

Clymit™ WaterSnake

**Leak-Detection Cable System for Continuous
Wide-Area and Perimeter Water Detection**



Setup and User Guide

Rev. 1.01

WATERSNAKE

Water Detection System

Water in your server room is never a good thing – and you’d be amazed at how many different ways water can get into the room, especially if your servers are located in an unattended remote facility, or in a basement, or even just in a converted warehouse building with already-existing plumbing that can’t be easily or economically moved or re-routed away from the space assigned to the server racks.

Or, you may find that your local building codes require the presence of a sprinkler system, in case of fire. If any of these pipes should spring a leak... or if your air-conditioning system’s condensation pipe should block up, or if one of the basement walls develops a crack that lets water seep in during the next good rainstorm... how would you know, if you weren’t there to see it? More importantly, while single-point water sensors (such as our WD-1) can easily keep watch on a small area near a known potential water source such as a drip pan or a sink, how do you monitor a large area where you can’t know in advance where the potential leak sources are?

The WaterSnake Water Detection System offers a solution to this problem. Instead of monitoring a single point, the WaterSnake’s special leak-detection cable can be strung across a large area; if water touches the cable at any point along its length, it will trigger an alarm signal which can be picked up by the Clymit ETD. In addition, the WaterSnake control box continuously monitors the integrity of the detection cable itself; if the cable should be accidentally cut, damaged, or disconnected, the control box will signal a “cable fault” condition to the Clymit ETD. A single WaterSnake control box can monitor up to 300ft of leak-detection cable, allowing you to monitor the entire perimeter of a room up to 75ft on each side. (Other arrangements of the cable, such as zig-zagging it back and forth over an area in order to provide detection coverage over the entire area, are also possible.)

The WaterSnake system is directly compatible with any Clymit monitoring unit which has analog-sensor inputs; such models include the Clymit 300 and Clymit 200. Models which do not have built-in analog inputs, such as the Clymit 50, will require the use of a pair of appropriately-programmed CCAT analog-to-digital converters to use the WaterSnake system. Models which do not provide connections for either analog or digital sensors, such as the MicroGoose, are not compatible with the WaterSnake system.

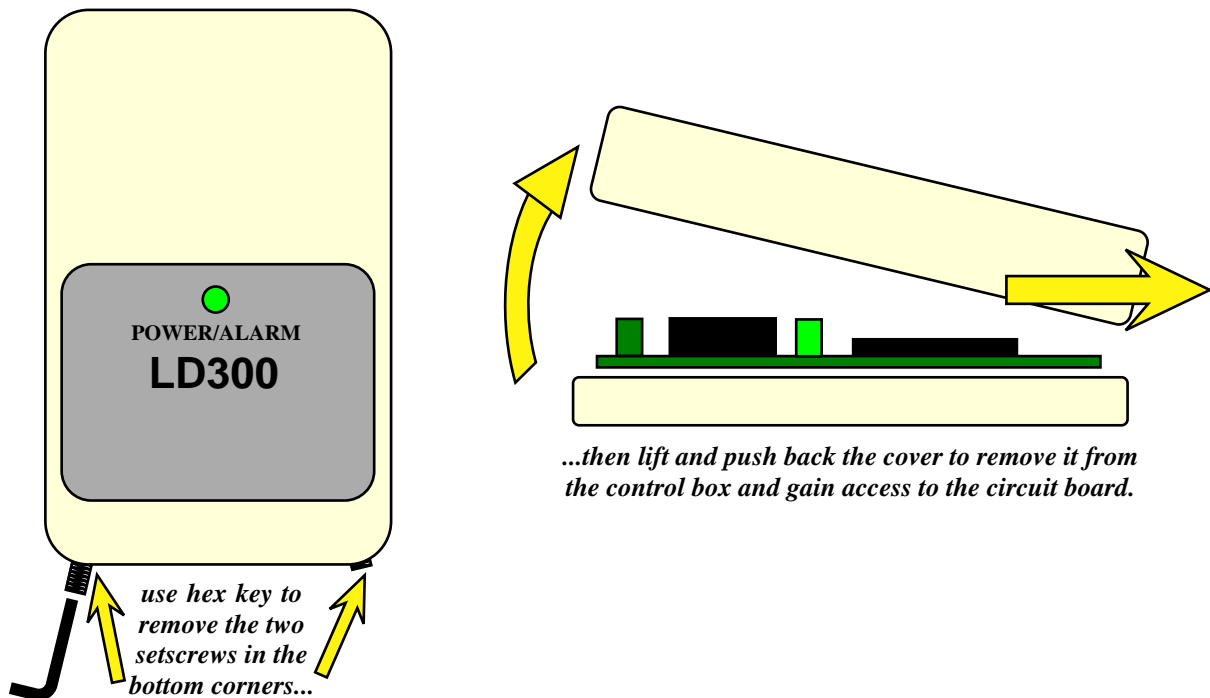


The WaterSnake control box (at left) and a section of leak-detection cable with a terminator plug attached, above. Note that depending on which kit(s) and optional additional lengths of sensing you initially ordered, you may receive a sensing cable with a permanently-attached termination resistor instead of a cable with a separate, detachable terminator.

When you first receive your WaterSnake Water Detection System kit, you should find the following components in the package:

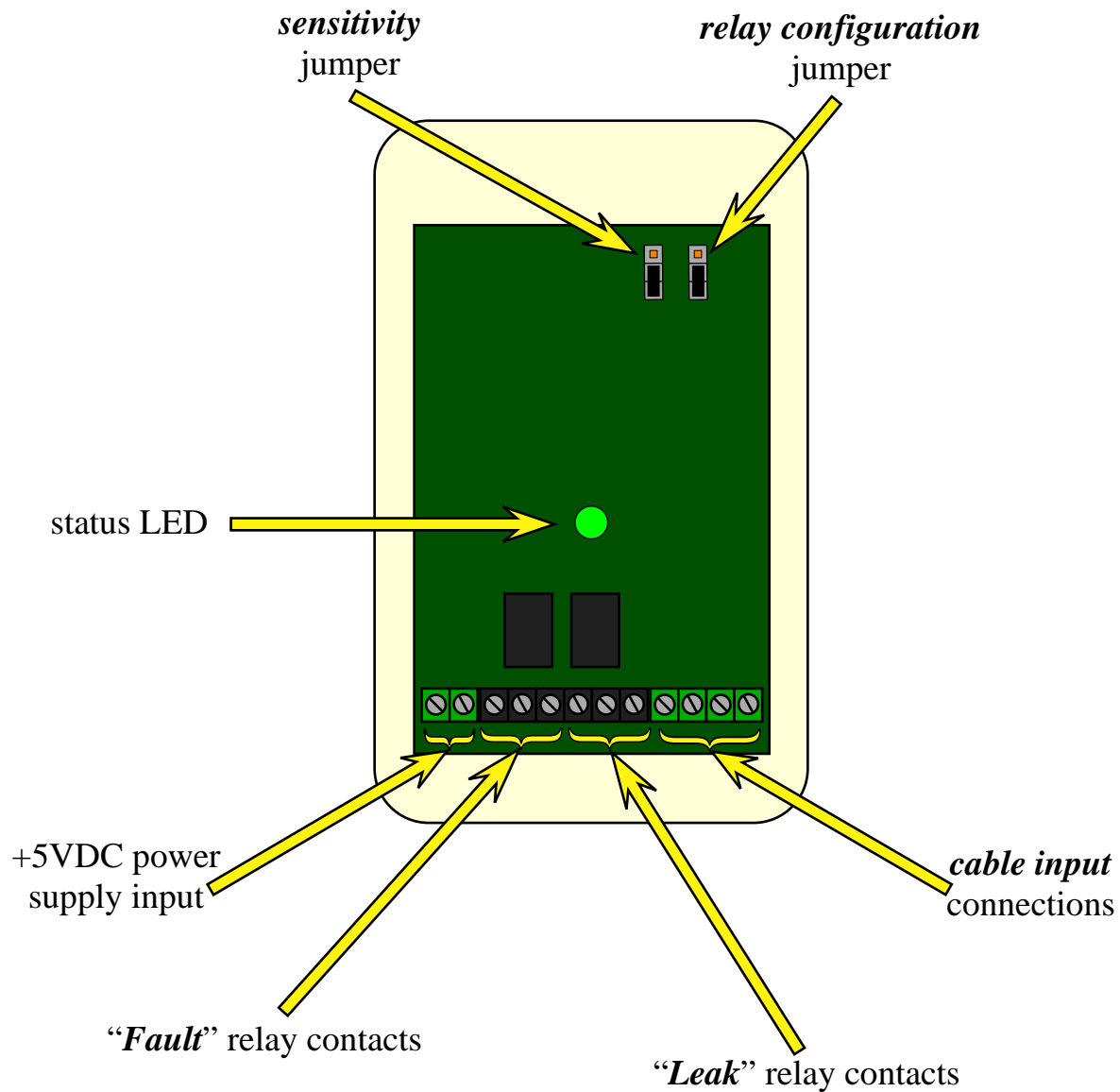
- (1) LD300 control box (includes wall-mounting hardware, and a hex key to open the box for hookup and servicing.)
- (1) 5Vdc power supply
- (1) 15ft white “leader” cable
- (1) 50ft length of 4-conductor alarm wire
- one or more lengths of orange “leak detection” cable (*note: the number of cables and their length(s) will depend on which WaterSnake kit and additional extra cable(s), if any, you ordered*)
- a package of self-adhesive “J”-clips (*note: the quantity of clips supplied will depend on which WaterSnake kit and additional extra cable(s), if any, you ordered*)

The LD300 control box is the primary component of the WaterSnake system; everything else connects to it, and the device’s sensitivity and behavior is configured via jumpers inside the control box. We will show how to connect the “leak” and “cable fault” signals to Clymit ETD, either directly or via CCAT interface, in the later sections of this guide; for now, we will first explain the various jumper settings, then illustrate how to connect the power supply, leader cable, and sensing cable(s) to the control box.



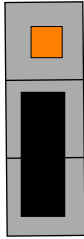
First, you will need to open the LD300 control box to get access to the settings jumpers and terminal blocks underneath the front cover. The cover is held in place by a pair of setscrews set into the bottom corners, as shown here; simply use the included hex key to remove the recessed setscrews from of the housing, then separate the top cover from the bottom half with the electronics board. Be careful not to lose the setscrews!

Once you have removed the cover, you'll see a rectangular green circuit board with numerous components, including a row of screw-terminal blocks on the bottom and a pair of jumpers at the top. (For clarity, the following diagrams have been simplified to show only the components of interest to us, rather than the entire circuit board. Also, the components shown are not necessarily to scale.)

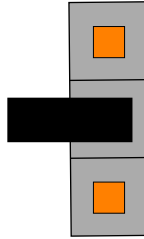


- ***SENSITIVITY* jumper:**

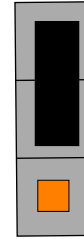
This jumper controls the relative sensitivity of the WaterSnake system to dampness along the detection cable. The factory-default setting is **low**, which is generally sufficient for most applications; however, if your particular application involves detecting leaks of distilled or deionized water, or other fluids which are only weakly conductive, you may wish to experiment with the **medium** or **high** sensitivity settings instead. If one of the higher-sensitivity settings gives you too many false positives, simply move down to a lower setting until the false positives stop.



