

ROBERTS GORDON® EP-200 Series Pump



Installation, Operation & Service Manual

⚠ WARNING

Improper installation, adjustment, alteration, service or maintenance can result in death, injury or property damage. Read the Installation, Operation and Service Manual thoroughly before installing or servicing this equipment.

Installation must be done by a contractor qualified in the installation and service of gas-fired heating equipment or your gas supplier.

Installer

Please take the time to read and understand these instructions prior to any installation. Installer must give a copy of this manual to the owner.

Owner

Keep this manual in a safe place in order to provide your service technician with necessary information.



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SECTION 1: HEATING SYSTEM SAFETY



Your Safety is Important to Us! This symbol is used throughout the manual to notify you of possible fire, electrical or burn hazards. Please pay special attention when reading and following the warnings in these sections.

Installation, service and annual inspection of heater and pump must be done by a contractor qualified in the installation and service of gas-fired heating equipment.

Read this manual carefully before installation, operation or service of this equipment.

CTHN multiburner and CRVB systems are designed for heating nonresidential indoor spaces. Model CRVSF is for nonresidential indoor spaces where exposed surfaces of heating equipment cannot exceed temperatures of 750 °F (399 °C) in facilities where compressed natural gas (CNG) or liquid natural gas (LNG) are present. Do not install in residential spaces. These instructions, the layout drawing, local codes and ordinances, and applicable standards that apply to electrical wiring, venting, etc. must be thoroughly understood before proceeding with the installation.

Protective gear is to be worn during installation, operation and service in accordance to the Occupational Safety and Hazard Administration (OSHA). Gear must be in accordance to NFPA 70E, latest revision when working with electrical components. Thin sheet metal parts, such as various venting components, have sharp edges. To prevent injury, the use of work gloves is recommended.

Do not attempt to operate the pump until all steps of the installation have been accomplished.

This pump must be applied and operated under the general concepts of reasonable use and installed using best building practices.

This equipment is not intended for use by persons (including children) with reduced physical, sensory or mental capabilities, or lack of experience and knowledge, unless they have been given supervision or instruction concerning use of the appliance by a person responsible for their safety. Children should be supervised to ensure that they do not play with the equipment.

For additional copies of the Installation, Operation and Service Manual, please contact Roberts-Gordon LLC.

1.1 Manpower Requirements

To prevent personal injury and damage to the pump, two persons will be required for installation.

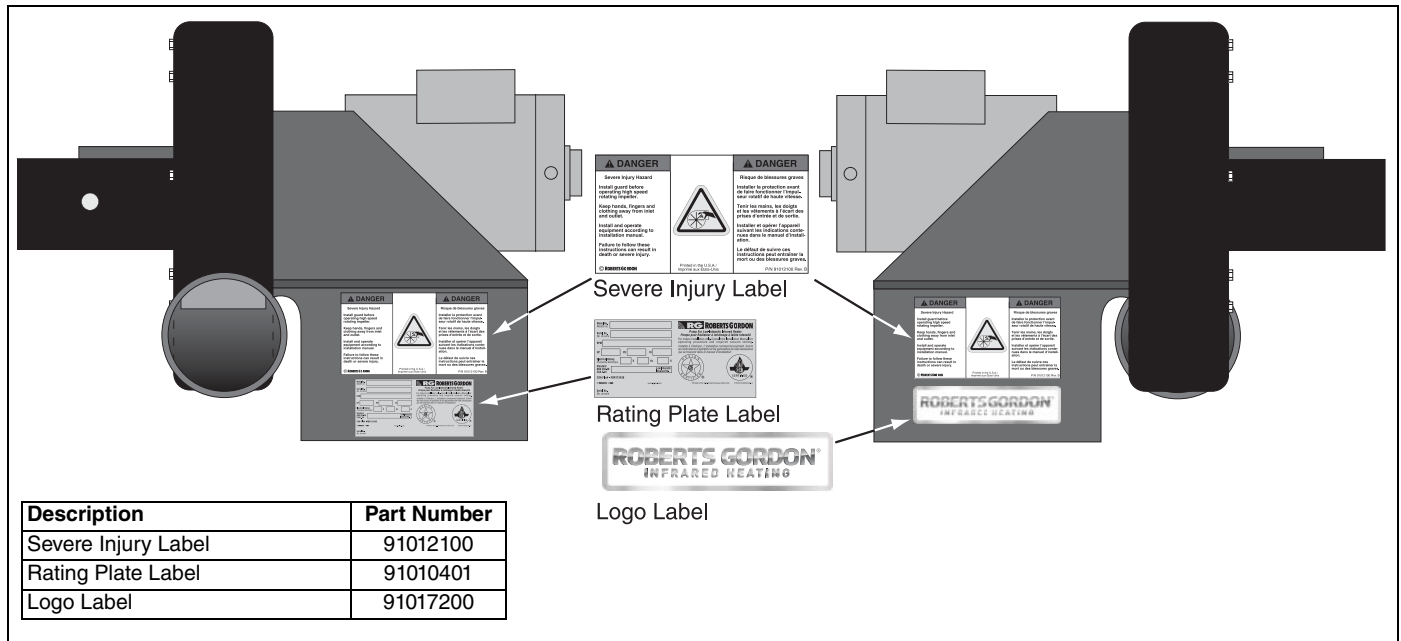
1.2 Safety Labels and Their Placement

Product safety signs or labels should be replaced by the product user when they are no longer legible. Please contact Roberts-Gordon LLC or your ROBERTS GORDON® independent distributor to obtain replacement signs or labels. See *Page 2, Figure 1*.

1.3 California Proposition 65

In accordance with California Proposition 65 requirements, a warning label must be placed in a highly visible location on the outside of the equipment (i.e., near equipment's serial plate). See the heaters' Installation, Operation and Service Manual for label placement. Avoid placing label on areas with extreme heat, cold, corrosive chemicals or other elements. To order additional labels, please contact Roberts-Gordon LLC or your ROBERTS GORDON® independent distributor.

FIGURE 1: Label Placement



SECTION 2: INSTALLER RESPONSIBILITY

The installer is responsible for the following:

- To install the pump and electrical supplies, in accordance with applicable specifications and codes. Roberts-Gordon LLC recommends the installer contact a local building inspector or fire marshal for guidance.
- To use the information given in a layout drawing and in the manual together with the cited codes and regulations to perform the installation.
- To install the heater in accordance with the clearances to combustibles.
- To furnish all needed materials not furnished as standard equipment.
- To plan location of supports.
- To provide access to pump for servicing on all sides and for pump removal.
- To provide the owner with a copy of this installation, operation and service manual.
- To never use pump or pump platform as support for ladder or other access equipment and never hang or suspend anything from pump or pump platform.
- To safely and adequately install pump using materials with a minimal working load of 750 lb (340 kg).
- To ensure the heater is placed in an approved application.
- **For CRVSF-Series only:** To install system with a minimum of 18" (45 cm) ceiling clearance in accordance to National Fire Protection Association NFPA 30A (2012 edition).

2.1 Corrosive Chemicals


<p>Product Damage Hazard</p> <p>Do not use heater in area containing corrosive chemicals.</p> <p>Refer to appropriate Material Safety Data Sheets (MSDS).</p> <p>Failure to follow these instructions can result in product damage.</p>

Roberts-Gordon LLC cannot be responsible for ensuring that all appropriate safety measures are undertaken prior to installation; this is entirely the responsibility of the installer. It is essential that the contractor, the sub-contractor, or the owner identifies the presence of combustible materials, corrosive chemicals or halogenated hydrocarbons* anywhere in the premises.

* **Halogenated Hydrocarbons** are a family of chemical compounds characterized by the presence of halogen elements (fluorine, chlorine, bromine, etc.). These compounds are frequently used in refrigerants, cleaning agents, solvents, etc. If these compounds enter the air supply of the burner, the life span of the heater components will be greatly reduced. An outside air supply must be provided to the burners whenever the presence of these compounds is suspected. Warranty will be invalid if the heater is exposed to halogenated hydrocarbons.

2.2 National Standards and Applicable Codes

All Appliances must be installed in accordance with the latest revision of the applicable standards and national codes. This refers also to the electric, gas and venting installation. Note: Additional standards for installations in Public Garages, Aircraft Hangars, etc. may be applicable.

SECTION 3: UNPACKING THE PUMP

3.1 Open Shipping Cartons

! WARNING

Cut/Pinch Hazard Wear protective gear during installation, operation and service. Edges are sharp. Failure to follow these instructions can result in injury.

Open cartons and remove packing inserts. Carefully remove pump components from the cartons. Lift assembly by gripping metal pump frame. Two people are required (weight 112 lb, 51 kg). This pump has been tested prior to packing. The impeller was dynamically balanced before assembly and requires care in handling to avoid damage.

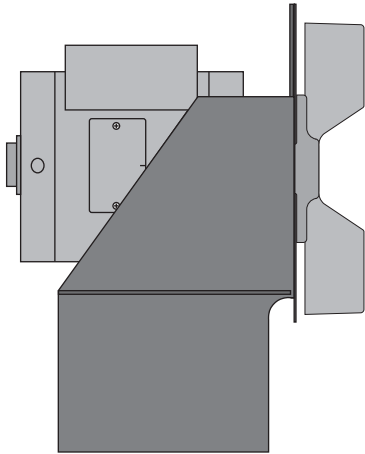
! DANGER

Severe Injury Hazard Install pump scroll and inlet assembly before operating high speed rotating impeller. Keep hands, fingers and clothing away from inlet and outlet. Install and operate equipment according to installation manual. Failure to follow these instructions can result in death or severe injury.

