Installation, Operation and Maintenance Instructions

Important

Read and become familiar with this manual prior to uncrating and installing your Spencer Scroll Blower. Following the instructions detailed here will help you realize its full potential of efficient service and extended lifespan. Damage resulting from failure to follow correct procedure will void the warranty.
Before proceeding with this set-up, refer to the machine nameplate and record the machine number and serial number in the boxes on the manual front cover.

I. General Instructions

Important
Read and become familiar with this manual prior to uncrating and installing or storing machinery – it is a precision piece of equipment capable of extended service and lifespan. Realization of this potential can best be achieved through proper handling and adherence to the following instructions. Damage resulting from failure to follow correct procedures will void warranty.

Spencer Service
Spencer service begins upon receipt of your request for equipment purchase. Our engineers welcome the opportunity to discuss your problems and will assist in determining specification requirements if so desired. To serve you promptly, we maintain a large inventory of electric motors and machine parts. Also, by combining under one roof the constantly supervised manufacturing, assembly, and test procedures, Spencer can assure you of a unit capable of optimum performance under the most severe service conditions. All Spencer machines are factory tested for load capacities and vibrational characteristics. This assures long, trouble-free operations.

Warranty
We warrant that this product will be free from defects in material and workmanship for a period of 18 months from date of shipment or 12 months from date of startup, whichever comes first. Within the warranty period, we shall repair or replace, F.O.B. our Factory or designated service center, such products that are determined by us to be defective.

This warranty will not apply to any product which has been subjected to misuse, negligence, or accident or, misapplied or improperly installed. This warranty will not apply to any product which has been disassembled, repaired or otherwise altered by any persons not authorized by our Service Department.

The guarantee of the motor, control, and component manufacturers govern the extent of our guarantee on such equipment. Warranty work on motors, controls, and components must be authorized by Spencer and must be performed in an authorized shop as designated by the motor, control, and component manufacturers. The Spencer Turbine Company reserves the right to invoice all expenses incurred when repairs are made in the field at the specific request of the customer.

Handling
This machine has been carefully balanced and tested at our factory. It is essential that it be handled with care during installation in order that you may be assured satisfactory performance.

Storage
Caution: If machine is to be stored for an extended period of time, it must be carefully protected from dampness, dirt and vibration. The inlet and discharge should be covered to keep foreign matter out; the motor shaft should be periodically rotated a few times by hand. Failure to comply with any of the preceding will void warranty.

Location
Caution: Do not locate unit in excessively hot area (> 104 °F) unless equipment is designed for this condition.

Before placing the machine in its operating position, be sure that the blower and motor are readily accessible for servicing by allowing several feet of clear space around the machine. Inaccessibility can prove costly in both time and labor.

Foundation
No special foundation is necessary for the Scroll Blower. A level concrete floor or block is recommended, although any other substantial floor will prove satisfactory. The blower should be placed on cork isolating pads furnished. The blower should not be vertically, or “wall” mounted.

Tubing
All tubing should be of ample size to minimize frictional loss. It is absolutely essential that all joints be airtight and that there be no leaks in the system. Leaky air pipes consume a surprising amount of power and impair the operating efficiency of the machine. Piping should be properly supported without producing any stress or strain on the machine casing. It is further recommended that the rubber or isolation sleeve supplied with the machine be used to connect it to the tubing system.
Rubber Inlet and Outlet Sleeve

The rubber connecting sleeve supplied with the scroll should be installed so that it covers a gap of approximately one inch as illustrated. The mounting clamps supplied with the sleeve should be adequately tightened to effect an air-tight connection.

Electrical

Caution: Be sure motor, starter, controls and other electrical equipment is the proper type suitable for the application and environment and complies with all applicable codes.

