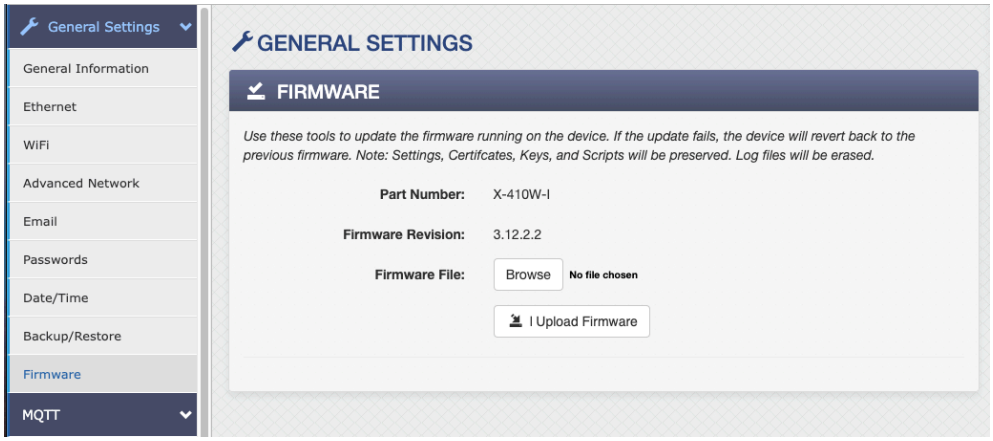
ControlByWeb 400 Series Firmware v3.12 Patch Notes

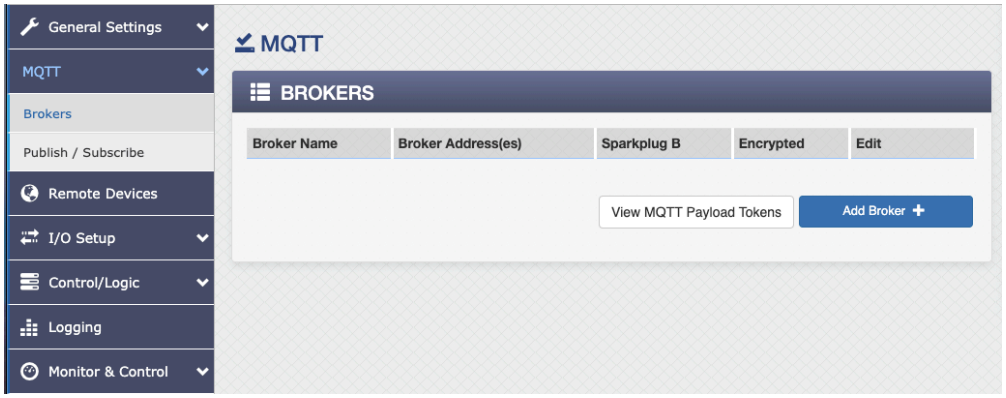
The ControlByWeb 400 Series devices have recently been updated to v3.12. This update includes many requested features alongside general fixes.

Overall Improvements

- **400 Series Device Remote Firmware Updates** - Device firmware can be updated from the web page in the General Firmware Tab. This process loads a *.fmr2* file, automatically saving your settings and allowing you to reapply them. Devices with hardware revision "J" that are running 3.10 or earlier will still need to update using the previous method to update to 3.12. Once the device is running 3.12 or higher, all future updates can be done through the web interface. This also applies to cell devices, meaning remote devices can be updated in the field. *Note that the remote update will typically take about 5 to 9 minutes to complete over a cellular connection.*



- **MQTT/Sparkplug B Support** - 400 Series devices running firmware version v3.12 or higher can use MQTT/Sparkplug B 3.1.1 protocol. A device can subscribe to data and publish changes to an MQTT broker, allowing integration with many remote SCADA HMI, Dashboards, and interconnectivity with other IoT devices.

