

USI HYDROCELL 4 & 8

Instruction Manual



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Contents

Specifications	2
1. General Information	3
Wiring and Handling Precautions.....	4
2. Introduction.....	6
3. Installing the Hydrocell.....	6
3.1. Location.....	6
3.2. Electrical Connections.....	6
4. Hydrocell Run Screens.	8
4.1. Home Screen.	8
4.1.1 START/STOP Button	10
4.1.2 SPOT SAMPLE Button.	12
4.1.3 Emptying the Bottle.	13
4.1.4 Temperature Trend Graph.....	16
4.1.5 LEDs.	17
4.1.6 SETTINGS.....	17
5. Configuring the Hydrocell.	20
5.1. Menu Screen.....	21
5.2. Sampling Screen.....	21
5.2.1 Choosing the Sample Size.	22
5.2.2 Entering the Sample and Purge Times.....	22
5.2.3 Reset Pump Tube	23
5.2.4 Sampling Mode.....	23
5.3. Change Over Screen.....	24
5.3.1 Bottle Status.	25
5.3.2 Programming Modes.....	26
5.4. Temperature Menu.	33
5.5. About Screen	35
5.5.1 Site Information	35
5.5.2 Change User Password.	35
5.5.3 Set Time and Date.....	36
6. Wastewater Refrigerated Sampler Service Tasks.	37

Specifications

USER INTERFACE	
Display	7 inch (800x480 pixels) full colour graphical display with anti-glare cover
Programming	Touch screen (optional wireless keypad)
Operating Systems	Windows CE 60 R3 (license included)
Enclosure rating	IP65
Logging	2GB SD Card records sampling events; alarm conditions; pump starts, pumped volume and configuration.
SOFTWARE	
Modes	Fully user programmable for calibration volume, line purge, start bottle, bottle sequence' continues or fixed cycle sample interval, refrigeration temperature.
Display Features	Graphical display of bottle filling action, current fill status, alarm conditions, spot sampling
Engineering	Password protected engineering mode for diagnostics, testing and software upgrades.
POWER	
Supply (AC)	85-240V 315A
Supply (DC)	24V 12A
PUMP	
Media source suitability	Wastewater from non-pressurised submersed sampling point
Type	Peristaltic with 24Vdc motor
Pump tube	Thick walled marprene tube, 8mm internal diameter
Intake tube	Braided LDPE up to 40m length
Maximum lift	7 metres (23 feet)
Repeatability	Typically, ± 5 ml (this may vary depending on the density of the liquid)
CONTROL	
Sample trigger	Pulsed input / 4-20mA input / contact closure / timed
Time based	Fully user programmable
OUTPUTS AND COMMUNICATIONS	
Alarms	2 x User programmable SPCO rated at 5A@230Vac
Digital	2 x USB, 1 x Ethernet

Table 1.1 – Device Specifications

1. 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.

Wiring and Handling Precautions



Electrocution Hazard. Always disconnect mains supply before removing covers and connecting any external wiring.
Only qualified Electricians should install this product. IET BS7671:2008 wiring regulations must be adhered to when installing the product.

NOTICE

Delicate internal electronic components can be damaged by static electricity, resulting in indeterminate instrument performance or eventual failure. Smart Storm recommends taking the following steps to prevent ESD damage to your instrument:

- Before touching any instrument electronic components (such as printed circuit cards and the components on them) discharge static electricity from your body. The user can accomplish this by touching an **earth - grounded** metal surface for 3 seconds such as the chassis of an instrument, or a metal conduit or pipe.
- To reduce static build-up, avoid excessive movement. Transport static-sensitive components in anti-static containers or packaging.
- To discharge static electricity from your body and keep it discharged, wear a wrist strap connected by a wire to earth ground, especially when handling circuit boards.
- Handle all static - sensitive components in a static - safe area. If possible, use anti-static floor pads and work bench pads.

⚠ DANGER

Electrocution hazard. Always install a ground fault interrupt circuit (GFIC)/ residual current circuit breaker (RCCB) with a maximum trigger current of 30 mA. If installed outside, provide overvoltage protection through a MCB rated not greater than 5 Amps.

⚠ DANGER

With fixed wiring, a disconnecting device (local interruption) must be integrated into the power supply line. The disconnecting device must meet BS7671:2008 standards and regulations. It must be installed near the device, be able to be reached easily by the operator and labelled as a disconnecting device.
If the connection is established using a mains connection cable that is permanently connected to the power supply, the plug of the mains connection cable can serve as local interruption.

⚠ DANGER

Ensure the relays are not subjected to loads great than 5 Amps as this will cause internal damage and possible product destruction.

2. Introduction.

The Hydrocell Wastewater Sampler Range is designed to collect composite (flow, event or time proportional) samples of trade effluent discharges in industrial applications.

The 2/4/8 bottles available for sampling in the Hydrocell gives flexibility in sampling and collecting, allowing both Continuous and Single Programmed Sequences to be performed.

The Hydrocell 4 & 8 incorporates a refrigerated compartment to keep the samples cool and help maintain the integrity of the effluent. The Thermo-electric cooler is also used for frost protection to heat the samples if the temperature falls below 0°C.

The large display and touch screen provide simple, user friendly programming and clear reporting of the Sampler Status.

This Instruction manuals show screen shots for the 8-bottle sample for illustrative purposes. The 2 & 4 bottle samplers differ only in the number of the bottles shown on the screen and all functionality (apart from the cooler) is the same on all 3 models.

3. Installing the Hydrocell.

3.1. Location.

The Hydrocell 8 is IP65 rated allowing it to be located outside and close to the required sample point. Whilst it includes a High-Resolution Display, care should be taken when positioning the Hydrocell to avoid direct sunlight. This will make the screen difficult to see and ultimately cause permanent damage.

3.2. Electrical Connections.

The Hydrocell can be supplied in either 24Vdc or 85-240Vac versions and is supplied with a pre-fitted 5-meter power cable:

24V version - Cable 1 +ve, Cable 2 -ve/GND

AC version – Cable 1/Brown Live, Cable 2/Blue Neutral, Green and Yellow GND.

The sampler will boot immediately the power is connected; it is recommended a local switch/isolator is fitted to the power cable.

A 5-meter sample request cable with a 3-pin connector is supplied. This mates with the connector on the side of the Hydrocell.

Intake Hose Connection

The Hydrocell is supplied with a 10-meter length of braided intake hose. One end should be attached to the Peristaltic Pump and secured with a Jubilee Clip.

The other end should be placed in the effluent at the point from which the sample is to be taken. The following points should be considered when fitting the intake tube:

- Keep the run as short as possible.
- Avoid U bends in the hose as this can lead to airlocks and inaccurate sample volumes. Ideally, place the Hydrocell as high as possible such that the intake tube runs down and horizontally.
- Ensure that the intake tube is below water level when a sample is requested – where a low flow is anticipated, it may be necessary to fit a reservoir to collect the liquid (e.g. after a flume).
- It may be advisable to fit a weight to the end of the Hose or to fit a solid pipe to ensure there is no bending of the Hose above the waterline.
- During a purge and sample the effluent may be disturbed and cause incorrect flow readings. If possible, place away from any open channel measuring equipment.
- Ensure the sample taken is representative of the effluent going to drain. Some systems can be prone to acidic or caustic build up near the edge of tanks and flumes.
- Ensure the sample intake is clear of any build-up of sediment.
- Consider fitting a filter to the end of the Intake Hose to stop the Hose becoming blocked.

4. Hydrocell Run Screens.

4.1. Home Screen.

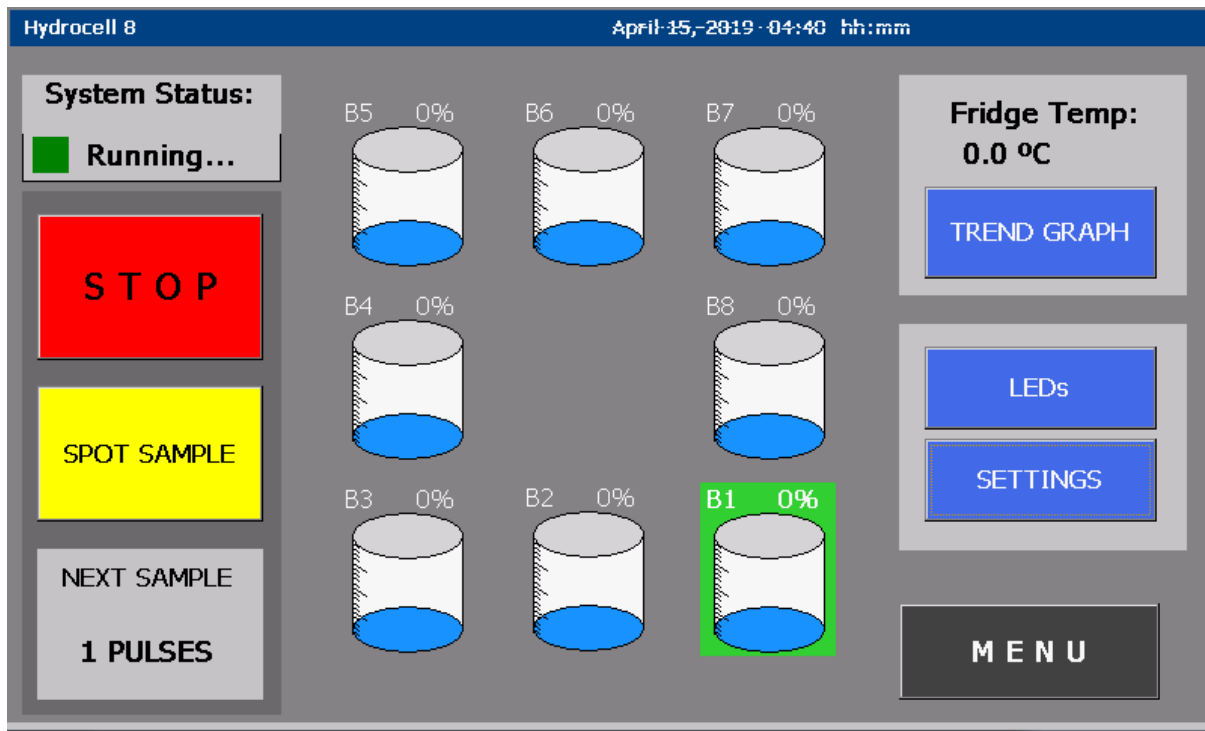


Figure 5.1 HC 8 Home Screen.

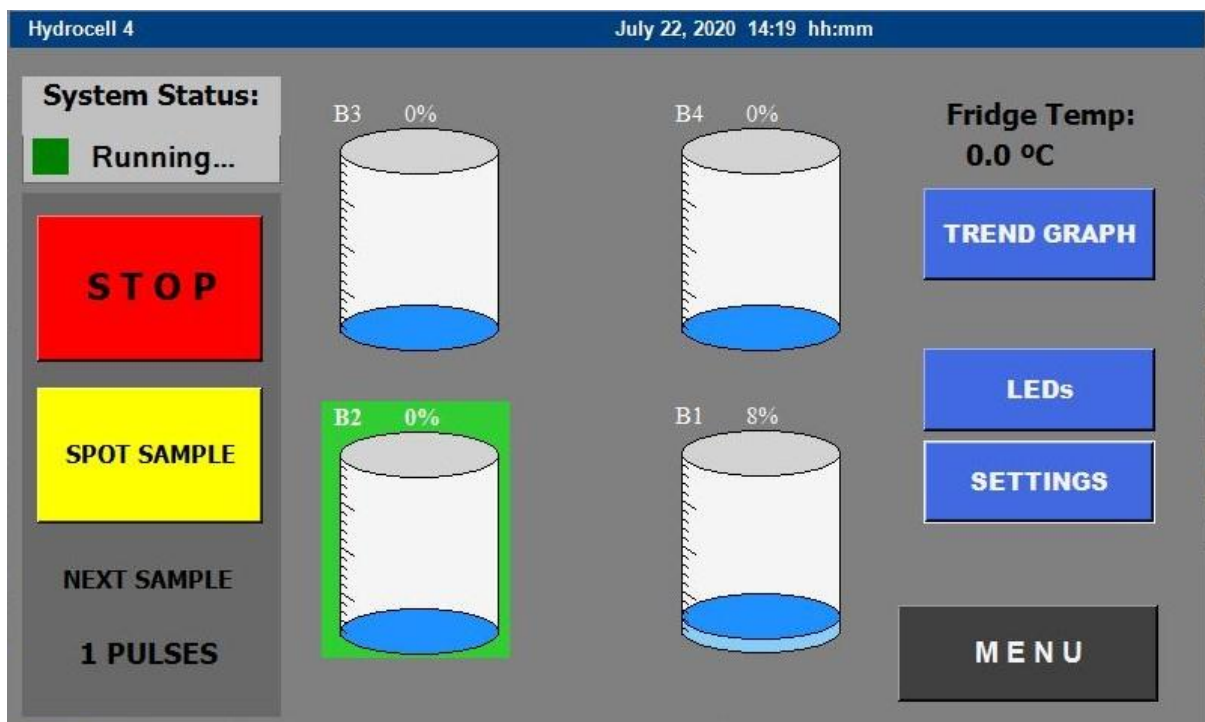


Figure 5.1.1 HC 4 Home Screen

The Home Screen provides information about the current status of the Hydrocell. Each of the bottles is shown on the Screen along with the percentage the bottle of effluent in the bottle.

