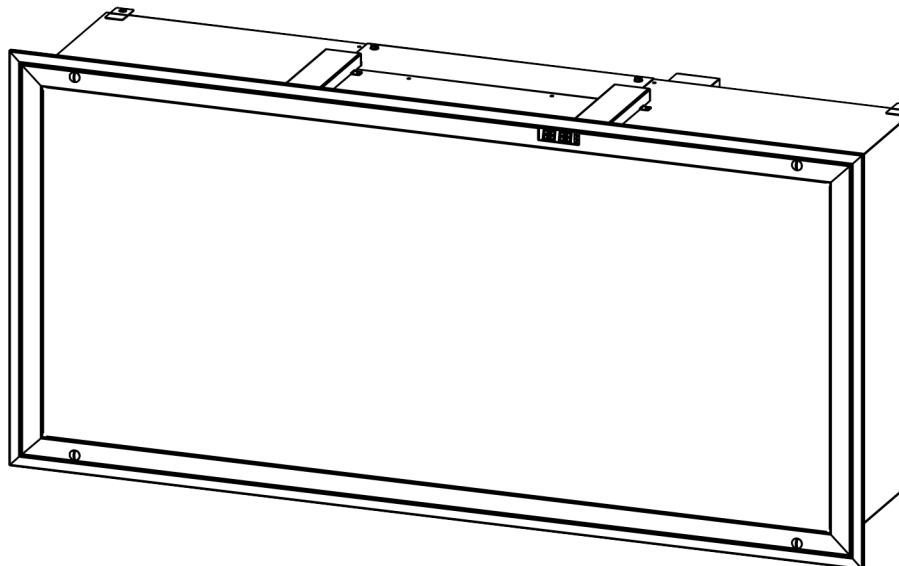




READ COMPLETELY AND SAVE THESE INSTRUCTIONS FOR FUTURE REFERENCE



These instructions cover Fan Filter units (FFUs) with Roomside Replaceable (RSR) Motors).



CEDFFU VS250

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For Non-Standard Sizes, Please Consult the Factory. _____ (H) X _____ (W) X _____ (D) Please Specify Size as Nominal or Exact _____	Customer Initial and Date for Product Specification

Critical operation conditions of the Fan Filter Unit

- DO NOT TOUCH the HEPA filter media. Damage to filter media may void the filter warranty. The screen is to protect against accidental contact with the filter. Never place objects on the filter. Always transport or lift the filter by its frame.
- Prior to powering the unit, verify that it is wired to the correct power supply. The rating plate label located on the electrical box shows the electrical data.
- For replacement parts refer to the model number and serial number on the rating plate label located on the electrical box.

Replacement Part numbers

FFU-RP11 - 48 x 24 x 3.5" High-Flow HEPA filter
 FFU-RP12 - 36 x 24 x 3.5" High Flow HEPA filter
 FFU-RP13 - 24 x 24 x 3.5" High Flow HEPA filter
 FFU-RP14 - 14 x 14 x 3/8 Expanded aluminum pre-filter (2-ply)
 FFU-RP21 - Variable speed motorized impellor (120 VAC)
 FFU-RP22 - Variable speed motorized impellor (208, 240, 277 VAC)
 FFU-RP31 - Main control board
 FFU-RP32 - Airflow measure and display system
 FFU-RP33 - Face control/display board (board only)
 FFU-RP34 - 120 -- 24 VAC transformer
 FFU-RP35 - 208/240 -- 24 VAC transformer
 FFU-RP36 - 277 -- 24 VAC transformer
 FFU-RP37 - Network power control circuit board
 FFU-RP38 - PAO challenge system
 FFU-RP39 - Safety shut-off switch

FPH-RP40 - Resetable fuse (8A up to 240 VAC)
 FPH-RP41 - Fuse holder with fuse (5A @ 277 VAC)
 FPH-RP42 - Cartridge fuse (5A @ 277 VAC)

WHEN ORDERING REPLACEMENT PARTS, PLEASE INCLUDE UNIT MODEL & SERIAL NUMBER AND PO # IF AVAILABLE.



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READ COMPLETELY AND SAVE THESE INSTRUCTIONS

**WARNING - TO REDUCE THE RISK OF FIRE, ELECTRIC SHOCK, OR INJURY TO PERSONS,
ALLOW ONLY QUALIFIED TECHNICIANS TO INSTALL AND SERVICE THE UNIT. ALL
PERSONS SHOULD OBSERVE THE FOLLOWING:**

- a) Use this unit only in a manner intended by the manufacturer.
If you have questions, contact the manufacturer.
 - b) Before servicing or cleaning unit, switch power off at the service panel and lock-out the service in accordance with OSHA (LOTO) practices and procedures to prevent power from being accidentally switched on avoiding accidental electric shock and injury. When the service disconnecting means cannot be locked, securely fasten a prominent warning device, such as a tag, to the service panel.
- Installation work and electrical wiring must be completed by qualified personnel in accordance with all applicable codes and standards, to include fire-rated constructions.
 - When cutting or drilling into walls and ceilings, be careful not to damage electrical wiring and other hidden utilities.
 - If this unit is to be installed within close proximity to water, mark the unit in accordance with applicable codes and standards.
 - This unit is to be used only as intended by the manufacturer. If you have any questions regarding the use, installation, or operation of this unit, contact the manufacturer:



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INSTALLATION CHECKLIST

This is to provide a general overview of what steps should be taken to achieve a successful installation of the fan filter unit. These steps should be performed in the order listed. For more detail see applicable section in this instruction manual. Read the entire manual before beginning installation.

- ☐ Unbox and inspect the fan filter unit.
- ☐ Install the fan unit into the ceiling. Support its weight from structure above.
- ☐ Connect ductwork to fan unit (if applicable).
- ☐ Seal the fan filter unit to the ceiling using gasketing and caulking.
- ☐ If the unit is to be ducted, set upstream air device to produce 0.0" W.C. static pressure at the fan unit inlet.
Use dampers if necessary if installing multiple fan units on the same duct line.
- ☐ Connect main power wiring.
- ☐ Connect control wiring (if applicable).
- ☐ Run the unit and/or upstream air device to flush out construction debris.
- ☐ Install the pre-filter (if applicable).
- ☐ Install the HEPA/ULPA filter.
- ☐ Turn unit on and adjust airflow to design CFM.
- ☐ Turn on the upstream airflow device.
- ☐ Leak test the fan unit and filter per local codes and building procedures.
- ☐ Install the perforated face screen.
- ☐ Verify airflow with a flow hood.



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Installation

The terminal unit is fully assembled from the factory with the exception of the HEPA filter and duct kit (if applicable) which are shipped in a separate box.

Step 1 -- Carefully remove the unit from the shipping carton and inspect for damage that may have occurred during shipping. If shipping damage is found, do not install. Call the supplier to report damage.

Step 2 -- Wipe down unit to remove shipping dust and debris.

Step 3 -- Raise unit into ceiling and lower onto gasketed opening. Gasket should be a closed-cell material approved for the environmental conditions. It is highly recommended to further support the unit from above using the tabs welded to the plenum.

Step 4 -- A qualified technician should connect the unit to the appropriate power supply per applicable codes and standards. Refer to the wiring diagrams included in these instructions. -FFU and -MA units: the electrical box will be accessible from the plenum side. -MEA units: the electrical box will be accessible from the room side.

