

Centrifugal Inline Fans Models SQ-M and BSQ-M Direct and Belt Drive



BUILDING VALUE IN AIR.

 **GREENHECK**
Building Value in Air.

July
2019

Designed for indoor and outdoor clean air applications where space is a prime consideration. Models SQ-M and BSQ-M feature a unique combination of installation flexibility, rugged construction, ease of service, high efficiency and low sound levels.

Typical Installations

- Offices
- Schools & Universities
- Hospitals
- Metro Stations
- Auditoriums

Benefits

- Reduces installation costs
- Mounting flexibility
- Highly efficient air movement
- Low sound levels

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Models SQ-M & BSQ-M

Centrifugal Square Inline Duct Fans

| Model Comparison | | | | | | | | | | | | | | | | | | | | | | |
|------------------|----------|---------|-----------|------------|---------|------|-----------------|---------|--------|------------|-------------|-------------------|------------------|-----------------|-------------------------|------------|--------|---------------|-----------------|------------|----------------------|------------------------------|
| Model | Location | | Mounting | | | | | Airflow | | | | Application | | | | Drive Type | | Impeller Type | | | Performance | |
| | Indoor | Outdoor | Roof Curb | Base/Floor | Hanging | Wall | Ceiling Mounted | Exhaust | Supply | Reversible | Recirculate | General/Clean Air | Contaminated Air | Spark Resistant | High Temp (above 121°C) | Belt | Direct | Centrifugal | Propeller/Axial | Mixed Flow | Maximum Volume (cmh) | Maximum Static Pressure (Pa) |
| SQ-M | X | | | X | X | | | X | X | | X | X | X | X | | X | X | | | | 8,537 | 435 |
| BSQ-M | X | X | | X | X | | | X | X | | X | X | X | X | | X | | X | | | 45,194 | 955 |

Greenheck's model SQ-M and BSQ-M centrifugal inline fans feature a unique combination of installation flexibility, rugged construction, ease of service, high efficiency and low sound levels. These compact inline fans are the ideal selection for indoor clean air applications, including intake, exhaust, return or make-up air systems, where space is a

prime consideration. The need for costly square-to-round transition pieces are eliminated, reducing installation costs. The square housing design, compact size, and straight-thru airflow also give the system designer the flexibility to mount SQ-M and BSQ-M fans in any configuration - horizontal or vertical.

Direct Drive Fan, SQ-M

- 8 sizes, 70-160
- Efficient air movement
- Low sound levels
- Maximum operating temperature of 130°F (54°C)

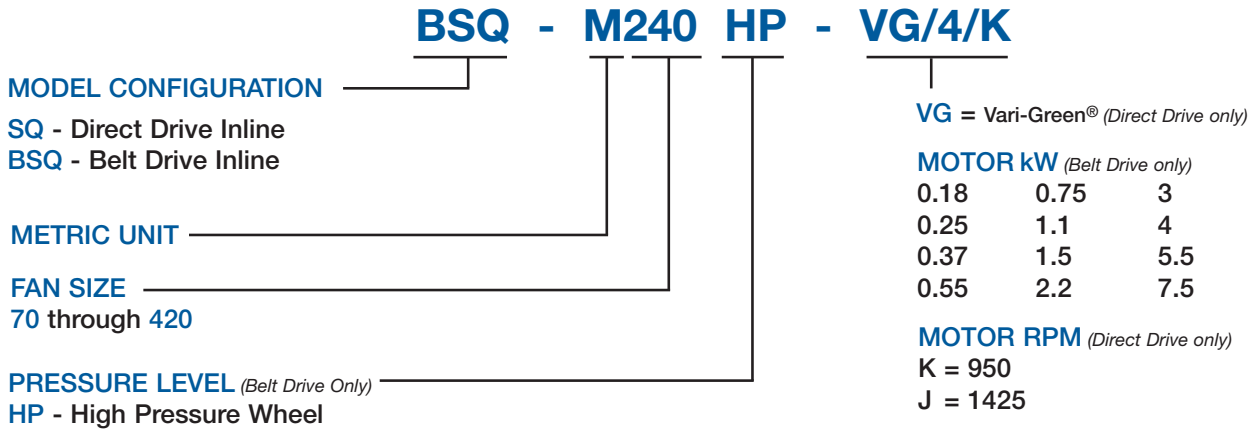
Belt Drive Fan, BSQ-M

- 22 sizes, 70-420, including High Pressure (HP)
- Ideal for clean air applications where space is limited
- Low sound levels
- Maximum operating temperature of 180°F (82°C)



