



HYDROCELL

Waste Water Sampler

USER MANUAL

Version – 2.0

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Revision History

Version	Date	Modifications	Approved by SSL
V1.0	02/08/2010	Original	V CHAPRONT
V2.0	12/04/2012	Screenshot changed for new design	V CHAPRONT

- **General Information**

The information contained in this manual has been carefully checked and is believed to be accurate. However, Smart Storm assumes no responsibility for any inaccuracies that may be contained in this manual. In no event will the Smart Storm be liable for direct, indirect, special, incidental or consequential damages resulting from any defect or omission in this manual, even if advised of the possibility of such damages. In the interest of continued product development, Smart Storm reserves the right to make improvements in this manual and the products it describes at any time, without notice or obligation. Revised editions may be found on the Smart Storm's web site www.smartstorm.eu

- **Safety information**

Please read this entire manual before unpacking, setting up or operating this equipment. Pay attention to all danger, warning and caution statements. Failure to do so could result in serious injury to the operator or damage to the equipment. Make sure that the protection provided by this equipment is not impaired, do not use or install this equipment in any manner other than that specified in this manual.








Smart Storm products are designed for outdoor use are provided with a high level of ingress protection against liquids and dust (see specification for rating). If these products are connected to a mains electricity socket by means of a cable and plug rather than by fixed wiring, the level of ingress protection of the plug and socket connection against liquids and dust is considerably lower. It is the responsibility of the operator to protect the plug and socket connection in such a manner that the connection has an adequate level of ingress protection against liquids and dust and complies with the local safety regulations. When the instrument is used outdoors, it should be connected only to a suitable socket with at least IP44 rating (protection against water sprayed from all directions).

- **Use of hazard information**

DANGER
Indicates a potentially or imminently hazardous situation which, if not avoided, could result in death or serious injury.
WARNING
Indicates a potentially or imminently hazardous situation which, if not avoided, could result in death or serious injury.
CAUTION
Indicates a potentially hazardous situation that may result in minor or moderate injury.
NOTICE
Indicates a situation that, if not avoided, could result in damage to the instrument. It also indicates information that requires special notice.

- **Precautionary labels**

Read all labels and tags attached to the instrument. Personal injury or damage to the instrument could occur if not fully observed.

	This symbol, if noted on the instrument, references the instruction manual for operation and/or safety information.
	This symbol, when noted on a product enclosure or barrier, indicates that a risk of electrical shock and/or electrocution exists
	This symbol, if noted on the product, indicates the need for protective eye wear.
	This symbol, when noted on the product, identifies the location of the connection for Protective Earth (ground).
	This symbol, when noted on the product, identifies the location of a fuse or current limiting device.

Introduction

The Hydrocell 1 or 2 are advanced samplers for wastewater applications. The Hydrocell 1 is a single bottle sampler and the Hydrocell 2 is a twin bottle sampler with a programmable change over time. The principle features of the Hydrocell are:

- Advanced Windows based intuitive programming
- Touch screen programming
- Full colour graphics display
- USB download ports
- Programmable changeover times and sample volumes
- Advanced microprocessor based stepping motor for accurate bottle positioning
- 10 litre bottles
- 7 metre lift
- Robust peristaltic pump

The Hydrocell is designed such that the user can quickly and simply programme the unit through intuitive screen displays, as you would find on a Windows based pc.

By touching the relevant button the user enter that specific programming mode and can easily navigate the screen to programme the relevant parameter.

The Hydrocell can sample in one of two programmable modes.

1. Flow proportional composite
2. Time based

Flow Proportional Composite Sampling is the most common form of sampling. In this mode a sample is only taken when it receives a pulse (>250ms) from a volt free contact in a flow meter. Normally, the flow meter will send this pulse after a specified volume of liquid has been measured by the flow meter.

A typical application would be to fill the 10L bottle over a 24-hour period (normally midnight to midnight) after which the sampler would change over to fill the second bottle in the following 24-hour period. Because the bottle is filled proportionately to the flow it represents a composite sample of what has flowed through the flow meter in the 24-hour period. This alternative method of filling the bottles means that the user always has a true representation of what wastewater has flowed through his flow meter in a day.

This composite sample is often used by Water Companies for analysis and billing purposes.

Example

The Jolly Chicken pie factory wants to use the Hydrocell 2 to monitor and analyse its wastewater discharge to sewer over a 24-hour period. The company has a V-Notch weir and an open channel flow meter to measure the flow out of the factory.

