



Pill
Hydrometer & Thermometer
KL20596
Quick Start Guide



KegLand Distribution PTY LTD

IMPORTANT

- 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.
- Firmware updates are performed when the Pill is connected to Wi-Fi and plugged in to USB-C. It is important to ensure your firmware is current before registering the device to the RAPT Portal.
- 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**.

The battery may come preinstalled in the RAPT Pill Hydrometer. If that is the case you will need to remove the blue plastic strip which prevents the battery from completing a connection and draining during shipping.



Battery Installation (If required)

Only use KegLand approved 18650 rechargeable Lithium-ion batteries ([KL26734](#)). The RAPT Pill Hydrometer has been calibrated according to the weight and density of these specific Li-ion batteries. If non-approved batteries are used this may alter the accuracy of the RAPT Pill hydrometer meaning that it will need to be re-calibrated.

To install the Li-ion battery unscrew the housing by rotating the coloured half of the housing counter clockwise. Then follow the (+) and (-) inscriptions on the battery and battery housing on circuit board to ensure you install the battery in the correct orientation.

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 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.



Important: Incorrect battery orientation can damage the circuit board. This will not be covered by warranty.

LED INDICATORS

The RAPT Pill Hydrometer 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)

SIGN UP FOR A RAPT ACCOUNT

To utilise the Wi-Fi connectivity of the RAPT Pill Hydrometer 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.

CONNECT THE RAPT PILL TO YOUR WI-FI AND REGISTER THE DEVICE

How to connect a RAPT Pill to your Wi-Fi

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 Portal (AP) using the password "kegland1"
3. Your device should automatically open a browser to the Pill Access Portal
4. Select your Wi-Fi access point, enter your Wi-Fi password and select **Join**. This will connect your Pill to your Wi-Fi network.
5. Before registration with the RAPT Portal, please ensure that the firmware is up to date. Firmware updates are performed automatically when the Pill is connected to the internet via Wi-Fi. In the **Diagnostics** screen, please select **Check For New Firmware** and update if needed.
6. Once you have ensured the firmware is current and connected the Pill to Wi-Fi, 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 with the RAPT Portal.



How to Register a RAPT Pill to 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. **IMPORTANT** – If you are connected to the Pill Access portal, *that device is not connected* to your WiFi network but to the Pill's self generated WiFi network. Thus, use a different device to log in to the RAPT Portal to complete registration. Using a phone to open the Pill's AP and a laptop or tablet to open the RAPT Portal is generally the easiest approach.
2. Ensure you are logged in to the RAPT Portal (www.app.rapt.io) on a device that is connected to the same 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** after ensuring that your Pill is connected to your Wi-Fi network as above.
4. Enter the **MAC address** and **Validation Code** when prompted in the required fields, then select Next.
5. Once registered you will see a confirmation message in the Pill Portal: **REGISTRATION DONE!** If you do not see this in the Pill Portal please follow the troubleshooting steps below to re-register the Pill.
6. Congratulations! Your RAPT Pill is connected to Wi-Fi and registered to your RAPT Portal.

How to Pair your RAPT Pill with another RAPT device

1. Ensure your RAPT Pill is connected to your Wi-Fi
2. Click on the Edit Button for your RAPT Pill in the RAPT Portal
3. Select "Paired Device"
4. Choose the RAPT device you wish to pair with
5. Click Save to finish.

NOTE: Only ONE RAPT Pill will be displayed on the paired device (such as a RAPT Fermentation Chamber). The telemetry for each Pill is viewable in the RAPT Portal separately.

How to confirm your PILL is registered to your RAPT Portal

1. Connect the Pill to USB-C and connect to the Pill Portal by following the steps above
2. Navigate to the **Diagnostics** screen of the Pill Portal
3. Make a note of the **Telemetry Sent** option. It will show 0/0 if you are setting up a Pill for the first time
4. Select the **Send Telemetry Now** button



5. After a few seconds, the **Telemetry Sent** option will update to reflect that telemetry has been sent to the cloud. The first number shows *telemetry sent*. The second number shows *telemetry received*. If both numbers have increased by 1 then your Pill is successfully registered and ready to go once calibration is completed.
6. If the first number increases but the second number does not, this indicates that telemetry was sent but not received, thus the registration to the RAPT Portal was not successful. Please follow the troubleshooting steps below to resolve this.

TROUBLESHOOTING REGISTRATION AND TELEMETRY

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, then you may need to re-register your RAPT Pill with the RAPT Portal.

