pawkit
water activity meter

Portable Water Activity
Measurement System

Operator's Manual

Version 9

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Trademarks

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1. Introduction

Welcome to the Pawkit water activity measurement system. The Pawkit allows you to make quick measurements of water activity to ensure the safety of your product. We hope you find the contents of this manual useful in understanding your instrument and maximizing its benefit to you.

Customer Support

If you ever need assistance with your Pawkit, or if you just have questions, there are several ways to contact us. Our Customer Support and Sales Representatives are available Monday thru Friday, between 7am and 5pm Pacific time.

NOTE: If you purchased your Pawkit through a distributor, please contact them for assistance.

E-mail
support@aqualab.com or **sales@aqualab.com**

Phone
1-509-332-5601

Fax
1-509-332-5158

If contacting us by email or fax, please include as part of your message your instrument's serial number, your name, address, phone, fax number, and a description of your problem or question.

About this Manual

This manual includes instructions on the operation, calibration, and maintenance of your Pawkit water activity system. Please read these instructions carefully to ensure that your samples are measured accurately and that you can fully utilize the instrument's potential.

Warranty

The Pawkit has a 30-day satisfaction guarantee and a one-year warranty on parts and labor.

Note to our Users

This manual is written to aid the end user in understanding the basic concepts of water activity, enabling them to use our instrument with confidence. Every effort has been made to ensure that the content of this manual is correct and scientifically sound.

Seller's Liability

Seller warrants new equipment of its own manufacture against defective workmanship and materials for a period of one year from date of receipt of equipment (the results of ordinary wear and tear, neglect, misuse, accident and excessive deterioration due to corrosion from any cause are not to be considered a defect); but Seller's liability for defective parts shall in no event exceed the furnishing of replacement parts F.O.B. the factory where originally manufactured. Material and equipment covered hereby which is not manufactured by Seller shall be covered only by the warranty of its manufacturer. Seller shall not be liable to Buyer for loss,

damage or injuries to persons (including death), or to property or things of whatsoever kind (including, but not without limitation, loss of anticipated profits), occasioned by or arising out of the installation, operation, use, misuse, nonuse, repair, or replacement of said material and equipment, or out of the use of any method or process for which the same may be employed. The use of this equipment constitutes Buyer's acceptance of the terms set forth in this warranty. There are no understandings, representations, or warranties of any kind, express, implied, statutory or otherwise (including, but without limitation, the implied warranties of merchantability and fitness for a particular purpose), not expressly set forth herein.

2. About the Pawkit

The Pawkit is designed to be a simple, rapid and portable system for measurement of water activity. It is easy to use, durable, and requires little maintenance.

PawKit Specifications

Water Activity Range: 0.00 to 1.00 a_w
Water Activity Accuracy: ±0.02 a_w
Water Activity Resolution: ±0.01 a_w
Read time: 5 min.
Sample Temperature Range: NA
Sample Temperature accuracy: NA
Sample Temperature resolution: NA
Sample Dish Capacity: 7 ml recommended (15 ml full)
Operating Environment: 4 to 50° C;
0 to 90% Relative Humidity (non-condensing)
Case Dimensions: 6.6 x 10.7 x 2.0 cm
Weight: 115 g (4 oz)
Case Material: Stainless Steel and Valox 325 Plastic
Display: 6-digit custom LCD with symbols
Data Communication: NA
Power: 2-3 Volt 16 mm coin cell batteries (3 years)
Warranty: 1 year parts and labor

How Pawkit Works

The Pawkit uses a capacitance humidity sensor to measure the water activity of a sample. The sensor is suspended in the headspace of the chamber and uses a special polymide material sandwiched between two electrodes to sense humidity changes. The sensor converts the humidity value into a specific capacitance, which is then measured electronically by the circuit. This signal is then translated by the software and displayed as water activity on the instrument's screen. At equilibrium, the relative humidity of the air in the chamber is the same as the water activity of the sample.

Accuracy

The Pawkit is accurate to ± 0.02 a_w. For many applications, this accuracy is more than adequate. If you require higher accuracy in your measurements, we recommend you use Decagon's AquaLab water activity meter, which is a lab-grade, bench-top instrument that has an accuracy of ± 0.003 a_w, and measures based upon the chilled-mirror dewpoint method. Contact Decagon for more details.

Getting Started

Components of your Pawkit System:

Your Pawkit should have been shipped to you with the following items:

- Pawkit main unit
- Durable carrying case

- 60 disposable Sample cups
- 3 spare sensor filters
- 1 reusable stainless steel cup
- 2 vials each of the following verification standards:
  2.33 molal NaCl 0.920 a_w
  6.0 molal NaCl 0.760 a_w
  13.41 molal LiCl 0.250 a_w
- AquaLab Cleaning Kit

Preparing for Operation

To ensure that your Pawkit operates correctly and consistently, always place it on a level surface when measuring. This reduces the chance that sample material will spill inside the instrument. To avoid inaccurate readings, place your Pawkit in a location where the temperature remains fairly stable. This location should be well away from air conditioner and heater vents, open windows, outside doors, refrigerator exhausts, or other items that may cause rapid temperature fluctuation.

