

Combat[®] SAT-Series

Small Air Turnover Unit

Installation, Operation & Service Manual

SAT142

FOR YOUR SAFETY

If you smell gas:

1. Open windows.
2. **DO NOT** try to light any appliance.
3. **DO NOT** use electrical switches.
4. **DO NOT** use any telephone in your building.
5. Extinguish any open flame.
6. Leave the building.
7. Immediately call your local fuel supplier after leaving the building. Follow the fuel supplier's instructions.
8. If you cannot reach your fuel supplier, call the Fire Department.

WARNING



Fire Hazard

Keep all flammable objects, liquids and vapors the minimum required clearances to combustibles away from equipment.

Some objects will catch fire or explode when placed close to equipment.

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

WARNING

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

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

Installer

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

Owner

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



Intertek
HEATING ONLY

NOT FOR RESIDENTIAL USE

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Combat[®] SAT-Series

L'appareil compact
de rotation de l'air

Manuel d'installation, d'opération, et d'entretien

SAT 142

POUR VOTRE SECURITE Si vous sentez une odeur de gaz:

1. Ouvrir les fenêtres.
2. N'essayer pas d'allumer un appareil.
3. N'utiliser pas d'interrupteurs électriques.
4. N'utiliser pas de téléphone dans votre bâtiment.
5. Eteindre flamme nue.
6. Quitter le bâtiment.
7. Après avoir quitté le bâtiment, appelez immédiatement votre fournisseur local de gaz.
Suivre les instructions du fournisseur de gaz.
8. Si vous ne pouvez pas joindre votre fournisseur de gaz, appeler le service d'incendie.

⚠ AVERTISSEMENT



Risque d'incendie

Garder tous les objets, liquides ou vapeurs inflammables à la distance minimale de l'unité de chauffage requise avec les matériaux combustibles.

Certains objets prendront feu ou exploseront s'ils sont placés à proximité de l'unité de chauffage.

Le non respect de ces instructions peut entraîner la mort, des blessures corporelles ou des dommages matériels.

⚠ AVERTISSEMENT

L'installation, le réglage, la modification, la réparation ou la maintenance inadapté peut entraîner la mort, des blessures ou des dommages matériels. Lire attentivement le manuel d'installation, d'utilisation et d'entretien avant d'installer ou de réparer cet équipement.

L'installation doit être effectuée par un entrepreneur qualifié dans l'installation et l'entretien d'appareils de chauffage au gaz ou par votre fournisseur de gaz.

Installateur

Vouloir prendre le temps de lire et de comprendre ces instructions avant toute installation. L'installateur doit donner un exemplaire de ce manuel au propriétaire.

Propriétaire

Garder ce manuel dans un endroit sûr pour fournir les informations nécessaires au personnel d'entretien.



Intertek

SEULEMENT LE CHALEUR

Conçus pour les applications non-résidentielles

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SECTION 1: SMALL AIR TURNOVER UNIT SAFETY



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

Installation, service and, at a minimum, annual inspection of small air turnover unit must be done by a contractor qualified in the installation and service of gas-fired heating and/or refrigerant-based cooling equipment.

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

This small air turnover unit is designed for use in non-residential indoor spaces. Do not install in residential spaces. These instructions, the layout drawing, local codes and ordinances and applicable standards that apply to fuel piping, electrical wiring, ventilation, etc. must be thoroughly understood before proceeding with the installation.

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

If unit is equipped to provide heat, check that the local distribution conditions, nature of fuel and pressure and adjustment of the equipment are compatible before installation.

If unit is equipped to provide cooling, check that refrigerant type used in the equipment and the third-party condensing unit are compatible before installation.

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

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

Children should be supervised to ensure that they do not play with the equipment.

For additional copies of the Installation, Operation

and Service Manual, please contact Roberts-Gordon LLC. For units equipped to provide heat, gas-fired equipment is not designed for use in atmospheres containing flammable vapors, flammable dust or chlorinated or halogenated hydrocarbons.

Recirculated room air may be hazardous if containing flammable solids, liquids, and gases; explosive materials; and/or substances which may become toxic when exposed to heat (i.e. refrigerants, aerosols, etc.).

1.1 Description of Operation

The small air turnover unit is available in air-only, cool-only, heat-only and heat-cool variations. It is designed for indoor installation.

When equipped to provide heat, this small air turnover unit is a piece of indirect, gas-fired equipment. The small air turnover unit is factory-tested to fire either with natural gas or LPG (check the small air turnover unit's rating plate for information on the appropriate fuel). The burner will operate to maintain room/space air temperature.

Be sure to read this entire manual before installation and start-up.

1.2 Inspection and Setup

The small air turnover unit is shipped in multiple sections based on the configuration selected. The small air turnover unit was inspected and operated prior to shipment. Immediately upon receipt of the small air turnover unit, check the fuel and/or refrigerant (if applicable) and electrical characteristics of the small air turnover unit and verify that they match the fuel and/or refrigerant (if applicable) and electrical supply available. Verify that the specifications on the small air turnover unit rating plate match your order. Check the small air turnover unit for any damage that may have occurred during shipment. If any damage is found, file a claim with the transporting agency. Do not refuse shipment. Check the installation location to ensure proper clearances to combustibles. See *Page 6, Section 3.1*.

Larger accessories (i.e. discharge plenum, extension section or cooling coil) may either ship with the small air turnover unit or separately on another truck. Check the bill of lading for information.

If the small air turnover unit must be temporarily stored (i.e. job site is not ready for installation of the small air turnover unit), the small air turnover unit should be left on the shipping pallet on the ground in a protected area. The small air turnover unit should be covered to be protected from the environment.

1.3 Safety Labels and Their Placement

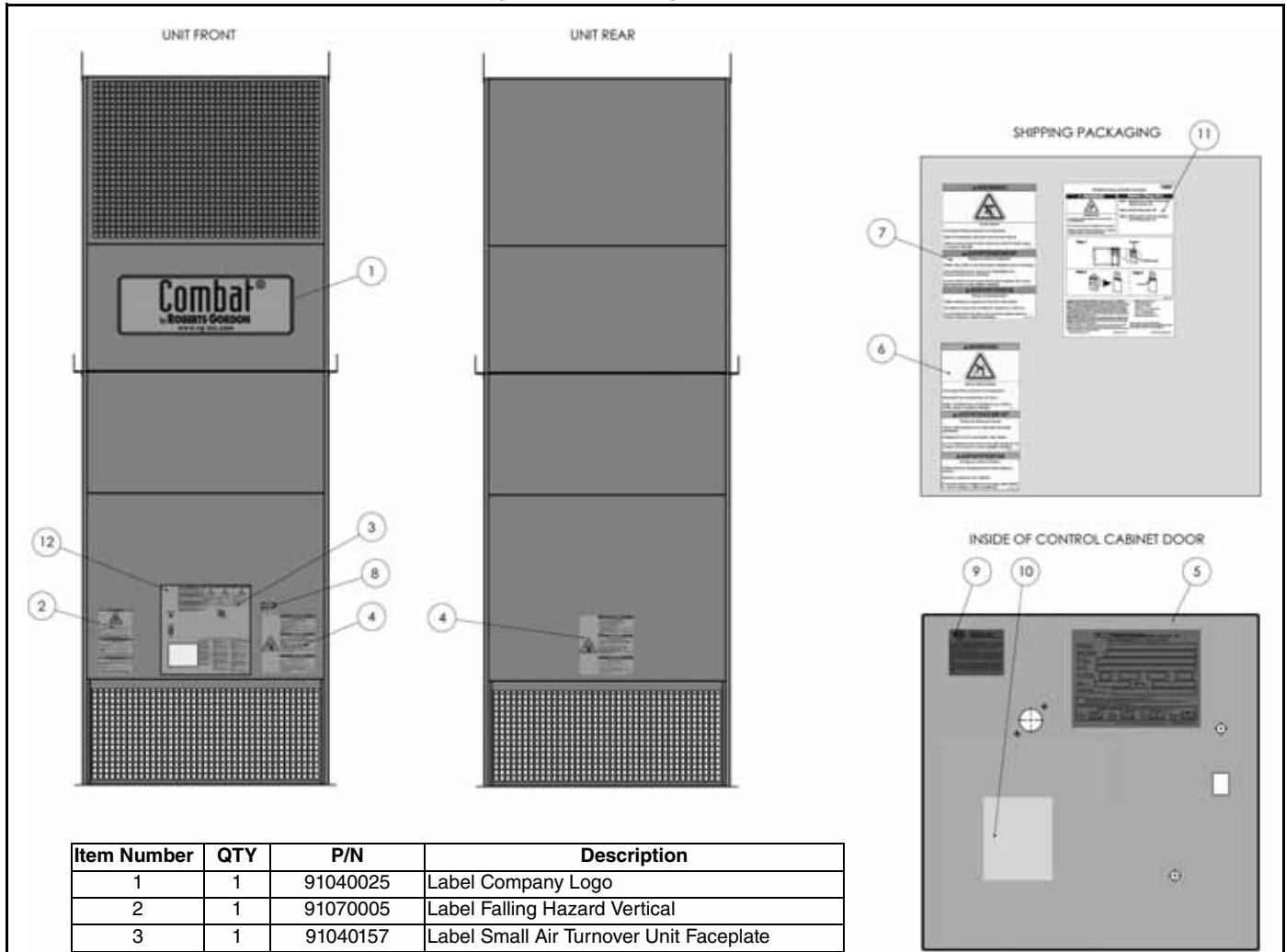
Product safety signs or labels should be replaced by product user when they are no longer legible. Please contact Roberts-Gordon LLC or your ROBERTS GORDON® independent distributor to obtain replacement signs or labels.

1.4 California Proposition 65

In accordance with California Proposition 65 requirements, a warning label must be placed in a highly visible location on the outside of the equipment (i.e., near equipment's serial plate). See label placement drawing on *Page 2, Figure 1* for label location. Avoid placing labels on areas with extreme heat, cold, corrosive chemicals or other elements. To order additional labels, please contact Roberts-Gordon LLC or your ROBERTS GORDON® independent distributor.

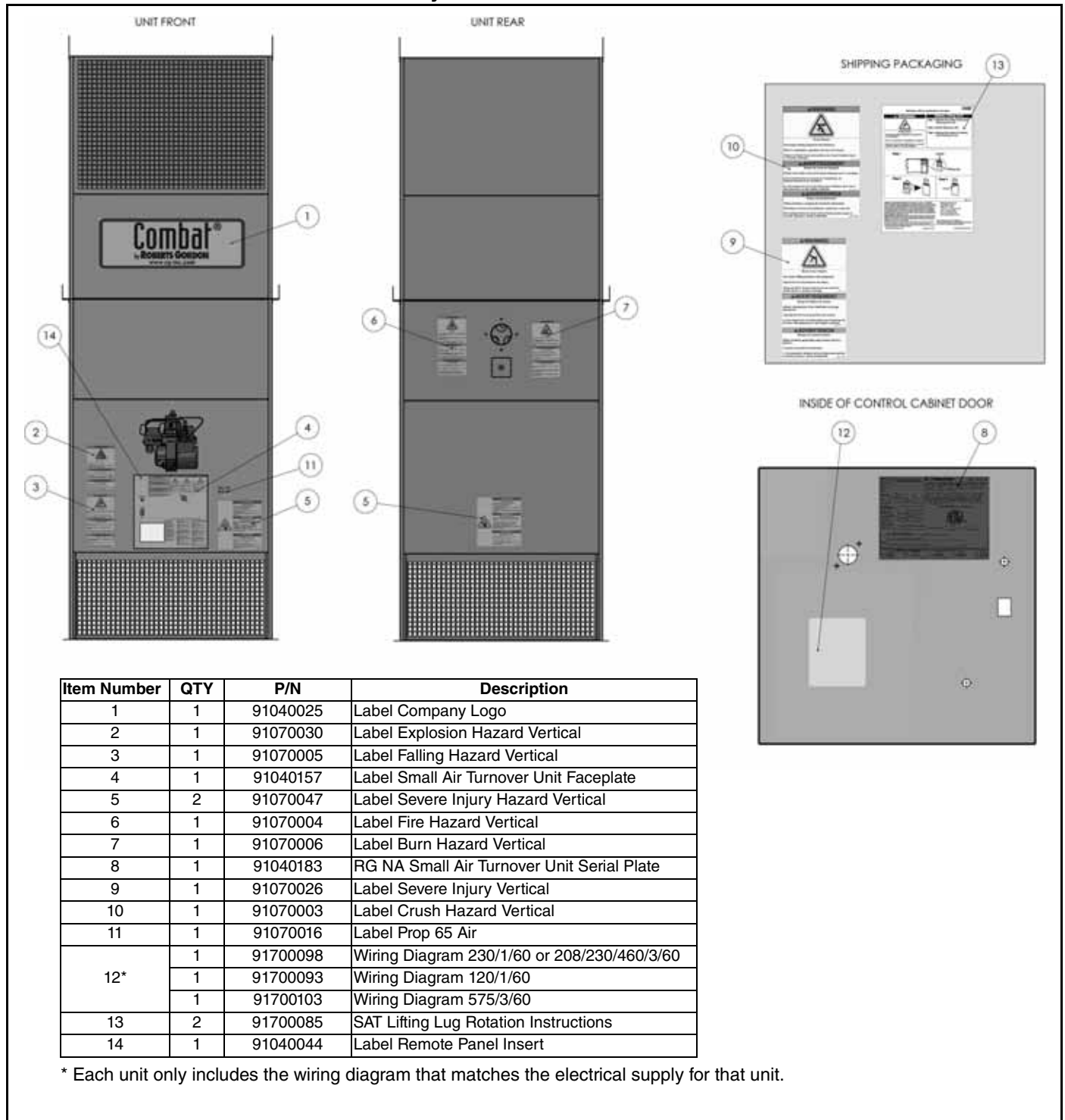
1.5 Label Placement

FIGURE 1: Label Placement for Air-Only or Cool-Only Units



Item Number	QTY	P/N	Description
1	1	91040025	Label Company Logo
2	1	91070005	Label Falling Hazard Vertical
3	1	91040157	Label Small Air Turnover Unit Faceplate
4	2	91070047	Label Severe Injury Hazard Vertical
5	1	91040182	RG NA Small Air Turnover Unit Serial Plate
6	1	91070029	Label Severe Injury Vertical
7	2	91070003	Label Crush Hazard Vertical
8	1	91070016	Label Prop 65 Air
9	1	91010451	Label Panel Shop
10*	1	91700098	Wiring Diagram 230/1/60 or 208/230/460/3/60
	1	91700093	Wiring Diagram 120/1/60
	1	91700103	Wiring Diagram 575/3/60
11	2	91700085	SAT Lifting Lug Rotation Instructions
12	1	91040044	Label Remote Panel Insert

* Each unit only includes the wiring diagram that matches the electrical supply for that unit.

FIGURE 2: Label Placement for Heat-Only or Heat-Cool Units

SECTION 2: INSTALLER RESPONSIBILITY

⚠ WARNING

Explosion Hazard
Equipment must have access to uncontaminated air at all times.
Failure to follow these instructions can result in death, injury or property damage.

The installer is responsible for the following:

- To install and commission the small air turnover unit (and the third-party condensing unit, if applicable), as well as the fuel and/or refrigerant (if applicable) and electrical supplies, in accordance with applicable specifications and codes. Roberts-Gordon LLC recommends the installer contact a local building inspector or Fire Marshal for guidance.
- To use the information given in a layout drawing and in the manual together with the cited codes and regulations to perform the installation.
- To furnish all needed materials not furnished as standard equipment.
- To provide access to small air turnover unit for servicing.
- To provide the owner with a copy of this Installation, Operation and Service Manual.
- To ensure there is adequate air circulation around the small air turnover unit and to supply air for combustion (heat-only and heat-cool units), ventilation and distribution in accordance with local codes.
- To assemble or install any accessories using best building practices.
- To ensure small air turnover unit is placed in an approved application.

2.1 Corrosive Chemicals

⚠ CAUTION

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

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

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

2.2 Required Equipment

When lifting of the equipment is required, the installing contractor is responsible for supplying or arranging for the appropriate lifting equipment so that the small air turnover unit and accessories may be placed in a safe manner. *See Page 11, Section 6.*

The qualified installing / service technician is responsible for having the appropriate equipment for the safe installation and start-up of an small air turnover unit. Tools required to commission the equipment include, but are not limited to, the following:

- Various screwdriver types and sizes
- Various adjustable wrenches
- Torque wrenches
- Drill motor and various drills
- Volt meter
- Clamp style ammeter
- Belt tension gauge

Additional tools required specifically to commission heat-only and heat-cool equipment include, but are not limited to, the following:

- Pipe wrenches sized appropriately for the gas train components
- U-tube manometer 0 to 6 in wc (0 to 14.9 mbar)
- Gas pressure gauge 0 to 30 in wc (0 to 74.7 mbar)
- Gas pressure gauge 0 to 1 PSIG (0 to 344.7 mbar)
- Combustion analyzer
- Stack thermometer

SECTION 3: CRITICAL CONSIDERATIONS**! WARNING****Fire Hazard**

Keep all flammable objects, liquids and vapors the minimum required clearances to combustibles away from equipment.

