

**syp**

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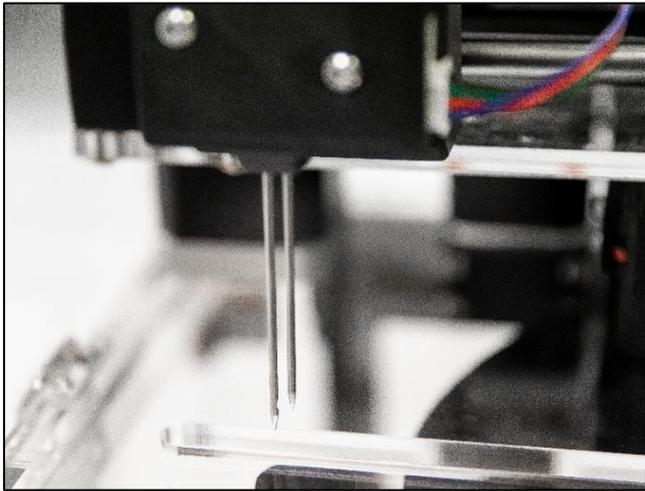
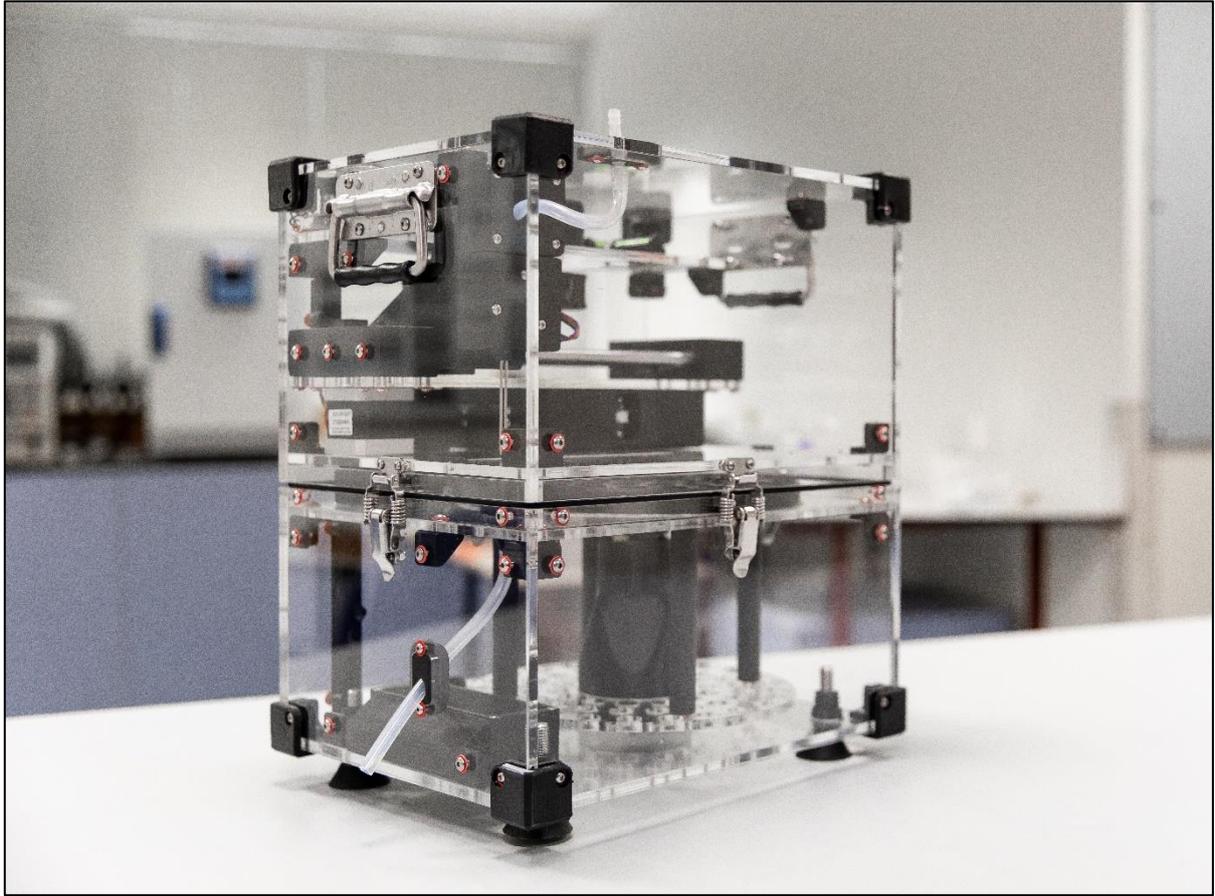
Sample smarter  
for richer data.

A WaikatoLink Brand

# Syp fluid sampler

User guide





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# Disclaimer

The Syp automatic fluid sampler is a fully customisable scientific tool: It is paramount to ensure correct set-up for your needs prior to deployment, or risk undesired operation. We strongly recommend users read the user guide thoroughly and test the device, both in the lab and on-site, to ensure expected functionality is achieved.



**Syp is not waterproof, only water resistant.** For very wet deployments, such as those in high flood risk areas, additional protection is required and is the responsibility of the user.

Waikato Scientific Instruments does not accept responsibility for failure due to operator error. Please contact [info@WaikatoScientific.com](mailto:info@WaikatoScientific.com) for support or deployment advice.

## Warranty

Waikato Scientific Instruments will repair or replace (at its option) any Product which fails due to a manufacturing defect within 18 months of shipment to the Customer (**Warranty Period**) and that failure is promptly notified to Waikato Scientific Instruments within the Warranty Period.

To avoid doubt, Waikato Scientific Instruments is not responsible for any damage where the primary cause is not a manufacturing defect, including any damage caused by a failure to follow the applicable operational guidelines, misuse, abuse, accident, neglect, improper installation, unauthorised disassembly, maintenance or operation, damage caused by war, lightning (or other electrical discharge), other acts of God, or acts of terrorism.

Waikato Scientific Instruments' sole liability in relation to any defect in Product supplied will be the repair or replacement of that product.



