Revision: I-R7DA (05-19) PN1024294R1

Supersedes: I-R7DA (02-19) PN1024294R0

INSTALLATION INSTRUCTIONS FOR R7DA SERIES

SINGLE PACKAGE GAS HEATING/ELECTRIC COOLING HIGH OUTSIDE AIR AND DOAS ROOFTOP UNIT

⚠ WARNING ⚠

FIRE OR EXPLOSION HAZARD

- **Failure to follow safety warnings exactly could result in serious injury or property damage.**
- **Installation and service must be performed by a qualified installer, service agency or the gas supplier.**
- **Do not store or use gasoline or other flammable vapors and liquids in the vicinity of this or any other appliance.**

WHAT TO DO IF YOU SMELL GAS

- **Do not try to light any appliance.**
- **Do not touch any electrical switch; do not use any phone in your building.**
- **Leave the building immediately.**
- **Immediately call your gas supplier from a neighbor's phone. Follow the gas suppliers instructions.**
- **If you cannot reach your gas supplier, call the fire department.**

DO NOT DESTROY. PLEASE READ CAREFULLY. KEEP IN A SAFE PLACE FOR FUTURE REFERENCE.

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GENERAL INFORMATION

This gas heating/electric cooling unit has been designed only for outdoor rooftop or ground level installations and can be readily connected to the duct system of a building. This unit has been tested for capacity and efficiency so as to provide many years of safe and dependable comfort providing it is properly installed and maintained. With regular maintenance, this unit will operate satisfactorily year after year. Abuse, improper use, and/or improper maintenance can shorten the life of the appliance and create unsafe hazards.

To achieve optimum performance and minimize equipment failure, it is recommended that periodic maintenance be performed on this unit. The ability to properly perform maintenance on this equipment requires certain tools and mechanical skills.

References

Table 1. Related Technical Manuals Available from Factory Distributor

Type	Form	PN
Operation	O-R7DA	1024295
Controls	CP-P125-D19-D21-D22-D23	1024315
Replacement parts	P-R7DA	D303299

Important Safety Information

Please read all information in this manual thoroughly and become familiar with the capabilities and use of your appliance before attempting to operate or maintain this unit. Pay attention to all dangers, warnings, cautions, and notes highlighted in this manual. Safety markings should not be ignored and are used frequently throughout to designate a degree or level of seriousness.

DANGER: A danger statement describes a potentially hazardous situation that if not avoided, will result in severe personal injury or death and/or property damage.

WARNING: A warning statement describes a potentially hazardous situation that if not avoided, can result in severe personal injury and/or property damage.

CAUTION: A caution statement describes a potentially hazardous situation that if not avoided, can result in minor or moderate personal injury and/or property damage.

NOTE: A note provides important information that should not be ignored.

⚠ DANGER ⚠

- **Improper installation, service, adjustment, or maintenance may cause explosion, fire, electrical shock or other hazardous conditions which may result in personal injury or property damage. Unless otherwise noted in these instructions, only factory authorized kits or accessories may be used with this product.**
- **Do not place combustible material on or against the unit cabinet. Do not place combustible materials, including gasoline and any other flammable vapors and liquids, in the vicinity of the unit.**

⚠ DANGER ⚠

The information listed below and must be followed during the installation, service, and operation of this unit. Unqualified individuals should not attempt to interpret these instructions or install this equipment. Failure to follow safety recommendations could result in possible damage to the equipment, serious personal injury or death.

- **This equipment contains liquid and gaseous refrigerant under high pressure. Installation or servicing should only be performed by qualified trained personnel thoroughly familiar with this type equipment.**
- **Before beginning the installation, verify that the unit model is correct for the job. The unit model number is printed on the data label.**
- **Never test for gas leaks with an open flame. Use a commercially available soap solution to check all connections (refer to Leak Check).**
- **Follow all precautions in the literature, on tags, and on labels provided with the equipment. Read and thoroughly understand the instructions provided with the equipment prior to performing the installation and operational checkout of the equipment.**
- **This unit is designed only for outdoor installations and should be located with consideration of minimizing the length of the supply and return ducts.**
- **The installer should become familiar with the unit's wiring diagram before making any electrical connections to the unit (refer to the wiring diagram included with the unit).**
- **Use caution when handling this appliance or removing components. Personal injury can occur from sharp metal edges present in all sheet metal constructed equipment.**
- **Familiarize yourself with the controls that shut off the gas and electrical power to the unit. If the unit is to be shut down for an extended period of time, turn off both the gas and electrical power. For your safety always turn off both the gas and electrical power before performing service or maintenance on the furnace. If the gas supply must be shut off, refer to the gas valve label (see Figure 1 or Figure 2).**

FOR YOUR SAFETY READ BEFORE OPERATING

WARNING: If you do not follow these instructions exactly fire or explosion may result causing property damage, personal injury, or loss of life.

A. This appliance does not have a pilot. It is equipped with an ignition device which automatically lights the burner. Do not try to light the burner by hand.
B. BEFORE OPERATING, smell all around the appliance area for gas. Be sure to smell next to the floor because some gas is heavier than air and will settle on the floor.

WHAT TO DO IF YOU SMELL GAS.

- Do not try to light any appliance.
- Do not touch any electrical switch; do not use any phone in your building.
- Immediately call your gas supplier from a neighbor's phone. Follow the gas supplier's instructions.
- If you cannot reach your gas supplier, call the fire department.

C. Use only your hand to push in or turn the gas control knob. Never use tools. If the knob will not push in or move by hand, do not try to repair it, call a qualified service technician. Force or attempted repair may result in a fire or explosion.
D. Do not use this appliance if any part has been under water. Immediately call a qualified service technician to inspect the appliance and to replace any part of the control system and any gas control which has been under water.

POUR VOTRE SÉCURITÉ, VEUILLEZ LIRE CE QUI SUIT AVANT L'UTILISATION

AVERTISSEMENT : Si ces directives ne sont pas respectées à la lettre, un incendie ou une explosion pourrait survenir et causer des dommages matériels, des blessures ou des pertes de vie.

A. Cet appareil n'est pas doté d'une veilleuse d'allumage. Il est pourvu d'un dispositif d'allumage qui allume automatiquement le brûleur. N'essayez pas d'allumer le brûleur de façon manuelle.
B. AVANT DE FAIRE FONCTIONNER L'APPAREIL, sentez tout autour de l'appareil pour déceler toute odeur de gaz. Sentez à proximité du sol, car certains gaz sont plus lourds que l'air et se déposent sur le sol.

QUE FAIRE S'IL Y A UNE ODEUR DE GAZ.

- N'essayez d'allumer aucun appareil.
- Ne touchez à aucun interrupteur électrique; n'utilisez aucun téléphone dans le bâtiment.
- Appelez immédiatement le fournisseur de gaz en employant le téléphone d'un voisin. Respectez les instructions du fournisseur de gaz.
- Si personne ne répond, appelez le service des incendies.

C. Enfoncez ou faites tourner le robinet à gaz à la main seulement. N'utilisez jamais d'outils. S'il n'est pas possible de faire tourner ou d'enfoncer le robinet à la main, n'essayez pas de le réparer. Faites appel à un spécialiste. Si vous forcez l'interrupteur ou tentez de le réparer, cela pourrait causer un incendie ou une explosion.
D. N'utilisez pas cet appareil si l'une de ses pièces a été immergée dans de l'eau. Appelez immédiatement un technicien qualifié pour inspecter l'appareil et remplacer toute pièce du système de commande ou toute commande de gaz qui a été immergée dans de l'eau.

OPERATING INSTRUCTIONS

1. **STOP!** Read the safety information above on this label.
2. Set the thermostat to the lowest setting.
3. Turn off all electrical power to the appliance.
4. The appliance's ignition device automatically lights the burner. Do not try to light burner by hand.
5. Remove the control access door/panel (upper door if two-door model).
6. Move the gas control switch to the "OFF" position. (See Figure 1)
7. Wait five (5) minutes to clear out any gas. Then smell for gas, including near the floor. If you smell gas, STOP! Follow "B" in above information. If you don't smell gas, go to the next step.
8. Move the gas control switch to the "ON" position. (See Figure 1)
9. Replace the control access door/panel (upper door if two-door model).
10. Turn on all electrical power to the appliance.
11. Turn the thermostat to a desired setting.
12. If the appliance will not operate, follow the instructions "To Turn Off Gas To Appliance" and call your service technician or gas supplier.

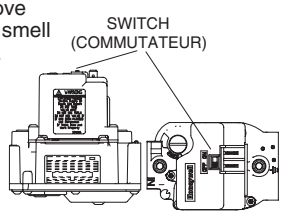


Figure 1

DIRECTIVES DE FONCTIONNEMENT

1. **ARRÊTEZ!** Veuillez lire les renseignements de sécurité à la partie supérieure de la présente étiquette.
2. Réglez le thermostat au réglage le plus bas.
3. Coupez l'alimentation électrique à l'appareil.
4. Cet appareil ménager étant doté d'un système d'allumage automatique, n'essayez pas d'allumer le brûleur manuellement.
5. Retirez le panneau/volet d'accès de commande (panneau supérieur s'il s'agit d'un modèle à deux panneaux).
6. Réglez l'interrupteur de commande du gaz en position « OFF » (arrêt). (Voyez la Figure 1.)
7. Attendez cinq (5) minutes pour s'assurer de la dissipation du gaz. Vérifiez alors s'il y a une odeur de gaz, y compris au niveau du sol. En cas d'odeur, ARRÊTEZ LE PROCÉDÉ! Suivez les instructions ci-dessus (Section B). Si vous ne remarquez aucune odeur de gaz, passez à l'étape suivante.
8. Réglez l'interrupteur de commande du gaz en position « ON » (marche). (Voyez la Figure 1.)
9. Remettez le panneau/volet d'accès de commande en place (panneau supérieur s'il s'agit d'un modèle à deux panneaux).
10. Allumez toute alimentation électrique à l'appareil.
11. Ajustez le thermostat à la position désirée.
12. Si l'appareil ne fonctionne pas, suivez les directives de la section « Pour couper l'alimentation en gaz de l'appareil » et appelez un technicien ou le fournisseur de gaz.

TO TURN OFF GAS TO APPLIANCE

1. Set the thermostat to the lowest setting.
2. Turn off all electrical power to the appliance if service is to be performed.
3. Remove the control access door/panel (upper door if two-door model).
4. Move the gas control switch to the "OFF" position. Do not use force. (See Figure 1)
5. Replace the control access door/panel (upper door if two-door model).

POUR COUPER L'ALIMENTATION EN GAZ DE L'APPAREIL

1. Réglez le thermostat au réglage le plus bas.
2. Coupez toute alimentation électrique à l'appareil si un entretien doit être effectué.
3. Retirez le panneau/volet d'accès de commande (panneau supérieur s'il s'agit d'un modèle à deux panneaux).
4. Tournez l'interrupteur de commande du gaz en position « OFF » (arrêt). Ne forcez pas. (Voyez la Figure 1.)
5. Remettez le panneau/volet d'accès de commande en place (panneau supérieur s'il s'agit d'un modèle à deux panneaux).

Figure 1. Gas Valve Label (100- and 166-kBTU Units)

Important Safety Information—Continued

FOR YOUR SAFETY READ BEFORE OPERATING

WARNING: If you do not follow these instructions exactly, a fire or explosion may result causing property damage, personal injury, or loss of life.

A. This appliance does not have a pilot. It is equipped with an ignition device which automatically lights the burner. Do not try to light the burner by hand.
B. BEFORE OPERATING smell all around the appliance area for gas. Be sure to smell next to the floor because some gas is heavier than air and will settle on the floor.

WHAT TO DO IF YOU SMELL GAS

- Do not try to light any appliance.
- Do not touch any electrical switch; do not use any phone in your building.
- Immediately call your gas supplier from a neighbor's phone. Follow the gas supplier's instructions.
- If you cannot reach your gas supplier, call the fire department.

C. Use only your hand to push in or turn the gas control knob. Never use tools. If the knob will not push in or move by hand, do not try to repair it, call a qualified service technician. Force or attempted repair may result in a fire or explosion.
D. Do not use this appliance if any part has been under water. Immediately call a qualified service technician to inspect the appliance and to replace any part of the control system and any gas control which has been under water.

POUR VOTRE SÉCURITÉ. À LIRE AVANT L'EMPLOI

ATTENTION! L'inobservation de ces instructions peut entraîner un incendie ou une explosion pouvant causer des dammages à votre propriété à votre personne, ou la mort.

A. Cet appareil ménager n'a pas de veilleuse. Il est doté d'un système d'allumage automatique. Ne pas essayer d'allumer le brûleur manuellement.
B. AVANT L'USAGE. Attention à une possible odeur de gaz surtout au niveau du plancher où les gaz les plus lourds ont la tendance de se concentrer.

EN CAS D'ODEUR DE GAZ.

- Ne mettre en marche aucun appareil électrique.
- Ne toucher à aucun commutateur électrique, ne pas employer le téléphone.
- Quitter le bâtiment immédiatement et avertir la compagnie du gaz en utili sant le téléphone d'un voisin.
- A défaut de la compagnie du gaz, avertir le service des pompiers.

C. Enfoncer ou faire tourner le robinet à gaz à la main seulement. Ne jamais utiliser d'outils. S'il n'est pas possible de faire tourner ou d'enfoncer le robinet à la main, ne pas essayer de le réparer. Faire appel à un spécialiste. Forcer ou tenter de réparer le robinet pourrait être à l'origine d'une explosion ou d'un incendie.
D. Il est déconseillé d'utiliser cet appareil en contact prolongé avec l'eau. Faire inspecter ou remplacer toute commande par un technicien qualifié si un des systèmes de contrôle du gaz s'est trouvé sous l'eau.

OPERATING INSTRUCTIONS

1. **STOP!** Read the safety information above on this label.
2. Set the thermostat to the lowest setting.
3. Turn off all electrical power to the appliance.
4. The appliance's ignition device automatically lights the burner. Do not try to light burner by hand.
5. Remove the control access door/panel (upper door if two-door model).
6. Move the gas control knob clockwise ↷ to "OFF". (See Figure 1)
7. Wait five (5) minutes to clear out any gas. Then smell for gas, including near the floor. If you smell gas, STOP! Follow "B" in above information. If you don't smell gas, go to the next step.
8. Move the gas control knob counterclockwise ↶ to "ON". (See Figure 1)
9. Replace the control access door/panel (upper door if two-door model).
10. Turn on all electrical power to the appliance.
11. Turn the thermostat to a desired setting.
12. If the appliance will not operate, follow the instructions "To Turn Off Gas To Appliance" and call your service technician or gas supplier.

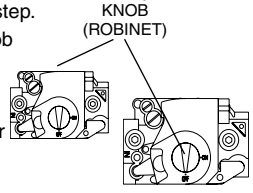


Figure 1

MODE D'EMPLOI

1. **ATTENTION!** Lire d'abord la liste des mesures de sécurité ci-dessus.
2. Mettre le thermostat à la position minimale.
3. Couper le courant électrique qui mène à l'appareil.
4. Cet appareil ménager étant doté d'un système d'allumage automatique, ne pas essayer d'allumer le brûleur manuellement.
5. Retirer le panneau/volet d'accès de commande (panneau supérieur s'il s'agit d'un modèle à deux panneaux).
6. Faire tourner le robinet à gaz dans le sens des aiguilles d'une montre ↷ pour l'amener sur la position OFF (Arrêt) (Voir Figure 1).
7. Attendre cinq (5) minutes pour s'assurer de la dissipation du gaz.
   En cas d'odeur, ARRÊTER LE PROCÉDÉ. Suivre les instructions ci-dessus (Section B). En l'absence de toute odeur de gaz, avancer à l'étape suivante.
8. Faire tourner le robinet à gaz dans le sens inverse des aiguilles d'une montre ↶ pour l'amener sur la position ON (Marche) (Voir Figure 1).
9. Remettre le panneau/volet d'accès de commande en place (panneau supérieur s'il s'agit d'un modèle à deux panneaux).
10. Rebrancher l'appareil sur le réseau électrique.
11. Ajuster le thermostat à la position désirée.
12. Si l'appareil ne fonctionne pas, suivre les "Directives d'arrêt" cidessous et appeler le technicien de service.

TO TURN OFF GAS TO APPLIANCE

1. Set the thermostat to the lowest setting.
2. Turn off all electrical power to the appliance if service is to be performed.
3. Remove the control access door/panel (upper door if two-door model).
4. Move the gas control knob clockwise ↷ to "OFF". Do not use force. (See Figure 1)
5. Replace the control access door/panel (upper door if two-door model).

DIRECTIVES D'ARRÊT

1. Mettre le thermostat à la position minimale.
2. Débrancher l'appareil en prévision de la réparation.
3. Retirer le panneau/volet d'accès de commande (panneau supérieur s'il s'agit d'un modèle à deux panneaux).
4. Faire tourner le robinet à gaz dans le sens des aiguilles d'une montre ↷ pour l'amener sur la position OFF (Arrêt) Ne pas forcer (Voir Figure 1).
5. Remettre le panneau/volet d'accès de commande en place (panneau supérieur s'il s'agit d'un modèle à deux panneaux).

Figure 2. Gas Valve Label (200- and 225-kBTU Units)

⚠ WARNING ⚠

PROPOSITION 65 WARNING: This product contains fiberglass insulation. Disturbing the insulation of this product during installation, maintenance, or repair may expose you to fiberglass insulation.

- **Breathing this material may cause respiratory irritations.**
- **Fiberglass insulation may also cause eye irritation, skin sensitization, or other allergic responses in susceptible individuals.**
- **Always wear goggles, disposable gloves, long sleeved shirt, and appropriate breathing protection when working near this insulation. If contact with skin occurs, wash immediately with soap and water. In case of contact with eyes, flush immediately with water for at least 15 minutes. Contact a physician if needed.**

Requirements and Codes

- This equipment must be installed in accordance with instructions outlined in this manual, all applicable local building codes, and the current revision of the National Fuel Gas Code (NFPA54/ANSI Z223.1) or the Natural Gas and Propane Installation Code, CAN/CSA B149.1.
- All electrical wiring must be completed in accordance with local, state and national codes and regulations and with the National Electric Code (ANSI/NFPA 70) or in Canada the Canadian Electric Code Part 1 CSA C.22.1.
- The installer must comply with all local codes and regulations which govern the installation of this type of equipment. Local codes and regulations take precedence over any recommendations contained in these instructions. Consult local building codes and the National Electrical Code (ANSI CI) for special installation requirements.
- Air ducts must be installed in accordance with the standards of the National Fire Protection Association, *Standards for Installation of Air Conditioning and Ventilation Systems* (NFPA 90A), *Standard for Installation of Residence Type Warm Air Heating and Air Conditioning Systems* (NFPA 90B), these instructions, and all applicable local codes.
- Refer to the rating plate for the proper circulating air flow and temperature rise (also refer to **Table 2**). It is important that the duct system be designed to provide the correct flow rates and external pressure rise. An improperly-designed duct system can result in nuisance shutdowns, and comfort or noise issues.
- This unit is designed for outdoor installations only and should be located as described in **Unit Location**.
- Use only with the type of gas approved for this unit. Refer to the unit rating plate.
- Provide adequate combustion and ventilation air to the unit as well as adequate clearance around the air vent intake terminal (refer to **Combustion Air and Venting** and **Vent Termination**).
- Combustion products must be discharged outdoors. Only connect this unit to an approved vent system as specified in **Vent Termination**).

