



Mini-Might Operating and Maintenance Instructions

Cooling Operation Wall Mounted Thermostat

A wall-mounted thermostat controls the cooling set point. Upon a call for cooling, compressor contact and evaporator fan relay contacts close. This will energize compressor and evaporator fan and condenser fan when applicable. As temperature falls below the room set point, the compressor contacts and evaporator fan contacts will open de-energizing the system.

Unit Mounted Thermostat

A unit-mounted thermostat controls the set point. Upon a call cooling, compressor contact relay closes. This will energize compressor and condenser fan when applicable. As the temperature falls below the room set point the compressor contacts will open.

Fan Operation

Wall Mounted Thermostat

The evaporator fan will operate in either auto or continuous mode, which is controlled by the thermostat sub-base. In the auto on position, the evaporator fan will run continuously.

Unit Mounted Thermostat

On units with unit mounted thermostats, the evaporator fan relay is kept energized by factory installed jumper between terminals R & G.

Humidification

When the humidity drops below the set point on the wall mounted humidistat; the auxiliary fan relay is on if it was off. At the same time, the water solenoid is energized, supplying water to the evaporator pad. When the humidity set point is reached the auxiliary relay and solenoid valve are de-energized.

INSTALLATION INSTRUCTIONS TO THE INSTALLER

A.) Hanging the unit.

B.)

- 1) Remove ceiling tile where unit is to be located and remove any adjacent tiles that would be helpful in handling the unit while positioning it in the ceiling.
- 2) Secure suitable type material (such as slotted angle) in place. The material should be capable of supporting the weight of the unit. Now attach all thread rods (3/8" field supplied) to angle. The rods should have double nuts. See diagram #1 for spacing of rods to ensure they will line up with hanger when unit is raised into the ceiling.
- 3) Next drill holes for hanger positioning screws. Hangers' positions are marked on the sides of the units. Do not mount hangers to the unit at this time. Note: if it is possible to remove one of the 4' T bar section from the ceiling, then the hangers can be mounted prior to lifting unit into ceiling.
- 4) Now raise unit into the ceiling. The use of a high jack is recommended, once unit is above the ceiling attach mounting brackets to unit and then attach all thread rods to hangers. Once all thread rods are attached to hangers raise unit several inches above the ceiling to allow placement of the grille into the ceiling grid. After grille is in place lower unit just far enough for the frame to form an airtight seal with the foam backing on the grille. The unit is now ready for electrical wiring or water piping.

B) Installing Remote Condenser Fan

- 1) The remote condenser fan can be mounted using a hanger strap or with hangers provided with the fan and short pieces of angle(field supplied)
- 2) Prior to hanging the condenser fan section mount the 2x4 junction box to the top of the unit. Attach wiring harness and connect fan motor wires to the wiring harness supplied.
- 3) It is **STRONGLY** recommended that a field supplied flexible duct connector be used when attaching condenser section to the evaporator sections.

C) Electrical

All field wiring should be done by a qualified electrician and should meet all local codes. Knockouts for the unit power, control wiring, and condenser fan are located in the top of the unit directly above the control section. A wiring harness for the remote condenser fan is supplied with the unit. The end of the harness with the stacons is attached to the control section of the unit. Connect the stacons to spade terminal on the main contact on the load side.

D) Condensate

A 3/4" mpt fitting is supplied on each side of the unit. Cap the fitting that will not be used.

E) Water Regulation valve (Water Cooled units only)

Water regulation valves are factory adjusted to maintain an approximate head pressure of 260 lbs psig. If adjustment becomes necessary remove the access panel on the condenser side and adjust accordingly.

F) Humidifier

The evaporative type humidifier pad is factory installed. Connection of water line and humidifier water valve is made on control panel side of unit. Humidifier should be connected to 140 degrees F water supply to insure effective operation.

G) Zone Valve (Chilled Water Units)

A 2 or 3 way water valve is provided with the chilled water unit. This valve is factory installed and is serviceable through access door adjacent to the control panel. The valve control head is easily removable for replacement. There is also a manual operation capability built into the valve to provide temporary operation should control head pressure fail.

