ECU Installation & Operation Manual
Vertical Air Conditioners

Models ECUA90/120/150/180/240 & ECUDA180/240/300/360

ECUA120

Intertek

Manufactured By:

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The most current version of this manual can be found at www.acice.com.

ICE ECU90-240/ECUDA180-360 I&O Manual 09/2020 Rev.16
Part Number 02118

How To Use This Manual

This manual is intended to be a guide to Industrial Climate Engineering's line of vertical air conditioners. It contains installation, troubleshooting, maintenance, warranty, and application information. The information contained in this manual is to be used by the installer as a guide only. This manual does not supersede or circumvent any applicable national or local codes.

If you are installing the air conditioner first read Chapter 1 and scan the entire manual before beginning the installation as described in Chapter 2. Chapter 1 contains general, descriptive information and provides an overview which can speed up the installation process and simplify troubleshooting.

If a malfunction occurs, follow this troubleshooting sequence:

1. Make sure you understand how the air conditioner works (Chapters 1 & 3).
2. Identify and correct installation errors (Chapter 2).
3. Refer to the troubleshooting information in Chapter 4.

If you are still unable to correct the problem, contact the Factory at 1-229-273-9558 for additional assistance.

Please read the following "Important Safety Precautions" before beginning any work.

Important Safety Precautions

1. USE CARE when LIFTING or TRANSPORTING equipment.
2. TRANSPORT the UNIT UPRIGHT. Laying it down on its side may cause oil to leave the compressor and breakage or damage to other components.
3. TURN ELECTRICAL POWER OFF AT THE breaker or fuse box BEFORE installing or working on the equipment. LINE VOLTAGES ARE HAZARDOUS or LETHAL.
4. OBSERVE and COMPLY with ALL applicable PLUMBING, ELECTRICAL, and BUILDING CODES and ordinances.
5. SERVICE may be performed ONLY by QUALIFIED and EXPERIENCED PERSONS.
    * **Wear safety goggles when servicing the refrigeration circuit**
    * **Beware of hot surfaces on refrigerant circuit components**
    * **Beware of sharp edges on sheet metal components**
    * **Use care when recovering or adding refrigerant**
6. **Use COMMON SENSE - BE SAFETY-CONSCIOUS**

This is the safety alert symbol ⚠. When you see this symbol on the air conditioning unit and in the instruction manuals be alert to the potential for personal injury. Understand the signal word DANGER, WARNING and CAUTION. These words are used to identify levels of the seriousness of the hazard.

⚠ DANGER Failure to comply will result in death or severe personal injury and/or property damage.

⚠ WARNING Failure to comply could result in death or severe personal injury and/or property damage.

⚠ CAUTION Failure to comply could result in minor personal injury and/or property damage.

IMPORTANT Used to point out helpful info that will result in improved installation, reliability or operation.

⚠ WARNING

- **If the information in these instructions are not followed exactly, a fire may result causing property damage, personal injury or loss of life.**
- **Read all instructions carefully prior to beginning the installation. Do not begin installation if you do not understand any of the instructions.**
- **Improper installation, adjustment, alteration, service or maintenance can cause property damage, personal injury or loss of life.**
- **Installation and service must be performed by a qualified installer or service agency in accordance with these instructions and in compliance with all codes and requirements of authorities having jurisdiction.**

INSTALLER: Affix the instructions on the inside of the building adjacent to the thermostat.
END USER: Retain these instructions for future reference.

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Chapter 1 Description & Specifications

1.1 General Description

Industrial Climate Engineering's (ICE) Environmental Control Units (ECU) are a series of vertical wall-mounted air conditioning systems that provide heating, cooling, and ventilation for electronic equipment shelters, process control centers, E-Houses, and other applications with high internal heat gains. The series includes multiple sizes and nominal cooling capacities from 90,000 to 360,000 BTUH. Resistance heating elements are available in various wattages.

Industrial Climate Engineering ECU's feature an exclusive electronic control board.

The control board consolidates several electrical components, improves the air conditioner's reliability and has LED's to indicate operating status and fault conditions to assist the service technician. A complete description of functions of the control board is in Section 1.6

Other standard components include:

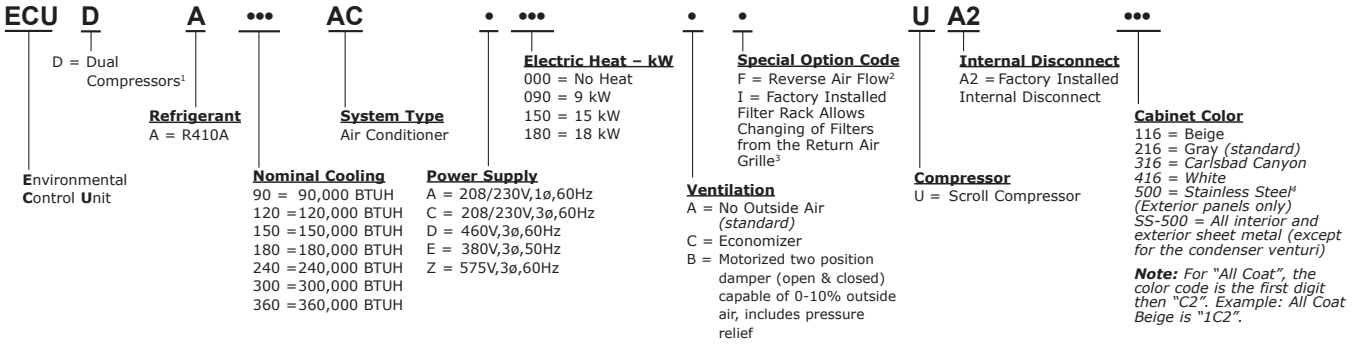
- Hot gas by-pass valve provides for closer temperature control in mechanical cooling and protects against coil freeze-updуring low load conditions.
- Thermal expansion valve to improve both efficiency and capacity over a wide range of ambient temperatures
- Phase monitor to prevent operation if the unit is not properly phased and high/low voltage

The ECU's are designed for easy installation and service. Major components are accessible for service beneath external panels.

All units have internal disconnects. Depending upon state and local code requirements, this feature may eliminate the need for an external breaker or disconnect.

1.2 Model Identification

The model identification number is found on the data sticker. Rating plate located on side panel.



Notes:
[1]The standard configuration on the ECUA90/120/150 is a single compressor. As an option, these units can be ordered with dual compressors. The ECUDA180-360 are only available with dual compressors.
[2]The standard configuration is with the supply (conditioned) air at the top of the unit and the return air below it. In the reverse air flow configuration, the return is at the top and the supply air below it.
[3]Filter access in the standard configuration is through the hinged, sheet metal panel on the exterior of the air conditioner. The "I" configuration allows access to the filter from inside the building through the return air grille.
[4]All Coat is not available with 500 Stainless Steel cabinet.

1.3 Serial Number Date Code

A = January	E = May	J = September	D = 2014	H = 2018	M = 2022
B = February	F = June	K = October	E = 2015	J = 2019	N = 2023
C = March	G = July	L = November	F = 2016	K = 2020	P = 2024
D = April	H = August	M = December	G = 2017	L = 2021	R = 2025

1.4 Weights and Filter Sizes

Complete electrical and performance specifications and dimensional drawings are in the Product Data Sheet.

Note: Follow local codes and standards when designing duct runs to deliver the required airflow. Minimize noise and excessive pressure drops caused by duct aspect ratio changes, bends, dampers and outlet grilles in duct runs.

Model Number	ECUA90	ECUA120	ECUA150	ECUDA180	ECUDA240	ECUDA300	ECUDA360
Cooling BTUH[1]	94,000	125,000	150,000	182,200	216,600	300,000	330,000
Rated Air Flow (CFM[2])	3,500	4,500	4,500	6,500	7,400	11,900	10,200
ESP[3] @ Rated Conditions	0.25	0.30	0.35	0.35	0.40	0.40	.50

[1]Cooling rated at 95°F (35°C) outdoor and 80°F DB/67° WB (26.5°C DB/19.5°C WB) return air
[2]CFM=Cubic Feet per Minute [3]ESP=External Static Pressure
Ratings are with no outside air. Performance will be affected by altitude.
Ratings are at 230 volts for 208/230 volt units ("C" models), 460 volts for "D" models, 380 volts for "E" models, 575 volts for "Z" models. Derate performance by 17% for ACE (380v. 3ø, 50 Hz) models
Operation of units at a different voltage from that of the rating point will affect performance and air flow.

Table 1. Cooling Performance and Air Flow Ratings

MODEL	Description	INCHES	MILLIMETERS	PART #	# OF FILTERS	MERV RATING
ECUA/ECUDA90/120/150	For Optional Fresh Air Hood	11" x 22" x 1	279 x 559 x 25	80119	2	N/A
ECUA/ECUDA90/120/150	Exterior Access Return Air Filter	25" x 16" x 2"	635 x 406 x 51	80137	3	8
ECUA/ECUDA90/120/150	Interior Access Return Air Filter	15" x 20" x 2"	381 x 508 x 51	92365	3	8
ECUA/ECUDA120/150 w/Economizer	Fresh Air Hood Pre-filters	26" x 12" x 1"	660 x 305 x 25	92526	2	N/A
ECUA/ECUDA120/150 Reverse Flow w/Economizer	Economizer Pre-filter	9.25" x 37" x .375"	235 x 940 x 10	92127	1	N/A
ECUDA180/240	Exterior Access Return Air Filter	25" x 16" x 2"	635 x 406 x 51	80137	4	8
ECUDA180/240	Interior Access Return Air Filter	24" x 18" x 2"	610 x 457 x 51	81257	4	8
ECUDA180/240 w/Economizer	Fresh Air Hood Pre-filters	26" x 12" x 1	660 x 305 x 25	92526	2	N/A
ECUDA180/240 Reverse Flow w/Economizer	Fresh Air Hood Pre-filters	16 x 32 x 1	406 x 813 x 25	93187	3	N/A
ECUDA300/360	Exterior Access Return Air Filter	30" x 30" x 2"	762 x 762 x 51	80156	4	8
ECUDA300/360	Interior Access Return Air Filter	24" x 18" x 2"	610 x 457 x 51	81257	4	8

Table 2. Filter Sizes/Part Numbers

MODEL	Unit Weight		Shipping Weight		Shipping Dimensions					
					Height		Width		Depth	
	LBS	KG	LBS	KG	Inches	MM	Inches	MM	Inches	MM
ECUA90	1,053	478.6	1,178	535.5	98	2,489	56	1,422	42	1,067
ECUA120	1,160	527.3	1,285	584.1	98	2,489	56	1,422	48	1,219
ECUA150	1,166	530	1,291	586.8	98	2,489	56	1,422	48	1,219
ECUDA180	2,307	1,046	2,420	1,098	98	2,489	76	1,930	51	1,295
ECUDA240	2,523	1,144	2,636	1,196	98	2,489	76	1,930	51	1,295
ECUDA300	2,625	1,193	2,750	1,250	108	2,743	72	1,829	72	1,829
ECUDA360	3,210	1,456	3,335	1,513	108	2,743	72	1,829	72	1,829

Table 3. Shipping Weights & Dimensions

1.5 General Operation

Hot Gas By-Pass

Normally used in specialty applications (i.e Magnetic Resonance Imaging (MRI) buildings) to prevent magnetic voltage disturbance caused by cycling. This technology is applied in this product to extend the operation envelope for the compressor to 20º F (-6.6ºC). Combined with a condenser low ambient Fan Cycle feature, compressor operation can be extended to 0º F (-17.8ºC). During Hot Gas operation mode, system performance will be reduced. If product operation is in mild outdoor ambient conditions, the installed shut-off ball valve may be closed, thus disabling the Hot Gas By-Pass feature.