Table 2. US and Canadian Requirements and Codes

Type	Code, Agency, and/or Document	
	US	Canada
Combustion and ventilation air	National Fuel Gas Code (NFGC), Air for Combustion and Ventilation	Natural Gas and Propane Installation Codes (NSCNGPIC), Venting Systems and Air Supply for Appliances
Duct systems	Air Conditioning Contractors Association (ACCA) Manual D	
	Sheet Metal and Air Conditioning Contractors National Association (SMACNA)	
	American Society of Heating, Refrigeration, and Air Conditioning Engineers (ASHRAE) Fundamentals Handbook	
Electrical connections	National Electrical Code (NEC) ANSI/NFPA 70	Canadian Electrical Code CSA C22.1
Gas piping and gas pipe pressure testing	NFGC and National Plumbing Codes	NSCNGPIC
General installation	Current edition of the NFGC and the NFPA 90B*	NSCNGPIC**
Safety	(NFGC) NFPA 54-1999/ANSI Z223.1 and the Installation Standards, Warm Air Heating and Air Conditioning Systems ANSI/NFPA 90B.	CAN/CSA-B149.1 and .2-M00 National Standard of Canada. (NSCNGPIC)
*For copies, contact the National Fire Protection Association Inc., Batterymarch Park, Quincy, MA 02269 or American Gas Association, 400 N. Capitol, N.W., Washington DC 20001 or www.NFPA.org.		
**For a copy, contact Standard Sales, CSA International, 178 Rexdale Boulevard, Etobicoke (Toronto), Ontario, M9W 1R3 Canada.		
NOTE: The information listed is for reference purposes only and does not necessarily have jurisdiction over local or state codes. Always consult with local authorities before installing any gas appliance.		

PRE-INSTALLATION CONSIDERATIONS

Pre-Installation Checklist

- ❑ The cooling load of the area to be conditioned must be calculated, and a system with proper capacity must be selected. It is recommended that the area to be conditioned be completely insulated and vapor sealed.
- ❑ Check the electrical supply and verify that the power supply is adequate for unit operation. Consideration should be given to availability of electric power, service access, noise, and shade. If there is any question concerning the power supply, contact the local power company.
- ❑ All units are securely packed at the time of shipment and, upon arrival, should be carefully inspected for damage prior to installing the equipment at the job site. Verify that coil fins are straight. If necessary, comb fins to remove flattened or bent fins. Claims for damage (apparent or concealed) should be filed immediately with the carrier.
- ❑ Please consult your dealer for maintenance information and for the availability of maintenance contracts. Read all instructions before installing the unit.

Minimum Clearance Requirements

These units are certified as combination heating and cooling equipment for outdoor installation only. **Figure 3** shows the minimum clearances to combustible materials for both downflow and horizontal discharge options.

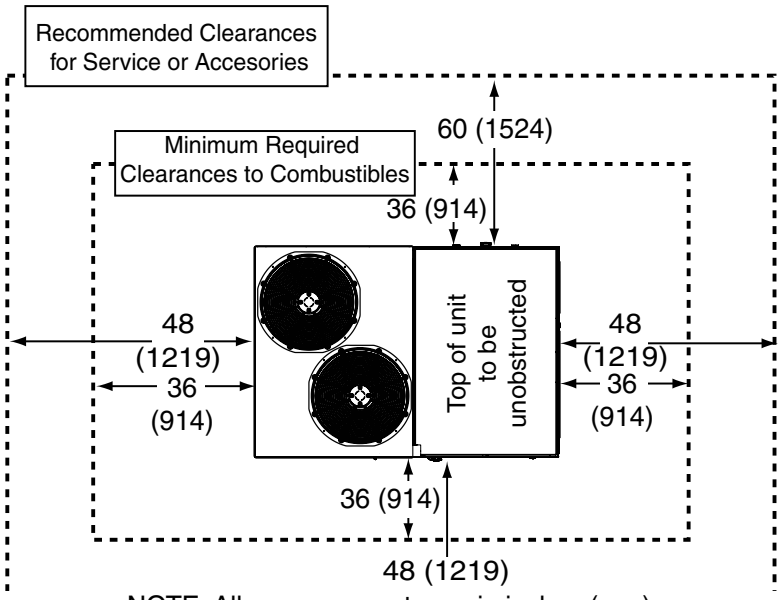
NOTE: The unit must be converted for horizontal connections prior to installation if using side supply with return air ducts.

These units may be installed on non-combustible surfaces when used with bottom supply and return air ducts. Units may be installed on wood flooring or on class A, B, or C roof-covering material as long as the following requirements are met:

- If using side supply with return air ducts, the unit must be converted for horizontal connections (refer to **Vertical to Horizontal Conversion**).
- If using vertical discharge and return air ducts a roof curb must be installed prior to unit installation. Refer to **Rigging and Hoisting** for setting of the unit.

NOTE: If minimum clearances to combustibles are greater than recommended serviceability clearances, clearances to combustibles must take precedence.

- Sufficient clearance for unobstructed airflow through the louvered control access panel and outdoor coil must be maintained in order to achieve rated performance. See **Figure 3** for minimum clearance requirements.



NOTE: All measurements are in inches (mm).

Figure 3. Minimum Clearance Requirements

Unit Location

- Survey the job site to determine the best location for the packaged unit. The unit should be located with consideration of minimizing the length of the supply and return ducts. If practical, place the equipment and its ducts in an area where they will be shaded from the afternoon sun—when the heat load is greatest.
- For horizontal installations, select a solid, level position, preferably on a concrete slab, slightly above the grade level and parallel to the building.
- Overhead obstructions, poorly ventilated areas, and areas subject to accumulation of debris should be avoided. Do not place the unit in a confined space or recessed area where discharge air from the unit could recirculate back through the condenser coil.

Heating Load

This unit should be sized to provide the design heating load requirement. Heating load estimates can be made using approved methods available from Air Conditioning Contractors of America (Manual N), American Society of Heating, Refrigerating, and Air Conditioning Engineers, or other approved engineering methods. For installations above 2,000 feet/609 meters, the unit should have a sea level input rating large enough that it will meet the heating load after deration for the installed elevation.

Combustion Air and Venting

⚠ WARNING ⚠

Installation methods other than those described in the following sections must comply with the National Fuel Gas Code and all applicable local codes for providing sufficient combustion air to the furnace.

- Provisions must be made during the installation of this unit that provide an adequate supply of air for combustion.
- Instructions for determining the adequacy of an installation can be found in the current revision of the NFGC (ANSI Z223.1 / NFPA54). Consult local codes for special requirements. These requirements are for US installations, as found in the NFGC.
- The requirements in Canada (B149.1) are structured differently. Refer to B149.1 and local code officials for Canadian installations.

⚠ WARNING ⚠

Combustion air must not be drawn from a contaminated atmosphere. Excessive exposure to contaminated combustion air will result in safety and performance related problems.

- To maximize heat exchanger life, combustion air must be free of chemicals that form corrosive acidic compounds in combustion gases.

⚠ WARNING ⚠

Do not store any chemicals with flammable or caustic vapors near the vent termination.

- Some examples of chemicals with flammable or caustic vapors that should not be stored near the vent termination:

Carbon tetrachloride	Gasoline/kerosene
Cements, glues, paint removers, varnishes, etc.	Halogen-type refrigerants
Chlorine-based swimming pool chemicals	Cleaning solvents
Masonry acid-washing materials	Hydrochloric acid
Chlorinated waxes & cleaners	Permanent wave solutions
De-icing salts or chemicals	Water-softening chemicals

⚠ CAUTION ⚠

DO NOT install jumper wires across the flame roll-out control to defeat its function or reset the control without identifying and correcting the fault condition.

Combustion Air and Venting—Continued

- Combustion air openings in the door of the unit must never be restricted. If the unit does not receive an adequate supply of air for combustion, the flame roll-out control located above the burners will open, turning off the gas supply to the burners. This safety device is a manually-reset switch.
- If this control must be replaced, use only factory-authorized replacement parts specified in the parts manual provided online and listed in **Table 1**.

Vent Termination

This unit has been equipped with an integral venting system and is designed to operate only with this venting system. If desired, an accessory venting kit is available.

⚠ WARNING ⚠

This unit is intended for outdoor installation only. Do not vent the unit through a conventional venting system. Use only the approved venting kit listed in the technical service literature.

A vent cover assembly has been supplied with the unit and can be found secured inside the compressor area of this unit. **Figure 4** shows the proper installation location of the vent cover assembly over the vent outlet. The fasteners used to secure the vent cover are affixed to the cover for transport.

The location requirements for venting system termination are as follows:

- The location of the vent termination must be consistent with the National Fuel Gas Code (ANSI Z223.1) or CAN/CSA-B149 Installation Codes.
- Must be located at least 4 feet/1.5 meters horizontally from any electric meters, gas meters, regulators, and relief equipment.
- Must be located at least 3 feet/1 meter above any forced air inlet located within 10 feet/3 meters of unit.
- Must be located at least 4 feet/1.5 meters below, 4 feet horizontally from, or 1 foot/0.5 meters above any door, window, or gravity air inlet into any building.
- Must be located at least 1 foot/0.5 meters above grade and installed in such a manner as to prevent snow accumulation from obstructing the vent termination.
- The vent termination must not be located above any public walkways.
- The vent cover assembly must be installed to assure proper operation of the unit.
- Make sure the exhaust gases will not impinge on windows or building surfaces, which may be compromised or damaged by condensation.
- Do not install the unit in a location where exhaust from the vent termination will be directed into windows, stairwells, under decks, or other recessed areas.

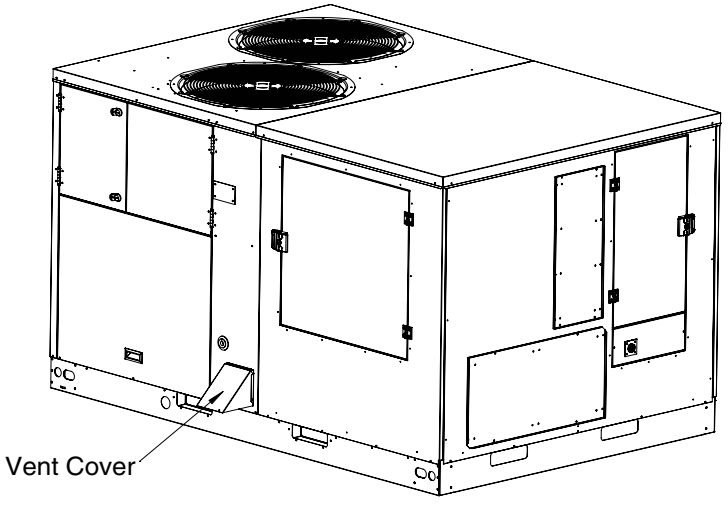


Figure 4. Vent Cover Installation Location

Circulating Air Supply

⚠ DANGER ⚠

- **Products of combustion must not be allowed to enter the return air ductwork or the circulating air supply. Failure to prevent products of combustion from being circulated into the living space can create potentially hazardous conditions including carbon monoxide poisoning that could result in personal injury or death.**
- **All return ductwork must be adequately sealed, all joints must be taped, and the ductwork must be secured to the unit with sheet metal screws. When return air is provided through the bottom of the unit, the joint between the unit and the return air plenum must be air tight.**
- **The roof curb or cement pad that the unit is mounted to must provide sound physical support of the unit with no gaps, cracks, or sagging between the unit and pad.**
- **Return air and circulating air ductwork must not be connected to any other heat producing device such as a fireplace insert, stove, etc. Doing so may result in fire, explosion, carbon monoxide poisoning, personal injury, or property damage.**

Supply and Return Ducts

This unit is designed only for use with supply and return ducts. Air ducts should be installed in accordance with the standards of the National Fire Protection Association *Standard for Installation of Air Conditioning Systems* (NFPA 90A), *Standard for Installation of Residence Type Warm Air Heating and Air Conditioning Systems* (NFPA 90B), and all applicable local codes. NFPA publications are available by writing to: National Fire Protection Association, Batterymarch Park, Quincy, ME 02269 or visit their website: **www.NFPA.org**.

- Design the ductwork according to *Manual Q* by the Air Conditioning Contractors of America (ACCA) or similar commercial methods.
- If a roof curb is installed, the ducts must be attached to the curb hangers—not the unit.
- Ductwork should be attached directly to the unit end panel for horizontal applications.
- It is recommended that the outlet duct be equipped with a removable access panel. This opening should be accessible when the unit is installed in service and shall be of a size so that smoke or reflected light may be observed inside the casing to indicate the presence of leaks in the heat exchanger. The cover for the opening shall be attached in such a manner as to prevent leaks.
- If outside air is utilized as return air to the unit for ventilation or to improve indoor air quality, the system must be designed so that the return air to the unit is not less than 50°F (10°C) during heating operation.
- If a combination of indoor and outdoor air is used, the ducts and damper system must be designed so that the return air supply to the furnace is equal to the return air supply under normal, indoor return air applications.
- This unit is shipped ready for vertical duct connections and is easily converted for horizontal duct connections.

Unconditioned Spaces

All ductwork passing through unconditioned space must be properly insulated to prevent condensation and to minimize duct losses. Use insulation with an outer vapor barrier. Refer to local codes for insulation material requirements.

Acoustical Ductwork

- Certain installations may require the use of acoustical lining inside the supply ductwork.
- Acoustical insulation must be in accordance with the current revision of the Sheet Metal and Air Conditioning Contractors National Association (SMACNA) application standard for duct liners.
- Duct lining must be UL-classified batts or blankets with a fire hazard classification of FHC-25/50 or less.
- Fiber ductwork may be used in place of internal duct liners if the fiber ductwork is in accordance with the current revision of the SMACNA construction standard on fibrous glass ducts. Fibrous ductwork and internal acoustical lining must be NFPA Class 1 air ducts when tested per UL Standard 181 for Class 1 ducts.

Air Filter Requirements

⚠ WARNING ⚠

Never operate the unit without a filter in place. Dust and lint could accumulate on internal parts, resulting in loss of efficiency, equipment damage and possible fire.

All return and outside air must pass through the filters before entering the cooling and heating compartments. It is important that all filters be kept clean and that they be replaced frequently to ensure proper operation of the unit. Dirty or clogged filters will reduce the efficiency of the unit and will result in unit shutdowns. When replacing the air filters, a suitable air filter must be installed ahead of the evaporator coil of the return air system. Refer to **Table 3** for recommended air filter sizes and quantities.

Table 3. Air Filters

Unit Size	Size (Inches)	Quantity
072	16 × 25 × 4	2
090, 120	16 × 16 × 4	4

COMPONENT FUNCTIONS AND LOCATIONS

Component Functions

The functional descriptions that follow are of various components that affect the operation and shutting down of the unit. If any component must be replaced, use only factory authorized parts listed in the replacement parts manual found in **Table 1** and provided online at **www.reznorhvac.com**.

Pressure Switches

The pressure switches act to verify that the inducer motor is running. Combustion gases are drawn through the heat exchanger tubes and vented through the vent system.

Flame Roll-Out Control

The flame roll-out control acts to verify that the burner flame is being drawn into the heat exchanger tubes. If the burner flame is not being drawn into the heat exchanger tubes, the roll-out control will open within several seconds. The combustion blower will continue to operate if the flame roll-out control opens until it is manually reset.

Flame Sensor

The flame sensor acts to prove that flame has carried over from the ignitor to the right-most burner. If no flame is sensed, the unit will be shut down automatically and will attempt three additional ignition trials before going into lockout. Recovery from lockout requires a manual reset by either resetting the thermostat or by removing 24 volts for a period of 5 seconds. If the thermostat still calls for heat after 1 hour, the control will automatically reset and attempt to ignite the burner again.

Gas Valve

The gas valve controls the flow of gas to the burners. When the valve is energized, it automatically opens and regulates the gas pressure to the manifold.

Modulating Gas Valve

The modulating gas valve is a plunger-type valve that provides precise control of the gas volume flowing to the burners through a 2–10VDC signal from the system programmable controller.

High Pressure Switch

This factory-installed switch is designed to deenergize the unit when excessive pressure occurs due to abnormal conditions. Under normal conditions, the switch is closed. If the discharge pressure rises above 650 psig, the switch opens and deenergizes the outdoor unit. The switch is a manual-reset type and remains open until the button on top of the switch is depressed.

Low Pressure Switch

A low pressure cutoff switch is used for protection against compressor damage caused by a loss of system charge. This protection prevents short cycling on the internal overload, which can pump the oil out of the compressor.

Over-Temperature Limit Control

The over-temperature limit control acts to prevent the air temperature leaving the unit from exceeding the maximum outlet air temperature. If the limit opens, the blower limit relay energizes. The circulating air blower and combustion blower will continue to operate if the over-temperature limit control opens.

Component Locations

Component locations are shown in **Figure 5**.

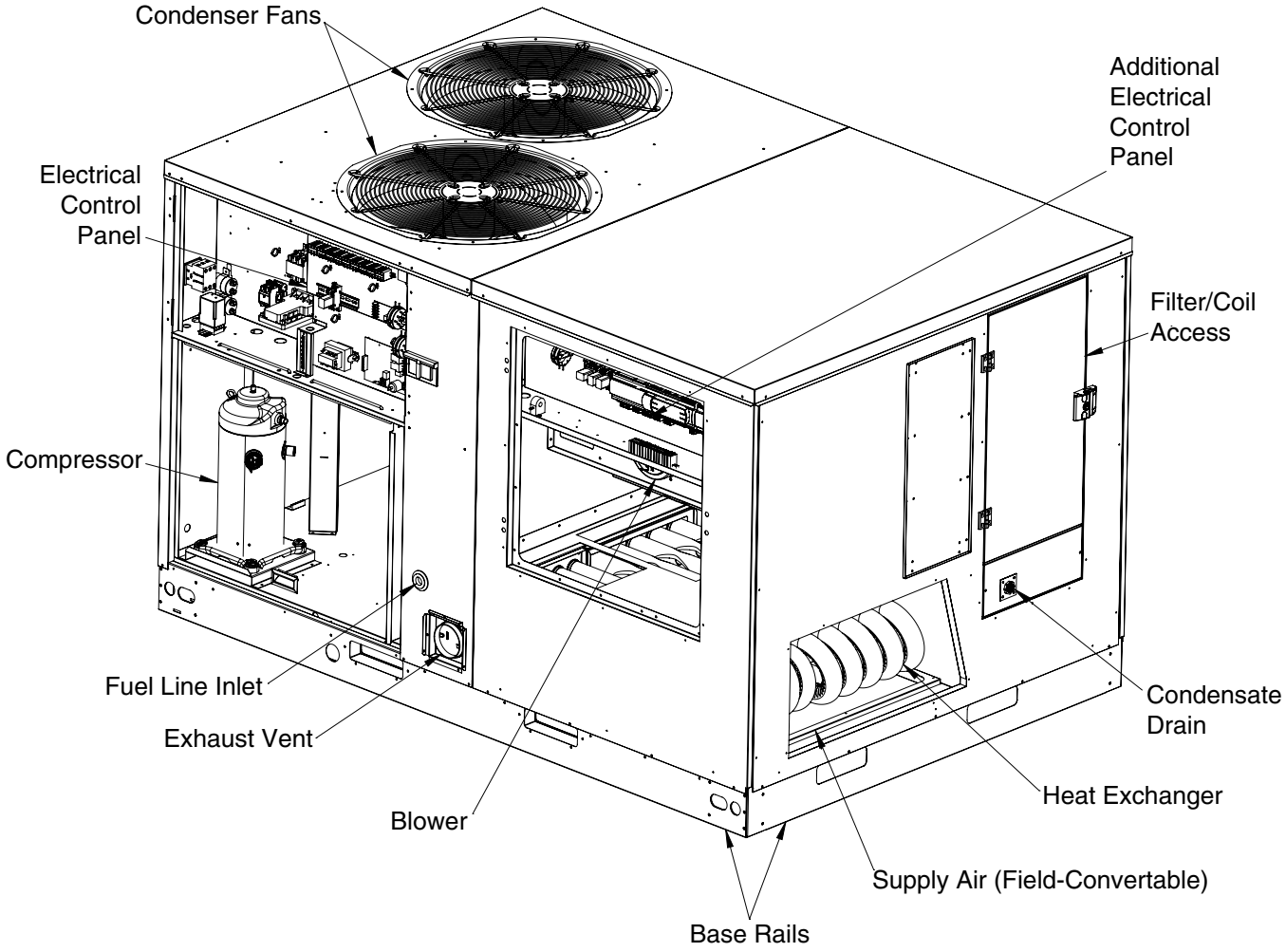


Figure 5. Component Locations

UNIT INSTALLATION

Unpacking

All units have been securely packaged at the point of shipment. After unpacking the unit, carefully inspect for apparent and concealed damage. Claims for damage should be filed with the carrier by the consignee.