SECTION 4: MAJOR COMPONENTS

FIGURE 2: Major Component Descriptions

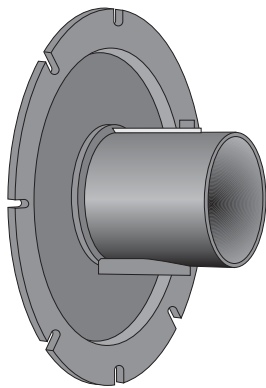
EP-201 Pump Assembly - 01312001
 EP-203 Pump Assembly - 01312002



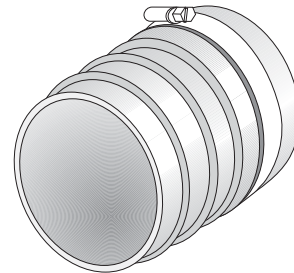
Pump Scroll Assembly - 01394401



Pump Inlet Assembly - 01327400



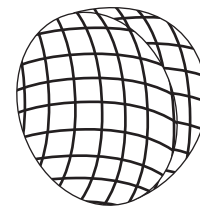
Flexible Boot 4.5" (11 cm) - 91412801
 Silicone Rubber Ring - 91906900



Band Clamp 5" (13 cm) - 91901301



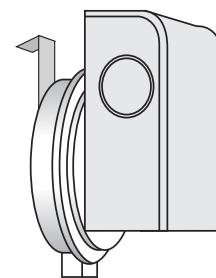
Bird Screen 4" (10 cm) - 01365400



Mounting Angle - 01365000



Pressure Switch - 90430600K



4.1 Standard Parts List

Table 1: EP-201 Pump Package (P/N 02716305)


Part No.	Description	Quantity
	Box 1 of 2	
01312001	EP-201 Pump Assembly Includes:	1
127102NA	CORAYVAC® Installation, Operation and Service Manual	1
127200NA	EP-200 Series Installation, Operation and Service Manual	
	Box 2 of 2	
01317805	EP-200 Pump Accessory Package Includes:	1
01327500	Inlet Plate Assembly	1
01329500	Damper Support Assembly	1
01365400	Bird Screen, 4"	1
01365000	Mounting Angle	6
01394401	Pump Scroll	1
01394502	Inlet Casting	1
02757500	Motor Shaft Seal	1
91312600	Sleaving	1
91406940	Pump Gaskets	4
93413008	Bolt (1/4" - 20" x 1/2")	1
127200NA	EP-200 Series Installation, Operation and Service Manual	1
01311700	EP-200 Pump Accessory Kit Includes:	1
91901301	Band Clamp, 5" (13 cm)	4
92113900	Hex Nut	6
93413912	Bolt (5/16" -18" x 3/4")	6
94273914	Bolt (5/16" -18" x 7/8")	16
95211600	Flat Washer (5/16")	28
96411600	Lockwasher (5/16")	6
91412801	4.5" Flexible Boot	2
91906900	Silicone Rubber Ring	2
90430600K	Pressure Switch Kit Includes:	1
90430600	Pressure Switch	1
91417409	Silicone Hose	1
91220201	Barbed Fitting	1
91104001	Locknut	2
94118106	Screw #8 x 3/8	2
96211000	Lock Washer #10	2
93511706	Screw #10-32 x 3/8	2
92311800	Locknut #10-32	2
91700015	Instructions	1
127302NA	CORAYVAC® Classic SF Installation, Operation and Service Manual (Included in CRVSF burner carton)	

Table 2: EP-203 Pump Package (P/N 02712034)

Part No.	Description	Quantity
	Box 1 of 2	
01312002	EP-203 Pump Assembly Includes:	1
127102NA	CORAYVAC® Installation, Operation and Service Manual	1
	Box 2 of 2	
01317805	EP-200 Pump Accessory Package Includes:	1
01327500	Inlet Plate Assembly	1
01329500	Damper Support Assembly	1
01365400	Bird Screen, 4"	1
01365000	Mounting Angle	6
01394401	Pump Scroll	1
01394502	Inlet Casting	1
02757500	Motor Shaft Seal	1
91312600	Sleaving	1
91406940	Pump Gaskets	4
93413008	Bolt (1/4" - 20" x 1/2")	1
127200NA	EP-200 Series Installation, Operation and Service Manual	1
01311700	EP-200 Pump Accessory Kit Includes:	1
91901301	Band Clamp, 5" (13 cm)	4
92113900	Hex Nut	6
93413912	Bolt (5/16" -18" x 3/4")	6
94273914	Bolt (5/16" -18" x 7/8")	16
95211600	Flat Washer (5/16")	28
96411600	Lockwasher (5/16")	6
91412801	4.5" Flexible Boot	2
91906900	Silicone Rubber Ring	2
90430600K	Pressure Switch Kit Includes:	1
90430600	Pressure Switch	1
91417409	Silicone Hose	1
91220201	Barbed Fitting	1
91104001	Locknut	2
94118106	Screw #8 x 3/8	2
96211000	Lock Washer #10	2
93511706	Screw #10-32 x 3/8	2
92311800	Locknut #10-32	2
91700015	Instructions	1
127302NA	CORAYVAC® Classic SF Installation, Operation and Service Manual (Included in CRVSF burner carton)	

SECTION 5: PUMP INSTALLATION

⚠ DANGER



Severe Injury Hazard

Install pump scroll and inlet assembly before operating high speed rotating impeller.

Keep hands, fingers and clothing away from inlet and outlet.

Install and operate equipment according to installation manual.

Failure to follow these instructions can result in death or severe injury.

⚠ WARNING



Cut/Pinch Hazard


Wear protective gear during installation, operation and service.

Edges are sharp.

Failure to follow these instructions can result in injury.

NOTE: Installers may also visit Roberts-Gordon YouTube page to view pump assembly video at <https://www.youtube.com/watch?v=F-u8xtvaAZ8> or scan the QR code below:

⚠ WARNING



Severe Injury Hazard

Secure pump to tube.

Hang pump with materials with a minimum working load of 750 lbs (340 kg).

Failure to follow these instructions can result in death, injury or property damage.



5.1 Pump Assembly Instructions

5.1.1 Determine Orientation of Pump Discharge

To ensure your safety, and comply with the terms of the warranty, all units must be installed in accordance with these instructions.

The pump must be installed in a location that it is readily accessible for servicing.

For CRVSF-Series only, a minimum of 18" (45 cm) ceiling clearance in accordance to National Fire Protection Association (NFPA) 30A latest revision is required.

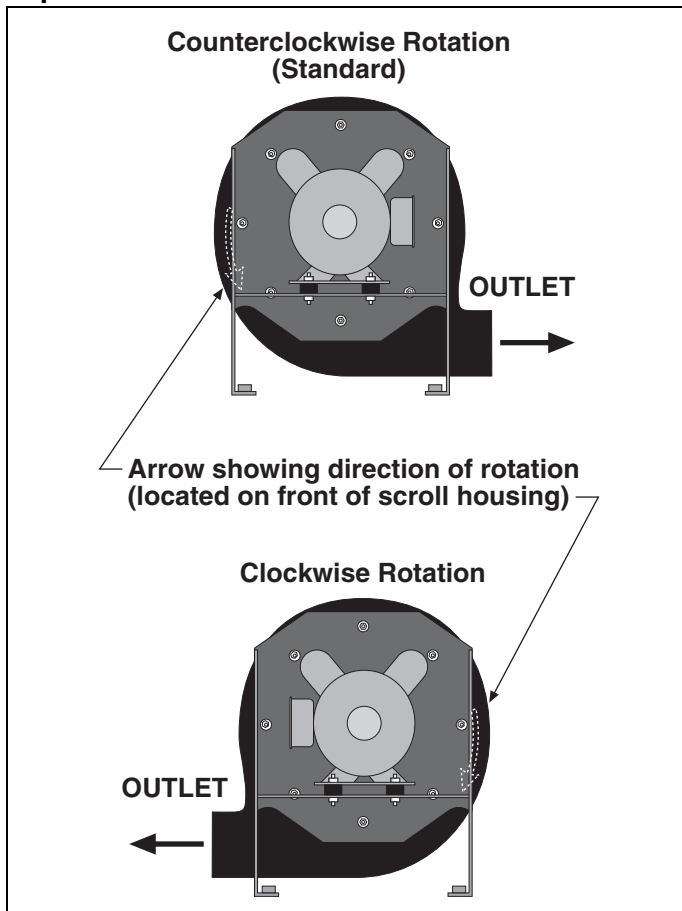
An arrow is affixed to the outside of the pump scroll to indicate the direction of rotation of the impeller. The standard rotation of the impeller is in the counter-clockwise direction.

Pump discharge orientation and impeller rotation direction is viewed from the rear of the motor as shown on Page 9, Figure 3. Note that the pump scroll outlet must always be positioned at the bottom hori-

zontal position.

quate clearance is maintained between the impeller blades and the body of the pump scroll.

FIGURE 3: Pump Discharge Orientation / Impeller Rotation Direction

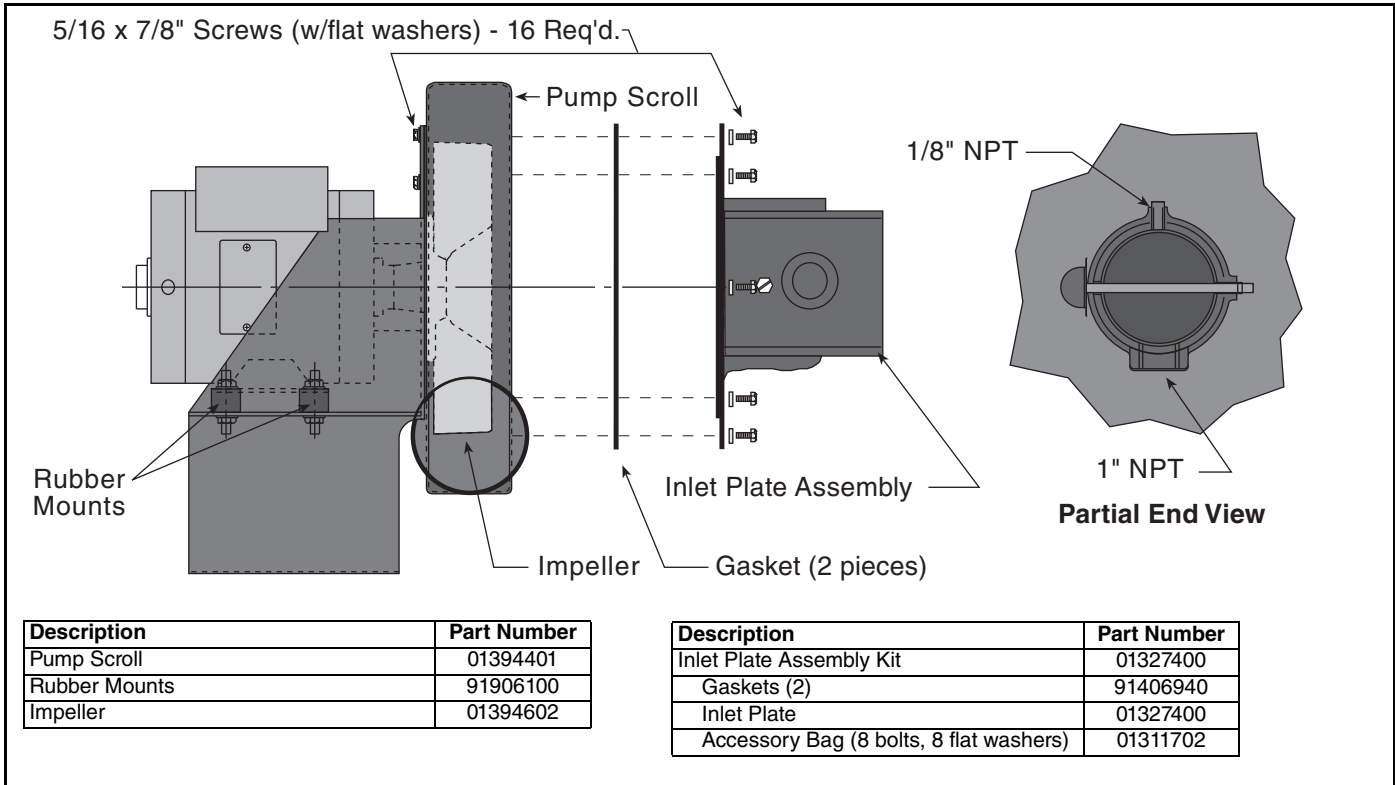


5.1.2 Attaching Pump Scroll

After determining the correct orientation of the pump scroll outlet, attach the pump scroll to the pump frame as follows:

- Place Flat Washer (P/N 95211600), on the 5/16" x 7/8" Screw (P/N 94273914).
- From the motor side of the vertical mounting plate of the pump frame, insert the 5/16" x 7/8" screws.
- Install two pieces of the gasket material on the exposed thread ends of the mounting screws. Make sure the ends of the opposing gasket segments interlock to form a complete circular gasket.
- Carefully position the pump scroll against the vertical mounting plate of the pump frame; align and loosely install the 5/16" x 7/8" screws into the corresponding mounting holes in the pump scroll.
- While tightening the screws (torque to 132 in/lb) that secure the pump scroll to the motor frame, periodically spin the impeller to be sure that ade-

FIGURE 4: Pump Assembly

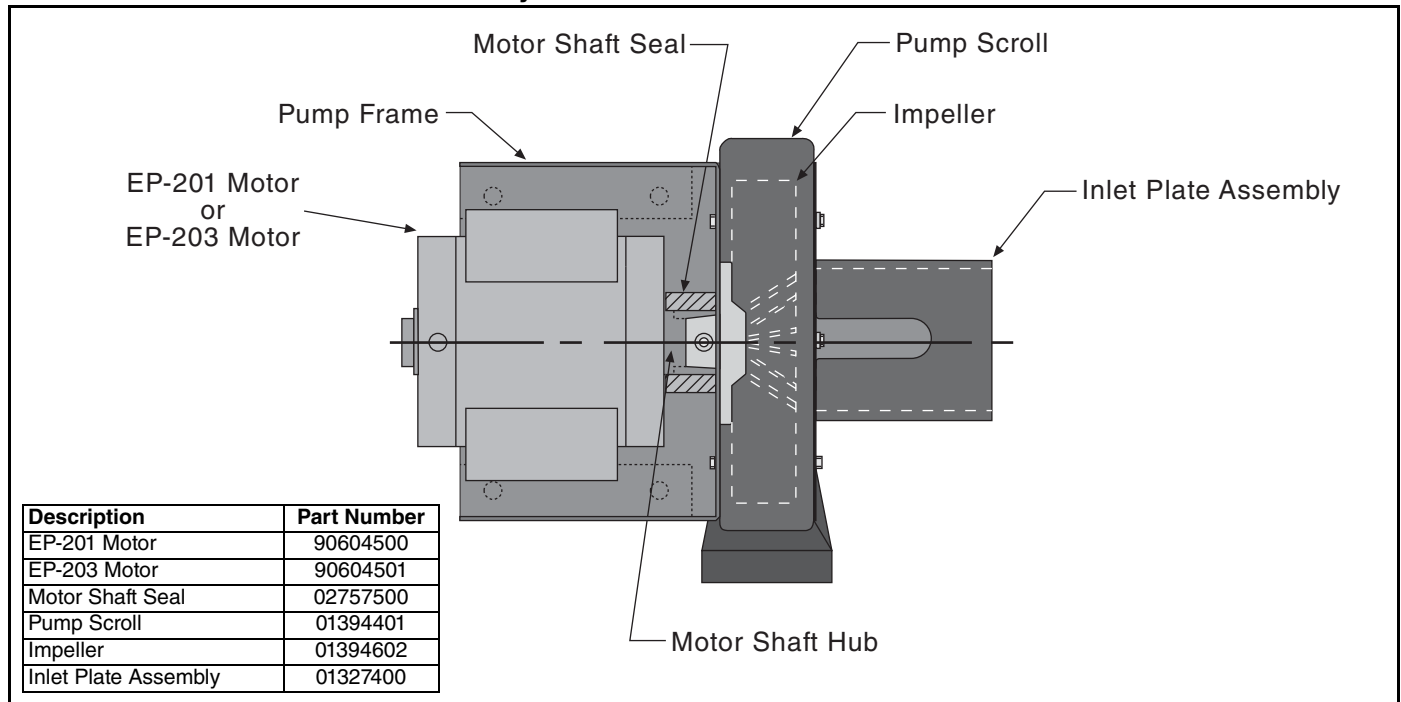


5.1.3 Attaching Pump Inlet Assembly

From scroll assembly side of pump, orient inlet assembly so threaded pipe coupling is on top. See partial end view on Page 10, Figure 4.

- Install pressure switch in 1/8" NPT hole in top of outlet.

- Place flat washer on the 5/16" x 7/8" screw.
- Position a single section of gasket against face of pump scroll; align clearance holes of gasket with mounting holes of pump scroll. Loosely install one 5/16" x 7/8" screw through gasket segment and into top center mounting hole of pump scroll to support gasket.
- Interlock remaining gasket segment to previously installed gasket segment to complete circular gasket.
- Orient inlet plate assembly as shown. The 1/8" NPT plug should face directly up, and 1" NPT plug should face directly downward. Carefully position top center mounting notch of inlet plate assembly to engage mounting screw positioned previously.
- Install seven remaining 5/16" x 7/8" screws through notches in inlet plate assembly and into corresponding mounting holes in pump scroll.
- Tighten screws (torque to 132 in/lb) to complete installation of inlet plate assembly.

FIGURE 5: Motor Shaft Seal Assembly

5.1.4 Installing Motor Shaft Seal

Motor shaft seal (P/N 02757500) eliminates air leakage around motor shaft and reduces associated noise. Install shaft seal as follows:

1. Separate motor shaft seal at pre-cut score line.
2. Wrap shaft seal around motor shaft hub as shown on *Page 11, Figure 5*.
3. Secure shaft seal in position with adhesive strip provided.

SECTION 6: PRESSURE SWITCH MOUNTING AND WIRING

6.1 Pressure Switch Installation

For connection to a pump, locate the two pressure switch mounting holes on the pump frame. If replacing an old pressure switch, you may need to drill two holes in the pump frame (7/32" dia. approximately 13/16" apart).

6.1.1 Attaching Pressure Switch to Pump Inlet

Using screws and locknuts included, mount the switch to the pump frame. Thread the barbed fitting into the threaded hole at the pump inlet. Cut the silicone tube to the appropriate length to eliminate the possibility of kinks and securely attach the hose to the pressure switch and the barbed fitting.

FIGURE 6: Pressure Switch Mounting Holes

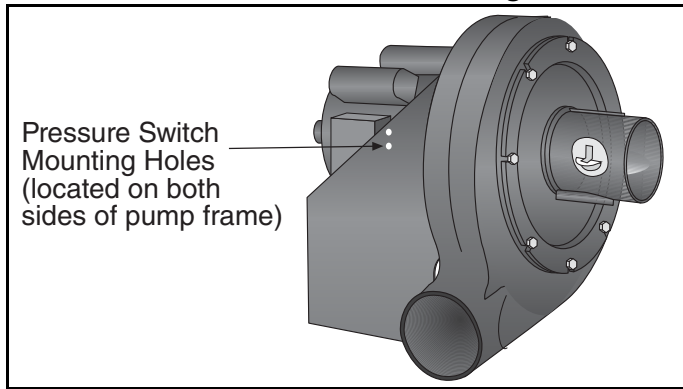


FIGURE 7: Mounted Pressure Switch

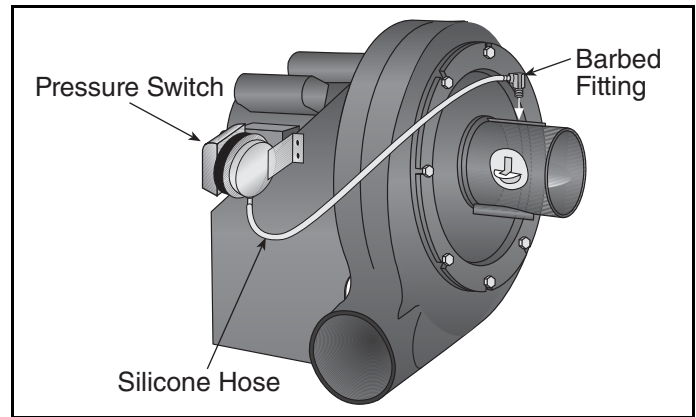
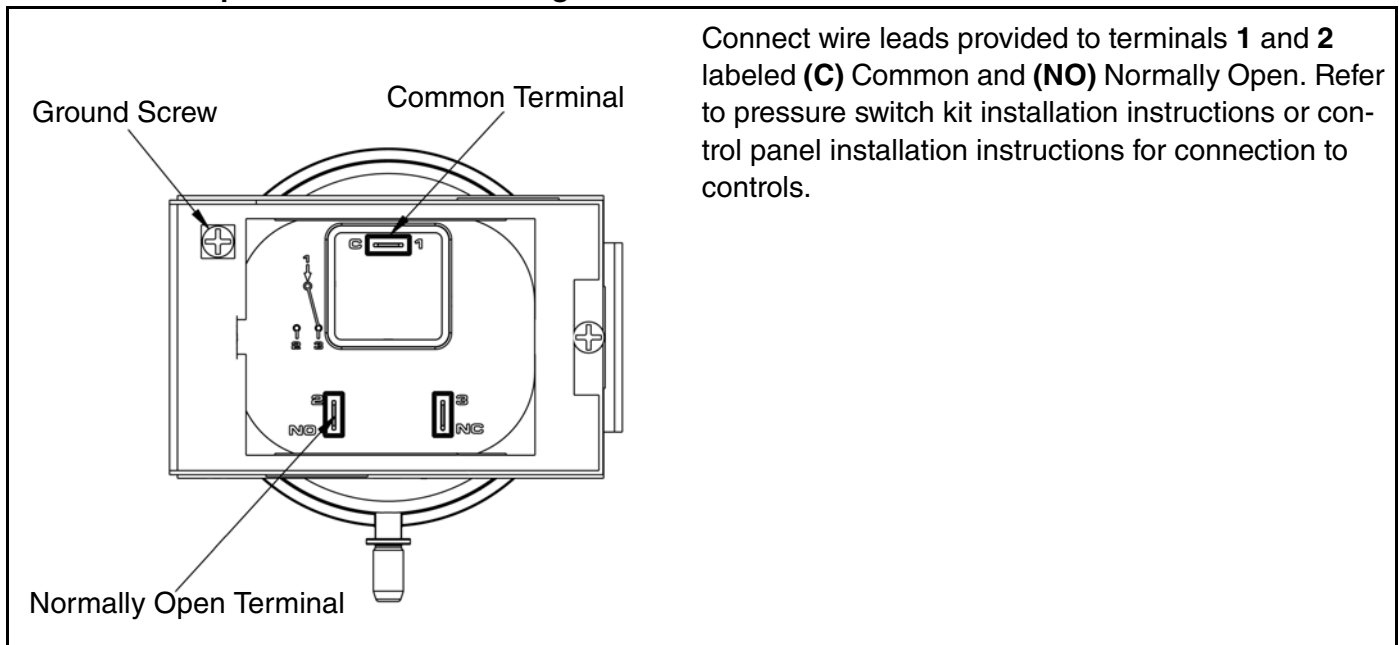



FIGURE 8: Pump Pressure Switch Wiring



Connect wire leads provided to terminals **1** and **2** labeled **(C)** Common and **(NO)** Normally Open. Refer to pressure switch kit installation instructions or control panel installation instructions for connection to controls.