The Active Bottle (Bottle 1 in figure 5.1) is shown with a green outline, and this is the bottle into which samples are currently being taken. The System Status is displayed at the top left of the screen immediately above the Stop/Start and Spot Sample Buttons.

An indication of the time/events to the next sample is displayed in the bottom left of the screen. This may be the number of Pulses/Contact closures, the Time or the volume of Flow, depending up on the configuration of the Sampling.

On the right of the display the current temperature of the Refrigerated Compartment is shown and a button to allow the Temperature Trend Graph display screens. The LEDs button opens a pop-up box to indicate the function of the six LEDs on the USI Fascia and the Settings button allows access to Screens giving information regarding the Set-Up and History of the Hydrocell.

Finally, a button is provided to access the Menu for configuring the Hydrocell.

The Home Screen is also used to empty Bottles and take Spot Samples.

4.1.1 START/STOP Button

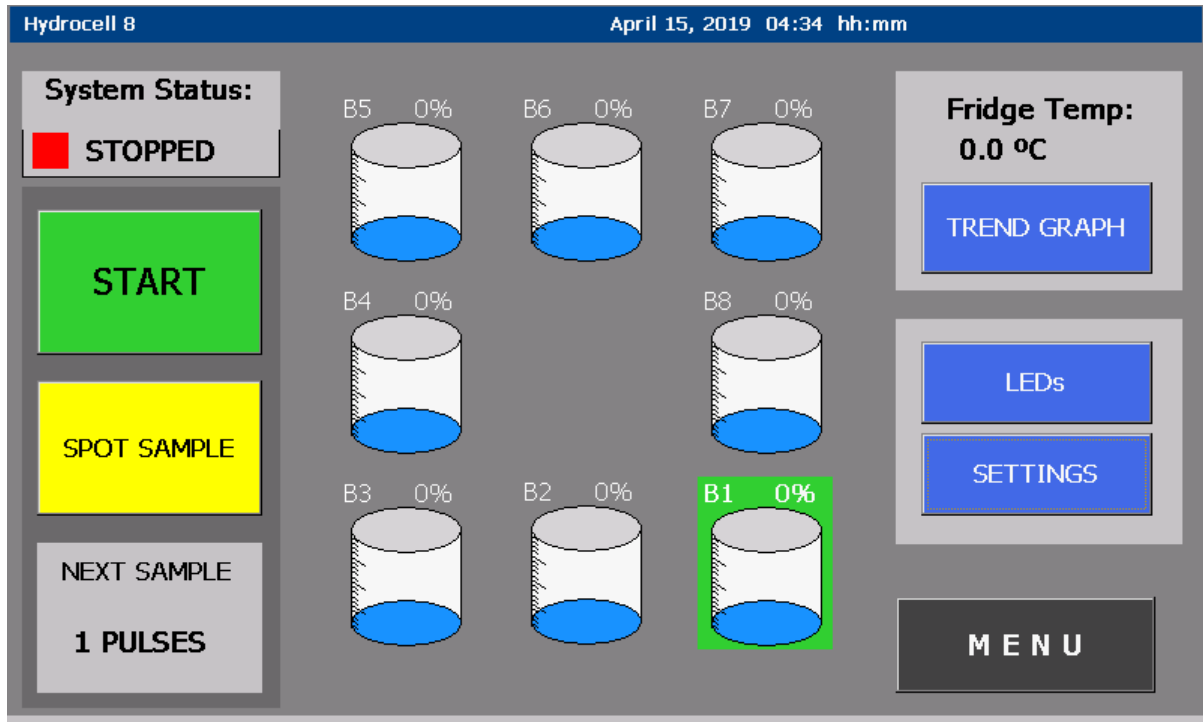


Figure 5.2 HC8 Pressing the Stop Button.

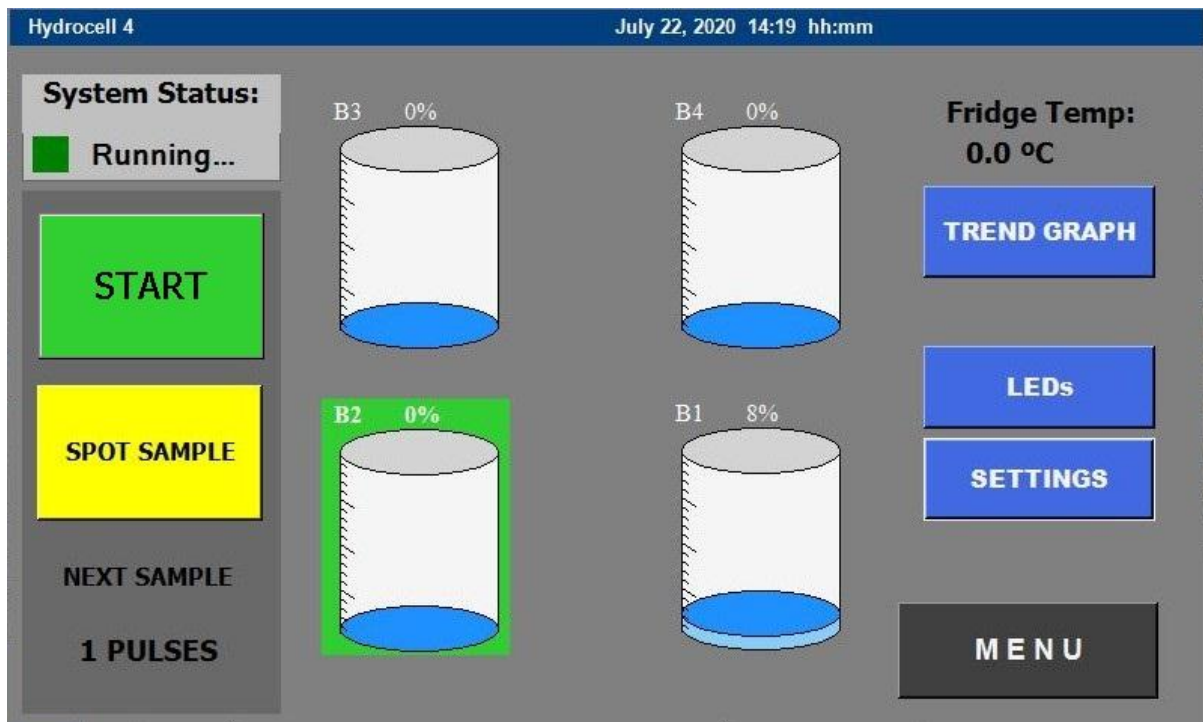


Figure 5.2.1 HC4 Pressing the Stop Button

When the Stop Button is pressed the Button will change to a green Start Button and the System Status will change depending on the Programming Mode of the Hydrocell.

If the Hydrocell is in Continuous Mode, the System Status will show STOP and the Active Bottle will remain unchanged until the Hydrocell is restarted and a Bottle Changeover Time is reached.

If the Hydrocell is in Programmed Mode, the System Status will show PAUSE and the Active Bottle will change when a Bottle Changeover Time is reached in order to remain synchronised with the program.

In both Modes no samples will be taken whilst the Hydrocell is either STOPPED or PAUSED.

4.1.2 SPOT SAMPLE Button.

The Spot Sample Button is used to take a Manual Sample. This is typically used to check the operation of the sampler (calibration and functionality) or to take an immediate, non-composite sample for testing.

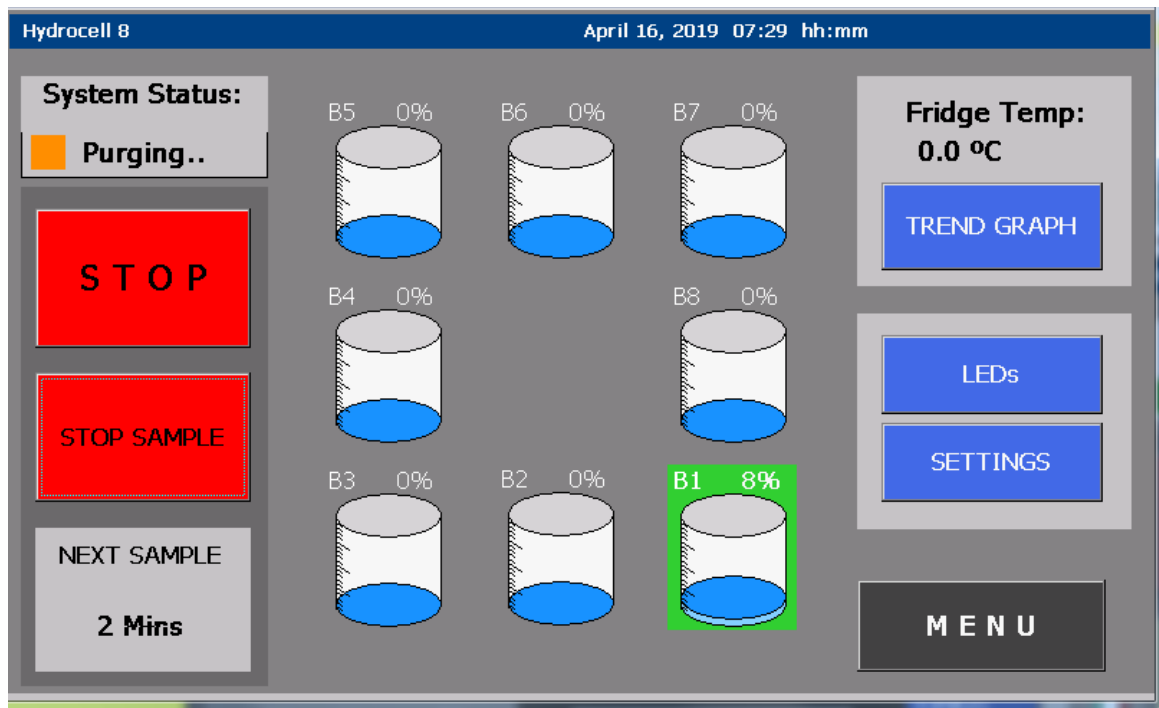


Figure 5.2 HC8 Spot Sample.

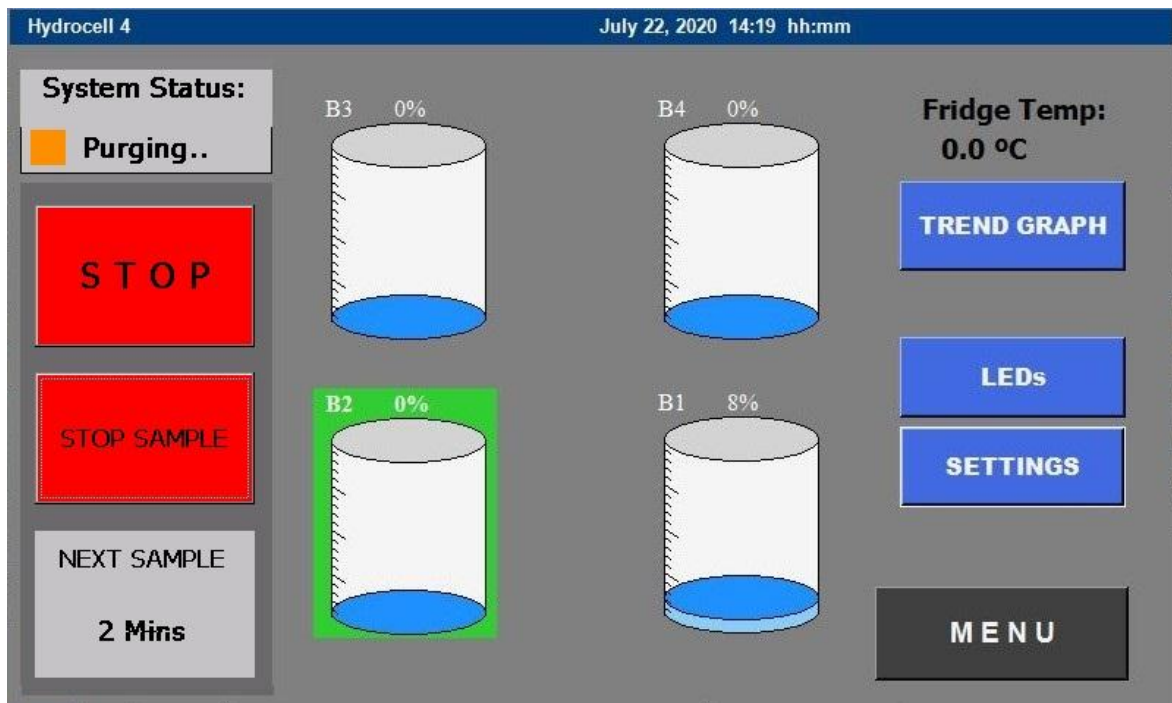


Figure 5.2.1 HC4 Spot Sample.

