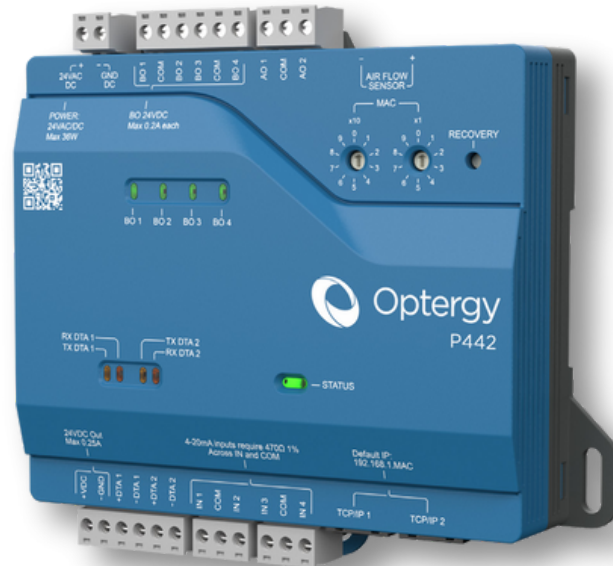




P442 Controller

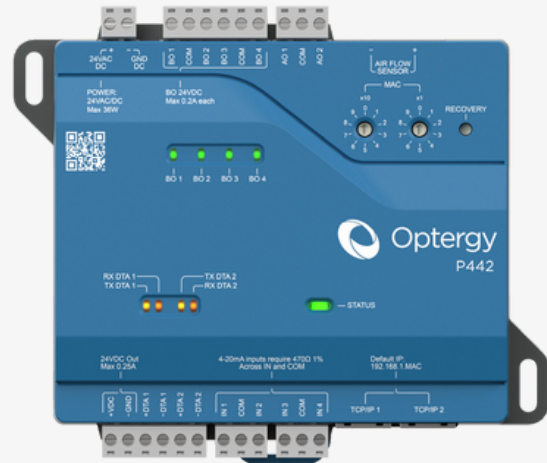
Installation Guide

The P442 programmable controller offers an affordable, high-volume solution for small controller and VAV applications, streamlining your control system needs. It ensures seamless integration and reliability, consistent with our Optergy Edge controller range.

P442 Installation

The P442 is a BACnet programmable controller that is used in control applications.

Common applications include: HVAC, Lighting and Energy Management.

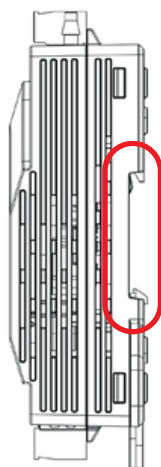


Installation: Mounting

Mount the P442 in one of two ways:

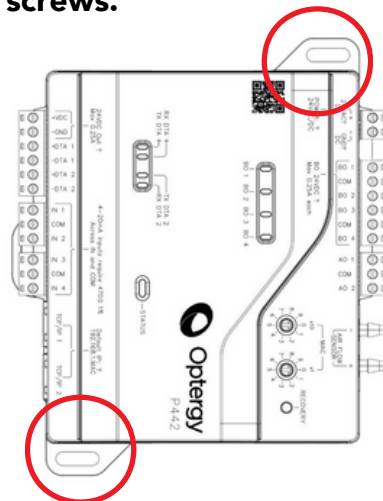
METHOD
1

Mount the controller to a DIN rail.



METHOD
2

Use the 2 screw holes to fasten with self tapping screws.



Wiring Diagrams & Product Label

Wiring

All terminals are labeled on the cover. Refer to the wiring diagrams for details.

