

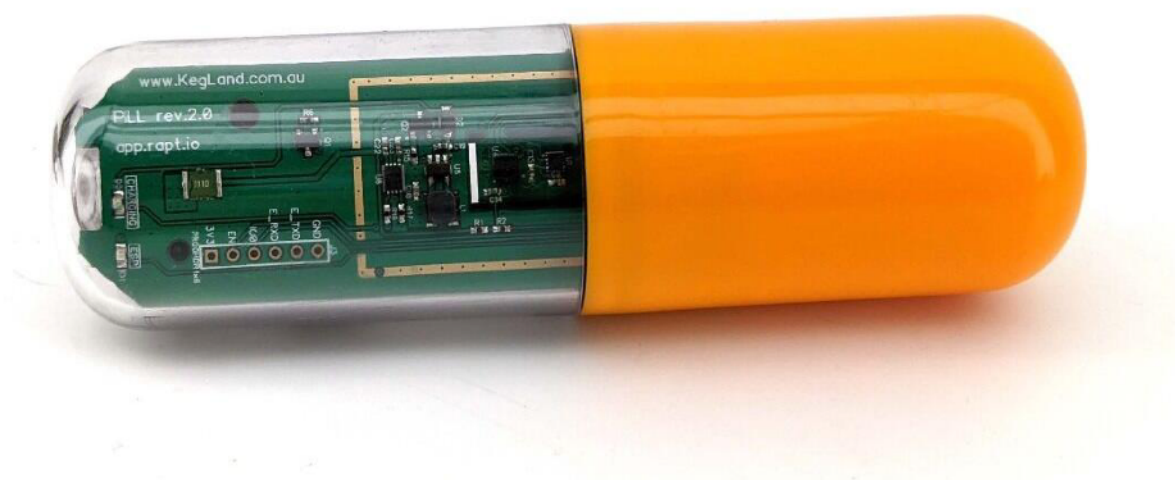


RAPT PILL

Hydrometer & Thermometer

KL20596

Quick Start Guide



KegLand Distribution PTY LTD



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WARNINGS

- Fully Charge the Li-ion battery after installation before first time use by plugging a USB-C cable into the USB-C charging port on the circuit board until the RED charging LED turns off. This allows the device to calibrate and correctly determine the remaining battery charge.
- Incorrect battery orientation can damage the circuit board.
- Always leak test your RAPT Pill by submerging in water prior to sanitising and dropping in your fermenter
- Only use KegLand approved cleaners such as **StellarOxy** and **StellarClean** and sanitisers such as **StellarSan** or **Phosphoric Acid**.