SECTION 7: PUMP MOUNTING INSTRUCTIONS

⚠ WARNING	
	Suspension Hazard
	Mount pump with materials with a minimum working load of 750 lbs (340 kg).
	Failure of the supports can result in death, injury or property damage.

7.1 Wall Mounting

The standard method of mounting the EP-200 pump is on an outside wall and venting directly through the wall.

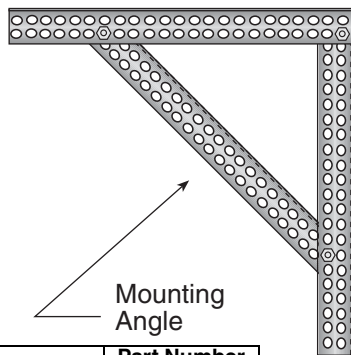
The pump may be mounted by using mounting angles as shown in *Figure 9*. The two mounting angles form a mounting platform to which the pump will be attached.

Attach the mounting frame to the wall using anchors. Select an anchor that will give equal to or greater than 2000 lb ultimate pull-out strength.

For CRVSF-Series only, a minimum of 18" ceiling clearance in accordance to National Fire Protection Association (NFPA) 30A latest revision is required.

FIGURE 9: Wall Bracket Assembly

NOTE: Typical assembly shown.
Two (2) assemblies per each pump required.



Description	Part Number
Mounting Angle	01365000
Hex Bolt 5/16" x 3/4"	93413912
Flat Washer	95211600
Lockwasher	96411600
Hex Nut	92113900

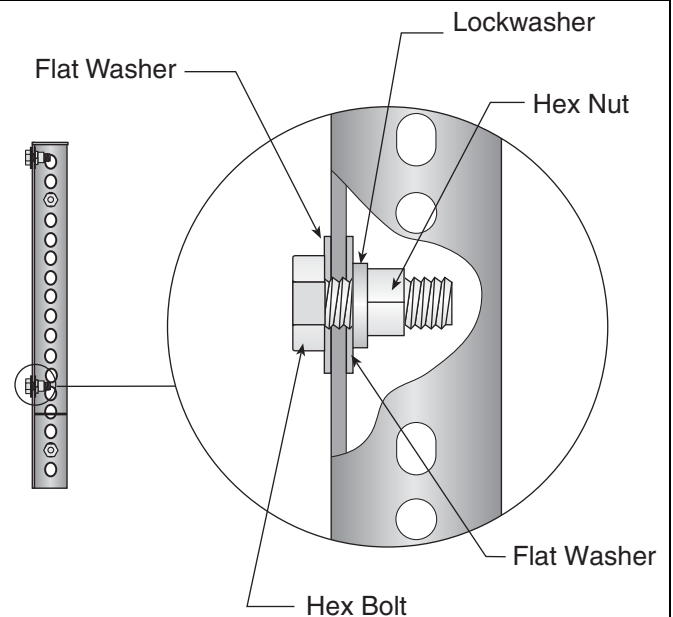


FIGURE 10: Wall Mounting Angle Assembly

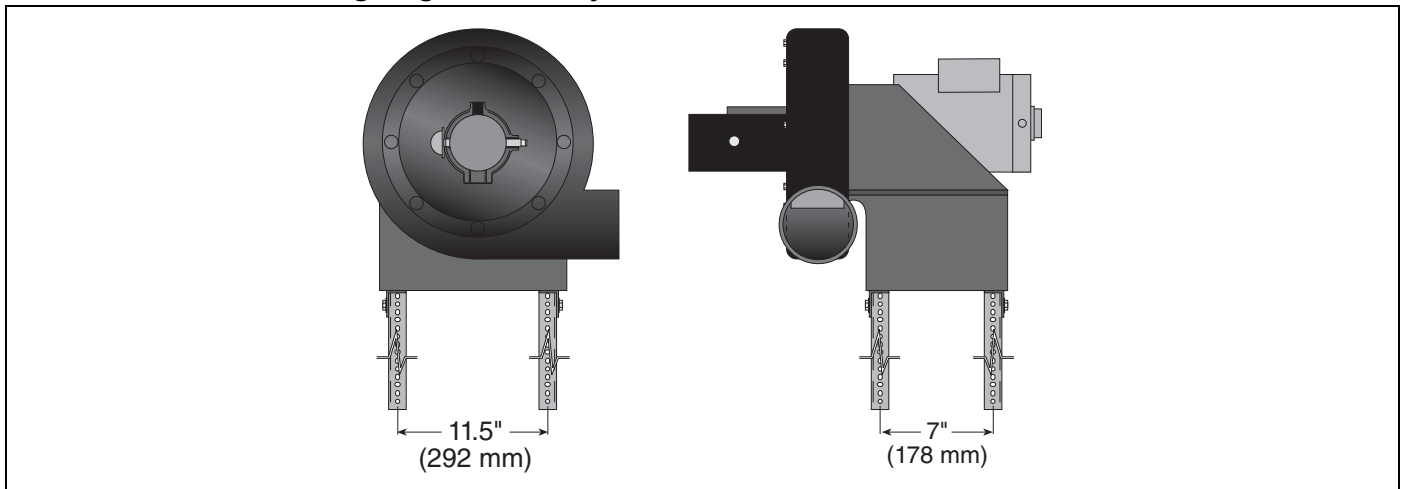
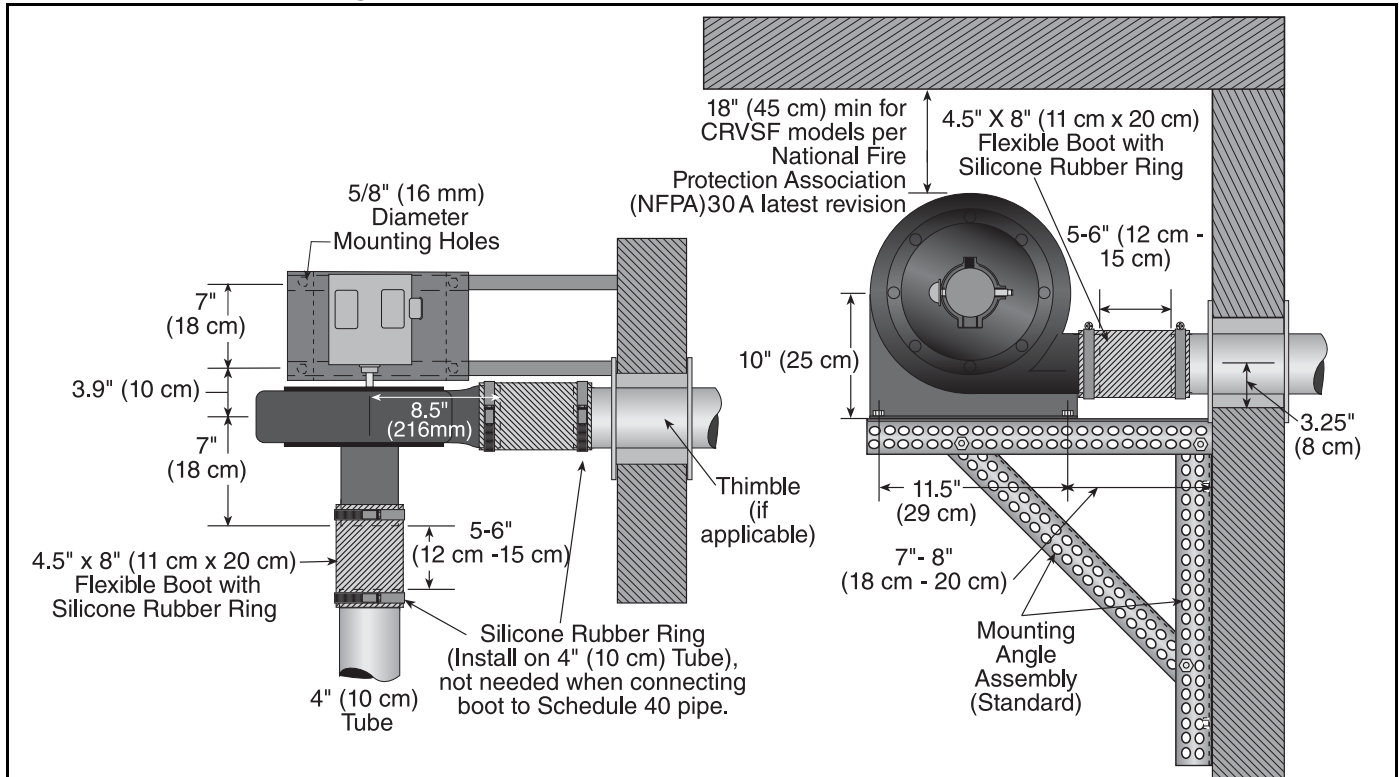


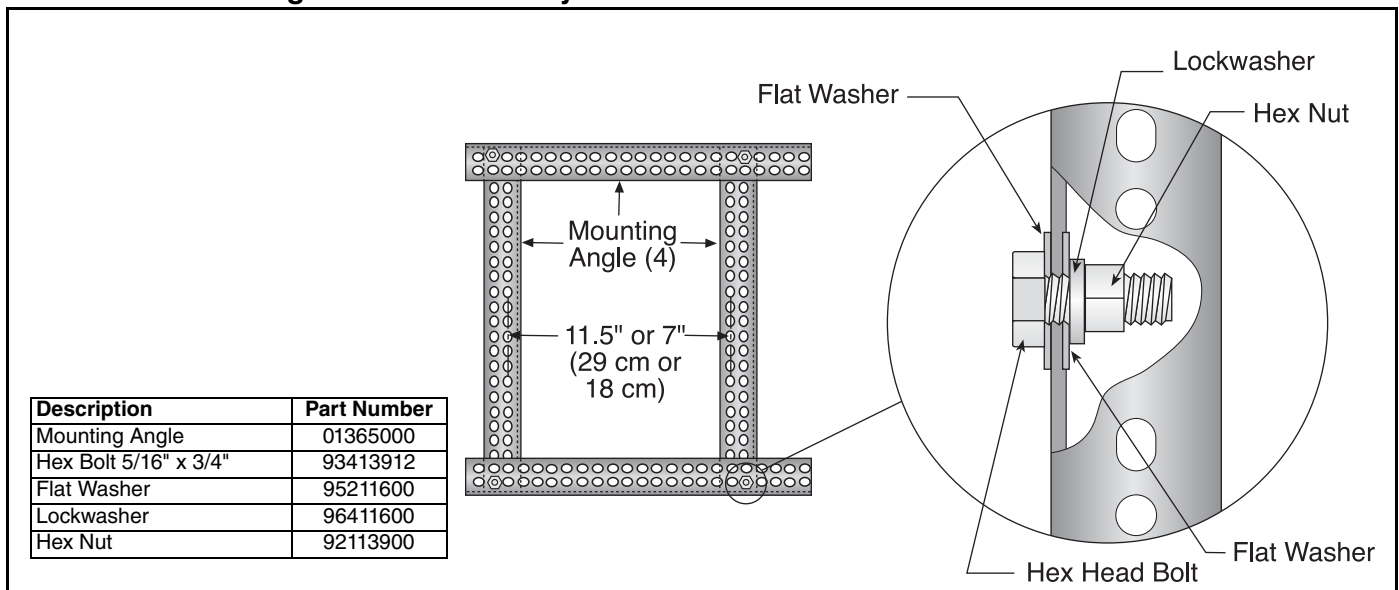
FIGURE 11: Wall Mounting



7.2 Mounting Platform (Optional Platform Assembly)

If mounting on an outside wall is not practical, it may be mounted on a platform suspended from the ceiling, or for noise reduction, in an enclosure.