**Our warranty does not cover damage that occurs during deployment while the unit is unsupervised, unless due to manufacturing defect as outlined in 'Warranty' above.**

## Not included

- 16 AA batteries



# Glossary

Term	Description
<b>Stopper</b>	Push-in, self-healing seal for keeping sample tubes airtight. Custom-made by WSI from THERMOLAST® K TF5FMA.
<b>Stopper guard</b>	Acrylic plate that screws into the top of the carousel. Ensures stoppers are not dislodged during sampling.
<b>Battery cartridge</b>	Battery pack that slots into the back of the device, secured by two thumb screws. Contains 2x battery holders.
<b>Battery holder</b>	Battery 'sub-pack' that can hold 8x AA batteries. There are two battery holders inside the battery cartridge.
<b>Purge / rinse (action)</b>	The machine expels liquid rather than sampling it to rinse wetted parts and avoid overflow.
<b>Gravity-driven</b>	Mode of operation where liquid flow into sample tubes relies on pressure from gravity; 'hydraulic head'.
<b>Flow-stop valve</b>	Internal component. Squeezes internal tube to control flow of liquid into test tubes.
<b>Vial-full detection</b>	Automatic detection of completed samples via conductivity measurement on needles. Always on in Continuous Gravity mode.
<b>Reservoir</b>	A puddle / container where drips or flowing water is collected or stored prior to sampling.
<b>Hydraulic head</b>	Downward pressure caused by accumulation of liquid above a certain point.
<b>Waste tube</b>	Tube protruding from the bottom half of the device where excess 'purged' liquid is ejected.
<b>Machine-time</b>	Time according to the Syp on-board clock. Updated automatically when connected to a smart device.
<b>Needle block / cartridge</b>	Enclosure holding two sampling needles. Moving part.
<b>RTC voltage</b>	Real-time clock voltage. Provides indication of remaining charge onboard clock battery. Flat RTC battery will cause operating issues.
<b>Desiccant holder</b>	Compartment inside Syp's bottom half (near waste tube) for users to place desiccant to mitigate moisture build-up.
<b>Carousel</b>	Rotating plate containing holes that sample tubes screw directly into. Sample positions are marked on the carousel.
<b>Syp app</b>	Control interface for the Syp fluid sampler, accessed by connecting to Syp's local WiFi network ("Syp fluid sampler") and navigating to 192.168.4.1



# Overview

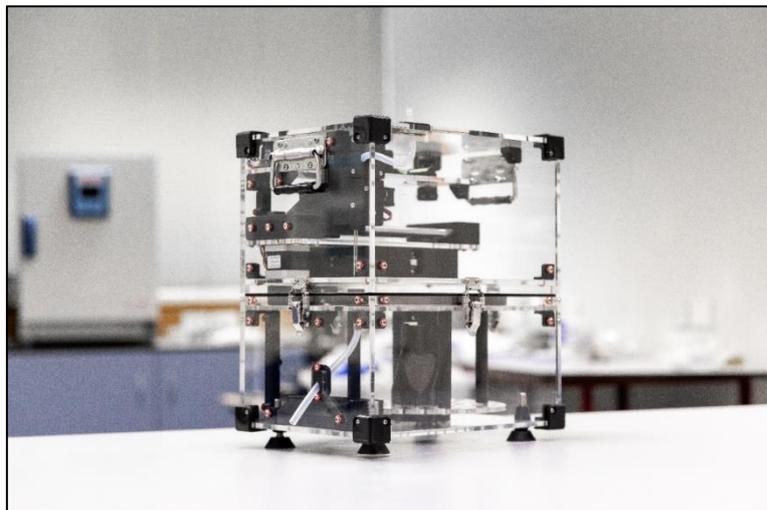
The Syp automatic fluid sampler is an advanced automated tool capable of collecting up to 58 liquid samples, continuously or at configurable intervals, with battery capacity to last over a year on a single charge.

The sampler injects sample fluids into sealed vials via peristaltic pump or gravity. Sample collection is fully configurable and can be triggered via timer, sensor data, or flow rate. Full samples are timestamped and purge cycles between samples can be scheduled by the user.

The device is carefully constructed in modular form using quality stainless fasteners, custom 3D-printed components and a transparent acrylic case with carry handles for convenience. Syp is the perfect companion for field-active environmental scientists or geochemists, whether sampling surface water, ground water, rainfall or subterranean stalactite drips.

## Feature summary

- 58 sealed 15ml vials
- 12+ months continuous operation on AA batteries
- Fully adjustable sample & rinse schedule, including integrated time & sensor triggers
- Sample collection via gravity or peristaltic pump
- Anti-coring needle and flow-stop valve prevent leaks between samples
- Comprehensive sensing: humidity, temperature, air pressure, full vials
- Lightweight & modular design with screw-in vials for easy transport & maintenance
- Adjustable height feet & spirit level for mounting on uneven surfaces



## Operation

Syp features a fully configurable sampling process using either gravity or a peristaltic pump. Samples can be taken consecutively using a vial-full detection feature or at user-defined intervals. Sample collection can begin instantly, set to start at a user-defined time, or be triggered by sensor data such as air pressure. A fully configurable 'purge' cycle flushes liquid through wetted parts to remove debris or contaminants.

### Gravity modes

There are two sampling modes that use gravity to feed fluid into vials. These were designed for collecting fluid drips falling from a height such as rain or from cave formations. These modes require a funnel or reservoir be set up (not included) to collect the liquid, which flows into the machine by gravity alone (without any mechanical support).

**Standard** gravity mode retrieves samples at pre-determined intervals using downward pressure from water in a tube or reservoir to push fluid into vials. Vial-full detection is used to ensure the correct sample volume is collected and purge operations are carried out at user-defined intervals.

**Continuous** gravity mode retrieves samples continuously using downward pressure from water in a tube or reservoir to push fluid into vials. Full vial detection is used to identify when a sample is completed and trigger immediate progression to the next sample. As a result, time of full vial events can be used to infer flow rates.

Continuous mode only works with gravity as the means of collection. There is no purge function in this mode.



For gravity-reliant modes, ensure there is sufficient pressure ("hydraulic head") to drive flow to vials by gravity alone. Kinks or dips in tubing will cause operating issues.

### Pump mode

Pump mode was designed for sampling surface or ground water, but is suitable for any situation where sampling from a reservoir is desired. A peristaltic pump moves fluid from a reservoir into vials at user-defined intervals. Sample and purge operations are carried out at user-defined intervals.



Pump mode can be set up with a funnel or reservoir in tight or cramped settings where flow to vials by gravity alone is unreliable.

### Start options

There are three ways to trigger the start of a sample sequence, accessible in any mode:

1. **Instant start:** The default setting. First sample is taken when the user presses 'Start'.
2. **Time-delayed start:** Set a date and time for the unit to begin a sample schedule.
3. **Sensor-triggered start:** Set sensor reading criteria that trigger sampling start.



