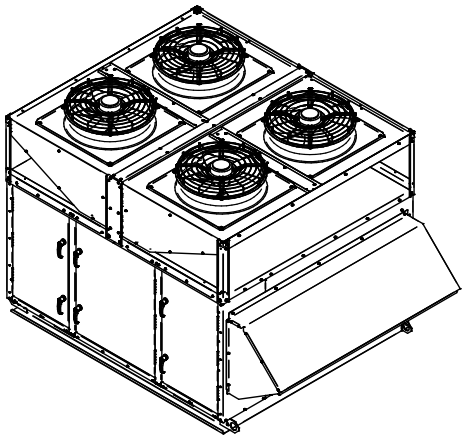

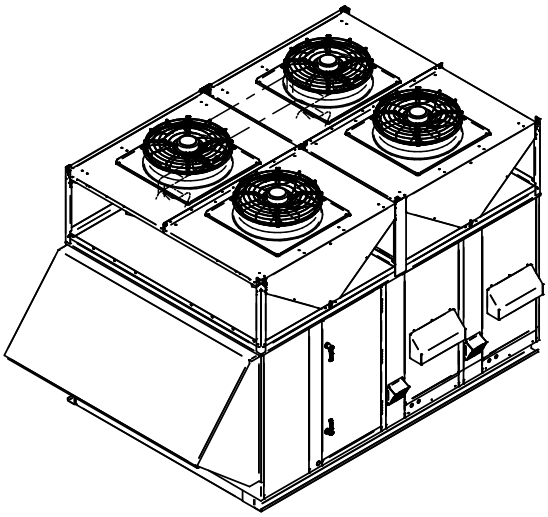

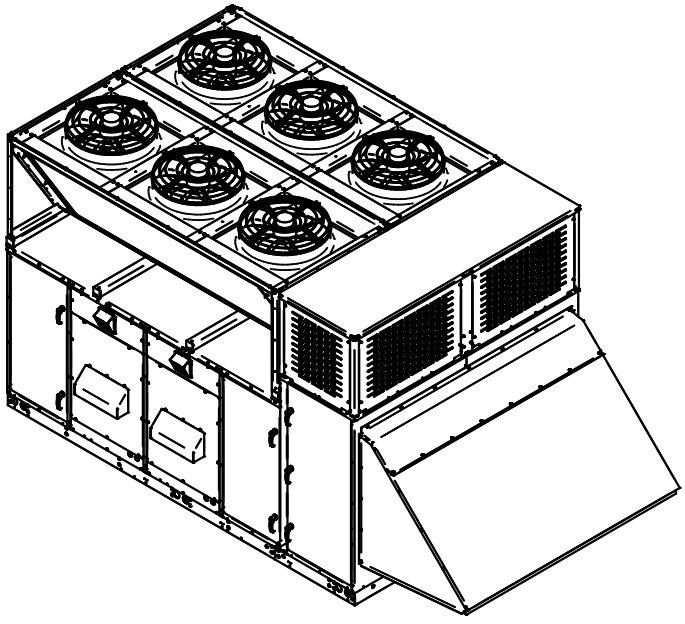

NEXGEN

DEDICATED OUTDOOR AIR SYSTEMS

NR SERIES

Packaged Compact Rooftop DOAS Unit

Installation, Operation, & Maintenance Manual

NR*K120
NR*K180
NR*K240
NR*K299
NR*K360
NR*K480
NR*K541
NR*K660
NR*K840
NR*K09T
NR*K150
NR*K210
NR*K241
NR*K300
NR*K420
NR*K540
NR*K640
NR*K720
NR*K960

⚠ NOTICE

Installer:
Please take the time to read and understand the instructions contained inside this manual prior to any installation. The installer must give a copy of this manual to the unit owner.

Owner:
Keep this manual in a safe place in order to provide service technicians with necessary unit information.

NOT FOR RESIDENTIAL USE

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Table of Contents:

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Section 1:
Safety Introduction and Labeling Guide:

Your Safety is Important to Us!

Please follow and understand the rules and the instructions contained herein carefully. Failure to do so could cause a malfunction of the HVAC equipment, resulting in injury, death and/or property damage.

Throughout this manual, and in specific places on the unit itself, the signal words **DANGER**, **WARNING** and **CAUTION** are used to identify levels of hazard seriousness. **NOTICE** will be used in areas where there is important information but not hazard related.

- **DANGER** – Immediate hazards which ***WILL*** result in severe personal injury or death.
- **WARNING** – Hazards or unsafe practices which ***COULD*** result in severe personal injury or death.
- **CAUTION** – Hazards or unsafe practices which ***COULD*** result in minor personal injury or product or property damage.
- **NOTICE** – Information to consider that might result in poor operation, or equipment damage/failure.

⚠ DANGER

DANGER labels will feature white text on a red background.

⚠ WARNING

WARNING labels will feature white text on an orange background.

⚠ CAUTION

CAUTION labels will feature white text on a yellow background.

⚠ NOTICE

NOTICE labels will feature white text on a black background.

⚠ WARNING

Improper installation, service, or maintenance can result in death, injury, or property damage. Read this installation, operation, and maintenance manual thoroughly before installing or servicing this equipment.

Installation must be done by a registered installer/ contractor qualified in the installation and service of HVAC equipment.

These instructions, local codes and ordinances and applicable standards that apply to 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 Hazard 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.

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

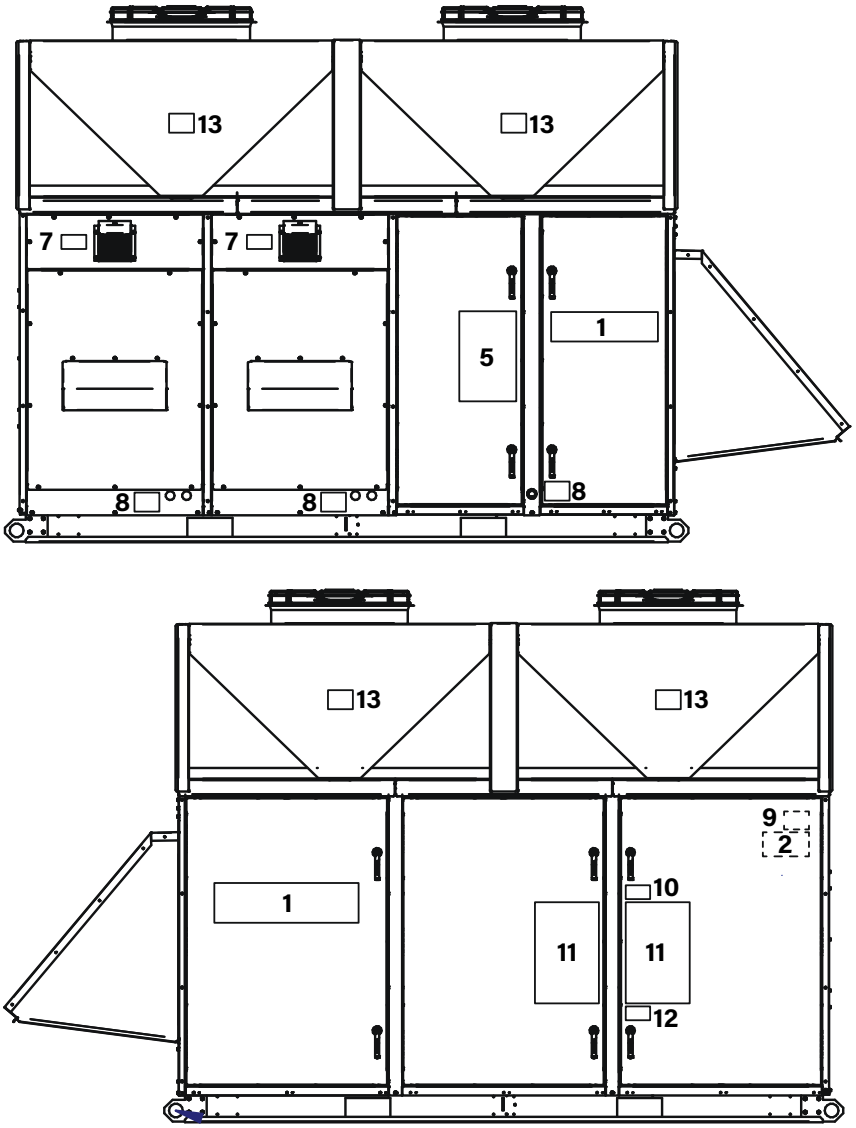
This equipment is not intended for use by persons (including children) with reduced physical, sensory or mental capabilities, or lack of experience and knowledge, unless they have been given supervision or instruction concerning use of the equipment by a person responsible for their safety.

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

To obtain additional copies of the Installation, Operation and Maintenance Manual, please www.nexgendoas.com.

For detailed information regarding specifications, dimensional drawings, and weight information, contact your local NexGen manufacturer's representative.

Figure 1: Label Placement Drawing



Part Number:	Description:	Location:
	Brand Logo	1
	Serial Data Plate	2
91070016	CA Prop 65 Label	3
91060002	R-410A Label	4
91070002	Fan Warning Label	5
	Quality Inspection Stamp	6
9-21577	Hot Surface Label	7
0527N-0018	Condensate Trap Label	8
0527-0048	Copper Conductors Label	9
S-8238	Additional Parts Label	10
	Electrical Warning Label	11
91031108	Door Latch & Lock Label	12
	Remove for Access Label	13

Figure 2: Sample Unit Data Plate

NEXGEN

Model #	NRAK480S5A4A
Serial #	200303201001
Tag #	MAU-1

Refrigerant Charge	R410A	Lbs.	Kg.
Circuit #1		35	15.91
Circuit #2		33	15.00

Unit Info.	
Volts	Phase
460	3

Test Pressure Max.		
	Low	High
psig	250	490
kPa	1724	3379

	Volts	Phase	RLA	LRA	Qty.
Compressor(s) - Circuit #1	460	3	32.1	211	1
Compressor(s) - Circuit #2	460	3	32.1	211	1

Allowable Voltage		
Max	506	
Min	414	
Hz	65	

	Volts	Phase	FLA	HP	Qty
Outdoor Fan (ea.)	460	3	1.6	1.27	2
Outdoor Fan (ea.)	460	3	1.6	1.27	2
Indoor Fan (ea.)	380-480	3	6.6	6.97	2
Exhaust Fan (ea.)					
Wheel Motor (ea.)					

Minimum Circuit Ampacity
91.8

Max. Circuit Protection	
(HACR Type)	110

Electric Heat — kW — V — Phase — Amp — Stages

Gas heat — 700,000 Btu/h Input — Stages — NG

Minimum Clearance to Combustible Materials — Inches

Short-circuit current: 5 kA ms symmetrical, 600 V maximum

SUITABLE FOR OUTDOOR USE

Date of Manufacture: Jun-20

Manufacture Location:

Orlando, FL 32810

Conforms to UL 1995 and ANSI Z83.8
Certified to CSA 22.2 No. 236 and CSA 2.6

C ETL US LISTED Intertek 43136

Before installation or service, the unit data plate similar to the examples above should be found and consulted.

Section 2:
Introduction and Pre-Installation:

2.1 - Description of Operation

The AK Series unit is a factory-assembled packaged system that can operate within a broad range of ambient conditions and introduce ventilation air into a building at neutral conditions. It consists of matched refrigeration and air moving components (system controls, compressor[s], evaporator section, condensing section and fan[s]) designed to treat 100% outside air. This system has the ability to filter, cool, heat, and/or dehumidify air.

The unit may be provided with several different options and/or controls to meet various application requirements, including optional hot gas reheat, energy recovery wheel, supplemental heat (gas, electric hot water or steam) and variable air volume delivery. Be sure to read this entire manual before installation and start-up.

2.2 Inspection and Setup

The unit was leak-tested, pressure-tested, evacuated, charged and run-tested prior to shipment. Immediately upon receipt of the unit, check the electrical supply and/or fuel characteristics of the unit and verify that they match the electrical supply and/or fuel available. Verify that the specifications on the unit rating plate match your order. Check the 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. See Page 13, Section 4.

Any small options which do not come attached to the unit (i.e. sensors) will be found inside the unit control enclosure.

If the unit must be temporarily stored (i.e. job site is not ready for installation of the unit), the unit should be set on 4" x 4" (10 cm x 10 cm) pieces of timber on the ground in a protected area. The unit should be covered to be protected from the environment.

⚠ WARNING

This unit contains HFC-(R410A), an azeotropic mixture of R-32 (Difluoromethane) and R-125 (Pentafluoroethane). DO NOT VENT HFC-(R410A) to the atmosphere. The U. S. Clean Air Act requires the recovery of any residual refrigerant. Do not use R-22 service equipment or components on R410A systems.

⚠ NOTICE

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 drawings on Figure 1 for label location. Avoid placing label on areas with extreme heat, cold, corrosive chemicals or other elements. To order additional labels, please contact NexGen or your NexGen independent distributor.

2.3 - Unit Nomenclature Example

Digit:	Description:	Feature:
1 - 2	Product Family	**NR** = Packaged Rooftop
3	Application	**A** = Dedicated Outdoor Air - Air Cooled
		R = Recirculating
		E = Dedicated Outdoor Air with ECW
		M = Mixed Air
4	Type	**K** = Compact
5 - 7	Nominal Capacity	**036** = 3.0 Tons
		060 = 5.0 Tons
		096 = 8.0 Tons
		118 = 10.0 Tons
		120 = 10.0 Tons
		150 = 12.5 Tons
		180 = 15.0 Tons
		210 = 17.5 Tons
		240 = 20.0 Tons
		241 = 20.0 Tons
		299 = 25.0 Tons
		300 = 25.0 Tons
		360 = 30.0 Tons
		420 = 35.0 Tons
		480 = 40.0 Tons
		540 = 45.0 Tons
		541 = 45.0 Tons
		640 = 50.0 Tons
		660 = 55.0 Tons
		720 = 60.0 Tons
		840 = 70.0 Tons
		960 = 80.0 Tons
		09T = 90.0 Tons
8 - 9	Cabinet Size	**S1** = 1 Series Cabinet
		S3 = 3 Series Cabinet
		S5 = 5 Series Cabinet
		S7 = 7 Series Cabinet
10	Controls	**A** = ALC, Standard Program, DOAS
		J = Controls by Others, Factory Mounted
		K = Terminal Strip, Controls Provided and Mounted by Others
11	Voltage	**2** = 208/60/3
		3 = 230/60/3
		4 = 460/60/3
12	Vintage	**B** = Current
13	Airflow Orientation	**E** = Vertical supply and no return
		F = Horizontal supply and no return

2.3 - Unit Nomenclature Example, Cont.

Digit:	Description:	Feature:
14 - 15	Supply Blower	**AA** = EC 350
		BB = EC 450 (Low) 460V Only
		CC = EC 450 (High)
		DD = EC 500 (Low)
		EE = EC 500 (High) 460V Only
		FF = EC 560 208, 230V Only
		GG = Dual EC 450 (High)
		HH = Dual EC 500 (Low)
		JJ = Dual EC 500 (High) 460V Only
		KK = Dual EC 560 208/230V Only
		LL = Three EC 500 (Low)
		MM = Three EC 500 (High) 460V Only
		NN = Three EC 560 208/230V Only
		PP = Dual EC 460 (Low) 460V Only
20	Compressor Type	**6** = Dual Scroll/Dual Circuit Lead VFD (10.0 Tons and Above)
		8 = Single Scroll/Single Circuit Lead VFD (10.0 Tons and Below)
22 - 23	Refrigeration Options	**AA** = Lead Circuit Hot Gas Reheat, Hot Gas Bypass, Liquid Subcooling
24	Heating Type	**0** = None
		A = Electric Heat
		B = Natural Gas Heat
		D = LP Gas Heat
		F = Hot Water Heat
25	Electric Heating Capacity	**0** = None
		A = 5kW 240/480V - 3.75kW 208V
		B = 10kW 240/480V - 7.5kW 208V
		C = 15kW 240/480V - 11.25kW 208V
		D = 20kW 240/480V - 15kW 208V
		E = 25kW 240/480V - 18.75kW 208V
		F = 30kW 240/480V - 22.5kW 208V
		G = 35kW 240/480V - 26.25kW 208V
		H = 40kW 240/480V - 30kW 208V
		K = 50kW 240/480V - 37.5kW 208V
		M = 60kW 240/480V - 45kW 208V
		N = 70kW 240/480V - 52.5kW 208V
		P = 80kW 240/480V - 60kW 208V
		R = 100kW 240/480V - 75kW 208V
		S = 110kW 240/480V - 81.4kW 208V
		T = 120kW 240/480V - 90kW 208V
		U = 130kW 240/480V - 97.5kW 208V
		V = 140kW 240/480V - 105kW 208V
		W = 150kW 240/480V - 112.5kW 208V

2.3 - Unit Nomenclature Example, Cont.

Digit:	Description:	Feature:
26 - 27	Gas Heating Capacity	**00** = None
		B1 = 100MBH
		C1 = 150MBH
		D1 = 200MBH
		E1 = 250MBH
		F1 = 300MBH
		G1 = 350MBH
		H1 = 400MBH
		J1 = 500MBH
		K1 = 600MBH
		F2 = 350+350MBH
		E2 = 400+400MBH
		H2 = 500+500MBH
		J2 = 600+600MBH
28	Heater Control	**0** = None
		4 = SCR (N/A 5kW)
		5 = Hot Water Coil Heating Control
		6 = Modulating 5:1 NG, 3:1 LPG
		7 = Modulating 10:1 NG, 6:1 LPG
		8 = Modulating 20:1 NG, Dual Furnace Only, NG Only
29	ECW Media	**0** = None
		1 = Polymer
		2 = Aluminum
38 - 39	Corrosion Protection	**00** = None
		A1 = Cabinet
		F1 = Condenser Coils
		H1 = Indoor Coils

Section 3:
Installer Responsibility:

The installer is responsible for the following:

- To install and commission the unit, as well as the fuel and electrical supplies, in accordance with applicable specifications and codes. The manufacturer recommends the installer contact a local building inspector 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 plan location of supports.
- To provide access to 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 unit and to supply air for combustion, ventilation and distribution in accordance with local codes.
- To assemble or install any accessories or associated duct work using best building practices.
- To properly size supports and hanging materials.
- To verify that the unit is delivering design airflow by having an air balancing test performed.
- To have refrigerant technician certification per Section 608 of the US Environmental Protection Agency (EPA) Clean Air Act of 1990 or equivalent certification program.
- To have all required equipment to work on direct expansion and/or chilled water air conditioning system.

3.1 Corrosive Chemicals

The manufacturer 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 subcontractor, 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 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 unit is exposed to halogenated hydrocarbons.*

⚠ 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.

⚠ CAUTION

PRODUCT DAMAGE HAZARD
Do not use equipment in area containing corrosive materials. Refer to appropriate Material Safety Data Sheets (MSDS). Failure to follow these instructions can result in product damage.

3.2 Required Equipment and Materials

When lifting of the unit is required, the installing contractor is responsible for supplying or arranging for the appropriate lifting equipment so that the unit may be placed in a safe manner.

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

- Various screwdriver types and sizes
- Various wrench types and sizes
- Drill motor and various drill bits
- Voltmeter
- Clamp style ammeter
- Butyl caulk
- Gauges and accessories
- Direct expansion and/or chilled water gauges and accessories.

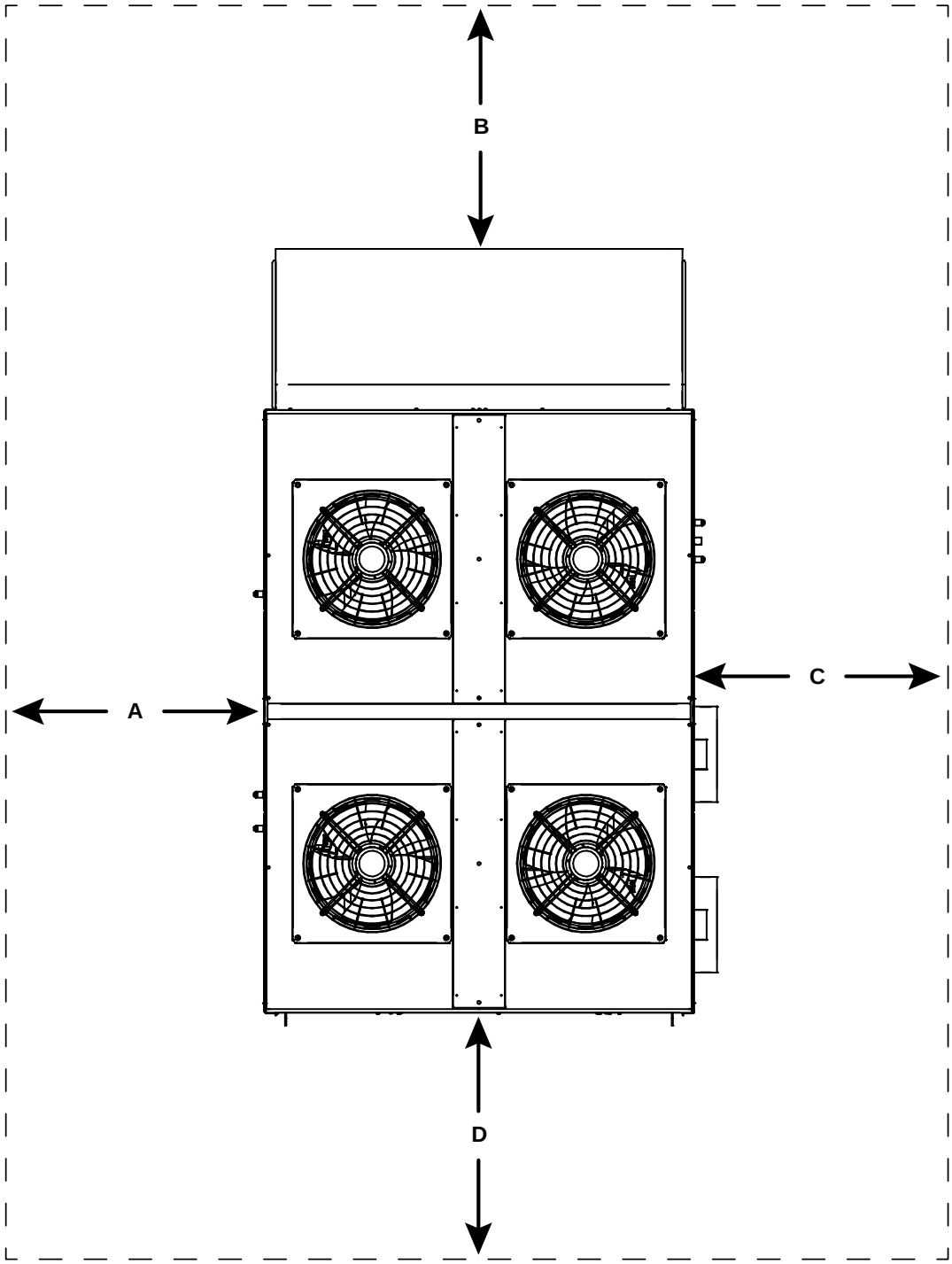
Section 4:
Critical Considerations:

4.1 Required Clearances

Clearances are the required distances that the unit must be away from objects and other units to allow service access and proper operation of the unit.