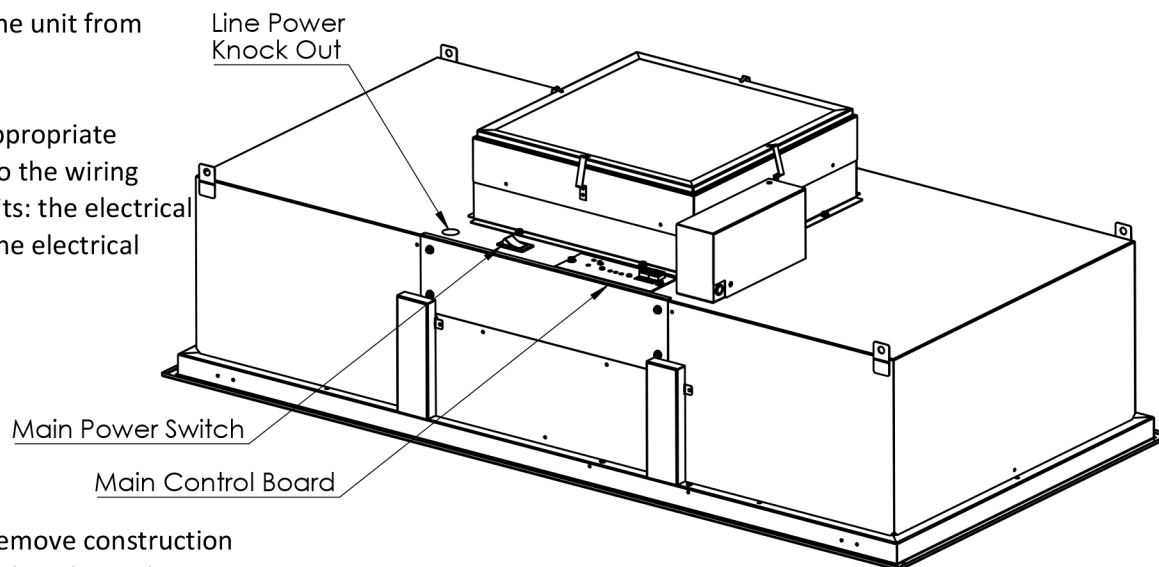
SSLFHFD-FFU-120 --- 120 VAC SUPPLY
SSLFHFD-FFU-208 --- 208 VAC SUPPLY
SSLFHFD-FFU-240 --- 240 VAC SUPPLY
SSLFHFD-FFU-277 --- 277 VAC SUPPLY

Step 5 -- Blow out / clean entire duct system leading to unit to remove construction debris. This is especially important for motor accessible units as they do not have a pre-filter. Wash pre-filter if applicable per "Cleaning the Fan Filter Unit Pre-filter" on page 7.

Step 6 -- Install the HEPA filter per the "Removal and Replacement of the HEPA Filter with Gel Seal" section.

NOTE: If an -MA or -MEA unit is installed in an area with no access above the ceiling, the main power switch **must be turned on before installing unit**.

NOTE: An additional disconnect should be added by others per local codes and regulations.



NOTE: FOR DUCTED INSTALLATIONS, IT IS RECOMMENDED THAT PRIMARY AIR BALANCING TO ACHIEVE 0.0"WC INLET STATIC PRESSURE BE DONE BEFORE FAN FILTER UNIT IS CONNECTED TO DUCT SYTEM.



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A NOTE ABOUT VAV BOXES AND DUCTED APPLICATIONS

In applications where the fan filter unit will be installed downstream of variable airflow devices such as VAV boxes, air valves, or variable air handlers, proper care in unit set-up needs to be taken.

The unit should not be programmed to run as constant airflow in this application. Two variable controllers trying to reach their respective set point will continuously adjust. This will cause issues such as surging, starving, and eventual shut down of the fan filter unit. In this application the unit should be placed into "open-loop" control by turning off the S1-1 dip switch (see pict below). This will no longer keep constant airflow automatically. It will also remove the dirty filter ramp-up feature and the HEPA-lert dirty filter indicator (if applicable) will be set as a static timer of 4400 hours (about 6 months). The set point will now be a percentage of motor torque instead of CFM but it will still display CFM during normal operation. The unit in this setting is still preferable to a PSC system due to the energy efficiency of an ECM versus a PSC motor and all control options are still applicable.

Ducted applications While the fan filter unit can handle some positive or negative static pressure, optimal performance and reliability will be achieved with an inlet static pressure of 0.0" WC or slightly negative.

To reach an accurate 0.0" WC inlet static, it is recommended that the primary air balancing of the duct system be done before installing the fan filter unit. When the duct is at optimal static, install the unit per these instructions and adjust the airflow to the design setting. Verify the airflow with an airflow hood.



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Cleaning the Fan Filter Unit Pre-filter

(when applicable)

WARNING!

Disconnect the unit from the electrical power source before attempting to service the unit.

Note: For maximum performance, wash pre-filter every three to six months at a minimum.

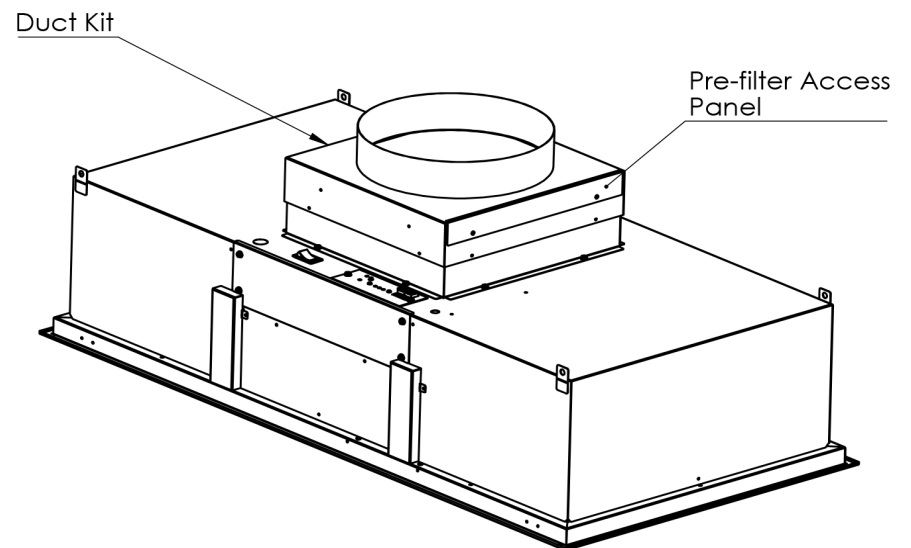
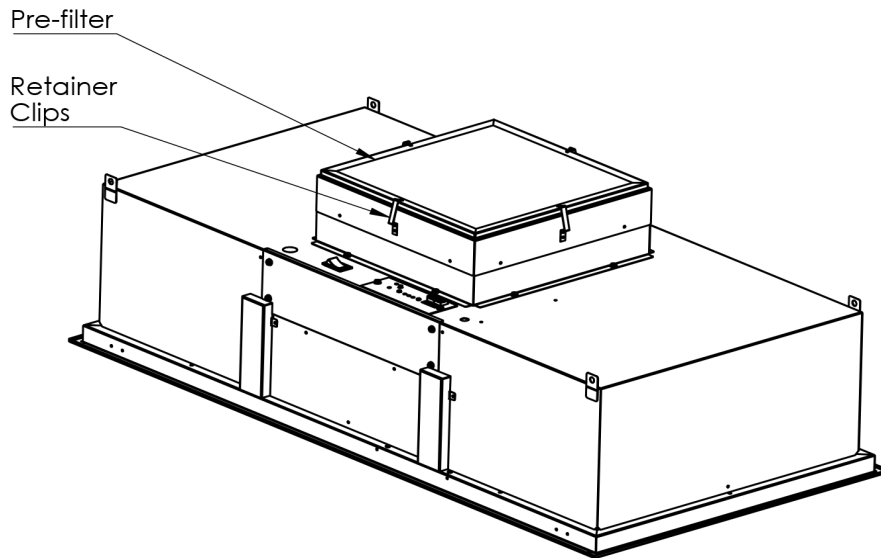
Step 1 -- Turn the unit off with the rocker switch located on the unit.

Step 2 -- Disconnect the unit at the power source or at the service panel in accordance with OSHA (LOTO) practices and procedures.

Step 3 -- Using a driver, remove the screws holding the access panel. This allows access to the pre-filter. Slide the pre-filter out of the duct kit. If the unit is non-ducted, remove the pre-filter from the retainer clips.

Step 4 -- Wash the filter with hot water and a mild detergent and rinse thoroughly. Do not use a caustic solution to clean the filter. Blow dry or let air dry and slide the filter back into the motor enclosure. **Filter should be completely dry before reinstalling into unit.**

Step 5 -- Using the driver, re-secure the cover with the screw.



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Removal and Replacement of the HEPA Filter with Gel Seal

WARNING!

Disconnect the unit from the electrical power source before attempting to service the unit.

WARNING!

The HEPA filter may be protected by an expanded metal screen. The screen prevents accidental contact with the filter media. It is not meant to allow handling of the filter by the media. Handle the filter **ONLY** by the frame.

NOTE: The manufacturer recommends two people to remove and install the HEPA filter in the unit.

Step 1 -- Using a flat screwdriver, release the face frame by rotating the four (4) fasteners a 1/4-turn counter clock-wise. Unhook the safety cables from the filter clips. Set the frame aside.

Step 2 -- Turn the unit off with the switch located on the unit (round, black button).