Model Number Code

The Model Number Code system is designed to completely identify the fan. The correct code letters must be specified to designate belt or direct drive. The remainder of the model number is determined by the size and performance selected from the following pages.



CERTIFICATIONS AND TESTING



Greenheck India Private Limited certifies that the SQ-M and BSQ-M models shown herein are licensed to bear the AMCA Seal. The ratings shown are based on tests and procedures performed in accordance with AMCA Publication 211 and AMCA Publication 311 and comply with the requirements of the AMCA Certified Ratings Program.

For SQ-M and BSQ-M performance showing AMCA licensed data for sound and air performance, please refer to the *Models SQ-M and BSQ-M Sound and Air Performance Supplement, Rev. 5, June 2019* found on our website at www.greenheck.in.

- AMCA Sound and Air certified for models SQ-M and BSQ-M
- Greenheck subjects these products to extensive life testing, assuring you that the fans will provide many years of reliable performance.

1 CABINET CONSTRUCTION

The fan housing is constructed of rigid structural members and formed galvanized steel panels. Aluminum construction is optional for belt drive sizes up to 300.

2 WHEEL

Each aluminum, backward-inclined, non-overloading centrifugal wheel is statically and dynamically balanced to deliver maximum efficiency.

3 DUCT COLLARS

Inlet and discharge duct collars are provided for easy duct connection. The square design provides a larger discharge area than tubular, centrifugal, and vane axial fans; outlet velocities are reduced for quieter operation.

4 MOTOR

Permanently lubricated, sealed ball bearing motors are selected to provide years of trouble-free operation with minimal maintenance.

5 DRIVE FRAME

Constructed from heavy gauge galvanized steel. Belt adjustment is accomplished by loosening fasteners, sliding the motor plate, and retightening fasteners.

6 DRIVE ASSEMBLY

Drives are sized for a minimum of 150 percent of driven horsepower. Machined cast iron pulleys are factory set to the required RPM. Belts are static free and oil resistant.

7 BEARINGS

100 percent factory tested and designed specifically for air-handling applications with a minimum L₁₀ life in excess of 100,000 hours.

