Installation, Operation & Maintenance

**WARNING**

QUALIFIED INSTALLER

Improper installation, adjustment, alteration, service or maintenance can cause property damage, personal injury or loss of life. Startup and service must be performed by a Factory Trained Service Technician. A copy of this IOM should be kept with the unit.

**WARNING**

FOR YOUR SAFETY

Do not store or use gasoline or other flammable vapors and liquids in the vicinity of this or any other appliance.

**WARNING**

If the information in this manual is not followed exactly, a fire or explosion may result causing property damage, personal injury or loss of life.
# Table of Contents

Safety .................................................................................................................. 5  
General Description .......................................................................................... 10  
Receiving Unit .................................................................................................. 10  
Storage ............................................................................................................. 10  
Direct Expansion (DX) Condensing Units ....................................................... 11  
Wiring Diagrams ............................................................................................... 11  
Installation ....................................................................................................... 12  
Locating Unit .................................................................................................... 12  
Forklifting the Unit ........................................................................................... 13  
Lifting the Unit ................................................................................................ 13  
Electrical .......................................................................................................... 13  
 Thermostat ....................................................................................................... 15  
Refrigerant Piping ............................................................................................ 15  
  Determining Refrigerant Line Size ................................................................. 16  
  Liquid Line ..................................................................................................... 16  
  Suction Line .................................................................................................. 17  
  Hot Gas Bypass Line ..................................................................................... 18  
  Hot Gas Reheat .............................................................................................. 19  
  Predetermined Line Sizes ............................................................................ 19  
Startup ............................................................................................................. 23  
Compressors ..................................................................................................... 23  
Charging Refrigerant & Adjusting Refrigerant Charge ...................................... 23  
  Before Charging ............................................................................................ 23  
  Checking Liquid Sub-Cooling ...................................................................... 24  
  Adjusting Sub-Cooling and Superheat Temperatures ................................... 24  
Operation ......................................................................................................... 27  
Thermostat Operation ....................................................................................... 27  
Compressor Operation ...................................................................................... 27  
Variable Capacity Compressor Controller ...................................................... 27  
Low Voltage Terminals ................................................................................... 28  
High Voltage Terminals .................................................................................. 28  
Low Ambient Options ...................................................................................... 30  
Maintenance .................................................................................................... 30  
Coils ................................................................................................................... 30  
E-Coated Coil Cleaning ................................................................................... 30  
DX Cooling ....................................................................................................... 32  
Condenser Fan Motor Lubrication .................................................................... 32  
Replacement Parts ........................................................................................... 32  
AAON - Longview ............................................................................................ 32  
Warranty, Service, and Parts Department ....................................................... 32  
Refrigerant Piping Diagrams .......................................................................... 33  
CC Series Startup Form ................................................................................... 45  
Literature Change History .............................................................................. 49
Index of Tables and Figures

Tables:
Table 1 - CC Series Clearances ................................................................. 12
Table 2 - Recommended Elevation Minimums ............................................ 13
Table 3 - Predetermined Line Sizes for R-410A CC Condensing Units .......... 22
Table 4 - Sub-cooling and Superheat.......................................................... 24
Table 5 - R-410A Refrigerant Temperature-Pressure Chart ....................... 26
Table 6 - Demand Signal vs. Compressor Capacity Modulation ................. 28
Table 7 - Thermistor Temperature vs. Resistance Values ......................... 29

Figures:
Figure 1 - Vertical Air Discharge .............................................................. 12
Figure 2 - Horizontal Air Discharge ......................................................... 12
Figure 3 - Riser height versus total equivalent line length .......................... 21
Figure 4 - Variable Capacity Compressor Controller ................................ 28
Figure 5 - Compressor Controller Flash Code Details ............................... 29
Figure 6 - A/C only piping, AHU above CU .............................................. 33
Figure 7 - A/C only piping, AHU below CU .............................................. 34
Figure 8 - Modulating hot gas reheat piping, AHU above CU .................... 35
Figure 9 - Modulating hot gas reheat piping, AHU below CU .................... 36
Figure 10 - Hot gas bypass piping, AHU above CU .................................... 37
Figure 11 - Hot gas bypass piping, AHU below CU .................................... 38
Figure 12 - Modulating hot gas reheat with hot gas bypass piping, AHU above CU .................. 39
Figure 13 - Modulating hot gas reheat with hot gas bypass piping, AHU below CU .................. 40
Figure 14 - Heat pump piping, AHU above CU ......................................... 41
Figure 15 - Heat pump piping, AHU below CU ......................................... 42
Figure 16 - Heat pump with modulating hot gas reheat piping, AHU above CU .................. 43
Figure 17 - Heat pump with modulating hot gas reheat, AHU below CU ........ 44
Safety

Attention should be paid to the following statements:

**NOTE** - Notes are intended to clarify the unit installation, operation and maintenance.

⚠️ **CAUTION** - Caution statements are given to prevent actions that may result in equipment damage, property damage, or personal injury.

⚠️ **WARNING** - Warning statements are given to prevent actions that could result in equipment damage, property damage, personal injury or death.

⚠️ **DANGER** - Danger statements are given to prevent actions that will result in equipment damage, property damage, severe personal injury or death.

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**WARNING**

**ELECTRIC SHOCK, FIRE OR EXPLOSION HAZARD**

Failure to follow safety warnings exactly could result in dangerous operation, serious injury, death or property damage.

Improper servicing could result in dangerous operation, serious injury, death or property damage.

➢ Before servicing, disconnect all electrical power to the unit. More than one disconnect may be provided.
➢ When servicing controls, label all wires prior to disconnecting. Reconnect wires correctly.
➢ Verify proper operation after servicing. Secure all doors with key-lock or nut and bolt.

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**WARNING**

**FIRE, EXPLOSION OR CARBON MONOXIDE POISONING HAZARD**

Failure to replace proper controls could result in fire, explosion or carbon monoxide poisoning. Failure to follow safety warnings exactly could result in serious injury, death or property damage. Do not store or use gasoline or other flammable vapors and liquids in the vicinity of this appliance.
**WARNING**

During installation, testing, servicing and troubleshooting of the equipment it may be necessary to work with live electrical components. Only a qualified licensed electrician or individual properly trained in handling live electrical components shall perform these tasks.

Standard NFPA-70E, an OSHA regulation requiring an Arc Flash Boundary to be field established and marked for identification of where appropriate Personal Protective Equipment (PPE) be worn, should be followed.

**WARNING**

**GROUNDING REQUIRED**

All field installed wiring must be completed by qualified personnel. Field installed wiring must comply with NEC/CEC, local and state electrical code requirements. Failure to follow code requirements could result in serious injury or death. Provide proper unit ground in accordance with these code requirements.

**WARNING**

**ROTATING COMPONENTS**

Unit contains fans with moving parts that can cause serious injury. Do not open door containing fans until the power to the unit has been disconnected and fan has stopped rotating.

---

**WARNING**

**UNIT HANDLING**

To prevent injury or death lifting equipment capacity shall exceed unit weight by an adequate safety factor. Always test-lift unit not more than 24 inches high to verify proper center of gravity lift point to avoid unit damage, injury or death.

**WARNING**

**CAUTION**

Rotation must be checked on all MOTORS AND COMPRESSORS of 3 phase units at startup by a qualified service technician. Scroll compressors are directional and can be damaged if rotated in the wrong direction. Compressor rotation must be checked using suction and discharge gauges. Fan motor rotation should be checked for proper operation. Alterations should only be made at the unit power connection.

