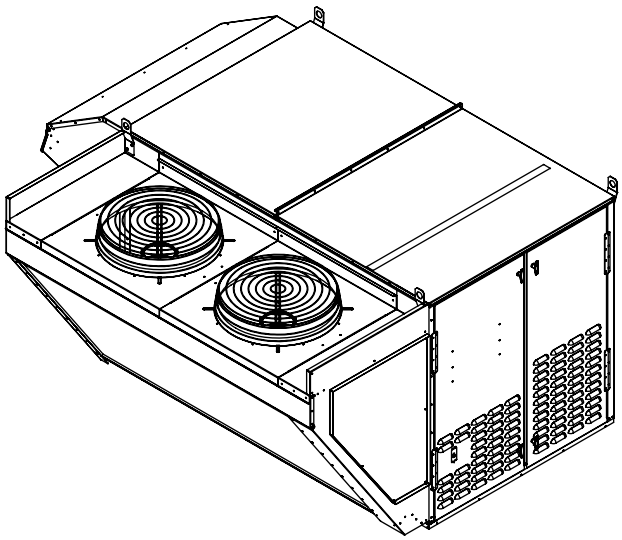
Installation, Operation, and Maintenance

Horizon™ Outdoor Air Unit

Indirect Gas-Fired/Electric Heat

Models: OA1D, OA2D, OA3D



Important: *Proper execution 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.

April 2014 **OAU-SVX01E-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-including industry replacements for CFCs such as HCFCs and HFCs.

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. 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 electrical codes.

⚠WARNING

Personal Protective Equipment (PPE) Required!

Installing/servicing this unit could result in exposure to electrical, mechanical and chemical hazards.

- **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 Material Safety Data Sheets (MSDS)/Safety Data Sheets (SDS) and OSHA guidelines for proper PPE.**
- **When working with or around hazardous chemicals, ALWAYS refer to the appropriate MSDS/SDS and OSHA/GHS (Global Harmonized System of Classification and Labelling 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.**

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

⚠ WARNING

Contains Refrigerant!

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.

Failure to follow proper procedures or the use of non-approved refrigerants, refrigerant substitutes, or refrigerant additives could result in death or serious injury or equipment damage.

⚠ WARNING

Hazard of Explosion and Deadly Gases!

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. Failure to follow all proper safe refrigerant handling practices could result in death or serious injury.

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Trademarks

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Revision History

OAU-SVX01E-EN (17 Apr 2014)

- Model number updates

Table of Contents

Model Number Descriptions

O	A	2	D	3	0	0	A	4	-	D	1	A	1	A	0	G	M	-	G	1	K	B	0	A	C	3	C	J	-	A	4	1	B	1	0	2	A	0
1	2	3	4	5	6	7	8	9	10	11	12	13	14	15	16	17	18	19	20	21	22	23	24	25	26	27	28	29	30	31	32	33	34	35	36	37	38	39

Horizon Outdoor Air Unit

Digit 1, 2 — Unit Type

OA = Outdoor Air

Digit 3 — Cabinet Size

1 = 625 cfm–4,000 cfm
2 = 1,500 cfm–9,000 cfm
3 = 3,750 cfm–13,500 cfm

Digit 4 — Major Design Sequence

C = Revision 4
D = Revision 5
E = Heat Pump

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

000 = No Cooling
060 = 5 Tons High Efficiency
072 = 6 Tons High Efficiency
084 = 7 Tons High Efficiency
096 = 8 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
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

Digit 8 — Minor Design Sequence

A
B

Digit 9 — Voltage Selection

1 = 115/60/1
2 = 208-230/60/1
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
A = DX 3-Row
B = DX 4-Row
C = DX 4-Row Interlaced
D = DX 6-Row Interlaced
E = DX 8-Row
F = Glycol/Chilled Water Coil
G = DX 4-Row with MSP® Technology

Digit 12 — Hot Gas Reheat

0 = No HGRH
1 = Fin and Tube Modulating
2 = Fin and Tube On/Off
3 = Microchannel Modulating
4 = Microchannel 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)

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
5 = Air-Cooled Microchannel
6 = Air-Cooled Microchannel w/Head Pressure On/Off Control
7 = Air-Cooled Microchannel 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
C = ERCC Valve on 1st Circuit
D = ERCC Valve on 1st and 2nd Circuit
E = HGBP Valve on 1st Circuit
F = HGBP Valve on 1st and 2nd Circuit

Digit 16 — Indoor Fan Motor (IFM)

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

Digit 17 — Indoor Fan Wheel

A = 122
B = 122.6
C = 150
D = 150.6
E = 165
F = 165.6
G = 182
H = 182.6
J = 200
K = 200.6
L = 182 X 2
M = 182.6 X 2

Digit 18 — Indoor Fan Motor Power (hp)

A = 1/2 hp—1800 rpm
B = 1/2 hp—3600 rpm
C = 3/4 hp—1800 rpm
D = 3/4 hp—3600 rpm
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)
B = Direct-Fired (DF)
C = Electric—4-Stage
D = Electric—SCR Modulating
E = Dual Fuel (PRI-IF/SEC-DF)
F = Dual Fuel (PRI-ELEC/SEC-DF)
G = Dual Fuel (PRI-IF/SEC-ELEC)
H = Dual Fuel (PRI-ELEC/SEC-ELEC)
J = Hot Water
K = Steam

Digit 21 — Primary Fuel Type

0 = No Heat
1 = Natural Gas
2 = Propane
3 = Electric—Open Coil
4 = Electric—Sheathed Coil
5 = Hot Water
6 = Steam

Digit 22 — Heat Capacity (Primary Heat Source)

Digit	IF	ELEC
0	No Heat	No 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
X	Special Heater Option	

Digit 23 — Heat Capacity (Secondary Heat Source)

Digit	IF	ELEC	DF
0	No Heat/No Secondary Heat		
A	50 MBh	10 kW	300 MBh
B	75 MBh	20 kW	600 MBh
C	100 MBh	24 kW	900 MBh
D	125 MBh	28 kW	1200 MBh
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 Cabinet, Basepan, Eco-Coated Coils
2 = S/S Cabinet, Basepan
3 = S/S Basepan, Eco-Coated Coils
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 Condenser, Evap, HGRH Coils

Digit 25, 26 — Unit Controls

00 = Non-DDC—Electromechanical
AA = Trane—Discharge Air Control w/LON Read-Write w/Display
AB = Trane—Space Control w/LON Read-Write w/Display
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
AH = Trane—Discharge Air Control w/BACnet w/Display
AI = Trane—Discharge Air Control w/LON Read-Write (No Display)
AJ = Trane—Space Control w/LON Read-Write (No Display)
AK = Trane—Multi-Zone VAV Control w/LON Read-Write w/Display
AL = Trane—Multi-Zone VAV Control w/BACnet w/Display
AM = Trane—Multi-Zone VAV Control w/LON Read-Write (No Display)
AN = Trane—Multi-Zone VAV Control w/BACnet (No Display)
AO = Trane—Single-Zone VAV Control w/LON Read-Write w/Display
AP = Trane—Single-Zone VAV Control w/BACnet w/Display
AQ = Trane—Single-Zone VAV Control w/LON Read-Write (No Display)
AR = Trane—Single-Zone VAV Control w/BACnet (No Display)

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)
3 = Belt Drive
4 = Belt Drive w/VFD
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 = 122
B = 122.6
C = 150
D = 150.6
E = 165
F = 165.6
G = 182
H = 182.6
J = 200
K = 200.6
L = 182 X 2
M = 182.6 X 2

Digit 29 — Powered Exhaust Fan Motor Power

0 = No Powered Exhaust
A = 1/2 hp—1800 rpm
B = 1/2 hp—3600 rpm
C = 3/4 hp—1800 rpm
D = 3/4 hp—3600 rpm
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 — Reserved for Future Use

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
1 = 3014
2 = 3622
3 = 4136
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

Model Number Descriptions

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
M = MERV-8 30%, ALM, and TCACS
N = MERV-13 80%, ALM, and TCACS
P = MERV-14 95%, ALM, and TCACS
Q = MERV-8 30%, MERV-13 80%, ALM, and TCACS
R = MERV-8 30%, MERV-14 95%, ALM, and TCACS
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 Detector

Digit 36 — Electrical Options

0 = Non-Fused Disconnect
A = Fused Disconnect Switch
B = Non-Fused Disconnect w/Convenience Outlet
C = Fused Disconnect Switch w/Convenience Outlet
D = 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

Digit 37 — Air Flow 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 and
C = Hailguards and LED Service Light

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 unit's 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. 6). 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 unit's 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 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 three minutes of operation, the compressor for that circuit will be locked out, and a manual reset will be required to restart the compressor.

Refrigerant Circuits

For 5–7 ton units, one refrigerant circuit shall incorporate a standard 6-row coil. For 8–54 ton units, two independent refrigerant circuits shall incorporate an interlaced coil. All circuits shall have thermal expansion valves (TXVs), service pressure ports and refrigerant line filter driers as standard. An area will be provided for replacement suction line driers. Refrigerant circuit one (1st Stage) is equipped with a factory installed and preset refrigerant capacity control (RCC) to prevent evaporator coil temperatures below approximately 38°F (114 lb suction). The refrigerant capacity device is not installed when the unit is equipped with a digital scroll.

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 temperature sensor (BAYSENS036A) and humidity to control space cooling, heating and dew point. Refer to "Space Control with Indirect Gas-Fired or Electric Heat and Modulating HGRH, ERV, and Powered Ex.," p. 21 for specific details.

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 (MDTS) is 90°F (adj 70–100°F), the unit will be shut down, and require a manual restart if Discharge Air Temperature exceeds MDTS for 10 minutes (adj 10–25 minutes). If DAT exceeds Discharge Air High Temperature Cutoff (DHCS) of 125°F for 10 minutes, 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. Refer to "Sequence of Operation," p. 21 for detailed unit control and operational modes.

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. Refer to the "Sequence of Operation," p. 21 for detailed unit control and operational modes.

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 is factory equipped with provisions to accept an optional field installed 100 percent return air damper controlled by a direct coupled actuator that is electrically interlocked with the outdoor air damper.

Modulating Indirect Gas-Fired Burner

The unit will have fully modulating, high turndown, indirect gas-fired 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 430 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 shutoff 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 fully modulating, SCR, or Vernier-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. 25.

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.

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 carrier's 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 unit's 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 unit's heater for temporary heat without first completing the start-up procedure detailed in "Start-Up," p. 36.

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

Unit Clearances

"Unit Clearances, Curb Dimensions, and Dimensional Data," p. 12 contains figures that illustrate the minimum operating and service clearances for either a single or multiple unit installation: Figure 1, p. 12 and Figure 2, p. 12 for OA1 units,Figure 7, p. 14 through Figure 10, p. 15 for OA2 units, and Figure 15, p. 16 through Figure 18, p. 17 for OA3 units. 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!

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

OA1 Units

Unit Clearances

Figure 1. Typical installation clearances for OA1 unit

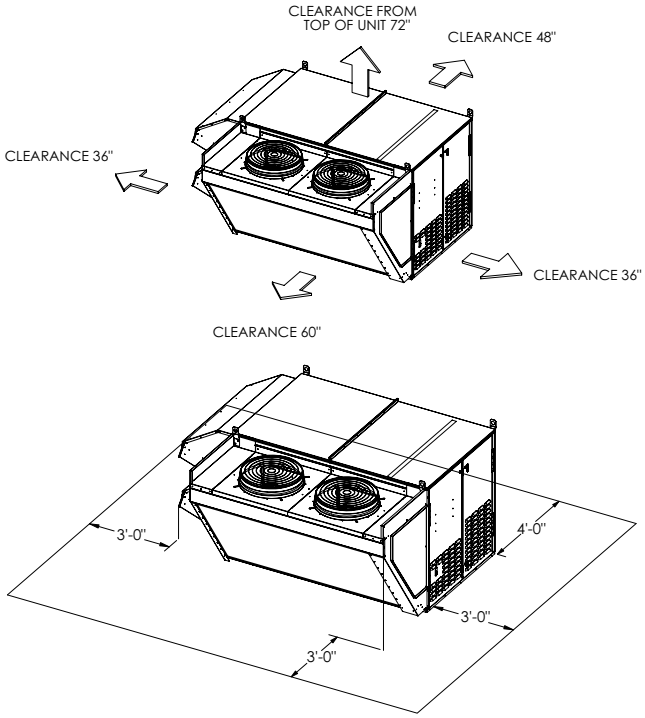
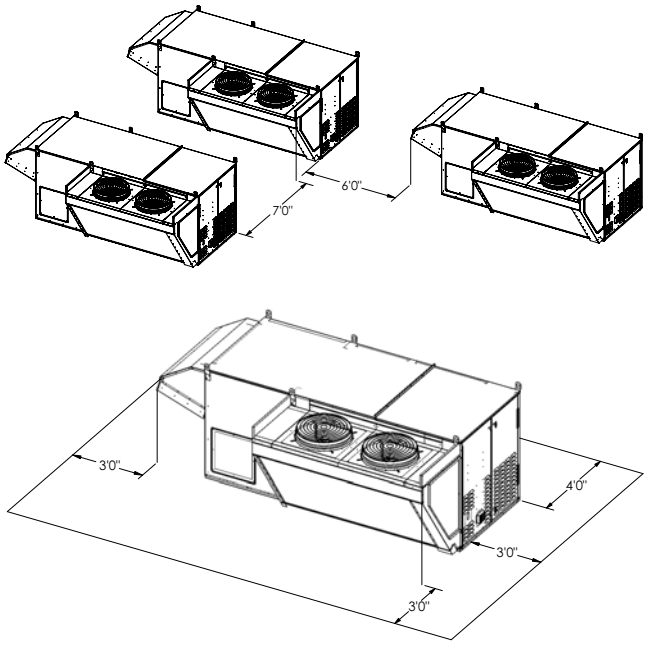


Figure 2. Typical installation clearances for OA1 unit with auxiliary cabinet



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

Curb Dimensions

Figure 3. Unit curb data for OA1 5–15 tons

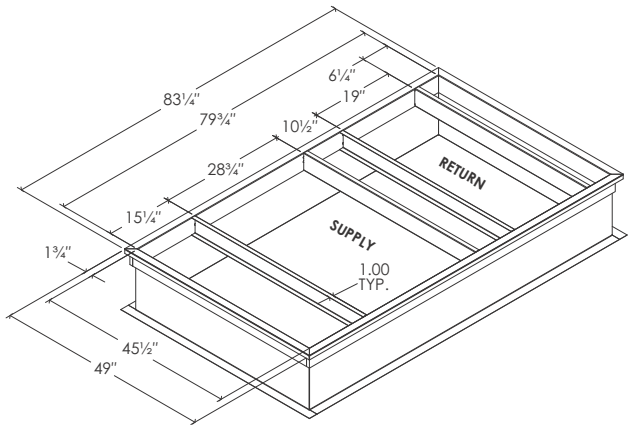
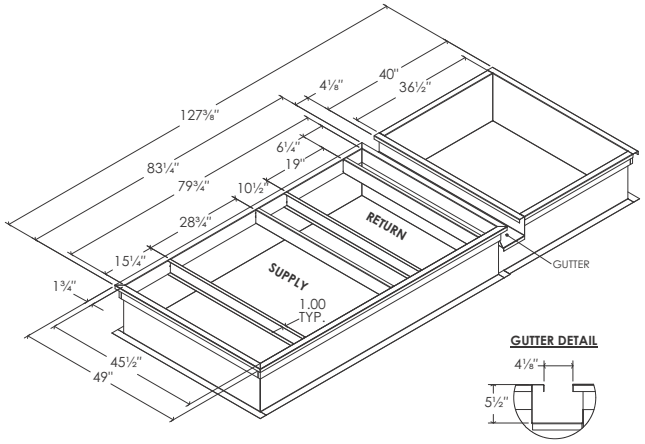


Figure 4. Unit curb data for OA1 5–15 tons with auxiliary cabinet



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

Dimensional Data

Figure 5. Unit dimensional data for OA1 5–15 tons (in.)

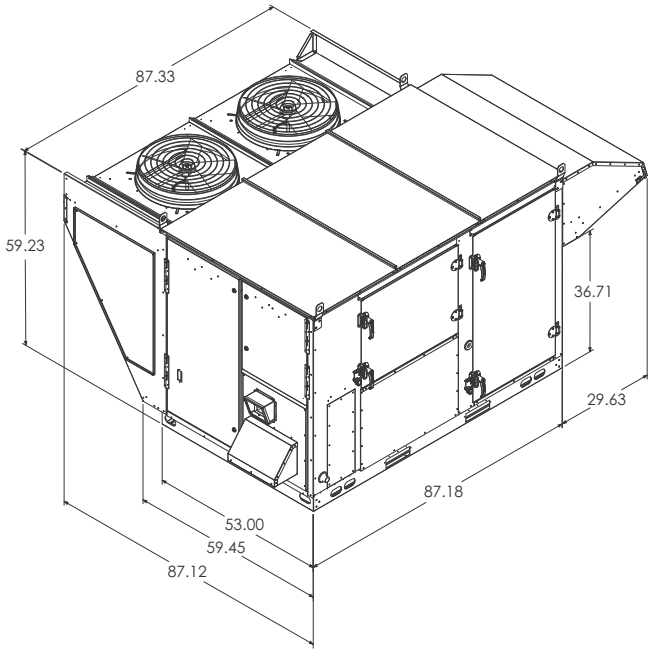
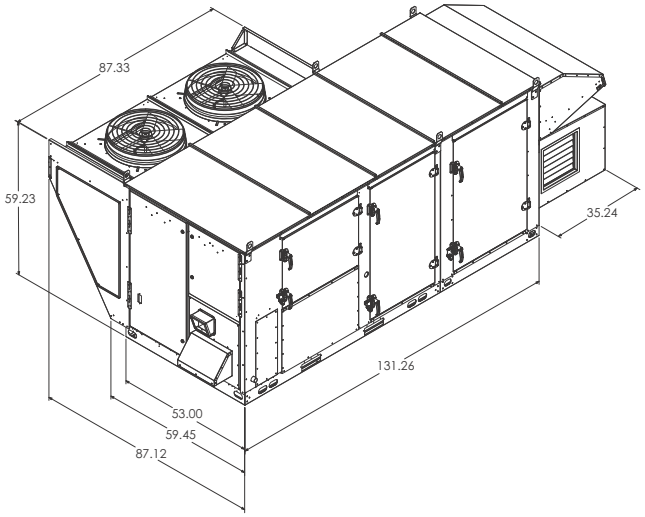


Figure 6. Unit dimensional data for OA1 5–15 tons with auxiliary cabinet (in.)