When the SPOT SAMPLE Button is pressed, the Button changes to a red STOP Button. Pressing this Button at any time during the Sample Process will immediately halt the process and return the sampler to its previous status.

The Spot Sample will mirror the process when a sample request is received, having the same timings and sequence and sampling into the Active Bottle.

Following the SPOT SAMPLE request there will be a delay whilst the Hydrocell selects the Active Bottle. The System Status will then change to Purging and the Peristaltic Pump will rotate in the direction that will drive air out through the Intake Hose (if the pump is functioning correctly this will cause bubbling in the effluent). The number of Purges is set on the Sampling Page.

The System Status will then change to Sampling and the Peristaltic Pump will rotate in the opposite direction. This will draw a sample up through the Intake Hose and into the Active Bottle.

Finally, the Hydrocell will carry out a number of Post Purges designed to evacuate the INTAKE HOSE of any liquid.

At the end of the Spot Sample Sequence the Hydrocell will return to its previous Status and the percentage volume in the Bottle will increase by the volume set on the Sampling Page.

N.B. The Spot Sample will take a Sample even when the Status is STOPPED. Care must be taken that it is not pressed when the Peristaltic Pump is being worked upon.

4.1.3 Emptying the Bottle.

The Hydrocell tracks the volume of liquid in each Bottle by multiplying the number of Samples taken into the Bottle by the Sample size. This volume is then shown as a percentage of the total Bottle volume.

If the next Sample would make the Bottle exceed 95% of its volume, the Sample will not be taken and a pop-up message will appear on the Display.

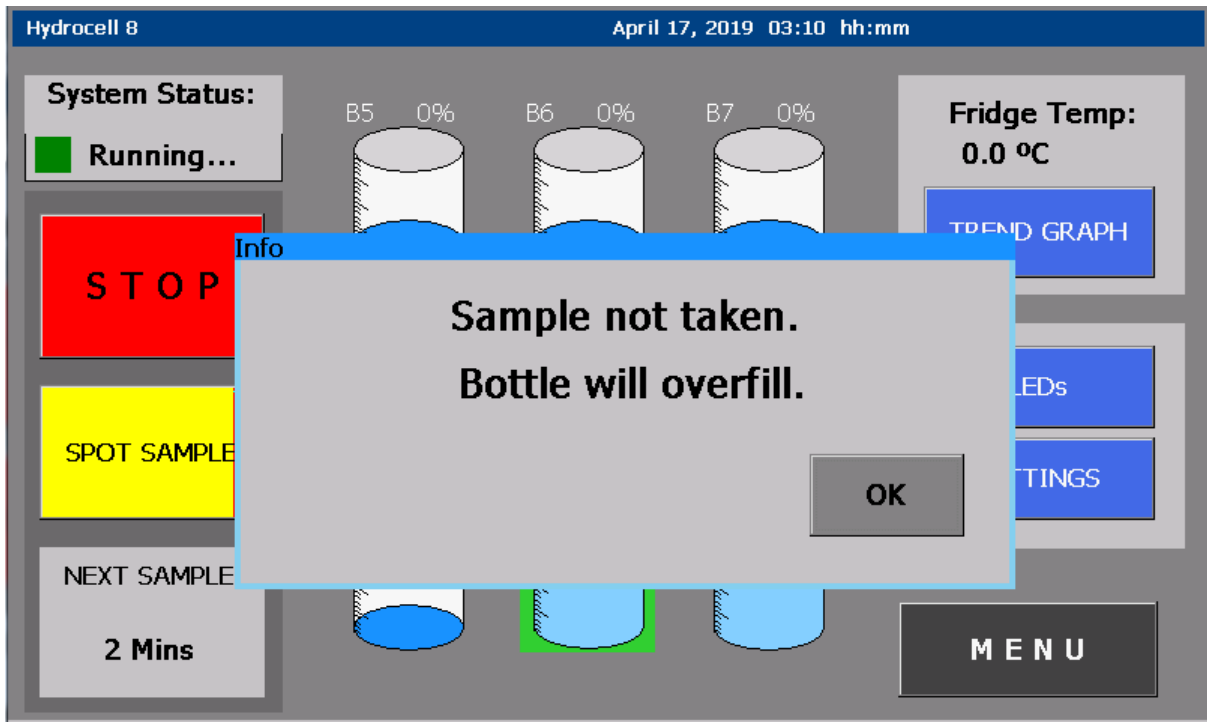


Figure 5.3 HC8 Bottle requires Emptying.



Figure 5.3.1 HC4 Bottle requires Emptying

To continue either a new Active Bottle must be selected (see [section 6.3.1](#)) or the Bottle must be emptied.

Cancel the pop-up message by pressing OK.

To empty the Bottle, select the Bottle to be emptied using the Touchscreen, the EMPTY Button will appear in the centre of the Display.

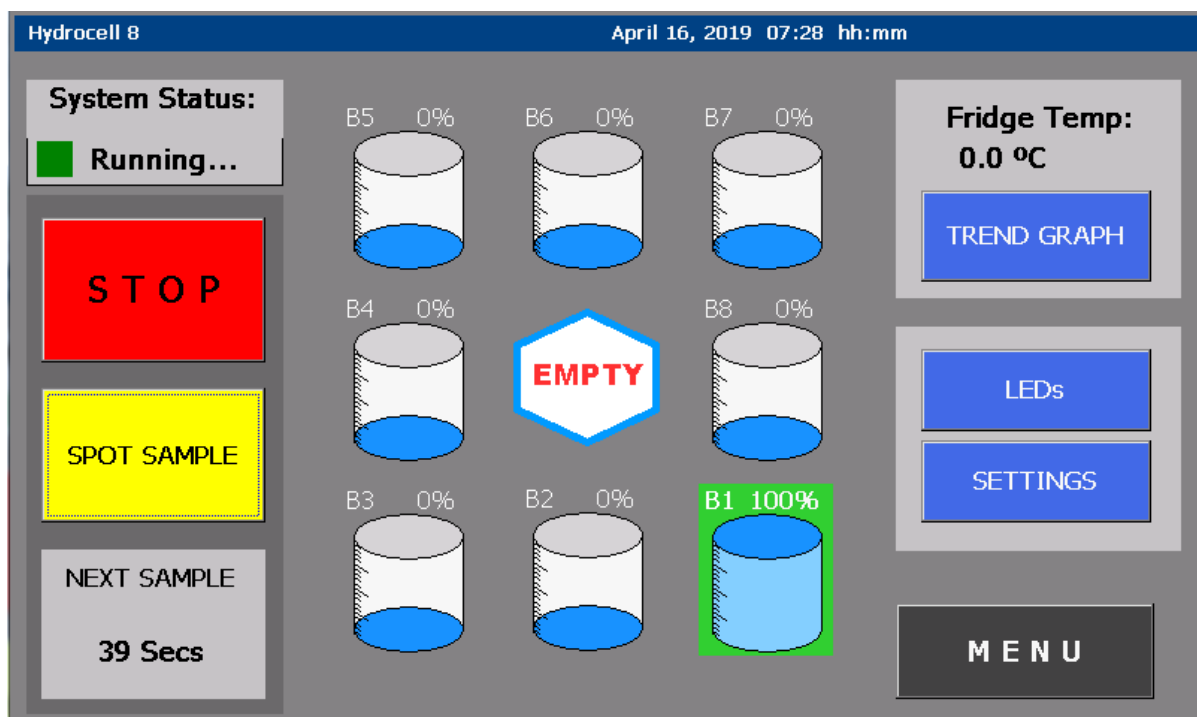


Figure 5.4 HC8 Emptying the Bottle.

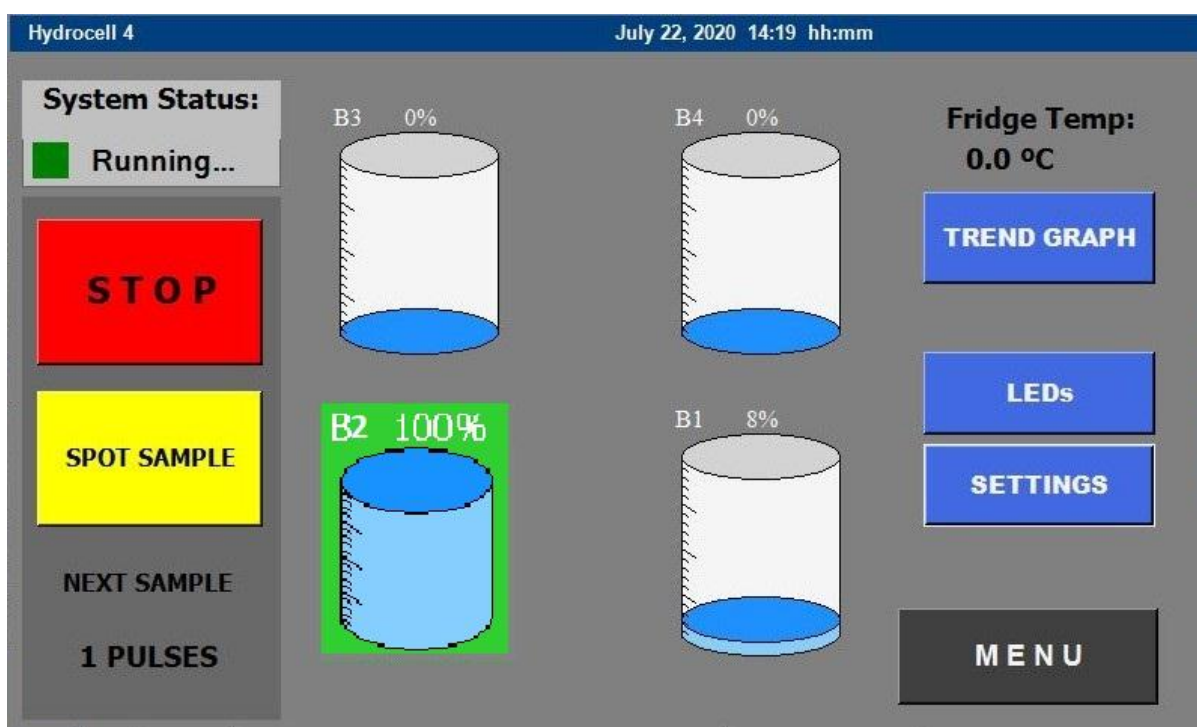


Figure 5.4 HC4 Emptying the Bottle

Press the EMPTY Button and the volume will be reset to 0% and the Hydrocell will now take a Sample into that Bottle.

N.B. Emptying the Bottle only resets the volume of the Bottle it does not physically empty the Bottle!

After resetting the volume, it is essential that all the effluent is removed from the Bottle to prevent overfilling.

When the Hydrocell is running in Continuous Mode an option is provided to Pause the program if the Active Bottle has not emptied since it was last filled. This is to maintain the integrity of the sample to a single changeover time. It is therefore essential to ensure the Bottles are regularly emptied.

4.1.4 Temperature Trend Graph.

The Hydrocell Home Screen shows the current temperature inside the refrigerated compartment and a Trend Graph to ensure it is functioning correctly.

