# Installation, Operation, and Maintenance

## Packaged Outdoor Air Unit

Indirect Gas-Fired/Electric Heat

**⚠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 2011

**OAU-SVX01B-EN**

# Warnings, Cautions and Notices

**Warnings, Cautions and Notices.** Note that warnings, cautions and notices appear at appropriate intervals throughout this manual. Warnings are provided to alert installing contractors to potential hazards that could result in personal injury or death. Cautions are designed to alert personnel to hazardous situations that could result in personal injury, while notices indicate a situation that could result in equipment or property-damage-only accidents.

Your personal safety and the proper operation of this machine depend upon the strict observance of these precautions.

**ATTENTION**: Warnings, Cautions and Notices appear at appropriate sections throughout this literature. Read these carefully.

⚠**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.

## 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 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.**

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## ⚠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.**

## ⚠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 Personal Protective Equipment (PPE) recommended for the work being undertaken. ALWAYS refer to appropriate MSDS sheets and OSHA guidelines for proper PPE.**
- **When working with or around hazardous chemicals, ALWAYS refer to the appropriate MSDS sheets and OSHA guidelines for information on allowable personal exposure levels, proper respiratory protection and handling recommendations.**
- **If there is a risk of arc or flash, technicians MUST put on all Personal Protective Equipment (PPE) in accordance with NFPA70E or other country-specific requirements for arc/flash protection PRIOR to servicing the unit.**

**Failure to follow recommendations could result in death or serious injury.**

## ⚠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.**

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# Model Number Descriptions

## Packaged Outdoor Air Unit

### Digit 1, 2 — Unit Type

OA = Outdoor Air

### Digit 3 — Cabinet Size

1 = 625 cfm–3,600 cfm
2 = 1,500 cfm–9,000 cfm
3 = 3,500 cfm–13,500 cfm

### Digit 4 — Major Design Sequence

C

### Digit 5, 6, 7 — Normal Gross Cooling

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

### Digit 12 — Hot Gas Reheat

0 = No HGRH
1 = Modulating
2 = On/Off

### Digit 13 — Compressor

0 = No Compressor
A = Scroll Compressor
B = Digital Scroll (1st Circuit Only)
C = Digital Scroll (1st and 2nd Circuit)
D = Variable Speed Scroll

### Digit 14 — Condenser

0 = No Condenser
1 = Air-Cooled
2 = Air-Cooled w/Head Pressure On/Off Control
3 = Water Source Heat Pump
4 = Air-Cooled Variable Speed

### 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 = 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 Horsepower (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

0 = No Heat
A = Indirect-Fired (IF)
B = Direct-Fired (DF)
C = Electric—2-Stage
D = Electric—SCR Modulating
E = Dual Fuel (PRI-DF/SEC-IF)
F = Dual Fuel (PRI-DF/SEC-ELEC)
G = Dual Fuel (PRI-IF/SEC-ELEC)
H = Dual Fuel (PRI-ELEC/SEC-ELEC)
J = Hot Water
K = Steam

### Digit 21 — 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 | DF |
|---|---|---|---|
| 0 | No 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 23 — Heat Capacity (Secondary Heat Source)

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

### Digit 24 — Corrosive Environment Package

0 = No Corrosive Package
1 = S/S 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

### Digit 25, 26 — Unit Controls

00 = Non-DDC—Electromechanical
AA = Trane—Outside Air Control w/LON Read-Only
AB = Trane—Space Control w/LON Read/Write
AC = Trane—Outdoor Air Control w/BACnet®
AD = Trane—Space Control w/BACnet

### Digit 27 — Powered Exhaust Fan Motor (PFM)

0 = No Powered Exhaust
1 = Direct Drive w/VFD
2 = Direct Drive (VFD by Others)
3 = Belt Drive
4 = Belt Drive w/VFD
5 = Special Motor Option

### 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 Horsepower (hp)

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 / HRV (Requires Powered Exhaust)

0 = No ERV
A = ERV
B = ERV w/Electric Trim Heat
C = ERV w/Bypass
D = ERV w/Electric Trim Heat and Bypass

### Digit 32 — ERV Size

0 = No ERV
1 = 3014C
2 = 3622C
3 = 4634C
4 = 5856C
5 = 6488C
6 = 6786C
7 = 74122C

### Digit 33 — Economizer

0 = 100% OA 2-Position Damper
1 = 100% OA 2-Position Damper w/RA 2-Position Damper
2 = Modulating Mixed Air Damper

### Digit 34 — Filtration Options

A = Aluminum Mesh Intake Filters (ALM)
B = MERV-8 30%, and ALM
C = MERV-13, 80%, and ALM
D = MERV-15, 95%, and ALM
E = Aluminum Mesh Intake Filters (ALM), w/UVC
F = MERV-8, 30%, and ALM, w/UVC
G = MERV-13, 80%, and ALM, w/UVC
H = MERV-15, 95%, and ALM, w/UVC
J = Aluminum Mesh Intake Filters (ALM), with UVC, and Electrostatic Filters
K = MERV-8, 30%, and ALM, w/UVC, and Electrostatic Filters
L = MERV-13, 80%, and ALM, w/UVC, and Electrostatic Filters
M = MERV-15, 95%, and ALM, w/UVC, and Electrostatic Filters
N = Aluminum Mesh Intake Filters (ALM), and Electrostatic Filters
P = MERV-8, 30%, and ALM, and Electrostatic Filters
Q = MERV-13, 80%, and ALM, and Electrostatic Filters
R = MERV-15, 95%, and ALM, and Electrostatic Filters
S = 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

### Digit 37 — Air Flow Monitoring

0 = No Airflow Monitoring
1 = Airflow Monitoring—IFM Fan Piezo Ring
2 = Airflow Monitoring—IFM w/Display
3 = Airflow Monitoring—PE w/Display
4 = Airflow Monitoring—Outdoor Air
5 = Airflow Monitoring—Outdoor Air w/Display

### Digit 38 — Hailguards

0 = No Hailguards
A = Hailguards

### 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. 8). 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 Control Module (MCM) and ReliaTel™ Control Module (RTRM) are microelectronic control systems. The acronyms MCM and RTRM are used extensively throughout this document when referring to the control system network.

The MCM Control Panel and the RTRM are mounted in the Main Control Panel. The MCM 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.

If air flow through the unit is not proven by the differential pressure switch connect to the MCM within 90 seconds nominally, the MCM will shut off all mechanical operations, lock the system out and send a diagnostic alarm to the Remote Operator Display (ROD). The system will remain locked out until a reset is initiated either manually or through the MCM via the Alarm Reset function on the ROD.

## 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.

## Dual Refrigerant Circuits

The two independent refrigerant circuits incorporate an interlaced coil with 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 (1$^{st}$ 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).

## 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 RH Sensor (Optional)

Field installed, wall mounted humidity sensor is used to control activation of the hot gas reheat dehumidification option when using the space sequence of operations (see "Sequence of Operation," p. 35 for operating specific details). Humidity set points can be selected for relative humidity levels between 40 and 60 percent.

## Space Temperature Sensor (Optional)

Field installed, wall mounted temperature sensor with adjustable cooling setpoint thumbwheel is used to control space cooling and heating setpoints.

## High Temperature Sensor

The Supply Air Temperature Sensor (STC) supplies a continuous signal to the MCM. If Supply Air Temperature (SAT) exceeds Maximum Supply Air Temperature Setpoint (MSTS) of 90°F, the unit will be shut down, and require a manual restart. If SAT exceeds Supply Air High Temperature Cutoff (SHCS) of 125°F for 10 minutes, the unit will shut down and require manual restart. The MSTS and SHCS are factory-set and may not be modified by the operator.

## 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. 35 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. 35 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" (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 409 or optional type 304 stainless steel and be a tubular design capable of draining internal condensate. External flue to be constructed of type 304 stainless steel.

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

## Through the Base Electrical with Disconnect Switch

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

## Through the Base Gas Piping

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

## Hinged Access Doors

Latches with hold down hooks will be factory installed on hinged access doors.

## Modulating Electric Heat

The unit may have fully modulating, SCR, or Vernier-controlled, electric heat. The primary heating section will include finned tubular 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.

# 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. 83.*

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. 16 contains figures that illustrate the minimum operating and service clearances for either a single or multiple unit installation: Figure 1, p. 16 and Figure 2, p. 17 for OA1 units,Figure 8, p. 21 through Figure 11, p. 23 for OA2 units, and Figure 17, p. 27 through Figure 20, p. 29 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 5–12 tons**

**Figure 4. Unit curb data for OA1 5–12 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 5–12 tons (in.)**

**Figure 6. Unit dimensional data for OA1 5–12 tons with auxiliary cabinet (in.)**

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

**Figure 7. OA1 Indirect gas-fired furnace heater and power**

# OA2 Units

## Unit Clearances

**Figure 8. Typical installation clearances for OA2 Unit**

**Figure 9. Typical installation clearances for OA2 Unit with auxiliary cabinet**

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

**Figure 10. Typical installation clearances for OA2 Unit**

**Figure 11. Typical installation clearances for OA2 Unit with auxiliary cabinet**

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

## Curb Dimensions

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

**Figure 13. 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 14. Unit dimensional data for OA2 12–30 tons**

**Figure 15. Unit dimensional data for OA2 12–30 tons with auxiliary cabinet**

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

**Figure 16. OA2 Furnace heater and power**

# OA3 Units

## Unit Clearances

**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.*

**Figure 19. Typical installation clearances for OA3 Unit**

**Figure 20. Typical installation clearances for OA3 Unit with auxiliary cabinet**

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

## Curb Dimensions

**Figure 21. Unit curb data for OA3 30–54 tons**

**Figure 22. 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 23. Unit dimensional data for OA3 30–54 tons**

**Figure 24. Unit dimensional data for OA3 30–54 tons with auxiliary cabinet**

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

**Figure 25. OA3 Furnace heater and power**

# 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 Weights

**Table 1. Typical unit weights and CGs—units without auxiliary cabinet**

| Model Number | Weights (lb) | | | | CGs (in.) | |
|---|---|---|---|---|---|---|
| | Min. Net | Max. Net | Min. Ship | Max. Ship | Length | Width |
| OA1C060* | 1799 | 1886 | 2047 | 2134 | 40 | 30 |
| OA1C072* | 1799 | 1886 | 2047 | 2134 | 40 | 30 |
| OA1C084* | 1804 | 1926 | 2052 | 2174 | 40 | 30 |
| OA1C096* | 1977 | 2135 | 2225 | 2383 | 40 | 30 |
| OA1C120* | 1982 | 2170 | 2230 | 2418 | 40 | 30 |
| OA1C144* | 1992 | 2203 | 2240 | 2451 | 40 | 30 |
| OA2C144* | 3542 | 3752 | 4001 | 4211 | 49 | 34 |
| OA2C180* | 3592 | 3883 | 4051 | 4342 | 49 | 34 |
| OA2C210* | 3896 | 4239 | 4355 | 4698 | 49 | 34 |
| OA2C240* | 3935 | 4327 | 4394 | 4786 | 49 | 34 |
| OA2C264* | 3940 | 4332 | 4399 | 4791 | 49 | 34 |
| OA2C300* | 4029 | 4511 | 4488 | 4970 | 49 | 34 |
| OA2C360* | 4042 | 4524 | 4501 | 4983 | 49 | 34 |
| OA3C360* | 5819 | 6464 | 6482 | 7127 | 67 | 38 |
| OA3C420* | 6224 | 6870 | 6887 | 7533 | 67 | 38 |
| OA3C480* | 6317 | 6992 | 6980 | 7655 | 67 | 38 |
| OA3C540* | 6384 | 7004 | 7047 | 7667 | 67 | 38 |
| OA3C600* | 6526 | 7299 | 7189 | 7962 | 67 | 38 |
| OA3C648* | 6538 | 7311 | 7201 | 7974 | 67 | 38 |

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

**Table 2. Typical unit weights and CGs—units with auxiliary cabinet**

| Model Number | Weights (lb) | | | | CGs (in.) | |
|---|---|---|---|---|---|---|
| | Min. Net | Max. Net | Min. Ship | Max. Ship | Length | Width |
| OA1C060* | 2437 | 2581 | 2745 | 2889 | 56 | 29 |
| OA1C072* | 2437 | 2648 | 2745 | 2956 | 56 | 29 |
| OA1C084* | 2448 | 2694 | 2756 | 3002 | 56 | 29 |
| OA1C096* | 2621 | 2903 | 2929 | 3211 | 56 | 29 |
| OA1C120* | 2631 | 2943 | 2939 | 3251 | 56 | 29 |
| OA1C144* | 2641 | 2976 | 2949 | 3284 | 56 | 29 |
| OA2C144* | 5104 | 5419 | 5623 | 5938 | 72 | 33 |
| OA2C180* | 5153 | 5550 | 5672 | 6069 | 72 | 33 |
| OA2C210* | 5463 | 5965 | 5982 | 6484 | 72 | 33 |
| OA2C240* | 5502 | 6053 | 6021 | 6572 | 72 | 33 |
| OA2C264* | 5512 | 6063 | 6031 | 6582 | 72 | 33 |
| OA2C300* | 5601 | 6242 | 6120 | 6761 | 72 | 33 |
| OA2C360* | 5619 | 6261 | 6138 | 6780 | 72 | 33 |
| OA3C360* | 8201 | 9010 | 8924 | 9733 | 81 | 37 |
| OA3C420* | 8611 | 9421 | 9334 | 10144 | 81 | 37 |
| OA3C480* | 8770 | 9609 | 9493 | 10332 | 81 | 37 |
| OA3C540* | 8837 | 9621 | 9560 | 10344 | 81 | 37 |

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

**Table 2. Typical unit weights and CGs—units with auxiliary cabinet (continued)**

| Model Number | Weights (lb) | | | | CGs (in.) | |
|---|---|---|---|---|---|---|
| | Min. Net | Max. Net | Min. Ship | Max. Ship | Length | Width |
| OA3C600* | 8989 | 9927 | 9712 | 10650 | 81 | 37 |
| OA3C648* | 9001 | 9939 | 9724 | 10662 | 81 | 37 |

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

**Figure 26. Rigging and center-of-gravity data**

## Rigging

Refer to Table 1, p. 33, Table 2, and Figure 26 for typical unit operating weights rigging before proceeding.

1. Remove the shipping crate from around the unit. Do not remove the crating from the top of the unit.
2. Rig the unit as shown in Figure 26. 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 26, 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.
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

## Outdoor Air Control with Indirect Gas-Fired or Electric Heat and Modulating HGRH

### Terminology

| **Controls** | |
|---|---|
| G | Indoor Fan Motor (IFM)—Terminal G (RTRM1) *and RTRM2 3 or 4 compressors* |
| R1 | 24 Vac Power - Terminal R (RTRM1) *and RTRM2 3 or 4 compressors* |
| Y1 | Dehumidification or Cooling Compressor 1—Terminal Y1 (RTRM1) |
| Y2 | Dehumidification or Cooling Compressor 2—Terminal Y2 (RTRM1) |
| Y3 | Dehumidification or Cooling Compressor 3—Terminal Y1 (RTRM2) |
| Y4 | Dehumidification or Cooling Compressor 4—Terminal Y2 (RTRM2) |
| CHP1-2-3-4 | Comp. High Discharge Pressure Manual Reset Limit (Comp 1–4) |
| CHT1-2-3-4 | Comp. High Discharge Temperature Auto Reset Limit (Comp 1–4) |
| CLP1-2-3-4 | Comp. Low Suction Pressure Auto Reset Limit (Comp 1–4) |
| DES | Damper End Switch (Outdoor Air Damper) |
| DP | Dewpoint |
| ELT | Evaporator Leaving air Temperature |
| ERCC | Electronic Refrigeration Capacity Controller (See RCC also) |
| ERLT | ERV Leaving Air Temperature |
| ERV | Energy Recovery Ventilator *(Optional)* |
| FSS | Filter Status Switch *(Optional)* |
| HCP | Heating Control Panel |
| HGRH | Hot Gas ReHeat |
| HTC | SA High Temperature Cutout |
| IFM | Indoor Fan Motor |
| IFFS | Indoor Fan Failure Switch |
| IOM | Installation Operation Maintenance Manual |
| IVFD | Indoor Fan Motor VFD (Variable Frequency Drive) |
| MCM | Main Control Module |
| MRV | Modulating HGRH Valve *(Optional—2 valves)* |
| OA | Outdoor Air |
| OADP | Outdoor Air Dewpoint |
| ODA | Outdoor Air Damper Actuator (Located in Inlet Hood) |
| OAUTS | Outdoor Air Unit Control Terminal Strip (Low-Voltage Field Connections) |
| PFM | Powered Exhaust Fan Motor *(Optional)* |
| PVFD | Powered Exhaust Fan Motor VFD (Variable Frequency Drive) |
| RA | Return Air |
| RCC | Refrigeration Capacity Controller (Mechanical) See ERCC |
| RDA | Return Air Damper Actuator *(Optional)* |
| ROD | Remote Operator Display |
| RTRM1 | ReliaTel Refrigeration Module (Compressor 1 and 2 control) |
| RTRM2 | ReliaTel Refrigeration Module (Compressor 3 and 4 control) |
| SA | Supply Air (unit discharge) |
| SAT | Supply Air Temperature (unit discharge) |
| SetPt | Setpoint |

