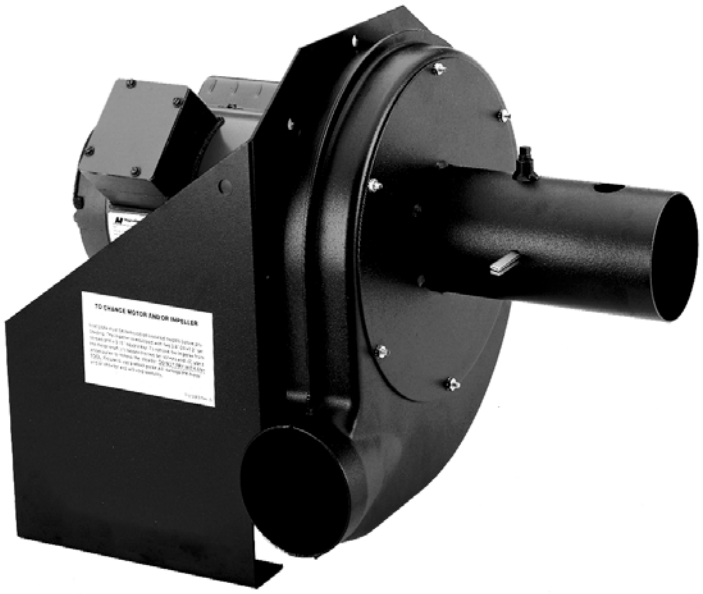
ROBERTS GORDON®

# EP-100 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.

**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**



P/N 127201NA Rev. G 3/18

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Printed in U.S.A.

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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.

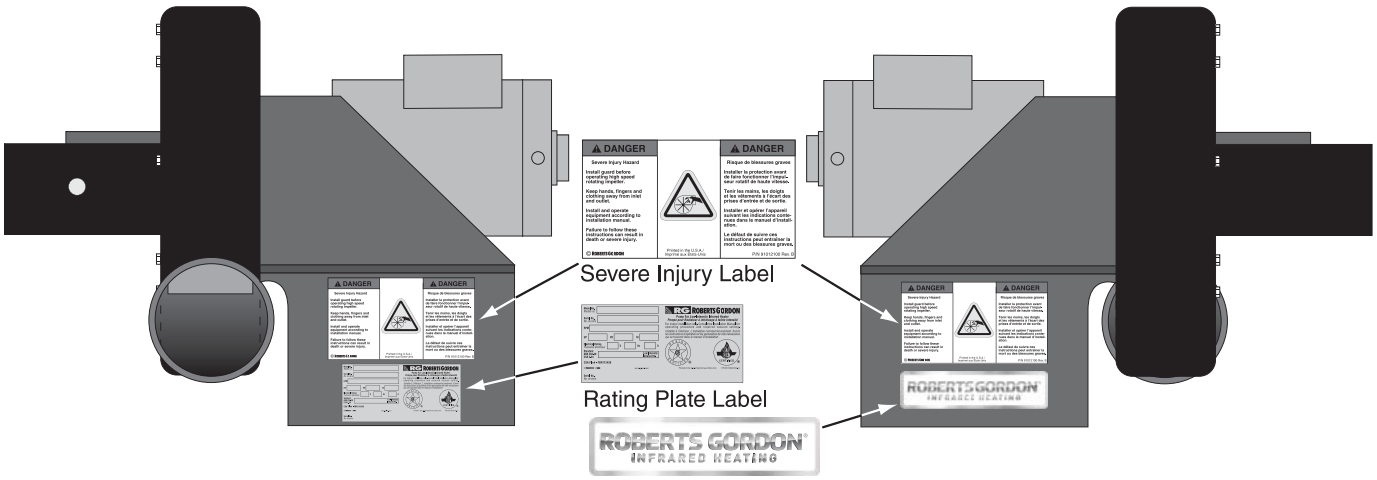
### 1.2 Safety Labels and Their Placement

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




| Description | Part Number |
|---|---|
| Severe Injury Label | 91012100 |
| Rating Plate Label | 91010401 |
| Logo Label | 91017200 |

## 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 pump 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

**⚠ CAUTION**

**Product Damage Hazard**

**Do not use heater in area containing corrosive chemicals.**

**Refer to appropriate Material Safety Data Sheets (MSDS).**

**Failure to follow these instructions can result in product damage.**

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 equipment 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 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 cartons. Lift assembly by gripping metal pump frame. Two people are required (weight 62 lbs, 28.1 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.**

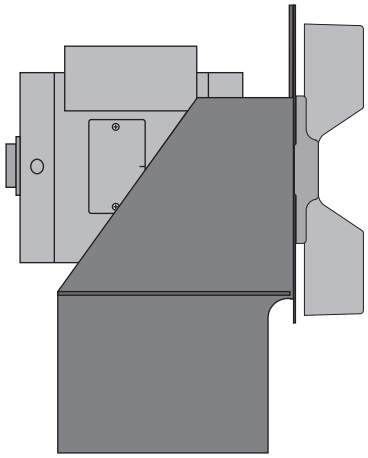
**Install and operate equipment according to installation manual.**

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

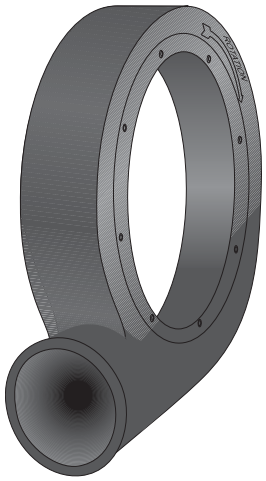
## SECTION 4: MAJOR COMPONENTS

### FIGURE 2: Major Component Descriptions

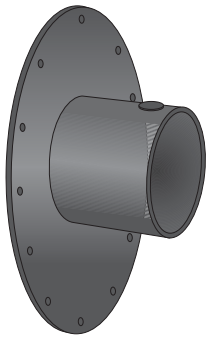
**EP-100 Pump Assembly - P/N 02719100**



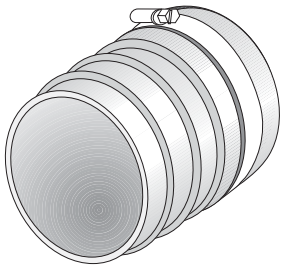
**Pump Scroll Assembly - P/N 02757001**



**Pump Inlet Assembly - P/N 02724200**

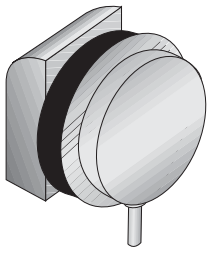


**Flexible Boot 4.5" (11 cm) - P/N 91412801**
**Silicone Rubber Ring - P/N 91906900**



**Band Clamp 4" (10 cm) - P/N 91901300**

**Pressure Switch - P/N 90430600K**



**2 1/2'' S-Hook - P/N 91907302**

**Bird Screen 4" (10 cm) P/N 01365400**

## 4.1 Standard Parts List

**Table 1: EP-100 Pump Package 4" (10 cm) (P/N 02719105)**

| Part No. | Description | Quantity |
|---|---|---|
| | Box 1 of 2 | |
| **02719100** | **Pump Frame, Motor and Impeller Assembly Includes:** | **1** |
| 127102NA | CORAYVAC® Installation, Operation and Service Manual | 1 |
| 127201NA | EP-100 Series Installation, Operation and Service Manual | 1 |
| | Box 2 of 2 | |
| **02724700** | **EP-100 Accessory Package Includes:** | **1** |
| 127201NA | EP-100 Installation, Operation and Service Manual | 1 |
| 02724200 | Pump Inlet Assembly | 1 |
| 02757001 | Pump Scroll | 1 |
| 91901300 | Band Clamp 4'' (10 cm) | 5 |
| 91907302 | 2 1/2" S-Hooks | 3 |
| 91412801 | 4.5" Flexible Boot | 2 |
| 91906900 | Silicone Rubber Ring | 4 |
| 92311600 | #10-24 Keps Locknuts | 12 |
| 90430600K | Pressure Switch | 1 |
| 02757500 | Motor Shaft Seal | 1 |
| 01365400 | Bird Screen 4'' (10 cm) | 1 |
| 01327500 | Damper Assembly | 1 |
| 01329500 | Damper Support Assembly | 1 |
| 93413008 | Bolt 1/4" - 20 x 1/2" Hex Head | 1 |
| 95211600 | 5/16" Flat Washer | 1 |
| 96211500 | 1/4" External Tooth Lockwasher | 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**