Step 3 -- Disconnect the unit at the power source or at the service panel in accordance with OSHA (LOTO) practices and procedures.

Step 4 -- USE TWO PEOPLE TO SUPPORT THE FILTER and rotate the swingarm filter clips off of the filter until clip is clear of the filter.

Step 4 ALT (if stud style filter clips) -- Using a 7/16" nut-driver, evenly loosen the nuts holding the filter retaining clips by working your way around the unit loosening the nuts a little at a time. To make installing the new filter easier, loosen the nuts until flush with the end of the threaded stud. USE TWO PEOPLE TO SUPPORT THE FILTER and rotate the filter clips toward the offset hole until clip is clear of the filter.

Step 5 -- Allow gravity to pull the filter away from the unit. If installing a new filter discard the filter in an appropriate manor.

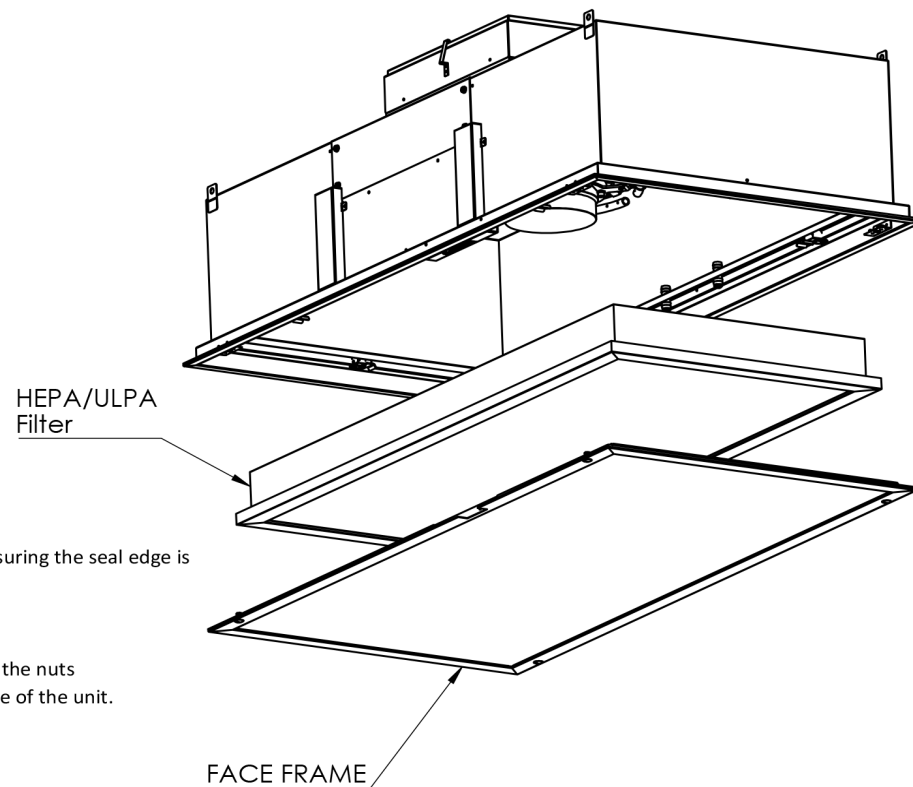
Step 6 -- Unpack the new filter and inspect for shipping damage. If damage is found, do not install in unit; call the vendor for replacement arrangements.

Step 7 -- Using two people, raise the filter into place in between the filter guides (or threaded posts if stud style) assuring the seal edge is approximately in the center of the gel channel.

Step 8 -- While supporting the filter by its frame, rotate the filter clips so that the clips are supporting the frame and are at 90° to the frame. (ALT--Evenly tighten the nuts by working your way around the unit tightening the nuts a little at a time. Stop tightening when the aluminum filter frame contacts the stainless steel housing frame of the unit. **DO NOT OVER TIGHTEN**). Wait at least 30 minutes before performing any challenge testing to allow the gel to fully adhere to the unit.

Step 9 -- Inspect all gaskets and seals for integrity. Reconnect power and turn unit power on.

Step 10 -- Raise the face frame back into place, reattach the safety chains, and secure 1/4-turn fasteners.



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WARNING!
Disconnect the unit from the electrical power source before attempting to service the unit.

Step 1 -- Using a flat screwdriver, release the face frame by rotating the four (4) fasteners a 1/4-turn counter clock-wise. Unhook the safety cables from the filter clips. Set the frame aside.

Step 2 -- Turn the unit off with the switch located on the frame of the unit.

Step 3 -- Disconnect the unit at the power source or at the service panel in accordance with OSHA (LOTO) practices and procedures.

Step 4 -- Remove the HEPA filter and set aside. See sections 2 and 3 for instructions.

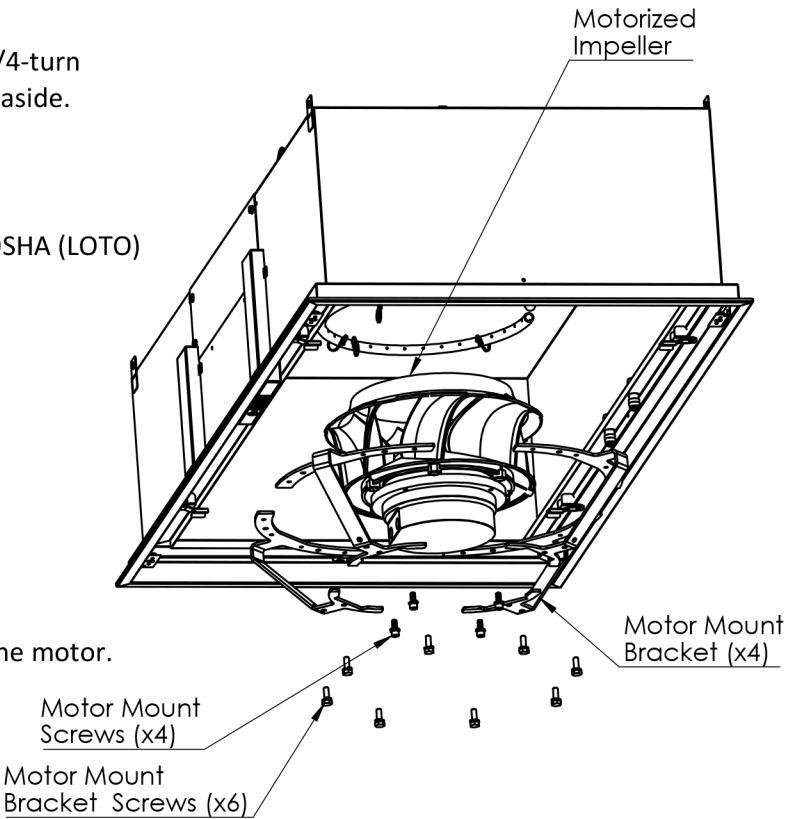
Step 5 -- Disconnect the 3-pin power plug and the 4-pin data plug from the electrical box.

Step 6 -- Use a 7/16" driver to remove the six (6) motor mount bracket screws.

Step 7 -- Lower the motor/bracket assembly out of the unit.

Step 8 -- Use a 4 mm hex driver to remove the four (4) screws holding the motor brackets to the motor.

Step 9 -- Reverse above steps to reassemble the motor/fan/ring assembly into the unit.



