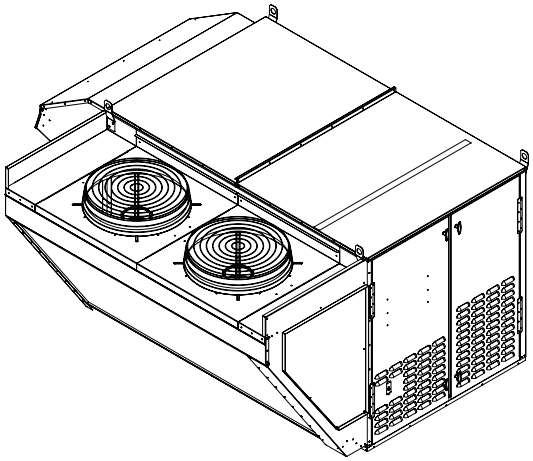
Installation, Operation, and Maintenance

Horizon™ Outdoor Air Unit

Horizon UC600 Controls Program Version 12.0



Models: OABD, OABE, OABF, OADG, OAGD, OAGE, OAGF, OAKD, OAKE, OAKF, OAND, OANE, OANF, OANG

Important: *Proper completion of the tasks outlined in this Installation, Operation, and Maintenance manual require and assume the technician has been certified as a start up technician for the Horizon Outdoor Air unit. This includes working knowledge of the Tracer TU program.*

⚠SAFETY WARNING

Only qualified personnel should install and service the equipment. The installation, starting up, and servicing of heating, ventilating, and air-conditioning equipment can be hazardous and requires specific knowledge and training. Improperly installed, adjusted or altered equipment by an unqualified person could result in death or serious injury. When working on the equipment, observe all precautions in the literature and on the tags, stickers, and labels that are attached to the equipment.

⚠AVERTISSEMENT DE SÉCURITÉ

L'installation et l'entretien de cet équipement doivent être assurés exclusivement par du personnel qualifié. L'installation, la mise en service et l'entretien d'équipements de chauffage, de ventilation et de climatisation (CVC) présentent un danger et requièrent des connaissances et une formation spécifiques. Une installation, un réglage ou une modification inappropriés d'un équipement par une personne non qualifiée peut provoquer des blessures graves, voire la mort. Lors de toute intervention sur l'équipement, respectez les consignes de sécurité figurant dans la documentation, ainsi que sur les pictogrammes, autocollants et étiquettes apposés sur l'équipement.

November 2023 **OAU-SVX007C-EN**

Introduction

Read this manual thoroughly before operating or servicing this unit.

Warnings, Cautions, and Notices

Safety advisories appear throughout this manual as required. Your personal safety and the proper operation of this machine depend upon the strict observance of these precautions.

The three types of advisories are defined as follows:

WARNING	Indicates a potentially hazardous situation which, if not avoided, could result in death or serious injury.
CAUTION	Indicates a potentially hazardous situation which, if not avoided, could result in minor or moderate injury. It could also be used to alert against unsafe practices.
NOTICE	Indicates a situation that could result in equipment or property-damage only accidents.

Important Environmental Concerns

Scientific research has shown that certain man-made chemicals can affect the earth's naturally occurring stratospheric ozone layer when released to the atmosphere. In particular, several of the identified chemicals that may affect the ozone layer are refrigerants that contain Chlorine, Fluorine and Carbon (CFCs) and those containing Hydrogen, Chlorine, Fluorine and Carbon (HCFCs). Not all refrigerants containing these compounds have the same potential impact to the environment. Trane advocates the responsible handling of all refrigerants.

Important Responsible Refrigerant Practices

Trane believes that responsible refrigerant practices are important to the environment, our customers, and the air conditioning industry. All technicians who handle refrigerants must be certified according to local rules. For the USA, the Federal Clean Air Act (Section 608) sets forth the requirements for handling, reclaiming, recovering and recycling of certain refrigerants and the equipment that is used in these service procedures. In addition, some states or municipalities may have additional requirements that must also be adhered to for responsible management of refrigerants. Know the applicable laws and follow them.

⚠WARNING

Proper Field Wiring and Grounding Required!

Failure to follow code could result in death or serious injury. All field wiring MUST be performed by qualified personnel. Improperly installed and grounded field wiring poses FIRE and ELECTROCUTION hazards. To avoid these hazards, you MUST follow requirements for field wiring installation and grounding as described in NEC and your local/state/national electrical codes.

⚠ATTENTION

Câblage et Mise à la Terre Appropriés Champs Obligatoires!

Le non-respect du code pourrait entraîner la mort ou grave blessure. Tout le câblage sur le terrain DOIT être effectué par des personnes qualifiées personnel. Terrain mal installé et mis à la terre le câblage pose des risques de FIRE et d'ÉLECTROCUTION. À evitez ces risques, vous devez suivre les exigences pour l'installation et la mise à la terre du câblage de terrain comme décrit dans NEC et vos codes électriques locaux/étatiques/nationaux.

WARNING

Personal Protective Equipment (PPE) Required!

Failure to wear proper PPE for the job being undertaken could result in death or serious injury. Technicians, in order to protect themselves from potential electrical, mechanical, and chemical hazards, MUST follow precautions in this manual and on the tags, stickers, and labels, as well as the instructions below:

- **Before installing/servicing this unit, technicians MUST put on all PPE required for the work being undertaken (Examples; cut resistant gloves/sleeves, butyl gloves, safety glasses, hard hat/bump cap, fall protection, electrical PPE and arc flash clothing). ALWAYS refer to appropriate Safety Data Sheets (SDS) and OSHA guidelines for proper PPE.**
- **When working with or around hazardous chemicals, ALWAYS refer to the appropriate SDS and OSHA/GHS (Global Harmonized System of Classification and Labeling of Chemicals) guidelines for information on allowable personal exposure levels, proper respiratory protection and handling instructions.**
- **If there is a risk of energized electrical contact, arc, or flash, technicians MUST put on all PPE in accordance with OSHA, NFPA 70E, or other country-specific requirements for arc flash protection, PRIOR to servicing the unit. NEVER PERFORM ANY SWITCHING, DISCONNECTING, OR VOLTAGE TESTING WITHOUT PROPER ELECTRICAL PPE AND ARC FLASH CLOTHING. ENSURE ELECTRICAL METERS AND EQUIPMENT ARE PROPERLY RATED FOR INTENDED VOLTAGE.**

AVERTISSEMENT

Équipements de protection individuelle (EPI) obligatoires!

En cas d'équipement de protection individuelle inadapté au travail entrepris, les techniciens s'exposent à des risques de blessures graves voire mortelles. Afin de se prémunir d'éventuels risques électriques, mécaniques et chimiques, les techniciens DOIVENT respecter les consignes préconisées dans le présent manuel, sur les étiquettes et les autocollants, ainsi que les instructions suivantes:

- **Avant d'installer/réparer cette unité, les techniciens doivent IMPÉRATIVEMENT porter tout l'équipement de protection individuelle (EPI) recommandé pour le travail entrepris (exemples: gants/manchons résistants aux coupures, gants en caoutchouc butyl, lunettes de protection, casque de chantier/antichoc, protection contre les chutes, EPI pour travaux électriques et vêtements de protection contre les arcs électriques). Consulter SYSTÉMATIQUEMENT les fiches de données de sécurité et les directives de l'OSHA pour connaître la liste des EPI adaptés.**
- **Lors d'une intervention avec ou à proximité de produits chimiques dangereux, consulter SYSTÉMATIQUEMENT les fiches de données de sécurité appropriées et les directives de l'OSHA/du SGH (système général harmonisé de classification et d'étiquetage des produits chimiques) afin d'obtenir des renseignements sur les niveaux admissibles d'exposition personnelle, la protection respiratoire adaptée et les recommandations de manipulation.**
- **En cas de risque d'éclair, d'arc électrique ou de contact électrique avec un équipement électrique sous tension, et AVANT de réparer l'unité, les techniciens doivent IMPÉRATIVEMENT porter tout l'équipement de protection individuelle (EPI) conformément à l'OSHA, à la norme NFPA 70E ou à toute autre exigence propre au pays pour la protection contre les arcs électriques. NE JAMAIS COMMUTER, DÉBRANCHER ou EFFECTUER DE TEST DE TENSION SANS PORTER UN EPI POUR TRAVAUX ÉLECTRIQUES OU UN VÊTEMENT DE PROTECTION APPROPRIÉ CONTRE LES ARCS ÉLECTRIQUES. IL CONVIENT DE S'ASSURER QUE LES COMPTEURS ET ÉQUIPEMENTS ÉLECTRIQUES CORRESPONDENT À LA TENSION NOMINALE PRÉVUE.**

WARNING

Refrigerant under High Pressure!

Failure to follow instructions below could result in an explosion which could result in death or serious injury or equipment damage. System contains oil and refrigerant under high pressure. Recover refrigerant to relieve pressure before opening the system. See unit nameplate for refrigerant type. Do not use non-approved refrigerants, refrigerant substitutes, or refrigerant additives.

AVERTISSEMENT

Fluide frigorigène sous haute pression!

Tout manquement aux instructions indiquées ci-dessous peut provoquer une explosion pouvant causer des blessures graves voire mortelles ou des dommages matériels. Le système contient de l'huile et du fluide frigorigène sous haute pression. Avant d'ouvrir le circuit, récupérez le fluide frigorigène pour éliminer toute pression dans le circuit. Consultez la plaque constructeur de l'unité pour connaître le type de fluide frigorigène employé. Utilisez uniquement des fluides frigorigènes, substituts et additifs agréés.

WARNING

Hazard of Explosion and Deadly Gases!

Failure to follow all proper safe refrigerant handling practices could result in death or serious injury. Never solder, braze or weld on refrigerant lines or any unit components that are above atmospheric pressure or where refrigerant may be present. Always remove refrigerant by following the guidelines established by the EPA Federal Clean Air Act or other state or local codes as appropriate. After refrigerant removal, use dry nitrogen to bring system back to atmospheric pressure before opening system for repairs. Mixtures of refrigerants and air under pressure may become combustible in the presence of an ignition source leading to an explosion. Excessive heat from soldering, brazing or welding with refrigerant vapors present can form highly toxic gases and extremely corrosive acids.

AVERTISSEMENT

Risque d'explosion et gaz mortels!

Le non-respect de toutes les consignes de manipulation des fluides frigorigènes peut entraîner la mort ou des blessures graves.

N'effectuez en aucune circonstance des opérations de brasage ou de soudage sur des conduites de fluide frigorigène ou des composants de l'unité sous pression ou pouvant contenir du fluide frigorigène. Récupérez systématiquement le fluide frigorigène en respectant les directives de la loi américaine sur la propreté de l'air (Agence fédérale pour l'environnement) ou toute autre réglementation nationale ou locale en vigueur. Après la récupération du fluide frigorigène, utilisez de l'azote déshydraté pour ramener le système à la pression atmosphérique avant de l'ouvrir pour procéder aux réparations. Les mélanges de fluide frigorigène et d'air sous pression peuvent devenir combustibles en présence d'une source d'inflammation et provoquer une explosion. La chaleur excessive découlant de travaux de soudage ou de brasage associée à la présence de vapeurs de fluide frigorigène peut entraîner la formation de gaz hautement toxiques et d'acides extrêmement corrosifs.

WARNING

Follow EHS Policies!

Failure to follow instructions below could result in death or serious injury.

- **All Trane personnel must follow the company's Environmental, Health and Safety (EHS) policies when performing work such as hot work, electrical, fall protection, lockout/tagout, refrigerant handling, etc. Where local regulations are more stringent than these policies, those regulations supersede these policies.**
- **Non-Trane personnel should always follow local regulations.**

AVERTISSEMENT

Respecter les politiques EHS!

Lenon-respect des consignes suivantes peut être à l'origine de blessures graves,voire mortelles.

- **Tous les membres du personnel du groupe Trane sont tenus de respecter les règles établies par Trane en matière d'environnement, d'hygiène et de sécurité (EHS) lors d'une intervention, notamment en cas de travaux à chaud, de risque d'électrocution et de chute, deprocédures de verrouillage/mise hors service, de manipulation de fluide frigorigène, etc. Si les réglementations locales sont plus strictes que les règles imposées par le groupe, elles deviennent prioritaires.**
- **Le personnel extérieur au groupe Trane est, quant à lui, systématiquement tenu d'observer les réglementations en vigueur à l'échelle locale.**

WARNING

Hazard of Explosion and Deadly Gases!

Failure to follow instructions could result in death or serious injury.

If you smell gas:

1. Open windows.

2. Don't touch electrical switches.

3. Extinguish any open flame.

4. Immediately call your gas supplier.

AVERTISSEMENT

Risque d'explosion et gaz mortels!

Le non-respect de toutes les consignes de sécurité ci-dessous peut entraîner la mort ou des blessures graves.

Si vous sentez une odeur de gaz:

1. Ouvrez les fenêtres.

2. Ne touches à aucun interrupteur.

3. Éteignez toute flamme nue.

4. Avertissez immédiatement votre fournisseur de gaz.

WARNING

Hazardous Service Procedures!

Improper installation, adjustment, alteration, service or maintenance can cause property damage, injury or death. Read the installation, operating and maintenance instructions thoroughly before installing or servicing this equipment.

AVERTISSEMENT

Procédures d'entretien dangereuses!

Une installation, un réglage, une modification, une réparation ou un entretien incorrect peut entraîner des dommages matériels, des blessures ou la mort. Lisez attentivement les instructions d'installation, de fonctionnement et d'entretien avant de procéder à l'installation ou à l'entretien de cet équipement.

WARNING

Hazard of Explosion and Deadly Gases

Failure to follow instructions could result in death or serious injury.
The use and storage of gasoline or other flammable vapors and liquids in open containers in the vicinity of this appliance is hazardous.

AVERTISSEMENT

Risque d'explosion et gaz mortels!

Le non-respect de toutes les consignes de sécurité ci-dessous peut entraîner la mort ou des blessures graves.
Il est dangereux d'utiliser ou d'entreposer de l'essence ou autres liquides ou vapeurs inflammables dans des récipients ouverts à proximité de cet appareil.

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Revision History

- Added 25 and 30 tons information in Digit 5, 6, 7 — Normal Gross Cooling Capacity (MBh) for model OADG and OANG in Model Number Descriptions chapter.
- General Information chapter includes following updates:
  - Updated Unit Description section.
  - Added Split Return/Exhaust section.
  - Updated Barometric Relief Exhaust Dampers section.
  - Updated Modulating 2-Stage Gas Heat section.

  - Updated Figure 5 (Modulating heat signal and staging for 3-stage gas heat) and Modulating 3-Stage Gas Heat section.
  - Updated Condenser fans figures.
  - Added Phase Monitor section.
- Updated OAK, OAG, Outdoor WSHP, Indoor, OAD, and OAN units sections in Unit Clearances, Curb Dimensions, and Dimensional Data chapter.
- Updated Unit weight tables and Corner weight figure in Unit Weight and Rigging chapter.
- Installation chapter includes following updates:
  - Updated Ductwork section.
  - Added Units with Electric Heat section.
  - Updated Units with Indirect Fired Gas Heat section.
  - Updated Chilled Water Connection Size and Location section.
  - Updated Filter Installation section.
  - Updated Field Installed Power Wiring section.
  - Updated Hot Water Connection Size and Location section.
- Updated Indirect Fired Gas Heating Start-Up section in Start-Up chapter.
- Added ERV Wheel Cleaning section in Maintenance chapter.
- Updated Mitsubishi VFD section in Alarms and Troubleshooting chapter.
- Updated Field Installation of Factory-Provided Sensors section in Appendix chapter.

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Model Number Descriptions

Horizon Outdoor Air Unit

Model: OAK Rev5 and OAN Rev5

Digit 1, 2 — Unit Type

OA = Outdoor Air

Digit 3 — Cabinet Size

K = 1,500 CFM–9,000 CFM
N = 3,750 CFM–13,500 CFM

Digit 4 — Major Design Sequence

C = Revision 4
D = Revision 5
E = Heat Pump
F = Indoor WSHP

Digit 5, 6, 7 — Normal Gross Cooling Capacity (MBh)

000 = No Cooling
144 = 12 Tons High Efficiency
180 = 15 Tons High Efficiency
210 = 17 Tons High Efficiency
240 = 20 Tons High Efficiency
264 = 22 Tons High Efficiency
300 = 25 Tons High Efficiency
360 = 30 Tons High Efficiency
420 = 35 Tons High Efficiency
480 = 40 Tons High Efficiency
540 = 45 Tons High Efficiency
600 = 50 Tons High Efficiency
648 = 54 Tons High Efficiency
720 = 60 Tons High Efficiency

Digit 8 — Minor Design Sequence

A = Vertical Discharge/Vertical Return
B = Vertical Discharge/ Horizontal Return
C = Horizontal Discharge/ Vertical Return
D = Horizontal Discharge/ Horizontal Return
E = Vertical Discharge/No Return
F = Horizontal Discharge/No Return
G = Vertical Discharge/ Split Vertical Return-Exhaust
H = Horizontal Discharge/ Split Vertical Return-Exhaust

Digit 9 — Voltage Selection

3 = 208-230/60/3
4 = 460/60/3
5 = 575/60/3

Digit 10 — Reserved for Future Use

Digit 11 — Evaporator Type

0 = No Cooling
B = DX 4-Row
C = DX 4-Row Interlaced
D = DX 6-Row Interlaced
F = Glycol/Chilled Water Coil

Digit 12 — Hot Gas Reheat

0 = No HGRH
1 = Fin and Tube Modulating
2 = Fin and Tube On/Off

Digit 13 — Compressor

0 = No Compressors
A = Scroll Compressors
B = Digital Scroll (1st Circuit Only)
C = Digital Scroll (1st and 2nd Circuit)
D = Variable Speed Scroll (1st Circuit Only)
E = Variable Speed Scroll (1st and 2nd Circuit)
F = Scroll Compressors w/Sound Attenuation Package
G = Digital Scroll (1st Circuit Only) w/Sound Attenuation Package
H = Digital Scroll (1st Circuit and 2nd Circuit) w/Sound Attenuation Package
J = Variable Speed Scroll (1st Circuit Only) w/Sound Attenuation Package
K = Variable Speed Scroll (1st Circuit and 2nd Circuit) w/Sound Attenuation Package
L = Variable Speed Scroll (1st Circuit), Digital Scroll (2nd Circuit)
M = Variable Speed Scroll (1st Circuit), Digital Scroll (2nd Circuit) w/Sound Attenuation Package

Digit 14 — Condenser

0 = No Condenser
1 = Air-Cooled Fin and Tube
2 = Air-Cooled Fin and Tube w/Head Pressure On/Off Control
3 = Water Cooled DX Condenser Copper/Steel
4 = Air-Cooled Fin and Tube w/Head Pressure Variable Speed
8 = Water Cooled DX Condenser Copper/Nickel

Digit 15 — Refrigerant Capacity Control

0 = No RCC Valve
A = RCC Valve on 1st Circuit

Digit 16 — Indoor Fan Motor (IFM)

0 = Direct Drive w/VFD
1 = Direct Drive (VFD by Others)
4 = Direct Drive w/Shaft Grounding Ring w/VFD
5 = Special Motor Option

Digit 17 — Indoor Fan Wheel

A = 120
B = 120.6
C = 140
D = 140.6
E = 160
F = 160.6
G = 180
H = 180.6
J = 200
K = 200.6
L = 180 X 2
M = 180.6 X 2

Digit 18 — Indoor Fan Motor Power (hp)

E = 1 hp –1800 rpm
F = 1 hp – 3600 rpm
G = 1.5 hp – 1800 rpm
H = 1.5 hp – 3600 rpm
J = 2 hp – 1800 rpm
K = 2 hp – 3600 rpm
L = 3 hp – 1800 rpm
M = 3 hp – 3600 rpm
N = 5 hp – 1800 rpm
P = 5 hp – 3600 rpm
R = 7.5 hp – 1800 rpm
S = 7.5 hp – 3600 rpm
T = 10 hp – 1800 rpm
U = 10 hp – 3600 rpm
V = 15 hp – 1800 rpm
W = 15 hp – 3600 rpm

Digit 19 — Reserved for Future Use

Digit 20 — Heat Type (PRI/SEC)

0 = No Heat
A = Indirect-Fired (IF)
C = Electric – Stage
D = Electric – SCR Modulating
G = Dual Fuel (PRI-IF/SEC-ELEC)
H = Dual Fuel (PRI-ELEC/SEC-ELEC)
J = Hot Water
L = No Primary Heat, Secondary ELEC
N = Dual Fuel (PRI-ELEC-STAGED/ SEC-ELEC)

Digit 21 — Primary Fuel Type

0 = No Heat
1 = Natural Gas
2 = Propane
3 = Electric – Open Coil
5 = Hot Water
7 = Natural Gas - 81% Eff.
8 = Propane - 81% Eff.

Model Number Descriptions

Digit 22 — Heat Capacity (Primary Heat Source)

		IF	ELEC	Hot Water
0	=	No Heat	No Heat	No Heat
A	=	50 MBh	10 kW	1 Row/10 FPI
B	=	75 MBh	20 kW	1 Row/12 FPI
C	=	100 MBh	24 kW	1 Row/14 FPI
D	=	125 MBh	28 kW	2 Row/10 FPI
E	=	150 MBh	32 kW	2 Row/12 FPI
F	=	200 MBh	40 kW	2 Row/14 FPI
G	=	250 MBh	48 kW	3 Row/10 FPI
H	=	300 MBh	60 kW	3 Row/12 FPI
J	=	350 MBh	68 kW	3 Row/14 FPI
K	=	400 MBh	79 kW	
L	=	500 MBh	99 kW	
M	=	600 MBh	111 kW	
N	=	700 MBh	119 kW	
P	=	800 MBh	139 kW	
R	=	1000 MBh	159 kW	
S	=		179 kW	
T	=		199 kW	
U	=		215 kW	
X	=	Special Heater Option		

Digit 23 — Heat Capacity (Secondary Heat Source)

		IF	ELEC
0	=	No Secondary Heat	No Secondary Heat
A	=	50 MBh	10 kW
B	=	75 MBh	20 kW
C	=	100 MBh	24 kW
D	=	125 MBh	28 kW
E	=	150 MBh	32 kW
F	=	200 MBh	40 kW
G	=	250 MBh	48 kW
H	=	300 MBh	60 kW
J	=	350 MBh	68 kW
K	=	400 MBh	79 kW
L	=	500 MBh	99 kW
M	=	600 MBh	111 kW
N	=	700 MBh	119 kW
P	=	800 MBh	139 kW
R	=	1000 MBh	159 kW
S	=		179 kW
T	=		199 kW
U	=		215 kW

Digit 24 — Corrosive Environment Package

0 = No Corrosive Package
1 = S/S Interior, S/S Evap Coil Casing
2 = S/S Interior, Eco Coated Coils
3 = S/S Interior, Copper/Copper Evap Coil
4 = S/S Coil Casing
5 = S/S Interior Casing
6 = Eco-Coated Coils
7 = S/S Coil Casing with Eco-Coated Coils
8 = Copper/Copper Evap, HGRH Coils
9 = Corrosion Resistant Package

Digit 25, 26 — Unit Controls

00 = Non-DDC – Electromechanical
AC = Trane – Discharge Air Control w/BACnet® (No Display)
AD = Trane – Space Control w/BACnet (No Display)
AF = Trane – Discharge Air Control w/BACnet w/Display
AG = Trane – Space Control w/BACnet w/Display
AL = Trane – Multi-Zone VAV Control w/BACnet w/Display
AN = Trane – Multi-Zone VAV Control w/BACnet (No Display)
AP = Trane – Single-Zone VAV Control w/BACnet w/Display
AR = Trane – Single-Zone VAV Control w/BACnet (No Display)
BB = Trane – Space Control w/BACnet (No Display) w/Thumbwheel
BC = Trane – Space Control w/BACnet w/Display w/Thumbwheel
BG = Trane – Single-Zone VAV Control w/BACnet w/Display w/ Thumbwheel
BJ = Trane – Single-Zone VAV Control w/BACnet (No Display) w/ Thumbwheel
CA = Trane – Lab Space Control w/ BACnet (No Display)
CB = Trane – Lab Space Control w/ BACnet w/Display
CC = Trane – Lab Discharge Air Control w/BACnet (No Display)
CD = Trane – Lab Discharge Air Control w/BACnet w/Display
CE = Trane – Lab Multi-Zone VAV Control w/BACnet (No Display)
CF = Trane – Lab Multi-Zone VAV Control w/BACnet w/Display
CG = Trane – Lab Space Control w/ BACnet (No Display) w/ Thumbwheel
CH = Trane – Lab Space Control w/ BACnet w/Display w/Thumbwheel
DA = Trane – Horizon Thrive Control w/ BACnet (No Display)
DB = Trane – Horizon Thrive Control w/ BACnet w/Display
XX = Control Special

Digit 27 — Powered Exhaust Fan Motor (PFM) and Exhaust Dampers

0 = No Powered Exhaust
1 = Direct Drive w/VFD and Gravity Dampers
2 = Direct Drive (VFD by Others)
5 = Special Motor Option
6 = Direct Drive w/VFD and Barometric Relief Damper
7 = Direct Drive w/VFD and Isolation Dampers w/End Switch
8 = Barometric Relief Dampers (NO PFM)

Digit 28 — Powered Exhaust Fan Wheel

0 = No Powered Exhaust
A = 120
B = 120.6
C = 140
D = 140.6
E = 160
F = 160.6
G = 180
H = 180.6
J = 200
K = 200.6
L = 180 X 2
M = 180.6 X 2

Digit 29 — Powered Exhaust Fan Motor Power

0 = No Powered Exhaust
E = 1 hp – 1800 rpm
F = 1 hp – 3600 rpm
G = 1.5 hp – 1800 rpm
H = 1.5 hp – 3600 rpm
J = 2 hp – 1800 rpm
K = 2 hp – 3600 rpm
L = 3 hp – 1800 rpm
M = 3 hp – 3600 rpm
N = 5 hp – 1800 rpm
P = 5 hp – 3600 rpm
R = 7.5 hp – 1800 rpm
S = 7.5 hp – 3600 rpm
T = 10 hp – 1800 rpm
U = 10 hp – 3600 rpm
V = 15 hp – 1800 rpm
W = 15 hp – 3600 rpm

Digit 30 — UC600 Hardware Template

- = Prior to v8.0
1 = v8.X, v9.X, or v10.X
2 = v11.0 / Thrive v2.1
3 = v11.1 - v11.3 / Thrive v2.1
4 = v12.0 / Thrive v2.2

Digit 31 — ERV (Requires Powered Exhaust)

0 = No ERV
A = ERV – Composite Construction
B = ERV – Composite Construction with Frost Protection w/VFD
C = ERV – Composite Construction with Bypass
D = ERV – Composite Construction with Frost Protection and Bypass
E = ERV – Aluminum Construction
F = ERV – Aluminum Construction with Frost Protection w/VFD

G = ERV – Aluminum Construction with Bypass
H = ERV – Aluminum Construction with Frost Protection and Bypass

Digit 32 — ERV Size

0 = No ERV
4 = 4634
5 = 5856
6 = 6488
7 = 6876
8 = 74122

Digit 33 — Damper Options

0 = 100% OA 2-Position Damper
1 = 100% OA 2-Position Damper w/RA 2-Position Damper
2 = Modulating OA and RA Dampers w/Economizer
3 = 100% OA 2-Position Damper – Class 1A
4 = 100% OA 2-Position Damper w/RA 2-Position Damper – Class 1A
5 = Modulating OA and RA Dampers w/Economizer – Class 1A
6 = 100% RA Opening (No Damper)
7 = 100% RA w/ 2-Position Damper
8 = 100% RA w/ 2-Position Damper – Class 1A

Digit 34 — Filtration Options

A = Aluminum Mesh Intake Filters (ALM)
B = MERV-8,30%, and ALM
C = MERV-13, 80%, and ALM
D = MERV-14, 95%, and ALM
E = MERV-8 30%, MERV-13 80%, and ALM
F = MERV-8 30%, MERV-14 95%, and ALM
G = MERV-8, 30%, and ALM, with UVC
H = MERV-13, 80%, and ALM, with UVC
J = MERV-14, 95%, and ALM, with UVC
K = MERV-8 30%, MERV-13 80%, ALM, and UVC
L = MERV-8 30%, MERV-14 95%, ALM, and UVC
X = Special Filter Options

Digit 35 — Smoke Detector (Factory-Installed)

0 = No Smoke Detector
1 = Supply Smoke Detector
2 = Return Smoke Detector
3 = Supply and Return Smoke Detectors

Digit 36 — Electrical Options

0 = Non-Fused Disconnect
A = Fused Disconnect Switch
B = Non-Fused Disconnect Switch w/Convenience Outlet
C = Fused Disconnect Switch w/Convenience Outlet
D = Dual Point Power
E = Dual Point Power w/Convenience Outlet
F = 65 SCCR Electrical Rating w/Non-Fused Disconnect
G = 65 SCCR Electrical Rating w/Fused Disconnect
H = 65 KAIC Electrical Rating w/Non-Fused Disconnect
J = 65 KAIC Electrical Rating w/Fused Disconnect
K = 65 KAIC Non-Fused w/Convenience Outlet
L = 65 KAIC Fused w/Convenience Outlet
M = 65 SCCR Non-Fused w/Convenience Outlet

Digit 37 — Airflow Monitoring

0 = No Airflow Monitoring
1 = Airflow Monitoring – IFM Piezo Ring
2 = Airflow Monitoring – PE Piezo Ring
3 = Airflow Monitoring – Outdoor Air with Display and IFM w/Piezo Ring
4 = Airflow Monitoring – IFM Piezo Ring and PE Piezo Ring
5 = Airflow Monitoring – Outdoor Air Monitoring w/Display Supply Air and Exhaust Air w/Piezo Rings

Digit 38 — Accessories

0 = No Options
A = Hailguards
B = LED Service Light
C = Hailguards and LED Service Light
D = LED Service Light in Exhaust Fan Section
E = LED Service Light in Supply and Exhaust Fan Section
F = Hailguards and LED Service Light in Exhaust Fan Section
G = Hailguards and LED Service Light in Supply and Exhaust Fan Section

Digit 39 — Altitude

0 = Sea Level to 1,000 Feet
1 = 1,001 to 2,000 Feet
2 = 2,001 to 3,000 Feet
3 = 3,001 to 4,000 Feet
4 = 4,001 to 5,000 Feet
5 = 5,001 to 6,000 Feet
6 = 6,001 to 7,000 Feet
7 = Above 7,000 Feet

Horizon Outdoor Air Unit

Model: OADG Rev6 and OANG Rev6

Digit 1, 2 — Unit Type

OA = Outdoor Air

Digit 3 — Cabinet Size

D = 1250–8000 cfm
N = 5000–25000 cfm

Digit 4 — Major Design Sequence

G = Revision 6

Digit 5, 6, 7 — Normal Gross Cooling Capacity (MBh)

000 = No DX Cooling
010 = 10 Tons High Efficiency
012 = 12 Tons High Efficiency
015 = 15 Tons High Efficiency
017 = 17 Tons High Efficiency
020 = 20 Tons High Efficiency
025 = 25 Tons High Efficiency
030 = 30 Tons High Efficiency
040 = 40 Tons High Efficiency
045 = 45 Tons High Efficiency
050 = 50 Tons High Efficiency
055 = 55 Tons High Efficiency
060 = 60 Tons High Efficiency
065 = 65 Tons High Efficiency
070 = 70 Tons High Efficiency
075 = 75 Tons High Efficiency
080 = 80 Tons High Efficiency

Digit 8 — Airflow Configuration

A = Vertical Discharge/No Return
B = Horizontal Discharge/No Return
C = Vertical Discharge/Vertical Return
D = Vertical Discharge/Horizontal Return/Exhaust
E = Horizontal Discharge/Vertical Return/Exhaust
F = Horizontal Discharge/Horizontal Return/Exhaust
G = Vertical Discharge/Vertical Return/Vertical Exhaust
H = Vertical Discharge/Vertical Return/Horizontal Exhaust
J = Vertical Discharge/Horizontal Return/Vertical Exhaust
K = Vertical Discharge/Horizontal Return/Horizontal Exhaust
L = Horizontal Discharge/Vertical Return/Vertical Exhaust
M = Horizontal Discharge/Vertical Return/Horizontal Exhaust
N = Horizontal Discharge/Horizontal Return/Vertical Exhaust
P = Horizontal Discharge/Horizontal Return/Horizontal Exhaust

Digit 9 — Voltage Selection

1 = 208/60/3
2 = 230–240/60/3
3 = 460/60/3
4 = 575/60/3

Digit 10 — Not Used

Digit 11 — Indoor Coil Type

0 = No Indoor Coil
C = DX 4-Row
D = DX 6-Row
F = Glycol/Chilled Water Coil – 4-Row
G = Glycol/Chilled Water Coil – 6-Row
H = Glycol/Chilled Water Coil with Cooney Freeze Block Technology – 4-Row
J = Glycol/Chilled Water Coil with Cooney Freeze Block Technology – 6-Row

Digit 12 — Reheat

0 = No Reheat
A = Fin and Tube Modulating HGRH
B = Fin and Tube On/Off HGRH

Digit 13 — Compressor

0 = No Compressor
A = Scroll Compressors
B = Digital Scroll – 1st Circuit Only
C = Digital Scroll – 1st Circuit and 2nd Circuit
D = eFlex™ – 1st Circuit Only
E = eFlex™ – 1st Circuit and 2nd Circuit
F = eFlex™ – 1st Circuit, Digital Scroll-2nd Circuit

Digit 14 — Outdoor Coil

0 = No Condenser
1 = Air-cooled Fin and Tube
3 = Water-cooled Copper/Nickel
4 = Water-cooled Copper/Steel
5 = ASHP Fin and Tube
7 = WSHP Copper/Nickel
8 = WSHP Copper/Steel

Digit 15 — Refrigerant Capacity Control

0 = No RCC Valve
1 = RCC Valve on 1st Circuit
2 = RCC Valve on 1st and 2nd Circuit

Digit 16 — Heat Type — Primary

0 = No Heat
A = Indirect Fired NG (IF) – Standard Efficiency (80%)
B = Indirect Fired NG (IF) – High Efficiency (82%)
C = Indirect Fire NG (IF) – Premium Efficiency (+90%)
D = Indirect Fired LP (IF) – Standard Efficiency (80%)
E = Indirect Fired LP (IF) – High Efficiency (82%)
F = Indirect Fire LP (IF) – Premium Efficiency (+90%)
G = Hot Water
H = Electric – Staged
J = Electric – SCR Modulating
Q = Hot Water – Eco Coated Coils
R = Hot Water – S/S Coil Casing
S = Hot Water – S/S Coil Casing with Eco Coated Coils

Digit 17 — Heat Capacity — Primary

		IF	ELEC	HOT WATER
0	=	No Heat		
A	=	50 MBh	5 kW	1 Row/10 FPI
B	=	75 MBh	10 kW	1 Row/12 FPI
C	=	100 MBh	15 kW	1 Row/14 FPI
D	=	125 MBh	20 kW	2 Row/10 FPI
E	=	150 MBh	24 kW	2 Row/12 FPI
F	=	200 MBh	28 kW	2 Row/14 FPI
G	=	250 MBh	32 kW	3 Row/10 FPI
H	=	300 MBh	40 kW	3 Row/12 FPI
J	=	350 MBh	48 kW	3 Row/14 FPI
K	=	400 MBh	60 kW	
L	=	500 MBh	68 kW	
M	=	500 MBh (Dual 250)	79 kW	
N	=	600 MBh	99 kW	
P	=	600 MBh (Dual 300)	111 kW	
R	=	800 MBh	119 kW	
S	=	800 MBh (Dual 400)	139 kW	
T	=	1000 MBh	159 kW	
U	=	1000 MBh (Dual 500)	179 kW	
V	=	1200 MBh	199 kW	
W	=		215 kW	
Y	=		230 kW	
Z	=		250 kW	

Digit 18 — Heat Type — Secondary

0 = No Secondary Heat
4 = Electric – Staged
5 = Electric – SCR Modulating

Digit 19 — Heat Capacity — Secondary

0 = No Secondary Heat
A = 5 kW
B = 10 kW
C = 15 kW
D = 20 kW
E = 24 kW
F = 28 kW
G = 32 kW
H = 40 kW
J = 48 kW
K = 60 kW
L = 68 kW
M = 79 kW
N = 99 kW
P = 111 kW
R = 119 kW

Digit 20 — Not Used

Digit 21 — Supply Fan Motor

A = 1 hp – 1800 rpm
B = 1 hp – 3600 rpm
C = 1.5 hp – 1800 rpm
D = 1.5 hp – 3600 rpm
E = 2 hp – 1800 rpm
F = 2 hp – 3600 rpm
G = 3 hp – 1800 rpm
H = 3 hp – 3600 rpm
J = 5 hp – 1800 rpm
K = 5 hp – 3600 rpm
L = 7.5 hp – 1800 rpm
M = 7.5 hp – 3600 rpm
N = 10 hp – 1800 rpm
P = 10 hp – 3600 rpm
R = 15 hp – 1800 rpm
S = 15 hp – 3600 rpm
T = 20 hp – 1800 rpm
U = 20 hp – 3600 rpm

Digit 22 — Supply Fan Motor Type

1 = Direct Drive w/VFD
2 = Direct Drive (VFD by Others)
3 = Direct Drive w/Shaft Grounding Ring w/VFD

Digit 23, 24 — Supply Fan Wheel Diameter

AA = 12-in. Wheel
AB = 12-in. – 60% Width Wheel
AC = 14-in. Wheel
AD = 14-in. – 60% Width Wheel
AE = 16-in. Wheel
AF = 16-in. – 60% Width Wheel
AG = 18-in. Wheel
AH = 18-in. – 60% Width Wheel
AJ = 20-in. Wheel
AK = 20-in. – 60% Width Wheel
AL = 22-in. Wheel
AM = 22-in. – 60% Width Wheel
AN = 25-in. Wheel
AP = 25-in. – 60% Width Wheel
BG = Dual 18-in. Wheel
BH = Dual 18-in. – 60% Width Wheel
BJ = Dual 20-in. Wheel
BK = Dual 20-in. – 60% Width Wheel
BL = Dual 22-in. Wheel
BM = Dual 22-in. – 60% Width Wheel
BN = Dual 25-in. Wheel
BP = Dual 25-in. – 60% Width Wheel

Digit 25 — Exhaust Fan Motor

0 = No Powered Exhaust
A = 1 hp – 1800 rpm
B = 1 hp – 3600 rpm
C = 1.5 hp – 1800 rpm
D = 1.5 hp – 3600 rpm
E = 2 hp – 1800 rpm
F = 2 hp – 3600 rpm
G = 3 hp – 1800 rpm
H = 3 hp – 3600 rpm
J = 5 hp – 1800 rpm
K = 5 hp – 3600 rpm
L = 7.5 hp – 1800 rpm
M = 7.5 hp – 3600 rpm
N = 10 hp – 1800 rpm
P = 10 hp – 3600 rpm
R = 15 hp – 1800 rpm
S = 15 hp – 3600 rpm
T = 20 hp – 1800 rpm
U = 20 hp – 3600 rpm

Digit 26 — Exhaust Fan Motor Type

0 = No Powered Exhaust
1 = Direct Drive w/VFD
2 = Direct Drive (VFD by Others)
3 = Direct Drive w/Shaft Grounding Ring w/VFD

Digit 27, 28 — Exhaust Fan Wheel Diameter

00 = No Powered Exhaust
AA = 12-in. Wheel
AB = 12-in. – 60% Width Wheel
AC = 14-in. Wheel
AD = 14-in. – 60% Width Wheel
AE = 16-in. Wheel
AF = 16-in. – 60% Width Wheel
AG = 18-in. Wheel
AH = 18-in. – 60% Width Wheel
AJ = 20-in. Wheel
AK = 20-in. – 60% Width Wheel
AL = 22-in. Wheel
AM = 22-in. – 60% Width Wheel
AN = 25-in. Wheel
AP = 25-in. – 60% Width Wheel
BG = Dual 18-in. Wheel
BH = Dual 18-in. – 60% Width Wheel
BJ = Dual 20-in. Wheel
BK = Dual 20-in. – 60% Width Wheel
BL = Dual 22-in. Wheel
BM = Dual 22-in. – 60% Width Wheel
BN = Dual 25-in. Wheel
BP = Dual 25-in. – 60% Width Wheel

Digit 29 — Powered Exhaust Fan Motor (PFM) and Exhaust Dampers

0 = No Piezo Ring
1 = Supply Fan Piezo Ring
2 = Exhaust Fan Piezo Ring
3 = Supply Fan Piezo Ring and Exhaust Fan Piezo Ring

Digit 30 — Not Used

Digit 31 — Unit Controls

0 = No Controls
1 = Space Control
2 = Discharge Air Control
3 = Multi-Zone VAV
4 = Single-Zone VAV
5 = Trane – Lab Space Control
6 = Trane – Lab Discharge Air Control
7 = Trane – Lab Multi-Zone VAV Control
8 = Horizon Thrive Control

Digit 32 — Building Interface

0 = No Controls
1 = BACnet®

Digit 33 — Filter Options

0 = No Filters
A = MERV-8, 30%
B = MERV-13, 80%
C = MERV-14, 95%
D = MERV-8 30%, MERV-13 80%
E = MERV-8 30%, MERV-14 95%

Digit 34 — Energy Recovery

0 = No Energy Recovery
1 = ERV – Composite Construction with Bypass for Frost Protection
2 = ERV – Composite Construction with Frost Protection w/VFD
3 = ERV – Aluminum Construction with Bypass for Frost Protection
4 = ERV – Aluminum Construction with Frost Protection w/VFD

Digit 35 — Energy Recover Option, Purge

0 = No Purge
1 = Purge

Digit 36 — Energy Recover Wheel Size

0 = No ERV
A = 3014
B = 3622
C = 4136
D = 4634
E = 5262
F = 5856
G = 6488
H = 6876
J = 74122
K = 81146
L = 86170
M = 92180

Digit 37 — Energy Recovery Option, Rotation Sensor

0 = No Rotation Sensor
1 = Rotation Sensor

Digit 38 — Damper Options

1 = 100% OA 2-Position Damper
2 = 100% OA 2-Position Damper w/RA 2-Position Damper
3 = Modulating OA and RA Dampers w/Economizer
4 = Modulating OA Damper
5 = Manually Adjusted OA Damper
6 = 100% RA Opening (No Damper)
7 = 100% RA w/ 2-Position Damper

Model Number Descriptions

Digit 39 — Exhaust Dampers

0 = No Exhaust Dampers
A = Gravity Dampers
B = Isolation Dampers
C = Barometric Relief Dampers

Digit 40 — Not Used

Digit 41 — Electrical Options

0 = Terminal Block – No Factory Installed Disconnect
A = Non-Fused Disconnect
B = Fused Disconnect Switch
C = 65 SCCR Electrical Rating w/Non-Fused Disconnect
D = 65 SCCR Electrical Rating w/Fused Disconnect
E = 65 KAIC Electrical Rating w/Non-Fused Disconnect
F = 65 KAIC Electrical Rating w/Fused Disconnect
G = Dual Point Power
H = Dual Point Power 65 KAIC
J = Dual Point Power 65 SCCR

Digit 42 — Corrosive Environment Package

0 = No Corrosive Package
A = Eco Coated Coils
B = S/S Interior
C = S/S Coil Casing
D = S/S Coil Casing with Eco Coated Coils
E = S/S Interior, Eco Coated Coils
F = Corrosion Resistant Package

Digit 43 — Outdoor Air Monitoring

0 = No Outdoor Air Monitoring
1 = Airflow Probes

Digit 44 — Condenser Fan Options

0 = No Condenser Fans
A = Standard Condenser Fan
B = Passive Head Pressure Control
C = Active Head Pressure Control
D = ECM Condenser Fans with Active Head Pressure Control
E = ECM Condenser Fans with Active Head Pressure Control for Sound Attenuation

Digit 45 — Compressor Sound Blankets and Sound Attenuation

0 = No Sound Attenuation Package
A = Compressor Sound Blankets
B = Compressor Sound Blankets with Sound Attenuation Condenser Fans

Digit 46 — Smoke Detector

0 = No Smoke Detector
1 = Supply Smoke Detector
2 = Return Smoke Detector
3 = Supply and Return Smoke Detector
4 = Supply Smoke Detector (Factory Provided/Field Installed)
5 = Return Smoke Detector (Factory Provided/Field Installed)
6 = Supply and Return Smoke Detector (Factory Provided/Field Installed)

Digit 47 — Hailguards

0 = No Hailguards
A = Hailguards
B = Outdoor Coil Wind Blockers

Digit 48 — Service Lights

0 = No Service Lights
A = Supply Fan Section Service Light
B = Exhaust Fan Section Service Light
C = Supply and Exhaust Fan Section Service Light

Digit 49 — UV Lights

0 = No UV Lights
1 = UV Lights

Digit 50 — Not Used

Digit 51 — Unit Installation Location

A = Outdoor
B = Indoor

Digit 52 — Convenience Outlet

0 = No Convenience Outlet
A = Convenience Outlet

Digit 53 — Controls Display

0 = No Display
1 = TD7 Factory Installed
2 = TD7 Remote Mounted

Digit 54 — Cooling Controls

0 = No ReliaTel™
A = ReliaTel™
B = ReliaTel™ with BCIR Card

Digit 55 — Face and Bypass on Indoor Coil

0 = No Face and Bypass

Digit 56 — Thermostat

0 = No Thermostat
1 = Thumbwheel Thermostat

Digit 57 — Altitude

0 = Sea Level to 1000 Feet
1 = 1001 to 2000 Feet
2 = 2001 to 3000 Feet
3 = 3001 to 4000 Feet
4 = 4001 to 5000 Feet
5 = 5001 to 6000 Feet
6 = 6001 to 7000 Feet
7 = Above 7000 Feet

Digit 58 — Condensate Overflow Switch

0 = No Condensate Overflow Switch
A = Condensate Overflow Switch

Digit 59 — Frostat

0 = No Frostat™
A = Frostat™ Installed

Digit 60 — Not Used

Digit 61 — Outdoor Coil Fluid Type

0 = None
1 = Water
2 = Ethylene Glycol
3 = Propylene Glycol
4 = Methanol
5 = Other

Digit 62 — Minimum Damper Leakage

0 = Standard
1 = Class 1A

Digit 63, 64 — UC600 Hardware Template

00 = Prior to Hardware Template
AA = v7.X
AB = v8.X
AC = v9.X
AD = v10.0
AE = v11.0 / Thrive v2.1
AF = v11.1 / Thrive v2.1
AG = v11.2 / Thrive v2.1
AH = v11.3 / Thrive v2.1
AK = v12.0 / Thrive v2.2

Digit 65, 66, 67, 68, 69 — Reserved for Future Use

Horizon Outdoor Air Unit

Model: OAB Rev5 and OAG Rev5

Digit 1, 2 — Unit Type

OA = Outdoor Air

Digit 3 — Cabinet Size

B = 500 – 3000 CFM
G = 1250 – 7500 CFM

Digit 4 — Major Design Sequence

D = Revision 1
E = Heat Pump
F = Indoor WSHP

Digit 5, 6, 7 — Normal Gross Cooling Capacity (MBh)

000 = No Cooling
036 = 3 Tons High Efficiency
048 = 4 Tons High Efficiency
060 = 5 Tons High Efficiency
072 = 6 Tons High Efficiency
084 = 7 Tons High Efficiency
096 = 8 Tons High Efficiency
108 = 9 Tons High Efficiency
120 = 10 Tons High Efficiency
144 = 12 Tons High Efficiency
180 = 15 Tons High Efficiency
210 = 17 Tons High Efficiency
240 = 20 Tons High Efficiency
264 = 22 Tons High Efficiency
300 = 25 Tons High Efficiency
360 = 30 Tons High Efficiency

Digit 8 — Minor Design Sequence

A = Vertical Discharge/Vertical Return
B = Vertical Discharge/Horizontal Return
C = Horizontal Discharge/Vertical Return
D = Horizontal Discharge/Horizontal Return
E = Vertical Discharge/No Return
F = Horizontal Discharge/No Return

Digit 9 — Voltage Selection

3 = 208-230/60/3
4 = 460/60/3
5 = 575/60/3

Digit 10 — Reserved for Future Use

Digit 11 — Evaporator Type

0 = No Cooling
B = DX 4-Row
C = DX 4-Row Interlaced
D = DX 6 Row Interlaced
F = Glycol/Chilled Water Coil

Digit 12 — Hot Gas Reheat

0 = No HGRH
1 = Fin and Tube Modulating
2 = Fin and Tube On/Off

Digit 13 — Compressor

0 = No Compressors
A = Scroll Compressors
B = Digital Scroll (1st Circuit Only)
C = Digital Scroll (1st Circuit and 2nd Circuit)
D = Variable Speed Scroll (1st Circuit Only)
E = Variable Speed Scroll (1st Circuit and 2nd Circuit)
F = Scroll Compressors w/Sound Attenuation Package
G = Digital Scroll (1st Circuit Only) w/Sound Attenuation Package
H = Digital Scroll (1st Circuit and 2nd Circuit) w/Sound Attenuation Package
J = Variable Speed Scroll (1st Circuit Only) w/Sound Attenuation Package
K = Variable Speed Scroll (1st Circuit and 2nd Circuit) w/Sound Attenuation Package
L = Variable Speed Scroll (1st Circuit), Digital Scroll (2nd Circuit)
M = Variable Speed Scroll (1st Circuit), Digital Scroll (2nd Circuit) w/Sound Attenuation Package

Digit 14 — Condenser

0 = No Condenser
1 = Air Cooled Fin and Tube
2 = Air Cooled Fin and Tube w/Head Pressure On/Off Control
3 = Water Cooled DX Condenser Copper/Steel
4 = Air Cooled Fin and Tube w/Head Pressure Variable Speed
8 = Water Cooled DX Condenser Copper/Nickel

Digit 15 — Refrigerant Capacity Control

0 = No RCC Valve
A = RCC Valve on 1st Circuit
B = RCC Valve on 1st and 2nd Circuit

Digit 16 — Indoor Fan Motor (IFM)

0 = ECM w/Backward Curved Plenum Fan
1 = Direct Drive w/VFD
2 = Belt Drive
3 = Belt Drive w/VFD
4 = Special Motor Option

Digit 17 — Indoor Fan Wheel

A = 355
B = 450
C = 450 X 2
D = 12/9 T2 (Single Fan-Belt drive)
E = 12/9 BT (Dual Fan-Belt drive)
F = 315
G = 500
H = 500 X 2
J = 120.6
K = 140.6
L = 100.6

Digit 18 — Indoor Fan Motor (hp)

	ECM	BELT DRIVE	DIRECT DRIVE
A =	1 kW	2 hp	
B =	2 kW	3 hp	
C =	3 kW	5 hp	
D =	4 kW	7.5 hp	
E =		10 hp	1 hp – 1800 rpm
F =		15 hp	1 hp – 3600 rpm
G =			1.5 hp – 1800 rpm
H =			1.5 hp – 3600 rpm
J =			2 hp – 1800 rpm
K =			2 hp – 3600 rpm
L =			3 hp – 1800 rpm
M =			3 hp – 3600 rpm
N =			5 hp – 1800 rpm
P =			5 hp – 3600 rpm

Digit 19 — Reserved for Future Use

Digit 20 — Heat Type (PRI/SEC)

0 = No Heat
A = Indirect Fired (IF)
B = No Primary Heat, Direct Fired (DF) Secondary
C = Electric – Staged
D = Electric – SCR Modulating
G = Dual Fuel (PRI-IF/SEC-ELEC-STAGED)
H = Dual Fuel (PRI-ELEC-SCR/SEC-ELEC-STAGED)
J = Hot water (HW)
L = No Primary Heat, Secondary ELEC-STAGED
N = Dual Fuel (PRI-ELEC-STAGED/SEC-ELEC-STAGED)
Q = Dual Fuel (PRI-HW/SEC-ELEC-STAGED)
T = Dual Fuel (PRI-IF/SEC-ELEC-SCR)
U = Dual Fuel (PRI-ELEC-SCR/SEC-ELEC-SCR)
V = No Primary Heat, Secondary ELEC-SCR
W = Dual Fuel (PRI-ELEC-STAGED/SEC-ELEC-SCR)
Y = Dual Fuel (PRI-HW/SEC-ELEC-SCR)
X = Special Heat Option

Digit 21 — Primary Fuel Type

0 = No Heat
1 = Natural Gas
2 = Propane
3 = Electric – Open Coil
4 = Electric – Sheathed Coil
5 = Hot Water
7 = Nature Gas – 81% Eff.
8 = Propane – 81% Eff.

Digit 22 — Heater Capacity — Primary Heat Source

		IF	ELEC	HOT WATER
0	=	No Heat	No Heat	No Heat
A	=	50 MBh	5 kW	1 Row/10 FPI
B	=	75 MBh	10 kW	1 Row/12 FPI
C	=	100 MBh	15 kW	1 Row/14 FPI
D	=	125 MBh	20 kW	2 Row/10 FPI
E	=	150 MBh	24 kW	2 Row/12 FPI
F	=	200 MBh	28 kW	2 Row/14 FPI
G	=	250 MBh	32 kW	3 Row/10 FPI
H	=	300 MBh	40 kW	3 Row/12 FPI
J	=	350 MBh	48 kW	3 Row/14 FPI
K	=	400 MBh	60 kW	
L	=	500 MBh	68 kW	
M	=	600 MBh	79 kW	
N	=		99 kW	
P	=		111 kW	
R	=		119 kW	
X	=		Special Heater Option	

Digit 23 — Heat Capacity — Secondary Heat Source

		ELEC	DF
0	=	No Secondary-Heat	
A	=	5 kW	6-inch Burner – up to 330
B	=	10 kW	12-inch Burner – up to 400 MBh
C	=	15 kW	12-inch Burner – up to 600 MBh
D	=	20 kW	18-inch Burner – up to 400 MBh
E	=	24 kW	18-inch Burner – up to 900 MBh
F	=	28 kW	
G	=	32 kW	

Digit 24 — Corrosive Environment Package

0 = No Corrosive Package
1 = S/S Interior, S/S Coil Casing
2 = S/S Interior, Eco Coated Coils
3 = S/S Interior, Copper/Copper Evap Coil
4 = S/S Coil Casing
5 = S/S Interior
6 = Eco Coated Coils
7 = S/S Coil Casing with Eco Coated Coils
8 = Copper/Copper Evap, HGRH Coils
9 = Corrosion Resistant Package

Digits 25, 26 — Unit Controls

00 = Non DDC – Electromechanical
AC = Trane – Discharge Air Control w/BACnet (No Display)
AD = Trane – Space Control w/BACnet (No Display)
AF = Trane – Discharge Air Control w/BACnet w/Display
AG = Trane – Space Control W/BACnet w/Display
AL = Trane – Multi-Zone Vav Control w/BACnet w/Display
AN = Trane – Multi-Zone Vav Control w/BACnet (No Display)
AP = Trane – Single-Zone Vav Control w/BACnet w/Display
AR = Trane – Single-Zone Vav Control w/BACnet (No Display)
BB = Trane – Space Control w/BACnet (No Display) w/Thumbwheel
BC = Trane – Space Control w/BACnet w/Display w/Thumbwheel
BG = Trane – Single-Zone Vav Control w/BACnet w/Display w/Thumbwheel
BJ = Trane – Single-Zone Vav Control w/BACnet (No Display) w/Thumbwheel
CA = Trane – Lab Space Control w/BACnet (No Display)
CB = Trane – Lab Space Control w/BACnet w/Display
CC = Trane – Lab Discharge Air Control w/BACnet (No Display)
CD = Trane – Lab Discharge Air Control w/BACnet w/Display
CE = Trane – Lab Multi-Zone Vav Control w/BACnet (No Display)
CF = Trane – Lab Multi-Zone Vav Control w/BACnet w/Display
CG = Trane – Lab Space Control w/BACnet (No Display) w/Thumbwheel
CH = Trane – Lab Space Control w/BACnet w/Display w/Thumbwheel
DA = Trane – Horizon Thrive Control w/BACnet (No Display)
DB = Trane – Horizon Thrive Control w/BACnet w/Display
XX = Control Special

Digit 27 — Powered Exhaust Fan Motor (PFM) and Exhaust Dampers

0 = No Powered Exhaust
1 = Direct Drive w/VFD
5 = Special Motor Option
6 = ECM w/Backward Curved Plenum Fan
7 = ECM w/Backward Curved Plenum Fan and Barometric Relief Damper
8 = ECM w/Backward Curved Plenum Fan and Isolation Dampers w/End switch
9 = Barometric Relief Dampers (No PFM)\
A = Direct Drive w/VFD and Barometric Relief Damper
B = Direct Drive w/VFD and Isolation Dampers w/End Switch

Digit 28 — Powered Exhaust Fan Wheel

0 = No Powered Exhaust
A = 355
B = 450
C = 450 X 2
D = 12/9 T2 (single fan - belt drive)
E = 12/9 BT (dual fan - belt drive)
F = 315
G = 500
H = 500 X 2
J = 120.6
K = 140.6
L = 100.6

Digit 29 — Powered Exhaust Fan Motor (hp)

		ECM	DIRECT DRIVE
0	=	No Powered Exhaust	
A	=	1 kW	
B	=	2 kW	
C	=	3 kW	
D	=	4 kW	
E	=		1 hp – 1800 rpm
F	=		1 hp – 3600 rpm
G	=		1.5 hp – 1800 rpm
H	=		1.5 hp – 3600 rpm
J	=		2 hp – 1800 rpm
K	=		2 hp – 3600 rpm
L	=		3 hp – 1800 rpm
M	=		3 hp – 3600 rpm
N	=		5 hp – 1800 rpm
P	=		5 hp – 3600 rpm

Digit 30 — UC600 Hardware Template

- = Prior to v8.0
1 = v8.X, v9.X, or v10.X
2 = v11.0 / Thrive v2.1
3 = v11.1 - v11.3 / Thrive v2.1
4 = v12.0 / Thrive v2.2

Digit 31 — ERV (Requires Powered Exhaust)

0 = No ERV
A = ERV – Composite Construction w/Bypass
B = ERV – Composite Construction with Frost Protection w/VFD
C = ERV – Aluminum Construction w/Bypass
D = ERV – Aluminum Construction with Frost Protection w/VFD

Digit 32 — ERV Size

0 = No ERV
1 = 3014
2 = 3622
3 = 4136
4 = 4634
5 = 5856

Digit 33 — Damper Options

0 = 100% OA 2-Position Damper
1 = 100% OA 2-Position Damper w/RA 2-Position Damper
2 = Modulating OA and RA Dampers w/Economizer
3 = 100% OA 2-Position Damper – Class 1A
4 = 100% OA 2-Position Damper w/RA 2-Position Damper – Class 1A
5 = Modulating OA and RA Dampers w/Economizer – Class 1A
6 = 100% RA Opening (No Damper)
7 = 100% RA w/2-Position Damper
8 = 100% RA w/2-Position Damper – Class 1A

Digit 34 — Filtration Options

A = No Filters
B = MERV-8, 30%
C = MERV-13, 80%
D = MERV-14, 95%
E = MERV-8 30%, MERV-13 80%
F = MERV-8 30%, MERV-14 95%
G = MERV-8, 30%, with UVC
H = MERV-13, 80%, with UVC
J = MERV-14, 95%, with UVC
K = MERV-8 30%, MERV-13 80%, and UVC
L = MERV-8 30%, MERV-14 95%, and UVC
X = Special Filter Options

Digit 35 — Smoke Detector — Factory Installed

0 = No Smoke Detector
1 = Supply Smoke Detector
2 = Return Smoke Detector
3 = Supply and Return Smoke Detectors

Digit 36 — Electrical Options

0 = Terminal Block
A = Non-Fused Disconnect
B = Fused Disconnect Switch
C = Non-Fused Disconnect w/ Convenience Outlet
D = Fused Disconnect Switch w/ Convenience Outlet
E = Dual Point Power
F = Dual Point Power w/Convenience Outlet
G = 65 SCCR Electrical Rating w/Non-Fused Disconnect
H = 65 SCCR Electrical Rating w/ Fused Disconnect
J = 65 KAIC Electrical Rating w/Non-Fused Disconnect
K = 65 KAIC Electrical Rating w/Fused Disconnect
L = 65 KAIC Non-Fused w/Convenience Outlet
M = 65 KAIC Fused w/Convenience Outlet
N = 65 SCCR Non-Fused w/Convenience Outlet

Digit 37 — Airflow Monitoring

0 = No Airflow Monitoring
1 = Airflow Monitoring – IFM Piezo Ring
2 = Airflow Monitoring – PE Piezo Ring
3 = Airflow Monitoring – Outdoor Air with Display and IFM w/Piezo Ring
4 = Airflow Monitoring – IFM Piezo Ring and PE Piezo Ring
5 = Airflow Monitoring – OA w/Display Supply and Exhaust Air w/Piezo Rings
6 = Airflow Monitoring – Outdoor Air Monitoring for Direct Fired Heat Units

Digit 38 — Accessories

0 = No Options
A = Hailguards
B = Hailguards and LED Service Light in Supply Fan Section
C = LED Service Light in Supply Fan Section
D = Hailguards and LED Service Light in Exhaust Fan Section
E = Hailguards and LED Service Light in Supply and Exhaust Fan Section
F = LED Service Light in Exhaust Fan Section
G = LED Service Light in Supply and Exhaust Fan Section

Digit 39 — Altitude

0 = Sea Level to 1,000 feet
1 = 1,001 to 2,000 feet
2 = 2,001 to 3,000 feet
3 = 3,001 to 4,000 feet
4 = 4,001 to 5,000 feet
5 = 5,001 to 6,000 feet
6 = 6,001 to 7,000 feet
7 = Above 7,000 feet

General Information

Overview of Manual

Note: *One copy of this document ships inside the control panel of each unit and is customer property. It must be retained by the units maintenance personnel.*

This booklet describes proper installation, operation, and maintenance procedures for air cooled systems. By carefully reviewing the information within this manual and following the instructions, the risk of improper operation and/or component damage will be minimized.

It is important that periodic maintenance be performed to help assure trouble free operation. A maintenance schedule is provided at the end of this manual. Should equipment failure occur, contact a qualified service organization with qualified, experienced HVAC technicians to properly diagnose and repair this equipment.

Model Number Description

All products are identified by a multiple-character model number that precisely identifies a particular type of unit. An explanation of the alphanumeric identification code is provided (see "Model Number Descriptions," p. 11). Its use will enable the owner/operator, installing contractors, and service engineers to define the operation, specific components, and other options for any specific unit.

When ordering replacement parts or requesting service, be sure to refer to the specific model number and serial number printed on the unit nameplate.

Unit Nameplate

A Mylar® unit nameplate is located on the units corner support next to the control box. It includes the unit model number, serial number, electrical characteristics, refrigerant charge, as well as other pertinent unit data.

Compressor Nameplate

The nameplate for the compressors are located on the side of the compressor.

Unit Description

Before shipment, each unit is leak tested, dehydrated, charged with refrigerant and compressor oil, and run tested for proper control operation.

The condenser coils are aluminum fin, mechanically bonded to copper tubing.

Direct-drive, vertical discharge condenser fans are provided with built-in thermal overload protection.

The Outdoor Air Unit Main Unit Display and ReliaTel™ Control Module (RTRM) are microelectronic control systems. The acronym RTRM is used extensively throughout this document when referring to the control system network.

