CDS538 Cumulus Logger User Manual

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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

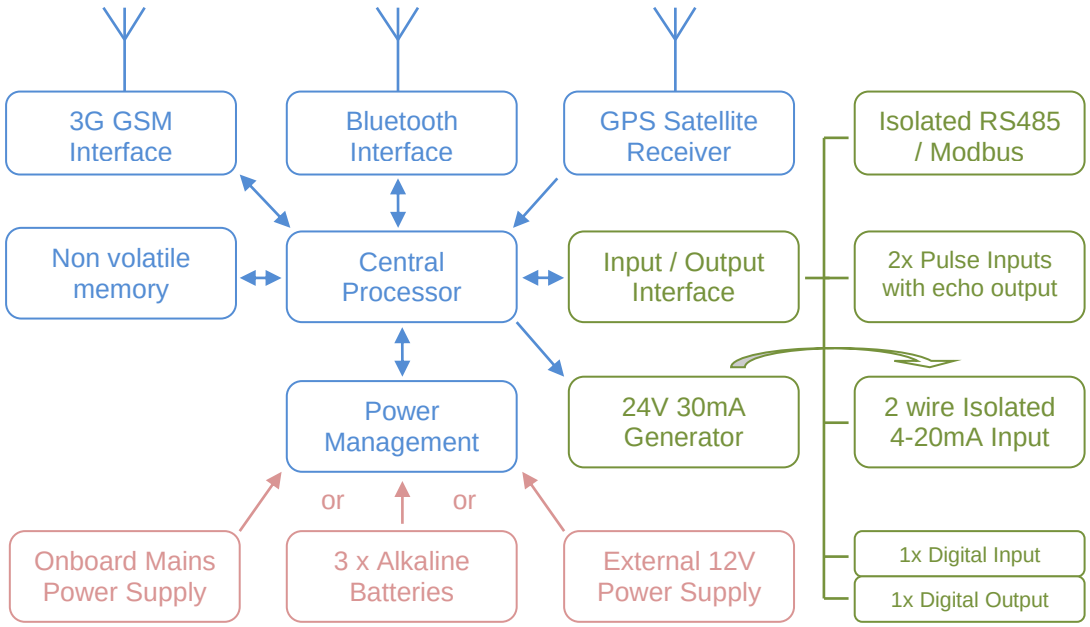
- Uses 3G GSM (UMTS/HSPA) technology. This has become essential as many cellular network providers around the world will soon no longer be supporting older GPRS technologies, rendering legacy GPRS dataloggers obsolete. This has already started happening in many countries around the world.
- Onboard GPS. 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.

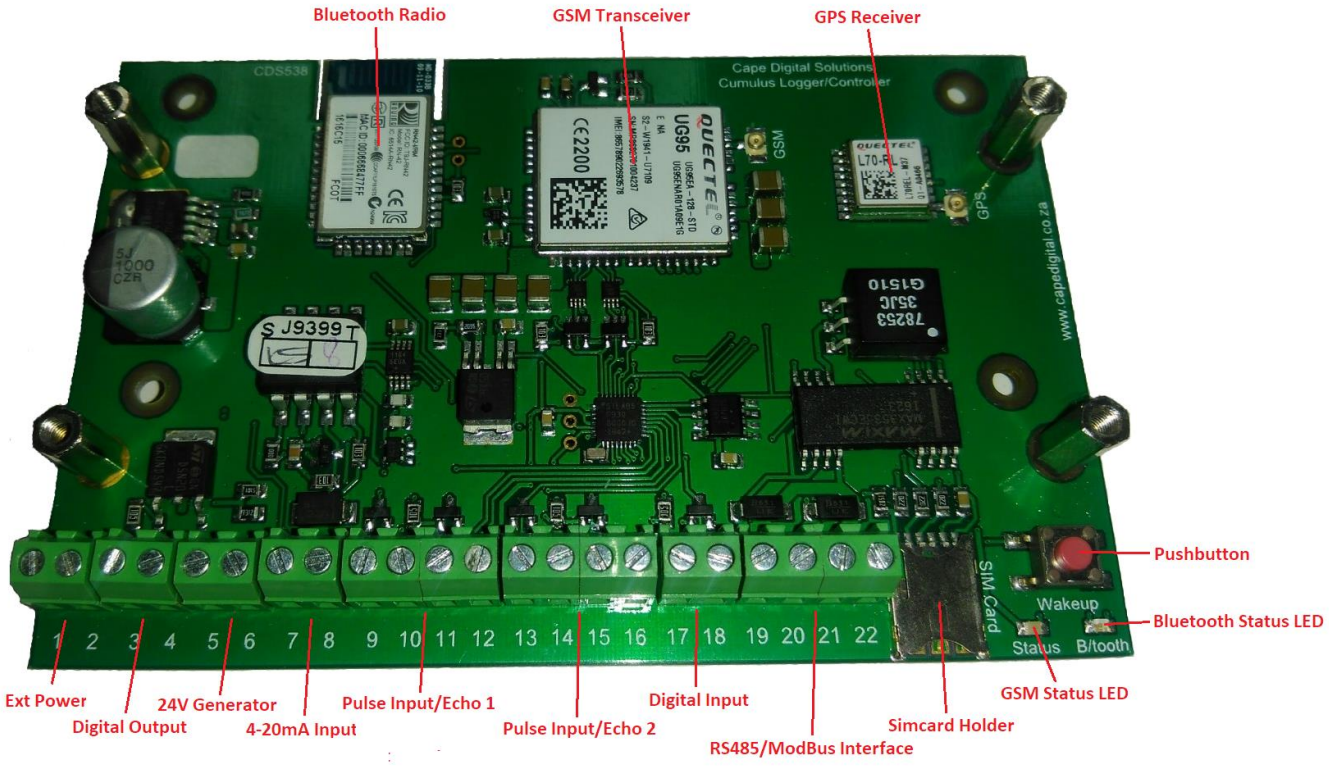
- Onboard 24V 30mA power generator. The Cumulus logger can generate a stable 24V output at a maximum of 30mA allowing for the powering of an external piece of equipment or current loop device eliminating the need for a secondary power supply. This option will also function under battery operation.
-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