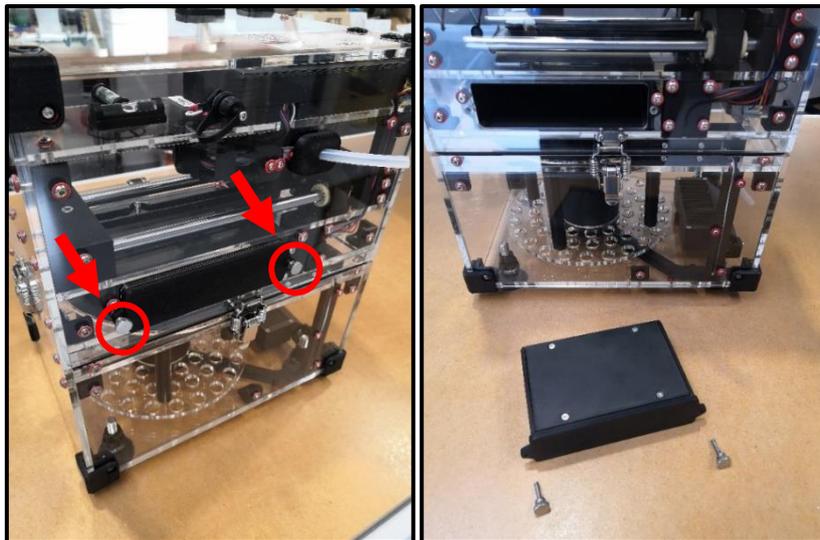
# Before you begin

## Batteries

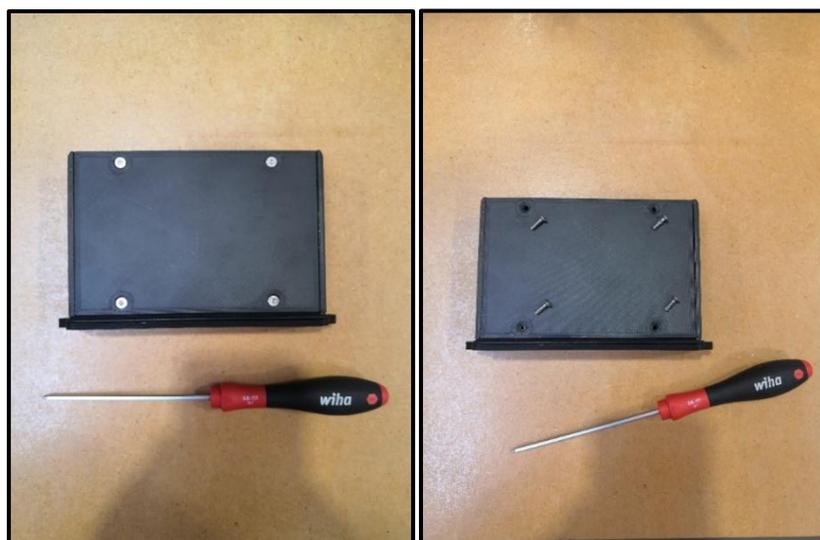
The main battery cartridge is located at the back of the top half of the unit, secured by two thumb screws. The pack holds two 8-cell AA battery holders for a total of 16 AA batteries.

To install or replace batteries,

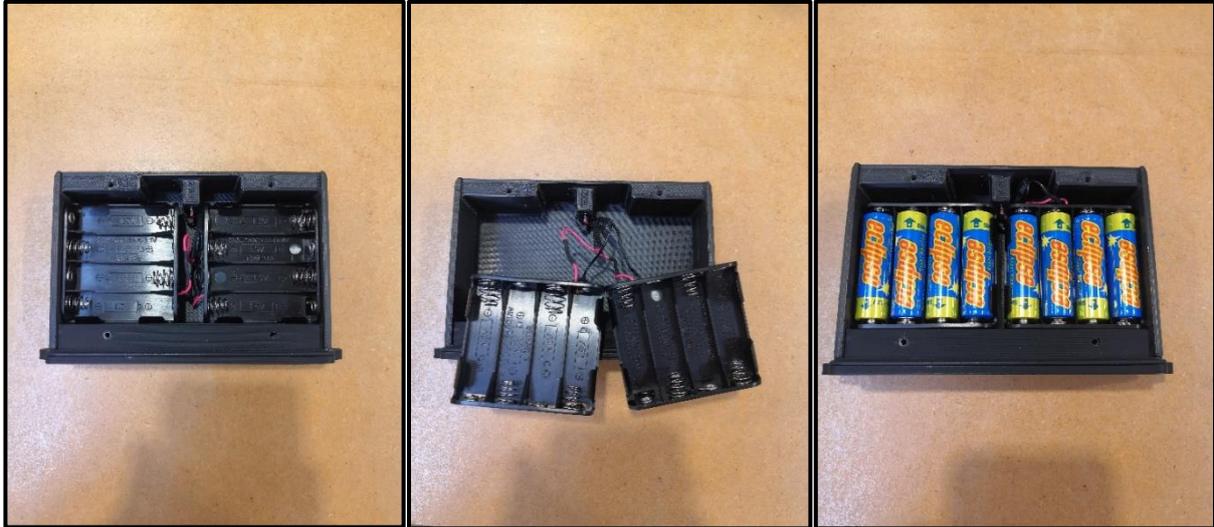
1. Locate the battery cartridge at the rear of the device
2. Remove the two thumb screws holding the cartridge in place



3. Pull battery cartridge out to expose 4 screws on the top of the cartridge
4. Remove the 4 screws on top of the battery cartridge using a 2mm Hex driver or allen key to open the top cover



5. With the battery cartridge top cover removed, gently pull the inner battery holders out of the cartridge and replace or fill the battery slots in one or both holders
  - a. Ensure every battery is in the correct orientation. Incorrect orientation can cause operation errors or damage batteries



6. Gently move wires out of the way when replacing the battery holders, so the wires are not underneath or above the battery holders
7. Screw the cover back onto the battery cartridge, making sure the cover is in the correct orientation
  - a. Countersunk holes for the screws must face upwards
8. Push the cartridge back into the Syp fluid sampler and tighten the thumb screws

Battery voltage can be checked via the Syp app as an indication of remaining charge. Always remove the battery pack when performing maintenance or when not in use.



**Always use alkaline batteries.** Other battery chemistries such as lower quality 'Heavy Duty' batteries do not provide the required instantaneous power.

The Status page of the Syp app (described later) provides a readout of main battery voltage as an indication of remaining charge. We always recommend using a fresh set of batteries for any long deployment.



If the sampler moves to purge when not expected, it may be the result of low or flat batteries.

When the main battery pack is not connected, the Syp fluid sampler real-time clock is powered by a Panasonic CR2032 Lithium button battery. The battery has an estimated operating life of 8 years. See the "Physical construction & maintenance" section of this guide for replacement instructions.



## Buttons & LEDs

The Syp fluid sampler has two buttons, located at the back left of the top panel of the unit:

### Sample / reset button

#### Single press:

- If not in a sample process: start the sample process
- If sample process is active: Immediately move to the next sample
  - a. Pressing multiple times in quick succession will skip multiple samples

#### Hold down:

- Reset and re-home the carousel and needle block

### Transport / pump button

This button only works if the device is not currently sampling: When a sampling process starts, this button is disabled until all samples are complete or the process is paused or reset.