The Hydrocell intake pipe is plumbed into the V-notch weir tank and the Hydrocell programmed to change over to the next bottle at midnight.

The data from the flow meter shows that the factory output varies between 50m³ to 75m³ per day.

Ideally, the 10L bottle should be full when the maximum daily discharge occurs but still have enough sample volume (not less than 5L) at the minimum daily discharge.

So, if the flow meter is programmed to send a pulse every metre cubed then 75 samples will take over 24 hours. If these samples are measured at 125ml then the total volume collected over 24 hours will be $75 \times 125 = 9.375$ Litres.

However, if the discharge from the factory is at a minimum, the total volume collected will be $50 \times 125 \text{ml} = 6.25$ Litres.

So, this fits both upper and lower daily discharge regimes. Of course, larger samples and greater intervals between samples will give a similar result.

As long as samples are taken frequently the total sample volume should be a true composite of the daily discharge from the factory.

Timed Based Sampling is sampling independent of an external device and should only be used if no flow meter is available. It does not give a true representation of the waste water make up being discharged from the factory as a sample will be taken at a fixed time period irrespective of whether or not waste water is being discharged to sewer. In some cases this might be a sample that has been stagnating for some time and can thus give significant errors when the total sample is analysed.

This method should only be used where there is continuous flow or where the sample point does not contain standing water.

In the above example it would be reasonable to programme the Hydrocell to take a sample every 20 minutes. This would give a maximum number of samples of $3 \times 24 = 72$ samples every 24 hours. It is totally independent of the flow to sewer in terms of a composite sample.

Hence, if the sample volume taken every 20 minutes is 125ml the total daily volume would be 9.0 litres.

Installation

Location: In a shady area and as close as possible to the measuring point.

Protection: The Hydrocell is IP56 rated so can be used outdoors. However, to ensure complete protection from rain the Hydrocell should be placed in a weatherproof enclosure or used with the optional rain hood (available from Smart Storm). ***DO not spray the Hydrocell with water jets to clean.***

Temperature: The electronics are rated to -20 degrees centigrade to 40 degree centigrade. However, if the ambient temperature falls below zero water freezing in the pump head and discharge pipes can cause irreversible damage.

Intake Pipe: Always keep the intake pipe from the sample point to the Hydrocell horizontal or vertically downwards, i.e. the Hydrocell should be at a higher point than the sample point. U bends and loops in the intake pipe will cause airlocks and prevent accurate sampling.

Wiring: Refer to the wiring diagram in section 4 to wire the Hydrocell.

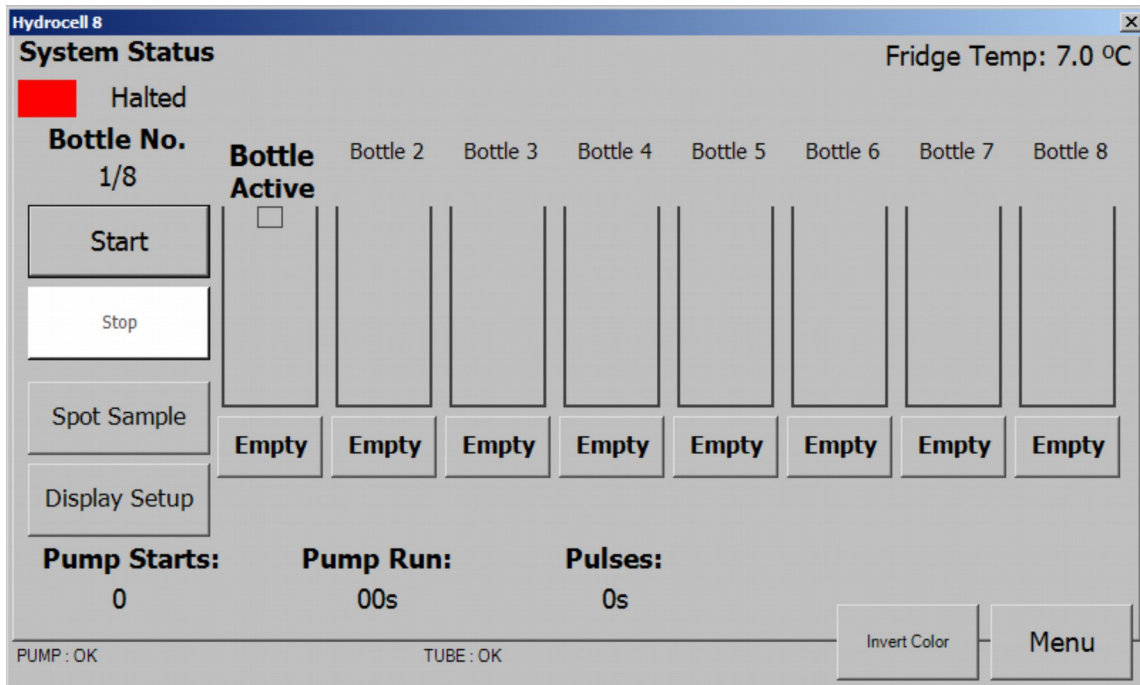
Switch On: When the mains power is turned on the Hydrocell screen will show the windows based program being loaded. **Do not switch the unit off while this is being performed.** The default screen will be the display showing a pictorial image of the bottles. This is the running screen and after programming the unit must always be left in the running screen.

