

Residential Installation Guide



IMPORTANT:

Critical notes to installing the Leak Defense System are highlighted in shaded boxes, such as this box, throughout the document.

It is essential these critical notes are read prior to installation.

INSTALLER:

Please leave this guide with the homeowner when installation is complete.



Planning & System Preparation Page

Step 1: Tools and supplies needed	4
Step 2: Evaluate plumbing system	5
Step 3: Determining the valve location for the Leak Defense System.....	6
Step 4: Locate an electrical outlet for the valve	7
Step 5: Determine control panel location	7
Figure 1: Piping Diagram	8

Leak Defense System Valve Installation

Step 6: Prepare the Leak Defense System for installation.....	9
Step 7: Make a space to accommodate valve installation	9
Step 8: Install Leak Defense System valve.....	10

Control Panel Installation

Step 9: Install the control panel wire	11
Step 10: Mount the control panel.....	12
Figure 2: Wiring diagram.....	14

Power Supply Installation Page

Step 11: Install power supply wire.....	15
Step 12: Power the system	15

Leak Defense System Checks & Programming

Step 13: Confirm control panel water shut-off feature.....	16
Step 14: Setting ZERO FLOW and full flow (SPAN).....	17
Step 15: Verify and set automatic shut-off features	18
Step 16: Connecting the Leak Defense System to an alarm system (optional)	20

Customer Education

Step 17: Review Leak Defense System operation with owner	21
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Warranty

Leak Defense System Limited Warranty	22
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STEP 1: Tools and supplies needed

- a. Pipe cutting, soldering equipment and supplies

- b. A spool of shielded four conductor, 22 gauge alarm or thermostat cable, outside diameter of no more than .160". Sentinel Hydrosolutions recommends General Cable #E2004S.30.10 shielded riser sound and security cable with outside diameter of .146" This cable is available at www.digikey.com. Enter part number E2004S-1000-ND in the search field.

- c. Tape measure

- d. Pipe marking pen

- e. #2 Phillips screw driver

- f. Jeweler's or small electrician's screwdriver (less than 3/32" flat blade)

- g. Insulated low voltage wire staples/staple gun or hammer

- h. 1/4" Twist drill bit and drill motor (diameter of no more than .160")

- i. 2 ea. - #6 drywall anchors and screws

- j. Fish Tape

- k. 3/16" Stucco Drill Bit

- l. Spade Terminals for #22 wire

- m. Wire Stripping Tool for #22 wire

- n. Flashlight

STEP 2: Evaluate plumbing system

Before beginning installation, you should first determine the overall condition of the existing plumbing system.

- a. Ensure all plumbing outlets in the home are completely closed.
- b. Attach a water pressure gauge to a hose bib or similar faucet downstream of the utility water meter, primary shut-off valve and pressure regulator.
- c. Fully open the hose bib or faucet and record the “active” water pressure as indicated.
- d. If equipped with a pressure regulator, set pressure to optimum level of 62 psi to maximize usable pressure and minimize leakage.

Determine static water pressure

- a. Record the initial “static” water pressure by closing the primary shut-off valve. (Note: The valve at the water meter can be used if the primary shut-off valve cannot be located or is otherwise inaccessible.)
- b. Allow the system to rest for 15 minutes prior to recording the “static” water pressure.

Note: Prior to beginning the Leak Defense System installation process, inform the homeowner that it will be necessary for the water to be off for at least 1 hour.

Important: The residence should be considered leak free with a pressure loss of less than 1 psi. For pressure loss greater than 1 psi, follow the leak diagnosis procedures on the following page.

Planning & System Preparation

Leak diagnosis procedures

- a. Close the supply valves to all fixtures, appliances and equipment, such as toilets, faucets, dishwashers, ice makers, etc. The most likely pressure change will occur from the water heater firing if it is not isolated prior to performing the pressure tests.
- b. Open the primary shut-off valve and recharge system to the original active water pressure.
- c. Repeat the “static” pressure test. The pressure loss should now be less than 1 psi.
If the pressure loss is still greater than 1 psi, this indicates a leak in at least one of the supply valves or a leak in the piping system, or that a water using appliance came on unexpectedly.