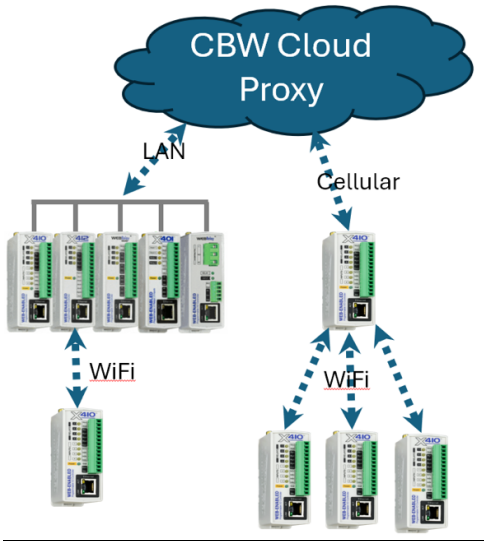


- **mDNS Support** - mDNS is now supported and is the recommended process for initial device setup. Each device is addressed using the last six MAC address characters followed by ".local", such as *035A3F.local*. Devices can also be configured for DHCP, allowing them to get an address on the network and immediately be addressed using the mDNS name instead of a fixed IP address.
- **Wi-Fi Access Point (Wi-FiAP)** - Wi-Fi Access Point mode is now supported and enabled by default on Wi-Fi capable devices. The SSID defaults to the model and MAC address (e.g. X-412-000CC8035A36). This allows other devices to connect to the ControlByWeb device. This can be used to set up the device. Phones/tablets/browsers can connect to display control and setup pages.
- **Email Notifications and Logging Tasks** - Tasks now have a checkbox for "Email" and "Log". When checked, an email or log entry will be generated for the selected task. Before, sending an email or generating a log entry required an action. This is no longer the case, and logs and emails are handled separate from actions, and happen before the actions. This means the values reported would be the ones that initially triggered the set task.
- **Security Improvements** - Firmware 3.12 greatly improves the security of your devices. These settings can be found in the Advanced Network configuration tab. The settings are:
    - **Strict-Transport-Security Header**. Enabling this header will force browsers to convert HTTP requests to HTTPS. This prevents users from establishing a non-encrypted connection to the device.
    - **X-Frame-Options Header.** Enabling this header will prevent iframes from rendering pages from this device. If you display your CBW devices on an internal company website using iframes, you may need to disable this.
    - **Content-Security-Policy Header.** Enabling this header will make the browser only allow linked files in the web pages to originate from this device.
    - **CORS Origin**. Cross-Origin Resource Sharing permitted origin. Requests from this origin (domain, protocol, and port) will be permitted access to status and log pages. Requests outside this origin will be denied. Leave blank to disable. Examples: https://your-domain.com, http://localhost, etc.
    - **MTU.** Maximum Transmission Unit. (The default size is recommended for most installations.). You may need to change this for special network installations.
- **Vin Monitoring** - The input voltage monitoring (Vin) has been smoothed considerably to give consistent readings. The Vin can also be calibrated as other analog values by entering either a multiplier or two voltage readings. The device will determine the slope and offset. Please get in touch with technical support for more information.
- **Analog Input Minimum Delta for Logging** - The minimum delta change allowed for devices that can accept analog inputs is 0.1. This value, entered on the Logging page, triggers an entry into the data log. The log is not designed for continuous data recording of inputs, only when there is a change in value.

