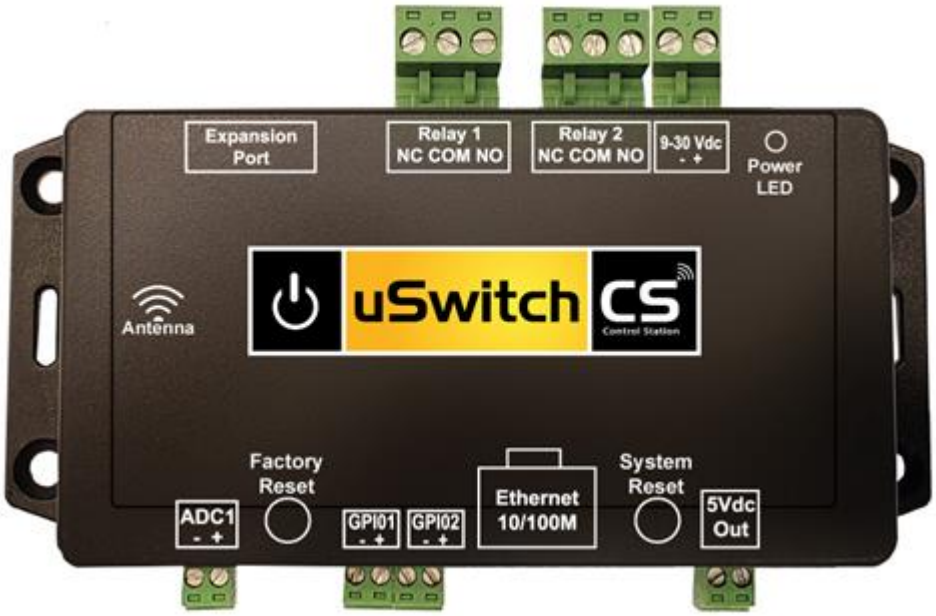
uHave Control



uSwitchCS™ Installation and Operating Manual

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Introduction

uHaveControl specializes in innovative network solutions keeping you *Connected and* providing the ability to control and monitor your world!

The uSwitch **C**ontrol **S**tation, uCS for short, is the ultimate web based relay and I/O controller. With infinite possibilities, uCS enables you to securely control or monitor any device, anywhere, anytime. With built-in AutoReboot the uCS can also reboot/restart any networked or network infrastructure device whether, wired, wireless or cellular, anywhere in the world automatically if it locks up or stops communicating, preserving your security and operations, saving you cost, unnecessary site visits, decreasing down-time and improving overall customer satisfaction. uSwitch technology has a reputation for reliability and is currently deployed in the most demanding industrial, environmental monitoring, law enforcement, security, M2M, OEMs and consumer applications throughout the world.

Simple to use, with no programming required, uSwitchCS automatically builds a secure, controlled web environment with

multiple levels of password and SSL encrypted pages. It can run stand-alone, over the local network and over the internet.

Once connected, uCS can monitor, sense, control and reboot any device or sensor over a local network or over the web whether on a desk, in a vacation home or halfway across the world on top of an isolated mountain. In addition to full mobile phone integration, you can connect via network computers, iPads, or a myriad of smart devices providing unlimited control anywhere, anytime and from anyplace.

uSwitchCS Features

- Plug-and-Play
- Connects to phones, computers, iPads and other smart devices
- No programming required
- Minimal footprint
- Minimal power consumption
- Flexible, 9-30 Vdc, input
- Over the Air (OTA) software updates.
- Built-in Wi-Fi (b/g/n) radio supports fully configurable Access Point, Repeater and Station(infrastructure) modes
- Transmission range 250 feet
- Wi-Fi Security including WEP, WPA-PSK, WPA2-PSK, WPA-WPA2-PSK, WPA2-Enterprise, Open
- Hard-wired network adapter for 10/100 Ethernet connectivity supporting Full and Half Duplex
- Network Protocols SSL/TLS 2.13,, SMTP(SSL), NTP, HTTPS, HTTP, TCP/IP, UDP, NAT, DDNS, XML, CGI
- Static and Dynamic IP support with Port Forwarding, NAT, and Virtual Port Addressing.
- Supports Primary, Secondary and Fallback DNS
- Supports Primary and Secondary NTP Servers
- Selectable TCP, HTTP, HTTPS and SMTP ports for proxy server and NAT applications
- SSL encrypted SMTP mail client enabling secure user defined notifications deliverable to single or multiple eMail recipients based on user customized events triggers, and schedules.
- User downloadable SSL keys and certificates
- Two dry contact relays (5A@120Vac, 3A@250VAC), (5A@120VDC, 3A@ 250VDC).
- Relays support hardware and software Normally Open/Normally Closed operation
- 5Vdc and 3.3Vdc outputs for i2c, SPI or other expansion devices.
- Real-time Clock with Super Cap for extended operation during power outages
- Independent and Isolated, removable Terminal Connectors for each input, output and power
- Built-in, user configurable, web server providing a simple interface with full OEM /User customization options
- Customizable Menus, Controls, Icons, Real-Time Data, Colors to meet any need
- Built in Scheduler which can run off NTP time servers or manually entered time
- Time Zone and Daylight Savings support
- Scheduler supporting 80 time/date based configurable events
- User and Administrator Passwords which can be changed or disabled
- Built-in automatic, user-configurable, watchdogs per relay; 3 user programmable URLs for auto reboot/ping detection with email notifications
- Configurable Automatic and Manual relay modes with, I/O Event driven, Timers, Scheduler supporting automatic and Latched options.

- User definable Relay Power-On state
- Digital inputs support rate detection for paddle sensors, counters with rollover, setpoints, triggers, cutoff filters, hysteresis and notification options
- Each Digital Input supports real-time configurable Pull Ups/Pull Downs, and signal Debounce Timers for maximizing and simplifying external device options
- Virtual Relays for Peer-to-Peer communication supporting Remote dispersed relay control that can be latched, momentary, driven by local relays, local inputs, or manually controlled by local/remote user or trigger
- Analog ADC input includes power on/off (for low power apps), user calibratable with limits for creating events and triggers
- ADC supports real-time configurable Input Resolution, Hardware Sampling Rates, and Hysteresis
- User Customizable Event Log,which can be accessed online, downloaded and emailed.
- Supports i2c, SPI, and other serial communication protocols
- i2c auto-discovery supporting up to 120 chainable devices
- Device Expansion Port with Real-time Population of Menus and Controls after Auto Discovery of attached expansion modules
- Expansion options include Relays/GPIOs/ADC/Temp/Pressure/Humidity/Air Quality/CO2/LCD, …
- Company, Product Name, Links to Website, Manuals, Icons fully User Configurable for Rapid OEM Integration
- Manual and Marketing Literature in Standard Formats for Rapid OEM Marketing and Support.
- Optional A-Plug 120Vac relay Adapter
- End flanges with through holes for easy mounting
- Separate Factory Restore and Board Reset Buttons
- Custom API(s) for quick software integration with other products or control interfaces
- Great documentation! Great Support!
- Manufactured Proudly in the USA, Software developed in the USA.

About uSwitchCS

uSwitchCS (uCS) contains a Wi-Fi (802.11b/g/n) radio, an RJ45 Ethernet connection, two high power electro-mechanical relays, two GPIO(s), an Analog input, a hardware backed up Real-Time Clock, 5 Vdc and 3.3 Vdc outputs, expansion port, an embedded web-server, control application and boot loader supporting secure Over The Air (OTA) upgrades. The uCS is accessed over secure or open Wi-Fi networks or from any wired or wireless network supporting the secure HTTPS protocol, over VPNs, or home/industrial/business networks (HTTP can be manually enabled). uCS may also be accessed via custom third-party applications through an easy to use API. It can be used for access control and monitoring on locks, lights, pumps, alarms, valves, gates, supporting a slew of sensors including proximity, temperature, pressure, humidity, etc.

Other advanced features include auto discovery of devices on its expansion bus(s), detecting network failures and restarting network infrastructure, utility devices without human involvement (even when a complete communication loss has occurred). This Watchdog mechanism automatically restarts servers, cell/satellite modems, switches, gateways, access points, computers, network cameras, etc. uSwitchCS relays can be wired in series with a device's power source to switch the power on and off automatically or manually. uCS relays can be connected directly into a device's reset circuit. In this configuration, uSwitchCS does not power down the device and initiate a cold reboot, it simply forces a warm restart triggering a device or module's internal reset (reboot methods may have different requirements in physical connection and setup)

If a device's power load exceeds the max specifications of internal relays the uSwitch can control an external relay to meet the power requirements of the device.

Supporting universal web/cloud interfaces, the uSwitchCS is accessed by its network address on the local LAN, or from any remote network using (NAT, Port-Forwarding, DDNS) and industry standard browsers. This enables visibility and control from any remote network (factory default IP address 192.168.4.1, default network port 443 (SSL), default gateway 192.168.4.1, subnet mask 255.255.255.0).

uCS supports secure Peer-to-Peer communication so that a user action or event at one uSwitch can simultaneously trigger events or controls at multiple satellite uSwitch sites. For instance, a single push button or alarm sensor on a local uSwitch can trigger thirty-two (32) other access control points opening or locking down a campus/facility, setting off satellite alarms and simultaneously alerting monitoring stations or appropriate individuals via alarms, eMail notifications and SMS text messages. Peer to Peer communication is daisy chainable to a virtually unlimited set of endpoints.

Installation Guidelines (Read before Installing)

Opening the uSwitchCS enclosure or tampering voids the warranty.

1. uSwitchCS is NOT waterproof (do not install outdoors without a proper environmental enclosure).
2. If connecting a relay output to a power source, disconnect the source prior to wiring to the terminal connector.
3. Installation by qualified personnel recommended
4. Not designed to run in a high radio emission or environments with strong magnetic fields.
5. Must not be used for medical, lifesaving, or any purpose where its failure could cause serious injury, loss of life, property, or create significant financial losses.
6. Must be correctly wired. Incorrect wiring could result in damage to the uSwitch or device(s) to which it is partnered.
7. Relays on the uCS are not intended to support high power/high current devices.
8. The uCS has removable terminal connectors. To make the best connection remove the connectors and install wires directly on the connector before reattaching to their female adapter on the uSwitch.

Antenna Connection - The CS comes with an internal omni-directional Wi-Fi antenna. Do not locate within proximity of microwaves or other radio/high emission devices such as access points, solenoids or radios that might interfere with its radios.

1. uSwitchCS can be powered by any DC voltage between 9-30 Vdc. Connect an appropriate DC power supply to the + and - terminals in Figure 1 (regulated power supply recommended). The power supply should be rated to meet the operating current of the uSwitchCS (see appendix C for power specifications) along with any expansion modules that receive power from the uCS. As shown in the photo, the positive terminal is closest to the outside edge; the negative terminal closest to the “Relay 2” connector.

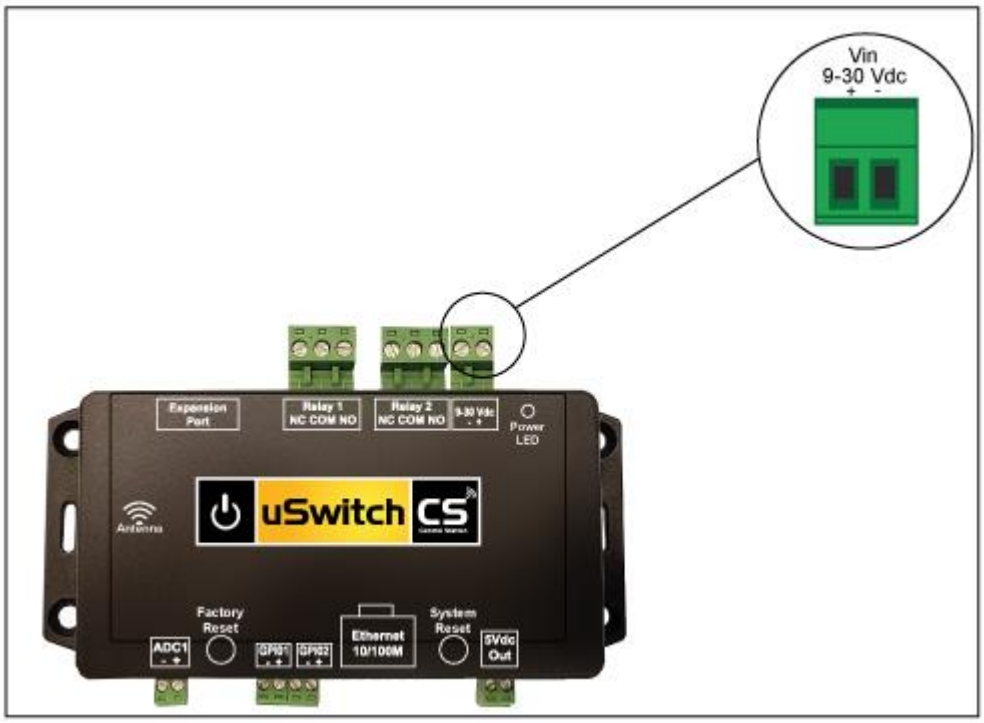


Figure 1

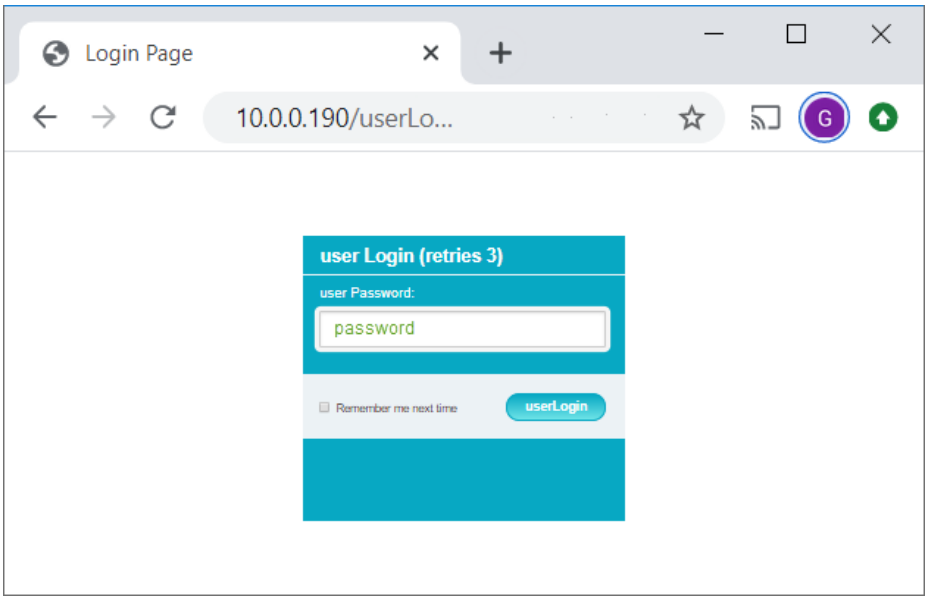
Wireless Network Connection to the Access Point

1. The uSwitchCS supports multiple wireless modes. It can run as an Access Point (AP), a Station[1] or a combined Access Point and Station. Running in Station or Access Point/Station mode enables connection to a host Access Point or gateway to other networks/modems which may have internet access. Running Access Point Station mode allows the uSwitch to simultaneously support other wireless devices such as wireless sensors or cell phones and the uSwitch can act as a Wi-Fi repeater for your gateway.
2. From the factory, uSwitch is configured in Access Point Station mode with SSID "**uStationAP**", "Passphrase "**uSwitchCS**", security "**WPA2-PSK**" and is running an internal DHCP server.

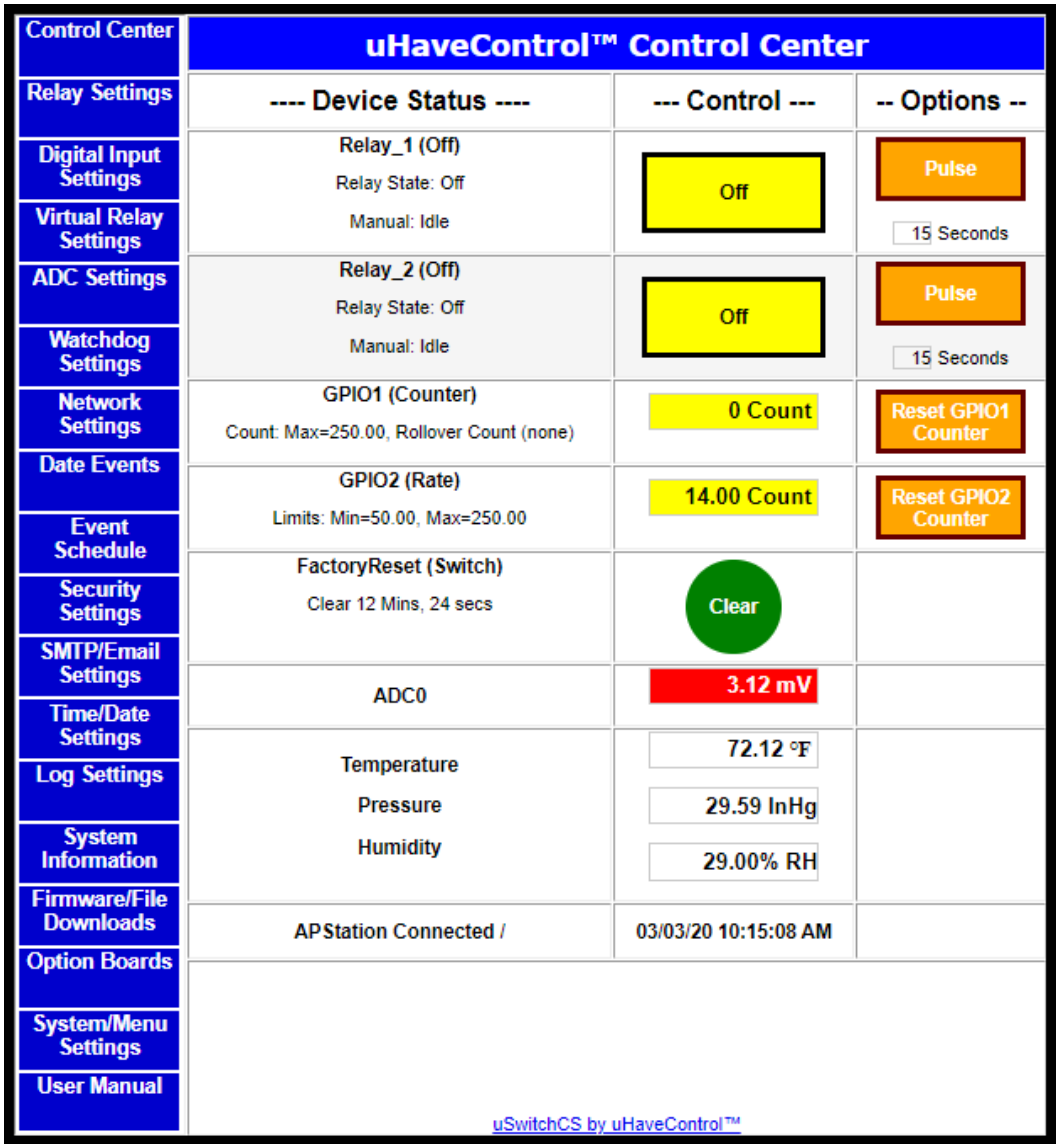
It is important when attempting to connect to the uSwitch for the first time from an external device that the uSwitchCS starts in Access Point/Station mode (default). Holding the firmware reset button for 5+ seconds will always restore to this mode and restore factory network and wireless settings (so you can always get back to a known SSID/Passphrase and can re-establish connection).

3. To connect to the uSwitch for the first time from your wireless device, set your device's Wi-Fi to the uSwitch SSID "**uStationAP**". Select "**wpa2-psk**" for security and enter "**uSwitchCS**" as the Passphrase.
4. Make sure that your Device runs DHCP mode so the uSwitch can assign an IP address to your device.
5. After connecting to the uSwitch network, from your devices browser, enter the address, 'https://192.168.4.1:443' in the address bar. If user Logins are required, The 'user Login' screen below will appear, if not you will be logged in automatically.

[1] Station Mode may also be known as Infrastructure Mode



6. Enter '**password**' which will bring you to the Control Center Page below.



uSwitch upon Network Connection from AP

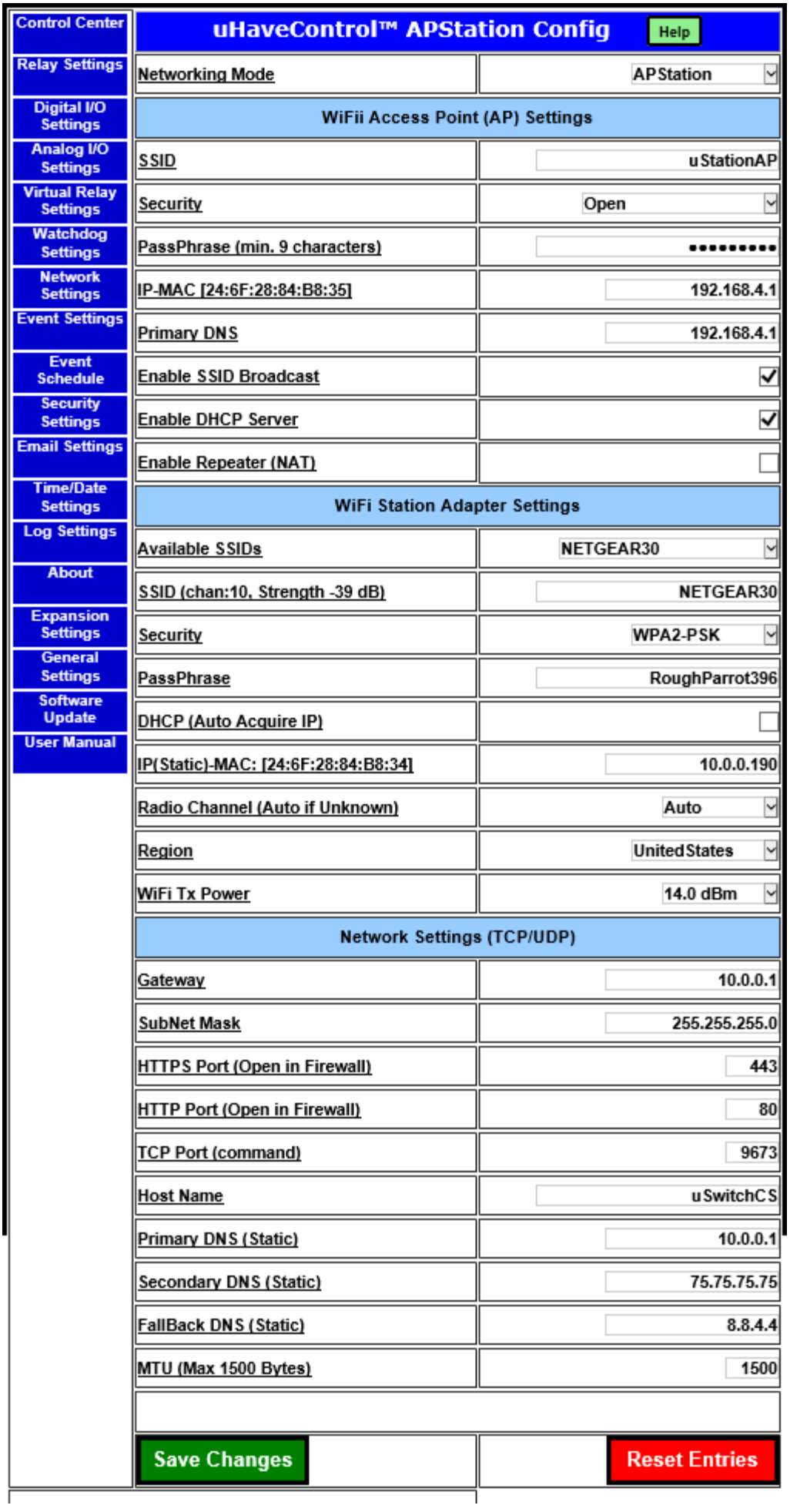
Connecting as a Station or to Ethernet

1. You now have established a connection to the uSwitch's wireless network. The next step is to provision the uSwitch itself onto your private network. This provisioning enables you to login to the uSwitch from your network or the Internet, and allows the uSwitch to send encrypted email notifications, be accessed from the internet, connect to Network Time Servers (NTP) and implement watchdogs that that can detect and restart your network or other devices when lockup occurs.
2. To provide outside access we need to put the uSwitchCS onto your network in either Access Point Station mode (default) or Station-only mode if wireless, if hard-wired use Ethernet mode.

Note: in Station-only mode other client wireless devices will not connect to the uSwitch directly (although the uSwitch can still talk to them from your wired or wireless network). For Station mode, the same steps below are followed but "Station" is chosen as the "Net Adapter" type instead of "APStation".

