

# Quick Start Guide

Water Activity Data Logger System



**AQUA<sup>®</sup>**  
**LAB**  
BY DECAGON

Indoor Moisture Monitoring System

# Surface Water Activity

**Surface Water Activity** or  $a_w$  was developed to account for the intensity with which water associates with various non-aqueous constituents and solids. Simply stated, it is a measure of the energy status of the water in a system. It is defined as the vapor pressure of water in a substance divided by that of pure water at the same temperature; therefore, pure distilled water has a water activity of exactly one. Higher  $a_w$  substances support more microorganisms. Bacteria usually require at least 0.91, and fungi at least 0.7. Water migrates from areas of high  $a_w$  to areas of low  $a_w$ . For example, if honey ( $a_w \approx 0.6$ ) is exposed to humid air ( $a_w \approx 0.7$ ) the honey will absorb water from the air.

Water can occur in different forms, it originates from different sources, and its measurement in terms of availability is often overlooked in buildings. This concept of water availability is well known in microbiology and food science as water activity. In buildings it is known as equilibrium relative humidity, surface relative humidity, or surface water activity. To measure surface water activity, the system has to be in equilibrium, meaning the temperature should be constant and no net flow of water occurs from the substrate to air or vice versa.

$$\text{Water Activity} = \frac{\text{vapor pressure of air above sample}}{\text{vapor pressure of pure water at the same temperature}}$$





For decades water activity has been referenced in standards, books and journals regarding mold in the indoor environment. However, until recently the measurement of water activity has been unavailable in the built environment. We are excited to take our technology and expertise from the disciplines of food science and microbiology and make water activity measurements available to professionals that focus on minimizing the effects of mold indoors.

Together we can solve the problems mold creates in the indoor environment by understanding the differences between moisture content, relative humidity and surface water activity.

It will take some effort to change the way we think about buildings and moisture but we can solve the mold problem. We look forward to understanding your application for water activity and helping you achieve your goals. If we can ever be of any assistance please contact us directly.

### **AquaLab**

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# Setting Up Your System

## Step 1



### Directly Connect to Logger

To configure your data logger you will need to download the DataTrac3 Software onto a computer and connect your computer to the Comm Port on your data logger using the provided USB cable. Inside the sleeve of the DataTrac3 software you will find your registration key. Once the software has been loaded onto your computer enter the registration key to access the software.

OR



### Cell Enabled Logger

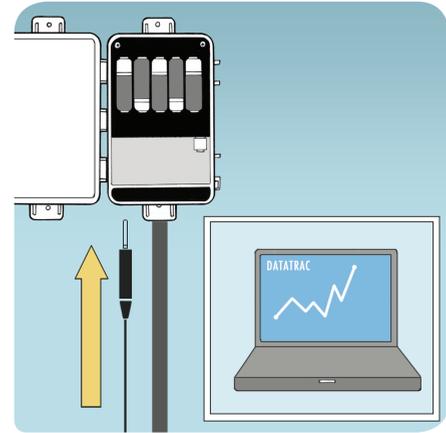
If you are using our remote logger remove the red cap on the top of the logger and screw on the black antennae. You will find a device id, password, and the location of our server at ECH<sub>2</sub>O data.com inside the front cover of the logger. From our server at ECH<sub>2</sub>O data.com you will be able to set up an account and access your data remotely from any computer. This data logger comes with a one year cell subscription that needs to be renewed with us annually. In the event that you are using this logger out of the range of cell service you can connect the Comm Port on the logger to your computer to gather your data.

## Step 2

### Configure a Logger

Open the DataTrac3 software and connect to the logger. Once your logger is connected, select Configure in the toolbar. Select how frequently you want each sensor to log readings. The logger uses 5 AA batteries which should last for several months of use.

More instructions on DataTrac3 are available inside the software sleeve. Extensive help files exist to guide you through the various features and processes of DataTrac 3. The DataTrac3 software is used with a variety of different equipment to make a variety of different measurements.