**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.**

**⚠ 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:

### 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.

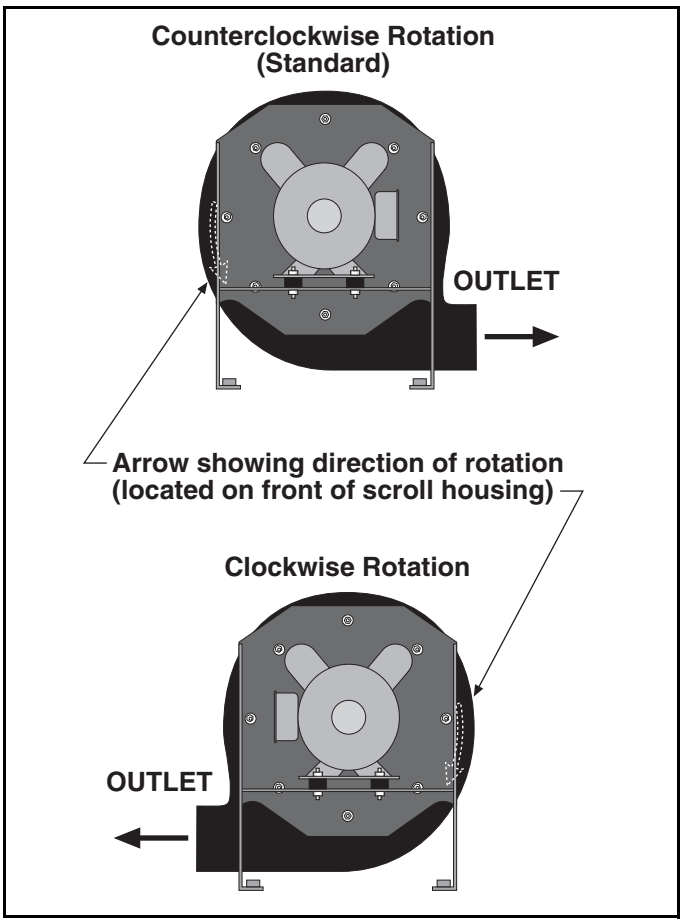
The pump must be installed in a location that it is readily accessible for servicing.

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 outside of pump scroll to indicate impeller rotation direction. The standard impeller rotation is in the counterclockwise direction.

Pump discharge orientation is viewed from the rear of the motor as shown *on Page 8, Figure 3*. Note that pump scroll outlet must always be in bottom horizontal position.

**FIGURE 3: Pump Discharge Orientation/Impeller Rotation Direction**




### 5.1.2 Attaching Pump Scroll

After determining correct orientation of pump scroll outlet, attach pump scroll to pump frame using #10 - 24 Keps locknuts provided.

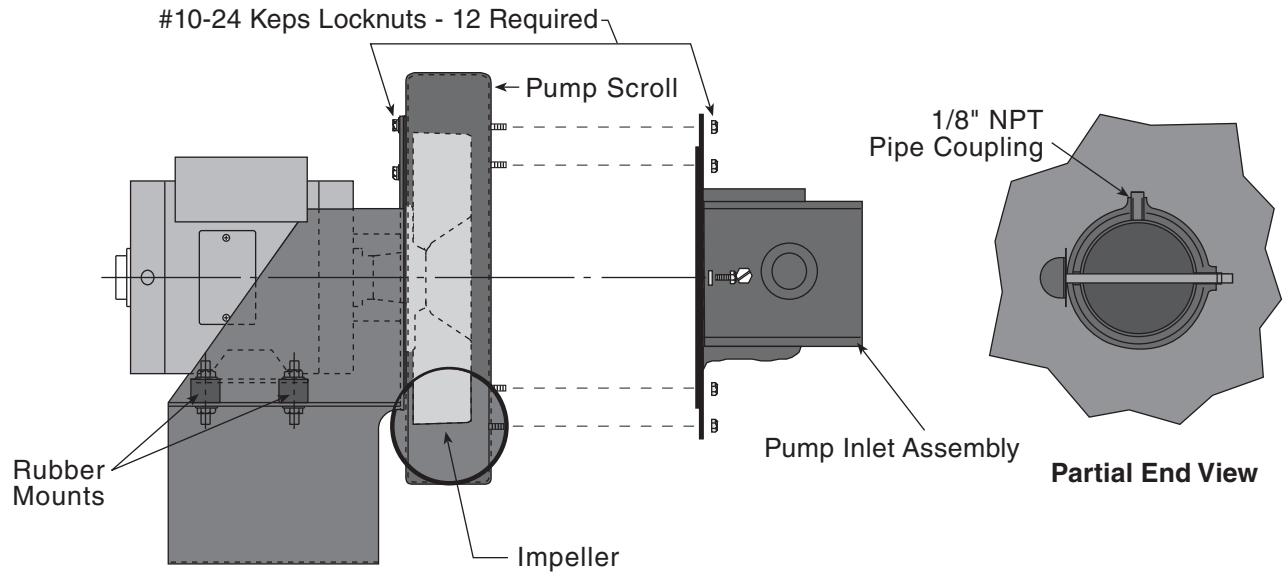
NOTE: Periodically spin impeller to be sure that adequate clearance is maintained between impeller blades and pump scroll body.

### 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 9, Figure 4*.

- Attach inlet assembly onto scroll assembly by using #10 - 24 Keps locknuts provided.

**FIGURE 4: Pump Assembly**



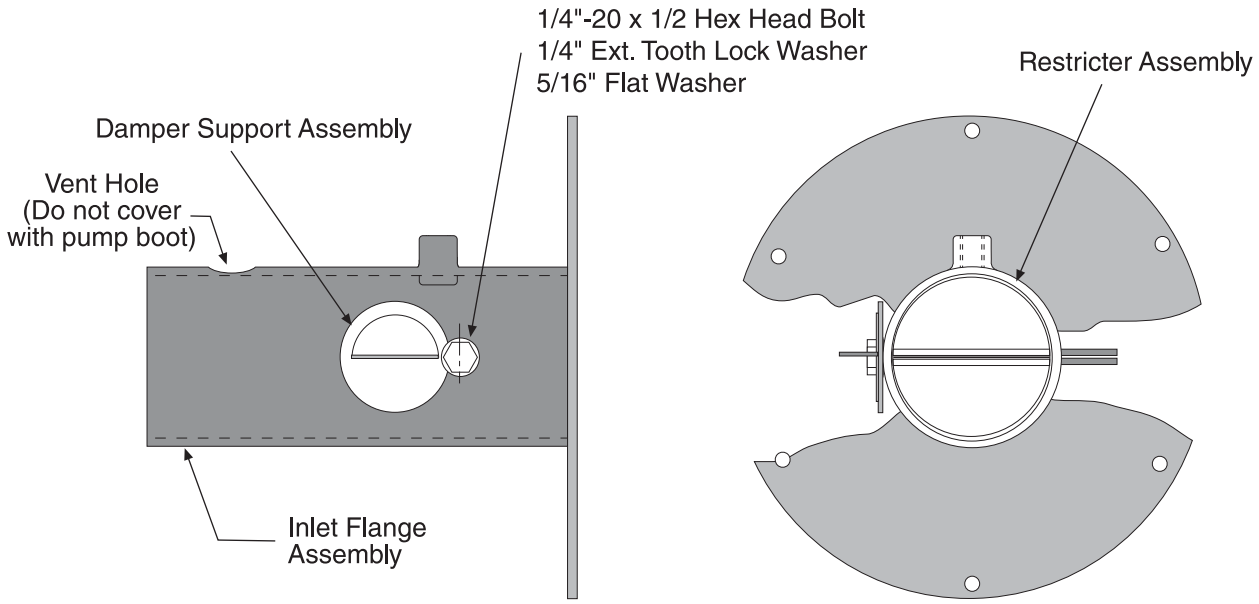

| Description | Part Number |
|---|---|
| Rubber Mounts | 91906100 |
| Pump Scroll | 02757001 |
| Pump Inlet Assembly | 02724200 |

### 5.1.4 Damper Assembly

Pump is equipped with a damper assembly which is used as a means of setting system vacuum. See appropriate Installation, Operation and Service Manual for additional vacuum setting information.

