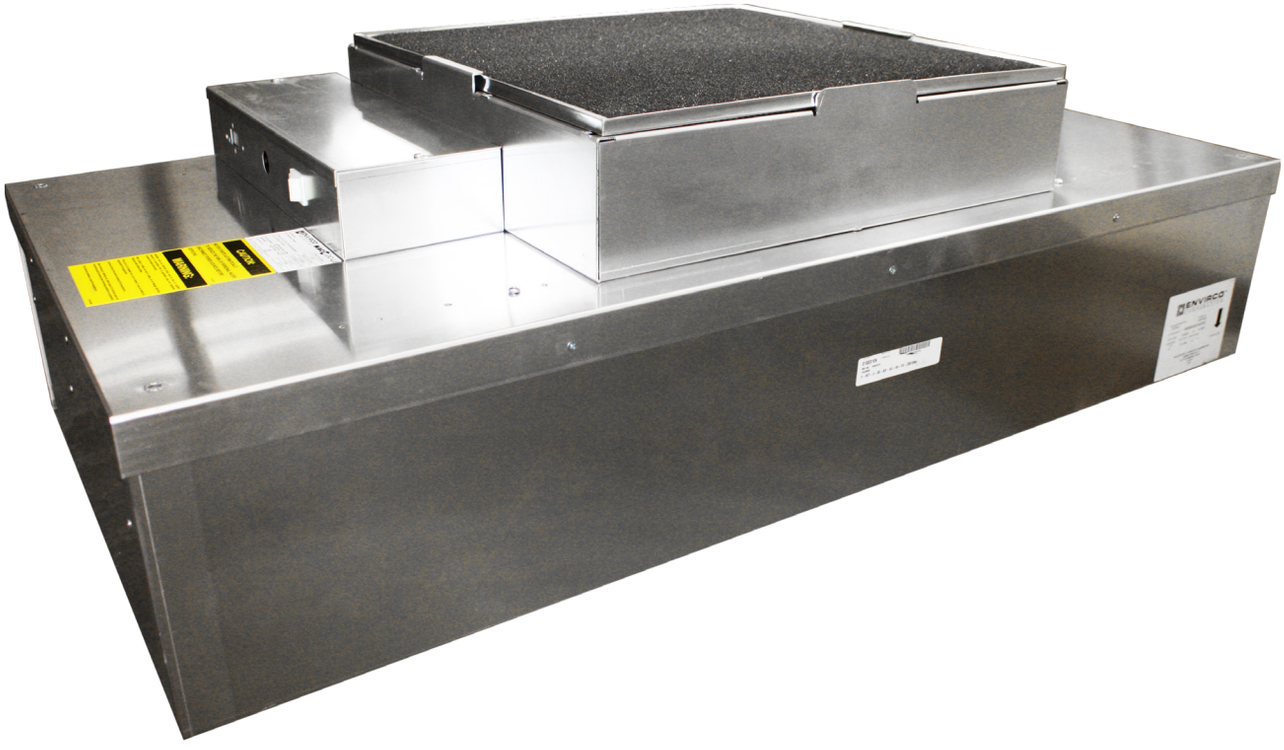
READ AND SAVE THESE INSTRUCTIONS



MAC 10® LEDC/IQ

Fan Filter Unit

Standard, RSR, RSRE, & RSRC Models

OPERATION & MAINTENANCE MANUAL

ENVIRCO Technical Support: 800-884-0002

ENVIRCO®

Innovators in clean air technology

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For MAC 10 4x4, please see manual form #267278.

For assistance, call 800-884-0002 or techsupport@envirco.com with model and job number available.

■ Warning

TO REDUCE THE RISK OF FIRE, ELECTRICAL SHOCK, OR INJURY TO PERSONS, OBSERVE THE FOLLOWING:

A. Installation work and electrical wiring must be done by qualified person(s) in accordance with all applicable codes and standards, including fire-rated construction.
B. When cutting or drilling into wall or ceiling, do not damage electrical wiring and other hidden utilities.
C. If this unit is to be installed over an area using liquid, such as water or chemical cleaning solutions, it must be marked as appropriate for the application.
D. Use this unit only in the manner intended by the manufacturer. If you have any questions, contact the manufacturer.
E. Before servicing or cleaning the unit, switch power off at unit service panel and lock service panel to prevent power from being switched on accidentally.
F. NOTE – The Mac 10 has not been investigated for use in fire resistance rated construction.
G. To fulfill our obligations towards Article 33, in accordance to European REACH Regulation No 1907/2006 EC, we hereby inform you that this article contains the following Substances of Very High Concern mentioned on the Candidate list: Cadmium/ 1,3,5-triglycidyl-s-triazinetrione

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101 McNeill Road
Sanford, NC 27330
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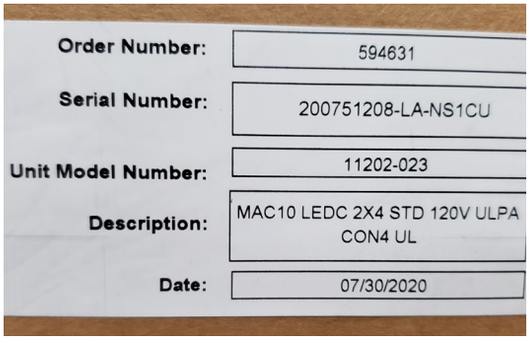
■ Part Numbers Covered by this Manual

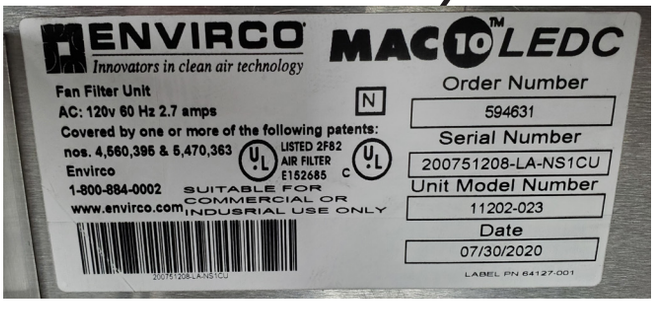
Part Number	Model	Nominal Size	Type	SelNav Model	SelNav Size Code
11202-XXX	MAC10 LEDC	2X4	Standard	MDS	S04
11203-XXX	MAC10 LEDC	2X3.5	Standard	MDS	S03
11204-XXX	MAC10 LEDC	2X3	Standard	MDS	S02
11205-XXX	MAC10 LEDC	2X2	Standard	MDS	S01
11206-XXX	MAC10 LEDC	2X4	RSR/E	MDR/MDRE	S04
11207-XXX	MAC10 LEDC	2X3.5	RSR/E	MDR/MDRE	S03
11208-XXX	MAC10 LEDC	2X3	RSR/E	MDR/MDRE	S02
11209-XXX	MAC10 LEDC	2X2	RSR/E	MDR/MDRE	S01
11274-XXX	MAC10 LEDC	2X4	RSRC	MDRC	S04
11275-XXX	MAC10 LEDC	2X3.5	RSRC	MDRC	S03
11276-XXX	MAC10 LEDC	2X3	RSRC	MDRC	S02
11277-XXX	MAC10 LEDC	2X2	RSRC	MDRC	S01
11074-XXX	MAC10 IQ	2X4	Standard	MQS	S04
11085-XXX	MAC10 IQ	2X3.5	Standard	MQS	S03
11084-XXX	MAC10 IQ	2X3	Standard	MQS	S02
11083-XXX	MAC10 IQ	2X2	Standard	MQS	S01
11089-XXX	MAC10 IQ	2X4	RSR/E	MQR/MQRE	S04
11088-XXX	MAC10 IQ	2X3.5	RSR/E	MQR/MQRE	S03
11087-XXX	MAC10 IQ	2X3	RSR/E	MQR/MQRE	S02
11086-XXX	MAC10 IQ	2X2	RSR/E	MQR/MQRE	S01
11270-XXX	MAC10 IQ	2X4	RSRC	MQRC	S04
11271-XXX	MAC10 IQ	2X3.5	RSRC	MQRC	S03
11272-XXX	MAC10 IQ	2X3	RSRC	MQRC	S02
11273-XXX	MAC10 IQ	2X2	RSRC	MQRC	S01

■ Unit Labels and Handling

1. Touching the HEPA filter will damage it and void the warranty on the filter. The screen is only to protect against an accidental 'touch' of the filter. Never place a hand or tool on the filter. Never lie filter face flat down on a surface and always have filter on its side to protect from damage when not installed.
2. Prior to powering the unit, verify the voltage on the label and that the unit match what is on the box label. Next, verify the unit is the correct voltage desired. The serial number label on the top of the Mac 10 unit has the required voltage. More instructions on unboxing can be found on page 6.
3. To ensure you order the proper replacement parts or complete MAC 10 unit, record the part number and serial number. This information is located on the serial number label, located adjacent to the electrical box. Please locate the filter label and record filter serial number to go with unit serial number and part number. This information will also be on the certificates of conformance covered later in this manual. If you can't locate these labels, please contact ENVIRCO for this information. Once obtained, record the information for reference.

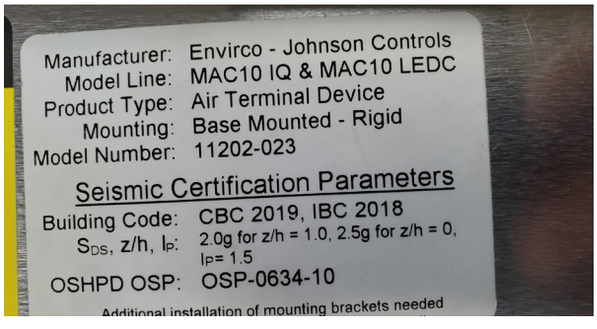


Box Label



Fan Filter Unit Label

Filter Label



OSHPD Label

■ Description Codes

The MAC10 LEDC/IQ will display a code string on the box and serial label labeled as description. This code string provides details about the options and features the MAC10 will come with. A list of standard descriptions is below. If you have questions, contact the manufacturer for more information.

Code	Code Description	SelNav Equivalent
CSL	Motor Controls Remote	CSL
CON4	Universal Control Card	UCC
CPR2X	Challenge and Concentration Port	N/A
E-HEPA	Energuard HEPA Filter	H; EG
E-ULPA	Energuard ULPA Filter	U; EG
HEPA	99.99% @ 0.3 micron HEPA filter	H
IL	Green Unit Running Indicator Light	IL
ILS-PSS	Red Filter Status Indicator Light	ILFS
INSTS	1” Insulation Top & Sides of Unit	Special
IR	Infrared Sensor and Control	IR
IQ	MAC10 Model and CFM Motor Program	MQ
IQLAF	Low Airflow Motor Program for IQ	IQLAF
TQ	Torque Motor Program for IQ	IQTQ
SP	Speed Motor Program for IQ	IQSP
LEDC	MAC10 Model and Torque Motor Program	MD
LSC	1/4 Turn Latch Screen with Lanyard	LSC
PTP	Powder Coated White (Entire Unit)	M02; D02
PTPD	Powder Coated White (Diffuser Screen)	D02
RSR	Room-side Replaceable Filter & CPR2X	-R
RSRE	Room-side Filter & Motor & CPR2X	-RE
RSRC	Room-side Filter, Motor, Control, & CPR2X	-RC
SPS	Pressure Transducer	SPS
SPSC	Pressure Transducer (Factory Wired)	SPSC
SST	Stainless Steel (Entire Unit Minus Filter)	M304; D304
SSTD	Stainless Steel (Diffuser Screen)	D304
SSTF	Stainless Steel Filter	Special
STD	Standard Filter Style	-S
UL	UL Listed	N/A
ULPA	99.9995% @ 0.12 micron ULPA filter	U
WOF	Without Filter Installed	WOF
70MM	70MM Pleat Depth Filter	70
100MM	100MM Pleat Depth Filter	C

■ Installation

Note: The MAC10 LEDC/IQ Fan Filter Unit is completely assembled at the factory with the exception of the optional ¼" (0.64 cm)-20 eyebolts that are used when hanging the unit from an engineered support system (eyebolts not included and need to be ordered separately, p/n 222449-001 or SelNav p/n FFTEB).

Step 1. Carefully remove the unit from the shipping carton and inspect for any damage that may have occurred during transportation. Verify voltage on the serial label matches what is on the box label. Examples of these labels can be seen on page 4. It is recommended to record the part number and serial number of the unit for future reference for parts or assistance. It is the responsibility of the installers and owners of the fan filter units to record serial numbers. Other documents may not be retrievable without this information. Cerficates of Conformance are provided by Envirco. The certificates will be on an envelope attached to the delivered fan filter units. Filter certificates will be located inside the fan filter unit boxes unless filters are shipped separately. Filter certificates in this scenario will be included with the filters. Keep these documents for your records. Contact Envirco at techsupport@envirco.com for more assistance.

Unboxing

Note: When ordering RSR, RSRE, & RSRC units, the HEPA filters may be shipped separately and not installed by the factory.

ENVIRCO Innovators in clean air technology

101 McNeill Road
Sanford, North Carolina 27330
Phone (800) 884-0002

Certificate of Conformance

This certifies that the products listed below, were manufactured and inspected per applicable specifications and drawings. Filter components are leak tested using a MET One particle counter, Model Number (2100B) and are certified to meet the criteria. Every filter has been tested and a certification label is affixed to the filter component of the unit.

CO Number	ModelNumber	UnitSerial	FilterSerial
594689	11206-030	2009753143-LA-NR3CH	H052225-085
594689	11206-030	2009753144-LA-NR3CH	H052225-081
594689	11206-030	2009753145-LA-NR3CH	H052225-105
594689	11206-030	2009753146-LA-NR3CH	H052225-077
594689	11206-030	2009753147-LA-NR3CH	H168330-052
594689	11206-030	2009753148-LA-NR3CH	H168330-081
594689	11206-030	2009753149-LA-NR3CH	H168330-082
594689	11206-030	2009753150-LA-NR3CH	H168330-051

Order Certificate of Conformance

Certification of Conformance / US8 LEAK REPORT

camfil
1 North Corporate Drive
Riverdale, NJ 07457

Date: 9/4/2020 Time: 12:56:52 PM Operator: 0000001
Filter Serial Number: H168330-100
Filter Name: Q5-21.00-45.00-5-40-VU-1D-00-0

This document certifies that the filter identified herein has been manufactured, inspected and found to be in compliance with specifications, drawings, approved samples and/or other requirements stated in your purchase order.

The filter meets the given efficiency and pressure drop and complies with IEST-RP-CC034.2 for scanning leak thresholds.

Customer Name: TRION, INC.
Customer Purchase Order: P22301-00

Sales Order: M28641
Part Number: 85502A974

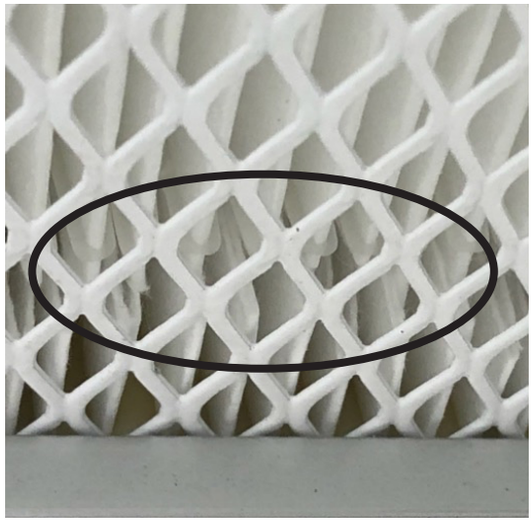
Thomas Beyer - Quality Manager - Camfil USA, INC.
862-228-2521 Email: Thomas.Beyer@camfil.com

Leakage Factor (% Pen.)	2	Dillution Ratio:	15676
Scan Speed (mm/sec)	50	Volume Flow Rate:	926 (m³/h) / 545 (cfm)
Particle Limit:	95	Particles / CFM:	7.787283E+07
Pressure Drop Target (Pa)	102 / .409 (in w.g.)	Pressure Drop Pa)	101 / .405 (in w.g.)
Efficiency Target (%)	99.99	Efficiency (%)	99.999
Lot No:	J	Roll No:	
No of Leaks:	0		
MeasizeX:	1152	MeasizeY:	533

y

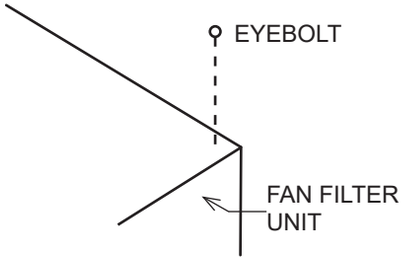
Filter Certificate of Conformance

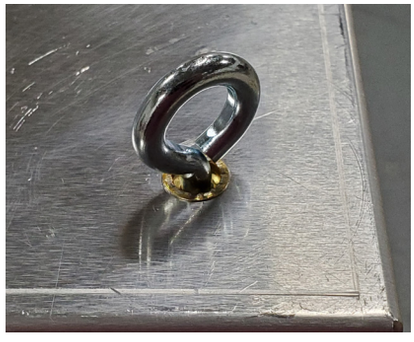
Step 2. Carefully inspect the diffuser face screen for any damage. If standard filter, inspect the filter along the edges for any visible damage. Example of pleat shearing can be seen below. If the unit or filter is damaged, do not install in the ceiling. Document the damage with pictures. Record the serial number of the unit (located on the top of the unit next to the electrical box), description of the damage, and contact Envirco at techsupport@envirco.com for more assistance.