3. Water Activity Theory

Water is a major component of foods, pharmaceuticals, and cosmetics. Water influences the texture, appearance, taste and spoilage of these products. There are two basic types of water analysis: moisture content and water activity.

Moisture Content

The meaning of the term moisture content is familiar to most people. It implies a quantitative analysis to determine the total amount of water present in a sample. Primary methods for determining moisture content are loss on drying and Karl Fisher titration, but secondary methods such as infrared and NMR are also used. Moisture content determination is essential in meeting product nutritional labeling regulations, specifying recipes and monitoring processes. However, moisture content alone is not a reliable indicator for predicting microbial responses and chemical reactions in materials. The limitations of moisture content measurement are attributed to differences in the intensity with which water associates with other components.

Water Activity

Water activity (a_w) is a measurement of the energy status of the water in a system. It indicates how tightly water is bound, structurally or chemically, within a substance. Water activity is the relative humidity of air in equilibrium with a sample in a sealed measurement chamber. The concept of

water activity is of particular importance in determining product quality and safety. Water activity influences color, odor, flavor, texture and shelf-life of many products. Most importantly, it predicts product safety and stability with respect to microbial growth, chemical and biochemical reaction rates, and physical properties.

Therefore, water activity is a far better indicator of perishability than moisture content. *Figure 1* shows how the relative activity of microorganisms, lipids and enzymes relate to water activity. While other factors, such as nutrient availability and temperature, can affect the relationships, water activity is the best single measure of how water affects these processes.

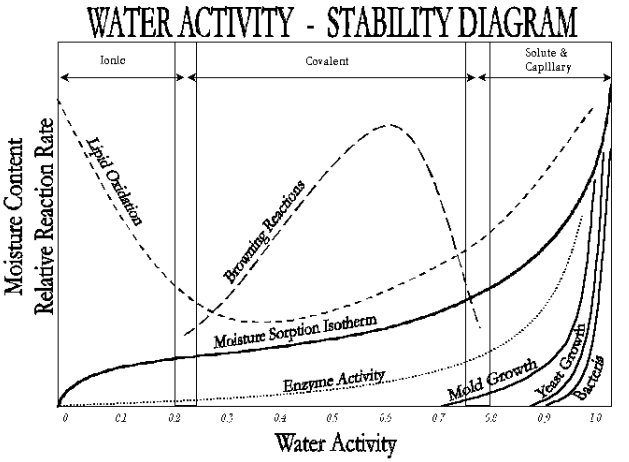


Figure 1. Water Activity Diagram—adapted from Labuza

Water activity of a system is measured by equilibrating the liquid phase water in the sample with the vapor phase water

in the headspace and measuring the relative humidity of the headspace. In the Pawkit, a sample is placed in a sample cup which is sealed inside a chamber. Inside the sensor block is a capacitive humidity sensor. Changes in the electrical capacitance of the polymide layer of the sensor occur as the relative humidity of the chamber changes. By monitoring the change in electrical capacitance, the relative humidity of the headspace is computed. When the water activity of the sample and the relative humidity of the air are in equilibrium, the measurement of the headspace humidity gives the water activity of the sample.

In addition to equilibrium between the liquid phase water in the sample and the vapor phase, the internal equilibrium of the sample is important. If a system is not at internal equilibrium, one might measure a steady vapor pressure (over the period of measurement) which is not the true water activity of the system. An example of this might be a baked good or a multi-component food. Initially out of the oven, a baked good is not at internal equilibrium; the outer surface is at a lower water activity than the center of the baked good. One must wait a period of time in order for the water to migrate and the system to come to internal equilibrium. It is important to remember the restriction of the definition of water activity to equilibrium.

Temperature Effects

Temperature plays a critical role in water activity determinations. Most critical is the measurement of the difference between sample and dew point temperature. Best accuracy is

therefore obtained when the sample is near chamber temperature.

Water Potential

Some additional information may be useful for understanding what water activity is and why it is such a useful measure of moisture status in products. Water activity is closely related to a thermodynamic property called the water potential, or chemical potential (μ) of water, which is the change in Gibbs free energy (G) when water concentration changes. Equilibrium occurs in a system when μ is the same everywhere in the system. Equilibrium between the liquid and the vapor phases implies that μ is the same in both phases. It is this fact that allows us to measure the water potential of the vapor phase and use that to determine the water potential of the liquid phase. Gradients in μ are driving forces for moisture movement. Thus, in an isothermal system, water tends to move from regions of high water potential (high a_w) to regions of low water potential (low a_w). Moisture content is not a driving force for water movement, and therefore can not be used to predict the direction of water movement, except in homogeneous materials.

