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OPERATION AND MAINTENANCE MANUAL

Job:

APHIS FACILITY USDA

ENGINEER: DAMMON ENGINEERING

PREPARED FOR:

TAYLOR MECHANICAL, LLC

PRODUCTS SUBMITTED:

*FANS GREENHECK FAN CORP.
INFRARED HEATERS MARKEL*

*SUBMITTED BY
KENNY SMITH*

FANS

GREENHECK

Installation, Operation and Maintenance Manual

Please read and save these instructions. Read carefully before attempting to assemble, install, operate or maintain the product described. Protect yourself and others by observing all safety information. Failure to comply with instructions could result in personal injury and/or property damage! Retain instructions for future reference.

Model G Direct Drive

Model G is a direct drive downblast centrifugal exhaust fan. These fans are specifically designed for roof mounted applications exhausting relatively clean air. Performance capabilities range up to 4,300 cfm (7,305 m³/hr) and up to 1 in. wg (249 Pa) of static pressure. The maximum continuous operating temperature is 180°F (82°C). G models are available in 27 sizes with nominal wheel diameter ranging from 8 to 24 inches (203 to 610 mm) (060 - 243 unit sizes). Each fan shall bear a permanently affixed manufacturer's engraved metal nameplate containing the model number and individual serial number. All fans are UL/cUL listed Standard 705.



Model GB Belt Drive

GB Model Fans are belt drive downblast centrifugal exhaust fans. These fans are specifically designed for roof mounted applications exhausting relatively clean air. Performance capabilities range up to 44,700 cfm (75,950 m³/hr) and up to 2.5 in. wg (623 Pa) of static pressure. The maximum continuous operating temperature is 180°F (82°C). GB models are available in twenty sizes with nominal wheel diameters ranging from 11 to 54 inches (279 to 1372 mm) (071-540 unit sizes). Each fan shall bear a permanently affixed manufacturer's nameplate containing the model number and individual serial number. All fans are UL/cUL listed Standard 705.

General Safety Information

Only qualified personnel should install this fan. Personnel should have a clear understanding of these instructions and should be aware of general safety precautions. Improper installation can result in electric shock, possible injury due to coming in contact with moving parts, as well as other potential hazards. Other considerations may be required if high winds or seismic activity are present. If more information is needed, contact a licensed professional engineer before moving forward.

DANGER

Always disconnect, lock and tag power source before installing or servicing. Failure to disconnect power source can result in fire, shock or serious injury.

CAUTION

When servicing the fan, motor may be hot enough to cause pain or injury. Allow motor to cool before servicing.

CAUTION

Precaution should be taken in explosive atmospheres.

1. Follow all local electrical and safety codes, as well as the National Electrical Code (NEC) and the National Fire Protection Agency (NFPA), where applicable. Follow the Canadian Electric Code (CEC) in Canada.
2. The rotation of the wheel is critical. It must be free to rotate without striking or rubbing any stationary objects.
3. Motor must be securely and adequately grounded.
4. Do not spin fan wheel faster than max cataloged fan RPM. Adjustments to fan speed significantly affects motor load. If the fan RPM is changed, the motor current should be checked to make sure it is not exceeding the motor nameplate amps.
5. Do not allow the power cable to kink or come in contact with oil, grease, hot surfaces or chemicals. Replace cord immediately if damaged.
6. Verify that the power source is compatible with the equipment.
7. Never open access doors to a duct while the fan is running.

Receiving

Upon receiving the product, check to make sure all items are accounted for by referencing the bill of lading to ensure all items were received. Inspect each crate for shipping damage before accepting delivery. Notify the carrier if any damage is noticed. The carrier will make notification on the delivery receipt acknowledging any damage to the product. All damage should be noted on all the copies of the bill of lading which is countersigned by the delivering carrier. A Carrier Inspection Report should be filled out by the carrier upon arrival and reported to the Traffic Department. If damaged upon arrival, file a claim with carrier. Any physical damage to the unit after acceptance is not the responsibility of Greenheck Fan Corporation.

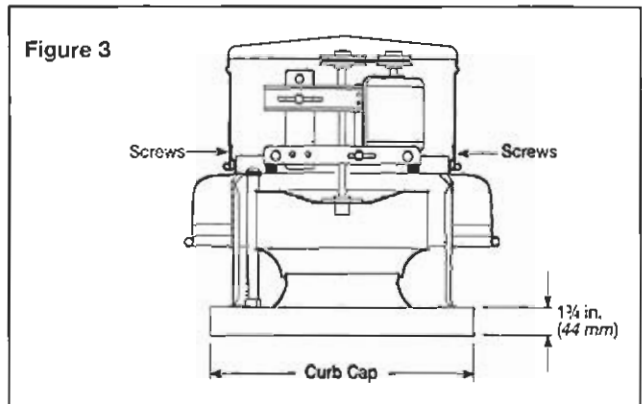
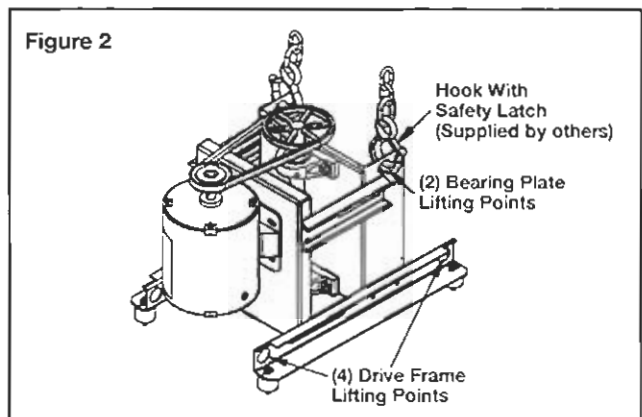
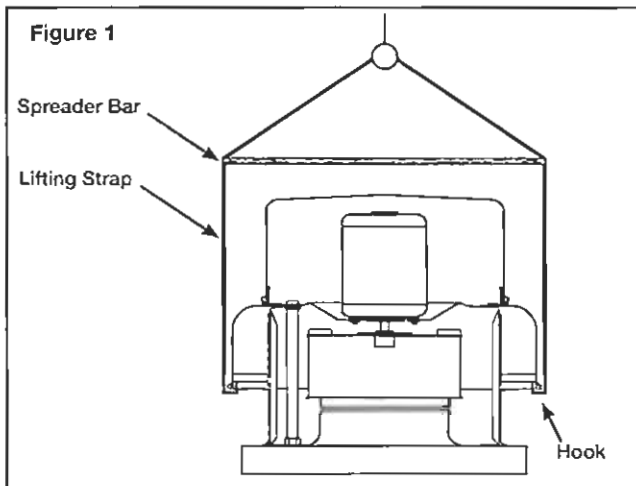
Unpacking

Verify that all required parts and the correct quantity of each item have been received. If any items are missing, report shortages to your local representative to arrange for obtaining missing parts. Sometimes it is not possible that all items for the unit be shipped together due to availability of transportation and truck space. Confirmation of shipment(s) must be limited to only items on the bill of lading.

Handling

G Direct Drive

Lift unit on to the roof utilizing hooks under the lip of the shroud. Evenly space the hooks around the shroud using a minimum of four lifting straps. Use a spreader bar to ensure the straps do not come in contact with the unit (see Figure 1).



GB Belt Drive

When lifting the unit on to the roof, use either the four lifting points on the drive frame or the two lifting points on the bearing plate if present (see Figure 2 for lifting points). Access to the drive frame is accomplished by removing the screws pointed out in Figure 3. The cover can then be removed and placed on a flat surface in an area protected from strong winds.

When G/GB unit is on the roof, move fan to desired location using lifting points and fasten securely through mounting holes in base. Shims may be necessary depending upon roofing material thickness.

The motor amperage and voltage ratings must be checked for compatibility to supply voltage prior to final electrical connection. For G/GB installations, the electrical supply should be routed through the conduit chase located between the curb cap and the bottom of the motor compartment. Wiring must conform to local and national codes.

Storage

Fans are protected against damage during shipment. If the unit cannot be installed and operated immediately, precautions need to be taken to prevent deterioration of the unit during storage. The user assumes responsibility of the fan and accessories while in storage. The manufacturer will not be responsible for damage during storage. These suggestions are provided solely as a convenience to the user.

Indoor

The ideal environment for the storage of fans and accessories is indoors, above grade, in a low humidity atmosphere which is sealed to prevent the entry of blowing dust, rain or snow. Temperatures should be evenly maintained between 30° to 110°F (-1° to 43°C) (wide temperature swings may cause condensation and “sweating” of metal parts). All accessories must be stored indoors in a clean, dry atmosphere.

Remove any accumulations of dirt, water, ice or snow and wipe dry before moving to indoor storage. To avoid “sweating” of metal parts, allow cold parts to reach room temperature. To dry parts and packages, use a portable electric heater to get rid of any moisture buildup. Leave coverings loose to permit air circulation and to allow for periodic inspection.

The unit should be stored at least 3½ inches (89 mm) off the floor on wooden blocks covered with moisture proof paper or polyethylene sheathing. Aisles between parts and along all walls should be provided to permit air circulation and space for inspection.

Outdoor

Fans designed for outdoor applications may be stored outdoors, if absolutely necessary. Roads or aisles for portable cranes and hauling equipment are needed.

The fan should be placed on a level surface to prevent water from leaking into the fan. The fan should be elevated on an adequate number of wooden blocks so that it is above water and snow levels and has enough blocking to prevent it from settling into soft ground. Locate parts far enough apart to permit air circulation, sunlight and space for periodic inspection. To minimize water accumulation, place all fan parts on blocking supports so that rain water will run off.

Do not cover parts with plastic film or tarps as these cause condensation of moisture from the air passing through heating and cooling cycles.

Fan wheels should be blocked to prevent spinning caused by strong winds.

Inspection and Maintenance During Storage

While in storage, inspect fans once per month. Keep a record of inspection and maintenance performed.

If moisture or dirt accumulations are found on parts, the source should be located and eliminated. At each inspection, rotate the wheel by hand ten to fifteen revolutions to distribute lubricant on motor. If paint deterioration begins, consideration should be given to touch-up or repainting. Fans with special coatings may require special techniques for touch-up or repair.

Machined parts coated with rust preventive should be restored to good condition promptly if signs of rust occur. Immediately remove the original rust preventive coating with petroleum solvent and clean with lint-free cloths. Polish any remaining rust from surface with crocus cloth or fine emery paper and oil. Do not destroy the continuity of the surfaces. Thoroughly wipe clean with Tectyl[®] 506 (Ashland Inc.) or the equivalent. For hard to reach internal surfaces or for occasional use, consider using Tectyl[®] 511M Rust Preventive, WD-40[®] or the equivalent.

Removing From Storage

As fans are removed from storage to be installed in their final location, they should be protected and maintained in a similar fashion until the fan equipment goes into operation.

WARNING

Installation, troubleshooting and parts replacement is to be performed only by qualified personnel.

WARNING

Disconnect power before installing or servicing.

CAUTION

A fan manufactured with an explosion resistant motor does not certify the entire unit to be explosion proof.

Installation

Typical Roof Mounting Installation

1. On the roof surface, cut an appropriate sized hole and follow manufacturer's instructions on curb installation. Caulk and flash the curb to ensure a water tight seal.
2. If unit is equipped with a backdraft damper, it should be installed now.
3. Remove motor cover. Access to the motor compartment is accomplished by removing the screws as shown in Figure 3.
4. Only on GB Belt Drive fans. On the drive frame use the lifting lugs to lift and place the unit on top of roof curb. (Refer to Figure 2 on page 2).
5. Secure fan to curb using a minimum of eight lag screws, metal screws or the suitable fasteners. Shims may be required depending upon curb installation and roofing material.
Note: Severe duty applications may require additional fasteners.
6. Verify power line wiring is de-energized before connecting fan motor to power source.
7. Connect power supply wiring to the motor as indicated on the motor nameplate or terminal box cover. Check the power source for compatibility with the requirements of your equipment.
8. Check fan wheel for free rotation, re-center if necessary.
9. Check all fasteners for tightness.
10. Mount and wire safety disconnect switch under motor cover. Wire control switches at ground level, refer to Figure 4.
11. Replace motor cover.

Typical Wiring Diagram

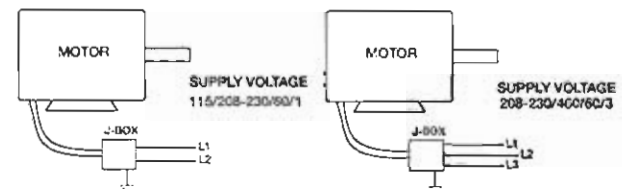


Figure 4

Vari-Green Wiring

For Vari-Green wiring refer to the Vari-Green Motor IOM PN 473681 for complete wiring and operation instructions.

G - Direct Drive

Model	Curb Cap	Damper	Roof Opening	*Approx. Weight
G 060, 065, 070, 075	17 (432)	8 (203)	10½ (267)	18 (8)
G 080, 085, 090, 095	17 (432)	10 (254)	12½ (267)	26 (12)
G 97, 98, 99	19 (483)	12 (305)	14½ (368)	57 (26)
G 103, 103 HP	19 (483)	12 (305)	14½ (368)	62 (28)
G 123	19 (483)	12 (305)	14½ (368)	65 (30)
G 133	19 (483)	12 (305)	14½ (368)	66 (30)
G 143, 143 HP	22 (559)	16 (406)	18½ (470)	76 (35)
G 163, 163 HP	22 (559)	16 (406)	18½ (470)	80 (36)
G 183, 183 HP	30 (762)	18 (457)	20½ (521)	119 (54)
G 203, 203 HP	30 (762)	18 (457)	20½ (521)	130 (59)
G 223/243, 223/243 HP	34 (864)	24 (610)	26½ (673)	150 (68)

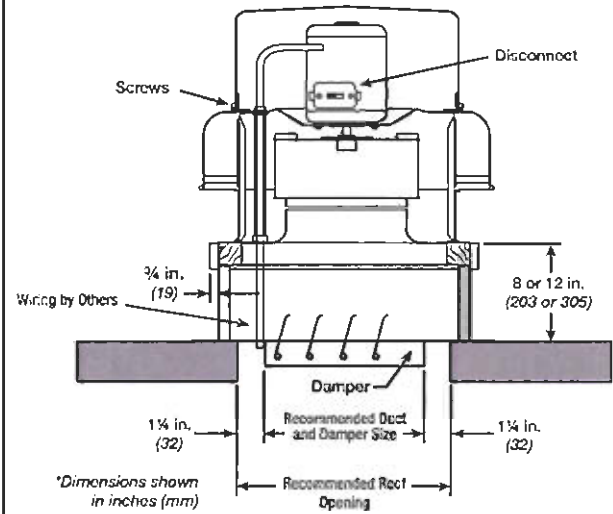
GB - Belt Drive

Model	Curb Cap	Damper	Roof Opening	*Approx. Weight
GB 071, 081, 091	19 (483)	12 (305)	14½ (368)	58 (26)
GB 101, 101HP	19 (483)	12 (305)	14½ (368)	63 (29)
GB 121	19 (483)	12 (305)	14½ (368)	66 (30)
GB 131	19 (483)	12 (305)	14½ (368)	67 (30)
GB 141, 141HP	22 (559)	16 (406)	18½ (470)	83 (38)
GB 161, 161HP	22 (559)	16 (406)	18½ (470)	89 (40)
GB 180, 180HP	30 (762)	18 (457)	20½ (521)	125 (57)
GB 200, 200HP	30 (762)	18 (457)	20½ (521)	138 (63)
GB 220, 220HP, 240, 240HP	34 (864)	24 (610)	26½ (673)	158 (72)
GB 260	40 (1016)	30 (762)	32½ (826)	305 (138)
GB 300, 300HP	40 (1016)	30 (762)	32½ (826)	320 (145)
GB 330	46 (1168)	36 (914)	38½ (978)	385 (175)
GB 360, 360HP	46 (1168)	36 (914)	38½ (978)	403 (183)
GB 420	52 (1321)	42 (1067)	44½ (1130)	495 (225)
GB 480	52 (1321)	48 (1219)	50½ (1283)	623 (283)
GB 500	64 (1626)	54 (1372)	56½ (1435)	687 (312)
GB 540	64 (1626)	54 (1372)	56½ (1435)	748 (339)

- All dimensions are in inches (millimeters). *Approximate weight shown in pounds (kilograms) is the largest cataloged Open Drip Proof motor.
- The roof curb should be 1½ in. (38 mm) less than the curb cap to allow for roofing and flashing.