1. Remove any shipping brackets. DO NOT remove base rails from unit.
2. Inspect unit thoroughly for shipping damage.

Carefully lower and position unit to its permanent location.

Rigging and Hoisting

⚠ DANGER ⚠

- **To avoid the risk of property damage, personal injury, or death, it is the rigger's responsibility to ensure that whatever means are used to hoist the unit are safe and adequate: The lifting equipment must be adequate for the load (refer to Table 4).**
- **The unit must be lifted from the holes in the base rails using cables or chains (see Figure 6).**
- **Spreader bars are required to protect the unit and to ensure even loading (see Figure 6).**
- **Keep the unit in an upright position at all times. The rigging must be located outside the unit's center of gravity (refer to Table 4).**
- **All panels must be securely in place during rigging and hoisting.**

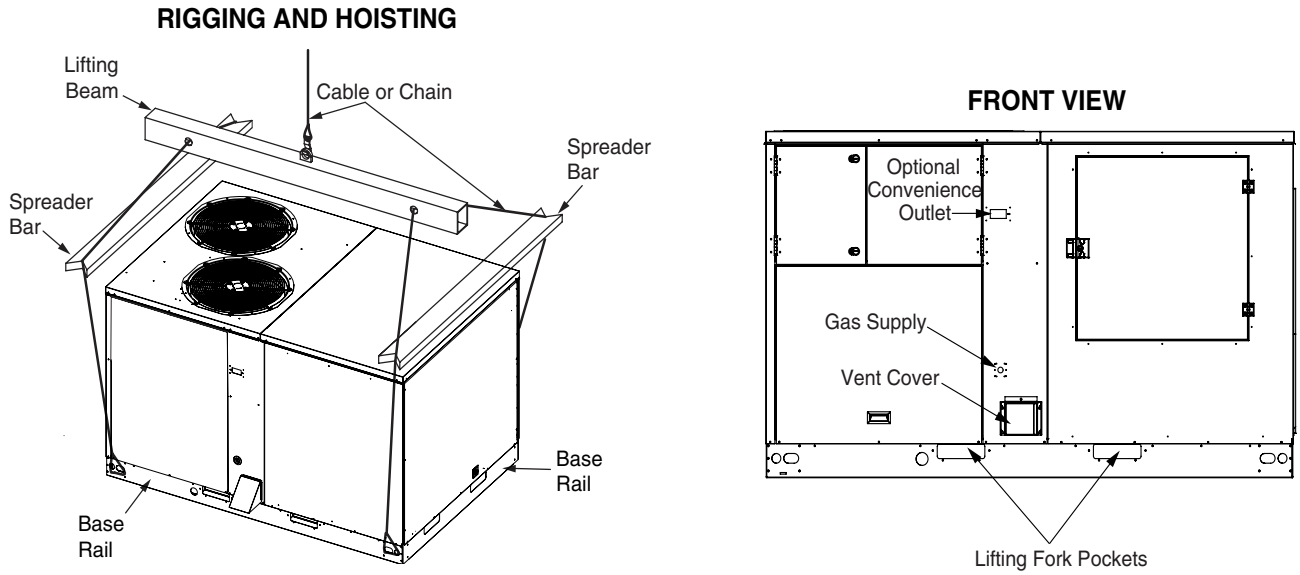


Figure 6. Lifting

Table 4. Unit Height, Weight, and Center of Gravity

Unit Size	Height (Inches (mm))*		Weight (Pounds (kg))						Center of Gravity (Inches (mm))**	
			Unit Weight	Shipping Weight	Corner Weight**					
	Horizontal Duct Applications	Vertical Duct Applications			A	B	C	D	E	F
072	54 (1372)	48.5 (1232)	1145 (519)	1267 (575)	284 (129)	347 (157)	283 (128)	232 (105)	49 (1245)	27 (686)
090			1182 (536)	1304 (591)	310 (141)	354 (161)	276 (125)	242 (110)	50 (1270)	28 (711)
120			1225 (556)	1344 (611)	280 (127)	367 (166)	328 (149)	251 (114)	47 (1194)	26 (660)

*Baserails are not intended to be removed. Information provided is total unit height for horizontal duct applications or height dimension added to selected roof curb height for vertical duct applications.

**See Figure 7.

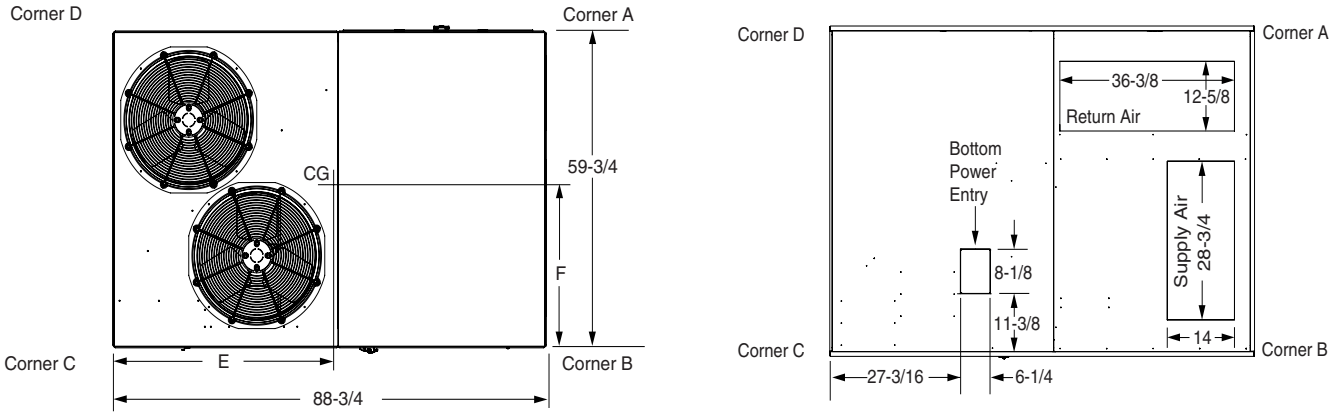


Figure 7. Dimensions and Center of Gravity

Vertical to Horizontal Conversion

The unit is shipped ready for downflow duct connections. If horizontal ducts are required, the unit must be converted prior to attaching ductwork to unit as follows:

1. Remove both return and supply horizontal duct covers. Do not discard the covers. These will be used to cover the openings in the bottom of the unit (see **Figure 8**, DETAIL A).

⚠ CAUTION ⚠

Use caution when cutting the left vertical side of the return air panel. The filter rack is in close proximity to opening.

2. Cut both the return and supply openings, following along the tabbed cutouts. Note that there are tabs on the inside and the outside of the panels. Discard the cut sections when done (see **Figure 8**, DETAIL B. These will not be needed.
3. To provide additional clearance for the correct positioning of the supply air cover below the heat tubes, remove two screws that secure the air baffle bracket to the heat exchanger air baffles (see **Figure 8**, DETAIL C).
4. Apply adhesive to one side of each duct cover that was removed in step 1. Using predrilled locating holes, install the duct covers over the openings in the bottom of the unit and secure them to the bottom of the unit.
5. Reinstall the air baffle bracket.

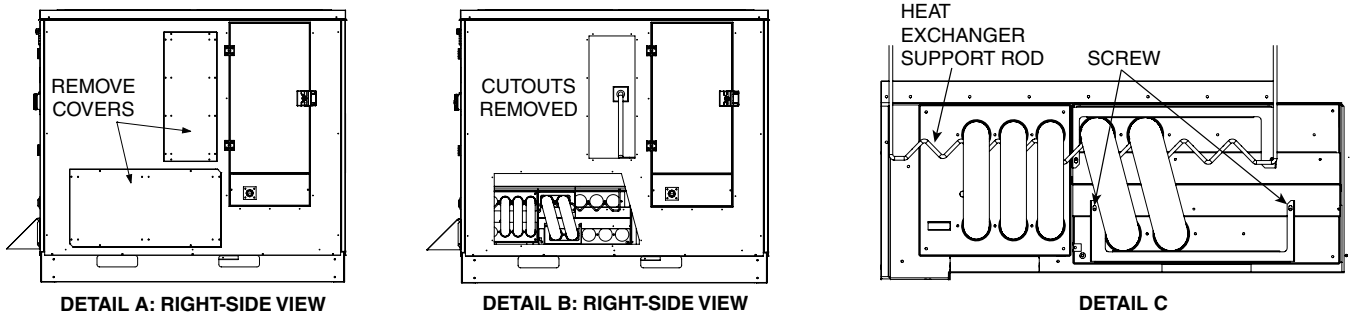


Figure 8. Vertical to Horizontal Conversion

Rooftop Mounting

Rooftop installations must be located according to local building codes or ordinances and these requirements:

- The roof must be capable of handling the weight of the unit (refer to **Table 4**). Reinforce the roof if necessary.
- The appropriate accessory roof curb (see **Figure 9**) must be installed prior to unit installation. Refer to the available roof curb height offerings in the technical sales literature. The roof curb must be square and level to ensure proper condensate drainage. Please follow all instructions provided with the kit.

Rooftop Mounting—Continued

⚠ WARNING ⚠

Never drill or punch holes in unit base when installing downflow units. Leakage may occur if bottom pan is punctured.

- For bottom discharge applications, the supply and return air ducts must be attached to the roof curb duct supports, not the unit. Install all ductwork before setting the unit on a curb or frame.
- Frame support must be constructed using noncombustible materials. Full perimeter support is required under the unit. Supports must be made of steel or weather-resistant wooden materials. The unit must be square and level to ensure proper condensate drainage.
- The frame must be high enough to ensure prevention of any moisture from entering the unit. Recommended height to unit base is 8 inches (20 cm) for both downflow and horizontal installations.
- Secure the roof curb or frame to the roof using acceptable mechanical methods per local codes.

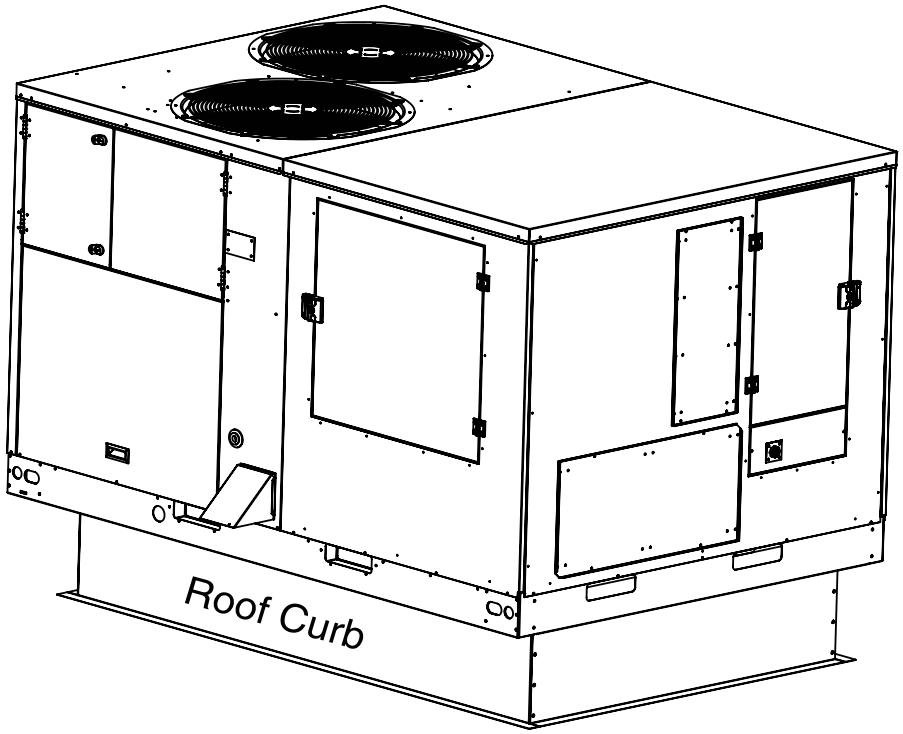


Figure 9. Roof Curb

Ground Level Installation

Ground level installations must be located according to local building codes or ordinances and these requirements:

- Clearances must be in accordance **Figure 3**.
- A mounting pad (see **Figure 10**) separate from the building foundation must be provided. The pad must be level to ensure proper condensate disposal and strong enough to support the unit's weight. The slab height must be a minimum of 3 inches (8 cm) above grade and with adequate drainage.
- When using horizontal supply with return air ducts, the unit must be converted for horizontal connections prior to unit installation. Refer to **Vertical to Horizontal Conversion**.

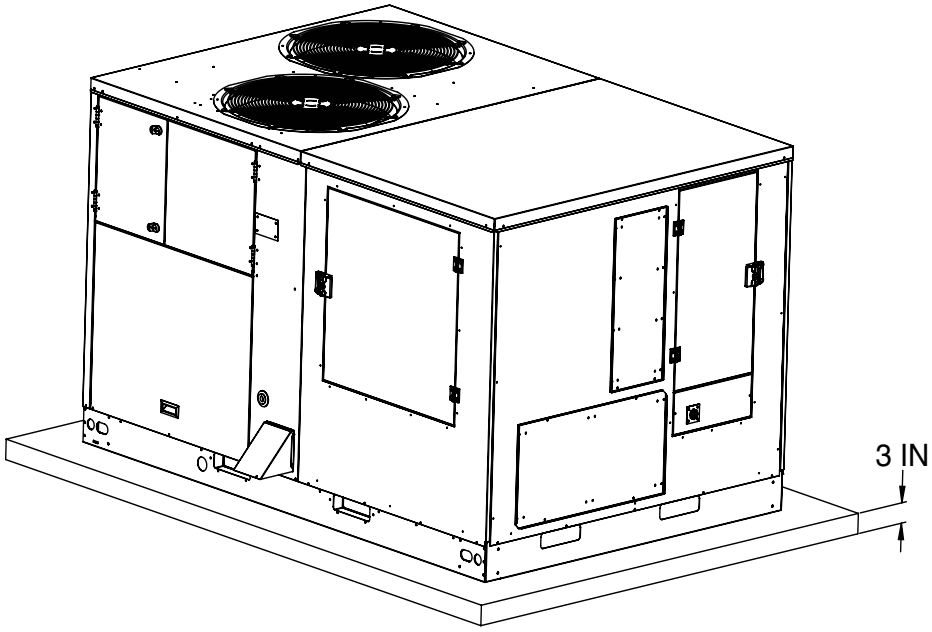


Figure 10. Mounting Pad

Condensate Drain

Condensate is drained from the unit through a 1-inch (25.4 mm) PVC pipe located on the end of the unit (see **Figure 11**). For proper drainage, consider the following when installing a condensate drain line and drain trap in the cooling coil drain:

- Avoid areas where condensate drainage may cause problems. The method for disposing of condensate varies according to local codes. Consult your local code or authority having jurisdiction.

⚠ CAUTION ⚠

When connecting rigid drain line, hold any fittings with a wrench to prevent twisting. Do not overtighten!

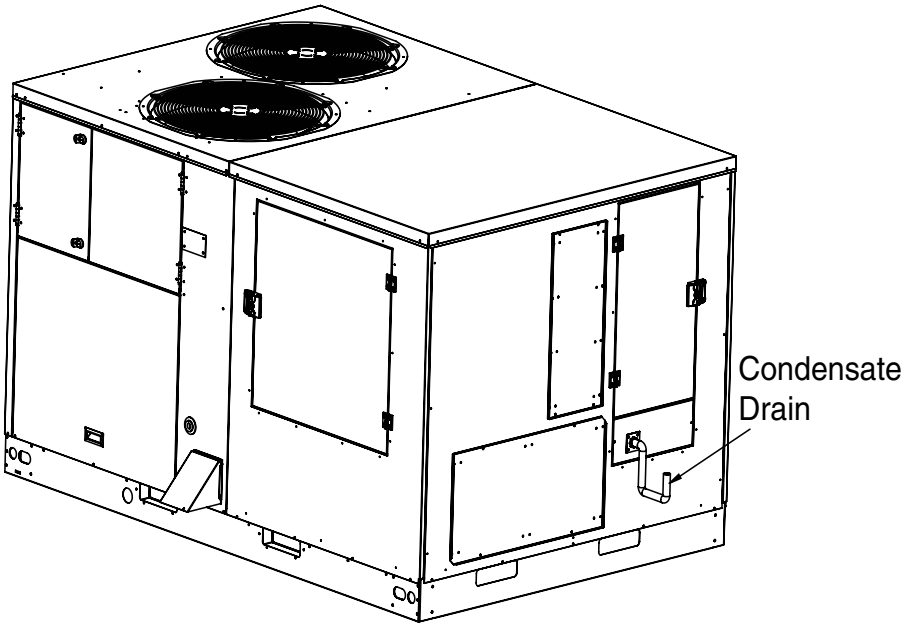


Figure 11. Condensate Drain Location

Condensate Drain—Continued

NOTE: The design of the drain trap is important.