Whilst the Hydrocell is a product that requires little skill to programme the following pages take the user through the main screens.

Screen Design

Run

What: Display the current status of the sampler and the bottles.



Description:

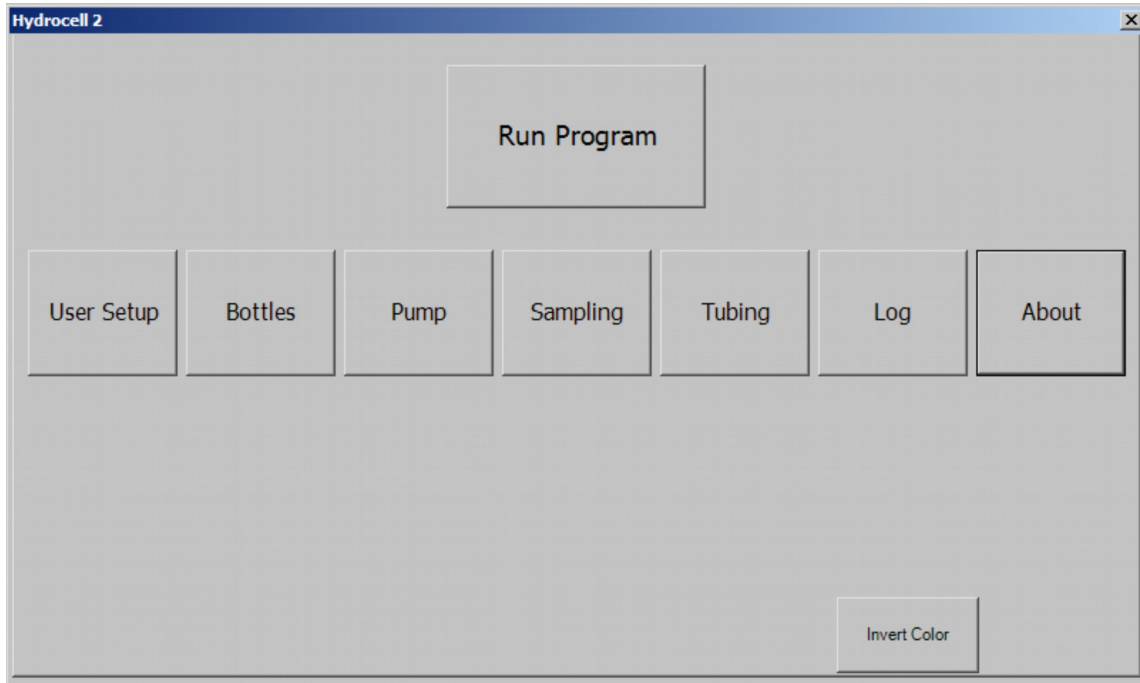
- Status: Current status of the sampler. Can be “Running”, “Purging”, “Sampling”, “Rotating” or “Halted”.
- Fridge Temp: The current temperature inside the sampler. This value is only displayed on the Hydrocell4 and Hydrocell8 sampler.
- Bottle No.: The bottle that will receive the sample. The Hydrocell 1 screen shows only 1 bottle.
- Active: The bottle that is being filled in the present time cycle.
- Start: Start the sampling sequence.
- Stop: Stop the sampling sequence.
- Spot Sample: Run a full Sample Cycle (reset home, rotate to current bottle, purge, sample and purge).
- Menu: Display the menu options. **FACTORY DEFAULT PASSWORD 0001**
- Pump Starts: Number of time the pump has started.
- Pump Run: The total time during which the pump has been running.