Factors in Determining Water Potential

The water potential of the water in a system is influenced by factors that effect the binding of water. They include osmotic, matric, and pressure effects. Typically water activity is measured at atmospheric pressure, so only the osmotic and matric effects are important.

Osmotic Effects

Osmotic effects are well known from biology and physical chemistry. Water is diluted when a solute is added. If this diluted water is separated from pure water by a semi-permeable membrane, water tends to move from the pure water side through the membrane to the side with the added solute. If sufficient pressure is applied to the solute-water mixture to just stop the flow, this pressure is a measure of the osmotic potential of the solution. Addition of one mole of an ideal solute to a kilogram of water produces an osmotic pressure of 22.4 atm. This lowers the water activity of the solution from 1.0 to 0.98 a_w. For a given amount of solute, increasing the moisture content of the systems dilutes the solute, decreasing the osmotic pressure, and increasing the water activity. Since microbial cells are high concentrations of solute surrounded by semi-permeable membranes, the osmotic effect on the free energy of the water is important for determining microbial water relations and therefore their activity.

Matric Effects

The sample matrix affects water activity by physically binding water within its structure through adhesive and cohesive forces that hold water in pores and capillaries, and to particle surfaces. If cellulose or protein were added to water, the energy status of the water would be reduced. Work would need to be done to extract the water from this matrix. This reduction in energy status of the water is not osmotic, because the cellulose or protein concentrations are far too low to produce any significant dilution of water. The reduction in energy is the result of direct physical binding of water to the cellulose or protein

matrix by hydrogen bonding and van der Waal forces. At higher water activity levels, capillary forces and surface tension can also play a role.

Sorption Isotherms

Relating Water Activity to Moisture Content

Changes in moisture content affect both the osmotic and matric binding of water in a product. Thus a relationship exists between the water activity and moisture content of a product. This relationship is called the sorption isotherm, and is unique for each product. Besides being unique to each product, the isotherm changes depending on whether it was obtained by drying or wetting the sample. These factors need to be kept in mind if one tries to use moisture content to infer the stability or safety of a product. Typically, large safety margins are built in to moisture content specifications to allow for these uncertainties.

While the sorption isotherm is often used to infer water activity from moisture content, one could easily go the other direction and use the water activity to infer the moisture content. This is particularly attractive because water activity is much more quickly measured than moisture content. This method gives particularly good precision in the center of the isotherm. In order to infer moisture content from water activity, one needs an isotherm for the particular product; produced, ideally, using the process that brings the product to its final moisture content.

For example, if one were to monitor the moisture content of dried potato flakes, one would measure the water activity

and moisture content of potato flakes dried to varying degrees using the standard drying process for those flakes. An isotherm would be constructed using those data, and the moisture content would be inferred using the measured water activity of samples and that isotherm.

The importance of the concept of water activity of foods, pharmaceuticals, and cosmetics cannot be overly emphasized. *Water activity* is a measure of the energy status of the water in a system. More importantly, the usefulness of water activity in relation to microbial growth, chemical reactivity, and stability over moisture content has been shown.

4. Operation

Operation of the Pawkit is very simple. Once you have ensured that you have a stable working environment, you are ready to begin sampling. Following is a description of the features and operation of the instrument.

Features

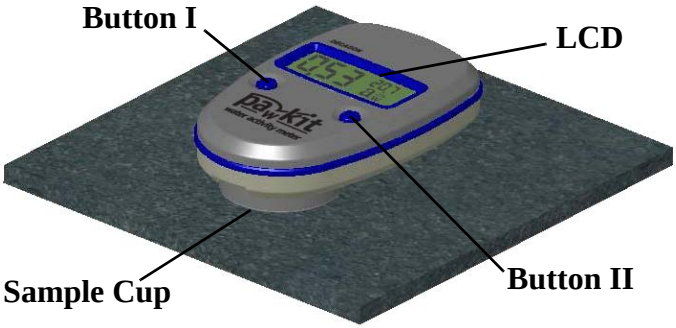
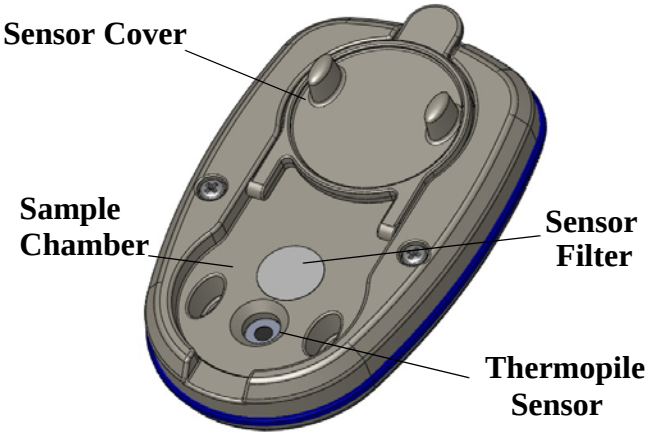


Diagram of Pawkit features



Bottom of Pawkit

Sample Preparation and Insertion

Your Pawkit system comes with 60 disposable plastic sample cups and 1 stainless steel sample cup. If you run out, additional cups can be purchased from Decagon.