Some objects will catch fire or explode when placed close to equipment.

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

3.1 Required Clearances to Combustibles

Clearances are the required distances that combustible objects must be away from the heat-only and heat-cool small air turnover unit to prevent fire hazards. Combustibles are materials that may catch on fire and include common items such as wood, paper, rubber, fabric, etc. **Maintain clearances to combustibles at all times for safety.**

Check the clearances on each small air turnover unit being installed to make sure the product is suitable for your application and the clearances are maintained.

Minimum clearances for heat-only and heat-cool models are as follows:

- 6" (15.2 cm) Above the top of the equipment
- 36" (91.4 cm) In front of the equipment
- 36" (91.4 cm) In rear of equipment
- 48" (121.9 cm) Along the sides of the equipment
- 18" (45.7 cm) Around the flue pipe

Read and follow the safety guidelines below:

- Locate the small air turnover unit so that the air intakes are not too close to any exhaust fans, gasoline storage, or other contaminants that could potentially cause dangerous situations.
- Keep gasolines or other combustible materials including flammable objects, liquids, dust or vapors away from this small air turnover unit or any other equipment.
- Maintain clearances from heat sensitive material, equipment and workstations.

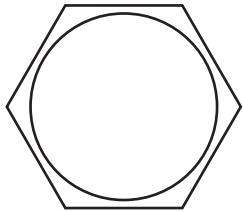
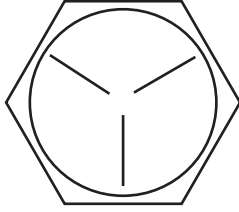
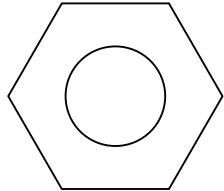
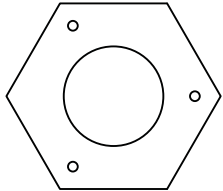
The stated clearances to combustibles represent a surface temperature of 90 °F (32 °C) above room temperature. Building materials with a low heat tolerance (i.e. plastics, vinyl siding, canvas, tri-ply, etc.) may be subject to degradation at lower temperatures. It is the installer's responsibility to assure that adjacent materials are protected from degradation. Maintain clearances from heat sensitive material, equipment and workstations.



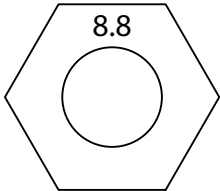
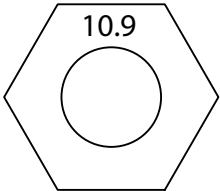
Clearances to combustibles do not denote clearances for accessibility. Minimum clearance for access is 48" (122 cm). Minimum clearance for accessibility applies to the user interface panel and inlet plenum panels.

3.2 Hardware

Unless otherwise specified, all hardware must be torqued to settings from *Page 7, Table 1*.

Table 1: Recommended Torque Settings

Bolt Head Grade Marking		
Nut Grade Marking		
Bolt Size	Grade 2	Grade 5
10-24	27 in•lb	42 in•lb
1/4-20	65 in•lb	101 in•lb
5/16-18	11 ft•lb	17 ft•lb
3/8-16	19 ft•lb	30 ft•lb

Bolt Head Grade Marking		
Nut Grade Marking		
Bolt Size	Grade 8.8	Grade 10.9
M5	6Nm	9Nm
M6	10Nm	15Nm
M8	25Nm	35Nm
M10	50Nm	75Nm
M12	85Nm	130Nm
M16	215Nm	315Nm

SECTION 4: NATIONAL STANDARDS AND APPLICABLE CODES

4.1 Refrigerant Handling Practices (Cool-Only and Heat-Cool Units)

The handling, reclaiming, recovering and recycling of refrigerants as well as the equipment to be used and the procedures to be followed must comply with the national and local codes.

United States: Refer to Federal Clean Air Act - latest revision.

Canada: Refer to Canadian Environmental Protection Act - latest revision.

4.2 Fuel Codes (Heat-Only and Heat-Cool Units)

The type of fuel appearing on the nameplate must be the type of fuel used. Installation must comply with national and local codes and requirements of the local fuel company.

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

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

4.3 Installation Codes

Installations must be made in accordance with the Standard for the Installation of Air-Conditioning and Ventilating Systems, NFPA 90A - latest revision for the installation of air conditioning and ventilating systems.

4.4 Aircraft Hangars

These units are not suitable for installation in aircraft hangars.

4.5 Parking Structures and Repair Garages

Installation in garages must be in accordance with the following codes:

United States: Refer to Standard for Parking Structures, NFPA 88A - latest revision or Code for Motor Fuel Dispensing Facilities and Repair Garages, NFPA 30A - latest revision.

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

4.6 Electrical

Electrical connection to small air turnover unit must be in accordance with the following codes:

United States: Refer to National Electrical Code®, NFPA 70 - latest revision. Wiring must conform to the most current National Electrical Code®, local ordinances, and any special diagrams furnished.

Canada: Refer to Canadian Electrical Code, CSA C22.1 Part 1 - latest revision.

4.7 Venting (Heat-Only and Heat-Cool Units)

This small air turnover unit must be vented in accordance with the requirements within this manual and with the following codes and any state, provincial or local codes which may apply:

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

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

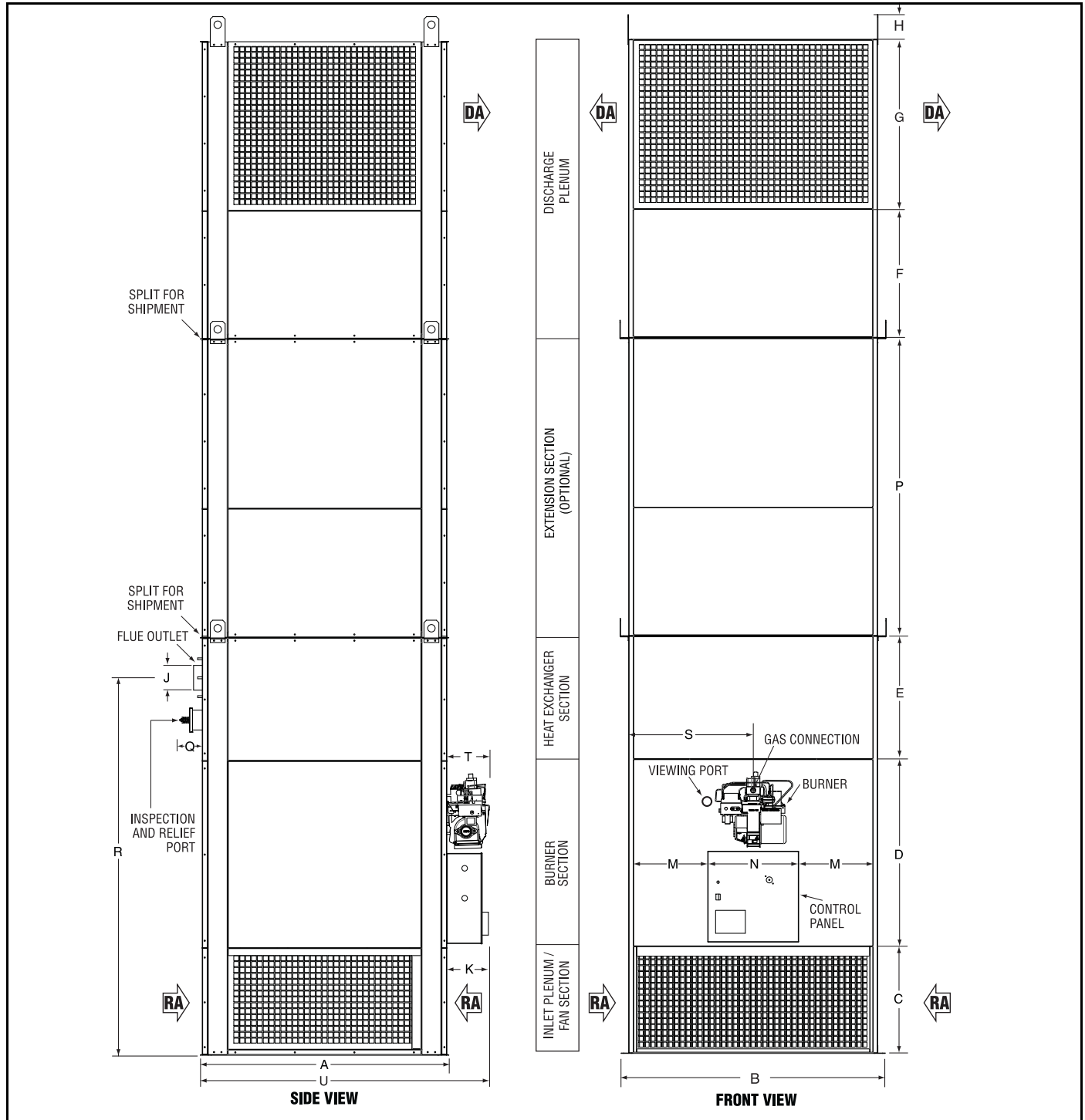
4.8 High Altitude

These small air turnover units are approved for installations up to 2000' (609.6 m) (US), 4500' (1371.6 m) (Canada) without modification. Consult factory if US installation is above 2000' or Canadian installation is above 4500' (1371.6 m).

SECTION 5: SPECIFICATIONS

Dimension and estimated weight tables apply to all configurations. The legend below is a list of abbreviations used in this section and applies to *Page 9, Figure 3*.

FIGURE 3: Model Dimensions



NOTE: Coil always mounted in section immediately above heat exchanger section.

Table 2: Legend

DA = Discharge Air	RA = Return Air
--------------------	-----------------

Table 3: Model Dimensions

Model		A	B	C	D	E	F	G	H	J	K	M	N	P	Q	R	S	T	U
142	(in)	50.1	53.2	21.6	37.7	24.9	26	34.2	5	5	7	16	18.3	60	4	75.8	25.1	11.3	56.8
	(cm)	127.3	135.1	54.9	95.8	63.2	66	86.9	12.7	12.7	17.8	40.6	46.5	152.4	10.2	192.5	63.8	28.6	144.3

Table 4: Technical Data

		120/1/60	230/1/60	208/3/60	230/3/60	460/3/60	575/3/60
Airflow	[CFM]	10,000	10,000	10,000	10,000	10,000	10,000
	[m ³ /h]	16,990	16,990	16,990	16,990	16,990	16,990
Number of Propeller Fans	--	1	1	1	1	1	1
Propeller Fan Diameter	[in]	42	42	42	42	42	42
Sheave Type	--	Adjustable	Adjustable	Adjustable	Adjustable	Adjustable	Adjustable
Fan Motor Size	[HP]	3	3	3	3	3	3
Fan Motor Type	--	Single Speed, Premium Efficiency, ODP					
Total Input	[Btu/h x 1000]	400	400	400	400	400	400
	[kW]	117.2	117.2	117.2	117.2	117.2	117.2
Total Output	[Btu/h x 1000]	340	340	340	340	340	340
	[kW]	99.6	99.6	99.6	99.6	99.6	99.6
Efficiency	[%]	85	85	85	85	85	85
Gas Connection	[in]	3/4	3/4	3/4	3/4	3/4	3/4
	[cm]	1.9	1.9	1.9	1.9	1.9	1.9
Minimum Inlet Gas Pressure	[in wc]	5.5	5.5	5.5	5.5	5.5	5.5
Maximum Inlet Gas Pressure	[in wc]	14	14	14	14	14	14
Flue Diameter	[in]	5	5	5	5	5	5
	[cm]	12.7	12.7	12.7	12.7	12.7	12.7
Maximum Flue Length	[ft]	40	40	40	40	40	40
	[m]	12.2	12.2	12.2	12.2	12.2	12.2
Cooling Capacity	[T]	20	20	20	20	20	20
	[kW]	70.3	70.3	70.3	70.3	70.3	70.3
Refrigerant	--	R410A	R410A	R410A	R410A	R410A	R410A
Coil Design	--	A-frame	A-frame	A-frame	A-frame	A-frame	A-frame
Coil Circuits	--	2	2	2	2	2	2
Coil Circuit Design	--	Intertwined	Intertwined	Intertwined	Intertwined	Intertwined	Intertwined
Disconnect Fuse Size	[A]	50	25	17.5	17.5	8	6
Full Load Amps (Air-Only/Cool-Only)	[A]	34.5	17.5	11.2	10.1	5.1	4.1
Running Amps (Air-Only/Cool-Only)	[A]	24.3	12.4	8.0	7.2	3.7	2.9
Full Load Amps (Heat-Only/Heat-Cool)	[A]	38.2	19.7	13.6	12.3	6.2	5.0
Running Amps (Heat-Only/Heat-Cool)	[A]	28.0	14.6	10.4	9.4	4.7	3.8

NOTE: This data assumes the small air turnover unit is designed to operate at the maximum allowable airflow and at 0" ESP. See Section 14, Table 13 for axial fan RPM settings.

Table 5: Weights

Air-Only Unit	[lb]	1,200.0
	[kg]	544.3
Heat-Only Unit	[lb]	1,400.0
	[kg]	635.0
Cool-Only Unit	[lb]	1,350.0
	[kg]	612.3
Heat-Cool Unit	[lb]	1,550.0
	[kg]	703.1

Table 6: Filters

	Filter Size	Filter Quantity	Filter Type
(in)	20 x 50 x 1	2	Polyester
(cm)	50.8 x 127.0 x 2.5		
(in)	20 x 40 x 1	2	Polyester
(cm)	50.8 x 101.6 x 2.5		

Table 7: Orifice Size

Gas	Orifice
Natural Gas	0.516 in
LPG	0.332 in

Table 8: Sound Data

	Octave Band Noise (Hz)	Sound Level (dBA)
Readings were taken 10' from front intake with filters installed	31.5	41.0
	63	55.0
	125	61.0
	250	67.0
	500	68.0
	1000	66.0
	2000	65.0
	4000	59.0
	8000	55.5
	16000	43.0
Total		73.0

NOTE: Noise level data can vary widely dependent on the installation surroundings of the small air turnover unit. Data is to be used as a guideline only and applies to small air turnover units in any configuration.

SECTION 6: LIFTING A SMALL AIR TURNOVER UNIT



The small air turnover unit must be installed in compliance with all applicable codes. The qualified installation technician must use best building practices when installing the small air turnover unit and any optional equipment. If installing a heat-only or heat-cool unit, check local distribution condition, nature of fuel and fuel pressure, and the current state of adjustment of the small air turnover unit are compatible before installation.

If installing a cool-only or heat-cool unit, check that the refrigerant type used in the equipment and the third-part condensing unit are compatible before installation.

6.1 Preparing to Lift the Small Air Turnover Unit:

Prior to lifting the small air turnover unit, the following steps must be performed.

1. Remove all packaging or banding that attached the small air turnover unit to the skid and ensure that the small air turnover unit is no longer bound to the skid.
2. Inspect the small air turnover unit to:
 - Verify that there is no damage as a result of shipping.
 - Ensure that it is appropriately rated for the utilities available at the installation site.
 - Verify that the lifting lugs are intact, undamaged and secured to the small air turnover unit. See *Page 11, Section 6.2* for instructions to rotate base unit lifting lugs.
 - Ensure factory-installed hardware is torqued as specified.
3. Prepare the installation location to be ready to accept the small air turnover unit.