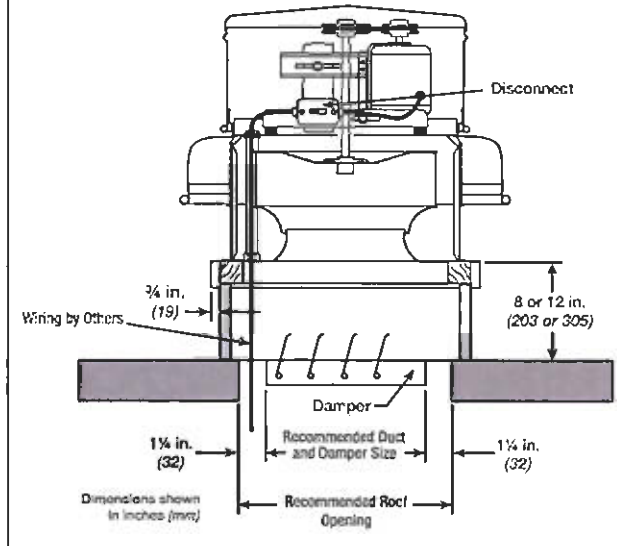
G Direct Drive

Figure 5 - Typical Roof Mounting Installation



GB Belt Drive

Figure 6 - Typical Roof Mounting Installation



Pre-Starting Checks

1. Check all fasteners and set screws for tightness. The wheel should rotate freely and be aligned as shown in Figure 7 below.
2. Wheel position is preset and the unit is test run at the factory. Movement may occur during shipment and realignment may be necessary.
3. Only G unit - Centering height alignment can be accomplished by loosening the set screws in the wheel and moving the wheel to the desired position.
4. Only GB unit - Centering can be accomplished by loosening the bolts holding the drive frame to the shock mounts and repositioning the drive frame.
5. Only GB unit - Wheel and inlet cone overlap can be adjusted by loosening the set screws in the wheel and moving the wheel to the desired position.
6. Only GB unit - Fan RPM should be checked and verified with a tachometer.
7. Check wheel rotation (viewing from the shaft side) by momentarily energizing the unit. Rotation should be clockwise as shown in Figure 8 and correspond to rotation decal on the unit. If wheel rotation is incorrect, reverse two of the wiring leads or check motor wiring for single phase.

Wheel Overlap and Gap Dimensions

Model	G - Overlap in. (mm)	H - Gap in. (mm)
G 060-095	-	1/2 (2)
G 97-163	1/4 (6)	-
GB 071-161	1/4 (6)	-
G 183-243	3/4 (10)	-
GB 180-240	3/4 (10)	-
GB 260-540	1/2 (13)	-

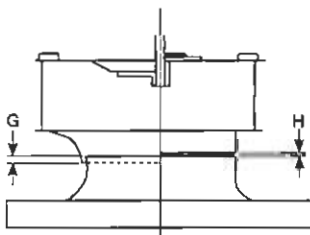


Figure 7

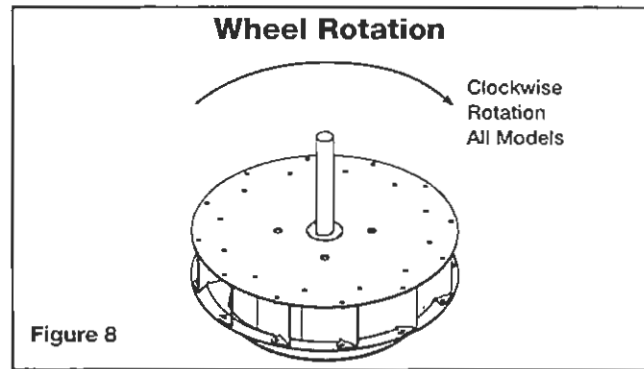


Figure 8

WARNING

Correct direction of wheel rotation is critical. Reversed rotation will result in poor air performance, motor overloading and possible burnout.

WARNING

The fan has been checked for mechanical noises at the factory prior to shipment. If mechanical noise should develop, suggested corrective actions are offered in the Troubleshooting section.

IMPORTANT

Over tightening will cause excessive bearing wear and noise. Too little tension will cause slippage at startup and uneven wear.

Model GB

Pre-Starting Belt Tension Checks

8. Always loosen tension enough to install belts without stretching, see Figure 9.

Belts



Do not force belt(s). Forcing the belt(s) will break the cords and cause belt failure

Figure 9

9. For units with two groove pulleys, adjust so the tension is equal in both belts.
10. If adjustments are made, it is very important to check the pulleys for proper alignment. Misaligned pulleys lead to excessive belt wear vibration, noise and power loss, see Figure 10.

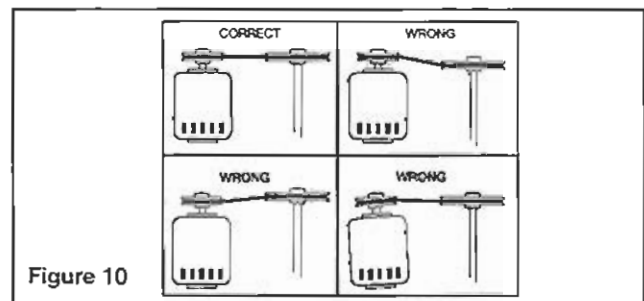


Figure 10

Fasteners

(4) *Fasteners

**Identical fasteners on opposing side must also be loosened.*

Figure 11

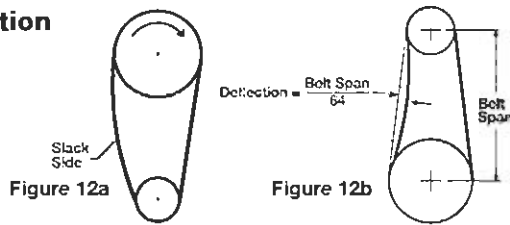


11. Belt tension can be adjusted by loosening four fasteners on the drive frame, see Figure 11. The motor plate slides on the slotted adjusting arms and drive frame angles in the same manner.

12a. Sizes 071-161: Belts should be tensioned just enough to prevent slippage at full load.

Note: Belts should have a slight bow on the slack side while running at full load (see Figure 12a).

Deflection



12b. Sizes 180-540: Belt tension should be adjusted to allow $\frac{1}{64}$ in. (0.397 mm) of deflection per inch of belt span. For example, a 15 in. (381 mm) belt span should have $\frac{15}{64}$ in. (0.234 mm) (or about $\frac{1}{4}$ in. (6 mm)) of deflection with moderate thumb pressure at mid-point between pulleys (see Figure 12b).

13. The adjustable motor pulley is factory set for the RPM specified. Speed can be increased by closing or decreased by opening the adjustable motor pulley.
14. Any increase in speed represents a substantial increase in the horsepower required by the unit.
15. Motor amperage should always be checked to avoid serious damage to the motor when speed is varied.

Operation: G / GB

1. Before starting up or operating fan, check all fasteners for tightness. In particular, check the setscrews in wheel hub.
2. While in the OFF position or before connecting the fan to power, turn the fan wheel by hand to be sure it is not striking the venturi or any obstacle.
3. Start the fan and shut it off immediately to check rotation of the wheel with directional arrow in the motor compartment.
4. When the fan is started, observe the operation and check for any unusual noises.
5. With the system in full operation and all ductwork attached, measure current input to the motor and compare with the nameplate rating to determine if the motor is operating under safe load conditions.
6. Keep inlets and approaches to fan clean and free from obstruction.

IMPORTANT

Adjust (tighten) belt tension after the first 24-48 hours of operation.

Inspection

Inspection of the fan should be conducted at the first 30 minute and 24 hour intervals of satisfactory operation.

30 Minute Interval

Inspect bolts, setscrews and motor mounting bolts. Adjust and tighten as necessary.

24 Hour Interval

Check all internal components. On GB unit only, inspect belt alignment and tension. Adjust and tighten as necessary.

Maintenance: G / GB

Installation and maintenance are to be performed only by qualified personnel who are familiar with local codes and regulations and who are experienced with this type of equipment.

Motor maintenance is generally limited to cleaning and lubrication (where applicable). Cleaning should be limited to exterior surfaces only. Removing dust buildup on motor housing ensures proper motor cooling.

WARNING

Always disconnect, lock and tag power source before servicing. Failure to disconnect power source can result in fire, shock or serious injury.

Greasing of motors is only intended when fittings are provided. Many fractional horsepower motors are permanently lubricated and should not be lubricated after installation. Motors supplied with grease fittings should be greased in accordance with manufacturers' recommendations. Where motor temperatures do not exceed 104°F (40°C), the grease should be replaced after 2,000 hours of running time as a general rule.

Wheels require very little attention when moving clean air. Occasionally, oil and dust may accumulate causing imbalance. When this occurs, the wheel and housing should be cleaned to ensure smooth and safe operation.

All fasteners should be checked for tightness each time maintenance checks are performed prior to restarting unit.

A proper maintenance program will help these units deliver years of dependable service.

CAUTION

Uneven cleaning of the wheel will produce an out of balance condition that will cause vibration in the fan.

WARNING

This unit should be made non-functional when cleaning the wheel or housing (fuses removed, disconnect locked off).

Belt/Bearing Maintenance GB Unit

- Belts tend to stretch after a period of time. They should be checked periodically for wear and tightness. When replacing belts, use the same type as supplied with the unit.
- Matched belts should always be used on units with multi-groove pulleys.
- For belt replacement, loosen the tensioning device enough to allow removal of the belt by hand.
- Once installed, adjust belts as shown in "Pre-Starting Checks."
- Shaft bearings can be classified in two groups: relubricating and non-relubricating. All non-relubricating bearings on model GB fans are factory lubricated and require no further lubrication under normal use (between -20° to 180°F (-29° to 82°C) in a relatively clean environment).
- On GB belt driven fans, the standard cast pillow block bearings are factory lubricated and are provided with external grease fittings. Annual lubrication is recommended, or more frequently if needed (See Table 2). Do not over-grease. Use only one or two shots of lubricant with a hand gun. Maximum hand gun rating is 40 psi. Rotate bearings during lubrication where good safety practice permits. Caution should be employed to prevent over packing or contamination.
- Grease fittings should be wiped clean. The unit should be in operation while lubricating. Extreme care should be used around moving parts.
- Grease should be pumped in very slowly until a slight bead forms around the seal. A high grade lithium base grease should be used. (See Table 3)
- To ensure tightness, check pulley setscrews. Proper keys must be in keyways.
- Fan RPM should not be readjusted. Only use pulleys of identical size and type when replacing pulleys.

- During the first few months of operation, check bearing setscrews periodically to ensure tightness.
- If unit is to be left idle for an extended period, remove belts and store in a cool, dry place to avoid premature belt failure.

Recommended Relubrication Frequency in Months

NOTE: If unusual environment conditions exist (extreme temperature, moisture or contaminants) more frequent lubrication is required.

A good quality lithium base grease, conforming to NLGI Grade 2 consistency, such as those listed here may be used.

Table 2: Suggested Fan Bearing Greasing Intervals

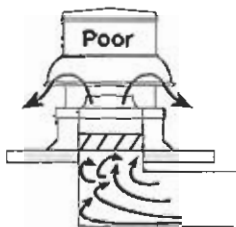
Interval (months)	Type of Service
1 to 3	Heavy duty in dirty, dusty locations; high ambient temperatures; moisture laden atmosphere; vibration.
3 to 6	12 to 24 hours per day, heavy duty, or if moisture is present
6 to 12	8 to 16 hours per day in clean, relatively dry atmosphere
12 to 18	Infrequent operation or light duty in clean atmosphere

Table 3: Grease Manufacturers

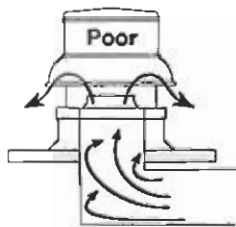
Manufacturer	Grease (NLGI #2)
U.S. Electric Motors	Grease No. 83343
Chevron U.S.A. Inc	Chevron SRI Grease #2
Mobil Oil Corporation	Mobilith
	Mobil 532
Texaco, Inc.	Premium BRB #2
	Texaco Multifak #2
Amoco Oil Co.	Rykon Premium #2
Exxon	Unirex N2
Shell	B Shell Alvania #2

Fan Inlet Connections

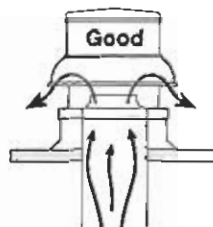
In order to assure proper fan performance, caution must be exercised in fan placement and connection to the ventilation system. Obstructions, transitions, poorly designed elbows, improperly selected dampers, etc. can cause reduced performance, excessive noise and increased mechanical stress. For performance to be as published, the system must provide uniform and stable airflow into the fan.



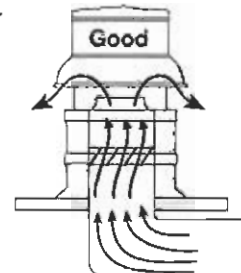
Dampers must open fully. Use motorized dampers in low airflow applications to reduce losses.



Avoid sharp turns or entrance conditions which cause uneven flow. Use turning vanes in elbows to reduce adverse effects.



Provide uniform airflow at fan inlet to assure optimum performance.



Provide uniform airflow at fan inlet and through the damper to assure optimum performance. The curb cap should be three wheel diameters from the radius. Use turning vanes in duct when possible.

Troubleshooting

WARNING: Before taking any corrective action, make certain unit is not capable of operation during repairs.

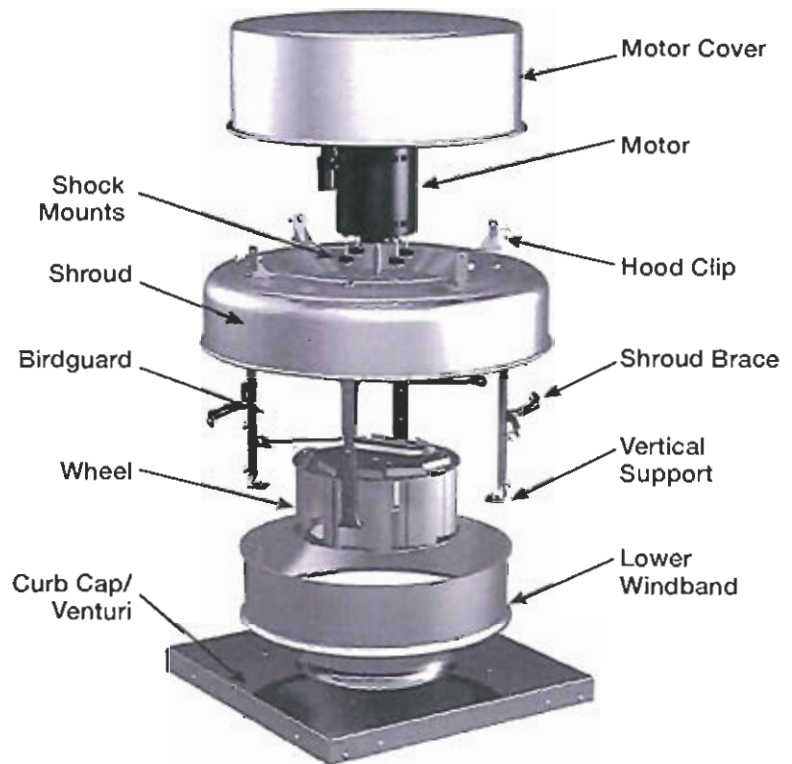
PROBLEM	CAUSE	CORRECTIVE ACTION
Excessive noise or vibration	Wheel rubbing inlet	Adjust wheel and/or inlet cone. Tighten wheel hub or bearing collars on shaft.
	V-belt drive	Tighten pulleys on motor/fan shaft. Adjust belt tension. Align pulleys properly, see page 6, Figure 9-10. Replace worn belts or pulleys.
	Bearings	Replace defective bearing(s). Lubricate bearings. Tighten collars and fasteners.
	Wheel unbalance	Clean all dirt off wheel. Check wheel balance, rebalance in place if necessary.
	Belts too tight or too loose	Adjust tension, see page 7, Figure 12a-b.
	Wheel improperly aligned and rubbing	Center wheel on inlet, see page 6, Figure 7.
	Loose drive or motor pulleys	Align and tighten. See "Pre-Starting Checks", see page 6.
	Foreign objects in wheel or housing	Remove objects, check for damage or unbalance.
	Fan base not securely anchored	Secure properly.
	Motor hood loose and rattling	Tighten screws securing motor hood.
	Defective or loose motor bearings	Replace motor with same frame size, RPM-HP.
High horsepower	Fan	Check rotation of wheel, see page 6, Figure 8. Reduce fan speed.
	Duct system	Resize ductwork. Check proper operation of face and bypass dampers. Check filters and access doors.
Fan does not operate	Electrical supply	Check fuses/circuit breakers. Check for switches off . Check for correct supply voltage.
	Drive	Check for broken belts. Tighten loose pulleys.
	Motor	Assure motor is correct horsepower and not tripping overload protector.
Motor overloads or overheats	Lubrication	Check for excessive or insufficient grease in the bearing.
	Mechanical	Replace damaged bearing. Relieve excessive belt tension. Align bearings. Check for bent shaft.
	Belt slippage	Adjust tension or replace bad belts, see page 6-7.
	Over/Under line voltage	Contact power company.
	Incorrect wheel rotation	Check motor wiring (page 4) verify motor is wired for correct rotation.
	Wheel RPM too high	Check drives or slow down fan by opening variable pitch pulley on motor shaft.
	Undersized motor	Check motor ratings with catalog speed and air capacity chart.
	Motor wired incorrectly	Check motor wiring to wiring diagram located on fan motor.
Reduced airflow	System resistance too high	Check system: Proper operation of backdraft or control dampers, obstruction in ductwork, clean dirty filters.
	Unit running backwards	Correct as shown on page 6, Figure 8.
	Excessive dirt buildup on wheels	Clean wheel.
	Improper wheel alignment	Center wheel on inlets, see Pre-Starting checks on page 6, Figure 7.
	Dampers closed	Inspect and repair.
	Blocked duct/clogged filter	Clean or replace.
	Belt slippage	Replace and adjust tension.
	Speed too slow	Check for correct drives.