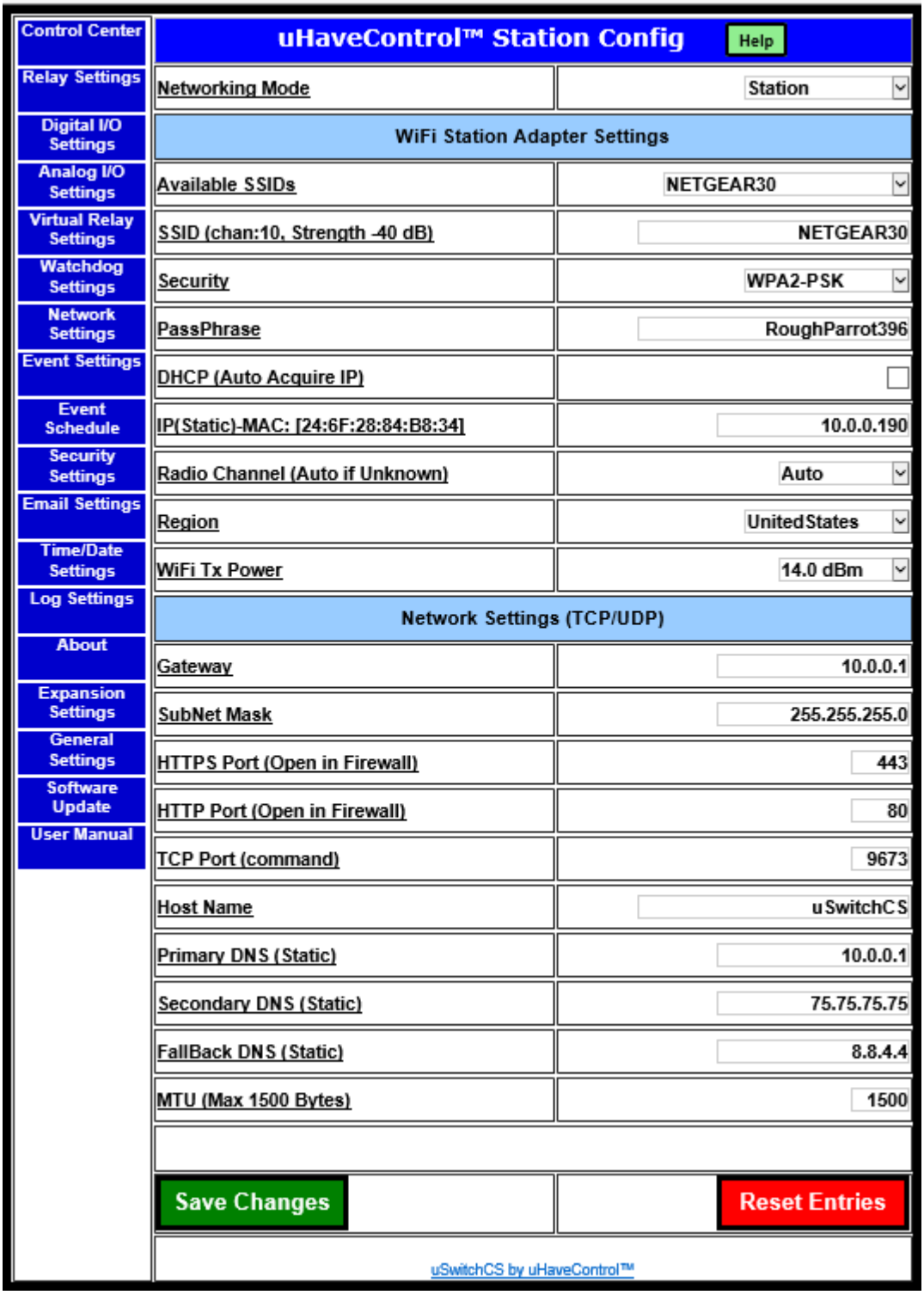
3. To change network Adapter types, select the "Network Settings" menu.

4. You should now see the "Access Point/Network Settings" page below (if you are going to connect the uSwitchCS via WiFi continue to step 5, for hard-wired Ethernet go to step 25 below).


Control Center
Relay Settings
Digital I/O Settings
Analog I/O Settings
Virtual Relay Settings
Watchdog Settings
Network Settings
Event Settings
Event Schedule
Security Settings
Email Settings
Time/Date Settings
Log Settings
About
Expansion Settings
General Settings
Software Update
User Manual
uHaveControl™ APStation Config
Help
Networking Mode
APStation
WiFii Access Point (AP) Settings
SSID
uStationAP
Security
Open
PassPhrase (min. 9 characters)
IP-MAC [24:6F:28:84:B8:35]
192.168.4.1
Primary DNS
192.168.4.1
Enable SSID Broadcast
Enable DHCP Server
Enable Repeater (NAT)
WiFi Station Adapter Settings
Available SSIDs
NETGEAR30
SSID (chan:10, Strength -39 dB)
NETGEAR30
Security
WPA2-PSK
PassPhrase
RoughParrot396
DHCP (Auto Acquire IP)
IP(Static)-MAC: [24:6F:28:84:B8:34]
10.0.0.190
Radio Channel (Auto if Unknown)
Auto
Region
UnitedStates
WiFi Tx Power
14.0 dBm
Network Settings (TCP/UDP)
Gateway
10.0.0.1
SubNet Mask
255.255.255.0
HTTPS Port (Open in Firewall)
443
HTTP Port (Open in Firewall)
80
TCP Port (command)
9673
Host Name
uSwitchCS
Primary DNS (Static)
10.0.0.1
Secondary DNS (Static)
75.75.75.75
FallBack DNS (Static)
8.8.4.4
MTU (Max 1500 Bytes)
1500
Save Changes
Reset Entries

Wireless Network Connection to a Station

5. From the network Settings page, change the “Net Adapter” setting from whatever mode it is in to ‘**APStation**’ or ‘**Station**' mode. Changing the “**Networking Mode”** forces an immediate update to this page (wait for the page update to complete). After the update the **Station** page below should be displayed.



6. After the page updates in the **WiFi Station Adapter Settings** section, you may manually enter the SSID in the text

entry box “SSID” or select it from the “Available SSIDs” list box.

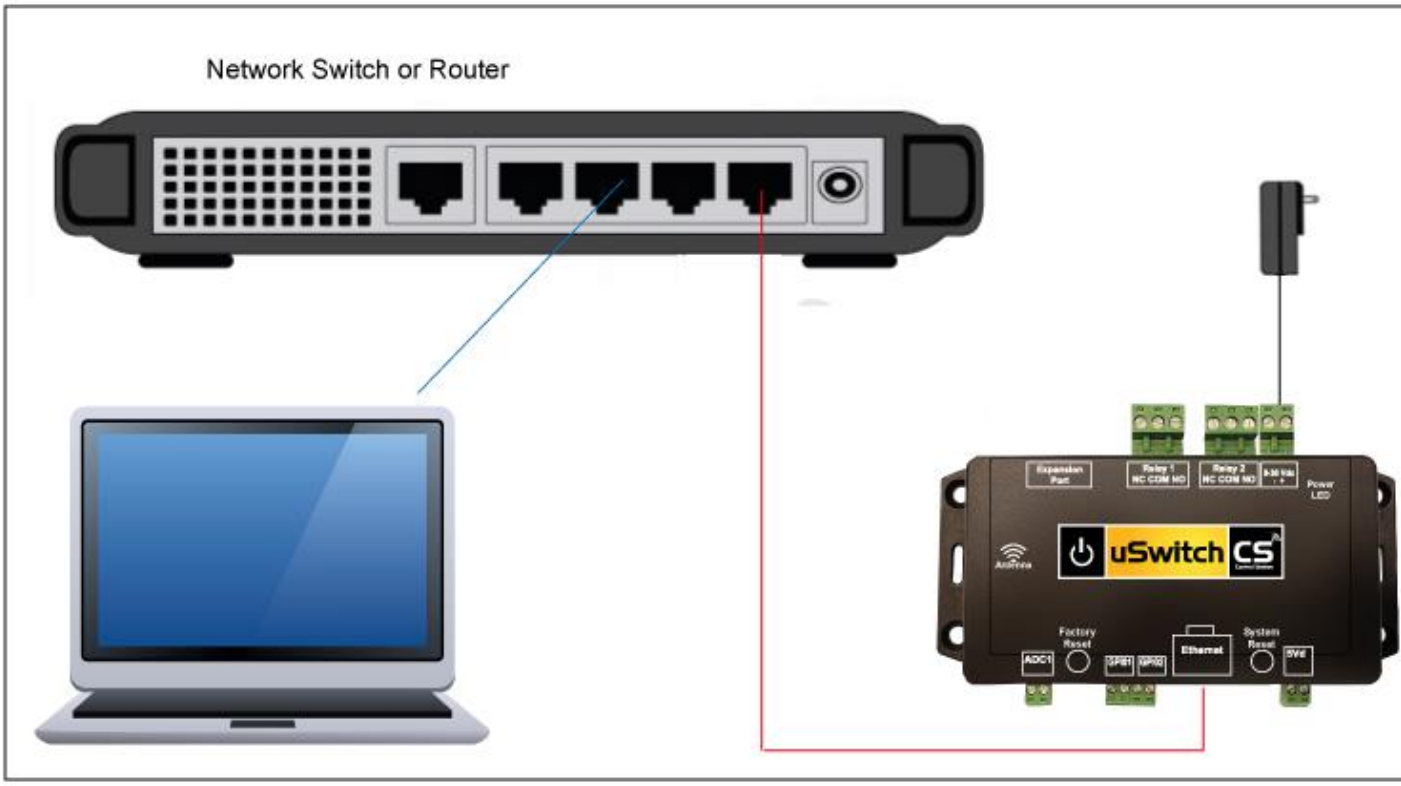
7. From the pull-down menu in the ‘**Host Security’** field select your network’s Security type (if this is unknown, get it from a network administrator).
8. In the ‘**Passphrase’** field enter the passphrase for the selected SSID (if this is unknown, get it from a network administrator).
9. In the **IP** field enter an IP address on your wireless subnet (this address must be outside the range of any DHCP server that is on your router, otherwise unexpected behavior might occur). DHCP is not recommended.
10. If the RadioChannel is unknown select the “Auto” option in the “Radio Channel” selection box, otherwise you may specify the channel from your AP.
11. In the **“Region**” list box, select the correct region that matches the region from your Access Point. Not entering the correct region can result in unpredictable wireless behavior.
12. The WiFi Tx Power should be set to the minimum power limit that works well in your environment. We recommend a max setting of 15.0 dBm. Setting to Maximum values can result in unnecessary power usage, noise or cause interference with other wireless networks.

Network Settings

13. Under the **Network Settings** heading update the “**Gateway**” to point to your gateway (usually the IP address of your home/office AccessPoint/modem/router). When the gateway is not programmed properly you may still access the uSwitch but the uSwitch will have issues connecting to outside devices such as NTP servers, Mail servers, and Update File Servers or any URLs specified by the Watchdogs.
14. Enter the **Subnet Mask** for your LAN (this should match the LAN SubNet on your router)
15. The “**HTTPS Port “** is the secure port you will use to connect to the uSwitch. Unless running a proxy server and connecting to multiple uSwitchCS’ leave the **HTTPS Port** at **443**. This port must be open on your firewall.
16. The “**HTTP Port “** is the non-secured port that can be used to connect to the uSwitch. If this mode of operation is desired it can be enabled in the”security settings “menu.
17. **TCP Port** is the port that will be used if other uSwitch devices send I/O or control messages to this uSwitch or control its devices as slaves. This Port must match the Port specified on the Remote uSwitch’s Virtual Relay settings for this device.
18. Now program the **DNS** server fields. The DNS fields available to program here depend on the selected ‘Network Adapter’ mode. You only program these addresses if you intend to use URL(s) for the watchdog, use NTP Servers, send Emails or allow remote (out of network) access to the uCS.
19. **MTU** (is the Maximum Transmission Unit) for network communication. It is recommended that **MTU** is only modified if you have communication issues (Never set MTU higher than 1500).
20. Click ‘**Save Changes’**, this change may take a few minutes to propagate through the network.
21. If the browser doesn't reconnect after 30 seconds, re-enter the network address in the browser address bar and try again. The address must match the IP address assigned above.

When running wireless modes, a secondary benefit of choosing Access Point/Station mode is when network connectivity is lost through the gateway a link still exists to the uSwitch via its internal AP. If in Station-only mode the uSwitch will not be accessible until the gateway/router is back online and has re-established network connections.

22. Connect your computer or phone back onto your network and access the uSwitch via the IP assigned in step 9 if a wireless connection, or step 25 if a hard-wired Ethernet connection. Once you connect to the uSwitchCS through your router you have correctly provisioned the uSwitch onto your network and can access it both locally, from devices on the LAN, and remotely if your network supports outside access (see NAT/port forwarding).

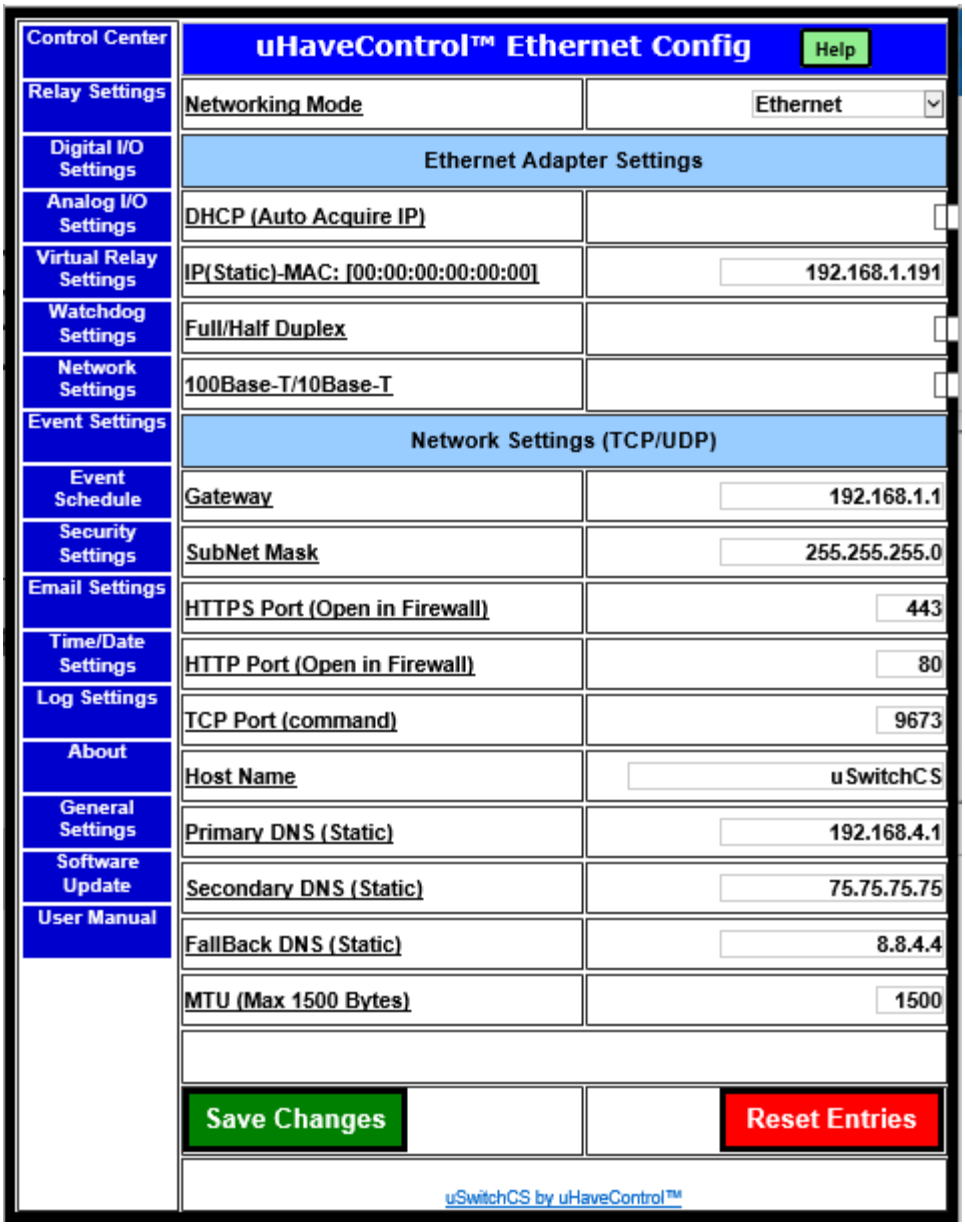


Hard Wired Ethernet Connection

23 Connect a CAT5, Ethernet, cable between the uSwitch Ethernet port and an Ethernet port on the network switch/router/gateway. Connect a computer to the network switch/router. (See diagram below). Alternatively, you can connect the uSwitchCS directly to the Ethernet port of your computer (using a crossover/null-modem cable).

24 From the **Network Settings** page, change the "**Networking Mode**" setting from current settings to '**Ethernet**'. Changing "Net Adapter" forces an update to this page (wait for the page update to complete)

25 Although the uSwitchCS provides for hard wired Ethernet or Wi-Fi connectivity, it does not support both Hard-Wired and Wireless connections simultaneously. It must either run in Wi-Fi mode, or Ethernet Mode. To connect to Ethernet, first establish a Wi-Fi connection to the uCS (steps 1-5 above). Changing to hardwired mode requires a power cycle of the uSwitch.



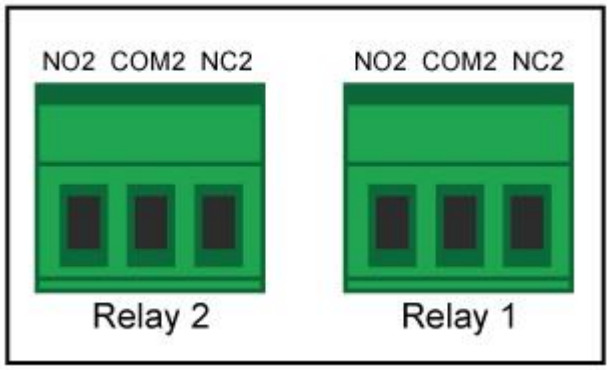
26 In the **"IP**" field enter an address on your subnet (outside of the router's DHCP address range).

27 If your network supports Full-Duplex mode, check the "Full-Duplex" box, similarly, for a 100BASE-T network check its box.
Changing to Ethernet from WiFi mode will require a manual power cycle of the uSwitch. After you save the **Ethernet** settings (you will lose the network connection). Unplug the power supply from the uSwitchCS and plug it back in after waiting five seconds. Wait a few minutes for the changes to propagate through the network and login over the network using the IP address you entered in step 26. Now proceed with the **Network Settings** in step 13 above.

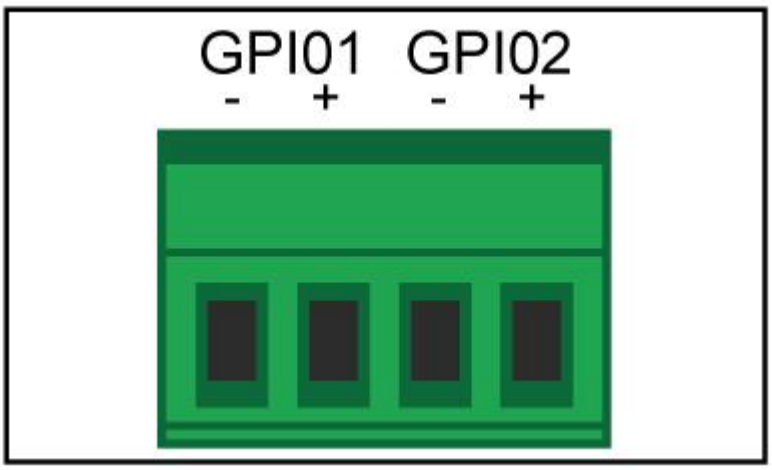
Regardless of whether you are on a wireless or wired network all further Configurations and Menus options apply to both. The uSwitch is network hardware agnostic.

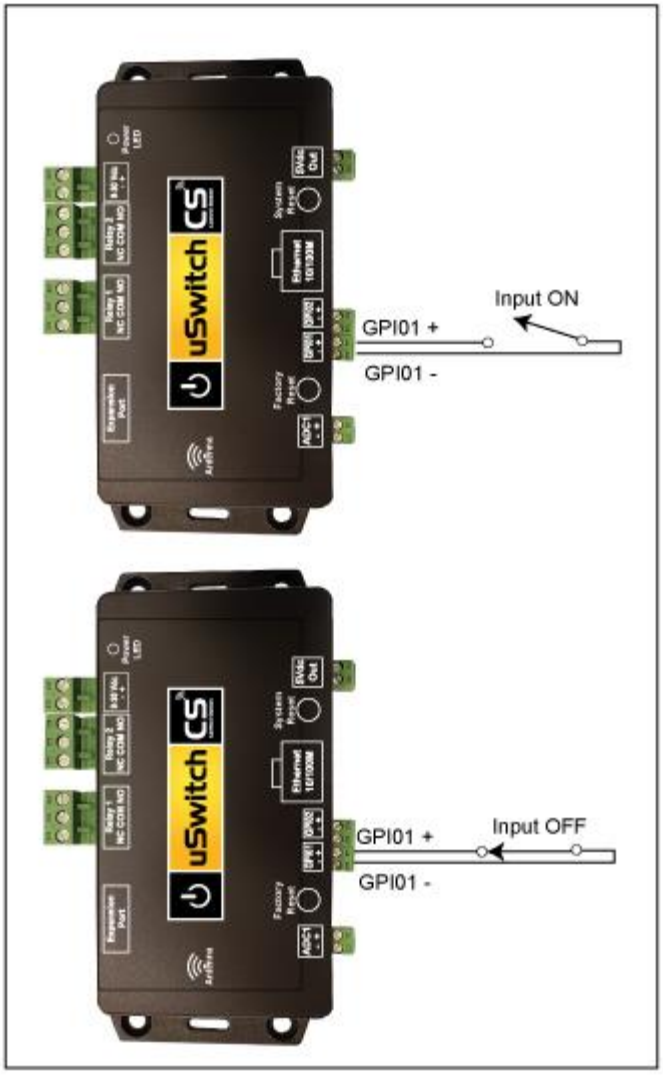
Relay Connection

When connecting to the relay contacts make sure any current or future load does not exceed the maximum load rating for the relays (per spec. in Appendix B).

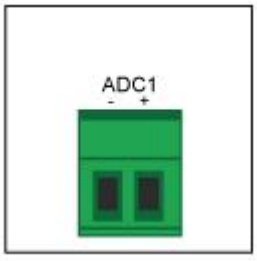


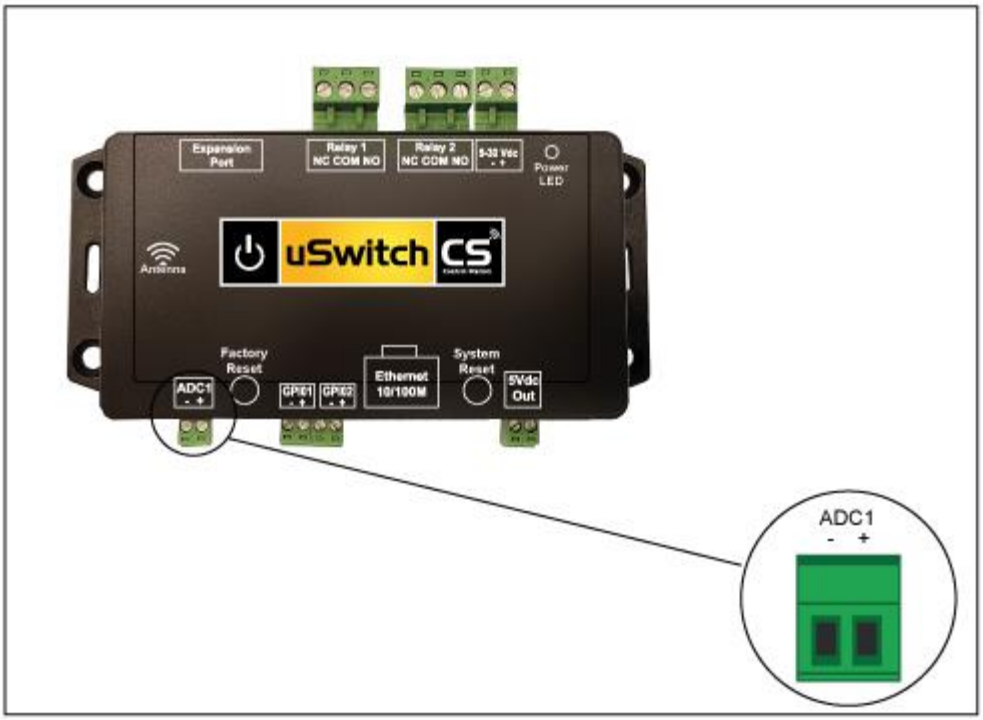
GPIO Connections





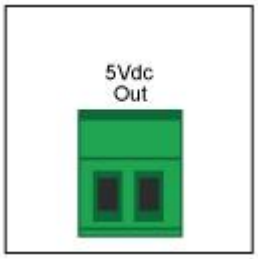
Analog to Digital input Connection

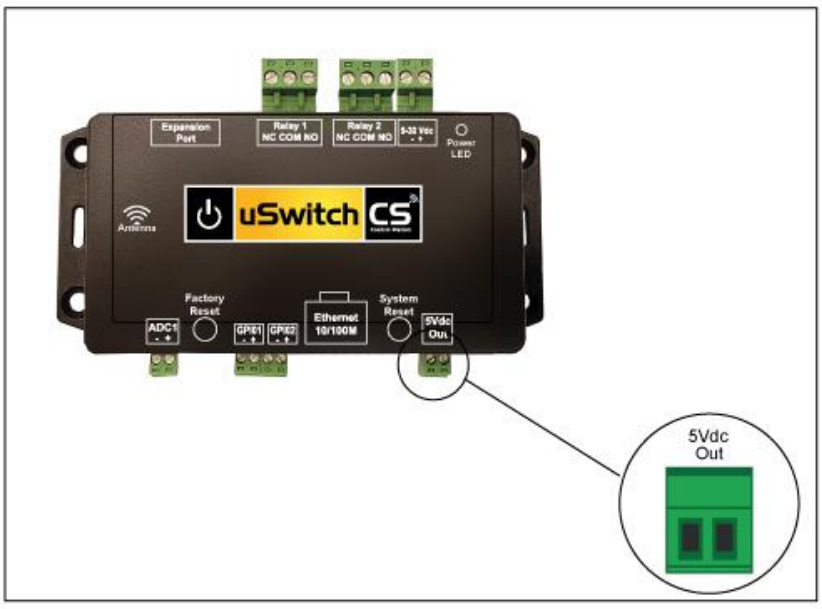




Expansion Port Connections

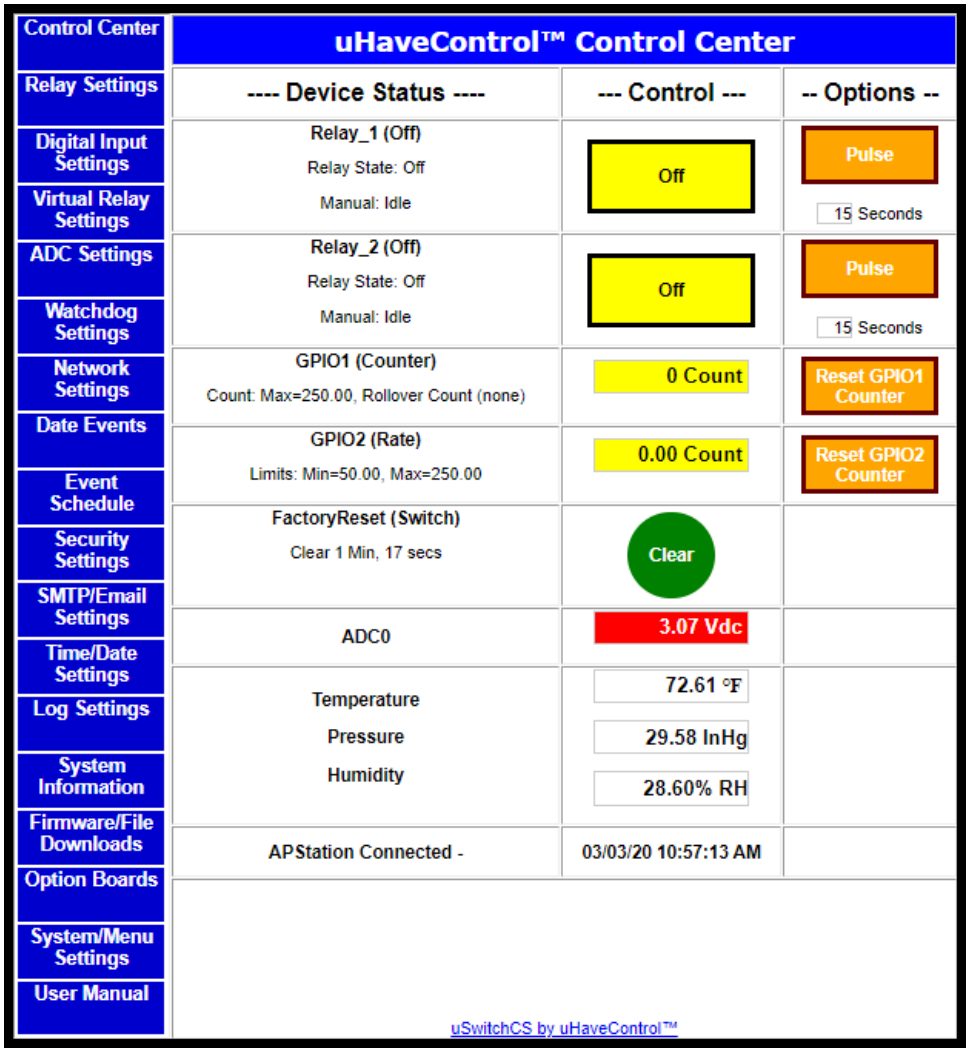
5Vdc Power Output





Control Center (Home Page)

