X-420™

Web-Enabled Instrumentation-Grade Data Acquisition
4 Analog-to-Digital Inputs, 2 Digital I/O, up to 16 1-Wire Sensors (temp/humidity), Frequency Input
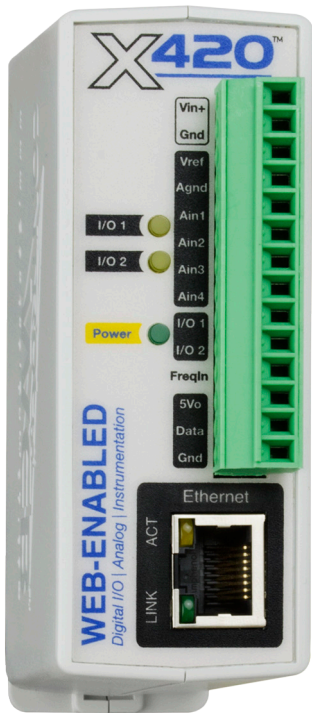
PRODUCT OVERVIEW

The X-420™ is a multifunction web-enabled industrial control and instrumentation module. The X-420 has four multi-function analog inputs, two digital I/O with programmable pull resistors, two pulse counters, one frequency input, 16 general purpose timers, 16 general purpose registers, and a 1-Wire® bus. The 1-Wire bus supports up to 16 sensors for monitoring temperature, humidity and more. It can be controlled and/or monitored over any TCP/IP network including private networks, IP-based industrial control networks, and the Internet. Users can operate the X-420 using a web browser, the CBW Mobile app, or custom applications written for a computer, PLC, or other automation controller.

The X-420's built-in interface allows you to create custom "Tasks" for simple and advanced control logic. Easily create tasks based on time, input or outputs' status, or device responsiveness. The X-420 also has a built-in BASIC interpreter for custom applications not achievable through the Task Builder system.

The module is powered by an external wall transformer (9-28 VDC), solar panel, or other DC power source. The model X-420-E is powered over the twisted pair Ethernet cable.
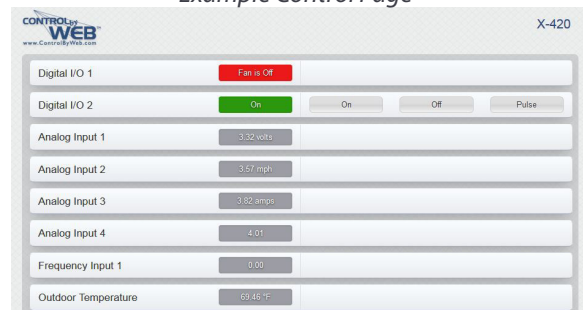
Other features are also included such as, email notification, event scheduling, and logging. The X-420 can control and monitor up to 32 remote devices, graph logged data, FTP logged data, email logged data, send encrypted emails, and monitor its power supply voltage. The X-420 supports a number of Ethernet protocols including HTTP/HTTPS, Modbus/TCP, SNMP V1,V2 & V3, NTP, SMTP(Encrypted), and FTP/FTPS. The status of the device can be retrieved in human readable formats XML and JSON.

