



## ENGINEERS' SUBMITTAL REVIEW STAMP & COMMENTS

<b>Project:</b> MMC Bean AHU Replacement Project	
<b>Submittal Name #</b> 18 - Bean A.H.U. Replacement Project - HVAC Power Ventilators Submittals (5-13-2015)	
<b>AKF Project No:</b> B140263-000	<b>AKF Log No.</b> H-15

### AKF Group, LLC Submittal Stamp

- No Exceptions Taken
- Make Corrections Noted - No Resubmission Required
- Revise and Resubmit
- Rejected
- Returned Without Action

Checking is only for general conformance with the design concept of the project and general compliance with the information given in the contractor documents. Any action shown is subject to the given requirements of the plans and specifications. Contractor is responsible for: Dimensions which shall be confirmed and correlated at the job site; fabrication processes and techniques of construction; coordination of his work with that of all other trades; and the satisfactory performance of his work.

Date: 6/12/15

By: DPR

**General Comments:** Review of submitted shop drawings is limited to system material and function compliance to issued plans, specifications, addendums and bulletins. Specific quantities of necessary material items to provide a complete and functioning system are not being confirmed as part of this review. Ultimate responsibility for quantities of necessary materials to provide a complete and functioning system shall be by the submitting contractor and equipment vendor.

### Review Comments:

1. Motor for RF-069 shall be 5 HP as scheduled in drawing M-502.
2. Motor for EF-193 shall be 5 HP as scheduled in drawing M-502.
3. Motors shall be manufactured by Reliance.



# Submittal #80.0 23 34 23 - HVAC Power Ventilators

## S/D: HVAC Power Ventilators

<b>APPROVERS:</b>	Brandon Romano (Maine Medical Center) David Roberts (AKF)	<b>CREATED BY:</b>	Samantha Loring(Consigli Construction Co., Inc.)
<b>RESPONSIBLE CONTRACTOR:</b>	Johnson & Jordan, Inc Dana Foote (Johnson & Jordan, Inc)	<b>STATUS:</b>	Open
<b>TYPE:</b>	Shop Drawing	<b>SPEC SECTION:</b>	23 34 23 - HVAC Power Ventilators
<b>COPIES TO:</b>			
<b>DESCRIPTION:</b>			
<b>ATTACHMENTS:</b> <a href="#"># 18 - Bean A.H.U. Replacement Project - HVAC Power Ventilators Submittals (5-13-2015).pdf</a>			

ARCHITECT'S STAMP

CONTRACTOR'S STAMP

<b>Consigli Construction Co., Inc.</b>	
<input type="checkbox"/> Approved for A/E Review	<input type="checkbox"/> Revise & Resubmit
<input type="checkbox"/> Approved as Noted for A/E Review	<input type="checkbox"/> Rejected
Spec. Section: 23 34 23	Submittal No.: 80
Date: 6/4/2015	By: Nick Munro
<p>If so marked, approval is given for design only. It does not relieve the subcontractor from complying with the requirements of the contract, contract drawings and specifications. The subcontractor shall be responsible for all dimensions, quantities, schedules and field conditions.</p>	

**SUBMITTAL WORKFLOW**

#	NAME	SUBMITTER/ APPROVER	SENT DATE	DUE DATE	RETURNED DATE	RESPONSE	ATTACHMENTS	COMMENTS
1	Nick Munro	Submitter		6/4/2015	6/4/2015	Submitted		
2	David Roberts	Approver	6/4/2015	6/18/2015		Pending		
3	Brandon Romano	Approver		7/2/2015		Pending		

BY \_\_\_\_\_ DATE \_\_\_\_\_ COPIES TO \_\_\_\_\_

*Johnson and Jordan Mechanical*

SUBMITTAL - # 18

**PROJECT:** **MMC – Bean Air Handler Replacement Project**  
22 Bramhall Street  
Portland, Maine 04102  
**JOB # 15035**

**Construction Managers:** Maine Medical Center Facilities Development  
P.M. – Brandon Romano  
22 Bramhall Street  
Portland, Maine 04102

**SUBMITTED BY:** JOHNSON & JORDAN, INC  
18 MUSSEY RD.  
SCARBOROUGH, ME  
(207) 775-1169

**SUBCONTRACTOR:** JOHNSON & JORDAN, INC  
18 MUSSEY RD.  
SCARBOROUGH, ME  
(207) 775-1169

**SUPPLIER:** New England Tech Air  
16 Manson Libby Road  
Scarborough, Maine 04074  
207-347-7577

**SPECIFICATION SECTION:** **233423**

**PARAGRAPH:** 2.2

**ITEM:** **HVAC Power Ventilators**



*MECHANICAL CONTRACTORS*

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APPROVED \_\_\_\_\_ APPROVED AS NOTED \_\_\_\_\_  
REVIEWED \_\_\_\_\_ RE-SUBMIT \_\_\_\_\_  
SUBJECT TO ARCHITECTS APPROVAL \_\_\_\_\_  
DATE **5/13/15** \_\_\_\_\_ By: ***Jamie Evans*** \_\_\_\_\_



## New England Tech Air/Maine Steel

**1<sup>st</sup>, 2<sup>nd</sup>, 3<sup>rd</sup> SUBMITTAL**

DATE: 5/12/2015

PROJECT NAME & ADDRESS:
MMC AHU Replacement Project
22 Bramhall St
Portland, Maine 04102

ENGINEER
AKF
99 Bedford St 2 <sup>nd</sup> Floor
Boston, Ma 02111
ENGINEER PROJECT # B140263-000

MECHANICAL CONTRACTOR
Johnson and Jordan Mechanical Contractors
765 Congress Street 2 <sup>nd</sup> Floor
Portland, ME 04102
J & J Submittal Coordinator: Dana L Foote <a href="mailto:dfoote@johnsonandjordan.com">dfoote@johnsonandjordan.com</a>

MATERIALS:	Fans
SECTION:	230000

SUBMITTED FOR: (X) APPROVAL ( ) RECORD

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# ***SUBMITTAL***

*Job Title:* **MMC BEAN - AHU RELACEMENT PROJECT**

*Elevation: (ft)* 62

*Date:* 05/11/15

*Submitted By:* Ed Sawyer

**BUCKLEY ASSOCIATES INC**

**498B WOODFORD STREET**

**PORTLAND , ME 04103-2461**

**US**

**Phone: (207)773-0078**

**Fax: (207)773-0074**

**Email Address: [esawyer@buckleyonline.com](mailto:esawyer@buckleyonline.com)**

**SUBMITTAL NOTES:**

FANS



P.O. Box 410 Schofield, WI 54476 (715) 359-6171 FAX (715) 355-2399 [www.greenheck.com](http://www.greenheck.com)

Performance	
Quantity	1
Volume (CFM)	19,500
External SP (in. wg)	2
Total SP (in. wg)	2
Operating Power (hp)	10.26
Start-Up Power (hp)	12.57
Fan RPM	1094
Max Fan RPM	1,587
Oper. Frequency (Hz)	56
Elevation (ft)	62
Start-up Temp.(F)	70
Operating Temp.(F)	70

Fan Configuration	
Size	33
Arrangement	4
Discharge Position	Horizontal
Mounting	Ceiling Hung
Material Type	Steel