**Relays (not included in description)**

| | |
|---|---|
| R1 | OA Damper (ODA damper actuator and if used optional RDA actuator) |
| R2 | Indoor Fan Motor (IFM and RTRM1 Terminals G-R) |
| R3 | Compressor 1 (COOL Y1—Stage 1) |
| R4 | Compressor 2 (COOL Y2—Stage 2) |
| R5 | ERV Enable |
| R6 | Heating |
| R7 | Spare |
| R8 | ESR (Emergency Stop Relay) |
| R9 | Compressor 3 (COOL Y3—Stage 3) |
| R10 | Compressor 4 (COOL Y4—Stage 4) |

**Sensors**

| | |
|---|---|
| ERC | ERV Leaving Air Temperature (ERLT) |
| ETC | Evaporator Leaving Air Temperature (ELT) |
| ORHC | Outdoor Air Relative Humidity (ORH) |
| OTC | Outdoor Air Temperature (OAT) |
| SPTC | Space Temperature |
| SPHC | Space Humidity |
| STC | Supply Air Temperature Sensor (at unit discharge) |

**Operator Setpoints**

| | |
|---|---|
| EDS | Evap Dehumid Temp (Evaporator leaving air temperature Dehumidification) |
| EES | OA Economizer (Ventilation) Enable (°F Dewpoint) |
| HGRS | HGRH Heating (SA) (Supply Air Hot Gas Reheat Heating) |
| IFMS | Indoor Fan Motor VFD (% IVFD Output) |
| NSCS | Unocc (Unoccupied) Space Cooling |
| NSHS | Unocc (Unoccupied) Space Heating |
| NSDS | Unocc (Unoccupied) Space Dewpoint |
| OACS | OA Cooling Enable |
| OADS | OA Dewpoint Enable (°F Dewpoint) |
| OAHS | OA Heating Enable |
| PFMS | P Ex Fan Motor VFD (Powered Exhaust Fan Motor VFD % PVFD Output) |
| SAHS | Supply Air Heating |
| SLCS | SA (Supply Air) Low Temp Time (Cutoff) |
| SLTS | SA (Supply Air) Low Temp Cutoff |
| -SPS | Static Pressure Minimum (See System Status Screen 4 of 4) |
| +SPS | Static Pressure Maximum (See System Status Screen 4 of 4) |

**Setpoints - Not Operator Adjustable:**

| | |
|---|---|
| MSTS | Maximum SA (Supply Air) Temperature |
| SHCS | SA (Supply Air) High Temp Cutoff (Temperature 125°F at Time 10-Minutes) |

# Outdoor Air Control

## "Occupied" Power On

Three Phase Unit Disconnect ON.

### Emergency Stop Normal

Contact at OAUTS-9 and -10 are Closed. Control relay 8 LED illuminated. When enabled Emergency Stop SHUTDOWN disables all Modes and stops Indoor Fan Motor (IFM).

### Alarms Normal

Refer to "Alarms and Troubleshooting," p. 99. Some alarms will prevent starting sequence and require Alarm Reset to begin starting sequence. If home screen Alarm Status line indicates ALARM proceed to View - Custom Displays - Alarm Status. Cycling 3-phase power will erase reset Alarm Status and erase alarm history.

### Overrides Released

Refer to "Override List," p. 110. Active Overrides may prevent start sequence. Overrides must be opened individually to assure they are released.

***Important:*** *Cycling power DOES NOT reset overrides.*

### Program ID

Identified on Home Screen Display: OAU-IF-ER-O1-VX.X or OAU-IF-ER-O3-VX.X. Either program controls OAU with Indirect Gas-Fired or Electric Resistance heat. O1 controls units with one or two compressors. O3 controls units with three or four compressors. VX.X indicates version of program. Other than compressor staging programs are identical.

## "Occupied" Starting Sequence

- Main Control Module (MCM) and ReliaTel Refrigeration Module (RTRM1) Initialize, *and RTRM2 when three or four compressors are installed*.
- Control Input Contact CLOSED at Outdoor Air Unit Control Terminal Strip (OAUTS) Terminals-7 and -8.
- MCM Energizes control relay R1 OA Damper.
- R1 powers Outdoor Air Damper Actuator (ODA) open and (optional) Return Air Damper Actuator (RDA) closed.
- ODA makes the Outdoor Air Damper End Switch (DES).
- MCM energizes control relay R2 Indoor Fan Motor when DES is made.
- R2 N/O contact enables Indoor Fan Motor VFD (IVFD) run command and closes RTRM1 Terminals G and R *and RTRM2 terminals G and R when RTRM2 is installed*.
- IVFD ON.
- MCM controls IVFD to operate at Indoor Fan Motor VFD Setpoint (IFMS).
- IFM ramps to IFMS.
- Indoor Fan Failure Switch (IFFS) proves indoor fan Airflow. Failure to prove airflow discontinues starting sequence and displays ALARM.

### Fan Speed Control (with Direct Drive Fan)

The IVFD adjusts the operating speed of the IFM. The IFMS may be used to change the fixed operating setpoint of IFM by adjusting the fixed operating setpoint of the IVFD at the MCM Remote Operator Display (ROD) between 50 percent and 100 percent of factory setpoint.

***Note:*** *Refer to control-specific supplement for external or on-board control of IVFD.*

- MCM Indoor Fan Motor VFD Setpoint: 50 percent to 100 percent (default is 100 percent)

### Return Air Damper with Outdoor Air Damper Control *(Optional)*

When Optional Return Air Damper is installed with Modulating Damper Control, Outdoor Air Damper position will be controlled by a separate on-board auxiliary controller. Return Air Damper modulates based on feedback from Outdoor Air Damper Actuator (ODA) to corresponding setpoint.

***Note:*** *Refer to control-specific supplement for external or on-board control of Damper Modulation.*

## "Occupied" Operating Modes

- Economizer (Ventilation)
- Dehumidification
- Cooling
- Heating

## "Occupied" Economizer Mode

Economizer Mode is enabled on Outdoor Air Dewpoint (OADP). OADP is calculated by MCM based on readings sensed by Outdoor Air Relative Humidity Sensor (ORHC) and Outdoor Air Temperature Sensor (OTC). Call for Economizer Mode is based on OA Dewpoint Enable Setpoint (OADS) minus OA Economizer Enable Setpoint (EES). EES sets the dewpoint °F that the OADP must be below OADS to enable Economizer Mode. Operation in Economizer Mode continues until outdoor air conditions enable either Dehumidification or Cooling or Heating Mode.

- MCM Y1—OA Dewpoint Enable Setpoint (OADS): 49°F–65°F DP (default is 58°F)
- MCM—OA Economizer Enable Setpoint (EES): 1°F–5°F DP (default is 1°F)

## "Occupied" Dehumidification—Cooling Modes

Dehumidification and Cooling Control Sequence:

- Y1—MCM Energizes RTRM1-Y1 through control relay R3 (Compressor 1) and compressor safeties CHP1 (Compressor High Pressure), CHT1 (Compressor High Temperature), and CLP1 (Compressor Low Pressure).
- Y2—MCM Energizes RTRM1-Y2 through control relay R4 (Compressor 2) and compressor safeties CHP2, CHT2, and CLP2.
- Y3—MCM Energizes RTRM2-Y1 through control relay R9 (Compressor 3) and compressor safeties CHP3, CHT3, and CLP3.
- Y4—MCM Energizes RTRM2-Y2 through control relay R10 (Compressor 4) and compressor safeties CHP4, CHT4, and CLP4.

***Note:*** *Individual compressors in tandem sets will operate independently but share one CHP, CHT, and CLP limit set.*

## "Occupied" Dehumidification Mode

Dehumidification Mode is enabled on OA Dewpoint Enable Setpoint (OADS). Outdoor Air Dewpoint (OADP) is calculated by MCM based on readings from Outdoor Air Temperature Sensor (OTC) and Outdoor Air Relative Humidity Sensor (ORHC). If enabled, Dehumidification is activated when Evaporator Leaving Air Temperature (ELT), as sensed by the Evaporator Leaving Air Temperature Sensor (ETC), is ≥ Evaporator Dehumid Temp Setpoint (EDS).

### RCC/ERCC Operation

Evaporator dehumidification capacity is controlled by the mechanical Refrigeration Capacity Controller (RCC) (or the optional Electronic Refrigeration Capacity Controller ERCC). When excess evaporator capacity lowers Compressor 1 discharge pressure to the RCC's regulator setpoint the regulator opens and bypasses excess hot gas into a de-superheating chamber. An integral RCC TXV meters liquid refrigerant into the chamber, as required to cool the hot gas and maintain Compressor 1 suction temperature. The RCC pressure regulator is factory set but is also field

adjustable. The optional ERCC also bypasses hot gas but uses an electronic valve to maintain EDS, as sensed at the ETC. The MCM controls ERCC valve modulation.

Following call for Y1 Dehumidification and a 5-minute delay, and if installed the ERCC signal is 0 percent, the MCM will call for Y2 Dehumidification if ELT is ≥ EDS + 2°F. If, following sequential 5-minute delays, ELT remains ≥ EDS + 2 °F MCM calls for Y3 and Y4 separately with Y-3 following Y2 and Y4 following Y-3.

Following a call for Y2, Y3 or Y4 Dehumidification plus sequential 5-minute time delays, and if installed the ERCC signal is 100 percent, the MCM will in reverse order discontinue Y4, Y3, Y2 and/or Y1 if ELT remains ≤ EDS -1°F. All Dehumidification is de-energized when OADP = OADS - 1°F.

***Note:*** *RTRM may extend or delay compressor operation. For additional ReliaTel functions, refer to RT-SVD03F-EN (*ReliaTel™ Microprocessor Controls*), or the most recent version.*

### Dehumidification Mode with *Optional* Hot Gas Reheat (HGRH)

Operation of compressors and call for dehumidification with HGRH is identical to operation without HGRH. Hot Gas Reheat is enabled by the MCM on call for Dehumidification. HGRH modulation is controlled by the MCM based on unit Supply Air Temperature (SAT) sensed at Supply Air Temperature Sensor (STC) and HGRH Heating (SA) Setpoint (HGRS). Open position of Modulating Reheat Valves (MRV) modulates to bypass to HGRH coil and/or bypass HGRH coil based on signal from MCM to maintain HGRS. MCM calls for a purge cycle of approximately 3 minutes following each 30-minute cycle of HGRH operation. During purge cycle MRV is opened to bypass 100 percent of hot gas to HGRH coil. HGRH operation is discontinued when SAT reaches HGRS +2°F. When HGRH is enabled Heating Mode is locked out.

## “Occupied” Cooling Mode

When no call for Dehumidification is present, Cooling Mode is enabled on OA Cooling Enable Setpoint (OACS). Outdoor Air Temperature (OAT) is sensed at the Outdoor air Temperature Sensor (OTC). If enabled, Cooling is activated when Evaporator Leaving Air Temperature (ELT), as sensed by the Evaporator Leaving Air Temperature Sensor (ETC), is ≥ Evap Dehumid Temp Setpoint (EDS).

Evaporator cooling capacity is controlled by the RCC or the optional ERCC (see “ “Occupied” Dehumidification Mode,” p. 38 for a description of RCC or ERCC operation).

Following call for Y1 Cooling and a 5-minute delay, and if installed the ERCC signal is 0 percent, the MCM will call for Y2 Cooling if ELT is ≥ EDS + 2°F. If, following sequential 5-minute delays, ELT remains ≥ EDS + 2°F MCM calls for Y3 and Y4 separately with Y-3 following Y2 and Y4 following Y-3.

Following a call for Y2, Y3, or Y4 Cooling plus sequential 5-minute time delays, and if installed the ERCC signal is 100 percent, the MCM will in reverse order discontinue Y4, Y3, Y2 and/or Y1 if ELT remains ≤ EDS -1°F. All Cooling is de-energized when OADP = OADS - 1°F.

***Note:*** *RTRM may extend or delay compressor operation.*

- MCM Y1—OA Dewpoint Enable Setpoint (OADS): 49°F–65°F DP (default is 58°F)
- MCM—Evaporator Dehumid Temp. Setpoint (EDS): 43°F–65°F (default is 55°F)
- MCM—Hot Gas Reheat Heating Setpoint (HGRS): 50°F–75°F (default is 72°F)
- RCC Factory Suction Pressure Setting: 114 psig—38°F Saturated Suction Temperature (Apx.)
- MCM—OA Cooling Enable Setpoint (OACS): 70°F–85°F (default is 75°F)

## “Occupied” Heating Mode

**Heating Control Sequence:**

- MCM Energizes Heating Control Panel (HCP) through control relay R6 Heating and heating auto-reset high limit controls.
- MCM Provides modulating 0–10 Vdc signal to HCP to maintain Supply Air Heating Setpoint (SAHS).

***Note:*** *See unit-specific IOM Heating Supplement for HCP operating instructions.*

### Heating Mode

When no call for Dehumidification or Cooling is present, Heating is enabled on Outdoor Air Temperature (OAT) as sensed at the Outdoor Air Temperature Sensor (OTC). Heat is activated when OAT ≤ OA Heating Enable Setpoint (OAHS). OAHS deadband is OA Cooling Enable Setpoint (OACS) -5°F. Heating modulation is controlled through MCM signal out to Heating Control Panel (HCP) to maintain Supply air Heating Setpoint (SAHS) as sensed by the Supply Air Temperature Sensor (STC).

Heating mode continues until OAT = OAHS + 2°F.

On units with variable volume controls, MCM will limit supply air temperature to Maximum Supply air Temperature Setpoint (MSTS).

When operating in Heating Mode low temperature alarm is actuated when SAT is ≤ SA Low Temp Cutoff Setpoint (SLTS) for the SA Low Temp Time Setpoint (SLCS). Low temperature alarm discontinues unit operation.

When operating in any mode SA High Temp Cutoff Alarm (SHCS) is actuated when SAT, as sensed by STC, exceeds the, not operator adjustable, SHCS of 125°F for 10 minutes.

Alarm reset at ROD will be required to restart operation following Low or High Temperature Alarm trip.

- MCM OA Heating Enable Setpoint (OAHS): 40°F–90°F (default is 60°F [limited by MSTS and OACS])
- MCM Supply Air Heating Setpoint (SAHS): 40°F–90°F (default is 60°F)
- MCM SA Low Temp Cutoff (SLTS): 25°F–40°F (default is 34°F)
- MCM SA Low Temp Time (SLCS): 15–30 minutes (default is 15 minutes)
- MCM SA High Temp Cutoff (SHCS): 125°F for 10 minutes (not operator adjustable)
- MCM Maximum SA Temperature (MSTS): 90°F (not operator adjustable)

## “Unoccupied” Power On

Three Phase Unit Disconnect ON.

### Emergency Stop Normal

Contact at OAUTS-9 and -10 are Closed. Control relay 8 LED illuminated. Emergency Stop SHUTDOWN disables all Modes and stops Indoor Fan Motor (IFM).

### Alarms Normal

Refer to “Alarms and Troubleshooting,” p. 99. Some alarms will prevent starting sequence and require Alarm Reset to begin starting sequence. If home screen Alarm Status line indicates ALARM proceed to View - Custom Displays - Alarm Status. Cycling 3-phase power will erase reset Alarm Status and erase alarm history.

### Overrides Released

Refer to “Override List,” p. 110. Active Overrides may prevent start sequence. Overrides must be opened individually to assure they are released.

***Important:*** *Cycling power DOES NOT reset overrides.*

### Program ID

Identified on Home Screen Display. OAU-IF-ER-O1-VX.X or OAU-IF-ER-O3-VX.X. Either program controls OAU with Indirect Gas-Fired or Electric Resistance heat. O1 controls units with one or two compressors. O3 controls units with three or four compressors. VX.X indicates version of program. Other than compressor staging programs are identical.

## “Unoccupied” Starting Sequence

- Main Control Module (MCM) and ReliaTel Refrigeration Module (RTRM1) Initialize.