The X-420 supports TLS V1.2 encryption as well as cloud integration(not required) for easier configuration and access. Specifically the X-420 supports HTTPS connections, can send encrypted emails, can communicate with remote devices using TLS, and send logged data to FTP servers over an encrypted connection. In addition, the X-420 can be configured to automatically connect to ControlByWeb.cloud, ControlByWeb's cloud service. This feature is not required, but does simplify the configuration process and internet access to an X-420 installed behind a network router by eliminating manual configuration of the device and port forwarding setup on routers.
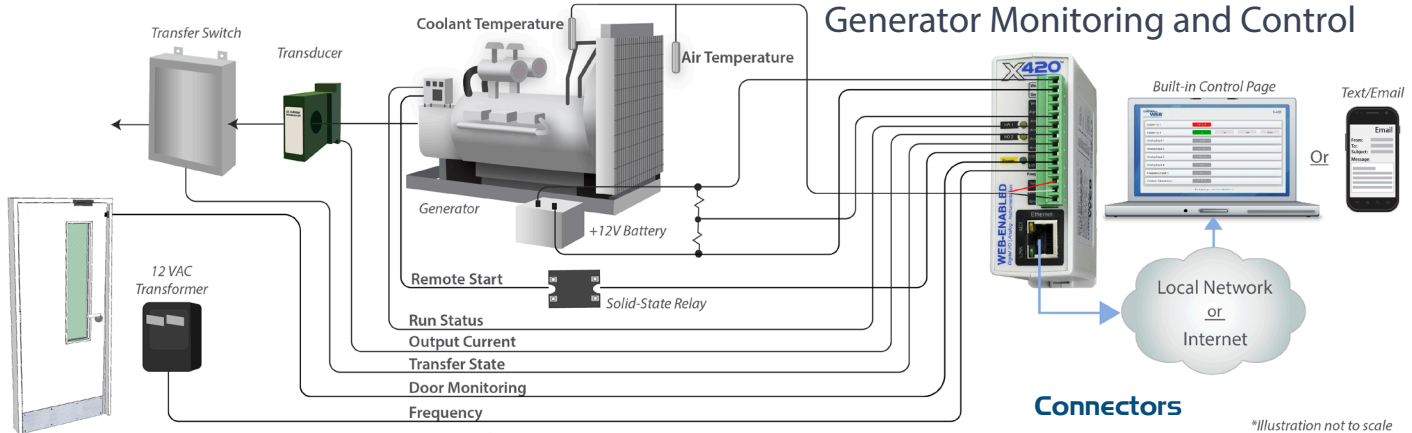
Features:

- Built-in web server for configuration and remote monitoring (HTTPS supported).
- Four channel, programmable, 16-bit, analog data acquisition system.
- Two 5V digital input/outputs. Use as inputs to monitor wind speed or rainfall etc. Use as outputs to control relays or other devices.
- Two pulse counters.
- Millivolt AC frequency input for use with magnetic or optical wind speed sensors
- 1-Wire port for connecting up to 16 digital sensors for measuring temperature, humidity and more.
- 1-Wire temperature sensors are available in various packaging and accuracy.
- Sensor/Input status can control I/O on other ControlByWeb devices.
- Control/Logic Task Builder for custom control with no scripting necessary.
- Configurable logging of all I/O, both local and remote.
- Real-time clock with manual or NTP time sync.
- Send email alerts (up to 8 email addresses) based on any sensor or input conditions.
- Send encrypted emails.
- Auxiliary protocols including: Modbus/TCP, SNMP V1,V2 & V3, and Remote Services.
- Custom scripts using the built-in BASIC interpreter provide additional flexibility.
- Ethernet auto-negotiation automatically selects speed, duplex mode and works with straight or crossover cables.
- Simple and easy to use.
- Power Supply: 9 to 28VDC and/or POE
- 5-year warranty.

Example Control Page

X-420™

Web-Enabled Instrumentation-Grade Data Acquisition
4 Analog-to-Digital Inputs, 2 Digital I/O, up to 16 1-Wire Sensors (temp/humidity), Frequency Input

APPLICATIONS & SPECS

Generator Monitoring and Control

Illustration not to scale

Power Requirements

- **Voltage:**
  - X-420-I: 9-28 VDC
  - X-420-E: POE and/or 9-28VDC
- **Max Current:** 175mA Max *(2-Digital I/O=On, no 1-wire sensors. See users manual for typical values at 25°C)*

Output Mode

- Logic output to external controllers 5V high through 49.9 Ohm resistor

Digital Inputs

- **Number of Inputs:** 2 (Configurable)
- **Type:** Non-Isolated
- **Voltage Range:** 0-5VDC
- **Current:** Switchable 47K Pullup/Pulldown
- **Vin Hi (Min):** 3.5V
- **Vin LO (Max):** 1.5V
- **Debounce:** 0 to 250mS (configurable)
- **Minimum Hold Time:** 1mS
- **Number of Counter Inputs:** 0-2 (configurable)
- **Max Count Rate:** 200Hz Max
- **Input Functions:** Monitor State, Control Digital I/O, Control Remote Relays, Scalable Counter, On Timer, Total On Timer, Frequency
- **Edge Trigger:** Rising, Falling or Both