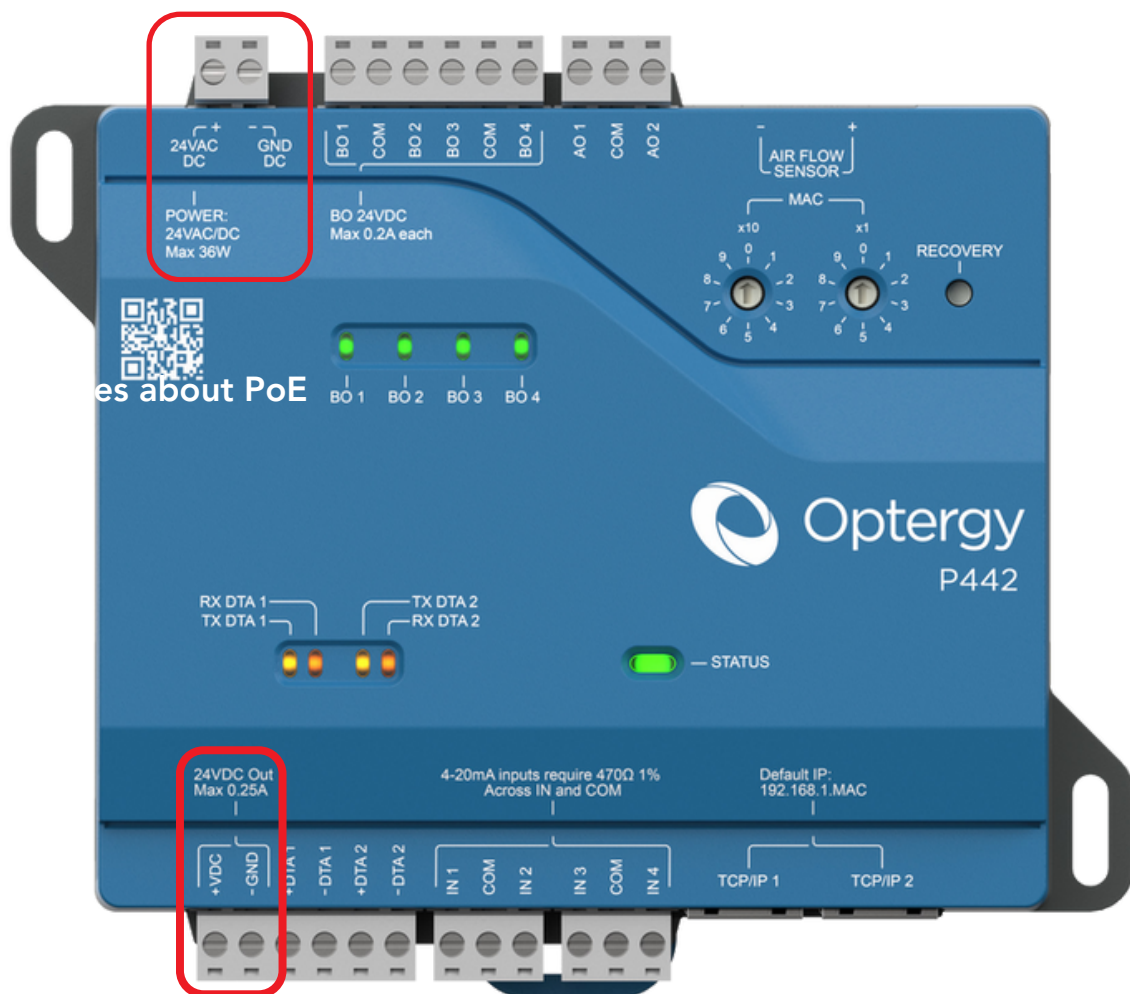
Power

P442 Power can be supplied by:

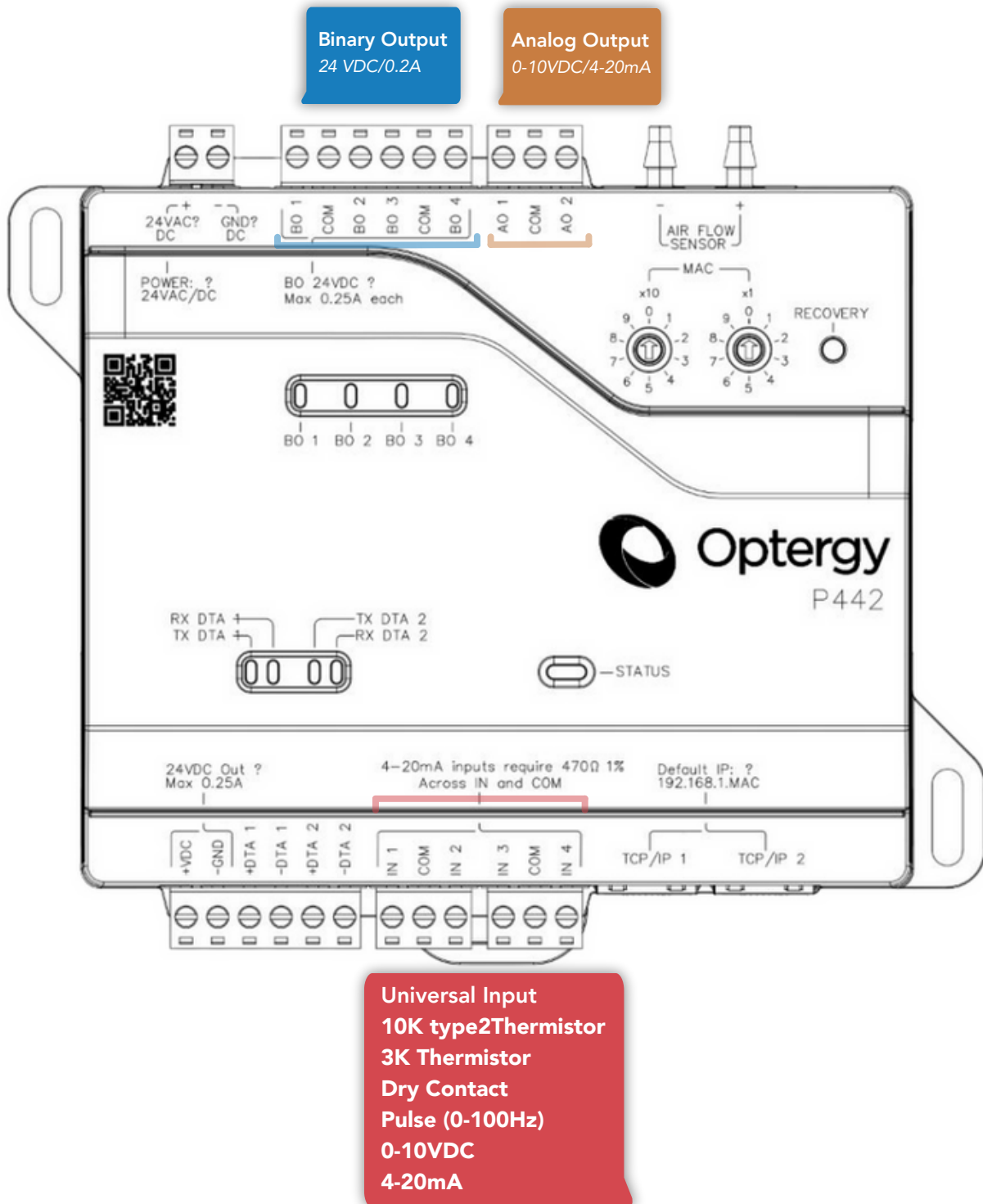
- 24 VAC ½ wave (grounded secondary)
- 12-24VDC Power Supply

