' function to allow the server to update the database correctly.

2.3   Setup via Offline Script Configure

Once activated, the correct blank Scripting Editor screen will be displayed, ready for the capture of the settings that need to be altered.
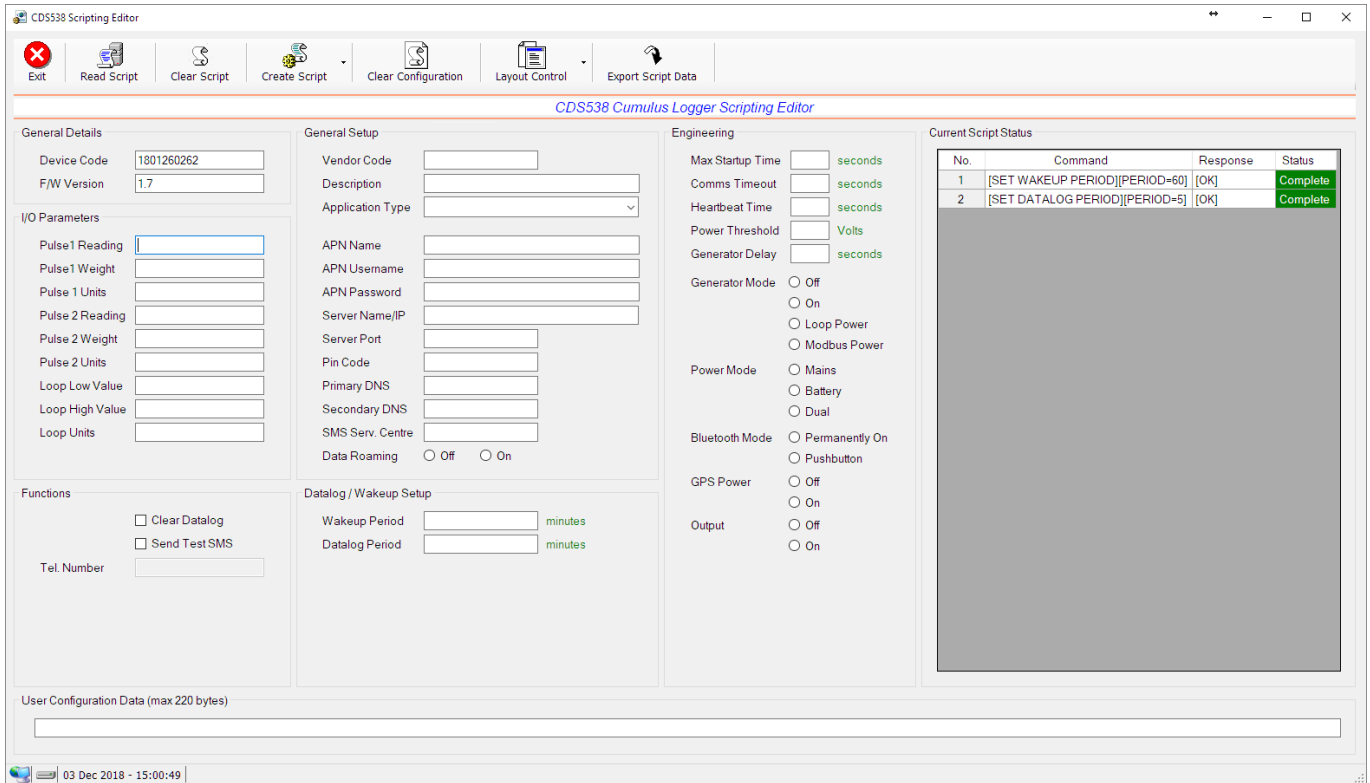
Since the device is offline the only parameters available are the Device Code and Firmware Version which are picked up from the communications register.

As you can see the parameters are the same as when you configure via the Bluetooth setup option with one or two minor exceptions explained later.

All the parameter fields are empty at this point. To create a script, simply enter the new values for the parameters you wish to change in the correct fields. The script will only be generated for the parameters that have been altered in this form. Should you wish to restart your parameter changes, you can press the 'Clear Configuration' button in the top tool bar to reset all the fields.

When generating a script for your new parameters, you have an option of adding to the current script or replacing the script with only your new one. To do this, press the 'Create Script' dropdown button on the top tool bar and select the option you require.

On the right of the screen is a table of the current script that appears in the database with the status of each command tabled. This would include older scripts that are still present in the database. Each command has associated with it a status - either Pending or Complete.

Current Script Status

No.	Command	Response	Status
1	[SET GENERATOR MODE][MODE=OFF]	[OK]	Complete
2	[SET DESCRIPTION][DESCRIPTION=Cape Digital]	[OK]	Complete
3	[SET GENERATOR MODE][MODE=ON]		Pending

Pending commands are those that still need to be executed. Listed also is the response to each command for diagnostic purposes. You can read back the current script to determine its status at any point by pressing the 'Read Script' button. 'Clear Script' would delete the script from the database.

All the other functions should be familiar with the exception of the 'Clear Datalog' and 'Send Test SMS' functions. Since these cannot be a button on the screen, they are captured as selectable options.

If you have made changes to configuration data and the logger is present in the database, please remember to trigger a 'Reload Device Config' function to allow the server to update the database correctly.