- When three or four compressors are installed, RTRM2 DOES NOT initialize in Unoccupied Sequence.
- Control Input Contact OPEN at OAUTS Terminals-7 and -8.
- MCM De-energizes control relay R1 OA Damper.
- R1 powers *Optional* Return Air Damper Actuator (RDA) *(optional RDA is required for Unoccupied operation)* and De-energizes Outdoor Air Damper Actuator (ODA).
- ODA spring returns closed.
- On call from Space Temperature Sensor (SPTC) or Space Relative Humidity Sensor (SPHC) *(optional SPTC required for space cooling and heating. SPHC and SPTC required for space dehumidification)*.
- MCM energizes control relay R2 Indoor Fan Motor.
- MCM overrides DES.
- R2 N/O contact enables Indoor Fan Motor VFD (IVFD) and closes RTRM terminals G-R.
- IVFD ON.
- MCM controls IVFD at Indoor fan motor Operating Setpoint (IFMS).
- IFM ramps to IFMS.
- Indoor Fan Failure Switch (IFFS) proves indoor fan Airflow. Failure to prove airflow discontinues starting sequence and displays ALARM.

## “Unoccupied” Operating Modes

- Dehumidification
- Cooling
- Heating

## “Unoccupied” Dehumidification and Cooling Modes

**Dehumidification and Cooling Control Sequence:**

- Y1—MCM Energizes RTRM1-Y1 through control relay R3 (Compressor 1) and compressor safeties CHP1 (Compressor High Pressure), CHT1 (Compressor High Temperature), and CLP1 (Compressor Low Pressure).
- Y2—MCM Energizes RTRM1-Y2 through control relay R4 (Compressor 2) and compressor safeties CHP2, CHT2, and CLP2.

**Y3 and Y4 Disabled in Unoccupied Modes.**

***Note:*** *Individual compressors in tandem sets will operate independently but share one CHP, CHT, and CLP safety set.*

### Dehumidification Mode

Dehumidification is enabled on Space Dewpoint. Space Dewpoint is calculated by MCM based on readings from Space Temperature Sensor (SPTC) and Space Relative Humidity Sensor (SPHC). Dehumidification Mode is activated when Space Dewpoint ≥ Unoccupied Space Dewpoint Setpoint (NSDS) +2°F and de-activated at NSDS -1°F dewpoint. Unoccupied Dehumidification operation is identical to Occupied operation except call is enabled and disabled based on space conditions and Y3 and Y4 are disabled.

- MCM Unocc Space Dewpoint Setpoint (NSDS): 51°F–64°F DP (default is 60.2°F)

### Cooling Mode

When no call for Dehumidification is present, Cooling is enabled on space temperature as sensed by the Space Temperature Sensor (SPTC). Cooling Mode is activated when space temperature is ≥ the Unocc Space Cooling Setpoint (NSCS) +2°F and de-activated at NSCS -1°F. Unoccupied unit operation is identical to Occupied Cooling operation except call is enabled and disabled based on space temperature and Y3 and Y4 are disabled.

- MCM Unocc Space Cooling Setpoint (NSCS): 75°F–90°F (default is 80°F)

## “Unoccupied” Heating Mode

### Heating Mode

When no call for Dehumidification or Cooling is present, Heating is enabled on space temperature as sensed by the Space Temperature Sensor SPTC. Heating Mode is activated when space temperature is ≤ the Unocc Space Heating Setpoint (NSHS) -2°F and de-activated at NSHS +1°F. Unoccupied unit operation is identical to Occupied Heating operation except call is enabled and disabled based on space temperature.

- MCM Unocc Space Heating Setpoint (NSHS): 50°F–80°F (default is 55°F)

## *Optional* Powered Exhaust with or without *Optional* Energy Recovery Ventilator

### “Occupied”

Energy Recovery Ventilator (ERV) Control Power Sequence:

- MCM energizes ERV through control relay R5 ERV Enable.
- MCM interlocks Powered Exhaust Fan Motor VFD (PVFD) operation with Indoor Fan Motor VFD (IVFD) in Occupied Mode via MCM output speed signal to PVFD.

### Operation

Direct drive PVFD is interlocked ON with “Occupied” Indoor fan motor VFD (IVFD) operation. Powered Exhaust Fan Motor VFD Setpoint (PFMS,) between 50 percent and 100 percent of factory setpoint, is set at the MCM Remote Operator Display (ROD). When operating in Economizer mode MCM overrides PFMS to 100 percent.

MCM interlocks ERV operation ON with “Occupied” IVFD operation. MCM discontinues ERV operation when Outdoor Air (OA)/Return Air (RA) conditions would frost ERV and when unit is operating in Economizer Mode.

- MCM P EX Fan Motor VFD (%) Setpoint (PFMS): 50 percent to 100 percent (default is 100 percent)

### “Unoccupied”

ERV and Powered Exhaust operations are disabled in “Unoccupied” Mode.

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

## Terminology

**Controls**

| | |
|---|---|
| G | Indoor Fan Motor (IFM)—Terminal G (RTRM1) *and RTRM2 3 or 4 compressors* |
| R1 | 24 Vac Power—Terminal R (RTRM1) *and RTRM2 3 or 4 compressors* |
| Y1 | Dehumidification or Cooling Compressor 1—Terminal Y1 (RTRM1) |
| Y2 | Dehumidification or Cooling Compressor 2—Terminal Y2 (RTRM1) |
| Y3 | Dehumidification or Cooling Compressor 3—Terminal Y1 (RTRM2) |
| Y4 | Dehumidification or Cooling Compressor 4—Terminal Y2 (RTRM2) |
| CHP1-2-3-4 | Comp. High Discharge Pressure Manual Reset Limit (Comp 1–4) |
| CHT1-2-3-4 | Comp. High Discharge Temperature Auto Reset Limit (Comp 1–4) |
| CLP1-2-3-4 | Comp. Low Suction Pressure Auto Reset Limit (Comp 1–4) |
| DES | Damper End Switch (Outdoor Air Damper) |
| DP | Dewpoint |
| ELT | Evaporator Leaving air Temperature |
| ERCC | Electronic Refrigeration Capacity Controller (See RCC also) |
| ERLT | ERV Leaving Air Temperature |
| ERV | Energy Recovery Ventilator *(Optional)* |
| FSS | Filter Status Switch *(Optional)* |
| HCP | Heating Control Panel |
| HGRH | Hot Gas ReHeat |
| HTC | SA High Temperature Cutout |
| IFM | Indoor Fan Motor |
| IFFS | Indoor Fan Failure Switch |
| IOM | Installation Operation Maintenance Manual |
| IVFD | Indoor Fan Motor VFD (Variable Frequency Drive) |
| MCM | Main Control Module |
| MRV | Modulating HGRH Valve *(Optional)* |
| OA | Outdoor Air |
| OAT | Outdoor Air Temperature |
| OADP | Outdoor Air Dewpoint |
| ODA | Outdoor Air Damper Actuator (Located in Inlet Hood) |
| OAUTS | Outdoor Air Unit Control Terminal Strip (Low-Voltage Field Connections) |
| PFM | Powered Exhaust Fan Motor *(Optional)* |
| PVFD | Powered Exhaust Fan Motor VFD (Variable Frequency Drive) |
| RA | Return Air |
| RCC | Refrigeration Capacity Controller (Mechanical) *See ERCC* |
| RDA | Return Air Damper Actuator *(Optional)* |
| ROD | Remote Operator Display |
| RTRM1 | ReliaTel Refrigeration Module (Compressor 1 and 2 control) |
| RTRM2 | ReliaTel Refrigeration Module (Compressor 3 and 4 control) |
| SA | Supply Air (unit discharge) |
| SAT | Supply Air Temperature (unit discharge) |
| SetPt | Setpoint |
| SPAT | Space Air Temperature |

**Relays (not included in description)**

| | |
|---|---|
| R1 | OA Damper (ODA damper actuator and if used optional RDA actuator) |
| R2 | Indoor Fan Motor (IFM and RTRM1 Terminals G-R) |
| R3 | Compressor 1 (COOL Y1—Stage 1) |
| R4 | Compressor 2 (COOL Y2—Stage 2) |
| R5 | ERV Enable |
| R6 | Heating |
| R7 | Spare |
| R8 | ESR (Emergency Stop Relay) |
| R9 | Compressor 3 (COOL Y3—Stage 3) |
| R10 | Compressor 4 (COOL Y4—Stage 4) |

**Sensors**

| | |
|---|---|
| ERC | ERV Leaving Air Temperature (ERLT) |
| ETC | Evaporator Leaving Air Temperature (ELT) |
| ORHC | Outdoor Air Relative Humidity (ORH) |
| OTC | Outdoor Air Temperature (OAT) |
| SPTC | Space Temperature |
| SPHC | Space Humidity |
| STC | Supply Air Temperature Sensor (at unit discharge) |

**Operator Setpoints**

| | |
|---|---|
| EDS | Evaporator Leaving Air Temp. Dehumidification (°F Dewpoint) |
| EES | OA Economizer (Ventilation) Enable (°F Dewpoint) |
| IFMS | Indoor Fan Motor VFD (% IVFD Output) |
| NSCS | Unoccupied Space Cooling |
| NSHS | Unoccupied Space Heating |
| NSDS | Unoccupied Space Dewpoint |
| OADS | OA Dewpoint Enable (Dehumidification) |
| OAHS | OA Heating Enable |
| PFMS | Powered Exhaust Fan Motor VFD (% PVFD Output) |
| SPCS | Occupied Space Cooling |
| SPDS | Occupied Space Dewpoint |
| SPHS | Occupied Space Heating |
| SLCS | Supply Air Low Cutoff (Time) |
| SLTS | Supply Air Low Cutoff (Temperature) |
| -SPS | Static Pressure Minimum |
| +SPS | Static Pressure Maximum |

**Setpoint—Not Operator Adjustable:**

| | |
|---|---|
| MSTS | Maximum SA (Supply Air) Temperature |

**Alarm—Not Operator Adjustable**

| | |
|---|---|
| SHCS | SA (Supply Air) High Temp Cutoff (Temp 125°F at Time 10 Minutes) |

# Space Control

## "Occupied" Power On

Three-Phase Unit Disconnect ON.

### Emergency Stop Normal

Contact at OAUTS-9 and -10 are Closed. Control relay 8 LED illuminated. When enabled Emergency Stop SHUTDOWN disables all Modes and stops Indoor Fan Motor (IFM).

### Alarms Normal

Refer to "Alarms and Troubleshooting," p. 99. Some alarms will prevent starting sequence and require Alarm Reset to begin starting sequence. If home screen Alarm Status line indicates ALARM proceed to View - Custom Displays - Alarm Status. Cycling 3-phase power or 24-volt power to MP will erase MP alarm history and reset current alarm.

### Overrides Released

Refer to "Override List," p. 110. Active Overrides may prevent start sequence. Overrides must be opened individually to assure they are released.

***Important:*** *Cycling power DOES NOT reset Overrides.*

### Program ID

Identified on Home Screen Display. OAU-IF-ER-S1-VX.X or OAU-IF-ER-S3-VX.X. Either program controls OAU with Indirect Gas-Fired or Electric Resistance heat. S1 controls units with one or two compressors. S3 controls units with three or four compressors. VX.X indicates version of program. Other than compressor staging programs are identical.

## "Occupied" Starting Sequence

- Main Control Module (MCM) and ReliaTel Refrigeration Module (RTRM1) Initialize, and RTRM2 when three or four compressors are installed.
- Control Input Contact CLOSED at Outdoor Air Unit Control Terminal Strip (OAUTS) Terminals-7 and -8.
- MCM Energizes control relay R1 OA Damper.
- R1 powers Outdoor Air Damper Actuator (ODA) open and (optional) Return Air Damper Actuator (RDA) closed.
- ODA makes the Outdoor Air Damper End Switch (DES).
- MCM energizes control relay R2 Indoor Fan Motor when DES is made.
- R2 N/O contact enables Indoor Fan Motor VFD (IVFD) run command and closes RTRM1 Terminals G and R and RTRM2 terminals G and R when RTRM2 is installed.
- IVFD ON.
- MCM controls IVFD to operate at Indoor Fan Motor VFD Setpoint (IFMS).
- IFM ramps to IFMS (approximately 60-second ramp to full speed).
- Indoor Fan Failure Switch (IFFS) proves indoor fan Airflow. Failure to prove airflow discontinues starting sequence and displays ALARM.

### Fan Speed Control (with Direct Drive Fan)

The IVFD adjusts the operating speed of the IFM. The IFMS may be used to change the fixed operating setpoint of IFM by adjusting the fixed operating setpoint of the IVFD at the MCM Remote Operator Display (ROD) between 50 percent and 100 percent of factory setpoint.

***Note:*** *See control-specific supplement for external or on-board control of IVFD.*

- MCM Indoor Fan Motor VFD Setpoint (IFMS): 50 percent to 100 percent (default is 100 percent)

### Return Air Damper with Outdoor Air Damper Control *(Optional)*

When Optional Return Air Damper is installed with Modulating Damper Control, Outdoor Air Damper position will be controlled by a separate on-board auxiliary controller.

***Note:*** *See control-specific supplement for external or on-board control of Damper Modulation*

## "Occupied" Operating Modes

- Economizer (Ventilation)
- Dehumidification
- Cooling
- Heating

## "Occupied" Economizer Mode

Economizer Mode is enabled on Outdoor Air Dewpoint (OADP). OADP is calculated by MCM based on readings sensed by Outdoor Air Relative Humidity Sensor (ORHC) and Outdoor Air Temperature Sensor (OTC). Call for Economizer Mode is based on OA Dewpoint Enable Setpoint (OADS) minus OA Economizer Enable Set Point (EES). EES sets the dewpoint °F that the OADP must be below OADS to enable Economizer Mode. Operation in Economizer Mode continues until outdoor air conditions enable either Dehumidification or Cooling or Heating Mode.

- MCM Y1—OA Dewpoint Enable Setpoint (OADS): 49°F–65°F DP (default is 58°F)
- MCM—OA Economizer Enable Setpoint (EES): 1°F–5°F DP (default is 1°F)

## "Occupied" Dehumidification—Cooling Modes

**Dehumidification and Cooling Control Sequence:**

- Y1—MCM Energizes RTRM1-Y1 through control relay R3 (Compressor 1) and compressor safeties CHP1 (Compressor High Pressure), CHT1 (Compressor High Temperature), and CLP1 (Compressor Low Pressure).
- Y2—MCM Energizes RTRM1-Y2 through control relay R4 (Compressor 2) and compressor safeties CHP2, CHT2, and CLP2.
- Y3—MCM Energizes RTRM2-Y1 through control relay R9 (Compressor 3) and compressor safeties CHP3, CHT3, and CLP3.
- Y4—MCM Energizes RTRM2-Y2 through control relay R10 (Compressor 4) and compressor safeties CHP3, CHT3, and CLP3.

***Note:*** *Individual compressors in tandem sets will operate independently but share one CHP, CHT, and CLP limit set. Y2 in Tandem connects through Y1 Limits.*

## "Occupied" Dehumidification Mode

The MCM calculates Space Dewpoint Temperature (SPDT) based on space temperature as sensed at the Space Temperature Sensor (SPTC) and space relative humidity as sensed at the Space Relative Humidity Sensor (SPHC). MCM activates Dehumidification Mode when SPDT is ≥ Space Dewpoint Setpoint (SPDS). Dehumidification will also be activated if SPDS is satisfied and Outdoor Air Dewpoint Temperature (OADP) ≥ Outdoor Air Dewpoint Setpoint (OADS) and will remain active until OADP is OADS -1°F for 5 minutes.

### RCC/ERCC Operation

Evaporator dehumidification capacity is controlled by the mechanical Refrigeration Capacity Controller (RCC) (or the optional Electronic Refrigeration Capacity Controller ERCC). When excess evaporator capacity lowers Compressor 1 discharge pressure to the RCC's regulator setpoint the regulator opens and bypasses excess hot gas into a de-superheating chamber. An integral RCC TXV meters liquid refrigerant into the chamber, as required to cool the hot gas and maintain Compressor 1 suction temperature. The RCC pressure regulator is factory set but is also field adjustable. The optional ERCC also bypasses hot gas but uses an electronic valve to maintain the

Evaporator Dehumidification Setpoint (EDS), as sensed at the Evaporator Leaving Air Temperature Sensor (ETC). The MCM controls ERCC valve modulation.

Following call for Y1 Dehumidification and a 5-minute delay, and if installed the ERCC signal is 0 percent, the MCM will call for Y2 Dehumidification if SPDT is ≥ SPDS + 2°F. If, following sequential 5-minute delays, SPDT remains ≥ SPDS + 2°F MCM calls for Y3 and Y4 separately with Y-3 following Y2 and Y4 following Y3.

Following a call for Y2, Y3 or Y4 Dehumidification plus sequential 5-minute time delays, and if installed the ERCC signal is 100 percent, the MCM will in reverse order discontinue Y4, Y3, Y2 and/or Y1 if SPDT remains ≤ SPDS -1°F and OADP is OADS -1°F.