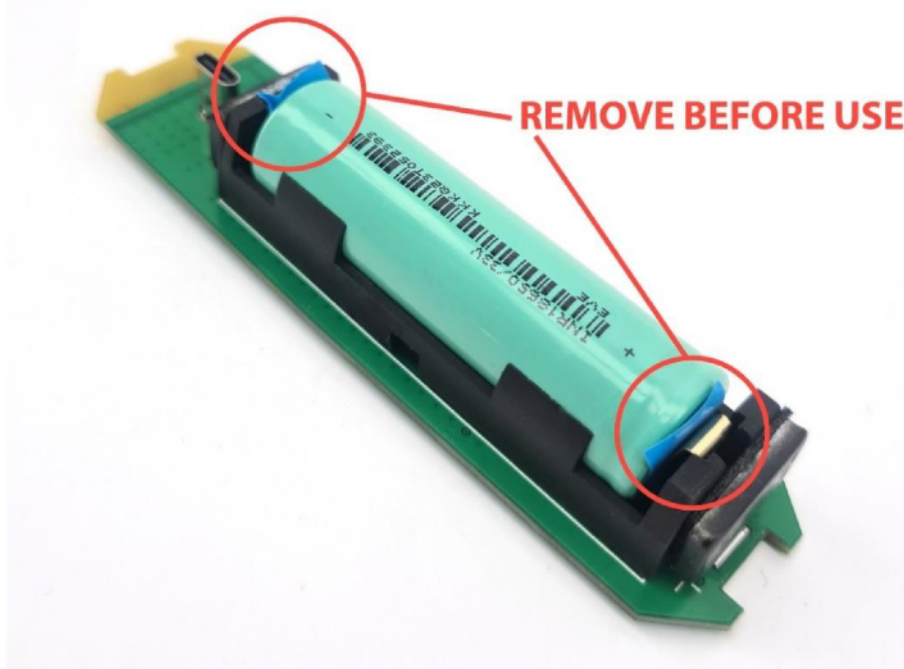
Battery Installation

The battery will come pre-installed in the RAPT Pill with a non-conductive strip on each terminal to prevent the device from being activated during transit. Before plugging the device into power, you will need to remove the battery and remove the two non-conductive strips from the terminals. Then reinstall the battery making sure you follow the (+) and (-) inscriptions on the battery and battery housing to ensure you install the battery in the correct orientation.

Important: make sure you install the battery in the correct orientation. Incorrect battery orientation can result in damage to the circuit board. This will not be covered by warranty.

BEFORE CHARGING:

1. REMOVE BATTERY
2. REMOVE BLUE NON-CONDUCTIVE STRIPS
3. RE-INSERT BATTERY IN CORRECT ORIENTATION



Only use KegLand approved 18650 rechargeable Lithium-ion batteries ([KL26734](#)). If non-approved batteries are used the device will require [calibration](#).



Once installed ensure your battery has good contact with the terminals. After installing the battery rotate it slightly within the battery holder to ensure it has good contact.

Important: Once you have installed the Li-ion battery in the correct orientation **FULLY** charge the battery before first time use by plugging a USB-C Cable into the USB-C Charging port on the circuit board. (USB-C cable NOT included). The RED charging LED will turn off when the RAPT PILL is fully charged and plugged into USB-C.

LED Indicators

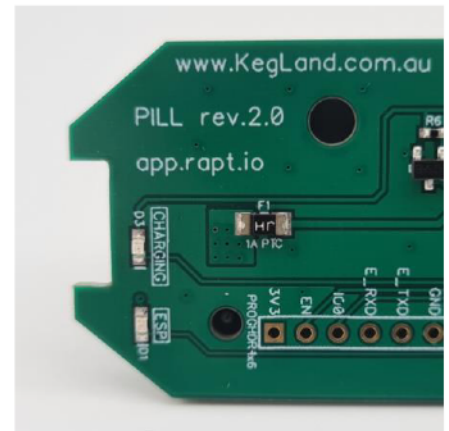
The RAPT Pill features two onboard LEDs

CHARGING LED (RED):

- Solid Red when plugged into USB type-C - Charging
- Light Off when plugged into USB type-C –Fully Charged

ESP LED (GREEN):

- Slow Green Flashes – flashes when the captive portal is enabled and the Pill is searching for a Wi-Fi network. This will happen when the Pill is plugged in to USB-C the first time
- Medium Green Flashes (roughly 2 per second) – The Pill is connected to Wi-Fi and active (plugged in via USB-C)
- Fast Green Flashes – Movement detected while active (plugged in via USB-C)
- Solid Green – when the device is awake and submitting telemetry (typically on for 20-30 seconds)



Registering your Device

1. Sign up for a RAPT account

To utilise the Wi-Fi connectivity of the RAPT Pill you will need to sign up for an account on the RAPT portal. This will allow you to track and monitor your specific gravity and fermentation temperature in real time.

1. Sign up for an account on the RAPT portal. <https://app.rapt.io/>
2. Once signed up log in to your account on the RAPT portal.

2. Connect your smart phone or tablet to the RAPT Pills Wi-Fi Network

2. Plug your Rapt Pill into a charger or computer with a USB-C cable (not included).
3. On your smart phone or tablet, open your Wi-Fi settings and connect to the "RAPT Pill XXXX" Wi-Fi network using the password "kegland1".