**CAUTION**

Door compartments containing hazardous voltage or rotating parts are equipped with door latches to allow locks. Door latches are shipped with nut and bolts requiring tooled access. If you do not replace the shipping hardware with a pad lock always re-install the nut & bolt after closing the door.
1. Startup and service must be performed by a Factory Trained Service Technician.

2. The unit is for outdoor use only. See General Information section for more unit information.

3. Every unit has a unique equipment nameplate with electrical, operational and unit clearance specifications. Always refer to the unit nameplate for specific ratings unique to the model you have purchased.

4. READ THE ENTIRE INSTALLATION, OPERATION AND MAINTENANCE MANUAL. OTHER IMPORTANT SAFETY PRECAUTIONS ARE PROVIDED THROUGHOUT THIS MANUAL.

5. Keep this manual and all literature safeguarded near or on the unit.

**WARNING**

Do not work in a closed area where refrigerant or nitrogen gases may be leaking. A sufficient quantity of vapors may be present and cause injury or death.

**WARNING**

COMPRESSOR CYCLING

5 MINUTE MINIMUM OFF TIME
To prevent motor overheating compressors must cycle off for a minimum of 5 minutes.

5 MINUTE MINIMUM ON TIME
To maintain the proper oil level compressors must cycle on for a minimum of 5 minutes.
The cycle rate must not exceed 6 starts per hour.

**CAUTION**

Do not clean DX refrigerant coils with hot water or steam. The use of hot water or steam on refrigerant coils will cause high pressure inside the coil tubing and damage to the coil.

**CAUTION**

To prevent damage to the unit, do not use acidic chemical coil cleaners. Do not use alkaline chemical coil cleaners with a pH value greater than 8.5, after mixing, without first using an aluminum corrosion inhibitor in the cleaning solution.

**WARNING**

Some chemical coil cleaning compounds are caustic or toxic. Use these substances only in accordance with the manufacturer’s usage instructions. Failure to follow instructions may result in equipment damage, injury or death.

**WARNING**

Do not use oxygen, acetylene or air in place of refrigerant and dry nitrogen for leak testing. A violent explosion may result causing injury or death.

**WARNING**

To prevent damage to the unit, do not use acidic chemical coil cleaners. Do not use alkaline chemical coil cleaners with a pH value greater than 8.5, after mixing, without first using an aluminum corrosion inhibitor in the cleaning solution.
CC Series Feature String Nomenclature

<table>
<thead>
<tr>
<th>Model Option</th>
<th>Unit Feature Options</th>
</tr>
</thead>
<tbody>
<tr>
<td>GEN</td>
<td>MJR</td>
</tr>
<tr>
<td>CC</td>
<td>-</td>
</tr>
</tbody>
</table>

**BASE MODEL OPTIONS**

**Series and Generation**
CC

**Revision**
C = Design Sequence

**Unit Size**
002 = 2 Ton Capacity - Horizontal Discharge
003 = 3 Ton Capacity - Horizontal Discharge
004 = 4 Ton Capacity - Horizontal Discharge
005 = 5 Ton Capacity - Horizontal Discharge
006 = 6 Ton Capacity
007 = 7 Ton Capacity
008 = 8 Ton Capacity
010 = 10 Ton Capacity
014 = 14 Ton Capacity
017 = 17 Ton Capacity
022 = 22 Ton Capacity
025 = 25 Ton Capacity
030 = 30 Ton Capacity
031 = 31 Ton Capacity
034 = 34 Ton Capacity
040 = 40 Ton Capacity
045 = 45 Ton Capacity
050 = 50 Ton Capacity
055 = 55 Ton Capacity
063 = 63 Ton Capacity

**Voltage**
1 = 230V/1Φ/60Hz
2 = 230V/3Φ/60Hz
3 = 460V/3Φ/60Hz
4 = 575V/3Φ/60Hz
8 = 208V/3Φ/60Hz
9 = 208V/1Φ/60Hz

**Compressor Type**
0 = No Compressor - Condenser Only
A = R-410A Single Step Scroll Compressor
B = R-410A Two Step Scroll Compressor
C = R-410A Tandem Scroll Compressors
D = R-410A Variable Capacity Scroll Compressor
9 = R-410A Variable Capacity Scroll Compressor - Each Circuit

**Number of Circuits**
1 = One Circuit
2 = Two Circuits
4 = Four Circuits

**UNIT FEATURE OPTIONS**

**Feature 1: Ambient Control**
0 = Standard - 55°F Ambient
B = Adjustable Fan Cycling - 35°F Ambient
D = Modulating Fan Pressure Control - 35°F Ambient
F = Flooded Condenser Low Ambient Controls + Option B
G = Flooded Condenser Low Ambient Controls + Option D

**Feature 2: Refrigeration Options**
0 = Standard - Split System Air Conditioner
A = External Hot Gas Bypass
B = Split System Heat Pump
D = Modulating Hot Gas Reheat
F = Options A + D
G = Options B + D

**Feature 3: Controls**
0 = Standard - Terminal Block with Control Transformer
A = Suction Pressure Transducer
B = Phase and Brown Out Protection
C = Factory Wired 115V Outlet
D = Options A + B
E = Options A + C
F = Options B + C
G = Options A + B + C
J = Variable Capacity Compressor Integrated Controls
CC Series Feature String Nomenclature

<table>
<thead>
<tr>
<th>Model Option</th>
<th>Unit Feature Options</th>
</tr>
</thead>
<tbody>
<tr>
<td>GEN</td>
<td>MIREY</td>
</tr>
<tr>
<td>CC - C - 010 - 3 - D - 2</td>
<td>:</td>
</tr>
</tbody>
</table>

**Feature 4: Coil Protection**
- 0 = Standard
- A = Polymer E-Coated Coil

**Feature 5: Cabinet Options**
- 0 = Standard
- B = Compressor Sound Blanket
- D = Exterior Corrosion Protection
- E = Options B + D
- R = California OSHPD Certified
- S = Shake Table Cert. (ASHE 7-05/ICC-ES AC 156)
- T = Seismic Construction (Non-Certified)
- U = Options D + R
- W = Options D + S
- Z = Options D + T

**Feature 6: Warranty**
- 0 = Standard
- A = Second to Fifth Year Extended Compressor Warranty

**Feature 7: Type**
- 0 = Standard
- X = Special Price Authorization
General Description

AAON CC Series air-cooled condensers and condensing units have been designed for outdoor installation only. Startup and service must be performed by a Factory Trained Service Technician.

**WARNING**

Improper installation, adjustment, alteration, service or maintenance can cause property damage, personal injury or loss of life. Startup and service must be performed by a Factory Trained Service Technician.

**Codes and Ordinances**

System should be sized in accordance with the American Society of Heating, Refrigeration and Air Conditioning Engineers Handbook.

Installation of CC Series units must conform to the ICC standards of the International Mechanical Code, the International Building Code, and local building, plumbing and waste water codes. All appliances must be electrically grounded in accordance with local codes, or in the absence of local codes, the current National Electric Code, ANSI/NFPA 70 or the current Canadian Electrical Code CSA C22.1.

**WARNING**

Coils and sheet metal surfaces present sharp edges and care must be taken when working with equipment.

**WARNING**

Failure to observe the following instructions will result in premature failure of your system and possible voiding of the warranty.

**Receiving Unit**

When received, the unit should be checked for damage that might have occurred in transit. If damage is found it should be noted on the carrier’s Freight Bill. A request for inspection by carrier’s agent should be made in writing at once.

Nameplate should be checked to ensure the correct model sizes and voltages have been received to match the job requirements.