Control Center is the Device Control and User Interface. It is accessed on the local network using the local IP in a browser or from remote networks using the gateway's Static or Dynamic IP. It enables manual control for manual relays and displays automatically controlled relays, digital and analog input, sensors and events. Navigating from the Control Center to any other page is done by selecting the Blue Menu fields on the left side of the page. Menu selections begin with "**Control Center**"at the top and go down to "**User Manual"** at the bottom. Menu items can be removed or added using the "**General Settings**" menu to meet your specific needs.The **Control Center** is accessible without a password if "**Require Login Passwords**" is disabled in the security Menu. If Passwords are required, the factory set password for the Control page is "**user**". For all other control pages the factory password is "**admin**".



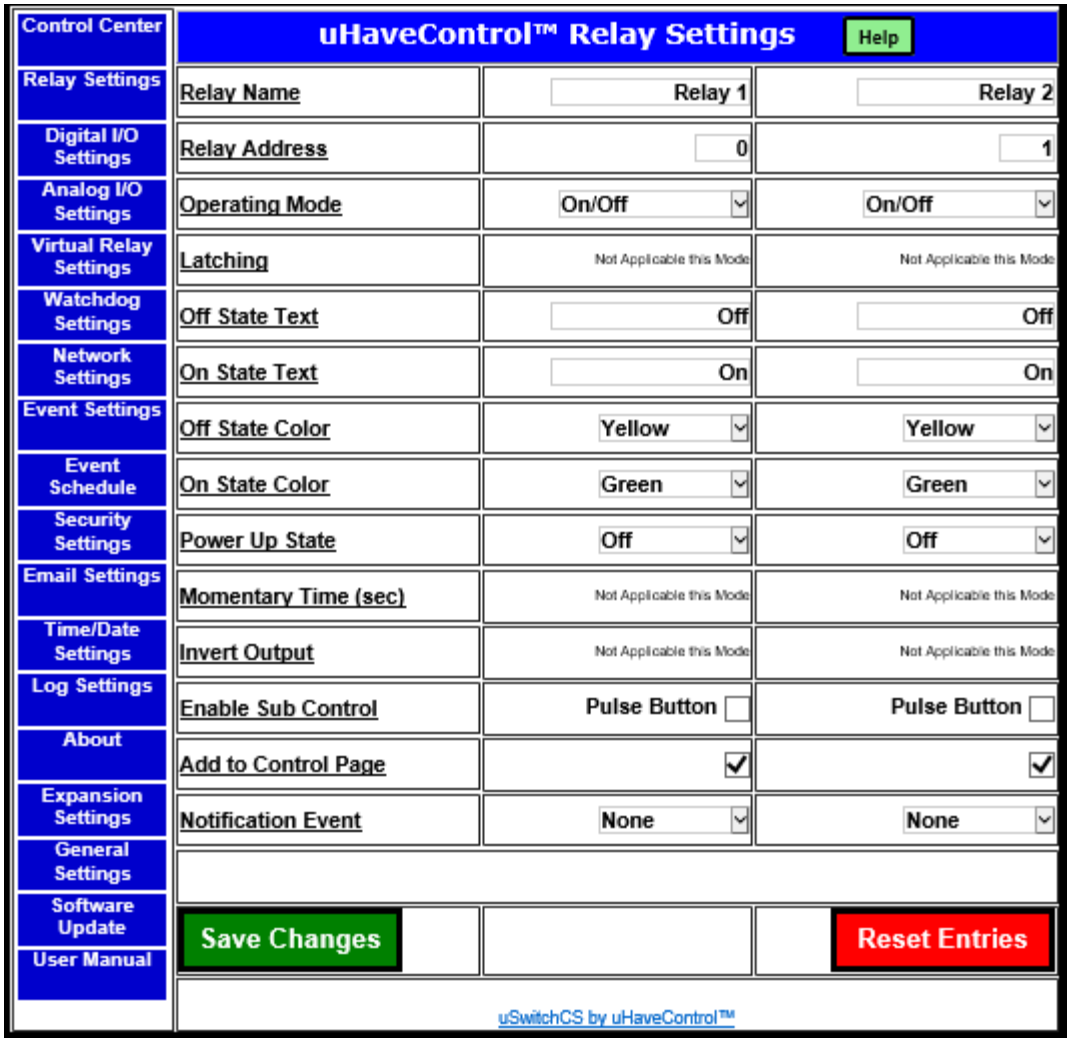
Control-Page for uSwitchCS

The Control Center is divided into three columns. **Device Status** on left shows the assigned Device name, its status, and any timers or related activity. The middle or **Control** column displays the Device Control if it is a relay, or the current calibrated reading on any sensor, or Digital/Analog input. The **Options** column shows extra information or features when enabled.

On the above Control Screen, the first two rows are manual relay buttons. Clicking on a manual relay-button forces the relay to change states (a closed relay will open, an open relay will close). At the same time, user specified names and colors are displayed based on current status. User setup for button text, colors and any other relay configurations is done from the "Relay Settings" Page below.

Relay Settings Page

This page configures how each relay and its identifying fields are displayed on the Control-Page, and how each relay is initialized, controlled and used. All configuration pages have a description field on the left, followed by data entry fields to the right (Additional field help and details is available by hovering over description under the Relay Name Field). More Detailed help is available by Pressing the Green Help Button, adjacent to the Menu Page Title.



Relay Configuration Page for uSwitchCS

Relay Name (text string)

The Relay Name field represents a user assigned name for the relay. It will be the name used in all references to the relay (default is Relay_X). It will be transmitted whenever an email, or notification is sent for this relay and will be displayed on the screen whenever there is a reference. The user should assign meaningful names to relays, inputs and sensors.

Relay Address (integer)

Physical address of the Relay on uCS. Address zero is reserved for Relays that are located on the uSwitchCS. Relays can be added to a uSwitchCS if they are detected on the expansion bus. Relays on the expansion bus use their bus address combined with an assigned index via the automated discovery process.

Operating Mode (custom select box)

Operating Mode is a dropdown list with the following options: **Manual, Resettable, Clearable, Momentary, Scheduled, Watchdog, Sync2GPIOx, Sync2ADCx,** and **Slave**. Modes fall into two Categories. Operator and automated modes. Operator modes are Manual, Resettable, Clearable, and Momentary and require human interaction. Any change to a relay in Operator mode is initiated by a user clicking on a relay button from the Control-Center. Automated modes are controlled by either a schedule, the internal watchdog, synchronized to another input or remotely controlled by remote commands from a master. Default mode is Manual.

ever

Operator Modes

1. **Manual** - The relay changes state when it is clicked by an operator.

2. **Momentary** - the relay changes state when clicked by an operator and returns to its initial state when the momentary timer expires. Hitting the button before the timer expires has no effect.

3. **Resettable -** Operates as a Momentary however, if clicked before the timer expires, the timer is reloaded and countdown restarts.

4. **Clearable -** Operates as a Momentary however, if clicked before the timer expires, the relay returns to its initial state and the countdown stops.

Automated Modes

5. **Scheduled** - Relay functions according to the time and date events set up in the **Event Schedule**.

6. **Watchdog** - the relay will function as a watchdog to a dependent device and will follow the protocol set up in the **Watchdog Settings**. In this mode the uSwitchCS automatically detects non-responsive devices and reboots or restarts them without human intervention.

7. **Sync2GPIO**- the relay will be driven by the specified GPIO.

8. **Sync2DC**- the relay will be driven by the specified ADC.

9. **Slave -** Relay receives TCP commands from a “Master” and is set as commanded. This is the slave half of the Peer-to-Peer Mechanism.

“Warning” if a uSwitchCS relay is used to power on and off a device that provides its own network connectivity, then that relay cannot be in Manual, or Slave mode. In either of these two modes, once disconnected, there would be no mechanism to restart the powered down appliance. In this instance the relay must be in watchdog, or one of the timed modes.

Off StateText (text string)

Text shown on Control Screen Relay when it is de-energized. (default is “Off”)

On State Text (text string)

Text shown on Control Screen Relay when it is energized. (default is “On”)

Off State Color (color select-box)

This field specifies the background color of the relay on the Control Center when the relay is in the de-energized state. Default is “Yellow”

On State Color (color select-box)

This field specifies the background color of the relay on the Control Center when the relay is in the energized state. Default is “Green”

Latching (checkbox)

If latching mode is checked and the relay changes state due to an alarm condition, the relay will not exit that Condition/State until a user manually resets the relay button to its pre-alarm state and the condition, which forces the alarm and returns to its non-alarm state.

Power Up State (custom select box)

This dropdown sets the initial state of the relay when a uSwitchCS is first turned on. The options are **Off, On, Last**. Depending upon the operating mode this field may be disabled or forced to a predefined state based on the Mode.

1. **Off** - Relay is not energized on power up.
2. **On** - Relay is energized upon power up.
3. **Last** - Relay is put in the last known state prior to its shutdown (this is the default state).

Momentary Time (integer)

This field specifies the number of seconds to be loaded into the countdown timer for all momentary modes (default is 30 second).

Invert Output (checkbox)

When checked, the relay will act opposite as commanded when it is in the **Scheduled, Sync2GPIO or Slave** Mode (default unchecked)

Enable Sub Control (checkbox)

Depending upon the operating mode, this field may enable the user to override the current state of the Relay via an optional control button on the Control-Center (default unchecked).

Add to Control Page (checkbox)

When checked this relay will be visible on the Control-Page. If unchecked it will not be on the Control-Page (default unchecked).

Notification Event (selection box)

The Notification selection box will cause an email to get sent when the associated relay turns **ON, Off** or **Changes** state (default is none).

Link All Relays to Relay 1 (checkbox)

This checkbox is used to assign all the properties set for relay 1 to any other local relays. When relay buttons are linked, whenever Button1 is manually pushed all relays transition their states simultaneously. If timer mode is specified along with linking, both buttons use Relay1's timer properties (default unchecked).

Save Changes (submit button)

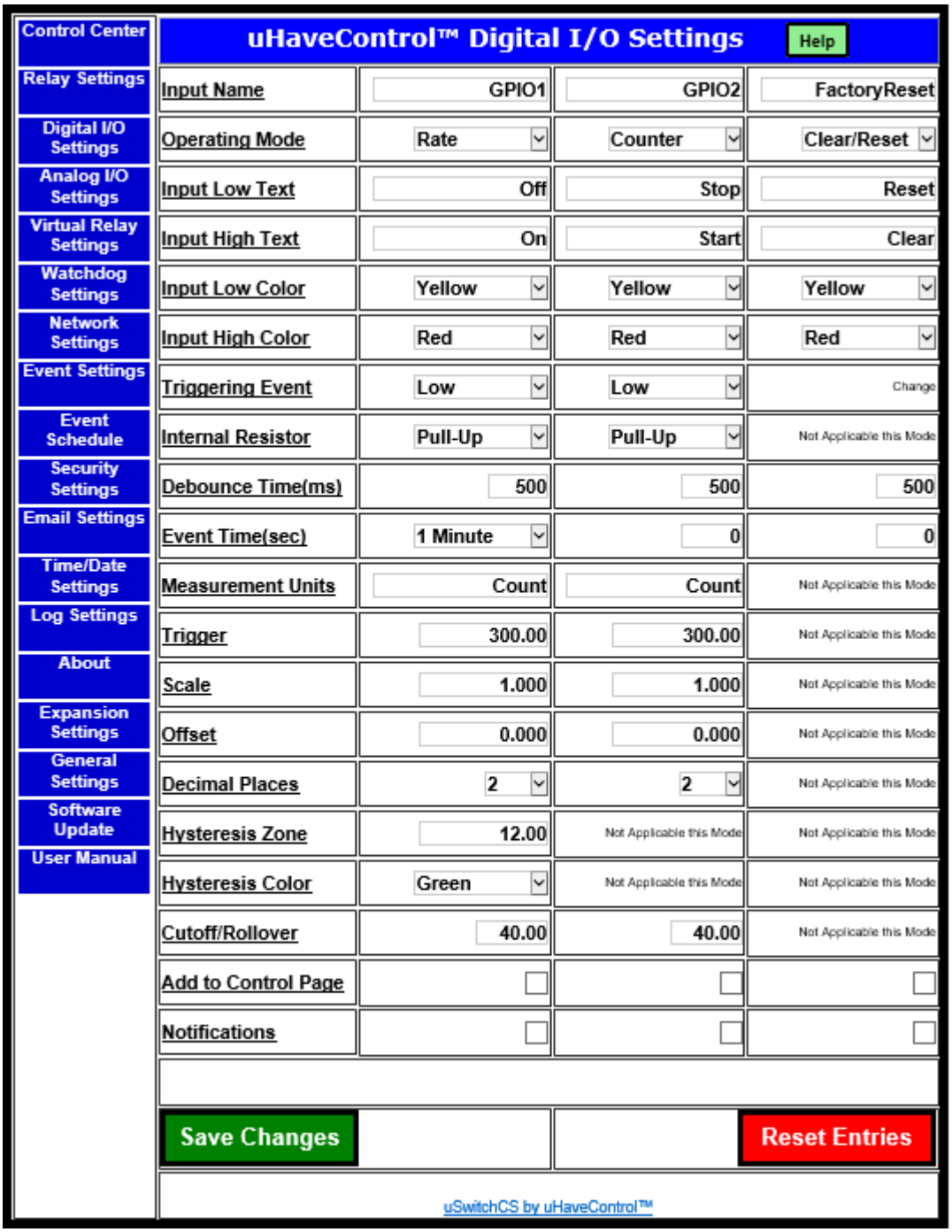
On every page that enables changes to the uSwitchCS there will be a **Save Changes**Button on the bottom left of the screen. After making changes if you wish to save the changes click this button. The uSwitchCS may take several seconds to update but it should then come back with all changes saved and the page updated. In some instances, especially if a major change such as a device operating mode, or network adapter type is changed the updated page may offer new fields only available relevant to the changed mode.

Restore Defaults (submit button)

On every page that enables changes to the uSwitchCS there will be a button on the bottom right to restore the factory default settings for the fields on the page. This is provided so that all the fields on the page can be restored to a fresh starting point should changes have been made that need to be removed for any reason.

Digital Input Settings

This page enables a user to customize the digital inputs. The user can configure whether and how each input is displayed, how it is calibrated/processed by the embedded application and any properties that trigger events.



Input Name (text string)

Set this to a meaningful name for the input. The name will be used in all references to the input (default is GPIO1). It is transmitted whenever an email, or notification is sent regarding this input and is displayed on the screen whenever there is a reference.

Operating Mode (custom select box)

The operating Mode specifies how the GPIO is processed and displayed on the Control Center. If it is set to **Switch** it operates as a digital On/Off binary switch. If it is set to **Counter**, it will switch on and off and maintain a count that is incremented each time the event specified by **Trigger Event** occurs. If it is set to **Rate** it will calculate a frequency rate based on the **Period**, **Scale** and **Offset** fields. A **Rate** GPIO can be used as a mechanism to calibrate readings for rate encoding inputs such as digital flow

sensors and traffic meters. The default operating mode is **Switch.**

Input Low Text (text string)
This field specifies the text assigned to the GPIO when it is in the low state. This field will also be used when referencing the GPIO in any notifications or texts.

Input High Text (text string)
This field specifies the text assigned to the GPIO when it is in the high state. This field will also be used when referencing the GPIO in any notifications or texts.

Input Low Color (color select box)
Background color when displaying a Low value if **switch** mode, or a below limit value if in **counter** mode. In rate Mode it specifies below the low limit of allowed frequencies.

Input High Color (color select box)
Background color when displaying a High value if switch mode, or an above limit value if in counter mode. In rate Mode it specifies a frequency above the max.

Triggering Event (custom select box)
Specifies the event type that is recognized for a state change. Switch and Counter mode support **Low** state event triggers and **High** state event triggers. Rate mode supports either an event when the input moves within allowed limits or when it goes outside them, or crosses a limit boundary.

Internal Resistor (custom select box)
This field either sets or removes an internal resistor on the GPIO. As a **PullUP** the GPIO pin is connected to V+, as **PullDOWN** the resistor is connected to ground, on **Float** the GPIO is not connected. For a dry contact sensor, a PullUP is suggested. For a device that applies or removes power, a **PullDOWN** is suggested (default is **PullUP**).

Debounce Time (ms) (integer)
This millisecond value is used to determine how long a digital input must hold a new state before a change is recognized. The value used will be a function of the device on the input and may vary based on application. This logic is applied to the input before its status is updated whether it is in Switch, Counter or Rate modes (default debounce Time is 10ms).

Event Time (sec)

Rate Mode (select box) - in This mode Event Time is the minimum time period necessary to acquire readings and calculate rate. This Time frame is divided into, small, counting, time slices. Once a full **Event Time** worth of time slices has been acquired an accurate calibrated reading will be displayed. Each time slice reading is put into a FIFO. As each new time slot starts, the oldest time slot is discounted. This effectively implements a real-time Frequency decoder (default **Cycle Period** is 1-Minute).

Counter Mode (integer) - When **Event Time** is non-zero, Input events only trigger after the event has been recorded in the event state for the **Event Time**. This field ensures that triggering events are meaningful and not due to spurious or short term events.

Measurement Units (text string)
Enter the units for readings that are displayed on the control screen or transmitted. The default is count. Units should be standard units such as Vdc, pph, gpm.

Trigger (integer, rate mode only)
In Rate Mode Trigger represents the point at which an event will trigger. In Count mode the trigger is an upper limit after which the event will trigger.

Scale (decimal number, rate mode only)
The scale multiplier is used to convert Rate readings into calibrated engineering units. The uSwitchCS calibrates a count by using the linear equation Y=mX+b. If m=1 and b=0 the raw count equals the engineering count. The factory default value for the scale (m) is 1 and the offset(b) is 0.

Offset (decimal number, rate mode only)
The Offset is the starting point of the reading when the count is 0. The factory default is 0.

Decimal Places (decimal number, rate mode only)
The number of digits after the decimal point to display scaled readings.

Hysteresis Zone(integer)
This measurement is used in Rate Field as the triggers differential zone. When readings rise above the trigger an event will only be generated after the reading rises above the trigger value by half the Hysteresis Zone value. Similarly when a reading falls below the Trigger Value, an event will only be generated if the value drops half a Hysteresis Zone value below the actual trigger value The whole value represents the differential or hysteresis zone and prevents event oscillation. If Hysteresis zone is zero or small oscillations may occur.

Hysteresis Color (color select box, rate mode only)
This field only applies to rate mode and will be the background color when the rate reading is within its triggers Hysteresis Zone.

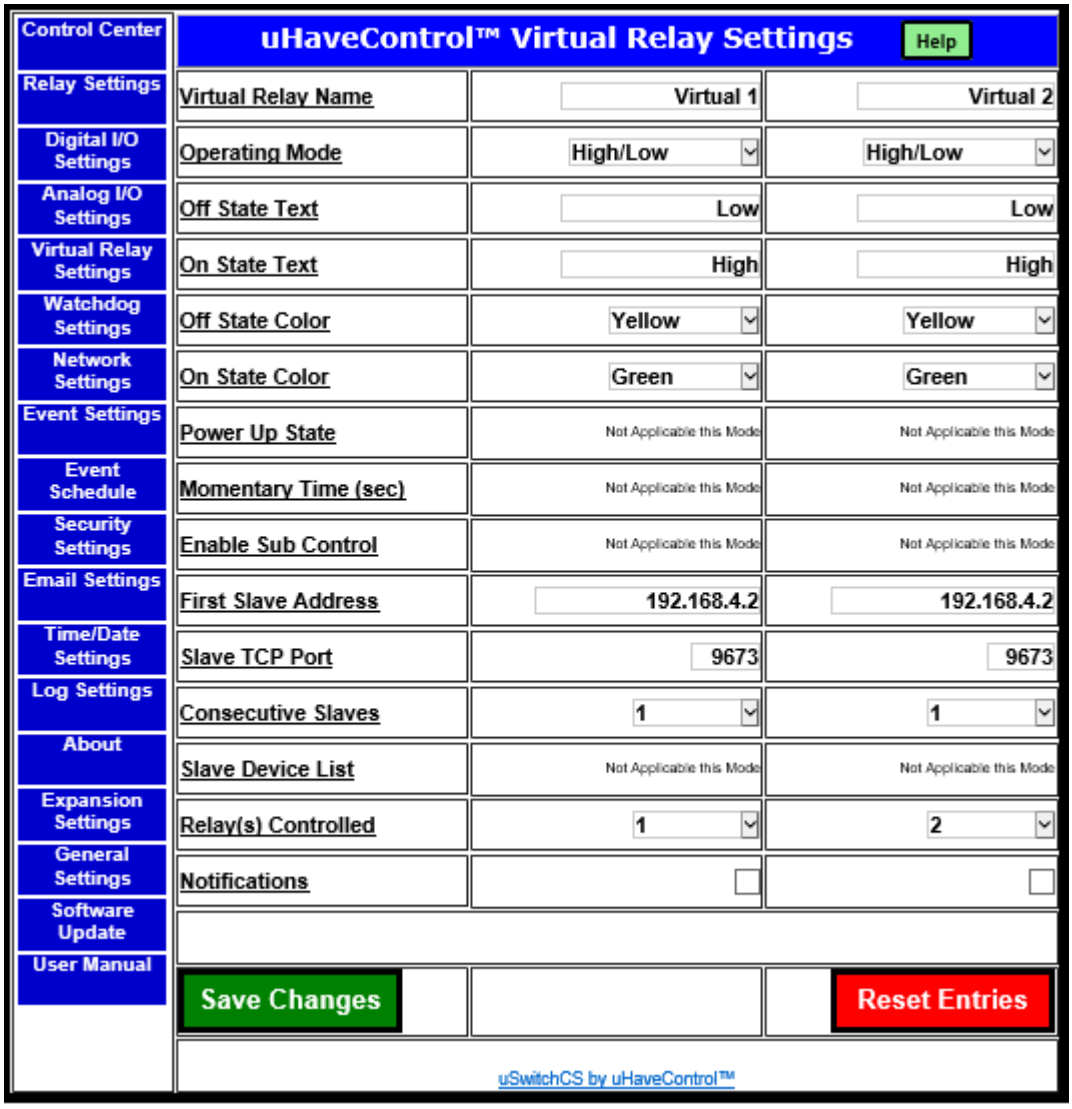
Cutoff/Rollover (integer, counter mode only)
In counter mode this Cutoff value will reset the counter to 0 if its value is reached. If the value is 0 there is no rollover count (default value is 0). In Rate Mode this value acts as a rate Filter limiting microbursts that might occur in short term readings.

