# AIRSYS Refrigeration Engineering
Air Filter Protection Device
Manual

OVERVIEW

➢ Free Cooling in challenging environments where airborne particulates would previously make economizer operation prohibitive.

➢ Ensures air filter will last > 6 months without clogging by closing the outdoor air damper when airborne contaminates exceed density limit.

➢ Compatible with all existing AIRSYS Wall Packaged Units (WPUs) and Indoor Packaged Units (IPUs).

➢ Expect up to $1,000 per site savings[1] on electricity by enabling free cooling instead of running the compressor.
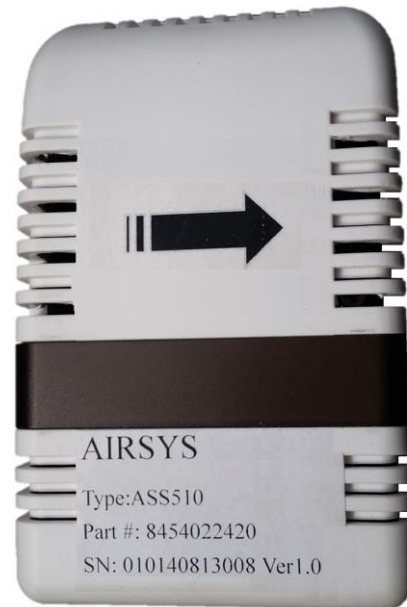
SPECIFICATIONS

Enclosure
4.0" x 2.7" x 1.4", 100% contained within the unit.

Power
Taps off WPU, no external power

Trigger Density
0.1-0.5 mg/m^3

Reset Density
0.05-0.4 mg/m3

Minimum Particulate Diameter
1 micron

Damper Reset Timer
1- 999mins → Adjustable to accommodate local conditions

Design Life
100,000 Triggers

[1]Estimate based on 10kW heat load in climate zone 3-7 and electricity rate $0.10 per kW.

AIRSYS
Balance the Environment

1. PREREQUISTE

The Air Filter Protection Device (AFPD) is compatible with all AIRSYS HVAC systems that utilize the AIRSYS Lead/Lag controller (Models ASLLC.2, ASLLC2.48, and ASLLC.2A, and ASLLC.2A.48). The Lead/Lag Controller Software must be updated to rev. 13B87 or higher to support this product. Please contact AIRSYS support at (855) 874-5380 or ASNSupport@air-sys.com to upgrade.

1.1. Material - AIRSYS Provided

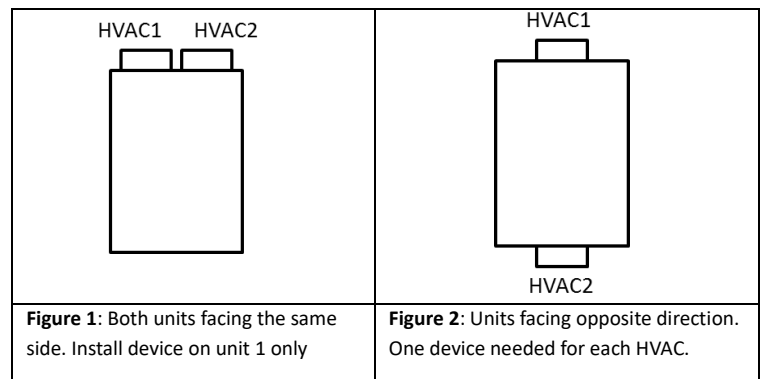- Air Filter Protection Device
- Installation Kit

1.2. Material – Installer Provided

- 18-24AWG wire (~25ft)

2. PHYSICAL INSTALLATION

2.1. General

For buildings where both lead/lag units are on the same wall, the device only needs to be installed on unit 1. A trigger on unit 1 will shut the damper for both units. If the HVAC units are facing different directions, one device will be needed for each unit.

Figure 1: Both units facing the same side. Install device on unit 1 only

Figure 2: Units facing opposite direction. One device needed for each HVAC.

2.2. Positioning

The protection device shall be positioned directly below the air filter, within the compressor chamber. Use self –tapping screws to secure the mounting plate.