Parts List

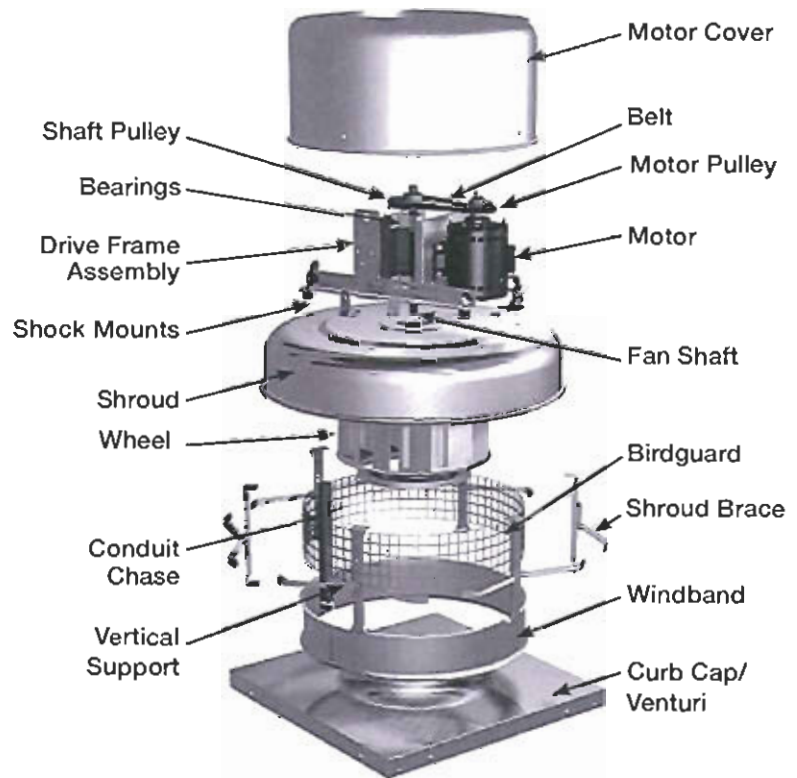
NOTE

Each fan bears a manufacturer's nameplate with model number and serial number embossed. This information will assist the local Greenheck representative and the factory in providing service and replacement parts. Before taking any corrective action, make certain unit is not capable of operation during repairs.

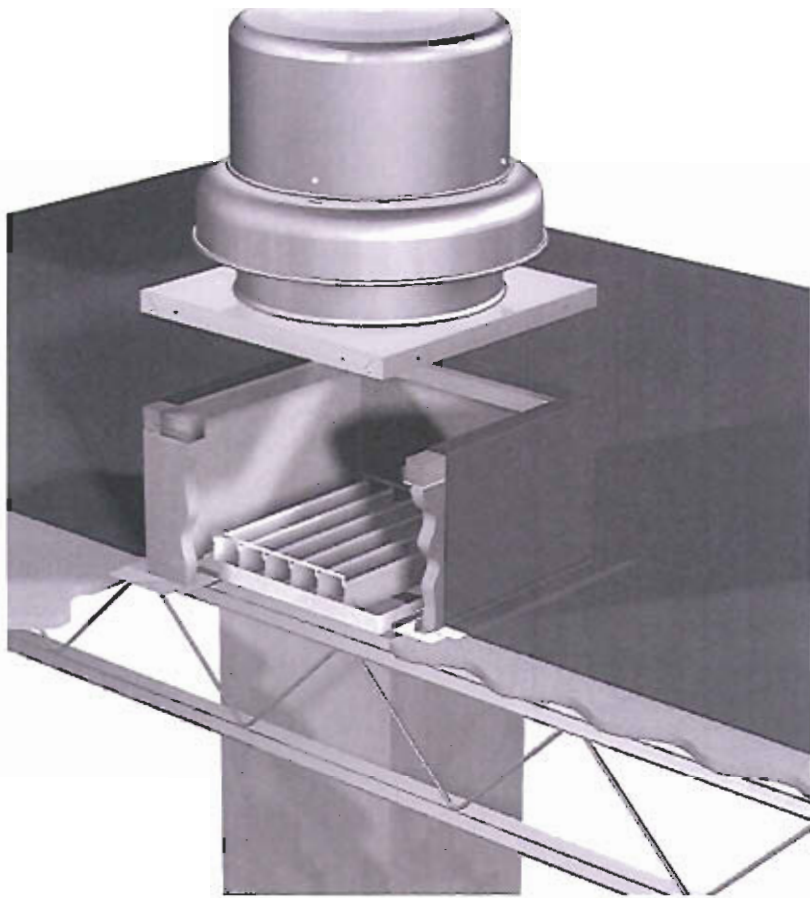
G Direct Drive Centrifugal Roof Exhaust Fan



GB Belt Drive Centrifugal Roof Exhaust Fan



Roof Curb Installation



Warranty

Greenheck warrants this equipment to be free from defects in material and workmanship for a period of one year from the shipment date. Any units or parts which prove defective during the warranty period will be replaced at our option when returned to our factory, transportation prepaid. Motors are warranted by the motor manufacturer for a period of one year. Should motors furnished by Greenheck prove defective during this period, they should be returned to the nearest authorized motor service station. Greenheck will not be responsible for any removal or installation costs.

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

Greenheck Catalog G/GB provides additional information describing the equipment, fan performance, available accessories, and specification data.

AMCA Publication 410-96, Safety Practices for Users and Installers of Industrial and Commercial Fans, provides additional safety information. This publication can be obtained from AMCA International, Inc. at: www.amca.org.

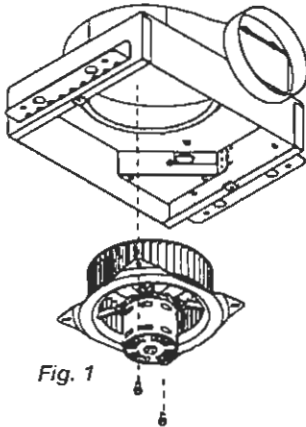


Phone: (715) 359-6171 • Fax: (715) 355-2399 • E-mail: gfcinfo@greenheck.com • Website: www.greenheck.com



Model SP-B
Model CSP-B
Ceiling Exhaust and Inline Fans

Installation, Operation and Maintenance Manual

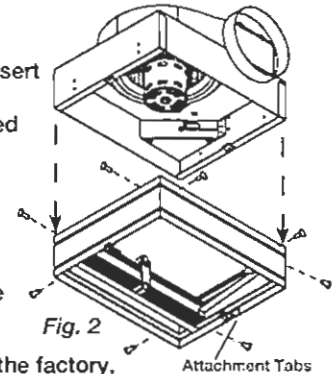


Prepare the Fan

1. If power assembly (motor and wheel) is not installed in housing, insert the electrical plug into fan socket, then slide wheel end of power assembly into fan housing and rotate clockwise until it is positioned under tabs. Align the holes and attach by using two sheet metal screws provided, shown in Fig. 1.

Ceiling Radiation Damper - CRD

1. If fan is to be used in a fire resistive membrane ceiling, a ceiling radiation damper must be used. Otherwise proceed to Install the Fan.
2. If the ceiling radiation damper is already mounted to the fan from the factory, proceed to Install the Fan.



3. To mount the ceiling radiation damper to fan, make sure grille attachment tabs are facing down. Then place the inlet part of the fan into the ceiling radiation damper collar, and use self-tapping sheet metal screws #10x1/2 in. (by others) to screw through the damper collar and into the fan housing, shown in Fig. 2. If the fan/light combination is being used, make sure ceiling radiation damper has an electrical plug in it. The electrical plug must be inserted into the fan. Make sure the electrical wire will not interfere with damper operation, shown in Fig. 3.



WARNING !

To reduce the risk of fire, electric shock, or injury to persons, observe the following:

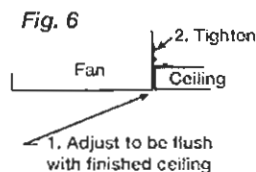
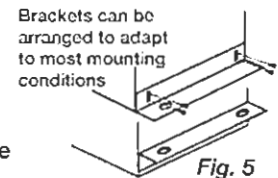
- Suitable for use with solid-state speed controls.
- Use this unit only in the manner intended by the manufacturer. If you have questions, contact the manufacturer.
- Before servicing or cleaning unit, switch power off at service panel and lock service disconnecting means to prevent power from being switched on accidentally. When the service disconnecting means cannot be locked, securely fasten a prominent warning device, such as a tag, to the service panel.
- Installation work and electrical wiring must be done by qualified person(s) in accordance with all applicable codes and standards, including fire-rated construction.
- Sufficient air is needed for proper combustion and exhausting of gases through the flue (chimney) of fuel burning equipment to prevent back drafting. Follow the heating equipment manufacturer's guideline and safety standards such as those published by the National Fire Protection Association (NFPA), and the American Society for Heating, Refrigeration and Air Conditioning Engineers (ASHRAE) and the local code authorities.
- When cutting or drilling into wall or ceiling, do not damage electrical wiring or other hidden utilities.
- Acceptable for use over a bathtub or shower when installed in a GFCI protected branch circuit. (Up through size SP-A390)
- Never place a switch where it can be reached from a tub or shower.
- Ducted fans must always be vented to the outdoors.
- These fans are not recommended for cooking exhaust applications. They are designed primarily for low temperature, clean air applications only. The diagram shows the minimum distance these fans should be placed in relation to cooking equipment.
- Fan/Light combination not to be installed in a ceiling thermally insulated to a value greater than R40.

CAUTION !

- For general ventilating use only. Do not use to exhaust hazardous or explosive materials and vapors.

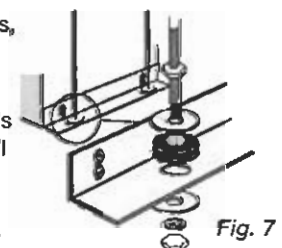
Install the Fan

1. For best performance, choose a location with the shortest possible duct run and minimum number of elbows. Do not mount near cooking equipment, shown in Fig. 4.
2. Attach adjustable mounting brackets to fan, but leave the screws loose until proper height is determined, shown in Fig. 5. For fan and fan/light combination opening, cut a 14 1/4 by 11 1/4 inch hole in the ceiling. For fan/CRD combination opening, cut a 14 1/4 by 12 1/4 inch hole in the ceiling.



For Frame Construction: Position unit between joists. Position brackets such that bottom edge of housing will be flush with finished ceiling, and tighten the adjustable mounting brackets, shown in Fig. 6.

For Hanging Installations: Use Greenheck's optional vibration isolator kit Part Number VI Kit. Using the fan's standard adjustable mounting brackets and 10 by 32 threaded rod (by others) hang unit as shown in Fig. 7.



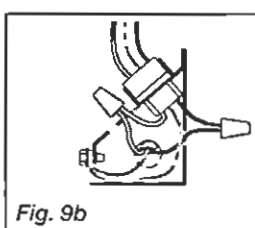
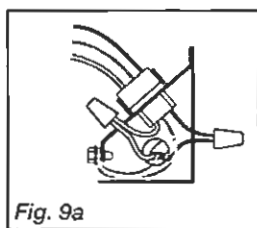
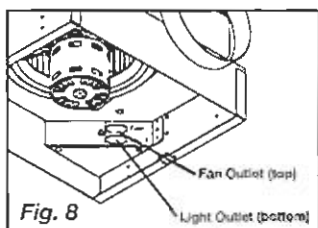
Installation Recommendations

Install the Fan - continued

- Slide ductwork over the fan's discharge collar and securely attach it with sheet metal screws. *Make sure the screws do not interfere with damper operation. Check damper to make sure it opens freely.*

Wire the Fan

- Remove wiring cover. If fan/light combination is being used, make sure the fan plug is connected to the fan receptacle and the light plug is connected to the light receptacle, shown in Fig. 8. Using proper wire connectors, wire the fan as shown in Fig. 9a. For wiring of light proceed to Fig. 9b.



115 & 277 Volt
Black wire is "Hot"
White wire is "Neutral"
Green wire is "Ground"

220 - 240 Volt
Black wire is "Hot"
White wire is "Hot"
Green wire is "Neutral/Ground"

- Push all wiring into the unit's cover and replace wiring cover.

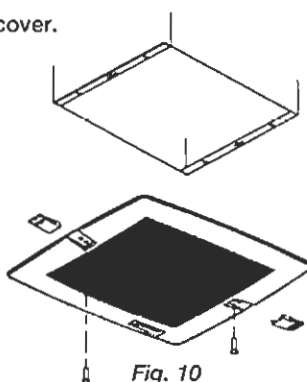
Attach the Grille

- If lighted grille is being used, plug wire into fan socket.

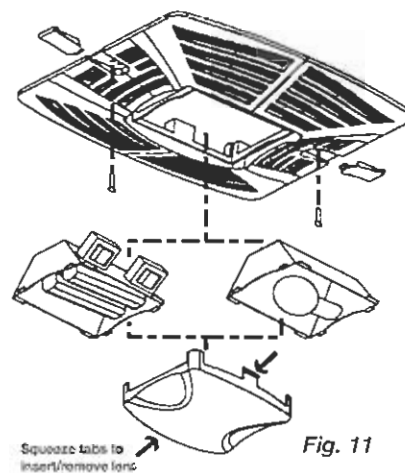
If lighted grille and ceiling radiation damper are being used, plug wire from lighted grille into ceiling radiation damper socket. Do not plug wire directly into the fan socket. Make sure the wire does not interfere with the ceiling radiation damper operation.

- Attach grille with two screws provided. Make sure not to over tighten, over tightening will damage grille.

- Slide attachment screw covers over the attachment screws, shown in Fig. 10.



- If lighted grille is being used, install light bulb(s) into light socket(s). For incandescent lights, use maximum 100 watt bulb (by others). For fluorescent lights, use only Greenheck's Part Number 382854, provided, 13 watt flicker resistant light bulbs. For replacement bulbs please contact Greenheck at phone number 1-800-355-5354.



- If lighted grille is being used, snap lens into place, by pushing on the outside edges of lens, shown in Fig. 11. To remove lens, use small screw driver and pry on one side of lens.

- Turn on power and check fan and light operation.

General Maintenance Suggestions

Model SP/CSP ceiling exhaust fans require very little maintenance. But since small problems over time left unchecked could lead to loss of performance or early motor failure, we do recommend that the unit be inspected periodically (once or twice a year).

The fan motor and wheel should be checked for dust and dirt accumulations. Dirt buildup can lead to loss of performance and motor overheating. Cleaning can be accomplished by brushing off any dust that may have accumulated. Even filtered units can accumulate build-up and should be checked when cleaning filters.

The motor should be checked for lubrication at this time. Lubricate only those motors which have an oil hole provided. A few drops of all purpose oil (SAE 20) will be sufficient.

Warranty

Greenheck warrants this equipment to be free from defects in material and workmanship for a period of three years from the purchase date. Any units or parts which prove to be defective during the warranty period will be replaced at our option when returned to our factory, transportation prepaid.

Greenheck will not be responsible for any installation or removal costs.

Installation, Operation and Maintenance Manual

Please read and save these instructions for future reference. Read carefully before attempting to assemble, install, operate or maintain the product described. Protect yourself and others by observing all safety information. Failure to comply with instructions could result in personal injury and/or property damage!

Model SP

Model SP is a direct drive ceiling exhaust fan designed for clean air applications where low sound levels are required. Many options and accessories are available such as lights, motion detectors, ceiling radiation dampers and speed controls. Capacities range from 25 to 1,600 cfm (42 to 2,718 m³/hr) and 1 in. wg (248 Pa). AMCA Licensed for Sound and Air Performance.



ENERGY STAR[®] Certified models include:
SP-A, 50, 70, 90, 200, 250, 290 and 410;
SP-B, 50, 70, 80 and 90.



Model CSP

Model CSP is a direct drive inline exhaust fan designed for clean air applications where low sound levels are required. Capacities range from 70 to 3,800 cfm (119 to 6,456 m³/hr) and 1 in. wg (248 Pa). AMCA Licensed for Air Performance.

WARNING!

To reduce the risk of fire, electric shock, or injury to persons, observe the following:

- Suitable for use with solid state speed controls.
- Use this unit only in the manner intended by the manufacturer. If you have questions, contact the manufacturer.
- Before servicing or cleaning unit, switch power off at service panel and lock service disconnecting means to prevent power from being switched on accidentally. When the service disconnecting means cannot be locked, securely fasten a prominent warning device, such as a tag, to the service panel.
- Installation work and electrical wiring must be done by qualified person(s) in accordance with all applicable codes and standards, including fire-rated construction.
- Sufficient air is needed for proper combustion and exhausting of gases through the flue (chimney) of fuel burning equipment to prevent back drafting. Follow the heating equipment manufacturer's guideline and safety standards such as those published by the National Fire Protection Association (NFPA), and the American Society for Heating, Refrigeration and Air Conditioning Engineers (ASHRAE) and the local code authorities.
- When cutting or drilling into wall or ceiling, do not damage electrical wiring or other hidden utilities.
- Acceptable for use over a bathtub or shower when installed in a GFCI protected branch circuit. (Up through size SP-A390)
- Never place a switch where it can be reached from a tub or shower.
- Ducted fans must always be vented to the outdoors.
- These fans are not recommended for cooking exhaust applications. They are designed primarily for low temperature, clean air applications only. The diagram shows the minimum distance these fans should be placed in relation to cooking equipment.
- Fan/Light combination not to be installed in a ceiling thermally insulated to a value greater than R40.

CAUTION!

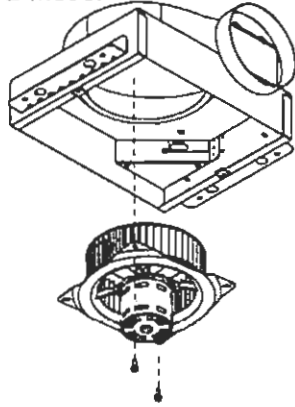
- For general ventilating use only. Do not use to exhaust hazardous or explosive materials and vapors.

