



FAN FILTER DIFFUSERS

PRODUCT OVERVIEW

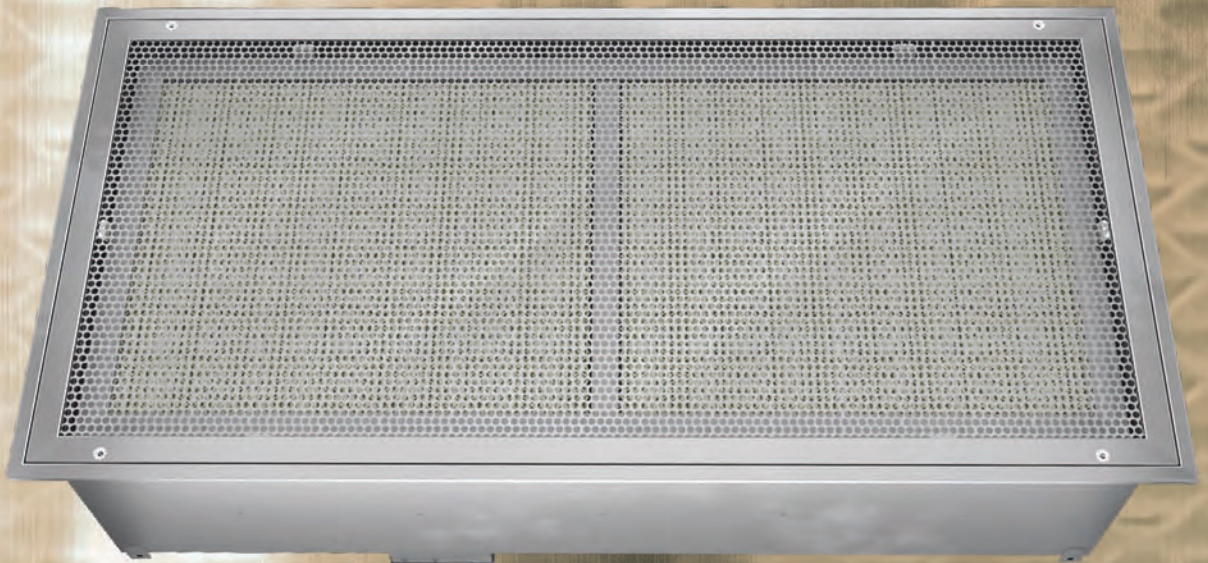


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W92FFD2015

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FAN FILTER DIFFUSERS

- ECM TECHNOLOGY
- ROOM SIDE REPLACEMENT FILTER
- DESIGNED FOR HEPA OR ULPA FILTER

Models:

- 92FFD** Aluminum
- 92FFD-SS** Stainless Steel



Model 92FFD-SS

Nailor **92FFD Series Fan Filter Diffusers** consist of a unitary, welded stainless steel plenum, a removable perforated grille face, pressure independent EC motor and forward curved centrifugal blower. The fan/motor assembly is designed to supply HEPA/ULPA filtered air to a clean room environment and can be used in many applications such as microelectronics, pharmaceutical, biotechnology as well as aerospace manufacturing/assembly and laser/optics industries.

All **92FFD Series** Plenums are robotically welded to ensure a repeatable, rigid, clean, and near leak free design to verify the specified efficiency and leakage meets the most stringent of current leak tests. Each unit is built to IEST RP Standards and factory leak tested and serialized (HEPA filter only) with a PAO aerosol. A Scan Testing Certificate can be provided upon request. Model 92FFD comes with an aluminum perforated face and Type 304 stainless steel plenum. Model 92FFD-SS comes with a stainless steel perforated face and Type 304 stainless steel plenum.

Filters are secured within the plenum against a continuous knife edge. The knife edge contacts the gel channel of the filter to provide a leak proof seal.

Standard ECM (Electronically Commutated Motor) technology provides an ultra-energy efficient design with the ability to precisely set a constant air volume. Additionally, as filter loading increases fan external static pressure, the ECM will compensate to maintain set airflow. Extra benefits of using ECM technology include an improved motor life, wider airflow operating range, low heat generation and quiet operation. Optionally, motors and controls are room-side removable for easy access when servicing or replacing. All 92FFD Series products are ETL tested and listed to UL 507.

STANDARD FEATURES:

- # 4 Brushed Satin Polished finish (Model 92FFD-SS).
- AW Appliance White (Model 92FFD).
- Removable face plate for cleaning, filter replacement and secured by 1/4 turn fasteners.
- HEPA Filter (99.99% on 0.3 μm) is supplied as standard.
- Accepts HEPA/ULPA gel channel filters.
- High Efficiency ECM for precise constant airflow and field balancing. Available in (1 Ph, 60 Hz- 120V, 208V, 240V or 277V voltages).
- LED fan operation indicator (on during normal operation).
- Internal Urethane Foam insulation to reduce sound levels.
- Face accessible static pressure port (*for plenum side pressure readings).
- Heavy duty hanger brackets.
- Digital speed controller with airflow readout.
- Two stainless steel safety cables to prevent accidental dropping of removable face.

- Main power disconnect.
- PAO (Polyalphaolefin) Testing is on individual units to serialize leakage.

CONSTRUCTION MATERIAL:

- Aluminum (Model 92FFD) or Type 304 Stainless Steel perforated face (Model 92FFD-SS) has 3/16" (5) diameter holes on 60 degree 1/4" (6) staggered centers (51% free area). The face plate is removable for cleaning, filter replacement and is secured by 1/4 turn fasteners.
- Type 304 stainless steel frame and fully welded plenum (all models).

MATERIAL OPTIONS:

- Type 316 stainless steel construction (92FFD-SS only).

FINISH OPTIONS:

- AW Appliance White (92FFD-SS).

FILTER OPTIONS:

- ULPA Filter (99.9995% on 0.12 μm).
- Filter by others.
- Loaded Filter Indicator Package-LFI (Adjustable, transformer included).
- Washable MERV 4 Pre-filter.
- Scan Testing Certificate – STC is available for PAO Testing.

MOTOR/CONTROL OPTIONS:

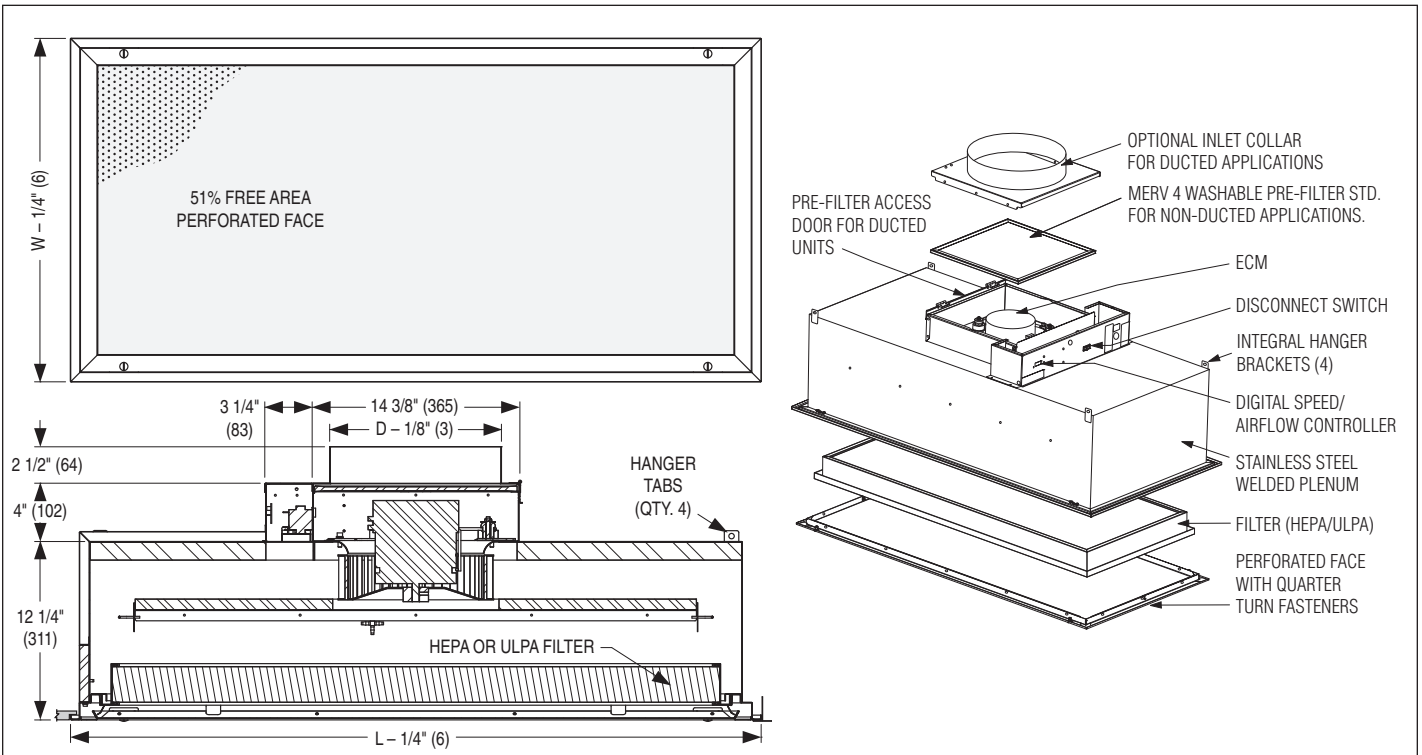
- Room-side removable Motor/Blower.
- Room-side removable Motor/Blower/Controls.

