WD-1

WATER SENSOR

ITWatchDogs

installation & user guide

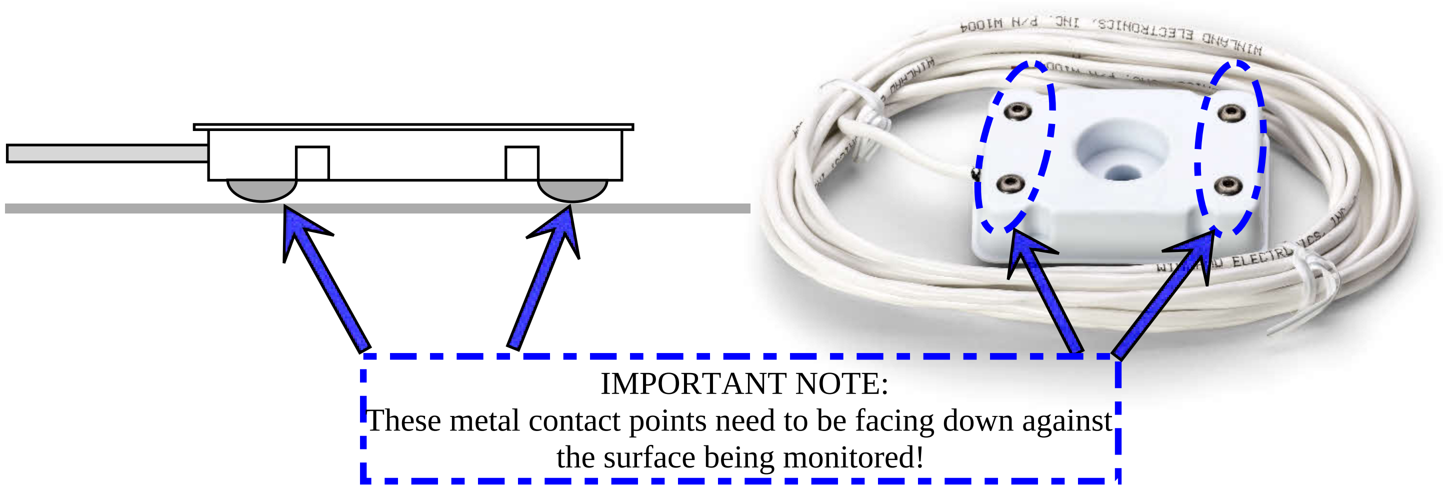
WD-1 *Water Sensor*

The WD-1 Water Sensor offers an economical way to keep a constant watch on potential water leaks into your server room from sources such as plumbing fixtures, air-conditioner drip pans and condensation-outflow pipes (you'd be surprised how much water can accumulate in a short time from a blocked outflow pipe!), and so on. The unit acts as a simple conductivity sensor, displaying a high electrical resistance across the metal contact pads when the surface underneath them is dry, while the presence of water or other conductive liquids across the pads will drop the resistance dramatically.

The WD-1 Water Sensor is directly compatible with any WeatherGoose (series I or series II) monitoring unit which has analog-sensor inputs; such models include the WeatherGoose, SuperGoose, and the MiniGoose/XP. Models which do not have built-in analog inputs, such as the MiniGoose, will require the use of an appropriately-programmed CCAT analog-to-digital converter to use a WD-1. Models which do not provide connections for either analog or digital sensors, such as the MicroGoose, are not compatible with the WD-1.

If you need to monitor several points at once, the WD-1 offers considerable flexibility, as multiple units can be connected in parallel to reduce the number if analog inputs or CCAT expansion devices required. And because it is a simple conductivity sensor, no external power supply is required; the weak loop current automatically supplied by the WeatherGoose's analog inputs (or by the CCAT) is all that's required to operate the device, making it easy to install, with a minimum of extra wiring per sensor.

As you can see in the following diagrams, installation of the WD-1 Water Sensor is fairly straightforward; simply place the white plastic "brick" on the floor in the area you wish to monitor, positioned so that the metal contact points are facing downwards against the floor. This last point is important, because it is via these contact points that the WD-1 senses dampness underneath it; if you position it with the contacts facing upwards, it won't detect water until the water rises high enough to cover the entire brick – and with over a half-inch of water on the floor before the sensor can detect it, your server room could already be in serious trouble long before you get the alerts!