LOW sensitivity
(jumper across the bottom two pins)



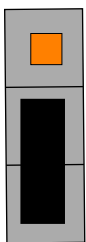
MEDIUM sensitivity
(technically, “medium” is selected by having no jumper across any of the pins; however, we suggest that you place the jumper on a single pin, as shown, to help keep it from getting misplaced.)



HIGH sensitivity
(jumper across the top two pins)

- ***RELAY CONFIGURATION* jumper:**

This jumper controls the behavior of the output relays when a leak-detection or cable-fault event occurs. The relays can be set to one of two different modes: **supervised**, or **non-supervised**. In supervised mode, the relays are held in an energized state as long as conditions are normal, and de-energized when an alert occurs; in non-supervised mode, the relays are de-energized when conditions are normal, and energized when an alert occurs. This action is illustrated by the diagrams below: (note: the terms “normally open” (NO) and “normally closed” (NC), when describing relay actions, refer to the state of the relay contacts in the relay’s “normal”, i.e. de-energized state, not to “normal” as in normal room conditions!)



NON-SUPERVISED MODE

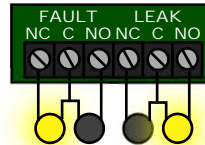
(jumper across the bottom two pins)

(no alarm condition)



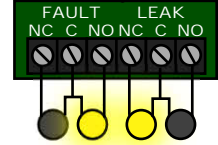
with no alarm condition, both relays are **de-energized**, and the NC contact pairs are closed.

leak detected

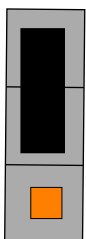


when water is detected on the cable, the LEAK relay **energizes**, and its NO contact pair closes

cable fault



if a cable fault is detected, the FAULT relay **energizes**, and its NO contact pair closes



SUPERVISED MODE

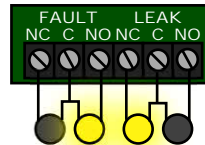
(jumper across the top two pins)

(no alarm condition)



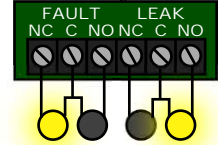
with no alarm condition, both relays are **energized**, and the NO contact pairs are closed.

leak detected



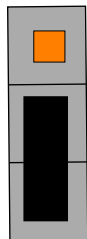
when water is detected on the cable, the LEAK relay **de-energizes**, and its NC contact pair closes

cable fault



if a cable fault is detected, the FAULT relay **de-energizes**, and its NC contact pair closes

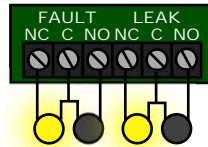
The primary advantage between the two modes is that in supervised mode, since the relays are held in the energized state when conditions are normal, if the LD300 loses power or malfunctions both relays will de-energize, resulting in a simultaneous “leak detection” and “cable fault” event being seen by the Clymit ETD which the LD300 is connected to. Since obviously both of these alarm events can’t possibly be true at the same time (you can’t detect water if the cable is faulty, and the cable can’t be faulty if it’s detecting water!), the simultaneous occurrence of both of these events can alert you to the possibility that something else is wrong in your facility. This action is shown below:



NON-SUPERVISED MODE

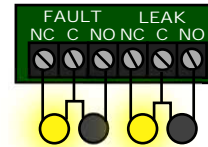
(jumper across the
bottom two pins)

(no alarm condition)

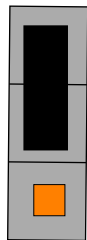


with no alarm condition,
both relays are **de-energized**, and the NC
contact pairs are closed.

(no power to LD300)



in the event of a power loss at the LD300, with
the device in supervised mode, both relays will
still be **de-energized**, so the Clymit ETD will
not see any state change and you won't receive
any alert that something is wrong at your facility.



SUPERVISED MODE

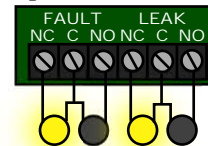
(jumper across the
top two pins)

(no alarm condition)



with no alarm condition,
both relays are **energized**,
and the NO contact pairs
are closed.

(no power to LD300)



in the event of a power loss at the LD300, with
the device in supervised mode, both relays will
de-energize, and the NC contact pairs will both
close, indicating a simultaneous LEAK and
FAULT detection, which is obviously impossible,
alerting you that something has happened at your
facility that needs to be investigated.

• STATUS LED:

The LD300 control box features a single LED which indicates the unit's current state:



• **LED dark:** no power to the unit



• **LED on solidly:** LD300 control box has power, no alarm conditions present



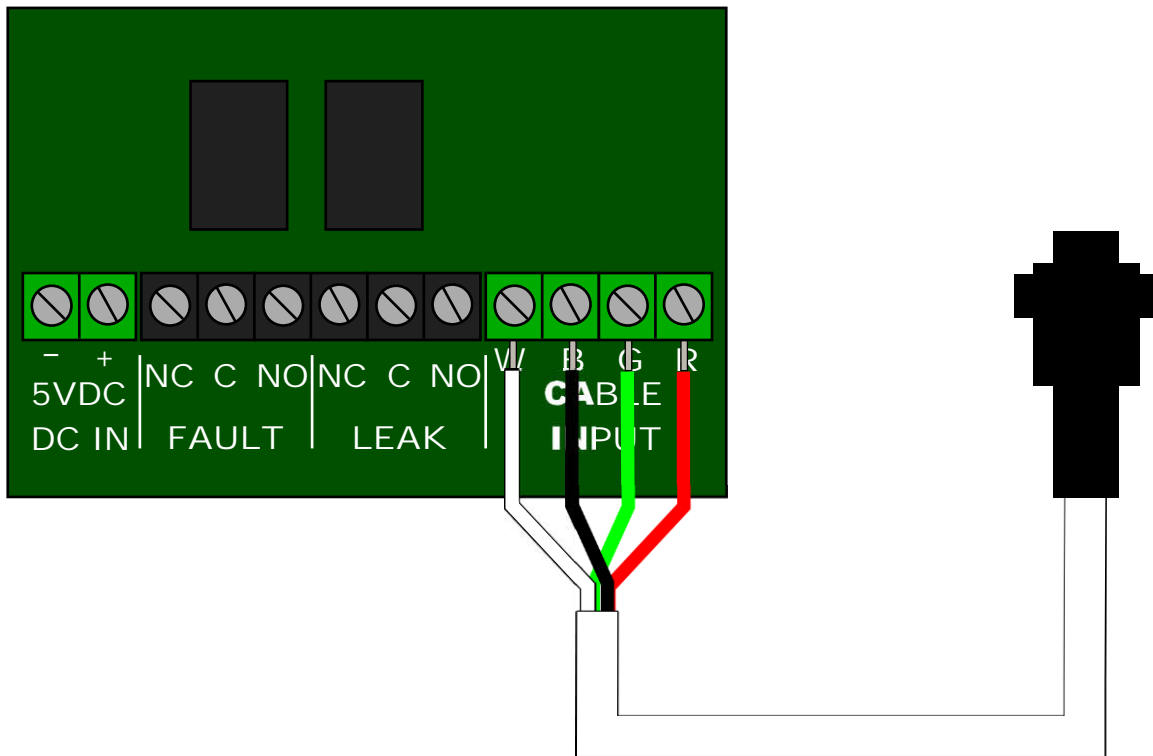
• **LED rapid blinking (about once every 1/2 second):** leak detected



• **LED slow blinking (about once every 2~3 seconds):** cable fault detected

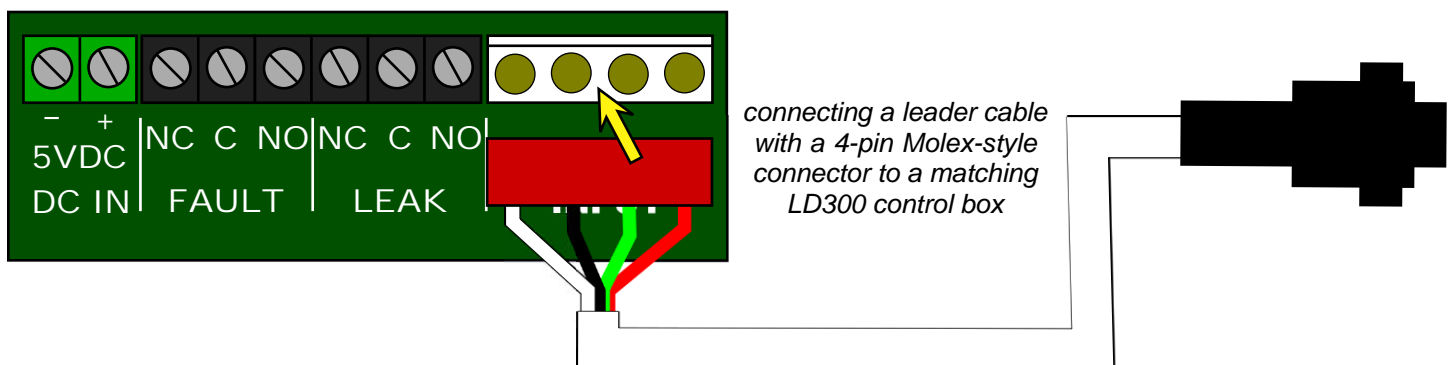
Y Connecting the Leader Cable:

In your WaterSnake kit, you should have received a 15-foot (4.57m) white cable with a twist-lock connector at one end and four bare, stripped and tinned wires at the other, similar to the one pictured here to the right. This is called the “leader cable”, and its purpose is to connect the control box to the orange water-sensing cable, allowing you to mount the control box in a convenient place without having to waste any lengths of the actual sensing cable going up the side of a wall or cabinet. To connect the leader cable, simply insert the four colored wires into the appropriate terminals of the *CABLE INPUT* terminal block, as shown below:



Make sure the wires are stripped back about ¼ inch, then insert each wire into the appropriate terminal, then tighten the screw to lock the wire into place. (The leader cable wires usually come pre-stripped from the factory; if the amount of stripped wire exceeds more than about ¼ inch, we recommend trimming off the excess so as to minimize the chance of shorts between the exposed wires.)

(Note: depending on when your LD300 was manufactured, the leader cable may have a four-pin Molex-style plug instead of four bare wires, and the control box may have a matching locking-pinheader connector in place of the four terminals shown above. If this is the case, simply plug the leader cable into the matching pinheader connector, as shown below; the connectors are physically polarized so that they can only fit together one way.)