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

OA2 Units

Unit Clearances

Figure 7. Typical installation clearances for OA2 unit

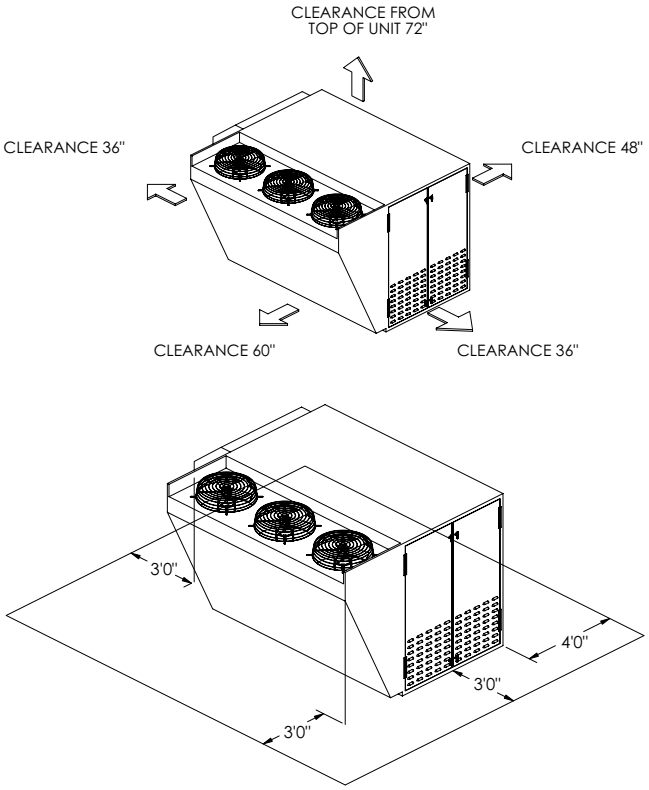
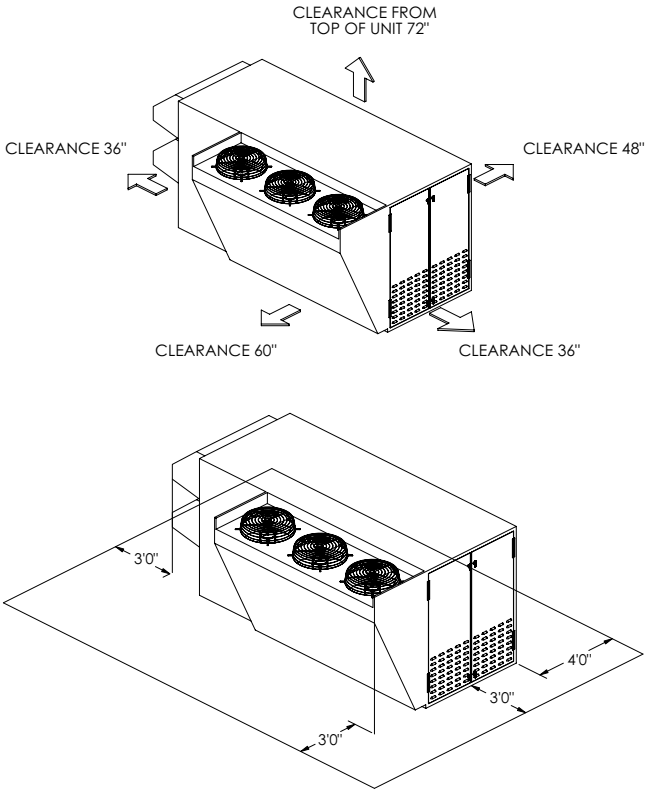


Figure 8. Typical installation clearances for OA2 unit with auxiliary cabinet



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

Figure 9. Typical installation clearances for OA2 unit

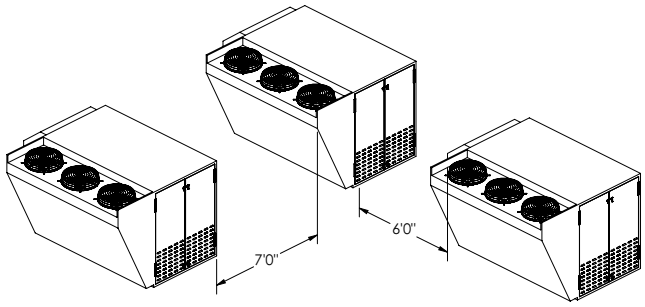
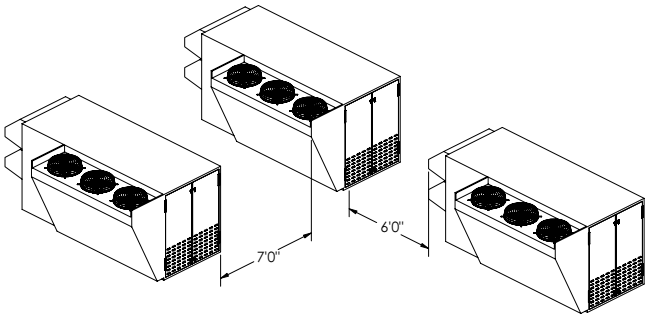


Figure 10. Typical installation clearances for OA2 unit with auxiliary cabinet



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

Curb Dimensions

Figure 11. Unit curb data for OA2 12–30 tons (in.)

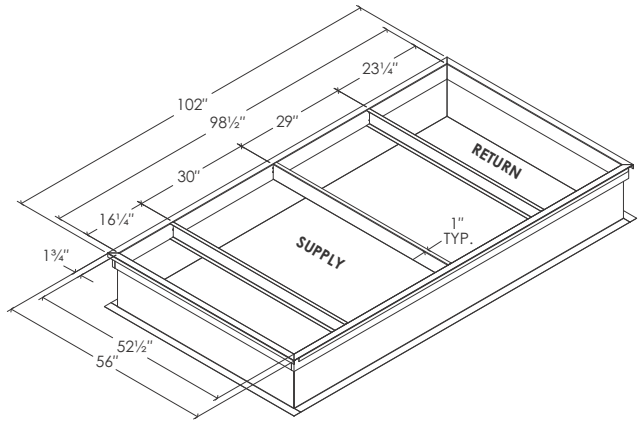
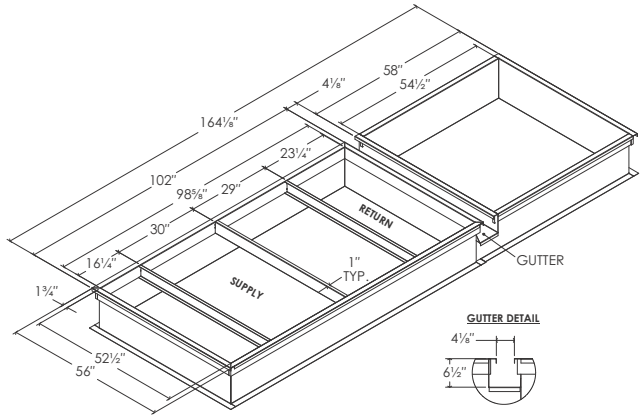


Figure 12. Unit curb data for OA2 12–30 tons with auxiliary cabinet (in.)



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

Dimensional Data

Figure 13. Unit dimensional data for OA2 12–30 tons

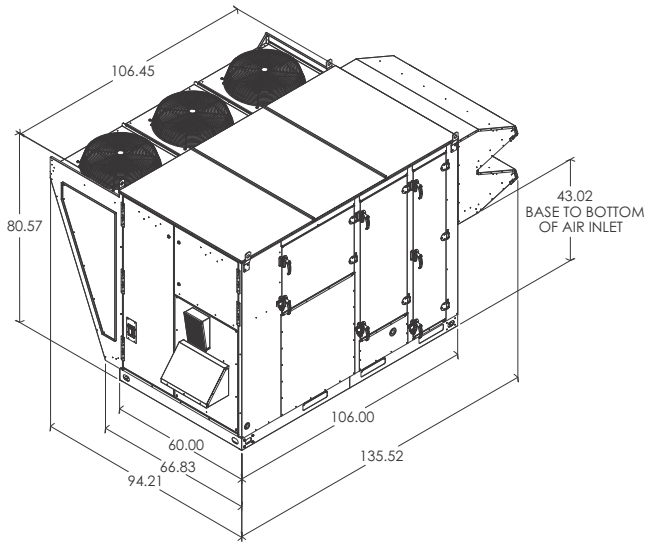
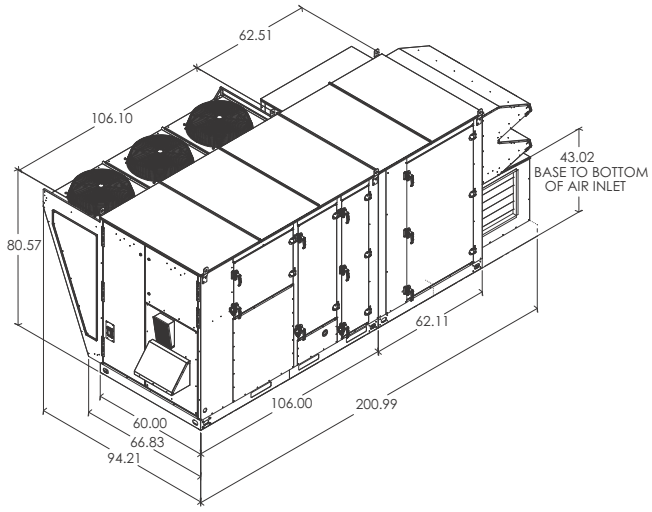


Figure 14. Unit dimensional data for OA2 12–30 tons with auxiliary cabinet



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

OA3 Units

Unit Clearances

Figure 15. Typical installation clearances for OA3 unit

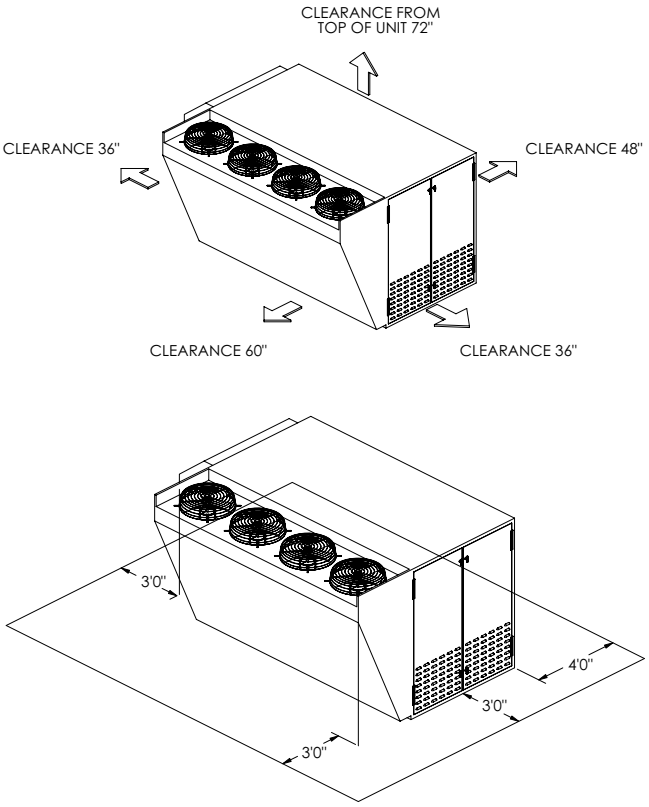
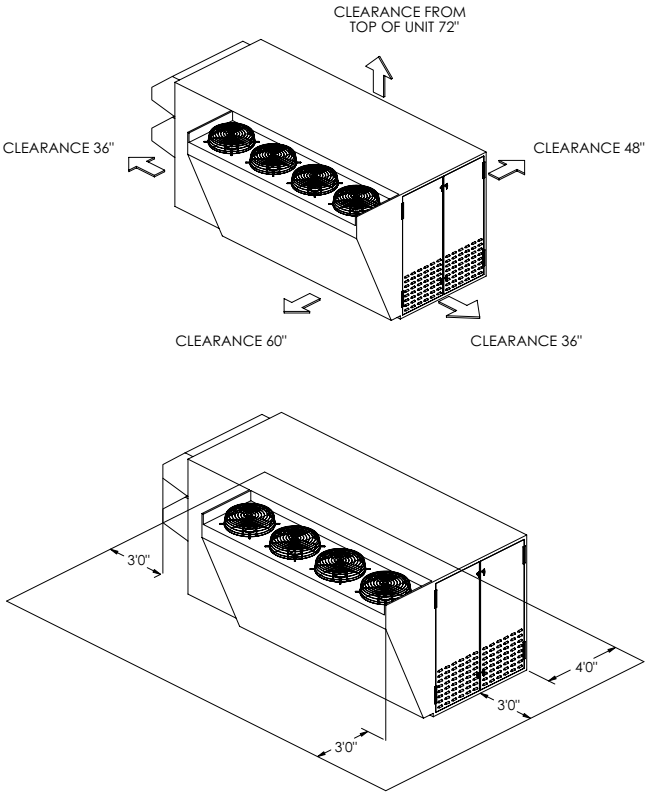


Figure 16. Typical installation clearances for OA3 unit with auxiliary cabinet



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

Figure 17. Typical installation clearances for OA3 unit

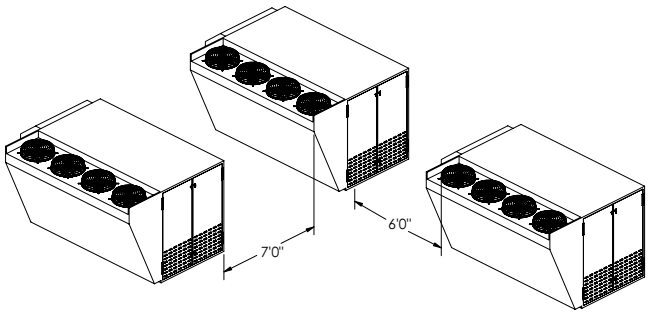
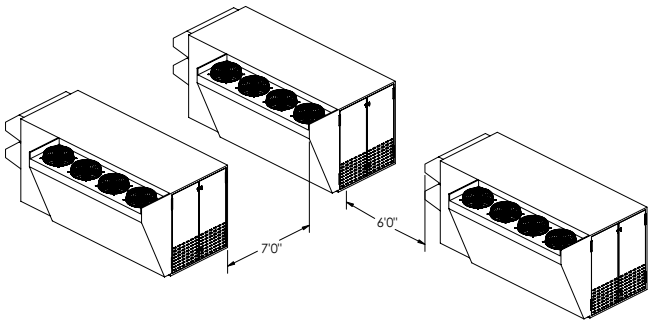


Figure 18. Typical installation clearances for OA3 unit with auxiliary cabinet



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

Curb Dimensions

Figure 19. Unit curb data for OA3 30–54 tons

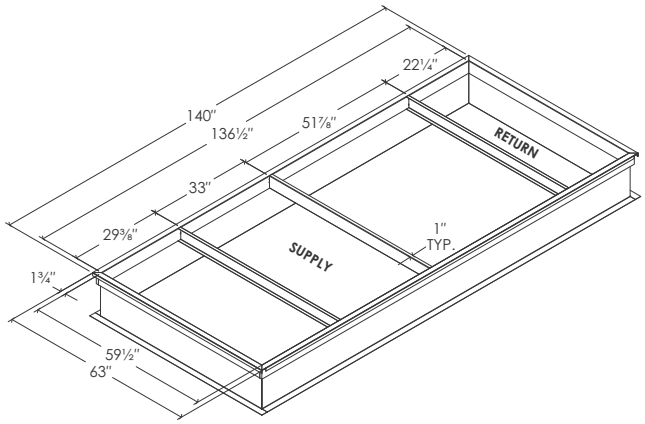
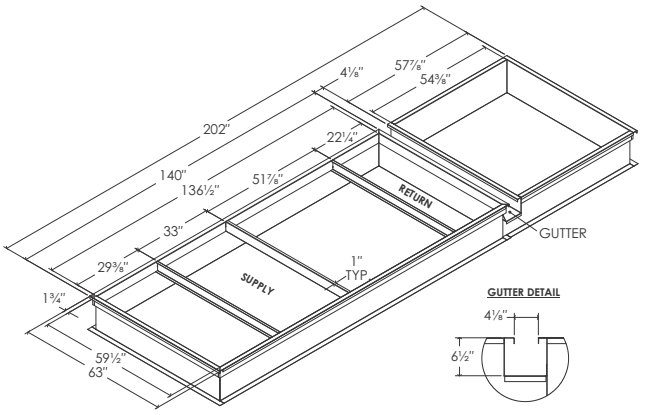