### Dehumidification Mode with *Optional* Hot Gas Reheat (HGRH)

Operation of compressors and call for dehumidification with HGRH is identical to operation without HGRH. Hot Gas Reheat is enabled by the MCM on call for Dehumidification. HGRH modulation is controlled by the MCM to maintain Occupied Space Cooling Setpoint (SPCS). Open position of Modulating Reheat Valves (MRV) modulates to bypass to HGRH coil and/or bypass HGRH coil based on signal from MCM to maintain SPCS. MCM calls for a purge cycle of approximately 3 minutes following each 30-minute cycle of HGRH operation. During purge cycle MRV is opened to bypass 100 percent of hot gas to HGRH coil. HGRH operation is discontinued when Space Air Temperature (SPAT) = SPCS +2°F. When HGRH is enabled Heating Mode is locked out.

***Note:*** *RTRM may extend or delay compressor operation. For additional ReliaTel functions, refer to RT-SVD03F-EN (*ReliaTel™ Microprocessor Controls*), or the most recent version.*

## "Occupied" Cooling Mode

When no call for Dehumidification is present the MCM senses Space Air Temperature (SPAT) at the Space Temperature Sensor (SPTC) and activates Cooling when SPAT ≥ Occupied Space Cooling Setpoint (SPCS).

Evaporator cooling capacity is controlled by the RCC or the *optional* ERCC (see ""Occupied" Dehumidification Mode," p. 46 for a description of RCC or ERCC operation).

Following call for Y1 Cooling and a 5-minute delay, and if installed the ERCC signal is 0 percent, the MCM will call for Y2 Cooling if SPAT is ≥ SPCS + 2°F. If, following sequential 5-minute delays, SPAT remains ≥ SPCS + 2°F MCM calls for Y3 and Y4 separately with Y-3 following Y2 and Y4 following Y-3.

Following a call for Y2, Y3, or Y4 Cooling plus sequential 5-minute time delays, and if installed the ERCC signal is 100 percent, the MCM will in reverse order discontinue Y4, Y3, Y2, and/or Y1 if SPAT remains ≤ SPCS -1°F for 5 minutes.

***Note:*** *RTRM may extend or delay compressor operation.*

- MCM Y1—OA Dewpoint Enable Setpoint (OADS): 49°F–65°F DP (default is 60°F)
- Evaporator Dehumidification temp. Setpoint (EDS): 43°F–65°F (default is 55°F)
- Occupied Space Dewpoint Setpoint (SPDS): 49°F–65°F DP (default is 58°F)
- RCC Factory Suction Pressure Setting: 114 psig—38°F Saturated Suction Temperature (Apx.)
- Occupied Space Cooling Setpoint (SPCS): 70°F–85°F (default is 75°F)

## "Occupied" Heating Mode

### Heating Control Sequence

- MCM Energizes Heating Control Panel (HCP) through control relay R6 Heating and heating auto-reset high limit controls on Outdoor Air Heating Setpoint (OAHS).
- MCM Provides modulating 0–10 Vdc signal to HCP to maintain Space Heating Setpoint (SPHS).

***Note:*** *See unit-specific IOM Heating Supplement for HCP operating instructions.*

**Heating Mode:**

When no call for Dehumidification or Cooling is present, Heating is enabled on Space Air Temperature (SPAT) as sensed at the Space Air Temperature Sensor (SPTC). Heating is activated when SPAT ≤ Space Heating Setpoint (SPHS). SPHS deadband is Space Cooling Setpoint (SPCS) -5°F. Heating modulation is controlled through MCM signal out to Heating Control Panel (HCP) to maintain SPHS.

Heating mode continues until SPAT = SPHS + 2°F.

On units with variable volume controls, MCM will limit supply air temperature to Maximum Supply air Temperature Setpoint (MSTS).

When operating in Heating Mode low temperature alarm is actuated when SAT is ≤ SA Low Temp Cutoff Setpoint (SLTS) for the SA Low Temp Time Setpoint (SLCS). Low temperature alarm discontinues unit operation.

When operating in any mode SA High Temp Cutoff Alarm (SHCS) is actuated when SAT, as sensed by STC, exceeds the, not operator adjustable, SHCS of 125°F for 10 minutes.

Alarm reset at ROD will be required to restart operation following Low or High Temperature Alarm trip.

- MCM Occupied Space Heating Setpoint (SPHS): 40°F–90°F (default is 60°F [limited by MSTS and SPCS])
- MCM SA Low Cutoff Temperature (SLTS): 25°F–40°F (default is 34°F)
- MCM Supply Air Low Cutoff Time (SLCS): 15–30 minutes (default is 15 minutes)
- MCM SA High Cutoff Temperature (SHTS): 125°F (not operator-adjustable)
- MCM Supply Air High Cutoff Time: 10 minutes (not operator-adjustable)
- MCM Maximum Supply Air Temperature (MSTS): 90°F (not operator-adjustable)

## “Unoccupied” Power On

Three Phase Unit Disconnect ON.

### Emergency Stop Normal

Contacts at OAUTS-9 and -10 are Closed. Control relay 8 LED illuminated. Emergency Stop SHUTDOWN disables all Modes and stops Indoor Fan Motor (IFM).

### Alarms Normal

Refer to “Alarms and Troubleshooting,” p. 99. Some alarms will prevent starting sequence and require Alarm Reset to begin starting sequence. If home screen Alarm Status line indicates ALARM proceed to View - Custom Displays - Alarm Status. Cycling 3-phase power to unit or 24-volt power to MP will erase MP alarm history and rest current alarm.

### Overrides Released

Refer to “Override List,” p. 110. Active Overrides may prevent start sequence. Overrides must be opened individually to assure they are released.

***Important:*** *Cycling power DOES NOT reset Overrides.*

### Program ID

Identified on Home Screen Display. OAU-IF-ER-S1-VX.X or OAU-IF-ER-S3-VX.X. Either program controls OAU with Indirect Gas-Fired or Electric Resistance heat. S1 controls units with one or two compressors. S3 controls units with three or four compressors. VX.X indicates version of program. Other than compressor staging programs are identical.

## “Unoccupied” Starting Sequence

- Main Control Module (MCM) and ReliaTel Refrigeration Module (RTRM1) initialize.
- When 3 or 4 compressors are installed RTRM2 DOES NOT initialize in Unoccupied Sequence.

- Control Input Contact OPEN at OAUTS Terminals-7 and -8.
- MCM De-energizes control relay R1 OA Damper.
- R1 powers Optional Return Air Damper Actuator (RDA) open *(optional RDA is required for Unoccupied operation)* and de-energizes Outdoor Air Damper Actuator (ODA).
- ODA spring returns closed.
- On call from Space Temperature Sensor (SPTC) or Space Relative Humidity Sensor (SPHC) *(optional SPTC required for space cooling and heating. SPHC and SPTC required for space dehumidification)* MCM energizes control relay R2 Indoor Fan Motor.
- MCM overrides DES.
- R2 N/O contact enables Indoor Fan Motor VFD (IVFD) and closes RTRM1 terminals G-R.
- IVFD ON.
- MCM controls IVFD at Indoor fan motor Operating Setpoint (IFMS).
- IFM ramps to IFMS *(approximately 60-second ramp to full speed)*.
- Indoor Fan Failure Switch (IFFS) proves indoor fan Airflow. Failure to prove airflow discontinues starting sequence and display ALARM.

## “Unoccupied” Operating Modes

- Dehumidification
- Cooling
- Heating

## “Unoccupied” Dehumidification and Cooling Modes

**Dehumidification and Cooling Control Sequence:**

- Y1—MCM Energizes RTRM1-Y1 through control relay R3 (Compressor 1) and compressor safeties CHP1 (Compressor High Pressure), CHT1 (Compressor High Temperature), and CLP1 (Compressor Low Pressure).
- Y2- MCM Energizes RTRM1-Y2 through control relay R4 (Compressor 2) and compressor safeties CHP2, CHT2, and CLP2.

**Y3 and Y4 Disabled in Unoccupied Modes.**

***Note:*** *Individual compressors in tandem sets will operate independently but share one CHP, CHT, and CLP safety set.*

### Dehumidification Mode

Dehumidification is enabled on Space Dewpoint. Space Dewpoint is calculated by MCM based on readings from Space Temperature Sensor (SPTC) and Space Relative Humidity Sensor (SPHC). Call for Dehumidification Mode is based on Unoccupied Space Dewpoint Setpoint (NSDS). MCM energizes Y1 Dehumidification at NSDS +2°F dewpoint and de-energizes at NSDS -1°F dewpoint. Unoccupied Dehumidification operation is identical to Occupied operation except Y3 and Y4 are disabled.

- MCM Unoccupied Space Dewpoint Setpoint (NSDS): 51°F–64°F DP (default is 60.2°F)

### Cooling Mode

When no call for Dehumidification is present, Cooling is enabled on space temperature as sensed by the Space Temperature Sensor (SPTC). Cooling Mode is activated when space temperature is ≥ the Unocc Space Cooling Setpoint (NSCS) +2°F and de-activated at NSCS -1°F. Unoccupied unit operation is identical to Occupied Cooling operation except Y3 and Y4 are disabled.

- MCM Unoccupied Space Cooling Setpoint (NSCS): 75°F–90°F (default is 80°F)

## “Unoccupied” Heating Mode

### Heating Mode

When no call for Dehumidification or Cooling is present, Heating is enabled on space temperature as sensed by the Space Temperature Sensor (SPTC). Heating Mode is activated when Space Air Temperature (SPAT) is Unocc Space Heating Setpoint (NSHS) -2°F and de-activated at NSHS +1°F. Unoccupied heating is enabled and disabled based on Space Air Temperature (SPAT) and Supply Air Temperature (SAT) defaults to the not adjustable Maximum Supply Air Temperature Setpoint (MSTS).

- MCM Unoccupied Space Heating Setpoint (NSHS): 50°F–80°F (default is 55°F)

## *Optional* Powered Exhaust with or without *Optional* Energy Recovery Ventilator

### “Occupied”

**Energy Recovery Ventilator (ERV) Control Power Sequence:**

- MCM energizes ERV through control relay R5 ERV Enable.
- MCM interlocks Powered Exhaust Fan Motor VFD (PVFD) operation with Indoor Fan Motor VFD (IVFD) in Occupied Mode via MCM output speed signal to PVFD.

### Operation

Direct drive PVFD is interlocked ON with “Occupied” Indoor fan motor VFD (IVFD) operation. Powered Exhaust Fan Motor VFD Setpoint (PFMS), between 50 percent and 100 percent of factory setpoint, is set at the MCM Remote Operator Display (ROD). When operating in Economizer mode MCM overrides PFMS to 100 percent.

MCM interlocks ERV operation ON with “Occupied” IVFD operation. MCM discontinues ERV operation when Outdoor Air (OA)/Return Air (RA) conditions would frost ERV and when unit is operating in Economizer Mode.

- MCM Powered Exhaust Motor VFD Setpoint (PFMS): 50 percent to 100 percent (default is 100 percent)

### “Unoccupied”

NO ERV or Powered Exhaust operation in “Unoccupied” Mode.

# 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 recommended 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.

## 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. 33).
- ☐ 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 27, p. 52).

## 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 29, p. 54, Figure 30, p. 54, and Figure 31, p. 55 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 27.

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 27. Condensate trap installation**

## 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 29, p. 54, Figure 30, p. 54, and Figure 31, p. 55. To ensure that the unit's supply power wiring is properly sized and installed, refer to the following guidelines.

**Figure 28. Main power entrance**

**Figure 29. OA1 Utility connections**

**Figure 30. OA2 Utility connections**

**Figure 31. OA3 Utility connections**

***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% of the rated voltage stamped on the nameplate. Use only copper conductors to connect the power supply to the unit.

### *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.**

## 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.**

## 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 29, p. 54, Figure 30, p. 54, and Figure 31, p. 55. 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. 51 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.
- ☐ Using blower test mode 1, check proper indoor fan wheel rotation. Wheel housing will be marked to indicate direction of proper rotation.
- ☐ Optional Belt Drive Supply Fan: Check the supply fan belts for proper tension and the fan bearings for sufficient lubrication. If the belts require adjustment, or if the bearings need lubricating, refer to the maintenance section of this manual for instructions.
- ☐ With access doors closed and secured, operate blower in 100 percent speed test mode. 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:

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

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

V1, V2, V3 = Line Voltage Readings

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

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

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

VD (reading farthest from average) = 221

The percentage of Imbalance equals:

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

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).
- ☐ With power off, open disconnect cover and connect the phase sequence indicator leads to the line side of the disconnect device as follows: Black (phase A) to L1, Red (phase B) to L2, Yellow (phase C) to L3.
- ☐ 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”.

## MCM 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 MCM and the Liteport LED located on the RTRM module is turned “On” within one second of power-up if internal operation is okay.

Use the test procedures as described under *Test Mode* in "System Configuration and Pre-Start," p. 63. Each step of unit operation can be activated individually by inputting the desired test mode via the Remote Operator Display (ROD). Exit test modes at ROD upon completion of testing. The unit can be left in a test mode for up to 30 minutes. After 30 minutes, the MCM will automatically release any active test modes and return to normal operation. Cycling MCM power off-on will also remove any active test modes.

## 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 32, p. 61 and Figure 33, p. 62.

***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 29, p. 54, Figure 30, p. 54, and Figure 31, p. 55 for the electrical access locations provided on the unit and Table 3 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 3. 24 Vac conductors**

| Distance from Unit to Control | Recommended Wire Size |
|---|---|
| 000–460 feet<br>000–140 m | 18 gauge<br>0.75 $mm^2$ |
| 461–732 feet<br>104–223 m | 16 gauge<br>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 29, p. 54, Figure 30, p. 54, and Figure 31, p. 55 for the electrical access locations provided on the unit.

1. Table 4, p. 60 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.

# DC Conductors

**Table 4. Zone sensor module wiring**

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

**Figure 32. Space sensor field wiring (optional with OA control; required with Space control)**

**Figure 33. Typical field wiring diagrams for optional controls**

# 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 Remote Operator Display (ROD) and configure the Outdoor Air Unit Main Control Module (MCM) system set points and operating parameters.

***Important:*** *The unit is configured at the factory with the default settings as described in* *"Sequence of Operation," p. 35**; refer to* *"Sequence of Operation," p. 35* *for details concerning setup and operating setpoints. This section is intended to provide guidelines for navigating through the remote operator display screens.*

## Remote Operator Display Navigation

### Main Display

The *Main Display* will be displayed on the Remote Operator Display upon initial start-up. Touch the screen if the display is blank or dark. The display will "sleep" is not accessed for a preset period of time. Display Brightness and Contrast settings can be adjusted via the *Setup* screen.

**Home Screen.** Screen layouts are common to OA Control Sequence and Space Control Sequence. Where there are differences, this publication makes note in the comments beneath each screen. On the home screen, "O1" denotes OA Control Sequence (one or two compressors), and "O3" denotes OA Control Sequence (three or four compressors). "S1" denotes Space Control Sequence (one or two compressors), and "S3" denotes Space Control Sequence (three or four compressors). When proceeding with setup, the operator should ensure the correct sequence for unit application is loaded into MCM.

Unit operating parameters, set points, overrides, alarms and system set-up are accessed from the touch sensitive Remote Operating Display (ROD). To make a selection, press firmly on the center of the button. A beep will sound indicating that the selection has been accepted.

**Date – Time.** Displays Date and Time. Date and Time set up are accessed through the Home Screen Setup button. Setting the date and time are not critical to unit operations.

**Program Title & Version.** Program Title and Version, such as OAU-IF-ER-O1-V1.0, is displayed on the Home Screen directly beneath the day of the week, which is displayed top center of screen. On the home screen, "O1" denotes OA Control Sequence (one or two compressors), and "O3" denotes OA Control Sequence (three or four compressors). "S1" denotes Space Control Sequence (one or two compressors), and "S3" denotes Space Control Sequence (three or four compressors). Closing letters such as -V1.0 indicate version. Display **ONLY**.

**Control Input.** System operating mode – OCCUPIED or UNOCCUPIED. This mode is determined by the dry contact input at Terminals 7 and 8 on the Outdoor Air Unit Terminal Strip (OAUTS) or Override or Test Mode. Be sure to release all Overrides before leaving unit as Overrides do not time release. Display **ONLY**.

**View.** Access *Customer Displays and Analog and Binary – Inputs and Outputs* displays.

**Alarm.** Access *Alarm* display.

This function displays sensor failure alarms **ONLY**. Unit level alarms are accessed through the *Custom Displays* screen under *Alarm Status*. Refer to "Alarms and Troubleshooting," p. 99 for detailed alarm mode information.