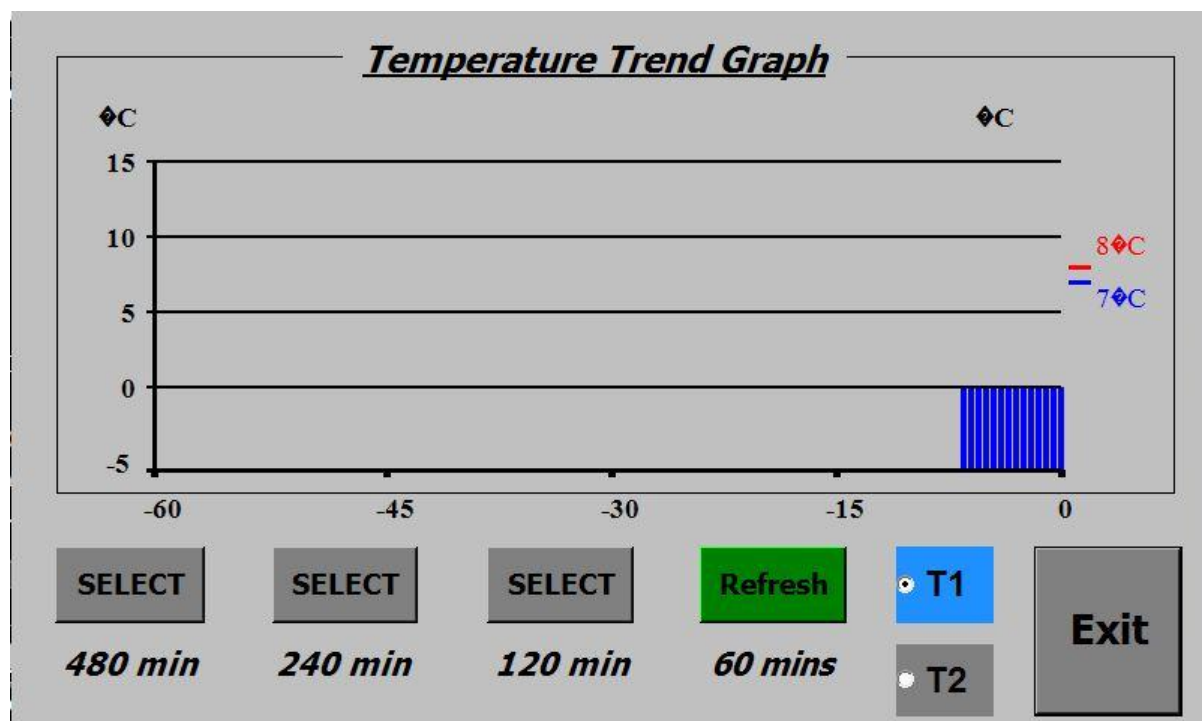


Figure 5.5 Temperature Trend Graph.

The ON temperature for the Thermo-electric Cooler is shown in red on the right-hand side of the screen, and the OFF temperature is shown in Blue. The temperature is shown as a bar graph with a blue line indicating the temperature is below the OFF temperature and a red line indicating the temperature is above the ON temperature.

If the Refrigerating Unit is functioning correctly the Trend Graph will show a majority of green lines.

The Hydrocell has two Thermistors one at the top and one at the bottom, either of which can be used to regulate the temperature in the compartment. The Trend Graph for either Thermistor can be selected by pressing T1 or T2.

Four time scales are selectable, to show the temperature over the last 1, 2, 4 and 8 hours and the graph can be manually refreshed by pressing the selected time scale.

If the Hydrocell is turned off the information will be lost, and the Trend Graph will restart.

4.1.5 LEDs.

Pressing the LEDs Button on the Home Screen generates a pop-up which identifies the functionality of the six LEDs on the Hydrocell Fascia.

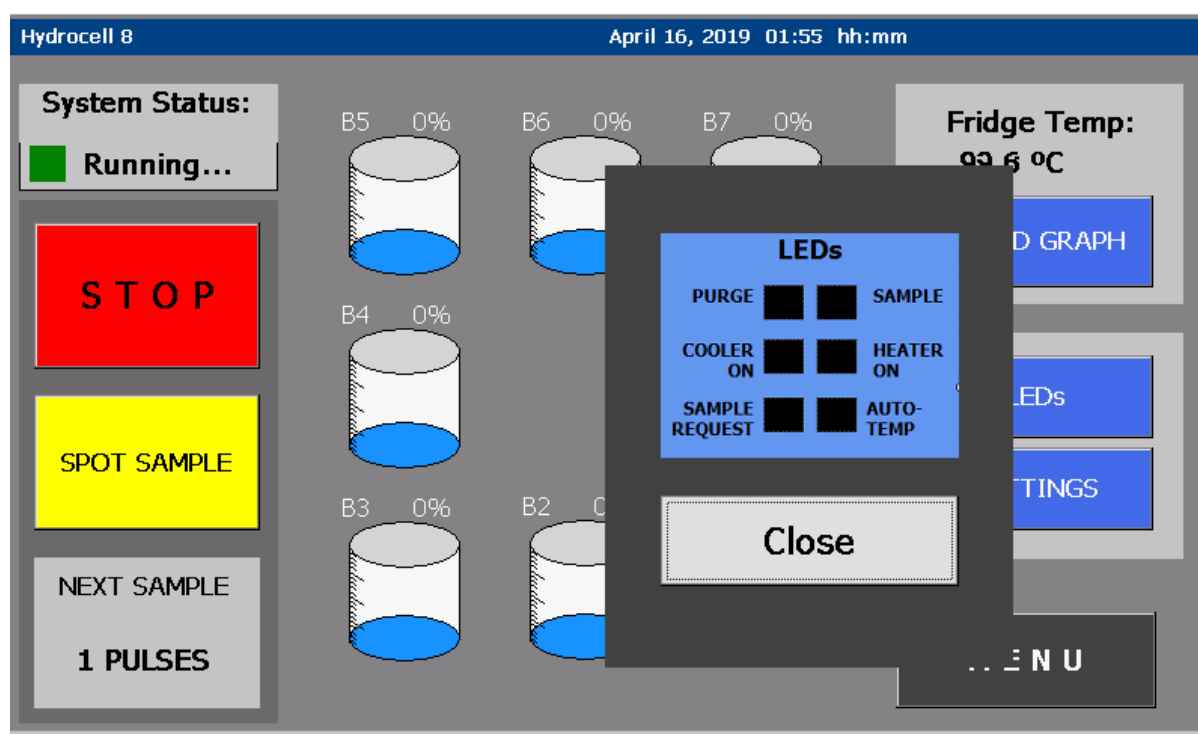


Figure 5.6 LEDs.

To return to the Home Screen, press the Close Button.

4.1.6 SETTINGS.

The SETTINGS Button gives access to pages showing information regarding the Set-up and operation of the Hydrocell. The different screens can be accessed using the left and right scroll buttons at the bottom of the screen.

- Sampling Screen

Hydrocell 8 April 18, 2019 06:03 hh:mm

SAMPLING INFORMATION

SAMPLE MODE: BOTTLE CHANGE:

SAMPLE EVERY: Mins PAUSE IF BOTTLE NOT EMPTIED:

SAMPLE VOLUME: ml

SAMPLE TIME: Secs BOTTLE SIZE: liters

PRE- PURGE: Secs

POST- PURGE: Secs

<< CLOSE >>

Fig 5.7 Sampling Information.

Shows information on the Sampling and Purge times and Program Mode. These settings are explained further in the Sampling set-up section.

- Site Information Screen

Hydrocell 8 April 24, 2019 12:25 hh:mm

Smart Storm
Environmental Measurement & Control

Hydrocell 8
Version: 1.0.0
SN: 123456

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www.smartstorm.eu

Company: HYDRO SYSTEMS
Site ID: EFFLUENT PLANT
City/Town: PONTEFRAC
Contact: FRED SMITH
Phone: 01977 564679

<< CLOSE >>

Fig 5.8 Site Information.

- Bottle Information

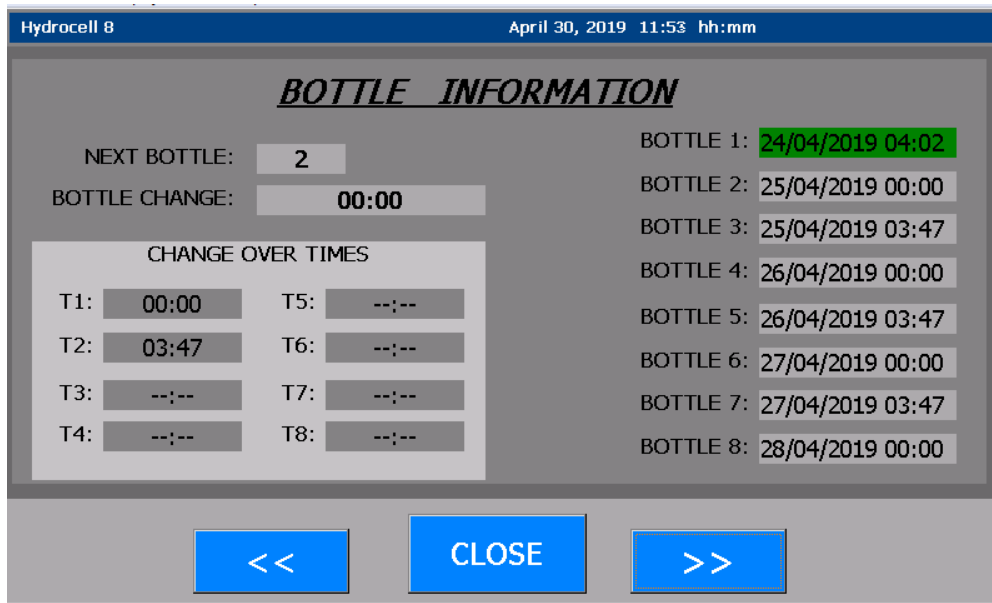


Fig 5.9 Bottle Information.

The Bottle Information screen shows details of the information programmed in the Change Over menu.

The right hand side of the screen details the time and date that each of the Bottles became the Active Bottle, with the current Active Bottle highlighted in green.

The Next Active Bottle and the time it becomes active is indicated on the top left of the screen.

- Cooler and Pump Information.

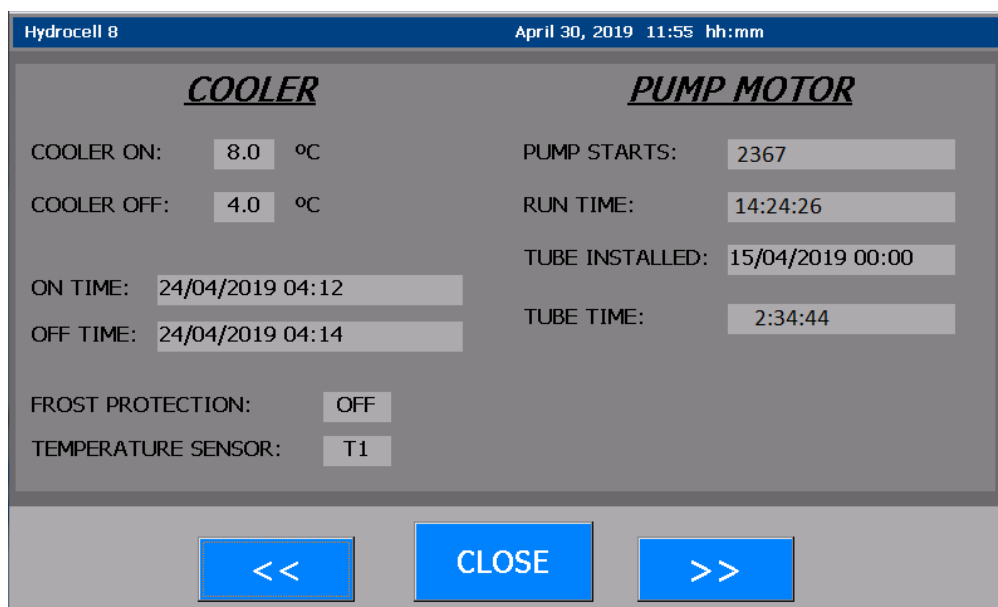


Fig 5.10 Cooler and Pump Information.

The Cooler Information details the settings in the Temperature Menu, with the addition of the time the cooler was last switched ON and OFF. Monitoring these values gives an indication of the performance of the Cooler and Insulation of the Hydrocell.

The Pump Information shows the number of Pump starts and total Run-Time of the motor. This should be reset if the pump is changed.

After a period of time, the Peristaltic Pump Tube will become misshapen and will need to be replaced. The Pump Tube will typically last around 100 hours. When the Pump Tube is changed, the installation date is recorded and the Tube time reset by pressing the Tube Install Button in the Sampling Menu.

5. Configuring the Hydrocell.

The Hydrocell is configured from the Menu Screens. These are accessed by pressing the Menu Button on the Home Screen and entering the Password.