Figure 20. Unit curb data for OA3 30–54 tons with auxiliary cabinet



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

Dimensional Data

Figure 21. Unit dimensional data for OA3 30–54 tons

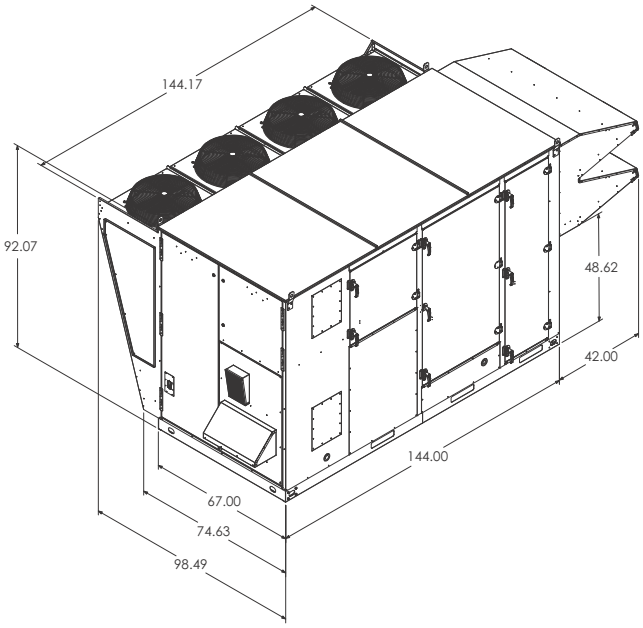
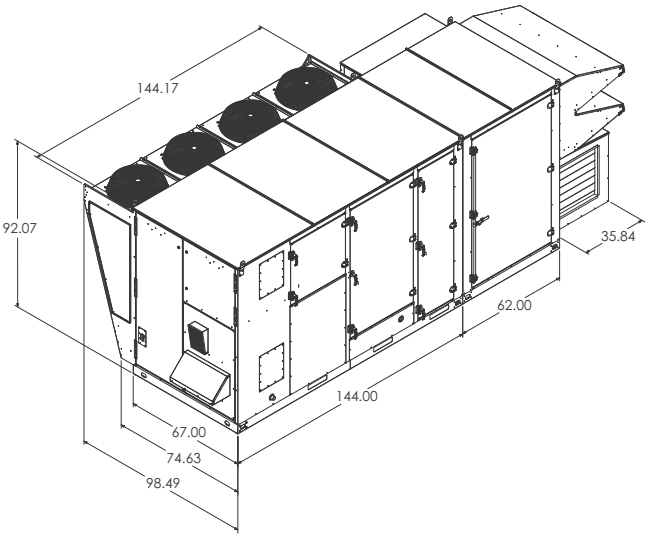


Figure 22. Unit dimensional data for OA3 30–54 tons with auxiliary cabinet



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

Unit Weight and Rigging

⚠WARNING

Heavy Objects!

Do not use cables (chains or slings) except as shown. Each of the cables (chains or slings) 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. Other lifting arrangements may cause equipment or property-only damage. Failure to properly lift unit could result in death or serious injury. See details below.

⚠WARNING

Improper Unit Lift!

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. Failure to properly lift unit could result in death or serious injury or possible equipment or property-only damage.

Unit Weight

Table 1. Typical unit weight and center-of-gravity (CG)—units without auxiliary cabinet

Model Number	Operating Weight (lb)		Shipping Weight (lb)		Center-of-gravity (in.)	
	Min	Max	Min	Max	Length	Width
OA1D060*	1811	2275	1898	2362	40	30
OA1D072*	1811	2330	1898	2417	40	30
OA1D084*	1811	2330	1933	2452	40	30
OA1D096*	1901	2596	2059	2754	40	30
OA1D120*	1901	2596	2089	2784	40	30
OA1D144*	1901	2596	2112	2807	40	30
OA1D180*	1901	2734	2192	3025	40	30
OA2D144*	3125	3790	3335	4000	49	34
OA2D180*	3289	3954	3580	3871	49	34
OA2D210*	3344	4161	3687	4030	49	34
OA2D240*	3372	4189	3764	4156	49	34
OA2D264*	3372	4189	3764	4156	49	34
OA2D300*	3530	4390	4012	4494	49	34
OA2D360*	3338	4198	3820	4302	49	34
OA3D360*	4931	5914	5576	6221	67	38
OA3D420*	5246	6229	5892	6538	67	38
OA3D480*	5339	6351	6014	6689	67	38
OA3D540*	5406	6363	6026	6646	67	38
OA3D600*	5570	6652	6343	7116	67	38
OA3D648*	5582	6664	6355	7128	67	38

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

Table 2. Typical unit weight and center-of-gravity (CG)—units with auxiliary cabinet

Model Number	Operating Weight (lb)		Shipping Weight (lb)		Center-of-gravity (in.)	
	Min	Max	Min	Max	Length	Width
OA1D060*	2798	3262	2885	3349	56	29
OA1D072*	2743	3262	2830	3349	56	29
OA1D084*	2775	3294	2897	3416	56	29
OA1D096*	2927	3622	3085	3780	56	29
OA1D120*	2927	3622	3115	3810	56	29
OA1D144*	2927	3622	3138	3833	56	29
OA1D180*	2927	3760	3218	4051	56	29
OA2D144*	4508	5173	4718	5383	72	33
OA2D180*	4715	5380	4632	5297	72	33
OA2D210*	5028	5845	4897	5714	72	33
OA2D240*	5056	5873	5023	5840	72	33
OA2D264*	5056	5873	5023	5840	72	33
OA2D300*	5194	6054	5298	6158	72	33
OA2D360*	4936	5796	5040	5900	72	33
OA3D360*	6907	7890	7214	8197	81	37
OA3D420*	7222	8205	7531	8514	81	37
OA3D480*	7315	8327	7653	8665	81	37
OA3D540*	7382	8339	7665	8622	81	37
OA3D600*	7527	8609	7991	9073	81	37
OA3D648*	7539	8621	8003	9085	81	37

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

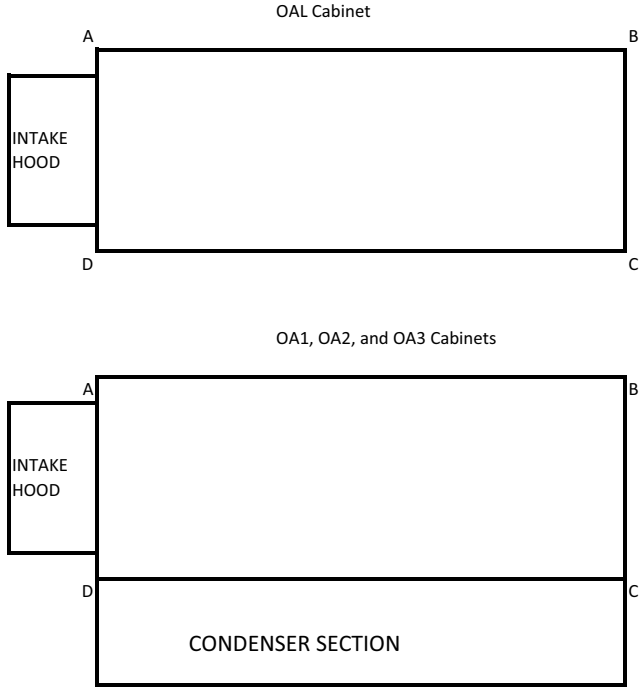
Corner Weight

Table 3. Corner weights (percent of total weight)

Cabinet Size	Percentage (%)			
	Corner A	Corner B	Corner C	Corner D
OA1* without auxiliary cabinet	16.3	20.7	33.3	29.7
OA1* with auxiliary cabinet	18.2	23.2	27.5	31.1
OA2* without auxiliary cabinet	20.1	17.2	34.0	28.7
OA2* with auxiliary cabinet	18.3	24.0	32.5	25.2
OA3* without auxiliary cabinet	14.9	24.2	29.9	31.0
OA3* with auxiliary cabinet	16.8	23.6	28.5	31.1

Note: Actual corner weights will vary depending on components selected.

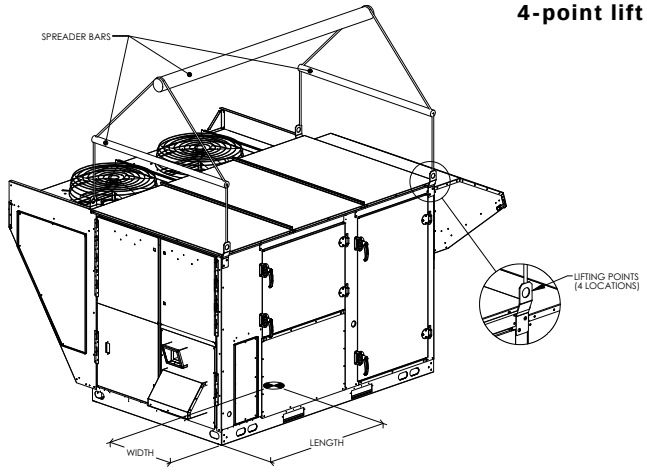
Figure 23. Cabinet corners



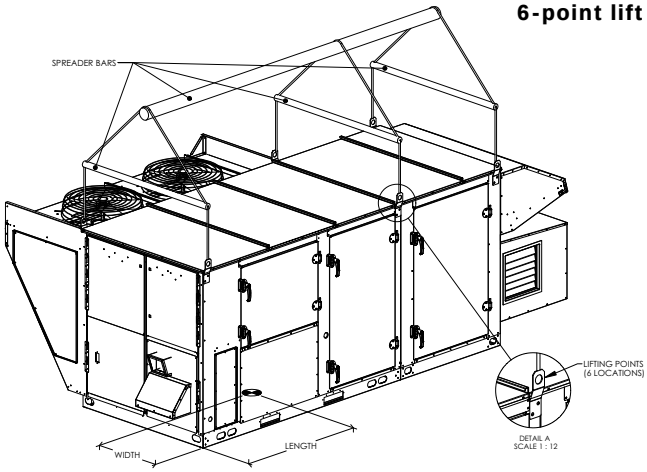
Rigging

Figure 24. Rigging and center-of-gravity data

4-point lift



6-point lift



Refer to Table 1, p. 18, Table 2, p. 19, and Figure 24, p. 20 for typical unit operating weights rigging before proceeding.

1. Remove the shipping crate from around the unit.
2. Rig the unit as shown in Figure 24, p. 20. 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 24, p. 20, 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.

Sequence of Operation

Space Control with Indirect Gas-Fired or Electric Heat and Modulating HGRH, ERV, and Powered Ex.

Sequence of Operation—"Occupied"

Optional space temperature and/or humidity sensors must be installed and wired to unit and configured as "installed" at the main unit controller.

Emergency Stop. When the contacts at Terminal OAUTS 9 and 10 are open, the unit's operation will be in Alarm Status. The Alarm must be reset from either the BAS or the optional on-board unit display.

Alarms must be reset from the optional on-board unit display or remote BAS to restart the control sequence. If optional display is not installed; Tracer TU must be used to diagnose and clear alarm. If Tracer TU is not available, cycle main power to unit to clear alarm.

Important: Cycling power to unit to clear alarm may not resolve alarm condition.

Starting Sequence

When 3-phase is powered to unit the main unit controller and the RTRM will initialize. Initialization process requires approximately 3 minutes.

The unit is placed in occupied operation via either the BAS or by closing connection between unit terminals OAUTS 7 and 8. The unit must not be in lockout.

Starting Sequence with No Return Air Damper Installed

The outdoor air damper will be commanded to open. The damper end switch will make causing the main unit controller to initialize the indoor fan starting sequence by sending a preset run signal (field adjustable between 50 percent and 100 percent) to the indoor fan VFD. If after 30 seconds the indoor fan proving switch does not prove the indoor fan on, the main unit controller will command the indoor fan off and signal an alarm.

Starting Sequence with Optional Return Air Damper Installed

Identical to sequence with no return air damper except the outdoor air and return air dampers will be commanded to move to their preset occupied positions. Outdoor air damper end switch is disabled when the return air damper is installed.

Operating Modes

A. Economizer (Ventilation)

B. Heating

C. Dehumidification

D. Cooling

All modes are enabled by the main unit control module. The control module calculates dewpoint based on sensed air temperature and humidity.

A. Economizer Mode. Economizer mode is enabled based on outdoor air dewpoint. Operation in economizer mode is enabled when the outdoor air dewpoint remains below the outdoor air economizer enable dewpoint setpoint. Operation in economizer mode continues until outdoor air conditions call for either dehumidification, cooling or heating mode. Space call for heating, dehumidification or cooling will cancel call for economizer operation.

B. Heating Mode. Heating mode is enabled on space heating setpoint. The main unit controller will modulate the heating output to maintain the space heating setpoint. Maximum discharge air heating temperature is adjustable—default maximum is 90ºF. Hot gas reheat is disabled when heating is enabled.

C. Dehumidification Mode. Dehumidification mode is enabled on space dewpoint setpoint if no call for heating is enabled. The unit's controller will activate the dehumidification mode when space dewpoint is higher than or equal to space dewpoint setpoint. Compressor control is based on evaporator leaving air temperature setpoint. With dehumidification enabled, if evaporator leaving air temperature is above setpoint first stage dehumidification (Compressor 1) will start. If after a 3-minute minimum delay the evaporator leaving air temperature is still above the setpoint, the second, third, and fourth stages of dehumidification (Compressor 2, 3, and 4) will be staged on sequentially following individual 3-minute minimum delays between each call.

Dehumidification mode will remain active if outdoor air is above outdoor air dehumidification setpoint. Space call for heating will cancel outdoor air dehumidification.

During operation in dehumidification mode, the main unit controller will enable hot gas reheat. Hot gas reheat will modulate to maintain the space cooling setpoint.

D. Cooling Mode . Cooling mode is enabled on space cooling setpoint if no call for heating or dehumidification is present. Compressor staging is identical to dehumidification however control temperature is space cooling setpoint.

During operation in cooling mode hot gas reheat is enabled. Hot gas reheat is controlled to maintain space cooling setpoint.

Optional Features

Digital Compressors

Main unit controller will modulate digital compressor to maintain either evaporator leaving or space temperature setpoints depending on mode of operation. Remaining compressors will be staged as described in mode.

ERV and Powered Exhaust

ERV and powered exhaust are interlocked with indoor fan operation in occupied heating, dehumidification or cooling modes. Outdoor air sensors sending temperature and Rh signals to the main unit controller to make mode calls are relocated downstream of the ERV. Outdoor air heating and dehumidification override setpoints will be based on ERV leaving conditions. Additional sensors will be installed in the non-ERV outdoor air position for information purposes and those outdoor air readings may be viewed at the main unit controller or via the BAS. When operating in economizer mode the ERV is disabled and the ERV by-pass damper(s) open, powered exhaust remains on and is adjusted to 100 percent capacity by the main unit controller. The main unit controller will end ERV operation and open ERV bypass dampers if outdoor air/return air conditions could cause ERV frosting, powered exhaust remains on.

Note: For units with optional ERV defrost heater, the control sequence will engage heater at frost condition rather than stop ERV.

The powered exhaust fan speed is factory set to run between 50 percent and 100 percent (field adjustable).

Hot Gas Reheat

Following continuous 30-minute hot gas reheat operation at less than 100 percent reheat capacity a purge cycle will be initiated. During the purge cycle the, hot gas reheat signal is set and held at 100 percent for a period of 3 minutes. Following the purge cycle, normal operation resumes.

Sequence of Operation—"Unoccupied"

Emergency Stop. When the contacts at Terminal OAUTS 9 and 10 are open, the unit's operation will be in Alarm Status. The Alarm must be reset from either the BAS or the optional on-board unit display.

Starting Sequence

Indoor fan proving sequence is identical to occupied operation.

Starting Sequence with Optional Return Air Damper Installed

The outdoor air damper will be commanded to close and the return air damper will open. Outdoor air damper end switch is disabled when the return air damper is installed.

Starting Sequence with No Return Air Damper Installed. Identical to occupied sequence no return air damper installed.

Operating Modes

A. Unoccupied Heating

B. Unoccupied Dehumidification

C. Unoccupied Cooling

A. Heating Mode. Unoccupied heating is enabled based on unoccupied space heating setpoint. Unoccupied heating is enabled when space temperature reaches unoccupied space heating setpoint - 2°. The modulating gas heat or SCR electric heat will continue to raise the discharge air temperature to a maximum of 90°F and continue to supply heated 90° air to the space until the space temperature reaches setpoint + 2°. Unit operation is discontinued when unoccupied space heating is satisfied.

B. Dehumidification Mode. When no call for unoccupied heating exists, unoccupied dehumidification is enabled based on unoccupied space dewpoint setpoint. During unoccupied dehumidification operation dehumidification capacity is restricted to 50 percent (only half of the compressors are allowed to come on). Unoccupied dehumidification is enabled when space temperature reaches unoccupied space dehumidification setpoint + 1°. Dehumidification stops at setpoint - 1°. Unit operation is discontinued when unoccupied space dehumidification is satisfied.

