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P442 (DC-48)

Optergy

## Edge

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.

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

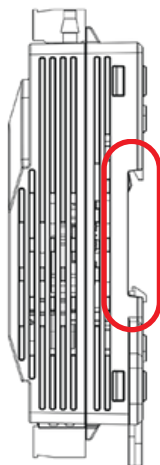Common applications include: HVAC, Lighting and Energy Management.
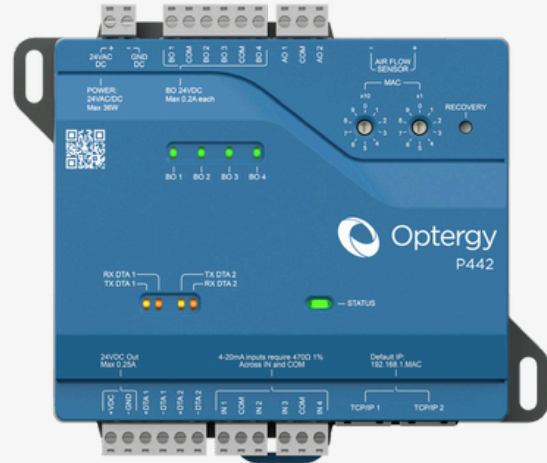
Installation: Mounting
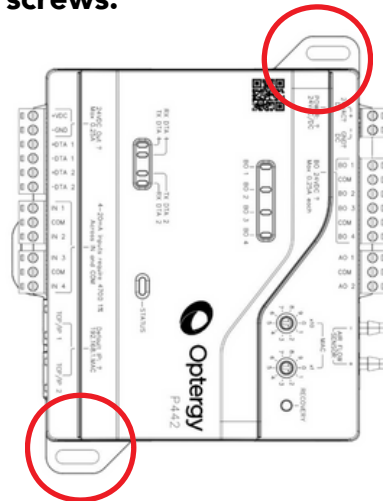
Mount the P442 in one of two ways:

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

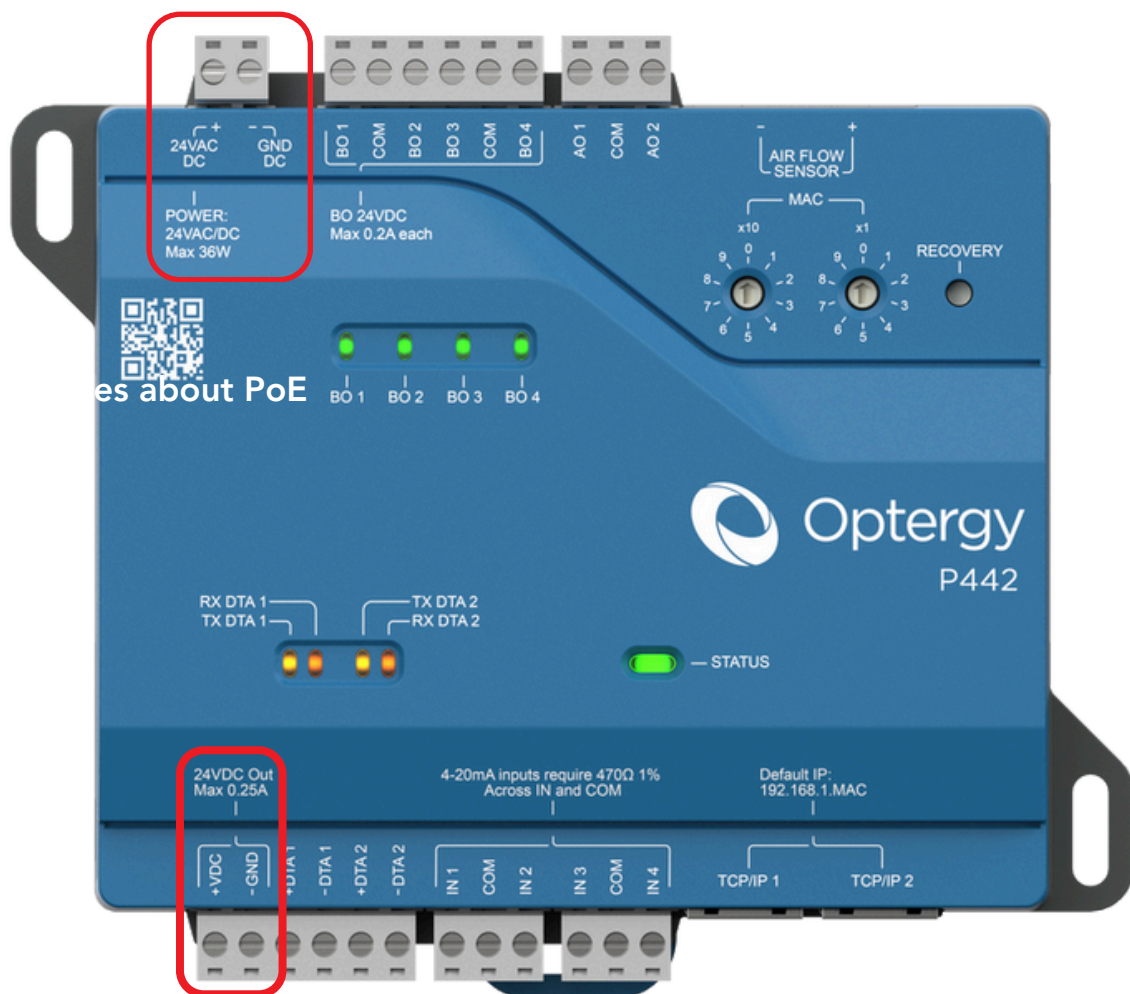All terminals are labeled on the cover. Refer to the wiring diagrams for details.
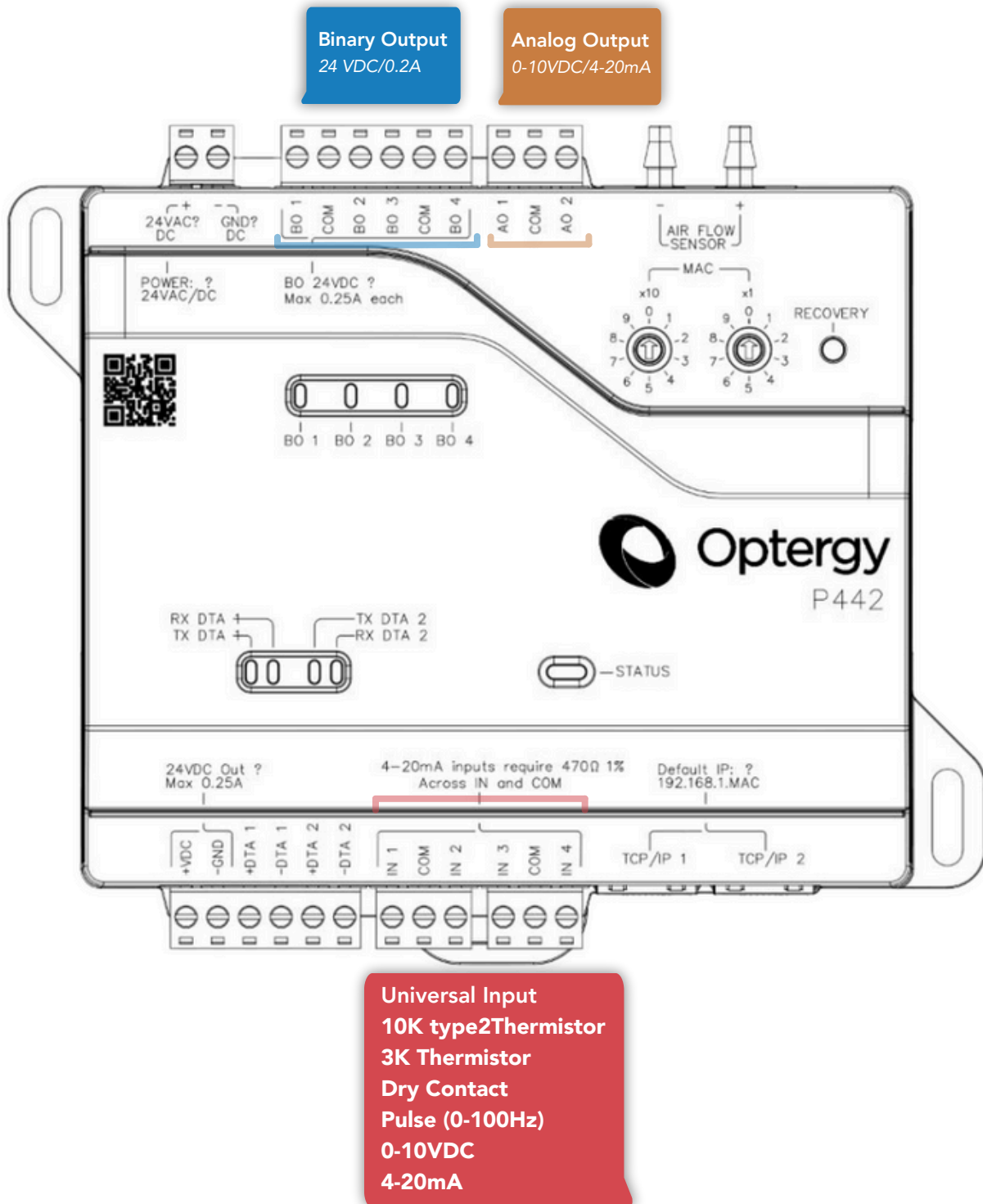
Power