Recommendation: Verify unit runs properly before installing in the ceiling. If unable to provide power, it is recommended to remove the pre-filter and inspect the motor/blower installation for any damage that may have occurred in shipping.

Step 3. If using rigidly supported grid (usually 2” (50 mm) or wider), raise unit through ceiling and lower onto the gasketed grid. If using a flexible grid (typically supported with wires), the unit must be secured to an engineered support system with s-hooks and chain. Screw the four eyebolts into the nutserts on the lid assembly before lifting into an overhead position.
Note: Confirm fan dimensions match T-grid dimensions before installing. Custom size units are available to fit cleanroom grid systems.



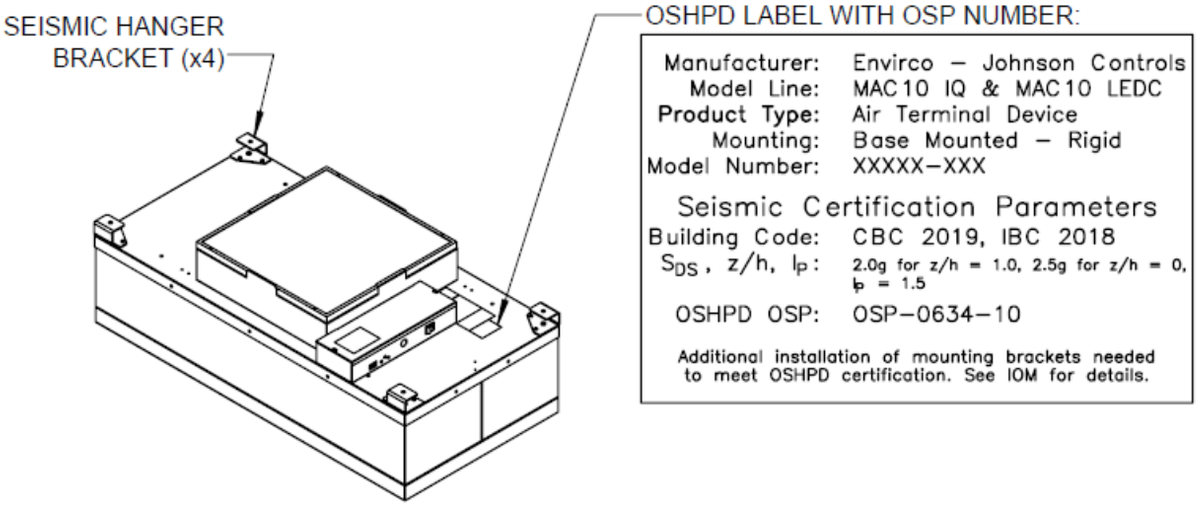


Step 4. Have an electrician wire the unit to the appropriate voltage utilizing the three position terminal block for field connection. Reference the wiring diagrams on pages 12 - 14 and all national and local electrical codes. Verify correct single-phase power, before energizing units.
Step 5. Turn on the power using the rocker switch (ON/OFF) located on the electrical box. For filters shipped loose, let the unit run for a few hours to purge off particulate that may be adhered to the inside of the unit before installing the filters. Do not run fan at full speed as this may cause an overload condition.

Note: It is recommended to have at least 12” above the fan filter unit to remove motor/blower assembly and to allow the fan enough air circulation. If less than 12”, please contact the manufacturer to ensure proper installation.

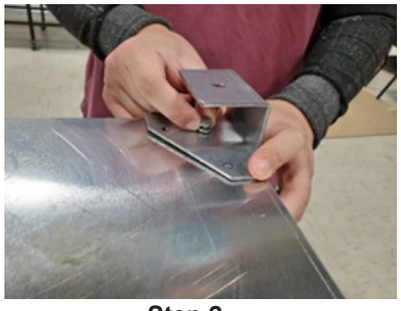
■ OSHPD Installation

The MAC10 LEDC and IQ have OSHPD Seismic Certification pre-approval (OSP-0634-10). The seismic hanger bracket kit is sold separately from the fan filter units and requires field installation. The lateral cable bracing is required as per OSP-0634-10 report (Mason SCB-0/SCBH-0 cable assembly supplied by others). To obtain site specific seismic certificate, please complete the 80000024 - OSHPD form located on the Envirco website and email the completed form to techsupport@envirco.com.



To install the bracket kit:
Step 1. Place brackets in their appropriate corners on the lid. Line up the large mounting hole in each bracket with the nutsert in the lid corners.
Step 2. Secure with a 1/4-20 hex head bolt and lockwasher. Hand tighten only.
Step 3. Line up the remaining two holes on the bottom of the bracket with the corresponding holes in the lid and secure with #8-18 x 5/8" screws.
Step 4. Use a wrench to fully tighten the 1/4-20 bolts.


Step 1.


Step 2.


Step 3 & Step 4.

Nominal Size Unit	Kit Part Number
2' x 4', 2' x 3.5', 2' x 3'	270607-001
2' x 2'	270608-001

MAC10 LEDC Programs

The MAC10 LEDC comes standard with a constant torque program. This program will try and maintain the torque setting chosen by the user through speed control options. Please refer to unit description codes on page 5 to determine motor program or contact the manufacturer for more information.

MAC10 IQ Programs

The MAC10 IQ comes standard with a constant CFM program. This program will try and maintain a constant air volume chosen by the user through speed control options. The constant air volume program is designed to compensate for filter loading. The MAC10 IQ with constant CFM program is **not recommended** in ducted, pressurized air applications and for use in series with CAV or VAV devices. The MAC10 IQ utilizes an EC motor designed to maintain a constant air volume. Two controllers that compensate the air volume in series may cause the motor to shut down or act erratically as it is unable to stabilize the airflow and locate a stable operating point. Envirco advises to use a MAC10 LEDC or different motor program for the MAC10 IQ in the above scenario.

Other programs are available for the MAC10 IQ including a constant torque (IQTQ), constant speed (IQSP), and a low airflow constant torque program (IQLAF). Please refer to unit description codes on page 5 to determine program or contact the manufacturer for more information.

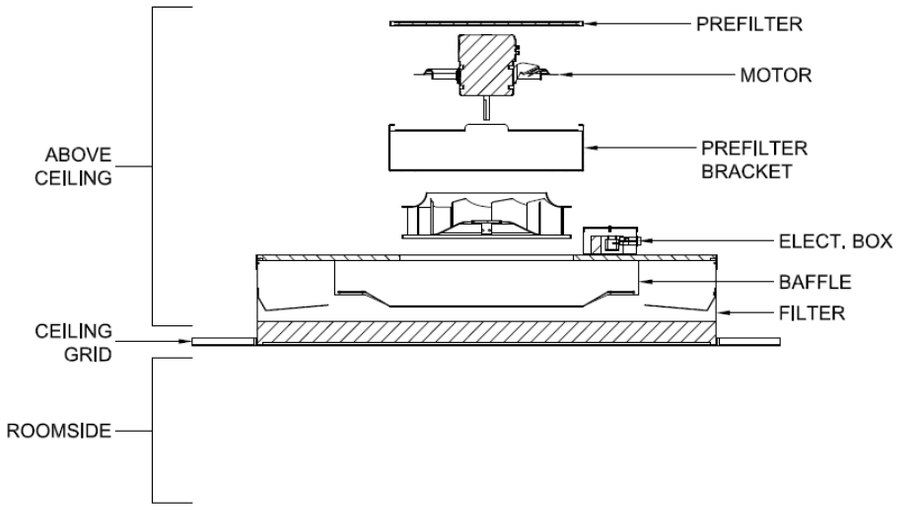
MAC10 Model Styles

The MAC10 LEDC/IQ comes in four different style configurations. These include STD, RSR, RSRE, and RSRC. Examples of these differences can be seen on the next page. Below is an explanation for the abbreviations and a table showing the diffences between the style configurations and what is room-side accessible.

STD - Standard Filter
RSR - Room-side Removable Filter
RSRE - Room-side Removable Motor and Filter
RSRC - Room-side Removable Motor, Filter, and Electrical Box Components

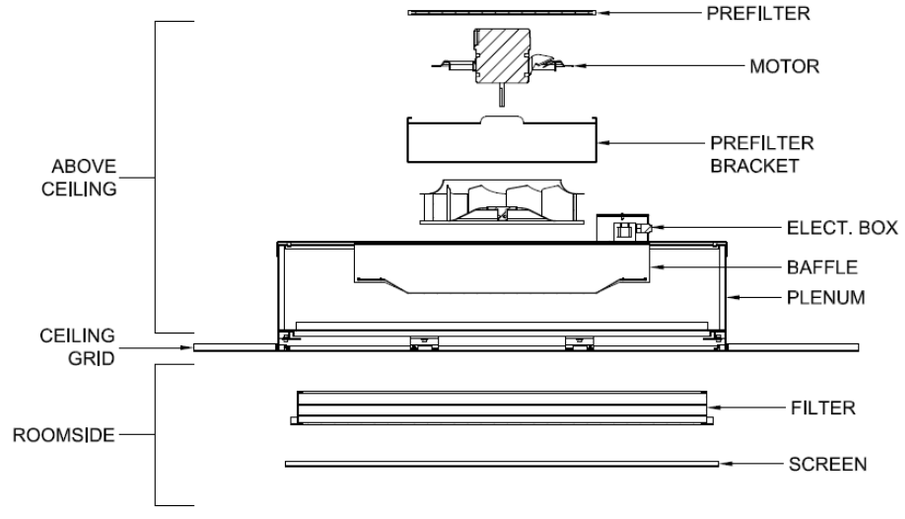
Room-side Removable Feature			
Model Style	**Filter**	**Motor**	**Electrical Box Components**
STD	No	No	No
RSR	Yes	No	No
RSRE	Yes	Yes	No
RSRC	Yes	Yes	Yes

■ MAC10 Standard (STD) Style Configuration



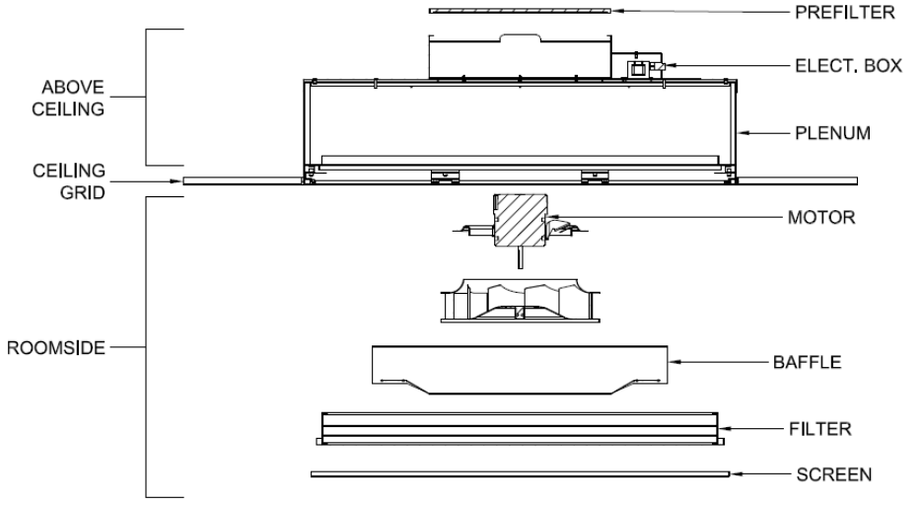
Standard filter configuration above. All components are only accessible from above the ceiling.

■ MAC10 RSR Style Configuration



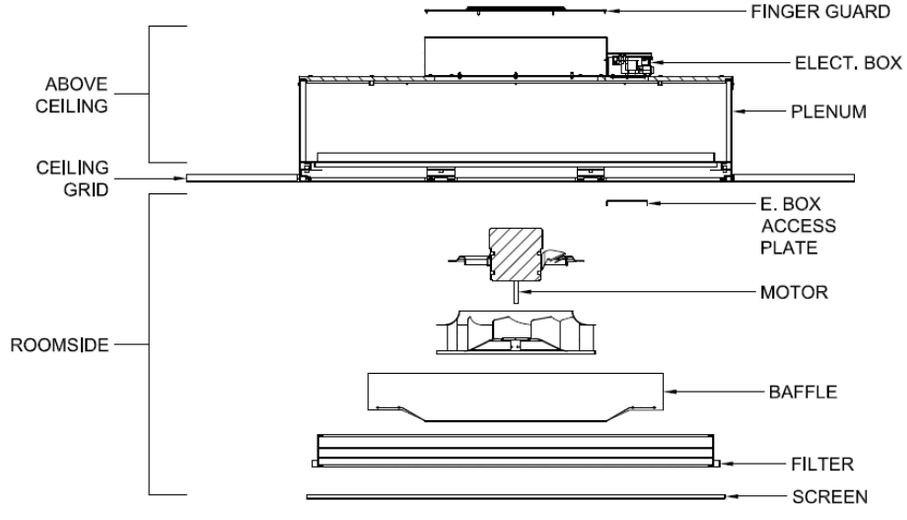
Room-side filter configuration above. The screen and filter can be removed from the room-side. All other components are only accessible from above the ceiling.

■ MAC10 RSRE Style Configuration



Room-side filter and motor configuration above. The screen, filter, baffle, and motor assembly can be removed from the room-side. All other components are only accessible from above the ceiling.

■ MAC10 RSRC Style Configuration

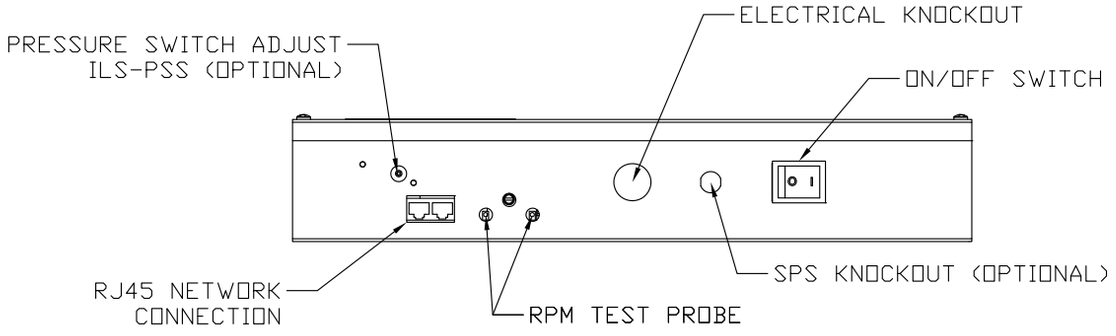


Room-side filter, motor, and electrical components configuration above. The screen, filter, baffle, motor assembly, and electrical components can be removed from the room-side. All other components are only accessible from above the ceiling.