The Main Unit Display and the RTRM are mounted in the Main Control Panel. The Main Unit Display and RTRM receive information from sensors and customer binary contacts to satisfy the applicable request for ventilation, cooling, dehumidification and heating.

Indoor Fan Failure Input

The Indoor Fan Failure Switch (IFFS) is connected to verify indoor fan operation.

When there is a call for the indoor fan to be energized, the differential pressure switch, connected to the Main Unit Display, must prove airflow within 30 seconds or the Main Unit Display will shut off all mechanical operations, lock the system out and send a diagnostic alarm to the Unit Display. The system will remain locked out until a reset is initiated through the MCM via the Alarm Reset Function on the Unit Display.

Low Pressure Control ReliaTel Control

This input incorporates the compressor low pressure control (CLP 1/2) of each refrigeration circuit and can be activated by opening a field supplied contact installed on the OAUTS.

If this circuit is open before the compressor is started, the ReliaTel™ control will not allow the affected compressor to operate. Anytime this circuit is opened for 1 continuous second during compressor operation, the compressor for that circuit is immediately turned "Off." The compressor will not be allowed to restart for a minimum of 3 minutes should the contacts close.

If four consecutive open conditions occur during the first 3 minutes of operation, the compressor for that circuit will be locked out, and a manual reset will be required to restart the compressor.

High Pressure Control ReliaTel Control

The compressor high pressure controls (CHP 1/2/3/4) are wired in series between the compressor outputs on RTRM1 (CHP 1/2) and RTRM2 (CHP 3/4) and the compressor contactor coils. If one of the high pressure control switches opens, the respective RTRM senses a lack of current while calling for cooling and locks the compressor out.

On dual circuit units, if the high pressure control opens, the compressor on the affected circuit is locked out. A manual reset for the affected circuit is required.

Space Temperature/RH Sensor (Optional)

Field installed, wall mounted combination temperature/ humidity sensor (BAYSENS036A) to control space cooling, heating and dew point.

High Temperature Sensor

The Discharge Air Temperature Sensor (DTC) supplies a continuous signal to the MCM. Factory setting for Discharge Air Temperature (DTC) Discharge Air Temperature Setpoint Maximum (MDTS) is 120°F (range of 80 to 120°F), the unit will be shut down, and require a manual restart if Discharge Air Temperature exceeds MDTS for 10 minutes (adj 10 to 25 minutes). If DAT exceeds Discharge Air High Temperature Cutoff (DHCS) of 125°F for 10 minutes for gas heat or 90°F for electric heat, the unit will shut down and require manual restart.

Outdoor Air Temperature and Relative Humidity Sensor

This factory installed combination outdoor air sensor located in the outdoor air hood is designed to sense both outdoor air temperature and relative humidity for use by the microprocessor controller to make required ventilation, cooling, dehumidification and heating decisions. Control Input (Occupied / Unoccupied) Terminals are provided on the terminal strip labeled OAUTS for a field installed dry contact or switch closure to put the unit in the Occupied or Unoccupied modes.

Hot Gas Reheat

This option shall consist of a hot-gas reheat coil located on the leaving air side of the evaporator.

100 Percent Outdoor Air Hood with Damper and Filters

Factory-installed and -integrated 100 percent outdoor air hood with damper controlled by a direct coupled actuator and 2 in. (50.80 mm) permanent and washable aluminum mesh filters (mist eliminators) removable through a hinged access panel. The unit can be factory provided with an optional 100 percent return air damper controlled by a direct coupled actuator that is electrically interlocked with the outdoor air damper.

Modulating Indirect Fired Gas Burner

The unit will have fully modulating, high turn-down, indirect fired gas heat. The heating section will include high turn-down burners and a stainless steel tubular heat exchanger. The heat exchanger will be constructed of type 439 stainless steel and be a tubular design capable of draining internal condensate. External flue to be constructed of type 304 stainless steel.

Units will be suitable for use with natural gas or Liquid Propane (LP) gas.

Through the Base Electrical with Disconnect Switch

Factory installed 3-pole, molded case disconnect switch with provisions for through the base electrical connections will be included. The disconnect switch, with integral overcurrent circuit breaker, will be installed in the unit in a water tight enclosure with access through a hinged door. Factory wiring will be provided from the switch to the unit high voltage terminal block. The switch will be UL/CSA agency recognized.

Through the Base Gas Piping

The unit will include provisions for installing through the base gas piping. The factory installed option will have all piping necessary including an external shut-off piping yoke with pre-assembled, manual gas shut-off valve, elbows, and union. The manual shut-off valve will include an 1/8 in. (3.17 mm) NPT pressure tap. This assembly will require minor field labor to install.

Hinged Access Doors

Hinged access doors with hold open brackets will be factory-installed.

Modulating Electric Heat

The unit may have four stage or fully modulating SCR controlled electric heat. The primary heating section will include open coil heating elements, automatic and manual cut-outs, low voltage controls, air proving switch, maximum 48 amps per circuit and fusing for heaters over 48 amps. For ductwork installation, refer to “Ductwork,” p. 75.

Supply and Exhaust Piezo Fan Rings

Airflow monitoring measuring fan suction and cone pressure differential to calculate fan airflow.

ERV

Energy Recovery Wheels rotate between the incoming outdoor air stream and the building exhaust air stream. As the wheel rotates, it transfers a percentage of the heat and moisture differential from one air stream to the other. Instead of wasting energy in the exhaust airstream, it is temporarily captured by the energy transfer media and then released to preheat, pre-cool, humidify, or dehumidify the incoming air.

Hot Water Coils

This option consists of a hot water coil located in the primary heat position. Hot water valve is field provided.

Suction Pressure Monitoring

All units with compressors will come standard with a refrigeration suction pressure transducer on Circuit 1, and on Circuit 2 when the unit has a digital scroll on the second circuit.

Outdoor and Return Air Dampers

2-Position Outdoor Air Damper

2-position outdoor air damper without a return air damper is an open/close damper that is energized with 24 Vac when the unit begins its start-up sequence and energizes the coil on the OADR relay. There is an end switch wired back to the controller, factory set to close at 30 to 50 percent damper position, using a rotary dial on the actuator, to begin the supply fan sequence. The damper should remain closed while the unit is off, with or without power.

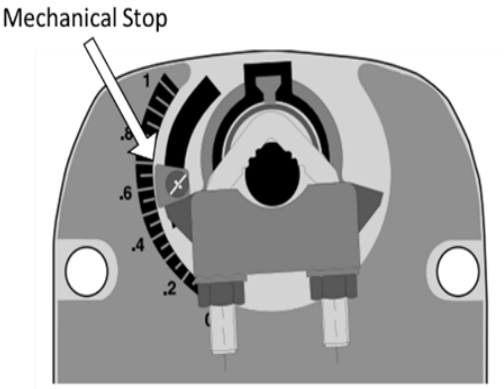
2-Position Outdoor and Return Air Dampers

2-position outdoor and return air dampers are open/close dampers energized with 24 Vac. Each actuator is connected to the OADR relay, with the outdoor air damper on the normally open (NO) and the return air damper on the normally closed (NC). With no power on the unit, both dampers are closed. As the unit is powered, the NC contact is closed, and the return air damper opens. Once the start-up sequence begins and OADR is energized, the NO contact is closed and the NC contact is opened, thus opening the outdoor air damper, and closing the return air damper.

Mixed Air Setup on 2-Position Dampers

2-Position outdoor and return air dampers can be set up for a mixed airflow using mechanical stops at any position between 0 and 90°. The mechanical stops are factory provided, installed on the actuators. With the damper closed, loosen the set screw on the stop and set it in position. Depending on static pressures, setting the position on the return air damper may not be necessary to achieve proper mixed airflows. Depending on access, the clamp may need to be loosened and re-positioned to set the mechanical stop in position.

Figure 1. Mechanical stop on a 2-position actuator



2-Position Return Air Damper

2-position return air damper without an outdoor air damper is an open/close damper that is energized with 24 Vac when the unit begins its start-up sequence and energizes the coil on the OADR relay. There is an end switch wired back to the controller, factory set to close at 30 to 50 percent damper position, using a rotary dial on the actuator, to begin the supply fan sequence. The damper should remain closed while the unit is off, with or without power.

No Damper (100 Percent Return Air)

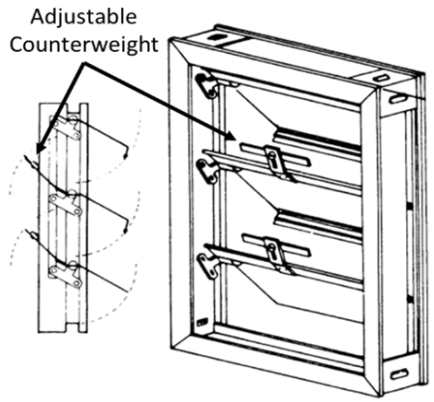
No return or outdoor air damper installed and supply fan start-up sequence begins immediately.

Exhaust Dampers

Barometric Relief Exhaust Dampers

Barometric relief dampers are weighted backdraft dampers with a counterweight that requires a small amount of back pressure before the dampers are opened. The counterweights are adjustable such that the pressure required to open them can be set for site requirements. When the exhaust fan is operating (if installed), the backdraft dampers open automatically as the fan speed increases.

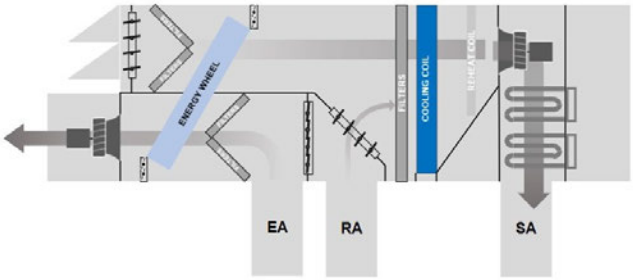
Figure 2. Barometric relief damper with counterweight



Split Return/Exhaust

Units equipped with dual air paths for the return and exhaust will have an additional function of the exhaust fan operation. During all operating conditions, the exhaust fan controls to a pressure differential across the damper between the two air paths to always have air leakage from the return into the exhaust. This ensures the exhaust air stream does not leak into the return air stream. If preferred, the damper between the two air paths can be set to a minimum position to allow a certain amount of return air to be exhausted during normal operation. During Economizer Mode, the damper between the two paths will open fully, the return air damper will close fully, and all of the air will be exhausted out of the unit.

Figure 3. Split return/exhaust air paths



Primary Heaters

Indirect-Fired Gas Heat

Indirect Gas Heater Sequencing

Primary gas heat typically has a minimum turndown of 5°F to 15°F, depending on heater size and airflow. A resetting deadband is utilized to prevent cycling due to minimum turndown of the modulating heater, but still allows precise control when the heat demand is not between stages and minimum turndown. The deadband ranges from 0.5°F to 2°F for the discharge air setpoint.

Air stratification can occur whenever there is a duct tee immediately after the unit or when the discharge air sensor is installed too closely to the outlet. When there's more than a single stage of heat, the primary heater is split manifold and there are instances where only half the gas heater is ignited, and only half of the air stream is conditioned immediately downstream of the unit.

Modulating 1-Stage Gas Heat

Heat 1 is enabled whenever the Heating Capacity Primary Status is above 0 percent, and the modulating heat output is directly proportional to the heating capacity. Stage 1 heat command is turned off once the heat capacity returns to 0 percent for 3 continuous minutes and has a minimum on time of 5 minutes.

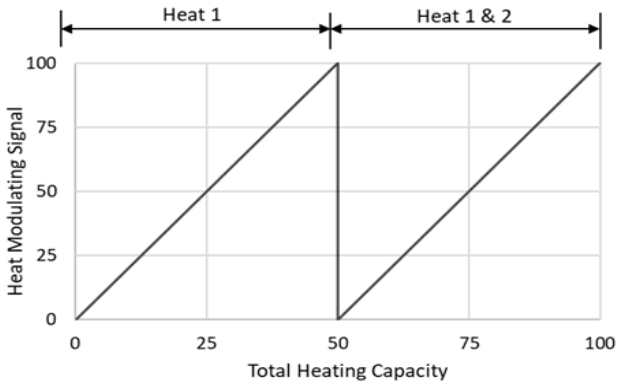
Modulating 2-Stage Gas Heat

With modulating 2-stage gas heat, there is a single heater with a split manifold, with each stage having 50 percent of the total capacity. The first stage is on one side, and the second stage is on the other side.

Heat 1 is enabled whenever the Heating Capacity Primary Status is above 0 percent, and heat 2 is enabled whenever the heating capacity reaches 50 percent. The modulating heat output is scaled from 0 to 100 percent with the heating capacity between 0 to 50 percent and again at 50 to 100 percent, see Figure 4, p. 23.

Heat 1 heat command is turned off once the heat capacity returns to 0 percent for 3 continuous minutes and has a minimum on time of 5 minutes. When starting heat 2, the heat capacity is initially locked at 50 percent to prevent overshooting setpoint.

Figure 4. Modulating heat signal and staging for 2-stage gas heat

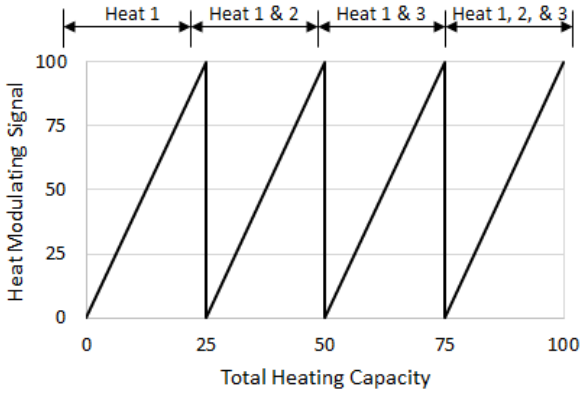


Modulating 3-Stage Gas Heat

With modulating 3-stage gas heat, heat 1 and 2 are a single, split manifold burner, with each stage being 25 percent of the capacity (totaling 50 percent of the total capacity). Heat 3 is 50 percent of the total capacity and equal to the size of both heat 1 and heat 2. The burners are staged in different orders to achieve the full modulating range.

Heat 1 is enabled whenever the heating capacity is above 0 percent. Heat 2 is enabled when the heating capacity is between 25 to 50 percent and from 75 to 100 percent. Heat 3 is enabled when the heating capacity is above 50 percent. The modulating heat signal is scaled 0 to 100 percent between each of the stages, see Figure 5, p. 24. Each time a burner is staged off/on, the PID is locked to prevent overshooting the setpoint.

Figure 5. Modulating heat signal and staging for 3-stage gas heat



Space Temperature/Humidity Sensor

All units ordered with Space Control or Single Zone VAV Control (with or without thumbwheel) come standard with a hardwired space temperature/humidity combo sensor (BAYSENS036A). In all cases when controlling to space conditions, a space temperature sensor is required, either using the factory provided hardwired sensor, a field provided wireless sensor, or communicated via BAS.

Space humidity is required on all lab/critical applications, and is highly recommended (but not required) for other applications controlling to space conditions.

Fans

Condenser Fans

The following pictures represent the condenser fan numbering for each Horizon cabinet from the top view. The ones labeled with VFD are the fans that are on a VFD when the unit is equipped with Active Head Pressure Control, while the others are on/off.

Figure 6. Top view of OAB 3 to 9 tons

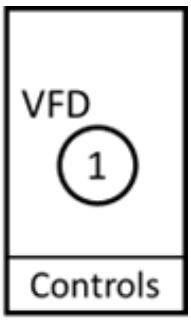


Figure 7. Top view of OADG (rev 6) 10 to 20 tons standard DX; and 10 to 15 tons air source heat pump

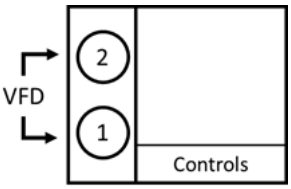


Figure 8. Top view of OADG (rev 6) 25 to 30 tons standard DX; and 17 to 30 tons air source heat pump; and OAK 12 to 30 tons

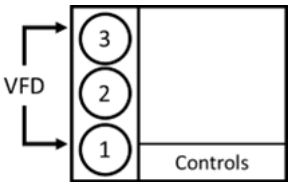


Figure 9. Top view of OAG 10 to 12 tons (left) and 15 to 30 tons (right)

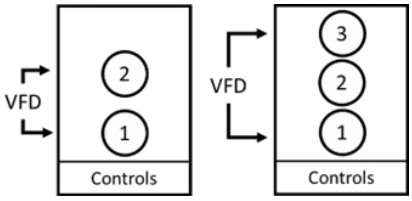


Figure 10. Top view of OAN (rev 5) 30 to 60 tons

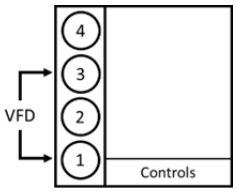


Figure 11. Top view of OANG (rev 6) 40 to 50 tons

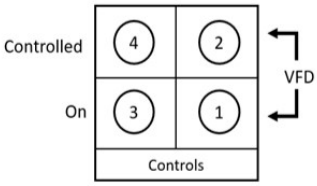
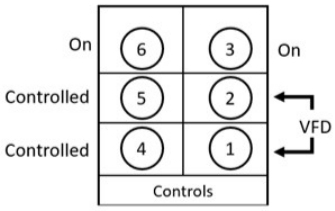


Figure 12. Top View of OANG (rev 6) 55 to 80 tons



Filter Status Switches

Each unit is equipped with up to three filter status switches based on ordered options. These switches are differential pressure measured across the filters that triggers a binary input into the controller.

The final filter status is located on the filter bank just before the indoor cooling coil (or just upstream of the supply fan for no cooling units). When equipped with dual filters (such as Merv-14 and Merv-8) in the same filter bank, the switch measures the pressure drop across both filter sets, and not each individual filter type.

Each unit with an ERV has a filter status switch on the exhaust path (before ERV) and on the outdoor air path, but the outdoor air filter bank is removed on units with pre-heat. The two filter switches are located near the filter banks and are labeled Energy Recovery Wheel Outdoor and Exhaust Air Filter Status.

Airflow Monitoring

Supply Airflow Monitoring

When equipped with airflow monitoring on the supply fan(s), the airflow is measured using a piezo reading on the cone of the supply fan and should not be confused with a static pressure reading. Each unit has a local and global airflow reading, with the local value being critical for unit operation, and the global value having an available k-factor to align the unit with BAS readings for VAV's or other purposes.

Piezo pressure is measured with supply fan piezo pressure local, and a multiplier is applied using the supply fan wheel size to generate a supply fan airflow local. The local value is used within the program as a safety measure. To utilize the supply airflow reading for fan control, refer to "Supply Fan Operation," p. 120.

The supply airflow active is calculated by multiplying the supply fan airflow local by the supply fan airflow k-factor. The k-factor should be the only adjusted value.

Exhaust Airflow Monitoring

When equipped with airflow monitoring on the exhaust fan(s), the airflow is measured using a piezo reading on the cone of the exhaust fan and should not be confused with a static pressure reading. Each unit has a local and global airflow reading, with the local value being critical for unit operation, and the global value having an available k-factor to align the unit with BAS readings for VAVs or other purposes.

Piezo pressure is measured with exhaust fan piezo pressure local, and a multiplier is applied using the exhaust fan wheel size to generate an exhaust fan airflow local. The local value is used within the program as a safety measure. To utilize the exhaust airflow reading for fan control, refer to "Exhaust Fan Operation," p. 124.

The exhaust airflow active is calculated by multiplying the exhaust fan airflow local by the exhaust fan airflow k-factor. The k-factor should be the only adjusted value.

Outdoor Airflow Monitoring

Outdoor airflow is measured using averaging probes mounted in front of the outdoor air damper, measuring velocity pressure. The pressure measurement is fed back into the controller to calculate an airflow reading.

Units equipped with outdoor airflow monitoring and modulating dampers have the capability to control the dampers to an airflow setpoint. To set the unit up for outdoor airflow control using the outdoor air dampers, set the outdoor airflow setpoint to the requested value. The unit will modulate the outdoor air damper position command to maintain the outdoor airflow active to the setpoint. Damper position is restricted between the outdoor air damper minimum position setpoint and outdoor air damper maximum position setpoint.

On VAV units, the supply airflow minimum setpoint active is limited to not fall below the outdoor air minimum flow setpoint, so that the minimum amount of outdoor air is sustained.

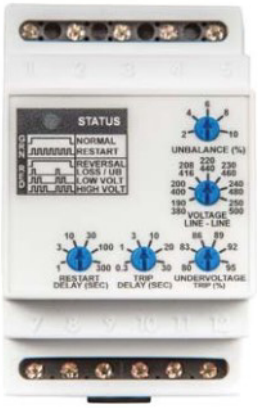
Note on Accuracy: The airflow measurement device is designed for 0 to 100 percent of the full range of each cabinet. As such, it's not possible to design a measurement device that works across the wide ranges of operating conditions.

At full flow, the readings are accurate within ±5 percent, but measurement accuracy falls off at low outdoor airflow ranges. At about 25 percent of the full cabinet airflow, accuracy may fall to ±10 percent, and continues to decline from there.

For example, the OAB has a range up to 3,000 cfm. At 200 cfm of outside air, the accuracy may only be 20 percent.

Phase Monitor

Figure 13. Macromatic phase monitor



LED STATUS		STATUS
GREEN	⎍	NORMAL (RELAY ON)
	⎍⎍⎍⎍⎍	RESTART (DELAY)
RED	⎍	REVERSAL
	⎍_⎍	LOSS/UB (UNBALANCE)
	⎍⎍_⎍⎍	LOW VOLT (UNDERVOLTAGE)
	⎍⎍_⎍⎍	HIGH VOLT (OVERVOLTAGE)

Figure 14. Time Mark phase monitor

LED STATUS

UNDER	ON CONTINUOUSLY	RED
OVER	⎍⎍	
UNBAL / SINGLE PH	⎍⎍⎍⎍	
REVERSE PHASE	⎍⎍⎍⎍⎍⎍	
RUN	ON CONTINUOUSLY	GRN
RESTART DELAY	⎍⎍⎍⎍⎍⎍	

Unit Inspection

⚠WARNING

Fiberglass Wool!

Product may contain fiberglass wool. Disturbing the insulation in this product during installation, maintenance or repair will expose you to airborne particles of glass wool fibers and ceramic fibers known to the state of California to cause cancer through inhalation. Glass wool fibers may also cause respiratory, skin or eye irritation.

AVERTISSEMENT

Laine de verre!

Le produit peut contenir de la laine de verre. Des interventions inappropriées sur l'isolation de ce produit pendant les opérations d'installation, d'entretien ou de réparation vous exposent à des particules aériennes de fibres de verre ou de fibres céramiques, responsables selon la législation américaine (état de Californie) de risques de cancers par inhalation. Les fibres de verre peuvent aussi provoquer des phénomènes d'irritation au niveau du système respiratoire, de la peau ou des yeux.

As soon as the unit arrives at the job site:

- ☐ Verify that the nameplate data matches the data on the sales order and bill of lading (including electrical data).
- ☐ Verify that the power supply complies with the unit nameplate specifications.
- ☐ Visually inspect the exterior of the unit, including the roof, for signs of shipping damage.
- ☐ Visually inspect the internal components for shipping damage as soon as possible after delivery and before it is stored. Do not walk on the sheet metal base pans.
- ☐ If concealed damage is discovered, notify the carriers terminal of damage immediately by phone and by mail. Concealed damage must be reported within 15 days.
- ☐ Request an immediate joint inspection of the damage by the carrier and the consignee. Do not remove damaged material from the receiving location. Take photos of the damage, if possible. The owner must provide reasonable evidence that the damage did not occur after delivery.
- ☐ Notify the appropriate sales representative before installing or repairing a damaged unit.

- Avoid breathing fiberglass dust.
- Use a NIOSH approved dust/mist respirator.
- Avoid contact with the skin or eyes. Wear long-sleeved, loose-fitting clothing, gloves, and eye protection.
- Wash clothes separately from other clothing: rinse washer thoroughly.
- Operations such as sawing, blowing, tear-out, and spraying may generate fiber concentrations requiring additional respiratory protection. Use the appropriate NIOSH approved respiration in these situations.

First Aid Measures

Eye Contact

Flush eyes with water to remove dust. If symptoms persist, seek medical attention.

Skin Contact

Wash affected areas gently with soap and warm water after handling.

Storage

Take precautions to prevent condensate from forming inside the units electrical compartments and motors if:

- the unit is stored before it is installed; or,
- the unit is set on the roof curb, and temporary heat is provided in the building. Isolate all side panel service entrances and base pan openings (e.g., conduit holes, S/A and R/A openings, and flue openings) from the ambient air until the unit is ready for start-up.

Note: *Do not use the units heater for temporary heat without first completing the start-up procedure detailed in* *"Start-Up," p. 97**.*

The manufacturer will not assume any responsibility for equipment damage resulting from condensate accumulation on the units electrical and/or mechanical components.

Unit Clearances

“Unit Clearances, Curb Dimensions, and Dimensional Data,” p. 28 contains figures that illustrate the minimum operating and service clearances for either a single or multiple unit installation. These clearances are the minimum distances necessary to assure adequate serviceability, cataloged unit capacity, and peak operating efficiency.

Providing less than the recommended clearances may result in condenser coil starvation, short-circuiting of exhaust or recirculation of hot condenser air.

Unit Clearances, Curb Dimensions, and Dimensional Data

⚠WARNING

Combustible Materials!

Failure to maintain proper clearance between the unit heat exchanger, vent surfaces and combustible materials could cause a fire which could result in death or serious injury or property damage. Refer to unit nameplate and installation instructions for proper clearances.

⚠AVERTISSEMENT

Matériaux combustibles!

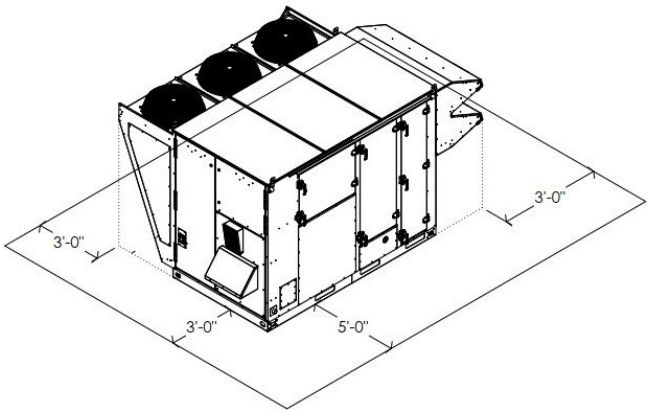
Tout manquement à l'obligation de maintenir une distance appropriée entre l'échangeur de chaleur de l'unité, les surfaces de ventilation et les matériaux combustibles peut provoquer un incendie pouvant résulter en des blessures corporelles graves, voire mortelles, ou des dommages matériels. Reportez-vous à la plaque signalétique de l'unité et aux instructions d'installation pour connaître les distances appropriées.

OAK Units

Unit Clearances

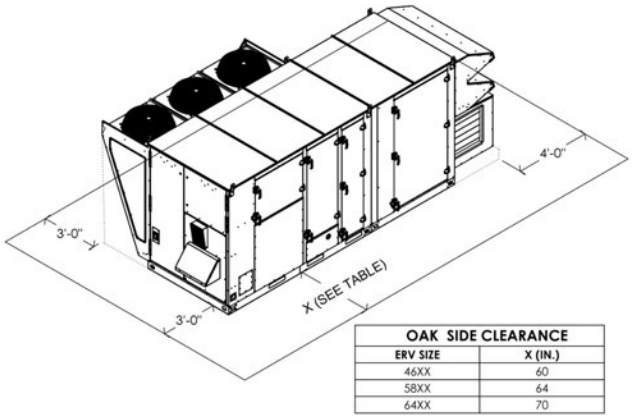
Note: *Minimum clearance above the unit is 72 inches.*

Figure 15. Typical installation clearances for OAK unit



Note: *Minimum clearance above the unit is 72 inches.*

Figure 16. Typical installation clearances for OAK unit with auxiliary cabinet



OAK SIDE CLEARANCE	
ERV SIZE	X (IN.)
46XX	60
58XX	64
64XX	70

Note: *Certain options require auxiliary cabinet. Refer to project-specific unit submittals.*

Figure 17. Typical installation clearances for OAK unit

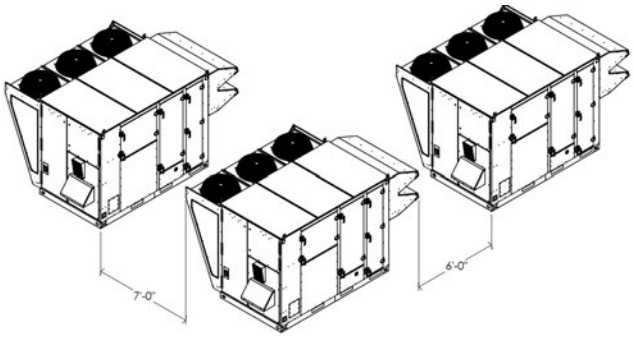
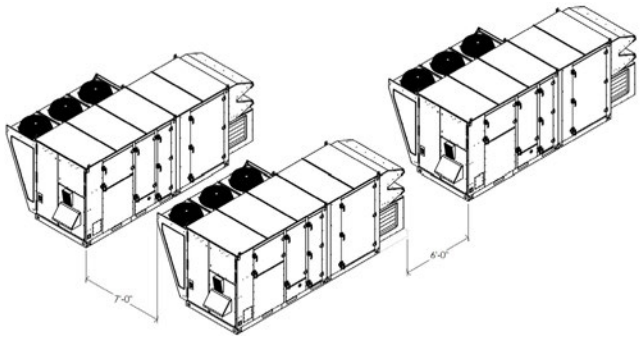


Figure 18. Typical installation clearances for OAK unit with auxiliary cabinet



Note: *Certain options require auxiliary cabinet. Refer to project-specific unit submittals.*

Curb Dimensions

Figure 19. Unit curb data for OAK 12 to 30 tons (in.)

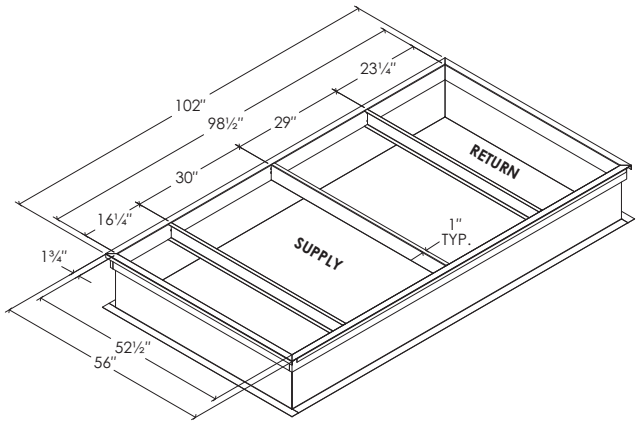
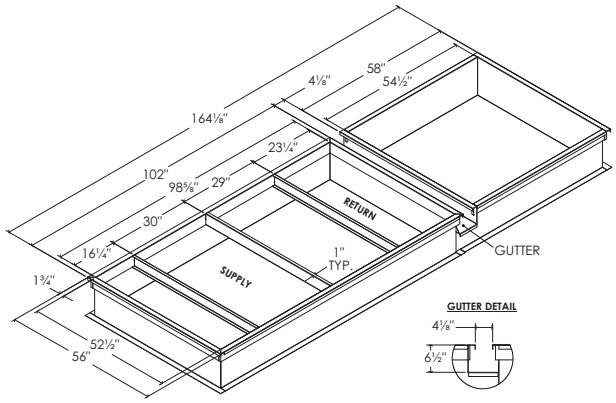


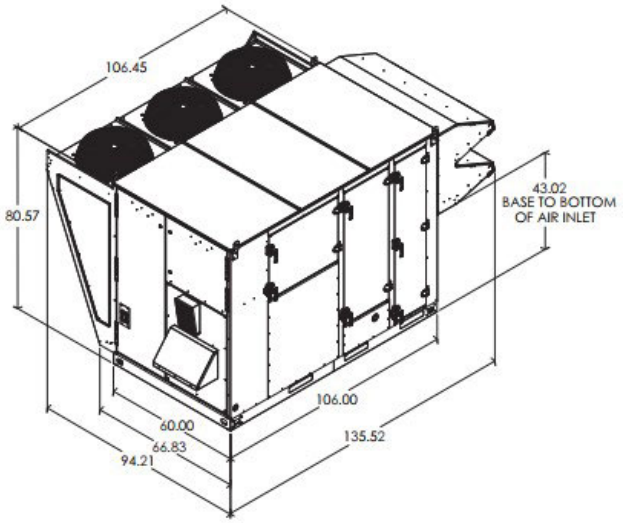
Figure 20. Unit curb data for OAK 12 to 30 tons with auxiliary cabinet (in.)



Note: *Certain options require auxiliary cabinet. Refer to project-specific unit submittals.*

Dimensional Data

Figure 21. Unit dimensional data for OAK 12 to 30 tons, vertical supply and vertical/no return without ERV



Note: *Sound attenuation package will add 10.01 in. to the height of the condenser fan section. Refer to project-specific unit submittals.*

Figure 22. Unit dimensional data for OAK 12 to 30 tons with auxiliary cabinet , vertical supply and vertical return with ERV

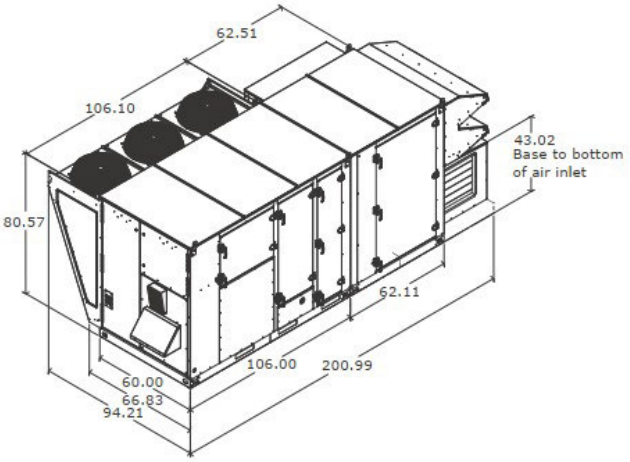
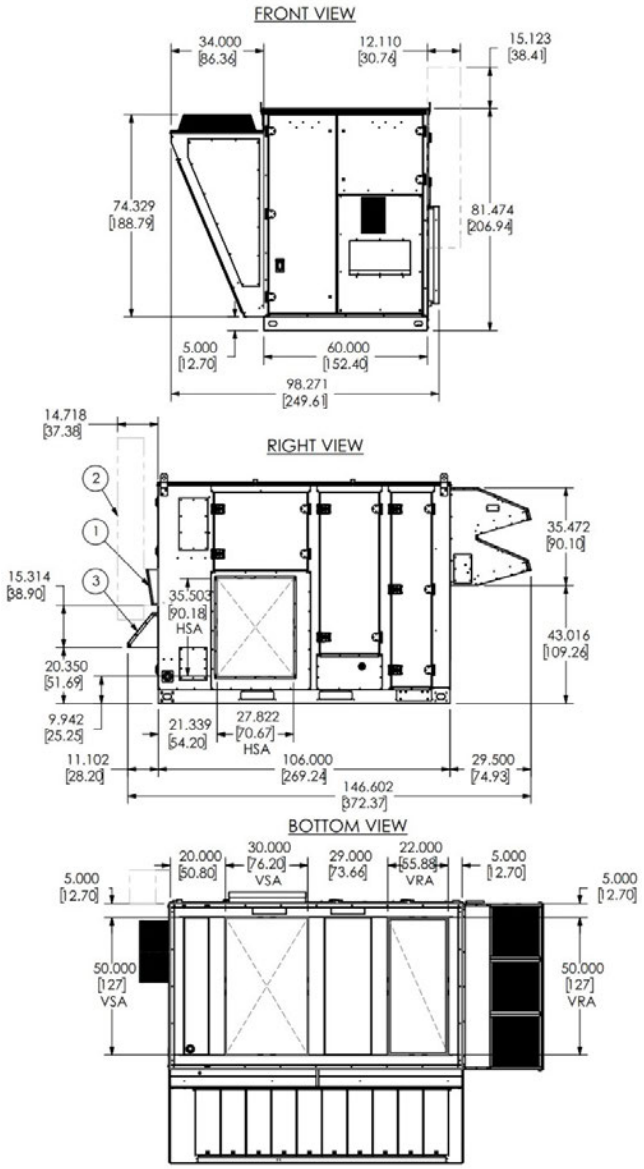
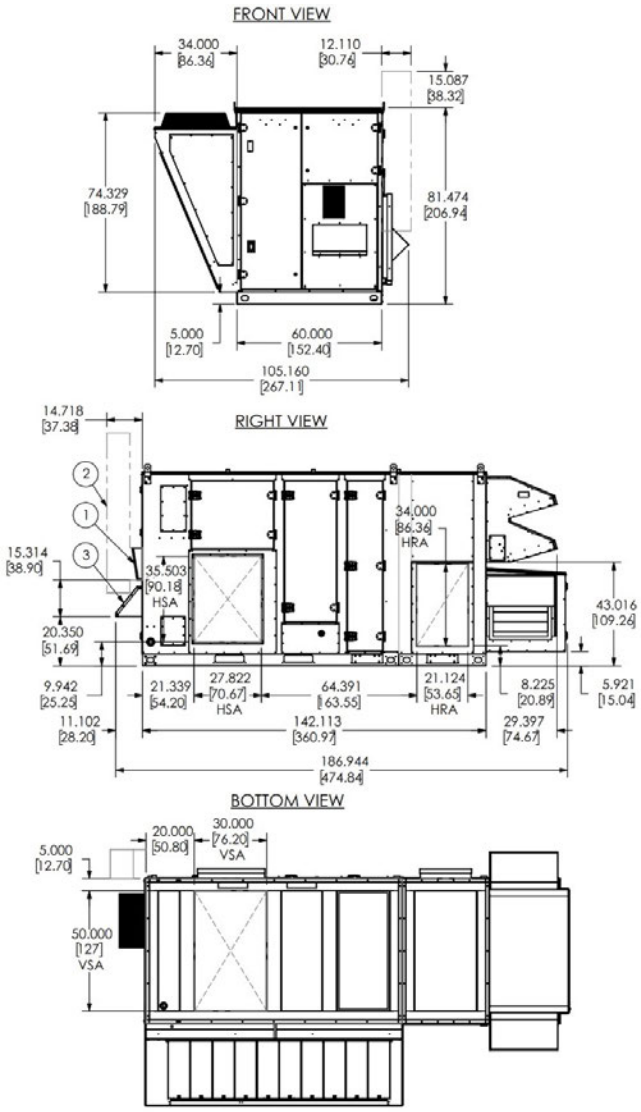


Figure 23. Unit dimensional data for OAK 12 to 30 tons, horizontal supply and vertical/no return (dual dimensions, in. [cm])



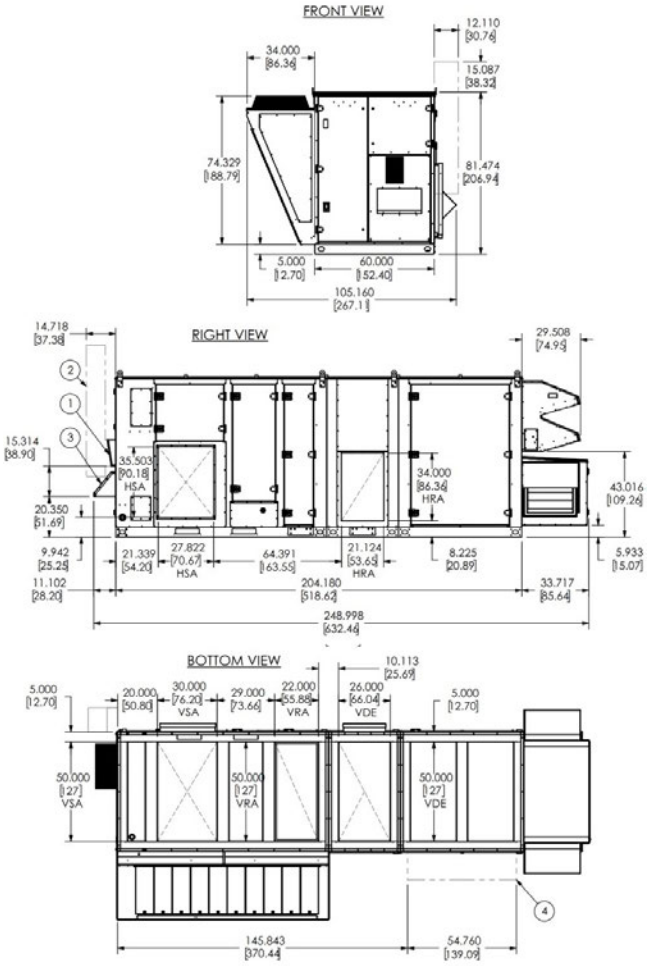
CONFIGURATION SPECIFIC NOTES:
1. FLUE HOOD: INCLUDED WITH 150-400MBH GAS HEAT
2. FLUE EXTENSION: INCLUDED WITH 500-800MBH GAS HEAT
3. COMBUSTION AIR INTAKE: INCLUDED WITH GAS HEAT

Figure 24. Unit dimensional data for OAK 12 to 30 tons, horizontal supply and horizontal return with optional exhaust fan (dual dimensions, in. [cm])



CONFIGURATION SPECIFIC NOTES:
1. FLUE HOOD: INCLUDED WITH 150-400MBH GAS HEAT
2. FLUE EXTENSION: INCLUDED WITH 500-800MBH GAS HEAT
3. COMBUSTION AIR INTAKE: INCLUDED WITH GAS HEAT

Figure 25. Unit dimensional data for OAK 12 to 30 tons, horizontal supply and horizontal return with ERV (dual dimensions, in. [cm])



Notes:

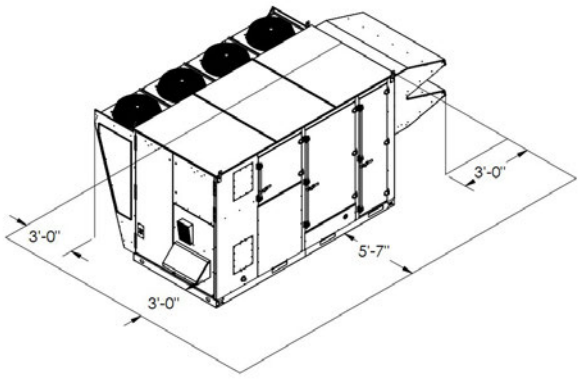
- *Certain options require auxiliary cabinet. Refer to product-specific unit submittals.*
- *Sound attenuation package will add 10.01 in. to the height of the condenser fan section. Refer to project-specific unit submittals.*

OAN Units

Unit Clearances

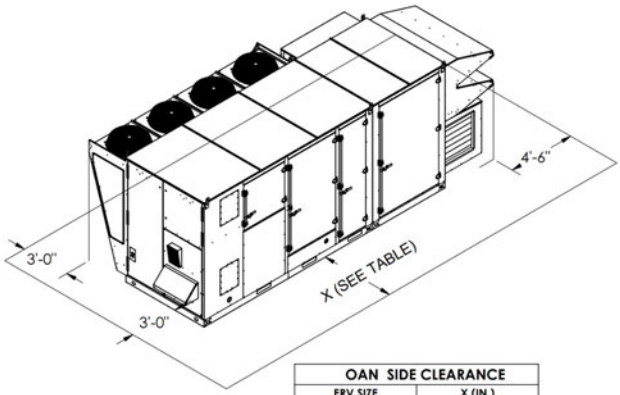
Note: *Minimum clearance above the unit is 72 inches.*

Figure 26. Typical installation clearances for OAN unit



Note: *Minimum clearance above the unit is 72 inches.*

Figure 27. Typical installation clearances for OAN unit with auxiliary cabinet



OAN SIDE CLEARANCE	
ERV SIZE	X (IN.)
58XX	67
68XX	74
74XX	80

Note: *Certain options require auxiliary cabinet. Refer to project-specific unit submittals.*

Figure 28. Typical installation clearances for OAN unit

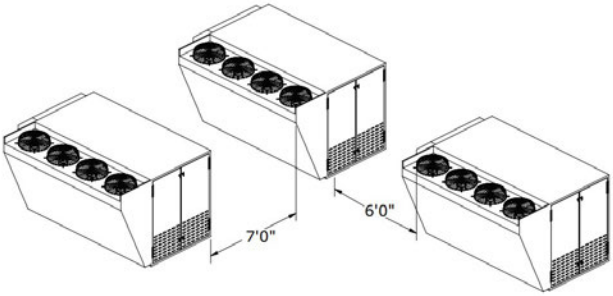
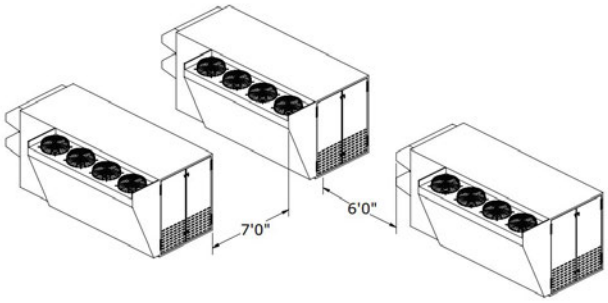


Figure 29. Typical installation clearances for OAN unit with auxiliary cabinet



Note: *Certain options require auxiliary cabinet. Refer to project-specific unit submittals.*

Curb Dimensions

Figure 30. Unit curb data for OAN 30 to 54 tons

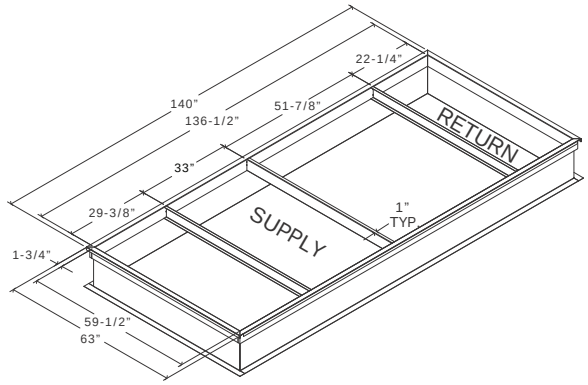
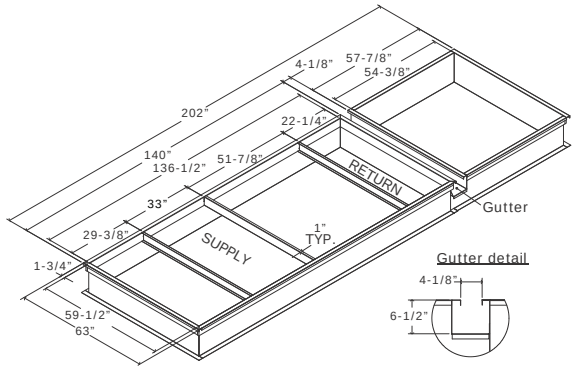


Figure 31. Unit curb data for OAN 30 to 54 tons with auxiliary cabinet



Note: *Certain options require auxiliary cabinet. Refer to project-specific unit submittals.*

Dimensional Data

Figure 32. Unit dimensional data for OAN 30 to 54 tons, vertical supply and vertical/no return without ERV

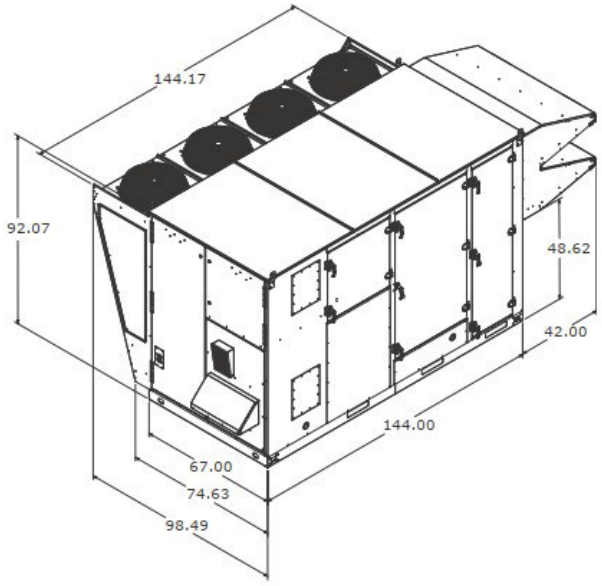


Figure 33. Unit dimensional data for OAN 30 to 54 tons with auxiliary cabinet, vertical supply and vertical return with ERV

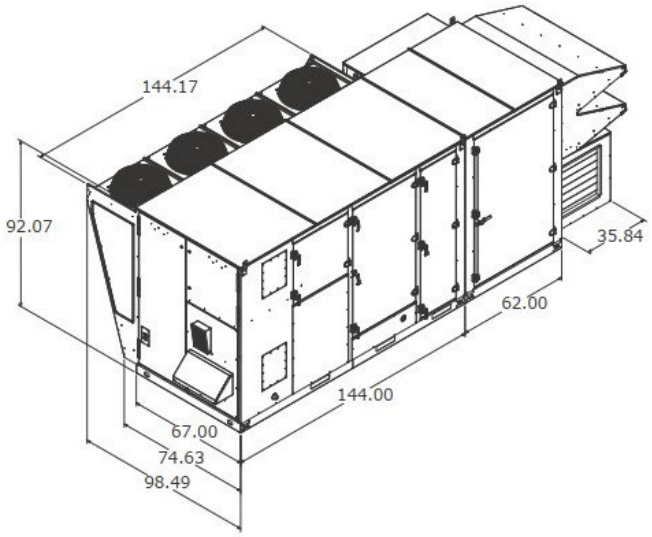
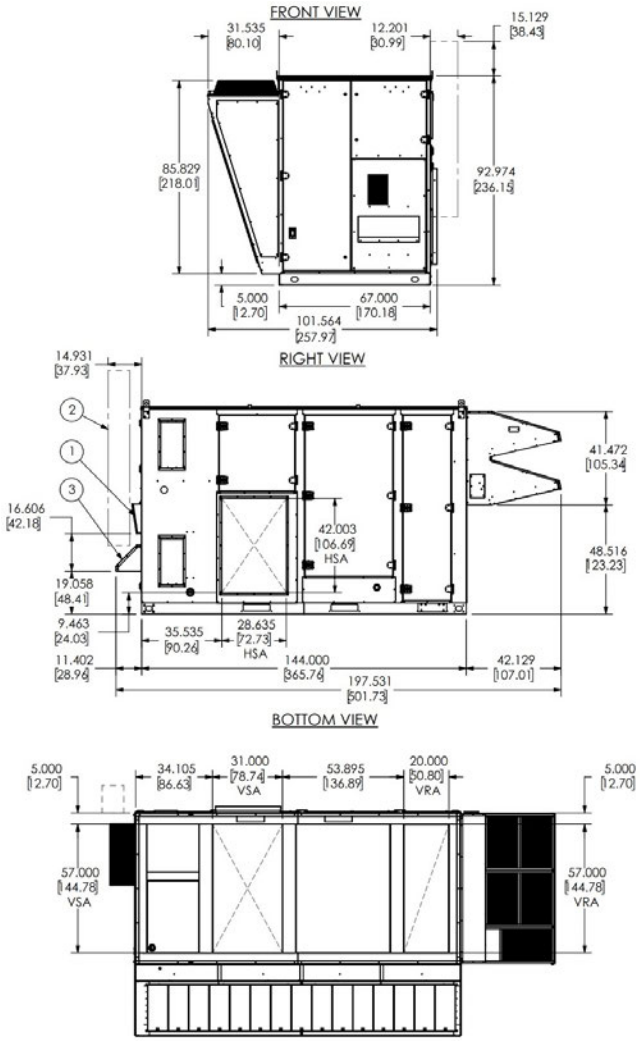
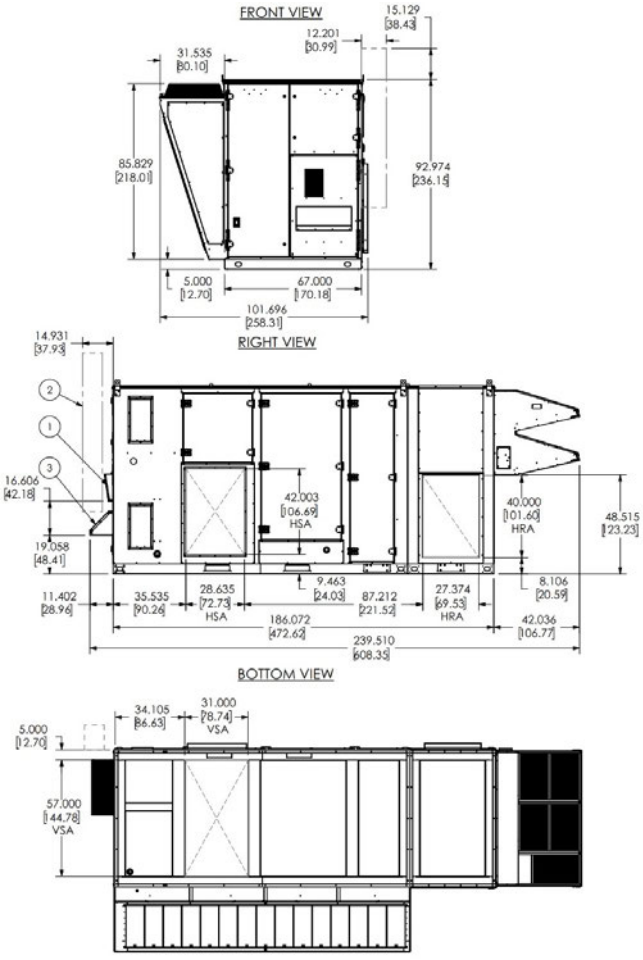


Figure 34. Unit dimensional data for OAN 30 to 54 tons, horizontal supply and vertical/no return (dual dimensions, in. [cm])



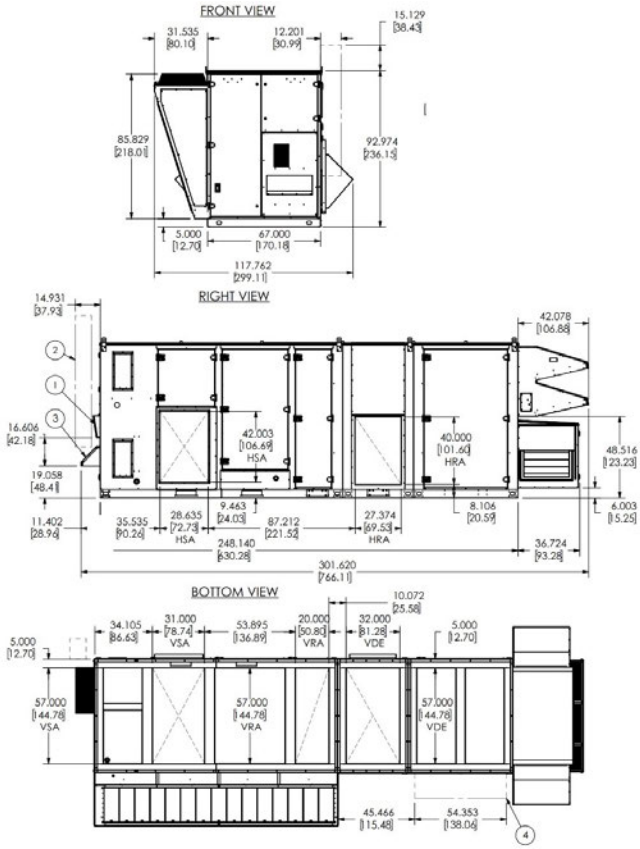
CONFIGURATION SPECIFIC NOTES:
1. FLUE HOOD: INCLUDED WITH 300-500MBH GAS HEAT
2. FLUE EXTENSION: INCLUDED WITH 600-1000MBH GAS HEAT
3. COMBUSTION AIR INTAKE: INCLUDED WITH GAS HEAT

Figure 35. Unit dimensional data for OAN 30 to 54 tons, horizontal supply and horizontal return with optional exhaust fan (dual dimensions, in. [cm])



CONFIGURATION SPECIFIC NOTES:
1. FLUE HOOD: INCLUDED WITH 300-500MBH GAS HEAT
2. FLUE EXTENSION: INCLUDED WITH 600-1000MBH GAS HEAT
3. COMBUSTION AIR INTAKE: INCLUDED WITH GAS HEAT

Figure 36. Unit dimensional data for OAN 30 to 54 tons, horizontal supply and horizontal return with ERV (dual dimensions, in. [cm])



CONFIGURATION SPECIFIC NOTES:
1. FLUE HOOD: INCLUDED WITH 300-500MBH GAS HEAT
2. FLUE EXTENSION: INCLUDED WITH 600-1000MBH GAS HEAT
3. COMBUSTION AIR INTAKE: INCLUDED WITH GAS HEAT
4. ERV EXTENSION: ENERGY RECOVERY 68-74XX

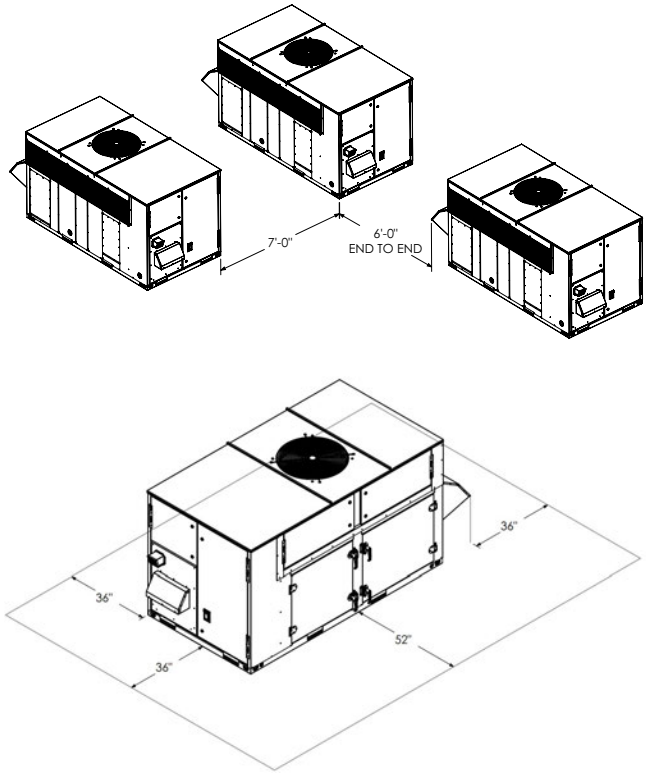
Note: *Certain options require auxiliary cabinet. Refer to project-specific unit submittals.*

OAB Units

Unit Clearances

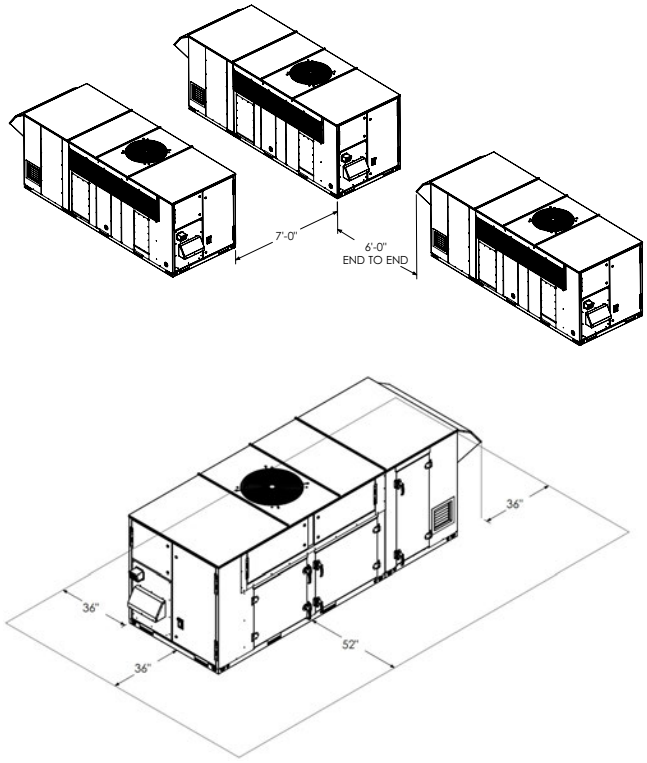
Note: *Minimum clearance above the unit is 72 inches.*

Figure 37. Typical installation clearances for OAB unit



Note: *Minimum clearance above the unit is 72 inches.*

Figure 38. Typical installation clearances for OAB unit with auxiliary cabinet



Note: *Certain options require auxiliary cabinet. Refer to project-specific unit submittals.*

Curb Dimensions

Figure 39. Unit curb data for OAB 3 to 9 tons

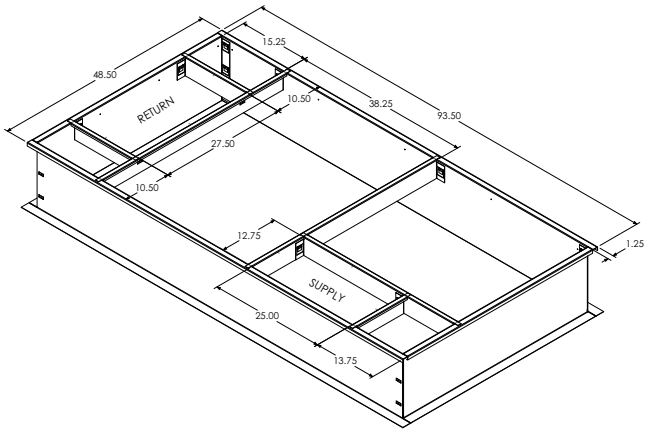
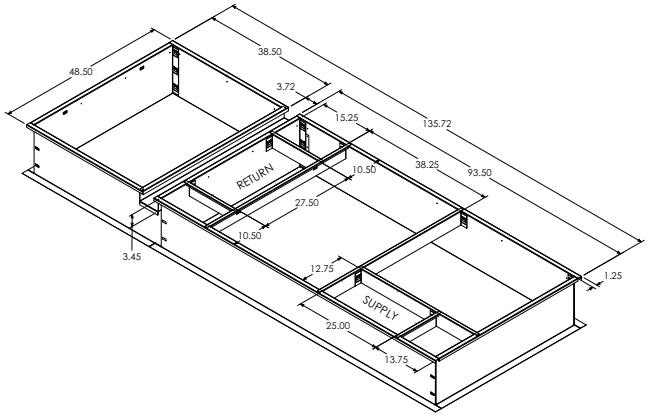


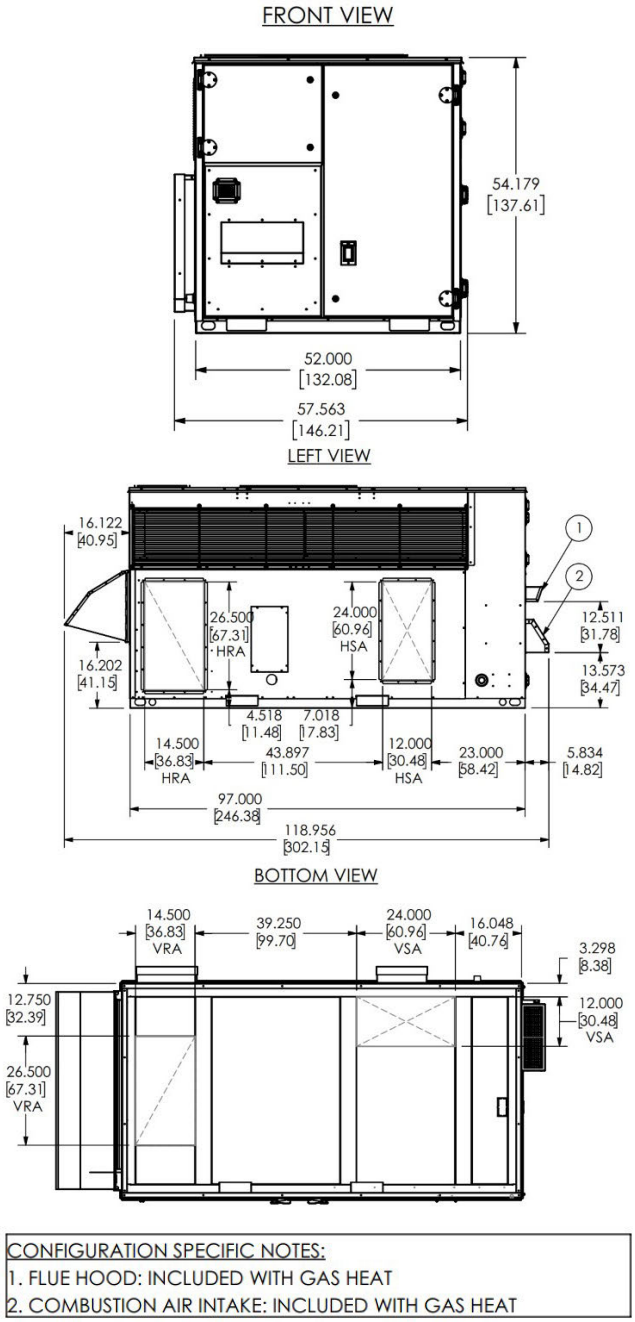
Figure 40. Unit curb data for OAB 3 to 9 tons with auxiliary cabinet



Note: *Certain options require auxiliary cabinet. Refer to project-specific unit submittals.*

Dimensional Data

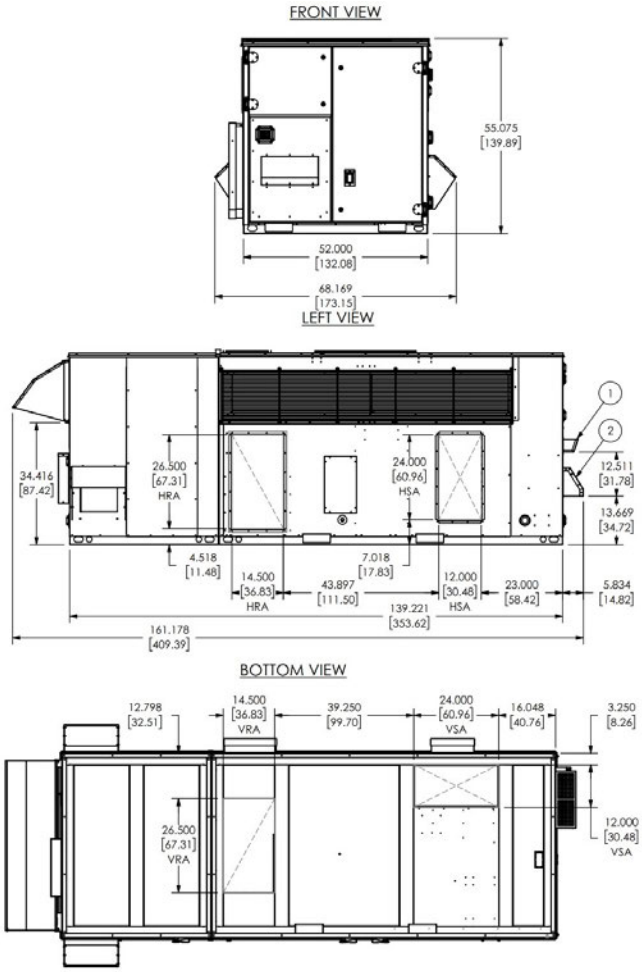
Figure 41. Unit dimensional data for OAB 3 to 9 tons (dual dimensions, in. [cm])



CONFIGURATION SPECIFIC NOTES:
1. FLUE HOOD: INCLUDED WITH GAS HEAT
2. COMBUSTION AIR INTAKE: INCLUDED WITH GAS HEAT

Note: *Sound attenuation package will add 17.76 in. to the height of the condenser fan section. Refer to project-specific unit submittals.*

Figure 42. Unit dimensional data for OAB 3 to 9 tons with auxiliary cabinet (dual dimensions, in. [cm])



CONFIGURATION SPECIFIC NOTES:
1. FLUE HOOD: INCLUDED WITH GAS HEAT
2. COMBUSTION AIR INTAKE: INCLUDED WITH GAS HEAT

Notes:

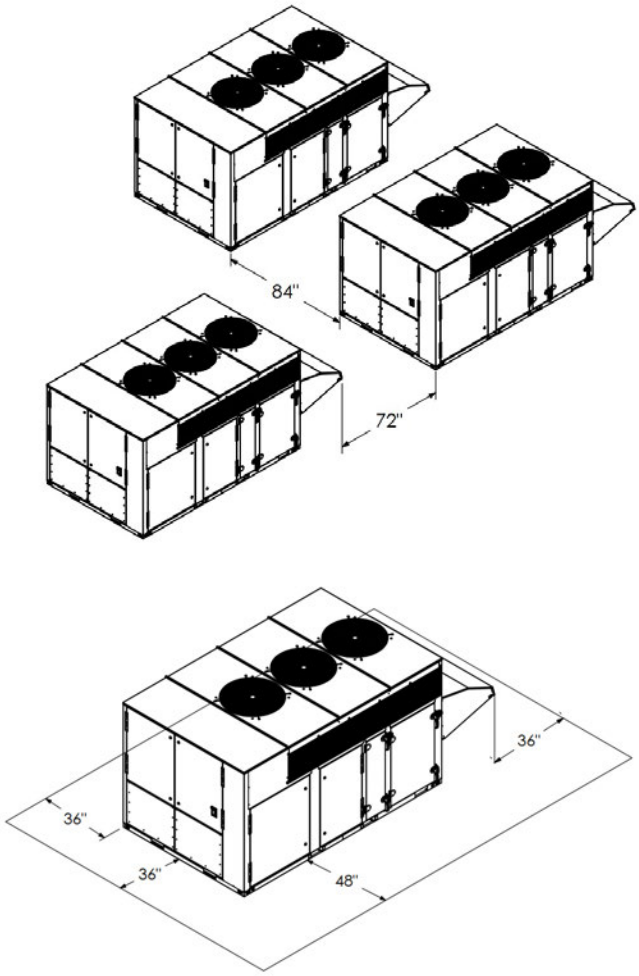
- *Certain options require auxiliary cabinet. Refer to project-specific unit submittals.*
- *Sound attenuation package will add 17.76 in. to the height of the condenser fan section. Refer to project-specific unit submittals.*

OAG Units (Non-Direct Fired Heat)

Unit Clearances

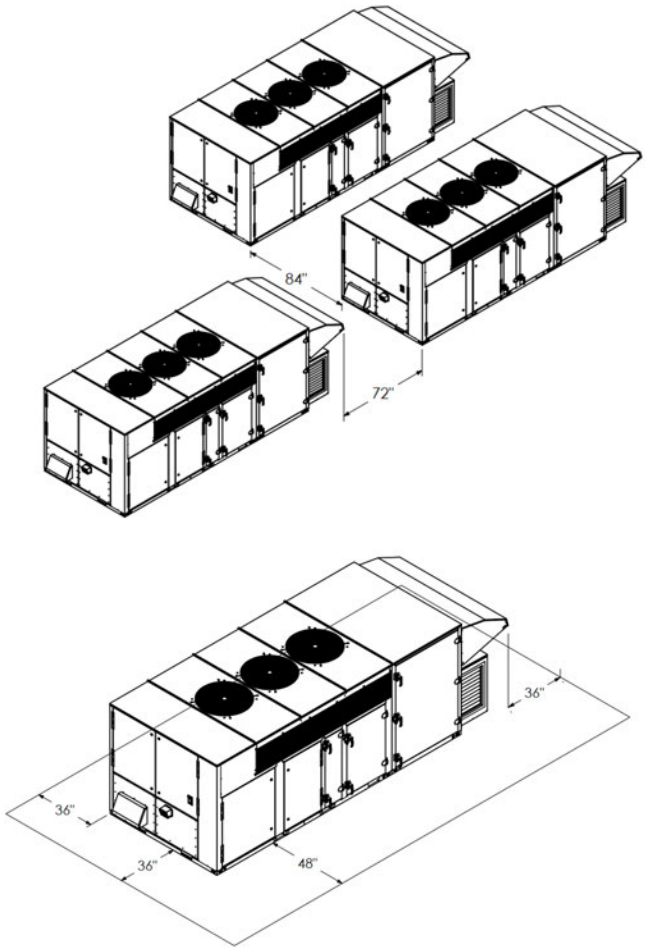
Note: *Minimum clearance above the unit is 72 inches.*

Figure 43. Typical installation clearances for OAG units (non-direct fired heat)



Note: *Minimum clearance above the unit is 72 inches.*

Figure 44. Typical installation clearances for OAG units (non-direct fired heat) with auxiliary cabinet



Note: *Certain options require auxiliary cabinet. Refer to project-specific unit submittals.*

Curb Dimensions

Figure 45. Unit curb data for OAG units (non-direct fired heat) (in.)