Be sure that the motor furnished with this machine is wound for the same type of voltage available at the installation site. In making the electrical connections, follow the wiring instructions furnished. Wire and fuses should be of ample capacity to insure that proper voltage is maintained at the motor terminals while starting and running. It is important that proper starting equipment be used. All AC machines should be equipped with a magnetic contactor or a manual or automatic compensator depending on the machine size and the installation regulations of the local power company. The starters should have thermal overload protection as well as true low-voltage protection.

Air Filters

The Spencer Turbine Company recommends the use of inlet air filters on all Scroll Blowers for pressure applications.

The use of any type of filter requires that it be kept clean to prevent excessive pressure drop in the lines. The dry element of the Spencer filter may be cleaned with soap & water and reused.

Silencers and Combination Filter-Silencers

Spencer offers silencers and combination filter-silencers for intake discharge, and bleed applications. The silencers should be properly supported at both ends. Rigid connection to the machine is not recommended. The tubing mount is recommended and connects to the machine with a rubber sleeve and a flange to tubing adapter.

Vacuum Applications

When the machine is used for vacuum, the outlet should discharge outdoors (preferred) or into a room having ample volume and proper ventilation in order to permit the air to escape and at the same time keep the unit at a reasonable temperature. Intake air must be kept clean through proper filtration methods.

Motor Rotation

The motor must be wired correctly to rotate the blower in the right direction. A rotation arrow is located on the blower housing. "Bump" or jog the start button and observe the direction of rotation of the motor shaft. This movement must agree with the rotation arrow. If the rotation is incorrect, the motor wiring must be changed.

This diagram shows the available discharge positions, viewed from the intake end, and the direction of blower rotation associated with each discharge position.

Coupling Alignment

The coupling on this machine was carefully aligned at the factory and the coupling halves and shell(s) marked to indicate optimum relative position. However, transportation may have caused coupling misalignment.

Caution: Check the motor and blower shafts for misalignment and carefully realign them if necessary after Installation and before startup, as misalignment can cause destructive vibration. Coupling alignment should be rechecked again after an hour's operation. Final alignment should be made at average operating temperature. After each alignment check, add lubricant per instructions and replace coupling guard.

WARNING: DISCONNECT AND LOCK OUT ELECTRICAL POWER BEFORE PERFORMING ALIGNMENT.

On certain blowers, the coupling is disassembled after factory alignment and marking. The coupling halves are specially protected against the elements during shipping. Prior to startup, assemble the coupling, align keyways using factory markings and lubricate as instructed.
Coupling alignment lines up the motor shaft and blower shaft in horizontal and vertical planes. It also ensures an adequate clearance (gap) between the two coupling halves. Only qualified personnel should attempt to align a coupling. If problems arise, contact Spencer or your Spencer Representative.

**Sier Bath Gear-Type Couplings**, manufactured to our rigid specifications, are most commonly supplied with Spencer equipment.

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Remove one snap ring and slide the sleeve off the hub halves. Using a feeler gage, verify that the gap between the coupling halves agrees with this table.

**Caution: Some motor shafts are spring-loaded axially. Be careful when using the feeler gage to avoid compressing the shaft and disturbing the normal at-rest position.**

**Machinery Soft Foot**
Imperfections or unevenness between the machine base and any foot of the motor or blower creates a condition known as soft foot, which may be parallel or angular. If uncorrected, soft foot leads to increased stress and high vibration. Although both the motor and blower feet were preset at the factory, each foot must be checked for soft foot prior to alignment. Any vertical or angular soft foot that exceeds .003" is excessive and must be corrected.

**Laser Alignment Technique (Recommended)**
Laser systems have significant advantages such as reduced maintenance costs and energy consumption; prolonged life for bearings, seals and couplings; decreased bearing temperatures and lower vibration levels. Many laser systems also identify and measure soft foot conditions.