8 FAN SHAFT

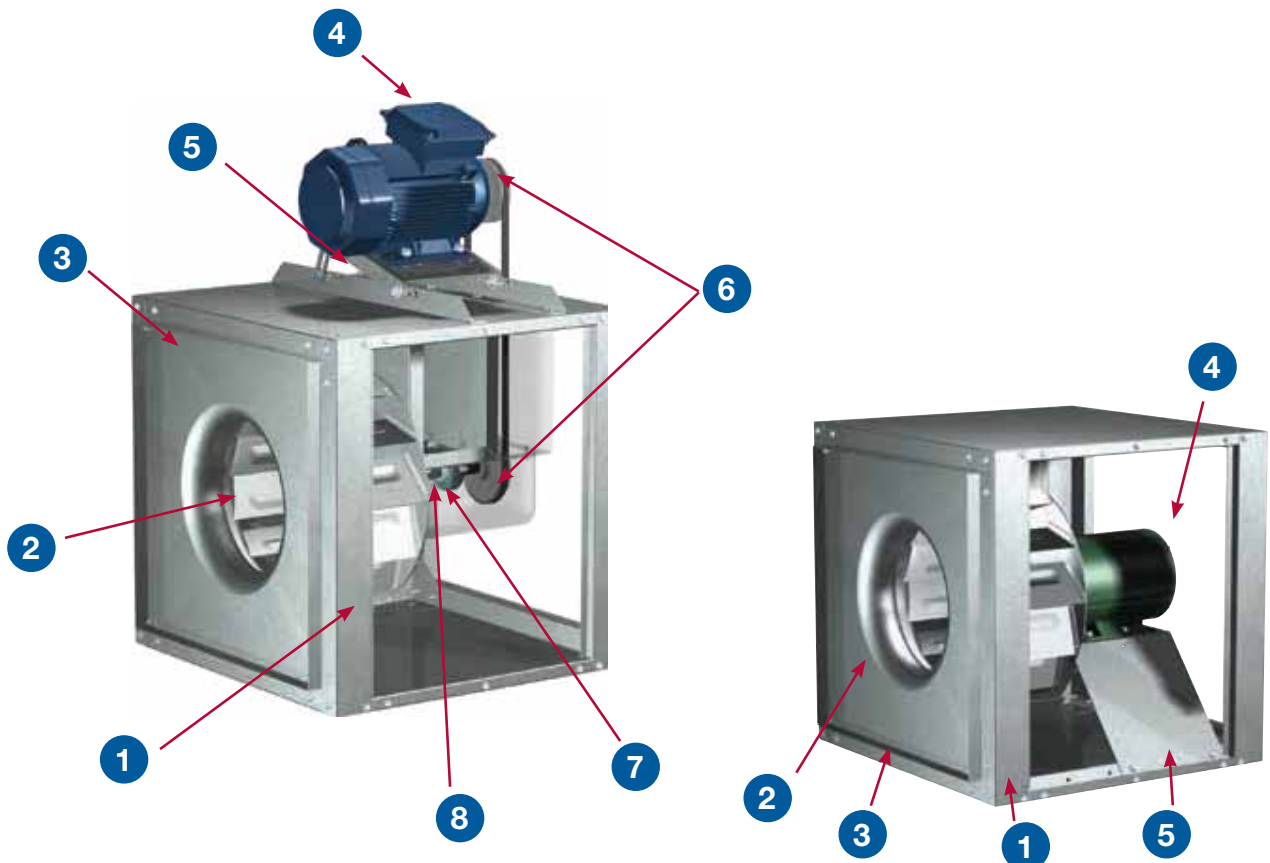
Precisely sized, ground, and polished so the first critical speed is at least 25 percent over the maximum opportunity speed. Where the shaft makes contact with bearings, close tolerances result in longer bearing life.

DISCONNECT SWITCH *(not shown on images)*

Disconnect switch is factory-mounted and wiring is provided from the motor.

ACCESS PANELS *(not shown on images)*

The cabinet construction features two side access panels. These panels permit easy access to all internal components.



Vari-Green[®] Motor



Greenheck's electronically commutated (EC)

Vari-Green (VG) motor combines motor technology, controllability and energy-efficiency into one single low maintenance unit and is the industry's first fully controllable motor. When combined with Greenheck's SQ-M fans, all the CFM and static pressure ranges of a belt drive can be attained with the benefits of a direct drive.



The Vari-Green motor is available in:

- 1/10 - 3/4 horsepower 115 volt only.
- 1 horsepower 115/208-230 volt.
- 2 horsepower 208-230 volt.

All motors are available in a 50/60 Hz power.

Benefits

Operates on AC power that's converted to DC—providing a more efficient motor operation as compared to an AC operation.

- The motor can attain up to 85% efficiency and reduce energy consumption.
- Watt savings of 30-70% depending on RPM. Note: As motor speed is turned down, efficiency stays high as compared to an AC motor that decreases dramatically.
- Operates cooler than a standard AC motor at lower RPMs. A cooler motor has longer motor life and reduces energy consumption.
- 80% usable RPM turndown vs. 30%. (chart at right)
- SQ-M fans with Vari-Green motors can provide all the CFM and static pressure ranges of a comparable belt drive.
- Maintenance costs are reduced as there are no belts or bearings to replace and no pulleys to adjust.
- Direct drive fans are often preferred where maintenance access is difficult.
- Provides a solution for demand controlled ventilation applications.