P442 has an onboard 24VDC power supply:

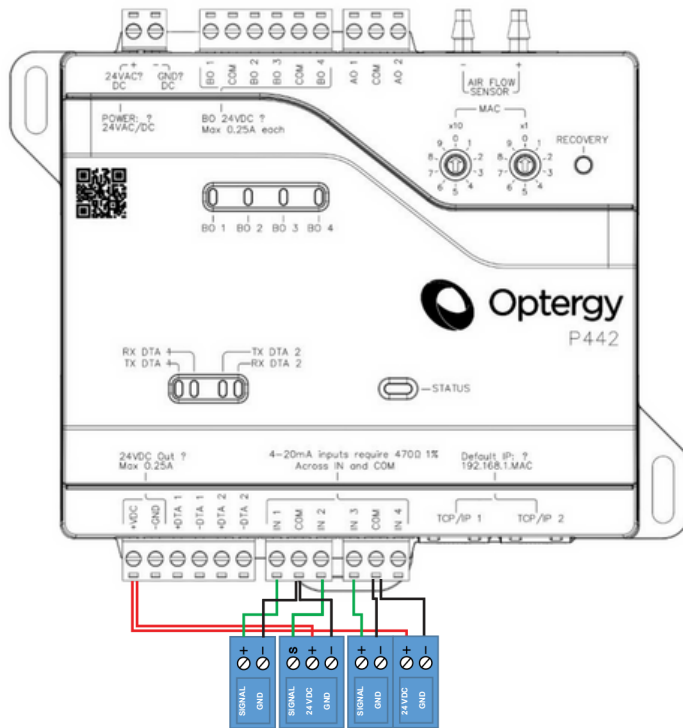
- Stay within power budget (6W).



Universal Input (Analog, Binary & Pulse Wiring Details)



Universal Input Wiring Details



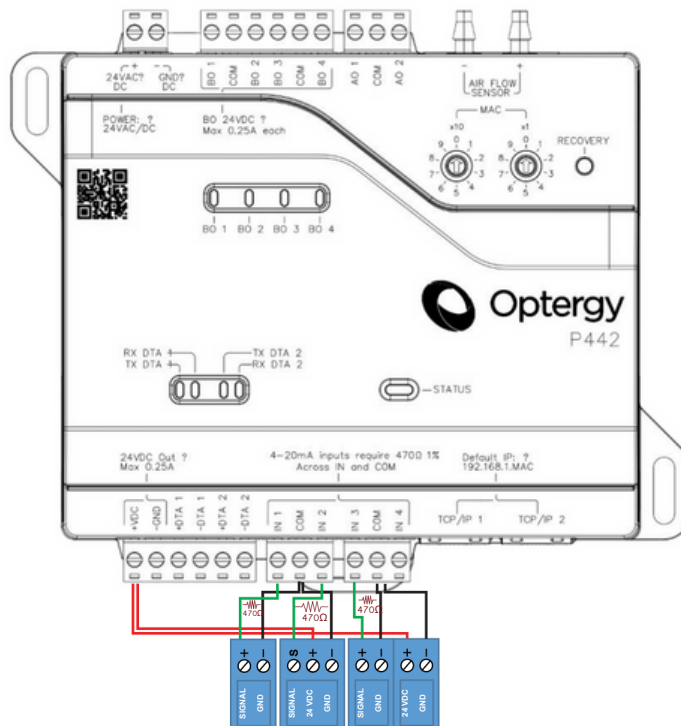
Universal Input (0-10 VDC)

2-Wire/3-Wire/4-Wire Devices

Universal Input (4-20mA)

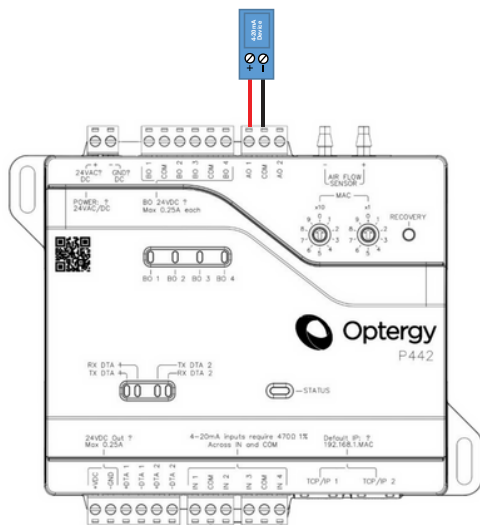
470 Ohm resistor required

2-wire/3-Wire/4-Wire Devices

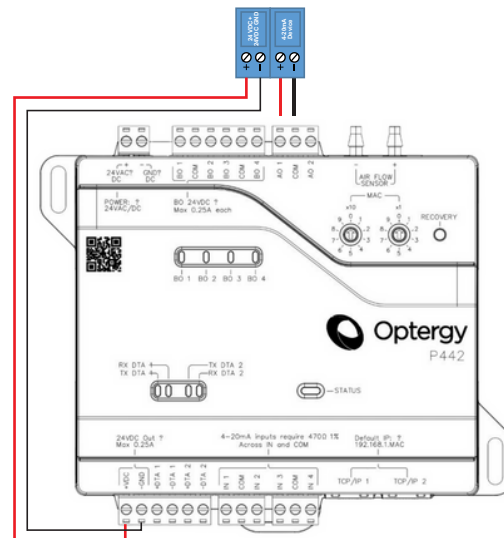


Output Wiring Details

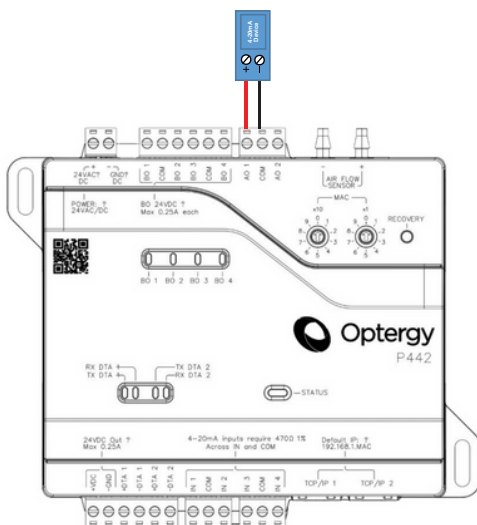
4-20mA Device (2-wire)