Frequency Input

- **Type:** AC coupled, sine or square wave (works with millivolt magnetic wind speed sensors)
- **Input Voltage:** +/-12 VDC, 30Vpp AC max
- **Hysteresis:** 25mV
- 0-20 kHz input frequency
- Sine or Square Wave
- 1 second average
- **Minimum input level:**

Input Frequency	Min Vin
Vin @ 1 Hz	50mVpp
Vin @ 10 Hz	50mVpp
Vin @ 100 Hz	60mVpp
Vin @ 1 kHz	80mVpp
Vin @ 10 kHz	700mVpp
Vin @ 20 kHz	1.7Vpp min

Analog Inputs

- **Number of Inputs:** 4
- **Resolution:** 16-bit, SAR
- **Type:** Single-ended, differential, 4-20mA (0-20mA), or a combination
- **Input Range:** ±1.28V, ±2.56V, ±5.12V, ±10.24V
- **Max Input Voltage (Vin):** -12.5V < Vin < +12.5V
- **Input Impedance (Zin):** > 500Meg Ohm
- **Channel Off Leakage:** ±0.6nA (typ)
- **Input Common Mode Rejection:** >100dB
- **Total Unadjusted Error:** -9LSB (min), +9LSB (max)
- **Voltage Reference Drift:** ±5 ppm/°C
- **Internal 4-20mA input shunt:** 200-ohm, ±0.1%, 25ppm (uses ±5.12V range)
- **Logging Rate:** 25 Hz

Temperature Sensors

- **Maximum Number of Sensors:** 16
- **Type:** Dallas Semiconductor DS18B20
- **Temperature Range:** -67°F to 257°F (-55°C to +125°C)
- **Accuracy:** ±0.5°C (from -10°C to +85°C)
- **Sensor Functions:** Monitor Temperature, Log Temperature, Email Alerts, SNMP Traps
- **Humidity Type:** Xytronix Model X-DTHS-P sensor
- **Humidity Range:** 0-100% RH
- **Accuracy:** ±2%
- **Max Cable Length:** 600 feet (180m) maximum combined cable length

Real-Time Clock

- Manual or NTP(Network Time Protocol) setup
- **NTP Sync Period:** Once, Daily, Weekly, On Power-up
- Auto Daylight Savings Adjustment

Capacitor Power Backup

- **Backup Functions:** Retain Real-Time Clock, External Variables, Relay State, and Counters
- **Backup Duration:** 3 days minimum

Network

- **Type:** 10/100 Base-T Ethernet Port
- **Setup:** Static IP address assignment. TCP port selectable

Connectors

- **Power/Input/Relays:** 14-Position, 3.81mm, Removable
- **Network:** 8-pin RJ-45

LED Indicators

- **Number of LEDs:** 5
  - Power on, I/O (1-2), Network linked, Network activity

Physical

- **Operating Temperature:** -40°F to 150°F (-40°C to 65.5°C)
- **Size:**
  - 1.41in (35.7mm) wide x 3.88in (98.5mm) tall x 3.1in (78mm) deep (not including connector)
- **Weight:** 5 oz (142 grams)
- **Enclosure Material:** Lexan 940 Polycarbonate Plastic
- **Enclosure Flame Rating:** UL94 V0

Protocols

- HTTP, HTTPS, SSL, XML, Modbus TCP/IP, SNMP, SMTP, Remote Services

Logging

- **Log File Size:** 3072K (up to 50,688 log entries depending on configuration)
- **Storage:** Nonvolatile Flash
- **Buffer Architecture:** Circular Buffer
- *Log data can be periodically read and stored on a computer*

Advanced Features

- Task Builder, BASIC interpreter, Remote services

Password Settings

- **Password protection on setup page:** Yes
- **Password protection on control page:** Optional
- **Password Encoding:** Base 64
- **Max Password Length:** 18 Characters

Electromagnetic Compliance

- IEC CISPR 22, CISPR 24
- EU EN55024, EN55022
- X-418-I: FCC 47CFR15 (Class B)
- X-418-E: FCC 47CFR15 (Class A)

Product Safety Compliance

- IEC 61010-1

CE