Prepare the fan

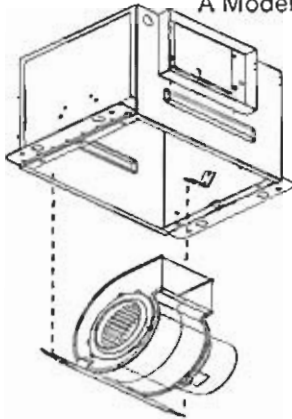
Power Assembly

If power assembly (motor, wheel, and scroll) is not installed in housing, insert the electrical plug into fan socket, then slide scroll end of power assembly into fan housing. Attach by using two sheet metal screws provided.

B Model

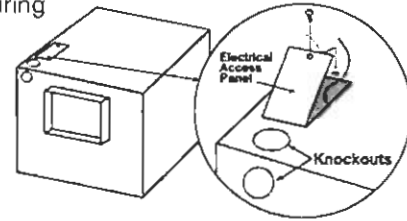


A Model



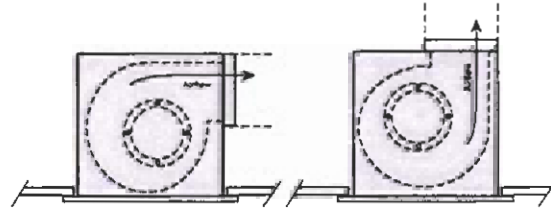
Remove Wiring Knockout

Remove either top or side wiring knockout, depending on wiring direction, by bending it back and forth to break tabs.



Ductwork

Check ductwork to see if the fan's discharge requires rotation from horizontal to vertical discharge.

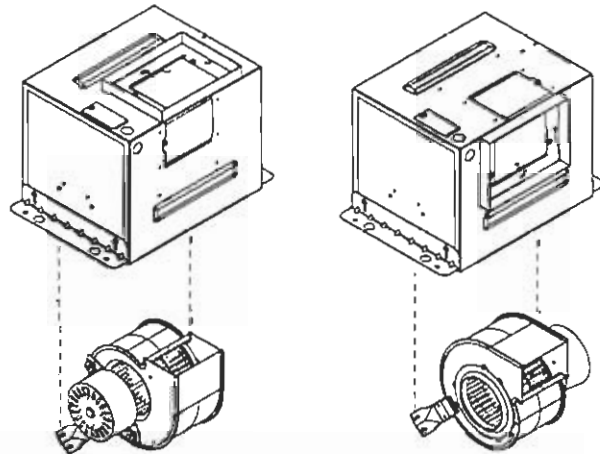


Fan Rotation

To rotate from horizontal to vertical discharge
A-Models Only

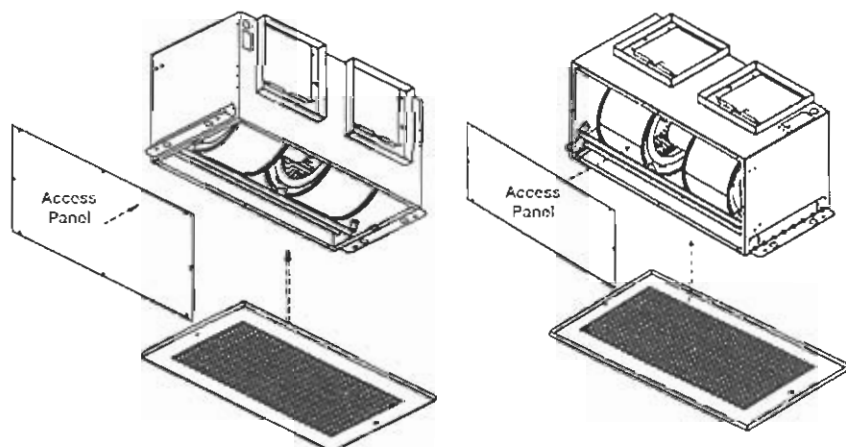
A-50-500, 710, 780 Models

Remove the two screws holding the power assembly in and pull power assembly out. Rotate power assembly 180 degrees and put back into fan. Use the same screws to reattach power assembly to fan housing. Flip fan over and remove the four screws holding the discharge duct and damper assembly. Exchange the assembly with plate mounted on top of fan, as shown in these illustrations.



A-700, 900-1500 Models

Remove the eight screws holding the access panel or collar as shown in picture. Rotate the fan housing so the discharge is facing up. Replace access panel or collar and screws.



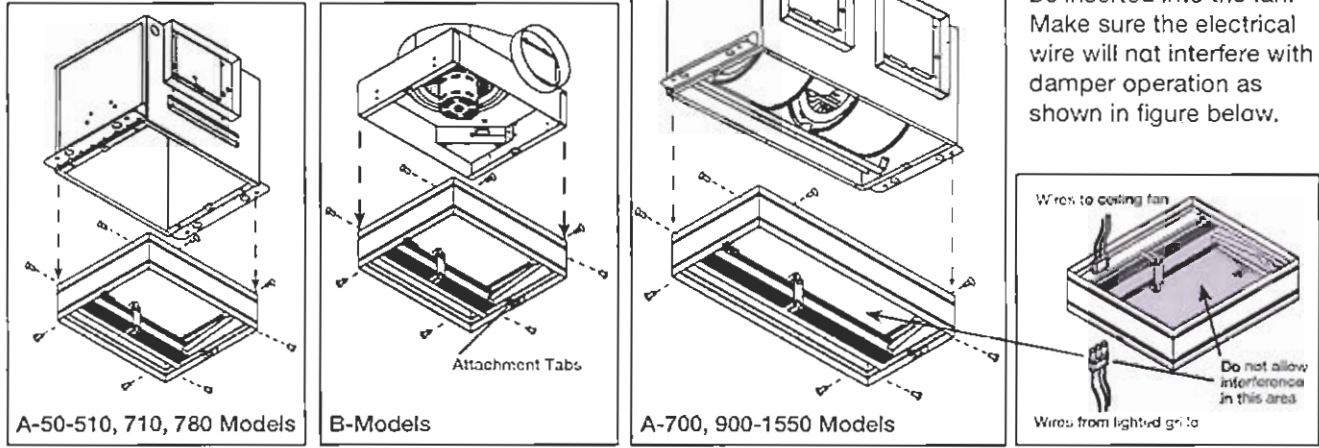
Ceiling Radiation Damper (CRD)

If fan is to be used in a fire resistive membrane ceiling, a ceiling radiation damper must be used.

If the ceiling radiation damper is already mounted to the fan from the factory, proceed to Install the Fan.

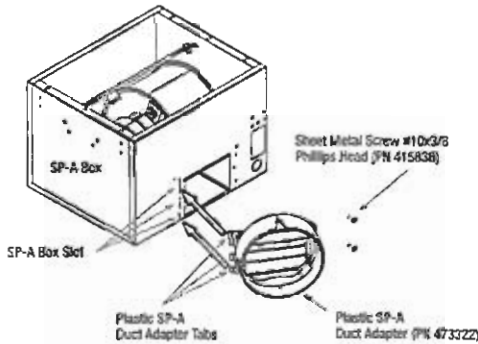
To mount the ceiling radiation damper to fan, make sure grille attachment tabs are facing down. Then place the inlet part of the fan into the ceiling radiation damper collar, and use self-tapping sheet metal screws (by others) to screw through the damper collar and into the fan housing. If the fan/light combination is being used, make sure ceiling

radiation damper has an electrical plug in it. The electrical plug must be inserted into the fan. Make sure the electrical wire will not interfere with damper operation as shown in figure below.

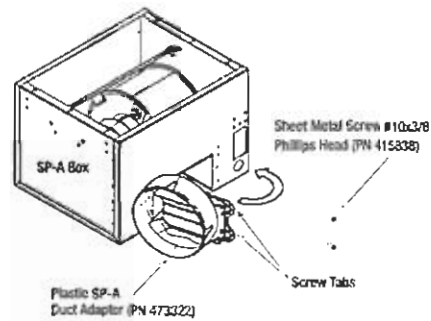


Discharge Installation SP-A 50-90 Models

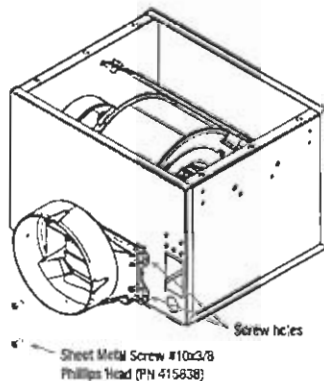
1 Insert plastic duct tab into SP-A box slots.



2 Rotate plastic SP-A duct adapter (PN 473322) until the screw tabs meet SP-A box.

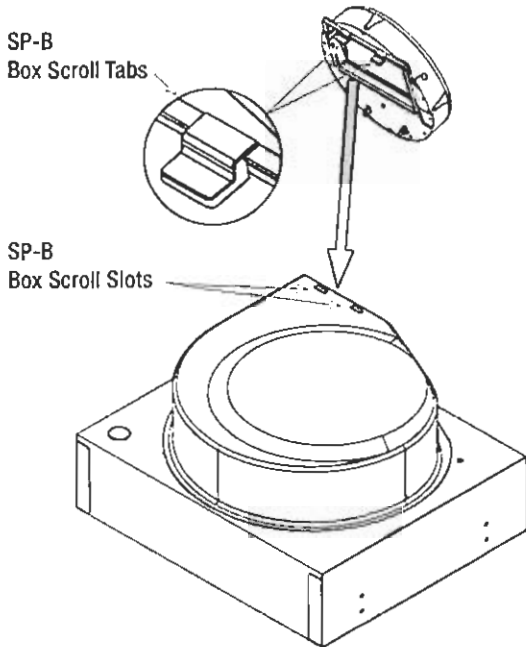


3 Install screws provided to secure discharge.

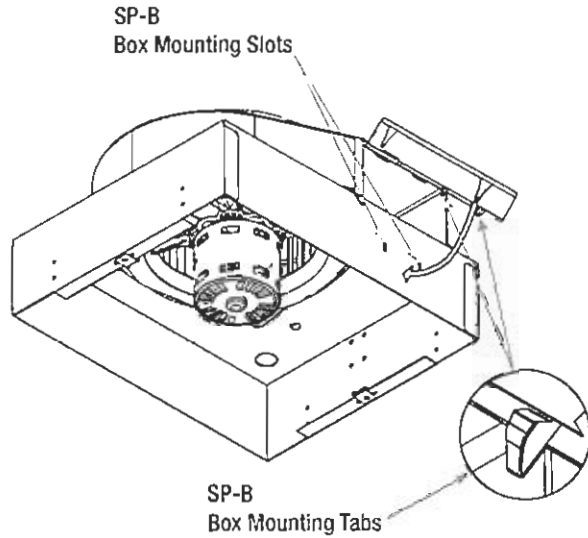


Discharge Installation SP/CSP-B 50-200 Models

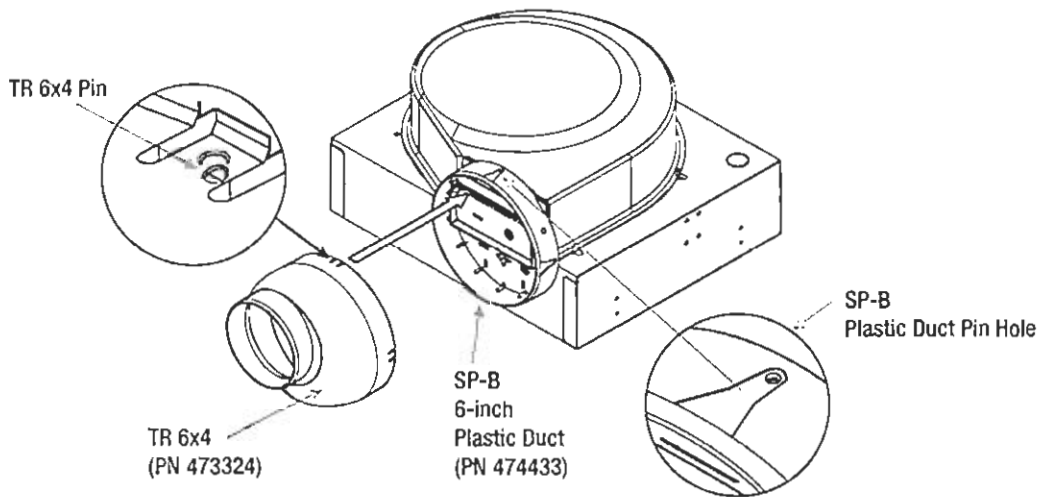
1 Insert SP-B box scroll tab into SP-B box scroll slots.



2 Rotate plastic SP-B duct adapter (PN 474433) until the two SP-B mounting tabs fully engage into the two SP-B box mounting slots.

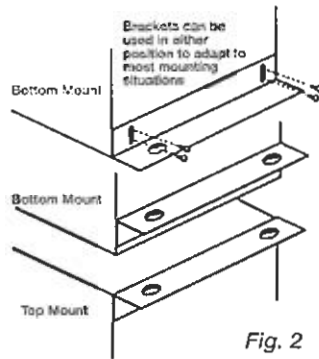
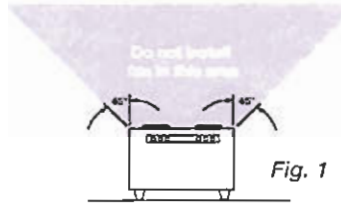


3 **OPTIONAL**
Align the pins on the TR 6x4 adaptor to the duct pin hole on the SP-B 6-inch duct. Push until the adaptor snaps into place.



Install the Fan

- For best performance, choose a location with the shortest possible duct run and minimum number of elbows. Do not mount near cooking equipment, as shown in Fig. 1.
- Attach adjustable mounting brackets to fan, but leave the screws loose until proper height is determined, shown in Fig. 2. Cut hole to dimensions shown in table below:



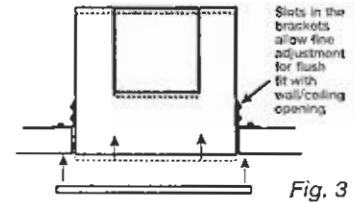
Ceiling Openings		
Sizes	Fan or Fan/Light	Fan/CRD
SP-A50, A70, A90 SP-A110, A125, A190	10 $\frac{3}{8}$ x 13 $\frac{3}{8}$	11 $\frac{1}{8}$ x 13 $\frac{7}{16}$
SP-A200, A250, A290, A390	12 $\frac{1}{4}$ x 14 $\frac{1}{4}$	12 $\frac{1}{4}$ x 14 $\frac{3}{8}$
SP-A700	23 $\frac{3}{4}$ x 11 $\frac{3}{4}$	24 $\frac{1}{8}$ x 12 $\frac{1}{4}$
SP-A410, A510, A710, A780	14 $\frac{3}{4}$ x 18 $\frac{3}{8}$	14 $\frac{7}{8}$ x 18 $\frac{1}{16}$
SP-A900, A1050, A1410, A1550	14 $\frac{3}{4}$ x 24	14 $\frac{7}{8}$ x 24 $\frac{1}{8}$
SP-B 50 - 200	14 $\frac{1}{8}$ x 11 $\frac{3}{4}$	14 $\frac{3}{8}$ x 12 $\frac{1}{4}$

NOTE

Model SP-A 50-90 are standard with a round duct. Should Model SP-A 110-190 require a round duct, Model RDC (Round Duct Connector) may be ordered from Greenheck for field installation.

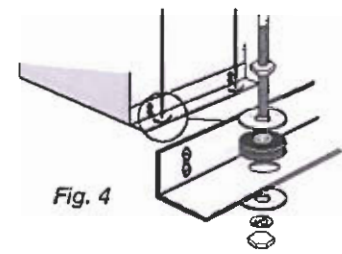
For Frame Construction:

Position unit between joists. Position brackets such that bottom edge of housing will be flush with finished ceiling, and tighten the adjustable mounting brackets, shown in Fig. 3.



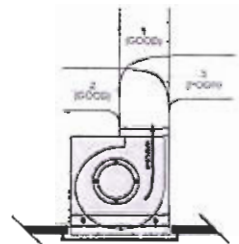
For Hanging Installations:

Use Greenheck's optional vibration isolator kit Part Number VI Kit. Using the fan's standard adjustable mounting brackets and 10 by 32 threaded rod (by others), hang unit as shown in Fig. 4.



- Installation of ductwork is critical to the performance of the fan, shown in Fig. 5. Straight ductwork (1) or ductwork that turns in the same direction as the wheel (2) is recommended. Ductwork turning opposite the wheel direction (3) will cause turbulence and back pressure resulting in poor performance.

Fig. 5

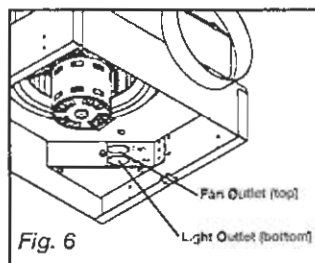


- Slide ductwork over the fan's discharge collar and securely attach it with sheet metal screws.

Make sure the screws do not interfere with damper operation. Check damper to make sure it opens freely.

Wire the Fan

- Remove wiring cover. If fan/light combination is being used, make sure the fan plug is connected to the fan receptacle and the light plug is connected to the light receptacle, shown in Fig. 6.



Using proper wire connectors, wire the fan as shown in Fig. 7a. For wiring of light proceed to Fig. 7b.

- Push all wiring into the unit's cover and replace wiring cover.