1. When pump is installed, be certain to lock damper in full open position with (1/4"- 20) Hex Head bolt. *See Page 10, Figure 5*.
2. Pump inlet assembly is provided with a 1/8" N.P.T. tapping which is located at the top. Use tapping to connect pressure switch (P/N 90430600K). *See Page 12, Figure 8*.

**FIGURE 5: Damper Assembly**



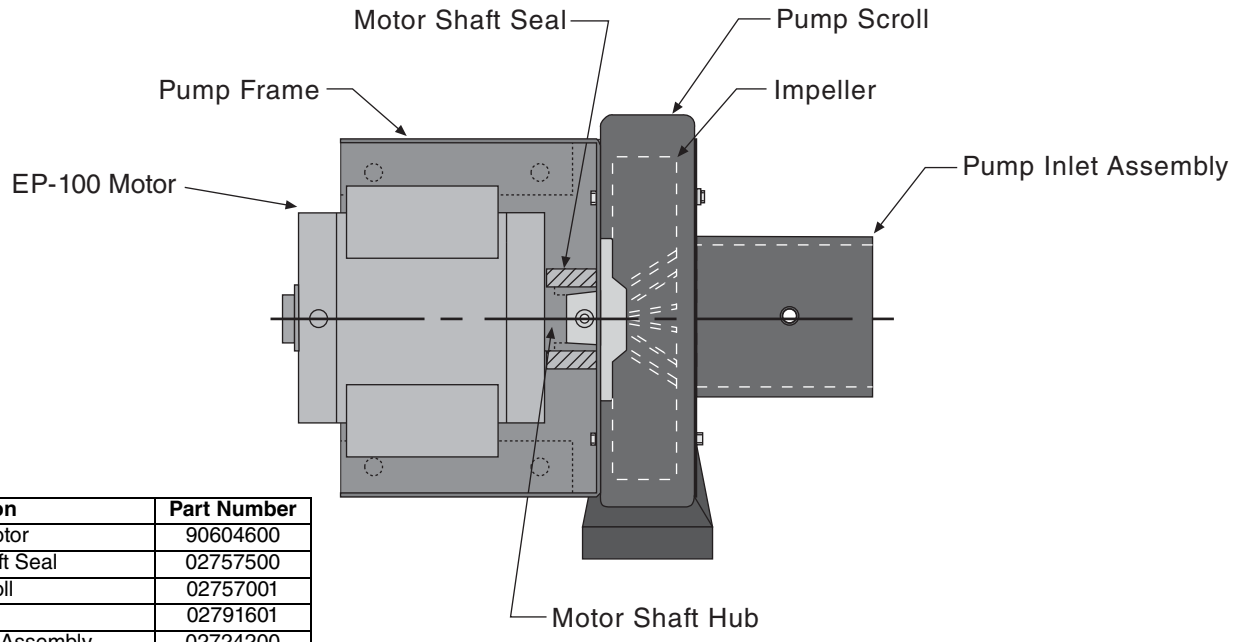

| Description | Part Number |
|---|---|
| Damper Support Assembly | 01329500 |
| Inlet Flange Assembly | 02724200 |
| 1/4"-20 x 1/2" Hex Head Bolt | 93413008 |
| 1/4" Ext. Tooth Lock Washer | 96211500 |
| 5/16" Flat Washer | 95211600 |
| Restricter Assembly | 01327500 |

### 5.1.5 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.
3. Secure shaft seal in position with adhesive strip provided.

**FIGURE 6: Motor Shaft Seal Installation**



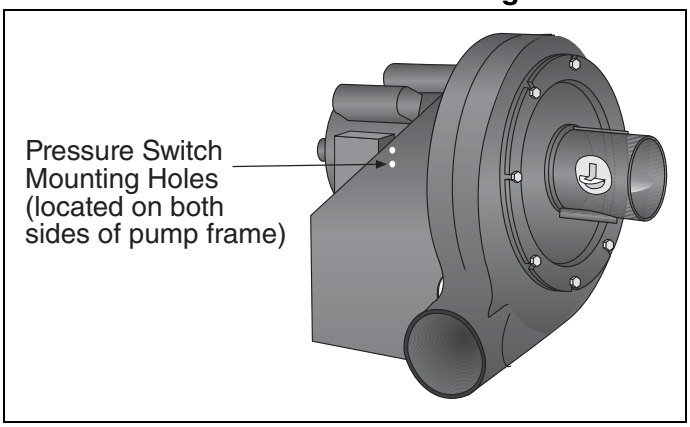

| Description | Part Number |
|---|---|
| EP-100 Motor | 90604600 |
| Motor Shaft Seal | 02757500 |
| Pump Scroll | 02757001 |
| Impeller | 02791601 |
| Inlet Plate Assembly | 02724200 |

## SECTION 6: PRESSURE SWITCH MOUNTING AND WIRING

### 6.1 Pressure Switch Installation

For connection to a pump, locate two pressure switch mounting holes on 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).

**FIGURE 7: Pressure Switch Mounting Holes**




#### 6.1.1 Attaching Pressure Switch to Pump Inlet

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

**FIGURE 8: Mounted Pressure Switch**

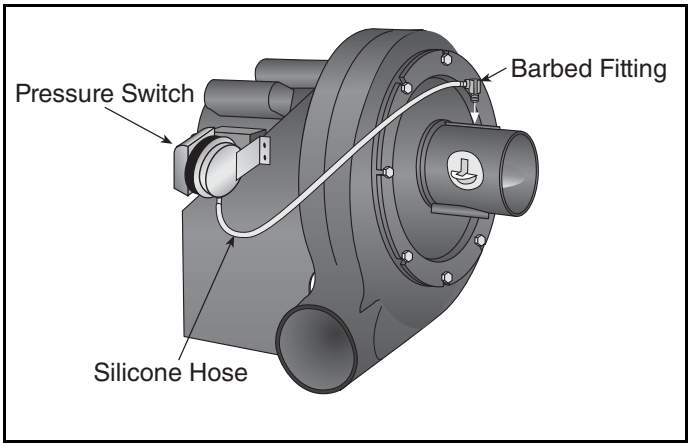
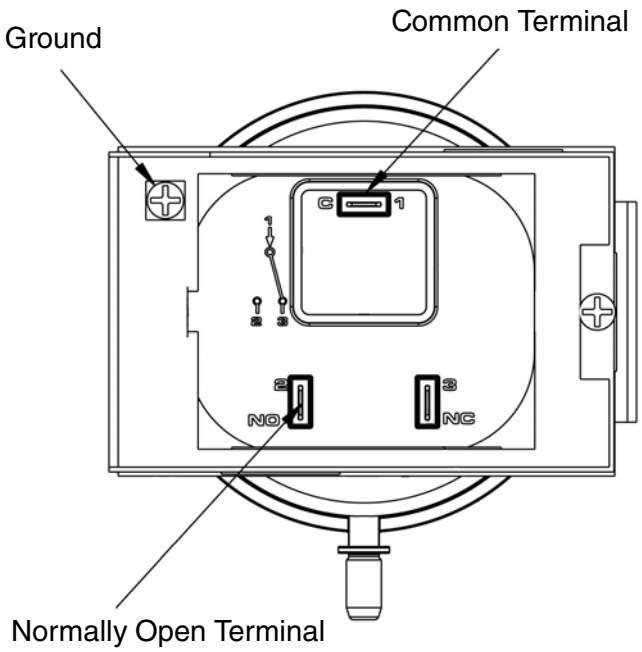