3. Open the RAPT Pill Captive Portal

1. Once you have connected your smart phone or tablet to your RAPT Pills Wi-Fi network you will need to open the RAPT Pill Captive Portal.
2. Your smart phone or tablet should provide a prompt to sign into the network of your RAPT Pill when you connect to its Wi-Fi Network. Clicking on this prompt will open the RAPT Pill Captive Portal.

If you are not prompted to sign into the network of your RAPT Pill by your smart phone or tablet then open your Wi-Fi settings and select the "RAPT Pill XXXX" Wi-Fi network again to open the Pill Captive Portal.

TIP: Once you have opened the RAPT Pill Captive Portal navigate to **Diagnostics** and write down the **IP (AP)**. This is the IP address of your RAPT Pill and can be input into your web browser to quickly connect the RAPT Pill Captive Portal when plugged into power.

Once you have connected to your RAPT Pill's Wi-Fi network and opened the Pill Captive Portal you will still need to connect your RAPT Pill to your home Wi-Fi network and register the device to your RAPT account before the RAPT Pill will send any telemetry.

4. Connect the RAPT Pill to your home Wi-Fi network

1. Select your home Wi-Fi network in the RAPT Pill captive portal, enter your Wi-Fi password and select **Join**. This will connect your Pill to your Wi-Fi network.

NOTE: The RAPT Pill cannot connect to 5GHz networks so if you have a dual band router make sure you are connecting to the 2.4GHz network.

2. Once you have joined, click on the **Registration** link to see your **MAC address** and **User Code**. Write both of these down or copy them on your device. You will need to enter the MAC address and User Code to register your Pill on your RAPT account.