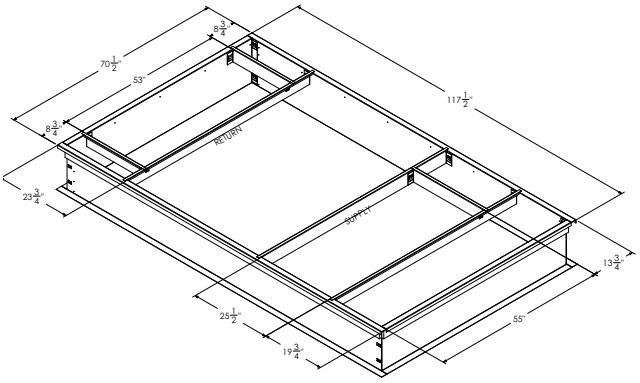
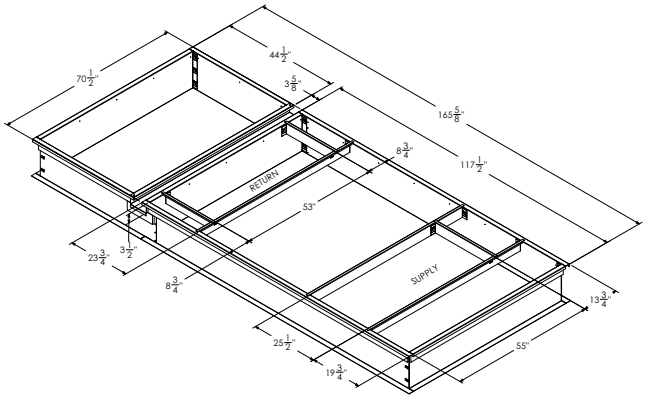


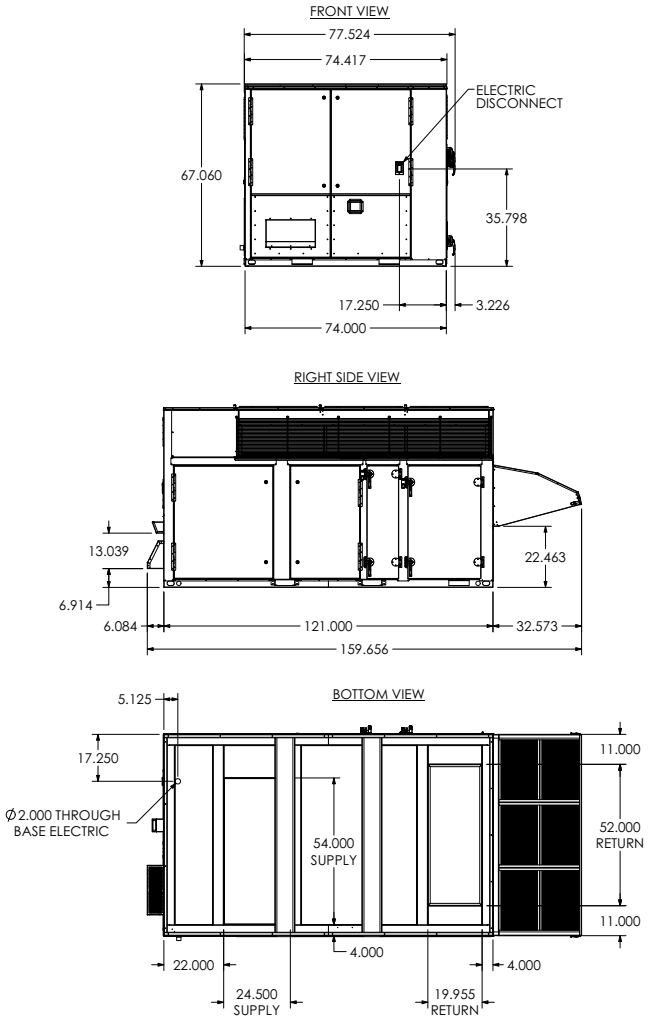
Figure 46. Unit curb data for OAG units (non-direct fired heat) with auxiliary cabinet (in.)



Note: *Certain options require auxiliary cabinet. Refer to project-specific unit submittals.*

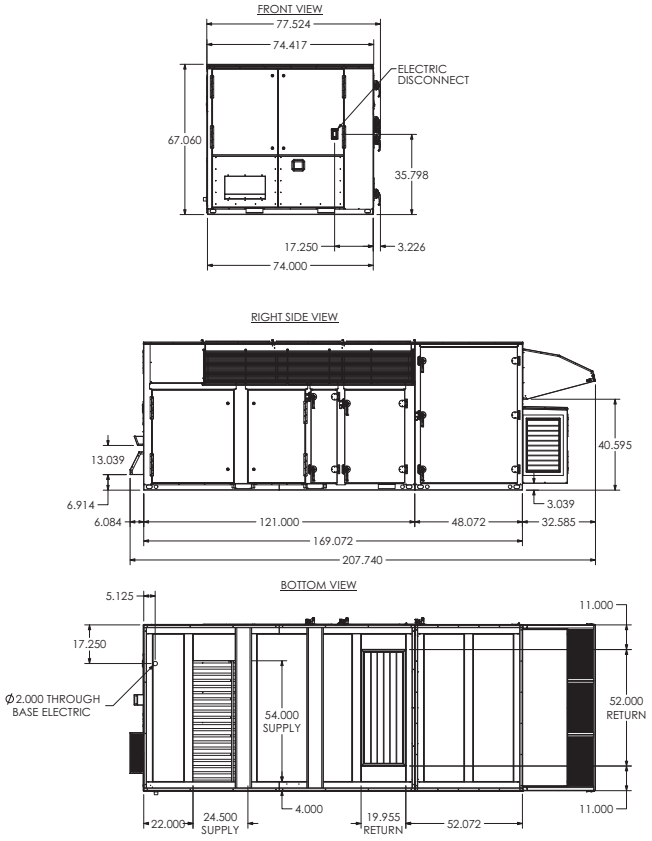
Dimensional Data

Figure 47. Unit dimensional data for OAG units (non-direct fired heat)



Note: *Sound attenuation package will add 10.79 in. to the height of the condenser fan section. Refer to project-specific unit submittals.*

Figure 48. Unit dimensional data for OAG units (non-direct fired heat) with auxiliary cabinet



Notes:

- *Certain options require auxiliary cabinet. Refer to project-specific unit submittals.*
- *Sound attenuation package will add 10.79 in. to the height of the condenser fan section. Refer to project-specific unit submittals.*

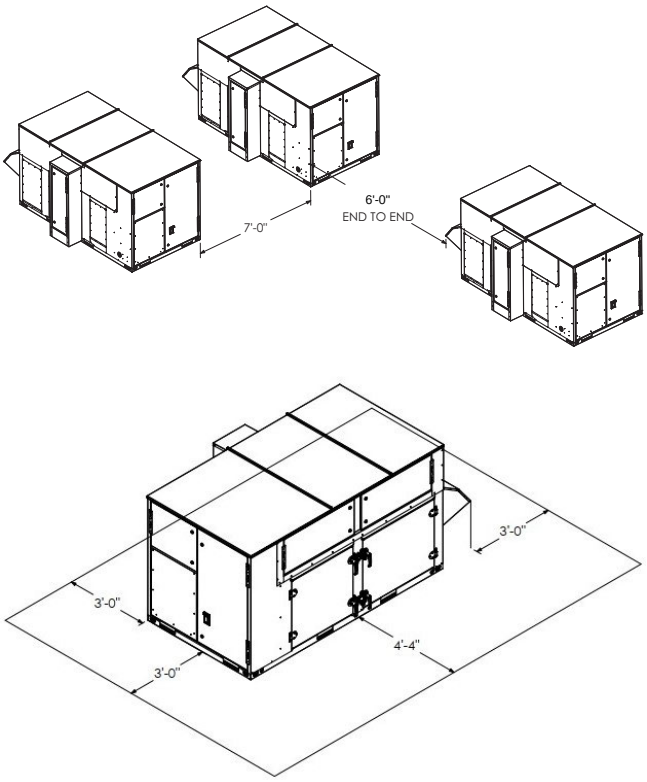
Outdoor WSHP Units

OABE Units

Unit Clearances

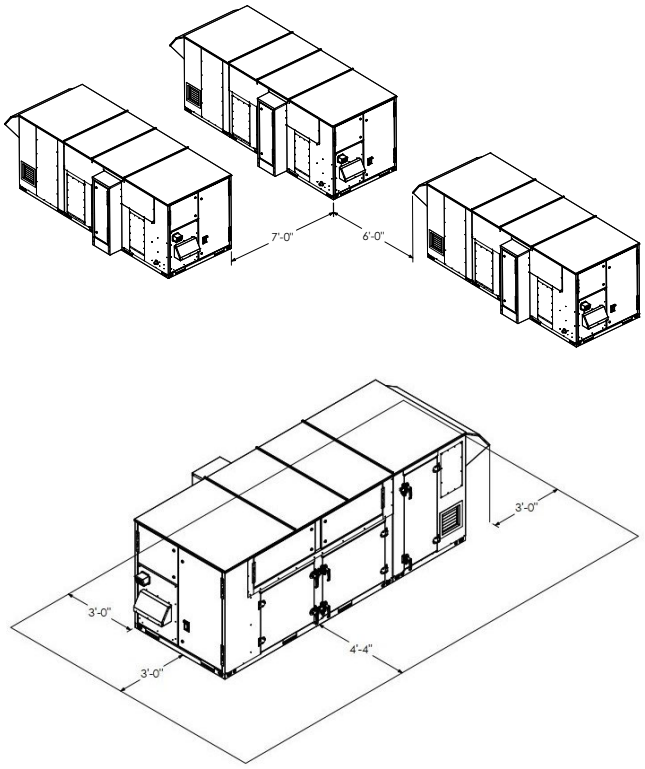
Note: *Minimum clearance above the unit is 72 inches.*

Figure 49. Typical installation clearances for OABE unit



Note: *Minimum clearance above the unit is 72 inches.*

Figure 50. Typical installation clearances for OABE unit with auxiliary cabinet



Note: *Certain options require auxiliary cabinet. Refer to project-specific unit submittals.*

Curb Dimensions

Figure 51. Unit curb data for OABE 3 to 9 tons

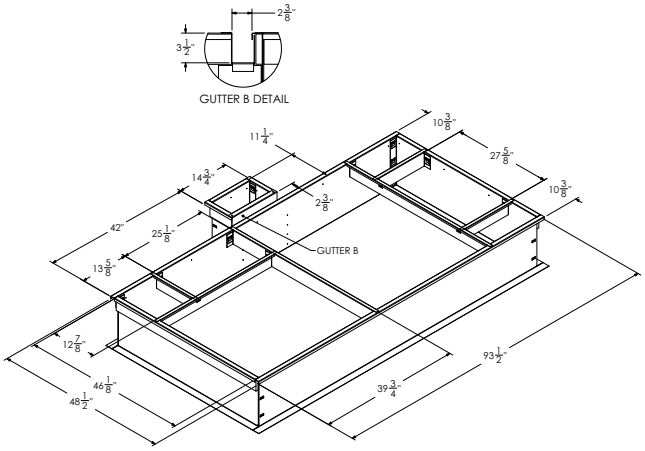
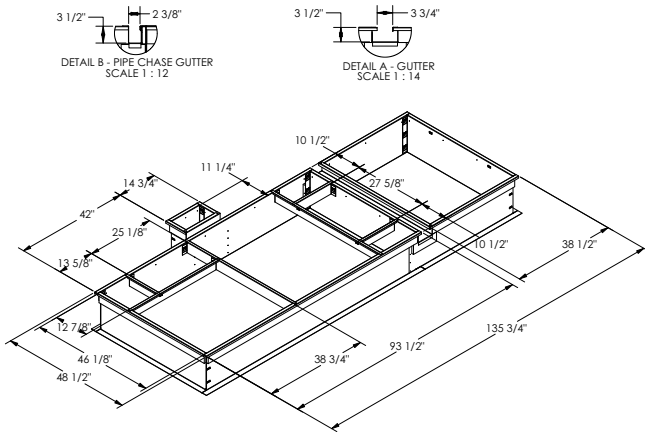


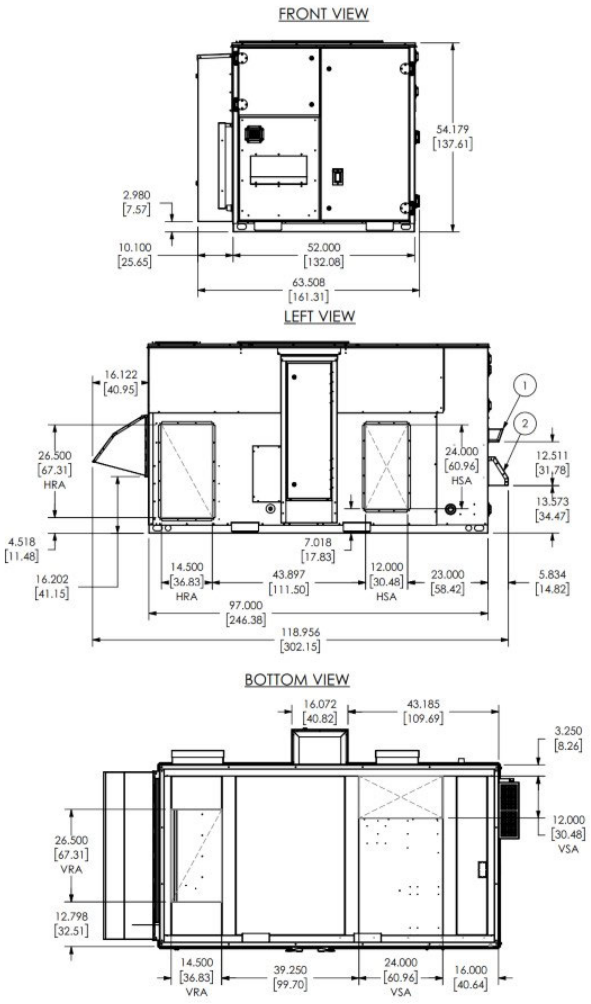
Figure 52. Unit curb data for OABE 3 to 9 tons with auxiliary cabinet



Note: *Certain options require auxiliary cabinet. Refer to project-specific unit submittals.*

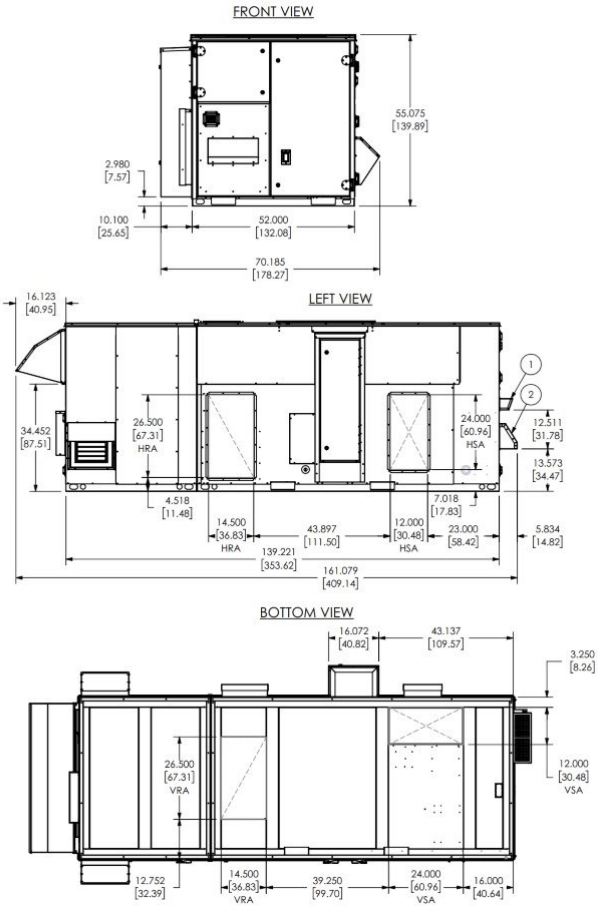
Dimensional Data

Figure 53. Unit dimensional data for OABE 3 to 9 tons (dual dimensions, in. [cm])



CONFIGURATION SPECIFIC NOTES:
1. FLUE HOOD: INCLUDED WITH GAS HEAT
2. COMBUSTION AIR INTAKE: INCLUDED WITH GAS HEAT

Figure 54. Unit dimensional data for OABE 3 to 9 tons with auxiliary cabinet (dual dimensions, in. [cm])



CONFIGURATION SPECIFIC NOTES:
1. FLUE HOOD: INCLUDED WITH GAS HEAT
2. COMBUSTION AIR INTAKE: INCLUDED WITH GAS HEAT

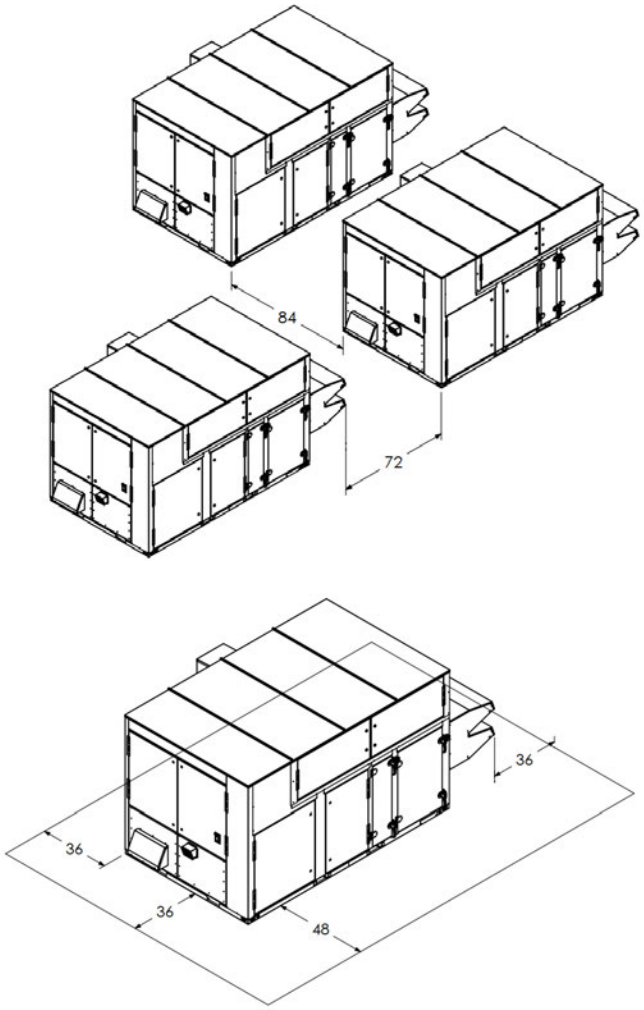
Note: *Certain options require auxiliary cabinet. Refer to project-specific unit submittals.*

OAGE Units

Unit Clearances

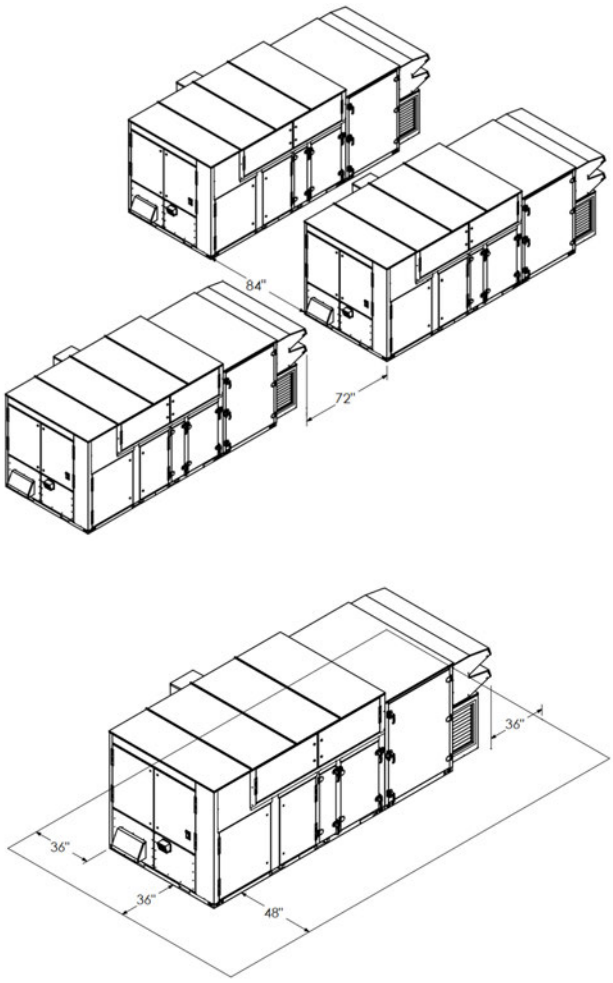
Note: *Minimum clearance above the unit is 72 inches.*

Figure 55. Typical installation clearances for OAGE unit (in.)



Note: *Minimum clearance above the unit is 72 inches.*

Figure 56. Typical installation clearances for OAGE unit with auxiliary cabinet (in.)



Note: *Certain options require auxiliary cabinet. Refer to project-specific unit submittals.*

Curb Dimensions

Figure 57. Unit curb data for OAGE (in.)

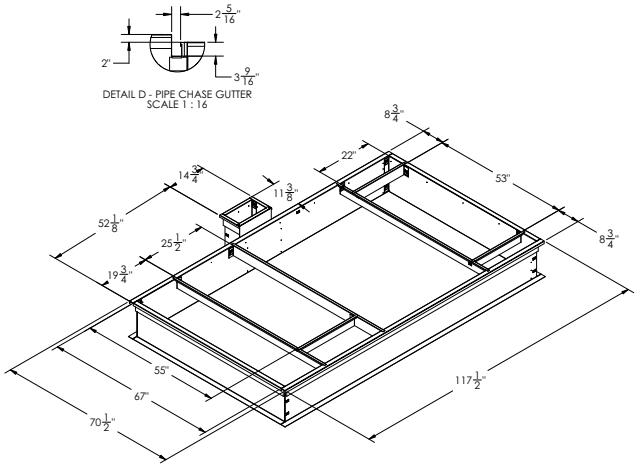
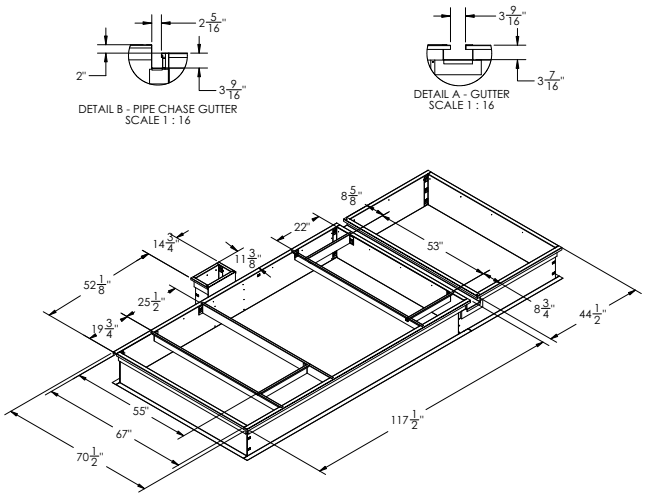


Figure 58. Unit curb data for OAGE with auxiliary cabinet (in.)



Note: *Certain options require auxiliary cabinet. Refer to project-specific unit submittals.*

Dimensional Data

Figure 59. Unit dimensional data for OAGE (in.)

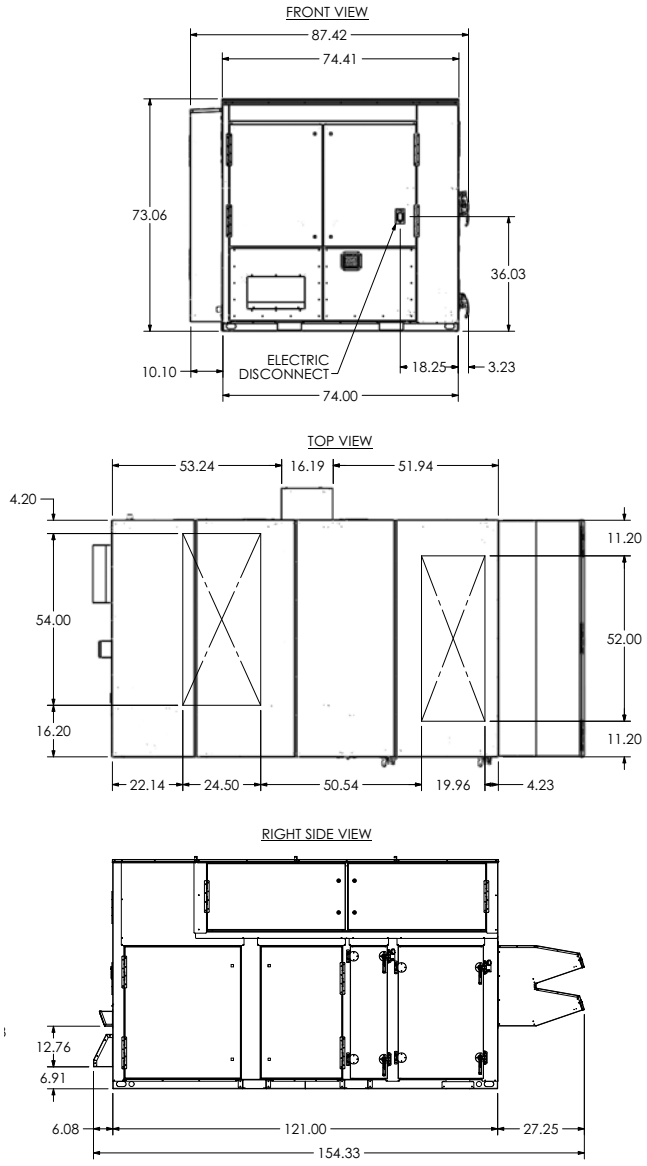
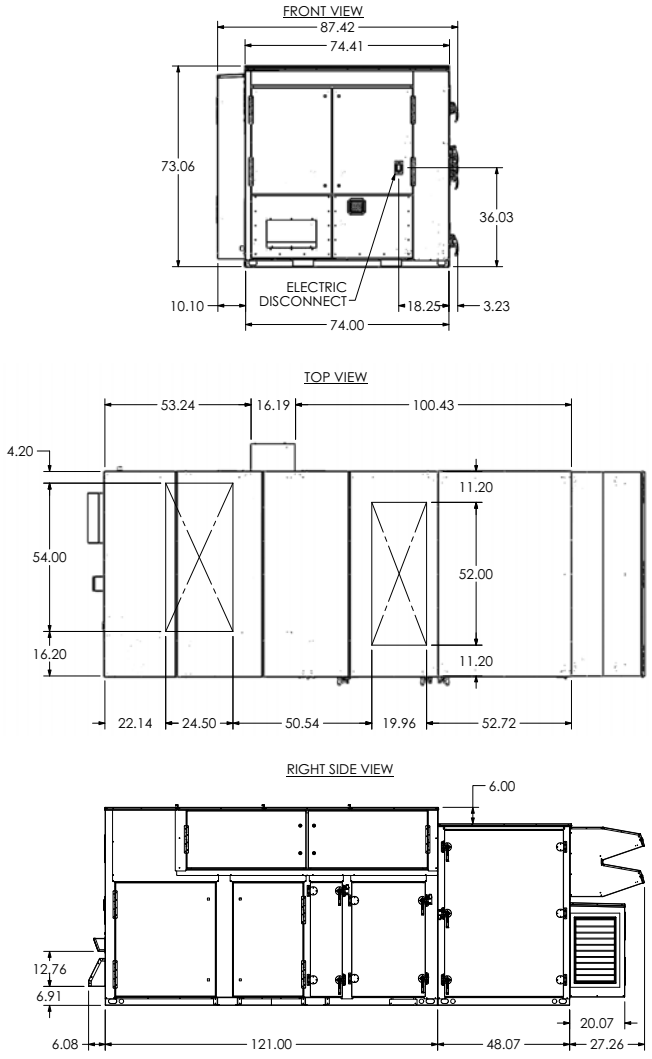


Figure 60. Unit dimensional data for OAGE with auxiliary cabinet (in.)



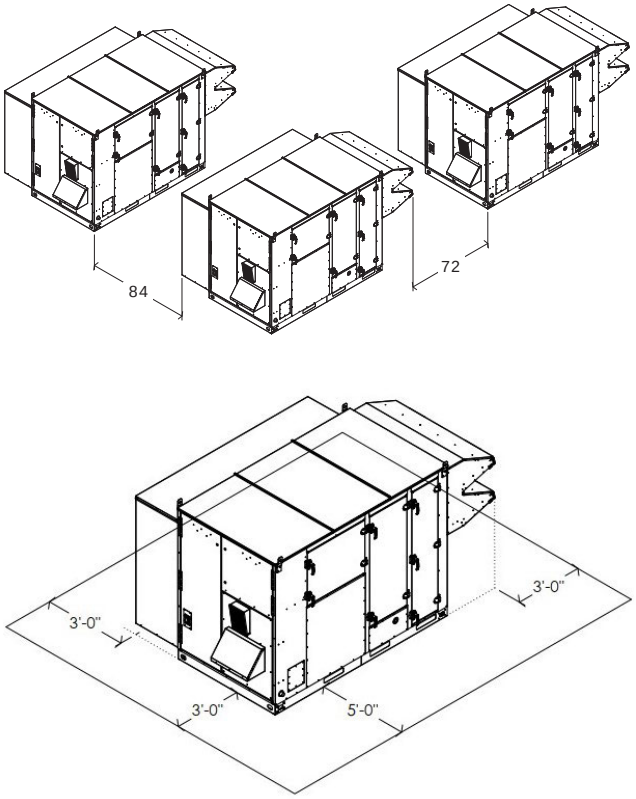
Note: *Certain options require auxiliary cabinet. Refer to project-specific unit submittals.*

OAKE Units

Unit Clearances

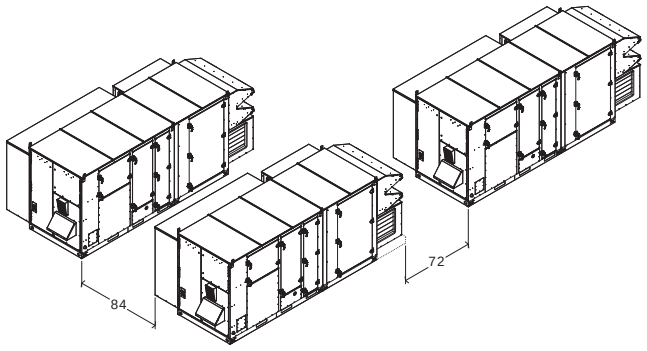
Note: *Minimum clearance above the unit is 72 inches.*

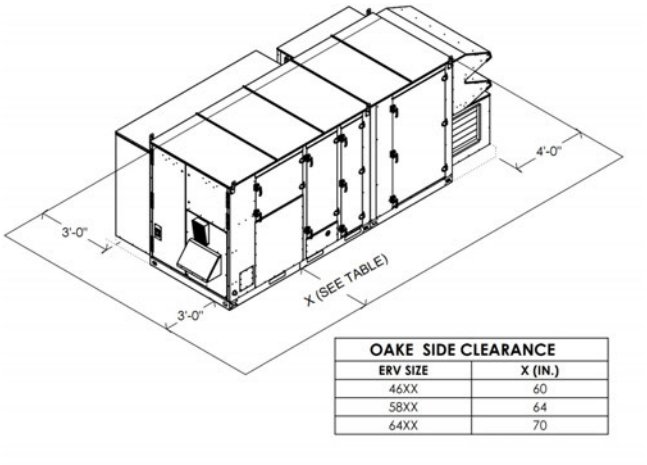
Figure 61. Typical installation clearances for OAKE unit (in.)



Note: *Minimum clearance above the unit is 72 inches.*

Figure 62. Typical installation clearances for OAKE unit with auxiliary cabinet (in.)





OAKE SIDE CLEARANCE	
ERV SIZE	X (IN.)
46XX	60
58XX	64
64XX	70

Note: *Certain options require auxiliary cabinet. Refer to project-specific unit submittals.*

Curb Dimensions

Figure 63. Unit curb data for OAKE 12 to 30 tons (in.)

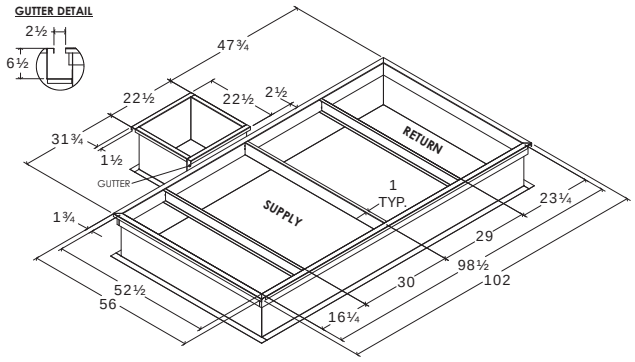
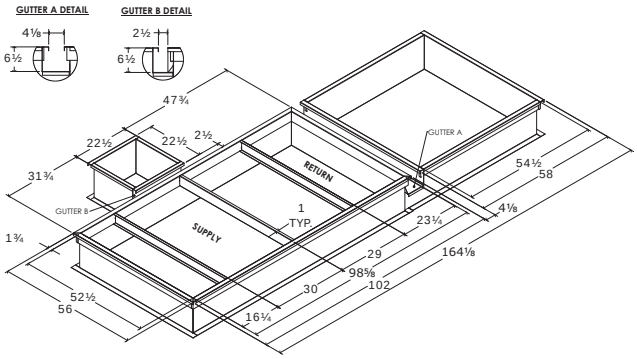


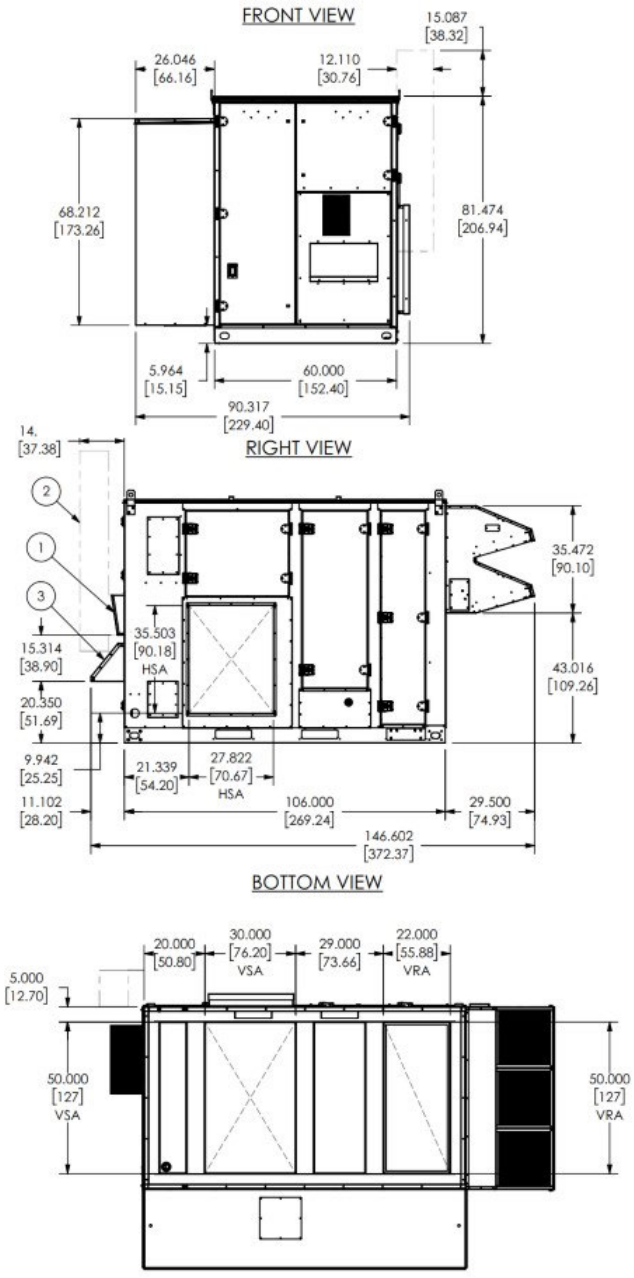
Figure 64. Unit curb data for OAKE 12 to 30 tons with auxiliary cabinet (in.)



Note: *Certain options require auxiliary cabinet. Refer to project-specific unit submittals.*

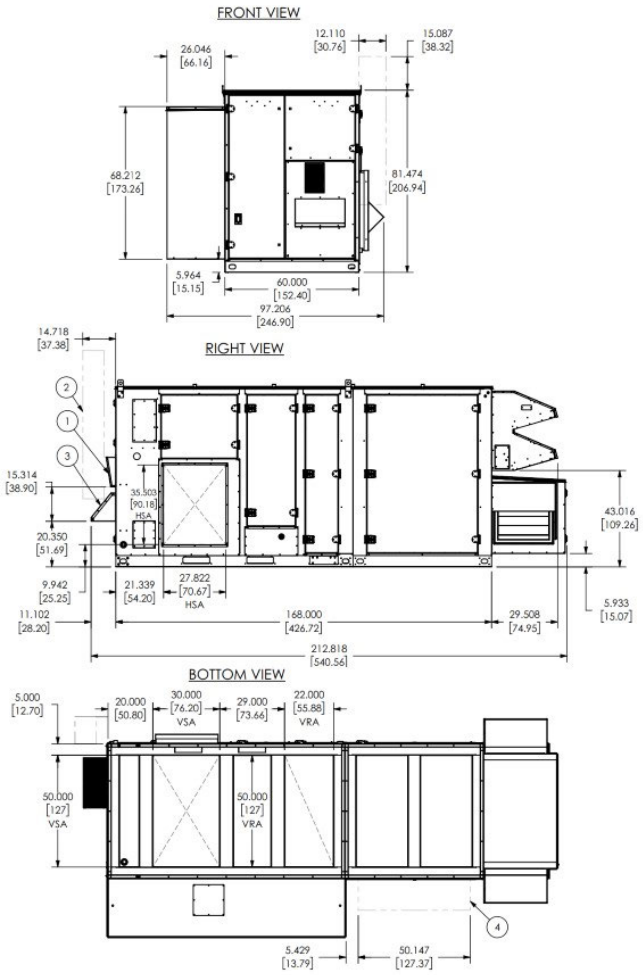
Dimensional Data

Figure 65. Unit dimensional data for OAKE 12 to 30 tons (dual dimensions, in. [cm])



CONFIGURATION SPECIFIC NOTES:
1. FLUE HOOD: INCLUDED WITH 150-400MBH GAS HEAT
2. FLUE EXTENSION: INCLUDED WITH 500-800MBH GAS HEAT
3. COMBUSTION AIR INTAKE: INCLUDED WITH GAS HEAT

Figure 66. Unit dimensional data for OAKE 12 to 30 tons with auxiliary cabinet (dual dimensions, in. [cm])



CONFIGURATION SPECIFIC NOTES:
1. FLUE HOOD: INCLUDED WITH 150-400MBH GAS HEAT
2. FLUE EXTENSION: INCLUDED WITH 500-800MBH GAS HEAT
3. COMBUSTION AIR INTAKE: INCLUDED WITH GAS HEAT
4. ERV EXTENSION: ENERGY RECOVERY 58-64XX

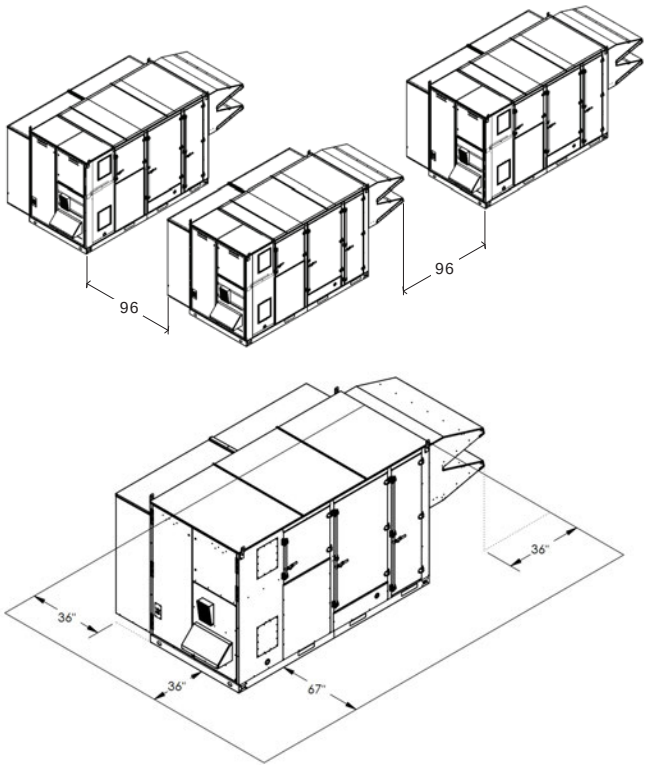
Note: *Certain options require auxiliary cabinet. Refer to project-specific unit submittals.*

OANE Units

Unit Clearances

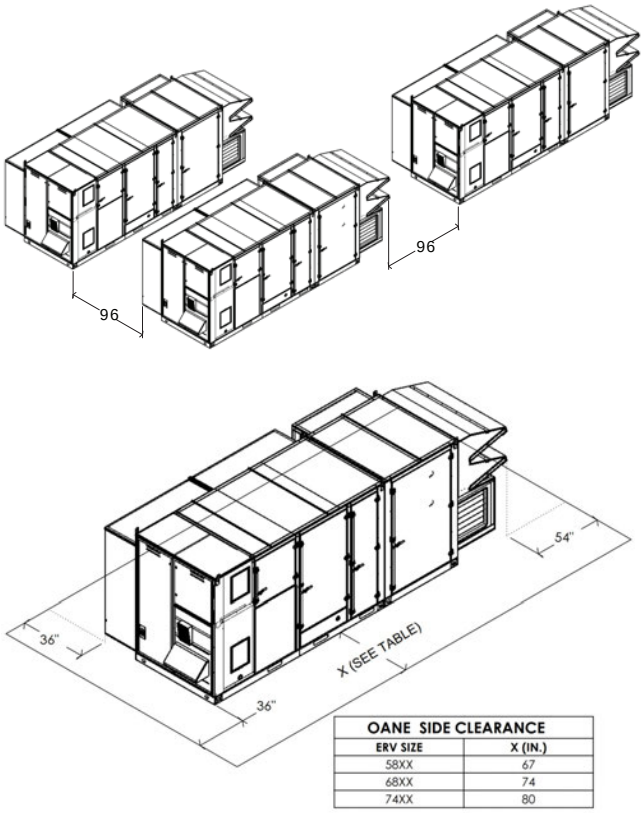
Note: *Minimum clearance above the unit is 72 inches.*

Figure 67. Typical installation clearances for OANE unit (in.)



Note: *Minimum clearance above the unit is 72 inches.*

Figure 68. Typical installation clearances for OANE unit with auxiliary cabinet (in.)



OANE SIDE CLEARANCE	
ERV SIZE	X (IN.)
58XX	67
68XX	74
74XX	80

Note: *Certain options require auxiliary cabinet. Refer to project-specific unit submittals.*

Curb Dimensions

Figure 69. Unit curb data for OANE 30 to 54 tons (in.)

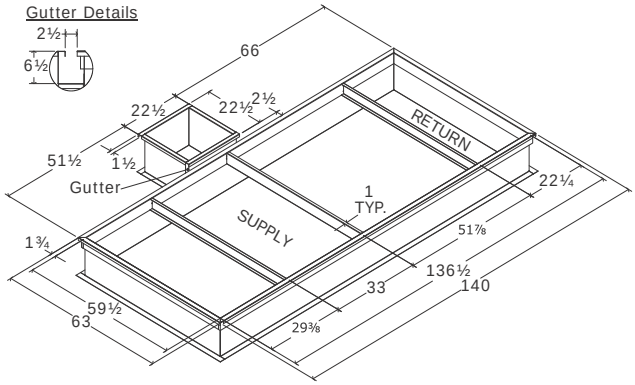
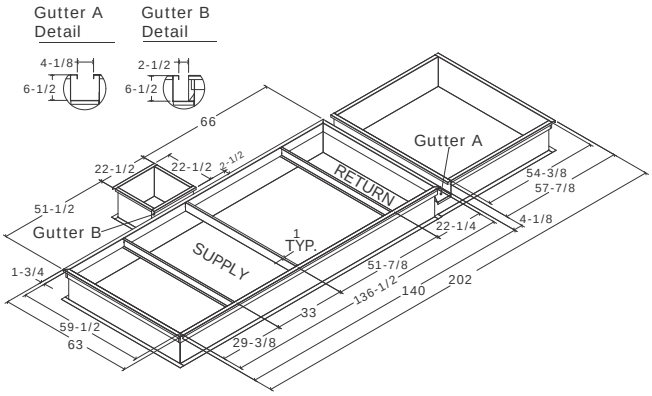


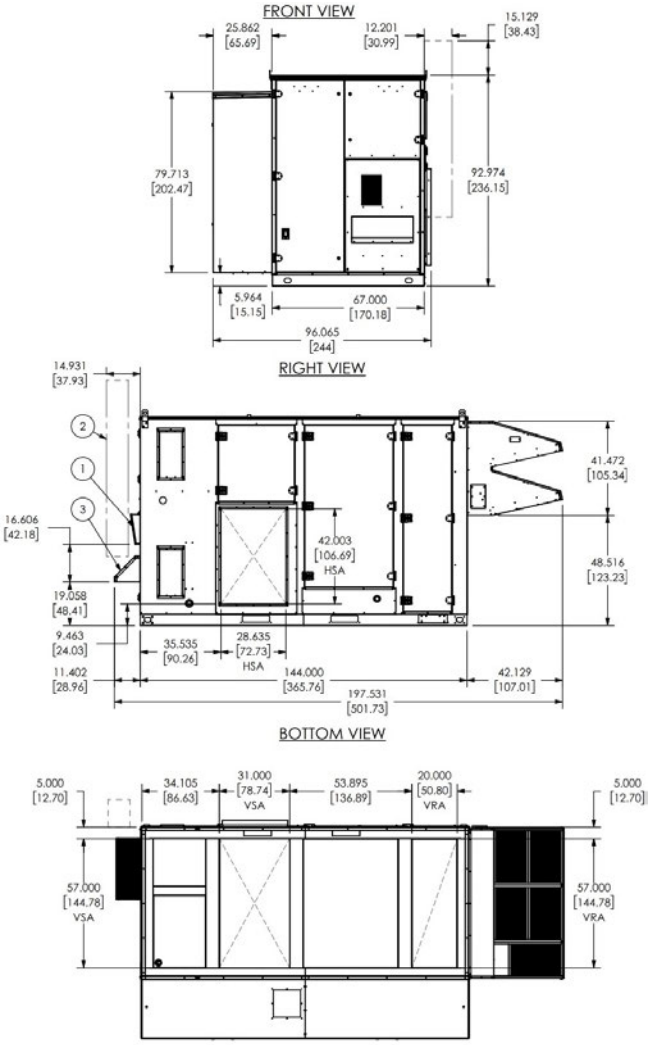
Figure 70. Unit curb data for OANE 30 to 54 tons with auxiliary cabinet (in.)



Note: *Certain options require auxiliary cabinet. Refer to project-specific unit submittals.*

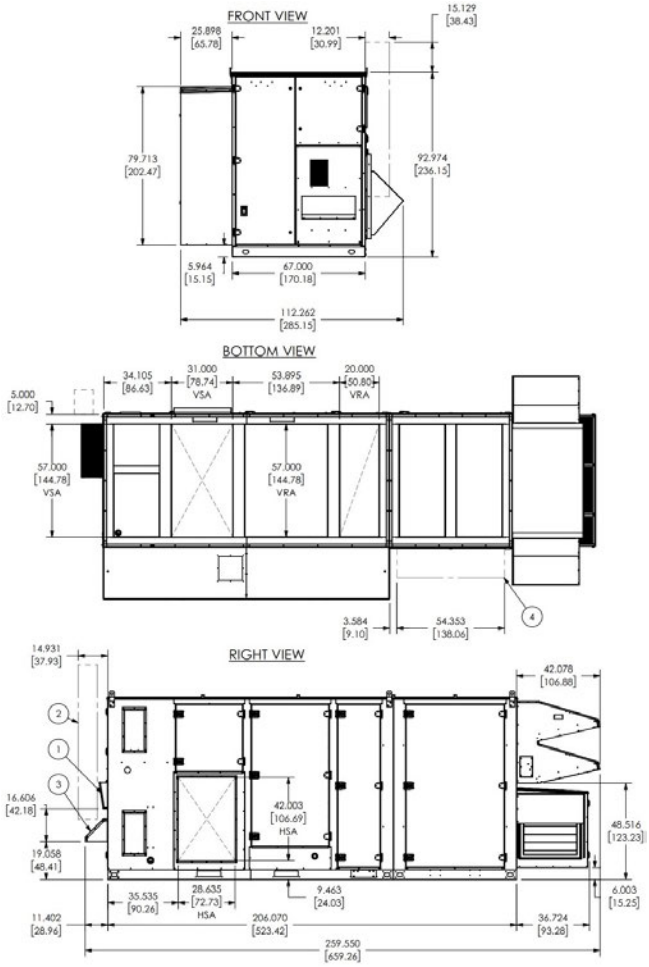
Dimensional Data

Figure 71. Unit dimensional data for OANE 30 to 54 tons (dual dimensions, in. [cm])



CONFIGURATION SPECIFIC NOTES:
1. FLUE HOOD: INCLUDED WITH 300-500MBH GAS HEAT
2. FLUE EXTENSION: INCLUDED WITH 600-1000MBH GAS HEAT
3. COMBUSTION AIR INTAKE: INCLUDED WITH GAS HEAT

Figure 72. Unit dimensional data for OANE 30 to 54 tons with auxiliary cabinet (dual dimensions, in. [cm])



Note: *Certain options require auxiliary cabinet. Refer to project-specific unit submittals.*

Indoor Water Source Heat Pump (WSHP) Units

OABF Units

Note: *Indoor units have the same clearances as outdoor units. Refer to (outdoor OABF unit clearances).*

Dimensional Data

Figure 73. Unit dimensional data for indoor OABF WSHP with horizontal supply and no return (dual dimensions, in. [cm])

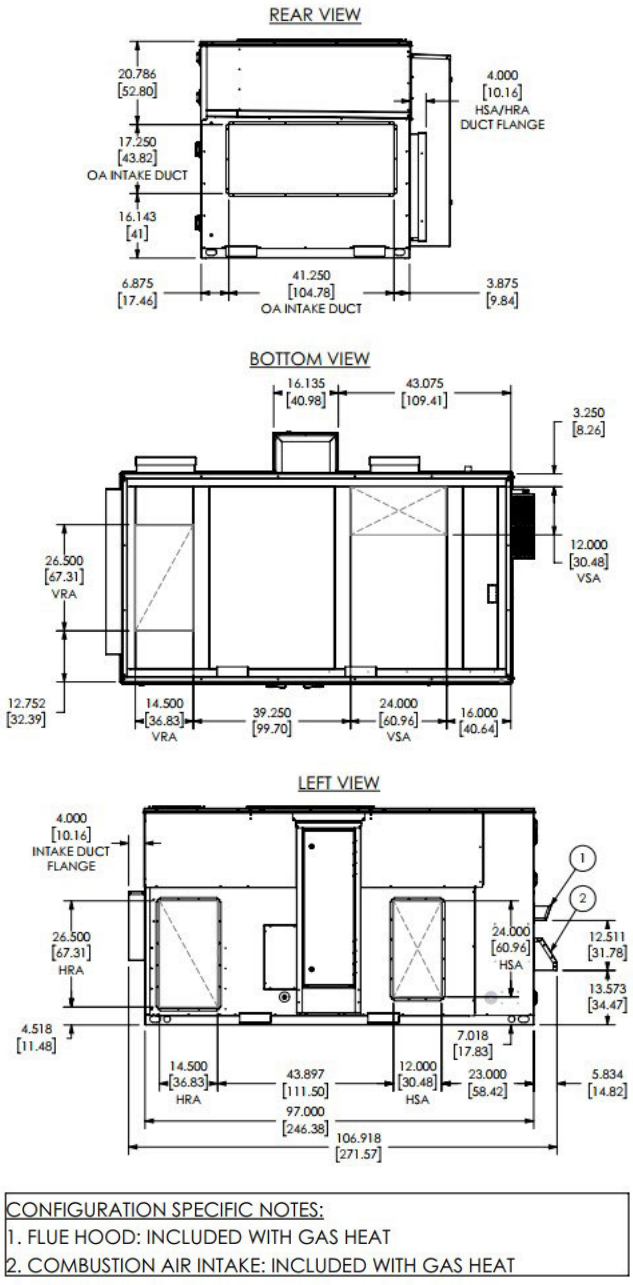
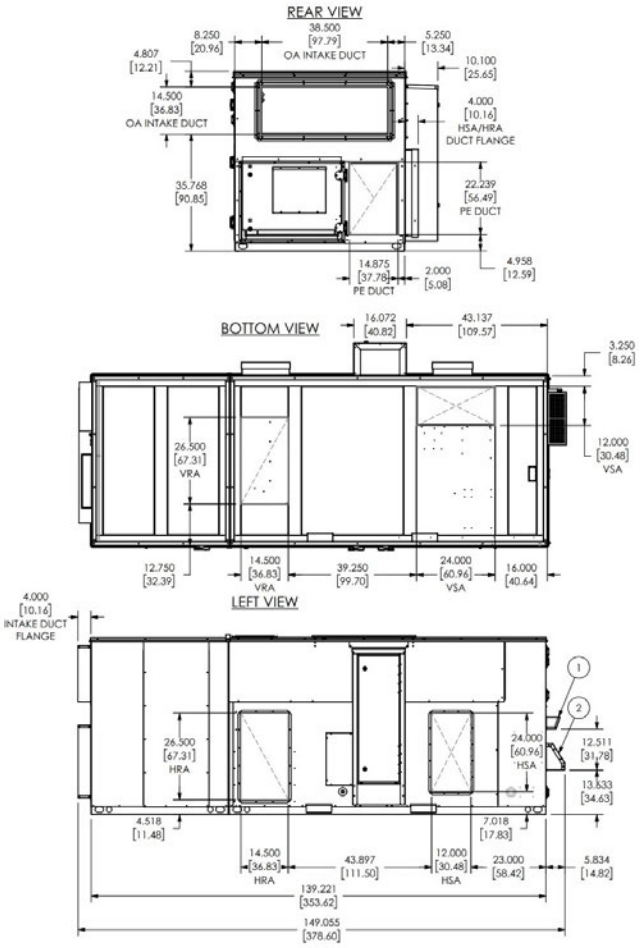


Figure 74. Unit dimensional data for indoor OABF WSHP and ERV or exhaust fan (dual dimensions, in. [cm])



CONFIGURATION SPECIFIC NOTES:
1. FLUE HOOD: INCLUDED WITH GAS HEAT
2. COMBUSTION AIR INTAKE: INCLUDED WITH GAS HEAT

OAGF Units

Note: *Indoor units have the same clearances as outdoor units. Refer to (outdoor OAGF unit clearances).*

Dimensional Data

Figure 75. Unit dimensional data for indoor OAGF WSHP with horizontal supply and no return (in.)