- **Bottle:** A graphical representation of the 2 bottles in the sampler with the expected volume of liquid in each of them and their current state. This is for indication only. When a bottle volume is greater than the full limit, the volume colour switches from blue to red. The states are as follow:

State	Representation	Description
Off		The arm is rotating or is on the top of another bottle
Waiting		The arm is on the top of the bottle and the pump is off
Purging		The arm is on the top of the bottle and the pump is purging
Sampling		The arm is on the top of the bottle and the pump is sampling

Menu

What: The menu with buttons to take the user to each sub-menu.

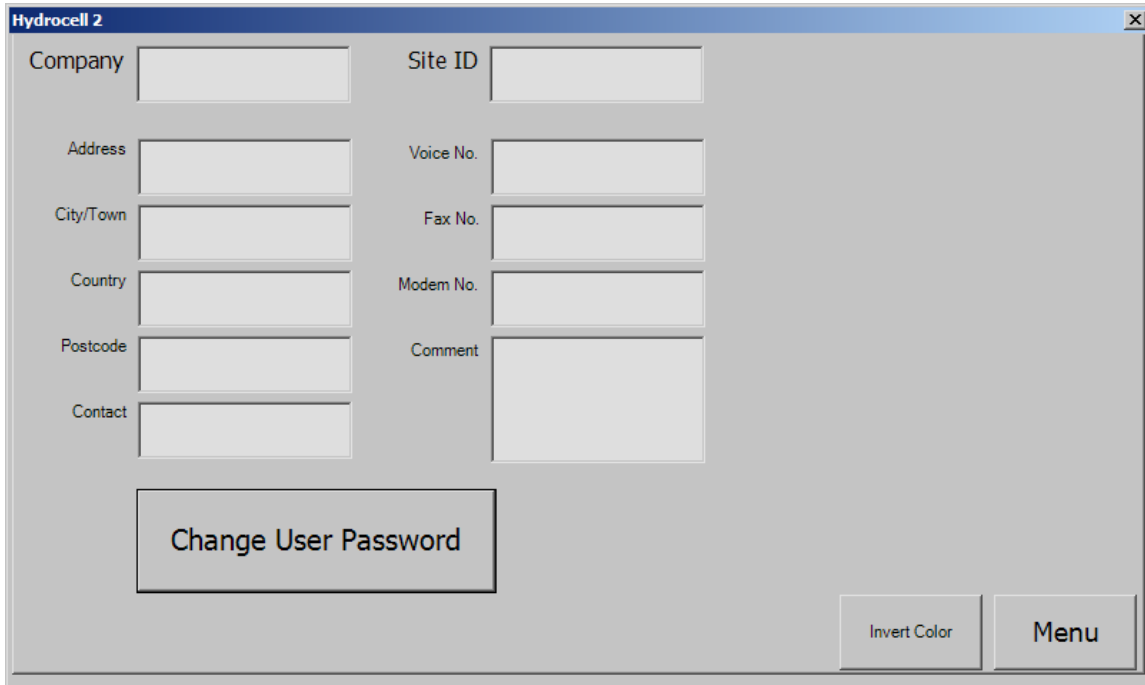


Description:

- For each page (except Menu), a button is displayed which redirects to the corresponding sub-menu where parameters can be set and stored.
- After programming always press “Run Program” to return to the running display.

Setup

What: Owners information page.



The screenshot shows a window titled "Hydrocell 2" with a close button in the top right corner. The window contains several input fields arranged in two columns. The left column includes fields for "Company", "Address", "City/Town", "Country", "Postcode", and "Contact". The right column includes fields for "Site ID", "Voice No.", "Fax No.", "Modem No.", and "Comment". Below the input fields is a large button labeled "Change User Password". In the bottom right corner, there are two smaller buttons: "Invert Color" and "Menu".

Description:

- Site Details: Information about the company and the site where the Hydrocell is installed.
- Change User Password: Change the user password. If lost, the User Password can be changed by an Engineer.
- To enter information simply tap the appropriate box and an alphanumeric keyboard will pop up. Enter and save your information.

Pump

What: Configure the pump. Normally only programmed by experienced service engineers.