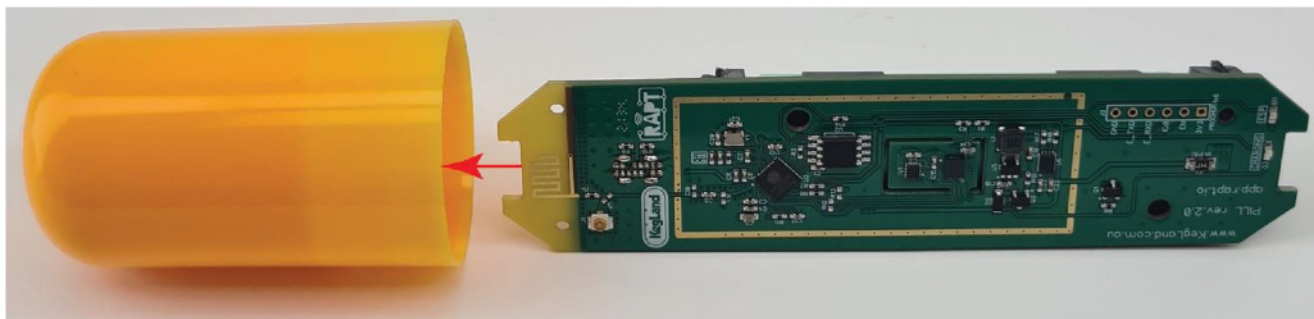


5. Register your RAPT Pill to your account on the RAPT Cloud

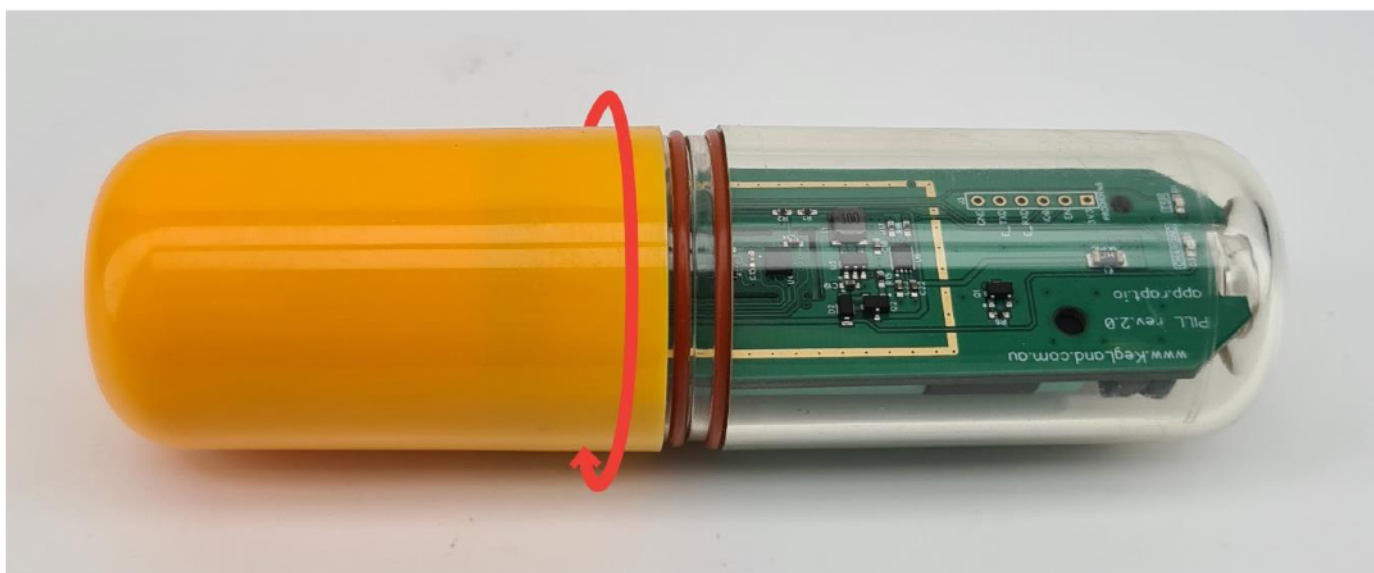
1. Ensure your RAPT Pill is connected to your Wi-Fi (above). Note – if you click on your Wi-Fi network, you can note the IP address of the Pill. This can be used to access the Pill AP in a browser.
2. Ensure you are logged in to the RAPT Portal (<https://app.rapt.io>) on a second device that is connected to the same home Wi-Fi network as the Pill you are registering.
3. In the RAPT Portal select **Add New Device**. Select **RAPT Pill (Digital Hydrometer)** from the drop down. Select **Next** and enter the **MAC address** and **User Code (Validation Code)** when prompted in the required fields, then select Next.
4. Congratulations! Your RAPT Pill is connected to Wi-Fi and registered to your RAPT Portal.

Assembly Instructions

When installing the circuit board into the housing it is important to insert the circuit board in the correct orientation to ensure the correct weight distribution for accurate readings. The yellow end of the circuit board should be inserted into the yellow housing as shown below.



Once the circuit board has been inserted into the yellow housing, screw the two housings together hand-tight until both o-rings are hidden to ensure formation of a hermetic seal.



Operation Instructions

After charging, assembly and device registration your RAPT Pill should be calibrated before use. Refer to the [Calibration](#) section for instructions on how to calibrate your device.

1. Calibrate and then assemble your RAPT Pill. After calibration confirm your RAPT Pill is correctly sending telemetry to the RAPT Portal by leaving it in a jug of water or sugar solution for an hour and checking to see if telemetry has been received by the RAPT Portal.

It is best to conduct this test in the position where the Pill will be located during fermentation such as if you are fermenting in a fermentation chamber place the Pill in a jug in the fermentation chamber to confirm that telemetry is received and your RAPT Pill has good signal strength.

2. Once it is confirmed that your RAPT Pill is sending telemetry then sanitise your RAPT Pill with an approved sanitiser such as **StellarSan** or **Phosphoric Acid** which has been correctly diluted according to the instructions on the sanitiser's container.
3. Drop your RAPT Pill into your fermenter to monitor the specific gravity and temperature of your brew in real time.