H) Low Ambient Control (MAC/D Model Optional)

Low ambient controls that can be provided by means of a pressure activated switch mounted in the compressor section of the unit, fan cycling, fan speed and flood condenser.

I) Motor Speed

All 2 and 3 ton units are shipped with three speed motors. Changing the motor leads in the evaporator section of the unit may change the motor speed. Access to leads is through the access door on the control panel side of the unit. Leads will either be color coded or number coded.

On units with color-coded leads the colors represent the following speeds: On units with number coded leads the Number represents the following speeds

YELLOW	=	COMMON	=	1
RED	=	LOW SPEED	=	4
BLUE	=	MEDIUM SPEED	=	3
BLACK	=	HIGH SPEED	=	2

To change the speed of the unit first disconnect power to the unit. Disconnect speed now in used and cap this lead with suitable device. Reconnect lead from fan relay to speed desired.

Note 1: On units that have both humidifier and reheat the auxiliary relay is omitted and a jumper is installed between terminals (R) and (G).

Note 2: 140 degrees domestic hot water should be supplied to humidifier in order to satisfy rated capacity.

Note 3: a small plastic orifice installed between the solenoid valve and the evaporator pad regulates the water flow.

Note 4: the humidistat and dehumidistat can either be wall mounted or unit mounted.

DE-HUMIDIFICATION AND REHEAT

(Wall Mounted thermostat)

Upon an increase in humidity beyond the set point on the wall mounted de-humidistat the cooling cycle is energized. The unit will remain in cooling until the humidity level in the room reaches the set point on the de-humidistat. If the room temperature falls below the set point on the room thermostat the reheat coil will energize to offset the cooling effect of the de-humidification cycle. There must be at least a low load in the room to maintain room temperature.

(Unit Mounted thermostat)

On units with a unit mounted thermostat the reheat is controlled by the same thermostat that controls the cooling cycle. Reheat can not be energized except when there is a call for de-humidification which functions the same as the units with wall mounted controls.

SYSTEM SAFETIES

The unit has several inherent safety devices. High and Low pressure switches are an integral part of the refrigeration system. Should an unsafe high and or low-pressure condition exist the appropriate safety device will trip. Condensate overflow switches are installed on the drain pan of each unit. There are two switches and should the condensate level rise to an unsafe level the switches will cause the unit to shut down operation. This is accomplished by interrupting the low voltage power supply from the 24-volt transformer. Both compressor and fan motor have an internal automatic reset safety, which is the thermal type.

MAINTENANCE

Filter Changes:	The unit is supplied with a 20 x 20 x 1 disposable filter. Access to the filter is through the hinged return air grille. This filter should be changed a minimum of four times per year. A higher frequency of filter changes may be necessary depending on the area where the unit is installed.
Fan motor Lubrication:	The evaporator fan motor should be oiled once per year using a SAE#10 or SAE#20 non-detergent oil. There are oil ports at each end of the motor.
Evap. and Cond. Coil:	Clean both coils with a stiff brush. Be careful of the coil fins due to the fact that they are razor sharp. After brushing use a vacuum or compressed air to clean away brushed off dirt.
Remote Condenser Coil:	Clean coil as stated above or use low pressurized water or steam.
Condensate pan & Drain:	Check and clean on a bi-monthly basis.
Humidifier:	Check canister on a bi-monthly basis for material builds up, replaces as required.
Reheat:	Reheat units have a tendency to collect minute dust/dirt particles. When energized, these particles will burn off. Energize reheat during normal maintenance procedures. NOTE: disable halon system to prevent possible discharge during reheat test.

CHARGING PROCEDURE

Before charging, make sure that no air was allowed to enter the system. If pre charged tubing was not used evacuate the system completely and check for leaks. When charging the unit do not use liquid refrigerant in the suction side. Charge with vapor refrigerant only. A manual shut-off valve is provided between the receiver and expansion valve. By shutting off this valve charging the system can be accomplished faster. Be sure to open the valve when charging is completed.