P442 Power can be supplied by:

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

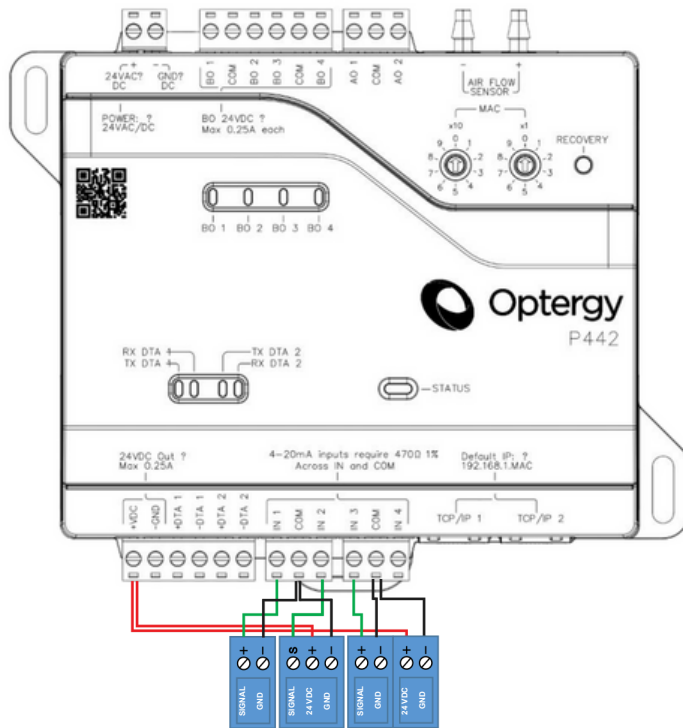P442 has an onboard 24VDC power supply:
- Stay within power budget (6W).

Universal Input (Analog, Binary & Pulse Wiring Details)