Sleep Mode

The RAPT Pill will enter sleep mode when the device is in a horizontal orientation. It will automatically wake up when its orientation is changed indicated by the illumination of a green light on the circuit board.

When not in use ensure the RAPT Pill is in a horizontal orientation to ensure it remains asleep.



Calibration

Calibration before first use is strongly encouraged for best results.

1. Plug your Rapt Pill into a charger or computer with a USB-C cable (not included).
2. On your smart phone or tablet, open your Wi-Fi settings and connect to the "RAPT Pill XXX" access point (AP) using the password "kegland1". You may not need to enter the password if you have previously connected your device to the Pill's Wi-Fi.
3. Open the Pill Captive Portal when prompted to sign into the network of your RAPT Pill by your smart phone or tablet.

If you are not prompted to sign into the network of your RAPT Pill by your smart phone or tablet then open your Wi-Fi settings and select the "RAPT Pill XXXX" Wi-Fi network again to open the Pill Captive Portal.

3. Once the RAPT Pill Access Portal is open on your phone or tablet, navigate to the **Calibration** tab.
4. Select the desired calibration method ([Standard](#), [Advanced](#) or [Custom](#)) and follow the relevant steps.

IMPORTANT: The RAPT Pill is designed to disconnect from the RAPT Portal once the USB-C cable is unplugged to preserve battery life. Opening the Calibration or Diagnostics screen will keep the Pill Portal active to allow calibration of the Pill. You will be prompted after to 10 minutes to "Click Here To Maintain Connection" if the calibration process takes longer than 10 minutes.

Once you have entered a Calibration mode, please assemble your Pill according to the directions so that it can be removed from the USB and calibrated according to the instructions below.

There are three ways to calibrate your RAPT Pill: [Standard Calibration](#), [Advanced Calibration](#) and [Custom Calibration](#).



1: Standard Calibration

The Standard calibration mode is recommended for most users.

Standard calibration is the quickest and simplest method of calibration.

1. Fill a container of sufficient volume to hold the RAPT Pill in suspension with a liquid of known gravity. It is simplest and easiest to use water which has a gravity of 1.000.
2. Once the angle reading has stabilised* enter the gravity (1.000 for water) and press Calibrate. Wait until the screen indicates that calibration is complete.

Your Pill is now ready to use!

* The angle will never be completely steady, as it is extremely sensitive. Press Calibrate when the RAPT Pill has stabilised as much as possible.

2: Advanced Calibration

The advanced calibration mode can give greater accuracy across a wider range.

Advanced calibration is also quite quick and easy, and can provide a more accurate result than Standard Calibration. It is the same procedure as standard calibration, but in addition to water at 1.000, have a solution of a known gravity prepared.

We recommend using a gravity in the range that your fermentation will start – 1.040-1.060 for typical beers, for example.

1. Fill a container of sufficient volume to hold it in suspension with a liquid of known gravity. It is simplest and easiest to use water which has a gravity of 1.000.
2. Prepare another vessel capable of holding the Pill in suspension with a solution of known gravity in the range representative of the upper limit of your starting gravities.
3. Place the Pill in the weaker solution. Once the angle reading has stabilised enter the gravity (1.000 for water) and hit Calibrate. Wait until the screen indicates that calibration is complete.
4. Place the Pill in the stronger solution. Enter the gravity as determined by a calibrated hydrometer. Once the angle reading has stabilised press Calibrate. Wait until the screen indicates that calibration is complete.

3: Custom Calibration

Warning! Custom Calibration is for advanced users only.

This mode can provide the most accurate readings across a wider range than the other calibration modes.

Only proceed if you are comfortable with spreadsheets and complex curves. If you are working with solutions with gravities higher than 1.080, then custom calibration is advised.