### Questions? Contact us:

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## Step 3

### Install Sensors

The wall mount sensor should be mounted on a clean surface with the cable pointing down if possible and the seal pointing towards the surface. The sensor can be adhered to the substrate using the two adhesive foam strips by removing the tape backing or can be attached using the two self-tapping mounting screws.

### Mounting Data Logger

Your data logger has double-sided tape on the back. Using the tape the logger can be installed directly to any wall or surface. Please note that to remove, you will need to use pliers to pull the tape slowly and carefully. Doing so will ensure no damage to wall occurs. A roll of double-sided tape is included with your system. A tripod for the data logger is also available.

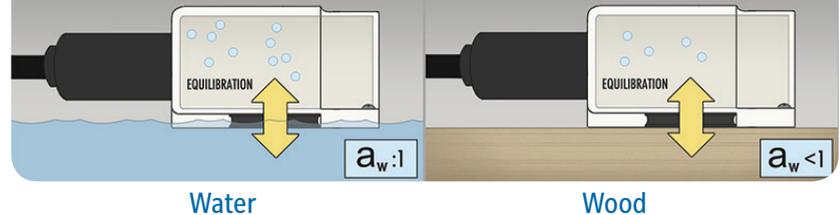
5

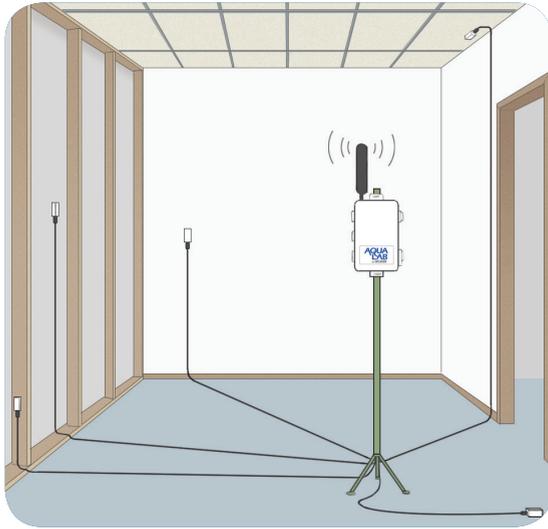
### Equilibrium

Please note that the rubber seal must make a tight seal to the substrate being tested. If a proper seal is not made the sensor will measure the relative humidity of the room. When a proper seal is made the air in the white chamber comes to equilibrium with the substrate. When equilibrium is reached you are properly measuring the surface water activity of the substrate.

Please note that the screws will be a better option if the substrate is very wet. Equilibration times will vary depending on the properties of the substrate. For example, drywall or wood will equilibrate faster than a wall painted with an oil based paint. The painted wall will emit water differently than a non-painted wall and therefore equilibration times may vary.

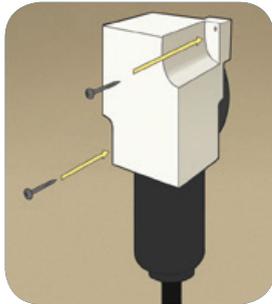
Leaving the sensor on the wall until the reading has stabilized is the best way to know if the chamber has come to equilibrium. Be aware that the equilibration can be several hours for some building materials. When using the self-tapping screws, it is important that the screws are tightened only to the point that they secure the wall mount. Tightening beyond this point may cause the screw to strip the wall that it is mounted against. If this happens you will not have a proper seal.



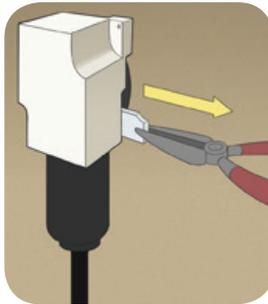


## Removal of Wall Mount Sensor When Adhesive is Used

The wall mount is designed so that the adhesive foam strips on the top and bottom can be grabbed by pliers and pulled gently sideways thereby stretching the foam strip which removes it from the wall. Apart from buildings, the VP-3 sensor is used in weather stations which are sold by the Environmental Monitoring Division of Decagon Devices and measures vapor pressure, humidity, and temperature. By connecting the sensor to the white chamber head and sealing the chamber against a substrate, you create an equilibrated chamber that can provide a water activity measurement of the substrate in question. If you would also like to measure relative humidity you can simply remove the white head off the sensor and use the VP-3 to gather humidity readings of the environment.