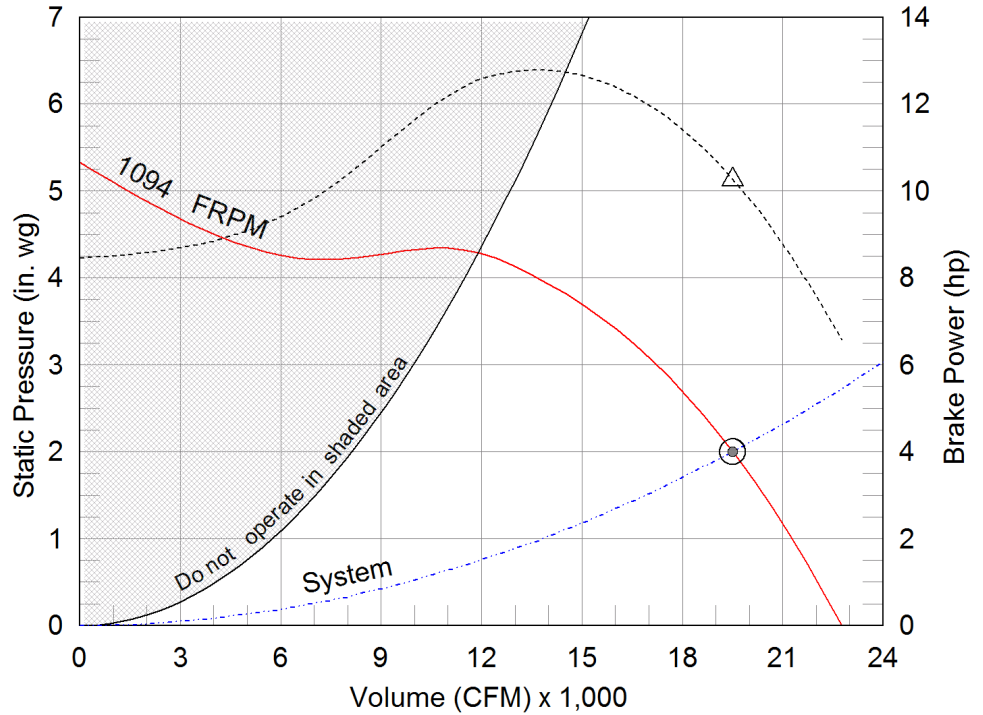
Equipment Weights	
Fan (LMD)(lb)	1,140
Motor/Drive (lb)	391
Accessories (lb)	84

Misc Fan Data	
FEG	75
Outlet Velocity (ft/min)	1,730
Static Efficiency (%)	60
Wheel WR2 (lb-ft <sup>2</sup> )	305
Tip Speed (ft/min)	11,525

Motor and Drives	
Motor Supplier	Greenheck
Size (hp)	15
RPM	1170
Enclosure	TEFC
Voltage	460
Cycle	60
Phase	3
Frame Size	284T
Max Frame Size	365
Location	N/A

**Model: QEID-33-75-B150**  
Mixed Flow Fan

**Operating Performance**



- △ Operating Bhp point
- Operating point at Total SP
- Operating point at External SP
- Fan curve
- - - System curve
- - - Brake horsepower curve



**Sound Power by Octave Band**

Sound Data	62.5	125	250	500	1000	2000	4000	8000	LwA	dBA	Sones
Inlet	81	91	90	90	86	84	78	70	92	80	31
Outlet	86	92	94	97	91	87	81	71	97	85	42

LwA - A weighted sound power level, based on ANSI S1.4

dBA - A weighted sound pressure level, based on 11.5 dB attenuation per octave band at 5 ft. dBA levels are not licensed by AMCA International  
Sones - calculated using AMCA 301 at 5 ft

## Model: QEID-33-75-B150

Mixed Flow Fan

### Standard Construction Features:

HOUSING: Continuously welded steel housing. Welded steel air straightening vanes. Lifting lugs. Slip-fit inlet and outlet collars. Structural parts are phosphatized and coated with Permator.

WHEEL: Welded construction. Single thickness cambered blades.

### Selected Options & Accessories:

NEMA Premium Efficient Motor - meets NEMA Table 12-12

Motor VFD Rated with Shaft Grounding Protection

Motor with Shaft Grounding

Motor with Class B Insulation

Coated with Permator, Concrete Gray-RAL 7023, Fan and Attached Accessories

Hanging, Isolator-Spring, Hanging, 1 Inch

Switch - NEMA-1, Toggle, For Indoor Use Only, Ship Separate

Access Door - Bolted

Sure-Aire Flow Station (With Electronics), 100-240VAC

Extended Motor Wiring

Inlet Flange - Punched

Outlet Flange - Slip Fit

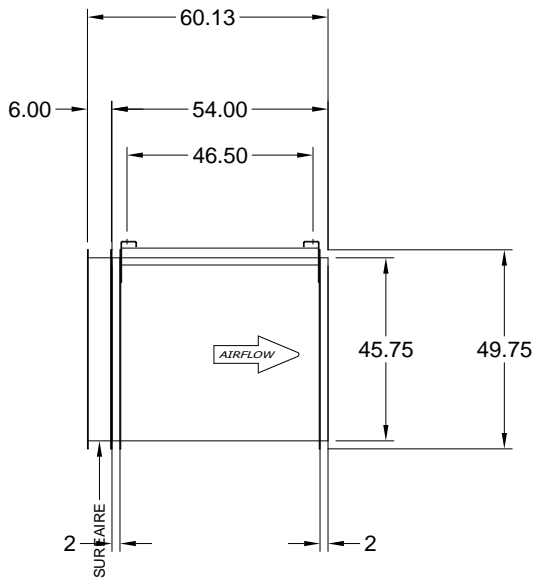
Extended Lube Lines - Nylon

Housing is not sealed for outdoor use

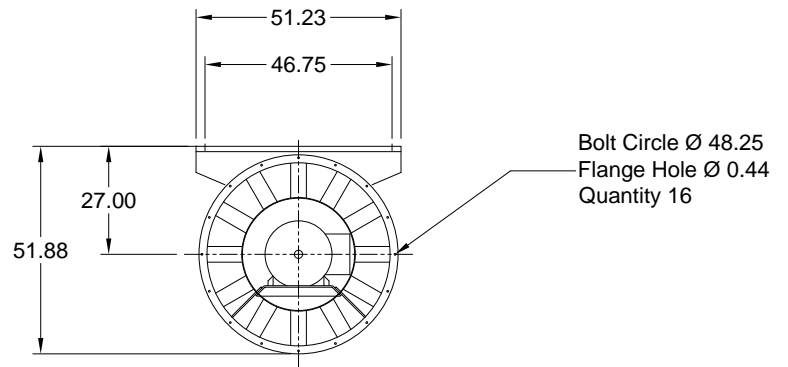


Model: QEID-33-75-B150

Mixed Flow Fan



SIDE VIEW



END VIEW

0.69 DIA. MOUNTING HOLES  
END VIEW SHOWS FROM OUTLET END OF UNIT

Notes: All dimensions shown are in units of in.