STEP 3: Determining the valve location for the Leak Defense System

The Leak Defense System valve must be installed on the main water line and downstream of the primary shut-off valve, pressure regulator, irrigation line and fire sprinkler line. (See Figure 1 on page 8.)

Typical location of the Leak Defense System valve installation will be in a garage, basement or crawl space. If the home is on a concrete slab, the valve can be installed in the garage or outside before the piping enters the structure. In the latter case, the valve should be located at least 6” above grade.

Critical: Any leaks discovered must be brought to the attention of the homeowner/customer prior to installing the Leak Defense System.

Note: If there is a fire sprinkler and/or irrigation system that branches off the building supply downstream of the utility meter, the Leak Defense System valve must be installed on the building supply downstream of the fire sprinkler, and if possible, irrigation supply branch. In no instance may the Leak Defense System be installed in a way that it will interfere with the fire sprinkler system.

Important: The valve cannot be installed where it may be submerged or exposed to freezing conditions!

Other important considerations include:

- a. Install the valve in an accessible location allowing easy access for proper installation and maintenance. It will be necessary to allow ample space for the removal of the motor box cover for wiring connections inside later in the installation process. The valve also has a manual override handle which should remain accessible.
- b. Some water utilities require the valve be a minimum of 18" downstream of the water utility meter.
- c. If possible, install the valve downstream of a manual shut-off valve to allow for easier maintenance.

STEP 4: Locate an electrical outlet for the valve

- a. Locate an available 120 VAC outlet close to the valve into which the transformer can be plugged. Make sure this outlet is not connected to an on/off switch.
- b. The transformer should not be more than 200 feet from the valve. If necessary, have a new outlet installed by a licensed electrician.

Critical: The transformer must be located in a dry location.

STEP 5: Determine control panel location

- a. The control panel should be located near the most frequently used door of the home.
- b. Once a location is chosen, make sure you can easily run the control panel cable from the panel to the motor box before proceeding.
- c. The control panel must be located no further than 200 feet from the Leak Defense System valve.

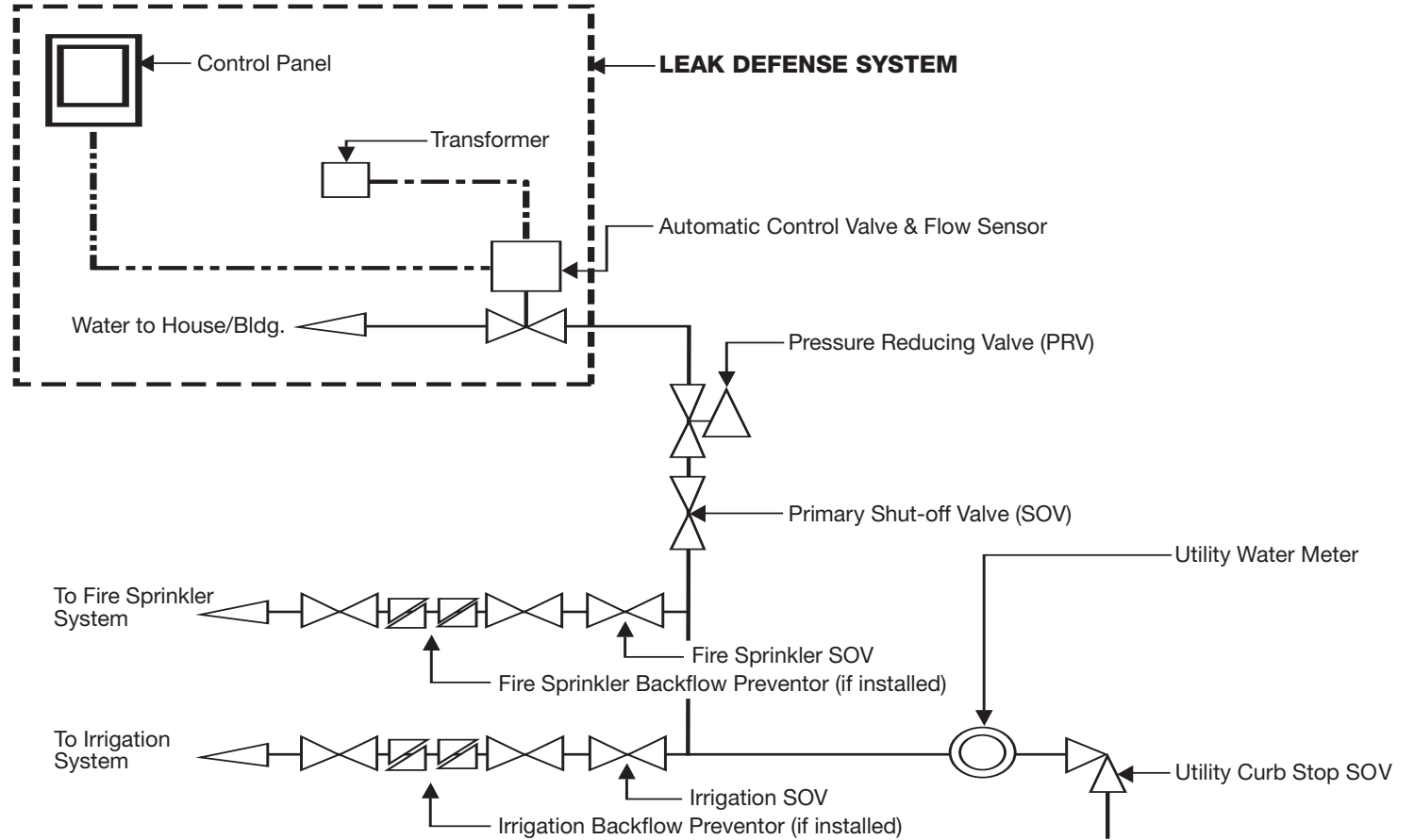
Note: The contrast on the control panel may be adjusted to make the panel easier to read in its chosen location. Once the control panel is powered up, use a small screwdriver to adjust it for optimum viewing. See wiring diagram on page 14 for location of the adjustment component.