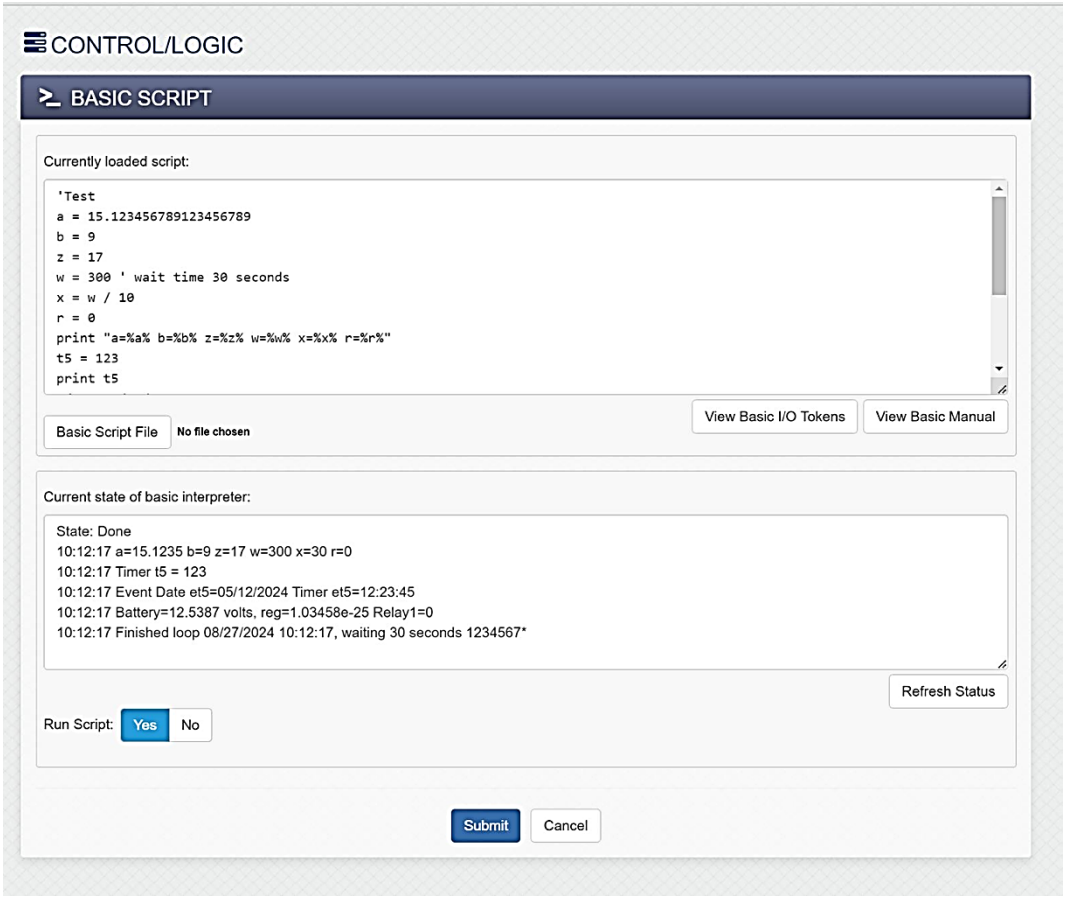
- **Battery-Backed Registers and I/O** - The number of battery-backed registers has increased from 2 to 6. The number of digital input counters has increased from 1 to 4, including the first four inputs on expansion modules. For registers, the first six registers defined are backed up by the battery and default to "Last State" for the initial value. It is recommended that if you plan to use these persistent registers, you define them before other registers are defined. For digital inputs, the first four digital input counters are persistent. (*Note that there is no actual battery but a "super-capacitor" used to provide power to the memory, and it only lasts 24 to 48 hours.)*
- **Increased Number of Registers** - Increased the number of device registers to 32.

Remote Devices

- Device discovery works on all interfaces except cellular (Ethernet, Wi-Fi, Wi-FiAP) and displays the interface where the device was found. The correct IP address for the selected interface is sent.
- Search time increased to 27 seconds with Wi-Fi from 9 seconds with Ethernet.
- MAC addresses can be entered with commas or dashes.
- The remote device's IP must now be manually set.
- Up to 10 devices can communicate using Wi-Fi to a single 400 Series device configured to the host's internal Wi-Fi Access Point. This does not require a separate Wi-Fi Access Point. The central AP device is not a router, so the client devices cannot get time or communicate directly to the Cloud, but all their I/O and Registers can be mapped to the central device, which can report the values to the Cloud.
- Cellular remote devices communicate with each other using our cloud proxy. This allows near-instantaneous peer-to-peer communication and the implementation of wide-area mesh networks. Any ControlByWeb device running firmware version 3.12.2 or later can communicate with any other device using Ethernet, Wi-Fi, or cellular through our cloud proxy service.