DUCTED OPTIONS:

- Round duct collars available in 10", 12" or 14" (254, 305 or 356).

DIMENSIONAL DATA:

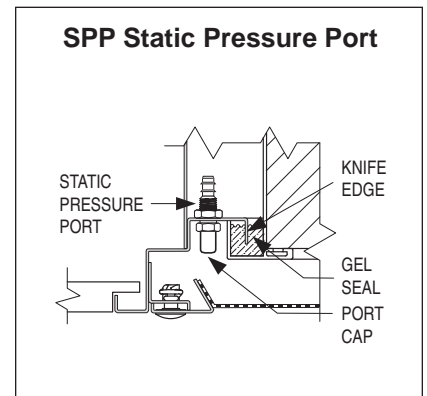
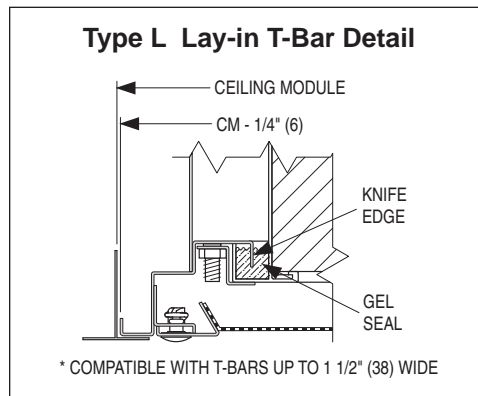
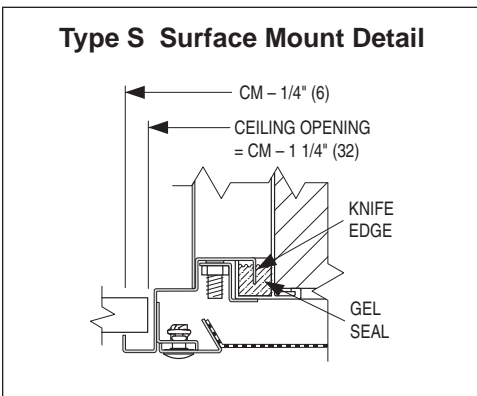
92FFD SERIES



Models 92FFD and 92FFD-SS
Ceiling Module Sizes L x W & Nominal Round Duct Sizes D



L x W	Imperial Modules (inches)		24 x 24 (610 x 610)	36 x 24 (914 x 610)	48 x 24 (1219 x 610)
	Metric Modules (mm)		600 x 600	900 x 600	1200 x 600
Duct Size D	(inches)		14 x 14 std. 10, 12, 14 opt.	14 x 14 std. 10, 12, 14 opt.	14 x 14 std. 10, 12, 14 opt.
	(mm)		356 x 356 std. 254, 305, 356 opt.	356 x 356 std. 254, 305, 356 opt.	356 x 356 std. 254, 305, 356 opt.



(Standard) 1 1/2" (38) wide or L20 (Optional)
 2" (51) wide.

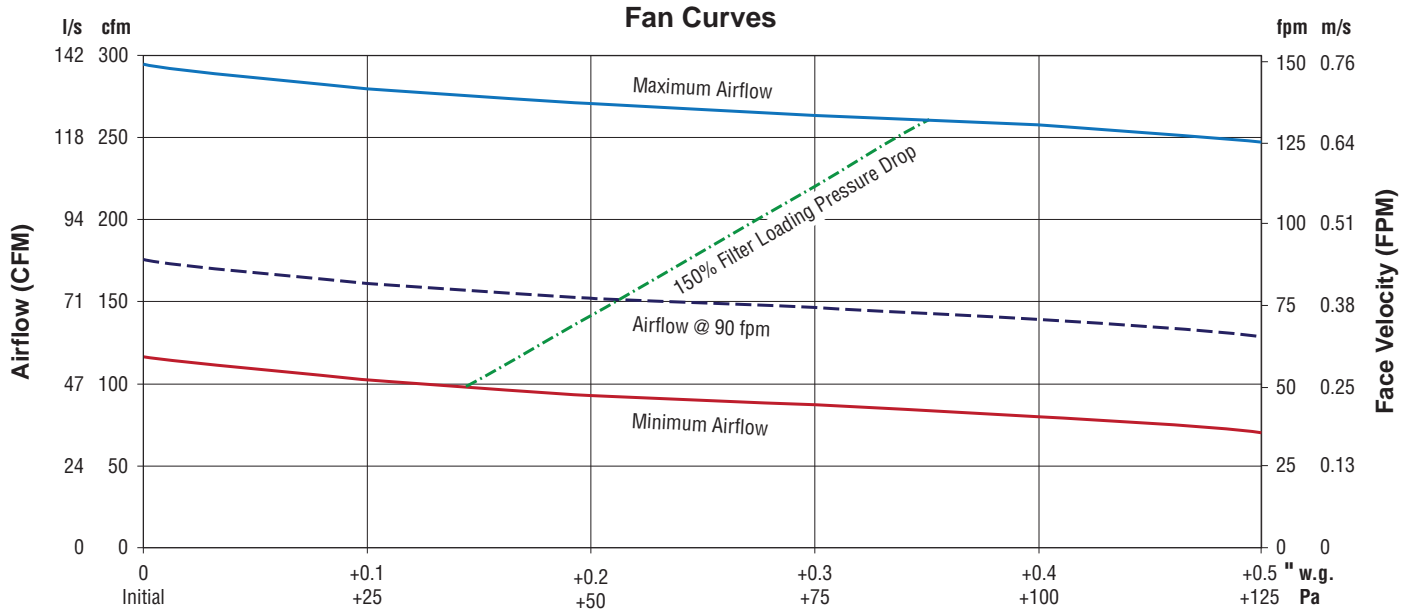
PERFORMANCE DATA:

92FFD SERIES • FAN PERFORMANCE CURVES

ECM • With HEPA Filter • 99.99% Minimum Removal Efficiency on 0.30 Micrometer Particle Size

Unit Size 24" x 24" (610 x 610)

120V, 208V, 240V and 277V

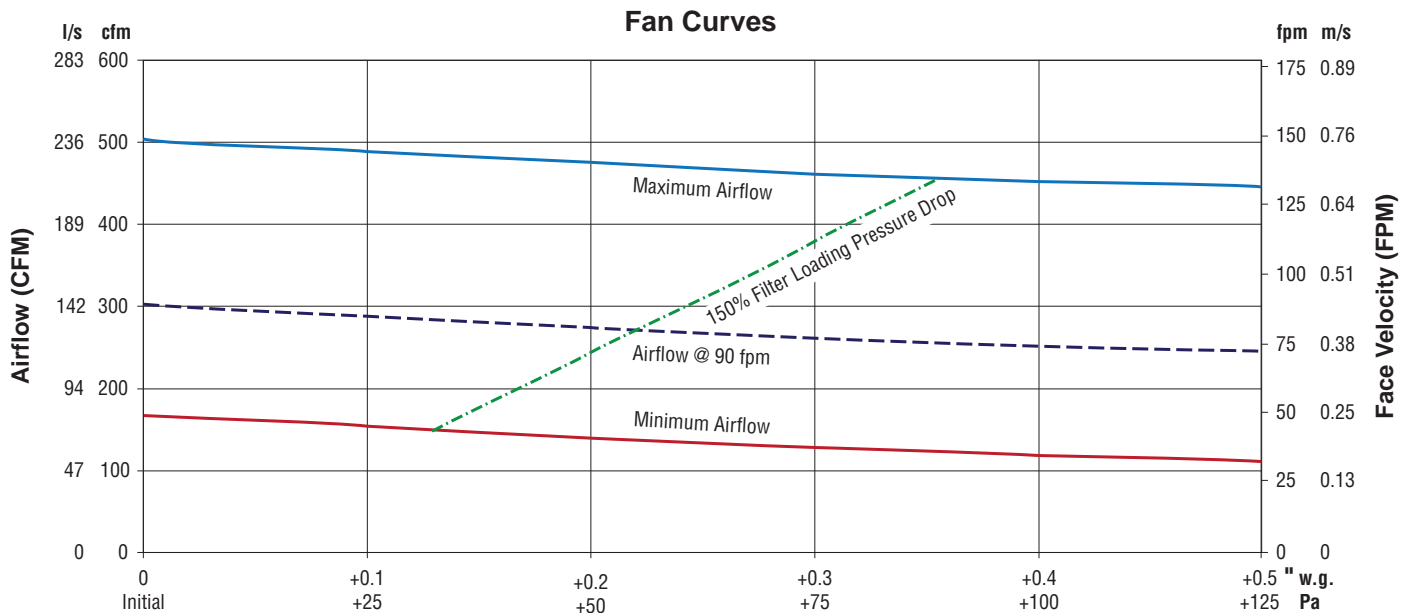


**Airflow @ Initial Filter Resistance
Loaded Filter Static (" w.g.) Coefficient***

1. A coefficient for factory supplied filter loading can be obtained from the provided line. IEST recommends the filter be replaced @ 150% of initial pressure drop.
2. For example: If initial filter resistance = .5" w.g., use the provided line to estimate the additional static pressure, @ indicated airflow, for a 150% loaded filter. Add the additional static pressure to the initial pressure drop, @ indicated airflow, to determine maximum allowable pressure drop.