Sample Preparation

Special care should be taken in preparing the sample in order to get the best readings possible. Follow these guidelines when preparing samples.

- **Make sure that the sample to be measured is homogeneous.** Multi-component samples (e.g., muffins with raisins) or samples that have outside coatings (like deep-fried, breaded foods) can be measured, but may take longer to equilibrate. Samples like these may require addi-

tional preparation (crushing or grinding) to obtain a representative sample.

- **Completely cover the bottom of the cup with the sample, if possible.** The Pawkit is able to accurately measure a sample that leave small spaces of the cup bottom exposed. For example, raisins only need to be placed in the cup and not flattened to cover the bottom. A larger sample surface area increases instrument efficiency by shortening the time needed to reach vapor equilibrium.

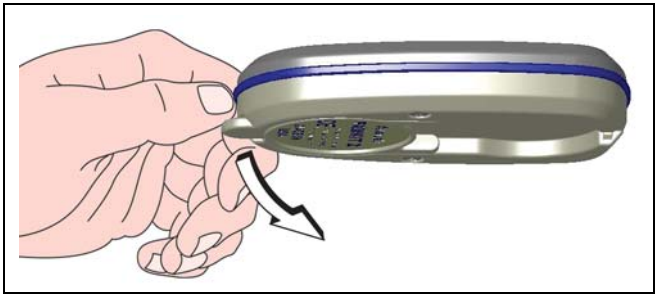
- **Fill the cup no more than half-full of the sample.** The Pawkit does not require a large sample size to make its reading. As long as the bottom of the cup is covered by the sample and that the sample is representative of the product you wish to measure, you should be able to make accurate readings. If the sample cup is too full, you risk contaminating the sensor, which will lead to inaccurate readings.

- **Make sure that the rim and outside of the sample cup are clean.** Wipe any excess sample material from the rim of the cup with a clean tissue. Material left on the rim or the outside of the cup will be transferred to subsequent samples and can affect the accuracy of your readings. The rim of the cup forms a vapor seal with the sensor. Therefore, any sample material left on the cup rim may prevent this seal, and contaminate future samples.

- **If a sample will be read at some other time, put the sample cup's disposable lid on the cup to restrict water transfer.** To seal the lid, place tape or Parafilm™ completely around the cup/lid junction. It is necessary to seal the cup if it will be a long time before the measurement is made.

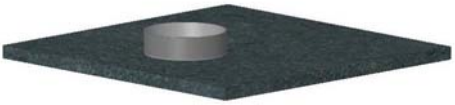
Sample Placement

1. Open the Pawkit by holding the case near the LCD with one hand and pulling down on the plastic sensor cover tab with the other hand.

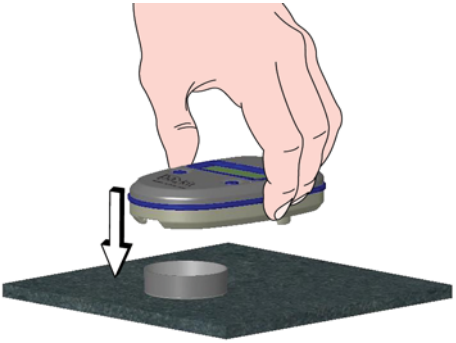


The sensor cover will rotate and snap into the open position as shown in the illustration below.

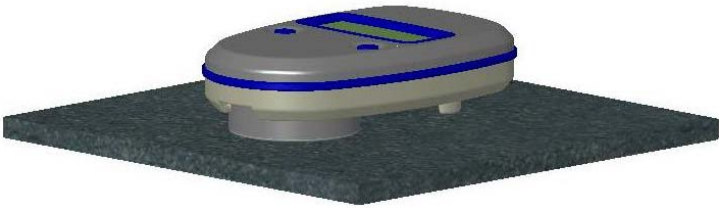
2. Place your prepared sample cup onto a level surface:



Next, place the opened Pawkit onto the prepared sample cup. The cup will fit under the sensors into a recess in the bottom of the Pawkit.



A correctly positioned cup will result in the Pawkit being level on the bench when sitting on the cup and the sensor cover legs. Ensure the cup is entirely within the recess. Otherwise, the Pawkit will not be level on the bench and the cup will not make a vapor seal with the sensor.



Final sample cup placement

3. Once the Pawkit is properly positioned over the sample cup, you are now ready to take readings (see next section titled "Taking Measurements").

4. To close the instrument, reverse the opening procedure. With one hand holding the case near the LCD pull down on the plastic sensor cover tab with the other hand and rotate until it snaps into the closed position covering the sensors.