C. Cooling Mode. When no call for unoccupied heating or unoccupied dehumidification exists, unoccupied cooling is enabled based on unoccupied space cooling setpoint. During unoccupied space cooling operation cooling capacity is restricted to 50 percent (only half of the compressors are allowed to come on). Unoccupied cooling is enabled when space temperature reaches unoccupied space cooling setpoint + 2°. Cooling stops at setpoint - 2°. Unit operation is discontinued when unoccupied space cooling is satisfied.

Powered Exhaust/ERV Sequence of Operation

Powered Exhaust/ERV operation is disabled during unit "Unoccupied" operating modes.

Discharge Air Control with Indirect Gas-Fired or Electric Heat and Modulating HGRH, ERV, and Powered Ex.

Sequence of Operation—"Occupied"

Emergency Stop. When the contacts at Terminal OAUTS 9 and 10 are open, the unit's operation will be in Alarm Status. The Alarm must be reset from either the BAS or the optional on-board unit display.

Alarms must be reset from the optional on-board unit display or remote BAS to restart the control sequence. If optional display is not installed; Tracer TU must be used to diagnose and clear alarm. If Tracer TU is not available, cycle main power to unit to clear alarm.

Important: Cycling power to unit to clear alarm may not resolve alarm condition.

Starting Sequence

When 3-phase is powered to unit the main unit controller and the RTRM will initialize. Initialization process requires approximately 3 minutes.

The unit is placed in occupied operation via either the BAS or by closing connection between unit terminals OAUTS 7 and 8. The unit must not be in lockout.

Starting Sequence with No Return Air Damper Installed

The outdoor air damper will be commanded to open. The damper end switch will make causing the main unit controller to initialize the indoor fan starting sequence by sending a preset run signal (field adjustable between 50 percent and 100 percent) to the indoor fan VFD. If after 30 seconds the indoor fan proving switch does not prove the indoor fan on, the main unit controller will command the indoor fan off and signal an alarm.Starting Sequence with Optional Return Air Damper Installed

Identical to sequence with no return air damper except the outdoor air and return air dampers will be commanded to move to their preset occupied positions. Outdoor air damper end switch is disabled when the return air damper is installed.

Operating Modes

A. Economizer (Ventilation)

B. Heating

C. Dehumidification

D. Cooling

All modes are enabled by the main unit control module. The control module calculates dewpoint based on sensed outdoor air temperature and humidity.

A. Economizer Mode. Operation in economizer mode is enabled when the outdoor air temperature is between the Outdoor Air Cooling Setpoint and the Outdoor Air Heating setpoint and no call for dehumidification exists. Operation in economizer mode continues until outdoor air conditions call for either dehumidification, cooling or heating mode.

B. Heating Mode. Heating mode is enabled on outdoor air heating setpoint. The main unit controller will modulate the heating capacity to maintain the discharge air heating setpoint. Hot gas reheat is disabled when heating is enabled. Heating will be disabled at outdoor air heating setpoint + 2°.

C. Dehumidification Mode. Dehumidification mode is enabled on outdoor air dewpoint enable setpoint if no call for heating is enabled. The unit's controller will activate the dehumidification mode when outdoor air dewpoint is higher than or equal to outdoor air dewpoint setpoint. Compressor control is based on evaporator leaving air temperature setpoint. With dehumidification enabled, if evaporator leaving air temperature is above setpoint first stage dehumidification (Compressor 1) will start. If after a 3-minute minimum delay the evaporator leaving air temperature is still above the evaporator leaving air temperature setpoint, the second, third, and fourth stages of dehumidification (Compressor 2, 3, and 4) will be staged on sequentially following individual 3-minute minimum delays between each call. Dehumidification mode will be disabled at outdoor air dewpoint setpoint - 2°.

During operation in dehumidification mode, the main unit controller will enable hot gas reheat. Hot gas reheat will modulate to maintain the discharge air cooling setpoint.

C. Cooling Mode. Cooling mode is enabled on outdoor air cooling setpoint if no call for heating or dehumidification is present. Compressor staging is identical to dehumidification; however, control temperature is discharge air cooling setpoint. Cooling will be disabled at outdoor air cooling setpoint - 2°.

During operation in cooling mode hot gas reheat is enabled. Hot gas reheat is controlled to maintain discharge air cooling setpoint.

Optional Features

Digital Compressors

Main unit controller will modulate digital compressor to maintain either evaporator leaving or discharge air temperature setpoints depending on mode of operation. Remaining compressors will be staged as described in mode.

ERV and Powered Exhaust

ERV and powered exhaust are interlocked with indoor fan operation in occupied heating, dehumidification or cooling modes. Outdoor air sensors sending temperature and Rh signals to the main unit controller to make mode

calls are relocated downstream of the ERV. Mode calls will be based on ERV leaving conditions. Additional sensors will be installed in the non-ERV outdoor air position for information purposes and those outdoor air readings may be viewed at the main unit controller or via the BAS. When operating in economizer mode the ERV is disabled and the ERV by-pass damper(s) open, powered exhaust remains on and is adjusted to 100 percent capacity by the main unit controller. The main unit controller will end ERV operation and open ERV bypass dampers if outdoor air/return air conditions could cause ERV frosting, powered exhaust remains on.

Note: For units with optional ERV defrost heater, the control sequence will engage heater at frost condition rather than stop ERV.

The powered exhaust fan speed is factory set to run between 50 percent and 100 percent (field adjustable).

Hot Gas Reheat

Following continuous 30-minute hot gas reheat operation at less than 100 percent reheat capacity a purge cycle will be initiated. During the purge cycle the, hot gas reheat signal is set and held at 100 percent for a period of 3 minutes. Following purge cycle normal operation resumes.

Sequence of Operation—"Unoccupied"

Optional space temperature and/or humidity sensors must be installed and wired to unit and configured as "installed" at the main unit controller to enable unoccupied sequences.

Emergency Stop. When the contacts at Terminal OAUTS 9 and 10 are open, the unit's operation will be in Alarm Status. The Alarm must be reset from either the BAS or the optional on-board unit display.

Starting Sequence

Indoor fan proving sequence is identical to occupied operation.

Starting Sequence with Optional Return Air Damper Installed

The outdoor air damper will be commanded to close and the return air damper will open. Outdoor air damper end switch is disabled when the return air damper is installed.

Starting Sequence with No Return Air Damper Installed

Identical to occupied sequence no return air damper installed.

Operating Modes

A. Unoccupied Heating

B. Unoccupied Dehumidification

C. Unoccupied Cooling

A. Heating Mode. Unoccupied heating is enabled based on unoccupied space heating setpoint. Unoccupied heating is enabled when space temperature reaches unoccupied space heating setpoint - 2°. The modulating gas heat or SCR electric heat will continue to raise the discharge air temperature to a maximum of 90°F and continue to supply heated 90° air to the space until the space temperature reaches setpoint + 2°. Unit operation is discontinued when unoccupied space heating is satisfied.

B. Dehumidification Mode. When no call for unoccupied heating exists, unoccupied dehumidification is enabled based on unoccupied space dewpoint setpoint. During unoccupied dehumidification operation dehumidification capacity is restricted to 50 percent (only half of the compressors are allowed to come on). Unoccupied dehumidification is enabled when space temperature reaches unoccupied space dehumidification setpoint + 1°. Dehumidification stops at setpoint - 1°. Unit operation is discontinued when unoccupied space dehumidification is satisfied.

C. Cooling Mode. When no call for unoccupied heating or unoccupied dehumidification exists, unoccupied cooling is enabled based on unoccupied space cooling setpoint. During unoccupied space cooling operation cooling capacity is restricted to 50 percent (only half of the compressors are allowed to come on). Unoccupied cooling is enabled when space temperature reaches unoccupied space cooling setpoint + 2°. Cooling stops at setpoint - 2°. Unit operation is discontinued when unoccupied space cooling is satisfied.

Powered Exhaust/ERV Sequence of Operation

Powered Exhaust/ERV operation is disabled during unit "Unoccupied" operating modes.

Installation

⚠WARNING

Hazardous Service Procedures!

The maintenance and troubleshooting procedures recommended in this section of the manual could result in exposure to electrical, mechanical or other potential safety hazards. Always refer to the safety warnings provided throughout this manual concerning these procedures. When possible, 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. Failure to follow all of the safety warnings provided could result in death or serious injury.

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.

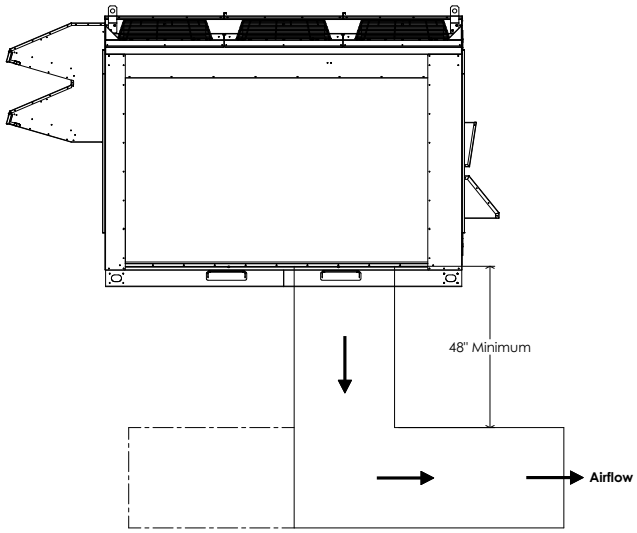
Note: For sound consideration, cut holes in the roof deck only for the ductwork penetrations. Do not cut out the roof deck within the entire curb perimeter. All duct work must be installed and connected to top of roof curb before the unit is set on curb.

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.

Note: For units will electric heat in the primary heating position, refer to Figure 25.

Figure 25.



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.

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. 18).
- ☐ 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 26, p. 26).

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.

Condensate Drain Configuration

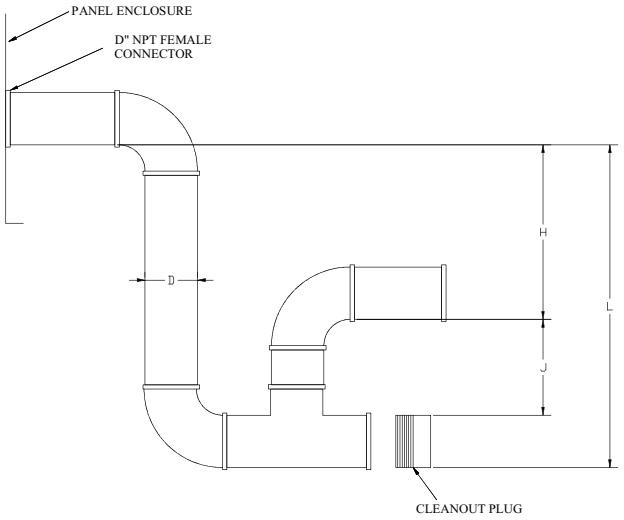
OAU units are selected based on dehumidification capability. As such, condensate can form at a high rate. Therefore, the OAU drain pan and condensate line are sized and designed accordingly. However, an often-overlooked element of proper condensate drainage is proper P-Trap and drain line sizing and 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. Refer to Figure 28, p. 27, Figure 29, p. 27, and Figure 30, p. 27 for the appropriate drain location.

A condensate trap must be installed at the unit due to the drain connection being on the "negative pressure" side of the fan. Install the P-Trap using the guidelines in Figure 26.

Pitch drain lines connected to P-Trap at least 1/2 inch for every 10 feet of horizontal run to assure 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 26. Condensate trap installation



D = Pipe diameter; see Figure 28, p. 27, Figure 29, p. 27, and Figure 30, p. 27 for correct pipe diameter
H = Internal static pressure (in wg) +1 in.
J = H + 0.5
L = H + J +D

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.

Filter Installation

Each unit ships 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.

Field Installed Power Wiring

⚠WARNING

Proper Field Wiring and Grounding Required!

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 electrical codes. Failure to follow code could result in death or serious injury.

An overall dimensional layout for the standard field installed wiring entrance into the unit is illustrated in Figure 28, p. 27, Figure 29, p. 27, and Figure 30, p. 27. To

ensure that the unit's supply power wiring is properly sized and installed, refer to the following guidelines.

Figure 27. Main power entrance

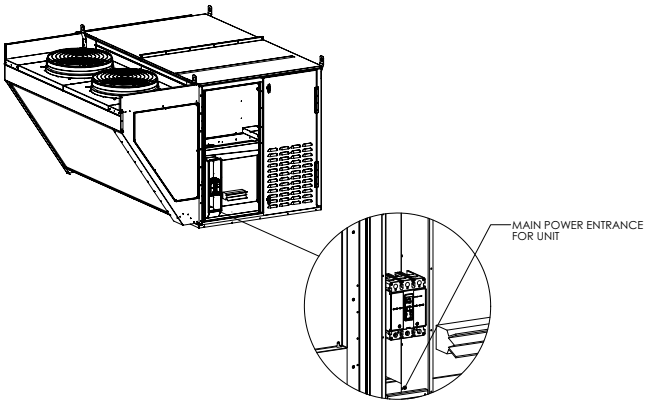


Figure 28. OA1D utility connections

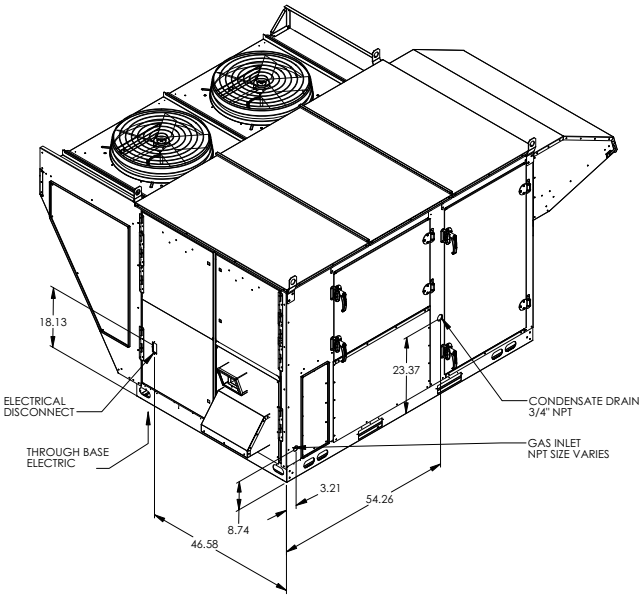


Table 4. OA1D Unit

MBh	Pipe Connection (in.)
50	1/2
75	1/2
100	1/2
125	1/2
150	3/4
200	3/4
250	3/4
300	3/4
350	1

Figure 29. OA2 utility connections

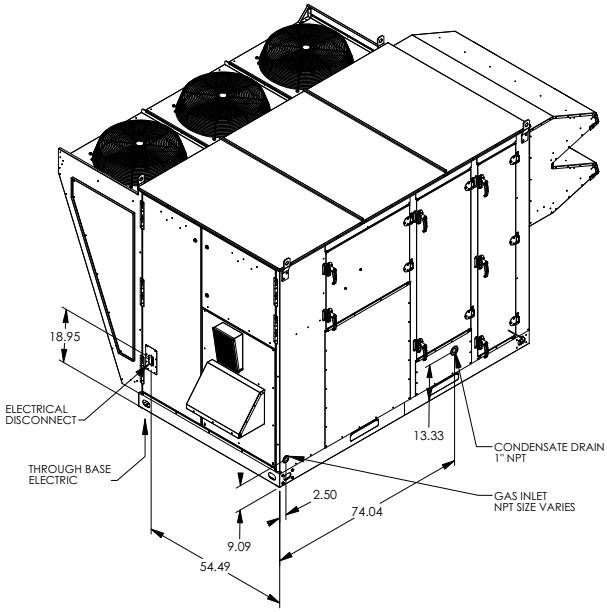


Table 5. OA2D Unit

MBh	Pipe Connection (in.)
150	3/4
200	3/4
250	3/4
300	3/4
350	1
400	1
500	1
600	1-1/4
700	1-1/4
800	1-1/4

Figure 30. OA3 utility connections

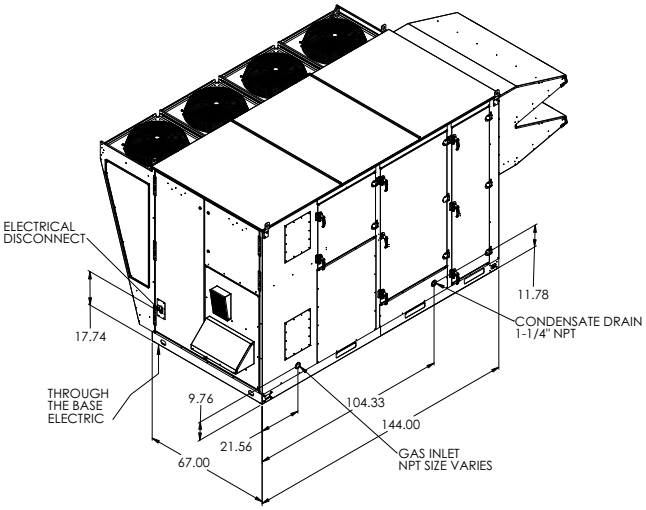


Table 6. OA3D Unit

MBh	Pipe Connection (in.)
300	3/4
350	1
400	1
500	1
600	1-1/4
700	1-1/4
800	1-1/4
1000	1-1/4

Note: All field installed wiring must conform to NEC guidelines as well as State and Local codes.