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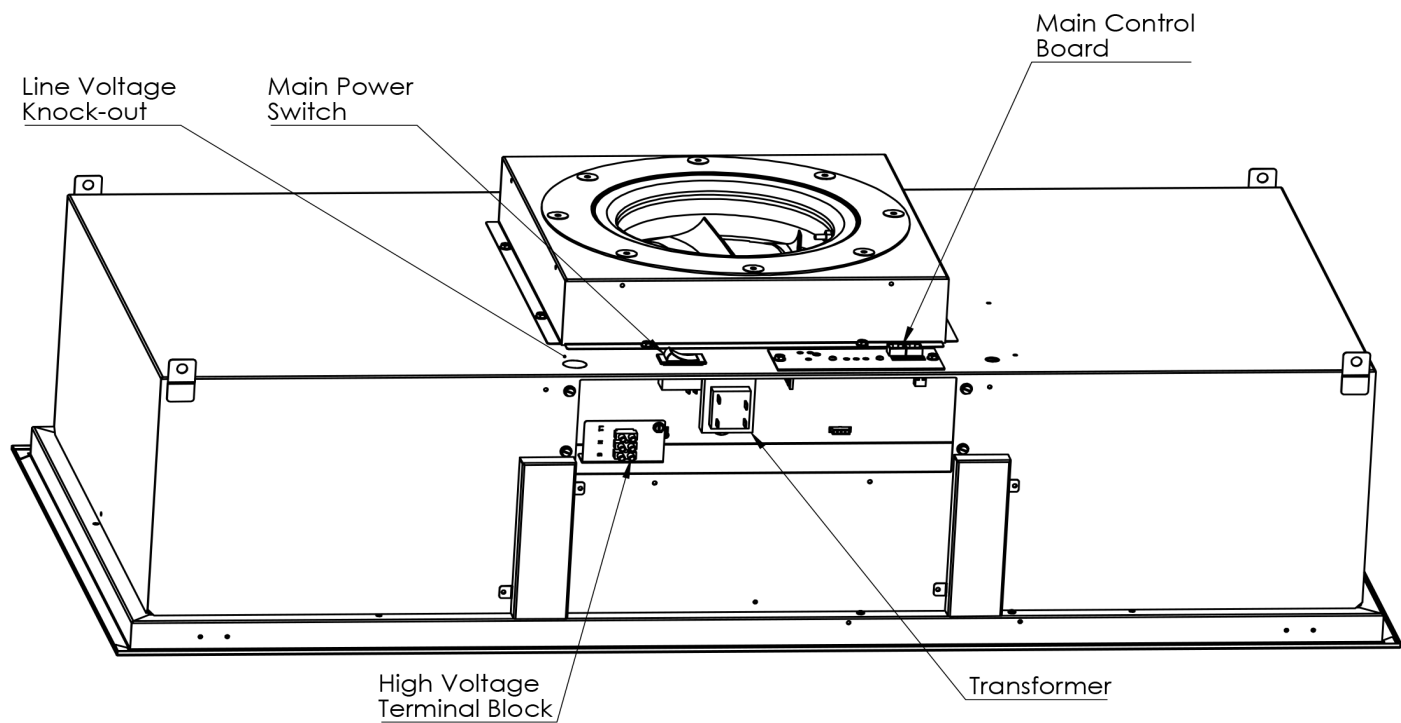
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Access to Electrical Components (Standard Construction)

WARNING!

Disconnect the unit from the electrical power source before attempting to service the unit.

- Turn the unit off with the switch located on the electrical box.
- Disconnect the unit at the power source or at the service panel in accordance with OSHA (LOTO) practices and procedures.



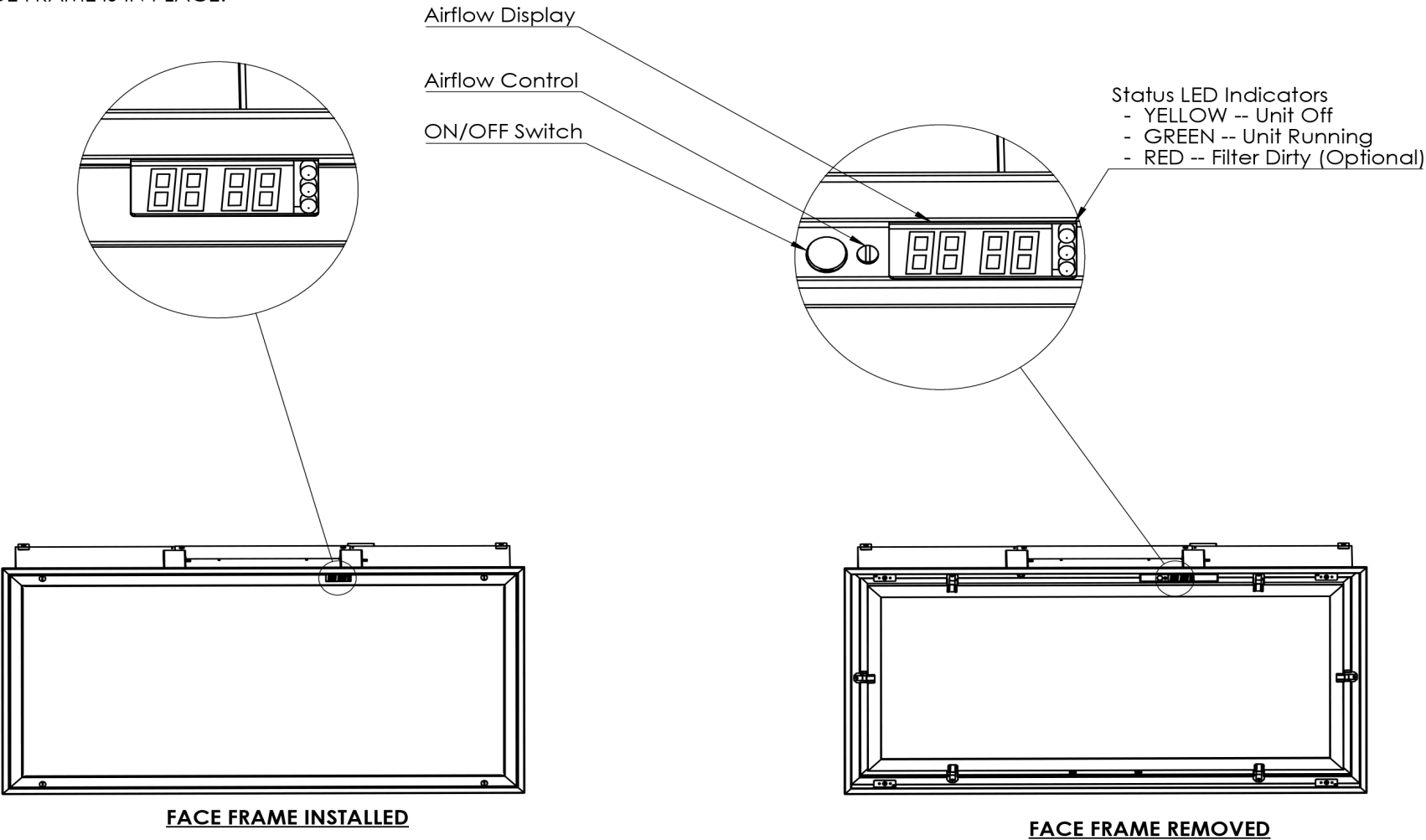
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NOTE: ON/OFF SWITCH AND
DIGITAL CONTROL ARE HIDDEN
WHEN FACE FRAME IS IN PLACE.



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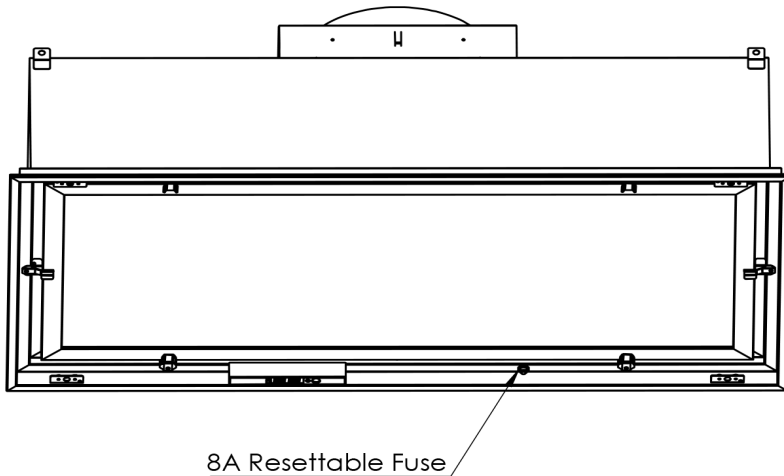
RESETTABLE FUSE

Each fan filter is equipped with an 8 Amp resettable or 5 Amp cartridge fuse to protect the unit from electrical spikes. The fuse is located on the plaster frame close to the display board.