Vari-Green Advantages

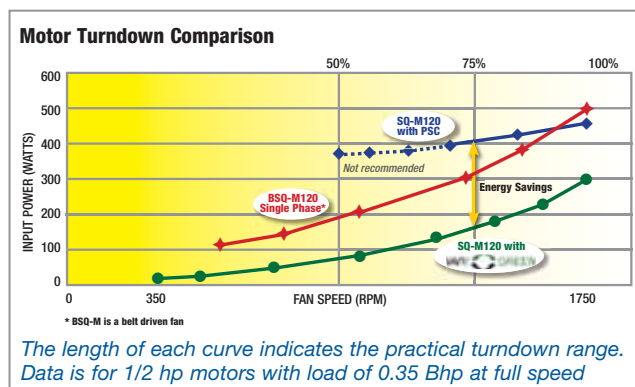
- Initial cost is similar to a belt drive
- Lower operating cost
- No maintenance, no belts, pulleys or bearings
- Easy RPM adjustment

Features

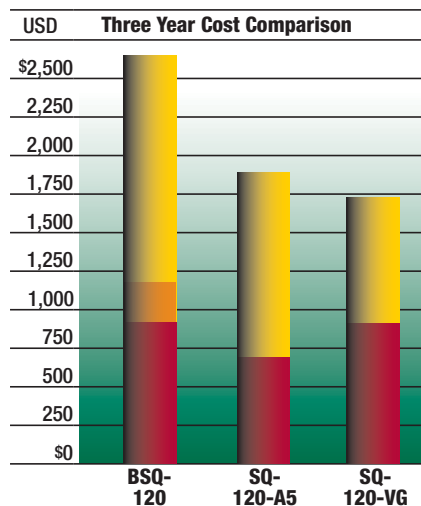
1. Dial on Motor Control - A potentiometer (dial on motor control) is mounted on the motor for easy speed adjustment for system balance. Simply turn the dial; there are no belts and pulleys to adjust.
2. Control Wire Inputs - the motor accepts a 0-10 VDC signal from Building Automated Systems, Vari-Green Controls or other controls to adjust motor speed.



Comparisons: Belt, Direct Drive with PSC and Direct Drive with Vari-Green



Constant Volume Life Cycle Analysis



Analysis is based on operating costs for a period of three years where the fans operate continuously at 1725 rpm, 24/7, with an energy rate of \$0.10/kWh. Maintenance on the SQ-120 is estimated at \$65/yr (USD)

Note: Example is based on a relative cost. Use and installation variables may produce different results.

■ Initial Cost
 ■ Maintenance cost over three years
 ■ Operating cost over three years

ALUMINUM CONSTRUCTION

Aluminum construction is available only for belt drive sizes 70-300.

INLET AND OUTLET GUARDS

Inlet and outlet guards provide protection for non-ducted applications. Guards are fabricated of welded wire on a galvanized steel frame. They are easily removed for maintenance and inspection.

BELT DRIVE MOTOR COVER AND BELT GUARD

For belt driven fans, combination motor cover and belt guards constructed of galvanized steel are available for protection of motors, drives, and personnel.

WIRING PIGTAIL

Allows direct hook-up to the power supply eliminating field wiring at the fan.

ISOLATORS

Complete isolation kits are available with either neoprene or spring isolators and are sized to match the weight of the specified fan size.

INSULATED HOUSING

For noise reduction and condensation control, the interior of the fan housing can be lined with a fiberglass duct liner (25 mm being standard). The optional motor cover can also be insulated.

The table depicts the dB reduction that can be obtained in each octave band for the insulated housing and motor cover together.

| Approximate dB Sound Attenuation | | | | | | | | |
|----------------------------------|----|----|----|----|----|-----|-----|----|
| Octave Band | 1 | 2 | 3 | 4 | 5 | 6 | 7 | 8 |
| Sizes 70 - 130 | -2 | -7 | -4 | -4 | -6 | -13 | -13 | -9 |
| Sizes 140 - 420 | -3 | -2 | -5 | -4 | -5 | -5 | -7 | -8 |

OUTDOOR APPLICATION

Extended motor cover allows for outdoor installations.