Add to Control Page (checkbox)
When checked this GPIO and all related fields/options are visible on the Control-Page.

Notifications (selection box)
The Notification selection box will cause an email to get sent when the associated relay turns **Low, High** or **Both**

Virtual Relay Settings Page

This page is used to define Virtual Relays. A Virtual relay enables a uSwitchCS (Master) to drive peer remote relays (Slaves) on other uSwitches anywhere on the network. These slave relays can be commanded from a Virtual Button on the Master's Control-Center interface or synchronized to the Master's local relays or inputs. This feature enables a single Master site to control a web of slave sites without the need for any home-run wiring. With virtual relays, a single button or alarm event can instantaneously lock down/open/light up an entire campus or facility from a single physical button, virtual button or alarm sensor anywhere in the world.



Virtual Relay Name (text string)

The Virtual Relay Name represents a user assigned name to this item. It will be the name used in all references to the Virtual relay (default is Virtual0). It is transmitted whenever an email, or notification is sent referencing this item and will be displayed on screens referring to it.

Operating Mode (custom select box)

This pulldown provides the **Manual, Momentary, Resettable**, and **Clearable, Relay, Sync to GPIOx** options, identical to those from the Relay Settings page, with the exception that a new (Virtual) button is created on the Control-Center and that Virtual button will act as the user's control for all assigned remote relays. If the mode specified is **Relay**, then remote relays are synchronized to this local relay. Any of the local relay's properties are automatically tied to the remote relays. This means that if the local relay is in watchdog mode, the remote relays will function with the same watchdog properties affecting the local relay. If **GPIO** is selected all remote relays are synchronized to the local GPIO (default is None).

Off State Text (text string)

This field specifies the text assigned to the Virtual relay button when it is de-energized.

On State Text (text string)
This field specifies the text assigned to the Virtual relay button when it is energized.

Off State Color (color select box)
This field specifies the background color of the relay on the Control Center when the relay is de-energized.

On State Color (color select box)
This field specifies the background color of the relay on the Control Center when the relay is energized.

Power Up State (custom select box)
This dropdown configures the initial energized state of Virtual relays when they are in controlled modes (**Manual, Momentary, Resettable, Clearable**)**.** The options are Off, On, Last. Depending upon the operating mode this field may be disabled or forced to a given state.

1. Off - Relay is not energized on power up.
2. On - Relay in energized state on power up.
3. Last - Relay is put in the state it was in last before it was powered down.

Momentary Time (sec) (integer)
This field specifies the number of seconds for the countdown timer if the Operating mode is momentary, resettable or clearable. (see Relay Settings above for further details).

Enable Sub Control (checkbox)
This field enables overriding the current state of the Virtual Relay using an override button on the Control Center.

First Slave Address (4-digit numeric IP)
This field should have the IP address (such as 192.168.0.50) of a slave uSwitch to control that is addressable on the LAN. If the network address specified is not routable from this uSwitch (because of a firewall or addressing limitation) the feature will not drive the remote relay and communication failures will occur.

Slave TCP Port (integer-port)
This specifies the TCP port for any internal or external TCP commands sent by this uSwitch. By default, this port is set to 9760. This port does not need to be changed unless your remote device specifies a port other than 9760. Since only one TCP port is specified by the Virtual relay page, all controlled devices should be on the same port otherwise devices with different TCP ports will not receive Virtual Relay Commands.

Consecutive Slaves (integer)
Number of uSwitches controlled by this Virtual Relay (consecutive addresses) If this value is 3 and the **IP to Control** is 10.0.0.50, this Virtual Relay will control relays on uSwitches 10.0.0.50, 10.0.0.51, 10.0.0.52.

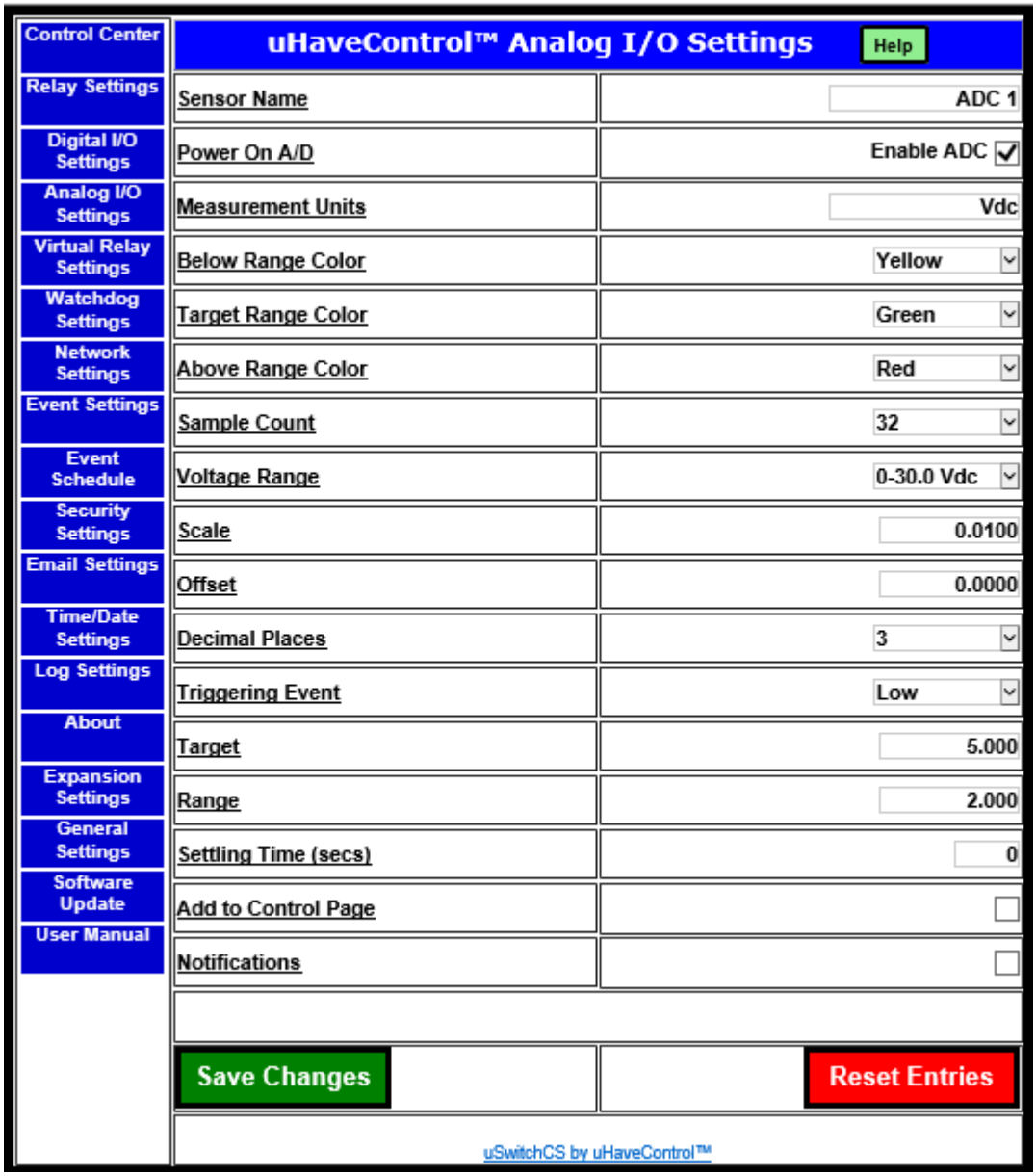
Slave Device List (4-digit numeric IP, read-only)
This read-only field shows all the slave IP addresses assigned to the virtual relay.

Relay(s) Controlled (custom select box)
This Pulldown specifies which relay(s) on the remote uSwitch are controlled by this virtual Relay. 1 will control relay 1. 2 controls relay 2… and All will control all relays on the remote device

Notifications (selection box)
The Notification selection box will cause an email to be sent when the associated relay turns **ON, Off** or **Changes**

ADC Settings Page

This page enables a user to customize an analog input channel. The user can configure whether and how it is displayed, how it is calibrated/processed by the embedded application and its properties that trigger events.



Sensor Name (text string)

The Input Name field sets the name for the ADC. It will be the name used in all references to the input (default is ADC0). The Input Name is transmitted whenever an email, or notification is sent regarding this input and is displayed on the screen whenever there is a reference.

Power On A/D (checkbox)

This field is used to disable the onboard ADC if it is not in use. The ADC has a hardware processor that runs continuously on input channels and generates heat and dissipates power. If it is not used, the ADC should be disabled to minimize power usage. This becomes very relevant in battery and solar applications (default to power off).

Measurement Units (text string)

This text field sets the units of measurement corresponding to the calibrated ADC readings.

Below Range Color (color select box)

Background color to be used when the ADC is below its low limit.

Target Range Color (color select box)
Background color when the ADC is operating within both Low and High Limits

Above Range Color (color select box)
Background color to be used when displaying the ADC reading when it is above its high limit.

Sample Count (custom select box)
This value from, the pulldown list, represents the number of readings per ADC sample. Increasing the Sampling rate filters out noise and spikes. If an input is slow to change then a high sampling count makes sense. If data is more erratic and spikes are not to be filtered out use a lower value. Default value is 32 samples per reading. The range is between 1 -256 readings per sample.

Voltage Range(custom select box)
Specifies the full voltage input range from the attached sensor. The value set should be as close as possible to the value that just exceeds the maximum expected voltage. If a value chosen is less than the max expected, any voltage reading above the max saturates the input and reports the max value.

Scale (decimal number)
The scale multiplier is used to convert ADC readings into calibrated engineering units. The uSwitch calibrates a count by using the linear equation Y=mX+b. If m=1 and b=0 the raw count equals the engineering count. The factory default value for the scale (m) is 1 and the offset(b) is 0.

Offset (rate mode only)
The Offset is the starting point of the reading when its value is 0. The factory default is 0.

Decimal Places (rate mode only)
The number of Digits after the decimal point to display the scaled readings. Default is 2

Triggering Event (rate mode only)
This selection box specifies the trigger (High, Low, Change) that will cause an event to occur.

Target (decimal number)
Represents the value around which an event will occur..

Range (decimal number)
Represents the low and high Range around the Target which will cause the event to occur.

Settling Time (secs) (integer)
When Settling time is nonzero, AD events only trigger after the event has been recorded in the event state for **Settling Time** seconds. This field ensures that triggering events are meaningful and not due to a spurious event (default is zero).

Hysteresis (decimal number)
A calibrated offset from either limit setpoint that must be satisfied to trigger an event. A value of 0 means no hysteresis. A value of 2 for a limit of 200 means the unit must reach 202 to trigger an above limit event or drop below 198 to trigger crossing back. Hysteresis prevents constant oscillations when an input stays close to a setpoint.

Add to Control Page(checkbox)
When checked this GPIO and all related fields/options are visible on the Control-Page. If unchecked it will not be on the Control-Page.

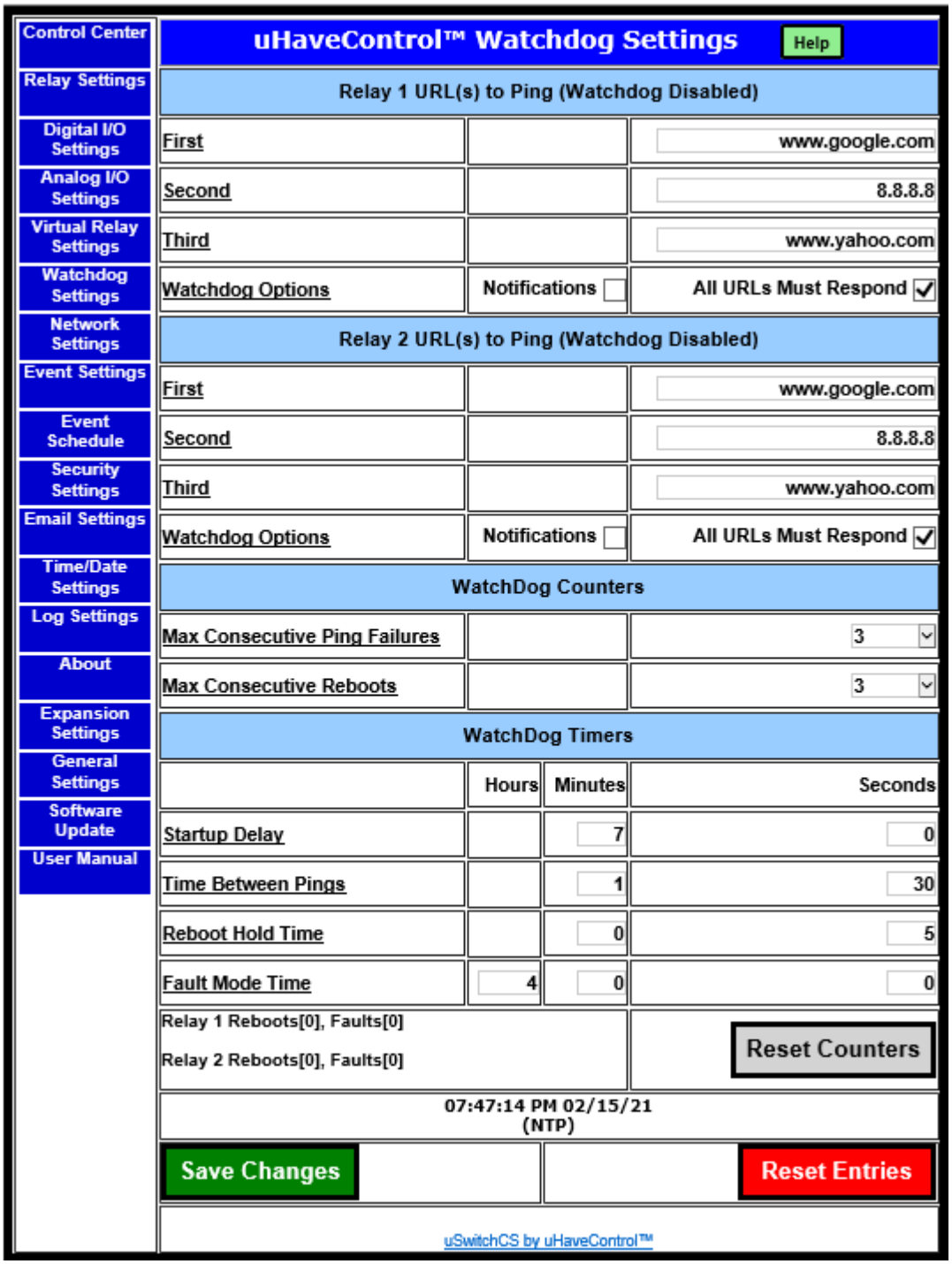
Notifications (checkbox)
When checked email events or log events enabled for the ADC will be sent.

Watchdog Configuration Page

The Auto Reboot Ping feature allows uSwitchCS to automatically detect failed equipment and reboot or restart it without human intervention. You may set one to three IP addresses or URLs to be periodically polled for each relay setup as a watchdog. If the uSwitchCS determines a communication problem exists between any or all of the assigned devices, the selected relay will automatically switch on/off device's power source resulting in a full restart of the device(s).

The Watchdog feature has been successfully deployed for IP cameras, kiosks, web signs, cellular routers, Servers, DSL and cable modems, RTUs, control sensors, a variety of Smart Grid technologies, etc.

Watchdog parameters are effective only when the assigned relay is set to **Watchdog** mode from the Relay Configuration page.



Note, for a relay to be placed in Watchdog mode, the operating Mode for that relay must be set to "Watchdog". This

field is set from the **"Relay Settings"** Page.

URLs to Ping (URL string or 4-digit numeric IP)

These three fields contain the IP addresses, or URLs of local network devices or servers that uSwitchCS will ping to ring out communication lockups or device failures. These may include the static IP address or remote IP of devices that will be tested (router, cellular modems, computer, Kiosk, network camera, mobile router). This is ideal for restarting network devices such as CSU/DSUs/RTUs, cameras, satellite modems, routers, re-closures, power meters etc., after locked up. Note if URL(s) are specified the Gateway field must be correct to provide access to specified DNS servers to resolve URL names.

All URLs must respond (checkbox)

When Checked the "All URLs must Respond" requires a response from every URL listed to determine a successful ping, if unchecked a response from any URL is evaluated as a successful ping response. .

Notifications (checkbox)

Turn notification on for Watchdog Events. Notifications include Ping Reboots, and Fault Mode Notifications.

Max Consecutive Ping Failures (integer)

If no ping responses are received for **Max Consecutive Ping Failures** then the selected relay will be cycled (forcing a power cycle for **Reboot Hold Time** on the device whose power is switched on and off via the relay). A ping failure occurs if any single device fails to respond when **All URLs Must Respond** is checked, or when no devices respond, and **All URLs Must Respond** is unchecked.

Max Consecutive Reboots (integer)

After "**Max Consecutive Reboots**" without successful reboot detection the uSwitchCS™ temporarily stops Watchdog Mode for the period specified in the **Fault Mode Time** field During that period the uSwitchCS™ stops cycling the relay. This period gives a functional device a break, when a device restart does not cure a network failure.

Startup Delay (integer)

When uSwitchCS is first powered on (or after a Watchdog reboot) the software will wait "**Start Delay**" time before initiating testing for ping failures. This **Startup Delay** gives a newly restarted system setup time to initialize and establish stable connections before testing begins. Certain devices such as cellular modems may never get a chance to establish connections with an ISP and WAN if the specified **Startup Delay** period is insufficient, causing the Watchdog to determine failure and reboot devices prior to their establishing successful connections. The factory default, and recommended **Startup Delay** Time is 7 Minutes.

Time Between Pings (integer)

This is the time between consecutive device ping attempts to the same URL. This field prevents ping flooding the network. (The default, and recommended minimum time is one minute and thirty seconds).

Reboot Hold Time (integer)

This is the time period that the watchdog switches the relay before switching it back. The time provides for a clean power shutdown and power back up. (the recommended minimum, and factory default Relay Hold Time is five (5) seconds)

Fault Mode Time (integer)

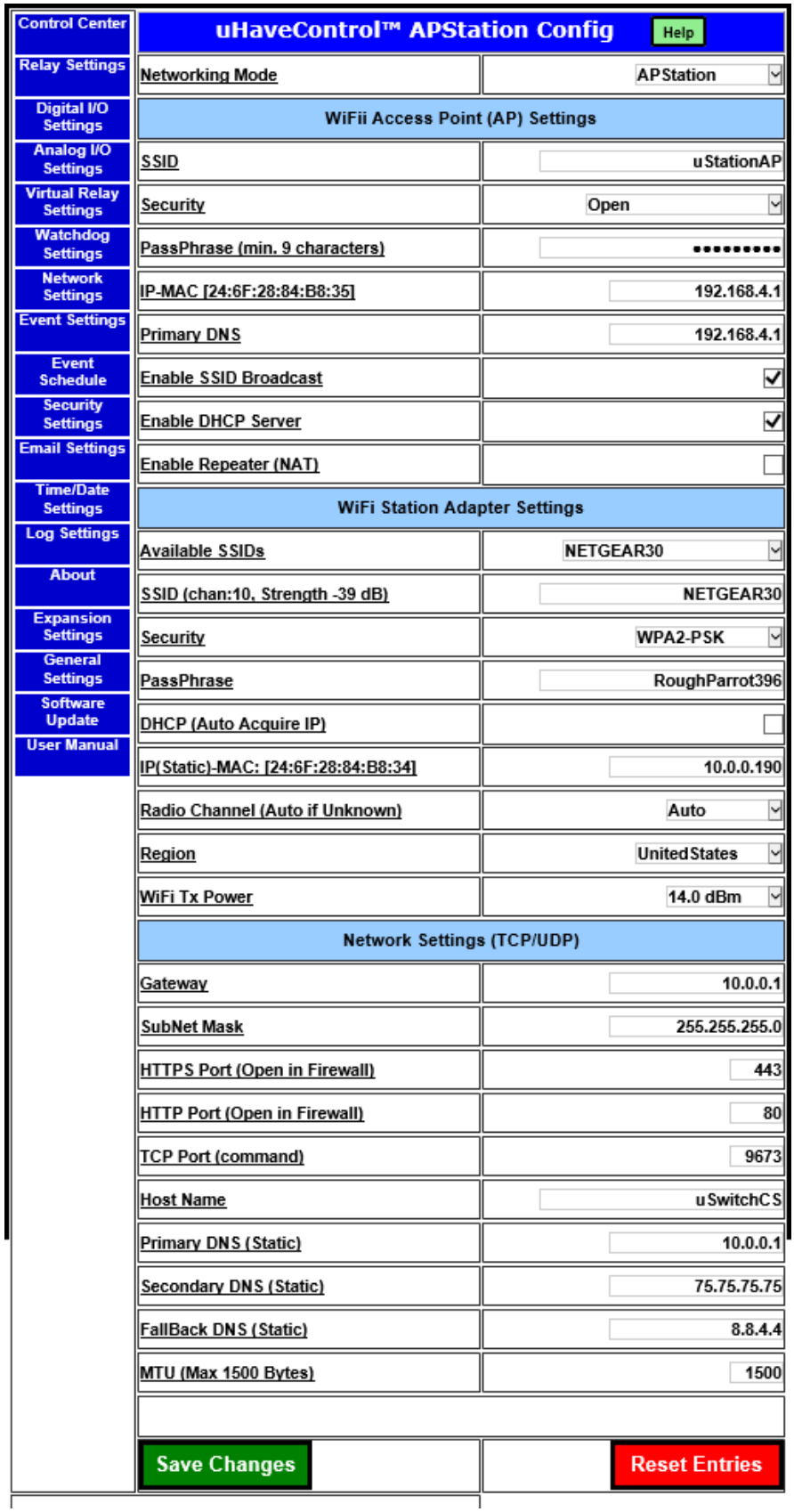
This is the time a watchdog stands -down in "Device Fault Mode" before returning to "Watchdog" mode after Fault Mode is entered by reaching **Max Consecutive Reboots** without any communication. This feature prevents the continuous cycling of power to a device that may not have a power cycle curable failure. The recommended minimum, and factory default, stand-off time is four (4) hours.

Reset Counters (button)

Watchdog statistics are stored for each relay that has its watchdog enabled.This button is used to reset all watchdog statistics.

Network Configuration Page

Network adapter selection, Network Adapter Settings, Network properties, and TCP-IP settings are configured from the “Network Settings” page. The Network Settings Page below shows the factory default network settings.



Networking Mode (custom select box)

The **Networking Mode** pulldown selects a network interface. Four different network interfaces are supported. The first three are Wi-Fi 802.11, **Access Point, Station,** and combined **Access Point Station**. The fourth interface (disables the Wi-Fi radio) is for hard wired **Ethernet**.

When the **Networking Mode** is configured as either **Access Point** or **Access Point Station**, the fields under the heading "**Access Point Settings**" are populated. When the net Adapter is either a **Station** or **Access Point Station**, then the fields under the heading "**Station Adapter Settings**" are populated. When the unit is set up for **Ethernet, all** wireless configuration fields are removed and two Ethernet-only fields are added. Now we describe all the **Networking Modes** and their settings.

Access Point (AP) Settings (used in Access Point and Access Point Station modes)

SSID (text string)

This field displays the SSID assigned to the uSwitch's Access Point whenever it is in Access Point Mode. Cell phones, computers and client sensors can connect to the uSwitch's Access Point Network directly in this mode. The factory default SSID is "**uStationAP"**.

Security (custom select box)

The security mode being used by the uSwitch AP (factory default encryption is **Open**).

Passphrase (text string)

Security Passphrase to connect to the uSwitch Access Point (factory default is **uSwitchCS**).

IP - MAC: (4-digit numeric IP)

This field represents the IPV4 TCP/IP address assigned to the Access Point. To connect to the Access Point directly this address should be specified in the address bar of the browser. When assigning a client device to the uSwitch AP this address should be the client's gateway (the aAP adapter's MAC is also shown here).

Primary DNS (4-digit numeric IP)

For Access Point Station mode this field should be set to the IP address of the Access Point. if the Access Point supports NAT or is acting as a WiFi repeater to another Access Point,specified in the Station Field.

Enable SSID Broadcast(checkbox)

This box should be checked if the SSID is to be broadcasted enabling discovery of it's SSID by other wireless devices.