Note: The low-ambient refrigerant control valve will bypass whenever the head pressure is lower than 220 psig. This is normal.

AIR COOLED UNITS- REFRIGERANT LINE SIZING

Unit tonnage	Circuit	Liquid Drain Line	Hot Gas Line
1	1	½"	½"
2	1	5/8"	7/8"
3	1	5/8"	7/8"

- 1) Each circuit will have a liquid drain line and a hot gas line.
- 2) The liquid line is an oversized liquid line that runs between the condenser and receiver (unit). Its size allows vapor in the receiver to return to the condenser against the flow of liquid refrigerant.
- 3) On horizontal runs the hot gas line should be pitched downward in the direction of flow ½" for every ten feet (10 ft)
- 4) On vertical rises the hot gas line should be trapped every twenty feet (20 ft)
- 5) Refrigerant lines should be properly supported to avoid pulsation vibrations.
- 6) Avoid running refrigerant lines in areas where low noise levels are required.

AIR COOLED UNITS – REFRIGERANT CHARGE

The tables below indicate the amount of refrigerant required per circuit to adequately operate the unit. Please note; if you are charging the unit in a warm ambient condition not all of the recommended charge is needed to operate the unit at that condition. However, all the recommended charge must be used in order for the equipment to operate properly the year round.

1) Basic Unit charges

Unit tonnage	Circuits	Charge per circuit (lbs)
1	1	3
2	1	6
3	1	6

2) Interconnection pipe charge

For split-systems you need to consider the refrigerant charge being held in the interconnection piping (liquid drain line, hot gas line). The amount of charge held in the hot gas line is minimal. Therefore, we will consider only the liquid line for calculation purposes.

Liquid line size copper tubing	Charge per circuit
½" O.D.	.7 OZ/10 ft

5/8" O.D.

1.2 lbs/10 ft

7/8" O.D.

2.4 lbs/10 ft

3) Total Charge

Add R410A charge to the system to compensate for the additional interconnecting tubing, as follows:

If additional charge is needed, add this prior to releasing the factory charge into the low side. If less charge is needed, recover the excess R-410A during final charge adjustment. Use the factors below to determine the installed liquid line charge needed.

1/4" OD LIQUID LINE = .20 oz. per foot

5/16"OD LIQUID LINE = .36 oz. per foot

3/8" OD LIQUID LINE = .55 oz. per foot

1/2" OD LIQUID LINE = 1.07 oz. per foot

IMPORTANT: Use only refrigerant which is certified to meet ARI Standard 700. Used refrigerant may cause compressor damage, and will void the warranty. (Most portable machines cannot clean used refrigerant well enough to meet this ARI Standard.)

NOTE: R-410A refrigerant cylinders contain a dip tube which allows liquid refrigerant to flow with the cylinder in an upright position. R-410A refrigerant should be charged in the upright position with the liquid gradually metered into the unit.

NOTE: Installations may be made with up to 100 feet equivalent lengths by installing the recommended tube sizes and adding the necessary refrigerant, R410A.

A maximum length of 150 feet of interconnection tubing is permitted if the following additional steps are taken: Install a suction line accumulator close to the condensing units. Add three ounces of refrigerant oil for each 10 feet of tubing over 100 feet.

Oil specifications are: Ultra 22CC POE oil (Synthetic Polyol Ester oil)

IMPORTANT

If your unit is equipped with a
CANISTER HUMIDIFIER:

The canister must be changed approximately one to two times per year.

Please call

1-800-625-SKIL

For parts and information.

Please have your model number ready:

For 208/230 volts, use model #102

For 460 volts, use model #104

FU INFORMATION

Warning the manufacturer's warranty does not cover any damage or defect to the air conditioner caused by the attachment of use of any components, accessories or devices (other than those authorized by the manufacturer) into, onto or in conjunction with the air conditioner. You should be aware that the use of unauthorized components, accessories or devices may adversely affected the operation of the air conditioner and may also endanger life and property. The manufacturer disclaims any responsibility for such loss or injury resulting from the use of such unauthorized components, accessories or devices

GENERAL

The information contained in this manual has been prepared to assist in the proper installation, operation and maintenance of the air conditioning system. Improper installation, or installation not made in accordance with these instructions, can result in unsatisfactory operation and/or dangerous conditions, and can cause the related warranty not to apply.