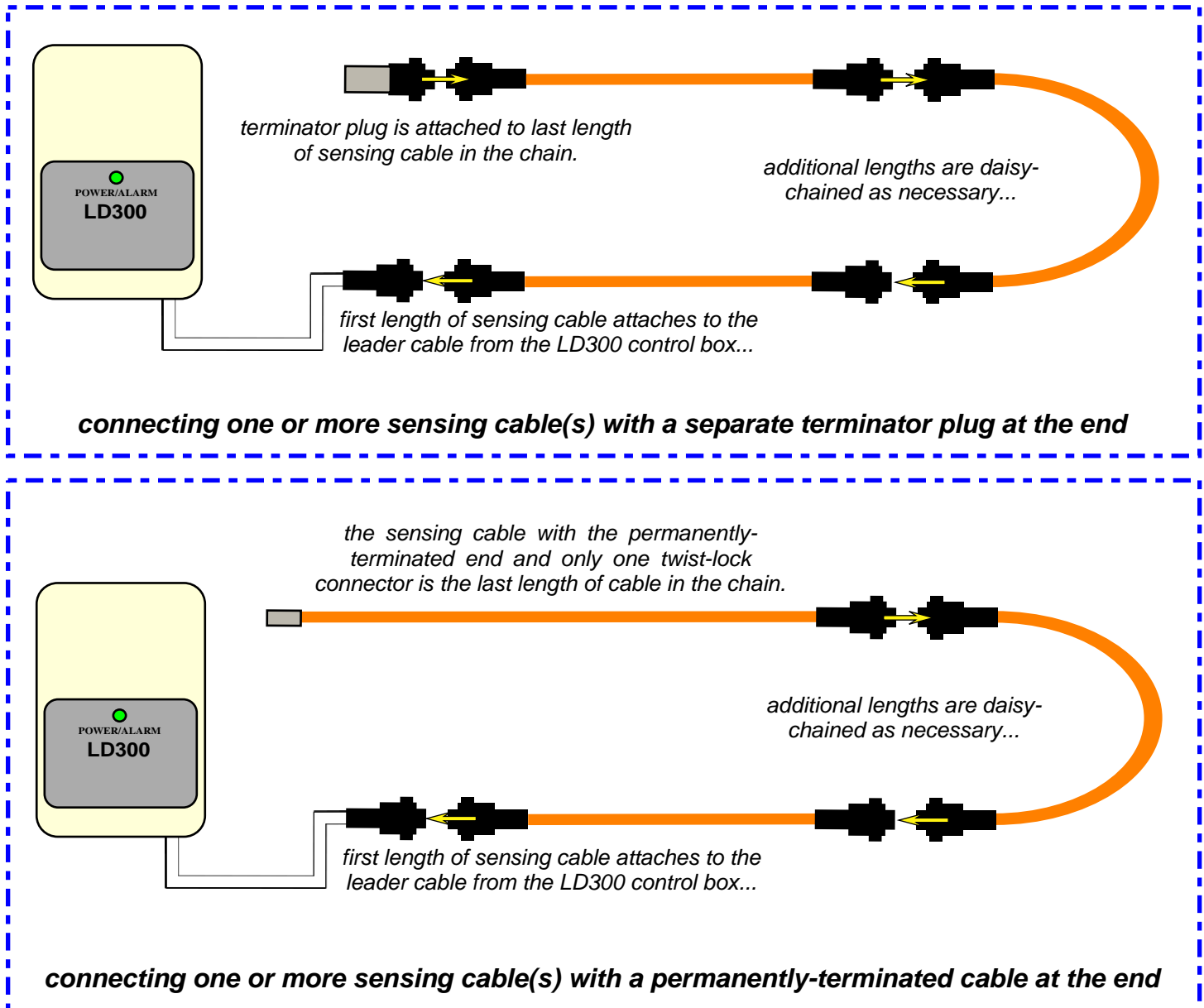
connecting a leader cable
with a 4-pin Molex-style
connector to a matching
LD300 control box

Y Connecting the Leak-Detection Cable(s):

Your WaterSnake kit should also have included one or more lengths of orange Leak Detection cable, similar to the one shown here. The cables are designed to be daisy-chained together, so each cable will have a 4-pin male twist-lock plug on one end, and a 4-pin female twist-lock socket on the other.



The example shown here actually consists of two pieces; the sensing cable itself, and a “termination plug” which fits into one of the 4-pin twist-lock connectors located at each end of the cable. Note that depending on the cable option(s) you specified at the time of ordering, your WaterSnake kit may not have an actual terminator plug; instead, it may have a section of cable with only a single twist-lock plug on one end, and a permanently-attached terminator at the other. **Regardless of which style you have, the end of the WaterSnake’s Leak Detection Cable must be terminated in order to work properly;** if the cable run is not terminated, the WaterSnake will see it as a “cable fault” and will not detect liquids on the cable. If your kit has a separate terminator plug, that plug must be attached to the socket at the end of the last cable in the chain; if your kit came with a length of cable with a permanently-attached terminator, that particular length of cable must be the last cable in the chain. These connections are illustrated below:

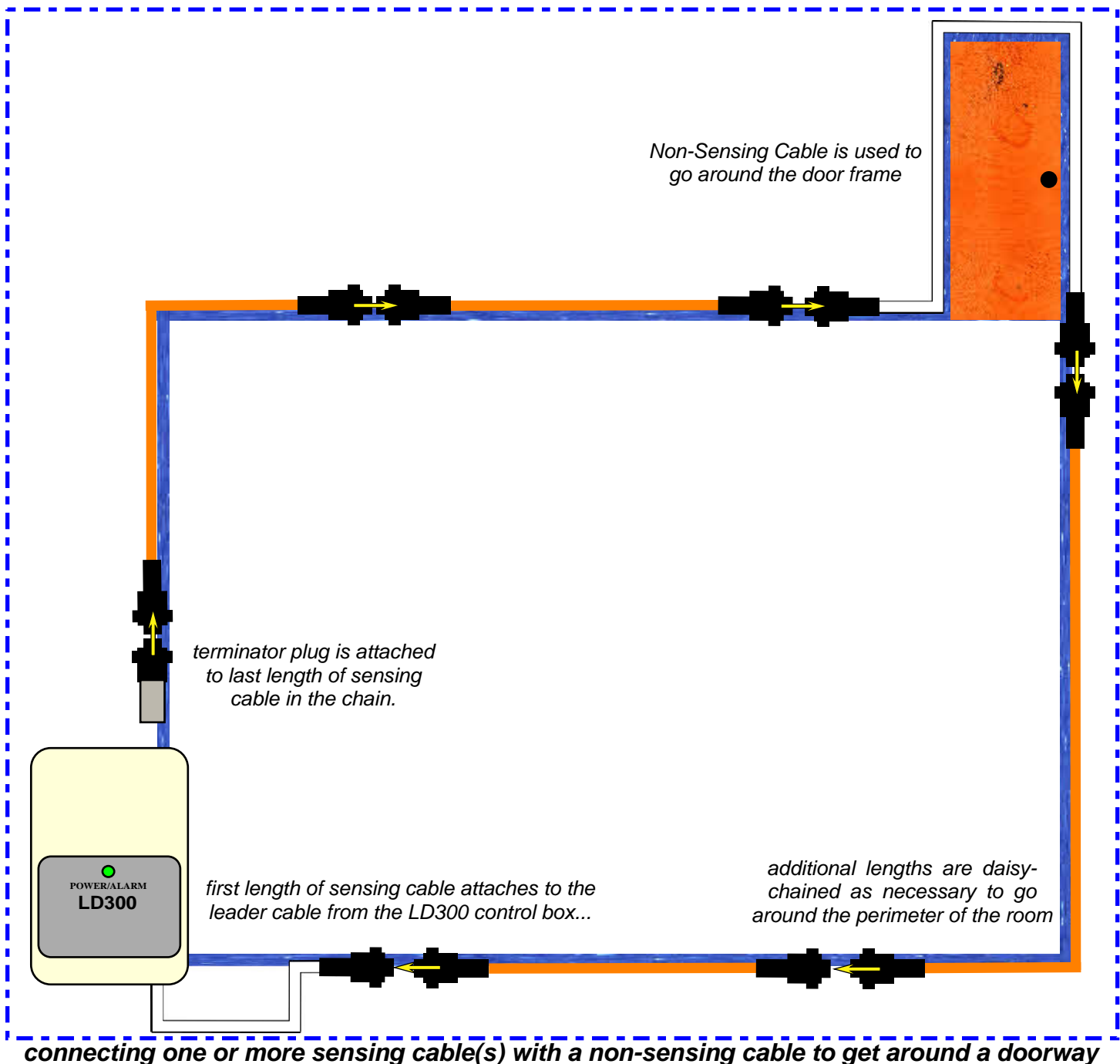


¶ Connecting the optional Non-Sensing Cable(s):

Your WaterSnake kit may also have included one or more lengths of white Non-Sensing Cable, similar to the one shown here. This is the same type of cable as that used for the Leader Cable, except that these Non-Sensing Cables are designed to be daisy-chained together along with the orange Leak Detection Cables, so these also feature a 4-pin male twist-lock plug on one end and a 4-pin female twist-lock socket on the other.



The Non-Sensing Cables are designed to give you an economical way to route around or over non-monitored spaces, such as doorways, or to give you greater flexibility in where to mount the control box without having to waste excessive amounts of sensing cable across areas where there is no need to actually sense liquids. An example of this kind of non-sensing application is shown below:



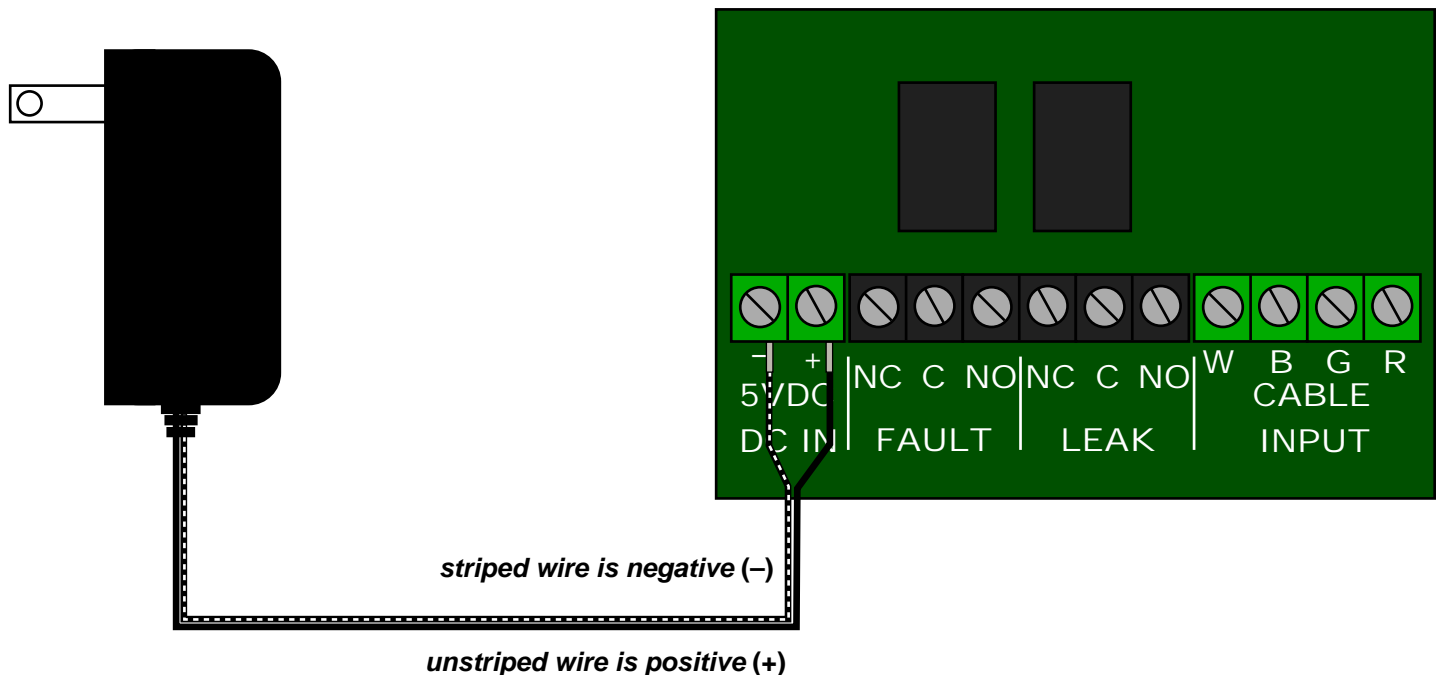
connecting one or more sensing cable(s) with a non-sensing cable to get around a doorway

Y Connecting the 5V power supply:

The WaterSnake's LD300 Control Box is powered by a standard 5VDC wall transformer-style power supply, similar to the one shown here, which is included with the WaterSnake Kit. Note that while the power supply has a standard US-style plug for 120VAC/60Hz operation, it is actually capable of worldwide voltage (100 ~ 240VAC) and line-frequency (50 / 60Hz) operation; all that is required is an appropriate adapter to go from a U.S.-style plug to the appropriate non-U.S. socket. It is also suitable for use with power strips which provide 208VAC from IEC C-13 sockets connected across two phases of a 3-phase power system, which are becoming increasingly common in larger IT installations; again, all that is required is the correct plug-and-socket adapter.