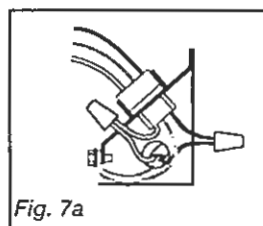


Fig. 7a

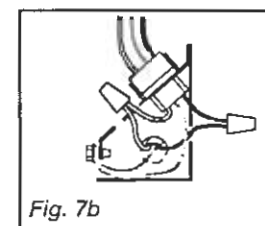


Fig. 7b

115 & 277 Volt
Black wire is "Hot"
White wire is "Neutral"
Green wire is "Ground"

220 - 240 Volt
Black wire is "Hot"
White wire is "Hot"
Green wire is "Neutral/Ground"

Attach the Grille

1. If lighted grille is being used, plug wire into fan socket.
If lighted grille and ceiling radiation damper are being used, plug wire from lighted grille into ceiling radiation damper socket. Do not plug wire directly into the fan socket. Make sure the wire does not interfere with the ceiling radiation damper operation.
2. Attach grille with two screws provided. Make sure not to over tighten; over tightening will damage grille.
3. Slide attachment screw covers over the attachment screws, shown in Figure 8 and 9.
4. If lighted grille is being used, install light bulb(s) into light socket(s). For incandescent lights, use maximum 100 watt bulb (by others). For fluorescent lights, use 27W GU24 bulbs. Greenheck has replacement 27W GU24 bulbs call 1-800-355-5354 to order.
5. If lighted grille is being used, snap lens into place, by pushing on the outside edges of lens, shown in Fig. 9. To remove lens, use small screw driver and pry on one side of lens.
6. Turn on power and check fan and light operation.

Fig. 8

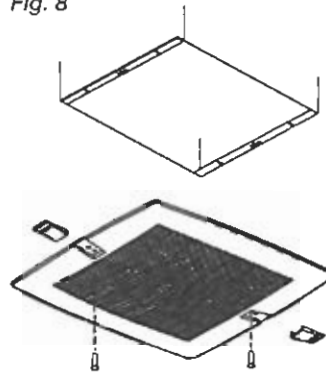
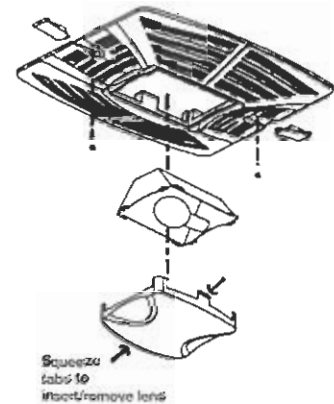


Fig. 9



Converting from ceiling to cabinet design for Model SP fans

All SP convertible sizes will be shipped with grille and duct collar cover.

Conversion Kit Parts List

- Qty. of 1 Blower Box Cover

Tools Required

- Phillips Head Screwdriver

- Step 1: Remove grille (A) by removing the two grille screws (B).
- Step 2: Remove duct collar cover (C) by removing the four duct collar screws (D).
- Step 3: Discard grille (A), two grille screws (B), and duct collar cover (C).
- Step 4: Remove the six (6) tinnerman clips (E) by twisting them to one side and pulling straight out. Discard two of the six tinnerman clips.
- Step 5: Insert the remaining four tinnerman clips (E) on grille opening side.
- Step 6: Place blower box cover (F) over tinnerman clips (E), which were inserted in step 5.
- Step 7: Screw the blower box cover (F) into place with four blower box cover screws (D).



SP, CSP models shown are
UL and cUL listed E 83599

Other Installation Considerations

Ductwork and Noise

Fiberglass ductboard is a better choice than metal ductwork for reducing fan noise and is highly recommended for low sound applications. Where metal duct is used, sound transmission can be reduced with flexible duct connections between the fan and the duct.

Sound and Location

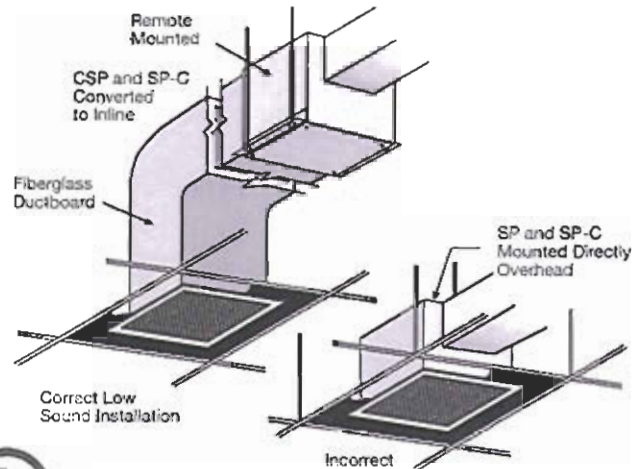
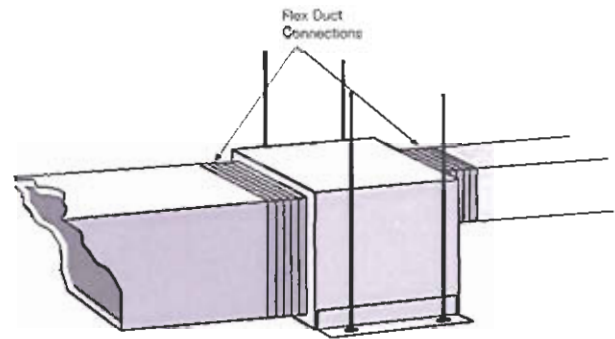
The location of these fans must be taken into consideration before installation. In critical sound installations, insulated ductwork, flexible duct connections or placing the fan in a remote section of ductwork are solutions to meeting the required fan sound levels.

Filters

The addition of an intake filter is highly recommended for these fans, even in clean air environments excess dirt can accumulate on wheels and motors causing reduced performance and imbalance.

Filters, once installed, should be checked and cleaned periodically to maintain performance.

Greenheck offers washable aluminum mesh filters specifically designed for these fans. Please consult our SP/CSP catalog for more information.



SP/CSP models shown are UL and cUL listed E 33530

General Maintenance Suggestions

Model SP/CSP ceiling exhaust fans require very little maintenance. But since small problems over time left unchecked could lead to loss of performance or early motor failure, we do recommend that the unit be inspected periodically (once or twice a year).

The fan motor and wheel should be checked for dust and dirt accumulations. Dirt buildup can lead to loss of performance and motor overheating. Cleaning can be accomplished by brushing off any dust that may have accumulated. Even filtered units can accumulate build-up and should be checked when cleaning filters.

The motor should be checked for lubrication at this time. Lubricate only those motors which have an oil hole provided. A few drops of all purpose oil (SAE 20) will be sufficient.

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 within the product area tabs and in the Library under Warranties.

Greenheck SP and CSP catalog provides additional information describing the equipment, fan performance, available accessories, and specification data.

AMCA Publication 410-96, Safety Practices for Users and Installers of Industrial and Commercial Fans, provides additional safety information. This publication can be obtained from AMCA International, Inc. at www.amca.org.



Phone: (715) 359-6171 • Fax: (715) 355-2399 • E-mail: gfcinfo@greenheck.com • Website: www.greenheck.com

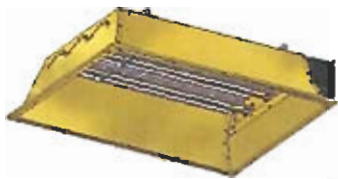
HEATERS

MARKEL

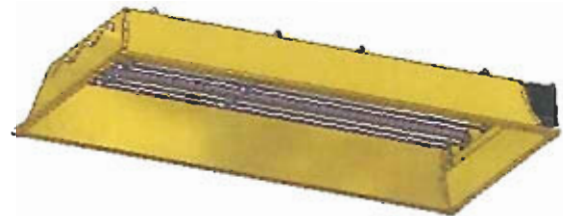


CH-Series

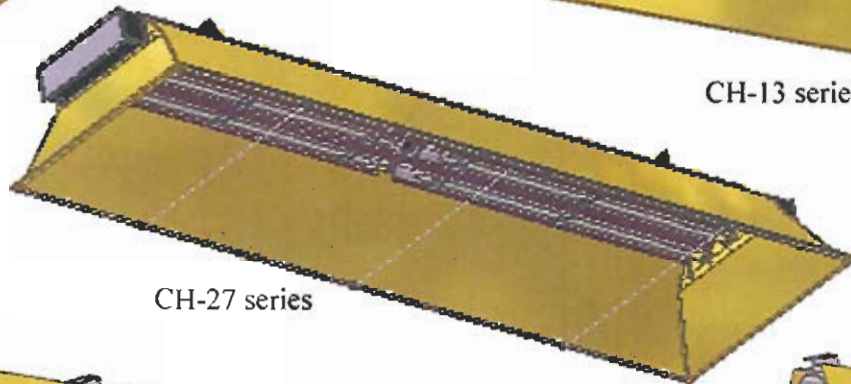
Heavy-duty Metal Sheath Element Electric Overhead Infrared Heaters



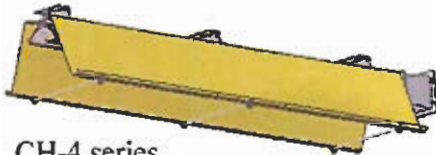
CH-6 series



CH-13 series



CH-27 series



CH-4 series



CH-2 series

WARNING

IMPORTANT SAFETY INFORMATION INSIDE

- **Serious injury or death possible**
- **Read, understand, and follow all safety information and instructions in this manual before using or servicing this product.**
- **Retain these instructions for future reference.**



WARNING

EXTREMELY HIGH TEMPERATURES ARE PRESENT, DURING OPERATION. MAINTAIN CLEARANCES FROM COMBUSTIBLES AS STATED IN MANUAL. SHOULD AN ARC FAILURE OCCUR MOLTEN METAL MAY FALL FROM THE HEATER. TO HELP PREVENT FIRE OR PERSONAL INJURY, GROUND FAULT PROTECTION MUST BE USED ON ALL METAL SHEATH HEATERS.

REFER TO COMPLETE INDEX OF INFORMATION ON
PAGE 2

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ATTENTION:

The table to the right provides definitions of the signal words that can be found throughout this manual. These signal words are used to express the severity of the hazard at hand. The signal words are generally used in conjunction with safety symbols that correspond to the text for that particular hazard. As you read this manual, refer back to this table when you are unsure of the signal word definition.

SIGNAL WORD DEFINITIONS

DANGER	DANGER indicates an imminently hazardous situation which, if not avoided, <u>will</u> result in death or serious injury.
WARNING	WARNING indicates a potentially hazardous situation which, if not avoided, <u>could</u> result in death or serious injury.
CAUTION	CAUTION indicates a potentially hazardous situation which, if not avoided, <u>may</u> result in minor or moderate injury.
CAUTION	CAUTION used without the safety alert symbol indicates a potentially hazardous situation which, if not avoided, <u>may</u> result in property damage.
<small>As defined in ANSI Z535.4-2002</small>	
SIGNAL WORD DEFINITIONS	
DANGER	DANGER indicates an imminently hazardous situation which, if not avoided, <u>will</u> result in death or serious injury.
WARNING	WARNING indicates a potentially hazardous situation which, if not avoided, <u>could</u> result

THANK YOU!!

Thank you very much for selecting Fostoria's overhead electric infrared heating equipment for your comfort heating needs. These products were engineered with the most reliable components and materials available and are equipped with features to assure ease of installation and maintenance.

The warmth you will now enjoy when using this heating equipment is created by a heat source; a metal-sheathed element; that emits infrared energy in the form of heat, like the sun. This is an economical way to heat because it heats people and objects, not the air, so you don't need to heat a large area to feel warm.

CHECKING YOUR SHIPMENT

- ❑ Upon receipt of your shipment, check all cartons for visible damage.
- ❑ Claims for damaged material or shortages that were not evident upon receipt of shipment must be reported to carrier and TPI Corporation's customer service (800-251-0382) immediately.
- ❑ Any accessory items ordered for the heater will be shipped in separate cartons.

GENERAL DESCRIPTION & USE

⚠ WARNING	
	EXPLOSION HAZARD FIRE HAZARD BURN HAZARD
	<ul style="list-style-type: none">• Serious injury or death may occur.
	<ul style="list-style-type: none">• Not for indoor residential use.
	<ul style="list-style-type: none">• Do not use outdoors.
	<ul style="list-style-type: none">• Use for comfort heating only.
	<ul style="list-style-type: none">• Do not use in locations containing hazardous or explosive atmospheres.
	<ul style="list-style-type: none">• Comply with "REQUIRED CLEARANCES" at right for minimum mounting distances to combustible materials.

The Fostoria CH-Series heaters provides safe, efficient electric infrared heat for total area heating or spot heating applications for warehouses, steel mills, machine shops and many other industrial applications. They are ideal for use in high vibration environments. Using the "L" brackets on the top of the housing, these overhead heaters can be hung by chain or rigidly mounted. They operate cleanly, emitting no fumes or odors.

Applications where combustible materials and/or personnel will be located near these heaters require the addition of a ground-fault sensing switch as part of the electrical circuit. See the INSTALLATION PLANNING section of this manual for more details. Any installation of these heaters must also adhere to the minimum clearance information below.

REQUIRED CLEARANCES

DO NOT install closer than 36 inches to a vertical surface or 24 inches to a ceiling. Heaters **MUST BE SEPARATED** by more than 36 inches and 72 inches from any combustible surface in direct radiation path (87 inches for CH-27 Series).

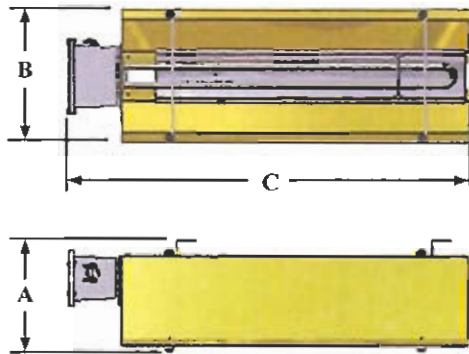
SPECIFICATIONS

- ❑ ETL listed for suspended, high-bay, indoor applications (see table below)
- ❑ High-watt-density radiant heat with 60° heat pattern utilizing bright aluminum reflectors
- ❑ Features aluminum extrusion and element support clip for high-vibration areas and rugged environments
- ❑ U-shaped metal-sheath elements are factory-installed
- ❑ Gold-anodized aluminum housing for good reflectivity and corrosion resistance
- ❑ “L”-brackets included for chain suspension or rigid-mounting
- ❑ Designed for direct-wire, single or three-phase configurations (see table below)

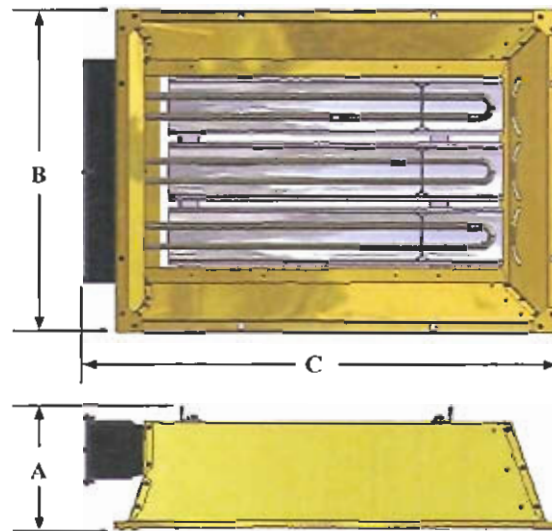
Heater Models	Voltage And Phase	Amps 1ph.	Amps 3ph.	Number Of Elements	Watts	Btu's/Hr.	ETL listed	cETLus certified
CH-212-1C	120; 1ph	15.0	n/a	1	1800	6,142	No	No
CH -220-1C	208; 1ph	9.7	n/a		Yes		Yes	
CH -224-1C	240; 1ph	8.4	n/a		Yes		Yes	
CH -227-1C	277; 1ph	7.3	n/a		Yes		Yes	
CH -248-1C	480; 1ph	4.2	n/a		Yes		Yes	
CH -257-1C	600; 1ph	3.5	n/a		Yes		Yes	
CH -420-1C	208; 1ph	21.7	n/a	1	4500	15,355	Yes	Yes
CH -424-1C	240; 1ph	18.8	n/a				Yes	Yes
CH -427-1C	277; 1ph	16.3	n/a				Yes	Yes
CH -448-1C	480; 1ph	9.4	n/a				Yes	Yes
CH -457-1C	600; 1ph	7.8	n/a				Yes	Yes
CH -620-3C	208; 1 or 3ph	28.9	16.6				3	6000
CH -624-3C	240; 1 or 3ph	25.0	14.4	Yes	Yes			
CH -627-3C	277; 1ph	21.7	n/a	Yes	Yes			
CH -648-3C	480; 1 or 3ph	12.5	7.2	Yes	Yes			
CH -657-3C	600; 1 or 3ph	10.4	6.1	Yes	Yes			
CH -1320-3B	208; 3ph	n/a	37.4	3	13,500	46,064		
CH -1324-3B	240; 3ph	n/a	32.4				Yes	Yes
CH -1327-3B	277; 1ph	48.8	n/a				Yes	Yes
CH -1348-3B	480; 3ph	n/a	16.2				Yes	Yes
CH -1357-3B	600; 3ph	n/a	13.6				Yes	Yes
CH-2720-3C	208; 3ph	n/a	74.8				6	27,000*
CH-2724-3C	240; 3ph	n/a	64.8	Yes	No			
CH-2748-3C	480; 3ph	n/a	32.4	Yes	No			
CH-2757-3C	600; 3ph	n/a	27.0	Yes	No			

*NOTE: CH-27 series includes (2) element terminal box assemblies; one at each end that are to be wired separately.

