XW110

Wi-Fi Temperature Module

USERS MANUAL

Revision 1.0

For models: XW-110, XW-111

Wi-Fi temperature monitoring & status alerting • Zero wiring needed

Features

- 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
- Air or submersible temperature probes available, sensors are interchangeable and need no calibration
- Powered from internal battery or external DC power adapter
- Small data packets provide long battery life
- Simple and easy to use
- Two models available: (1) Temperature, (2) Switch closure input

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

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XW110/XW111 User Manual Revisions	
Revision	**Description**
0.05	Work in progress, for review only

Section 1: Introduction

The XW110 and XW111 are easy to use wireless Wi-Fi temperature monitoring and status alerting devices. The XW-110 measures and reports temperature using a temperature probe which contains a precision digital sensor. The XW-111 monitors and reports the status of switch closure sensors and alarms. Both are ideal for applications where temperature or events must be monitored and Ethernet wiring is not accessible or practical to install.

The modules are powered from either two internal AA batteries or a 5-volt wall transformer. In the case both are connected, the XW11x will use the wall transformer and automatically switch to the batteries in the event of a power failure. A three position terminal strip provides connections for a temperature sensor or up to two switch closure sensors. Not other cables, interfaces or PC utility programs are needed.

Two user accessible push button switches aid in provisioning the module. Press the “access point” switch to active the access point mode. With a PC or smart phone you then connect to and access the internal web server. Using the web server, you may configure the measurement interval, access port, name and other setup parameters. Alternatively, press the WPS (Wi-Fi Protected Setup) switch on both the XW11x and your access point to add the XW11x to an existing network.

1.1.1 Features

- Wireless Wi-Fi 802.11 b/g/n
- Transmission range up to 250ft
- Two models available: (1) Temperature, (2) Switch closure input
- Built-in web server for configuration and remote monitoring
- Temperature sensor is accurate to +/-0.5°C from -10°C to +85°C
- Air or submersible temperature probes available, sensors are interchangeable and need no calibration
- Powered from two “AA” batteries or external DC power adapter
- Small data packets provide long battery life
- Simple and easy to use

1.1.2 Part Numbers and Accessories

Device	Description	Part Number
XW-110	Wi-Fi temperature sensor with built-in web server	XW-110
XW-111	Wi-Fi digital input sensor with built-in web server	XW-111
Temperature Sensor	Digital temperature sensor with short wire leads (connects directly to the terminal strip)	X-DTS-U
Temperature Sensor	Digital temperature sensor with 3 foot wire leads (housed in submersible stainless steel probe)	X-DTS-S3C
Temperature Sensor	Digital temperature sensor with 32 foot wire leads (housed in submersible stainless steel probe)	X-DTS-S32C
Power Supply	Wall Transformer, 120VAC in, 5V, 1A out	PS5VW1.0-2.5mm

1.1.3 Wireless Communication Notes

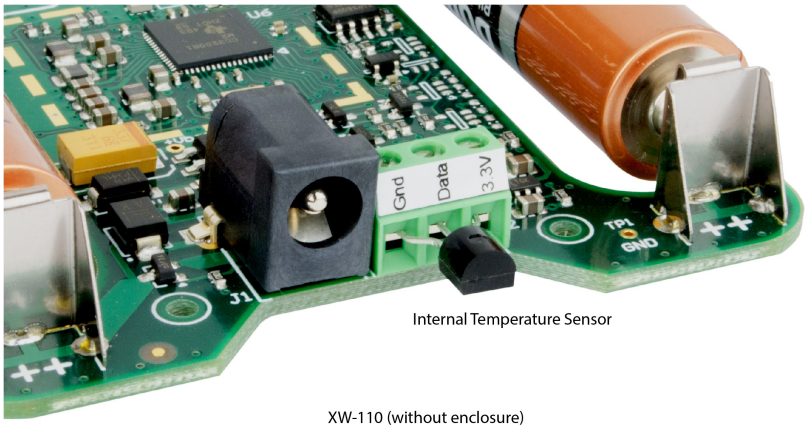
Due to the nature of wireless communications, transmission and reception of data can not be guaranteed. Data may be delayed, have errors or be lost. Although delays or losses of data are rare with a well constructed network, data can be lost due to interference, noise, reflections or other environmental conditions. The XW11x 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

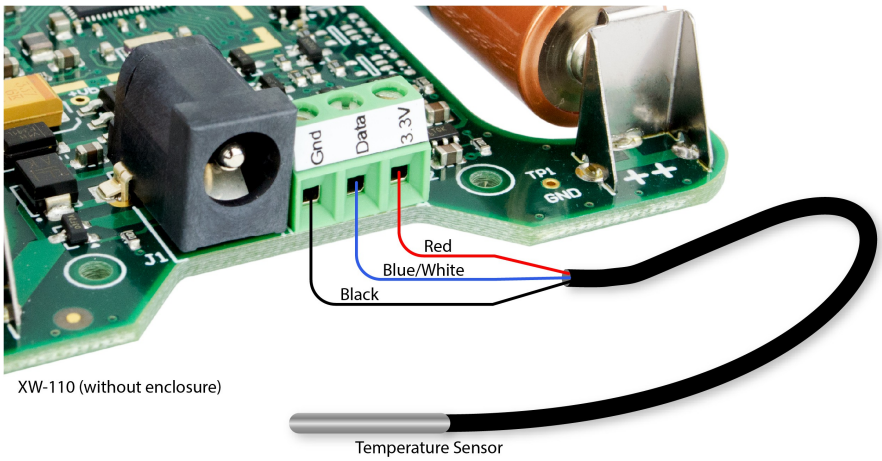
Begin by wiring the sensors to the green 3-terminal strip.

2.1.1 XW-110 Temperature Sensor Connections

The XW-110 works with a specific digital temperature sensor which is interchangeable and requires no calibration. The sensors accuracy is +/-0.5°C (-10°C to +85°C). The sensor requires three connections for communications and power (+5V, Ground, Data**).** The temperature sensor is available in several configurations. For monitoring room temperature, the bare sensor can be connected directly to the terminal strip. The rugged version is encapsulated in a stainless steel probe and can be used in unprotected outdoor locations.