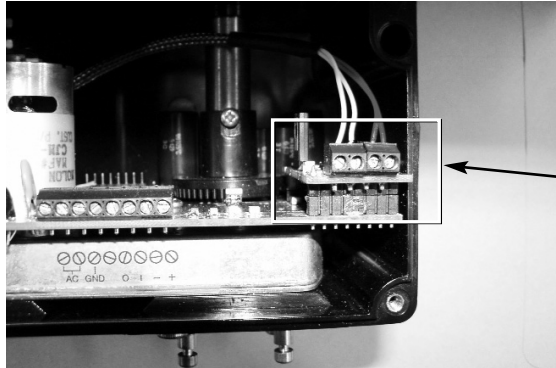
FIGURE 1:
Piping Diagram

SCHEMATIC LEGEND

Low Voltage Wire

—————
Pipe



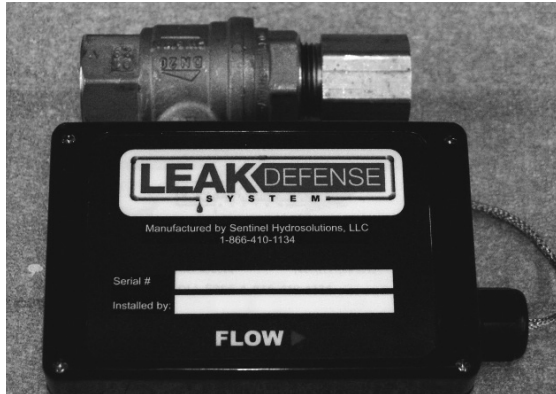


STEP 6: Prepare the Leak Defense System for installation

The Leak Defense System leaves the factory with the analog circuit board plugged into the motor control board. There is some risk that the board could come loose during shipping. Before installing the valve assembly on the incoming water line, inspect the unit to be sure the circuit board is still plugged in securely. This photo shows the proper seating.