Mounting Screws

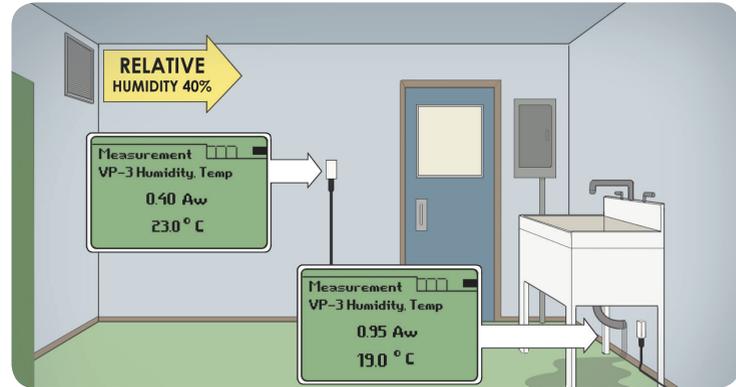


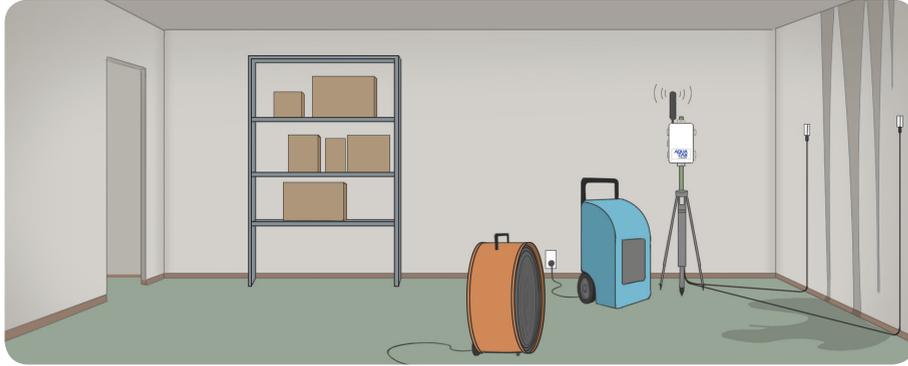
Adhesive Strip

## Step 3 continued

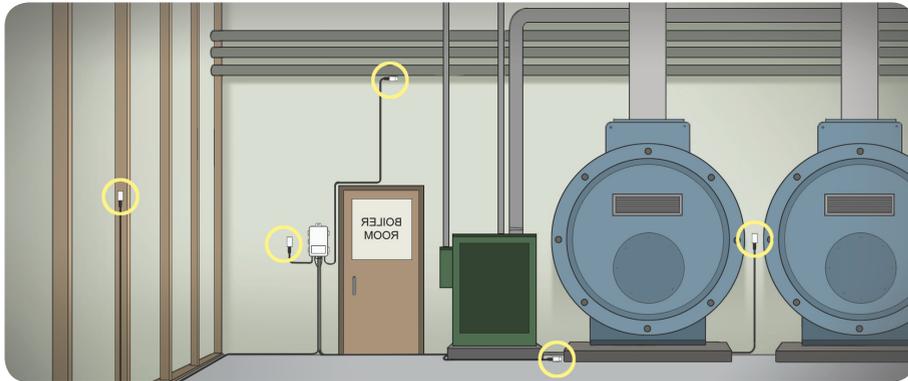
### Spatial Variability

Knowing where to place the sensors can be tricky. Moisture intrusion can come from almost anywhere and spatial variability of a room can be infinite due to a variety of factors including the different building materials used and how and where the dampness is entering the building. Although spatial variability is a concern, having a firm understanding of the differences between relative humidity, water activity, and moisture content can help you start to troubleshoot what is happening and prevent mold growth in high risk areas.