The filter box is designed to provide a compact and convenient clean air solution. Factory-assembled as a single unit, this fan eliminates the costly process of designing, fabricating and installing special remote filter box assemblies. Both the fan and filter section feature removable access panels on both sides to remove and replace filters, making fan maintenance simple and fast.



MODEL SELECTION PROCEDURE

1. Calculate system pressure drop and cfm requirements (not including filters).
2. Make a preliminary model size selection.
3. Calculate a filter pressure drop (P) for the preliminary model size selected in step 2 using the equation: $P = F \times \left(\frac{\text{cfm}}{10,000}\right)^2$
 • To determine the filter factor (F) refer to chart below.
4. Add the filter pressure drop (P) to the system pressure drop and make a revised model size selection.

| | Fan Size | Filter Box Weight kilograms (pounds) | Filter Size millimeters (inches) | Filter Quantity | Filter Factor (F) |
|--------------------|---------------|---|-------------------------------------|-----------------|---|
| | | | | | Paper Filters (MERV 7) 1 inch (25 mm) |
| Model SQ-M | 70 | 18 (40) | 254 x 305 (10 x 12) | 1 | 318.06 |
| | 80, 90 | 34 (74) | 356 x 635 (14 x 25) | 1 | 37.28 |
| | 100 | 40 (88) | 406 x 508 (16 x 20) | 2 | 14.91 |
| | 120 | 52 (114) | 406 x 635 (16 x 25) | 2 | 9.54 |
| | 130 | 54 (120) | 508 x 508 (20 x 20) | 2 | 9.54 |
| | 140 | 79 (174) | 508 x 635 (20 x 25) | 2 | 6.11 |
| | 160 | 112 (246) | 508 x 508 (20 x 20) | 4 | 3.57 |
| Model BSQ-M | 70, 80, 90 | 53 (117) | 356 x 635 (14 x 25) | 1 | 37.28 |
| | 100 | 54 (120) | 406 x 508 (16 x 20) | 2 | 14.91 |
| | 120 | 79 (144) | 406 x 635 (16 x 25) | 2 | 9.54 |
| | 130, 130HP | 64 (140) | 508 x 508 (20 x 20) | 2 | 9.54 |
| | 140, 140HP | 82 (181) | 508 x 635 (20 x 25) | 2 | 6.11 |
| | 160, 160HP | 133 (294) | 508 x 508 (20 x 20) | 4 | 3.57 |
| | 180, 180HP | 156 (344) | 508 x 635 (20 x 25) | 4 | 2.29 |
| | 200, 200HP | 200 (441) | 305 x 635 (12 x 25) | 3 | 1.32 |
| | | | 406 x 635 (16 x 25) | 3 | |
| | 240, 240HP | 260 (573) | 508 x 635 (20 x 25) | 4 | 0.70 |
| | | | 406 x 635 (16 x 25) | 4 | |
| | 300, 300HP | 344 (759) | 508 x 635 (20 x 25) | 8 | 0.56 |
| | 360, 360HP | 434 (957) | 406 x 635 (16 x 25) | 10 | 0.26 |
| | | | 508 x 635 (20 x 25) | 5 | |
| 420 | 538 (1185) | 406 x 635 (16 x 25) | 5 | 0.22 | |
| | | 508 x 635 (20 x 25) | 10 | | |

Note: 24-inch (610mm) side clearance is recommended for accessing and removing filters.

