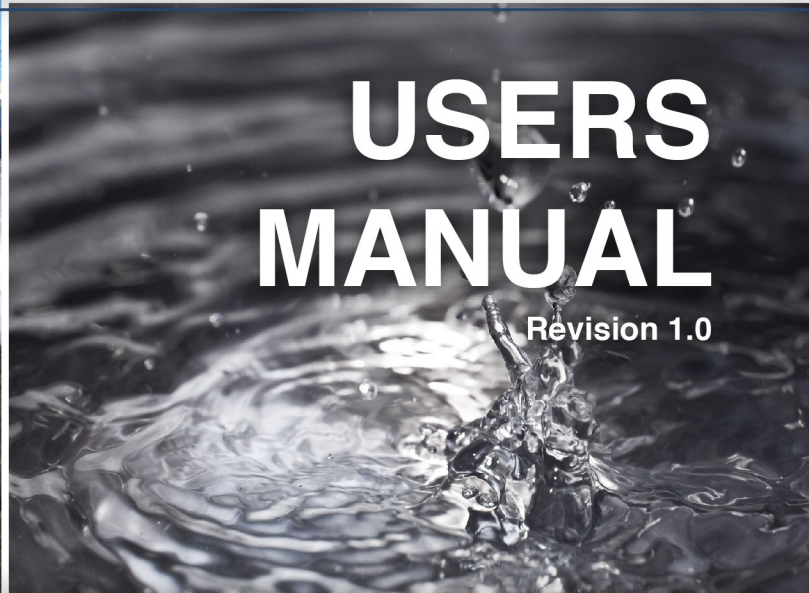


XW-112™

Wireless Water Detector



For models: XW-112-5

Wi-Fi Water Monitoring & Alerting • No Wiring Needed

Features

- ▶ Monitor presence of water
- ▶ Send email alarms and weekly status alerts (up to 3 addresses)
- ▶ Wireless Wi-Fi 802.11 b/g/n
- ▶ Transmission range up to 250ft
- ▶ Built-in web server and WPS for setup, configuration and remote monitoring
- ▶ Two "AA" batteries provide backup power to send a power-fail alarm
- ▶ Control relays on other ControlByWeb devices
- ▶ Simple and easy to use

CONTROL by WEB™
www.ControlByWeb.com

a division of Xytronix Research & Design, Inc.
located in Nibley, Utah, USA

©2017 Xytronix Research and Design, Inc.

XW-112 User Manual Revisions	
Revision	Description
1.0	Initial release

Section 1: Introduction

The XW-112 is an easy-to-use wireless device which monitors the presence of liquids using a GRI-2605 liquid detection sensor (included). It is ideal for applications where liquid level or a water leak must be monitored and Ethernet wiring is not accessible or practical to install.

The XW-112 is a self-contained device that requires no additional servers or ControlByWeb devices. The XW-112 can provide real-time status to users through web browsers or the CBW Mobile app. In addition, it offers the ability to monitor the sensor status and send out email alerts (which can be converted to text message alerts) whenever an alarm condition occurs.

A terminal strip provides connections to the GRI-2605 Liquid Detection Sensor. No other cables, interfaces, or PC utility programs are needed. The XW-112 is powered by an external wall transformer (5VDC). Two AA batteries can be installed to provide an AC power-fail alarm.

Provisioning the module:

Access-Point mode: Two user accessible push-button switches aid in provisioning the module. Press the “Access Point” button anytime to active the access point mode. Then with a PC or smart phone, connect to and access the XW-112's internal web server (The XW-112 will always be accessible this way, regardless of the mode to which it was previously set).

Using the web server, configure the access port, name, and other setup parameters.

WPS: Alternatively, add the XW-112 to an existing network by pressing the “WPS” (Wi-Fi Protected Setup) button on both the XW-112 and on your access point (i.e., router).

Network Discovery: Using the Android or iOS app, the XW-112 can be used to configure the Wi-Fi network as well as any cloud or network settings.

ControlByWeb Cloud:

The XW-112 can be configured to automatically connect to ControlByWeb.cloud after being connected to a wireless network with internet access. This feature allows internet access to an XW-112 which is installed behind a network router, without the need to setup port forwarding in the router. This also allows for easy installation using DHCP without the need to assign a specific IP address to the XW-112.

Since the connection from the XW-112 is outgoing rather than incoming, the local router on the network (where the XW-112 resides) does not need to be configured to forward sockets. This simplifies the installation since the router configuration is not modified.

1.1.1 Features

- Wireless Wi-Fi 802.11 b/g/n
- Direct connections to a GRI-2605 liquid detection sensor
- Built-in web server for configuration and remote monitoring
- Powered from a 5-Volt DC power adapter
- Two “AA” batteries provide backup power to send a power-fail alarm
- Alarm can control relays on other ControlByWeb devices
- Send email alarms and weekly status alerts (up to 3 addresses)
- Send encrypted emails
- Simple and easy to use
- Includes auxiliary protocols: XML and Remote Services
- Static or DHCP IP address configuration
- 5-year warranty

1.1.2 Part Numbers and Accessories

Device	Description	Part Number
XW-112	Wi-Fi Digital Input Monitor with built-in web server	XW-112-5
Power Supply	Wall Transformer, 120VAC in, 5V-1A out (included)	PS5VW1.0-2.5mm
Water Leak Sensor	Water leak sensor (included).	GRI-2605
Complete Kit	XW-112, power supply and sensor	XW-112-5+PS5V-2605

1.1.3 Water Leak Sensor

The GRI 2605 sensor can detect the presence of water and provides a relay output for control of an external device. The sensor has two exposed stainless steel electrodes which detect the presence of water. Although the sensor housing is sealed and is water resistant it is not rated for long-term submersion by the manufacturer. The sensor operates on 5-Volts DC and functions as a Normally Closed switch. The Red and Black wires power the sensor, the White and Green wires are the relay output connections.

1.1.4 Wireless Communication Notes

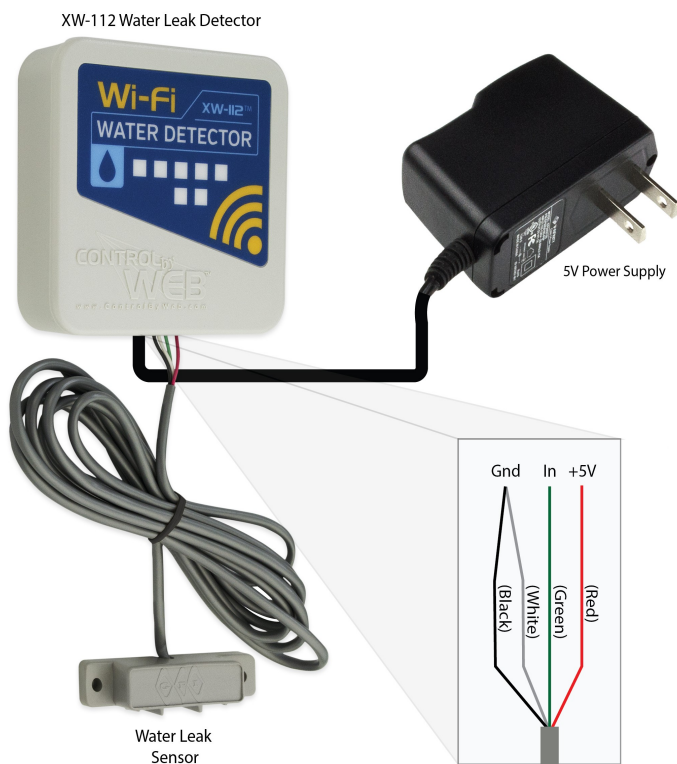
Due to the nature of wireless communications, data transmission and/or reception cannot be guaranteed. Data may be delayed, have errors, or be lost. Although delays or losses of data are rare with a well constructed network, data can be lost due to interference, noise, reflections, or other environmental conditions. The XW-112 should not be used in situations where failure to transmit or receive data could result in damage to property, equipment, direct, indirect, consequential, or incidental damage, including damage for loss of business profit, business interruption, loss of data, life, and the like.