**Schedule.** Function is **NOT USED**.

**Override.** *Override Occupancy, Override a Binary Input and Override an Analog Output. If used, RELEASE ALL OVERRIDES when complete;* ***OVERRIDES DO NOT TIME-RELEASE****.* ***Cycling power DOES NOT release overrides.***

**Setup.** Access *Change Time, Change Date, Change Occupied Bypass Time and View Communication Information* displays.

## View List

Press *View* to display the *View List*. The *Custom Displays* and *Analog and Binary – Inputs and Outputs* displays are accessed from the *View List*.

**Custom Displays.** View the Custom Display List screens. Unit operating status, set points, set up parameters and alarms are accessed via *Custom Displays*.

**Analog and Binary-Inputs and Outputs.** Displays values or state of unit control binary and analog input and outputs.

**Custom Displays Button.** Press *Custom Displays* to access the *Custom Displays List*. System Status, System Cooling Status, System Heating Status, System Setpoints, Alarm Status, and System Setup are accessed from these screens.

## Custom Displays Button

Press *Custom Displays* to access the *Custom Displays List*. System status, system set points, alarms and system setup are accessed from screen 1 of 2 of the *Custom Display List*. Alarm Status and System Setup are accessed from page 2 of 2 of *Custom Display List*. Use page up-down arrows

in bottom right corner of display screen to navigate from page to page. The Home icon at the bottom of each display screen will return to Home screen; the large left-arrow icon will return to previous category screen.

***Note:*** *Refer to* *"Sequence of Operation," p. 35* *for operating-specific details.*

**System Status.** Displays the current unit operating status.

**System Cooling Status.** Displays the current cooling and dehumidification operations.

**System Heating Status.** Displays the current heating operations.

**System Setpoints.** Use this button to display or change system setpoints.

**Alarm Status.** The Alarm Status button on the Custom Display List provides detailed alarms concerning unit function. Unit level alarms should be accessed via the Alarm Status button on the Custom Displays List. Sensor failures ONLY can be accessed via the Alarm button on the Main Display. Alarm Status also allows alarm reset.

**System Setup.** The System Setup button on the Custom Display List allows the user to communicate to the MCM that certain options are installed or not installed.

***Note:*** *Refer to* *"Sequence of Operation," p. 35* *for operating specific details.*

**OA Economizer Mode.** (Display Only) If conditions specified in Sequence of Operation indicate that the unit should be operating in Economizer mode, "ENABLED" will show. Otherwise, "Disabled" will be displayed.

**OA Dehumid Mode.** (Display Only) If conditions specified in Sequence of Operation indicate that the unit should be operating in dehumidification mode, "ENABLED" will show. Otherwise "Disabled" will be displayed.

**Cooling Mode.** (Display Only) If conditions specified in Sequence of Operation indicate that the unit should be operating in cooling mode, "ENABLED" will show. Otherwise "Disabled" will be displayed.

**Heating Mode.** (Display Only) If conditions specified in Sequence of Operation indicate that the unit should be operating in heating mode, "ENABLED" will show. Otherwise "Disabled" will be displayed.

***Note:*** *Refer to* *"Sequence of Operation," p. 35* *for operating specific details.*

**Control Input.** (Display Only) Indicates current operating mode: Occupied or UNOCC.

**OA Temperature.** (Display Only) Display of MCM calculated Outdoor Air Temperature (OAD). Value is derived from input of OA Temperature Sensor (OTC).

**OA Dewpoint.** (Display Only) Display of MCM calculated Outdoor Air Dewpoint (OAD). Value is derived from input of OA Relative Humidity Sensor (ORHC).

**SA Temperature.** (Display Only) Display of MCM calculated Supply Air Temperature (SAT). Value is derived from input of SA Temperature Sensor (STC).

***Note:*** *Refer to "Sequence of Operation," p. 35 for operating specific details.*

**Evap Leaving Air Temp.** (Display Only) Indicates the Evaporator Leaving Air Temperature (ELT) as measured by the Evaporator Leaving Air Temperature Sensor (ETC) and calculated by the MCM.

**ERV Leaving Air Temp.** (Display Only) Indicates the ERV Leaving Air Temperature (ERLT) as measured by the ERV Leaving Air Temperature Sensor (ERC) and calculated by the MCM.

**System Delta T.** (Display Only) Indicates the MCM calculated difference between Outdoor Air Temperature as measured by the Outdoor Air Temperature Sensor (OTC) and the Supply Air Temperature as measured by the Supply Air Temperature Sensor (STC). Also refer to "Indirect Gas-Fired Heating Start-Up," p. 83 for specific operating details.

**IFM VFD Setpoint.** (Display Only) Indicates the setpoint (IFMS) of the Indoor Fan Motor Variable Frequency Drive (IVFD). Adjustable via System Setpoints screen on Remote Operator Display between 50 percent and 100 percent of factory setting.

***Note:*** *Refer to "Sequence of Operation," p. 35 for operating specific details.*

**Pressure Control.** Allows operator to activate pressure control functions of MCM.

**Pressure Setpoint.** Allows operator to set Space Pressure Setpoint.

**Static Pressure.** (Display Only) Indicates the amount of external static pressure currently experienced by system.

**System Airflow.** (Display Only) Indicates the airflow of the system in Cubic Feet per Minute (CFM). Optional differential pressure switch must be installed to read System Airflow.

## System Cooling Status

The *System Cooling Status* is accessed from the *Custom Displays* screen. The *System Cooling Status* shows the unit cooling operating status **ONLY**. System set points and setup are accessed through the *System Setpoints* and *System Setup* screens accessed from the *Custom Displays* screen.

***Note:*** *Refer to "Sequence of Operation," p. 35 for operating specific details.*

**Dehumid/Cooling Status.** (Display Only) Indicates if unit is operating in either Dehumidification or Cooling Mode. When Dehumid/Cooling Status is ON, one or more of the other displays on this page will be ON. In addition, RTRM Y1 and/or Y2 will indicate ON as well. In heating mode, Dehumid/Cooling Status should indicate Off, Y1 Dehumid should indicate Off, Y1 Cooling Off, and Y2 Dehumid/Cooling Off.

**Y1 Dehumid.** (Display Only) Indicates if unit is operating in first stage (Compressor 1—ON and Compressor 2—ON or OFF) dehumidification mode. When Y1 Dehumid indicates "ON", RTRM should indicated Y1 ON.

**Y1 Cooling.** (Display Only) Indicates if unit is operating in first stage (Compressor 1—ON and Compressor 2—ON or OFF) cooling mode. When Y1 Cooling indicates "ON", RTRM should indicate Y1 ON.

**Y2 Dehumid/Cooling.** (Display Only) Indicates if unit is operating second stage (Compressor 1—ON and Compressor 2—ON) dehumidification/cooling mode. When Y2 Dehumid/Cooling indicates "ON", RTRM should indicate Y1 and Y2 ON.

***Note:*** *Refer to "Sequence of Operation," p. 35 for operating specific details.*

**Y3 Dehumid/Cooling.** (Display Only) Indicates the status of Compressor 3 (Y3). In order for Y3 Dehumid/Cooling to be ON, Y1 and Y2 must also be ON. If Y3 Dehumid/Cooling is ON, RTRM 2 should show Y1 ON.

**Y4 Dehumid/Cooling.** (Display Only) Indicates the status of Compressor 4 (Y4). In order for Y4 Dehumid/Cooling to be ON, Y1, Y2 and Y3 must also be ON. If Y4 Dehumid/Cooling is ON, RTRM 2 should show Y1 and Y2 ON.

**ERCC Capacity Control.** (Display Only) Indicates the percentage of bypass as determined by the optional Electronic Refrigeration Capacity Control (ERCC) signal from the MCM.

**HGRH Modulation Signal.** (Display Only) Indicates amount of Hot Gas Reheat (HGRH) modulation, as measured by the Modulating Hot Gas Reheat Valve (MRV) position.

## OA Control Sequence ONLY:

***Note:*** *Refer to "Sequence of Operation," p. 35 for operating specific details.*

**SA Temperature.** (Display Only) Indicates the temperature of the Supply Air as measured by the Supply Air Temperature Sensor (STC), and calculated by the MCM.

**Unocc Dehumid Mode.** (Display Only) Indicates if unit is operating in Unoccupied Dehumidification mode. Optional RA Damper is required for unit to operate in this 100 percent recirculation mode.

**Unocc Cooling Mode.** (Display Only) Indicates if unit is operating in Unoccupied Cooling mode. Optional RA Damper is required for unit to operate in this 100 percent recirculation mode.

**Unocc Heating Mode.** (Display Only) Indicates if unit is operating in Unoccupied Heating mode. Optional RA Damper is required for unit to operate in this 100 percent recirculation mode.

## Space Control Sequence ONLY:

***Note:*** *Refer to "Sequence of Operation," p. 35 for operating specific details.*

**Evap Leaving Air Temp.** (Display Only) Indicates the temperature of the air as it leaves the evaporator coil, as sensed by the Evaporator Leaving Air Temperature sensor (ETC), and calculated by the MCM.

**Unocc Dehumid Mode.** (Display Only) Indicates if unit is operating in Unoccupied Dehumidification mode. Optional RA Damper is required for unit to operate in this 100 percent recirculation mode.

**Unocc Cooling Mode.** (Display Only) Indicates if unit is operating in Unoccupied Cooling mode. Optional RA Damper is required for unit to operate in this 100 percent recirculation mode.

**Unocc Heating Mode.** (Display Only) Indicates if unit is operating in Unoccupied Heating mode. Optional RA Damper is required for unit to operate in this 100 percent recirculation mode.

### Space Control Sequence ONLY:

***Note:*** *Refer to "Sequence of Operation," p. 35 for operating specific details.*

**Space Temperature.** (Optional—Display Only) Display of remote Space Temperature Sensor (SPTC) reading. Remote SPTC must be installed (see "System Setup," p. 77). System will read "Failed" if not installed. Ignore the Alarm and Alarm light on the Main Display if the SPTC is DISABLED or Not Used..

**Space Humidity.** (Optional—Display Only) Display of remote Space Relative Humidity Sensor (SPHC) reading. Remote SPHC must be installed (see "System Setup," p. 77). System will read "Failed" if not installed. Ignore the Alarm and Alarm light on the Main Display if the SPHC is DISABLED or Not Used.

**Space DewPoint.** (Optional—Display Only) Display of MCM calculated Dewpoint. Remote Space Relative Humidity Sensor (SPHC) must be installed (see "System Setup," p. 77). System will read "Failed" if not installed. Ignore the Alarm and Alarm light on the Main Display if the SPHC is DISABLED or Not Used.

## System Heating Status

The *System Heating Status* is accessed from the *Custom Displays* screen. The *System Heating Status* shows the unit cooling operating status only. System set points and setup are accessed through the *System Setpoints* and *System Setup* screens accessed from the *Custom Displays* screen.

| System Heating Status | |
|---|---|
| Heating | Off |
| Heat Modulation Signal | 0.0 % |
| SA Temperature | 70.0 °F |
| SA Heating Setpoint | 70.0 °F |
| | Page 1 of 1 |

### OA Control Sequence ONLY:

***Note:*** *Refer to "Sequence of Operation," p. 35 for operating specific details.*

**Heating.** (Display Only) Indicates if unit is operating in Heating mode.

**Heat Modulation Signal.** (Display Only) Indicates the amount of heat modulation, based upon MCM analog signal to Heating Control Panel.

**SA Temperature.** (Display Only) Indicates the supply air temperature based upon signal from Supply Air Temperature Sensor (STC) as calculated by MCM.

**SA Heating Setpoint.** (Display Only) Provides a readout of the current Supply Air Heating Setpoint (SAHS). Adjustable setpoints are changed via the System Setpoints menus.

| System Heating Status | |
|---|---|
| Heating | Off |
| Heat Modulation Signal | 0.0 % |
| SA Temperature | 70.0 °F |
| Active Space Heating | 70.0 °F |
| | Page 1 of 1 |

### Space Control Sequence ONLY:

***Note:*** *Refer to "Sequence of Operation," p. 35 for operating specific details.*

**Heating.** (Display Only) Indicates if unit is operating in Heating mode.

**Heat Modulation Signal.** (Display Only) Indicates the amount of heat modulation, based upon MCM analog signal to Heating Control Panel.

**SA Temperature.** (Display Only) Indicates the supply air temperature based upon signal from Supply Air Temperature Sensor (STC) as calculated by MCM.

**Active Space Heating.** (Display Only) Provides a readout of the current Space Heating Setpoint (SPHS). Adjustable setpoints are changed via the System Setpoints menus. The optional Space Temperature Sensor (SPTC) is required for this function of the MCM to work properly.

## System Setpoints Status

Unit control set point settings and adjustments are accessed through the System Setpoints on the Custom Displays List (Page 1 of 2).

### OA Control Sequence ONLY:

***Note:*** *Refer to "Sequence of Operation," p. 35 for operating specific details.*

**Supply Air Heating.** Allows operator to adjust SA Heating Setpoint (SAHS). Setpoint range is from 40°F to 90°F.

**SA Low Temp Cutoff.** Allows operator to adjust SA Low Temperature cutoff Setpoint (SLTS). Setpoint range is from 25°F to 40°F.

**SA Low Temp Time.** Allows operator to adjust SA Low Temperature cutoff Time Setpoint (SLCS). Setpoint range is from 15 minutes to 30 minutes.

**Maximum SA Temperature.** (Display Only) Allows operator to view Maximum SA Temperature Setpoint (MSTS). Setpoint is fixed at 90°F and is not adjustable by the operator.

## Space Control Sequence ONLY:

***Note:*** *Refer to "Sequence of Operation," p. 35 for operating specific details.*

**Occupied Space Dewpoint.** Allows operator to adjust Space Dewpoint Setpoint (SPDS). Setpoint range is from 49°F to 65°F. This requires the optional Space Temperature Sensor (SPTC) and the optional Space Relative Humidity Sensor (SPHC) to be installed in the space, connected to the unit, and installed on unit setup (see "System Setup," p. 77 for MCM installation).

**Occupied Space Cooling.** Allows operator to adjust Space Cooling Setpoint (SPDS). Setpoint range is from 70°F to 85°F. This requires the optional Space Temperature Sensor (SPTC) and the optional Space Relative Humidity Sensor (SPHC) to be installed in the space, connected to the unit, and installed on unit setup (see "System Setup," p. 77 for MCM installation).

**Occupied Space Heating.** Allows operator to adjust Space Heating Setpoint (SPHS). Setpoint range is from 40°F to 90°F. This requires the optional Space Temperature Sensor (SPTC) and the optional Space Relative Humidity Sensor (SPHC) to be installed in the space, connected to the unit, and installed on unit setup (see "System Setup," p. 77 for MCM installation).

### OA Control Sequence ONLY:

***Note:*** *Refer to* *"Sequence of Operation," p. 35* *for operating specific details.*

**OA Cooling Enable.** Allows operator to adjust Outdoor Air Cooling Setpoint (OACS). Setpoint range is from 70°F to 85°F.

**OA Heating Enable.** Allows operator to adjust Outdoor Air Heating Setpoint (OAHS). Setpoint range is from 40°F to 90°F.

**OAHS Max = OACS – 5F.** (Display Only) Allows operator to view OAHS/OACS deadband.

**Evap Dehumid Temp.** Allows operator to adjust Evaporator leaving air Dehumidification Setpoint (EDS). Setpoint range is from 43°F to 65°F.

### Space Control Sequence ONLY:

***Note:*** *Refer to* *"Sequence of Operation," p. 35* *for operating specific details.*

**SA Low Temp Time.** Allows operator to adjust SA Low Temperature cutoff Time Setpoint (SLCS). Setpoint range is from 15 minutes to 30 minutes.

**Evap Cooling Temp.** Allows operator to adjust Evaporator leaving air Cooling Setpoint (ECS). Setpoint range is from 70°F to 85°F.

**Evap Dehumid Temp.** Allows operator to adjust Evaporator leaving air Dehumidification Setpoint (EDS). Setpoint range is from 43°F to 65°F.

**OA Economizer Enable.** Allows operator to adjust OA Dehumidification Deadband Setpoint (EES). Setpoint range is from 1°F to 5°F DP.

***Note:*** *Refer to "Sequence of Operation," p. 35 for operating specific details.*

**OA Economizer Enable.** Allows operator to adjust OA Dehumidification Deadband Setpoint (EES). Setpoint range is from 1°F to 5°F DP.

**HGRH Heating (SA).** Allows operator to adjust Hot Gas Reheat Setpoint (HGRS). Setpoint range is from 50°F to 75°F DP.

**P Ex Fan Motor VFD.** Allows operator to adjust Power Exhaust Fan Speed Setpoint (PFMS). Setpoint range is from 50 percent to 100 percent of factory setting.

***Note:*** *This will change the airflow out of the building, and may alter air balance.*

**Indoor Fan Motor VFD (%).** Allows operator to adjust Indoor Fan Speed Setpoint (IFMS). Setpoint range is from 50 percent to 100 percent of factory setting.