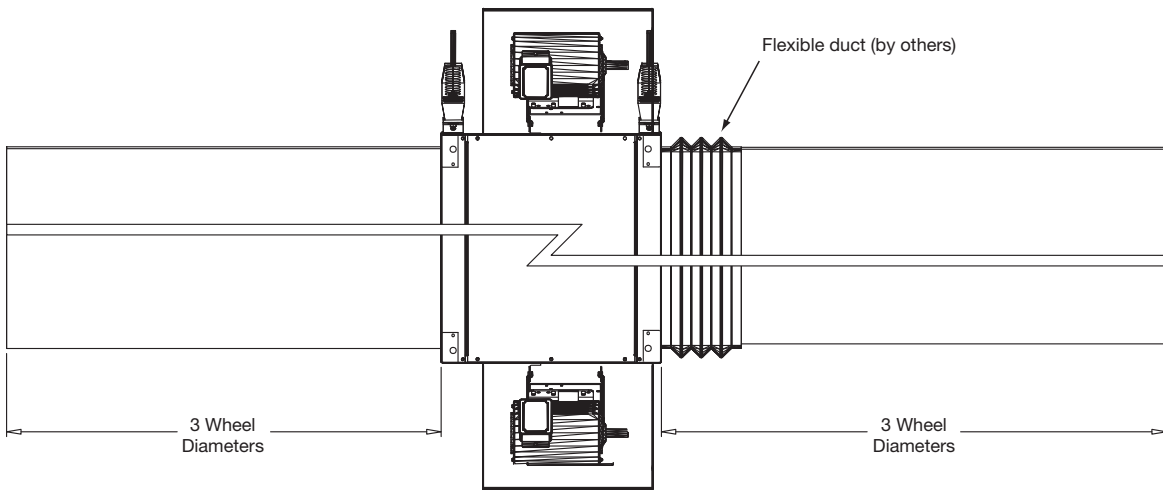
Models SQ-M/BSQ-M ducted inline fans are designed for the exhaust, supply, or recirculation of air in a building. Typical installation requires ductwork on the inlet and outlet side of the fan. A minimum of three duct diameters is required on the inlet and outlet of the fan to prevent system effect losses. See the diagram below for a typical installation, showing optional top or bottom motor.

Installations can include flexible duct connections (by others) on either the inlet or outlet side of the fan or both. The motor is rigid mounted and can be oriented in any direction (top, bottom, side).

The model BSQ-M ducted inline fan must be installed with the motor accessible for maintenance and inspection.

External isolators are recommended, hanging (shown below) or base mounted.

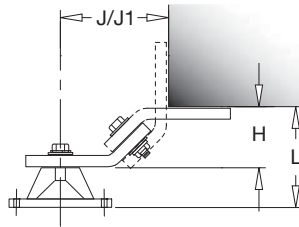
Installation must meet all local governing codes.



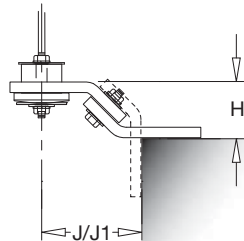
Complete isolation kits are available with either neoprene or spring isolators and are sized to match the weight of the specified fan size. The base isolator support brackets are designed to permit mounting of the fan with the motor located on top or either side. The hanging isolator support brackets are designed to permit mounting of the fan with the motor located on top, bottom or side.

Note: Hanging rods to be supplied by others.

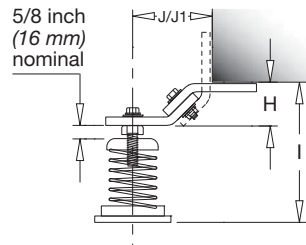
Neoprene Base Isolator



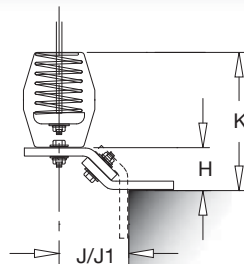
Neoprene Hanging Isolator



Spring Base Isolator



Spring Hanging Isolator



Neoprene Base Isolators

| Model | H | J | J1 | L | I | K |
|---------------|------------|------------|------------|-------------|---|---|
| SQ-M 70-90 | 38 (1½) | 51 (2) | 70 (2¾) | 70 (2¾) | | |
| SQ-M 100-160 | 35 (1⅓) | 51 (2) | - | 67 (2⅝) | | |
| BSQ-M 70-140 | 35 (1⅓) | 35 (1⅓) | 60 (2⅔) | 67 (2⅝) | | |
| BSQ-M 160-240 | 35 (1⅓) | 35 (1⅓) | 64 (2½) | 67 (2⅝) | - | - |
| BSQ-M 300 | 35 (1⅓) | 35 (1⅓) | 64 (2½) | 80 (3⅓) | | |
| BSQ-M 360 | 35 (1⅓) | 35 (1⅓) | 64 (2½) | 105 (4⅓) | | |
| BSQ-M 420 | 35 (1⅓) | 35 (1⅓) | 64 (2½) | 105 (4⅓) | | |