Enable DHCP Server(checkbox)

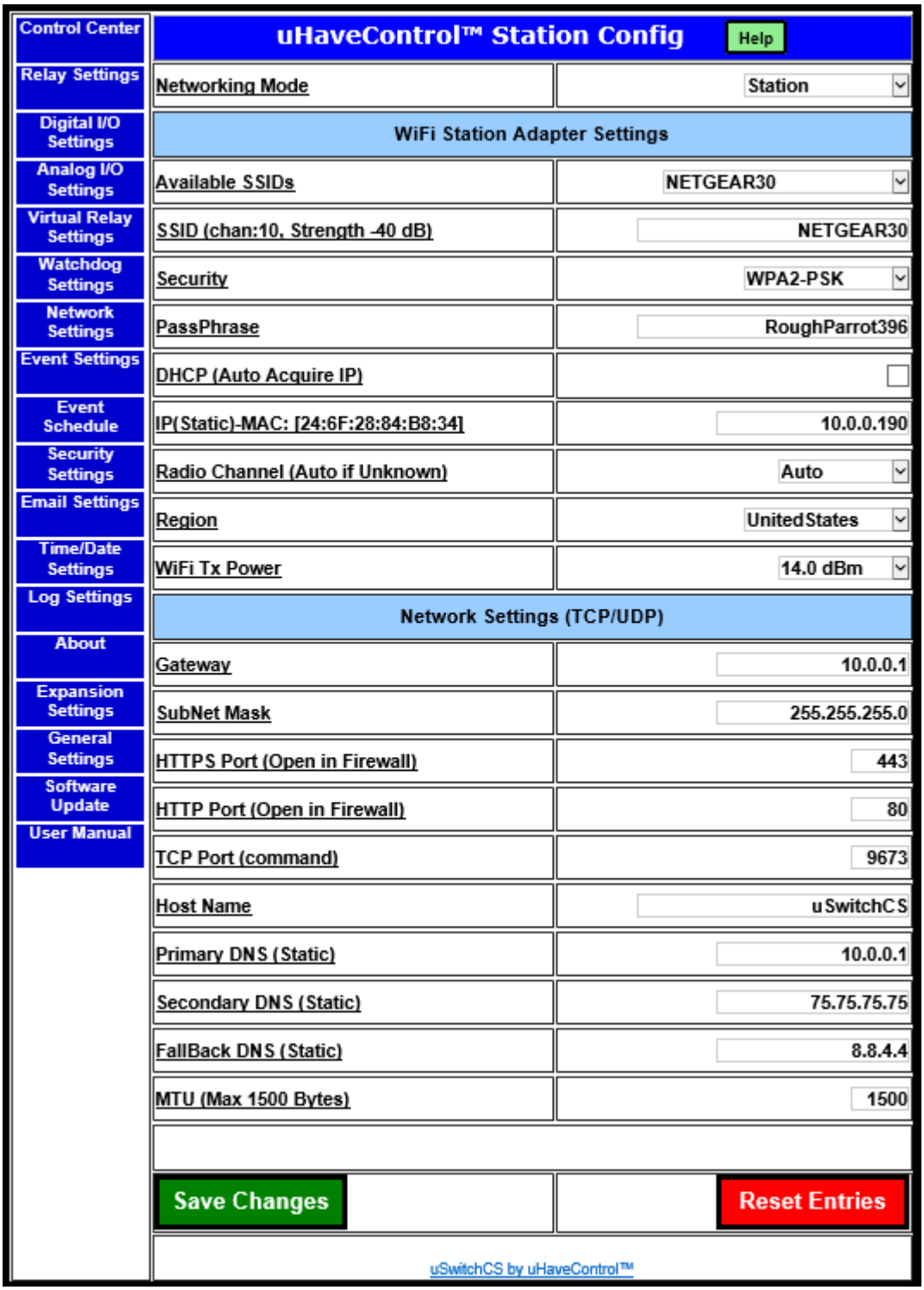
This box should be checked if the Clients are going to be assigned to the Access Point and will need their Network Addresses Dynamically assigned. If assigned Statically then the field should not be checked.

Enable Repeater (NAT) (checkbox, Access Point Station Mode Only)

This box should be checked in Access Point Station Mode if the Access Point is to be used as a repeater for the Access Point specified by the Station, or if it has locally connected clients that will be remotely accessed via Network Address Translation (NAT) or Port Forwarding.

Station Adapter Settings

When the **Networking Mode** is either **Station** or **Access Point Station**, then the fields under the heading "**Station Adapter Settings**" are populated.



Available SSIDs (custom select-box)
An automatically populated selection box of all WiFi Networks in range of the uSwitch.. This field selects the SSID of an AP/Router/Modem to assign to the Station (Infrastructure) device.

SSID (text string)

This field will always hold the current SSID for the access point that the station is connecting to. It can be used to manually enter a known SSID when the uSwitch fails to discover a desired Access Point and display it (this will occur if the desired AP has broadcasting Disabled). Once a connection has been established to a Host AP, the (b/g/n) channel used by the Host is displayed in parentheses along with its received signal strength to the uSwitch. This channel number can then be entered in the **Host Channel** field, described below.

Security (custom select box)

This field must be set to the encryption mode for the AP the Station is connecting to.

Passphrase (text string)

This is the passphrase for the Host AP's security.

DHCP (Auto Acquire IP)(checkbox)

If **DHCP** is checked (not recommended) then this Station will expect to have its IP address and DNS fields automatically assigned by the selected by the specified AP (it is best practice to never assign a DHCP address to the uSwitch as it is a server and its IP address should be static so it can always be found and will never change).

IP(Static) - MAC[XX:XX:XX:XX:XX:XX] (4-digit numeric IP)

This field represents the IPV4 address you are assigning (or that was automatically assigned via DHCP) to the Station in Station Mode or Ethernet address in Ethernet Mode. It must be on the Host's Access Point's LAN (the adapter's MAC id will be displayed on the left).

Radio Channel (select box)

When Net Adapter is in **Station** or **Access Point Station** mode, this channel should be set to **Auto**. It should only be changed to the channel of the Station's Host AP if it is known. Leaving the field in **Auto** mode should not affect its operation.

Region (Select Box)

In the **"Region**" list, select the correct region that matches the region from your Access Point. Not entering the correct region can result in unpredictable wireless behavior.

WiFi Tx Power (select Box)

The WiFi Tx Power should be set to the minimum power limit that works well in your environment. We recommend a max setting of 15.0 dBm. Unnecessarily setting to Maximum values can result in excessive power usage, and or cause noise and radio interference with other wireless networks.

Network Settings (TCP/UDP)

Gateway (4-digit numeric IP)

The gateway field specifies the IPV4 address to a router, cellular modem or gateway responsible for creating the LAN and connecting to outside networks or the internet. If unknown, the gateway address can be obtained from the network administrator. In **Access Point** (only) mode, the gateway should be the address of the uSwitch AP .In **Station**, **Access Point Station or Ethernet** modes it should be the address of the device that routes the network/LAN and provides access to the internet. The gateway must be correct if using a mail server, a Network Time (NTP) server, or URLs in the watchdog to ping devices outside the network..

SubNet Mask (4-digit numeric IP)

The subnet mask identifies a specific LAN's private addressing scheme on a TCP IPV4 network. The subnet mask can typically be obtained from the network administrator. The uSwitchCS default subnet mask is set to 255.255.255.0. Each of these four, three-digit fields represent an IPV4 address field. Each of these fields represents a byte worth of addressing (1-255). Any bit positions in the address with a value of zero are accessible on the local subnet. Any bit positions with a value of 1 are fixed (unchangeable) on the local subnet. In the subnet mask, 255.255.255.0, the first three IP byte address fields are fixed and must match the gateway, the last byte field may vary from 1 to 255 (a value of 255 is equivalent to 11111111 in binary).

HTTPS Port (integer-port)

The secure SSL port used by all HTML clients (browsers) to access the uSwitches internal web server. By default, this port is set to 443 (standard HTTPS port). A unique port is required for each uSwitchCS that is going to be accessed from outside the local network. In this case, each uSwitchCS device on the same local area network would be assigned a different port (for example 443, 444, 444, etc). Two network devices on the same LAN should never be assigned the same port address. With unique ports assigned to a uSwitchCS, a router can forward all outside communication for a given device directly to it without the outside network having any internal knowledge of the private networks addressing scheme. Beyond the address of the gateway to the LAN, and the port number (private IPV4 addresses should not be able to access the outside world/cloud). Any port (besides port 443) assigned to a uSwitchCS requires outside HTTPS references to include that Port number. (443 is the default port). This port must be open in any firewall.

HTTP Port (integer-port)

Unsecured port that can be used to connect to the uSwitch. Non-secure mode must be enabled in **Security Settings**.

TCP Port (integer-port)

TCP Port is the port that will be used if other uSwitch devices send messages to this uSwitch and control its devices as slaves. This Port must match the Port specified on the Remote uSwitch's Virtual Relay settings for this device.

Host Name (Text String)

The network host name for the uSwitch. It is a virtual name and may be referenced in SSL Security Certificates.

Primary DNS (4-digit numeric IP)

This field is used by the uSwitchCS to resolve outside URLs that may be included as **Watchdog** addresses for devices to Ping, or outside servers for mail or any other reference. Factory Default is 10.0.0.1. For Access Point only mode this field must be set to the IP address of the Access Point and is set automatically in DHCP mode if the specified adapter type is **Station** or **Ethernet**.

Secondary DNS (4-digit numeric IP, station/ethernet mode only)

This secondary DNS is used by the uSwitchCS to resolve outside URLs that may be included in the automatic reboot options or device firmware whose actual IP addresses are unknown from the private network just in case the primary DNS is not available. Factory default is 8.8.8.8. (set automatically in DHCP mode if adapter type is station or ethernet).

Fallback DNS (4-digit numeric IP, station/ethernet mode only)

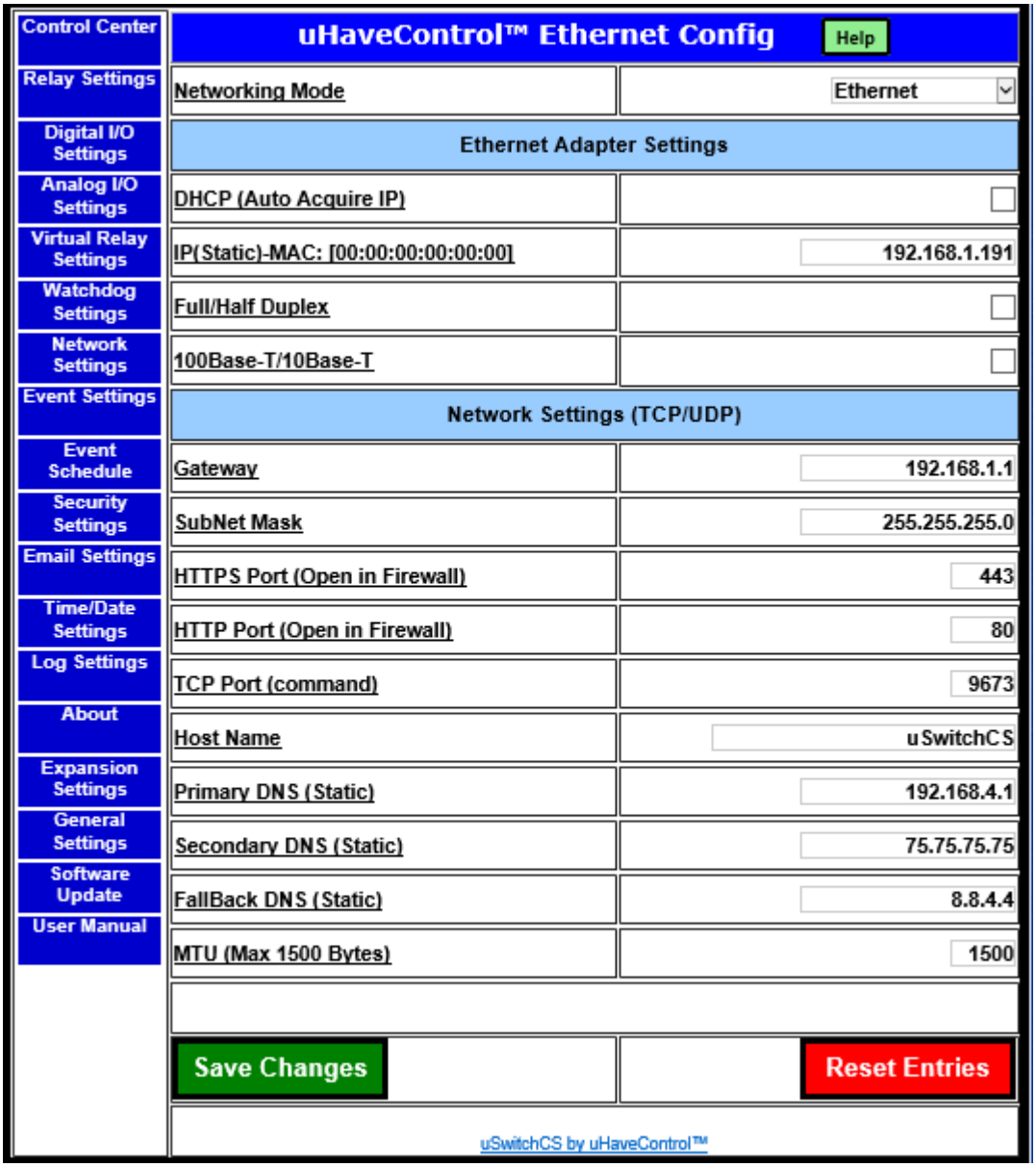
This tertiary backup DNS is used by the uSwitchCS to resolve outside URLs that may be included in the automatic reboot options or device firmware whose actual IP addresses are unknown from the private network just in case the secondary DNS is not available. Factory default is 8.8.4.4. Not affected by DHCP.

MTU (Max 1500 Bytes)

MTU (is the Maximum Transmission Unit) for network communication. It is recommended that **MTU** is only modified if you have communication issues and should never be set to a value higher than 1500.

Ethernet Adapter Settings

The following network page is populated when the Networking Mode is **Ethernet**. Only two unique fields are defined for Ethernet. They are **Full Duplex** and **100Base-T.**



Full/Half Duplex (checkbox)
In ethernet mode this checkbox will put the adapter in full duplex, otherwise it will operate half duplex (it will only work on a network that supports full duplex operation).

100BASE-T (checkbox)
In ethernet mode this checkbox will set the adapter for 100BASE-T, otherwise it will operate as a 10BASE-T device.(it will only work on a network that supports 100Base-T)

Adding Multiple uSwitch Devices to the same Network

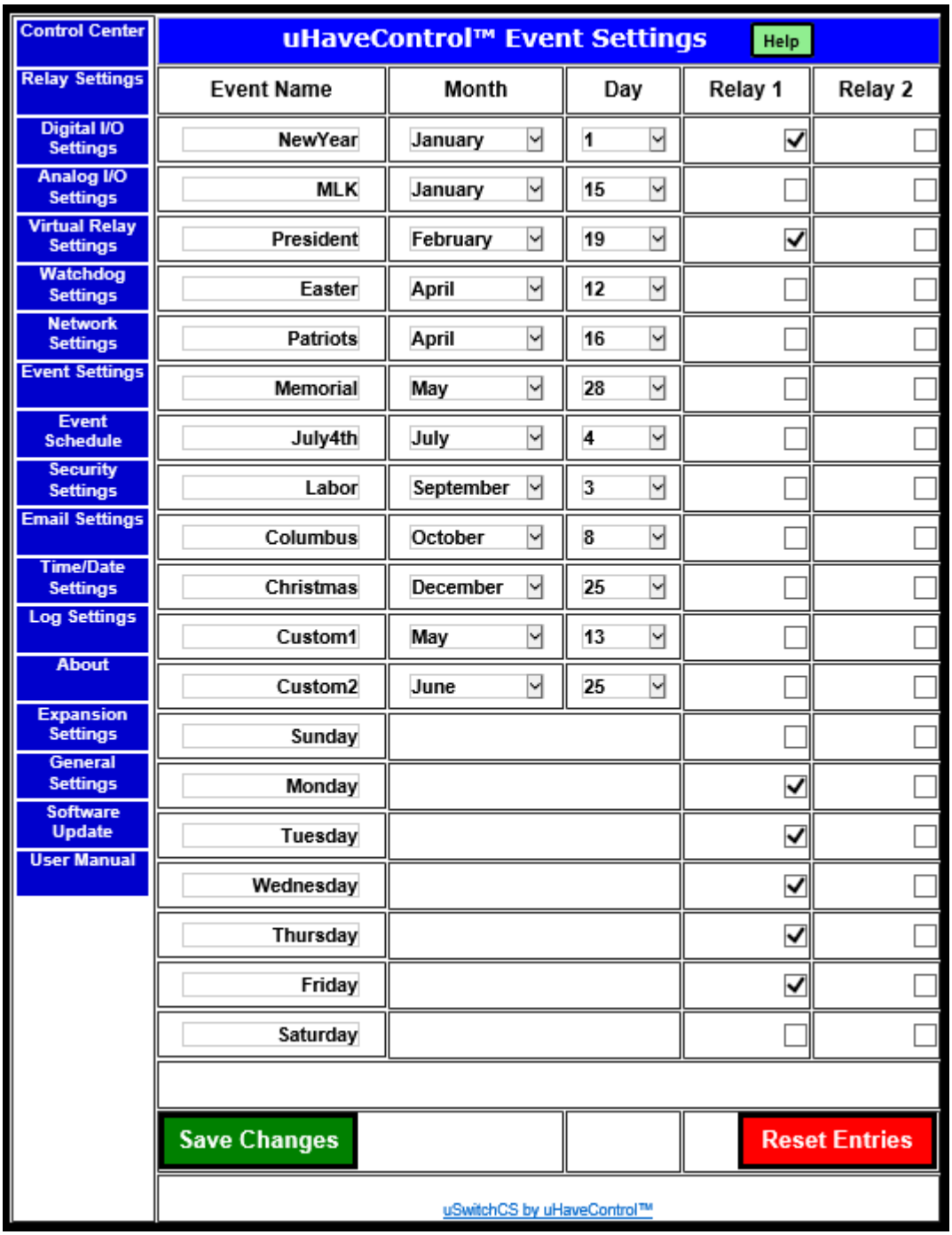
You may need to clear the Address Resolution Protocol Cache (ARP) each time you add a new uSwitchCS onto a network. This is because each uSwitchCS has the same factory default IP address. If the ARP cache is not cleared an IP address conflict could occur if two devices have the same IP addresses with different hardware MAC addresses (each uSwitch has a unique MAC address). To clear the ARP cache on a Windows PC type “arp –d inet addr”, in a DOS/Windows command prompt window (“arp -d –a” as super user on Apple OSX).

You can use a proxy server to connect multiple uSwitchCS to an outside network or the internet from a single static or dynamic IP address. This can be done using most routers. If a proxy server environment is to be set up, each uSwitch will not be accessible from the internet until the proxy server (router) is configured with the unique and specific port number and IP address assigned to each uSwitchCS on the router’s local area network. This is a form of Network Address Translation (NAT) also called Port Forwarding or Virtual Port Addressing. To determine how to set up the proxy server for port forwarding, review the router’s manual which acts as the proxy server and gateway for the uSwitch.

(Note: When multiple uSwitchCS devices are installed on the same local area network, each must have its own unique ‘LAN’ IP address. Every uSwitchCS comes with a factory default IP address of 10.0.0.190 If multiple uSwitchCS devices are used, assign a unique IP address to each, such as: 10.0.0.195, 10.0.0.1.196, 10.0.0.197, etc.).

Event Settings

The uSwitchCS supports Scheduled events so that specific access controls, general controls or timed events can be activated on a specific calendar date and time or a regularly scheduled weekday and time. Regular time-based events (weekday events), do not specify dates. Weekday events are overridden by calendar day events when they occur for the same day. For instance, if an event is established for Mondays and New Year's Day falls on Monday, the New Year Day event takes precedence. Once an event is defined and enabled its activity is scheduled from the **"Event Schedule"** Menu.



Event Name (text string)

This field names a calendar event. The name will be used in notifications or emails that go out when the calendar event is triggered and is used to reference the event when scheduling it on the **Event Schedule** page.

Month Day (checkbox)

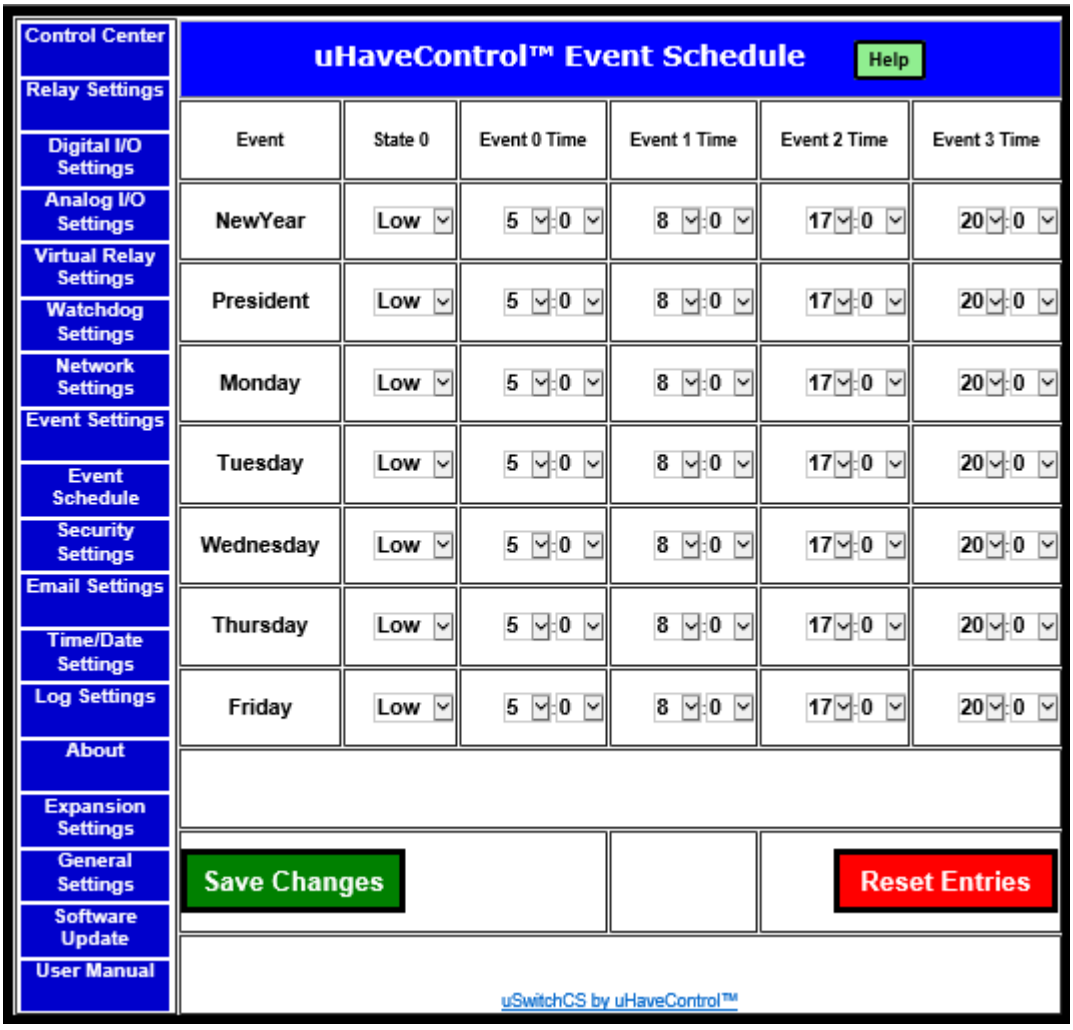
The Month/Day on which the event occurs. (Weekday events do not specify specific dates.

Event Schedule

The Event Schedule page works in conjunction with the **Date Events** page. For each enabled **Date Event** enabled, an entry will be available on the **Event Schedule**. This entry defines the times during that Event Date, that the associated relay is to be energized or de-energized. Four event times are available for each event date. If more events are required than multiple calendar events can be assigned the same date. The example below shows the calendar event that was enabled and the five weekday events.

Relay[X](checkbox)

Any Relay whose checkbox is set for a specific event will be triggered according to the event trigger schedule. In the page above events are enabled for President's Day, New Years and Monday-Friday for Relay 1. These events will need entries in the Event Schedule below, which was populated based on the user's selections in the Event Schedule.



State (custom select box)

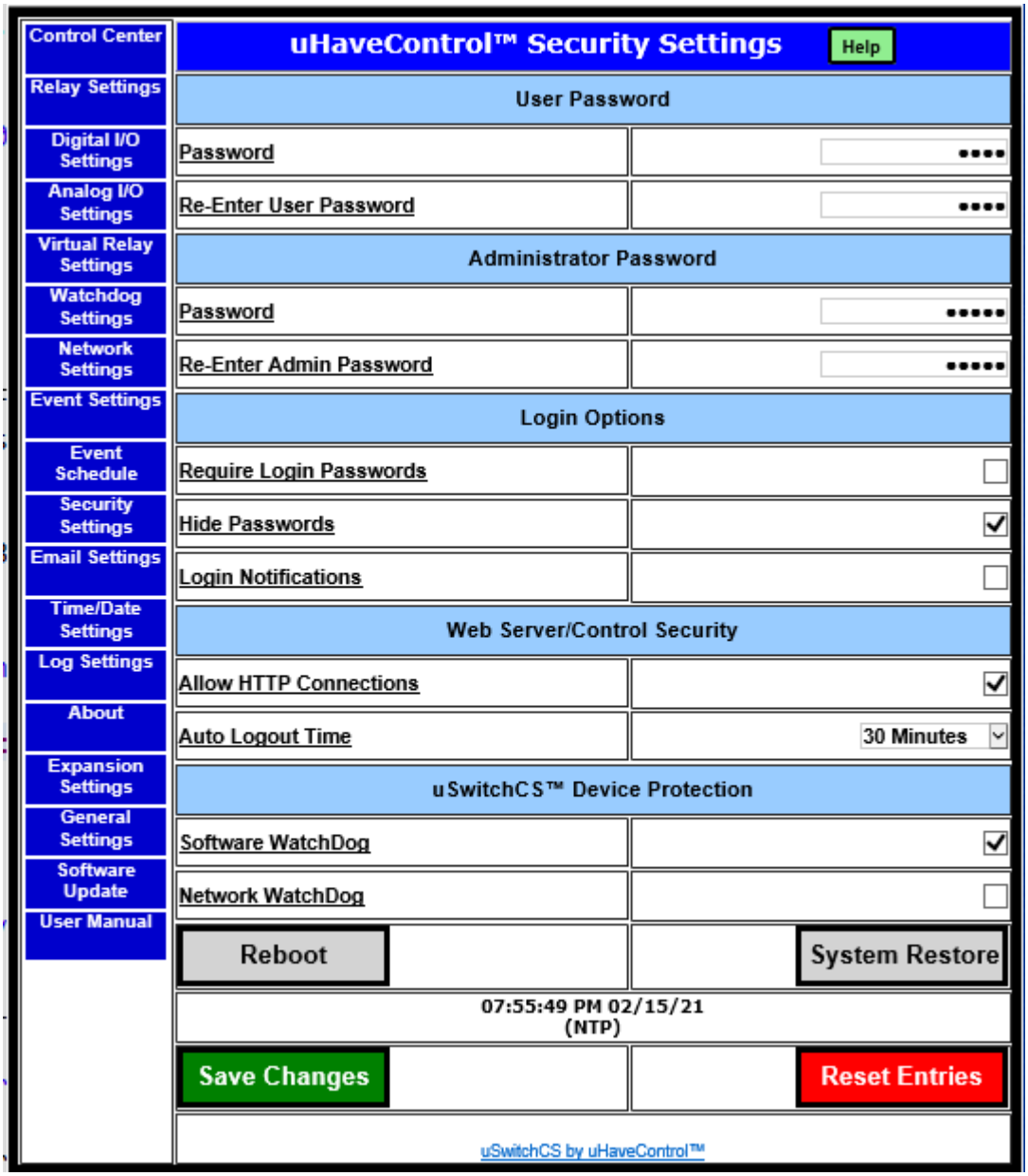
This field specifies the state of the relay for "Event 0 Time". At "Event 1 Time" the relay will change to the opposite state. Similarly, all event times moving forward will force the relay to change states.