Refrigerant Cycle (Cooling Mode)

The air conditioners use R-410A refrigerant in a conventional vapor-compression refrigeration cycle to transfer heat from air in an enclosed space to the outside. A motorized impeller assembly blows indoor

air across the evaporator. Cold liquid refrigerant passing through the evaporator is boiled into gas by heat removed from the air. The warmed refrigerant gas enters the compressor where its temperature and pressure are increased. The hot refrigerant gas condenses to liquid as heat is transferred to outdoor air drawn across the condenser by the condenser fan. Liquid refrigerant is metered with a thermal expansion valve (TXV) into the evaporator to repeat the cycle.

Economizer

The factory installed economizer saves energy and reduces the run time on the compressor and condenser fan motor by using outside air – when suitable – to cool the shelter.

Note: The economizer option is currently available on the 120,150, 180, 240,300 and 360.

On a signal from the wall mounted indoor thermostat that cooling is required, either mechanical cooling with the compressor or free cooling with the economizer is provided. A factory installed enthalpy controller determines whether the outside air is sufficiently cool and dry to be used for cooling. If suitable, the compressor is locked out and the economizer damper opens to bring in outside air through fresh air hoods located on each side of the air conditioner. The outside air is filtered with filters in each of the outside air hoods. Integral pressure relief allows the interior air to exit the shelter, permitting outside air to enter the shelter. The temperature at which the economizer opens is adjustable from 63°F (17°C) at 50% Relative Humidity to 73°F (23°C) at 50% Relative Humidity.

After the enthalpy control has activated and outside air is being brought into the building, the mixed air sensor measures the temperature of the air entering the indoor blower and then modulates the economizer damper to mix the right proportion of cool outside air with warm indoor air to maintain 50°-63°F (10° - 17°C) air being delivered to the building. This prevents shocking the electronic components with cold outside air.

The compressor is not permitted to operate when the economizer is functioning.

If the outside air becomes too hot or humid, the economizer damper closes completely, or to a field selectable minimum open position, and mechanical cooling is activated.

Fresh air hoods with prefilters are field installed on each side of the air conditioner.

ECUA (Single Compressor) Units: The cooling input terminal of the ECUA is terminal (1) of the low voltage terminal strip. When terminal (1) has 24vac applied the system operates in the cooling mode.

ECUDA (Dual Compressor) Units: The ECUDA is factory wired for maximum cooling utilizing both compressors. If 2 stage compressor operation is desired, the factory installed jumper between terminals 1 and 2 of the low voltage terminal strip must be removed. The 1st stage cooling input is terminal 1 of the low voltage terminal strip and the 2nd stage cooling input is terminal 2 of the low voltage terminal strip. The thermostat must be programmed for 2 stage cooling operation when 2 stage compressor operation is desired.

Heating Mode

A wall-mounted thermostat controls the heating cycle of models which incorporate resistance heating elements. On a call for heat, the thermostat closes the heat relay to energize the indoor fan and the resistance elements.

1.6 Electronic Control Board Mode of Operation

Normal

24 VAC power must be continuously applied to “R” and “C”. Upon a call for cooling “Y” and with the high pressure switch (HPS) closed, the compressor will be energized. (Note: See the delay on make feature.) The compressor will remain energized during the 3 minute timed low pressure by-pass cycle. If the low pressure switch (LPS) is open after the 3 minute by-pass cycle, the compressor will de-energize.

Lock-out

If either of the fault conditions (LPS or HPS) occurs twice during the same call for cooling, the control board will enter into and indicate the lockout mode. In the lockout mode, the compressor is turned off. If there is a call for indoor air flow "G", the blower remains energized, the alarm output is energized and the status LED will blink to indicate which fault has occurred. When the lockout condition is cleared, the unit will reset if the cooling demand from the thermostat is removed or when the power is reset. With the control board, the user can now have either normally closed or normally open remote alarm dry contacts. The air conditioners are factory wired to be normally open.

Delay on Break

If the compressor is de-energized due to a loss of a cooling "Y" call or the first fault, the unit re-start will be delayed 3 minutes from the time the contactor is de-energized. (Note: There is no delay on break if the lockout condition is reset.)

Delay on Make

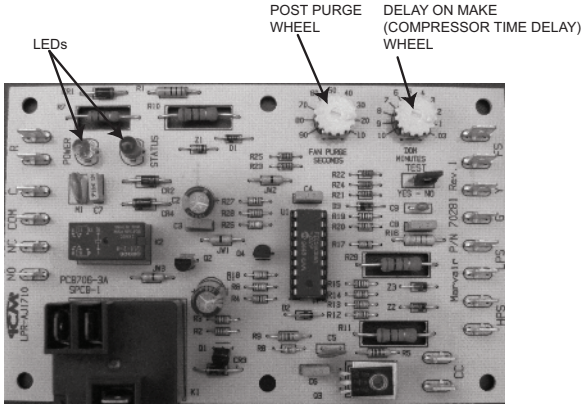
On initial power up or after a power failure, the air conditioner will wait 0.03 to 10 minutes from the cooling "Y" call before allowing the contactor to energize. The delay can be adjusted by the DOM wheel on the board. Factory recommended wait is 3 minutes.

Low Pressure By-Pass Time

When starting, the low pressure switch (LPS) fault condition will be by-passed for 3 minutes before the contactor is de-energized.

Post Purge

Upon a call for indoor airflow "G" the blower will energize immediately. When in the cooling mode, the blower will remain energized for 10 to 90 seconds (adjustable) after the compressor has been de-energized. The time period can be changed by fan purge wheel on the board. Factory setting is 90 seconds.



LED Indicator Lights

COLOR	TYPE	STATUS	DESCRIPTION
Green	Power	Contstant On	24 VAC power has been applied
Red	Status	Contstant On	Normal operation
Red	Status	1 Blink	High pressure switch has opened twice
Red	Status	2 Blinks	Low pressure switch has opened twice

High Pressure Switch

The high pressure switch is mounted on the liquid line. It is electrically connected to a lockout circuit on the board which shuts down the system if the refrigerant pressure rises to 650 PSIG. This protects the unit if airflow through the condenser is blocked or if the outdoor fan motor fails.

Although the contacts of the high pressure switch close when the refrigerant pressure falls to approximately 450 PSIG, the system must be manually reset once the lockout circuit is activated. A manual reset is necessary to prevent harmful short-cycling. To reset switch, turn primary power off, then back on or turn thermostat system switch off, then back on.

Low Pressure Switch

The low pressure switch is mounted on the compressor suction line. It is designed to open if the refrigerant pressure drops to 40 PSIG; it resets when the pressure rises to 60 PSIG. The switch protects the unit if airflow through the indoor blower is impeded, if the blower motor fails, or if there is a loss of refrigerant.

1.7 Optional Controls & Packages

Protective Coating Packages

Coated Coils: Either the condenser or evaporator coil can be coated. For harsh conditions, e.g., power plants, paper mills or sites were the unit will be exposed to salt water, the coils should be coated. ***Note:*** Cooling capacity may be reduced by up to 5% on units with coated coils.

Coastal Environmental Package: This package includes:

- Corrosion resistant fasteners,
- Sealed or partially sealed condenser fan motor,
- Coating applied to all exposed internal copper and metal in the in the condenser section, and
- A protective coating on the condenser coil.

All Coat Package: Includes the same features as the Coastal Environmental Package and adds a coating on the evaporator coil and on all exterior and interior components and sheet metal. (**Note:** the insulated internal sheet metal and the internal control box are not coated).

Dirty Filter Indicator

A diaphragm type of indicator measures the air pressure on either side of the filter and when the pressure drops below the set point, a red LED is illuminated. The set point is adjustable.

Cabinet Color and Material

ICE air conditioners are available in two cabinet colors -the standard gray and beige. The standard cabinet's sides, top and front panels are constructed of 16 gauge painted steel. Contact your sales representative for color chips, custom colors and 316 stainless steel cabinets.

Fresh Air Damper

Allows introduction of outside air into the building to provide positive pressurization. Field installed on either the left or right hand side of the unit. See Appendix A for installation instructions.

Model Number	Fresh Air Damper Part #	Fresh Air Damper Filter Part #	Fresh Air Damper Filter Size In (mm)
ECUA/ECUDA90/120/150	K/04657-xxx	80119	11" x 22" x 1" (279 x 559 x 25)
ECUDA180/240/300/360	K/04757-xxx	92127	91/4" x 37" x 3/8" (235 x 940 x 10)
xxx designates the color. 200 = Grey (standard). 100 = Beige. 500 = Stainless Steel			

Crankcase Heater

Crankcase Heater Recommended for use for units installed in cold climates.

Dual Compressors With Lead/Lag Operation

Freeze Sensor On Indoor Coil

Prevents frost on the indoor coil caused by a loss of air flow or restrictive duct work.

Filter Access From Return Air Grille

Factory or field installed filter bracket allows changing and access to the filters from the return air grille. See model ID, special option code "I".

Reverse Air Flow Configuration

Location of Supply and Return Air Openings are reversed.

1.8 Electrical Operation

The compressor and condenser fan are energized with a contactor controlled by a 24 VAC pilot signal.

Some compressors incorporate an internal PTC crankcase heater that functions as long as primary power is available. The heater drives liquid refrigerant from the crankcase and prevents loss of lubrication caused by oil dilution. Power must be applied to the unit for 24 hours before starting the compressor.