Binary Output
24 VDC/0.2A

Analog Output
0-10VDC/4-20mA

24VAC? DC   GND? DC

POWER: ?
24VAC/DC

BO 24VDC ?
Max 0.25A each

BO 1   COM   BO 2   BO 3   COM   BO 4

AO 1   COM   AO 2

AIR FLOW SENSOR

MAC
x10   x1

RECOVERY

BO 1   BO 2   BO 3   BO 4

Optergy
P442

RX DTA +
TX DTA +

TX DTA 2
RX DTA 2

STATUS

24VDC Out ?
Max 0.25A

4—20mA inputs require 470Ω 1%
Across IN and COM

Default IP: ?
192.168.1.MAC

+VDC   -GND   +DTA 1   -DTA 1   +DTA 2   -DTA 2   IN 1   COM   IN 2   IN 3   COM   IN 4   TCP/IP 1   TCP/IP 2

Universal Input
10K type2Thermistor
3K Thermistor
Dry Contact
Pulse (0-100Hz)
0-10VDC
4-20mA
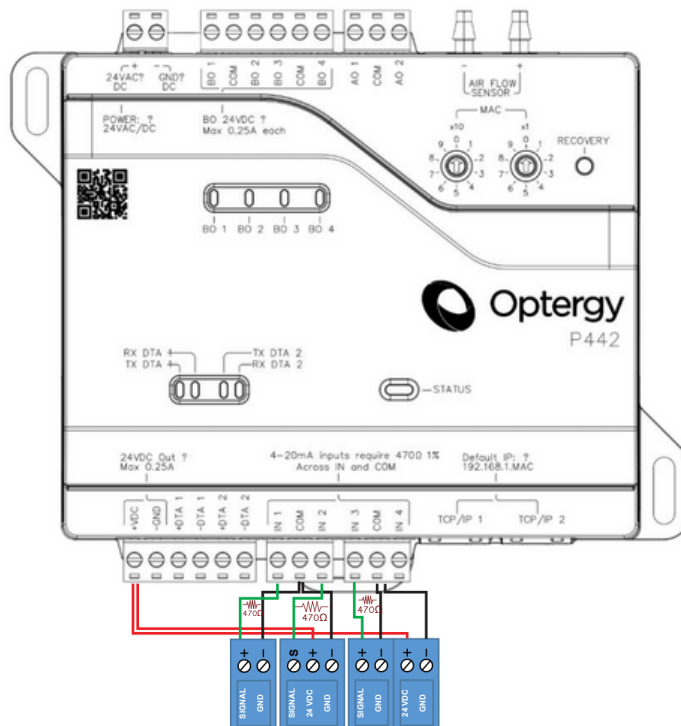
Universal Input Wiring Details

Universal Input (0-10 VDC)

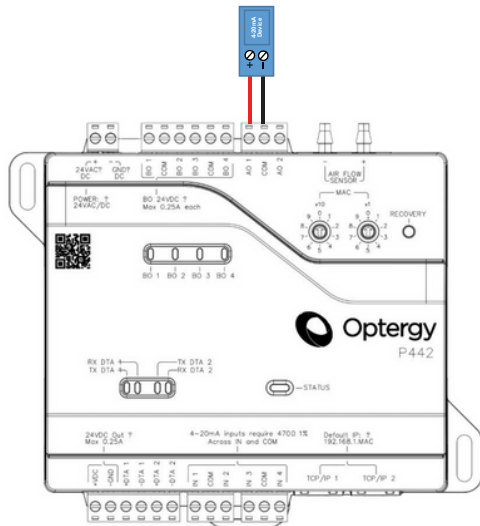2-Wire/3-Wire/4-Wire Devices

Universal Input (4-20mA)
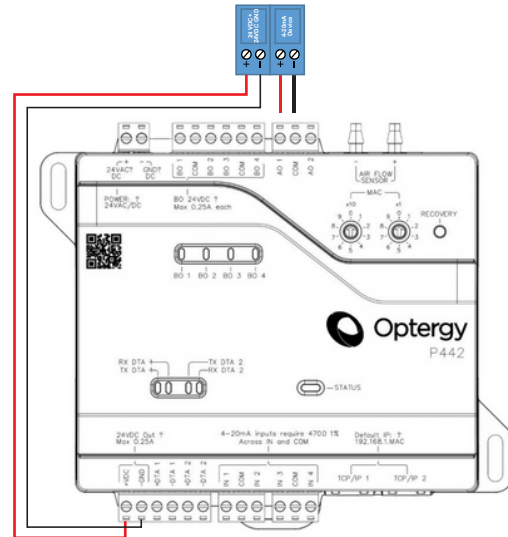
470 Ohm resistor required
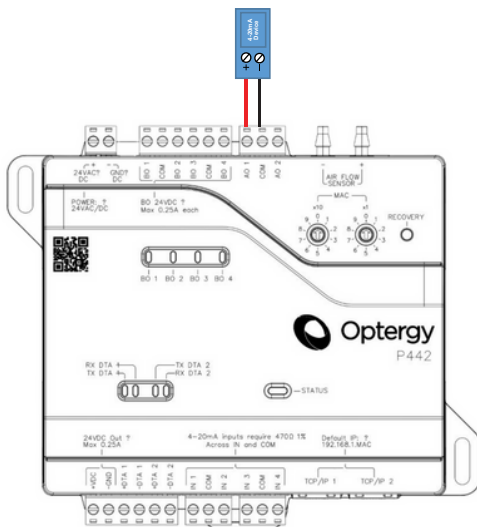2-Wire/3-Wire/4-Wire Devices