Event 0/1/2/3 Time (custom select box)

Specifies the time, for the Calendar or Weekday event, that the relay will be set as specified. Each subsequent time, after **Event 0 Time**, (**Event 1**, **Event 2**, **Event 3** Time) will cause the relay to flip its state.

Security Settings

The Security Page is used to change or enable/disable passwords. A password is required on initial login to uSwitchCS. Passwords may be up to fifteen (15) characters and numbers. We recommend difficult passwords of at least eight (8) characters including both letters and numerals. Blank spaces are not allowed.



Passwords: All passwords should be secure and non-obvious. This means at least 8 characters, including digits and upper/lower case letters. The default user password is **user**.

VPN(s) and Firewall(s): If a firewall is in place the firewall can be set up to limit access to only certain network addresses. Additionally, a VPN may be used between the uSwitchCS and connected devices limiting access to only those devices or individuals who have access via the VPN.

User/Admin Password (text string)

To change the User/Admin password enter the password in both fields. To see the entries uncheck **Hide Passwords** and then click **Save Changes**. When the page is updated passwords will show the characters on this page and others. Check the **Hide Passwords** checkbox to hide the passwords and click save once entries are complete. The admin password provides access to all uSwitchCS configuration options and should be given out discriminately. The default admin password is **admin**.

Login Options

Require Login Passwords (checkbox)
Uncheck this field to eliminate password verification to log in to the uSwitch (default is checked).

Hide Passwords (checkbox)
Set to hide or show the passwords as they are being entered.

Login Notifications(checkbox)
When checked emails will be sent when a user/admin Login occurs.

Web Server/Control Security

Allow HTTP Connections (checkbox)
Checking this box will enable unsecure connections to the uSwitch. This is not recommended but can be used to test the uSwitch during initial setup. The default HTTP port for the uSwitch is 80.

Auto Logout Time(custom select box)
If there is no user activity on a connection and the uSwitch checkbox "**Require Login Passwords**" is checked, the uSwitch will require a new login the next time it is accessed by a user.

Device Protection

Software WatchDog(checkbox)
This is a uSwitch internal Watchdog. It is used in the event that an unpredictable error occurs to restart the uSwitch. The factory default setting is enabled.

NetworK WatchDog(checkbox)
This is a uSwitch internal Watchdog. It is used if the uSwitch loses connection regularly due to a faulty/noisy network or unreliable power. The factory default is off, but it can be turned on if the network behavior is noticeably unreliable.

SMTP/Email Settings

The Email setting page is used to set up the eMail client. From this page the user establishes the mail server, its port and connection requirements. The user can also select a few universal events that will automatically generate emails.

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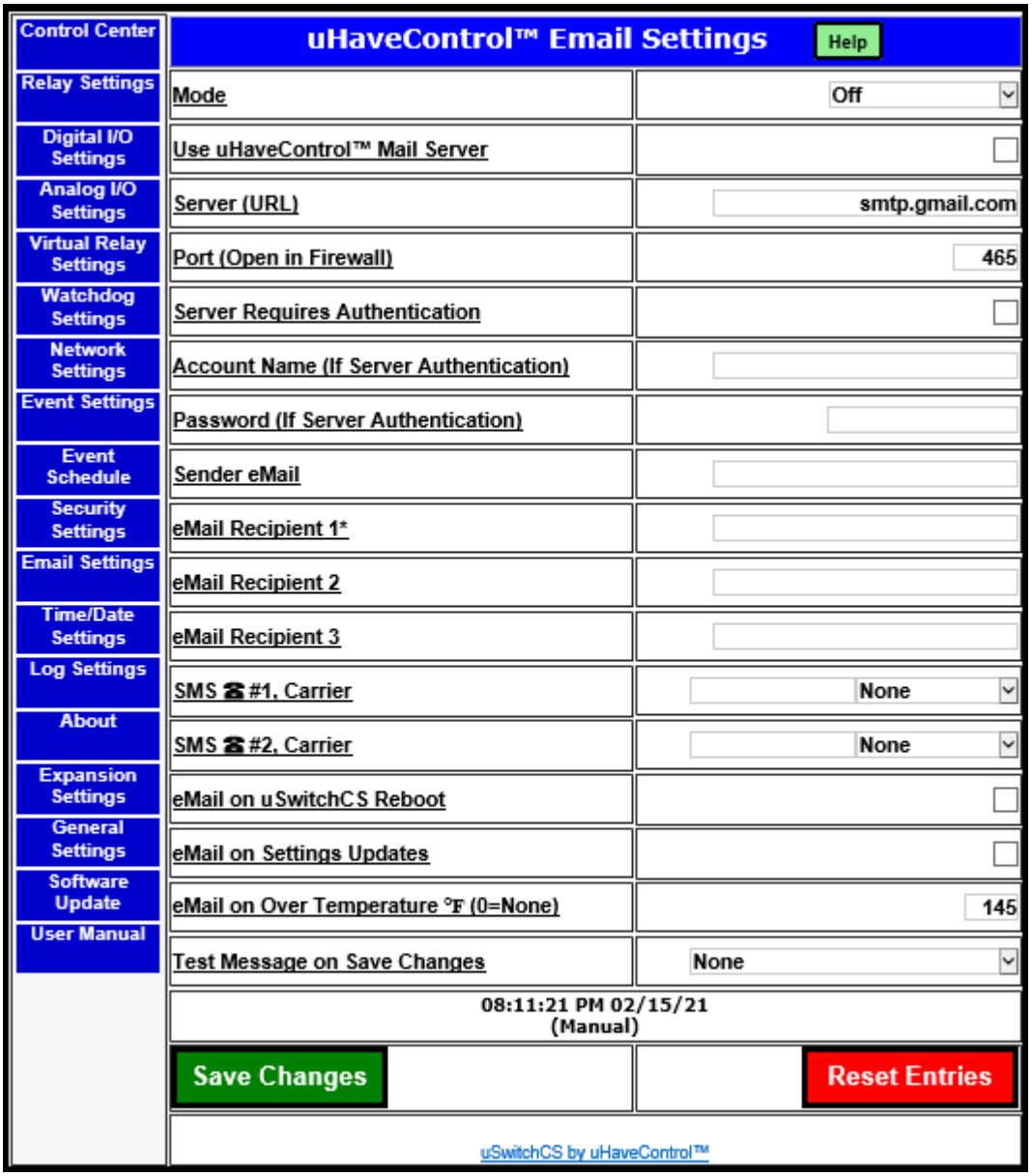


Mode (select box)

Sets the Mode for Email. Either **None** to Disable all eMail, **Standard** for Minimal Email or **Detailed** for additional State information in each Email.

Use uHaveControl Mail Server (checkbox)

When Checked the eMail server and settings are used from uHaveControl's test site. This should be used when setting up and testing eMail. Once eMail works, uncheck and point the settings to any Mail Server.

Server (URL)

The URL or IP address for the SMTP mail server, such as, the factory default,'smtp.gmail.com'. (When URLs are used the gateway and the DNS fields on the **Network Settings** page must be correct).

Port (integer-port)

The uSwitchCS securely transmits emails using TLS/SSL. The standard port for TLS/SSL is 465. If the mail server specified requires a different port that should be entered here.

Server Requires Authentication (checkbox)
Check this box if the Mail Server being used requires authentication (username and password)

Account Name(text string)
The Account Name used to login to the mail server.

Password (text string)
Most mail servers require account authentication. Enter account password here.

Sender Email (full email address)
This is the email that will show up in the mail header. You can set it to a help desk or technical support address if you have one.

Return Email (full email address)
This is an email address required by the server. It must be a legitimate email address.

eMail Recipient(s) 1-3 (full email address(s))
These five email addresses are legitimate email addresses where all emails initiated by the uSwitchCS are sent.

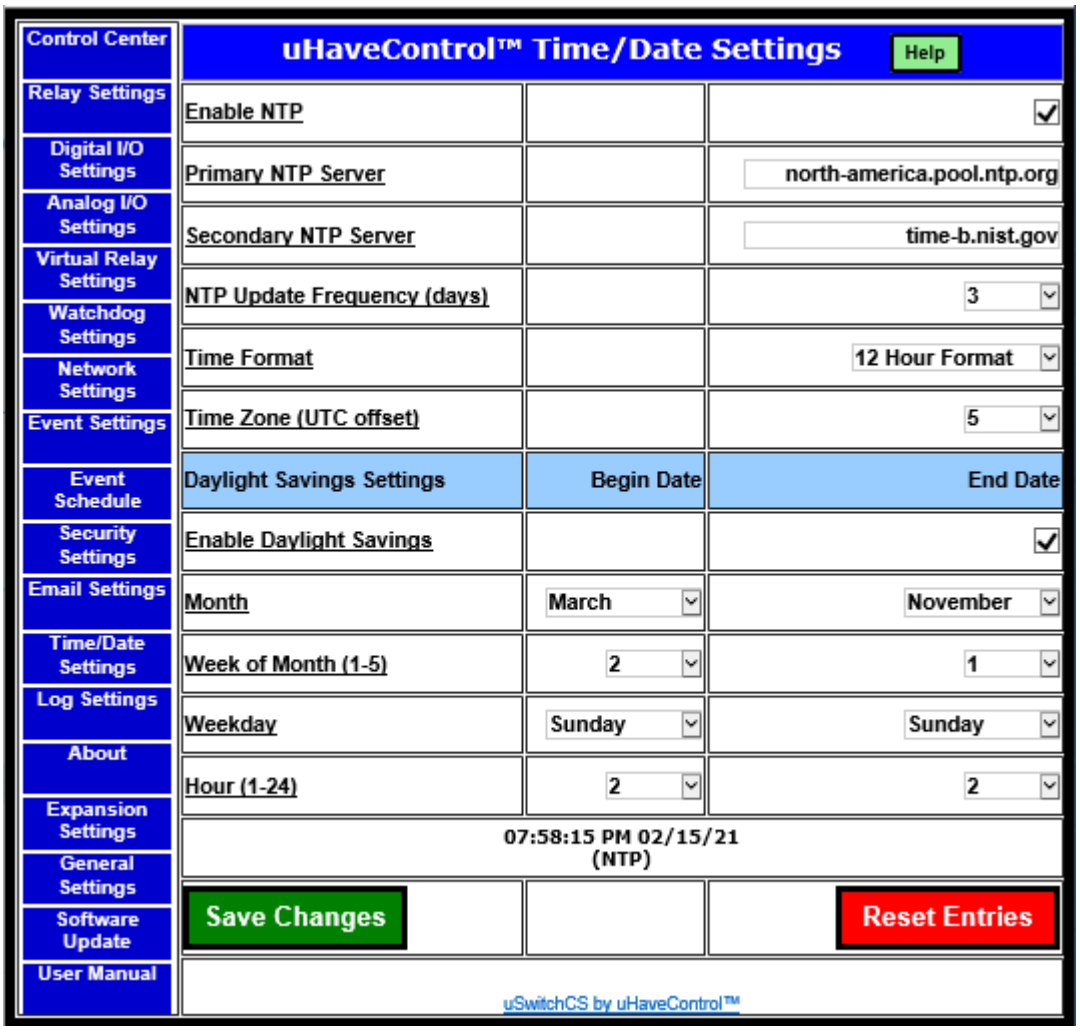
SMS 1-2, Carrier (text String)
Enter a phone number for each desired SMS, followed by selecting the phone carrier for that phone number. (An SMS message requires the carrier to be selected to determine the proper address to send the SMS to).

eMail on uSwitchCS Reboot/Settings Updates/Over Temp (checkbox(s))
The checkboxes specify events that should cause an email to be sent. When checked, if the event occurs a corresponding email is sent to all recipients listed.

Test Message on Save Changes (selection box)
When the selection box is set to any selected address (except **None)** a test message will be sent out to the recipient whenever the **Save Changes** button is clicked..

Time/Date Settings (if NTP enabled)

The uSwitchCS supports scheduled events. These events will occur based on specified times and dates. Accurate time is required to turn a relay on or off on a schedule or log an accurate time stamp with an event occurrence. To support accurate logging and scheduling a real-time clock is employed to keep time. This page is used to establish how time is acquired and processed.



NTP Enabled (checkbox)

When checked an NTP (Network Time Protocol) server will be used to get and maintain time. If an NTP server is used, the gateway and DNS servers must be set up on the **Network Settings** page to resolve URLs and access remote NTP servers. When unchecked, the user will have to enter a time manually. Manual entry of time is not as accurate over extended periods of time, as there is only the original time reference and loss of power, as well as internal time-keeping inaccuracies, will result in time inaccuracies.

Primary NTP Server (URL text string)

This is the IP address or URL of an NTP server (a list of public NTP Servers can be obtained by googling 'public NTP'). The default primary NTP Server is time-a.nist.gov.

Secondary NTP Server (URL text string)

In the event the Primary NTP Server is not available, this NTP server will be. The default secondary server is time-b.nist.gov.

NTP Update Frequency (days) (selection box)
In order to maintain accurate time, it is suggested that a periodic time update request is sent to the NTP Server. The value in this field will be the number of days between requests. There is a minimum of 24 hours between updates, so a device does not overwhelm a public time server and a maximum value of every 30 days (default value is every 3 days).

Time Format (UTC offset) (custom select box)
Select whether Time is displayed in 12 or 24 hour time format.

Time Zone (UTC offset) (custom select box, NTP mode only)
NTP servers provide time in universal GMT format. This time can be corrected by a time zone offset. This pulldown is used to set the Time Zone offset. The Time Zone selected should be based on the time zone for the location of the uSwitchCS or the time zone where its readings are to be accessed and processed (default Time zone is Eastern Standard Time (EST)).

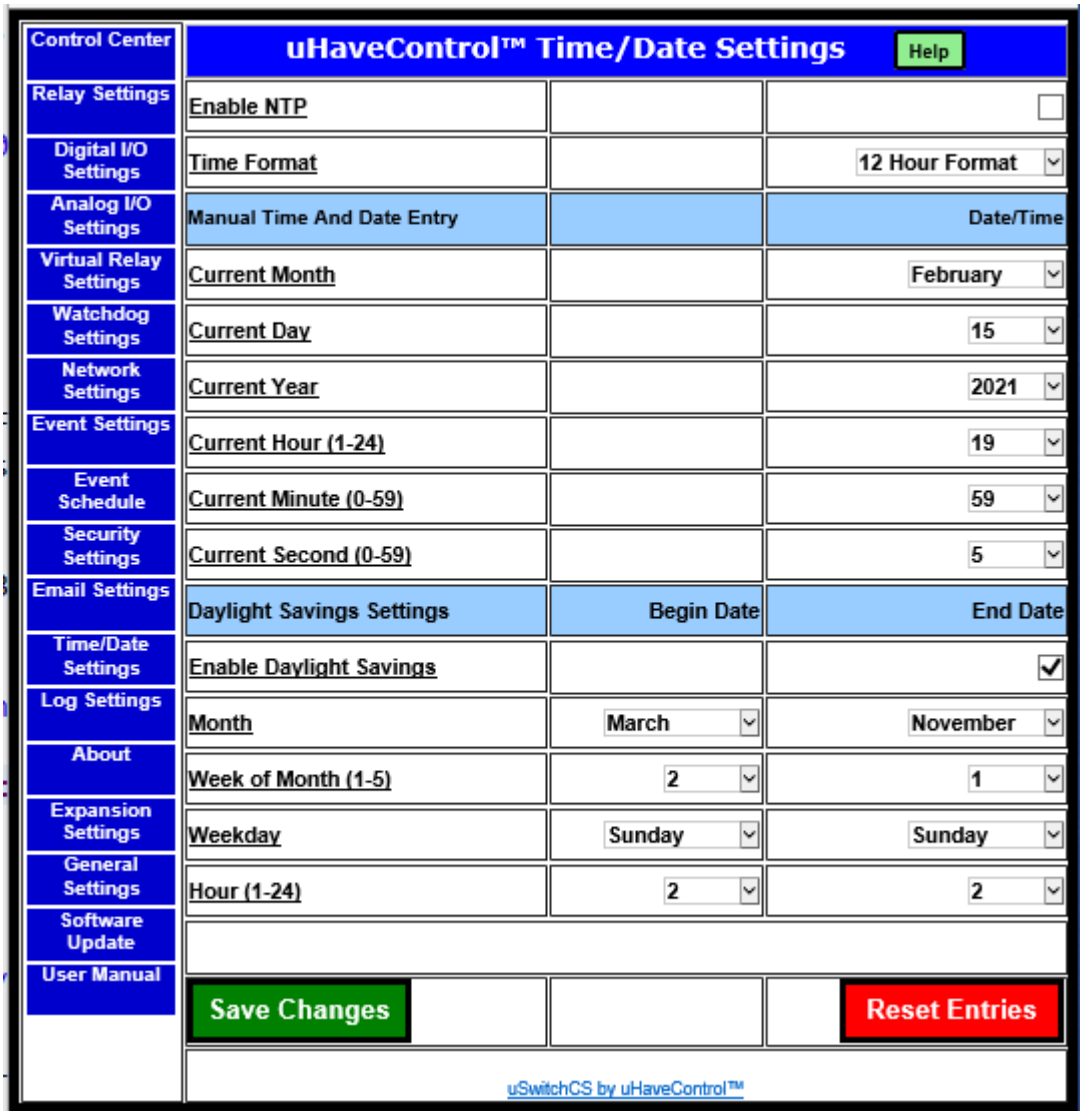
Enable Daylight Savings (checkbox, NTP mode only)
If daylight Savings time adjustments are required, this checkbox should be checked.

Daylight Savings Options

This section contains fields that are only displayed when Enable Daylight Savings is checked. There are four related entries that are used to specify the start and end dates of daylight savings time. The four entries are, **Month**, **Week of Month, Weekday**, and **Hour**.

Time/Date Settings (when NTP not enabled)

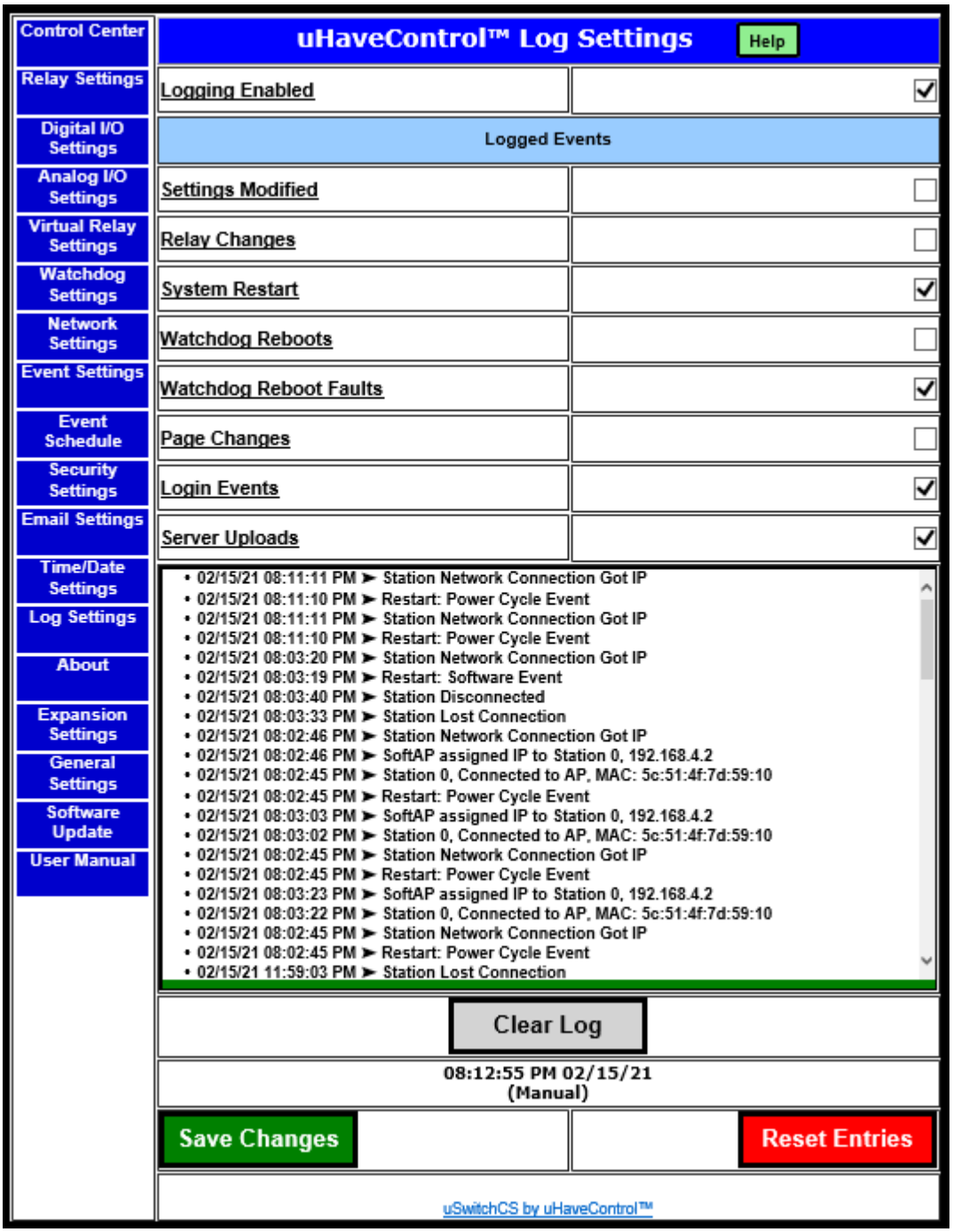
When NTP is not enabled or an NTP server is not accessible, the user must enter the current date and time to establish a time frame for uSwitchCS' reference. The following fields are displayed when NTP is disabled.



Enter the current Month, Day, Year, Hour, Minute and Second on the Time/Date Settings Page. The uSwitchCS has a super capacitor for backup of its Real-Time Clock (this mechanism should keep RTC accurate for several days). In the event of power loss, time is preserved and should remain accurate for short outages. Periodically (every three months) check the accuracy of the time to ensure proper schedules will be maintained. If not accurate re-enter time on this page.

Log Settings

uSwitch can maintain an operating log. The data placed in the operating log and whether an operating log is maintained is set from the **Log Settings** page.



Logging Enabled (checkbox)

When checked the system creates entries that are put into the System Log. To download the log, select the Text within the Log's text window and copy it (click copy). The log can then be pasted into a text file or email message and emailed.

Settings Modified (checkbox)

Creates a Log entry when a configuration change is made.

Relay Changes (checkbox)

Creates a Log entry whenever a user changes a relays's state.

System Restart (checkbox)

Creates a Log entry each time the system is rebooted, power cycled or reset.

Watchdog Reboots (checkbox)

Creates a Log entry when the watchdog forces a reboot.

Watchdog Reboot Faults (checkbox)

Creates a Log entry when a Watchdog reboot fails to restart a device.

Page Changes (checkbox)

Creates a Log entry whenever a user navigates to a new page from the web interface.

Login Events (checkbox)

Creates a Log entry on all user login events.

Server Uploads (checkbox)

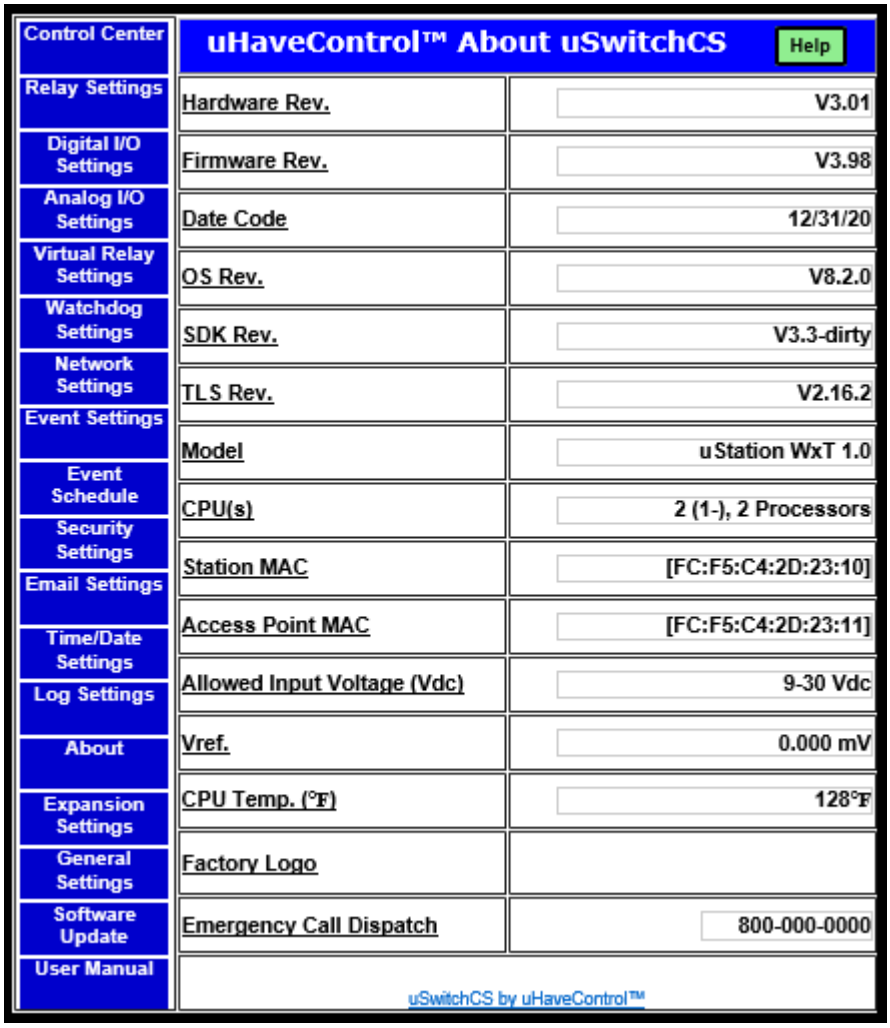
Creates a Log entry when a file is updated. Including, firmware updates, SSL Keys or Certificates.