The screenshot shows a software window titled "Hydrocell 2" with a close button (X) in the top right corner. The interface is divided into several sections:

- Pump Starts:** A digital display showing the value "0".
- Pump Run:** A digital display showing "00s". Below it is a "Reset" button.
- Pump Maintenance Cycle:** A text input field containing "10000 h".
- Remaining Lifetime:** A digital display showing "416days 16h". Below it is a "Reset" button.
- Alarm:** A section with a checked checkbox and a text input field containing "0 days before".

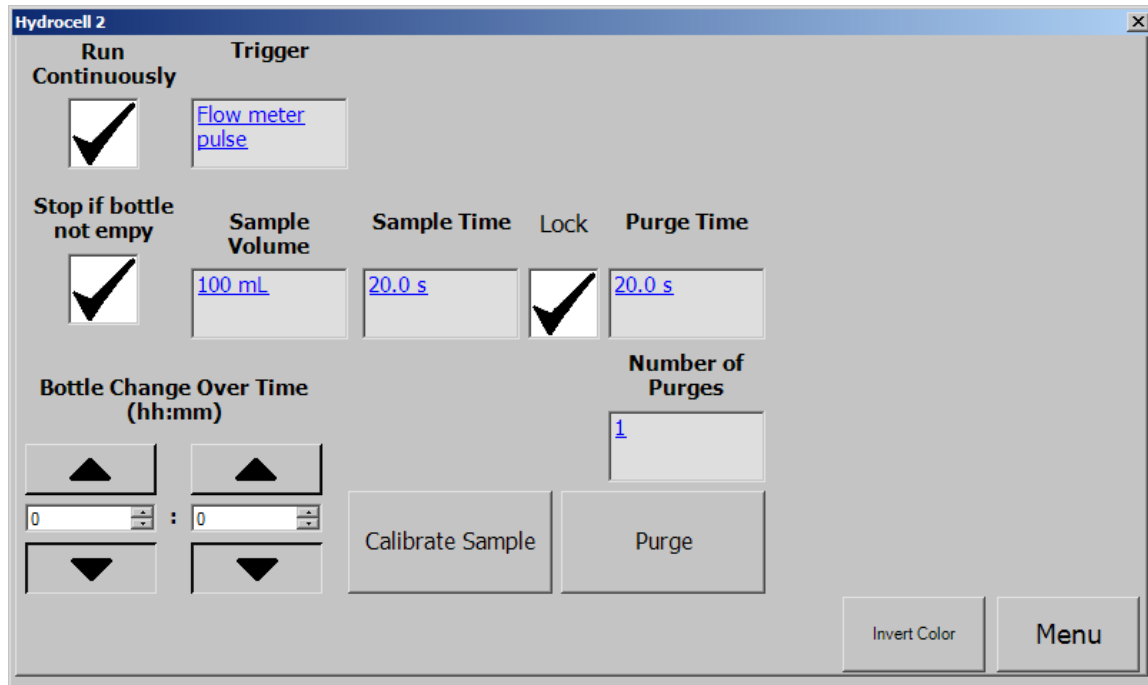
At the bottom right of the window, there are two buttons: "Invert Color" and "Menu".

Description:

- Pump Starts: Number of time the pump has started.
- Pump Run: Time length during which the pump has been running.
- Reset: Reset the Pump Starts and the Pump Run to 0.
- Pump Maintenance Cycle: Time between two services of the pump.
- Remaining Lifetime: Time before the next service of the pump.
- Alarm: Enable an alarm to be displayed a number of specified days before the next pump maintenance.
- Days Before: Number of days before the next maintenance for the alarm.

Sampling

What: Configure the sampler. This is the most important menu.



Description:

- Run Continuously:
 - If not checked: When the sample reaches the 2nd bottle, it will automatically stop when this one is full or at the end of the current day. This is the safest mode of operation and prevents overflow.
 - If checked: The sample will not stop and will assume that the bottles have been emptied.
- Stop if bottle not empty:
 - If checked: On a new day, if the bottle that should be the current one is not emptied, the Hydrocell will stop. To empty a bottle, physically empty it and press the empty button on the running display. ***This will be coloured red if the bottle is full.***
 - If not checked: The Hydrocell will continue whatever the state of the bottle is (unless it is full).
- Trigger:
 - Flow meter pulse: The Hydrocell will perform a sample every time it receives a pulse from a flow meter.
 - Time Interval: The Hydrocell will perform a sample on a defined time interval in minutes.
 - Flow meter pulse: The Hydrocell will perform a sample when a 4-20mA input value get higher than a defined value.
- Sample Volume: Volume in millilitre of a sample.