**NOTE:** Consult an alignment specialist if laser equipment is not available.

**Reverse Indicator Method (Permissible)**
This method may be done electronically following the instrument manufacturer's instructions or by means of dial indicators as follows:
1. Reinstall the coupling sleeve, seal and snap ring.
2. Clamp dial indicators on shafts 180° apart as shown.
3. Place indicator probes on opposite shafts as shown.
4. Rotate both shafts simultaneously in the correct operating direction, taking readings at 90° intervals.
5. Adjust motor to achieve parallel and angular alignment. If questions arise, contact the Spencer Service Department.

**Straightedge Method (Permissible)**
1. Remove old lubricant and clean the hub teeth.
2. Set a machine shop quality straightedge across the coupling hubs (at the root diameter of the gear teeth).
3. Adjust the motor so the straightedge is evenly supported between the coupling hubs at the 3, 6, 9 and 12 o'clock positions.
4. Using a feeler gage, measure the clearance between the coupling hubs at the 3, 6, 9 and 12 o'clock positions.
5. Adjust the motor so the gap is identical at all four positions and in accord with the table of hub to hub gaps.
Coupling Alignment with Sleeve Bearing Motors

Caution: Complete the following procedures before attempting coupling alignment with sleeve bearing motors.

Use a flange-type gear coupling for both 1800 and 2600 RPM motors. Do not use a sleeve-type coupling.

Sleeve bearing motors have a specified end play. End play limits and the magnetic center (where motor will run) should be scribed on the shaft by the manufacturer.

Use the following procedure to align a sleeve bearing motor with a blower.

1. Make sure the motor shaft is level.
2. Position the motor so that when the rotor is pushed toward the blower as far as it will go, there will 0.030” clearance between the ends of the motor and blower shafts (or the alignment faces on the coupling hubs).
3. Proceed with coupling alignment using the appropriate instructions.

Alignment Tips
- Make sure the blower is level before alignment.
- Mark the axial location of the motor before alignment as a reference point to be sure it does not move.
- Avoid disturbing any factory-installed shims unless they are to be replaced.
- Do soft foot corrections first; loosen all mounting bolts before correcting any foot.
- During the final vertical adjustment of the motor, work on one side at a time, loosening the jack bolts first so the motor does not move laterally as mounting bolts are loosened.
- Use the smallest shim that will slide over the mounting bolts.
- Minimize the number of shims. One thick shim and 2-3 thin shims are usually satisfactory.
- Remove all traces of dirt or contaminants from shims and machine parts.
- Use stainless steel shims only.
- Never reuse shims.

Caution: After each alignment check, add coupling lubricant if required.

WARNING: REPLACE THE COUPLING GUARD BEFORE RESTARTING THE BLOWER.

Surge

Caution: Do not operate blower in surge (unstable low flow range). Damage to blower caused by operating in surge is not covered by Spencer warranty.

A blower in surge produces a rush or pulsating rhythmic air sound caused when airflow into or out of the blower is restricted. In addition to its characteristic noise, surge may be detected by power or pressure fluctuations. Surge is destructive because it is accompanied by excessive temperatures and aerodynamic forces that will ultimately cause mechanical failure. A surge condition is simply eliminated by increasing the airflow either into the system or to a bypass or vent.

NOTE: If a blower surges violently at startup, avoid recurrences by leaving the throttling valve open at or near its normal operating position.

II. Operation and Adjustments

Startup Precautions

Before operating a new blower for the first time, review its installation and setup to be sure that no steps have been overlooked.

1. Installation Check List
- Is there any damage from transportation or installation?
- Is the machine level?
- Have all packing, shipping materials and tools been removed?
- Is the inlet filter in place?
- Are isolation pads in place?
- Is the piping connected and supported?
- Are flexible connectors in place between blower and piping?
- Are safety guards in place?

2. Adjustment Checks
- Is the coupling aligned within tolerances and lubricated?

3. Operational Checks
- Is the throttling valve closed or properly positioned?
- Do the blower shaft and driver spin freely?
- Is the isolation valve (if any) open?
- Is the system ready for air or gas delivery?
- Has motor rotation been checked?
- Are motor and electrical accessories properly wired?
Instructions for Disassembly and Reassembly

CAUTION: This blower must have adequate system resistance at all times to avoid operation at or near free delivery (wide open). It is typically imposed by the process and supplemented with a throttling valve. Running the blower overloaded will damage the motor.