Cabinet:	A	B	C	D
S3	50″	48″	41″	48″
S5	80″	48″	56″	48″
S7	104″	48″	56″	60″

Minimum clearance required for side removal of energy recovery wheels and/or DX coils.



4.1.1 Service Clearances

Minimum service clearance for service is based on cabinet size described in section 4.1.

4.1.2 Ventilation Clearances

In order to help ensure proper operation of an air-source constructed unit, a 48" (61.0 cm) clearance for ventilation must be maintained.

In addition, read and follow the additional ventilation clearance guidelines below:

- Do not locate the unit under an overhang or near a wall/other equipment that will short circuit hot air to the coil intakes.
- Do not locate unit within 10' (3.0 m) of exhaust fans or flues.
- Do not locate the unit too close to another unit to allow air recirculation.

4.2 Placement Considerations

The unit is typically mounted on a curb with ductwork and utility connections usually going through the curb. It may also be pad-mounted. (Contact factory for specific instructions if unit is to be mounted in a different way [ie. on mounting stand].)

Select a location where external water drainage cannot collect around the unit. Locate the unit so roof runoff water does not pour directly on the unit. Provide gutter or other shielding at roof level. Where snowfall is anticipated, mount the unit so all intakes and discharges are above the maximum snow depth for the area. Unit shall not be installed with inlet opening facing into the prevailing wind direction in order to help prevent the possibility of moisture entrainment.

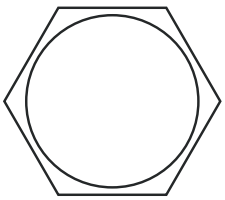
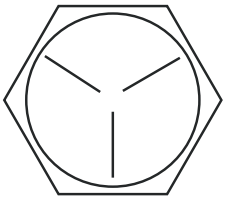
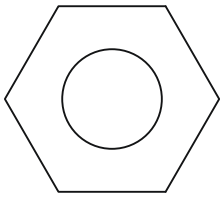
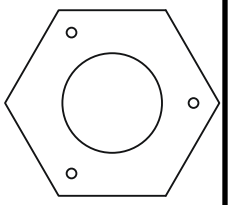
When installed at ground level, the unit should be mounted on a level concrete slab which should extend at least 2" (5.1 cm) beyond the unit on all sides. The top of the slab should be 2" (5.1 cm) above the ground level. The depth of the slab below the ground level and its structural design is governed by the type of soil and climatic conditions. The slab must not be in contact with any part of the building wall or foundation. The space between the slab and the building wall prevents the possibility of transmitting vibration to the building.

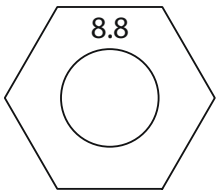
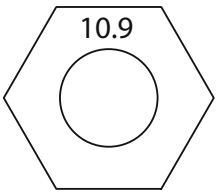
When installing a unit on the roof of a building, the structural members supporting the unit must be sufficiently strong for the weight of the unit and mounting rails.

4.3 Hardware

Unless otherwise specified, all hardware (except sheet metal screws) must be torqued to settings from 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 fl-Lb	30 ft-Lb

Bolt Head Grade Marking		
Nut Grade Marking		
Bolt Size:	**Grade 2:**	**Grade 5:**
M5	6Nm	9Nm
M6	10Nm	15Nm
M8	25Nm	35Nm
M10	50Nm	75Nm
M12	85Nm	130Nm
M16	215Nm	315Nm

Section 5: National Standards and Applicable Codes:

5.1 Refrigerant Handling Practices

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.

5.2 Fuel Codes

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.

5.3 Installation Codes

Installations must be made in accordance with NFPA 90A - latest revision, Standard for the Installation of Air-Conditioning and Ventilation Systems.

5.4 Aircraft Hangars

Installation in aircraft hangars must be in accordance with the following codes:

United States: Refer to Standard for Aircraft Hangars, NFPA 409 - latest revision.
Canada: Refer to Standard CSA B149.1 - latest revision, Natural Gas and Propane Installation Code.

5.5 Parking Structures and Repair Garages

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

United States: Standard for Parking Structures NFPA 88A - latest revision or the Code for Motor Fuel Dispensing Facilities and Repair Garages, NFPA 30A - latest revision.
Canada: Refer to CSA B149.1 - latest revision, Natural Gas and Propane Installation Code.

5.6 Electrical

Electrical connection to 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.

5.7 Venting

The optional gas furnace in the 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.

5.8 High Altitude

The optional gas furnace in the unit is 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' (609.6 m) or Canadian installation is above 4500'(1371.6 m).

Section 6:
Lifting a Packaged Rooftop Unit:

The unit must be installed in compliance with all applicable codes. The qualified installer or service technician must use best building practices when installing the unit.

6.1 Moving/Lifting a Packaged Air Conditioning Unit

6.1.1 Preparing to Move/Lift the Unit:

Prior to moving/lifting the unit, the following steps must be performed.

1. Remove all packaging or blockers.
2. Remove all packages that were shipped inside the unit.
3. Inspect the 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 packaged air conditioning unit.
    - Ensure factory-installed hardware is torqued as specified.
4. Prepare the installation location to be ready to accept the unit (i.e. roof curb is correct size).
5. Verify that the moving/lifting equipment can handle the unit's weight. Verify that forklift forks extend through the unit frame and that crane has required reach.

6.1.2 Moving the Unit with Forklift

On smaller S3 and S5 cabinet units, forklift pockets are provided for lifting and moving. The following must be considered before using this option.

- Forklift must be rated for the weight of the unit.
- Forklift must have forks long enough to go through both side pockets and not rest on the underside base-pans of the unit.
- Care must be taken to not jar the unit, bounce, or drop the unit during move.

Note: S7 units are not designed to be, and should never be lifted/moved with a forklift.

⚠ WARNING

CRUSH HAZARD
Use proper lifting equipment and practices. Failure to follow these instructions can result in death, injury, or property damage.

6.1.3 Lifting the Unit with Crane

Lift the unit into place installing appropriate hardware (supplied by others) into all four lifting lugs holes on small units, and up to 8 on larger cabinets. Use spreader bars to ensure that the lifting cables clear the sides of the unit. See Figures 3 - 5. Test lift to 12" [30.5 cm] to check stability of rigging before completing the lift. Use caution as the load may be unbalanced. The unit must be kept level during the lift to prevent tipping, twisting or falling. If lifted improperly, product damage may occur.

Figure 3: Lifting a Large Unit (S7 Cabinets)

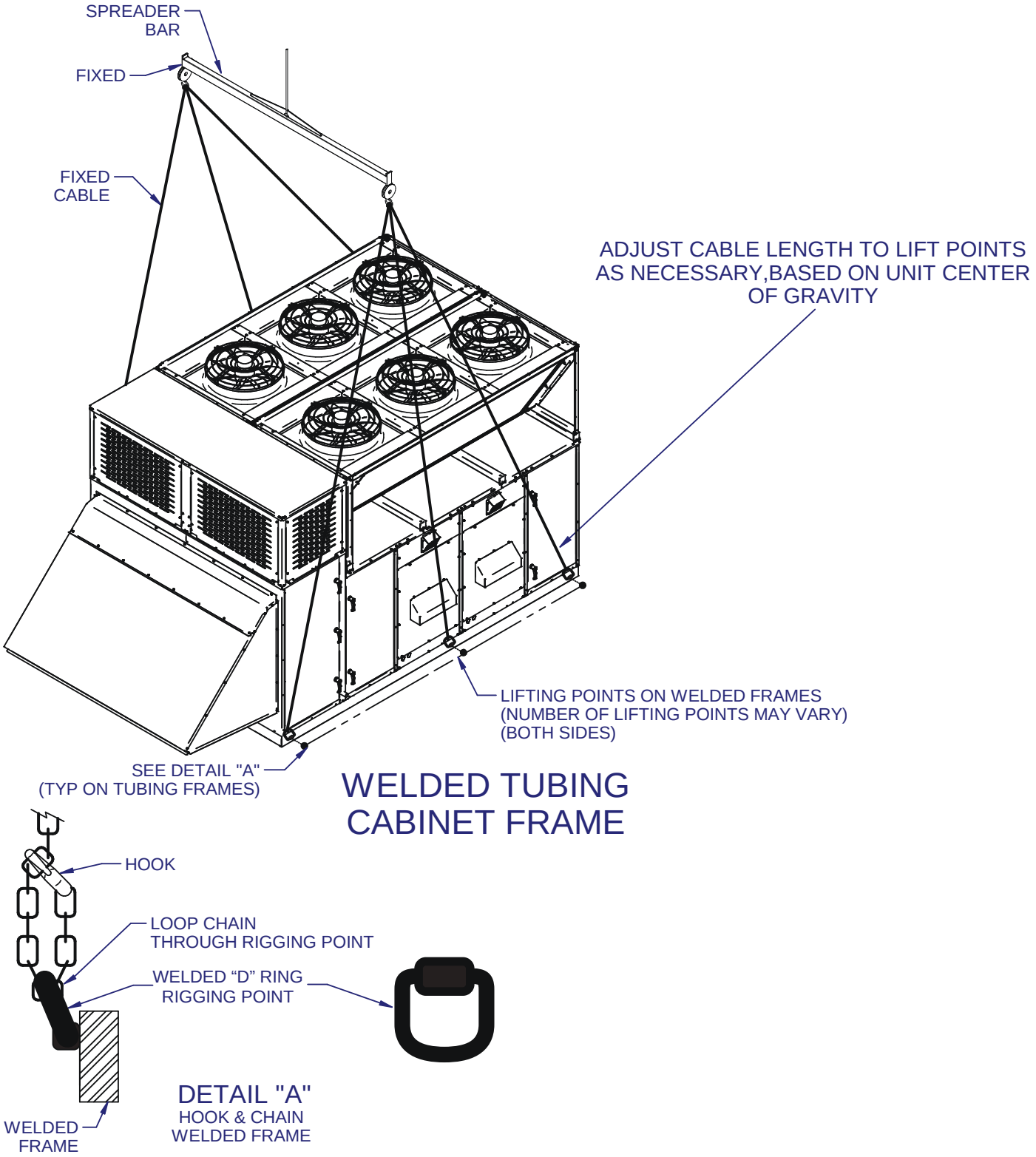


Figure 4: Lifting a Medium Unit (S5 Cabinets)

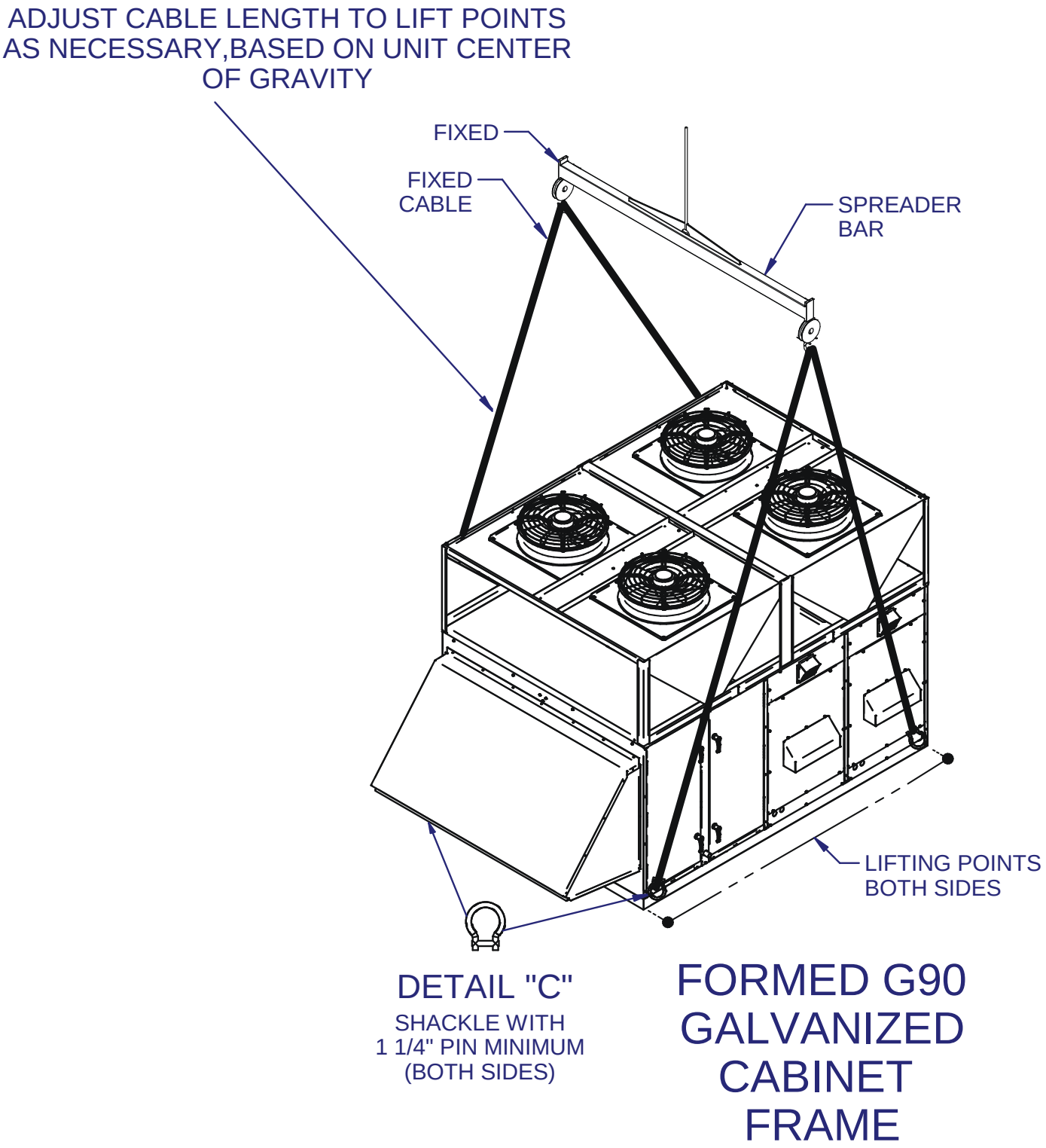
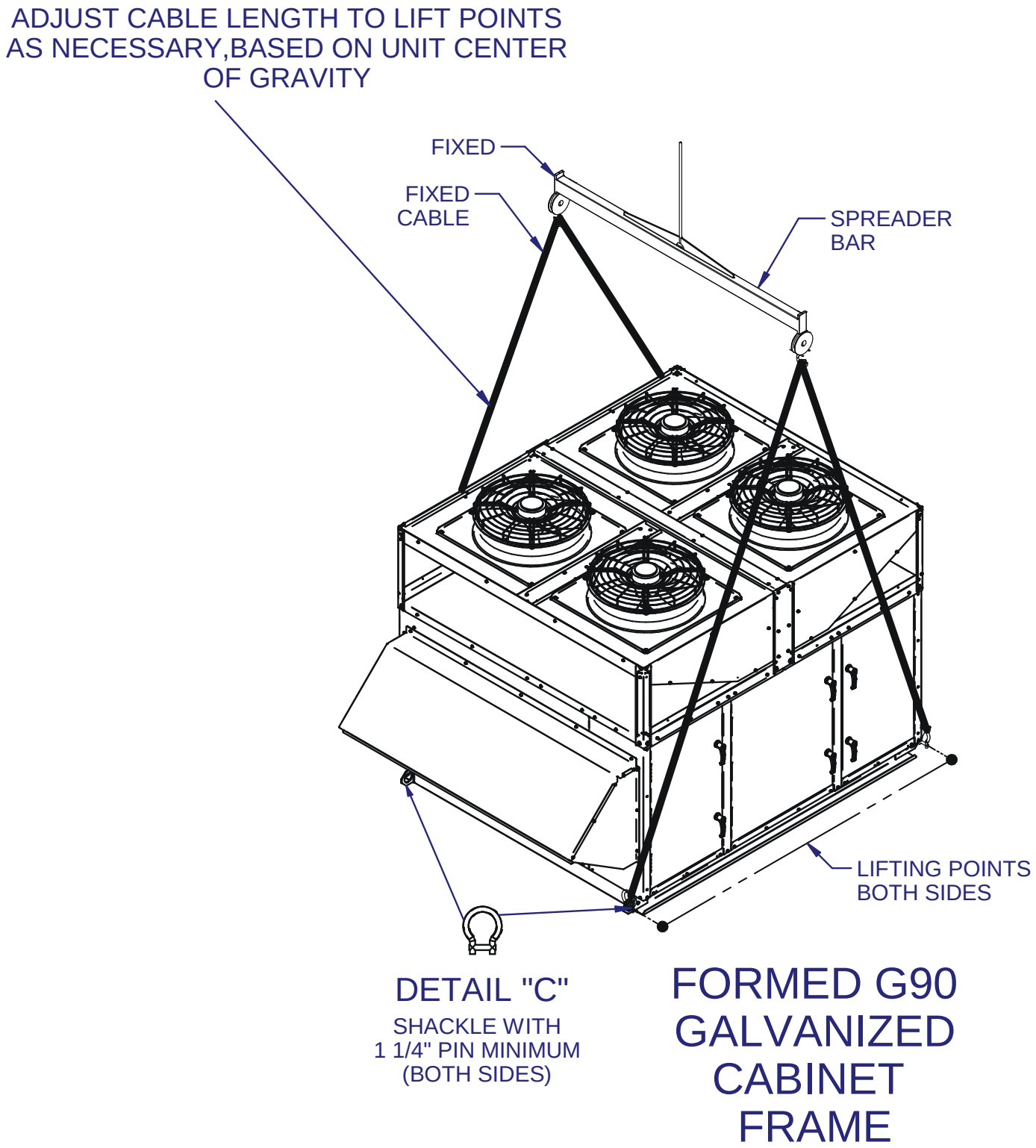


Figure 5: Lifting a Small Unit (S3 Cabinets)



Section 7:
Unit Placement:

7.1 Roof Installation on Curb

Roof curbs are available for units that are to be installed on a typical flat roof (ie. bonded or corrugated) with no seismic restraint requirements. (If seismic restraint is required, contact factory.) Curb dimension and weight information is available in the AK Selection Software, ACE Interface. Note: Before installation, verify that you have the correct roof curb and that all required components are present.

7.2 Roof Curb Assembly and Installation

Place the curb on the roof in the position in which it will be installed. Check that the diagonal measurements are within 1/16"(1.6 mm) of each other. To ensure a weatherproof seal between the unit and the curb, the curb must be level with no twist from end to end. Shim level as required and secure curb to roof deck using best building practices. Inspect curb to ensure that none of the field piping routed through the curb protrude above the curb. Install roofing material as required.

NOTE: Check the installation location to ensure proper clearances to combustibles and clearance for access.

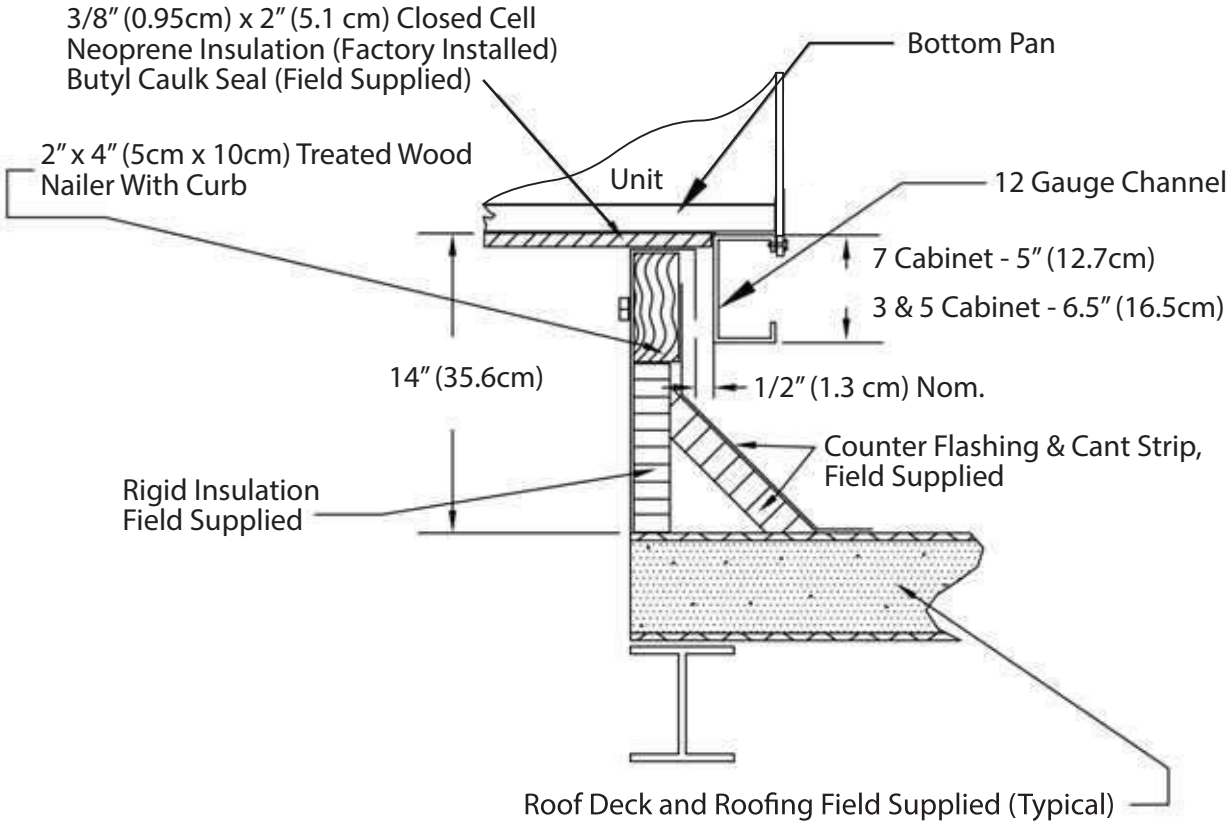
7.3 Unit Mounting to Roof Curb

After the curb has been installed, the unit may be placed on the curb. All AK units are supplied with a closed cell neoprene insulation on the underside of the unit. This will seal the top of the curb and the base surface of the unit to prevent moisture from leaking into the building (ie. from driving rains or melting snow.) The installer is responsible for attaching the unit to the curb per all applicable codes.

7.4 Unit Mounting to Ground Pad

When installed at ground level, the unit should be mounted on a level concrete slab which should extend at least 2" (5.1 cm) beyond the unit on all sides. The top of the slab should be 2" (5.1 cm) above the ground level. The depth of the slab below the ground level and its structural design is governed by the type of soil and climatic conditions. The slab must not be in contact with any part of the building wall or foundation. The space between the slab and the building wall prevents the possibility of transmitting vibration to the building.

Figure 6: Roof Curb Installation



Section 8:
Ductwork Consideration:

The unit has been designed to operate at the specific air volume and external static pressure that was ordered. This static pressure is generated by any additional components that are added to the unit (i.e. ductwork, etc). Additional static pressure beyond that ordered will affect the performance of the packaged air conditioning unit and lessen the air volume that can be delivered.