Output Wiring Details
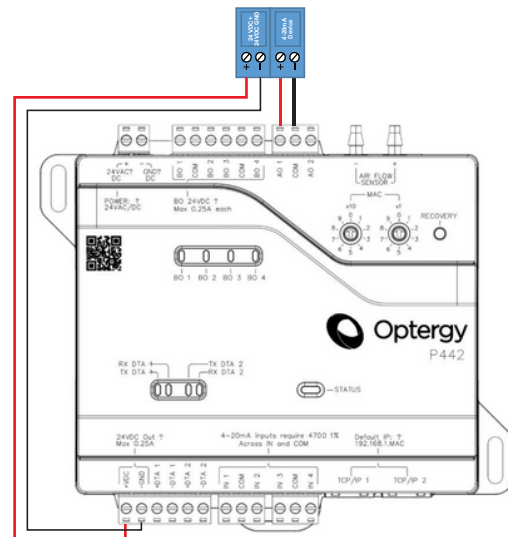
4-20mA Device (2-wire)

4-20mA Device (4-wire)

0-10 VDC Device (2-wire)

0-10 VDC Device (4-wire)
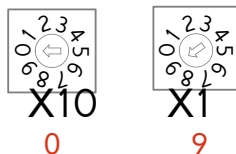
TCP/IP Communication

Both TCP/IP 1 and TCP/2 2 can be used for BACnet/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

X10   X1
0   9

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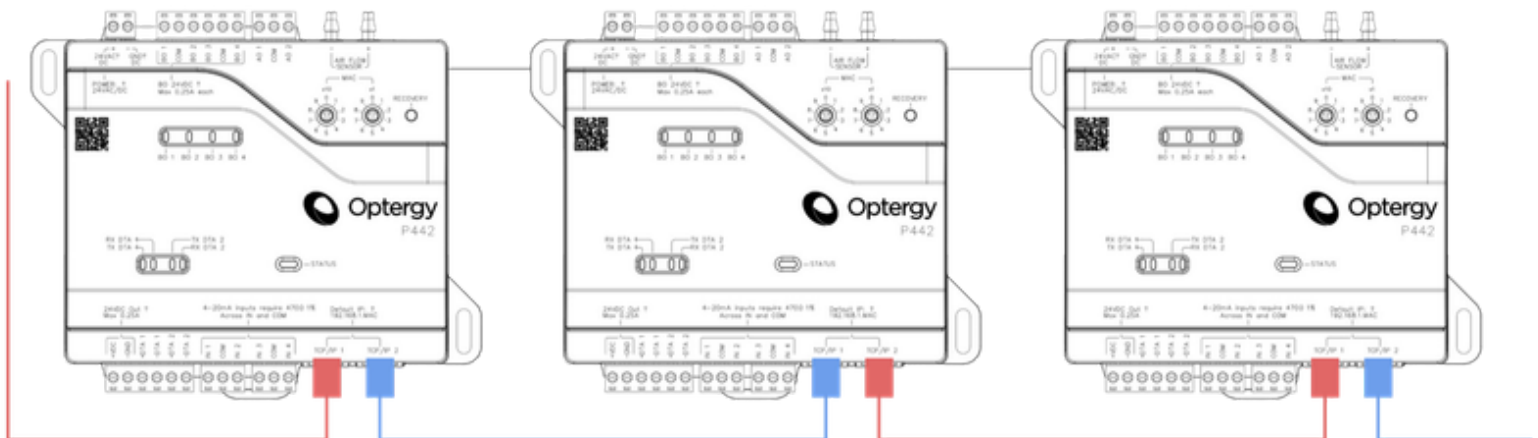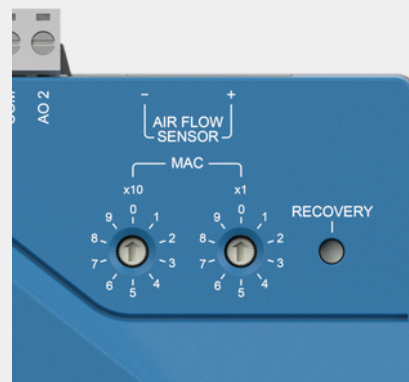
P442 now has an Ethernet Failover Relay, this means when the controller loses power the Ethernet cable bypasses the controller and continues the signal onto the next controller