Unit Size 36" x 24" (914 x 610)

120V, 208V, 240V and 277V



**Airflow @ Initial Filter Resistance
Loaded Filter Static (" w.g.) Coefficient***

1. A coefficient for factory supplied filter loading can be obtained from the provided line. IEST recommends the filter be replaced @ 150% of initial pressure drop.
2. For example: If initial filter resistance = .5" w.g., use the provided line to estimate the additional static pressure, @ indicated airflow, for a 150% loaded filter. Add the additional static pressure to the initial pressure drop, @ indicated airflow, to determine maximum allowable pressure drop.

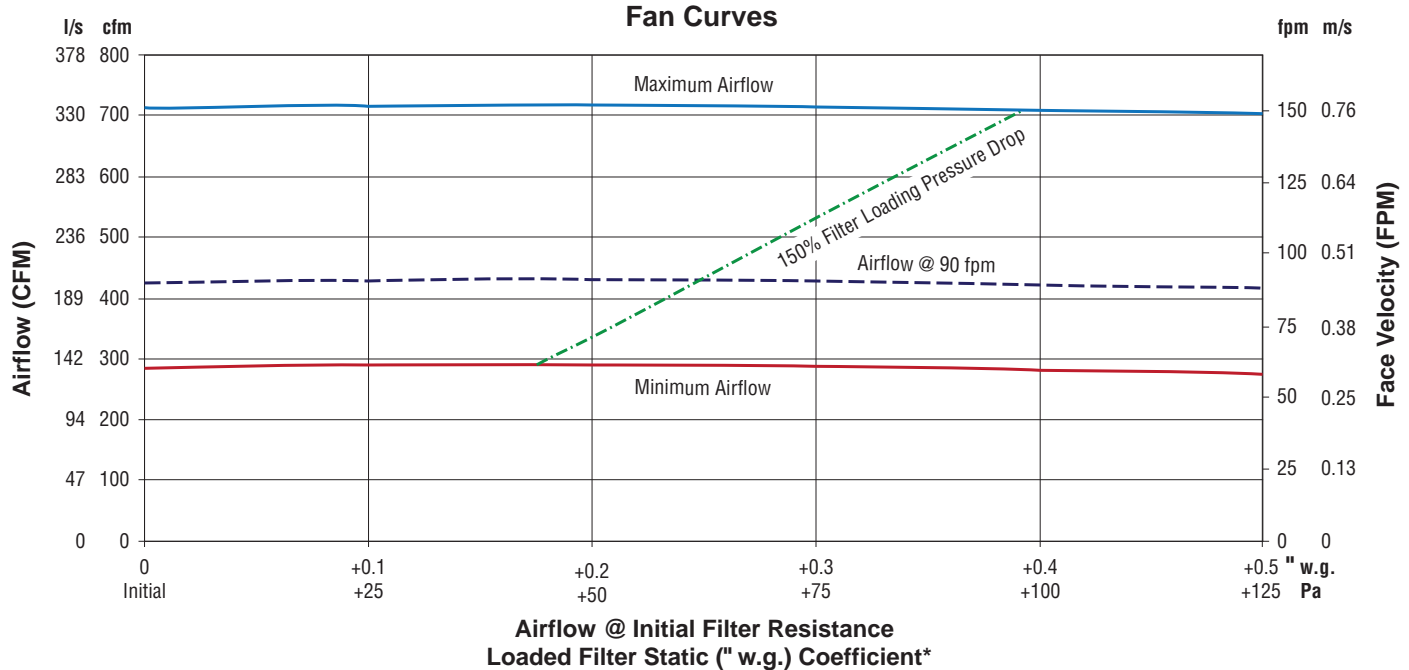
PERFORMANCE DATA:

92FFD SERIES • FAN PERFORMANCE CURVES

ECM • With HEPA Filter • 99.99% Minimum Removal Efficiency on 0.30 Micrometer Particle Size

Unit Size 48" x 24" (1219 x 610)

120V, 208V, 240V and 277V



1. A coefficient for factory supplied filter loading can be obtained from the provided line. IEST recommends the filter be replaced @ 150% of initial pressure drop.
2. For example: If initial filter resistance = .5" w.g., use the provided line to estimate the additional static pressure, @ indicated airflow, for a 150% loaded filter. Add the additional static pressure to the initial pressure drop, @ indicated airflow, to determine maximum allowable pressure drop.

PERFORMANCE DATA:

92FFD SERIES

ECM • With HEPA Filter • 99.99% Minimum Removal Efficiency on 0.30 Micrometer Particle Size

Nominal Unit Size	Voltage [V/PH/Hz]	Active Filter Area [sq. ft.]	Operating Range [fpm]	Max. Airflow [cfm]	Min. Airflow [cfm]	Airflow @ 90 fpm [cfm]	Amps @ 90 fpm	Watts @ 90 fpm	Initial Resistance @ 90 fpm [in. - w.g.]	Weight [lbs.]	Motor Heat Gain [BTU]	Sound @ 90 fpm [dBA]
24 x 24	120/1/60	1.96	50 - 160	310	100	176	1.20	75	0.45	60	257	50
24 x 24	208/1/60	1.96	55 - 170	330	105	176	0.65	71	0.45	60	242	50
24 x 24	240/1/60	1.96	55 - 170	330	105	176	0.65	71	0.45	60	242	50
24 x 24	277/1/60	1.96	60 - 170	330	115	176	0.65	74	0.45	60	253	50
36 x 24	120/1/60	3.37	45 - 170	575	160	303	1.20	73	0.45	70	248	47
36 x 24	208/1/60	3.37	45 - 165	555	155	303	0.70	76	0.45	70	259	47
36 x 24	240/1/60	3.37	45 - 165	555	155	303	0.70	76	0.45	70	259	47
36 x 24	277/1/60	3.37	50 - 160	535	165	303	0.60	77	0.45	70	261	47
48 x 24	120/1/60	4.77	25 - 145	685	120	429	2.00	131	0.45	90	446	51
48 x 24	208/1/60	4.77	25 - 145	705	125	429	1.05	117	0.45	90	401	51
48 x 24	240/1/60	4.77	25 - 145	705	125	429	1.05	117	0.45	90	401	51
48 x 24	277/1/60	4.77	60 - 145	700	280	429	1.05	124	0.45	90	422	51

NOTES:

1. All airflow tested in accordance with current version of IEST-RP-CC002.3 UNI DIRECTIONAL – FLOW, clean air devices.
2. Initial resistance refers to the static pressure associated with a clean filter at the corresponding face velocity.
3. Active filter area is based on factory supplied filter. Use of field supplied filters will result in different active filter areas.
4. Per IEST-RP-CC002.3, filters should be replaced once the internal static pressure has reached 1.5 times initial resistance at corresponding face velocity.

