AquaVision Sani

Product Manual

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Contents

1 Product info **3**
- 1.1 Product overview . . . 3
- 1.2 Hardware overview . . . 4
- 1.3 Features . . . 4
  - 1.3.1 Leak detection . . . 4
  - 1.3.2 Communication . . . 4
  - 1.3.3 User interface . . . 5
- 1.4 Recommended Setup . . . 5

2 Installation **6**
- 2.1 Mounting instructions . . . 6
- 2.2 Wiring instructions . . . 6
  - 2.2.1 Ethernet connection (optional) . . . 9

3 Configuration **10**
- 3.1 Logging in . . . 10
- 3.2 System settings . . . 10
- 3.3 Network settings . . . 12
- 3.4 Water meter settings . . . 14
  - 3.4.1 General settings . . . 14
  - 3.4.2 Action settings . . . 15
  - 3.4.3 Leak detection parameters . . . 16
- 3.5 Communication settings . . . 18
  - 3.5.1 Modbus settings . . . 19
  - 3.5.2 SMTP settings . . . 19

4 Usage manual **21**
- 4.1 Status page . . . 21
- 4.2 Consumption . . . 22
  - 4.2.1 Overview . . . 22
  - 4.2.2 Viewer . . . 22
  - 4.2.3 Live flow . . . 23
- 4.3 Events . . . 24

5 Development **25**
- 5.1 Planned features . . . 25
- 5.2 Custom feature requests . . . 25

Appendices **26**

A BREEAM compliance **26**
- A.1 Overview of standards . . . 26
- A.2 BREEAM New Construction V7.0 . . . 26
- A.3 BREEAM New Construction V6.0 and V6.1 . . . 27
- A.4 BREEAM In-Use V6.1 . . . 27
- A.5 BREEAM-NL Nieuwbouw . . . 28

B Modbus **30**
B.1 Input registers 30
B.2 Holding registers 31
B.3 Modbus RTU common issues 32

C Legal Disclaimer **34**

1 Product info

1.1 Product overview

The **AquaVision Sani** is an intelligent water monitoring system that detects leaks and excessive water consumption in buildings. Due to high resolution flow measurements, **very accurate leak detection** can be achieved with very few false positives. The **AquaVision Sani** is a **leak detection system** specifically **designed for sanitary and utility spaces**, such as bathrooms, kitchens, janitorial rooms, . . . The device **shuts off the water supply by default** and opens it when the dedicated digital input is activated (e.g. by a motion detector or BMS). This guarantees water loss prevention during the absence of people. Additionally, the **AquaVision Sani** will detect leaks by observing changes in pressure in the pipe.

Integration with building management systems can be achieved using either **Modbus TCP or RTU**. An Ethernet connection to the technical network is recommended, to allow users access to the device's interface without needing to be on site or have physical access.

Combining the AquaVision Control with one or more AquaVision Minis or AquaVision Sanis creates a more complete, **standalone water management system**: While the AquaVision Control monitors the main water supply pipes, the Mini and Sani can be used to monitor specific areas or applications within the building. Using the AquaVision Control's **remote device management capabilities**, it can communicate with the Mini and Sani units, allowing for a single interface to monitor all leak detection devices.

The device has been **designed to conform to BREEAM standards** for water leak detection and monitoring (see BREEAM overview). As a service, **maintenance contracts** are available to receive regular software updates and maintenance on-site. Contact our sales team for more information.

1.2 Hardware overview

Physical specifications

Enclosure	108 x 90 x 60 mm 6 DIN units IP20	**Power**	230 VAC 9 W
User Interface	On-board web server	**Communication**	10 Mbps Ethernet (RJ45) Modbus RTU (RS485)
Water Meter Inputs	1 connection Analog or digital pulse Max. 20 Hz	**Valve Outputs**	1 connection 230 VAC Max. DN32
Additional I/O	Pressure sensor motion sensor Alarm Relay (NO/NC)		

Table 2: Hardware specifications

1.3 Features

1.3.1 Leak detection

Sanitary facilities are a **unique environment** with specific water usage patterns, often having intermittent water usage, making leaks difficult to detect with traditional flow-based methods. The AquaVision Sani 's leak detection is **designed differently from other AquaVision models** to address these specific challenges. Based on the **pressure and motion sensors**, the system implements a **unique leak detection method** particularly suitable for sanitary applications, where leaks are most likely to occur.

The AquaVision Sani module is designed to **turn off the water supply when no motion is detected** after a set period of inactivity. This **limits the impact of any potential leaks**, **prevents water waste when the area is unoccupied**, and ensures that water is only supplied when the area is actively in use. While the water supply is turned off, the system **continuously monitors the pressure in the pipe and detects any drops**. This allows the system to **detect leaks even when there is no water flow**, such as a dripping tap or continuous flushing.

1.3.2 Communication

The AquaVision Sani supports multiple ways to communicate with users, other systems and devices:

- **Ethernet**: For remote access and additional features such as email notifications and SFTP reporting.
- **Modbus TCP/IP**: For integration with building management systems over the local network and communicating between AquaVision modules.
- **Modbus RTU**: For integration with building management systems over an existing RS485 network and communicating between AquaVision modules.
- **Email notifications**: For sending alerts via SMTP (email) in case of detections or system events.
- **User configurable relay**: NO/NC relay for triggering external systems or actuators.

1.3.3 User interface

Every AquaVision device hosts a web server that can be accessed over the local network, allowing users to monitor and configure the system from any device with a web browser. The user interface allows users to:

- Configure the system.
- Change leak detection parameters.
- View real-time water usage data.
- See consumption analytics such as daily and weekly average water usage.
- View historical consumption graphs to analyze trends.
- Manually open or close valves.

Info

The AquaVision Sani is designed to be connected to the network or used in conjunction with an AquaVision control, a building management system or any other monitoring system. A Modbus TCP or RTU connection is required for monitoring while network access is required for accessing the device's interface and using more advanced features.

1.4 Recommended Setup

Figure 1: AquaVision Sani - Simplified usage diagram

To operate correctly, the AquaVision Sani must be connected to a water meter equipped with a pulse module, an electronic valve, and a pressure sensor. The motion input can be connected to a motion sensor, a BMS, or any other device that can provide a signal to indicate when the area is in use. An Ethernet connection is required to access the user interface and configure the system. When completely configured, either an Ethernet or Modbus RTU connection can be used to monitor and control the system.

Danger

Never install motorised valves on pipes that supply fire suppression systems, as this poses a serious fire safety hazard.

2 Installation

2.1 Mounting instructions

The AquaVision Sani is designed to be installed on a standard DIN rail. Install it inside an electrical cabinet or weatherproof enclosure fitted with a DIN rail. The module's housing has a built-in clip on the back, allowing for easy installation and removal from the rail. A small tab on the bottom of the module can be pulled up to release the module from the rail when needed.

The device should be mounted in a location where it can easily access the water meter and valve it will be controlling. For easy access, the device should be in a location where the front of the device can be easily accessed for installation, maintenance and troubleshooting, and where cables can be easily routed to the device.

⚠ Warning

Always use appropriate fasteners for the surface you are mounting on. Damage due to improper installation will not be covered under warranty.

⚠ Warning

Never mount the device in a location where it can be exposed to direct water contact. Improper installation can damage the device and void the warranty.

2.2 Wiring instructions

Power

1. Turn off the power to the circuit where the AquaVision Sani will be installed.
2. Locate the power terminals on the bottom left of the module.
3. Strip the outer sheathing of the power cable to expose the inner wires ($\pm 5cm$).
4. Strip the inner wires to expose the copper conductors ($\pm 8mm$).
5. When using multi-stranded cable, crimp ferrules on the stripped ends of the power cable.
6. Temporarily turn on the power to the circuit where the AquaVision Sani is installed.
7. The light on the bottom right of the module should illuminate. If the device does not power on, check the power connections and circuit breaker.
8. If the device powers on and boots correctly, shut it down again and switch off the power to continue with the installation.