**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

X10   X1
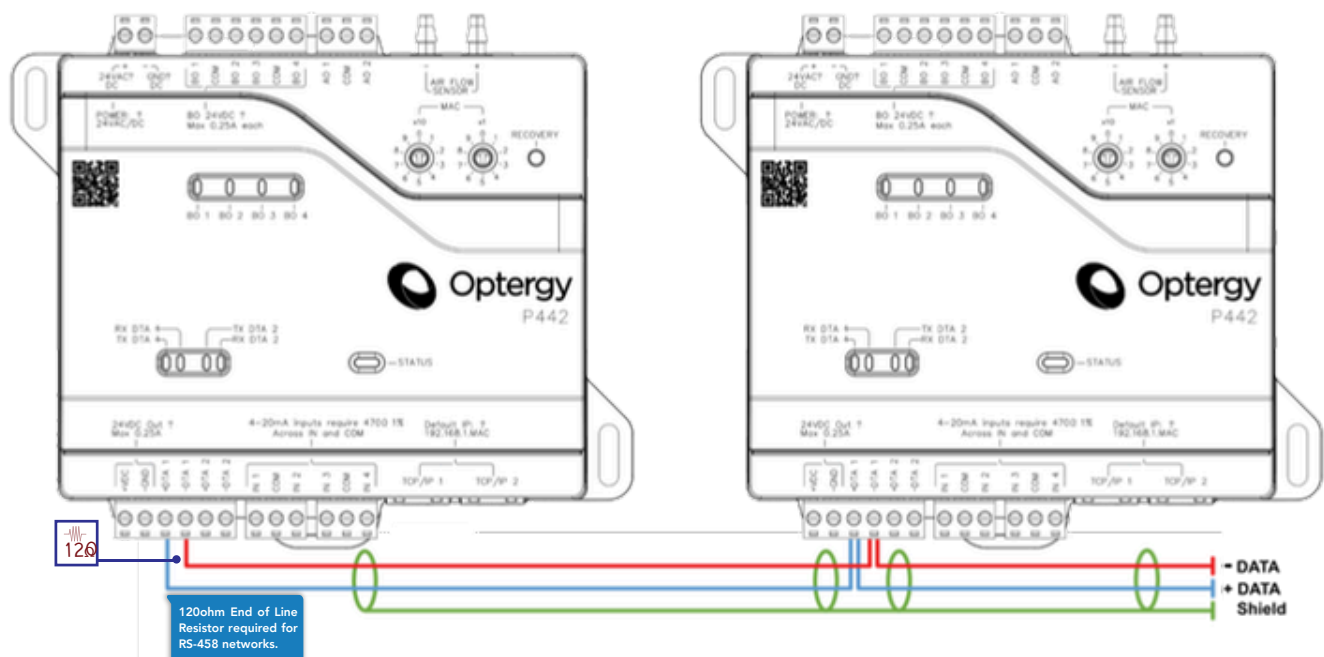**0**   **9**
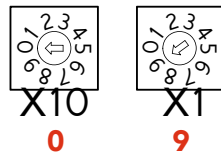
Result Result: MS/TP MAC Address = 9

Default device instance is 442+MAC (442009)
442+MAC (442009)

BACnet MS/TP controllers
Use Data 1 Port

120ohm End of Line Resistor required for RS-458 networks.

- DATA
+ DATA
Shield

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 <u>Mapping</u> (max 50 registers).

P442
Data 2

RS-485 Modbus RTU Sensor Network

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

TCP/IP
Network

P442
Data 2

Optergy Air Wireless Sensor Network

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://<IP address> will be redirected to https://<IP address>.