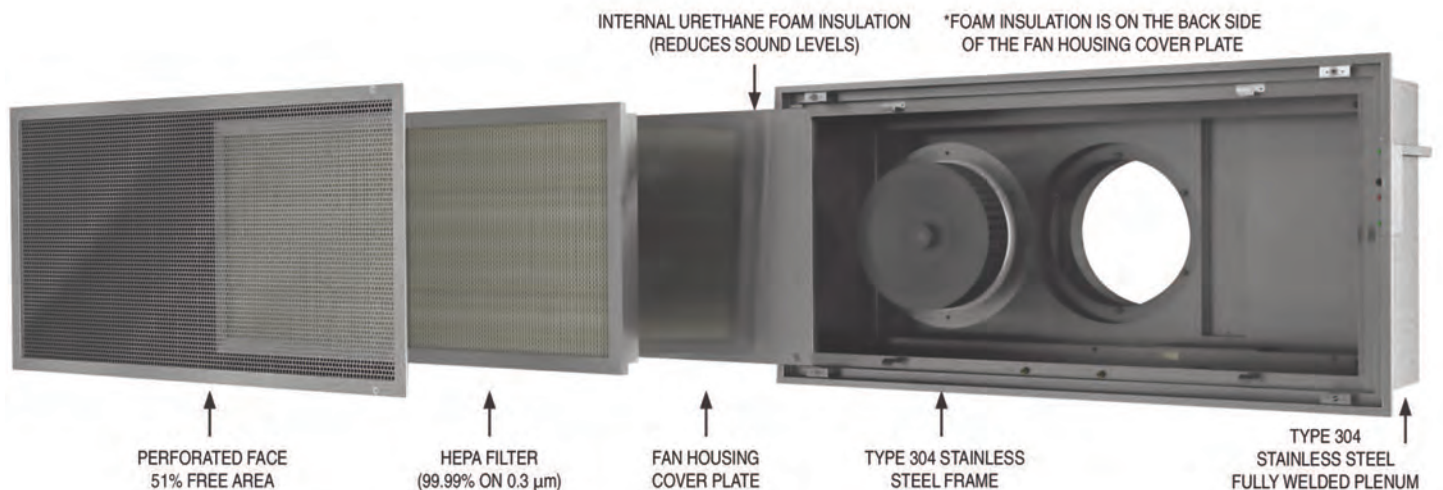
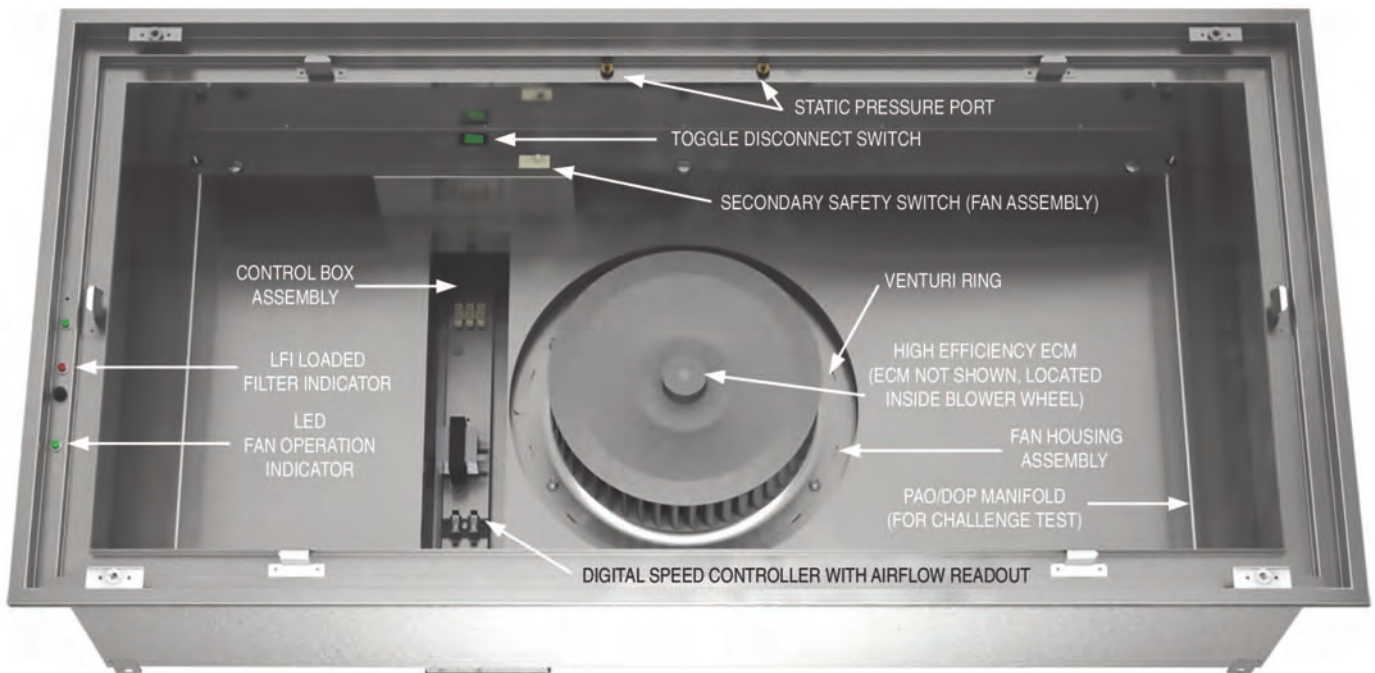
92FFD SERIES • ECM TECHNOLOGY

FEATURES/BENEFITS:

- Super quiet throughout all modes of operation.
- Up to 82% efficient, 30% greater than common PSC motors.
- Strong, integrated electronics with advanced thermal and overload protection
- Works with multiple voltages (120V, 208V, 240V and 277V)
- 1 Phase, 60 Hz
- Ability to precisely set a constant airflow
- Pressure independent airflow

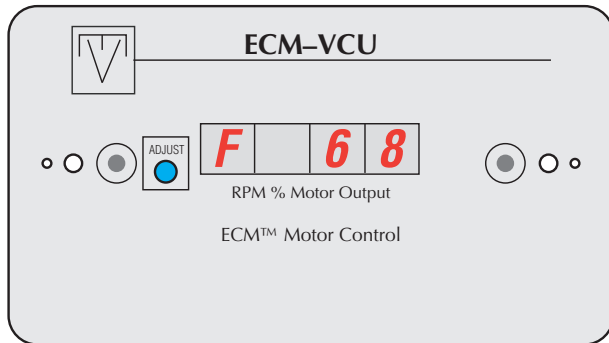


92FFD SERIES • RMBC (ROOM-SIDE REMOVABLE BLOWER/MOTOR/CONTROLS)



MN ECM FAN CONTROLLER:

The ECM-VCU (Visual Control Unit) is a manual volume controller that provides precise manual adjustment and monitoring of the fan when used with an ECM. The ECM controller features a 4 digit LED numerical display, providing excellent legibility of numbers, especially when viewing in dark spaces. The flow index is set and adjusted with a screwdriver. After 20 seconds, the board will display cfm and then alternate between calculated cfm and percent torque (flow index).

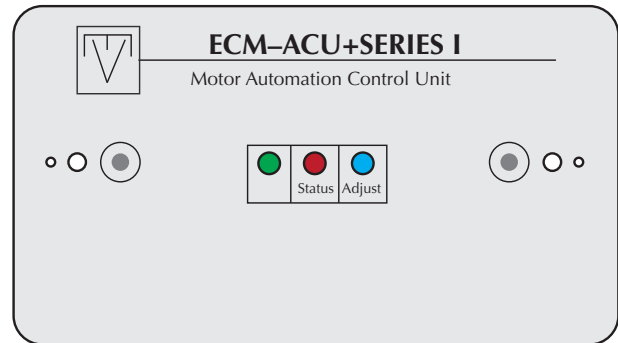


MN – Manual Volume Control

AT ECM FAN CONTROLLER:

The ECM-ACU+ is an Auto/Dynamic Volume Control that adjusts and monitors the ECM by using 0 – 10 Vdc analog input.

The motor is factory programmed to provide constant mass airflow over the configured control range. The interface provides remote adjustment of the ECM output with a programmed control range of 0 – 100%. A signal lamp on the control continually flashes out the flow index. Instruments are not required to read the airflow value. Jumpers allow the interface to be configured for 0 – 10 Vdc, or 2 – 10 Vdc or manual/override control. The interface can also be used for stand alone manual control.



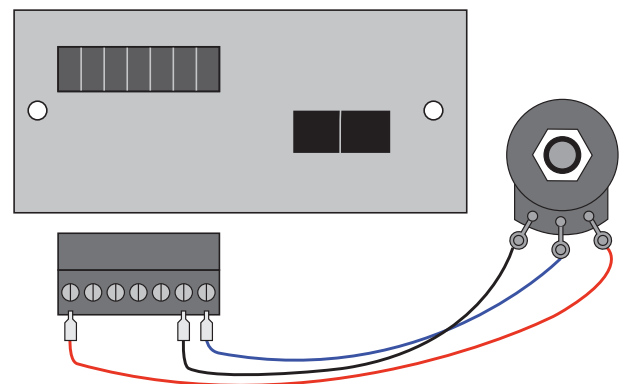
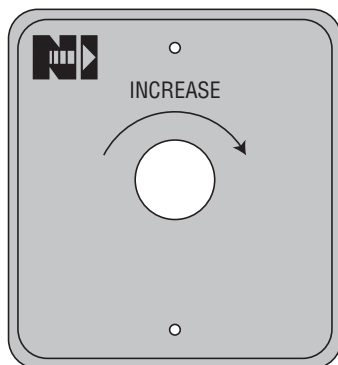
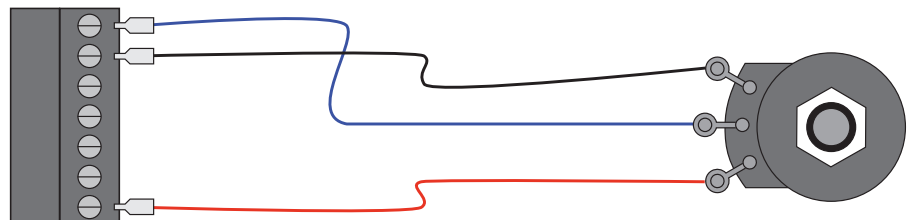
AT – Auto/Dynamic Volume Control

WMK – WALL MOUNT SPEED CONTROL KIT

Overview:

Nailor Model WMK is a wall mounted speed controller that provides convenient airflow adjustment in the occupied zone without the use of tools. The WMK provides a potentiometer to vary the speed of a single unit set-up in analog mode. This option is recommended for single units installed in locations where access to the unit mounted volume controller is inconvenient or for applications where frequent adjustment of the volume is required.