#### Single press:

- Move the needle block to the home position

#### Hold down:

- Runs the pump for the duration of the button press

Pressing either button (single press) will enable WiFi if the unit is disconnected (no other action will be triggered in this case). LED rings around the buttons will light up when a button press is detected. In addition, the following LED signals may occur:

#### Both LEDs blinking:

- WiFi has disconnected and/or
- Fast mode is enabled (described later)

#### Transport / pump button LED on

- Date & time are not set correctly and/or
- Battery pack is critically low and should be replaced



## Assembly

The Syp fluid sampler splits into several pieces that must be assembled before use:

1. **Syp top half** contains the needle block, battery slot, buttons & spirit level
2. **Syp bottom half** contains carousel, dessicant box, purge/waste tube
3. **Battery pack** holds up to 16 AA batteries (batteries not included)
4. **Peristaltic pump & connection lead (optional)**

The two halves of the Syp fluid sampler clip together with four spring-loaded latches. Ensure that the two halves are oriented correctly and locked together before use. Needles should be positioned directly above the purge/waste tube and all electronics sit at the rear of the device. Press and hold the Sample / reset button to move the needle block from its retracted position to its home position.



If you receive the message "**Please set up your device first**" when starting a sample schedule, check to ensure the two halves are oriented and connected correctly before trying again.

## Attaching a pump

Waikato Scientific Instruments offers a 12V peristaltic pump for the Syp fluid sampler. The pump is attached via a threaded circular port on the top-centre of the rear panel of the device.

To use the peristaltic pump:

1. plug in the threaded power cable to the circular port on the top-centre of the rear panel of the device
2. screw the fitting in securely
3. connect the water inflow tube to the pump and outflow tubes from the pump to the Syp Fluid Sampler
  - a. the inflow port has arrow pointing inward, toward the word 'pump' and should take water from the sample collection point into the pump
  - b. the outflow port has an arrow pointing outward, away from the word 'pump', and should take water from the pump into the Syp Fluid Sampler
4. choose Pump mode on the Settings page of the Syp app (described later) to use

## Stopper-guard

Newer Syp devices are equipped with a stopper-guard. The guard ensures stoppers remain secure in sample tubes during operation. Sample tubes cannot be accessed while the stopper-guard is in place.



The stopper-guard is secured with 4 hex screws that thread into metal inserts on the carousel. To remove the stopper-guard,

1. Remove the top half of the Syp unit to expose the stopper-guard and carousel
2. Remove the 4x hex screws on the stopper-guard with a hex screwdriver
  - a. There is one screw in each quadrant of the guard
3. The stopper-guard can be lifted off, exposing the carousel and sample tubes
4. Ensure tubes and stoppers are secure in the carousel before replacing



## Software

The Syp fluid sampler is configured wirelessly via a web application ("web app"). The web app is accessible via **short-range** WiFi network generated by the Syp fluid sampler, and can be accessed, configured, and updated via web browser on any WiFi-capable smart device. The web app is hosted on the Syp fluid sampler itself, no additional downloads are needed. The Syp WiFi network is not connected to the internet.

Software updates can be downloaded from [WaikatoScientific.com](http://WaikatoScientific.com) to your smart device, which requires an internet connection. Once downloaded, the software can be installed and used without internet connectivity by connecting to the Syp WiFi network. The update process is described in detail in the Software updates & diagnostics section of this guide.

Software configuration and updates are described in detail in following sections.



# Connect to the Syp fluid sampler

To connect to the Syp fluid sampler you will need a WiFi-enabled device such as a smartphone or laptop computer. The app is hosted on the fluid sampler itself; no initial download is necessary.

First, connect to the Syp fluid sampler network on your device:

## Android OS Phones

1. Swipe down from the top of the screen.
2. Touch and hold Wi-Fi ▼.
3. Turn on **Use Wi-Fi**.
4. Tap the “**Syp fluid sampler**” network in the list.

## Apple iOS Phones

1. Go to Settings.
2. Click on Wi-Fi & make sure it is on
3. Choose the “**Syp fluid sampler**” to connect.

## Windows PC

1. Make sure your PC has Wi-Fi available.
2. Click the WiFi icon, usually found at the bottom right-hand corner of the screen:



3. This will show you the Wi-Fi options. Click on “**Syp fluid sampler**” to connect.

**i** When you connect to the fluid sampler, your device may ask if you want to “keep the connection” as no internet will be available. Click “Keep Connection” to connect to Syp.



## Load the Syp app

Google Chrome is the preferred browser for using the Syp app. There are two ways to load the app:

1. Scan the QR code using your phone's camera. This works on newer versions of Android and iOS.



2. Open your web browser (Google Chrome is recommended), and type in **192.168.4.1** into your search bar to take you to the Status page of the Syp webapp interface.

← → ↻ 🌐 192.168.4.1



While connected to the Syp fluid sampler you won't be able to connect to the internet, as the sampler itself isn't connected to the internet.



# The Syp app

## Status page

You will be taken directly to the Status page upon loading the Syp interface. This page displays current information about the device. Buttons at the bottom of the page allow interaction & navigation to the main menu.

**SYP Fluid Sampler**

Carousel position of current sample

Machine-time next sample will be taken

Sampler Status			
Sample	Next Sample Time	Progress	State
Waiting For Start		0 %	Idle

Live sensor data

Progress through current setting

Sensors		
Internal Temperature	Internal Humidity	Air Pressure
27 °C	33.1 %	1013 hPa

Current device status

Battery Status	
Battery Voltage	RTC Voltage
11.933 V	2.914 V

Machine date & time

Refresh

Refresh display button

Machine Date-Time: 10:22:07 13/08/2021

Sensor data graph

Current operation readout

Actuator Down  
In Purge

Sensor Recordings for Each Sample

Graph display buttons
 

- Temperature
- Humidity
- Pressure
- Fill-time

**Action**

Action buttons:
 

- Stop (not shown)
- Skip (not shown)
- Reset
- Menu
- Start

Start

Carousel position of first sample (configurable)

Reset

Start Sample

Menu



## Sampler status & battery status

This region provides an overview of progress through the current sampling operation:

- **Sample** current sample carousel position
- **Next sample time** machine-time at which the next sample will be collected
- **Progress** progress through a sample sequence or deployment
- **State** device operating status
- **Battery & RTC voltage** ensure batteries meet 10–12V power requirement

## Sensors & sensor recordings

The Syp fluid sampler features integrated sensors that monitor:

- Air temperature
- Relative humidity
- Air pressure
- Vial fill time (via vial-full detection)

Each metric is recorded **at time of sample completion** and plotted on the "Sensor Recordings" graph toward the bottom of the Status page. Data between samples is not automatically recorded.



Sensors are located inside the device casing so may differ slightly from actual external conditions.

Sensor data including vial-full detection, air pressure and machine-time can be used to trigger sampling.

## Buttons & configurable fields

Up to 10 buttons and configurable fields are present on the Status page at any given time:

### Action buttons

To control operation or navigate to another page.