Start Up

Caution: It is very important that the blower be installed with regard to the correct direction of rotation. A direction-of-rotation arrow is affixed to the scroll casing.

Under no circumstances should the Scroll Blower be operated without being connected to the pipe system with which it is to be used.

When starting up a Scroll Blower it is recommended that the blast gate or other control device be closed. When first starting the installation, an ammeter should be connected to the motor circuit and the control device opened until full load current is reached. At this point, the unit is delivering the full rated volume of air for which it was designed and the control device should be adjusted to prevent opening beyond this point. (See following paragraphs.)

Multiple Machine Operation

Caution: All Scroll Blowers in a multiple machine operation should be operated periodically. This can be accomplished through bi-weekly, alternate operation of the machines.

Check valves must be installed in the discharge of each Scroll Blower to prevent blow-back through the unit not in operation. These are available as optional equipment.

When operating two or more Scroll Blowers in parallel it is necessary to be sure that each machine carries its respective share of the load. This is accomplished by setting each blast gate so that the Scroll Blower operates within the full load amp rating of its motor. Once the proper setting is established, tighten bolts securing the variable stop (View A) or the locking nut (View B). This prevents the blast gate from being opened beyond the full load rating of the motor.

Instructions for Disassembly and Reassembly

Caution: Parts must be reassembled in exactly the same relative positions. Therefore, it is recommended that each part be tagged as it is removed from the machine to facilitate later reassembly. It is especially important that the impeller location and its position on the shaft be marked.

Balancing

Each machine is fully tested before leaving the Spencer factory to be sure vibrations, if any, are well within specifications for that particular machine. However, rough handling during shipment or improper disassembly/reassembly of a machine can upset its balance and result in excess vibration.

When a machine is being disassembled for repairs, mark the parts as they are removed. If this is done, no trouble should be expected from vibration when they are reassembled in the same order.

However, if the impeller is being replaced or there is any vibration due to an unbalanced condition after assembly, use the following procedure.

Run the unit at maximum speed. Mark the position of the impeller hub on the shaft. Loosen the bolts or screws holding the impeller on the shaft. Rotate the impeller 90° on the shaft. Run the machine again at the maximum speed, and check the vibration. Repeat this process until the best position is located for the impeller on the shaft so that there is no vibration or unbalance in the machine.

Disassembly

Scroll blowers are now being supplied with casing, motor base and casing/base support welded into an integral unit. This innovation provides a stable and maintenance free platform. As a result, maintenance is confined to removal of the motor on one end and
removal of the end head on the other. Removal of the end head provides immediate access to the impeller.

To disassemble the scroll blower, proceed as follows: Remove the bolts (8) securing end head (4) to the casing assembly. Remove the end head.

Measure or mark position of impeller on the shaft, loosen the three (or six) Allen socket screws three full turns, tap the heads of the screws. This will loosen the impeller from the tapered bushing allowing removal.

Remove the bolts holding the motor in place. Remove motor leaving the block and shims in their original place. The motor can now be overhauled. It is good maintenance practice and Spencer recommends replacing the division head packing (11) when motor removal/reinstallation is accomplished.

Reassembly

Replace motor in original position on blocking and shims, making sure that shaft is centered in hole in division head and taking care not to damage packing (11). Be sure motor is perpendicular to division head so that fan is properly aligned within the casing.

Tighten motor hold-down bolts finger tight. Replace fan and tighten Allen socket screws. Determine (by hand) that fan turns freely without interference. Without causing the motor to move, tighten motor hold-down bolts securely.

Replace end head gasket and end head in proper position. Insert all bolts. Then tighten uniformly. Machine is ready to run.

Check that motor leads are properly connected and motor is rotating in the right direction.