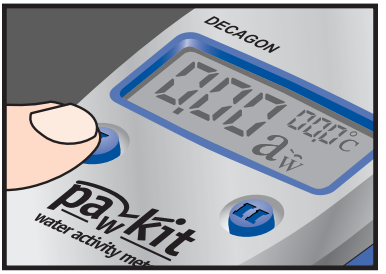
Taking Measurements

1. Make sure the sample cup is positioned as described in the previous section.

2. Press the left button (**I**) to turn on the instrument. It will display the last reading taken. This allows you to begin a measurement and leave without having to attend

the instrument throughout the measurement. If it is already on, proceed to the next step.

3. Press button **I** to begin the water activity measurement. The LCD display will be reset to $0.00a_w$.



NOTE: *Pressing button* ***I*** *any time during a measurement will restart the water activity measurement.*

4. Once the measurement process has been started, the Pawkit will begin to display water activity measurements as well as temperature after 5 seconds, and update the display every second. During this time you will be able to see that it is measuring by looking at the "sunburst" icon to the right of the water activity value. As it measures, you will see the "beams" of the sunburst move from left to right.

The final water activity measurement will not be displayed until the instrument "beeps" and the sunburst icon disappears from the screen.

If you receive an error code of 9.99 at any time during the process, it indicates that the sensor has failed and that the instrument needs to be serviced. Refer to Chapter 7 for instructions on how to return your Pawkit for repair.

NOTE: DO NOT lift or move the instrument during the measurement. You risk contaminating the chamber and you will break the vapor seal of the chamber and invalidate the water activity measurement.

5. After 5 minutes, the instrument will display the final water activity and beep 5 times. The sunburst disappears when the water activity reading is finished. At this point

you can either restart the measurement by pressing button **I** again, or you can record the shown value and end the measurement procedure.

6. Remove the sample cup by lifting the Pawkit. Lift the Pawkit straight up as shown to avoid spilling the sample cup. The sample may now be discarded or covered with a lid if it is to be re-measured at a later time.

Turning it off

To turn off the Pawkit, leave it idle for more than 5 minutes, and it will shut off automatically. If the Pawkit has automatically shut itself off, pressing button (**I**) will wake up the instrument and display the last water activity measurement.

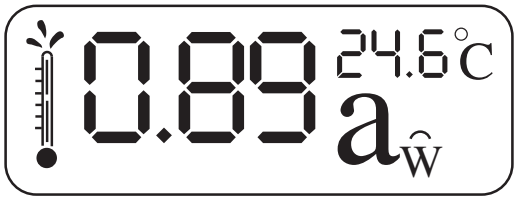
Sampling Precautions

Long exposure to a variety of volatile substances or to samples with water activities near 1.00 can shift the sensor calibration. Therefore, always remove samples as soon as the Pawkit is finished sampling (beeps) to avoid damage to the sensor. If a sample is accidentally left in the chamber for an extended period of time, be sure to check the calibration when the instrument is next used.

If sensor damage occurs, an error code of 9.99 will be displayed on the screen. Refer to chapter 7 for further instructions on how to return your Pawkit for repair.

Pawkit and Temperature

Pawkit makes its most accurate measurements when the sample and instrument temperatures are within 1°C. If the sample is too warm, the thermometer icon on the left of the screen will appear:



You will see the "mercury" go up the thermometer and pop out of the top, and the instrument will beep, indicating that the sample's temperature is too high and there is danger of condensing water in the sample chamber and on the sensor. If you get this warning while sampling, remove the sample, place the cup lid on the sample and wait until it has reached ambient temperature before attempting to read again.

If your sample is colder than the ambient temperature of the Pawkit, the accuracy of your reading after 5 minutes may be questionable. Wait until the sample's temperature is similar to that of the Pawkit.

5. Cleaning and Maintenance

Cleaning

The accuracy of your Pawkit is dependent on keeping your instrument clean. Dust and sample debris can contaminate the sampling chamber, and must therefore be regularly cleaned out. To clean your instrument, carefully follow the instructions in this chapter.

Cleaning Supplies

Your new instrument comes with the AquaLab Cleaning Kit and instructional DVD. The AquaLab Cleaning Kit comes with all the materials needed to clean one instrument for about a year. If you need to purchase a new cleaning kit, please contact us by phone at 1-509-332-5601 or at sales@aqualab.com. The following supplies are included in the cleaning kit:

Spatula (a thin plastic rod)
Distilled Water
Decagon Cleaning Solution
Kimwipes® and Kimwipe strips

NOTE: Wash your hands with soap and water and/or use clean lab gloves before starting the cleaning procedure. This will prevent oils from contaminating the cleaning materials, the sample chamber and/or the sensors.