**FIGURE 9: Pump Pressure Switch Wiring**




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

### 7.1 Chain Suspension

**⚠ WARNING**

**Suspension Hazard**

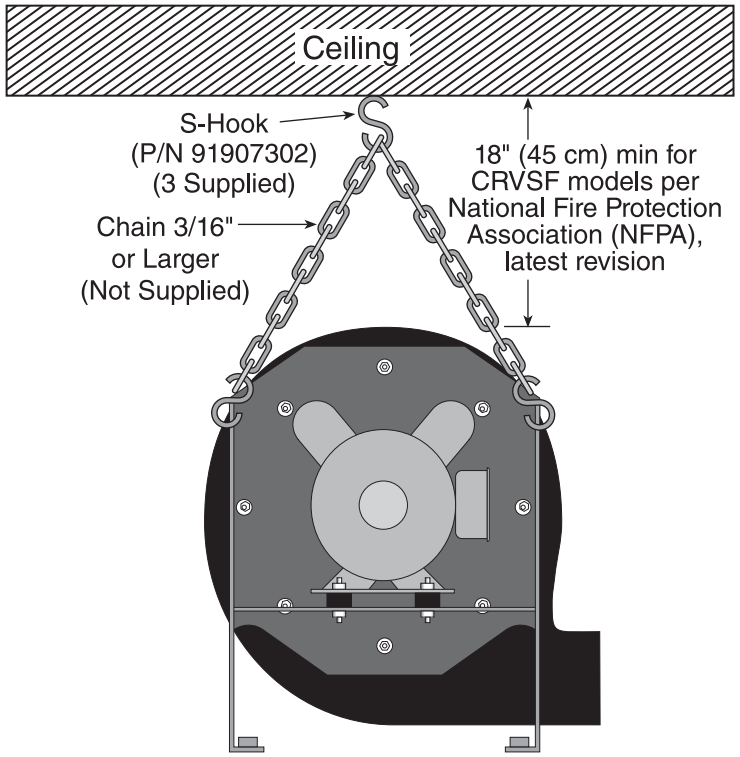
**Mount pump with materials with a minimum working load of 750 lbs (340 kg).**

**Failure of the supports can result in death, injury or property damage.**

The standard method of mounting the EP-100 pump is suspending it from a chain and venting through the roof.

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.

**FIGURE 10: EP-100 Mounting - Chain Suspension**



## 7.2 Wall Mounting

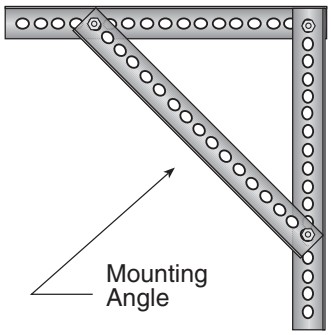
### 7.2.1 Wall Mounting Platform

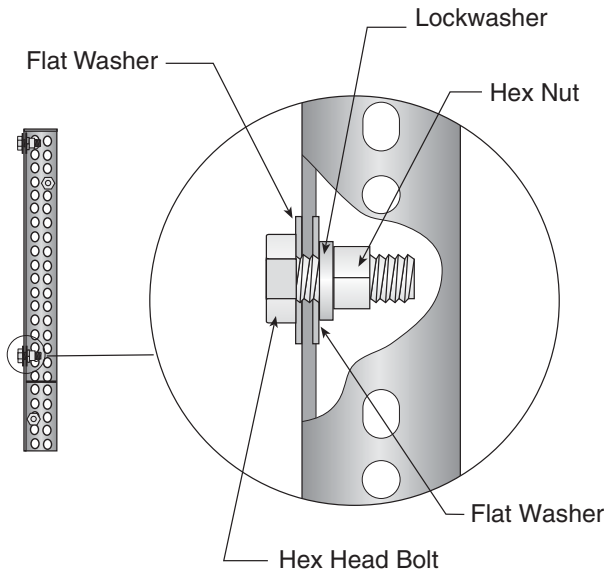
The alternative method of mounting the pump is on an outside wall and venting directly through the wall. Order the optional mounting angle package (P/N 01312102) if this method is used.

The pump may be mounted by using mounting angles as shown *on Page 14, Figure 11 and Page 15, Figure 12*. The two mounting angles form a mounting platform to which the pump will be attached.

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

**FIGURE 11: Wall Bracket Assembly**




| Description | Part Number |
|---|---|
| Mounting Angle Package | 01312102 |
| Mounting Angle | 01365000 |
| Hex Bolt 5/16" x 3/4" | 93413912 |
| Flat Washer | 95211600 |
| Lockwasher | 96411600 |
| Hex Nut | 92113900 |

### 7.2.2 Mounting Platform (Angle Assembly)

Mount pump using mounting angles *on Page 15, Figure 12*.

**FIGURE 12: Wall Mounting Angle Assembly**

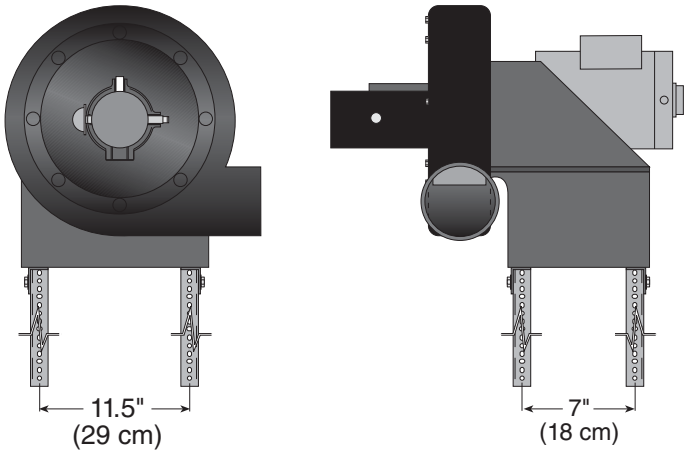
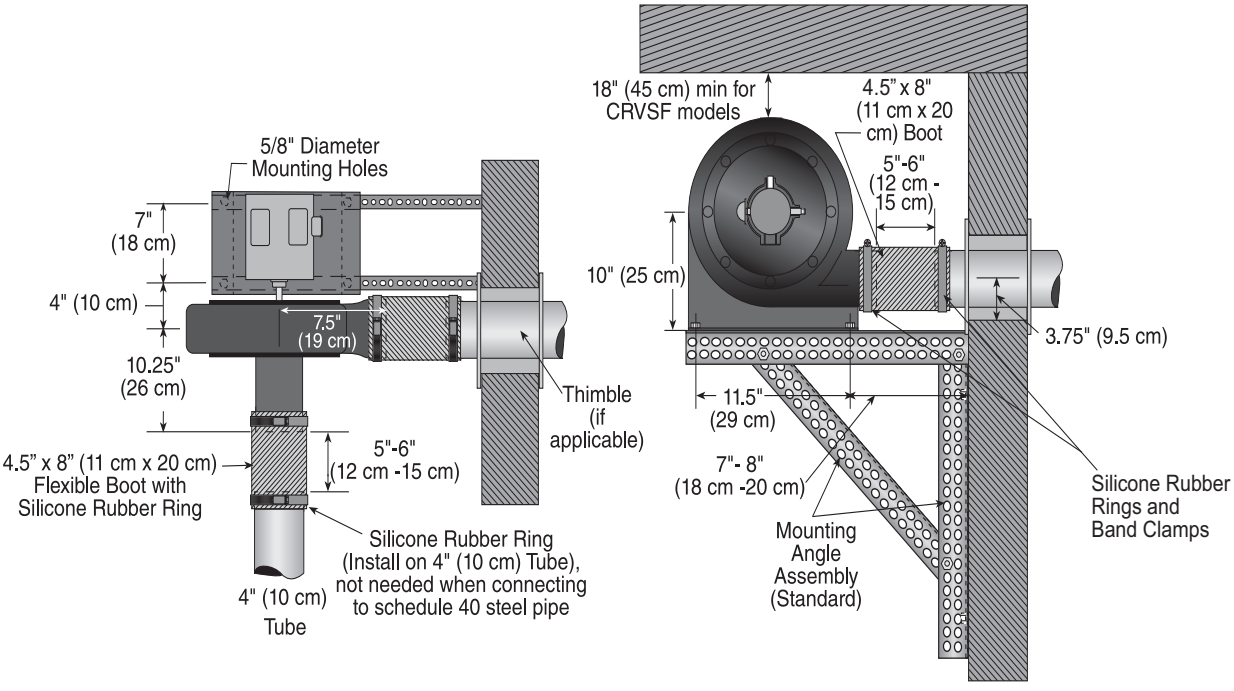