Section 2: Installation and Setup

2.1 Power and Sensor Connections

The XW-112 has a 3-position terminal strip for making connections to the GRI-2605 Liquid Detection Sensor. The sensor detects the presence of water or other conductive, non-flammable liquids. The sensor has 4-wires which are connected as shown below. The XW-112 input works with simple switch or relay sensors. **Do not connect the 5V output or the digital input to a power source.** The input will work with cable lengths up to 20-feet and should not be routed near motors or AC wiring.

The GRI-2605 has an internal relay. Its contacts (green & white wires) are closed when the sensor is dry. When the sensor is dry, the digital input will be “On.” When water is detected, the relay contacts open and the digital input will be “Off.” With the connections shown, the water sensor is a supervised closed-loop alarm circuit such that if a wire is disconnected or the sensor fails, an alarm will be generated. The XW-112 can be programmed to activate a relay at a remote location and/or send an email warning when a water leak is detected. After installation, test the sensor with a damp sponge or wet towel and inspect annually.



Wire	Description
Red	+5V DC
Black	Ground
Green	Relay contact (closed if dry)
White	Relay contact (closed if dry)

The enclosure can be mounted to a wall or panel with screws (not included). The two screw holes are located underneath the batteries.

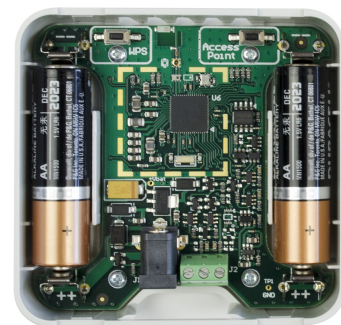
The following installation example shows the water sensor installed on the floor underneath a sink.



2.2 Power / Batteries

The GRI-2605 water sensor has an internal relay which provides a supervised closed-loop alarm circuit. The circuit requires power from a 5-volt DC wall transformer and will not operate from batteries alone. Installing batteries however, allows the XW-112 to send a “power fail” email notification if the AC power fails. The liquid detection sensor is inactive during a power failure. (**Note:** *Your Wi-Fi access point must be powered by an uninterruptible power supply (UPS) in order to send a power-failure notification.*)

Install the batteries as shown. Observe the “+” and “-” markings molded in the enclosure underneath the batteries. Both batteries should be replaced at the same time.



Battery Installation

2.3 Provisioning

After making the sensor connections and providing power, you must provision the XW-112 to use it on your wireless network. The goal is to configure the XW-112 such that it can recognize and attach to your Wi-Fi access point. There are two methods for doing this:

1. Access Point

By default, the XW-112 comes up as a wireless access point when powered for the first time. Pressing the "access point" button any time also activates the access point mode. It isn't really an access point because it will not provide internet connectivity to your computer or smart phone, but it will appear as an access point, meaning that your computer or smart phone will detect it as an access point and display it as such. When acting as an access point, the XW-112 broadcasts an SSID of "XW112-XXXXXX" where XXXXXX are the last six digits of its MAC address.

With your wireless device (laptop computer or smart phone) scan for, and connect to the XW112 wireless network. Next, using a web browser, access the XW-112's setup pages, by entering the following URL in the address bar of your web browser:

```
http://192.168.1.2/setup.html
```

After the page is requested, a password prompt will appear. Enter the username and password. The username is `admin` and the password is `webrelay` (password is case sensitive). The next chapter explains each of the setup tabs and screens. Use the *WiFi Networks* tab for making the proper settings to allow the XW-112 to connect to your access point.

Notes About Access Point Mode:

- As an "access point," the XW-112 functions independently of other wireless networks. It broadcasts beacons and services Wi-Fi packet requests. In this mode, your computer or smart-phone is "connected" directly with the XW-112 on a private network and is NOT using another Wi-Fi network. Typically you would use this for configuration and not for normal operation.
- The XW-112 has no hardware "restore defaults" button, to prevent the installer from being locked out, the default username (`admin`) and password (`webrelay`) always work in the access point mode, even if the password is changed. If the password has changed via the *Password* tab, both the new password and the `webrelay` password will work.
- Only one client (computer or smart-phone) can be connected to the XW-112 at a time.
- SSID and password cannot be customized (once again this mode is intended for configuration only).
- Access point is unsecured and open.

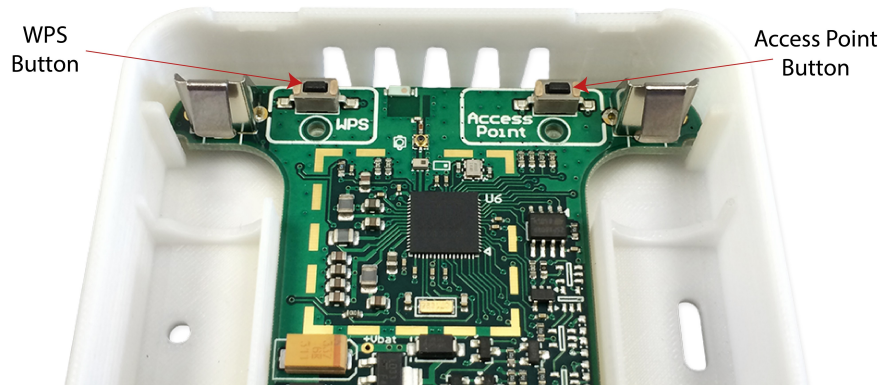
2. WPS (Wi-Fi Protected Setup)

The WPS method, provides a simple method for attaching the XW-112 to a wireless network without needing to use any setup pages. Although using this method to connect the XW-112 to the network is simple, you will not be able to access the XW-112 web server unless you know the IP address that was assigned by the DHCP sever (router) or unless mDNS services are available on your device. For this reason, it is recommended that you use this method of configuration only when the XW-112 units have been pre-configured to operate in a non-web-server mode or when you have full access to the DHCP server so you can obtain the IP address that was assigned.

To begin, press the WPS button on your wireless router or access-point. You will generally have about two minutes to connect wireless devices to the network with WPS. Now remove the cover of the XW-112 and press the “WPS” push button. After a few seconds, the XW-112 should register itself with the router or access-point. If WPS fails, the XW-112 will automatically enter the access point mode.