IMPORTANT: Self tapping screws must not interfere with the supply fan assembly. When not absolutely certain of the location of the supply fan, open the side panel to verify. An example is shown in Figure 4 for model WPU model 13E1C3 (3.5 Ton).
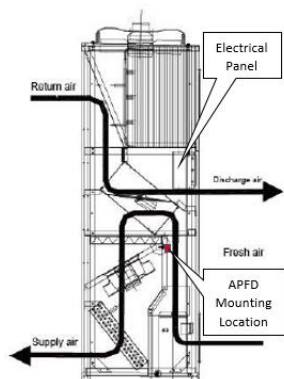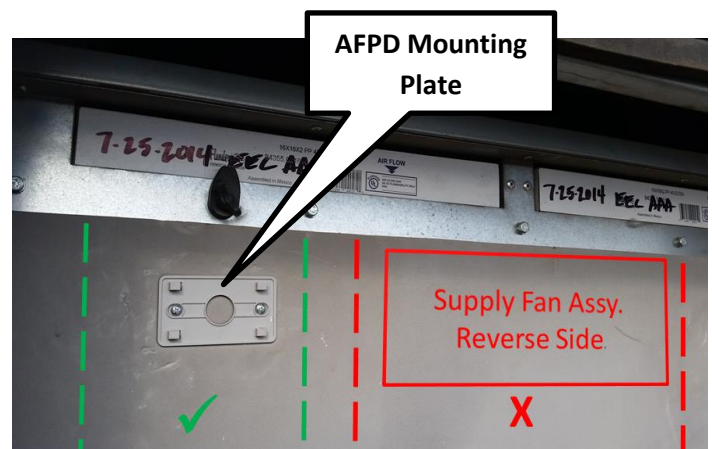
Figure 3: Mounting Location

Figure 4: Position mounting plate

2.3. Mounting

Slide AFPD onto the mounting plate as shown in Figure 5.

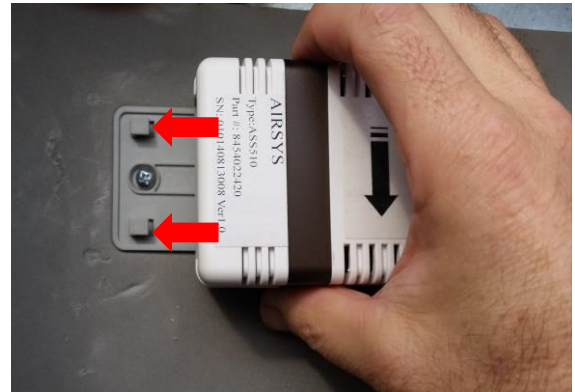**IMPORTANT:** Black arrow must face downward.

Figure 5: Mounting

3. ELECTRICAL INSTALLATION

3.1. AFPD to Electric Box

Connect low voltage leads from the protection device to the electrical box through the rubber grommets as shown in Figure 6. Seal the grommets with silicon after the wiring is complete to minimize air leakage.

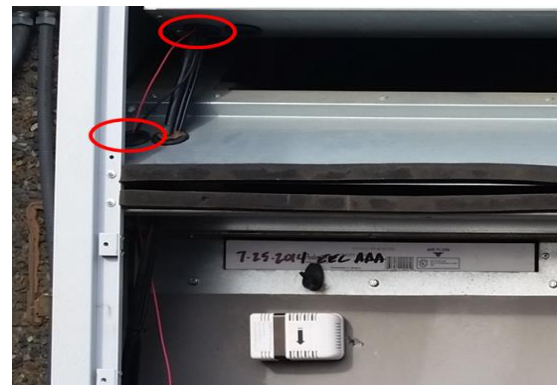You may use 18-24AWG wire. Refer to Figure 7 for the wiring diagram.
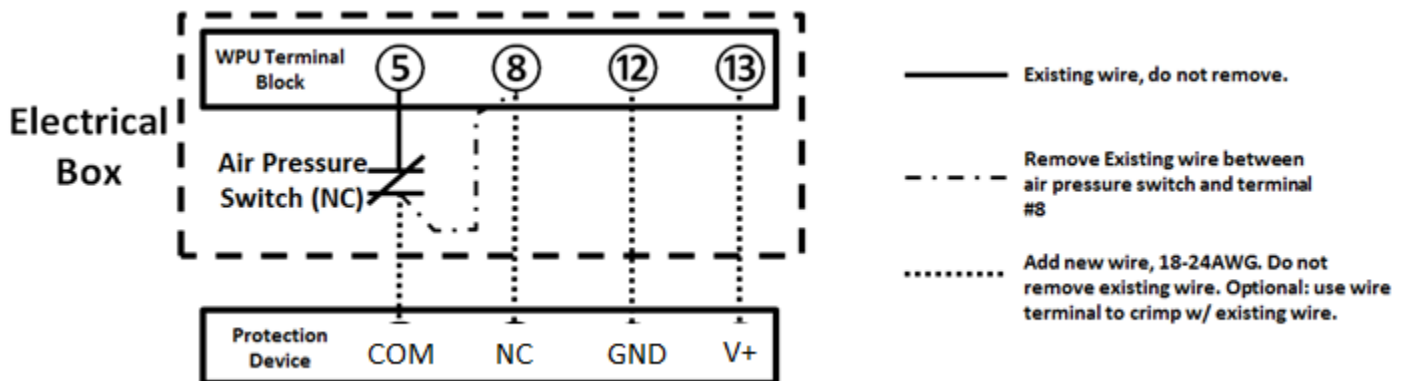