"WMK is easily field installed by a qualified electrician. The WMK is provided with a lead and 7-way connector as standard that simply plugs into the face of the factory installed ECM fan volume controller".



WALL MOUNT COVER PLATE:

Included with every purchase of the WMK, the Stainless Steel wall plate comes standard with mounting screws.

SMALL SYSTEM CONSOLE • ACC1-10, ACC1-25, ACC1-50, ACC1-125

Overview:

The Small System Console intelligently monitors and controls the ECM network. The console provides communication (MODBUS-RTU platform), unit control and system monitoring, consolidated into a simplified all-in-one package.

With the help of a user friendly, menu driven format, no programming is necessary to install a network. The console automatically scans the network, allowing the units/system to be configured through the menu.

The Small System Console is a single zone that has 4 available models to choose from, with the ability to control up to 10, 25, 50 or 125 network addressed units.

System Intelligence:

- Self-configuration upon start-up.
- Individual speed adjustment.
- Global speed adjustment.
- Global set-back speed adjustment.
- Central monitoring of fault sensors (pressure drop on AC, RPM drop on EC type).
- Menu driven configuration options.
- Monitors units and identifies error modes.

Features:

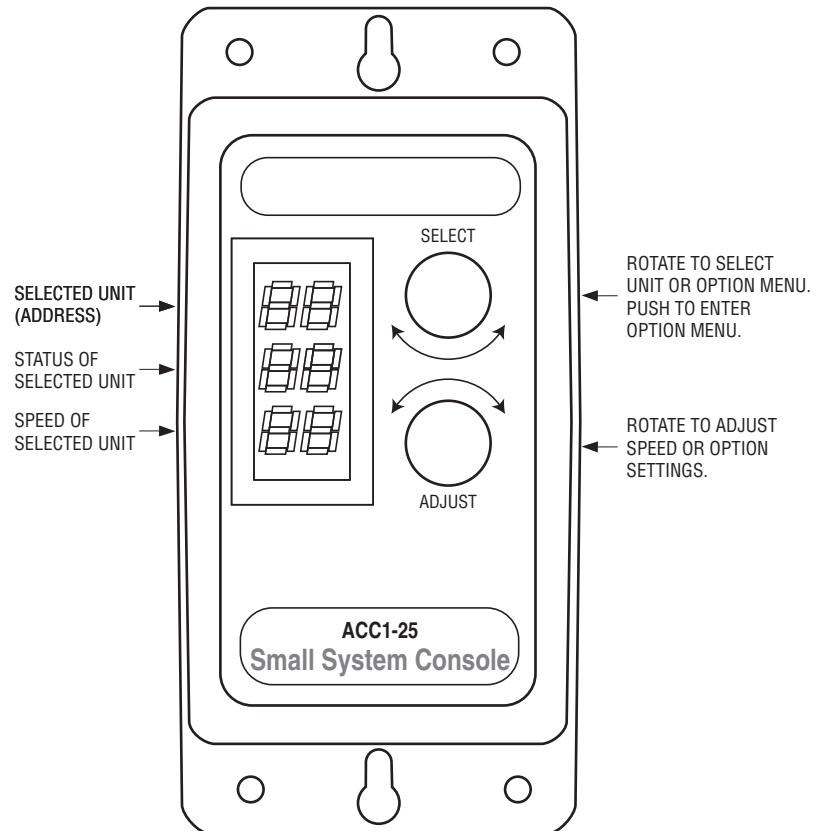
- Simple wall mount.
- 4 access levels to control modifications.
- User friendly interface.
 - 7 segment LED display.
 - Dual rotary encoders for selection and adjustment.
- Supports small to medium scale networks.
 - RS 485 (2 wire)
 - Up to 125 slave nodes

Installation:

The Small System Console (MODBUS Controller) can be mounted to the wall in the cleanroom or at a remote location. Maximum distance from the beginning to end of the daisy chain should not exceed 800 linear feet. ECM fan cards are pre-set with a unique address with a range of the MODBUS. DC power to the console can be provided by CAT5 network cable, Battery Pack (4) x AA batteries or Power Supply Module connected to the DC power jack. Once the control console has been connected to at least one fan filter diffuser, power can be applied.

Specifications:

- Supply Voltage: 8 – 13 Vdc
- Common Supply Current: 90 mA
- Batteries: 4 x AA size (battery life: typically 30 hours)
- Network Transceivers: 2-wire 1/8" unit load type
- Operating Temperature: 32°F to 104°F
- Electrical Connections
 - DC Power Connector: 2.1 mm DC Power Jack
 - MODBUS Network: RJ45 socket



Console Operation: Front and Panel View

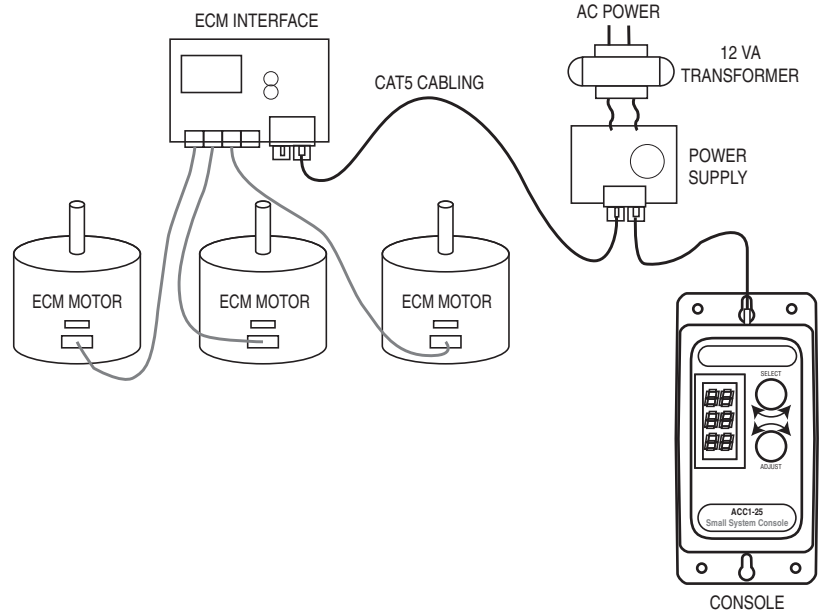
SMALL SYSTEM CONSOLE • ACC1-10, ACC1-25, ACC1-50, ACC1-125

Network Wiring:

A network is constructed by simple daisy-chaining between the ACC1-XXX and the unit controls. Network cable requirements should be specified based on:

- Distance between nodes.
- Total network length
- Noisy electrical environment
- Environmental conditions
- Mechanical issues

Pre-terminated cables are available and are suitable for many small system installations. Upon start-up, the console will automatically scan the controls.



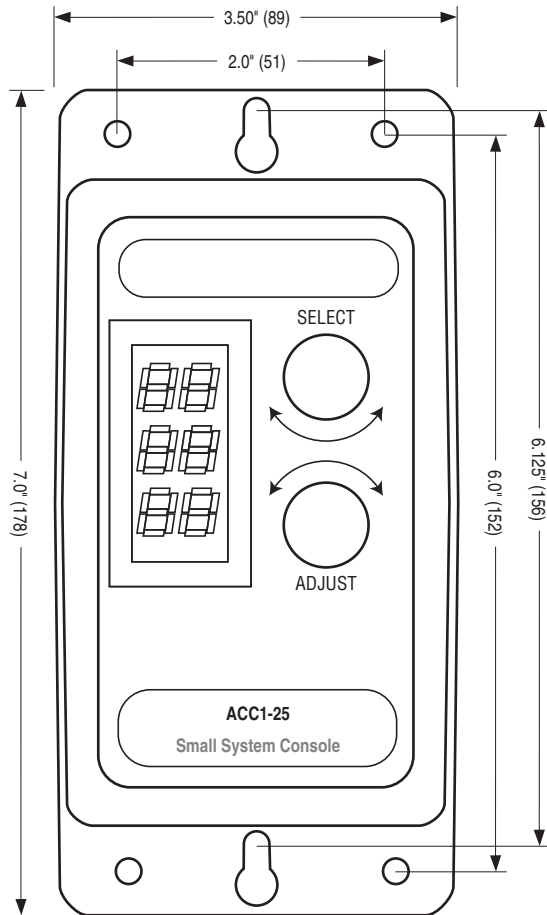
Mounting Instructions (Two Options):

Permanent Installation: Using the 4 outer holes (top and bottom) on the ACC1, the console can be permanently mounted to any desired location. *Please note that a wall outlet must be near the mounting location if the ACC1 is powered through a wall adaptor. An alternative is to power the ACC1-XXX through the CAT5 cable.*

Removable Installation: The key holes in the center of the ACC1 can be used to hang the ACC1 in any desired location.

