June 30th, 2023

Dr. Farid Golnaraghi
Professor
The School of Mechatronic Systems Engineering
Simon Fraser University
250 – 13450 102 Avenue
Surrey, BC V3T 0A3

Re: MSE 411 User Manual for Smart Water Leak Protector

Dear Dr. Golnaraghi:

The attached document is the User Manual for an innovative water leak protector system aiming to address the drawbacks of existing commercial products in water leak detection. The water leak protector system incorporates an inline shut-off valve, a single central integrated water flow sensor, IoT applications and AI algorithms. This document is intended to give an overview of the setup and operation of the smart water leak device.

Dr. Shen from the School of Mechatronic Systems Engineering at Simon Fraser University will provide guidance and technical insight during this system's development.

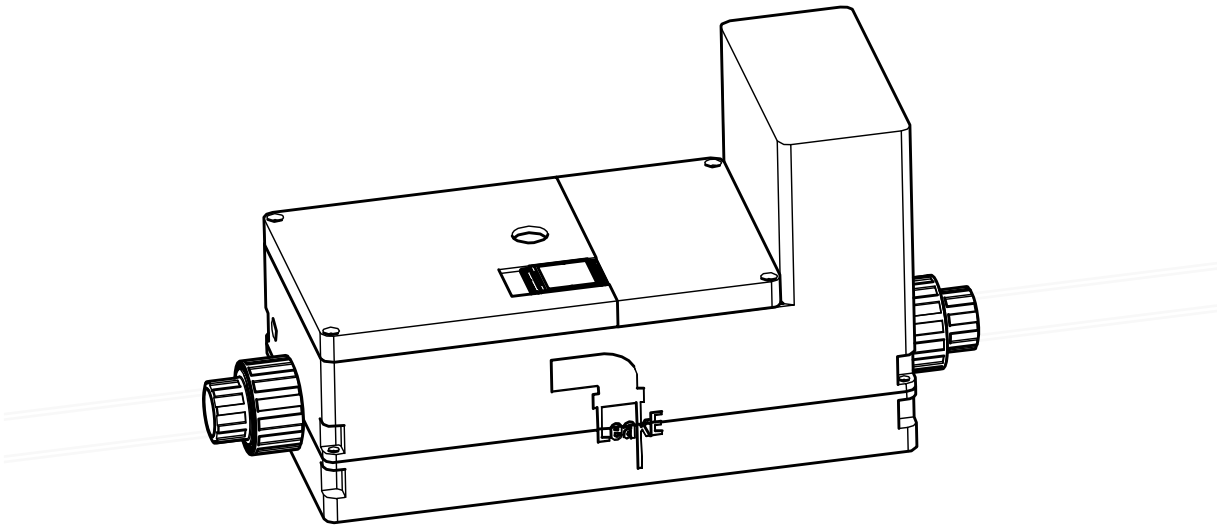
Thank you for your time and consideration.

Sincerely,

Lokton Au

President

LeakE



User Manual:

LeakE- Smart Water Leak Protector

Disclaimer

There are inherent risks in the operations of LeakE's device, which can result in death, bodily injury, loss, or property damage. Therefore, the customer must take all prudent safety precautions in installing, using, and maintaining this device. Persons who install, operate, and service the device must be technically qualified, experienced in working with electrical components and pressurized systems, and have a good general knowledge of water pipes. This manual includes specific safety guidelines and recommendations; however, this manual is not intended to cover all situations. The customer is responsible for determining the suitability of the particular design or application and ensuring the safe operation, maintenance and storage of the device and systems into which it is integrated. LeakE cannot be responsible for using the device in ways or as part of systems that deviate from the operation recommendation in the manual. The described procedures should only be attempted once the customer has read this manual. Failure to follow instructions or recommendations could result in death, bodily injury, loss, or property damage. Information in this manual is subject to change without notice. Updates and other changes to the manual will be posted on our website and may be accessed. It is the customer's responsibility to check for any such updates or changes.

Copyright

Warranty Information

Thank you for purchasing a LeakE device. At LeakE, we understand the importance of protecting your home or property from water damage and strive to provide a reliable and efficient product. The warranty information is designed to outline the terms and conditions of the warranty coverage for your smart water leak detector.

Warranty Coverage

Our smart water leak detectors are covered by a limited warranty that protects against defects in materials and workmanship of the device during the specified warranty period; we will take responsibility for repairing or replacing the product at no additional cost to you. This coverage extends to the original purchaser and is non-transferable. Terms and Conditions apply. Please refer to Exclusions and Limitations for the terms and conditions.

Duration of Warranty

Our standard warranty coverage for the product is valid for 1 (one) year from purchase. During this period, LeakE will provide repair or replacement services for any defect in materials or quality.

However, some customers may prefer an extended warranty for additional coverage and peace of mind. Therefore, we offer the option to extend the warranty beyond the initial 1-year period by contacting our company directly.

Exclusions and Limitations

Misuse or improper installation: The warranty may not cover damages resulting from improper installation, neglect, abuse, unauthorized repairs, modifications, or product use contrary to the provided instructions.

Normal wear and tear: The warranty typically does not cover damages resulting from normal wear and tear, including cosmetic damage, minor scratches, or discoloration that does not affect the device's functionality.

Acts of nature: Damages caused by floods, fires, earthquakes, lightning, or other acts of nature are not covered under the warranty.

Third-party services: The warranty may be voided if unauthorized third-party technicians have serviced or repaired the water leak detector. This does not include third-party technicians assisting the customer with the initial installation.

Limited liability: The warranty coverage is limited to repairing or replacing the water leak detector and does not extend to consequential or incidental damages.

Claiming Warranty

If you encounter a problem with your water leak detector within the warranty period, don't hesitate to contact LeakE for assistance in warranty claims. We will guide you through the necessary steps to assess the issue and provide appropriate measures and assistance, which may involve repair or replacement.

To expedite the warranty claim process, ensure that you retain the original purchase receipt or proof of purchase, and submit photos of the issue where applicable. This documentation is usually required to validate your warranty claim.

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Glossary

Acronym	Description
AI	Artificial Intelligence
GUI	Graphical User Interface – Interactive visual components for a computer software
LCD	Liquid Crystal Display – Project information onto a screen
PRV	Pressure Reducing Valve – A safety valve in your home used to control or limit the pressure in the plumbing system
PVC	Polyvinyl Chloride – Pipe material

1 Introduction

LeakE's water leak detection system is a comprehensive product that utilizes advanced technologies to monitor and prevent leaks. The device includes an inline shut-off valve, a centralized water flow sensor, IoT applications, and AI algorithms. The device will detect abnormal flow patterns and shut off the water supply when leaks are detected. It employs sensors, actuators, AI, energy harvesting, and Wi-Fi communication to an AWS server. This product aims to create an intelligent and efficient leak detection and prevention solution, helping minimize water waste and potential damage.

1.1 Smart Leak Protector Overview

The inline shut-off valve plays a crucial role in the system. It allows the automatic and manual control of water flow. The valve can shut off the water supply when a leak is detected.

The single central integrated water flow sensor is at the system's core. The sensor consists of a pressure transducer and a turbine strategically positioned in the water supply line and continuously monitors the flow rate and pressure. It can accurately detect abnormal flow patterns that indicate leaks or bursts in the water system.

Implementing IoT applications allows seamless communication between the water leak detection system and your mobile device. Using Wi-Fi communication protocols and the AWS server, the system can send real-time alerts and notifications to homeowners or property managers, allowing them to take immediate action.

Integrating an inline shut-off valve, a central water flow sensor, IoT applications, and AI algorithms effectively monitor and prevent leaks, enhancing water conservation efforts and minimizing potential damage.

1.2 About This Manual

This document covers the necessary information with images and step-by-step instructions to install and operate the water detection system safely. In addition, the safety precautions, overview of parts, software setup, troubleshooting, and maintenance are provided to ensure the user understands and takes full advantage of the features this device has to offer.

1.3 Intended Usage

The user manual is designed to be a valuable resource for customers, plumbers, technicians, and anyone seeking assistance installing and operating the device. It provides detailed instructions, guidelines, and information necessary to understand and effectively operate the device. It also allows the customers and serves as a comprehensive guide that helps them familiarize themselves with the system's components, functionalities, and features.

2 Safety Precautions

This section contains important safety information about the operations detailed in this manual. Ensure that you fully understand and read the safety precautions before undergoing any instruction or procedure in the manual.

2.1 Symbols

The following symbols are relevant to safety and are used throughout this manual. These are intended to call your attention to hazards and important information; the symbols are described on the following page:

⚠ DANGER

DANGER: These warnings mean that it is certain or highly probable that death or severe injuries will occur if no precautions are taken.

The DANGER symbol is used in the following contexts:

- Indicates a hazardous situation, if not avoided, will result in serious injury or death.
- Indicates a procedure or step, if not followed correctly, will result in serious or death.

⚠ WARNING

WARNING: These warnings mean death or severe injuries may occur if no precautions are taken.

The WARNING symbol is used in the following contexts:

- Indicates a hazardous situation, if not avoided, could result in serious injury or death.
- Indicates a procedure or step, if not followed correctly, could result in serious or death.

⚠ CAUTION

CAUTION: These warnings mean minor injuries may occur if no precautions are taken.

The CAUTION symbol is used in the following contexts:

- Indicates a hazardous situation, if not avoided, could result in minor injuries.
- Indicates a procedure or step, if not followed correctly, could result in minor injuries.

NOTICE

NOTICE: These warnings mean that damage to property or equipment may occur if no precautions are taken.

The NOTICE symbol is used in the following contexts:

- Indicates a hazardous situation, if not avoided, could result in equipment or property damage.
- Indicates a procedure or step, if not followed correctly, could result in equipment or property damage.

INFORMATION: This symbol is to assist you in making your work easier or reference further information.

The INFORMATION symbol is used in the following contexts:

- Indicates a preferred way in the procedure or step; if not followed correctly, it may result in redundant work.

2.2 General Hazards

These warnings are relevant to safety and must be observed and complied with.

⚠ WARNING Personal Protective Equipment (PPE) is essential for ensuring the safety and well-being of the installer. Approved safety glasses and non-slip steel toe-shoes must be worn during installation. Failure to comply could result in death or severe injuries.

2.3 Work Area Hazards

These warnings are relevant to safety and must be observed.

⚠ DANGER Beware of water and electrical devices. The presence of water can create a path for electricity to flow through, leading to electric shock, electrocution, or fire hazards. Failure to comply will result in death or severe injuries.

⚠ WARNING Ensure the working area is clean, visible, and debris-free to prevent slips and falls. Failure to comply could result in death or severe injuries.

⚠ WARNING Ensure the work condition is free from sharp objects, as many main water supplies are in tight crawl spaces, where loose nails and screws may be present. Remove hazards before working. Failure to comply could result in death or severe injuries.

2.4 Operational Hazards

These operational hazards are relevant to safety and must be followed.

DANGER PVC is not a safe or approved compressed air or gas piping material. This may lead to an explosion of the pipe. Failure to comply will result in death or severe injuries.

DANGER Only use the LeakE device as intended. Any operation besides the intended purpose may result in damage or hazards. Failure to comply will result in death or severe injuries.

WARNING The use of power tools emits loud noises. Prolonged exposure to loud noises can have detrimental effects on hearing health. Ensure adequate hearing production. Failure to comply could result in severe injuries.

CAUTION Ensure the working area is clean, visible, and debris-free to prevent slips and falls. Failure to comply could result in death or severe injuries.

NOTICE Please handle this with care during installation and in general. Dropping it from any height could cause damage to the device.

2.5 Electrical Hazards

These electrical hazards are relevant to safety and must be followed.

CAUTION Ensure the outlet is located at least 6 feet from the installed device or comply with Electrical and Plumbing Codes in your local area. Failure to comply could result in severe injuries.

2.6 Mechanical Hazards

These mechanical hazards are relevant to safety and must be followed.

DANGER Under normal operation, the device will be under pressure; before work is done on the device, ensure that the device is depressurized. Failure to comply will result in death or severe injuries.

3 What's Included: Parts Overview

The product overview is an essential start, as it introduces you to different elements that make up the product. Here is where you will see how the final product should look like. Please familiarize yourself with the parts, and check if any parts are missing. If there are, please do not hesitate to contact one of our customer service representatives.

3.1 Packaging List

The packaging list is a comprehensive inventory of all the main items included in the package. Please refer to this packaging list to ensure all the items mentioned are in your package. If you encounter any issues or have further questions, kindly consult the user manual to contact our customer support for prompt help. The following figure and table describe the packaging contents.

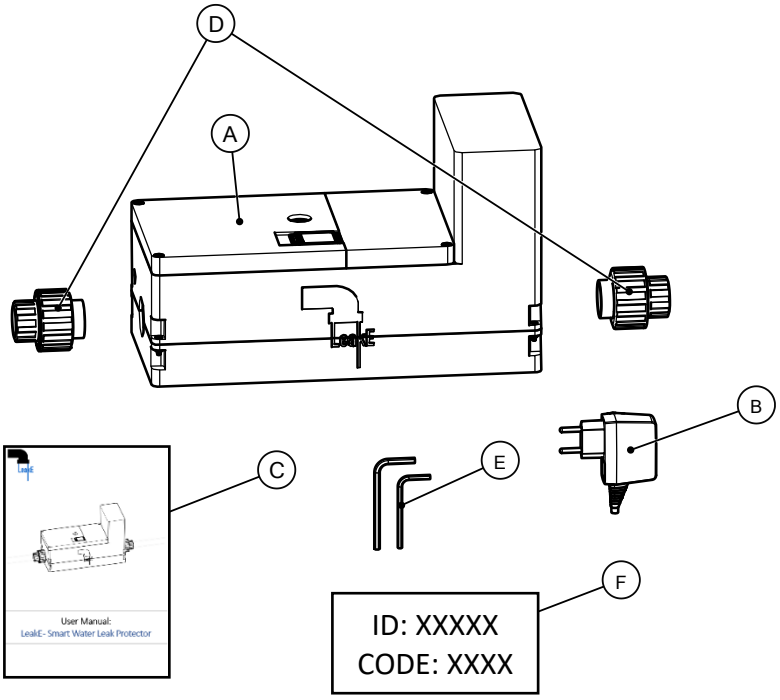


Figure 1: Packaging List Overview

Table 1: Full Packaging List

Callout	Part	Quantity
A	Water Leak Detector System	1
B	3.3ft/1m AC Adapter	1
C	User Manual	1
D	SCH40 PVC Unions	2
E	Allen Key Set	1
F	Connection Slip	1

3.2 Mechanical Component Assembly

The device's mechanical assembly is shown below, and the critical mechanical components are highlighted and referenced.

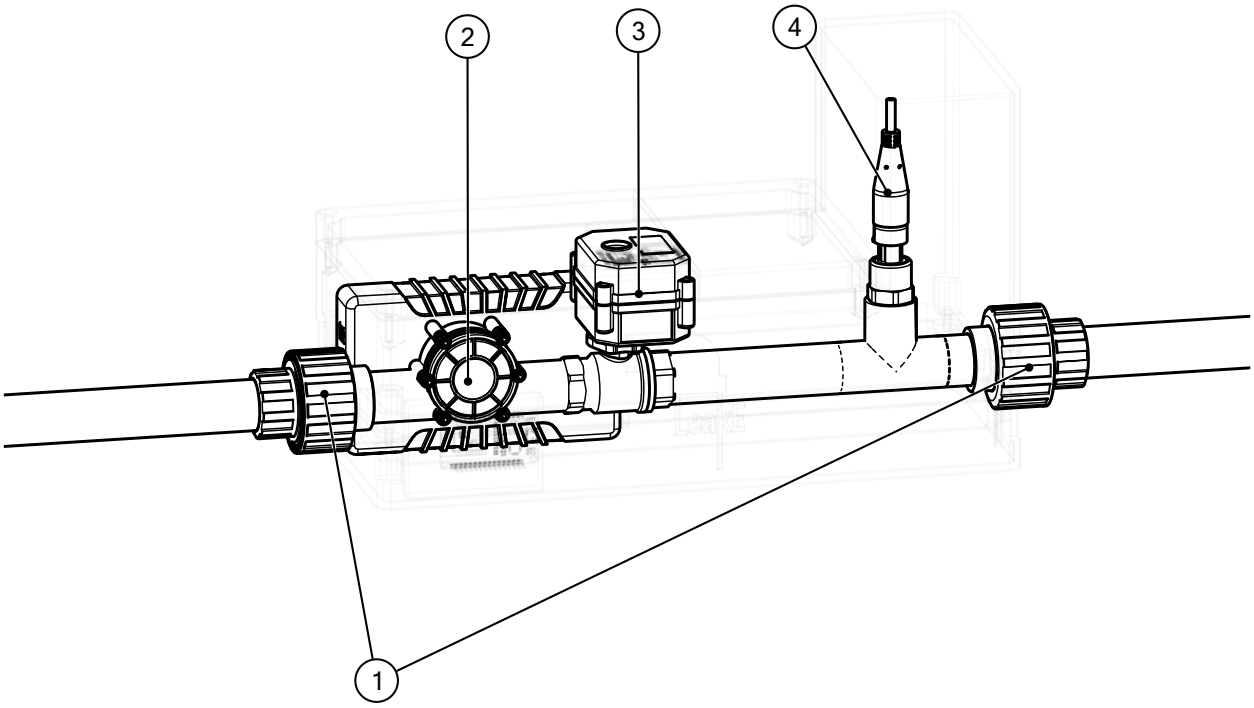


Figure 2: Mechanical Assembly Overview

Table 2: Mechanical Parts

Callout	Part	Quantity
1	SCH40 PVC Unions	2
2	Turbine	1
3	Ball Valve	1
4	Pressure Transducer	1

Please also see *Section 8* below for images of each mechanical component.

3.3 Electrical Component Assembly

The device's electrical assembly is shown below, and the critical electrical components are highlighted and referenced.