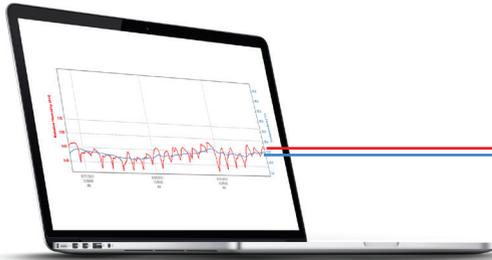
Even if an environment is held at a stable relative humidity, the water activities of materials that are damp can remain high and mold. The water activities of these problem areas will need to be monitored until the water activity has dropped below 0.600. No mold or microorganisms can grow below 0.600  $a_w$ . A great strategy includes finding where the moisture is located, maintaining a low ambient relative humidity, and using water activity sensors to monitor when the materials are verifiably dry lower than a water activity value where mold cannot grow.



# Viewing Results

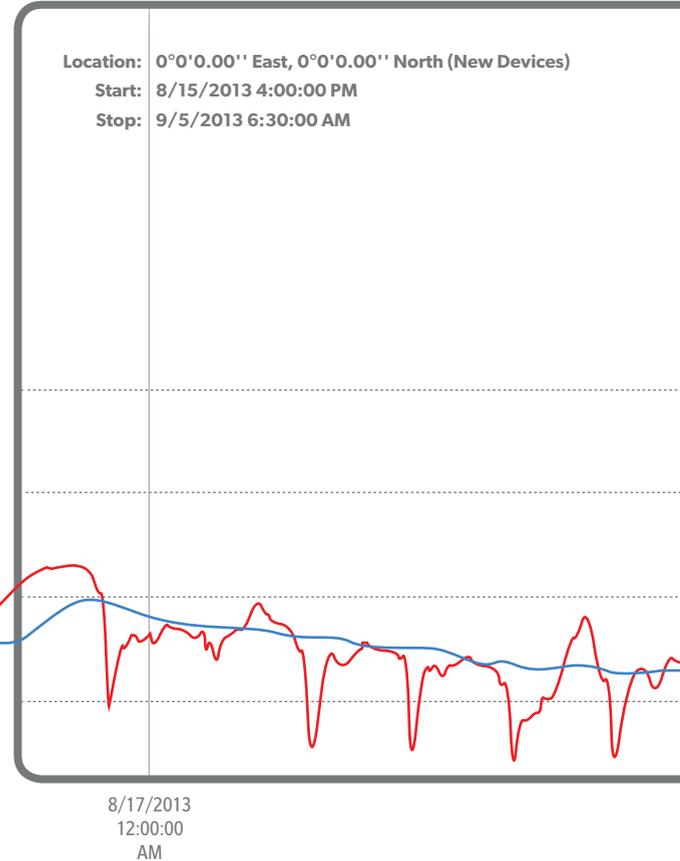
## Software Interface

DataTrac 3 provides you with an almost real-time graphical picture of your data. DataTrac 3 displays your logger status, manages multiple data loggers, and creates meaningful metrics that allow you to understand what drives changes in environmental conditions by seeing all of your recorded data on one graph.



Note: (DataTrac 3) example shown is an approximation of actual data points.

Relative Humidity (RH)