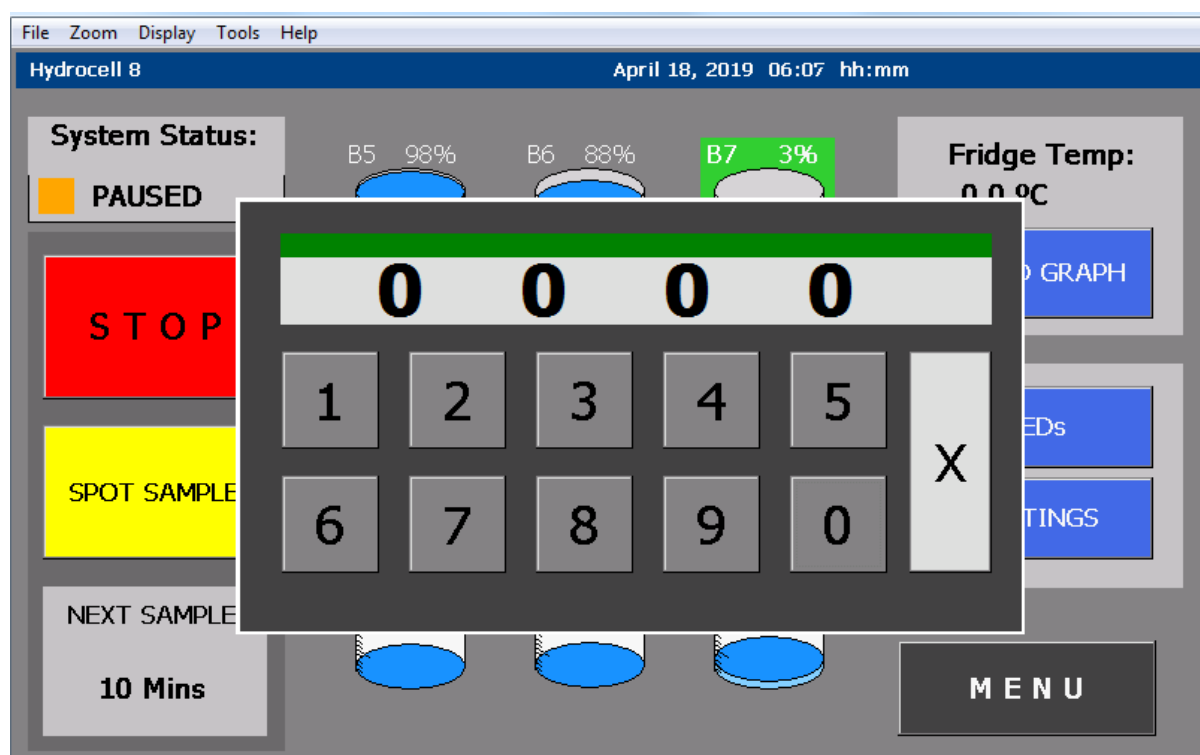


Fig 6.1 Password Screen.

The Password is factory set to 0000 and if entered correctly the Bar above the Password will turn green and the MENU Screen will appear. The Hydrocell will be placed in PAUSED mode for whilst accessing the Menu and will be return to RUNNING when the Menu is exited.

5.1. Menu Screen.

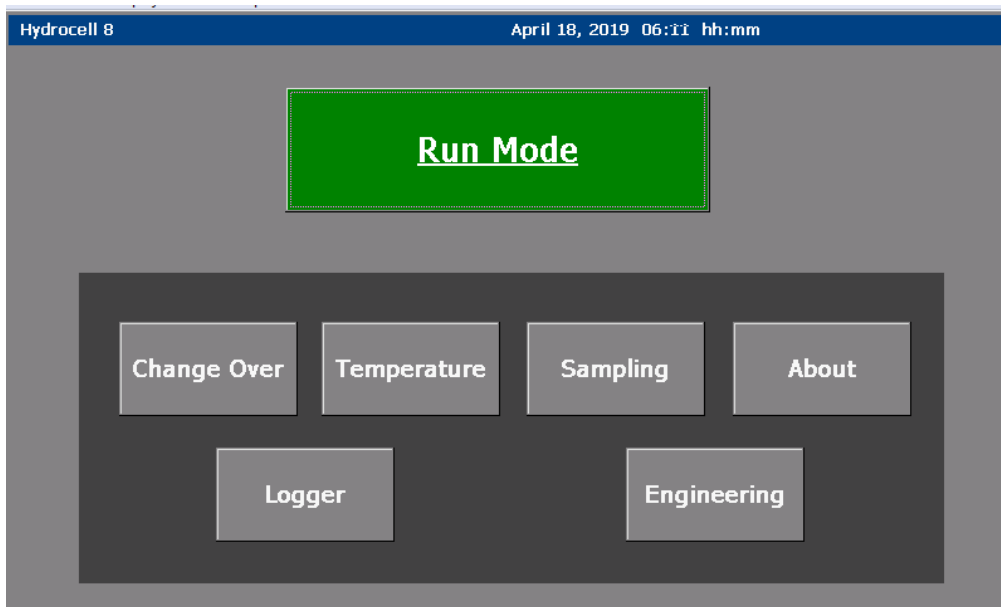


Fig 6.2 Menu Screen.

The large Run Mode Button returns the Hydrocell to the Home Screen. The Engineering Button is only accessible when the Engineering Password is entered. For further information please contact Smart Storm.

The Menu will time-out 15 minutes after no button is pressed to prevent the Hydrocell being left in a PAUSED state.

5.2. Sampling Screen.

The Sampling Screen is used to configure the size of the sample and the method of triggering the sample.

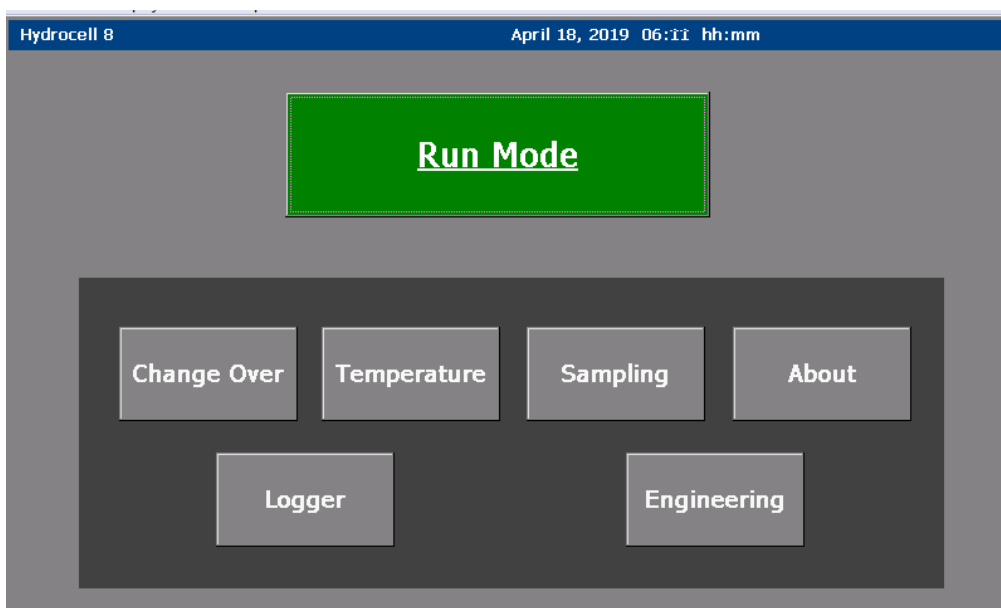


Fig 6.3 Sampling Screen.

5.2.1 Choosing the Sample Size.

The Hydrocell is designed to fill the bottles to approximately 95% of their total volume and stop. Ideally the sample should be Flow Proportional i.e. more samples should be taken when the flow is high, and the bottle should fill over the entire time the Bottle is Active.

Consider a Bottle which is Active for a period of 24 hours (e.g. a single bottle changeover is set at 00:00) and an average daily flow of 30m³.

The flow proportional sample request can be set to trigger every 1m³, such that there are 30 sample requests on average every day.

If the sample size is set to 100ml then on an average day, the bottle will fill to 75% (3 litres) of its total volume. This will leave overhead for days when larger volumes occur. Similarly, the sample request can be set to 0.5m³ and the Sample size set to 50ml with the same resultant volume.

The sample size would typically be set to between 50ml and 200ml depending on the bottle size and nature of the effluent.

The eight bottles of the Hydrocell 8 give the flexibility to fill numerous bottles over a 24-hour period, with increased sample size. The trade off being the reduced time between emptying the bottles.

Enter the value of the Sample Size and Bottle Volume in to the appropriate Boxes.

N.B. If the wrong values are entered the Hydrocell will over or under fill the Bottles.

5.2.2 Entering the Sample and Purge Times.

The sequence for taking a sample consists of 3 stages:

- Pre-Purge.
- Sample
- Post-Purge

The Pre-Purge stage is designed to clear the Intake Hose of any residual liquid from a previous sample and clear any blockage before a Sample is taken. The Pump Head will rotate in the opposite direction to that of a sample and blow air from the Hydrocell through the Intake Hose. An option is included to have more than one Pre-Purge, and this should be used where blockages may be expected.

The Post-Purge is similarly designed to evacuate the effluent from the Intake Hose after a sample has been taken. Again, an option for multiple Purges is included.

The Purge times are usually set to the same time as the sample time to ensure the pipe is fully purged, however it may be prudent to shorten or omit the purges if it is thought this may adversely disturb any suspended solids in the effluent.

The Sample Time should be set to take the required Sample size. The required sample time is a function of the length and lift of the Intake Hose and can be set by a process of trial and error.

Three Buttons are provided to calibrate the Sample Size:

- Purge
- Sample
- Calibrate

Purge and Sample, when pressed will run the Pump for up to 60 seconds and can be stopped by repressing the Button.

Calibrate will take a Sample according to the Sample and Purge Times set. Both Sample and Calibrate use Bottle 2 to take the sample to allow easy positioning of a measuring jug.

To initially set the Sample time, ensure the Intake Hose is fully submerged and free from blockages.

Press the Purge Button and ensure that bubbles can be seen in the effluent. Press the Sample Button and record the time taken for the effluent to begin to fill the bottle. Add 2 seconds to this time and enter it as the Sample and Purge Times.

Place a measuring jug in place of Bottle 2 and press the Calibrate Button. When the sampling cycle has finished check the amount of liquid in the measuring jug and adjust the sampling time accordingly. Adjustments should be kept small, bearing in mind that the volume of liquid is only dependent on the length of time after the liquid has been drawn to pump (i.e. if the sample time is set to 22 seconds and it takes 20 seconds to draw liquid to the pump to double the sample size change the sample time to 24 seconds, not 44 second!).

Finally decide if it is necessary to vary the number and length of the purges.

N.B. As the Pump Tube ages it may be necessary to re-calibrate the Sample Time to maintain the Sample Volume.

5.2.3 Reset Pump Tube

A Button is provided to reset the time the Peristaltic Pump Tube has been installed. Pressing this Button and confirming will reset the values displayed on the Settings Screen to indicate when the Pump Tube should be changed.

Typically, a pump Tube will last around 100 hours, although this is dependent on the nature of the effluent.

5.2.4 Sampling Mode

Several different Trigger methods are available to initiate a sample request on the Hydrocell 8:

- **Timed** (all versions) – A sample is taken after the specified number of minutes. This method does not give a Flow Proportional Composite Sample. Samples are taken even when there is no flow.
- **Sample Request** (all versions) – The sample is initiated by Contact Closure. This would typically be achieved by connecting the inputs to the Common and Normally Open Outputs of a relay and setting the relay to trigger after a certain volume of effluent had been recorded on a Flow Meter. This will give a Flow Proportional Composite Sample.

The number of Inputs required before a Sample is taken must be entered and the Filter Length – the length of time the relay must be closed to be recognised as an input. The Filter Length is used to eliminate false trigger in noisy environments and must be less than the relay closure time of the Flow Meter. A value of 50mS would be typical.

- **4-20mA** (factory build) – The Hydrocell 4-20mA input is connected to the 4-20mA output of a Flow Meter. The flow values that are represented by 4mA and 20mA are then entered in to Hydrocell – this information should be available on the Flow Meter.

The Hydrocell can calculate the volume of effluent by sampling the flowrate and multiplying by the time period.

The Volume after which a Sample should be taken can be calculated from the average daily flow, the sample volume and the Bottle size.

5.3. Change Over Screen.

The Change Over Menu is used to define the status, selection mode and changeover times of the Active Bottle.