Proper engineering methods need to be employed when calculating duct and component static pressure (i.e. 2009 ASHRAE Handbook - Fundamentals, Chapter 21).

The system ductwork must comply with Sheet Metal and Air Conditioning Contractors National Association (SMACNA) or any other recognized standards.

It is recommended that flexible duct connections be incorporated into the ductwork design to prevent the transmission of any vibrations, either mechanical or harmonic.

As a general rule, all ducts should have a straight run of at least 3 hydraulic duct diameters immediately before and after the unit before adding any fittings, elbows, restrictions, etc.

Hydraulic duct diameter for round ducts (in inches):
Dh = d
Dh: hydraulic diameter
d: round duct inside diameter

Hydraulic duct diameter for rectangular ducts (in inches):
Dh = (2*H*W)/(H+W)
Dh: hydraulic diameter
H: rectangular duct inside height
W: rectangular duct inside width

The unit is not designed to support the weight of ductwork. Ductwork must be constructed in a fashion that is self-supporting. Ductwork for curb-mounted units should be attached to the curb prior to setting the unit, and may not be attached to the bottom of the unit.

Units ordered in a horizontal discharge are supplied with flanges to attach ductwork. Neither the flanges nor exterior skin of the unit are capable of supporting the load of the ductwork. Ductwork support must come from the structure itself that the unit is servicing. Ductwork passing through unconditioned spaces must be insulated (including a vapor barrier) to prevent unnecessary energy losses and/or condensation.

8.1 Inlet Ductwork

Inlet ductwork height and width must be no smaller than the packaged air conditioning unit inlet height and width and supply only uncontaminated air to the unit.

8.2 Return Air Ductwork

Return air ductwork height and width must be no smaller than the unit return air opening height and width.

8.3 Discharge Ductwork

Discharge air ductwork height and width must be no smaller that the unit discharge air opening height and width.

Section 9:
Refrigeration Circuits and Piping:

9.1 Refrigerant

This unit utilizes R-410A, a refrigerant with a zero ozone depletion rating, and POE (Copeland) or PVE (Bitzer) refrigerant oil. 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 system refrigerant flows and higher operating pressures.

The unit has a broad application range. For optimum performance and efficiency, it may be necessary to adjust the refrigerant charge to maintain desired subcooling and superheat at operating temperature extremes.

9.2 Components and Configurations

There are many different refrigeration circuit variations available. Depending on the configuration, the unit may include, but is not limited to, the following components:

- Accumulator
- Coil
  - Evaporator coil
  - Condenser coil
- Compressor
  - Standard scroll
  - Variable Speed Scroll
- Filter drier
- Hot gas bypass valve
- Hot gas reheat components
  - Check valve
  - Coil
  - Solenoid valve (standard) or modulating bypass/ reheat valves (modulating)
- Receiver
- Refrigerant pressure switches- high and low
  - Non-adjustable
  - Adjustable
- Switchable liquid sub-cooling components
  - Coil
  - Two solenoid valves
  - Check valve
- Thermal expansion valve (TXV)

⚠ WARNING

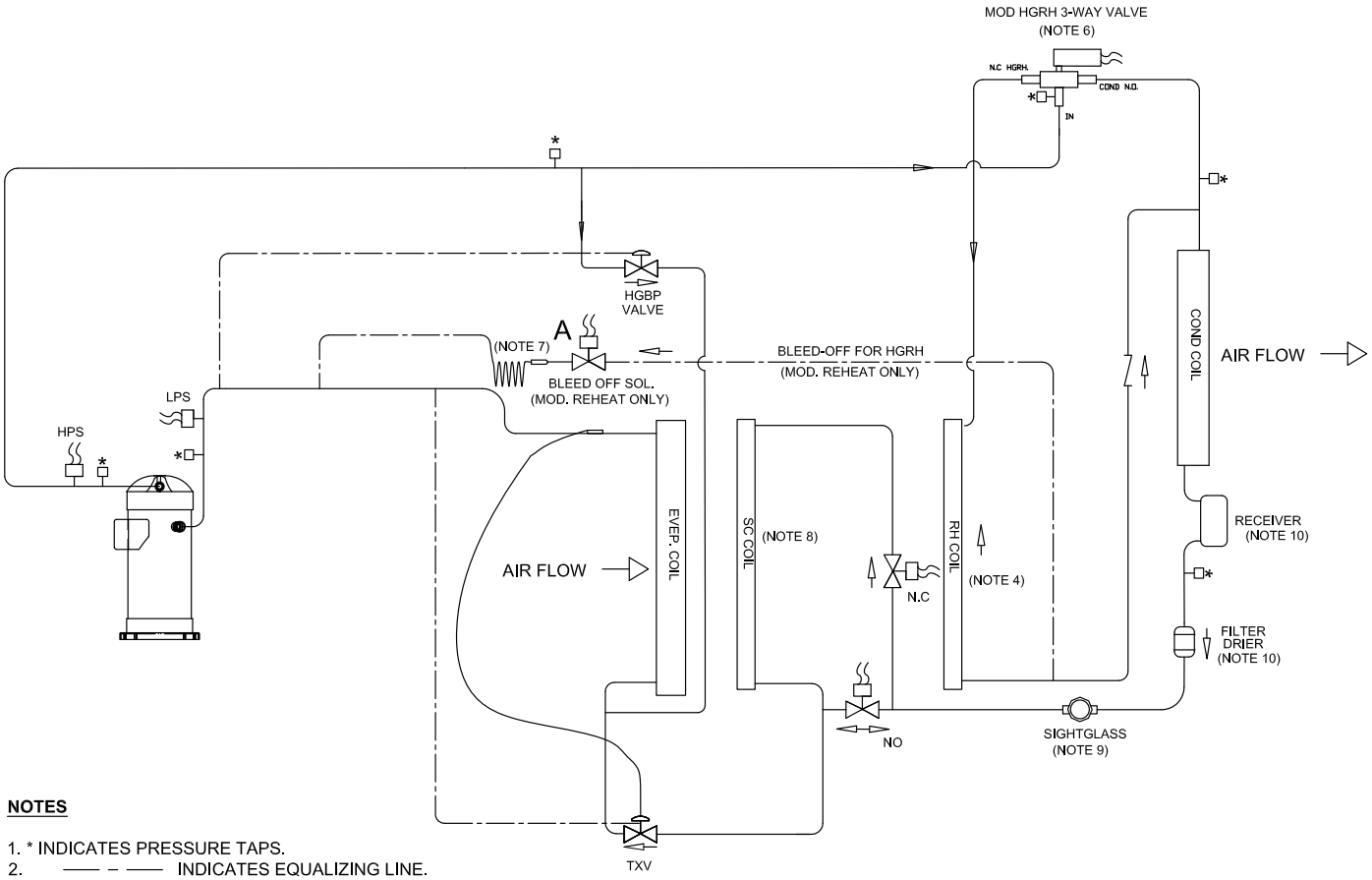
EXPLOSION HAZARD
System contains R-410A refrigerant. Operating pressures may exceed limits of R-22 service equipment. Use proper refrigerant handling practices, tools, and equipment. Failure to follow these instructions can result in death, injury, or property damage.

⚠ CAUTION

PRODUCT 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.

See Figure 7 for schematics of the most common refrigeration circuit configuration. All schematics illustrate a single-compressor, single-circuit, cooling-only system.

Figure 7: Circuit Diagram for Standard Compressor with Hot Gas Bypass, Modulating Hot Gas Reheat, and Subcooling



NOTES

1. * INDICATES PRESSURE TAPS.
2. —— – —— INDICATES EQUALIZING LINE.
3. LOCATE TXV BULB AT EITHER 7:00 OR 5:00 (IF APPLICABLE)
4. HGRH LEAD CIRCUIT ONLY
5. STRAINER FOR HGRH BLEED-OFF
6. THREE WAY VALVE LABELS:
   N.O. - MAIN CONDENSER
   N.C. - AUXILIARY CONDENSER
7. SUBCOOLING COIL IS TO BE INSTALLED DOWNSTREAM OF EVAP.
   REHEAT COIL DOWNSTREAM OF SUBCOOLING COIL.
8. SWITCHABLE SUBCOOLING All CIRCUITS
9. INSTALL SIGHT GLASS IN COMPRESSOR SECTION
10. INSTALL IN CONDENSER SECTION

SERV = SERVICE VALVE
RH SOL = REHEAT SOLANOID
SC = SUB COOLING
HGBP = HOT GAS BY PASS
LPS= LO- PRESSURE-SWITCH
HPS= HI- PRESSURE-SWITCH

Section 10:
Energy Recovery/Conservation Wheels:

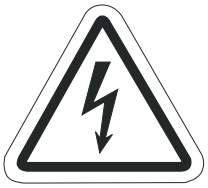
10.1 Principal of Operation

The energy conservation wheel module is a self-contained unit consisting of the following components:

- **Enthalpy wheel:** Active air-to-air heat exchanger portion of the module. It is constructed on corrugated synthetic fiber-based media impregnated with a non-migrating water selective molecular sieve desiccant. Standard wheels are 4" (10.1 cm) thick and transfer the total energy (sensible and latent) of the air-stream.
- **Desiccant wheel (Purple Color):** Wound Silica Gel (WSG wheels are comprised of silica gel desiccant in a high temperature fiber substrate. WSG wheels are generally used for traditional industrial dehumidification, low dewpoint applications, and near saturated air streams.
- **Cassette:** Steel structure composed of punched sheet metal that houses the enthalpy wheel.
- **Drive Motor:** Constant speed, 220/1/60 motor rotates the enthalpy wheel at a typical speed of 45 RPM via multi-link drive belt.

Figure 15: Example Energy Recovery (ECW) Wheel

⚠ DANGER



ELECTRICAL SHOCK HAZARD
Disconnect electric before service. More than one disconnect switch may be required to disconnect electric from equipment. Equipment must always be properly grounded.

SEVERE INJURY HAZARD
Do not enter equipment while in operation. Equipment may start automatically. Do not operate with access doors open. Installation, operation, and maintenance must be performed by a trained technician only.

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

- **Variable Frequency Drive (Optional):** Drive can be used to vary the wheel's rotation speed.
- **Bypass Damper (Optional):** Bypasses air around the energy recovery wheel for frost control and economizer operation.

See provided energy conservation wheel manual for more information.

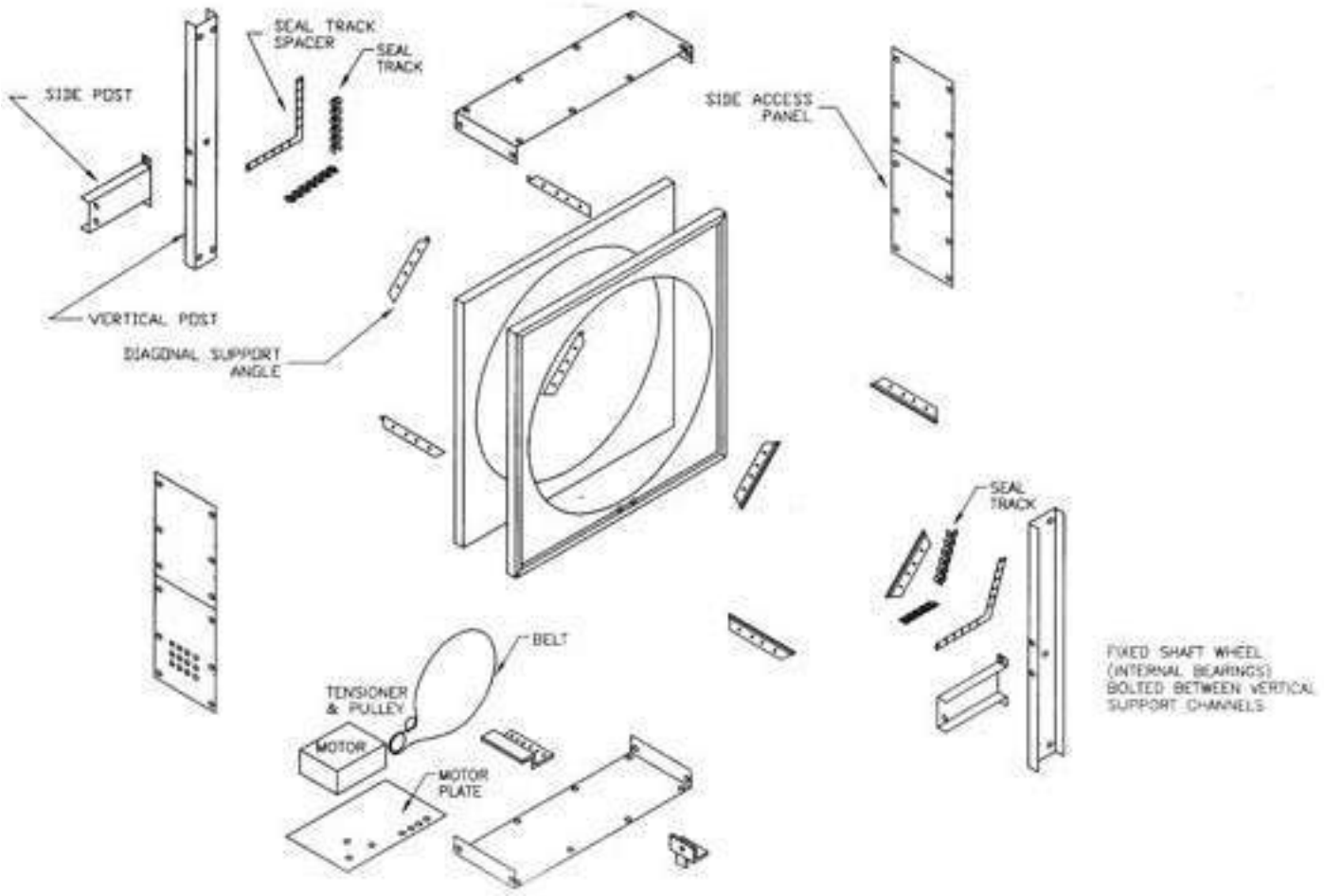
10.2 Routine Maintenance

Energy recovery wheels are designed for minimal maintenance over their operating lifetime. On an annual basis, the faces of the wheel should be checked to ensure no apparent dirt or debris, or damage to wheel faces from loose matter within the unit.

When energy recovery wheels are used with proper filtration, the corrugated flow channels will have a minimum of dirt and dust buildup. This can be measured by the installation of a differential pressure detector measuring pressure drop across the wheel. If wheel pressure drop (for a carefully measured flowrate through the wheel) exceeds the design pressure drop by 10%, then the wheel should be cleaned. Pressure drop should be checked each time air filters are changed.

Other maintenance includes re-coating the face flanges of the wheel with a specialized graphite lubricant. This should be done at normal intervals, coincident with seal replacement. It is recommended that this (relubrication) procedure is completed at minimum of every 16,000 hours of operation to extend seal life. Contact the factory for lubricant part number and application procedure.

Figure 16: Example Energy Recovery (ECW) Wheel Construction



10.3 Cleaning The Wheel

In the event that routine annual inspection (or pressure drop greater than 10% of factory rating is observed indicates that there is dirt or dust buildup within the wheel, then wheel cleaning is required as follows: Using 20 psig clean dry air, and a small air nozzle, blow air through one (1) face of the wheel. At a similar location on the opposite side of the wheel, gently apply a shop vacuum to “receive” debris exiting the wheel. Slowly work around the entire face of the wheel to complete the procedure. In the event that this method does not remove visual buildup or return pressure drop to within normal parameters, contact the factory for a wheel washing procedure.

Do not use solvents or any other cleaning fluids on the face of the wheel. Additionally, although a desiccant wheel may be washed in a clean water solution, special precautions are required to ensure adequate drying of the wheel to prevent damage to sensitive internal surfaces.

Section 11:
Gas Heater Packages:

11.1 Principle of Operation

The gas furnace is an 80% efficient, self-contained duct furnace that can burn natural gas or LPG. It is comprised of:

- **Manifold:** Includes combination gas valve incorporating redundant safety shut-off valve, manual shut-off and gas regulator.
- **Burners:** Inshot gas burners with direct spark ignition and remote flame sensor to ensure carryover across all burners.
- **Heat exchanger:** Serpentine heat exchanger constructed of 409 stainless steel.

11.2 Gas Piping and Pressure

All gas piping to the unit must comply with:

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.

The gas furnace is equipped to handle a maximum gas supply pressure of 13.5" w.c. (33.5 mbar). When gas supply exceeds this maximum gas pressure, an additional high gas pressure gas regulator will be required by others to insure that the correct gas pressure is supplied to the combination gas valve.

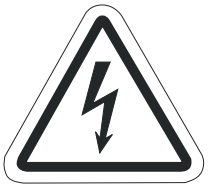
The gas supply is normally piped through an outside unit cabinet wall. If through the curb gas connection is required, the connection is made as necessary in the furnace vestibule compartment. A manual shut-off valve must be provided by others. Gas piping and the manual shut off valve must conform to best building practices and local codes. Support piping with hangers and not with the furnace itself. Units with multiple furnaces require individual gas connections.

Two 1/8" NPT pressure test ports for measuring manifold inlet pressure are located on the gas valve.

Table 2: Manifold Size and Minimum Pressure

Minimum Heat Input:	Gas NPT Connection	Minimum Inlet Gas Pressure - NG	Minimum Inlet Gas Pressure - LPG
BTUH	in.	in w.c.	in w.c.
≤ 400,000	0.75	5.0	11.0
> 400,000	1.00	6.0	12.0

⚠ DANGER



ELECTRICAL SHOCK HAZARD
Disconnect electric before service. More than one disconnect switch may be required to disconnect electric from equipment. Equipment must always be properly grounded.

SEVERE INJURY HAZARD
Do not enter equipment while in operation. Equipment may start automatically. Do not operate with access doors open. Installation, operation, and maintenance must be performed by a trained technician only.

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

⚠ WARNING

EXPLOSION HAZARD

FIRE HAZARD

CARBON MONOXIDE HAZARD

BURN HAZARD
Allow equipment to cool before service. Internal components of equipment may still be hot after operation.

CUT/PINCH HAZARD
Wear protective gear during installation, operation, or maintenance. Edges are sharp.

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

11.3 Operating and Safety Controls

Safety systems are required for proper performance of the gas furnace. The gas furnace 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 equipment, using only components that are sold and supplied by manufacturer.

- **Combustion Air Pressure Switch:** An airflow switch is provided as part of the control system to verify airflow through induced draft fan by monitoring the difference in pressure between the fan and the atmosphere. If sufficient negative pressure is not present, indicating lack of proper air movement through heat exchanger, the switch opens shutting off gas supply through the ignition control module. The air pressure switch has fixed settings and is not adjustable.

- **Rollout Switch (Manual Reset):** The furnace is equipped with manual reset rollout switch(es) in the event of burner flame rollout. The switch will open on temperature rise and shut-off gas supply through the ignition control module. Flame rollout can be caused by insufficient airflow for the burner firing rate (high gas pressure), blockage of the vent system or in the heat exchanger. The furnace should not be placed back in operation until the cause of rollout condition is identified. The rollout switch can be reset by pressing the button on the top of the switch.

- **Primary High Limit Switch:** To prevent operation of the furnace under low airflow conditions, the unit is equipped with a fixed temperature high limit switch mounted on the vestibule panel. This switch will shut off gas to the furnace through the ignition control module before the air temperature reaches 250 °F (121.1 °C). Reduced airflow may be caused by restrictions upstream or downstream of the circulating air blower, such as dirty or blocked filters or restriction of the air inlet or outlet to the unit. The high limit switch will shut- off the gas when the temperature reaches its set point and then reset when the temperature drops 30 °F (16.7 °C) below the set point, initiating a furnace ignition. The furnace will continue to cycle on limit until the cause of the reduced air flow is corrected.

  Ignition Control Module: Ignition control modules are available having a number of different operating functions. Refer to Sequence of Operation and Control Diagnostic data sheets provided in the instruction package (located in the control section when the unit ships) for a detailed description of the control features, operation and troubleshooting for the model control installed.

11.4 Wiring

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

United States: Refer to National Electric Code®, NFPA 70 - latest revision.

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

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

If any of the original control wire supplied with the gas furnace must be replaced, replace it with type THHN 221° F (105°C), 600 V, 16 gauge wire or equivalent.

11.5 Sequence of Operation

10.5.1 Sequence of Operation for 20-100% Modulating Furnace with 75-200 MBH (21.9-58.6kW) Input

When system is powered up 24VAC will be applied to the ignition control (ignition control) terminals 24VAC / R and to the timer relay control.

The ignition control will reset, perform a self check routine, flash the diagnostic LED for up to four seconds and enter the thermostat scan standby state. The amber light on the timer relay control will be lit indicating it is in the ready position.

Call for Heat:

1. Controller provides contact closure on call for heat.
2. 24VAC to is supplied to ignition control terminal TH, provided limit switch is in closed position.
3. The control will check that pressure switch contacts are open (ignition control terminal PSW is not powered).
4. Combustion blower is then energized at high speed.
5. When the airflow switch closes, a 15 second pre-purge period begins.
6. At end of pre-purge period, the spark commences and the 1st stage gas valve is energized for the trial for ignition period. (If the burners fail to light or carryover during a trial for ignition, the control will attempt two additional ignition trials. If no flame is present at the flame sensor within 10 seconds, the spark and gas valve will be de-energized. A 15 second inter- purge period begins and the combustion blower continues to run. After the inter-purge period another ignition trial will take place. If burner fails to light or prove the flame sensor following the two additional trials the control will go into lockout. The valve relay in the ignition control will be de-energized shutting of the gas valve

immediately and the combustion blower following a 30 second post-purge period. If the thermostat (controller) is still calling for heat one hour after a lockout occurs, the control will automatically reset and initiate a call for heat sequence.)

7. Burners ignite and cross light. Timer relay control is powered (terminal 7) simultaneously and begins timing a 90 second warm-up period while maintaining the combustion blower at high speed and powers the SC30. The SC30 will output 12 to 13VDC to the modulating control valve during the timing duration (90 seconds) of timer relay control, regardless of the analog input signal to SC30 terminals 7 & 8.
8. When flame is detected by flame sensor, the spark is shut-off immediately and gas valve(s) and combustion blower remain energized.
9. When the initial timer in timer relay control times out, it defaults the gas valve to low fire and the combustion blower to low speed and returns control of the operating mode to the building temperature controller.
10. If the controller is providing an analog signal between 0.5 and 5.3VDC to the SC30 control, the system will continue to run at low speed combustion blower and with only the 1st stage valve open. The modulating valve will be powered proportional to the input voltage signal from the controller, and will open or close changing the gas manifold pressure. Manifold pressure will vary from 0.4 to 1.2 " w.c. (1.0-3.0 mbar) operating in this mode.
11. If the signal increases above 5.3VDC, the SC30 relay closes powering terminal 6 on the timer relay control, and starts a second time delay of 15 seconds. At the end of this time delay the fan switches to high speed and the 2nd stage gas valve opens through the timer relay control (terminal 9) provided the high air switch contacts are closed. The manifold pres- sure will vary from 1.4 to 3.5" w.c. (3.5-8.7 mbar) in this mode.
12. During heating operation, the thermostat, pres- sure switch and main burner flame are constantly monitored by the ignition control to assure proper system operation.
13. Operation continues in the high fire mode until the controller input signal to the SC30 control drops to 4.7VDC. At this point the SC30 relay circuit opens (SC30 terminal 5 has no output) de-energizing the 2nd stage valve and the timer relay control switches the combustion blower to low speed operation. Low-fire modulation will continue as in Step 10.
14. When the thermostat (temperature controller) is satisfied and the demand for heat ends, the heat enable contact opens and the 1st stage valve is de-energized immediately, the control senses loss of flame and a 30 second post- purge occurs (at high speed) before de-energizing the combustion blower.