The warranty card must be completed in full and returned to AAON not more than 3 months after unit is delivered.

**Storage**

If installation will not occur immediately following delivery, store equipment in a dry protected area away from construction traffic and in the proper orientation as marked on the packaging with all internal packaging in place. Secure all loose-shipped items.

**CAUTION**

The Clean Air Act of 1990 bans the intentional venting of refrigerant as of July 1, 1992. Approved methods of recovery, recycling, or reclaiming must be followed.
Direct Expansion (DX) Condensing Units
Condensing units are factory assembled and wired, including a holding charge of refrigerant. Refrigeration systems include factory provided liquid line filter driers and fully hermetic scroll compressors with a positive pressure forced lubrication system.

CAUTION
CRANKCASE HEATER OPERATION

Units are equipped with compressor crankcase heaters, which should be energized at least 24 hours prior to cooling operation, to clear any liquid refrigerant from the compressors.

Never cut off the main power supply to the unit, except for servicing, emergency, or complete shutdown of the unit. When power is cut off from the unit, compressors using crankcase heaters cannot prevent refrigerant migration. This means the compressor may cool down and liquid refrigerant may accumulate in the compressor. Since the compressor is designed to pump refrigerant gas, damage may occur when power is restored.

If power to the unit must be off for more than an hour, turn the thermostat system switch to “Off”, or turn the unit off at the control panel, and then cut off the main power supply. Leave the unit off until the main power supply has been turned on again for at least 24 hours. This will give the crankcase heater time to clear any liquid accumulation out of the compressor before it is required to run.

Always control the system from the thermostat, or control panel, never at the main power supply, except for servicing, emergency, or complete shutdown of the unit.

Note: Low Ambient Operation
Units without a low ambient option, such as adjustable fan cycling or the 0°F low ambient option, will not operate in the cooling mode of operation properly when the outdoor temperature is below 55°F. Low ambient and/or air handling unit economizer options are recommended if cooling operation below 55°F is expected.

Note: Multiple Systems with Multiple Thermostats
When several heating and cooling split systems are used to condition a space all thermostat switches must be set in either heating mode, cooling mode or off. Do not leave part of the systems switched to the opposite mode. Cooling only systems should be switched off at the thermostat during the heating season.

Wiring Diagrams
Unit specific wiring diagrams are laminated in plastic and affixed inside the controls compartment door.
Installation

AAON equipment has been designed for quick and easy installation.

Locating Unit
CC Series units are designed for outdoor application and placement at ground level or on a rooftop. Units must be placed on a level and solid foundation that can support the unit’s weight.

When rooftop mounted, a steel frame must be provided that will support the unit above the roof itself for load distribution.

When installed at ground level, a one-piece concrete slab - preferably at least 4 inches thick - should be used with footings that extend below the frost line (a substantial base that will not settle). Slab should be surrounded by a graveled area for proper drainage and should not adjoin the building as sound and vibration may be transmitted to the structure. Care must also be taken to protect the coils and fins from damage due to vandalism or other hazards.

<table>
<thead>
<tr>
<th>Location</th>
<th>Unit Size</th>
</tr>
</thead>
<tbody>
<tr>
<td></td>
<td>2-5 tons</td>
</tr>
<tr>
<td>Front</td>
<td>Unobstructed</td>
</tr>
<tr>
<td>Back</td>
<td>12”</td>
</tr>
<tr>
<td>Left Side</td>
<td>10”</td>
</tr>
<tr>
<td>Right Side</td>
<td>36”</td>
</tr>
<tr>
<td>Top</td>
<td>0”</td>
</tr>
</tbody>
</table>

Air flow to and from the unit must not be restricted. Coils and fans must be free of any obstructions and debris in order to start and operate properly with a correct amount of airflow. Obstruction to airflow will result in decreased performance and efficiency.

6-63 ton units are vertical air discharge and should not be installed in an enclosure or pit that is deeper than the height of the unit. If recessed installation is necessary, the clearance to maintain proper air flow is at least 6 feet. There must be no obstruction above the equipment. Do not place the unit under an overhang.
2-5 ton units are horizontal discharge and must have no obstruction on the discharge side of the unit. Unit should not be installed in an enclosure or pit.

Placement relative to the building or other structures must be carefully selected. Consider the effects of outdoor fan noise on any adjacent occupied space. It is recommended that the unit be placed so that air does not discharge toward windows on intakes less than 25 feet away.

Service compartments must be accessible for periodic servicing of compressors, controls, safety devices, refrigerant service/shutoff valves, coils, and condenser fans.

Heat pumps require special location consideration in areas where snow accumulation can become an obstruction and areas with prolonged continuous subfreezing temperatures. The unit must be placed to permit free drainage of the defrost water and ice. A minimum 3 inches clearance under the outdoor coil is required in the milder climates. In more severe weather locations, it is recommended that the unit include additional elevation to allow unobstructed drainage and airflow.

<table>
<thead>
<tr>
<th>Design Temperature</th>
<th>Suggest Minimum Elevation</th>
</tr>
</thead>
<tbody>
<tr>
<td>+15°F and above</td>
<td>3”</td>
</tr>
<tr>
<td>-5°F to +17°F</td>
<td>8”</td>
</tr>
<tr>
<td>Below -5°F</td>
<td>12”</td>
</tr>
</tbody>
</table>

Table 2- Recommended Elevation Minimums

Forklifting the Unit
Units can be lifted from the base using a forklift. This allows movement and placement without causing physical damage. Larger units may require a fork length of 72 inches or the fork must have 72 inch fork extensions. Smaller units can be lifted from multiple sides, while larger units must be lifted from the front side.

Forks must be perpendicular to the unit and they must be in far enough that the back of the fork is no more than 6 inches away from the edge of the unit.

Incorrect lifting can cause damage to the unit.

Lifting the Unit
If cables or chains are used to hoist the unit they must be the same length and care should be taken to prevent damage to the cabinet. Arrange spreader bars, blocking, or other lifting devices to prevent any damage to the cabinet, coils, and condenser fans.

Before lifting unit, be sure that all shipping material has been removed from unit. Secure hooks and cables at all lifting points/lugs provided on the unit.

Electrical
Verify the unit nameplate agrees with power supply. Connect power and control field wiring as shown on the unit specific wiring diagram provided laminated and attached to the door in the controls compartment.

Electric shock hazard. Before attempting to perform any installation, service, or maintenance, shut off all electrical power to the unit at the disconnect switches. Unit may have multiple power supplies. Failure to disconnect power could result in dangerous operation, serious injury, death or property damage.
Route power and control wiring through the utility entries on the sides of the unit. It is recommended not to run power and control signal wires in the same conduit. If the control wires are run inside the same conduit as the power wiring use 600 volt wire, or as required by applicable codes.

Size supply conductors based on the unit MCA rating. Supply conductors must be rated a minimum of 75°C.

Protect the branch circuit in accordance with code requirements. The unit must be electrically grounded in accordance with local codes, or in the absence of local codes, the current National Electric Code, ANSI/NFPA 70 or the current Canadian Electrical Code CSA C22.1.

**Note:** Units are factory wired for 208V, 230V, 460V or 575V. In some units, the 208V and 230V options may also be provided in single or three phase configurations. The transformer configuration must be checked by a qualified technician prior to startup.

Wire power leads to the unit terminal block or compressor contactor. All wiring beyond this point has been done by the manufacturer and cannot be modified without effecting the unit's agency/safety certification.

All units require field supplied electrical overcurrent and short circuit protection. Device must not be sized larger than the Maximum Overcurrent Protection (MOP) shown on the unit nameplate.