The XW-112 will use DHCP to obtain an IP address after a successful WPS association. Additionally, the connection information is also broadcast using mDNS. If you need to access the XW-112 using its internal web server you will need to obtain the IP address that was assigned to the XW-112 through your DHCP server or router. Alternatively, if using an mDNS capable device, it may be accessed by entering the appropriate URL into the address bar of your web browser:

```
http://xw-112.local/setup.html
```



2.4 Application Example

Remote Alarm Example

You wish to receive an email alert and activate a buzzer or light to indicate that a water leak has occurred. The sensor is within range of a Wi-Fi access point and AC power is available.

Install a WebRelay™ or WebSwitch™ in your office and connect it to your Ethernet network. Connect a buzzer or light to the relay contact. The WebRelay must be accessible from the Wi-Fi network and be assigned a static IP address. Your Wi-Fi network must have adequate coverage to connect to the XW-112 as well. Connect the GRI-2605 sensor to the XW-112 and mount it near the floor where the water is to be detected. To provide for an AC power-fail email alarm, install two AA batteries. (**Note:** *Your Wi-Fi access point must be powered by an uninterruptible power supply (UPS) in order to send a power-failure notification.*)

First, the XW-112 must be configured to access your Wi-Fi network. If no network profiles have been configured, the XW-112 will automatically enter access point mode and you can access the XW-112 directly with a computer or mobile device with a wireless connection. If the XW-112 has been previously configured for other uses, press the Access Point button. Scan for, and attach to the XW112-XXXXXX wireless network. Access the setup pages with the following URL: <http://192.168.1.2/setup.html>

Configure the XW-112 to connect to your wireless network. Navigate to the WiFi Networks tab and fill in the appropriate settings for your Wi-Fi network. Obtain an available IP address from your network administrator. Press the Submit button at the bottom of the page. (The XW-112's internal web server is always enabled and accessible.)

Navigate to the *Water Sensor* tab. On the *Email Alerts* setting, select *On*. Change the *Description* text to a descriptive name such as "*Laundry Room Water Sensor*." This text may be up to 40 characters long and appears on the *Control Page* and in email messages when email alerts are enabled. Click the Submit button at the bottom of the page.

Navigate to the *Email* tab and enter the SMTP server settings as well as the username and password (if required). You may need to contact your email provider for the exact settings to use. To provide ongoing assurance the XW-112 is working, enable the *Weekly Status Email* option.

Set the *Remote Relay Options* to *Remote Command Opposite of Sensor*. With this setting the remote WebRelay or WebSwitch's relay will be On when the water sensor detects water, and Off when the sensor is dry. This setting is needed since the water sensor is a supervised closed-loop alarm circuit. Upon selecting an action, the remote relay options will show, and ask you to specify the WebRelay or WebSwitch's IP address, port, relay number, etc. Enter these settings for the WebRelay/WebSwitch and press the Submit button at the bottom of the page.

Once all the appropriate settings have been applied, click on the *Reboot* button on the Main tab, the XW-112 will then reboot and begin operation. The XW-112 will no longer broadcast an SSID. The web page will now be available at the assigned IP address. If a water alarm is detected, an email will be sent and the remote relay will be activated. You will receive a weekly email which indicates the XW-112 is connected and working (if selected in the Email tab).

Section 3: Web Server

The internal web server presents two classes of web pages: *Setup* pages and *Control* pages. *Setup* pages are used by an installer to provision and configure the XW-112. The *Control* page displays water sensor and battery status information. The Control Page displays measurement and status information for the user.

To access the *setup* pages, enter the following URL in the address bar of your web browser:

```
http://192.168.1.2/setup.html
```

To access the *control* page, enter the following URL in the address bar of your web browser:

```
http://192.168.1.2
```

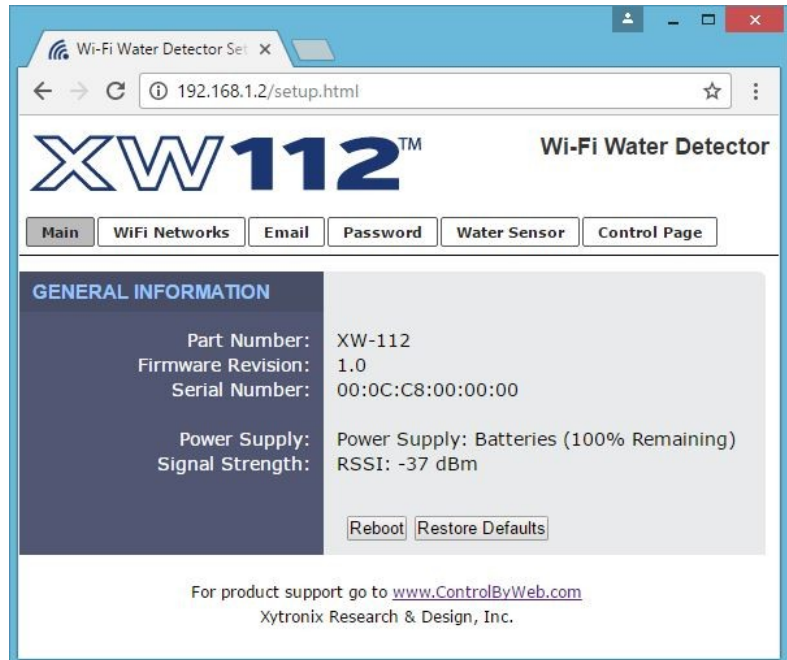
The internal web server is always enabled and it can be accessed any time.

Note that if you are accessing the unit as an access point, the above IP address will work even if you have previously changed the IP address or port in the setup pages. If you are accessing the unit through the network after it has been configured, you will enter the IP address that was assigned to the device.

If the XW-112 has been added to a network using WPS, it will use DHCP and you will need to use the IP address assigned to it by the DHCP server or router. This can be found by logging into the DHCP server/router, or by using mDNS. In a web browser, enter the mDNS name: `http://xw-112.local/`

3.1 Main Tab

This is the initial page that is displayed when accessing the setup pages. It displays model and serial number information, and has navigation tabs which allow access to the configuration and setup settings.



Part Number

This is the full model number of the XW-112

Firmware Revision

This is the current product revision of the internal software

Serial Number

This is the serial number of the XW-112. The serial number is also the MAC address of the unit.

Power Supply

This field shows if the XW-112 is currently being powered by batteries or the DC wall transformer. The battery voltage is periodically measured and an estimate is made of the remaining battery life. If the module is powered by the DC wall transformer the voltage is measured with no load on the battery. The calculations are made for alkaline "AA" batteries with a usable capacity of 2000mAH. When using other types of batteries or in cold conditions, the displayed estimate may be in error. Depending on the activity, the battery life estimate may fluctuate (perhaps even increase) as the load current changes.

Signal Strength

This indicates the current receive Wi-Fi signal strength. The more negative the number, the less signal is being received. -30dBm is a strong signal, and -90dBm is a very weak signal.

Reboot

After showing a confirmation message, this button will send a command to reboot the device.

Restore Defaults

After showing a confirmation message, this button will erase all user settings and return the module to its factory defaults.

3.2 WiFi Networks Tab

As a Wi-Fi client device, the XW-112 attempts to automatically connect to configured Wi-Fi access points. The settings on this page tab are used to configure this connection.