## Isolators

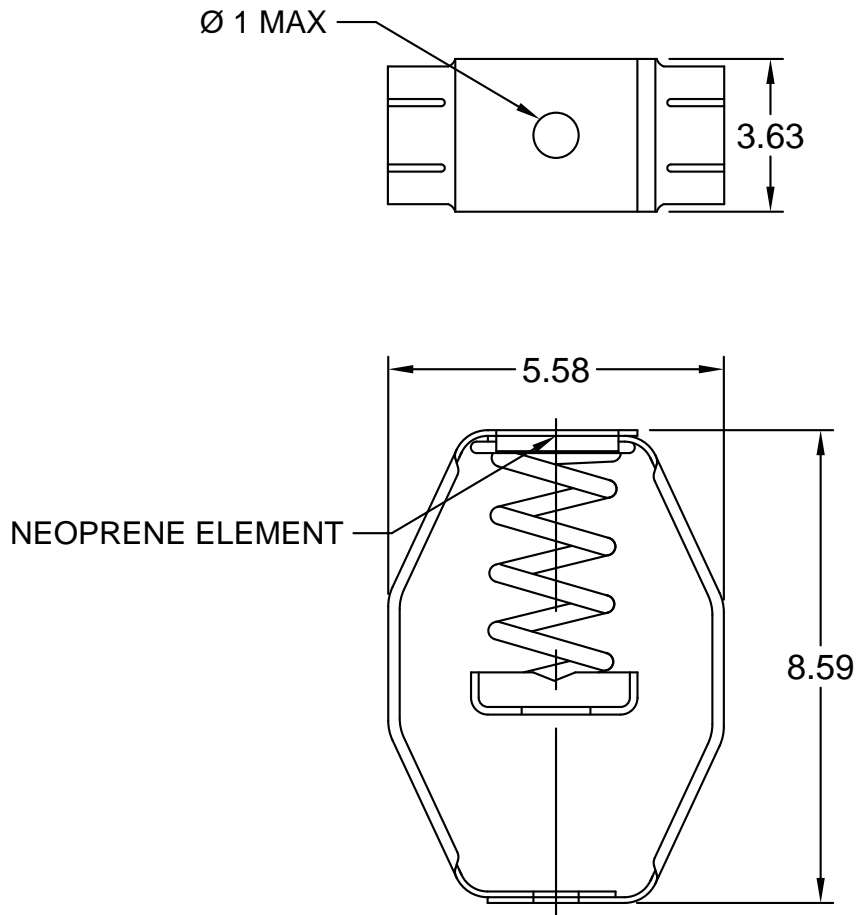
Type: Spring, Hanging, 1 Inch

### Standard Construction Features:

The spring hanging isolator is designed to reduce transmission of vibration and noise produced by suspended equipment and piping. The assure stability, the spring element has a minimum lateral stiffness of 1.0 times the rated vertical stiffness. The hanger will allow a support rod misalignment through 30 degree arc and the isolation brackets will carry a 500% overload without failure. The isolator has an epoxy powder coated bracket and spring coil which is color coded according to the load capacity and has a noise isolation pad, all which is assembled into a stamped or welded hanger bracket.

### Fan Configuration

Model:	QEID-33-75-B150	Class:	
Arrangement:	4	Motor Frame Size:	284T
Rotation:	N/A	Isolator/Deflection:	Spring, Hanging, 1 Inch
Motor Position:	N/A		
Isolator Color:	Black		



Notes: All dimensions shown are in units of in.

\*\*Isolator dimensions may vary with all aluminum, aluminum airstream, or Spark A construction, external inlet vane damper or with an outlet damper accessory. Consult factory for details.

## QEID-33-75-B150 - Electronics Data Sheet

<b>Sure-Aire Flow Equations</b>	
<b>Unit Size</b>	<b>Fan Equation</b>
<b>9</b>	cfm = 408 *sqrt(dP/density)
<b>12</b>	cfm = 408 *sqrt(dP/density)
<b>15</b>	cfm = 603 *sqrt(dP/density)
<b>16</b>	cfm = 724 *sqrt(dP/density)
<b>18</b>	cfm = 897 *sqrt(dP/density)
<b>20</b>	cfm = 1088 *sqrt(dP/density)
<b>22</b>	cfm = 1321 *sqrt(dP/density)
<b>24</b>	cfm = 1631 *sqrt(dP/density)
<b>27</b>	cfm = 1962 *sqrt(dP/density)
<b>30</b>	cfm = 2400 *sqrt(dP/density)
<b>33</b>	cfm = 2923 *sqrt(dP/density)
<b>36</b>	cfm = 3576 *sqrt(dP/density)
<b>40</b>	cfm = 4331 *sqrt(dP/density)
<b>44</b>	cfm = 5318 *sqrt(dP/density)
<b>49</b>	cfm = 6525 *sqrt(dP/density)
<b>54</b>	cfm = 7891 *sqrt(dP/density)
<b>60</b>	cfm = 9648 *sqrt(dP/density)

dP = The differential static pressure between the Sure-Aire high and low taps. Standard Density = 0.075 lb/ft<sup>3</sup>.

### Installation Notes:

Mount differential pressure transmitter above sensor elevation to eliminate condensation buildup in the differential pressure cell.

Recommended tube size is 0.25 in for runs 25 ft or less. For longer runs, (Max. 100 ft.) use 0.375 in or larger tubing.

**Consult factory for wiring diagram or installation instructions.**

Performance	
Quantity	1
Volume (CFM)	18,000
External SP (in. wg)	2.6
Total SP (in. wg)	2.6
Operating Power (hp)	12.07
Start-Up Power (hp)	12.07
Fan RPM	1254
Max Fan RPM	1,670
Oper. Frequency (Hz)	64
Elevation (ft)	62
Start-up Temp.(F)	70
Operating Temp.(F)	70

Fan Configuration	
Size	30
Arrangement	4
Discharge Position	Horizontal
Mounting	Ceiling Hung
Material Type	Steel

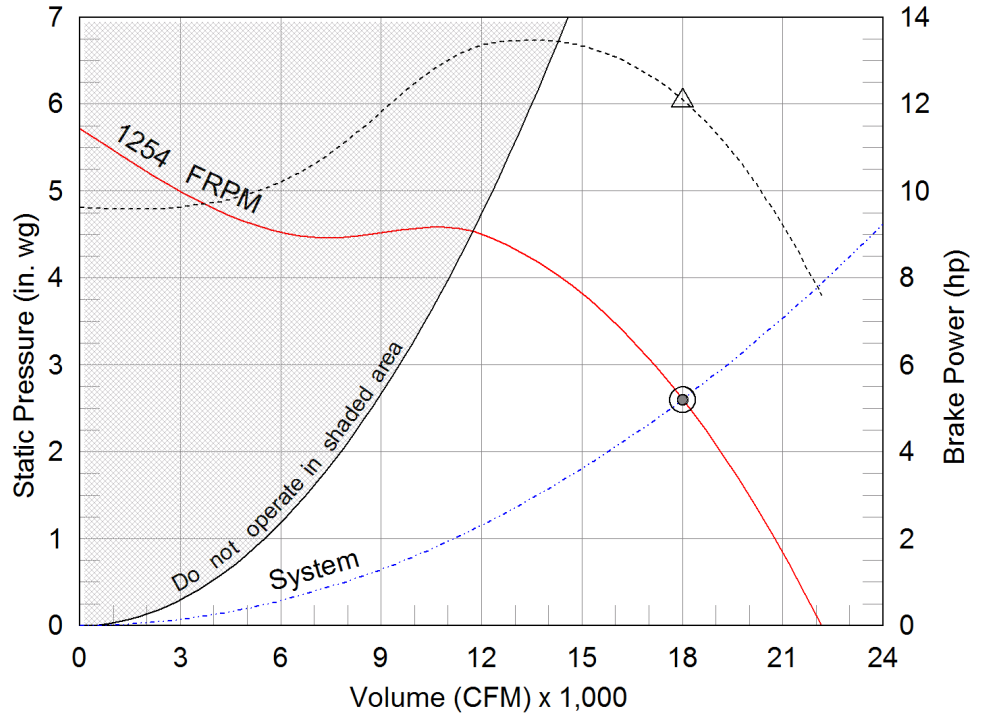
Equipment Weights	
Fan (LMD)(lb)	860
Motor/Drive (lb)	391
Accessories (lb)	78

Misc Fan Data	
FEG	71
Outlet Velocity (ft/min)	1,952
Static Efficiency (%)	61
Wheel WR2 (lb-ft <sup>2</sup> )	185
Tip Speed (ft/min)	11,978

Motor and Drives	
Motor Supplier	Greenheck
Size (hp)	15
RPM	1170
Enclosure	TEFC
Voltage	460
Cycle	60
Phase	3
Frame Size	284T
Max Frame Size	326
Location	N/A

**Model: QEID-30-85-B150**  
Mixed Flow Fan

**Operating Performance**



- △ Operating Bhp point
- Operating point at Total SP
- Operating point at External SP
- Fan curve
- - - System curve
- - - Brake horsepower curve



**Sound Power by Octave Band**

Sound Data	62.5	125	250	500	1000	2000	4000	8000	LwA	dBA	Sones
Inlet	83	91	91	88	87	82	77	70	91	80	31
Outlet	87	89	90	92	91	85	79	69	94	83	36

LwA - A weighted sound power level, based on ANSI S1.4

dBA - A weighted sound pressure level, based on 11.5 dB attenuation per octave band at 5 ft. dBA levels are not licensed by AMCA International  
Sones - calculated using AMCA 301 at 5 ft

## Model: QEID-30-85-B150

Mixed Flow Fan

### Standard Construction Features:

HOUSING: Continuously welded steel housing. Welded steel air straightening vanes. Lifting lugs. Slip-fit inlet and outlet collars. Structural parts are phosphatized and coated with Permator.

WHEEL: Welded construction. Single thickness cambered blades.