4. Verify that the lifting equipment can handle the small air turnover unit's weight and the required reach.

6.2 Rotating Base Unit Lifting Lugs

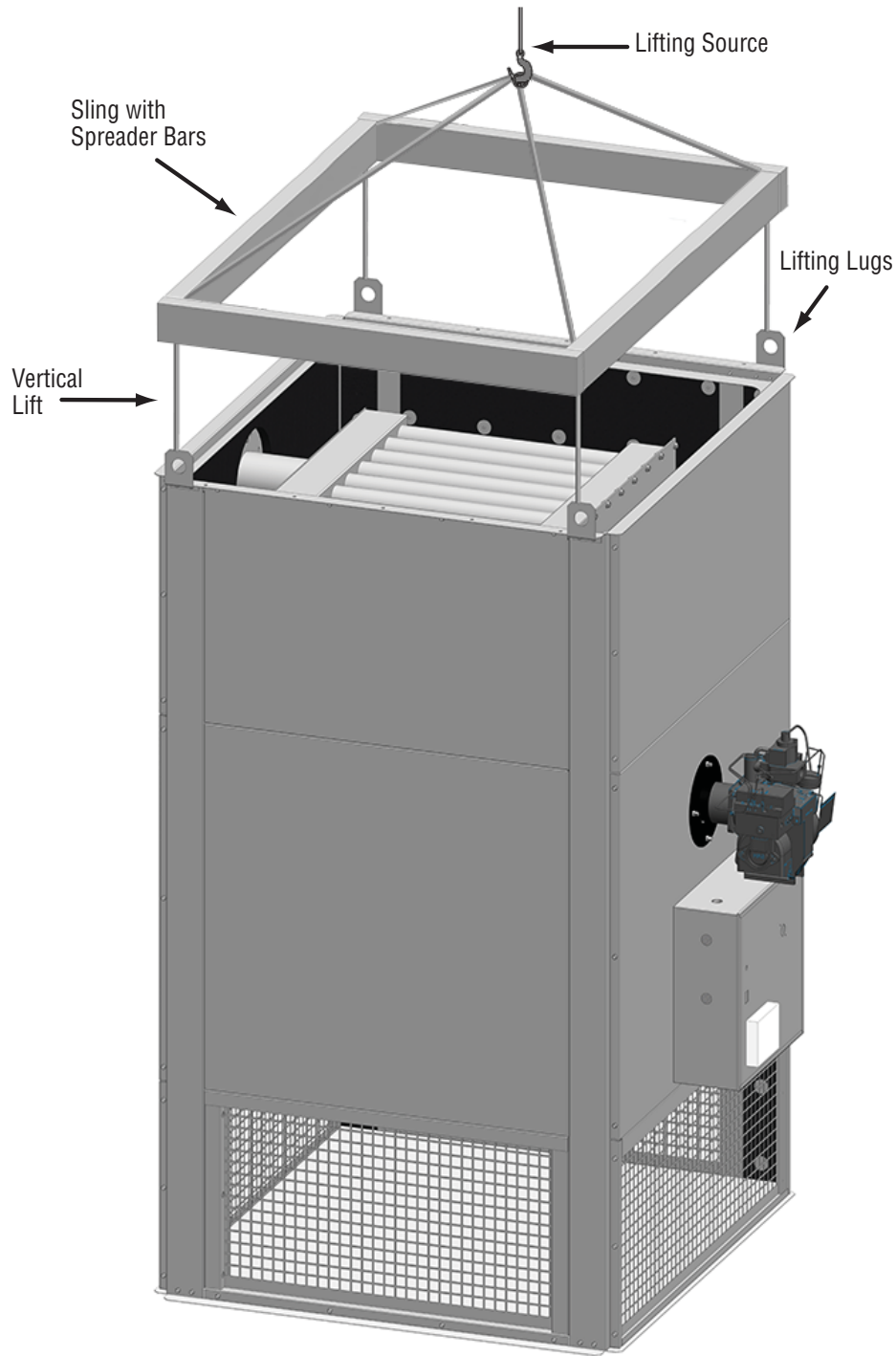
Prior to lifting the small air turnover base unit, the following steps must be performed.

1. Remove hardware to free lifting lug from each upper corner of unit.
2. Rotate lifting lugs 180°.
3. Replace hardware to re-attach each lifting lug to unit.
4. Torque hardware according to *Page 7, Table 1*.

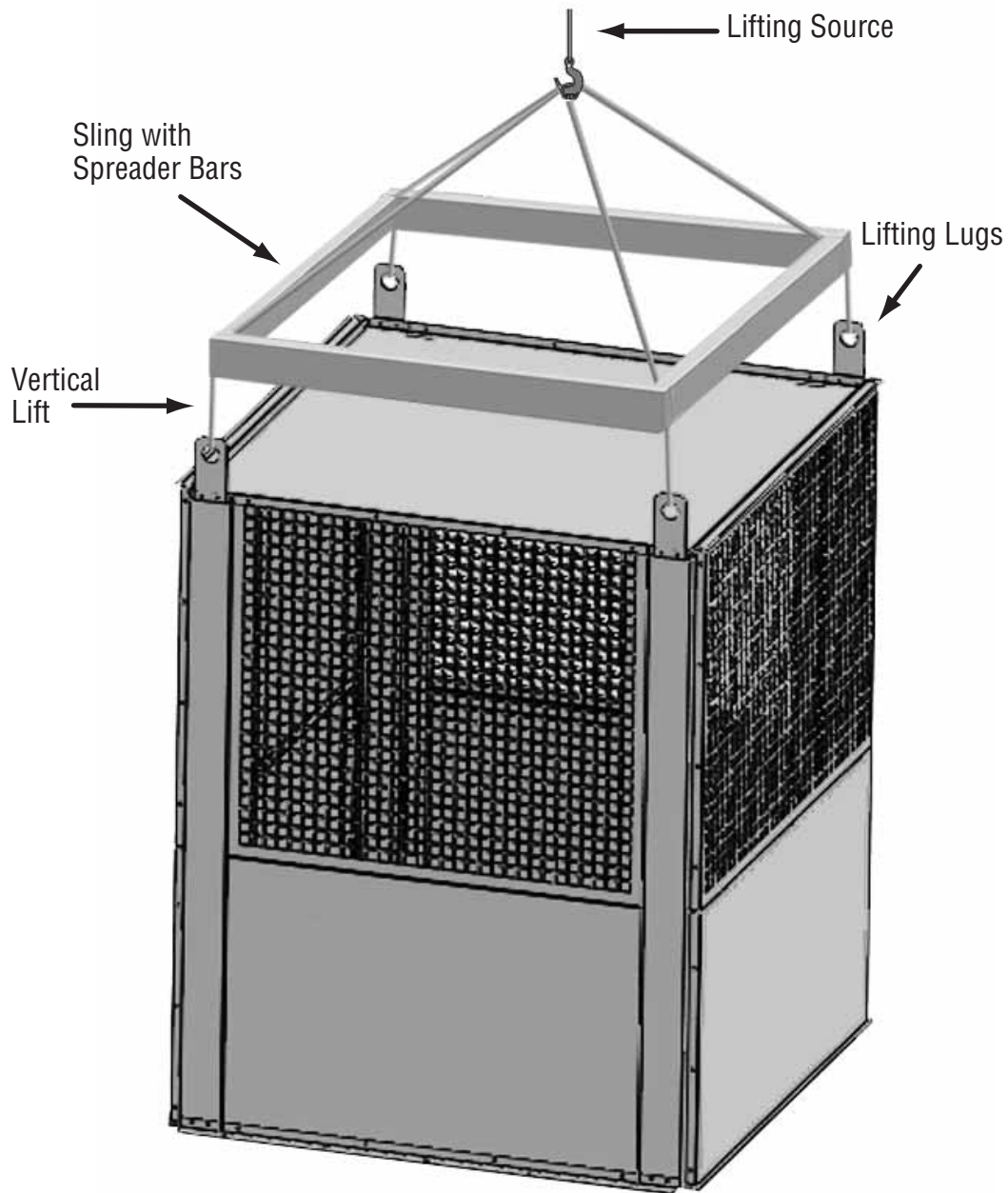
6.3 Lifting a Small Air Turnover Unit

Lift each piece of the small air turnover unit into place using lifting lugs on the top of each section. Use spreader bars to ensure that the lifting cables clear the sides of the small air turnover unit. See *Page 12, Figure 4 and Page 13, Figure 5*. The small air turnover unit must be kept level during the lift to prevent tipping, twisting or falling. If lifted improperly, product damage may occur. See *Page 14, Section 7* for assembly instructions.

FIGURE 4: Lifting a Small Air Turnover Unit Base Unit



NOTE: Heat-only or heat-cool base unit is illustrated. Lifting procedures for an air-only or cool-only base is identical.

FIGURE 5: Lifting a Small Air Turnover Unit Extension Section or Discharge Plenum

NOTE: Air-only or heat-only discharge plenum is illustrated. Lifting procedure for a cool-only discharge plenum, heat-cool discharge plenum or extension section is identical.

SECTION 7: SMALL AIR TURNOVER UNIT ASSEMBLY

⚠ WARNING

Crush Hazard
<p>Use proper lifting equipment and practices.</p> <p>Failure to follow these instructions can result in death, injury or property damage.</p>

⚠ WARNING

Falling Hazard
<p>Use proper safety equipment and practices to avoid falling.</p> <p>Failure to follow these instructions can result in death, injury or property damage.</p>

The base unit, extension section and discharge plenum are shipped assembled.

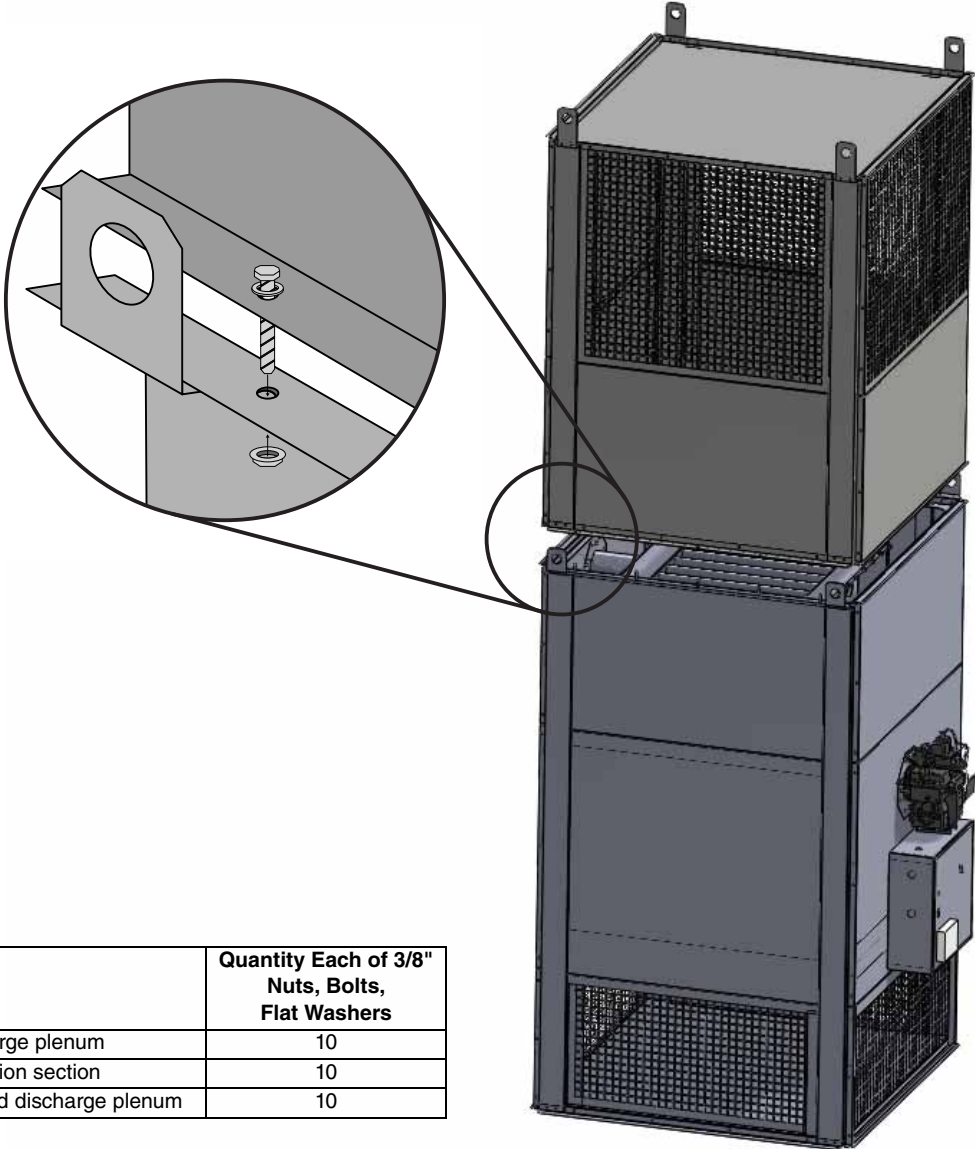
NOTE: Check to be sure that all required components are present. If any are missing, contact your ROBERTS GORDON® independent distributor.

There is an outward-turned flange on each side of the:

- Base unit top
- Extension section top and bottom
- Discharge plenum bottom

On two sides, this flange extends horizontally beyond the cabinet wall and includes five holes for field-assembly of the sections with provided hardware. Stack sections one set at a time, being sure to align holes in top extended flanges of one section with holes in the bottom extended flanges of the next. Insert bolt into each set of holes and secure with washer and nut. Torque according to *Page 7, Table 1*.

FIGURE 6: Small Air Turnover Unit Assembly



Section Set	Quantity Each of 3/8" Nuts, Bolts, Flat Washers
Base unit and discharge plenum	10
Base unit and extension section	10
Extension section and discharge plenum	10

NOTE: Heat-only unit is illustrated. Assembly procedure for air-only, cool-only and heat-cool units are identical.

SECTION 8: VENTING

! WARNING



Carbon Monoxide Hazard

Small air turnover unit must be vented.

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

This section only applies to heat-only and heat-cool units. Any conflicting information in Section I, Part D of the provided burner manual is superseded by information in this section.

8.1 General Venting Requirements

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

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

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

8.2 Recommended Flue Venting Practices

All small air turnover units are shipped without flue/vent pipe components. It is the responsibility of the installer to supply the venting components.

All small air turnover units must be vented. Each small air turnover unit must have an individual vent pipe and vent terminal.

Termination of the vent pipe must be located so that the combustion fumes can not be drawn back into the small air turnover unit or into any other outside air intakes.

Vent pipe diameter must match the diameter of the small air turnover unit's flue pipe extension. Recommended vent pipe is a minimum 26 gauge galvanized steel or stainless steel. The installer must provide a rain cap or weather cap. See Page 16, Figure 7 for an illustration of recommended cap design. All joints must be sealed. Type "B" vents are not acceptable.

DO NOT support the weight of the vent pipe on the

equipment's flue pipe extension. Vent pipe must be self-supported.

Maximum vent pipe length (horizontal or vertical) is 40' (12.2 m). A total equivalent vent pipe length can be calculated using equivalent straight pipe lengths for tees and elbows reducing the maximum vent pipe length by 6' (1.8 m) for each sweep elbow, 2.5' (.7 m) for the termination tee, and 10' (3.0 m) for each short radius elbow.

The vent pipe should be fitted with a drip leg with a clean out and a drain plug in the bottom. The vent pipe shall be constructed so that any water or condensate that collects in the vent will remain in the drip leg and not drain back into the small air turnover unit. Be sure the drip leg is constructed in a way that water or condensate will not fall on small air turnover unit's controls when drain plug is removed. Pitch horizontal vents downward 1/4" (0.6 cm) per foot toward outlet for condensate drainage. Support horizontal runs as required to prevent sagging.

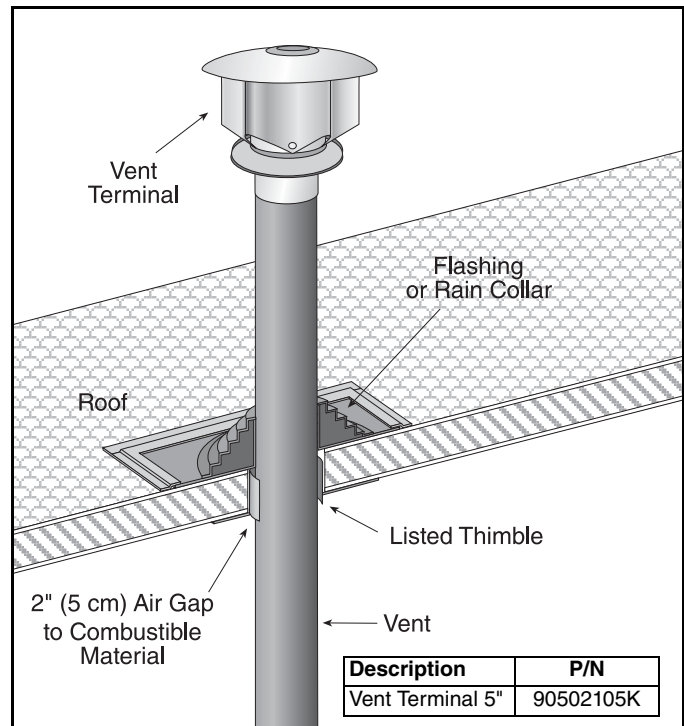
Do not install dampers or other restrictive devices in the vent pipe.

The vent pipe should not be installed in such a manner that access to the components is obstructed.

The vent pipe shall have a minimum of at least 18" (45.7 cm) clearance to combustibles, and be guarded to protect personnel from coming in contact.