****Note:** The Nailor MODBUS controllers have memory of the set point and provide local control of their motor/fan - removing the ACC1-XXX will not shut down the system. The system will continue to run until the ACC1-XXX is reconnected and the set-point modified.**

ACC1-XX System Diagram



Mechanical Dimensions

LFI – LOADED FILTER INDICATOR PACKAGE:

Nailor's LFI – Loaded Filter Indicator Package is offered as an option for the 92FFD Series Fan Filter Diffusers and provides convenient room-side visibility of filter condition and ECM status. On a standard Fan Filter Diffuser, where components are serviced from above the ceiling, the LFI package comes with two LED lights (1 green, 1 red). The green light is connected to a pressure switch to show that the unit is running. The light does not communicate that there is power to the unit, only that the blower wheel is spinning. The red light will turn on when the pressure set-point for filter replacement has been reached.

When RMB/RMBC (Room-side removable Blower/Motor/Controls) options are selected for the Fan Filter Diffusers, three LED lights will be provided with the LFI package (2 Green, 1 Red). One of the Green lights will communicate that the blower wheel is spinning and the second Green light will display that the 24V circuit is on. Both of the Fan Operation Indicator Lights (Green LEDs) will be on during normal operation, which allows for external monitoring of motor functionality. The Red light will illuminate only when the filter has built up enough pressure inside the unit where it needs to be replaced.

The LFI package comes standard with an adjustable 24V transformer and factory installed pre-calibrated switch that can be field adjusted if required. Maximum available pressure setting is 1.0" w.g.

NAILOR HEPA/ULPA FILTERS

Introduction:

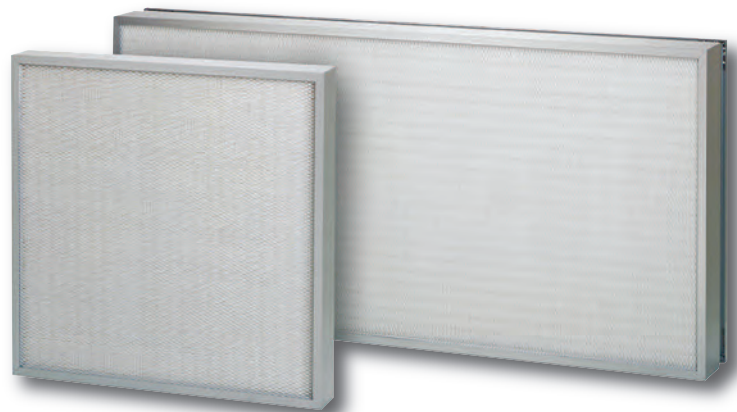
Model 92GSF-HE HEPA filters and Model 92GSF-UL ULPA filters are designed to fit in Nailor 92LFD, 92RPD and 92FFD Series products, which are ideal for use in cleanroom applications such as pharmaceutical, microelectronics, biotechnology as well as aerospace manufacturing/assembly and laser optic industries. The HEPA/ULPA filters are designed with mini-pleated wet laid glass media with efficiencies ranging from 99.99% on 0.3 μm particle size (HEPA) and 99.995% on 0.12 μm particle size. The filters incorporate an anodized extruded aluminum frame and a 2" (51) deep separatorless media pack with an overall height of 5.25". All filters are UL 900 Class 1 listed. Each filter is constructed per IEST-RP-CC001.5 standards and individually scan tested in accordance with IEST-RP-CC034.3. Filters are packaged independently from the diffuser for final installation in the field (by others). Filters cannot and will not be shipped installed.

FEATURES:

- Maximized media content for lower pressure drop and extended service life.
- 70% open face screen keeps the high performance of the media intact.
- Aluminum frame reduces weight and need for structural support.
- Hot melt beads protect pack from screen.

BENEFITS:

- Lower Energy Cost
- Low Pressure Drop
- Easy Installation, Light Weight
- No Media Damage



DOP/PAO CHALLENGE:

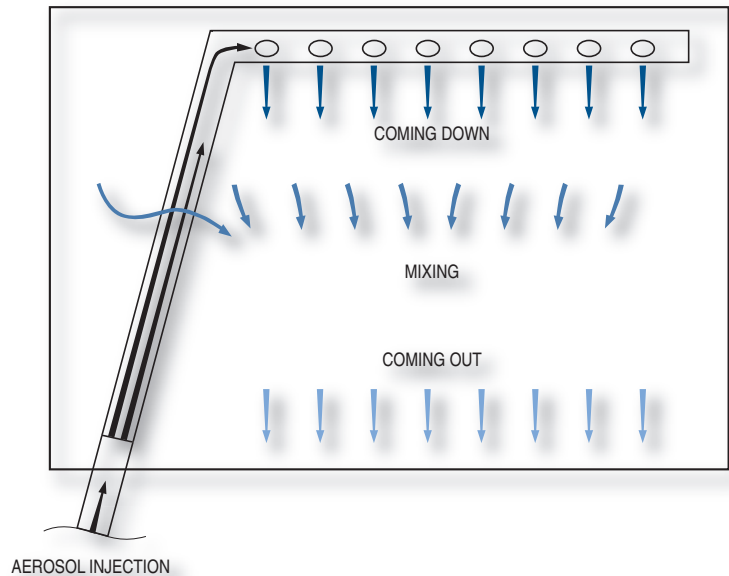
Nailor uses robotically welded plenums and gel channel filters. Each filter is constructed per IEST-RP-CC001.5 standards and individually scan tested in accordance with IEST-RP-CC0034.3. Our plenums have robotically welded seams and a unitized design.

How it works:

DOP/PAO Scan Testing is performed by using a photometer with a hand held probe. The probe is held or attached to the air exhaust of the unit. The photometer display indicates the percentage of leakage through or around the filter.

By initializing the Aerosol Generator, the production of DOP/PAO occurs, directing the aerosol to the inlet/filter side of the unit, permitting the HEPA unit to draw the media through the filter and blower. The test aerosol is introduced into the system to challenge the HEPA filter and seals on the upstream side of the filter. This can be achieved by aerosol passing through the mixing chamber, creating adequate mixing of the aerosol with the airflow in the duct or by directing the generated particles over entire filter media and around filter edges to test seal.

- Good design
- Stringent leak tests
- Ensures a near leak free design



HHRC – HAND HELD REMOTE CONTROL:

Nailor HHRC is an infrared remote control system that remotely changes the airflow of the Fan Filter Diffuser. The ECM allows adjustment of the airflow between the manufacturer's programmed minimum and maximum, which is achieved by setting the airflow index between 1 – 100 in the control. The HHRC sends modulated infrared signals to a receiver on the control. The control may be mounted on or near the equipment. A flow index lamp flashes out the motor's output, so instruments are not required to adjust or record the air balance setting. A red status lamp indicates the motor is powered and turning. Lamps and the infrared sensor may be mounted on the control or remotely to accommodate a wide variety of equipment configurations.





HEPA FILTER ENCLOSURE TEST REPORT

M/N (Enclosure): _____

S/N (Enclosure): _____

ID Number: _____	Date: _____	Technician: _____
Client: _____	Test Results	Manufacturer (filter): <u>Filtrair</u>
Address: _____	<input type="checkbox"/> Pass	P/N (filter): _____
City, State, Zip: _____	<input type="checkbox"/> See Comments	S/N (filter): _____
Contact Number: _____	<input type="checkbox"/> Fail	Filter Specs: <u>43.5 x 19.5 x 2 HEPA</u>
Phone: _____	<input type="checkbox"/> Pending Action	

TEST INSTRUMENTATION

Air Data:	Aerosol Photometer:	Aerosol (PAO) Generator:
Manufacturer: <u>Alnor</u>	Manufacturer: <u>TEC Services</u>	Manufacturer: <u>TEC Services</u>
M/N: <u>EBT-721</u>	M/N: <u>PH-4</u>	M/N: <u>AG-E1</u>
S/N: <u>90648017</u>	S/N: <u>1204</u>	S/N: <u>1177</u>

LEAK TEST: PERFORMED WITH 1.5 LASKIN NOZZLES @ RES. = 0.50

TEST 1	TEST 2	TEST 3
Airflow: <u>300 cfm</u>	Airflow: _____	Airflow: _____
Leaks Detected:	Leaks Detected:	Leaks Detected:
<input type="checkbox"/> Media	<input type="checkbox"/> Media	<input type="checkbox"/> Media
<input type="checkbox"/> Plaster Frame Corner	<input type="checkbox"/> Plaster Frame Corner	<input type="checkbox"/> Plaster Frame Corner
<input type="checkbox"/> Gasket	<input type="checkbox"/> Gasket	<input type="checkbox"/> Gasket
Test Comments: _____	Test Comments: _____	Test Comments: _____

PASS

Setup Comments: _____

Test equipment has been performance tested in accordance with:

- | | |
|---|---|
| <input checked="" type="checkbox"/> Owner's Specifications | <input checked="" type="checkbox"/> NSF Standard 49 |
| <input checked="" type="checkbox"/> Manufacturer's Specifications | <input checked="" type="checkbox"/> IEST-RP-CC034.3 |
| | <input checked="" type="checkbox"/> IEST-RP-CC021 |