XW-110 (without enclosure)



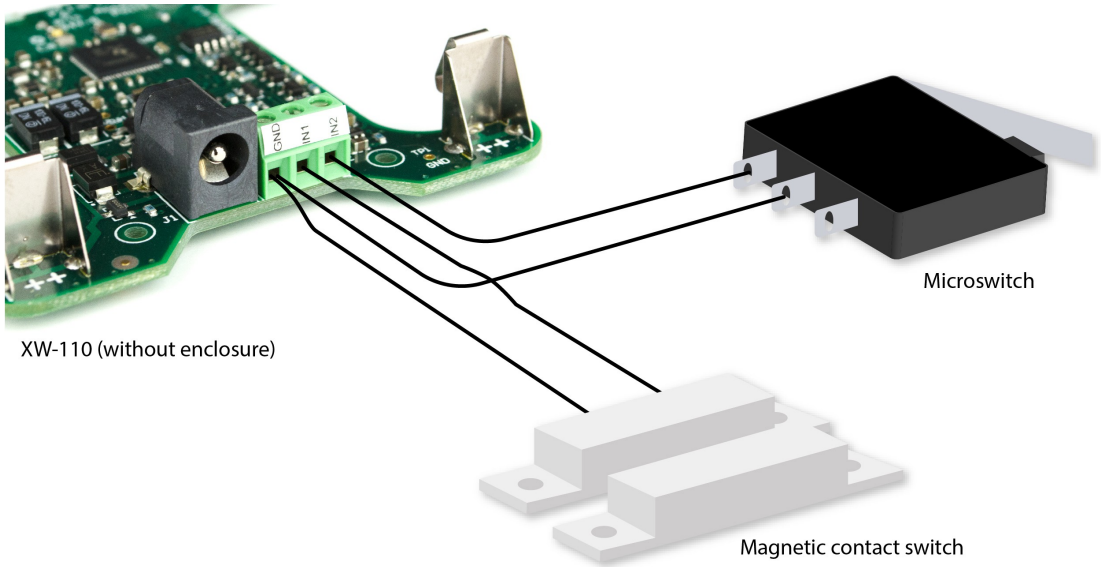
XW-110 (without enclosure)

Sensor Wire Color	Connection
Red	+5Vout
Black	GND
Blue (or White)	Data

2.1.2 XW-111 Switch Closure Connections

The XW-111 can sense the state of up to two switch closure sensors. Sensors with switch closure outputs include push buttons, magnetic door alarm switches, micro-switches, or any device which has a relay or switch closure output. Both sensor inputs share the same GND connection. The XW-111 can be configured for the alarm to be active when the switch is either open or closed. If possible, use switches which are normally open (NO). When the switch contact is open no current flows thru the switch and the longest battery life is achieved. When the switch is closed 17uA flows thru the switch.

The inputs use 3.3Volt logic and work with simple switches and relays. Do not connect the digital inputs to a power source. The inputs will work with cable lengths up to 50-feet and should not be routed near motors or AC wiring. The connections for two switches are shown:



2.1.3 Power

The XW-110 and XW-111 are powered from either a 5-volt DC wall adapter or two internal 1.5V “AA” batteries. If the wall adapter is connected, no power is drawn from the batteries. If the external power fails the module automatically switches to the internal batteries. No jumpers or switches are needed. The wall adapter should be used for certain modes with high current demands such as: “Stand-Alone mode” with HTTP server enabled, “Slave mode” with high reporting rates, or when “access point” is active.

2.1.4 Provisioning

After making the sensor connections and providing power, you must provision the XW11x for use on your wireless network. The goal is to configure the XW11x such that it can recognize and attach to your Wi-Fi access point. There are two methods for doing this:

Internal Web Server

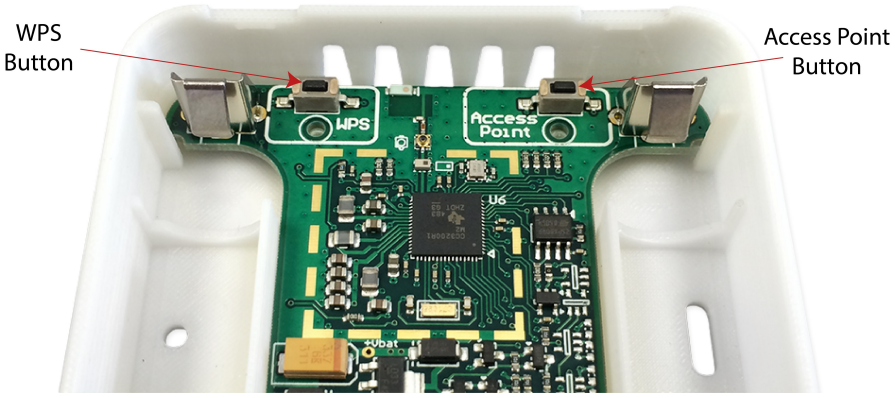
The web server requires an active Wi-Fi connection running at full power. It is recommended to use a wall-transformer with this method or do the configuration quickly as this mode consumes large amounts of energy. If this is the first time powering the device, it will automatically enumerate as an access-point, other wise, you must remove the top cover and press the "access point" push button. The XW11x will awaken and begin broadcasting as an access point. Its SSID is "TempModule-XXXXXX" or "InputModule-XXXXXX" where XXXXXX are the last six digits of its MAC address. With your wireless device (laptop computer or smart phone) scan for, and attach to the TempModule or InputModule wireless network. Next, access the web server in the XW11x using a web browser. To access the setup pages, enter 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 default username is `admin` and the default password is `webrelay` (password is case sensitive). The following chapter explains each of the setup tabs and screens. Use the ***WiFi Networks*** tab for making the proper settings to allow the XW11x to connect to your access point.

WPS (Wi-Fi Protected Setup)

The WPS *Push button method*, allows users a simple method for attaching the XW11x to a wireless network without needing to use any setup pages. 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 XW11x and press the "WPS" push button. After a few seconds, the XW11x should register itself with the router or access-point. If the XW11x has not already been configured, it will use DHCP to obtain an IP address. You will need to access the DHCP server, router, or access-point to find the IP address it was assigned. Additionally, the connection information is also broadcast using mDNS. Please note, that the XW11x web server is available with the default configuration, but will not be if the device has been configured as a slave device or if it has been disabled for the stand-alone mode.