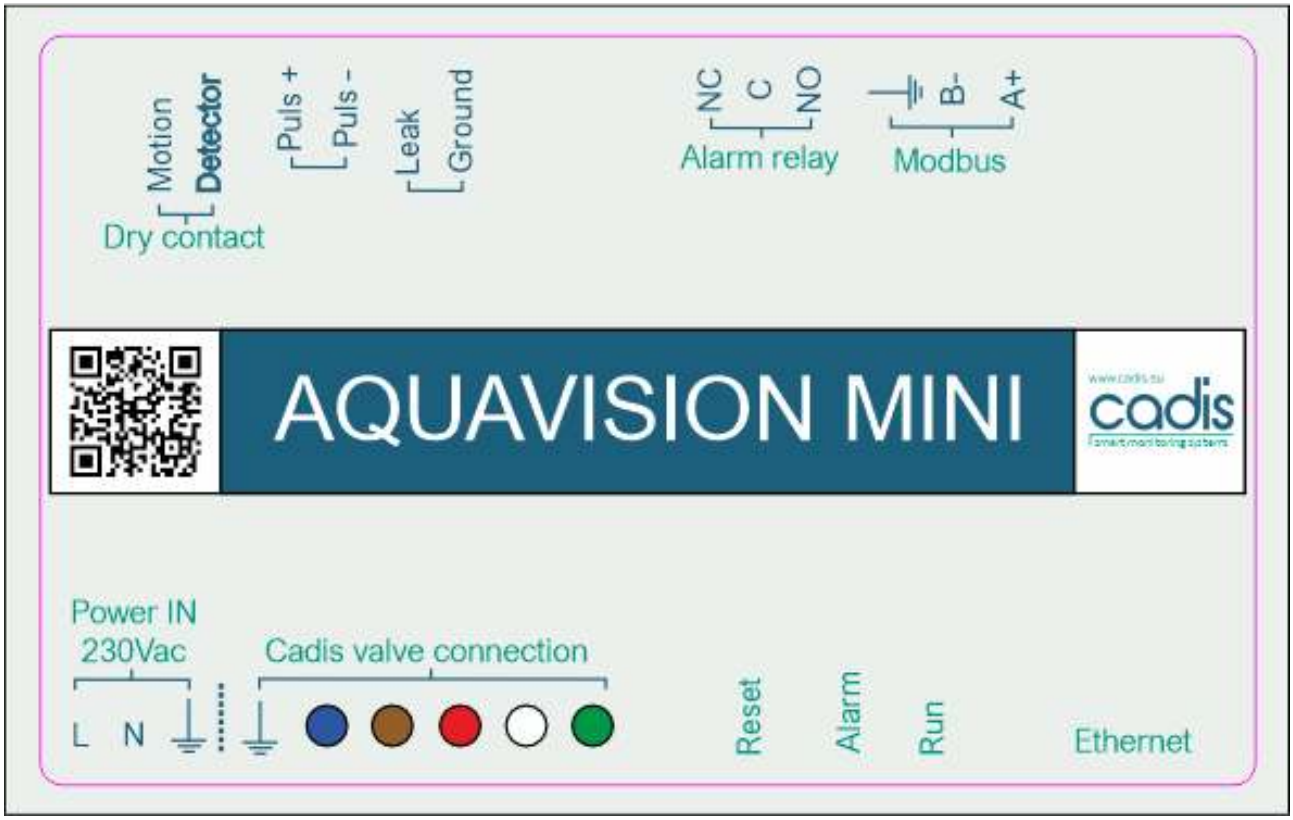


Figure 2: Connectors on the AquaVision Sani

Info

When using multi-stranded cable, it is recommended to use crimp-on ferrules. Always use the correct size of ferrule for the wire gauge you are using to ensure a secure connection and prevent damage to the device.

Water meters

1. Locate the water meter inputs on the top left of the module.
2. Strip the inner wires of the cable to expose the copper conductors ($\pm 8mm$).
3. Crimp ferrules on the stripped ends of the water meter cable. Make sure to use the correct size for the wire gauge you are using.
4. Connect the water meter to the correct input on the circuit board.

Info

It is very important to keep the wires of the water meters as short as possible and away from any high voltage cables, as these can cause interference and lead to false readings.

Motorised valves

1. Locate the valve output connections on the bottom left of the circuit board, next to the power connection (See Figure 2 D).
2. Strip the outer sheathing of the valve cable to expose the inner wires ($\pm 10cm$).
3. Strip the inner wires to expose the copper conductors ($\pm 8mm$).
4. Crimp ferrules on the stripped ends of the valve cable. Make sure to use the correct terminals for the wire gauge you are using.
5. Connect the valve cable to the corresponding valve output on the circuit board.

⚠ Warning

Connecting the valves incorrectly will prevent the module from closing the right valve or even close the wrong valve when a leak is detected.

Modbus RTU

1. Locate the Modbus connections on the top right of the module.
2. Unscrew the cap nut from the cable gland closest to the Modbus connections and thread the Modbus cable through.
3. Pull the Modbus cable through the cable gland.
4. Strip the outer sheathing of the Modbus cable to expose the inner wires ($\pm 10cm$) and the shielding.
5. Strip the inner wires to expose the copper conductors ($\pm 8mm$).
6. If the cable has a drain wire, strip it and twist it together with the shielding.
7. Crimp ferrules on the stripped ends of the Modbus cable. Make sure to use the correct terminals for the wire gauge you are using.
8. Connect the Modbus cable to the Modbus connections you identified before.
9. Connect the shielding and/or drain wire to the ground connection.
10. Screw the cap nut back onto the cable gland to secure it into place.

Info

Always use shielded twisted pair cable for Modbus connections to ensure reliable communication and prevent interference. Double-check that Modbus A and B wires are connected correctly, as reversing these will prevent communication with the device.

2.2.1 Ethernet connection (optional)

The AquaVision Sani has an Ethernet port at the bottom right of the device. This connection gives access to the device's user interface for monitoring and configuration. An internet connection is required for advanced features such as email notifications and remote access.

1. Lay an Ethernet cable (Cat5e or higher) from the AquaVision Sani to an available network switch or router.
2. Terminate both ends of the Ethernet cable with an RJ45 connector if needed.
3. Locate the Ethernet port on the bottom right of the AquaVision Sani enclosure.
4. Connect the Ethernet cable to the RJ45 port on the AquaVision Sani .
5. Plug the other end of the Ethernet cable into the network switch or router.
6. Make sure the network switch or router is powered on and connected to the local network or internet as needed.
7. Verify the network connection after powering on the AquaVision Sani by checking the network status indicator on the device or going to the device's user interface.

3 Configuration

3.1 Logging in

To maintain system security, access to settings pages and sensitive controls is restricted. Without signing in, users are limited to a minimal interface that includes only the status page and basic system information. For full access over the network, users must log in. When logging in for the first time, the following default credentials can be used:

- **Username**: `user`
- **Password**: `user`

⚠ Warning

It is recommended to change the password after the first login to prevent unauthorized access. If the password is forgotten, contact Cadis support for assistance.

3.2 System settings

The system settings provide some basic information about the module like the software version and serial number. It also provides the option to configure some basic parameters of the device. These settings include the device name, language and time zone as well as the reactions to some system level alarms.

Those who bought a Moni-Saver or SSV module in the past and received a software upgrade to the latest version might need to turn on legacy valve control mode. This setting inverts the functionality of the valve outputs, as the older modules closed the valves by default while the new modules are normally open. Only change this setting if the functionality of the valves is reversed, i.e. the valves close when you try to open them and open when you try to close them.

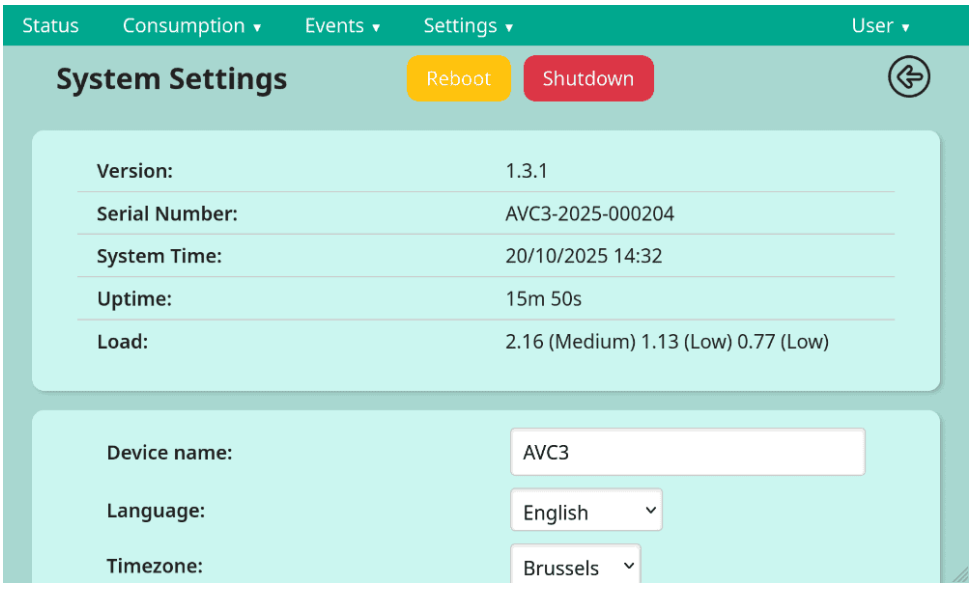


Figure 3: System settings page

System events

Included in the system settings are system events and their related actions. These events are related to the system as a whole, meaning that they are not specific to a single water meter.