STEP 7: Make a space in the existing pipe wide enough to accommodate the valve installation

The Leak Defense System requires a length of pipe be removed to accommodate the valve and allow adequate space for both the valve and connectors. The Leak Defense System valve can accept all common methods of pipe connections including unions, sweat adapters, threaded pipe or slip fittings (such as Shark Bite®).



Critical: If some form of sweat adapter is used, it is imperative that heat from the torch does not reach the valve body and flow probe as this may cause permanent damage to the Leak Defense System unit.

Leak Defense System Valve Installation

STEP 8: Install Leak Defense System valve

- a. The motor box is water-tight and moisture cannot escape once inside so *it is imperative that no water enter into the motor box*. Make sure the motor box lid is securely attached to prevent water from entering it before beginning installation.
- b. Once connected to the incoming pipe, rotate the valve on the pipe to make it easy to remove the cover to install the low voltage wiring. Also, make sure the valve has been installed with the water flowing in the correct direction according to the arrow on the unit.
- c. Install the Leak Defense System so the manual valve can be easily activated if necessary. (In difficult installations such as a crawl space, the Leak Defense System valve can be pre-wired before installation).
- d. Restore water supply.
- e. Check for leaks at the valve and probe.
- f. Only after you are certain that the system is leak-free should you remove the motor box cover for wiring.

Important: Bleed air slowly from the piping system to prevent damage to the Leak Defense System or to any other plumbing fixtures when water flow is restored.

STEP 9: Install the control panel wire

- a. The control panel wire must connect the Leak Defense System valve to the control panel.
- b. It may be run through an attic or through a crawl space.
- c. The wire at the control panel may be run straight into the wall or through a single gang electrical box and must extend at least 6 inches beyond the wall.
- d. Make certain you clip and secure the bare ground wire at the Panel end so it will not touch anything on the circuit board.

The wire at the valve should also have at least 6 inches of slack to allow for proper installation.

CAUTION: The control panel components are static electricity sensitive and may be damaged by a static discharge so use extreme caution when handling the unit and do not touch components on the circuit board.

Note: Only four conductor code approved 22-gauge copper cable meets Leak Defense System required specifications for control panel and power supply wiring. Leak Defense System recommends General Cable #E2004S shielded-riser sound & security cable. It has an outside diameter of .146" and thus will allow the cord grip to seal properly. It is available from www.digikey.com order #E2004S-1000-ND.

Control Panel Installation

STEP 10: Mount the control panel

Remove the control panel cover and place in a safe location. The housing of the control panel can either be attached to a single gang electrical box or directly to the wall. Attach the housing using one of the following options.

Option 1 – Mounting the control panel on a single gang electrical box

- 1) Pull the panel wire through the hole in the rear of the panel housing.
- 2) Line up the screw holes in the housing with the single gang box.

Option 2 – Mounting the control panel directly on a wall

- 1) Pull the panel wire through the hole in the rear of the panel housing.
- 2) Position the panel housing on the desired location against the wall.
- 3) Use a small level to make final adjustments to ensure the panel is level.
- 4) Use a pencil to mark the location of the mounting holes in the housing on the wall.
- 5) Mount the panel with #6 drywall anchors and screws. Use only the screw holes provided as screws placed in other locations will not allow the panel cover to close properly.

Note: Please wash your hands prior to handling and mounting the control panel cover to avoid getting it dirty.

Once the housing is mounted: (See Figure 2 on page 14)