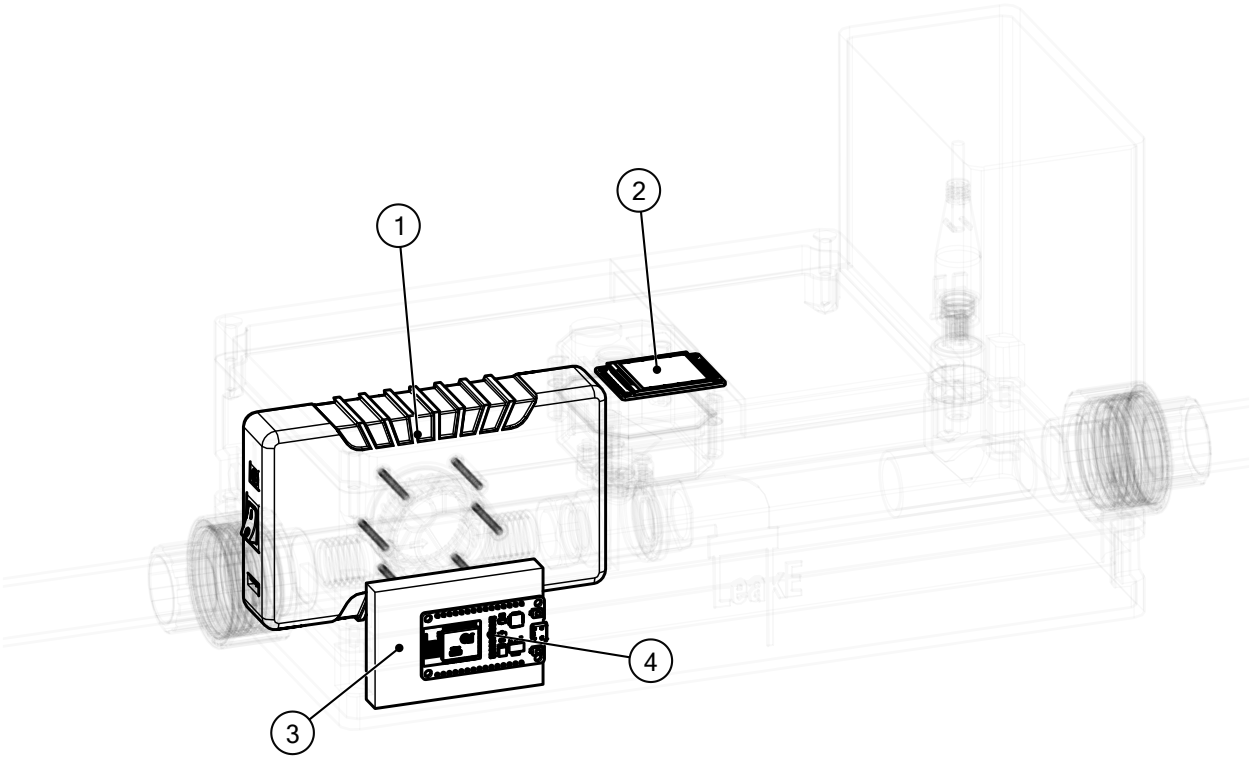


Figure 3: Electrical Assembly Overview

Table 3: Electrical Parts

Callout	Part	Quantity
1	Battery	1
2	LCD Screen	1
3	Breadboard	1
4	Microcontroller	1

Please also see *Section 8* below for images of each electrical component.

3.4 Parts List

The parts list is a comprehensive inventory of all items. It serves as a guide to help users verify the contents of the package and ensure that everything is present.

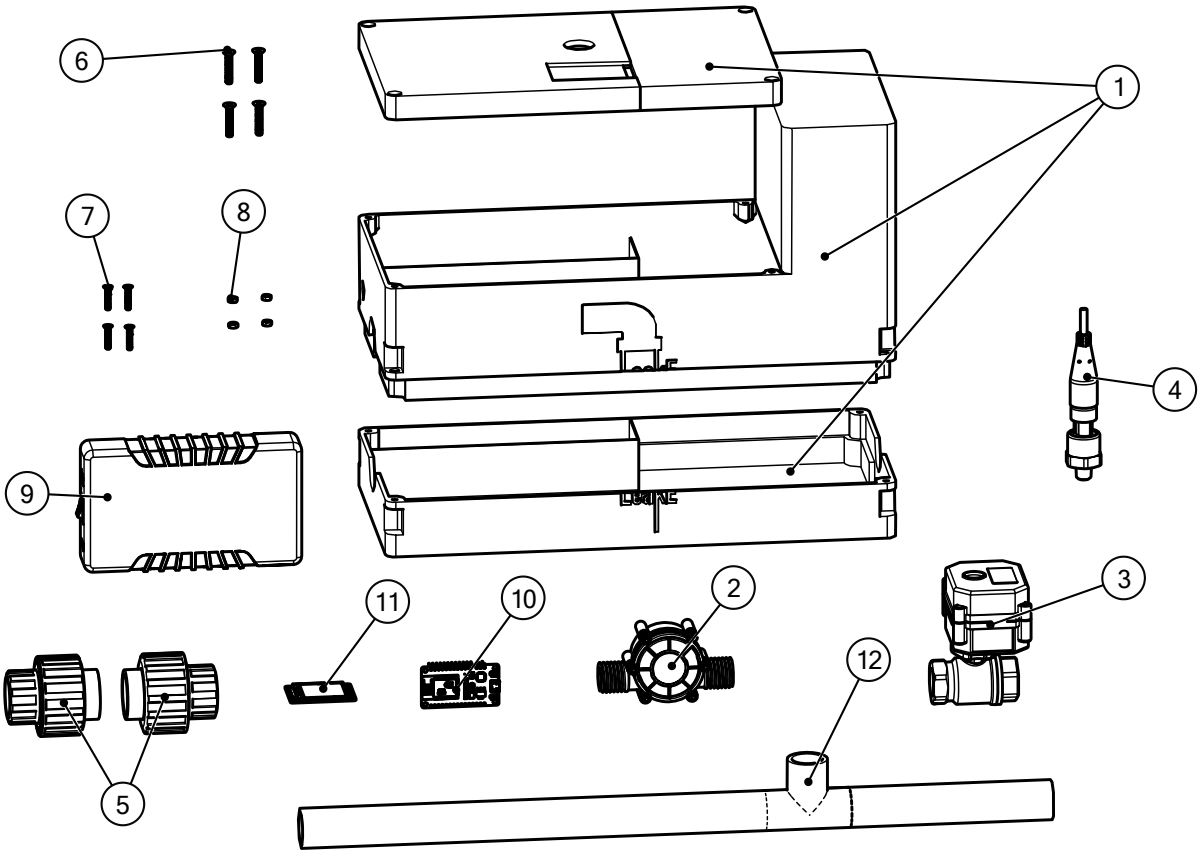


Figure 4: Parts Overview

Table 4: Parts List

Callout	Part	Quantity
1	Protective Housing (3 Separate Sections)	1
2	Turbine	1
3	Ball Valve	1
4	Pressure Transducer	1
5	SCH40 PVC Unions	2
6	M4 Screws	4
7	M3 Screws	4
8	M3 Nuts	4
9	Battery	1
10	Microcontroller	1
11	LCD Screen	1
12	PVC Pipe with Tee	1

4 Installation

4.1 Prerequisites

Before installing the device, it is crucial to ensure that you comply with all municipal, provincial, and federal codes and regulations regarding building and plumbing codes. We strongly recommend contacting your local authority or relevant regulatory bodies for detailed information and guidelines specific to your area.

4.2 Appropriate Installation Location

When installing the device and finding an appropriate installation location, the following prerequisites must be met:

NOTICE Hire a professional plumbing service if required. Failure to comply could result in device damage and property damage.

DANGER Do **NOT** install on-fire sprinkler systems to prevent any interference or disruption to the operation of the sprinkler system, which is essential for fire safety.

The device should be installed at the main water line, specifically after the water meter, pressure-reducing valve, and manual shut-off valve. This ensures optimal compatibility with your existing plumbing system. The device should be installed horizontally. Additionally, choose a location that allows for at least one 90-degree bend in the piping, as this provides sufficient lateral flexibility to insert the device. The bend should be within 2-3 feet of the device installation location.

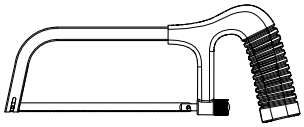
Compliance with local codes and regulations is crucial for the installation's safety, effectiveness, and legal compliance. Always consult the appropriate authorities and experts to ensure a proper and compliant installation process.

4.3 Required Tools

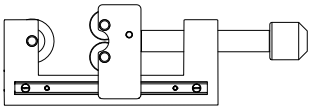
To ensure the smooth and successful installation of your device, it is essential and recommended to have the following tools readily available. Before you begin, ensure that all tools are in good working condition and appropriate for the task.

4.3.1 PVC Piping Installation

Before proceeding with the installation of the device on PVC piping, it is important to ensure that you have the following tools:



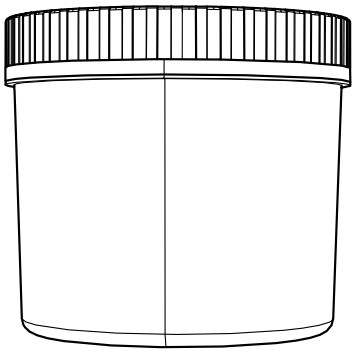
Hacksaw



Tube Cutter

M4 Hex Key (3mm Key)

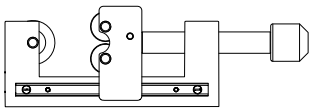
M3 Hex Key (2.5mm key)



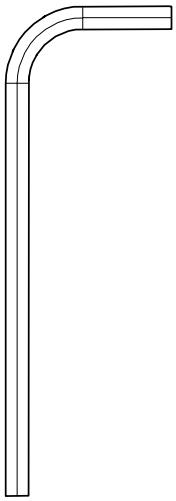
PVC Cement

4.3.2 Copper Piping Installation

Before proceeding with the installation of the device on copper piping, it is important to ensure that you have the following tools:



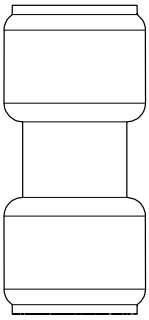
Tube Cutter



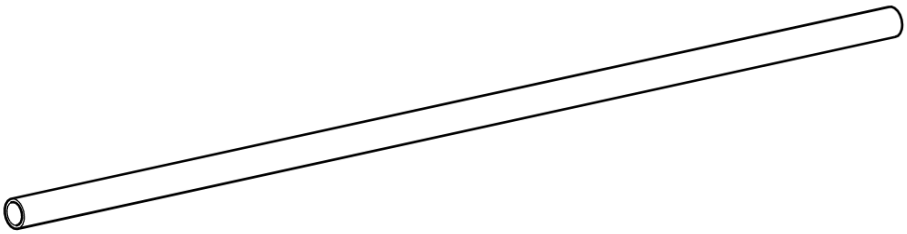
M4 Hex Key (3mm Key)

M3 Hex Key (2.5mm key)

PVC Cement



Push in Valve



PVC Pipe

NOTICE Please consult with the appropriate staff at your local hardware store to obtain the correct push-in valve that fits your home system tubing and our device, which is ¾".

4.4 Installation of Device

Before installation of the device, ensure adequate safety protection before commencing any procedures. Ensure the following items are worn and used as intended:

- Safety glasses
- Safety shoes

⚠ WARNING Personal Protective Equipment (PPE) is essential for ensuring the safety and well-being of the installer. Approved safety glasses and non-slip steel toe-shoes must be worn during installation. Failure to comply could result in death or severe injuries.

Before commencing, it is crucial that you thoroughly read through the entire procedure and have a clear understanding of its intricacies and requirements.

4.4.1 Installation of PVC Piping

1. Locate the main water shut-off valve and shut off the water. Identify an appropriate location as discussed in *Section 4.2 Appropriate Installation Location.*

   NOTICE Hire a professional plumbing service if required. Failure to comply could result in device damage and property damage.

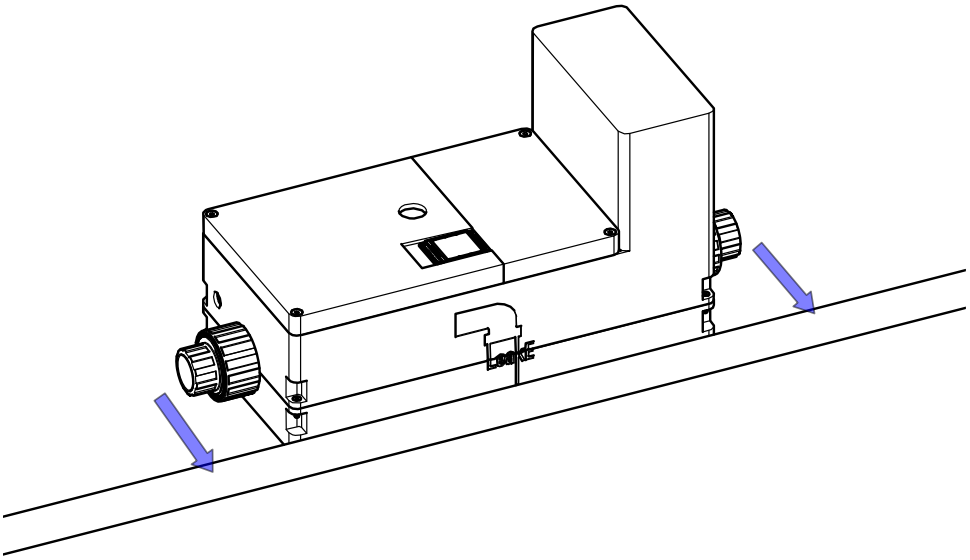
2. Purge the system of the remaining water by opening a faucet or valve inside the residence until no more water comes out.

   Opening a faucet or valve on the lowest floor is recommended. Place a bucket or moderately sized container under the installation workspace in case some water has not been purged.

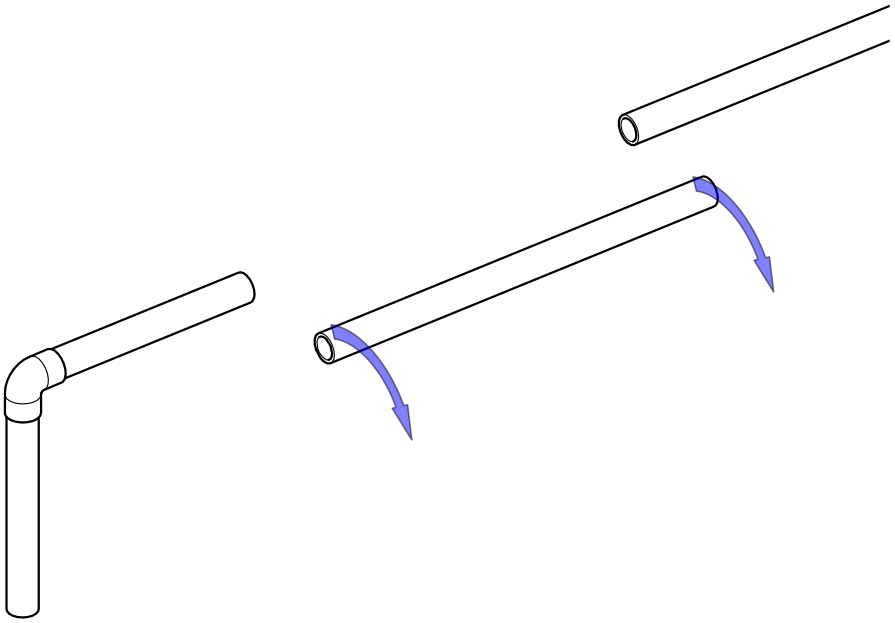
3. Hold the device parallel to the pipe and in the correct orientation.

   Look at the arrow behind the device and ensure that the water flow of your pipe is in that direction).

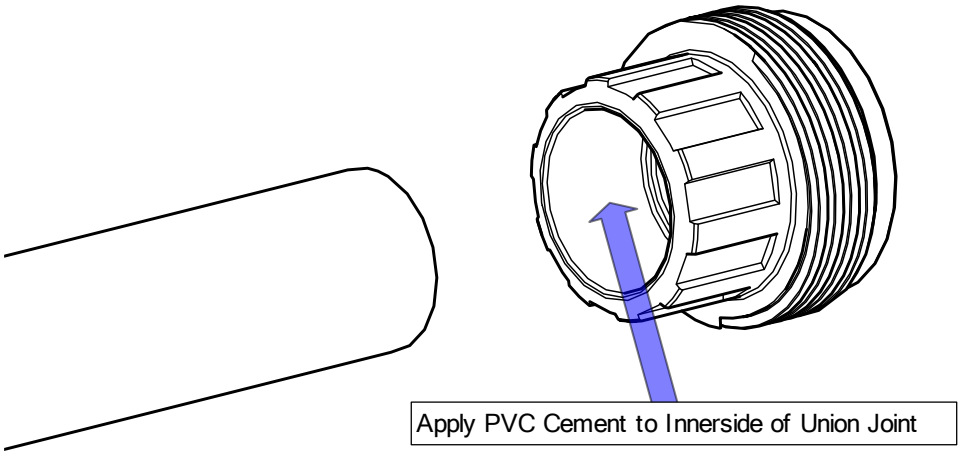
4. Mark the gap length: 40cm (15.75")



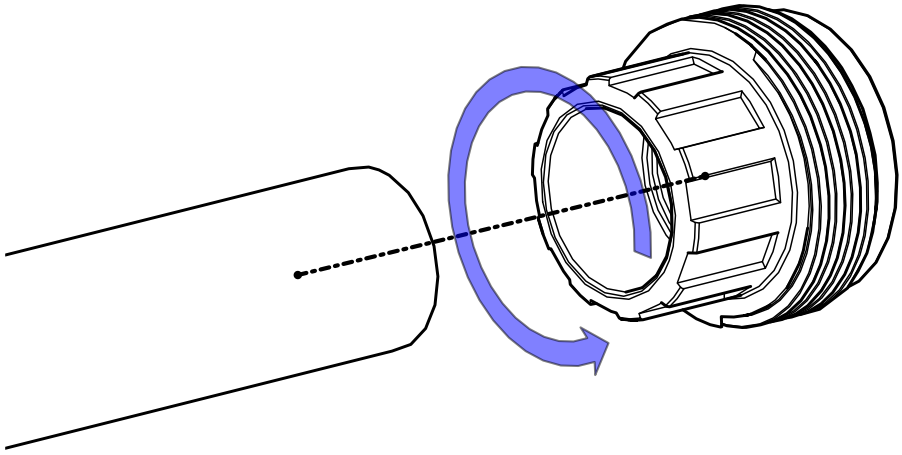
5. Cut the gap in the main water line with a tube cutter: 40cm (15.75")



6. Remove the union joints from the device. Brush enough PVC cement to cover the inside of a union joint.

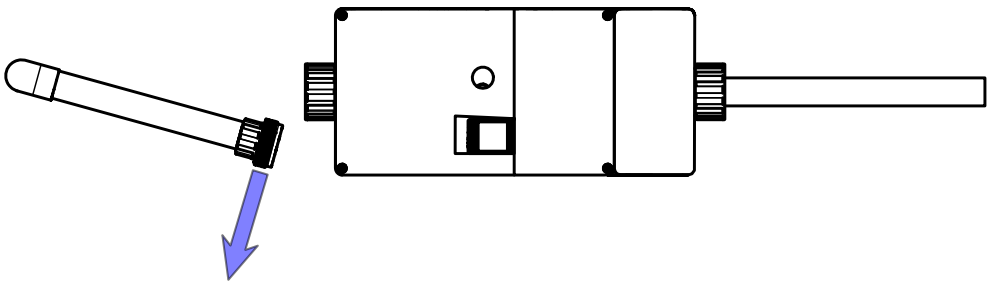


7. Place the union joint onto the end of the water main's cut pipe. Twist and push to ensure it is fully secured.
8. Perform steps 6 – 7 for the other side of the device.