The condenser (outside fan) motor is energized by the same contactor.

The indoor evaporator fan motor is controlled by the fan purge on the electronic control board.

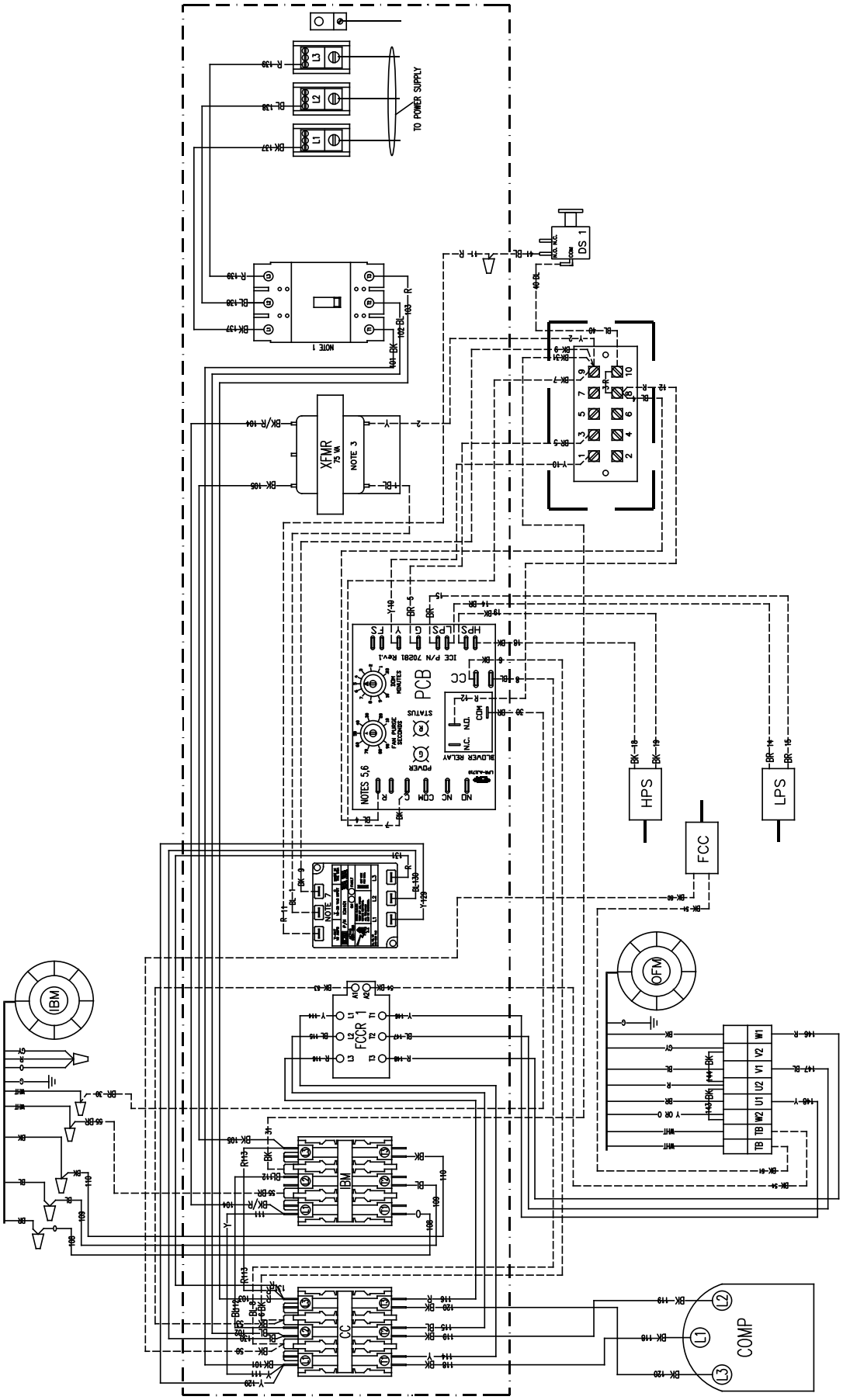


Figure 1a. Typical Electrical Schematic for Single Compressor Units

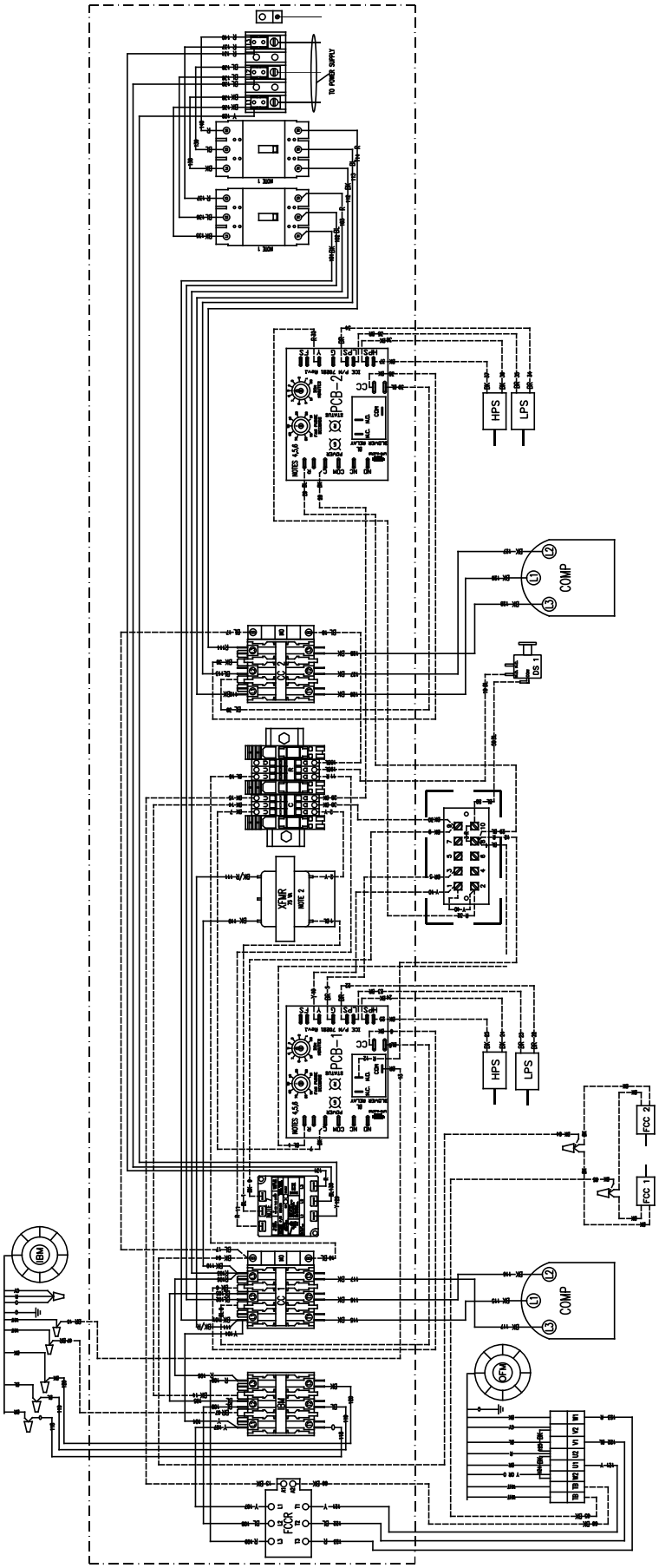


Figure 1b. Typical Electrical Schematic for Dual Compressor Units

Chapter 2 Installation

⚠ WARNING

Failure to observe and follow Warnings and Cautions and these Instructions could result in death, bodily injury or property damage. Read this manual and follow its instructions and adhere to all Cautions and Warnings in the manual and on the ICE unit.

2.1 Equipment Inspection

Concealed Damage

Inspect all cartons and packages upon receipt for damage in transit Remove cartons and check for concealed damage. **Important: keep the unit upright at all times.** Remove access panels and examine component parts. Inspect refrigerant circuit for fractures or breaks. The presence of refrigerant oil usually indicates a rupture. If damage is apparent, immediately file a claim with the freight carrier.

Units that have been turned on their sides or tops may have concealed damage to compressor motor mounts or to the oil system. If the unit is not upright, immediately file a claim for concealed damages and follow these steps:

1. Set unit upright and allow to stand for 24 hours with primary power turned on.
2. Attempt to start the compressor after 24 hours.
3. If the compressor will not start, makes excessive noise, or will not pump, return the unit to the freight carrier.

2.2 Installation Requirements

General

1. Inspect unit for completeness. Check for missing parts (e.g. hardware). Refer to the installation kit information in section 2.3.
2. Remove access panels and check for loose wires. Tighten screw connections.
3. Complete and mail the warranty registration card.

You must consider all of the following when choosing the installation site:

1. **Noise.** Install the unit so that the least amount of noise will be transmitted to inhabited spaces.
2. **Condensate Drainage**. Condensate produced during operation must be discharged to a suitable drain.
3. **Placement.**
   A) Place the unit in a shaded area, if possible.
   B) Install it above ground for protection against flooding.
   C) The unit exhausts air. Be sure that the airflow is not impeded by shrubbery or other obstructions.
   D) When installing multiple units, please note the recommended clearances noted in Table 4.

⚠ CAUTION

ECUA/ECUDA180, 240, 300 & 360 units require additional support. The mounting flanges alone are not adequate.

4. **Airflow Requirements:**

This is maximum external static pressures for duct design. Duct pressure drop not to exceed these values.

Maximum Static Pressures	ECUA90	ECUA120-180	ECUDA240	ECUDA300	ECUDA360
IWG	1.0	1.6	1.4	1.6	0.8
Pa	248	398	348	398	149

Keep duct lengths as short as possible. Do not obstruct airflow through the unit.

Duct work should be designed and installed in accordance with *all* applicable safety codes and standards. Industrial Climate Engineering strongly recommends referring to the current edition of the National Fire Protection Association Standards 90A and 90B *before* designing and installing duct work. The duct system must be engineered to insure sufficient air flow through the unit to prevent over-heating of the heater element. This includes proper supply duct sizing, sufficient quantity of supply registers, and adequate return and filter areas. Duct work must be of correct material and must be properly insulated. Duct work must be constructed of galvanized steel with a minimum thickness of .019 inches. Duct work must be firmly attached, secured, and sealed to prevent air leakage. See section 2.4 for additional duct work requirements.

5. **Clearances:**

Note the minimum clearances required for proper operation and service. There must be no obstruction 24" from the sides of the unit, or 120"from the front of the unit.