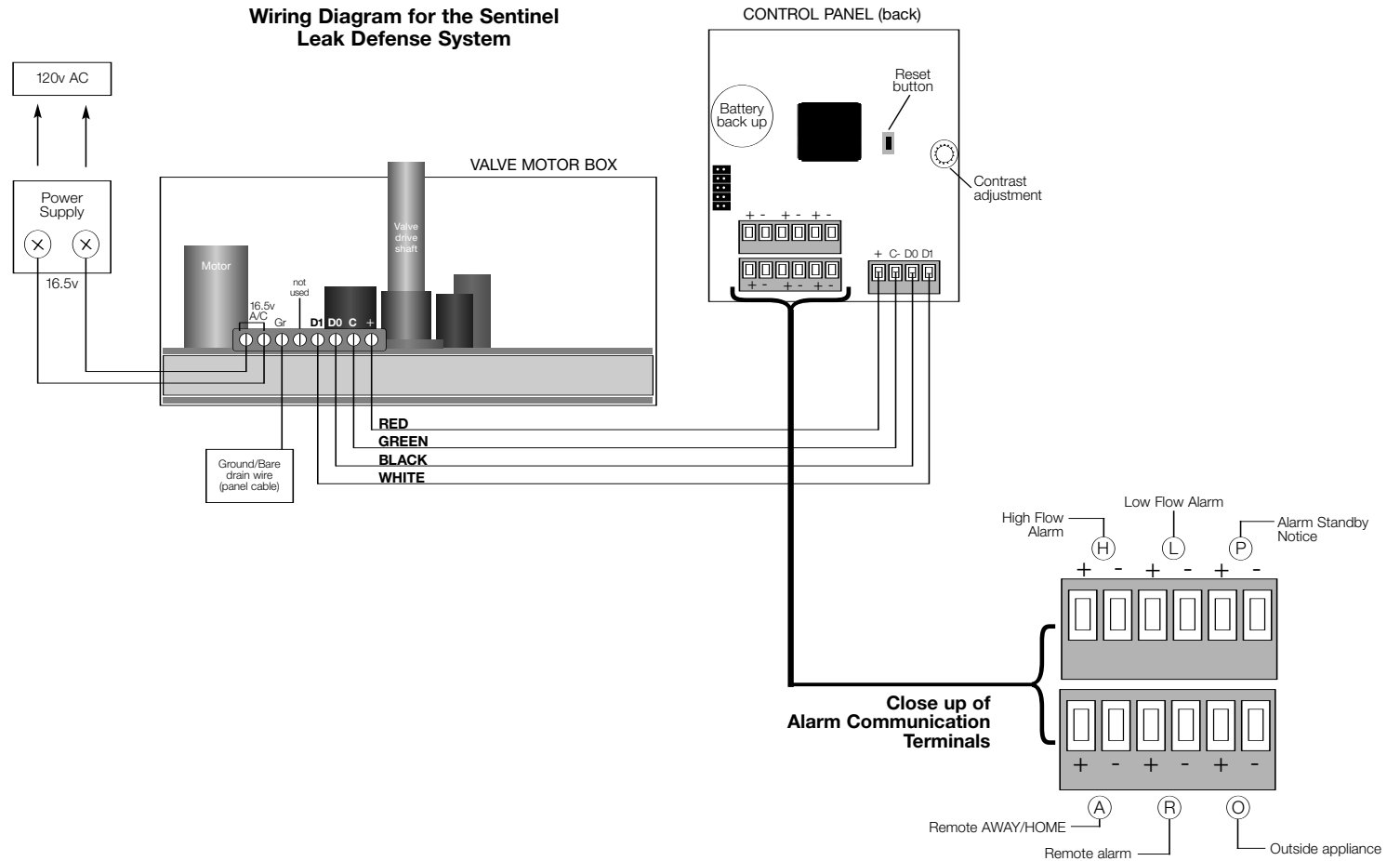
- a. Extend the panel wire through the hole in the rear of the panel housing.
- b. Strip back each wire 1/4".
- c. Important: Make note of the wire colors used so there are no mistakes connecting the other end of the wire at the valve box. We recommend Red to +, Green to C, Black to D0 & White to D1. Fold the remaining wire back into the wall and snap the panel to the rear housing.
- d. Cut the bare grounding wire off and wrap tape around the cable to prevent the ground wire from contacting the circuit board.

At the valve:

- e. Remove the front cover from the motor box located on the valve.
- f. Pull the panel wire through the watertight cord grip located on the side of the motor box,
- g. Strip the ends of the wire and, as before, connect them to the proper terminals located inside the motor box taking care that wire colors match the +, C-, D0 and D1 connection made at the panel.

Note: Connect the bare shield wire to the terminal marked GR.

FIGURE 2:
**Wiring Diagram
 for the Leak
 Defense System**



STEP 11: Install power supply wire

- Run the 22 gauge low voltage power wire from where the transformer power supply will be located to the motor box on the valve.
- Allow 6 inches of slack for proper installation of the wire.
- Attach the wire to the power supply terminals marked AC.
- Attach the wire to the terminals on the transformer using spade terminals.