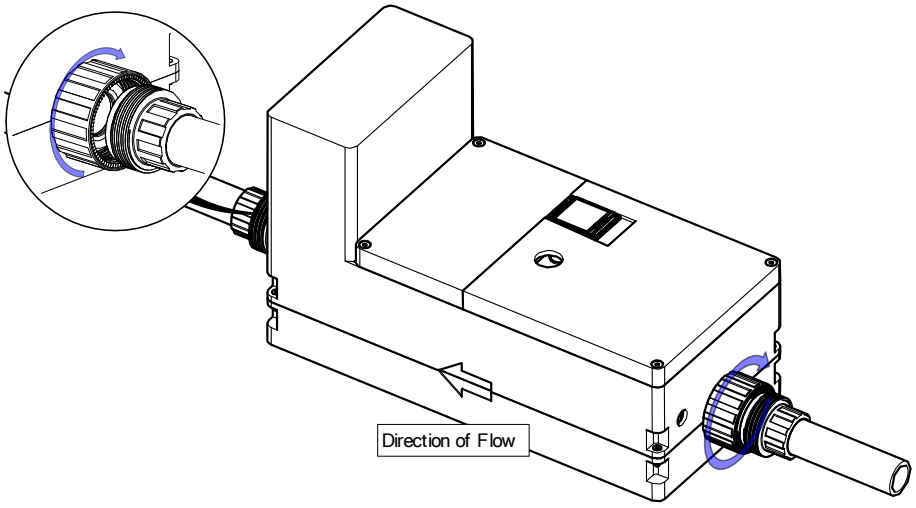
9. Allow the PVC cement in the union joints to dry for 1-2 minutes to ensure a secure fit.
10. Place the device into the gap and align each end to its corresponding union joint. You will need to use the lateral flexibility of the pipe to secure the union joints into the ends of your cut pipe. Ensure it is snug and does not warp your water line.

NOTICE Ensure the arrow on the side of the housing matches the direction of your supply flow.



11. Tighten the ends of the pipes of the device.

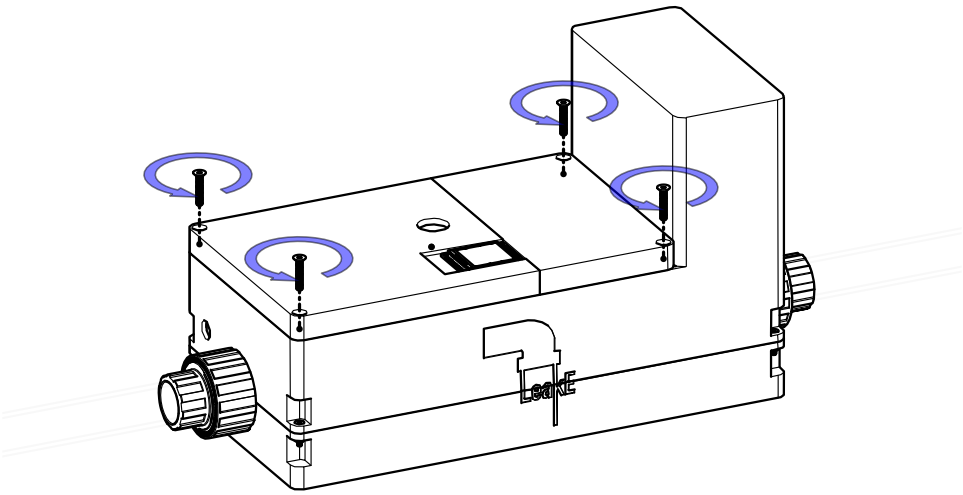
NOTICE Hand-tighten the device by turning it clockwise until it feels snug and secure. Once hand tightened, use a wrench and make a final ¼ turn. Overturning may cross the PVC, and the part will be deemed unusable.



12. Turn on the main water valve and perform a leak check. Retighten as required.

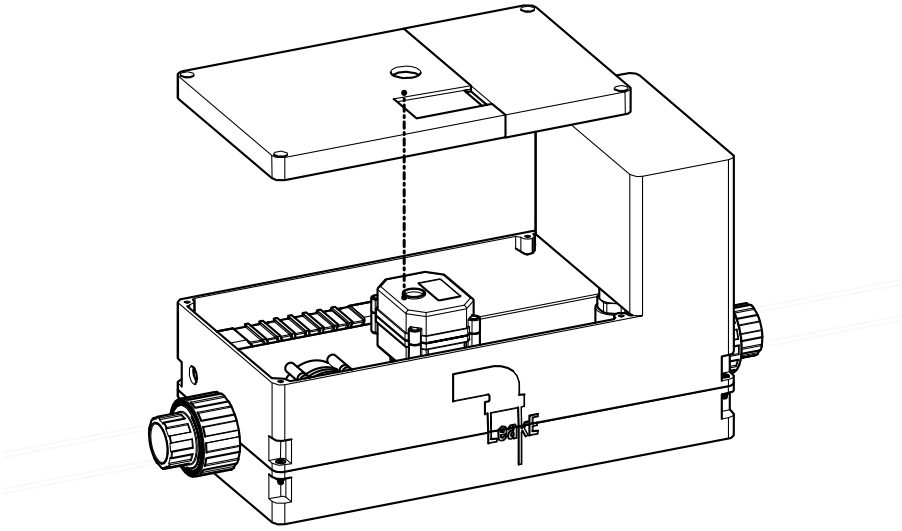
⚠ WARNING Turning on the supply main water valve will repressurize the system. Ensure proper fixation of the device and proper connections are made.

13. To open the housing, use the M4 hex keys (2.5mm) provided and loosen the four (4) M4 screws on the top corner of the box.

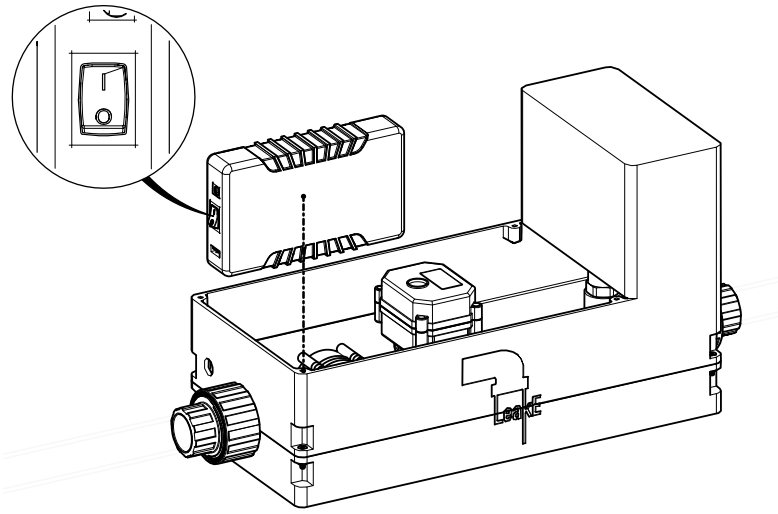


NOTICE Do not apply too much pressure on the screws while using the hex keys, as it may strip them.

14. Remove the lid from the device and safely stow away the lid.

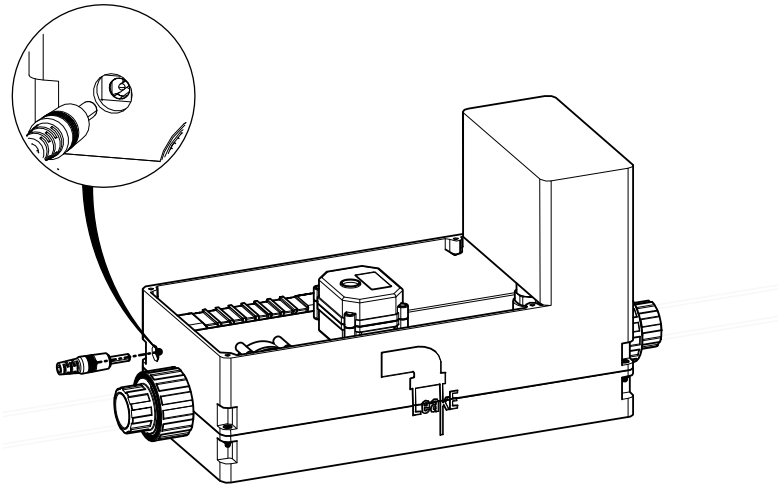


15. Locate and turn on the device with the switch on the battery. Check that switch is in the off position denoted with an "◯" symbol. Access the switch with your hand and gently press or flip it to the on or " | " position.



16. Plug the device into an outlet and connect the pin to the adaptor port.

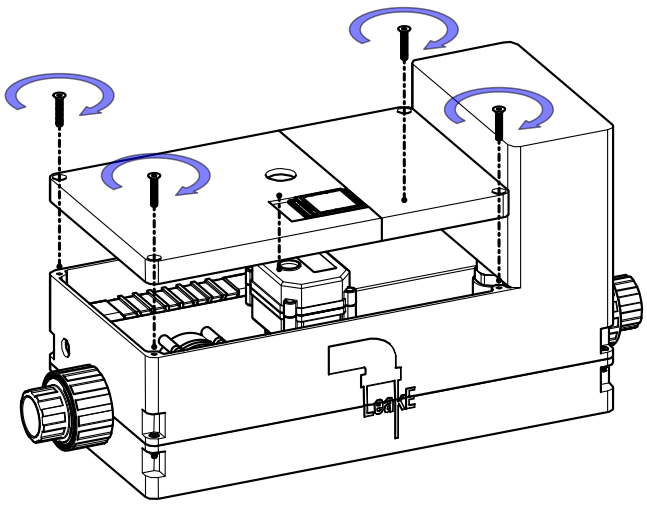
DANGER Ensure that your hands are sufficiently dry before plugging in. Failure to comply may lead to electrocution, resulting in death or severe injuries.



17. Ensure proper connection to the internet.
18. Navigate to the web app and follow the Software Setup steps.

Allow the device to run and learn daily water habits for optimal usage.

19. Replace the lid by screwing down the four (4) M4 screws on the top corner of the box using the M4 hex keys (2.5mm) provided.



4.4.2 Installation on Copper Piping

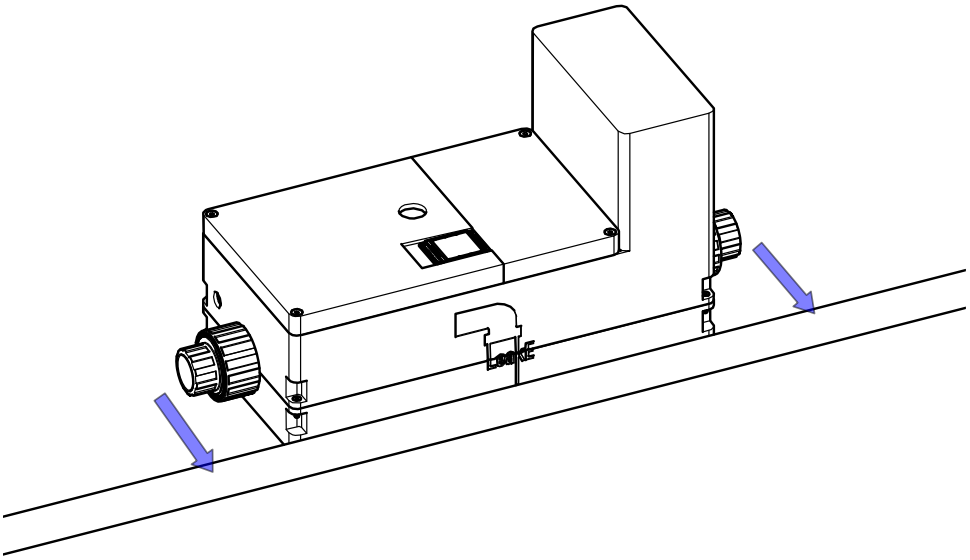
1. Locate the main water shut-off valve and shut off the water. Identify an appropriate location as discussed in *Section 4.2 Appropriate Installation Location.*

> **NOTICE** Hire a professional plumbing service if required. Failure to comply could result in device damage and property damage.

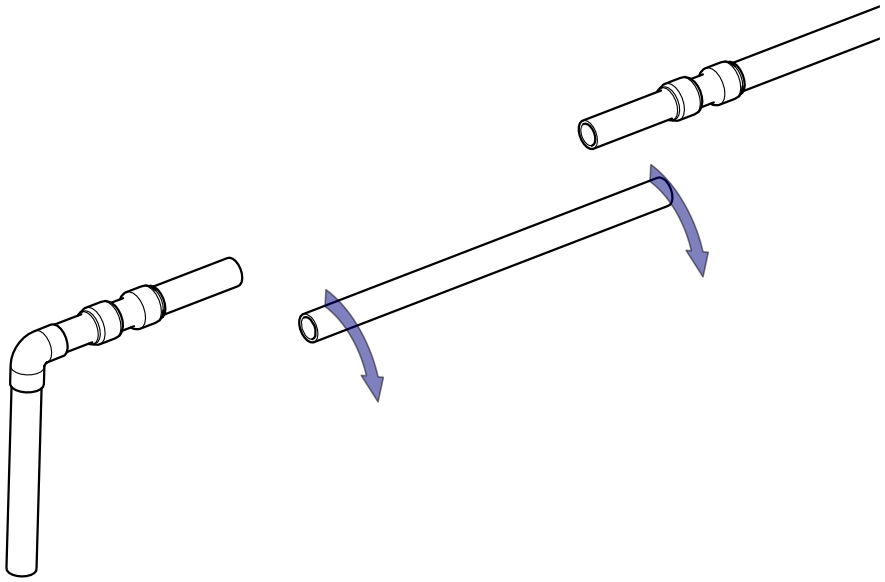
2. Mark the pipe of the intended area to the housing length of 40cm (15.75") with an additional 8" on both sides to account for push-in fittings and PVC Pipe.
3. Cut the intended length with the additional 8".
4. Install the push-in valves with the PVC Piping into the copper tube.
5. Hold the device parallel to the pipe and in the correct orientation.

> Look at the arrow behind the device and ensure that the water flow of your pipe is in that direction).

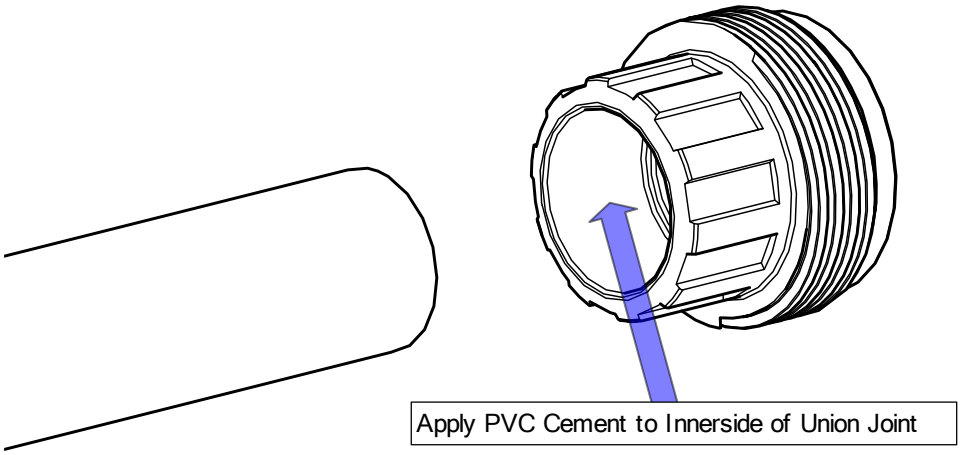
6. Mark the gap length on the PVC piping: 40cm (15.75")



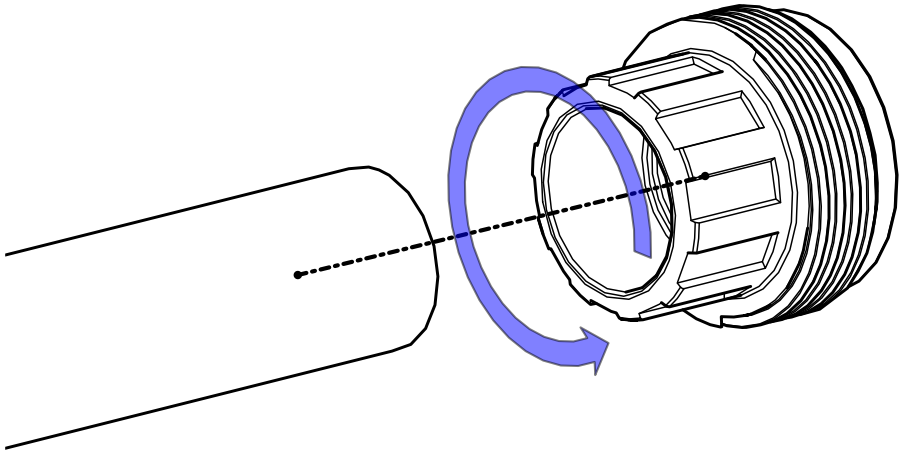
7. Cut the gap in the main water line with a tube cutter: 40cm or 15.75"



8. Remove the union joints from the device. Brush enough PVC cement to cover the inside of a union joint.

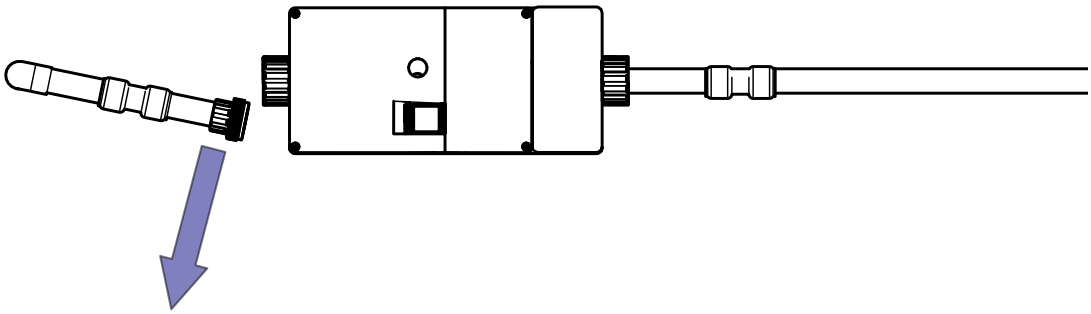


9. Place the union joint onto the end of the water main's cut pipe. Twist and push to ensure it is fully secured.
10. Perform steps 6 – 7 for the other side of the device.