The screenshot shows the XW-112™ Wi-Fi Water Detector web interface. At the top, there is a navigation bar with tabs: Main, WiFi Networks (selected), Email, Password, Water Sensor, and Control Page. The main content area is divided into four sections:

- WiFi SETTINGS:**
 - SSID: A dropdown menu with the text "Please choose a network" and a "Refresh" button. Below it, a note reads "Reboot to re-scan for networks when Access Point."
 - Security: Radio buttons for Open (selected), WEP, and WPA/WPA2.
- IP SETTINGS:**
 - Use DHCP: Radio buttons for Yes and No (selected).
 - IP Address: Text input field containing "192.168.1.2".
 - Subnet Mask: Text input field containing "255.255.255.0".
 - Gateway: Text input field containing "192.168.1.1".
 - DNS Server: Text input field containing "192.168.1.1".
- HTTP SERVER:**
 - HTTP Port: Text input field containing "80".
- REMOTE SERVICES:**
 - Remote Services Enabled: Radio buttons for Yes and No (selected).

At the bottom of the form, there are three buttons: "Submit", "Submit & Reboot", and "Reset Changes".

Note: Reboot required for WiFi and IP settings to take effect.

WiFi SETTINGS

SSID

The SSID (Service Set Identifier) is the name of your Wi-Fi network. Click the *Refresh* button to make a fresh scan of available networks. **Note:** *The Refresh button is inactive if the XW-112 itself is an access point.*

Security

Type of authentication used by the access point for connections.

Security Key

Enter the security key or password for the Wi-Fi network to connect to. (Hidden when not applicable)

IP SETTINGS

Use DHCP

This option allows DHCP to be enabled or disabled. If this option is set to Yes, the XW-112 will wait for an IP address from a DHCP server each time it is powered. The default setting is No (this is

recommended for most installations). If DHCP is set to Yes, the Network page must be submitted and the XW-112 must be rebooted before an IP address will be assigned. Once the XW-112 is assigned an IP address by the DHCP, the new IP address can be found through the clients list kept by the DHCP server. For most instances, this is found on the local gateway or router. Alternatively, the device will broadcast its information via mDNS.

Brief Notes About DHCP: All devices on an IP network require an IP address. This is a unique address that identifies each device on the network. DHCP (Dynamic Host Control Protocol) is a mechanism that automatically assigns an IP address to a computer (or other devices) when it is connected to a network. This eliminates the need to manually enter the IP address. When a computer is connected to the network, another device on the network called a DHCP server detects the presence of the computer and dynamically assigns the IP address to that computer. On many small networks, the DHCP server is built into the router.

DHCP works well for "client" devices such as computers, but is not ideal for servers. This is because servers usually don't initiate communications with other devices, but rather they wait for a request from "clients." To make this request, the client must know the IP address of the server. If a server gets its IP address dynamically, the IP address may not always be the same so client devices may not be able to find the server. For this reason, servers usually use an IP address that is fixed and does not change. The XW-112 is a server and manual IP address assignment is usually recommended.

IP Address

Enter the IP address for the XW-112 in this field. The IP address is specific to the network where the XW-112 will be installed and is obtained from the network administrator. The default setting for this field is 192.168.1.2

Subnet Mask

The subnet mask defines the size of the local network. This can be obtained from the network administrator. For additional information about sub-netting and IP networking, many tutorials are available on the Internet. The default setting for this field is 255.255.255.0

Gateway

This specifies the IP address of the gateway router. This can be obtained from the network administrator. The default setting for this field is 192.168.1.1

DNS Server

The IP address of the DNS server is specified here. When DNS services are required, this is the address that will be used. The default setting for this field is 192.168.1.1. An alternate DNS server is not supported.

HTTP SERVER

Since the HTTP server is always enabled, the XW-112's setup and control pages can be accessed using a web browser or the CBW Mobile app and you can view the current water alarm status.

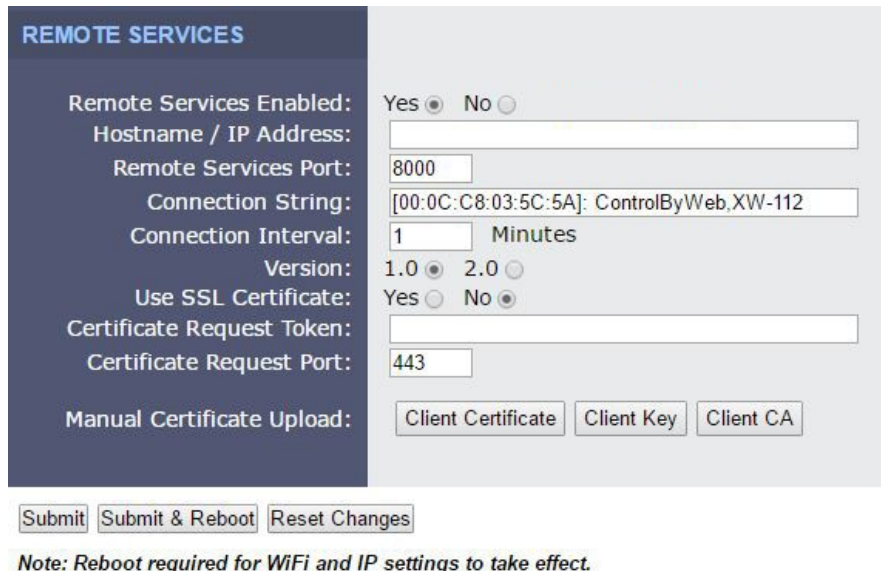
The TCP port used for HTTP communications with the XW-112 can be customized here. The default setting for this field is 80, which is the standard HTTP port. It is recommended that the port be left unchanged unless the user has an understanding of TCP/IP and ports.

REMOTE SERVICES

Remote Services

This option enables or disables Remote Services. If Yes is selected, Remote Services will be enabled as soon as the Submit button is pressed and XW-112 will immediately attempt to make a connection with a custom remote server (power cycle not required). Once a connection is established, the connection will remain until it is disconnected by the remote server. Proper connection with the remote server can be verified by checking the remote server. The default setting for this field is *No*. If Remote Services is enabled, the default settings will connect to the ControlByWeb.cloud cloud service. Users will need to supply either a token from their account or upload SSL certificates. Most users should leave these settings at their default. (See *Remote Services* at the end of this section for more information.)

If Remote Services Enabled is set to Yes, the following settings are shown:



REMOTE SERVICES

Remote Services Enabled: Yes No

Hostname / IP Address:

Remote Services Port:

Connection String:

Connection Interval: Minutes

Version: 1.0 2.0

Use SSL Certificate: Yes No

Certificate Request Token:

Certificate Request Port:

Manual Certificate Upload:

Note: Reboot required for WiFi and IP settings to take effect.

Hostname/IP Address

Specify the name or IP address of the Remote Services' server here. If the IP address is specified, enter it in this format *aaa.bbb.ccc.ddd*. For numbers that are less than 100, preceding zeros should not be included (for example, enter 80 rather than 080). This field can be up to 40 characters long and has no default setting.

Remote Services Port

Enter the TCP port used for the Remote Services' server. This can be set within the range of 0-65535. The default setting for this field is 8000.