Technician Signature: _____

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HOW TO ORDER

MODEL SERIES: 9200

FAN FILTER DIFFUSER – MODEL SERIES 92FFD • ALUMINUM OR STAINLESS STEEL

EXAMPLE: 92FFD-SS - 48 x 24 - 12 - L - #4 - V18 - MN - HE - 304 - PFM4 - SPP - QF

- | | | |
|--|--|---|
| <p>1. Model
92FFD Aluminum
92FFD-SS Stainless Steel</p> <p>2. Ceiling Module Size
Imperial Modules
inches (mm's)
24" x 24" (610 x 610)
36" x 24" (914 x 610)
48" x 24" (1219 x 610)
Metric Modules
(mm's)
600 x 600
900 x 600
1200 x 600</p> <p>3. Inlet Size
inches
1414 14" x 14" (356 x 356)
Non-ducted (default)
10 10" (254) dia. round collar
12 12" (305) dia. round collar
14 14" (356) dia. round collar</p> <p>4. Frame Type
L Lay-in T-Bar (up to 1 1/2" [38] wide) (default)
S Surface Mount
L20 Lay-in T-Bar – 2" (51) wide</p> <p>5. Finish
AW Appliance White (default 92FFD)
#4 Brushed Satin Polished (default 92FFD-SS)</p> <p>6. Fan Motor Voltage
V18 120V/1PH/60Hz ECM
V19 208V/1PH/60Hz ECM
V20 240V/1PH/60Hz ECM
V21 277V/1PH/60Hz ECM</p> <p>7. ECM Fan Card
MN Manual Volume Control (default)
AT Auto/Dynamic Volume Control, 0 – 10 Vdc</p> <p>8. Filter Type
HE HEPA (99.99% on 0.3 µm) (default)
UL ULPA (99.9995% on 0.12 µm)
FBO Filter by others</p> <p>9. Construction (-SS)
304 Type 304 Stainless Steel (default)
316 Type 316 Stainless Steel (Model 92FFD-SS only)</p> | <p>OPTIONS AND ACCESSORIES:
(Default is none unless noted otherwise)</p> <p>10. Pre-Filter
PFM4 MERV4 Washable Pre-filter (default for 14" x 14" [356 x 356] inlet)
– None (default for round inlet)</p> <p>11. SP/DOP Port
SPP Static Pressure Test/DOP Port (default)</p> <p>12. Disconnect Switch
QF Toggle Type (default)</p> <p>13. Filter Indicator
LFI LED Loaded Filter Indicator
Package (adjustable, transformer included)</p> <p>14. Removable Option
RMB Room-Side Removable Motor/Blower
RMBC Room-Side Removable Motor/Blower/Controls</p> <p>15. DOP/PAO Challenge
CPM Challenge Port and Manifold</p> <p>16. Control Option
WMK Wall Mount Speed Control Kit
HHRC Hand Held Remote Control</p> <p>17. Scan Testing Certificate
STC Scan Testing Certificate</p> | <p>Notes:</p> <p>1. Finish: AW Appliance White is the only finish available for Model 92FFD.</p> <p>2. ECM with LED digital display volume controller is standard.</p> <p>3. PFM4 MERV4 Washable Pre-filter is standard on non-ducted units and optional on ducted (round collar) units. Pre-filter access door for ducted units.</p> <p>4. Consult price pages as to limitations of module and neck size combination.</p> |
|--|--|---|

HOW TO SPECIFY

MODEL 92FFD (ALUMINUM) FAN FILTER DIFFUSERS

SUGGESTED SPECIFICATIONS:**GENERAL:**

- Furnish and Install Nailor **Model 92FFD Fan Filter Diffusers** of the sizes and capacities shown on the plans and air distribution schedules.

CONSTRUCTION:

- 1.00 The unit shall be constructed and classified in accordance with IEST-RP-CC002.3.
- 1.01 The perforated face of the diffuser shall be constructed with 0.032" aluminum alloy (AL3003) and have 3/16" (5) diameter holes on 60° 1/4" (6) staggered centers with 51% free area.
- 1.02 The face shall be attached with 1/4 turn fasteners to allow for complete removal and access to the interior for cleaning. All diffusers are to include safety cables to prevent accidental dropping of the removable face.
- 1.03 Frame Type shall be either Lay-in T-Bar suitable for flat ceiling tees, up to 1 1/2" (38) wide, or Surface Mount.
- 1.04 All room-side exposed surfaces shall have AW Appliance White powder coat finish.
- 1.05 Inlet size shall be 14" x 14" (356 x 356) for non-ducted applications and include a MERV 4 washable pre-filter.
- 1.06 The diffuser plenum shall be robotically welded 304 stainless steel, minimum 20 ga. (1.0). The diffuser plenum shall incorporate an integral filter frame to accommodate a Gel Seal Filter of type HEPA or ULPA. Integral hanger tabs shall be included and shall be permanently welded to the plenum. Hanger tabs using mechanical fasteners are not acceptable.
- 1.07 Fan Filter Diffusers shall be strategically lined with 1.25" thick internal urethane foam insulation attached to the bottom of the plenum and 0.75" on the mid panel, both surrounding the fan, for sound attenuation.
- 1.08 A static pressure port shall be included for upstream filter static pressure measurements. The pressure port shall be factory installed and factory leak tested prior to shipment.
- 1.09 Factory leak testing of the Fan Filter Diffuser assembly shall be provided using a PAO (Poly-Alpha-Olefin) aerosol in accordance with IEST-RP-CC0034.3.
- 1.10 Filters shall be securely held in place by at least four mounting brackets allowing filter removal from the face of the diffuser without disturbing the installed ductwork or the diffuser mounting surface. The mounting bracket assembly shall not compromise the integrity of the knife edge assembly with any through penetrations of the knife edge.

FILTERS:

- 2.01 The filters efficiency shall be HEPA: 99.99% minimum removal efficiency on 0.30 micrometer particle size. Filters shall incorporate an anodized extruded aluminum frame and 2" (51) deep separatorless filter pack. Filters shall incorporate a removable test port, to measure filter pressure drop or to perform leakage (scan) tests.
- 2.02 All filters shall be UL 900 Class 1 Listed and Factory Mutual Approved. All filters shall be constructed per IEST-RP-CC001.5 standards and individually scan tested in accordance with IEST-RP-CC034.3.
- 2.03 Filters shall be packaged independently from the diffuser for final installation in the field (by others). Filters cannot and will not be shipped installed.

PERFORMANCE:

- 3.01 The manufacturer shall provide published performance data for the diffuser, which shall be tested in accordance with ANSI/ASHRAE Standard 70.
- 3.02 Motor shall be a high efficiency ECM for precise constant airflow and field balancing, complete with integrated electronics, advanced thermal and overload protection. The following motor specifications shall apply:
 - Frame Size – 48
 - 1 Phase, 60HZ
 - Available Voltages: 120V, 208V, 240V, 277V
 - Operation Modes: Constant CFM.
- 3.03 Blower wheel shall be forward curved centrifugal type, dynamically balanced and driven by direct drive ECM.
- 3.04 Motor/Blower assembly shall be accessible and removable from the top of the unit.

CONTROLS:

- 4.01 Non-ducted units shall be ETL listed to UL 507.
- 4.02 ECM Fan Card shall be a manual volume controller that provides precise manual adjustment of CFM and monitoring of the fan when used with the ECM. The display shall include a backlit and clearly legible digital readout.
- 4.03 LED fan operation indicator shall remain on during normal operation and be room-side visible.
- 4.04 Toggle type disconnect switch shall be provided with all units for main power on/off.

HOW TO SPECIFY

MODEL 92FFD (ALUMINUM) FAN FILTER DIFFUSERS (continued)

SUGGESTED SPECIFICATIONS:**OPTIONS:****Construction – Substitute the following paragraph(s):**

- 1.03 Frame type shall be either Lay-in T-bar suitable for flat ceiling tees, up to 2" (51) wide, or Surface Mount. T-Bar frame type L20 shall be specified.
- 1.05 Ducted units shall be provided with 10", 12" or 14" (254, 305 or 356) round inlet and optional MERV 4 pre-filter with access door.
- 1.09 Factory leak testing of the Fan Filter Diffuser assembly shall be provided using a PAO aerosol in accordance with IEST-RP-CC0034.3. A Scan Testing Certificate shall be provided for individual unit serialization.
- 1.11 A PAO dispersion manifold, with unit integrated challenge port, shall be factory installed and accessible without removal of the filter.

Filters – Substitute the following paragraph(s):

- 2.01 The filter efficiency shall be ULPA: 99.9995% minimum removal efficiency on 0.12 micrometer particle size. Filters shall incorporate an anodized extruded aluminum frame and removable test port, to measure filter pressure drop or to perform leakage (scan) tests.
- 2.04 Unit shall be provided with LFI – Loaded Filter Indicator package to provide room-side visibility of filter condition and ECM status.

Performance – Substitute the following paragraph(s):

- 3.04 Blower/Motor assembly shall be accessible and replaceable from the room-side, option code RMB.
- 3.04 Blower/Motor/Controls shall be accessible and replaceable from the room-side, option code RMBC.

Controls – Substitute the following paragraph(s):

- 4.02 Unit shall be provided with a wall mounted speed control potentiometer to vary the speed of a single unit set-up in analog mode (shipped loose for field installation).
- 4.02 MODBUS controller shall be provided with the unit, which monitors and controls the ECM network (shipped loose for field installation).
- 4.02 Unit shall be provided with an Auto/Dynamic Volume Control that adjusts and monitors the ECM by using 0V to + 10V AC or DC automation signals. The interface provides remote BAS adjustment of the ECM output with a programmed control range of 0-100%.