FIGURE 12: Mounting Platform Assembly



SECTION 8: MOTOR WIRING

⚠ DANGER

Electrical Shock Hazard
Disconnect electric before service.
Appliance must be properly grounded.
Failure to follow these instructions can result in death or electrical shock.

All wiring must comply with current wiring regulations and any local regulations which may apply. Always switch off the supply and disconnect before servicing.

8.1 Impeller Rotation Direction

Prior to operation of the pump in the heating system, operation and proper rotation of the impeller must be verified. For reverse rotation, follow manufacturer's wiring diagram located on motor.

8.3 EP-203 Wiring

The EP-203 motor can be wired for 3 Ø, 208 V - 230 V, 60 Hz or 3 Ø, 460 V, 60 Hz operation.

The EP-203 motor rotation direction can be changed by interchanging any two leads. For proper motor wiring, follow manufacturer's wiring diagram located on motor.

When controlled by a CORAYVAC® Heating Control use Contactor Package 17A (P/N 10050011). See *Page 15, Figure* . See ROBERTS GORDON® CORAYVAC® Heating Control Manual (P/N 10091601NA) wiring details.

Wire the pressure switch per the heaters' Installation, Operation and Service Manual or appropriate controller installation manual.

The motor must be wired for clockwise or counter-clockwise rotation.

IMPORTANT: Improper rotation of the impeller will not produce the vacuum required for proper system operation.

8.2 EP-201 Wiring


The EP-201 motor is wired for 1 Ø, 120 V, 60 Hz operation. The EP-201 motor can be rewired for 230 V operation by changing the motor connections as indicated by the diagram on the motor. For proper motor wiring, follow manufacturer's wiring diagram located on motor.

When controlled by a CORAYVAC® Heating Control use Contactor Package 17A (P/N 10050011). See ROBERTS GORDON® CORAYVAC® Heating Control Manual (P/N 10091601NA) wiring details.

Wire the pressure switch per the CORAYVAC® Manual (P/N 127102NA) for CRV models, CORAYVAC® Classic SF (127302NA) for CRVSF models or VANTAGE® CTHN (P/N 152101NA) Installation, Operation and Service Manuals.

SECTION 9: VENTING

⚠ WARNING



Carbon Monoxide Hazard
Pump must be vented to the outside.
Heaters must be installed according to the installation manual.
Failure to follow these instructions can result in death or injury.

⚠ WARNING



Cut/Pinch Hazard
Wear protective gear during installation, operation and service.
Edges are sharp.
Failure to follow these instructions can result in injury.

9.1 General Venting Requirements

This pump must be vented in accordance with the rules contained in this manual and with the following national codes and any state, provincial or local codes which may apply:

United States: Refer to National Fuel Gas Code NFPA 54/ANSI Z223.1 - latest revision.

Canada: Refer to Natural Gas and Propane Installation Code CSA B149.1 - latest revision.

This section provides partial information about this specification with regard to size and configuration for venting requirements. See Page 17, Figure 13 and Page 18, Figure 14. However, to provide assurance of proper and safe operation, it is the responsibility of the installer to make sure the installation is in strict accordance with all local and national codes.

9.2 Venting the Pump

- Exhaust connection from pump is 4.5" (11 cm) diameter.
- Connect one of the flexible boots provided to the 4" (10 cm) flue pipe, using the silicone rubber ring provided.
- Connections to flue pipe larger than 4" (10 cm) require use of an appropriate "taper pattern reducer" (not supplied).
- Venting from pump may discharge either horizontally or vertically. **Horizontal discharge is preferred.** See Page 17, Figure 13. Vertical discharge must be arranged as shown on Page 18, Figure 14. Corrosion resistant pipe is required.
- Both horizontal and vertical venting must be supported by suitable hangers.
- Vent lengths are allowed as follows:

VENT LENGTH	VENT SIZE
Up To 10' (3 m)	4" (10 cm) vent - 1 elbow
Up To 25' (8 m)	5" (12.5 cm) vent - 3 elbow
Up To 50' (15 m)	6" (15 cm) vent - 3 elbow

9.3 Vent Material Recommendations

Vent recommendations:

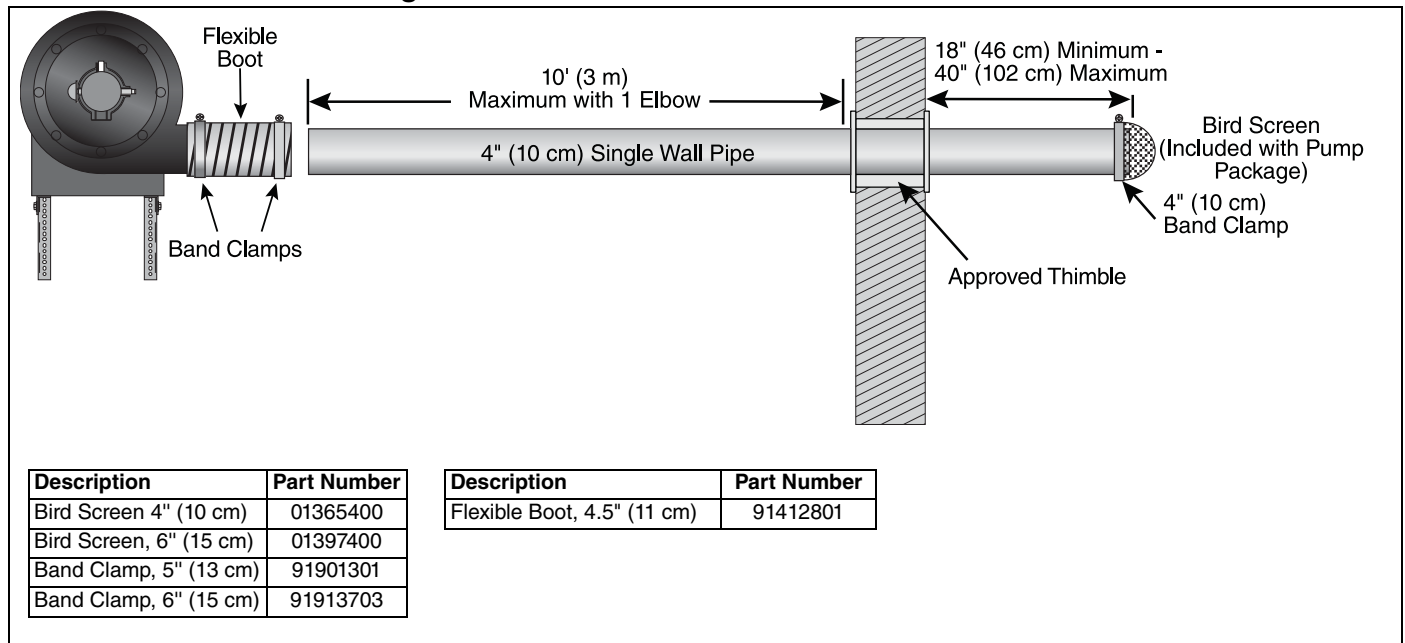
1. Porcelain coated tubing 4" (10 cm) O.D. (P/N 9141030D)
2. Heat treated aluminized tubing 4" (10 cm) O.D. (P/N 91409408)
Heat treated aluminized tubing 6" (15 cm) O.D. (P/N E0009105)
3. Single wall flue pipe - minimum 26 ga. (Not suitable for modulating and condensing system designs)
4. Schedule 40 ASTM A53 (Latest Edition) grade B ERW black steel pipe"

9.4 Horizontal Venting

Vent length be limited to less than 30' (9 m). If using vent lengths greater than 30' (9 m), condensation will form in the vent pipe. Insulation and additional sealing measures will be required. Seal all discharge pipe joints with high temperature silicone adhesive.

- Vent must exit building not less than 7' (2 m) above grade when located adjacent to public walkways.

- Vent must terminate at least 3' (1 m) above any forced air inlet located within 10' (3 m).
- Vent must terminate at least 4' (1.2 m) below 4' (1.2 m) horizontally from or 12" (30 cm) above any door, window or gravity air inlet into building.
- Locate vent terminal at least 12" (30 cm) from any opening through which vent gases could enter a building.
- Use only corrosion resistant materials for the discharge line from the pump to the point of discharge.
- Vent terminal opening must extend beyond any combustible overhang.
- Install vent terminal at a height sufficient to prevent blockage by snow.
- Protect building materials from degradation by flue gases.
- Any portion of flue pipe passing through a combustible wall must be dual insulated and an approved thimble must be used.

FIGURE 13: Side Wall Venting

9.5 Vertical Venting

Condensation will form in the vent pipe. Insulation and additional sealing measures may be required. Length of flue pipe is equal to total of vertical and horizontal length. Seal all discharge pipe joints with high temperature silicone adhesive. Vertical venting for CRVSF systems is not recommended.