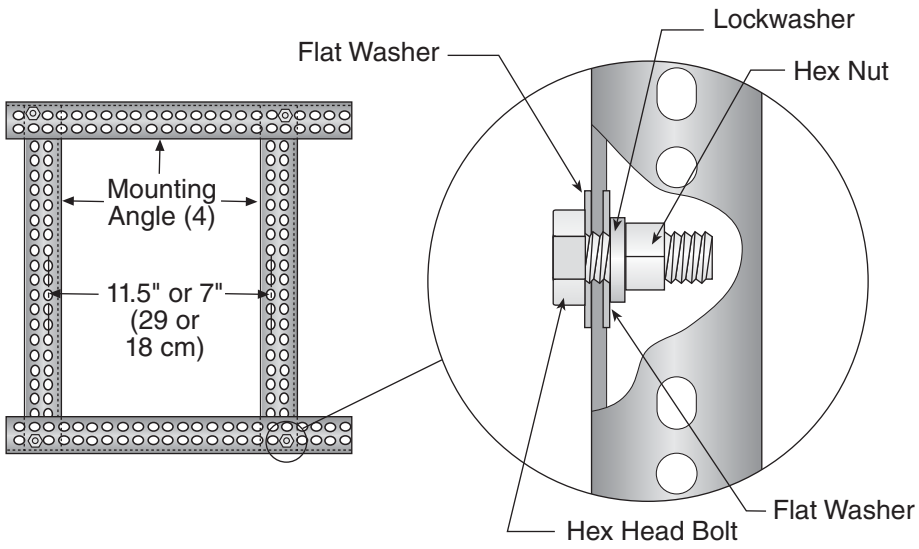

**FIGURE 13: Wall Mounting**



### 7.2.3 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.

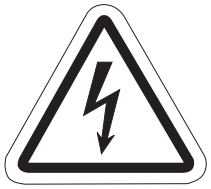
**FIGURE 14: Optional Platform Assembly Mounting**




| Description | Part Number |
|---|---|
| Mounting Angle Package | 01312102 |
| Mounting Angle | 01365000 |
| Hex Bolt 5/16" x 3/4" | 93413912 |
| Flat Washer | 95211600 |
| Lockwasher | 96411600 |
| Hex Nut | 92113900 |

## 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 supply and disconnect before servicing.

### 8.1 Impeller Rotation Direction

Prior to operation of pump in heating system, verify proper impeller operation and rotation. See impeller rotation direction arrow label on pump scroll for correct rotation direction. The motor must be wired for clockwise or counterclockwise rotation. For reverse rotation, follow manufacturer's wiring diagram located on motor.

IMPORTANT: Improper rotation of the impeller can produce only half of the vacuum required for proper system operation.

### 8.2 EP-100 Wiring

The EP-100 motor is wired for 1 Ø, 115 V, 60 Hz operation. However, the motor can be rewired for 230 V operation by changing motor connections as indicated by the diagram on motor. For proper motor wiring, follow manufacturer's wiring diagram located on motor.

Motor operation can be changed from counterclockwise to clockwise as shown *on Page 8, Figure 3*.

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® (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 19, Figure 15* and *Page 20, Figure 16*). 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" (10 cm) diameter.
- Connect 4" (10 cm) pump boot (provided) to 4" (10 cm) flue pipe, using 4" (10 cm) band clamp 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 19, Figure 15*. Vertical discharge must be arranged as shown *on Page 20, Figure 16*. 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 25' (8 m) | 4" (10 cm) vent - 3 elbows |
| Up To 50' (15 m) | 5" (12.5 cm) vent - 3 elbows |

### 9.3 Vent Material 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)
3. Single wall flue pipe (corrosion resistant) - minimum 26 Ga. (Not suitable for modulating and condensing system designs)
4. Schedule 40 ASTM A53 (Latest Edition) grade B ERW black steel pipe.

**NOTE:** 4" (10 cm) O.D. Porcelain coated tubing (P/N 914030D), 4" (10 cm) O.D. Heat treated aluminized tubing (P/N 91409408), and 6" (15 cm) O.D. Heat treated aluminized tubing (P/N E0009105) are equivalent to single wall flue pipe.

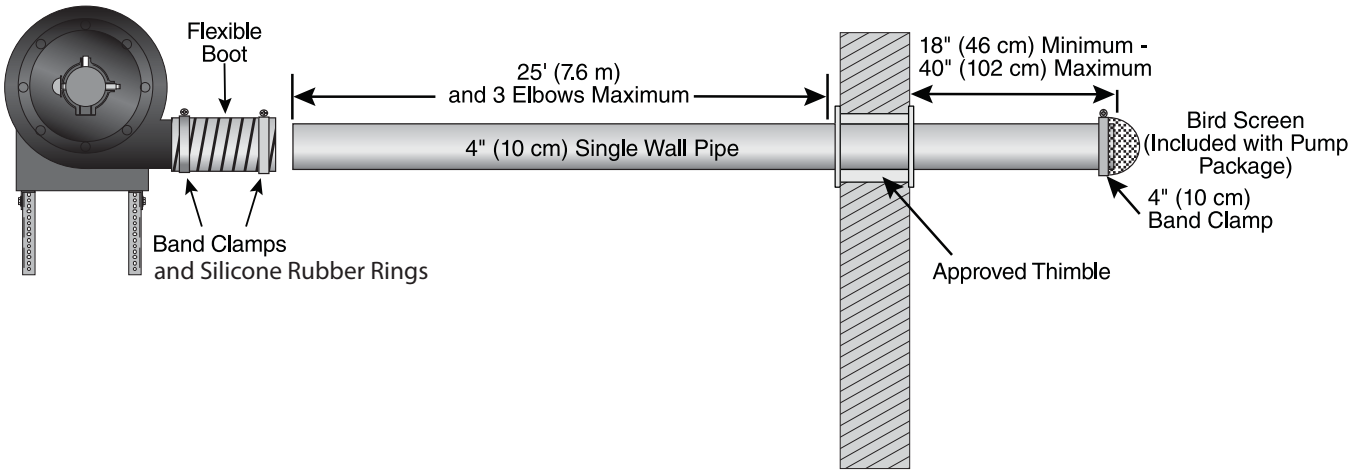
### 9.4 Horizontal Venting

If using vent lengths greater than 30' (9 m), condensation will form in 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 15: Horizontal Venting**



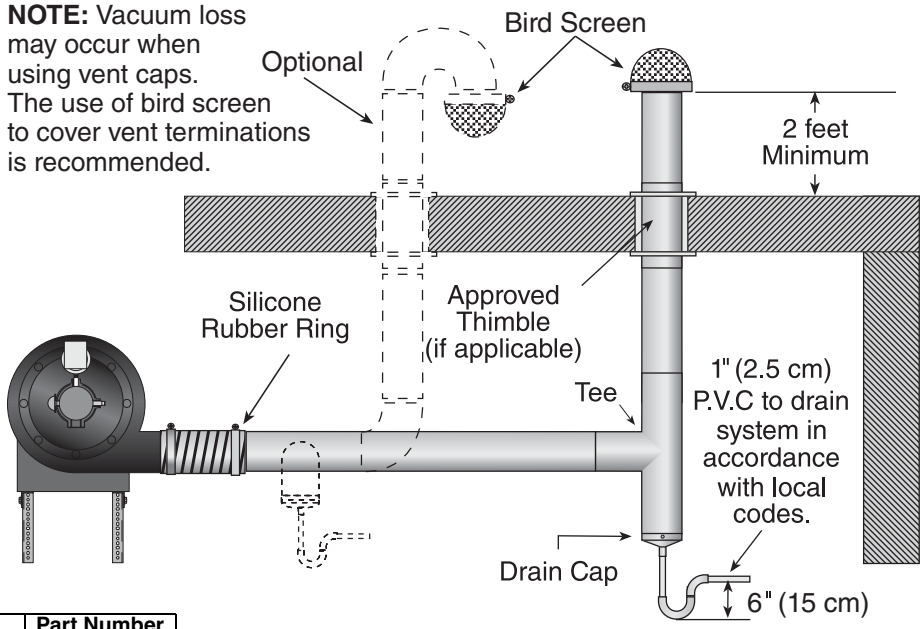

| Description | Part Number |
|---|---|
| Bird Screen 4" (10 cm) | 01365400 |
| Bird Screen, 6" (15 cm) | 01397400 |
| Band Clamp, 4" (10 cm) | 91901300 |
| Band Clamp, 6" (15 cm) | 91913703 |

| Description | Part Number |
|---|---|
| Flexible Boot, 4" (10 cm) | 91412801 |
| Silicone Rubber Rings | 91906900 |

### 9.5 Vertical Venting

Vent length should be limited to less than 30' (9 m). If using vent lengths greater than 30' (9 m), condensation will form in vent pipe. Insulation and additional sealing measures will 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. Vertical venting for CRVSF systems is not recommended.