### Selected Options & Accessories:

NEMA Premium Efficient Motor - meets NEMA Table 12-12

Motor VFD Rated with Shaft Grounding Protection

Motor with Shaft Grounding

Motor with Class B Insulation

Coated with Permator, Concrete Gray-RAL 7023, Fan and Attached Accessories

Hanging, Isolator-Spring, Hanging, 1 Inch

Switch - NEMA-1, Toggle, For Indoor Use Only, Ship Separate

Access Door - Bolted

Sure-Aire Flow Station (With Electronics), 100-240VAC

Extended Motor Wiring

Inlet Flange - Punched

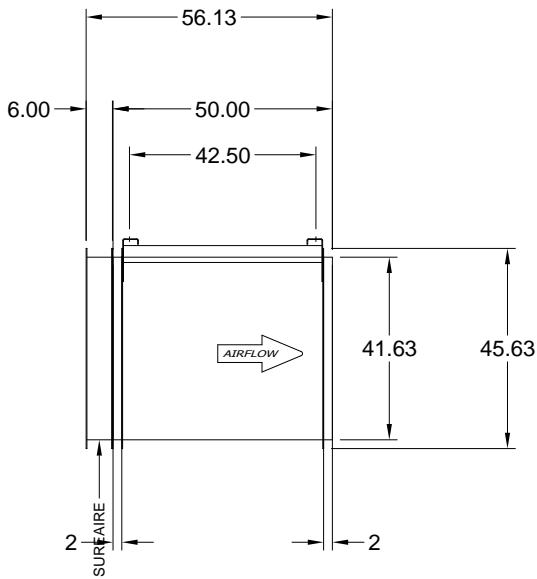
Outlet Flange - Slip Fit

Extended Lube Lines - Nylon

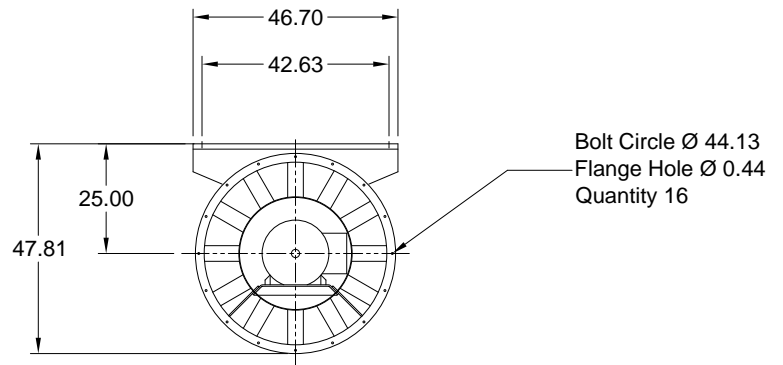
Housing is not sealed for outdoor use

Model: QEID-30-85-B150

Mixed Flow Fan



SIDE VIEW



END VIEW

0.69 DIA. MOUNTING HOLES  
END VIEW SHOWS FROM OUTLET END OF UNIT

Notes: All dimensions shown are in units of in.

## Isolators

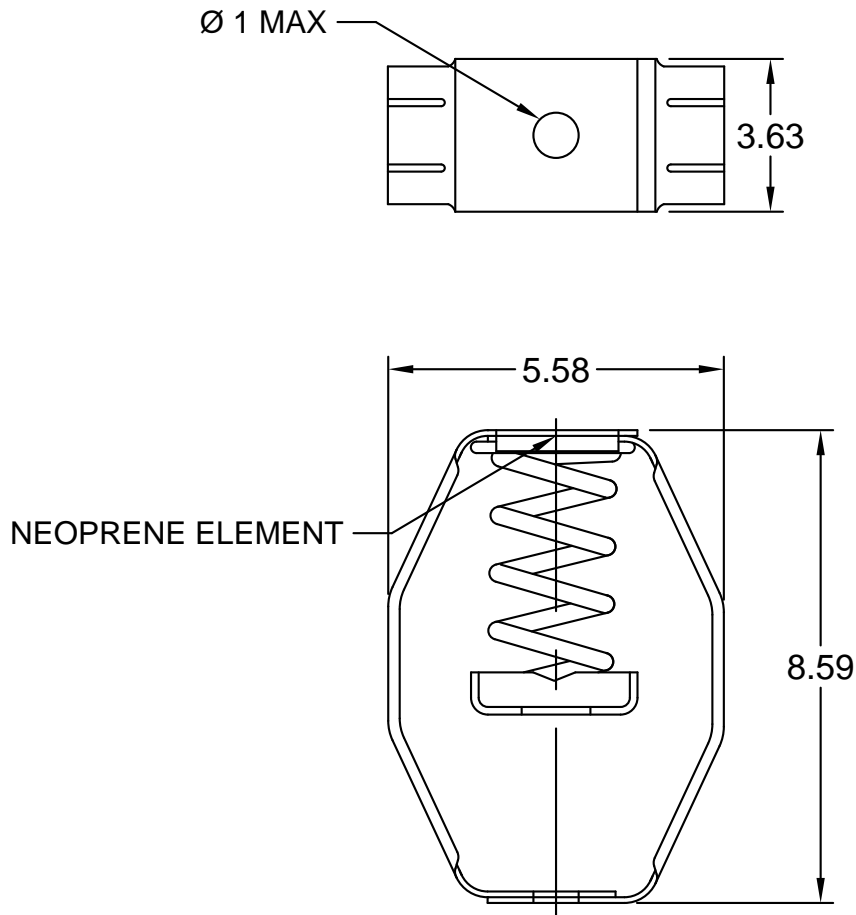
Type: Spring, Hanging, 1 Inch

### Standard Construction Features:

The spring hanging isolator is designed to reduce transmission of vibration and noise produced by suspended equipment and piping. The assure stability, the spring element has a minimum lateral stiffness of 1.0 times the rated vertical stiffness. The hanger will allow a support rod misalignment through 30 degree arc and the isolation brackets will carry a 500% overload without failure. The isolator has an epoxy powder coated bracket and spring coil which is color coded according to the load capacity and has a noise isolation pad, all which is assembled into a stamped or welded hanger bracket.

### Fan Configuration

Model:	QEID-30-85-B150	Class:	
Arrangement:	4	Motor Frame Size:	284T
Rotation:	N/A	Isolator/Deflection:	Spring, Hanging, 1 Inch
Motor Position:	N/A		
Isolator Color:	Green		



Notes: All dimensions shown are in units of in.

\*\*Isolator dimensions may vary with all aluminum, aluminum airstream, or Spark A construction, external inlet vane damper or with an outlet damper accessory. Consult factory for details.

## QEID-30-85-B150 - Electronics Data Sheet

<b>Sure-Aire Flow Equations</b>	
<b>Unit Size</b>	<b>Fan Equation</b>
<b>9</b>	cfm = 408 *sqrt(dP/density)
<b>12</b>	cfm = 408 *sqrt(dP/density)
<b>15</b>	cfm = 603 *sqrt(dP/density)
<b>16</b>	cfm = 724 *sqrt(dP/density)
<b>18</b>	cfm = 897 *sqrt(dP/density)
<b>20</b>	cfm = 1088 *sqrt(dP/density)
<b>22</b>	cfm = 1321 *sqrt(dP/density)
<b>24</b>	cfm = 1631 *sqrt(dP/density)
<b>27</b>	cfm = 1962 *sqrt(dP/density)
<b>30</b>	cfm = 2400 *sqrt(dP/density)
<b>33</b>	cfm = 2923 *sqrt(dP/density)
<b>36</b>	cfm = 3576 *sqrt(dP/density)
<b>40</b>	cfm = 4331 *sqrt(dP/density)
<b>44</b>	cfm = 5318 *sqrt(dP/density)
<b>49</b>	cfm = 6525 *sqrt(dP/density)
<b>54</b>	cfm = 7891 *sqrt(dP/density)
<b>60</b>	cfm = 9648 *sqrt(dP/density)

dP = The differential static pressure between the Sure-Aire high and low taps. Standard Density = 0.075 lb/ft<sup>3</sup>.