Section 3: Setup Pages

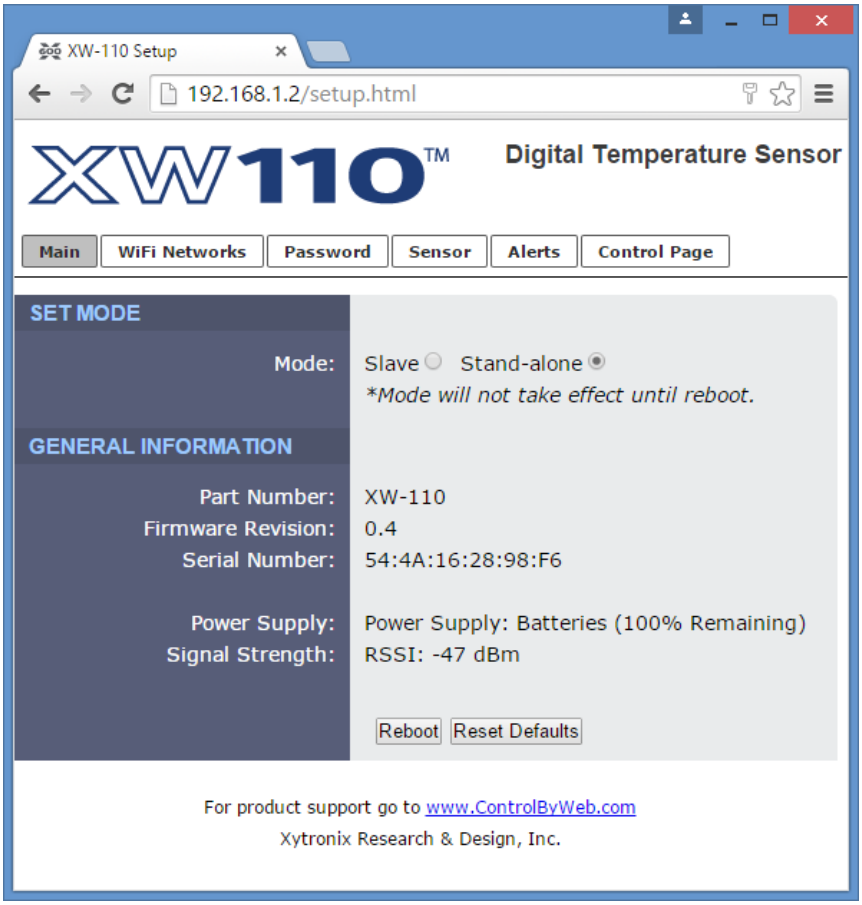
The XW11x is configured using a web browser. To access the setup pages, enter the following URL in the address bar of a web browser:

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

If the XW11x has been added to a network using WPS, it will use DHCP and you will need to use the IP address assigned to it. This can be found in the DHCP server, or by using mDNS. The mDNS name is <NAME HERE>.

3.1 Main Tab – Stand Alone

This is the initial page that is displayed when setup.html is entered into the address bar of the browser. It displays model and serial number information, and has navigation tabs which allow access to the configuration and setup settings. The web pages and communication settings for the XW-110 and XW-111 are similar, pages with specific settings for the temperature or digital inputs are shown in the following sections.



The XW11x operates in two fundamental modes designated "*Slave*" and "*Stand-alone*". Depending on this setting the menu tabs change to reflect the relevant settings. Select "Slave" if the XW11x is to make measurements and send data to a master device such as an X-600™. Select "Stand-Alone" if the XW11x is to simply monitor the temperature/inputs and/or send e-mail alerts.

The ***Mode*** setting will not take effect until the XW11x is rebooted. To do this click the ***Reboot*** button after making a change to the ***Mode***.

Slave*:*

- In this low power mode the XW11x sleeps most of the time. It periodically awakens, makes measurements, connects to a WiFi network and transmits data to a CBW device or other server.
- Use longer interval for long battery life.
- Intermittently connects to the wireless network as a *Station*. If the reporting interval is short, the WR100 remains connected since the energy required to re-connect is greater than the energy saved by disconnecting.
- No Emails are supported
- The Alert tab is suppressed, Remote Master tab is shown
- The internal web server is not accessible

Stand-Alone:

- Operates as a *Station* which allows the XW11x to be part of another wireless network.
- Periodically makes measurements and sends email alerts only when alarm conditions are satisfied.
- Alarms and Emails are supported.
- The Alert tab is visible and Remote Master is suppressed.
- The internal web server is accessible at the option of the user. Enabling the internal web server requires an active connection to the access point and is not feasible with battery operation.

Access Point:

- As an A*ccess Point* the XW11x functions independently of other wireless networks. It broadcasts beacons and services WiFi packet requests.
- Connect to the XW11x access point with any WiFi enabled phone or laptop computer.
- Used for provisioning the XW11x.
- Periodically makes measurements and displays the data on its internal web page. Data is not sent to other networks.
- Access Point works best when powered from a 5-volt DC wall adapter.

Part Number

This is the full model number of the XW11x

Firmware Revision

This is the current product revision of the internal software

Serial Number

This is the serial number of the XW11x. The serial number is also the MAC address of the unit.

Power Supply

This field shows if the XW11x is currently being powered by batteries or the DC wall transformer. If running on batteries, the battery voltage is measured and an estimate is made of the remaining battery life. The calculations are made for alkaline “AA” batteries with a usable capacity of 2000mAH. When using other batteries or in cold conditions the displayed estimate may be in error.

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 page, this button will send a command to reboot the device.

Reset Defaults

After showing a confirmation page, this button will erase all user settings and return the device to factory defaults.