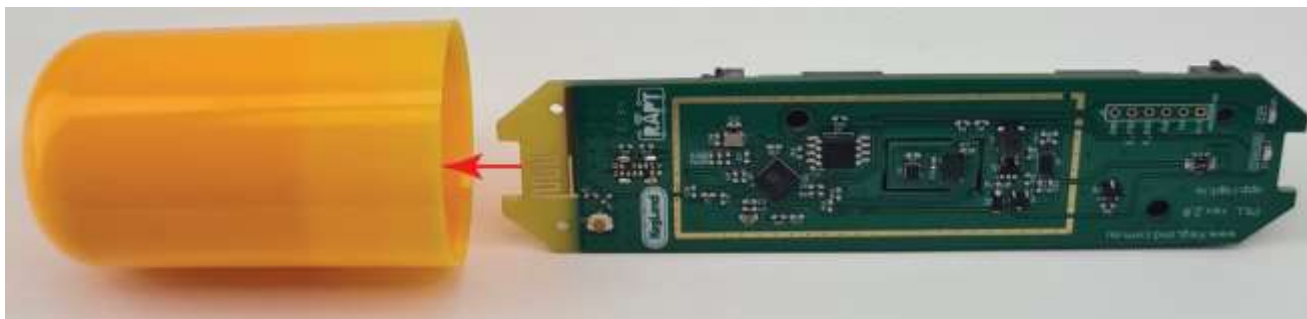
How to Re-Register Your RAPT Pill

1. Connect the Pill via USB-C cable. Access the Pill Access Point by entering the Pill's IP address in a browser window, or connect to the Pill AP using your phone. (See **How To Connect A RAPT Pill To Your Wi-Fi** above)
2. Go to the **Registration** tab in your Pill AP
3. Click the **Clear Registration** button, and wait a couple of seconds for a new **User Code** to be generated
4. In a separate browser tab, open the RAPT Portal (app.rapt.io)
5. Click on the **Edit** button of the RAPT Pill Hydrometer 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 code that was generated and click **Save**. Your RAPT Pill should now be registered successfully.