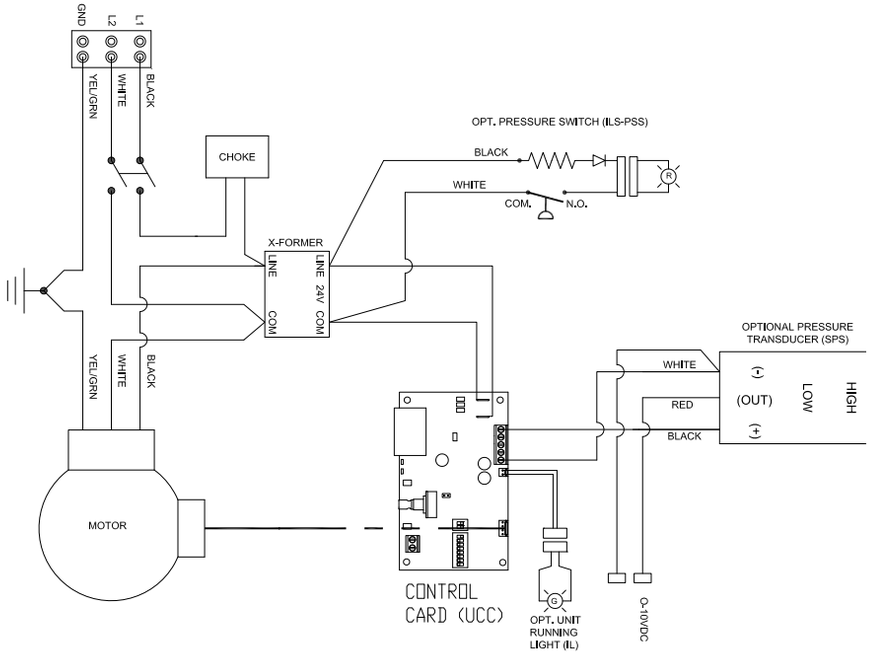
■ Unit Control Box

The MAC10 LEDC/IQ has a variety of available control configurations. The standard offering is the Universal Control Card. Infrared Control Card and the remote Visual Control Unit (ships separately) are also available options. Electrical box face examples are shown for all the control configurations below. Please see the LEDC/IQ Description codes to determine the type of control you have or contact the manufacturer for more information.

Electrical Box Face and Wiring Diagrams
All MAC10 LEDC/IQ units are equipped with a two-position rocker switch (ON/OFF), which is located on the front side of the electrical box, on top of the unit.

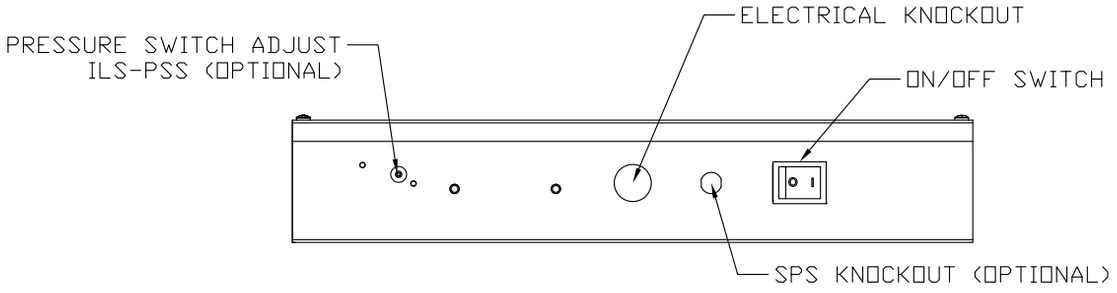


Universal Control Card Electrical Box Face

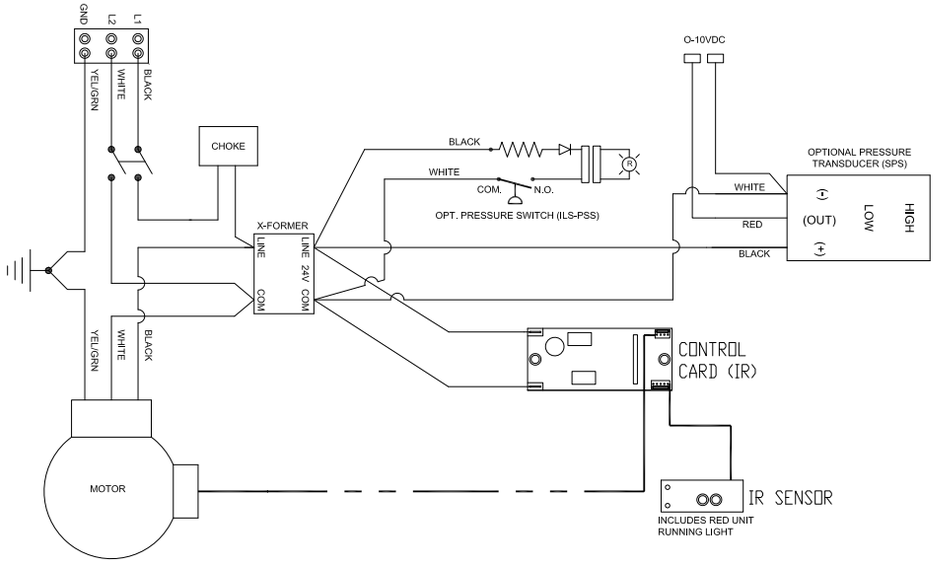


Universal Control Card Wiring Diagram

■ Unit Control Box Cont.

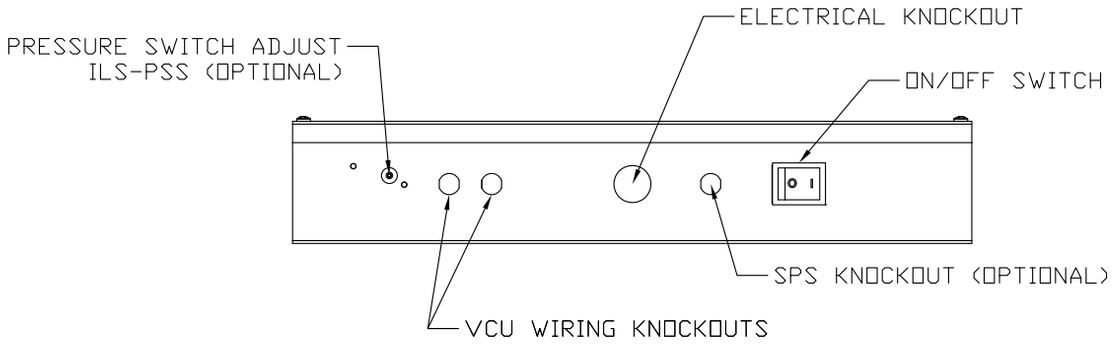


Infrared Control Card Electrical Box Face

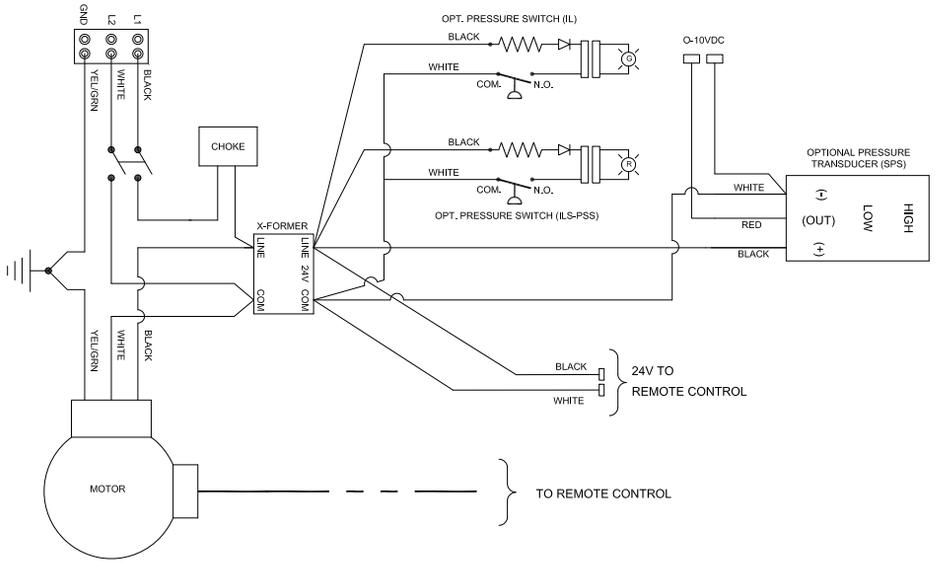


Infrared Control Card Wiring Diagram

■ Unit Control Box Cont.



Remote Visual Control Card Electrical Box Face



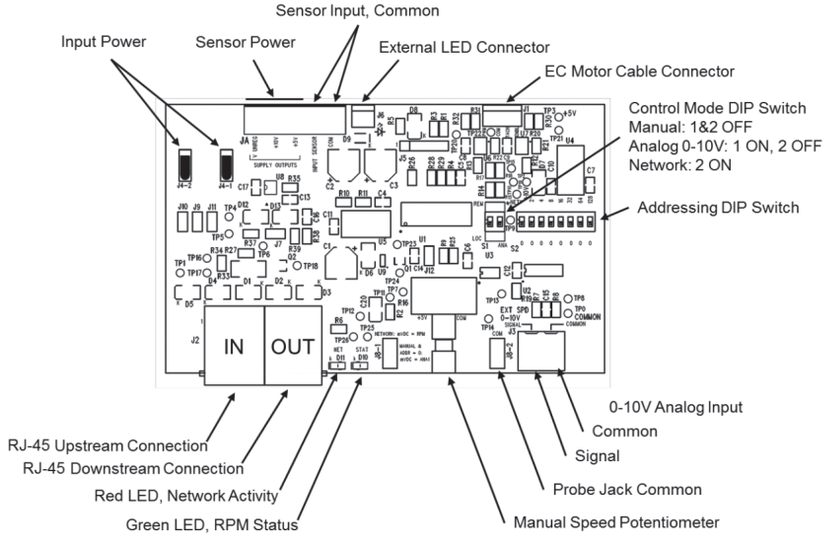
Remote Visual Control Card Wiring Diagram

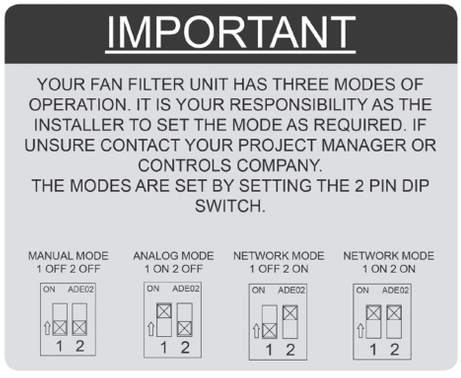
■ Universal Control Card

The Universal Control Card is the standard control option for the MAC10 LEDC and IQ. This section will cover the features, control modes, dip switch setting, specifications, and more in depth information for the control.

FEATURES

- Networkable via an RJ45 serial bus with MODBUS RTU protocol
- Has AC and DC output power available connecting to and for activating external pressure sensors
- 0-10 VDC analog control
- Manual control via onboard potentiometer
- Simple connections
  - Two RJ45 connections for daisy-chain network connections
  - Screw terminals for analog control
  - Text probe jacks for DC mV signal output of RPM and motor control set points
- LED diagnostics
  - Support for external LED (10mA) remote status notification via 2-pin MTA connector
  - Onboard green LED for board status notification
  - Onboard red LED for network traffic
- Powered from network or local supply





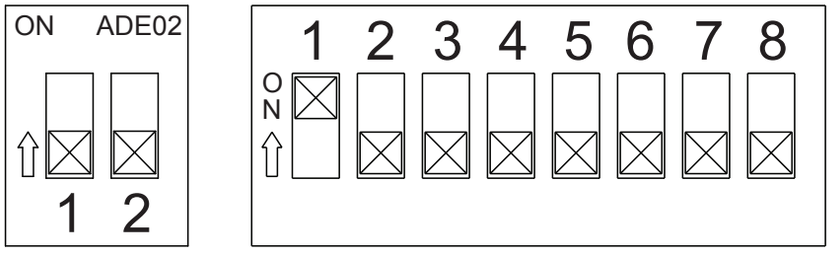
Example of label on unit for Universal Control card. Units come set in manual mode from the factory if equipped with Universal Control Card Option. Please review installation requirements and set up with end user.

CONTROL MODES

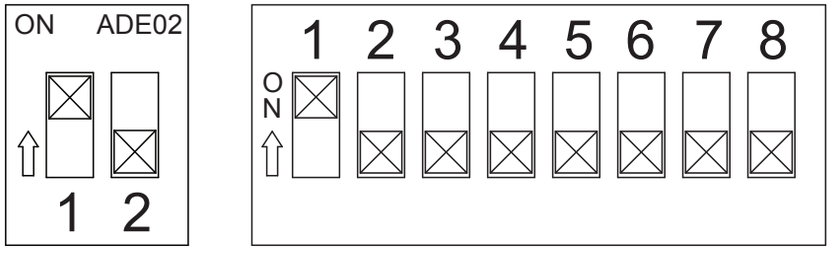
The UCC2 operates in one of three selectable modes. The Mode is selected using DIP Switch S1.

- MANUAL control, on-board potentiometer
- ANALOG control, Remote 0-10 VDC
- NETWORK control, MODBUS RTU

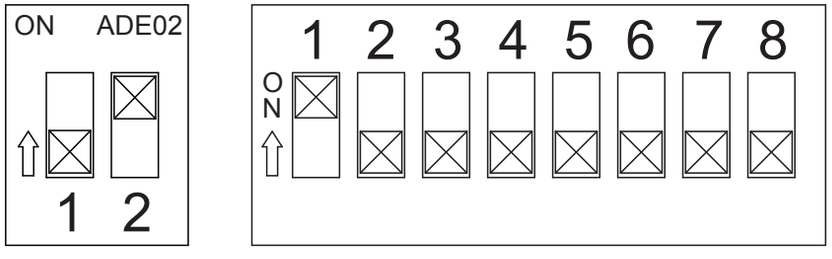
Manual Mode = 1 OFF 2 OFF



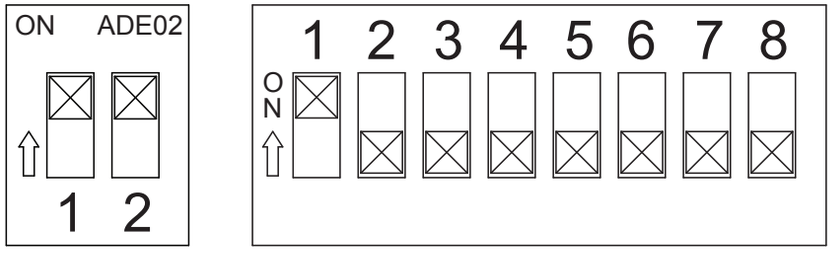
Analog Mode = 1 ON 2 OFF



Network Mode = 1 OFF 2 ON



Network Mode = 1 ON 2 ON

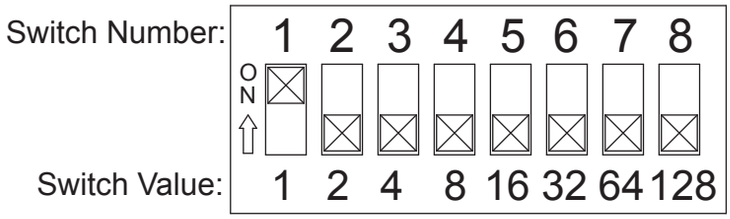


Note: Network mode can be configured using either DIP switch setting shown above.
DIP switch pictorials are for reference and may be labeled differently by the manufacturer.

Manual Control Mode:
In Manual control mode, the motor speed is set using the onboard potentiometer. Onboard potentiometer rotation is clockwise to increase the motor output.

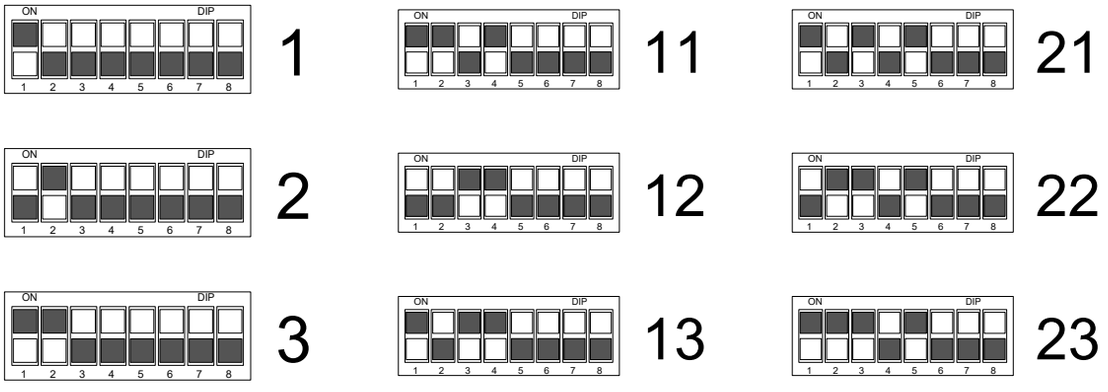
Analog Control Mode:
In ANALOG control mode, the motor output is set using an external 0-10 VDC demand signal.