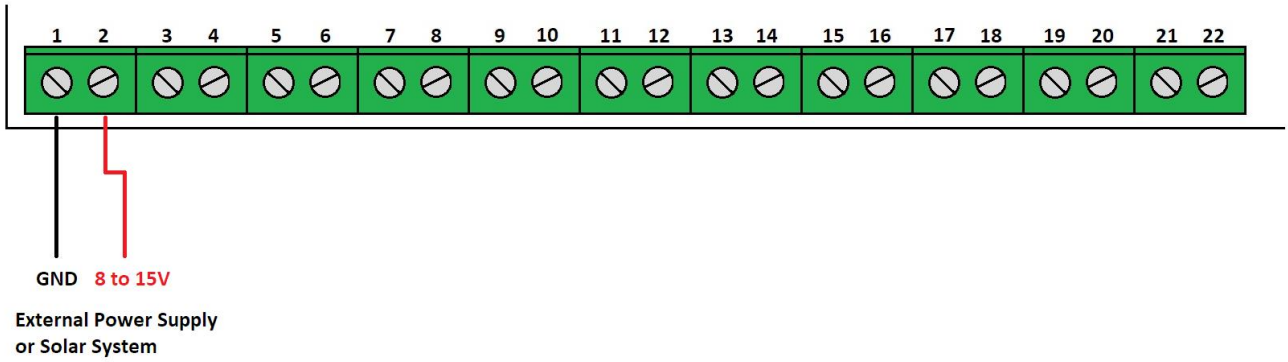
1.8 Connections

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)

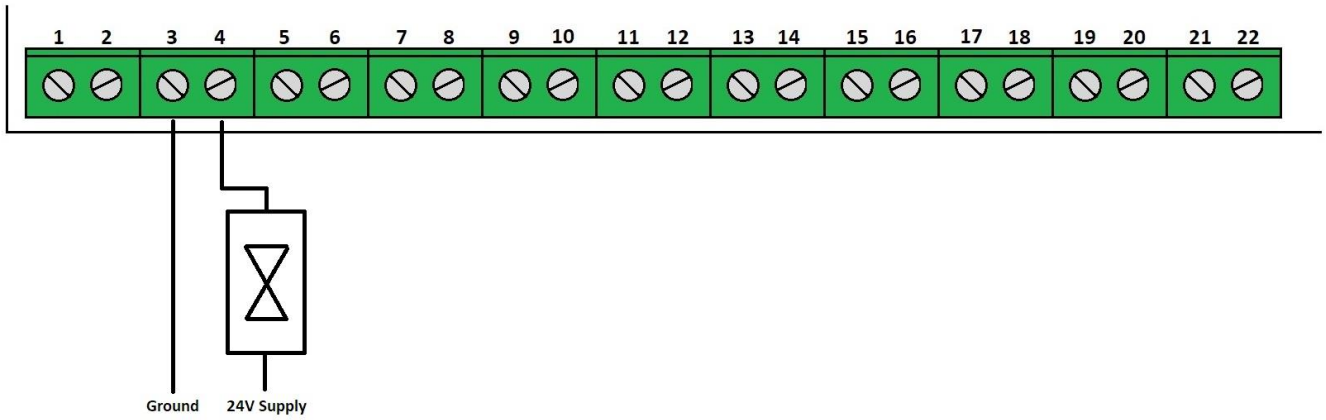
1.8.1 External Power Supply / Solar System Connection