III. Typical Scroll Blower

Note:

1. The impeller is equipped with a split clamped hub or a tapered bushing clamp (as illustrated). The latter is tightened on the shaft with three or six Allen socket screws.

2. Contact Spencer for separate instructions for arrangement 9 (Belt Drive) single-stage Scroll Blowers.

Screened items are recommended spare parts

1 - Front Motor End Bracket
2 - Discharge Flange
3 - Impeller
4 - End Head
5 - Impeller Allen Screws
6 - Motor Shaft
7 - Inlet
8 - End Head Bolts
9 - End Head Gasket
10 - Motor Housing Assembly (Casing, Motor Base, Floor Support)
11 - Division Head Packing
12 - Rear Motor Bearing
13 - Motor Bolts
14 - Front Motor Bearing
15 - Thrust Bearing Nut
16 - Front Bearing End Cap
BP - Balancing Point
LP - Lifting Point (Half-moon cutouts in Scroll floor support)
Recommended spare parts
1 - Flexible Coupling
2 - Coupling End Bearing
3 - Blower End Bearing
4 - Division Head Packing
5 - Shaft
6 - Impeller
7 - End Head Gasket
8 - Drive End Motor Bearing
9 - Opposite Drive End Motor Bearing
IV. Replacement Parts

How to order replacement parts
When ordering replacement parts, it is important that the information you furnish to Spencer is correct. Be sure when reading nameplates that you obtain the correct information. Remember, the more complete the information, the quicker the order will be processed; incomplete information will result in unnecessary delays and expense through callbacks. When in doubt, consult the factory for further information.

To order replacement parts, furnish the following:
1. Machine model and serial number from machine nameplate.
3. Measure and record the casing diameter.
4. Refer to applicable illustration in the instruction manual and locate needed item by its circled call-out number. Refer to callout list for nomenclature and record.

V. Lubrication Instructions

WARNING: DISCONNECT AND LOCK OUT ELECTRICAL POWER BEFORE PERFORMING LUBRICATION.

Motor Bearings
Follow the motor manufacturer's recommendations. Some motors are equipped with sealed bearings not intended for relubrication; these motors have no grease or drain plugs.

Blower Bearings (Arrangement 8)
Blowers are equipped with deep-groove ball bearings designed to carry the thrust and radial loads. These bearings are packed at the factory with sufficient grease for 1500 to 8000 hours of continuous operation prior to relubrication. *Lubrication prior to blower operation is not recommended and should not be attempted.*

If, however, the blower has been stored for three months or longer, remove the bearing caps and check for moisture or hard grease. Discard any hard or dry grease and relubricate if necessary.

An average lubrication interval should be established based on existing conditions. Several factors affect the frequency of lubrication:
1. Operating temperature of the bearing
2. Indoor or outdoor blower location
3. Clean or dusty conditions
4. Ambient temperature
5. Predicted duty cycle
6. Bearing size and speed

Under actual operating conditions, the ideal lubrication interval of 8000 hours should be adjusted according to the following table.

*NOTE: The higher limit of each range shown is for small bearings (#308 and smaller); the lower limit is for large sizes. This table is only a guide. An extremely dirty atmosphere could decrease the lubrication interval as much as 50%.*

<table>
<thead>
<tr>
<th>Operating Condition</th>
<th>Lubrication Interval</th>
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<tr>
<td>I</td>
<td>1. 120-150 °F bearing temp. 4000-6000 hours</td>
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<td></td>
<td>2. Indoor installation</td>
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<td>3. Clean atmosphere</td>
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<td>4. 40-100 °F ambient temp.</td>
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<td>5. Continuous operation</td>
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<tr>
<td>II</td>
<td>Same conditions as I 6000-8000 hours except Intermittent operation</td>
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<tr>
<td>III</td>
<td>1. 120-155 °F bearing temp. 3000-5000 hours</td>
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<td></td>
<td>2. Outdoor installation</td>
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<td></td>
<td>3. All atmospheres</td>
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<td>4. 0-104 °F ambient temp.</td>
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<td>5. Continuous operation</td>
</tr>
<tr>
<td>IV</td>
<td>Same conditions as III 5000-7000 hours except intermittent operation</td>
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The Spencer Turbine Company ◆ 600 Day Hill Road, Windsor, CT 06095 ◆ TEL: 800-232-4321 ◆ 860-688-8361 ◆ www.spencerturbine.com
VI. Trouble Shooting Guide