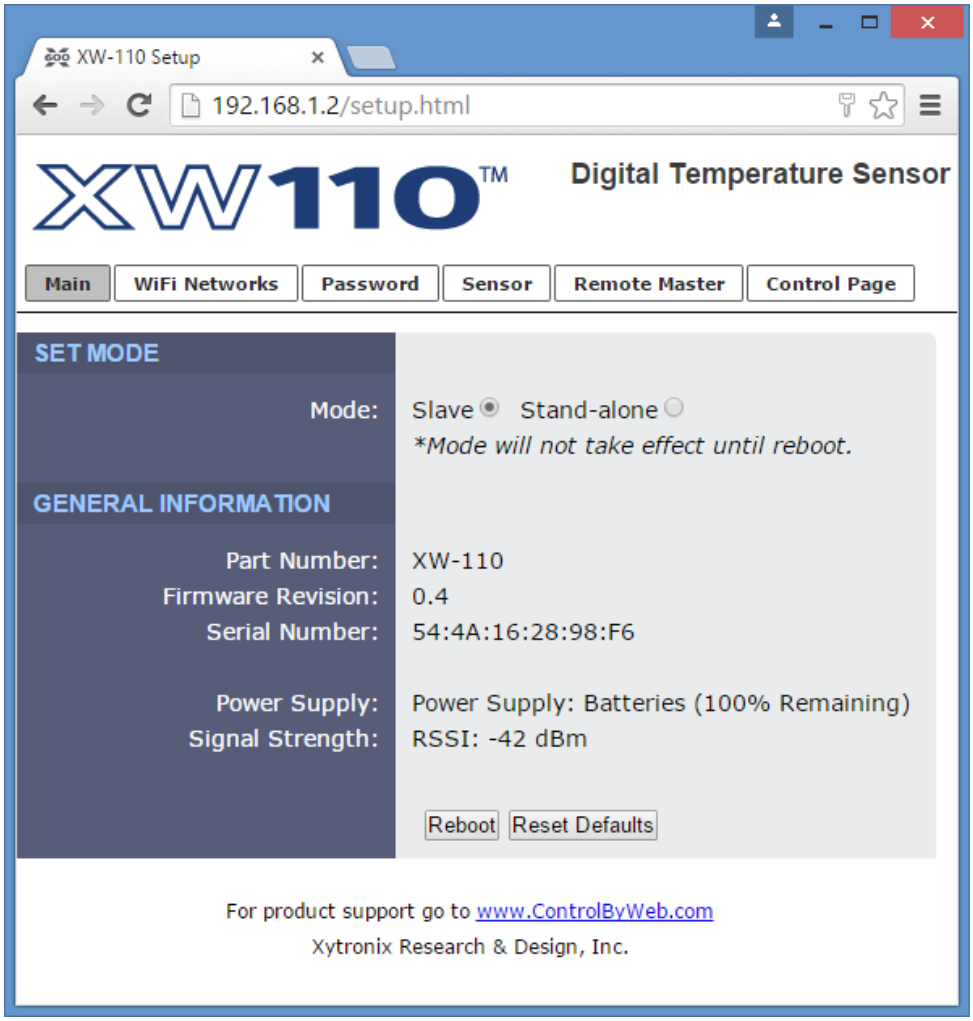
3.2 Main Tab – Slave

This tab is identical to the tab described above (Main Tab - Stand Alone) with the exception that the **Slave** mode has been selected. With ***Slave*** selected, the ***Alert*** tab is replaced by the ***Remote Master*** tab.

Select "Slave" if the XW11x is to make measurements and send data to a master device such as an X-600™. In this mode, the XW11x sleeps most of time conserving battery power. It periodically awakens, makes simple measurements and transmits (pushes) the data to a remote server. Access the ***Remote Master*** tab to select how often measurements are made and to which server the data is to be sent.

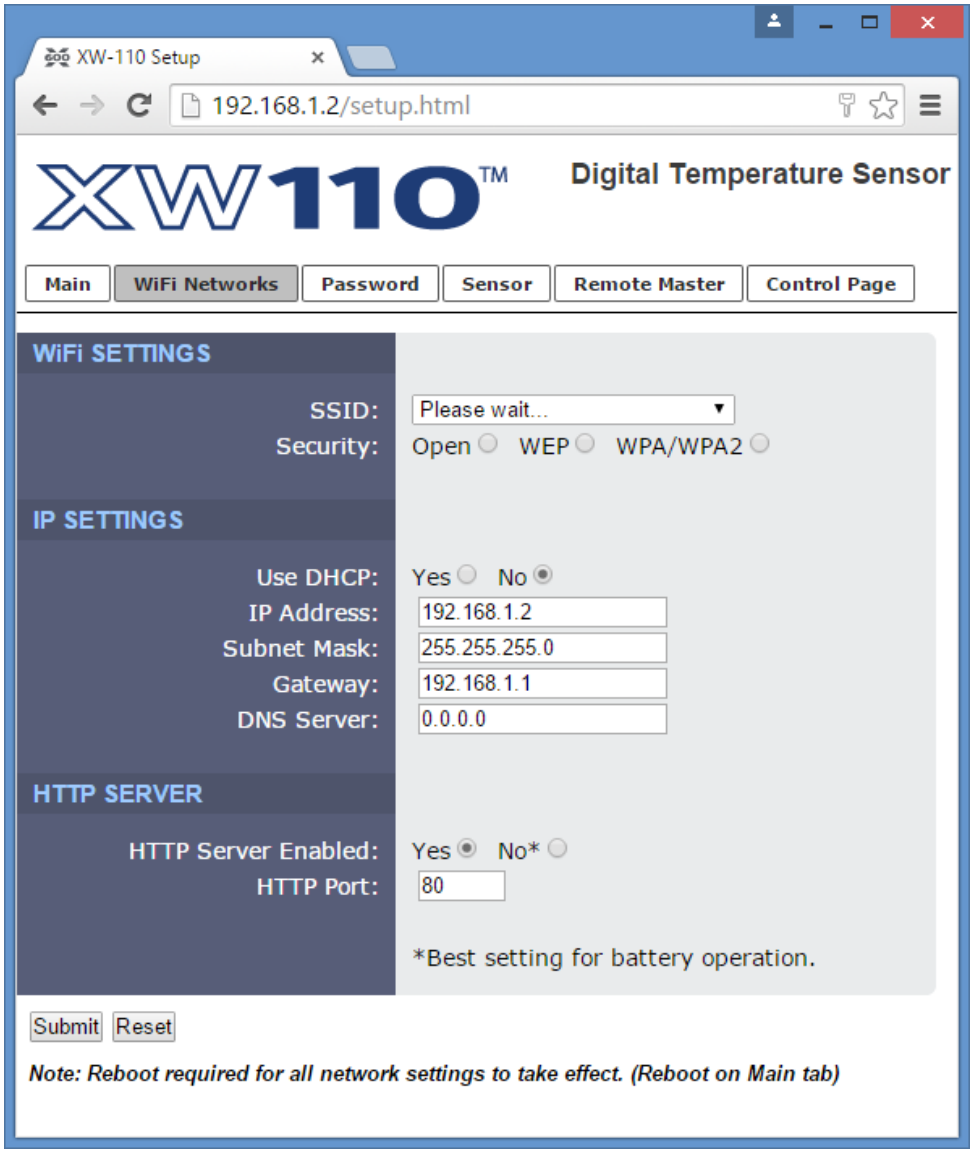
The ***Mode*** setting will not take effect until the XW11x is rebooted. To do this click the ***Reboot*** button after making a change to the ***Mode***.

In the low power Slave mode the web server is no longer accessible. To make subsequent changes you must remove the top cover and press the "access point" push button to force the XW11x into a state where you can connect to and access the internal web server again.