Neoprene Hanging Isolators

| Model | H | J | J1 | L | I | K |
|---------------|------------|------------|------------|---|---|---|
| SQ-M 70-90 | 38 (1½) | 51 (2) | 70 (2¾) | | | |
| SQ-M 100-160 | 35 (1⅓) | 51 (2) | - | | | |
| BSQ-M 70-140 | 35 (1⅓) | 35 (1⅓) | 60 (2⅔) | | | |
| BSQ-M 160-420 | 35 (1⅓) | 35 (1⅓) | 64 (2½) | | | |

Spring Base Isolators

| Model | H | J | J1 | L | I | K |
|---------------|------------|------------|------------|---|-------------|---|
| SQ-M 70-90 | 38 (1½) | 51 (2) | 70 (2¾) | | 152 (6) | |
| SQ-M 100-160 | 35 (1⅓) | 51 (2) | - | | 150 (5⅝) | |
| BSQ-M 70-140 | 35 (1⅓) | 35 (1⅓) | 60 (2⅔) | | 150 (5⅝) | |
| BSQ-M 160-420 | 35 (1⅓) | 35 (1⅓) | 64 (2½) | | 150 (5⅝) | |

Spring Hanging Isolators

| Model | H | J | J1 | L | I | K |
|---------------|------------|------------|------------|---|---|-------------|
| SQ-M 70-90 | 38 (1½) | 51 (2) | 70 (2¾) | | | 140 (5½) |
| SQ-M 100-160 | 35 (1⅓) | 51 (2) | - | | | 135 (5⅝) |
| BSQ-M 70-140 | 35 (1⅓) | 35 (1⅓) | 60 (2⅔) | | | 135 (5⅝) |
| BSQ-M 160-200 | 35 (1⅓) | 35 (1⅓) | 64 (2½) | | | 135 (5⅝) |
| BSQ-M 240-420 | 35 (1⅓) | 35 (1⅓) | 64 (2½) | | | 160 (6⅝) |

All dimensions in millimeters (inches).

All SQ-M and BSQ-M fan models can be mounted horizontally or vertically. For ease of installation, knockouts are provided at each location where mounting brackets are shown in figures 1, 2 and 3. Optional brackets are universally adjustable to mount in any of these locations.

Figure 1

Horizontal Hanging or Base Mount

With either a hanging or base mount, the motor may be located on either side. The base mount allows top access panels only.

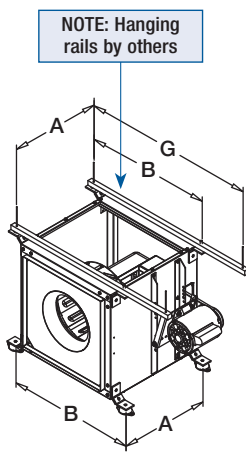


Figure 2

Horizontal Hanging or Base Mount

With a hanging mount, the motor may be located on either top or bottom. The base mount allows top motor location only. Both options provide access panels on two sides.

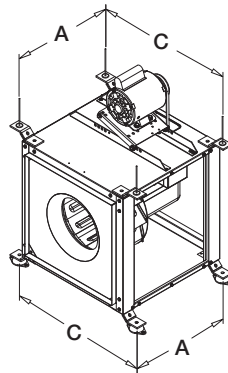
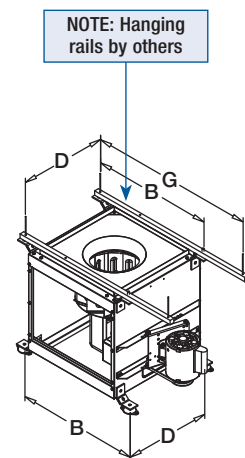