SPECIFICATIONS (cont.)



CII-2 & 4 series



CH-6, 13 & 27 series

Model Series	Dimension A (inches)	Dimension B (inches)	Dimension C (inches)	Weight (lbs.)
CH-2xx	7-1/2	9	28	9.0
CH-4xx	7-1/2	9	48-1/4	15.0
CH-6xx	7-1/2	19-3/4	30-5/8	27.0
CH-13xx	7-1/2	20	50-1/2	43.0
CH-27xx	14-7/8	27-3/4	96-3/4	288.0 (crated)

INSTALLATION PLANNING

Fostoria's metal-sheath infrared heaters are equipped with heating elements that are manufactured using materials with exceptional mechanical and thermal performance and are built with precise process control to provide rugged and reliable infrared performance in challenging environments. It is our understanding that these precision characteristics can change with time, specifically in environments with high humidity or where mechanical damage can occur, causing the internal electrical insulation to weaken. Use of Fostoria's GF-SK-1 ground fault sensing switch will monitor this gradual change and interrupt power to the heaters prior to any arc-fault type failures, thereby protecting against a possible fire or burn hazard.

WARNING: Any installation where this is a concern must be protected by using the GF-SK-1 switch.

⚠ **WARNING**

FIRE HAZARD
BURN HAZARD

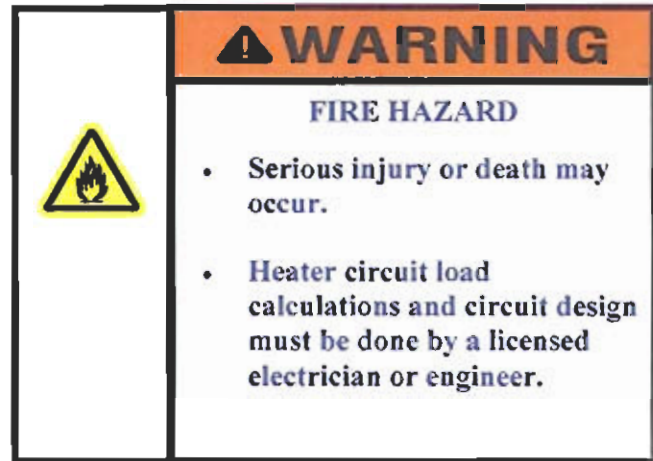
- To prevent arcing type faults, premature element failure and potential fire or burn hazard, use Fostoria model GF-SK-1 ground fault switch with these heaters.
- Read and follow all instructions provided for proper installation of heaters and GF-SK-1.

INSTALLATION PLANNING (cont.)

Options for using the GF-SK-1 with Fostoria CH-Series heaters:

Mounting Option	Heater Compatibility
Mounting GF-SK-1 directly onto heater	CH-6xx, CH-13xx (cannot be mounted to CH-2xx and CH-4xx)
Wall-mounting the GF-SK-1 (see explanation below)	CH-2xx, CH-4xx, CH-6xx, CH-13xx

The GF-SK-1 can monitor a single heater as denoted above but the most cost effective arrangement of the system is realized when monitoring a circuit of multiple heaters. The total number of heaters that can be monitored by one GF-SK-1 is dependant upon the heater models selected and the supply voltage. Using the total watts of the selected heaters to be monitored, the known supply voltage (be certain the heater voltage rating matches the supply voltage), and the phase of the supply, the total load or “amps” can be calculated. The GF-SK-1 is capable of monitoring a heater circuit of up to 50 amps maximum. **A licensed electrician or design engineer must do the necessary calculations.**



Installer Qualifications

The installation and wiring of Fostoria CH heaters must be performed by a licensed electrician.

Installer Responsibility

The National Electric Code (NEC) and local codes and ordinances together with specifications provided by Fostoria comprise the information needed for proper installation. The installer must furnish all materials that have not been purchased from Fostoria or its representatives. It is the installer's responsibility that the materials and methods of installation result in a job that is workmanlike and compliant with all applicable codes.

Preparations For Hanging Heaters

- ❑ Hardware to suspend these heaters from overhead supports (chain, “S”-hooks etc.) is not included with the product. Make certain that the hardware to be used is capable of supporting at least twice the total weight of the heater/s in question. Refer to the specifications section of this manual for product weights.
- ❑ Identify and use installation locations that are strictly compliant with the clearance-to-combustibles requirements in the installation section of this manual.
- ❑ Mounting height is an important consideration to assure satisfaction with the heating performance of infrared heaters. Fostoria has many years of practical experience in the successful application of infrared technology. For that reason, recommended mounting heights have been included in the installation section of this manual. Please refer to this data and select installation points where these recommendations can be followed.

INSTALLATION PLANNING (cont.)

Preparations for Wiring Heaters

CAUTION

Over-voltage is a major cause of element failure with these heaters. Make certain the power supply voltage is the same as the rated voltage of the heater being utilized.

- The opening in the terminal box for branch circuit supply wiring on CH-2 models is sized for 1/2-inch trade size conduit. Openings in terminal boxes for supply wiring on CH-4, CH-6, CH-13 and CH-27 models are sized for 3/4-inch trade size conduit. Conduit and conduit fittings are not provided with these heaters.
- The maximum ampacity rating for an infrared heating circuit is 50A.

Supply Wire Size Recommendations

The table at the right is provided to assist the licensed electrician in sizing the electric supply wires required to deliver power to each individual heater. All branch circuit supply wiring must be copper, rated 90° C minimum and comply with all local codes and the NEC.

All recommended wire sizes assume a 50ft. maximum wire length.

Heater Model	kW	VOLTS	AMPS		Recommended AWG Wire Size	
			3ph	1ph	3ph	1ph
CH-212-1C	1.8	120	n/a	15.0	n/a	12
CH-220-1C	2.0	208	n/a	9.7	n/a	12
CH-224-1C	2.0	240	n/a	8.4	n/a	12
CH-227-1C	2.0	277	n/a	7.3	n/a	12
CH-248-1C	2.0	480	n/a	4.2	n/a	12
CH-257-1C	2.0	600	n/a	3.5	n/a	12
CH-420-1C	4.5	208	n/a	21.7	n/a	12
CH-424-1C	4.5	240	n/a	18.8	n/a	12
CH-427-1C	4.5	277	n/a	16.3	n/a	12
CH-448-1C	4.5	480	n/a	9.4	n/a	12
CH-457-1C	4.5	600	n/a	7.8	n/a	12
CH-620-3C	6.0	208	16.6	28.9	12	10
CH-624-3C	6.0	240	14.4	25.0	12	10
CH-627-3C	6.0	277	n/a	21.7	n/a	12
CH-648-3C	6.0	480	7.2	12.5	12	12
CH-657-3C	6.0	600	6.1	10.4	12	12
CH-1320-3B	13.5	208	37.4	n/a	8	n/a
CH-1324-3B	13.5	240	32.4	n/a	8	n/a
CH-1327-3B	13.5	277	n/a	48.8	n/a	6
CH-1348-3B	13.5	480	16.2	n/a	12	n/a
CH-1357-3B	13.5	600	13.6	n/a	12	n/a
CH-2720-3C	27.0	208	74.8	n/a	8*	n/a
CH-2724-3C	27.0	240	64.8	n/a	8*	n/a
CH-2748-3C	27.0	480	32.4	n/a	12*	n/a
CH-2757-3C	27.0	600	27.0	n/a	12*	n/a

* These are minimum AWG wire sizes required to deliver power to elements at each end of these heaters.

INSTALLATION – HANGING HEATERS

⚠ WARNING



FIRE HAZARD BURN HAZARD

- To prevent arcing type faults, premature element failure and potential fire or burn hazard, use Fostoria model GF-SK-1 ground fault switch with these heaters.
- Read and follow all instructions provided for proper installation of heaters and GF-SK-1.
- Install heaters to comply with **REQUIRED CLEARANCES** listed above at right.
- Do not mount heaters vertically.

REQUIRED CLEARANCES

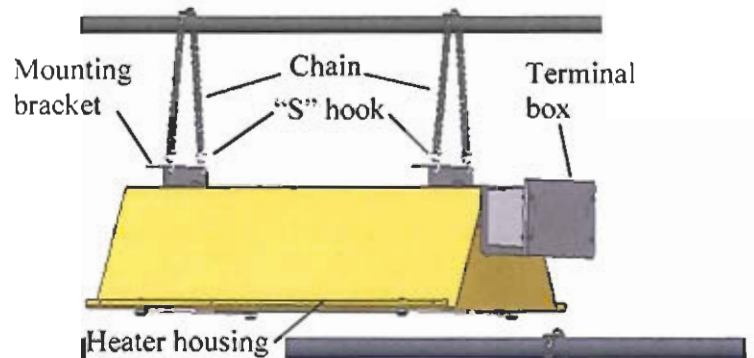
DO NOT install heaters closer than 36 inches to a vertical surface or 24 inches to a ceiling. Heaters **MUST BE SEPARATED** by more than 36 inches and 72 inches from any combustible surface in direct radiation path (87 inches for CH-27 Series).

Heater Hanging Alternatives

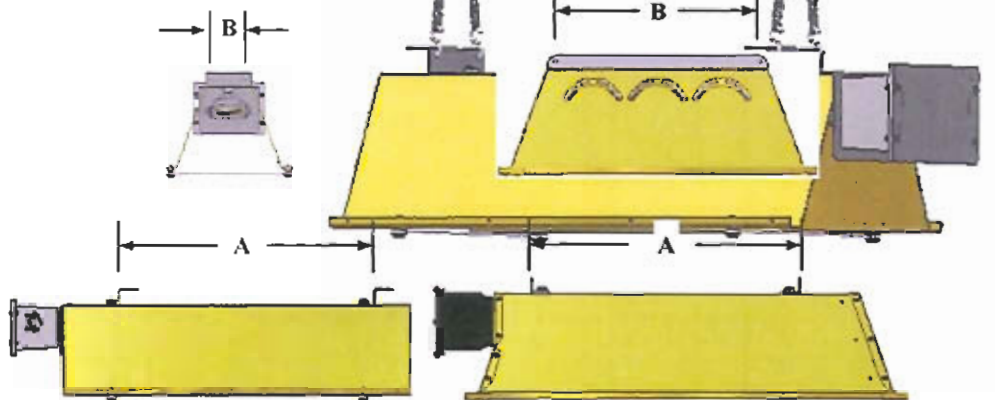
One method of hanging the heaters (shown below) is with hardware chain and “S” hooks. The chain and “S” hooks must be either 14 or 16 gauge for all models except CH-27, which must be 12 or 14 gauge. The heaters also can be mounted “fixed” with angle iron, metal rods or metal straps. Whatever means is used to mount the heaters, the terminal box must be EVEN WITH or LOWER THAN the horizontal plane of the heater housing.

SERIES	RECOMMENDED MOUNTING HEIGHTS
CH-2	8-10 Ft.
CH-4	8-12 Ft.
CH-6	10-14 Ft.
CH-13	12-16 Ft.
CH-27	15-30 Ft.

Chain-hanging



Fixed-Mounting






Mounting Centers (in inches)		
Series	Dim. A	Dim. B
CH-2	16-3/4	2-1/2
CH-4	37	2-1/2
CH-6	16-1/8	12-3/4
CH-13	36-1/2	12-3/4
CH-27	66	8

CH-2 & 4 series

CH-6, 13 & 27 series

INSTALLATION – WIRING

For All Heaters

  	⚠ WARNING
	ELECTRICAL SHOCK HAZARD
	<ul style="list-style-type: none">• Serious injury or death may occur.• Disconnect heater and lock out from electrical supply before installing or servicing.• <u>Always</u> securely connect green wire on heater to bonding (green) wire from electrical supply.

The CH-series heaters do not have any onboard controls and therefore must be used in conjunction with the applicable Fostoria FPC-series control center or be wired to a listed, properly rated safety switch for on/off control. Always disconnect the power at the circuit breaker or disconnect switch before installing electric power to the heater. If the breaker or disconnect switch cannot be seen from where you will be working, lock it in the open position and tag it to prevent unexpected application of power. **Failure to do so could result in fatal electric shock.** Do not depend on a thermostat or other switch as the sole means of turning off power to the heater. When bringing supply wiring to the heater always route it away from the area directly above the heater and away from the sides of the heater where temperatures may be dangerously high.

“Bonding” is the intentional electrical connection of all non-current carrying metal parts to the equipment grounding (green) conductor of the heater and then terminating this green conductor to the green conductor of the power supply to form a low-impedance path back to the power supply so that safety devices (circuit breakers, fuses) can quickly remove dangerous touch voltage from these parts when a fault occurs. **Always securely connect the green conductor from the power supply to the green conductor of the heater.**

Wiring of CH-2 and CH-4 Series Heaters:

1. Remove the cover from the terminal box.
2. Connect the supply wires (12 AWG 90°C Minimum) to the lead wires located in the terminal box with wire nuts or other safe mechanical means. Black and white supply leads can be connected to either element lead wire. Be sure green lead from supply and green (bonding) lead from the terminal box are connected.
3. Reinstall the terminal box cover.
4. Connect supply wires to a suitable electrical circuit.

INSTALLATION – WIRING (cont.)

Wiring of CH-6, CH-13 and CH-27 Series Heaters:

All of these three-element models are factory-wired for three-phase operation. Voltages other than 277V are wired as shown in illustration 2. The 277V models are wired as shown in illustration 3. To connect the appropriate electrical service to your heater, follow the steps below.

1. Remove the cover from the terminal box.
2. Select the properly sized supply wire (12 AWG 90°C Minimum) from the table on page 7 and route it into the terminal box.
3. Connect the lead wires to the supply wires inside the splice box, with wire nuts or other safe mechanical means. Be sure green lead from supply and green (ground) lead from the terminal box are connected.
4. Reinstall the terminal box covers.
5. Connect the heater to a suitable electrical circuit.

NOTE: The CH-27 series models are actually two individual CH-13 series heaters integrated into one fixture. Complete the supply wiring to the terminal boxes at each end of this fixture as described for the CH-13.

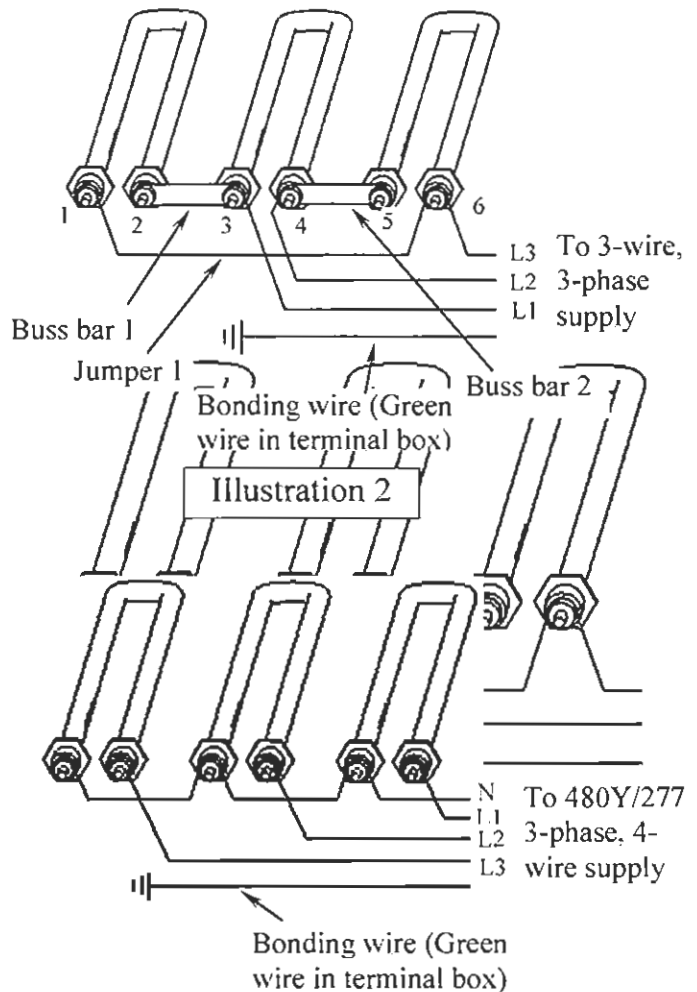


Illustration 3

3-Phase to Single-Phase Conversion:

This conversion is allowable on CH-6 series models only. To make this conversion, the licensed electrician must take the arrangement in illustration 2 and revise it to become as shown in illustration 4 by following the steps below.

1. Remove pigtail L3 from post 6 (illustration 2).
2. Move one end of Jumper 1 from post 6 to post 5.
3. Install Jumper 2** on posts 2 and 6.
4. Do not move Buss bars 1 and 2.
5. **Replace supply wires with heavier gauge to meet additional amp load.** Reference chart on page 7.

** Jumper 2 (customer supplied) must be 12 AWG, 90° C rated minimum, at least 10 inches long. This jumper (p/n 3160609) can be purchased from the factory.