3.3 WiFi Networks Tab

As a Wi-Fi slave device, the XW11x attempts to automatically connect to configured Wi-Fi access points. The settings on this page tab are used to configure this connection.



SSID

The SSID (Service Set Identifier) is the name of your WiFi network.

Security

Type of authentication used by the access point for connections.

Security Key

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

Use DHCP

This option allows DHCP to be enabled or disabled. If this option is set to ***Yes***, the XW11x 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 XW11x must be rebooted before an IP address will be assigned. Once the XW11x 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. By not using DHCP, battery life is extended as the device does not need energy for transmitting requests and receiving responses every time it connects to the WiFi network.

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 XW11x is a server and manual IP address assignment is usually recommended.

HTTP Server Enabled

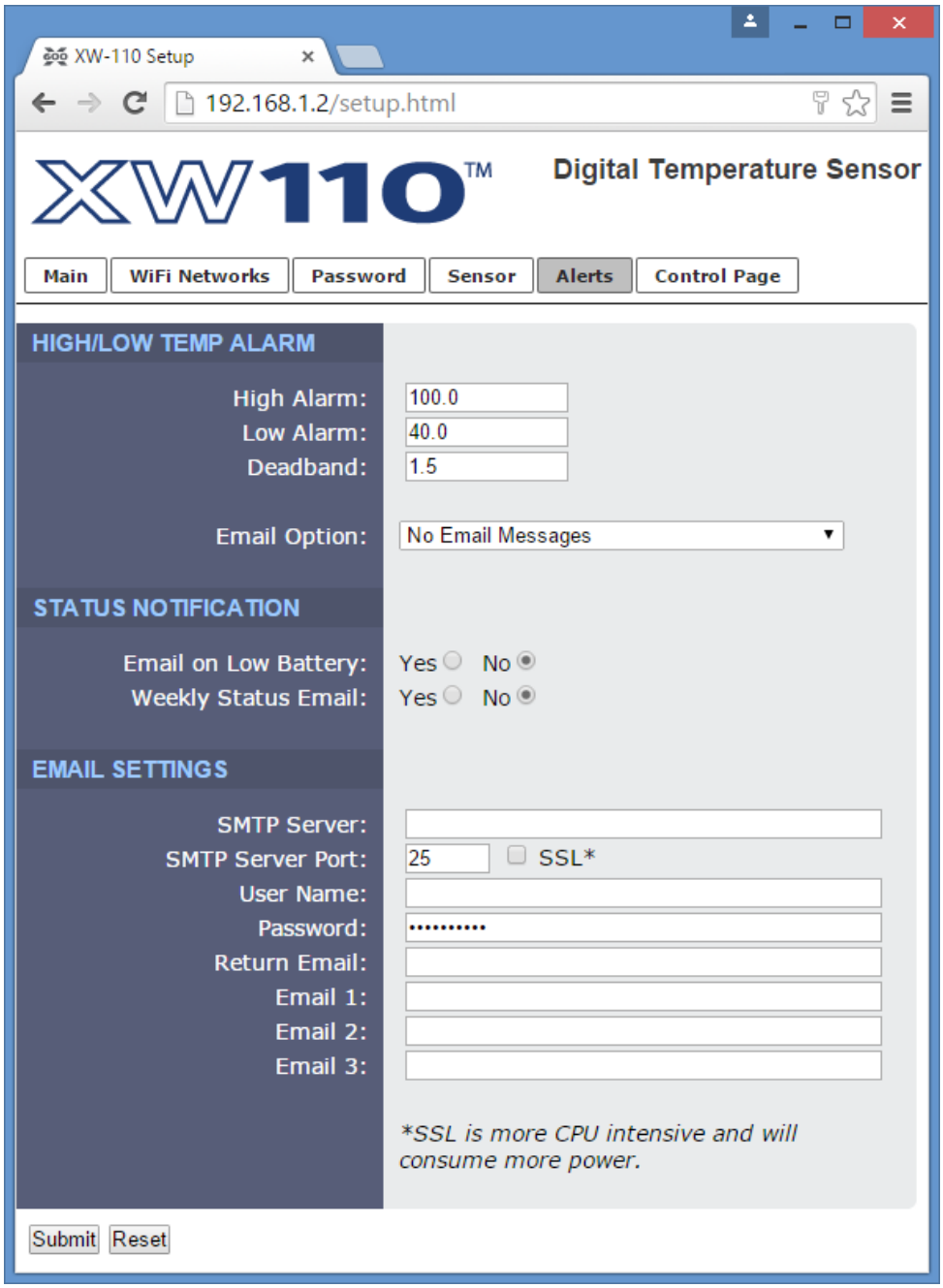
This option can turn the internal HTTP web server on or off. Turning the web server off will allow the device to make use of more power saving features. With the web server turned off, the device will be allowed to disconnect from the WiFi network or at the very least service beacons selectively.

HTTP Port

The TCP port used for HTTP communications with the XW11x 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.

3.4 Alerts & Email Tab

When configured as a *Stand-Alone* device this tab is visible. This page determines when alarm (alert) events occur and what actions are to be taken. Up to three Email addresses can be assigned for alerts. The same message is sent to each Email address. For Email notification to work, the XW11x must have a properly configured network connection and a SMTP server must be defined.



High Alarm

A high alarm is triggered when the temperature exceeds this set point.

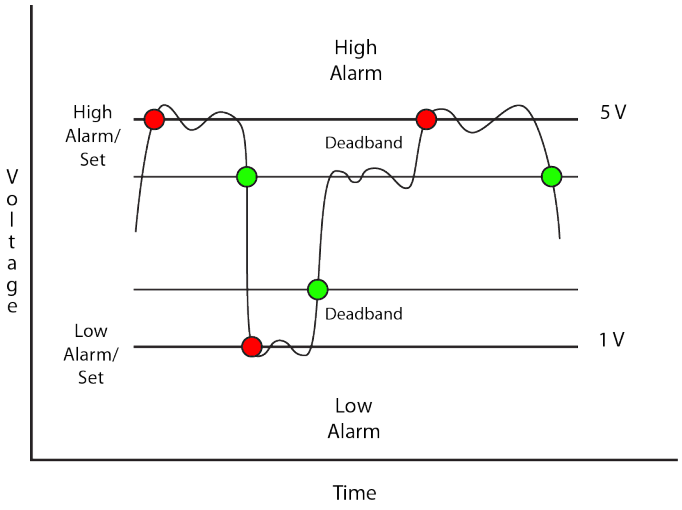
Low Alarm

A low alarm occurs when the temperature is lower than this set point.