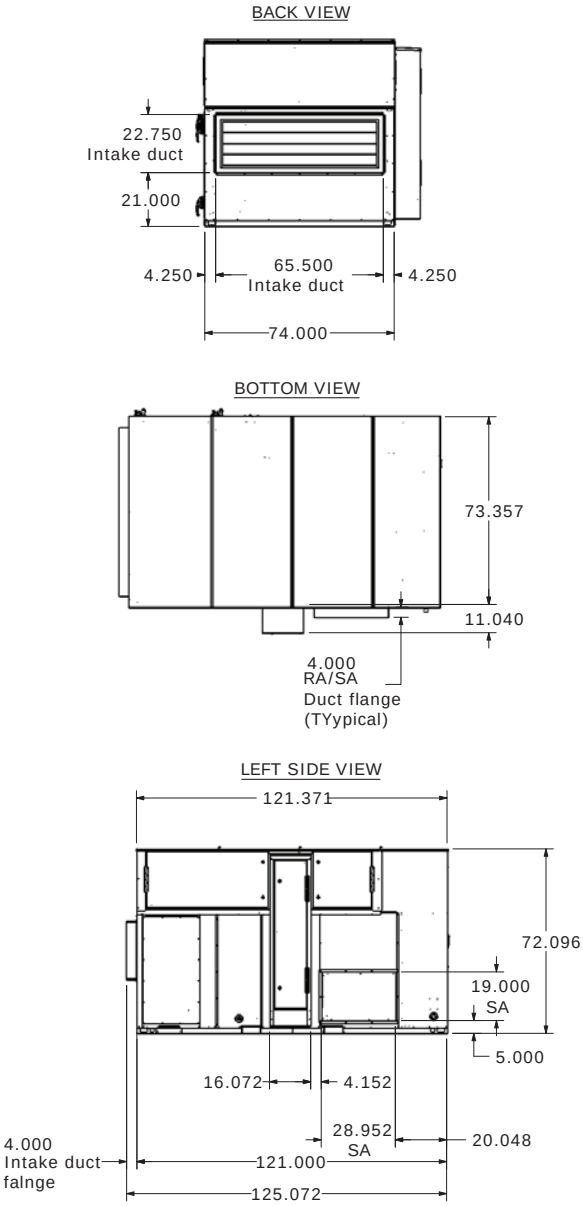


Figure 76. Unit dimensional data for indoor OAGF WSHP with horizontal supply/return (no ERV or exhaust fan) (in.)

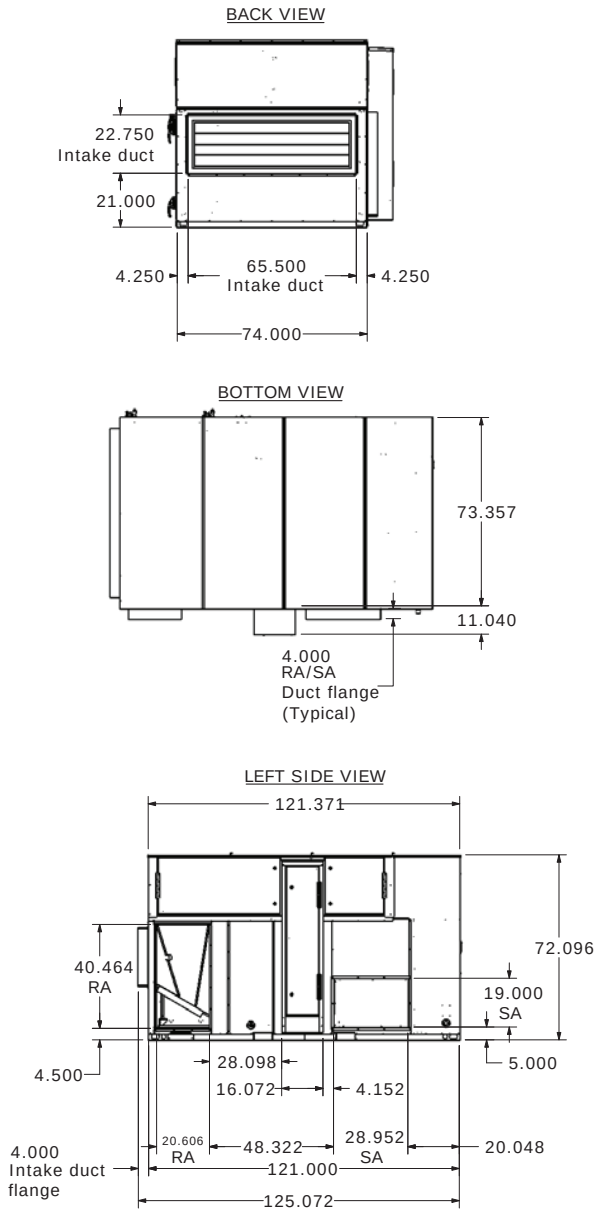
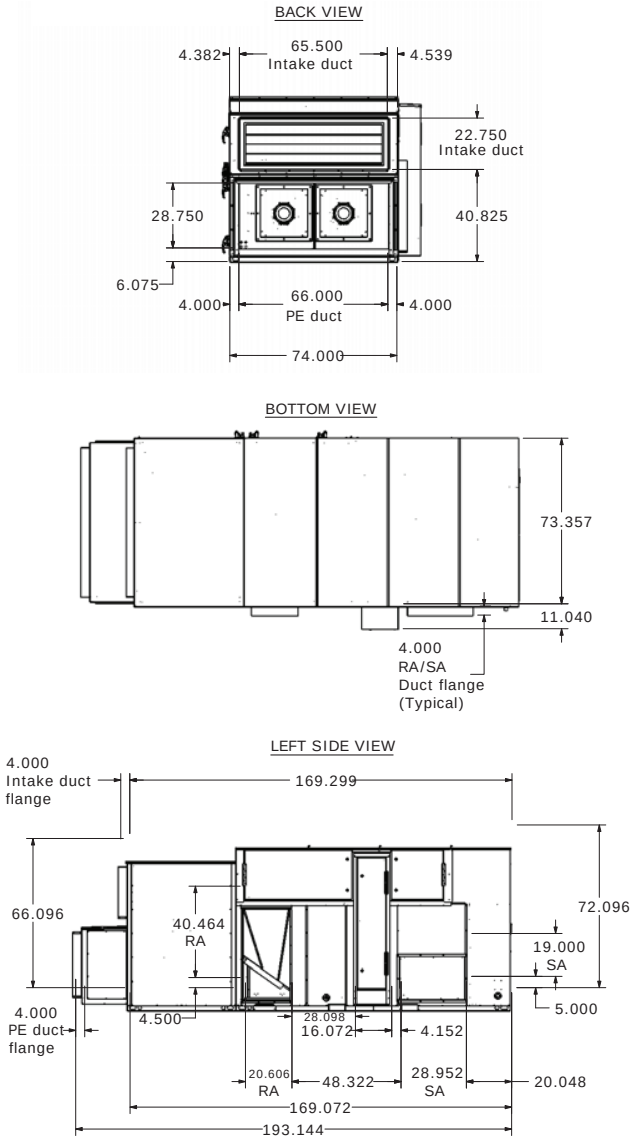


Figure 77. Unit dimensional data for indoor OAGF WSHP with horizontal supply/return and ERV or exhaust fan (in.)

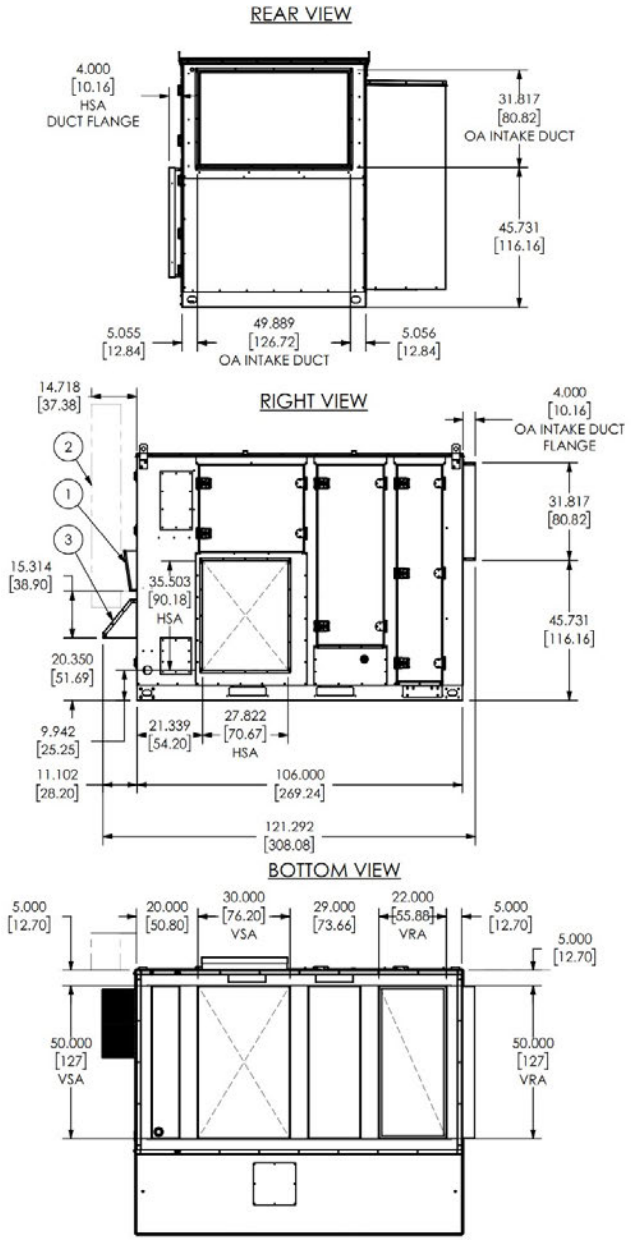


OAKF Units

Note: *Indoor units have the same clearances as outdoor units. Refer to (outdoor OAKF unit clearances).*

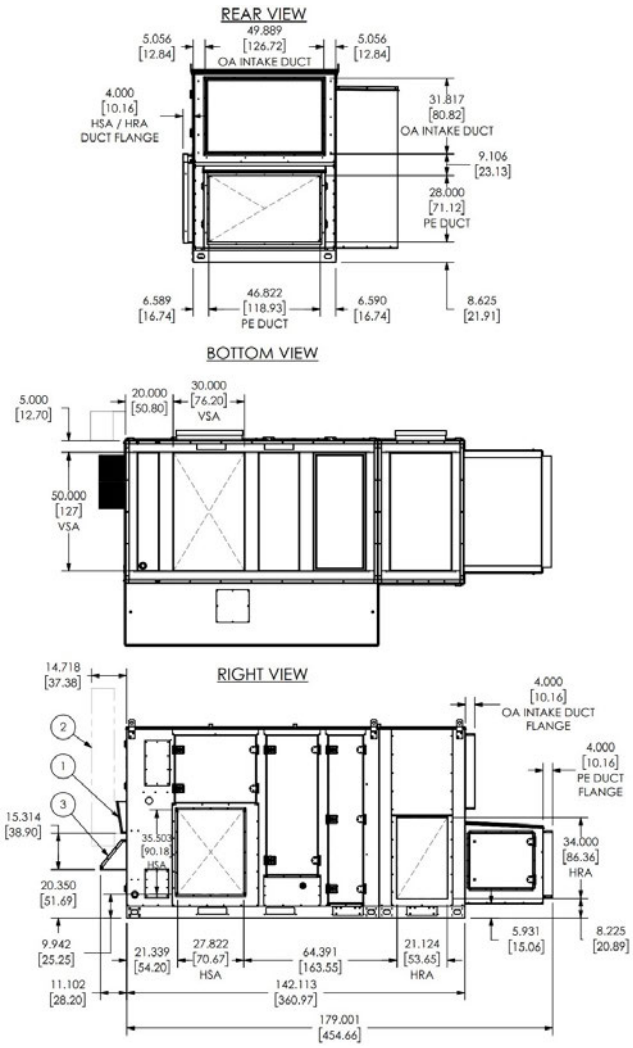
Dimensional Data

Figure 78. Unit dimensional data for indoor OAKF WSHP with horizontal supply and no return (dual dimensions, in. [cm])



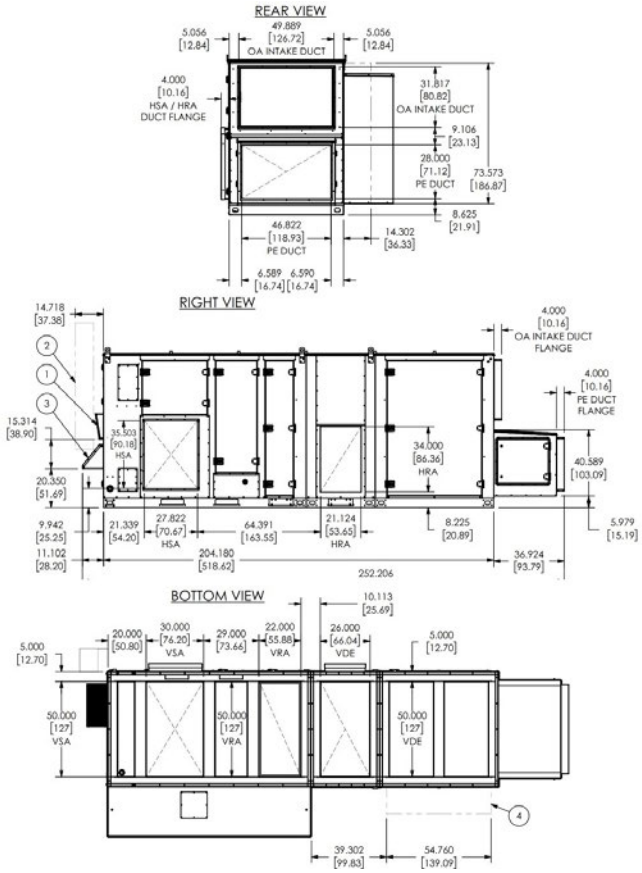
CONFIGURATION SPECIFIC NOTES:
1. FLUE HOOD: INCLUDED WITH 150-400MBH GAS HEAT
2. FLUE EXTENSION: INCLUDED WITH 500-800MBH GAS HEAT
3. COMBUSTION AIR INTAKE: INCLUDED WITH GAS HEAT

Figure 79. Unit dimensional data for indoor OAKF WSHP with horizontal supply/return (no ERV) (dual dimensions, in. [cm])



CONFIGURATION SPECIFIC NOTES:
1. FLUE HOOD: INCLUDED WITH 150-400MBH GAS HEAT
2. FLUE EXTENSION: INCLUDED WITH 500-800MBH GAS HEAT
3. COMBUSTION AIR INTAKE: INCLUDED WITH GAS HEAT

Figure 80. Unit dimensional data for indoor OAKF WSHP with horizontal supply/return and ERV (dual dimensions, in. [cm])



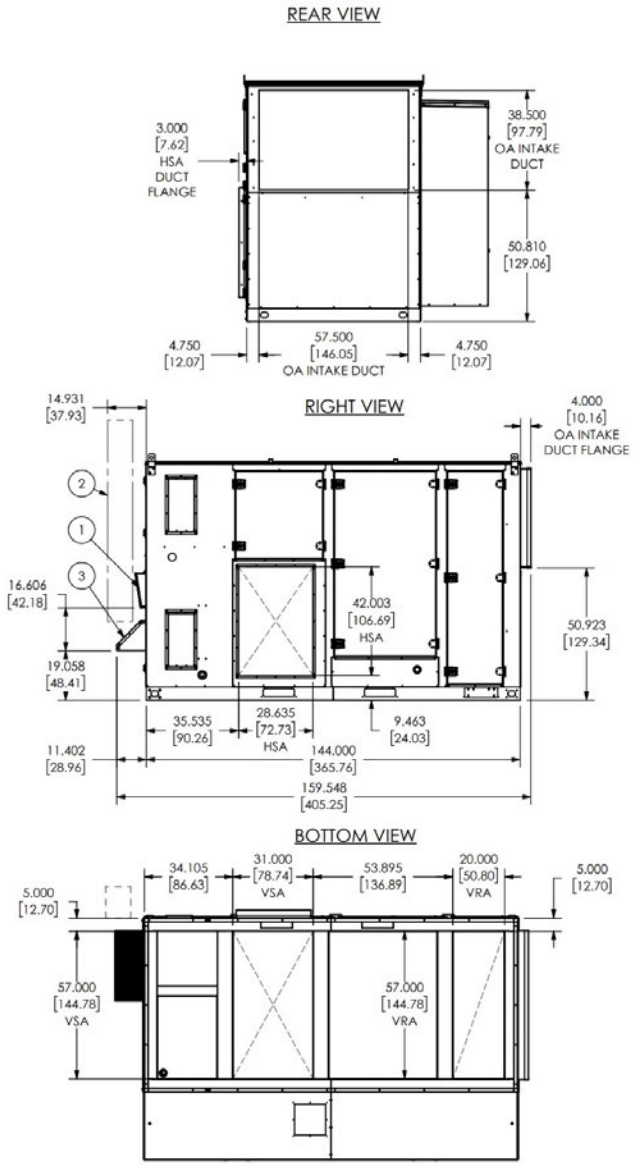
CONFIGURATION SPECIFIC NOTES:
1. FLUE HOOD: INCLUDED WITH 150-400MBH GAS HEAT
2. FLUE EXTENSION: INCLUDED WITH 500-800MBH GAS HEAT
3. COMBUSTION AIR INTAKE: INCLUDED WITH GAS HEAT
4. ERV EXTENSION: ENERGY RECOVERY 58-64XX

OANF Units

Note: *Indoor units have the same clearances as outdoor units. Refer to (outdoor OANF unit clearances).*

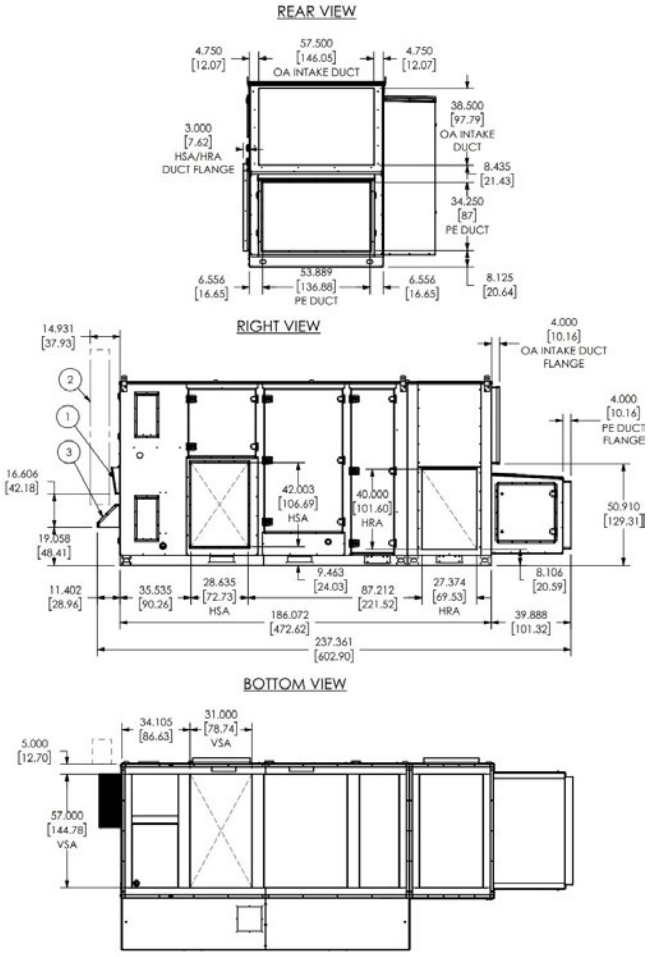
Dimensional Data

Figure 81. Unit dimensional data for indoor OANF WSHP with horizontal supply and no return (dual dimensions, in. [cm])



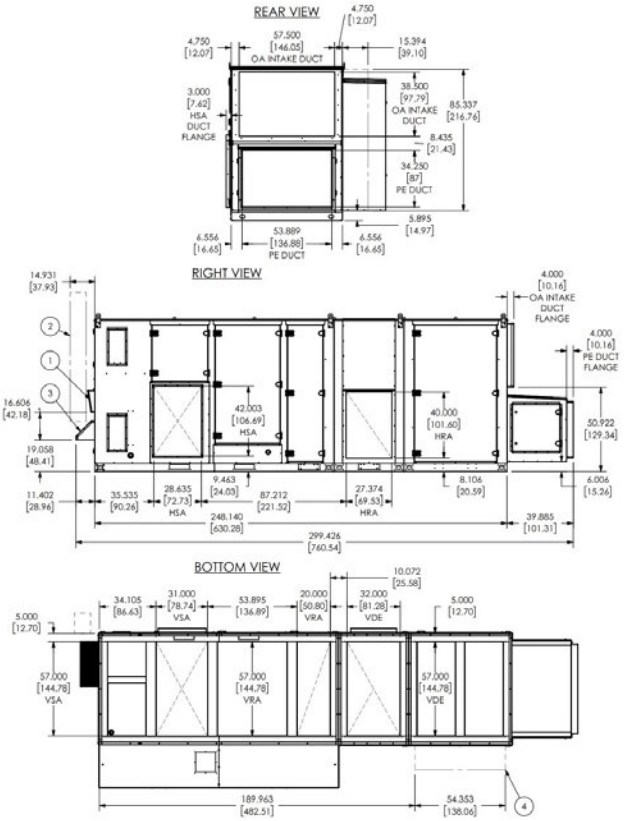
CONFIGURATION SPECIFIC NOTES:
1. FLUE HOOD: INCLUDED WITH 300-500MBH GAS HEAT
2. FLUE EXTENSION: INCLUDED WITH 600-1000MBH GAS HEAT
3. COMBUSTION AIR INTAKE: INCLUDED WITH GAS HEAT

Figure 82. Unit dimensional data for indoor OANF WSHP with horizontal supply/return (no ERV) (dual dimensions, in. [cm])



CONFIGURATION SPECIFIC NOTES:
1. FLUE HOOD: INCLUDED WITH 300-500MBH GAS HEAT
2. FLUE EXTENSION: INCLUDED WITH 600-1000MBH GAS HEAT
3. COMBUSTION AIR INTAKE: INCLUDED WITH GAS HEAT

Figure 83. Unit dimensional data for indoor OANF WSHP with horizontal supply/return and ERV (dual dimensions, in. [cm])

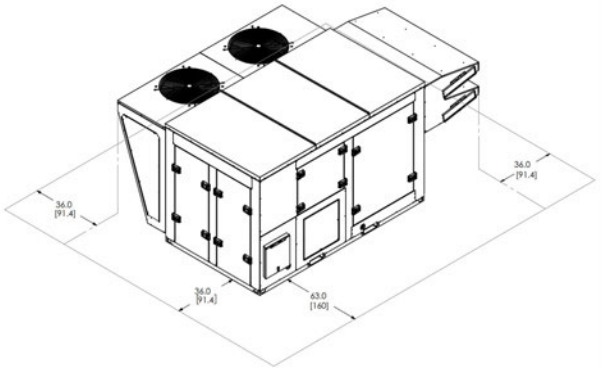


CONFIGURATION SPECIFIC NOTES:
1. FLUE HOOD: INCLUDED WITH 300-500MBH GAS HEAT
2. FLUE EXTENSION: INCLUDED WITH 600-1000MBH GAS HEAT
3. COMBUSTION AIR INTAKE: INCLUDED WITH GAS HEAT
4. ERV EXTENSION: ENERGY RECOVERY 68-74XX

OAD Units

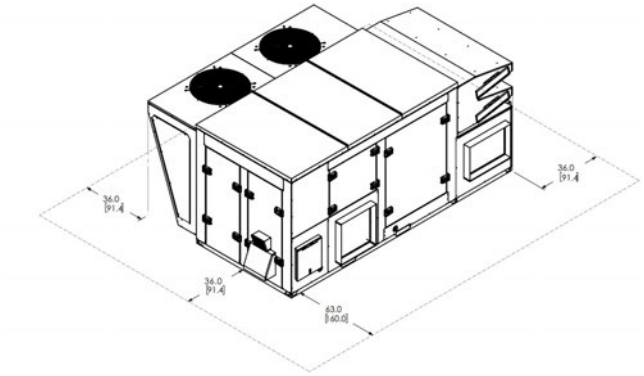
Unit Clearances

Figure 84. Installation clearances for units with no powered exhaust or ERV, in. (cm)



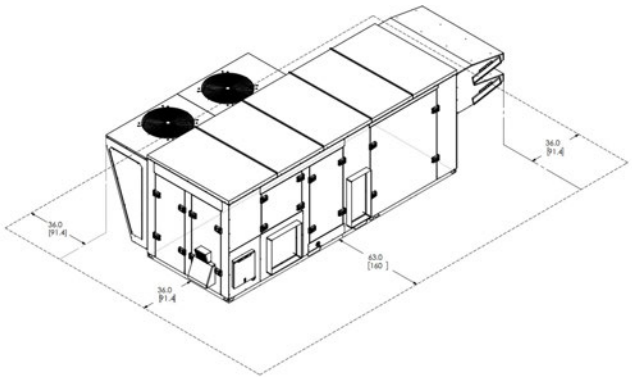
Note: *72 in. (182.9 cm) clearance is required above the condenser fans.*

Figure 85. Installation clearances for unit with powered exhaust but no ERV, in. (cm)



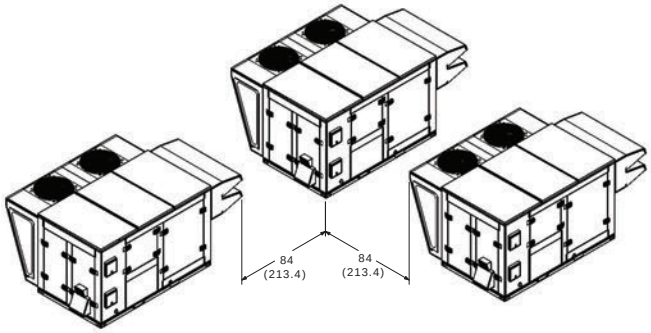
Note: *72 in. (182.9 cm) clearance is required above the condenser fans.*

Figure 86. Installation clearances for unit with ERV, in. (cm)



Note: *72 in. (182.9 cm) clearance is required above the condenser fans.*

Figure 87. Unit to unit clearance, in. (cm)



Curb Dimensions

Figure 88. Unit curb data for OAD cabinet with no powered exhaust or ERV, in. (cm)

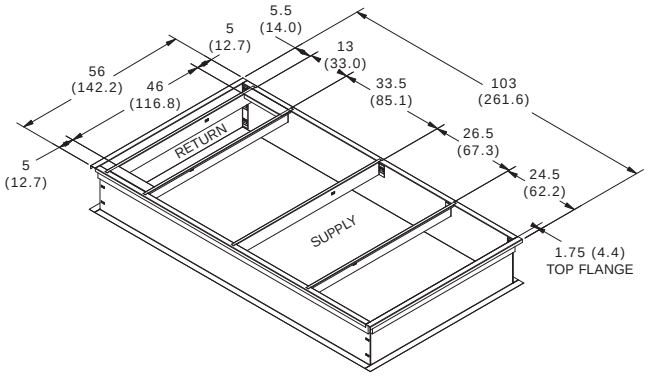


Figure 89. Unit curb data for OAD cabinet with powered exhaust but no ERV, in. (cm)

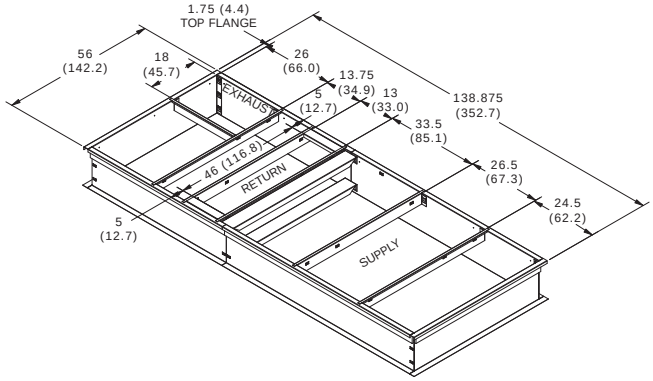
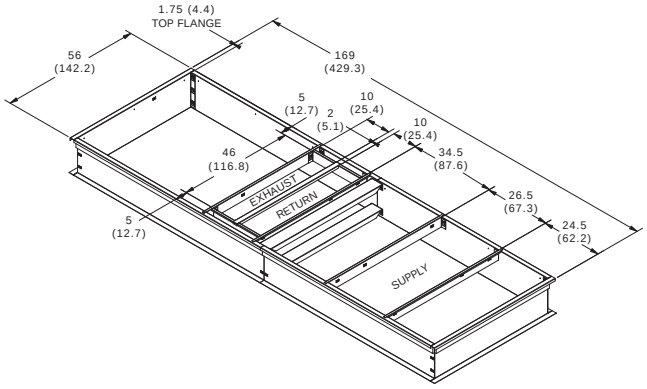
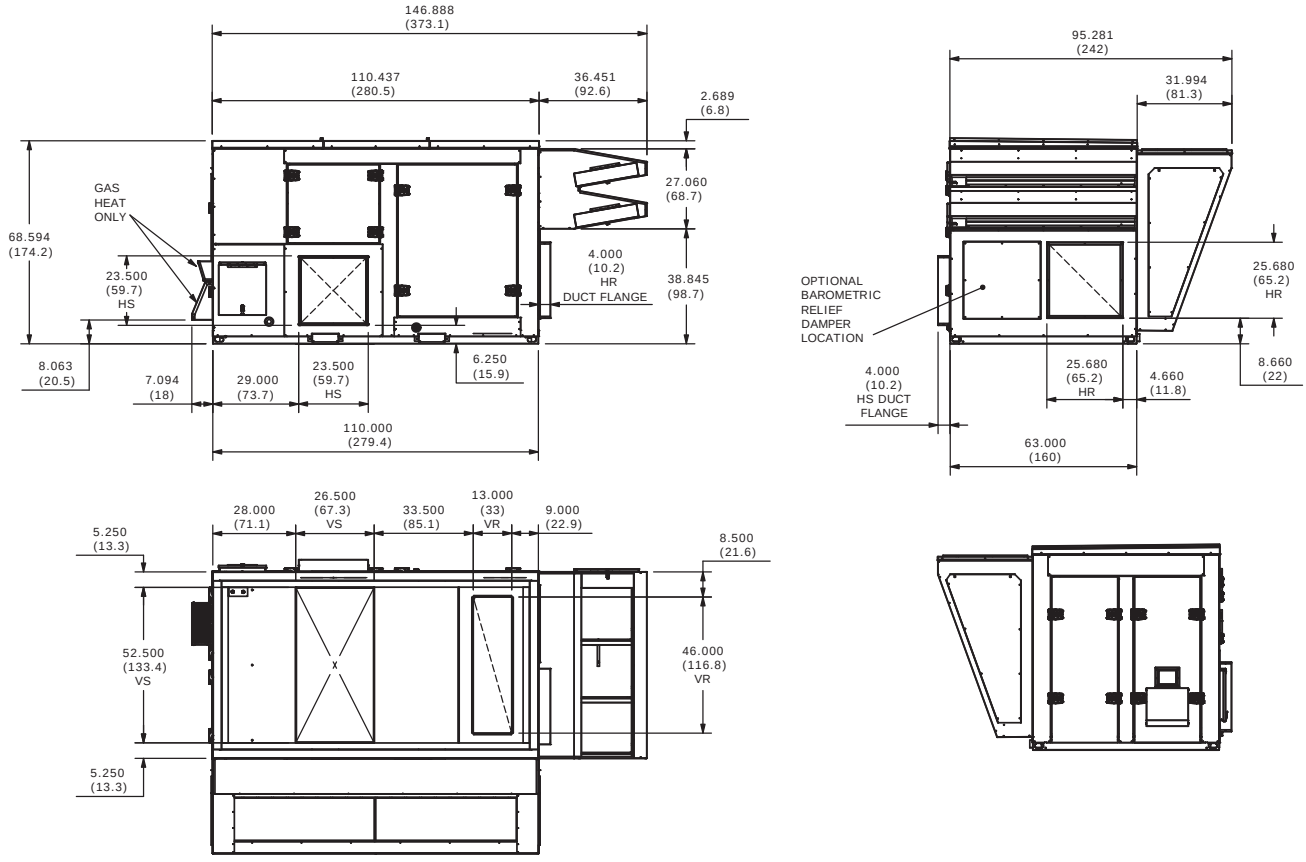


Figure 90. Unit curb data for OAD cabinet with ERV, in. (cm)



Dimensional Data

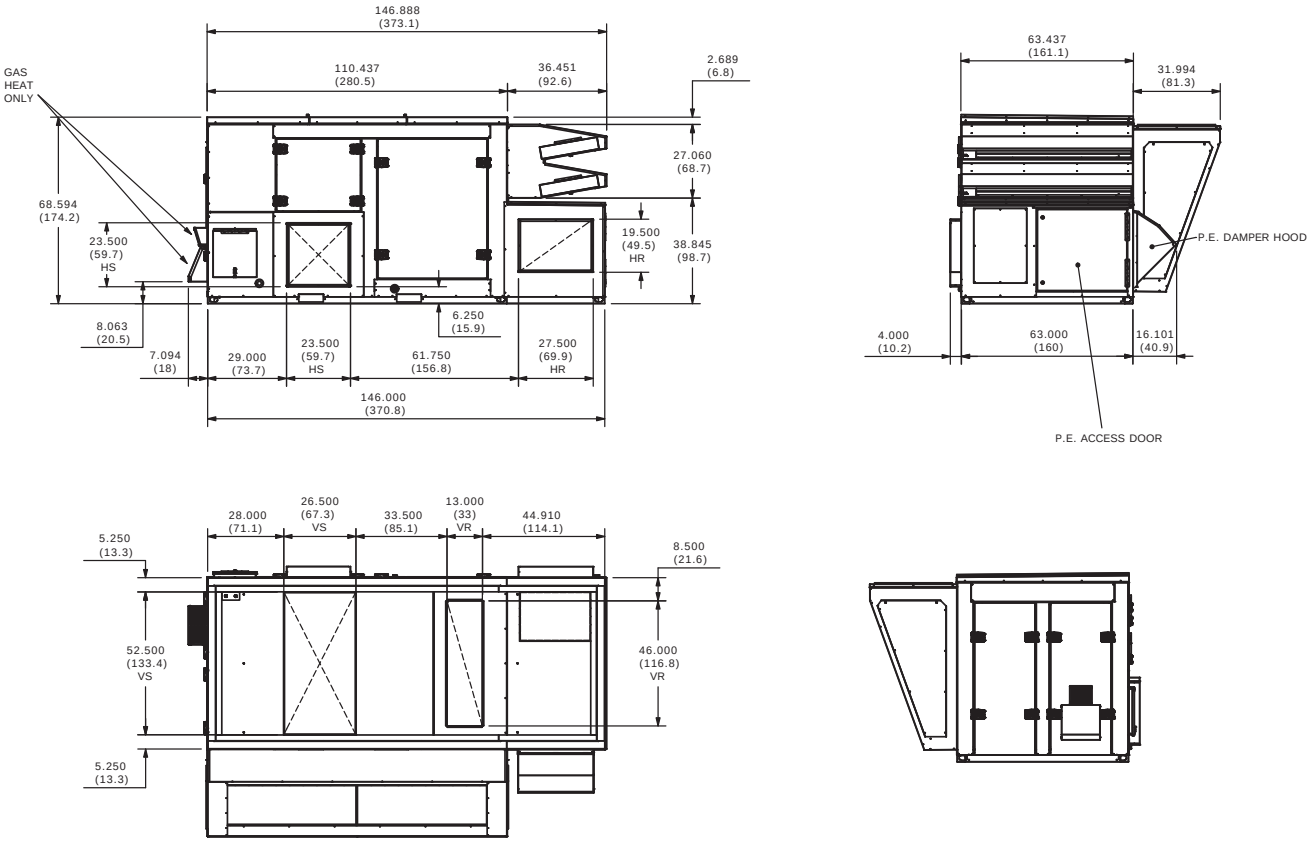
Figure 91. Unit dimensional data for OAD unit with no powered exhaust or ERV, in. (cm)



Notes:

- *Sound attenuation package will add 16 in. (40.6 cm) to the height of the condenser fan section.*
- *Units with no cooling will have the same dimensions, less the condensing section.*
- *Units with chilled water cooling will have the same dimensions, less the condensing section, and with an 18 in. (45.7 cm) deep pipe cabinet added.*
- *Refer to project-specific unit submittals.*

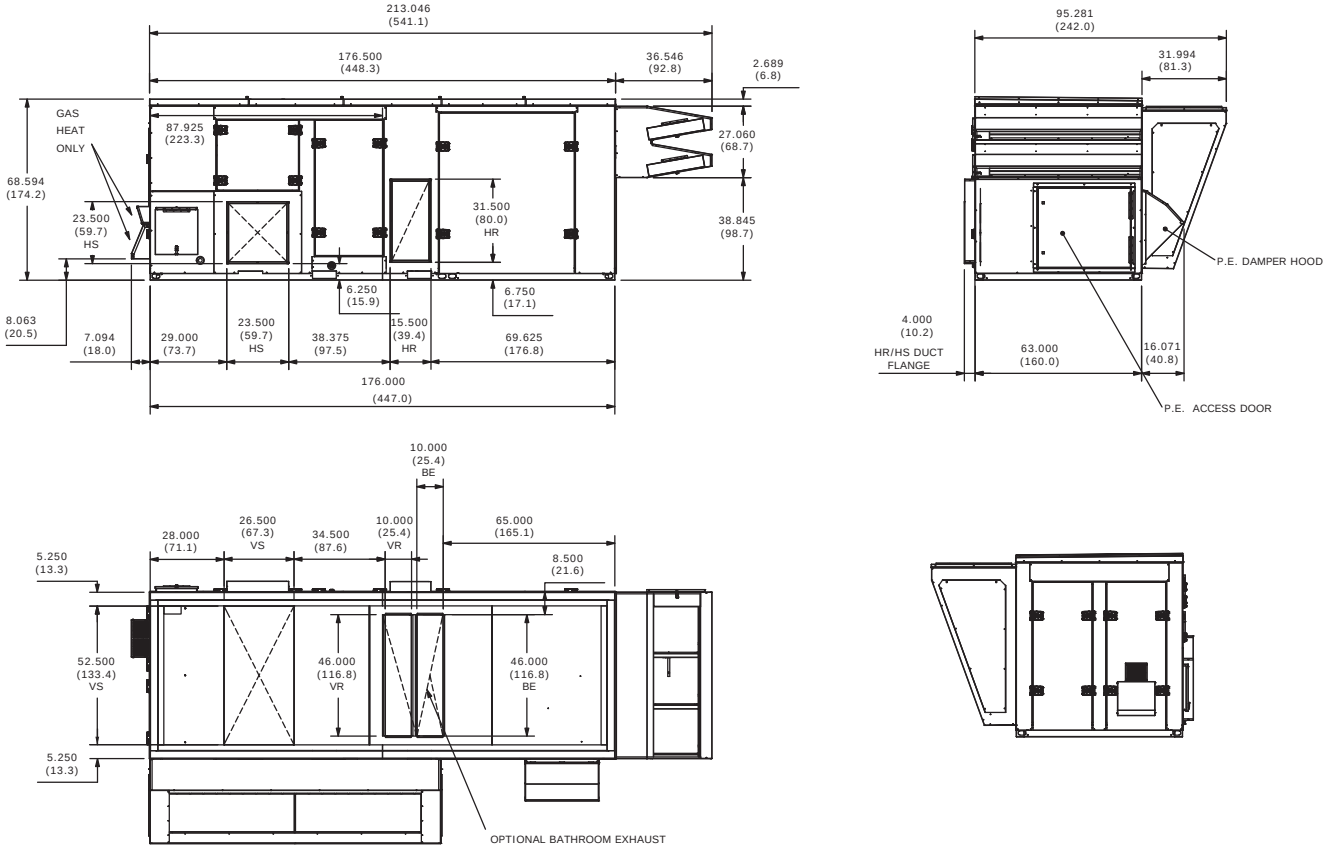
Figure 92. Unit dimensional data for OAD cabinet with powered exhaust but no ERV, in. (cm)



Notes:

- *Sound attenuation package will add 16 in. (40.6 cm) to the height of the condenser fan section.*
- *Units with no cooling will have the same dimensions, less the condensing section.*
- *Units with chilled water cooling will have the same dimensions, less the condensing section, and with an 18 in. (45.7 cm) deep pipe cabinet added.*
- *Refer to project-specific unit submittals.*

Figure 93. Unit dimensional data for OAD cabinet with ERV, in. (cm)



Notes:

- *Sound attenuation package will add 16 in. (40.6 cm) to the height of the condenser fan section.*
- *Units with no cooling will have the same dimensions, less the condensing section.*
- *Units with chilled water cooling will have the same dimensions, less the condensing section, and with an 18 in. (45.7 cm) deep pipe cabinet added.*
- *Refer to project-specific unit submittals.*

OAN Units

Unit Clearances

Figure 94. Installation clearances for units with no powered exhaust or ERV, in. (cm)

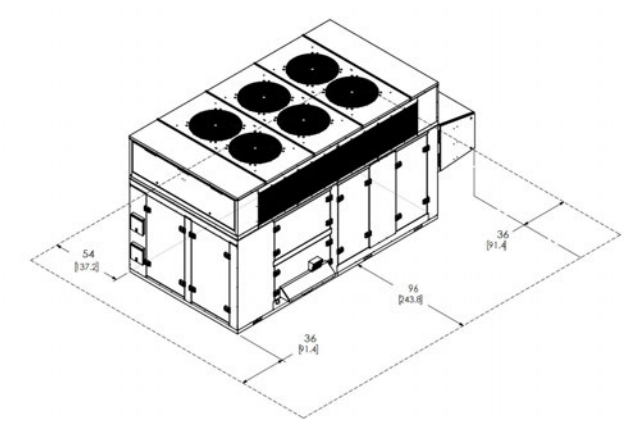
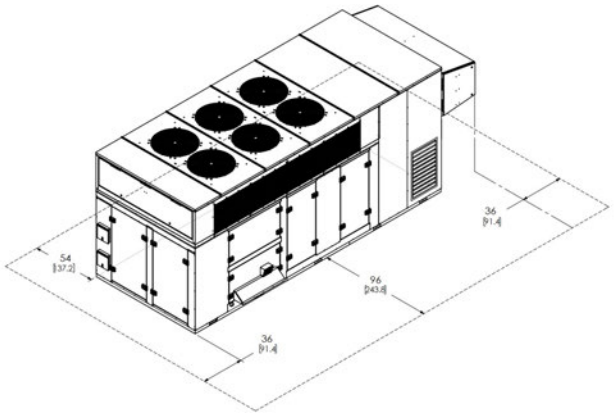
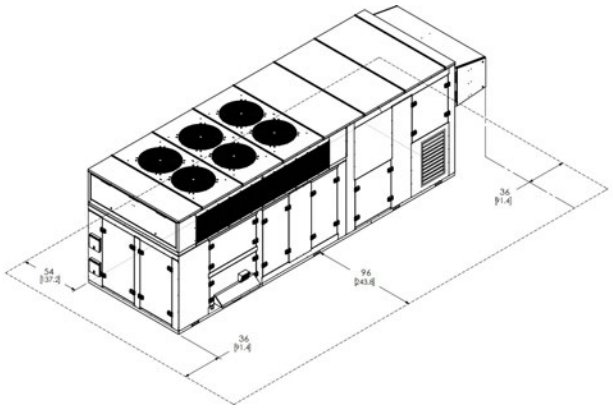


Figure 95. Installation clearances for unit with powered exhaust but no ERV, in. (cm)



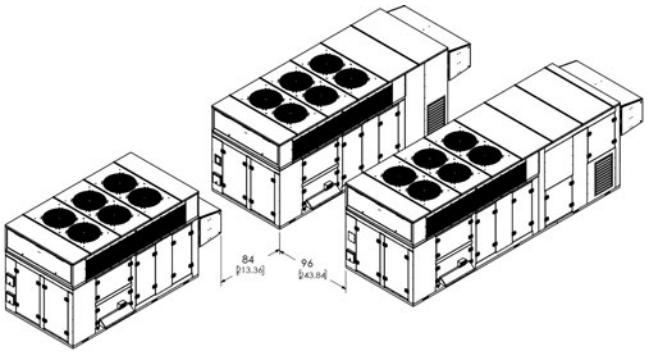
Note: *72 in. (182.9 cm) clearance is required above the condenser fans.*

Figure 96. Installation clearances for unit with ERV, in. (cm)



Note: *72 in. (182.9 cm) clearance is required above the condenser fans.*

Figure 97. Unit to unit clearance, in. (cm)



Curb Dimensions

Figure 98. Unit curb data for OAN cabinet with no powered exhaust or ERV, in. (cm)

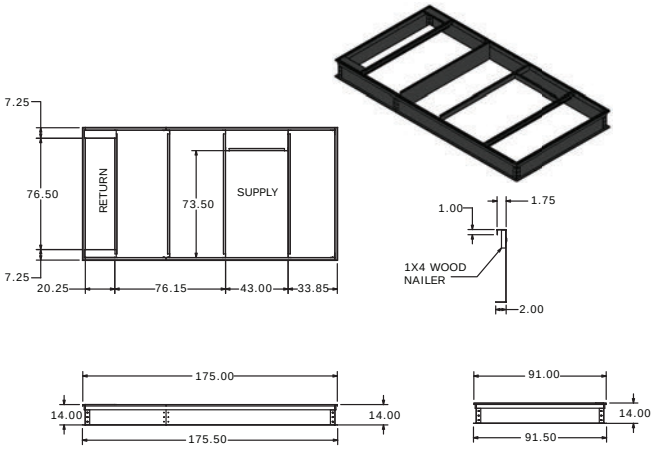


Figure 99. Unit curb data for OAN cabinet with powered exhaust but no ERV, in. (cm)

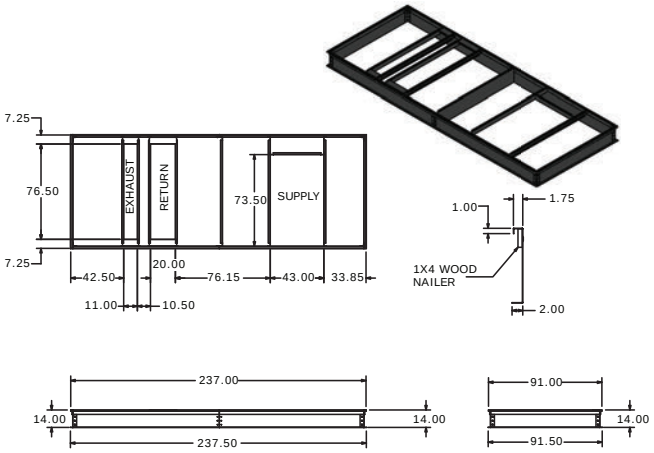
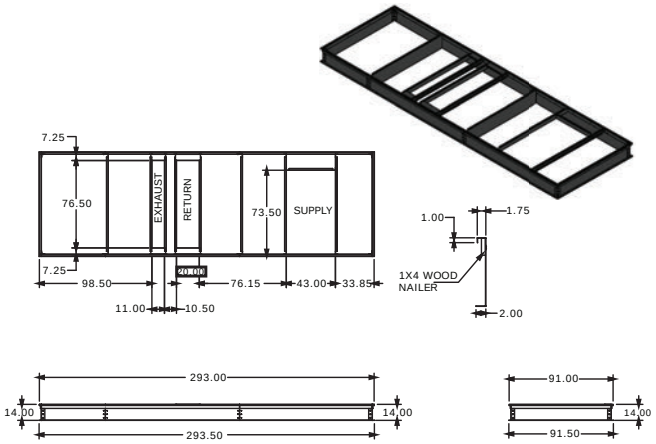
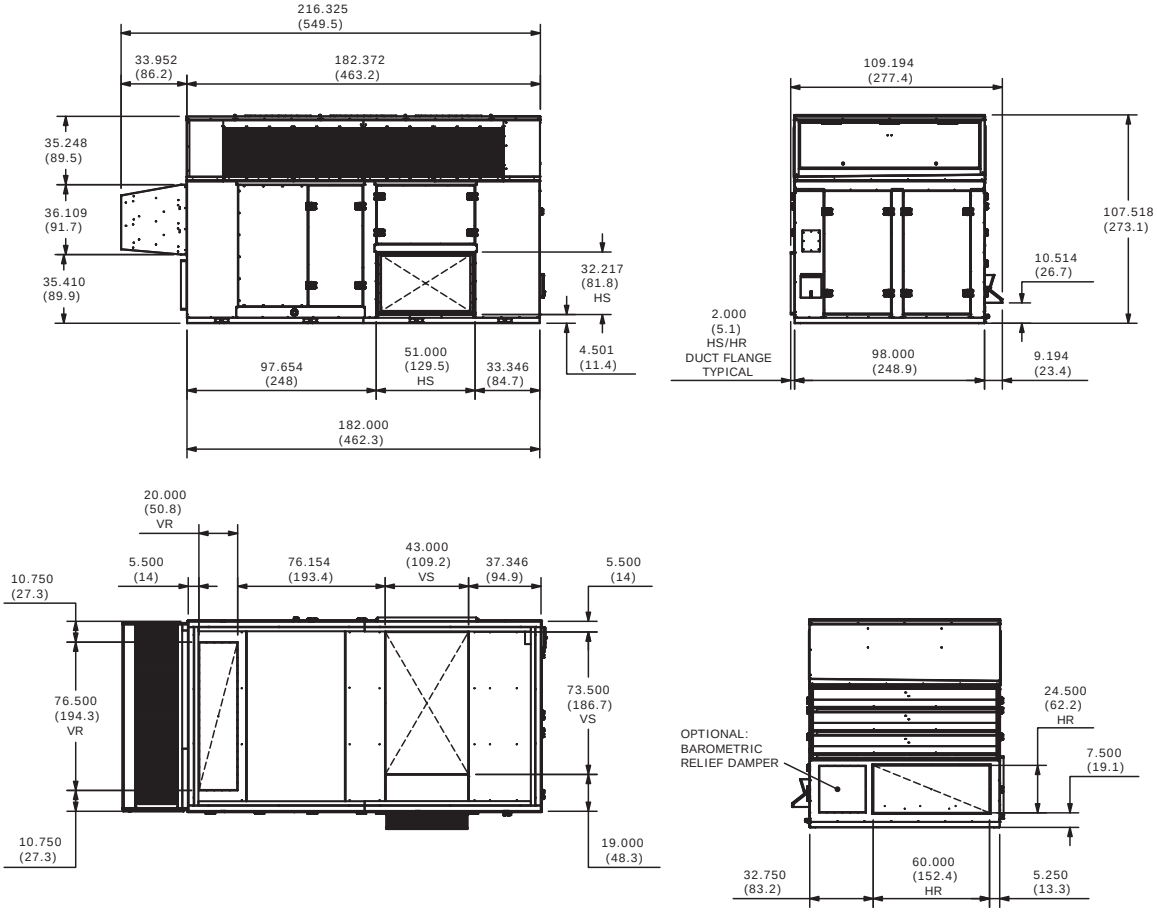


Figure 100. Unit curb data for OAN cabinet with ERV, in. (cm)



Dimensional Data

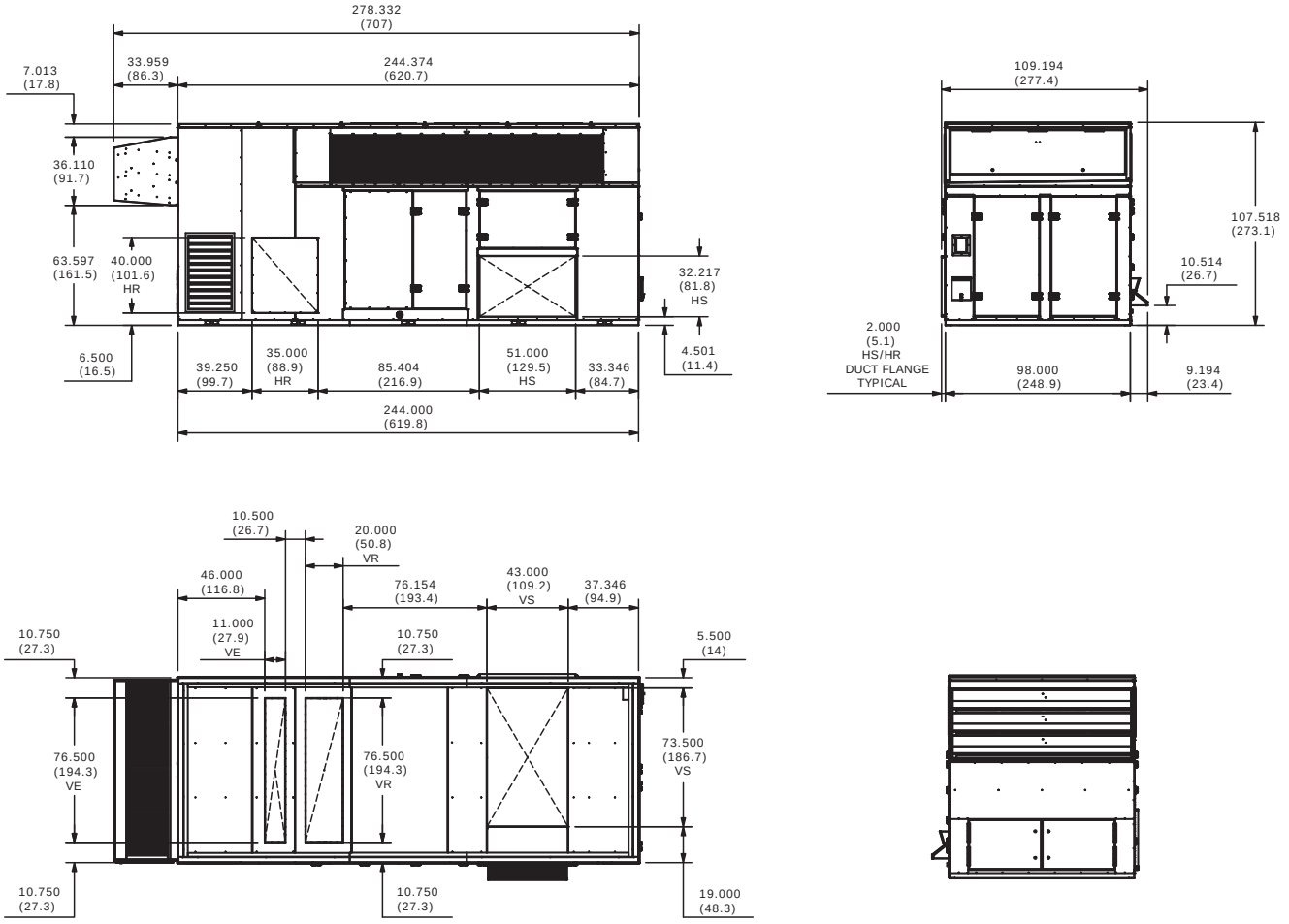
Figure 101. Unit dimensional data for OAN unit with no powered exhaust or ERV, in. (cm)



Notes:

- *Units with no cooling will have the same dimensions, less the condensing section.*
- *Units with chilled water cooling will have the same dimensions, less the condensing section, and with an 18 in. (45.7 cm) deep pipe cabinet added.*
- *Refer to project-specific unit submittals.*

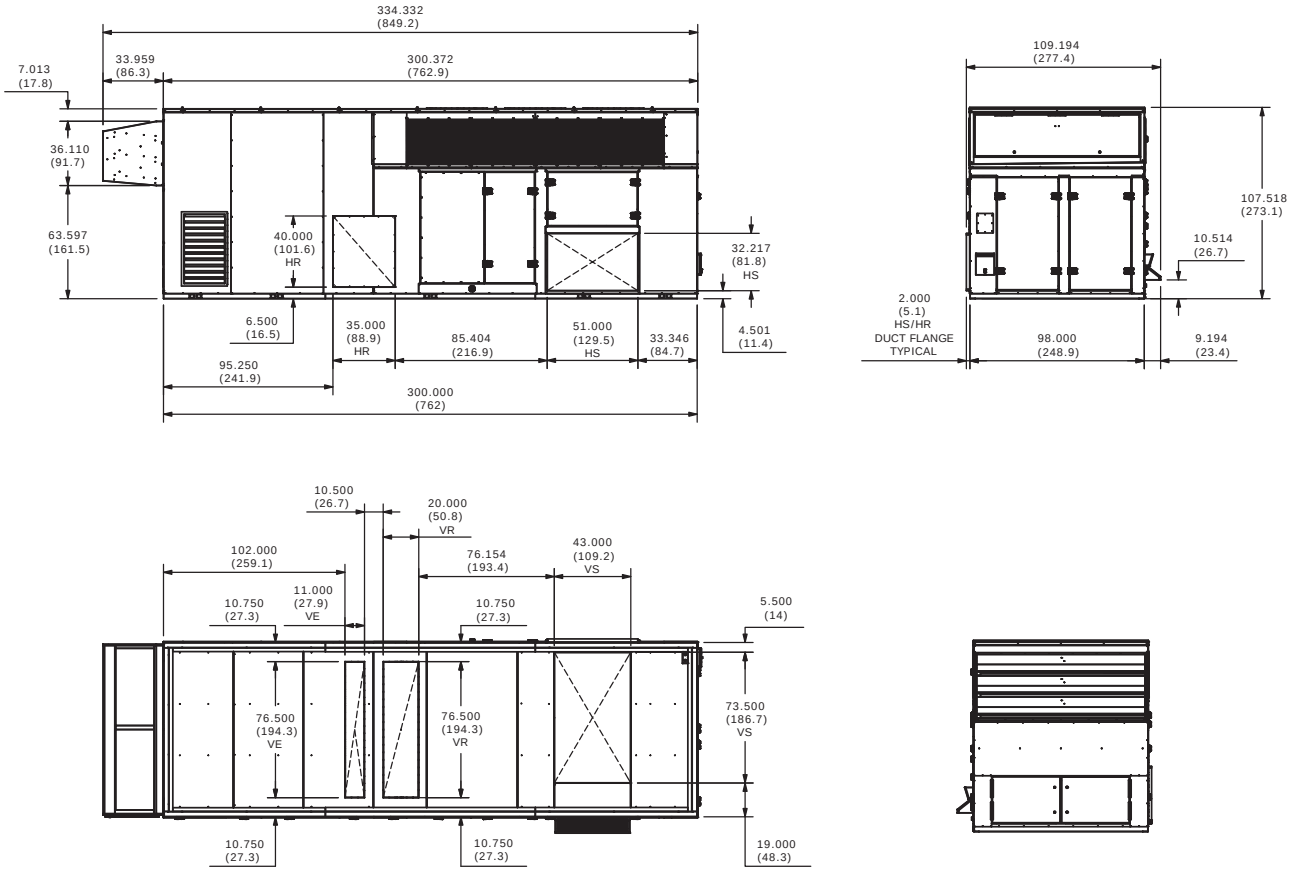
Figure 102. Unit dimensional data for OAN cabinet with powered exhaust but no ERV, in. (cm)



Notes:

- *Units with no cooling will have the same dimensions, less the condensing section.*
- *Units with chilled water cooling will have the same dimensions, less the condensing section, and with an 18 in. (45.7 cm) deep pipe cabinet added.*
- *Refer to project-specific unit submittals.*

Figure 103. Unit dimensional data for OAN cabinet with ERV, in. (cm)



Notes:

- *Units with no cooling will have the same dimensions, less the condensing section.*
- *Units with chilled water cooling will have the same dimensions, less the condensing section, and with an 18 in. (45.7 cm) deep pipe cabinet added.*
- *Refer to project-specific unit submittals.*

Unit Weight and Rigging

⚠WARNING

Heavy Objects!

Failure to follow instructions below or properly lift unit could result in unit dropping and possibly crushing operator/technician which could result in death or serious injury, and equipment or property-only damage. Ensure that all the lifting equipment used is properly rated for the weight of the unit being lifted. Each of the cables (chains or slings), hooks, and shackles used to lift the unit must be capable of supporting the entire weight of the unit. Lifting cables (chains or slings) may not be of the same length. Adjust as necessary for even unit lift.

⚠AVERTISSEMENT

Objets lourds!

Le non-respect des instructions ci-dessous ou un levage inapproprié de l'unité peut provoquer sa chute voire écraser l'opérateur/le technicien, ce qui peut occasionner des blessures graves voire mortelles, et éventuellement endommager l'équipement ou provoquer des dégâts matériels. Assurez-vous que l'équipement de levage utilisé est adapté au poids de l'unité à soulever. Chaque câble (chaîne ou élingue), crochet ou manille utilisé pour le levage de l'unité doit être assez robuste pour supporter le poids total de l'unité. Les câbles, chaînes ou élingues de levage ne doivent pas être de longueur identique. Procédez au réglage afin de soulever l'unité de manière équilibrée.

⚠WARNING

Improper Unit Lift!

Failure to properly lift unit could result in unit dropping and possibly crushing operator/technician which could result in death or serious injury, and equipment or property-only damage. Test lift unit approximately 24 inches to verify proper center of gravity lift point. To avoid dropping of unit, reposition lifting point if unit is not level.

⚠AVERTISSEMENT

Levage inapproprié de l'unité!

Le non-respect des instructions ci-dessous ou un levage inapproprié de l'unité peut provoquer sa chute voire écraser l'opérateur/le technicien, ce qui peut occasionner des blessures graves voire mortelles, et éventuellement endommager l'équipement ou provoquer des dégâts matériels. Faites un test de levage de l'unité d'environ 60 cm (24 po) afin de vérifier que le point de levage correspond au centre de gravité de l'appareil. Pour éviter une chute de celle-ci, ajustez son point de levage si elle n'est pas à l'horizontale.