10.5.2 Sequence of Operation for 20-100% Modulating Furnace with 250-400 MBH (73.3-117.2 kW) Input

When system is powered up 24 VAC will be applied to the ignition control (ignition control) terminals 24VAC / R and to the timer relay control.

The ignition control will reset, perform a self check routine, flash the diagnostic LED for up to four seconds and enter the thermostat scan standby state. The amber light on the timer relay control will be lit indicating it is in the ready position.

Call for Heat:

1. Controller provides contact closure on call for heat.
2. 24VAC to is supplied to ignition control terminal TH, provided limit switch is in closed position.
3. The control will check that pressure switch contacts are open (ignition control terminal PSW is not powered).
4. Combustion blower is then energized at high speed.
5. When the airflow switch closes, a 15 second pre-purge period begins.
6. At end of pre-purge period, the spark commences and the 1st stage gas valve is energized for the trial for ignition period. (If the burners fail to light or carryover during a trial for ignition, the control will attempt two additional ignition trials. If no flame is present at the flame sensor within 10 seconds, the spark and gas valve will be de-energized. A 15 second inter- purge period begins and the combustion blower continues to run. After the inter-purge period another ignition trial will take place. If burner fails to light or prove the flame sensor following the two additional trials the control will go into lockout. The valve relay in the ignition control will be de-energized shutting of the gas valve immediately and the combustion blower following a 30 second post-purge period. If the thermostat (controller) is still calling for heat one hour after a lockout occurs, the control will automatically reset and initiate a call for heat sequence.)
7. Burners ignite and cross light. Timer relay control is powered (terminal 7) simultaneously and begins timing a 90 second warm-up period while maintaining the combustion blower at high speed and powers the SC30. The SC30 will output 12 to 13VDC to the modulating control valve during the timing duration (90 seconds) of timer relay control regardless of the analog input signal to SC30 terminals 7 & 8.
8. When flame is detected by flame sensor, the spark is shut-off immediately and gas valve(s) and combustion blower remain energized.
9. When the initial timer in timer relay control times out, it defaults the gas valve to low fire and the combustion blower to low speed and returns control of the operating mode to the building temperature controller.

10. If the controller is providing an analog signal between 0.5 and 5.3VDC to the SC30 control, the system will continue to run at low speed combustion blower and with only the 1st stage valve open. The modulating valve will be powered proportional to the input voltage signal from the controller, and will open or close changing the gas manifold pressure. Manifold pressure will vary from 0.3 to 1.2 “w.c. (0.75-3.0 mbar) operating in this mode.
11. If the signal increases above 5.3VDC, the SC30 relay closes powering terminal 6 on the timer relay control, and starts a second time delay of 15 seconds. At the end of this time delay the fan switches to high speed and the 2nd stage gas valve opens through the timer relay control (terminal 9) provided the high air switch contacts are closed. The manifold pres- sure will vary from 1.4 to 3.5” w.c. (3.5-8.7 mbar)in this mode.
12. During heating operation, the thermostat, pres- sure switch and main burner flame are constantly monitored by the ignition control to assure proper system operation.
13. Operation continues in the high fire mode until the controller input signal to the SC30 control drops to 4. VDC. At this point the SC30 relay circuit opens (SC30 terminal 5 has no output) de-energizing the 2nd stage valve and the timer relay control switches the combustion blower to low speed operation. Low-fire modulation will continue as in Step 10.
14. When the thermostat (temperature controller) is satisfied and the demand for heat ends, the heat enable contact opens and the 1st stage valve is de-energized immediately, the control senses loss of flame and a 30 second post- purge occurs (at high speed) before de-energizing the combustion blower.

Figure 8: Example Gas Heater Wiring Diagram - 10:1 Modulation

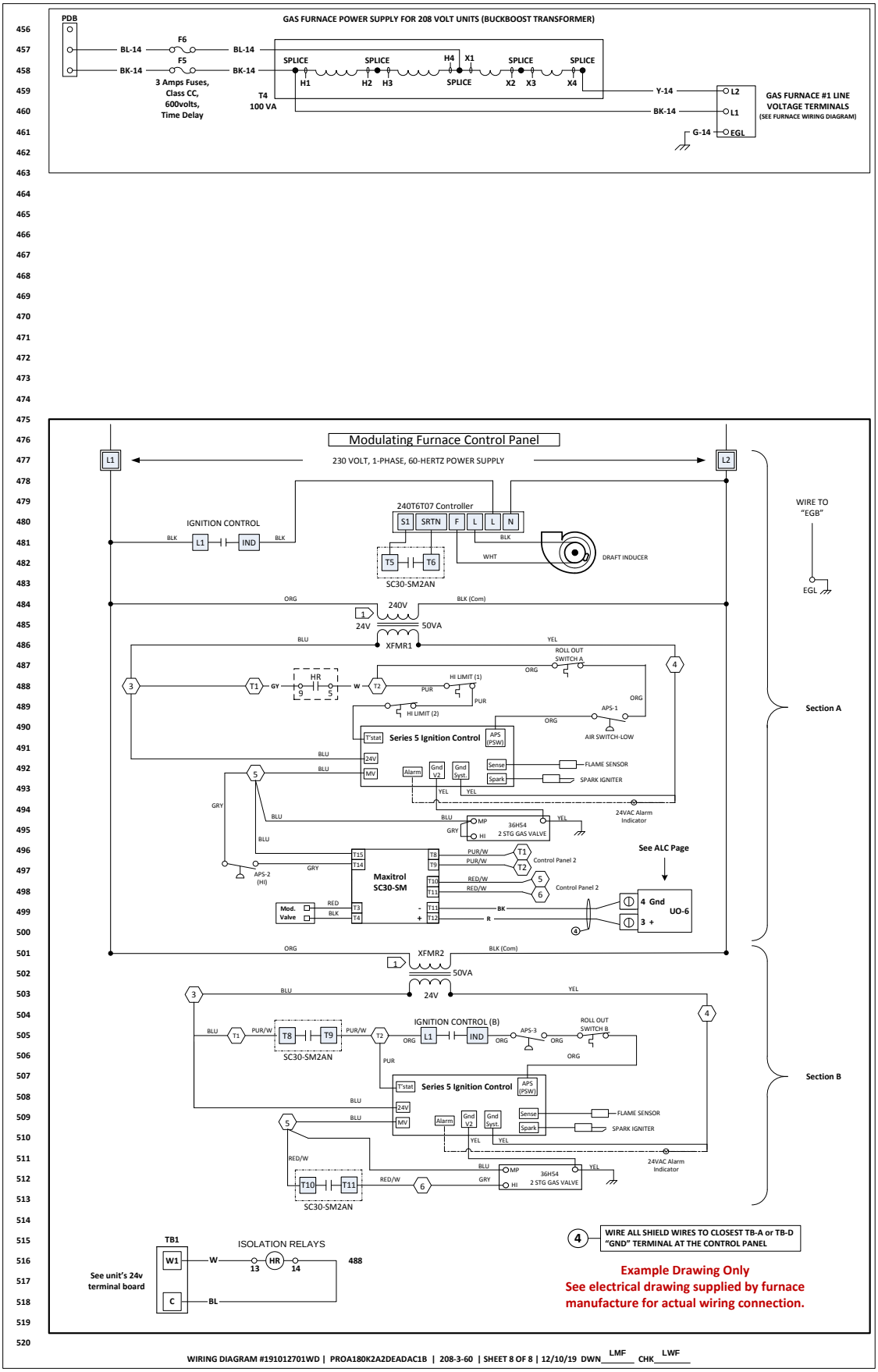
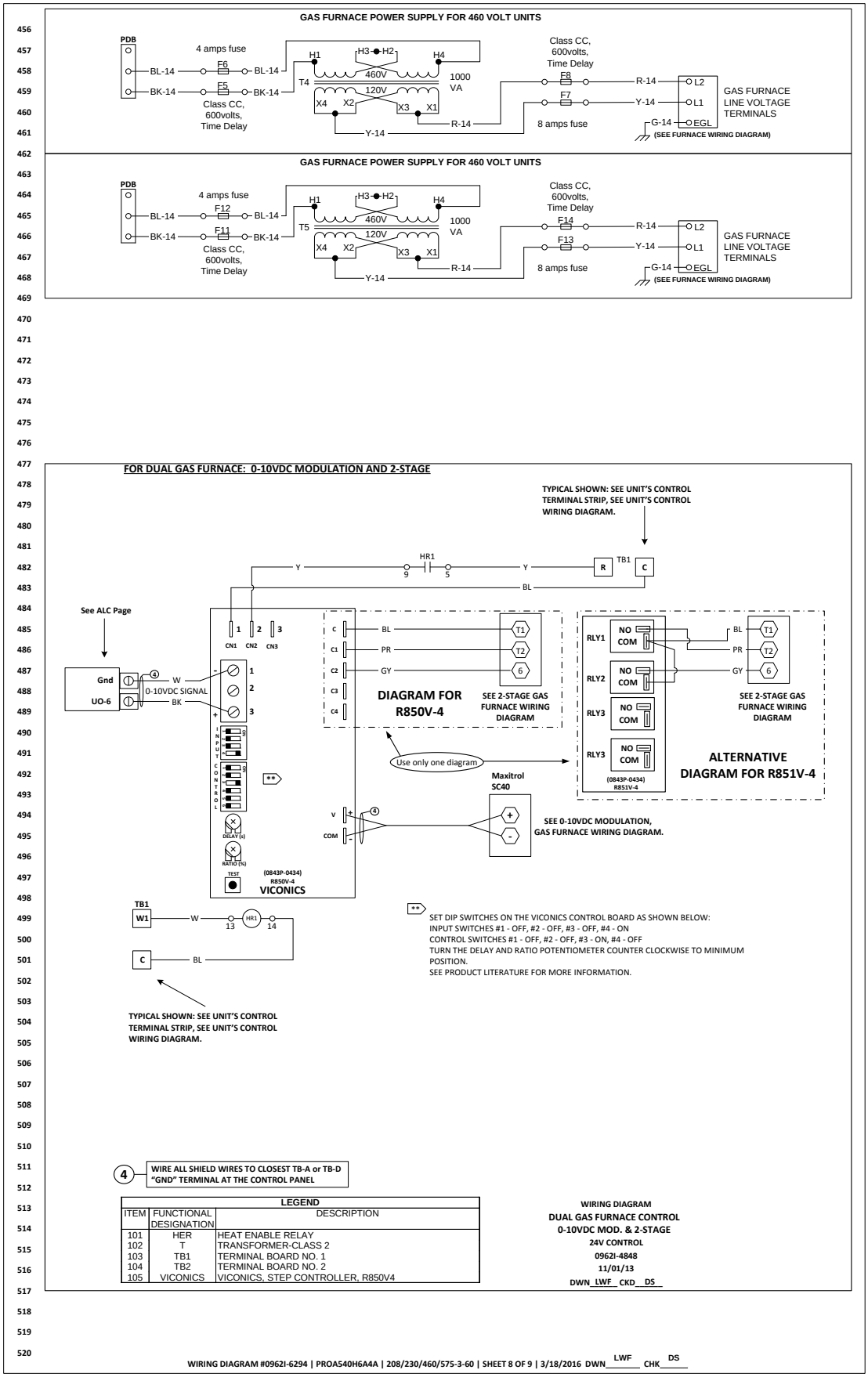


Figure 9: Example Gas Heater Wiring Diagram - Dual Furnace



Section 12:
Electric Heater Packages:

12.1 Principle of Operation

The electric heater is a self-contained duct heater comprised of:

- Power distribution
- Safety circuits
- Control circuit
- Heating elements

12.2 Operating and Safety Controls

Safety systems are required for proper performance of the electric heater. The electric heater 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 electric heating equipment, using only components that are sold and supplied by the manufacturer.

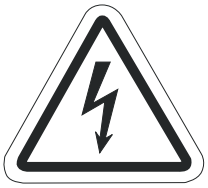
- **Air Proving Switch:** An air proving switch is provided as part of the control system to verify airflow across the elements. If sufficient airflow is not present, indicating lack of proper air movement through the elements, the switch opens shutting off the elements. The air proving switch has fixed settings and is not adjustable.
- **Automatic Limit Switch:** To prevent operation of the electric heater under low airflow conditions, the unit is equipped with a fixed temperature high limit switch mounted on the vestibule panel. This switch will shut off heater when the actual discharge air temperature exceeds the switch's setpoint. Reduced airflow may be caused by restrictions upstream or downstream of the circulating air blower, such as dirty or blocked filters or restriction of the air inlet or outlet to the unit.

12.3 Wiring

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

- United States: Refer to National Electric Code®, NFPA 70 - latest revision.
- Canada: Refer to Canadian Electric Code, CSA C22.1 Part 1 - latest revision.
- Check rating plate on unit for supply voltage and current requirements (located in the control panel access door of the heater).
- If any of the original control wire supplied with the electric heater must be replaced, replace it with type THHN 221° F (105°C), 600 V, 16 gauge wire or equivalent.
- Electric heaters are pre-wired for single point power termination.

⚠ DANGER



ELECTRICAL SHOCK HAZARD
Disconnect electric before service. More than one disconnect switch may be required to disconnect electric from equipment. Equipment must always be properly grounded.

SEVERE INJURY HAZARD
Do not enter equipment while in operation. Equipment may start automatically. Do not operate with access doors open. Installation, operation, and maintenance must be performed by a trained technician only.

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

⚠ 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.

BURN HAZARD
Allow equipment to cool before service. Internal components of equipment may still be hot after operation.

CUT/PINCH HAZARD
Wear protective gear during installation, operation, or maintenance. Edges are sharp.

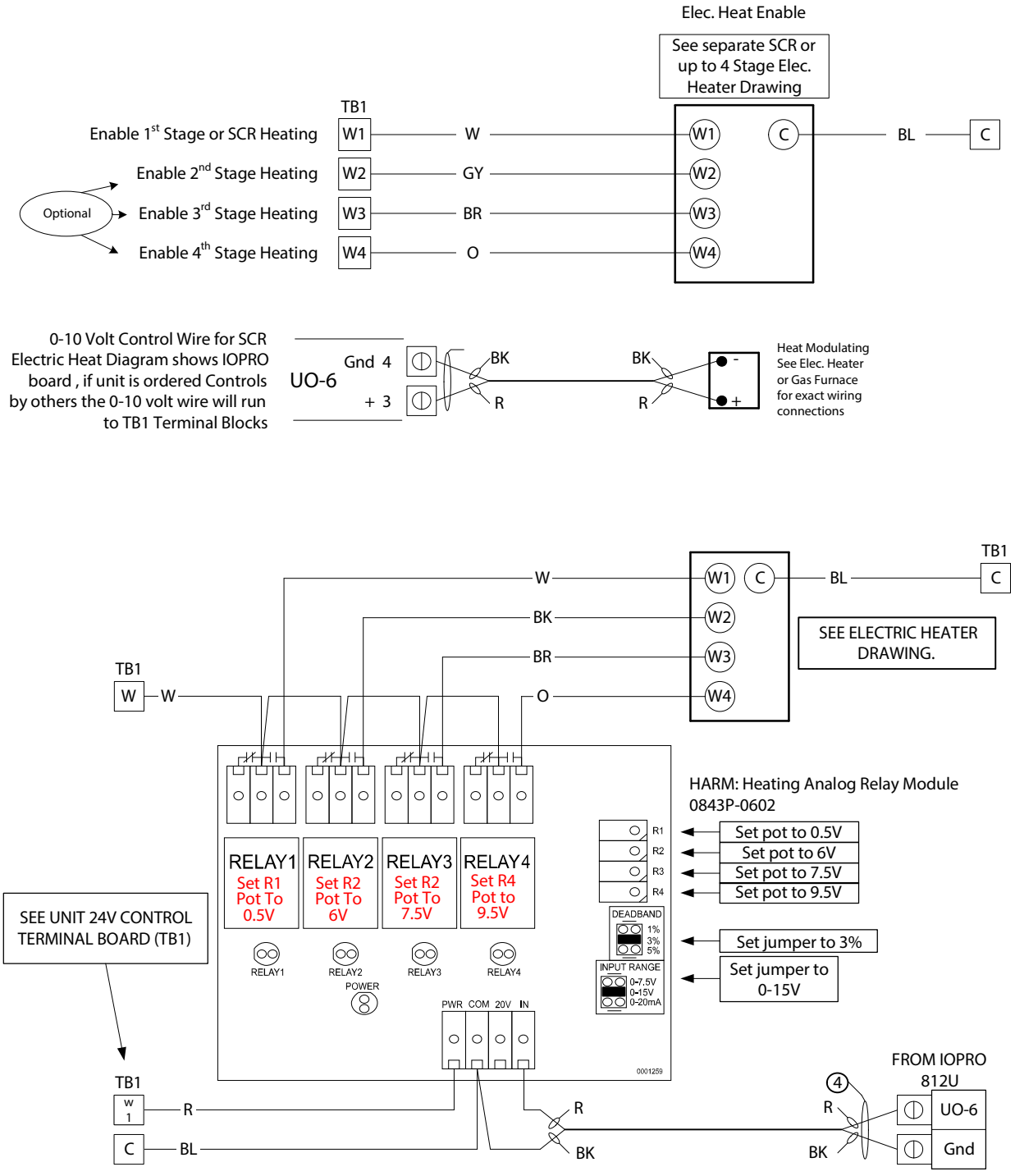
Failure to follow these instructions can result in death, injury, or property damage.

Table 3: Standard Electric Heaters

Model	Function	Minimum CFM	Maximum CFM	Minimum kW	Maximum kW*
120	OA	875	3850	10	80
150		875	3850	10	80
180		875	3850	10	80
210		1500	6600	10	100
240		1500	6600	10	100
241		1500	6600	10	150
299		1500	6600	10	100
300		1500	6600	10	150
360		2000	8800	15	150
420		2000	8800	15	150
480		2666	11733	20	150
540		2666	11733	20	150
541		3333	14666	25	150
640		3333	14666	25	150
660		3333	14666	25	150
720		3333	14666	25	150
840		4166	18333	30	150
960		4166	18333	30	150
09T		4166	18333	30	150

*Note 1: Heaters rated at 460V. De-rate maximum kW by 25% for 208V. Larger heater sizes available on select models via applied special. Consult Applications.

Figure 10: Typical Electric Heater Wiring Diagram



Section 13: Unit Electrical:

Each unit is equipped with a wiring diagram (permanently attached behind clear view plastic on the inside of the control compartment door or on laminated sheets in an inside compartment) which will vary depending on the type of controls and options supplied. Check unit data plate for unit electrical data.

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

13.1 Wiring and Electrical Connections

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

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

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

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

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

13.2 Disconnect

An external weather-tight disconnect switch properly sized for the unit total load is required for each unit. This disconnect can be supplied by the factory or supplied by others. Do not use the unit disconnect as a method of on/off control. Use the operating controller or thermostat to shut down the unit.

13.3 Current Draw

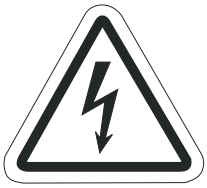
For current requirements of the unit, refer to the unit rating plate.

13.4 Wiring Connections

Power wiring should be connected to the main power terminal block located within the unit main control section. Power wiring connections on units with factory-mounted disconnects should be made at the line side of disconnect. Main power wiring should be sized for the minimum wire ampacity shown on the unit rating plate.

For your safety, make sure that the unit has been properly grounded at ground lug connection. Do not obstruct service panels or service areas with electrical gear.

⚠ DANGER



ELECTRICAL SHOCK HAZARD
Disconnect electric before service. More than one disconnect switch may be required to disconnect electric from equipment. Equipment must always be properly grounded.

13.5 Voltage Unbalance

The power supply should be checked against the unit nameplate characteristics. It must be within 10% of rated voltage and not more than 2% phase unbalance. The power supply cables must be sized to carry the minimum circuit ampacity listed on the nameplate.

Once it is established that supply voltage is within the utilization range; check and calculate if an unbalanced condition exists between phases. Calculate percent voltage unbalance as follows:

Percent Voltage Unbalance = 100x (Maximum Voltage Deviation From Average Voltage ÷ Average Voltage)

For Example – With voltage of 220, 215 and 210 (Measure L1-L2, L1-L3, L2-L3)

Average voltage = 645 ÷ 3 = 215
Maximum voltage deviation from Average voltage = 220 – 215 = 5

$$\text{Percent Voltage Unbalance} = \frac{100 \times 5}{215} = \frac{500}{215} = 2.3\%$$

Percent voltage unbalance must not exceed (2%) two percent. Contact Power Company if phase unbalance exceeds 2%. A means of disconnecting power from the unit must be placed adjacent to the unit in accordance with national electrical code or local codes. Aluminum power wire is not recommended.

13.6 Low Voltage Wiring

For commercial equipment the following table lists the minimum size of 24-volt class 2 wire to be used.