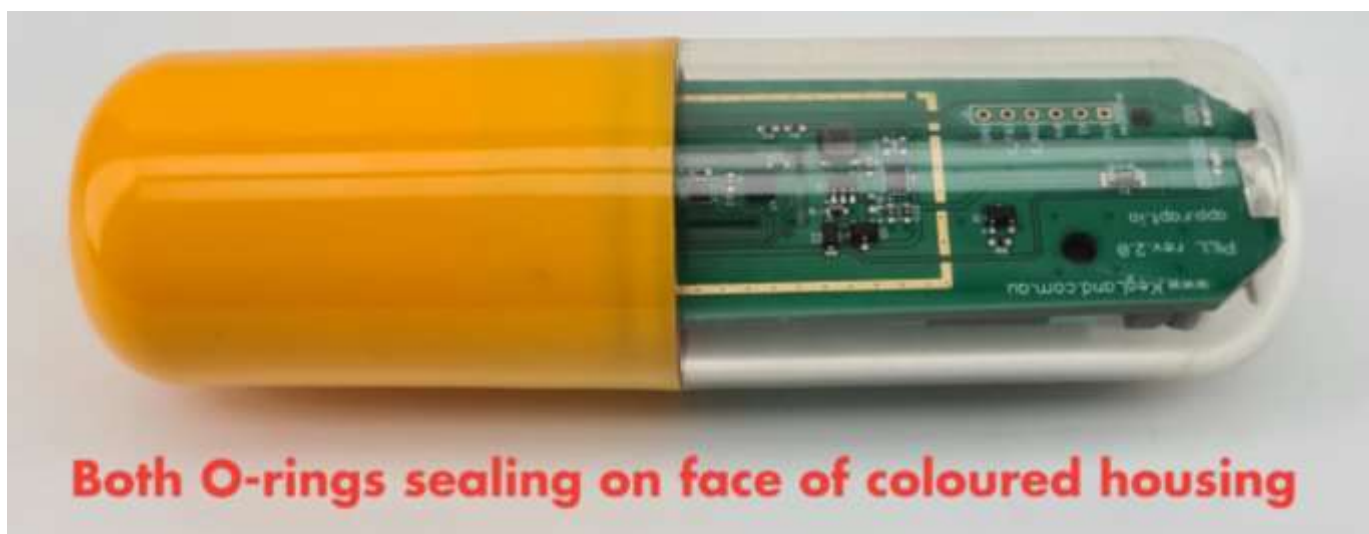
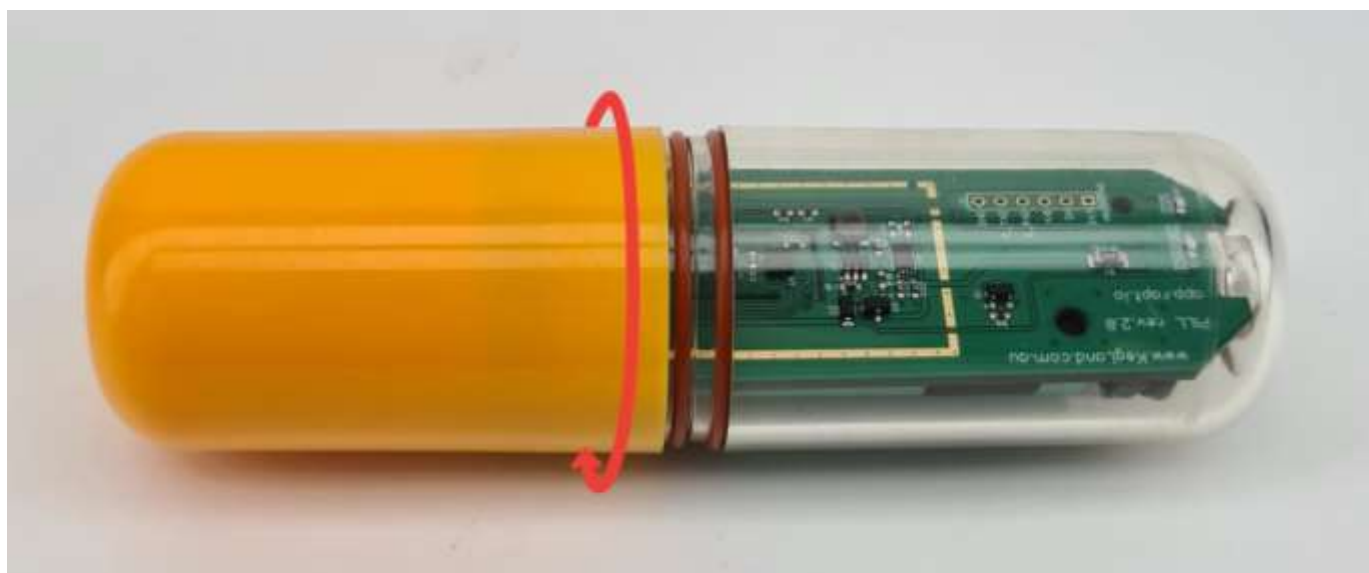
If you are still experiencing issues, please contact beer@kegland.com.au for further assistance.

INSTALL THE CIRCUIT BOARD AND ASSEMBLE YOUR DEVICE

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.





SLEEP MODE

The RAPT Pill Hydrometer 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 hydrometer is in a horizontal orientation to ensure it remains asleep.

Please note that telemetry may be sent in sleep mode if the device is moved for any reason. The accelerometers are quite sensitive.

OPERATION INSTRUCTIONS

Your RAPT Pill Hydrometer comes pre-calibrated and ready to go after charging, assembly and device registration. For calibration steps refer to the [Calibration](#) section below. NOTE – Opening the Pill housing (for charging via USB-C, for example) can affect calibration. Thus, we recommend performing Standard Calibration whenever the Pill housing has been opened and reassembled.

1. Submerge your RAPT Pill hydrometer in a glass of pint water to test for leaks prior to placing into your fermenter.
2. Sanitise your RAPT Pill Hydrometer 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 Hydrometer into your fermenter to monitor the specific gravity and temperature of your brew in real time which is relayed to the RAPT portal for logging.

UPDATING FIRMWARE

Your RAPT Pill will 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 Point with your phone or tablet or through the Pill IP address.
3. Navigate to the **Diagnostics** page
4. Generally, 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).



5. To check and update manually in the event that this is not up to date, press the **Check For New Firmware** button. Your device will automatically download and update the most current available firmware.

CALIBRATION

Calibration before first use is strongly encouraged for best results.

Your RAPT Pill comes pre-calibrated from the factory. Due to minor tolerance differences, this calibration can be improved by performing a manual user calibration.