<table>
<thead>
<tr>
<th>Trouble</th>
<th>Probable Cause</th>
<th>Corrective Action</th>
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</table>
| Insufficient air through system | Low pressure or vacuum as determined by measurement with a manometer:  
- Incorrect rotation.  
- Machine sized for requirements given, but air lines too small causing excessive frictional loss.  
- Valves in line, causing excessive losses.  
- Inlet or outlet partially blocked, i.e., clogged inlet filter, blast gate shaft slipped in handle and shutter does not open fully.  
- High inlet temperature, i.e., higher than designed inlet temperature.  
- Lower inlet pressure, i.e., lower than designed inlet pressure.  
- Machine not running at designed speed.  
- Lower than design gas density or specific gravity.  
- Machine air passages clogged with material.  
- Fans worn out due to explosion, abrasion, or vibration.  
- Pressure or vacuum gauge inaccurate – would not apply to performance of machine, but to gauge reading only.  
- System requirements incorrectly calculated by customer.  
- Too many leaks and/or openings.  
| Measuring gas or air flow incorrectly:  
- Flowmeters incorrectly calibrated.  
- No means of measurement available so customer is guessing at airflow.  
| Machine vibrating | Imbalance:  
- Material build-up on Impeller.  
- Shaft bent.  
- Faulty replacement motor installed and/or machine reassembled incorrectly.  
- Motor bearings worn.  
| Mechanical:  
- Inlet and/or outlet piping connected to machine without flexible connector causing torque or strain on casing.  
- Machine bolted down causing change in alignment.  
- Piping not properly supported.  
- Improper voltage on motor causing assembly to operate at different speed.  
- Solids or liquids in, or passing through machine.  
- Machine not mounted on solid foundation, i.e., on unstable catwalk, etc.  
| Motor Hot (Can be checked with surface thermometer. Refer to factory for decision as to whether or not it is too hot.) | Incorrect motor selection:  
- Ambient temperature too high for insulation class.  
- Incorrect voltage.  
- Incorrect cycle.  
- Electrical short-circuit insulation failure.  
- Motor overloaded – blowout too small for system.  
| Unbalanced voltage supply:  
- Contact a power company for correction.  
- Cool motor or replace with motor having proper insulation.  
- Change to correct voltage.  
- Change to correct cycle.  
- Repair or replace motor.  
- Install larger motor and/or blower.  
- Check with power company for correction.  
| Machine noisy | Internal machine malfunction:  
- Fan hitting after customer reassembly and/or fan slipping on shaft due to heat or excessive inlet pressure.  
- Fan coming apart due to age or wear from dirty air or gas.  
- Machine out of balance running rough.  
- Foreign material in machine.  
| Motor malfunctions:  
- Excessive electrical hum or whistle.  
- Wrong voltage – low voltage motor not up to speed. High voltage will burn out motor and also cause noticeably more noise.  
- Bearing failure.  
- Motor rebuilt improperly – thrust taken on wrong end in standard overhung machine.  
- Worn bearings or loose part.  
- Low frequency.  
| Reassemble according to instructions, tighten fan. Bleed air at low flow to reduce heat. Change inlet conditions if necessary. Replace fan. Rebalance and/or clean machine (refer to “Machine Vibrating”). Disassemble machine, inspect and clean. Reassemble and, if necessary, install filter to prevent further clogging.  
| Calibrate gauge; always use a “U” tube manometer for checking pressure and/or vacuum.  
| Install larger volume or lower vacuum machine to handle correct system requirements. Locate and repair all leaks.  
| Calibrate flowmeters; be certain proper orifice is used for meter (check with flowmeter manufacturer). Obtain and install flowmeter.  
| Clean Impeller; install or improve filter to prevent further build up. Replace shaft. Disassemble machine, balance motor, reassemble according to instruction in this book and assembly print. Replace worn bearings.  
| Install flexible connection at inlet and outlet.  
| Remove bolts; use dowel pins or set in guide channels. Properly anchor piping beyond flexible connector. Check voltage and wiring connections; correct voltage.  
| Disassemble, inspect and clean machine, install or improve filter to prevent further contamination. Re-inforce foundation.  
| The Spencer Turbine Company ◆ 600 Day Hill Road, Windsor, CT 06095 ◆ TEL 800-232-4321 ◆ 860-688-8361 ◆ www.spencerturbine.com
Spencer Single-stage Scroll Blowers