For advanced calibration, you will need to take readings at various gravity points roughly 10 gravity points apart, and make a note of the angle of the Pill at each point. We recommend readings from 1.080 down to 1.000, 10 points apart (so, 1.080, 1.070, 1.060 etc). Note that it does not matter if the gravity readings are not exactly 10 points apart, as long as the gravity reading is correct. Use of a hydrometer that is known to be accurate is quite important.

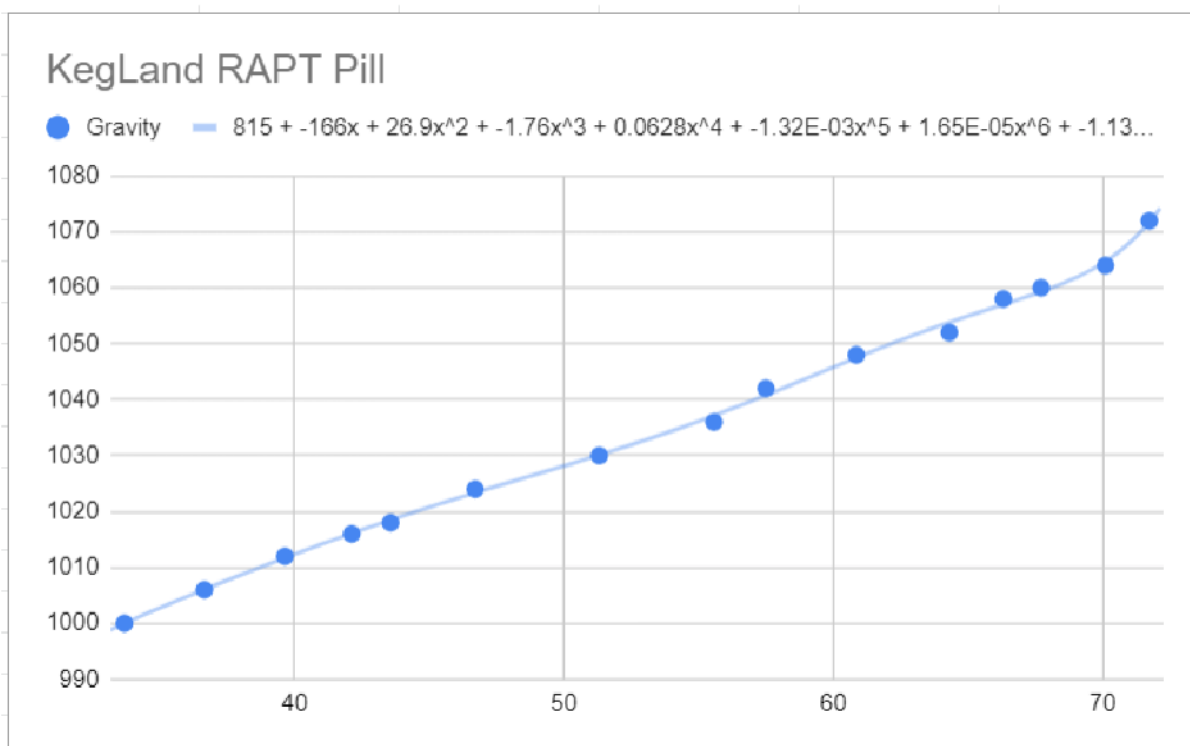
To perform Custom Calibration, it is easiest to start with the strongest solution and dilute to progressively weaken the solution. It is important to use a calibrated hydrometer to ensure accurate gravity readings.

1. Place the Pill in the first solution of known gravity. Wait for the angle to stabilise, then make a note of the angle and the gravity.
2. Repeat this step for solutions of different gravity, making a note of the angle and the gravity at each step. It is easiest to dilute the starting solution in steps of approximately 10 points. Finish with a reading in a solution with a gravity of 1.000 (IE water).

Once you have sufficient readings, the angle and the gravity need to be entered on an Excel spreadsheet (or similar such as Google Sheets) as a graph with gravity on the 'y' axis and angle on the 'x' axis. The more readings you take, the more accurate this calibration will be. We recommend a minimum of 6 samples, with 10 or more providing a greater degree of accuracy.