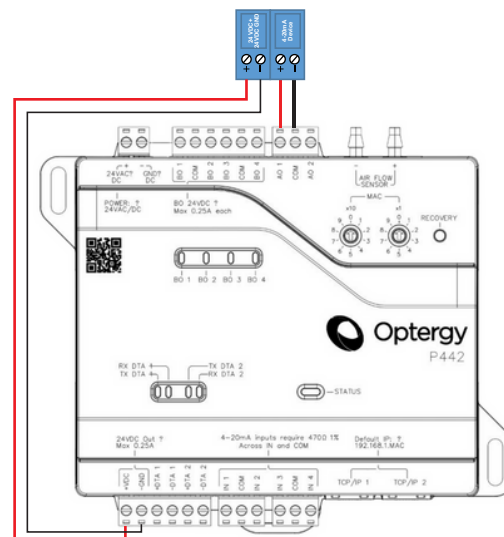
4-20mA Device (4-wire)



0-10 VDC Device (2-wire)



0-10 VDC Device (4-wire)



TCP/IP Communication

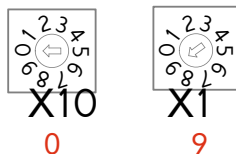
Both TCP/IP 1 and TCP/2 2 can be used for BAC-net/IP and user interface via HTTPS web browser.

Or

It can be looped to another P442 on TCP/IP 1 or 2.
(No limit to number of devices.)

Default IP address is 192.168.1.MAC

MAC rotary dials can be set from 1-99 (TCP/IP address). Example MAC set to: **MS/TP MAC**



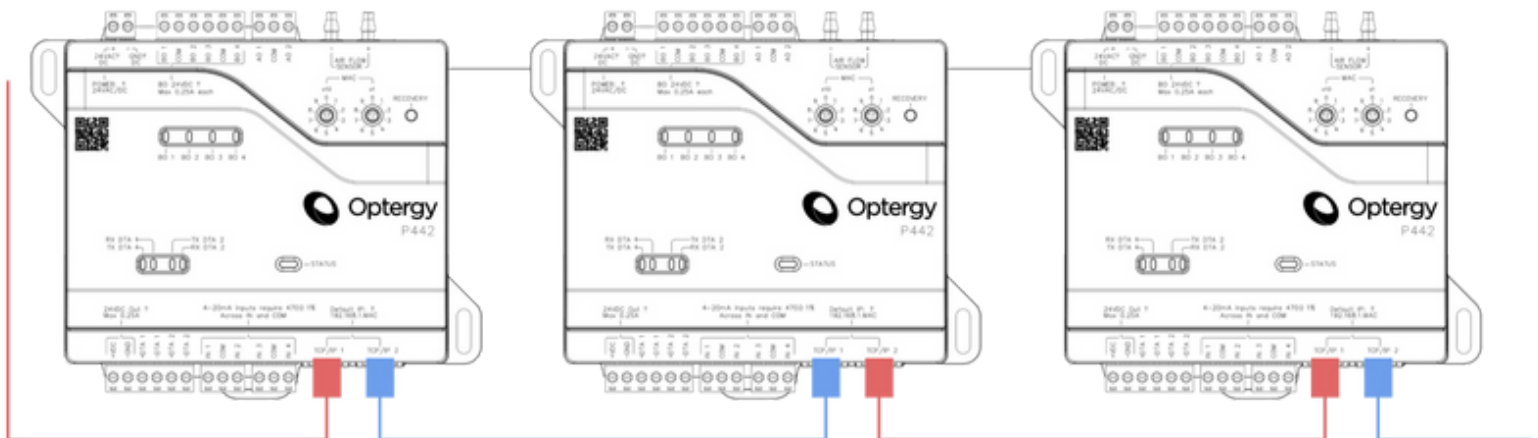
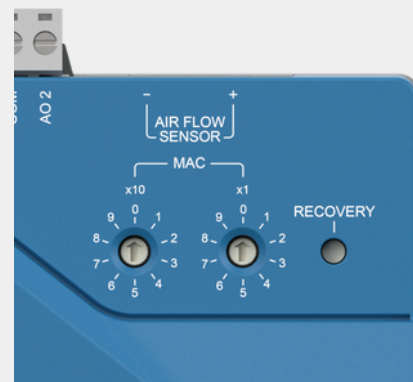
Result **192.168.1.9**

Default Device instance is **4420+MAC (442009)**

To Reset the P442, hold down the recovery button for 5 seconds or until you will see the status light begin to flash yellow.

Once the lights flash yellow release the Recovery button and the controller will reboot.

Once rebooted the IP Address will be reset to 192.168.1.MAC and the credentials will have defaulted to user: admin and pass: admin



P442 now has an Ethernet Failout Relay, this means when the controller loses power the Ethernet cable bypasses the controller and continues the signal onto the next controller

IP cable can be looped in and looped out

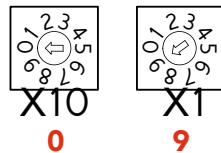
MS/TP Communication Wiring

The P442 is a 2 wire + shield MS/TP device. MS/TP controllers are always wired onto the Data 1 port.