Deadband

The deadband (hysteresis) prevents conditions and alarms from triggering excessively when the measurement value vacillates around the trigger point. With high alarms, the measurement must fall below the high alarm point minus the dead band before the high alarm will be triggered again. Likewise the deadband on the low alarm requires the measurement to rise above the low alarm point plus the deadband before the low alarm will be triggered again.

For example, if the dead band is set to 0.5°C, and a high alarm is set at 13°C - the high alarm will occur at 13°C; however, it will not turn off until the temperature drops below 12.5°C (13°C - 0.5°C).



Email Option

Simple email messages can be sent in response to alarm conditions. This parameter is used to specify what alarm conditions, if any, will cause email messages to be sent. Email notifications will work only if email is correctly setup in the following settings.

No Email Messages: No email messages will be sent due to alarm conditions.

Send Email on High Alarm: Email notifications will be sent due to a High Alarm condition.

Send Email on Low Alarm: Email notifications will be sent due to a Low Alarm condition.

Send Email on High and Low Alarm: Email notifications will be sent due to a High or Low Alarm condition.

Send Email on High, Low and Normal Alarm: Email notifications will be sent due to a High or Low alarm condition or when Normal conditions are restored.

Email on Low Battery

When a low battery condition occurs an email message is sent to this address. To conserve already meager energy resources, only one low battery message is sent.

Weekly Status Email

When checked, the XW11x will send an email once a week with temperature and battery information. This is to assure the user the unit is functioning properly.

SMTP Server

The SMTP mail server host name.

SMTP Server Port

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

SSL Checkbox

Check this checkbox if the server and port you have configured is expecting a SSL/TLS connection.

User Name

Email user name (if required)

Password

Email password (if required)

Return Email

The emails address that will get notification if the sent email does not get sent.

Email 1

When an alert occurs an Email message is sent to this address

Email 2

When an alert occurs an Email message is sent to this address

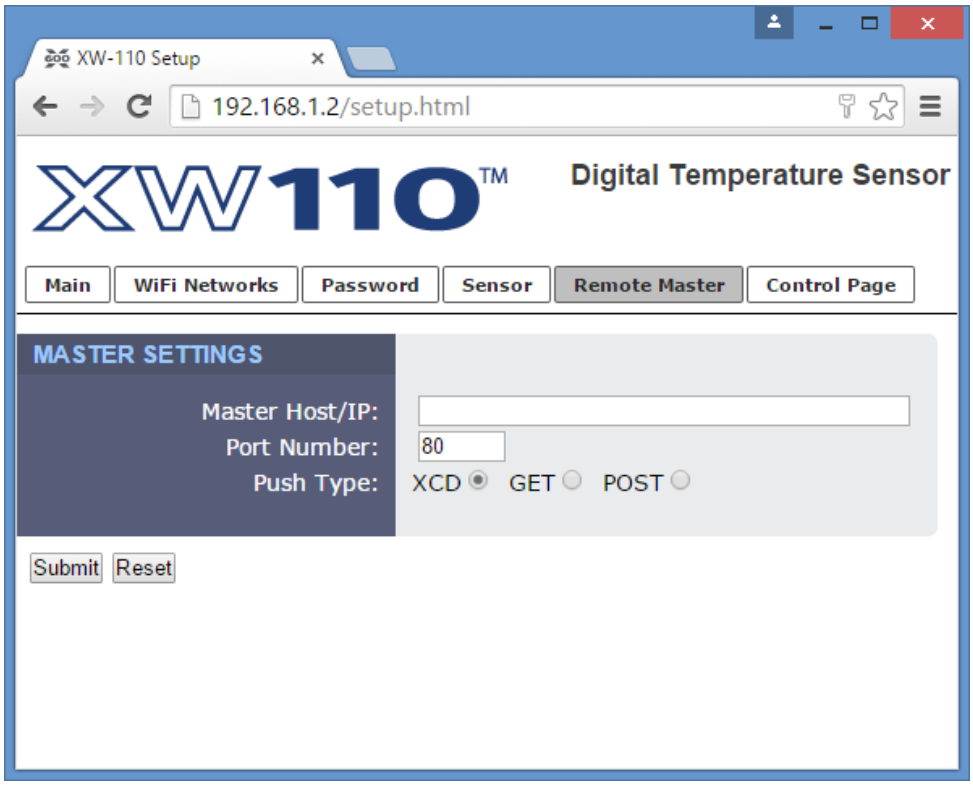
Email 3

When an alert occurs an Email message is sent to this address

3.5 Remote Master Tab

When configured as a *Slave* device this tab is visible. In this low power mode the XW11x periodically awakens, makes simple measurements and transmits (pushes) the data to a remote server. This tab is used to set how often measurements are made and to which server the data is to be sent. No alarms or Emails are supported and the web server is inactive.

To save power in the *Slave* mode the XW11x normally disconnects from the access point. If the sleep interval is less than 63-seconds the XW11x automatically remains connected since the energy required to re-connect is greater than the energy saved by disconnecting.



Master Host/IP

The URL or IP address of the server you wish to send (push) data to.

Port Number

The TCP port used for communications with the remote server.

Push Type

Data is sent to the remote server with one of three HTTP protocols:

XCD Method (Xytronix Compact Data)

This method is used to send data to Xytronix devices such as the X-300. The CBW method condenses the information into binary data to reduce the amount of energy needed by the XW11x to transmit the information.

GET Method

The HTTP GET method is used to send the data to the path specified in the *Path* field. The *Path* field is hidden unless the GET or POST methods are selected.