**FIGURE 16: Vertical Venting**




| Description | Part Number |
|---|---|
| Tee 4" (10 cm) | 01330203 |
| Drain Cap 4" (10 cm) | 02718851 |

**FIGURE 17: Condensate Check Valve**

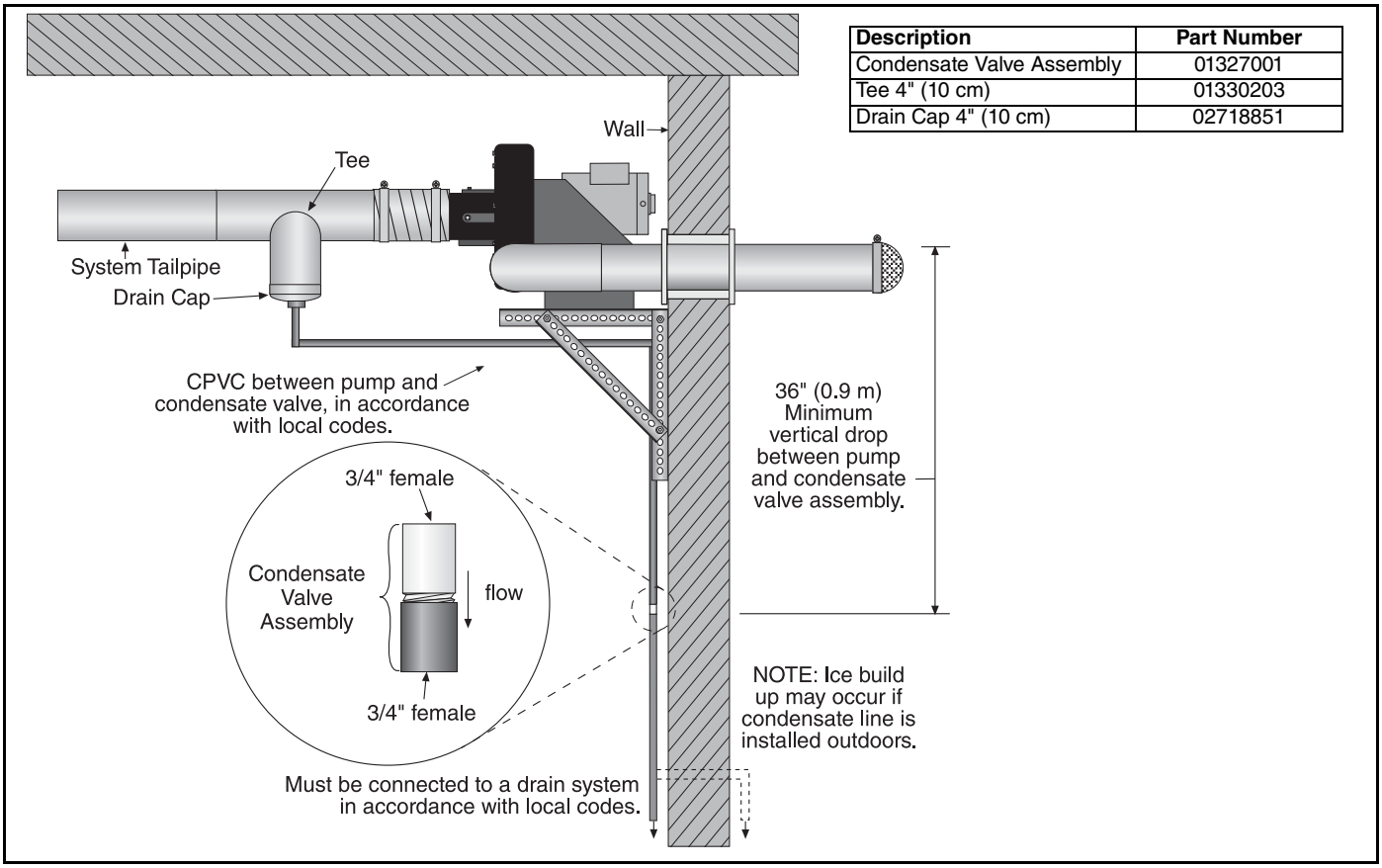
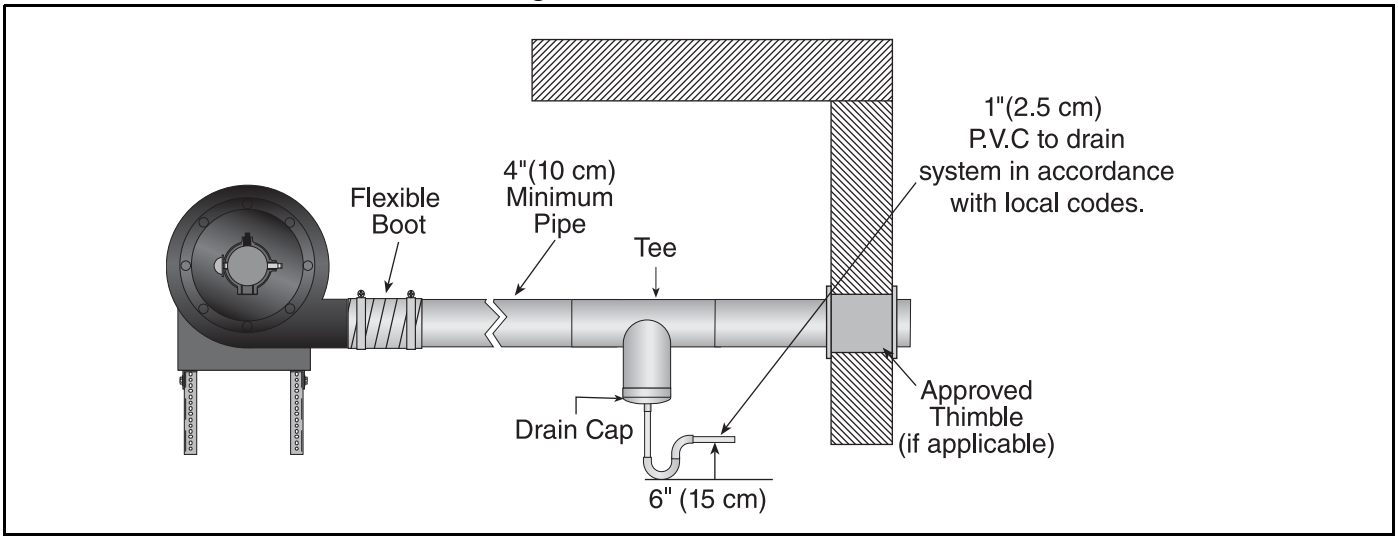



**FIGURE 18: Condensate Tee - Discharge Side**




### 9.6 Condensate Trap and Condensate Tee

Install condensate trap assembly (optional) (P/N 01327001), on inlet side of EP-100 Series pump assembly, *See Page 21, Figure 17*.

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 23, Figure 19*.

**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:

**Total condensate (gal/h) = Total Input (Btu/h) / 100,000 (Btu/h) x 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) x 0.3 = 1.8 (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.