Connection String

This text is sent to the Remote Services' server when the connection is established. This string should include any information required by the server at connection. For example, it may include an ID number, customer number, password, etc. The format is entirely dependent upon the server requirements. This field can be up to 80 characters long. Default text is provided only as an example placeholder. The default text is [*<Serial Number>*]:ControlByWeb,XW-112.

Connection Interval

This field specifies the periodic interval in which the XW-112 attempts to connect to the remote server, or if XW-112 is already connected, it is the interval in which the XW-112 sends the connection string. This field can be set within the range of 1 to 55 minutes. The default setting for this field is 1 minute.

Version

This field specifies the version of the remote services' protocol to use. Version 1 of the protocol sends the connection string after successfully connecting to the remote server and then periodically per the connection interval specified. Version 2 of the protocol sends the connection string in addition to the MAC address, connection interval, model number and then immediately sends the state.xml file of the device. Version 2 of the protocol requires the remote server to reply to the connection string with a 3 byte packet containing the text "ACK". If the "ACK" is not received within 10 seconds of sending the connection string, the XW-112 will close the connection. Version 2 continues to send the connection string and the state.xml file periodically per the connection interval specified.

Use SSL Certificate

This option enables encryption of the remote services' connection with the remote services' server as well as authentication of the XW-112 to the server by a client certificate and key. Custom certificates and keys can be loaded into the XW-112 for this purpose. (See *Remote Services* at the end of this section for more information.)

By default, the XW-112 does not come with any SSL certificates already installed. The certificates will need to be installed either manually by uploading the files or automatically with a token. The SSL certificates must be in the PEM format.

Certificate Request Token

When the XW-112 has a valid Certificate Request Token entered, it will automatically attempt to request and download its Client Certificate, Key, and CA. Once successful, the token will be erased and the XW-112 will stop its requests. (See *Remote Services* at the end of this section for more information.)

Certificate Request Port

The certificate server is a server that has been configured to deliver the Client Certificate, Key, and CA when requested by the XW-112. For the XW-112 to request a Certificate, Key, and CA from the certificate server, it must have a previously issued Certificate Request Token. This field specifies what port the Certificate Server listens on. The server is found at the same host name as the remote services server. (See *Remote Services* at the end of this section for more information.)

Manual Certificate Upload

Client Certificate

A client certificate is used with custom remote services servers for device authentication. To upload a custom client certificate to the XW-112, click the *Browse* button, find the PEM formatted certificate file, and select *Submit*.

Client Key

A client key is used with custom remote services servers for device authentication. The key that is uploaded must be the correct key associated with the Client Certificate. Care should be taken with where this client key is stored as it is meant only to be known to the XW-112. To upload a custom client key to the XW-112, click the *Browse* button, find the PEM formatted file, and select *Submit*.

Client CA

A CA (Certificate Authority) is used by the XW-112 to verify the authenticity of the remote services server it is connecting to. It is important to note that this CA does not need to be the CA that signed the Client Certificate used by the XW-112. Rather the CA needs to be the one used to sign the certificate used by the remote services server. To upload a custom CA to the XW-112, click the *Browse* button, find the PEM formatted file, and select *Submit*.

Remote Services Notes: Remote Services initiates an outgoing connection to a server at a remote location. This can be used in an environment where a web server on the Internet provides a custom web

page to XW-112 and other ControlByWeb products. Users access the XW-112 through the web server rather than communicating directly with it. This method is sometimes referred to as “web services” and allows programmers to create powerful, custom web pages to multiple devices using the web programming languages of their choice.

Remote Services initiates the connection to the external web server (rather than the web server initiating communications to the XW-112). This has two main benefits. First, the web server does not need to know the IP address of XW-112. This means that XW-112 can get its IP address dynamically from a DHCP server, simplifying the installation. Second, since the connection from XW-112 is outgoing, rather than incoming, the local router on the network where XW-112 resides doesn't need to be configured to forward sockets. This simplifies the installation. Since the router configuration is not modified, the risk of compromising security on the local network is eliminated.

3.3 Email Tab

When a water alarm occurs and the email option is enabled, an email is sent. This page is used to configure the email settings and send notifications to up to three email addresses. The same message is sent to each email address. For email notification to work, the XW-112 must have a properly configured network connection and a SMTP server must be defined. Emails only work if the XW-112 is connected to an access point and can communicate with an SMTP email server (typically over the internet).


Wi-Fi Water Detector

Main
WiFi Networks
Email
Password
Water Sensor
Control Page

STATUS NOTIFICATION

Email on Low Battery: Yes No

Weekly Status Email: Yes No

Email on AC Power Fail: Yes No

EMAIL SETTINGS

SMTP Server:

SMTP Server Port: SSL

User Name:

Password:

Return Email:

Email 1:

Email 2:

Email 3:

STATUS NOTIFICATION

Email on Low Battery

When the estimated battery life reaches 15%, an email alert is sent. To conserve already meager energy resources, only one low battery message is sent until the estimated battery life goes above 50%.

Weekly Status Email

When checked, the XW-112 will send an email at least once a week with water sensor status and battery information. This provides ongoing assurance the unit is functioning properly. The weekly emails are sent 7-days from the last email that was successfully sent, including alarm or low battery emails. If you are receiving alarm email alerts regularly, the weekly email may never be sent.

Email on AC Power Fail

When enabled, the XW-112 will send a status email when it detects loss of the +5V input power source. This feature only works if batteries are installed and power to the access point and the internet is still available.

EMAIL SETTINGS

SMTP Server

The SMTP mail server host name. To save energy, DNS lookups are only performed the first time after the settings are submitted, or after a failure to send an email.

SMTP Server Port

The port number of the SMTP mail server. This is generally port 25 for non-encrypted SMTP servers. If using SSL/TLS, this port number is generally 465.

SSL

Check this check box if the server and port you have configured is expecting a SSL connection.

User Name

Email user name (if required).

Password

Email password (if required).

Return Email

The email address that will receive a notification if the sent email does not get delivered. (*Note: Most email providers require the Return Email address to match the address in the User Name field.*)

Email 1-3

When an alert occurs an email message is sent to these addresses.

Test Email

Pressing this button will submit any changes to the email settings and trigger an alert email to be sent to the configured email addresses.

The result of the test email will be displayed directly below the Test Email button along with the last message received from the SMTP server, if applicable.

The following are typical responses you may see along with a description of what they mean:

- Error initiating communications: Did not receive the expected HELO from SMTP server. Ensure you are using the proper port and host/IP settings.
- Error with EHLO: Error sending or error receiving proper response to the SMTP EHLO command. Server may be unavailable or port and IP address settings are not correct.
- Error authenticating: Error sending or error receiving proper response to the SMTP AUTH PLAIN command. This may indicate the use of an incorrect username or password.
- Error with FROM field: Error sending or error receiving proper response to the SMTP MAIL FROM command. Ensure the Return Email address has been properly specified.
- Error with RCPT(To) field: Error sending or error receiving proper response to the SMTP RCPT TO command. Ensure the To email addresses are using valid characters and formatted properly.