- Start Start a sample schedule. Disappears when Syp is in operation.
- Stop Stop the current sample schedule
- Skip Skip the next sample and move to the following position immediately
- Reset Stop sampling, clear sample count and move needle to purge position
- Menu Navigate to the Menu page

### Sensor buttons

Toggle each data display on or off. Graph axes auto-update to fit.

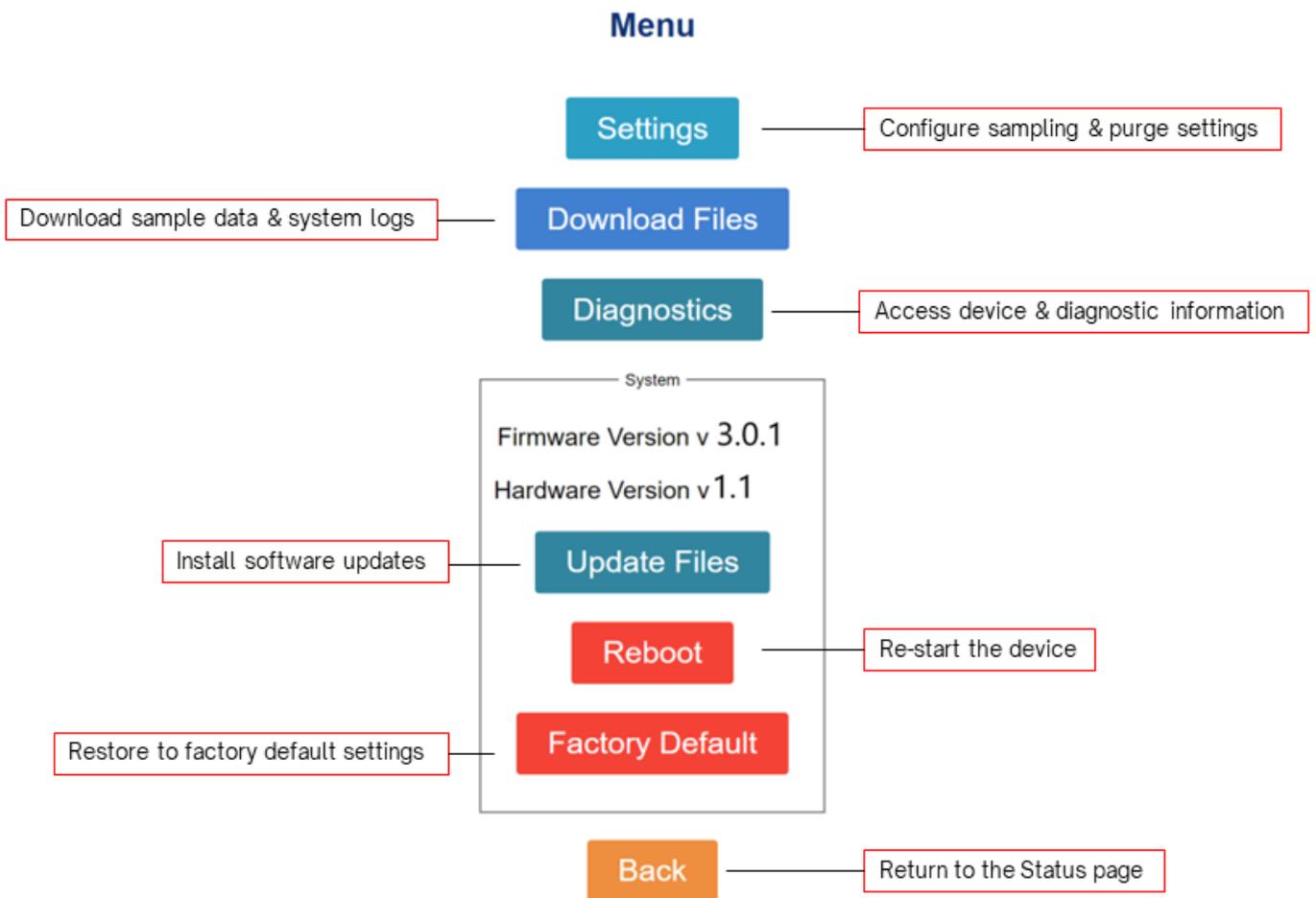
- Internal temperature (°C)
- Internal humidity (%)
- Air pressure (hPa)
- Fill time (seconds)



## Menu page

Press the Menu button on the Status page of the Syp app to navigate to the Menu page. The Menu page provides access to various areas of the Syp app that allow sample sequence configuration, data and log downloads, and software updates.

Device firmware and hardware versions are listed here alongside update and factory reset options.



## Settings page

This section describes how to configure settings for each mode. See the Overview - Operation section at the start of the manual for a general description of how each mode works or might be used.

The Settings page is accessed from the Menu and gives full control of device configuration.

The Syp fluid sampler features three modes of operation, each with its own custom settings. Each mode can be finely tuned to meet a wide range of deployment requirements.

## Settings

SYP Fluid Sampler Date-Time: 09:59:11 13/08/2021

User Date-Time: 09:59:15 13/08/2021

The screenshot shows the settings page for a SYP Fluid Sampler. It includes sections for Mode, Diagnostics, Start Trigger, and Sampling Settings. A Submit button is present, along with a battery check section showing a capacity of 1500 mAh and a duration of 1 year 6 months. A Notes section at the bottom provides additional information.

**Mode**  
 Standard gravity  Pump  Continuous gravity  
Fast samples  (Currently: Off)

**Diagnostics**  
Enable additional logging  (Currently: On)

**Start Trigger**  
 Pressure  Above  Below  Delayed Start

**Sampling Settings**  
Site Name   
Sample Count  (Max 58)  
Sample Period  Hours  
Purge Time  Hours  
Vial-full Detection  (Currently: Off)

**Submit**

Battery Capacity:  mAh

1 years 6 months  
All samples should complete.

**Notes:**  
- Time until completion is an approximation and assumes new batteries.  
- The result does not take into account idle time before a environmental trigger.

**Back**



## Sampler modes

The Syp fluid sampler features three modes of operation:

Mode	Description
<b>Standard gravity</b>	<ul style="list-style-type: none"> <li>• Sample collection via gravity (“hydraulic head”)</li> <li>• Sample schedule is a user-defined time interval</li> </ul>
<b>Pump</b>	<ul style="list-style-type: none"> <li>• Sample collection via peristaltic pump</li> <li>• Sample schedule is a user-defined time interval</li> </ul>
<b>Continuous gravity</b>	<ul style="list-style-type: none"> <li>• Sample collection via gravity (“hydraulic head”)</li> <li>• Next sample begins immediately upon completion of the last</li> </ul>

Each mode has its own tailored configuration options, as well as shared features accessible in all modes.