Verify that the power supply available is compatible with the unit's 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.

Main Unit Power

⚠WARNING

Hazardous Voltage!

Disconnect all electric power, including remote disconnects before servicing. Follow proper lockout/tagout procedures to ensure the power can not be inadvertently energized. Failure to disconnect power before servicing could result in death or serious injury.

NOTICE:

Use Copper Conductors Only!

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

Standard Wiring

⚠WARNING

Proper Field Wiring and Grounding Required!

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 electrical codes. Failure to follow code could result in death or serious injury.

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. Location of the applicable electrical service entrance is illustrated in Figure 28, p. 27, Figure 29, p. 27, and Figure 30, p. 27. Complete the unit's 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. 25 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!

During installation, testing, servicing and troubleshooting of this product, it may be 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. Failure to follow all electrical safety precautions when exposed to live electrical components could result in death or serious injury.

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:

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

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

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:

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

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!

During installation, testing, servicing and troubleshooting of this product, it may be 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. Failure to follow all electrical safety precautions when exposed to live electrical components could result in death or serious injury.

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!

During installation, testing, servicing and troubleshooting of this product, it may be 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. Failure to follow all electrical safety precautions when exposed to live electrical components could result in death or serious injury.

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!

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 electrical codes. Failure to follow code could result in death or serious injury.

An overall layout of the various control options available with the required number of conductors for each control device is illustrated in Figure 31, p. 31 and Figure 32, p. 32.

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

Control Power Transformer

⚠WARNING

Hazardous Voltage!

Disconnect all electric power, including remote disconnects before servicing. Follow proper lockout/tagout procedures to ensure the power can not be inadvertently energized. Failure to disconnect power before servicing could result in death or serious injury.

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!

Disconnect all electric power, including remote disconnects before servicing. Follow proper lockout/tagout procedures to ensure the power can not be inadvertently energized. Failure to disconnect power before servicing could result in death or serious injury.

NOTICE:

Use Copper Conductors Only!

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

Before installing any connecting wiring, refer to Figure 28, p. 27, Figure 29, p. 27, and Figure 30, p. 27 for the electrical access locations provided on the unit and Table 7 for AC conductor sizing guidelines, and:

1. Use copper conductors unless otherwise specified.
2. Ensure that the AC control wiring between the controls and the unit's 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 7. 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!

Disconnect all electric power, including remote disconnects before servicing. Follow proper lockout/tagout procedures to ensure the power can not be inadvertently energized. Failure to disconnect power before servicing could result in death or serious injury.

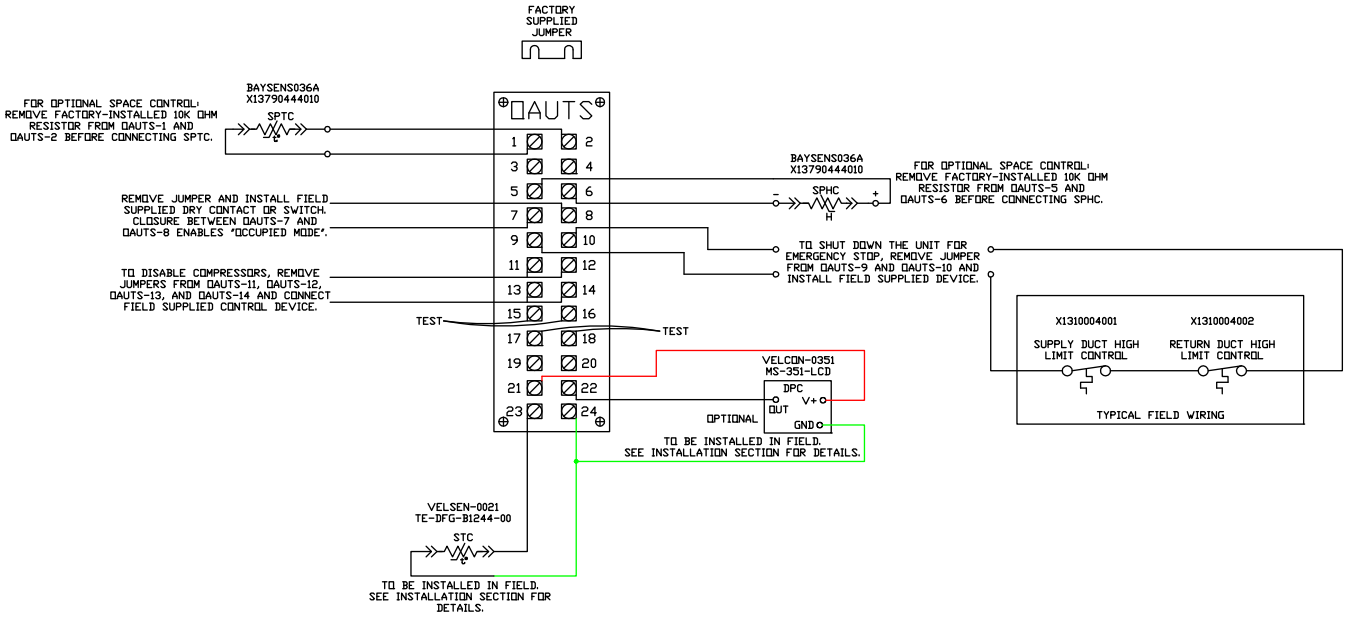
Before installing any connecting wiring between the unit and components utilizing a DC analog input\output signal, refer to Figure 28, p. 27, Figure 29, p. 27, and Figure 30, p. 27 for the electrical access locations provided on the unit.

1. Table 8, p. 31 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 unit's 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.

Figure 31. OAUTS Connection B

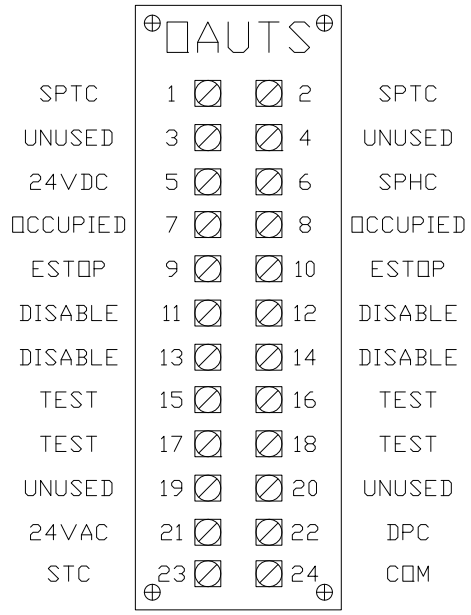


DC Conductors

Table 8. 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 32. OAUTS Connection C



System Configuration and Pre-Start

The following procedure must be completed prior to performing the start-up procedure in the system Start-Up section in this document. This section describes procedures to navigate the various displays on the Unit Display and configure the Outdoor Air Unit Main Unit Display system setpoints and operating parameters.

Important: This section is intended to provide guidelines for navigation through the remote operator display screens. For additional control system information, refer to Integration Guide: Tracer™ UC600 Programmable Controller for Packaged Outdoor Air Unit *(BAS-SVP18A-EN, or the most recent revision). The unit is configured at the factory with the default settings as described in "Sequence of Operation—"Unoccupied"," p. 24; also refer to "Sequence of Operation," p. 21 for details concerning setup and operating setpoints.*

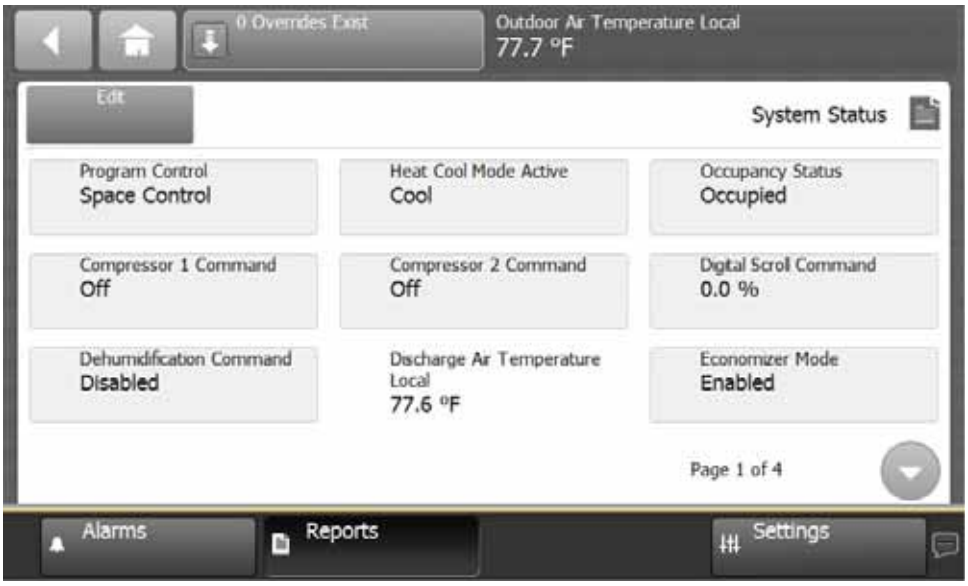


Table 9. Menu descriptions

Screen	Menu	Point List	Min / Inactive	Default	Max / Active	BAS Point?
Alarms	Active Alarms	List of all active alarms				
	All Alarms	List of all previous alarms				
Reports (continued on next page)	Custom Graphics	*NOT USED*				
	System Status	Program Control	Discharge Air Control	Space Control	Space Control	Y
		Heat Cool Mode Active	Heat	---	Cool	N
		Occupancy Status	Occupied|Unoccupied|Occupied Bypass|Occupied Standby|Unknown			Y
		Compressor 1 Command	Off	---	On	N
		Compressor 2 Command	Off	---	On	N
		Compressor 3 Command	Off	---	On	N
		Compressor 4 Command	Off	---	On	N
		Digital Scroll Command	0%	---	100%	N
		Dehumidification Command	Disabled		Enabled	N
		Discharge Air Temperature Local	Analog Input			
		Economizer Mode	Disabled		Enabled	N
		Evap Leaving Temp Local	Analog Input			
		Heat Capacity	0%	---	100%	N
		Heating Output Command	0%	---	100%	N
		Heat 1 Command	Off	---	On	N
		Heat 2 Command	Off	---	On	N
		Heat 3 Command	Off	---	On	N
		Inducer Command	Off	---	On	N
		Gas Valve Status	Binary Input			
		HGRH Command	0%	---	100%	N
		OA Damper End Switch	Binary Input			
		Outdoor Air Damper Command	Closed	---	Open	N
		OAD Position Local	Binary Input			
		Outdoor Air Relative Humidity Local	Analog Input			
		Outdoor Air Temperature Local	Analog Input			
		Space Dewpoint Active	Analog Input			
		Space Temperature Local	Analog Input			
		Supply Fan Start Stop Command	Off	---	Off	N
		Filter Status	Clean	---	Dirty	N
		System Lockout	Normal	Normal	Lockout	N
		UNOCC Cooling Mode	Off	---	On	N
		UNOCC Dehumid Mode	Off	---	On	N
		UNOCC Heating Mode	Off	---	On	N
		ERV Command	Disable	---	Enable	N
		ERV Leaving Air Temperature Local	Analog Input			
		PEVFD Command	0%	80%	100%	Y
		Discharge Airflow Local	Analog Input			
		ERV Leaving Air Humidity Local	Analog Input			

Table 9. Menu descriptions (continued)

Screen	Menu	Point List	Min / Inactive	Default	Max / Active	BAS Point?
Reports (continued from previous page)	System Setpoints	DAT High Temp Cutout	100°F	125°F	150°F	Y
		DAT Low Temp Cutout	35°F	35°F	50°F	Y
		DAT Temp Cutout Time	10 min.	10 min.	25 min.	Y
		Discharge Air Cooling Setpoint	55°F	55°F	75°F	Y
		Discharge Air Heating Setpoint	65°F	85°F	90°F	Y
		ERV Wheel Frost Cutout Setpoint	32°F	34°F	40°F	Y
		EVAP Leaving Temp Setpoint	45°F	53°F	70°F	Y
		IVFD Signal	50%	100%	100%	Y
		Maximum Discharge Air Temperature	70°F	90°F	100°F	Y
		Minimum Discharge Air Cooling Setpoint	40°F	50°F	65°F	Y
		Minimum Discharge Air Heating Setpoint	50°F	55°F	60°F	Y
		Maximum OA Damper Position	0%	100%	100%	Y
		Minimum OA Damper Position	0%	100%	100%	Y
		Occupied Space Cooling Setpoint	65°F	74°F	90°F	Y
		Occupied Space Heating Setpoint	60°F	70°F	75°F	Y
		Outdoor Air Cooling Setpoint (OACS)	70°F	75°F	85°F	Y
		Outdoor Air Dewpoint Setpoint (OADS)	49°F	58°F	65°F	Y
		Outdoor Air Heating Setpoint (OAHS)	40°F	70°F	70°F	Y
		PEVFD Setpoint	0%	80%	100%	Y
		Space Dewpoint Setpoint (SPDS)	50°F	59°F	68°F	Y
		UNOCC Space Cooling Setpoint	60°F	80°F	90°F	Y
		UNOCC Space Dewpoint Setpoint	49°F	65°F	68°F	Y
		UNOCC Space Heating Setpoint	50°F	60°F	70°F	Y
	System Setup	Program Control	Discharge Air Control	Space Control	Space Control	Y
		Compressor Count	0	0	4	N
		Heater Count	0	0	2	N
		Split Manifold Burner	Not Installed	Installed	Installed	N
		ERV Option	Not Installed	Installed	Installed	N
		Powered Exhaust Option	Not Installed	Installed	Installed	N
		Return Air Damper Option	Not Installed	Installed	Installed	N
		Space Temp/Humidity Sensor Installed	Not Installed	Installed	Installed	N
		Heat Type	No Heat|Gas Heat|Electric Heat|Other			N
		Alarm Reset	Off	Off	On	Y
		Supply Fan Failure Reset	Off	Off	On	Y
	Override Summary	List of active overrides - same as selecting Override button at top of screen				
	All Point Report	List of all points (AO/AI/BO/BI/MS/etc ...) in the configuration file				
	About	Controller Name listed is the version of the program installed in the UC600				
	Expansion Modules	Provides status of expansion modules				
	TGP2 Programs	List of all TGP2 programs loaded on the UC600				
Data Graphs	*NOT USED*					
Settings	Schedules - Refer to UC600 IOM for scheduling functions					
	Display Preferences					
	Language					
	Date and Time					
	Clean Touchscreen					

Start-Up

Indirect Gas-Fired Heating Start-Up

⚠WARNING

Hazardous Service Procedures!

The maintenance and troubleshooting procedures recommended in this section of the manual could result in exposure to electrical, mechanical or other potential safety hazards. Always refer to the safety warnings provided throughout this manual concerning these procedures. When possible, 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.

Failure to follow all of the safety warnings provided could result in death or serious injury.

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!

Never use an open flame to detect gas leaks. It could result in an explosion. Use a leak test solution for leak testing. Failure to follow recommended safe leak test procedures could result in death or serious injury or equipment or property-only-damage.

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 staring 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.

Refer to “Sequence of Operation,” p. 21 for additional information.

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 insure 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 shutoff and pressure tap.

2. Verify Indoor Fan Failure Switch Operation

   Indoor Fan Failure Switch (IFFS) is located in the unit electrical control compartment above the heater. Indoor fan failure switch will fail if not proven within 30 seconds of call for indoor fan—ON.

   All unit air filters must be clean before proceeding to properly complete this verification.

   Important: If the unit air filters are not clean, unit performance could be affected. Remove and clean or replace air filters as required prior to proceeding with the burner pressure testing.

   In the event that the pressure switch fails to operate, check the pick-up tubes to be certain that the tubes are not obstructed and confirm that the tube connections to IFFS are tight and secure.

3. Confirm Gas Flow at Unit

⚠WARNING

Hazardous Voltage and Gas!

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

Open door to unit vestibule housing the gas heater. Move gas control lever to "OFF" position. Remove 1/8-in. pressure taps (see Figure 34, p. 39) 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 2 and correct leak. If you don't smell gas or have corrected any leaks, go to Step 4.

4. Burner Starting Sequence and Burner Ignition

Figure 34, p. 39 illustrates indirect gas-fired furnace components.

5. Main Gas Supply

Turn manual gas cock "ON".

6. Split Manifold High Fire and Burner Test

Open all manual gas valves. Turn power on at unit's 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 100.0 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 startup, 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 0.17 in. 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.

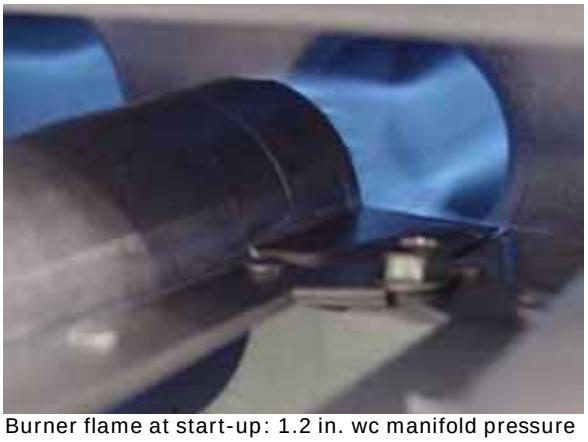
Failure to Ignite

- 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.