Network Control Mode:
In NETWORK control mode, the motor output is set using MODBUS Register 2. Motor output is specified as a value from 0 to 100 representing a percentage of motor output based on the motor program. Each UCC2 in a MODBUS network must be set to a unique address. The address value is set in binary using the eight DIP switches of switch bank (S2). A maximum of 200 UCC2 devices is recommended per local area network(LAN). If an ENVIRCO ACC Control Console is the MODBUS master, then addresses should be assigned within the address range supported by the Control Console. Address zero should not be used as it is reserved for global commands. Address switch settings are only checked by the UCC2 at power-up. Power must be cycled (OFF/ON) before any changes take effect. It is recommend to have network cables unconnected while changing switch settings to eliminate possibilty of network power.



Addess DIP Switches
S2

Example of binary S2 switch settings



Daisy-chain networking connection overview:
1. The overall control console's RJ45 downstream control cable is connected to the "IN" marked RJ45 connector of the first FFU in the group, to be noted as FFU #1.
2. Then, a CAT5 network cable is connected from FFU #1's RJ45 "OUT" connector to FFU #2's "IN" connector.
3. All of the subsequent UCC2-equipped FFUs will be daisy-chain connected as noted in steps #1 and #2 above.
4. The final FFU in the system to be controlled will have no cable connected to its "OUT" connector.

ELECTRICAL SPECIFICATIONS

Control and Interface Signals:

1. External Speed 0-10V Input
   - Input impedance 20k Ohms.
   - MIN ON-to-OFF threshold: 190mV*
   - MAX OFF-to-ON threshold: 240mV*
   - ON (~215mV) to 9.89V linearly scales 1 to 99% speed.
   - 9.89V or more deadbands to 100% speed.
2. External LED Output
   - 10mA regulated
   - LED forward voltages up to 5V
3. RPM Signal
   - Signal Value: mVDC = RPM
   - Ex: 900mV = 900RPM
   - RPM Output Range: ~ 0, 5 to 2000 RPM (0, 5mV to 2000 mV DC)
   - RPM Output Resolution: 5RPM (Zero, 400 steps from 5 to 2000 RPM inclusive)
   - RPM Accuracy: +/- 3%

Electrical and Environmental Specifications:

Specification	Min	Typical	Max	Units
Input Voltage	22	24	42	VAC
Supply Frequency	50	50/60	60	Hz
Input Power Consumption	na	na	0.5	VA
Ambient Operating Temperature	0	25	50	C

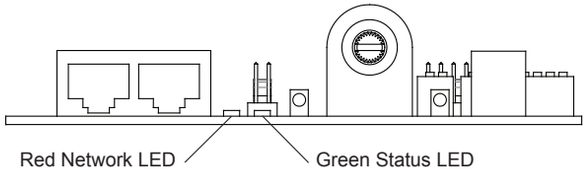
Test Probe Jacks Points:

The test probe jacks may be used to measure the motor rpm or the PWM signal that is being output to the motor.
- In Manual or Analog Control Mode with an Address setting of 1 or greater, the test probe jacks output 0-2000 mVDC representing motor RPM. By changing the address DIP switches to 0, the test probe jacks will output 0-1000 mVDC representing 0-100% demand signal to the motor. The address may be changed without interrupting power to the control card.
- In Network Control Mode, 0-2000 mVDC always represents RPM.

LED Indicators:

- Onboard Status LED (green):
  The Onboard Status LED is software controlled by the unit microcontroller. The Status LED is solid ON when RPM reported by the motor is greater than zero and OFF when RPM reported by the motor is zero. This Onboard Status LED will flash when PWM signal is sent to the motor but no RPM is reported by the motor.
- External Status LED:
  Support for an external Status LED (10mA current-controlled driver), via a 2-pin MTA connector, for remote system status notification. The external Status LED operates in the same manner as the Onboard Status LED.
- Onboard Net LED (red):
  The Onboard Net LED is driven directly by the receive data signal. The NET LED shows all network traffic on a 2-wire network. The NET LED is intended to confirm low-level network connectivity, independent of microcontroller or firmware functionality. If A/B network wires are swapped, the NET LED will be normally on, providing quick diagnostics of this common condition.

Net LED Status Definition	
LED OFF	Power Lost or No Communications
LED Flickering	Network Data Traffic In Progress
LED ON	A/B network wires are swapped



RJ45 Network Cable Connections:

1	2	3	4	5	6	7	8
Bus Power Pass Through	0V (GND)	RS485				0V (GND)	Bus Power Pass Through
		+	NC	NC	-		

COMMUNICATION SPECIFICATIONS

Overview:

- MODBUS RTU protocol over RS485 (serial)
- 9600 baud rate, word length is 8, parity is none(n), stop bits=1
- 255 unique address values selectable by DIP switch settings
- (recommended network node capacity 200 nodes)
- Slew rate limited transceivers for improved network performance MODBUS Register Summary Table
- **DO NOT USE CROSSOVER CABLES. THIS MAY DAMAGE THE CONTROL CARD OR RENDER IT NON-OPERATIONAL.**

MODBUS Register Specifications:

Register	Name	R/W	Values	Default	Origin	Comments
1	RUN/STOP	R,W	0,1	1	RAM	read-only in analog
2	DEMAND SETPOINT	R,W	0-100	50	RAM	read-only in analog
6	SPEED/RPM	R	0,5-2000	-	LIVE	RPM feedback
7	ANALOG_INPUT_1	R	0-1000	-	LIVE	external 0-10V, analog input
8	MINIMUM SETPOINT	R,W	0-100	0	EEPROM	manual & analog only
9	RUNSTOP STATUS	R	0,2	-	RAM	2=Run; 0=Stop
10	NETWORK DEFAULT	R,W	0-100	50	EEPROM	applies in network mode only
12	ACTUAL SETPOINT	R	0-100	-	RAM	value same as Register 2
14	NETWORK RUN-STOP DEFAULT	R,W	0,1,0xAA	1	EEPROM	On startup, 0=Stop, 1=Run, 0XAA=Restart Factory Default
24	ANALOG_INPUT_2	R	0-1023	-	RAM	sensor input (SPSC if applicable)

To reset non-volatile registers to factory default values, write 170 (AA hex) to Register 14, and then cycle power.

■ Infrared Speed Control Card

The infrared speed control is an optional control avaialbe on RSR/E/C units. Please see the LEDC/IQ Description codes to determine the type of control you have or contact the manufaturer for more information.

A Flow-Set handheld infrared remote control is required to adjust the infrared speed control card. Only one remote is required to control all the fan filter units you have in one location. The Flow-Set handheld remote sends infrared remote commands to the EVO/ECM-IRC control, allowing remote adjustment of the Motor. Using the Flow-Set, you can turn the motor on/off, adjust the flow index from 1-100, and read the current settings.

There are two lamps on the unit. A red lamp indicates motor running. A green lamp is used for motor feedback controlling the unit. This will be covered in more detail below.

How to use:
Point the handheld remote at the sensor located near the lamps (red lamp if the motor is on) on the equipment. Operate the on/off button if the unit is off. Press the Enter button after every adjustment if the setting is intended to be saved. If not, the unit will go back to the previous setting after 15 minutes. The red lamp will light up for motor running and the green lamp will light up indicating you are in an adjustment session. Use the Clear button to read the current settings. Point the handheld remote at the sensor and press the Clear button. A green lamp begins to flash indicating the signal was received. The flash sequence indicates the current flow index. The sequence occurs in two sets. The feedback uses long flashes to indicate the tens digit. The next feedback uses short flashes to indicate the singles digit. An extra long flash in the tens set or the singles set indicates the value of the corresponding digit is zero. Examples of the flow index feedback is below:

- A flow index of 24 flashes two longs, then 4 shorts.
- A flow index of 89 flashes 8 longs, then 9 shorts.
- A flow index of 30 flashes 3 longs, then an extra long.
- A flow index of 04 flashes an extra long, then 4 short.
- A flow index of 100 flashes 10 longs, then an extra long.

Use the On/Off button to turn the motor on or off. Point the handheld remote at the sensor on the equipment and press the on/off button. If you press Enter while the motor is off, the motor stays off, even through a power on/off cycle.

Adjust the flow index using the ↑↓ buttons. The ↑↓ button pair on the left adjusts the index ↑↓ 10. The ↑↓ button pair on the right adjusts the flow index ↑↓1. During an adjustment session, the green lamp blinks each time you make a valid entry. If the flow index is already 100, and you try to increase the flow index, the green lamp does not blink, and the increase does not occur. If the flow index is at 91 and you press the ↑↓10 buttons, the green lamp does not blink and the increase does not occur. The green lamp responds similarly when controlling less than 10 (zero is also not a valid flow index). Remember to press the Enter command to save any adjustments. The Clear button will delete new adjustments and revert back to the previous settings during an adjustment session.

Batteries

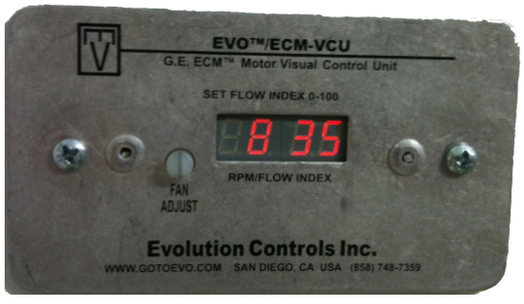
Two AA batteries power the handheld remote. Remove the sliding door on the back of the unit to expose the battery compartment. Remove the old batteries. Insert the new batteries in the position indicated by the battery pictures molded into the bottom of the battery compartment. The battery spring clips are difficult, so you may need to use a small screwdriver to “shoehorn” the batteries into place.

For maximum battery life, store the handheld remote so the buttons are not pressed. While current drain is minimum when the unit is not sending infrared signals, some battery current is drawn to sense the pressed key.

■ Visual Speed Control Card

The visual speed control (VCU) for remote control is an optional control available on all LEDC/IQ units. Please see the LEDC/IQ Description codes to determine the type of control you have or contact the manufaturer for more information.

One visual speed control card is required per fan filter unit. The visual speed control features a 4-digit LED numerical display. The flow index can be adjusted with a screwdriver. Clockwise speeds up the flow index and counterclockwise slows down the flow index. The flow index is a value between 0-100 and can be seen when adjusting with a screwdriver. The LED readout on the visual speed control will alternate between displaying the flow index and the motor RPM.

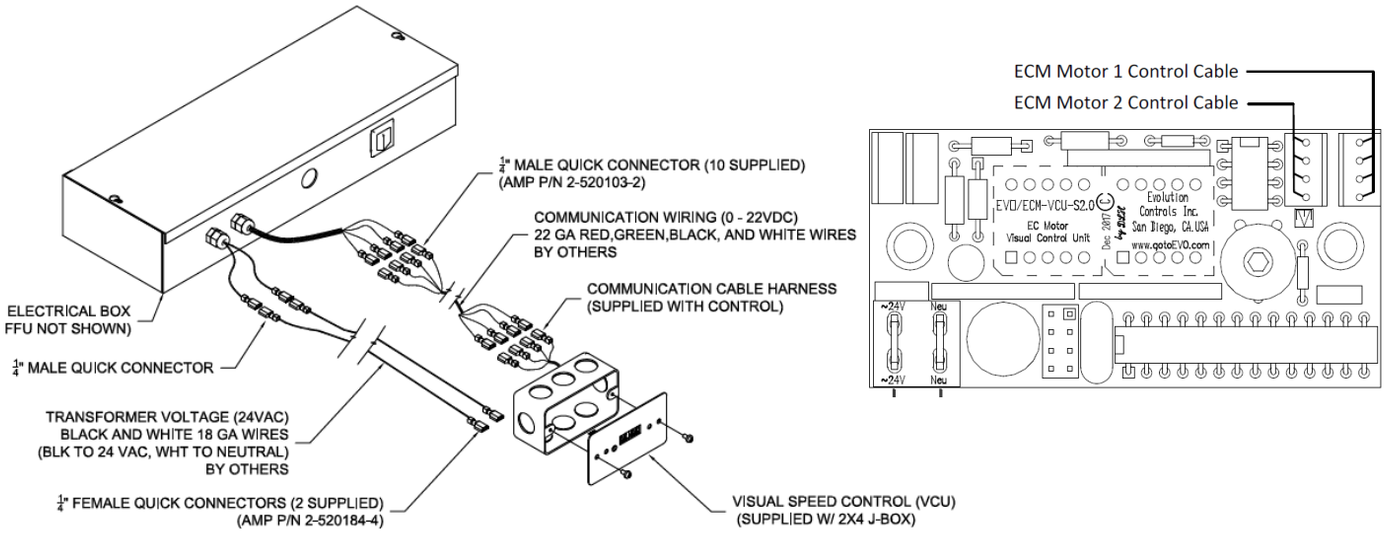


Installing the VCU:
Please refer to the depiction of the electrical box and VCU installation connections and the wiring detail information below.

Please make sure all power is off before making the connections.

- The six leads exiting the FFU electrical box have 1/4” female quick connectors.
- The six leads attached to the control have 1/4” female quick connectors.
- Please follow all applicable local codes for low voltage wiring. Conduit or plenum rated cables may be required.
- The wiring between the FFU electrical box and the VCU require the 18 gauge black and white leads (24VAC) from the electrical box to be connected to the same 18 gauge wire colors on the VCU (white to white & black to black).
- The 22 gauge communication wiring (0-22VDC) is also color coded to assist in installation. Connect the correct wire from the electrical box to the correct wire on the VCU. Red to red, green to green, black to black, and white to white.
- 1/4” male connectors have been supplied with the control to connect between the FFU electrical box and the VCU.
- The VCU board has two ECM connection points. It is recommended to use the ECM Motor 1 connection location. The 4-pin connection is keyed for correct installation orientation.

1/4" MALE CONNECTORS HAVE BEEN SUPPLIED WITH THE CONTROL TO CONNECT BETWEEN THE FFU ELECTRICAL BOX AND REMOTE MOUN
CONTROL WHERE 1/4" MALE QUICK CONNECTORS ARE REQUIRED.

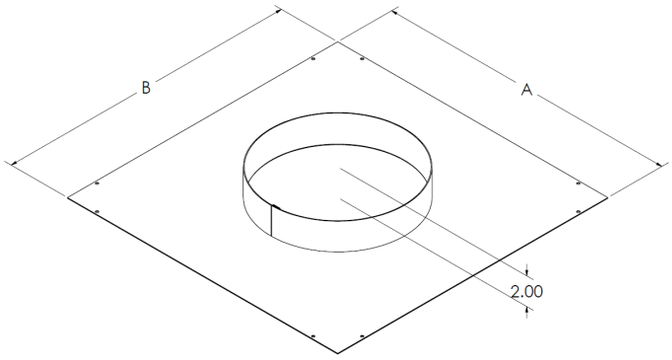


■ LEDC/IQ Duct Collar

Fan filter units have the ability to be ducted and duct collars can be purchased from Envirco. RSRC style units will not utilize a pre-filter, but instead have a finger guard. The pre-filter to the fan filter unit can be removed and discarded when ducting to the fan filter unit. If a pre-filter is still required at the unit, Envirco has side-inlet pre-filter extension brackets sold separately.