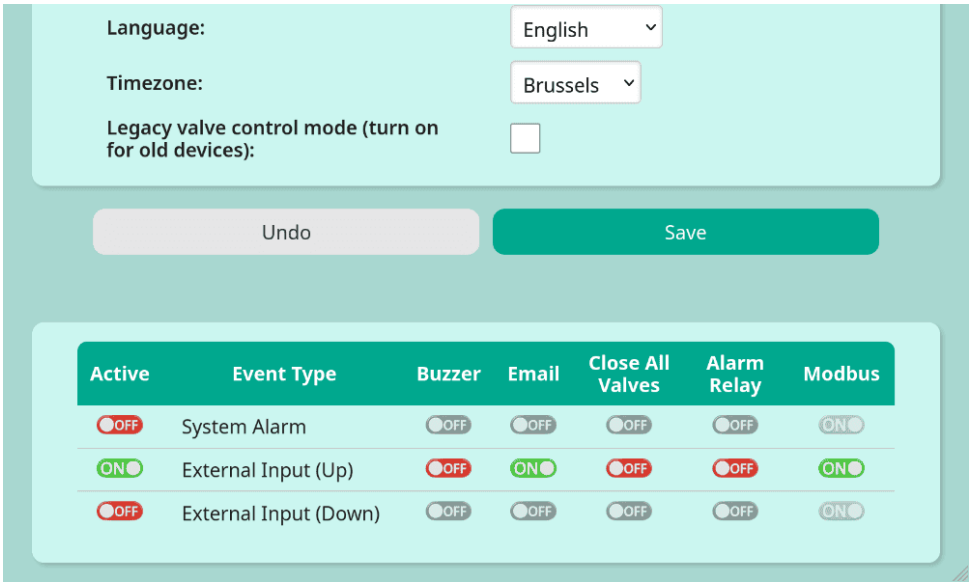


Figure 4: System alarms

System alarm	This event is triggered when a system error occurs, such as a hardware failure or a critical software error.
External input (up)	This event is triggered when the external input is activated.
External input (down)	This event is triggered when the external input is deactivated.

Table 4: System event types

Info

External input (up/down) events will automatically be acknowledged when the state of the external input goes back to normal. For example, if the external input is connected to a flow switch, the external input (up) event will be triggered when the flow switch is activated and acknowledged automatically when the flow switch is deactivated again.

Active	Enable or disable all actions for the given event type. If disabled, no actions will be taken when the event occurs and the event will not be logged.
Ring buzzer	Activate the buzzer. The buzzer will keep ringing until the user acknowledges the event or mutes it from the status page.
Send email	Send an email notification when the event occurs. Emails can only be sent if the SMTP settings are correctly configured.
Close all valves	Closes all valves connected to the AquaVision Sani when the event occurs. This will only work if valve control is enabled in the general settings and all valves are correctly connected and enabled.
External alarm	Trigger the on-board NO/NC alarm relay.
Modbus alarm	Update the value in the Modbus registers. Useful for integration with building management systems.

Table 6: Action settings for system events

Time settings

The time settings are used to configure the time on the module. This is important for accurate logging of events and proper functioning of time-based features such as scheduled reports and actions. The time can be set manually or automatically via NTP. Make sure your module has access to the internet if you want to use NTP to keep the time up to date.

Firmware Update

This form allows users to upload new firmware to the device. Firmware updates are released periodically to add new features, improve performance, and fix bugs. To update the firmware, download the latest firmware file from the Cadis website and upload it using this form. Make sure to follow the instructions provided with the firmware update to ensure a successful update process. Updating the firmware may cause a temporary disruption in service, so it is recommended to perform updates during a maintenance window or when the device is not in active use. This firmware update can take several minutes to complete, and it is important not to power off the device or interrupt the update process once it has started, as this can cause damage to the device or result in an incomplete update.

It is recommended to back up your settings before performing a firmware update, as some updates may reset the device to factory settings. If the firmware update fails or the device becomes unresponsive after the update, contact Cadis support for assistance. If you are unsure about how to perform a firmware update, please contact Cadis support for guidance or request an intervention.

3.3 Network settings

The network page shows the device's LAN network information including the current IP and MAC address of the device. These parameters are important when troubleshooting network issues or when configuring other devices to communicate with the AquaVision Sani .

When logged in, the network settings page allows the user to configure the device's network parameters, such as IP address, subnet mask, gateway, and DNS servers. Both DHCP (automatic) and static (manual) IP configuration are possible. To ensure reliable communication, make sure the network settings match your

local network configuration. Incorrect settings may prevent the device from connecting to your network or communicating with other devices. If you are unsure about the correct network parameters, consult your network administrator.

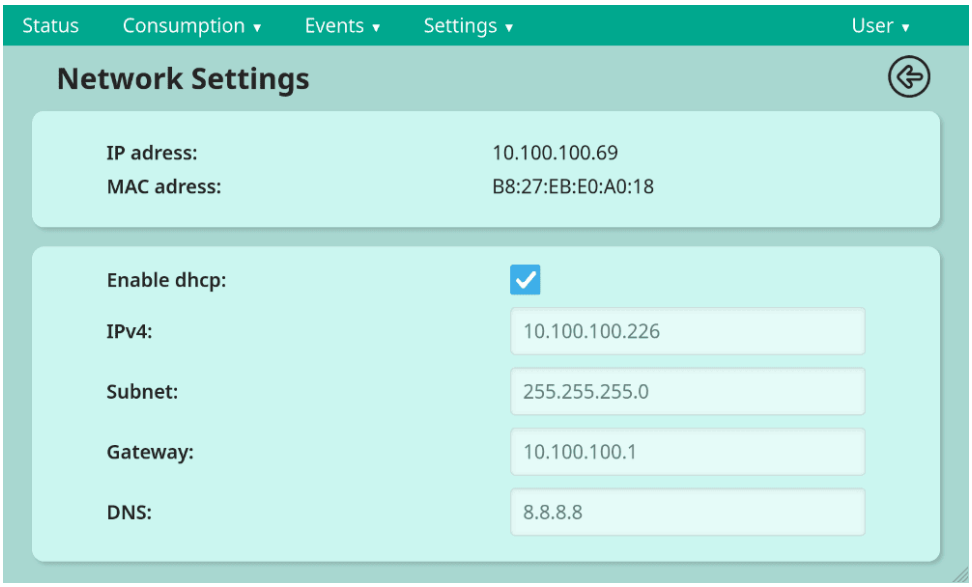


Figure 5: Network settings page

Trusted origins

When making use of port forwarding, using a custom domain name, or utilizing some other method that assigns a different IP (or URL) to the device, it is important to add this IP or domain name to the CSRF Trusted Origins. This is a cybersecurity measure to prevent cross-site request forgery (CSRF) attacks. Multiple entries can be added, separated by semicolons (e.g.: `10.100.100.123;cadis.local;leakdetection.mycompany.com`). To turn off CSRF protection (not recommended), `0.0.0.0` can be filled in to allow all origins.

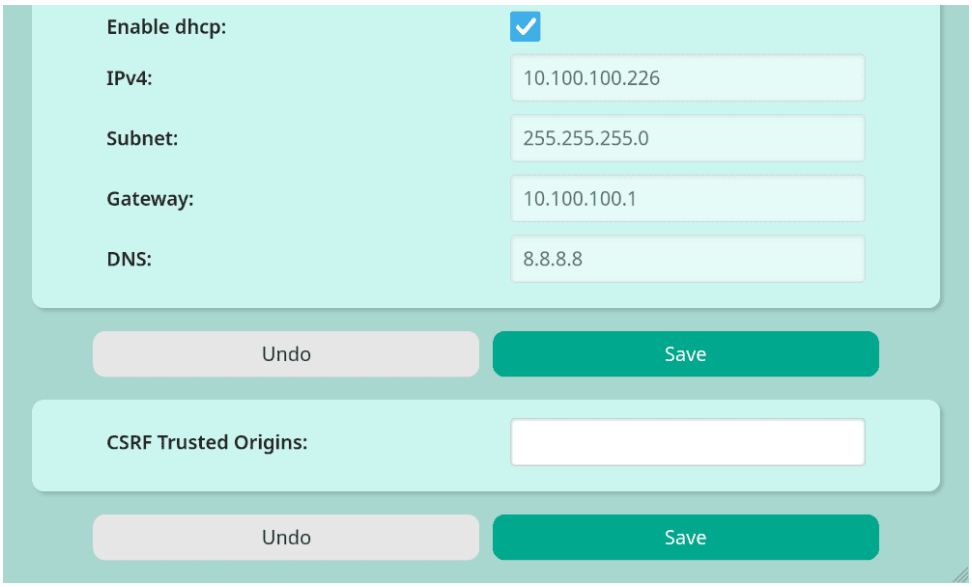


Figure 6: Trusted origins

3.4 Water meter settings

The water meter settings page provides a quick overview of which meters and valves are activated and allows users to configure each water meter connected to the AquaVision Sani .