Unit Weight

Table 1. Typical unit weight, center of gravity, and corner weights (percentage of total weight) - air cooled DX units without powered exhaust or ERV

	Weight (lb)		Center-of-gravity (in.)		Corner weight (% of total weight)[(a)]			
Model Number	Min	Max	Length	Width	Corner A	Corner B	Corner C	Corner D
OAK*144	3095	4725	54.4	38.1	25%	12%	37%	27%
OAK*180	3095	4725	51.6	38.1	15%	22%	30%	34%
OAK*210	3095	4725	53.4	38.4	16%	20%	30%	34%
OAK*240	3095	4725	52.9	37.4	24%	14%	36%	26%
OAK*264	3095	4725	54.6	38.3	20%	16%	32%	32%
OAK*300	3095	4725	52.5	34.5	23%	20%	31%	27%
OAK*360	3095	4725	52.0	37.4	18%	20%	31%	31%
OAN*360	4737	7240	69.4	41.4	19%	19%	32%	29%
OAN*420	4737	7240	71.9	42.1	20%	18%	32%	30%
OAN*480	4737	7240	70.4	41.3	20%	18%	33%	29%
OAN*540	4737	7240	71.1	40.8	20%	19%	32%	29%
OAN*600	4737	7240	68.6	41.8	18%	20%	32%	30%
OAN*648	4737	7240	67.4	41.4	17%	21%	32%	30%
OAB*036	1255	1736	46.1	24.1	28%	26%	27%	20%
OAB*048	1255	1736	46.6	23.9	30%	24%	28%	18%
OAB*060	1255	1736	45.9	23.9	29%	25%	28%	18%

Table 1. Typical unit weight, center of gravity, and corner weights (percentage of total weight) - air cooled DX units without powered exhaust or ERV (continued)

Model Number	Weight (lb)		Center-of-gravity (in.)		Corner weight (% of total weight)[a]			
	Min	Max	Length	Width	Corner A	Corner B	Corner C	Corner D
OAB*072	1255	1736	47.5	23.8	31%	24%	27%	18%
OAB*084	1255	1736	46.5	24.0	29%	25%	28%	19%
OAB*096	1255	1736	46.7	24.1	31%	22%	30%	17%
OAB*108	1255	1736	46.2	24.0	27%	27%	25%	21%
OAG*120	2437	4546	60.2	34.7	29%	24%	26%	21%
OAG*144	2437	4546	59.5	34.9	26%	27%	24%	24%
OAG*180	2437	4546	59.3	34.7	28%	26%	26%	21%
OAG*210	2437	4546	60.7	35.5	26%	26%	24%	24%
OAG*240	2437	4546	59.5	34.6	29%	24%	26%	20%
OAG*264	2437	4546	59.9	34.4	26%	28%	23%	24%
OAG*300	2437	4546	58.8	35.2	28%	24%	27%	20%
OAG*360	2437	4546	58.9	34.2	28%	26%	25%	21%
OADG010	2209	3578	54	41.1	20%	15%	36%	29%
OADG012	2430	3585	54.1	41.3	23%	11%	39%	26%
OADG015	2209	3578	53.3	41.1	19%	16%	36%	29%
OADG017	2430	3585	53.4	41	21%	14%	37%	28%
OADG020	2209	3578	54.2	41.7	19%	15%	36%	30%
OADG025	2430	3785	53.4	41	21%	14%	37%	28%
OADG030	2430	3785	53.4	41	21%	14%	37%	28%
OANG040	6220	8111	87.2	50.1	24%	26%	26%	24%
OANG045	6220	8111	87.2	50.1	24%	26%	26%	24%
OANG050	6565	8505	91.4	50.2	24%	26%	26%	24%
OANG055	6565	8505	91.4	50.2	24%	26%	26%	24%
OANG060	6881	8883	96.0	50.5	24%	26%	26%	24%
OANG070	6220	8111	87.2	50.1	24%	26%	26%	24%
OANG080	7038	9058	95.6	50.7	24%	26%	26%	24%

(a) Refer to Figure 104, p. 67 and Figure 105, p. 67 for corner locations.

Table 2. Typical unit weight, center of gravity, and corner weights (percentage of total weight) - air cooled DX units with powered exhaust but without ERV

Model Number	Weight (lb)		Center-of-gravity (in.)		Corner weight (% of total weight)[a]			
	Min	Max	Length	Width	Corner A	Corner B	Corner C	Corner D
OAK*144	3421	6240	58.4	37.7	20%	17%	28%	35%
OAK*180	3421	6240	58.4	37.0	27%	11%	34%	28%
OAK*210	3421	6240	56.7	36.9	26%	13%	34%	28%
OAK*240	3421	6240	56.7	36.9	26%	13%	34%	28%
OAK*264	3421	6240	56.7	36.9	26%	13%	34%	28%
OAK*300	3421	6240	56.7	36.9	26%	13%	34%	28%
OAK*360	3421	6240	55.0	36.6	27%	12%	36%	25%
OAN*360	5629	7814	71.9	39.5	19%	22%	28%	31%
OAN*420	5629	7814	74.5	41.0	17%	22%	26%	35%
OAN*480	5629	7814	74.5	41.0	17%	22%	26%	35%
OAN*540	5629	7814	73.4	41.5	18%	20%	29%	33%

Table 2. Typical unit weight, center of gravity, and corner weights (percentage of total weight) - air cooled DX units with powered exhaust but without ERV (continued)

Model Number	Weight (lb)		Center-of-gravity (in.)		Corner weight (% of total weight)[a]			
	Min	Max	Length	Width	Corner A	Corner B	Corner C	Corner D
OAN*600	5629	7814	77.0	41.2	18%	21%	26%	36%
OAN*648	5629	7814	75.2	41.4	15%	23%	24%	37%
OAB*036	1608	2352	68.8	24.8	36%	17%	34%	14%
OAK*240	3421	6240	56.7	36.9	26%	13%	34%	28%
OAB*048	1608	2352	63.6	24.1	32%	22%	32%	14%
OAB*060	1608	2352	65.5	24.3	29%	24%	29%	18%
OAB*072	1608	2352	65.2	24.2	29%	25%	29%	18%
OAB*084	1608	2352	63.0	24.0	22%	32%	23%	23%
OAB*096	1608	2352	65.5	24.3	29%	24%	29%	18%
OAB*108	1608	2352	66.9	24.6	29%	24%	28%	19%
OAG*120	3199	4730	84.4	35.5	26%	26%	24%	24%
OAG*144	3199	4730	83.6	35.3	24%	28%	23%	25%
OAG*180	3199	4730	82.5	35.4	23%	29%	23%	25%
OAG*210	3199	4730	84.0	35.0	24%	29%	21%	26%
OAG*240	3199	4730	83.6	35.3	24%	28%	23%	25%
OAG*264	3199	4730	83.6	35.3	24%	28%	23%	25%
OAG*300	3199	4730	83.6	35.3	24%	28%	23%	25%
OAG*360	3199	4730	83.6	35.3	24%	28%	23%	25%
OADG010	2970	4207	66	38.3	22%	18%	37%	23%
OADG012	2970	4207	62.5	40.2	23%	13%	44%	20%
OADG015	2970	4207	59.5	40.2	22%	15%	45%	19%
OADG017	3170	4407	60.5	39.9	22%	15%	44%	19%
OADG020	3170	4407	60.1	39.8	21%	16%	43%	21%
OADG025	3170	4607	60.1	39.8	21%	16%	43%	21%
OADG030	3170	4607	60.1	39.8	21%	16%	43%	21%
OANG040	7327	9888	106.8	49.9	25%	27%	28%	20%
OANG045	7327	9888	106.8	49.9	25%	27%	28%	20%
OANG050	7327	9888	106.8	49.9	25%	27%	28%	20%
OANG055	7674	10282	115.9	49.9	25%	27%	28%	20%
OANG060	7674	10282	115.9	49.9	25%	27%	28%	20%
OANG070	7990	10660	120.5	50.0	25%	27%	28%	20%
OANG080	8147	10834	125.0	50.5	25%	27%	28%	20%

(a) Refer to Figure 104, p. 67 and Figure 105, p. 67 for corner locations.

Corner Weight

Table 3. Typical unit weight, center of gravity, and corner weights (percentage of total weight) - air cooled DX units with powered exhaust and ERV

Model Number	Weight (lb)		Center-of-gravity (in.)		Corner weight (% of total weight)[a]			
	Min	Max	Length	Width	Corner A	Corner B	Corner C	Corner D
OAK*144	4508	6337	79.1	35.0	22%	20%	31%	27%
OAK*180	4508	6337	80.5	36.8	23%	16%	35%	27%

Table 3. Typical unit weight, center of gravity, and corner weights (percentage of total weight) - air cooled DX units with powered exhaust and ERV (continued)

Model Number	Weight (lb)		Center-of-gravity (in.)		Corner weight (% of total weight)[a]			
	Min	Max	Length	Width	Corner A	Corner B	Corner C	Corner D
OAK*210	4508	6337	81.3	37.4	24%	13%	36%	26%
OAK*240	4508	6337	82.5	37.5	26%	12%	37%	25%
OAK*264	4508	6337	81.2	37.2	22%	16%	34%	28%
OAK*300	4508	6337	76.7	35.5	22%	19%	34%	25%
OAK*360	4508	6337	81.9	38.0	23%	13%	36%	27%
OAN*360	6690	8621	101.1	41.0	18%	21%	30%	32%
OAN*420	6690	8621	101.1	41.0	18%	21%	30%	32%
OAN*480	6690	8621	103.2	40.0	19%	22%	28%	31%
OAN*540	6690	8621	105.0	41.5	18%	20%	29%	33%
OAN*600	6690	8621	100.0	41.0	19%	20%	31%	30%
OAN*648	6690	8621	100.9	41.2	16%	22%	29%	33%
OAB*036	1740	2526	68.1	24.3	31%	22%	29%	18%
OAB*048	1740	2526	68.9	24.0	31%	23%	27%	19%
OAB*060	1740	2526	67.0	24.1	28%	25%	26%	20%
OAB*072	1740	2526	67.0	24.4	25%	28%	24%	23%
OAB*084	1740	2526	68.3	24.4	28%	26%	25%	22%
OAB*096	1740	2526	67.3	24.2	30%	24%	28%	19%
OAB*108	1740	2526	68.1	24.0	28%	26%	25%	21%
OAG*120	3879	5972	89.4	35.3	28%	24%	23%	25%
OAG*144	3879	5972	84.3	38.8	23%	24%	26%	26%
OAG*180	3879	5972	88.1	35.1	25%	27%	21%	27%
OAG*210	3879	5972	88.2	35.2	31%	22%	26%	21%
OAG*240	3879	5972	87.4	35.2	29%	23%	25%	23%
OAG*264	3879	5972	85.8	35.1	24%	28%	21%	26%
OAG*300	3879	5972	87.0	36.0	27%	24%	24%	25%
OAG*360	3879	5972	87.0	36.0	27%	24%	24%	25%
OADG010	3405	4744	78.8	38.3	20%	19%	36%	24%
OADG012	3405	4744	78.4	38.3	20%	19%	36%	25%
OADG015	3405	4744	78	38.5	22%	17%	38%	23%
OADG017	3605	4944	77.3	38.7	21%	18%	38%	23%
OADG020	3605	4944	78.8	39.3	18%	20%	36%	27%
OADG025	3605	5144	78.8	39.3	18%	20%	36%	27%
OADG030	3605	5144	78.8	39.3	18%	20%	36%	27%
OANG040	8536	11563	143.4	49.2	24%	25%	30%	21%
OANG045	8536	11563	143.4	49.2	24%	25%	30%	21%
OANG050	8536	11563	143.4	49.2	24%	25%	30%	21%
OANG055	8883	11957	146.2	49.3	24%	25%	30%	21%
OANG060	8883	11957	146.2	49.3	24%	25%	30%	21%
OANG070	9199	12335	149.4	49.4	24%	25%	30%	21%
OANG080	9356	12510	151.8	49.5	24%	25%	30%	21%

(a) Refer to Figure 104, p. 67 and Figure 105, p. 67 for corner locations.

Corner Weight

Figure 104. Cabinet corners

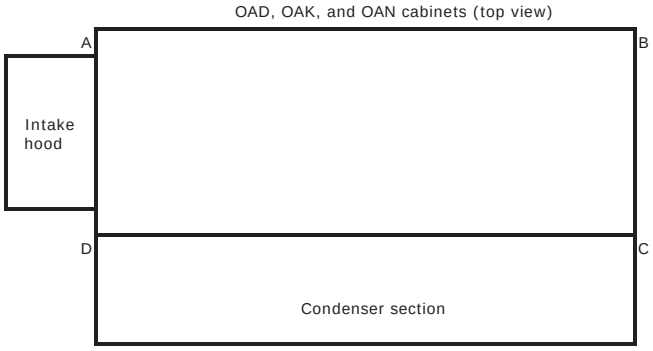
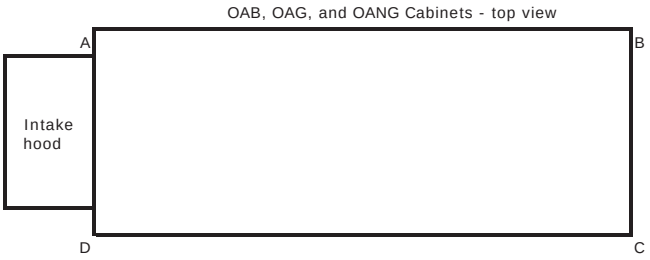


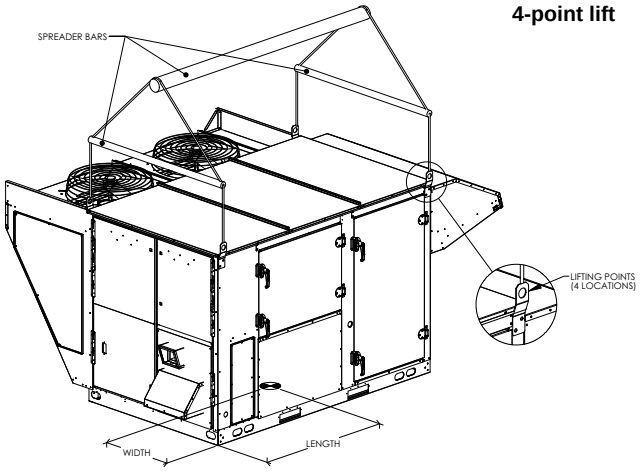
Figure 105. Cabinet corners



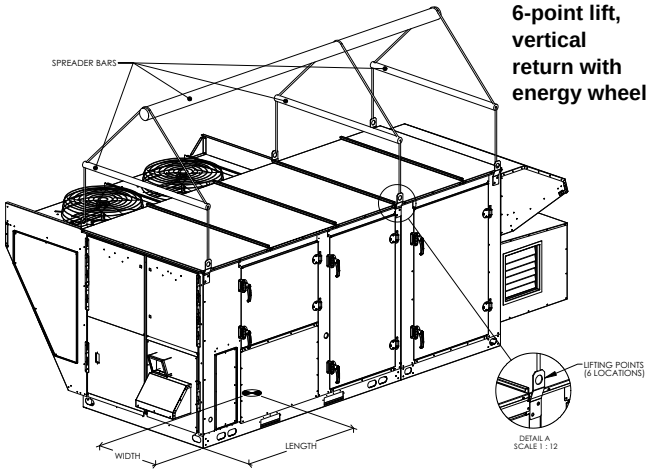
Rigging

Figure 106. Rigging and center-of-gravity data

4-point lift



6-point lift, vertical return with energy wheel



6-point lift, horizontal return, no energy wheel

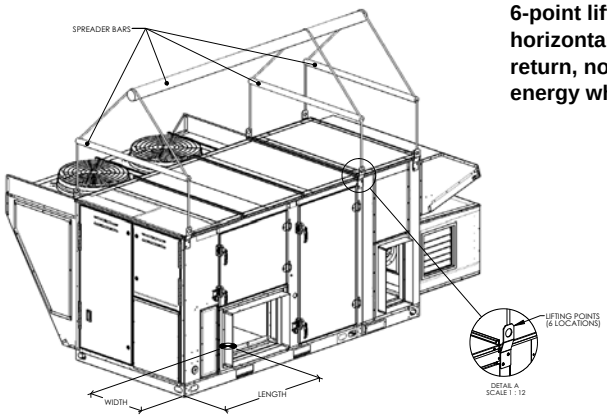
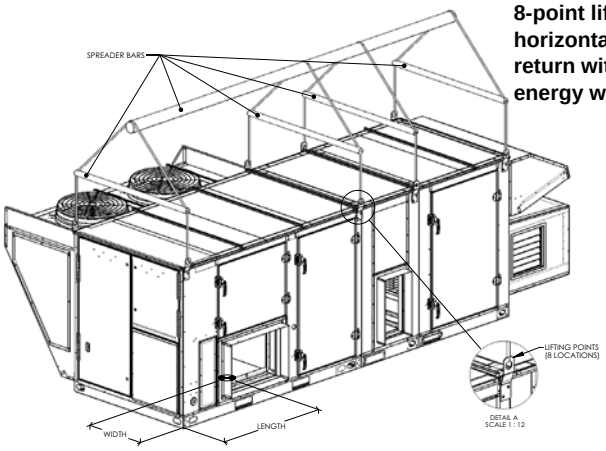


Figure 106. Rigging and center-of-gravity data



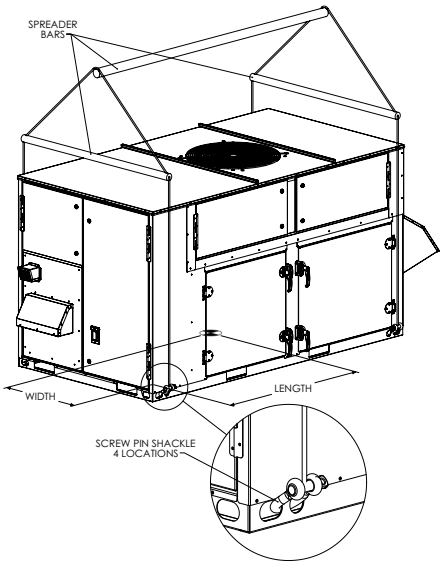
8-point lift, horizontal return with energy wheel

Before proceeding, refer to tables in Unit Weight section for typical unit operating weights and Figure 106, p. 67 for rigging drawing.

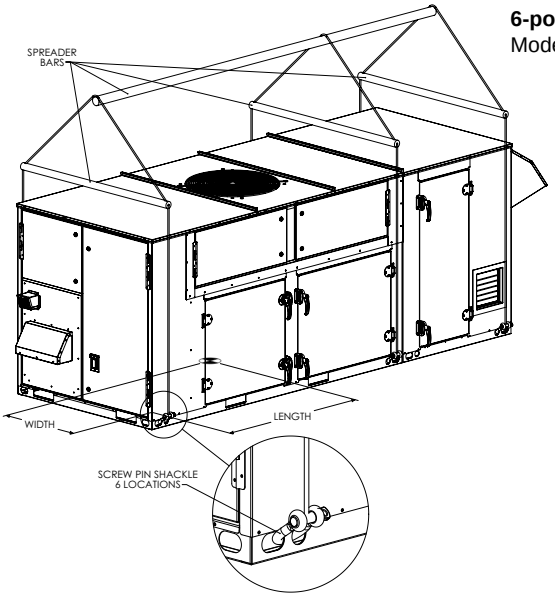
1. Remove the shipping crate from around the unit.
2. Rig the unit as shown in Figure 106, p. 67. Attach adequate strength lifting slings to all four lifting brackets in the unit base rail. Do not use cables, chains, or slings except as shown.
3. Install a lifting bar, as shown in Figure 106, p. 67, to protect the unit and to facilitate a uniform lift. The minimum distance between the lifting hook and the top of the unit should be 7 feet.
4. Test-lift the unit to ensure it is properly rigged and balanced, make any necessary rigging adjustments.
5. Lift the unit and position it into place. Remove fork pockets prior to setting on the curb.
6. Downflow units; align the base rail of the unit with the curb rail while lowering the unit onto the curb. Make sure that the gasket on the curb is not damaged while positioning the unit.

Rigging

Figure 107. Rigging and center-of-gravity data

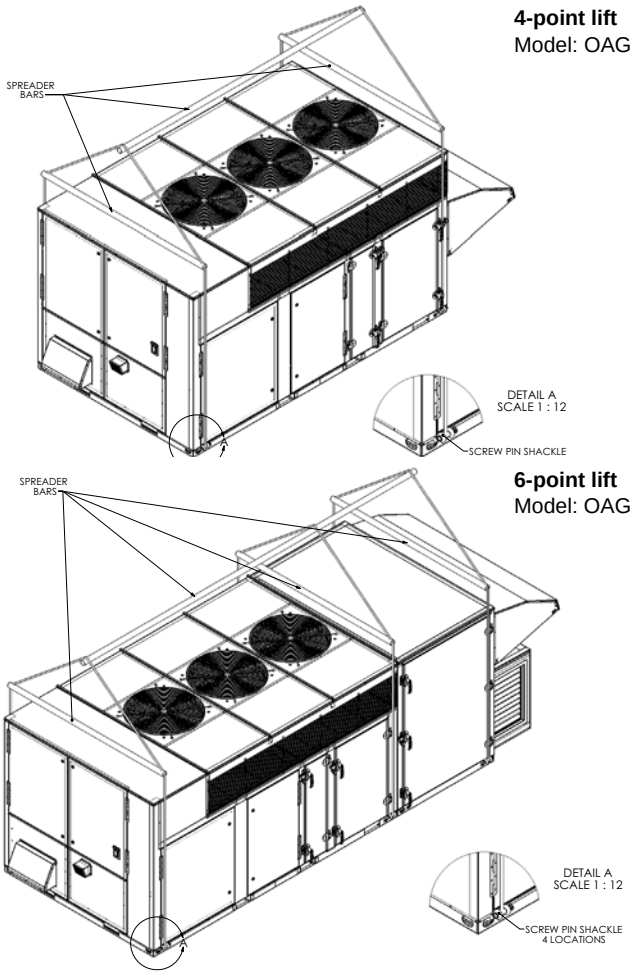


4-point lift
Model: OAB



6-point lift
Model: OAB

Figure 107. Rigging and center-of-gravity data



Before proceeding, refer to tables in Unit Weight section for typical unit operating weights and Figure 107, p. 68 for rigging drawing.

1. Remove the shipping crate from around the unit.
2. Rig the unit as shown in Figure 107, p. 68. Attach adequate strength lifting slings to all four lifting brackets in the unit base rail. Do not use cables, chains, or slings except as shown.
3. Install a lifting bar, as shown in Figure 107, p. 68, to protect the unit and to facilitate a uniform lift. The minimum distance between the lifting hook and the top of the unit should be 7 feet.
4. Test-lift the unit to ensure it is properly rigged and balanced, make any necessary rigging adjustments.
5. Lift the unit and position it into place. Remove fork pockets prior to setting on the curb.
6. Downflow units; align the base rail of the unit with the curb rail while lowering the unit onto the curb. Make sure that the gasket on the curb is not damaged while positioning the unit.

Unit Weight

Table 4. Typical unit weights — units without auxiliary cabinet

Model Number	Operating Weight (lb)		Shipping Weight (lb)	
	Min	Max	Min	Max
OABE036*	1172	1356	1420	1604
OABE048*	1189	1373	1437	1621
OABE060*	1189	1373	1437	1621
OABE072*	1237	1421	1485	1669
OABE084*	1237	1421	1485	1669
OABE096*	1269	1453	1517	1701
OABE108*	1313	1497	1561	1745
OAGE120*	2456	2964	2456	2964
OAGE144*	2506	3014	2506	3014
OAGE180*	2512	3021	2512	3021
OAGE210*	2676	3184	2676	3184
OAGE240*	2752	3278	2752	3278
OAGE264*	2788	3314	2788	3314
OAGE300*	2908	3444	2908	3444
OAGE360*	2930	3466	2930	3466
OAKE144*	2685	3350	2685	3350
OAKE180*	2521	3186	2521	3186
OAKE210*	2803	3620	2803	3620
OAKE240*	2831	3648	2831	3648
OAKE264*	2831	3648	2831	3648
OAKE300*	2835	3695	2835	3695
OAKE360*	2909	3769	2909	3769
OANE360*	4631	5614	4631	5614
OANE420*	4946	5929	4946	5929
OANE480*	5039	6051	5039	6051
OANE540*	5106	6063	5106	6063
OANE600*	5270	6352	5270	6352
OANE648*	5282	6364	5282	6364

Note: Minimum and maximum weights vary widely due to the highly configurable nature of the product.

Table 5. Typical unit weights — units with auxiliary cabinet

Model Number	Operating Weight (lb)		Shipping Weight (lb)	
	Min	Max	Min	Max
OABE036*	1657	1841	1905	2089
OABE048*	1674	1858	1922	2106
OABE060*	1674	1858	1922	2106
OABE072*	1722	1906	1970	2154
OABE084*	1722	1906	1970	2154
OABE096*	1754	1938	2002	2186
OABE108*	1798	1982	2046	2230
OAGE120*	4402	5111	4402	5111
OAGE144*	4361	5161	4361	5161
OAGE180*	4367	5167	4367	5167
OAGE210*	4531	5331	4531	5331
OAGE240*	4606	5424	4606	5424
OAGE264*	4643	5460	4643	5460
OAGE300*	4763	5590	4763	5590
OAGE360*	4784	5612	4784	5612
OAKE144*	4068	4733	4068	4733
OAKE180*	4068	4733	4068	4733
OAKE210*	4487	5304	4487	5304
OAKE240*	4515	5332	4515	5332
OAKE264*	4515	5332	4515	5332
OAKE300*	4499	5359	4499	5359
OAKE360*	4507	5367	4507	5367
OANE360*	6607	7590	6607	7590
OANE420*	6922	7905	6922	7905
OANE480*	7015	8027	7015	8027
OANE540*	7082	8039	7082	8039
OANE600*	7227	8309	7227	8309
OANE648*	7239	8321	7239	8321

Note: Minimum and maximum weights vary widely due to the highly configurable nature of the product.

Table 6. Typical unit weight — units with horizontal return section — no auxiliary cabinet

Model Number	Operating Weight (lb)		Shipping Weight (lb)	
	Min	Max	Min	Max
OABE036*	1172	1356	1420	1604
OABE048*	1189	1373	1437	1621
OABE060*	1189	1373	1437	1621
OABE072*	1237	1421	1485	1669
OABE084*	1237	1421	1485	1669
OABE096*	1269	1453	1517	1701
OABE108*	1313	1497	1561	1745
OAGE120*	2456	2964	2456	2964
OAGE144*	2506	3014	2506	3014
OAGE180*	2512	3021	2512	3021
OAGE210*	2676	3184	2676	3184
OAGE240*	2752	3278	2752	3278
OAGE264*	2788	3314	2788	3314
OAGE300*	2908	3444	2908	3444
OAGE360*	2930	3466	2930	3466
OAKE144*	3200	3865	3200	3865
OAKE180*	3036	3701	3036	3701
OAKE210*	3318	4135	3318	4135
OAKE240*	3346	4163	3346	4163
OAKE264*	3346	4163	3346	4163
OAKE300*	3350	4210	3350	4210
OAKE360*	3424	4284	3424	4284
OANE360*	5241	6224	5241	6224
OANE420*	5556	6539	5556	6539
OANE480*	5649	6661	5649	6661
OANE540*	5716	6673	5716	6673
OANE600*	5880	6962	5880	6962
OANE648*	5892	6974	5892	6974

Note: Minimum and maximum weights vary widely due to the highly configurable nature of the product.

Table 7. Typical unit weights — units with horizontal return section and auxiliary cabinet

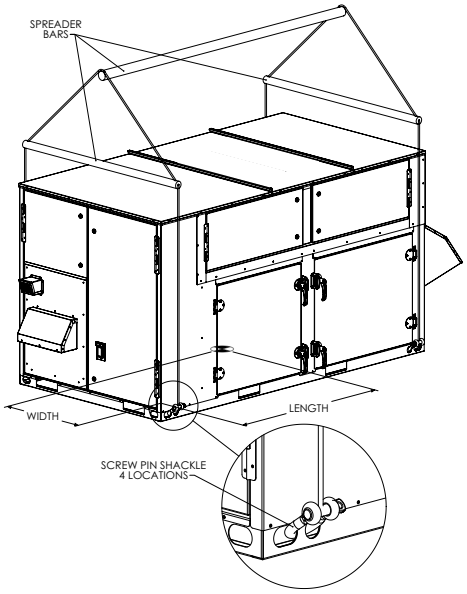
Model Number	Operating Weight (lb)		Shipping Weight (lb)	
	Min	Max	Min	Max
OABE036*	1657	1841	1905	2089
OABE048*	1674	1858	1922	2106
OABE060*	1674	1858	1922	2106
OABE072*	1722	1906	1970	2154
OABE084*	1722	1906	1970	2154
OABE096*	1754	1938	2002	2186
OABE108*	1798	1982	2046	2230
OAGE120*	4402	5111	4402	5111
OAGE144*	4402	5161	4402	5161
OAGE180*	4367	5167	4367	5167
OAGE210*	4531	5331	4531	5331
OAGE240*	4606	5424	4606	5424
OAGE264*	4643	5460	4643	5460
OAGE300*	4763	5590	4763	5590
OAGE360*	4784	5612	4784	5612
OAKE144*	4583	5248	4583	5248
OAKE180*	4583	5248	4583	5248
OAKE210*	5002	5819	5002	5819
OAKE240*	5030	5847	5030	5847
OAKE264*	5030	5847	5030	5847
OAKE300*	5055	5874	5055	5874
OAKE360*	5063	5882	5063	5882
OANE360*	7217	8200	7217	8200
OANE420*	7532	8515	7532	8515
OANE480*	7625	8637	7625	8637
OANE540*	7692	8649	7692	8649
OANE600*	7837	8919	7837	8919
OANE648*	7849	8931	7849	8931

Note: Minimum and maximum weights vary widely due to the highly configurable nature of the product.

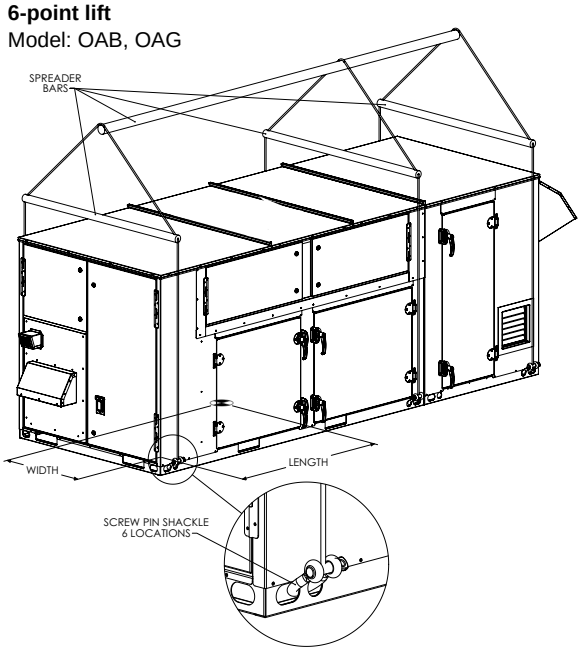
Rigging

Figure 108. Rigging

4-point lift
Model: OAB, OAG



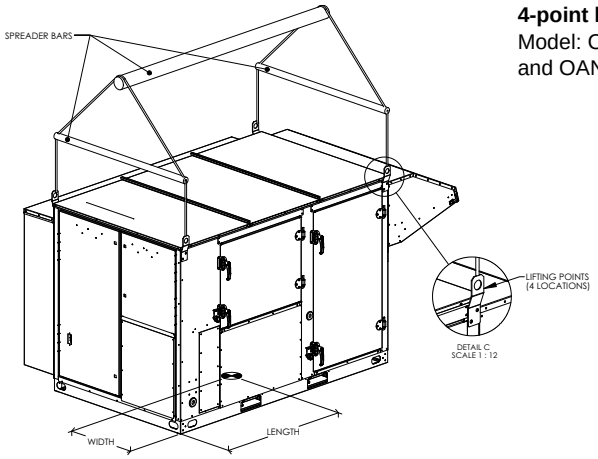
6-point lift
Model: OAB, OAG



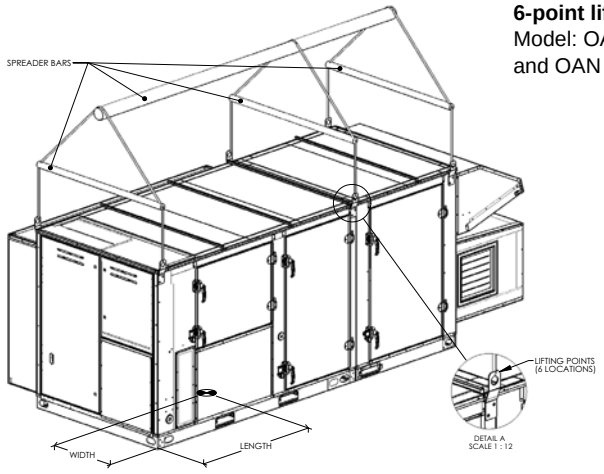
Unit Weight and Rigging

Figure 108. Rigging (continued)

4-point lift
Model: OAK and OAN



6-point lift
Model: OAK and OAN



8-point lift
Model: OAK and OAN

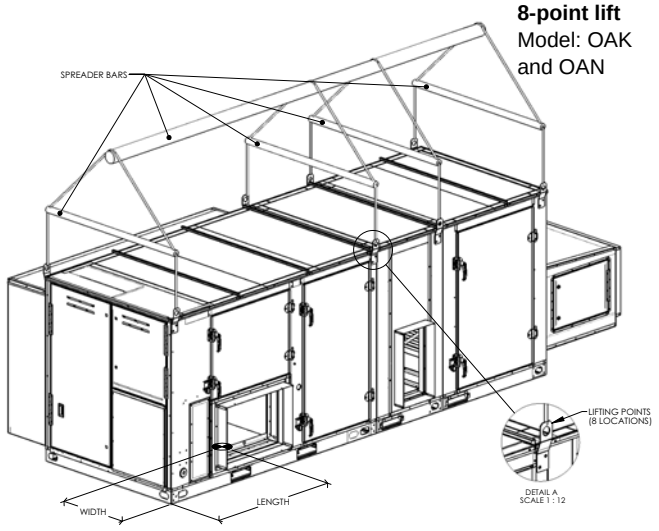
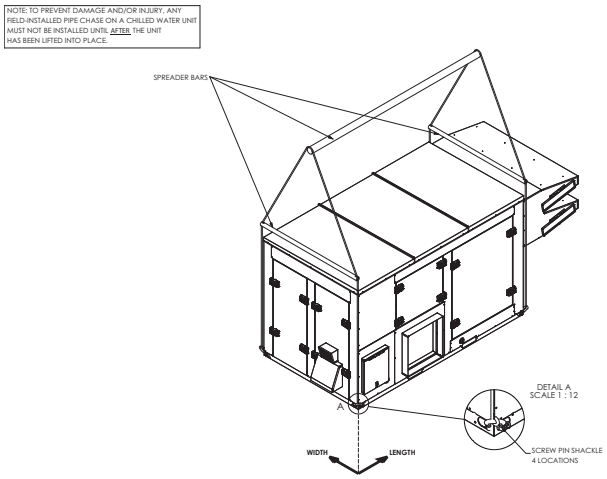
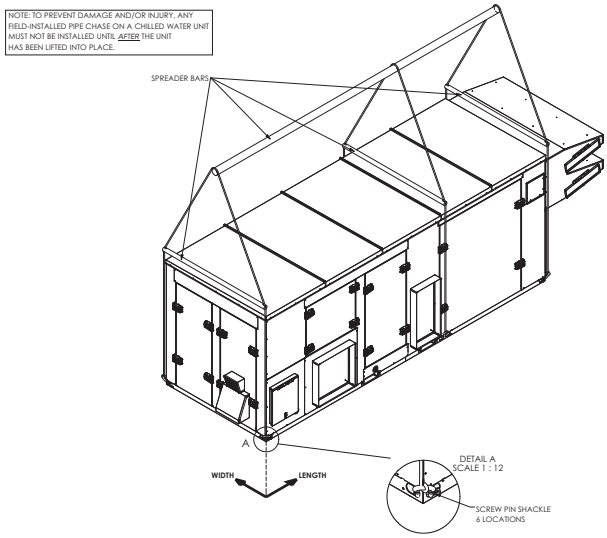
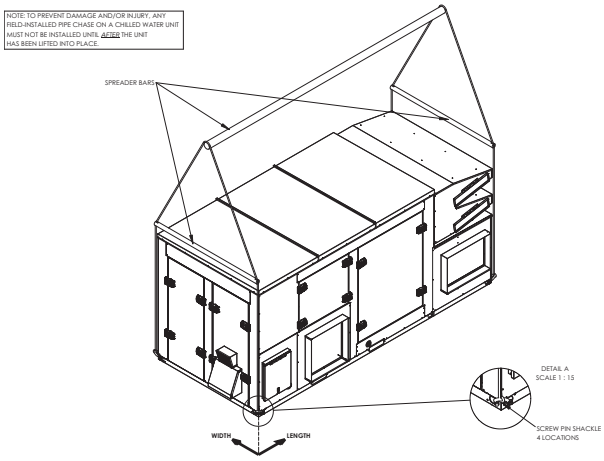


Figure 108. Rigging (continued)







Before proceeding, refer to tables in Unit Weight section for typical unit operating weights and Figure 108, p. 71 for rigging drawing.

1. Remove the shipping crate from around the unit.
2. Rig the unit as shown in Figure 108, p. 71. Attach adequate strength lifting slings to all four lifting brackets in the unit base rail. Do not use cables, chains, or slings except as shown.
3. Install a lifting bar, as shown in Figure 108, p. 71, to protect the unit and to facilitate a uniform lift. The minimum distance between the lifting hook and the top of the unit should be 7 feet.
4. Test-lift the unit to ensure it is properly rigged and balanced, make any necessary rigging adjustments.
5. Lift the unit and position it into place. Remove fork pockets prior to setting on the curb.
6. Downflow units; align the base rail of the unit with the curb rail while lowering the unit onto the curb. Make sure that the gasket on the curb is not damaged while positioning the unit.

Rigging

Figure 109. Four-point lift (OAD cabinet with no exhaust fan or ERV)

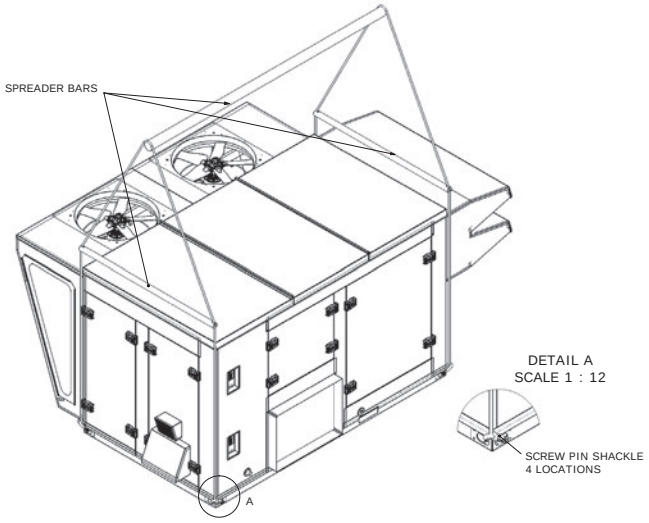


Figure 111. Four-point lift (OAD cabinet with exhaust fan and no ERV)

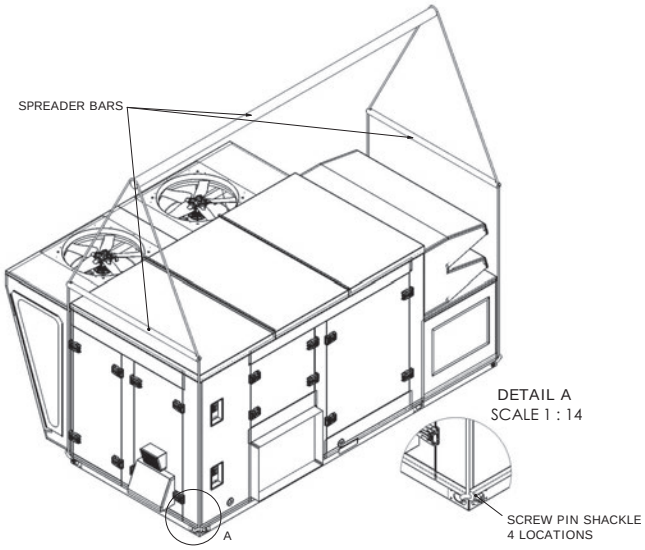


Figure 112. Six-point lift (OAD cabinet with ERV section)

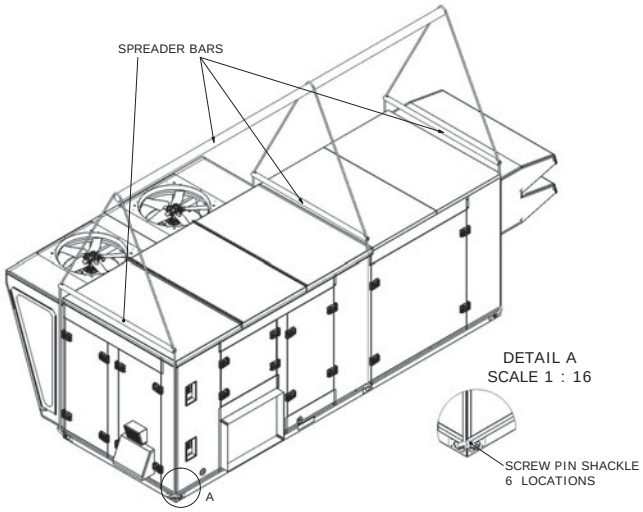


Figure 113. Eight-point lift (OAN cabinet with no exhaust fan or ERV)

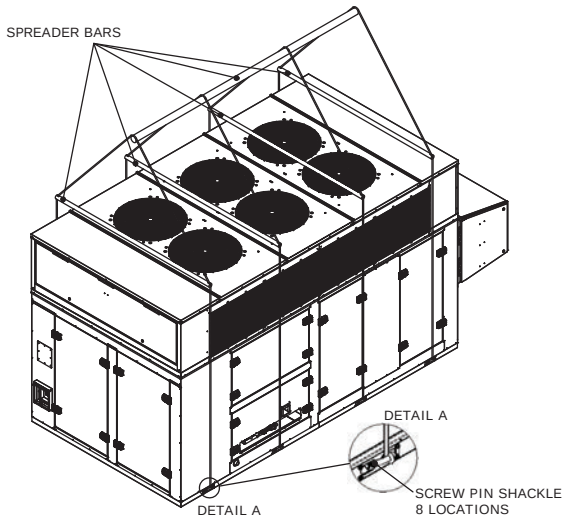


Figure 114. Ten-point lift (OAN cabinet with exhaust fan and no ERV)

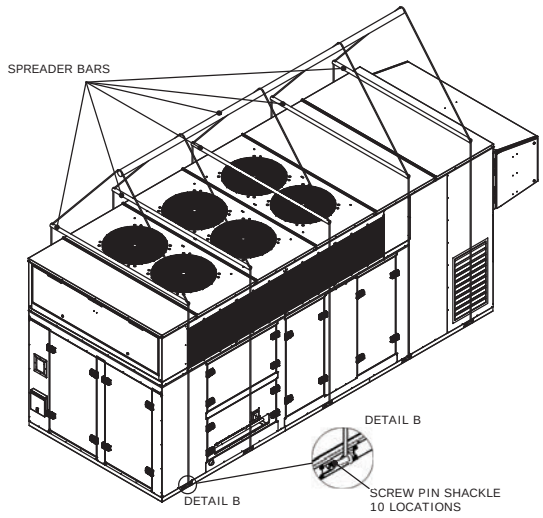
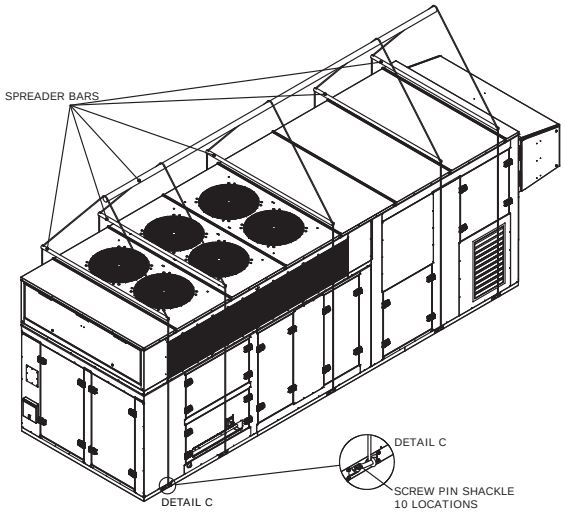


Figure 115. Ten-point lift (OAN cabinet with ERV section)



Before proceeding, refer to Table 1, p. 63, Table 2, p. 64 and Table 3, p. 65 for typical unit operating weights and Figure 109, p. 73 to Figure 115, p. 74 for rigging drawing.

1. Rig the unit as shown in Figure 109, p. 73 to Figure 115, p. 74. Attach adequate strength lifting slings to all lifting brackets in the unit base rail. Do not use cables, chains, or slings except as shown.
2. Install a lifting bar, as shown in Figure 109, p. 73 to Figure 115, p. 74, to protect the unit and to facilitate a uniform lift. The minimum distance between the lifting hook and the top of the unit should be 7 feet.
3. Test-lift the unit to ensure it is properly rigged and balanced, make any necessary rigging adjustments.
4. Lift the unit and position it into place. Remove fork pockets prior to setting on the curb.
5. Downflow units; align the base rail of the unit with the curb rail while lowering the unit onto the curb. Make sure that the gasket on the curb is not damaged while positioning the unit.

Installation

⚠WARNING

Hazardous Service Procedures!

Failure to follow all precautions in this manual and on the tags, stickers, and labels could result in death or serious injury.
Technicians, in order to protect themselves from potential electrical, mechanical, and chemical hazards, MUST follow precautions in this manual and on the tags, stickers, and labels, as well as the following instructions: Unless specified otherwise, disconnect all electrical power including remote disconnect and discharge all energy storing devices such as capacitors before servicing. Follow proper lockout/tagout procedures to ensure the power can not be inadvertently energized. When necessary to work with live electrical components, have a qualified licensed electrician or other individual who has been trained in handling live electrical components perform these tasks.

⚠AVERTISSEMENT

Procédures d'entretien dangereuses!

Le non-respect de toutes les précautions contenues dans ce manuel ainsi que sur les étiquettes et les autocollants peut entraîner des blessures graves voire mortelles. Les techniciens, afin d'être protégés des éventuels risques électriques, mécaniques et chimiques, DOIVENT suivre les précautions contenues dans ce manuel, sur les étiquettes et les autocollants, ainsi que les instructions suivantes : Sauf indication contraire, coupez toute l'alimentation électrique y compris les disjoncteurs à distance et déchargez tous les dispositifs de stockage d'énergie comme les condensateurs avant l'entretien. Respectez les procédures de verrouillage et d'étiquetage appropriées pour éviter tout risque de remise sous tension accidentelle. S'il est nécessaire de travailler avec des composants électriques sous tension, demandez à un électricien qualifié et agréé ou à une autre personne ayant la formation nécessaire pour manipuler des composants électriques sous tension d'exécuter ces tâches.

Ductwork

Elbows with turning vanes or splitters are recommended to minimize air noise due to turbulence and to reduce static pressure.

When attaching the ductwork to the unit, provide a water- tight flexible connector at the unit to prevent operating sounds from transmitting through the ductwork.

All outdoor ductwork between the unit and the structure should be weather proofed after installation is completed.

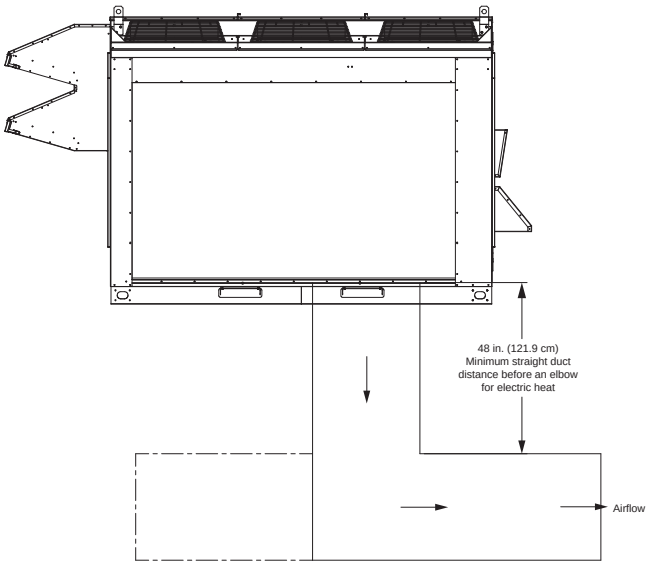
Note: *For sound consideration, cut holes in the roof deck only for the ductwork penetrations. Do not cut out the roof deck within the entire curb perimeter. All duct work must be installed and connected to top of roof curb before the unit is set on curb.*

If a Curb Accessory Kit is not used:

1. Be sure to use flexible duct connections at the unit.
2. Gaskets must be installed around the curb perimeter flange and the supply and return air opening flanges.

Units with Electric Heat

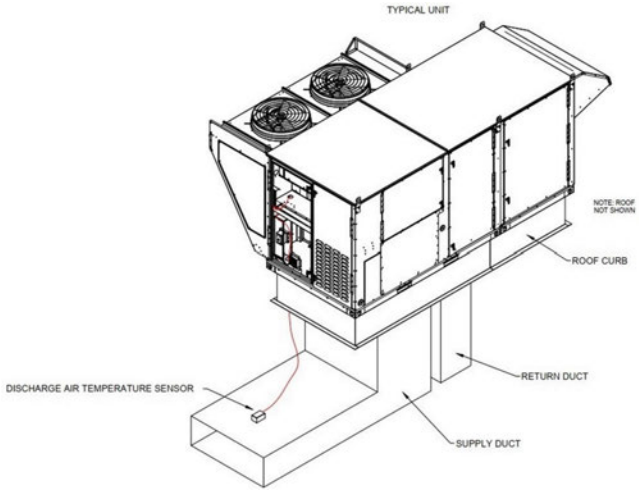
Figure 116.



Important: *Bottom discharge units with open coil electric heater in primary heat location require discharge duct with 90° elbow. This is a MANDATORY installation requirement.*

- A minimum 48-inch of straight duct is required before an elbow. This is a requirement for both vertical and horizontal discharge.
- Discharge air temperature sensor to be located after elbow so it is out of **Line of Sight** to avoid detecting radiant heat. Refer to Figure Figure 117, p. 76.

Figure 117. Discharge air temperature sensor located after elbow



Units with Indirect Fired Gas Heat

- Issue can arise with split manifold gas burner when operating below 50 percent capacity, causing airflow to not be heated throughout. See Figure 118, p. 76 hot and cold airflow locations.
- Duct tee should run front/back of the unit and not left/right for ideal install (see Figure 119, p. 76).
- Ductwork leaving unit should not have an immediate duct tee.
- If possible allow 4 feet vertical duct before first duct tee.
- Ensure duct work does not have an extreme transition at the outlet of the unit. Extreme transitions can cause restriction of airflow and high limit trips (see Figure 120, p. 76).

Figure 118. Vertical indirect fired duct – hot and cold airflow locations

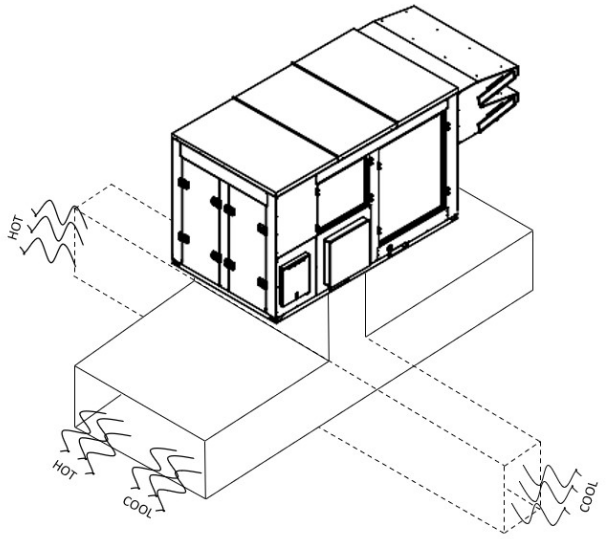


Figure 119. Vertical indirect fired duct – acceptable duct tee orientation

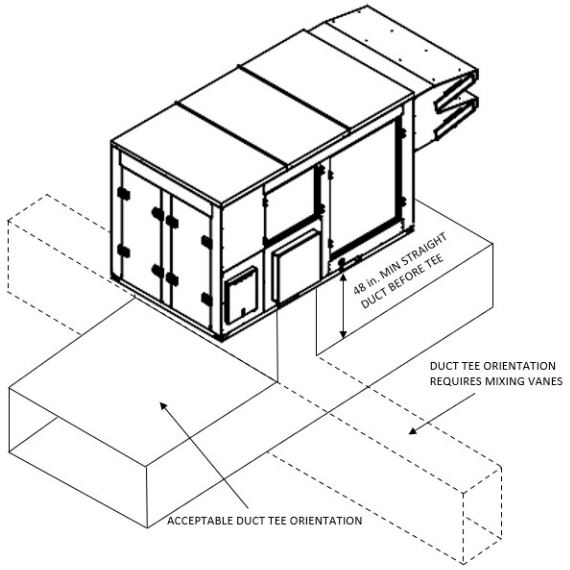
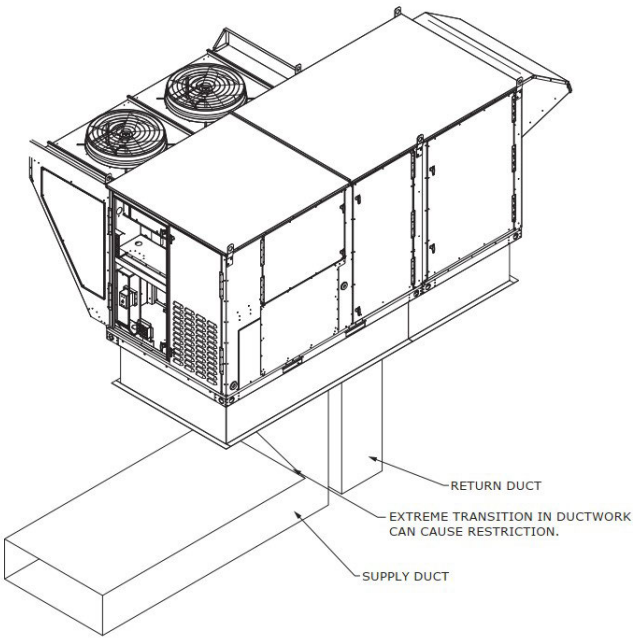
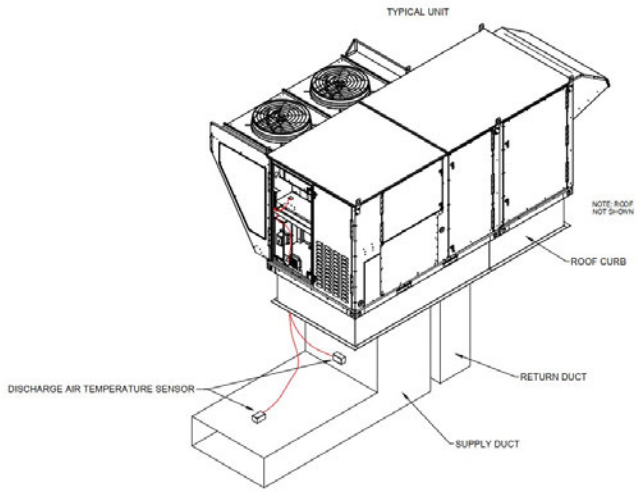


Figure 120. Extreme transition in duct work



- Discharge air temperature sensor should be placed in the center of the ductwork at least 4 feet from the unit or after the first 90° bend. Refer to Figure 121, p. 77.

Figure 121. Discharge air sensor placed in the center



General Unit Requirements

The checklist listed below is a summary of the steps required to successfully install a commercial unit. This checklist is intended to acquaint the installing personnel with what is required in the installation process. **It does not replace the detailed instructions called out in the applicable sections of this manual.**

- ☐ Check the unit for shipping damage and material shortage. File a freight claim and notify appropriate sales representative if damage or shortage is discovered.
- ☐ Verify that the unit nameplate model, options, and voltage are correct.
- ☐ Verify that the installation location of the unit will provide the required clearance for proper operation.
- ☐ Assemble and install the roof curb (if applicable). Refer to the latest edition of the curb installers guide that ships with each curb kit. Check curb for level installation; if not level, shim as required.
- ☐ Rigging unit (refer to "Unit Weight and Rigging," p. 63).
- ☐ Set the unit onto the curb; check for level.
- ☐ Ensure unit-to-curb seal is tight and without buckles or cracks.
- ☐ Install and connect proper condensate drain line to the evaporator condensate pan drain connection (see Figure 122, p. 77).

Condensate Drain Configuration

OAU units are selected based on dehumidification capability. As such, condensate can form at a high rate. Therefore, the OAU drain pan and condensate line are sized and designed accordingly. However, an often-overlooked element of proper condensate drainage is proper P-Trap and drain line sizing and installation. An incorrectly-designed and -installed P-Trap can restrict condensate flow or cause water in the condensate drain pan to **spit** or **geyser**, which may cause condensate overflow. Carefully install and trap the drain pan to ensure adequate condensate removal under all conditions.

An evaporator condensate drain connection is provided on each unit.

A condensate trap must be installed at the unit due to the drain connection located on the **negative pressure** side of the fan. Install the P-Trap using the guidelines in Figure 122, p. 77.

Pitch drain lines connected to P-Trap at least 1/2 inch for every 10 feet of horizontal run to ensure proper condensate flow. Do not allow the horizontal run to sag, causing a possible double-trap condition which could result in condensate backup due to **air lock**.

Figure 122. Condensate trap installation

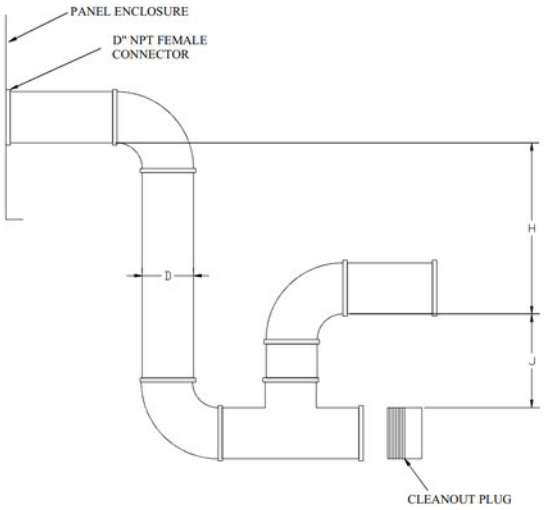


Table 8. Condensate P-Trap sizing based on static pressure

Pressure (In. WC)	H	J
1	2	1
2	3	1.5
3	4	2
4	5	2.5
5	6	3

Notes:
1. Pitch drain at least 1/2 in. per 10 ft horizontal run.
2. Condensate drain pan will not drain properly if P-trap is not primed and of adequate height to allow for cabinet operating negative pressure.
3. Pressure is the static pressure measured in the drain pan. If unsure of operating static, use the design total static.
4. For variable air volume applications, pressure must be at the maximum operating static.

Main Electrical Power Requirements

- ☐ Verify that the power supply complies with the unit nameplate specifications.
- ☐ Inspect all control panel components; tighten any loose connections.
- ☐ Connect properly sized and protected power supply wiring to a field-supplied/-installed disconnect switch and to the main power terminal block (HTB1) in the unit control panel.
- ☐ Connect properly-sized earth ground.

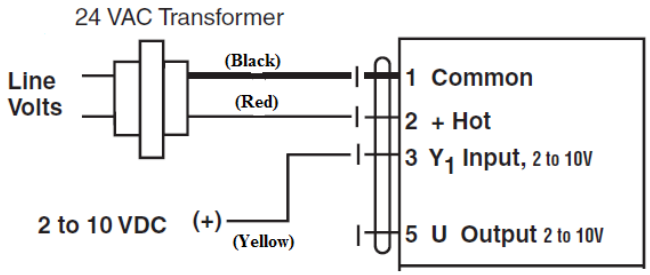
Note: *All field-installed wiring must comply with NEC and applicable local codes.*

Hot Water Control Valve Wiring

1. Mount the factory-provided water valve on the return line of the hot water coil.
2. Ensure the valve is set to normally open.
3. Run the 16 gauge black wire from TNS 2 to Input 1 of the actuator.
4. Run the 16 gauge red wire from TNS 2 to Input 2 of the actuator.
5. Run the 16 gauge yellow wire from AO1 from the UC600 to Input 3 of the actuator.

   Note: *The actuator valve will be open with a 0 percent call for heat.*

Figure 123. Hot water control valve wiring



Chilled Water Connection Size and Location

Figure 124. OAB and OAG chilled water cooling pipe-chase connections

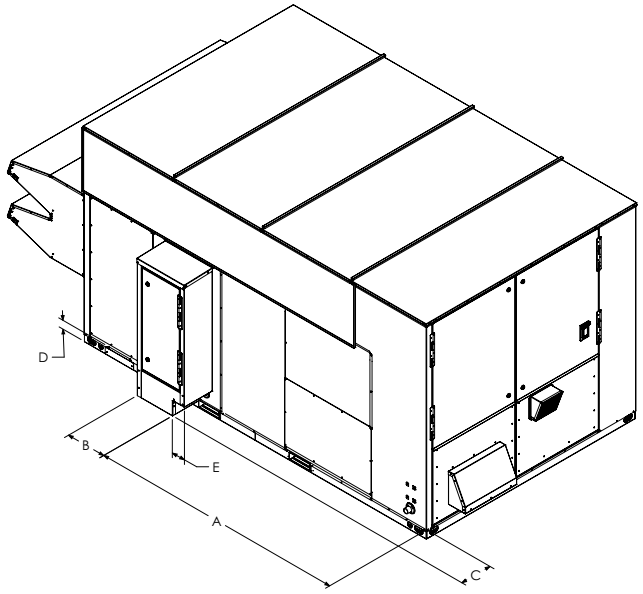


Figure 125. OAD, OAK, and OAN chilled water cooling pipe-chase connections

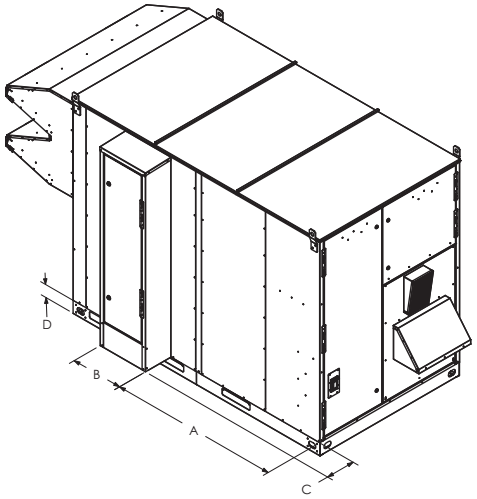


Table 9. Chilled water pipe chase location (in.)

Unit	A	B	C	D	E
OAB	61.25	12.00	10.00	3.00	3.000
OAG	79.75	12.50	10.00	3.00	4.125
OAK	63.84	19.50	11.00	5.00	NA
OAND	93.93	20.64	11.00	5.00	NA
OAD	64.25	30.00	18.00	3.50	NA
OANG	92.64	30.00	18.00	2.81	NA

Table 10. Chilled water connection size (MPT-in.)