Codes may require a disconnect switch be within sight of the unit.

It is recommended that the field installed overcurrent protection or disconnect switch not be installed on the unit.

Supply voltage must be within the min/max range shown on the unit nameplate. Available short circuit current should not exceed the short circuit current rating (SCCR) shown on the unit nameplate.

**CAUTION**

Three phase voltage imbalance will cause motor overheating and premature failure.

Three phase voltage imbalance will cause motor overheating and premature failure. The maximum allowable imbalance is 2.0%. Voltage imbalance is defined as 100 times the maximum deviation from the average voltage divided by the average voltage.

Example:

\[
\frac{221V+230V+227V}{3} = 226V, \text{ then } 100 \times \frac{(226V-221V)}{226V} = 2.2\%, \text{ which exceeds the allowable imbalance.}
\]

Check voltage imbalance at the unit disconnect switch and at the compressor terminal. Contact your local power company for line voltage corrections.

Installing contractor must check for proper motor rotation and check fan motor amperage listed on the motor nameplate is not exceeded.

**CAUTION**

Rotation must be checked on all MOTORS AND COMPRESSORS of three phase units. Condenser fan motors should be checked by a qualified service technician at startup and any wiring alteration should only be made at the unit power connection.
Wire control signals to the unit’s low voltage terminal block located in the controls compartment.

If any factory installed wiring must be replaced, use a minimum 105°C type AWM insulated conductors.

**Thermostat**
If a thermostat is used for unit control, thermostat should be located on an inside wall 4-5 feet above the floor where it will not be subjected to drafts, sun exposure, or heat from electrical fixtures or appliances. Follow thermostat manufacturer’s instructions for general installation procedure.

Thermostat control wiring size must be large enough to prevent excess voltage drop and ensure proper operation.

All external devices must be powered via a separate external power supply.

**Refrigerant Piping**
(See back of the manual for refrigerant piping diagrams.)

---

**CAUTION**

Scroll compressors are directional and will be damaged by operation in the wrong direction. High pressure switches on compressors have been disconnected after factory testing. Rotation should be checked by a qualified service technician at startup using suction and discharge pressure gauges and any wiring alteration should only be made at the unit power connection.

---

**CAUTION**

This section is for information only and is not intended to provide all details required by the designer or installer of the refrigerant piping between the condenser or condensing unit and the air handling unit. AAON, Inc. is not responsible for interconnecting refrigerant piping. Consult ASHRAE Handbook – Refrigeration and ASME Standards.

**General**
Piping from the condensing unit to the air handler is the responsibility of the installing contractor.

Use only clean type “ACR” copper tubing that has been joined with high temperature brazing alloy.

The pipe or line sizes must be selected to meet the actual installation conditions and not simply based on the connection sizes at the condensing unit or air handler.

All CC Series condensing units are provided with in-line shutoff valves on both the liquid and suction lines. These should remain closed until the system is ready for start-up after installation.

Piping should conform to generally accepted practices and codes.

Care must be taken not to cross the circuits on multiple circuit systems.

Upon completion of piping connection, the interconnecting piping and air handler MUST BE evacuated to 500 microns or less; leak checked and charged with refrigerant.
Determining Refrigerant Line Size

The piping between the condenser and low side must ensure:
1. Minimum pressure drop, and
2. Continuous oil return, and
3. Prevention of liquid refrigerant slugging, or carryover

Minimizing the refrigerant line size is favorable from an economic perspective, reducing installation costs, and reducing the potential for leakage. However, as pipe diameters narrow, pressure-reducing frictional forces increase.

Excessive suction line pressure drop causes loss of compressor capacity and increased power usage resulting in reduced system efficiency. Excessive pressure drops in the liquid line can cause the liquid refrigerant to flash, resulting in faulty TXV operation and improper system performance. In order to operate efficiently and cost effectively, while avoiding malfunction, refrigeration systems must be designed to minimize both cost and pressure loss.

Equivalent Line Length
All line lengths discussed in this manual, unless specifically stated otherwise, are Equivalent Line Lengths. The frictional pressure drop through valves, fittings, and accessories is determined by establishing the equivalent length of straight pipe of the same diameter. Always use equivalent line lengths when calculating pressure drop.

Special piping provisions must be taken when lines are run underground, up vertical risers, or in excessively long line runs.

Liquid Line
When sizing the liquid line, it is important to minimize the refrigerant charge to reduce installation costs and improve system reliability. This can be achieved by minimizing the liquid line diameter. However, reducing the pipe diameter will increase the velocity of the liquid refrigerant which increases the frictional pressure drop in the liquid line, and causes other undesirable effects such as noise.

Maintaining the pressure in the liquid line is critical to ensuring sufficient saturation temperature, avoiding flashing upstream of the TXV, and maintaining system efficiency. Pressure losses through the liquid line due to frictional contact, installed accessories, and vertical risers are inevitable. Maintaining adequate subcooling at the condenser to overcome these losses is the only method to ensure that liquid refrigerant reaches the TXV.

Liquid refrigerant traveling upwards in a riser loses head pressure. If the evaporator is below the condenser, and the liquid line does not include risers, the gravitational force will increase the pressure of the liquid refrigerant. This will allow the refrigerant to withstand greater frictional losses without the occurrence of flashing prior to the TXV.

A moisture-indicating sight glass may be field installed in the liquid line to indicate the occurrence of premature flashing or moisture in the line. The sight glass should not be used to determine if the system is properly charged. Use temperature and pressure measurements to determine liquid sub-cooling, not the sight glass.
**Liquid Line Routing**
Care should be taken with vertical risers. When the system is shut down, gravity will pull liquid down the vertical column, and back to the condenser when it is below the evaporator. This could potentially result in compressor flooding. A check valve can be installed in the liquid line where the liquid column rises above the condenser to prevent this. The liquid line is typically pitched along with the suction line, or hot gas line, to minimize the complexity of the configuration.

**Liquid Line Insulation**
When the liquid line is routed through regions where temperature losses are expected, no insulation is required, as this may provide additional sub-cooling to the refrigerant. When routing the liquid line through high temperature areas, insulation of the line is appropriate to avoid loss of sub-cooling through heat gain.

**Liquid Line Guidelines**
In order to ensure liquid at the TXV, frictional losses must not exceed available sub-cooling. A commonly used guideline to consider is a system design with pressure losses due to friction through the line not to exceed a corresponding 1-2°F change in saturation temperature.

If the velocity of refrigerant in the liquid line is too great, it could cause excessive noise or piping erosion. The recommended maximum velocities for liquid lines are 100 fpm from the condenser to a receiver tank to discourage fluid backup, and 300 fpm from receiver tank to the evaporator to minimize valve induced liquid hammer.

**Liquid Line Accessories**
Liquid line shut off valves and filter driers are factory provided. Filter driers must be field installed on 2-5 ton units. The total length equivalent of pressure losses through valves, elbows and fittings must be considered when adding additional components in the field. It is a good practice to utilize the fewest elbows that will allow the mating units to be successfully joined.

**Suction Line**
The suction line is more critical than the liquid line from a design and construction standpoint. More care must be taken to ensure that adequate velocity is achieved to return oil to the compressor at minimum loading conditions. However, reducing the piping diameter to increase the velocity at minimal load can result in excessive pressure losses, capacity reduction, and noise at full load.

**Suction Line Routing**
Pitch the suction line in the direction of flow (about 1 foot per 120 feet of length) to maintain oil flow towards the compressor, and keep it from flooding back into the evaporator. Crankcase heaters are provided to keep any condensed refrigerant that collects in the compressor from causing damage or wear. Make sure to provide support to maintain suction line positioning, and insulate completely between the evaporator and condensing unit.