Approved listed thimble is to be used wherever the vent pipe passes through a combustible wall or ceiling/roof.

FIGURE 7: Vent and Roof Detail



SECTION 9: BURNERS

! WARNING**Explosion Hazard**

Leak test all components of gas piping before operation.

Gas can leak if piping is not installed properly.

Do not high pressure test gas piping with small air turnover unit connected.

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

This section only applies to heat-only and heat-cool units.

9.1 Principal of Operation

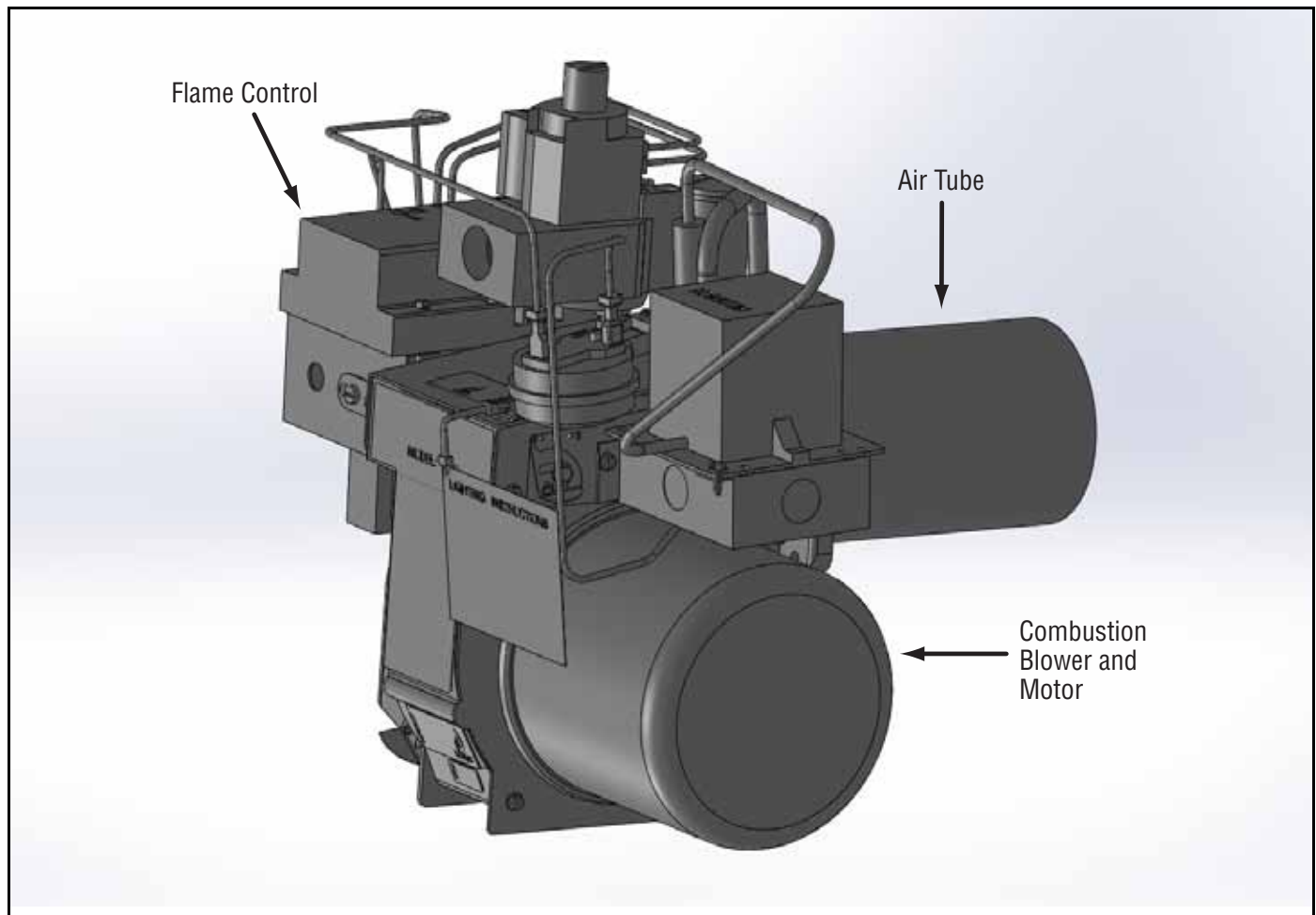
Small air turnover units include a gas-fired burner.

The burner is a self-contained unit comprising of a blower assembly, firing head, ignition and flame monitoring system. Gas burners incorporate multiple orifices, venturi operation for proper combustion.

Air for combustion is furnished by an integrally mounted combustion air fan, which discharges into the burner blast tube assembly. Combustion airflow is controlled by a multi-louvered damper assembly. The air/fuel ratio is established at the time of start-up and proven with combustion test equipment to provide the lowest practical oxygen with a clean flame.

See provided burner manual for more information.

FIGURE 8: Burner



SECTION 10: GAS PIPING**! WARNING****Explosion Hazard**

Leak test all components of gas piping before operation.

Gas can leak if piping is not installed properly.

Do not high pressure test gas piping with small air turnover unit connected.

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

This section applies only to heat-only and heat-cool units. Any conflicting information in Section I, Part H of the provided burner manual is superseded by information in this section.

10.1 Gas Manifolds

All gas piping to the small air turnover unit must comply with:

United States: Refer to NFPA 54/ANSI Z223.1-latest revision, National Fuel Gas Code for natural gas and LPG units.

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

Gas supply piping must conform to best building practices and local codes. During installation of the gas piping, be sure that no piping restricts accessibility to the small air turnover unit.

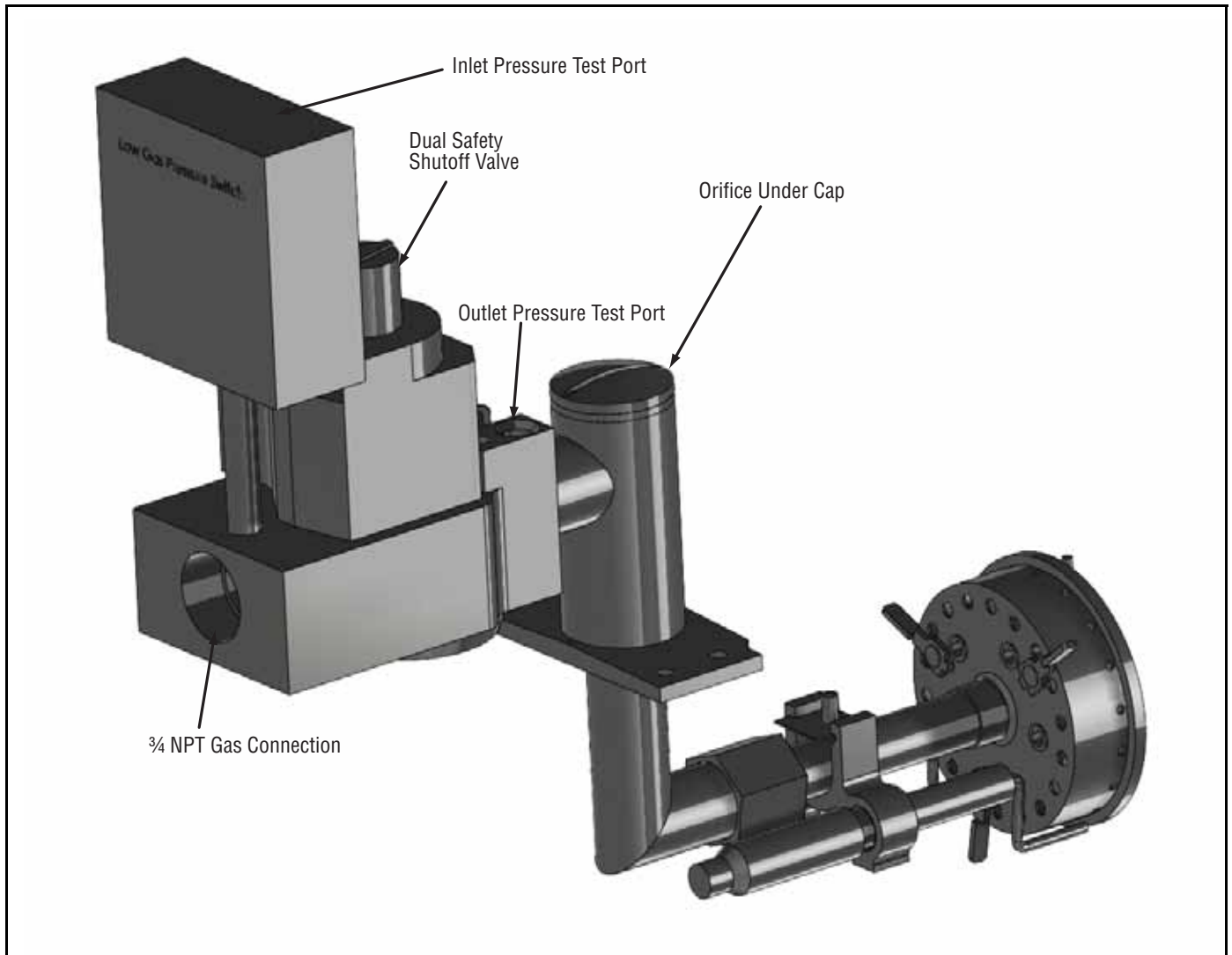
Lockable manual shut-off valve must be added by the installer in compliance with Occupational Safety and Health Administration (OSHA) regulations.

10.2 Gas Piping and Pressures

The small air turnover unit is equipped with a 3/4" NPT gas manifold suitable for connection to supply pressure of up to 14 in wc (34.5 mbar). When gas supply exceeds this maximum gas pressure, an optional high pressure gas regulator is required to insure that the correct gas pressure is supplied to the regulator. Pressure should be measured between the high pressure gas regulator and safety shut off valve.

Minimum gas pressure as indicated on data plate must be measured with the burner operating.

See Section I, Part F, Figure 9 of provided burner manual for gas pipe size requirements.

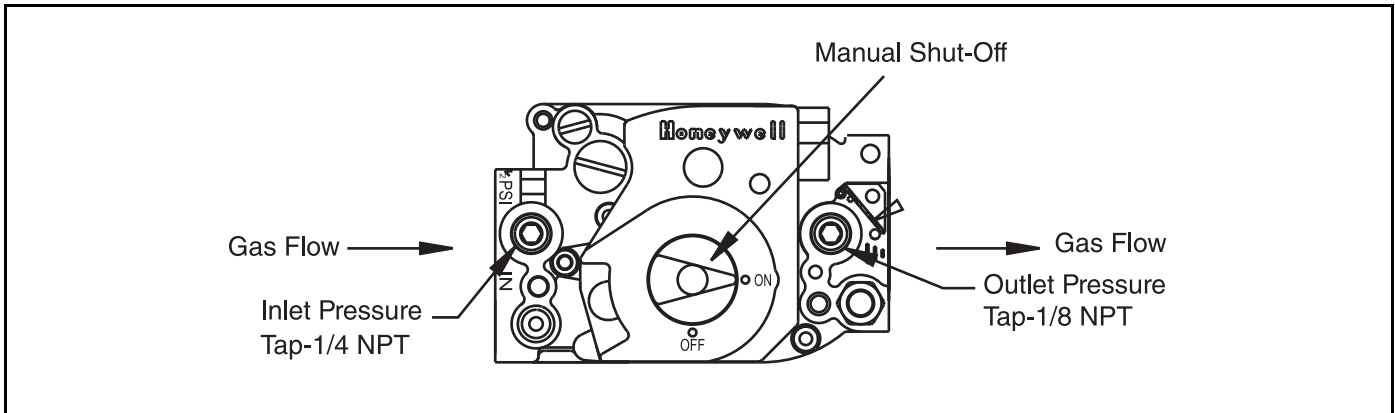
FIGURE 9: Manifold for Small Air Turnover Unit Burners

10.3 Pressure Test Ports

There are 1/8" pressure test ports located on the manifold. The test ports are available to measure the manifold inlet gas pressure and the burner gas pressure during burner setup.

10.3.1 Manifold Inlet Gas Pressure - 1/8" NPT

The pressure test port for measuring manifold inlet pressure is located on the low gas pressure switch tee. Refer to the small air turnover unit rating plate for the acceptable inlet gas pressure. See *Page 19, Figure 9*.

FIGURE 10: Test Port Location

10.4 Line Pressure Test - Leak Testing

The small air turnover unit and its individual shut-off valve must be disconnected from the gas supply piping systems during any pressure testing of that system at test pressures in excess of 14 in wc (34.5 mbar). The small air turnover unit must be isolated from the gas supply piping system by closing its individual manual gas valve that is located immediately upstream of the safety shut-off gas valve.

SECTION 11: COOLING COIL

⚠ CAUTION**Equipment Damage Hazard**

System contains R-410A refrigerant.

Operating pressures may exceed limits of R-22 service equipment.

Use only R-410A refrigerant and POE 3MAF compressor oil.

Failure to follow these instructions can result in equipment damage.

⚠ WARNING**Explosion Hazard**

System contains R-410A refrigerant.

Operating pressures may exceed limits of R-22 service equipment.

Use proper refrigerant handling practices, tools and equipment.

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

This section only applies to cool-only and heat-cool units.

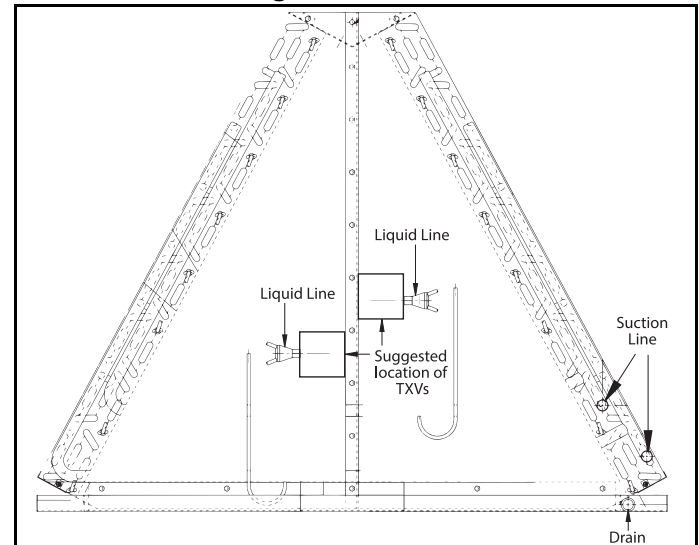
11.1 Principal of Operation

Small air turnover units include an R410A cooling coil that can be in the following configurations, depending upon the unit ordered:

1. Factory-mounted in the discharge plenum.
2. Factory-mounted in the extension section.
3. Field-mounted in the discharge plenum.
4. Field-mounted in the extension.

Coil is always mounted in section immediately above heat exchanger section.

The 20 ton, dual-circuit, A-frame coil is a self-contained unit consisting of the copper tube-aluminum fin coil itself, along with the capillary tubes and two distributors, mounted in a condensate tray. Thermal expansion valves (TXVs) can be either shipped loose by the factory (if ordered as an optional component) or are supplied in the field.

FIGURE 11: Cooling Coil**11.2 Refrigerant**

This unit utilizes R-410A, a refrigerant with a very low ozone depletion rating. Equipment utilizing R-410A refrigerant operates at higher pressures than other typical refrigerants. System components have been sized and pressure switch settings have been adjusted for the reduced refrigerant flows and higher operating pressures.