- Error sending DATA command: Error sending or error receiving proper response to the SMTP DATA command. This error generally indicates a problem with the SMTP server.
- Error sending message body: Error sending or error receiving proper response to sending the content of the email. This error generally indicates a problem with the SMTP server.
- Error resolving DNS: Error resolving the hostname in the SMTP Server field on the setup pages. If this field is an IP address, ensure no numbers are greater than 255, there are four numbers separated by dots, and there are no alphabetic characters. If the SMTP Server field is a host name, ensure the DNS Server on the WiFi Networks tab or DNS server issued via DHCP is valid and has a proper DNS record for the SMTP Server host provided.
- Error establishing connection: Error configuring security on SSL socket or error creating socket.
- Error with SSL handshake: Could not successfully negotiate a cipher or protocol version to use for the SSL connection to the SMTP server. Ensure the configured port is indeed expecting an SSL connection.
- No SMTP server configured: No valid SMTP Server has been specified. Enter the host name or IP address of the SMTP Server you would like to use.
- No To address configured: No recipients of the email alerts has been configured. Enter at least one email address into any of the Email fields.
- Success: The test email was sent successfully.

Note: When the XW-112 is in Access Point mode, your smart-phone or computer connects directly to it and the XW-112 is not connected to the Internet. In this mode, no email messages can be sent and the Test Email button is disabled.

3.4 Password Tab

The XW-112 has separate passwords for the Setup and Control pages. The passwords can be changed on this page. The username (admin) is fixed and cannot be changed.

The screenshot shows the web interface for the XW-112 Wi-Fi Water Detector. At the top, there is a navigation bar with tabs: Main, WiFi Networks, Email, Password (selected), Water Sensor, and Control Page. Below the navigation bar, the interface is divided into two main sections: 'SETUP PAGE' and 'CONTROL PAGE'. The 'SETUP PAGE' section contains two password input fields: 'Setup Password:' and 'Re-enter Setup Password:'. Both fields are masked with dots. The 'CONTROL PAGE' section contains a radio button for 'Enable Control Password:' with 'Yes' and 'No' options. The 'No' option is selected. Below this are two more password input fields: 'Control Password:' and 'Re-enter Control Password:'. Both fields are masked with dots. At the bottom of the interface are two buttons: 'Submit' and 'Reset Changes'.

Setup Password

The Setup Password, which is required to access the setup pages, can be modified by entering a new password here. Passwords that are 8 characters or longer (up to 13 characters can be entered in this field) with both alphabetic and numeric characters are recommended. For security purposes, the password will not be displayed as it is entered.

Re-enter Setup Password

When the Setup Password is changed, it must be entered twice. One time in the previous field and a second time in this field. If the password is not entered identically in both fields, the password will not be changed.

CONTROL PAGE

Enable Control Password

The Control Page is normally viewed without entering a password. For security purposes, a password can be enabled. When this field is set to Yes, a password will be required to view the control page. The default setting for this field is No.

Control Password

The password for the control page can be modified by entering a new password here. Passwords that are 8 characters or longer (up to 13 characters can be entered in this field) with both alphabetic and numeric characters are recommended. For security purposes, the password will not be displayed as it is entered.

Re-enter Control Password

When the Control Password is changed, it must be entered twice. One time in the previous field and a second time in this field. If the password is not entered identically in both fields, the password will not be changed.

3.5 Water Sensor Tab

This page determines what actions are taken when a water alarm occurs.

Description

This text is used to describe the function of the XW-112. The text appears on the *Control Page*, and in email messages when email alerts are enabled. This field may be up to 40 characters long. Enter a descriptive name such as “*Laundry Room Water Sensor.*”

Control Page Refresh Rate

This value specifies the time interval in seconds that the Control Page will be refreshed.

Email Alert

Simple email messages can be sent in response to changes in the water alarm. This setting is used to specify what conditions, if any, will cause email messages to be sent.

- **Off:** No email messages will be sent due to a water alarm.
- **On:** Email notifications will be sent when the water alarm changes from dry-to-wet or wet-to-dry.

Up to three email addresses can be assigned. The same message is sent to each email address. For email notification to work, the XW-112 must have a properly configured network connection and a SMTP server must be defined.

Remote Relay Options

The water alarm can be configured to control the relay contacts of another ControlByWeb™ device (such as WebRelay™) at a remote location. The ‘Remote Relay Options’ setting is used to specify if and how the control commands are sent.

- **No remote relay control** – No remote commands are sent due to alarm changes
- **Remote command equals sensor** – The remote relay turns off when the sensor is wet and turns on when the sensor is dry

- **Remote command opposite of sensor** – The remote relay turns on when the sensor is wet and turns off when the sensor is dry
- **Send On command when dry (no off command)** – The remote relay latches on when the sensor becomes dry.
- **Send On command when wet (no off command)** - The remote relay latches on when the sensor becomes wet.
- **Send Off command when dry (no on command)** – The remote relay latches off when the sensor becomes dry.
- **Send Off command when wet (no on command)** – The remote relay latches off when the sensor becomes wet.
- **Send pulse command when dry** – The remote relay is pulsed when the sensor becomes dry.
- **Send pulse command when wet** – The remote relay is pulsed when the sensor becomes wet.
- **Send pulse command when sensor changes** – The remote relay is pulsed when the sensor changes state.
- **Send toggle command when dry** – The remote relay changes state when the sensor becomes dry. When the sensor becomes wet, no command is sent.
- **Send toggle command when wet** – The remote relay changes state when the sensor becomes wet. When the sensor becomes dry, no command is sent.
- **Send toggle command when sensor changes** – The remote relay changes to the state opposite of its current state when the sensor changes state.


Wi-Fi Water Detector

Main WiFi Networks Email Password Water Sensor Control Page

SENSOR SETTINGS

Description:	<input type="text" value="Wi-Fi Water Detector"/>
Control Page Refresh Rate:	<input type="text" value="3"/> Seconds
Email Alerts:	On <input checked="" type="radio"/> Off <input type="radio"/>
Remote Relay:	<input type="text" value="Remote command equals sensor"/>
Hostname / IP Address:	<input type="text"/>
TCP Port:	<input type="text" value="80"/>
Password:	<input type="password" value="....."/>
Relay #:	<input type="text" value="0"/>
Remote Service:	Send State Msg on sensor Change <input type="checkbox"/>

Submit Reset Changes

Hostname / IP Address

Enter the IP address or Host Name of the device on which the remote relay is located. To save energy, DNS lookups are only performed the first time after the settings are submitted, or after a failure to send a remote relay command.

TCP Port

Specify the TCP Port. By default this is set to port 80.

Password

Enter the Control Page password (if applicable) of the device on which the remote relay is located.

Relay#

Specify the number of the relay you would like to control on the device. (**Note:** To control WebRelay's relay, enter in the number 0.)

Remote Services

The XW-112 can be configured to send messages to other ControlByWeb™ products or servers that are located at a remote location and running the remote services' server software. If the check box is set, the XW-112 will transmit a status message whenever the water alarm changes state.

Section 4: Control Page

The internal HTTP web server is always enabled and the water sensor status can be monitored by using a web browser, the CBW Mobile app, and/or by sending text commands to an XML status/control page.