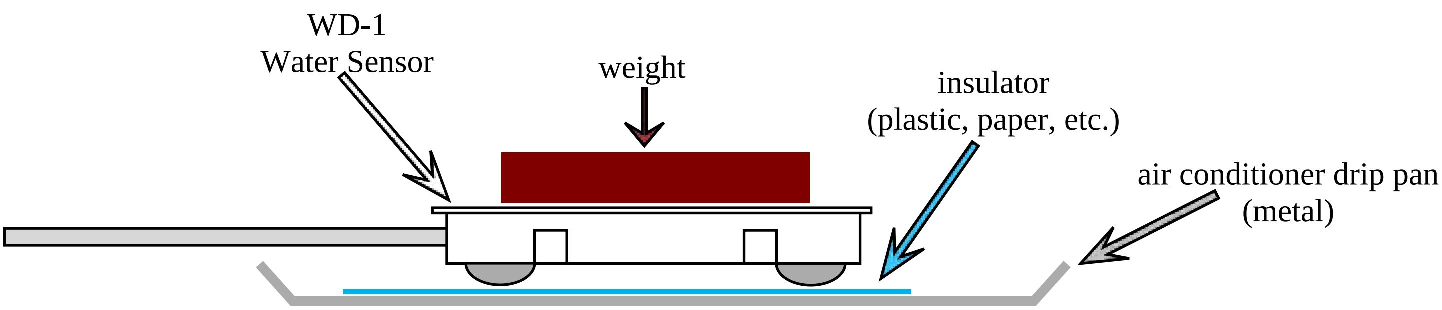


You can also install the WD-1 closer to the potential source of water leaks, such as in the overflow drip pan of an air-conditioning system, to get earlier warning of a blocked outflow tube. However, this does bring up another important consideration for placing the sensor, namely:

The WD-1 sensor must not be placed in direct contact with a metal surface!

Placing the WD-1 directly onto a metal surface, or other surfaces with high conductivity, will short the contact points together, causing the device to continuously read full conductivity regardless of whether it and the surface underneath is wet or dry. If it is necessary to place the sensor on top of a metal or conductive surface, place a thin sheet of insulating material in between the sensor and the surface, as shown here. Any non-conductive material will do; a square piece of plastic cut from a sheet protector, a piece of posterboard, or even a 3x5" card, will do nicely. (A couple of pieces of duct tape might also work; just test it to make sure the surface is non-conductive, as some brands are metalized and may conduct significant leakage current.)

A small weight placed on top of the sensor, such as a rock, a chunk of brick, or even a reasonably heavy glass or metal paperweight, will help keep the sensor in place and firmly in contact with the ground. This can be especially helpful if it's necessary to put something in between the sensor and the surface it rests on, as below, since the extra weight will help prevent water from getting underneath the insulating material and causing the sensor to "float" on top of the insulator.



One final consideration to take into account: since the sensor depends on conductivity to determine the presence of water underneath it, distilled or deionized water may provoke little, if any response from the sensor, since such highly purified water is often only weakly conductive – although this, of course, will also depend greatly on the surface the sensor is sitting upon, since some surface materials are more likely to allow the water to pick up conductive ions (either from the material itself, or from surface contaminants such as dried cleaning-solution residues) than others. Similarly, the sensor may not be suitable for detecting leaks of liquids other than water, if such liquids are not electrically conductive.

Under no circumstances should the sensor be exposed to or immersed in any corrosive acid or alkaline substances; it is not designed to withstand chemical attack by such substances.

A WD-1 sensor should not be left immersed in water for extended periods; sensors which have been exposed to water should be dried off as soon as possible, to prevent oxidization of the metal contact points.

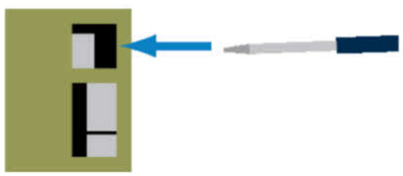
Using the WD-1 via a direct connection to the WeatherGoose's built-in Analog Inputs:

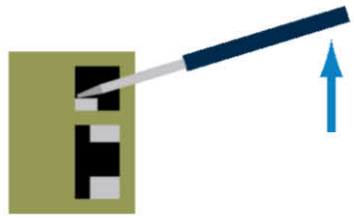
Ÿ Connecting the WD-1 to the Analog-Input terminals:

The following diagrams demonstrate how to connect your WD-1 Water Sensor directly to the spring-loaded analog-input terminals used on most of the standard series-I and series-II WeatherGoose product lines. (Note that specialized models, such as the PowerGoose and RelayGoose, use different styles of terminal blocks; while the connections will be the same electrically, the mechanical nature of the connector will be different than the one shown here. If necessary, refer to the manuals for those specific models for further details on how to connect analog sensor devices.) Each terminal consists of two openings; a larger, square opening at the bottom, where the wire will be inserted, and a smaller, narrower opening above which is used to open the spring-loaded jaws inside the terminal block so the wire can be inserted.

Note that the terminal jaws are not of an insulation-piercing type, and the wire ends must be stripped at least ½" prior to insertion.