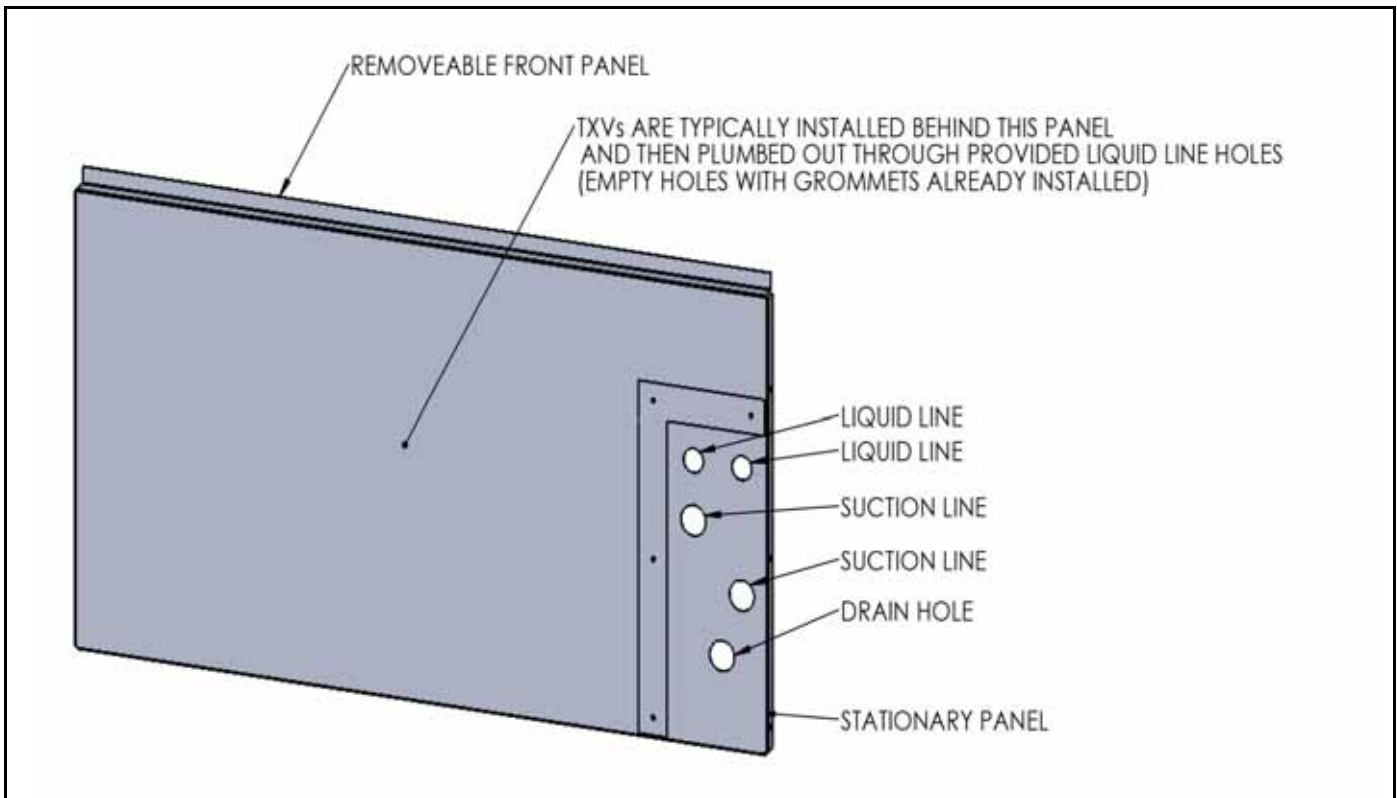
11.3 Piping of Coil to Condensing Unit

All piping between the coil and the condensing unit is to be performed in the field.

If the coil is factory-installed, the majority of the cabinet panel to the front of the coil (regardless of whether the coil is located in the discharge plenum or the extension section) is removable for access to the coil and distributors for installation of the TXVs. The bottom righthand corner of the panel is stationary and contains knock-outs for the two liquid lines, two suction lines and condensate drain. See Page 22, Figure 12.

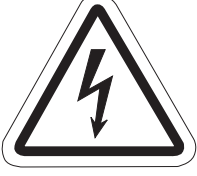
The condensate drain shall be constructed so that any water or condensate does not drain back into the drain pan. Be sure that the condensate drain is constructed in such a way that water or condensate will not fall on small air turnover unit's controls.

FIGURE 12: Cabinet Front Panel



SECTION 12: ELECTRICAL

⚠ DANGER



Electrical Shock Hazard

Disconnect electric before service.

More than one disconnect switch may be required to disconnect electric from equipment.

Equipment must be properly grounded.

Failure to follow these instructions can result in death or electrical shock.

Each small air turnover unit is equipped with a wiring diagram which will vary depending on the type of controls and options supplied.

Note: Spark testing or shorting of the control wires by any means will render the transformers inoperative.

12.1 Wiring and Electrical Connections

All electrical wiring and connections, including electrical grounding, must be copper and comply with;

United States: Refer to National Electrical Code®, NFPA 70 - latest revision. Wiring must conform to the most current National Electrical Code®, local ordinances, and any special diagrams furnished.

Canada: Refer to Canadian Electrical Code, CSA C22.1 Part 1 - latest revision.

Check rating plate on small air turnover unit for supply voltage and current requirements.

If any of the original control wire supplied with the small air turnover unit must be replaced, replace it with type THHN 221 °F (105 °C), 600 V, 16 gauge copper wire or equivalent. For all other wires, replace with the equivalent size and type of wire that was originally provided with the small air turnover unit.

12.2 Motor Current Draw

For current requirements of the motor, see rating plate located inside the control panel door.

12.3 Control Current Draw

The maximum current draw for a small air turnover unit's control is 5 A.

12.4 Safety Systems

Safety systems are required for proper performance of the small air turnover unit. The small air turnover unit shall not be permitted to operate with any safety system disabled. If a fault is found in any of the safety systems, then the system shall be repaired only by a contractor qualified in the installation and service of gas-fired heating and/or refrigerant-based cooling equipment, using only components that are sold and supplied by Roberts-Gordon LLC. See *Page 23, Table 9* for a brief description of each safety device, its location and its switching voltage.

Table 9: Safety Systems

Safety Controls	Location	Voltage
High Temperature Limit Switch	Heat Exchanger Section	120
Cabinet Airflow Switch	Control Enclosure	120
Blocked Flue Airflow Switch	Control Enclosure	120
Burner Airflow Switch	Burner Assembly	24
Low Gas Pressure Switch	Burner Assembly	24
Flame Control	Burner Assembly	24

12.4.1 High Temperature Limit Switch

If for any reason, the temperature of the air surrounding the heat exchanger reaches the limit set point of 122 °F (50.0 °C), the high temperature limit switch will open the circuit to the burner system and discontinue all burner functions. Restarting of the burner can only be accomplished after the limit has cooled down below its set point.

12.4.2 Cabinet Airflow Pressure Switch

The cabinet airflow switch monitors the airflow through the fan section, and activates the air conditioning (a/c) airflow relay once the required pressure is observed. Once the relay is activated, the cooling will be operated by the thermostat.

This airflow switch is factory set at 0.47 in wc (1.15 mbar) and cannot be field-adjusted.

12.4.3 Blocked Flue Airflow Pressure Switch

The blocked flue airflow switch monitors the airflow through the heat exchanger of the small air turnover unit; its function is to protect the heat exchanger and power burner from improper low airflow conditions (blocked flue). This only allows the burner to function as long as airflow is present through the heat exchanger of the small air turnover unit.

This airflow switch is factory-set at 0.47 in wc (1.15 mbar) and cannot be field-adjusted.

12.4.4 Burner Airflow Switch

The burner airflow switch monitors the airflow inside the burner of the small air turnover unit; its function is to verify that the burner has the proper airflow before the burner is allowed to ignite and during the burners operation. This only allows the burner to function as long as airflow is present inside the burner of the small air turnover unit.

This airflow switch is factory-set at 0.20 in wc (0.5 mbar) and cannot be field-adjusted.

12.4.5 Low Gas Pressure Switch

The low gas pressure switch is standard. The function of the low gas pressure switch is to protect against insufficient, lack of gas pressure in the system. Upon the gas pressure going below the set point, the switch opens and shuts the burner down and prevents its operation. The settings of the low gas pressure switch are field adjustable. It must be set for 5.5 in wc (13.7 mbar), which is the minimum

required gas pressure for the power burner to operate, and is listed on the data plate.

12.4.6 Flame Control

This device senses that a flame is present upon ignition and a flame sensor sends an electrical current back to the flame control module. If at any point the flame is extinguished the sensor stops sending the signal back to the module, the module then turns off the gas valve and goes into lockout. The flame control module will need to be manually reset to clear a lockout condition.

FIGURE 13: Wiring Diagram Key

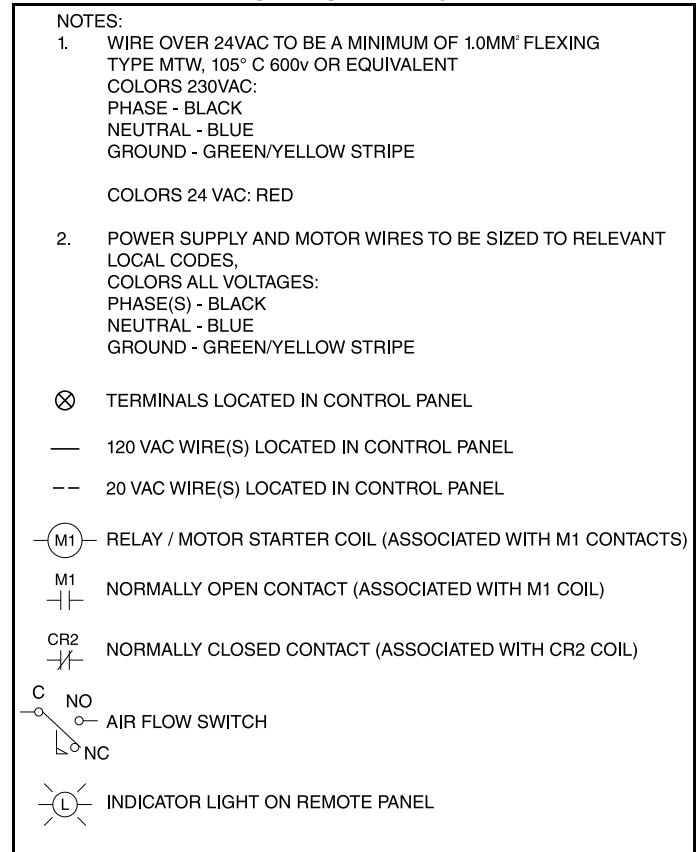
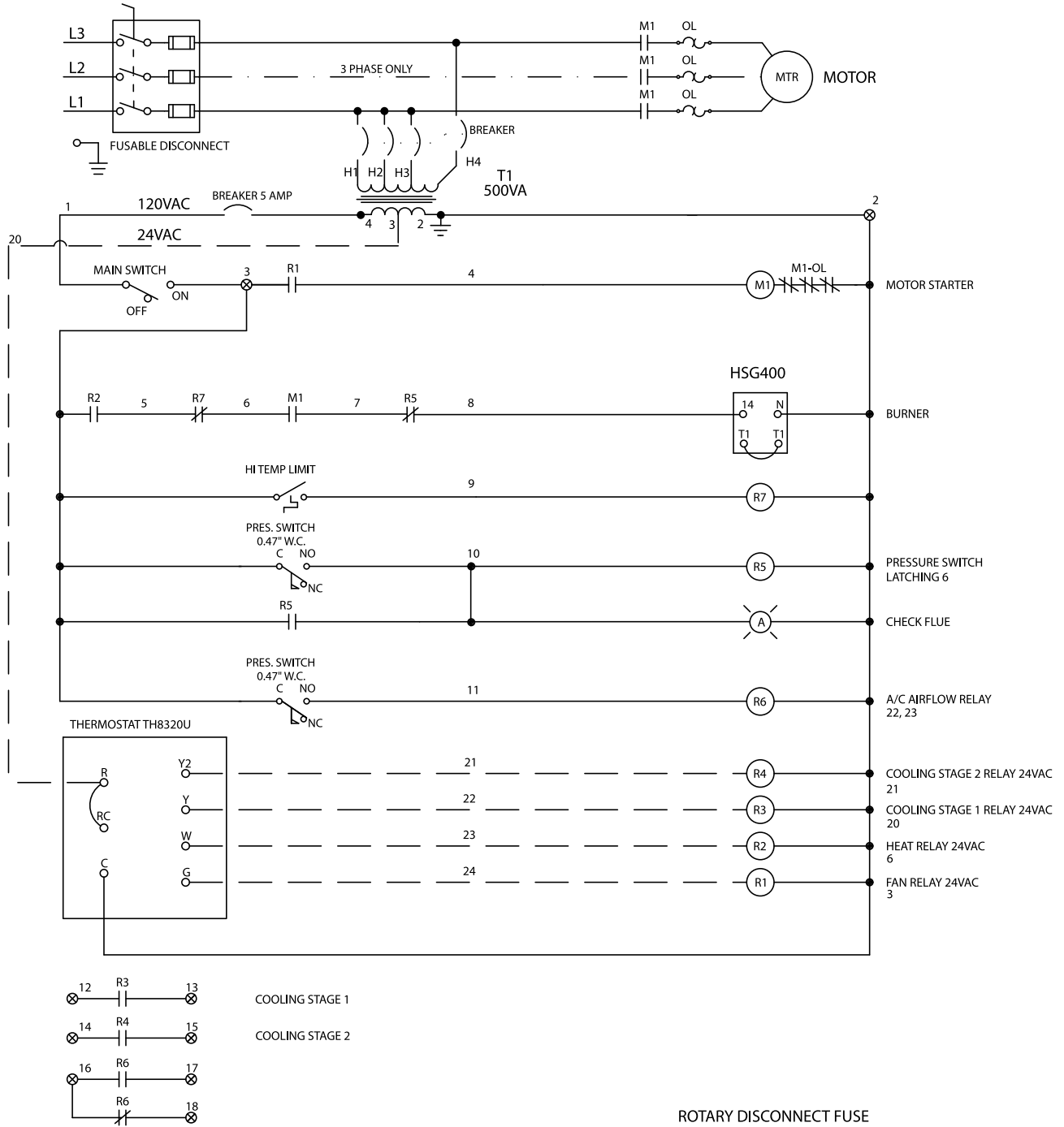


FIGURE 14: Wiring Diagram for 3HP 230/1/60 and 208-230-460/3/60 Small Air Turnover Unit



NOTES:

1. WIRE OVER 24VAC TO BE A MINIMUM OF 16 AWG FLEXING TYPE MTW, 105C, 600V OR EQUIVALENT
 COLORS 115VAC: PHASE-RED, NEUTRAL-WHITE, GROUND-GREEN
 COLORS 24VAC: BLUE
2. POWER SUPPLY AND MOTOR WIRES TO BE SIZED TO NFPA79, LATEST EDITION
 COLORS ALL VOLTAGES: PHASE(S)-BLACK, GROUND-GREEN

MAIN TERMINALS LOCATED IN CONTROL PANEL

115VAC WIRES _____
 24VAC WIRES - - - -

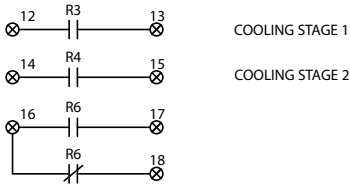
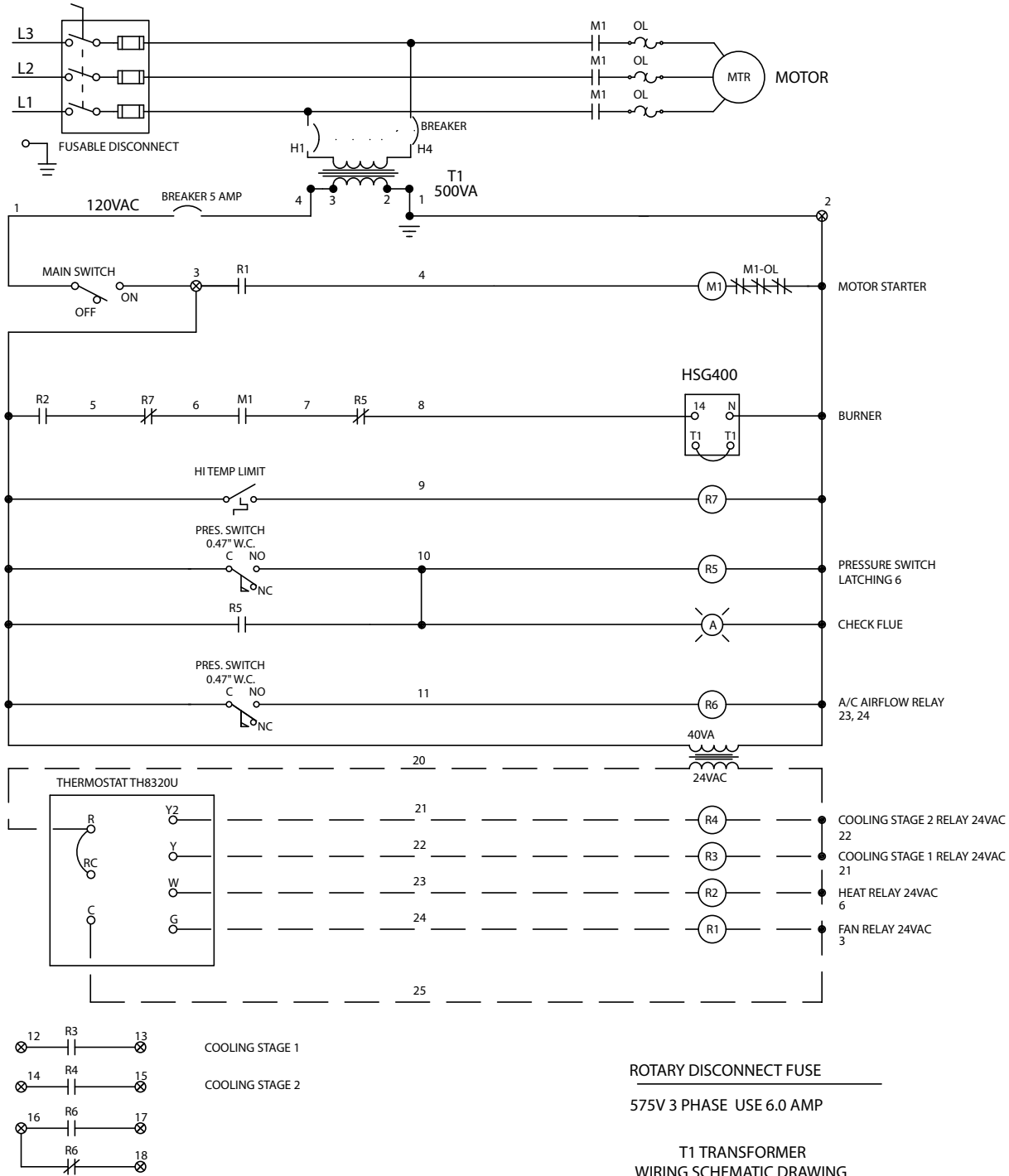
ROTARY DISCONNECT FUSE