- Because the condensate drain pan is on the blower inlet side of the unit, there is a negative pressure at the drain relative to the atmospheric pressure. The trap height must account for this static pressure difference.
- Determine maximum negative static pressure by measuring the negative pressure at the blower inlet and adding 0.2 IN WC to allow for dirty filters.
- As condensate forms during normal operation, the water level in the condensate drain trap (see **Figure 12**) rises until there is a constant outflow.
- If dimension B shown in **Figure 12** is not of sufficient length, the water seal will not hold and air will be drawn through the drain pipe into the unit. If the outlet leg of the trap is too long, water will back up into the drain pan.
- Refer to the following equation (dimensions refer to **Figure 12**) to calculate the appropriate dimensions for trapping a negative pressure system.

$$A = 1\ inch\ (25\ mm)\ for\ each\ 1\ inch\ (25\ mm)\ of\ maximum\ static\ pressure + 1\ inch\ (25\ mm)$$

$$B = A + A/2$$

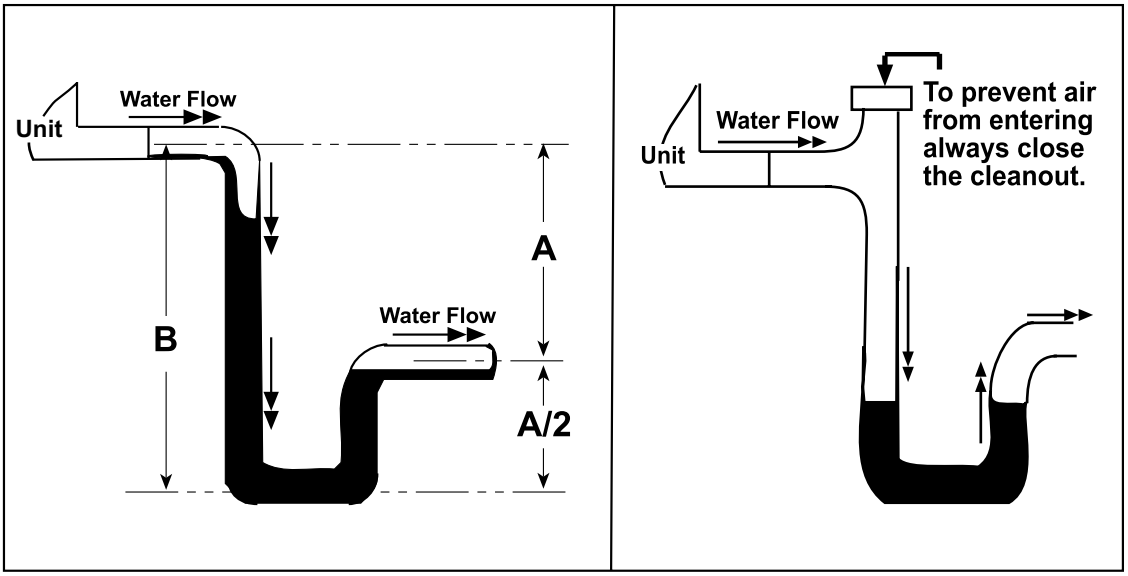


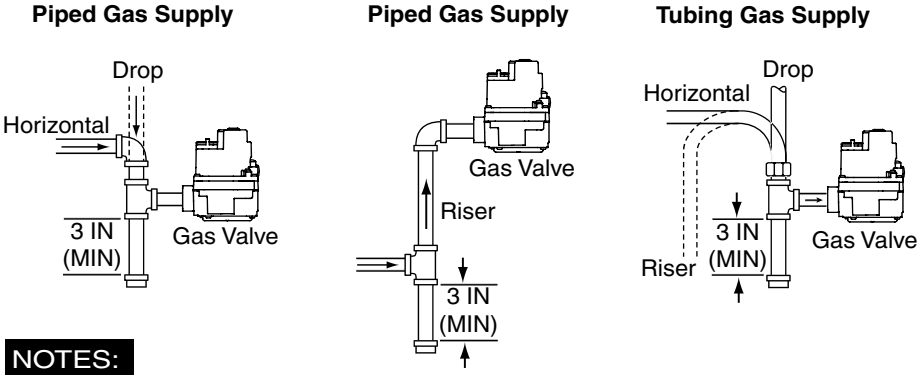
Figure 12. Condensate Drain Trap

GAS SUPPLY AND PIPING

NOTE:

- **All gas piping must be installed in compliance with local codes and utility regulations. In the absence of local codes the gas line installation must comply with the latest edition of the National Fuel Gas Code ANSI Z223.1 or CAN/CSA B149 Installation Codes.**
- **Some local codes require the installation of a manual main shutoff valve and ground joint union external to the furnace.The shutoff valve should be readily accessible for service and/or emergency use (see Figure 13). Consult the local utility or gas supplier for additional requirements regarding placement of the manual main gas shutoff.**
- **Gas piping must never run in or through air ducts, chimneys, gas vents, or elevator shafts.**
- **Compounds used to seal joints on gas piping must be resistant to the actions of LP propane gas.**
- **The main gas valve and main power disconnect to the furnace must be properly labeled by the installer in case emergency shutdown is required.**
- **An 1/8-inch NPT plugged tap must be installed in the gas line immediately upstream of the gas supply connection to the furnace for use when measuring the gas supply pressure. The plug should be readily-accessible for service use.**
- **A drip leg should be installed in the vertical pipe run to the unit (see Figure 13).**

This unit has only right side gas entry. When connecting the gas, provide clearance between the gas supply line and the entry hole in the unit's casing to avoid unwanted noise and/or damage to the unit. Gas pipe inlet sizes are dependent on heat size as follows: for heat sizes H100 and H166, inlet size is 1/2-inch NPT; for heat sizes H200 and H225, inlet size is 3/4-inch NPT. A typical gas service hookup is shown in **Figure 13**.



NOTES:

1. All piping must comply with local codes, ordinances, and/or National Fuel Gas Codes.
2. If local codes allow the use of a flexible gas appliance connector, always use a new listed connector. Do not use a connector that has previously serviced another gas appliance.
3. A manual shutoff valve must be installed within 6 feet of this equipment.
4. Always include a drip leg in piping.

Figure 13. Typical Gas Service Connection

This unit is shipped from the factory for natural gas operation at sea level elevation and is equipped with an orifice at each burner. **Table 5** lists gas pipe capacities for standard pipe sizes as a function of length in typical applications based on nominal pressure drop in the line.

Table 5. Capacity of Black Iron Gas Pipe for Natural Gas (Specific Gravity = 0.60)

Nominal Pipe Diameter (Inches)	Length of Pipe Run (Feet)							
	10	20	30	40	50	60	70	80
	Cubic Feet per Hour							
1/2	130	90	75	65	55	50	45	40
3/4	280	190	150	130	115	105	95	90
1	520	350	285	245	215	195	180	170
1-1/4	1050	730	590	500	440	400	370	350
1-1/2	1600	1100	890	760	670	610	—	

NOTE: Cubic feet per hour listed must be greater than the cubic feet per hour of gas flow required by the furnace. To determine the cubic feet per hour of gas flow required by the furnace, divide the input rate of the furnace by the heating value (from gas supplier) of the gas.

$$\text{Cubic Feet Per Hour Required} = \frac{\text{Input To Furnace (Btu/hr)}}{\text{Heating Value of Gas (Btu/Cu. Ft.)}}$$

Leak Check

⚠ DANGER ⚠

FIRE OR EXPLOSION HAZARD

- **Failure to follow safety warnings exactly could result in serious injury or property damage.**
- **Never test for gas leaks with an open flame. Use a commercially available soap solution made specifically for the detection of leaks to check all connections. A fire or explosion may result causing property damage, personal injury or loss of life.**

⚠ CAUTION ⚠

- **If pressure testing the gas supply lines at pressures greater than 1/2 psig (14 IN WC), the unit must be disconnected from the gas supply piping system to prevent damage to the gas valve.**
- **If the test pressure is less than or equal to 1/2 psig (14 IN WC), the unit must be isolated from the gas supply line by closing the manual shutoff valve.**

- After the gas piping to the unit is complete, all connections must be tested for gas leaks. This includes pipe connections at the main gas valve, emergency shutoff valve and other gas connectors.
- The soap and water solution can be applied on each joint or union using a small paintbrush. If any bubbling is observed, the connection is not sealed adequately and must be retightened. Repeat the tightening and soap check process until bubbling ceases.

High Altitude (Above 2,000 Feet/609 Meters) Deration

⚠ DANGER ⚠

The reduction of input rating necessary for high altitude installation may only be accomplished with factory-supplied orifices. Do not attempt to drill out orifices in the field. Improperly drilled orifices may cause fire, explosion, carbon monoxide poisoning, personal injury or death.

High altitude application with this unit depends on the installation altitude and the heating value of the gas. At high altitudes, the heating value of natural gas is always lower than the heating value at sea level.

All installations of this equipment must be made in accordance with the National Fuel Gas Code or with local jurisdiction codes. For installations at exactly 2,000 feet/609 meters in altitude or under, the installer does not need to derate the heat exchanger performance. For any installation that exceeds 2,000 feet, please see the following instructions and example:

If installing this unit above 2,000 feet, the input rate must be reduced 4% per 1,000 feet/304 meters of altitude (e.g., 12% at 3,000 feet/914 meters, 16% at 4,000 feet/1219 meters, etc.). Always round up to the next highest value of 1,000—an installation at 3,120 feet/950 meters is derated by 16% due to rounding up to 4,000.

High Altitude (Above 2,000 Feet/609 Meters) Deration—Continued

NOTE: Deration is necessary to compensate for low atmospheric pressure at high altitudes. Generally this will require obtaining the gas heating value from the local gas utility and replacing the burner orifices.

Table 6 lists the correct orifice size to use at different altitudes. Determine the unit rating and orifice size using the following example as a guide:

- A 200,000-BTU natural gas unit is being installed at an elevation of 3,890 feet/1185 meters.
- Rounding up to 4,000 feet/1219 meters, the unit needs to be derated by 4% for each 1,000 feet/304 meters of elevation. This equates to 16% or less than the sea level rating of 200,000 BTUh.
- Determine unit input rating: [200,000 × (100 − 16)%] = 168,000 BTUh. The required heating rate for 3,890 feet/1185 meters is 168,000 BTUh.
- Determine orifice size: Refer to Table 6 for BTU output and orifice size, which is #32 at 4,000 feet/1219 meters.
- Install one #32 orifice in every burner and check firing rate. In this example, the firing rate must not exceed 168,000 BTUh.

⚠ CAUTION ⚠

Observe the action of the burners to ensure that there is no yellowing, lifting, or flashback of the flame. Yellowing of flame on propane units is acceptable.

After changing the orifices, adjust the firing rate in accordance with the **Firing Rate Adjustment** section.

Table 6. Natural Gas High Altitude (Above 2,000 Feet/609 Meters) Orifice (Drill) Size

Heat Size	Altitude (Feet/Meters)									Orifice Quantity
	0–2000/ 0–609	3000/ 914	4000/ 1219	5000/ 1524	6000/ 1828	7000/ 2133	8000/ 2438	9000/ 2743	10,000/ 3048	
	Orifice (Drill) Size									
H100	#30	#31				#32		#33	#35	2
H166/H200	#31	#31	#32		#33	#34	#35	#36	#37	4/5
H225	0.125									5

Conversion to LP (Propane)

⚠ DANGER ⚠

The furnace was shipped from the factory equipped to operate on natural gas. Conversion to LP (propane) gas must be performed by qualified service personnel using a factory-supplied conversion kit. Failure to use the proper conversion kit can cause fire, explosion, property damage, carbon monoxide poisoning, personal injury, or death.

In the US, if installing the unit above 2,000 feet, refer to Table 7 to determine the correct orifice size. When conversion is complete, verify the input rate is correct as listed in the tables. Approved conversion kit must be used. Please follow the instructions provided with each kit.

Table 7. LP (Propane) Gas High Altitude (Above 2,000 Feet) Orifice (Drill) Size

Heat Size	Altitude (Feet)									Orifice Quantity
	0–2000	3000	4000	5000	6000	7000	8000	9000	10,000	
	Orifice (Drill) Size									
H100	46	47	47	48	48	49	49	50	50	2
H166/H200	50	50	50	51	51	51	52	52	52	4/5
H225	48	49	49	50	50	50	51	51	52	5

NOTE: Refer to **High Altitude (Above 2,000 Feet/609 Meters) Deration** to determine heat exchanger capacity at increased elevations.

ELECTRICAL WIRING

Pre-Electrical Checklist

⚠ DANGER ⚠

ELECTRICAL SHOCK, FIRE, OR EXPLOSION HAZARD

Failure to follow safety warnings exactly could result in serious injury or property damage.

Improper servicing could result in dangerous operation, serious injury, death or property damage.

- **Before servicing, disconnect all electrical power to furnace.**
- **When servicing controls, label all wires prior to disconnecting. Reconnect wires correctly.**
- **Verify proper operation after servicing.**

- ❑ Verify that the voltage, frequency, and phase of the supply source match the specifications on the unit rating plate.
- ❑ Verify that the service provided by the utility is sufficient to handle the additional load imposed by this equipment.
- ❑ For Minimum Circuit Ampacity (MCA)/Maximum Overcurrent Protection (MOP) data, refer to the wiring diagram included with the unit.
- ❑ Verify that factory wiring is in accordance with the unit wiring diagram. Inspect for loose connections.
- ❑ For three-phase units, always check the phase balance (refer to **Unbalanced Three-Phase Supply Voltage**).
- ❑ For electrical ratings, refer to the unit rating plate.

Line Voltage

- Electrical connections must be in compliance with all applicable local codes and ordinances, and with the current revision of the National Electric Code (ANSI/NFPA 70). For Canadian installations, the electrical connections and grounding shall comply with the current Canadian Electrical Code (CSA C22.1 and/or local codes).
- Provide power supply for the unit in accordance with the unit wiring diagram and the unit rating plate. The line voltage to the unit should be supplied from a dedicated branch circuit containing the correct fuse or circuit breaker for the unit.

NOTE: An electrical disconnect must be located within sight of and readily accessible to the unit. This switch shall be capable of electrically deenergizing the outdoor unit.

- The installer should become familiar with the wiring diagrams before making any electrical connections to the outdoor unit. Refer to these wiring diagrams for proper incoming field wiring. Any other wiring methods must be acceptable to the authority having jurisdiction.
- If any of the original wires supplied with the unit need replacing, they must be replaced with material of the same voltage, gauge, and temperature rating.
- Connect the line-voltage leads to the terminals on the 3-pole terminal block inside the control compartment.
- Use only copper wire for the line voltage power supply to this unit. Use proper code agency listed conduit and connector for connecting the supply wires. Use of rain-tight conduit is recommended.
- Overcurrent protection must be provided at the branch circuit distribution panel and sized as shown on the unit rating label and according to the National Electric Code and applicable local codes.

NOTE: Refer to the unit rating plate for maximum circuit ampacity and maximum overcurrent protection limits.

Grounding

⚠ WARNING ⚠

The unit cabinet must have an uninterrupted or unbroken electrical ground to minimize personal injury if an electrical fault should occur. Do not use gas piping as an electrical ground!

This unit must be electrically grounded in accordance with local codes or, in the absence of local codes, with the National Electrical Code (ANSI/NFPA 70) or the CSA C22.1 Electrical Code. Use the grounding lug provided in the control box for grounding the unit.

Unbalanced Three-Phase Supply Voltage

Voltage unbalance occurs when the voltages of all phases of a three-phase power supply are no longer equal. This unbalance reduces motor efficiency and performance. Some underlying causes of voltage unbalance may include lLack of symmetry in transmission lines, large single-phase loads, and unbalanced or overloaded transformers. A motor should never be operated when a phase imbalance in supply is greater than 2%.

Determine the percentage of voltage imbalance in the line voltages (see **Figure 14**) as follows:

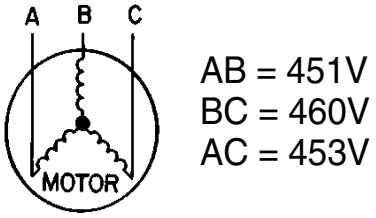


Figure 14. Typical Line Voltages

1. Measure the line voltages of the three-phase power supply where it enters the building and at a location that will be dedicated only to unit installation—at the unit's circuit protection or disconnect.
2. Determine the average voltage in the power supply. In the example shown in **Figure 14**, the measured line voltages are 451, 460, and 453 with an average of 454 volts (451 + 460 + 453 = 1,364 / 3 = 454).
3. Determine the maximum deviation. For example, from the values given in step 1, the BC voltage (460V) is the greatest difference in value from the average (i.e., 460 − 454 = 6, 454 − 451 = 3, and 454 − 453 = 1).
4. Determine the voltage imbalance percentage using the following equation, where 100 × (6 / 454) = 1.32%:

$$\% \text{ Voltage Imbalance} = 100 \times \frac{\text{max voltage deviation from average voltage}}{\text{average voltage}}$$

The amount of phase imbalance (1.32%) is satisfactory because the amount is lower than the maximum allowable (2%). Please contact your local electric utility company if your voltage imbalance is more than 2%.

FIELD CONNECTIONS

Low Voltage Control Wiring

NOTE: Required field wiring is indicated on the unit wiring diagram by dashed lines. Refer to manufacturer's installation instructions provided with shipped-loose components prior to installation.

Consider the following when making field connections using low voltage control wiring:

- Ensure that 24VAC control wiring is sized for a maximum 3% voltage drop
- Where possible, route control wiring to the unit in separate conduits, isolated from 24VAC controls and from line voltage power to the unit
- If the digital sensor wires are to be run in the same conduit as the 24VAC control wiring, the wiring MUST be shielded cable and must be bundled separately from the 24VAC control wiring. The shield MUST be drained at the unit and MUST be taped on the opposite end.

Pneumatic Tubing Recommendations

All tubing is field-supplied. For best results (shortest response times), the following tubing diameters are preferred:

- 3/16-inch ID for tubing lengths up to 100 feet (30 meters)
- 1/4-inch ID for tubing lengths up to 300 feet (91 meters)
- 3/8-inch ID for tubing lengths up to 900 feet (274 meters)

Field-Connected Components

Refer to **Table 8** for components that require field connections.