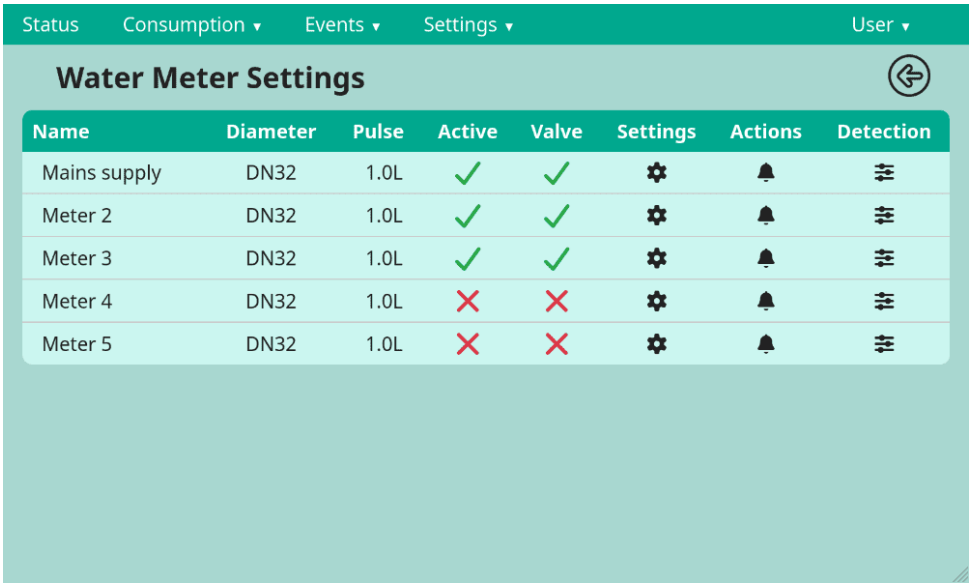


Figure 7: Water meter settings page

3.4.1 General settings

The general settings are used to configure the physical parameters of a water meter, given the parameters in table 8. These are specific to the physical installation and should be set according to the specifications of the water meters, pulse modules, valves and motors.

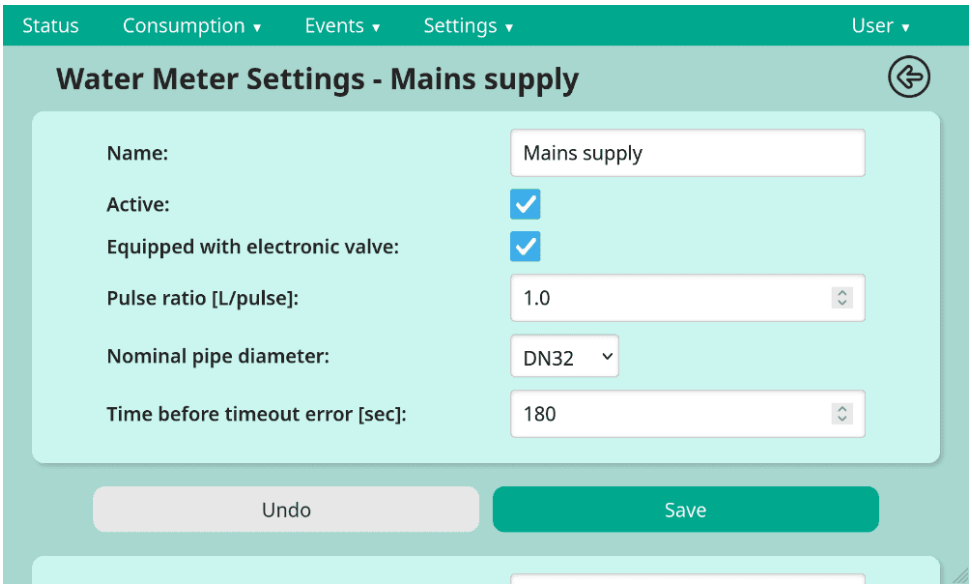


Figure 8: General settings for water meters

Name	Set a custom name for the water meter. This can later be used to identify the water meter on the status page and in other parts of the interface.
Active	Enable or disable the water meter. If this is disabled, the water meter will not be monitored, leak detection will not be performed, and any inputs will be ignored.
Pulse ratio	Set the pulse ratio (K-factor) for the water meter. This is the number of pulses per liter of the water meter and should be indicated on the water meter or in its datasheet.
Nominal pipe diameter	Set the diameter of the pipe used (DN15–DN100). This influences the default leak detection parameters.
Valve error timeout*	The maximum time (in seconds) a valve gets to open or close before a valve error is generated.

Table 8: General settings for water meters

Info

The pulse ratio/K-factor is used to calculate the total consumption and flow rate for the water meter. A pulse ratio of 10 means one pulse will be generated for every ten liters that passes by the water meter through the pipe. If you are unsure about the correct pulse ratio, consult the documentation of the water meter or contact the manufacturer.

Warning

Setting the wrong pulse ratio/K-factor will cause the module to miss leaks entirely or lead to false leak detections and incorrect actions being taken by the module.

3.4.2 Action settings

The action settings are used to configure the actions that are taken when the specified event type occurs. Every action, associated with the related event type, is triggered the moment that event type is detected and remains active until the user acknowledges the event. Acknowledging events can be done via the general events page or the leak detection page.

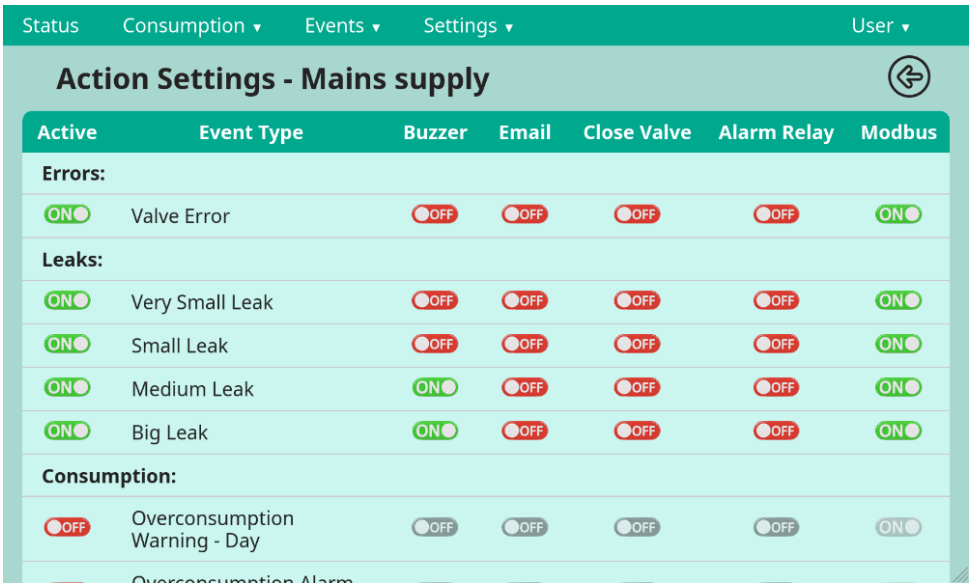


Figure 9: Action settings for water meters

Active	Enable or disable all actions for the given event type. If disabled, no actions will be taken when the event occurs and the event will not be logged.
Ring buzzer	Activate the buzzer. The buzzer will keep ringing until the user acknowledges the event or mutes it from the status page.
Send email	Send an email notification when the event occurs. The email will be sent according to the SMTP settings.
Close valve	Close the valve for this water meter when the event occurs. This only works if valve control is enabled for this water meter in the general settings and a motorised valve is connected.
External alarm	Trigger the on-board NO/NC alarm relay.
Modbus alarm	Update the Modbus registers with the current state of the water meter. Useful for integration with building management systems.

Table 10: Action settings for water meters

Info

When using SMTP notifications, make sure to configure the SMTP settings first. A company SMTP server or external SMTP service is required to send email notifications. Please contact your IT department for more information.

3.4.3 Leak detection parameters

Leak detection parameters define the criteria used by the AquaVision Sani to identify potential leaks. The system evaluates leaks based on both the minimum continuous flow rate measured and the duration of the flow. Higher flow rates take a shorter time before a leak detection is flagged while smaller flow rates take a longer time before they are considered a leak. This allows the system to react quickly to significant leaks while avoiding false positives from minor fluctuations in water usage. At the same time, the system also monitors for continuous small flows that may indicate a slow leak like a dripping tap or a bad pipe connection. These

parameters are configurable for each water meter, allowing customization to match the specific usage patterns and characteristics of the installation. By default, the AquaVision Sani uses recommended values based on the selected pipe diameter and the typical flow profiles for that diameter in a building.