4.1 Browser Operation

Once the XW-112 is set up, users can access the Control Page by either clicking the *Control Page* tab from within the setup pages, or by using a web browser and typing the IP address of the XW-112 into the web browser address bar. For example, using the default IP address, the user would enter: `http://192.168.1.2`. If the IP address is changed from the default, the user must use the new IP address. Note that if any port is used other than the default port 80, the port must also be included in the request. For example, to access the device at port 8000 enter: `http://192.168.1.2:8000`.

4.1.1 XW-112 Control Page

While the control page is open, the water sensor status and battery information will update every three seconds.



The *Control Page* is normally what users see and use and can be configured with a descriptive title. The device name can be customized with a 40-character description such as "Laundry Room Leak Alarm".

Other control page examples include:



Section 5: Network Discovery

XW-112 has implemented a network discovery and provisioning protocol to aid in accessing the device. With this protocol, a user may connect the device to a network without knowing the IP address, search and identify the IP address, query basic information and if not yet configured send the desired network and remote services configurations. This feature can be utilized in the latest versions of the Android and iOS apps.

The network discovery protocol listens for specific requests on UDP port 65431 sent to the IP broadcast address 255.255.255.255. All requests must have the proper header and, when applicable, the correct MAC address. This header is the first 12 bytes of all messages and is simply the string 'ControlByWeb'.

Header											
C	o	n	t	r	o	l	B	y	W	e	b
0x43	0x6f	0x6e	0x74	0x72	0x6f	0x6c	0x42	0x79	0x57	0x65	0x62

5.1 Initial Contact

The initial contact request is sent to discover ControlByWeb devices on the network. It is recommended to send this message multiple times in environments where many ControlByWeb devices are present due to potentially lost traffic where collisions occur as UDP does not guarantee deliver of packets.

Request:

Header (12 bytes)	ASCII String	ControlByWeb
Message ID (1 byte)	Initial Contact Request	0x00

Response:

Header (12 bytes)	ASCII String	ControlByWeb
Message ID (1 byte)	Initial Contact Response	0x01
MAC Address (6 bytes)	Binary version	0x00 0x0c 0xc8 0x00 0x00 0x00
Device Info (2 bytes)	Bit[15-7] Reserved	0b0
	Bit 6 – Mode	0b0=Station, 0b1=AP
	Bit 5 – Reserved	0b0
	Bit 4 – Remote Services Status	0b0=Disconnected, 0b1=Connected
	Bit 3 – DHCP Status	0b0=Waiting, 0b1=Success
	Bit 2 – Remote Services Enabled	0b0=Disabled, 0b1=Enabled
	Bit 1 – DHCP Enabled	0b0=Disabled, 0b1=Enabled
	Bit 0 – Configuration Allowed	0b0=Not Allowed, 0b1=Allowed
Model Code (2 bytes)		0x002D=XW-112
IP Address (4 bytes)	Network endianness	0xc0 0xa8 0x01 0x02 (192.168.1.2)

5.2 Setup Information

The Setup Information request allows the device to receive IP network, remote services and WiFi network configuration data that it should use. Once this request is properly received, the device will apply the settings and reboot. There are two variants of this request, one has message ID 0x03 and the other has message ID 0x06. The only difference in these requests is message ID 0x06 includes fields for WiFi SSID, security and password.

Once the device has received this command or after the user has configured the device through the web-pages, this request will be ignored and will return an error. The only way to re-enable this request, is to reset the device to factory defaults, or re-associate the device to a WiFi network via WPS.

Request:

Header (12 bytes)	ASCII String	ControlByWeb
Message ID (1 byte)	Setup Information request	0x03 -or- 0x06
MAC Address (6 bytes)	Binary version	0x00 0x0c 0xc8 0x00 0x00 0x00
DHCP (1 byte)	Enable DHCP	0x00=Disabled, 0x01=Enabled
Enable Remote Services (1 byte)	Enable Remote Services	0x00=Disabled, 0x01=Enabled
Token (32 bytes)	ASCII String, no null terminator	"xx"
IP Address (4 bytes)	Network endianness	0xc0 0xa8 0x01 0x02 (192.168.1.2)
Subnet (4 bytes)	Network endianness	0xff 0xff 0xff 0x00 (255.255.255.0)
Gateway (4 bytes)	Network endianness	0xc0 0xa8 0x01 0x01 (192.168.1.1)
Primary DNS (4 bytes)	Network endianness	0x08 0x08 0x08 0x08 (8.8.8.8)
Alternate DNS (4 bytes)	Not used by the XW-110-(Plus)	0x08 0x08 0x04 0x04 (8.8.4.4)
Remote Services Version (1 byte)	Specify protocol version	0x01=1.0, 0x02=2.0
Remote Services port number (1 byte)	Port Remote Services server is listening on (Network Endianness)	0x1f 0x40 (8000)
Remote Services Connection Interval (2 bytes)	Time in minutes between connection attempts and pushing state.xml	0x00 0x01 (1 minute)
Remote Services uses SSL (1 byte)	Only applicable to Remote Services Version 2.0	0x00=No SSL, 0x01=Use SSL
Certificate retrieval port number (2 bytes)	Port used to pass token information to retrieve certificates	0x01 0xbb (443)
Remote Services host	Null terminated ASCII string	devices.controlbyweb.cloud
Remote Services Connection String	Null terminated ASCII string	
WiFi Security option (1 byte)	Message ID 0x06 only	0x00=none, 0x01=WEP, 0x02=WPA(2)
SSID	Null terminated ASCII string (message ID 0x06 only)	
Password	Null terminated ASCII string (message ID 0x06 only)	

Successful Response:

Header (12 bytes)	ASCII String	ControlByWeb
Message ID (1 byte)	Setup successful response	0x04
MAC Address (6 bytes)	Binary version	0x00 0x0c 0xc8 0x00 0x00 0x00

Error Response:

Header (12 bytes)	ASCII String	ControlByWeb
Message ID (1 byte)	Command not recognized response	0x05
MAC Address (6 bytes)	Binary version	0x00 0x0c 0xc8 0x00 0x00 0x00

Appendix A: Specifications

Wireless Specifications

Network Standards:	IEEE 802.11b/g/n
Frequency Band	2.412 – 2.462 GHz
Wi-Fi Security Standards	Open, WEP, WPA, WPA2
Network Settings:	DHCP or Static
Wireless Range	Up to 250ft (typical for Wi-Fi devices) depends on environment
Antenna:	Integral chip antenna, 1.9 dBi.
RF Output Power (typ)	14dBm (802.11b/g), 12dBm (802.11n)

Operation

Provisioning:	Via internal web server (no cables or PC utilities needed)
Access Point:	Yes, push button activated (setup via web page)
WPS:	Yes, push button activated (Wi-Fi Protected Setup)
Connectivity:	Always connected
Remote Server:	ControlByWeb's X-600™ or cloud-based server
Remote Relays:	Control relays on other ControlByWeb™ products
Polling:	state.xml (only when web-server is active)

Power

External:	5VDC ±10%, 500ma max (via DC power wall adapter)
DC Jack:	5.5mm barrel x 2.5mm center pin (positive)
Internal:	Two replaceable 1.5V "AA" cells
Power Consumption:	59mA active RX, 229mA TX (at +12dBm)
Battery Usage:	Battery voltage is measured and periodically reported.
Battery Life:	On external power failure, 3 days minimum.