Table 8. Field-Connected Components

Option	Description	PN	Note
—	Discharge air temperature sensor	222753	Applies to all installations; refer to unit wiring diagram for termination details
BACnet IP/Ethernet interface	BACnet IP/Ethernet card for use with control option D19	1012849	Refer to unit wiring diagram for termination details
	BACnet IP/Ethernet card for use with control option D21	1012850	
	BACnet IP/Ethernet card for use with control option D22	1013658	
	BACnet IP/Ethernet card for use with control option D23	1024340	
BD5	Firestat, return air or outlet air	152632	Comply with local building codes and manufacturer's installation instructions
BE15	Space-mounted CO_2 sensor, 0–2000 ppm, 0–10 vdc	234820	Refer to unit wiring diagram for termination details
BE17	Smoke detector, return air or outlet air	159553	Comply with local building codes and manufacturer's installation instructions
	Sampling tube, return air or outlet air	259069	
BHB8	BACnet MSTP interface card for use with control option D19	272633	Recommended wire type: 22–24 AWG, twisted-pair, shielded; refer to unit wiring diagram for termination details
	BACnet MSTP interface card for use with control option D21	1006079	
	BACnet MSTP interface card for use with control option D22	1013642	
	BACnet MSTP interface card for use with control option D23	1024341	
CL23	Programmable conventional thermostat with touch screen interface	257338	For use with control option D19 only; refer to unit wiring diagram for termination details
CL33	Programmable conventional thermostat with keypad interface	1011393	
CL90	Programmable conventional thermostat with keypad Interface and BACnet communication	1011394	
CL91	Programmable conventional thermostat with keypad Interface and LON communication	1011394	
CL78	Wall-mounted DDC temperature and humidity sensor with setpoint adjustment	260436	For use with control options D19, D21, and D23; refer to unit wiring diagram for termination details
GF1	External 0–10 vdc input signal for mixed air damper control	—	Refer to unit wiring diagram for termination details
GF1A	Mixed air damper control from BACnet Interface	—	Requires either option BHB8 or BACnet IP/ Ethernet card; refer to unit wiring diagram for termination details
GF5	Mixed air damper control from building static pressure sensor (±0.5 IN WC)	—	Pressure transducer is factory-installed in unit control cabinet; refer to **Option GF5 (Mixed Air Damper) or VFC4 (Supply Fan): Building Static Pressure Controls**
	Indoor sensor probe	234905	
	Outdoor sensor probe	234906	
RB5	Wall-mounted display package	260436	Refer to **Table 9** for kit contents; see **Figure 17** for wiring distance limitations
RB6	Hand-held display package	272407	Refer to **Table 9** for kit contents
VFC2	External 0–10 vdc Input signal for supply fan control	—	Refer to unit wiring diagram for termination details
VFC3	Supply fan control from duct static pressure sensor (0–2.5 IN WC)	—	Pressure transducer is factory-installed in unit control cabinet; refer to **Option VFC3: Supply Fan Control from Duct Static Pressure**
	Sensor probe	234821	
VFC4	Supply fan control from building static pressure sensor (±0.5 IN WC)	—	Pressure transducer is factory-installed in unit control cabinet; refer to **Option GF5 (Mixed Air Damper) or VFC4 (Supply Fan): Building Static Pressure Controls**
	Indoor sensor probe	234905	
	Outdoor sensor probe	234906	
VFCD	Two-speed supply fan control CO_2 control from space-mounted CO_2 sensor input	—	Requires option BE15; refer to unit wiring diagram for termination details
VFCC	Supply fan speed control from BACnet Interface	—	Requires option BHB8 or BACnet IP/ Ethernet card; refer to unit wiring diagram for termination details

Discharge Air Temperature Sensor (PN 222753)

The discharge air temperature sensor (see **Figure 15**) applies to all installations and must be field-installed in the unit supply ductwork. Correct placement of the discharge air sensor in the ductwork is critical to the operation of the system in both cooling and heating modes. Install the discharge air temperature sensor as follows:

Figure 15. Discharge Air Temperature Sensor

NOTE:

- **According to the latest edition of AMCA Standard 201, in straight ducts, the air is typically well mixed a minimum of five equivalent duct diameters from the discharge of the unit with equivalent duct diameter defined as equal to the square root of 4AB/3.14 (A and B are duct cross-sectional dimensions).**
- **Locate the sensor a minimum of 96 inches (2435 mm) from the outlet of the unit.**
- **If the length of the discharge duct is less than 8 feet (2.4 meters), a mixing vane is recommended for mixing the discharge air. Do not mount the sensor in the ductwork after a split in the supply as this will cause loss of control in the duct that does not house the sensor.**

1. Determine appropriate distance from unit.
   a. Ensure that there is sufficient distance from outlet to have good mixture of discharge air temperature.
   b. Refer to following formula for calculating sensor placement. This example assumes cross-sectional dimensions for supply ductwork of 24 × 12 inches (610 × 305 mm):

$$5\ equivalent\ duct\ diameters \times \sqrt{\frac{4 \times 12 \times 24}{3.14}} = 96\ inches$$

$$5\ equivalent\ duct\ diameters \times \sqrt{\frac{4 \times 305 \times 610}{3.14}} = 2435\ millimeters$$

2. Determine location and orientation of sensor. Position of sensor in duct is also important.
   a. In horizontal ductwork, position sensor assembly in top-middle of duct, with sensor probe extending vertically down into center of air stream.
   b. In vertical ductwork, position sensor assembly in middle of side of duct that corresponds with top-middle of discharge outlet.
3. Attach sensor.
   a. Mark selected location and drill 7/16-inch hole.
   b. Insert probe into hole. Ensure that blue plastic fitting that holds probe is centered in hole.
   c. Attach sensor using two #8 sheet metal screws (do not overtighten).
   d. Check to ensure that hole is sealed.
4. Run field-supplied 16- to 18-gauge wire from sensor to unit and connect in accordance with unit wiring diagram.

Option RB5: Wall-Mounted Display Package

The components included in option RB5, the wall-mounted display package (see **Figure 16**), are listed in **Table 9**.

NOTE:

- **Allows the same system control as the unit-mounted display.**
- **Field-install up to 656 feet (200 meters) from the unit (see Figure 17).**
- **If the display needs to be mounted more than 656 feet (200 meters) from the unit, contact the factory about adding a required field-supplied power supply to extend the range up to 1,640 feet (500 meters).**

Figure 16. Wall-Mounted Display

Table 9. Wall-Mounted Display Package (PN 260436) Components

Description	PN	Quantity
Remote display	260178	1
6-pin connection cable	260175	2
Cable splitter and signal booster module	260735	2
Instruction sheet	260737	1

Connect the remote display to the J10 terminal (see **Figure 17**) on the controller using the 6-pin connection cable. The splitter/booster modules may be used but are not required for installations under 164 feet (50 meters) from the unit. Installations greater than 164 feet (50 meters) but less than 656 feet (200 meters) require two booster modules connected with a field-provided 4-pin shielded cable.

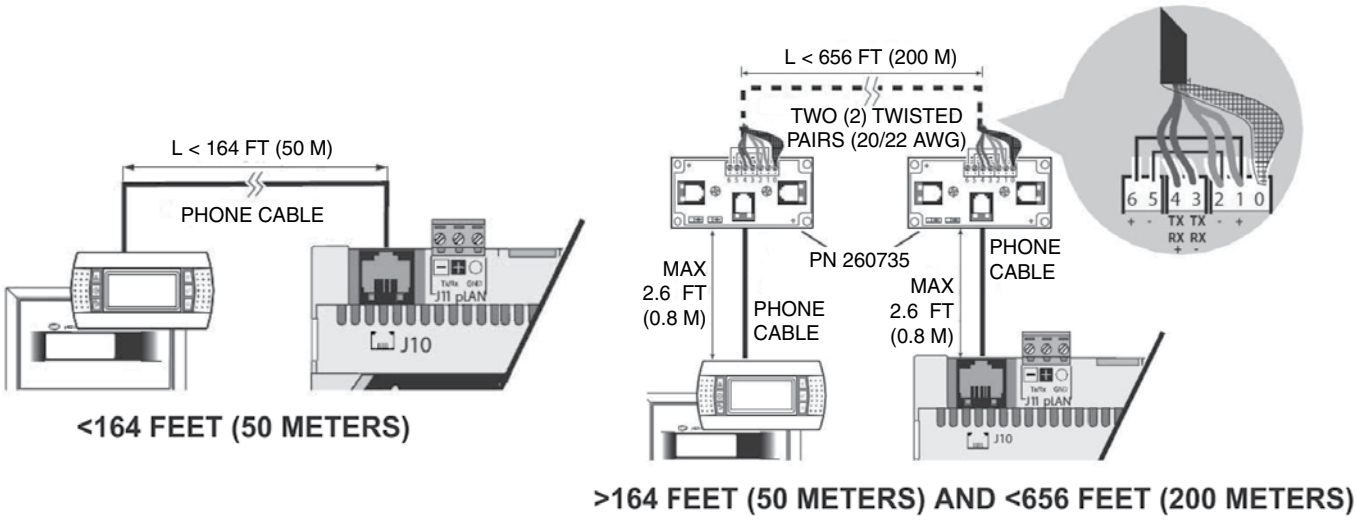


Figure 17. Wall-Mounted Display Installation (Up to 656 Feet (200 Meters) from Unit)

Option RB6: Hand-Held Display Package

The hand-held display package (PN 272407) includes the same remote display (see **Figure 16**) and 6-pin connection cable (refer to **Table 9**) as option RB5. Like option RB5, it allows the same system control as the unit-mounted display.

Option VFC3: Supply Fan Control from Duct Static Pressure

Option VFC3 (see **Figure 18**) utilizes a factory-installed pressure transducer. The transducer is located in the unit control cabinet and is equipped with 1/4-inch OD pressure fittings for connection to a pressure signal pickup. Both the positive pressure (HIGH) connection port and the reference pressure (LOW) connection port are located and labeled on the front of the transducer.

FACTORY-INSTALLED
PRESSURE TRANSDUCER

PICKUP TUBE

Figure 18. Supply Fan Control from Duct Static Pressure (Option VFC3)

Connect the sensor tubing as follows:

1. Refer to **Pneumatic Tubing Recommendations** for tubing selection.
2. Install pickup tube (PN 234821) shipped with unit.
   a. Select pickup tube location approximately 2/3 down length of ductwork (minimum of 10 duct lengths).
   b. Drill 7/16-inch hole in side of duct at selected location.
   c. Insert pickup tube in hole, ensuring that it is centered in hole.
   d. Secure pickup tube to duct using two #8 sheet metal screws.
   e. Check to ensure that hole is sealed.
3. Connect tubing between pickup tube in duct and HIGH connection port on pressure transducer. Leave LOW connection port open to control cabinet.
4. At startup, verify that there is duct static pressure reading displayed on system programmable controller.

Option GF5 (Mixed Air Damper) or VFC4 (Supply Fan): Building Static Pressure Controls

Option GF5 or VFC4 (see **Figure 19**) utilizes a factory-installed pressure transducer. The transducer is located in the unit control cabinet and is equipped with 1/4-inch OD pressure fittings for connection to pressure signal pickups. Both the positive pressure (HIGH) connection port and the reference pressure (LOW) connection port are located and labeled on the front of the transducer.

FACTORY-INSTALLED
PRESSURE TRANSDUCER

INDOOR PICKUP
CONNECTION

OUTDOOR PICKUP
CONNECTION

Figure 19. Building Static Pressure Sensor (Options GF5 and VFC4)

Connect the sensor tubing as follows:

1. Refer to **Pneumatic Tubing Recommendations** for tubing selection.
2. Install indoor pickup connection (PN 234905) at desired building pressure-sensing location.
3. Install outdoor pickup connection (PN 234906) at desired location to sense atmospheric pressure.
4. Connect tubing between indoor pickup connection and HIGH connection port on pressure transducer.
5. Connect tubing between outdoor pickup connection and LOW connection port on pressure transducer.
6. At startup, verify that there is building static pressure reading displayed on system programmable controller.

STARTUP

Pre-Start Checklist

- ❑ Verify that the unit is properly supported.
- ❑ Verify that the unit is level for proper condensate drainage.
- ❑ Verify that all clearance requirements are met. Airflow to and from the outdoor coil must be unrestricted.
- ❑ Verify that the ductwork is adequately sealed to prevent air leakage. Insulate if necessary.
- ❑ Verify that the line voltage power leads are securely connected and the unit is properly grounded.
- ❑ Verify that low voltage wires are securely connected to the correct leads in the low voltage area of the control box.
- ❑ Verify gas line pressure. For natural gas, the line pressure must not exceed 10 IN WC (0.36 psig), or be less than 5 IN WC (0.20 psig). For LP gas, the line pressure must not exceed 14 IN WC (0.51 psig) and must not be less than 11 IN WC (0.40 psig).

⚠ CAUTION ⚠

The flame roll-out control is a safety switch with manual reset. If necessary, press the red button to reset the control. DO NOT install a jumper wire across the control to defeat its function. If the control reopens at startup, DO NOT reset the control without identifying and correcting the fault condition that caused the control to trip.

- ❑ Verify that the flame roll-out control is closed.
- ❑ Verify that the gas line has been purged and all connections are adequately sealed. Refer to TBD to check for gas leakage.
- ❑ Verify that the indoor blower is properly set for the installation.
- ❑ Verify that the outdoor fans turn freely.
- ❑ Verify that the power supply branch circuit overcurrent protection is properly sized.
- ❑ Verify that all exterior panels have been reinstalled and securely fastened.

Startup Procedures

⚠ CAUTION ⚠

- **The unit is equipped with crankcase heaters. Allow 24 hours *before* continuing with startup procedures to allow for heating of the refrigerant compressor crankcase. Failure to comply may result in damage and could cause premature failure of the system.This caution should be followed at initial startup and any time power has been removed for 12 hours or longer.**
- **Failure to follow the crankcase heater instructions for units equipped with microchannel coils may lead to discharge pressure spikes that could cause the unit's high pressure switch to trip. If this occurs, wait for unit pressures to equalize before depressing the manual reset switch and restarting the unit again.**

- Check all electrical wiring for loose connections and tighten as needed.
- Check the return air filters and condensate trap.
- Close all electrical disconnects to energize the system.

ADJUSTMENTS

Firing Rate Adjustment

The firing rate must be verified for both HIGH fire and LOW fire for each installation to prevent over-firing of the unit.

⚠ CAUTION ⚠

- **Do not re-drill the burner orifices. If the orifice size must be changed, use only new orifices.**
- **The firing rate must not exceed the rate shown on the unit data label. At altitudes above 2,000 feet/609 meters, it must not exceed that on the data label less 4% for each 1,000 feet/304 meters.**

NOTE: For installations at 2,000 feet/609 meters and less, the firing rate is the same as shown on the unit rating label. For installations above 2,000 feet, compute the firing rate as described in High Altitude (Above 2,000 Feet/609 Meters) Deration.

Determine the unit firing rate as follows:

1. Obtain the gas heating value from the gas supplier (HHV).
2. Shut OFF all other gas fired appliances.
3. Turn ON the main gas supply at the manual valve.
4. Start the unit in heating mode and allow it to run for at least 3 minutes in HIGH fire mode (100% modulation).
5. Measure the time (in seconds) required for the gas meter to complete one revolution.
6. Convert the time per revolution to cubic feet of gas per hour using the values listed in Table 10.
7. Multiply the gas flow rate in cubic feet per hour by the heating value of the gas in BTU per cubic foot to obtain the firing rate in BTUh using the following steps as a guide:
   a. Time for one revolution of a gas meter with a 1-cubic-foot dial = 40 seconds.
   b. Read 90 cubic feet gas per hour (refer to Table 10).
   c. Local heating value of the gas (obtained from gas supplier) = 1,040 BTU per cubic foot.
   d. Input rate = 1,040 × 90 = 93,600 BTUh.

Table 10. Gas Flow Rates

Time per One Revolution (Seconds)	Cubic Feet per Revolution of Gas Meter			Time per One Revolution (Seconds)	Cubic Feet per Revolution of Gas Meter			Time per One Revolution (Seconds)	Cubic Feet per Revolution of Gas Meter		
	1	5	10		1	5	10		1	5	10
	Cubic Feet per Hour				Cubic Feet per Hour				Cubic Feet per Hour		
10	360	1800	3600	44	82	409	818	90	40	200	400
12	300	1500	3000	46	78	391	783	92	39	196	391
14	257	1286	2571	48	75	375	750	94	38	191	383
16	225	1125	2250	50	72	360	720	96	38	188	375
18	200	1000	2000	66	55	273	545	98	37	184	367
20	180	900	1800	68	53	265	529	100	36	180	360
22	164	818	1636	70	51	257	514	102	35	176	353
24	150	750	1500	72	50	250	500	104	35	173	346
26	138	692	1385	74	49	243	486	106	34	170	340
28	129	643	1286	76	47	237	474	108	33	167	333
30	120	600	1200	78	46	231	462	110	33	164	327
32	113	563	1125	80	45	225	450	112	32	161	321
34	106	529	1059	82	44	220	439	114	32	158	316
36	100	500	1000	84	43	214	429	116	31	155	310
38	95	474	947	86	42	209	419	118	31	153	305
40	90	450	900	88	41	205	409	120	30	150	300
42	86	429	857								

8. Low fire input (stage 1) must also be verified by repeating all steps outlined for high fire input rate. Refer to Table 11, which lists low fire input values.

Table 11. Heat Rise and Range

Heat Size	High Fire		Low Fire		Temperature Rise at High Fire (°F)	Airflow	
	Input (BTUh)	Output (BTUh)	Input (BTUh)	Output (BTUh)		Maximum (cfm)	Minimum (cfm)
H100	100,000	80,000	16,667	13,333	30–90	1852	823
H166	166,000	132,800	27,667	22,133		3074	1366
H200	200,000	160,000	33,333	26,667		3704	1646
H225	225,000	180,000	37,500	30,000		4167	1852

NOTE: Values listed are based on sea level values. For installation at high altitudes (above 2,000 feet/609 meters), refer to **High Altitude (Above 2,000 Feet/609 Meters) Deration**.

Modulating Valve Adjustment

Adjust the modulating valve as follows:

1. Remove two screws that secure cover. See **Figure 20** for the location of the LED and the adjustment buttons.

NOTE:

- **The modulating valve has a red LED that indicates the following conditions:**
  - **Solid red = high fire (10V)**
  - **Blinking red = low fire**
  - **Off = valve is in operating mode**
- **Buttons 1 and 2 on the modulating valve are used to adjust the setting.**
- **To increase gas flow, press or hold button 1. Each button press equals the minimum available step increase and will increase flow slowly.**
- **To decrease gas flow, press or hold button 2. Each button press equals the minimum available step decrease and will decrease flow slowly.**
- **Holding the button down auto steps and eliminates the need to repeatedly press the button. Use this feature to rapidly increase or decrease flow.**
- **Holding buttons 1 and 2 down simultaneously until LED is extinguished saves the setting.**

2. To enter high fire setting mode, press and hold button 1 until LED lights solid red and then release button 1. To enter low fire setting mode, press and hold button 2 until LED blinks red and then release button 2.
3. Refer to steps 21 and 24 in **Table 14** to set high fire pressure. Refer to steps 22–24 in **Table 14** to set low fire pressure.
4. Replace cover and secure with two screws.

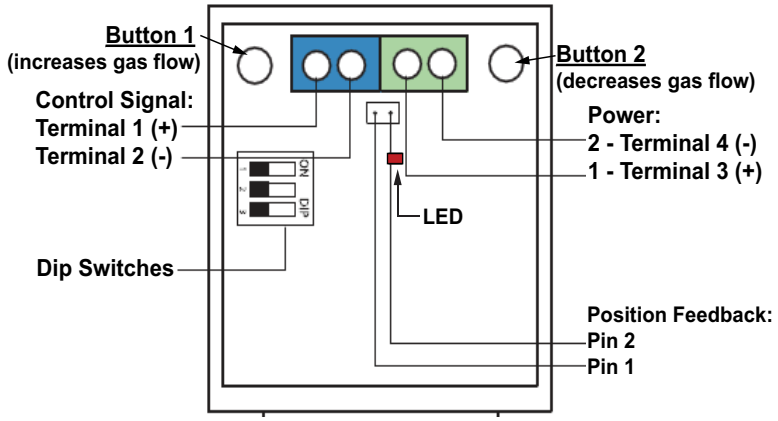
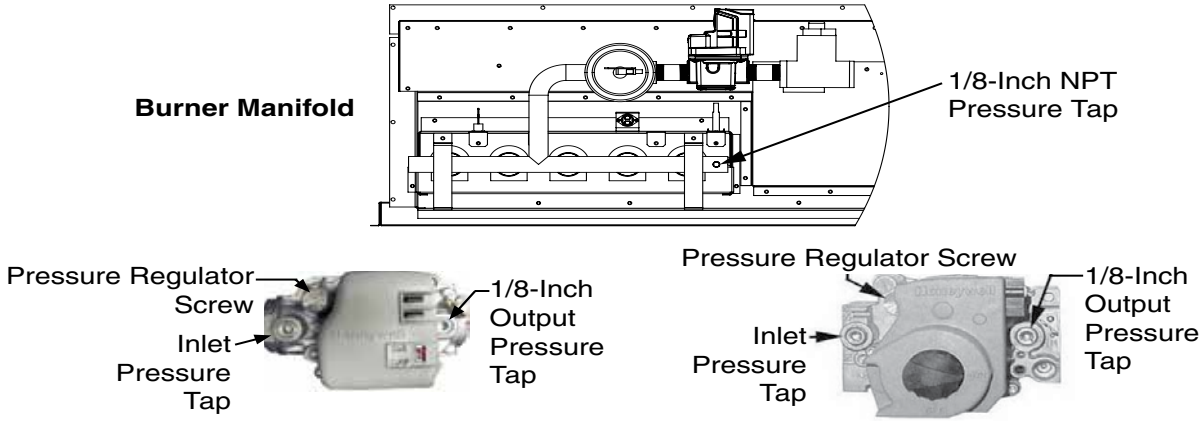


Figure 20. Modulating Valve with Cover Removed

Gas Valve Adjustment

Adjust the gas valve in accordance with step 20 in **Table 14**. See **Figure 21**, which shows the gas valve's pressure taps and pressure regulator screw as well as the burner manifold pressure tap.