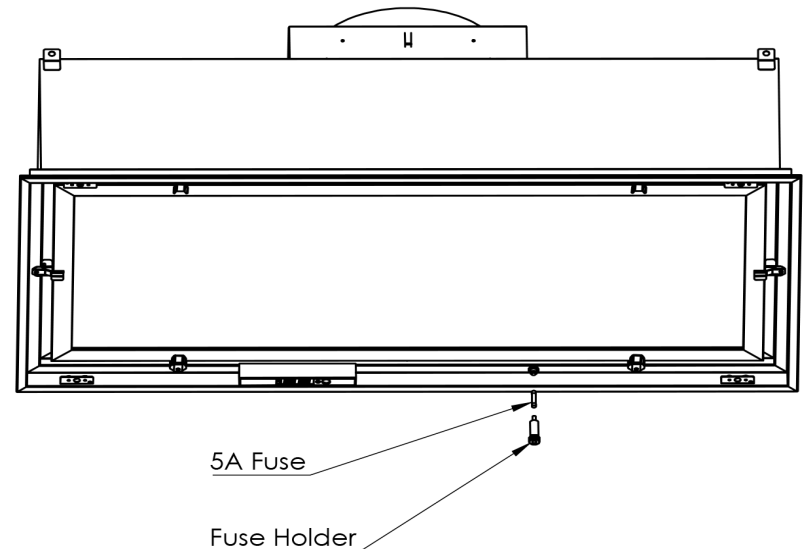
The cartridge fuse can be removed by turning the fuse holder counterclockwise a 1/4-turn. Remove the fuse from the fuse holder and discard. Insert new fuse and replace fuse holder.

NOTE: 277VAC units have a 5 A cartridge fuse. Others have a 8 A resettable fuse.

NOTE: If the unit is installed in an area with no access above the ceiling, the main power switch **must be turned on before installing into the ceiling**.



120, 208, or 240 VAC Unit



277 VAC Unit



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PAO CHALLENGE SYSTEM

An optional PAO Challenge Manifold System is available to provide a reliable, convenient method of performing a challenge test of the fan filter unit at the face.

****These instructions are to assist a qualified technician in testing the leakage of the fan filter unit. Filter should be installed for a minimum of 30 minutes before test is performed**

Step 1 -- Use a flat screwdriver to release the face frame by rotating the four (4) fasteners a 1/4-turn counter clock-wise.
Unhook the safety cables from the filter clips. Set the frame aside.

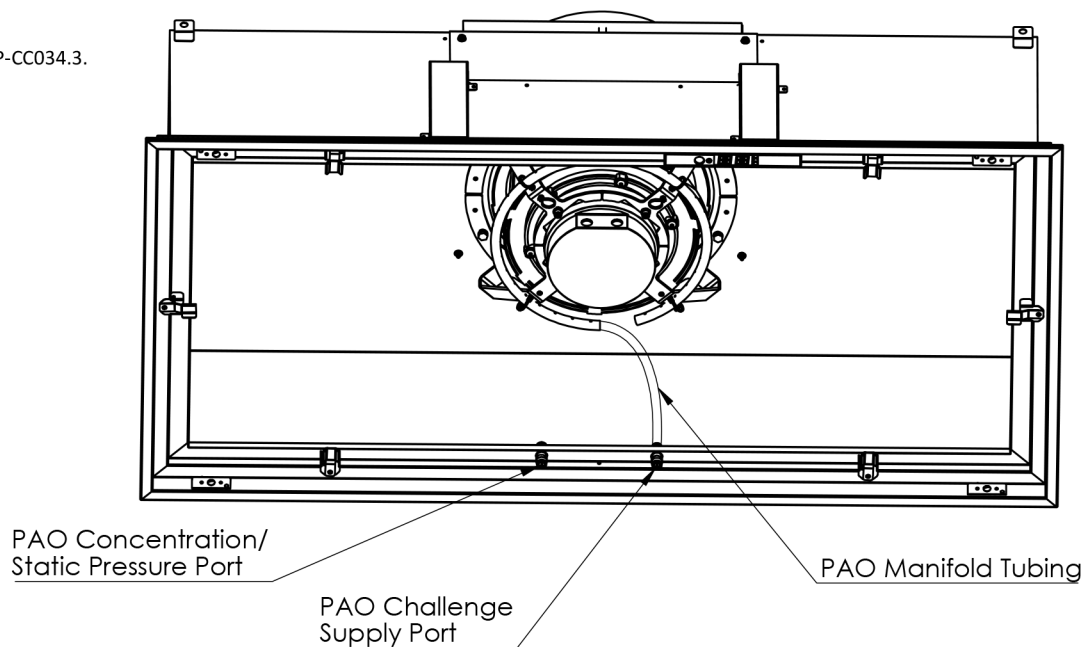
Step 2 -- Use a philips screw driver to remove the plug from the PAO concentration port (Silver Washer). Attach UPSTREAM hose (1/2" ID) from photometer to PAO concentration port.

Step 3 -- Use a philips screw driver to remove the plug from PAO challenge supply port (White Washer). Attach DOWNSTREAM hose (1/2" ID) from photometer to PAO concentration supply port.

Step 4 -- Conduct the challenge test per equipment specifications and IEST-RP-CC034.3.

Step 5 -- Disconnect hoses from ports, and securely replace plugs.

Step 6 -- Raise the face frame back into place, reattach the safety chains, and secure quarter-turn fasteners.



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CONTROLS

The fan filter unit can be controlled through various inputs:

1. Local potentiometer control
 - Adjust airflow from the face (disabled if unit external controlled)
 - Adjust flow from back of unit (disabled if face control present)
2. Individual unit wall mounted control (must be determined before ordering)
3. 0 - 10V/0 - 5V DC Control
4. 0 - 20mA/4 - 20mA Control
5. Full range of network controls including connection to BAS/BMS through MODBUS RTU RS485 control
 - BACNet IP, BACNet MS/TP, & LONWorks available with additional hardware

Additionally, monitoring and control of the FFU can be done through closed loop control from sensors such as pressure transducers, thermostats, particulate counters, etc.

This manual will give basic information on how to connect controls and sensors to the unit. For more details refer to the instructions included with the controller or sensors.



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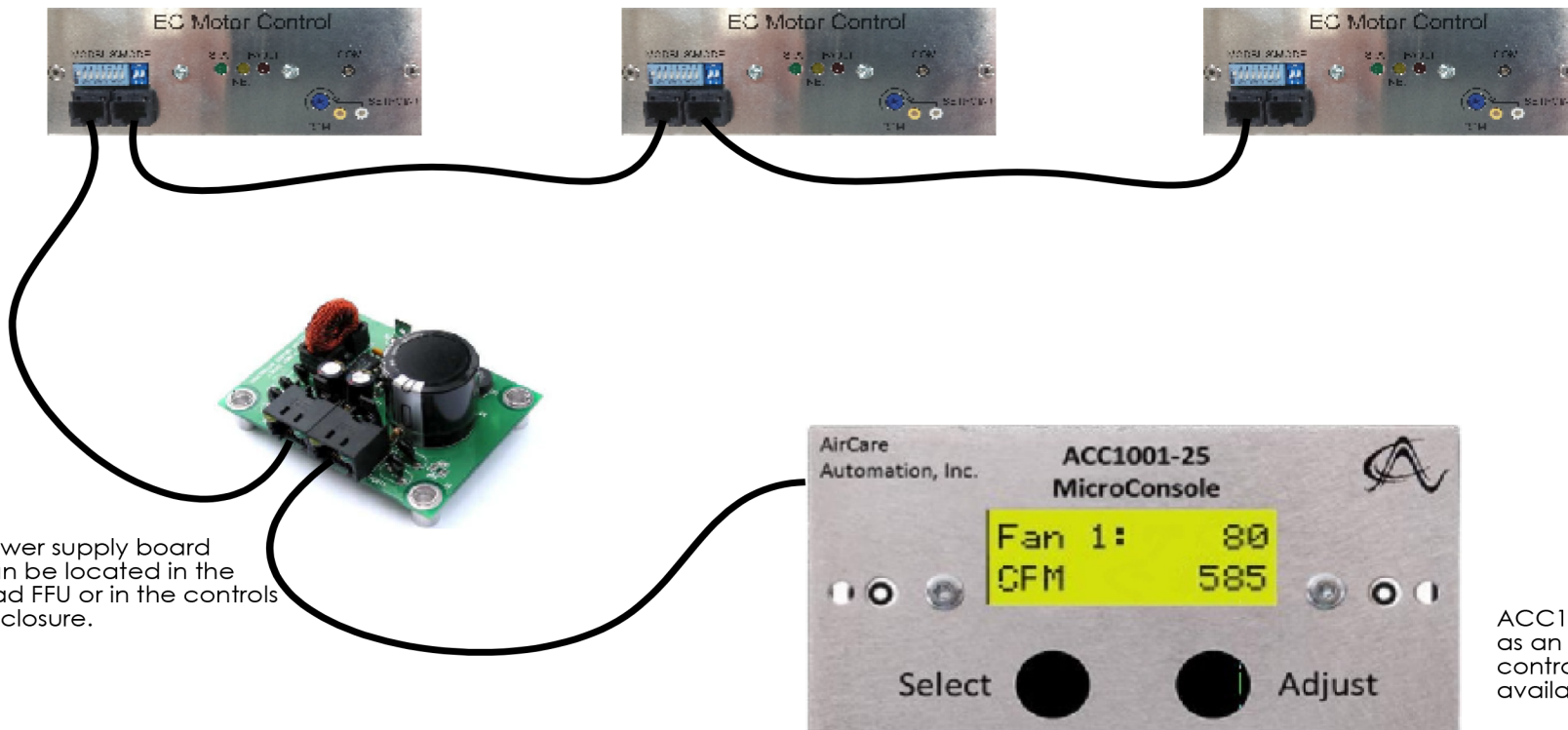
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NETWORKING

When networking the fan filter units either in a local area network (LAN) or connecting to a BAS/BMS system, each unit is connected in a "straight-through" daisy-chain using Cat5e or Cat6 network cables and the on-board RJ45 connectors.