The model included in the WaterSnake kit comes with two bare wires at the end, pre-stripped and tinned for insertion into the screw terminals. The proper connection is shown below:



IMPORTANT NOTE!

If the power supply which comes with your WaterSnake kit should happen to come with a tag attached to the wires which indicate a different polarity than the one shown here, be sure to follow the polarity indicated on the tag! (While the wire-color scheme shown above is fairly standardized among plug-in power supply manufacturers, it is always possible that one of the several vendors from which we purchase these power supplies may not follow this standard.)

Using the WaterSnake via a direct connection to the built-in Analog Inputs:

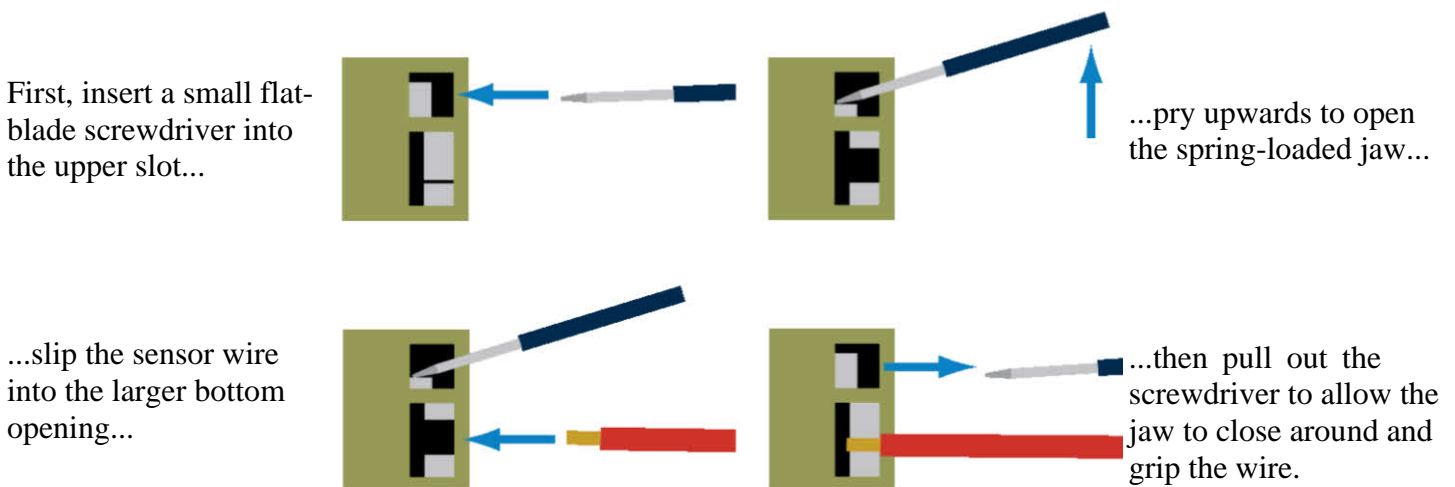


Y Connecting the LD-300 Control Box's relay outputs to the Analog-Input terminals:

The following diagrams demonstrate how to connect your WaterSnake's LD-300 relay outputs directly to the spring-loaded analog-input terminals used on most of the standard Clymit product lines.

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.



Your WaterSnake kit should have come with a 50-foot length of 4-conductor alarm wire, similar to the one shown here. Note: Be careful not to confuse this wire with the 15-foot Leader Cable! They may look very similar, right down to the colors of the four individual wires inside the white outer sheath. The alarm wire used to connect the Control Box's relay outputs to the monitoring unit can be distinguished from the Leader Cable by its longer length, and by the lack of a 4-pin twist-lock socket at the end.

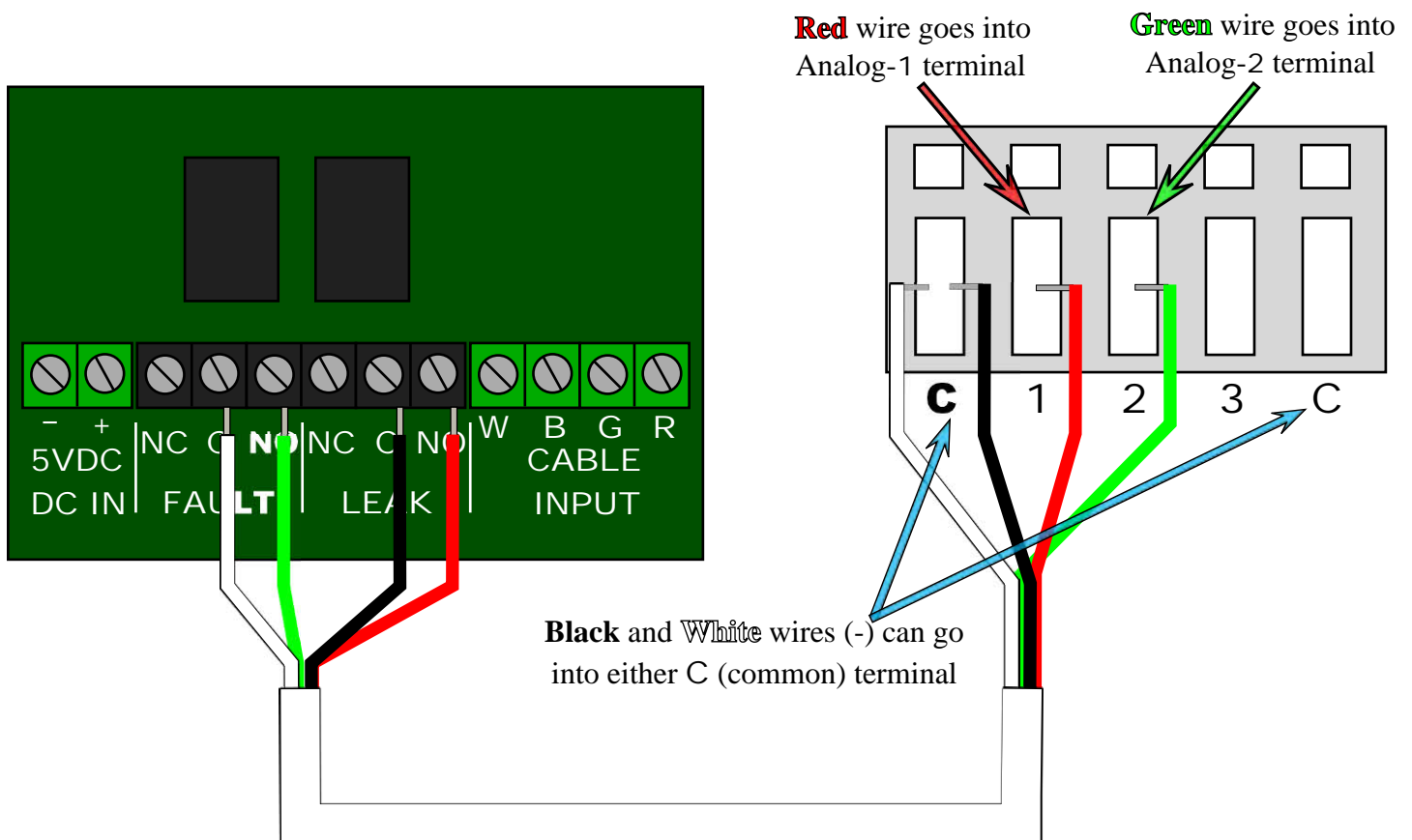
With both the NC (Normally Closed) and NO (Normally Open) contact pairs provided for both relays, and with the relay action being selectable between Supervised and Non-Supervised modes, there are a variety of possible ways in which the relays could be connected. On the following pages, we'll illustrate some hookup methods which work best with the Clymit monitoring system.



¶ Relays in SUPervised Mode, individual Leak/Fault signals to the Clymit ETD:

Here, the Relay Configuration jumper is placed on the **SUP**ervised setting, meaning that the relays will be held in their energized state as long as the LD300 Control Box has power and that the **NO** (Normally Open) contact pair will be held closed until an alarm event occurs, at which point the appropriate relay will de-energize and its contact pair will open. (If power is lost, then both relays will de-energize and open.)

In the example shown below, the Cable Fault relay contacts are connected to Analog-2, and the Leak Detected relay is connected to Analog-1 – but this is not absolutely required; since all of the Analog Inputs on a Clymit unit behave the same way, if either Analog-1 or Analog-2 are already occupied by another sensor on your particular installation, it is perfectly acceptable to connect one of the relays to Analog-3 instead, as long as you keep track of which relay you connected to which Analog Input when it comes time to set “friendly” names and alarms in the Clymit monitoring unit (which we’ll cover in a moment).



NOTE: This is the configuration which ITWatchDogs most recommends, and which will be used in the following sections describing the device’s behavior and the setting of alarm thresholds.