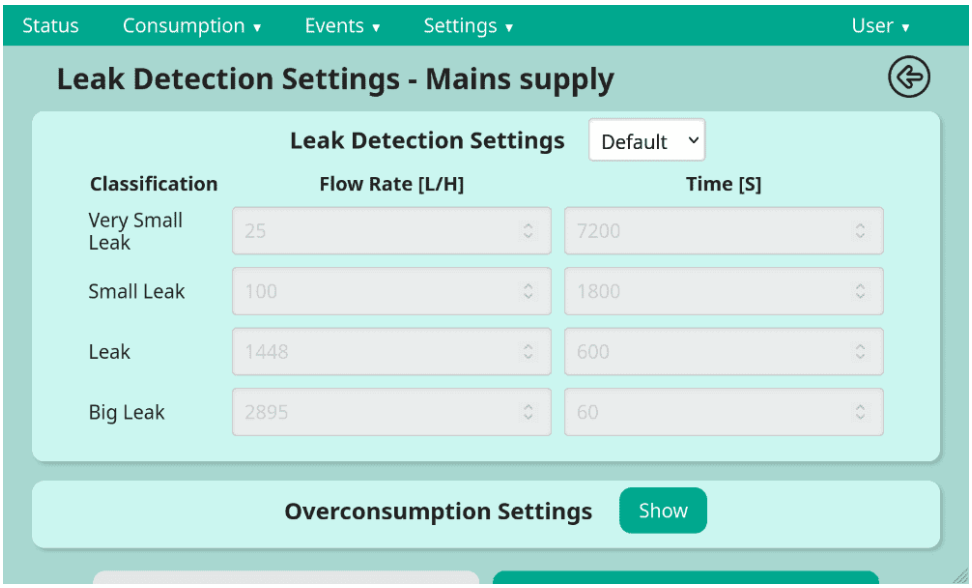


Figure 10: Leak detection parameters for water meters

⚠ Warning

It is recommended to retain the default leak detection parameters unless there is a specific reason to modify them. Adjusting these parameters without a thorough understanding may result in false positives or undetected leaks. Please contact Cadis technical support before making any changes to these settings.

Overconsumption parameters

In addition to actual leak detection, the AquaVision Sani is also able to monitor and/or prevent excessive water usage that falls under normal water usage. This is achieved by restricting the maximum volume of water that can be consumed within a defined time interval. These parameters can be configured in the overconsumption parameters on the leak detection settings page of any water meter. The actions taken when an overconsumption is detected can be configured in the action settings.

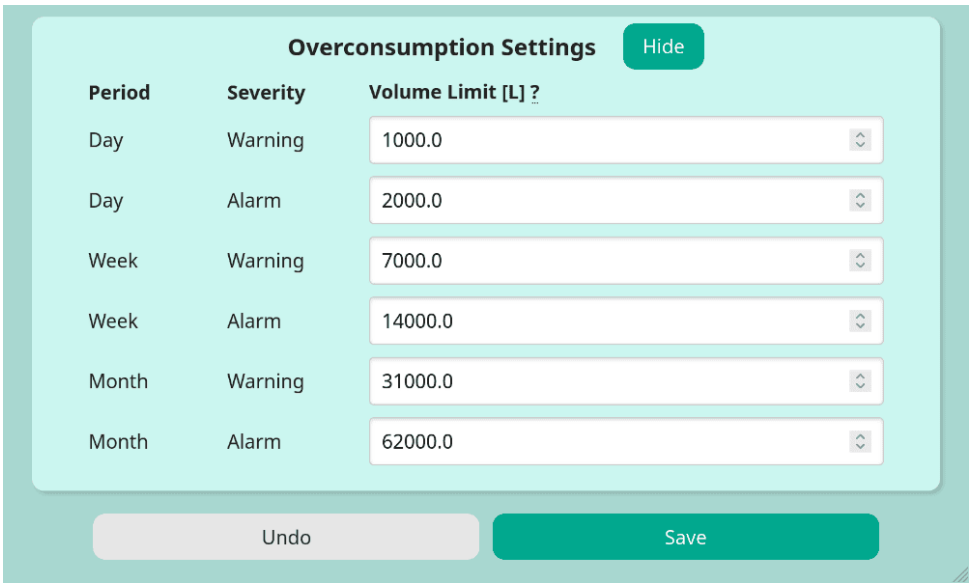


Figure 11: Overconsumption parameters for water meters

⚠ Warning

The leak detection settings are only applied to the water meter when it is active. Inactive water meters will not be monitored for leaks, and the leak detection parameters will not be applied.

3.5 Communication settings

All communication settings are grouped on the communication settings page. This includes the Modbus server settings, SMTP settings for email notifications, and SFTP settings for exporting periodic consumption reports.

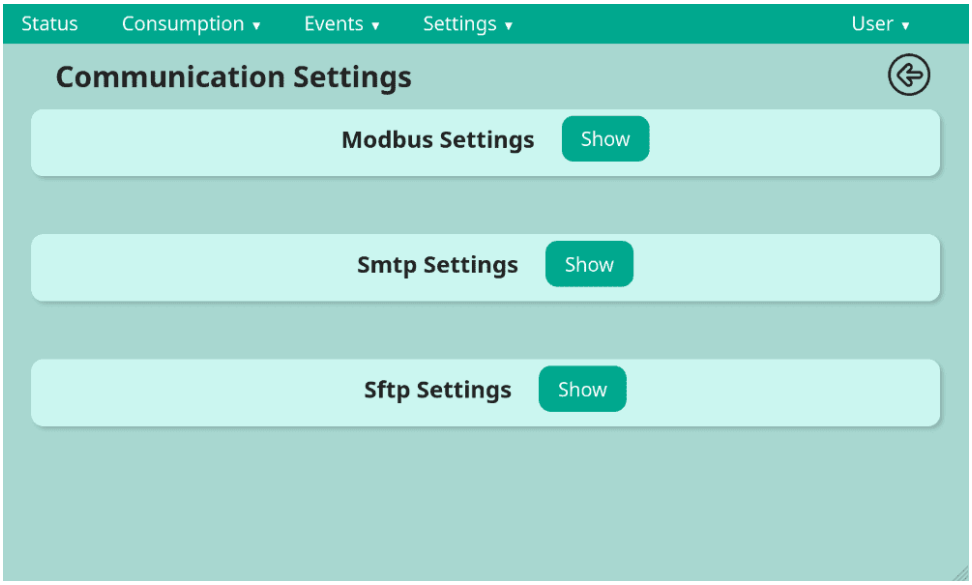


Figure 12: Communication settings

3.5.1 Modbus settings

The Modbus settings provide a way to enable and configure the integrated Modbus server. This server enables communication with external systems, such as building management systems, via the Modbus protocol. Both Modbus TCP (Ethernet-based) and Modbus RTU (serial-based) connections are supported. Modbus register values are refreshed periodically to ensure that external devices can reliably access up-to-date information regarding the status of water meters and valves.

		Default:
Connection type	Choose between Modbus TCP and Modbus RTU.	TCP
Slave ID	Set the Modbus slave ID for the server. This is used to identify the device on the Modbus network.	1
Baudrate	Set the baudrate for the Modbus RTU connection.	19200
Parity	Choose the parity for the Modbus RTU connection.	None
Stop bits	Set the number of stop bits for the Modbus RTU connection.	1
Endianness	How to interpret the order of bytes for the Modbus RTU connection.	Big endian
Legacy mode	Revert the Modbus register layout back to how it was on the AquaVision2. Used for interoperability with existing BMS integrations.	Off

Table 12: Modbus settings parameters

Info

The integrated Modbus TCP server is enabled by default and operates on port 502. The Modbus RTU functionality can be activated on the Modbus settings page. Modbus register values only get updated periodically which means there is a slight delay between them and the actual state on the module.

3.5.2 SMTP settings

The SMTP settings page is used to configure the parameters required for the AquaVision Sani to send email notifications. Email alerts can be triggered by any event such as a leak detection, overconsumption, or hardware error. To enable this functionality, enter the appropriate SMTP server details, including security protocol, server address, authentication credentials, and recipient information. Please ensure that the selected protocol and port number match the configuration of your organization's email server. This feature requires internet access and a properly configured SMTP server.

Info

Make sure to configure the SMTP settings correctly to allow the AquaVision Sani to send email notifications. A company SMTP server or an external SMTP service is required to send email notifications. These are not provided by Cadis. Please contact your IT department for more information.

Security protocol	Choose the security protocol for the SMTP connection. Options include None, TLS, and SSL.
Mail server host	The hostname or IP address of the SMTP server.
Username	The username or email used to log into the SMTP server.
Password	The password used to log into the SMTP server.
SMTP port	The port used by the SMTP server. Common ports are 25, 465, and 587. Leave empty to use the default port for the selected protocol.
Sender email	The email address to be used as the sender for outgoing notifications.
Recipient email 1-5	The email addresses that need to receive the notifications.
Subject addendum	A custom piece of text that will be added to the subject of the email notifications. This can be used to identify the source of the notification.
Message addendum	A custom piece of text that will be added to the body of the email notifications. This can be used to provide additional information about the notification.