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

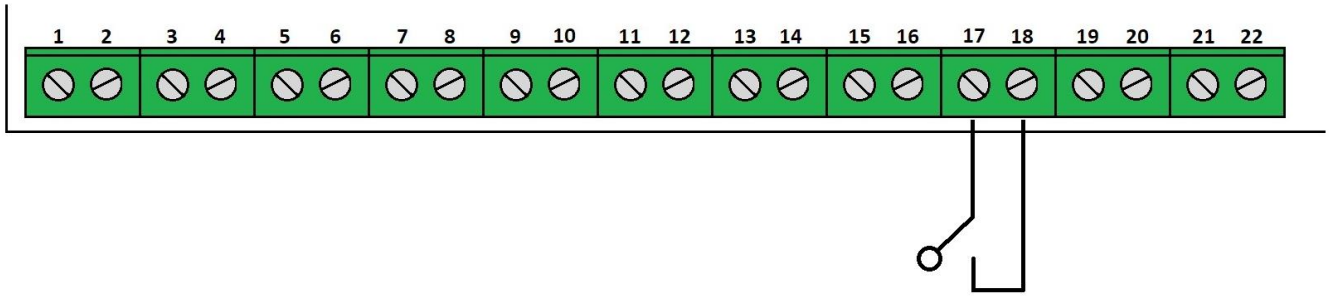
The output on the CDS538 Logger can be used to switch a DC device of up to 500mA at a maximum of 50V. This output is an open drain output that will switch to ground. This output is protected by a 500mA resettable fuse so it will trip if overloaded. Should this happen, please disconnect all the power,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



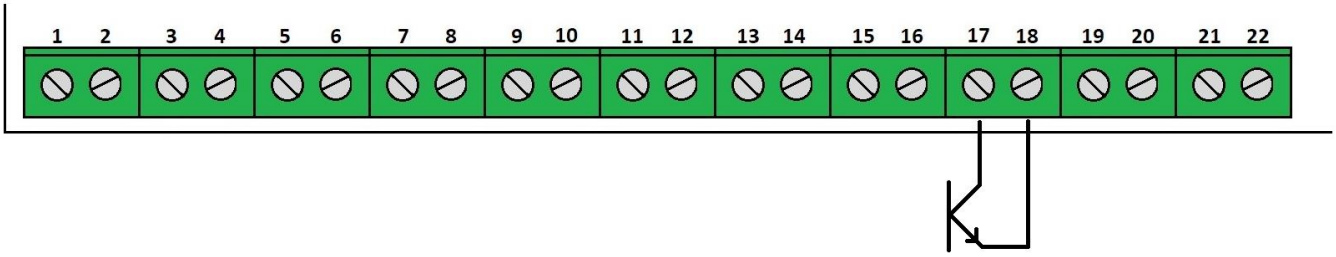
Example configuration for operating a 24V Valve

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.



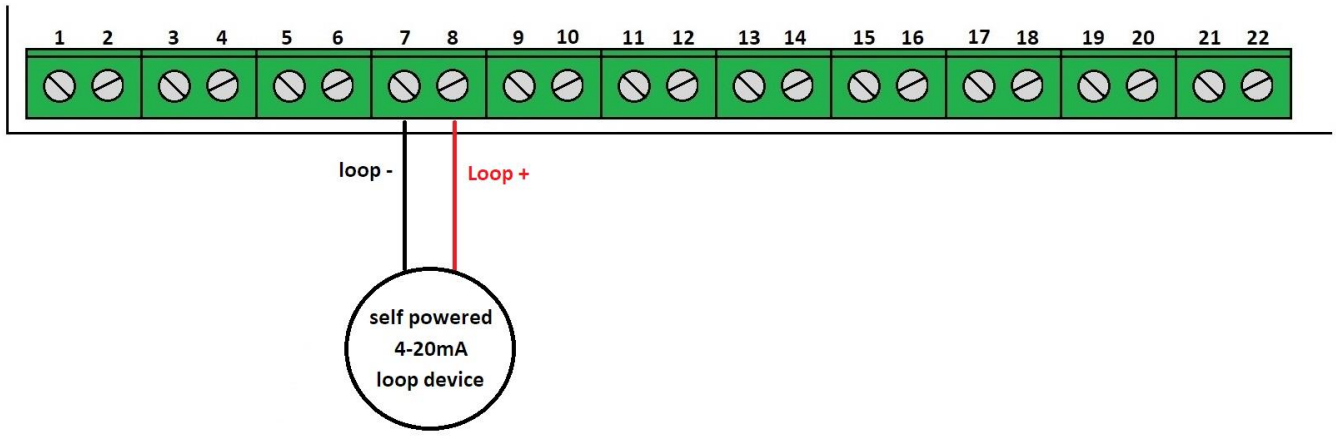
Example for connecting to a volt free contact