It is important to consider part load operation when sizing suction lines. At minimum capacity, refrigerant velocity may not be adequate to return oil up the vertical riser. Decreasing the diameter of the vertical riser will increase the velocity, but also the frictional loss.

---

**CAUTION**

Circuits with variable capacity scroll compressors require suction riser traps every 10 feet.
A double suction riser can be applied to the situation of part load operation with a suction riser. A double suction riser is designed to return oil at minimum load while not incurring excessive frictional losses at full load. A double suction riser consists of a small diameter riser in parallel with a larger diameter riser, and a trap at the base of the large riser. At minimum capacity, refrigerant velocity is not sufficient to carry oil up both risers, and it collects in the trap, effectively closing off the larger diameter riser, and diverting refrigerant up the small riser where velocity of the refrigerant is sufficient to maintain oil flow. At full load, the mass flow clears the trap of oil, and refrigerant is carried through both risers. The smaller diameter pipe should be sized to return oil at minimum load, while the larger diameter pipe should be sized so that flow through both pipes provides acceptable pressure drop at full load.

*Suction Line Insulation*

The entire suction line should be insulated with a minimum 1 inch thick Armaflex insulation. This prevents condensation from forming on the line, and reduces any potential loss in capacity associated with heat gain placing additional load on the system.

*Suction Line Guidelines*

For proper performance, suction line velocities less than a 4,000 fpm maximum are recommended. The minimum velocity required to return oil is dependent on the pipe diameter, however, a general guideline of 1,000 fpm minimum may be applied.

In a fashion similar to the liquid line, a common guideline to consider is a system design with pressure losses due to friction through the line not to exceed a corresponding 1-2°F change in saturation temperature.

At points where small pipe size can be used to provide sufficient velocity to return oil in vertical risers at part loads, greater pressure losses are incurred at full loads. This can be compensated for by over sizing the horizontal runs and vertical drop sections. This will however require additional refrigerant charge.

Circuits with variable capacity scroll compressors require suction riser traps every 10 feet.

*Suction Line Accessories*

If the job requirements specify suction accumulators, they must be separately purchased and field installed.

*Hot Gas Bypass Line*

Hot Gas Bypass is available for use with DX systems that may experience low suction pressure during the operating cycle. This may be due to varying load conditions associated with VAV applications or units supplying a large percentage of outside air. The system is designed to divert refrigerant from the compressor discharge to the low pressure side of the system in order to keep the evaporator from freezing and to maintain adequate refrigerant velocity for oil return at minimum load.

Hot discharge gas is redirected to the evaporator inlet via an auxiliary side connector (ASC) to false load the evaporator when reduced suction pressure is sensed.

**Field piping between the condensing unit and the evaporator is required.**

*Hot Gas Bypass Piping Considerations for Evaporator above Condensing Unit*

Pitch the hot gas bypass (HGB) line downward in the direction of refrigerant flow, toward the evaporator.
When installing hot gas bypass risers, an oil drip line must be provided at the lowest point in the system. The oil drip line must be vertical, its diameter should be the same as the diameter of the riser, and it should be 1 foot long. Install a sight glass in the oil drip line for observation. Run an oil return line, using 1/8 inch capillary tube, 10 feet in length, from the oil drip line to the suction line. Connect the oil return line below the sight glass and 1 inch above the bottom of the oil drip line.

HGB valves are adjustable. Factory HGB valve settings will be sufficient for most applications, but may require slight adjustments for some applications, including some make up air applications.

Insulate the entire length of the HGB line with a minimum 1 inch thick Armaflex insulation.

**Hot Gas Bypass Piping Considerations for Evaporator Below Condensing Unit**
The line must slope downward from the HGB valve toward the evaporator.

**Hot Gas Bypass Line Guidelines**
Choose a small size line to ensure oil return, and minimize refrigerant charge.

Maintain velocities below a maximum of 4,000 fpm. A general minimum velocity guideline to use is approximately 1,000 fpm.

**Hot Gas Reheat**
The AAON modulating hot gas reheat system diverts hot discharge gas from the condenser to the air handling unit through the hot gas line. **Field piping between the condensing unit and the air handler is required.**

The line delivers the hot discharge gas to the reheat coil and/or the hot gas bypass valve, so it is sized as a discharge line. Discharge lines should be sized to ensure adequate velocity of refrigerant to ensure oil return, avoid excessive noise associated with velocities that are too high, and to minimize efficiency losses associated with friction.

Pitch the hot gas line in the direction of flow for oil return.

When installing hot gas reheat risers, an oil drip line must be provided at the lowest point in the system. The oil drip line must be vertical, its diameter should be the same as the diameter of the riser, and it should be 1 foot long. Run a drip line, using 1/8 inch capillary tube, 10 feet in length, from the oil drip line to the suction line. Connect the oil return line below the sight glass and 1 inch above the bottom of the oil drip line.

Insulate the entire length of the hot gas line with a minimum 1 inch thick Armaflex insulation.

**Hot Gas Reheat Guidelines**
Maintain velocities below a maximum of 3,500 fpm. A general minimum velocity guideline is 2,000 fpm.

**Predetermined Line Sizes**
To aid in line sizing and selection, AAON has predetermined line sizes for the liquid, suction, and hot gas lines in comfort cooling applications.

In order to generate this information, the following cycle assumptions are made: Saturated suction temperature = 50°F, Saturated condensing temperature = 125°F, Sub-cooling = 10°F, Superheat = 15°F.
The liquid lines have been chosen to maintain velocities between 100 and 350 fpm. The suction line diameters are selected to limit velocities to a 4,000 fpm maximum, while a minimum velocity restriction is imposed by the ability to entrain oil up vertical suction risers (ASHRAE Handbook - Refrigeration).

Acceptable pressure loss criteria are applied to each of the lines: The total equivalent length of the liquid line available is determined such that 3°F of liquid subcooling remain at the TXV. This includes the pressure losses in horizontal and vertical sections, accessories, elbows, etc.

Recall that the available sub-cooling for the cycle is assumed as 10°F. To maintain at least 3°F sub-cooling as a factor of safety to avoid flashing at the TXV, we consider a maximum pressure loss equivalent to a 7°F change in saturation temperature. Pressure losses in the suction line are not to exceed 2°F.

*When to Use Predetermined Line Sizing*

The line sizes presented are not the only acceptable pipe diameters, they are however appropriate for general comfort cooling applications, and satisfy common job requirements. Examine the conditions, assumptions, and constraints used in the generation of the predetermined pipe diameters to ensure that this method is applicable to a particular case. Do not assume that these line sizes are appropriate for every case. Consult ASHRAE Handbook – Refrigeration for generally accepted system piping practices.

*How to Use Predetermined Line Sizing*

First, read the previous section, *When to Use Predetermined Line Sizing*, to decide if this method is applicable. Next, consult Table 3 for pipe diameters.

Examine Figure 3 to determine the acceptable line dimensions associated with the pipe diameters determined in Table 3. The figure is shown as total available riser height versus total equivalent line length for the liquid line. The curve identifies a region of acceptable piping configuration when the predetermined line sizes are selected for any model in the table. A piping configuration above the curve falls outside the assumptions used to determine the line size and will result in a loss of sub-cooling, and additional pressure losses in the suction and hot gas lines.

The total equivalent line length definition includes the height of vertical rise, pressure drop through elbows and accessories, and horizontal line length, so elbows, accessories, and vertical rise must be considered when determining horizontal length available from the total equivalent line length.