Table 14: SMTP settings parameters

4 Usage manual

Under normal operation, the AquaVision Sani will continuously monitor all active water meters and valves. Only when an event occurs, such as a leak detection or valve error, will the AquaVision Sani take action. Depending on the type of event and the configuration, the AquaVision Sani might activate the buzzer, close valves, send email alerts, or trigger other actions. Continuous actions such as ringing the buzzer or closing valves can only be stopped by acknowledging the event or disabling them through the user interface. This usually requires user interaction, such as interacting with the module's touchscreen or by accessing the web interface.

4.1 Status page

The status page is the main page of the user interface. It displays the current flow rate, total consumption, and status of active water meters. When activated in the settings, it also shows the status of the valve and provides a way to manually override the control logic when logged in. All values are updated in near real-time, so users can see the current status of the system at a glance. The basic status page is accessible without authentication, so it can be viewed by anyone on the local network.

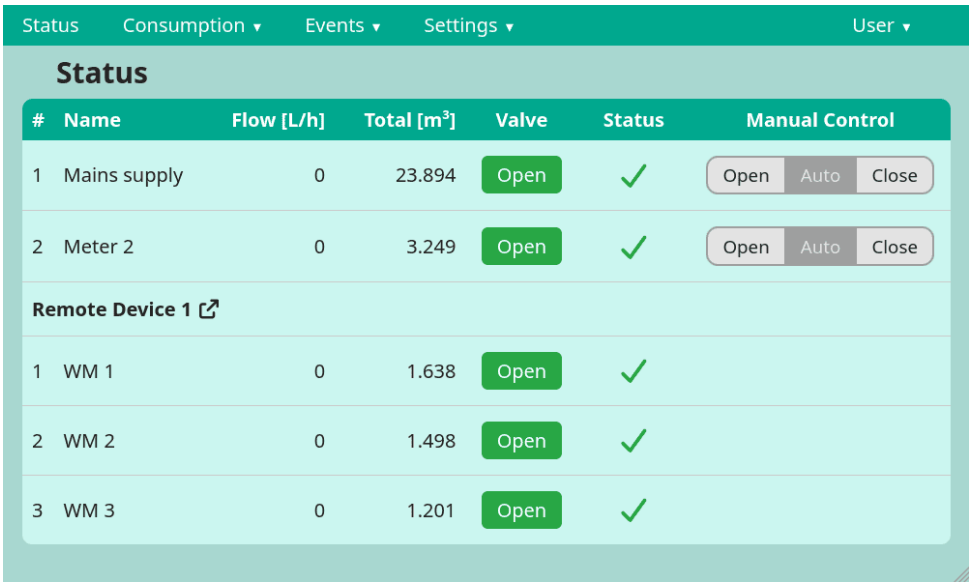


Figure 13: Status page

Info

If one of the devices is not displayed, it is likely not activated in the water meter settings. If the buttons for manual control of the valves are not displayed, it is likely that the valve for the water meter is not activated in the water meter settings. This also means that the AquaVision Sani will not be able to close the valve automatically when a leak is detected.

Manual valve control

When authenticated, the status page will show manual control buttons for each valve that has been configured to use an electronic valve. These buttons are intended for manual operation of the valves during maintenance or testing. Pushing the "Open" button will force that valve open, and pushing the "Close" button will force the valve closed. Pushing the "Auto" button will return the valve to automatic control by the AquaVision software.

Info

The manual control buttons for the valves allow users to open and close the valves manually. This overwrites the automatic control logic of the AquaVision Sani . These buttons are useful for testing the valves or for locking valves open/closed during maintenance or in case of an emergency.

Warning

Forgetting to turn off the manual control buttons will prevent the AquaVision Sani from controlling the valve. It will not be able to open or close that valve automatically until the valve is returned to "auto" mode. This can lead to leaks not being stopped or valves not being open when needed.

4.2 Consumption

4.2.1 Overview

The consumption overview page provides a graphical representation of the water consumption for each water meter. It displays a table with the total consumption for each water meter, as well as some useful statistics such as the average daily and weekly consumption. This can provide some insights into the normal water usage on each pipe and aid in identifying abnormal water usage patterns.

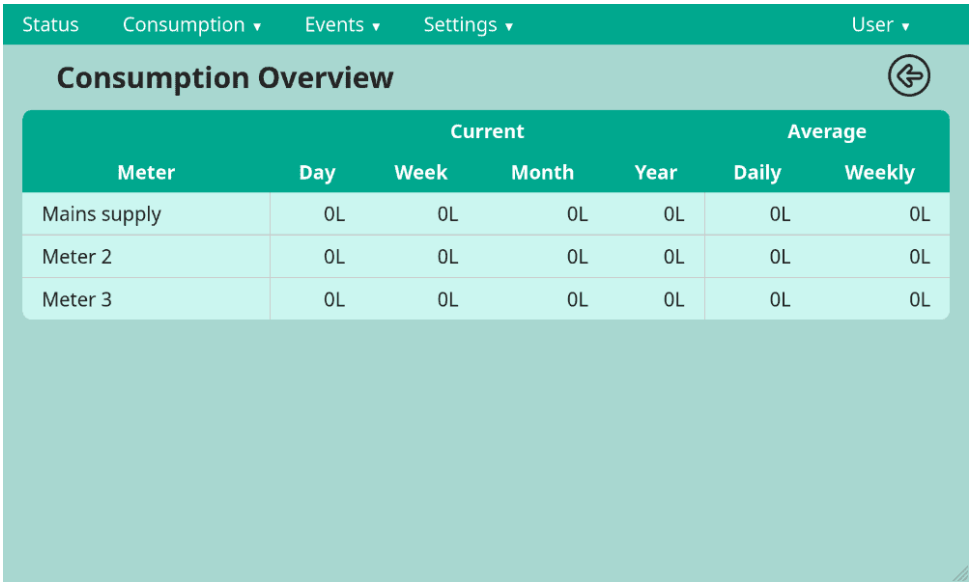


Figure 14: Consumption overview page

4.2.2 Viewer

The consumption viewer provides a detailed view of the water consumption. This configurable graph allows users to select the time period and date they want to view. The time period can be selected from a drop-down menu and the specific date by using the date picker at the top of the page. On either side of the date picker are arrows to quickly navigate to the previous or next period. The graph displays the water consumption for the selected time period, providing a deeper and more granular way to analyse the existing consumption patterns. The graph and its axes are automatically scaled to fit the data and the available space. Clicking on any of the identifiers in the legend will toggle the visibility of that water meter and update the graph.

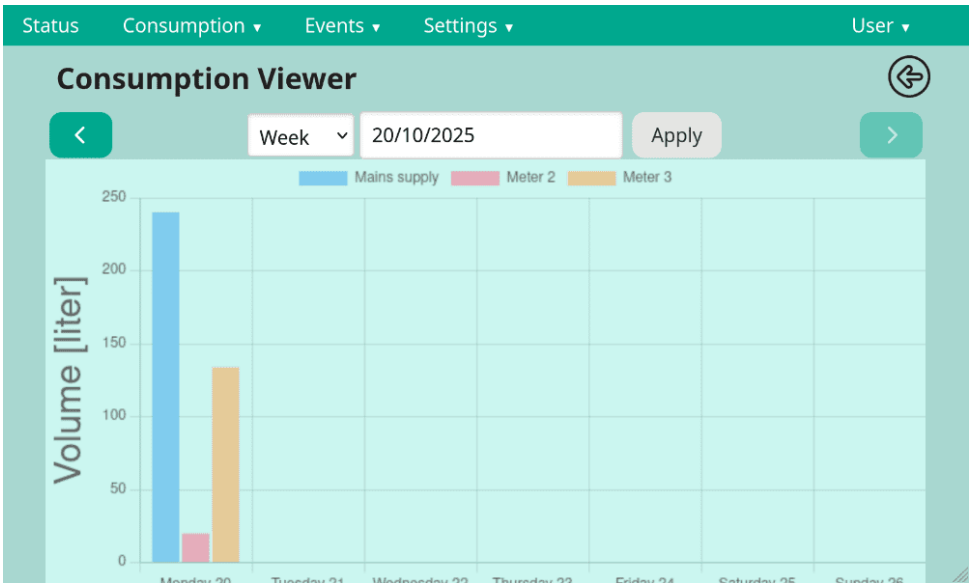


Figure 15: Consumption viewer page

Info

The consumption viewer is designed to analyse historical data and is not updated in real-time. For real-time monitoring of water consumption, use either the status page or live flow viewer.