### Installation Notes:

Mount differential pressure transmitter above sensor elevation to eliminate condensation buildup in the differential pressure cell.

Recommended tube size is 0.25 in for runs 25 ft or less. For longer runs, (Max. 100 ft.) use 0.375 in or larger tubing.

**Consult factory for wiring diagram or installation instructions.**



Performance	
Quantity	1
Volume (CFM)	8,900
External SP (in. wg)	1.5
Total SP (in. wg)	1.5
Operating Power (hp)	3.38
Start-Up Power (hp)	3.74
Fan RPM	1131
Max Fan RPM	2,036
Oper. Frequency (Hz)	58
Elevation (ft)	62
Start-up Temp.(F)	70
Operating Temp.(F)	70

Fan Configuration	
Size	24
Arrangement	4
Discharge Position	Horizontal
Mounting	Ceiling Hung
Material Type	Steel

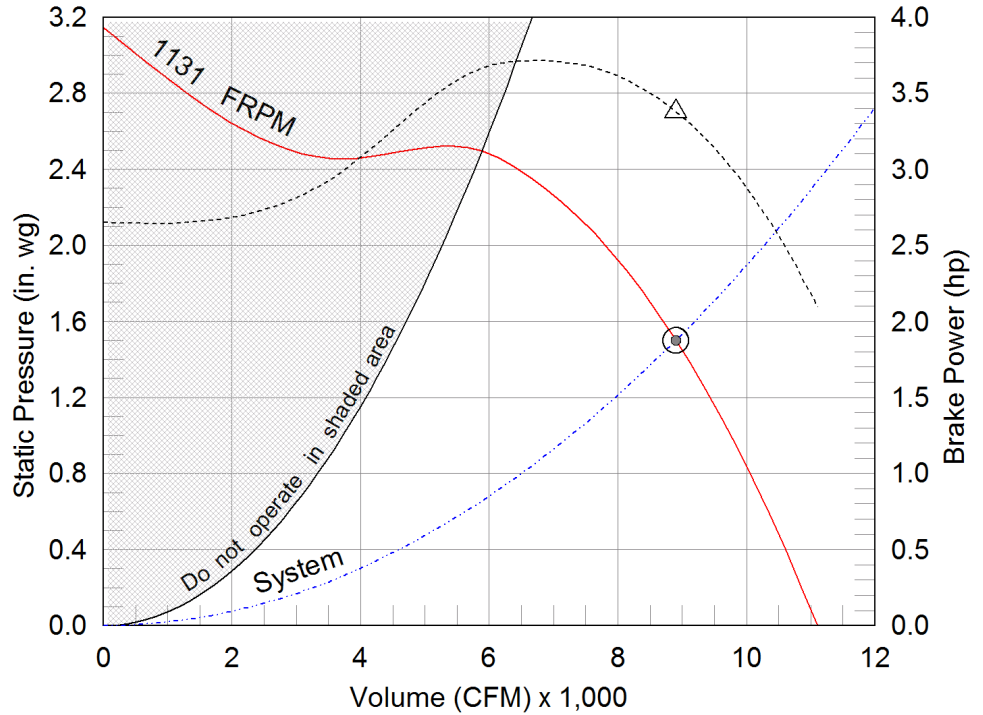
Equipment Weights	
Fan (LMD)(lb)	480
Motor/Drive (lb)	294
Accessories (lb)	46

Misc Fan Data	
FEG	71
Outlet Velocity (ft/min)	1,433
Static Efficiency (%)	62
Wheel WR2 (lb-ft <sup>2</sup> )	67
Tip Speed (ft/min)	8,886

Motor and Drives	
Motor Supplier	Greenheck
Size (hp)	7 1/2
RPM	1170
Enclosure	TEFC
Voltage	460
Cycle	60
Phase	3
Frame Size	254T
Max Frame Size	256
Location	N/A

**Model: QEID-24-85-B75**  
Mixed Flow Fan

**Operating Performance**



- △ Operating Bhp point
- Operating point at Total SP
- Operating point at External SP
- Fan curve
- - - System curve
- - - Brake horsepower curve



**Sound Power by Octave Band**

Sound Data	62.5	125	250	500	1000	2000	4000	8000	LwA	dBA	Sones
Inlet	74	84	82	79	78	74	68	61	83	71	18.8
Outlet	80	82	81	84	82	76	70	61	86	74	22

LwA - A weighted sound power level, based on ANSI S1.4

dBA - A weighted sound pressure level, based on 11.5 dB attenuation per octave band at 5 ft. dBA levels are not licensed by AMCA International  
Sones - calculated using AMCA 301 at 5 ft

## Model: QEID-24-85-B75

Mixed Flow Fan

### Standard Construction Features:

HOUSING: Continuously welded steel housing. Welded steel air straightening vanes. Lifting lugs. Slip-fit inlet and outlet collars. Structural parts are phosphatized and coated with Permator.

WHEEL: Welded construction. Single thickness cambered blades.

### Selected Options & Accessories:

NEMA Premium Efficient Motor - meets NEMA Table 12-12

Motor VFD Rated without Shaft Grounding Protection

Motor with Class B Insulation

Coated with Permator, Concrete Gray-RAL 7023, Fan and Attached Accessories

Hanging, Isolator-Spring, Hanging, 1 Inch

Switch - NEMA-1, Toggle, For Indoor Use Only, Ship Separate

Access Door - Bolted

Sure-Aire Flow Station (With Electronics), 100-240VAC

Extended Motor Wiring

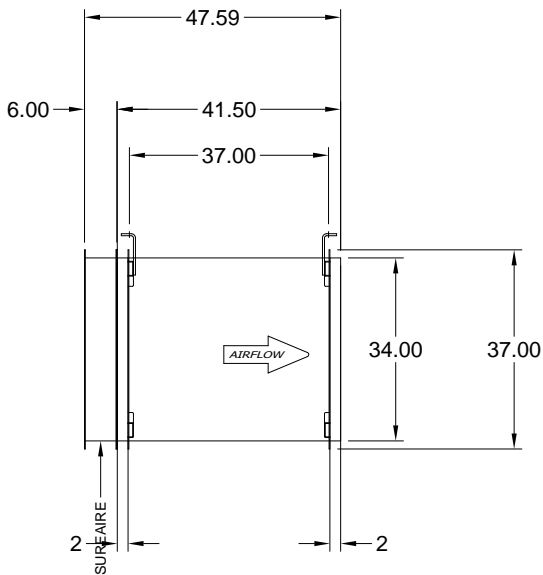
Inlet Flange - Punched

Outlet Flange - Slip Fit

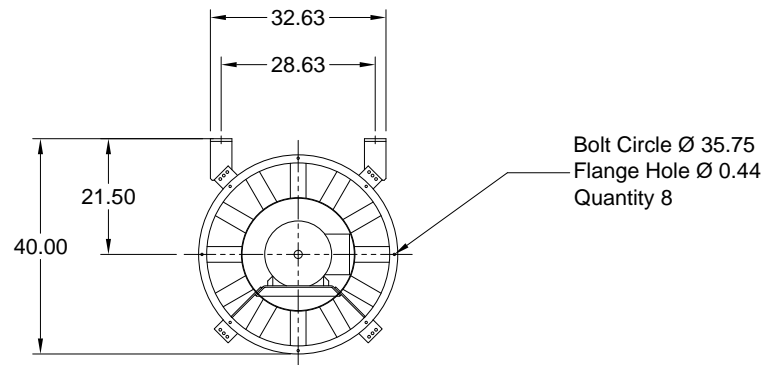
Housing is not sealed for outdoor use

Model: QEID-24-85-B75

Mixed Flow Fan



SIDE VIEW



END VIEW

0.56 DIA. MOUNTING HOLES  
END VIEW SHOWS FROM OUTLET END OF UNIT

Notes: All dimensions shown are in units of in.