- Lock: Keep the purge time equal to the sample time.
- Sample/Purge Time: Time in seconds for which the pump runs to grab a sample/purge the tube.
- Number of Purge: Number of purge before a sample and after it.
- Calibrate Sample: Perform a simple sample cycle (purge, sample, purge).
- Purge: Purge the tube.
- Sample Sequence: A sample sequence consists of a minimum of 3 cycles:
 - Purge: The pump runs in reverse and pumps air down the tube into the sample vessel. This clears the tube of any debris or stale sample
 - Sample: The pump then sucks a sample through to the 10L container.
 - Purge Again: The sampler then purges again to ensure the intake tube is clear for the next sample.
 - **Note: Sometimes it is necessary to purge more than once to clear the intake tube.**

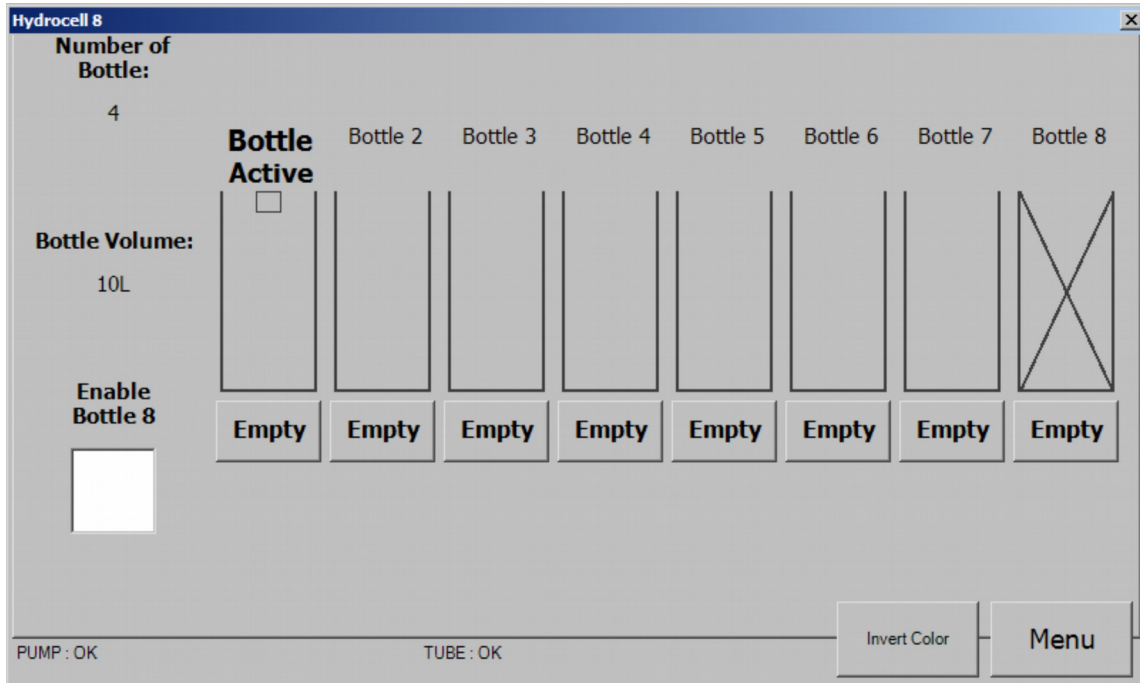
- How to calibrate the sample volume:

The sample volume is determined by the time the pump must run to collect your desired sample volume.

- 1) Set the sample time to 30 seconds.
- 2) Place a graduated measuring jug under the discharge arm on Bottle 1 position(the calibration sample will always be performed on bottle 1)
- 3) Press the “Calibrate Sample” button, read the message that appears and confirm.
- 4) Once the sample is finished, compare the volume taken by the sampler, with the one you want:
 - If the sample taken is too big, decrease the sample time, clean the jug and go back to 2;
 - If the sample taken is too small or no sample is collected, increase the sample time, clean the jug and go back to 2.
 - If the sample taken is of the correct volume, go to 5.
- 5) The sample time is now correctly calibrated.