Duct Collar Dimensions

Dim A	Dim B	Diameter	Envirco P/N	SelNav P/N
23.25"	16"	8"	11226	FFDC-B01-08
23.25"	16"	10"	10691	FFDC-B01-10
23.25"	16"	12"	10789	FFDC-B01-12
23.25"	16"	14"	11232	FFDC-B01-14
20"	20"	8"	11231-004	FFDC-B02-08
20"	20"	10"	11231-001	FFDC-B02-10
20"	20"	12"	11231-002	FFDC-B02-12
20"	20"	14"	11231-003	FFDC-B02-14



Install Procedure

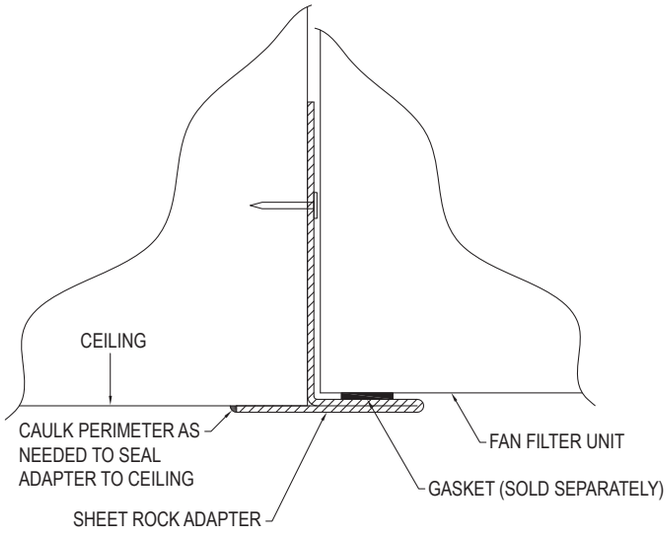
Tools Required: Phillips Head Driver.
Step 1. Switch the ON-OFF switch to the off position.
Step 2. Remove the 4 screws securing the 20” x 20” prefilter or 16” x 23.25” pre-filter to the frame. Keep the removed screws. Discard the pre-filter. If pre-filter is still required, install side-inlet pre-filter expension bracket (sold separately).
Step 3. Slide duct collar in place. Screw down onto bracket using the 4 screws kept from previous step.

■ Sheetrock Adapters

Fan filter units must be placed in a gasket grid or frame for proper sealing. A sheet rock adapter frame can be used for hard ceiling application. When using a sheet rock adapter frame it is impertive to make a proper seal. This can be done by applying gasket to the adapter frame prior to placing the fan filter unit (FFU) into it. Metal to metal will not make a proper seal.

Install Procedure

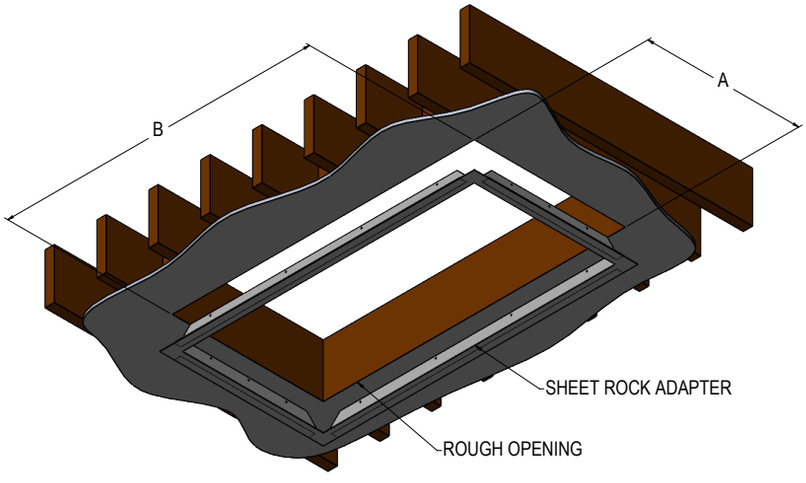
Step 1. Frame the proper opening in the ceiling for the fan filter unit size you have, per the table blow.
Step 2. Apply gasket (sold separately, see parts list) to the fan filter unit metal to gasket flange. (Metal to metal will not seal).
Step 3. Secure the adapter to the rough opening using the appropriate hardware.
Step 4. It is recommended to caulk the perimeter of the adapter.
Step 5. Test the fan filter units to ensure they are fully operational before placing in the sheet rock adapter frame.
Step 6. Place the fan filter unit into the sheet rock adapter frame. RSR/E/C style units will allow replacement of the gel seal filters through the adapter opening.
Step 7. It is recommended to create as many access panels as possible in the ceiling for the ability to access units from above as required.



Rough Opening Sizes (Inches)

Adapter Size (FFU Actual)	A	B
4’ x 4’ (47.63” x 47.63”)	48”	48”
2’ x 4’ (23.63” x 47.63”)	24”	48”
2’ x 3.5’ (23.63” x 41.63”)	24”	42”
2’ x 3’ (23.63” x 35.63”)	24”	36”
2’ x 2’ (23.63” x 23.63”)	24”	24”

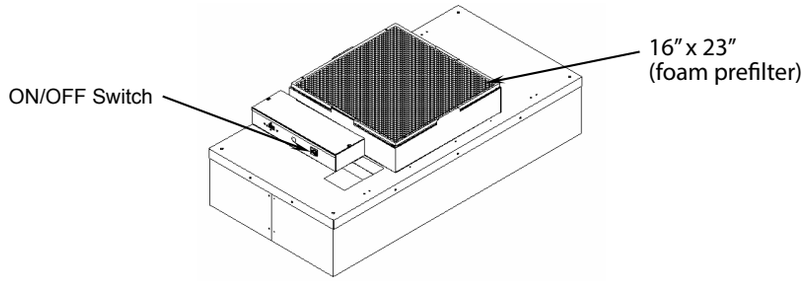
Tolerance = + 1/8” / -0



■ Service: Changing the LEDC/IQ Pre-filter (foam)

Tools Required: Phillips Head Driver.
Note: To keep the filter in top operating condition, washing and/or cleaning the foam pre-filter is recommended every three to six months. Frequency is unique to each application.

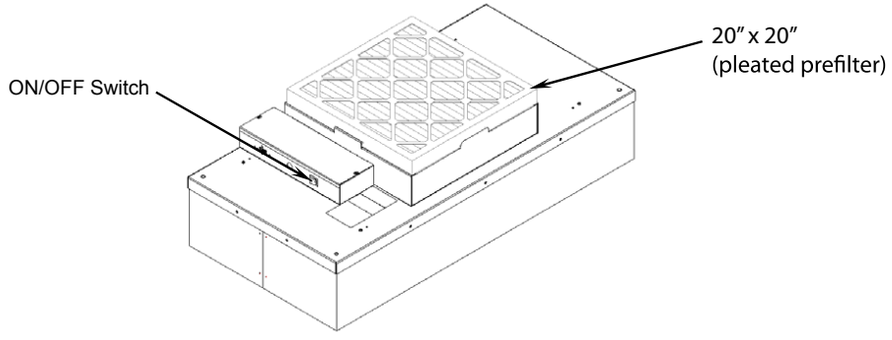
Step 1. Switch the ON-OFF switch to the off position.
Step 2. Remove the four screws securing the 20” x 20” prefilter or 16” x 23.25” pre-filter to the frame.
Step 3. Replace clean the pre-filter by hand washing in water with a mild detergent or by using a vacuum cleaner. Allow pre-filter to dry completely before replacing.
Step 4. Reassemble by reversing the above steps.



■ Service: Changing the LEDC/IQ Pre-filter (pleated)

Tools Required: None.
Note: To keep the filter in top operating condition replacing the pleated pre-filter is recommended every twelve months or sooner. Frequency is unique to each application.

Step 1. Switch the ON-OFF switch to the off position.
Step 2. Remove the 20” x 20” prefilter or 16” x 23.25” pre-filter from the snap-in frame. The beverage board frame has slots that have to be depressed to release the filter from the pre-filter housing.
Step 3. After removing the new pleated pre-filter from the box, remove the die cut slots from the beverage board frame and install on pre-filter bracket.
Step 4. Reassemble by reversing the above steps.



■ Service: Removal and Replacement of Standard HEPA/ULPA Filters

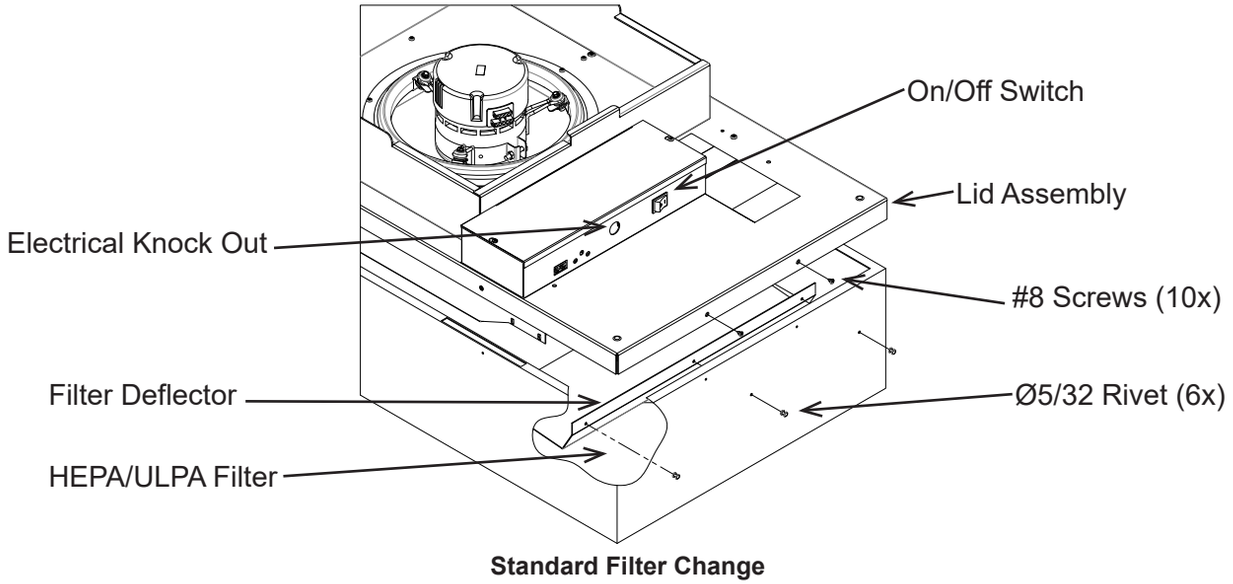
WARNING
DISCONNECT THE UNIT FROM THE ELECTRICAL POWER SOURCE BEFORE ATTEMPTING ANY SERVICE

WARNING
THE STANDARD FILTER IS PROTECTED WITH AN EXPANDED METAL FACE SCREEN. THIS IS NEVER TO BE USED TO HANDLE THE FILTER. IT IS ONLY FOR PROTECTION AGAINST AN ACCIDENTAL TOUCH OF THE FILTER. ONLY HANDLE THE FILTER BY THE FRAME.

Note: All filters should be visually inspected for freight damage before installation (see page 6). It is necessary to use two workers when removing the filter and for installation to avoid twisting or separation of the media seals. Handle the filter only by the frame and never place anything on the upstream filter side of the filter. Additionally, it is important to keep the filter level to prevent any shearing force on the media itself.

For Standard Filters:
Tools Required: Phillips Head Driver, Battery Operated Drill with 5/32 drill bit, Rivet Hand Tool, Ø5/32 aluminum rivet grip range .126-.187

Step 1. Disconnect power connections and any hardware required to remove unit from ceiling. Remove unit from ceiling.
Step 2. Remove the ten screws holding the HEPA/ULPA filter to the lid assembly.
Step 3. Lift the lid assembly off the HEPA/ULPA filter. Remove filter deflectors using 5/32 drill bit. Keep filter deflectors to install in new filter. Discard the used filter as per requirements of applicable regulations. Carefully install the filter deflectors into the new filter using the 5/32 rivets. Do not touch or place the filter deflectors on the HEPA/ULPA media pack. This could cause tears in the filter pack.
Note: Filters with deflectors installed can be ordered from the factory.
Step 4. Before replacing with the new filter, carefully inspect the new filter for any visible damage. Also inspect the gasket and the support system to insure a tight seal. Replace if necessary.
Step 5. To replace filter, raise the filter and rotate into position in the ceiling grid (with power off) , then lower the plenum housing into place. Reconnect wiring and hardware from previous steps that have been removed.
Step 6. Restore power and verify proper operation of FFU.



Standard Filter Change

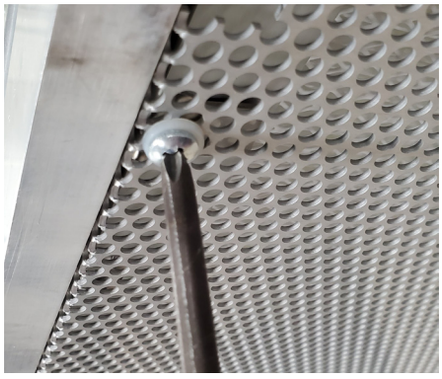
■ Service: Removal and Replacement of RSR/E/C Filters

WARNING
DISCONNECT THE UNIT FROM THE ELECTRICAL POWER SOURCE BEFORE ATTEMPTING ANY SERVICE

WARNING
THE FILTER IS PROTECTED WITH AN EXPANDED METAL FACE SCREEN. THIS IS NEVER TO BE USED TO HANDLE THE FILTER. IT IS ONLY FOR PROTECTION AGAINST AN ACCIDENTAL TOUCH OF THE FILTER. ONLY HANDLE THE FILTER BY THE FRAME.

Note: All filters should be visually inspected for freight damage before installation (see page 6). It is necessary to use two workers when removing and installing the filter to avoid twisting or separation of the media seals. Handle the filter only by the frame and never place anything on the upstream filter side of the filter. Additionally, it is important to keep the filter level to prevent any shearing force on the media itself.

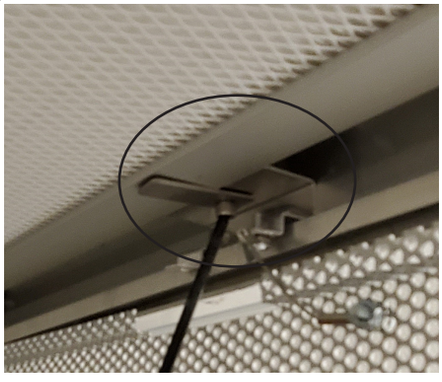
For RSR/E/C Filters:
Tools Required: Phillips Head Driver, Standard Screwdriver (latch screen) , Battery Operated Drill, 3/16" hex head ball driver
Step 1a (if RSR/E). With the power off, remove the diffuser screen by removing the quantity 6 of 10-32x1/2 screws, then carefully place hardware in a safe location.
Step 1b (if RSRC or has latch screen). With the power off, open the diffuser screen by rotating the 3 quarter-turn latches.



Screw and Nylon Washer

Quarter-Turn Latch

Step 2. Loosen the six (4 on 2X2 size) 1/4-20X1/2 socket head screws far enough to rotate the six filter clips 90°. The filter may be loose enough to drop during this operation. If not, slowly pull the filter away from the knife-edge seal, taking care not to touch the filter face during this operation. It is important to pull the filter slowly away from the seal, so that the gel remains in the filter gel track.



■ Service: Removal and Replacement of RSR/E/C Filters

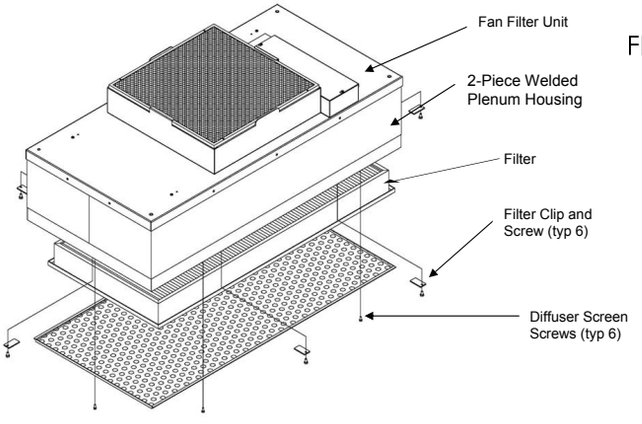
WARNING
DISCONNECT THE UNIT FROM THE ELECTRICAL POWER SOURCE BEFORE ATTEMPTING ANY SERVICE

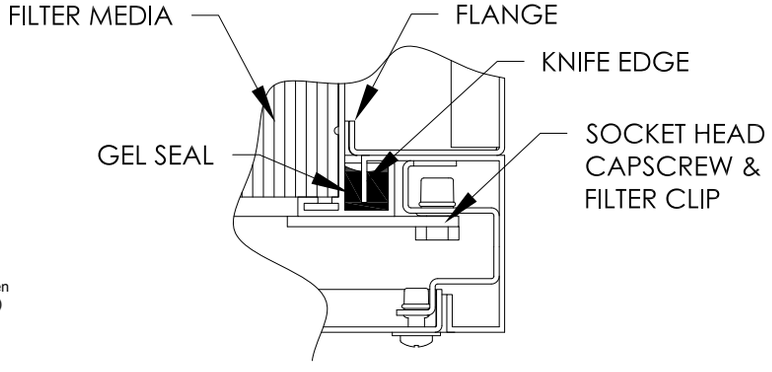
WARNING
THE FILTER IS PROTECTED WITH AN EXPANDED METAL FACE SCREEN. THIS IS NEVER TO BE USED TO HANDLE THE FILTER. IT IS ONLY FOR PROTECTION AGAINST AN ACCIDENTAL TOUCH OF THE FILTER. ONLY HANDLE THE FILTER BY THE FRAME.