Figure 6: Wire Passage

Figure 7: Wiring Diagram

3.2. Controller Wiring (NOTE: ONLY NEEDED if installing one AFPD per lead/lag controller. Skip to Step 4 if installing one AFPD per Wall Packaged Unit)

When using only one AFPD per lead/lag controller, move factory wire #8 from the unit that does not have AFPD installed to the unit that does. For example, if only installing AFPD on unit 1:
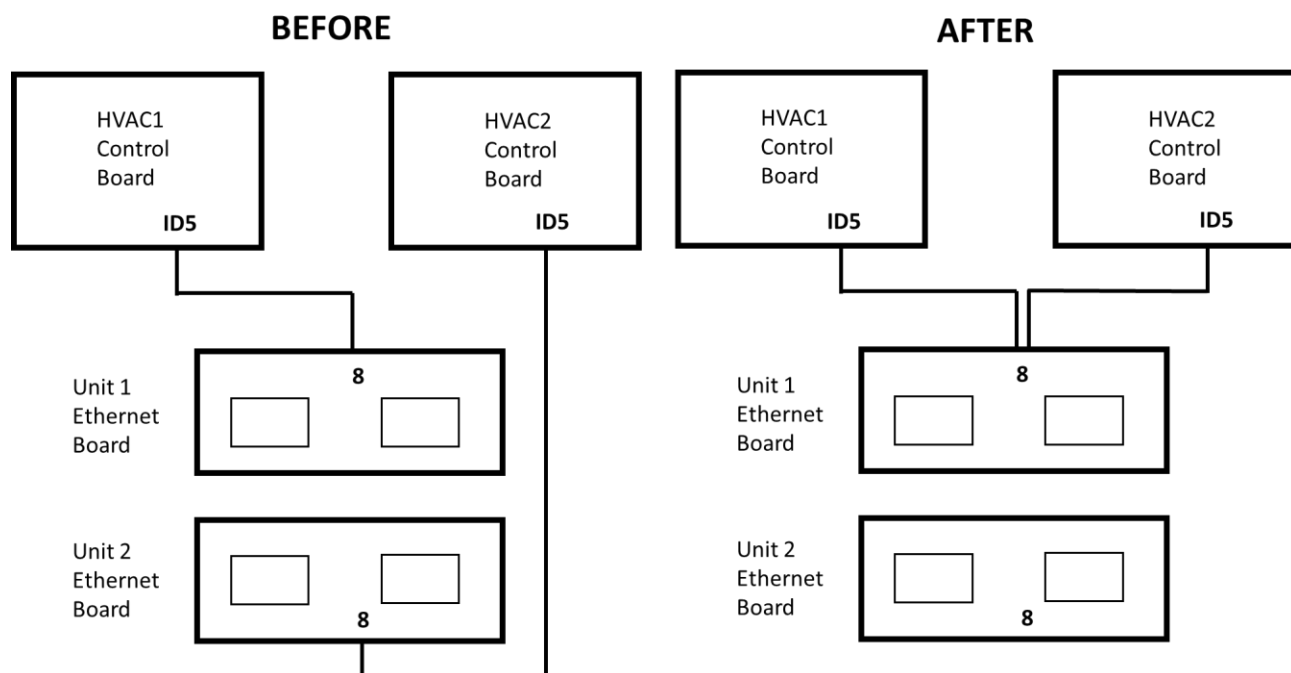
Controller Models ASLLC.2A and ASLLC.2A.48:

Figure 8: Wiring Diagram for Controller Models ASLLC.2A and ASLLC.2A.48
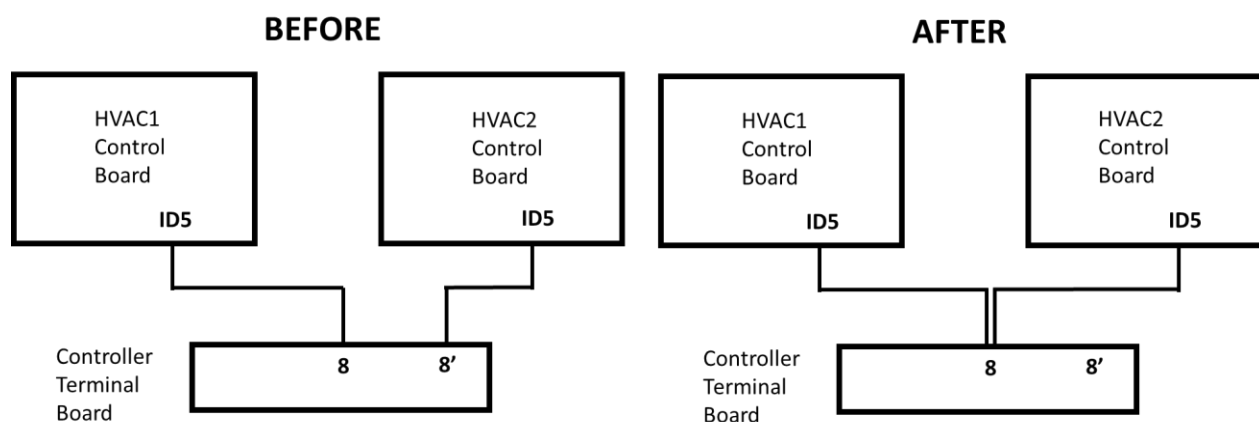
Controller Models ASLLC.2 and ASLLC.2.48:

Figure 9: Wiring Diagram for Controller Models ASLLC.2 and ASLLC.2.48

4. CONTROLLER SETUP

Note: Controller software must be upgraded to rev. 13B87 or above to utilize this technology.

After upgrade, access the D menu to setup the device:

1. Press **Up** and **Down** buttons together to reach indoor temperature display.
2. Press **Up** until $5 \, \mathcal{C} \, \mathcal{E}$ is displayed.
3. Press the **Up** and **Select** buttons together. The screen should display $\mathcal{E} \, \mathcal{E} \, 5$ (if unit off) or $5 \, \mathcal{F} \, \mathcal{E}$ (if unit on). If unsuccessful, return to step 1.
4. Press **Up** until $\mathcal{A} \, \mathcal{F} \, \mathcal{P}$ is displayed and then press **Sel**.
5. Press **Up** to change $\mathcal{n} \, \mathcal{o}$ to $\mathcal{Y} \, \mathcal{E} \, 5$ and then press **Sel**, the screen should be back to $\mathcal{A} \, \mathcal{F} \, \mathcal{P}$.
6. Press **Up** and **Down** together to return to indoor temperature display.
7. Press **Up** until $5 \, \mathcal{C} \, \mathcal{E}$ is displayed.
8. Press **Down** and **Sel** simultaneously, the screen should display $\mathcal{O}$ (if unsuccessful, return to step 6).
9. Press **Up** until 6 is displayed, press **Sel**. The screen should display $\mathcal{L} \, \mathcal{O} \, 1$.
10. Press **Up** until $\mathcal{L} \, \mathcal{O} \, 5$ is displayed, press **Sel**. The screen should display $\mathcal{F} \, \mathcal{O} \, 1$.
11. Press **Down** until $\mathcal{F} \, \mathcal{O} \, 4$ is displayed, press **Sel**. The screen should display $\mathcal{Y} \, \mathcal{E} \, 5$.
12. Press **Down** until $\mathcal{n} \, \mathcal{o}$ is displayed, press **Sel.** The screen should display $\mathcal{F} \, \mathcal{O} \, 4$.
13. Press **Down** until $\mathcal{F} \, 2 \, 3$ is displayed, press **Sel**. The screen should display $1 \, \mathcal{O}$.
14. Press **Down** until $\mathcal{O}$ is displayed, press **Sel**.
15. Press **Up** and **Down** together to return to the L menu and **Up** and **Down** together a second time to return to the indoor temperature display.