Bottles

What: Configure the bottle. Modifiable only in Engineer Mode.



Description:

- Number: Number of bottle in the sampler.
- Volume: Volume of each bottle in litre.
- Bottle: Graphical representation of the bottle with the expected volume of liquid. For indication only.
- Empty: Empty the bottles.
- Enable Bottle 8: In the Hydrocell8, it is possible to enable or disable the 8th bottle. When the 8th bottle is disabled, to each day of the week corresponds a single bottle (Bottle 1 is always used on Monday...)

Tubing

What: Configure the peristaltic pump tube

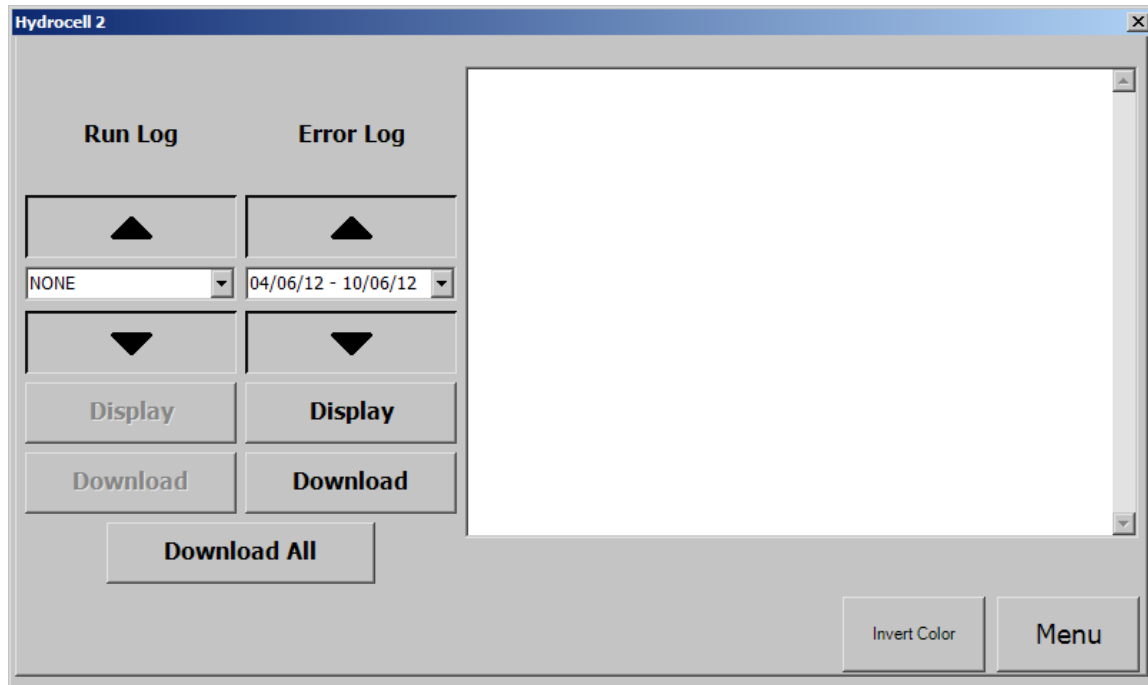
The screenshot shows a software window titled "Hydrocell 2" with a grey background. On the left, under the heading "Life", there is a dropdown menu currently showing "Quarterly". To its right, under "Installation Date:", are four spinners for "Day", "Month", and "Year", with values 1, 6, and 2012 respectively. Below these are four more spinners with downward-pointing triangles. In the center, there is an "Alarm:" label next to a checked checkbox. To the right of the checkbox is an "Alert" spinner set to "30" followed by the text "days before". At the bottom right of the window are two buttons: "Invert Color" and "Menu".

Description:

- Life: Expected lifetime of the tube.
- Installation Date: Date of the installation of the current tube.
- Alarm: If enabled, an alarm is enabled when the tube lifetime is almost finished.
- Alert n days before: If an alarm is enabled, an alert will be sent n days before the end of the tube lifetime.

Log

What: Displays log of Hydrocells performance.