BASIC

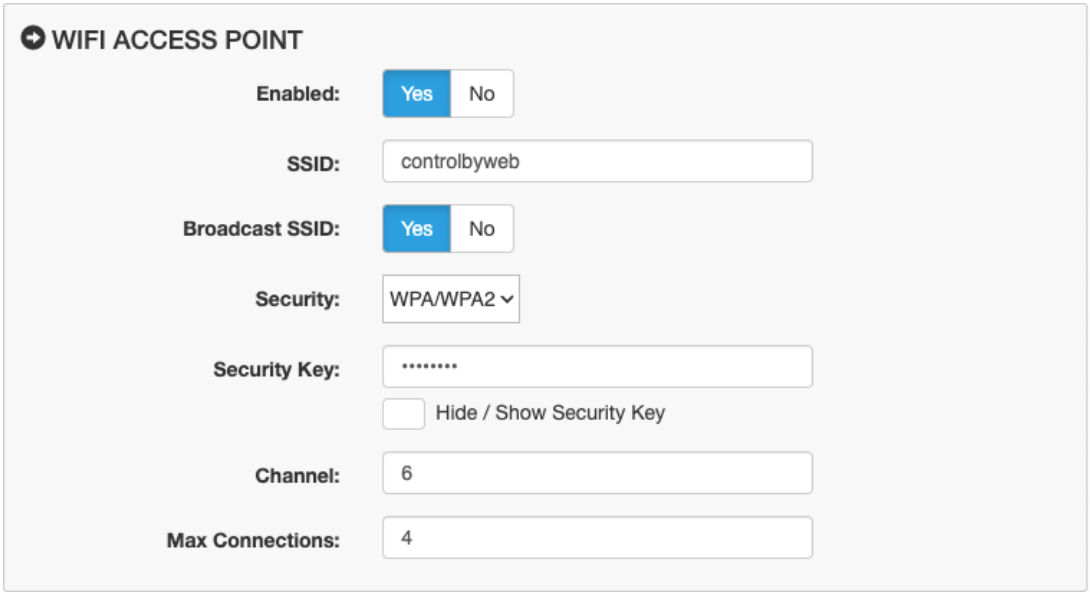


- Increased variables from 10 to 26 variables (**a-z**).
- Doubled the execution speed. Each line runs 2.5mS each.
- Variables **ia** to **iz** returns an integer value of the variable (rounded).
- Upgraded to an 8K script size.
- Subroutine calls are no longer case-sensitive.
- Added PRINT statement.
  - Can print from any variable or I/O **`PRINT io.relay1`**
  - Can print string with %variable% substitution **`PRINT "Relay 1 = %io.relay1%"`**
  - EMAIL statement uses the same format as PRINT for the subject line to allow custom subject lines with variable data.
  - The last six lines printed using the BASIC PRINT statement appear in the BASIC Script Results window with a time stamp before the printed text. This allows monitoring of a program's execution over time.

- The SELECT statement allows a switch/computed **Gosub** call based on a variable. It will call the appropriate subroutine based on the variable's value and return after the call. A value of 1 will call the first subroutine, 2 the second, etc. (e.g **SELECT io.register1 Sub1 DoSub2, Sub3 Sub4**). This allows setting a Register to on-demand execute code based on Conditional Tasks. A value of 0 will drop through the call, so a script can loop, waiting for a non-zero value to call a subroutine. **SELECTC** is a variation that will reset the variable to 0 on the call.
- **LET** is now optional. `io.relay1 = 1` can be entered to assign a value.
- **ENDIF** can be used instead of **END IF**, and ENDSUB or **RETURN** can be used instead of **END SUB**.
- If the BASIC script encounters a runtime error and stops running, along with displaying the status on the BASIC Script web page, if an email is set up, it will generate an email with "BASIC ERROR >" in the subject line. This allows notification that the BASIC script is no longer executing on the device.
- The variable storage has changed from float to double for higher precision.
- Fixed modulus % operator to work for floating point values.
- Power function allows raising a number to an exponent using the ^ operator.
- Hexadecimal values can be specified with 0x in front of the number (e.g. 0x12AB).
- Added AND and OR bit operations. & | are now supported.
- Added **timenow** that returns the number of seconds since Jan 1, 2020 00:00 UTC to allow time calculations. Adding 1577836800 to this number will give the standard Unix Epoch time value.
- Added 10 **ed_** and **et_** long integer variables for date and time calculations.
  - For date calculations, use the ed_ ed0 = 01/02/2023.
  - For time calculations, use the et_ variables. et5 = 18:21:43 to generate a value of the number of seconds in the day or days since January 1, 1970.
- The BASIC script syntax is checked before executing the application. Before, syntax errors were discovered during execution. Now, it is identified before the application is run. The display will give better error messages, identifying the problem and the line number on which it occurred and displaying the line. If you use Notepad++ and save the files as .bas files, Notepad++'s syntax editor will help with BASIC keywords.
- setcfg?eraseBasic=Y erases the Basic app.