Standard Features

- Flanged outlet with standard ANSI B16.5 125lb/150lb drilling for ease of installation.
- Heavy-duty 3/16" welded steel housing and motor support. Heavy-gauge steel absorbs shock of sudden back pressure. If damaged, sections can be repaired or replaced.
- Six standard outlet positions provide flexibility of air piping placement and layout.
- Standard shaft motor. ODP or TEFC motor enclosure is standard.
- Direct drive Arrangement No. 4, with impeller mounted directly on motor shaft.
- Direct drive Arrangement No. 8 or belt drive Arrangement No. 9 is available upon request.
- Standard finish of epoxy primer with urethane topcoat.
- Radial bladed aluminum impeller. Maximum vibration tolerance 1.5 mils total amplitude. Each impeller is statically and dynamically balanced prior to shipment.
- Cork mounting pads. Blower stands free on cork pads; no special foundation, bolts or grout required.
- High efficiency wheel and housing design results in optimum efficiency ratings and lower sound levels.

Optional Features

- Stainless steel or other special materials.
- Housing of 1/4" or 3/8" steel plate.
- Mechanical seal for gas-tight construction.
- Spark-resistant construction.
- High temperature construction with heat slinger.
- Epoxy or other coatings for chemical applications.
- Custom designs.
- Special motor enclosures – chemical duty, high-efficiency, explosion-proof.
- Casing drains.
- Backward curved impellers to reduce noise and increase operating stability at low flows.
- Rotatable discharge.

Refer to Spencer Bulletin No. TDS192 for Single-stage Scroll Blower specifications.

The Spencer Turbine Company ◆ 600 Day Hill Road, Windsor, CT 06095 ◆ TEL 800-232-4321 ◆ 860-688-8361 ◆ www.spencerturbine.com
Industrially rated products offering effective solutions for air and gas handling problems:

- Multistage centrifugal blowers
- Single-stage centrifugal blowers
- High speed turbo blowers
- Gas boosters and hermetic gas boosters
- Regenerative blowers
- Modular central vacuum systems
- Mobile or stationary integrated vacuum units
- Separators and dust collectors
- Custom-engineered products with special materials for extreme temperatures and pressures

Complementary accessories with single source convenience and compatibility:

- Standard and custom electrical control panels – UL, CUL Listed and C.E. Compliant available
- Valves, gauges, couplings, shrink sleeves, vibration isolators and other system components
- Comprehensive selection of tubing, fittings, vacuum hoses, valves and tools

Comprehensive engineering and other customer support services:

- The industry's largest complement of technical specialists in air and gas handling technology
- Worldwide parts and service organization
- Application research and testing facility

Worldwide organization of sales representatives and distributors offering:

- Product selection, installation and operation assistance
- Comprehensive system design services
- Follow-up services and troubleshooting

For the name and telephone number of your local Spencer Representative, call 800-232-4321 or email marketing@spencer-air.com