FIGURE 14: Vertical Venting

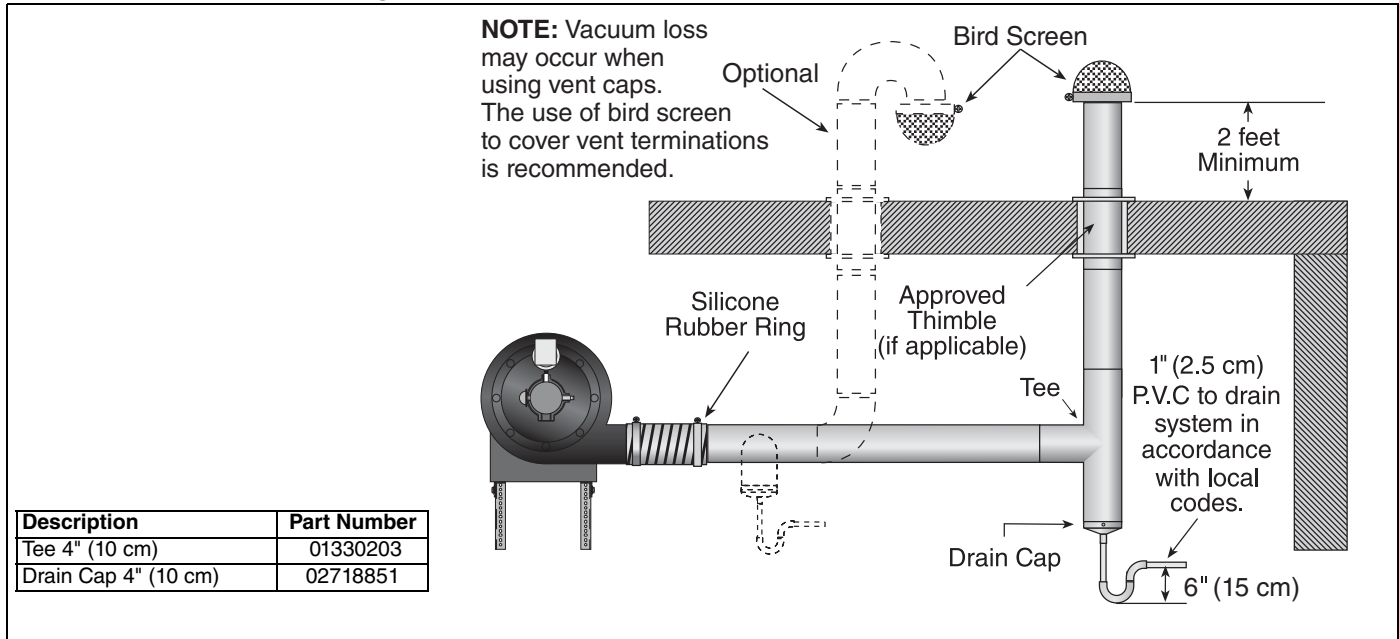


FIGURE 15: Condensate Check Valve

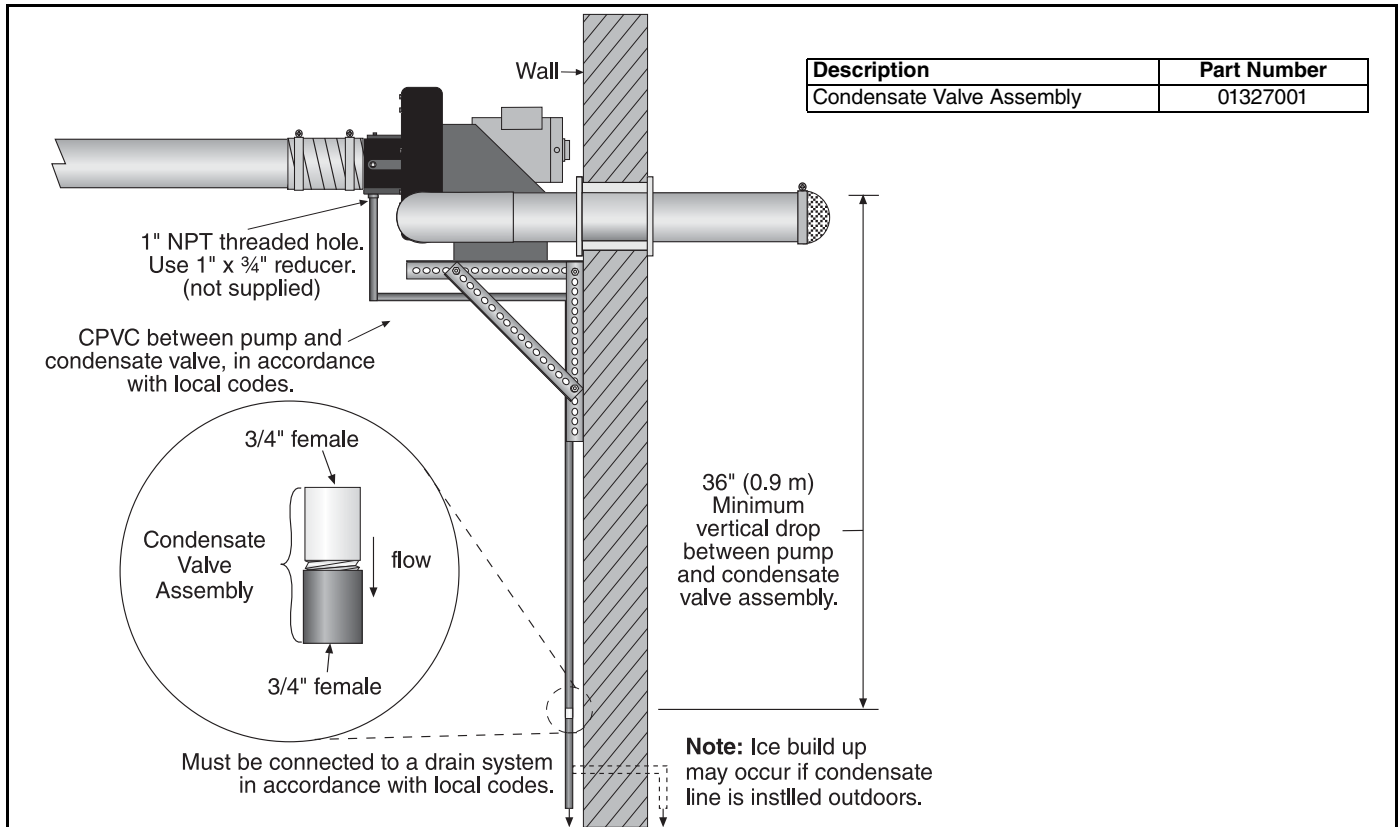
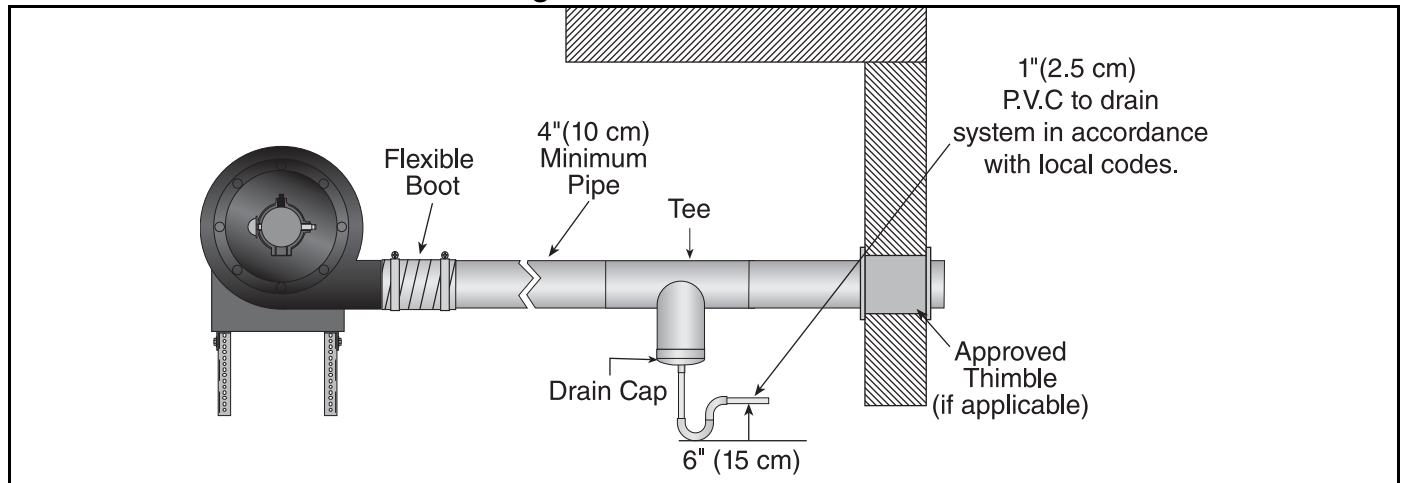


FIGURE 16: Condensate Tee - Discharge Side

9.6 Condensate Trap and Condensate Tee

The condensate trap assembly (optional) (P/N 01327001), should be installed on the inlet side of the EP-200 Series pump assembly, See Page 18, Figure 15.

It is possible to eliminate the condensate trap assembly on the pump if the one-inch threaded hole is plugged. This arrangement will permit drainage of condensate through the pump and outside via horizontal (pitched) discharge line.

The condensate trap assembly in the discharge line can be eliminated if the discharge line is horizontal through the wall and pitched down at least one inch per foot. A condensate trap on the discharge side is required if there is a vertical rise in the discharge line.

9.6.1 Condensate Neutralization Tube (optional)

If a condensate neutralization tube is specified to be used with the heating system, follow the steps below to choose the proper condensate neutralization tube. See Page 20, Figure 17.

Step 1: Condensate flow (gal/h) per 100,000 Btu/h installed

You will need to know the tailpipe length per flow unit and the total input (Btu/h) on the heating system. Please refer to the following chart to determine the condensate flow (gal/h) per 100,000 Btu/h installed:

Radiant Tube Length (average distance between burners)	Tailpipe Length per Flow Unit			
	Minimum	Recommended	1.7 ft/flow unit	Maximum
Minimum	N/A	0.1	0.3	0.6
Recommended	0.1	0.3	0.6	0.8
Maximum	0.3	0.6	0.8	0.8

Step 2: Total condensate

Determine the total condensate (gal/h) using the follow calculation:

$$\text{Total condensate (gal/h)} = \frac{\text{Total Input (Btu/h)}}{100,000 \text{ (Btu/h)}} \times \text{condensate flow (gal/h)}$$

Step 3: Choose the condensate neutralization tube

Choose the condensate neutralization tube which is closest to and higher than the calculated gal/h value.

Calculated gal/h	Description	Part Number
Less than 2	Condensate Neutralization Tube 200	01327002
Less than 6	Condensate Neutralization Tube 600	01327003
Less than 10	Condensate Neutralization Tube 1000	01327004
Less than 20	Condensate Neutralization Tube 2000	01327005

Example:

CORAYVAC® system has a total input of 600,000 Btu/h. The radiant tube length and tailpipe are set-up according to the RECOMMENDED specifications.

Step 1: Condensate flow (gal/h) per 100,000 Btu/h installed

Select 0.3 from the Condensate flow chart.

Radiant Tube Length (average distance between burners)	Tailpipe Length per Flow Unit			
	Minimum	Recommended	1.7 ft/flow unit	Maximum
Minimum	N/A	0.1	0.3	0.6
Recommended	0.1	0.3	0.6	0.8
Maximum	0.3	0.6	0.8	0.8

Step 2: Total condensate

Multiply the total input Btu/h / 100,000 by the condensate flow (gal/h) per 100,000 (Btu/h)
 $(600,000/100,000) \times 0.3 = 1.8 \text{ (gal/h)}$

Step 3: Choose the condensate neutralization tube

Choose the condensate neutralization tube which is closest to and higher than the calculated gal/h value. For this example, the total condensate is 1.8 (gal/h), the condensate neutralization tube which is closest to and higher than the calculated gal/h value is P/N 01327002.