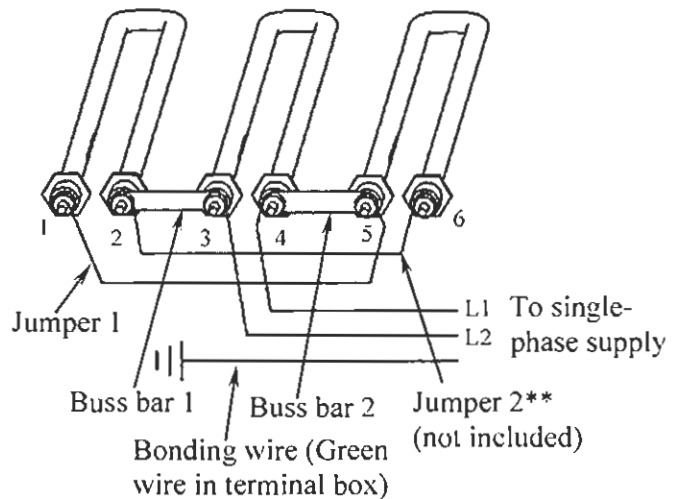



Illustration 4

OPERATION

	⚠ WARNING
	BURN HAZARD <ul style="list-style-type: none">• Serious injury or death may occur.• Allow heater to fully cool after power is removed (may take minutes) before touching or working on it.

When power is provided to these heaters the heater elements will take several minutes to achieve full infrared output that can be confirmed by an orange to dull red glow on the element sheath. The element sheath under this condition is operating between 1,500 and 1,600° F emitting medium wavelength (approx. 3 microns or millionths of a meter) infrared energy. This energy, that can also be considered “radiation” is not harmful, yet is very effective at heating objects and surfaces that are within the line-of-sight of the elements and the heater’s reflective surfaces.

When power is provided or removed from these heaters, you may hear unfamiliar sounds that are caused by the expansion and contraction of metal components in the heater. This is normal.

If power control at the heater is desired, a disconnect switch kit (DC-SK-1) is available. See the “additional equipment” section of this manual for more details.

CAUTION
If any metal-sheath element has an obvious “bowing” or sagging condition during operation, an over-voltage / over-temperature condition may exist. De-energize the heater immediately and allow to fully cool. Replace all elements that have been distorted in any way. Before returning power to heaters, make certain the power supply voltage is the same rating as on the heater data label.

Ground-Fault Monitoring and Operation:

As explained in the “installation planning” section of this manual, most, if not all, applications using metal-sheath heaters will require the use of the GF-SK-1 ground-fault sensor switch. Refer to the instructions provided with this switch for proper installation.

If, during heater operation, the GF-SK-1 “trips” and interrupts power to your heater or heater circuit, then one or more of the metal-sheath elements in the heater or heater circuit being monitored has a reduced insulation resistance value that may be due to an element that is about to fail. Have a licensed electrician follow the warnings and instructions in the “operation” section of the GF-SK-1 manual.

  	⚠ WARNING
	FIRE HAZARD BURN HAZARD
	<ul style="list-style-type: none">• To prevent arcing type faults, premature element failure and potential fire or burn hazard, use Fostoria model GF-SK-1 ground fault switch with these heaters.• Read and follow all instructions provided for proper installation of heaters and GF-SK-1.

MAINTENANCE



Pre-Season Maintenance and Annual Inspection

To ensure your safety and years of trouble-free operation from the heaters, periodic service and inspections must be done by a trained maintenance person or licensed electrician.

To obtain maximum performance from your heater(s) each year, we recommend the following be performed at the start of the heating season:

1. Clean housing reflector surfaces with a damp cloth.
2. Blow or dust off the elements and inner reflectors.
3. Repair or replace damaged power cables.
4. DO NOT hose-down these heaters.

ELEMENT & REFLECTOR REPLACEMENT: CH-2 & CH-4

 	WARNING
	ELECTRICAL SHOCK HAZARD <ul style="list-style-type: none">• Serious injury or death may occur.• Disconnect heaters from electrical supply before replacing parts.

CAUTION
Use only Fostoria replacement elements of the same wattage, voltage and part number as the original element. Reference tables on replacement parts pages later in this manual. Always install new reflector included with each replacement element.

1. DISCONNECT POWER FROM THE ELECTRICAL SUPPLY WIRES OF THE HEATER BEING REPAIRED.
2. Position heater on workbench with reflector opening pointing UP (see illustration 5).
3. Remove element support clip (2ea. on CH-4 models), save clip(s).
4. Remove terminal box cover from terminal box on heater (see illustration 6); save cover and hardware.
5. Disconnect the 2 wires from heating element by loosening the 3/8" hex nuts at the bottom of the element.
6. Remove old element by removing the large hex nuts, metal washers and gaskets, discard all.
7. Slide old reflector out of the extrusion and discard (see illustration 5).
8. Peel protective film from new reflector, and then place it in the extrusion. Make sure reflector is secured in slots in extrusion.
9. Install new element in terminal box, using hardware included (see illustration 6).
10. Reinstall element support clip(s), removed in step 3, into extrusion.

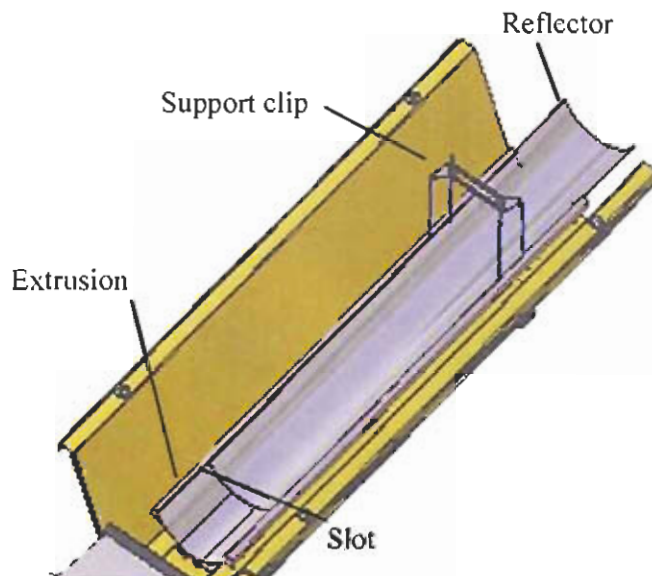


Illustration 5

ELEMENT & REFLECTOR REPLACEMENT: CH-2 & CH-4 (cont.)

11. Reconnect the two wires to the element as shown in illustration 6. Make certain that bare metal wire terminals from different posts do not come in contact with each other.
12. Reattach terminal box cover to terminal box with screws removed in Step 4.
13. Heater is now ready for normal operation.

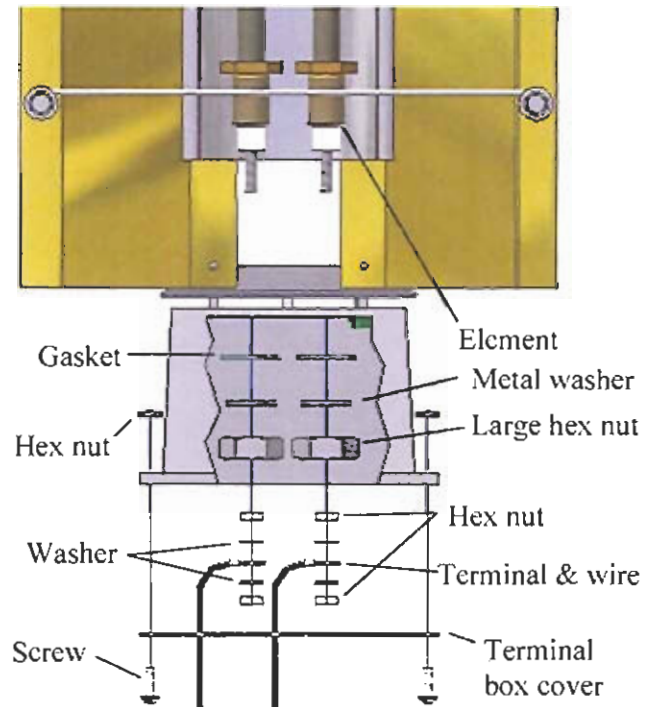


Illustration 6

ELEMENT REPLACEMENT: CH-6, CH-13 & CH-27

⚠ WARNING



ELECTRICAL SHOCK HAZARD

- **Serious injury or death may occur.**
- **Disconnect heaters from electrical supply before replacing parts.**

CAUTION

Use only Fostoria replacement elements of the same wattage, voltage and part number as the original element. Reference tables on replacement parts pages later in this manual.
Always install new reflector included with each replacement element.

1. DISCONNECT POWER FROM THE ELECTRICAL SUPPLY WIRES OF THE HEATER BEING REPAIRED.
2. Position heater with reflector opening pointing UP.
3. Remove and save the (4) screws that attach the terminal box to the heater, with a 1/4" nut driver (see illustration 7).
4. Grasp terminal box assembly and firmly pull in the direction shown in illustration 8. The elements have been fed through some support clips inside the heater housing. These clips will cause some drag or resistance to removal. There will be some unpleasant noise as the elements slide through the clips.
5. Remove cover from terminal box; save it and all screws.
6. Disconnect the wires from only the heating element to be replaced by loosening the 3/8" hex nuts at the bottom of the element similar to illustration 6.
7. Remove old element by removing the large hex nuts, metal washers and gaskets, discard all.
8. Install new element in terminal box, using hardware included (see illustration 6).
9. Reconnect the wires to the element as they were before removal. Make certain that bare metal wire terminals from different posts do not come in contact with each other.
10. Reattach cover and screws to terminal box.
11. Before reinstalling the heating elements, the old reflector should be replaced with the new one received with the new element. See next page for reflector replacement.
12. After completing all steps in reflector replacement, replace the heating element assembly back into the housing and secure with screws removed in Step 3.
13. Heater is now ready for normal operation.

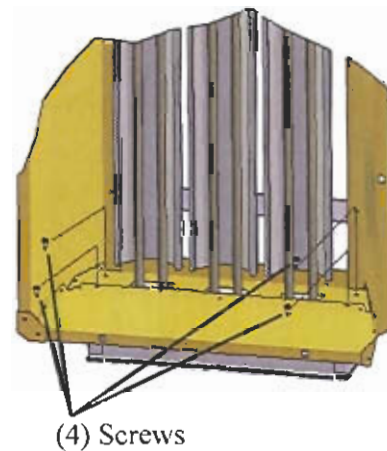


Illustration 7

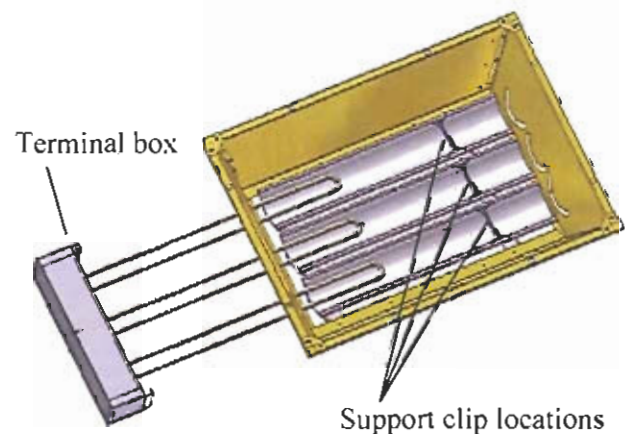



Illustration 8

REFLECTOR REPLACEMENT: CH-6, CH-13 & CH-27

	⚠ WARNING
	<p style="text-align: center; margin: 0;">ELECTRICAL SHOCK HAZARD</p> <ul style="list-style-type: none"> Serious injury or death may occur. Disconnect heaters from electrical supply before replacing parts.

CAUTION
<p>Use only Fostoria replacement elements of the same wattage, voltage and part number as the original element. Reference tables on replacement parts pages later in this manual.</p> <p>Always install new reflector included with each replacement element.</p>

To replace the reflector with the extrusion still assembled inside the heater (CH-6 & 13 models only) see illustration 9 and do the following:

1. With the elements out of the heater, remove the support clip(s) from the front of reflector.
2. Slide the reflector out of the extrusion, through the curved slot in the housing, and discard.
3. Peel protective film from new reflector, and then place the reflector in the extrusion. Make sure it is secured in slots in extrusion.
4. Replace support clips on the front of the reflector.
5. Finish reassembly of heater by completing Steps 12 and 13 on page 14.

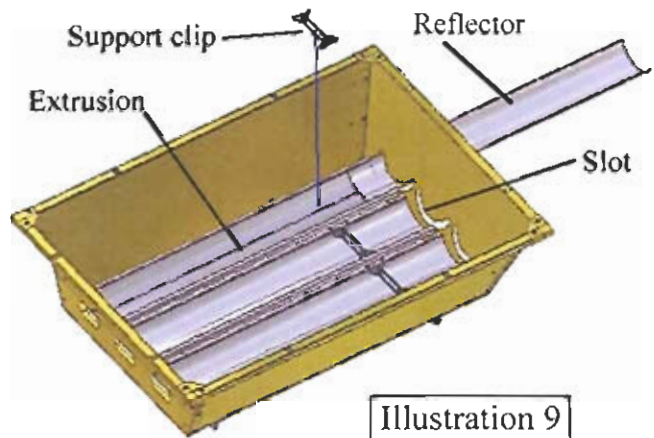


Illustration 9

To replace the reflector in the CH-27 models (CH-6 & 13 models can be done similarly), do the following:

1. With the elements out of the heater, remove the jam nuts that hold the extrusion in place. Note: The Unistrut mounting channel will have to be removed to free the two outside extrusions (see illustration 10).
2. Remove the support clip(s) from the front of the reflector.
3. Slide the reflector out of the extrusion and discard.
4. Peel protective film from new reflector, and then place the reflector in the extrusion. Make sure it is secured in slots in extrusion.
5. Replace support clips on the front of the reflector.
6. Reinstall the extrusion (and Unistrut).
7. Finish reassembly of heater by completing Steps 12 and 13 on page 14.

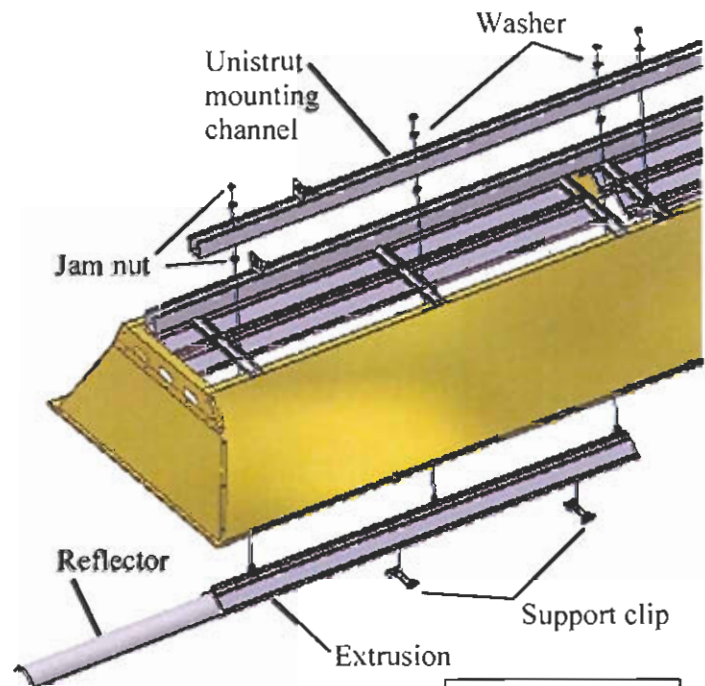
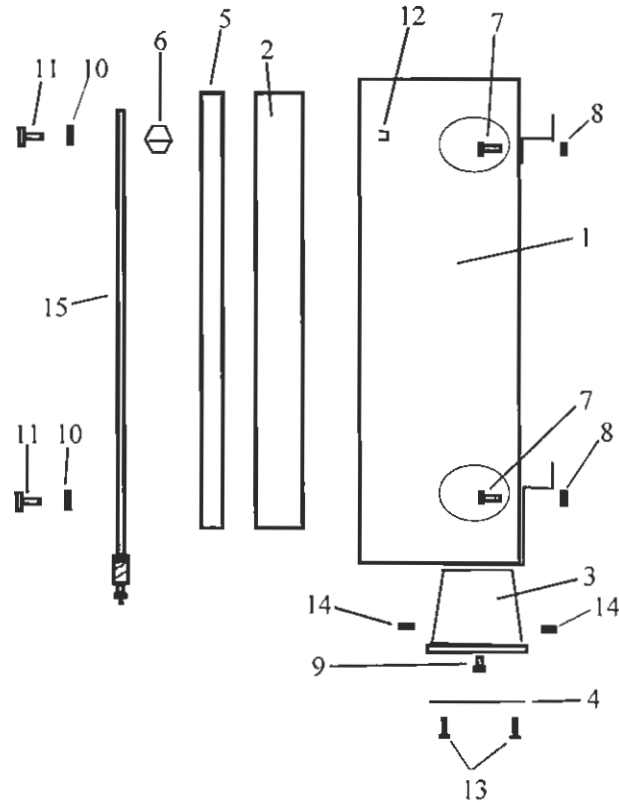