MODEL	MIN. CLEARANCE AROUND SIDES (SINGLE UNIT)	MIN. CLEARANCE BETWEEN UNITS (TWO UNITS)	MIN. SPACE ABOVE UNIT	MIN. SPACE BEHIND UNIT
All ECUA and ECUDA Models	24 inches (61 cm)	24 inches (61 cm)	24 inches (61 cm)	120 inches (305 cm)

Table 4. Minimum Clearances

6. **Codes:**

Make sure your installation conforms to all applicable electrical, plumbing, building, and municipal codes. Some codes may limit installation to single story structures.

7. **Electrical Supply:**

The power supply must have the appropriate voltage, phase, and ampacity for the model selected. Voltage must be maintained above minimum and below maximum specified values listed below. Refer to the data sticker on the unit for ampacity requirements.

Note: Operation near the Minimum or Maximum limits at extended periods voids the waranty. Power supply should be at nominal Voltage.

Electrical Rating Designations*	A	C	D	Z
Nominal Voltage	208/230	208/230	460	575
Phase	1	3	3	3
Minimum Voltage	197	197	414	518
Maximum Voltage	253	253	506	632

* Letters refer to model number code designations. Refer to page 5.

Table 5. Voltage Limitations

2.3 Installation Materials

The ECU is shipped with a top bracket and lifting brackets. The top bracket provides a method of sealing the top of the unit from water intrusion. The bracket is shipped attached to the top of the unit. Before installing the ECU, remove the bracket and reattach as described in Section 2.5

The Lifting brackets are shipped attached to the back panel of the ECU. These brackets provide a method for lifting the ECU. The installation of the brackets is described in Section 2.6.

Kit Components:

Accessories:

The package may include other factory-supplied items (optional):

P/N	Description
70705	CommStat 6 2/4 HVAC Controller, Solid State Lead/Lag Controller
S/12087-04	CommStat 6 4/8 HVAC Controller, Solid State Lead/Lag Controller
S/12087-06	CommStat 6 6/12 HVAC Controller, Solid State Lead/Lag Controller
S/07846	CommStat 4 HVAC Controller, Solid State Lead/Lag Controller
S/04581	CommStat 3 HVAC Controller, Solid State Lead/Lag Controller
50123	Digital thermostat. 1 stage heat, 1 stage cool. 7 day programmable. Fan switch: Auto & On. Auto-change over. Keypad lockout. Non-volatile program memory.
93189	Double Deflection Aluminum Supply Grille for the ECUA90/120/150 42½ x 15¼ (1,080mm x 387mm)
93188	Aluminum Return Filter Grille for the ECUA90/120/150 42½ x 21½ (1,080mm x 546mm)
93190	Double Deflection Aluminum Supply Grille for the ECUDA180/240/300/360 54½ x 15½ (1,384mm x 394mm)
93191	Aluminum Return Filter Grille for the ECUDA180/240 54½ x 21½ (1,384mm x 546mm)
93192	Aluminum Return Filter Grille for the ECUDA300/360 54½" x 37½" (1,384mm x 953mm)

Additional Items Needed:

Additional hardware and miscellaneous supplies (not furnished by ICE®) are needed for installation.

The list below has the items typically needed for mounting a unit on a wood frame wall structure. Concrete or fiberglass structures have different requirements. ICE cannot recommend a specific method of attaching the air conditioner to the building due to the wide variety of building types, code requirements, wall construction and specific installation conditions. The installation of the air conditioner to the building must take in to account all of these factors and follow best industry practices to provide a safe and secure attachment to the building.

- Mounting bolts for unit mounting flanges. The length needed is typically the wall thickness plus one inch (25 mm).
- Washers
- Hex nuts
- Silicone Sealer to seal around cracks and openings
- Minimum 5 conductor low voltage multicolored wire cable (i.e. thermostat wire)
- Appropriate electrical supplies such as conduit, electrical boxes, fittings, wire connectors, etc.
- High voltage wire, sized to handle the MCA (minimum circuit ampacity) listed on the data plate.
- Over-Current Protection Device sized in accordance with the MFS (maximum fuse size) listed on the unit data plate.

⚠ WARNING FIRE HAZARD

Improper adjustment, alteration, service, maintenance or installation could cause serious injury, death and/or property damage.

Installation or repairs made by unqualified persons could result in hazards to you and others. Installation MUST conform with local codes or, in the absence of local codes, with codes of all governmental authorities have jurisdiction.

The information contained in this manual is intended for use by a qualified service agency that is experienced in such work, is familiar with all precautions and safety procedures required in such work, and is equipped with the proper tools and test instruments.

2.4 Porting and Duct Work

General Information

Note: The following instructions are for general guidance only. Due to the wide variety of installation possibilities, specific instructions will not be given. When in doubt, follow standard and accepted installation practices, or contact ICE™ for additional assistance.

Wall Openings

Measure the dimensions of the supply and return ports on the unit.

Cut the openings in the exterior wall for the supply and return. **IMPORTANT: All units with electric heat must have 1" (25.4mm) clearance on all four sides of the supply outlet duct flange on the unit. The 1" (25.4mm) clearance must extend on all sides of the supply duct for the first 3 feet (1 meter) from the unit.**

IMPORTANT: ICE™ requires a minimum of 1" (25.4mm) from the surface of any supply ducts to combustible material for the first 3 feet (1 meter) of the duct.

Ducting

Extensions should be cut flush with the inside wall for applications without duct work.

Applications using duct work should be designed and installed in accordance with *all* applicable safety codes and standards. ICE strongly recommends referring to the current edition of the National Fire Protection Association Standards 90A and 90B *before* designing and installing duct work. The duct system must be engineered to insure sufficient air flow through the unit to prevent over-heating of the heater element. This includes proper supply duct sizing, sufficient quantity of supply registers, adequate return and filter area. Ductwork must be of correct material and must be properly insulated. Duct work must be constructed of galvanized steel with a minimum thickness of .019 inches for the first 3 feet (1 meter). Ductwork must be firmly attached, secured and sealed to prevent air leakage. Do not use duct liner on inside of supply duct within 4 feet (122cm) of the unit.

Galvanized metal duct extensions should be used to simplify connections to duct work and grilles. Use fabric boots to prevent the transmission of vibration through the duct system. The fabric must be U.L. rated to a minimum of 197°F (92°C).

Minimum Airflow Requirements

The duct system must be engineered to assure sufficient air flow through the unit even under adverse conditions such as dirty filters, etc.

2.5 Top Flange Installation *(See Figure 2)*

1. All models have built-in side mounting flanges.
2. Attach the top flange to the top of the air conditioner. The holes in the top of the air condtioner have been predrilled. Remove the 4 screws in these holes and use these screws to attach the top flange to the air conditioner.
3. Apply a bead of silicone sealer on the wall side of the bottom support brackets on the unit. Circle the mounting holes with the silicone bead.