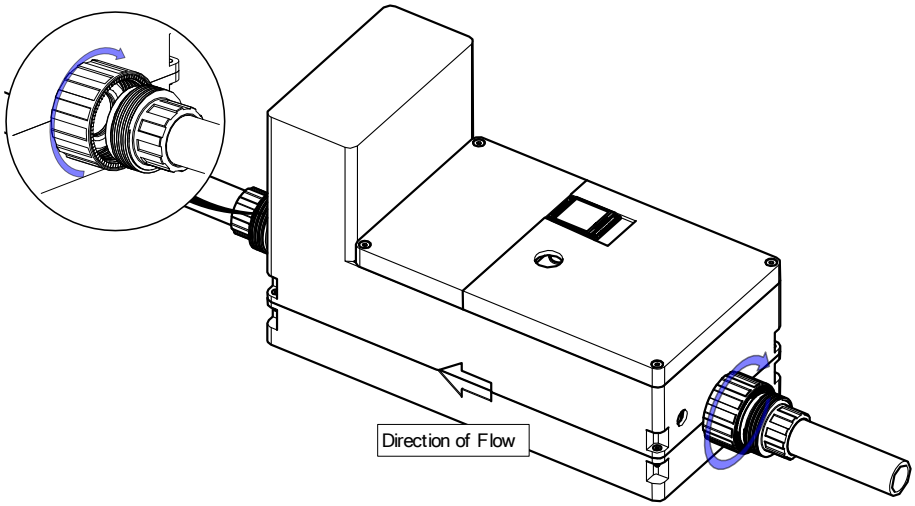
11. Allow the PVC cement in the union joints to dry for 1-2 minutes to ensure a secure fit.
12. Place the device into the gap and align each end to its corresponding union joint. You will need to use the lateral flexibility of the pipe to secure the union joints into the ends of your cut pipe. Ensure it is snug and does not warp your water line.

NOTICE Ensure the arrow on the side of the housing matches the direction of your supply flow.



13. Tighten the ends of the pipes of the device.

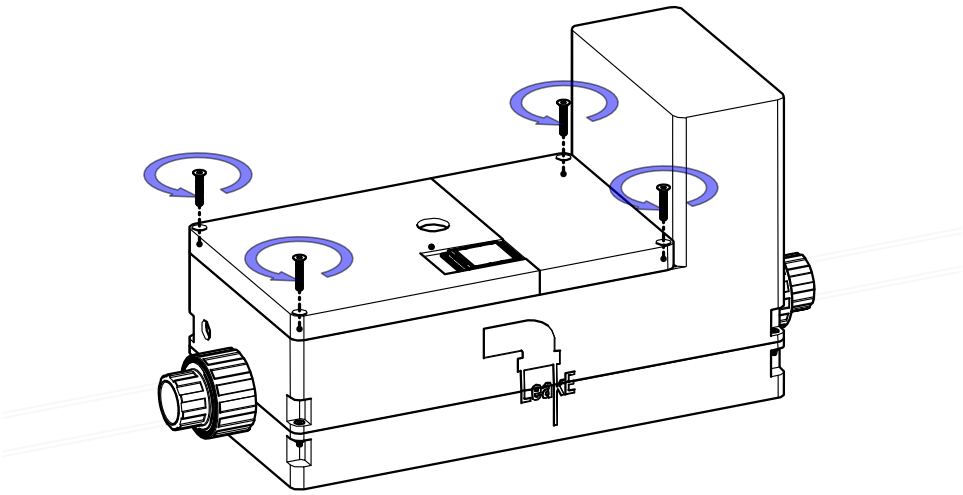
NOTICE Hand-tighten the device by turning it clockwise until it feels snug and secure. Once hand tightened, use a wrench and make a final ¼ turn. Overturning may crack the PVC, and the part will be deemed unusable.



14. Turn on the main water valve and perform a leak check. Retighten as required.

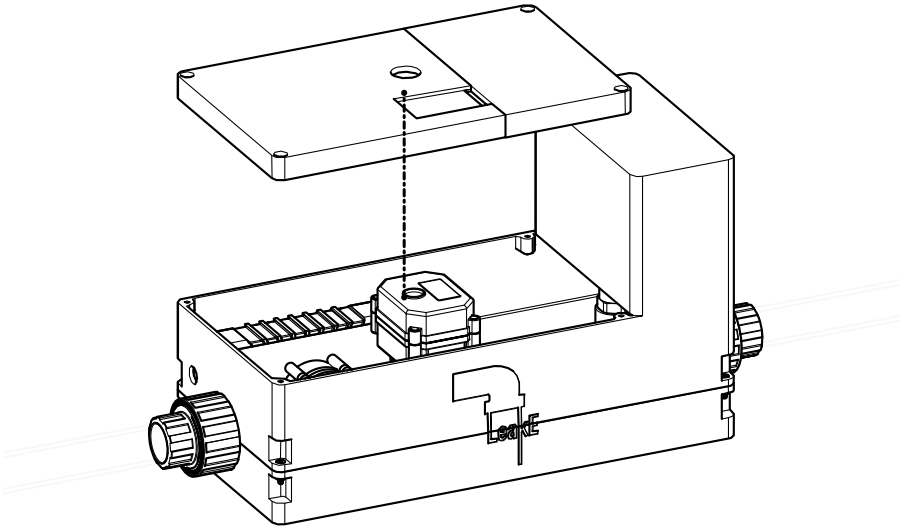
⚠ WARNING Turning on the supply main water valve will repressurize the system. Ensure proper fixation of the device and proper connections are made.

15. To open the housing, use the M4 hex keys (2.5mm) provided and loosen the four (4) M4 screws on the top corner of the box.

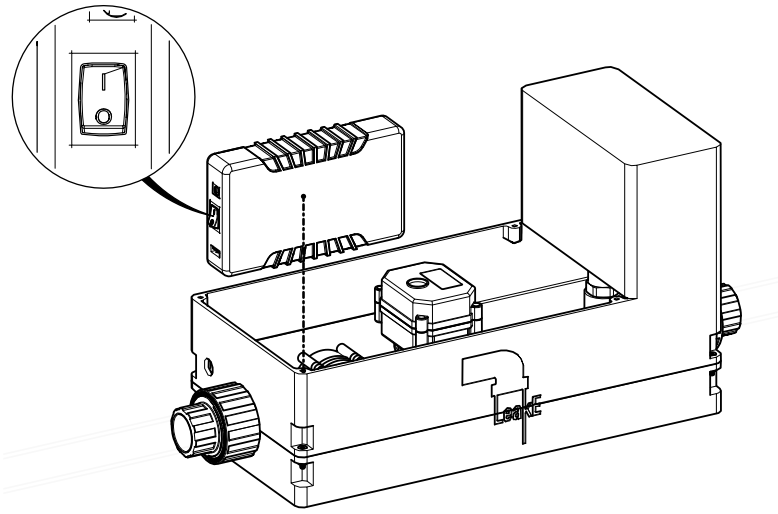


NOTICE Do not apply too much pressure on the screws while using the hex keys, as it may strip them.

16. Remove the lid from the device and safely stow away the lid.

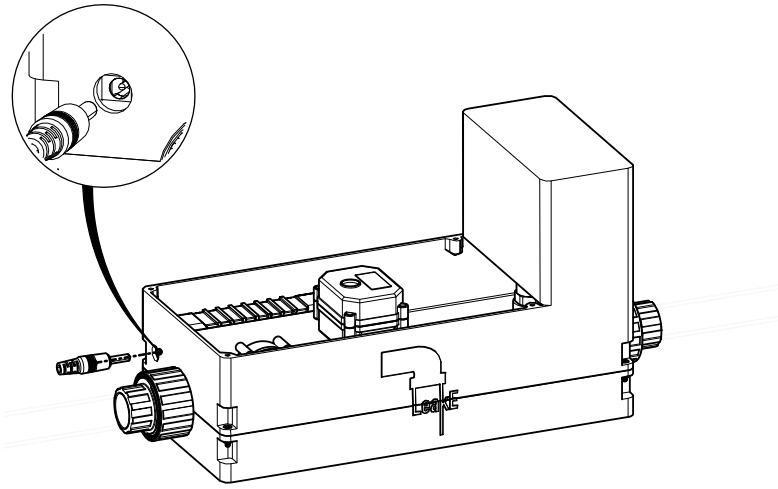


17. Locate and turn on the device with the switch on the battery. Check that switch is in the off position denoted with an "◯" symbol. Access the switch with your hand and gently press or flip it to the on or " | " position.



18. Plug the device into an outlet and connect the pin to the adaptor port.

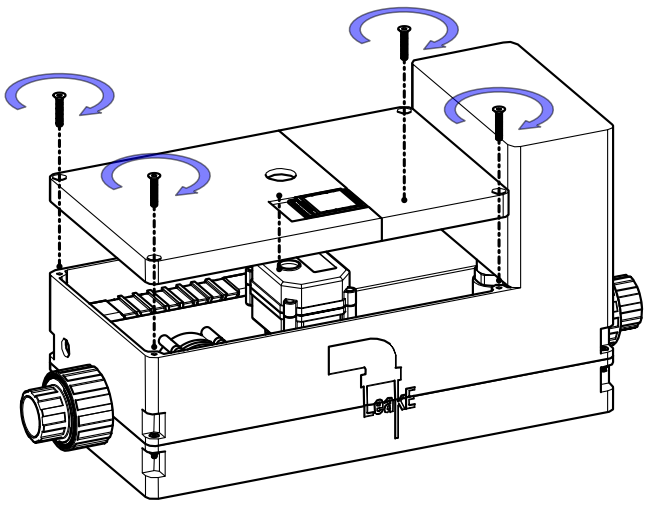
DANGER Ensure that your hands are sufficiently dry before plugging in. Failure to comply may lead to electrocution, resulting in death or severe injuries.



19. Ensure proper connection to the internet.
20. Navigate to the web app and follow the Software Setup steps.

Allow the device to run and learn daily water habits for optimal usage.

21. Replace the lid by screwing down the four (4) M4 screws on the top corner of the box using the M4 hex keys (2.5mm) provided.



5 Software

5.1 Getting Started: Pairing Devices

Before pairing your device, you must ensure that your smartphone and the device are within a secure and reliable Wi-Fi signal. It is required that the Wi-Fi network is WLAN connectivity and supports a 2.4 GHz range.

Get connected with your LeakE device by pairing it with your smartphone on any browser in iOS or Android. In your mobile browser, enter the URL and navigate to *leakE.nicepage.io* to access the LeakE web app and its features. From here, you can start monitoring and controlling your device from your smartphone.

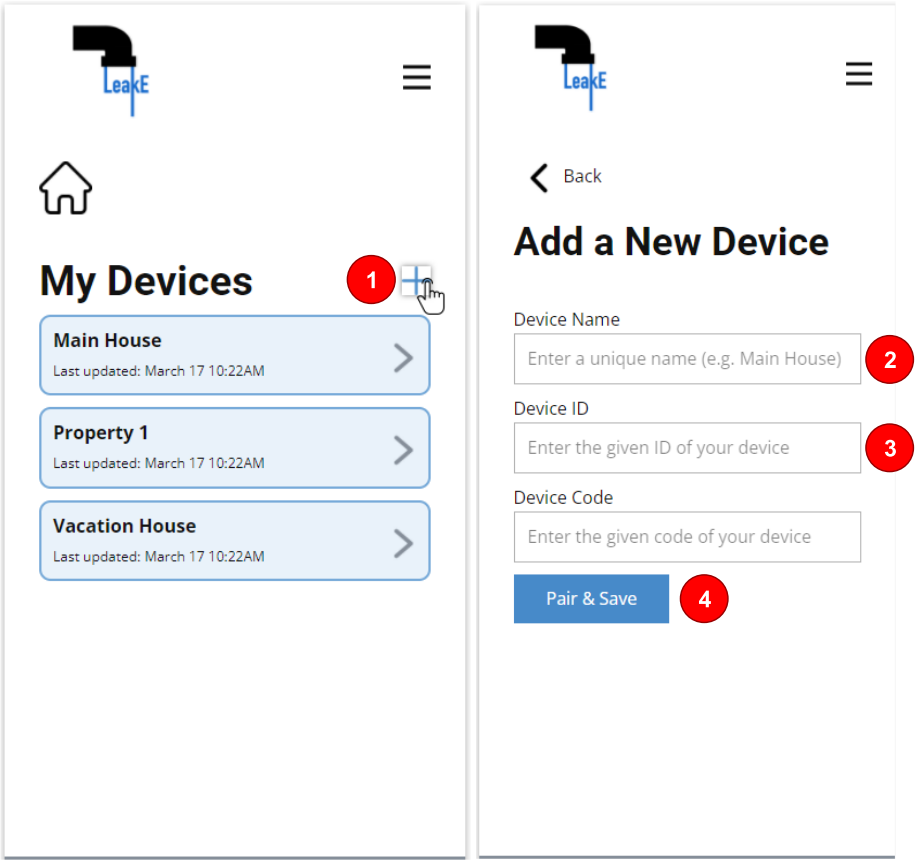
5.2 Getting Started: Web Application

NOTICE The packaging has a slip stating your device's ID and pairing code/password. These can also be found on your device's LCD when powered. You will need these for the following steps.

The next sections present the GUI and functions of the web app. When you first open the web app, the home page appears first with the title 'My Devices.' This page allows you to manage all your LeakE devices and their contents on one page. If you have never paired a LeakE device on the web app, this page will contain a blank list with the 'No devices.' Also, on this page, you can add your device or devices as shown in the steps below.

1. Tap on the plus (+) icon to the right of 'My Devices,' which will unveil a new page.

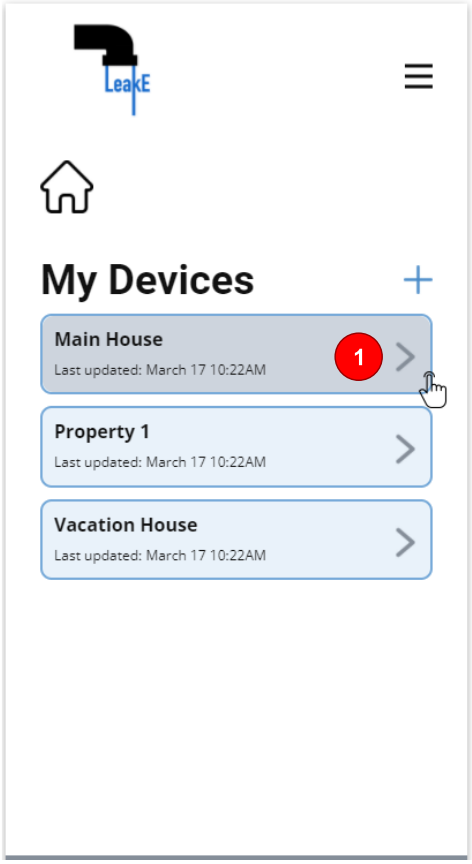
2. Enter a unique name for this device (e.g. Main House).
3. Ensure you have the paper slip with the device's ID and pairing code on hand, and enter this combination into the appropriate boxes.
4. Tap Pair and Save, and the device will begin to pair. Give it 2-3 minutes to save fully.



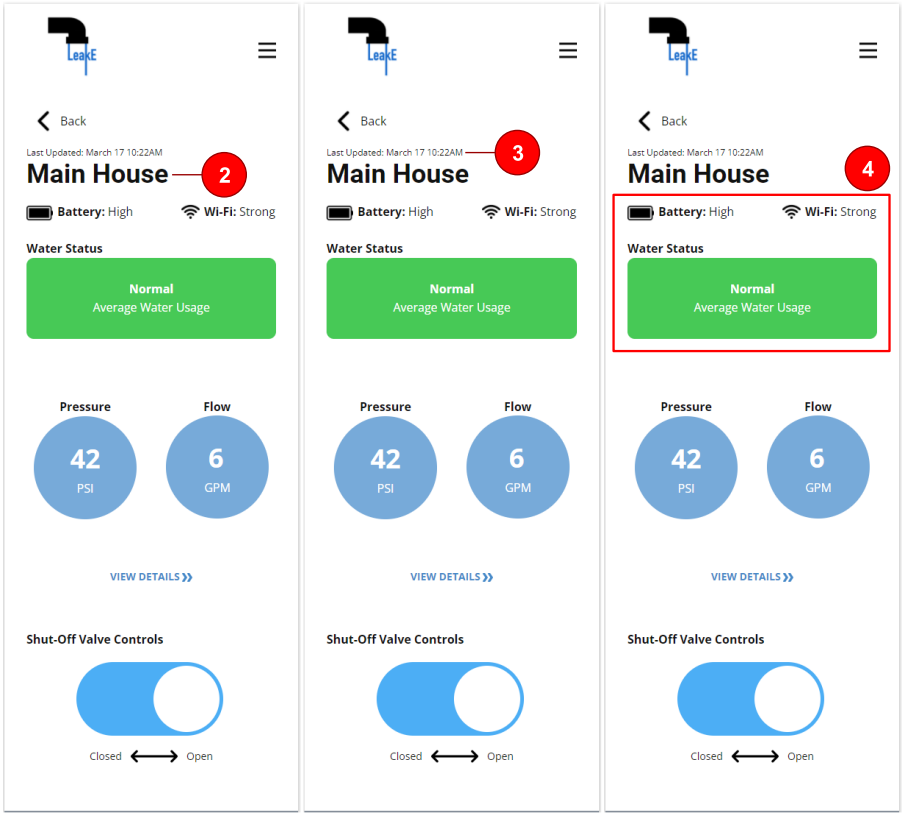
5.2.1 Main Screen

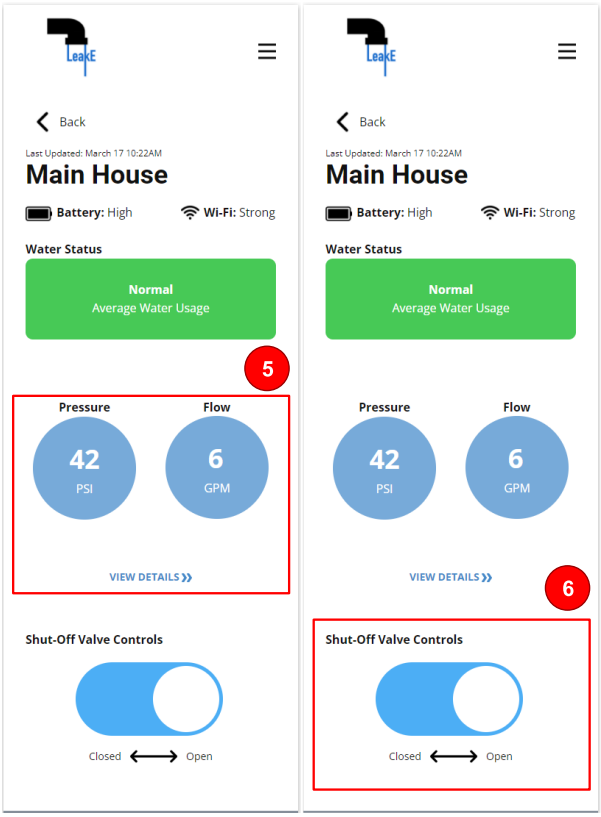
Now that your device is paired, you can find information about your home's plumbing system's various statuses, data, and controls.

1. On the home page, start by tapping on the device you want to monitor/control. This will take you to a new page.



2. The title of this page will be under your saved device's name. On this page, you will find the following information as shown with the corresponding number icon:
3. The date and time of the displayed information were last updated.
4. Status of the battery and Wi-Fi connection.
5. Real-time pressure and flow readings.
6. Controls for the shut-off valve.