STEP 12: Power the system

The last step is to provide power to the system

- Plug the transformer into the outlet that was located in Step 4. The green pilot light on the front of the transformer, the power light on the back of the control panel, and the power light inside the motor box should all be on and the system should now be operational.
- Tighten the cord grip to seal all three wires at the motor box.
- Align the motor box cover and secure it with the four screws.

Note: Power from the transformer is AC current, so polarity on the power wires is not important.

WARNING: The AC terminals are fused in the transformer. Make certain they do not short circuit or the transformer will be ruined.

Note: If the alarm continues to sound on first power up, the system may need to be reset. Follow this procedure on the control panel. Press **HOME** > **PROGRAM** > **SETTINGS** > **F2** and then press the “check list” icon to finish the reset process.

Leak Defense System Checks & Programming

STEP 13: Confirm control panel water shut-off feature

Once the unit is powered up, the system valve can be closed using the control panel.

- a. Begin with the control panel in the HOME mode (indicated by shading of the word on the panel.) If HOME is not shaded simply press HOME and the system will activate the HOME mode.
- b. From the HOME screen, press TURN OFF WATER button. On the next screen press TURN WATER OFF.
- c. Shortly after pressing TURN WATER OFF the panel will display WATER IS OFF.
- d. Turn on a faucet and check to see that the valve has closed. It may take several minutes for the water pressure to bleed down. If the control panel does not control the flow of water with the water off/water on command, check the communication and power lights on the back of the panel circuit board. The RX (receive) and TX (transmit) lights should be flashing in the motor box. If these lights are not flashing, or if the error light is on, you will need to recheck the positioning of the wires at the panel and then re-test the system as described in the above section.
- e. Turn water back on by pressing TURN WATER ON.

Note: Communications between the control panel and valve assembly may be re-established if necessary by pressing the RESET button on the back of the control panel. (Figure 2 on page 14)

STEP 14: Setting ZERO FLOW and full flow (SPAN)

The zero-flow function re-calibrates the Leak Defense System to a zero flow state to account for installation variables. The zero-flow setting closes the valve on the Leak Defense System to ensure there is truly no flow in the system. Follow the steps below to perform this last critical step in the installation process.

- a. Begin with the control panel in **HOME** mode indicated by the shading of the word on the panel. If HOME is not shaded simply press **HOME** and the system will activate the **HOME** mode.
- b. Press **PROGRAM** to forward you to the programming screen.
- c. At the programming screen, press **SETTINGS**, then **ZERO SPAN**.
- d. Turn on a faucet close to the control panel and adjust the water flow so that the CURR= value on the screen is between 300 and 400%.
- e. Press the **MAX FLOW** button.
- f. Turn the faucet off.
- g. Press the **MIN FLOW** button and wait for the value displayed in the CURR= value to settle to its lowest point. Press the **MIN FLOW** button a second time.
- h. Press the **END** button. The system is now calibrated to this installation.

Note: The ZERO/SPAN setting can also be used to fine tune the LDS in a number of ways. If a plumbing system is known to be leak free but the LDS bar graph is constantly moving up and down when no water is flowing, this “noise” can be filtered out by pressing the **MIN FLOW** button when the bar graph has bounced to a high point. Do NOT press **MIN FLOW** a second time to take a zero reading when the valve is closed. Simply press **END** and re-open the valve from the home screen. The **MAX FLOW** can also be used to tune the sensitivity of the system. If **MAX FLOW** is pressed while a very small flow is present at a faucet, then that very small flow will show up as 100% on the bar graph. This increases the system’s sensitivity to flow, making it possible for it to detect very small flows and potential leaks.

Leak Defense System Checks & Programming

STEP 15: Verify and set automatic shut-off features

Program the FLOW TO ALARM:

- a. While in the HOME mode, press PROGRAM.
- b. At the programming screen, press FLOW TO ALARM. The “Trip Point” must be set at or above the 1% point. If there is flow shown, determine if the flow is being caused by a true leak or by an automatic appliance such as a humidifier, ice maker, etc.
- c. Set the FLOW TO ALARM setting at least 1 point above the indicated flow to prevent unnecessary alarms, but below the flow level caused by water-using appliances.
- d. Press SELECT.