5.3.1 Bottle Status.

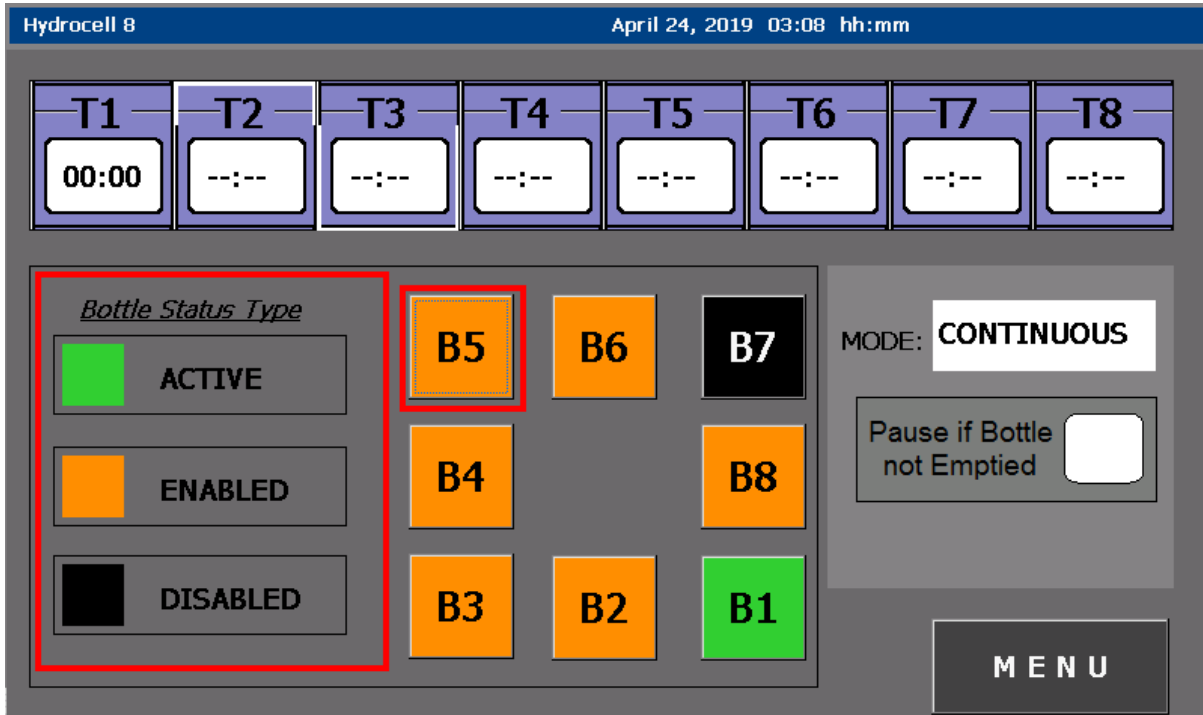


Fig 6. HC 8 Change Over Screen.

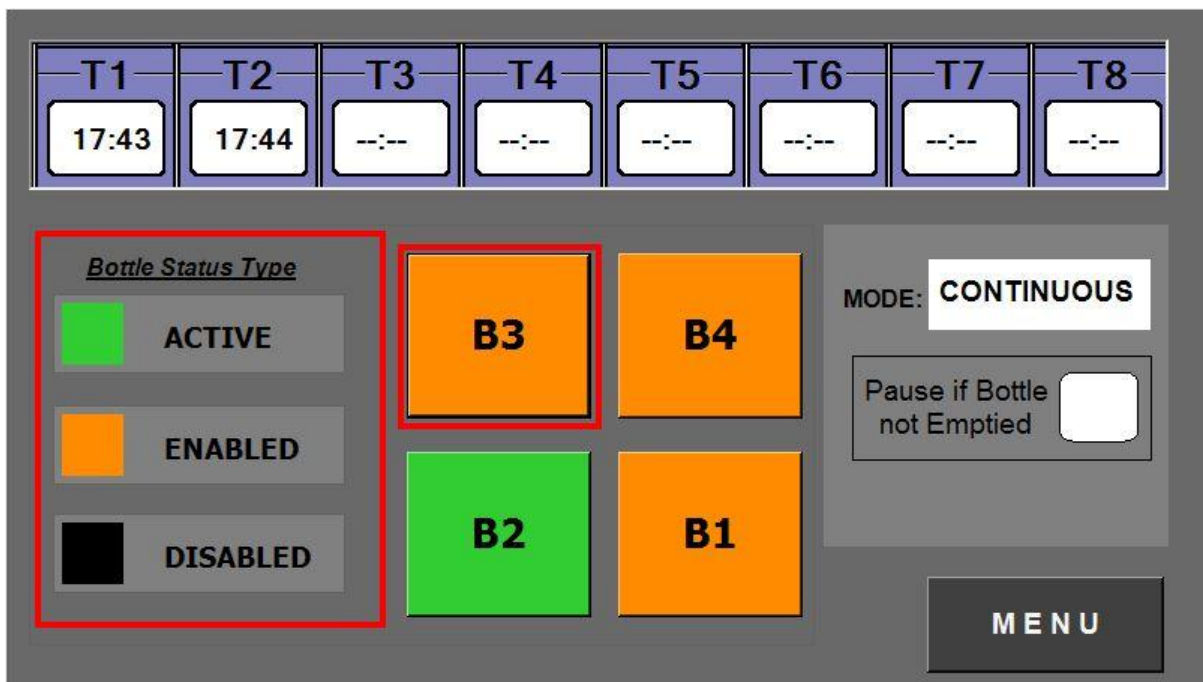


Fig 6.1 HC4 Change Over Screen.

Each of the Bottles can be set to one of three states

- ACTIVE – the bottle will be selected when the next sample is taken - shown as **GREEN**.
- ENABLED – the bottle can become the ACTIVE bottle when it is selected in turn according to the change-over times – shown as **ORANGE**.

- **DISABLED** – the bottle will never become the **ACTIVE** bottle and will be passed over when it is reached in the change-over times – shown as **BLACK**. This would generally be used if a bottle was missing or a previous sample was to be maintained.

To change the status of a bottle, press the bottle and a **RED SQUARE** will appear around the bottle and around the **STATUS BUTTONS** (pressing the bottle again without pressing a **STATUS BUTTON** will deselect the bottle and the status will remain unchanged).

Pressing a **STATUS BUTTON** will change the Bottle Status and deselect the bottle.

Only one Bottle can be **ACTIVE**. If a new Bottle is selected as **ACTIVE**, the current **ACTIVE** bottle will change to **ENABLED**.

The **STATUS** of the **ACTIVE BOTTLE** cannot be changed. If selected a Pop-Up box shall appear stating an alternate **ACTIVE BOTTLE** must be selected to allow changes to be made.

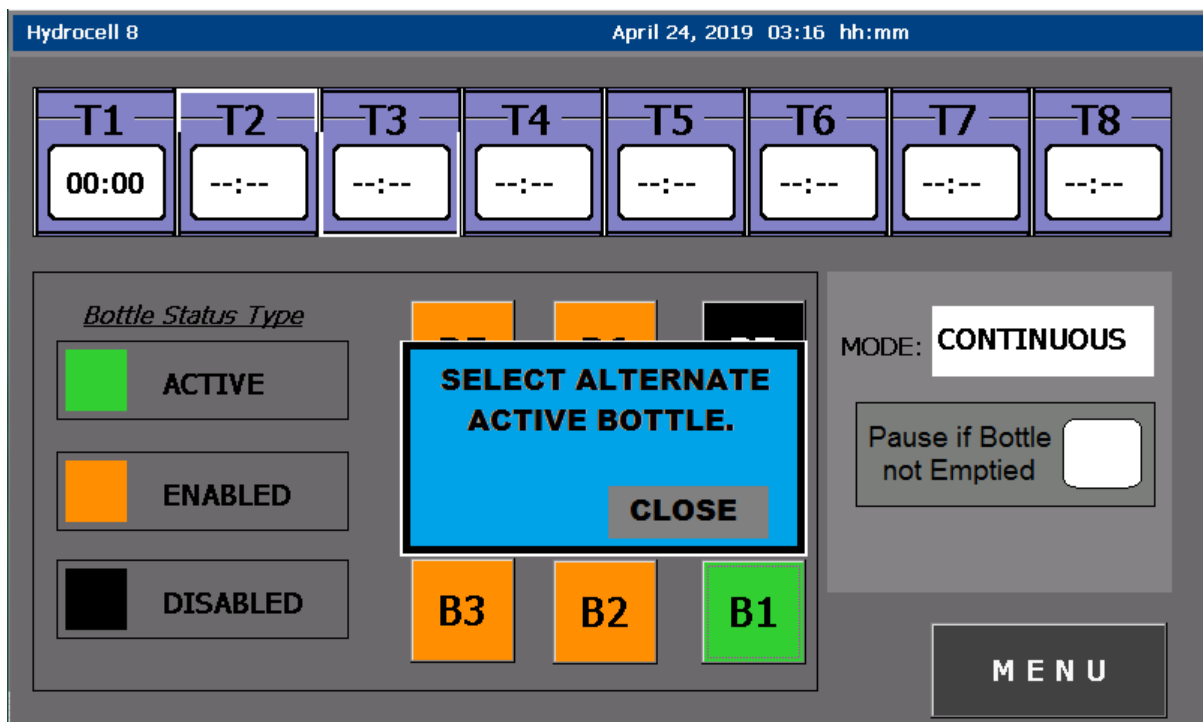


Fig 6. Active Bottle Selected.

5.3.2 Programming Modes.

There are 2 modes available:

- **Programmed** – The Hydro-cell will carry out a sequence of timed bottle change-overs and then stop. The Hydro-cell will remain inactive until the bottles are emptied and the program re-started. A 7-bottle sequence can be implemented – T8 becomes the stop time.
- **Continuous** – The Hydro-cell will change to the next bottle when any of the listed times are encountered. The Hydrocell can be set to stop if the bottles have not been emptied or continue and add additional Samples.

- **PROGRAMMED MODE.**

PROGRAMMED MODE is selected by pressing the MODE BUTTON and selecting PROGRAMMED from the drop-down menu. Select the start bottle using the ACTIVE BUTTON (Bottle 4 in the example below).

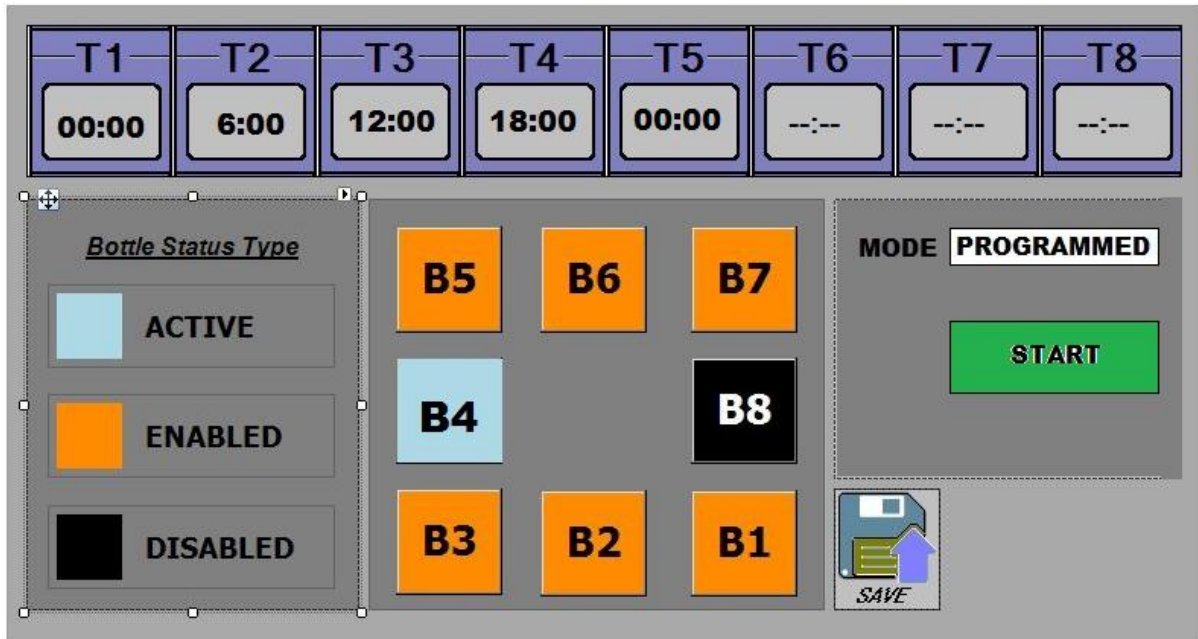


Figure 1 Programmed with Start time.

Enter the Time T1 at which the first Bottle (B4) is required to start filling – this can be up to 24 Hours ahead. If it is required that the program start immediately T1 can be left blank. Enter the subsequent times (T2 – T7) for the bottle changes and the program the last time as the Stop time. If a bottle time is before the previous time the change-over will take place the follow day.

Press Start to initiate the program – N.B. Starting a program will assume all bottles have been emptied.

Return to the Home Screen and Press Start to start the Sampler.

In the above example the Hydro-cell will:

- Remain inactive until Midnight and will then start sampling into Bottle 4.
- Change to Bottle 5 at 6:00
- Change to Bottle 6 at 12:00
- Change to Bottle 7 at 18:00
- Stop Sampling at Midnight

If the STOP BUTTON on the Home Screen is pressed the program will halt and restart when START is pressed (providing the Stop Time has not passed).