Step 3. Carefully clean plenum assembly knife edge surface of residual gel material.

For Removal and Reinsertion:
Step 4. Inspect filter for visible damage, if damaged set aside for replacement or repair.
Step 5. Inspect the gel seal. Determine if the gel has lost its ability to seal (i.e. the gel should reform to cover the track without voids or openings). If so, repair the gel material or consider replacement of filter.

For Installation:
Step 6. Place the filter evenly against the filter-sealing surface of the RSR unit. Reposition filter clips and screws. The clips should be rotated and angled into place. It is recommended that workers work on each corner of the filter simultaneously, holding the filter seated into the track. Hand tighten clips from opposite corners evenly until all clamps are tightened. Do not overtighten.
Step 7. Reinstall diffuser screen by hand-tightening the screws or use a standard screwdriver to rotate the quarter-turn latches.
Step 8. Determine if recertification or testing of replacement is required.
Step 9: Restore power to FFU and verify proper operation of FFU.





■ Service: Standard and RSR Motor Removal and Installation for IQ

WARNING
DISCONNECT THE UNIT FROM THE ELECTRICAL POWER SOURCE BEFORE ATTEMPTING ANY SERVICE

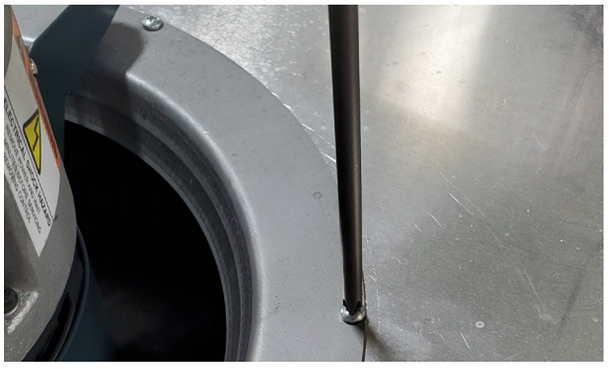
WARNING
ELECTRICAL SERVICE SHOULD ONLY BE PERFORMED BY A LICENSED OR QUALIFIED ELECTRICIAN.

Tools Required: Phillips Head Driver, Battery Operated Drill, (2) 8” adjustable wrenches, 5/32” hex head wrench

Step 1. To gain access to the motor, remove the ceiling panel next to the unit, if applicable. The unit may need to be removed from the ceiling to access components.
Step 2. Switch the ON-OFF switch to the off position.
Step 3. Remove the four screws securing the pre-filter. Remove the pre-filter and set aside or replace.
Step 4. Disconnect motor wire harnesses from the motor.
Step 5. Remove the six mounting screws to free the motor/blower assembly from the lid. If using power drivers, set the unit to a low torque setting to avoid stripping the sheet metal screws.
Step 6. Pull the motor/blower assembly upward utilizing the motor mount to remove from fan filter unit.
Step 7. Remove the blower wheel from the assembly by loosening the set screw in the blower wheel hub.
Step 8. Motor can be removed from assembly by loosening bolt on belly band (motor support bracket). Before removing motor, mark location of the belly band on the motor. If replacing motor, mark the new motor with the recorded location and install accordingly.
Step 9. Replace with new components as required and reassemble using reverse steps. The spacing is 0.08” (2.03 mm) clearance between the blower wheel and the venturi ring.

Step 3.

Step 4.



Step 5.

Step 6.

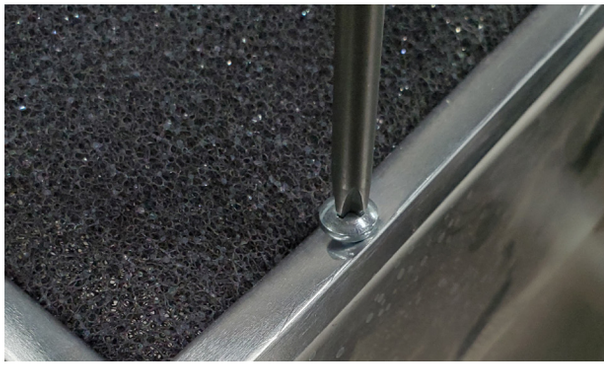
■ Service: Standard and RSR Motor Removal and Installation for LEDC

WARNING
DISCONNECT THE UNIT FROM THE ELECTRICAL POWER SOURCE BEFORE ATTEMPTING ANY SERVICE

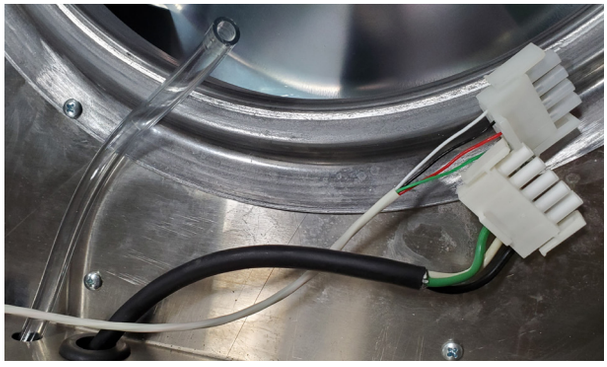
WARNING
ELECTRICAL SERVICE SHOULD ONLY BE PERFORMED BY A LICENSED OR QUALIFIED ELECTRICIAN.

Tools Required: Phillips Head Driver, Battery Operated Drill, 1/4” drive bit for SST screws, (2) 8” adjustable wrenches, 5/32” hex head wrench, 3/8” drive bit.

Step 1. To gain access to the motor, remove the ceiling panel next to the unit, if applicable. The unit may need to be removed from the ceiling to access components.
Step 2. Switch the ON-OFF switch to the off position.
Step 3. Remove the four screws securing the pre-filter. Remove the pre-filter and set aside or replace.
Step 4. Loosen the electrical box cover screws (2), and slide/lift off cover. Make note of all wire routing and locations for later reinstallation.



Step 5. Disconnect motor wiring and motor harnesses from the electrical box housing and remove the tubing for test port, if installed.

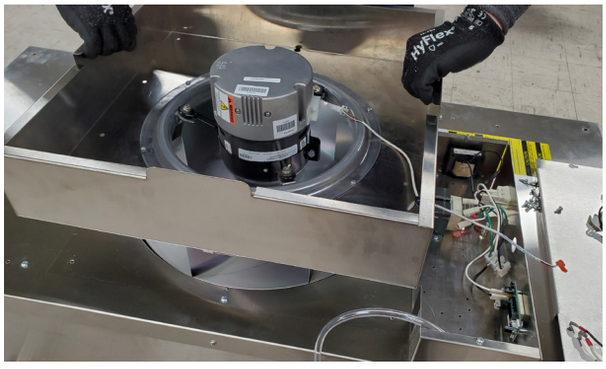


■ Service: Standard and RSR Motor Removal and Installation for LEDC

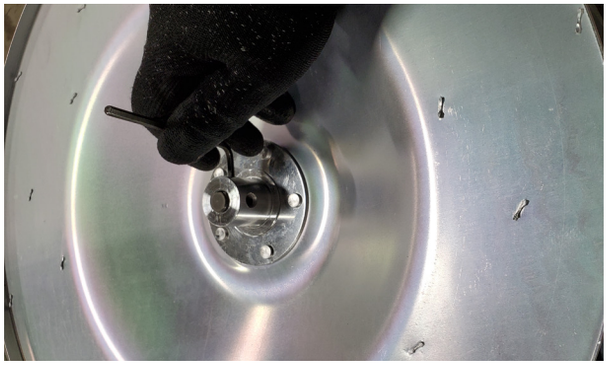
WARNING
DISCONNECT THE UNIT FROM THE ELECTRICAL POWER SOURCE BEFORE ATTEMPTING ANY SERVICE

WARNING
ELECTRICAL SERVICE SHOULD ONLY BE PERFORMED BY A LICENSED OR QUALIFIED ELECTRICIAN.

Step 6. Remove the ten mounting screws to free the pre-filter bracket with motor/blower assembly from the lid assembly. Two mounting screws are located near baffle screws. Do not remove baffle screws. If using power drivers, set the unit to a low torque setting to avoid stripping the sheet metal screws. Carefully remove housing assembly, paying attention to wire routing.
Step 7. Loosen the set screw that attaches the blower wheel to the motor shaft to remove blower wheel.



Optional Step. Remove the six mounting screws to free the motor/blower assembly from the pre-filter bracket..



Step 8. Motor can be removed from assembly by loosening bolt on belly band (motor support bracket). Before removing motor, mark location of the belly band on the motor. If replacing motor, mark the new motor with the recorded location and install accordingly.
Step 9. Replace with new components as required and reassemble using reverse steps. The spacing is 0.23” (5.84 mm) clearance between the blower and the upper motor plate/prefilter frame.

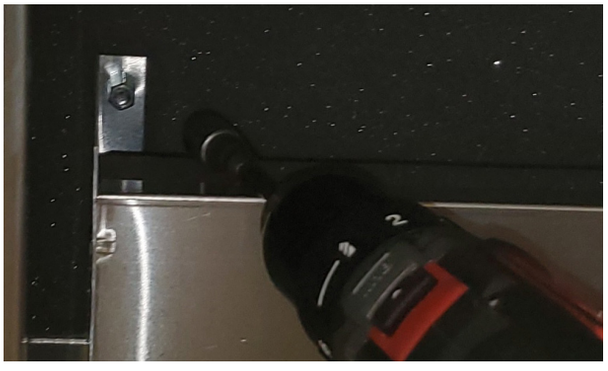
■ Service: RSRE/C Motor Removal and Installation for IQ

WARNING
DISCONNECT THE UNIT FROM THE ELECTRICAL POWER SOURCE BEFORE ATTEMPTING ANY SERVICE

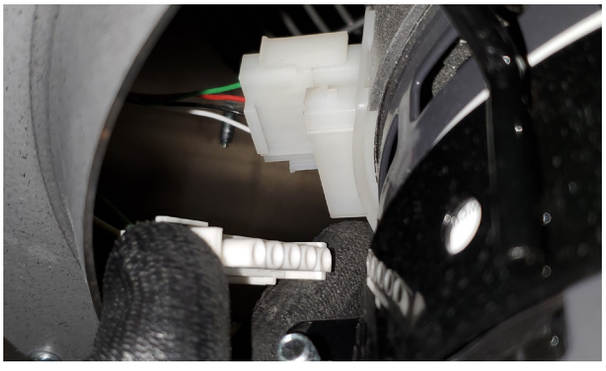
WARNING
ELECTRICAL SERVICE SHOULD ONLY BE PERFORMED BY A LICENSED OR QUALIFIED ELECTRICIAN.

Note: Minimum 2 person project.
Tools Required: 3/16” Ball Driver, Phillips Head Driver, Battery Operated Drill, (2) 8” adjustable wrenches, 5/32” hex head wrench, 3/8” socket

Step 1. To gain access to the motor, remove the gel seal filter (see page 26).
Step 2. Remove the baffle by removing the four 1/4-20 collar nuts. Take care to support baffle while removing the fasteners.
Step 3. Prior to removing motor/blower assembly, remove blower wheel to expose motor connectors on motor. Remove the blower wheel from the assembly by loosening the set screw in the blower wheel hub.
Step 4. Disconnect motor wire harnesses from the motor.
Step 5. While supporting the motor blower assembly from below, remove the six screws on the underside of the venturi ring and lower the assembly.
Step 6. Motor can be removed from assembly by loosening bolt on belly band (motor support bracket). Before removing motor, mark location of the belly band on the motor. If replacing motor, mark the new motor with the recorded location and install accordingly.
Step 7. Replace with new components as required and reassemble using reverse steps. The spacing is 0.08” (2.03 mm) clearance between the blower wheel and the venturi ring.



Step 2.



Step 4.

Step 5.

Step 5.

■ Service: RSRE/C Motor Removal and Installation for LEDC

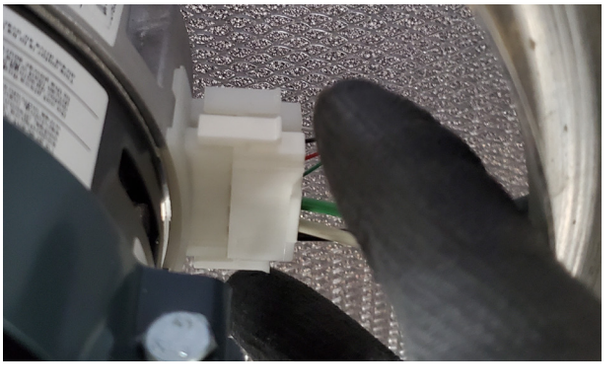
WARNING
DISCONNECT THE UNIT FROM THE ELECTRICAL POWER SOURCE BEFORE ATTEMPTING ANY SERVICE

WARNING
ELECTRICAL SERVICE SHOULD ONLY BE PERFORMED BY A LICENSED OR QUALIFIED ELECTRICIAN.

Note: Minimum 2 person project.
Tools Required: 3/16” Ball Driver, Phillips Head Driver, Battery Operated Drill, (2) 8” adjustable wrenches, 5/32” hex head wrench, 3/8” socket

Step 1. To gain access to the motor, remove the gel seal filter (see page 26).
Step 2. Remove the baffle by removing the four 1/4-20 collar nuts. Take care to support baffle while removing the fasteners.
Step 3. Prior to removing motor/blower assembly, remove blower wheel to expose motor connectors on motor. Loosen the set screw that attaches the blower wheel to the motor shaft to remove blower wheel.
Step 4. Disconnect motor wire harnesses from the motor.
Step 5. While supporting the motor blower assembly from below, remove the six screws on the underside of the venturi ring and lower the assembly.
Step 6. Motor can be removed from assembly by loosening bolt on belly band (motor support bracket). Before removing motor, mark location of the belly band on the motor. If replacing motor, mark the new motor with the recorded location and install accordingly.
Step 7. Replace with new components as required and reassemble using reverse steps. The spacing is 0.23” (5.84 mm) clearance between the blower and the upper motor plate/prefilter frame.

Step 3.



Step 4.

Step 5.

Step 5.

■ Service: Accessing Electrical Box from Room-side (RSRC)

WARNING
DISCONNECT THE UNIT FROM THE ELECTRICAL POWER SOURCE BEFORE ATTEMPTING ANY SERVICE

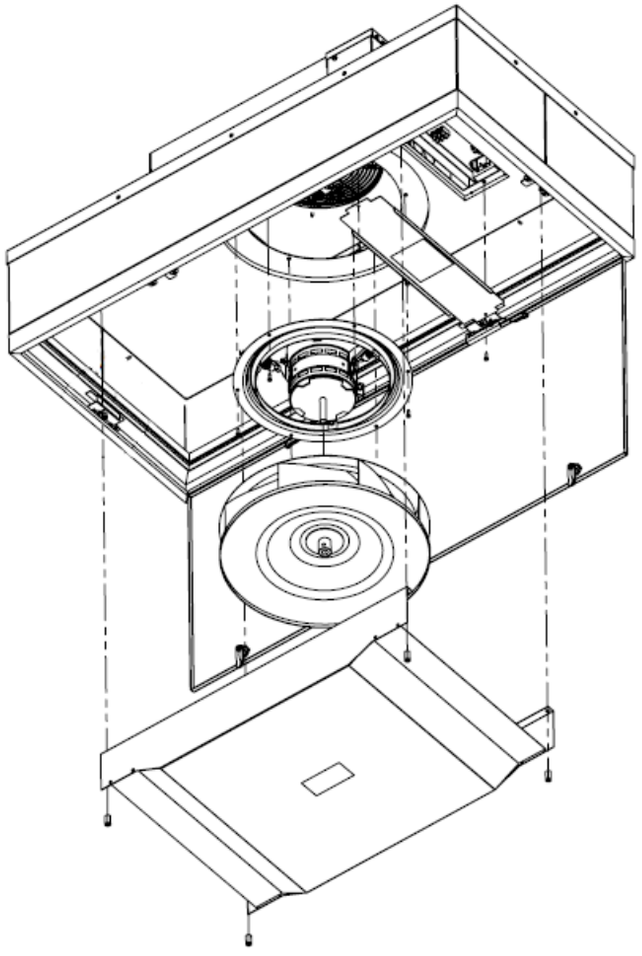
WARNING
ELECTRICAL SERVICE SHOULD ONLY BE PERFORMED BY A LICENSED OR QUALIFIED ELECTRICIAN.