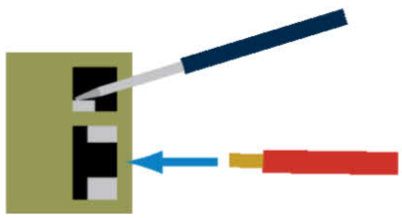
First, insert a small flat-blade screwdriver into the upper slot...

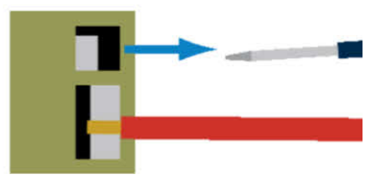




...pry upwards to open the spring-loaded jaw...

...slip the sensor wire into the larger bottom opening...

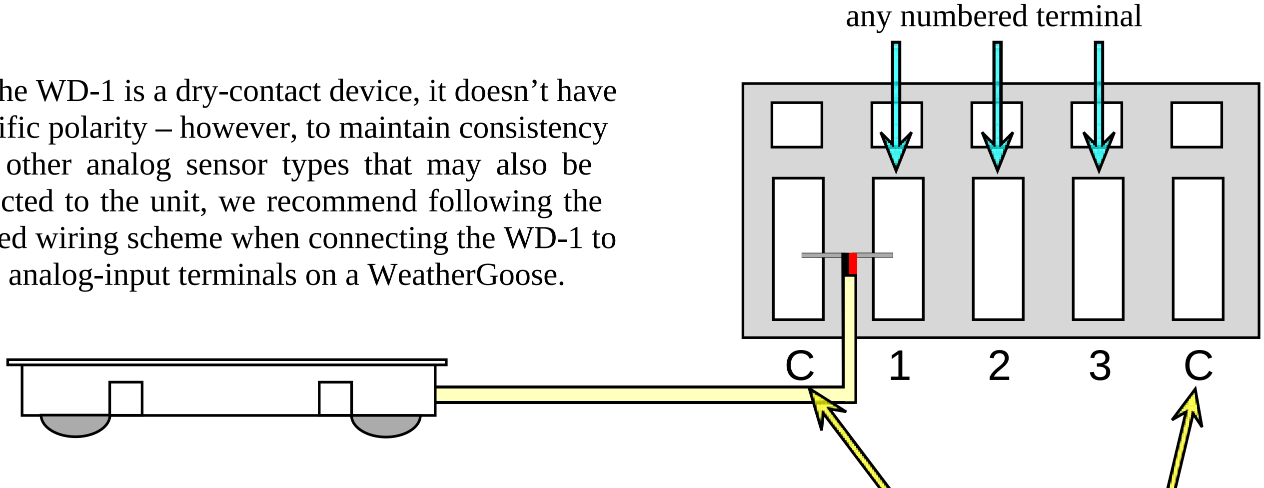




...then pull out the screwdriver to allow the jaw to close around and grip the wire.

Since the WD-1 is a dry-contact device, it doesn't have a specific polarity – however, to maintain consistency with other analog sensor types that may also be connected to the unit, we recommend following the indicated wiring scheme when connecting the WD-1 to the analog-input terminals on a WeatherGoose.

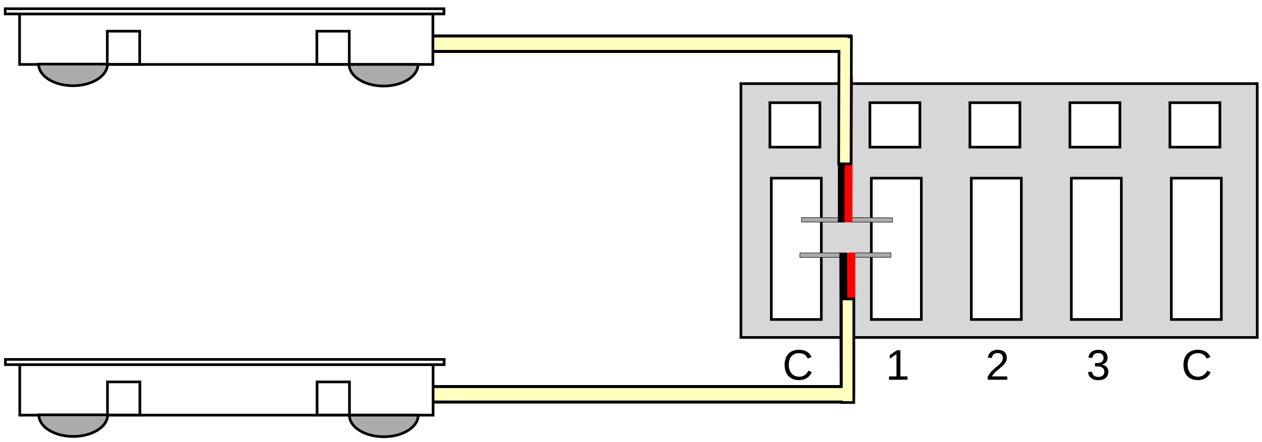
Red wire can go into any numbered terminal