Back
Last Updated: March 17 10:22AM
Main House
2
Battery: High
Wi-Fi: Strong
Water Status
Normal
Average Water Usage
Pressure
Flow
42
PSI
6
GPM
VIEW DETAILS
Shut-Off Valve Controls
Closed
Open
Back
Last Updated: March 17 10:22AM
Main House
3
Battery: High
Wi-Fi: Strong
Water Status
Normal
Average Water Usage
Pressure
Flow
42
PSI
6
GPM
VIEW DETAILS
Shut-Off Valve Controls
Closed
Open
Back
Last Updated: March 17 10:22AM
Main House
4
Battery: High
Wi-Fi: Strong
Water Status
Normal
Average Water Usage
Pressure
Flow
42
PSI
6
GPM
VIEW DETAILS
Shut-Off Valve Controls
Closed
Open

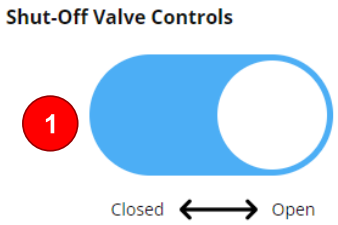

Back
Last Updated: March 17 10:22AM
Main House
Battery: High
Wi-Fi: Strong
Water Status
Normal
Average Water Usage
5
Pressure
Flow
42
PSI
6
GPM
VIEW DETAILS
Shut-Off Valve Controls
Closed
Open
Back
Last Updated: March 17 10:22AM
Main House
Battery: High
Wi-Fi: Strong
Water Status
Normal
Average Water Usage
Pressure
Flow
42
PSI
6
GPM
VIEW DETAILS
6
Shut-Off Valve Controls
Closed
Open

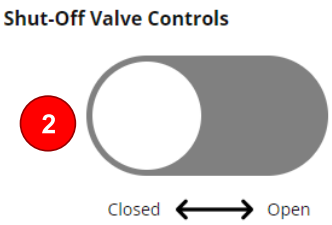
5.2.2 Controlling the Valve

When you scroll to the bottom of the selected device's page, the controls for the shut-off valve are available. It is a simple toggle switch to conveniently open and close the valve as needed or when a potential leak is notified.

1. If the circle knob is on the right side and in blue (as shown), the valve is open, and water is supplied to your home and its fixtures.
2. If the circle knob is on the left side and in grey, the valve is closed, and water is blocked from flowing to the home and its fixtures.

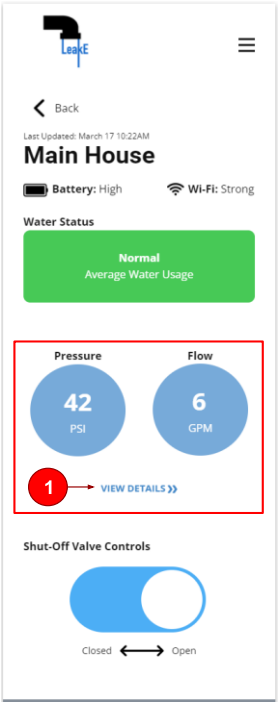
> It takes approximately 3-5 seconds for the valve to open or close from its previous state fully.





5.2.3 Looking at History

Better understand your home's water system by viewing the most recent water pressure and flow trends. Aside from the current rate of the pressure/flow (accessible on the main screen), the comprehensive details of these data can be found by:



1. On the main screen of your device, tap on *View Details>>* just underneath the 'Pressure' or 'Flow' section.

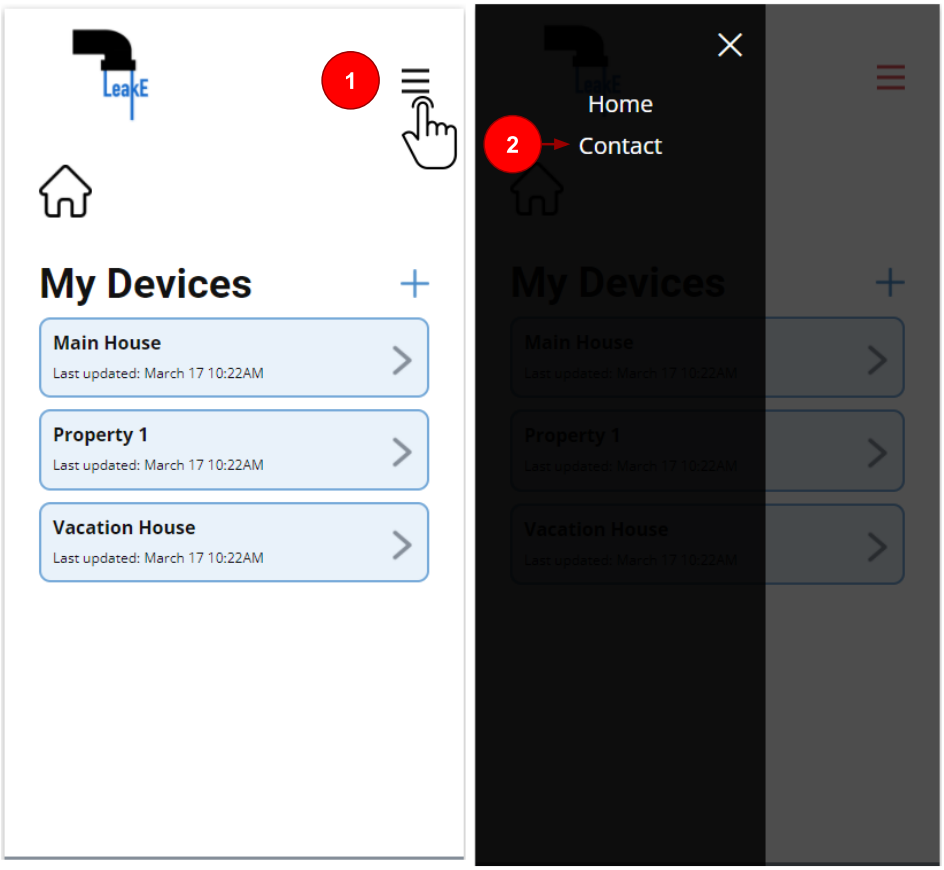
2. On the next page, you will find the pressure and flow sensor trends illustrated in data points and line graphs in the last 3 minutes.

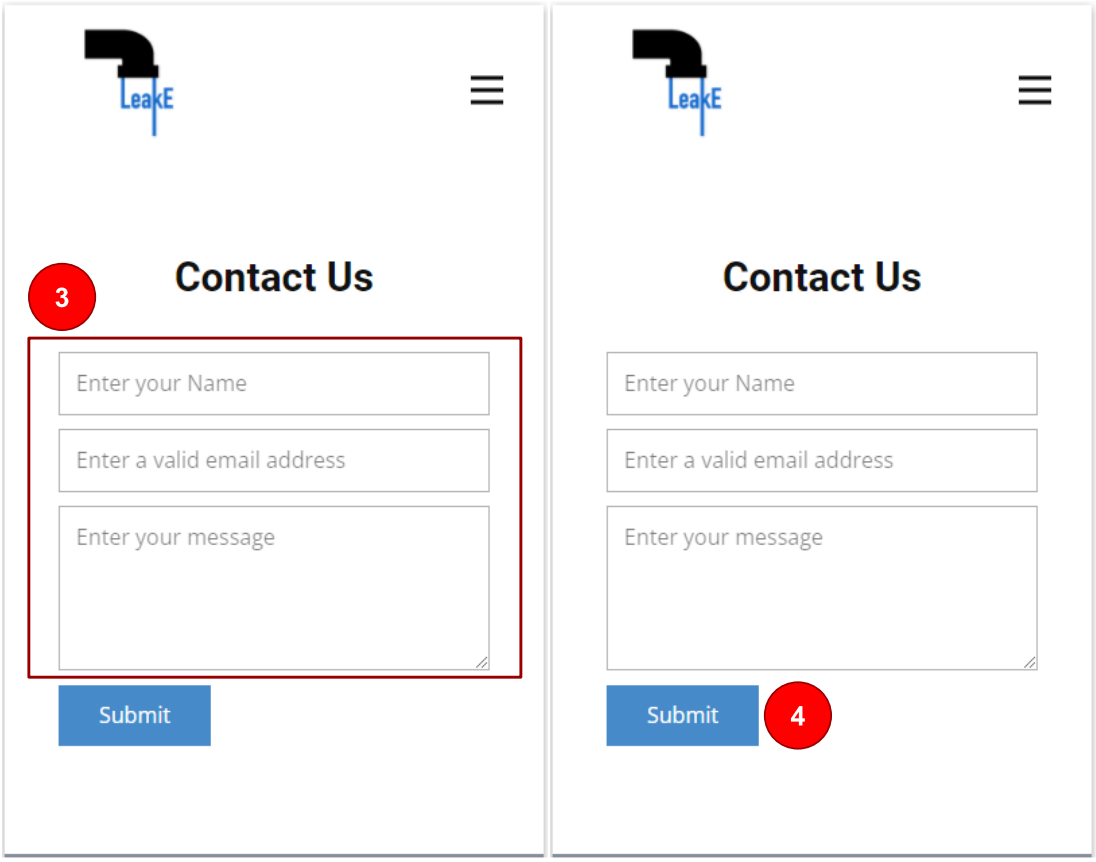
5.2.4 Contact Us and Help Centre

Also, the web app has an easy and accessible way to reach us directly about any inquiries or concerns. You will find this information on the dedicated Contact page.

1. Anywhere on the LeakE web app, tap the three-line icon on the top-right of the screen to open the side navigation menu.
2. Tap on 'Contact.'
3. You can fill out your name, email and message us on this page!
4. Tap submit when you are finished, and LeakE will receive your message.

We look forward to hearing from you and will promptly reply to your message as soon as possible. Please expect up to five (5) business days for a response from one of our representatives.



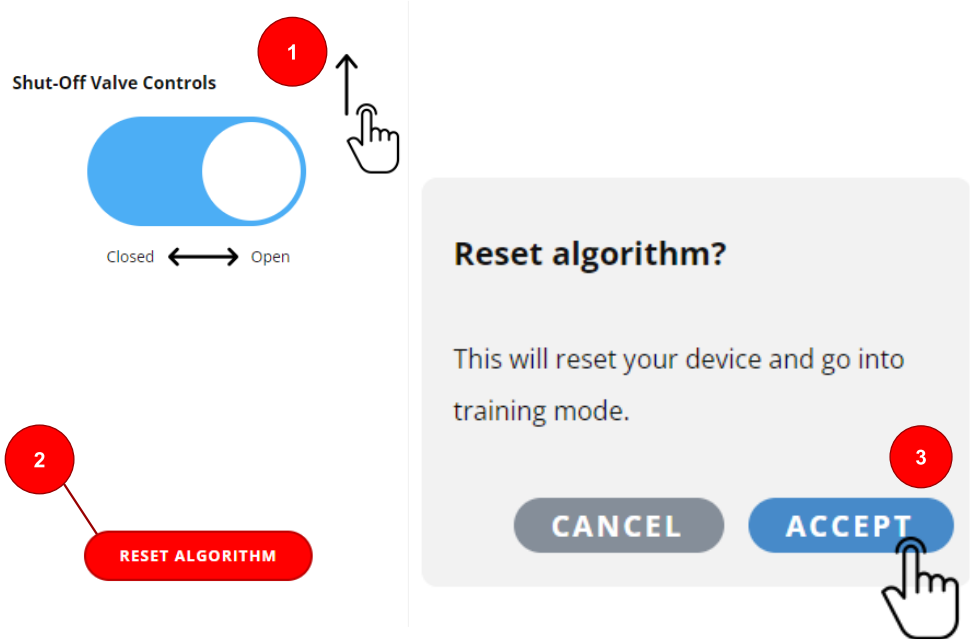


5.2.5 Reset Algorithm

This section covers the procedures if you are not satisfied with the performance of your device. At the bottom of the device's main page is a button that will reset the AI algorithm of your device and will force it to go into training mode once again.

1. In the web app, scroll to the bottom of the device you want to reset, just below the shut-off valve controls.
2. Tap the red 'RESET' button.
3. Before proceeding, a window will pop up to confirm the action. Tap Accept.

Resetting the algorithm will completely erase the previous history and data from your device, return it to its default state, and you will not be able to recover it.

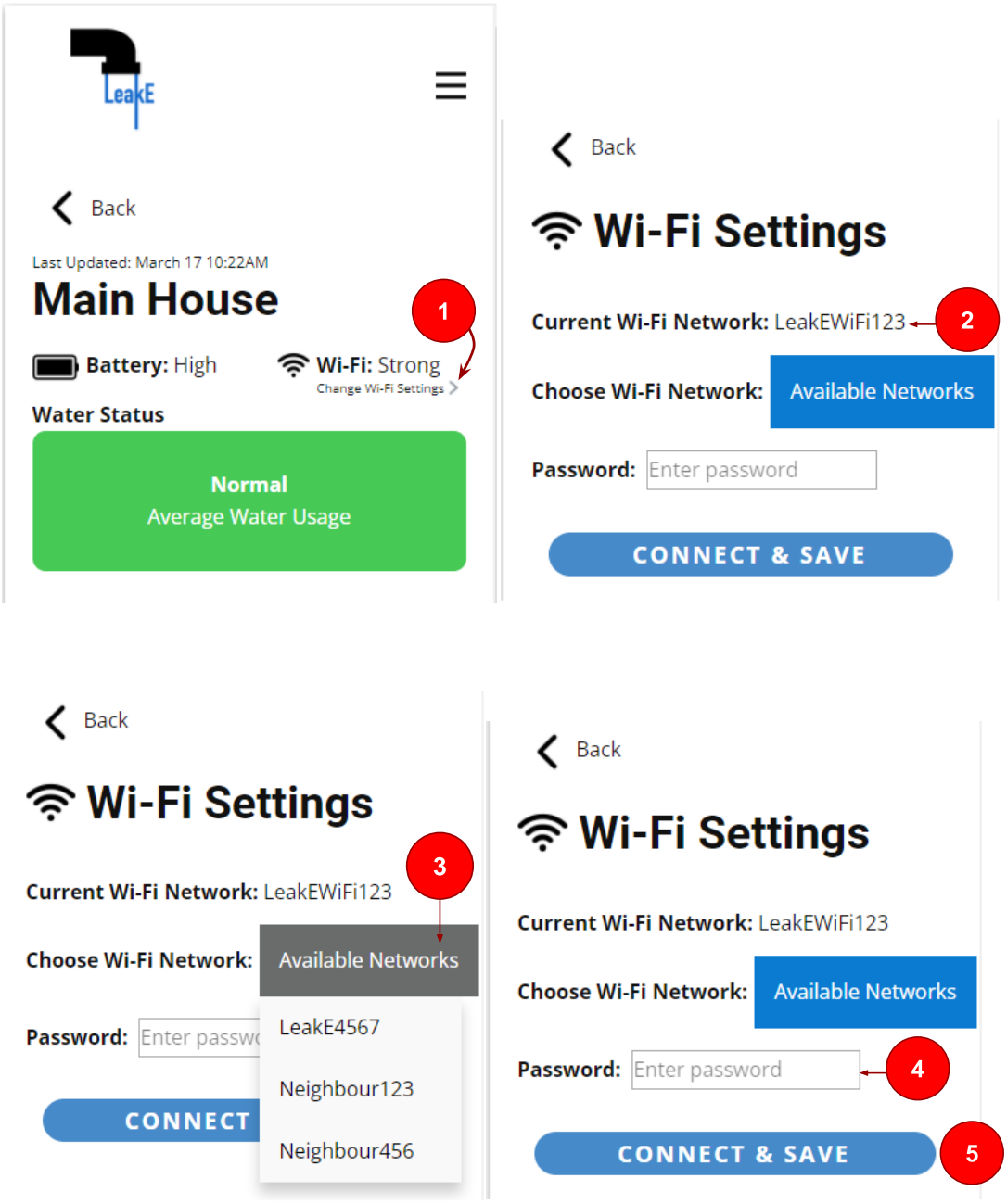


5.2.6 Updating the Wi-Fi

Perhaps you moved into a new home, upgraded to a better plan, or changed your router. In any case, the web app can easily update your Wi-Fi network on your LeakE device.

1. Open the device's main page and tap 'Change Wi-Fi Settings' below the Wi-Fi status.
2. On this page, the current Wi-Fi network is displayed at the top.
3. Choose your Wi-Fi network using the drop-down menu by hovering over Available Networks in the area.
4. Enter the Wi-Fi password.
5. Tap 'Connect and Save' to confirm your changes.

This will take a few seconds to connect to the new Wi-Fi network, and after connecting, the web app will reboot with the updated settings.


Back
Last Updated: March 17 10:22AM
Main House
1
Battery: High
Wi-Fi: Strong
Change Wi-Fi Settings
Water Status
Normal
Average Water Usage
Back
Wi-Fi Settings
Current Wi-Fi Network: LeakEWiFi123
2
Choose Wi-Fi Network:
Available Networks
Password:
Enter password
CONNECT & SAVE
Back
Wi-Fi Settings
Current Wi-Fi Network: LeakEWiFi123
3
Choose Wi-Fi Network:
Available Networks
Password:
Enter passwo
CONNECT
LeakE4567
Neighbour123
Neighbour456
Back
Wi-Fi Settings
Current Wi-Fi Network: LeakEWiFi123
Choose Wi-Fi Network:
Available Networks
Password:
Enter password
4
CONNECT & SAVE
5

6 Operation

When turning the device on, the LCD screen will light up and describe the device's current state. The screen will change between showing the current Wi-Fi connectivity status, battery charge, pressure reading, flow reading and state of water usage. The devices' name and connection code will also be displayed on the screen.