Gas Valve: Heat Sizes H100 and H166 **Gas Valve: Heat Sizes H200 and H225**

Figure 21. Gas Valve Adjustment

Refrigerant Charging

⚠ DANGER ⚠

- **If repairs make it necessary for evacuation and charging, it should be done only by qualified, trained personnel thoroughly familiar with this equipment. Some local codes require licensed installation/service personnel to service this type of equipment. Under no circumstances should the owner attempt to install and/or service this equipment.**
- **The cooling system contains refrigerant under high pressure. Always use safe practices when servicing the unit. Always review the factory literature and safety warnings before servicing. Failure to comply with this warning could result in property damage, personal injury, or death.**

⚠ CAUTION ⚠

- **When repairing system leaks, always use nitrogen (inert) gas to protect the refrigerant system and always pressure check the repair before recharging. Always replace the filter dryers when performing any repair to the refrigeration system. After completing repairs, evacuate the system to 350–500 microns and charge with refrigerant in accordance with Table 12.**
- **Always inspect the unit rating label to determine the unit's information prior to working on the system. Do not mix different refrigerants or charge the unit with a refrigerant not listed on the unit rating label.**

The unit is fully charged with refrigerant (refer to **Table 12**) at the factory and, when properly-installed, no charging is required. The refrigerant charge can be checked and adjusted through the service ports provided on the units. Use only gauge lines that have a Schrader depression device present to actuate the valve. Refrigerant charging must be done by qualified personnel familiar with safe and environmentally-responsible refrigerant-handling procedures. Refer to the unit rating plate for the proper type and amount of refrigerant.

Table 12. Refrigerant Charge

Nominal Tonnage	Refrigerant Charge (lb)	
	Base Model	Unit with Hot Gas Reheat
6	9.50	10.75
7.5	10.50	12.25
10	14.00	15.50

Supply Fan Airflow Adjustment

Adjust the supply fan airflow in accordance with steps 8–11 in **Table 14**. Refer to **Table 13** for correct airflow.

Table 13. Blower Airflow Performance Data

Static Pressure (IN WC)	Unit Size		
	072	090	120
	Airflow (SCFM)		
0.6	684	684	—
1.0	883	883	883
1.4	1045	1045	1045
1.8	1185	1185	1185
2.2	1310	1310	1310
2.6	1424	1424	1424
3.0	1529	1529	1529
3.4	1628	1628	1628
3.8	1721	1721	1721
4.2	1810	1810	1810
4.6	1894	1894	1894
5.0	1974	1974	1974
5.4	2052	2052	2052
5.8		2127	2127
6.2		2199	2199
6.6		2268	2268
7.0		2336	2336
7.4			2402
7.8			2466
8.2			2529
8.6			2589
9.0			2649
9.4			2707
9.8	—		2764
10.2			2820
10.6			2875
11.0		—	2929
11.4			2981
11.8			3033
12.2			3084
12.6			3134
13.0			3184
13.4			3232
13.8			3280
14.2			3327

Setup, Adjustment, and Testing of Unit Using System Programmable Controller

System Programmable Controller

The system programmable controller (see **Figure 22**) has an integral display that shows unit features and parameters that can be modified. For the available automatic control sequences, refer to the controls manual listed in **Table 1**.

Figure 22. System Programmable Controller with Integral Display

Display Screen Navigation

Navigation through the controller's display screens is accomplished by using the function keys (see **Figure 23**) located on each side of the controller's display.

Function Key Identification	Alarm	Prg	Esc	Up	Enter	Down
Function Key Display on the System Controller	⚠	◎	↩	↑	↵	↓
Function Key Display on the Remote Controller	🔔	Prg	Esc	↑	↵	↓

Figure 23. Function Keys

The position of the cursor on the screen dictates which of the function keys need to be pressed and when. The home position for the cursor on any screen is located in the upper left-hand corner as shown in **Figure 24**. Display screen navigation when the cursor is in the home position is as follows:

- Press up key to go back to previous screen
- Press down key to advance to next screen in alpha-numeric order
- Press enter key to advance cursor to next available modifiable field (see **Figure 24**)

Display screen navigation when the cursor is positioned on a modifiable field is as follows:

- Press up or down keys to scroll through or toggle
- Press enter key to advance cursor through remaining modifiable fields
- Press enter key again to advance cursor to home position

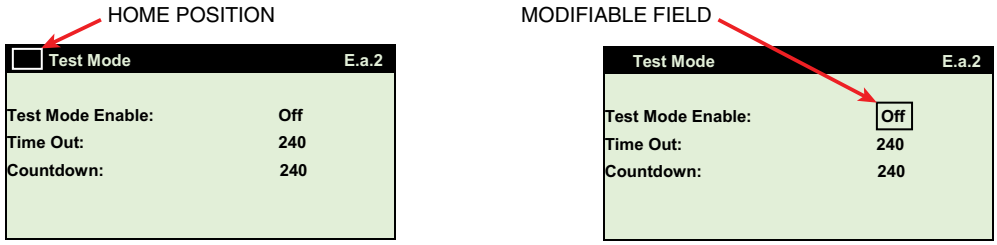


Figure 24. Cursor Home Position and Modifiable Field Position

Test Mode

The test mode (refer to **Table 14**) of the system programmable controller may be used to troubleshoot the unit and to set unit parameters at startup (refer to **APPENDIX: STARTUP FORM**) or to adjust parameters as needed. The test mode is accessed via the service menu and can be entered only when the unit is in the off state. Once the test mode is enabled, it remains active for a 4-hour period. When the timer expires, or test mode is disabled, the unit returns to the off state. When test mode is enabled, the following devices are automatically controlled:

- Unit dampers are positioned to 100% outside air
- Unit primary supply and exhaust (if equipped) fans are commanded on
- Unit supply fan speed signal (if equipped) is set to maximum speed setpoint value
- Speed is commanded for unit venter motor associated with optional gas heating systems
- Unit condenser fans start with their associated compressors

Once airflow has been proven to the controller, the user can manually select the remaining controller outputs to command or adjust for unit testing.

NOTE: The specific parameters that are available to be adjusted in test mode are dependent upon unit hardware configuration. Refer to Display Screen Navigation for operating the controller display.

Setup, Adjustment, and Testing of Unit Using System Programmable Controller—Continued

Test Mode—Continued

Table 14. Test Mode Sequence

Step	Description	Display Screen
1	Turn **ON** disconnect switch to energize unit	06:34am 12/26/18 M.1 R7 Series D21 Mode:Occ State_Sel: Off Outside Air Conditions Temperature: 78.9°F Humidity: 47.3% Dewpoint: 52.7°F
	Controller initializes	
2	From home screen, press program key to access **Main Menu**	
3	From **Main Menu**, select **E. Service**	Main Menu D. Alarms E. Service F. Factory Settings
4	Enter service password: **7125**	Service Password Insert service password (PW1) 7125
5	From **Service Menu** select **a. Test Mode**	Service Menu h. BMS Config a. Test Mode b. TAB
6	From screen **E.a.1**, set **Enable:** field to **On**	Test Mode E.a.1 Manual Control Enable: On Time Out: 240m Countdown: 240m
	Once enabled **On**, advance to screen **E.a.3**	
7	If applicable, verify that unit dampers have actuated to 100% outside air	Test Mode E.a.3 Test Supply Fan Speed: 100% vdc Y02 SF_Spd_Cmd 10.00 DI01 SF_Sts On
	NOTE: The damper actuator has up to a 120-second period for travel. Fans on units equipped with 100% outside air arrangements will not start until the damper end switch allows operation.	
8	From screen **E.a.3**, verify that supply fan airflow status point **DI01 SF_Sts** is **On**	
	NOTE: Proof of supply fan airflow is required for speed adjustment and for heating and cooling operation. Units equipped with a fan speed control option that is independent of unit controller output Y02 will need external speed control to set unit SCFM.	
9	Using field-supplied tees, connect manometer to pressure tap tubes associated with supply fan air proving switch (blue low) and (clear high)	
	Record differential pressure reading from connected manometer	
	From screen **E.a.3**, press up or down key to set **Test Supply Fan Speed:** field to desired SCFM (refer to **Table 13**)	
	NOTE: If fan speed adjustment is required, the adjusted value needs to be saved in the TAB Menu in accordance with step 28.	

Table 14. Test Mode Sequence—Continued

Step	Description	Display Screen
10	Advance to screen **E.a.5**. and set **Test Comp A:** field to **100%**	Test Mode E.a.5 Test Comp A: 100.0% vdc
11	Verify that condenser section fans and compressor are operating	
12	Verify that refrigerant suction pressure drops and discharge pressure rises when compressor is energized to ensure correct unit phasing	Y03 Comp_A_Cmd 5.00 Cond Sec A auto starts With Comp A test
	If unit phasing is incorrect, switch any two of three phase leads at main unit disconnect switch	
13	For units equipped with reheat valve option AUR2, proceed to step 14	Cond_A_Cmd On
	For units not equipped with reheat valve option AUR2, set **Test Comp A:** field to **0%** and proceed to step 18	
14	While unit compressor is operating, advance to screen **E.a.6** and set **Test Reheat A:** field to **100%**	Test Mode E.a.6 Test Reheat A: 100.0% vdc
15	Verify that refrigerant gas is being diverted from outdoor condenser section coil to indoor reheat coil	
16	Once reheat valve operation is verified, set **Test Reheat A:** field back to **0%**	Y05 RH_A_Cmd 10.00
17	Return to screen **E.a.5** and set **Test Comp A:** field to **0%**	Test Mode E.a.5 Test Comp A: 0.0% vdc
18	For units equipped with gas heating, advance to screen **E.a.10** and perform steps 19 through 30	Y03 Comp_A_Cmd 5.00 Cond Sec A auto starts With Comp A test
	For units not equipped with gas heating proceed to step 27	Cond_A_Cmd On
19	Prior to starting gas heating system, set up and adjust modulating valve low fire setting as follows:	Test Mode E.a.9 Test NO08 HX_Stg1: On Heat Section 1 Flame:
	Install 1/8-inch NPT pressure taps on gas valve inlet and outlet and on burner manifold (see **Figure 21**)	DI15 Htr_1_Sts On
	Connect manometer to each pressure tap	
	From screen **E.a.9** set **Test NO08 HX_Stg1:** field to **On**	
	Advance to screen **E.a.10**	Test Mode E.a.10
	60-second warmup period starts once flame is **On**, as shown in **DI15 Htr_1_Sts** field	DI15 Htr_1_Sts: On Time Until Manual
	Warmup timer countdown is displayed on screen **E.a.10**	Test Allowed 26s Test
	Adjustment of modulating valve via **Test HX_Mod:** field is not permitted until 60-second timer has expired	HX Mod: 100.0% vdc Y04 HX_Mod_Cmd 10.00
	NOTE: Speed control of the venter motor output Y06 is automatic at all times during unit operation.	Y06 Vent_Spd_Cmd 8.00
	When warmup timer countdown has expired and **Manual Test Allowed** prompt is displayed on screen **E.a.10**, set **Test HX Mod:** point to **100%**	
20	Ensure that gas valve (see **Figure 21**) outlet pressure is 4.0–4.5 IN WC while running at high fire	Test Mode E.a.1 Manual Control
	Adjust gas valve as needed by turning pressure regulator screw (see **Figure 21**)	Enable: Off
21	Enter high fire setting mode (refer to step 2 of **Modulating Valve Adjustment** section)	
	Use button 1 on modulating valve (see **Figure 20**) to set high fire pressure to 3.5 IN WC (+0.0/−0.1 IN WC)	Time Out: 240m Countdown: 240m
	Simultaneously hold buttons 1 and 2 until LED is extinguished (see **Figure 20**) to save setting	
22	Set **Test HX Mod:** field to **0%**	Test Mode E.a.10
	If flame is extinguished, increase low fire setting as follows:	DI15 Htr_1_Sts: On Manual Test Allowed
	Enter low fire setting mode (refer to step 2 of **Modulating Valve Adjustment** section)	
	Hold button 1 (see **Figure 20**) for 6 to 7 seconds	
	Simultaneously hold buttons 1 and 2 until LED is extinguished (see **Figure 20**) to save setting	Test
	When system proves flame and **Manual Test Allowed** prompt is displayed on screen **E.a.10**, proceed to step 23	HX Mod: 0.0% vdc Y04 HX_Mod_Cmd 2.00
23	Use button 2 on modulating valve (see **Figure 20**) to set low fire pressure to 0.12 IN WC (+0.03/−0.0 IN WC)	Y06 Vent_Spd_Cmd 4.00
	Simultaneously hold buttons 1 and 2 until LED is extinguished (see **Figure 20**) to save setting	

Setup, Adjustment, and Testing of Unit Using System Programmable Controller—Continued

Test Mode—Continued

Table 14. Test Mode Sequence—Continued

Step	Description	Display Screen
24	Test repeatability by setting **Test HX Mod:** field to **100%** and **0%**	Test Mode E.a.9
	Readjust modulating valve as needed	Test NO08 HX_Stg1: Off
25	Once gas heating system operation is verified, set **Test HX Mod:** point back to **0%**	Heat Section 1 Flame:
26	Return to screen **E.a.9** and set **Test NO08 HX_Stg1:** field to **Off**	DI15 Htr_1_Sts On
27	Return to screen **E.a.1** and set **Enable:** field to **Off**	
28	To save adjusted maximum fan speed values, press escape key to return to **Service Menu**	Service Menu
	Select **b. TAB** and press enter key to advance to screen **E.b.1**	a. Test Mode
	NOTE: Screen E.b.1 is used to save all adjustable unit parameters. The Set Max SF Spd? and Set Max EF Spd? modifiable fields are used to set the maximum fan speed setpoints for saving to the maximum fan speed values determined in step 9.	b. TAB c. Supply Fan
	Press enter key to advance to **Set SF Max Spd?** field and press up key to set field to **Yes**	TAB: Service Save E.b.1
	After 2-second period, **Set SF Max Spd?** field automatically returns to **No**	
	If applicable, press enter key to advance to **Set EF Max Spd?** field and press up key to set field to **Yes**	Set Max SF Spd? No Set Max EF Spd? No
	After 2-second period, **Set EF Max Spd?** field automatically returns to No	Save? Yes
29	To save unit and fan speed parameters, press enter key to advance to **Save?** field	
	Press up key to set **Save?** field to **Yes**	Restore? No
	After 2-second period, **Save?** field automatically returns to **No**	
	NOTE: Unit parameters have now been successfully saved to the controller's permanent memory. From this point forward, the most recently-saved unit parameters can be restored using the Restore? field.	
30	With clean filters in place, all doors closed (except electrical compartment), and blower operating, advance to screen **E.a.35**	Digital Input E.a.35
	DI02 Filter_Sts field is displayed as **On**	D101 SF_Sts On
	Turn setscrew (see **Figure 25**) clockwise to increase pressure setting until **DI02 Filter_Sts** field is displayed as **Off**	D102 Filter_Sts On D103 Safety_Sts On
	Turn setscrew (see **Figure 25**) three full turns counterclockwise	D104 Ext_OCC On
	At this setpoint, digital input D102 is activated at approximately 50% filter blockage	
31	Press escape key three times to return to home screen	
	Test mode procedure is now complete	

Set Date and Time

Table 15. Setting Date and Time Sequence

Step	Description	Display Screen
1	From home screen, press program key to access **Main Menu**	06:34am 12/26/18 M.1 R7 Series D21 Mode:Occ State_Sel: Off Outside Air Conditions Temperature: 78.9°F Humidity: 47.3% Dewpoint: 52.7°F
2	From **Main Menu**, select **B. Schedule**	Main Menu A. Quick Setpoints B. Schedule C. Points List

Table 15. Setting Date and Time Sequence—Continued		
Step	**Description**	**Display Screen**
3	From screen **B.1**, press enter key to access modifiable date and time fields Set date and time fields to current date and time	Clock B.1 06:34am 12/27/18 Date: 12/27/18 Hour: 06:34am Day: Thursday
4	Advance to screen **B.2** and set modifiable **DST** fields	Clock B.2 DST: Enable Transition Time: 60min Start: Last Sunday In March at 2.00 End: Last Sunday In October at 3.00
5	Press escape key three times to return to home screen Setting date and time is now complete	06:34am 12/26/18 M.1 R7 Series D21 Mode:Occ State_Sel: Off Outside Air Conditions Temperature: 78.9°F Humidity: 47.3% Dewpoint: 52.7°F

Select Unit Occupancy Type and Enable System

Table 16. Selecting Unit Occupancy Type and Enabling System Sequence		
Step	**Description**	**Display Screen**
1	From home screen press program key to access **Main Menu**	06:34am 12/26/18 M.1 R7 Series D21 Mode:Occ State_Sel: Off Outside Air Conditions Temperature: 78.9°F Humidity: 47.3% Dewpoint: 52.7°F
2	From **Main Menu** select **E. Service**	Main Menu A. Quick Setpoints B. Schedule C. Points List
3	From screen **A.1**, select **Occupied Mode Select:** field and set to one of following: **Digital Input:** This is default value (unit ships with jumper wired on occupied digital input); unit remains in occupied status until occupied jumper is removed and replaced with external field-supplied contact **Schedule:** Unit operates based on local time of day schedule (configurable for up to 10 weekly schedules and 16 holidays) **BMS:** Unit operates based on command from third-party BACnet system (requires BHB8 BACnet card option)	Quick setpoints A.1 Occupied Mode Select: Digital Input State Select: Off
4	When occupied mode has been selected, press escape key to return to **Main Menu** If **Schedule** mode has been selected, proceed to step 5 If **Digital Input** or **BMS** mode has been selected, proceed to step 8	Main Menu A. Quick Setpoints
5	From **Main Menu**, select **B. Schedule**	B. Schedule C. Points List

Setup, Adjustment, and Testing of Unit Using System Programmable Controller—Continued

Select Unit Occupancy Type and Enable System—Continued

Table 16. Selecting Unit Occupancy Type and Enabling System Sequence—Continued

Step	Description	Display Screen
6	Advance to screen **B.3** and press enter key to access **Schedule** fields Set **Time On:**, **Time Off:**, and **Days Enabled:** fields to desired values Press escape key to return to **Main Menu**	Scheduler B.3 Schedule # 1 Time On: 7:00am Time Off: 5:00pm Days Enabled: MTWTF**
7	From **Main Menu**, select **A. Quick Setpoints**	Main Menu F. Factory Settings A. Quick Setpoints B. Schedule
8	For units equipped with control option D19 or D22, set **System Enable:** field to **On** from screen **A.1** For units equipped with control option D19, D21, or D23, set **State Select:** field to **Heat**, **Cool**, or **Auto f**rom screen **A.1** Selecting unit occupancy type and enabling system procedure is now complete	Quick setpoints A.1 Occupied Mode Select: Digital Input System Enable: On Quick setpoints A.1 Occupied Mode Select: Digital Input State Select: Auto

Dirty Filter Switch (Option BE18 or BE28) Adjustment

The dirty filter switch (PN 105507) is a pressure switch located in the low voltage electrical compartment. For option BE18, one dirty filter switch is located in the electrical compartment with tubing sensors placed on either side of the supply filters. For option BE28, two dirty filter switches are located in the electrical compartment with tubing sensors placed on either side of the supply air filters and the energy recovery wheel filters. Adjust the dirty filter switch(es) (see **Figure 25**) in accordance with step 30 in **Table 14.**

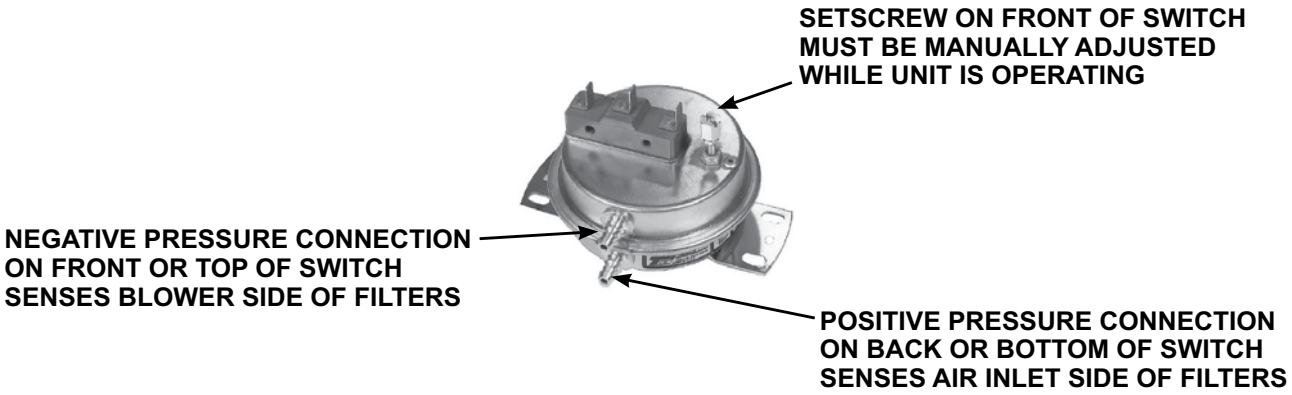


Figure 25. Dirty Filter Switch Adjustment

BUILDING MANAGEMENT SYSTEM

BACnet® Network

The Building Management System's (BMS) BACnet network is considered open communication, whereas any device on the network has the capability to receive input from any other controller on the network. The BACnet communication cards allow access to selected unit parameters. The currently-supported interface types are MSTP and IP/Ethernet. Contact the factory if additional protocol support is needed.