Tools Required: Phillips Head Driver, Battery Operated Drill

Step 1. Remove the gel seal filter (see page 26).
Step 2. Remove the baffle by removing the four 1/4-20 collar nuts (see page 31).
Step 3. Electrical box plate can now be seen near the motor/blower assembly. Remove the two #8-32X1/2" screws holding the plate. Once removed, access to the electrical box is available.

To remove any components in the electrical box, make all connector and wire disconnections before removing hardware. Components removable in Electrical box include: control board, transformer, choke, and terminal block.

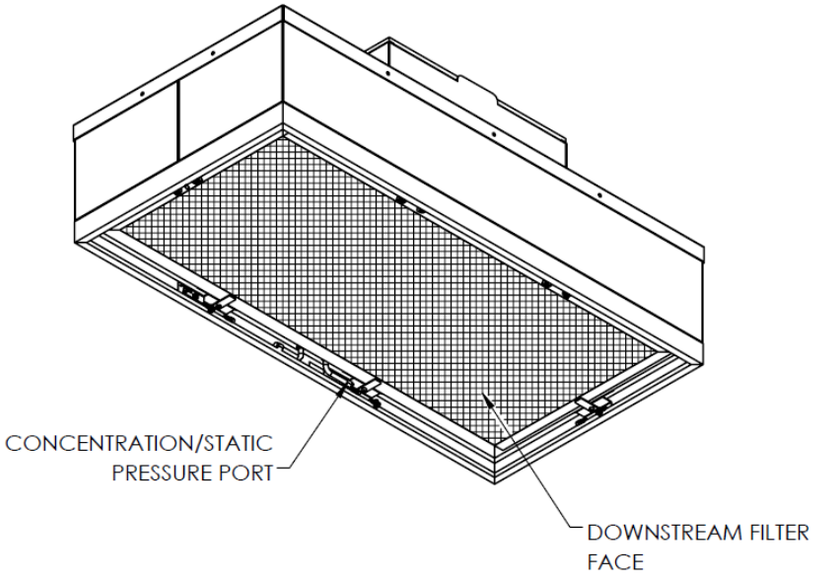
Note: Access to the ON-OFF switch is not available from the room-side. Be sure to disconnect power and follow proper lock-out tag-out procedure.



Step 3.

■ Challenge/Concentration Ports

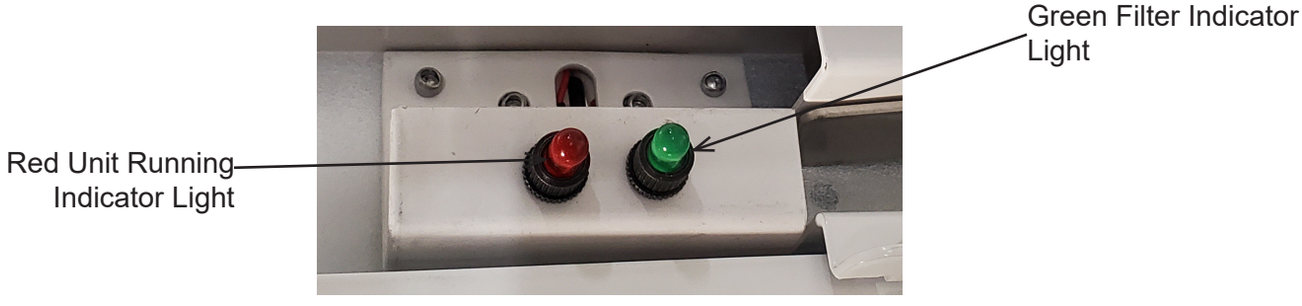
Challenge and concentration ports are an available option on fan filter units. Every RSR/E/C comes with these ports as a standard option. Standard style units do not come with challenge and concentration ports, although it may be an available option. On standard style units, the ports are located on the center bar of the filter. On RSR/E/C style units, the ports are located beneath the diffuser screen along the housing outer channel. Remove the diffuser screen by removing the six 10-32X1/2 screws. If the unit is equipped with the latch screen, rotate the 3 quarter-turn latches to access the ports. The concentration and challenge tubing has dimensions of 3/8" O.D. x 1/4" I.D. This tubing connects to barbed fittings with hex-head plugs that can be removed for access.



Challenge/Concentration Ports

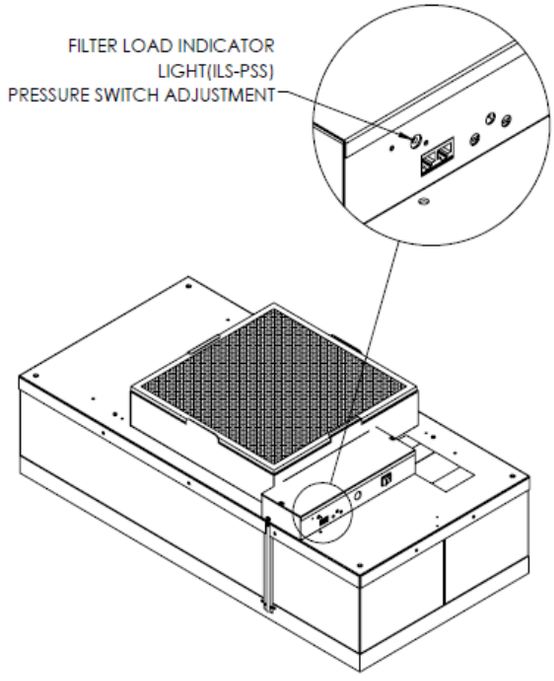
■ Indicator Lights

Indicator lights are an available option on fan filter units. To determine if your unit has lights, please refer to the description code of the unit and reference page 5 of this manual. Standard style units may come with lights which would be located in the center bar on the filter. Lights on RSR/E/C units will be located along the housing outer channel. Follow the protective wire chase along the outside of the unit to determine the location.



The green indicator light should be illuminated when the unit is running. The red indicator light utilizes a pressure switch that has been set at the factory. It is recommended to adjust the pressure switch during initial installation as each application has unique pressure balances that may affect the pressure switch.

The filter change indicator differential pressure switch is located inside the electrical box with access for adjustment through the front of the electrical box.

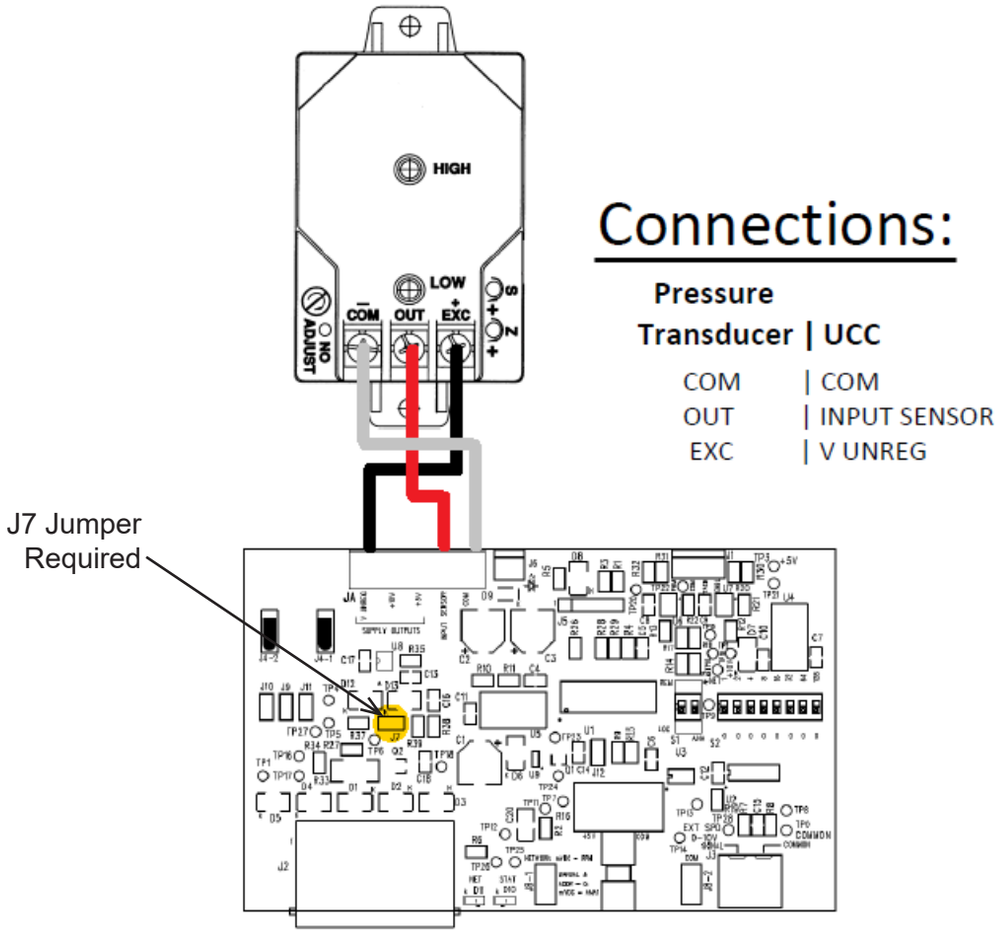


Adjustments can be made using a small flat head screwdriver and turning the adjustment screw CW or CCW. Take care not to overtighten the screw as this could damage the pressure switch. It is recommended to change the filter at twice the initial static pressure of the filter. The initial static pressure can be located on the label on the side of the filter. The initial static pressure can also be measured across the filter using a magnehelic gauge if the fan filter unit is equipped with a concentration/static pressure port.

To set the pressure switch:
Simulate filter loading to set the light indication point. To simulate filter loading, use a piece of carboard, plexiglas, etc. to block off airflow on the downstream side of the filter face. If using a magnehelic gauge, block the filter face until twice the initial static pressure is registered. Adjust the pressure switch for the indicator light to flicker on and off at this point. If not using a magnehelic gauge, block the filter face approximately 90% and adjust the pressure switch for the indicator light to illuminate. To test indicator light, block the filter face 95% and the light should illuminate. Remove the blockage from the filter face and the light should turn off.

■ Pressure Transducer

A pressure transducer is an available option on fan filter units. The pressure transducer allows for real-time monitoring of pressure values across the motor/blower assembly. The pressure transducer is installed and pre-piped in the factory by Envirco and has a pressure range of 0 to 1 iwc. The pressure transducer can be wired directly to a building automation system or to the Universal Control Card. This can be specified at time of order. For wiring directly to a buidling automation system, the description code is SPS. A red signal out and white com. wire will be provided at the electrical box for others to wire to the building automation system . For wiring to the Universal Control card, the description code is SPSC. All wiring is done in factory for SPSC and the pressure value is stored in the Universal Control Card. Please see page 19 for the appropriate register. The value stored in this register will need to be converted to iwc by dividing the stored value by the max register value. Wiring to the Universal Control Card can be seen below.



■ Troubleshooting MAC10 LEDC/IQ

Please reference the different sections below for potential issues with the MAC10 LEDC/IQ. Not every issue can be solved with the guides below. If unable to get the fan filter unit to function properly, please contact Envirco by phone or email to resolve the issue.

Problem: Unit Not Running
Potential Issues: No Power, Bad Electronics (switch, transformer, board), Faulty Motor Harness, Faulty Motor, Mechanical Issue, Network Control Issues
Useful Documents: TN1013 - ECM Control Test Procedure

The following steps below work for all controls (IR, CSL, UCC). There will be an individual section for each of the controls with further in depth instruction.
Step 1. Confirm power (primary voltage). See **TN1013** High Voltage Test.
Step 2. Check electrical components for functionality. See **TN1013** High Voltage Test.
Step 3. Confirm output voltage from control board to motor (see individual sections below).

For UCC:
- Turn off rocker switch on fan filter unit.
- Put the unit in manual mode. First set of switches should be in off position (1 off, 2 off). Reference lid label for dip switch settings or see page 16-17 in manual.
- Verify orientation of the 4 pin connector from **TN1013** for the Universal Control Card.
- Turn on rocker switch.
- Green light on board should turn on briefy and then turn back off. Light will stay on if motor is running.
- Adjust the potentiometer on the board. Slow unit down = turn counter-clockwise. Speed unit up = turn clockwise.
- If unit does not start up and green light does not illuminate on the control board, peform Motor ON Test from **TN1013**. Verify voltage at control board and motor.
- If correct voltage found, perform Variable SpeedTest from **TN1013**. Verify voltage at control board and motor.
- If voltage not found at control board output: Replace control board (265888).
- If voltage found at control board, but not motor: Replace Motor Harness for control (see parts list on page 41).
- If voltages are correct on board and motor and motor still does not run: Reference troubleshooting section for mechanical issues and perform steps.

For IR:
- Turn off rocker switch on fan filter unit.
- Verify orientation of the 4 pin connector from **TN1013** for the IR control card.
- Turn on rocker switch.
- Verify IR remote has power and illuminates when buttons are pressed. If not, replace batteries. If this does not work, replace IR remote (63760).
- Point remote at IR sensor on fan filter unit. Press On. Press Enter. Red light should illuminate and stay On for motor running. Green light should flash when commands are pressed on the remote. Press Clear on the remote for the flow-set feedback. Refer to IR control on page 20 for operation.
- If green light on fan filter unit does not illuminate, recommend cleaning IR sensor. If green light does not illuminate to commands from IR remote, recommend replacing IR sensor (63759-005) and IR control board (63758).
- If green light illuminates with commands from IR remote, but unit does not run, perform Motor ON Test from **TN1013**. Verify voltage at control board and motor.
- If voltage not found at control board output: Replace control board (63758).
- If voltage found at control board, but not motor: Replace Motor Harness for control (see parts list).
- If voltages are correct on board and motor and motor still does not run: Reference troubleshooting section for mechanical issues and perform steps.

For CSL:
- Turn off rocker switch on fan filter unit.
- Verify orientation of the 4 pin connector from **TN1013** for the remote VCU control board (CSL).
- Turn on rocker switch.
- Verify Visual Speed control readout display illuminates. If display does not illuminate, verify control board has correct power (24VAC from transformer in fan filter unit electrical box). If control board has confirmed power, but display screen does not work: Replace control board (63951).
- Adjust flow index with screwdriver. Slow unit down = turn counter-clockwise. Speed unit up = turn clockwise. LED readout display should show higher flow index that corresponds to the rotation of the pot. RPM will increase as well.
- If flow index and RPM do not increase, peform Motor ON Test from **TN1013**. Verify voltage at control board and motor.
- If voltage not found at control board: Replace control board (63951).
- If voltage found at control board, but not at motor: Verify wiring between motor and control board. This wiring is done by others.
- If voltages are correct on board and motor: Reference troubleshooting section for mechanical issues and perform steps.

Problem: Mechanical Issues
Potential Issues: Broken Motor Mount, Broken Inlet Ring Connections, Damaged Blower Wheel, Wheel Fallen Off Motor Shaft, Failing Motor Bearings

Step 1. Turn off rocker switch on fan filter unit. Turn off power connections to the fan filter units.
Step 2. Take off pre-filter or duct to inspect motor.
Step 3. Visually inspect motor assembly for damage. Inspect venturi inlet ring connection points for any potential issues (3 in total). Inspect the the motor mount bracket (belly band) for damage. If damage is found, contact Envirco for further assistance.
Step 4. Put on protective glove and try to turn the blower wheel (verify power is off before doing so). If unable to, find the cause. Is the wheel physically damaged? Does it contact the housing? Has the blower wheel fallen off the motor shaft? Access to the blower wheel is different depending on the model. Reference the manual pages for motor replacement for assistance on access, removal, and installation.
Step 5. If permanent damage found, please contact Envirco for further assistance.
Step 6. If no mechanical issues found and motor is not running after performing Unit Not Running and Mechanical Issues troubleshooting, please contact Envirco for further assistance. Motor/blower will likely need to be replaced.