- 460V 3 PHASE USE 8.0 AMP
- 208-230V 3 PHASE USE 17.5 AMP
- 230V 1 PHASE USE 25.0 AMP

**T1 TRANSFORMER
 PRIMARY CONNECTION**

- H1-460V USE 3.0 AMP BREAKER
- H2-230V USE 4.0 AMP BREAKER
- H3-208V USE 4.0 AMP BREAKER
- H4-COMMON

FIGURE 15: Wiring Diagram for 3HP 575/3/60 Small Air Turnover Unit



ROTARY DISCONNECT FUSE

575V 3 PHASE USE 6.0 AMP

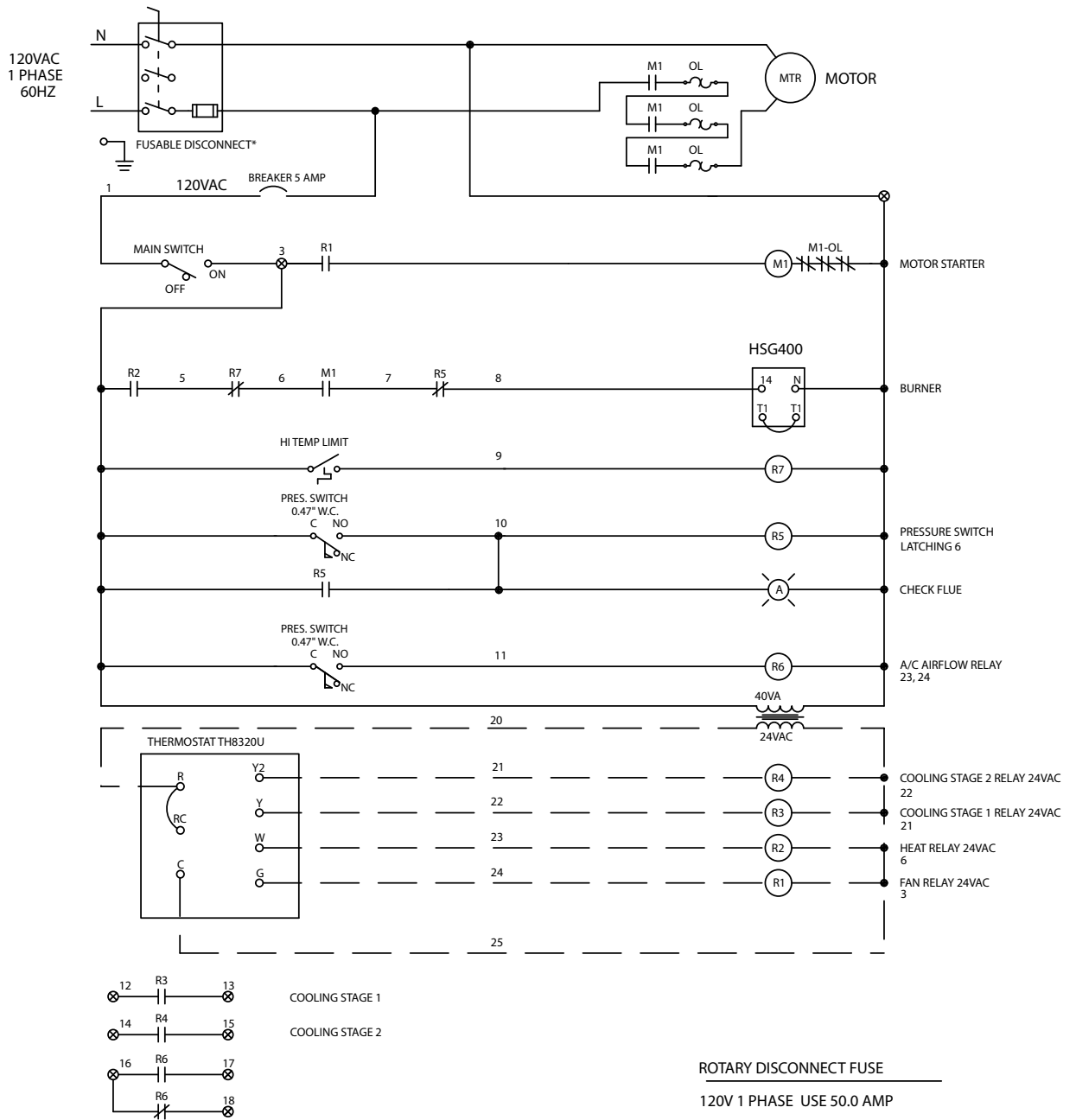
T1 TRANSFORMER
WIRING SCHEMATIC DRAWING

H1-575V USE 2.5 AMP BREAKER
H4-COMMON

NOTES:

- WIRE OVER 24VAC TO BE A MINIMUM OF 16 AWG FLEXING TYPE MTW, 105C, 600V OR EQUIVALENT
COLORS 115VAC: PHASE-RED, NEUTRAL-WHITE, GROUND-GREEN
COLORS 24VAC: BLUE
 - POWER SUPPLY AND MOTOR WIRES TO BE SIZED TO NFPA79, LATEST EDITION
COLORS ALL VOLTAGES: PHASE(S)-BLACK, GROUND-GREEN
- MAIN TERMINALS LOCATED IN CONTROL PANEL
115VAC WIRES ———
24VAC WIRES - - - -

FIGURE 16: Wiring Diagram for 3HP 120/1/60 Small Air Turnover Unit



NOTES:

- WIRE OVER 24VAC TO BE A MINIMUM OF 16 AWG FLEXING TYPE MTW, 105C, 600V OR EQUIVALENT
 COLORS 115VAC: PHASE-RED, NEUTRAL-WHITE, GROUND-GREEN
 COLORS 24VAC: BLUE
- POWER SUPPLY AND MOTOR WIRES TO BE SIZED TO NFPA79, LATEST EDITION
 COLORS ALL VOLTAGES: PHASE(S)-BLACK, GROUND-GREEN

MAIN TERMINALS LOCATED IN CONTROL PANEL
 115VAC WIRES ———
 24VAC WIRES - - - -

* LIVE WIRE HAS FUSE, NEUTRAL WIRE HAS BAR

SECTION 13: SEQUENCE OF OPERATION

DANGER

Electrical Shock Hazard
Disconnect electric before service.

More than one disconnect switch may be required to disconnect electric from equipment.

Equipment must be properly grounded.

Failure to follow these instructions can result in death or electrical shock.

13.2 User Interface Panel

WARNING
 Electric Shock Hazard
 Disconnect electric before service. More than one disconnect switch may be required to disconnect electric from equipment. Equipment must be properly grounded.

ADVERTISSEMENT
 Danger de Choque Electrique
 Déconnecter le courant avant d'intervenir. Plus qu'un seul disjoncteur peut être requis pour déconnecter le courant électrique de l'équipement. L'équipement doit être correctement relié à terre.

ADVERTENCIA
 Peligro de Choque Eléctrico
 Desconecte el electricidad antes de hacer mantenimiento. Más de un interruptor de electricidad puede ser necesario antes de desconectar este equipo. El equipo deberá conectarse a tierra correctamente.

Operating Instructions / Consignes de Fonctionnement / Instrucciones Operativas

13.1 Small Air Turnover Unit Configuration

Based on the small air turnover unit application, the small air turnover unit may be configured in any of the following styles to achieve the described functionality. These configurations are available on all small air turnover units. For a comparison of these configurations, see *Page 28, Table 10 and Page 29, Figure 17.*

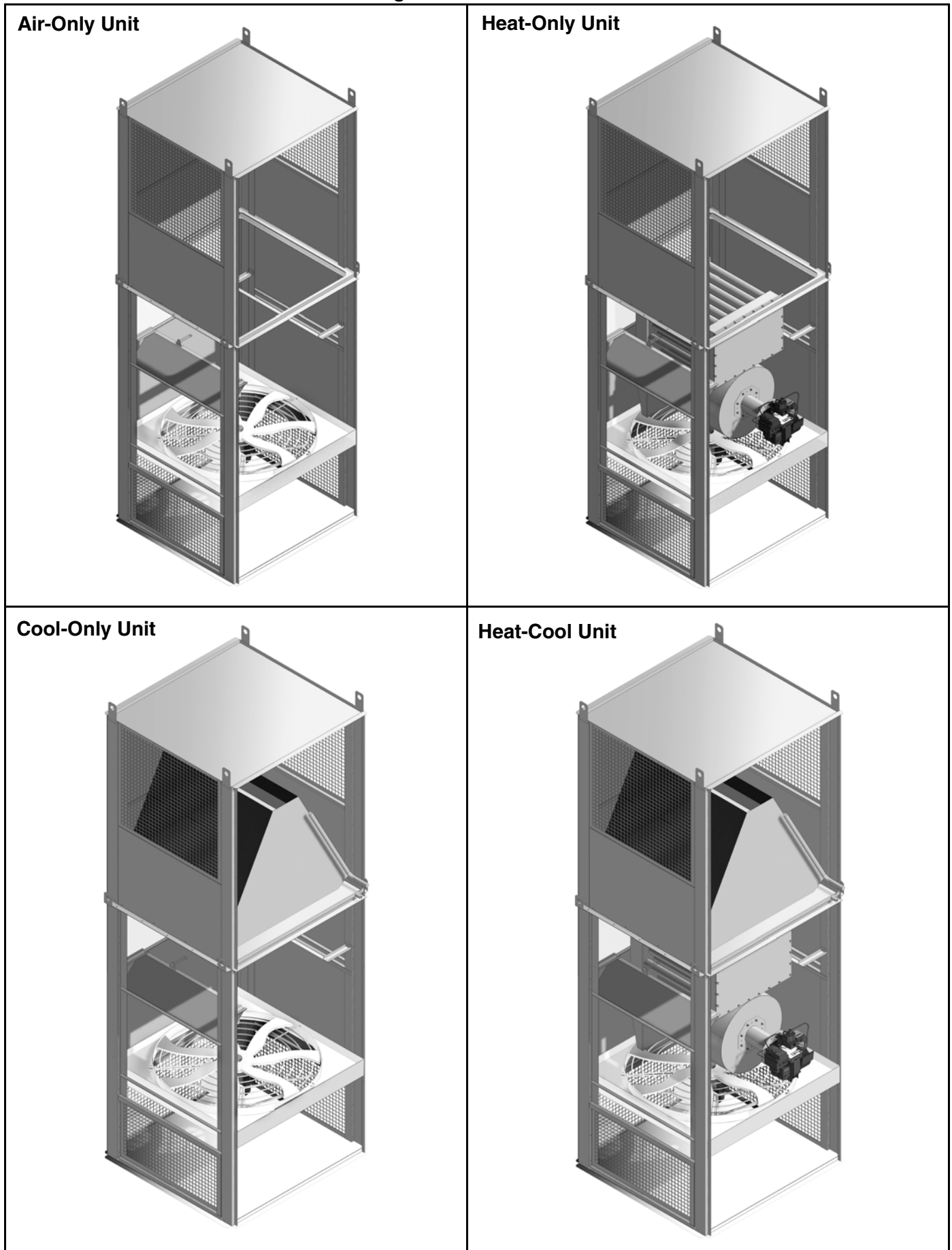
Table 10: Configuration Chart

Configuration	Air Volume	Control
Air-Only	Constant	On - Off
Heat-Only	Constant	Thermostat
Cool-Only	Constant	Thermostat
Heat-Cool	Constant	Thermostat

The user interface panel includes double-pole, single-throw (DPST) on/off switch, check flue indicator, rotary disconnect and temperature controller.

Check Flue Indicator:

Indicates that the flue of the small air turnover unit may be blocked.

FIGURE 17: Small Air Turnover Unit Configurations

13.3 Sequence of Operation

Fan Sequence:

When the rotary disconnect switch is in the "ON" position and the unit-mounted on/off switch is also in the "ON" position, step-down transformer provides 24VAC power to the room thermostat and 120VAC power to all other control wiring.

The thermostat energizes the fan relay R1. The fan will run continuously in the occupied mode and will cycle in the unoccupied mode.

Heating Operation Sequence:

With a call for heat from the thermostat, the 24VAC relay R2 will be energized. See Page 30, Table 11 for default heating setpoints on thermostat. The 120VAC from the step-down transformer will be sent out to the burner. The burner fan will start. If, at some point, the flue becomes blocked, the blocked flue airflow switch and relay inside the control cabinet will trip, shutting the burner off until the blockage is removed. The burner will turn off when the thermostat is satisfied and removes power from the R2 relay.

See Section III of the provided burner manual for a more detailed sequence of operation.

Cooling Operation Sequence:

With a call for cooling from the thermostat, the 24VAC relay R3 will be energized. See Page 30, Table 11 for default cooling setpoints on thermostat. The R3 relay contacts will close, signaling the condensing unit to start. If, at some point, the pressure inside the small air turnover unit reduces, the air conditioning (A/C) airflow switch inside the control cabinet, will drop out causing the condensing unit to turn off.

If there is a greater demand for cooling the thermostat will energize the R4 relay. This will signal the condensing unit to engage the second compressor of the condensing unit. When the demand for added cooling is reduced, the thermostat will remove power from the R4 relay turning off the second compressor.

When the thermostat reaches the set point, it will remove power from the R3 relay and shut the condensing unit off.

See provided condensing unit manual for a more detailed sequence of operation.

System Settings:

In the AUTO mode: Thermostat automatically changes between heating and cooling based on indoor temperature.

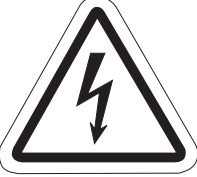

In the COOL mode: Thermostat controls two stages of cooling by energizing the cooling relays R3 & R4. The cooling relays provide dry contacts for operating remote equipment.




In the HEAT mode: Thermostat controls heating by energizing the heat enable relay R2. The heat enable will energize the burner circuit.

Table 11: Default Thermostat Setpoints

Mode	Setpoint
Heating-Occupied	70°F / 21°C
Heating-Unoccupied	62°F / 17°C
Cooling-Occupied	78°F / 25°C
Cooling-Unoccupied	82°F / 28°C

SECTION 14: START-UP PROCEDURES

⚠ DANGER	
	
<p style="text-align: center;">Electrical Shock Hazard</p> <p>Disconnect electric before service.</p> <p>More than one disconnect switch may be required to disconnect electric from equipment.</p> <p>Equipment must be properly grounded.</p>	<p style="text-align: center;">Severe Injury Hazard</p> <p>Do not enter equipment while in operation.</p> <p>Equipment may start automatically.</p> <p>Operate unit only with inlet plenum panels/doors secured.</p> <p>Installation, operation and service must be done by a trained technician only.</p>
Failure to follow these instructions can result in death, electrical shock or injury.	

⚠ WARNING		
		
<p style="text-align: center;">Explosion Hazard</p> <p>Leak test all components of equipment gas piping before operation.</p> <p>Gas can leak if piping is not installed properly.</p> <p>Do not high pressure test gas piping with equipment connected.</p>	<p style="text-align: center;">Falling Hazard</p> <p>Use proper safety equipment and practices to avoid falling.</p> <p>Do not use any part of equipment as support.</p>	<p style="text-align: center;">Burn Hazard</p> <p>Allow equipment to cool before service.</p> <p>Internal components of equipment may still be hot after operation.</p>
Failure to follow these instructions can result in death, injury or property damage.		