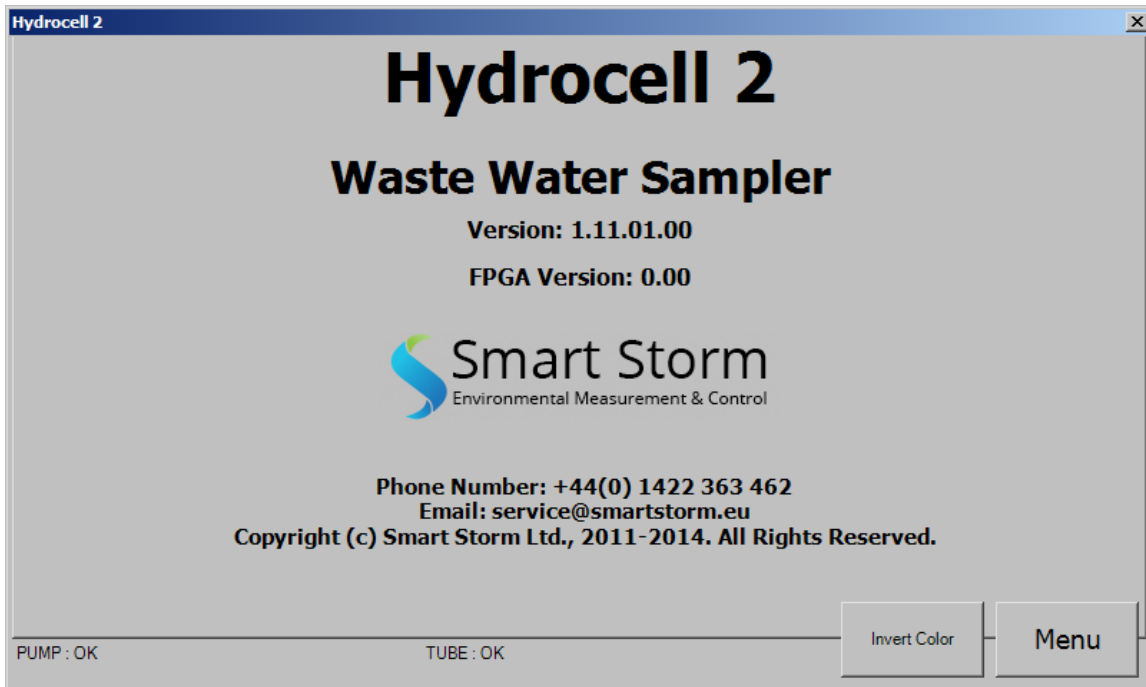


Description:

- Log File: Every action performed by the Hydrocell (including errors) is stored in files. Each file represents a week of event sampling.
- Run Log: Contains date, time and details about normal operation event such as:
 - Auto or Manual Sample Time.
 - Start and Stop of the Run Mode.
 - Bottle changed and volume of previous and new bottle.
 - Bottle full.
 - Bottle empty.
- Error Log: Contains date, time and details about abnormal operation event such as
 - Rotor arm can not position itself to the above the correct bottle.
 - Application started or closed.
 - Connection with the rotor arm lost.
 - Configuration changed.
- Display: Display the selected Log file in the right hand side.
- Download: Download the selected Log file to a USB stick. Please ensure your USB stick is connected before pressing this button.
- Download all: Download every existing Log files (Run and Error) to a USB stick.

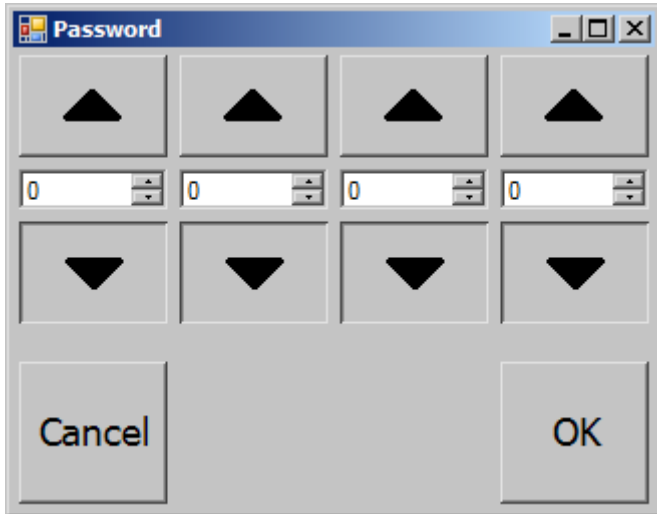
About

What: Information about the software and Smart Storm Limited



Password

What: A form to input a password to log on.



- **Factory set: The factory set default password is 0001.**

Wiring Hydrocell