***Note:*** *This will change the airflow into the building, and may alter air balance.*

***Note:*** *Refer to "Sequence of Operation," p. 35 for operating specific details.*

**Unocc Space Cooling.** Allows operator to adjust Unoccupied Space Cooling Setpoint (NSCS). Setpoint range is from 75°F to 90°F.

***Note:*** *This setpoint requires optional RA Damper to be installed, as well as space sensors*

**Unocc Space Heating.** Allows operator to adjust Unoccupied Space Heating Setpoint (NSHS). Setpoint range is from 50°F to 80°F.

***Note:*** *This setpoint requires optional RA Damper to be installed as well as space sensors*

**Unocc Space DewPoint.** Allows operator to adjust Unoccupied Space Dew Point Setpoint (NSDS). Setpoint range is from 51°F to 64°F DP.

***Note:*** *This setpoint requires optional RA Damper to be installed, as well as space sensors*

**OA Dewpoint Enable.** Allows operator to adjust OA Dehumidification enable Setpoint (OADS). Setpoint range is from 49°F to 65°F DP.

## System Setup

*System Setup* is accessed from the *Custom Displays* screen. The *System Setup* enables the installer to configure the various options and accessories. The HGRH Coil option MUST be installed from the factory. The Space Temperature Sensor (STC) and Space Relative Humidity Sensor (SHC) and return air damper are field provided and installed.

***Note:*** *Refer to* *"Sequence of Operation," p. 35* *for operating specific details.*

**HGRH Coil.** Allows Operator to change installation status of optional Hot Gas Reheat (HGRH) coil. When installed, this function allows MCM to control SA temperature via signals to the HGRH Valves (MRV).

***Note:*** *Changing status to "NOT USED" will disable Hot Gas Reheat, Space Temperature, and SA Temperature functions of the MCM. The MCM will also calculate control signals utilizing Hot Gas Reheat Setpoint (HGRS).*

**Electronic ERCC.** Allows Operator to change installation status of optional Electronic Refrigerant Capacity Controller (ERCC).

**PVFD (Powered Ex).** Allows Operator to change installation status of optional Powered Exhaust Variable Frequency Drive (PVFD). When PVFD is installed, Powered Exhaust VFD Setpoint (PFMS) is enabled, via *System Setpoints*. In addition, Powered Exhaust Motor is energized through R5 whenever unit indoor fan is operating.

**ERV.** Allows Operator to change installation status of optional Energy Recovery Ventilator (ERV). When ERV is installed, the MCM will enable ERV power when unit is in Dehumidification, Cooling,

or Heating mode. ERV will not rotate in Economizer Mode. Use of ERV requires use of Powered Exhaust.

***Note:*** *Refer to "Sequence of Operation," p. 35 for operating specific details.*

**RA Damper.** Allows Operator to change installation status of optional RA Damper.

**IVFD (Indoor Fan).** Allows Operator to change installation status of Indoor Fan Motor VFD (IVFD).

**Space Temperature Sensor.** Allows Operator to change installation status of optional Space Temperature Sensor (SPTC).

***Note:*** *The field provided and installed remote Space Temperature Sensor (SPTC) must be installed in the space and connected to the unit for this feature to function effectively.*

**Filter Status Switch.** Allows Operator to change installation status of optional Filter Status Switch.

***Note:*** *Refer to "Sequence of Operation," p. 35 for operating specific details.*

**Test Mode Status.** Allows Operator to place MCM in test mode.

***Note:*** *This must display "DISABLED" for unit to operate in normal mode.*

**Desired Test Mode Stage.** After enabling Test Mode Status, allows operator to select a test mode of MCM. Refer to Table 5 for test modes.

**Active Test Stage.** (Display Only) The test mode selected by Desired Test Mode Stage is displayed. Refer to Table 5 for test modes.

**Heat Modulation Signal.** (Display Only) Indicates the amount of heat modulation as measured by the MCM signal to Heat Control Panel.

***Note:*** *Refer to "Sequence of Operation," p. 35 for operating specific details.*

**Static Pressure Minimum.** Allows Operator to set minimum external pressure setpoint (-SPS) for purposes of pressure control of Indoor Fan Motor Variable Frequency Drive (IVFD). Limits are -0.5 in. wg to -2.0 in. wg.

**Static Pressure Maximum:** Allows Operator to set maximum external pressure setpoint (+SPS) for purposes of pressure control of Indoor Fan Motor Variable Frequency Drive (IVFD). Limits are +0.5 in. wg to +8.0 in. wg.

**Static Pressure Maximum.** Allows Operator to change installation status of the optional Space RH Sensor (SPHC).

***Note:*** *The optional Space RH sensor must be installed in the space for this feature to function properly.*

**Table 5. Test modes**

| Test Stage[a] | Mode | OAD | RAD | IFM | Compressor Stage 1 | 2 | 3 | 4 | RCC/ERCC | HGRH | Heat Enable |
|---|---|---|---|---|---|---|---|---|---|---|---|
| 0 | Unit Off[b] | Closed | Open[c] | Off | Off | Off | Off | Off | Off | Off | Off |
| 1 | Occupied—Fan ON | Open | Closed | ON | Off | Off | Off | Off | Off | Off | Off |
| 2 | Occupied—Y1 Dehumid | Open | Closed | ON | ON | Off | Off | Off | Off | Off | Off |
| 3 | Occupied—Y1 Dehumid—RCC | Closed | Open[c] | ON | ON | Off | Off | Off | ON[d] | Off | Off |
| 4 | Occupied—Reheat | Open | Closed | ON | ON | Off | Off | Off | Off | ON[d], [e] | Off |
| 5 | Occupied—Y1 and Y2 Cooling | Open | Closed | ON | ON | ON | Off | Off | Off | Off | Off |
| 6 | Occupied—Y3 and Y4 Cooling | Open | Closed | ON | Off | Off | ON | ON | Off | Off | Off |
| 7 | Occupied—Low Fire | Open | Closed | ON | Off | Off | Off | Off | Off | Off | ON |
| 8 | Occupied—High Fire | Open | Closed | ON | Off | Off | Off | Off | Off | Off | ON |
| 9 | Occupied—ERV/PFM | Open | Closed | ON | Off | Off | Off | Off | Off | Off | Off |
| 10 | Unoccupied | Closed | Open[c] | ON | Off | Off | Off | Off | Off | Off | Off |

(a) Test Mode is DISABLED and Normal Operation is initiated after 30 minutes has elapsed if Test Mode Stage is not changed.
(b) No unit function or operation.
(c) Return Air Damper (RAD) must be installed.
(d) Signal tests at 50 percent.
(e) Hot Gas Reheat must be installed.

## Daily Exception and Schedule List

Schedule pages will interface with the MCM. It is recommended that these pages not be used. When the MCM has a schedule programmed, the schedule overrides all inputs from sensors.

## Setup List

**Change Time.** Allows operator to change system time. System time is useful in that it allows the operator to log major system events, such as alarms; refer to "Alarms and Troubleshooting," p. 99 for more details. System time also allows for scheduling. It is recommended that the scheduling functions be ignored, as they will act as overrides of normal unit operation.

**Change Date.** Allows operator to change system date. System date is useful in that it allows the operator to log major system events, such as alarms; refer to "Alarms and Troubleshooting," p. 99 for more details. System Date also allows for scheduling. It is recommended that the scheduling functions be ignored, as they will act as overrides of normal unit operation.

**Change Occupied Bypass Time.** Allows operator to change amount of time the unit will bypass occupied mode.

**Change Display Language.** Allows operator to change system language. MCM offers 10 languages: English, French, German, Hungarian, Italian, Polish, Brazilian Portuguese, Portuguese, Spanish, and Spanish-Americas.

**View Communication Information.** Allows operator to view technical information about the MCM as installed. Items of information include State, Product ID, Neuron ID, DSN A, DSN B, Version, and Profile. Operator can also activate service Pin from this screen.

**View Expansion Module Information.** Allows operator to view any expansion modules which are connected to MCM. MCM allows up to four expansion modules to be connected.

**Adjust Brightness.** Allows operator to adjust brightness. Settings allow adjustment from 1 to 10.

**Calibrate Touch Screen.** Allows operator to calibrate touch screen. A pencil eraser is required to fully calibrate the touch screen.

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

### ⚠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. The following procedure must be followed for the unit heating section to function properly. The following procedures are to be performed after 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 satisfactorily.**

***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.
2. BEFORE OPERATING, leak test all gas piping up to heater gas valve. Smell around the unit area for gas. DO NOT attempt to place heater in operation until source of gas leak is identified and corrected.
3. Use only hand force to push and turn the gas control knob to the “ON” position. NEVER use tools. If knob 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. 35 for additional information.

### Tools Required

- Voltage Meter (µA)
- Amp Meter
- Pressure Gauge w/ 0–1 in. wg scale
- Gas Pressure Gauge
- Tachometer
- Temperature Probe
- Anemometer

- Service Mirror
- Small Refrigeration Screwdriver
- 5/16″ Nut Driver
- 1/2″ Open End Wrench

## Start-Up Procedure

1. **Check Inlet Gas Pressure**

   Check to insure the inlet gas pressure 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 Fan Failure Switch Operation**

   Indoor Fan Failure Switch (IFFS) is located on the supply plenum wall in the evaporator fan section.

   Factory provided aluminum mesh air filters, located in outdoor air inlet hood, must be clean before proceeding.

   ***Important:*** *If the outdoor air inlet aluminum mesh filters are not clean, unit performance could be affected. Remove and clean the outdoor air inlet aluminum mesh filters prior to proceeding with the burner pressure testing.*

   In the event that the pressure switch fails to operate, check the aluminum 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 knob to “OFF” position. Install a tapped fitting for attachment to a manometer, or other gauge suitable for 14.0 in. wc, in the inlet pressure tap, and for 10.0 in. wc in the manifold pressure tap. Wait 5 minutes for any gas to clear out. 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**

   “Unit Clearances, Curb Dimensions, and Dimensional Data,” p. 16 contains figures that illustrate the furnace components: Figure 7, p. 20 for OA1 units, Figure 16, p. 26 for OA2 units, and Figure 25, p. 32 for OA3 units. These components include Modulating Gas Valve, Gas Manifold with Pressure Taps, Combination Valves, Inducer Blower, Inducer Blower Motor and manual and auto-reset limit switches.

5. **Main Gas Supply**

   Turn manual gas cock “ON”.

6. **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 test mode operating parameters guide in Table 5, p. 80, enable high fire test mode at ROD. Enabling this test mode will continue high fire operation until test mode is disabled. Depending on outdoor air temperatures, at time of startup, high limit temperatures may be exceeded causing limit switches to trip. Limit switches are auto reset. This will initiate call for heat. Draft inducer will run for a 15- to 30-second pre-purge period. At the

end of the pre-purge the direct spark will be energized and gas valve will open. Burners ignite. Should the flame go out or the burner fail to light an ignition retry will initiate following a 15-second inter-purge period. Manifold pressure should be 1.2 in. wc during the 90-second warm-up period. The manifold pressure will rise to 3.5 in. wc at 100 percent firing rate.

**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 turning heat test mode off at ROD for 10 seconds and then again entering High Fire Test Mode.

***Note:*** *When not in test mode, controls provided will automatically reset after 1 hour and initiate a call for heat.*

Prior to completing the start-up, check the appearance of the main burner flame. Refer to Figure 34 for flame characteristics of properly adjusted natural gas systems.

**Figure 34. 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 Figures 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 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. Ignition Controller Test**

Enable low fire test mode at ROD. Following successful establishment of flame, Ignition Controller LED will not be illuminated.

Fault Conditions and LED Key:

| LED Steady On | Internal Control Fault |
|---|---|
| 1 Flash | Combustion Air Flow Fault |
| 2 Flash | Flame with No Call for Heat |
| 3 Flash | Ignition Lockout |

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

**8. Flame Sensor Current Check**

Flame current is the current which passes through the flame from the sensor to ground. The minimum flame current necessary to keep the system from lockout is 0.7 µA. To measure flame current, connect an analog DC microammeter to the FC-FC+ terminals per Figure 35. The meter should read 0.7 µA or higher.

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

**Figure 35. Service checks**

## 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 circulating airflow over the heat exchanger. Reduced airflow can be caused by motor failure of the circulating air blower, 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 30°F below the set point. Determine the cause of the reduced air flow and correct.

# Performance Data

### Table 6. OA1 General Data—Cooling 5–12 Tons High Efficiency

| | 5 Tons Downflow | 6 Tons Downflow | 7 Tons Downflow | 8 Tons Downflow | 10 Tons Downflow | 12 Tons Downflow |
|---|---|---|---|---|---|---|
| | **OA1C060A** | **OA1C072A** | **OA1C084** | **OA1C096** | **OA1C120A** | **OA1C144A** |
| **Cooling Performance** | | | | | | |
| Gross Cooling Capacity | 61,464 | 73,757 | 86,050 | 98,342 | 121,904 | 147,514 |
| Nominal cfm | 625–1250 | 750–1500 | 875–1750 | 1000–2000 | 1250-2500 | 1500-3000 |
| **Compressor** | | | | | | |
| Number/Type | 1 / Scroll | 1 / Scroll | 1 / Scroll | 2 / Scroll | 2 / Scroll | 2 / Scroll |
| **Outdoor Coil** | | | | | | |
| Type | High Performance | High Performance | High Performance | High Performance | High Performance | High Performance |
| Tube Size (in.) OD | 3/8 | 3/8 | 3/8 | 3/8 | 3/8 | 3/8 |
| Face Area ($ft^2$) | 13 | 13 | 13 | 24 | 24 | 24 |
| Rows/FPI | 2/12 | 2/12 | 2/12 | 2/12 | 2/12 | 2/12 |
| **Indoor Coil** | | | | | | |
| Type | High Performance | High Performance | High Performance | High Performance | High Performance | High Performance |
| Tube Size (in.) OD | 1/2 | 1/2 | 1/2 | 1/2 | 1/2 | 1/2 |
| Face Area ($ft^2$) | 6 | 6 | 6 | 9 | 9 | 9 |
| Rows/FPI | 6/10 | 6/10 | 6/10 | 6/10 | 6/10 | 6/10 |
| Refrigerant Control | TXV | TXV | TXV | TXV | TXV | TXV |
| Drain Connection Number/Size (in.) | 3/4 | 3/4 | 3/4 | 3/4 | 3/4 | 3/4 |
| **Outdoor Fan** | | | | | | |
| Type | Propeller | Propeller | Propeller | Propeller | Propeller | Propeller |
| Number Used/Diameter (in.) | 1/24 | 1/24 | 1/24 | 2/24 | 2/24 | 2/24 |
| Drive Type/No. Speeds | Direct / 1 | Direct / 1 | Direct / 1 | Direct / 1 | Direct / 1 | Direct / 1 |
| CFM | 5,000 | 5,000 | 5,000 | 10,000 | 10,000 | 10,000 |
| Number Motors/HP each | 1/0.5 | 1/0.5 | 1/0.5 | 2/0.5 | 2/0.5 | 2/0.5 |
| Motor RPM | 1,140 | 1,140 | 1,140 | 1,140 | 1,140 | 1,140 |
| **Indoor Fan** | | | | | | |
| Type | Backward Inclined | Backward Inclined | Backward Inclined | Backward Inclined | Backward Inclined | Backward Inclined |
| Number Used/Diameter (in.) | 1/Varies | 1/Varies | 1/Varies | 1/Varies | 1/Varies | 1/Varies |
| Drive Type | Direct Drive | Direct Drive | Direct Drive | Direct Drive | Direct Drive | Direct Drive |
| Number Motors | 1 | 1 | 1 | 1 | 1 | 1 |
| Motor HP (Standard/Oversized) | 0.25–1.5 | 0.25–2 | 0.25–3 | 0.33–3 | 0.5–3 | 0.5–3 |
| Motor RPM (Standard/Oversized) | 1750–3500 | 1750–3500 | 1750–3500 | 1750–3500 | 1750–3500 | 1750–3500 |
| Motor Frame Size (Standard/Oversized) | Varies | Varies | Varies | Varies | Varies | Varies |
| **Filters** | | | | | | |
| Type Furnished | Varies | Varies | Varies | Varies | Varies | Varies |
| Number Size Recommended | Varies | Varies | Varies | Varies | Varies | Varies |
| **Refrigerant Charge (lb of R-410A) (g)** | | | | | | |
| Downflow | See Nameplate | See Nameplate | See Nameplate | See Nameplate | See Nameplate | See Nameplate |