Table 4: Low Voltage Wiring Lengths

Wire Size	Distance From Unit, or Longest Run
18 AWG	Maximum Run - 50 Feet
16 AWG	Maximum Run - 75 Feet
14 AWG	Maximum Run - 100 - 125 Feet
12 AWG	Maximum Run - 150 - 200 Feet

Figure 11a: Typical Electrical Wiring Diagram

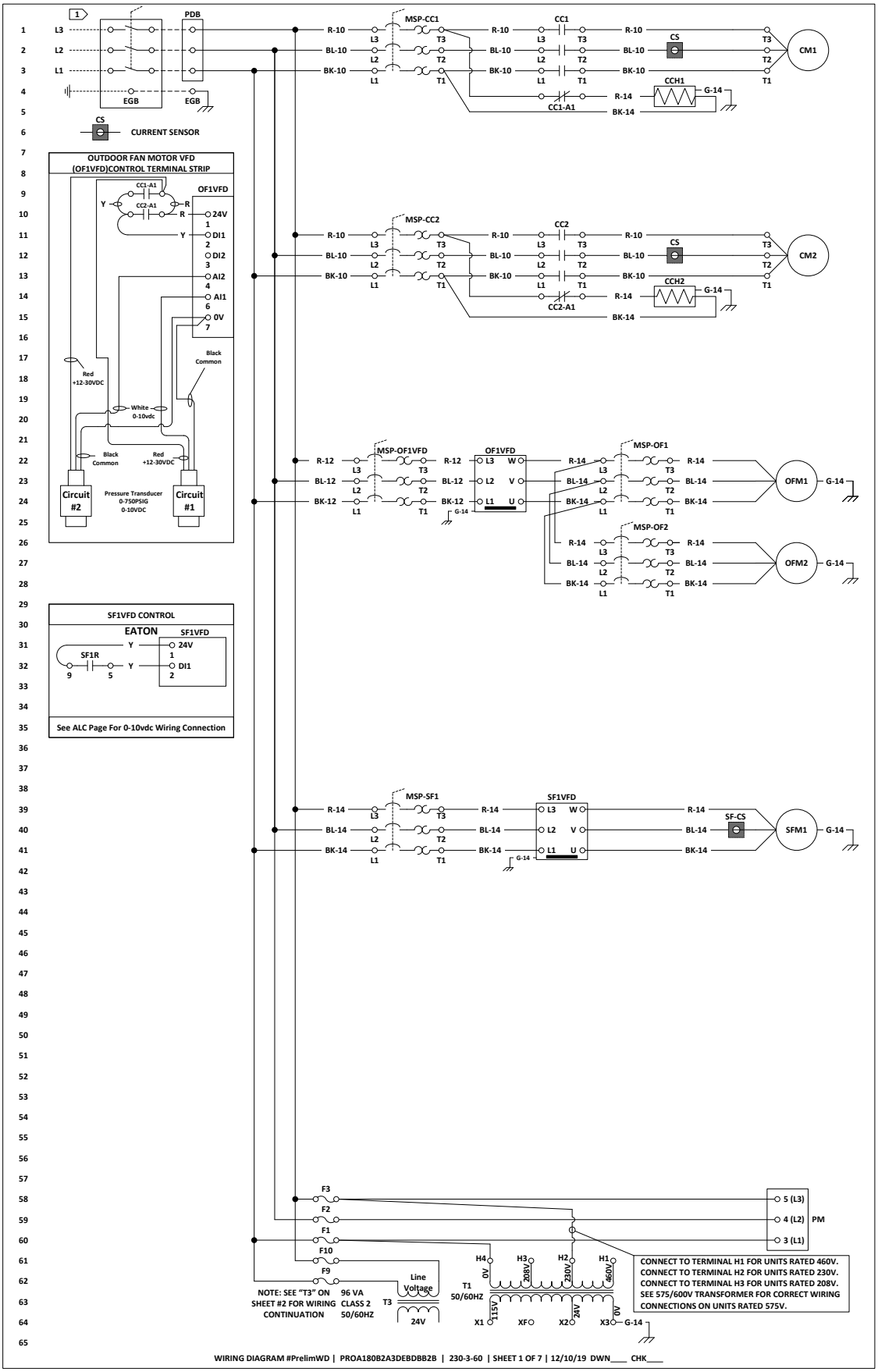


Figure 11b: Typical Electrical Wiring Diagram

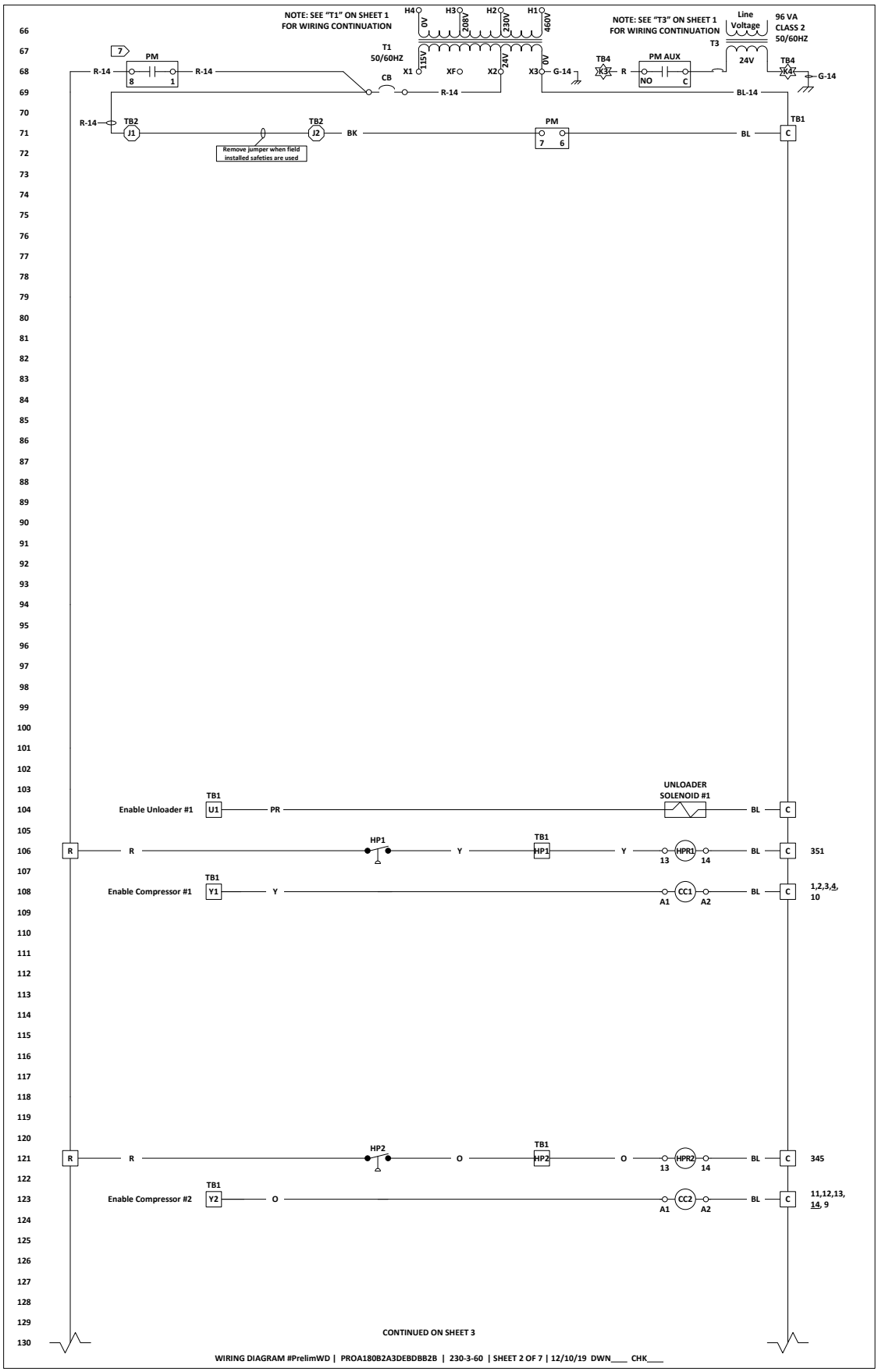


Figure 11c: Typical Electrical Wiring Diagram

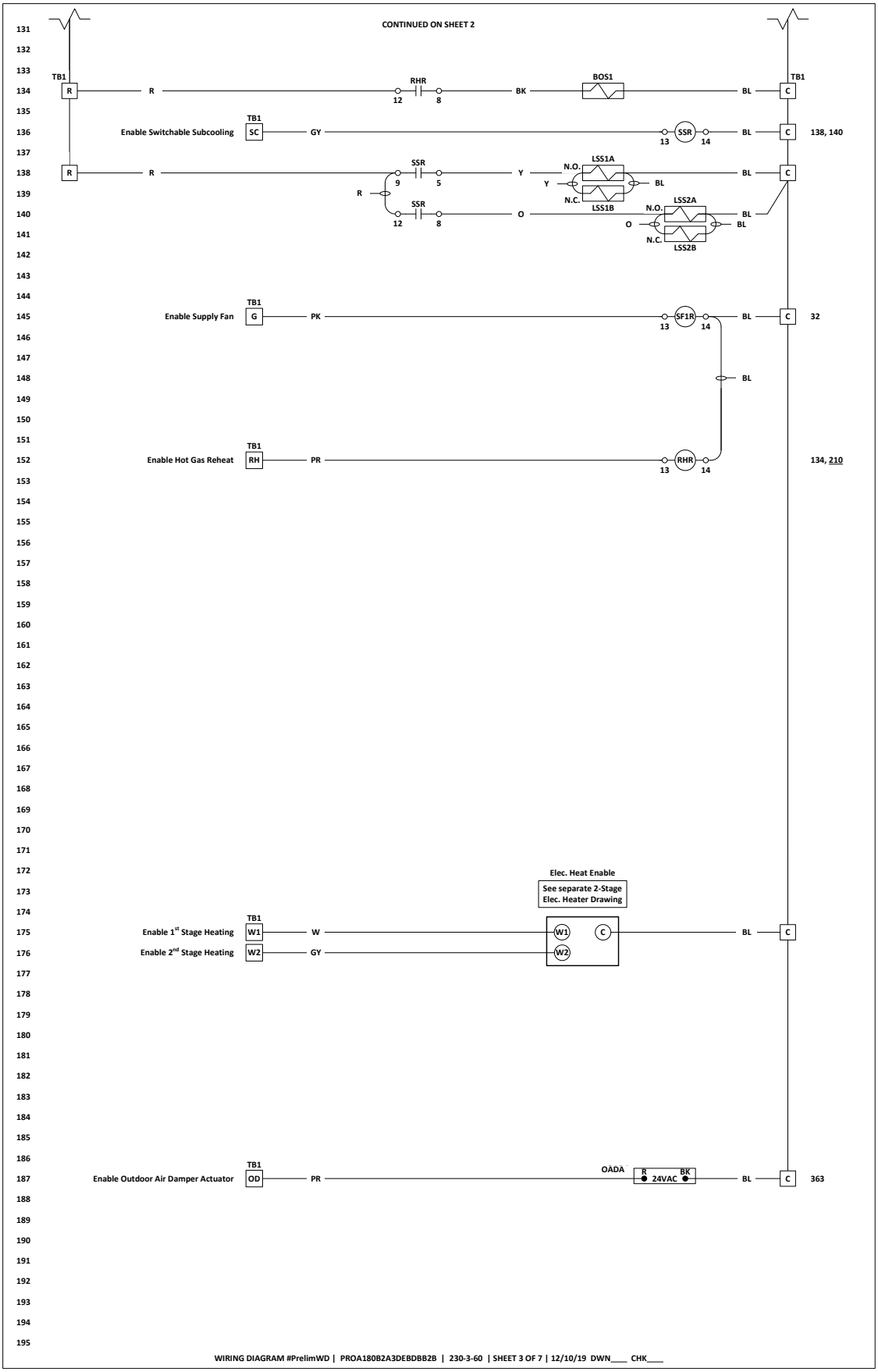


Figure 11d: Typical Electrical Wiring Diagram

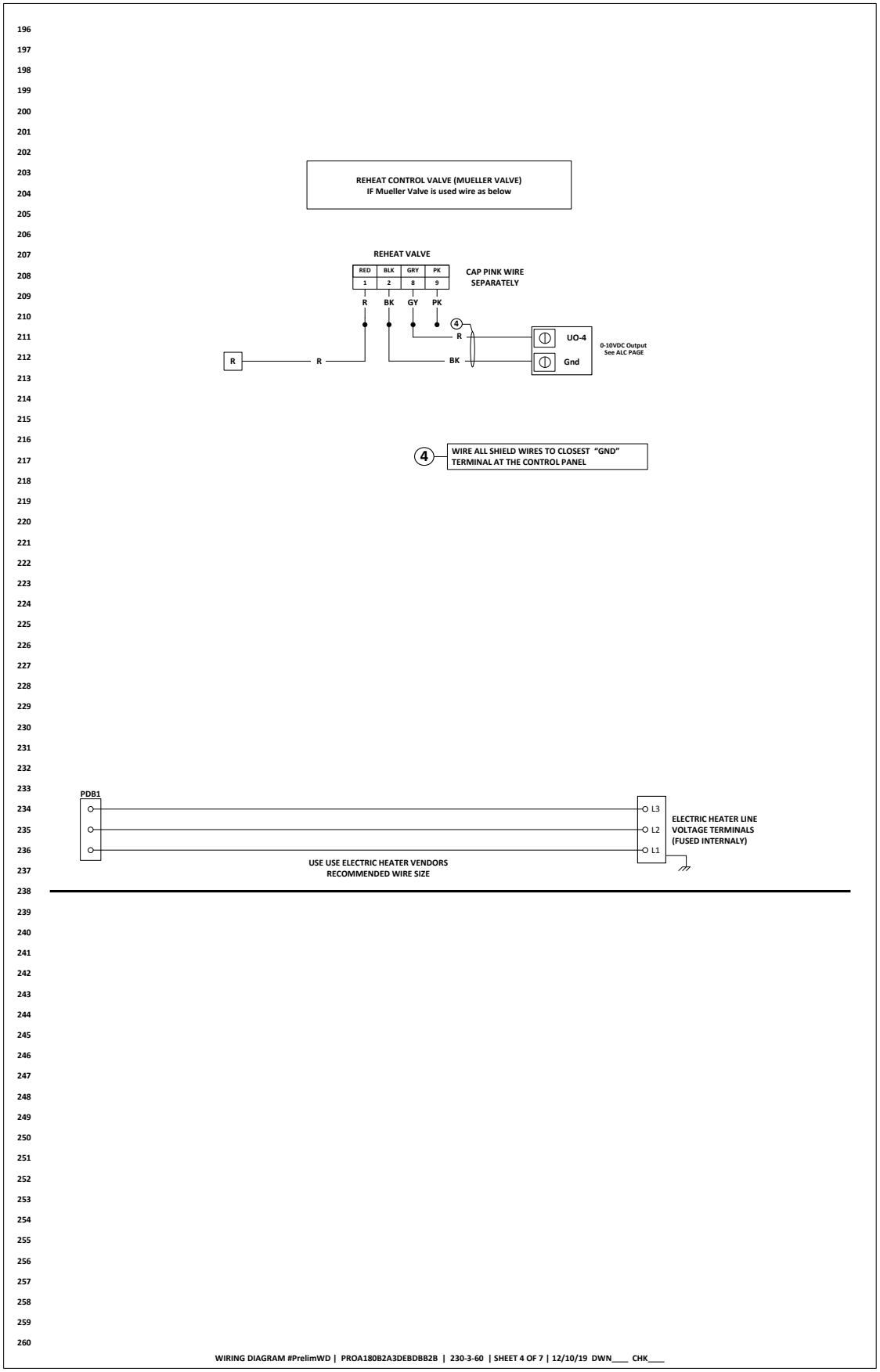
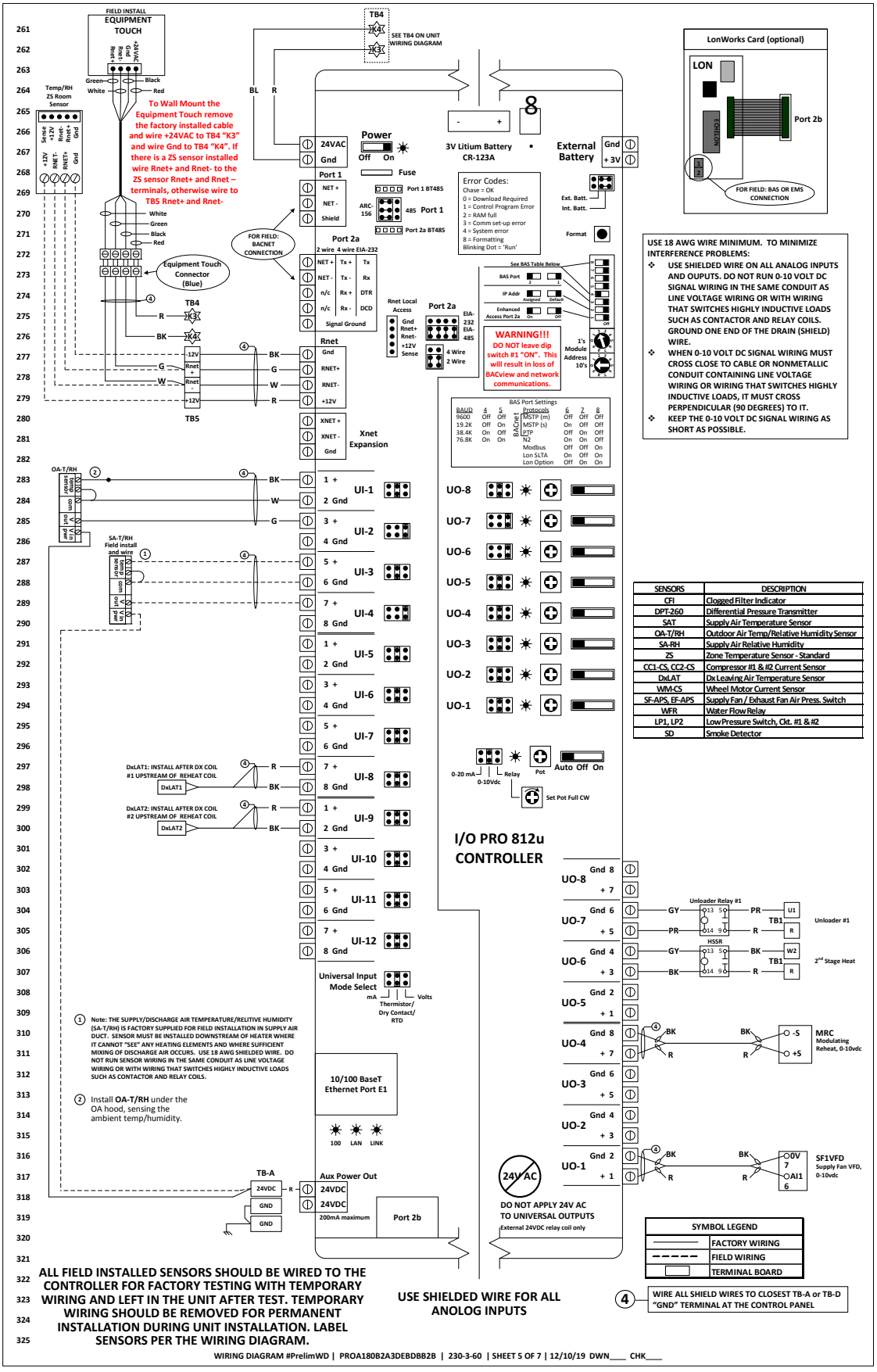


Figure 11e: Typical Electrical Wiring Diagram



SENSORS	DESCRIPTION
CFI	Clogged Filter Indicator
DPT-260	Differential Pressure Transmitter
SAT	Supply Air Temperature Sensor
OA-T/RH	Outdoor Air Temp/Relative Humidity Sensor
SA-RH	Supply Air Relative Humidity
ZS	Zone Temperature Sensor - Standard
CC1-CS, CC2-CS	Compressor #1 & #2 Current Sensor
DxLAT	Dx Leaving Air Temperature Sensor
WMI-CS	Wheel Motor Current Sensor
SF-APS, EF-APS	Supply Fan / Exhaust Fan Air Press. Switch
WFR	Water Flow Relay
LP1, LP2	Low Pressure Switch, Ckt. #1 & #2
SD	Smoke Detector

Figure 11f: Typical Electrical Wiring Diagram

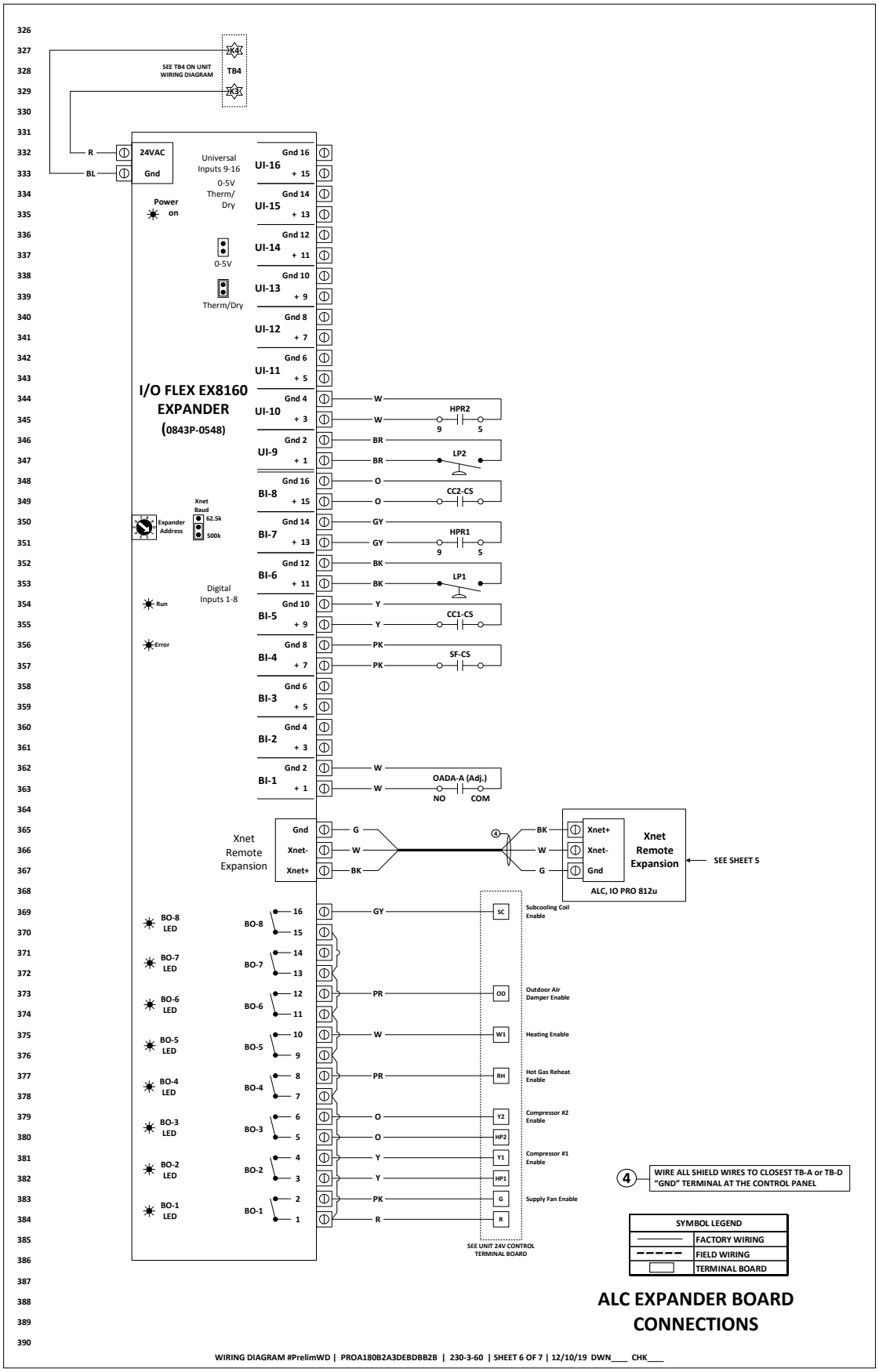
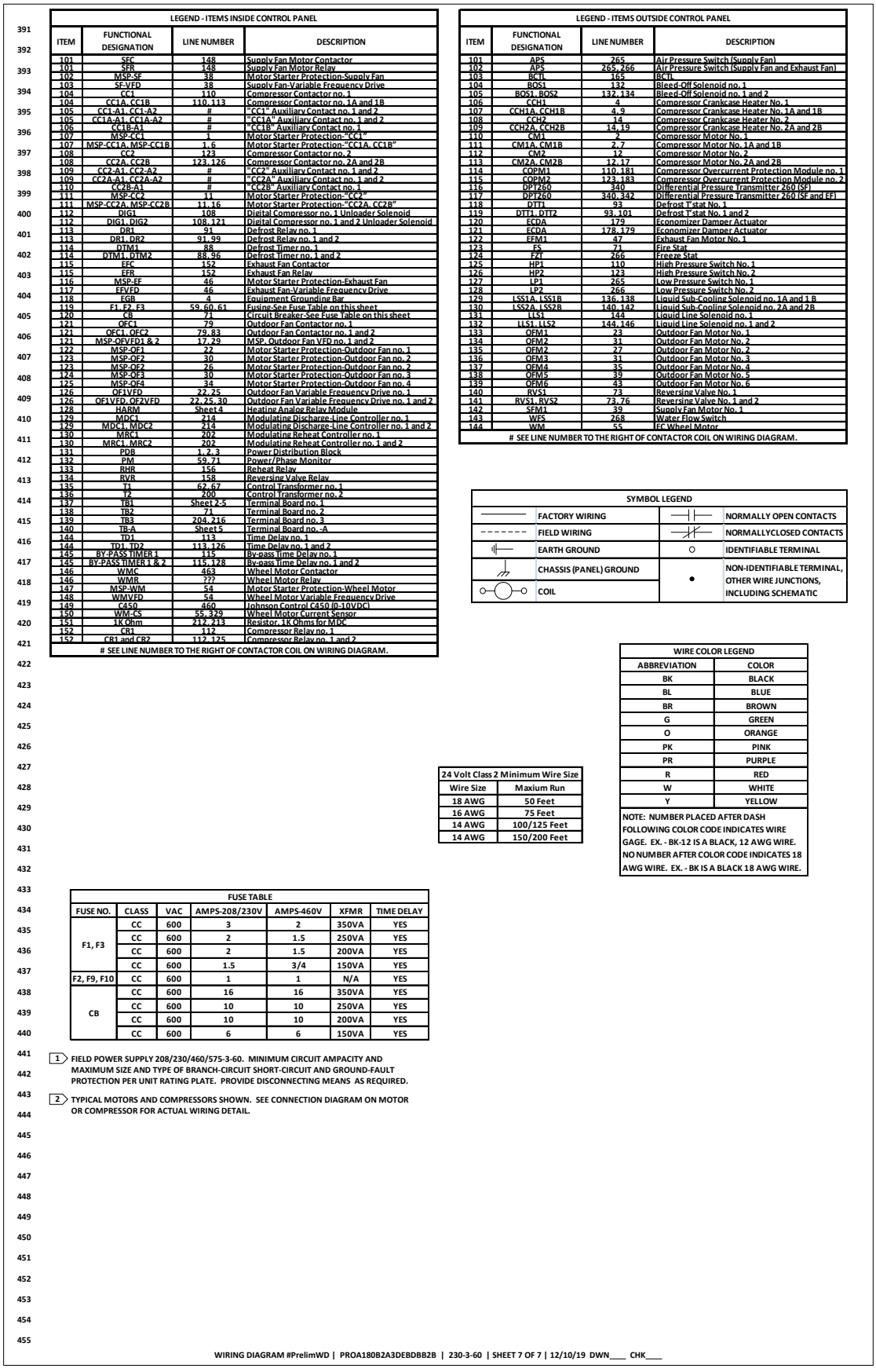