Installation Code and Annual Inspections:

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

Check installation site to ensure all codes and engineering specifications are correct. This section of the manual is intended to be used as an instructional guide to the commissioning of the small air turnover unit. Fill out the attached start up sheet (located at the back of the manual) as each step of the procedure is performed. This procedure should be completed by the commissioning contractor and returned to Roberts-Gordon LLC.

14.1 Mechanical

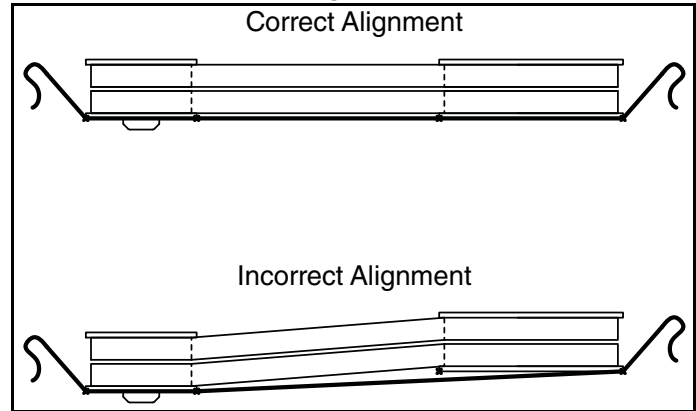
14.1.1 Sheave Alignment

Sheaves are factory aligned. On all small air turnover units, check sheave alignment as follows.

1. Attach a string to the horizontal surface next to the blower shaft bearing. (See Page 32, Figure 18)
2. Wrap the string around the blower sheave and across both sheave surfaces as shown.
3. Adjust until all four contact points (triangle) touch the sheave surfaces. "IN" or "OUT" adjustment of the motor sheave and/or motor adjustment may be required.
4. Pull the string away from the motor sheave and then move it slowly back towards the sheave, making sure the string remains straight while touching all contact points.
5. Remove string before turning small air turnover unit on.

NOTE: Allowances must be made for motor sheaves which are wider than the blower sheaves.

FIGURE 18: Sheave Alignment



14.1.2 Belt Tension

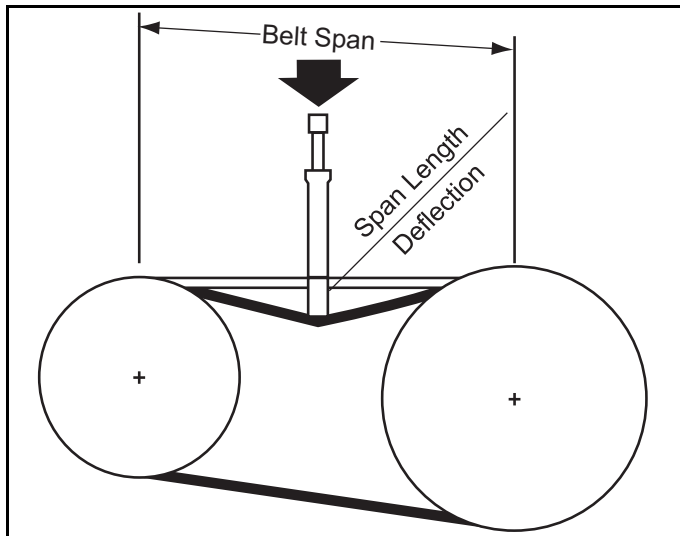
- Belt tension should be checked with a belt-tension gauge when one is available. Follow the belt tension gauge instructions. See Page 33, Figure 19.
- When a tension gauge is not available, measure the belt span of the belts.
- Allow for ¼" (0.6 cm) of deflection for each foot of center distance length for the charted pounds of force. Check the table below for proper deflection force.

Table 12: Deflection Force A Belts (in lbs)

Belt Cross-Section	Motor Sheave Dimension in (cm)	Min. in-lbs (N-m)	Max in-lbs (N-m)
A	2.8 - 3.8 (7.1 - 9.6)	2.25 (0.254)	3.375 (0.381)

Table 13: Axial Fan RPM Settings

Configuration	RPM	Turns Open From Closed
Air-Only	657	3
Heat-Only	657	3
Cool-Only	717	1.5
Heat-Cool	717	1.5

FIGURE 19: Belt Tension

NOTE: If drive belts squeal during start-up, increase belt tension to the highest allowed value. Re-check tension during each inspection.

14.2 Electrical

1. Check motor starter for proper overload settings. The overload setting should equal the full load amps (FLA) of motor.
2. Measure the supply voltage with the small air turnover unit off and then on. For a system that is powered with three phase power, measure the voltage of each phase.
3. Verify correct blower rotation.
4. While the blower is running and the burner is off, measure the total system current draw with an ammeter. Measure the system current draw again after the burner adjustments are made and with the burner and blower both on.

14.3 Airflow

The airflow switches are safety devices for burner airflow that are factory-calibrated. If an airflow switch does not close, the problem may not be the airflow switch. It could be an indication of an airflow problem (incorrect blower rotation, etc.)

14.4 Fan Start-Up

Check rotation of main supply motor by momentarily making contact of the motor contractor/starter. Proper rotation is imprinted on the small air turnover unit for the supply fan.

Place main disconnect switch in the on position and the main switch in the on position.

With the main supply fan motor running take and

record its amp draw, return the selector to the off position.

14.5 General Start-up Procedures for Heating

A qualified burner technician should be employed to provide the initial burner start up. Before beginning start up, the technician should study and become familiar with the exact sequence of operation and all other details of the specific flame safeguard control system being used. Because of the various flame safeguard controls being utilized, a separate manufacturer's bulletin is supplied with the small air turnover unit.

Complete and/or review all precautions and inspection procedures in previous sections and burner manufacturers' literature.

Close main and manual burner shut-off valves.

Tighten all screws on terminal blocks in control cabinet in case some may have loosened during transit.

Check flue to ensure it is open and unobstructed.

Check operating controls, limit controls, flame safeguard control reset and low gas pressure switch. All contacts should be closed (except the low gas pressure switch).

14.6 Burner Start-Up

The standard burners are manufactured by Wayne Combustion Systems. The following start up information pertains to these burners. If a different manufacturer's burner is utilized, refer to the separate manufacturer's literature included with the documentation shipped with the small air turnover unit.

To help prevent unburned fuel in the heat exchanger, do not repeatedly cycle the burner. Specific instructions relative to component sequencing are provided in the flame safeguard manufacturer's bulletin which is included with the documentation shipped with the burner.

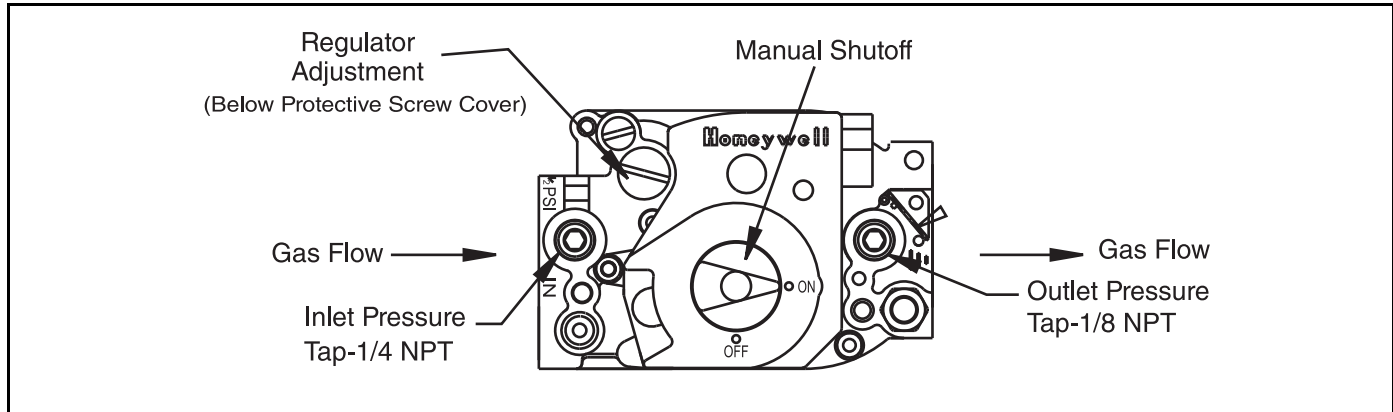
Proper test equipment must be used in order to achieve maximum system operational reliability and fuel efficiencies.

All fuel/air adjustments should be made to achieve required input rate, satisfactory combustion test values, flame stability and appearance.

14.7 Gas Pressure Adjustments

Firing adjustments, for all gas types, are accomplished by adjusting the main gas regulator located on the inlet side of the Honeywell gas valve. Refer to the equipment's serial tag for proper burner manifold pressure. See Page 34, Figure 20.

FIGURE 20: Gas Valve

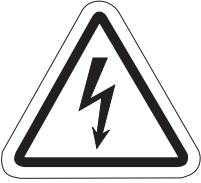






14.8 Start-Up Procedures for Heating

1. Open the manual gas valve, to allow the low gas pressure switch to make its circuit. Press the manual reset button on the low gas pressure switch.
2. Turn the black knob on the Honeywell gas valve to the "ON" position (1/4 turn counter-clockwise).
3. When the main automatic gas valve begins to open, the main flame should light immediately. If not, it may be necessary to eliminate air from the main gas line and/or adjust main gas pressure to attain a stable flame signal value. Adjust the burner as necessary to provide smooth ignition of the main flame.
4. Adjust the main gas valve to achieve the proper main flame gas input. Set and lock the primary air setting dampers to provide 8.5 to 10% carbon dioxide (CO₂) and 0% carbon monoxide (CO). The "off cycle air damper" must be set at 2. Make certain the burner operates reliably at the final fuel/air settings.

NOTE: When firing natural gas and propane, it is possible to attain CO₂ readings that appear to be acceptable (i.e., 8%, 9%, 10%, etc.) while actually producing an unsafe condition. At such CO₂ readings, a deficiency of air will create the formation of CO (Carbon Monoxide) in the flue gases. Therefore, when firing gas, test for CO to make certain that the burner is adjusted so that it has an excess, rather than a deficiency, of air, CO is a dangerous product of incomplete combustion and is associated with combustion inefficiency and increased fuel cost. 0% CO (Carbon Monoxide) may not be achievable. Readings between 0 and 100 PPM are desirable with the maximum level determined by local codes.

SECTION 15: MAINTENANCE

⚠ DANGER	
	
Electrical Shock Hazard Disconnect electric before service. More than one disconnect switch may be required to disconnect electric from equipment. Equipment must be properly grounded.	Severe Injury Hazard Do not enter equipment while in operation. Equipment may start automatically. Operate unit only with inlet plenum panels/doors secured. Installation, operation and service must be done by a trained technician only.
Failure to follow these instructions can result in death, electrical shock or injury.	

⚠ WARNING		
		
Explosion Hazard Leak test all components of equipment gas piping before operation. Gas can leak if piping is not installed properly. Do not high pressure test gas piping with equipment connected.	Falling Hazard Use proper safety equipment and practices to avoid falling. Do not use any part of equipment as support.	Burn Hazard Allow equipment to cool before service. Internal components of equipment may still be hot after operation.
Failure to follow these instructions can result in death, injury or property damage.		

Prior to any maintenance or service to the small air turnover unit, shut off, lockout and tagout the electrical disconnect and fuel valve that supplies the unit in accordance with OSHA regulations and allow ample time for the small air turnover unit to cool. After maintenance is performed or unit is serviced, the unit shall be re-commissioned to the start-up procedure as outlined on *Page 31, Section 14*.

Installation Code and Annual Inspections:

All installation and service of ROBERTS GORDON® equipment must be performed by a contractor qualified in the installation and service of equipment sold and supplied by Roberts-Gordon LLC and conform to all requirements set forth in the ROBERTS GORDON® manuals and all applicable governmental authorities pertaining to the installation, service, operation and labeling of the equipment.

To help facilitate optimum performance and safety, Roberts-Gordon LLC recommends that a qualified contractor conduct, at a minimum, annual inspections of your ROBERTS GORDON® equipment and perform service where necessary, using only replacement parts sold and supplied by Roberts-Gordon LLC.

15.1 General

First 8 Hours of Operation	Check belts and adjust as required (<i>See Page 32, Section 14.1.2</i>). Though belts were properly adjusted at the factory, they will stretch after the first few hours of operation.
First 100 Hours of Operation	Re-check belt tension and adjust if necessary.
Annual Fall Start-Up	Follow the entire start-up procedure at this time and check control settings and operation.

15.2 Unit Exterior

Cabinet Exterior	After installation, touch up scratches. Periodic painting should be done thereafter as required.
Unit Location	Verify that no flammable objects, liquids or vapors are present near the small air turnover unit. Do not hang anything from or place anything on the small air turnover unit. Keep the area under and around the small air turnover unit free of all objects.

15.3 Fan Section

Fan Wheel	Inspect fan blades and clean as necessary. A small build up of dust can cause a significant decrease in blower performance. Check for excessive vibration, repair as required.
Drive Belts and Sheaves	Check for belt ride in the groove. In multiple groove drives, belt ride should be uniform. Check groove wear area for wear. Side wall of groove should be straight, not dished out. Bottom of groove should show no signs of belt contact. Sheave alignment, set screw torque and belt tension should be checked after 8, 24, and 100 hours of initial start-up. Visually inspect belts and sheaves for excessive wear. If belts have a slick, glazed look, the belts are slipping. Check drive capacity and belt tension. Never replace only one belt in a used set, as used belts will elongate. Replace the entire set if replacement is necessary.

Fan Bearing Lubrication

1. The fan bearings should be re-lubricated as per chart below. The recommended lubricant is Shell Alvania #2 or S3 grease. To re-lubricate the fan pillow block/flange bearings, be sure that the grease fittings on the bearing housing are clean. Apply the recommended grease to the fitting with a low-pressure grease gun and add slowly while the shaft is spun by hand. Do not over-grease. Over-greasing will reduce the service life of the bearings.

Table 14: Fan Bearing Lubrication Intervals

Lubrication Use a No. 2 lithium complex base or equivalent			
Hours Run per Day	Suggested Lubrication Period in Weeks		
	251 to 500 RPMP	501 to 750 RPM	751 to 1000 RPM
8	12	10	7
16	7	5	4
24	5	3	2

Motors**Inspection:**

1. Inspect motor every 3 months or 500 hours of operation, whichever occurs first. Keep the motor clean and vent openings clear.

Lubrication:

1. Motors with grease fittings must be lubricated based on the table below.

Table 15: Motor Lubrication Intervals

NEMA Frame Size (Motor HP)	Rated at 1800 RPM (Hrs)
Up to 210 (5)	6,000

Note: These intervals are based on severe duty. Over lubricating bearings/bushings could result in reduced motor life.

2. A high grade ball or roller bearing grease must be used. Recommended grease for standard service is Mobile Polyrex™ EM. Other compatible greases include ChevronTexaco Polystar®, ChevronTexaco Rykon® Premium 2, Pennzoil® Pen 2 and ChevronTexaco SRI.
3. Motors without grease fittings are sealed for life and do not require re-lubrication.

Instructions for Lubricating

Before greasing, be sure fittings are clean and free from dirt. Remove grease relief plug or plate and, using a low-pressure grease gun, pump in the required grease. Do not over-grease. Relubrication intervals are specified in the table above. After relubricating, allow motor to run for 10 minutes before replacing relief hardware.

NOTE: In general it is not recommended to mix greases of different brands. The mixing of different types of thickeners may destroy the composition and physical properties of the grease. In the event that a different grease is required by the end user, the following steps can be taken. Using the instructions for lubrication, open grease outlet and purge the system as much as possible of the old or unwanted grease. Repeat this same operation after 1 week of service. Consult Roberts-Gordon LLC or the motor manufacturer for further recommendations on grease compatibility.

15.4 Manifold and Controls

Manifold	Periodically check fuel control assembly and external piping for leaks.
Airflow Switch	An annual check of the tubes attached to the airflow switches should be made to ensure against blockage caused by insects or any other substance. Clean as required.
Electric Components	Check to see there is no physical damage on any of the electric components and verify all electrical connections are secure. Ensure equipment is properly grounded.

15.5 Burner

An annual inspection of the burner and components must be made to insure proper and safe operation. Periodically clean the burner. Refer to the burner manufacturer's literature for guidance.

15.6 Filters

Filters should be checked for dirt restriction on a monthly basis (or as required). Replace filters with filters of equal specification when they appear dirty.

15.7 Motor and Drive Components

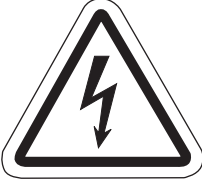



Gain access to the fan and motor by removing the filters and filter panels. First, release tension on the belts by adjusting the motor base closer to the fan pulley. Remove the belts.