Unit Size	MPT-in.
OAB 3 to 9 tons	2.0
OAG 10 to 30 tons	2.0
OAK 12 to 30 tons	2.5
OAND 30 to 60 tons	3.0
OAD, 4-row	1.5
OAD, 6-row	2.0
OANG, 4-row	2.5
OANG, 6-row	3.0

Filter Installation

The filter rack is accessible through the evaporator coil compartment door. Filter type, size, and quantity are determined by selected filter option and unit size. Refer to "OAU Filter Guide," p. 112.

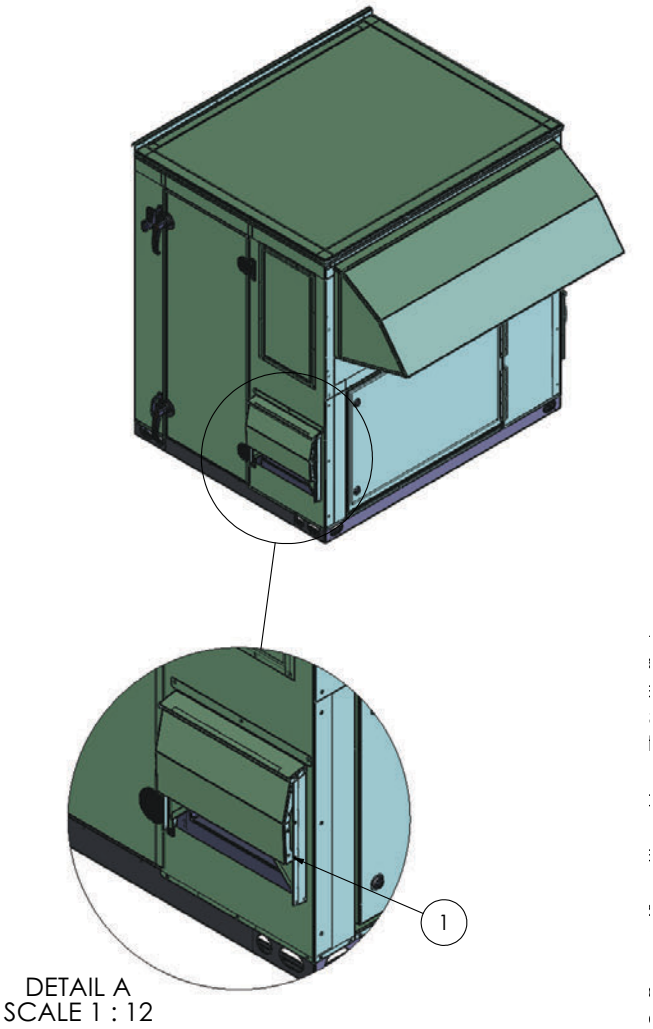
Note: *Do not operate the unit without filters.*

Opening the Collapsed Exhaust Damper Hood

The drawings shown in this section are for one cabinet. Other cabinets may have a different appearance, but the process remains the same.

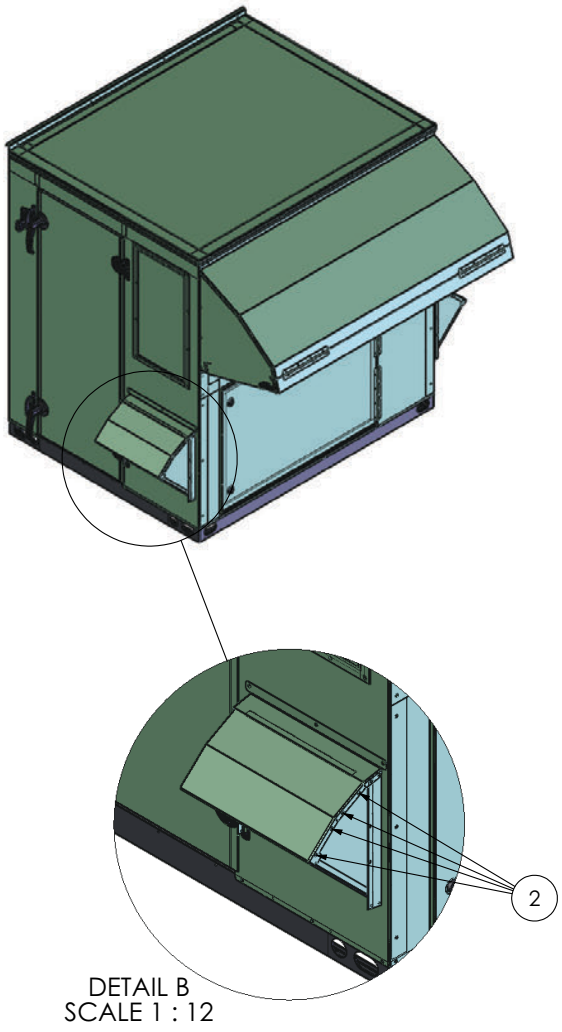
1. To release the damper hood, remove the hex head sheet metal screws (one per side) shown in DETAIL A (see Figure 126, p. 79) and marked by arrow (1).

Figure 126. Powered exhaust damper hood, collapsed



2. Lift the hood upward and rotate the side panels outward while holding the top up.
3. As shown in DETAIL B (see Figure 127, p. 80) and marked by arrow (2), secure the side panels to the top of the hood using (8) hex head sheet metal screws, provided with the unit, through the pre-punched holes in the top and side panels (four screws per side).
4. Repeat these steps for the remaining damper hood, if applicable.

Figure 127. Powered exhaust damper hood, open



Field Installed Power Wiring

⚠WARNING

Proper Field Wiring and Grounding Required!

Failure to follow code could result in death or serious injury. All field wiring MUST be performed by qualified personnel. Improperly installed and grounded field wiring poses FIRE and ELECTROCUTION hazards. To avoid these hazards, you MUST follow requirements for field wiring installation and grounding as described in NEC and your local/state/national electrical codes.

⚠ATTENTION

Câblage et Mise à la Terre Appropriés Champs Obligatoires!

Le non-respect du code pourrait entraîner la mort ou grave blessure. Tout le câblage sur le terrain DOIT être effectué par des personnes qualifiées personnel. Terrain mal installé et mis à la terre le câblage pose des risques de FIRE et d'ÉLECTROCUTION. À evitez ces risques, vous devez suivre les exigences pour l'installation et la mise à la terre du câblage de terrain comme décrit dans NEC et vos codes électriques locaux/étatiques/nationaux.

An overall dimensional layout for the standard field installed wiring entrance into the unit is illustrated in the Utility Connections section. To confirm that the units supply power wiring is properly sized and installed, refer to the NEC guidelines as well as state and local codes for conformance.

Verify that the power supply available is compatible with the units nameplate ratings. The available supply power must be within 10 percent of the rated voltage stamped on the nameplate. Use only copper conductors to connect the power supply to the unit.

Utility Connections

Figure 128. OAB utility connections, in. (cm)

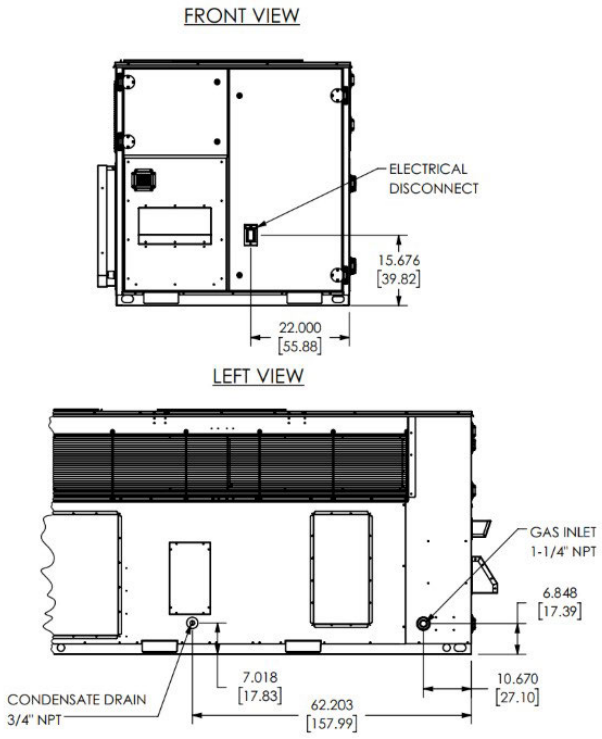


Figure 129. OAG utility connections, in. (cm)

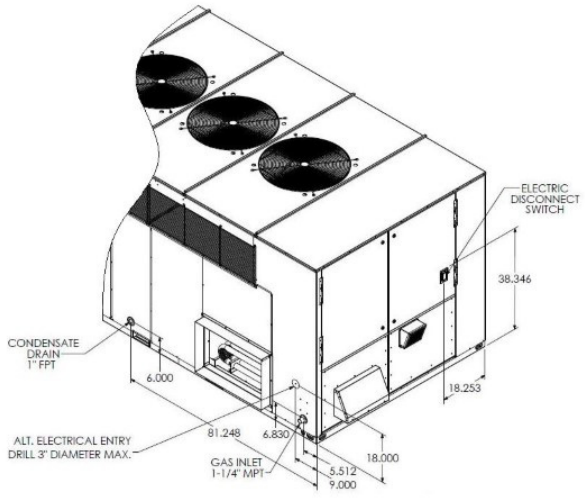


Figure 130. OAK utility connections, in. (cm)

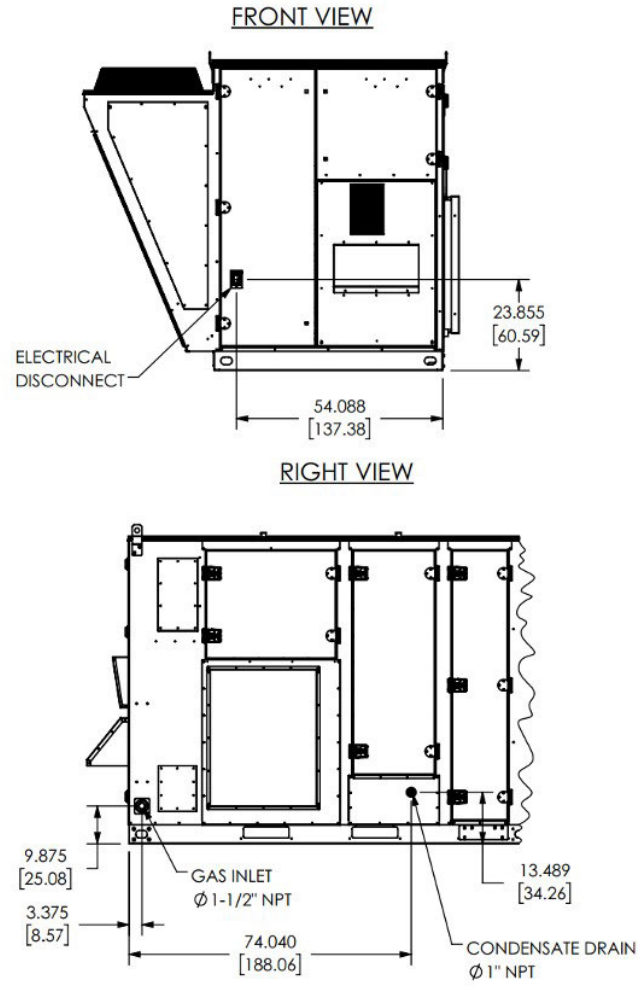


Figure 131. OAND utility connections, in. (cm)

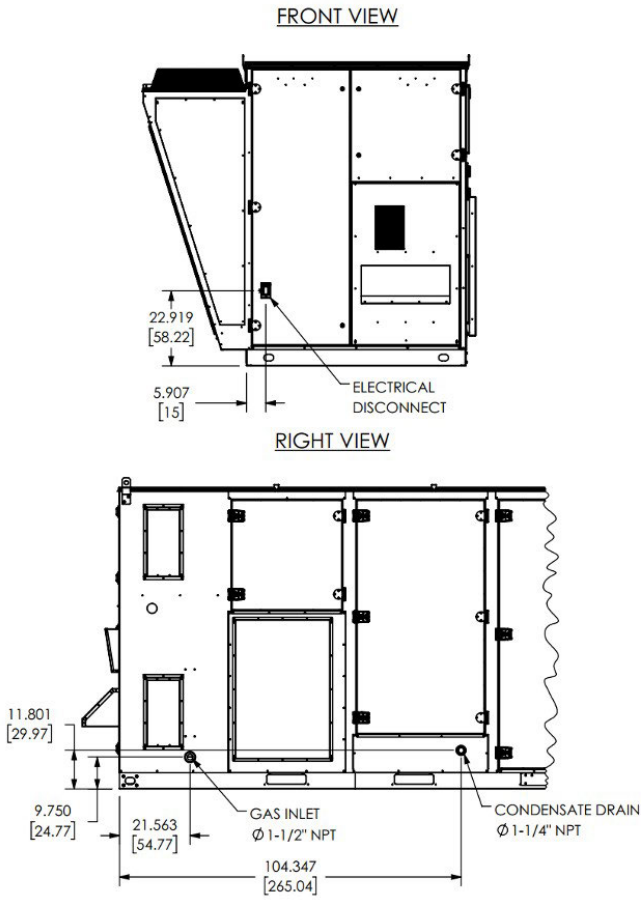


Figure 132. OADG utility connections, in. (cm)

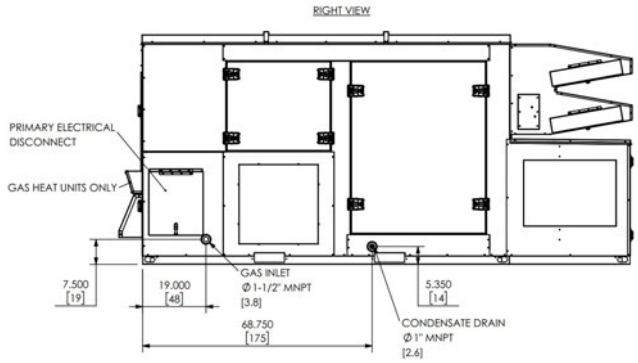
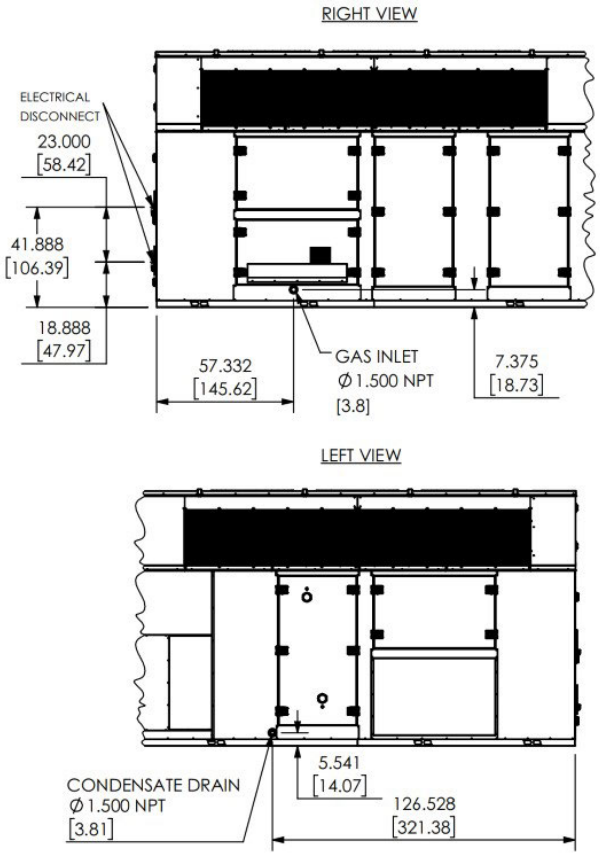


Figure 133. OANG utility connections, in. (cm)



Horizon Water Source Heat Pump Field Connection Instructions

The following instructions illustrate the field connections for water lines on a typical Horizon™ water source heat pump unit.

Water source heat pump units will be installed on curbs with a pipe chase section attached (as shown in Figure 134, p. 82).

Figure 134. Typical water source heat pump cabinet

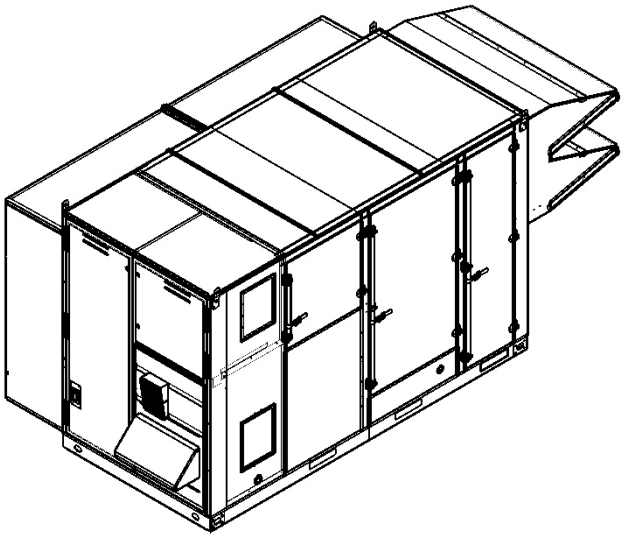
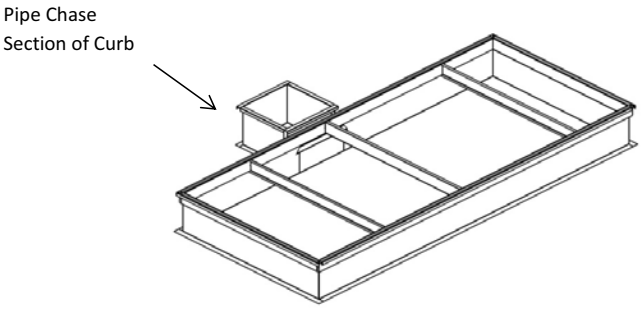


Figure 135. Typical water source heat pump unit curb



1. Open the doors on the water source heat pump cabinet section to access the coils and the pipe chase panel cover (see Figure 137, p. 83 for a view of the pipe chase panel cover located on the floor of the cabinet section beneath the center drain pan).

Figure 136. Rear isometric view (doors hidden for clarity)

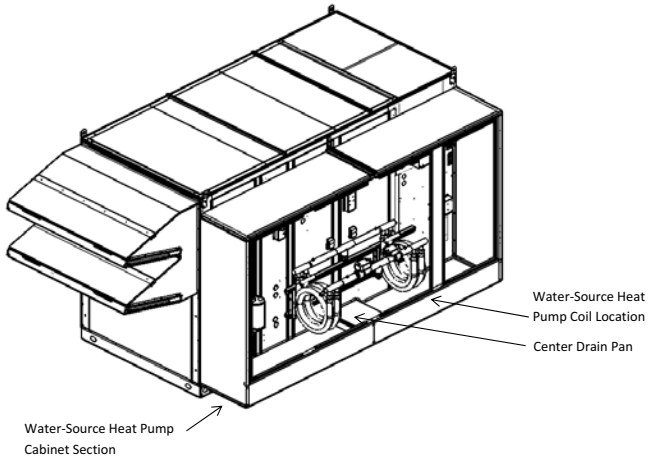
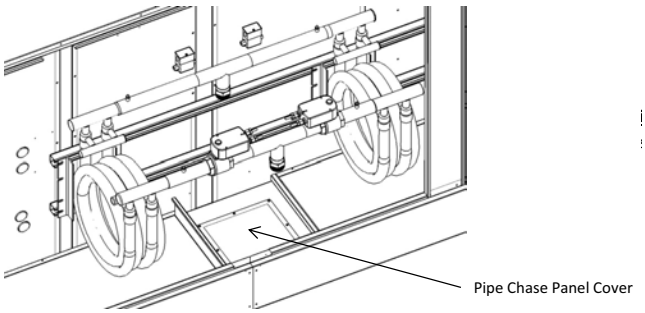


Figure 137. Pipe chase panel cover



2. Remove the hex head sheet metal screws from the center drain pan (do not discard) to access the pipe chase panel cover.
3. Remove the hex head sheet metal screws from the pipe chase panel cover for access to the pipe chase and discard the cover.

   Note: *If water lines will not be entering the cabinet section through the pipe chase, contractor must field-cut holes and the pipe chase panel cover can remain in place.)*
4. Cut required holes (size varies depending on unit size and type of pipe gasket used) in the center drain pan for pipe entry. Reinstall the center drain pan, insert pipe, and seal as necessary to prevent water leakage around drain pan/ pipes.
5. Connect the water lines to the NPT external connections (there is a “water in” and a “water out” connection per unit). Refer to Table 11, p. 83 for specific water line sizes per cabinet and tonnage.

The “water out” line will contain a factory installed ball valve with actuator. See Figure 138, p. 83 for details (coil size and style will vary depending on the tonnage of each unit).

Figure 138. Coil connection detail

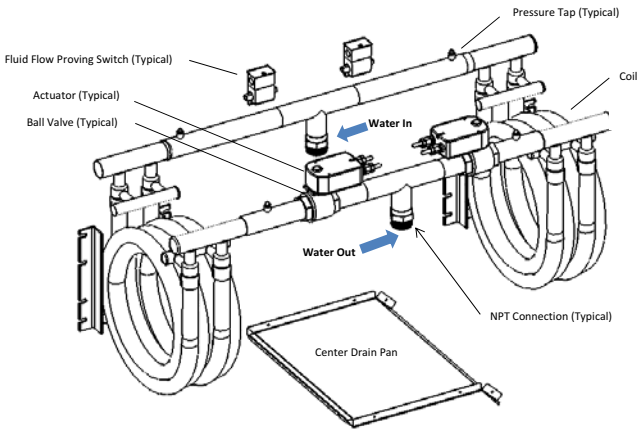


Table 11. WSHP water connection sizes

Cabinet Size	Tonnage	Connection Size (in., MNPT)
OAB	3	1
	4	1
	5	1
	6	1
	7	2
	8	2
	9	2
OAG	10	1
	12	1.5
	15	1.5
	17	2
	20	2
	22	2
	25	2
	30	2
OAK	12	1.5
	15	1.5
	17	2
	20	2
	22	2
	25	2
	30	2
OAN	30	2
	35	2.5
	40	2.5
	45	2.5
	50	2.5
	54	2.5

OAB IF Heater Air Inlet Hood and Flue Assembly Instructions for Outdoor Installations

Unit is shipped with the IF heater air inlet hood, flue cover, and flue stowed in the blower compartment.

Important: *Assemble the flue to the heater and the inlet hood and flue cover to the heater door* before *attempting any unit start-up.*

Figure 139. Flue cover

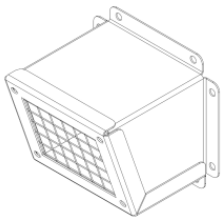


Figure 140. Flue

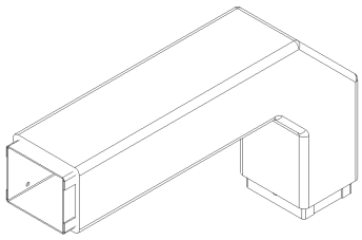


Figure 141. Wind screen

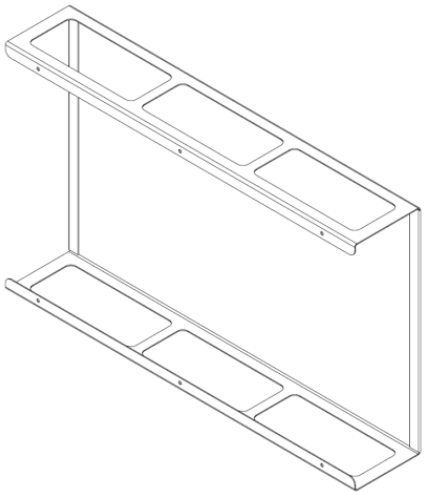
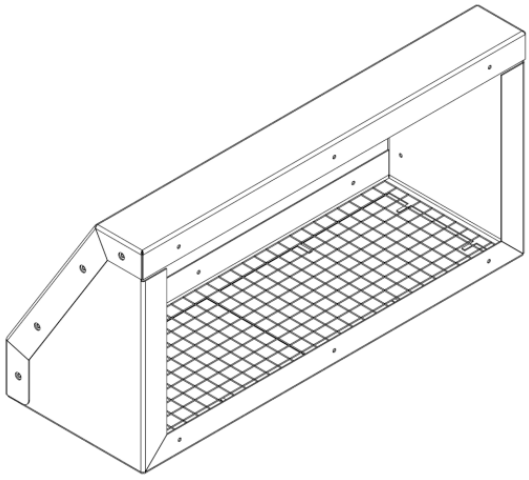
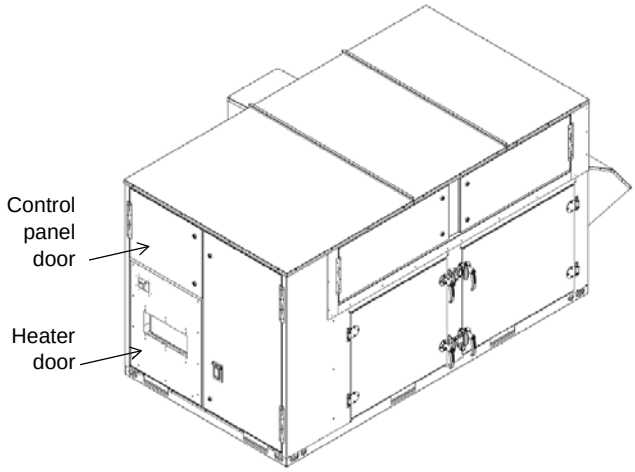


Figure 142. Heater air inlet hood



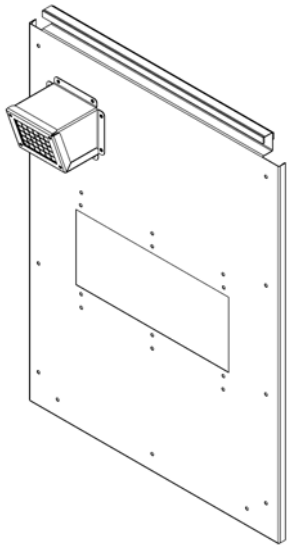
1. Open the blower compartment and remove the flue, flue cover, wind screen, and heater air inlet hood.
2. Open the control panel door and remove the heater door shown in Figure 143, p. 84.

Figure 143. Typical layout of OAB cabinet with indirect fired gas heat



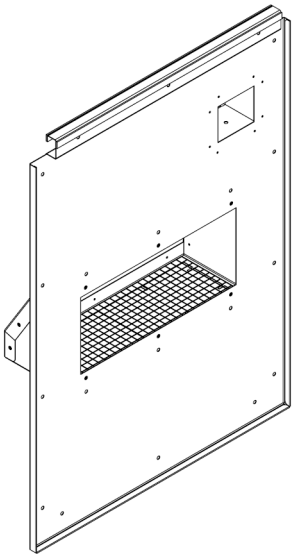
3. Attach the flue cover to the heater door using the provided stainless steel screws as shown in Figure 144, p. 84.

Figure 144. Heater door with flue cover attached



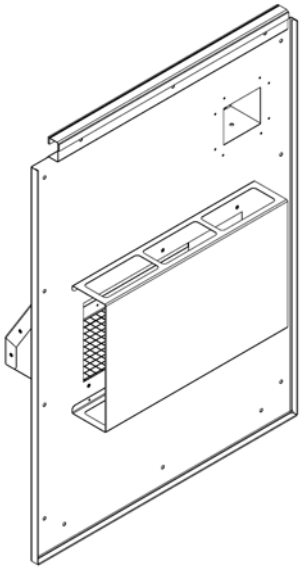
4. Attach the heater air inlet hood to the heater door using quantity (6) of the provided painted head screws as shown in Figure 145, p. 85.

Figure 145. Heater door with inlet and flue cover attached



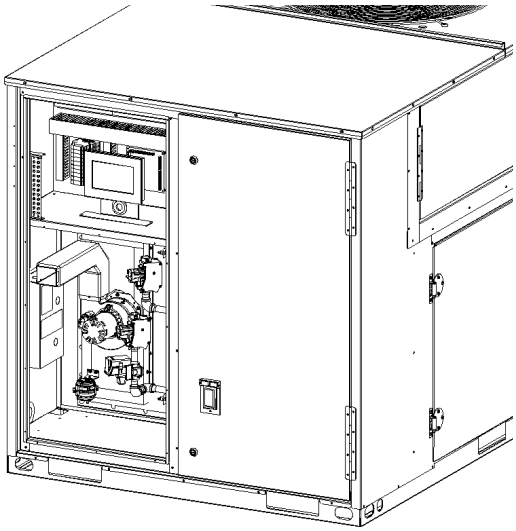
5. Attach the wind screen to the inside of the heater door using quantity (6) of the provided painted head screws as shown in Figure 146, p. 85.

Figure 146. Fully assembled heater door



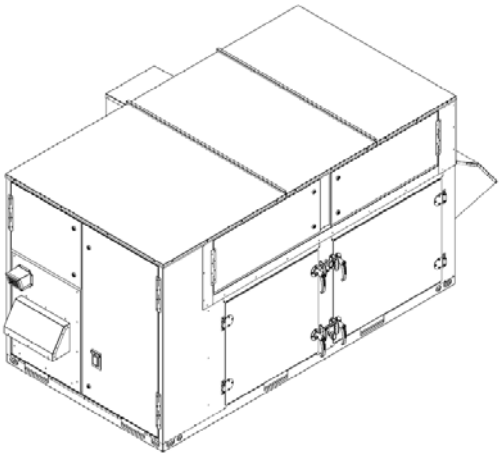
6. Attach the heater flue to the inducer blower on the heater and secure with (2) stainless steel self-drilling screws provided, as shown in Figure 147, p. 85.

Figure 147. OAB with flue attached



7. Install the heater door on the unit, as shown in Figure 148, p. 85, ensuring that the heater flue extends through the flue opening in the door.

Figure 148. OAB with fully assembled heater door



Venting of Furnace for Indoor Installations

All furnace modules must be vented outside of the heated space. Vents must be designed and installed in accordance with ANSI Z223.1. Beyond an equivalent length of 15 feet, the extension may require power venting. Please refer to ANSI Z223.1.

Units with dual burners will require separate vents. Dual burners are included in any cabinet with a 700 to 1000 MBh gas heater section, as well as OAK and OAN cabinets with a 600 MBh gas heater section.

Horizon™ units with gas heat are not designed for sealed combustion. The unit air intake must be open to atmosphere

for combustion air entering the unit. The unit should not be placed in a sealed room with ducted outside air for combustion.

The furnace must be connected to a vent complying with a recognized standard, or a masonry or concrete chimney lined with a material acceptable to the authority having jurisdiction.

The furnace modules will be classified in accordance with ANSI standards as follows:

- Category I — Non-condensing appliance with negative vent pressure
- Category III — Non-condensing appliance with positive vent pressure

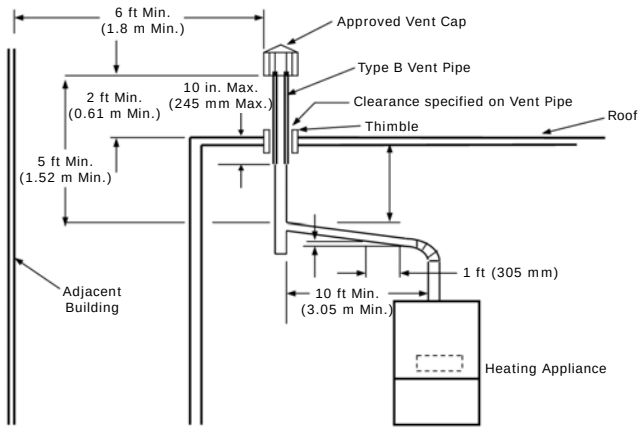
Vertically Vented Furnaces — Category I (Refer to Figure 149, p. 86)

1. Use single wall or double wall (Type B) vent pipe of a diameter listed in the following table for the appropriate model.
2. Maximize the height of the vertical run of vent pipe. A minimum of 5 ft (1.5 m) of vertical pipe is required. The top of the vent pipe must extend at least 2 ft (0.61 m) above the highest point on the roof. Use Listed Type B vent for external runs. An approved weatherproof vent cap must be installed on the vent termination.
3. Horizontal runs must not exceed 75 percent of the vertical height of the vent pipe, up to a maximum of 10 ft (3 m). Horizontal runs should be pitched upward 1/4 in./ft (21 mm/m) and should be supported at 3 ft (1 m) maximum intervals.
4. Design vent pipe runs to minimize the use of elbows. Each 90° elbow is equivalent to 5 ft (1.5 m) of straight vent pipe.
5. Vent pipe should not be run through unheated spaces. If such runs cannot be avoided, insulate the vent pipe to prevent condensation. Insulation should be a minimum of 1/2 in. (12.7 mm) thick foil faced fiberglass minimum of 1-1/2# density.
6. Dampers must not be used in vent piping runs, as spillage of flue gases into the occupied space could result.
7. Vent connectors serving Category 1 heaters must not be connected into any portion of a mechanical draft system operating under positive pressure.

National Fuel Gas Code Venting Pipe Requirement			
Input Ratings		Diameter Pipe to Use	
Btu/h	W	in.	mm
75000–149999	21980–43959	5	126
150000–399999	43960–117227	6	152
400000–500000	117228–146535	7	178
500001–600000	146536–175843	8	203

Note: Installers should follow both National Fuel Gas Code and local codes.

Figure 149. Vertical venting — Category I



Horizontally Vented Furnaces — Category III (Refer to Figure 150, p. 87)

Pressures in Category III venting systems are positive and therefore care must be taken to prevent flue products from entering the heated space. **Use only venting materials and components that are UL-listed and approved for Category III venting systems.**

⚠WARNING

Proper Vent Pipe Required!

Failure to follow instructions could result in death, serious injury, and property damage. Never use a pipe of a diameter other than specified! Never use PVC, ABS, or any other non-metallic pipe for venting!

⚠AVERTISSEMENT

Tuyau de ventilation approprié requis!

Le non-respect de ces instructions peut causer le décès, des blessures graves ou des dégâts matériels. N'utilisez jamais un tuyau d'un diamètre autre que celui indiqué! N'utilisez jamais de tuyau en PVC, ABS ou d'autre tuyau non métallique pour la ventilation!!

⚠WARNING

Carbon Monoxide!

Failure to follow these instructions could result in Carbon Monoxide Poisoning (symptoms include grogginess, lethargy, inappropriate tiredness, or flu-like symptoms) which could result in death or serious injury. Never operate a unit without combustion air and flue gas piping in place. Each unit MUST have an individual vent pipe! Each unit MUST NOT be connected to other vent systems or to a chimney. Your venting system must not be blocked by any snow, snow drifts, or any foreign matter. Inspect your venting system to ensure adequate ventilation exists at all times!

⚠AVERTISSEMENT

Monoxyde de carbone!

Le non-respect de ces instructions peut résulter en un empoisonnement au monoxyde de carbone (parmi les symptômes figurent des étourdissement, une léthargie, une fatigue inhabituelle ou des symptômes grippaux) qui peut entraîner le décès ou des blessures graves. Ne faites jamais fonctionner une unité en l'absence d'une tuyauterie d'air de combustion et de conduits de fumée. Chaque unité doit IMPÉRATIVEMENT être équipée d'un tuyau de ventilation qui lui est propre! Chaque unité NE DOIT PAS être raccordée à d'autres systèmes de ventilation ou à une cheminée. Notre système de ventilation ne doit pas être bloqué par de la neige, des congères ou tout autre corps étranger. Inspectez votre système de ventilation pour garantir que la ventilation est appropriée en tout temps!

All vent pipe joints must be sealed to prevent leakage. Follow the instructions provided with the approved venting materials. Vent pipe shall be sized as follows:

Input Ratings		Diameter Pipe to Use	
Btu/h	**W**	**in.**	**mm**
75000–149999	21980–43958	5	126
150000–400000	43960–117228	6	152

The total equivalent length of vent pipe must not exceed 50 ft (15.25 m). Equivalent length is the total length of straight sections, plus 5 ft (1.52 m) for each 90° elbow and 2.5 ft (0.76 m) for each 45° elbow.

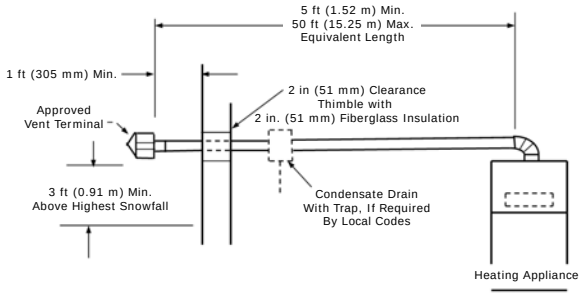
The vent system must also be installed to prevent collection of condensate. Pitch horizontal pipe runs downward 1/4 in./ft (21 mm/m) toward the outlet to permit condensate drainage. Insulate vent pipe exposed to cold air or routed through unheated areas. Insulate vent pipe runs longer than 10 ft (3 m). Insulation should be a minimum of 1/2 in. (12 mm) thick foil faced fiberglass of 1-1/2# density. Maintain 6 in. (152 mm) clearance between vent pipe and combustible materials.

An approved Breidert Type L, Field Starkap or equivalent vent cap must be provided. Vent cap inlet diameter must be the same as the vent pipe diameter. The vent terminal must be at least 12 in. (305 mm) from the exterior wall that it passes through to prevent degradation of building material by flue gases. The vent terminal must be located at least 12 in. (305 mm) above grade, or in snow areas, at least 3 ft (1 m) above snow line to prevent blockage. Additionally, the vent terminal must be installed with a minimum horizontal clearance of 4 ft (1.2 m) from electric meters, gas meters, regulators or relief equipment.

Through-the-wall vents shall not terminate over public walkways or over an area where condensate or vapor could create a nuisance or hazard. Provide vent termination clearances to building or structure features as follows:

Structure	Minimum Clearance
Door, Window or Gravity Inlet	4 ft (1.2 m) Below
	4 ft (1.2 m) Horizontally
	1 ft (305 mm) Above
Forced Air Inlet within 10 ft (3 m)	3 ft (0.91 m) Above
Adjoining Building or Parapet	6 ft (1.8 m)
Adjacent Public Walkways	7 ft (2.1 m) Above Grade

Figure 150. Horizontal venting — category III



Hot Water Connection Size and Location

Figure 151. OAD water inlet and outlet, in. (cm)

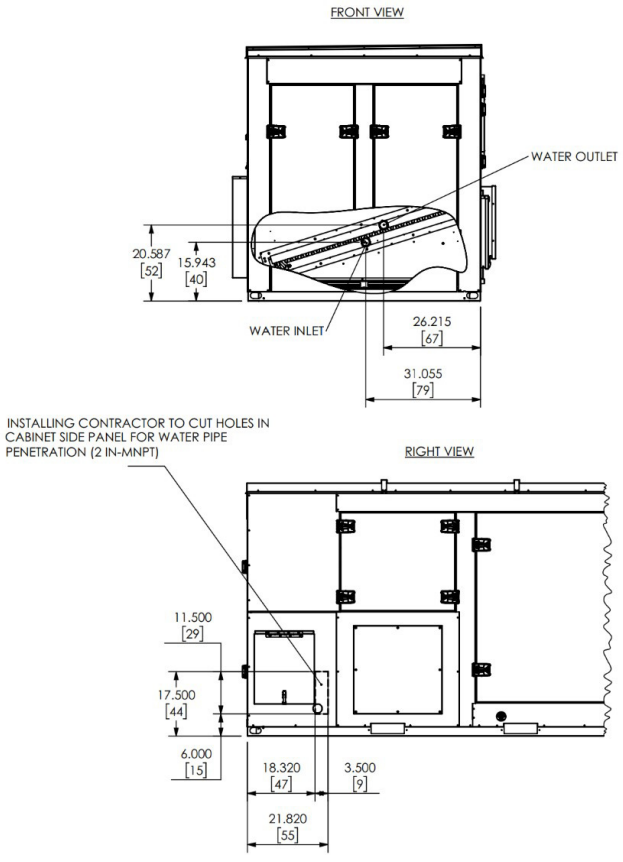


Figure 152. OAB water inlet and outlet, in. (cm)

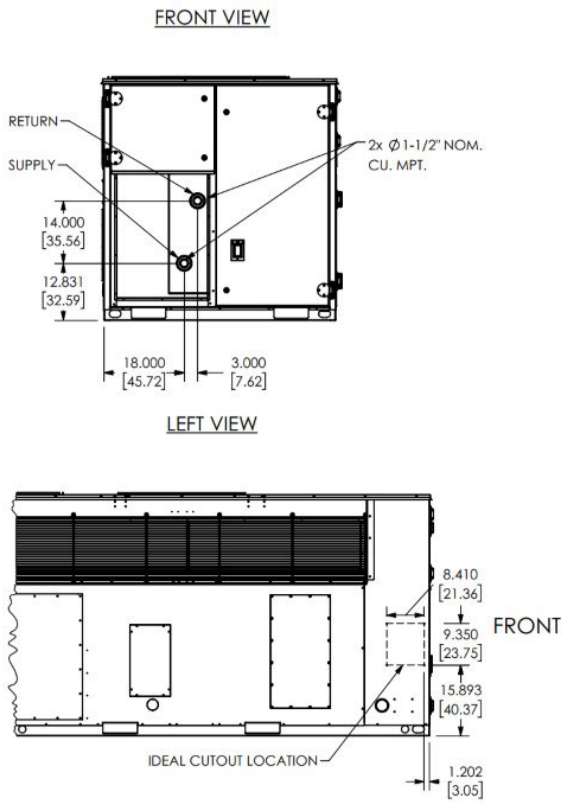


Figure 153. OAK water inlet and outlet, in. (cm)

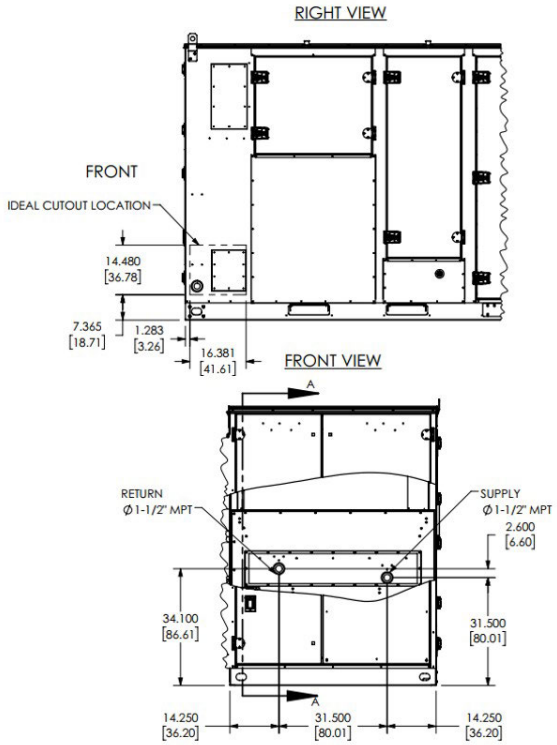


Figure 154. OAND water inlet and outlet, in. (cm)

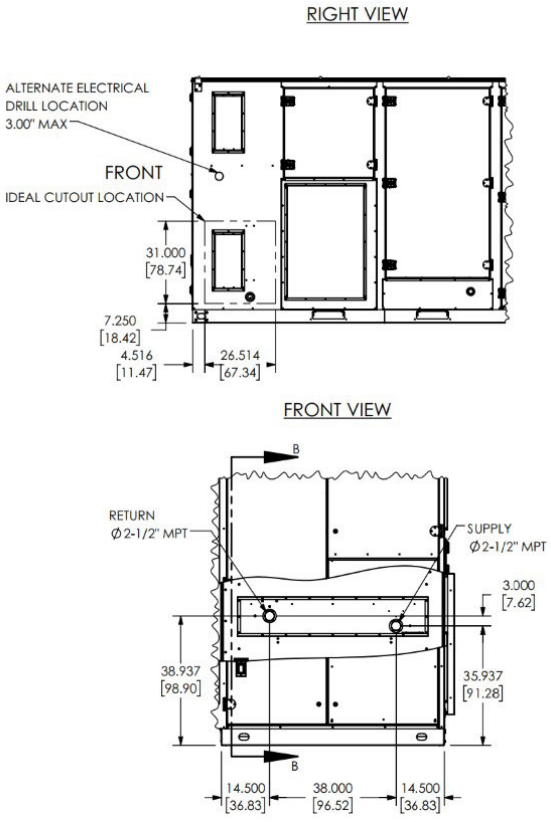
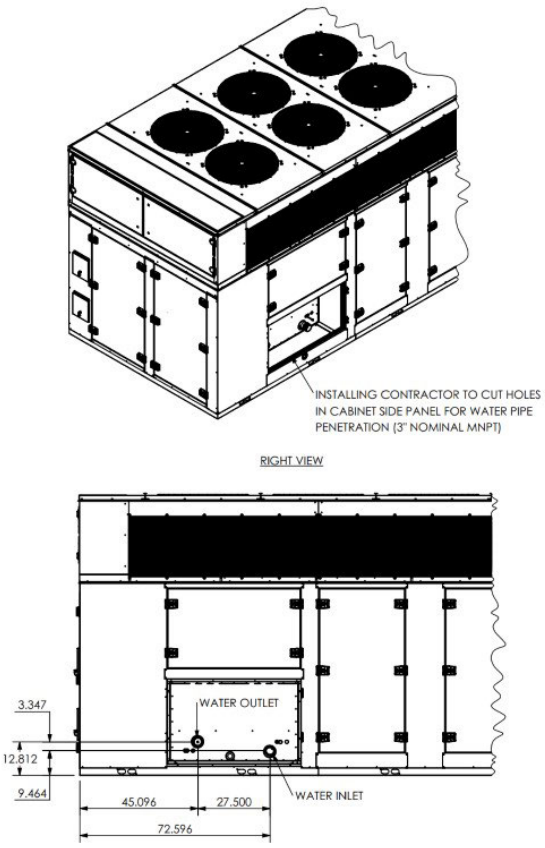


Figure 155. OANG water inlet and outlet, in. (cm)



Main Unit Power

⚠WARNING

Hazardous Voltage!

Failure to disconnect power before servicing could result in death or serious injury. Disconnect all electric power, including remote disconnects before servicing. Follow proper lockout/tagout procedures to ensure the power can not be inadvertently energized.Verify that no power is present with a voltmeter.

⚠AVERTISSEMENT

Risque d'électrocution!

Le non-respect de cette consigne peut entraîner des blessures graves, voire mortelles. Avant toute intervention, coupez l'alimentation électrique, y compris aux sectionneurs à distance. Suivez scrupuleusement les procédures de verrouillage/mise hors service préconisées pour empêcher tout rétablissement accidentel de l'alimentation électrique.

NOTICE

Use Copper Conductors Only!

Failure to use copper conductors could result in equipment damage as unit terminals are not designed to accept other types of conductors.

Standard Wiring

⚠WARNING

Proper Field Wiring and Grounding Required!

Failure to follow code could result in death or serious injury. All field wiring MUST be performed by qualified personnel. Improperly installed and grounded field wiring poses FIRE and ELECTROCUTION hazards. To avoid these hazards, you MUST follow requirements for field wiring installation and grounding as described in NEC and your local/state/national electrical codes.

⚠ATTENTION

Câblage et Mise à la Terre Appropriés Champs Obligatoires!

Le non-respect du code pourrait entraîner la mort ou grave blessure. Tout le câblage sur le terrain DOIT être effectué par des personnes qualifiées personnel. Terrain mal installé et mis à la terre le câblage pose des risques de FIRE et d'ÉLECTROCUTION. À evitez ces risques, vous devez suivre les exigences pour l'installation et la mise à la terre du câblage de terrain comme décrit dans NEC et vos codes électriques locaux/étatiques/nationaux.

The electrical service must be protected from over current and short circuit conditions in accordance with NEC requirements. Protection devices must be sized according to the electrical data on the nameplate.

1. Complete the units power wiring connections onto either; the main terminal block HTB1 inside the unit control panel, the factory mounted non-fused disconnect switch (UCD) or circuit breaker (UCB), or the electric heat non-fused disconnect switch. Refer to the customer connection diagram that shipped with the unit for specific termination points.
2. Provide proper grounding for the unit in accordance with local and national codes.

Use the following checklist in conjunction with the checklist in "General Unit Requirements," p. 77 to ensure that the unit is properly installed and ready for operation.

- ☐ Verify that the correct size and number of filters are in place.
- ☐ Inspect the interior of the unit for tools and debris and install all panels in preparation for starting the unit.

- ☐ Check all electrical connections for tightness and "point of termination" accuracy.
- ☐ Verify condenser airflow is unobstructed.
- ☐ Verify that the condenser and indoor fans turn freely without rubbing and are properly tightened on the shafts.
- ☐ Check motor mounting bolts and inlet cone for tightness. Free spin wheel by hand to check for proper alignment of motor, wheel, and inlet cone. Record motor nameplate amps at unit-rated voltage.
- ☐ Check proper indoor fan wheel rotation. Wheel housing will be marked to indicate direction of proper rotation.
- ☐ With access doors closed and secured, operate blower at 100 percent speed. Check amp readout of amps output to indoor fan at VFD display to confirm operation within motor amp capacity.

Voltage Imbalance

⚠WARNING

Live Electrical Components!

Failure to follow all electrical safety precautions when exposed to live electrical components could result in death or serious injury. When it is necessary to work with live electrical components, have a qualified licensed electrician or other individual who has been properly trained in handling live electrical components perform these tasks.

⚠AVERTISSEMENT

Composants électriques sous tension!

Le non-respect de toutes les consignes de sécurité lors de la manipulation de composants électriques sous tension peut entraîner des blessures graves, voire mortelles. S'il est nécessaire de travailler avec des composants électriques sous tension, demandez à un électricien qualifié et agréé ou à une autre personne ayant la formation nécessaire pour manipuler des composants électriques sous tension d'exécuter ces tâches.

Three phase electrical power to the unit must meet stringent requirements for the unit to operate properly. Measure each leg (phase-to-phase) of the power supply. Each reading must fall within the utilization range stamped on the unit nameplate. If any of the readings do not fall within the proper tolerances, notify the power company to correct this situation before operating the unit.

Excessive three phase voltage imbalance between phases will cause motors to overheat and eventually fail. The maximum allowable voltage imbalance is 2.0 percent. Measure and record the voltage between phases 1, 2, and 3 and calculate the amount of imbalance as follows:

$$\% \text{ Voltage Imbalance} = 100 \times \frac{AV - VD}{AV} \quad \text{where;}$$

$$AV \text{ (Average Voltage)} = \frac{\text{Volt 1} + \text{Volt 2} + \text{Volt 3}}{3}$$

V1, V2, V3 = Line Voltage Readings

VD = Line Voltage reading that deviates the farthest from the average voltage.

Example: If the voltage readings of the supply power measured 221, 230, and 227, the average volts would be:

$$\frac{221 + 230 + 227}{3} = 226 \text{ Avg.}$$

VD (reading farthest from average) = 221

The percentage of Imbalance equals:

$$100 \times \frac{226 - 221}{226} = 2.2\%$$

The 2.2 percent imbalance in this example exceeds the maximum allowable imbalance of 2.0 percent. This much imbalance between phases can equal as much as a 20 percent current imbalance with a resulting increase in motor winding temperatures that will decrease motor life. If the voltage imbalance is over 2.0 percent, notify the proper agencies to correct the voltage problem before operating this equipment.

Electrical Phasing (Three-Phase Motors)

⚠WARNING

Live Electrical Components!

Failure to follow all electrical safety precautions when exposed to live electrical components could result in death or serious injury. When it is necessary to work with live electrical components, have a qualified licensed electrician or other individual who has been properly trained in handling live electrical components perform these tasks.

⚠AVERTISSEMENT

Composants électriques sous tension!

Le non-respect de toutes les consignes de sécurité lors de la manipulation de composants électriques sous tension peut entraîner des blessures graves, voire mortelles. S'il est nécessaire de travailler avec des composants électriques sous tension, demandez à un électricien qualifié et agréé ou à une autre personne ayant la formation nécessaire pour manipuler des composants électriques sous tension d'exécuter ces tâches.

The compressor motor(s) and the supply fan motor are internally connected for the proper rotation when the incoming power supply is phased as A to L1, B to L2, and C to L3.

Proper electrical supply phasing can be quickly determined and corrected before starting the unit by using an instrument such as an Associated Research Model 45 Phase Sequence Indicator and following these steps:

- ☐ Turn off the main source feeding power to the unit field-supplied or factory-installed main disconnect device (switch or circuit breaker).
- ☐ Close the unit disconnect device cover, leaving disconnect switch in the off position, and turn main source power on.
- ☐ Observe the ABC and CBA phase indicator lights on the face of the sequencer. The ABC indicator light will glow if the phase is ABC. If the CBA indicator light glows, turn main source power off and then open the unit main disconnect device cover and reverse any two power wires.
- ☐ Restore the main source power and recheck the phasing. If the phasing is correct, turn main source power off then open the unit main disconnect device cover, remove the phase sequence indicator, reinstall disconnect device cover and, leaving disconnect device in the off position, turn main power source to unit on.

Compressor Crankcase Heaters

⚠WARNING

Live Electrical Components!

Failure to follow all electrical safety precautions when exposed to live electrical components could result in death or serious injury. When it is necessary to work with live electrical components, have a qualified licensed electrician or other individual who has been properly trained in handling live electrical components perform these tasks.

⚠AVERTISSEMENT

Composants électriques sous tension!

Le non-respect de toutes les consignes de sécurité lors de la manipulation de composants électriques sous tension peut entraîner des blessures graves, voire mortelles. S'il est nécessaire de travailler avec des composants électriques sous tension, demandez à un électricien qualifié et agréé ou à une autre personne ayant la formation nécessaire pour manipuler des composants électriques sous tension d'exécuter ces tâches.

To prevent injury or death from electrocution, it is the responsibility of the technician to recognize this hazard and use extreme care when performing service procedures with the electrical power energized.

Each compressor shall be equipped with a crankcase heater. The proper operation of the crankcase heater is important to maintain an elevated compressor oil temperature during the **Off** cycle to reduce oil foaming during compressor starts. Oil foaming occurs when refrigerant condenses in the compressor and mixes with the oil. In lower ambient conditions, refrigerant migration to the compressor could increase.

When the compressor starts, the sudden reduction in crankcase pressure causes the liquid refrigerant to boil rapidly causing the oil to foam. This condition could damage compressor bearings due to reduced lubrication and could cause compressor mechanical failures.

Before initial start-up, or if main power has been off for an extended period of time, compressor crankcase heater(s) should be operated for a minimum of 8 hours prior to compressor operation. With main power OFF, remove jumper between OAUTS terminals 9 and 10 (E-Stop). Turn main power to energize crankcase heater(s). At end of warm up period turn main power off, install 9-10 jumper, turn main power on, and resume normal operation.

Following crankcase heater warm-up, turn main power disconnect off, and install jumper on E-Stop terminals 9 and 10.

Turn Main disconnect **On**.

Main Unit Display and ReliaTel Controls

When first powered **On**, the controls perform self-diagnostic initialization to check that all internal controls are functional. The Status LED located on the Main Unit Display and the Liteport LED located on the RTRM module is turned **On** within one second of power-up if internal operation is okay.

Field-Installed Control Wiring

⚠WARNING

Proper Field Wiring and Grounding Required!

Failure to follow code could result in death or serious injury. All field wiring MUST be performed by qualified personnel. Improperly installed and grounded field wiring poses FIRE and ELECTROCUTION hazards. To avoid these hazards, you MUST follow requirements for field wiring installation and grounding as described in NEC and your local/state/national electrical codes.

⚠ATTENTION

Câblage et Mise à la Terre Appropriés Champs Obligatoires!

Le non-respect du code pourrait entraîner la mort ou grave blessure. Tout le câblage sur le terrain DOIT être effectué par des personnes qualifiées personnel. Terrain mal installé et mis à la terre le câblage pose des risques de FIRE et d'ÉLECTROCUTION. À evitez ces risques, vous devez suivre les exigences pour l'installation et la mise à la terre du câblage de terrain comme décrit dans NEC et vos codes électriques locaux/étatiques/nationaux.

An overall layout of the various control options available with the required number of conductors for each control device is illustrated in Figure 156, p. 93.

Note: *All field wiring must conform to NEC guidelines as well as state and local codes.*

Control Power Transformer

⚠WARNING

Hazardous Voltage!

Failure to disconnect power before servicing could result in death or serious injury. Disconnect all electric power, including remote disconnects before servicing. Follow proper lockout/tagout procedures to ensure the power can not be inadvertently energized.Verify that no power is present with a voltmeter.

⚠AVERTISSEMENT

Risque d'électrocution!

Le non-respect de cette consigne peut entraîner des blessures graves, voire mortelles. Avant toute intervention, coupez l'alimentation électrique, y compris aux sectionneurs à distance. Suivez scrupuleusement les procédures de verrouillage/mise hors service préconisées pour empêcher tout rétablissement accidentel de l'alimentation électrique.

The 24-volt control power transformers are to be used only with the accessories called out in this manual. Transformers rated greater than 50 VA are equipped with internal circuit breakers. If a circuit breaker trips, turn **Off** all power to the unit before attempting to reset it.

The transformers are located in the control panel. The circuit breaker is located on the left side of the transformers and can be reset by pressing in on the black reset button.

Controls Using 24 Vac

⚠WARNING

Hazardous Voltage!

Failure to disconnect power before servicing could result in death or serious injury. Disconnect all electric power, including remote disconnects before servicing. Follow proper lockout/tagout procedures to ensure the power can not be inadvertently energized.Verify that no power is present with a voltmeter.

⚠AVERTISSEMENT

Risque d'électrocution!

Le non-respect de cette consigne peut entraîner des blessures graves, voire mortelles. Avant toute intervention, coupez l'alimentation électrique, y compris aux sectionneurs à distance. Suivez scrupuleusement les procédures de verrouillage/mise hors service préconisées pour empêcher tout rétablissement accidentel de l'alimentation électrique.

NOTICE

Use Copper Conductors Only!

Failure to use copper conductors could result in equipment damage as unit terminals are not designed to accept other types of conductors.

Before installing any connecting wiring, refer to the below table for AC conductor sizing guidelines:

1. Use copper conductors unless otherwise specified.
2. Ensure that the AC control wiring between the controls and the units termination point does not exceed three (3) ohms/conductor for the length of the run.

   Note: *Resistance in excess of 3 ohms per conductor may cause component failure due to insufficient AC voltage supply.*
3. Be sure to check all loads and conductors for grounds, shorts, and mis-wiring.
4. Do not run the AC low-voltage wiring in the same conduit with the high-voltage power wiring.

Table 12. 24 Vac conductors

Distance from Unit to Control	Recommended Wire Size
000–460 feet 000–140 m	18 gauge 0.75 mm^2
461–732 feet 104–223 m	16 gauge 1 mm^2

Controls Using DC Analog Input/Output (Standard Low Voltage Multiconductor Wire)

⚠WARNING

Hazardous Voltage!

Failure to disconnect power before servicing could result in death or serious injury. Disconnect all electric power, including remote disconnects before servicing. Follow proper lockout/tagout procedures to ensure the power can not be inadvertently energized.Verify that no power is present with a voltmeter.

⚠AVERTISSEMENT

Risque d'électrocution!

Le non-respect de cette consigne peut entraîner des blessures graves, voire mortelles. Avant toute intervention, coupez l'alimentation électrique, y compris aux sectionneurs à distance. Suivez scrupuleusement les procédures de verrouillage/mise hors service préconisées pour empêcher tout rétablissement accidentel de l'alimentation électrique.

Before installing any connecting wiring between the unit and components utilizing a DC analog input\output signal, find the electrical access locations provided on the unit.

1. Below table lists the conductor sizing guidelines that must be followed when interconnecting the DC binary output devices and the system components utilizing a DC analog input\output signal to the unit.

   Note: *Resistance in excess of 2.5 ohms per conductor can cause deviations in the accuracy of the controls.*

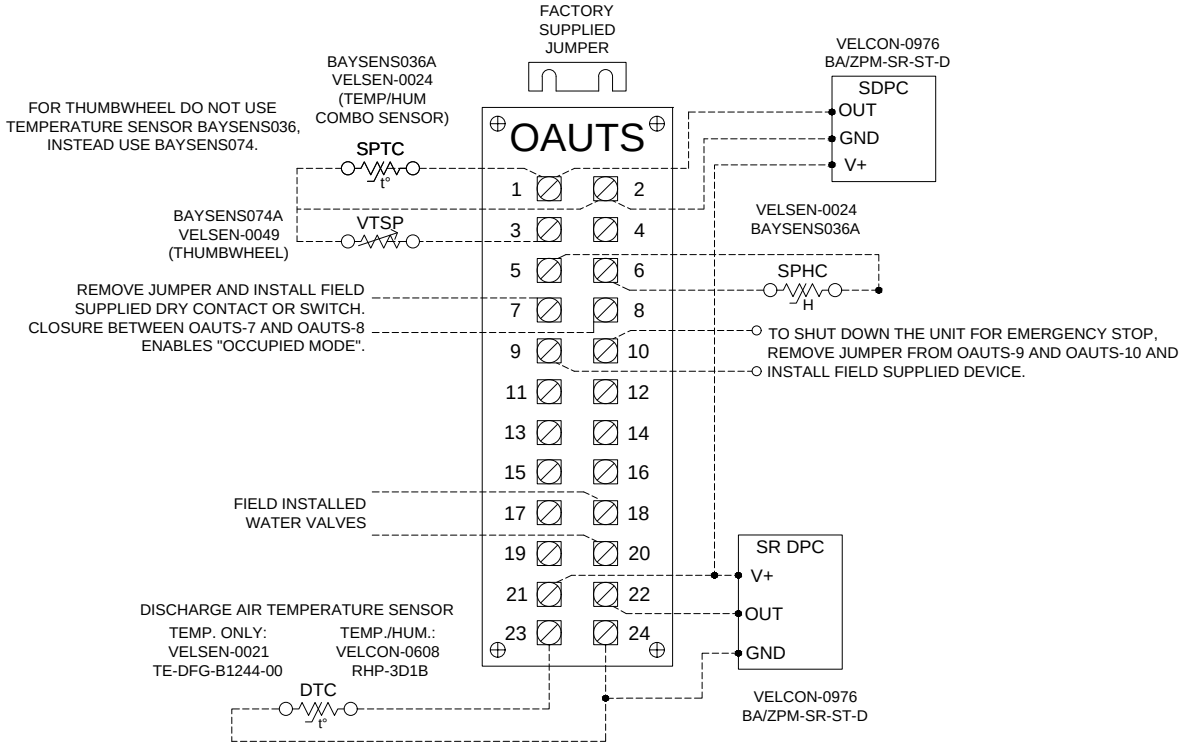
2. Ensure that the wiring between controls and the units termination point does not exceed 2.5 ohms/conductor for the length of the run.
3. Do not run the electrical wires transporting DC signals in or around conduit housing high voltage wires.

DC Conductors

Table 13. Zone sensor module wiring

Distance from Unit to Control	Recommended Wire Size
000–150 feet 0–45.7 m	22 gauge 0.33 mm^2
151–240 feet 46–73.1 m	20 gauge 0.50 mm^2
241–385 feet 73.5–117.3 m	18 gauge 0.75 mm^2
386–610 feet 117.7–185.9 m	16 gauge 1.3 mm^2
611–970 feet 186.2–295.7 m	14 gauge 2.0 mm^2

Figure 156. OAUTS connection B



Factory-Provided Sensors

A discharge temperature sensor (VELSEN-0021) will be factory-provided for field installation in the supply duct. Refer to Figure 164, p. 114 for installation instructions.