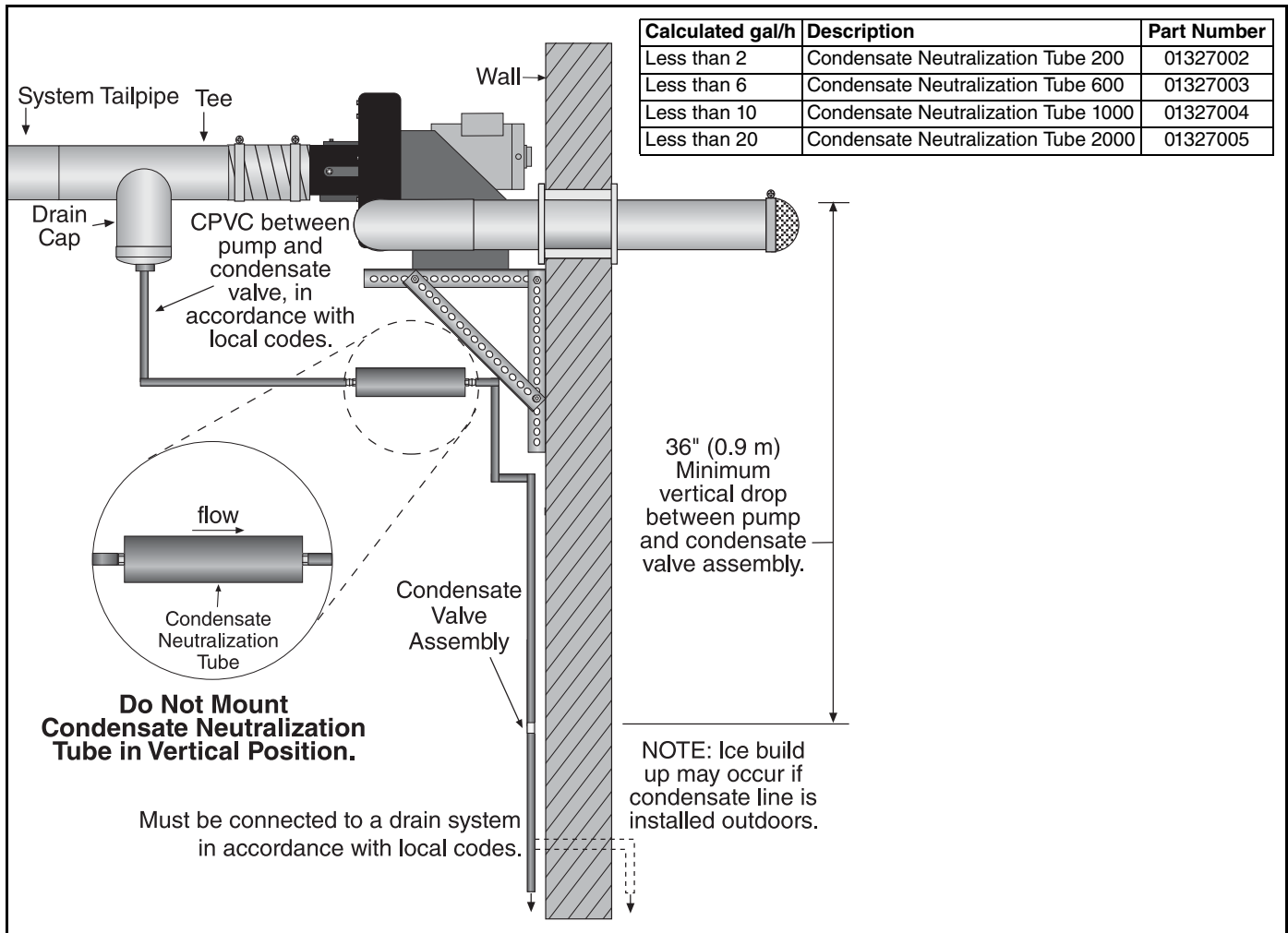
Calculated gal/h	Description	Part Number
Less than 2	Condensate Neutralization Tube 200	01327002
Less than 6	Condensate Neutralization Tube 600	01327003
Less than 10	Condensate Neutralization Tube 1000	01327004
Less than 20	Condensate Neutralization Tube 2000	01327005

NOTE: Condensate neutralization tubes must be replaced yearly (every 2000 operating hours) or check condensate water pH level. If it is below pH 6, replace tube.

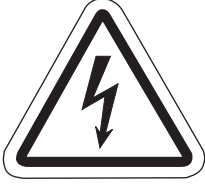



To order replacement, see the chart below:


Description	Part Number
Condensate Neutralization Tube 200	01327002
Condensate Neutralization Tube 600	01327003
Condensate Neutralization Tube 1000	01327004
Condensate Neutralization Tube 2000	01327005
Refill, Condensate Neutralization Tube 600	01327007
Refill, Condensate Neutralization Tube 1000	01327008
Refill, Condensate Neutralization Tube 2000	01327009

FIGURE 17: Condensate Neutralization Tube



SECTION 10: SERVICING INSTRUCTIONS

⚠ DANGER		⚠ WARNING	
			
Electrical Shock Hazard Disconnect electric before service. Heater and pump must be connected to a properly grounded electrical source.	Explosion Hazard Turn off gas supply to heater before service.	Burn Hazard Allow heater and pump to cool before service. Tubing may still be hot after operation.	Cut/Pinch Hazard Wear protective gear during installation, operation and service. Edges are sharp.
Failure to follow these instructions can result in death, electric shock, injury or property damage.			

⚠ DANGER

Severe Injury Hazard Install pump scroll and inlet assembly before operating high speed rotating impeller. Keep hands, fingers and clothing away from inlet and outlet. Install and operate equipment according to installation manual. Failure to follow these instructions can result in death or severe injury.

Disassembly and removal or replacement of any pump components must be done by a service contractor or electrician qualified in the installation and service of gas-fired heating equipment.

Overtorquing can result in a failure of components. Failure to follow these instructions can compromise pump operation and void warranty.

10.1 Pre-Season Maintenance and Annual Inspection

To ensure your safety and years of trouble-free operation of the pump, service and annual inspections must be done by a contractor qualified in the installation and service of gas-fired heating equipment. Disconnect electric and gas supplies before performing service or maintenance.

Before every heating season, a contractor qualified in the installation and service of gas-fired heating equipment must perform a thorough safety inspection of the pump.

For safety and best performance, the electrical, venting, suspensions and overall pump condition are some of the areas requiring inspection.

Please see *Page 23, Section 10.3* for suggested items to inspect.

10.2 To Change the Motor and/or the Impeller

1. Disconnect electrical before servicing.
2. To remove the motor or impeller, the scroll must be opened. Remove the eight nuts/bolts and insert a knife blade between the scroll halves to cut through the factory applied sealant. Separate the two halves.
3. The impeller can be removed by loosening the two 3/8-24 set screws, removing the 10-32 screw and retainer assembly. With an appropriate wheel puller, remove the impeller.

4. The motor can now be removed, if necessary, by loosening the attachment hardware.
5. Re-assembly of motor/impeller combination require proper alignment. Make sure the impeller has a 1/4" (6 mm) clearance off the inside wall of the scroll. Verify proper motor alignment and free rotation.
6. The two) impeller set screws should be removed and reinstalled with a drop of thread locking sealant and remain unseated during initial re-assembly.
7. Slide the impeller onto the motor shaft end. Apply a drop of thread locking sealant to the threads of the retainer screw/washer assembly. Insert the retainer screw into the shaft so that it bottoms on the end of the shaft and hub of the impeller. Torque to 30 in/lb.
8. Seat the two impeller set screws. Torque to 100 in/lbs.
9. Re-attach the scroll halves. Apply a bead of high temperature silicone sealant (600°F) to the scroll halves. Secure with all seven nuts/bolts. Torque to 150 in/lb.

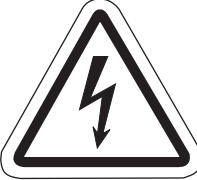



10.3 Maintenance Checklist

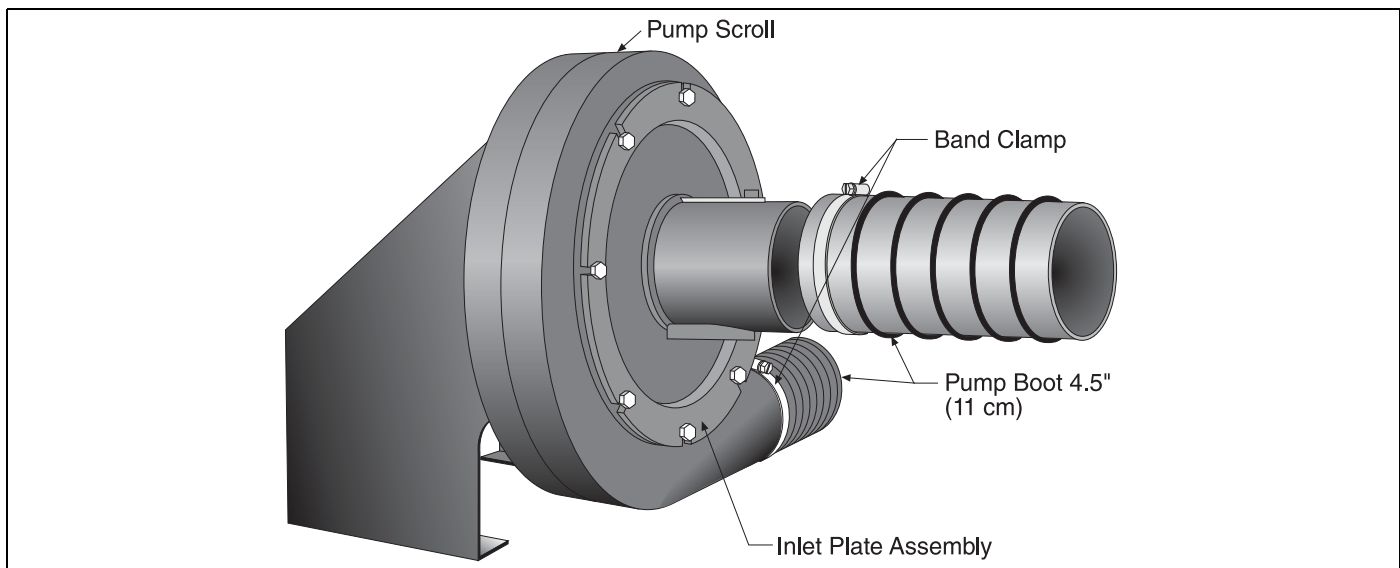
Installation Code and Annual Inspections:

All installation and service of ROBERTS GORDON® equipment must be performed by a contractor qualified in the installation and service of equipment sold and supplied by Roberts-Gordon LLC and conform to all requirements set forth in the ROBERTS GORDON® manuals and all applicable governmental authorities pertaining to the installation, service, operation and labeling of the equipment. To help facilitate optimum performance and safety, Roberts-Gordon LLC recommends that a qualified contractor conduct, at a minimum, annual inspections of your ROBERTS GORDON® equipment and perform service where necessary, using only replacement parts sold and supplied by Roberts-Gordon LLC

System Tubing and Vent Pipe	<p>Venting must be intact. Using a flashlight, look for obstructions, cracks on the pipe, gaps in the sealed areas or corrosion.</p> <p>The area must be free of dirt and dust or blockage.</p> <p>Remove any carbon deposits or scale using a wire brush.</p> <p>Replace pipe if there are any holes due to corrosion. Seal any gaps in venting to prevent condensate leakage.</p>
Pump Scroll, Impeller and Motor	<p>Compressed air or a vacuum cleaner may be used to clean dust and dirt.</p> <p>Check for corrosion, if any parts have corroded through, replace as necessary.</p> <p>Ensure all hex nuts are tight for proper seal.</p>
Suspension Points	<p>Make sure the pump is hanging securely.</p> <p>Look for signs of wear on the mounting angles, wall mounting points or ceiling mounting points.</p>
Pump Boot	<p>Inspect pump boot at pump inlet and outlet for cracking or deterioration.</p> <p>Replace if cracks are found.</p> <p>Ensure band clamps are tight at all connection points.</p>
Condensate Trap, Drain Cap	<p>Check connection of tee to drain cap and between tee and condensate trap.</p> <p>Seal connections between tee and drain cap to prevent condensate leakage.</p> <p>Screw condensate trap tightly into drain cap or pump inlet assembly to prevent leakage.</p> <p>Condensate trap should be filled with water.</p>
Pressure Switch	<p>Ensure that wiring is intact. Check silicone hose for cracks.</p> <p>Ensure secure connection between pressure switch and barbed fitting.</p>
Safety Labels	<p>Product safety signs or labels should be replaced by the product user when they are no longer legible. Please contact Roberts-Gordon LLC or your ROBERTS GORDON® independent distributor to obtain replacement signs or labels. See Page 2, Figure 1.</p>

SECTION 11: REPLACEMENT PARTS AND ACCESSORIES

⚠ DANGER		⚠ WARNING	
			
Electrical Shock Hazard	Explosion Hazard	Fire Hazard	Carbon Monoxide Hazard
<p>Use only genuine ROBERTS GORDON® replacement parts per this installation, operation and service manual.</p> <p>Failure to follow these instructions can result in death, electric shock, injury or property damage.</p>			



11.1 Replacement Parts

Description	Part Number	Description	Part Number
EP-201 Motor 3/4 HP, 115 V, 1 Ø	90604500	Bird Screen w/ clamp	01312200
EP-203 Motor 3/4 HP 208 V - 230 V/ 460 V, 3 Ø	90604501	Shaft Seal	02757500
Impeller - 5/8" Bore	01394602	Damper Assembly	01313800
Impeller - 1/2" Bore	01394600	Mounting Angle Assembly	01312102
Pressure Switch Kit	90430600K	Inlet Plate Assembly Kit	01327401
Rubber Mounts for Pump Motor	91906100	Flexible Boot Replacement Package	02771000
Pump Scroll	01394401		

11.2 Accessories

Description	Part Number	Description	Part Number
4" Plain Coupling	01312700	4" Aluminized 90° Elbow	01335801
6" Plain Coupling	01312706	6" Aluminized 90° Elbow	T0100320
4" Lined Coupling	0131270I	4" Coated 90° Elbow	0133580D
4" Damper Coupling	01331900	6" Coated 90° Elbow	0133660D
6" Damper Coupling	E0009356	4" Aluminized Non Heat Treated 10' Tube	91409403
4" Aluminized Tee	01330203	6" Aluminized Non Heat Treated 10' Tube	91409420
6" Aluminized Tee	01330204	4" Coated 10' Tube	9141030D
4" Coated Tee	0133022D	Aluminized Tube adapter (6" dia. x 4" dia.)	91418200
6" Coated Tee	0133025D	6" Tube Hanger	91240010
4" Aluminized Cross	01330903	6" Aluminized Cross	01330904

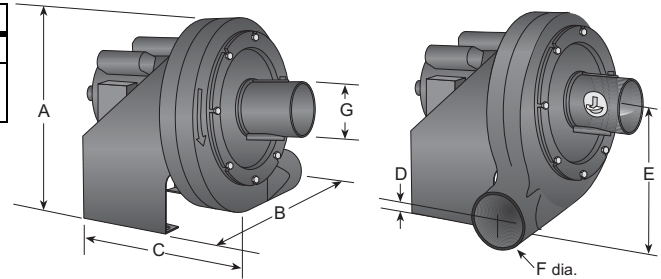
Description	Part Number
Schedule 40 Damper Nipple	01322000
4" Coated Cross	0133092D
5" (13 cm) Band Clamp	91901301
6" (15 cm) Band Clamp	91913703

Description	Part Number
4" Drain Cap	02718851
6" Drain Cap	02718852
Condensate Trap	01327001

SECTION 12: SPECIFICATIONS

Pump Dimensional Data (in.)

Model	A	B	C	D	E	F	G
EP-201	17.75	17	20.25	3.25	10	4.5	4.5
EP-203							



Pump Specifications

Model	EP-201	EP-203
Horsepower (Hp)	3/4	3/4
Phase (Ø)	1	3
Hertz (Hz)	60	60
Voltage (V)	115/208 - 230	208 - 230 / 460
Full Load Amp (A)	8.0/4.42 - 4.0	2.5 - 2.26/1.13
R.P.M.	3500	3475
Motor Frame	56	56
Motor Enclosure	TEFC	TEFC
Noise Level @ 5' dB(A)	70	N/A
Inlet/Outlet (In.)	4.5/4.5	4.5/4.5
Weight (lbs.)	112	112

12.1 Material Specifications

12.1.1 Pump, Frame, Scroll Materials

12 Gauge Stamped Steel Construction

12.1.2 Impeller Materials

319 Cast Aluminum

12.2 Suspension Specifications

Hang pump with materials with a minimum working load of 750 lbs (340 kg).

12.3 Controls Specifications

Time switches, thermostats, etc. can be wired into the electrical supply. External controls supplied as an optional extra. See the heaters' Installation, Operation and Service Manual for details.

SECTION 13: THE ROBERTS GORDON® EP-200 SERIES PUMP WARRANTY

ROBERTS-GORDON LLC WILL PAY FOR:

Within 36 months from date of purchase by buyer or 42 months from date of shipment by Roberts-Gordon LLC (whichever occurs first), replacement parts will be provided free of charge for any part of the product which fails due to a manufacturing or material defect.

Roberts-Gordon LLC will require the part in question to be returned to the factory. Roberts-Gordon LLC will, at its sole discretion, repair or replace after determining the nature of the defect and disposition of part in question.

ROBERTS GORDON® Replacement Parts are warranted for a period of 12 months from date of shipment from Roberts-Gordon LLC or the remaining ROBERTS GORDON® EP-200 Series Pump warranty.

ROBERTS-GORDON LLC WILL NOT PAY FOR:

Service trips, service calls and labor charges.

Shipment of replacement parts.

Claims where the total price of the goods have not been paid.

Damage due to:

- Improper installation, operation or maintenance.
- Misuse, abuse, neglect, or modification of the ROBERTS GORDON® EP-200 Series Pump in any way.
- Use of the ROBERTS GORDON® EP-200 Series Pump for other than its intended purpose.
- Incorrect gas or electrical supply, accident, fire, floods, acts of God, war, terrorism, or other casualty.
- Improper service, use of replacement parts or accessories not specified by Roberts-Gordon LLC.
- Failure to install or maintain the ROBERTS GORDON® EP-200 Series Pump as directed in the Installation, Operation and Service Manual.
- Relocation of the ROBERTS GORDON® EP-200 Series Pump after initial installation
- Use of the ROBERTS GORDON® EP-200 Series Pump in a corrosive atmosphere containing contaminants.
- Use of the ROBERTS GORDON® EP-200 Series Pump in the vicinity of a combustible or explosive material.
- Any defect in the ROBERTS GORDON® EP-200 Series Pump arising from a drawing, design, or specification supplied by or on behalf of the consumer.
- Damage incurred during shipment. Claim must be filed with carrier.

WARRANTY IS VOID IF:

The ROBERTS GORDON® EP-200 Series Pump is not installed by an contractor qualified in the installation and service of gas fired heating equipment.

You cannot prove original purchase date and required annual maintenance history.

The data plate and/or serial number are removed, defaced, modified or altered in any way.

The ownership of the ROBERTS GORDON® EP-200 Series Pump is moved or transferred. This warranty is non-transferable.

Roberts-Gordon LLC is not permitted to inspect the damaged equipment and/or component parts.

READ YOUR INSTALLATION, OPERATION AND SERVICE MANUAL.

If you have questions about your equipment, contact your installing professional. Should you need Replacement Parts or have additional questions, call or write:

Roberts-Gordon LLC

1250 William Street

P.O. Box 44

Buffalo, New York 14240-0044

Telephone: +1.716.852.4400

Fax: +1.716.852.0854

Toll Free: 800.828.7450

www.robertsgordon.com

Roberts-Gordon LLC's liability, and your exclusive remedy, under this warranty or any implied warranty (including the implied warranties of merchantability and fitness for a particular purpose) is limited to providing replacement parts during the term of this warranty. Some jurisdictions do not allow limitations on how long an implied warranty lasts, so this limitation may not apply to you. There are no rights, warranties or conditions, expressed or implied, statutory or otherwise, other than those contained in this warranty.

Roberts-Gordon LLC shall in no event be responsible for incidental or consequential damages or incur liability for damages in excess of the amount paid by you for the ROBERTS GORDON® EP-200 Series Pump. Some jurisdictions do not allow the exclusion or limitation of incidental or consequential damages, so this limitation or exclusion may not apply to you. This warranty gives you specific legal rights, and you may also have other rights which vary from jurisdiction to jurisdiction.

Roberts-Gordon LLC shall not be responsible for failure to perform under the terms of this warranty if caused by circumstances out of its control, including but not limited to war, fire, flood, strike, government or court orders, acts of God, terrorism, unavailability of supplies, parts or power. No person is authorized to assume for Roberts-Gordon LLC any other warranty, obligation or liability.

LIMITATIONS ON AUTHORITY OF REPRESENTATIVES:

No representative of Roberts-Gordon LLC, other than an Executive Officer, has authority to change or extend these provisions. Changes or extensions shall be binding only if confirmed in writing by Roberts-Gordon LLC's duly authorized Executive Officer.