Shield must be carried through and single point to earth ground.

Use low capacitance cable in accordance with BACnet specification.

Default IP address is 192.168.1.MAC, The MAC can be set with rotary dials from 0-99 (TCP/IP address). Example MAC set to: **MS/TP MAC**



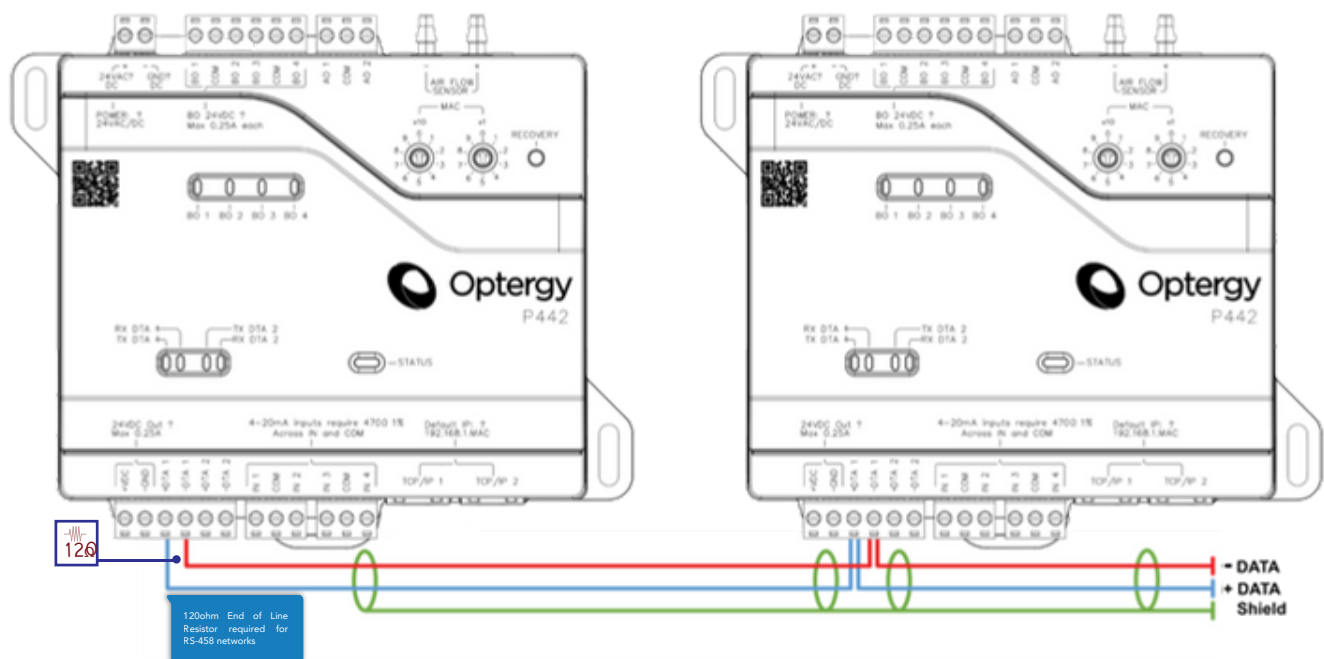
ResultMS/TPMACADDRESS = 9

Defaultdevice instance is

442+MAC (864009)

BACnet MS/TP controllers

Use Data 1 Port



DATA-2 Bus (RS-485)

The P442 has a communication (DATA-2) which allows it to talk Modbus RTU (RS-485). This network can be used for 2 purposes:

1. Optergy Wireless Sensor Integration, by connecting 1 BG-1000-M Transceiver
2. Modbus RTU, allowing you to connect and configure Modbus RS-485 devices to integrate with the P442 logic

**Note that the P442 does not act as a full Modbus RTU to TCP Gateway and that Modbus devices integrated to the P442 will be available only within the P442 itself.*

Data 2 - (Modbus RTU or Data B)

Data 2 + (Modbus RTU or Data A)

GND (DC-/Ground for sensors/devices)

+ VDC (+24 VDC, power for sensors/devices)

Biasing: Biasing is used to control network communication, many devices use a local bias resistance or have selectable in or out of circuit. Routers or router/controllers use a network bias. The Optergy 2nd RS-485 expansion network has the network bias, it should be used when routing or connecting to sensor network.

Example 1 - P442 configured with Modbus RTU > BACnet IP Mapping (max 50 registers).



Example 2 - P442 configured with BG-1000-M Transceiver and wireless Optergy Air Sensors