4.2.3 Live flow

The live flow page provides a near real-time view of the water consumption for each water meter. It displays a graph of the current flow rate for each water meter, allowing users to actively monitor the water consumption within the last 15 minutes. Clicking on any of the identifiers in the legend will toggle the visibility of that water meter in the graph.

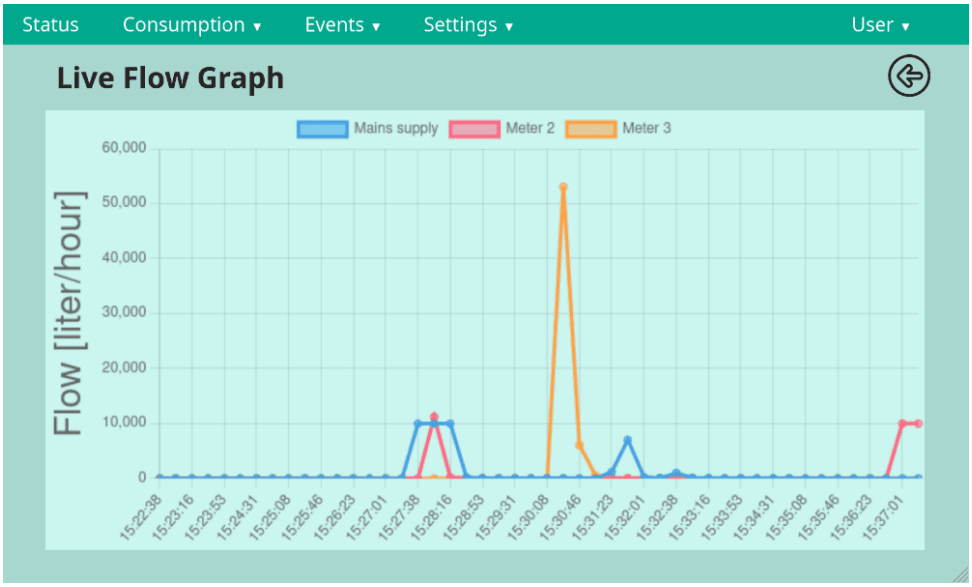


Figure 16: Live flow page

Info

The live flow page is intended for quick monitoring of the water consumption. It is not intended for long-term monitoring or analysis of water consumption patterns. For long-term monitoring and analysis, use the consumption overview or consumption viewer.

4.3 Events

Whenever an event occurs, a red "detections" bar at the top of the screen will appear. Clicking on this bar will redirect users to the general event history page, where a list of all events is displayed. At the top of the page, the "acknowledge all" button will acknowledge all past events and stop all active actions, including buzzers and valve closures, related to these events.

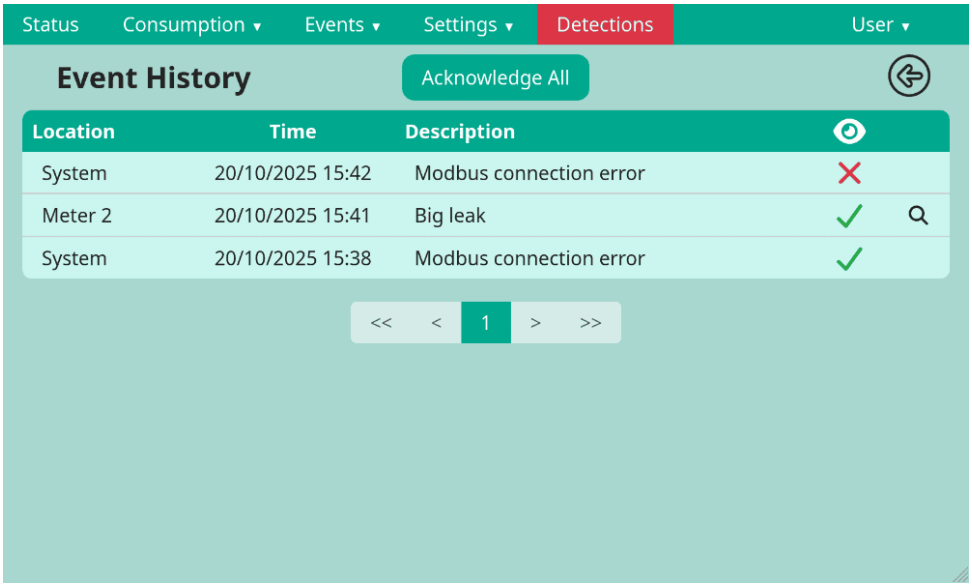


Figure 17: Events overview

Info

An event can only be triggered if it is enabled in the action settings. If an event type is not enabled, it will not be triggered and will not appear in the events list.

Warning

Acknowledging an event does not mean the source of the problem is resolved. It just stops all actions related to the event. Acknowledging an event is only recommended if you have resolved the issue that caused the event, otherwise further damage may be incurred.

Leak detections

When a leak is detected, the AquaVision Sani will automatically perform any actions configured for that specific leak type. (see section 3.4.2) For extra information about the leak, you can click on the magnifying glass icon next to the leak detection in the events list.

5 Development

The AquaVision Sani is actively being developed, with new features, bug fixes and improvements being added regularly. The version available at the time of shipping is supplied. Any additional software updates are deployed during the commissioning of the device or during maintenance. New version releases are based on user feedback, so for any feature requests or suggestions, please contact us at info@cadis.eu.

5.1 Planned features

The following features are under consideration for future releases of the AquaVision line:

- BACnet support
- Expanded reporting capabilities
- API support
- Additional leak detection algorithms
- Calendar functionality for scheduling valve control

5.2 Custom feature requests

Cadis is always available for feedback, both from end users and installers. If there are any features missing or improvements that need to be made, please contact us. In select cases, custom or expedited development of new features is also possible. If you have a specific feature in mind, please contact us at info@cadis.eu to discuss the possibilities. Please note that custom development may incur additional costs, depending on the complexity of the feature and the time required to implement it.

Appendices

A BREEAM compliance

A.1 Overview of standards

AquaVision devices are designed to conform to the BREEAM standards as a **Water Monitoring and Management System**, as well as a **leak detection system**. This way they provide a simple turnkey solution for multiple issues.

The AquaVision was designed for the following BREEAM standards[1]:

BREEAM Standard	Version	Requirement
BREEAM International New Construction	V7.0	WAT02 & WAT03
BREEAM International New Construction	V6.1	WAT02 & WAT03
BREEAM International In-Use	V6.0	WAT07 & WAT08
BREEAM-NL Nieuwbouw	V6.1.1	WAT02 & WAT03
BREEAM-NL In-Use	V6.1.1	WAT07 & WAT08

Table 16: BREEAM standards

A.2 BREEAM New Construction V7.0

WAT02: Water monitoring

Starting from V7.0, a **Water Monitoring and Management System** for buildings with a total surface area larger than $1000m^2$ is a **required minimum standard**. For smaller buildings it is **strongly recommended**. The

AquaVision Control fits the entire definition, given by BREEAM:

- It provides users with data about water consumption patterns in a building to facilitate informed water management decisions.
- It provides real time data on water consumption.
- It flags faults in equipment and can remotely deactivate the equipment, either by communicating to a BMS or by shutting of a motorized valve.
- It has the ability to provide performance indicators that can be used to measure performance against targets.
- It provides real time alerts in instances where water use is unexpected, such as equipment left on after hours.

WAT03: Water leak detection and prevention: Leak detection system

The AquaVision Control fulfills the role of a **leak detection system**:

[1] Cadis cannot provide guarantees regarding the BREEAM assessment. The actual judgment is made by a certified BREEAM assessor.

- provides users with data about water consumption patterns in a building to facilitate informed water management decisions.
- provides real time data on water consumption.
- flags faults in equipment and can remotely deactivate the equipment, either by communicating to a BMS or by shutting of a motorized valve.
- has the ability to provide performance indicators that can be used to measure performance against targets.
- provides real time alerts in instances where water use is unexpected, such as equipment left on after hours.

WAT03: Water leak detection and prevention: Flow control devices

The AquaVision Sani fulfills the role of a **flow control device**, as it meets all the criteria given by BREEAM:

- A time controller, i.e. an automatic time switch device to switch off the water supply after a predetermined interval.
- A programmed time controller, i.e. an automatic time switch device to switch water on or off at predetermined times.
- A volume controller, i.e. an automatic control device to turn off the water supply once the maximum pre-set volume is reached.
- A presence detector and controller, i.e. an automatic device that switches water on and off, depending on the detection of occupancy or movement.
- A central control unit, i.e. a dedicated computer-based control unit for the overall management of a water control system, utilising some or all the types of control elements listed above.

A.3 BREEAM New Construction V6.0 and V6.1

WAT02: Water monitoring

The AquaVision Control facilitates integration of multiple water meters into a BMS, while also detecting leaks.