To remove the motor pulley, first loosen the adjustment set screws and count the number of turns to fully close the pulley (this number will be required to re-install the pulleys to the previous adjustment). Open the adjustable sheaves to gain access to the shaft set screws. Loosen the set screw(s) that hold it to the motor shaft and pull away from the motor.

To remove the fan pulley, remove the bolts from the bushing and insert into the previously unused threaded holes of the bushing. Carefully press the fan pulley off the bushing, tightening the bolts evenly. Loosen the Allen Head set-screw (located on top of the keyway) and slide the pulley bushing off the shaft.

To remove the motor, first remove any guards and/or covers around motor and then remove motor pulley as described above. Disconnect the motor power wiring and conduit at the junction box in the side of the motor. Support the motor so that it will be secure when disconnected from the adjustable base. Remove the bolts that hold the motor to the adjustable base. The motor may now be removed.

SECTION 16: REPLACEMENT PARTS



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


Replacement parts list is general and MAY NOT BE APPLICABLE FOR your specific unit configuration. Before ordering replacement parts, please contact factory to make sure that the replacement parts are the direct replacement for your specific unit.

Table 16: Replacement Parts

Description	Part No.	Usage				
		120/1/60	230/1/60	208-230/3/60	460/3/60	575/3/60
Amber Light- 120V	18663	X	X	X	X	X
Axial Fan Assembly	90740021			X	X	
Axial Fan Assembly	90740022		X			
Axial Fan Assembly	90740023	X				
Axial Fan Assembly	90740024					X
Burner Assembly	90740080	X	X	X	X	X
Belt A47	13536	X	X	X	X	X
Circuit Breaker - 1 Pole, 120VAC, 5.0A	91300492	X	X	X	X	X
Circuit Breaker - 2 Pole, 208VAC, 4.0	91300500		X	X		
Circuit Breaker - 2 Pole, 480VAC, 3.0 A	91300510				X	
Circuit Breaker - 2 Pole, 600VAC, 2.5 A	91300535					X
Disconnect Fuse - 600V	91340060					X
Disconnect Fuse - 600V	91340080				X	
Disconnect Fuse - 600V	91340175			X		
Disconnect Fuse - 600V	91340250		X			
Disconnect Fuse - 600V	91340500	X				
DPDT Relay - 120VAC	90447110	X	X	X	X	X
DPDT Relay - 24VAC	90447120	X	X	X	X	X
DPDT Relay Socket	90447200	X	X	X	X	X
Heat Exchanger Assembly	14002000	X	X	X	X	X
Motor Control - 208 to 600V, 17A	90600200			X	X	X
Motor Control - 208 to 600V, 54A	90600210	X	X			
On/Off DPST Rocker Switch	22039	X	X	X	X	X
Overload - 3.5 to 5A	90445997					X
Overload - 4.5 to 6.5A	90446000				X	
Overload - 7.5 to 11A	90446010			X		
Overload - 13 to 19A	90446020		X			
Overload - 29.0 to 42A	90446035	X				
Pressure Switch - 0.47" White	90439804	X	X	X	X	X
Pressure Switch Snap Ring	90439850	X	X	X	X	X
Rotary Disconnect - 600V, 30A	91339900			X	X	X
Rotary Disconnect - 600V, 60A	91339905	X	X			
Transformer - 40VA, 120/208/230, 24 V	90407100	X				X
Transformer - 500VA, 500/575/600, 24V	90407204					X
Transformer - 500VA, 208/230/460, 24V	90407216		X	X	X	
Thermostat - 2 Heat/2 Cool	90425110	X	X	X	X	X
Sheave 2VP42 1-1/8	13538	X	X	X	X	X
Sheave 2AK84 1-3/16	13537	X	X	X	X	X

SECTION 17: TROUBLESHOOTING

⚠ DANGER	
	
<p style="text-align: center;">Electrical Shock Hazard</p> <p>Disconnect electric before service.</p> <p>More than one disconnect switch may be required to disconnect electric from equipment.</p> <p>Equipment must be properly grounded.</p>	<p style="text-align: center;">Severe Injury Hazard</p> <p>Do not enter equipment while in operation.</p> <p>Equipment may start automatically.</p> <p>Operate unit only with inlet plenum panels/doors secured.</p> <p>Installation, operation and service must be done by a trained technician only.</p>
<p>Failure to follow these instructions can result in death, electrical shock or injury.</p>	

⚠ WARNING				
				
<p style="text-align: center;">Explosion Hazard</p> <p>Turn off gas supply to equipment before service.</p>	<p style="text-align: center;">Fire Hazard</p> <p>Keep all flammable objects, liquids and vapors the minimum required clearances to combustibles away from equipment.</p> <p>Some objects will catch fire or explode when placed close to equipment.</p>	<p style="text-align: center;">Falling Hazard</p> <p>Use proper safety equipment and practices to avoid falling.</p> <p>Do not use any part of equipment as support.</p>	<p style="text-align: center;">Burn Hazard</p> <p>Allow equipment to cool before service.</p> <p>Internal components of equipment may still be hot after operation.</p>	<p style="text-align: center;">Cut/Pinch Hazard</p> <p>Wear protective gear during installation, operation and service.</p> <p>Edges are sharp.</p>
<p>Failure to follow these instructions can result in death, injury or property damage.</p>				

17.1 Initial Checks

When encountering any abnormal operation or fault conditions of the equipment, all troubleshooting should start with the following initial checks. If a problem is discovered in these initial checks, it must be corrected before moving on in the troubleshooting.

1. Compare voltage and phase of supply power on site with rating plate information.
2. Review wiring, do the electrical connections match the supplied wiring diagram?
3. Compare gas type and supply pressure on site with rating plate information.
4. Check for proper fan rotation.
 - Blowers powered with a three phase motor can be reversed by swapping any two incoming power legs. For fans powered by a single phase motor, refer to the motor rating plate for reversing instructions.

17.2 Supply Fan

PROBLEM	POSSIBLE CAUSE	SOLUTION
Fan motor does not run	Motor thermal over-loads tripped.	For tripped condition-reset.
	Fuses blown or missing.	Replace.
	External power source lacking.	Have incoming power lines checked.
	Motor inoperative.	Repair or replace.
Fan motor runs, but fans do not supply enough air	Belts broken or loose.	Readjust or replace.
	Intake filters dirty.	Replace or clean.
	Obstruction in intake.	Check filters.
	Fan blades loose on shaft.	Reposition and tighten.
Excessive fan noise	Fan bearing	Lubricate or replace.
	Fan sheave loose on shaft.	Tighten.
	Belts not adjusted.	Readjust.
	Fan blades loose on shaft.	Reposition and retighten.
	Fan blades rubbing.	Loosen setscrews. Reposition hub and tighten.
	Fan blades dirty.	Clean.
	Foreign article in fan.	Remove.

17.3 Burner




PROBLEM	POSSIBLE CAUSE	SOLUTION
Burner Fails to Start	Defective On/Off switch.	Replace.
	Control circuit has an open control contact.	Check limits, proof of closure switch and others as applicable.
	Bad fuse or switch open on in-coming power source.	Correct as required.
	Motor overloads tripped.	Reset and correct cause for trip out.
	Flame safeguard control safety switch tripped out.	Reset and determine cause for apparent flame failure.
	Loose connections or faulty wiring.	Tighten all terminal screws and consult wiring diagram furnished with the small air turnover unit.
	Flame safeguard control starting circuit blocked due to flame relay being energized.	Possible defective flame rod - replace. Possible defective amplifier -replace. Defective flame safeguard control - replace.
	Defective fan motor.	Repair or replace.
Occasional Lockouts for No Apparent Reason	Check for proper settings on direct spark ignition electrodes.	Make certain that gap is not too wide.
	Direct spark ignition.	Verify that there are no cracks in the porcelain and that transformer end and electrode end plug in connections are tight.
	Loose or broken wires.	Check all wire nut connections and tighten all terminal screw connections in panel and elsewhere as appropriate.
	Airflow switch tripped.	Check for blocked flue.
Occasional Lockouts for No Apparent Reason	Occasional low voltage supply.	Have local utility correct.
	Occasional low gas supply pressure.	Have local utility correct. Reset low gas pressure switch

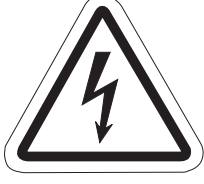

17.4 Gas Operation

PROBLEM	POSSIBLE CAUSE	SOLUTION
Burner Motor Runs, but Does Not Light	Gas supply to burner shut off.	Make sure all manual gas supply valves are open.
	Gas pressure too high or too low at orifice.	Refer to gas adjustments for correct settings. Readjust as required.
	Defective ignition transformer.	Replace.
	Incorrect ignition electrode settings.	Refer to gas pilot adjustments for correct settings.
	Defective flame safeguard control.	Replace as required.
	Airflow switch not making circuit.	Check out electrically and correct pressure adjustment on switch If required. Check for blocked flue.
	Defective airflow switch.	Replace.
	Air switch negative pressure sensing tube out of position.	Reposition as necessary.
	Defective main gas shut off valves.	Check electrical circuitry to valves. Replace valves or correct circuitry as required.
	Main gas pressure regulator atmospheric vent line obstructed.	Correct.
	Defective main gas pressure regulator	Replace.
	Misadjusted main gas pressure regulator	Readjust to meet required operational values.
Carbon Monoxide Readings on Gas Firing	Flame impingement on cold start-up of heat exchanger caused by excessive firing rate.	Reduce firing rate to correct input volume.
	Incorrect gas/air ratios.	Readjust burner to correct CO ₂ /O ₂ levels, reducing CO formation to appropriate level.
Gas High Fire Input Cannot Be Achieved	Gas company pressure regulator or meter operating incorrectly, not allowing required gas pressure at gas train inlet.	Have gas company correct.
	Manual gas valve upstream of gas train inlet not fully open.	Check and correct.
	Gas line obstructed.	Check and correct.
	Gas train main gas valve not turned on.	Check and correct.
	Automatic gas valve not opening fully due to defective operation.	Replace gas valve.
	Defective main gas pressure regulator.	Replace.
	Main gas pressure regulator vent line obstructed.	Check and correct.
	Normally open vent valve (if supplied) not closing when automatic gas valves open.	Check to see if valve is fully closed when automatic valves are open. Replace vent valve, if not closing fully.

Additional trouble shooting information can be found in the burner manual supplied with the small air turnover unit.

SECTION 18: START-UP PROCEDURES

⚠ WARNING		
		
<p style="text-align: center;">Explosion Hazard</p> <p>Leak test all components of equipment gas piping before operation.</p> <p>Gas can leak if piping is not installed properly.</p> <p>Do not high pressure test gas piping with equipment connected.</p>	<p style="text-align: center;">Falling Hazard</p> <p>Use proper safety equipment and practices to avoid falling.</p> <p>Do not use any part of equipment as support.</p>	<p style="text-align: center;">Burn Hazard</p> <p>Allow equipment to cool before service.</p> <p>Internal components of equipment may still be hot after operation.</p>
<p>Failure to follow these instructions can result in death, injury or property damage.</p>		

⚠ DANGER	
	
<p style="text-align: center;">Electrical Shock Hazard</p> <p>Disconnect electric before service.</p> <p>More than one disconnect switch may be required to disconnect electric from equipment.</p> <p>Equipment must be properly grounded.</p>	<p style="text-align: center;">Severe Injury Hazard</p> <p>Do not enter equipment while in operation.</p> <p>Equipment may start automatically.</p> <p>Operate unit only with inlet plenum panels/doors secured.</p> <p>Installation, operation and service must be done by a trained technician only.</p>
<p>Failure to follow these instructions can result in death, electrical shock or injury.</p>	

Model Serial No. Electrical Drawing No.

Installation Name

Start Up Contractor's Name

Name of Technician Doing Start Up

Contractor's Phone No. Invoice No.

Unit Type Heat Heat/Cool Cool Ventilation

Configurations - All

Check Thermostat operation and programming.

Check incoming power supply (line voltage) before turning on unit disconnect
(Note: for 3 phase, voltage should be measured from line to line,
Leg 1-2 Leg 1-3 Phase / 60 Hz
Leg 2-3

Record nameplate voltage from serial tag
Voltage Phase / 60 Hz

Record full load amps (F.L.A.) for the voltage matching the service voltage on all motors and set overloads
Set overloads at nameplate
Motor F.L.A. Overloads set at Amps

Check the belt tension on fan. Adjust as necessary
NOTE: Belt should not move more than 1/2 inch (1.3cm)

Place disconnect in "ON" position and test for 120V on transformer secondary to ground before turning the selector switch to "ON". Set the thermostat to Fan "ON".

Check for the correct rotation of fan. (Reverse if necessary.)

Measure and record voltage and amp draw
Voltage Leg 1 Leg 2 Leg 3
Amps Leg 1 Leg 2 Leg 3

Measure and record RPM of fan

Note ambient temperature ° F / ° C

Return Thermostat to Fan "AUTO".

Configurations - Heat

Type of Gas Natural Propane Orifice

Burner Manufacturer Burner Model

Burner Serial No.

After bleeding, connect pressure gauge to the gas line where the plug was removed and measure incoming gas pressure. NOTE: If pressure is more than 14 in wc (1/2 psi), a pressure regulator is required.

Make sure the gas valve is "ON" and all manual ball valves. Reset the low gas pressure switch

Adjust the manifold pressure to to match the serial tag.

Incoming Gas Pressure in wc with Burner in the off position

Incoming Gas Pressure in wc with Burner in the on position

Manifold Gas Pressure in wc with Burner running

Stack Temperature

Input Rate BTU/HR

CO2 CO Combustion Efficiency

Low Gas Pressure Switch Setting in wc Must be set to 5.5 in wc.

Blocked Flue Pressure Switch Operation

Low Gas Pressure Switch Operation

Configurations - Cooling

Condensing unit

Refrigerant Single Circuit Dual Circuit

Charge

Measure and record voltage and amp draw - Compressor 1

Voltage Leg 1	<input type="text"/>	Leg 2	<input type="text"/>	Leg 3	<input type="text"/>
Amps Leg 1	<input type="text"/>	Leg 2	<input type="text"/>	Leg 3	<input type="text"/>

Measure and record voltage and amp draw - Compressor 2

Voltage Leg 1	<input type="text"/>	Leg 2	<input type="text"/>	Leg 3	<input type="text"/>
Amps Leg 1	<input type="text"/>	Leg 2	<input type="text"/>	Leg 3	<input type="text"/>

Check incoming power supply (line voltage) before turning on unit disconnect
(Note: for 3 phase, voltage should be measured from line to line)

Leg 1-2	<input type="text"/>	Leg 1-3	<input type="text"/>	Phase	<input type="text"/>	/ 60 Hz
				Leg 2-3	<input type="text"/>	

Record nameplate voltage from serial tag

Voltage	<input type="text"/>	Phase	<input type="text"/>	/ 60 Hz
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Record full load amps (F.L.A.) for the voltage matching the service voltage on all motors and set overloads
Set overloads at nameplate

Motor(s)	<input type="text"/>	F.L.A.	Overloads set at	<input type="text"/>	Amps
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Personal Training Review

The following items should be completed during the final walk through with the customer.

It is important that everyone concerned with the operation and maintenance of the equipment be trained in the safety procedures contained in the operation.

Operation of the thermostat? (Heat - if equipped, Cool - if equipped, Occupied, Unoccupied operation
If no, explain

Location and operation of safety disconnect switch? (use lockout/tag out procedures
If no, explain

Proper maintenance and replacement of filters?
If no, explain

Location and operation of safety devices and location of reset buttons?
If no, explain

SECTION 19: THE ROBERTS GORDON® SAT-SERIES WARRANTY

ROBERTS-GORDON LLC WILL PAY FOR:

Within 24 months from date of purchase by buyer or 27 months from date of shipment by Roberts-Gordon LLC (whichever occurs first), replacement parts will be provided free of charge for any part of the product which fails due to a manufacturing or material defect.

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

ROBERTS GORDON® Replacement Parts are warranted for the later of 12 months from date of shipment from Roberts-Gordon LLC or the remaining ROBERTS GORDON® ROBERTS GORDON® SAT-Series warranty.

ROBERTS-GORDON LLC WILL NOT PAY FOR:

Service trips, service calls and labor charges.

Shipment of replacement parts.

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

Damage due to:

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

WARRANTY IS VOID IF:

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

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

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

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

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

READ YOUR INSTALLATION, OPERATION AND SERVICE MANUAL.

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

Roberts-Gordon LLC

1250 William Street

P.O. Box 44

Buffalo, New York 14240-0044

Telephone: +1.716.852.4400

Fax: +1.716.852.0854

Toll Free: 800.828.7450

www.robertsgordon.com

www.rg-inc.com

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

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

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

LIMITATIONS ON AUTHORITY OF REPRESENTATIVES:

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