Problem: Low Airflow
Potential Issues: Dirty Media, Air Supply Issue, Unit Not Running, Low Speed Setting, Other Environmental Restrictions

Dirty Media: Check filter media. Pre-filter can be cleaned or replaced. HEPA/ULPA media may need to be replaced.
Air Supply Issue: Verify air supply is adequate to provide airflow required. Recommend starting fan filter units before air handlers.
Unit Not Running: Refer to Unit Not Running troubleshooting and/or Mechanial Issues troubleshooting.
Low Speed Setting: Increase speed control setting to fan filter units.
Environmental Restrictions: Verify there are no environmental restrictions. Environmental restrictions can also cause non-laminar flow from the fan filter unit.

Problem: High Airflow
Potential Issues: Air Supply Issue, High Speed Setting

Air Supply Issue: Verify air supply is adequate to provide airflow required. Recommend starting fan filter units before air handlers.
High Speed Setting: Decrease speed control setting to fan filter units.

Problem: Leaking Filter
Potential Issues: Damaged Filter, Improper Installation/Bypass
Useful Documents: TN1012 - Leaking Filters Determination

Damaged Filter: Inspect the filter for any physical damage before installing in the ceiling. Damage can occur in shipping that would cause the filter to leak. Please reference the unboxing/installation section on page 6 and the filter installation procedure on pages 25-27 .
Bypass: Please see **TN1012** to help determine if the filter is leaking or if there is bypass coming from another location.

Problem: Unit Acting Erratically/Unable to Balance
Potential Issues: Incorrect Motor Program, Air Supply Issue
Useful Documents: TN1002 - MAC10 Design with VAV Boxes

Incorrect Motor Program: Constant volume programming available to the MAC10 IQ is incompatible with ducted, pressurized air applications for use in series with CAV or VAV devices. Please refer to **TN1002**.
Air Supply Issue: Providing too much or too little air to the fan filter units can cause issues with the fan filter units. The fan filter unit may react by speeding up rapidly and eventually shutting down as it is unable to meet the required setpoint determined by the program in the motor.

Problem: Indicator Light Not On (Light On for ILS-PSS)
Potential Issues: No Power, Non-working Light, Pressure Switch Closure

There are multiple indicator lights that can be included on your fan filter unit. The universal control card has a green and red indicator light located on the card which can be seen in the electrical box. The green light is for motor running and the red light is for network communication. Please see the Universal Control Card section starting on page 15 for more information. The IR control sensor has two indicator lights which can be seen from the roomside. The red light is for motor running and the green light is for status feedback. Please see the IR Control card section starting on page 20 for more information. Fan filter units can also be provided with a green uniti running indicator light and a red filter status indicator light which are visible from the roomside. See the sections dedicated to these two indicator lights for more information. Please identify what type of lights you may have on your unit to better troubleshoot.

No Power: If there is an issue with the electrical components the indicator lights will not function. It is recommended to look over the Unit Not Running troubleshooting to verify all electrical components are working as intended. The unit running indicator lights require the fan filter unit motor to be running to illuminate.
Non-working Light: The green unit running indicator light visible from the roomside is polarized. It is recommended to unscrew the bezel, take out the bulb, turn it 180 degrees, and reinsert the bulb. If a nearby unit running light is working, test the non-working bulb on that unit to identify if the bulb is the issue. Replace the bulb if found to be non-working. This process can also be used for the red filter status indicator light to verify a bulb is working.
Pressure Switch Closure: The red filter status indicator light may be on the first day of installation. The pressure switch must be adjusted when first installed to work for that application's specific conditions. See appropriate section in this manual for adjusting this pressure switch. If the red light, visible from the roomside, is on (not IR sensor red light), the pressure switch has closed to indicate the filter is loaded and may need to be replaced soon.

Problem: Network Issues (Universal Control Card Only)
Potential Issues: Non-working Cables, Unit Not Running, Incorrect Board Settings

It is recommended to test a fan filter unit with the Universal Control Card set in manual mode before attempting to control over a network. A majority of network related issues are due to non-working cables and incorrect board settings. It is recommended to establish connection with one fan filter unit before attempting to connect to a large chain of units. Once connection has been proven and established to one fan filter unit, other units can be connected for communication. Please reference the Universal Control Card section for more information. If a local controller was purchased from Envirco, a manual and quick start guide should be available to help assist with operation. Contact Envirco for further assistance.

Non-working Cables: Purchased plenum rated cables are recommended over field manufactured cables. A typical sign of non-working cables is the inability to communicate with any fan filter units or losing communication with a large amount of sequential fan filter units.
Unit Not Running: Refer to Unit Not Running troubleshooting and/or Mechanial Issues troubleshooting.
Incorrect Board Settings: For the ability to control fan filter units over the network, the Universal Control Card must be put into Network mode. Each Universal Control Card will also need a unique address. Both the mode and address are set with dipswitches located in the electrical box on top of the fan filter unit.

Replacement Parts

Unit Model #	Model	Part Number	Description
All IQ/LEDC Models	All IQ/LEDC Models	63720	Choke 3.0 Amps 120/240/277V
		63667	Transformer 120/24V
		63666	Transformer 240/24V
		63665	Transformer 277/24V
		63739-002	Rocker Switch, DPST
		62968-12	Gasket - 1/8" x 1/2", 12' Length
		222449-001	1/4" - 20 Threaded Eye Bolts
		64078	Pressure Transducer
		265888	Universal Control Card
		63638	Terminal Strip 3 Position
		63027	Pressure Switch for Filter Monitoring
		63415-003	Pressure Switch for Run Indicator
		S24344-001	8' Power Cord
		63760	IR Remote
		11166-001	Remote Visual Control Unit (VCU)
		63758	IR Control Board
		63759-005	IR Sensor Board **(RSR/E/C Only)**
		63820-001	IL Wiring Harness **(RSR/E/C Only)**
		63820-004	ILS-PSS Wiring Harness **(RSR/E/C Only)**
		133546-001	Red LED Indicator Light
		133546-002	Green LED Indicator Light

Unit Model #	Model	Part Number	Description
11202-XXX 11203-XXX 11204-XXX 11205-XXX	2X2, 2X3, 2X3.5, 2X4 LEDC Standards	63752-001 63752-002 63751-015	120V Motor Harness for Power 15" 240/277V Motor Harness for Power 15" 120/240/27&V Motor Harness for Control 18"
11206-XXX 11207-XXX 11208-XXX	2X3, 2X3.5, 2X4 LEDC RSR/E		
11074-XXX 11083-XXX 11084-XXX 11085-XXX	2X2, 2X3, 2X3.5, 2X4 IQ Standards		

Unit Model #	Model	Part Number	Description
11209-XXX	2X2 LEDC RSR/E	63752-003	3 Pin to 5 Pin 240/277V Motor Harness for Power 12"
11274-XXX	2X2, 2X3, 2X3.5, 2X4 LEDC RSRC	63752-005	3 Pin to 5 Pin 120V Motor Harness for Power 12"
11275-XXX		63752-004	3 Pin 120/240/277V Motor Harness for Power 8"
11276-XXX		63751-003	Board to 4 Pin 120/240/277V Motor Harness for Control 14"
11277-XXX		63751-016	4 Pin to 4 Pin 120/240/277V Motor Harness for Control 12"
11086-XXX	2X2, 2X3, 2X3.5, 2X4 IQ RSR/E		
11087-XXX			
11088-XXX			
11089-XXX			
11270-XXX	2X2, 2X3, 2X3.5, 2X4 IQ RSRC		
11271-XXX			
11272-XXX			
11273-XXX			

■ Replacement Parts: Motor/Blower

Motor/blower parts below. To verify correct parts, please visit our website or contact envirco at techsupport@envirco.com.

Unit Model #	Model	Part Number	Description
11202-XXX 11206-XXX 11274-XXX 11203-XXX 11207-XXX 11271-XXX	2X4 LEDC STD 2X4 LEDC RSR/E 2X4 LEDC RSRC 2X3.5 LEDC STD 2X3.5 LEDC RSR/E 2X3.5 LEDC RSRC	S266613-001X	Motor/Blower Assembly
11204-XXX 11208-XXX 11276-XXX	2X3 LEDC STD 2X3 LEDC RSR/E 2X3 LEDC RSRC	S266613-005X	Motor/Blower Assembly
11205-XXX 11209-XXX 11277-XXX	2X2 LEDC STD 2X2 LEDC RSR/E 2X2 LEDC RSRC	S266612-017	Motor/Blower Assembly
11074-XXX 11089-XXX 11270-XXX 11085-XXX 11088-XXX 11271-XXX	2X4 IQ STD 2X4 IQ RSR/E 2X4 IQ RSRC 2X3.5 IQ STD 2X3.5 IQ RSR/E 2X3.5 IQ RSRC	S266612-001	Motor/Blower Assembly Constant CFM for IQ
11084-XXX 11087-XXX 11272-XXX	2X3 IQ STD 2X3 IQ RSR/E 2X3 IQ RSRC	S266612-003	Motor/Blower Assembly Constant CFM for IQ
11083-XXX 11086-XXX 11273-XXX	2X2 IQ STD 2X2 IQ RSR/E 2X2 IQ RSRC	S266612-005	Motor/Blower Assembly Constant CFM for IQ
All IQ Models	All IQ Models	S266612-013	Motor/Blower Assembly Constant Speed for IQ
All IQ Models	All IQ Models	S266612-021	Motor/Blower Assembly Constant Torque for IQ
All IQ Models	All IQ Models	S266612-023	Motor/Blower Assembly Low Air Flow for IQ

■ Replacement Parts: Primary Filters

Filter part numbers below. These are for most common filter part numbers and may not match the filter inside the fan filter unit. To verify correct filter, please vist our website or contact envirco at techsupport@envirco.com.

Unit Model #	Model	Part Number	Description
11202-XXX	2X4 LEDC STD	69600S-001HAPXX	2X4 Standard HEPA filter 53MM
11074-XXX	2X4 IQ STD	69600S-001UAPXX	2X4 Standard ULPA filter 53MM
11203-XXX	2X3.5 LEDC STD	69600S-002HAPXX	2X3.5 Standard HEPA filter 53MM
11085-XXX	2X3.5 IQ STD	69600S-002UAPXX	2X3.5 Standard ULPA filter 53MM
11204-XXX	2X3 LEDC STD	69600S-003HAPXX	2X3 Standard HEPA filter 53MM
11084-XXX	2X3 IQ STD	69600S-003UAPXX	2X3 Standard ULPA filter 53MM
11205-XXX	2X2 LEDC STD	69600S-004HAPXX	2X2 Standard HEPA filter 53MM
11083-XXX	2X2 IQ STD	69600S-004UAPXX	2X2 Standard ULPA filter 53MM
11206-XXX	2X4 LEDC RSR/E	69601-001H	2X4 RSR/E/C HEPA Filter 53MM
11274-XXX	2X4 LEDC RSRC	69601-001U	2X4 RSR/E/C ULPA Filter 53MM
11089-XXX	2X4 IQ RSR/E		
11270-XXX	2X4 IQ RSRC		
11207-XXX	2X3.5 LEDC RSR/E	69601-002H	2X3.5 RSR/E/C HEPA Filter 53MM
11275-XXX	2X3.5 LEDC RSRC	69601-002U	2X3.5 RSR/E/C ULPA Filter 53MM
11088-XXX	2X3.5 IQ RSR/E		
11271-XXX	2X3.5 IQ RSRC		
11208-XXX	2X3 LEDC RSR/E	69601-003H	2X3 RSR/E/C HEPA Filter 53MM
11276-XXX	2X3 LEDC RSRC	69601-003U	2X3 RSR/E/C ULPA Filter 53MM
11087-XXX	2X3 IQ RSR/E		
11272-XXX	2X3 IQ RSRC		
11209-XXX	2X2 RSR/E	69601-004H	2X2 RSR/E/C HEPA Filter 53MM
11277-XXX	2X2 RSRC	69601-004U	2X2 RSR/E/C ULPA Filter 53MM
11086-XXX	2X2 RSR/E		
11273-XXX	2X2 RSRC		

■ Limted Warranty

LIMITED WARRANTY: Unless otherwise expressly stated in ENVIRCO's published specifications for the Goods, ENVIRCO warrants that Goods are free from defects in material and workmanship, except for services which are warranted to be performed in a competent and diligent manner in accordance with any mutually agreed specifications. The foregoing warranty shall apply for eighteen (18) months from the date of shipment from ENVIRCO's facility, except for services for which the warranty shall apply for ninety (90) days from the date of performance (the "Warranty Period"). Provided Buyer informs ENVIRCO in writing of any breach of warranty prior to the expiration of the applicable Warranty Period, ENVIRCO shall, as its sole obligation and Buyer's sole and exclusive remedy for any breach of this warranty, repair or replace/re-perform the Goods which gave rise to the breach or, at ENVIRCO' option, refund the amounts paid by Buyer for the Goods which gave rise to the breach. Any repair, replacement or re-performance by ENVIRCO hereunder shall not extend the applicable Warranty Period. The parties shall mutually agree on the specifications of any test to determine the presence of a defect. Unless otherwise agreed upon by ENVIRCO in writing, Buyer shall bear the costs of access, de-installation, re-installation and transportation of Goods to ENVIRCO and back to Buyer. These warranties and remedies are conditioned upon (a) the proper storage, installation, operation, and maintenance of the Goods and conformance with the proper operation instruction manuals provided by ENVIRCO or its suppliers or subcontractors, (b) Buyer keeping proper records of operation and maintenance during the applicable Warranty Period and providing ENVIRCO access to those records, and (c) modification or repair of the Goods only as authorized by ENVIRCO. ENVIRCO does not warrant the Goods or any repaired or replacement parts against normal wear and tear or damage caused by misuse, accident, or use against the instructions of ENVIRCO. Any modification or repair of any of the Goods not authorized by ENVIRCO shall render the warranty null and void. EXCEPT AS EXPRESSLY SET FORTH HEREIN, ENVIRCO MAKES NO OTHER WARRANTIES, EXPRESS OR IMPLIED, INCLUDING, BUT NOT LIMITED TO, ANY IMPLIED WARRANTIES OF MERCHANTABILITY, NON-INFRINGEMENT OR FITNESS FOR A PARTICULAR PURPOSE WHICH ARE HEREBY DISCLAIMED TO THE EXTENT PERMITTED BY APPLICABLE LAW.

■ Testing

Each MAC 10 LEDC filter unit is thoroughly tested at the factory before shipment. However, because of the "rigors" of shipping, ENVIRCO encourages its re-test after installation.

ENVIRCO recommends that the customer contact an independent organization, with technicians trained and experienced in performance evaluation and maintenance of clean air equipment.

HEPA filters (Type J) are tested to IEST-RP-00034. ULPA filters are tested to (Type F) IEST-RP-00034. All filters are UL 900 recognized. Your filters may have special requirements, please see original engineering specifications for you specific project.

All units that are airflow tested at ENVIRCO are tested using a Shortridge Airdata Multimeter 870 with a Velgrid head. The recommended method of reading is to place one corner of the Velgrid head 1-1/4" from the corner of the filter face and then take four reading evenly spaced along the four foot side, then repeat these reads three additional times. This gives a total of 8 reading to test the unit. All advertised data is based on using the Velgrid with 8 readings (128 velocity points). ENVIRCO recognizes the using 8 readings during a cleanroom start-up may be time consuming and recommends using 4 Velgrid readings taken on each 2x2 filter section will approximate the same as 8 readings.

Additional independent testing on the ENVIRCO Mac 10 2x4, 2x2, 2x3, and 2x3½ shows that using one-2x4 or two-2x2 hoods simultaneously give airflow data (cfm) within 5 percent of a duct traverse using 10 diameters of straight duct upstream of the fan intake.]

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Clean air solutions built for you.

MORE INFORMATION AVAILABLE AT WWW.ENVIRCO.COM

Industrial

Cleanroom Products

- MAC 10® Original
- MAC 10® IQ™
- MAC 10® LEAC2™
- MAC 10® LEDC™
- MAC 10® RFAC™
- Ducted Ceiling Module: DCM & RSR
- AC or DC Control Systems

Hospital & Healthcare

Hospital & Healthcare

- IsoClean® 400
- IsoClean® 800
- IsoClean® CM
- Hospi-Gard® Room Pressure Monitor

Pharmaceutical

Pharmaceutical & Medical Device

- Unimodule M-2 Vertical Unidirectional Flow Workstation
- METD 100% Exhausted Vertical Flow Workstation
- Unidirectional Downflow Module

Laboratory & Research

Laboratory & Research

- Unidirectional Flow Horizontal Flow Bench (LF)
- TT Table Top Horizontal Flow Clean Bench
- EnviraLab Sterility Module: ESM

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