BACnet® MSTP Card

The BACnet MSTP card user interface is shown in **Figure 26**. Refer to **Table 17** and **Table 18** for information about the BACnet MSTP card's dip switches and LED indications.

Figure 26. BACnet MSTP Card User Interface

Table 17. BACnet MSTP Card Dip Switches

Location	Switch	Function
Inside front opening of cover	S1	Adds 511-ohm polarization resistance between negative data line (−) and GND
	S2	Adds 120-ohm terminal resistance between two data lines (+) and (−)
	S3	Adds 511-ohm polarization resistance between positive data line (+) and +VCC internal voltage
NOTE: Set all three dip switches to the ON position on the units at the start and end of the BACnet MSTP network. Ensure that all three dip switches on intermediate units are set to the OFF position.		

BACnet® Network—Continued

BACnet® MSTP Card—Continued

Table 18. BACnet MSTP Card LED (See Figure 26) Indications

LED	LED State	Indication
Status*	OFF	At power-up or after restarting BACnet MSTP network
	Quick flash: RED-GREEN	1 second after restarting BACnet MSTP network
	Steady: GREEN	3 seconds after restarting BACnet MSTP network
	Quick flash: GREEN-OFF-GREEN	45 seconds after restarting BACnet MSTP network, communication has been established with system programmable controller
	Slow flash: RED-OFF-RED	45 seconds after restarting BACnet MSTP network, communication has not been established with system programmable controller
	Flash: GREEN-RED-GREEN	45 seconds after restarting BACnet MSTP network, communication error or temporary lack of response from system programmable controller
Network**	OFF	At power-up or after restarting BACnet MSTP network
	Slow flash: GREEN-RED-GREEN-RED	45 seconds after restarting BACnet MSTP network, BACnet LED is active
	Steady: GREEN Occasional flashes: RED	BACnet MSTP communication has been established
	Steady: GREEN	BACnet MSTP network retains control (token) of MSTP network
	OFF: GREEN	BACnet MSTP network does not retain control (token) of MSTP network
	Steady: RED	Poll-For-Master (search for master to pass token to)
	Steady: GREEN Steady: RED	Continuous Poll-For-Master (communication not established because of connection problem or no network device found—may depend on electrical connection difficulties or communication settings that are not compatible with other connected network devices

*The status LED (green or red on the left) indicates the status of communication with the controller and the status of the BACnet MSTP card. Approximately 45 seconds after restarting, when the starting sequence has been completed, the status LED flashes to indicate the status of communication with the system programmable controller.

**The network LED (red or green on the right) indicates the status of communication with the BACnet MSTP network (RS485). When the starting sequence has been completed, the network LED flashes to indicate the status of communication with the BACnet MSTP network.

BACnet® IP/Ethernet Card

The BACnet IP/Ethernet card user interface is shown in **Figure 27**. Refer to **Table 19** for information about the BACnet IP/Ethernet card's LED indications.

Figure 27. BACnet IP/Ethernet Card User Interface

Table 19. BACnet IP/Ethernet Card LED (See Figure 27) Indications		
LED	**LED State**	**Indication**
Status*	OFF	At power-up or after restarting BACnet IP/Ethernet network
	Quick flash: RED-GREEN	1 second after restarting BACnet IP/Ethernet network
	Steady: GREEN	3 seconds after restarting BACnet IP/Ethernet network
	Quick flash: GREEN-OFF	45 seconds after restarting BACnet IP/Ethernet network, communication has been established with system programmable controller
	Slow flash: RED-OFF	45 seconds after restarting BACnet IP/Ethernet network, communication has not been established with system programmable controller
	Flash: GREEN-RED	45 seconds after restarting BACnet IP/Ethernet network, communication error or temporary lack of response from system programmable controller
Ethernet**	Steady: GREEN	Communication has been established with BMS system
	Flashing: GREEN	Exchanging data
	Steady: RED	Communication has not been established with BMS system (cable broken or problem at other end of cable)
*The status LED (green or red on the left) indicates the status of communication with the controller and the status of the board. During stable operation, the LED flashes to indicate the status of communication with the system programmable controller.		
**The Ethernet LED (red or green on the right) indicates the status of communication with the BACnet IP/Ethernet network.		

Modifying BACnet® Parameters

For units configured with a BACnet network, there are parameters that need to be set before communication can be established with other devices. Refer to **Table 20** and **Table 21** to modify the BACnet parameters required by the building maintenance system network.

Table 20. Modifying BACnet MSTP Card Parameters		
Step	**Description**	**Display Screen**
1	Simultaneously hold alarm and enter keys on system programmable controller (see **Figure 22**) until **SYSTEM INFORMATION** menu is displayed	SYSTEM INFORMATION LOG DATA > OTHER INFORMATION FLASH / USB MEMORY
	Select **OTHER INFORMATION** and press enter	
2	Select **PCOWEB / NET CONFIG**	ID / PRODUCT CODE > PCOWEB / NET CONFIG MEMORIES STATUS CHIP IO VERSION
3	Select **PCONET Settings**	PCOWEB Settings > PCONET Settings
4	Set **BACnet ID:** and **BACnet baud:** fields	BACnet ID: 77000 BACnet baud: 38400bps
	Press enter to advance to next screen	
5	Set **BACnet MAC:** field	BACnet MAC: --0 Max Masters: 127 MAX Frames: ---20
	NOTE: Typically, the Max Masters: and Max Frames: fields do not need to be changed from the default settings.	
	Press enter to advance to next screen.	
6	**NOTE: The modified values from the previous steps need to be saved.**	PCONET CONFIG ENABLE Update pCOnet? Yes
	Press up key	
	With **Update pCOnet?** field flashing **Yes**, press enter key	
7	Press enter key	PCONET CONFIG ENABLE Update complete Reboot pconet to Apply new setting
	Reboot prompt appears	
	Cycle power to controller	
	BACnet MSTP card parameter setup is now complete	

BACnet® Network—Continued

Modifying BACnet® Parameters—Continued

Table 21. Modifying BACnet IP/Ethernet Card Parameters

Step	Description	Display Screen
1	Simultaneously hold alarm and enter keys on system programmable controller (see **Figure 22**) until **SYSTEM INFORMATION** menu is displayed	SYSTEM INFORMATION LOG DATA > OTHER INFORMATION FLASH / USB MEMORY
	Select **OTHER INFORMATION** and press enter	
2	Select **PCOWEB / NET CONFIG**	ID / PRODUCT CODE > PCOWEB / NET CONFIG MEMORIES STATUS CHIP IO VERSION
3	Select **PCOWEB Settings**	> PCOWEB Settings PCONET Settings
4	Set **DHCP:** field to desired value Enter IP address if required Press enter to advance to next screen	DHCP: Off IP Address: --0.--0.--0.--0
5	Set **Netmask:** and **Gateway:** fields if required	Netmask: --0.--0.--0.--0 Gateway: --0.--0.--0.--0
6	Set DNS1: and DNS2: fields if required Press enter to advance to next screen	DNS1: --0.--0.--0.--0 DNS2: --0.--0.--0.--0
7	Set **BACnet ID:** field Set **Bacnet Type:** field to either **IP** or **Ethernet** Press enter to advance to next screen	BACnet ID: 77000 BACnet Type: ----------
8	**NOTE: The modified values from the previous steps need to be saved.** Press up key With **Update pCOWeb?** field flashing **Yes**, press enter key	PCONET CONFIG ENABLE Update pCOWeb? Yes
9	Press enter key Reboot prompt appears Cycle power to controller BACnet IP/Ethernet card parameter setup is now complete	PCONET CONFIG ENABLE Update complete Reboot pconet to Apply new setting

TROUBLESHOOTING

⚠ WARNING ⚠

IMPORTANT: Do not release refrigerant to the atmosphere! If required service procedures include the adding or removing of refrigerant, the service technician must comply with all federal, state and local laws. The procedures discussed in this manual should only be performed by a qualified HVAC technician.

NOTE: The unit is equipped with a phase loss/phase reversal control. If the unit does not start, check the phase of the electrical supply.

Refer to **Table 22** (refrigeration circuit), **Table 23** (electric heat section), and **Table 24** (gas heat section) for general troubleshooting symptoms, probable causes, and remedies. For checking and adjusting subcooling and superheat, refer to the **Checking and Adjusting Subcooling and Superheat** section. To troubleshoot the unit using either DSI control board or digital compressor controller LEDs, refer to the **Unit Troubleshooting Using DSI Control Module** or **Unit Troubleshooting Using Digital Compressor Controller** section. If replacement parts are required, refer to the replacement parts manual listed in **Table 1**.

Table 22. Refrigeration Circuit Troubleshooting

Symptom	Probable Cause	Remedy
A. Compressor will not start	1. Power off, loose electrical connections, or fuse open	Check disconnect switch, fuses, and wiring; replace parts or repair as necessary
	2. Compressor contactor not closing	Check voltage to contactor coil, transformer, slave relay, and system; replace parts as necessary
	3. Internal compressor thermal overload open	If compressor is hot, allow 2 hours to cool; refer to symptom D
	4. Defective compressor	Check compressor for electrical failure
		Compressor may be seized; check refrigerant
		If necessary, replace compressor
	5. High or low pressure switch open or defective	If manual reset (high pressure), reset switch (switch opens at 600 psi and will not reset above 400 psi)
		If auto reset (low pressure) does not reset and everything else is OK, replace low pressure switch
B. Compressor starts but cuts out on low pressure (low pressure switch activates at 35 psig)	1. Low refrigerant charge	Check subcooling
	2. Restricted airflow	Check for dirty evaporator coil, dirty filters, dampers closed, iced evaporator coil, and/or improper belt
		Check motor amps
		Check duct design
	3. Restriction in refrigerant line	Check subcooling and superheat; adjust as necessary
		Check operation of thermal expansion valve
		Check for pressure drop across filter drier
	4. Defective low pressure switch	Check to ensure that switch opens at 35 psi and closes at 50 psi; replace low pressure switch as necessary
C. Compressor starts but cuts out on high pressure switch	1. Refrigerant overcharge	Check subcooling; adjust as necessary
	2. Defective condenser fan motor	Check fan motor; replace as necessary
	3. Obstructed or dirty condenser coil inlet	Check coil and inlet clearances and for possible air recirculation
	4. Air or non-condensables in system	Check high side equalized pressure reading with equivalent outdoor temperature
	5. Defective high pressure switch	Check to ensure that switch opens at 650 psi, proof at 700 psi, and manual reset allowed below 400 psi; replace high pressure switch as necessary
	6. Restriction in discharge or liquid line	Check subcooling and superheat; adjust as necessary
		Check operation of thermal expansion valves
D. Compressor cuts out on thermal overload	1. Low voltage	Check voltage
	2. Sustained high discharge pressure	Check running amperage and conditions described in symptom I
	3. High suction and discharge pressures	Check thermal expansion valve operation
		Check for air in system
	4. Defective compressor overload	If compressor is hot, allow compressor to cool for 2 hours; recheck for open circuit
	5. Improper refrigerant charge	Check subcooling; adjust as necessary
	6. Bearings or pistons too tight	Check for low oil level

Table 22. Refrigeration Circuit Troubleshooting—Continued

Symptom	Probable Cause	Remedy
E. Noisy compressor	1. Reverse rotation	Check at startup; if suction pressure rises and discharge pressure drops, shut down compressor and switch three-phase wiring connections
	2. Refrigerant overcharge	Check pressures and subcooling; adjust as necessary
	3. Liquid flood back	Check thermal expansion valve setting
		Check subcooling for refrigerant overcharge; adjust as necessary
	4. Tubing rattle	Dampen tubing vibration by taping or clamping; carefully bend tubing away from contact where possible
	5. Defective compressor	Check internal parts; replace defective parts or compressor as necessary
F. Noisy unit operation	1. Blower rotational noise	Check blower, motor, and drive for faulty adjustment, noisy bearings, loose parts, and/or blower out of balance
	2. Air noise	Check ductwork to ensure that air velocity is not too high
	3. Chattering contactor	Check for adequate control voltage and contact points; check for shorts or breaks
	4. Tubing rattle	Dampen tubing vibration by taping or clamping; carefully bend tubing away from contact where possible
G. High suction pressure	1. Excessive load on evaporator coil	Check superheat; adjust as necessary
		Check for high entering wet bulb temperature
		Check for excessive air
	2. Compressor is unloaded	Check head pressure
		Check thermal expansion valve; if valve is not functioning properly, check pressure drop across filter drier
	3. Expansion valve bulb not secured to suction line or valve is defective	Check thermal expansion valve; ensure that bulb is attached properly and is insulated; replace valve as necessary
H. High discharge pressure	1. Refrigerant overcharge	Check subcooling and adjust refrigerant charge as necessary
	2. Thermal expansion valve setting	Check superheat and adjust valve as necessary
	3. Dirty or obstructed air inlet to condenser	Check for proper clearances and for possible air recirculating
	4. Defective condenser fan motor	Check condenser fan motor(s); replace as necessary
I. Suction pressure is too low	1. Refrigerant undercharge	Check subcooling and add refrigerant as necessary
	2. Thermal expansion valve setting	Check superheat and adjust valve as necessary
	3. Blower running backward	Interchange any two wires from three-phase disconnect
	4. Loose blower, pulley, or belts	Check drive pulley alignment and belt tension
	5. Dirty filter	Check filter and evaporator coil
	6. Too little air flow or low entering air temperature	Check airflow and entering air wet bulb conditions
	7. Restriction in suction or liquid line	Check refrigerant circuit for restriction
J. Head pressure is too low	1. Insufficient refrigerant charge	Check subcooling and add refrigerant as necessary
		Check for leak; repair and add refrigerant as necessary
	2. Defective or improperly-adjusted expansion valve	Check superheat and adjust or replace thermal expansion valve as necessary
	3. Low suction pressure	Refer to remedies for symptom I
	4. Defective compressor	Refer to remedies for symptom G
K. Compressor short cycles	1. Improper refrigerant charge	Check subcooling and superheat; adjust as necessary
	2. Defective high or low pressure control	Check high or low pressure switch; replace as necessary
	3. Liquid flood back	Possible tight bearings; check for low oil level
	4. Defective or improperly-adjusted expansion valve	Check superheat and adjust or replace thermal expansion valve as necessary
	5. Poor air distribution	Check ductwork ffor possible air recirculating
	6. High discharge pressure	Refer to remedies for symptom H
	7. Leaking discharge valves in compressor	Refer to remedies for symptom G
L. Running cycle is too long or unit operates continuously	1. Refrigeration undercharge	Check subcooling and add refrigerant as necessary
	2. Dirty filter or evaporator coil	Check filter, coil, and airflow; clean and/or replace filter
	3. Dirty or clogged condenser coil	Check coil and airflow; clean coil as necessary
	4. Air or other non-condensables in system	Check equalized high side pressure with equivalent outdoor temperature
	5. Defective compressor	Refer to remedies for symptom G
	6. Restriction in suction and liquid line	Check for restrictions in refrigerant circuit
	7. Control contacts stuck	Check wiring

Table 22. Refrigeration Circuit Troubleshooting—Continued		
Symptom	**Probable Cause**	**Remedy**
M. Supply air temperature is too high	1. Refrigerant undercharge or leak in system	Check subcooling and add refrigerant as necessary
		Check for leak; repair and add refrigerant as necessary
	2. Evaporator plugged with dirt or ice	Check evaporator, airflow, and filter; clean and/or replace filter
	3. Defective or improperly-adjusted expansion valve	Check superheat and adjust or replace thermal expansion valve as necessary
	4. Defective compressor	Check compressor for proper operation; replace as necessary
	5. High discharge pressure	Refer to remedies for symptom H
	6. Airflow is too high	Check external static pressure
N. Supply air temperature is too low	1. Airflow is too low	Check evaporator and filter; clean and/or replace filter
		Check for closed dampers or grills
		Check drive for loose parts, belts, or misalignment
		Check external static pressure
	2. Return air temperature too low	Check entering air wet bulb conditions
O. Liquid line is too hot	1. Refrigerant undercharge	Check subcooling and add refrigerant as necessary
	2. High discharge pressure	Refer to remedies for symptom H

Table 23. Electric Heat Section Troubleshooting		
Problem	**Probable Cause**	**Remedy**
A. Unit does not operate	1. No power to unit	Ensure that power is turned on
		Check main circuit breaker
	2. Blown fuse(s)	Check and replace as necessary
	3. Defective or incorrect wiring	Check wiring and connections; refer to wiring diagram provided with unit
	4. Defective or burned out control transformer	Check secondary voltage using voltmeter; replace transformer as necessary
B. Fan operates but element does not heat	1. Dirty filter(s)	Check filters and clean or replace as necessary
	2. Defective air proving switch	Check and replace as necessary
	3. Blown element fuses	Check and replace as necessary
C. Insufficient heat	1. Burned out element	Turn off power and check element resistance using ohmmeter; replace if open
	2. Blown fuses	Check and replace as necessary
	3. Cycling on limit control	Check air throughput (temperature rise)
		Check motor rpm against nameplate rating; replace motor if speed is too slow
		Check limit control wiring and connections
		Check continuity through limit control; replace control as necessary
	4. Defective or incorrect wiring	Check wiring and connections; refer to wiring diagram provided with unit

Table 24. Gas Heat Section Troubleshooting		
Problem	**Probable Cause**	**Remedy**
A. Venter motor will not start	1. No power to unit	Ensure that power is turned on
		Check main circuit breaker
	2. No 24V power to ignition system circuit board	Turn up thermostat
		Check control transformer output
	3. Integrated circuit board fuse blown	Correct cause and replace fuse
	4. No power to venter motor	Tighten connections at circuit board and/or motor terminals
	5. Venter motor power leads interchanged	Switch (black to white) venter motor power leads
	6. Integrated circuit board defective	Replace integrated circuit board
	7. Defective venter motor or PWM converter board	Replace defective parts