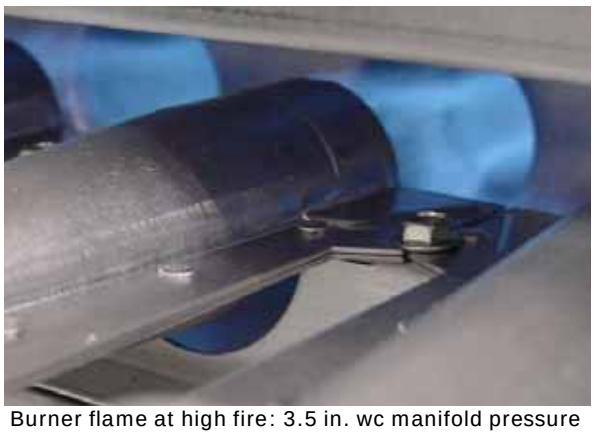
- Control can be brought out of lockout by cycling call for heat at the Main Unit Display.

Prior to completing the start-up, check the appearance of the main burner flame. Refer to Figure 33, p. 38 for flame characteristics of properly adjusted natural gas systems.

Figure 33. 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 33 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.

7. Flame Sensor Current Check

NOTICE:

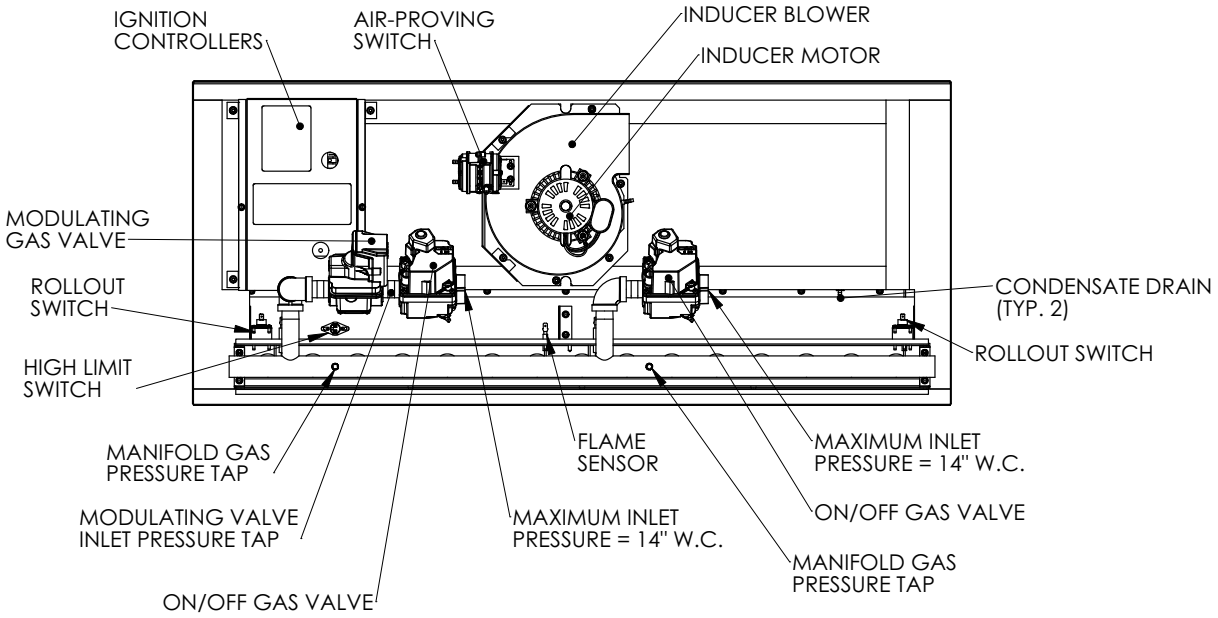
Meter Damage!

Do NOT measure voltage with meter connected to a circuit. Failure to follow these instructions could result in meter damage.

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 meter's 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 34. OA1/OA2/OA3 indirect gas-fired 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 air flow 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!

Disconnect all electric power, including remote disconnects before servicing. Follow proper lockout/tagout procedures to ensure the power can not be inadvertently energized. Failure to disconnect power before servicing could result in death or serious injury.

Filters

- Inspect the return air filters. Clean or replace them if necessary. Refer to the unit Service Facts for filter information and refer to "OAU Filter Guide" in "Appendix," p. 55 for exact replacement dimensions.

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 unit's 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. 40.
- 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 (each circuit); superheat (each circuit); Record this data on an "operator's maintenance log" like the one shown in Table 10, p. 41. 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's 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 unit's 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.

Microchannel (MCHE) Coils

NOTICE:

Coil Damage!

DO NOT use any detergents with microchannel condenser coils. Use pressurized water or air ONLY, with pressure no greater than 600psi. Failure to do so could result in coil damage.

For additional information regarding the proper microchannel coil cleaning procedure, refer to RT-SVB83-EN.*

Due to the soft material and thin walls of the MCHE coils, the traditional field maintenance method recommended for Round Tube Plate Fin (RTPF) coils does not apply to microchannel coils.

Moreover, chemical cleaners are a risk factor to MCHE due to the material of the coil. The manufacturer does not recommend the use of chemical cleaners to clean microchannel coils. Using chemical cleaners could lead to warranty claims being further evaluated for validity and failure analysis.

The recommended cleaning method for microchannel condenser coils is pressurized water or air with a non-pinpoint nozzle and an ECU of at least 180 with pressure no greater than 600 psi. To minimize the risk of coil damage, approach the cleaning of the coil with the pressure washer aimed perpendicular to the face of the coil during cleaning. Optimum clearance between the sprayer nozzle and the microchannel coil is 1 in.–3 in.

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 10. 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					

Performance Data

Table 11. OA1 General Data—Cooling 5–8 Tons High Efficiency

	5 Tons Downflow	6 Tons Downflow	7 Tons Downflow	8 Tons Downflow
	OA1D060A	OA1D072A	OA1D084	OA1D096
Cooling Performance				
Gross Cooling Capacity, Btu (kW)	61,464 (18.01)	73,757 (21.62)	86,050 (25.22)	98,342 (28.82)
Nominal cfm (m^3/h)	625–1250 (1062–2124)	750–1500 (1274–2549)	875–1750 (1487–2973)	1000–2000 (1699–3398)
Compressor				
Number	1	1	1	2
Type	Scroll	Scroll	Scroll	Scroll
Outdoor Coil				
Type	High Performance	High Performance	High Performance	High Performance
Tube Size—OD, in. (mm)	3/8 (9.5)	3/8 (9.5)	3/8 (9.5)	3/8 (9.5)
Face Area, ft^2 (m^2)	13 (1.21)	13 (1.21)	13 (1.21)	24 (2.23)
Rows	2	2	2	2
FPI	12	12	12	12
Indoor Coil				
Type	High Performance	High Performance	High Performance	High Performance
Tube Size—OD, in. (mm)	1/2 (12.7)	1/2 (12.7)	1/2 (12.7)	1/2 (12.7)
Face Area, ft^2 (m^2)	6 (0.56)	6 (0.56)	6 (0.56)	9 (0.84)
Rows	6	6	6	6
FPI	12	12	12	12
Refrigerant Control	TXV	TXV	TXV	TXV
Drain Connection Size, in. (mm)	3/4 (20)	3/4 (20)	3/4 (20)	3/4 (20)
Outdoor Fan				
Type	Propeller	Propeller	Propeller	Propeller
Number Used	1	1	1	2
Diameter, in. (mm)	24 (609.6)	24 (609.6)	24 (609.6)	24 (609.6)
Drive Type	Direct	Direct	Direct	Direct
No. Speeds	1	1	1	1
CFM (m^3/h)	6,500 (11,044)	6,500 (11,044)	6,500 (11,044)	13,000 (22,087)
Number Motors	1	1	1	2
Motor HP (kW), per motor	1.0 (0.75)	1.0 (0.75)	1.0 (0.75)	1.0 (0.75)
Motor RPM	1140	1140	1140	1140
Indoor Fan				
Type	Backward Inclined	Backward Inclined	Backward Inclined	Backward Inclined
Number Used	1	1	1	1
Diameter	Varies	Varies	Varies	Varies
Drive Type	Direct Drive	Direct Drive	Direct Drive	Direct Drive
Number Motors	1	1	1	1
Motor HP (kW), Standard–Oversized	1.0–3.0 (0.75–2.24)	1.0–3.0 (0.75–2.24)	1.0–3.0 (0.75–2.24)	1.0–5.0 (0.75–3.73)
Motor RPM, Standard–Oversized	1750–3500	1750–3500	1750–3500	1750–3500
Motor Frame Size, Standard–Oversized	Varies	Varies	Varies	Varies
Filters				
Type Furnished Number Size Recommended	Refer to "OAU Filter Guide" in "Appendix," p. 55	Refer to "OAU Filter Guide" in "Appendix," p. 55	Refer to "OAU Filter Guide" in "Appendix," p. 55	Refer to "OAU Filter Guide" in "Appendix," p. 55
Refrigerant Charge, lb of R-410A				
Downflow	See Nameplate	See Nameplate	See Nameplate	See Nameplate

Table 12. OA1 General Data—Cooling 10–15 Tons High Efficiency

	10 Tons Downflow	12 Tons Downflow	15 Tons Downflow
	OA1D120A	OA1D144A	OA1D144A
Cooling Performance			
Gross Cooling Capacity, Btu (kW)	121,904 (35.73)	147,514 (43.23)	184,392 (54.04)
Nominal cfm (m^3/h)	1250–2500 (2124–4248)	1500–3000 (2549–5097)	1875–3750 (3186–6371)
Compressor			
Number	2	2	2
Type	Scroll	Scroll	Scroll
Outdoor Coil			
Type	High Performance	High Performance	High Performance
Tube Size—OD, in. (mm)	3/8 (9.5)	3/8 (9.5)	3/8 (9.5)
Face Area, ft^2 (m^2)	24 (2.23)	24 (2.23)	24 (2.23)
Rows	2	2	2
FPI	12	12	12
Indoor Coil			
Type	High Performance	High Performance	High Performance
Tube Size—OD, in. (mm)	1/2 (12.7)	1/2 (12.7)	1/2 (12.7)
Face Area, ft^2 (m^2)	9 (0.84)	9 (0.84)	9 (0.84)
Rows	6	6	6
FPI	12	12	12
Refrigerant Control	TXV	TXV	TXV
Drain Connection Size, in. (mm)	3/4 (20)	3/4 (20)	3/4 (20)
Outdoor Fan			
Type	Propeller	Propeller	Propeller
Number Used	2	2	2
Diameter, in. (mm)	24	24	24
Drive Type	Direct	Direct	Direct
No. Speeds	1	1	1
CFM (m^3/h)	13,500 (22,937)	13,500 (22,937)	13,500 (22,937)
Number Motors	2	2	2
Motor HP (kW), per motor	1.0 (0.75)	1.0 (0.75)	1.0 (0.75)
Motor RPM	1140	1140	1140
Indoor Fan			
Type	Backward Inclined	Backward Inclined	Backward Inclined
Number Used	1	1	1
Diameter	Varies	Varies	Varies
Drive Type	Direct Drive	Direct Drive	Direct Drive
Number Motors	1	1	1
Motor HP (kW), Standard–Oversized	1.0–5.0 (0.75–3.73)	1.0–5.0 (0.75–3.73)	1.0–5.0 (0.75–3.73)
Motor RPM, Standard–Oversized	1750–3500	1750–3500	1750–3500
Motor Frame Size, Standard–Oversized	Varies	Varies	Varies
Filters			
Type Furnished Number Size Recommended	Refer to "OAU Filter Guide" in "Appendix," p. 55	Refer to "OAU Filter Guide" in "Appendix," p. 55	Refer to "OAU Filter Guide" in "Appendix," p. 55
Refrigerant Charge, lb of R-410A			
Downflow	See Nameplate	See Nameplate	See Nameplate

Table 13. OA2 General Data—Cooling 12–20 Tons High Efficiency

	12 Tons Downflow	15 Tons Downflow	17 Tons Downflow	20 Tons Downflow
	OA2D144A	OA2D180A	OA2D210A	OA2D240A
Cooling Performance				
Gross Cooling Capacity, Btu (kW)	147,514 (43.23)	184,392 (54.04)	208,973 (61.24)	245,856 (72.05)
Nominal cfm (m^3/h)	1500–3000 (2549–5097)	1875–3750 (3186–6371)	2125–4250 (3610–7221)	2500–5000 (4248–8495)
Compressor				
Number	2	2	2	2
Type	Scroll	Scroll	Scroll	Scroll
Outdoor Coil				
Type	High Performance	High Performance	High Performance	High Performance
Tube Size—OD, in. (mm)	3/8 (9.5)	3/8 (9.5)	3/8 (9.5)	3/8 (9.5)
Face Area, ft^2 (m^2)	24 (2.23)	30 (2.79)	38 (3.53)	38 (3.53)
Rows	2	3	3	3
FPI	12	12	12	12
Indoor Coil				
Type	High Performance	High Performance	High Performance	High Performance
Tube Size—OD, in. (mm)	1/2 (12.7)	1/2 (12.7)	1/2 (12.7)	1/2 (12.7)
Face Area, ft^2 (m^2)	9 (0.84)	10 (0.93)	15 (1.39)	15 (1.39)
Rows	6	6	6	6
FPI	12	12	12	12
Refrigerant Control	TXV	TXV	TXV	TXV
Drain Connection Size, in. (mm)	1 (25)	1 (25)	1 (25)	1 (25)
Outdoor Fan				
Type	Propeller	Propeller	Propeller	Propeller
Number Used	2	3	3	3
Diameter, in. (mm)	24 (609.6)	24 (609.6)	24 (609.6)	24 (609.6)
Drive Type	Direct	Direct	Direct	Direct
No. Speeds	1	1	1	1
CFM (m^3/h)	19,500 (33,131)	19,500 (33,131)	19,500 (33,131)	19,500 (33,131)
Number Motors	3	3	3	3
Motor HP (kW), per motor	1.0 (0.75)	1.0 (0.75)	1.0 (0.75)	1.0 (0.75)
Motor RPM	1140	1140	1140	1140
Indoor Fan				
Type	Backward Inclined	Backward Inclined	Backward Inclined	Backward Inclined
Number Used	1	1	1	1
Diameter	Varies	Varies	Varies	Varies
Drive Type	Direct Drive	Direct Drive	Direct Drive	Direct Drive
Number Motors	1	1	1	1
Motor HP (kW), Standard–Oversized	1.0–5.0 (0.75–3.73)	1.0–5.0 (0.75–3.73)	1.0–7.5 (0.75–5.6)	1.0–7.5 (0.75–5.6)
Motor RPM, Standard–Oversized	1750–3500	1750–3500	1750–3500	1750–3500
Motor Frame Size, Standard–Oversized	Varies	Varies	Varies	Varies
Filters				
Type Furnished Number Size Recommended	Refer to "OAU Filter Guide" in "Appendix," p. 55	Refer to "OAU Filter Guide" in "Appendix," p. 55	Refer to "OAU Filter Guide" in "Appendix," p. 55	Refer to "OAU Filter Guide" in "Appendix," p. 55
Refrigerant Charge, lb of R-410A				
Downflow	See Nameplate	See Nameplate	See Nameplate	See Nameplate

Table 14. OA2 General Data—Cooling 22–30 Tons High Efficiency

	22 Tons Downflow	25 Tons Downflow	30 Tons Downflow
	OA2D264A	OA2D300A	OA2D360A
Cooling Performance			
Gross Cooling Capacity, Btu (kW)	270,442 (79.26)	307,320 (90.07)	368,784 (108.08)
Nominal cfm (m^3/h)	2750–5500 (4692–9345)	3125–6250 (5309–10619)	3750–7500 (6371–12743)
Compressor			
Number	2	2	2
Type	Scroll	Scroll	Scroll
Outdoor Coil			
Type	High Performance	High Performance	High Performance
Tube Size—OD, in. (mm)	3/8 (9.5)	3/8 (9.5)	3/8 (9.5)
Face Area, ft^2 (m^2)	38 (3.53)	38 (3.53)	38 (3.53)
Rows	3	3	3
FPI	12	12	12
Indoor Coil			
Type	High Performance	High Performance	High Performance
Tube Size—OD, in. (mm)	1/2 (12.7)	1/2 (12.7)	1/2 (12.7)
Face Area, ft^2 (m^2)	15 (1.39)	20 (1.86)	20 (1.86)
Rows	6	6	6
FPI	12	12	12
Refrigerant Control	TXV	TXV	TXV
Drain Connection Size, in. (mm)	1 (25)	1 (25)	1 (25)
Outdoor Fan			
Type	Propeller	Propeller	Propeller
Number Used	3	3	3
Diameter, in. (mm)	24 (609.6)	24 (609.6)	24 (609.6)
Drive Type	Direct	Direct	Direct
No. Speeds	1	1	1
CFM (m^3/h)	19,500 (33,131)	19,500 (33,131)	19,500 (33,131)
Number Motors	3		
Motor HP (kW), per motor	1.0 (0.75)	1.0 (0.75)	1.0 (0.75)
Motor RPM	1140	1140	1140
Indoor Fan			
Type	Backward Inclined	Backward Inclined	Backward Inclined
Number Used	1	1	1
Diameter	Varies	Varies	Varies
Drive Type	Direct Drive	Direct Drive	Direct Drive
Number Motors	1	1	1
Motor HP (kW), Standard–Oversized	1.0–7.5 (0.75–5.6)	1.0–15.0 (0.75–11.19)	1.0–15.0 (0.75–11.19)
Motor RPM, Standard–Oversized	1750–3500	1750–3500	1750–3500
Motor Frame Size, Standard–Oversized	Varies	Varies	Varies
Filters			
Type Furnished Number Size Recommended	Refer to "OAU Filter Guide" in "Appendix," p. 55	Refer to "OAU Filter Guide" in "Appendix," p. 55	Refer to "OAU Filter Guide" in "Appendix," p. 55
Refrigerant Charge, lb of R-410A			
Downflow	See Nameplate	See Nameplate	See Nameplate