## Isolators

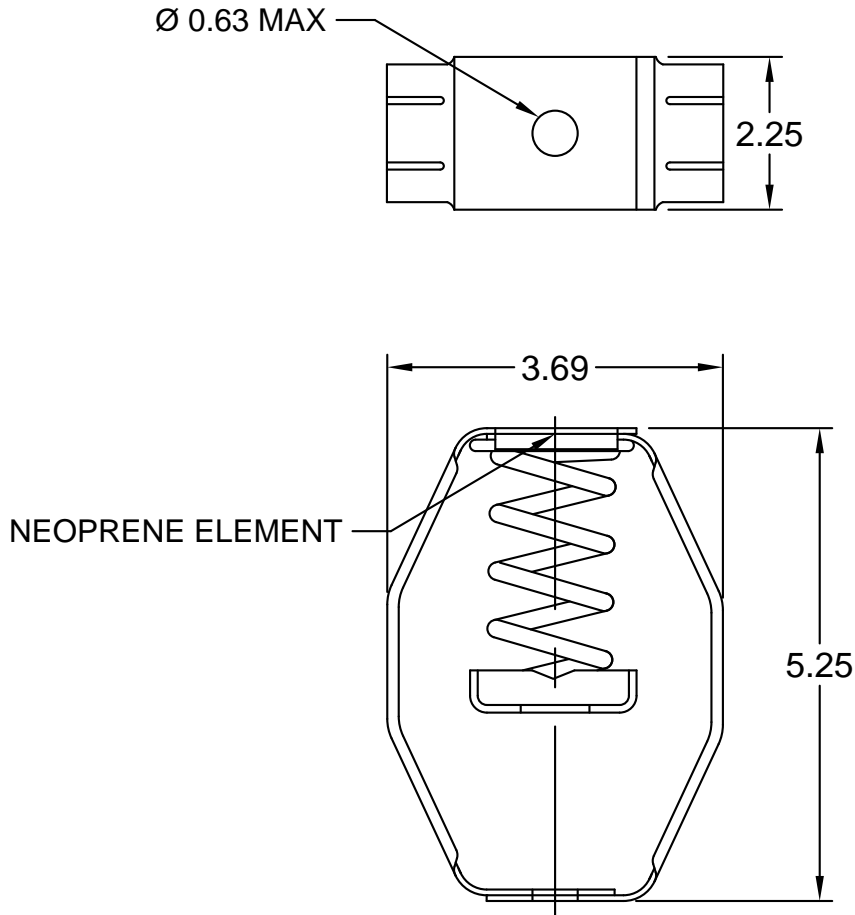
Type: Spring, Hanging, 1 Inch

### Standard Construction Features:

The spring hanging isolator is designed to reduce transmission of vibration and noise produced by suspended equipment and piping. The assure stability, the spring element has a minimum lateral stiffness of 1.0 times the rated vertical stiffness. The hanger will allow a support rod misalignment through 30 degree arc and the isolation brackets will carry a 500% overload without failure. The isolator has an epoxy powder coated bracket and spring coil which is color coded according to the load capacity and has a noise isolation pad, all which is assembled into a stamped or welded hanger bracket.

### Fan Configuration

Model:	QEID-24-85-B75	Class:	
Arrangement:	4	Motor Frame Size:	254T
Rotation:	N/A	Isolator/Deflection:	Spring, Hanging, 1 Inch
Motor Position:	N/A		
Isolator Color:	Orange		



Notes: All dimensions shown are in units of in.

\*\*Isolator dimensions may vary with all aluminum, aluminum airstream, or Spark A construction, external inlet vane damper or with an outlet damper accessory. Consult factory for details.

QEID-24-85-B75 - Electronics Data Sheet

Sure-Aire Flow Equations	
Unit Size	Fan Equation
9	cfm = 408 *sqrt(dP/density)
12	cfm = 408 *sqrt(dP/density)
15	cfm = 603 *sqrt(dP/density)
16	cfm = 724 *sqrt(dP/density)
18	cfm = 897 *sqrt(dP/density)
20	cfm = 1088 *sqrt(dP/density)
22	cfm = 1321 *sqrt(dP/density)
24	cfm = 1631 *sqrt(dP/density)
27	cfm = 1962 *sqrt(dP/density)
30	cfm = 2400 *sqrt(dP/density)
33	cfm = 2923 *sqrt(dP/density)
36	cfm = 3576 *sqrt(dP/density)
40	cfm = 4331 *sqrt(dP/density)
44	cfm = 5318 *sqrt(dP/density)
49	cfm = 6525 *sqrt(dP/density)
54	cfm = 7891 *sqrt(dP/density)
60	cfm = 9648 *sqrt(dP/density)

dP = The differential static pressure between the Sure-Aire high and low taps. Standard Density = 0.075 lb/ft<sup>3</sup>.

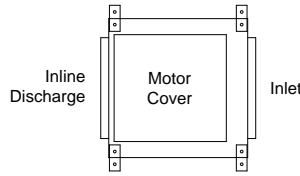
Installation Notes:

Mount differential pressure transmitter above sensor elevation to eliminate condensation buildup in the differential pressure cell.

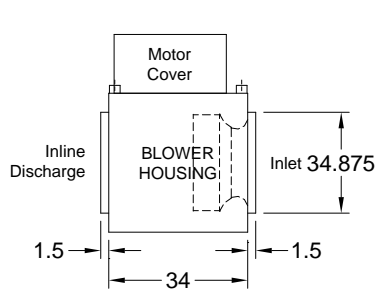
Recommended tube size is 0.25 in for runs 25 ft or less. For longer runs, (Max. 100 ft.) use 0.375 in or larger tubing.

**Consult factory for wiring diagram or installation instructions.**

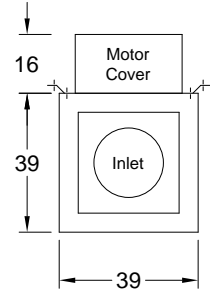
**Model: BSQ-240HP-30**  
Belt Drive Centrifugal Inline Fan



PLAN VIEW



ELEVATION VIEW

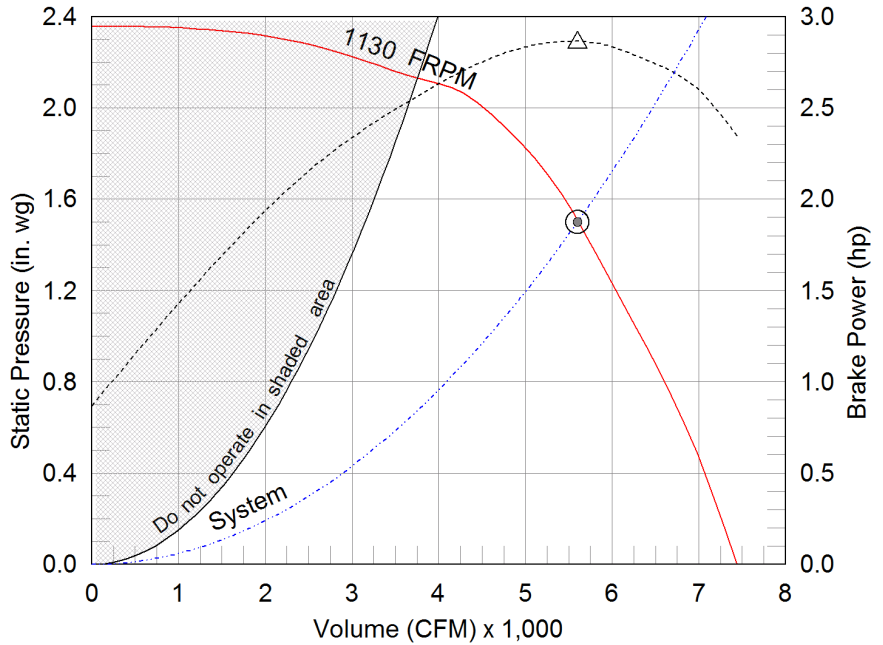


END VIEW

Dimensional	
Quantity	1
Weight w/o Acc's (lb)	431
Weight w/ Acc's (lb)	487
Max T Motor Frame Size	215