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

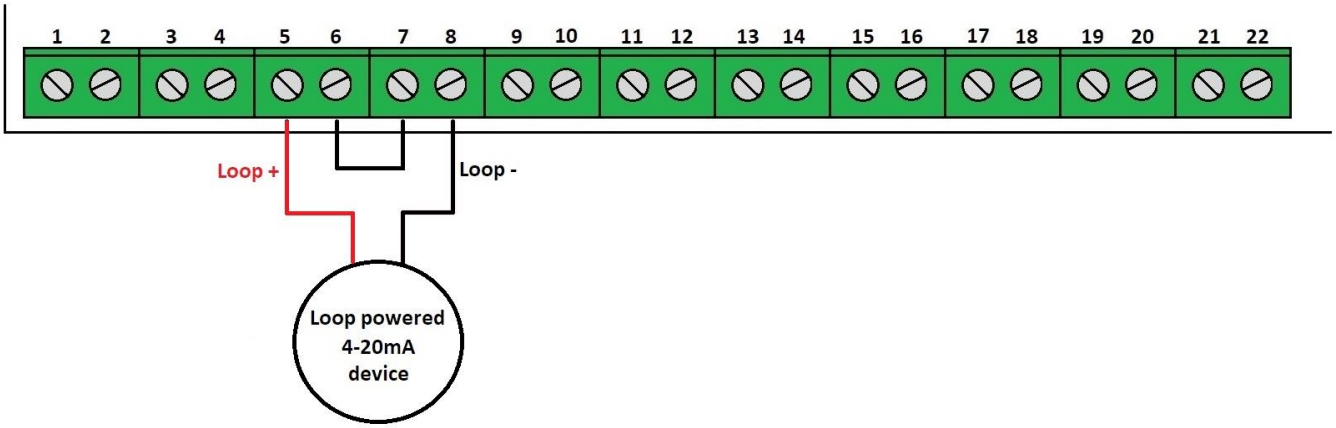
1.8.4 Using the 4-20mA loop input and 24V loop power generator

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,

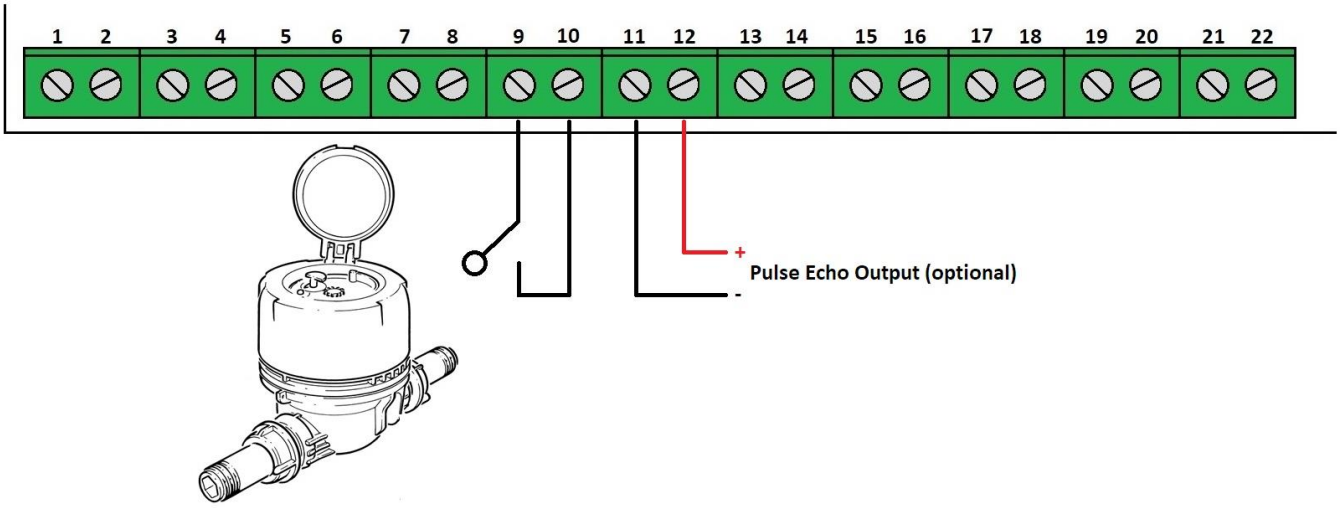
using the 24V power generator to power a loop device, uses a substantial amount of power. For this reason, in battery operated devices, the loop should only be powered each time the device needs to be read. This can be achieved by setting the generator into 'loop power' mode.