## Mode-agnostic software features

Feature	Description
<b>Fast Samples</b>	<ul style="list-style-type: none"> <li>• Toggled on via tick box in ‘Sampler Mode’ box (Settings page)</li> <li>• Convert timers from hours to minutes / minutes to seconds</li> <li>• Enables rapid sample collection for events or device testing</li> <li>• Power usage is similar to non-‘Fast Samples’ operation</li> <li>• Suitable for testing or sampling on short time-scales is required</li> </ul>
<b>Start Trigger</b>	<ul style="list-style-type: none"> <li>• Toggled via tick boxes in ‘Start Trigger’ box on the Settings page</li> <li>• Pressure: Set an air pressure threshold to triggers sampling</li> <li>• Delayed start: Set a machine time for sampling to begin</li> </ul> <p><i>Note:</i> Only impacts schedule start; subsequent samples are collected according to ‘Sampler Settings’ on the Settings page</p>
<b>Purge</b>	<ul style="list-style-type: none"> <li>• Configured via ‘Sampler settings’ boxes on the Settings page</li> <li>• Available in Standard gravity or Pump modes only</li> </ul>
<b>Vial-full detection</b>	<ul style="list-style-type: none"> <li>• Automatic detection of completed samples</li> <li>• Checks occurs every 1 minute (or 1 second if using Fast Samples)</li> </ul>
<b>Logging level</b>	<ul style="list-style-type: none"> <li>• Determines level of detail provided in log files over the sample schedule. Primarily for diagnostics.</li> </ul>
<b>Start sample [x]</b>	<ul style="list-style-type: none"> <li>• Allows a sample schedule to begin at a carousel position other than 1</li> <li>• Configured from the Status page</li> </ul>
<b>Daily / weekly sample buttons</b>	<ul style="list-style-type: none"> <li>• Auto-fill ‘Sample period’ field with “24” or “168” for daily or weekly sampling. “Fast samples” is not affected; when toggled on, 24 hours is converted to 24 minutes.</li> <li>• Visible in Standard gravity or Pump modes</li> </ul>



## Standard gravity mode

**Sampling Settings**

Site Name  Name of deployment (to differentiate log files)

Sample Count  (Max 58) Total number of samples to be collected

Sample Period  Hours   How often samples will be collected

Purge Time  Hours Auto-fill 'Sample Period' field with 24 (daily) or 168 (weekly) sampling. Assumes 'Fast Samples' is OFF.

Vial-full Detection  (Currently: Off) Time between purge & sample collection (i.e., 1 hour means purge 1 hour before sampling)

Full vial detection feature

- Needles rest in the sampling position from the start of the sample period
- Needles move to the purge position at [Purge Time] from the next sample until the next sample starts
- If a full vial is detected, needles move to the purge position immediately

## Continuous gravity mode

**Sampling Settings**

Site Name  Name of deployment (to differentiate log files)

Sample Count  (Max 58) Total number of samples to be collected

Vial-full Detection  (Currently: On) Water detection feature (required)

- Needles rest in the sampling position from the start of the sample period
- Automatically progress to the next sample when a full vial is detected
- There is no purge function in Continuous gravity mode
- Vial-full Detection is always on in Continuous gravity mode



Always test your in-situ setup before leaving the device. Incorrect setup can cause samples to not be collected, particularly in gravity-driven modes.



## Pump mode

Sampling Settings	
Site Name <input type="text" value="Abby Cave"/>	Name of deployment (to differentiate log files)
Sample Count <input type="text" value="58"/> (Max 58)	Total number of samples to be collected
Sample Period <input type="text" value="24"/> Hours	How often samples will be collected
Pump Sample Volume <input type="text" value="10"/> mL	Liquid volume collected at each sample
Pump Purge Time <input type="text" value="5"/> Seconds	How long the pump runs when purging
Pump Purge Delay <input type="text" value="1"/> Hours	Time between purge & sample collection (i.e., 1 hour means purge 1 hour before sampling)
Vial-full Detection <input checked="" type="checkbox"/> (Currently: On)	Water detection feature

- Sample is collected at the beginning of the sample period
- On sample completion, the needle moves to the purge position until the next sample is collected
- Pump purge delay refers to the time between purge and sample collection. Purge delay can be used to empty a fluid collection reservoir prior to sampling to ensure fluids sampled are reflective of the time the sample is taken.



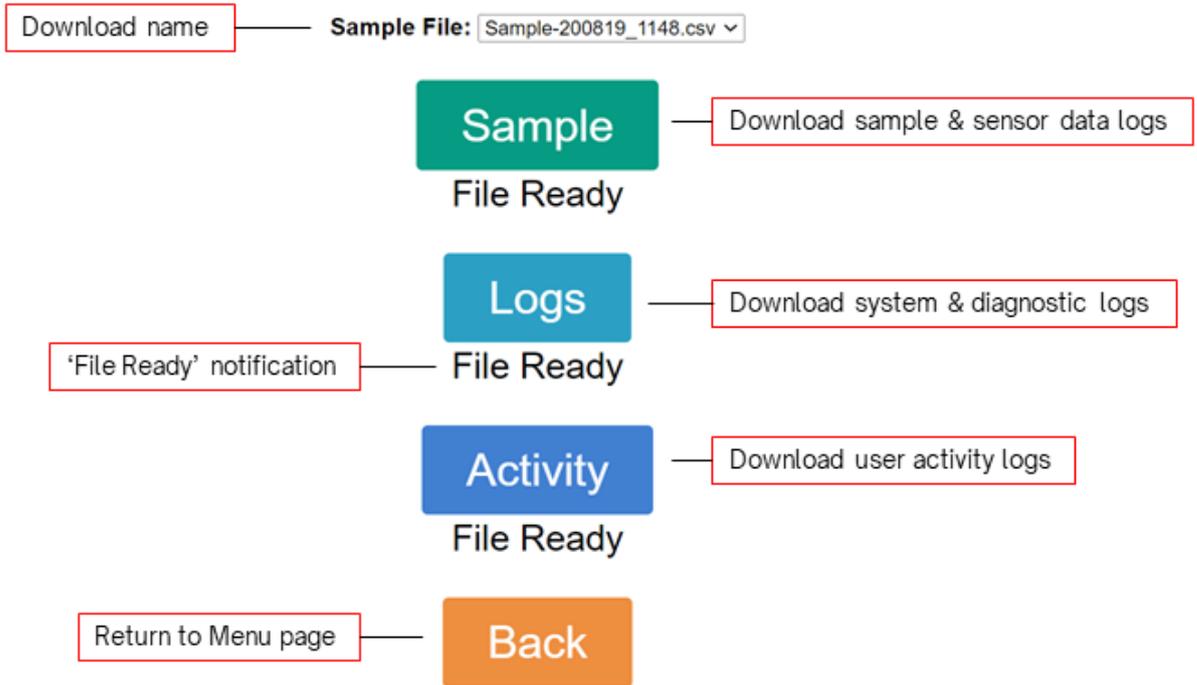
Setting the "Purge time" (or "Pump Purge Delay" in Pump mode) to 0 disables purging. An in-tube filter may help to prevent needles clogging.