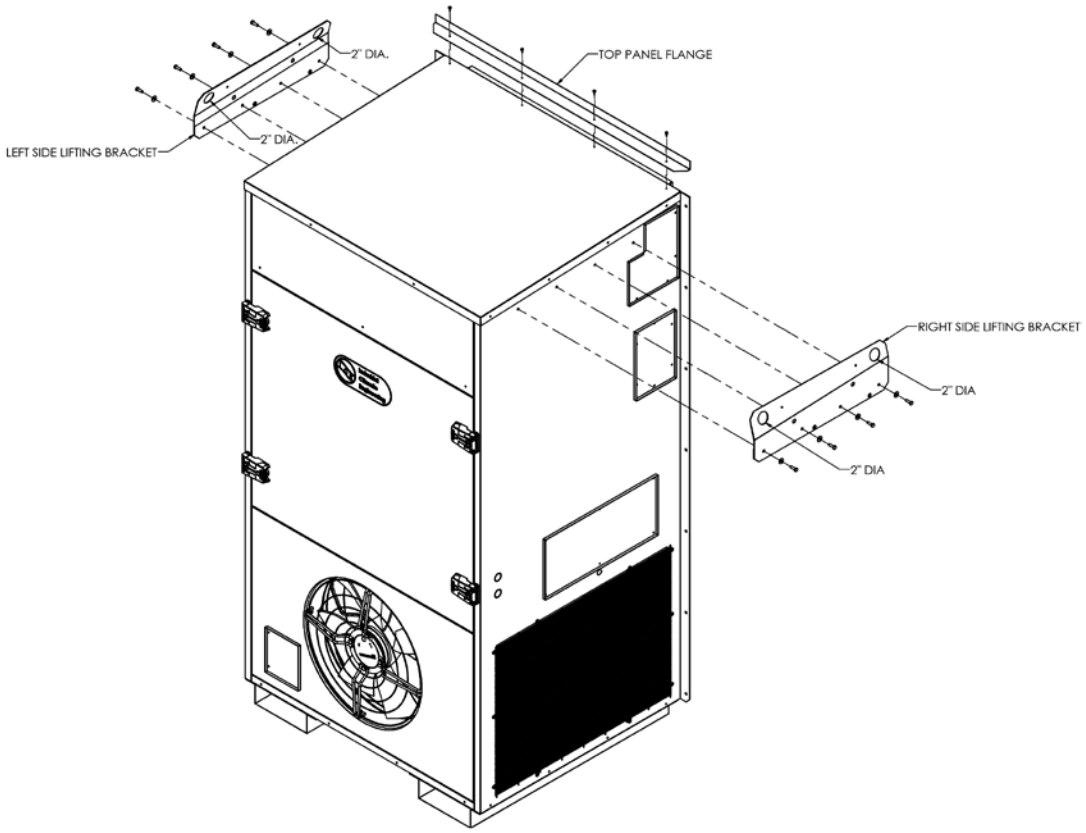


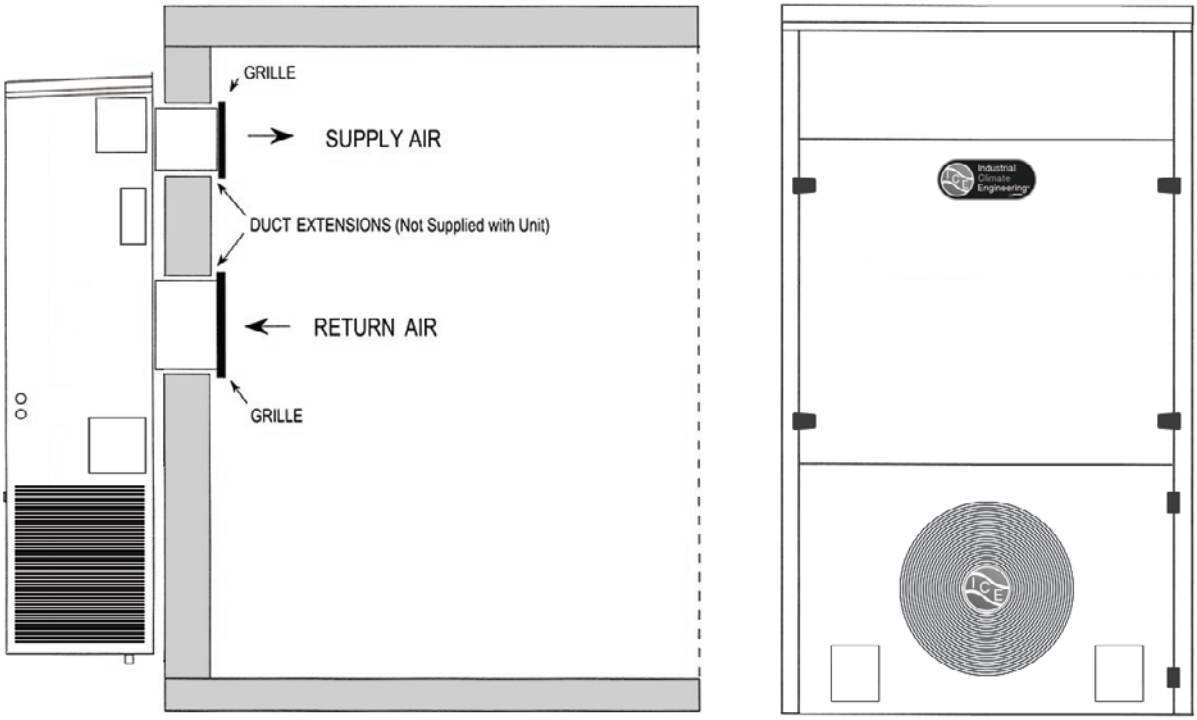
Figure 2. Top Flange and Lifting Bracket Installation (Typical)

2.6 Installing the Optional Lifting Brackets

Lifting brackets are available which can be installed on the top of the side panels. These brackets allow the unit to be picked up using lifting eyes in the brackets. Attach the brackets to the left and right side panels as shown in Figure 3. The ICE units are shipped with the 4 screws for attaching the brackets installed in the holes at the top of the side panels. When attaching the brackets, remove and reinstall the screws and make sure the top of the bracket is angled towards the center of the unit.

2.7 Mounting The Unit

1. For wiring into the back of unit, locate the lower of the two knockouts on the wall side of the unit. Drill a one inch hole in the shelter wall to match this opening. Allow sufficient clearance to run 3/4" conduit through the hole and to the unit.
2. Lift the unit into position using an appropriate and safe lifting device.
3. Make sure that the duct flanges are properly aligned with the wall opening. Adjust as necessary.
4. Note the holes in each side flange. Using the holes for guides, drill holes through the wall with a drill bit. Insert the bolts through the flanges. Install nuts and washers on the inside of the shelter. Tighten the bolts to secure the unit.
5. Apply a bead of silicone where the side and top flanges contact the exterior wall.
6. On the inside of the shelter, install the wall sleeves in the supply and return air openings. The sleeves may be trimmed to fit flush with the inside wall.
7. Check the fit of each sleeve to its mating flange for possible air leaks. Apply silicone sealer to close any gaps. Install the air return and supply grilles.



For units with electric heat, a one inch clearance is required around the duct extensions. The duct extensions must be constructed of galvanized steel with a minimum thickness of .019" as per the NFPA standards 90A & 90B.

Figure 3. Air Conditioner Wall Mount Detail

2.8 Electrical Connections

⚠ WARNING ELECTRICAL SHOCK HAZARD

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

Turn off electrical power at fuse box or service panel BEFORE making any electrical connections and ensure a proper ground connection is made before connecting line voltage.

Important

All electrical work must meet the requirements of local codes and ordinances. Work should be done **only** by qualified persons.

The units may incorporate an internal crankcase heater for compressor protection. **The crankcase heater must be energized for at least 24 hours prior to starting the compressor.**

Scroll compressors, like several other types of compressors, will only compress in one rotational direction. The direction of rotation is not an issue with single-phase compressors since they will always start and run in the proper direction. However, three phase compressors will rotate in either direction depending upon phasing of power. Since there is a 50-50 chance of connecting power in such a way as to cause rotation in the reverse direction, it is imperative to confirm that the compressor is rotating in the proper direction at the initial field start-up of the system. Verification of proper rotation is made by observing that the suction pressure drops and the discharge pressure rises when the compressor is energized. An

alternate method of verification for self contained system with small critical refrigerant charges, where the installation of gauges may be objectionable, can be made by monitoring the temperature of the refrigerant lines at the compressor. The temperature should rise on the discharge line while the suction line temperature decreases. Reverse rotation also results in a substantially reduced current draw when compared to tabulated values.

There is no negative impact on durability caused by operating three phase compressors in the reversed direction for a short duration of time, usually defined as less than one hour. However, after several minutes of operation the compressor's internal protector will trip. The compressor will then cycle on the protector until the phasing is corrected. Reverse operation for longer than one hour may have a negative impact on the bearings.

To change the rotation, turn off power to the unit and reverse L1 & L2 at the disconnect in the air conditioner.

The middle front panel provides access to the electrical/control box and to the filters. This panel has hinges on the left and right hand side. This panel should ONLY be opened by using the two hinges on the left side **OR** the two hinges on the right side. **NEVER OPEN ALL FOUR HINGES SIMULTANEOUSLY**.

If all four hinges are opened simultaneously, the front panel will drop and may cause serious injury and damage the panel.

⚠ DANGER

NEVER open all four hinges simultaneously. The panel should ONLY be opened by using the two hinges on the left side OR the two hinges on the right side.

High Voltage Wiring

The power supply should have the proper voltage, phase, and ampacity for the selected model.

1. Refer to the electrical data on the data sticker on the unit for field wiring requirements of the unit. Size the incoming power supply lines and the fuse(s) or HACR breaker(s) according to requirements described in the National Electric Code. Run the power conductors through the knockouts on the side or back of the unit. Use appropriate conduit and strain reliefs.

⚠ CAUTION

Note: Power supply service must be within allowable range (+10% - 5%) of rated voltage stamped on the unit rating plate. To operate nominal 230/208V unit at 208V, change the transformer line tap from 240V to 208V following the instruction on wiring label in unit.

2. Connect the wires to the input side of the internal breaker or terminal block L1, L2, & L3 for three-phase models.
3. Install the ground wire on the ground lug.
4. For units designed for operation on 208/230V, 60Hz power supply, the transformer is factory wired for a 230V power supply. For a 208V power supply, remove the orange lead from the transformer and connect the red lead. Insulate the orange lead.

⚠ CAUTION

The external breaker(s) that provide power to the air conditioner must be sized per the maximum Fuse Size (MFS) shown on the Unit's data label.

Dual Unit Phasing

For applications where one controller operates two units, e.g., the CommStat 4.

1. Wire each unit as described in steps 1 through 4 above.

2. Test for proper phasing as follows:
   A. Power up the units.
   B. Using an AC volt meter set to the 300 volt scale, measure voltage between terminal L1 on the compressor contactor of unit #1 and terminal L1 on the compressor contactor of unit #2 If voltage is present, units are wired out of phase and must be rewired.
   C. If units are not in phase, turn off power and reverse the field power leads connected to the internal circuit breaker on one of the units only.
   D. Restore power and retest the phase (step B). When the voltage reads "0", the units are in phase.
   E. Turn off power and proceed.

Low Voltage Wiring

IMPORTANT. The following instructions are generic wiring instructions and may not be applicable for air conditioners with various options. Always refer to the wiring diagram in the air conditioner for the proper method to wire your unit.

1. On single units, pull the low voltage wiring (e.g., 18 gauge 4-conductor Class 2 thermostat wire) from the air conditioners into the thermostat / subbase assembly. See Figure 4a for connections to various thermostats.
2. Mount the thermostat on the wall of the shelter. The thermostat should be located so that the supply air from the unit does NOT blow directly on to the thermostat. Connect the thermostat to the terminal block in the air conditioner as shown in Figure 6a.
3. On dual units, refer to either the ICE CommStat 3 or CommStat 4 *Controller Specification sheet.* Wire the two air conditioners to the Lead/Lag Controller, according to the wiring diagram on the specification sheet.

Remote Signalling: Terminals 5 & 7(N.O.) and 6 & 7 (N.C.) on the air conditioners terminal board are dry contacts which can be used for remote signalling in the event of a/c cutoff on low or high pressure limit.

Continuous fan operation: For continuous indoor fan operation on single units, install a jumper between terminals 8 and 3.

CommStat 6 Lead /Lag HVAC Controller

The CommStat 6 HVAC controller is designed for controlling up to six redundant air conditioners in an E-House or telecommunication shelter and is available in three configurations.

CommStat 6 2/4 - Controls up to two single or 2-Stage air conditioners (4 Stages max.) Marvair Part Number: . 70705

CommStat 6 4/8 - Controls up to four single or 2-Stage air conditioners (8 Stages max.) Marvair Part Number:S/12087-04

CommStat 6 6/12 - Controls up to six single or 2-Stage air conditioners (12 Stages max.) Marvair Part Number:S/12087-06

In addition to the control of the air conditioners, the CommStat 6 controller has multiple configurable outputs for remote alarms or notification. The CommStat 6 controller is factory programmed with standard industry set points, but can be configured on site. Settings are retained indefinitely in the event of a power loss.