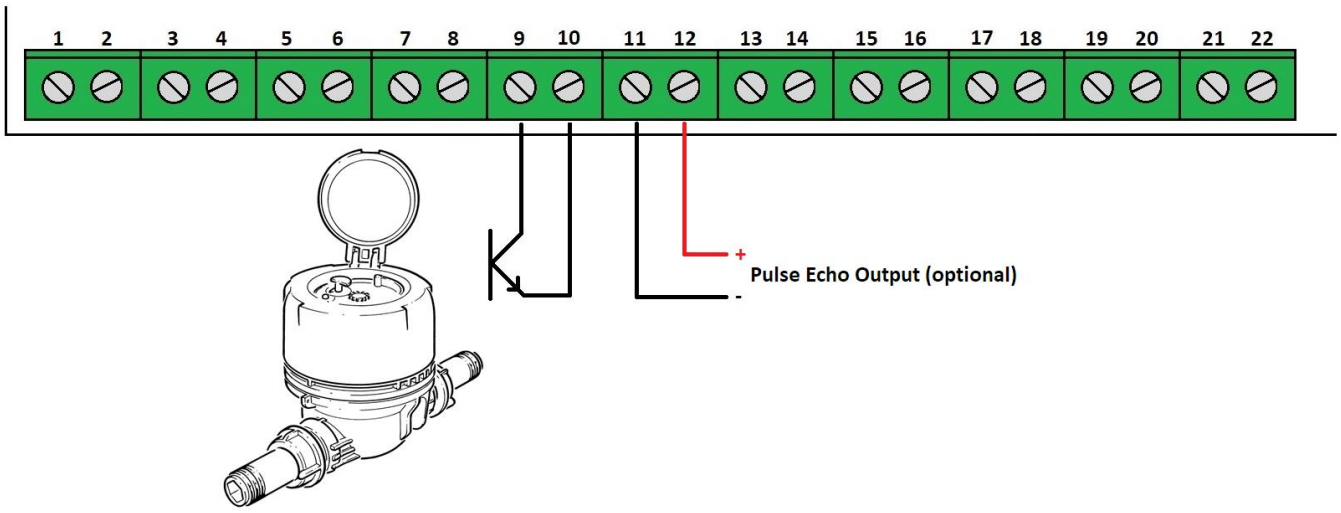
Example configuration of the generator supplying power to a loop powered device

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.



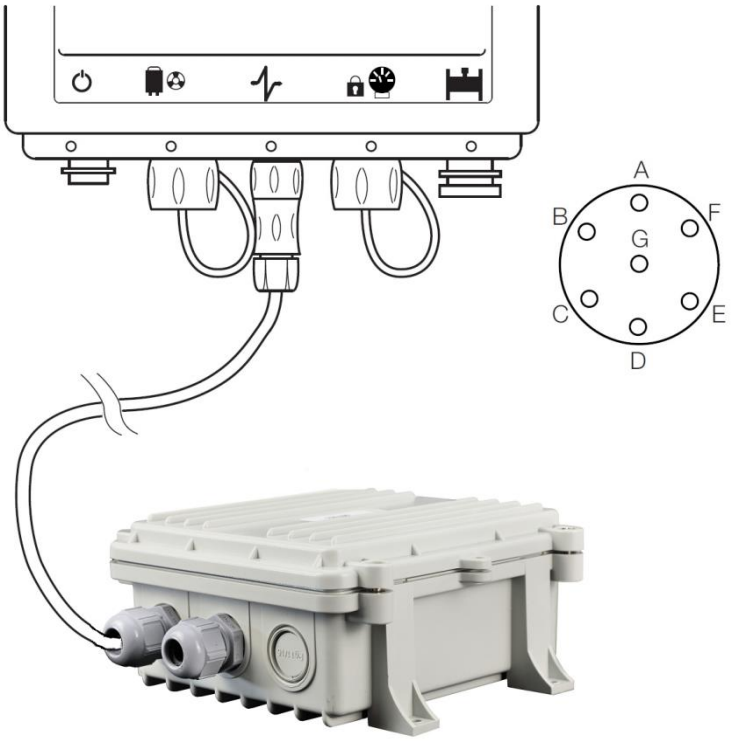
Example configuration of water meter with a volt free switch (e.g. reedswitch)