## Downloads page

Navigate to the Downloads page from the Menu. Sample and sensor data, system logs and user-device interaction logs can all be accessed here. Click the relevant button to download the data to your device.

### Downloads



Before downloading a file, ensure that the File Ready status shows below the button. This indicates that files are up-to-date and contain records from the most recent usage. Files may not immediately be available for download - take note of the progress bar.

Files are downloaded in .csv format.

**i** A maximum of the 5 most recent sample files are stored on the Syp fluid sampler. The oldest file is deleted as necessary each time sampling starts. Select the required data file using the drop-down menu ("Sample File"). Files are named based on the initial timestamp of the sample sequence.



## Software updates & diagnostics

### Updating Syp software:

1. **Before connecting to the Syp fluid sampler interface**, navigate to <https://www.waikatoscientific.com/Syp-support> on your WiFi-enabled device
2. Press the 'Download' button on the right side of the page to download the latest software
  - a. Syp fluid sampler software has a **.Syp** file extension
3. Connect to the Syp fluid sampler on your WiFi-enabled device (with the Syp software downloaded) and navigate to the Menu page
4. Press **Update Files**
5. Select the .Syp file you would like to install and press 'Open'
6. Press Update File to start the update process.



Download the software update in advance of installation - you cannot be connected to the internet while connected to Syp.

### Diagnostics

The Diagnostics section provides additional information that may be helpful to a technician in case of a product fault, including hardware and firmware versions, unique device serial number and logging information.

For more information or for support, please email [info@waikatoscientific.com](mailto:info@waikatoscientific.com).



Only perform functions on the Diagnostics page when instructed by a support technician. Use of these functions without proper understanding may result in unrecoverable faults or void the product warrantee.



# General information

## Needle positions

### 1. Purge

In the purge position, the needle rests inserted into the waste tube to ensure excess fluids will not leak into the device.

- In pump mode, the needle sits in the purge position for the duration of the sample period.
- In either gravity-driven mode, the needle moves to the purge location depending on user settings.

Purge time and duration can be configured via Settings page of the Syp webapp. Purge behaviour is described in the 'Settings page - Sampler modes' section.

### 2. Home / transport

When there is no active sampling process, the needle rests above the waste tube to ensure the needles are protected.



The needle will always be retracted as required before performing any movements. If the home position is unknown, a homing operation will occur before any other actions.

Upon disconnection of the two Syp halves, the needle block fully retracts into the top half to prevent injury or damage to the needles.

### 3. Sampling

When a sample is due to be taken, the needle block moves to the sampling position where needles pierce the stopper of a sample vial.

- In either gravity-driven mode, the needle rests in this position from when a sample is scheduled to be taken until the device detects a sample is complete or the next sample is due to be taken.
- In pump mode, the needle remains in this position only while a sample is being taken.



## Physical construction & maintenance

The Syp fluid sampler is designed in two halves, connected by four spring-loaded latches, for easier transport and maintenance. All maintenance should be carried out at the user's discretion based on their particular requirements and deployment conditions.



The Syp fluid sampler is **water resistant but not fully waterproof**. For very wet deployments, use extra protection (e.g., a plastic bag).

## Maintenance tools

Syp is designed for tool-less deployment, though some equipment is required for a user to perform maintenance:

- 2.5mm Allen key
- M4 button screwdriver

## Stoppers

Stoppers are used to seal sample vials and the purge release tube from outside conditions. The stopper for the purge release tube may require more frequent replacement due to being pierced on each purge operation.

We recommend replacing or cleaning all removable parts before each deployment. Stoppers can be re-used at the operator's discretion but old or used stoppers may negatively impact sample integrity.

## Carousel

The carousel may be removed to allow cleaning and maintenance of the bottom half of the fluid sampler or to access the dessicant holder. To remove the carousel,

1. Remove the top half of the device to access the carousel
2. Remove the four M4 button head screws in the centre of the carousel using a 2.5mm Allen key



Changing sample vials does not require removal of the carousel. Vials can be slotted into the carousel from the top without the use of any additional tools.

## Dessicant holder

The desiccant holder is located on the left side of the bottom half of the unit. Desiccant can be added for high-humidity deployments to mitigate build-up of condensation inside the device. To access the desiccant holder,

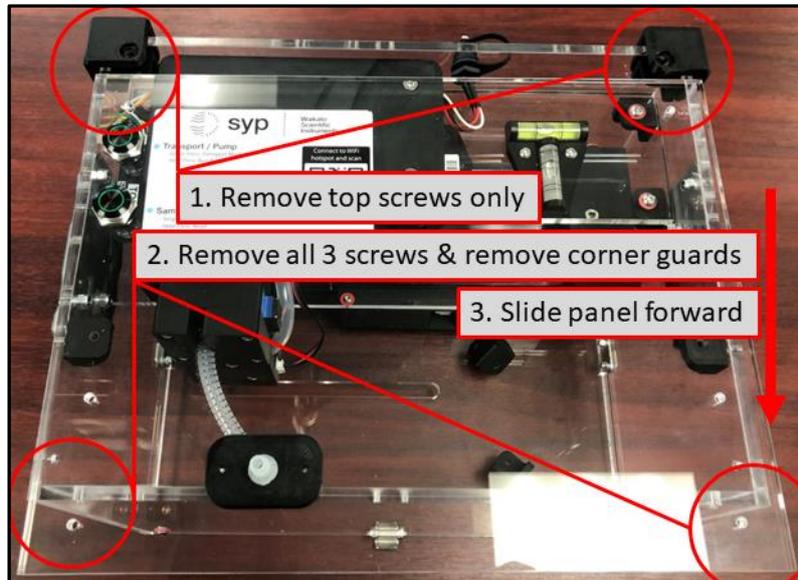
1. remove the bottom half of the unit
2. remove the carousel (as described above)



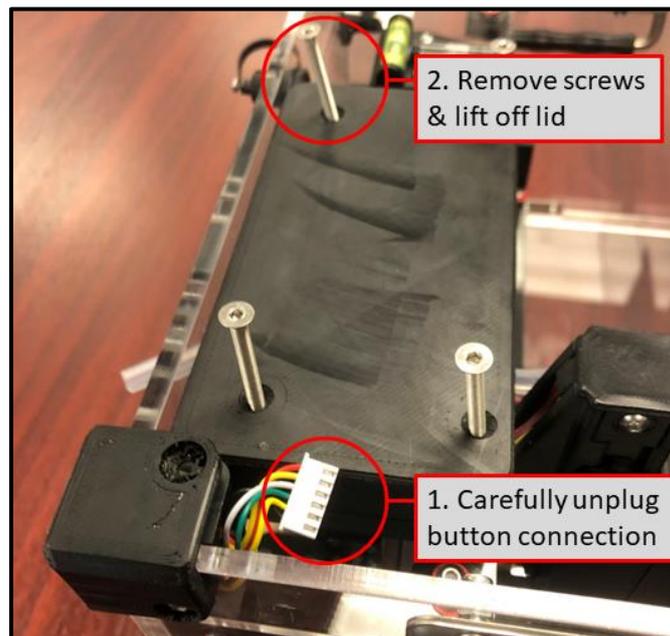
## Replacing the real-time clock button battery