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:
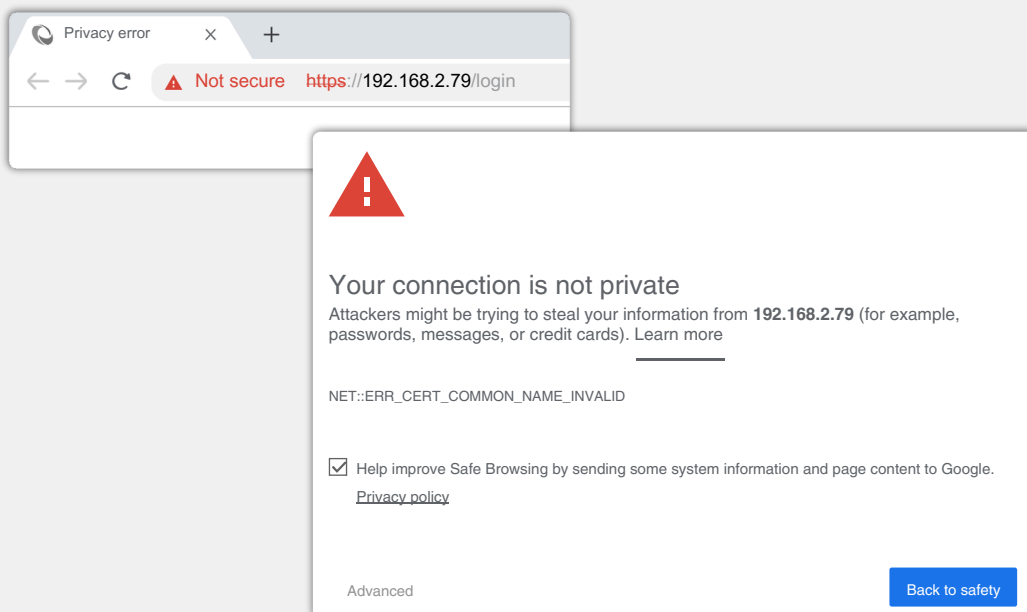
> Press the Advanced button

> Click proceed to <ip address>(unsafe)

P442 Web User Interface

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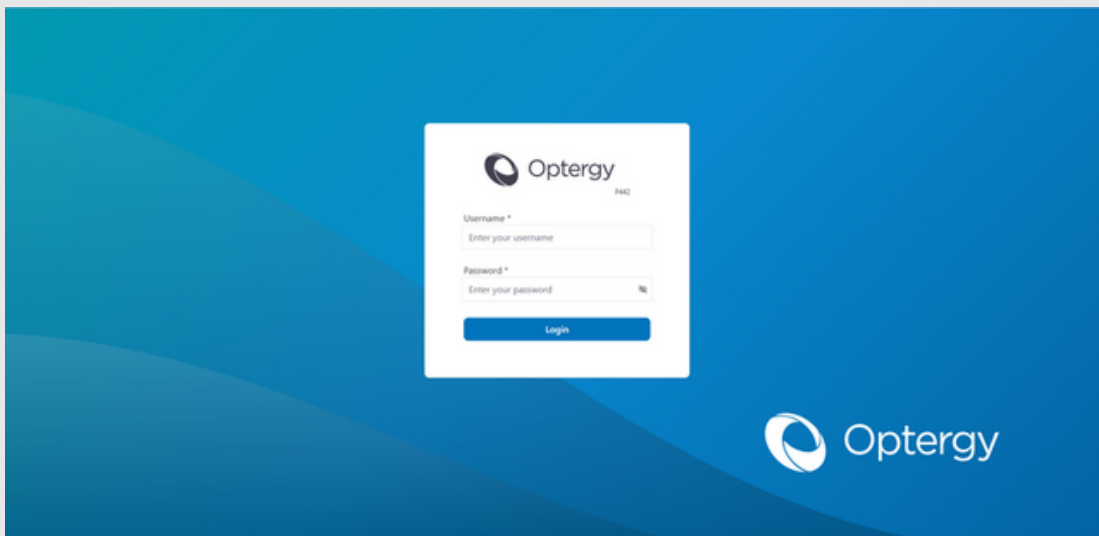
Note: If the user forgets the login credentials, the recovery button can be used to reset the user back to admin/admin and 192.168.1.MAC.