Wi-Fi

- **Wi-Fi Enterprise** – Connecting to Wi-Fi Enterprise is now supported. You can connect using Enterprise WPA2, WPA3 or WPA3 192 bit. We are looking for feedback so we can further improve it. Please send any feedback to support@controlbyweb.com.
- **Wi-Fi Access Point (Wi-FiAP)** - Wi-Fi Access Point mode is now supported and enabled by default on Wi-Fi-capable devices. The SSID defaults to the model and MAC address (e.g. X-412-000CC8035A36). This allows other devices to connect to the ControlByWeb device. This can be used to set up the device. Phones/tablets/browsers can connect to display Control and Setup pages.



- Up to 10 ControlByWeb devices can connect to a single CBW Wi-FiAP for device-to-device connectivity.
- On the main status page, Network Interface In use: shows the interface the user is connected to the device.
- As a Wi-Fi station, the device will retry connecting to the AP four times and then retry every 30, 60, 90, and 120 seconds. to reconnect.

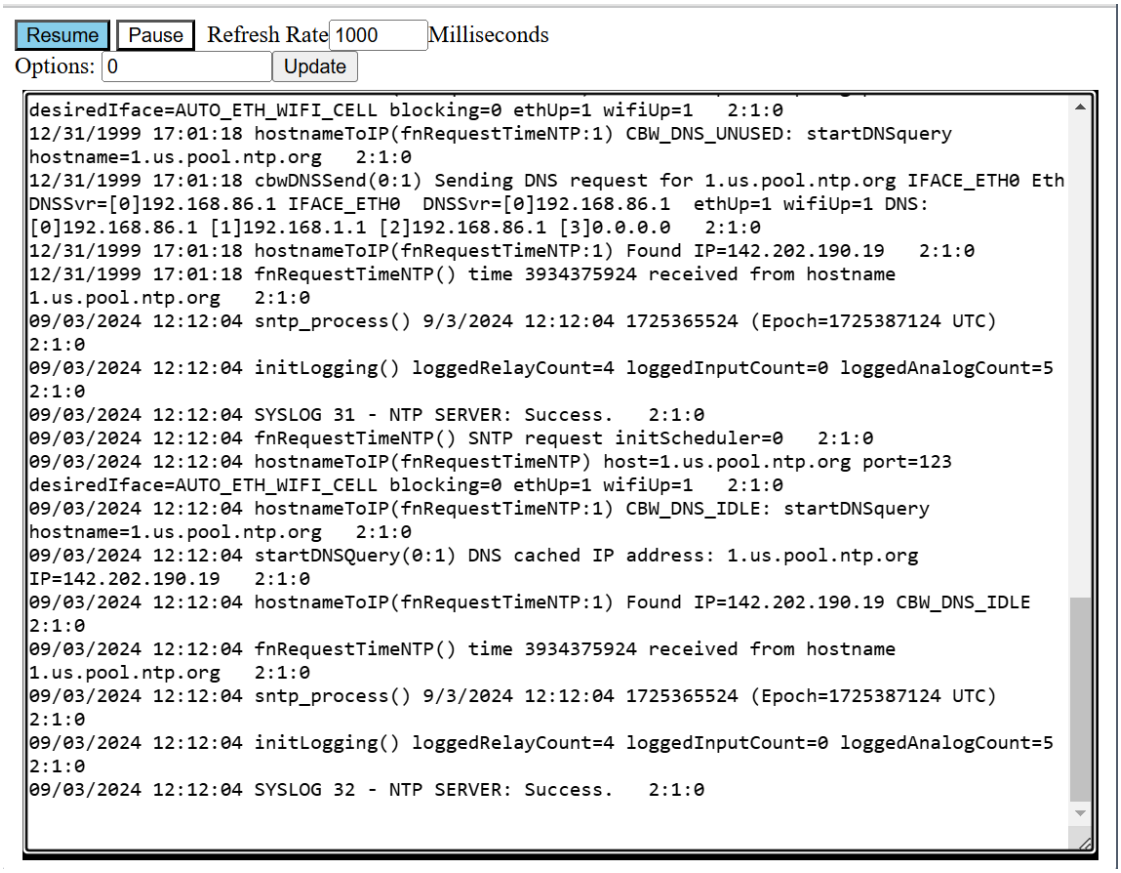
Cellular

- The cellular carrier the device is currently connected to is now shown in Cellular Status.
- Cell mode selection gives the status of the Backup mode and label text changes with Wi-Fi-capable devices.
- Turning the Cell off is immediate, and if the Cellular is off, the modem won't initiate a cell connection when rebooted.
- Cellular operation and cell carrier DNS operations reliability is greatly improved.
- Data is sent over the correct interface (Ethernet, Wi-Fi Station, Wi-Fi Access Point, or Cellular) based on the device's IP address. Prior to this, device traffic was often routed over the Ethernet connection.

Diagnostics & Support

- Device debugging and operational output are now visible. This should help customers and ControlByWeb support diagnose any device issues. Two web pages can be used to get diagnostics information. These pages follow the device URL. (ex **https://192.168.1.2/debug.html)**
  - **/debug.html** provides a real-time updating debug output from the device. By default, the last 400 lines of debug output are displayed. The update rate can be adjusted, and the device's output can be paused. In particular circumstances,

ControlByWeb support may ask the user to enter an Option setting value to provide additional debug output.