Table 15. OA3 General Data—Cooling 30–40 Tons High Efficiency

	30 Tons Downflow	35 Tons Downflow	40 Tons Downflow
	OA3D360A	OA3D420A	OA3D480A
Cooling Performance			
Gross Cooling Capacity, Btu (kW)	368,784 (108.08)	430,248 (126.09)	491,712 (144.11)
Nominal cfm (m^3/h)	3750–7500 (6371–12743)	4375–8750 (7433–14866)	5000–10000 (8495–16990)
Compressor			
Number	2	3	3
Type	Scroll	Scroll	Scroll
Outdoor Coil			
Type	High Performance	High Performance	High Performance
Tube Size—OD, in. (mm)	3/8 (9.5)	3/8 (9.5)	3/8 (9.5)
Face Area, ft^2 (m^2)	48 (4.46)	53 (4.92)	63 (5.85)
Rows	2	3	3
FPI	12	12	12
Indoor Coil			
Type	High Performance	High Performance	High Performance
Tube Size—OD, in. (mm)	1/2 (12.7)	1/2 (12.7)	1/2 (12.7)
Face Area, ft^2 (m^2)	23 (2.14)	23 (2.14)	29 (2.69)
Rows	6	6	6
FPI	12	12	12
Refrigerant Control	TXV	TXV	TXV
Drain Connection Size, in. (mm)	1-1/4 (32)	1-1/4 (32)	1-1/4 (32)
Outdoor Fan			
Type	Propeller	Propeller	Propeller
Number Used	4	4	4
Diameter, in. (mm)	24	24	24
Drive Type	Direct Drive	Direct Drive	Direct Drive
No. Speeds	1	1	1
CFM (m^3/h)	26,000 (44,174)	26,000 (44,174)	26,000 (44,174)
Number Motors	4	4	4
Motor HP (kW), per motor	1.0 (0.75)	1.0 (0.75)	1.0 (0.75)
Motor RPM	1140	1140	1140
Indoor Fan			
Type	Backward Inclined	Backward Inclined	Backward Inclined
Number Used	1	1	1 or 2
Diameter	Varies	Varies	Varies
Drive Type	Direct Drive	Direct Drive	Direct Drive
Number Motors	1	1	1 or 2
Motor HP (kW), Standard–Oversized	1.5–15 (1.12–11.19)	1.5–15 (1.12–11.19)	2.0–15 (1.49–11.19)
Motor RPM, Standard–Oversized	1750–3500	1750–3500	1750–3500
Motor Frame Size, Standard–Oversized	Varies	Varies	Varies
Filters			
Type Furnished Number Size Recommended	Refer to "OAU Filter Guide" in "Appendix," p. 55	Refer to "OAU Filter Guide" in "Appendix," p. 55	Refer to "OAU Filter Guide" in "Appendix," p. 55
Refrigerant Charge, lb of R-410A			
Downflow	See Nameplate	See Nameplate	See Nameplate

Table 16. OA3 General Data—Cooling 45–54 Tons High Efficiency

	45 Tons Downflow	50 Tons Downflow	54 Tons Downflow
	OA3D540A	OA3D600A	OA3D648A
Cooling Performance			
Gross Cooling Capacity, Btu (kW)	553,176 (162.12)	614,640 (180.13)	663,811 (194.54)
Nominal cfm (m^3/h)	5625–11250 (9557–19114)	6250–12500 (10619–21238)	6750–13500 (11468–22937)
Compressor			
Number	3	4	4
Type	Scroll	Scroll	Scroll
Outdoor Coil			
Type	High Performance	High Performance	High Performance
Tube Size—OD, in. (mm)	3/8 (9.5)	3/8 (9.5)	3/8 (9.5)
Face Area, ft^2 (m^2)	63 (5.85	63 (5.85	63 (5.85
Rows	4	4	4
FPI	12	12	12
Indoor Coil			
Type	High Performance	High Performance	High Performance
Tube Size—OD, in. (mm)	1/2 (12.7)	1/2 (12.7)	1/2 (12.7)
Face Area, ft^2 (m^2)	29 (2.69)	29 (2.69)	29 (2.69)
Rows	6	6	6
FPI	12	12	12
Refrigerant Control	TXV	TXV	TXV
Drain Connection Size, in. (mm)	1-1/4 (32)	1-1/4 (32)	1-1/4 (32)
Outdoor Fan			
Type	Propeller	Propeller	Propeller
Number Used	4	4	4
Diameter, in. (mm)	24 (609.6)	24 (609.6)	24 (609.6)
Drive Type	Direct	Direct	Direct
No. Speeds	1	1	1
CFM (m^3/h)	26,000 (44,174)	26,000 (44,174)	26,000 (44,174)
Number Motors	4	4	4
Motor HP (kW), per motor	1.0 (0.75)	1.0 (0.75)	1.0 (0.75)
Motor RPM	1140	1140	1140
Indoor Fan			
Type	Backward Inclined	Backward Inclined	Backward Inclined
Number Used	1 or 2	1 or 2	1 or 2
Diameter	Varies	Varies	Varies
Drive Type	Direct Drive	Direct Drive	Direct Drive
Number Motors	1 or 2	1 or 2	1 or 2
Motor HP (kW), Standard–Oversized	2.0–15 (1.49–11.19)	3.0–15 (2.24–11.19)	3.0–15 (2.24–11.19)
Motor RPM, Standard–Oversized	1750–3500	1750–3500	1750–3500
Motor Frame Size, Standard–Oversized	Varies	Varies	Varies
Filters			
Type Furnished Number Size Recommended	Refer to "OAU Filter Guide" in "Appendix," p. 55	Refer to "OAU Filter Guide" in "Appendix," p. 55	Refer to "OAU Filter Guide" in "Appendix," p. 55
Refrigerant Charge, lb of R-410A			
Downflow	See Nameplate	See Nameplate	See Nameplate