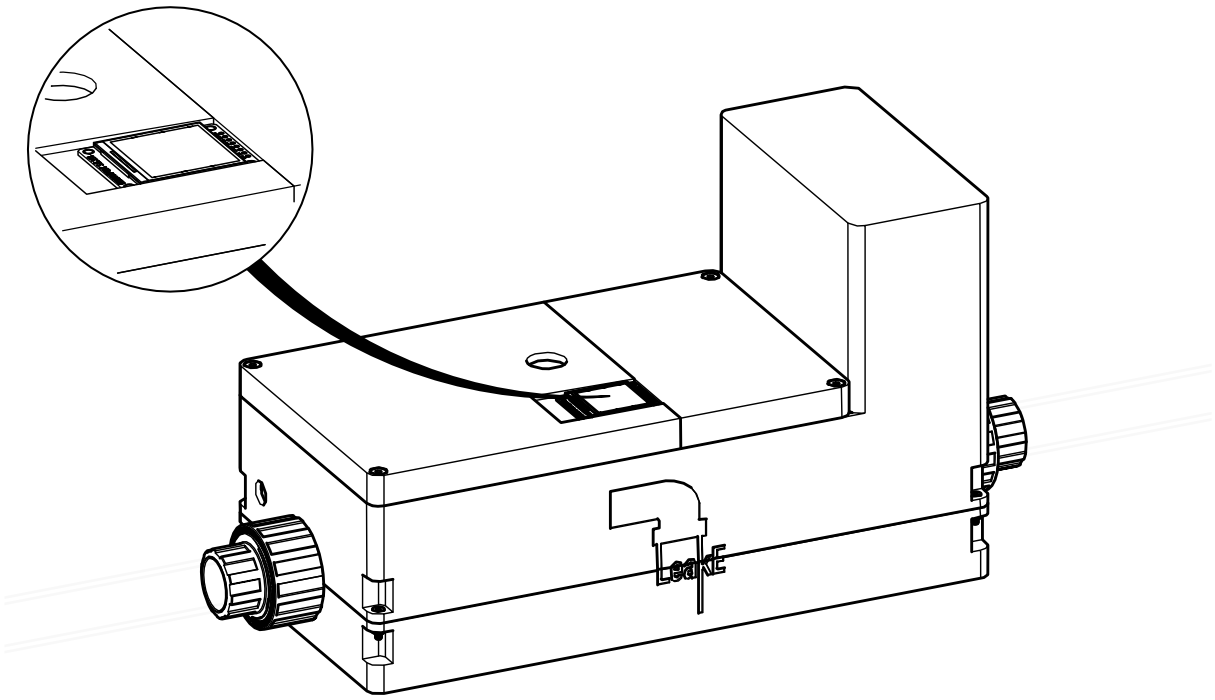


Figure 5: LCD on Device

Upon initial start-up, the device will be untrained and display "State: Untrained" on the LCD screen. Once the device detects pressure and water flow, it will automatically start training, and the screen will then show "State: Phase 1". During the first 24 hours of training, the device will learn your daily water habits. In the subsequent 24 hours, the screen will display "State: Phase 2", and the device will learn how long you spend using specific water fixtures. After 48 hours, the device will learn your water usage habits and utilize cloud services to improve performance. Through the web app, if you are unhappy with the performance of your device, you may force the device to re-enter the training process.

When powering up, after your device is trained, it will display its current state and show data readings, battery charge and Wi-Fi status. The different states of the device are shown below:

Table 5: States of the Device

Level	State	Description
1	Normal	No water usage
2		Minimal water usage
3		Average water usage
4		Above-average water usage
5		High water usage
6	Warning	Prolonged (minimal/average/above average/high) water usage
7		Untypical water usage
8		Untypical frequency response
9	Leak	Leak detected due to prolonged water usage
10		Leak was detected due to a very untypical usage pattern
11		Leak detected from a high-frequency response

Do not power the device and allow it to train before you intend to use water as you would daily. This is critical as it will affect the initial performance of the device.

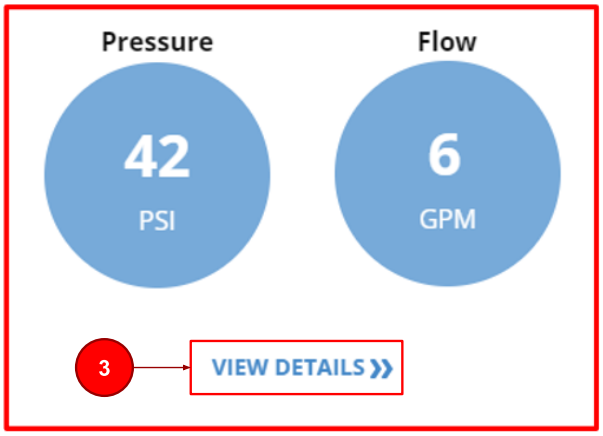
7 Troubleshooting Guide

7.1 General

7.1.1 Reset

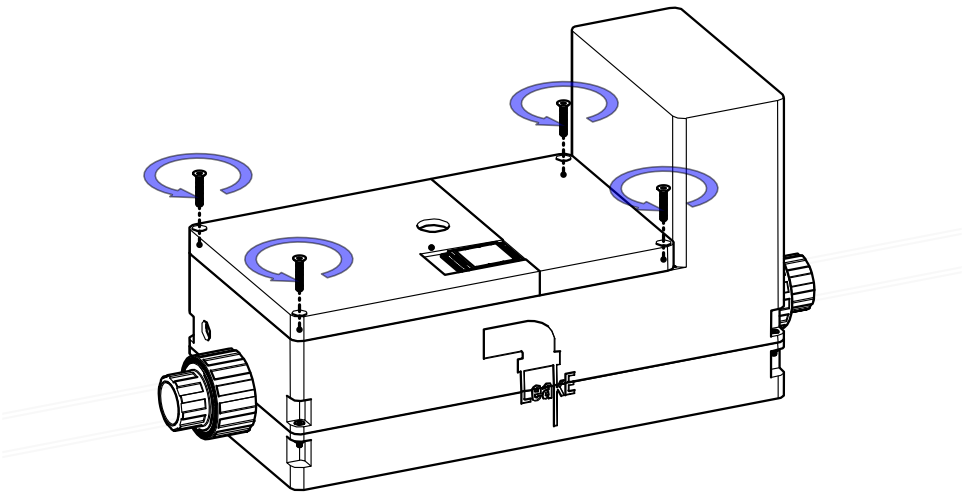
If your device is not working as expected, follow the following steps:

1. Ensure that the device is connected to the Wi-Fi.
2. Turn on a faucet in the house.
3. Open the app and see if it is logging real-time pressure data.



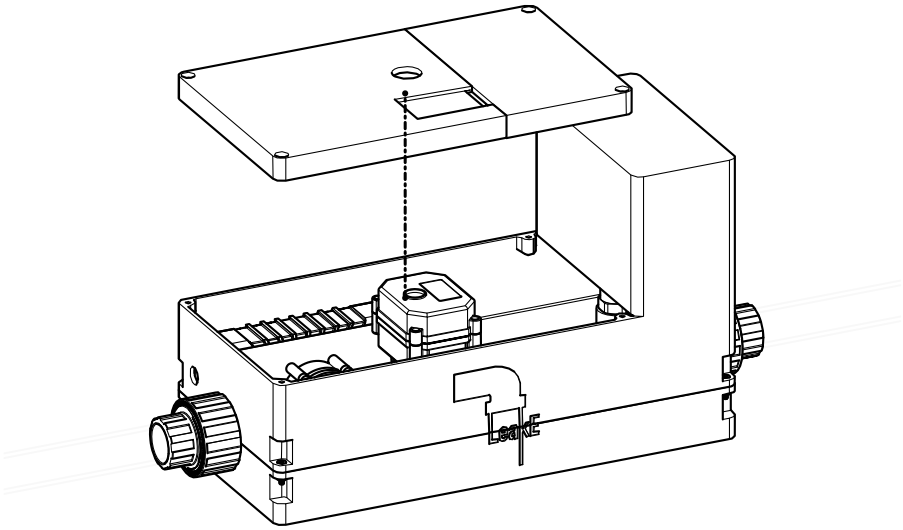
Under normal operations, comparing the history of the pressure, the pressure will decrease.

4. To open the housing, use the M4 hex keys (2.5mm) provided and loosen the four (4) M4 screws on the top corner of the box.



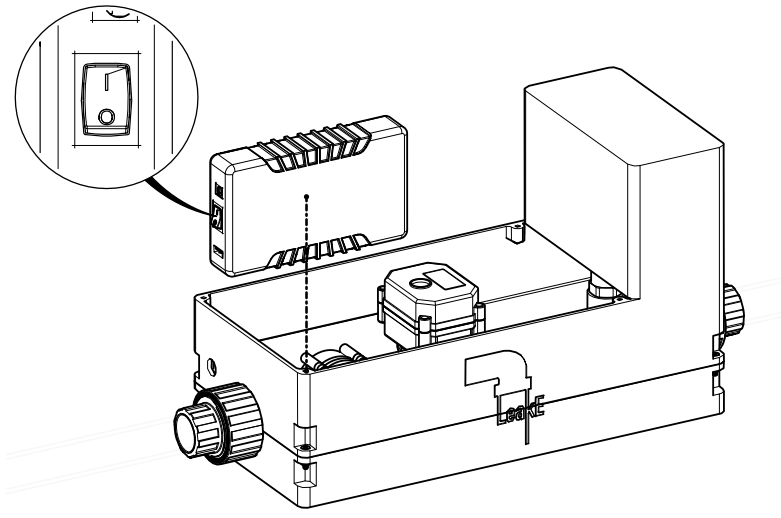
NOTICE Do not apply too much pressure on the screws while using the hex keys, as it may strip them.

5. Remove the lid from the device.



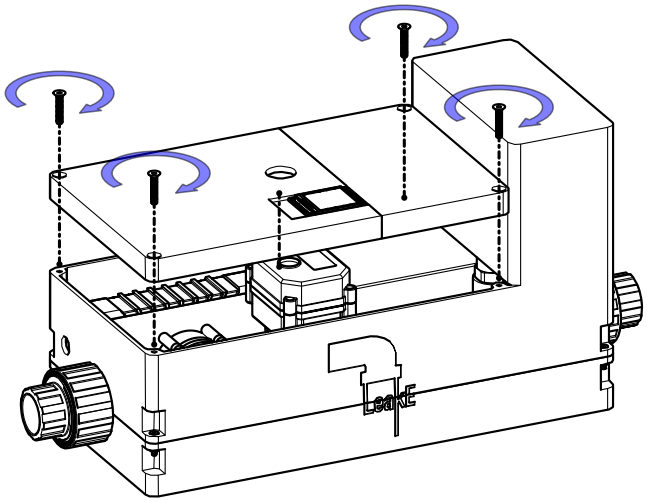
NOTICE Be cautious while removing the lid since pulling the lid too hard could cause the wires to disconnect.

6. Turn off the device's power and wait 10 seconds for a power cycle.



7. Turn on the device.
8. Open the app and see if it is logging real-time data.

9. Replace the lid by screwing down the four (4) M4 screws on the top corner of the box using the M4 hex keys (2.5mm) provided.



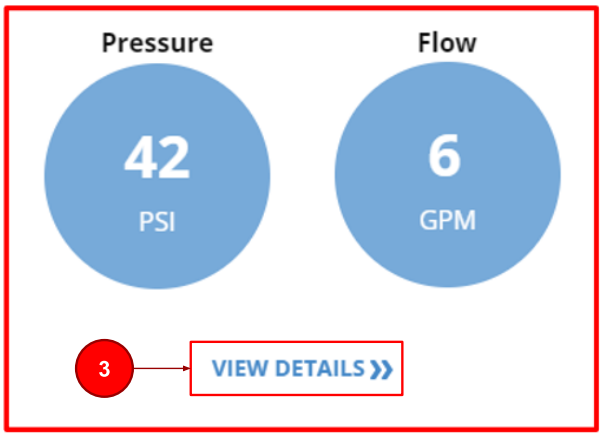
If the problem persists, please get in touch with Customer Support.

7.1.2 False Alarms

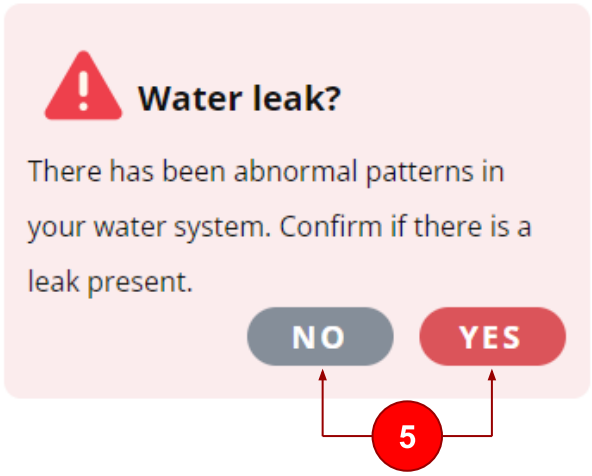
In the event of multiple false alarms, perform the following steps:

False alarms are a normal condition for a recently installed device. As the device learns your habits, the algorithm will slowly update and determine what is abnormal.

1. Ensure that no water is being used within the residence.
2. Open the app and see if it logs the real-time pressure and flow.
3. Look into the history of the pressure and flow data.



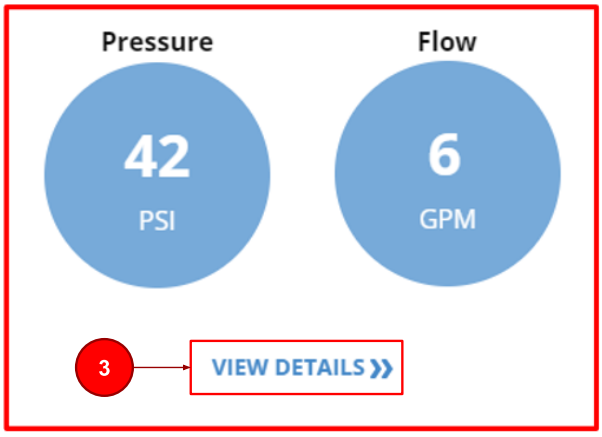
4. Validate if the leak is present or not within a 10-minute window.
    a. Pressure fluctuates and has a steady downward trend → **LEAK PRESENT**
    b. Pressure fluctuates and has no trend → **NO LEAK**
    c. Pressure is steady → **NO LEAK**
5. Input your selection on the app.



If the problem persists, please get in touch with Customer Support.

In the event of a notification due to a high-frequency response, perform the following steps:

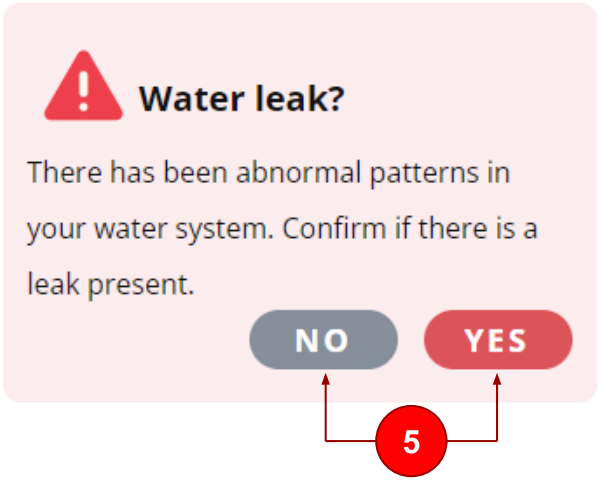
1. Ensure that no electronics are near the device.
2. Open the app and see if it logs the real-time pressure and flow.
3. Look into the history of the pressure and flow data.



4. Validate if the leak is present or not within a 10-minute window.
    a. Pressure fluctuates and has a steady downward trend → **LEAK PRESENT**
    b. Pressure fluctuates and has no trend → **NO LEAK**

c. Pressure is steady → **NO LEAK**

5. Input your selection on the app.



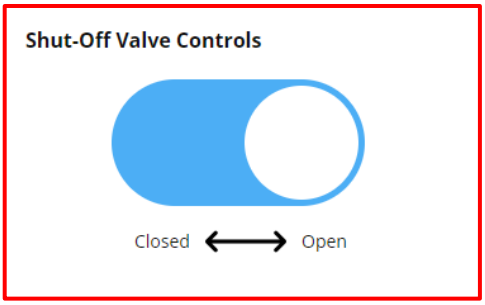
If the problem persists, please get in touch with Customer Support.

7.2 Valve

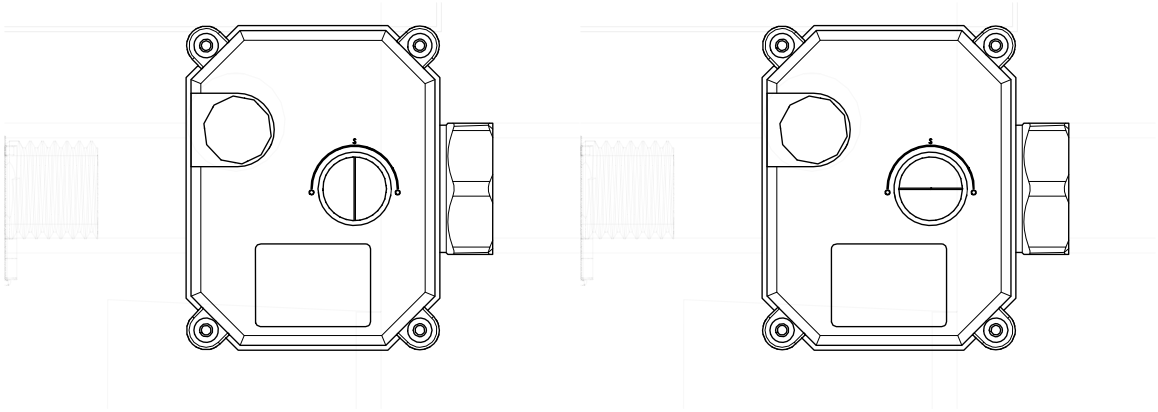
7.2.1 Valve Malfunction

To verify if the valve is non-functional, follow the following steps:

1. Ensure the device is connected to Wi-Fi
2. Toggle the Shut-Off Valve Controls



3. Visual inspection of the valve ensuring the red needle points to "S" for Closed and "O" for Open.

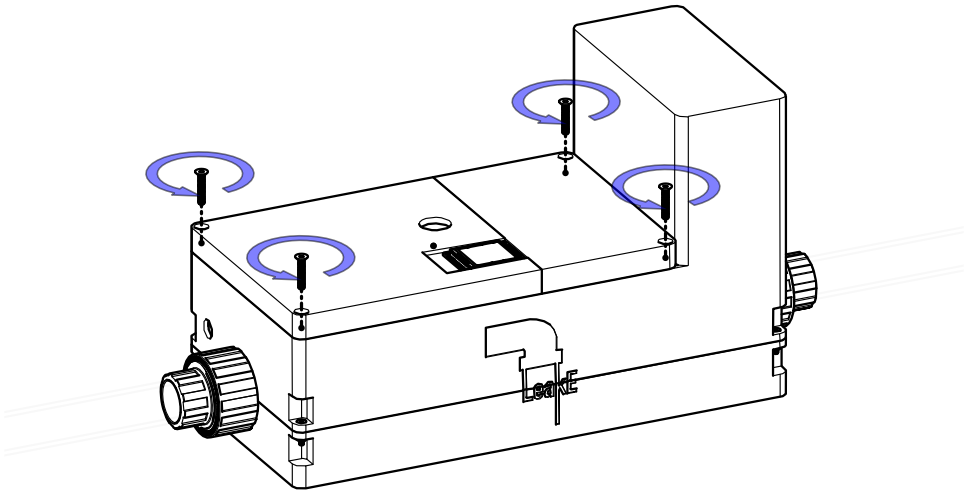


4. If the valve is not responding, please get in touch with Customer Support.

In the event of a non-functioning valve or power outage, carry out a manual override by taking the following steps:

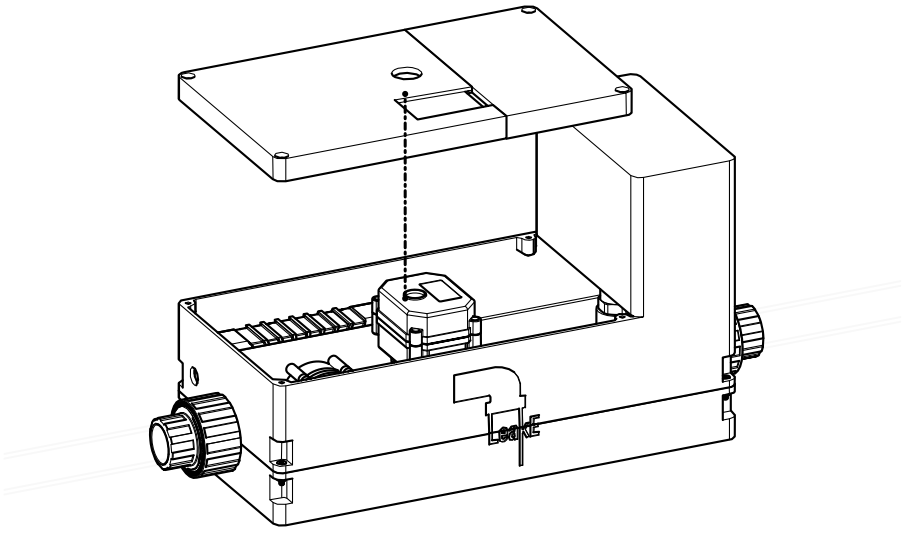
1. If the device has stopped the water supply and the website/app is not functioning, locate the manual override knob. Refer to *Section 8.4 Motorized Ball Valve,* for the technical specifications of the knob.