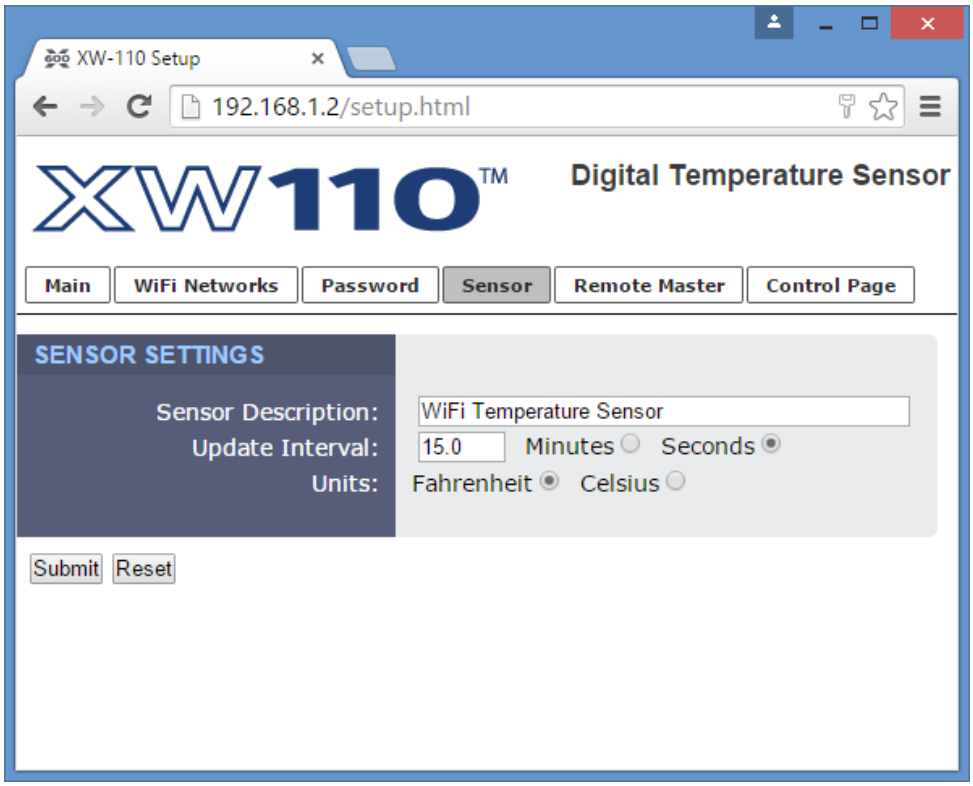
POST Method

The HTTP POST method is used to send the data to the path specified in the *Path* field. The *Path* field is hidden unless the GET or POST methods are selected.

Path

Location of a script or page that can accept the data being sent via POST or GET. (Only appears when GET or POST method is selected). For example, if the script is located at *www.yourdomain.com/logger.php*, the path would be *logger.php*

3.6 Temperature Sensor Tab



Sensor Description

This text will appear in email messages when email alerts are enabled as well as on the Control Page. This field may be up to 35 characters long.

Update Interval

The XW110 normally operates in a low power sleep mode and is programmed to periodically awaken and measure the temperature. This setting selects how often this occurs. When operating from a DC wall power supply this setting can be set to most any value. Realize that every measurement requires energy from the battery. To obtain the best battery life set the update for as long as possible for your application. For example, when monitoring the temperature of a freezer use 15 minutes or so, for outdoor temperature which changes slowly use a longer interval such as 30 minutes.

Units

This allows the user to select between the temperature units of ***Fahrenheit*** and ***Celsius***. All settings entered and displayed on subsequent pages will be in the units selected.

3.7 Digital Input Sensor Tab

Screenshot needed

Sensor Description

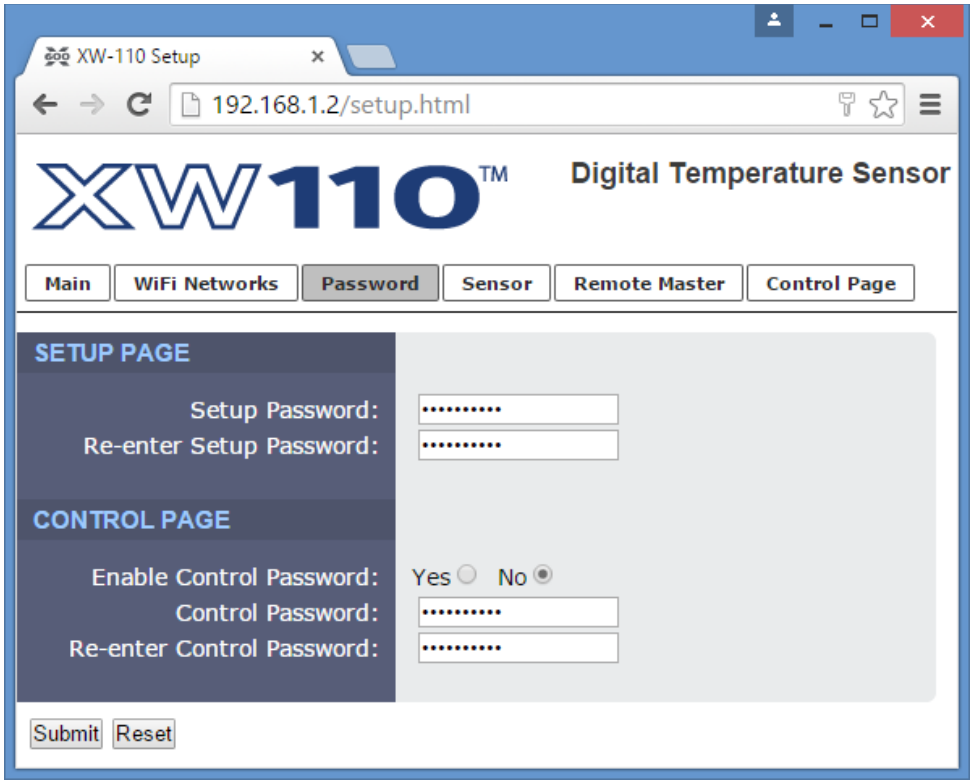
This text will appear in email messages when email alerts are enabled as well as on the Control Page. This field may be up to 35 characters long.

Update Interval

The XW111 normally operates in a low power sleep mode and is programmed to periodically awaken and test the state of the digital inputs. This setting selects how often this occurs. When operating from a DC wall power supply this setting can be set to most any value. Realize that every measurement requires energy from the battery. To obtain the best battery life set the update for as long as possible for your application.

3.8 Password Tab

The XW11x requires a password to log into the **Setup** or **Control** pages. The password is the same for all pages. The password can be changed on this page.



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.

Enable Control Password

The Web Pages can be 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 any of the pages. The default setting for this field is *No*.

Control Password

The Password, which is required to access the Control Page 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 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.