Figure 3 is presented in terms of the liquid line, but it assumes that the suction line length is similar, as these lines are commonly routed together to minimize the space and cost required for split system installation.
Note: CC-006, CC-007, CC-008, and CC-010 HGB line sizes are based on four stage cooling operation condensing units, with two step compressors. CC-031, CC-034, CC-040, CC-045, CC-050, CC-055, and CC-063 HGB line sizes are based on four stage cooling operation condensing units, with tandem compressors. With HGB, four stage cooling is recommended on these sizes of units.

Two stage cooling operation condensing units in these sizes with HGB may need larger HGB line sizes.

Figure 3 - Riser Height Versus Total Equivalent Line Length

Note: Figure 3 is for R-410A split system applications with CC-002 through CC-063 units. The region of acceptable riser height is the light area. Select the corresponding predetermined line size from the table above. Refer to AAON ECat32 for application specific refrigerant line sizing recommendations.

CAUTION

Total Equivalent Line Length in this figure is limited to 100 equivalent feet.
<table>
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<th>Connection Size</th>
<th>Predetermined Line Size</th>
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<td>1 3/8&quot;</td>
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</table>

*Hot Gas Bypass Line

**Hot Gas Reheat Line
**Startup**
(See back of the manual for startup form.)

**WARNING**
Improper installation, adjustment, alteration, service or maintenance can cause property damage, personal injury or loss of life. Startup and service must be performed by a Factory Trained Service Technician.

Compressors
All compressors are equipped with crankcase heaters, which should be energized at least 24 hours prior to cooling operation of the compressor.

**WARNING**
Electric shock hazard. Shut off all electrical power to the unit to avoid shock hazard or injury from rotating parts.

**CAUTION**
Scroll compressors are directional and will be damaged by operation in the wrong direction. High pressure switches on compressors have been disconnected after factory testing. Rotation should be checked by a qualified service technician at startup using suction and discharge pressure gauges and any wiring alteration should only be made at the unit power connection.

Charging Refrigerant & Adjusting Refrigerant Charge
Charging a system in the field must be based on determination of liquid sub-cooling and evaporator superheat. On a system with a thermostatic expansion valve (TXV) liquid sub-cooling is more representative of the charge than evaporator superheat but both measurements must be taken.

**CAUTION**
The Clean Air Act of 1990 bans the intentional venting of refrigerant (CFC’s and HCFC’s) as of July 1, 1992. Approved methods of recovery, recycling or reclaiming must be followed. Fines and/or incarceration may be levied for non-compliance.

**CAUTION**
Rotation must be checked on all MOTORS AND COMPRESSORS of three phase units. Condenser fan motors should all be checked by a qualified service technician at startup and any wiring alteration should only be made at the unit power connection.

Before Charging
Unit being charged must be at or near full load conditions before adjusting the charge.

Units equipped with hot gas bypass must have the hot gas bypass valve closed to get the proper charge.
Units equipped with hot gas reheat must be charged with the hot gas valves closed while the unit is in cooling mode. After charging, unit should be operated in reheat (dehumidification) mode to check for correct operation.

After adding or removing charge the system must be allowed to stabilize, typically 10-15 minutes, before making any other adjustments.

The type of unit and options determine the ranges for liquid sub-cooling and evaporator superheat. Refer to Table 4 below when determining the proper sub-cooling.

The vertical rise of the liquid line must be known in order to adjust the sub-cooling range for proper charge.

**Checking Liquid Sub-Cooling**

Measure the temperature of the liquid line as it leaves the condenser coil.

Read the gauge pressure reading of the liquid line close to the point where the temperature was taken. You must use liquid line pressure as it will vary from discharge pressure due to condenser coil pressure drop.

Convert the pressure obtained to a saturated temperature using the appropriate refrigerant temperature-pressure chart or Table 5 below.

Subtract the measured liquid line temperature from the saturated temperature to determine the liquid sub-cooling.

Compare calculated sub-cooling to Table 4 below for the appropriate unit type and options.

**Checking Evaporator Superheat**

Measure the temperature of the suction line close to the compressor.

Read gauge pressure at the suction line close to the compressor.

Convert the pressure obtained to a saturated temperature using the appropriate refrigerant temperature-pressure chart or Table 5 below.

Subtract the saturated temperature from the measured suction line temperature to determine the evaporator superheat.

Compare calculated superheat to Table 4 below for the appropriate unit type and options.

<table>
<thead>
<tr>
<th>Air-Cooled Condenser / Air-Source Heat Pump</th>
<th>Sub-Cooling*</th>
<th>Sub-Cooling with Hot Gas Reheat*</th>
<th>Superheat**</th>
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</thead>
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<tr>
<td>Sub-Cooling</td>
<td>12-18°F</td>
<td>15-22°F</td>
<td>8-15°F</td>
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</table>

* Sub-Cooling must be increased by 2°F per 20 feet of vertical liquid line rise for R-410A

** Superheat will increase with long suction line runs.

**Adjusting Sub-Cooling and Superheat Temperatures**

The system is overcharged if the sub-cooling temperature is too high and the evaporator is fully loaded (low loads on the evaporator result in increased sub-cooling) and the evaporator superheat is within the temperature range as shown in Table 4 (high superheat results in increased sub-cooling).

Correct an overcharged system by reducing the amount of refrigerant in the system to lower the sub-cooling.
The system is undercharged if the superheat is too high and the sub-cooling is too low. Correct an undercharged system by adding refrigerant to the system to reduce superheat and raise sub-cooling.

If the sub-cooling is correct and the superheat is too high, the TXV may need adjustment to correct the superheat.

**CAUTION**

Refrigerant overcharging leads to excess refrigerant in the condenser coils resulting in elevated compressor discharge pressure.

**CAUTION**

Before completing startup and leaving the unit a complete operating cycle should be observed to verify that all components are functioning properly.
Table 5 - R-410A Refrigerant Temperature-Pressure Chart

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<tr>
<th>°F</th>
<th>PSIG</th>
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<td>72</td>
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<td>46</td>
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<td>73</td>
<td>210.3</td>
<td>100</td>
<td>316.4</td>
<td>127</td>
<td>457.3</td>
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<td></td>
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</table>
Operation

Unit operations should be controlled with thermostat, or unit controller, never at the main power supply, except for emergency, servicing, or complete shutdown of the unit.

Thermostat Operation

Heating
Thermostat system switch - "Heat"
Thermostat fan switch - "Auto" or "On"
Thermostat temperature set to desired point.

Cooling
Thermostat system switch - "Cool"
Thermostat fan switch - "Auto" or "On"
Thermostat temperature set to desired point.

Air Circulation
Thermostat system switch - "Off"
Thermostat fan switch - "Auto" or "On"
No change of the thermostat temperature.
With these settings, the air handler’s supply fan will run continuously but the supply air will not be heated, cooled, or dehumidified.

System Off
Thermostat system switch - "Off"
Thermostat fan switch - "Auto"
No change of the thermostat temperature.
With these settings, the system is shut down, with the exception of the control system power (24 VAC), and the crankcase heaters (about 60 watts/compressor).

Night and Weekend Unoccupied Operation
To reduce the operating time of the unit when the space is unoccupied, such as nights and weekends, it is recommended that the temperature setting be raised about 5°F while unoccupied during the cooling season and lowered about 10°F during the heating season.

Compressor Operation
The compressors must be off for a minimum of 5 minutes and on for a minimum of 5 minutes. Short cycling of the compressors can causes undue stress and wear.