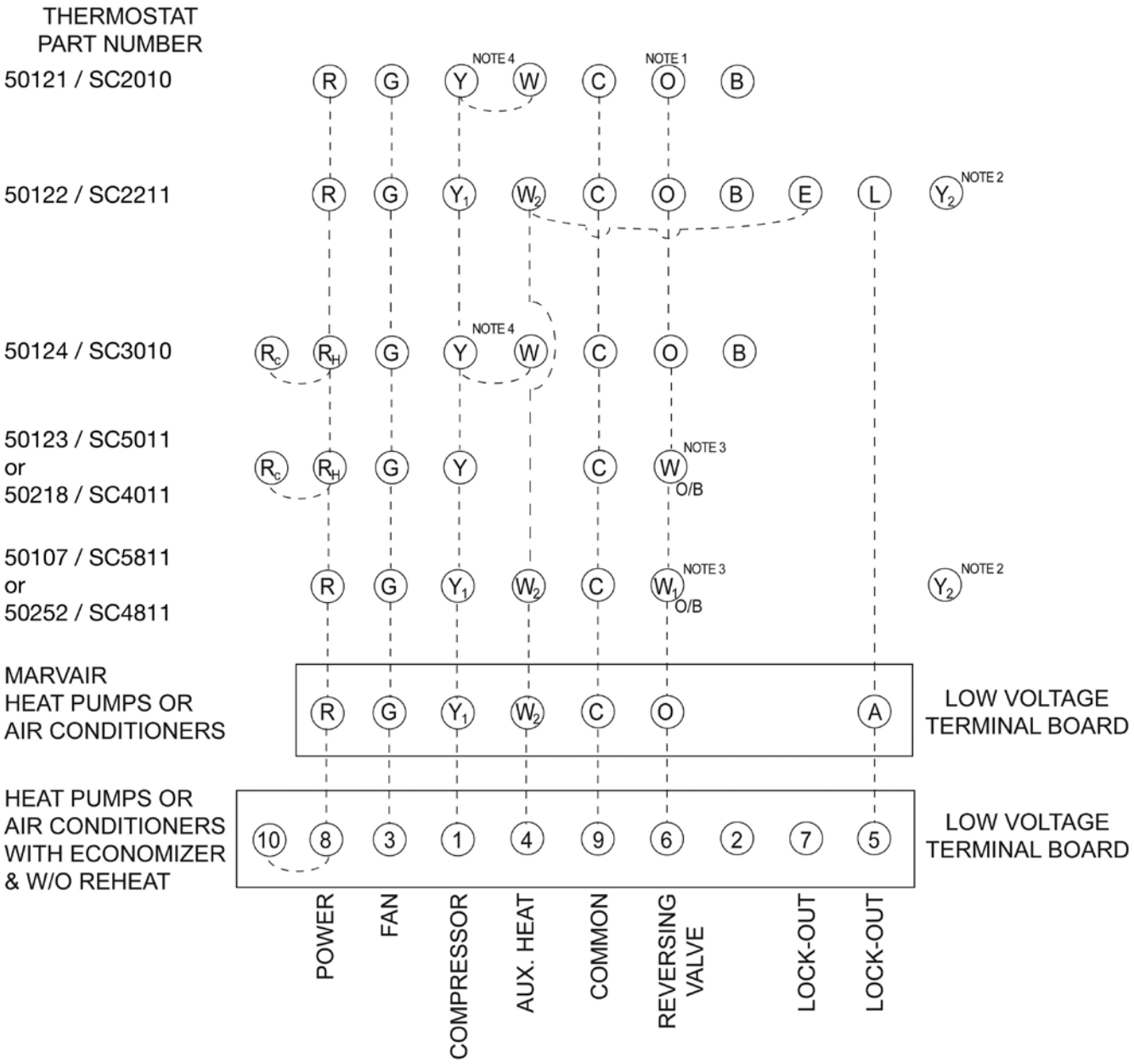
CommStat 4 Lead /Lag HVAC Controller

Please refer to the Product Data sheet for the CommStat 4 controller for complete instructions on installing and programming this controller.

CommStat Touch Lead/Lag HVAC Controller (See Figure 4b)

The CommStat Touch telecom controller with a touch screen interface is designed to allow remote control and monitoring of ICE air conditioners with single or 2-stage compressors in a shelter or enclosure and is certified by ETL for HVAC UL60950-1 and FCC47CFR compliance. In addition to the control of HVAC equipment, CommStat Touch includes the RemoteLink IPv4/IPv6 communication module to provide status information, alarm notifications, set point adjustment, and remote HVAC configuration. See the CommStat Touch PDS for more details.

MARVAIR®/SIMPLE COMFORT THERMOSTAT CONNECTION DIAGRAM
for Marvair Heat Pumps and Air Conditioners (without hot gas reheat or electric reheat)



NOTES:
1. Reversing valve on heat pumps only.
2. For units with 2-stage compressors, connect lead from the compressor monitor and diagnostic module, e.g., Copeland's Comfort Alert, to Y_2
3. For air conditioners with strip heat, connect W/O/B to terminal W or 4.
4. Jumper for heat pump only, omit with air conditioners.

A. Terminals 5 & 7 are normally open dry contacts and close to indicate lockout.
B. Terminals 6 & 7 are normally closed dry contacts and open to indicate lockout.
C. If the thermostat has RC & RH terminals, install a jumper wire between RC & RH.
D. IMPORTANT. The instructions are generic wiring instructions and may not be applicable for air conditioners with various options. Always refer to the wiring diagram in the air conditioner for the proper method to wire your unit.

Figure 4. Thermostat Connection Diagram

Chapter 3 Start-Up

3.1 Check-Out of Cooling Cycle

Important: Be sure that the crankcase heater (if used) has been energized for at least 24 hours before starting the unit(s). Double-check all electrical connections before applying power. All air conditioners with scroll compressors running on 3Ø power must be checked for proper rotation during the initial start-up. Please refer to Section 2.8 for determining if the 3Ø compressors are rotating correctly. Incorrect rotation can damage the compressor and is not covered by the warranty

Procedure:

1. Set the cooling set point temperature on the wall thermostat to a point *higher* than the ambient temperature. Set the heating set point temperature to a temperature that is *lower* than the ambient.
2. Set the thermostat system switch in the AUTO position. Nothing should operate at this time.
3. Set the time delay in the control box to three minutes. See Section 1.6.
4. Slowly lower the thermostat's cooling set point temperature until the switch closes. The indoor fan should operate.

   Once the indoor fan turns on, allow approximately three minutes for the compressor to start.
5. To stop cooling, slowly raise the thermostat cooling set point to a temperature higher than the ambient.

If the unit fails to operate, refer to the troubleshooting information in Chapter 4.

Follow the same procedure for additional units.

NOTE: The fan purge allows the indoor fan to run for approximately 90 seconds after the compressor is off. This operation provides a small improvement in system rated efficiency.

3.2 Check-Out of Heating Cycle

Procedure: (Applies only to units with resistance elements)

1. Raise the heating set point temperature to a setting which is higher than the ambient temperature. The fan and electric heat should immediately cycle on.
2. Move the system switch to the "OFF" position. All functions should stop.

Chapter 4 Troubleshooting

4.1 Overview

The middle front panel provides access to the electrical/control box and to the filters. This panel has hinges on the left and right hand side. This panel should ONLY be opened by using the two hinges on the left side **OR** the two hinges on the right side. **NEVER OPEN ALL FOUR HINGES SIMULTANEOUSLY**.

If all four hinges are opened simultaneously, the front panel will drop and may cause serious injury and damage the panel.

⚠ DANGER

NEVER open all four hinges simultaneously. The panel should ONLY be opened by using the two hinges on the left side OR the two hinges on the right side.

A comprehensive understanding of the operation of the air conditioner is a prerequisite to troubleshooting. Please read the Chapter 1 for basic information about the unit.

Our air conditioners are thoroughly tested before they are shipped from the factory. Of course, it is possible that a defect may escape undetected, or damage may have occurred during transportation. However, the great majority of problems result from installation errors.

If you experience difficulties with the unit, please review the installation steps in Chapter 2.

Much time can be saved by taking a thoughtful and orderly approach to troubleshooting. Start with a visual check - are there loose wires, crimped tubing, missing parts, etc? Begin deeper analysis only after making this initial inspection.

The troubleshooting information in this manual is basic. The troubleshooting section contains problem/solution charts for general problems, followed by a compressor section.

Not every problem can be anticipated. If you discover a problem that is not covered in this manual, we would be very grateful if you would bring it to the attention of our service department for incorporation in future revisions.

As always, please exercise caution and good judgement when servicing the air conditioner. Use only safe and proven service techniques. Use refrigeration goggles when servicing the refrigeration circuit.

⚠ WARNING

The refrigerant circuit has hot surfaces, and the electrical voltages inside of the unit may be hazardous or lethal. SERVICE MAY BE PERFORMED ONLY BY QUALIFIED AND EXPERIENCED PERSONS.

4.2 Failure Symptoms Guide

PROBLEM/SYMPTOM	LIKELY CAUSE(S)	CORRECTION
A. Unit does not run. **NOTE**: An internal anti-short-cycle timer will prevent the unit from starting for .2 to 8 minutes following start-up.	1. Power supply problem.	1. Check power supply for adequate phase and voltage. Check wiring to unit and external breakers or fuses.
	2. Tripped internal disconnect.	2. Check internal circuit protection devices for continuity.
	3. Shut off by external thermostat or thermostat is defective.	3. Check operation of wall-mounted thermostat.
	4. Unit off on high or low pressure limit.	4. Reset pressure switch.
	5. Internal component or connection failure.	5. Check for loose wiring. Check components for failure.

PROBLEM/SYMPTOM	LIKELY CAUSE(S)	CORRECTION
B. Unit runs for long periods or continuously; cooling is insufficient.	1. Dirty filter or reduced airflow	1. Check air filter(s). Check blower operation. Remove airflow restriction.
	2. Low refrigerant.	2. Check for proper charge and possible refrigerant leak.
	3. Component failure.	3. Check internal components, especially compressor for proper operation.
	4. Unit undersized for job.	4. Add additional units for greater capacity.
C. Unit cycles on high/low pressure limit.	1. Loss or restriction of airflow.	1. Check blower assembly for proper operation. Look for airflow restrictions, e.g.. the air filter. Check blower motor and condenser fan.
	2. Restriction in refrigerant circuit.	2. Check for blockage or restriction, especially filter drier and capillary tube assembly.
	3. Refrigerant overcharge (following field service)	3. Evacuate and recharge to factory specifications.
	4. Defective pressure control.	4. Check limit cutout pressures. Control is set to actuate at approximately 60 PSIG (low pressure) and 650 PSIG (high pressure).
D. Unit blows fuses or trips circuit breaker.	1. Inadequate circuit ampacity.	1. Note electrical requirements in Chapter 2 and correct as necessary.
	2. Short, loose, or improper connection in field wiring.	2. Check field wiring for errors.
	3. Internal short circuit. Loose or improper connection(s) in unit.	3. Check wiring in unit. See wiring and schematic diagrams. Test components (especially the compressor) for shorts.
	4. Excessively high or low supply voltage or phase loss (3ø only).	4. Note voltage range limitations specific to the compressor troubleshooting section.
E. Water on floor near unit.	1. Obstruction in condensate line.	1. Check for clog or restriction.
	2. Obstruction or leak in condensate pan.	2. Check pan for leak or blockage.
	3. Unit is not level.	3. Level unit.
F. No space heating or reduced heating (units equipped with resistance elements)	1. Defective heating element(s).	1. Check resistance element(s) for continuity.
	2. Thermal limit open.	2. Check continuity across thermal limit switch.
	3. Defective heater contactor.	3. Check relay for proper operation. Replace if defective.