When you have created the graph, create a polynomial trend line onto the graph with the degree of the polynomial being *at least* one less than the number of data points. If the trend line creates an irregular curve (such as not passing through the data point at 1.000 correctly or not following a polynomial shape) reduce the number of data points (ensuring that there are still more data points than the degree of the polynomial) until the curve matches.

With 10 data points, a polynomial degree between 5 and 8 will typically give the best results.



This is a sample only

Copy the equation of the trend line that is generated once this is done.

Paste this equation into the field provided on the Custom Calibration screen (In Google Sheets, set your label to Use Equation).

This will look similar to this:

$$y = 0.0000023109x^5 - 0.0005741632x^4 + 0.0568746764x^3 - 2.8119846525x^2 + 71.1087310405x + 265.6578215178$$

This is a sample only – DO NOT USE THIS EQUATION AS IT WILL NOT BE ACCURATE

Substitute x in this equation with “*angle^” thus:

$$y = 0.0000023109*angle^5 - 0.0005741632*angle^4 + 0.0568746764*angle^3 - 2.8119846525*angle^2 + 71.1087310405*angle + 265.6578215178$$

This is a sample only – DO NOT USE THIS EQUATION AS IT WILL NOT BE ACCURATE

Paste this equation into the field in your Custom Calibration to complete the calibration.

Congratulations! Your Pill is calibrated and ready to go.



Updating Firmware

Your RAPT Pill will automatically check and install for firmware updates when plugged in to USB power with a USB-C cable (not supplied).

To check the firmware on your Pill, plug the Pill in with a USB-C cable then open the Pill Access Portal by connecting to the Access Point on your phone or tablet or through the Pill IP address.

1. Plug your Pill in to USB power with a USB-C cable.
2. Connect to the Pill Access Portal with your phone or tablet or through the Pill IP address.
3. Navigate to the **Diagnostics** page.
4. Check that your Pill is running the latest firmware.
5. If a firmware update is available, this will be updated automatically when the Pill is plugged in to USB with a USB-C cable (not supplied).
6. To check and update manually in the event that this is not up to date, press the **DO OTA UPDATE** button. Your device will automatically download and update the most current available firmware.

Trouble-shooting Registration and Telemetry

Green light is not illuminating when RAPT Pill plugged in to USB-C

This occurs if the battery is below a minimum charge level. Please leave the Pill connected for 30 minutes to gain sufficient charge, then unplug and reconnect.

Red (battery) light flashes rapidly when plugged in to USB-C

Please install the battery or check that it is making good contact with the terminals.

Lights turn off immediately when disconnected from USB-C

Please check the charge level of the battery – it may be insufficient to power the Pill. The battery may be faulty, or not making good connection to the terminals. A fully charged battery has around 4.2V – this can be tested with a multimeter. If the battery has a good charge level, gently bend the terminals out in order to ensure there is good contact with the battery.

Battery level reads 0%/not displaying in the RAPT Portal

The battery needs to reach a full charge when installed in the Pill and connected via USB-C. If the Pill has not determined the fully charged state then it will not display the correct percentage. This will normally rectify itself after the Pill is used and then fully recharged.

The lights on the Pill stop flashing shortly after it is unplugged

This is normal behaviour. There is an approximately 10 minute timeout after the Pill is unplugged.

There are no lights on the Pill when unplugged

This is normal. The Pill will be 'asleep' by default and will wake briefly at the set interval to send telemetry. The green light will flash briefly when this happens.

Cannot access the Pill Captive Portal

This can only be accessed when the Pill is plugged in to USB-C. Access to the portal will cease after 10 minutes and the Pill will enter a sleep state. Unplugging and reconnecting to USB-C will allow it to be reconnected.