Clear Log (action-button)

Clicking this button will cause the log file to be completely cleared. All entries are deleted.

About Page

General Information page (all fields read-only).



HardwareRev. (string, read only)

Version number of uSwitch Base Hardware.

Firmware Rev. (string, read only)

Revision of the current firmware running on the uSwitch.

Date Code (date, read only)

Date firmware was created.

OS Rev. (string, read only)

Revision of the Operating System used.

SDK Rev. (string, read only)

Revision number for the development tools

TLS Rev. (string, read only)
Revision of TLS being used.

Model (string, read only)
OEM product model (configured by user)

CPU(s) (string, read only)
Microprocessor details

Station MAC(string, read only)
The MAC address of the WiFi station adapter

Access Point MAC(string, read only)
The MAC address of the WiFi Access Point adapter

Allowed Input Voltage (Vdc) (decimal number, read only)
Input voltage range for the device

Vref (decimal number, read only)
Voltage reference, used to calibrate the A/D.

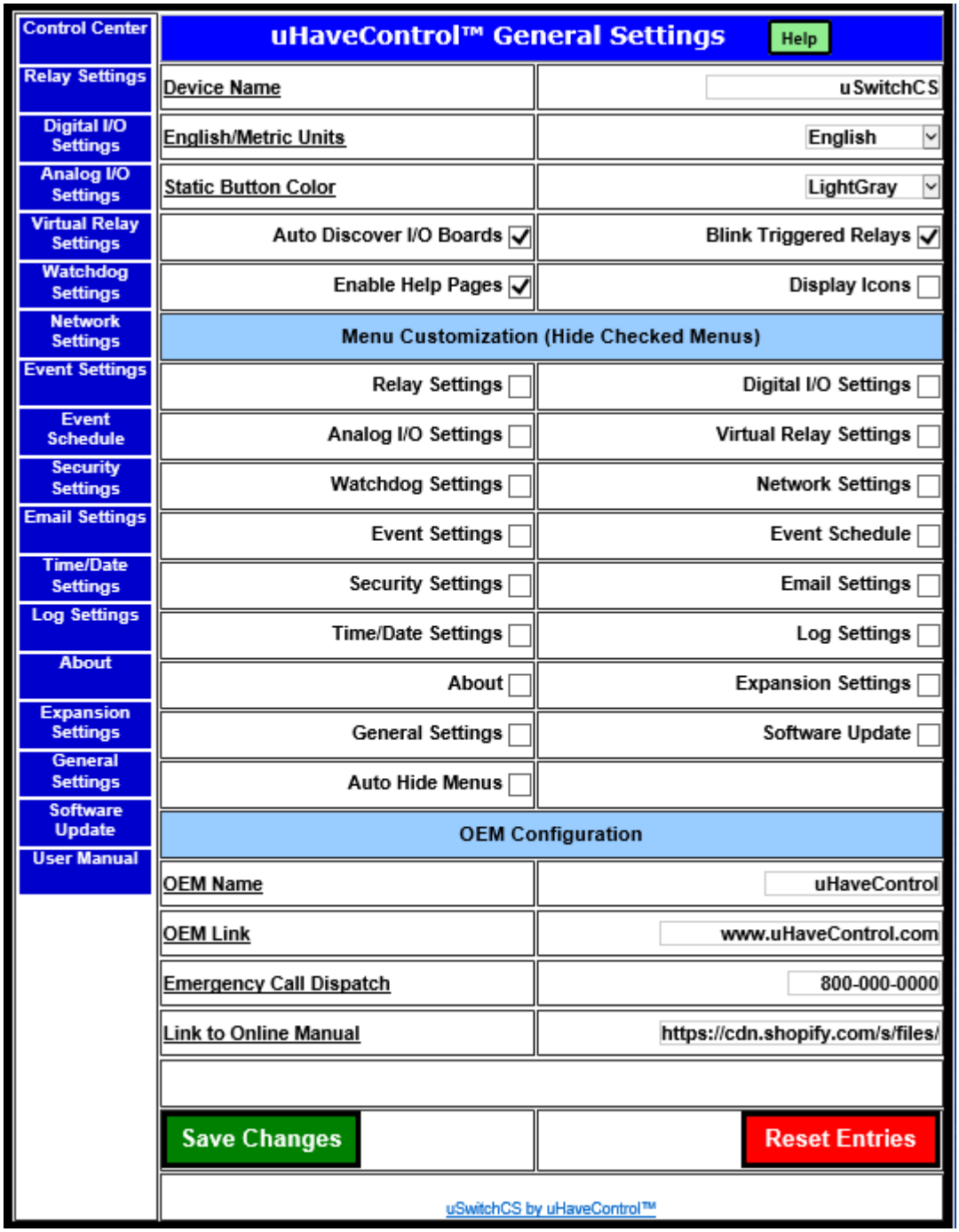
CPU Temperature (decimal number, read only)
Internal Temperature of the CPU.

Factory Logo (icon)
The most recent downloaded OEM Logo. This logo can be replaced by downloading a new Logo from a server via the “Software Update” Page.

Emergency Call Dispatch (phone number, read only)
OEM entered phone numbers for system operators to call in event of problems or emergencies.

General Settings

This page configures general system settings, menu settings, and OEM options.



Device Name (text string)

This is the name that will be sent on all emails and notifications when the next field is checked.

English/Metric Units (checkbox)

Selects the type of units to be used for display or sent out in Notifications.

Static Button Color (color selection checkbox)

Sets button color for any buttons whose color is not event driven or pre-specified.

Auto DiscoveryI/O Boards (checkbox)

If this box is checked the uSwitchCS will Autodiscover devices on its bus and populate the **Option Boards** menu page for all discovered devices (default is enabled)

Blink Triggered Relays (checkbox)

Uncheck to disable blinking of relays that are not under manual control.

Enable Help Pages (checkbox)

Uncheck this box to remove page specific Help from the menu pages.

Display Icons (checkbox)

Check this box to display OEM Icons on pages. OEM Icons can significantly slow down page loading. It is recommended to keep this box unchecked.

Menu Customization (Hide Checked Items) (checkboxes)

The uSwitchCS is an extremely flexible and powerful web-based control system. It supports many features and options. Depending upon the application many of the options may not be needed or are overkill for a specific application. If an installation does not require certain features, checking the appropriate box will remove that item from the menu and simplify the interface. Menu items can be added back by unchecking them.

OEM Configuration

The items in this section are for OEM customization.

OEM Name (text string)

This field will be displayed on the Heading of all Pages and should represent the name of a company or product. In this example the OEM name is uHaveControl.

OEM Link (URL text string)

This link will be on the bottom center of all pages. The link points to a web-site of the OEM's choosing (typically their own)

Emergency Call Dispatch Number (checkbox)

A phone number that can be referenced in event of a system problem or emergency event.

Link to Online Manual(URL text string)

This link will point to a manual for the uSwitchCS. In the event the OEM develops a custom manual this field should point to the Link for that manual.

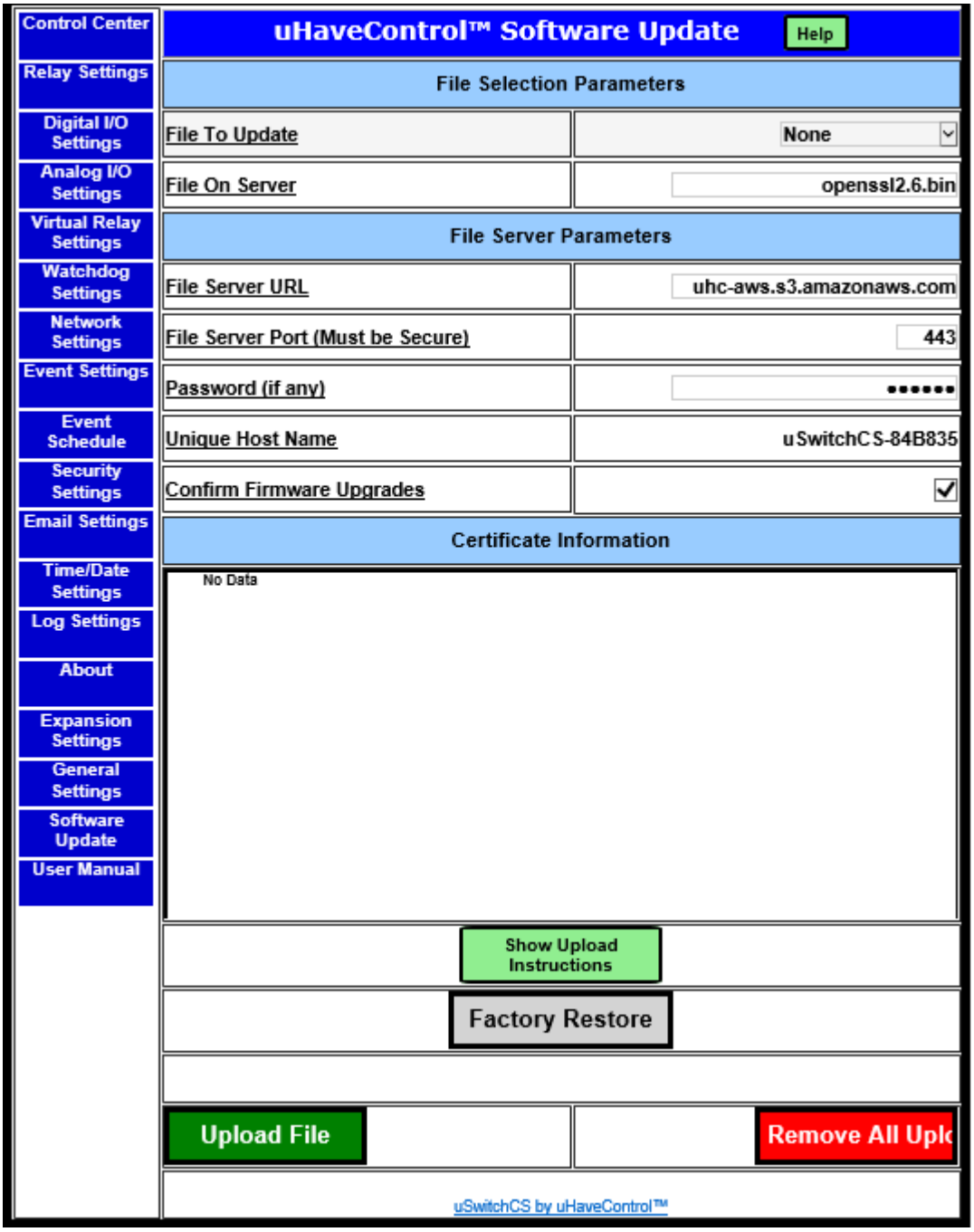
Enable OEM Icons (slow) (checkbox)

The uSwitch allows downloading of an OEM icon. If this field is checked the OEM icon will be sent to pages

that call for it. The reason to disable icons is they take up a large amount of network bandwidth on embedded systems (especially when the device is secure and running high level encryption). Therefore, it is recommended to use icons as sparsely as possible (default is not checked, and therefore icons are not being displayed)

Software Update

This page is used for all downloads or updates. There are several types of downloads supported. The supported downloads are **Host Firmware, Host Certificate, Host Key**, **Host Logo, SMTP Server Certificate and FTP Server Certificate** All SSL files must be in PEM format. SSL keys and certificates are preserved when a firmware update or factory restore is done. For details on creating Certificates and Keys using openssl refer to that section in the appendix.



File to Update (custom select box)
This pulldown list allows the user to select the type of download needed. The options are:

1. **Host Logo** – upload a small jpg or image file
2. **Host Firmware** – Upload new firmware to the uSwitch
3. **Host Certificate** – upload a custom Server Certificate
4. **Host Key** – upload a custom Server key file.

5. **SMTP Certificate** – Client Certificate for the SMTP Mail Server
6. **FTP Certificate** – Client Certificate for the FTP Site

File on Server (directory path and file name)
Is the file name of the file to upload from the remote server

File Server URL (URL text string)
The network Address (URL) for the file server

File Server Port (integer-port)
The port number assigned to the file server.

Password (text string)
If required password to access the file server

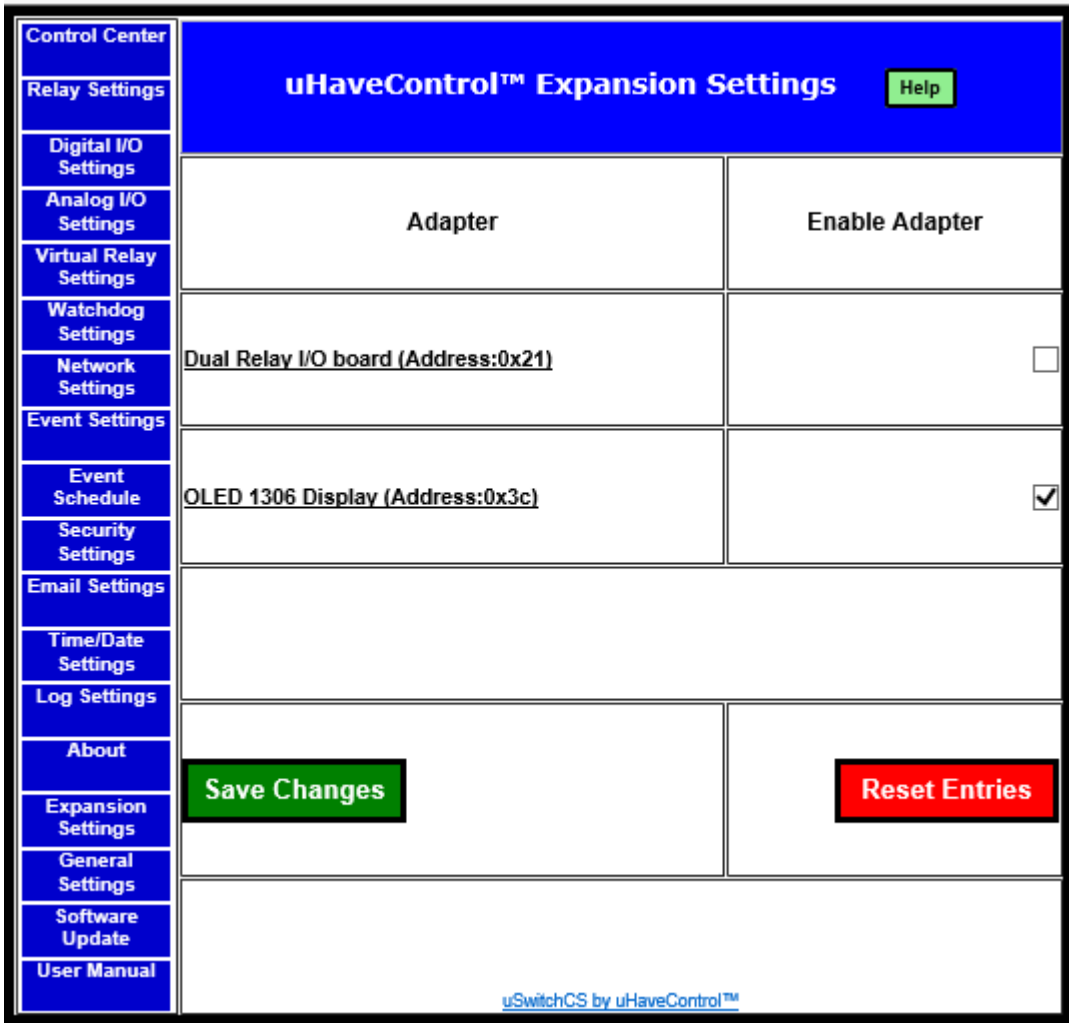
Confirm Firmware Upgrades (checkbox)
When this box is checked any firmware upgrades requires a confirmation from the user. If confirmation is not received within ten minutes of the upgrade the previous version of software will be automatically restored. This prevents a corrupt upload from locking up a unit. To confirm the upload the user must, within ten minutes, login to the uSwitch, go to the **Software Update** Page and click on a new checkbox that will be generated which says, "**Confirm Software Upload**". If this is not done, the unit will revert to the previous software image and automatically issue a system reset (which will restore the system and it should be accessible again on the network). It is recommended that this checkbox remain checked as a guaranteed system recovery mechanism.

Show Upload Instructions (button)
This button displays a step-wise set of instructions fully describing the upload procedure.

Factory Restore(text string)
This button is used to restore all uploads back to their original state when shipped from the factory.

Expansion Setting (checkbox)

The **Expansion Settings** page is automatically populated by any compatible option board that is discovered when Auto Discovery is enabled (Auto Discovery is enabled from the **General Menu**). This page has a checkbox next to each identified adapter to select whether it should be added to the uSwitchCS application and Control Center. When the box is checked the **Control Center** will be updated to reflect any features of the adapter that are enabled and made visible. Options to configure discovered devices will be available on the appropriate pages as described above.



User Manual

Selecting the user manual will redirect the user to an online manual either provided by uHaveControl or as pointed to by an OEM.

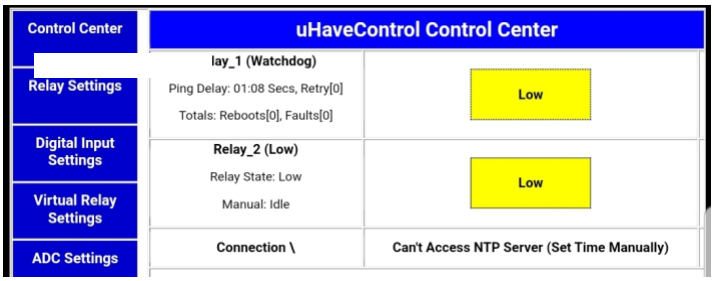
uSwitchCS Control Center Operating Modes

Control Center (Relay 1- Momentary Mode)

The image below shows the Control Center with relay one configured as a twenty (30) second momentary (or pulsed) relay (a relay is configured into momentary mode from the Relay Configuration page). In this case clicking the relay 1 button will force it to change state, countdown to zero (currently 5) and then changes back to its initial state. To change the relays starting state, temporarily disable momentary mode by setting the momentary time to zero (0) (from Relay Configuration page). This puts the relay into latching mode. Then manually change the state of the relay (on the Control Center page) to the desired initial state. Finally put the relay back into momentary mode by putting in a non-zero momentary time (from the Relay Configuration page). Note: Once a momentary countdown has started the push button relay controls are disabled until countdown completes (during countdown mode the colors of the relay flash between its current state and yellow).

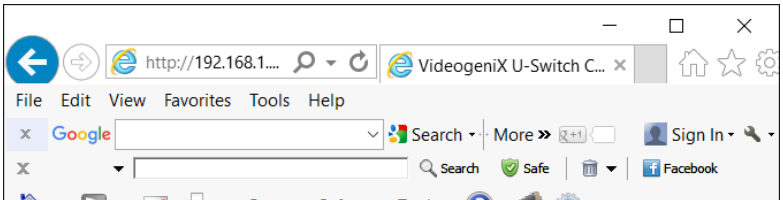
Control Center (Relay1 Watchdog Mode, Startup Delay phase)

The image below shows the Control Center with relay1 configured in Watchdog/"Ping Auto Reboot" mode (a relay is placed in watchdog mode from the Relay Configuration page)..A grayed out relay button indicates manual control is disabled when watchdog mode has been turned on. Whenever a relay is in watchdog mode it cannot be manually controlled by a push button (however there is a watchdog over-ride from the relay configuration screen). The image below shows Relay1 in Watchdog mode. On the screen below the watchdog feature has started the initial startup countdown specified by the startup delay entry before testing for connectivity, currently 1 min, 33 seconds remain before Watchdog mode becomes fully active. A minimum recommended startup countdown time of five minutes (300 seconds) is recommended which would allow slow connecting devices time to reconnect to the network before the uSwitchCS begins testing for connection



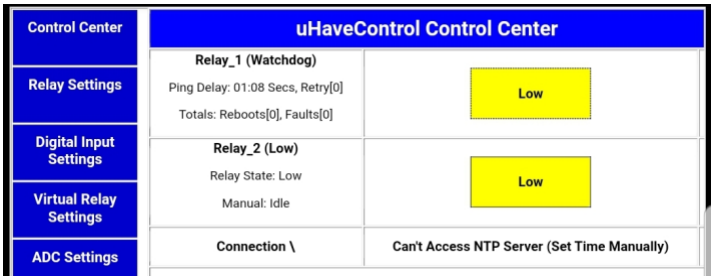
Control Center (Relay1 Watchdog Mode, Ping Delay phase)

The image below shows the Control Center with Relay 1 configured in Watchdog Mode, during the, "Ping Delay" phase. The Ping Delay Phase is the time between successive pings to the same URL. A recommended time of 90 seconds for the "ping delay" setting is suggested. Note: During Watchdog mode manual push-button relay control is disabled so the relay control button is grayed out.



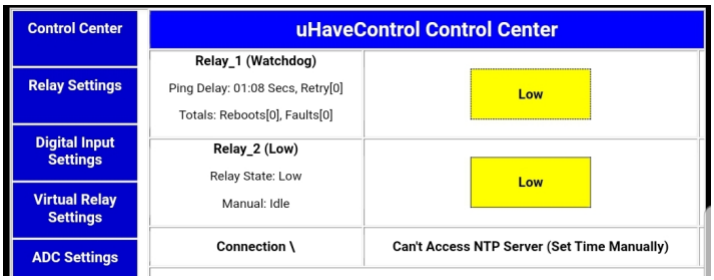
Control Center (Relay1 Watchdog Mode, pinging phase)

The image below shows the Control Center with Relay1 configured in Watchdog Mode. In this instance the uSwitch is attempting to ping the URL “yahoo.com” assigned for Relay 1 to determine if Relay 1 needs to be cycled. Also, note this is the 1st attempt to communicate with the URL.



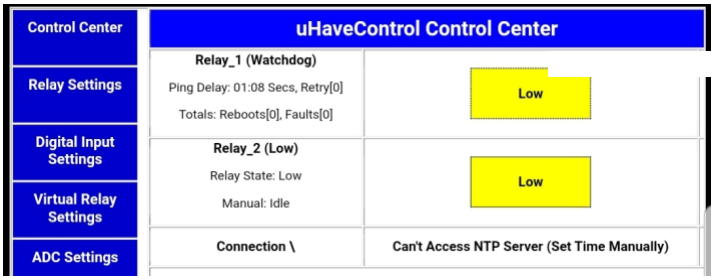
Control Center (Relay1 Watchdog Mode, auto reboot countdown phase)

The image below shows the Control Center with Relay1 configured in Watchdog Mode. The uSwitchCS automatically is cycling the relay after failing to get responses from the URLs specified by the user on the Watchdog Configuration page for Relay1. The screenshot below shows the reboot countdown time remaining and will turn power back on to the device when the countdown reaches 0. The amount of time for the relay to be cycled is as specified in the “Relay Cycle Time” field on the Watchdog Configuration page. After a reboot of the device the Watchdog will again initiate a startup delay countdown and hold off communication tests until the device Startup period completes.



Control Center (Relay1 Watchdog Mode, Fault Mode)

The image below shows the Control Center with Relay1 configured in Watchdog Mode. The uSwitchCS goes into Watchdog “Fault Mode” after the number of consecutive reboot attempts exceeds the user specified “Max Reboot Attempts' '. The screenshot below shows the uSwitchCS has attempted three consecutive reboots without success. The amount of time left in Fault Mode is 1 hour 46 Mins, 11 Secs. After the Fault Mode counts down to 0, the Watchdog will again initiate normal operation. The purpose of fault mode is after so many consecutive failures the uSwitchCS discontinues rebooting the device for a specified amount of time before restarting reboot attempts. This prevents continuously rebooting a device that may be working fine and the failure is elsewhere on the network. If at any time during “Fault Mode” the uSwitchCS determines the device is again operating normally the uSwitchCS will exit “Fault Mode” and transition back into normal Watchdog mode.