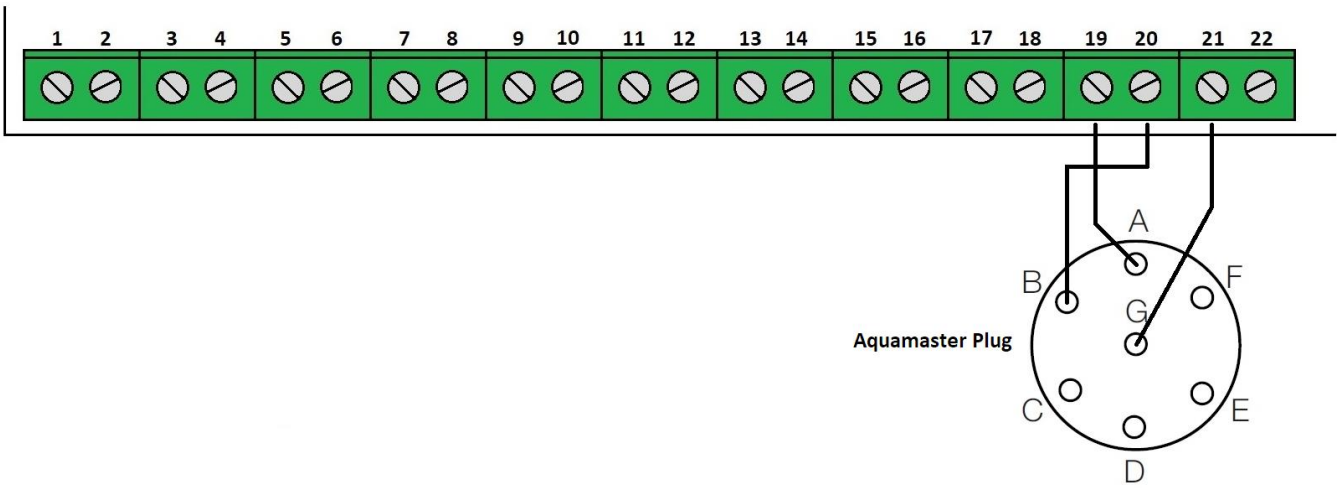


Example configuration of water meter with electronic interface. Please note the polarity of the interface. Ground connection to pin 10.

1.8.6 Using the RS485/Modbus interface

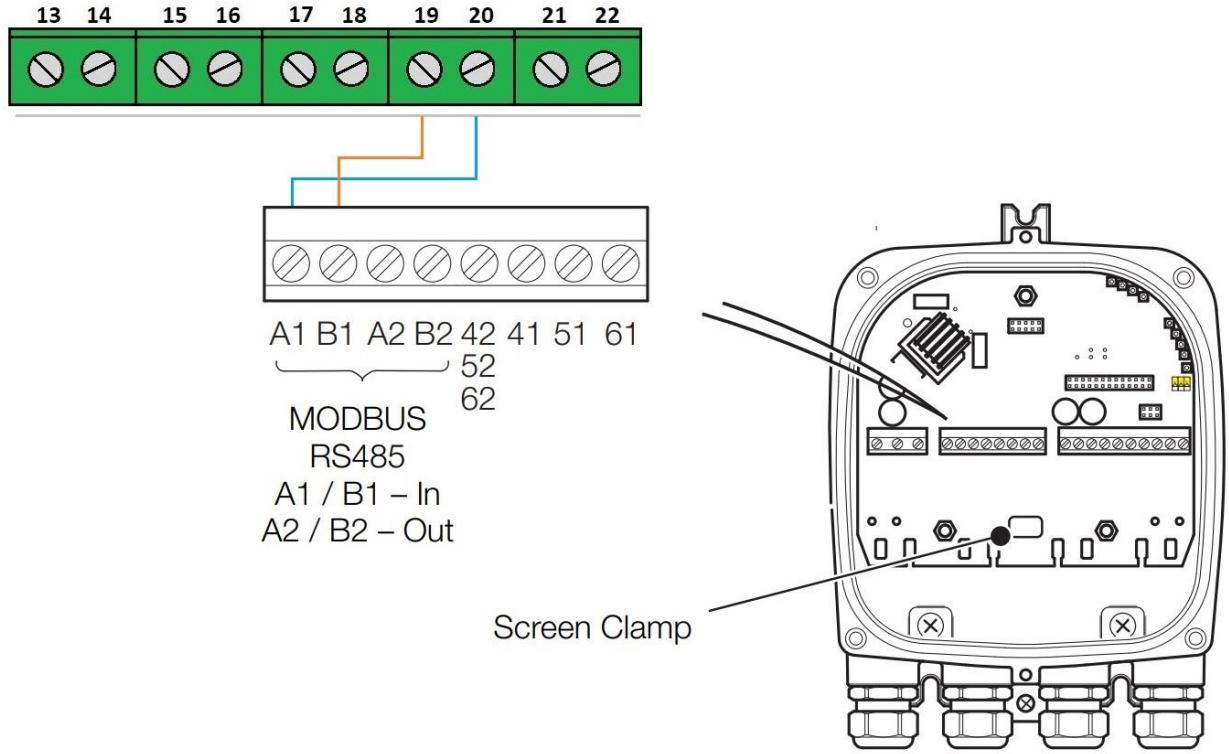
The Cumulus logger is equipped with a fully isolated RS485/Modbus interface. This interface is used for the connection to specific equipment with these kinds of output interfaces. e.g. ABB Aquamaster flow meters. These available devices are normally listed in the CloudWorks software as specific applications.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