Black wire can go into either C (common) terminal

Unlike some types of analog sensors, two or more WD-1's can be "doubled up"; i.e. connected in parallel to share a single analog input, as shown below. Note that in such a configuration, you will not be able to determine exactly which sensor(s) are detecting water; you will only know that one or more of the sensors in the group sharing that particular input is wet. Depending on your installation, though, it might not be necessary for your "water detected!" alerts to be that specific about the location; and if so, this can be a convenient and inexpensive way to set up water detection at multiple points in a room without having to use up all of your analog inputs.

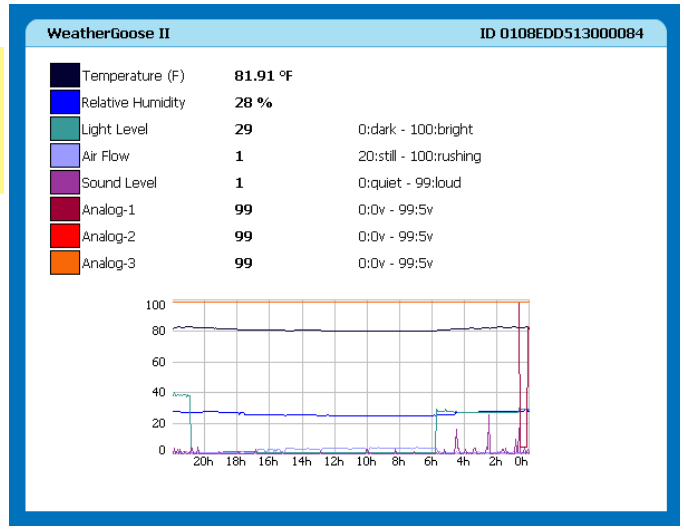
There is no fixed limit to the number of WD-1's that can share a single analog input, as such; however, in practical terms, the more wires you try to insert into a particular terminal, the more unwieldy the wiring becomes, so you may want to limit yourself to only two or three sensors per input just to keep the wiring manageable.



As with any sensor, it is recommended that the WD-1 be tested after installation to insure everything is working properly. Testing the WD-1 is as simple as dunking it in a cup of water or setting it on top of some wet paper towels; if the WD-1 is functioning correctly and the connections are sound, the WeatherGoose to which it is connected should indicate the change in conductivity, and any alarm settings associated with the WD-1 sensor should trip at the appropriate levels. This test should be periodically conducted as part of a regular maintenance schedule to insure the device is continuing to function properly.

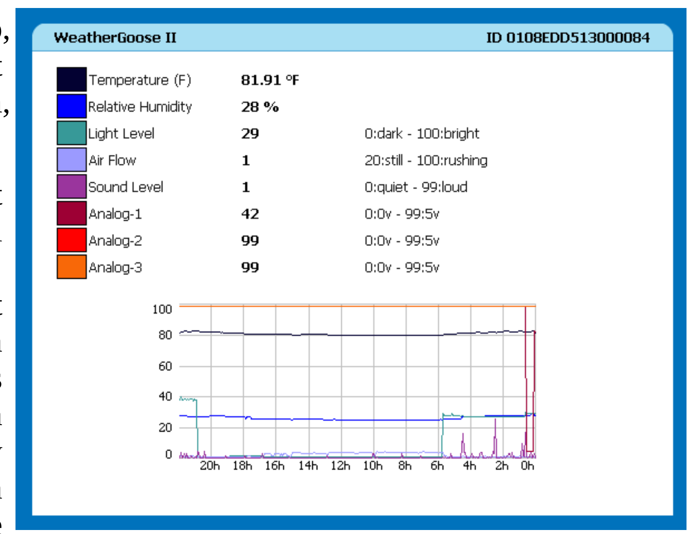
Ÿ Sensor operation and behavior:

Once you've successfully connected the WD-1 to your WeatherGoose, the internal-sensors display block of the ***Sensors*** page will look something like this: (NOTE: for purposes of this example, the WD-1 has been connected to Analog Input #1 of a WeatherGoose-II with v3.3 firmware; the use and operation of the WD-1 will be similar for other models, but the on-screen displays may differ somewhat.)