Program the HOME mode TIME TO ALARM:

- a. In the HOME mode, press PROGRAM.
- b. At the programming screen, press TIME TO ALARM.
- c. Press the up ↑ or down ↓ arrows to scroll time to alarm in 5 minute increments. Discuss the initial setting options with the homeowner and select an appropriate setting. Remind the homeowner that any time the water flow drops below the flow point the timer automatically resets.
- d. Press SELECT.
- e. Set the TIME TO ALARM above the longest expected water use period by the homeowner (i.e., washing machine, dishwasher cycle), or estimate the time and flow caused by a typical shower.

Program the AWAY mode TIME TO ALARM:

- a. At the HOME screen, press **AWAY** then **PROGRAM**.
- b. At the PROGRAM screen, press **TIME TO ALARM**.
- c. Using the up **↑** or down **↓** arrows, adjust the time to indicate 2 minutes. The homeowner may change this time period later if desired.
- d. Press **SELECT**. Return to the AWAY mode by pressing **EXIT** in the next screen. Follow the on screen instructions to reset the system.

Test the Leak Defense System Alarm

Open a faucet so the “Flow Rate Exceeded” lamp on the front of the control panel stays on. The system valve should shut off after the flow has exceeded the pre-set time limit and the screen should now show the ALARM mode.

Important: If the owner is informed of a leak and chooses not to have it corrected, it will be necessary to set the FLOW TO ALARM point above the residual flow of this leak. The homeowner must be informed of the possible consequences of this action.

Leak Defense System Checks & Programming

STEP 16: Connecting the Leak Defense System to an alarm system (OPTIONAL)

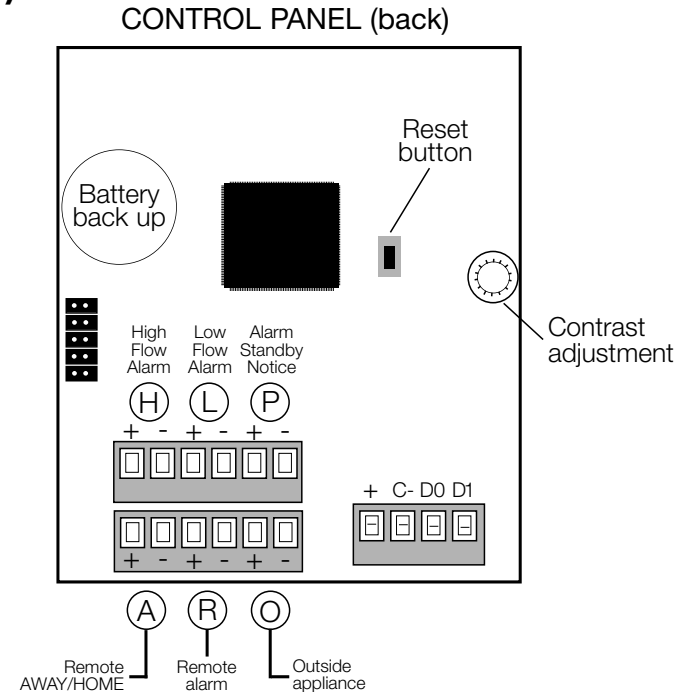
If the homeowner requests that the Leak Defense System be connected to an existing alarm system or a third party monitoring service, it is recommended that an alarm service technician make the connection between the Leak Defense System and the alarm panel. The alarm communication terminals are noted on the Leak Defense System wiring diagram on page 14.

Below is an overview of the terminals and their function.

- H — The “H” terminal will alert an alarm zone to an alarm that occurs with a flow half way between the trip point and 100%.
- L — The “L” terminal will alert an alarm zone any time an alarm occurs.
- P — The “P” terminal will alert an alarm zone any time the system is put in the “stand-by” mode.
- A — The “A” terminal can be connected to an alarm system to automatically switch the Leak Defense System into HOME or AWAY mode when the alarm is set to OCCUPIED or UNOCCUPIED.