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. Your device should automatically open a browser to the Pill Access Portal.
4. Once the RAPT Pill Access Portal is open on your phone or tablet, navigate to the **Calibration** tab.
5. 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.

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 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. 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

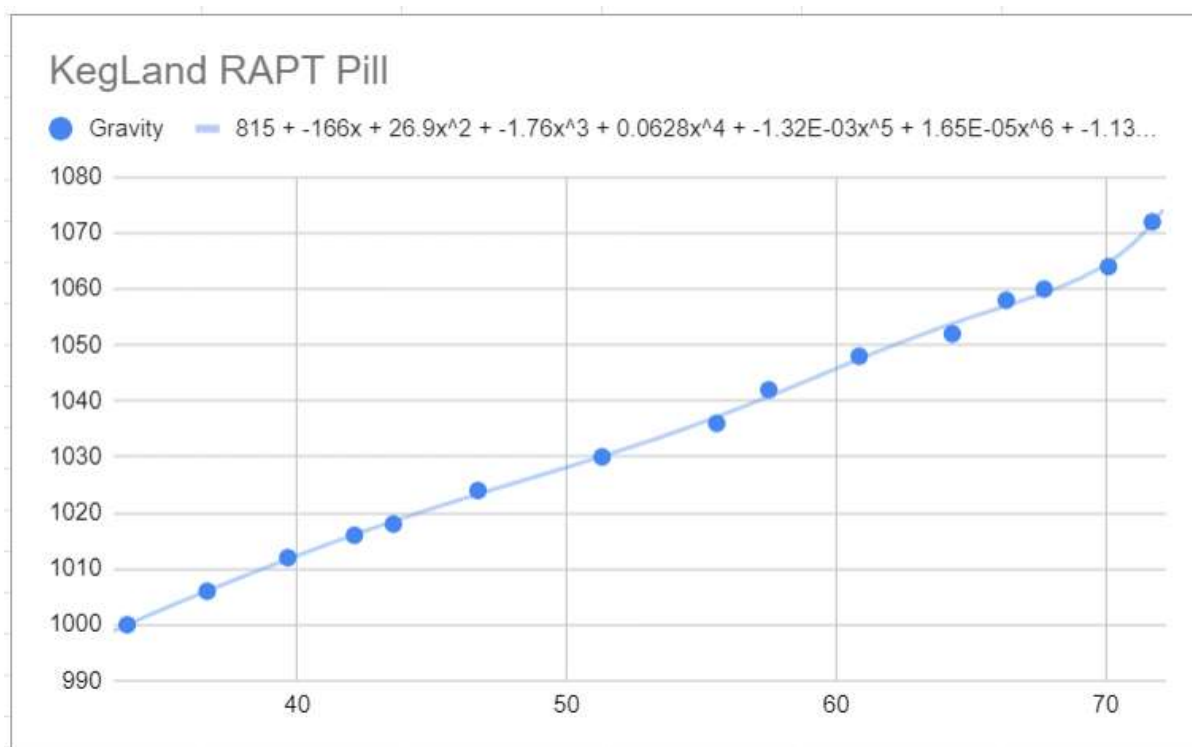


- Repeat this step for solutions of different gravity, making a note of the angle and the gravity at each step. It is easiest to dilute the starting solution in steps of approximately 10 points. Finish with a reading in a solution with a gravity of 1.000 (IE water).

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.

TROUBLE SHOOTING

Green light not illuminating when 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 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.

I can see Battery / Temperature data, but not Gravity

This will happen when the current gravity is outside of the range that can be displayed. If the gravity is in range, then the most likely issue is incorrect calibration. See the Calibration section for details on calibrating the Pill.

I am not receiving any telemetry

There are a number of causes for this. The most common is not being registered to the RAPT portal correctly. **This is covered in the separate troubleshooting section above.**

Ensure the Pill is connected to your Wi-Fi network – check the 'Wi-Fi' screen of the Pill portal.

Ensure you are accessing the RAPT portal from a device that is connected to the internet.

The Pill will send telemetry every 60 minutes by default. If less time than that has elapsed you may just need to be patient.

Ensure that the Pill is within range of your Wi-Fi router.

The Pill will not send telemetry when asleep. By default, it will go to sleep when horizontal. You may see telemetry such as battery and temperature when asleep occasionally. This occurs because the Pill is quite sensitive to movement by design and thus can be jugged awake briefly when sleeping.

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 Hydrometer & Thermometer or the RAPT Portal.

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

The RAPT Pill Hydrometer & 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](#)