Figure 11g: Typical Electrical Wiring Diagram



LEGEND - ITEMS INSIDE CONTROL PANEL			
ITEM	FUNCTIONAL DESIGNATION	LINE NUMBER	DESCRIPTION
101	SFC	148	Supply Fan Motor Contactor
101	SFR	148	Supply Fan Motor Relay
102	MSP-SF	38	Motor Starter Protection-Supply Fan
103	SF-VFD	38	Supply Fan-Variable Frequency Drive
104	CC1	110	Compressor Contactor no. 1
104	CC1A, CC1B	110,113	Compressor Contactor no. 1A and 1B
105	CC1-A1, CC1-A2	#	"CC1" Auxiliary Contact no. 1 and 2
105	CC1A-A1, CC1A-A2	#	"CC1A" Auxiliary Contact no. 1 and 2
106	CC1B-A1	#	"CC1B" Auxiliary Contact no. 1
107	MSP-CC1	1	Motor Starter Protection-"CC1"
107	MSP-CC1A, MSP-CC1B	1, 6	Motor Starter Protection-"CC1A, CC1B"
108	CC2	123	Compressor Contactor no. 2
108	CC2A, CC2B	123,126	Compressor Contactor no. 2A and 2B
109	CC2-A1, CC2-A2	#	"CC2" Auxiliary Contact no. 1 and 2
109	CC2A-A1, CC2A-A2	#	"CC2A" Auxiliary Contact no. 1 and 2
110	CC2B-A1	#	"CC2B" Auxiliary Contact no. 1
111	MSP-CC2	11	Motor Starter Protection-"CC2"
111	MSP-CC2A, MSP-CC2B	11, 16	Motor Starter Protection-"CC2A, CC2B"
112	DIG1	108	Digital Compressor no. 1 Unloader Solenoid
112	DIG1, DIG2	108, 121	Digital Compressor no. 1 and 2 Unloader Solenoid
113	DR1	91	Defrost Relay no. 1
113	DR1, DR2	91, 99	Defrost Relay no. 1 and 2
114	DTM1	88	Defrost Timer no. 1
114	DTM1, DTM2	88, 96	Defrost Timer no. 1 and 2
115	EFC	152	Exhaust Fan Contactor
115	EFR	152	Exhaust Fan Relay
116	MSP-EF	46	Motor Starter Protection-Exhaust Fan
117	EFVFD	46	Exhaust Fan-Variable Frequency Drive
118	FGB	4	Equipment Grounding Bar
119	F1, F2, F3	59, 60, 61	Fusing-See Fuse Table on this sheet
120	CB	71	Circuit Breaker-See Fuse Table on this sheet
121	OFC1	79	Outdoor Fan Contactor no. 1
121	OFC1, OFC2	79, 83	Outdoor Fan Contactor no. 1 and 2
121	MSP-OFVFD1 & 2	17, 29	MSP, Outdoor Fan VFD no. 1 and 2
122	MSP-OF1	22	Motor Starter Protection-Outdoor Fan no. 1
123	MSP-OF2	30	Motor Starter Protection-Outdoor Fan no. 2
123	MSP-OF2	26	Motor Starter Protection-Outdoor Fan no. 2
124	MSP-OF3	30	Motor Starter Protection-Outdoor Fan no. 3
125	MSP-OF4	34	Motor Starter Protection-Outdoor Fan no. 4
126	OF1VFD	22, 25	Outdoor Fan Variable Frequency Drive no. 1
126	OF1VFD, OF2VFD	22, 25, 30	Outdoor Fan Variable Frequency Drive no. 1 and 2
128	HARM	Sheet 4	Heating Analog Relay Module
129	MDC1	214	Modulating Discharge-Line Controller no. 1
129	MDC1, MDC2	214	Modulating Discharge-Line Controller no. 1 and 2
130	MRC1	202	Modulating Reheat Controller no. 1
130	MRC1, MRC2	202	Modulating Reheat Controller no. 1 and 2
131	PDB	1, 2, 3	Power Distribution Block
132	PM	59, 71	Power/Phase Monitor
133	RHR	156	Reheat Relay
134	RVR	158	Reversing Valve Relay
135	T1	62, 67	Control Transformer no. 1
136	T2	200	Control Transformer no. 2
137	TB1	Sheet 2-5	Terminal Board no. 1
138	TB2	71	Terminal Board no. 2
139	TB3	204, 216	Terminal Board no. 3
140	TB-A	Sheet 5	Terminal Board no. -A
144	TD1	113	Time Delay no. 1
144	TD1, TD2	113, 126	Time Delay no. 1 and 2
145	BY-PASS TIMER 1	115	By-pass Time Delay no. 1
145	BY-PASS TIMER 1 & 2	115, 128	By-pass Time Delay no. 1 and 2
146	WMC	463	Wheel Motor Contactor
146	WMR	???	Wheel Motor Relay
147	MSP-WM	54	Motor Starter Protection-Wheel Motor
148	WMVFD	54	Wheel Motor Variable Frequency Drive
149	C450	460	Johnson Control C450 (0-10VDC)
150	WM-CS	55, 329	Wheel Motor Current Sensor
151	1K Ohm	212, 213	Resistor, 1K Ohms for MDC
152	CR1	112	Compressor Relay no. 1
152	CR1 and CR2	112, 125	Compressor Relay no. 1 and 2
# SEE LINE NUMBER TO THE RIGHT OF CONTACTOR COIL ON WIRING DIAGRAM.			

LEGEND - ITEMS OUTSIDE CONTROL PANEL			
ITEM	FUNCTIONAL DESIGNATION	LINE NUMBER	DESCRIPTION
101	APS	265	Air Pressure Switch (Supply Fan)
102	APS	265, 266	Air Pressure Switch (Supply Fan and Exhaust Fan)
103	BCTL	165	BCTL
104	BOS1	132	Bleed-Off Solenoid no. 1
105	BOS1, BOS2	132, 134	Bleed-Off Solenoid no. 1 and 2
106	CCH1	4	Compressor Crankcase Heater No. 1
107	CCH1A, CCH1B	4, 9	Compressor Crankcase Heater No. 1A and 1B
108	CCH2	14	Compressor Crankcase Heater No. 2
109	CCH2A, CCH2B	14, 19	Compressor Crankcase Heater No. 2A and 2B
110	CM1	2	Compressor Motor No. 1
111	CM1A, CM1B	2, 7	Compressor Motor No. 1A and 1B
112	CM2	12	Compressor Motor No. 2
113	CM2A, CM2B	12, 17	Compressor Motor No. 2A and 2B
114	COPM1	110, 181	Compressor Overcurrent Protection Module no. 1
115	COPM2	123, 183	Compressor Overcurrent Protection Module no. 2
116	DPT260	340	Differential Pressure Transmitter 260 (SF)
117	DPT260	340, 342	Differential Pressure Transmitter 260 (SF and EF)
118	DTT1	93	Defrost T'stat No. 1
119	DTT1, DTT2	93, 101	Defrost T'stat No. 1 and 2
120	ECDA	179	Economizer Damper Actuator
121	ECDA	178, 179	Economizer Damper Actuator
122	EFM1	47	Exhaust Fan Motor No. 1
123	FS	71	Fire Stat
124	FZT	266	Freeze Stat
125	HP1	110	High Pressure Switch No. 1
126	HP2	123	High Pressure Switch No. 2
127	LP1	265	Low Pressure Switch No. 1
128	LP2	266	Low Pressure Switch No. 2
129	LSS1A, LSS1B	136, 138	Liquid Sub-Cooling Solenoid no. 1A and 1 B
130	LSS2A, LSS2B	140, 142	Liquid Sub-Cooling Solenoid no. 2A and 2B
131	LLS1	144	Liquid Line Solenoid no. 1
132	LLS1, LLS2	144, 146	Liquid Line Solenoid no. 1 and 2
133	OFM1	23	Outdoor Fan Motor No. 1
134	OFM2	31	Outdoor Fan Motor No. 2
135	OFM2	27	Outdoor Fan Motor No. 2
136	OFM3	31	Outdoor Fan Motor No. 3
137	OFM4	35	Outdoor Fan Motor No. 4
138	OFM5	39	Outdoor Fan Motor No. 5
139	OFM6	43	Outdoor Fan Motor No. 6
140	RVS1	72	Reversing Valve No. 1
141	RVS1, RVS2	73, 76	Reversing Valve No. 1 and 2
142	SFM1	39	Supply Fan Motor No. 1
143	WFS	268	Water Flow Switch
144	WM	55	EC Wheel Motor
# SEE LINE NUMBER TO THE RIGHT OF CONTACTOR COIL ON WIRING DIAGRAM.			

SYMBOL LEGEND			
	FACTORY WIRING		NORMALLY OPEN CONTACTS
	FIELD WIRING		NORMALLYCLOSED CONTACTS
	EARTH GROUND	○	IDENTIFIABLE TERMINAL
	CHASSIS (PANEL) GROUND	•	NON-IDENTIFIABLE TERMINAL, OTHER WIRE JUNCTIONS, INCLUDING SCHEMATIC
	COIL		

WIRE COLOR LEGEND	
ABBREVIATION	COLOR
BK	BLACK
BL	BLUE
BR	BROWN
G	GREEN
O	ORANGE
PK	PINK
PR	PURPLE
R	RED
W	WHITE
Y	YELLOW

NOTE: NUMBER PLACED AFTER DASH FOLLOWING COLOR CODE INDICATES WIRE GAGE. EX. - BK-12 IS A BLACK, 12 AWG WIRE. NO NUMBER AFTER COLOR CODE INDICATES 18 AWG WIRE. EX. - BK IS A BLACK 18 AWG WIRE.

24 Volt Class 2 Minimum Wire Size	
Wire Size	Maxium Run
18 AWG	50 Feet
16 AWG	75 Feet
14 AWG	100/125 Feet
14 AWG	150/200 Feet

FUSE TABLE						
FUSE NO.	CLASS	VAC	AMPS-208/230V	AMPS-460V	XFMR	TIME DELAY
F1, F3	CC	600	3	2	350VA	YES
	CC	600	2	1.5	250VA	YES
	CC	600	2	1.5	200VA	YES
	CC	600	1.5	3/4	150VA	YES
F2, F9, F10	CC	600	1	1	N/A	YES
CB	CC	600	16	16	350VA	YES
	CC	600	10	10	250VA	YES
	CC	600	10	10	200VA	YES
	CC	600	6	6	150VA	YES

1 FIELD POWER SUPPLY 208/230/460/575-3-60. MINIMUM CIRCUIT AMPACITY AND MAXIMUM SIZE AND TYPE OF BRANCH-CIRCUIT SHORT-CIRCUIT AND GROUND-FAULT PROTECTION PER UNIT RATING PLATE. PROVIDE DISCONNECTING MEANS AS REQUIRED.

2 TYPICAL MOTORS AND COMPRESSORS SHOWN. SEE CONNECTION DIAGRAM ON MOTOR OR COMPRESSOR FOR ACTUAL WIRING DETAIL.

WIRING DIAGRAM #PrelimWD | PROA180B2A3DEBDBB2B | 230-3-60 | SHEET 7 OF 7 | 12/10/19 DWN___ CHK___

Figure 12a: Phase Monitor Data

Purpose

The purpose of the DPM (Digital Phase Monitor) is to monitor the line voltage supplying single and three phase systems, providing the opportunity to disconnect equipment if the voltages are outside of the selectable operational parameters.

Operation

If the voltages and rotation are within the selectable set-up parameters, the DPM will energize the internal relays, transferring the output contacts. If the voltages and/or rotation are outside any of the set-up parameters, the DPM internal relays will not energized.

If the line voltage does not meet all of the set-up parameters, the Default screen will toggle between the voltage screen showing the actual voltages and words describing the fault.

During transitions to relays energized or relays de-energized, the remaining time in seconds is displayed above the present relay condition ("ON" or "off").

General Operational Specifications

Line Voltages Monitored: 200 to 240VAC, 1Ø, 50/60Hz
200 to 600VAC, 3Ø, 50/60Hz

Faults:
- Overvoltage
- Undervoltage
- Phase Loss
- Phase Rotation
- Phase Imbalance
- Frequency Out of Range

Set-Up: Membrane Buttons & Digital Display
- Nominal Line Voltage
- Over/Undervoltage percentage (7% to 15%)
- Trip Time Delay (2 seconds to 10 seconds)
- Re-Start Time Delay (Manual Reset to 4 minutes)
- Phase Imbalance Percentage (3% to 10%)

Screens:
- Manufacture Name and Firmware Version
- Average Voltage, Frequency, Imbalance, Relay Status
- A-B, B-C & C-A Voltages, Relay Status
- Nominal Voltage Selection
  (Pay attention to 1Ø and 3Ø at the end of the voltages)
- Over/Undervoltage Percentage Selection
- Trip Time Delay
- Re-Start Time Delay
- Phase Imbalance Percentage Selection
- History with Last 4 Faults
- (Wraps back to Manufacture Name and Firmware Version)

Custom Set-Up

The DPM uses 4 membrane buttons to allow the customer to change the set-up criteria for their particular line voltage and preferred parameters. The following listings show the arrangement and selections available by moving through the menu choices. The membrane buttons allow for movement right or left with wrap around to selection criteria and up and down within a selection for specific parameters.

You can select the set-up parameters with only the supply voltage connected.

Example: From the Default screen (A-B, B-C & C-A voltages with relay status) pressing the right Arrow will take you to the line voltage selection parameters. If you want to change the nominal voltage to a different voltage, press the Up or Down arrows. Once you have the line voltage (and number of phases) that you want displayed on the screen:

1. Pressing either the Right or Left arrow will set the new line voltage parameter into memory and take you to the next screen, or
2. After 30 seconds of no action, the new voltage parameter will be set into memory and the screen will go back to the default screen.

Figure 12b: Phase Monitor Data

Example: If you want to change the Re-Start Delay to 3 minutes (default is 2 minutes) and you are on the Default screen:

1. Press the Right arrow until you get to the Re-Start Delay screen
2. Press the Up button until you have 3 Minutes on the screen
3. Pressing either the Right or Left arrow will set the new Re-Start Delay into memory and take you to the next screen, or
4. After 30 seconds of no action, the new Re-Start Delay will be set into memory and the screen will go back to the Default screen.

DPM with tabs
(cover shows DPM with blocks)

Screens

Manufacturer's Screen
R-K Electronics
DPM v0.0.00

Average Voltage Screen
VAvg Imb Hz
460 0 60 off

Default –
The Default screen shows the real time voltage detected on each of the 3 phases:
A-B B-C C-A
460 459 461 ON

Voltage Selection Screen (Vertical Format)
200, 1Ø; 208, 1Ø; 220, 1Ø; 230, 1Ø; 240, 1Ø;
200, 3Ø; 208, 3Ø; 220, 3Ø; 230, 3Ø; 240, 3Ø; 380, 3Ø; 415, 3Ø; 440, 3Ø;
460, 3Ø; 480, 3Ø; 575, 3Ø; 600, 3Ø;

Over/Undervolage Percentage Screen (Vertical Format)
7%, 8%, 9%, 10%, 11%, 12%, 13%, 14% & 15%

Trip Time Delay Screen (Vertical Format)
2S, 3S, 4S, 5S, 6S, 27S, 8S, 9S & 10S

Digital Phase Monitor Settings:
- Line Voltage: Unit Voltage/ Phase per unit name plate
- Over & Undervoltage: ±7%
- Trip Time Delay: 5 Seconds
- Re-start Delay: 4 Minutes
- Phase Imbalance: 5%

Re-Start Time Delay Screen (Vertical Format)
Manual, 2S, 3S, 4S, 5S, 6S, 7S, 8S, 9S,10S, 30S, 1M, 2M, 3M & 4M

Phase Imbalance Percentage Screen (Vertical Format)
3%, 4%, 5%, 6%, 7%, 8%, 9% & 10%

Fault Screen (Vertical Format)
"0" most recent fault, "1" previous fault, "2" third oldest fault & "3" fourth oldest fault

Fault words:

"Phase A Loss"	(There is no voltage sensed on 3-L1/S)
"Voltage Low"	(Average line voltage is less than selected Undervoltage percentage)
"Voltage High"	(Average line voltage is more than selected Overvoltage percentage)
"Imbalance"	(One Phase is lower than the average voltage by more than the Imbalance percentage)
"Phase Loss"	(One phase is more than 30% below the Line Voltage selection)
"Bad Rotation"	(The phase rotation sequence is reversed)
"Bad Freq"	Line frequency out of allowable range of 45 to 65Hz)

Section 14:
Sequence of Operation:

14.1 Unit Configuration

Based on the unit's application, the unit may be configured in any number styles to achieve the described functionality. Refer to the unit's model number to see which configuration the unit was supplied with.

14.2 Controls Options

Unit may be controlled in one of the following ways:

- ALC DDC controller with sensors (factory mounted)
- Factory-mounted DDC controls (by others)
- Factory-mounted terminal strip for field-mounted
- Factory-mounted terminal strip for electromechanical controls (by factory or by others)

14.2.1 ALC DDC Controller With Sensors (Factory Mounted)

The ALC control option consists of a factory programmed controller and a series of factory-wired sensors. The controller can operate in a 100% stand alone mode with the use of a hand-held display. It can also connect to a building automation system (BMS) using one of four compatible protocols (BACnet®, LonWorks with the optional Echelon card, Modbus, N2). The point mapping to these protocols can be pre-set, so that the protocol and baud rates desired can be easily field-selected without the need for additional downloads or technician assistance. Depending on the options ordered, remote sensors may be installed and wired to the controller.

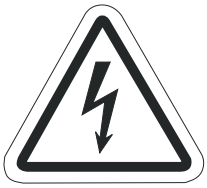
14.2.2 Factory-Mounted DDC Controls (by others)

Field-supplied DDC controls are mounted by the factory per the customer's specifications.

14.2.3 Factory-Mounted Terminal Strip for Field-Mounted DDC Controls (by others)

Field-supplied DDC controls can be connected to the factory-mounted and factory-wired terminal strip.

⚠ DANGER



ELECTRICAL SHOCK HAZARD
Disconnect electric before service. More than one disconnect switch may be required to disconnect electric from equipment. Equipment must always be properly grounded.

14.2.4 Factory-Mounted Terminal Strip for Electromechanical Controls (by factory or by others)

A factory-supplied or field-supplied programmable touchscreen thermostat can be connected to the factory-mounted and factory wired terminal strip for electromechanical controls.

The thermostat has a 45-90 °F [7-32 °C] temperature control range with a +/- 1 °F [0.5 °C] accuracy and are capable of connecting to optional factory-supplied remote indoor air and outdoor air temperature sensors.

Figure 13: Equipment Touch Display

14.3 Basic Sequence of Operation

All sequence of operation information for units controlled with ALC controls is available in the ALC Sequence of Operation documents that can be downloaded from the NexGen website at www.nexgendoas.com.

- Sequence of operation information specifically for the operation of the gas furnace and electric heater modules can be found on Page 28, Section 11.5.

For sequence of operation information for units controlled with field-supplied DDC controls (whether factory-mounted or field-mounted), consult the DDC controls manufacturer and/or installer.

14.4 Controls Options

Controls options include, but are not limited to:

- **Carbon Dioxide Detector:** This option provides a room-mounted carbon dioxide detector for initiating additional outdoor ventilation.
- **Clogged Filter Indicator:** This section provides a differential pressure switch and status indication.
- **Firestat:** This option de-energizes the unit when the stat, mounted in the return air section, senses return air above 135 °F (57.2 °C). The firestat must be manually reset.
- **Service Receptacle:** This option provides a 115V service receptacle with 15A breaker. It is mounted in a 2" x 4" (51cm x 10.2cm) enclosure. It can be field-wired or factory-wired.
- **Smoke Detector:** This option provides an ionization type supply air smoke detector which shuts off the unit if smoke is detected.