- **/debug.txt** displays a static display of the current debug file output. This may be easier for users to view since it is not changing and can be easily saved as a .txt file to send to ControlByWeb support.
- **/diagnostics.json** is an existing diagnostics screen that now displays the device's uptime (how long it has been operating without rebooting). This displays days, hours, minutes, and seconds.

```
{
        "modelNumber":"X-400-I",
        "firmwareRevision":"3.12.2.4",
        "serialNumber":"00:0C:C8:03:5A:3E",
        "vin":"26.0 V",
        "minRecRefresh":"3",
        "expIRQ":"0",
        "foundExpDevs":"0",
        "utcTime":"1725462101",
        "timezoneOffset":"-25200",
        "deviceUptime":"23:05:50",
        "options":"0x00001000"
}
```


- **/syslog.txt** displays the device's system logging page. This is also an existing diagnostics page and release 3.12 added considerably more detail to the items reported in the system log.

```
09/03/2024 08:39:35 DEVICE: Initialize.
09/03/2024 08:39:37 MAIN_MCU: Software Reset.
09/03/2024 08:39:42 NTP SERVER: Failed DNS Lookup.
09/03/2024 08:39:55 REMOTE SERVICES: Failed DNS Lookup.
09/03/2024 08:39:55 EMAIL: Missing recipient email address(es).
09/03/2024 08:39:55 EMAIL: Missing recipient email address(es).
09/03/2024 08:40:30 REMOTE SERVICES: Failed DNS Lookup.
09/03/2024 08:41:05 REMOTE SERVICES: Failed DNS Lookup.
09/03/2024 08:42:10 REMOTE SERVICES: Failed DNS Lookup.
09/03/2024 08:42:47 NTP SERVER: Failed DNS Lookup.
09/03/2024 08:43:15 REMOTE SERVICES: Failed DNS Lookup.
09/03/2024 08:39:35 DEVICE: Initialize.
09/03/2024 08:39:37 MAIN_MCU: Power-on Reset.
09/03/2024 08:55:58 NTP SERVER: Success.
09/03/2024 08:56:05 REMOTE SERVICES: Connection made.
09/03/2024 08:56:08 EMAIL: Missing recipient email address(es).
09/03/2024 08:56:08 EMAIL: Missing recipient email address(es).
09/03/2024 21:26:35 REMOTE SERVICES: Connection closed.
09/03/2024 21:27:07 REMOTE SERVICES: Failed DNS Lookup.
```

- The General Information page **Network Interface In Use** displays the connection you are using to connect to the device. Depending on the device model, this can be **Ethernet, Wi-Fi, Wi-FiAP, or Cellular.**