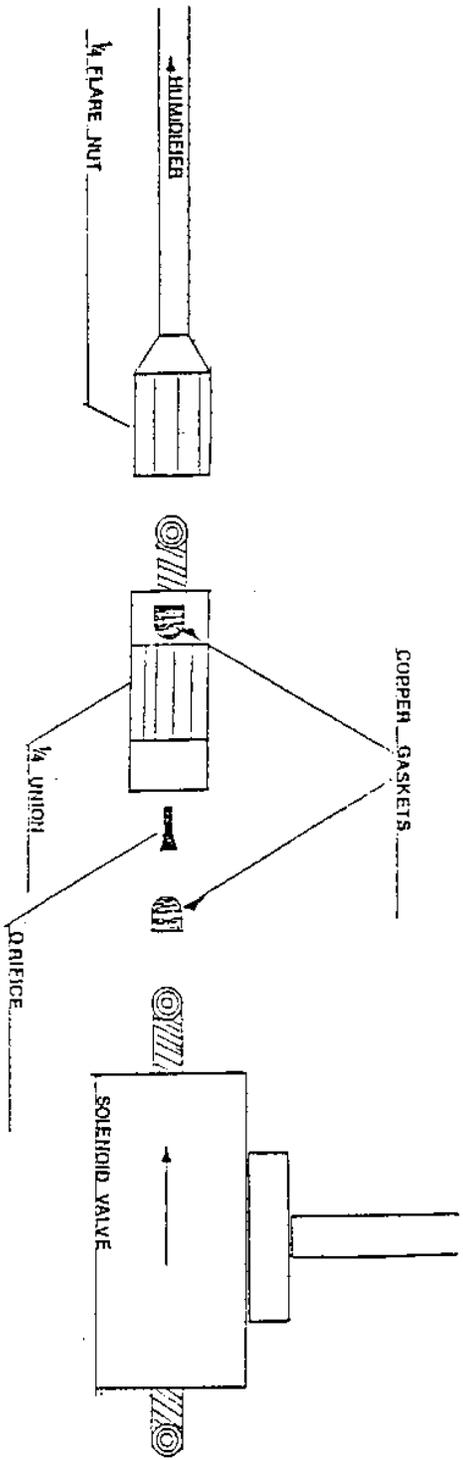
Read this manual and any instructions packaged with separate equipment required to make up the system prior to installation. Retain this manual for future reference. To achieve unit design operation efficiency and capacity, the indoor cooling coils listed in the condensing unit specification sheet should be used.

CHECKING PRODUCT RECEIVED

Upon receiving unit, inspect if for any shipping damage. Claims for damage, either apparent or concealed, should be filed immediately with the shipping company. Check condensing unit electrical characteristics and accessories to determine if they are correct. Check system components (evaporator coil, condensing unit, evaporator blower, etc. to make sure they are properly matched.

Remove shipping bracket under compressor if supplied. With the thermostat in the "Off" position, turn the power on to the furnace and the condensing unit. Before starting condensing unit allow 12 hours time to elapse, giving the crankcase heater (if provided) time to drive refrigerant from the compressor, thus preventing damage during start-up. Start the condensing unit and the furnace with the thermostat. Make sure the indoor air handler is operating.