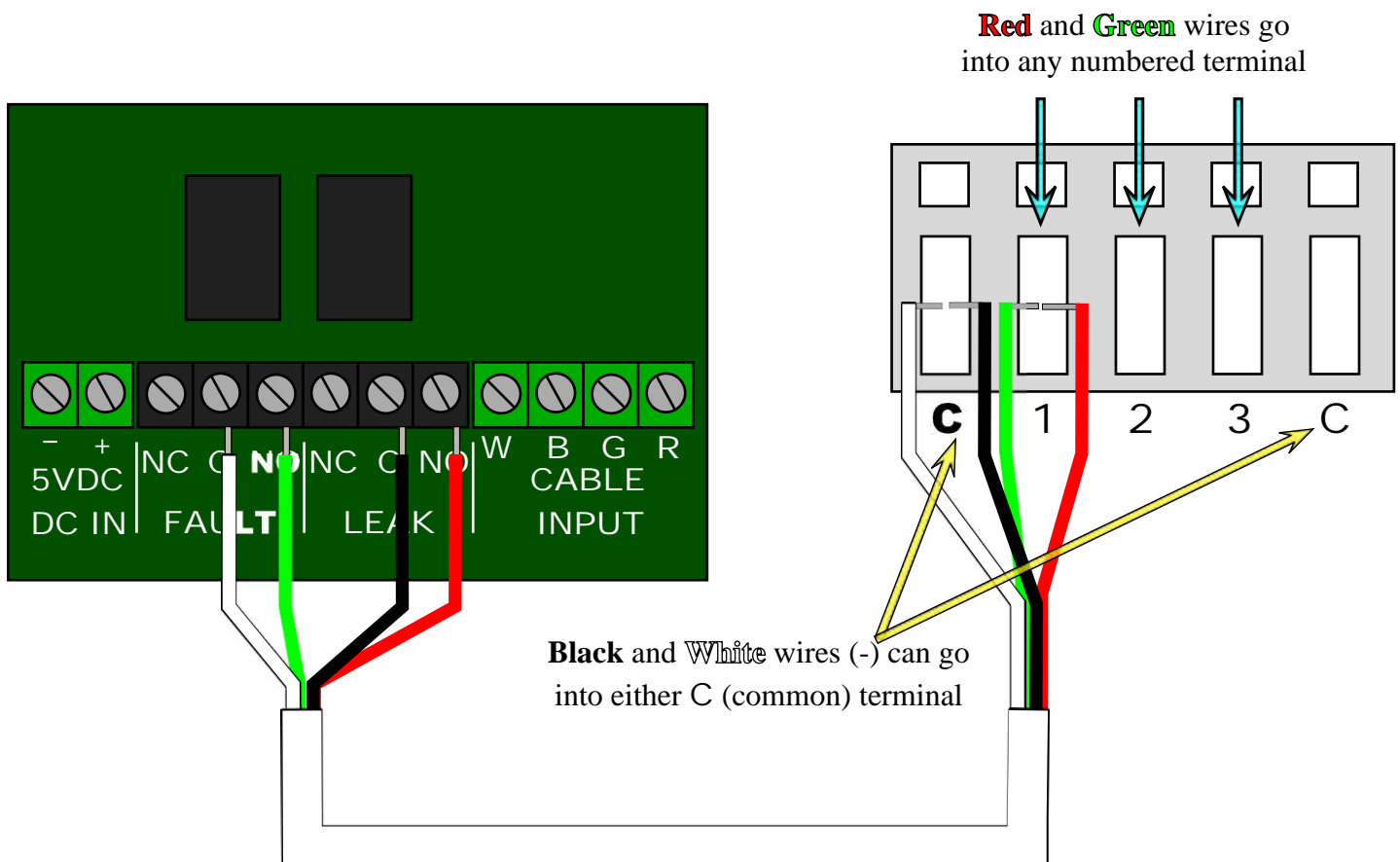
Relays in *NON-Supervised Mode*, shared Leak/Fault signals on a single input:

The previous hookup example assumed that you have at least two Analog Inputs available for use by the WaterSnake. If you don't have two Analog inputs available, or you want to conserve these inputs for future expansion, it is possible to have both relay signals share a single input by connecting both **NO** (Normally Open) contact pairs in parallel, as shown here.

In this configuration, the Relay Configuration jumper is on the **NON-Supervised** setting, meaning that the relays will stay in their de-energized state, and their **NO** (Normally Open) contact pairs will be open, until an alarm event occurs, at which point the associated relay will energize and the **NO** contact pair will close. Since the relay contacts are connected in parallel, the reading at the Analog Input will change from an open-circuit to a closed-circuit regardless of which relay actually closes.

The downsides to this configuration are that (1) you will not be able to tell, from the alarm message sent by the Clymit ETD alone, whether the alert is due to water detection or a cable fault; and (2), you will not receive any alarm messages if the WaterSnake loses power. To determine the exact cause of the alert, someone will have to physically visit the site to investigate.

Keep in mind that if you use this configuration, the actions seen by the Clymit ETD will be the opposite of those which will be described in the following sections on sensor behavior and alarm settings; i.e. an open circuit will indicate “no alarm”, while a closed circuit will indicate an alarm state.

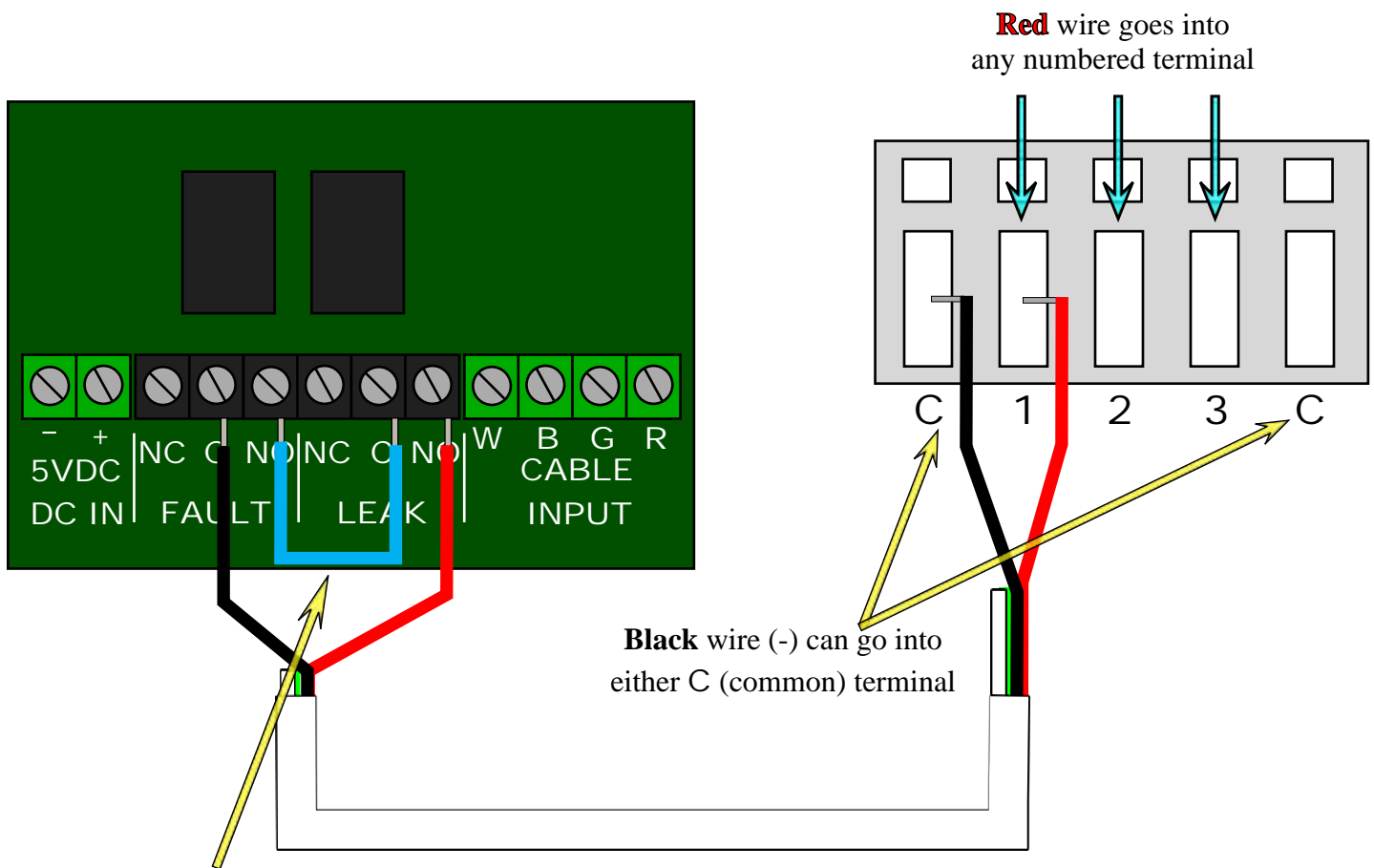


¶ Relays in SUPervised Mode, shared Leak/Fault signals on a single input:

In this configuration, the Relay Configuration jumper is again on the **SUP**ervised setting – but this time, the NO (Normally Open) pairs have been wired together in series, such that the circuit will remain closed as long as the LD300 Control Box has power and conditions are normal. If an alarm event occurs, causing one of the relays to de-energize, or if a power loss causes both relays to de-energize, the circuit will open.

This configuration, like the previous shared-single-input method, has the same disadvantage (compared to the two-input method) that you will not be able to tell, just from the alarm message sent by the Clymit ETD, exactly which condition caused the alert. However, unlike the previous configuration, wiring the relay contacts this way will also trip an alarm on the Clymit ETD if the WaterSnake loses power.

This configuration also has the advantage that, aside from the use of only one input instead of two, its behavior will be essentially the same as the two-input method; namely that a closed circuit indicates normal conditions, while an open circuit indicates an alarm state. For this reason, if you need to use the shared-single-input method, ITWatchDogs would recommend this configuration over the previous shared-input-Non-Supervised method.



Use a spare bit of wire to jumper across these two terminals to connect the NO contact pairs in series.

Y Sensor operation and behavior when connected directly to the Analog Inputs:

Once you've successfully connected the WaterSnake LD-300 Control Box to your Clymit ETD, the internal-sensors display block of the *Sensors* page will look something like this.

(NOTE: for purposes of the following examples, the WaterSnake has been connected with the the Leak Detected relay connected to Analog-1, and the Cable Fault relay contacts connected to Analog-2, using a Clymit 300 running firmware release v3.3.3. For clarity, the two Analog Inputs have been renamed (via the *Display* page) to indicate which input is which. The use and operation of the WaterSnake will be similar for other models, but the on-screen displays may differ somewhat.)

In this first screenshot, shown above, the WaterSnake cable is currently dry. With the LD-300 in “supervised mode”, both relays are energized; and with the Normally Open (**NO**) contact pairs connected to the analog inputs, both inputs are showing “0” because the **NO** contact pairs are closed and pulling both inputs down to GND, or 0Vdc. Now let's see what happens when water comes in contact with the sensing cable.

Here, the WaterSnake has detected liquid in contact with the sensing cable, causing the Leak Detect relay to de-energize and open the contacts. The reading at the analog input connected to the Leak Detect relay contacts has risen to “99”. (Note that depending on the amount of water and the length of the sensing cable, it may take a minute for the device to pick up the presence of water on the cable.)

At this point, you may be wondering: why does an open circuit 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. The analog input reads “99” on an open circuit due to the presence of a weak pull-up resistor which supplies loop current for dry-contacts connected to the Analog Input terminal; thanks to this pull-up resistor, an open circuit will tend to float up to +5Vdc – and since the Clymit ETD 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”.) Conversely, a closed circuit “shorts” the input down to 0V, since the C (“common”) terminals on the Analog Input terminal block are at 0V, causing a reading of “0” on the Clymit ETD display.

Now, let's see what happens if we physically disconnect the orange Leak Detection Cable from the Control Box, simulating a cable break.

Here, the WaterSnake has detected that the cable is no longer connected, causing the Cable Fault relay to de-energize and open the contacts. The reading at the analog input connected to the Cable Fault relay contacts has risen to “99”. (Note that if you conduct this test yourself, it may take a minute for the device to pick up on the cable break.)

Finally, we'll disconnect power from the Control Box. This causes both the Leak Detect and Cable Fault relays to de-energize and open their contact pairs, causing the reading at both analog inputs to rise to “99”. This would cause simultaneous “Leak” and “Cable Fault” alarm notifications to be sent (assuming, of course, that the appropriate alarm thresholds were set on the *Alarms* page), which is obviously an impossible condition and would alert the operator to a power loss or a malfunction of the LD-300 Control Box.

The previous examples assume, as mentioned previously, that you have individually connected the Leak and Fault relays to separate inputs on the Clymit ETD and that the Control Box is operating in “supervised” mode. If you have used one of the single-input methods illustrated previously in order to have both Leak and Fault share a single input, the behavior will be different:

¶ ***Relays in NON-Supervised Mode, shared Leak/Fault signals on a single input, NO contact pairs in parallel:***

With the **NO** (Normally Open) contact pairs connected in parallel and the Control Box operating in its “non-supervised” mode, the associated Analog Input will read “99” when conditions are normal, since both relays will be in their de-energized states and both relay contact pairs will be open circuits. Either a Leak Detect or a Cable Fault condition will cause its associated relay to energize and its **NO** contact pair to close, causing the reading to drop to “0”. A loss of power at the Control Box will not be detected, since the relays are already de-energized.