In this screenshot, the WD-1 is currently dry – so, why does the reading show "**`99`**", instead of "**`0`**" as you might normally assume? This is just a consequence of the way the internal Analog Inputs are designed to accommodate both dry-contact devices such as switches, relays, etc., and voltage-signal devices such as current transformers. Since a dry WD-1 is an open circuit, with no conductivity across the metal contact points, the analog input reads "**`99`**" due to the presence of a weak pull-up resistor which supplies loop current for dry-contacts connected to the Analog Input terminals. Thanks to this pull-up resistor, an open circuit will tend to float up to +5V – and since the WeatherGoose displays the Analog Inputs' 0 ~ 5Vdc input range as a proportional value from 0 ~ 99, an open contact pair reads as "**`99`**". (This, incidentally, is why Analog Inputs with nothing connected to them also display a default reading of "**`99`**".)

Here, the surface under the WD-1 has become damp, and the increased conductivity between the metal contact points allows a small current to flow between them, dropping the reading from "**`99`**" down to "**`42`**".

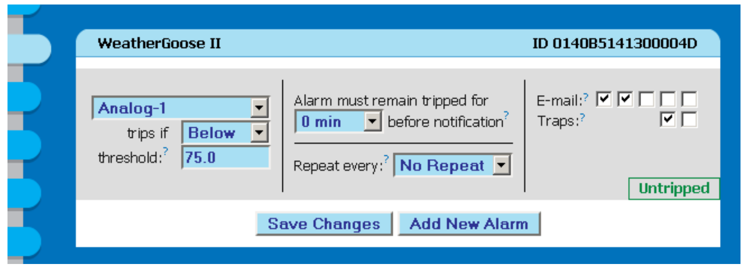


It is important to note here that these numbers are just examples, and you should not assume that a WD-1's will read identically to these examples in any given situation! Because the WD-1 operates by detecting conductivity, it can be affected by the surfaces the sensor is placed upon and the properties of the water (or other liquid) it comes into contact with. A WD-1 placed in a glass tray into which highly-purified, distilled or deionized water is leaking may not show as wide a swing in the readings as, say, common tap water leaking from an overhead pipe onto a concrete floor. (In the example shown here, the tests were conducted with the WD-1 sensor resting on top of some paper towels, inside a plastic tray, onto which plain tap water was dripped to saturate the paper towels.)

Ÿ Alarm-threshold settings when connected directly to an Analog Input:

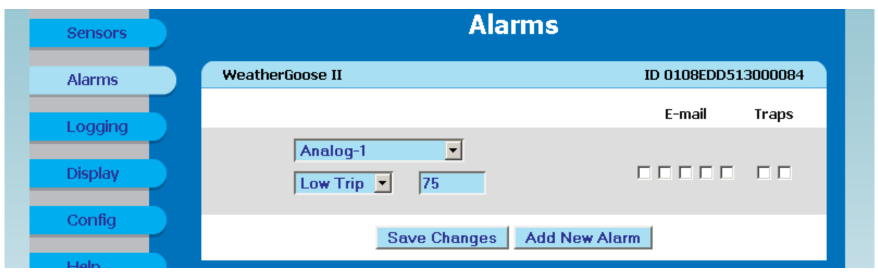
If you are using a Series-II unit:

To set an alarm threshold to notify you when a door is opened, simply go to the ***Alarms*** page, click the *Add New Alarm* button under the Goose's internal-sensors block, Analog Input to which the WD-1 is connected (Analog-1 in this example), set *trips if:* to **`Below`** and threshold to an appropriate level; then, set the checkboxes for the alarm actions you wish this alarm threshold to trigger, along with a trigger delay or alarm-repeat interval if desired, and click *Save Changes*.

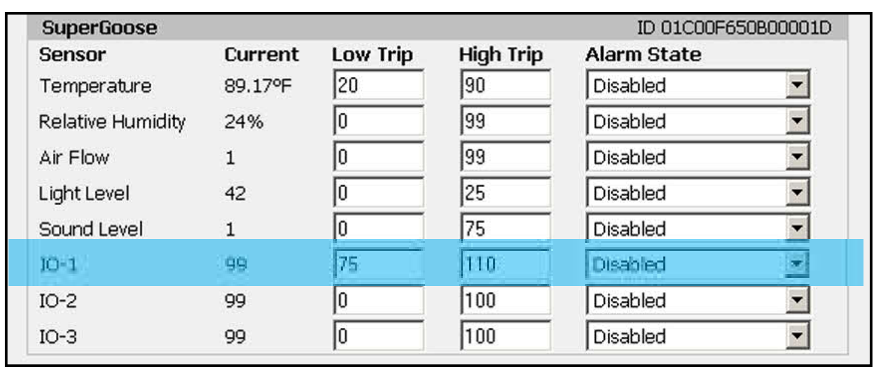


As noted previously, the correct thresholds will vary somewhat, depending on the surface the WD-1 is placed upon and the conductivity of the water or other liquid which may leak onto the surface. A Low-Trip threshold of around **`75`**, as shown in the example here, is generally a good place to start; after the unit has been in place for a day or so, and you've had the chance to accumulate some data and graph history on what "normal" conditions are for that sensor's particular installation, you can adjust your thresholds up or down as necessary.