The real-time clock button battery powers the Syp internal clock when the main battery pack is disconnected. To replace the real-time clock button battery,

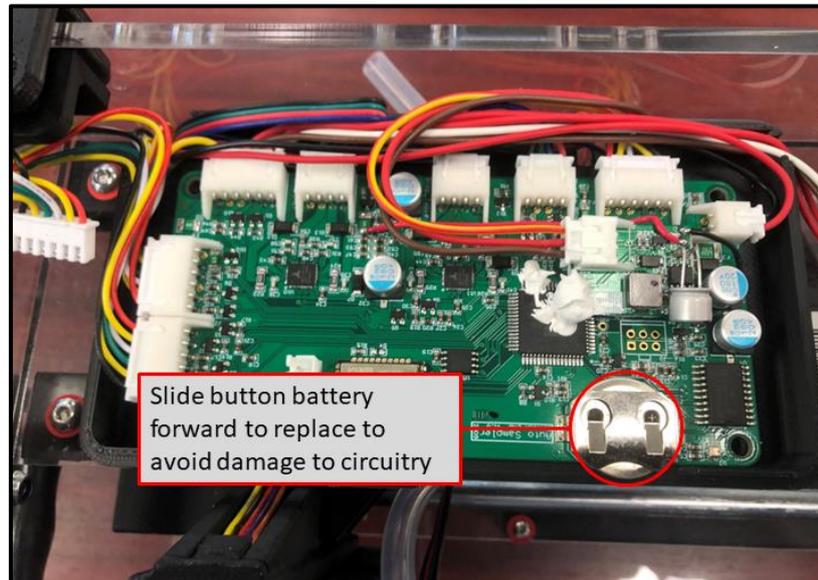
1. Remove the three screws securing the front corner guards on the top half of the unit
2. Remove the top screw on each of the rear corner guards
3. Slide the top panel towards the front to expose the wiring connecting the buttons on the Syp top acrylic panel to the electronics block



4. Unplug the wiring connecting the buttons on the Syp top panel to the electronics block
5. Remove the four screws securing the top of the electronics block



6. Remove the lid on the electronics block, exposing the circuit board
7. The button battery is secured under a metal holder. Access the battery from the front of the device (NOT over the circuitry) to remove and replace
  - a. We use a Panasonic CR2032 lithium button battery. Use a well-known battery brand for best performance



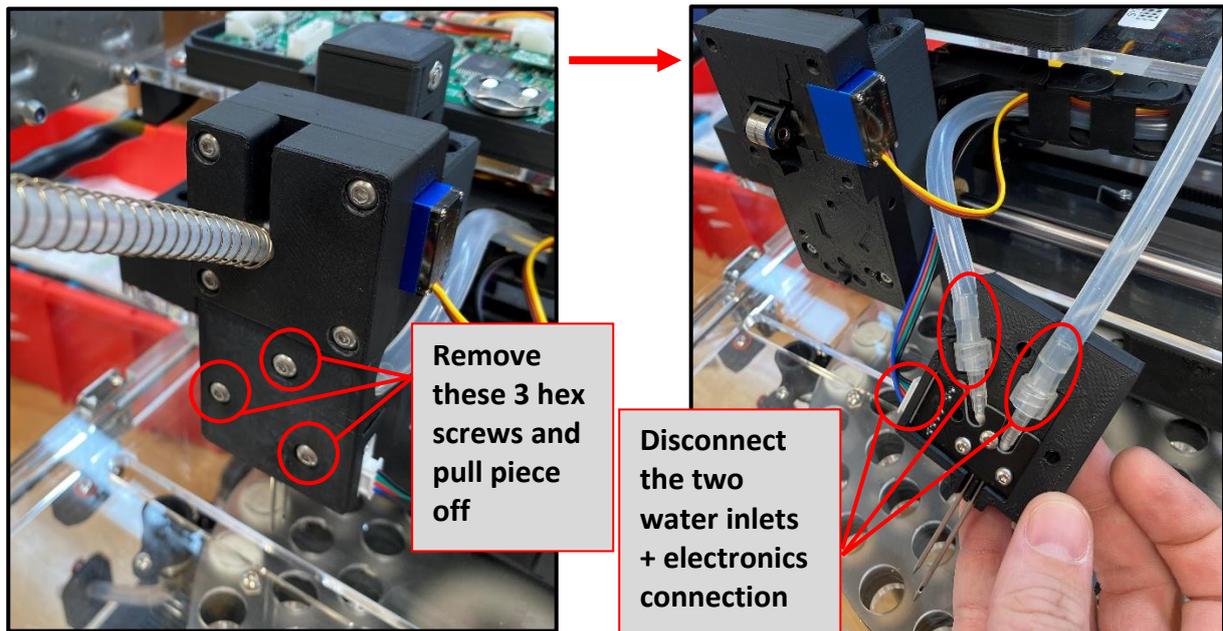
8. Replace and secure the electronics block lid, Syp top panel button connection, and corner guards



## Replacing the needle cartridge

Needle replacement may be required due to mineral build-up in some scenarios. Replacement needle cartridges are available for purchase from Waikato Scientific Instruments. To replace the needle cartridge:

1. Remove the top half of the unit to work on it
2. Remove the top panel as described in steps 1 - 3 of 'Replacing the real-time clock battery' above (p.26)
  - a. For easier access to the needle block, remove the front panel by removing the screws in each lower-front corner of the top half of the device
3. Remove the 3 hex screws on the lower section of the needle block, as shown below, and remove the lower panel of the needle cartridge



4. Disconnect each of the connections identified in the image below to remove the needle cartridge
5. Re-connect the wire and tubes on your new needle cartridge

This will provide full access to the needle cartridge. Perform these steps in reverse to re-install. Spare components are available for purchase from [www.waikatoscientific.com](http://www.waikatoscientific.com).



## Support

The Syp automatic fluid sampler is and designed by environmental geochemists at the University of Waikato and manufactured entirely in Hamilton, New Zealand. Product testing was carried out in several caves throughout the country.

Product documentation and additional resources can be found at [WaikatoScientific.com](http://WaikatoScientific.com).

For questions, concerns, or advice, please contact [info@WaikatoScientific.com](mailto:info@WaikatoScientific.com).



If ever in doubt of how to properly set up or maintain your device, please contact us at [info@waikatoscientific.com](mailto:info@waikatoscientific.com) for support.