Performance	
Requested Volume (CFM)	5,600
Actual Volume (CFM)	5,600
External SP (in. wg)	1.5
Total SP (in. wg)	1.5
Fan RPM	1130
Operating Power (hp)	2.86
Elevation (ft)	62
Airstream Temp.(F)	70
Air Density (ft3)	0.075
Drive Loss (%)	4.4
Tip Speed (ft/min)	7,249
Static Eff. (%)	48

Motor	
Motor Mounted	Yes
Size (hp)	3
V/C/P	460/60/3
Enclosure	ODP
Motor RPM	1725
Windings	1
NEC FLA* (Amps)	4.8



- △ Operating Bhp point
- Operating point at Total SP
- Operating point at External SP
- Fan curve
- - - System curve
- - - Brake horsepower curve

**Sound Power by Octave Band**

Sound Data	62.5	125	250	500	1000	2000	4000	8000	Lwa	dBA	Sones
Inlet	85	85	85	81	76	73	70	66	83	72	21
Radiated	88	86	81	75	68	58	52	50	77	66	15.0

**Notes:**

All dimensions shown are in units of in.  
\*FLA - based on tables 150 or 148 of National Electrical Code 2002. Actual motor FLA may vary, for sizing thermal overload, consult factory.  
LWA - A weighted sound power level, based on ANSI S1.4  
dBA - A weighted sound pressure level, based on 11.5 dB attenuation per Octave band at 5 ft - dBA levels are not licensed by AMCA International  
Sones - calculated using AMCA 301 at 5 ft



## Model: BSQ-240HP-30

### Belt Drive Centrifugal Inline Fan

#### Standard Construction Features:

- Galvanized steel housing - Backward inclined aluminum wheel - Two bolted access panels - Integral duct connection flanges - Ball bearing motors - Adjustable motor pulley - Adjustable motor plate - Fan shaft mounted in ball bearing pillow blocks - Static free belts - Corrosion resistant fasteners

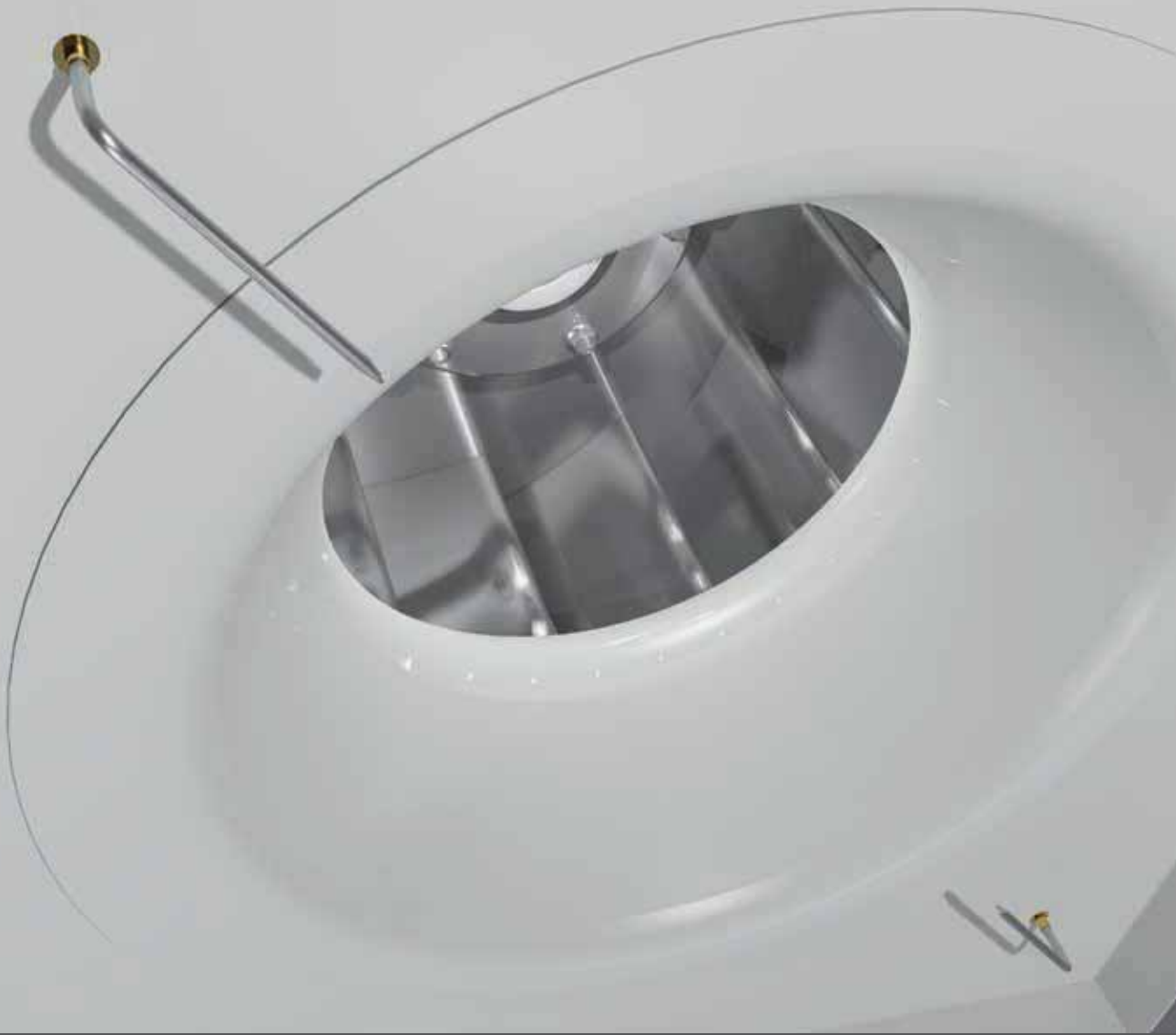
#### Selected Options & Accessories:

NEMA Premium Efficient Motor - meets NEMA Table 12-12  
Motor VFD Rated with Shaft Grounding Protection  
Motor with Shaft Grounding  
Switch, NEMA-1, Toggle, Junction Box Mounted & Wired  
Motor Cover  
Isolators & Brackets, Spring Hanging (1 Kit(s): Qty 4, PN: 850346) (Shipped Loose)  
Bearings with Grease Fittings, L10 life of 100,000 hrs (L50 avg. life 500,000 hrs)  
Unit Warranty: 1 Yr (Standard)

# Flow Monitoring System

## Sure-Aire™ for Centrifugal, Mixed Flow and Plenum Fans

- Accurate
- No System Effect
- Reliable



 **GREENHECK**  
Building Value in Air.

March  
2013



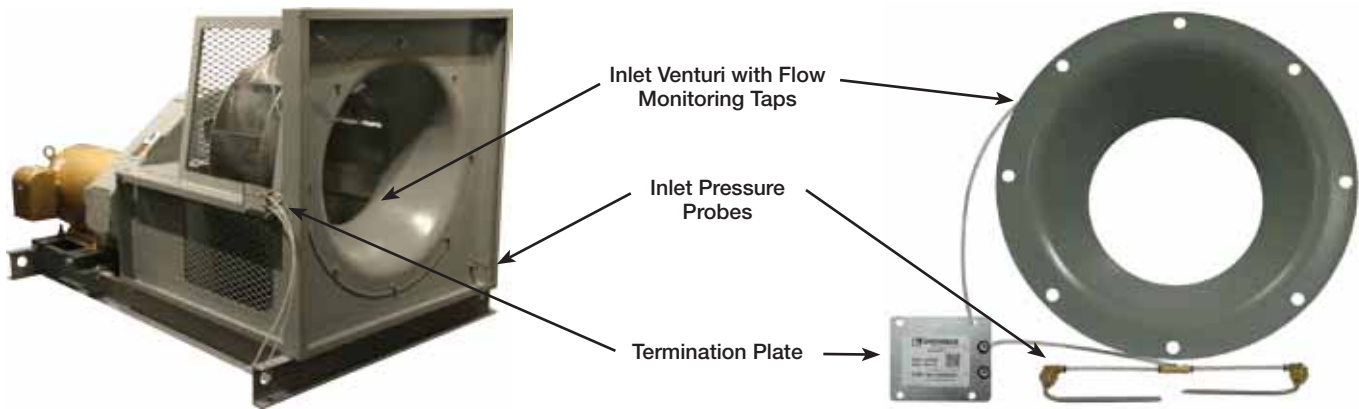
The Sure-Aire™ airflow monitoring system is ideal for HVAC applications where flow verification is required for proper system balancing, improving air quality, and controlling industrial processes.