If you are using a Series-II unit with a firmware revision prior to v3.4.x, your alarm-settings block will look like this. Alarm-threshold settings are calculated and programmed the same way as above; the only difference (aside from the lack of trigger-delay and alarm-repeat intervals, which were introduced in v3.4) is that the alarm types are named **`High Trip`** and **`Low Trip`** instead of **`Above`** and **`Below`**, respectively. **`High Trip`** alarms are tripped when the reading goes higher than the set threshold, while **`Low Trip`** alarms are tripped when the reading goes below the threshold.



If you are using a Series-I unit, the alarm settings are somewhat different. Find the sensor block on the ***Alarms*** page for the Goose unit's internal sensors, then set the *Low Trip* threshold to the desired threshold and the *High Trip* threshold to **`110`**, as shown here, for the input which the WD-1 is connected to, then set the *Alarm State* to the action you wish to take place when the trip threshold(s) are exceeded and click *Save Changes*. (The input being used is highlighted here for example purposes.) Since the Analog input cannot go higher than 99, this will effectively disable the High Trip event, which is not needed in this application.



As noted previously, the correct thresholds will vary somewhat, depending on the surface the WD-1 is placed upon and the conductivity of the water or other liquid which may leak onto the surface. A Low-Trip threshold of around **`75`** would be a good place to start; after the unit has been in place for a day or so, and you've had the chance to accumulate some data and graph history on what "normal" conditions are for that sensor's particular installation, you can adjust your thresholds up or down as necessary. The High-Trip threshold can be left at **`110`**, since regardless of the installed conditions the sensor reading can never exceed 99.

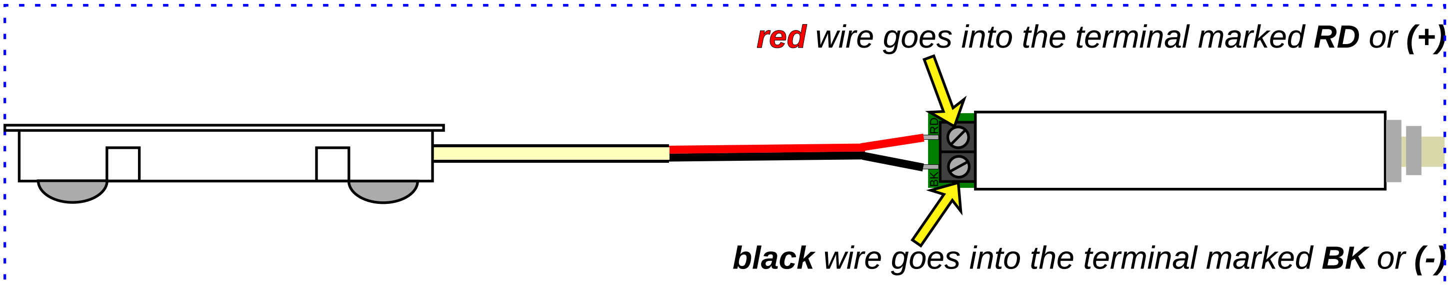
Using the WD-1 via a CCAT-WATER analog-to-digital bus interface module:

Ÿ Connecting the WD-1 to the CCAT-WATER:

If you are using an ITWatchdogs monitoring device which does not have built-in analog inputs, such as the MiniGoose-II, or if you have already used up all of your analog inputs on other sensors, then you will need to attach the WD-1 via an appropriately-programmed CCAT analog-to-digital bus interface module, available from IT Watchdogs. The following diagrams show how to hook up and use an WD-1 in combination with a CCAT-WATER interface module.

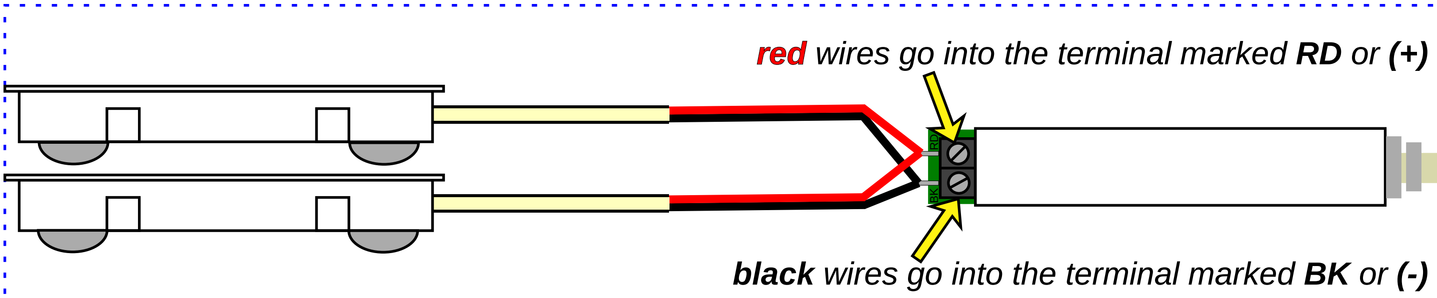
(Note: the CCAT has been manufactured in a couple of different physical variations over the lifetime of the product. If your CCAT does not seem to match the appearance of the one shown below, you may have an earlier model, and may wish to consult the CCAT User Guide to insure the correct hookups.)