If space control is selected, a combination space temperature/humidity sensor (BAYSENS036A) will be factory-provided for field installation in the space. Refer to Figure 165, p. 115 for installation instructions.

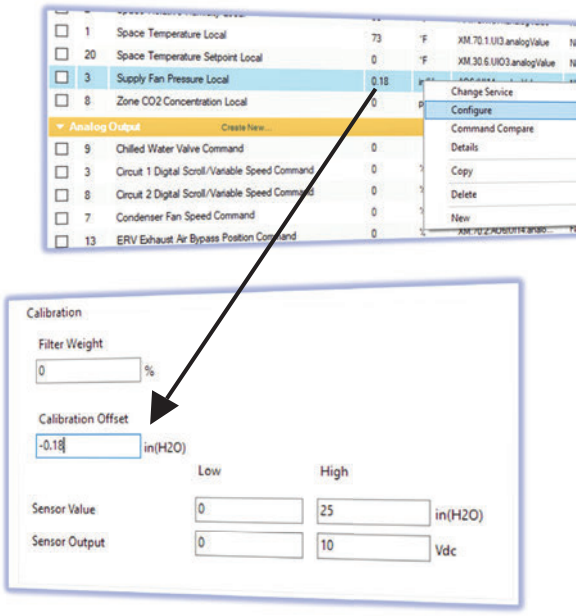
If multi-zone VAV control is selected, a static pressure sensor (VELCON-0976) will be factory-provided for field installation in the supply duct or space. Refer to Figure 167, p. 117 for installation instructions.

If modulating OA/RA dampers w/economizer and an exhaust fan are selected, a duct static pressure sensor (VELCON-0350) will be factory-provided for field installation in the return duct. Refer to Figure 167, p. 117 for installation instructions.

Pre-Start-Up

Start-Up

1. Perform test and balance before start-up (if possible).
2. Set up date and time for unit, helps with diagnosis when looking at alarms and data logs.
3. Check points of interest sheet and confirm in/out of service points.
4. Verify phase monitor.
   a. Check voltage.
   b. Check phase imbalance set to 2 to 3 percent.
   c. Restart is set halfway between 1 to 125 seconds.
   d. Check trip delay is set at 30 seconds.
   e. ESR 1/2/3 should be lit if phase monitor.
5. Check UC600 setpoints.
   a. Duct static pressure setpoint.
   b. Minimum OA damper position.
   c. Maximum OA damper position.
   d. Supply airflow setpoint.
   e. Exhaust airflow setpoint.
   f. IVFD signal.
   g. PEVFD setpoint.
6. Identify airflow monitoring.
   a. Zero out Piezo(s) before start-up if applicable.
      i. Detach clear tubing from sensor.
      ii. Remove sensor cover.
      iii. Press and hold the ZERO button.
      iv. Display should read 0.00.
      v. Put the cover back on.
      vi. Recalibrate in TU UC600.
      vii. Click on supply fan pressure if the number is not 0, right click to configure.
      viii. Make calibration offset the opposite of the number listed as supply fan pressure.
      ix. For example, if the supply fan pressure is listed as 0.18, set the calibration offset to -0.18 and save.



      x. Reattach the clear tubing to the sensor securely.
      xi. Repeat for exhaust piezo if applicable.
7. Identify OA/RA dampers.
   a. Verify end switch is set to 4.

Cooling Start-Up

Important: *This should NOT be performed if ambient temperatures are <65°F or >105°F.*

1. Check supply fan RPM and Hz settings.
2. Identify compressor type.
   a. If model number begins with:
      i. ZP- Fixed Speed (one or both circuits).
      ii. ZPD- Digital Compressor (one or both circuits).
      iii. ZPV- Variable Speed Compressor (1st circuit only).
3. For fixed/digital compressors:
   a. Override compressor 1 **ON**, or compressor 1 and 2 **ON** in a tandem circuit.
   b. For digital scroll, override circuit 1 command to 100 percent.
   c. Override HGRH to 25 percent.
   d. Raise head pressure to 400 psi.
   e. Record electrical data, refrigerant pressures, saturated temps and line temps on Horizon. Start-up sheet (available at the end of this document).
   f. Override HGRH 100 percent and check refrigerant flow.
   g. Override compressor **OFF**.

   h. Repeat circuit 2 (if applicable) variable speed compressor.

4. Variable speed compressor.
   a. Override compressor 1 **ON**.
   b. Override circuit 1 to 0 percent.
   c. Override HGRH to 100 percent.
   d. Maintain head pressure 400 psi.
   e. Record electrical data, refrigerant pressures, saturated temperature and line temperature on horizon. Start-up sheet (available at the end of this document).

Start-Up

Note: *Refer to "Start-Up Form," p. 127 for a copy of the start-up form.*

Indirect Fired Gas Heating Start-Up

⚠WARNING

Hazardous Service Procedures!

Failure to follow all precautions in this manual and on the tags, stickers, and labels could result in death or serious injury.

- **Technicians, in order to protect themselves from potential electrical, mechanical, and chemical hazards, MUST follow precautions in this manual and on the tags, stickers, and labels, as well as the following instructions: Unless specified otherwise, disconnect all electrical power including remote disconnect and discharge all energy storing devices such as capacitors before servicing. Follow proper lockout/tagout procedures to ensure the power can not be inadvertently energized. When necessary to work with live electrical components, have a qualified licensed electrician or other individual who has been trained in handling live electrical components perform these tasks.**
- **Do not attempt the following procedures until all electrical and gas connections to the unit have been completed and the outdoor air damper and evaporator fan operation have been verified and are operating correctly.**

⚠AVERTISSEMENT

Procédures d'entretien dangereuses!

- **Les techniciens, afin d'être protégés des éventuels risques électriques, mécaniques et chimiques, DOIVENT suivre les précautions contenues dans ce manuel, sur les étiquettes et les autocollants, ainsi que les instructions suivantes : Sauf indication contraire, coupez toute l'alimentation électrique y compris les disjoncteurs à distance et déchargez tous les dispositifs de stockage d'énergie comme les condensateurs avant l'entretien. Respectez les procédures de verrouillage et d'étiquetage appropriées pour éviter tout risque de remise sous tension accidentelle. S'il est nécessaire de travailler avec des composants électriques sous tension, demandez à un électricien qualifié et agréé ou à une autre personne ayant la formation nécessaire pour manipuler des composants électriques sous tension d'exécuter ces tâches.**
- **N'essayez pas de réaliser les procédures suivantes avant d'avoir effectué tous les raccordements en gaz et électricité sur l'unité, d'avoir inspecté le registre d'air extérieur et le ventilateur d'évaporateur et confirmé que leur fonctionnement est approprié.**

Notes:

1. This furnace module does not have a pilot. It is equipped with a direct spark ignition device that automatically lights the gas burner. **DO NOT** try to light burners by hand.

⚠WARNING

Hazard of Explosion!

Failure to follow proper safe leak test procedures could result in death or serious injury or equipment or property-only-damage. NEVER use an open flame to detect gas leaks. You MUST use a leak test solution for leak testing.

⚠AVERTISSEMENT

Risque d'explosion!

Le non-respect des procédures d'essai d'étanchéité sûres recommandées pourrait provoquer des accidents graves, voire mortels, ou des dommages matériels. Ne vérifiez JAMAIS la présence de fuites de gaz avec une flamme nue. Vous devez IMPÉRATIVEMENT utiliser une solution de test d'étanchéité pour vérifier l'étanchéité.

2. **BEFORE OPERATING**, leak test all gas piping up to heater gas valve. Smell around the unit area for gas. If gas is smelled, do **NOT** attempt to place heater in operation until source of gas leak is identified and corrected.

3. Use only hand force to operate the gas control lever to the **ON** position. **NEVER** use tools. If lever does not operate by hand, replace gas valve prior to starting the unit. Forcing or attempting to repair the gas valve may result in fire or explosion.
4. Do not attempt to operate unit, if there is indication that any part or control has been under water. Any control or component that has been under water must be replaced prior to trying to start the unit.

Tools Required

- Voltage Meter (μA)
- Amp Meter
- Gas Manometer (2)
- Temperature Probe
- Small Refrigeration Screwdriver
- 5/16-in. Nut Driver
- 3/16-in. Allen Wrench
- 3/32-in. Allen Wrench
- 1/8-in. NPT Barbed Pressure Taps (3)
- 1/2-in. Open End Wrench

Start-Up Procedure

1. Check Inlet Gas Pressure

Check to ensure the gas pressure supplied to the unit is within the pressure requirement listed on the nameplate. **DO NOT** expose gas controls to pressures above 1/2 psi (14-in. WC). The gas supply line should be installed with an external manual shut-off and pressure tap.

2. Confirm Gas Flow at Unit

⚠WARNING

Hazardous Voltage and Gas!

Failure to turn off gas or disconnect power before servicing could result in an explosion or electrocution which could result in death or serious injury. Turn off the gas supply and disconnect all electric power, including remote disconnects, before servicing the unit. Follow proper lockout/tagout procedures to ensure the power can not be inadvertently energized.

⚠AVERTISSEMENT

Tension dangereuse et présence de gaz!

Le non-respect de l'obligation de couper le gaz ou l'alimentation électrique avant de procéder à une opération d'entretien peut entraîner une explosion ou une électrocution pouvant résulter en des blessures graves, voire mortelles. Avant toute intervention sur l'unité, couper l'approvisionnement en gaz et l'ensemble de l'alimentation électrique, y compris les disjoncteurs à distance. Suivez scrupuleusement les procédures de verrouillage/mise hors service préconisées pour empêcher tout rétablissement accidentel de l'alimentation électrique.

Open door to unit vestibule housing the gas heater. Move gas control lever to **OFF** position. Remove 1/8-in. pressure taps (see Figure 158, p. 100) from both modulating and on-off sections of the split heater manifold. Install a barbed fitting in both 1/8-in. tapped holes for connection to individual gas manometers.

Note: *There is a third 1/8-in. gas pressure tap located in the pipe connecting the main valve/regulator and modulating valve. Maximum pressure into modulating valve is 5-in. The On-Off gas valve includes a regulator adjustment device that is located on the top of the valve. Use this device to regulate valve output to modulating valve as required.*

Wait 5 minutes for any gas to clear. If you smell gas, see Step 1 and correct leak. If you do not smell gas or have corrected any leaks, go to Step 3.

3. Burner Starting Sequence and Burner Ignition

Figure 158, p. 100 illustrates indirect fired gas furnace components.

4. Main Gas Supply

Turn manual gas cock **ON**.

5. Split Manifold High Fire and Burner Test

Open all manual gas valves. Turn power on at units main disconnect switch. Open gas supply manual shut-off valve. using unit display (or computer with Trane Tracer TU), proceed to system status display and override all compressor stages **OFF**, disable dehumidification, disable economizer mode, disable ERV. If two heaters are installed, test heating with split manifold first by overriding burner 2 **OFF**. Override heating output command to 100 percent if one heater is installed and to 49 percent if two heaters are installed. Override heat cool mode active to Heat. This will enable call for heat to split manifold heater. Depending on outdoor air temperature, at time of start-up, heater high limit temperature may be exceeded causing limit switch to trip. Limit switch is auto-reset. Limit switch must be jumpered out of the circuit if OA temperature dictates.

With limit switch closed, the draft inducer will run on high speed for 10 seconds for proof of high and low airflow switch closure, then begin a 30-second pre-purge period. At the end of the pre-purge the direct spark will be energized and On-Off gas valve will open for a 5-second ignition trial. Following successful ignition, the inducer remains on high for 10-second flame stabilization, followed by 30-second warm up. Should the flame go out or the burner fail to light, an ignition retry will initiate following a 15-second inter-purge period.

Following successful ignition, manifold pressure should be 1.2-in. WC during the warm-up period. The manifold pressure will rise to 3.5-in. WC at 100 percent firing rate. Following these sequences to check low fire gas pressure for modulating section, reduce heating output command to 0 percent. Inducer speed will reduce to low speed. Correct gas pressure for modulating manifold section of heater at 0 percent output signal or low fire will be 0.4-in. WC. For

modulating sections, the outlet gas pressure from main/ regulator valve into the modulating valve is 5-in. WC.

Main On-Off valves in 1/2-in. gas line require 3/32-in. Allen wrench to adjust outlet gas pressure. Valves in 3/4-in. gas line require flat blade screwdriver to adjust outlet gas pressure. Following these sequences, inducer speed will reduce to low speed and will now be speed-controlled by the heater controller based on gas input to burners.

With heating command at 100 percent and with a single split manifold heater installed, the On-Off section of the heater will require the modulating section to prove ON before the On-Off section will enable. Inducer speed high at all times the On-Off section is in ignition sequence or firing. On-Off section sequence includes a 1-second ignition pre-purge followed by 4-second ignition trial. Ignition or flame failure will be followed by 30-second inter-purge for two ignition retry then 5-minute lockout period if both retry attempts fail. Correct manifold gas pressure for On-Off heater section is 3.5-in. WC.

For units including an additional separate On-Off heater, set heat command output to 49 percent to run modulating heater start-up. When complete with modulating heater start-up, increase heat output command to 100 percent to start-up the second heater.

High Fire and Low Fire Adjustment

To adjust high fire or low fire setting, please refer to EXA STAR modulating valve document. This document will ship with all gas heat units.

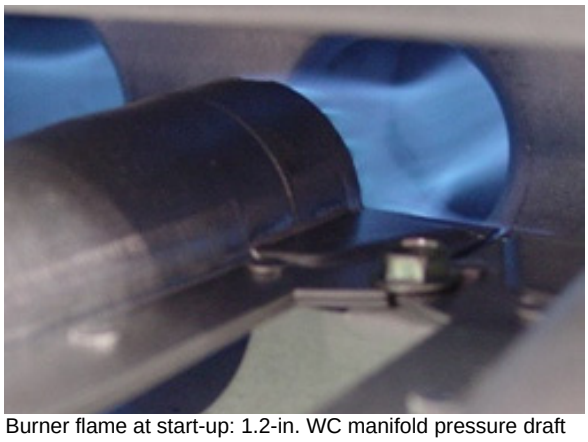
Failure to Ignite

- On the initial start-up, or after unit has been off long periods of time, the first ignition trial may be unsuccessful due to need to purge air from manifold at start-up.
- If ignition does not occur on the first trial, the gas and spark are shut-off by the ignition control and the control enters an inter-purge period of 15 seconds, during which the draft inducer continues to run.
- At the end of the inter-purge period, another trial for ignition will be initiated.
- Control will initiate up to three ignition trials on a call for heat before lockout of control occurs.
- Control can be brought out of lockout by cycling call for heat at the main unit display.

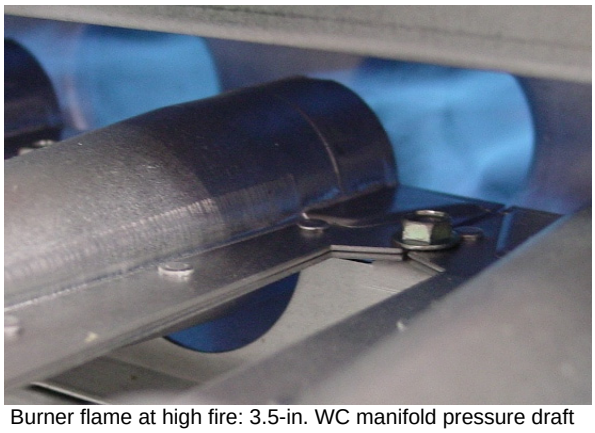
Prior to completing the start-up, check the appearance of the main burner flame. Refer to Figure 157, p. 99 for flame characteristics of properly adjusted natural gas systems.

Pressure Settings		
Fuel Type	NG	LP
Unit Inlet (in.)	7-14	10-14
Modulating Valve Inlet (in.)	5.0	10.0
Manifold (in.)	3.5	8.0
Low Fire (in.)	0.4	0.8
High Fire (in.)	3.5	8.0

Figure 157. Flame characteristics of properly-adjusted natural gas systems



Burner flame at start-up: 1.2-in. WC manifold pressure draft inducer — high speed



Burner flame at high fire: 3.5-in. WC manifold pressure draft inducer — high speed

Main Burner Flame

- The burner flame should be predominately blue in color and well defined and centered at the tube entry as shown in Figure 157, p. 99 above. Distorted flame or yellow tipping of natural gas flame, or a long yellow flame on propane, may be caused by lint and dirt accumulation inside burner or at burner ports, at air inlet between burner and manifold pipe, or debris in the main burner orifice. Soft brush or vacuum clean affected areas.
- Poorly defined, substantially yellow flames, or flames that appear lazy, indicate poor air supply to burners or excessive burner input. Verify gas supply type and manifold pressure with rating plate.
- Poor air supply can be caused by obstructions or blockage in heat exchanger tubes or vent discharge pipe. Inspect and clean as necessary to eliminate blockage. Vacuum any dirt or loose debris. Clean heat exchanger tubes with stiff brush. Poor flame

characteristics can also be caused by flue gas recirculation into combustion air supply. If surrounding buildings or prevailing winds cause recirculation, a flue extension may be required to prevent recirculation. Contact manufacturer prior to making any flue adjustments.

- Reduced air delivery can also be the result of inducer fan blade slippage, dirt accumulation in the fan blade or low voltage to draft inducer motor. Inspect draft fan assembly and be sure fan blade is secure to motor shaft. Check line voltage to heater.

6. Flame Sensor Current Check

NOTICE

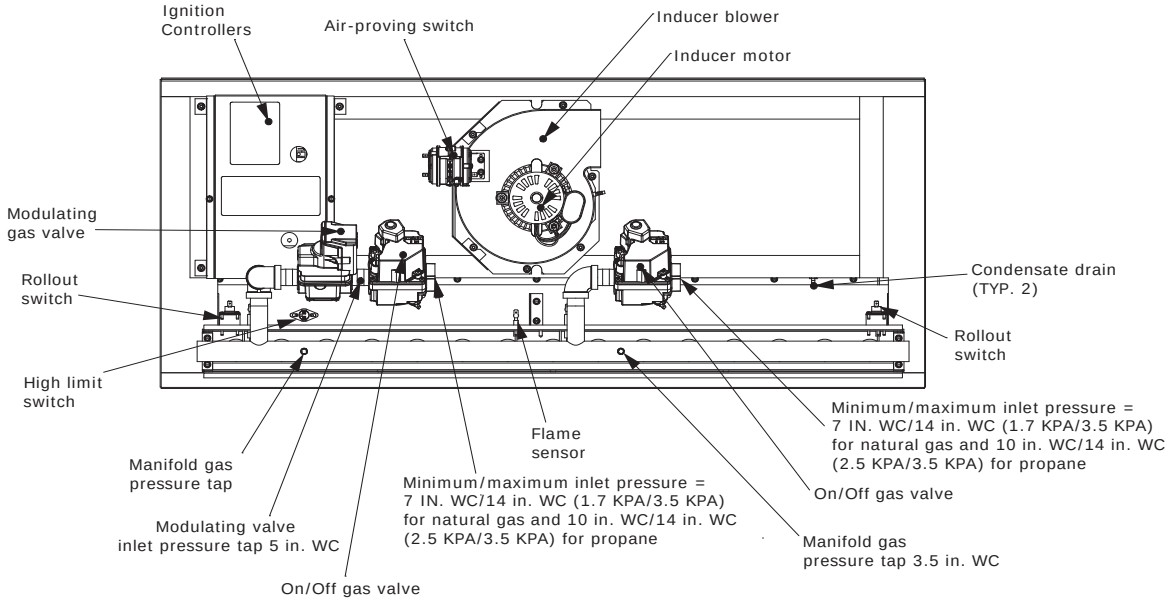
Meter Damage!

Measuring voltage with meter connect to a circuit could result in meter damage. Do NOT measure voltage with meter connected to a circuit.

Flame current is the current which passes through the flame from the sensor to ground. A flame signal of 0.5 to 1.0 microamp (μA) is marginal. For dependable operation, a flame signal of greater than 1.0 μA is required. To measure flame current, connect a meter capable of reading micro-amp current so the flame signal will be read thru the meters COM and μA connections. The meter should read greater than 1.0 μA.

Note: *If the meter reads below "0" on scale, meter leads are reversed; disconnect power and reconnect meter leads for proper polarity.*

Figure 158. OAK/OAN indirect fired gas furnace components



Safety Controls

Air Pressure Switch: An air pressure switch is provided as part of the control system to verify airflow through draft inducer by monitoring the difference in pressure between the draft inducer 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 though the ignition control module. On units with two speed draft inducer operation, a dual air pressure switch is used, monitoring high and low speed pressures. The air pressure switches have fixed settings and are not adjustable.

Rollout Switch (Manual Reset): The furnace module 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 module should not be placed back in operation until the cause of rollout condition is identified and corrected. The rollout switch can be reset by pressing the button on top of the switch.

High Limit Switch: The furnace module is equipped with a fixed temperature high limit switch mounted on the vestibule panel that shuts off gas to the heater through the ignition control module in the event of reduced airflow over the heat exchanger tubes. Reduced airflow can be caused by indoor fan failure, dirty or blocked filters, or restriction of the air inlet or outlet to the unit. The high limit switch will automatically reset when the air temperature drops to approximately 30°F below the limit setpoint. Determine the cause of the reduced airflow and correct.

Maintenance

Make sure all personnel are standing clear of the unit before proceeding. The system components will start when the power is applied.

Monthly Maintenance

Before completing the following checks, turn the unit OFF and lock the main power disconnect switch open.

⚠ WARNING

Hazardous Voltage!

Failure to disconnect power before servicing could result in death or serious injury. Disconnect all electric power, including remote disconnects before servicing. Follow proper lockout/tagout procedures to ensure the power can not be inadvertently energized.Verify that no power is present with a voltmeter.

⚠ AVERTISSEMENT

Risque d'électrocution!

Le non-respect de cette consigne peut entraîner des blessures graves, voire mortelles. Avant toute intervention, coupez l'alimentation électrique, y compris aux sectionneurs à distance. Suivez scrupuleusement les procédures de verrouillage/mise hors service préconisées pour empêcher tout rétablissement accidentel de l'alimentation électrique.

Filters

Inspect the return air filters. Clean or replace them if necessary. Refer to the unit Service Facts for filter information .

Filter Installation

Cabinet sizes OAD, OAG, OAK, and OAN ship with 2-inch permanent filters (mist eliminators) installed in the air inlet hood. The quantity of filters is determined by unit size. Access to the filters is through the hinged filter access panel on the air intake hood. In addition to the filters in the intake hood, there is a separate bank of filters accessible through the evaporator coil compartment door. Filter type, size, and quantity are determined by selected filter option and unit size.

Note: *Do not operate the unit without filters.*

Supply/Return Air Smoke Detector Maintenance

Airflow through the unit is affected by the amount of dirt and debris accumulated on the indoor coil and filters.

To insure that airflow through the unit is adequate for proper sampling by the return air smoke detector, complete adherence to the maintenance procedures, including recommended intervals between filter changes, and coil cleaning is required.

Periodic checks and maintenance procedures must be performed on the smoke detector to insure that it will function properly.

For detailed instructions concerning these checks and procedures, refer to the appropriate section(s) of the smoke detector installation and maintenance Instructions provided with the literature package for this unit.

Cooling Season

- Check the units drain pans and condensate piping to ensure that there are no blockages.
- Inspect the evaporator and condenser coils for dirt, bent fins, etc. If the coils appear dirty, clean them according to the instructions described in "Condenser Coil Cleaning," p. 102.
- Manually rotate the condenser fan(s) to ensure free movement and check motor bearings for wear. Verify that all of the fan mounting hardware is tight.
- Inspect the F/A-R/A damper hinges and pins to ensure that all moving parts are securely mounted. Keep the blades clean as necessary.
- Verify that all damper linkages move freely; lubricate with white grease, if necessary.
- Check supply fan motor bearings; repair or replace the motor as necessary.
- Check the fan shaft bearings for wear. Replace the bearings as necessary.
- Verify that all wire terminal connections are tight.
- Remove any corrosion present on the exterior surfaces of the unit and repaint these areas.
- Generally inspect the unit for unusual conditions (e.g., loose access panels, leaking piping connections, etc.).
- Make sure that all retaining screws are reinstalled in the unit access panels once these checks are complete.
- With the unit running, check and record the: ambient temperature; compressor suction and discharge pressures; superheat; Record this data on an "operators maintenance log" like the one shown in Table 14, p. 103. If the operating pressures indicate a refrigerant shortage, measure the system superheat.

Note: *Do not release refrigerant to the atmosphere! If adding or removing refrigerant is required, the service technician must comply with all federal, state and local laws.*

Heating Season

- Inspect the unit air filters. If necessary, clean or replace them.
- Check supply fan motor bearings; repair or replace the motor as necessary.

- Inspect both the main unit control panel and heat section control box for loose electrical components and terminal connections, as well as damaged wire insulation. Make any necessary repairs.
- Verify that the electric heat system operates properly.

Condenser Coil Cleaning

Regular coil maintenance, including annual cleaning, enhances the units operating efficiency by minimizing: compressor head pressure and amperage draw; evaporator water carryover; fan brake horsepower, due to increase static pressure losses; airflow reduction.

At least once each year, or more often if the unit is located in a dirty environment, clean the condenser coils using the instructions outlined below. Be sure to follow these instructions as closely as possible to avoid damaging the coils.

Round Tube Plate Fin (RTPF) Coils

To clean refrigerant coils, use a soft brush and a sprayer (either a garden pump-up type or a high-pressure sprayer). A high-quality detergent is also required; suggested brands include **SPREX A.C.**, **OAKITE 161**, **OAKITE 166** and **COILOX**. If the detergent selected is strongly alkaline (pH value exceeds 8.5), add an inhibitor.

⚠WARNING

Hazardous Chemicals!

Failure to follow all safety instructions below could result in death or serious injury. Coil cleaning agents can be either acidic or highly alkaline and can burn severely if contact with skin occurs. Handle chemical carefully and avoid contact with skin. ALWAYS wear Personal Protective Equipment (PPE) including goggles or face shield, chemical resistant gloves, boots, apron or suit as required. For personal safety refer to the cleaning agent manufacturer's Materials Safety Data Sheet and follow all recommended safe handling practices.

⚠AVERTISSEMENT

Produits chimiques dangereux!

Le non-respect de toutes les consignes de sécurité indiquées ci-après pourrait entraîner des blessures graves voire mortelles. Les agents de nettoyage pour serpentin peuvent être soit acides, soit fortement alcalins et peuvent entraîner des brûlures graves au contact de la peau. Manipulez les produits chimiques avec prudence et évitez tout contact avec la peau. Portez TOUJOURS un équipement de protection individuel (EPI), y compris des lunettes ou un masque facial, des gants résistant aux produits chimiques, des bottes, un tablier ou une combinaison conformément aux exigences. Pour la sécurité personnelle, voir les fiches de données de sécurité du fabricant pour l'agent de nettoyage et suivre toutes les pratiques de manipulation préconisées.

1. Remove enough panels from the unit to gain access to the coil.
2. Protect all electrical devices such as motors and controllers from any over spray.
3. Straighten any bent coil fins with a fin comb.

⚠WARNING

Hazardous Pressures!

Failure to follow safety precautions below could result in coil bursting, which could result in death or serious injury. Coils contain refrigerant under pressure. When cleaning coils, maintain coil cleaning solution temperature under 150°F to avoid excessive pressure in the coil.

⚠AVERTISSEMENT

Pressions dangereuses!

Tout manquement aux consignes de sécurité préconisées ci-dessous risquerait d'entraîner un éclatement du serpentin susceptible de provoquer des blessures graves voire mortelles. Les serpentins contiennent du fluide frigorigène sous pression. Lors du nettoyage des serpentins, maintenez la température de l'agent de nettoyage pour serpentin à moins de 65,5 °C (150 °F) pour éviter toute pression excessive dans le serpentin.

4. Mix the detergent with water according to the manufacturers instructions. If desired, heat the solution **BUT DO NOT EXCEED** 150ºF maximum to improve its cleansing capability.
5. Pour the cleaning solution into the sprayer. If a high-pressure sprayer is used:
   a. Do not allow sprayer pressure to exceed 600 psi.
   b. The minimum nozzle spray angle is 15°.
   c. Maintain a minimum clearance of 6 in. between the sprayer nozzle and the coil.
   d. Spray the solution perpendicular (at 90°) to the coil face.
6. Spray the leaving-airflow side of the coil first; then spray the opposite side of the coil. Allow the cleaning solution to stand on the coil for 5 minutes.
7. Rinse both sides of the coil with cool, clean water.
8. Inspect both sides of the coil; if it still appears to be dirty, repeat Step 6 and Step 7.
9. Reinstall all of the components and panels removed in Step 1 and any protective covers installed in Step 2.

ERV Wheel Cleaning

Energy recovery wheels will get dirty over time and require regular maintenance cleaning to be most effective. Dependent on the environment, the wheel may require more frequent cleaning. Examples where cleaning will need to take place

more often include sites with tars, oils, greases, etc in the air streams. Its important to maintain the energy recovery wheel so that dust particles continue to pass freely through the wheel and do not start to collect which will lead to blocked airflow passages, excessive pressure drop through the wheel and decreased energy savings.

To clean the wheel, determine if it can be pulled from the cassette as a whole or if it needs to be removed in segments. 25 inch diameter one-piece wheels and smaller can be directly taken out of the cassette, otherwise segment the wheel. Begin by brushing the face of the wheel to loosen accumulated dirt.

Use a non-acid based coil cleaner or alkaline detergent solution to wash the small wheel or individual segments; KMP Acti-clean AK-1 concentrate in a 5 percent solution is proven to be effective. To loosen the deposits, soak the small wheel or segments until contaminants are adequately loosened; an overnight soak might be necessary for some environments.

Notes:

- *The use of acid-based cleaners, aromatic solvents, temperatures over 170° F, or steam may result in damage to the wheel.*
- *The internal exchange surfaces can be examined by separating the polymer strips by hand to check condition. Some staining of the desiccant may be observed and is not harmful to the wheels performance.*

Once soaking is complete, rinse the cleaning solution off the wheel until water appears to run clear. Excess water should be allowed to drain off the wheel before segments are replaced or wheels placed back into their cassette. If there is a small amount of water that remains, it will be dried out by airflow when installed in the unit.

Final Process

For future reference, you may find it helpful to record the unit data requested below in the blanks provided.

(1) Complete Unit Model Number:

____

____

____

(2) Unit Serial Number:

____

____

____

(3) Wiring Diagram Numbers (from unit control panel)

— schematic(s)

____

____

____

____

____

— connection(s)

____

____

____

Table 14. Sample maintenance log

Date	Current Ambient Temp F/C	Refrigerant Circuit #1						Refrigerant Circuit #2					
		Compr. Oil Level	Suct. Press. Psig/kPa	Disch. Press Psig/kPa	Liquid Press Psig/kPa	Super-heat F/C	Sub-cool F/C	Compr. Oil Level	Suct. Press. Psig/kPa	Disch. Press Psig/kPa	Liquid Press Psig/kPa	Super-heat F/C	Sub-cool F/C
		- Ok - Low						- Ok - Low					
		- Ok - Low						- Ok - Low					
		- Ok - Low						- Ok - Low					
		- Ok - Low						- Ok - Low					
		- Ok - Low						- Ok - Low					
		- Ok - Low						- Ok - Low					
		- Ok - Low						- Ok - Low					
		- Ok - Low						- Ok - Low					
		- Ok - Low						- Ok - Low					
		- Ok - Low						- Ok - Low					
		- Ok - Low						- Ok - Low					
		- Ok - Low						- Ok - Low					
		- Ok - Low						- Ok - Low					

Alarms and Troubleshooting

Microprocessor Control

The Main Unit Display and RTRM have the ability to provide the service personnel with some unit diagnostics and system status information.

⚠WARNING

Hazardous Service Procedures!

Failure to follow all precautions in this manual and on the tags, stickers, and labels could result in death or serious injury.
Technicians, in order to protect themselves from potential electrical, mechanical, and chemical hazards, MUST follow precautions in this manual and on the tags, stickers, and labels, as well as the following instructions: Unless specified otherwise, disconnect all electrical power including remote disconnect and discharge all energy storing devices such as capacitors before servicing. Follow proper lockout/tagout procedures to ensure the power can not be inadvertently energized. When necessary to work with live electrical components, have a qualified licensed electrician or other individual who has been trained in handling live electrical components perform these tasks.

⚠AVERTISSEMENT

Procédures d'entretien dangereuses!

Le non-respect de toutes les précautions contenues dans ce manuel ainsi que sur les étiquettes et les autocollants peut entraîner des blessures graves voire mortelles.

Les techniciens, afin d'être protégés des éventuels risques électriques, mécaniques et chimiques, DOIVENT suivre les précautions contenues dans ce manuel, sur les étiquettes et les autocollants, ainsi que les instructions suivantes : Sauf indication contraire, coupez toute l'alimentation électrique y compris les disjoncteurs à distance et déchargez tous les dispositifs de stockage d'énergie comme les condensateurs avant l'entretien. Respectez les procédures de verrouillage et d'étiquetage appropriées pour éviter tout risque de remise sous tension accidentelle. S'il est nécessaire de travailler avec des composants électriques sous tension, demandez à un électricien qualifié et agréé ou à une autre personne ayant la formation nécessaire pour manipuler des composants électriques sous tension d'exécuter ces tâches.

1. Verify that the Liteport LED on the RTRM is burning continuously. If the LED is lit, go to Step 3.
2. If the LED is not lit, verify that 24 Vac is presence between J1-1 and J1-2. If 24 Vac is present, proceed to Step 3. If 24 Vac is not present, check the unit main power supply, check transformer (TNS1). Proceed to Step 3 if necessary.
3. Utilizing "Method 1" in the RTRM "System Status Checkout Procedure", check the following:
   - System status
   - Cooling status

   If a System failure is indicated, proceed to Step 4. If no failures are indicated, proceed to Step 5.
4. If a System failure is indicated, recheck Step 1 and Step 2. If the LED is not lit in Step 1, and 24 Vac is present in Step 2, the RTRM has failed. Replace the RTRM.
5. If no failures are indicated, use one of the override options to start the unit. Following the override procedure will allow you to check all of the operating modes, and all of the external controls (relays, contactors, etc.) for each respective mode.
6. Refer to the sequence of operations for each mode, to assist in verifying proper operation. Make the necessary repairs and proceed to Step 7.
7. If no abnormal operating conditions appear in the Override mode, release the override and turn the power **Off** at the main power disconnect switch.

System Alarms

The main unit display has built in alarms to help the operator troubleshoot system failures. This section will describe these alarms and provide a guide to troubleshooting the all unit operating modes.

Comprehensive system alarms and diagnostics are accessed through the alarms icon at the unit display discussed later in the section, or through Tracer TU programming on connected computer. Sensor failures may be viewed through the alarms icon.

If an alarm is present, the main indicator light on the UC600 will blink red. If the optional unit display is installed, the alarm icon on the display will register ALARM, illuminate red and flash.

Important: *The space temperature sensor (SPTC) and space relative humidity sensor (SPHC) will read failed if they are not connected; they will Alarm as "In Fault".*

Sensor Failure Alarm Display

Press the alarm button on the home display of the unit display to display system sensor status.

RTRM Failure Modes

⚠WARNING

Live Electrical Components!

Failure to follow all electrical safety precautions when exposed to live electrical components could result in death or serious injury. When necessary to work with live electrical components, have a qualified licensed electrician or other individual who has been properly trained in handling live electrical components perform these tasks.

⚠AVERTISSEMENT

Composants électriques sous tension!

Le non-respect de toutes les consignes de sécurité lors de la manipulation de composants électriques sous tension peut entraîner des blessures graves, voire mortelles. S'il est nécessaire de travailler avec des composants électriques sous tension, demandez à un électricien qualifié et agréé ou à une autre personne ayant la formation nécessaire pour manipuler des composants électriques sous tension d'exécuter ces tâches.

Following is the listing of RTRM failure indication causes.

System Failure

Check the voltage between RTRM terminals 6 and 9 on J6, it should read approximately 32 Vdc. If no voltage is present, a system failure has occurred. Refer to Step 4 in "Microprocessor Control," p. 104 for the recommended troubleshooting procedure.

Failure

CLP1 has opened during the 3 minute minimum **on time** during four consecutive compressor starts, check CLP1 by testing voltage between the J1-8 and J3-2 terminals on the RTRM and ground. If 24 Vac is present, the CLP not tripped. If no voltage is present, CLP tripped.

System Failure

Measure the voltage between terminals J6-9 and J6-6.

Normal Operation = approximately 32 Vdc

System Failure = less than 1 Vdc, approximately 0.75 Vdc

Failure

Measure the voltage between terminals J6-8 and J6-6.

Operating = approximately 32 Vdc

Off = less than 1 Vdc, approximately 0.75 Vdc

Failure = voltage alternates between 32 Vdc and 0.75 Vdc

Heat Module Ignition Board

The heat module, upon receiving a request for heating, energizes the appropriate heating stages or strokes the modulating heating valve as required. Units with indirect fire furnace come with heat module with ignition board that provides control, protection, and diagnostics for the furnace system. For troubleshooting refer to Table 15, p. 105 and Table 16, p. 106 for LED flash code keys.

Table 15. LED flash code keys for heat module UTEC 1016-xxx Ignition Board

Troubleshooting Guide for UTEC 1016-xxx Ignition Board			
LED Code	**System**	**Fault Description**	**Action**
Steady On	Normal	LED is Lit.	**Control Operation Normal.**
			24 Vac is applied to the control.
Led is OFF	Lockout	LED is OFF.	**No power or control hardware fault.**
			1. Check 120V is being supplied to heater transformer.
			2. Check that 24 Vac is being supplied by transformer. Replace transformer if not being supplied 24 Vac.
1 Flashes	Lockout	Air pressure switch contact is open with Inducer blower running.	**Open pressure switch, limit switch or flame rollout switch.**
			1. Check air pressure switch hose and hose connection between switch and fan.
			2. Check reset switch is not tripped for rollout switch.
			3. Check high limit switch is not open.
			4. Replace pressure switch if contact does not close when fan is running.
2 Flashes	Lockout	Air pressure switch contact is closed when Inducer blower is not running.	**Pressure switch stuck closed.**
			1. Check wiring between PS1 and PS2 on ignition control board for correct connection and proper wiring.
			2. Check pressure switch functions correctly with and without pressure.
			3. Replace pressure switch if fails to function correctly.

Table 15. LED flash code keys for heat module UTEC 1016-xxx Ignition Board (continued)

Troubleshooting Guide for UTEC 1016-xxx Ignition Board			
LED Code	**System**	**Fault Description**	**Action**
3 Flashes	Lockout	Ignition locked out from too many ignition attempts.	**Ignition/flame sense failure.**
			1. Verify gas supply is available.
			2. Verify gas safety valve is working correctly.
			3. Verify gas manifold pressure is adequate and correct.
			4. Check spark igniter is not cracked or dirty. Check spark igniter wire is not covered with oil and debris or cracked. Check wire is connected correctly.
			5. Check flame sensor wiring. Check to see if flame sensor is grounded.
4 Flashes	Lockout	Ignition lockout from too many flame losses within a single call for heat.	**Repeated flame losses.**
			1. Check pressure switch hose for leaks or poor connection.
			2. Check for condensate in pressure switch hose.
			3. Check pressure tap on Inducer blower and pressure switch for blockage.
			4. Check functionality of Inducer blower.
5 Flashes	Lockout	Control hardware fault detected.	**Internal control fault.**
			Change ignition board.

Table 16. LED flash code keys for two stage heat module UTEC 1171-63 Ignition Board

Troubleshooting Guide for UTEC 1171-63 Two Stage Board			
LED Code	**System**	**Fault Description**	**Action**
Heartbeat	Normal	System is Normal.	**All conditions are normal.**
			None.
2 Flashes	Inducer ON/No gas	Airflow pressure switch contact is open; Inducer blower is running.	**Pressure switch open with Inducer ON.**
			1. Airflow pressure switch hose leaking; repair and/or replace.
			2. Airflow pressure switch hose plugged; repair and/or replace.
			3. Airflow pressure switch hose fittings plugged or damaged; repair and/or replace.
			4. Air pressure hose and/or switch has condensate accumulation; repair and/or replace.
			5. Air pressure switch not functioning; replace.
			6. Inducer blower not working; repair or replace.
3 Flashes	No Flame	Air pressure switch contact is closed when Inducer blower is not running.	**Pressure switch close with Inducer OFF.**
			1. Check wiring to the airflow pressure switch.
			2. Check airflow pressure switch continuity with OHM meter; if not open replace.
4 Flashes	Lockout	Failed to ignite after too many failed attempts.	**Lockout from too many failed ignition tries.**
			1. Confirm gas supply available; verify manifold gas pressure is correct.
			2. Verify manual gas shut-off valve is open.
			3. Verify Gas Safety Control valve is in ON position.
			4. Confirm that spark is present and check spark igniter for debris between electrodes.
			5. Check for cracked ceramic; check for cracked, oil, debris, damaged or disconnected connections on ignition wires.
			6. Check for recirculation of exhaust gases.
			7. If all above condition are OK, replace ignition board.

Table 16. LED flash code keys for two stage heat module UTEC 1171-63 Ignition Board (continued)

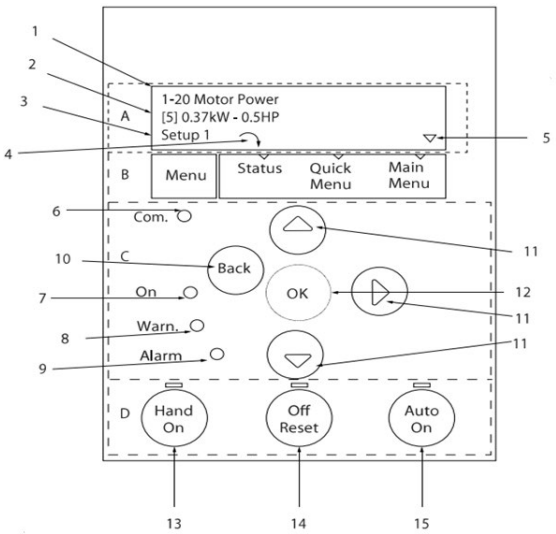
Troubleshooting Guide for UTEC 1171-63 Two Stage Board			
LED Code	**System**	**Fault Description**	**Action**
5 Flashes	Lockout	Burners light and then drop out resulting in too many flame failures.	**Lockout from too many flame losses.**
			1. Check flame sensor ceramic is not cracked; check flame rod for being coated with debris and oil.
			2. Check flame sensor wire is connected correctly; not cracked, no abrasions and not covered with debris.
			3. Check for recirculation of exhaust gases.
			4. Check flame stability and proper location from sensor.
			5. Check that pressure switch is not dropping out due to loss of pressure.
6 Flashes	No Flame	Inducer fan is running on high speed, burners are OFF, high limit is open.	**High temperature switch open.**
			1. Check temperature rise and airflow over the heat exchanger.
			2. If high limit does not reset, change high limit switch.
7 Flashes	No Flame	Rollout switch has tripped open.	**Rollout switch open.**
			1. Check for blockages in exhaust vent assembly.
			2. Check for air leaks inside the burner compartment.
			3. Reset the rollout switch and observe flame for any signs of rollout.
8 Flashes	Lockout	Flame is present without any call for heat.	**Flame present with gas OFF.**
			1. Verify there is no voltage to the gas valve.
			2. Check gas line pressure making sure it is not higher than allowed by gas valve manufacturer.
			3. If valve is not energized, check for gas flow. If gas is flowing, replace gas valve; verify line and manifold gas pressure are correct.
9 Flashes	Lockout	Exceeded max limit trips in one call for heat.	**Exceeded max limit trips in one call for heat (5).**

VFD Programming Parameters

TR150 VFD

Units shipped with TR150 variable frequency drives (VFD) are preset and run tested at the factory. If a problem with a TR150 VFD occurs, ensure that the programmed parameters listed in Table 17, p. 108 have been set before replacing the drive. Refer to Figure 159, p. 107 for TR150 VFD display layout.

Figure 159. TR150 VFD display



1	Parameter number and name.
2	Parameter value
3	Set-up number shows the active set-up and the edit setup. If the same set-up acts as both active and edit set-up, only that set-up number is shown (factory setting). When active and edit set-up differ, both numbers are shown in the display (set-up 12). The number lashing, indicates the edit set-up.
4	Motor direction is shown to the bottom left of the display-indicated by a small arrow painting either clockwise or counterclockwise.
5	The triangle indicates if the keypad is in status, quick menu or main menu.
6	Com LED: Flashes when bus communication is communicating.
7	Green LED/On: Control section is working.
8	Yellow LED/War: Indicates a warning.
9	Flashing Red LED/Alarm: Indicates an alarm.
10	[Back]: For moving to the previous step or layer in the navigation structure.
11	[▲][▼][►] : For maneuvering between parameter groups, parameters and within parameters. Can also be used for setting local reference.
12	[OK]: For selecting a parameter and for accepting changes to parameter settings.
13	[Hand On]: Starts the motor and enables control of the frequency converter via the keypad. NOTICE: Terminal 27 Digital Input (5-12 Terminal 27 Digital Input) has coast inverse as default setting. This means that [Hand On) does not start the motor if there is no 24 V to terminal 27. Connect terminal 12 to terminal 27.
14	[Off/Reset]: Stops the motor (Off). If in alarm made, the alarm is reset.
15	[Auto On]: Frequency converter is controlled either via control terminals or serial communication.

Verify parameters from Table 17, p. 108 are set to match parameters from unit nameplate.

1. To check a parameter press the Main Menu button twice (press the Back button if the main menu does not display).
2. Scroll down to Load and Motor, press **OK**.
3. Select 1-2, press **OK**.
4. Press down until the validated parameter is displayed. Any parameter can then be modified by pressing OK and pressing the Up and Down buttons.
5. When the desired selection has been made, press **OK**.

Should replacing the TR150 VFD become necessary, the replacement is not configured with all of Trane's operating parameters. The TR150 VFD must be programmed before attempting to operate the unit.

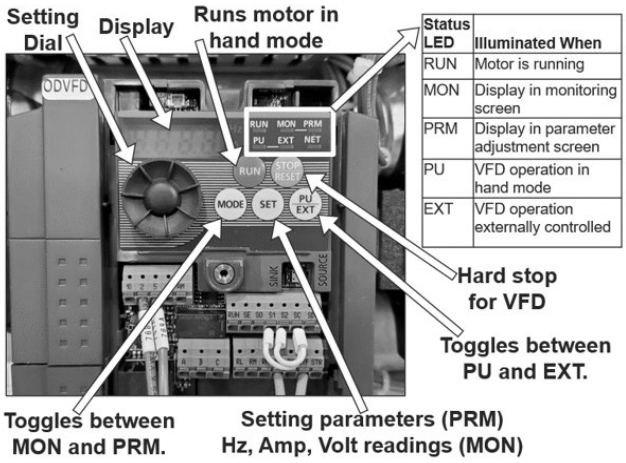
Table 17. TR150 VFD programming parameters

Parameter	Setting
0-03 Regional setting	1 [North America]
0-06 Grid Type	102 (200-240V, 60Hz)
	120 (380-440V, 60Hz)
	132 (525-600V, 60Hz)
1-03 Torque Characteristics	Variable Torque (Condenser, Supply, Exhaust fans)
	Auto Energy Optim. VT (ERV)
1-10 Motor Construction	0 [Asynchron]
1-20 Motor Power	Nameplate
1-22 Motor Voltage	Nameplate
1-23 Motor Frequency	Nameplate
1-24 Motor Current	Nameplate (1 Amp Minimum)
1-25 Motor Nominal Speed	Nameplate
3-02 Min Ref	Job Specific (20Hz Min)
3-03 Max Reference	Job Specific
3-41 Ramp 1 UP	30 Sec.
3-42 Ramp 1 DN	30 Sec.
4-12 Motor Speed Low Limit [Hz]	Job Specific (20Hz Min)
4-14 Motor Speed High Limit [Hz]	Job Specific
4-19 Maximum Output Frequency	90Hz
6-10 Term 53 LOW	0V
6-11 Term 53 HIGH	10V
6-14 Min Ref. Feedback	0
6-15 Max Ref. Feedback	Job Specific
6-19 Term 53 Mode	1 [Voltage]
14-20 Reset Mode	13 (Infinite)
14-21 Reset Time	10s
0-50 LCP Copy	1 (all to LCP)

Mitsubishi VFD

Units shipped with Mitsubishi variable frequency drives (VFD) are preset and run tested at the factory. If a problem with a Mitsubishi VFD occurs, ensure that the programmed parameters listed in Table 18, p. 108 (208V-460V) or Table 19, p. 109 (575V) have been set before replacing the drive.

Figure 160. Mitsubishi VFD navigation



Verify parameters are set to match parameters from unit nameplate. For units that are 208V - 460V use Table 18, p. 108, for units that are 575V use Table 19, p. 109.

1. To check a parameter turn the setting dial until the validated parameter is displayed.
2. Press the Set button.
3. The display will blink between the parameter number value and the parameter setting value.
4. Turn the setting dial again until the next desired selection has been made and displayed.
5. Repeat until all the parameters are inspected.
6. Should replacing the Mitsubishi VFD become necessary, the replacement is not configured with all of Trane's operating parameters. The Mitsubishi VFD must be programmed before attempting to operate the unit.

Table 18. Mitsubishi VFD programming parameters 208V–460V

Parameter	Setting	Description
1	Max. Hz	Maximum Frequency
2	Min. Hz	Minimum Frequency
7	30 s	Acceleration Time
8	30 s	Deceleration Time
9	Motor FLA	Electronic Thermal O/L Relay
38	Max Hz	Maximum Frequency
39	Max Hz	Maximum Frequency
67	5	Number of Retries at Fault Occurrence
71	3	Applied Motor
73	1	Analog Input Selection
152	6%	Zero Current Detection Level
153	1 s	Zero Current Detection Time
190	0	RUN Terminal Function Selection
79	2	Operative Mode Selection
77	1	Parameter Write Selection

Table 19. Mitsubishi VFD programming parameters 575V

Parameter	Setting	Description
1	Max Hz	Maximum Frequency
2	Min Hz	Minimum Frequency
7	30 s	Acceleration Time
8	30 s	Deceleration Time
9	Motor FLA	Electronic Thermal O/L Relay
38	Max Hz	Maximum Frequency
39	Max Hz	Maximum Frequency
67	5	Number of Retries at Fault Occurrence
71	3	Applied Motor
73	1	Analog Input Selection
152	6%	Zero Current Detection Level

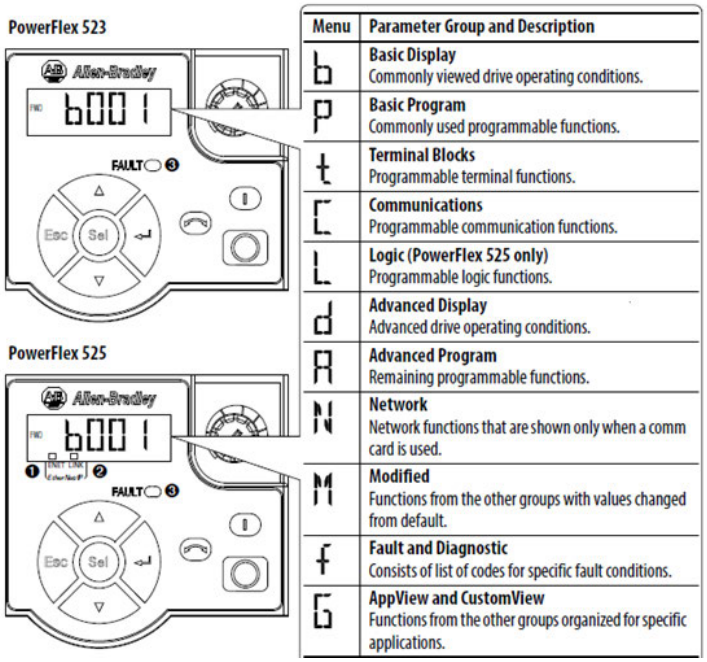
Table 19. Mitsubishi VFD programming parameters 575V (continued)

Parameter	Setting	Description
153	1 s	Zero Current Detection Time
190	0	RUN Terminal Function Selection
79	2	Operative Mode Selection
77	1	Parameter Write Selection

Allen Bradley PowerFlex 520 Series VFD

Units shipped with Allen Bradley PowerFlex 520 series variable frequency drives (VFD) are preset and run tested at the factory. If a problem with a PowerFlex 523/525 VFD occurs, ensure that the programmed parameters listed in Table 20, p. 110 have been set before replacing the drive. Refer to Figure 161, p. 109 for PowerFlex 523/525 VFD display layouts.

Figure 161. PowerFlex 523/525 VFD navigation



Menu	Parameter Group and Description
b	**Basic Display** Commonly viewed drive operating conditions.
P	**Basic Program** Commonly used programmable functions.
t	**Terminal Blocks** Programmable terminal functions.
C	**Communications** Programmable communication functions.
L	**Logic (PowerFlex 525 only)** Programmable logic functions.
d	**Advanced Display** Advanced drive operating conditions.
A	**Advanced Program** Remaining programmable functions.
N	**Network** Network functions that are shown only when a comm card is used.
M	**Modified** Functions from the other groups with values changed from default.
F	**Fault and Diagnostic** Consists of list of codes for specific fault conditions.
G	**AppView and CustomView** Functions from the other groups organized for specific applications.

PowerFlex 525 Embedded EtherNet/IP Indicators

No.	Display	Display State	Description
❶	ENET	Off	Adapter is not connected to the network.
		Steady	Adapter is connected to the network and drive is controlled through Ethernet.
		Flashing	Adapter is connected to the network but drive is not controlled through Ethernet.
❷	LINK	Off	Adapter is not connected to the network.
		Steady	Adapter is connected to the network but not transmitting data.
		Flashing	Adapter is connected to the network and transmitting data.

No.	LED	LED State	Description
❸	FAULT	Flashing Red	Indicates drive is faulted.

Key	Name	Description	Key	Name	Description
▲ ▼	Up Arrow Down Arrow	Scroll through user-selectable display parameters or groups. Increment values.		Reverse	Used to reverse direction of the drive. Default is active. Controlled by parameters P046, P048, and P050 [Start Source x] and A544 [Reverse Disable].
Esc	Escape	Back one step in programming menu. Cancel a change to a parameter value and exit Program Mode.		Start	Used to start the drive. Default is active. Controlled by parameters P046, P048, and P050 [Start Source x].
Sel	Select	Advance one step in programming menu. Select a digit when viewing parameter value.		Stop	Used to stop the drive or clear a fault. This key is always active. Controlled by parameter P045 [Stop Mode].
↵	Enter	Advance one step in programming menu. Save a change to a parameter value.		Potentiometer	Used to control speed of drive. Default is active. Controlled by parameters P047, P049, and P051 [Speed Referencex].

Verify parameters from Table 20, p. 110 are set to match parameters from unit nameplate.

1. To check parameters, press **Esc** to enter the parameter group list. The parameter group letter will flash.
2. Press the up or down arrows to scroll through the group list and press **Enter** or **Sel** to enter a group. The right digit of parameter in that group will flash.
3. Press the up or down arrows to scroll through the list. Press **Enter** to view the value of parameter and **Enter** or **Sel** to enter **Program Mode** to edit the value.
4. Once the LCD displays the word Program you are able to edit values. Press **Sel** to move from digit to digit while changing values.
5. Press **Enter** to save a change and exit **Program Mode** or press **Esc** to cancel a change and exit **Program Mode**.
6. Repeat to verify each parameter.
7. Should replacing the PowerFlex 523/525 VFD become necessary, the replacement is not configured with all of Trane's operating parameters. The PowerFlex 523/525 VFD must be programmed before attempting to operate the unit.

Table 20. Allen Bradley PowerFlex 520 series VFD

Parameter	Settings
P030 Language	1 [ENGLISH] 3 [ESPANOL]
P031 MOTOR NP VOLTS	10V [200V-240V, 60HZ] 20V [400V-440V, 60HZ] 25V [525V-600V, 60HZ]
P032 MOTOR NP HERTZ	NAMEPLATE [60 HZ]
P033 MOTOR OL CURRENT	NAMEPLATE
P034 MOTOR NP FLA	NAMEPLATE
P035 MOTOR NP POLES	2 [3600 RPM] 4 [1800 RPM] 6 [1200 RPM]
P036 MOTOR NP RPM	NAMEPLATE
P037 Motor NP Power	NAMEPLATE / Drive Rated Power
P038 Voltage Class	2 [480V] 3 [600V]
P040 Autotune	JOB SPECIFIC
P041 Accel Time 1	30 Sec.
P042 Decel Time 1	30 Sec.
P043 Minimum Freq	JOB SPECIFIC
P044 Maximum Freq	JOB SPECIFIC
P046 Start Source1	1 [Keypad]
P048 Start Source2	2 [DigIn TrmBlk]
P050 Start Source3	3 [Serial/DSI] - POWERFLEX 523. 5 [Ethernet/IP] - POWERFLEX 525
P047 Speed Reference1	1 [Drive Pot]
P049 Speed Reference2	5 [0-10V Input]
P051 Speed Reference3	3 [Serial/DSI] - POWERFLEX 523 15 [Ethernet/IP] - POWERFLEX 525

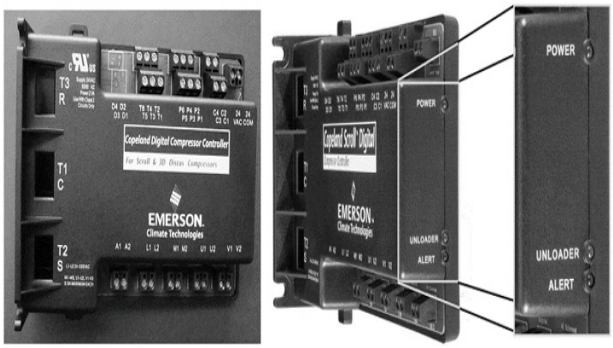
Table 20. Allen Bradley PowerFlex 520 series VFD (continued)

Parameter	Settings
P053 Reset to Defaults	0 [Ready/Idle] 1 [Param Reset] 2 [Factory Reset] 3 [Power Reset]

Digital Scroll Compressor Controller

Units with digital scroll compressor controller provides control, protection, and diagnostics for the digital compressor system. It also modulates or cycles the unloader solenoid in an ON/OFF pattern based on capacity demand signal from the system controller.

Figure 162. Digital scroll compressor controller



POWER LED (Green) - Voltage is present at the 24 Vac power terminals. When the anti-short cycle timer is active, the green LED will flash.

UNLOADER LED (Yellow) - Unloader solenoid status. This LED is **ON** when the unloader solenoid is energized.

ALERT LED (Red) - Communicates an abnormal system condition through a unique flash code. The **ALERT** LED will flash a number of times consecutively, pause and then repeat the process. The number of consecutive flashes, defined as the flash code (Table 21, p. 111), correlates to a particular abnormal condition.

While each **ALERT** code is active, the alarm relay contacts (A1 and A2) are closed. The **ALERT** code will remain active, and the alarm relay contacts closed until the reset conditions have been met or 24 Vac power has been cycled **OFF** and **ON**. All flash codes except code 6 and 8 result in the compressor contactor, unloader solenoid and vapor injection solenoid being de-energized. Flash codes 3, 4, 5, and 9 activate the 2-minute anti-cycle timer. Flash code 2 activates the 30-minute timer. All LEDs flashing at the same rate indicates 24 Vac supply is too low for operation.

All LEDs on solid at the same time indicate digital scroll compressor controller failure.

Whenever power is cycled **OFF** and **ON**, the current flash code and all internal counters are reset.

Table 21. Digital scroll compressor controller flash code details

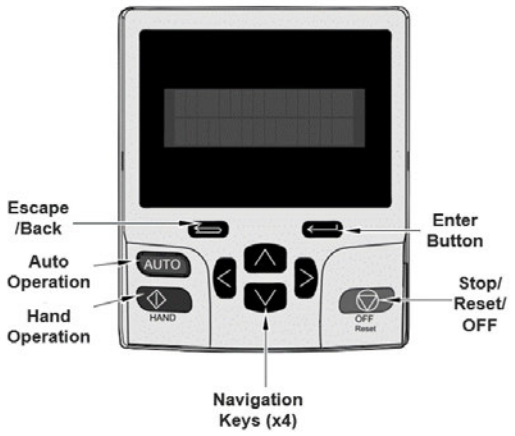
Trouble	Possible Cause
Digital Scroll Compressor not Running.	Compressor limit switch(es) open.
	Compressor limit switch(es) open.
	Minimum on/off time.
	Refer to digital scroll controller alarm flash code.

Digital Scroll Compressor Controller Alert Flash Codes	
Code 1	Reserved for future use.
Code 2	High Discharge Temperature.
Code 3	No current when compressor should be running.
Code 4	Locked Rotor.
Code 5	Normal operation when compressor is disabled.
Code 6	Thermistor Fault. Thermistor is not connected.
Code 7	Revere for future use
Code 8	Current is detected when compressor should be **OFF**.
Code 9	Supply voltage to controller dropped below 18.5 Vac.

Variable Speed Compressor Drive

Units with variable speed compressor drive deliver maximum machine performance with sensor less permanent magnet motor control, for dynamic and efficient machine operation.

Figure 163. Variable speed compressor HOA-keypad



The variable speed compressor drive parameter locations consist of a two-digit number (menu location) and a three-digit number (parameter location) that are setup from the factory based on the unit nameplate and values from Table 22, p. 111 and Table 23, p. 111 for ZPV066 compressors.