2. To open the housing, use the M4 hex keys (2.5mm) provided and loosen the four (4) M4 screws on the top corner of the box.



NOTICE Do not apply too much pressure on the screws while using the hex keys, as it may strip them.

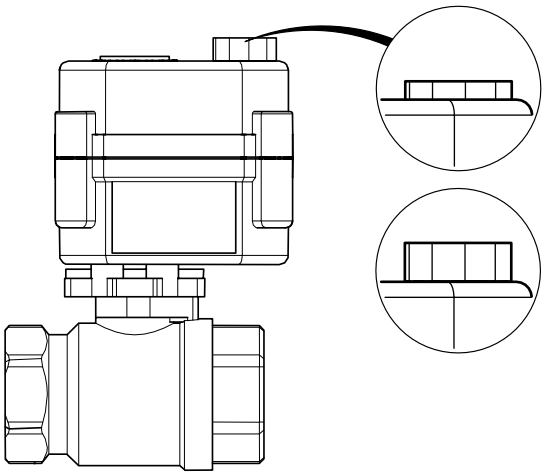
3. Remove the lid from the device.



NOTICE Be cautious while removing the lid since pulling the lid too hard could cause the wires to disconnect.

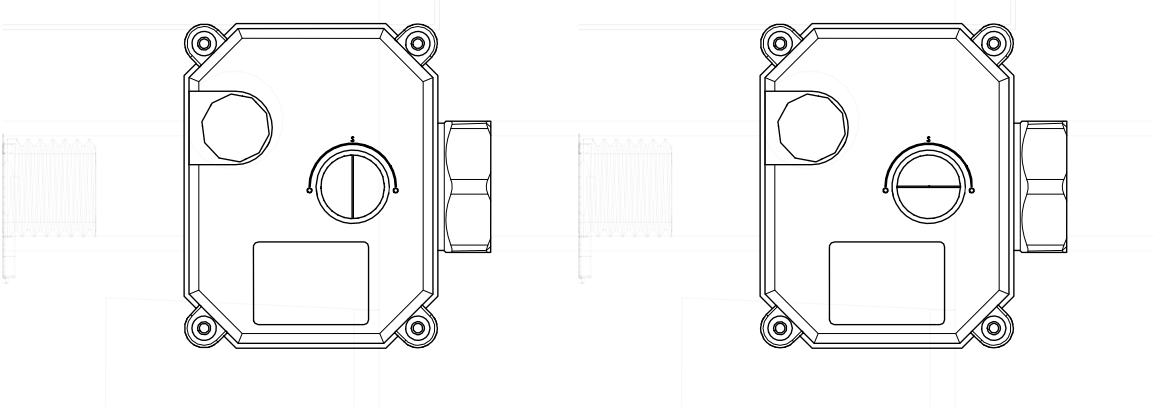
4. Pull out the knob until there is a small audible click.

The knob has slits on the sides where an Allen key can be inserted. Place the Allen key underneath to assist in pulling out the knob.

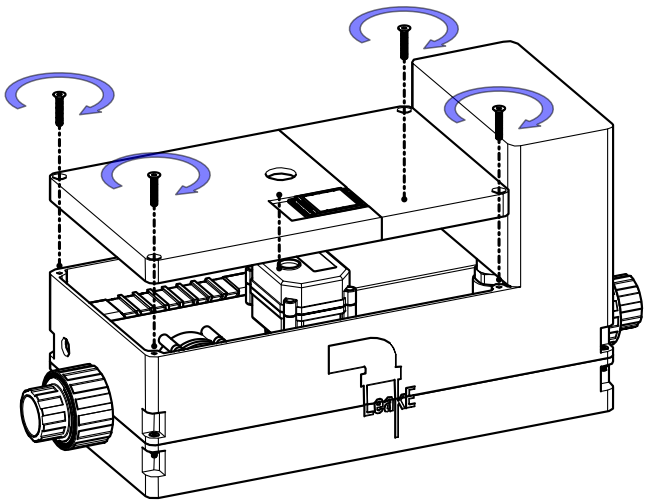


5. Turn the knob toward the "O" symbol until the water flows again.

NOTICE When the red needle in the indicator is pointing to "S," the valve is closed. When pointing to "O," the valve is open.



6. After you finish, push the knob back in so the chosen operation proceeds.
7. Replace the lid by screwing down the four (4) M4 screws on the top corner of the box using the M4 hex keys (2.5mm) provided.



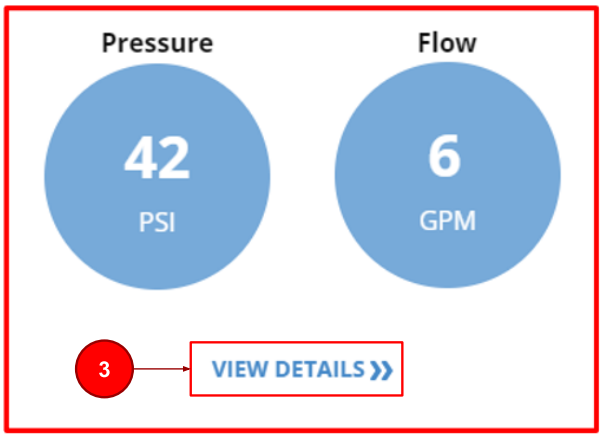
If the problem persists, please get in touch with Customer Support.

7.3 Calibration

7.3.1 Pressure Transducer Malfunction

In the event of a non-functioning pressure transducer, please take the following steps:

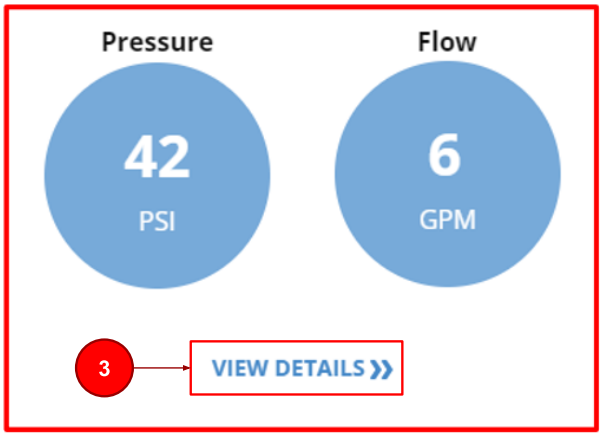
1. Ensure that no water is being used within the residence.
2. Open the app and see if it logs the real-time pressure and flow.
3. Look into the history of the pressure and flow data.



4. Ensure the flow is reading 0 and the pressure transducer reading is not fluctuating.
5. Contact LeakE Customer Support for the replacement of the pressure transducer.

7.3.2 Turbine Malfunction

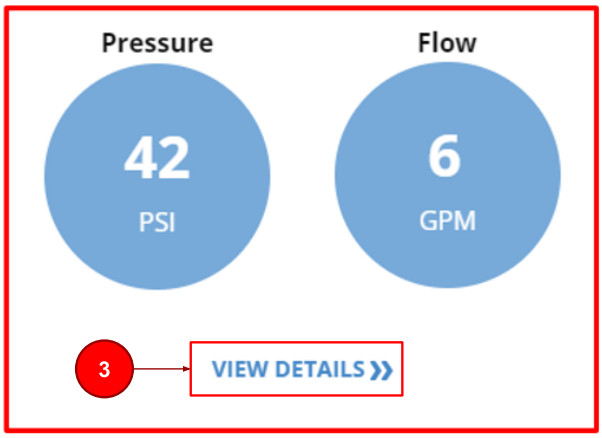
1. Ensure that no water is being used within the residence.
2. Open the app and see if it logs the real-time pressure and flow.
3. Look into the history of the pressure and flow data.



4. Ensure that the flow rate does not read 0.
5. Contact LeakE Customer Support for the replacement of the turbine.

7.4 Connectivity and Communication

1. Ensure that the device is connected to the Wi-Fi.
2. Turn on a faucet in the house.
3. Open the app and see if it is logging real-time pressure.

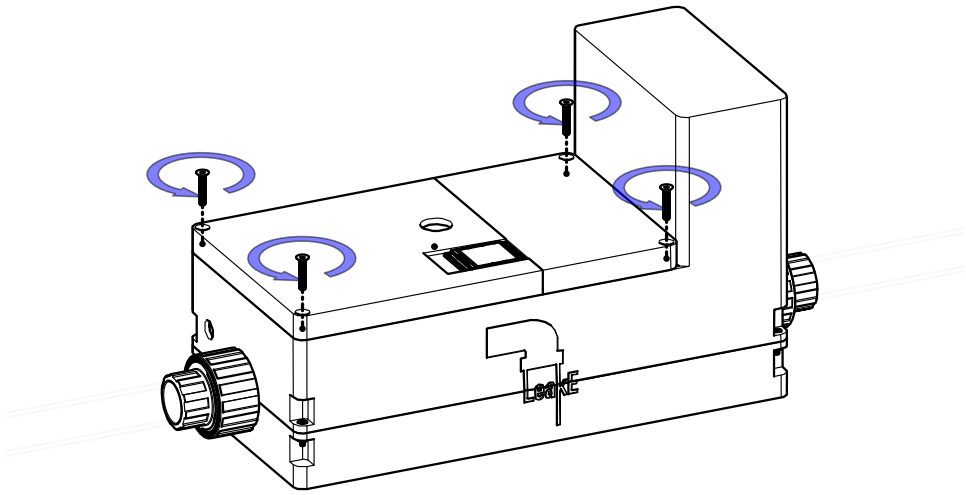


Under normal operations, comparing the history of the pressure, the pressure will decrease.

4. If it is not registering, restart Wi-Fi Router.

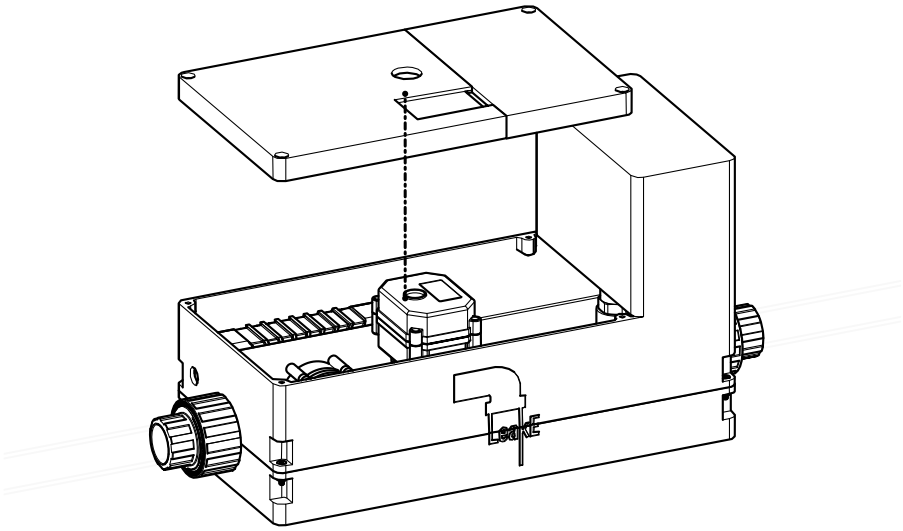
Update the Wi-Fi in the application to your latest SSID and Password.

5. Restart the device by opening the housing, use the M4 hex keys (2.5mm) provided and loosen the four (4) M4 screws on the top corner of the box.

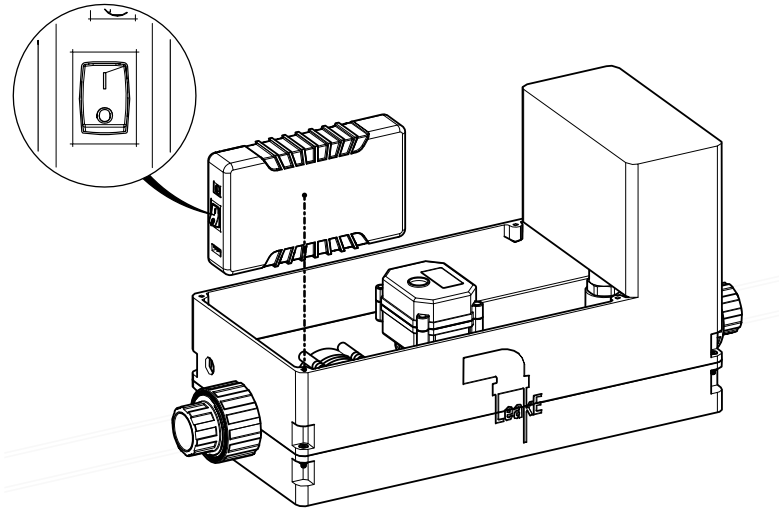


NOTICE Do not apply too much pressure on the screws while using the hex keys, as it may strip them.

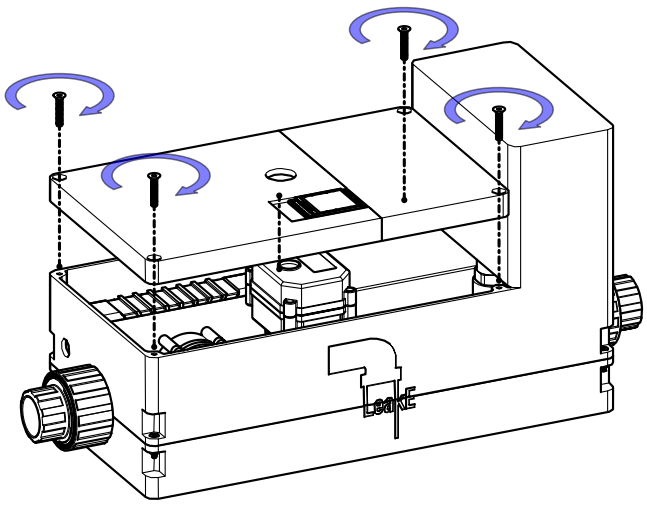
6. Remove the lid from the device.



7. Turn off the device's power and wait 10 seconds for a power cycle.



8. Turn on the device.
9. Open the app and see if it is logging real-time data.
10. Replace the lid by screwing down the four (4) M4 screws on the top corner of the box using the M4 hex keys (2.5mm) provided.



If the problem persists, please get in touch with Customer Support.

8 Technical Information

This section covers the technicalities of using the LeakE device or services intended for users, plumbers, or technicians. Information on the technical specifics of each mechanical and electrical component is presented.

8.1 Housing

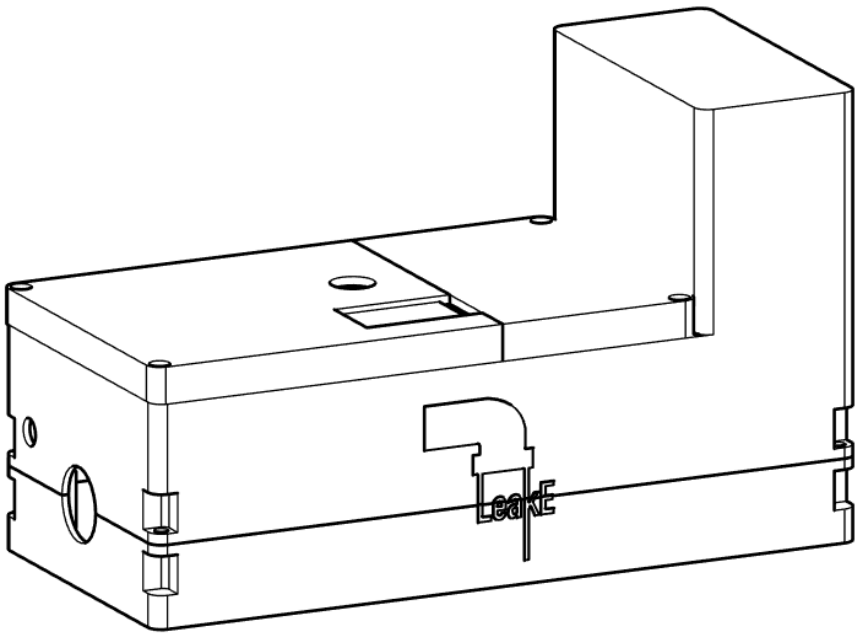


Figure 6: Housing

Table 6: Protective Housing Specifications

Property	Specification	Standards
Material	Polylactic Acid (PLA)	
Max. Size (Length x Depth x Height)	13.4 x 6.2 x 8 inches or 340 x 158 x 204 mm	
Tensile Strength at Yield	70 MPa	ISO 527
Strain at Yield	5%	ISO 527
Strain at Break	20%	ISO 527
Tensile Modulus	3120 MPa	ISO 527
Impact Strength at 23˚C	3.4 kJ/m^2	ISO 179
Moisture Absorption	1968 ppm	ISO 62
Melting Temperature	115±35°C	ISO 11357
Vicat Softening Temperature	60°C	ISO 306
Glass Transition Temperature	57°C	ISO 11357
Manufacturer	3D Printing Canada	

8.2 PVC Pipe

Pipe fitting and union joints are available in size ¾-inch of SCH-40 White, which is included with your purchased LeakE device. All pipe components in the device are made of PVC material. Please see the properties of the material below.

Low-temperature conditions reduce the impact resistance and flexibility of PVC pipes, such as 32°F (0°C) and below. If you live in a colder area, consider positioning the device in a location that will prevent it from freezing, such as a temperature-controlled environment, i.e. indoors.