If the STOP on the Program Screen is pressed the program will stop and cannot be resumed. Pressing START will restart the program from T1

When the program has stopped the STOP/START Button on the Front Screen will go to Stop and a pop-up message indicate the program has ended. The program must be restarted from the Program screen.

N.B. It is not possible to program a sequence greater than the number of available bottles if 2 bottles are disabled T8 will be disabled.

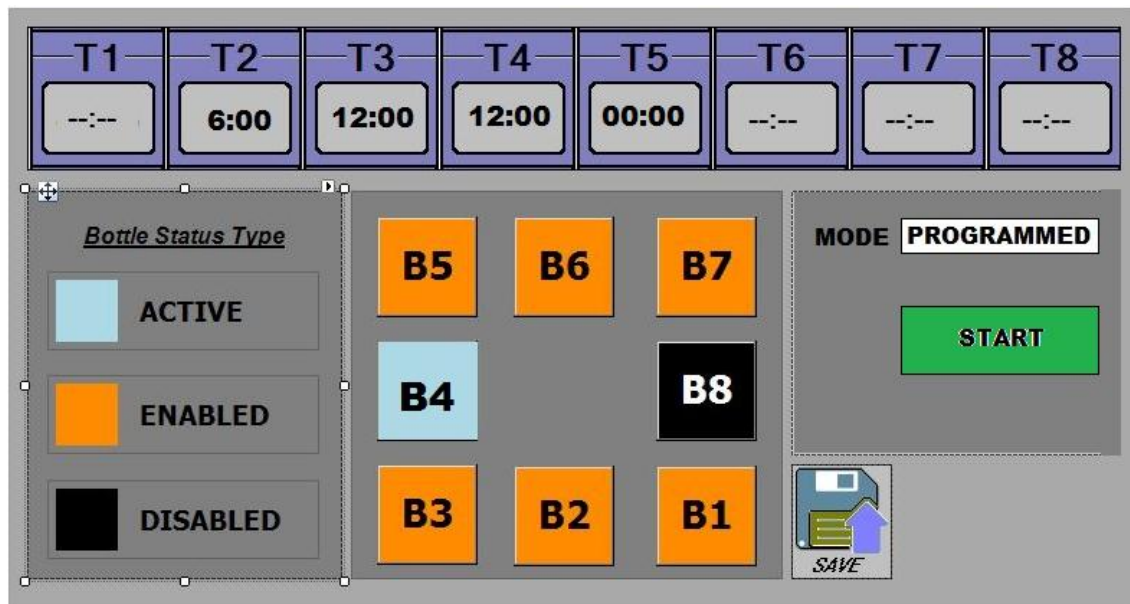


Fig 6 Programmed with Immediate Start.

In the above example the program will start immediately, and the Hydro-cell start sampling when the Start Button on the Home Screen is pressed. It will sample into the Active Bottle until 6:00 and then change to Bottle 5, then Bottle 6 at 12:00.

It will then sample into Bottle 6 for 24 hours until 12:00 the following day and fill Bottle 7 for 12 hours before stopping at 12:00.

- **CONTINUOUS MODE.**

Pressing the **MODE BUTTON** toggles the mode between **CONTINUOUS** and **PROGRAMMED**. Select the start bottle using the **ACTIVE BUTTON** (Bottle 1 in the example below).

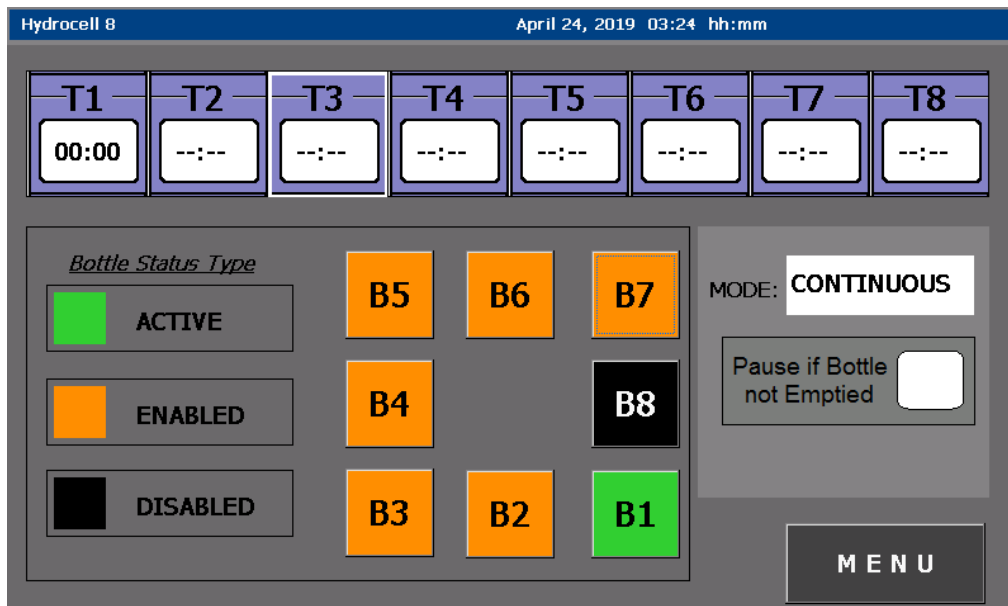


Fig 6. Continuous Mode with Pause Unchecked.

The Hydro-cell will start running the continuous program immediately and start Sampling when the Hydrocell returns to the Home Screen.

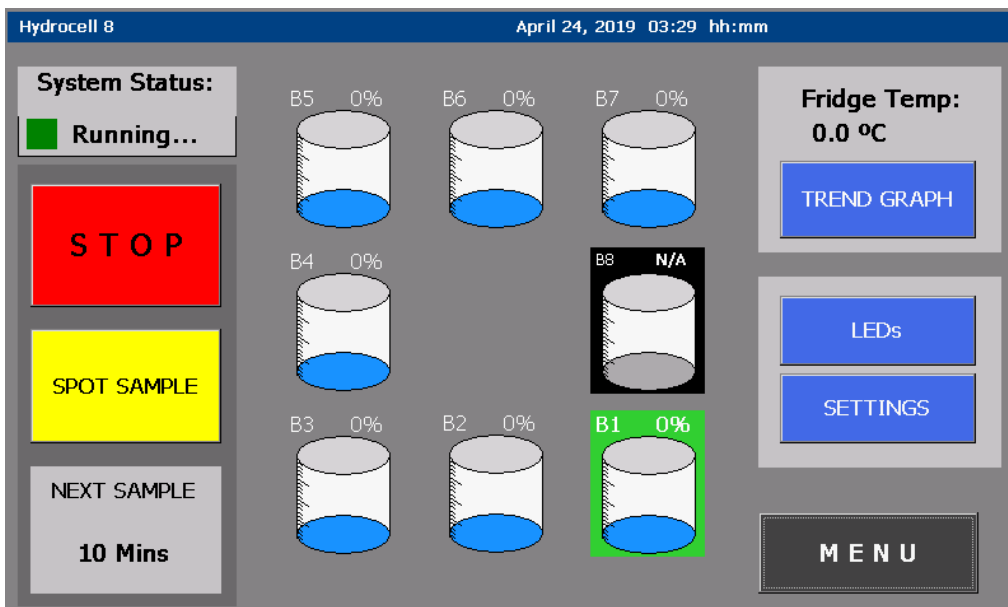


Fig 6. Continuous Mode with Pause Unchecked.

The **GREEN** highlighting around Bottle 1 indicates it as the **ACTIVE** Bottle and the **BLACK** highlighting around Bottle 8 indicate no samples will be taken into that bottle.

In the above example Bottle 1 will be filled until midnight then the sampler will change to Bottle 2. This will continue for the next 7 days such that Bottle 7 is filled on the 7th day. Bottle

8 will not be filled as it is Disabled so after 7 days the Hydro-cell will return to bottle 1 making this set up ideal for a week of sampling.

The 'Pause if Bottle not Emptied' box is not checked so the Hydro-cell will continue to fill Bottle 1 on the 8th, 15th, 22nd etc day until the bottle is filled. If Bottle 1 is full the sampler will take no further samples until Midnight, then move to bottle 2 and begin sampling if bottle 2 is not full. In this way all the samples in Bottle 1 could be from Mondays, all samples from Bottle 2 be from Tuesdays etc.

The Hydro-cell can be set to change bottles more than once a day.

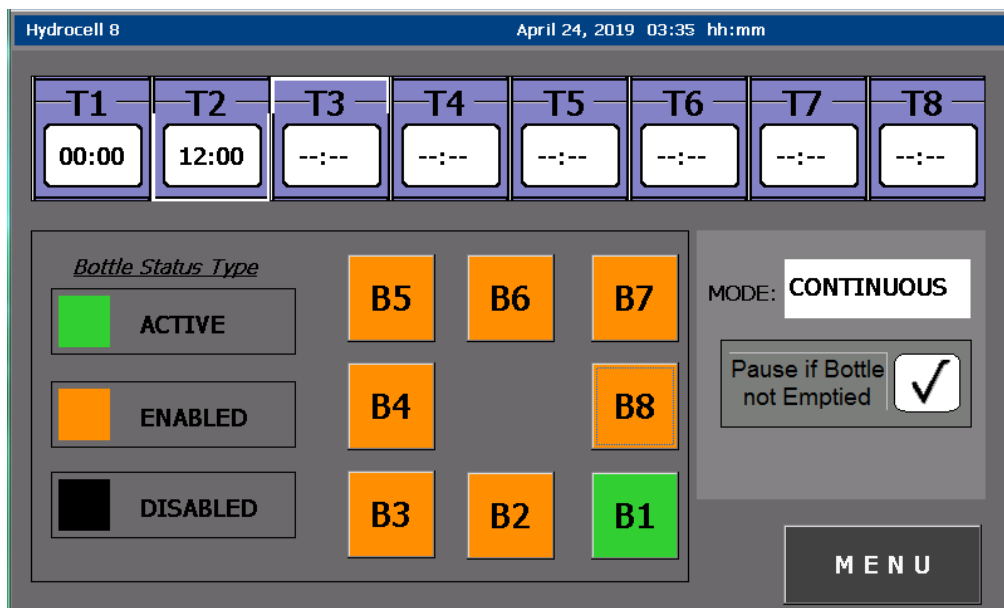


Figure 6 Continuous Mode with Pause checked and 2 changes per day.

Figure 4 shows the Hydrocell set to change bottle twice per day (this can be up to 8 times). The Hydrocell will return to Bottle 1 after 4 days.

The 'Pause if Bottle not Emptied' box is checked so when the Hydrocell returns to Bottle 1, the sampling will stop, and a pop-up message will appear on the screen.

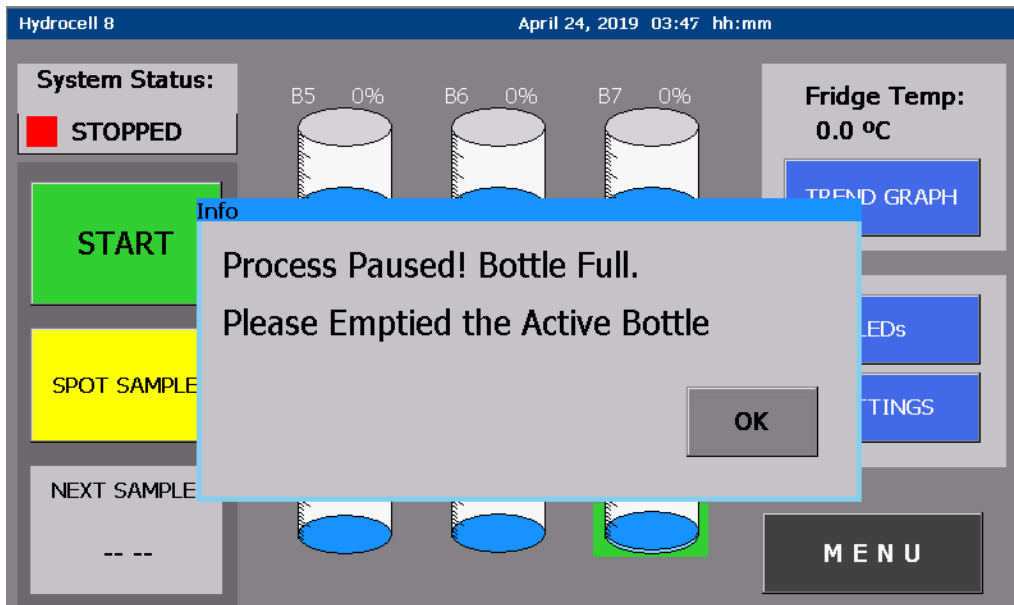


Fig 6. Bottle not emptied.