Connecting the Leak Defense System to external sensors.

- R — If a point of leak detection system is available, it can be connected to the “R” terminal to send a signal to the Leak Defense System panel to warn of a leak at a remote location.
- O — If optional sensors are used to advise when an automatic appliance is in use, the signals from these sensors can be connected to the “O” terminal to notify the Leak Defense System that this flow is normal and is to be ignored.



STEP 17: Review Leak Defense System operation with the owner

Using the Owner's Manual table of contents as a guide:

- a. Explain the system and use the control panel to demonstrate the various Leak Defense System functions.
- b. Encourage the owner to physically interact with the control panel during your demonstration. This will promote a level of comfort and usability.
- c. Make sure the owner understands that in the **HOME** mode, the water will shut off automatically 1 minute after the alarm sounds if the system is not reset at the control panel or by temporarily halting all water flow.
- d. Stress that even though the Leak Defense System has a Turn Water Off feature, the original main plumbing system valve should be used any time **all** water flow to the home must be stopped, such as during plumbing work.
- e. **Clearly explain the purpose of the Leak Defense System is to detect and protect from leaks and not to locate the source of leaks.**

Note: Take the owner through an alarm scenario as part of the customer education and to test the alarm.

LEAK DEFENSE SYSTEM LIMITED WARRANTY page 1 of 2

Warranty Period:

The manufacturer warrants its products that are sold and installed in the United States to be free of defects in materials and workmanship under normal use and service for a period of two (2) years from the date of purchase by the end user.

Warranty Coverage:

The manufacturer's obligations shall be limited within the warranty period, at its option, to repair or replace the product or any part thereof.

In order for the warranty to apply, the Leak Defense System must be installed by a licensed plumber, licensed General Contractor or approved installer. The manufacturer shall not be responsible for dismantling and/or reinstallation charges.

FOR WARRANTY CLAIMS, CONTACT SENTINEL HYDROSOLUTIONS AT WWW.SENTINELHYDROSOLUTIONS.COM OR CALL 1.866.410.1134

Items Not Covered:

Neither the manufacturer nor the seller of the Leak Defense System shall be liable for any damage or loss whatsoever whether directly, indirectly, consequentially or otherwise, caused by the malfunction of the product.

The product is not designed to prevent leaks, but rather to identify possible leaks caused by a variance in water flow over time. The manufacturer shall not be responsible for damages including but not limited to, damages for loss of profits, goodwill use or other intangible losses (even if the manufacturer has been advised of the possibility of such damages) resulting from the failure of the Leak Defense System or associated equipment.

LEAK DEFENSE SYSTEM LIMITED WARRANTY page 2 of 2

The manufacturer does not represent that its product may not be compromised and/or circumvented, or that the product will prevent any flood or damage to property resulting from a water leak or otherwise that the product will, in all cases, provide adequate warning or protection.

User or owner EXPRESSLY UNDERSTANDS AND AGREES that neither the seller nor the manufacturer has control on the final use of this product, its good working condition and its reasonable maintenance and that consequently, a properly installed and maintained system may only reduce the risk of an event involving water damage in specific circumstances:

- Damage or operational deficiencies due to water quality issues such as sediment or scale accumulation.
- Replacement of house fuses or resetting of circuit breakers.
- Damage to the product caused by accident, fire, or acts of God.
- Damage caused after delivery.

The above is in lieu of all others warranties; guarantees, statements expressed or implied and the items listed are not intended to be all-inclusive but rather representative of items not covered. The warranty is limited to the express warranty set forth herein. No warranty whether express or implied shall apply beyond the limited warranty period outlined above. Some states do not allow limitations on whether an implied warranty applies or how long an implied warranty lasts, therefore the above limitation may not apply to you. To know what your legal remedies or rights might be, consult your local state consumer affairs office or your state's Attorney General.

The unfailing love of the Lord never ends! By His mercies we have been kept from complete destruction. Great is His faithfulness; His mercies begin afresh each day.

Lamentations 3:22-23



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