If field cutting network cables, it is important for each end of the cable to be wired identically. However, assembled network cable are available; field assembled cables are the leading cause of problems in new systems.



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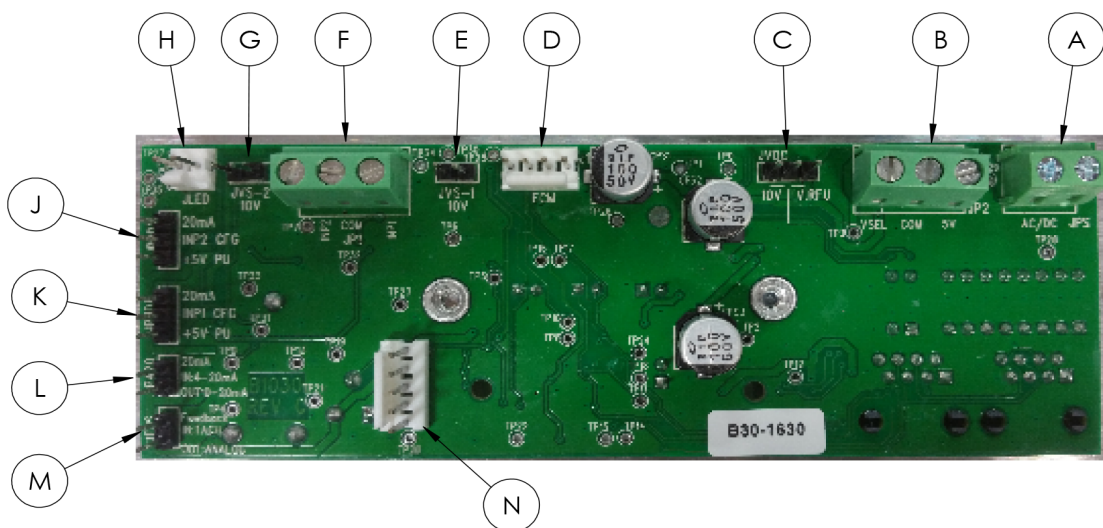
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1. RJ45 Dual Jacks
2. Modbus Address DIP Switches
3. S1-1 and S1-2 Configuration DIP Switches
4. STATUS LED
5. NET LED (network activity)
6. FAULT LED
7. Multimeter Common
8. Multimeter Setpoint as mVDC
9. Multimeter CFM as mVDC
10. Onboard Setpoint Potentiometer



- A. JPS: Bias input power, isolated
- B. JP2: Accessory output voltages
- C. JVDC: Selector for 10V regulated or unregulated rectified and filtered bus voltage
- D. J1: EC Motor Port
- E. JVS-1: INP1 10V signal range selector
- F. JP1: INP1 and INP2 analog/digital inputs
- G. JVS-2: INP2 10V signal range selector
- H. JLED: External FAULT output
- J. JPUD2: INP2 digital input pull-up or 20mA signal format selector
- K. JPUD1: INP1 digital input pull-up or 20mA signal format selector
- L. JP420: 0-20mA or 4-20mA signal format selector
- M. JFBS: TACH or Analog 2 feedback signal selector
- N. Aux Board Port



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NETWORKING

DIP SWITCH SETTINGS

Each fan filter unit in a network must be set to a unique address between 1 and 247. Addresses 248- 255 are declared reserved per MODBUS protocol. A DIP switch block of eight switches are used for addressing. The control board supports Modbus Broadcast Address Zero for single and multiple register write commands (Modbus Function Codes 6 and 16).

Address settings are checked by the board controller only at power-up, so power must be cycled before any changes take effect.

Analog input setpoint modes preserve the ability to monitor and modify register values using a suitable controller console or PLC. Therefore, addressing may be relevant for configuration, monitoring and/or troubleshooting even when units are intended to be used with analog setpoint input.

Address Selection

When adjusted to the ON position, each DIP switch pole represents a value as follows:

DIP Switch Pole	Value
1	1
2	2
3	4
4	8
5	16
6	32
7	64
8	128

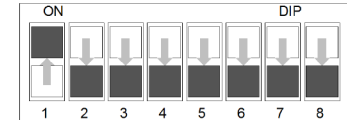
Calculate the address value of existing switch settings by adding the values of each DIP switch pole in the ON position, per the table at left. Construct switch settings for a desired address value by successively subtracting the largest pole value that is less than the desired address value, repeating with each remainder until the remainder is zero. An example is provided below.

Example: Desired address is 114

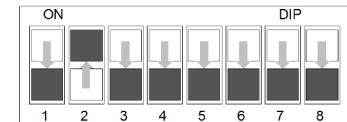
$114 - 64 = 50$ SW1-7 ON
 $50 - 32 = 18$ SW1-6 ON
 $18 - 16 = 2$ SW1-5 ON
 $2 - 2 = 0$ SW1-2 ON

$64+32+16+2 = 114$

*See page 23 for more



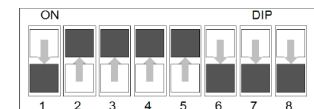
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CEDFFU VS250

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SPECIFICATION INFORMATION	SPECIFIED OPTIONS
Customer Information: _____	
Item Number: _____	
For Non-Standard Sizes, Please Consult the Factory. _____ (H) X _____ (W) X _____ (D) Please Specify Size as Nominal or Exact _____	Customer Initial and Date for Product Specification

CONFIGURATION DIP SWITCHES S1-1 & S1-2

Switch	S1-1	S1-2
	Control Loop Mode	Setpoint Source
OFF	Open-Loop Control	Analog Setpoint
ON	Closed-Loop Control	Network Setpoint

Open-Loop -- Fan filter unit is controlled by a controller, i.e. on-board potentiometer or network controller.

Closed-Loop -- A sensor is used to maintain airflow, i.e. room pressure, roomtemp, or a particle counter.

Analog Setpoint -- Unit is controlled with an analog controller, i.e. on-board potentiometer or individual wall mounted controller (must be determined before ordering)

Network Setpoint -- Unit is controlled with a networked controller, i.e. ACC1 or ACM7052 touchscreen controller

SENSOR SHUNT TABLES

Shunt	JP420	JFBS	JVS-1*	JVS-2*
OUT	0 - 20mA	ANALOG	0 - 5VDC	0 - 5VDC
IN	4 - 20mA	N/A	0 - 10VDC	0 - 10VDC

*Leave shunt out if using a 0-20mA or 4-20mA sensor.