HOW TO SPECIFY

MODEL 92FFD-SS (STAINLESS STEEL) FAN FILTER DIFFUSERS

SUGGESTED SPECIFICATIONS:**GENERAL:**

- Furnish and Install Nailor **Model 92FFD-SS Fan Filter Diffusers** of the sizes and capacities shown on the plans and air distribution schedules.

CONSTRUCTION:

- 1.00 The unit shall be constructed and classified in accordance with IEST-RP-CC002.3.
- 1.01 The perforated face of the diffuser shall be constructed with 304 stainless steel and have 3/16" (5) diameter holes on 60° 1/4" (6) staggered centers with 51% free area.
- 1.02 The face shall be attached with 1/4 turn fasteners to allow for complete removal and access to the interior for cleaning. All diffusers are to include safety cables to prevent accidental dropping of the removable face.
- 1.03 Frame Type shall be either Lay-in T-Bar suitable for flat ceiling tees, up to 1 1/2" (38) wide, or Surface Mount.
- 1.04 All room-side exposed surfaces shall have #4 Brushed Satin Polished finish.
- 1.05 Inlet size shall be 14" x 14" (356 x 356) for non-ducted applications and include a MERV 4 washable pre-filter.
- 1.06 The diffuser plenum shall be robotically welded 304 stainless steel, minimum 20 ga. (1.0). The diffuser plenum shall incorporate an integral filter frame to accommodate a Gel Seal Filter of type HEPA or ULPA. Integral hanger tabs shall be included and shall be permanently welded to the plenum. Hanger tabs using mechanical fasteners are not acceptable.
- 1.07 Fan Filter Diffusers shall be strategically lined with 1.25" thick internal urethane foam insulation attached to the bottom of the plenum and 0.75" on the mid panel, both surrounding the fan, for sound attenuation.
- 1.08 A static pressure port shall be included for upstream filter static pressure measurements. The pressure port shall be factory installed and factory leak tested prior to shipment.
- 1.09 Factory leak testing of the Fan Filter Diffuser assembly shall be provided using a PAO (Poly-Alpha-Olefin) aerosol in accordance with IEST-RP-CC0034.3.
- 1.10 Filters shall be securely held in place by at least four mounting brackets allowing filter removal from the face of the diffuser without disturbing the installed ductwork or the diffuser mounting surface. The mounting bracket assembly shall not compromise the integrity of the knife edge assembly with any through penetrations of the knife edge.

FILTERS:

- 2.01 The filters efficiency shall be HEPA: 99.99% minimum removal efficiency on 0.30 micrometer particle size. Filters shall incorporate an anodized extruded aluminum frame and 2" (51) deep separatorless filter pack. Filters shall incorporate a removable test port, to measure filter pressure drop or to perform leakage (scan) tests.
- 2.02 All filters shall be UL 900 Class 1 Listed and Factory Mutual Approved. All filters shall be constructed per IEST-RP-CC001.5 standards and individually scan tested in accordance with IEST-RP-CC034.3.
- 2.03 Filters shall be packaged independently from the diffuser for final installation in the field (by others). Filters cannot and will not be shipped installed.

PERFORMANCE:

- 3.01 The manufacturer shall provide published performance data for the diffuser, which shall be tested in accordance with ANSI/ASHRAE Standard 70.
- 3.02 Motor shall be a high efficiency ECM for precise constant airflow and field balancing, complete with integrated electronics, advanced thermal and overload protection. The following motor specifications shall apply:
 - Frame Size – 48
 - 1 Phase, 60HZ
 - Available Voltages: 120V, 208V, 240V, 277V
 - Operation Modes: Constant CFM.
- 3.03 Blower wheel shall be forward curved centrifugal type, dynamically balanced and driven by direct drive ECM.
- 3.04 Motor/Blower assembly shall be accessible and removable from the top of the unit.

CONTROLS:

- 4.01 Non-ducted units shall be ETL listed to UL 507.
- 4.02 ECM Fan Card shall be a manual volume controller that provides precise manual adjustment of CFM and monitoring of the fan when used with the ECM. The display shall include a backlit and clearly legible digital readout.
- 4.03 LED fan operation indicator shall remain on during normal operation and be room-side visible.
- 4.04 Toggle type disconnect switch shall be provided with all units for main power on/off.

HOW TO SPECIFY

MODEL 92FFD-SS (STAINLESS STEEL) FAN FILTER DIFFUSERS (continued)

SUGGESTED SPECIFICATIONS:**OPTIONS:****Construction – Substitute the following paragraph(s):**

- 1.03 Frame type shall be either Lay-in T-bar suitable for flat ceiling tees, up to 2" (51) wide, or Surface Mount. T-Bar frame type L20 shall be specified.
- 1.04 All room-side exposed surfaces shall have AW Appliance White powder coat finish.
- 1.05 Ducted units shall be provided with 10", 12" or 14" (254, 305 or 356) round inlet and optional MERV 4 pre-filter with access door.
- 1.09 Factory leak testing of the Fan Filter Diffuser assembly shall be provided using a PAO aerosol in accordance with IEST-RP-CC0034.3. A Scan Testing Certificate shall be provided for individual unit serialization.
- 1.11 A PAO dispersion manifold, with unit integrated challenge port, shall be factory installed and accessible without removal of the filter.

Filters – Substitute the following paragraph(s):

- 2.01 The filter efficiency shall be ULPA: 99.9995% minimum removal efficiency on 0.12 micrometer particle size. Filters shall incorporate an anodized extruded aluminum frame and removable test port, to measure filter pressure drop or to perform leakage (scan) tests.
- 2.04 Unit shall be provided with LFI – Loaded Filter Indicator package to provide room-side visibility of filter condition and ECM status.

Performance – Substitute the following paragraph(s):

- 3.04 Blower/Motor assembly shall be accessible and replaceable from the room-side, option code RMB.
- 3.04 Blower/Motor/Controls shall be accessible and replaceable from the room-side, option code RMBC.

Controls – Substitute the following paragraph(s):

- 4.02 Unit shall be provided with a wall mounted speed control potentiometer to vary the speed of a single unit set-up in analog mode (shipped loose for field installation).
- 4.02 MODBUS controller shall be provided with the unit, which monitors and controls the ECM network (shipped loose for field installation).
- 4.02 Unit shall be provided with an Auto/Dynamic Volume Control that adjusts and monitors the ECM by using 0V to + 10V AC or DC automation signals. The interface provides remote BAS adjustment of the ECM output with a programmed control range of 0-100%.



PRODUCT SPOTLIGHT

CRITICAL ENVIRONMENT APPLICATIONS 92FFD FAN FILTER DIFFUSERS

Nailor 92FFD Series Fan Filter Diffusers are fan powered diffusers with integrated high efficiency filters for critical environment applications. The diffusers are designed to supply HEPA/ULPA filtered air to a critical environment and are intended for use in cleanroom applications such as microelectronics, pharmaceutical, biotechnology as well as aerospace manufacturing/assembly and laser/optic industries.

Filters are secured within the plenum against a continuous knife edge. The knife edge contacts the gel channel of the filter to provide a leak proof seal. Filters are room-side removable via quarter turn fasteners.

All 92FFD Series Plenums are robotically welded to ensure a consistent, rigid, clean and relatively leak free design to verify the specified efficiency and leakage to meet the most stringent of current leakage tests. Each unit is PAO Scan Tested to IEST-RP-CC034.3 Standard to ensure leakage is consistent with an uncompromised filter. Premium design features and high quality construction include a removable face for room-side filter replacement. This enables the integrity of the clean space to be maintained as the ceiling does not need to be penetrated.

Standard ECM technology provides an ultra-energy efficient design with the ability to precisely set a constant air volume. Additionally, as filter loading increases fan external static pressure, the ECM will compensate to maintain set airflow.



STANDARD FEATURES

- Aluminum or Type 304 Stainless Steel construction
- 304 Stainless Steel Fully welded plenum
- High Efficiency ECM for reduced energy consumption, pressure independent airflow and simplified field balancing
- Internal Urethane Foam Insulation to reduce noise
- LED fan operation indicator (on during normal operation)
- #4 Brushed Satin Polished finish (SS) and AW Appliance White (AL)
- Two SS Safety Cables to prevent accidental dropping of face
- Digital speed controller with airflow readout
- Heavy duty hanger brackets
- ETL Listed and Tested to UL 507 Standard
- Face accessible static pressure port
- MERV 4 Washable Pre-Filter (non-ducted applications)
- HEPA filter (99.99% on 0.3 μm)
- Toggle disconnect switch

OPTIONS

- Type 316 Stainless Steel Construction
- ULPA Filter (99.9995% on 0.12 μm)
- Room-side removable Motor/Blower
- Room-side removable Motor/Blower/Controls
- Loaded Filter Indicator Package
- PAO Manifold for challenge test
- Inlet collar for ducted applications
- Wall mounted speed controller

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