WARNING

COMPRESSOR CYCLING

5 MINUTE MINIMUM OFF TIME
To prevent motor overheating compressors must cycle off for a minimum of 5 minutes.

5 MINUTE MINIMUM ON TIME
To maintain the proper oil level compressors must cycle on for a minimum of 5 minutes.

The cycle rate must not exceed 6 starts per hour.

Variable Capacity Compressor Controller
Units with variable capacity scroll compressors may include variable capacity compressor controller. The following is an explanation of the terminals and troubleshooting of the alert flash codes on the controller. For more information on the compressor controller, see Emerson Climate Bulletin AE8-1328.
The compressor controller modulates the compressor unloader solenoid in an on/off pattern according to the capacity demand signal of the system. The following table shows the linear relationship between the demand signal and compressor capacity modulation. The compressor controller also protects the compressor against high discharge temperature. Refer to Table 7 for the relationship between thermistor temperature readings and resistance values.

Table 6 - Demand Signal vs. Compressor Capacity Modulation

<table>
<thead>
<tr>
<th>Demand Signal (VDC)</th>
<th>Loaded %</th>
<th>Unloaded %</th>
<th>Time Loaded</th>
<th>Time Unloaded</th>
<th>% Compressor Capacity</th>
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<tr>
<td>1.00</td>
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<td>Off</td>
<td>Off</td>
<td>Off</td>
<td>0%</td>
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<td>1.44</td>
<td>10%</td>
<td>90%</td>
<td>1.5 sec</td>
<td>13.5 sec</td>
<td>10%</td>
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<tr>
<td>3.00</td>
<td>50%</td>
<td>50%</td>
<td>7.5 sec</td>
<td>7.5 sec</td>
<td>50%</td>
</tr>
<tr>
<td>4.20</td>
<td>80%</td>
<td>20%</td>
<td>12 sec</td>
<td>3 sec</td>
<td>80%</td>
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<tr>
<td>5.00</td>
<td>100%</td>
<td>0%</td>
<td>15 sec</td>
<td>0 sec</td>
<td>100%</td>
</tr>
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</table>
### LED Descriptions
- Green LED - 24VAC Power
- Yellow LED - Unloader Solenoid On
- Red LED - ALERT Flash Code
  - Flashing Green LED indicates anti-short cycle timer active
  - All LEDs flashing at same rate indicates 24VAC supply too low for operation
  - All LEDs solid at same time indicates controller failure
  - Reset ALERT code or lockout by removing 24VAC supply to module
  - All ALERTs close alarm relay contacts
  - All ALERTs deenergize contactor and solenoids except Code 6
  - Compressor always unloadS for 0.1 second at startup
  - Compressor only starts when Demand signal input is above 1.45 VDC and no ALERTs are present

### Troubleshooting ALERT Flash Codes
- **Code 1**: Reserved for future use
- **Code 2**: High Discharge Temperature
  - Discharge thermometer above trip set point or thermostat short circuited. Resets after 30 minutes and motor cools down.
  - If 5 events occur within 4 hours, the compressor is locked out.
- **Code 3**: Compressor Protector Trip
  - No compressor current is detected when compressor should be running. Resets when compressor current is detected.
- **Code 4**: Locked Rotor
  - Locked rotor condition is detected. Compressor is locked out.
- **Code 5**: Demand Signal Loss
  - Demand input signal is below 0.5VDC. Resets after demand input signal rises above 1.0VDC.
- **Code 6**: Discharge Thermistor Fault
  - Thermistor is not connected. Reset by reconnecting thermistor.
- **Code 7**: Reserved for future use
- **Code 8**: Compressor Contactor Fault
  - Compressor current is detected when compressor should be off. Resets when current is no longer detected.
- **Code 9**: Low 24VAC Supply
  - Supply voltage to module has dropped below 18.5VAC. Resets after voltage rises above 19.5VAC.

---

**Figure 5 - Compressor Controller Flash Code Details**

**Table 7 - Thermistor Temperature vs. Resistance Values**

<table>
<thead>
<tr>
<th>°C</th>
<th>°F</th>
<th>kΩ</th>
<th>°C</th>
<th>°F</th>
<th>kΩ</th>
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</table>
**Low Ambient Options**
Adjustable fan cycling is a low ambient head pressure control option that cycles the condenser fans to maintain refrigerant circuit head pressures at acceptable levels during cooling operation. The head pressure set point (100-470 psi) and pressure differential (35-200 psi) are field adjustable. Modulating fan pressure control is a low ambient head pressure control option that sends to an electronically commutated motor a variable signal in relation to the refrigerant circuit head pressure of the system. The motor either speeds up or slows down air flow accordingly in order to maintain constant head pressure. Both head pressure control options allow mechanical cooling with ambient temperatures down to 35°F.

The AAON 0°F low ambient system maintains normal head pressure during periods of low ambient by effectively reducing the heat transfer surface area, reducing capacity and increasing condensing pressure, allowing the system to operate properly. During periods with higher ambient temperatures the entire condenser is required to condense refrigerant.

**Maintenance**
(See back of the manual for maintenance log)

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**WARNING**
Improper installation, adjustment, alteration, service or maintenance can cause property damage, personal injury or loss of life. Startup and service must be performed by a Factory Trained Service Technician.

At least once each year, a qualified service technician should check out the unit. This includes reading and recording suction pressures and checking for normal subcooling and superheat.

Only Factory Trained Service Technicians experienced in both condensing units and air conditioning are permitted to service the CC Series units to keep warranties in effect.

**Coils**
The condenser coils should be inspected yearly to ensure unrestricted airflow. If the coils contain a large amount of airborne dust or other material, they should be cleaned. Care must be taken to prevent bending of the aluminum fins on the coils.

Before attempting to clean the coils; set thermostat to the "OFF" position; turn the electrical power to the unit to the "OFF" position at the disconnect switch. The condenser coil can be thoroughly cleaned by washing from the inside out with water and a coil cleaner. If coil is extremely dirty with clogged fins, a service professional specializing in coil cleaning should be called.

**E-Coated Coil Cleaning**
Documented routine cleaning of e-coated coils is required to maintain coating warranty coverage.

---

**WARNING**
Electric shock hazard. Shut off all electrical power to the unit to avoid shock hazard or injury from rotating parts.

Surface loaded fibers or dirt should be removed prior to water rinse to prevent restriction of airflow. If unable to back wash the side of the coil opposite of the coils entering air side, then surface loaded fibers or dirt should be removed with a vacuum...
cleaner. If a vacuum cleaner is not available, a **soft non-metallic** bristle brush may be used. In either case, the tool should be applied in the direction of the fins. Coil surfaces can be easily damaged (fin edges bent over) if the tool is applied across the fins.

Use of a water stream, such as a garden hose, against a surface loaded coil will drive the fibers and dirt into the coil. This will make cleaning efforts more difficult. Surface loaded fibers must be completely removed prior to using low velocity clean water rinse.

A **monthly** clean water rinse is recommended for coils that are applied in coastal or industrial environments to help to remove chlorides, dirt, and debris. It is very important when rinsing, that water temperature is less than 130°F and pressure is less than 900 psig to avoid damaging the fin edges. An elevated water temperature (not to exceed 130°F) will reduce surface tension, increasing the ability to remove chlorides and dirt.

**CAUTION**

Harsh chemicals, household bleach, or acid cleaners should not be used to clean outdoor or indoor e-coated coils. These cleaners can be very difficult to rinse out of the coil and can accelerate corrosion and attack the e-coating. If there is dirt below the surface of the coil, use the recommended coil cleaners.