Here are some tips for keeping your Pawkit clean:

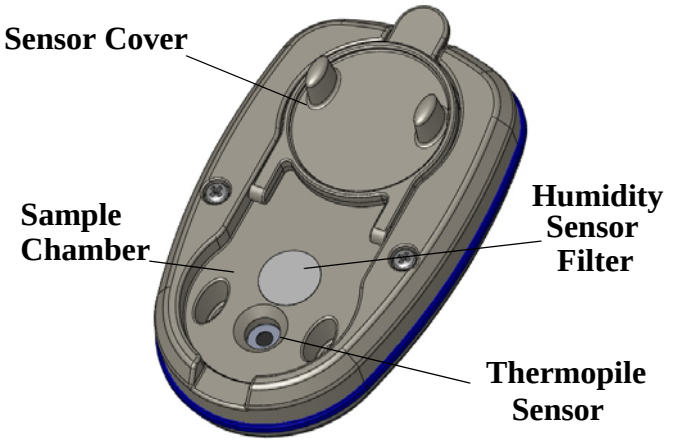
- First, watch the instructional DVD included with your cleaning kit to see step-by-step instructions on how to clean your Pawkit.

- Use only a soft cotton cloth to clean the LCD. Tissues can scratch the plastic, causing damage.

- Use moist Kimwipes to clean the rest of the outer case.

- To clean the sample chamber, use a moistened Kimwipe to clean sample residue. If you have spilled sample material on the sensor filter and it doesn't come off replace the filter as explained in the next section. It is important that contamination of this filter is minimized, as the relative humidity of the sample is measured via the filter.

Maintenance



Sensor Filter Cleaning/Replacement

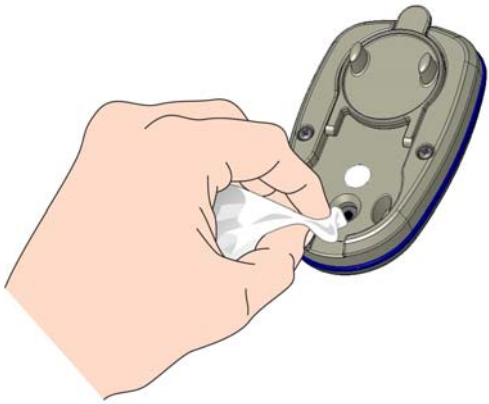
You may periodically need to replace the porous white humidity sensor filter if it becomes dirty. To remove the sensor filter use a knife or needle point to gently pry up the edge of the filter. Your Pawkit was shipped with 3 spare filters and you can order more by contacting Decagon by email at sales@aqualab.com or by phone at 1-509-332-5601.

Removal of filter

NOTE: The capacitance humidity sensor below the filter is extremely fragile! Do not touch it!

Thermopile Sensor Cleaning

The lens of this sensor must be free of all dirt and lint to be accurate. **1) WASH**--use a Kimwipe tissue moistened with Decagon cleaning solution or isopropyl alcohol to clean the thermopile sensor. **2) RINSE**--using a new Kimwipe moistened with distilled water to rinse the cleaning solution from the sensor. **3) DRY**--use a dry Kimwipe to help remove any moisture remaining from the cleaning process.



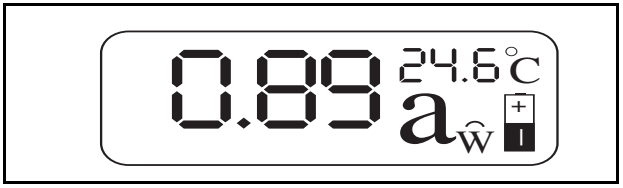
Chamber Cleaning Instructions

Wrap a new Kimwipe strip around the end of the spatula (included in the cleaning kit) and moisten it with Decagon-Cleaning Solution or isopropyl alcohol. **1) WASH**--clean the surrounding chamber area with the moist Kimwipe. The chamber area, especially where the cup seals, must be free of all contamination. **2) RINSE**--repeat the steps above using a

new Kimwipe strip moistened with distilled water. **3) DRY**--repeat steps above again, this time using a dry Kimwipe strip to remove any moisture remaining from the cleaning process. **Note**: Do NOT reuse Kimwipes.

Battery Replacement

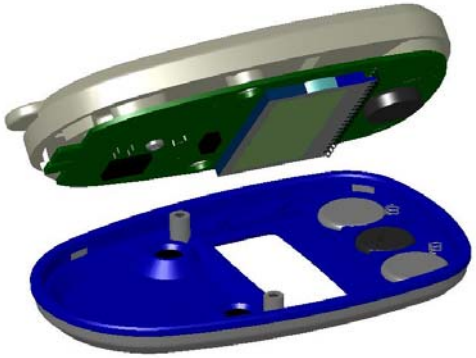
The Pawkit uses two Lithium-ion battery cells, and they should last for several years. If the battery charge is low, you will see a low-battery indicator icon appear in the lower right corner of the screen (an occasional low battery indication does not mean the battery needs replacing:



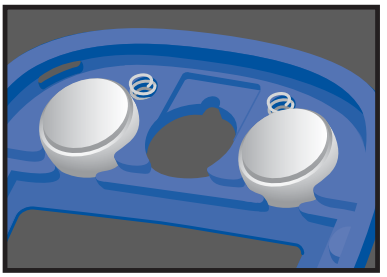
To replace the battery, follow these steps:

1. Remove the Pawkit bottom by unscrewing the two screws:

2. Separate the stainless steel top and elastomer (which contains the batteries) from the white plastic bottom.



3. Remove the old Lithium-ion batteries. Replace with new CR1632 or equivalent 3V lithium coin cells. Make sure to orient the batteries so the positive (+) contact is facing down into the elastomer pocket. Make sure the two small springs which make contact between the (+) battery terminal and the circuit board are in place.