Press and hold the recovery button for more than 5 seconds, after 5 seconds 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

P442 Web User Interface

Device Settings

IP Configuration

Ethernet Modes choices include:

> **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

- • **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

BACnet Configuration

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

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).

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

BACnet Configuration

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.*

Universal Input

Input	Present Value	Type	Min	Max	Pulse Factor	Description	Edit
IN-1	○	Dry Contact	-	-	-	Universal Input Description	✏
IN-2	0.369	Scaled 0-10V	0	100	-	Universal Input Description	✏
IN-3	-49.334	10K Type 2	-	-	-	Universal Input Description	✏
IN-4	0	Pulse Count	-	-	1	Universal Input Description	✏

Analog Output

Output	Present Value	Type	Override	Description	Edit
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

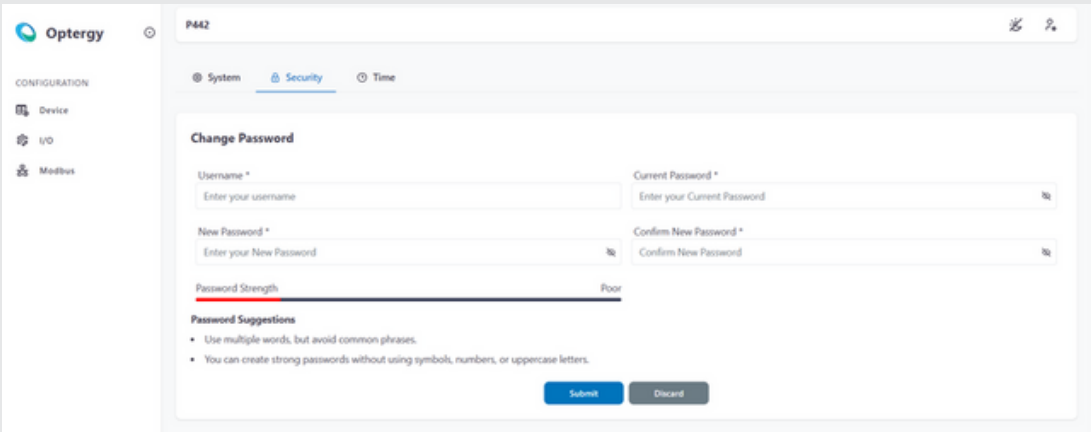| Connection Status	Differential Pressure
Online	-1 Pa

P442 Web User Interface

System Menu

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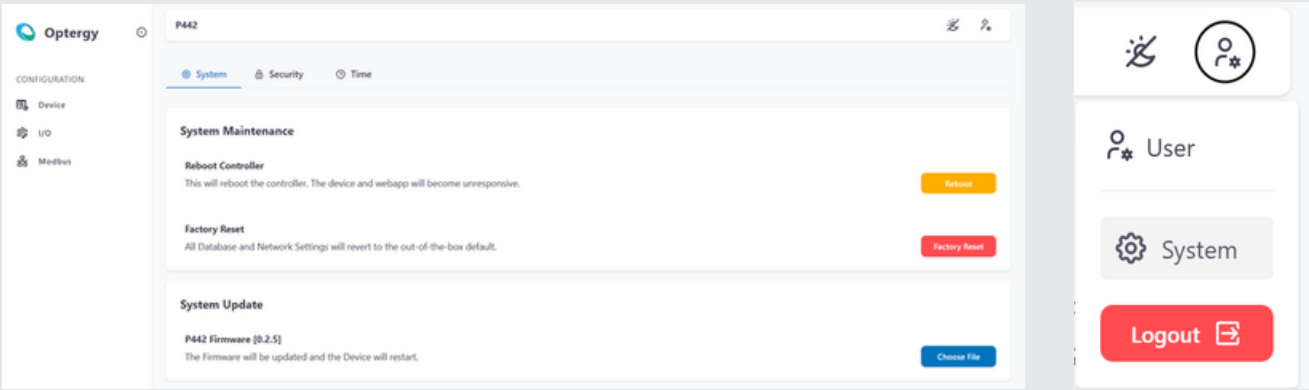
Change Password

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