Superheat and Refrigeration Circuit Data

Figure 35. Refrigeration diagram: Single compressor without reheat

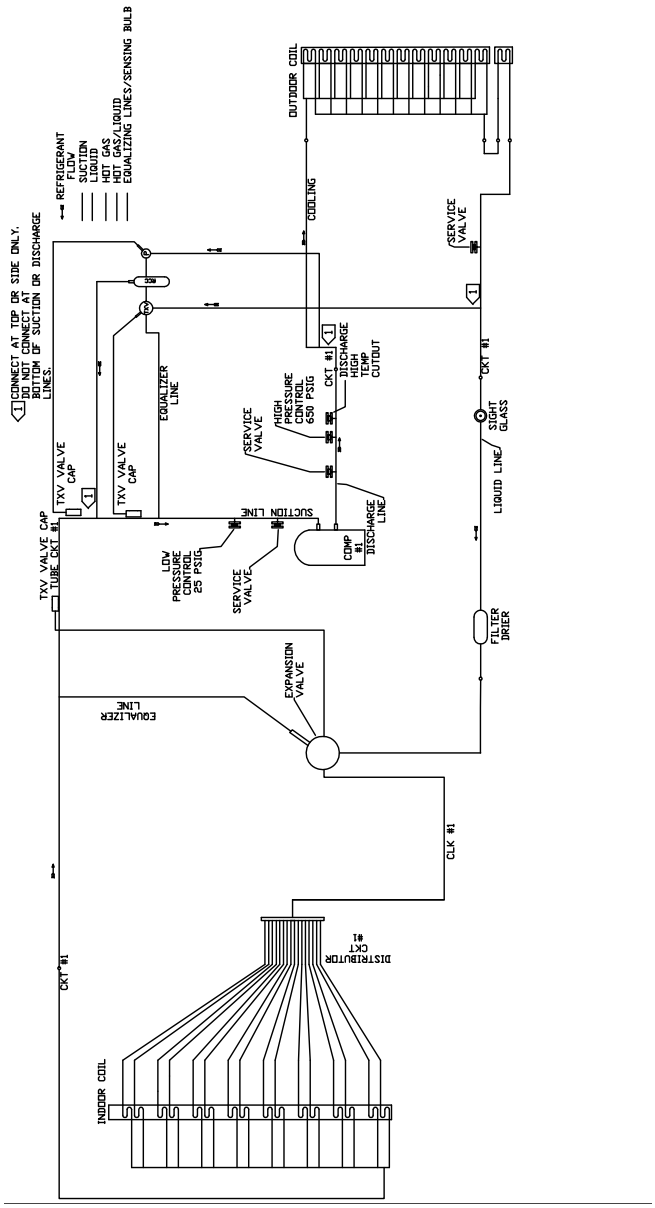


Figure 36. Refrigeration diagram: Single compressor with reheat

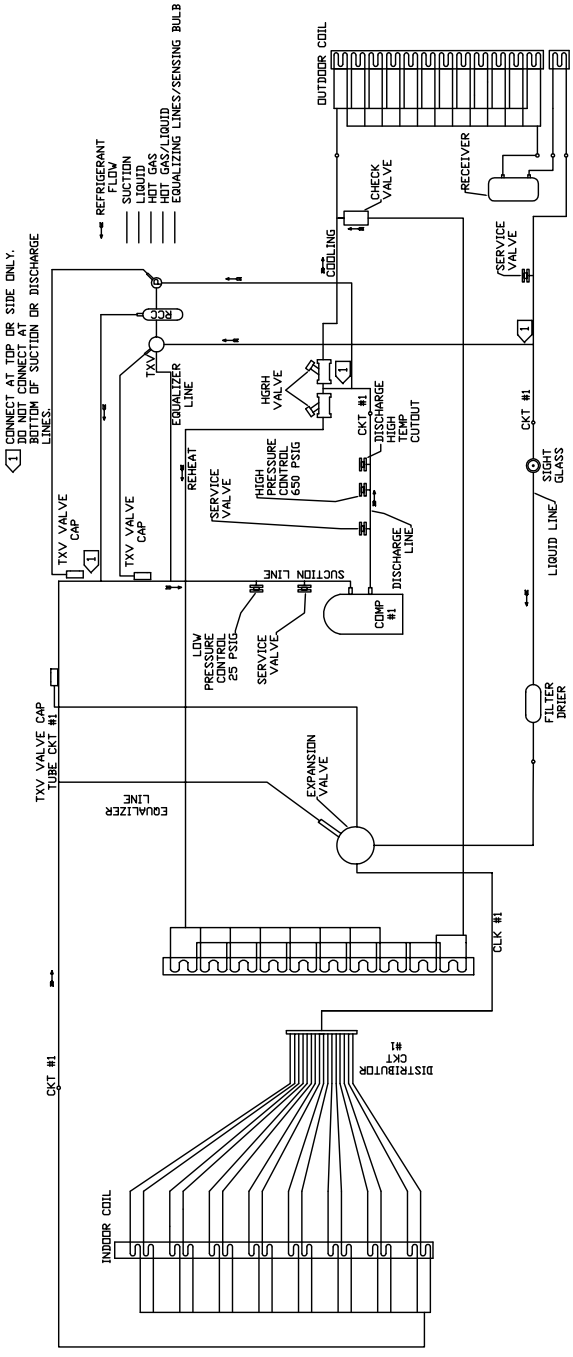


Figure 37. Refrigeration diagram: dual compressor no reheat

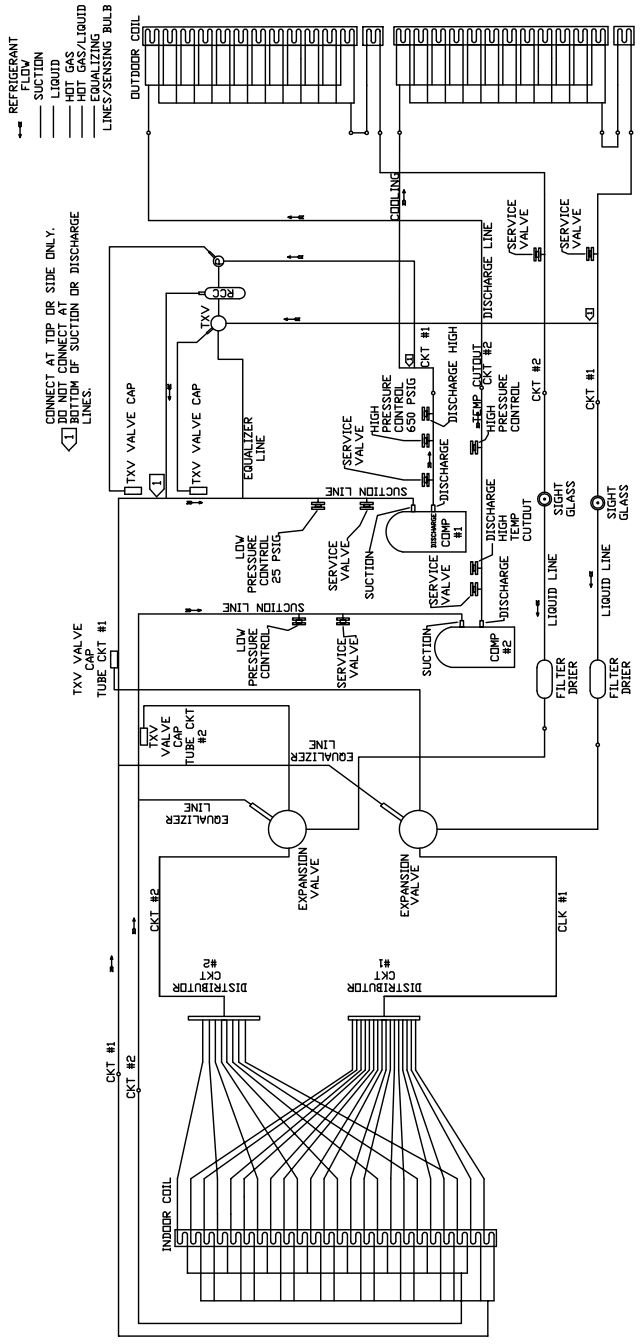


Figure 38. Refrigeration diagram: dual compressor with reheat

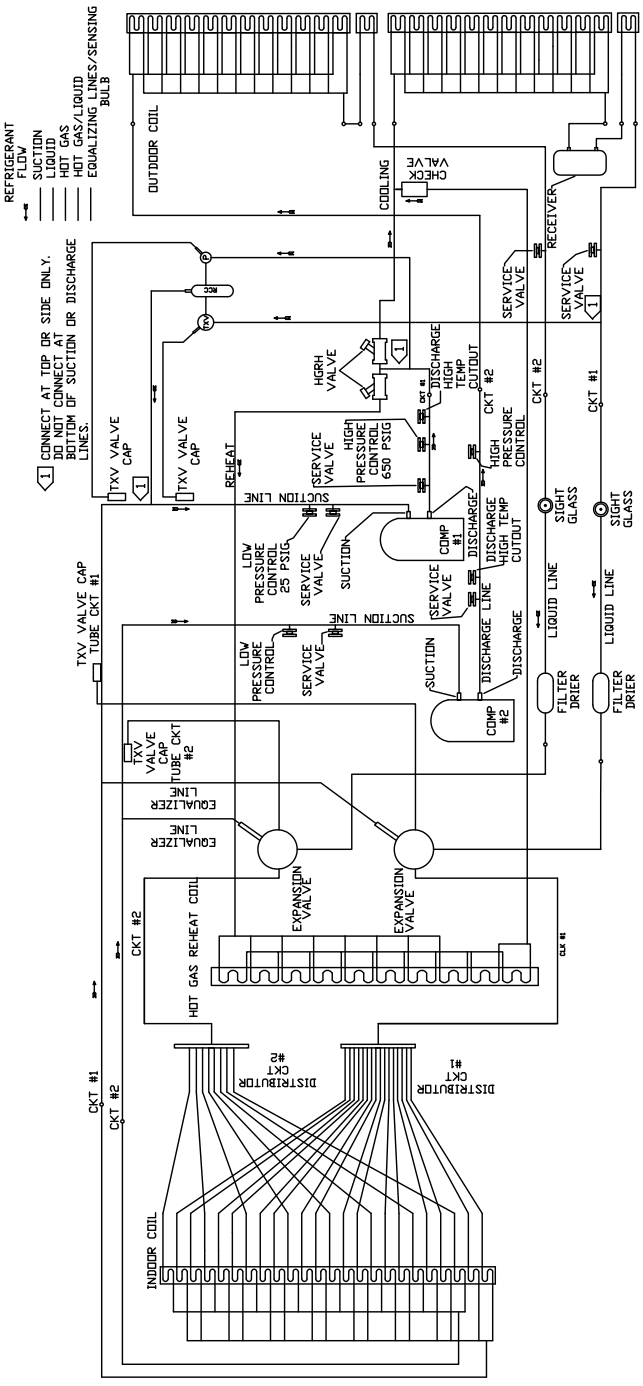


Figure 39. Refrigeration diagram: triple compressor with no reheat

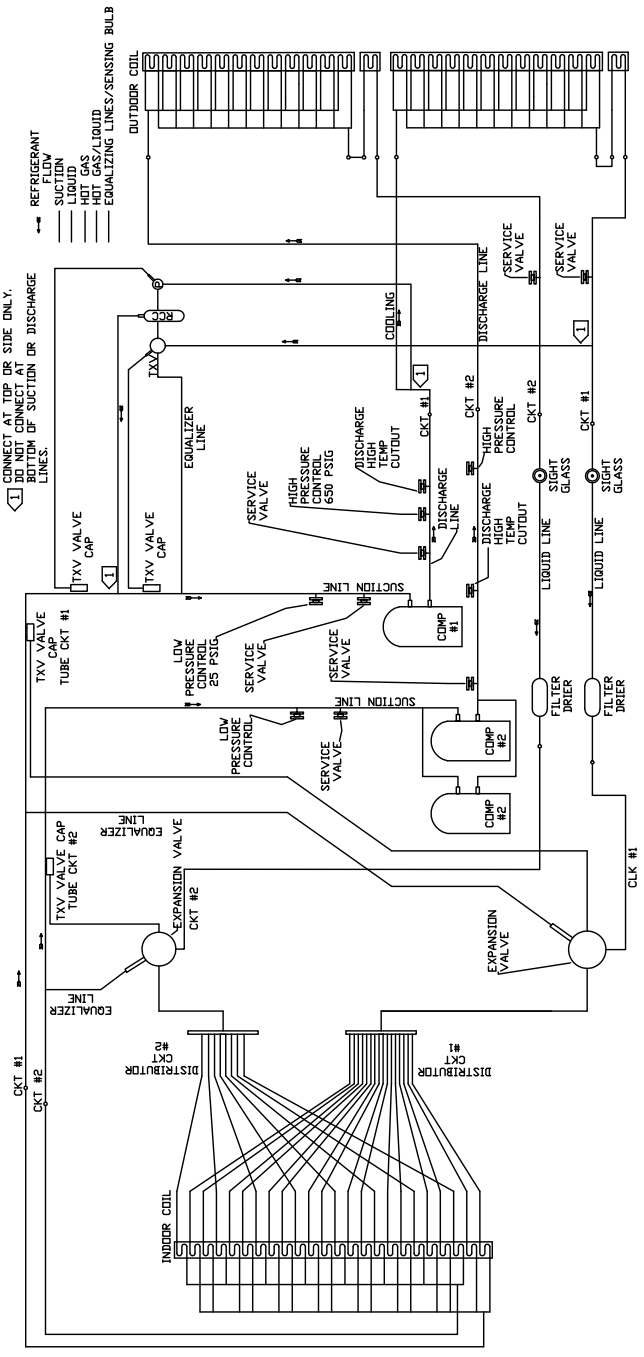


Figure 40. Refrigeration diagram: triple compressor with reheat

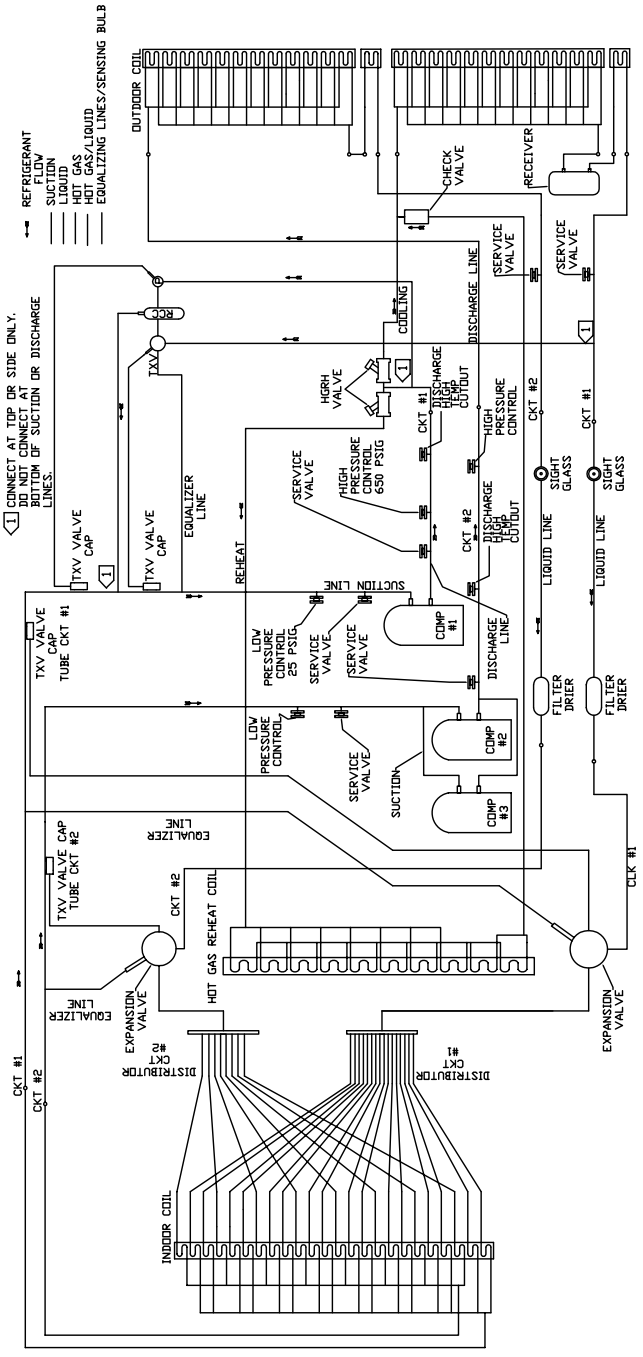


Figure 41. Refrigeration diagram: quad compressor with no reheat

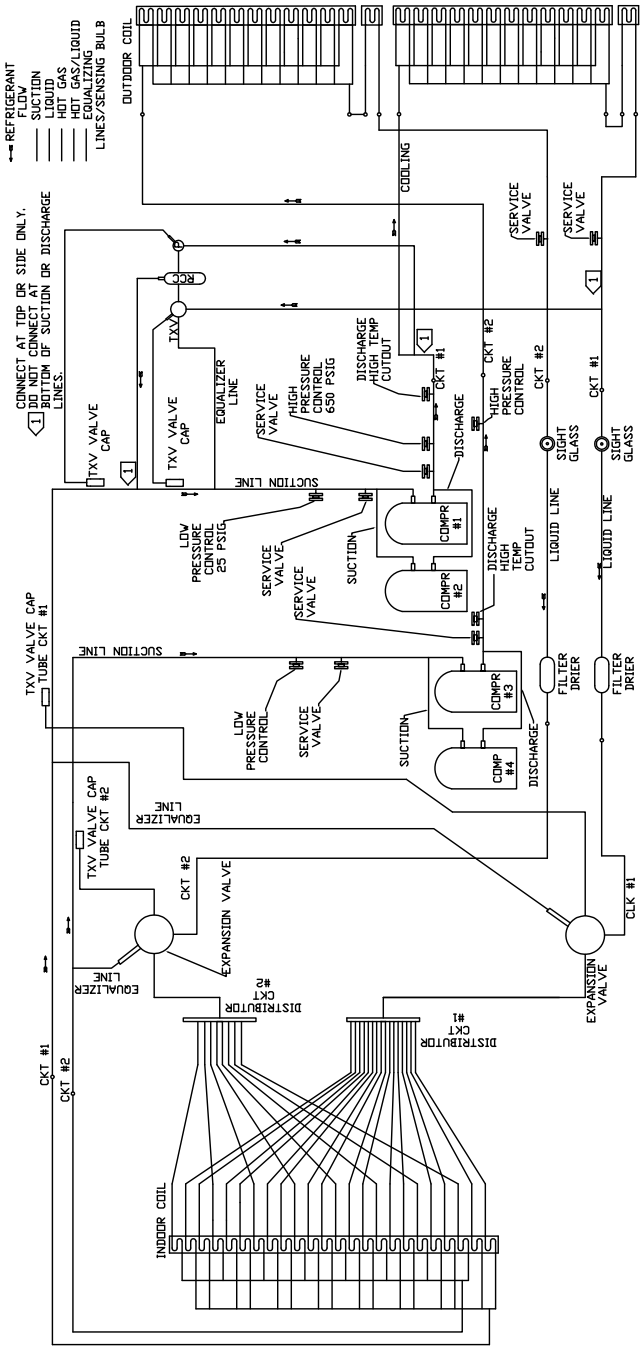
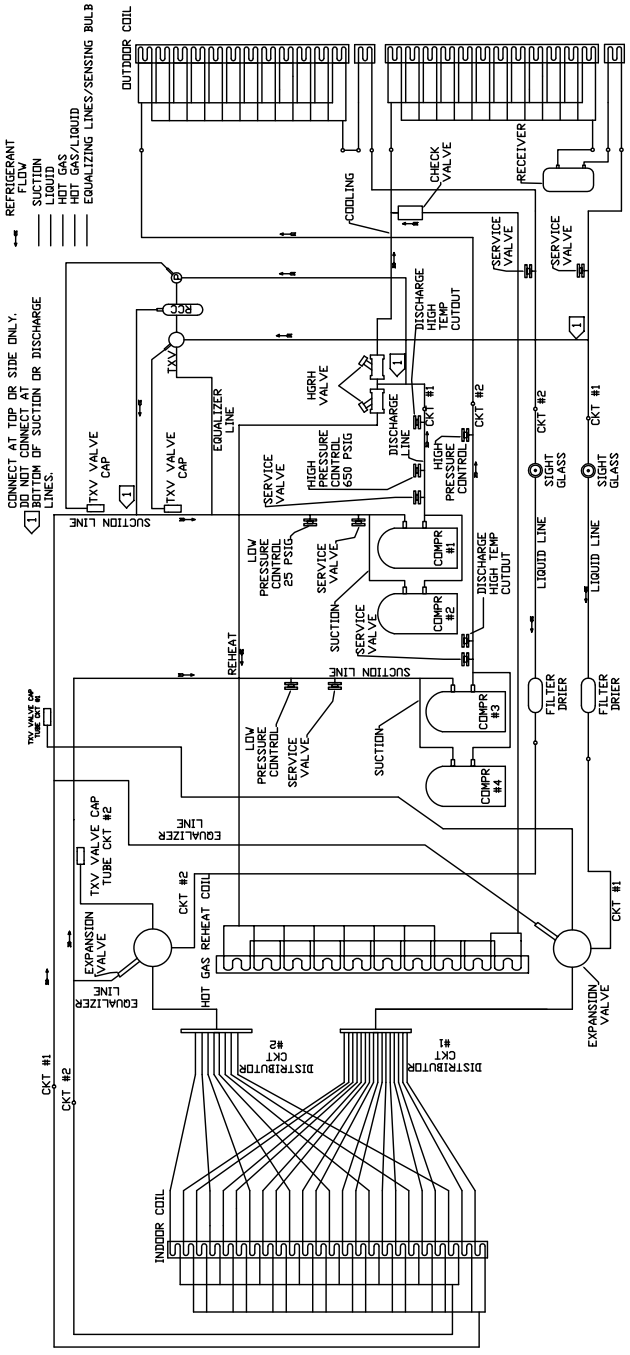


Figure 42. Refrigeration diagram: quad compressor with reheat



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!

The maintenance and troubleshooting procedures recommended in this section of the manual could result in exposure to electrical, mechanical or other potential safety hazards. Always refer to the safety warnings provided throughout this manual concerning these procedures. When possible, disconnect all electrical power including remote disconnects 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. Failure to follow all of the safety warnings provided could result in death or serious injury.

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 as described in Table 17 and Table 18, p. 53.

Table 17. TOAU UC600 alarms

Point	Diagnostic	Possible Cause
1	Indoor Fan Failure	VFD not operating
		Outdoor and/or Return Air Dampers not Operating Properly
		Indoor Fan Motor Failure
		Indoor Fan Failure Switch IFFS (pressure) Failure
		IFFS Tubing damaged or not properly connected
		Refer to startup procedure
3	OAD Proving Switch	No voltage at actuator
		Failed OAD power transformer
		No continuity thru end switch (check at UC)
		Note: If unit optional RA damper is installed, send switch on OAD is always proven
6	Discharge Air Temp Source Failure	BAS communication down
		Failed sensor or improper sensor installation
8	Fire Shutdown	BAS ONLY
10	Low Temp Lockout	Heat Overridden OFF
		Compressor(s) Overridden ON
		Setpoint Failures Incorrect
		DAT sensor malfunction
		Reference Table 18, p. 53 for heat failure issues

Table 17. TOAU UC600 alarms (continued)

Point	Diagnostic	Possible Cause
11	Space Temp Source Failure	BAS communication down
		Failed sensor or improper sensor installation
13	OA Temp Source Failure	BAS communication down
		Failed sensor or improper sensor installation
14	OA Humidity Source Failure	BAS communication down
		Failed sensor or improper sensor installation
		Humidity Wiring is polarity sensitive
15	High Temp Lockout	Heat Overridden ON
		Low discharge air volume
		Dirty air filters
		High gas heater manifold pressure
		OA/RA damper position incorrect
		High temp limit not properly installed or wired
		DAT sensor malfunction
17	System Lockout	Check all Alarms
		External safety device failed open
19	Space RH Source Failure	BAS communication down
		Failed sensor or improper sensor installation
		Humidity Wiring is polarity sensitive
32	ERV Leaving Air Condition Failure	Failed RH or temperature sensor
		Incorrectly installed or connect RH or Temp sensor
42	Heat Failure	Applies to 5:1 and 10:1 Gas Heaters Only
		Trips after heat command “ON” and no GV status offer 1 minute
		Refer to unit “Service Facts” heat control LED status legend
		No gas, low gas pressure or high gas pressure to unit
		Unit Manual shutoffs closed
		Heater inducer failure
		Heat relay failure
		Loose or incorrect wiring

Table 18. TOAU UC60 troubleshooting

Trouble	Possible Cause
Unit Not Running	No power supply to unit disconnect switch
	Power disconnect tripped
	Lockout alarm mode
	Emergency Stop condition exists
	Unit in Unoccupied mode
	Discharge air sensor failed or not installed and connected to unit

Table 18. TOAU UC60 troubleshooting (continued)

Trouble	Possible Cause
No Heat	No gas supply to unit
	Unit manual gas valve(s) closed
	Heater high limit tripped
	Heat relay not energized
	Conditions do not warrant call for heat
	Heater control module malfunction
	Roll out switch trip
	Main gas on-off switch OFF
	Inducer fan failure
	Heater air proving switch not making or failed
No Compressor	Compressor limit switch(es) open
	Compressor relay not energized or failed
	Conditions do not warrant call for cooling or dehumidification
Wide Discharge Temp Swings	Discharge air sensor position must be at least 4 ft.-0 in. away from unit outlet
	Min and Max gas heater manifold pressures not set correctly
Space too Hot, Cold or Humid	Setpoints no adjusted properly
	Space sensors not correctly located or wired
	Malfunctioning space sensor
IFM or PEX VFD OC Trip	Overcurrent alarm requires max Hz setting on VFD be checked and set to not exceed motor nameplate amps
EX VFD only run to Min HZ Setting	If supplied with RA pressure transducer and modulating damper setup is not installed or properly wired.
ERV Will Not Run	ERV leaving air temp below 34°F low temp cutout
	Interlocked with Exhaust fan if exhaust is not running ERV will be OFF
Unit Trips Heater High Limit	High fire gas manifold pressure too high
	Supply fan speed too low
	Dirty or clogged filters
	Restricted discharge air duct
	Temperature of air entering heater too high
	Defective high limit
Protonode Not Communicating	Change Baud rate on UC600 to 38,400

RTRM Failure Modes

⚠ WARNING

Live Electrical Components!

During installation, testing, servicing and troubleshooting of this product, it may be 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. Failure to follow all electrical safety precautions when exposed to live electrical components could result in death or serious injury.

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. 52 for the recommended troubleshooting procedure.

Cooling Failure

- CLP1 has opened during the 3 minute minimum "on time" during four consecutive compressor starts, check CLP1 or CLP2 by testing voltage between the J1-8 and J3-2 terminals on the RTRM and ground. If 24 Vac is present, the CLPs have not tripped. If no voltage is present, CLPs have tripped.

System Failure

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

Normal Operation = approximately 32 Vdc

System Failure = less than 1 Vdc, approximately 0.75 Vdc

Cool Failure

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

Cool Operating = approximately 32 Vdc

Cool Off = less than 1 Vdc, approximately 0.75 Vdc

Cooling Failure = voltage alternates between 32 Vdc and 0.75 Vdc

Appendix

OAU Filter Guide

Table 19. OA1D Units

Evaporator					
	Thickness	MERV	Qty	Height	Width
	2 in.	8, 13	2	16	20
			2	16	25
	4 in.	14	2	16	20
			2	16	25
Auxiliary Module					
	Return Air				
	Thickness	**MERV**	**Qty**	**Height**	**Width**
	2 in.	8	2	20	24
	Outside Air				
	Thickness	**MERV**	**Qty**	**Height**	**Width**
	2 in.	8	2	20	24
Inlet					
	Thickness	**Material**	**Qty**	**Height**	**Width**
	2 in.	Aluminum Mesh	3	16	25

Table 20. OA2D 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 21. OA3D 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

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