For routine quarterly cleaning, first clean the coil with the below approved coil cleaner. After cleaning the coils with the approved cleaning agent, use the approved chloride remover to remove soluble salts and revitalize the unit.

**Recommended Coil Cleaner**
The following cleaning agent, assuming it is used in accordance with the manufacturer’s directions on the container for proper mixing and cleaning, has been approved for use on e-coated coils to remove mold, mildew, dust, soot, greasy residue, lint, and other particulate:

Enviro-Coil Concentrate, Part Number H-EC01.

**Recommended Chloride Remover**
CHLOR*RID DTS™ should be used to remove soluble salts from the e-coated coil, but the directions must be followed closely. This product is not intended for use as a degreaser. Any grease or oil film should first be removed with the approved cleaning agent.

Remove Barrier - Soluble salts adhere themselves to the substrate. For the effective
use of this product, the product must be able to come in contact with the salts. These salts may be beneath any soils, grease or dirt; therefore, these barriers must be removed prior to application of this product. As in all surface preparation, the best work yields the best results.

Apply CHLOR*RID DTS - Apply directly onto the substrate. Sufficient product must be applied uniformly across the substrate to thoroughly wet out surface, with no areas missed. This may be accomplished by use of a pump-up sprayer or conventional spray gun. The method does not matter, as long as the entire area to be cleaned is wetted. After the substrate has been thoroughly wetted, the salts will be soluble and is now only necessary to rinse them off.

Rinse - It is highly recommended that a hose be used, as a pressure washer will damage the fins. The water to be used for the rinse is recommended to be of potable quality, though a lesser quality of water may be used if a small amount of CHLOR*RID DTS is added. Check with CHLOR*RID International, Inc. for recommendations on lesser quality rinse water.

**DX Cooling**
Set unit controls to cooling mode of operation with supply fans on. Check compressor operation, rotation, amperage and voltage to the unit nameplate (check the amperage on the load side of the compressor contactor).

The scroll compressors are fully hermetic and require no maintenance except for keeping the shell clean.

Each refrigerant circuit includes a factory provided liquid line filter drier. The unit does not include a liquid line solenoid valve. This must be field furnished and installed if required by job conditions.

**Condenser Fan Motor Lubrication**
All original motors and bearings are furnished with factory lubrication. They require no lubrication.

**Replacement Parts**
Parts for AAON equipment may be obtained from AAON, Inc. at www.aaonparts.com. When ordering parts, reference the unit serial number and part number.

**AAON - Longview**
**Warranty, Service, and Parts Department**
203 Gum Springs Rd.
Longview, TX 75602
Ph: 903-236-4403
Fax: 903-247-9219
www.aaon.com

**Note:** Before calling, technician should have model and serial number of the unit available for the customer service department to help answer questions regarding the unit.
Refrigerant Piping Diagrams

Figure 6 - A/C Only Piping, AHU Above CU
Figure 7 - A/C Only Piping, AHU Below CU
Figure 8 - Modulating Hot Gas Reheat Piping, AHU Above CU
Figure 9 - Modulating Hot Gas Reheat Piping, AHU Below CU
Figure 10 - Hot Gas Bypass Piping, AHU Above CU
Figure 11 - Hot Gas Bypass Piping, AHU Below CU
Figure 12 - Modulating Hot Gas Reheat with Hot Gas Bypass Piping, AHU Above CU
Figure 13 - Modulating Hot Gas Reheat with Hot Gas Bypass Piping, AHU Below CU
Figure 14 - Heat Pump Piping, AHU Above CU
Figure 15 - Heat Pump Piping, AHU Below CU
Figure 16 - Heat Pump with Modulating Hot Gas Reheat Piping, AHU Above CU
Figure 17 - Heat Pump with Modulating Hot Gas Reheat, AHU Below CU
CC Series Startup Form

Date:______________
Job Name:_____________________________________________________________________
Address:______________________________________________________________________
Model Number:________________________________________________________________
Serial Number:__________________________________________  Tag:_______________
Startup Contractor:__________________________________________  Address:________________________
Phone:_____________

Pre Startup Checklist
Installing contractor should verify the following items.
1. Is there any visible shipping damage?  Yes ☐  No ☐
2. Is the unit level?  Yes ☐  No ☐
3. Are the unit clearances adequate for service and operation?  Yes ☐  No ☐
4. Do all access doors open freely and are the handles operational?  Yes ☐  No ☐
5. Have all shipping braces been removed?  Yes ☐  No ☐
6. Have all electrical connections been tested for tightness?  Yes ☐  No ☐
7. Does the electrical service correspond to the unit nameplate?  Yes ☐  No ☐
8. On 208/230V units, has transformer tap been checked?  Yes ☐  No ☐
9. Has overcurrent protection been installed to match the unit nameplate requirement?  Yes ☐  No ☐
10. Have all set screws on the fans been tightened?  Yes ☐  No ☐
11. Do all fans and pumps rotate freely?  Yes ☐  No ☐
12. Is all copper tubing isolated so that it does not rub?  Yes ☐  No ☐

Ambient Temperature
Ambient Dry Bulb Temperature ________°F  Ambient Wet Bulb Temperature ________°F

Compressors / DX Cooling

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<th>L2</th>
<th>L3</th>
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<th>Suction Pressure PSIG</th>
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<td>Line Temperature</td>
<td>Sub-cooling</td>
<td>Superheat</td>
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<tr>
<td><strong>Pressure</strong></td>
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<td>Discharge</td>
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<tr>
<td>Suction</td>
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<tr>
<td>Liquid</td>
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**Condenser Fans**

<table>
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<th>Alignment</th>
<th>Check Rotation</th>
<th>Nameplate Amps</th>
</tr>
</thead>
<tbody>
<tr>
<td>Number</td>
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</tr>
<tr>
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<td></td>
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**Condenser Pump**

<table>
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<th>Nameplate Amps</th>
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<tbody>
<tr>
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</tr>
<tr>
<td>1</td>
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<tr>
<td>2</td>
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</tbody>
</table>
**Maintenance Log**
This log must be kept with the unit. It is the responsibility of the owner and/or maintenance/service contractor to document any service, repair or adjustments. AAON Service and Warranty Departments are available to advise and provide phone help for proper operation and replacement parts. The responsibility for proper start-up, maintenance and servicing of the equipment falls to the owner and qualified licensed technician.

<table>
<thead>
<tr>
<th>Entry Date</th>
<th>Action Taken</th>
<th>Name/Tel.</th>
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</table>
**Literature Change History**

**March 2009**
Update of IOM revising the model numbers, manual format, and piping diagrams to show factory installed liquid line receiver tank.

**November 2009**
Update of IOM adding variable capacity scroll compressor information

**September 2010**
Update of IOM to include water cooled condenser options and updated model and feature options. Text size in piping diagrams was increased for readability.

**March 2012**
Update of piping diagrams P1, P3, P4, and P6 and addition of piping diagram P7. Added oil drip note below piping diagrams. Updated startup form.

**May 2012**
Updated table of contents.

**March 2013**
Update of the manual adding information about compressor cycling.

**May 2013**
Add variable capacity compressor section, updated piping diagrams to show internal receivers and modulating reheat valves, updated predetermined line sizing, updated features description, and updated design revision from B to C. New part number assigned.

**March 2014**
Updated predetermined line sizing chart and unit feature options.
It is the intent of AAON, Inc. to provide accurate and current specification information. However, in the interest of product improvement, AAON, Inc. reserves the right to change pricing, specifications, and/or design of its products without notice, obligation or liability.