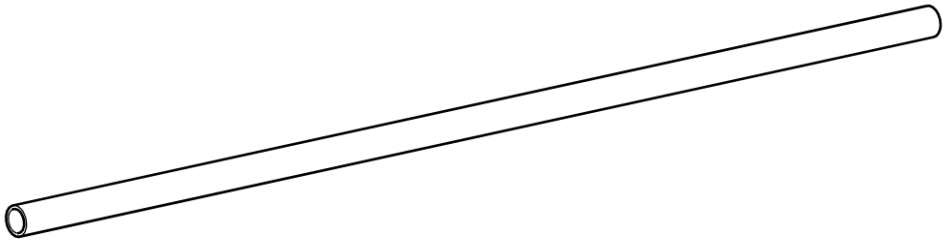


Figure 7: PVC Pipe

Table 7: PVC Material Properties

Property	Specification	Standards
Tensile Strength at 73°F (22°C)	400,000 PSI	ASTM D638
Compressive Strength	9,000 PSI	ASTM D695
Working Stress at 73°F (22°C)	2,000 PSI	
Maximum Operating Temperature Under Pressure	140°F (60°C)	
Deflection Temperature Under Load at 66 PSI	173°F (78°C)	
Deflection Temperature Under Load at 264 PSI	160°F (71°C)	
Manufacturer	IPEX Canada	

8.3 Turbine

The turbine is integrated into the electrical system, used for power generation, and sent back into the system. The turbine also assists with the reading of the flow.

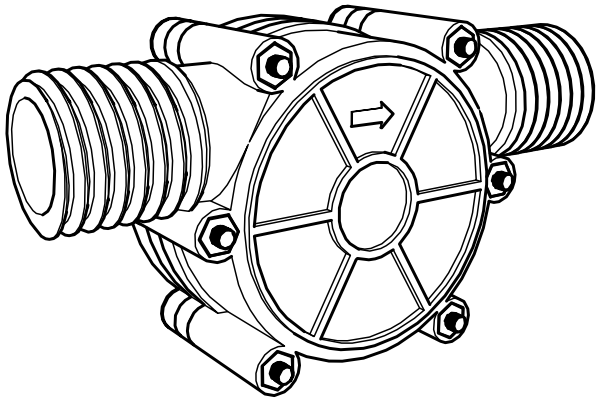


Figure 8: Turbine

Table 8: Turbine Specifications

Property	Specification
Material	Plastic
Weight	90 g
Output	Up to 12V DC/10W/220mA
Wire Resistance	10.5 ± 0.5 Ω
Insulation Resistance	10 MΩ (DC100)
Mechanical Noise	≤ 55dB
Lifespan	≥ 3000h
Start Pressure	0.05 MPa
Maximum Pressure (Outlet Closed)	0.6MPa
Manufacturer	Yosoo

8.4 Motorized Ball Valve

The motorized ball valve is used in the case of an emergency, which will allow the system to shut the water off. Additionally, the motorized ball valve comes with a manual knob to override the system in case of failures and water shut-off is needed.

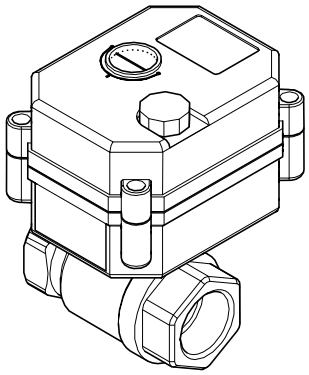


Figure 9: Motorized Ball Valve

Table 9: Valve Specifications

Property	Specification
Valve Type	Ball
Material	Stainless Steel
Inlet and Outlet Connection Size	NPT ¾ inch
Output	24V DC/AC/2W/500 Ma
Maximum Pressure	1.0 MPa
Torque Force	2 Nm
Working Temperature	0-100°C
Life Expectancy	50,000-100,000 times
Operating Time	3-5 seconds
Manufacturer	HSH-Flo

8.5 Pressure Transducer

A pressure sensor is a crucial component in a leak detector as it measures and monitors changes in fluid pressure within a system. By detecting variations in pressure, the sensor can identify potential leaks or abnormalities in plumbing systems.

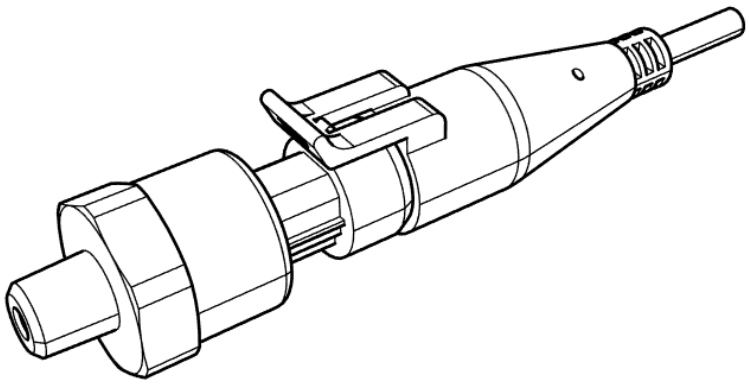


Figure 10: Pressure Transducer

Table 10: Pressure Transducer Specifications

Property	Specification
Material	Stainless Steel (body) with surge voltage protection function
Weight	74g (2.6oz)
Output Signal Type	Analog sensor
Thread	G1/4
Pressure Capability	Up to 100 PSI
Error %	0.5% at FS Including nonlinear, hysteresis error, and repeatability
Output	Linear 0.5V (0 psi)– 4.5V (100 psi)
Input	0V – 5V
Wiring	Red → Power Black → Ground Green → Signal
Manufacturer	Walfront

8.6 Rechargeable Battery

The technical details regarding the specifications of the rechargeable battery are listed in the table below. If you purchase a longer cable to reach an outlet in your home, ensure that it is compatible with the size of the battery's output port, DC5521.

To extend the service life of the battery, we suggest charging it every three months if long-term storage. It can be recharged without limitations, as the battery is designed for a slow charge process (6 hours for a full charge), which helps the battery pack last longer.

⚠ CAUTION Do not modify or disassemble the battery. Doing so will result in malfunction or failure to power the device properly.

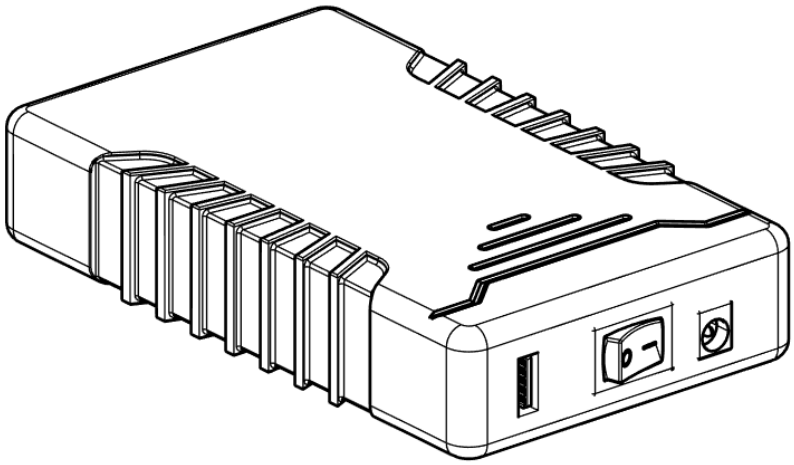


Figure 11: Rechargeable Battery

Table 11: Rechargeable Battery Specifications

Property	Specification
Weight	380 g
Power Cycle	2000
Output Port Size	DC5521
Input	12.6V/3A Max
Output Range	12.6-9V
Capacity	11.1V 6000mAh
Manufacturer	TalentCell

8.7 Microcontroller

Microcontrollers are essential in water leak detection as this is the system's brain. It utilizes sensors to make a judgement with the integrated AI and will notify users when a leak is detected. The microcontroller is the communication bridge between the device and the AWS server.

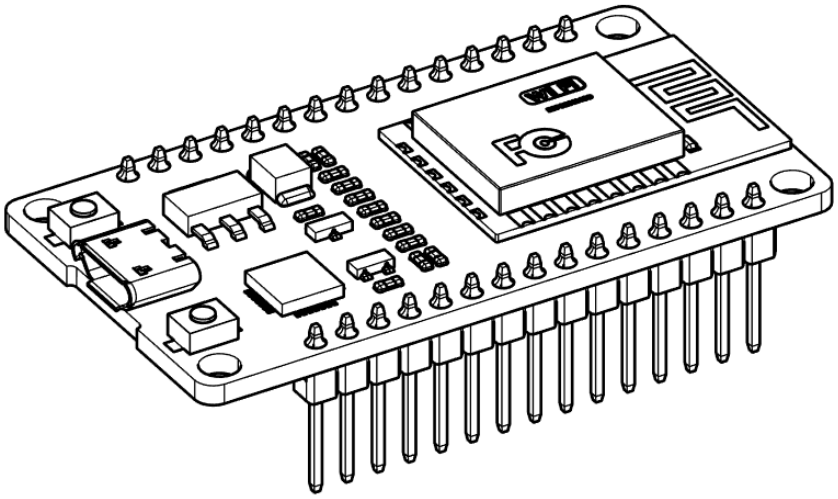


Figure 12: Microcontroller

Table 12: Microcontroller Specifications

Property	Specification
Type	ESP32 Development Board
Compatibility	Arduino
Mode	2.4 GHz dual-mode Wi-Fi and Bluetooth
Power Consumption	Ultra-Low
Peripherals	Capacitive touch sensors, Hall sensors, low noise sensor, SD card interface, Ethernet interface, high-speed SDIO / SPI, UART, I2S and I2C
Operating Systems	Windows, Linux
Manufacturer	ShopsPurch

8.8 LCD

Displays critical operating information and allows users to debug and troubleshoot the system.

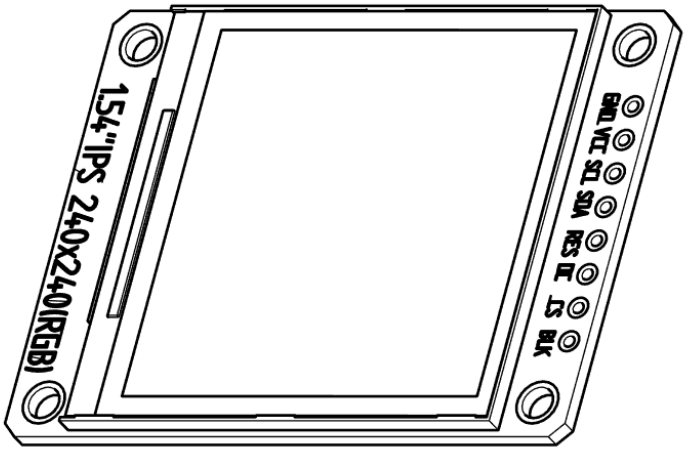


Figure 13: LCD

Table 13: LCD Specifications

Property	Specification
Screen Size	1.44 inch (3.66 cm)
Resolution	128 RGB x 160
Driver IC	ST7735S
Bus Speed of IIC	0 to 3.4 MHz
Applications	Arduino, ESP32, ESP8266, STM32
Pin Header	8-pin
Manufacturer	Omabeta

8.9 Web Application

The web application's responsive design was developed with NicePage and used Amazon Web Services (AWS) to get data from the device's sensors to the application. The website is authenticated with an SSL certificate using the HTTPS protocol. Therefore, it protects the user's login data and any information entered on forms and transactions.

The web app can be viewed across all major browsers, including Chrome, Safari, Firefox, and Edge.

9 Maintenance and Care

Regular maintenance and care are highly recommended to ensure your device works optimally for as long as possible. The following items are required for these actions:

- Cloth, rag, or towel
- Flashlight (recommended)
- Safety glasses
- Safety shoes

⚠ WARNING Personal Protective Equipment (PPE) is essential for ensuring the safety and well-being of the installer. Approved safety glasses and non-slip steel toe-shoes must be worn during installation. Failure to comply could result in death or severe injuries.

9.1 Regular Cleaning

Regular cleaning should be done approximately every six (6) months. Unplug the device during cleaning, then wipe off dust and debris with a damp cloth.

⚠ DANGER Do not use a damp cloth or any liquid cleaning product to clean the power cord's plug. If the plug requires cleaning, the entire device must be shut off, unplugged, and a dry cloth may be used to brush off debris. Failure to comply will result in death or severe injuries.

NOTICE Be careful when cleaning the LCD screen to avoid scratching it. Excessive pressure causing damage to the screen may affect the internal functionality of the device.

9.2 Regular Inspection

A regular inspection of the device's functionality and physical state should be done approximately every six (6) months. A flashlight can be used to ensure the inspection is thorough. Examine the union joints at the end of the device to see if any water leaks. The rubber seal may have failed and require replacement if a leak is present. If you are still within your warranty period, contact LeakE for this item.

An inspection should be done on the power cord to ensure no cuts or exposed wires. If damaged, cease use immediately. If you are still within your warranty period and the damage is from typical wear and tear, contact LeakE for a new unit.

⚠ DANGER Contact with a live, exposed wire may cause electrocution. Avoid contact with the damaged portion of the wire, unplug the device, and turn off the device. Failure to comply will result in death or severe injuries.

An inspection of the manual water shut-off should be done to ensure functionality. Complete the steps in *Section 7.2.1 Valve Malfunction* to test the manual override functionality.

9.2.1 Battery Inspection

Under rare circumstances, the battery in your device may not be holding a charge as intended when unplugged. To test your battery's status, unplug your device, and allow it to run on battery power for 2 hours. Once you return, your device should still be functioning on the battery's charge. Your battery should be replaced if it is not functioning when you return. If you are still within your warranty period, contact LeakE for this item.

9.3 Hard Water Maintenance

Your device may require more care if your residence has a hard water supply. Hard water has dissolved minerals (such as calcium and magnesium), which may cause buildup within the device, resulting in inefficient performance or breakage. If you suspect your device has mineral buildup, the device will have to be removed to be cleaned. The PPE listed at the beginning of *Section 9 Maintenance and Care* is required for this procedure.

NOTICE Hire a professional plumbing service to assist if required. Failure to comply could result in device damage and property damage.

1. Locate the main water shut-off valve and shut off the water.
2. Purge the system of the remaining water by opening a faucet or valve inside the residence until no more water comes out.
3. Unscrew the union joints at either end of the device, removing them from your water system line. Handle the device with care.
4. Run moderately warm water through the pipe of the device to dissolve the buildup. Continue until a visual inspection indicates the buildup has been removed.
5. Dry any water that may have ended up on the device's exterior.
6. Reinstall the device and ensure the union joints are securely tightened.
7. Turn on the main water line and resume device usage.

9.4 Data Management

If you have changed your internet connection setup at any point, it is recommended that you check your device's connection. For this, refer to *Section 5.2.6 Updating the* Wi-Fi.

Whenever you power the device on and off, or unplug the device from the outlet, check that the data is still being communicated. Open the web app/app and see if it logs the real-time pressure and flow. If not, refer to the steps in *Section 7.4 Connectivity and Communication.* If this still does not resume data communication, reset the device as specified in *Section 7.1.1 Reset.*

10 Customer Support

If you encounter any issues with the installation or performance of your device, do not hesitate to contact the team at LeakE for assistance. Refer to *Section 5.2.4 Contact Us* for the steps and method of contacting the team.

We hope to assist you with any questions or issues with your device. We will reply to your message as soon as we can. Please expect up to five (5) business days for a response from one of our representatives.

11 FAQ

1. **How does the water leak detector work?**
   - The water leak detector proactively monitors the water in the plumbing system and inspects for leaks and other irregularities. By detecting the pressure and flow rate through the sensors, it records typical water usage in the home. When an anomaly in water usage is detected, the AI algorithm compares it to previously collected normal data and determines the likelihood that it is a leak. It will close the valve and shut off all the water in the system if it detects a leak, preventing water damage and lowering repair expenses.

2. **Can the water leak detector be installed with different types of plumbing systems?**
   - The water leak detector is intended for use on potable water lines made of PVC, copper, and PEX only and should not be installed on galvanized steel or iron. It is also not recommended on a well system. This is because non-potable water could contain impurities or debris that compromise the water leak detector's ability to operate safely. Please consult with a professional if you are unsure. Residences systems are unique and may not be compatible.

3. **Where is the recommended location for installing the water leak detector?**
   - The recommended location for installing the water leak detector is on the main water line and downstream after the shut-off valve and PRV.

4. **Where is my house's water supply and pressure-reducing valve (PRV)?**
   - Usually, your main water line will come through the foundation near the front of your house. Often, there are access points for it in basements or crawlspaces; however, this may vary. The PRV will typically be right after the main water line shut-off valve.

5. **How do I purge my system of all the water?**
   - Before any tube or pipe cutting, you must purge all the water from the plumbing system. Shut off the main water supply line using the manual valve to purge the water. Open all the fixtures/faucets inside the home to relieve pressure in the water pipes.

6. **The device detects leaks when I don't see one. What should I do?**
    - During the initial training process after installing the water leak detector, "false alerts" may frequently occur as it teaches the typical behaviours and patterns in your water usage. Please refer to *Section 7.1.2 False Alarms,* to see the steps to resolve the situation.

7. **Can the water leak detector be plugged into outdoor or wet environments?**
    - Although the water leak detector is designed to be waterproof, we cannot guarantee that your home's outdoor outlets are properly covered and protected from moisture in wet conditions, such as rain and snow. This device is not recommended in an outdoor or wet environment because it can cause electric shocks, short circuits, and electrical fires and risk damage to your property and the water leak detector.

8. **Are there any troubleshooting tips for common issues with the water leak detector?**
    - The best tip recommended is to reset the device. Please refer to Section 5.2.5 on how to reset the device on the app or *Section 7.1.1 Reset* on how to reset the device manually.

9. **What types of alerts or notifications does the water leak detector provide?**
    - If the water leak detector finds unusual water usage, you will receive an alert/notification on your phone. Then you can navigate through the web app to further inspect the activity. Please refer to *Section 5.2.3 Looking at History*. It will also display the status on the LCD screen. Please refer to *Section 6 Operation*.

10. **How do I test the functionality and proper operation of the water leak detector?**
    - To test the general functionality of the water leak detector, attaching one end of the device to a hose and checking if the app provides any data or readings from the sensors are recommended. Adjust the water flow from your hose and verify if the web app updates as needed. Please refer to *Section 5.2.3 Looking at History*. You can also check the functionality of the valve by turning the valve on and off in the web app. Please refer to *Section 5.2.2 Controlling the Valve*.

11. **Can the water leak detector withstand the effects of hard water?**
    - Yes, although to ensure it does, we recommend regularly maintaining and caring for the water leak detector by following *Section 9.3 Hard Water Maintenance*.

12. **Does adding the water leak detector to my plumbing system lower the water pressure or flow rate?**
    - The water leak detector does not significantly affect your plumbing system's pressure or flow rate. It will slightly reduce them, but it is not obvious in your daily water usage.

13. **Is power required for the water leak detector? Does it turn off when there is a power outage?**
    - The water leak detector must be plugged into a standard 120V outlet for power. In a power outage, the rechargeable battery will last six to eight hours before recharging.

14. **Is there a monthly subscription?**
    - There are currently no monthly subscriptions to operate the water leak detector fully. All the features and the web app are accessible with the one-time purchase of your device.