WAT03: Water leak detection and prevention

The AquaVision Control fulfills the role of a **leak detection system**:

- The system alerts the user in case of leaks and/or takes autonomous action to stop the leak
- The system is activated when the flow rate exceeds a certain threshold for a specific period of time
- The system can identify different levels of flow rates and leakages
- The system is configured based on the needs of the user and the building
- The system is designed to avoid false alarms that may occur during normal consumption

A.4 BREEAM In-Use V6.1

WAT07: Leak detection system

The AquaVision fulfills the role of a leak detection system:

1. It has the ability to automatically detect the presence of a water leak throughout the water supply within a building by detecting higher than normal flow rates.

2. The leak detection system should be:

   (a) Able to easily identify any detected leaks

   (b) Activated when a continuous flow of water passes through the water meter at a flow rate above a pre-set minimum for a pre-set period of time

   (c) On all the pipework in a development that the owner/occupier has responsibility for.

3. Emergency systems such as fire hydrants and sprinklers can be covered by the system. The system can be tuned specifically for these pipes, such that different leak detection parameters or alarms apply than for normal pipes.

WAT08: Leak prevention

The AquaVision can serve as a flow control device in combination with one or more motorized ball valves, as it can close each valve:

- Automatically on detecting a leak.
- With a presence detector.

A.5 BREEAM-NL Nieuwbouw

WAT02: Waterverbruik monitoren

The AquaVision can be used for the following criteria:

- Alle watermeters in het gebouw kunnen worden aangesloten op het toestel, dus ook de hoofdwatermeter, brandleiding, etc...
- Elke meter kan afzonderlijk gelabeld worden naar de specifieke verbruiksgroep van de meter.
- Het systeem is modulair en kan altijd uitgebreid worden bij aanbouw van nieuwe gebouwdelen.

WAT03: Waterlekdetectie en preventie

The system is desigined to conform to the following criteria for ***lekdetectiesysteem***:

Het lekdetectiesysteem is geinstalleerd, direct na de hoofdmeter, voor het detecteren van grote lekken in de waterleiding. Het systeem is aangesloten op alle watertoevoerleidingen naar elk gebouw. Het lekdetectiesysteem is:

1. Hoorbaar wanneer geactiveerd (systeem heeft een ingebouwd hoorbaar alarm)
2. Geactiveerd wanneer het stroomvolume door de watermeter of datalogger hoger is dan het ingestelde maximumstroomvolume voor een bepaalde tijdsperiode
3. In staat om verschillende stroomsnelheden en lekkages te identificeren, bijvoorbeeld continu, hoog en/of laag stroomvolume, voor bepaalde tijdsperiode(n).
4. Programmeerbaar om aan te sluiten op de waterbehoefte van de gebouwgebruiker/eigenaar.
5. Indien van toepassing, ontworpen om loos alarm te voorkomen dat wordt veroorzaakt door normaal gebruik van grote waterverbruikers zoals koelinstallaties.

The system is designed to conform to the following criteria for ***debietregelaar***:

- Een volume gestuurde afsluiter die de watertoevoer afsluit wanneer een vooraf ingestelde maximale waarde is bereikt.
- Een automatisch bediende afsluiter die de watertoevoer afsluit als niemand aanwezig is.
- Een centraal gecontroleerd systeem waarbij gebruik wordt gemaakt van sommige of alle van de soorten bedieningselementen zoals hierboven vermeld welke centraal worden aangestuurd door een computergestuurde water beheersysteem.

B Modbus

All devices in the AquaVision product line support both Modbus RTU and Modbus TCP, allowing them to be easily integrated into existing building management systems and data loggers. The Modbus interface can be used to read data from the AquaVision modules and to control certain aspects of the devices, such as acknowledging events or controlling valves.

Standard Modbus registers are 16-bit and multi-register values can be configured to use either big- or little-endian through the device's Modbus settings ($Settings > Communication > ModbusSettings$).

B.1 Input registers

		Register for water meter				
Description	**Type**	1	2	3	4	5
Total consumption [L]	UINT32	30011	30021	30031	30041	30051
Flow rate [L/h]	UINT32	30013	30023	30033	30043	30053
Valve state	SINT16	30015	30025	30035	30045	30055
Leak state	SINT16	30016	30026	30036	30046	30056
Overconsumption state	SINT16	30017	30027	30037	30047	30057
Motion state	SINT16	30018	30028	30038	30048	30058
Pressure state	SINT16	30019	30029	30039	30049	30059

Table 18: Input registers

Feature	**AquaVision Control**	**AquaVision Mini**	**AquaVision Sani**
Water meters	5	1	1
Valves	3	1	1
Motion sensors	0	0	1
Pressure sensors	0	0	1

Table 20: Available features per AquaVision model

Info

Check Table 20 to figure out which hardware functions are available for your AquaVision model. If your model supports fewer functions than shown in Table 18, use the registers starting at 1 and continue only up to the number of available functions.

Valve state	Description
-3	Valve error
-2	No valve connected
0	Closed
1	Open
2	Opening
3	Closing
4	Forced open (Manual override)
5	Forced closed (Manual override)

Leak code	Description
0	No leak
1	Very small leak
2	Small leak
3	Medium Leak
4	Big leak
11	Pressure drop

Motion code	Description
-2	Not active
-1	Not present
0	No motion detected
1	Motion detected

Pressure code	Description
-2	Not active
-1	Not present
0	Low pressure
1	Normal pressure

Overconsumption code	Description
0	No overconsumption
1	Overconsumption detected

Table 22: Input register status codes

B.2 Holding registers

The holding registers can be used to trigger certain actions on the AquaVision like **acknowledging events** or **controlling valves**.

Description	Type	Register
Acknowledge all events	BOOL	40001
Acknowledge system events	BOOL	40002
Acknowledge leaks	BOOL	40003
Acknowledge overconsumptions	BOOL	40004

Table 24: Holding registers - System wide

Info

For security reasons, it is possible to disable the module's Modbus control in the settings. If disabled, the holding registers will not work and any attempts to write to them will be ignored.

Description	Type	1	2	3	4	5
Control valve	SINT16	40011	40021	40031	40041	40051
Acknowledge all events	BOOL	40012	40022	40032	40042	40052
Acknowledge leaks	BOOL	40013	40023	40033	40043	40053
Acknowledge overconsumptions	BOOL	40014	40024	40034	40044	40054

Table 26: Holding registers - Water meter specific

Info

In order to acknowledge events, the corresponding register must be set to 1. The AquaVision will automatically reset the register back to 0 after acknowledging the event.

Valve mode	Description
0	Auto (default)
1	Open
2	Closed

Table 28: Valve control options.

Info

Using the Modbus connection to control the valves will disable the automatic control from the AquaVision. Using the manual control options on the web interface of the AquaVision module will always override the Modbus control.

Warning

Setting the valve state through Modbus will override the automatic control from the AquaVision until the valve control is set back to **"Auto"**. This will prevent the AquaVision from closing the valve in case of a leak detection and cause significant damage.

B.3 Modbus RTU common issues

Some common pitfalls to avoid when using Modbus RTU:

- Make sure to use a shielded twisted pair cable to reduce noise and interference, especially with long cable runs.
- Avoid running the communication cable close to AC power cables, along high voltage cables or through high voltage installations.
- Make sure there are no branch points in the RS485 bus, as this will break the communication. The RS485 bus must be a single line with no branches.
- Use a good quality RS485 adapter, as some cheaper ones may not work reliably with large networks and a lot of devices.
- Always double-check the Modbus configuration at both ends: baudrate, parity, stop bits, endianness, ... must match on all devices on the bus.
- Slave IDs must be unique on the bus. Make a list of all devices on the bus and their slave IDs to avoid conflicts.
- When debugging, work from the master device forwards adding one device at a time to the bus. This will help identify any issues with specific devices or configurations.

C Legal Disclaimer

Important Notice and Disclaimer

This datasheet contains technical and safety-related information about the AquaVision, a water leak detection system (“the product”) developed by Cadis BV (“the company”). The information herein is provided in good faith and is believed to be accurate as of the date of publication. However, the Company makes no warranty, express or implied, regarding the accuracy, completeness, or suitability of this information for any particular purpose.

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This Product is designed to detect water leaks based on the flow of water through monitored water lines in residential, commercial, or industrial environments and for triggering alerts or actions accordingly. It is not designed or certified for use in billing, life-safety, critical infrastructure, or mission-critical systems, including but not limited to:

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- Life-critical applications where failure could result in significant harm or death. This includes, but is not limited to, fire suppression systems.
- Applications requiring fail-safe performance, such as life-support systems or other medical applications.
- Nuclear facilities or applications.
- Military or defense systems.

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The Product must be installed and maintained by qualified personnel in accordance with the installation instructions provided. Improper installation, connection to incompatible systems, or failure to follow instructions may result in damage, malfunction, or personal injury and void the warranty.

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