¶ ***Relays in SUPervised Mode, shared Leak/Fault signals on a single input, NO contact pairs in series:***

With the **NO** (Normally Open) contact pairs connected in series and the Control Box operating in its “supervised” mode, the associated Analog Input will read “0” when conditions are normal, since both relays will be in their energized states and the circuit will be closed. Either a Leak Detect or a Cable Fault condition will cause its associated relay to de-energize and its **NO** contact pair to open, causing the reading to rise to “99”. A loss of power will also de-energize the relays and cause the reading to rise to “99”.

Y Alarm-threshold settings when connected directly to the Analog Inputs:

If you are using a Series-II unit:

To set up alarm threshold to alert you if the WaterSnake signals a leak detection or a cable-fault, simply go to the **Alarms** page, click the *Add New Alarm* button under the Goose's internal-sensors block, choose the Analog Input to which the **Leak** relay is connected, set *trips if:* to **Above** and threshold to **50**; then, select 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*.

Then, repeat this process for the input which the **Cable Fault** relay is connected to, using the same *trips if:* and threshold settings.

In the example shown here, the two Analog Inputs in question have already been renamed via the **Display** page, to make it easier to distinguish between them. If you are in doubt on how to do this, consult the user guide for your particular model of climate monitor for further assistance.

If you are using one of the single-input methods, then you only need to set one alarm threshold:

Y ***Relays in NON-Supervised Mode, shared Leak/Fault signals on a single input, NO contact pairs in parallel:***

since the relay contact action is reversed in this configuration, set the alarm type to **Low Trip**, and the threshold to **50**

Y ***Relays in SUPervised Mode, shared Leak/Fault signals on a single input, NO contact pairs in series:***

since the relay contact action in this configuration is the same as the two-input method, set the alarm type to **High Trip**, and the threshold to **50**

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 device's behavior is the same as for Series-II, but the method of setting alarm thresholds is somewhat different.

Find the sensor block on the *Alarms* page for the Goose unit's internal sensors, then set the *Low Trip* threshold to **-10** and the *High Trip* threshold to **50**, as shown here, for both of the inputs to which the WaterSnake relays are connected to; then, set both inputs' associated *Alarm States* to the action(s) you wish to occur when the trip thresholds are exceeded and click *Save Changes*. (The inputs being used are highlighted here, for example purposes.) Since the Analog inputs cannot go lower than 0, this will effectively disable their Low Trip events, which are not needed in this application.

If you are using one of the single-input methods, then you only need to set one alarm threshold:

Y *Relays in NON-Supervised Mode, shared Leak/Fault signals on a single input, NO contact pairs in parallel:*

since the relay contact action is reversed in this configuration, set the **Low Trip** threshold to **50** and the **High Trip** threshold to **110** (this will effectively disable the High Trip event, which is not needed in this application)

Y *Relays in SUPervised Mode, shared Leak/Fault signals on a single input, NO contact pairs in series:*

since the relay contact action in this configuration is the same as the two-input method, set the **Low Trip** threshold to **-10** and the **High Trip** threshold to **50**

Using the WaterSnake via CCAT-DIGITAL analog-to-digital bus interface modules:



Y Connecting the WaterSnake to the CCAT modules:

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 WaterSnake using some appropriately-programmed CCAT analog-to-digital bus interface modules, available from IT Watchdogs. The following diagrams show how to hook up and use a WaterSnake in combination with either one or two CCAT interface modules.

Your WaterSnake kit should have come with a 50-foot length of 4-conductor alarm wire, similar to the one shown here. Note: Be careful not to confuse this wire with the 15-foot Leader Cable! They may look very similar, right down to the colors of the four individual wires inside the white outer sheath. The alarm wire used to connect the Control Box's relay outputs to the monitoring unit can be distinguished from the Leader Cable by its longer length, and by the lack of a 4-pin twist-lock socket at the end. As mentioned previously in the section on direct Analog Input connections, the hookup wires will need to be stripped, as the terminals on the CCATs 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 terminal-screw style of connector used on the CCAT.



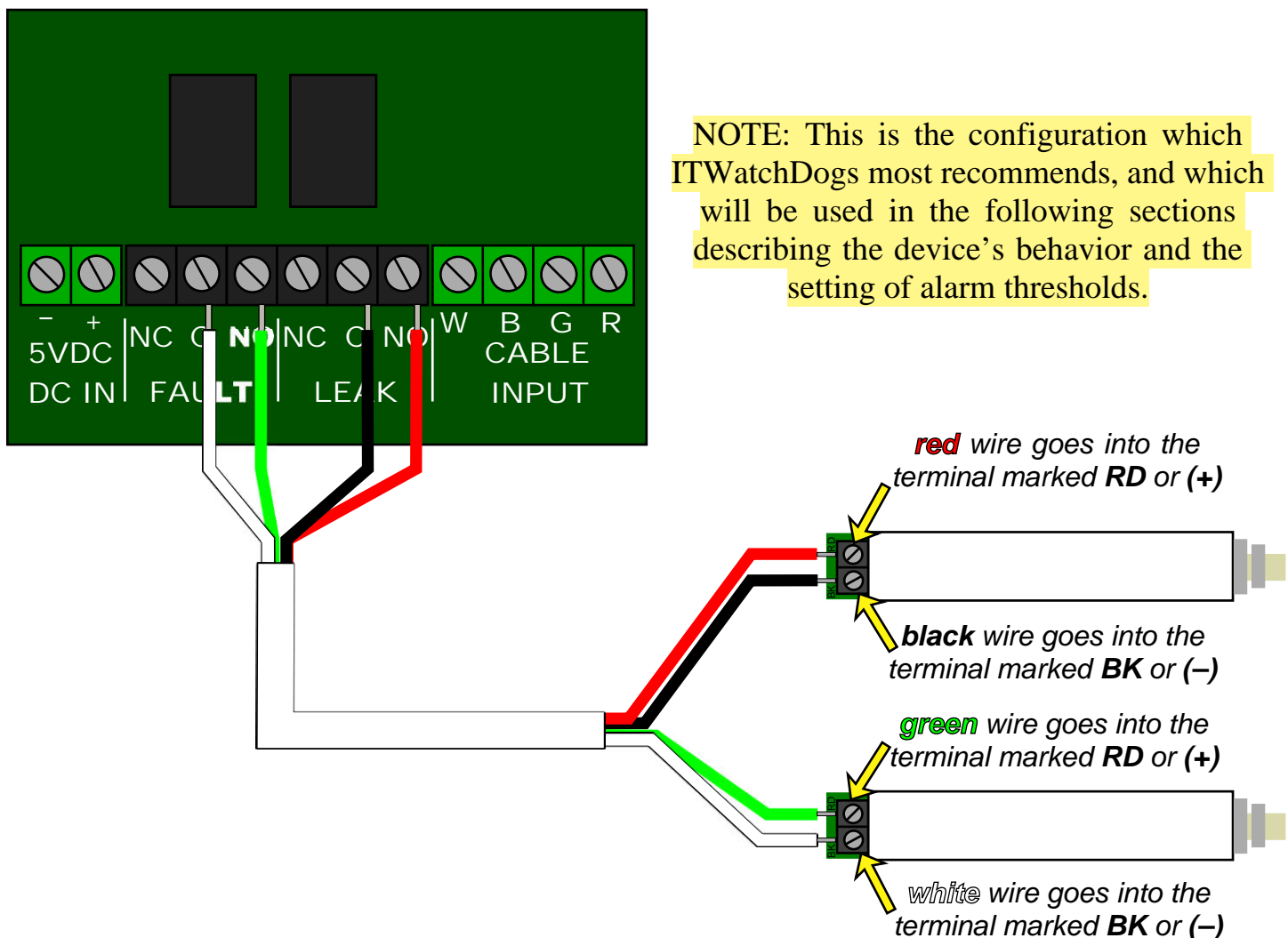
Relays in SUPervised Mode, individual Leak/Fault signals via 2 CCAT devices:

Here, the Relay Configuration jumper is placed on the **SUP**ervised setting, meaning that the relays will be held in their energized state as long as the LD300 Control Box has power and that the **NO** (Normally Open) contact pair will be held closed until an alarm event occurs, at which point the appropriate relay will de-energize and its contact pair will open. (If power is lost, then both relays will de-energize and open.)

In this configuration, a pair of CCAT-DIGITAL modules are required. Before connecting the LD-300 Control Box to the CCATs, it is strongly recommended that you connect only one of the CCATs to the Clymit ETD unit, wait for it to appear in the **Sensors** page, go to the **Display** page and re-name it appropriately, then make some kind of marking on that CCAT's sensor cable or the plastic tube containing the circuit board before connecting the second CCAT. **(IMPORTANT NOTE: if your CCAT does not initially display as "Digital Sensor", do not proceed further until you have contacted ITWatchDogs technical support for assistance, as your CCAT is not correctly programmed for this application and will not display the relays' status properly!)**

In the sensor-behavior and alarm-settings examples which follow, the CCAT-WATER connected to the Leak relay will be named "WaterSnake Leak", and the one connected to the Fault relay will be named "WaterSnake Fault". However, these names are arbitrary; you can choose your own naming scheme as you see fit when you install the WaterSnake in your facility, as long as it helps you distinguish between the two CCAT devices and their associated relay signals.

(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.)



¶ Relays in NON-Supervised Mode, shared Leak/Fault signals on a single input:

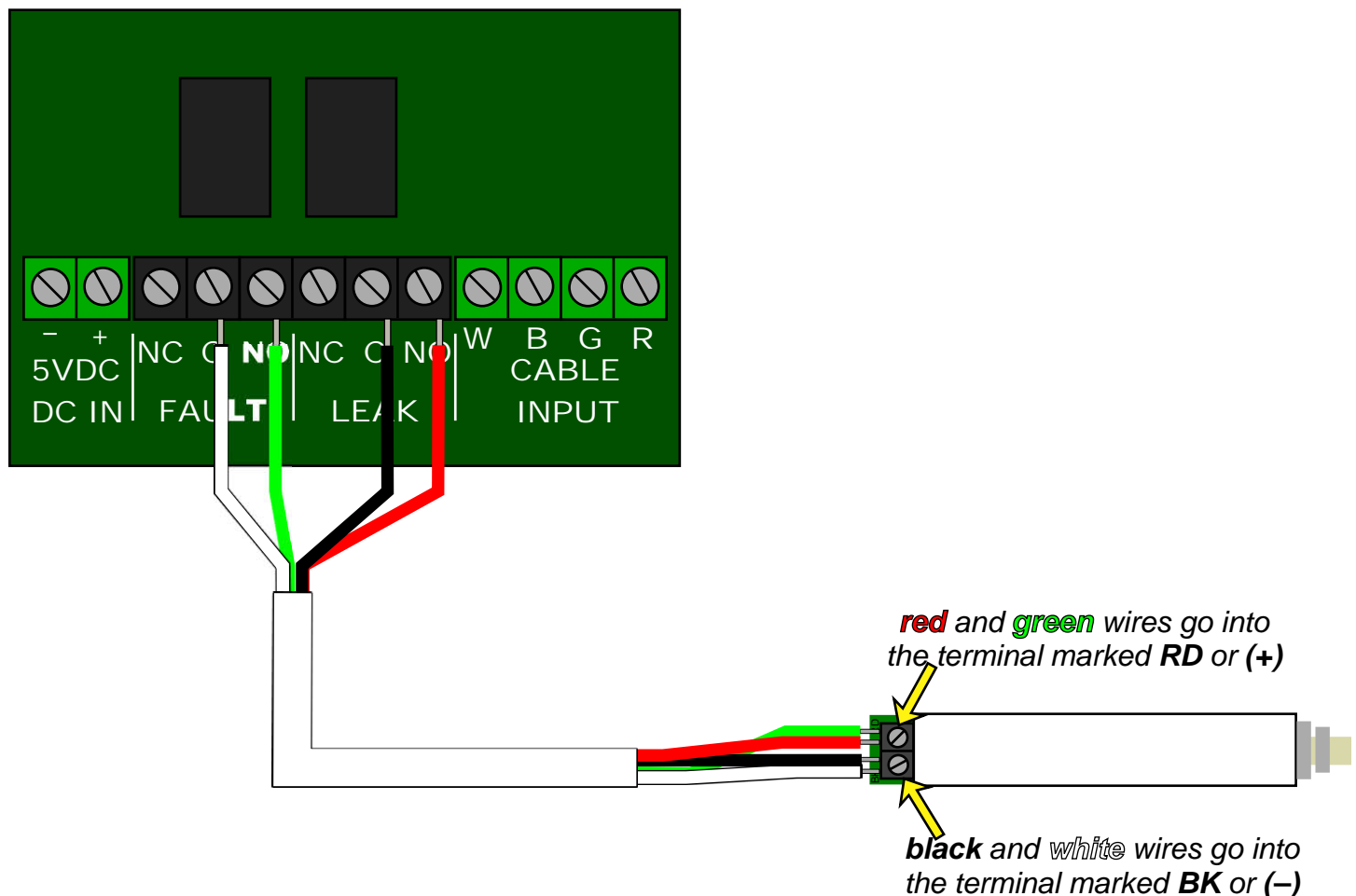
In this configuration, the Relay Configuration jumper is on the NON-Supervised setting, meaning that the relays will stay in their de-energized state, and their **NO** (Normally Open) contact pairs will be open, until an alarm event occurs, at which point the associated relay will energize and the **NO** contact pair will close. Since the relay contacts are connected in parallel, either relay can cause the reading at the CCAT to change.

The downsides to this configuration are that (1) you will not be able to tell, from the alarm message sent by the Clymit ETD alone, whether the alert is due to water detection or a cable fault; and (2), you will not receive any alarm messages if the WaterSnake loses power. To determine the exact cause of the alert, someone will have to physically visit the site to investigate.

Keep in mind that if you use this configuration, the actions seen by the Clymit ETD will be the opposite of those which will be described in the following sections on sensor behavior and alarm settings; i.e. an open circuit will indicate “no alarm”, while a closed circuit will indicate an alarm state. Due to the way the CCAT-DIGITAL interprets the voltages at the input terminal and the presence of a weak pull-up resistor to supply loop current to dry-contact switches, this means that the “ON” and “OFF” status messages will be the reverse of the true state of the WaterSnake relays; i.e. “ON” would indicate normal conditions, while “OFF” indicates an alarm state.

(IMPORTANT NOTE: if your CCAT does not initially display as “Digital Sensor”, do not proceed further until you have contacted ITWatchDogs technical support for assistance, as your CCAT is not correctly programmed for this application and will not display the relays’ status properly!)

(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.)



Y Relays in SUPervised Mode, shared Leak/Fault signals on a single input:

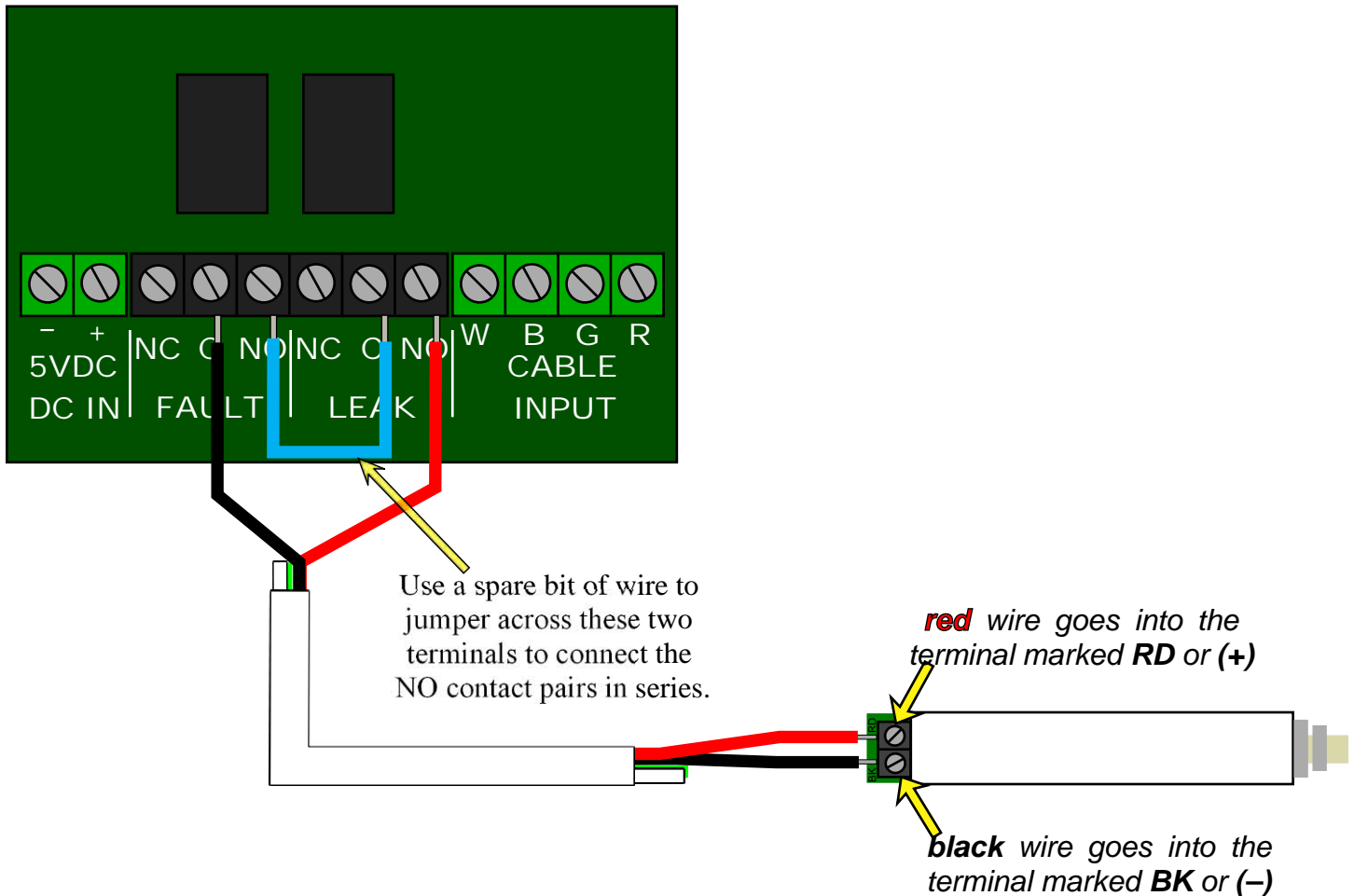
In this configuration, the Relay Configuration jumper is again on the **SUP**ervised setting – but this time, the NO (Normally Open) pairs have been wired together in series, such that the circuit will remain closed as long as the LD300 Control Box has power and conditions are normal. If an alarm event occurs, causing one of the relays to de-energize, or if a power loss causes both relays to de-energize, the circuit will open.

This configuration, like the previous shared-single-input method, has the same disadvantage (compared to the two-CCAT method) that you will not be able to tell, just from the alarm message sent by the Clymit ETD, exactly which condition caused the alert. However, unlike the previous configuration, wiring the relay contacts this way will also trip an alarm on the Clymit ETD if the WaterSnake loses power.

This configuration also has the advantage that its behavior will be essentially the same as the two-CCAT method; namely that a closed circuit indicates normal conditions, while an open circuit indicates an alarm state. For this reason, if you wish to use the shared-single-CCAT method, ITWatchDogs would recommend this configuration over the previous shared-input-Non-Supervised method.

(IMPORTANT NOTE: if your CCAT does not initially display as “Digital Sensor”, do not proceed further until you have contacted ITWatchDogs technical support for assistance, as your CCAT is not correctly programmed for this application and will not display the relays’ status properly!)

(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.)



Y Sensor operation and behavior when connected via CCAT-DIGITALs:

Once you've successfully connected the WaterSnake LD-300 Control Box to your Clymit ETD, the internal-sensors display block of the **Sensors** page will look something like this.

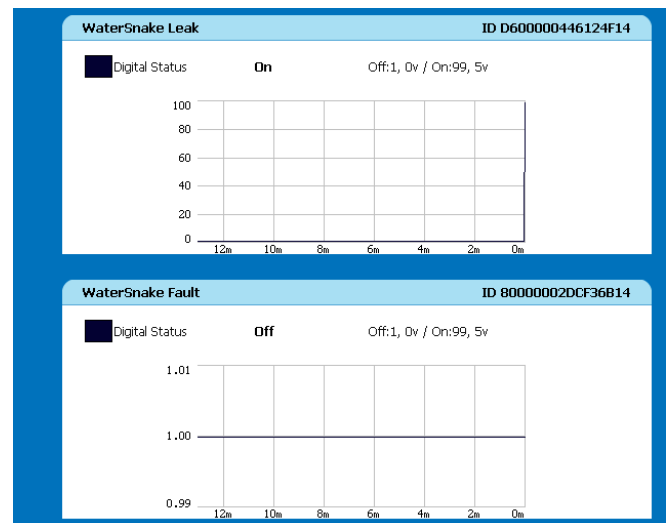
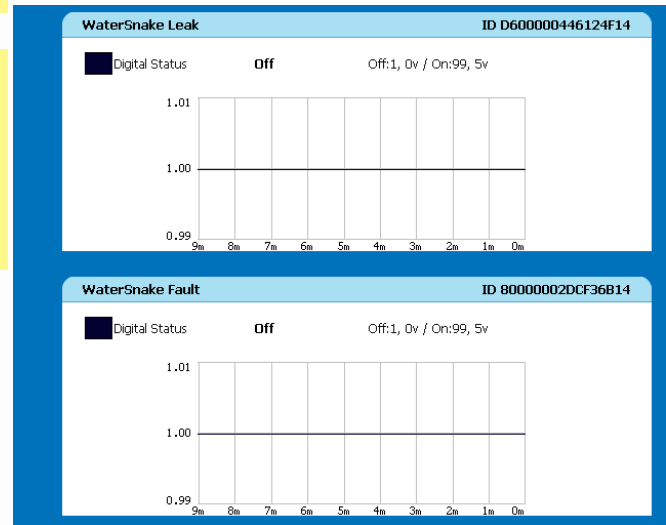
(NOTE: for purposes of the following examples, the WaterSnake has been connected via a pair of CCAT-DIGITALs to a Clymit 300 running firmware release v3.3.3. For clarity, the two CCATs have been renamed (via the **Display** page) to indicate which relay is which, as suggested in the previous section on physical hookups. The use and operation of the WaterSnake will be similar for other models, but the on-screen displays may differ somewhat depending on the model and firmware revision.)