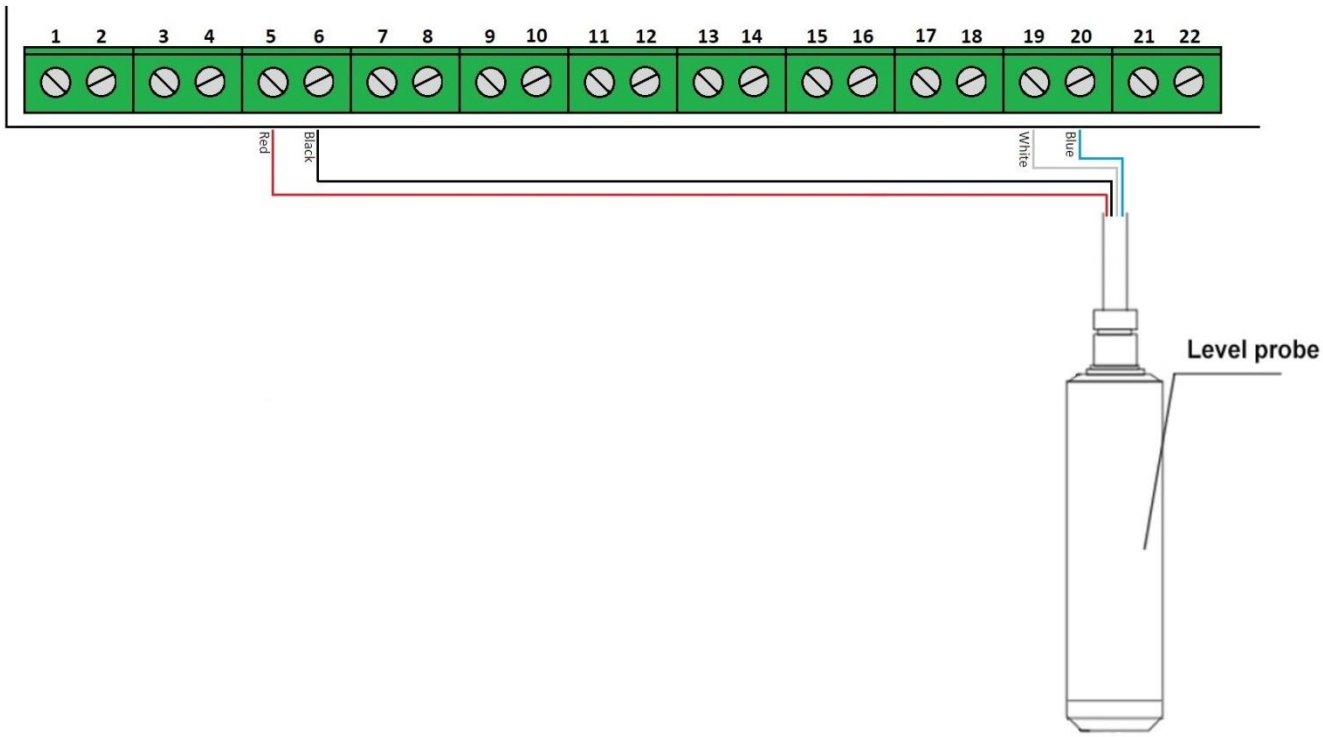
Example configuration for connection to an Aquamaster flow meter