Internal Push Buttons

Button 1:	Force access-point mode
Button 2:	Activate WPS mode

Sensor Connections

XW-112:	+5V	Excitation output voltage for sensor
	In:	Switch closure input (internal pullup resistor:12.4K to 3.3V)
	Gnd	Ground connection

Liquid Detection Sensor

Model GRI-2605:	Operating Voltage	5Volts DC
	Operating Current	10mA
	Contact Resistance	100-mΩ
	Electrode Sensitivity	>470KΩ (typ) = no alarm <300KΩ (typ) = alarm

**The GRI-2605 sensor is sealed and is water resistant; however, it is not rated for long-term submersion by the manufacturer.*

Email alerts

Email Alerts:	Configurable
Encrypted Email Alerts:	Yes
Switch Status Alerts:	Dry-to-wet or wet-to-dry transitions, power-fail

Environmental

Location:	Indoor use or NEMA-4 protected location
Using Alkaline Batteries:	-18°C to 55°C (0°F to 130°F)
Operating Temperature:	-40°C to 65°C (-40°F to 150°F)
Storage Temperature:	-40°C to 85°C (-40°F to 185°F)
Humidity:	5-95%, non-condensing

Mechanical

Mounting:	Wall mount
Material	Polycarbonate plastic
Size:	3.16 x 3.04 x 0.93 in. [80 x 77 x 24mm]
Weight:	2.4 oz [68g], no batteries

Certifications

FCC ID: 2AE4Z-XWD001
FCC 47CFR15 (Class B)
IEC CISPR 22, CISPR 24
EN55024 ITE Immunity (2010)
EN55022 Emissions (2010)
IC: 21441-XWD001

Appendix B: Trademark and Copyright Information

This document is Copyright ©2015-2017 by Xytronix Research & Design, Inc. All rights reserved.

XW-112™, WebRelay™, ControlByWeb™, and Xytronix Research & Design™ are trademarks of Xytronix Research & Design™, Inc. 2005-2017.

All other trademarks are the property of their respective owners.

All parts of this product and design including but not limited to firmware, hardware design, schematics, PCB layout, concept, graphics, users manual, etc., are property of Xytronix Research & Design, Inc. ©2005-2017. The XW-112™ may not be copied or reverse-engineered.

No part of this manual may be reproduced or transmitted in any form or by any means, electronic or mechanical, including photocopying or scanning, for any purpose other than the personal use by the purchaser of this product. Xytronix Research & Design, Inc., assumes no responsibility for any errors that may appear in this document.

Whereas reasonable effort has been made to make the information in this document as useful and accurate as possible, Xytronix Research & Design, Inc. assumes no responsibility for the application, usefulness, or completeness of the information contained herein. Under no circumstance will Xytronix Research & Design, Inc. be responsible or liable for any damages or losses including direct, indirect, special, incidental, or consequential damages or losses arising from either the use of any information contained within this manual or the use of any products or services referenced in this manual.

Xytronix Research & Design, Inc. reserves the right to change any product's features, specifications, documentation, warranties, fee schedules, and conditions at any time and without notice.

Appendix C: Warranty

This Xytronix Research & Design, Inc. product is warrantied against defects in material and workmanship for a period of five years from the date of shipment. During the warranty period, Xytronix Research & Design, Inc. will, at its option, either repair or replace products that prove to be defective. This warranty is extended to the original purchaser of the equipment only.

For warranty service or repair, customer must contact Xytronix Research & Design, Inc. technical support (support@ControlByWeb.com) and obtain a Return Authorization number (RA#). Before issuing an RA#, a support technician will work with customer to try to resolve the issue without returning the product. If technician determines that product must be returned for service an RA# will be issued. Next, the product must be properly packaged and returned to Xytronix Research & Design, Inc. with the RA# clearly marked on the package. The purchaser shall prepay all charges for shipping to Xytronix Research & Design, Inc. For warranty repairs of products less than one year old, Xytronix Research & Design, Inc. will pay the shipping charges to return the product to the purchaser as long as the product is shipped within the continental United States. If the product is shipped outside of the continental United States or the product was shipped more than one year earlier, the purchaser shall pay all shipping charges, duties, and taxes.

Limitation

The foregoing warranty shall not apply to defects or damage resulting from improper use or misuse, unauthorized repair, tampering, modification, improper connection, or operation outside the electrical/environmental specifications for the product. Further, the warranty does not cover Acts of God, such as fire, flood, hurricanes, and tornadoes. This warranty does not cover damage to property, equipment, direct, indirect, consequential, or incidental damage (including damage for loss of business profit, business interruption, loss of data, and the like) arising out of the use or misuse of this product.

UNDER NO CIRCUMSTANCES WILL THE LIABILITY OF XYTRONIX RESEARCH & DESIGN, INC. TO THE PURCHASER OR ANY OTHER PARTY EXCEED THE ORIGINAL PURCHASE PRICE OF THE PRODUCT, REGARDLESS OF THE FORM OF THE CLAIM. No other warranty is expressed or implied. Xytronix Research & Design, Inc. specifically disclaims the implied warranties or merchantability and fitness for a particular purpose. Some jurisdictions may not allow the exclusion of limitation of liability for consequential or incidental damage.

Appendix D: FCC Statement

This device complies with Part 15 of the FCC Rules. Operation is subject to the following two conditions:

1. This device may not cause harmful interference.
2. This device must accept any interference received, including interference that may cause undesired operation.

Warning

This equipment has been tested and found to comply with the limits for a Class B digital device, pursuant to part 15 of the FCC Rules. These limits are designed to provide reasonable protection against harmful interference in a residential installation. This equipment generates, uses and can radiate radio frequency energy and, if not in-stalled and used in accordance with the instructions, may cause harmful interference to radio communications. However, there is no guarantee that interference will not occur in a particular installation. If this equipment does cause harmful interference to radio or television reception, which can be determined by turning the equipment off and on, the user is encouraged to try to correct the interference by one or more of the following measures:

- Reorient or relocate the receiving antenna.
- Increase the separation between the equipment and receiver.
- Connect the equipment into a relay on a circuit different from where the receiver is connected.
- Consult the dealer or an experienced radio/TV technician for help.

Notice

Changes or modification not expressly approved by the party responsible for compliance could void the user's authority to operate the equipment.

RF Exposure Information

This equipment complies with the FCC RF radiation exposure limits set forth for an uncontrolled environment. The antennas used with this transmitter must be installed to provide a separation distance of at least 20cm from all persons and must not be located or operating in conjunction with any other antenna or transmitter.

Canadian License-Exempt Radio Apparatus (RSS-GEN)

This device complies with Industry Canada license-exempt RSS standard(s). Operation is subject to the following two conditions: (1) this device may not cause interference, and (2) this device must accept any interference, including interference that may cause undesired operation of the device.

Le présent appareil est conforme aux CNR d'Industrie Canada applicables aux appareils radio exempts de licence. L'exploitation est autorisée aux deux conditions suivantes : (1) l'appareil ne doit pas produire de brouillage, et (2) l'utilisateur de l'appareil doit accepter tout brouillage radioélectrique subi, même si le brouillage est susceptible d'en compromettre le fonctionnement.

Appendix E: Mechanical Dimensions