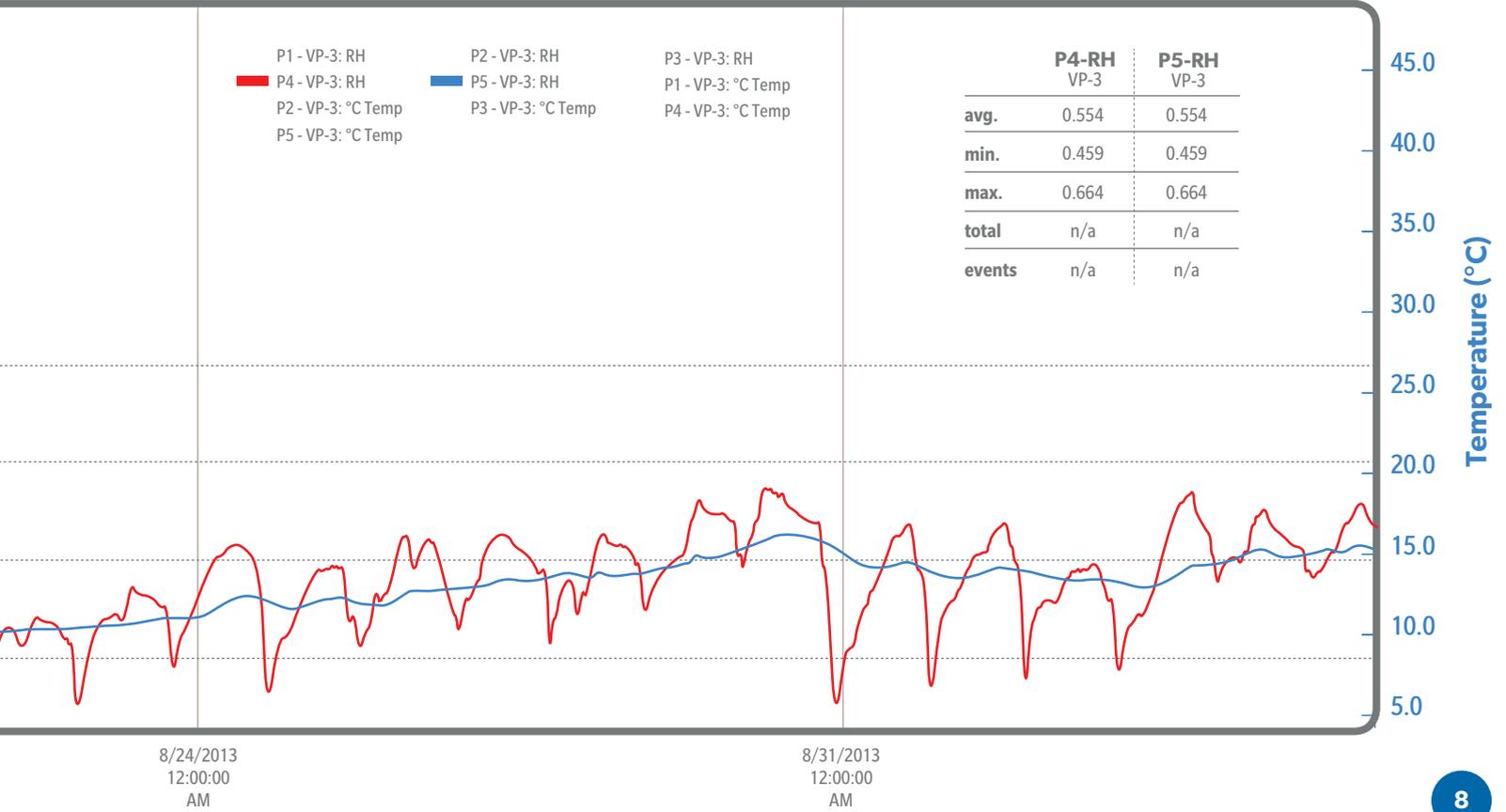


P1 - VP-3: RH  
 P4 - VP-3: RH  
 P2 - VP-3: °C Temp  
 P5 - VP-3: °C Temp

P2 - VP-3: RH  
 P5 - VP-3: RH  
 P3 - VP-3: °C Temp  
 P4 - VP-3: °C Temp

P3 - VP-3: RH  
 P1 - VP-3: °C Temp  
 P4 - VP-3: °C Temp

	P4-RH VP-3	P5-RH VP-3
<b>avg.</b>	0.554	0.554
<b>min.</b>	0.459	0.459
<b>max.</b>	0.664	0.664
<b>total</b>	n/a	n/a
<b>events</b>	n/a	n/a



VERSION 1

**DATA LOGGER**

# Indoor Moisture Monitoring System

[www.aqualab.com/buildings](http://www.aqualab.com/buildings)



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