## Table 7. OA2 General Data—Cooling 12–30 Tons High Efficiency

| | 12 Tons Downflow | 15 Tons Downflow | 17 Tons Downflow | 20 Tons Downflow | 22 Tons Downflow | 25 Tons Downflow | 30 Tons Downflow |
|---|---|---|---|---|---|---|---|
| | **OA2C144A** | **OA2C180A** | **OA2C210A** | **OA2C240A** | **OA2C264A** | **OA2C300A** | **OA2C360A** |
| **Cooling Performance** | | | | | | | |
| Gross Cooling Capacity | 147,514 | 184,392 | 208,973 | 245,856 | 270,442 | 307,320 | 368,784 |
| Nominal cfm | 1500–3000 | 1875–3750 | 2125–4250 | 2500–5000 | 2750–5500 | 3125–6250 | 3750–7500 |
| **Compressor** | | | | | | | |
| Number/Type | 2 / Scroll | 2 / Scroll | 2 / Scroll | 2 / Scroll | 2 / Scroll | 2 / Scroll | 2 / Scroll |
| **Outdoor Coil** | | | | | | | |
| Type | High Performance | High Performance | High Performance | High Performance | High Performance | High Performance | High Performance |
| Tube Size (in.) OD | 3/8 | 3/8 | 3/8 | 3/8 | 3/8 | 3/8 | 3/8 |
| Face Area ($ft^2$) | 24 | 30 | 38 | 38 | 38 | 38 | 38 |
| Rows/FPI | 2/12 | 3/12 | 3/12 | 3/12 | 3/12 | 3/12 | 3/12 |
| **Indoor Coil** | | | | | | | |
| Type | High Performance | High Performance | High Performance | High Performance | High Performance | High Performance | High Performance |
| Tube Size (in.) OD | 1/2 | 1/2 | 1/2 | 1/2 | 1/2 | 1/2 | 1/2 |
| Face Area ($ft^2$) | 9 | 10 | 15 | 15 | 15 | 20 | 20 |
| Rows/FPI | 6/10 | 6/10 | 6/12 | 6/12 | 6/12 | 6/10 | 6/10 |
| Refrigerant Control | TXV | TXV | TXV | TXV | TXV | TXV | TXV |
| Drain Connection Number/Size (in.) | 3/4 | 3/4 | 3/4 | 3/4 | 3/4 | 3/4 | 3/4 |
| **Outdoor Fan** | | | | | | | |
| Type | Propeller | Propeller | Propeller | Propeller | Propeller | Propeller | Propeller |
| Number Used/Diameter (in.) | 2/24 | 3/24 | 3/24 | 3/24 | 3/24 | 3/24 | 3/24 |
| Drive Type/No. Speeds | Direct / 1 | Direct / 1 | Direct / 1 | Direct / 1 | Direct / 1 | Direct / 1 | Direct / 1 |
| CFM | 10,000 | 15,000 | 15,000 | 15,000 | 15,000 | 15,000 | 15,000 |
| Number Motors/HP each | 2/0.5 | 2/0.5 | 2/0.5 | 2/0.5 | 3/0.5 | 3/0.5 | 3/0.5 |
| Motor RPM | 1,140 | 1,140 | 1,140 | 1,140 | 1,140 | 1,140 | 1,140 |
| **Indoor Fan** | | | | | | | |
| Type | Backward Inclined | Backward Inclined | Backward Inclined | Backward Inclined | Backward Inclined | Backward Inclined | Backward Inclined |
| Number Used/Diameter (in.) | 1/Varies | 1/Varies | 1/Varies | 1/Varies | 1/Varies | 1/Varies | 1/Varies |
| Drive Type | Direct Drive | Direct Drive | Direct Drive | Direct Drive | Direct Drive | Direct Drive | Direct Drive |
| Number Motors | 1 | 1 | 1 | 1 | 1 | 1 | 1 |
| Motor HP (Standard/Oversized) | 0.75–3 | 0.75–5 | 0.75–5 | 1–5 | 1–5 | 1–7.5 | 1.5–7.5 |
| Motor RPM (Standard/Oversized) | 1750–3500 | 1750–3500 | 1750–3500 | 1750–3500 | 1750–3500 | 1750–3500 | 1750–3500 |
| Motor Frame Size (Standard/Oversized) | Varies | Varies | Varies | Varies | Varies | Varies | Varies |
| **Filters** | | | | | | | |
| Type Furnished | Varies | Varies | Varies | Varies | Varies | Varies | Varies |
| Number Size Recommended | Varies | Varies | Varies | Varies | Varies | Varies | Varies |
| **Refrigerant Charge (lb of R-410A) (g)** | | | | | | | |
| Downflow | See Nameplate | See Nameplate | See Nameplate | See Nameplate | See Nameplate | See Nameplate | See Nameplate |

### Table 8. OA3 General Data—Cooling 30–54 Tons High Efficiency

| | 30 Tons Downflow | 35 Tons Downflow | 40 Tons Downflow | 45 Tons Downflow | 50 Tons Downflow | 54 Tons Downflow |
|---|---|---|---|---|---|---|
| | OA3C360A | OA3C420A | OA3C480A | OA3C540A | OA3C600A | OA3C648A |
| **Cooling Performance** | | | | | | |
| Gross Cooling Capacity | 368,784 | 430,248 | 491,712 | 553,176 | 614,640 | 663,811 |
| Nominal cfm | 3750–7500 | 4375–8750 | 5000–10000 | 5625–11250 | 6250–12500 | 6750–13500 |
| **Compressor** | | | | | | |
| Number/Type | 2 / Scroll | 3 / Scroll | 3 / Scroll | 3 / Scroll | 4 / Scroll | 4 / Scroll |
| **Outdoor Coil** | | | | | | |
| Type | High Performance | High Performance | High Performance | High Performance | High Performance | High Performance |
| Tube Size (in.) OD | 3/8 | 3/8 | 3/8 | 3/8 | 3/8 | 3/8 |
| Face Area ($ft^2$) | 48 | 53 | 63 | 63 | 63 | 63 |
| Rows/FPI | 2/12 | 3/12 | 3/12 | 3/12 | 4/12 | 4/12 |
| **Indoor Coil** | | | | | | |
| Type | High Performance | High Performance | High Performance | High Performance | High Performance | High Performance |
| Tube Size (in.) OD | 1/2 | 1/2 | 1/2 | 1/2 | 1/2 | 1/2 |
| Face Area ($ft^2$) | 23 | 23 | 29 | 29 | 29 | 29 |
| Rows/FPI | 6/12 | 6/12 | 6/12 | 6/12 | 6/12 | 6/12 |
| Refrigerant Control | TXV | TXV | TXV | TXV | TXV | TXV |
| Drain Connection Number/Size (in.) | 3/4 | 3/4 | 3/4 | 3/4 | 3/4 | 3/4 |
| **Outdoor Fan** | | | | | | |
| Type | Propeller | Propeller | Propeller | Propeller | Propeller | Propeller |
| Number Used/Diameter (in.) | 4/24 | 4/24 | 4/24 | 4/24 | 4/24 | 4/24 |
| Drive Type/No. Speeds | Direct Drive/1 | Direct Drive/1 | Direct Drive/1 | Direct / 1 | Direct / 1 | Direct / 1 |
| CFM | 20,000 | 20,000 | 20,000 | 26,000 | 26,000 | 26,000 |
| Number Motors/HP each | 4/0.5 | 4/0.5 | 4/0.5 | 4/1 | 4/1 | 4/1 |
| Motor RPM | 1,140 | 1,140 | 1,140 | 1,140 | 1,140 | 1,140 |
| **Indoor Fan** | | | | | | |
| Type | Backward Inclined | Backward Inclined | Backward Inclined | Backward Inclined | Backward Inclined | Backward Inclined |
| Number Used/Diameter (in.) | 1/Varies | 1/Varies | 1 or 2/Varies | 1 or 2/Varies | 1 or 2/Varies | 1 or 2/Varies |
| Drive Type | Direct Drive | Direct Drive | Direct Drive | Direct Drive | Direct Drive | Direct Drive |
| Number Motors | 1 | 1 | 1 or 2 | 1 or 2 | 1 or 2 | 1 or 2 |
| Motor HP (Standard/Oversized) | 1.5–7.5 | 1.5–10 | 2.0–10 | 2.0–10 | 3.0–10 | 3.0–10 |
| Motor RPM (Standard/Oversized) | 1750–3500 | 1750–3500 | 1750–3500 | 1750–3500 | 1750–3500 | 1750–3500 |
| Motor Frame Size (Standard/Oversized) | Varies | Varies | Varies | Varies | Varies | Varies |
| **Filters** | | | | | | |
| Type Furnished | Varies | Varies | Varies | Varies | Varies | Varies |
| Number Size Recommended | Varies | Varies | Varies | Varies | Varies | Varies |
| **Refrigerant Charge (lb of R-410A) (g)** | | | | | | |
| Downflow | See Nameplate | See Nameplate | See Nameplate | See Nameplate | See Nameplate | See Nameplate |

# Superheat and Refrigeration Circuit Data

**Figure 36. Refrigeration diagram: Single compressor without reheat**

**Figure 37. Refrigeration diagram: Single compressor with reheat**

**Figure 38. Refrigeration diagram: Dual compressor no reheat**

**Figure 39. Refrigeration diagram: Dual compressor with reheat**

**Figure 40. Refrigeration diagram: Triple compressor with no reheat**

**Figure 41. Refrigeration diagram: Triple compressor with reheat**

**Figure 42. Refrigeration diagram: Quad compressor with no reheat**

**Figure 43. Refrigeration diagram: Quad compressor with reheat**

# Alarms and Troubleshooting

## Microprocessor Control

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

Before turning the main power disconnect switch "Off", follow the steps below to check the Main Control Module (MCM) and the ReliaTel Refrigeration Module (RTRM). All diagnostics and system status information stored in the MCM and RTRM will be lost when the main power is turned "Off".

### ⚠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 recommended 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 "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 test mode procedures described in Table 5, p. 80 to start the unit. This procedure will allow you to check all of the operating modes, and all of the external controls (relays, contactors, etc.) for each respective mode. Proceed to Step 6.
6. Step the system through all of the applicable test modes, and verify operation of all outputs, controls, and modes. If a problem in operation is noted in any mode, you may leave the system in that mode for up to 30 minutes while troubleshooting. Refer to the sequence of operations for each mode, to assist in verifying proper operation. Make the necessary repairs and proceed to Step 7 and Step 8.
7. If no abnormal operating conditions appear in the test mode, exit the test mode by turning the power "Off" at the main power disconnect switch.
8. Refer to the individual component test procedures if other microelectronic components are suspect.

## System Alarms

The MCM 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 *Alarm Status* display in the *Custom Displays* menu at the ROD discussed later in the section. Sensor failures may be viewed through the Alarms button on the Home display screen. This screen is display only. No diagnostics are available at this display screen.

If an alarm is present the *Alarm Status* readout on the *Main* display will register ALARM or display NORMAL if the system is operating normally. Check both alarm display locations to troubleshoot system alarms.

The LED located at the top right corner of the ROD will blink red if a sensor fault exists.

***Important:*** *The optional space temperature sensor (SPTC) and space relative humidity sensor (SPHC) will read failed if they are not connected or set to not used in the System Setup main menu on the ROD.*

## Sensor Failure Alarm Display

Press the Alarm button on the Home display of the ROD to display system sensor status as described below:

| | |
|---|---|
| Supply Air Temperature Sensor | SA Temperature<br>Universal Input<br>1 Failed |
| Outdoor Air Temperature Sensor | OA Temperature<br>Universal Input<br>2 Failed |
| Outdoor Air Relative Humidity Sensor | Outdoor Air RH<br>Universal Input<br>3 Failed |
| Space Relative Humidity Sensor (Optional) | Space RH (Optional)<br>Universal Input<br>10 Failed |
| Space Temperature Sensor (Optional) | Space Temp (Optional)<br>Universal Input<br>11 Failed |

Universal Inputs 4 through 7 are binary inputs and will not register an alarm and universal inputs 8 and 9 are not used.

**Home Screen:** Screens are common to OA Control Sequence and Space Control Sequence. Where there are differences, this publication makes note in the comments beneath each screen. On the home screen, “O1” denotes OA Control Sequence (one or two compressors), and “O3” denotes OA Control Sequence (three or four compressors). “S1” denotes Space Control Sequence (one or two

compressors), and “S3” denotes Space Control Sequence (three or four compressors). When proceeding with setup, the operator should ensure the correct sequence for unit application is loaded into MCM.

## Alarm Status Display

The *Alarm Status* display is accessed through the *Custom Displays* screen (Page 2 of 2) at the ROD. A complete description of the system alarms and overrides follows:

***Note:*** *Refer to* *“Sequence of Operation,” p. 35* *for operating specific details.*

**Emergency Stop Input.** (Display Only) Indicates whether the Emergency Stop (controlled by MCM) has been activated. To reset, terminals 9 and 10 on OAUTS must be closed.

**System Lock-Out Alarm.** (Display Only) Indicates whether the unit has been locked out due to one of three alarms:

1. Supply Air Low Temperature Cutoff (SLTS),
2. Indoor Fan Failure, or
3. Supply Air High Temperature Cutoff (SHCS).

To reset, press *Alarm Reset* on Alarm Status page.

**Alarm Reset.** Press the OFF button and toggle the Alarm Reset status to ON to clear system lock-outs.

***Note:*** *Refer to* *"Sequence of Operation," p. 35* *for operating specific details.*

**OA Damper Failure.** OA Damper Failure alarm is displayed when the Damper End Switch (DES) is not made (CLOSED) after 90 seconds upon call for the system fan. A solid red LED located on relay R1 will indicate that the OA Damper motor is energized.

**SA Temp Sensor Failure.** SA Temperature Sensor (STC) Failure alarm will display when the STC fails or registers an out of range condition.

**OA Temp Sensor Failure.** An OA Temperature Sensor (OTC) Failure alarm is displayed when the OTC fails or registers an out of range condition.

**OA RH Sensor Failure.** An OA Relative Humidity Sensor (ORHC) Failure alarm is displayed when the ORHC fails or registers an out of range condition.

***Note:*** *Refer to* *"Sequence of Operation," p. 35* *for operating specific details.*

**SA Low Temp Cutoff.** A Supply Air Low Temperature Cutoff (SLTS) LOCKOUT alarm is displayed at the *System Lock-Out Alarm* status screen when the SA temperature read by the SA Temperature sensor (STC) falls below the preset low limit as set on the System Setup display at the ROD, and

continues below SLTS for the preset SA Low Temperature Cutoff Time (SLCS) as set via *System Setpoints*. This alarm can be reset through the *Alarm Reset* button at the ROD.

**SA High Temp Cutoff.** Supply Air High Temperature Cutoff alarm is displayed when SA, as measured by the Supply Air Temperature sensor (STC) exceeds the Supply Air High Temperature Cutoff Setpoint (SHCS) of 125°F for 10 minutes. SHCS is set at the factory at 125°F and is not operator-adjustable.

**Filter Status.** Filter Status alarm is displayed when the optional Filter Status Switch (FSS) indicates air filters are in need of service.

**Indoor Fan Failure.** Indoor Fan Failure alarm is displayed when the Indoor Fan Failure Switch (IFFS) indicates that there is insufficient airflow.

## OA Control Sequence ONLY:

***Note:*** *Refer to* *"Sequence of Operation," p. 35* *for operating specific details.*

**Space Temp Sensr Failure.** Space Temperature Sensor Failure alarm indicates whether optional Space Temperature Sensor (SPTC) is either sending no signal or signal out of range.

***Note:*** *The field provided and installed remote Space Temperature Sensor (SPTC) must be installed in the space and connected to the unit, and the Space Temp Sensor setting on System Setup screen must be "INSTALLED" for this feature to be enabled.*

**Space RH Sensor Failure.** Space Relative Humidity Sensor Failure alarm indicates whether optional Space Relative Humidity Sensor (SPHC) is either sending no signal or signal out of range.

***Note:*** *The field-provided and -installed remote Space Relative Humidity Sensor (SPHC) must be installed in the space and connected to the unit, and the Space RH Sensor setting on System Setup screen must be "INSTALLED" for this feature to be enabled.*

**Evap Temp Sensor Failure.** Evaporator Temperature Sensor Failure alarm indicates whether Evaporator leaving air Temperature Sensor (ETC) is either sending no signal or signal out of range.

**ERV Temp Sensor Failure.** ERV Temp Sensor Failure alarm indicates whether ERV Leaving Air Temperature Sensor (ERC) is either sending no signal or signal out of range.

### Space Control Sequence ONLY:

***Note:*** *Refer to* *"Sequence of Operation," p. 35* *for operating specific details.*

**Space Temp Sensr Failure.** Space Temperature Sensor Failure alarm indicates whether optional Space Temperature Sensor (SPTC) is either sending no signal or signal out of range.