Optional: Change the outdoor damper reset delay (Default). This will change the time delay between a protection event and the damper opening. For example, if the delay is 30 minutes, the damper will not open for 30 minutes after protection is triggered.

1. Press **Up** and **Down** buttons together to reach indoor temperature display.
2. Press **Up** until $5 \, \mathcal{C} \, \mathcal{E}$ is displayed.
3. Press **Up** and **Sel** together. The screen should display $\mathcal{E} \, \mathcal{E} \, 5$ (if unit off) or $5 \, \mathcal{F} \, \mathcal{E}$ (if unit on). If unsuccessful, return to step 1.
4. Press **Down** until $\mathcal{A} \, \mathcal{F} \, \mathcal{d}$ is displayed and then press **Sel**.
5. Use the **Up** or **Down** arrows to change the delay to the desired value (120 minutes is default) and press **Sel** to confirm.
6. Press **Up** and **Down** together to return to indoor temperature display.

5. VERIFICATION

When the unit is engaged in free cooling, smoke, cigarettes, or dirt can be used to simulate the trigger for the filter protection device. The outside air damper should be 100% closed within 30 seconds (*note: 18E1C4 damper may take up to 120 seconds to close*).

You may use temperature calibration to trick the system into free cooling if current conditions are not favorable. Reset calibration when verification is finished.

Conditions for free cooling:

(1) Outdoor Temp < Indoor Temp (default: minimum 3.6°F difference)

(2) Outdoor Temp < Setpoint

(3) Indoor Temp above economizer turn-on point (default: Setpoint -4°F)

(4) Humidity below limit (default: 85%)

6. (OPTIONAL) SENSITIVITY ADJUSTMENT

The protection device responds to most types of air borne contaminants including pollen, spores, dust, ash, smog, and tobacco smoke.

The contaminate density that triggers outdoor damper to close is adjustable through internal dials on RT1 and RT2.

To adjust RT1, dial using flat head while measuring VDC reading from Vref to GND. Refer to table below for details.

To adjust RT2, put a flanged screw loosely into the through hole. Then adjust while measuring the reading from Vref to GND. Refer to table below for details.
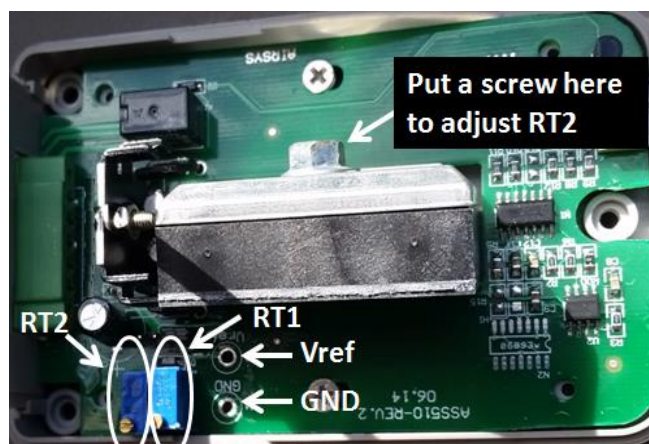

Figure 10: Sensitivity Adjustment

	Trigger Density	RT1 Setting	RT2 Setting
Most Sensitive	0.15mg/m^3	1.2 V	0.8V
Factory Set	0.25mg/m^3	1.8V	1.5V
Least Sensitive	0.35mg/m^3	2.5V	1.8V

Note: RT2 must be a minimum of 0.3V below RT1. RT1 must be below 1.8V before RT2 can be lowered below 1.5V.

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