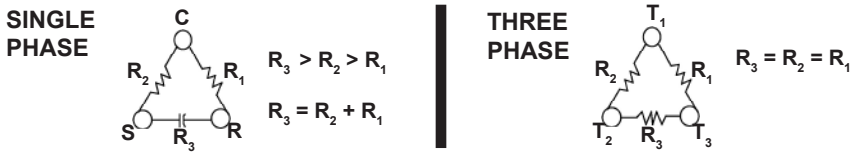
4.3 Compressor Troubleshooting

NOTE: It is important to rule out other component failures before condemning the compressor.

The following electrical tests will aid diagnosis:

1. **Start-Up Voltage**: Measure the voltage at the compressor contactor during start-up. The voltage must exceed the minimum shown in Table 5, section 2.2, or compressor failure is likely. A low voltage condition must be corrected.
2. **Running Amperage**: Connect a clip-on type ammeter to the (common) lead to the compressor. Turn on the supply voltage and energize the unit. The compressor will initially draw high amperage; it should soon drop to the RLA value or less. If the amperage stays high, check the motor winding resistances.

   NOTE: Feel the top of the compressor to see if it has overheated. If it is hot, the internal overload may be open. You may have to wait several hours for it to reset.
3. **Motor Winding Resistances:** Using a digital volt-ohm meter (VOM), measure the resistance across the compressor windings as shown below.



   Resistance can be measured as shown above. Any deviation from above values could indicate a defective compressor.
4. **High Voltage/Insulation Test:** Test internal leakage with a megohmeter. Attach one lead to the compressor case on a bare metal tube and to each compressor terminal to test the motor windings. A short circuit at high voltages indicates a motor defect. Do not do this test under vacuum.
5. On single phase models, check the capacitor by substitution.

4.4 Control Board Diagnosis

The control board (see section 1.6 for a complete description of the control board) has a red diagnostic LED which indicates the lockout fault. The control board will enter into and indicate lockout if either of the fault conditions (LPS or HPS) occur twice.

The compressor contactor must be closed before the first fault condition can be recognized by the control board. The contactor will be closed 3 minutes after the unit is energized and only if cooling is required. The first fault condition will open the contactor and shutdown the unit. The contactor on the unit that has the fault condition must be closed before the second fault condition can be recognized by the control board. The compressor contactor on the unit with the fault condition will close after 3 minutes if the unit is still calling for cooling and if the fault condition no longer exists. If you get a second fault condition, the contactor will open and shutdown the unit. The “red” led will have one blink if the high pressure switch has opened twice and will have two blinks if the low pressure switch has opened twice. The unit must be in the cooling mode (compressor contactor Closed) before a fault condition can occur.

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If all four hinges are opened simultaneously, the front panel will drop and may cause serious injury and damage the panel.

⚠ DANGER

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5.1 Scheduled Maintenance

Industrial Climate Engineering strongly recommends that the air conditioner be serviced a minimum of twice a year – once prior to the heating season and once prior to the cooling season. At this time the filters, evaporator coil, condenser coil, the cabinet, and condensate drains should be serviced as described below. Also at this time, the air conditioner should be operated in the cooling and heating cycles as described in Chapter 3, Start-Up. In addition to this seasonal check-out, the air conditioner should be maintained as follows:

Air Filter

Replace the air filter whenever it is visibly dirty. Never operate the unit without the filter in place. Depending upon the configuration of your unit, access to the filter can be either from the outside through the hinged door or from the return grille on the inside of the building.

Evaporator

If the evaporator becomes clogged or dirty, it may be cleaned by careful vacuuming or with a commercial evaporator cleaning spray. DO NOT use a solvent containing bleach, acetone, or flammable substances. Turn off power before cleaning. Be careful not to wet any of the electrical components. Be sure the unit has dried before restarting.

Condenser

Periodically inspect the outdoor condenser coil and the cabinet air reliefs for dirt or obstructions. Remove foreign objects such as leaves, paper, etc.

If the condenser coil is dirty, it may be washed off with a commercial solvent intended for this purpose. TURN OFF POWER BEFORE CLEANING! Be sure that all electrical components are thoroughly dry before restoring power. Use a fin comb of the correct spacing to straighten mashed or bent fins.

Cabinet

The cabinet may be cleaned with a sponge and warm, soapy water or a mild detergent. Do not use bleach, abrasive chemicals or harmful solvents.

Drains

The condensate is drained from the condensate pan through two drains – one on the left side of the pan and the other on the right side. The condensate lines drain to the outside at the bottom of the unit through the base pan. Each of the drain lines is looped to form a trap.

Regularly check each drain line to make sure it is not obstructed. If a commercial drain solvent is used, flush out the drain pan and system with sufficient water to remove the solvent. Some solvents can cause the drain pan to corrode.

Lubrication

The condenser fan motor(s) and the evaporator blower motor(s) never require oiling.

Chapter 6 Warranty

6.1 Airxcel Commercial/Industrial Group Limited Product Warranty

Airxcel Commercial/Industrial Group (ACIG) warrants its products to be free from defects in materials and workmanship under normal use to the original purchaser when installed within the contiguous United States, the District of Columbia, and Canada for the period of time in the table below. For units installed in Alaska and Hawaii, flat labor rates apply. If any part of your ACIG product fails within 15 months from the date of the original shipment, or within twelve months from the date of original start-up, whichever comes first, ACIG will furnish without charge, EXW Cordele, Georgia, the required replacement part. The owner must provide proof of the date of the original start-up. The contractor's invoice, the certificate of occupancy, or similar documents are examples of acceptable proof of the date of the original start-up.

Marvair, ICE, Eubank	Suburban Applied Products
90 Days DOA* w/Flat Rate Labor	1 Year Parts/Labor – Flat Rate
1 Year Parts	5 Years Heat Exchanger
5 Years Compressor	5 Years Compressor

*If any part of your ACIG unit fails within 90 days of the commencement of the warranty, ACIG will furnish without charge, EX Works, Cordele, Georgia, the required replacement part and pay for the labor to replace the part in accordance with the ACIG Flat Rate Labor Guidelines.

The following extra cost warranties are available from Airxcel Commercial Group:

Bronze	Silver	Gold	Diamond
Any Special Warranty Written for a Job	1 Year Parts/Labor	2 Years Parts/Labor	5 Years Parts/Labor

The responsibility of the equipment owner includes:

1. To operate the equipment in accordance with the manufacturer's instructions.
2. To provide easy accessibility for servicing.
3. To check and reset any circuit breaker(s) and/or disconnect(s) prior to calling for service.
4. To keep the unit clean and free of dirt and containment and replace filters as required.
5. To keep the outdoor coil clean and free of leaves, paper, or other debris.
6. To pay the charges incurred when any of the above have not been done.
7. To pay for repair or replacement of any material or part other than those within the ACIG unit or controller.

ACIG will not be responsible for labor, transportation costs, delays or failures to complete repairs caused by events beyond our control. This warranty does not cover:

1. Any transportation, related service labor, diagnosis calls, filter, driers, refrigerant, or any other material charges.
2. Damages caused by shipping, accident, abuse, negligence, misuse, fire, flood, or Acts of God.
3. Damages caused by operating or staging the unit in a corrosive environment
4. Damages caused by improper application of the product.
5. Damages caused by failing to perform proper routine maintenance.
6. Expenses incurred for erecting, disconnecting or dismantling the product or installing the replacement part(s).
7. Products not installed or operated according to the included instructions, local codes, and good trade practices.
8. Products moved from the original installation site.
9. Products lost or stolen
10. Consequential damages or incidental expenses including losses to persons, property or business.
11. Modifications to original unit after it leaves the factory, such as breaking the any part of the sealed systems.

When service is required, it must be performed during normal working hours (8:00 AM - 5:00 PM) Monday - Friday and must be performed by ACIG personnel or a designated Service Representative. ACIG will pay for non-priority shipping costs of the compressor during the first twelve months of the warranty period. After the first twelve months of the warranty period, all costs of shipment and risk of loss during the shipment of the compressor shall be the responsibility of the owner.

The owner of the product may ship the allegedly defective or malfunctioning product or part to ACIG, at such owner's expense, and ACIG will diagnose the defect and, if the defect is covered under this warranty, ACIG will honor its warranty and furnish the required replacement part. All costs for shipment and risk of loss during shipment of the product to ACIG and back to the owner shall be the responsibility and liability of the owner. Upon written request by an owner, ACIG may arrange for remote diagnosis of the allegedly defective or malfunctioning product or part but all costs for transportation, lodging and related expenses with regard to such diagnostic services shall be the responsibility and liability of the owner.

An owner requesting performance under this Warranty shall provide reasonable access to the allegedly defective or malfunctioning product or part to ACIG and its authorized agents and employees.

THIS WARRANTY CONSTITUTES THE EXCLUSIVE REMEDY OF ANY PURCHASER OF AN AIRXCEL COMMERCIAL GROUP HEAT PUMP OR AIR CONDITIONER AND IS IN LIEU OF ALL OTHER WARRANTIES, EXPRESSED OR IMPLIED, INCLUDING, WITHOUT LIMITATION, ANY IMPLIED WARRANTY OF MERCHANTABILITY OR FITNESS FOR USE, TO THE FULLEST EXTENT PERMITTED BY LAW. IN NO EVENT SHALL ANY IMPLIED WARRANTY OF MERCHANTABILITY OR FITNESS FOR USE EXCEED THE TERMS OF THE APPLICABLE WARRANTY STATED ABOVE AND AIRXCEL COMMERCIAL GROUP SHALL HAVE NO OTHER OBLIGATION OR LIABILITY. IN NO EVENT SHALL MARVAIR BE LIABLE FOR INCIDENTAL OR CONSEQUENTIAL DAMAGES OR MONETARY DAMAGES.

THIS WARRANTY GIVES YOU SPECIFIC LEGAL RIGHTS, AND YOU MAY ALSO HAVE OTHER RIGHTS WHICH VARY FROM STATE-TO-STATE. Some states do not allow limitations or exclusions, so the above limitations and exclusions may not apply to you.

10/2017 Rev.6

Chapter 7 Start-Up Check List

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If all four hinges are opened simultaneously, the front panel will drop and may cause serious injury and damage the panel.

⚠ DANGER

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7.1 Start-Up & Commissioning Form

Please complete the information on this form and return to Marvair by mail or fax. The mailing address and fax number can be found at the end of the form.