Section 15:
Start-Up Procedure:

Installation Code and Maintenance:

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

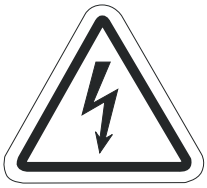
To help facilitate optimum performance and safety, NexGen recommends that a qualified contractor conduct, at a minimum, quarterly inspections of your NexGen equipment and perform service where necessary, using only replacement parts sold and supplied by NexGen.

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 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 NexGen.

15.1 Tools & Supplies Required

1. 5/16" Allen Key to Unlock Unit Doors
2. Equipment Touch
3. Refrigeration Manifold Gages
4. Refrigeration Wrench
5. Multimeter
6. Temperature Sensors
7. Clamp-On Temperature Probe
8. Socket Wrenches
9. Small Flat-Head Screwdriver
10. Refrigerant Oil
11. R-410A Refrigerant

⚠ DANGER



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SEVERE INJURY HAZARD
Do not enter equipment while in operation. Equipment may start automatically. Do not operate with access doors open. Installation, operation, and maintenance must be performed by a trained technician only.

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

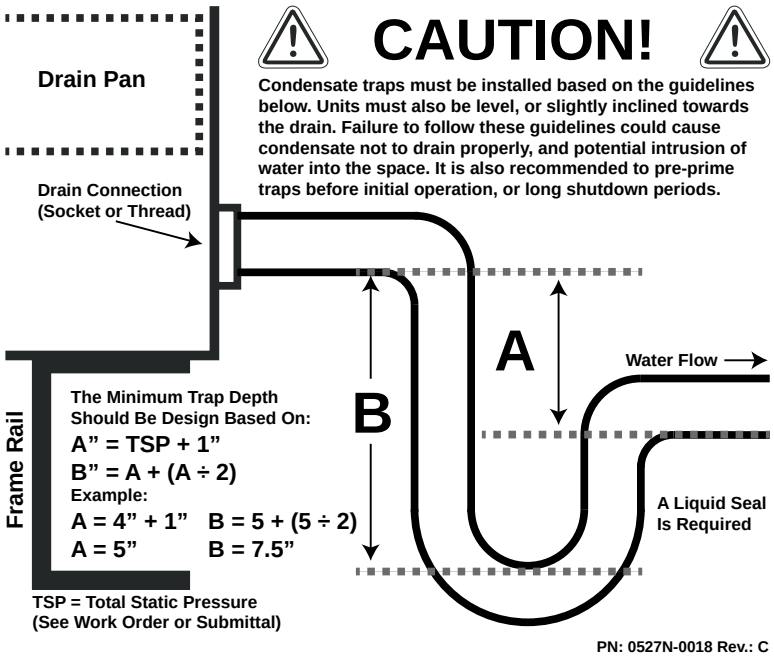
⚠ WARNING

BURN HAZARD
Allow equipment to cool before service. Internal components of equipment may still be hot after operation.

FALLING HAZARD
Use proper safety equipment and practices to avoid falling. Do not use any part of the equipment as a support.

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

Figure 14: P-Trap Configuration



15.2 Pre-Start Checks

15.2.1 Ductwork and Electrical Connections

Ensure that the following ductwork and electrical connections have been made:

- Ductwork: Supply and return air connections.
- Electrical: Line voltage power, control voltage power and remote sensor connections.

15.2.2 Condensate Drain

Units are provided with condensate drain connection(s). Do not operate unit unless a P-Trap is constructed and attached to drain connection. See Figure 21. Unit must be level or slightly inclined towards drain. Drain should pitch down and away from the unit. P-Trap pipe diameter should be the same as the drain connection diameter. Units with high internal and external static pressure drops will require a deeper trap. Prime the trap before operating the unit.

Drainage of condensate directly onto roof is acceptable if permitted by local codes. It is recommended that a small drip pad of either stone, tar, wood or metal be provided to prevent any possible damage to roof. Refer to local codes for additional requirements.

15.2.3 Supply and Exhaust Fans

Make sure electrical power is isolated.
Check power settings for voltage and verify that they correspond with the data on the motor plate.
Check that the motor is grounded (earthed).

Table 5: Condensate Connection Sizes

Cabinet	Condensate Connection Size
3	3/4"
4	3/4"
C	3/4"
D	1"
E	1"

Check that all electrical leads are sufficiently insulated.
Check that all electrical and system connections are properly made and tightened.
Check that all nuts, bolts and setscrews are tightened.
Check that the wheel and drive assembly turns freely without rubbing.
Check that drives are tightened, properly aligned and tensioned.
Bump the motor.
Check rotation.

15.2.4 Compressors

With the supply fan operational, prepare for compressor operation.

Verify that the crankcase heaters are operating. These should operate for at least 24 hours before starting the compressors. Crankcase heaters must be operating during off cycles to prevent liquid refrigerant from migrating to the compressor crankcase.

Table 6: Hot Water Heating Coil Flow Rate and Pressure Drop

Model	Cabinet	Nominal GPM (Water Only)	Pressure Drop (FT, H2O)
120 - 299	S3	24.6	1.23
241 - 540	S5	44.2	2.09
541 - 09T	S7	89.2	5.71

Table 7: Superheat and Subcooling - 100% OA

Ambient Air Temperature	95°F	85°F	75°F	65°F	55°F	45°F
Subcooling	8°F - 10°F				In Heating Mode	
Superheat	10°F - 13°F				In Heating Mode	

Note 1: Subcooling readings must be taken with the reheat circuit disabled and in the cooling mode. On water-source units, water regulating valves need to be open 100%.

Note 2: Circuit #1 Subcooling and Superheat readings must be taken with circuit #2 disabled/not running.

Note 3: Circuit #2 Subcooling and Superheat readings must be taken with circuit #1 energized/running.

Note 4: Variable speed compressors must be at 100%.

Table 8: Superheat and Subcooling - Recirculating

Ambient Air Temperature	95°F	85°F	75°F	65°F	55°F	45°F
Subcooling	10° - 12°F		8° - 10°F		6°F - 10°F	
Superheat	8°F - 15°F		6°F - 15°F		6°F - 10°F	

Note 1: Subcooling and superheat readings must be taken with the reheat circuit disabled and in the cooling mode.

Note 2: Variable speed compressors must be at 100%.

Table 9: Superheat and Subcooling - Heat Pump

Ambient Air Temperature	95°F	85°F	75°F	65°F	55°F	45°F
Subcooling	8° - 12°F		8° - 10°F		In Heating Mode	
Superheat	6°F - 15°F				In Heating Mode	

Note 1: Subcooling and superheat readings must be taken with the reheat circuit disabled and in the cooling mode.

Note 2: Variable speed compressors must be at 100%.

Table 10: Refrigerant Temperature-Pressure Chart (PSIG)

Temp °F	R-22	R-134A	R-410A	Temp °C
-40	0.6	14.8(“Hg)	10.8	-40
-38	1.4	13.9(“Hg)	12.1	-39
-36	2.2	12.9(“Hg)	13.4	-38
-34	3.1	12.0(“Hg)	14.8	-37
-32	4.0	10.9(“Hg)	16.3	-36
-30	4.9	9.8(“Hg)	17.8	-34
-28	5.9	8.7(“Hg)	19.4	-33
-26	6.9	7.5(“Hg)	21.0	-32
-24	8.0	6.3(“Hg)	22.7	-31
-22	9.1	5.0(“Hg)	24.5	-30
-20	10.2	3.7(“Hg)	26.3	-29
-18	11.4	2.3(“Hg)	28.2	-28
-16	12.6	0.8(“Hg)	30.2	-27
-14	13.9	0.3	32.2	-26
-12	15.2	1.1	34.3	-24
-10	16.5	1.9	36.5	-23
-8	17.9	2.8	38.7	-22
-6	19.4	3.6	41.0	-21
-4	20.9	4.6	43.4	-20
-2	22.4	5.5	45.9	-19
0.0	24.0	6.5	48.4	-18
2.0	25.7	7.5	51.1	-17
4.0	27.4	8.5	53.8	-16
6.0	29.1	9.6	56.6	-14
8.0	31.0	10.8	59.5	-13
10.0	32.8	11.9	62.4	-12
12.0	34.8	13.1	65.5	-11
14.0	36.8	14.4	68.6	-10
16.0	38.8	15.7	71.9	-9
18.0	40.9	17.0	75.2	-8
20.0	43.1	18.4	78.7	-7
22.0	45.3	19.9	82.2	-6
24.0	47.6	21.3	85.8	-4
26.0	50.0	22.9	89.6	-3
28.0	52.4	24.5	93.4	-2
30.0	55.0	26.1	97.4	-1
32.0	57.5	27.8	101.4	0.0
34.0	60.2	29.5	105.6	1.0
36.0	62.9	31.3	109.9	2.0
38.0	65.7	33.1	114.3	3.0
40.0	68.6	35.0	118.8	4.0
42.0	71.5	37.0	123.4	6.0
44.0	74.5	39.0	128.2	7.0
46.0	77.6	41.1	133.0	8.0
48.0	80.8	43.2	138.0	9.0
50.0	84.1	45.4	143.2	10.0
52.0	87.4	47.7	148.4	11.0
54.0	90.8	50.0	153.8	12.0
56.0	94.4	52.4	159.3	13.0
58.0	98.0	54.9	164.9	14.0
60.0	101.6	57.4	170.7	16.0
62.0	105.4	60.0	176.6	17.0
64.0	109.3	62.7	182.7	18.0
66.0	113.2	65.4	188.9	19.0
68.0	117.3	68.2	195.3	20.0
70.0	121.4	71.1	201.8	21.0
72.0	125.7	74.1	208.4	22.0
74.0	130.0	77.1	215.2	23.0
76.0	134.5	80.2	222.2	24.0
78.0	139.0	83.4	229.3	26.0
80.0	143.6	86.7	236.5	27.0
82.0	148.4	90.0	244.0	28.0
84.0	153.2	93.5	251.6	29.0
86.0	158.2	97.0	259.3	30.0
88.0	163.2	100.6	267.3	31.0
90.0	168.4	104.3	275.4	32.0
92.0	173.7	108.1	283.6	33.0
94.0	179.1	112.0	292.1	34.0
96.0	184.6	115.9	300.7	36.0
98.0	190.2	120.0	309.5	37.0
100.0	195.9	124.2	318.5	38.0
102.0	201.8	128.4	327.7	39.0
104.0	207.7	132.7	337.1	40.0
106.0	213.8	137.2	346.7	41.0
108.0	220.0	141.7	356.5	42.0
110.0	226.4	146.4	366.4	43.0
112.0	232.8	151.1	376.6	44.0
114.0	239.4	156.0	387.0	46.0
116.0	246.1	160.9	397.6	47.0
118.0	253.0	166.0	408.4	48.0
120.0	260.0	171.2	419.4	49.0
122.0	267.1	176.5	430.7	50.0
124.0	274.3	181.8	442.1	51.0
126.0	281.7	187.4	453.8	52.0
128.0	289.2	193.0	465.8	53.0
130.0	296.9	198.7	477.9	54.0
132.0	304.7	204.6	490.3	56.0
134.0	312.6	210.6	503.0	57.0
136.0	320.7	216.7	515.9	58.0
138.0	329.0	222.9	529.1	59.0
140.0	337.4	229.2	542.5	60.0
142.0	345.9	235.7	556.2	61.0
144.0	354.6	242.3	570.2	62.0
146.0	363.5	249.0	584.5	63.0
148.0	372.5	255.9	599.0	64.0
150.0	381.7	262.9	613.9	66.0

NEXGEN

DEDICATED OUTDOOR AIR SYSTEMS

PRE-START CHECKLIST: NR SERIES

Packaged Dedicated Outdoor Air Unit

7050 Overland Road
Orlando, FL 32810
Tel.: 407-292-4400 · Fax: 407-290-1329
www.nexgendoas.com

Technician Name:	
Start-Up Date:	
Serial Number:	
Project Name:	

Field start-up should be performed by a qualified technician.

The technician is responsible for assuring that all of the items on the unit pre-start checklist are properly installed and operating. Upon completion, a copy of the form should be returned fieldservice@addison-hvac.com

Installation Code and Quarterly Inspections:

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Further Information:

Applications, engineering and detailed guidance on systems design, installation and equipment performance is available through NexGen representatives. Please contact us for any further information you may require, including the Installation, Operation and Service Manual.

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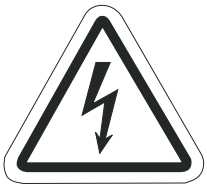
⚠ DANGER



ELECTRICAL SHOCK HAZARD
Disconnect electric before service. More than one disconnect switch may be required to disconnect electric from equipment. Equipment must always be properly grounded.

SEVERE INJURY HAZARD
Do not enter equipment while in operation. Equipment may start automatically. Do not operate with access doors open. Installation, operation, and maintenance must be performed by a trained technician only.

⚠ 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.

BURN HAZARD
Allow equipment to cool before service. Internal components of equipment may still be hot after operation.

FALLING HAZARD
Use proper safety equipment and practices to avoid falling. Do not use any part of the equipment as a support.

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

PRE-START CHECKLIST

- ☐ Documentation to properly start the unit including the sequence of operation, and a copy of the work order listing complete unit configuration.
- ☐ Supply power (line voltage) is connected to the unit, and is correct. (Check unit serial tag)
- ☐ Pre-Start visual check of the unit, and a copy of the unit start up form to document the operation and performance of the unit.
- ☐ Unit checked for debris.
- ☐ Confirm proper required unit clearances.
- ☐ Gages placed on each circuit to make sure the circuit has a refrigerant charge before circuit is enabled for operation.
- ☐ Phase monitor is set up correctly. See unit IOM for more information and settings.
- ☐ All ductwork is connected to the unit.
- ☐ All condensate piping is connected to the unit, and of correct size per unit label.
- ☐ Check all gas piping is connected (if applicable).
- ☐ All control wiring is connected to the unit.
- ☐ Field installed parts (if applicable) that shipped lose are installed.
- ☐ Electrical connections are tight.
- ☐ Overloads are adjusted.
- ☐ Fan(s) wheel(s) rotate freely.
- ☐ O/A dampers (if applicable) move freely.
- ☐ Safety switches are adjusted properly.
- ☐ Verify any field installed safeties (I.E. Fire (SD) or Condensate Overflow (COS)) are on the correct ALC board terminal location, and/or jumpers are installed correctly.
- ☐ Crankcase heater has been on for at least 24 hours at a minimum before startup.
- ☐ 80% of the calculated unit charge should be charged into the system before starting compressor.
- ☐ Vibration isolators adjusted (if applicable).

Notes:

1. Start-up technician will need to fill out the Start-Up Form with date of start-up and all information.
2. Start-up technician will need to verify the sequence of operation for the order.
3. Return trip may be necessary to check cooling or heating operation based on the outdoor air temperature at the time of start-up.

Comments:

Part Number:
ADFMNRPST
Rev.: 27 June 2022DS

Signature: _____

Notes:

Section 16
Start-Up Form:

Field start-up should be performed by a qualified technician.

The technician is responsible for assuring that all of the items on the unit start-up checklist are properly installed and operating. Upon completion, a copy of the form should be returned to NexGen, using the contact information listed.

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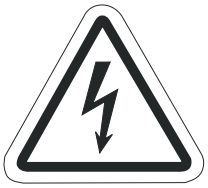

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Tel.: 407-292-4400 · Fax: 407-290-1329
www.nexgendoas.com

START-UP FORM: NR SERIES

Packaged Dedicated Outdoor Air Unit

Technician Name: _____

Start-Up Date: _____

Part Number:
ADFMNRST
Rev.: 27 June 2022DS

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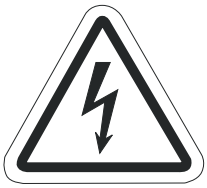

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GENERAL INFORMATION

Customer Name:

Address:

City/State/Zip:

Phone/Fax:

Project Name:

Contractor Name:

Unit Model #:

Unit Serial #:

Unit Tag #:

APPLICATION INFORMATION

Outdoor Air Temp (°F or °C): db wb

Return Air Temp (°F or °C): db wb

Design Duct ESP:

Supply Air Temp (°F or °C): db wb

Outdoor Fan Temp (°F or °C): db wb

UNIT NAMEPLATE INFORMATION

Unit Electrical:

Volts: Hertz: Phase:

Supply Voltage:

L1-L2: L2-L3: L1-L3:

Unit Controls:

Manufacturer:

Installed By:

Description & Operation:

Supply Fan Motor:

Make:

Model:

Voltage: AMPS:

Quantity:

HP:

AC supply fans need to run at 50Hz minimum.
EC supply fans need to run at 90% minimum.

Design CFM:

Exhaust Fan Motor:

Make:

Model:

Voltage: AMPS:

Quantity:

HP:

Design CFM:

UNIT INFORMATION

Condenser Fan Motor:

Make: | Model:

Voltage: | AMPS: | Quantity:

HP:

Energy Conservation Wheel Motor:

Make: | Model:

Voltage: | AMPS: | HP:

Unit Compressors:

Manufacturer:

C1A - Model Number: | Serial Number: | Nameplate: Voltage: | Phase:

C1B -Model Number: | Serial Number:

C2B - Model Number: | Serial Number:

C2B - Model Number: | Serial Number:

Unit Air Filters:	Type:	Size:	Quantity:
EC Wheel:			
Pre-Filters:			
Final Filters:			
ECW Regen:			
Other:			

Comments:

START-UP CHECK

Supply Fan: L1 (AMPS) | L2 (AMPS) | L3 (AMPS) | CFM | ESP[1] (inWG)

Command % or RPM

Exhaust Fan: L1 (AMPS) | L2 (AMPS) | L3 (AMPS) | CFM | ESP[2] (inWG)

Command % or RPM

Energy Recovery Wheel: L1 (AMPS) | L2 (AMPS) | L3 (AMPS)

Notes:
1. *Taken from field supply ductwork.*
2. *Taken from field return ductwork.*

OA Damper Operation: Actuator Model:

Return Damper Operation: Actuator Model:

Other Damper Operation: Actuator Model:

COOLING CHECK

Cooling Type: Water Cooled: | Air-Cooled: | Chilled Water Coil:

Glycol Type: Control Valve:

Refrigerant Type: Charge: Fans Run & Cycle Properly:

Number of Circuits:

Water-Source Condenser Coil Cooling: GPM | Water In °F: | Water Out °F: | Glycol %: | WPD

Compressor Circuit #1:

Suction Pressure: Suction Temp: Saturation Temp:

Discharge Pressure: Discharge Temp: Saturation Temp:

Liquid Pressure: Liquid Temp:

Superheat: *To Calculate Superheat: Convert suction pressure to saturation temperature, then subtract the suction line temperature.*

Subcooling: *To Calculate Subcooling: Convert liquid line pressure to condensing temperature, then subtract the liquid line temperature.*

Superheat and Subcooling readings must be taken with the reheat circuit disabled, and in the cooling mode. Additionally, Subcooling circuit must be energized and open.

Compressor 1A AMPS: L1 | L2 | L3

Compressor 1B AMPS: L1 | L2 | L3

Unloading Switch Settings:

Cut In:

Cut Out:

COOLING CHECK

Compressor Circuit #2:

Suction Pressure:		**Suction Temp:**		**Saturation Temp:**	
Discharge Pressure:		**Discharge Temp:**		**Saturation Temp:**	
Liquid Pressure:		**Liquid Temp:**			
Superheat:		*To Calculate Superheat: Convert suction pressure to saturation temperature, then subtract the suction line temperature.*			
Subcooling:		*To Calculate Subcooling: Convert liquid line pressure to condensing temperature, then subtract the liquid line temperature.*			

Superheat and Subcooling readings must be taken with the reheat circuit disabled, and in the cooling mode. Additionally, Subcooling circuit must be energized and open.

Compressor 2A AMPS:		**L1**		**L2**		**L3**
Compressor 2B AMPS:		**L1**		**L2**		**L3**

Unloading Switch Settings:

Cut In:	
Cut Out:	

Post Cooling Type: **N/A:** ☐ **DX:** ☐ **Chilled Water Coil:** ☐

Glycol Type:		**Control Valve:**	
Refrigerant Type:			
Number of Circuits:			

Condenser Fans:

Condenser Fan 1 AMPS:		**L1**		**L2**		**L3**
Condenser Fan 2 AMPS:		**L1**		**L2**		**L3**
Condenser Fan 3 AMPS:		**L1**		**L2**		**L3**
Condenser Fan 4 AMPS:		**L1**		**L2**		**L3**
Condenser Fan 5 AMPS:		**L1**		**L2**		**L3**
Condenser Fan 6 AMPS:		**L1**		**L2**		**L3**
Condenser Fan 7 AMPS:		**L1**		**L2**		**L3**
Condenser Fan 8 AMPS:		**L1**		**L2**		**L3**
Condenser Fan 9 AMPS:		**L1**		**L2**		**L3**

Condenser Air Temperature:

Inlet A °F	
Outlet A °F:	

Condenser Air Temperature:

Inlet B °F	
Outlet B °F:	

Condenser Air Temperature:

Inlet C °F	
Outlet C °F:	

Variable speed or digital compressors must be operated at 100%.

COOLING CHECK

Hot Gas Bypass/Hot Gas Reheat:

Hot Gas Bypass: Valve Begins to Open at 105PSI - Fully Open at 100PSI

Hot Gas Reheat: Staged: ☐ Modulating: ☐ SAT °F: ☐

Additional Charge:
Added or Subtracted - Circuit 1: ☐

Additional Charge:
Added or Subtracted - Circuit 2: ☐

Refrigerant Oil Added - Circuit 1: Yes ☐ No ☐

Refrigerant Oil Added - Circuit 2: Yes ☐ No ☐

Amount of Oil Added (Ounces): ☐

Amount of Oil Added (Ounces): ☐

Type of Oil Added: ☐

Type of Oil Added: ☐

HEATING CHECK

Heating Type: Heat Pump: ☐ Hot Water: ☐ Electric: ☐ Gas: ☐ Gas Type: ☐

Heat Stages - Qty: ☐

Manifold Pressure: ☐

Modulating Type: ☐

Electric Heat AMPS: ☐ L1 ☐ L2 ☐ L3 ☐ kW:

Water Source Coil: ☐ GPM ☐ Water In °F: ☐ Water Out °F: ☐ Glycol %: ☐ WPD

Hot Water Coil Heating: ☐ GPM ☐ Water In °F: ☐ Water Out °F: ☐ Glycol %: ☐ WPD

Steam Coil Heating: ☐ PSI ☐ Temp In °F: ☐ Temp Out °F:

CO^2 Reclaim Heating: ☐ PSI ☐ Temp In °F: ☐ Temp Out °F:

Entering Air Temperature (EAT): ☐ °F db

Supply Air Temperature (SAT): ☐ °F db

ENERGY CONSERVATION

Type: EC Wheel: ☐ Desiccant Wheel: ☐ Fixed-Plate: ☐

Exhaust Air Before the HX: ☐ db ☐ wb

Exhaust Air After the HX: ☐ db ☐ wb

Entering Air Before the HX: ☐ db ☐ wb

Entering Air After the HX: ☐ db ☐ wb

Comments:

Owner's Representative: _____

Signature: _____

Section 17:
Unit Maintenance:

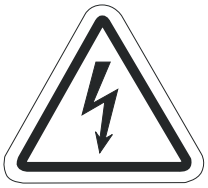
Prior to any maintenance or service to the unit, shut off, lockout and tagout the electrical disconnect and fuel valve (if applicable) that supplies the unit in accordance with OSHA regulations and, if the unit includes electric or gas heat, allow ample time for the unit to cool. After maintenance is performed or the unit is serviced, the unit shall be re-commissioned per the start-up procedure as outlined in Section 15.