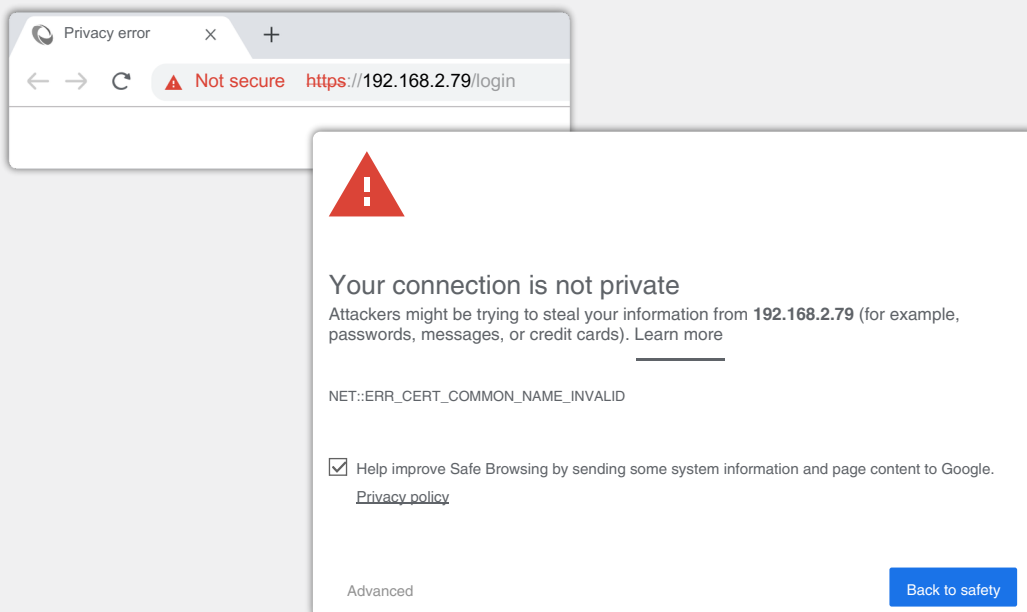
P442 Web User Interface

Access and Login

The P442 uses https or SSL encryption to assure secure communication to the web server. Optergy has issued a self signed certificate which is one that is published by Optergy. Most browsers will flag this as a security concern asking the user if this is a known and trusted publisher. The user should answer yes. While Optergy is not a known trusted publisher of certificates, like Truste, Verisign, Comodo etc. it is highly preferable to use encryption rather than not using any security. For this reason any requests made to `http://<ipaddress>` will be redirected to `https://<ipaddress>`.

To access the user interface for configuration purposes, follow these steps:

1. Plug local PC into TCP/IP port 1 or 2 on the P442.
2. Set local PC to the same IP range as the P442.
3. Open web browser on local PC and navigate to the P442 using `https://IP address (192.168.1.MAC)` for example `https://192.168.1.79`
4. You will be confronted with a message that looks like the following-



> Press the Advanced button

This server could not prove that it is **192.168.2.79**; its security certificate does not specify Subject Alternative names. This may be caused by a misconfiguration or an attacker intercepting your connection.

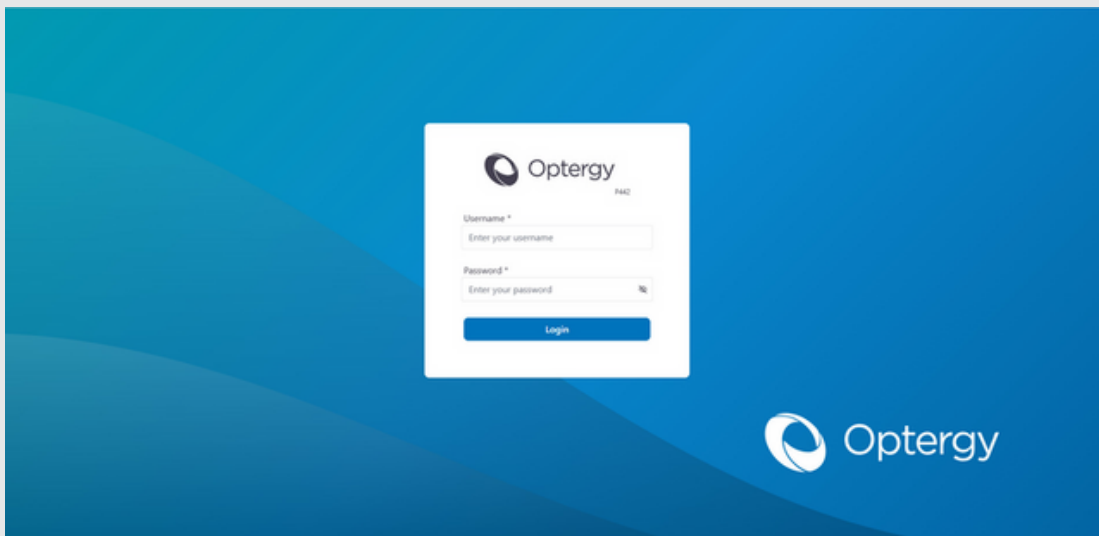
[Proceed to 192.168.2.79 \(unsafe\)](#)

> Click proceed to <ip address>(unsafe)

P442 Web User Interface

Access and Login

5. When prompted by the login screen, login with username - "admin", password - "admin".
 - a. The User will be prompted to change the password upon initial login.



Note: If the user forgets the login credentials, the recovery button can be used to reset the user back to admin/admin and 192.168.1.MAC.

Press and hold the recovery button for more than 5 seconds, after 5 second lights will begin flashing and you can let go, the system will take 30 seconds to complete the recovery sequence.

P442 Web User Interface

Device Settings

Setting device configuration

1. Device Configuration
 - a. Software Version
 - b. Device location
 - c. Device Description
 - d. Units – User Selectable Metric or US Customary
2. IP Configuration
 - a. Ethernet modes
 - b. IP address
 - c. Subnet Mask
 - d. Default Gateway
 - e. BACnet IP Network Number
 - f. BACnet IP Port
3. BACnet Configuration
 - a. Device Instance
 - b. BACnet Mode
4. BACnet MSTP Configuration
 - a. MSTP MAC Address
 - b. MSTP Network Number
 - c. MSTP Baud Rate
5. 2nd RS-485 Port
6. Port Protocol – BACnet or Modbus

The screenshot shows the Optergy P442 Web User Interface for the 'WBG' device. The interface is organized into a sidebar and a main configuration area. The sidebar includes a 'Device' tab, a 'SENSOR' section, and 'View' and 'Configure' options. The main area is divided into four configuration panels:

- Device Configuration:** Fields for Software Version (0.1.3), Device MAC (0:80:E1:26:0:1A), Serial Number (TES001.WBG.V0.1.00000X), Units (US Customary Units), Device Location (33423432), and Device Description (123123).
- BACnet Configuration:** Fields for Device Instance (Manual) (710054), BACnet Mode (BACnet MSTP), MAC (55), Baud Rate (76800), Max Info Frames (3), and Max Master (126).
- IP Configuration:** Fields for Ethernet Mode (Manual), IP Address (192.168.6.203), Subnet Mask (255.255.255.0), and Default Gateway (192.168.6.1).
- Wireless Configuration:** Fields for Operating Channel (Auto (Recommended)) and Operational Mode (Auto (Recommended)), with an 'Optimise Gateway Wireless Parameters' button.

At the bottom of the configuration area, there are 'Submit' and 'Discard' buttons.

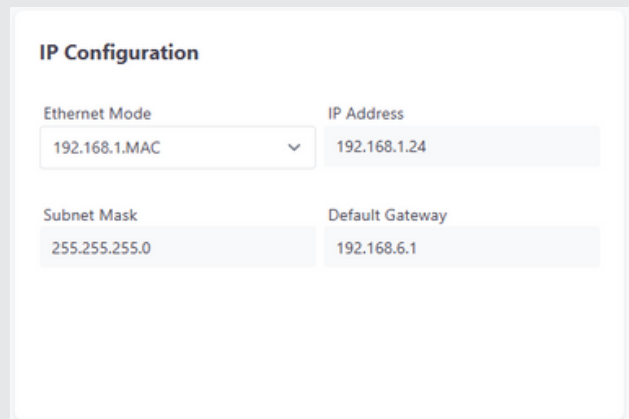
P442 Web User Interface

Device Settings

IP Configuration

Ethernet Modes choices include:

- **DHCP** (used only for issuing the IP address for the WEB UI).
- **Manual** (IP address is selected by user entry).
- **MAC** (IP address is determined by the switch positions and result in an IP address 192.168.1.XX mask: 255.255.255.0).
- **IP Address** (IPv4 addresses can be entered here example: 192.168.1.10)
- **Subnet Mask:** (IPv4 Subnet mask can be entered here example: 255.255.255.0)
- **Default Gateway:** (IPv4 addresses can be entered here example: 192.168.1.1)
- **BACnet IP Network Number:** any valid network number can be used, it must be set to the same as all other BACnet IP routers.
- **BACnet IP port:** default is 47808



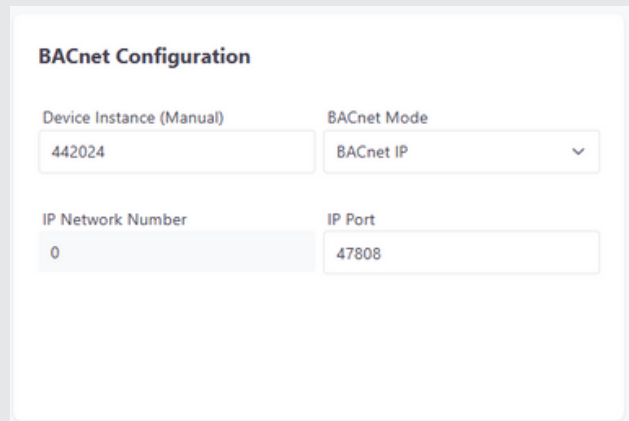
IP Configuration	
Ethernet Mode	IP Address
192.168.1.MAC	192.168.1.24
Subnet Mask	Default Gateway
255.255.255.0	192.168.6.1

BACnet Configuration

Device Instance: Device Instance is preset initially by concatenating the "4420 + Device MAC" this value can be entered manually from this field.

BACnet Mode choices include:

- **IP only** (BACnet IP is used to communicate to BACnet network).
- **MS/TP only** (BACnet IP is disabled).



BACnet Configuration	
Device Instance (Manual)	BACnet Mode
442024	BACnet IP
IP Network Number	IP Port
0	47808

P442 Web User Interface

Device Settings

BACnet MS/TP Configuration

MS/TP MAC Address: The initial MAC address is set using the rotary switches, valid MAC addresses are 0-127.

MS/TP Network Number: Enter a unique MS/TP network number, duplicate MS/TP network number can cause network conflict.

MS/TP Baud rate: The default configuration is 76.8K Baud, fixed baud rates also include 9.6, 19.2, 38.4, 57.6 and 115.2

The screenshot shows a web interface titled "BACnet Configuration". It contains six input fields arranged in a 3x2 grid:

Device Instance (Manual)	BACnet Mode
442024	BACnet MSTP
MAC	Baud Rate
24	76800
Max Info Frames	Max Master
2	127

P442 Web User Interface

Input / Output Configuration

Setup Input/Output

- 1. Universal Inputs
 - a. Analog inputs
 - i. 0-10 VDC
 - ii. 4-20 mA
 - iii. 10k thermistor
 - iv. 3k thermistor
 - b. Binary inputs
 - i. dry contact
 - ii. 0-100 Hz pulse
- 2. Binary Outputs
 - i. 24 VDC (MOSFET)
- 3. Analog Outputs
 - i. 0-10 VDC
 - ii. 4-20 mA

I/O Configuration

Input

IN-1

Type

Dry Contact

Dry Contact

Scaled 0-10V

10K Type 2

3K Type 2

Scaled 4-20mA

Pulse Count

Raw/Counts

Description

Universal Input Description

Units

No Units

Update

Discard

- Notes:
- Only voltage and current analog inputs can be scaled Inputs can be scaled from 0 to 100% to achieve output 0-10 VDC or 4-20 mA.
 - Pulse factor is only for use with pulse inputs.
 - Outputs can be driven into override manually at Priority, the user must choose the value then hit enter and refresh the page (F5).
 - Descriptors can be entered by the fields, to commit the values click away from the field. Descriptors can also be written from DDC Programming.