As we saw with the direct analog inputs in the previous section, the WD-1 does not have a specific polarity, so the wiring is not critical; nonetheless, we suggest following the indicated wiring scheme for consistency with other sensor types. The wires will need to be stripped, as the terminals are not of an insulation-piercing type – however, they do not need to be stripped back as far as they do for the Analog Input block; a ¼-inch of exposed wire will generally be sufficient for the style of terminals used on the CCAT.



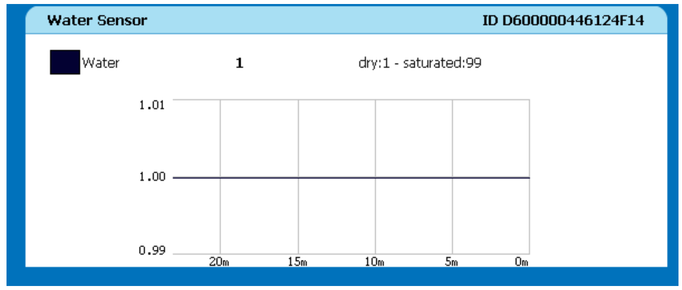
Unlike some types of analog sensors, two or more WD-1's can be "doubled up"; i.e. connected in parallel to share a single CCAT, as shown below. Note that in such a configuration, you will not be able to determine exactly which sensor(s) are detecting water; you will only know that one or more of the sensors in the group sharing that particular input is wet. Depending on your installation, though, it might not be necessary for your "water detected!" alerts to be that specific about the location; and if so, this can be a convenient and inexpensive way to set up water detection at multiple points in a room without the additional complexity and expense of a large number of CCAT devices to give each WD-1 its own connection to the WeatherGoose.

There is no fixed limit to the number of WD-1's that can share a single CCAT input, as such; however, in practical terms, the more wires you try to insert into a particular terminal, the more unwieldy the wiring becomes, so you may want to limit yourself to only two or three sensors per CCAT just to keep the wiring manageable.

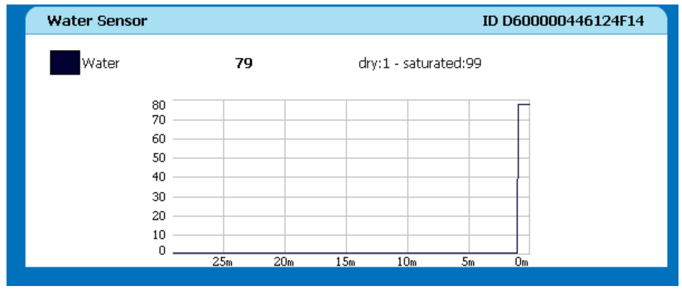


Ÿ Sensor operation & behavior when connected via a CCAT-WATER:

Once you've connected the CCAT-WATER to the monitoring unit, a new sensor block will appear, initially titled "Water Sensor." (This name can, of course, be changed from the ***Display*** page to something more specific to your installation.) If your CCAT does <u>not</u> initially display as "Water Sensor", do not proceed further, as your CCAT is not correctly programmed for this sensor and will not display its status properly! (In this event, contact IT Watchdogs technical support for assistance.)



In this first screenshot, the WD-1 is dry. Note that unlike when the device was connected to one of the internal analog inputs, the reading displays as "**`1`**", instead of "**`99`**"; this is because the WeatherGoose "knows" that this device is supposed to be a water sensor, thanks to the programmed CCAT, and so it is able to scale and intepret the raw conductivity signal into a "friendlier", more human-readable form.



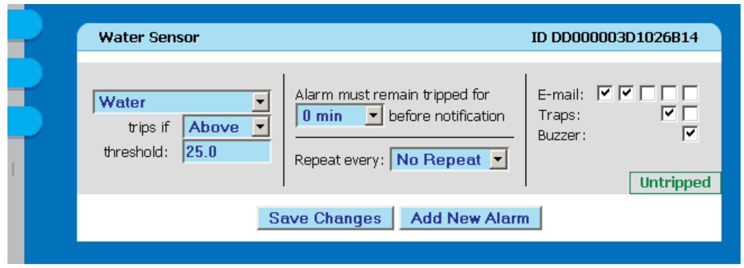
Here, the surface under the WD-1 has become damp; the increased conductivity between the metal contact points allows a small current to flow between them, and the reading rises from "**`1`**" to "**`79`**".