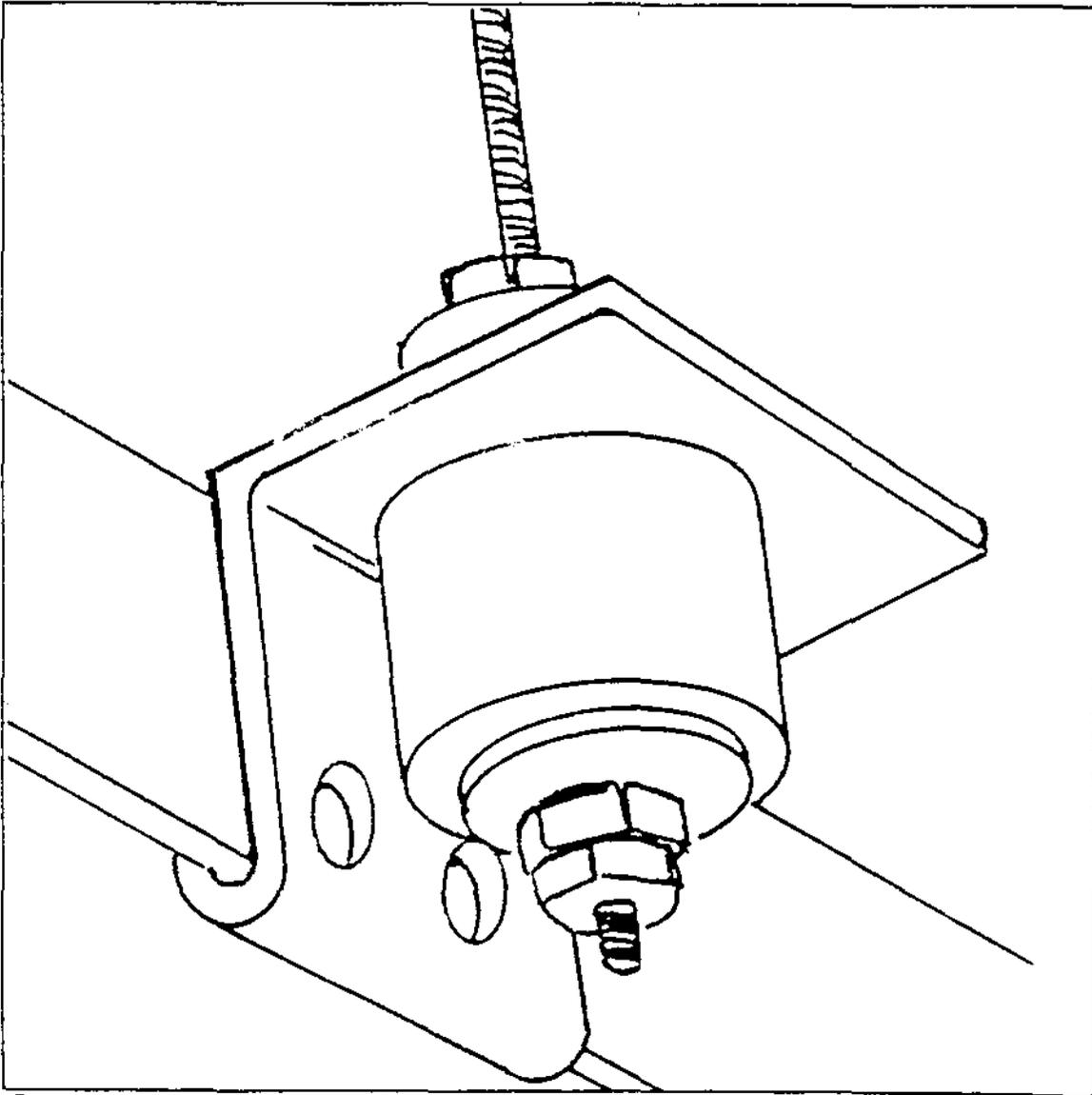
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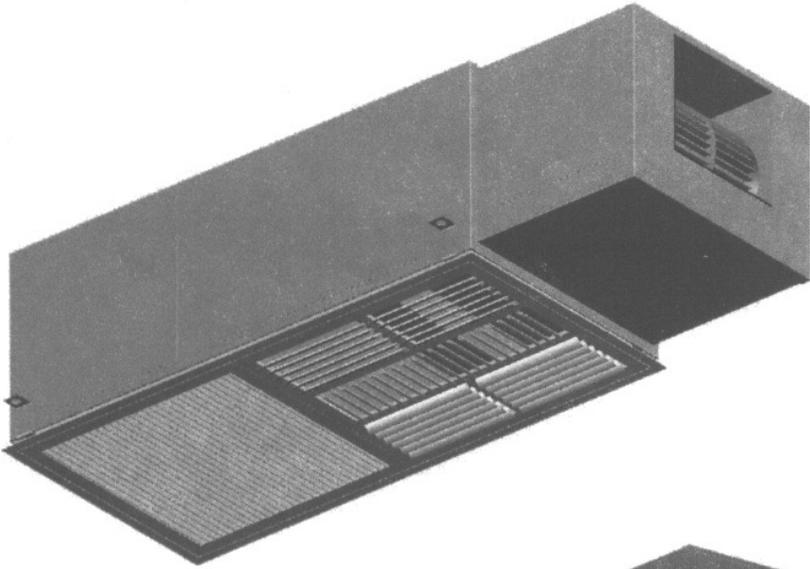