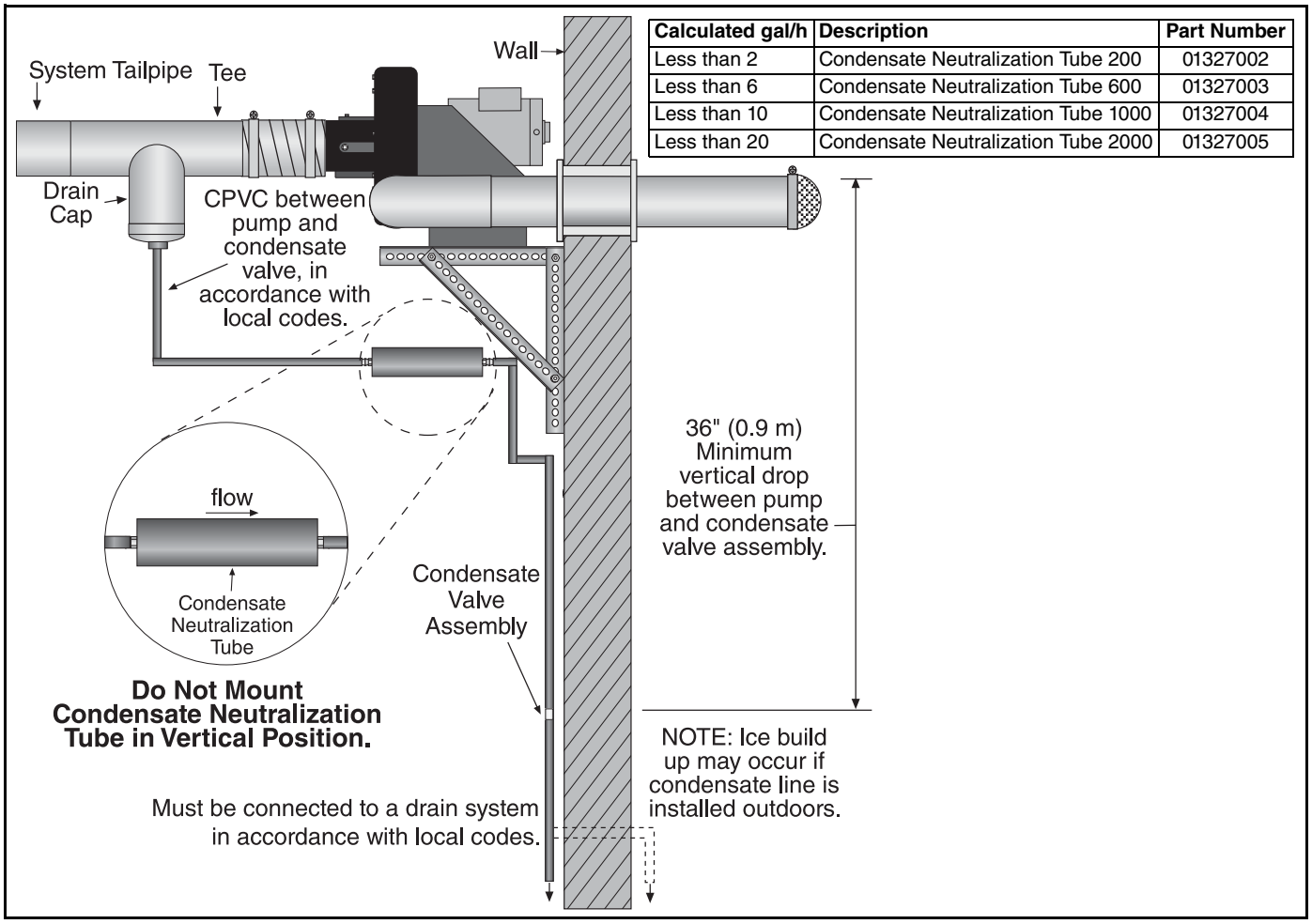
| **Calculated gal/h** | **Description** | **Part Number** |
|---|---|---|
| **Less than 2** | **Condensate Neutralization Tube 200** | **01327002** |
| Less than 6 | Condensate Neutralization Tube 600 | 01327003 |
| Less than 10 | Condensate Neutralization Tube 1000 | 01327004 |
| Less than 20 | Condensate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

NOTE: Condensate neutralization tubes must be replaced yearly (every 2000 operating hours). Check condensate water pH level and replace tubes if water level is below pH 6.

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 19: Condensate Neutralization Tube




| 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 |

## SECTION 10: SERVICING INSTRUCTIONS

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

| ⚠ DANGER |
|---|
|  |
| **Severe Injury Hazard**<br>**Install pump scroll and inlet assembly before operating high speed rotating impeller.**<br>**Keep hands, fingers and clothing away from inlet and outlet.**<br>**Install and operate equipment according to installation manual.**<br>**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, electrical, venting, suspensions and overall pump condition are some of the areas requiring inspection.

Please *see Page 25, Section 10.3* for suggested items to inspect.

### 10.2 To Change the Motor and/or the Impeller

1. Disconnect electrical before servicing.
2. Remove pump boots from inlet and outlet of scroll assembly, disconnecting pump from tailpipe and vent pipe.
3. To remove motor or impeller, scroll and inlet plate must be detached. Remove six nuts attaching scroll to pump frame.
4. Remove scroll assembly and inlet assembly from frame as one piece.
5. Impeller can be removed by loosening two 3/8"-24 set screws. With an appropriate wheel puller, remove impeller.

6. Detach motor, if necessary, by removing attachment hardware.
7. Re-assembly of motor/impeller combination requires proper alignment. Make sure impeller has a 1/4" (6 mm) clearance off inside wall of scroll. Be certain of proper motor alignment and free rotation.
8. Two impeller set screws should be reinstalled with a drop of thread locking sealant and remain unseated during initial re-assembly.
9. Slide impeller onto motor shaft end.
10. Seat two impeller set screws. Torque to 100 in/lbs.
11. Re-attach scroll and inlet. Secure with all six nuts. Torque to 150 in/lbs.

### 10.3 Maintenance Checklist

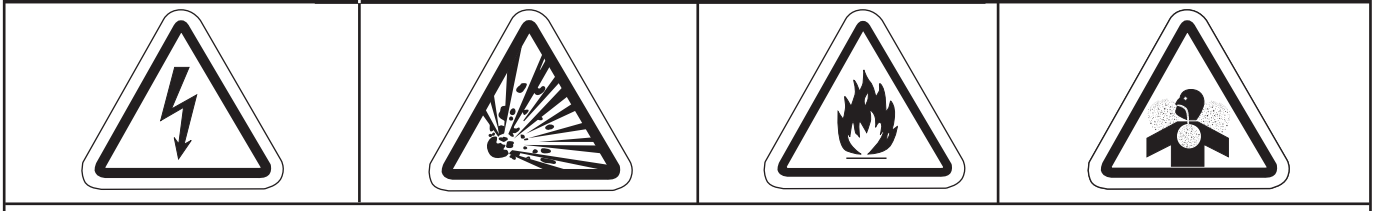
**Installation Code and Annual Inspections:**

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** | Venting must be intact. Using a flashlight, look for obstructions, cracks on pipe, gaps in sealed areas or corrosion. |
| | Area must be free of dirt and dust or blockage. |
| | Remove any carbon deposits or scale using a wire brush. |
| | Replace pipe if there are any holes due to corrosion. Seal any gaps in venting to prevent condensate leakage. |
| **Pump Scroll, Impeller and Motor** | Compressed air or a vacuum cleaner may be used to clean dust and dirt. |
| | Check for corrosion, if any parts have corroded through, replace as necessary. |
| | Ensure all hex nuts are tight for proper seal. |
| **Suspension Points** | Make sure pump is hanging securely. |
| | Look for signs of wear on mounting angles, wall mounting points or ceiling mounting points. |
| **Pump Boot** | Inspect pump boot at pump inlet and outlet for cracking or deterioration. |
| | Replace if cracks are found. |
| | Ensure band clamps are tight at all connection points. |
| **Condensate Trap, Drain Cap** | Check connection of tee to drain cap and between tee and condensate trap. |
| | Seal connections between tee and drain cap to prevent condensate leakage. |
| | Screw condensate trap tightly into drain cap to prevent leakage. |
| | Condensate trap should be filled with water. |
| **Pressure Switch** | Ensure that wiring is intact. Check silicone hose for cracks. |
| | Ensure secure connection between pressure switch and barbed fitting. |
| **Safety Labels** | 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*. |