Optergy

CONFIGURATION

Device

442

Monitor

P442

Universal Input							
Input	Present Value	Type	Min	Max	Pulse Factor	Description	Edit
IN-1	0	Dry Contact	-	-	-	Universal Input Description	
IN-2	0.009	Scaled 0-10V	0	100	-	Universal Input Description	
IN-3	-49.534	10K Type 2	-	-	-	Universal Input Description	
IN-4	0	Pulse Count	-	-	5	Universal Input Description	

Analog Output				
Output	Present Value	Type	Override	Description
AO-1	0 %	0-10V	Auto	Analog Output Description
AO-2	20 %	4-20mA	Auto	Analog Output Description

Binary Output				
Output	Present Value	Override	Description	Edit
BO-1		Auto	Binary Output Description	
BO-2		Auto	Binary Output Description	
BO-3		Auto	Binary Output Description	
BO-4		Auto	Binary Output Description	

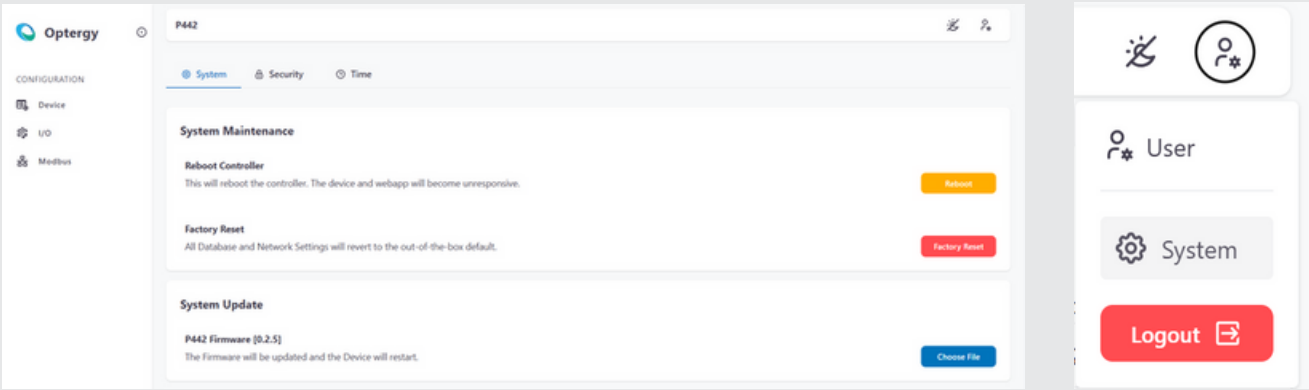
Variable Air Volume (VAV) Sensor		
Connection Status		Differential Pressure
Online		-1 Pa

P442 Web User Interface

System Menu

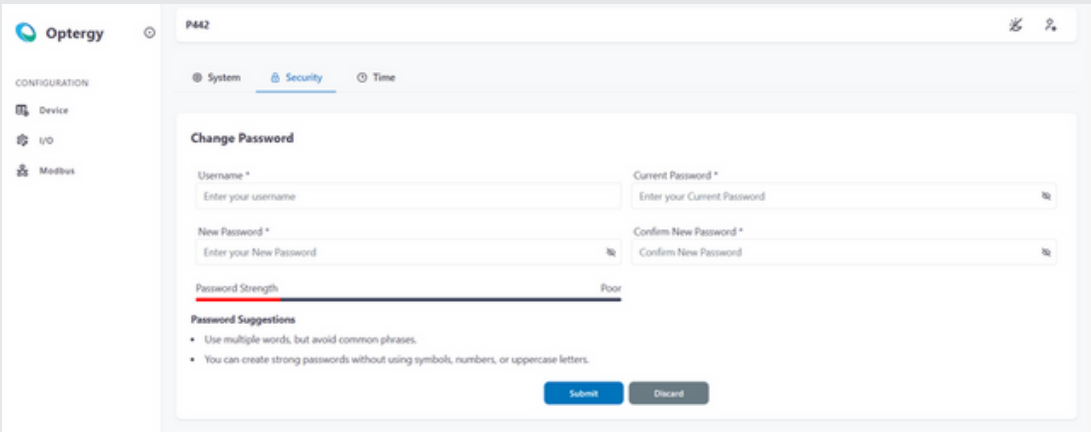
System Menu

Various System options exist, including Reboot, Reset and Firmware Update options. The System Menu can be found user the User/Cog icon in the top right hand corner of the page.



Change Password

To Change the Password use the Security Tab



P442 Installation of Airflow Sensor (EDGE-AFS)

The EDGE-AFS is a calibrated sensor that measures -2-2" w.c. or -500 to 500 Pa, this sensor can be added to any P442 to be used as a VAV Box Controller or filter DP sensor and more.

1. Insert the device.



2. Fasten the screws to the plastic base.

Note: This means the circuit board cannot be removed without removing these screws first.

Status LED

The P442 has a status LED that indicates:

- Green Blink** = Initialization
- Green Solid** = Normal Operation
- Red Blink** = Runtime Error
- Red Solid** = Start-up Error
- Blue Blink** = Firmware Update
- Yellow Blink** = Recovery Mode