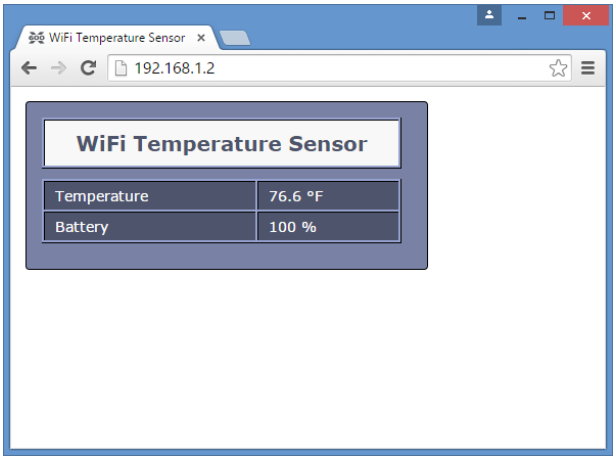
Section 4: Operation

In the stand alone mode the temperature or digital input 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 when the internal web server is enabled.

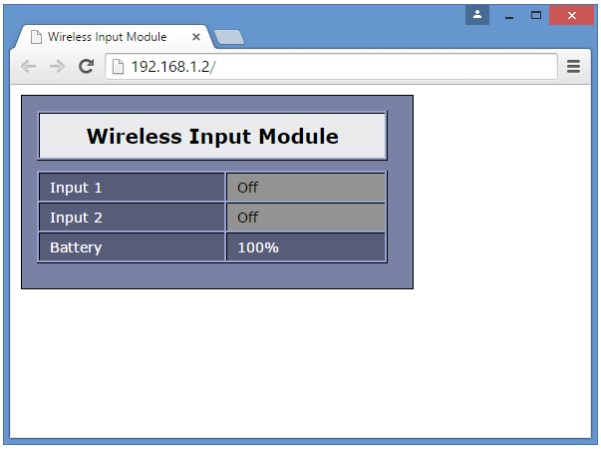
4.1 Browser Operation

Once the XW11x is set up, users can access the Control Page using a web browser by typing the IP address of the XW11x 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-110 Temperature Sensor Display



4.1.2 XW-111 Digital Input Display



Appendix A: XCD Packet Format

The XW-110 and XW-111 sensors send data contained in a TCP/IP packet. To keep the packets small they are not HTTP.

XS-110 Temperature Sensor Packet

Function Code	MAC Address	Battery	Temperature
1 byte	6 bytes	1 byte (MSb identifies 5V power)	4 byte IEEE-754 floating point number

Where:

Cmd: (1-byte) 1-byte format identifier

Data:

XS-111 Digital Sensor Packet

Function Code	MAC Address	Battery	Temperature
1 byte	6 bytes	1 byte (MSb identifies 5V power)	4 byte IEEE-754 floating point number

Where:

Cmd: (1-byte) 1-byte format identifier

Data:

Appendix B: Specifications

Wireless Specifications

Network Standards:	IEEE 802.11 b/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:	Intermittently connected or always connected
XCD Data Packet:	UDP, 10-bytes (See Appendix A)
Remote Server:	ControlByWeb™ X-600™, X-300™ or cloud based server
Polling:	state.xml (only with always-connected)

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 (included)
Power Consumption	27-770uA sleep, 59mA active RX, 229mA TX (at +12dBm)
Battery Life	Up to 3-years, depending on mode, security and reporting frequency
Battery Usage	Battery voltage is measured and periodically reported
Transmissions:	Up to xxx,xxx transmissions (intermittently connected) Up to xxx,xxx transmissions (always connected)

Internal Push Buttons

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

Sensor Inputs

Model XW-110:	Digital “1-wire” thermometer probe Interchangeable, no calibration needed Dallas Semiconductor DS18B20 digital 1-wire thermometer +/-0.5°C from -10°C to +85°C Available in non-submersible (air) or submersible versions Maximum cable length 600 ft (180m)
Model XW-111:	Two switch closure inputs Vin Max = +3.3V, Internal pullup = 200K Vin HI = 2.8V (min), Vin LO =1.0V (max) Max cable length 50 ft (use relay isolation for longer runs)

Configuration

Celsius/Fahrenheit:	User configurable
Temperature Reports:	Interval, temperature change (delta), or both
Switch Status Reports::	Interval, on state change, or both

Report Frequency:	User configurable
Email Alerts:	Yes
Encrypted Email Alerts:	Yes
SMS Message:	No

Environmental

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

Mechanical

Mounting:	Wall mount
Material	Polycarbonate plastic
Size:	3.16 x 3.04 x 0.91 in. [80 x 77 x 23mm]
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)

CE

Appendix C: Trademark and Copyright Information

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This Xytronix Research & Design, Inc. product has a warranty against defects in material and workmanship for a period of one year 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, the product must be properly packaged, and returned to Xytronix Research & Design, Inc. The purchaser shall prepay all charges for shipping to Xytronix Research & Design, Inc., and 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 United States. If the product is shipped outside of the United States, 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.

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Appendix E: 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

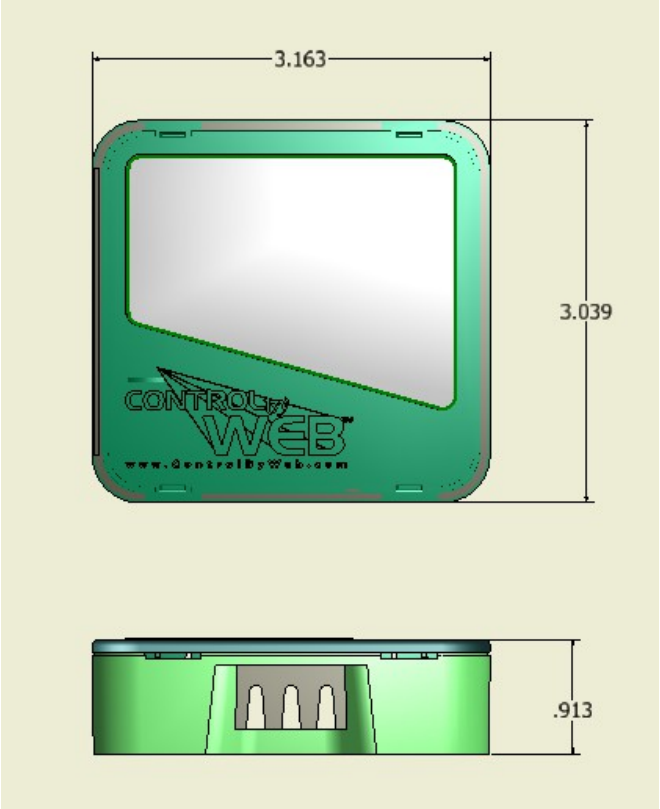
Changes or modification not expressly approved by the party responsible for compliance could void the user’s authority to operate the equipment.

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 licence-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 F: Mechanical Dimensions