Table 24. Gas Heat Section Troubleshooting—Continued

Problem	Probable Cause	Remedy
B. Burner will not light	1. Manual valve not open	Open manual valve
	2. Air in gas line	Bleed gas line (initial startup only)
	3. Gas pressure too high or too low	Adjust gas pressure in accordance with steps 19–27 of **Table 14**
	4. No spark	Proceed as follows:
	a) Loose wire connections	Ensure that all wire connections are solid
	b) Transformer failure	Ensure that 24V power is available
	c) Incorrect spark gap	Ensure that spark gap is maintained at 1/8 inch
	d) Spark cable shorted to ground	Replace worn or grounded spark cable
	e) Spark electrode shorted to ground	Replace spark electrode if grounded or if ceramic is cracked
	f) Ignition system circuit board not grounded	Ensure that circuit board is grounded to furnace chassis
	g) Unit not properly grounded	Ensure that unit is properly field grounded to earth ground
		Ensure that unit is properly phased (L1 to hot lead L2 to neutral)
	h) Ignition system circuit board fuse blown	Correct cause and replace fuse
	i) Modulation system out of acceptance range	Refer to **Table 26** to troubleshoot unit using DSI control module
	j) Faulty circuit board	If 24V power is available to circuit board and all other causes have been eliminated, replace board
	5. Lockout device interrupting control circuit by above causes	Reset lockout by interrupting control
	6. Combustion air proving switch not closing	Clean venter wheel
		Remove obstructions from vent
		Replace faulty tubing to pressure switch
	7. Faulty combustion air proving switch	Replace combustion air proving switch
	8. Valve not operating	Proceed as follows:
	a) Defective valve	If 24V is measured at valve connections and valve remains closed, replace valve
	b) Loose wire connections	Ensure that all wire connections are solid
	9. Circuit board does not power valves	Proceed as follows:
	a) Loose wire connections	Ensure that all wire connections are solid
	b) Flame sensor grounded	Ensure that flame sensor lead is not grounded
		Ensure that flame sensor insulation or ceramic is not cracked; replace as necessary
	c) Incorrect gas pressure	Adjust gas pressure in accordance with steps 19–27 of **Table 14**
	d) Cracked ceramic at sensor	Replace sensor
C. Burner cycles on and off	1. Gas pressure too high or too low	Adjust gas pressure in accordance with steps 19–27 of **Table 14**
	2. Circuit board not grounded	Ensure that integrated circuit board is grounded to furnace chassis
	3. Faulty integrated circuit board	If 24V power is available to circuit board and all other causes have been eliminated, replace board
	4. Combustion air proving switch not closing	Clean venter wheel
		Ensure that unit is properly vented
		Remove obstructions from vent
		Replace faulty tubing to pressure switch
	5. Faulty combustion air proving switch	Replace combustion air proving switch
	6. Flame sensor grounded	Ensure that flame sensor lead is not grounded
		Ensure that flame sensor insulation or ceramic is not cracked; replace as necessary
	7. Cracked ceramic at sensor	Replace sensor
	8. Incorrect polarity	Reverse line volt leads to integrated circuit board

Checking and Adjusting Subcooling and Superheat

⚠ DANGER ⚠

These refrigeration circuits are high pressure systems. Hazards exist that could result in personal injury or death. Removal, installation, and service of the digital scroll compressor must be performed by a technician qualified in R-410A refrigerant. DO NOT USE service equipment or tools designed for R22 refrigerant.

Subcooling is the measurement of liquid refrigerant stored in the condenser coil. Too much subcooling indicates a system overcharge. Too little subcooling indicates a system undercharge and may not provide the thermal expansion valve with a full column of liquid refrigerant for proper operation.

Superheat is the verification that the evaporator coil is properly using the refrigerant supplied. Too much superheat indicates that the coil is undercharged. Too little superheat indicates that the coil is overcharged and potentially flooding liquid refrigerant to the compressor.

The cooling system is charged and set at the factory to provide cooling as designed and to meet the requirements of the application. The procedures below for checking subcooling and superheat—refrigerant temperature and pressure—are not required under normal conditions and should be performed only as a service function and only by a qualified technician.

Two important requirements before checking superheat and subcooling:

1. The unit has fully-intertwined refrigerant circuits. Each refrigeration circuit MUST be isolated before measuring its temperature. Another active circuit will influence the reading and make it impossible to determine accurate superheat and subcooling.
2. If the refrigeration circuit is equipped with an optional hot gas bypass valve, the valve must be disabled before measuring superheat and subcooling. Locate the shutoff valve. Disable the hot gas bypass valve by closing the shutoff valve. When measurements are complete, be sure to open the valve.

Checking and Adjusting Subcooling

Check and adjust subcooling as follows. Measure refrigerant temperature and pressure in the liquid line at the condenser coil outlet.

1. Record measurements: temperature = _____°F (°C) and pressure = _____ psig.
2. Refer to **Table 25** to convert pressure recorded in step 1 to corresponding temperature: _____°F (°C).
3. Subtract temperature recorded in step 1 from temperature recorded in step 2 to determine degrees of subcooling: _____°F (°C) − _____°F (°C) = _____°F (°C).

NOTE: The recommended subcooling range is 10–12°F (5.6–6.7°C) with an outdoor temperature range of 70–95°F (21–35°C).

4. Adjust subcooling (as needed) as follows:

⚠ WARNING ⚠

Do not release refrigerant to the atmosphere. When adding or removing refrigerant, the qualified technician must comply with all national, state/province, and local laws.

a. Too much subcooling indicates refrigerant overcharge. To reduce subcooling, remove excess refrigerant.

b. Too little subcooling indicates refrigerant undercharge. To increase subcooling, slowly add R-410A refrigerant.

Checking and Adjusting Subcooling and Superheat—Continued

Checking and Adjusting Subcooling—Continued

Table 25. Temperature/Pressure Conversion for R-410A Refrigerant

Pressure (psi)	Temperature		Pressure (psi)	Temperature		Pressure (psi)	Temperature		Pressure (psi)	Temperature		Pressure (psi)	Temperature	
	°F	°C		°F	°C		°F	°C		°F	°C		°F	°C
1.8	–55	–48.3	49.5	1	–17.2	77.0	19	–7.2	112.2	37	2.8	218.2	75	23.9
4.3	–50	–45.6	50.9	2	–16.7	78.7	20	–6.7	114.4	38	3.3	235.9	80	26.7
7.0	–45	–42.8	52.2	3	–16.1	80.5	21	–6.1	116.7	39	3.9	254.6	85	29.4
10.1	–40	–40.0	53.6	4	–15.6	82.3	22	–5.6	118.9	40	4.4	274.3	90	32.2
13.5	–35	–37.2	55.0	5	–15.0	84.1	23	–5.0	121.2	41	5.0	295.0	95	35.0
17.2	–30	–34.4	56.4	6	–14.4	85.9	24	–4.4	123.6	42	5.6	316.9	100	37.8
21.4	–25	–31.7	57.9	7	–13.9	87.8	25	–3.9	125.9	43	6.1	339.9	105	40.6
25.9	–20	–28.9	59.3	8	–13.3	89.7	26	–3.3	128.3	44	6.7	364.1	110	43.3
27.8	–18	–27.8	60.8	9	–12.8	91.6	27	–2.8	130.7	45	7.2	389.6	115	46.1
29.7	–16	–26.7	62.3	10	–12.2	93.5	28	–2.2	133.2	46	7.8	416.4	120	48.9
31.8	–14	–25.6	63.9	11	–11.7	95.5	29	–1.7	135.6	47	8.3	444.5	125	51.7
33.9	–12	–24.4	65.4	12	–11.1	97.5	30	–1.1	138.2	48	8.9	474.0	130	54.4
36.1	–10	–23.3	67.0	13	–10.6	99.5	31	–0.6	140.7	49	9.4	505.0	135	57.2
38.4	–8	–22.2	68.6	14	–10.0	101.6	32	0.0	143.3	50	10.0	537.6	140	60.0
40.7	–6	–21.1	70.2	15	–9.4	103.6	33	0.6	156.6	55	12.8	571.7	145	62.8
43.1	–4	–20.0	71.9	16	–8.9	105.7	34	1.1	170.7	60	15.6	607.6	150	65.6
45.6	–2	–18.9	73.5	17	–8.3	107.9	35	1.7	185.7	65	18.3	645.2	155	68.3
48.2	0	–17.8	75.2	18	–7.8	110.0	36	2.2	201.5	70	21.1			

Checking and Adjusting Superheat

Check and adjust superheat as follows. Measure refrigerant temperature (insulate the probe from the surrounding air temperature) and pressure in the suction line at the compressor inlet.

1. Record measurements: temperature = _____°F (°C) and pressure = _____ psig.
2. Refer to **Table 25** to convert pressure recorded in step 1 to corresponding temperature: _____°F (°C).
3. Subtract temperature recorded in step 2 from temperature recorded in step 2 to determine degrees of superheat: _____°F (°C) − _____°F (°C) = _____°F (°C).

NOTE: The recommended superheat range is 8–12°F (4.5–6.7°C).

4. Adjust superheat (as needed) as follows:
   a. Too much superheat typically indicates that evaporator coil is undercharged. To reduce superheat, adjust the thermal expansion valve by turning its adjusting stem counterclockwise.
   b. Too little superheat typically indicates that evaporator coil is overcharged and may potentially flood liquid refrigerant to compressor. To increase superheat, adjust thermal expansion valve by turning its adjusting stem clockwise.

Unit Troubleshooting Using DSI Control Module

The LED (see **Figure 28**) on the DSI control module (PN 272626) may be used to troubleshoot the unit. Refer to **Table 26** for the DSI control module flash codes and their indications.

NOTE:

- **If troubleshooting indicates that repair of the DSI control board is required, note that its only replaceable part is the fuse (see Figure 27), which is a type ATC or ATO 3-amp fuse, color code violet, PN 201685.**
- **IMPORTANT: When using a multimeter to troubleshoot the 24V circuit, place the multimeter's test leads into the 5- or 9-pin connectors located on the ignition control. Do not remove connectors or terminals from the electrical components. Doing so can result in misinterpreted readings caused by the ignition control board's fault mode monitoring circuits.**

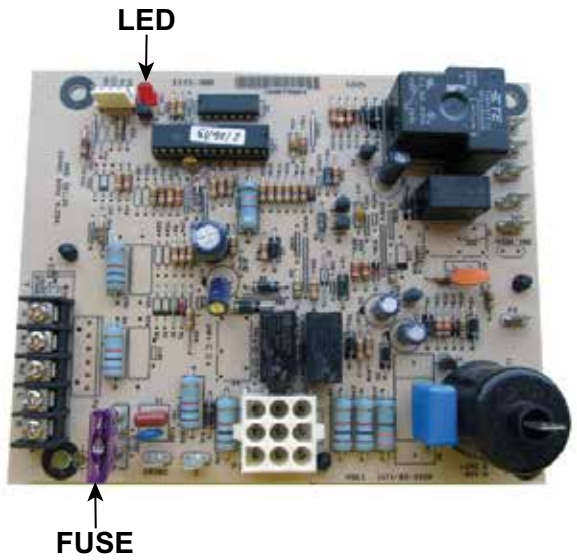


Figure 28. DSI Control Module

Table 26. Unit Troubleshooting Using DSI Control Board

LED State (Flash Code)	Indication
Fast flash	Normal operation
Steady OFF	No power, blown fuse, or defective board
One flash	Low pressure switch stuck open
Two flashes	Low pressure switch stuck closed
Three flashes	High pressure switch stuck open
Four flashes	High pressure switch stuck closed
Five flashes	Limit switch open
Six flashes	Ignition lockout (failed ignition)
Seven flashes	Too many (five) limit switch losses
Eight flashes	Too many (five) flame losses
Nine flashes	Too many (three) high pressure switch losses during one call for heat

Unit Troubleshooting Using Digital Compressor Controller

The digital compressor controller is located in the electrical compartment and acts as the interface between the digital compressor and the system programmable controller. If the controller's display indicates modulating compressor failure, troubleshoot the unit using the the LED lights on the digital compressor controller in accordance with **Table 27**.

NOTE: The alert code (red LED flashes) on the digital compressor controller remains active and the compressor remains deenergized until the reset conditions have been met or until 24VAC power has cycled off and on. All LED indicators except for six flashes result in the compressor (contactor and unloader valve) being deenergized.

Table 27. Unit Troubleshooting Using Digital Compressor Controller

LED Color	LED State	Indicated Condition	Notes
GREEN	Solid	24VAC power is present at power terminals	Compressor starts only when demand signal input is above 1.45 VDC and no alerts (RED LED flashes) are active
	Flashing	Anti-short cycle timer is active	—
YELLOW	Solid	Unloader solenoid valve is energized and compressor capacity is 0	Compressor always unloads for 0.1-second at startup
RED	Not lit	No abnormal operation alerts	—
	Two flashes	High discharge temperature alert: thermistor temperature is above 268°F or thermistor is short-circuited	Compressor is allowed to restart after 30-minute delay and after thermistor temperature is below 250°F
			Compressor will lockout after five alerts within four hours and can be reset only by cycling 24VAC power off and on
	Three flashes	Compressor protector trip: demand signal >1.44VDC and no compressor current	Possible causes: internal overload, fuse or breaker, or compressor wiring
			After 2-minute anti-short cycle, controller attempts to restart compressor as long as demand is above 1.44VDC
			No lockout feature
	Four flashes	Locked rotor alert	Locked rotor is sensed by controller on four consecutive startups
			Lockout occurs and can only be reset by cycling 24VAC power off and on
	Five flashes	Demand signal loss: below 0.5VDC	When demand signal input rises above 0.5VDC, alarm code is reset
			When demand reaches above 1.44VDC and anti-short cycle timer has timed out, modulating-capacity compressor restarts
	Six flashes	Discharge thermistor fault: no signal being received	Compressor capacity is limited to 50%
			Reconnect or replace thermistor
	Seven flashes	Unloader solenoid valve fault	—
	Eight flashes	Compressor contactor fault: compressor is running on less than 1.44VDC demand signal	Compressor runs unloaded
			Alarm is reset when current is no longer detected while system demand signal is below 1.44VDC
	Nine flashes	Low 24VAC supply to controller (below 18.5VAC)	Alarm is reset when supply voltage to controller rises above 19.5VAC
ALL	Solid	Digital compressor controller failure	Digital compressor controller can be tested to verify that it is working properly; in each test, 24VAC must be supplied to 24VAC and 24COM; for output test, 24–250VAC must be supplied to L1 and L2*
	Flashing	24VAC supply too low for operation	

*Test the digital compressor controller as follows:

Input Tests:
1) Thermistor Input: Disconnect thermistor (T1 and T2). The LED should display six RED flashes.
2) Demand Input: Disconnect unit controller (C1 and C2). The LED should display five RED flashes unless a previous alert code was present.

Output Tests:
1) Contactor Output: While the controller is powered off (no supply voltage to 24VAC and 24COM), disconnect the signal wire from C1 and C2. Add jumper wires from P3 to C2 and from P1 to C1. Restore power to 24VAC and 24COM. If function is normal, the same voltage should be read across M1 and M2 as across L1 and L2 unless an LED alert is present.
2) Unloader Output: While the controller is modulating the unloader solenoid (indicated by solid yellow LED), the voltage across U1 and U2 should be the same as L1 and L2.

APPENDIX: STARTUP FORM

Job Name _____ **Contractor** _____

Street _____ **Contact** _____ **Phone** _____

City, ST, Zip _____ **Model** _____ **Size** _____

Date _____ **Tag** _____ **Serial No.** _____

Startup Check List - General Checks

- ☐ Inspect unit for damage.
- ☐ Verify shipping brackets are removed.
- ☐ Check clearances.
- ☐ Seal electrical entrances.
- ☐ Check condenser fans for free movement.
- ☐ Verify outside air hood is installed.
- ☐ Verify inlet air filters are installed.
- ☐ Check coil condensate drain and trap.
- ☐ Verify all copper tubing is isolated and does not rub.
- ☐ Check and tighten all electrical terminals.
- ☐ Check for voltage imbalance.
- ☐ Check fuses/breakers/disconnects for correct sizing (Check unit rating plate for requirements.)
- ☐ Check discharge and space sensors.
- ☐ Check for manual resets (DX high pressure switch; optional firestat, optional high gas pressure switch)
- ☐ Inspect optional dampers.

Option Check List

- ☐ Makeup air control (Option D21) - field-installed sensor.
- ☐ Space Control (Option D19) - field-installed sensor and thermostat.
- ☐ Disconnect Switch (required) - factory or field installed.
- ☐ Smoke detector (field installed).
- ☐ Firestat (field-installed/manual reset).
- ☐ DDC Phase loss (factory installed).
- ☐ Dirty filter switch(es) - factory installed / setting required.
- ☐ Convenience outlet - 115v supply required.

Supply Fan and Optional Exhaust Fan

	DP*	CFM	Voltage (at the contactors) L1 - L2	L2 - L3	L3 - L1
Supply Fan - Cooling					
Supply Fan - Optional Heating (Gas or Electric)					
Optional Exhaust Fan					

* Inlet Ring Differential Static Pressure

☐ Set supply fan CFM using Test Mode. ☐ Set optional exhaust fan CFM using Test Mode.

	Voltage (at the contactors) L1 - L2	L2 - L3	L3 - L1	Amperage FLA-1	FLA-2	FLA-3
Fan 1						
Fan 2						
Fan 3						
Fan 4						

Optional Condenser Fan Control

- ☐ Low ambient phase control
- ☐ Low ambient modulating control

Compressors

NOTE: Crankcase heaters must be allowed to warm up for at least 24 hours prior to startup.

☐ Check Rotation.

Outdoor Air Conditions: Entering Dry Bulb _____ Entering Wet Bulb, Dewpoint, or % RH _____

Circuit	Voltage (at the contactors) L1 - L2	L2 - L3	L3 - L1	Amperage FLA-1	FLA-2	FLA-3	Nameplate RLA	Head Pressure PSIG	Suction Pressure PSIG	Superheat	Subcooling	DAT
Compressor A												
Compressor B												
D or Reheat DH												

Optional Gas Heat Section

- ☐ Natural Gas ☐ Sea Level
- ☐ Propane ☐ High Altitude
- ☐ Purge air from lines
- ☐ Leak test all piping

Inlet Gas Pressure _____

Measure Manifold Pressure

Modulating Control	Low	High
Heat Section 1		
Heat Section 2		

Staged Control	Low	High
Heat Section 1		
Heat Section 2		

High Efficiency Heat Section

- ☐ Condensate Drain(s) and Trap
- ☐ Vent
- ☐ Optional Heat Tape
- ☐ Optional Condensate Pump
- ☐ Optional Neutralizer Kit

Optional Electric Heat Section

	Voltage (at the contactors) L1 - L2	L2 - L3	L3 - L1	Amperage FLA-1	FLA-2	FLA-3
1						
2						
3						
4						

Electric Heat Control

- ☐ Staged
- ☐ Modulating (SCR)

Optional Energy Recovery Wheel

- ☐ Rotation and Alignment
- ☐ Belt tension

Optional Electric Pre-Heat

☐ 10kw ☐ 20kw ☐ 30kw

Voltage L1 - L2	L2 - L3	L3 - L1	Amperage FLA-1	FLA-2	FLA-3

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