Illustration 10

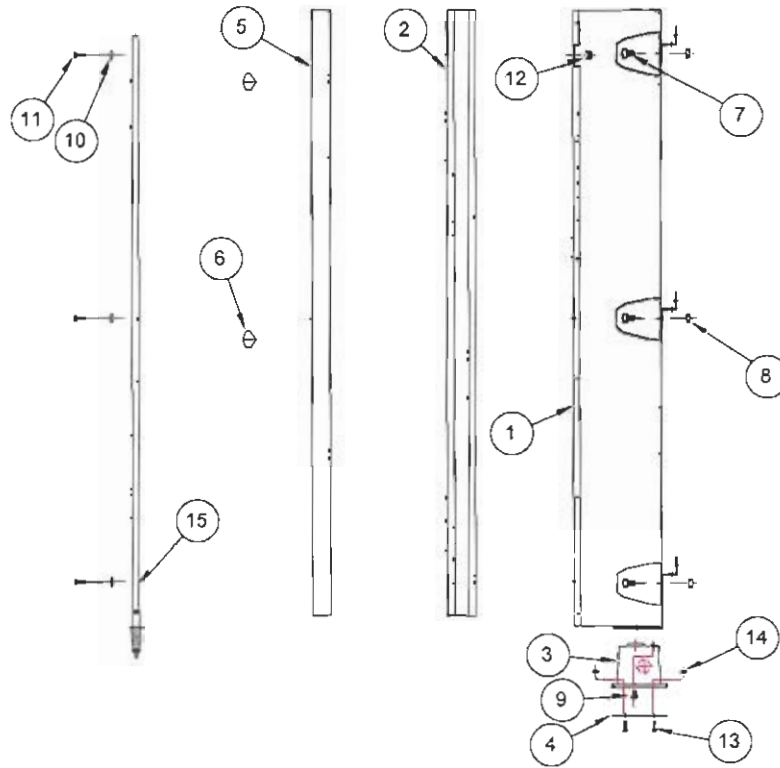
CH-2 EXPLODED VIEW AND REPLACEMENT PARTS LIST



REF. NO.	DESCRIPTION	PART NUMBER	QTY.
1	Housing assembly consisting of: Side baffles, pop rivets, mounting brace and L-shaped mounting brackets	CALL FACTORY	1
2	Extrusion	8041701	1
3	Terminal box	8040501	1
4	Terminal box cover	8040600	1
5	Reflector	8048901	1
6	Element support	8024100	1
7	3/8-16 x 1/2" hex head screw	3474300	2
8	3/8-16 jam nut	3429100	2
9	10-32 x 3/8 hex head screw	1458	1
10	Side support bracket	8022529	1
11	10-32 x 3/4" hex head screw	3424956	4
12	10-32 self-retaining nut	3403900	4
13	8-32 x 1/2" Philips pan head screw	3427456	4
14	8-32 hex nut	1038	4
15	Metal-sheath element	See Table 1	1

MODEL	VOLTS	METAL-SHEATH ELEMENT PART NUMBER
CH-212-1C	120	04458702
CH-220-1C	208	04458302
CH-224-1C	240	04457902
CH-227-1C	277	04458402
CH-248-1C	480	04458002
CH-257-1C	600	04458802

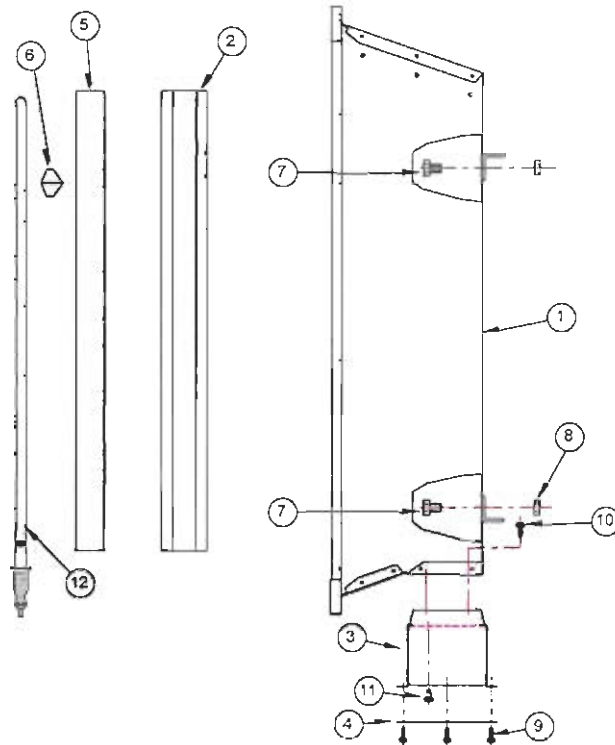
CH-4 EXPLODED VIEW AND REPLACEMENT PARTS LIST



REF. NO.	DESCRIPTION	PART NUMBER	QTY.
1	Housing assembly consisting of: Side baffles, pop rivets, mounting brace and L-shaped mounting brackets	CALL FACTORY	1
2	Extrusion	8042400	1
3	Terminal box	8040502	1
4	Terminal box cover	8040600	1
5	Reflector	8049000	1
6	Element support	8024100	2
7	3/8-16 x 1/2" hex head screw	3474300	3
8	3/8-16 jam nut	3429100	3
9	10-32 x 3/8" hex head screw	1458	1
10	Side support bracket	8022529	3
11	10-32 x 3/4" hex head screw	3424956	6
12	10-32 self-retaining nut	3403900	6
13	8-32 x 1/2" Philips pan head screw	3427456	4
14	8-32 hex nut	1038	4
15	Metal-sheath element	See Table 2	1

MODEL	VOLTS	METAL-SHEATH ELEMENT PART NUMBER
CH-420-1C	208	04458502
CH-424-1C	240	04458102
CH-427-1C	277	04458602
CH-448-1C	480	04461702
CH-457-1C	600	04458902

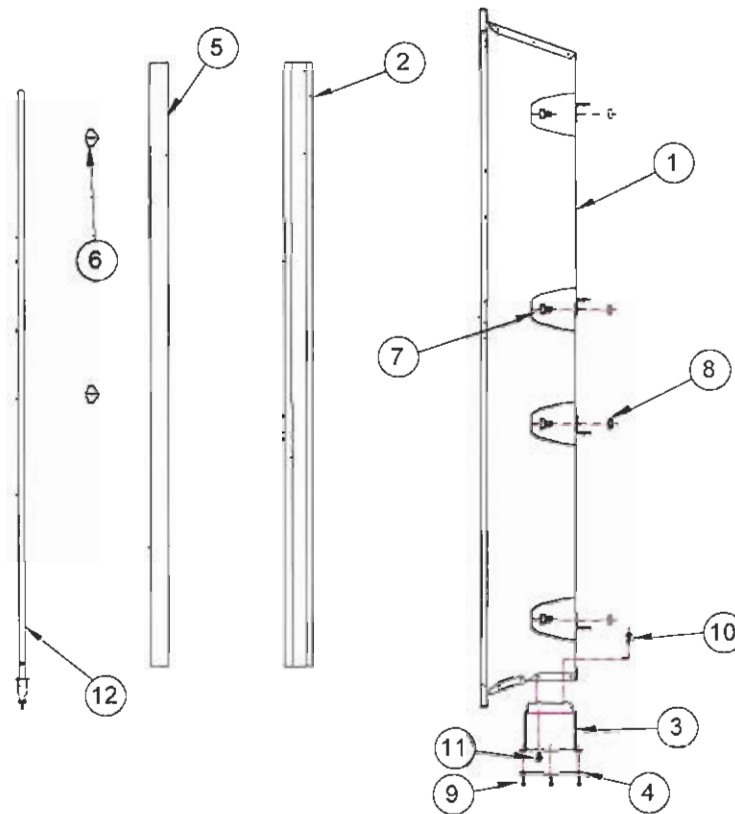
CH-6 EXPLODED VIEW AND REPLACEMENT PARTS LIST



REF. NO.	DESCRIPTION	PART NUMBER	QTY.
1	Housing assembly consisting of: Side, top, upper and lower baffles, pop rivets, corner gussets, and U-shaped mounting brackets	CALL FACTORY	1
2	Extrusion	8041701	3
3	Terminal box	8040802	1
4	Terminal box cover	8040900	1
5	Reflector	8048901	3
6	Element support	8024100	3
7	3/8-16 x 1/2" hex head screw	3474300	6
8	3/8-16 jam nut	3429100	6
9	8-18 x 1/2" hex washer head screw	5081	4
10	8-15 x 1/2" hex head screw	03470800	4
11	10-32 x 3/8" hex head screw	1458	1
12	Metal-sheath element	See Table 3	3

MODEL	VOLTS	METAL-SHEATH ELEMENT PART NUMBER
CH-620-3C	208	04458302
CH-624-3C	240	04457902
CH-627-3C	277	04458402
CH-648-3C	480	04458002
CH-657-3C	600	04458802

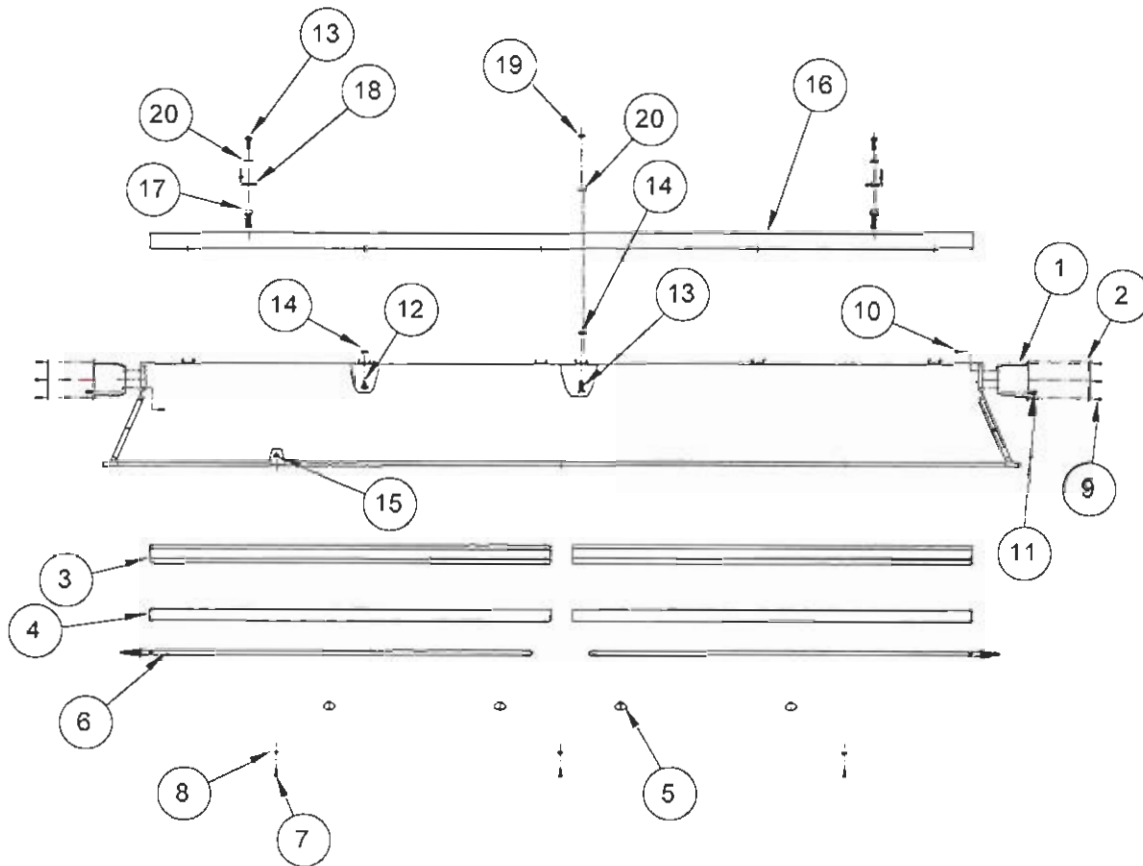
CH-13 EXPLODED VIEW AND REPLACEMENT PARTS LIST



REF. NO.	DESCRIPTION	PART NUMBER	QTY.
1	Housing assembly consisting of: Side, top, upper and lower baffles, pop rivets, corner gussets, and L-shaped mounting brackets	8828599	1
2	Extrusion	8042400	3
3	Terminal box	8040802	1
4	Terminal box cover	8040900	1
5	Reflector	8049000	3
6	Element support	8024100	6
7	3/8-16 x 1/2" hex head screw	3474300	12
8	3/8-16 jam nut	3429100	12
9	8-18 x 1/2" hex washer head screw	5081	4
10	8-15 x 1/2" hex head screw	03470800	4
11	10-32 x 3/8" hex head screw	1458	1
12	Metal-sheath element	See Table 4	3

MODEL	VOLTS	METAL-SHEATH ELEMENT PART NUMBER
CH-1320-3B	208	04458502
CH-1324-3B	240	04458102
CH-1327-3B	277	04458602
CH-1348-3B	480	04461702
CH-1357-3B	600	04458902

CH-27 EXPLODED VIEW AND REPLACEMENT PARTS LIST



REF. NO.	DESCRIPTION	PART NO.	QTY.
1	Terminal box assembly	8040802	2
2	Terminal box cover	8040900	2
3	Extrusion 42-1/4"	8042400	6
4	Reflector 42-1/4"	8049000	6
5	Element support	8024100	12
6	Metal-sheath element	See Table 5	6
7	10-32 x 3/4" hex head screw	3424956	6
8	Housing support bracket	8023329	3
9	8-18 x 1/2" hex washer head screw	5081	8
10	8-15 x 1/2" hex head screw	03470800	8
11	10-32 x 3/8" hex head screw	1458	2
12	3/8-16 x 1/2" hex head screw	3474300	6
13	3/8-16 X 1" hex head screw	3493900	16
14	3/8-16 heavy hex jam nut	3429100	18
15	10-32 self-retaining nut	3403900	6
16	Unistrut 86-3/4" long	8044602	2
17	Unistrut nut 3/8-16	9048530	4
18	Mounting bracket	8410102	4
19	3/8-16 jam nut	3429700	12
20	3/8" flat washer	3425200	16

MODEL	VOLTS	METAL-SHEATH ELEMENT PART NUMBER
CH-2720-3B	208	04458502
CH-2724-3B	240	04458102
CH-2748-3B	480	04461702
CH-2757-3C	600	04458902

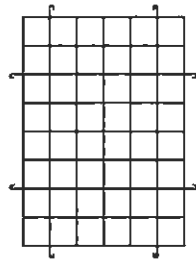
ADDITIONAL EQUIPMENT



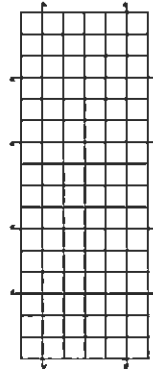
HDWG-2



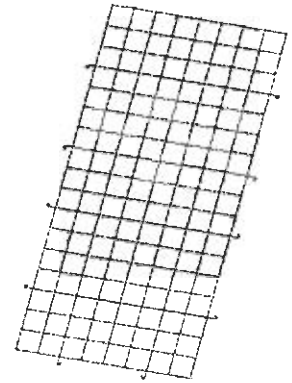
HDWG-4



HDWG-6



HDWG-13



HDWG-27

Wireguards are not included with any of the CH-Series heaters. If protection against foreign objects entering the front of the heaters is needed, the wireguards listed below can be used. All kits include mounting hardware.

Optional Wireguard Kits

Heater Series	Wireguard Model Number	Fostoria Part Number
CH-2	HDWG-2	04490902
CH-4	HDWG-4	04490602
CH-6	HDWG-6	04490702
CH-13	HDWG-13	04490802
CH-27	HDWG-27	08830429



DC-SK-1
Disconnect switch
Part No.: 05893702

- Wall mountable for all CH models
- Mounts directly on CH-6, CH-13 & CH-27 models only



GF-SK-1
Ground fault sensor switch
Part No.: 04860202

- Wall mountable for all CH models
- Mounts directly on CH-6 & CH-13 models only

LIMITED WARRANTY

Products manufactured by TPI Corporation are warranted to the original consumer to be free from defects in material and workmanship for twelve (12) months from the original purchase date.

The TPI limited warranty does not cover products that have been modified outside of our factory, damage or failure caused by acts of God, abuse, misuse, connected to or placed on other than rated voltage, abnormal usage, fault, installation, failure to follow suggested maintenance procedures enclosed with the product, improper maintenance or any repairs other than those provided by an authorized TPI service center.

There are no obligations or liabilities on the part of the Corporation for consequential damages arising out of or in connection with the use or performance of the product or other indirect damages with respect to loss of property, revenues, profit, costs of removal installation, or reinstallation.

All implied warranties with respect to TPI products, including implied warranties for merchantability and implied warranties for fitness, are limited in duration to twelve (12) months from original date of purchase, except those products or parts of products which are warranted for long periods thereon.

Some states do not allow the exclusions or limitation of incidental or consequential damages and some states do not allow limitations on how long an implied warranty lasts. The above exclusions or limitations may not apply to you.

During the warranty period, TPI Corporation will, at its sole option, repair or replace any defective parts or products returned, freight prepaid, to the TPI Corporation factory or such other locations as TPI Corporation may designate. Returned products must be packaged carefully and TPI Corporation shall not be responsible for damage in transit.

When returning parts, the owner must provide the model number of the product and nature of difficulty being experienced. This warranty does not obligate TPI Corporation to bear the cost of labor in replacing any assembly, unit or component part thereof, nor does the company assume any liability for secondary charges, expenses for installing or removal, freight or damages. There will be charges rendered for product repairs made after the warranty period has expired. Proof of purchase, including date, must accompany request for in-warranty service. In any event, TPI Corporation's maximum liability shall not in any case exceed the list price for the product claimed to be defective. This warranty gives to you specific legal rights and you may have other rights, which may vary from state to state. For the name of your nearest authorized TPI Corporation service center, please write to TPI Corporation, P.O. Box 4973, Johnson City, TN 37602.

HEATING PRODUCTS WARRANTY COVERAGE	
Heating Products Elements in	10 Years
Baseboards	1 Year
All other Heating Products	2 Years
Thermostats and Controls	

VENTILATION PRODUCTS WARRANTY COVERAGE	
Series HD or HDH Fans	5 Years
Series UHP or IHP Fans	3 Years
All other Ventilation Products	1 Year