***Note:*** *The field provided and installed remote Space Temperature Sensor (SPTC) must be installed in the space and connected to the unit, and the Space Temp Sensor setting on System Setup screen must be "INSTALLED" for this feature to be enabled.*

**Space RH Sensor Failure.** Space Relative Humidity Sensor Failure alarm indicates whether optional Space Relative Humidity Sensor (SPHC) is either sending no signal or signal out of range.

***Note:*** *The field provided and installed remote Space Relative Humidity Sensor (SPHC) must be installed in the space and connected to the unit, and the Space RH Sensor setting on System Setup screen must be "INSTALLED" for this feature to be enabled.*

**Evap Temp Sensor Failure.** Evaporator Temperature Sensor Failure alarm indicates whether Evaporator leaving air Temperature Sensor (ETC) is either sending no signal or signal out of range.

**ERV Temp Sensor Failure.** ERV Temp Sensor Failure alarm indicates whether ERV Leaving Air Temperature Sensor (ERC) is either sending no signal or signal out of range.

## Analog and Binary—Inputs and Outputs

Status of all system analog and binary inputs can be accessed through the *View List* display under *View* on the main display.

**Analog and Binary Inputs.** Pressing the Analog and Binary Inputs button allows the operator to see the various analog and binary inputs to the MCM.

**Analog Outputs.** Pressing the Analog Outputs button allows the operator to see the various MCM analog outputs.

**Binary Outputs.** Pressing the Binary Outputs button allows the operator to see the various MCM binary outputs.

## Analog and Binary Input Status

***Note:*** *Refer to* *"Sequence of Operation," p. 35* *for operating specific details.*

**SA Temperature.** (Display Only) Readout of SA Temperature Sensor (STC) as calculated by MCM.

**OA Temperature.** (Display Only) Readout of OA Temperature Sensor (OTC) as calculated by MCM.

**OA RH.** (Display Only) Readout of Outdoor Air Relative Humidity Sensor (ORHC) as calculated by MCM.

**OA Damper End Switch.** (Display Only) Indicates whether OA Damper End Switch (DES) has been closed (PROVEN).

| Analog and Binary Input Status | |
|---|---|
| Control Input (OCC) | Occupied |
| Indoor Fan Status Switch | PROVEN |
| Emergency Stop Input | Normal |
| Evap Leaving Air Temp | 55.0 °F |
| | Page 2 of 4 |

***Note:*** *Refer to "Sequence of Operation," p. 35 for operating specific details.*

**Control Input (OCC).** (Display Only) Indicates if unit is operating in Occupied or Unoccupied Mode.

**Indoor Fan Status Switch.** (Display Only) Indicates Indoor Fan Motor Status Switch (IFSS) has proven airflow.

**Emergency Stop Input.** (Display Only) Indicates whether OAUTS terminals 9 and 10 are closed (NORMAL).

**Evap Leaving Air Temp.** (Display Only) Indicates leaving air temperature off evaporator coil as measured by Evaporator Leaving Air Temperature Sensor (ETC) and calculated by MCM.

| Analog and Binary Input Status | |
|---|---|
| Space Temperature | 74.0 °F |
| Space Humidity | 60.0% |
| Filter Status | Normal |
| ERV Leaving Air Temp | 74.0 °F |
| | Page 3 of 4 |

***Note:*** *Refer to "Sequence of Operation," p. 35 for operating specific details.*

**Space Temperature.** (Display Only) Indicates readout of optional Space Temperature Sensor (SPTC) as calculated by MCM.

***Note:*** *Optional Space Temperature Sensor (SPTC) must be installed in the space and connected to unit, and status must be INSTALLED on System Setup screen.*

**Space Humidity.** (Display Only) Indicates readout of optional Space Relative Humidity Sensor (SPHC) as calculated by MCM.

***Note:*** *Optional Space Relative Humidity Sensor (SPHC) must be installed in the space and connected to unit, and status must be INSTALLED on System Setup screen.*

**Filter Status.** (Display Only) Indicates status of Filter Status Switch (FSS). Value displayed is either "Normal" or "Failed".

**ERV Leaving Air Temp.** (Display Only) Indicates air temperature immediately downstream of the optional ERV, as sensed by the ERV Leaving Air Temperature Sensor (ERC), and calculated by MCM.

***Note:*** *Refer to* *"Sequence of Operation," p. 35* *for operating-specific details.*

**Pressure Input.** (Display Only) Indicates whether Pressure Input to Duct Static input on MCM is either "Not Used" or "Installed".

## Analog Output Status

***Note:*** *Refer to "Sequence of Operation," p. 35 for operating specific details.*

**Heat Modulation Signal.** (Display Only) Indicates percentage of heat modulation signal (0%–100%) the MCM is sending to the Heating Control Panel (HCP).

**HGRH Modulation Signal.** (Display Only) Indicates the percentage of the Hot Gas Reheat (HGRH) signal (0% = closed, 100% = fully open) the MCM is sending to the Modulating Hot Gas Reheat Valves (MRV) control module.

**ERCC Capacity Control.** (Display Only) Indicates the percentage of the capacity control signal (0% = none, 100% = fully open) the MCM is sending to the optional Electronic Refrigerant Capacity Controller (ERCC).

**IFM VFD Setpoint.** (Display Only) Indicates a percentage of the factory set operating signal (50% minimum to 100% maximum) the MCM is sending to the Indoor Fan Motor Variable Frequency Drive (IVFD). The setpoints are factory-set, and the operator may adjust IFM speed between these setpoints.

***Note:*** *Refer to "Sequence of Operation," p. 35 for operating specific details.*

**PFM VFD SetPoint.** (Display Only) Indicates a percentage of the factory-set operating signal (50% minimum to 100% maximum) the MCM is sending to the Powered Exhaust Fan Motor Variable Frequency Drive (PVFD). The setpoints are factory set, and the operator may adjust PFM speed between these setpoints.

## Binary Output Status

| Binary Output Status | |
|---|---|
| OA Damper | OPEN |
| Indoor Fan Motor | ON |
| Compressor 1 | ON |
| Compressor 2 | ON |
| | Page 1 of 2 |

***Note:*** *Refer to "Sequence of Operation," p. 35 for operating specific details.*

**OA Damper.** (Display Only) Indicates whether Damper End Switch (DES) is closed (OA Damper OPEN).

**Indoor Fan Motor.** (Display Only) Indicates that Indoor Fan Motor (IFM) is providing airflow. RTRM G should also indicate ON when IFM is ON.

**Compressor 1.** (Display Only) Indicates that Compressor 1 is on. RTRM Y1 should also indicate on when Compressor 1 displays ON.

**Compressor 2.** (Display Only) Indicates that Compressor 2 is on. RTRM Y2 should also indicate on when Compressor 2 displays ON.

| Binary Output Status | |
|---|---|
| ERV Enable | Off |
| Heating | Off |
| Compressor 3 | Off |
| Compressor 4 | Off |
| | Page 2 of 2 |

***Note:*** *Refer to "Sequence of Operation," p. 35 for operating specific details.*

**ERV Enable.** (Display Only) Indicates whether optional ERV is enabled. If installed (see "System Setup," p. 77), ERV should be ON when unit is operating in Dehumidification, Cooling, or Heating Modes, and Off when unit is operating in Economizer Mode.

**Heating.** (Display Only) Indicates that MCM has enabled a call for heat.

**Compressor 3.** (Display Only) In units with three or four compressors, indicates status of Compressor 3 (Y3). If Compressor 3 is ON, then RTRM2-Y1 should also indicate ON.

**Compressor 4.** (Display Only) In units with four compressors, indicates status of Compressor 4 (Y4). If Compressor 4 is ON, then RTRM2-Y2 should also indicate ON.

## Alarm List

Any active alarms which the system is experiencing are logged on these screens. If troubleshooting the system, note significant events prior to removing power. The record of active alarms will remain on this screen until power is removed. Upon removal of system power, alarm list will be lost.

## Override List

***Note:*** *Refer to* *"Sequence of Operation," p. 35* *for operating specific details.*

**Override Occupancy.** Allows operator to override Occupancy status.

**Override a Binary Output.** Allows operator to override a selected list of Binary Outputs.

**Override an Analog Output.** Allows operator to override a selected list of Analog Outputs.

The following example illustrates the sequence for an operator to override then to cancel the override. Although the example is for overriding occupancy, overrides are enabled and cancelled in the same manner, when overriding Occupancy, a Binary Output, or an Analog Output. It is important to note that an override will remain in effect, and take precedence over normal operating modes until the override is released.

**Prior to initiating any call for technical assistance, ensure that all overrides are released. *Cycling power DOES NOT reset overrides.***

## Override Occupancy

This screen allows operator to override the occupancy status.

***Note:*** *Overriding occupancy will place unit in selected occupancy mode until override is manually released. Selecting an override will bring operator to a confirmation screen.*

This screen allows the operator to confirm his selection of occupancy override. Pressing the No button will cancel the action. Pressing the Yes button will complete the override action.

If an override has been previously selected, this screen will allow the operator to manually cancel the override. Pressing the Release Override button will bring operator to confirmation screen.

This screen allows the operator to confirm his selection of release override. Pressing the No button will cancel the action, and maintain the override in effect. Pressing the Yes button will release the override action.

## Binary Outputs

***Note:*** ***Prior to initiating any call for technical assistance, ensure all overrides are released.*** *Refer to "Override Occupancy," p. 111 for touch pad sequence to enact or release an override.* ***Cycling power DOES NOT reset overrides.***

**OA Damper.** Allows operator to override current position of OA Damper. Selecting or releasing an override will bring operator to a confirmation screen.

***Note:*** *Overriding OA Damper will open or close OA Damper until override is manually released.*

**Indoor Fan Motor.** Allows operator to override current call to Indoor Fan Motor (IFM). Selecting or releasing an override will bring operator to a confirmation screen.

***Note:*** *Overriding IFM will turn IFM on or off until override is manually released.*

**Compressor 1.** Allows operator to override MCM call for Compressor 1. Selecting or releasing an override will bring operator to a confirmation screen. When Compressor 1 is overridden ON, RTRM1 Y1, MCM BO3, and R3 should also indicate ON.

***Note:*** *Overriding Compressor 1 will bring Compressor 1 on or turn it off until override is manually released.*

**Compressor 2.** Allows operator to override MCM call for Compressor 2. Selecting or releasing an override will bring operator to a confirmation screen. When Compressor 2 is overridden ON, RTRM1 Y2, MCM BO4, and R4 should also indicate ON.

***Note:*** *Overriding Compressor 2 will bring Compressor 2 on or turn it off until override is manually released.*

***Note:*** ***Prior to initiating any call for technical assistance, ensure all overrides are released.*** *Refer to* *"Override Occupancy," p. 111* *for touch pad sequence to enact or release an override.* ***Cycling power DOES NOT reset overrides.***

**ERV Enable.** Allows operator to override current MCM call for ERV. Selecting or releasing an override will bring operator to a confirmation screen.

***Note:*** *Overriding ERV will turn ERV on or off until override is manually released.*

**Heating.** Allows operator to override current MCM call for heat. Selecting or releasing an override will bring operator to a confirmation screen.

***Note:*** *Overriding Heating will turn heat on or off until override is manually released.*

**Compressor 3.** Allows operator to override MCM call for Compressor 3. Selecting or releasing an override will bring operator to a confirmation screen. When Compressor 3 is overridden ON, RTRM2 Y1, MCM BO3, and R9 should also indicate ON.

***Note:*** *Overriding Compressor 3 will bring Compressor 3 on or turn it off until override is manually released.*

**Compressor 4.** Allows operator to override MCM call for Compressor 4. Selecting or releasing an override will bring operator to a confirmation screen. When Compressor 4 is overridden ON, RTRM2 Y2, MCM BO4, and R10 should also indicate ON.

***Note:*** *Overriding Compressor 4 will bring Compressor 4 on or turn it off until override is manually released.*

## Analog Outputs

***Note:*** ***Prior to initiating any call for technical assistance, ensure all overrides are released.*** *Refer to* *"Override Occupancy," p. 111* *for touch pad sequence to enact or release an override.* ***Cycling power DOES NOT reset overrides.***

**Heat Modulation Signal.** Allows operator to override current Heat Modulation. Selecting or releasing an override will bring operator to a confirmation screen. Heat must be on for Heat Modulation to have any effect on unit operation.

***Note:*** *Overriding Heat Modulation signal will place heat at that percent of modulation until override is manually released.*

**HGRH Modulation Signal.** Allows operator to override current Hot Gas Reheat Modulation. Selecting or releasing an override will bring operator to a confirmation screen. Unit must be in Dehumidification or Cooling mode for HGRH Modulation to have any effect on unit operation.

***Note:*** *Overriding HGRH Modulation will fix the percentage of HGRH modulation until override is manually released.*

**ERCC Capacity Control.** Allows operator to override amount of Capacity Control as sent from MCM to optional ERCC. Selecting or releasing an override will bring operator to a confirmation screen.

***Note:*** *Overriding Capacity Control will fix the percentage of capacity control until override is manually released.*

**IFM VFD Setpoint.** Allows operator to override Indoor Fan Motor VFD Setpoint (IFMS). Selecting or releasing an override will bring operator to a confirmation screen.

***Note:*** *Overriding IFM VFD Setpoint will fix the VFD at that percentage of output until override is manually released. Changing the IFMS will alter the output of the IFM, may alter the air balance and pressure of the building, and affect published dehumidification, cooling, and heating performance of the unit.*

***Note:*** ***Prior to initiating any call for technical assistance, ensure all overrides are released.*** *Refer to "Override Occupancy," p. 111 for touch pad sequence to enact or release an override.* ***Cycling power DOES NOT reset overrides.***

**PFM VFD SetPoint.** Allows operator to override optional Power Exhaust Fan Motor VFD Setpoint (PFMS). Selecting or releasing an override will bring operator to a confirmation screen.

***Note:*** *Overriding PFMS will fix the VFD at that percentage of output until override is manually released. Changing the PFMS will alter the output of the Powered Exhaust Fan Motor, may alter the air balance and pressure of the building, and affect published dehumidification, cooling, and heating performance of the unit.*

## 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 complete listing of 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. 99 for the recommended troubleshooting procedure.

### Cooling Failure

1. Outdoor air temperature and/or relative humidity sensor failure.
2. CC1 or CC2 24 Vac control circuit has opened, check CC1 and CC2 coils, and any of the controls below that apply to the unit (CHP1, CHP2).
3. 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.

**Simultaneous Heat and Cool Failure.** 1. Emergency Stop is activated.

## 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

## Heat Failure

| | | |
|---|---|---|
| (A) Power Failure | 1. Disconnect not turned on | 1. Turn disconnect on |
| | 2. Blown fuses | 2. Check and replace |
| | 3. Main to unit disconnect not on | 3. Turn on power to main |
| (B) Damper will not operate | 1. Disconnect not turned on | 1. Turn disconnect on |
| | 2. Blown fuses | 2. Check and replace |
| | 3. Main to unit disconnect not on | 3. Turn on power to main |
| | 4. Failed damper motor | 4. Check and/or replace |
| | 5. Loose wiring to motor | 5. Check and tighten |
| | 6. Damper linkage binding | 6. Check and clear |
| (C) Motor Failure | 1. Disconnect not turned on | 1. Turn disconnect on |
| | 2. Blown fuses | 2. Check and replace |
| | 3. Main to unit disconnect not on | 3. Turn on power to main |
| | 4. Failed motor | 4. Check and/or replace |
| | 5. Loose wiring to motor | 5. Check and tighten |
| | 6. Starter fuses blown | 6. Check and/or replace |
| | 7. Motor overloaded | 7. Check for proper speed |
| | 8. Improper supply voltage | 8. Check and correct |
| | 9. Motor overheating | 9. Check firing rate of unit |
| (D) Blower not turning | 1. See problem “A” and “C” | 1. See “A” and “C” |
| | 2. Broken drive belts | 2. Check and replace |
| | 3. Bearing seized | 3. Check and replace |
| | 4. Improper supply voltage | 4. Check and correct |
| (E) No Burner Operation | 1. See problems “A” thru “D” | 1. See problems “A” thru “D” |
| | 2. Damper end switch not functioning | 2. Check and/or replace |
| | 3. Failed air flow switch | 3. Check and/or replace |
| | 4. Loose wiring connection at air proving | 4. Check and tighten |
| | 5. Flame safeguard in lockout | 5. Check and reset |
| | 6. High limit tripped | 6. Check and/or replace |
| | 7. Too high or low gas pressure | 7. Check inlet gas pressure |
| | 8. Failed control transformer | 8. Check and/or replace |
| | 9. Blown control transformer | 9. Check and/or replace |
| | 10. Failed or malfunctioning main gas valves | 10. Check and/or replace |

## 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

## Service Failure

Fan Failure = voltage alternates between 32 Vdc and 0.75 Vdc.

Lock-outs can be reset at the *Alarm Status Screen* (Page 1 of 4).

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