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

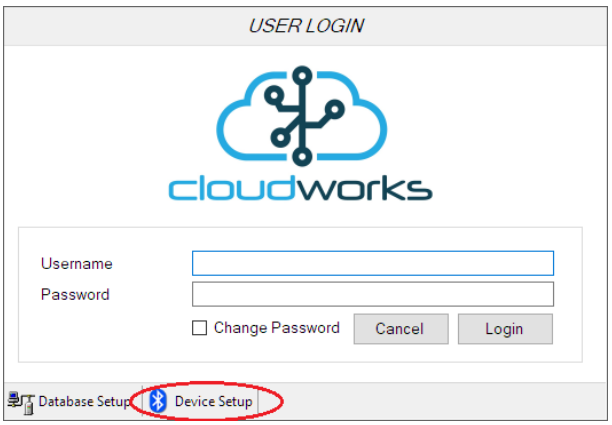


Example configuration for connection of the Cloudworks Hydrostatic BGT sensor

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

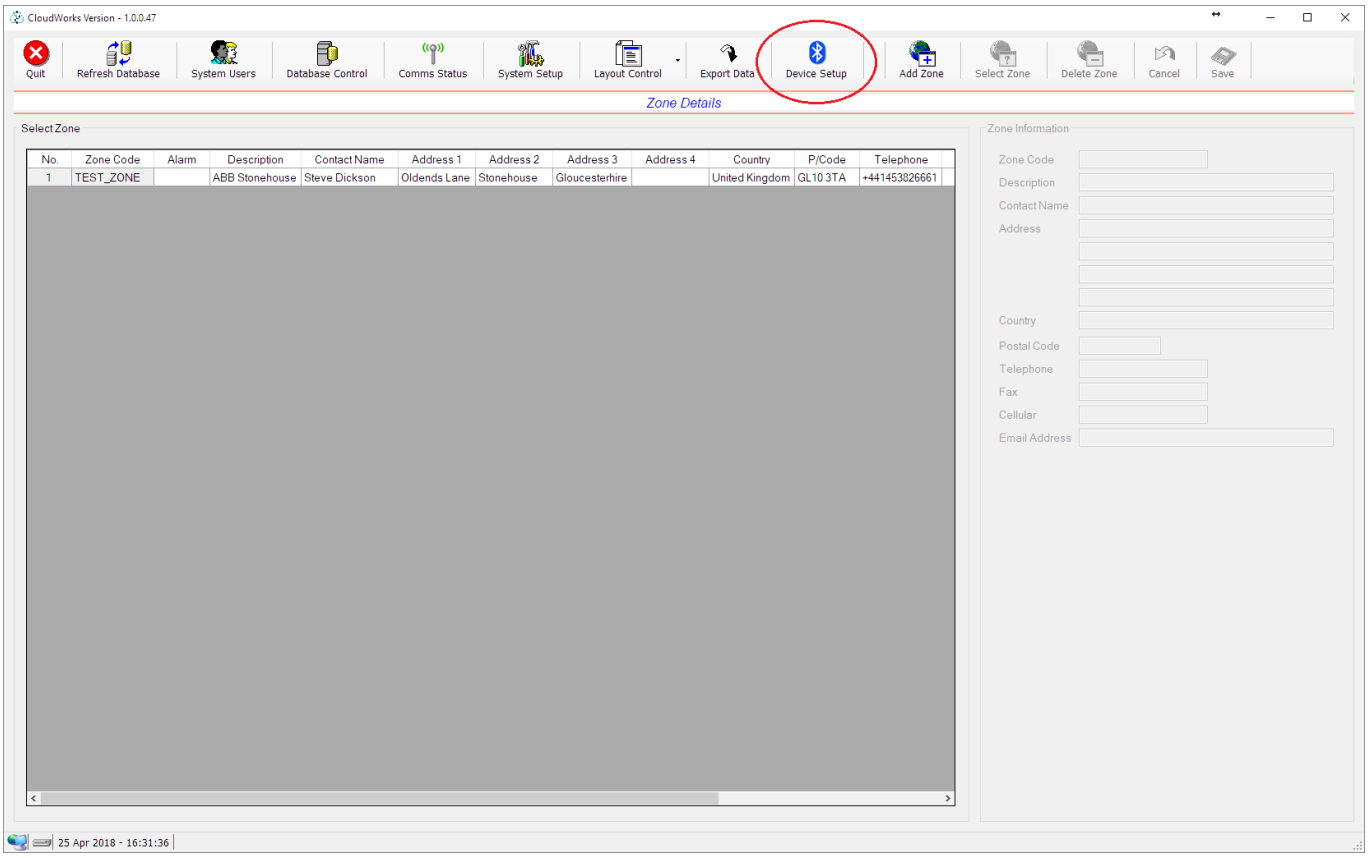
2 LOGGER SETUP

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.

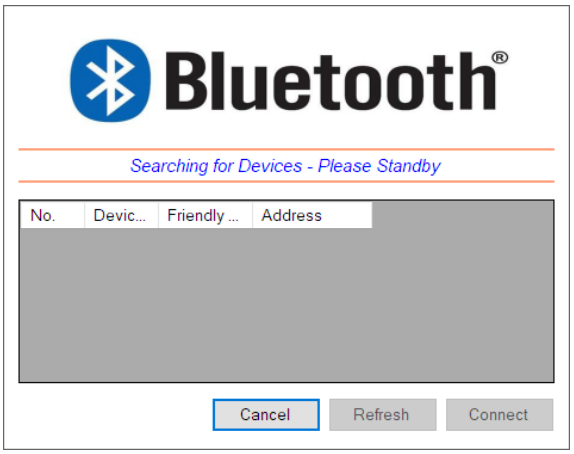


The purpose of having it here is to allow the user to access the Bluetooth setup option without needing to connect to the server and authenticating. This is useful in instances where there is no internet connection available in the field.

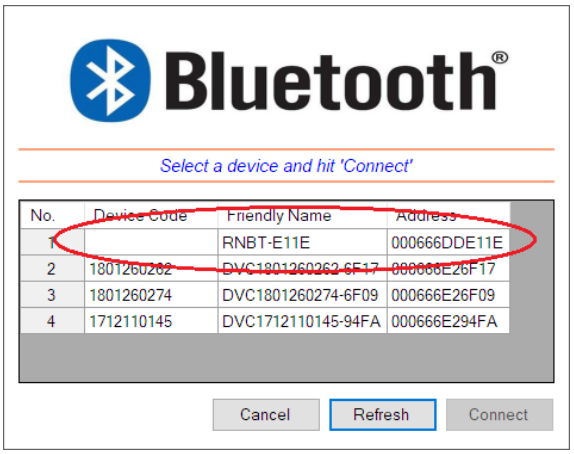
The second option is on the Zone screen by pressing the 'Device Setup' button.



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	Interface is off.
Flash	Interface is on and waiting for a connection.
Solid On	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	Device is sleeping.
Fast Flash	Connecting to the server.
Slow Flash	Connected to the server and communicating.
Solid On	Command Mode.

2.1 Logger setup

This logger can be configured using 3 different methods:-

1. Through the local Bluetooth interface.
2. Remotely when a logger is powered and is currently online.
3. Via the Offline scripting method for battery operated loggers that sleep most of the time.

All the details for Bluetooth connections and related settings are available in the CloudWorks Client software and can be accessed directly from there.