User code is not appearing on the Pill Captive Portal

If the space for the user/validation code on the Pill Captive Portal is blank then make sure that your RAPT Pill is connected to your home Wi-Fi network (See [Determine whether your RAPT Pill is connected to Wi-Fi](#) below).

No telemetry is being displayed on the RAPT Portal.

The default setting for telemetry is 60 minutes. As a result, you will not see telemetry in the RAPT Portal right away. Should the telemetry data not appear after 60 has passed you should check the following:

[Determine whether your RAPT Pill is connected to Wi-Fi](#)

If your RAPT Pill is not connected to your home Wi-Fi network it will be unable to send telemetry to the RAPT Portal.

To check this, plug your RAPT Pill in to power and open the RAPT Pill Captive Portal and Navigate to **Wi-Fi**. Check that it shows that the RAPT Pill is connected to your home Wi-Fi network.



You can also check by navigating to **Diagnostics** and checking that it shows your networks IP address next to **IP (STA)**.

To connect your RAPT Pill to your home Wi-Fi network, see [Connecting the RAPT Pill to your Home Wi-Fi Network](#)

Check the signal strength

If your RAPT Pill is connected to your home Wi-Fi network and there is no telemetry being received check that your RAPT Pill has a good signal strength in the area/vessel/chamber you are fermenting in.

To check the signal strength, log in to the RAPT Portal and click on the **information symbol** ⓘ below your RAPT Pill on the dashboard.

Signal strength is represented on a scale of 0 to -100dbm

Signal Strength (dBm)	What it means
0 to -30dBm	Maximum signal
-50dBm	Excellent signal
-67dBm	Good, reliable signal
-70dBm	Ok, not a strong signal
-80dBm	Poor, unreliable signal
-90dBm	Unusable

Re-Register Your RAPT Pill

If your RAPT Pill is still not sending telemetry despite being connected to Wi-Fi and with a good, reliable signal strength then you may need to re-register your RAPT Pill to your account. To re-register your RAPT Pill do not delete the device from the RAPT Portal, instead follow the steps below:

1. Connect the Pill via USB-C cable. Open the Pill Captive Portal on your smart phone or tablet. (See [Opening the RAPT Pill Captive Portal](#)).
2. Go to the **Registration** tab in your Pill Captive Portal.
3. Click the **Clear Registration** button, and wait a couple of seconds for a new **User Code** to be generated.
4. In a separate device, open and sign in to the RAPT Portal (<https://app.rapt.io>).
5. Click on the **Edit** button of the RAPT Pill that you wish to re-register.
6. Go to the **Troubleshooting** tab.
7. Click the **Reset Device Authentication** button.



8. When prompted, enter the new user/validation code that was generated and click **Save**. Your RAPT Pill should now be registered successfully.

The Pill has been sending telemetry but is no longer sending telemetry

This can occur for a number of reasons.

- Check that the Pill is within range of the Wi-Fi router.
- The battery may have dropped below a safe operating level – the Pill will enter a ‘deep sleep’ mode in order to protect the battery.
- There may have been an interruption to the network or internet.
- The battery may be slightly loose in the terminals causing an inconsistent power state.
- There may be a Wi-Fi connectivity issue caused by unusual network setups or network security settings.
- If there is battery and temperature data, but not gravity data, this indicates incorrect calibration or the current gravity is out of range.

If you are unable to sign up for an account or your RAPT portal displays an error please forward as many visual pieces of supporting information and a detailed description of the error to beer@kegland.com.au



Warranty (Australia) & Support

Please join the Facebook [RAPT Users Group](#) for support on how to use your RAPT Pill & Thermometer or the RAPT Portal.

If you need hardware support, please contact your nearest distributor.

The RAPT Pill & Thermometer comes with a 12-month warranty when sold in Australia. To lodge a warranty claim in Australia please forward as many visual pieces of supporting information and a detailed description of your issue to beer@kegland.com.au

If you purchased your unit from an international distributor, you will be required to go through their warranty claims process.

For a full terms and condition please visit our website here -> [Terms & Conditions](#)