## Typical Applications

- Packaged, custom or built-up air handlers
- Clean rooms
- Fume exhaust systems
- Stairwell pressurization
- Isolation rooms
- General exhaust, supply or return air systems

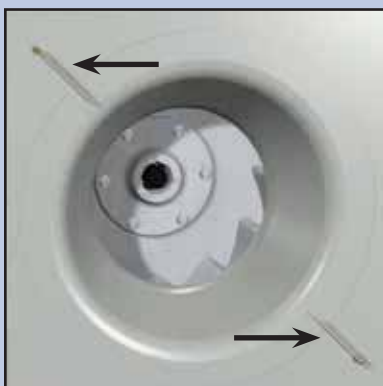
## Sure-Aire Advantages

- Flow accuracy to within 3%
- Multiple pressure taps provide a true averaged pressure drop reading
- No increase in the fan energy consumption or sound levels
- Ships completely assembled from factory
- Includes termination plate with low pressure and high pressure taps



## Sure-Aire Operation

The Sure-Aire system determines airflow by measuring the pressure drop across the fan inlet venturi. The airflow is then calculated based on the pressure drop and a K factor specific to each fan size. This is the same approach used by accredited laboratories for certifying fan performance. The Sure-Aire method measures the flow without causing turbulence in the venturi resulting in accurate flow measurement without increased energy consumption or higher sound levels.



Noninvasive Probes

## Sure-Aire System

Noninvasive pitot type probes and static pressure taps are installed to measure the pressure drop through the inlet venturi.

Airflow CFM is calculated based on the resulting pressure drop through the venturi.

Termination plate includes high and low pressure ports along with an airflow calibration equation specific to each fan.



Termination Plate

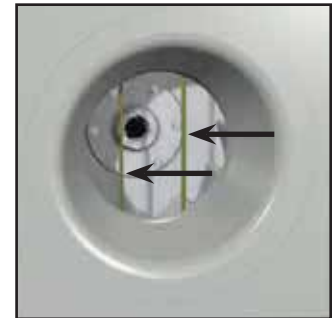
## Disadvantage of Traditional Invasive Flow Probes

Measurements within the inlet cone are desirable because of the uniform, high velocity airflow through the cone. For this reason, traditional flow probes are generally mounted into the smallest diameter of the inlet cone. Mounting the flow probes in this fashion causes turbulence and increases the system resistance. This can significantly detract from the fan's performance and cause the system to under perform. To compensate for the added pressure loss, the fan RPM and horsepower must increase. This results in additional energy consumption and higher overall sound levels.

Single Width Centrifugal or Plenum Fan (Wheel Diameter)	Max Class I	Max Class II	Max Class III
	Static Pressure Loss (in. wg)		
20	1.2	2.0	3.2
36	0.8	1.3	2.1
73	0.4	0.7	1.1

Expected pressure loss based on fan size and class due to invasive flow probes. Performance taken at 70% wide open volume (%WOV) and at maximum class RPM.

Visit [www.greenheck.com/library/videos](http://www.greenheck.com/library/videos) to observe the Sure-Aire and pressure drop demonstration.



Traditional Invasive Flow Probes

## Optional Electronics Package

The Greenheck Sure-Aire airflow measurement system is available with electronics for reading the fan performance. Resulting data can be tied to the facility Building Automation System (BAS).

- Real time digital LCD display that shows fan performance
- NEMA-4 (IP 56) enclosure suitable for indoor or outdoor use
- Provides a 4-20 mA or 2-10 VDC signal linear to differential pressure for interfacing
- Accuracy to 0.5% of full scale at 77°F
- Two available input options: 100 - 240 volt, AC  
24 volt, AC or DC
- Compatible with most Building Automation Systems (BAS)
- Ships loose for field mounting and wiring



Programmable Differential Pressure Controller

Note: The differential pressure controller should be mounted within 75 feet of termination plate.

## Applicable Products for the Sure-Aire™ System



**QEI**  
Mixed Flow Fans



**QEP/QEM**  
Plenum Fans



**BISW/AFSW**  
Single Width  
Centrifugal Fans



**BIDW/AFDW**  
Double Width  
Centrifugal Fans



**HPA**  
Plenum Fans

The Sure-Aire flow monitoring system is also available on Greenheck Vektor® products. Consult the Flow Monitoring System, Sure-Aire™ for Vektor Laboratory Exhaust Systems catalog for specific information.

# Specifications

Fans equipped with Sure-Aire™ Flow Monitoring shall include the following:

**Flow monitoring station** shall monitor the pressure difference between the fan inlet and the smallest diameter of the inlet cone.

Volumetric flow to be calculated from empirically derived formulas based on testing by the fan manufacturer.

Flow monitoring station shall not use air restricting probes that reduce fan performance or create additional fan sound.

Four (4) low-pressure sensor orifices, equidistantly spaced, shall be located at the smallest diameter of the inlet cone venturi. Flow tubes from each venturi sensor to extend to a termination plate mounted on the fan housing.

High-pressure flow probe(s) to be mounted in low velocity zone near fan inlet. Flow probe(s) from the high-pressure sensor shall extend to a termination plate mounted on the fan housing.

**Termination plate** shall include a low-pressure connection, a high-pressure connection and a listing of the empirically determined flow rate coefficient.

Flow monitoring station shall accurately measure the pressure differential to within +/- 3%.

Flow monitoring station to be installed by the fan manufacturer as part of the standard fan assembly.

**Optional:** Flow monitoring station to be supplied with electronics package that includes pressure transmitter and LCD digital readout.



## Technical Details

### Flow Element

1. **Accuracy** - Within +/- 3.0% of actual flow
2. **Resistance to Airflow** - No measurable amount
3. **Effect on Sound** - No measurable amount
4. **Operating Velocity Range**  
100 to 20,000 fpm (0.5 to 100 m/s)
5. **Material and Temperature Limits**  
Static Probes - 6061 Aluminum  
Tube Fittings:
  - Housing: PBT Resin
  - O-ring: NBR
  - Release Button: POM
  - Grab Ring: Stainless SteelTubing:
  - Nylon 1/4 inch (standard) -60-200°F (-51-82°C)
  - Copper 1/4 inch (optional) 0-200°F (-17-93°C)
6. **Humidity**  
All elements 0-100% non-condensing
7. **Corrosion Resistance**  
Good air and mild acid gas resistance, excellent solvent and aromatic hydrocarbon resistance
8. **Output Signal**  
Calibrated for the following ranges: 0-8.30, 0-22.14, 0-41.52, 0-83.04, 0-138.40 in. wg
9. **Termination Plate Output Connections**  
1/4 inch push connector

### Optional Electronics

1. **Input Power**
  - 100 - 240 VAC, 50-60 Hz
  - 24 VDC, 24 VAC
2. **Input Process Connections**  
1/4 inch quick connect
3. **Input Range**  
0-8.30, 0-22.14, 0-41.52, 0-83.04, 0-138.40
4. **Enclosure**  
NEMA-4 (IP 56) indoor or outdoor use, field mounted
5. **Transmitter**
  - Accuracy +/- 0.5% of full scale at 77°F
  - Pressure Limit: 70 psi (1938 in. wg)
  - Temperature Limit: 32-140°F (0-60°C)
6. **Digital Display**
  - 2.8 inch 320x240 TFT LCD display
  - Programmed for CFM reading
7. **Analog Output**
  - 4-20 mA DC into 900 ohms max or 2-10 VDC
  - Linear to the differential pressure

The Sure-Aire electronics package requires field mounting.



## Our Commitment

*As a result of our commitment to continuous improvement, Greenheck reserves the right to change specifications without notice.*

*Specific Greenheck product warranties are located on [greenheck.com](http://greenheck.com) within the product area tabs and in the Library under Warranties.*



*Prepared to Support  
Green Building Efforts*