Installation Code and Quarterly Inspections:

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

To help facilitate optimum performance and safety, NexGen recommends that a qualified contractor conduct, at a minimum, quarterly inspections of your NexGen equipment and perform service where necessary, using only replacements parts sold and supplied by NexGen.

⚠ DANGER



ELECTRICAL SHOCK HAZARD
Disconnect electric before service. More than one disconnect switch may be required to disconnect electric from equipment. Equipment must always be properly grounded.

SEVERE INJURY HAZARD
Do not enter equipment while in operation. Equipment may start automatically. Do not operate with access doors open. Installation, operation, and maintenance must be performed by a trained technician only.

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

⚠ 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.

BURN HAZARD
Allow equipment to cool before service. Internal components of equipment may still be hot after operation.

FALLING HAZARD
Use proper safety equipment and practices to avoid falling. Do not use any part of the equipment as a support.

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

Table 11: Maintenance Guidelines

17.1 General	
Quarterly	Follow the entire start-up procedure at this time and check settings (controls, operating temperatures, operating pressures, power and control voltages) and operation.
17.2 Unit Exterior	
Cabinet Exterior	After installation, touch up scratches. Periodic painting should be done thereafter as required. The caulk should be inspected annually. Re-apply caulk as needed to maintain integrity.
Unit Location	Verify that no flammable objects, liquids or vapors are present near the unit. If unit includes gas furnace, clearances to combustibles around the vent must be adhered to. Do not hang anything from or place anything on the unit. Keep the area around the unit free of all objects.
17.3 Direct-Drive Supply and Exhaust Fans	
Motors	**Inspection:** 1. Inspect motor every 3 months. Keep the motor clean and vent openings clear.
17.4 Condensing Fans	
Assemblies	Manually rotate to ensure free movement. Check that all fan mounting hardware is tight. Check motor bearings for wear.
17.5 Refrigeration Circuit Components	
Evaporator Coil	Check for dirt and bent fins. Clean with water from blower side towards filter side.
Condenser Coil	Check for dirt and bent fins. Clean by brushing off with broom.
Compressors	Compressors are factory-supplied with a charge of oil (POE for Copeland, and PVE for Bitzer) and should not require additional maintenance.
17.6 Condensate Drain Pan and Drain	
Assembly	Check for blockages. Clean as necessary with mixture of Algae Guard if signs of mold or algae are present.
17.7 Dampers	
Dampers	Check and clean blades.
Damper Motor/Linkages	Verify that all damper linkages move freely. Lubricate if necessary.
17.8 Electric Heater Wiring and Wiring Connections	
Assembly	Check all wiring connections. Tighten as necessary.
	Check internal wiring. Replace as necessary with type THHN 221°F (105°C), 600V, 16 gauge wire or equivalent.
Control Panel	Check heater control panel for dust/dirt and moisture. Clean as necessary.
Heating Elements	Check heating elements for dust/dirt build-up and/or broken elements. Replace elements and /or clean elements with low pressure air as necessary.
	Check element male/female chassis insulators for breaks and/or cracks. Replace as necessary.
	Check element support frame insulators. Replace missing or broken insulators as necessary.
17.9 Filters	
Assemblies	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.

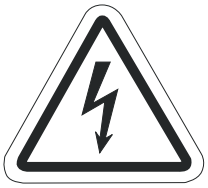
Section 18:
Replacement Parts:

Before ordering replacement parts from any other source, please contact the factory to obtain the correct replacement part information for your specific unit.

Replacement parts used in units with the harsh environment coating option must be coated before being installed.

Only genuine NexGen replacement parts should be used.

⚠ DANGER



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

⚠ WARNING

EXPLOSION HAZARD

FIRE HAZARD

CARBON MONOXIDE HAZARD

Table 12: Air Filters

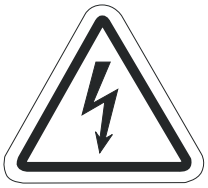
Cabinet	Size	Filter Size*	Quantity
S3	120 - 299	20 x 20	4
		16 x 20	2
S5	241 - 540	25 x 25	6
S7	541 - 09T	20 x 20	6
		20 x 24	5
		24 x 24	1

Section 19:
Troubleshooting:

The following tables outline typical unit troubleshooting techniques for each section of the system.

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

⚠ DANGER



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⚠ WARNING

EXPLOSION HAZARD

FIRE HAZARD

CARBON MONOXIDE HAZARD

Table 13.1: Supply Fan

Problem	Probable Cause	Solution
Blower Motor Does Not Run	Damper limit switch not closed or inoperative	Repair or replace switch
	Motor thermal overloads tripped	For tripped condition-reset
	Fuses blown or missing	Replace
	External power source lacking	Have incoming power lines checked
	Motor inoperative	Repair or replace
Blower Motor Runs, But Fans Do Not Supply Enough Make-Up Air	Intake filters dirty	Replace or clean
	Obstruction in intake	Check dampers for proper operation Clear all intake passages of obstructions
	Access doors and panels not closed	Close
	Excessive discharge resistance from: Dirty filters in discharge External dampers	Clean filters and/or readjust dampers
Excessive Fan Noise	Fan wheel loose on shaft	Reposition and re-tighten
	Fan wheel dirty	Clean
	Loose duct	Tighten or reinforce
	Foreign article in fan or duct	Remove

Table 13.2: Compressor

Problem	Probable Cause	Solution
Compressor Will Not Start	Power off, loose electrical connections or fuse open	Check disconnect switch, fuses and wiring
	Compressor contactor not closing	Check voltage to contactor coil, transformer slave relay, thermostat
	Internal compressor thermal overload open	If compressor is hot, allow 2 hours to cool – see below
	Compressor defective	Check compressor for electrical failure Compressor may be seized, check for LRA
	High or low pressure switch open or defective	Check calibration of high or low pressure switch
	Protection module in alarm	Check oil failure control – see below
Compressor Starts But Cuts Out On Low Pressure Switch	Low on refrigerant	Check sightglass and check pressures
	Airflow restricted	Check for dirty evaporator coil, dirty filters, dampers closed, iced evaporator, VFD settings, check motor amps, duct design
	Restriction in liquid line	Check head pressure, check and adjust TXV if not functioning properly, check pressure drop across filter drier
	Defective low pressure switch	Check calibration of switch
Compressor Starts But Cuts Out On High Pressure Switch	Refrigerant overcharged	Check pressures, charge by subcooling
	Condenser fan VFD has incorrect setting	Check calibration of the low ambient control
	Fan motor defective	Check fan motor
	Condenser coil inlet obstructed or dirty	Check coil and inlet clearances and for possible air re-circulation
	Air or non-condensables in system	Compare liquid refrigerant pressure with the saturated pressure If the presence of air or non-condensables is suspected, the refrigerant must be reclaimed through a service port The system must then be re-evacuated to 250-500 microns and recharged The filter-drier should also be replaced be charging
	Defective high pressure switch	Replace switch
	Restriction in discharge or liquid line	Check discharge and liquid line pressures, check TXV

Table 13.2: Compressor, Cont.

Problem	Probable Cause	Solution
Compressor Cuts Out On Thermal Overload	Low voltage	Check incoming voltage leg-to-leg All three legs must be within 10% of the required voltage and the leg-to-three-leg average voltage variation must be less than 2% on each leg
	Sustained high discharge pressure	Check running amperage and conditions described under high discharge pressure
	High suction and discharge pressures	Check TXV setting, check for air in system
	Defective compressor overload	Allow compressor to cool for two hours if compressor is hot, recheck for open circuit
	Improper refrigerant charge	Check subcooling
	Allow time for compressor to cool	Check dome temperature of compressor
Noisy Compressor	Scroll compressors are rotation sensitive	Reverse wiring at disconnect switch may require blower be rechecked for rotation
	Refrigerant overcharged	Check pressures and subcooling
	Excess or insufficient oil in compressor crankcase	Check oil level on hermetic compressors, check total equivalent feet of piping, add oil as recommended
	Liquid floodback	Check TXV setting, refrigerant overcharge refrigerant circuit problem
	Tubing rattle	Dampen by taping or clamping, bend tubing away from contact where possible
	Compressor defective	Replace compressor

Table 13.3: Refrigeration Circuit

Problem	Probable Cause	Solution
Noisy Operation	Air noise	Check ductwork Air Velocity too high
	Chattering contactor	Check for adequate control voltage, check for shorts or breaks, check thermostat, check contactor points
	Tubing rattle	Dampen by taping or clamping, bend tubing away from contact where possible
High Suction Pressure	Excessive load on evaporator coil	Check for high entering wet bulb temperature Check for excessive airflow
	Compressor is unloaded	Recalibrate unloader pressure switch
	Leaking check valve	Check temperature across check valve
	Expansion valve not secured to suction line or TXV defective	Check the TXV, ensure bulb is insulated
High Discharge Pressure	TXV setting	Check TXV setting and calibrate superheat
	Air inlet to condenser dirty or obstructed	Check for proper clearances and possible air recirculation
	Condenser fan, motor defective	Check condenser fan motor and run capacitor
	Condenser fan VFD has incorrect setting	Check calibration of low ambient head pressure control
Suction Pressure Too Low	Refrigerant undercharge	Check pressures and subcooling
	Blower running backwards	Interchange any two wires connected to motor
	Defective or improperly adjusted expansion valve	Check superheat and adjust TXV
	Dirty filter	Check filter and evaporator coil
	Too little airflow or low entering air temperature	Check airflow and entering air wet bulb conditions
	Restriction in suction or liquid line	Check refrigerant circuit for restriction
Head Pressure Too Low	Insufficient refrigerant charge	Check subcooling, check for leak
	Defective or improperly adjusted expansion valve	Check superheat and adjust TXV
	Low suction pressure	See above – suction pressure too low
	Condenser fan control setting	Check calibration of low ambient control
	Compressor defective	See above – high suction pressure
Liquid Line Too Hot	Refrigerant undercharged	See above – high discharge pressure
	High discharge pressure	Restriction upstream at point of frosting
Suction Line Frosting	Insufficient evaporator airflow	Check airflow, check fan VFD, closed dampers
	Restriction in suction or liquid line	Restriction upstream at point of frosting
	Malfunctioning or defective expansion valve	Check bulb of TXV

Table 13.3: Refrigeration Circuit, Cont.

Problem	Probable Cause	Solution
Compressor Short Cycles	Thermostat location or malfunction	Check thermostat, check heat anticipator setting
	Improper refrigerant charge	Check subcooling, verify superheat
	Defective high or low pressure control	Check high or low pressure switch
	Cycling on internal overload	Possible tight bearings – see above
	Defective expansion valve	Check TXV and superheat
	Poor air distribution	Check ductwork for recirculation
	High discharge pressure	See above – high discharge pressure
Running Cycle Too Long Or Unit Operates Continuously	Refrigerant undercharged	Check subcooling
	Dirty filter or evaporator coil	Check filter, coil and airflow
	Dirty or clogged condenser coil	Check coil and airflow
	Air or other non-condensables in system	Check equalized high side pressure with equivalent outdoor temperature
	Defective compressor	See above – high suction pressure
	Restriction in suction and liquid line	Check for restrictions in refrigerant circuit
	Control contacts stuck	Check thermostat, shorts in wiring, slave relay compressor contactor
Supply Air Temperature Too High	Refrigerant undercharge or leak in system	Check subcooling and check for leaks
	Evaporator plugged with dirt or ice	Check evaporator, airflow and filter
	Improperly adjusted or defective expansion valve	Check superheat and adjust TXV, check bulb
	Defective compressor	Check compressor for proper operation
	High discharge pressure	See above- high discharge pressure
	Airflow is too high	Check external static pressure
Supply Air Temperature Too Low	Airflow is too low	Check evaporator coil, filter, check for closed dampers, grills, drive for loose parts, belts, misalignment, check external static pressure
	Return air temperature too low	Check entering air wet bulb conditions
Blower Motor Not Running	Improper wiring	Check wiring diagram
	Defective motor	Check motor controller
	Defective thermostat or control circuit	Check “R” and “G” Circuit
	Motor off on overload protector	Allow motor to cool, check amperage

Table 13.4: Variable Speed Head Pressure Control

Problem	Probable Cause	Solution
No Fan Operation	No 24V control voltage	Check for 24 VAC at control
	No input pressure to control	Check alignment of capillary fitting Schrader valve depressor must depress Schrader valve enough to allow pressure into capillary
	Bad fan motor	Disconnect power, place a jumper from L1 to M1 and connect power, if fan does not start, motor is bad and should be replaced
	Pressure transducer problem	Disconnect 6 pin connector from right side of control, place a jumper wire between third pin from the top and bottom pin on the control (not the cable) If fan goes to full speed, check for input pressure If it has been determined there is adequate pressure, the transducer is bad and the control must be replaced
Fan Stops When Pressure Reached The High End Of The Operating Range	Control is not wired correctly	See wiring diagrams
No Fan Modulation (On-Off Operation)	Control is not wired correctly	See wiring diagrams
Fan Starts At Full Speed	Control is not wired correctly	See wiring diagrams
Erratic Fan Operation	Control is not wired correctly	See wiring diagrams
	Dirty or blocked condenser coil	Clean condenser coil
Fan Motor Is Cycling On Thermal Overload	Dirty or blocked condenser coil	Clean condenser coil
	Wrong motor for fan speed control application	Replace with motor approved for fan speed control application
Erratic Pressure Control	Defective regulator	Replace defective part
	Dirt causing regulator to bind	Disassemble regulator and clean internal parts Install strainer
	Power source to hot gas solenoid or operation of the solenoid is intermittent	Determine if problem is caused by supply voltage, solenoid or excessive MOPD, make changes necessary to correct problem
Regulator Leakage	Dirt in regulator causing seat to remain open	Clean regulator Install strainer
	Worn or eroded seating surface on regulator	Replace defective part
Regulator Hunting (Chattering) With Large Fluctuations In Controlled Pressures	Regulator is oversized	Contact manufacturer for correctly sized regulator
	Regulator and liquid injection thermovalve have control interaction	Increase superheat setting, dampen bulb response by repositioning
	Regulator and cylinder unloaders have control interaction	Increase differential between the controls by lowering the regulator's setpoint

Table 13.4: Variable Speed Head Pressure Control, Cont.

Problem	Probable Cause	Solution
Regulator Will Not Provide Pressure Control	Regulator seat is restricted	Locate and remove stoppage, install strainer
	Pressure adjusting stem is set at a point so high that suction pressure never reaches the setpoint	Re-adjust the regulator
	Strainer clogged at the regulator inlet	Locate and remove stoppage
	MOPD exceeded across the solenoid or loss of source voltage	Replace solenoid or troubleshoot the electrical problem
	Solenoid coil burned out	Replace coil
	Wrong type of distributor for hot gas bypass to the evaporator	Install proper venture-flo type distributor for low pressure drop
Regulator Fails To Close	Dirt under seat of regulator	Locate and remove stoppage, install strainer or filter drier
	Diaphragm failure (leakage around the adjusting stem)	Replace defective parts
	Pressure adjusting stem is set at a point so high that suction never reaches the setpoint	Re-adjust the regulator
	Blocked external equalizer passage	Locate and remove stoppage, install strainer
	Worn or eroded regulator seat	Replace defective part

Table 13.5: Gas Furnace

LED flashes on for 1/4 second and off for 1/4 second during fault condition. Pause between fault codes is 3 seconds.

Problem	Probable Cause	Solution
Steady On-No Operation	Internal control fault	
One Flash: Combustion Airflow Fault	Faulty combustion blower	Check for 230V supply and tightness at fan connections If no power, replace
	Airflow switch not closing	Check for 230V supply and tightness at fan connections If no power, replace
	Airflow switch opened during operation	
Two Flash: Flame with No Call for Heat	Faulty gas valve	Check voltage to gas valve with thermostat off, valve should not be powered, if there is gas flow, replace valve
Three Flash: Ignition Lockout	Ignition control miscommunication	Reset ignition control by removing 24V power to ignition control terminal 24VAC
	Dirty burners	Clean burners to ensure proper flame carryover
	Faulty spark igniter	Check if connecting lead or spark igniter are damaged, if yes, replace
	Faulty flame sensor	Check if connecting lead or flame probe are damaged and/or touching earthed components, if yes, replace
	Incorrect gas pressure at gas valve	Check gas pressure at inlet of valve is correct for gas type, if no, correct pressure problem
	Faulty gas valve	Check gas pressure at outlet of the valve rises when valve turns on and returns to zero or lower when valve turns off, if no, replace

Table 13.6: Electric Heater

Problem	Probable Cause	Solution
No Heat	No call for heat	Check that the controls are set to call for heating
	No power and control voltage to heater	Check that heater has power and control voltage
	Faulty component	Check components with continuity meter, replace as necessary
Not Enough Heat	Faulty component	Check ampere draw is reasonably close to that on the heater data plate If more than 10% short, begin testing individual components, replace as necessary
	Heat anticipator current draw too low, causing short cycling	Check current draw
Heater Cycling on Automatic Limit	Improper airflow	Check for obstructions to return air, loose or broken fan belt and clogged filters and/or evaporator coils
	Faulty temperature limit switch	Test and, if necessary, replace
Open Secondary Protective Device	Stuck contactor	Check contactor
Contactor Chatter	Improper wiring	Check wiring
	Insufficient transformer capacity	Check transformer
Element Failure	Corroded hardware and/or loose connections	Check hardware

Section 20
NexGen Warranty:

The following is the Limited Warranty provided by NexGen (a trade name of Addison HVAC LLC, herein "Seller") to any customer (herein "Buyer") for any goods and services (a "deliverable"):

1. 1. Limited Warranty. Seller provides such warranty as set forth in any instruction manual provided with the deliverable, or if there is no such warranty or instruction manual, Seller warrants to Buyer that such deliverable will be free from defects in material and workmanship (in either case the "Limited Warranty"). Except as expressly set forth in this section or specifically authorized by an executive officer of Seller in writing, the Limited Warranty is not transferable or assignable and any such transfer or assignment is void. If Buyer is authorized by Seller to be a reseller of deliverables that are goods or an installing contractor, the Limited Warranty may be passed through to Buyer's customer, but Buyer shall not alter the Limited Warranty in any way. Notwithstanding the foregoing, if Buyer re-brands Seller's deliverable or Seller, at Buyer's request, brands the deliverable with a mark not owned by Seller, the Limited Warranty may not be transferred or assigned, and all claims under the Limited Warranty shall be made directly by Buyer to Seller and not by any customer of Buyer.

   The Limited Warranty does not cover service trips, service calls, costs of removing and reinstalling components and other labor charges or the cost of shipment of replacement parts. The Limited Warranty excludes damages due to (i) failure to install, operate or maintain deliverables as directed in any instruction manual provided or under applicable law or regulation, (ii) misuse, abuse, neglect or modification of a deliverable or any controls, in any way, (iii) improper service, use of replacement parts or accessories that are not specified by Seller, (iv) improper installation, or any relocation of a deliverable after initial installation, (v) incorrect supply, accident, fire, flood, acts of God or other casualty, (vi) use of a deliverable other than its intended purpose and normal usage, (vii) use of a deliverable in a corrosive atmosphere or any atmosphere containing contaminants, (viii) shipment of a deliverable (all claims must be filed with carrier), (ix) use of a deliverable in the vicinity of combustible or explosive materials, (x) any defect in a deliverable arising from a drawing, design, or specification supplied by or on behalf of Buyer, (xi) failure of parts, components, services or hook-ups not supplied by Seller, (xii) incompatibility with items not supplied by Seller, (xiii) a deliverable not properly installed by a qualified contractor experienced in installing the deliverable, (xiv) inadequate air for combustion, (xv) improper or rapid cycling of the compressor. No warranty coverage is applicable if Buyer cannot prove original purchase date and required annual maintenance history, the data plate and/or serial number on any deliverable is removed, defaced, modified or altered in any way, or Seller is not permitted to inspect the damaged deliverable.

   Wear items or consumables such as belts, filters, coolant, refrigerant, etc. are not included under the Limited Warranty. The Limited Warranty does not cover the equipment and materials not manufactured by Seller; the warranty for those items shall be limited to only such warranty as that furnished by the manufacturer thereof as may properly be assigned to Buyer.

   No person other than an executive officer of Seller has authority to change or extend the terms of the Limited Warranty, and Buyer confirms that no other warranty terms have been extended by Seller or are applicable to the deliverables. Change or extensions to the terms of the Limited Warranty are binding only if confirmed in writing by Seller's duly authorized executive officer.

2. Limitation on Warranties/Damages. Any claim under the Limited Warranty set forth in section 1 must be made within the following time periods or such claim is waived: (a) for compressors, the claim must be made within sixty (60) months from the date of purchase by Buyer; (b) for replacement parts, the claim must be made within the latter of twelve (12) months from the date of shipment by Seller or any Limited Warranty period remaining on the deliverable with which the replacement part is used or is intended to be used; (c) for all other deliverables, the claim must be made within twelve (12) months from the date of start-up or eighteen (18) months from the date of shipment by Seller, whichever occurs first. For all deliverables (other than replacement parts) that require installation and start-up, the otherwise applicable warranty period shall be extended by an additional four (4) months if (i) the installation and start-up is performed by a contractor on Seller's current list of contractors who have successfully completed Seller's current installation course for that deliverable and (ii) full details of the installation and start-up are provided to Seller at or prior to the time any warranty claim is made.

Except as set forth in these terms, Seller makes no representation or warranty of any type, express or implied, including any warranty of merchantability, warranty of fitness for a particular purpose or warranty of non-infringement or warranty arising from any course of dealing, course of performance or usage of trade.

Seller will not under any circumstances, be liable for any special, indirect, punitive or consequential damages (even if Seller has been notified of the possibility of such damages) resulting from or related to a product including, without limitation, any loss of profits, or loss of opportunity. Some jurisdictions do not allow limitations on warranties or damages, so this limitation or exclusion may not apply to Buyer

3. Remedy. **Seller's sole obligation and Buyer's exclusive remedy with respect to any deliverable, whether arising in contract, tort (including negligence), strict liability, breach of warranty or otherwise, is limited to Seller, at its discretion, replacing or repairing the defective deliverable, providing replacement parts or issuing Buyer a credit equal to the price paid to Seller for such defective deliverable, and in no event will Seller's liability exceed the amounts actually received by Seller for any deliverable.**

   This exclusive remedy shall not be deemed to have failed its essential purpose so long as Seller is willing and able to repair or replace a defective deliverable or parts thereof or, also at Seller's option, to refund the price received by Seller for the defective deliverable, within a reasonable time after Buyer demonstrates that a defect exists in accordance with the terms and limitations of the Limited Warranty.

If you have questions, contact your installing professional. Should you need replacement parts or have additional questions, call or write:

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Notes:

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