NOTES:

- JP1 is for signal input
- JP2 is for output power
 - connect COM/5V --> 5V power supplied
 - connect COM/VSEL with 10V shunt --> 10V power supplied
 - connect COM/VSEL with V.RFU shunt --> Full wave rectified power supplied (~33VDC)
- INP1 on JP1 wiring block is for monitoring only
 - 0 - 10VDC
 - 0 - 5VDC
 - 0 - 20mA
 - 4 - 20mA
- INP2 on JP1 wiring block is for closed-loop feedback or monitoring
 - Controlling airflow by room pressure or particle counter

Shunt Table for JP1 wiring block

Center Pin to...	JPUD1:INP1	JPUD2:INP2
No connection	ANALOG 5V or 10V	ANALOG 5V or 10V
20mA	ANALOG 20mA	ANALOG 20mA
+5V PU	DIGITAL 10kΩ pull-up TO 5V	DIGITAL 10kΩ pull-up TO 5V

Shunt Table for JP2 wiring block

Center Pin to...	JVDC
No Connection	VSEL = no connection; open
10V	VSEL = 10V regulated
V.RFU	VSEL = DC filtered, unregulated, ~33VDC



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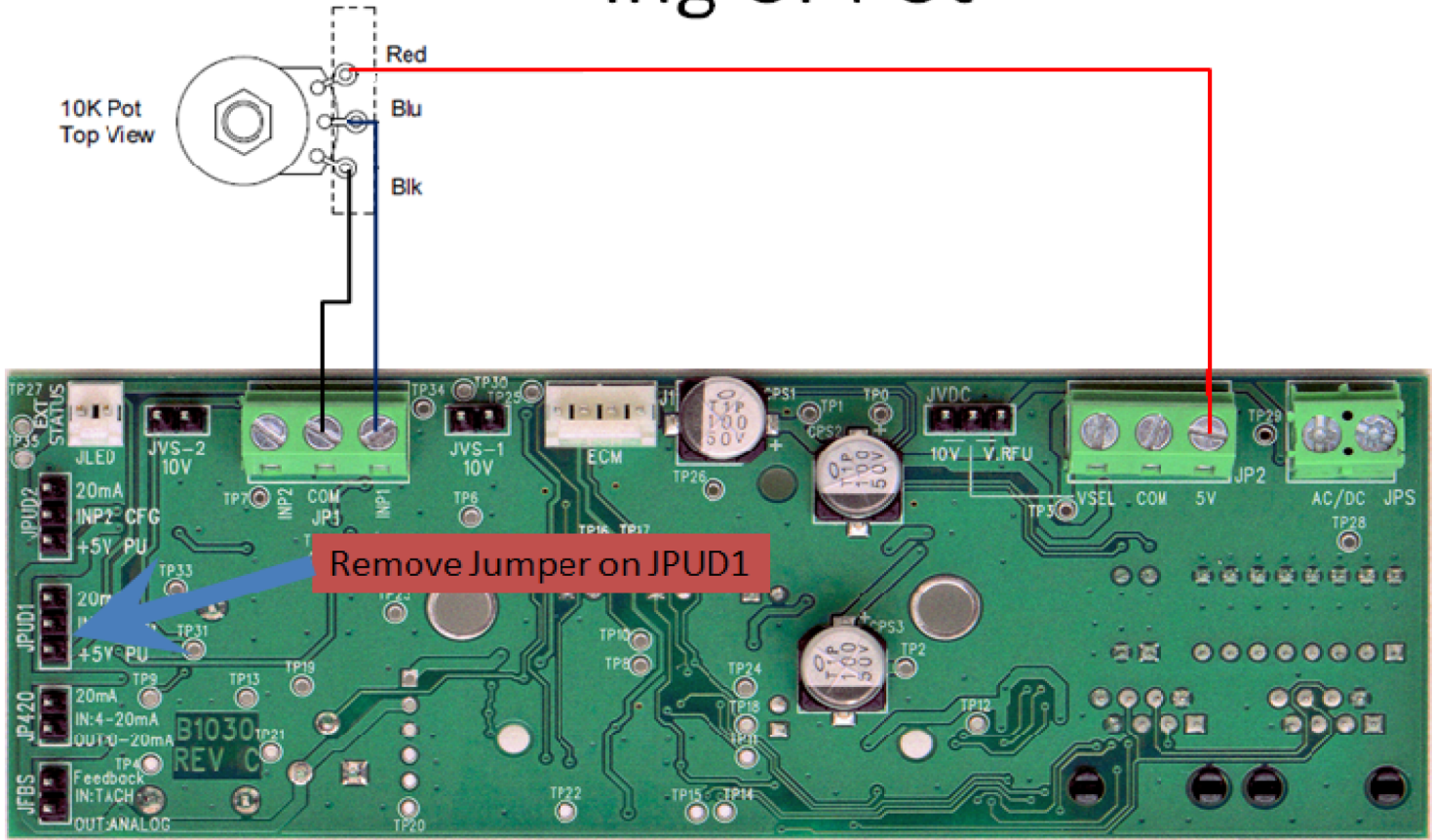
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WIRING A REMOTE MOUNTED POT
TO CONTROL BOARD

Wiring of Pot



CEDFFU VS250

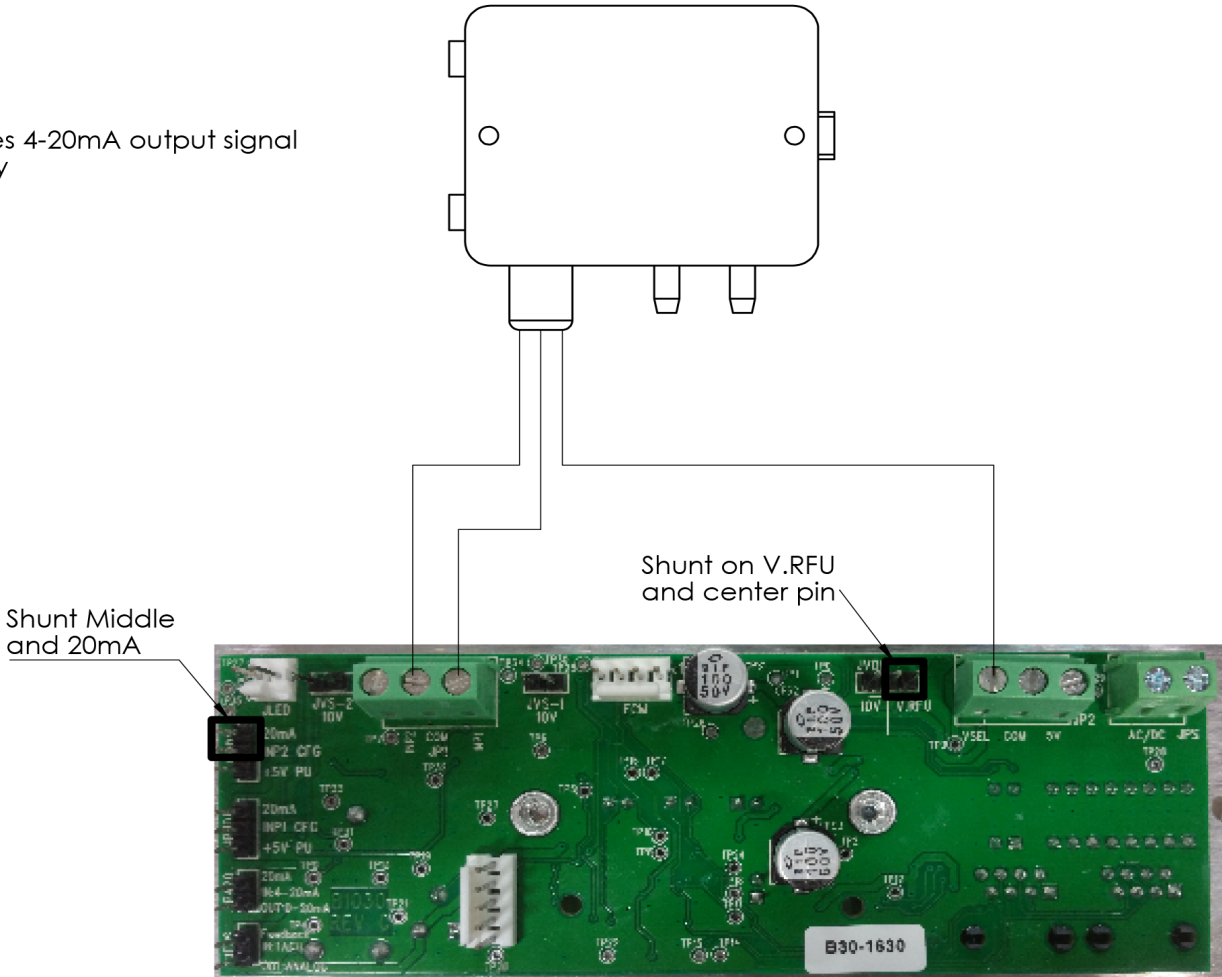
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EXAMPLE OF WIRING A SENSOR TO CONTROL BOARD FOR FEEDBACK OR MONITORING THROUGH CONTROLLER

- Pressure transducer provides 4-20mA output signal
- Powered by ~33VDC supply



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Testing

Each fan filter unit is thoroughly tested at the factory before shipment. However, many codes and standards require testing for bypass leakage after installation. The manufacture encourages that the customer contact an independent, certified testing organization with technicians that are trained and experienced in performance, evaluation, and maintenance of clean air equipment.