## SECTION 11: REPLACEMENT PARTS AND ACCESSORIES

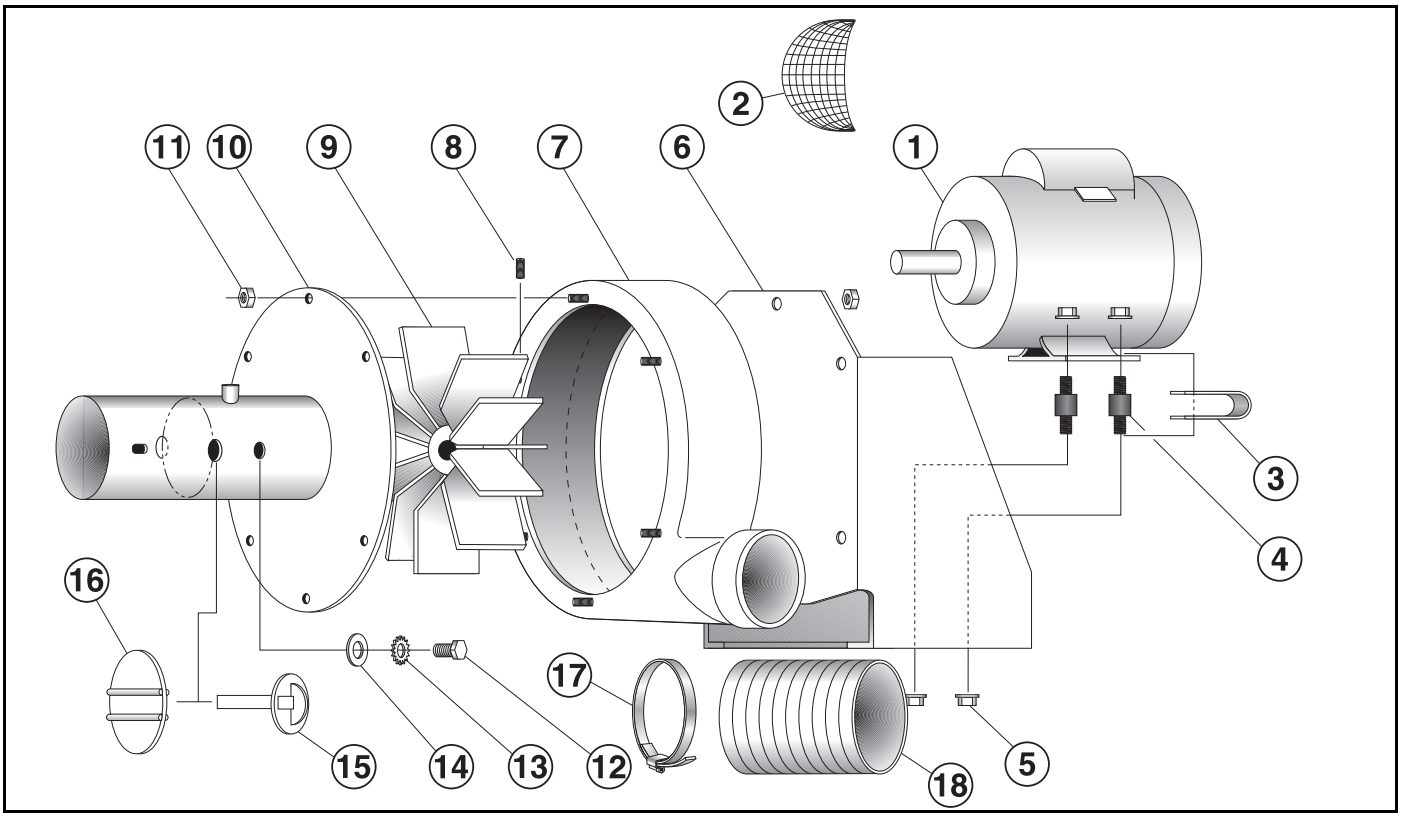
**⚠ DANGER** | **⚠ WARNING**



| Electrical Shock Hazard | Explosion Hazard | Fire Hazard | Carbon Monoxide Hazard |
|---|---|---|---|

**Use only genuine ROBERTS GORDON® replacement parts per this installation, operation and service manual.**

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




### 11.1 Replacement Parts

| Call Out # | Description | Part Number |
|---|---|---|
| 1 | Motor (1/3 H.P.) | 90604600 |
| 2 | Bird Screen with Clamp | 01312200 |
| 3 | Ground Strap | 01370200 |
| 4 | Rubber Mount for Motor | 91906100 |
| 5 | 5/16" - 18 Hex Nut | 92113900 |
| 5 | 5/16" Flat Washer | 95211600 |
| 5 | 5/16" Helical Spring Washer | 96411600 |
| 6 | Pump Frame Assembly | 01362500 |
| 7 | Blower Housing (Scroll) | 02757001 |
| 8 | 3/8" - 24 x 1/2" Set Screw | 91118008 |

| Call Out # | Description | Part Number |
|---|---|---|
| 9 | Impeller | 02791601 |
| 10 | Inlet Flange Assembly | 02724200 |
| 11 | #10 - 24 Keps Nut | 92311600 |
| 12 | 1/4" - 20 x 1/2" Hex Head Screw | 93413008 |
| 13 | 1/4" External Tooth Washer | 96211500 |
| 14 | 5/16" Flat Washer | 95211600 |
| 15 | Damper Support Assembly | 01329500 |
| 16 | Restrictor Assembly | 01327500 |
| 17 | Pump Boot Clamp | 91901300 |
| 18 | 4.5" Flexible Boot | 91412801 |
| | Pressure Switch (not shown) | 90430600K |
| | Silicone Rubber Ring (not shown) | 91906900 |

## 11.2 Accessories

| Description | Part Number |
|---|---|
| 4" Plain Coupling | 01312700 |
| 6" Plain Coupling | 01312706 |
| 4" Lined Coupling | 0131270I |
| 4" Damper Coupling | 01331900 |
| 6" Damper Coupling | E0009356 |
| 4" Aluminized Tee | 01330203 |
| 6" Aluminized Tee | 01330204 |
| 4" Coated Tee | 0133022D |
| 6" Coated Tee | 0133025D |
| 4" Aluminized Cross | 01330903 |
| 6" Aluminized Cross | 01330904 |
| 4" Coated Cross | 0133092D |
| 4" (10 cm) Band Clamp | 91901300 |
| 6" (15 cm) Band Clamp | 91913703 |
| Schedule 40 Damper Nipple | 01322000 |

| Description | Part Number |
|---|---|
| 4" Aluminized 90° Elbow | 01335801 |
| 6" Aluminized 90° Elbow | T0100320 |
| 4" Coated 90° Elbow | 0133580D |
| 6" Coated 90° Elbow | 0133660D |
| 4" Aluminized Non Heat Treated 10’ Tube | 91409403 |
| 6" Aluminized Non Heat Treated 10’ Tube | 91409420 |
| 4" Coated 10’ Tube | 9141030D |
| Aluminized Tube adapter (6" dia. x 4" dia.) | 91418200 |
| 6" Tube and Reflector Hanger | 91240010 |
| 4" Drain Cap | 02718851 |
| 6" Drain Cap | 02718852 |
| Condensate Trap | 01327001 |

## SECTION 12: SPECIFICATIONS

### 12.1 Material Specifications

#### 12.1.1 Pump Frame, Inlet, Scroll and Impeller

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). *See Page 11, Figure 6*.

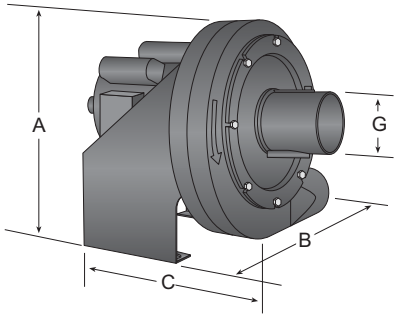
### 12.3 Controls Specifications

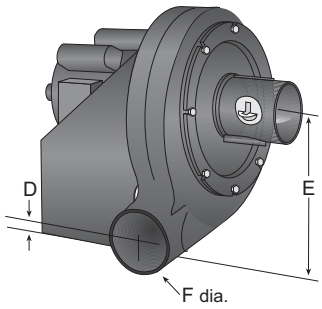
Time switches, thermostats, etc. can be wired into electrical supply. External controls supplied as an optional extra. See the heaters' Installation, Operation and Service Manual for details.

| Pump Dimensional Data (in) | | | | | | | |
|---|---|---|---|---|---|---|---|
| **Model** | **A** | **B** | **C** | **D** | **E** | **F** | **G** |
| EP-100 | 17 | 14.5 | 21 | 3.75 | 10 | 4 | 4 |

**Pump Specifications**

| Model | EP-100 |
|---|---|
| Horsepower (Hp) | 1/3 |
| Phase (Ø) | 1 |
| Hertz (Hz) | 60 |
| Voltage (V) | 120/230 |
| Full Load Amp (A) | 5.2/2.7 |
| R.P.M. | 3490 |
| Motor Frame | 56 |
| Motor Enclosure | TENV |
| Inlet/Outlet (In.) | 4/4 |
| Weight (lbs.) | 62 |



## SECTION 13: THE ROBERTS GORDON® EP-100 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 EP-100 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 EP-100 PUMP in any way.
- Use of the EP-100 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 EP-100 PUMP as directed in the Installation, Operation and Service Manual.
- Relocation of the EP-100 PUMP after initial installation
- Use of the EP-100 PUMP in a corrosive atmosphere containing contaminants.
- Use of the EP-100 PUMP in the vicinity of a combustible or explosive material.
- Any defect in the EP-100 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 EP-100 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 EP-100 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 EP-100 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.