A. Equipment Information

Date: _____ Equipment Owner _____

Installing Company: _____ Installer: _____

Address: _____ State _____

City: _____

ICE Air conditioner: Model No. _____

Serial No. _____

Compressor: Model No. _____

Serial No. _____

Compressor: Model No. _____

Serial No. _____

B. Pre-Start Up

Is there any shipping damage? ❒Yes ❒No

If so, where? _____

Will this damage prevent starting the unit? ❒Yes ❒No

Check Power Supply, does it agree with data sticker on air conditioner? ❒Yes ❒No

Has the ground wire been connected? ❒Yes ❒No

Has the circuit protection been sized and installed properly? ❒Yes ❒No

Controls

Are the thermostat control wiring connections made and checked? ❒Yes ❒No

Are all wiring terminals (including main power supply) tight? ❒Yes ❒No

If unit has a crankcase heater, has it been energized for 24 hours? ❒Yes ❒No

On a 208/230 v. units is control transformer (24 AC) wired for correct voltage? ❒Yes ❒No

Condensate Section

Has water been placed in drain pan to confirm proper drainage? ❒Yes ❒No

Are correct filters in place? ❒Yes ❒No

Refrigerant Piping

If leaks are found, report any leaks to ICE Warranty Service Dept.

C. Check Rated Voltage at Terminal Block for Imbalance before starting of Unit.

❒208/230V 1 Phase ❒208/230V 3 Phase ❒460V 3 Phase

❒380V 3 Phase 50Hz. ❒575 3 Phase 60 Hz.

Measured Line to Line Volts L1&L2_____V. L1&L3 _____V. L2&L3_____V.

(L1&L2 + L1&L3 + L2&L3)/3 = Avg. Voltage = _____

Max. Deviation from avg. voltage = _____volts

Voltage imbalance = (100 x Max. Deviation)/avg. Voltage = _____%

A voltage deviation greater than 2% with the unit running should be addressed and corrected. Excess voltage deviation can cause the compressor to overheat and to operate inefficiently.

Example: Maximum Deviation from Average Voltage X 100 (for Percent)
Average voltage

Measured Voltages:

L1 & L2 = 241 Volts
L1 & L3 = 243 Volts = 717 / 3 = 239 Average Voltage
L2 & L3 = 233 Volts

239 - 233 = 6
100 x 6/239 =2.5% Voltage Unbalance

Three phase units only check fan & compressor rotation.

D. Heating Mode Check & Record Readings

	Circuit 1	Circuit 2 *(if applicable)*
Room Temperature	_____	_____
Outside Temperature	_____	_____
Evap. Entering Air DB Temp	_____	_____
Evap. Entering Air WB Temp	_____	_____
Evap. Leaving Air DB Temp	_____	_____
Evap. Leaving Air WB Temp	_____	_____
Heater Contactor Amps (L1)	_____	_____
Heater Contactor Amps (L2)	_____	_____
Heater Contactor Amps (L3)	_____	_____

E. Cooling Mode Check & Record Refrigerant Pressures

Recheck voltage imbalance in cooling mode:

Measured Line to Line Volts L1&L2_____V. L1&L3 _____V. L2&L3_____V.

(L1&L2 + L1&L3 + L2&L3)/3 = Avg. Voltage = _____

Max. Deviation from avg. voltage = _____volts

Voltage imbalance = (100 x Max. Deviation)/avg. Voltage = _____%

After 10 minutes of compressor operation, record the following:

	Circuit 1	Circuit 2 *(if applicable)*
Room Temperature	_____	_____
Outside Temperature	_____	_____
Suction Pressure	_____	_____
Suction Line Temperature	_____	_____
Discharge Pressure	_____	_____
Discharge Line Temperature	_____	_____
Entering Condenser Air	_____	_____
Leaving Condenser Air	_____	_____
Evap. Entering Air DB Temp	_____	_____
Evap. Entering Air WB Temp	_____	_____
Evap. Leaving Air DB Temp	_____	_____
Evap. Leaving Air WB Temp	_____	_____
Compressor Amps (L1)	_____	_____
Compressor Amps (L2)	_____	_____
Compressor Amps (L3)	_____	_____

Notes:

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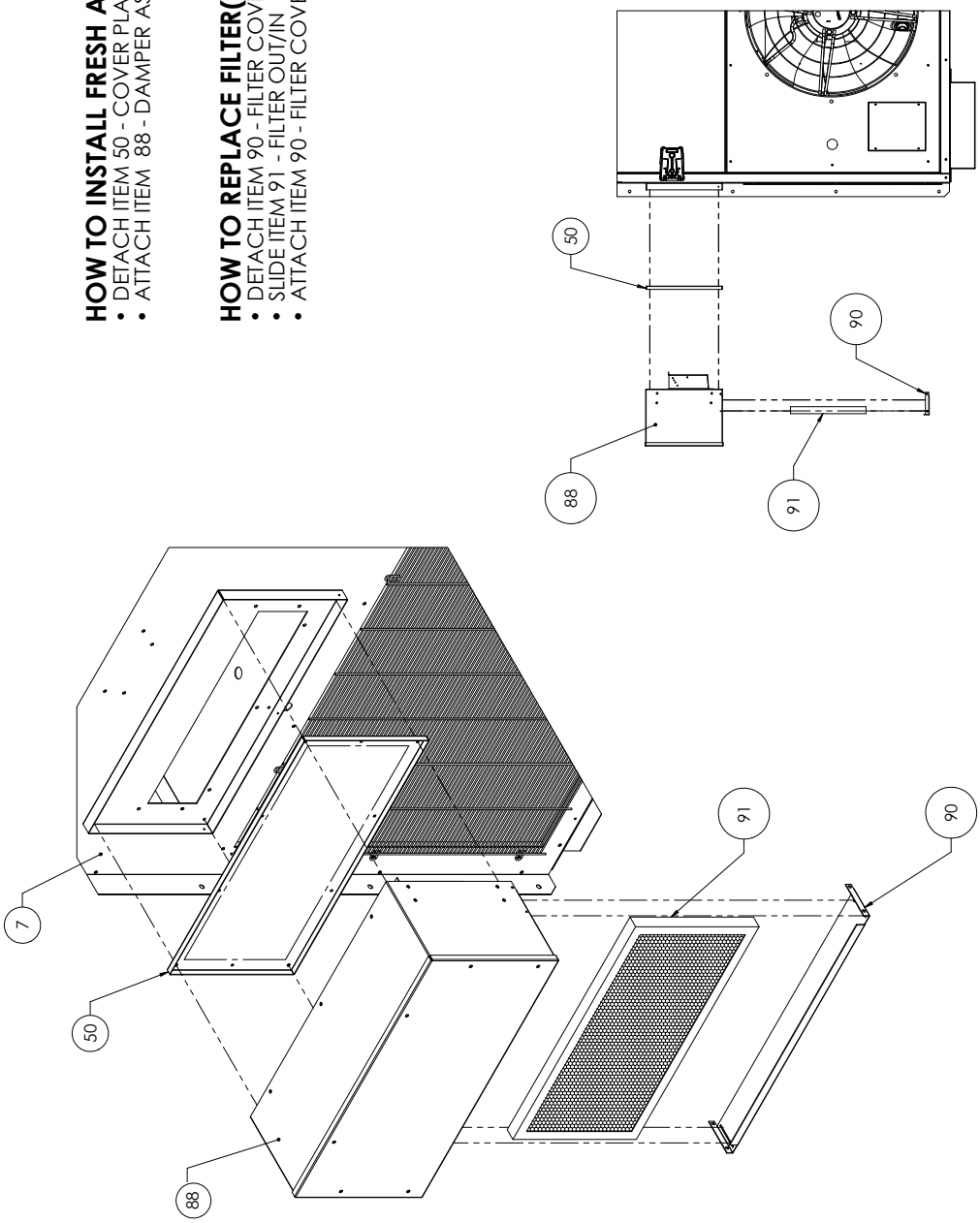
Appendix A Fresh Air Damper Installation

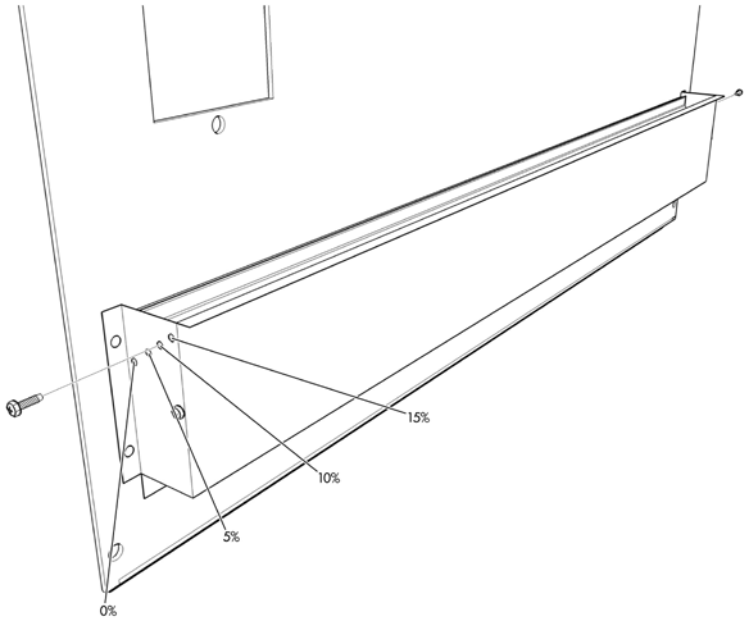
HOW TO INSTALL FRESH AIR DAMPER ASSY(88):
- DETACH ITEM 50 - COVER PLATE FROM ITEM 7 - MAIN UNIT AND DISCARD
- ATTACH ITEM 88 - DAMPER ASSY TO ITEM 7 - MAIN UNIT

HOW TO REPLACE FILTER(91):
- DETACH ITEM 90 - FILTER COVER FROM ITEM 88 -DAMPER ASSY
- SLIDE ITEM 91 - FILTER OUT/IN
- ATTACH ITEM 90 - FILTER COVER TO ITEM 88 - DAMPER ASSY



Fresh Air Hood Adjustment (non-economozer air conditioners only)

The fresh air hood is located on the inside, behind the slots on the bottom front panel. To access the hood, remove the screws that hold the front panel. The air flow can be adjusted from no (0%) fresh air to approximately 15% of rated air flow of fresh air, in 5% increments. The hood is shipped from the factory in the closed position (no fresh air). To provide fresh air, remove the two screws on either side of the hood and reposition as desired.



Fresh Air Hood Damper