Figure 3

Vertical Hanging or Base Mount

Mounting brackets are turned 90 degrees for vertical mounting. Access panels are located on the two sides adjacent to the motor.



| Model | A | B | C | D | G |
|----------------|---|--|---|---|--|
| SQ-M 70 | 270 (10 ⁵ / ₁₆) | 432 (17) | 400 (15 ³ / ₄) | 225 (8 ⁷ / ₁₆) | Hanging rails not included. Supplied by others. |
| SQ-M 80-90 | 337 (13 ¹ / ₄) | 508 (20) | 476 (18 ³ / ₄) | 302 (11 ⁷ / ₁₆) | |
| BSQ-M 70-90 | 473 (18 ⁵ / ₁₆) | 511 (20 ¹ / ₁₆) | 476 (18 ³ / ₄) | 302 (11 ⁷ / ₁₆) | |
| SQ-M/BSQ-M 100 | 473 (18 ⁵ / ₁₆) | 562 (22 ¹ / ₁₆) | 527 (20 ³ / ₄) | 352 (13 ³ / ₁₆) | |
| SQ-M/BSQ-M 120 | 473 (18 ⁵ / ₁₆) | 610 (24) | 578 (22 ³ / ₄) | 406 (16) | |
| SQ-M/BSQ-M 130 | 473 (18 ⁵ / ₁₆) | 664 (26 ¹ / ₁₆) | 629 (24 ³ / ₄) | 454 (17 ⁷ / ₁₆) | |
| SQ-M/BSQ-M 140 | 498 (19 ⁵ / ₁₆) | 714 (28 ¹ / ₁₆) | 679 (26 ³ / ₄) | 505 (19 ⁵ / ₁₆) | |
| SQ-M/BSQ-M 160 | 597 (23 ¹ / ₂) | 787 (31) | 756 (29 ³ / ₄) | 581 (22 ⁷ / ₁₆) | Hanging rails not included. Supplied by others. |
| BSQ-M 180 | 648 (25 ¹ / ₂) | 851 (33 ¹ / ₂) | 751 (29 ⁹ / ₁₆) | 578 (22 ³ / ₄) | |
| BSQ-M 200 | 740 (29 ¹ / ₁₆) | 940 (37) | 857 (33 ³ / ₄) | 679 (26 ³ / ₄) | |
| BSQ-M 240 | 803 (31 ⁵ / ₁₆) | 1124 (44 ¹ / ₄) | 1035 (40 ³ / ₄) | 860 (33 ³ / ₁₆) | |
| BSQ-M 300 | 889 (35) | 1295 (51) | 1213 (47 ³ / ₄) | 1038 (40 ⁵ / ₁₆) | |
| BSQ-M 360 | 974 (38 ³ / ₄) | 1454 (57 ¹ / ₄) | 1359 (53 ¹ / ₂) | 1187 (46 ³ / ₄) | |
| BSQ-M 420 | 1197 (47 ¹ / ₁₆) | 1600 (63) | 1521 (59 ⁵ / ₁₆) | 1521 (59 ⁵ / ₁₆) | |

All dimensions in millimeters (inches).

Design and Selection Support

Enjoy Greenheck's extraordinary service, before, during and after the sale.

Greenheck offers added value to our wide selection of top performing, energy-efficient products by providing several unique Greenheck service programs.



- Greenheck's free Computer Aided Product Selection program (CAPS), rated by many as the best in the industry, helps you conveniently and efficiently select the right products for the challenge at hand.



- Greenheck has been Green for a long time! Our energy-saving products and ongoing corporate commitment to sustainability can help you qualify for LEED credits.

Find out more about these Greenheck services at: www.greenheck.co.in



Building Value in Air

Greenheck delivers value to mechanical engineers by helping them solve virtually any air quality challenges their clients face with a comprehensive selection of

top quality, innovative air-related equipment. We offer extra value to contractors by providing easy-to-install, competitively priced, reliable products that arrive on time.

And building owners and occupants value the energy efficiency, low maintenance and quiet dependable operation they experience long after the construction project ends.

Our Commitment

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



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