4. Replace the circuit board/plastic bottom in the elastomer top. Tighten the two screws to complete the assembly of the Pawkit.

6. Verification and Calibration

As mentioned earlier, the Pawkit takes water activity measurements by measuring the change in electrical properties of a special polymer held between two electrodes. Due to the nature of the capacitance humidity sensor, there may be times when you may need to adjust the calibration. This section explains how to do so. Calibrations should be verified frequently with salt standards and adjusted as needed.

Verification Standards

The Pawkit uses 3 calibration standards: 6.0 molal NaCl ($0.760a_w$), 13.41 molal LiCl ($0.250a_w$), and 2.33 molal NaCl ($.920a_w$). You received a small supply of these standards with your instrument. These standards are specially prepared salt solutions at specific concentrations for constant and accurate water activity measurements. They have been produced under a strict quality assurance regime, and their accuracy is verified by an independent third party instrument. They are very accurate, easy to use, and readily available from Decagon Devices. Most importantly, they greatly reduce preparation errors. Because of these reasons, we recommend using these standards for the most accurate calibration of your Pawkit. The verification standards are shelf-stable for one year.

If these standards are not available you can make a saturated Sodium Chloride (NaCl) slurry with a water activity value of 0.75 a_w. To make a salt slurry of NaCl add water until the

salt can absorb no more water, as evidenced by the presence of free liquid. The slurry should take the shape of the cup and flow when tipped with the amount of free liquid at a minimum.

Steps to Verify Calibration

1. Take a vial of the 0.760 a_w NaCl standard and empty the entire contents of the vial into a sample cup. Place the Pawkit over the sample cup as described in the previous section.

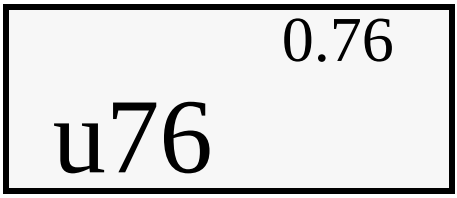
2. Press the left button (**I**) to take a reading. If it is reading the correct water activity ±0.02, your Pawkit needs no adjustment for this standard. Skip to step 9.

3. If the first reading was not the correct water activity (±0.02), clean the Pawkit according to the instructions in Chapter 5 and take a second reading. If it is reading the correct water activity ±0.02, your Pawkit needs no adjustment at this time and you may now skip to step 9. If it is not reading correctly, continue to the next step.

   ***Note**: An error code of 9.99 at any time during the process indicates that the sensor has failed and that the instrument needs to be serviced. Refer to Chapter 5 for shipping instructions.*

4. Once the reading is finished, the right button (**II**) will be active. Button **II** is only active until the Pawkit shuts

itself off. Press it once, and you will see the following screen:



5. This screen shows that you are in the calibration mode. This one in particular shows that you are ready to adjust calibration upwards for the 0.76 standard. The numbers in the upper right corner indicate the water activity measurement that your Pawkit just read. Press the **II** button to scroll through the other selections. They are: **u76, d76**, **u25**, **d25**, **Sto, u92** and **d92**. The "u" and "d" before each number stand for "up" or "down" adjustment for each standard. The numbers (e.g. 25, 76 and 92) correspond to the water activity of a verification standard (0.76, 0.25 and .92 a_w). The **Sto** position stores a reading.

6. As an example, if your NaCl reading is lower than it should be, press the **II** button to scroll to "u76" ("adjust up for 0.76 standard"). If it is higher than it should be, scroll to "d76" ("adjust down for 0.76 standard").

   ***Note**: If you accidentally scroll past your desired adjustment screen, simply keep pressing the II button until you cycle back to the right screen.*

7. Once you have scrolled to the proper screen for calibration adjustment, press the **I** button to adjust the value to what it should be. Each time you press the **I** button, the value in the corner will change by an increment of 0.01.

8. When you have it set to the correct value, press the **II** button to scroll until "**Sto**" appears in the lower right corner, then press **I**. This will store the new value you have set. You will then return to the main screen and begin a new measurement.