The manufacturer recommends at least 30 minutes elapse after HEPA/ULPA filter installation before performing any type of challenge leak testing. The unit should be sealed to the ceiling and the room should have a positive pressure held during testing and normal operation.

Trouble Shooting

Low Airflow

- If optional red HEPA-lert LED light is on, replace the HEPA filter.
- Inspect the pre-filter. Clean or replace as necessary.
- Adjust the digital speed control for higher airflow output.
- Check the power supply for proper voltage, amperage, and distribution frequency
- Verify dip switches are correct for type of controls used.
- Replace HEPA filter if airflow remains low.

High Airflow

- Adjust digital speed control for lower output.
- Verify dip switches are correct for type of controls used.

Non-Laminar Airflow and/or Excessive Contamination

- Insure that upstream airstream is clear of large obstructions.
- Ensure that no other air moving devices are operating in such a way to disrupt the room's airflow pattern.
- Check airflow and if not desired airflow see above.
- Conduct smoke or photometer test on HEPA filter and gel seal. If fail seal or replace the HEPA filter as necessary.



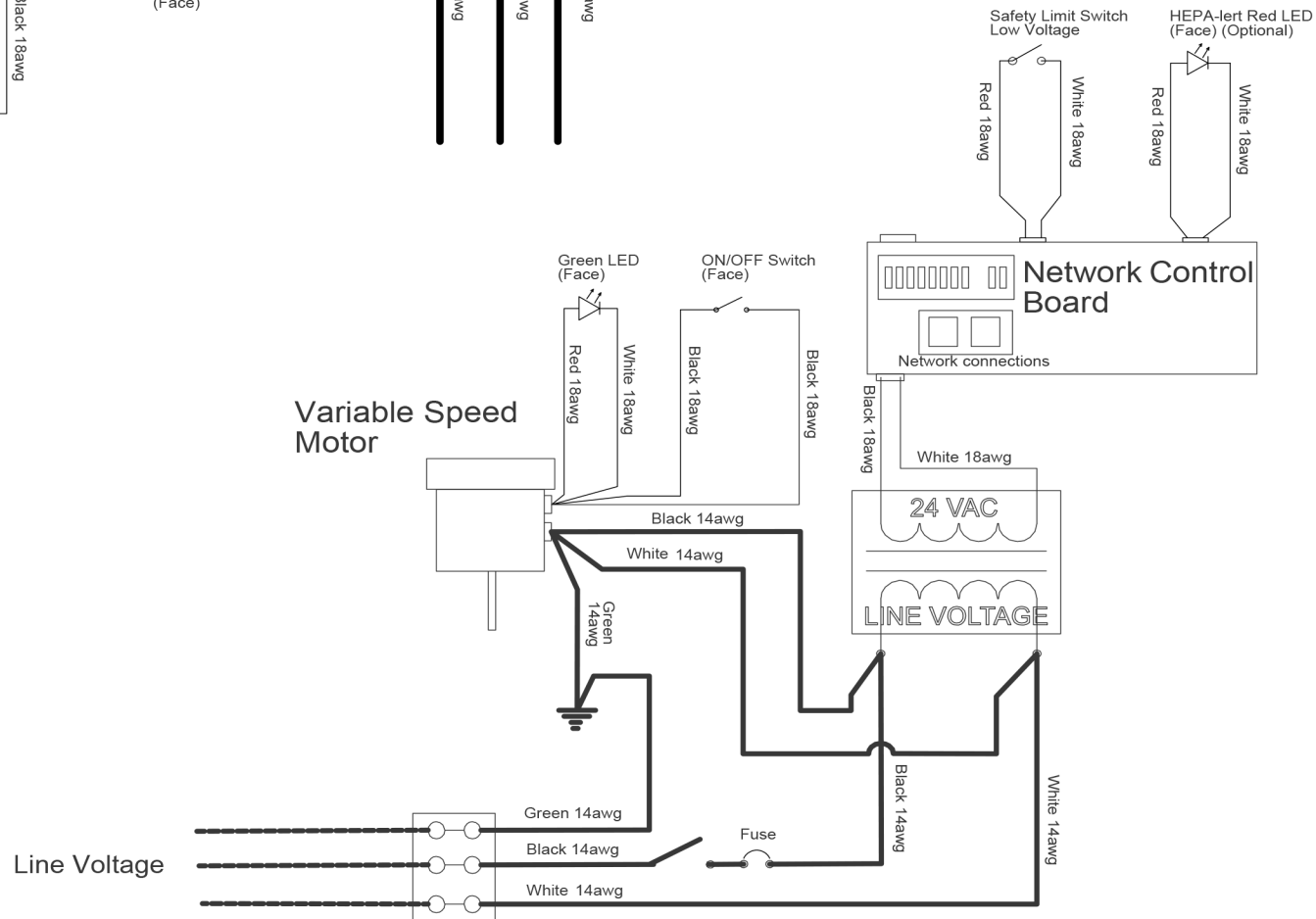
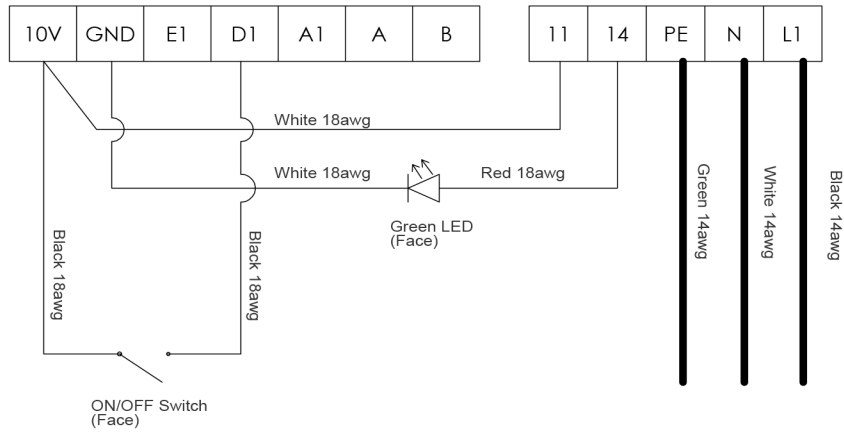
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MOTOR TERMINALS



Legend

— LINE VOLTAGE
— 24 VAC

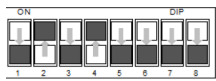


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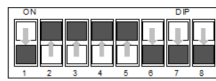
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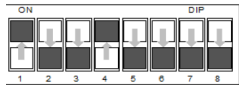
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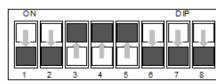
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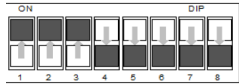
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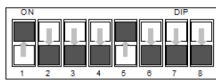
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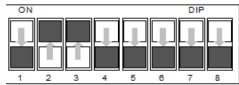
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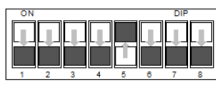
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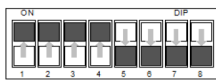
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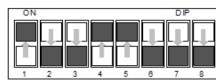
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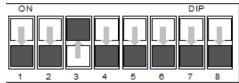
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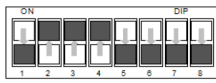
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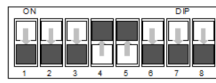
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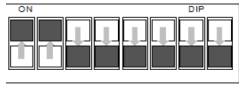
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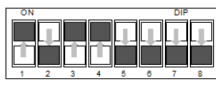
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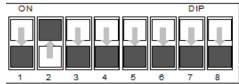
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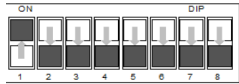
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**DIP SWITCH SETTINGS FOR UP TO 30 FAN FILTER UNITS
FOR MORE UNITS SEE BELOW.**

Calculate the address value of existing switch settings by adding the values of each DIP switch pole in the ON position, per the table below. Construct switch settings for a desired address value by successively subtracting the largest pole value that is less than the desired address value, repeating with each remainder until the remainder is zero. An example is provided below.

DIP Switch Pole	Value
1	1
2	2
3	4
4	8
5	16
6	32
7	64
8	128

Example: Desired address is 114

$114 - 64 = 50$ SW1-7 ON
 $50 - 32 = 18$ SW1-6 ON
 $18 - 16 = 2$ SW1-5 ON
 $2 - 2 = 0$ SW1-2 ON

 $64 + 32 + 16 + 2 = 114$ **CEDFFU VS250**FiltrationGroupIAQ.com

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