It is important to note here that these numbers are just examples, and you should not assume that a WD-1's will read identically to these examples in any given situation! Because the WD-1 operates by detecting conductivity, it can be affected by the surfaces the sensor is placed upon and the properties of the water (or other liquid) it comes into contact with. A WD-1 placed in a glass tray into which highly-purified, distilled or deionized water is leaking may not show as wide a swing in the readings as, say, common tap water leaking from an overhead pipe onto a concrete floor. (In the example shown here, the tests were conducted with the WD-1 sensor resting on top of some paper towels, inside a plastic tray, onto which plain tap water was dripped to saturate the paper towels.)

Ÿ Alarm-threshold settings when connected via a CCAT-WATER:

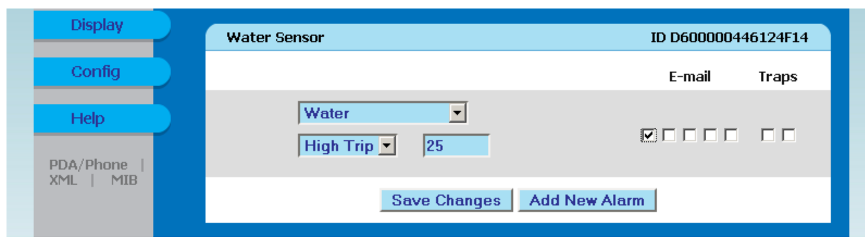
If you are using a Series-II unit:

When you go to the ***Alarms*** page, you'll find that a new parameter block has been added there as well, also titled "Water Sensor." To set an alarm threshold to notify you when the WD-1 detects smoke and sounds the alert, simply scroll down to this new parameter block, click the *Add New Alarm* button, set *trips if:* to **Above** and threshold to **25**; then, set the checkboxes for the alarm actions you wish this alarm threshold to trigger, along with a trigger delay or alarm-repeat interval if desired, and click *Save Changes*.

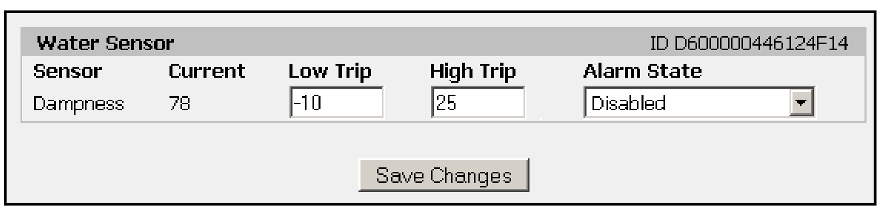


As noted previously, the correct thresholds will vary somewhat, depending on the surface the WD-1 is placed upon and the conductivity of the water or other liquid which may leak onto the surface. A High-Trip threshold of around **25** would be a good place to start; after the unit has been in place for a day or so, and you've had the chance to accumulate some data and graph history on what "normal" conditions are for that sensor's particular installation, you can adjust your thresholds up or down as necessary.

If you are using a Series-II unit with a firmware revision prior to v3.4.x, your alarm-settings block will look like this. Alarm-threshold settings are calculated and programmed the same way as above; the only difference (aside from the lack of trigger-delay and alarm-repeat intervals, which were introduced in v3.4) is that the alarm types are named **High Trip** and **Low Trip** instead of **Above** and **Below**, respectively. **High Trip** alarms are tripped when the reading goes higher than the set threshold, while **Low Trip** alarms are tripped when the reading goes below the threshold.



If you are using a Series-I unit, the alarm settings are somewhat different. Find the sensor block on the ***Alarms*** page for the newly-connected CCAT-WATER, then set the *High Trip* threshold to the desired threshold and the *Low Trip* threshold to **-10**, as shown here, then set the *Alarm State* to the action you wish to take place when the trip threshold(s) are exceeded and click *Save Changes*. Since the reading cannot go below 1, this will effectively disable the Low Trip event, which is not needed in this application.



As noted previously, the correct thresholds will vary somewhat, depending on the surface the WD-1 is placed upon and the conductivity of the water or other liquid which may leak onto the surface. A High-Trip threshold of around **25** would be a good place to start; after the unit has been in place for a day or so, and you've had the chance to accumulate some data and graph history on what "normal" conditions are for that sensor's particular installation, you can adjust your thresholds up or down as necessary. The Low-Trip threshold can be left at **-10**, since regardless of the installed conditions the sensor reading can never go below 1.