In this first screenshot, shown above, the WaterSnake cable is currently dry. With the LD-300 in “supervised mode”, both relays are energized; and with the Normally Open (**NO**) contact pairs connected to the analog inputs, both inputs are showing “**OFF**” (corresponding to a numeric reading of “**0**” on the graph) because the **NO** contact pairs are closed and pulling both inputs down to GND, or 0Vdc.

Now let's see what happens when water comes in contact with the sensing cable.

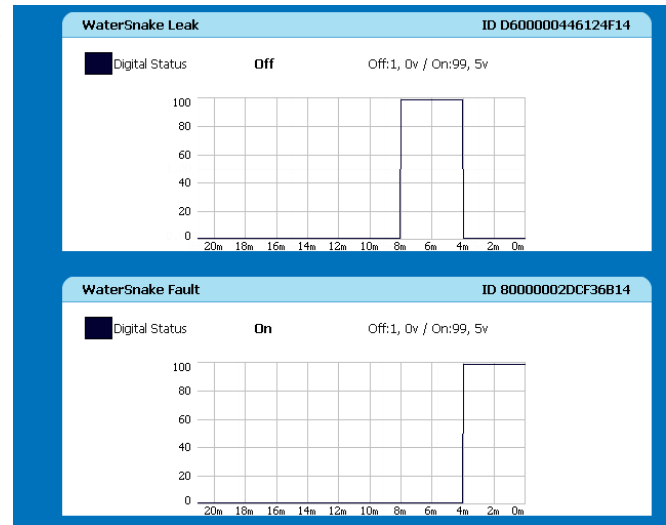
Here, the WaterSnake has detected liquid in contact with the sensing cable, causing the Leak Detect relay to de-energize and open the contacts. The reading at the CCAT-DIGITAL connected to the Leak Detect relay (named, appropriately enough, “WaterSnake Leak”) has changed to “**ON**”, corresponding to a numeric reading of “**99**” on the graph. (Note that depending on the amount of water and the length of the sensing cable, it may take a minute for the device to pick up the presence of water on the cable.)

At this point, you may be wondering: why does an open circuit show “**ON**”, instead of “**OFF**” 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. The presence of a weak pull-up resistor, which supplies loop current for dry-contacts connected to the Analog Input terminal, causes an open circuit will tend to float up to +5Vdc, which is interpreted as “**ON**” by the Clymit ETD firmware. Conversely, a closed circuit “shorts” the input down to 0V, which is interpreted as “**OFF**” on the Clymit display. This behavior may seem counterintuitive at first, but in the case of the WaterSnake it actually works to our advantage since the use of the **NO** relay contact pairs in “supervised” mode does, in fact, result in a closed circuit signifying “alarm off”, while an open circuit indicates “alarm on.”

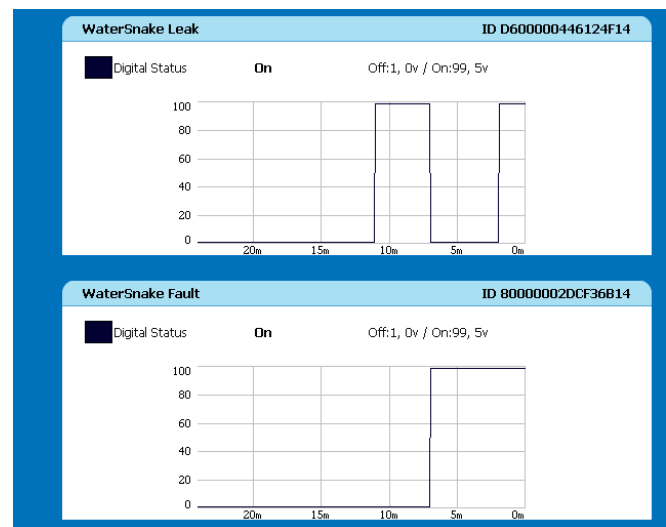


Now, let's see what happens if we physically disconnect the orange Leak Detection Cable from the Control Box, simulating a cable break.

Here, the WaterSnake has detected that the cable is no longer connected, causing the Cable Fault relay to de-energize and open the contacts. The reading at the CCAT-DIGITAL connected to the Cable Fault relay (named, appropriately enough, "WaterSnake Fault") has changed to "ON", corresponding to a numeric reading of "99" on the graph. (Note that if you conduct this test yourself, it may take a minute for the device to pick up on the cable break.)



Finally, we'll disconnect power from the Control Box. This causes both the Leak Detect and Cable Fault relays to de-energize and open their contact pairs, causing the reading at both CCATS to have changed to "ON", corresponding to a numeric reading of "99" on the graph. This would cause simultaneous "Leak" and "Cable Fault" alarm notifications to be sent (assuming, of course, that the appropriate alarm thresholds were set on the *Alarms* page), which is obviously an impossible condition and would alert the operator to a power loss or a malfunction of the LD-300 Control Box.



The previous examples assume, as mentioned previously, that you have individually connected the Leak and Fault relays to separate CCATs and that the Control Box is operating in "supervised" mode. If you have used one of the single-CCAT methods illustrated previously in order to have both Leak and Fault share a single input, the behavior will be different:

Relays in NON-Supervised Mode, shared Leak/Fault signals on a single CCAT, NO contact pairs in parallel:

With the NO (Normally Open) contact pairs connected in parallel and the Control Box operating in its "non-supervised" mode, the CCAT-DIGITAL will read "ON" ("99") when conditions are normal, since both relays will be in their de-energized states and both relay contact pairs will be open circuits. Either a Leak Detect or a Cable Fault condition will cause its associated relay to energize and its NO contact pair to close, causing the reading to drop to "OFF" ("0"). A loss of power at the Control Box will not be detected, since the relays are already de-energized.

Relays in SUPervised Mode, shared Leak/Fault signals on a single CCAT, NO contact pairs in series:

With the NO (Normally Open) contact pairs connected in series and the Control Box operating in its "supervised" mode, the CCAT-DIGITAL will read "OFF" ("0") when conditions are normal, since both relays will be in their energized states and the circuit will be closed. Either a Leak Detect or a Cable Fault condition will cause its associated relay to de-energize and its NO contact pair to open, causing the reading to rise to "ON" ("99"). A loss of power will also de-energize the relays and cause the reading to rise to "ON" ("99").

Y Alarm-threshold settings when connected via CCATs:

If you are using a Series-II unit:

To set up alarm threshold to alert you if the WaterSnake signals a leak detection or a cable-fault, simply go to the **Alarms** page, and find the sensor block for the CCAT-DIGITAL connected to the Leak relay, click the **Add New Alarm** button, set *trips if:* to **Above** and threshold to 50; then, select 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**.

Then, find the sensor block for the CCAT-DIGITAL connected to the Fault relay and repeat this process, using the same *trips if:* and threshold settings. (Note that you cannot set both alarms in the same operation, since the **Add New Alarm** and **Save Changes** buttons in each sensor block operate independently of the other block(s) on the **Alarms** page.)

In the example shown here, the two CCATs in question have already been renamed via the **Display** page, to make it easier to distinguish between them. If you are in doubt on how to do this, consult the user guide for your particular model of Clymit ETD monitor for further assistance.

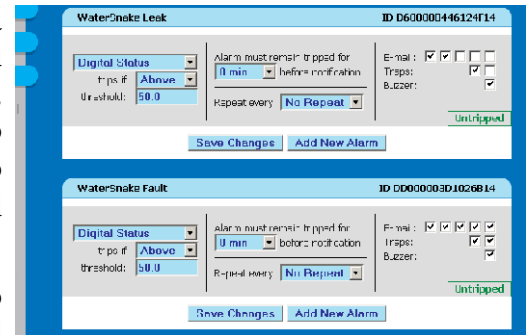
If you are using one of the single-CCAT methods, then you only need to set one alarm threshold:

Y *Relays in NON-Supervised Mode, shared Leak/Fault signals on a single CCAT, NO contact pairs in parallel:*

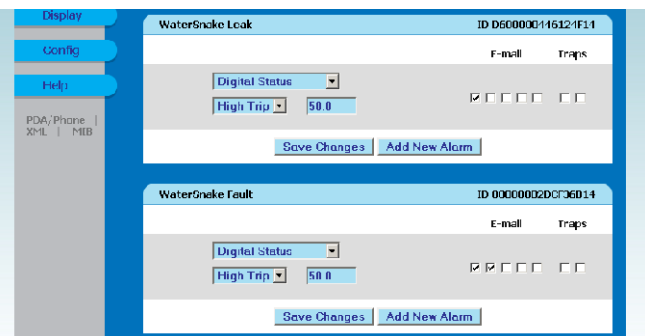
since the relay contact action is reversed in this configuration, set the alarm type to **Low Trip**, and the threshold to 50

Y *Relays in SUPervised Mode, shared Leak/Fault signals on a single CCAT, NO contact pairs in series:*

since the relay contact action in this configuration is the same as the two-CCAT method, set the alarm type to **High Trip**, and the threshold to 50



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 device's behavior is the same as for Series-II, but the method of setting alarm thresholds is somewhat different.

Find the sensor block on the *Alarms* page for the CCAT-DIGITAL connected to the **Leak** relay, set the *Low Trip* threshold to

| WaterSnake Leak | | | | | ID 80000002DCF36814 |
|-----------------|---------|----------------------------------|---------------------------------|---------------------------------------|---------------------|
| Sensor | Current | Low Trip | High Trip | Alarm State | |
| Digital Status | 1 | <input type="text" value="-10"/> | <input type="text" value="50"/> | <input type="text" value="Disabled"/> | |

| WaterSnake Fault | | | | | ID D6000000446124F14 |
|------------------|---------|----------------------------------|---------------------------------|---------------------------------------|----------------------|
| Sensor | Current | Low Trip | High Trip | Alarm State | |
| Digital Status | 1 | <input type="text" value="-10"/> | <input type="text" value="50"/> | <input type="text" value="Disabled"/> | |

-10 and the *High Trip* threshold to 50, as shown here, then set the associated *Alarm State* to the action(s) you wish to occur when the trip thresholds are exceeded. Do the same for the CCAT-DIGITAL connected to the **Fault** relay, then click *Save Changes*. (Unlike a series-II unit, the *Save Changes* button acts globally for all of the alarm settings on the page. Since the CCAT-DIGITAL readings cannot go lower than 0, this will effectively disable their Low Trip events, which are not needed in this application.

In the example shown here, the two CCATs in question have already been renamed via the *Display* page, to make it easier to distinguish between them. If you are in doubt on how to do this, consult the user guide for your particular model of Clymit ETD monitor for further assistance.

If you are using one of the single-CCAT methods, then you only need to set one alarm threshold:

Ÿ *Relays in NON-Supervised Mode, shared Leak/Fault signals on a single CCAT, NO contact pairs in parallel:*

since the relay contact action is reversed in this configuration, set the **Low Trip** threshold to 50 and the **High Trip** threshold to 110 (this will effectively disable the High Trip event, which is not needed in this application)

Ÿ *Relays in SUPervised Mode, shared Leak/Fault signals on a single CCAT, NO contact pairs in series:*

since the relay contact action in this configuration is the same as the two-CCAT method, set the **Low Trip** threshold to -10 and the **High Trip** threshold to 50