   ***Note**: If you do not press "Sto" no change will be made to the calibration of the Pawkit.*

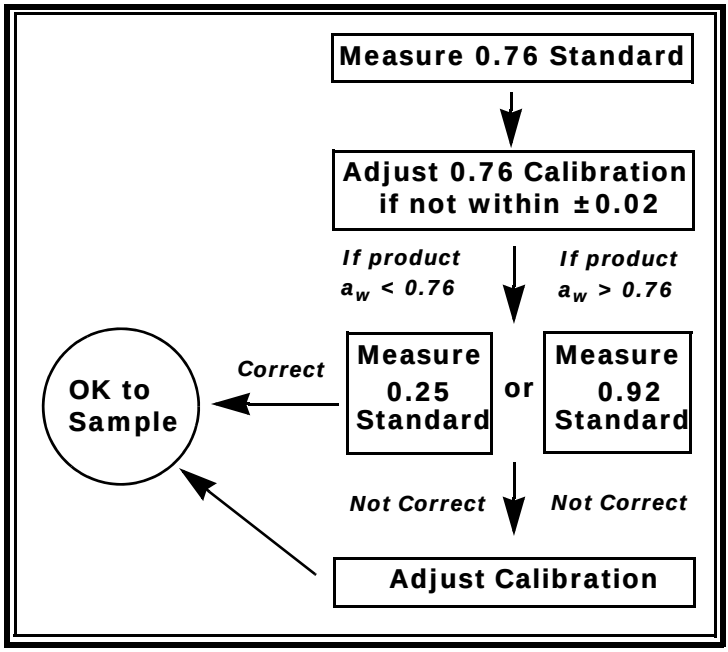
9. Verify with a second standard, either the 0.25 standard or the 0.92 standard. Choose the one that is closest to the water activity range of the sample material you will be testing. In other words, if it is normally higher than 0.76 a_w , use the 0.92 standard. If it is normally lower than 0.76 a_w, use the 0.25 standard. If the Pawkit measures the second standard correctly (±0.02), begin testing your product. If it does not measure correctly, repeat steps 3-8 for the second standard.

10. If you inadvertently enter the calibration routine, keep pressing button **II** until you scroll back to the main screen.

    ***Note**: The 0.76 standard adjustment adjusts the calibration intercept, while the 0.25 and 0.92 adjusts the slope. Changes in the intercept are more likely to occur than*

changes in the slope, so the 0.76 verification check is the most important and should be done more frequently.

Following is a graphical representation of the calibration routine:



7. Support and Repair

NOTE: If you purchased your Pawkit from one of our international distributors, please contact them. They will be able to provide you with local support and service.

When encountering problems with your Pawkit (that can't be resolved with the help of this manual), please contact Decagon Customer Support at support@aqualab.com, by phone at (509)-332-5601, or fax us at (509) 332-5158. Please have the serial number and model of the instrument ready.

All Pawkits returning to Decagon for servicing must be accompanied with a Return Material Authorization (RMA) form. Prior to shipping the instrument, please contact a Decagon customer support representative to obtain an RMA.

Shipping Directions:

The following steps will help to ensure the safe shipping and processing of your Pawkit.

Pack the Pawkit in its carrying case, securely in its original box. If the original packaging is not available, pack the box moderately tight with packing material (e.g. styrofoam pea-

nuts or bubble wrap), ensuring the instrument is suspended in the packing material. Use a box that has at least 2 inches of space between your instrument and each wall of the box.

Include a copy of the RMA form in the shipment. Please verify the ship to and bill to information, contact name, and problem description. If anything is incorrect please contact a Decagon representative.

Tape the box in both directions for added support.

Ship to:
Decagon Devices Inc.
ATTN: Repair Department
2365 NE Hopkins Court
Pullman, WA 99163

Repair Costs

Manufacturer's defects and instruments within the one year warranty will be repaired at no charge. Non-warranty repair charges for parts, labor and shipping will be billed to you. An extra fee may be charged for rush work. Decagon will provide an estimated repair cost, if requested.

Loaner Service

Decagon has loaner instruments to keep you measuring water activity while your instrument is being serviced. If your Pawkit is still under warranty or you have a service plan with your instrument, there is no charge for the loaner service.

Decagon Devices Inc.
ATTN: Repair Department
2365 NE Hopkins Court
Pullman, WA 99163

8. Further Reading

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Declaration of Conformity

Application of Council Directive:	89/336/EEC
Standards to which conformity is declared:	EN55022: 1987 EN500082-1: 1992
Manufacturer's Name:	Decagon Devices, Inc. 2365 NE Hopkins Court Pullman, WA 99163 USA
Type of Equipment:	Pawkit water activity meter.
Model Number:	N/A
Year of First Manufacture:	2000

This is to certify that the Pawkit water activity meter, manufactured by Decagon Devices, Inc., a corporation based in Pullman, Washington, USA meets or exceeds the standards for CE compliance as per the Council Directives noted above. All instruments are built at the factory at Decagon and pertinent testing documentation is freely available for verification. This certification applies to all Pawkit models.

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