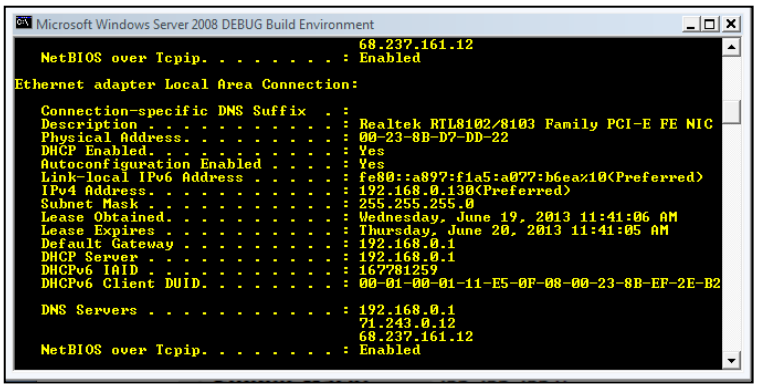


Control Center (GPIO1 with counter enabled)

The image below shows the Control Center with relay1 configured in Watchdog Mode and GPIO1 configured with the “Enable Counting” field checked (if counting is not enabled the running count field and counter reset are not present on this screen). The value 119 in the “Running Count” field means, since the counter started counting or was last reset by the “Clear Counter” button (directly below), 119 full input state transitions have occurred on GPIO1. Clicking the Reset button clears the counter

MAC Address

This is the physical address permanently assigned to a given uSwitchCS. It cannot be modified however it can be used to verify which LAN IP address is connected to which uSwitchCS by executing either an arp -a command (from a windows computer in a DOS or command window), or when running the uSwitchCS discovery utility.



To access a uSwitchCS remotely from an outside network, WAN or the internet you will need to set up port forwarding (also called NAT, Port Forwarding or Virtual Port addressing) on your router or gateway. You can set this up from your router's configuration page as follows:

1. Assign a specific and unique port to each uSwitchCS from the Network Configuration page of the uSwitchCS
2. Find the Port Forwarding/Virtual Server/NAT configuration in your router and specify the unique port number assigned to each uSwitchCS (from the network configuration page) along with each uSwitchCS's private IP address assigned in the step above.
3. If you are on a static IP line you may use a 3rd Party free DDNS provider to register a Domain Name for your Router (URL). Map your router to the free DDNS provider selected.
4. If the address assigned to your router by your ISP is dynamic (changes regularly) then you will need to set up the dynamic DNS page of your router to map the URL to a Dynamic IP Name Server (consult your router's user configuration manual).
5. Browse to your USwitchCS using the following protocol from a browser; http://myNetworksURL:myuSwitchPortNumber (i.e. http://myHomeRouter:8000))

Generating PEM files and running OpenSSL to serve files to Firmware/File/Icon upload Page

/* Root cert for howsmyssl.com, taken from server_root_cert.pem
The PEM file was extracted from the output of this command:
openssl s_client -showcerts -connect www.howsmyssl.com:443 </dev/null

The CA root cert is the last cert given in the chain of certs.

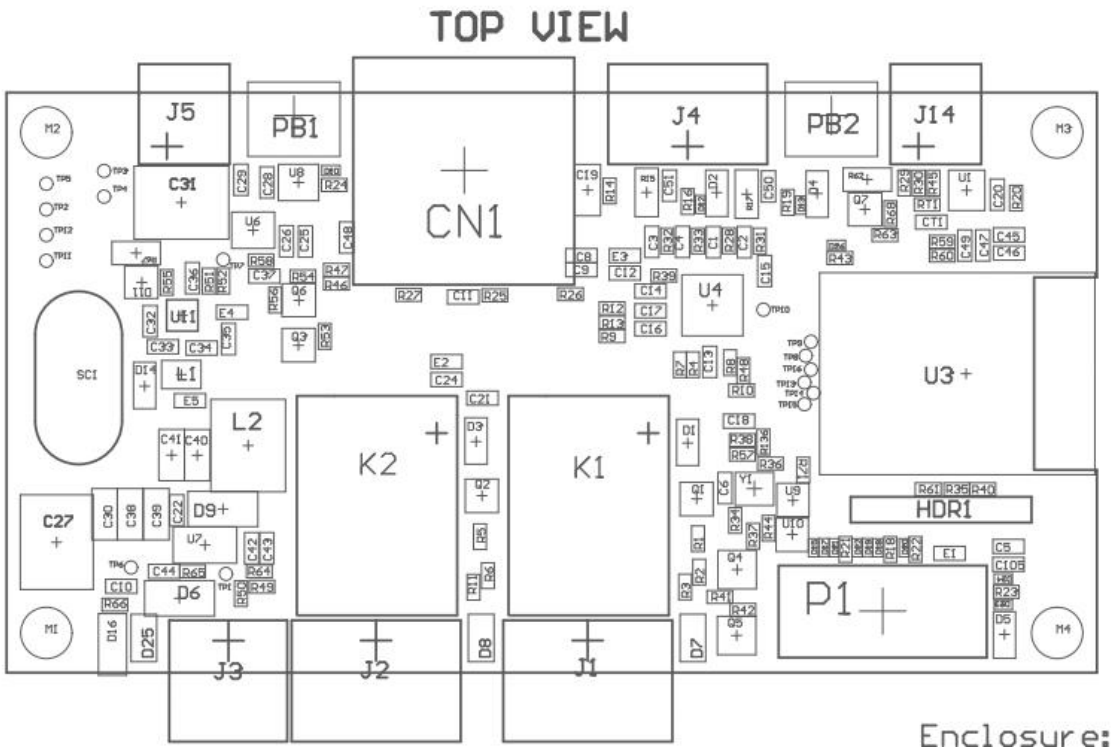
To embed it in the app binary, the PEM file is named
in the component.mk COMPONENT_EMBED_TXTFILES variable.
*/

buildWebServerForm(SSL *ssl,int iCode)

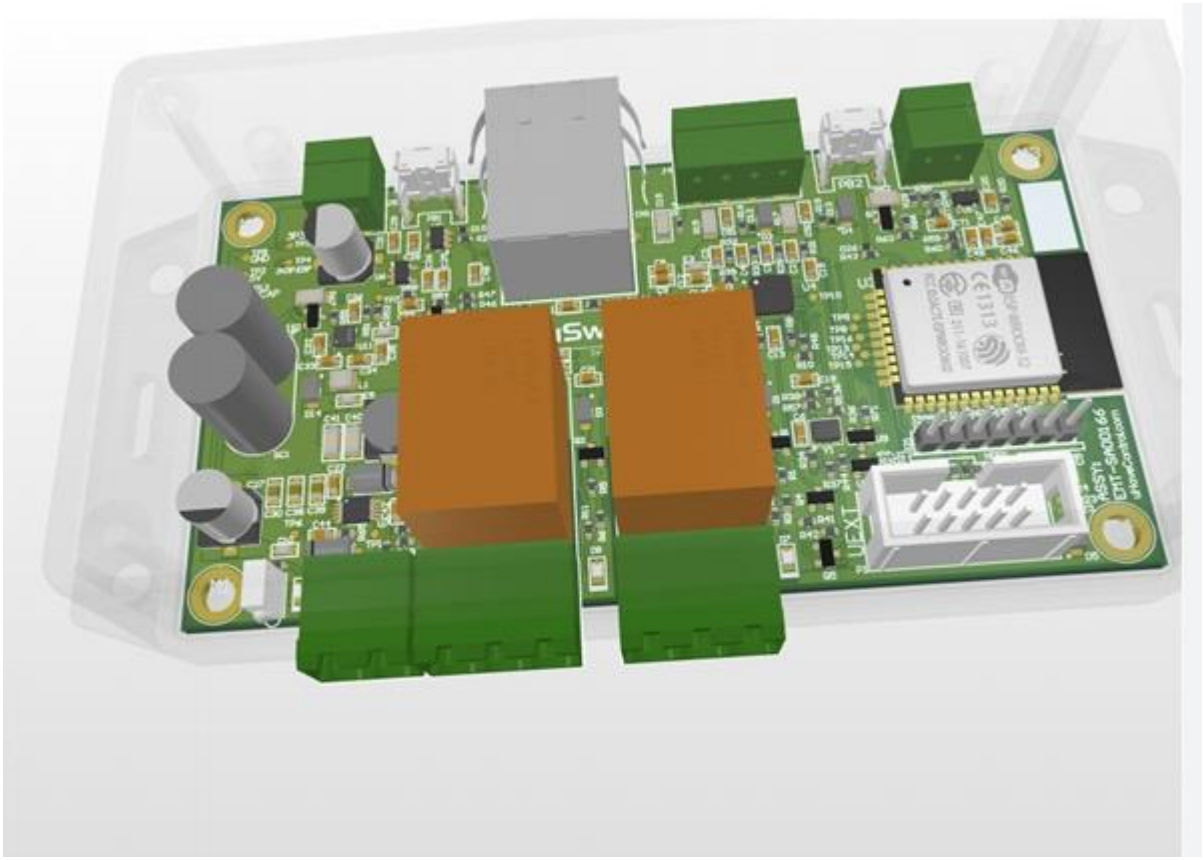
start a web server. put files into the directory.
// You must have files on a remote web server...
// openssl s_server -WWW -key prvtkey.pem -cert cacert.pem -port 443 -status_verbose -debug

"openssl req -x509 -newkey rsa:2048 -keyout ca_key.pem -out ca_cert.pem -days 365 -nodes"

uSwitchCS Board Schematic

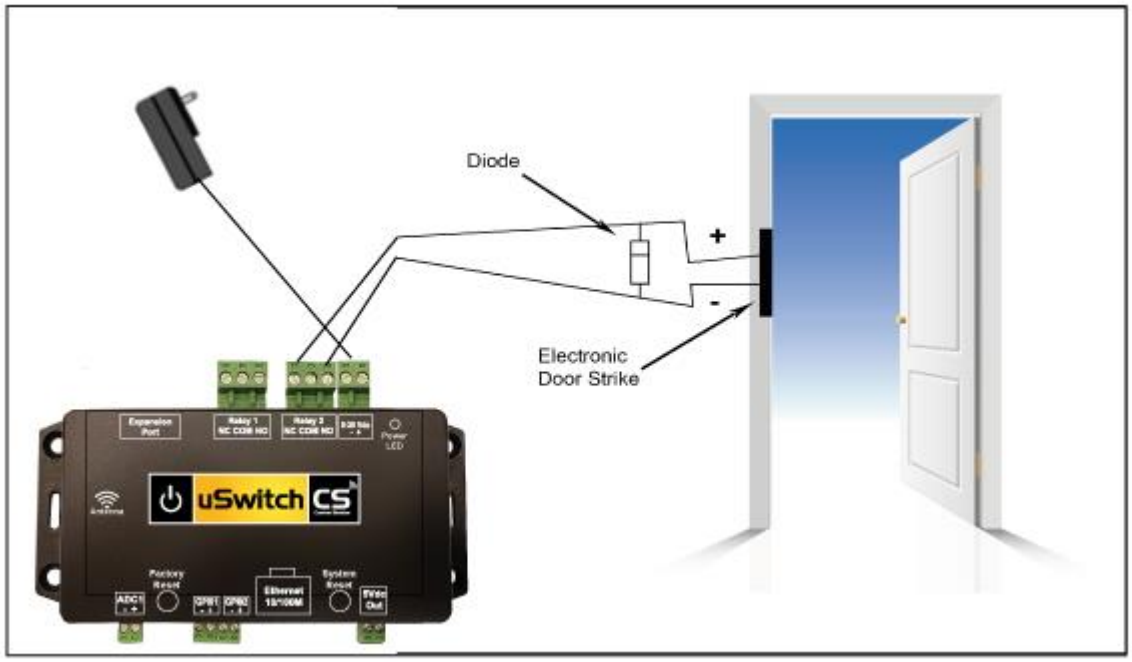


Enclosure:



Configurations

Access Control to Electronic Door Strike



The following is a configuration where uSwitch is used to provide access control. When connecting to door strikes a reverse-bias diode is recommended. In this example, a reverse-bias diode is connected in parallel with the lock to protect the relay contacts from the inductive kickback that can occur when the lock is switched. A variety of diodes is available and can be ordered either online or directly from us. (For AC door access control no diode is necessary, for DC powered devices a 60V p/p diode is recommended).

Driving multiple uSwitch Relays from a single uSwitch GPIO or Virtual Button

In addition to a physical push button driving the local relay on the same uSwitch either that push button or the button generated on the Control Center page, or a virtual button can be created to command a relay on a remote uSwitch. Once set up, pushing that button will drive all relays in its configuration as specified by the virtual or physical button. Each uSwitch can be programmed to drive up to eight separate relays on the network. Additionally, if a relay output is hardwired into its own, or another uSwitch's GPIO it can in turn be used to drive an additional 8 relays. By daisy chaining uSwitches in this manner a single GPIO can drive an unlimited number of relays on other uSwitches.

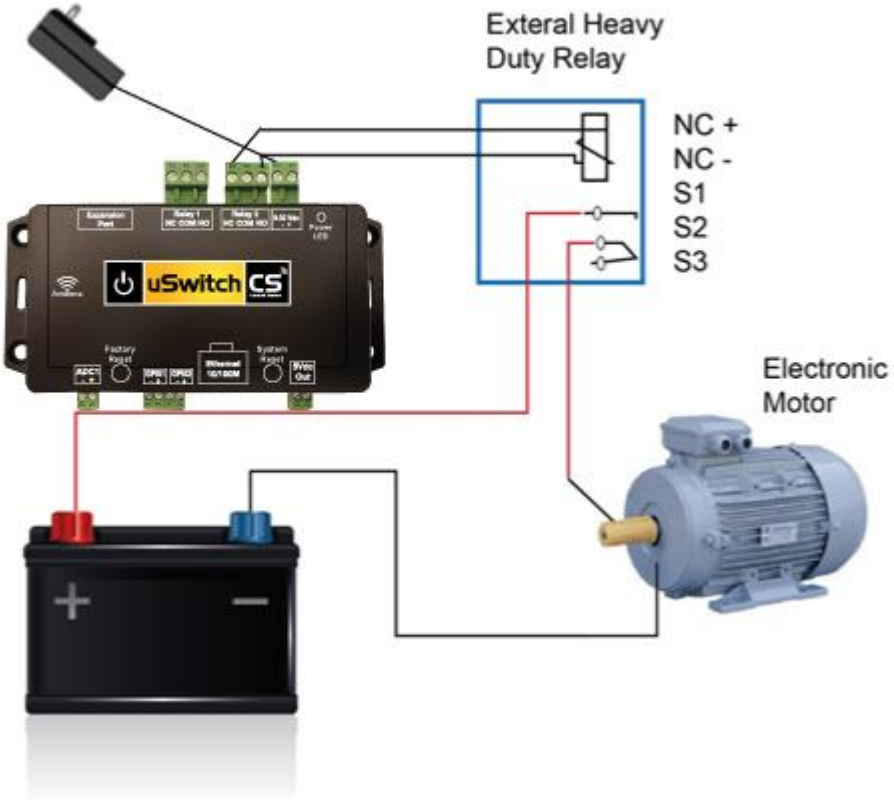
Auto Reboot Configuration

Connecting to High Power devices (such as Motors, etc.)

For loads greater than those rated for the uSwitchCS's internal relays, or when connected to devices with high inrush or peak current surge an external relay should be used with the uSwitchCS triggering the relay. The illustration below shows how a high current motor or other high load device can be controlled using by wiring to an external relay. A variety of external relays is available and can be ordered either online or directly from uHave Control.

When relays switch inductive loads such as motors, transformers, relays, etc., electricity will arc across the internal relay contacts each time the contacts open. Over time this causes wear on the relay contacts which can shorten their lifespan. When switching a high inductive load, it is recommended that simple relay contact protection devices be used. To be economically feasible uSwitchCS cannot provide relay protection for all possible loads.

For applications with excessive loads, the following diagram shows a relay contact protection circuit for DC and for AC applications. For component values required to provide sufficient contact protection for a specific application, consult the application reference. Note: for DC circuits a diode is used and for AC circuits an RC circuit across the load can be used.



The A-Plug Universal 110VAC uSwitchCS Adapter

The A-Plug is designed to easily snap into uSwitchCS converting its two relay outputs into two 110VAC outlets. There is no need for wiring or splicing with A-Plug. The A-Plug powers the uSwitchCS and receives its power directly from any wall outlet to which it is plugged in.

Troubleshooting:

Before returning a device test the power input transformer to uSwitchCS. This can easily be done by swapping out with a known working power transformer.

Appendix A: Factory Default Settings

In the event that the IP address or passwords are forgotten, and you cannot log in to uSwitchCS, you can reset uSwitchCS to its factory default settings. With power on press the reset button for a minimum of ten (10) seconds. After ten (10) seconds, release the reset button. Wait thirty (30) seconds then fully cycle power on uSwitchCS. At this point all settings should be restored to factory default settings (shown below). Holding the Reset Button down for <6 Seconds and more than 2 Seconds will cause the Network Settings to go back to factory but leave all other Settings as configured.

Network Settings

Networking Mode:	APStation

WiFi Access Point Settings

SSID:	uStationAP
Security:	Open
PassPhrase:	uSwitchCS
IP:	92.168.4.1
Primary DNS:	92.168.4.1
Enable SSID Broadcast:	Checked
Enable DHCP Server:	Checked
Enable Repeater (NAT):	UnChecked

WiFi Station Adapter Settings

SSID:	mySSID
Security:	WPA2-PSK
PassPhrase:	password
DHCP (auto acquire ip):	UnChecked
IP:	10.0.0.190
Radio Channel:	Auto
Region:	United States
WiFi Tx Power:	14.0 dBm

Network Settings (TCP/UDP)

Gateway:	10.0.0.1
SubNet Mask:	255.255.255.0
HTTPS Port:	443
HTTP Port:	80
TCP Port:	9673
Host Name:	uSwitchCS
Primary DNS:	10.0.0.1
Secondary DNS:	75.75.75.75
FallBack DNS:	8.8.4.4
MTU (Max 1500 Bytes):	1500

Relay Settings

Relay Name:	Rela[X]
Relay Address:	0
Operating Mode:	On/Off
Latching:	UnChecked
Off State Text:	Off
On State Text:	On
Off State Color:	Yellow
On State Color:	Green
Power Up State:	Off
Momentary Time:	0
Invert Output:	UnChecked
Enable Sub Control:	UnChecked
Add to Control Page:	UnChecked
Notification Event:	None

Digital I/O Settings

Input Name:	GPIO[X]
Operating Mode:	On/Off
Input Low Text:	Off
Input High Text:	On
Input Low Color:	Yellow
Input High Color:	Red
Triggering Event:	Low
Internal Resistor:	Pull-Up
Debounce Time (ms):	500
Event Time (sec):	1 Minute
Measurement Units:	Count
Trigger:	300.00
Scale:	1.000
Offset:	0.000
Decimal Places:	2
Hysteresis Zone:	12.0
Hysteresis Color:	Green
Cutoff/Rollover:	40.00
Add to Control Page:	UnChecked
Notification Event:	UnChecked

Analog I/O Settings

Input Name:	ADC[X]
Power On A/D:	UnChecked:
Measurement Units:	Vdc
Below Range Color:	Yellow
Target Range Color:	Green
Above Range Color:	Red
Sample Count:	32
Voltage Range:	0-30.0 Vdc
Scale:	0.0100
Offset:	0.0000
Decimal Places:	3
Triggering Event:	Low
Target:	5.000
Range:	2.000
Settling Time (secs):	0
Add to Control Page:	UnChecked
Notifications:	UnChecked

Watchdog Settings

URLs to Ping

First:	www.google.com
Second:	8.8.8.8
Third:	www.yahoo.com
Notifications:	UnChecked
All URLs Must Respond:	Checked

Watchdog Counters

Max Ping Failures:	3
Max Reboots:	3

Watchdog Timers

Startup Delay (minutes):	5 Minutes 0 Seconds
Time Between Pings:	1 Minute 30 Seconds
Reboot Hold Time:	5 Seconds
Fault Mode Time:	4 Hours

Security Settings

User Password:	user
Admin Password:	admin

Login Options

Require Login Passwords:	UnChecked
Hide Passwords:	UnChecked
Login Notifications:	UnChecked

Web Server/Control Security

Allow HTTP Connections:	Checked
Auto Logout Time:	30 Minutes

Device Protection

Software WatchDog:	Checked
Network WatchDog:	UnChecked

Appendix B: Specifications

AC

Relay Capacity: 7.5 A Max at 105-125 VAC, 5 A Max at 210-240 VAC

Power Requirements:

Model:	uSwitchCS
Voltage:	9Vdc -30 Vdc Model uSwitchCS

Standby Current :

Relays Off:	58mA
One Relay Energized:	92mA
Both Relays Energized	126mA

Relay Ratings:

Rated Carrying Current:	5A @ 125VAC, 5A @ 250VAC, 10A @ 24VDC
Max Current:	10A
Max Voltage:	240VAC, 110 VDC

Relay Performance:

Relay Control Options:	on/off, Pulsed, Latched, Momentary Contact Resistance <50m ohms (initial value)
Contact Material:	Ag alloy
Max Switching Voltage:	240VAC, 110VDC Max Switching Current 20A
Life (rated-load)	
Mechanical:	10,000,000 ops
Electrical:	100,000 ops.

WiFi:

Adapter:	Station(Infrastructure), Access Point, Station-AccessPoint, Repeater, NAT
Security:	Open, WPA-PSK, WPA2-PSK, WPA-WPA2-PSK, WPA2-Enterprise
Range:	250 Feet Line of Sight
WiFi Tx Power:	User Selectable
Region:	User Selectable (supports all standard regions)

Networking:

Network:	10/100 Base-T, IPv4
Network Setup:	static IP address assignment, DHCP, HTTP, HTTPS port selectable
Network Connector:	8-pin RJ-45 socket

Connectors:

Power/Input:	2-position, removable terminal strip, 3.81mm terminal spacing
Relays:	3-position (Normally Closed, Normally Open, Common) removable terminal, 3.81mm terminal
Ethernet:	8-pin RJ-45 socket
GPIOs:	4-position, removable terminal strip, 3.0mm terminal spacing
ADC:	2-position, removable terminal strip, 3.0mm terminal spacing
5Vdc Output:	2-position, removable terminal strip, 3.0 mm terminal spacing
Expansion Port:	10-pin Connector

LED Indicators: (on Ethernet jack)

-Network linked
-Network activity

Physical:

Temperature 0-50 degrees C (-30C, +80C)
Size: .4.2 in (106 mm) long, 2.15 in (55mm) wide, 1.0 in (25 mm) deep
Weight: 4.3 oz. (122 grams)

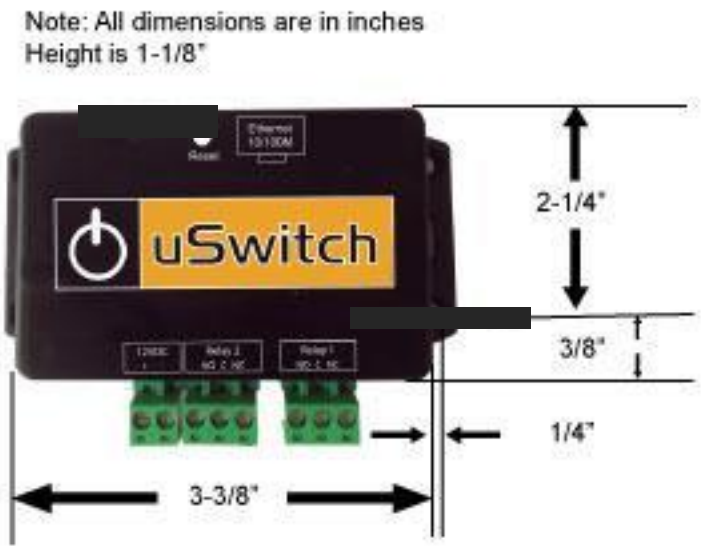
Password Settings:

Password protection on setup page: Yes Password protection on configuration pages: Yes

Appendix C: Updating Firmware

Device Dimensions:

uSwitchCS and aPlug Dimensions



Product Safety: FCC Statement

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

- This device may not cause harmful interference.
- 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. This equipment generates uses and can radiate radio frequency energy and, if not installed and used in accordance with the instructions, may cause 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 separation between the equipment and receiver.
- Connect the equipment into an outlet on a circuit different from that to which the receiver is connected.
- Consult the dealer or an experienced radio/TV technician for help.

Warranty

uHave Control warrants this product, if used in accordance with all manufacturers' specification, to be free from original defects in material and workmanship for a period of One Year from the date of initial purchase. If the product should prove defective within that period, Seller will repair or replace the product at its sole discretion.

This warranty is extended to the original purchaser of the equipment only. Call uHave Control Technical service to receive a Return Materials Authorization (RMA) Number prior to sending any equipment back for repair. Include all cables, power supplies and proof of purchase with shipment. For warranty service or repair, return to uHave Control at 1425 Beacon St, Brookline, MA. Purchaser shall prepay all charges for shipping to uHave Control. uHave Control. 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.

THIS WARRANTY DOES NOT APPLY TO NORMAL WEAR OR TO DAMAGE RESULTING FROM ACCIDENT, IMPROPER

USE, MISUSE, UNAUTHORIZED REPAIR, TAMPERING, MODIFICATION, IMPROPER CONNECTION, OPERATION OUTSIDE THE ENVIRONMENTAL OR ELECTRICAL SPECIFICATIONS, ABUSE OR NEGLECT. SELLER MAKES NO EXPRESS WARRANTIES OTHER THAN THE WARRANTY EXPRESSLY SET FORTH HEREIN. EXCEPT TO THE EXTENT PROHIBITED BY LAW, ALL IMPLIED WARRANTIES, INCLUDING ALL WARRANTIES OF MERCHANTABILITY OR FITNESS FOR ANY PURPOSE ARE LIMITED TO THE WARRANTY PERIOD SET FORTH ABOVE; AND THIS WARRANTY EXPRESSLY EXCLUDES ALL INCIDENTAL AND CONSEQUENTIAL DAMAGES.

Limitation

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 UHAVE CONTROL 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. uHave Control specifically disclaims the implied warranties or merchantability and fitness for particular purpose. Some jurisdictions may not allow the exclusion of limitation of liability for consequential or incidental damage.

Notice:

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

Trademark and Copyright Information

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