To continue the sampling:

- Press OK to cancel the pop.
- Empty the bottle from inside the compartment.
- Press Bottle 1 on the screen.
- Press the empty Button in the centre of the screen.

When running with the 'Pause if Bottle not Emptied' box checked it is essential that good housekeeping is maintained to ensure the next bottle is available for sampling.

5.4. Temperature Menu.

The Temperature Menu is used to control the Thermo-electric Cooler.

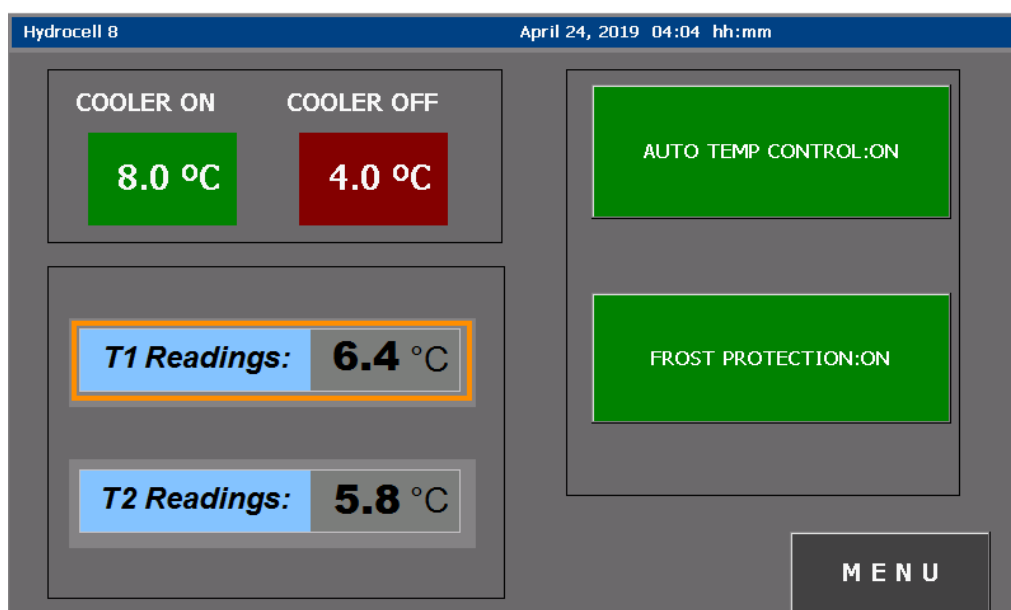


Fig 6.X Temperature Control

The Temperature Control ON/OFF Button determines whether the temperature inside the refrigerated compartment is regulated.

When the AUTO TEMP CONTROL is ON the temperature is controlled by one of the two Thermistors T1 and T2. The controlling Thermistor is selected by pressing the *Tx Readings:* Button and the Active Thermistor is identified by the **ORANGE** highlighting box.

The two thermistors provide dual redundancy in case of failure and allow selection of the best representation of the required temperature e.g. in the case of steaming liquids.

Under AUTO TEMP CONTROL the Thermo-electric Cooler will turn ON when the temperature is above the COOLER ON Temperature and remain ON until the temperature falls below the COOLER OFF Temperature.

The COOLER ON and COOLER OFF variables are entered by pressing the relative box and entering a value with the Keypad. The following rules must be adhered to:

- The Values must be in the range 2 – 15 °C
- The Values can be entered to 1 decimal place.
- The COOLER ON VALUE must be at least 2 °C Higher than the COOLER OFF VALUE.

If an attempt is made to enter a wrong value the previous values are maintained.

With the AUTO TEMP CONTROL ON the option of FROST PROTECTION is available. When selected the Thermo-electric cooler will turn On and Heat the compartment when the temperature falls below 1 °C and turn off when the value rises above 3 °C. This will stop the sample from freezing.

When the AUTO TEMP CONTROL is turned OFF two additional Buttons are available to give direct Control of the Thermo-electric Cooler.

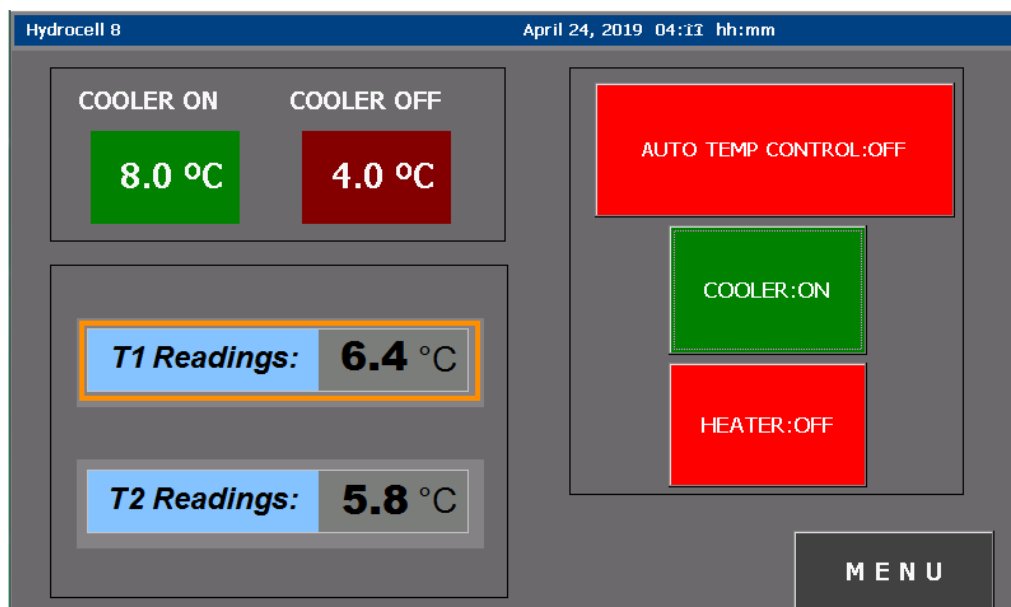


Fig 6.X Direct Control

The COOLER ON/OFF and HEATER ON/OFF Buttons give direct control. When a Button is pressed it will toggle between the ON and OFF states. A Button can only be turned ON when the other Button is turned OFF.

When the Temperature Menu is exited with the Temperature Control turned OFF the current state is ignored and both Heater and Cooler are turned OFF. Care should be taken to exit with the correct setting, particularly if the Menu is exited due to timing out.

5.5. About Screen

5.5.1 Site Information

The About Screen is used for entering the information to be seen on the Settings Screen and provides information about the site and contacts for anyone working on the equipment.

Hydrocell 8 April 24, 2019 04:20 hh:mm

Company: HYDRO SYSTEMS

Address: UNIT 16 THORPE BUSINESS PARK

City/Town: PONTEFRACT

Country: GREAT BRITAIN

Postcode: WF8 7TG

Contact: FRED SMITH

Site ID: EFFLUENT PLANT

Phone No.: 01977 564679

Mobile No.: 07845 234567

Comment:

Change User Password Set Date/Time

Smart Storm Environmental Measurement & Control

Hydrocell 8

Version: 1.0.0

FPGA version: 2.0

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www.smartstorm.eu

MENU

Fig 6. About Screen.

Information is entered by clicking on the relative field and using the pop-up keyboard.

5.5.2 Change User Password.

To change the Password, press the Change User Password Button. A pop-up password screen will appear. Enter the new Password – the Bar will turn **PURPLE** to show the new password has been accepted.

1 1 1 1

1 2 3 4 5

6 7 8 9 0 X

Fig 6. Change User Password

Care should be taken when changing the password as it will change immediately without confirmation.

If the password is lost the Engineering Password can be used to restore it.

Contact Smart Storm for further information.

5.5.3 Set Time and Date

The time and date can be changed from the About Screen. Click on the Set Date/Time Button.

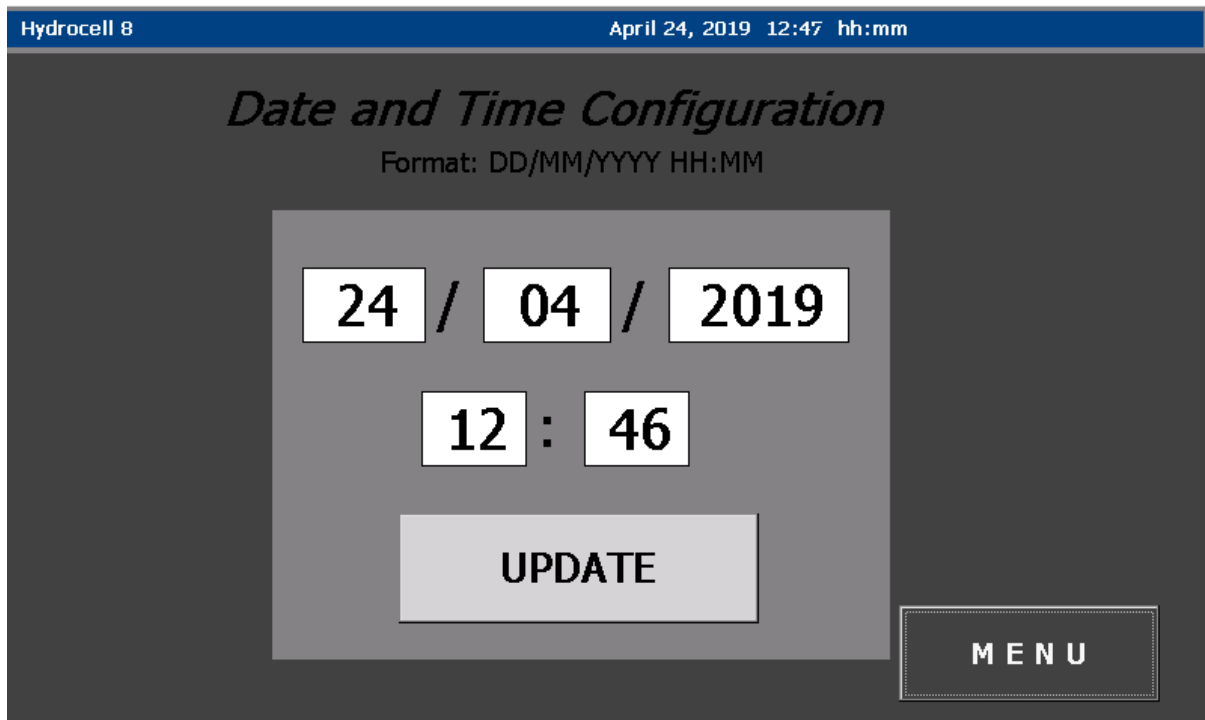


Fig 6.1 Set Time and Date.

Click on the individual fields to change the value using the pop-up Keypad. When all required fields have been changed click on the UPDATE Button. It may take up to a minute for the Time/Date to change.

6. Wastewater Refrigerated Sampler Service Tasks.

Daily – Performed by customer.

- ✓ Take Spot sample.
- ✓ Empty bottle from 2 days ago.
- ✓ Clean empty bottle with water.
- ✓ Reset bottle status on Touch Screen to Empty.
- ✓ Check temperature reading.
- ✓ Ensure door catches fully closed.

Monthly – Performed by Service Engineer

- ✓ Perform tasks as daily above.
- ✓ Calibrate sample volume and adjust if necessary.
- ✓ In engineering menu check sampler arm rotates to each bottle.
- ✓ Spray **WD40** onto bearing.
- ✓ Check status of peristaltic pump tube and replace always every 6 months.
- ✓ Check purge cycle at intake point.
- ✓ Download data log and check any error status.
- ✓ Check for any ice build-up and remove, as necessary.
- ✓ Check door Clasps.
- ✓ Check door seal.
- ✓ Check all hose connections internally and externally.
- ✓ If hose pipe available blow through intake line to clean debris build up.
- ✓ Check for dust build up on thermoelectric fan and clean, as necessary.
- ✓ Check Desiccator pouch and replace every 6 months.

Declaration of Conformity

We
Smart Storm Limited
The Old Mill
Wainstalls
Halifax
HX2 7TJ

Declare under our sole responsibility that the products:

USI, Hydrocell, USM, Avocet 9000, Mudsens, GreaseBuster FS

to which this declaration relates, is in conformity with the following directive.

The Electromagnetic Compatibility (EMC) Directive 2004/108/EC

And the following harmonised European Norms (EN standards), IRC and Environment Agency standards.

<u>Standard</u>	<u>Issue</u>
BS EN 50081-1 Emissions	1992
BS EN 50082-2 Immunity	1995
IEC 801 Immunity	1992
BS EN61010-1 Low Voltage	1993

We also declare that the products:

Named above

are of UK origin and are manufactured and tested to Smart Storm internal quality standards defined in the company's formal ISO9001:2015 quality manual.

Dr John Duffy
Managing Director