Table 22. Variable speed compressor drive programming based on cabinet size

Unit	RPM	Pr 07.012 -124
B060, B072, G120, G144, D060, D072	3600	0.5
B084	3900	0.542
G180, D180	4400	0.611
B096	4500	0.625
G210	4700	0.653
B108	4900	0.681
G240	5400	0.75

Table 23. Parameters reference for ZPV066 compressors/-124 VS drive only

Parameter	Description	Value
00.077	User Security Status	All menus (1)
07.011	AI2 Control	Volt
07.012	Scaling (see table)	-
07.014	Destination Address	29.017
07.015	A13 Control	Thermo-No Trip
07.016	Scaling	1
07.018	Destination Address	29.045
00.006	Configuration Control Parameter	00 0010 0000 1000
00.032	Soft-start Speed	1800 rpm
00.033	Soft Start Acceleration	3s
00.035	Normal Running Acceleration	10s
00.036	Normal Running Deceleration	10s
00.037	Shutdown Deceleration	10s
00.038	Shutdown Hold Speed	1000 rpm
00.039	Controlled Shutdown Dwell Time	15s
00.040	Stop Deceleration	10s
00.041	Oil Boost Threshold Speed	1800 rpm
00.042	Oil Boost Threshold Time	120 min
00.043	Oil Boost Acceleration Rate	10s
00.044	Oil Boost Deceleration Rate	10s
10.030	N/A	0
10.031	N/A	0
10.061	N/A	0
00.000	Save Parameters	On

Appendix

OAU Filter Guide

Table 24. OAK units

Evaporator				
Thickness	**MERV**	**Qty**	**Height**	**Width**
2 in.	8, 13	9	20	18
4 in.	14	6	20	25
Auxiliary Module (46XX ERV)				
Return Air				
Thickness	**MERV**	**Qty**	**Height**	**Width**
2 in.	8	2	25	20
		1	25	16
Outside Air				
Thickness	**MERV**	**Qty**	**Height**	**Width**
2 in.	8	2	25	20
		1	25	16
Auxiliary Module (58XX/ 64XX ERV)				
Return Air				
Thickness	**MERV**	**Qty**	**Height**	**Width**
2 in.	8	8	20	18
Outside Air				
Thickness	**MERV**	**Qty**	**Height**	**Width**
2 in.	8	8	20	18
Inlet				
Thickness	**Material**	**Qty**	**Height**	**Width**
2 in.	Aluminum Mesh	6	20	20

Table 25. OAND, OANE, and OANF units

Evaporator				
Thickness	**MERV**	**Qty**	**Height**	**Width**
2 in.	8, 13	9	24	20
4 in.	14	9	24	20
Auxiliary Module (58XX ERV)				
Return Air				
Thickness	**MERV**	**Qty**	**Height**	**Width**
2 in.	8	6	18	20
Outside Air				
Thickness	**MERV**	**Qty**	**Height**	**Width**
2 in.	8	6	18	20
Auxiliary Module (68XX / 74XX ERV)				
Return Air				
Thickness	**MERV**	**Qty**	**Height**	**Width**
2 in.	8	8	25	20
Outside Air				
Thickness	**MERV**	**Qty**	**Height**	**Width**
2 in.	8	8	25	20
Inlet				
Thickness	**Material**	**Qty**	**Height**	**Width**
2 in.	Aluminum Mesh	10	16	25

Table 26. OAB units

Evaporator				
Thickness	**MERV**	**Qty**	**Height**	**Width**
2 in.	8, 13	2	20	24
4 in.	14	2	20	24
Auxiliary Module				
Return Air				
Thickness	**MERV**	**Qty**	**Height**	**Width**
2 in.	8	4	20	24
Outside Air[(a)]				
Thickness	**MERV**	**Qty**	**Height**	**Width**
2 in.	8	4	20	24

(a) No filters will be provided on the outside air path of the auxiliary module if electric preheat is provided.

Table 27. OAG units

Evaporator				
Thickness	**MERV**	**Qty**	**Height**	**Width**
2 in.	8	2	16	20
		4	16	25
2 in.	13	2	16	20
		4	16	25
4 in.	14	2	16	20
		4	16	25
Auxiliary Module				
Return Air				
Thickness	**MERV**	**Qty**	**Height**	**Width**
2 in.	8	2	16	20
		4	16	25
Outside Air[(a)]				
Thickness	**MERV**	**Qty**	**Height**	**Width**
2 in.	8	2	16	20
		4	16	25
Inlet				
Thickness	**Material**	**Qty**	**Height**	**Width**
2 in.	Aluminum Mesh	6	16	24

(a) No filters will be provided on the outside air path of the auxiliary module if electric preheat is provided.

Table 28. OAD units

Evaporator				
Thickness	**MERV**	**Qty**	**Height**	**Width**
2 in.(5.1 cm)	8	6	24 in (63.5 cm)	18 in.(45.7 cm)
	13			
4 in.(10.2 cm)	14	6	24 in (63.5 cm)	18 in.(45.7 cm)
ERV Module				
Return Air				
Thickness	**MERV**	**Qty**	**Height**	**Width**
2 in.(5.1 cm)	8	6	20 in.(50.8 cm)	20 in.(50.8 cm)
Outside Air[a]				
Thickness	**MERV**	**Qty**	**Height**	**Width**
2 in.(5.1 cm)	8	6	20 in.(50.8 cm)	20 in.(50.8 cm)
Inlet Hood				
Thickness	**Material**	**Qty**	**Height**	**Width**
2 in.(5.1 cm)	Aluminum Mesh	6	20 in.(50.8 cm)	20 in.(50.8 cm)

(a) No filters will be provided on the outside air path of the auxiliary module if electric preheat is provided.

Table 29. OANG units

Evaporator (40 to 50 ton - 4 and 6 row coils; 55 to 100 ton - 6 row coils)				
Thickness	**MERV**	**Qty**	**Height**	**Width**
2 in.(5.1 cm)	8	15	20 in.(50.8 cm)	18 in.(45.7 cm)
	13			
4 in.(10.2 cm)	14	15	20 in.(50.8 cm)	18 in.(45.7 cm)
Evaporator (55 to 100 ton - 4 row coils)				
Thickness	**MERV**	**Qty**	**Height**	**Width**
2 in.(5.1 cm)	8	12	20 in.(50.8 cm)	25 in.(63.5 cm)
	13			
4 in.(10.2 cm)	14	12	20 in.(50.8 cm)	25 in.(63.5 cm)
ERV Module				
Return Air				
Thickness	**MERV**	**Qty**	**Height**	**Width**
2 in.(5.1 cm)	8	15	24 in.(61 cm)	18 in.(45.7 cm)
Outside Air[a]				
Thickness	**MERV**	**Qty**	**Height**	**Width**
2 in.(5.1 cm)	8	15	24 in.(61 cm)	18 in.(45.7 cm)
Inlet Hood				
Thickness	**Material**	**Qty**	**Height**	**Width**
2 in.(5.1 cm)	Aluminum Mesh	12	24 in.(61 cm)	24 in.(61 cm)

(a) No filters will be provided on the outside air path of the auxiliary module if electric preheat is provided.

Field Installation of Factory-Provided Sensors

Figure 164. VELSEN-0021 installation instructions

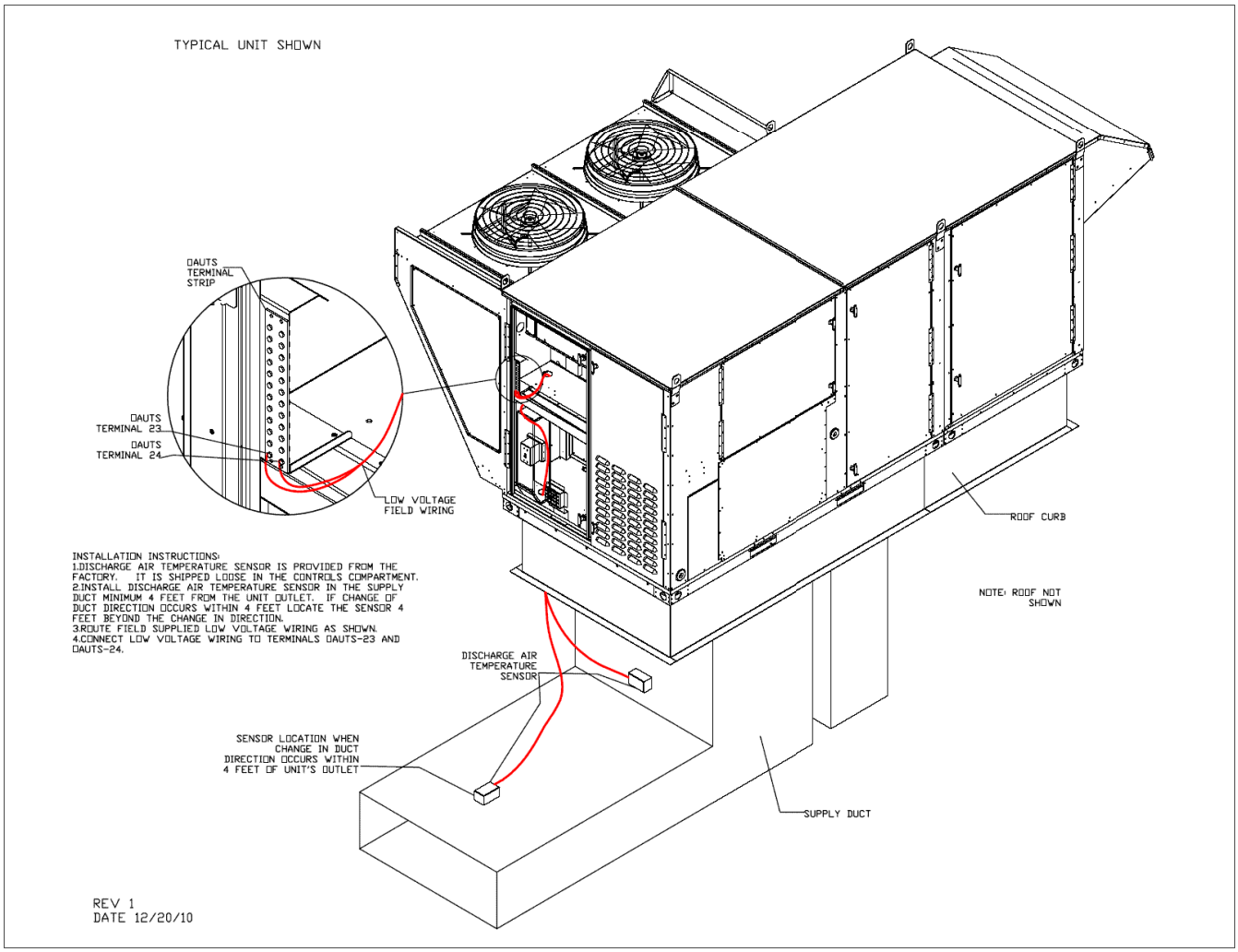
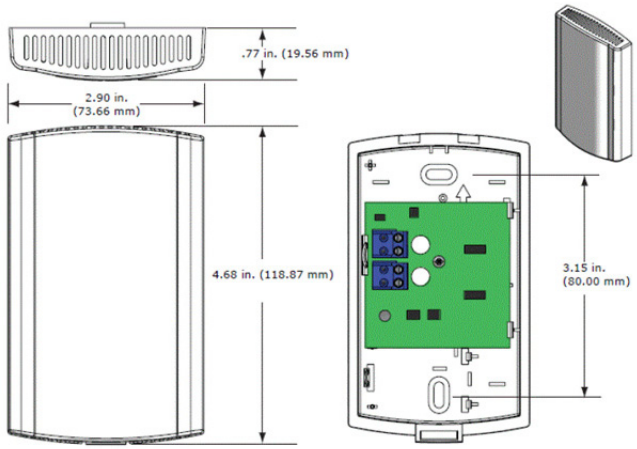


Figure 165. BAYSENS036A installation instructions

Sensor Specifications

Accuracy:	±3% RH over 20–95% RH at 77°F (25°C). Includes hysteresis, linearity, and repeatability.
Operating temperature range:	From -20°F to 140°F (-29°C to 60°C)
Supply voltage:	18-36 Vdc
Drift rate:	Less than 1% per year
Operating measurement range:	0-99% RH, noncondensing
Sensing element:	Polymer capacitive
Output characteristics:	4-20 mA for 0-100% RH (*X13790486010 is 20- mA for 0-100% RH*)
Repeatability:	0.5% RH
Hysteresis:	Less that 1% RH
Sensitivity:	0.1% RH
Storage temperature:	From -85°F to 158°F (-65°C to 70°C)
Thermistor resistance:	10 kΩ at 77°F
Temperature accuracy:	±0.36°F (±0.2°C)

Sensor Dimensions and Locating Best Practices



Proper location of the ***room humidity sensor*** is important to ensure accurate measurement. Place the sensor in an area of the room with good air circulation.

Places to avoid when locating the sensor:

- Locations subject to draft from windows, doors, or diffusers
- Surfaces with an uncooled or unheated area behind them, such as an outside wall or the wall of an unoccupied store room
- Near heat sources, such as radiant heat from the sun, heat from appliances, or heat from concealed pipes or chimneys
- Dead spots behind doors, draperies, or in corners
- Walls having excessive vibration
- Corrosive environments such as near swimming pools or in hospital rooms

Mounting

To mount the ***room humidity sensor***, first choose a flat interior surface that is approximately 54 inches (1.4 m) from the floor and then:

1. Remove sensor cover by pressing on the thumb tab at the bottom of the enclosure. Tilt the cover forward and raise it over the top of the back plate.
2. Feed the wires through the base.
3. Attach sensor to drywall or plaster (hardware not included with the sensor).
   Note: For a 2 x 4 junction box, mount the sensor using two #6-32 screws.
4. Connect the controller wires to the terminals on the sensor (refer to the next section about wiring).
5. Replace cover by engaging tab hinges on top of the unit and then push to snap in place.

Figure 166. Supply duct static pressure transducer (SDPC)

INSTALLATION INSTRUCTIONS FOR (BAPI) OR (BELIMO) SUPPLY DUCT STATIC PRESSURE TRANSDUCER (SDPC)

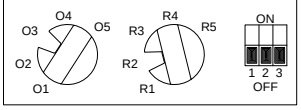
GENERAL:
SDPC IS USED TO CONTROL SUPPLY FAN SPEED BASED ON STATIC PRESSURE. DEFAULT FOR SDPC IS 0-2" WC TO 0-10VDC. ANY OTHER SETTING MUST BE RE-CONFIGURED WITHIN THE MAIN UNIT CONTROLLER.

IF A DUCT STATIC PRESSURE GREATER THAN 1.5"WC IS DESIRED, IT'S RECOMMENDED TO INCREASE THE RANGE OF THE TRANSDUCER AND RE-CONFIGURE THE MAIN UNIT CONTROLLER.

INSTALLATION:
1. VERIFY DIP SWITCH AND DIAL SETTINGS ACCORDING TO CHART BELOW.
2. MOUNT TRANSDUCER ON THE EXTERIOR OF THE DUCT AT LEAST 4 FT FROM THE UNIT.
3. INSTALL SAMPLING TUBE ONTO THE DUCT AND CONNECT TUBING TO PORT "H" ON TRANSDUCER.
4. LEAVE PORT "L" ON TRANSDUCER OPEN.
5. RUN WIRING FROM THE TRANSDUCER TO THE FIELD WIRING TERMINAL (OAUTS) STRIP USING COPPER CONDUCTORS ONLY.
6. LAND THE WIRING ON FIELD WIRING TERMINAL STRIP ACCORDING TO THE CHART BELOW.

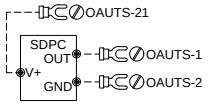
TRANSDUCER SETTINGS

O3 = 0-10 VOLTS
R2 = 2"WC
#1 OFF = UNIDIRECTIONAL
#2 OFF = INCHES
#3 OFF = SLOW



KCC PART NUMBER: VELCON-0976
SENSOR MODEL NUMBER: BA/ZPM-SR-ST-D

LINES 74 ON UNIT WIRING DIAGRAM



TRANSDUCER SETTINGS

#1 ON = 0-2" WC
#2 OFF = 0-2" WC
#3 OFF = 0-2" WC
#4 ON = SLOW
#5 OFF = 0-10 VOLTS
#6 ON = INCH WC

KCC PART NUMBER: VELCON-0067
SENSOR MODEL NUMBER: 22ADP-584L

LINES 74 ON UNIT WIRING DIAGRAM

OAUTS WIRING

OAUTS-21 -- PWR
OAUTS-1 -- VOUT
OAUTS-2 -- GND

TYPICAL DUCT INSTALLATION

UPDATED 12/13/2021
REV. D

Figure 167. Return duct/space pressure transducer (RDSPC)

RETURN DUCT/SPACE PRESSURE TRANSDUCER (SR DPC)

GENERAL:
RDSPC IS USED TO CONTROL EXHAUST FAN SPEED BASED ON STATIC PRESSURE. DEFAULT FOR RDSPC IS 0-2" WC TO 0-10VDC. ANY OTHER SETTING MUST BE CHANGED WITHIN THE MAIN UNIT CONTROLLER.

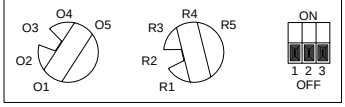
FACTORY SUPPLIED TRANSDUCER IS NOT RECOMMENDED FOR CONTROLLING TO SPACE PRESSURE. IF SPACE PRESSURE CONTROL IS DESIRED, USE A TRANSDUCER WITH A RANGE OF -0.5 TO 5" WC FOR PROPER OPERATION AND RE-CONFIGURE THE MAIN UNIT CONTROLLER.

INSTALLATION:
1. VERIFY DIP SWITCH AND DIAL SETTINGS ACCORDING TO CHART BELOW.
2. MOUNT TRANSDUCER ON THE EXTERIOR OF THE DUCT AT LEAST 4 FT FROM THE UNIT.
3. INSTALL SAMPLING TUBE ONTO THE DUCT AND CONNECT TUBING TO PORT "L" ON TRANSDUCER.
4. LEAVE PORT "H" ON TRANSDUCER OPEN.
5. RUN WIRING FROM THE TRANSDUCER TO THE FIELD WIRING TERMINAL (OAUTS) STRIP USING COPPER CONDUCTORS ONLY.
6. LAND THE WIRING ON FIELD WIRING TERMINAL STRIP ACCORDING TO THE CHART BELOW.

KCC PART NUMBER: VELCON-0976
SENSOR MODEL NUMBER: BA/ZPM-SR-ST-D

TRANSDUCER SETTINGS

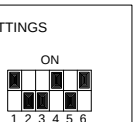
O3 = 0-10 VOLTS
R2 = 2"WC
#1 OFF = UNIDIRECTIONAL
#2 OFF = INCHES
#3 OFF = SLOW



KCC PART NUMBER: VELCON-0067
SENSOR MODEL NUMBER: 22ADP-584L

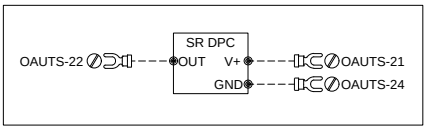
TRANSDUCER SETTINGS

#1 ON = 0-2" WC
#2 OFF = 0-2" WC
#3 OFF = 0-2" WC
#4 ON = SLOW
#5 OFF = 0-10 VOLTS
#6 ON = INCH WC

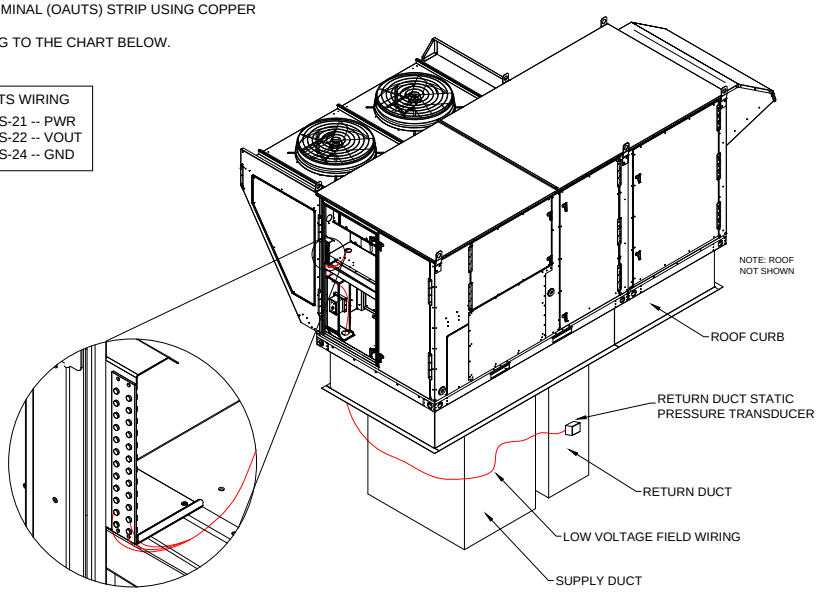


OAUTS WIRING
OAUTS-21 -- PWR
OAUTS-22 -- VOUT
OAUTS-24 -- GND

LINES 94 ON UNIT WIRING DIAGRAM



TYPICAL DUCT INSTALLATION



UPDATED 12/1/2021
REV. D

Figure 168. Discharge air temperature sensor (DTC)

INSTALLATION INSTRUCTIONS FOR
DISCHARGE AIR TEMPERATURE SENSOR (DTC)

THE DISCHARGE AIR TEMPERATURE SENSOR IS REQUIRED FOR UNIT OPERATION.

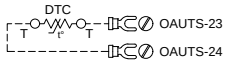
DISCHARGE AIR SENSOR MUST BE INSTALLED AT LEAST 4 FT DOWN DUCT ON UNITS WITHOUT ELECTRIC HEAT, AND INSTALLED AFTER A TRANSITION ON UNITS WITH ELECTRIC HEAT.

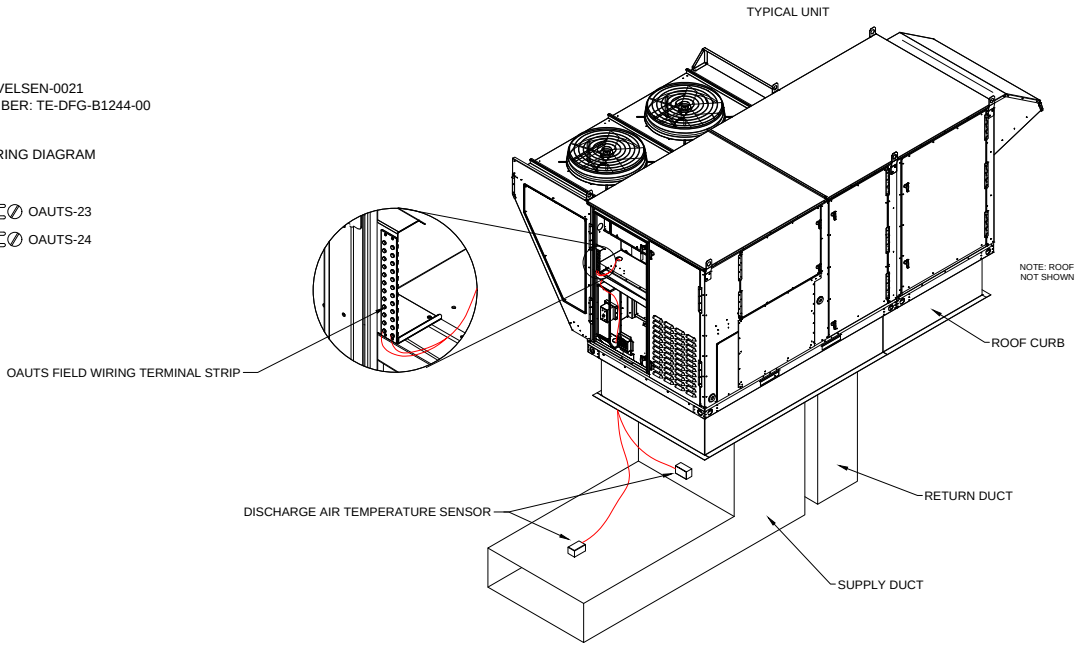
IT'S RECOMMENDED THAT THE DISCHARGE AIR SENSOR BE INSTALLED AFTER A TRANSITION ON UNITS WITH GAS HEAT TO ALLOW MIXING OF THE STRATIFIED AIR WHEN HEAT CAPACITY IS BELOW 50%.

INSTALL THE SENSOR ON THE SIDE OF THE DUCT AND WIRE TO OAUTS-23 AND 24 ON THE FIELD WIRING TERMINAL STRIP (NOT POLARITY SENSITIVE).

KCC PART NUMBER: VELSEN-0021
SENSOR MODEL NUMBER: TE-DFG-B1244-00

LINES 58 ON UNIT WIRING DIAGRAM





UPDATED 5/21/2020
REV. C

Note: *Reference "Ductwork," p. 75 section for installation details.*

Figure 169. Space temperature/humidity sensor (SPTC/SPHC)

INSTALLATION INSTRUCTIONS FOR SPACE TEMPERATURE/HUMIDITY SENSOR (SPTC/SPHC)

GENERAL:
SPTC AND SPHC ARE BOTH REQUIRED FOR CONTROLLING TO SPACE CONDITIONS.
SPTC IS A 10K OHM TYPE II THERMISTOR, SPHC IS 4-20mA TO 0-100%.

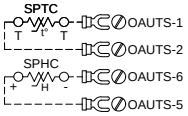
INSTALLATION:
1. INSTALL THE SENSOR IN THE SPACE ACCORDING TO IT'S INSTRUCTION MANUAL.
2. ROUTE WIRES TO UNIT'S FIELD WIRING TERMINAL STRIP.
3. LAND WIRES ACCORDING TO CHART BELOW.

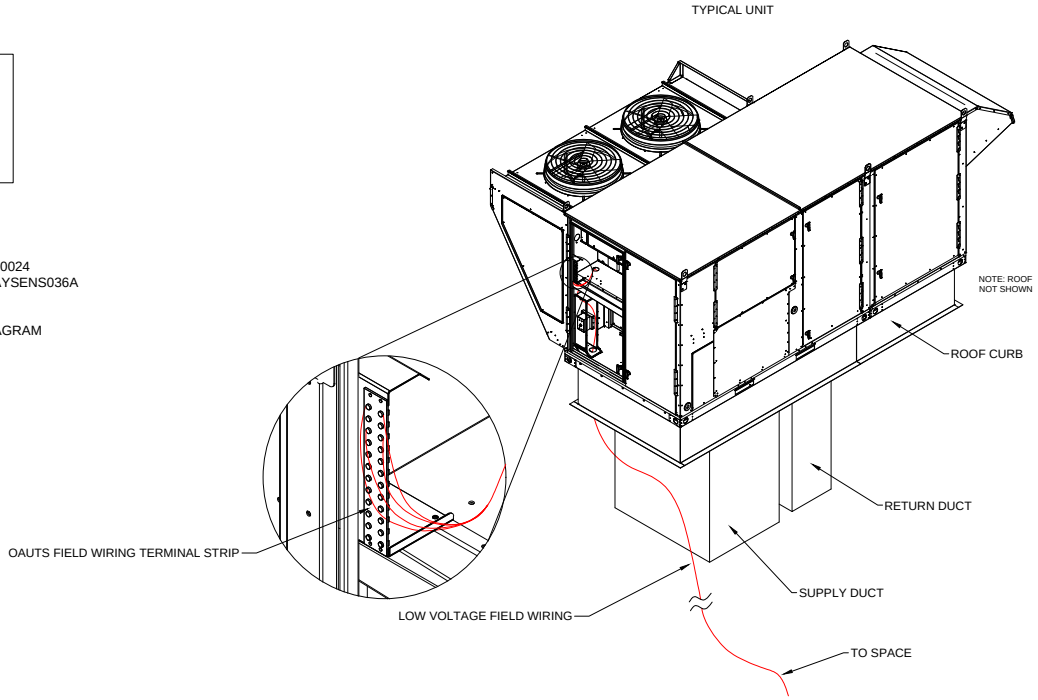
SPACE SENSOR WIRING

TERMINAL		SENSOR
OAUTS-1	-	T
OAUTS-2	-	T
OAUTS-5	-	+
OAUTS-6	-	-

KCC PART NUMBER: VELSEN-0024
SENSOR MODEL NUMBER: BAYSENS036A

LINES 74 ON UNIT WIRING DIAGRAM





UPDATED 5/21/2020
REV. B

Sequence of Operation v12.0

Description of Program Control

Each Horizon unit has four available control sequences: Space Control, Discharge, and Air Control.

Occupied Control

Starting Sequence

Occupied operation begins when the unit is placed in occupied via BAS or when OAUTS-7 and 8 is closed on the field wiring terminal strip (shipped with factory installed jumper).

Two-Position Outdoor Air Damper

Damper open close command is enabled, energizing the outdoor air damper actuator. The supply fan starting sequence begins once the damper end switch is closed.

Two-Position Outdoor and Return Air Dampers

Damper open close command is enabled, energizing the outdoor air damper actuator and de-energizing the return air damper (spring open). The supply fan starting sequence begins immediately (no end switch installed).

Two-Position Return Air Damper

Damper open close command is enabled, energizing the outdoor air damper actuator. The supply fan starting sequence begins once the damper end switch is closed.

Modulating Outdoor and Return Air Dampers

Outdoor air damper position command is adjusted to meet the outdoor air damper minimum position setpoint. The supply fan starting sequence begins immediately (no end switch installed).

Supply Fan Operation

After completing initial start-up, the supply fan start-up sequence will begin by enabling the supply fan start stop command and setting the supply fan speed command to 50 percent for the initial 30-seconds of operation.

The following sections describe the standard sequence of operation based on ordered options. For additional options on supply fan control, refer to (Additional factory available features).

Constant Speed Supply Fan

Standard on CV units without airflow monitoring.

The supply fan (VFD) operates at a constant, supply fan speed setpoint and does not vary supply fan speed to maintain an airflow setpoint.

Constant Volume Supply Fan

Standard on CV units with airflow monitoring.

The supply fan speed (ECM or VFD) is adjusted to maintain a constant airflow setpoint based on the reading from the supply airflow monitoring system. The airflow is factory set but can be adjusted in the field above the minimum airflow setpoints.

With constant volume operation, the supply fan speed command is adjusted to maintain the supply fan airflow local to the supply airflow setpoint active. Supply fan airflow setpoint active is set to the supply fan airflow setpoint (adj.).

Supply Duct Static Control (Multi-Zone VAV)

Standard (required) with multi-zone VAV control.

Supply fan speed command is adjusted to maintain the duct static pressure setpoint active. Supply fan speed is limited to keep the supply airflow above the supply fan airflow minimum setpoint active, which is a program-determined setpoint based on factory settings and mode of operation. Factory set minimum airflow vary between heating and cooling modes, limited to keep the components within safe operating ranges. If the heat pump is operating, the “cooling” minimum airflow is used due to the restriction on the indoor coil. The active minimum airflow will not fall below the outdoor airflow setpoint.

Space Temperature Control (Single Zone VAV)

Standard (required) with single zone VAV control.

Supply airflow is adjusted to maintain space temperature. Typically, it operates at minimum airflow until the discharge air setpoint reaches minimum or maximum, indicating that the heating/cooling demand is high, at which point the supply airflow is increased to meet the demand.

With single zone VAV operation, supply fan speed command is adjusted to maintain the supply fan airflow active to the supply fan airflow setpoint active. During normal operation, the supply fan airflow setpoint active is set to the supply fan airflow minimum setpoint active. If the discharge air temperature setpoint active (which adjusts based on space conditions) reaches the discharge air temperature setpoint minimum (Cooling) or Maximum (Heating), the supply fan airflow setpoint active will begin to adjust up by comparing the space temperature active to the space temperature setpoint active. As the airflow setpoint rises above minimum, the discharge setpoint is set to the respective minimum/maximum setpoint.

Supply fan airflow minimum setpoint active is a program-determined point based on factory settings, mode of operation, outdoor airflow setpoints, or other factors.

Economizer Operation

The following section describe the standard sequence of operation for economizer. Additional options are available for enabling economizer mode, such as dry bulb economizer. Contact the factory for additional information.

Economizer Mode with Supplemental Mechanical Cooling

Enthalpy (Comparative) Economizer

Units equipped with modulating outdoor/return air dampers have factory installed outdoor and return air temperature/ humidity sensors for determining economizer mode. Before allowing economizer mode, unit must be in cooling or dehumidification mode. economizer mode is enabled whenever the outdoor air enthalpy falls below the return air enthalpy (1.5 btu/lb. deadband).

During economizer mode with mechanical cooling, the outdoor air damper position opens to the maximum setpoint, and mechanical cooling is allowed to operate to achieve the discharge air temperature setpoint.

Economizer without Mechanical Cooling (Free Cooling)

Enthalpy (Comparative) Economizer

Units equipped with modulating outdoor/return air dampers have factory installed outdoor and return air temperature/ humidity sensors for determining economizer mode. Before allowing economizer mode, unit must be in cooling or dehumidification mode.

Economizer mode is enabled whenever the outdoor air enthalpy falls below the return air enthalpy (1.5 btu/lb. deadband).

Free cooling mode (without mechanical cooling) is enabled during economizer mode and when the outdoor air temperature active is 5° below the discharge setpoint active but is locked out during dehumidification mode. During free cooling, mechanical cooling is locked out, and the outdoor air damper position is modulated to maintain the discharge setpoint active.

If during free cooling mode, the damper control request reaches the minimum damper position, heating may be allowed to operate to maintain a 35° discharge air temperature to prevent supply freezing temperatures.

Ventilation Mode

Ventilation mode is used during neutral outdoor air conditions when there isn't a need for heating, cooling, or dehumidification. A demand for dehumidification locks out ventilation mode.

Space Control

Ventilation mode is enabled when the outdoor air temperature is between the high and low ventilation setpoints active (adj.), and the space temperature is within 2° of setpoint. During ventilation mode, all forms of heating, cooling, and energy recovery are disabled.

Single Zone VAV

Ventilation mode is enabled when the outdoor air temperature is between the high and low ventilation setpoints active (adj.), and the space temperature is within 2° of setpoint. During ventilation mode, all forms of heating, cooling, and energy recovery are disabled, and the supply fan runs at minimum airflow.

Discharge Air Control

Ventilation mode is enabled when the outdoor air temperature is between the high and low ventilation setpoints active (adj.). During ventilation mode, all forms of heating, cooling, and energy recovery are disabled.

Multi-Zone VAV

Ventilation mode is enabled when the outdoor air temperature is between the high and low ventilation setpoints active (adj.). During ventilation mode, all forms of heating, cooling, and energy recovery are disabled.

Dehumidification Mode

The following sections describe the standard sequence of operation based on ordered options. Additional options are available for enabling and controlling dehumidification. Contact the factory for additional information.

Space Control (Lab/Critical Application) with Outdoor Air Damper

A space dewpoint setpoint is calculated using space temperature setpoint active and space dehumidification setpoint (relative humidity). Dehumidification mode is enabled when the space dewpoint rises above the space dewpoint calculated enable setpoint (2° deadband) or when the outdoor air dewpoint rises above 53° (3° deadband). Dehumidification mode is terminated based on the setpoint deadbands or if the space becomes significantly overcooled.

During dehumidification mode, cooling is controlled to the dehumidification temperature setpoint active, and hot gas reheat (if installed) controls to the discharge air temperature setpoint active.

Dehumidification temperature setpoint active is reset by comparing the space dewpoint to the space dewpoint calculated enable setpoint but is limited to not rise above the discharge air temperature setpoint active. Discharge air temperature setpoint active is reset by comparing the space temperature to the space temperature setpoint active. If the hot gas reheat remains at 100 percent and there is insufficient reheat to meet the discharge temperature setpoint, and primary electric heat is installed, the heater may be energized to provide additional reheat.

Space Control (Lab/Critical Application) without Outdoor Air Damper

A space dewpoint setpoint is calculated using space temperature setpoint active and space dehumidification setpoint (relative humidity). Dehumidification mode is enabled when the space dewpoint rises above the space dewpoint calculated enable setpoint (2° deadband). Dehumidification mode is terminated if the space dewpoint falls below the deadband.

During dehumidification mode, cooling is controlled to the dehumidification temperature setpoint active, and hot gas reheat (if installed) controls to the discharge air temperature setpoint active. Dehumidification temperature setpoint active is reset by comparing the space dewpoint to the space dewpoint calculated enable setpoint but is limited to not rise above the discharge air temperature setpoint active. Discharge air temperature setpoint active is reset by comparing the space temperature to the space temperature setpoint active. If the hot gas reheat remains at 100 percent and there is insufficient reheat to meet the discharge temperature setpoint, and primary electric heat is installed, the heater may be energized to provide additional reheat.

Space Control without Outdoor Air Damper (100 Percent Return Air)

A space dewpoint setpoint is calculated using space temperature setpoint active and space dehumidification setpoint (relative humidity). Dehumidification mode is enabled when the space dewpoint rises above the space dewpoint calculated enable setpoint (2° deadband). Dehumidification mode is terminated based on the setpoint deadband.

During dehumidification mode, cooling is controlled to the dehumidification temperature setpoint active, and hot gas reheat (if installed) controls to the discharge air temperature setpoint active. Dehumidification temperature setpoint active is reset by comparing the space dewpoint to the space dewpoint calculated enable setpoint but is limited to not rise above the discharge air temperature setpoint active. Discharge air temperature setpoint active is reset by comparing the space temperature to the space temperature setpoint active.

If the hot gas reheat remains at 100 percent and there is insufficient reheat to meet the discharge temperature setpoint, the first circuit compressor capacity may be increased to provide additional reheat. If the reheat boost is still not able to meet the discharge air temperature setpoint and the space becomes overcooled for an extended period, dehumidification mode will be terminated to allow the heat to warm the space back to setpoint.

Space Control with Outdoor Air Damper

A space dewpoint setpoint is calculated using space temperature setpoint active and space dehumidification setpoint (relative humidity). Dehumidification mode is enabled when the space dewpoint rises above the space dewpoint calculated enable setpoint (2° deadband) or when the outdoor air dewpoint rises above 60° (3° deadband). Dehumidification mode is terminated based on the setpoint deadbands for the space dewpoint or the outdoor air dewpoint.

During dehumidification Mode, cooling is controlled to the dehumidification temperature setpoint active, and hot gas reheat (if installed) controls to the discharge air temperature setpoint active. Dehumidification temperature setpoint active is reset by comparing the space dewpoint to the space dewpoint calculated enable setpoint but is limited to not rise above the discharge air temperature setpoint active. Discharge air temperature setpoint active is reset by comparing the space temperature to the space temperature setpoint active.

If the hot gas reheat remains at 100 percent and there is insufficient reheat to meet the discharge temperature setpoint, the first circuit compressor capacity may be increased to provide additional reheat. If the reheat boost is still not able to meet the discharge air temperature setpoint and the space becomes overcooled for an extended period, dehumidification mode will be terminated to allow the heat to warm the space back to setpoint.

If the space humidity sensor is not installed or is in fault, the space dewpoint is ignored, and the unit reverts to using only outdoor air conditions to determine dehumidification, with a constant dehumidification temperature setpoint of 48°.

Single Zone VAV

A space dewpoint setpoint is calculated using space temperature setpoint active and space dehumidification setpoint (relative humidity). Dehumidification mode is enabled when the space dewpoint rises above the space dewpoint calculated enable setpoint or when the outdoor air dewpoint rises above 60° (3° deadband). Dehumidification mode is terminated based on the setpoint deadbands for the space dewpoint or the outdoor air dewpoint.

During dehumidification mode, cooling is controlled to the dehumidification temperature setpoint active, and hot gas reheat (if installed) controls to the discharge air temperature setpoint active. Dehumidification temperature setpoint active is reset by comparing the space dewpoint to the space dewpoint calculated enable setpoint but is limited to not rise above the discharge air temperature setpoint active. The discharge air temperature setpoint active and supply fan speed are reset based on space temperature. Refer to (supply fan section) to see a detailed explanation.

If the hot gas reheat remains at 100 percent and there is insufficient reheat to meet the discharge temperature setpoint, the first circuit compressor capacity may be increased to provide additional reheat. If the reheat boost is still not able to meet the discharge air temperature setpoint and the space becomes overcooled for an extended period, dehumidification mode will be terminated to allow the heat to warm the space back to setpoint.

If the space humidity sensor is not installed or is in fault, the space dewpoint is ignored, and the unit reverts to using only outdoor air conditions to determine dehumidification, with a constant dehumidification temperature setpoint of 48°.

Discharge Control with Outdoor Air Damper

Dehumidification mode is enabled when the outdoor air dewpoint rises above the outdoor air dewpoint setpoint (adj.) and is terminated when the outdoor air dewpoint falls 3° below setpoint. During dehumidification mode, cooling is controlled to the dehumidification temperature setpoint active, and hot gas reheat (if installed) controls to the discharge air temperature setpoint active.

Discharge Control without Outdoor Air Damper (100 Percent Return Air)

Dehumidification mode is enabled when the return air dewpoint rises above the return air dewpoint setpoint (adj.) and is terminated when the return air dewpoint falls 3° below setpoint. During dehumidification mode, cooling is controlled to the dehumidification temperature setpoint active, and hot gas reheat (if installed) controls to the discharge air temperature setpoint active.

Multi Zone VAV with Outdoor Air Damper

Dehumidification mode is enabled when the outdoor air dewpoint rises above the outdoor air dewpoint setpoint (adj.) and is terminated when the outdoor air dewpoint falls 3deg below setpoint. During dehumidification mode, cooling is controlled to the dehumidification temperature setpoint active, and hot gas reheat (if installed) controls to the discharge air temperature setpoint active.

Multi Zone VAV without Outdoor Air Damper

Dehumidification mode is enabled when the return air dewpoint rises above the return air dewpoint setpoint (adj.) and is terminated when the return air dewpoint falls 3° below setpoint. During dehumidification mode, cooling is controlled to the dehumidification temperature setpoint active, and hot gas reheat (if installed) controls to the discharge air temperature setpoint active.

Heating and Cooling Mode

Heating and Cooling modes are determined using a series of time-delay latches that vary based on distance from setpoint and a variable deadband. Generally, the mode of operation will be changed from cooling to heating whenever the cooling capacity is at 0 percent and the temperature is below the setpoint minus the deadband, occupied offset. Vice-versa when switching from heating to cooling mode.

Heating Mode

During heating mode, the entire range of heating capacity is done in “stages” of each component, with each “stage” stacking on top of the previous one to achieve the total heating capacity. The stages of heat, in order from first to last, are: ERV, heat pump, primary heat, and finally secondary heat. The heat types installed on a unit can be all, none, or any combination of those. This section describes normal heating operation, but each component has a dedicated operation for specifics on how they're controlled.

During heating mode, each of the various heat capacities are controlled to the discharge air temperature setpoint active. To see a detailed explanation of how each component is controlled, refer to the section that describes each component in detail.

Energy Recover Wheel Variable Effectiveness

First, the energy recovery wheel is used as variable effectiveness by modulating exhaust airflow across the ERV using the bypass damper. Once energy recovery is at full capacity (exhaust air bypass fully closed), the next stage of heat is engaged after a delay, and the exhaust air bypass remains fully closed while the next stage of heat is in operation.

Heat Pump

Heat pump is engaged, and compressor staging begins by modulating the compressor heating capacity to the discharge air temperature setpoint active. As the compressor heating reaches 100 percent capacity (or disabled under some other function), the next stage of heating (if available) is engaged, and the heat pump capacity remains locked at 100 percent.

Primary Heat

The primary heater is engaged, and heating capacity is modulated to the discharge air temperature setpoint active.

Secondary Heat (Pre-Heat)

Once all other stages of heat have been applied and operating at 100 percent capacity, the secondary electric heater is used as additional heat capacity.

Cooling Mode

During cooling mode, cooling capacity controls to discharge air temperature setpoint active. For more information on compressor staging, see section [Additional Features].

Exhaust Fan Starting Sequence

Starting Sequence with Isolation (Actuated) Dampers

Isolation dampers are actuator-controlled dampers with end switches. During initial start-up, the isolation damper(s) are energized, and the exhaust fan is started after the end switch(es) are made on the actuators. On initial start-up, the exhaust fan speed is set to 50 percent signal for the first 30-seconds of operation.

Starting Sequence with Gravity or Barometric Dampers

Gravity dampers are either a weighted (barometric) or non-weighted (gravity) damper. The powered exhaust fan starts immediately on a call for exhaust and the dampers are opened using the airflow from the exhaust. On initial start-up, the exhaust fan speed is set to 50 percent signal for the first 30-seconds of operation.

Exhaust Fan Operation

Return Duct Static Pressure Control

Standard on units equipped with exhaust fan(s) and modulating outdoor/return air dampers with economizer. A differential return duct static pressure transducer is factory provided, field installed.

After completing the exhaust fan start-up sequence, the exhaust fan controls to the space static pressure setpoint (0.25" WC default, adj.).

When there is no demand for the exhaust fan, the fan will operate at minimum speed for 5-minutes before disabling the fan. The isolation exhaust dampers (if installed) will be closed after the exhaust fan is disabled.

Constant Volume Control

Standard on units equipped with exhaust fan(s), and with two-position outdoor/return air dampers (not modulating with economizer, and with airflow monitoring (piezo) on the exhaust fan.

After completing the exhaust fan start-up sequence, the exhaust fan will control to a constant airflow based on the exhaust airflow setpoint (preset from the factory).

Care must be taken to not increase the exhaust airflow setpoint above the maximum limit of the energy recovery wheel (if installed), which will cause premature failure of the motor and/or bearings.

Constant Speed Control

Standard on units equipped with exhaust fan(s), and with two-position outdoor/return air dampers (not modulating with economizer, and without exhaust airflow monitoring).

After completing the start-up sequence, the exhaust fan(s) will operate at a constant speed setting, exhaust fan speed setpoint (adj., 80 percent default), which will operate the exhaust fan(s) at that percentage of the maximum hz setting in the VFD.

Energy Recovery Wheel (ERV)

The energy recovery wheel is used to pre-condition the outdoor air using energy recovered from the exhaust air. All units equipped with an ERV will be provided with modulating bypass dampers on both the outdoor and exhaust air paths. During occupied operation, ERV is typically on/off, with variable speed via an optional VFD. The ERV operates during occupied operation except during ventilation or economizer mode.

Stop Jog

During ventilation or economizer mode, there is a stop/jog sequence to prevent stagnant air from causing a musty smell on the ERV. After 30-continuous minutes of economizer or ventilation operation, the outdoor air damper is closed to its minimum position, the bypass dampers are closed, and the ERV is enabled for 2 minutes.

Exhaust Air Bypass Damper Control

As described in the heating mode section, the exhaust air bypass damper is used to modulate heat recovery as the first stage of heating. During heating mode, the exhaust bypass damper is modulated to maintain the discharge air temperature setpoint. The bypass damper is set to fully open whenever the ERV is disabled.

If the bypass damper is fully open and the unit is still overheating the discharge air temperature, the ERV will be cycled on/off to maintain the discharge air temperature setpoint active, with extended minimum on/off times to prevent short cycling.

Outdoor Air Bypass Damper Control (without VFD on ERV)

The outdoor air bypass on the energy recovery wheel is used as frost control for the ERV during low ambient conditions. The damper is modulated open whenever the exhaust leaving temperature (located downstream of the ERV) falls below 15°. The bypass damper is set to fully open whenever the ERV is disabled.

If the unit is equipped with an electric pre-heater, the heater is first used as the frost prevention method before using the outdoor air bypass damper. See pre-heat section for additional information.

If the bypass damper is open to 100 percent and the discharge air temperature is still above setpoint, the wheel may perform a start/stop sequence to reduce the capacity further. The wheel has a 10-minute minimum on/off time during this sequence to prevent short-cycling.

Outdoor Air Bypass Damper (with VFD on ERV)

The outdoor air bypass and VFD on the ERV is used as frost control for the ERV during low ambient conditions. First, the ERV speed is reduced whenever the exhaust leaving temperature (after ERV) falls below 15°. Once the ERV reaches minimum speed and the exhaust temperature is still below 15°, outdoor air bypass damper is modulated open and the ERV remains at minimum speed. The bypass damper is set to fully open whenever the ERV is disabled.

If the unit is equipped with an electric pre-heater, the heater is first used as the frost prevention method before using the wheel speed or the outdoor air bypass damper. See (preheat section) for additional information.

Additional Details on Operation

Evaporator Coil Frost Protection

All units equipped with compressors will have a suction pressure transducer on at least the first circuit. Since the evaporator coils are generally interlaced for dual circuit units, circuit 1 suction pressure is generally a good indication of both

circuits. But, in some cases, the second circuit may also have a suction transducer for expanded frost protection, depending on configuration, such as dual digital scroll.

During compressor operation, the frost control first attempts to limit the modulating capacity (variable or digital scroll, either circuit) before disabling compressors. The expectation is that if there's a demand for cooling below the point at which the unit will freeze, then the unit will actively control to the point just above that point. Generally, this frost point is 95-100psi (29-32° saturated) at the compressor but may vary slightly depending on operating conditions and unit configuration.

Hot Gas Reheat

Hot gas reheat is fully modulating from 0 to 100 percent, utilizes waste energy absorbed from the evaporator coil on circuit 1, and is used to temper the discharge air temperature during dehumidification or some cases, during cooling mode. Because it uses waste heat that would have been rejected through the condenser, it requires the refrigerant circuit to be operational to provide heat. The hot gas reheat coil is located downstream of the evaporator before the supply fan.

When enabled, the hot gas reheat valve command is adjusted to maintain the discharge air temperature setpoint active and is always enabled during dehumidification mode.

Hot Gas Reheat Operation with Standard Scroll Compressors

Units equipped with only standard scroll compressors (not digital scroll or variable speed) will enable the hot gas reheat during cooling mode to provide precise temperature control since staged compressors do not have modulating capacity to maintain a temperature. Compressor control is determined by offset the discharge setpoint down, and the compressors stage to that temperature off the evaporator. The amount of offset and deadband is determined by the number of compressor stages to reduce cycling. In summary, the compressors to a temperature just below the discharge air temperature setpoint active, and the hot gas reheat is enabled, controlling to the discharge air temperature setpoint active.

For 1 or 2 compressors, the deadband will be 5°; for 3 or 4 compressors, the deadband will be 5°. The setpoint offset will be half the deadband.

Hot Gas Reheat Operation with Modulating Capacity Compressors

Units equipped with modulating compressors (digital scroll or variable speed) on the first circuit will enable the hot gas reheat only during dehumidification mode. During dehumidification mode, the compressors control to the dehumidification temperature setpoint active, and the hot gas reheat controls to the discharge air temperature setpoint active.

Hot Gas Reheat Purge Mode

When utilizing hot gas reheat, the unit must initiate a purge mode to return oil back to the compressor(s). This purge operation has been improved to reduce the impact on the discharge air temperature, while still providing sufficient velocity for oil return.

Upon entering the purge mode, the last setting is saved so that the unit can return to that position immediately without having to wait for it to adjust down. The valve position is set to 0 percent in the final moments of the purge cycle to quickly cool off the coil to reduce the impact on the supply air conditions.

Parallel Piped Reheat Circuit (Parallel to Condenser)

After 30 cumulative minutes above 0 percent, a 4-minute purge cycle is initiated. During Hot Gas Reheat Purge Mode, the Hot Gas Reheat Valve Command is slowly ramped up to 90 percent for 2.5-minutes, and then ramped down to 0 percent for the remaining 2.5-minutes.

Series Piped Reheat Circuit (Series with Condenser)

After 30 cumulative minutes above 0 percent, a 4-minute purge cycle is initiated. During hot gas reheat purge mode, the hot gas reheat valve command is slowly ramped up to 90 percent for 3-minutes, and then ramped down to 0 percent for the remaining minute.

Heat Pump Operation

On heat pumps, the reversing valve's default (de-energized) state is in the heating position. On initial start-up, if there's a cooling demand, the reversing valve will switch into the cooling position after the compressor status has been proven. If the unit remains in cooling mode, but the first compressor is being cycled, the reversing valve remains energized in the cooling position, even while the compressor is off.

Once there is a heating demand following cooling operation, the compressor typically won't be operating during the switching of modes. To prevent the reversing valve from being stuck, the valve will remain in the cooling position until the compressor status is proven. Units with other forms of heating, such as an energy recovery wheel, may show that the reversing valve is in cooling mode for an extended period during heating mode.

Power Failure

If the reversing valve switches while the compressor is not operating, such as during a power failure, the reversing valve will be toggled between heating and cooling after the compressor is restarted to confirm that the valve is properly seated in its position.

Supplemental Primary Heat

During heat pump operation, if the compressor heating capacity reaches 100 percent and there is insufficient heating capacity to meet the discharge air setpoint, the primary heater will be engaged to supplement the discharge air temperature. While the primary heat is engaged, the heat pump will be locked at full capacity.

Air Source Heat Pumps

Frost Avoidance

During heating mode, outdoor air dewpoint is measured, and suction pressure is monitored using transducers installed on each refrigeration circuit. Using the measured saturated refrigerant temperature, the compressor capacity is modulated to maintain the saturated temperature slightly above the outdoor air dewpoint. This allows the circuit to run for an extended period without requiring defrost cycles. The frost avoidance operation is disabled when the saturated temperature rises above freezing.

Frost avoidance is used only on circuits with modulating capacity, such as digital scroll, variable, or even staged compressors, but not on single stage circuits. This operation is restricted if the outdoor air dewpoint is within 5° of the outdoor air temperature (~80 percentRH), as the limitation on the compressor capacity typically causes additional energy consumption with the primary heater.

Defrost Mode

With the frost avoidance method, defrost cycles occur infrequently, and a typical defrost cycle lasts less than 5 minutes on average.

Defrost mode for the outdoor coil occurs whenever the temperature difference between the outdoor air temperature and the saturated temperature rises above a pre-determined point that indicates heavy frost accumulation has occurred. This setpoint varies based on a variety of factors but is generally around a 25° difference.

During defrost mode, the reversing valves are switched to cooling, outdoor fans are disabled, the compressor staging is locked to prevent compressors from turning off or on, and any modulating compressors are taken to 80 percent command. After the coil is defrosted, the condenser fans are enabled to minimum flow to allow continued drying of the coil, before switching the reversing valve back to heating and returning the condenser fans back to full capacity.

The primary heater (if installed) will be engaged during defrost operation and control to the discharge air temperature setpoint active. The primary heater has full modulating during compressor operation.

Split/Dual Exhaust and Return Air Paths

Units equipped with dual air paths for the return and exhaust will have an additional function in addition to the exhaust fan operation. During all operating conditions, the exhaust fan controls to a pressure differential across the damper between the two air paths to always have air leakage from the return, into the exhaust, so that bathroom exhaust does not leak into the return air stream. During economizer mode, the damper between the two paths will open fully, closing the return air damper, and exhausting all of the air through the ERV and out through the exhaust air.

Start-Up Form

Trane® Horizon™ DOAS

Job Name						
Unit Serial Number						
Unit Tag						
Technician Name						
Horizon Tech Training Completed	☐	Yes	☐	No	Date Completed:	
Start-up Date						

To get a digital copy of this form, please email horizonstartup@kccmfg.com. For further questions please contact the factory at (502) 493-5757 or (800) 382-2872.

Note: *Cooling start-up instructions have changed from previous versions.*

Pre-Start-Up Checklist

- ☐ Checked for visible shipping damage.
- ☐ Unit is level.
- ☐ All fans spin freely.
- ☐ Interior cabinet inspected for damage or loose components.
- ☐ Clearances meet minimum requirements in IOM.
- ☐ Wiring schematics installed on front door.
- ☐ Condensate drains and P-Traps installed.
- ☐ All doors open freely.
- ☐ All electrical connections tight.
- ☐ Verify voltage on phase monitor matches incoming voltage to the unit.
- ☐ Verify phase unbalance on phase monitor. (Phase unbalance should be set to 3%)
- ☐ All field installed devices are installed

Voltages

Rated Voltage	Measured	Recommended
Voltage L1-L2		Voltage +/- 10%
Voltage L1-L3		Voltage +/- 10%
Voltage L2-L3		Voltage +/- 10%
Voltage L1-G		-
Voltage L2-G		-
Voltage L3-G		-
TNS2 Secondary Voltage		22-28

Motor Data

Motor	Model Number	Rated HP/kW	Rated FLA	Running FLA		
				L1	L2	L3
Supply Fan 1						
Supply Fan 2						
Exhaust Fan 1						
Exhaust Fan 2						
Condenser Fan 1						
Condenser Fan 2						
Condenser Fan 3						
Condenser Fan 4						
Condenser Fan 5						
Condenser Fan 6						
Energy Wheel						

Compressor Data

	Model Number	Serial Number	Rated Amps	Running Amps		
1						
2						
3						
4						
5						
6						

Actuators

Actuator Name	Control	Operation Verified
Outdoor Air Damper Actuator	2-Position or 2-10 Vdc	☐
Return Air Damper Actuator	2-Position or 2-10 Vdc	☐
Exhaust Damper Actuator(s)	2-Position	☐
Split Exhaust/Return Damper Actuator	2-Position	☐
Outdoor Air ERV Bypass Damper Actuator	2-10 Vdc	☐
Exhaust Air ERV Bypass Damper Actuator	2-10 Vdc	☐
WSHP Water Valve Actuator(s)	2-10 Vdc	☐
Chilled Water Valve Actuator (Field Supplied)	-	☐
Hot Water Valve Actuator (Field Supplied)	-	☐

Refrigeration Start-Up

Test Procedures

Important: *Cooling start-up can only be completed if the outdoor air temperature is 65-105°F. If outdoor air temperature is below 65°F, a bump test can be performed with 100 percent return air to confirm operation. Contact factory before adjusting charge.*

1. Test each circuit independently.
2. Tandem or trio circuits must have all compressors on, and digital scroll/variable speed commands set to 100 percent.
3. Outdoor Air Damper open to 100 percent, Return Air Damper closed (if installed).
4. Disable energy recovery wheel (if installed).
5. Purge the hot gas reheat coil (if installed) by setting the hot gas reheat command to 100 percent for one minute, and then immediately to 0 percent.
6. Allow the head pressure control to modulate the condenser fans freely.
7. Take measurements under “Cooling” once the system has settled.
8. If the first circuit has a VFD on compressor 1 (variable speed compressor), repeat the measurements with the variable speed signal at 0 percent and hot gas reheat at 100 percent.
9. Heat Pumps: Switch reversing valve to heating, repeat steps 1 to 8 for heating mode except with hot gas reheat at 100 percent. Take measurements under the “Heating” section.
10. Repeat for Circuit 2.
    a. Both circuits can be tested at the same time if outdoor air temperature is between 80-100°F.

☐ Check if test data below is with both circuits in operation.

Expectations: The subcooling may vary depending on outdoor air conditions and whether the unit is controlling the head pressure for dehumidification mode or cooling mode. In general, we expect that the subcooling will be higher on cooler days and lower on warmer days. During dehumidification mode, the head pressure setting is higher to improve reheat capacity and will generally have higher subcooling during testing because the hot gas reheat is manually being closed.

		Circuit 1		Circuit 2		Cir 1 VS Test 2
		Cooling	Heating	Cooling	Heating	
Outdoor Temp (°F)						100
Outdoor RH (%)						100
Hot Gas Reheat Signal (%)				-	-	100
Suction Line	Pressure (PSI)					100
	Sat. Temp (°F)					100
	Temp (°F)					100
	Superheat (°F)					100
Liquid Line	Pressure (PSI)					100
	Sat. Temp (°F)					100
	Temp (°F)					100
	Subcooling (°F)					100
Evaporator Leaving Temp (°F)						100
Refrigerant Charge +/- (Contact factory before +/-)						100
WSHP Only	Entering Water Temp (°F)					100
	Leaving Water Temp (°F)					100
	Water Coil Pressure Drop (PSI)					100

Indirect Fired Gas Heat Start-Up

Furnace Data

Gas heat start-up can be completed only if the outdoor air temperature is below 90°F.

	Serial Number	Model Number
Furnace 1		
Furnace 2		
Furnace 3		

Gas Pressure Settings

	Measured Pressure	Natural Gas Settings	Propane Settings	
Incoming to Unit		7 – 14	11 – 14	in.H_2O.
Between On/Off and Mod. Valve		5	10.5	in.H_2O.
Stage 1 Manifold (Low Fire)		0.4	1 – 2[(a)]	in.H_2O.
Stage 1 Manifold (High Fire)		3.5	8	in.H_2O.
Stage 2 Manifold		3.5	8	in.H_2O.
Stage 3 Manifold		3.5	8	in.H_2O.

(a) Because propane quality varies greatly from site to site, the desirable minimum fire setting can vary. Typically, the setting is between 1 to 2 in. WC range. Start at 2 in. WC at low fire and adjust the flame down based on appearance. Confirm that the flame does not go out by modulating the signal up and down.

Electric Heat Start-Up

Heater Data

		Primary Heater	Pre-Heater
Item Number			
Rated kW			
Rated Amps			
Running Amps	L1		
	L2		
	L3		

Direct Fired Gas heat Start-Up

1. Confirm unit airflow by measuring and recording the burner pressure drop. See table below.

OAT° F	Burner Pressure Drop in. wc	OAT° F	Burner Pressure Drop in. wc
o	.720	55	.643
5	.712	60	.637
10	.705	65	.631
15	.697	70	.625
20	.690	75	.619
25	.683	80	.613
30	.676	85	.608
35	.669	90	.602
40	.663	95	.597
45	.656	100	.592
50	.650		

2. Check inlet gas pressure and confirm gas flow to unit.
3. Test operating heating modes and record ΔT at
   a. Low Fire
      i. Start unit supply fan only and set heat capacity to 0 percent.
      ii. Confirm 10° temp rise on Discharge temp.
      iii. If ΔT < or >10°-12°, manually adjust ball valve attached to Belimo actuator until desired ΔT achieved.
   b. High Fire
      i. Set heat capacity to 100 percent.
      ii. Confirm 100° temp rise on Discharge temp.
      iii. If ΔT < or >100°, manually adjust ball valve attached to Belimo actuator until desired ΔT achieved.

OA Temp °F	
Burner Pressure Drop in. wc	
Gas Pressure at PG1	
Low Fire ΔT	
High Fire ΔT	

Final Notes

Is there something missing or do you have recommendations on improvements?

Note here if the outdoor air temperature is too low for cooling testing.

Submit completed form to horizonstartup@kccmfg.com

Include serial number and job name in subject of email.

Limited Warranty

1-Year Manufacturer Parts Warranty

Horizon Models

This warranty is extended to the original purchaser and to any succeeding owner of the real property to which the Horizon unit is originally affixed and applies to products purchased and retained for use within the U.S.A. and Canada. The Company warrants for a period of 12 months from initial start-up or 18 months from date of shipment, whichever is less, that the company products covered by this order (1) are free from defects in material and workmanship and (2) have the capacities and ratings set forth in the Companys catalogs and bulletins.

Warrantors obligations and liabilities under this warranty are limited to furnishing F.O.B. warrantor factory or warehouse at warrantor designated shipping point, freight allowed to buyers city, replacement parts for warrantors products covered under this warranty. Warrantor shall not be obligated to pay for the cost of lost refrigerant. No liability shall attach to warrantor until products have been paid for and then liability shall be limited solely to the purchase price of the equipment under warranty shown to be defective.

This warranty shall not apply to any equipment which has been repaired or altered in such manner as, in the judgment of the Company, affects its stability or reliability. Nor does it cover corrosion, erosion, deterioration or damage due to accident, abuse, external causes, or freezing. This warranty is conditioned upon the equipment operating under normal use and service. A written notice of material considered defective under this warranty shall be given to the Company. No liability whatever shall attach to the Company until said products have been paid for and then said liability shall be limited to the purchase price of the equipment shown to be defective.

THE WARRANTY AND LIABILITY SET FORTH HEREIN ARE IN LIEU OF ALL OTHER WARRANTIES AND LIABILITIES, WHETHER IN CONTRACT OR IN NEGLIGENCE, EXPRESS OR IMPLIED, IN LAW OR IN FACT, INCLUDING IMPLIED WARRANTIES OF MERCHANTABILITY AND FITNESS FOR PARTICULAR USE, AND IN NO EVENT SHALL WARRANTOR BE LIABLE FOR ANY INCIDENTAL OR CONSEQUENTIAL DAMAGES.

In no event shall KCC International Inc. be liable for any incidental or consequential damages. This exclusion applies regardless of whether such damages are sought based on breach of warranty, breach of contract, negligence, strict liability in tort, or any other legal theory. Should KCC International Inc. nevertheless be found liable for any damages, they shall be limited to the purchase price of the equipment.

* This warranty is for commercial usage of said equipment and not applicable when the equipment is used for a residential application. Commercial use is any application where the end purchaser uses the product for other than personal, family or household purposes.

Notes

Trane - by Trane Technologies (NYSE: TT), a global climate innovator - creates comfortable, energy efficient indoor environments for commercial and residential applications. For more information, please visit trane.com or tranetechnologies.com.

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