TOLERANCES UNLESS OTHERWISE SPECIFIED		For Minimight Evap. Pad Humid	
1 ORIGINAL	2	SCALE	DRAWN BY <i>AWW</i>
3 PRACTICAL	4	TITLE	APPROVED BY <i>AWW</i>
5	6	DATE	FORMING NUMBER
7	8	9	10

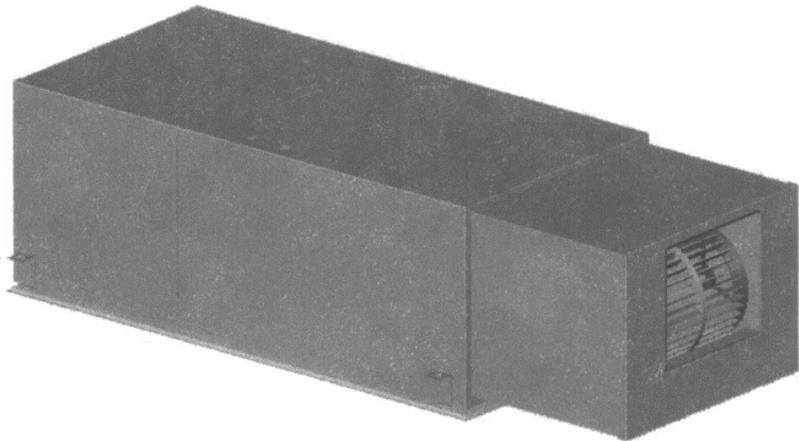
Quick-clip hanging system

Means fast, easy installation. No complicated hanging alignment or procedures necessary. Quick-clip mounts adjust easily for quick levelling.

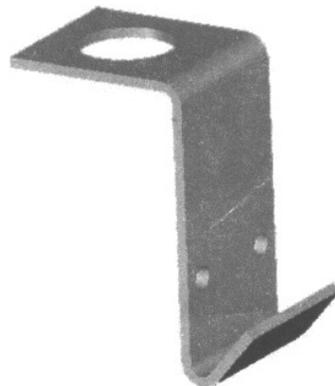
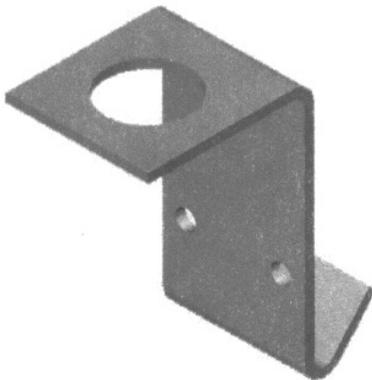




Hanging Brackets
(Qty 4 per unit)



Hanging Brackets (Qty 4 per unit)



LINE SIZING CHART FOR INDOOR CONDENSING UNITS. (BU)

COND. UNIT (TONS)	REFRIGERANT LINE LENGTH (FT)											
	0-24		25-49		50-74***		75-99		100-124		125-149	
	LINE DIAMETER (IN. OD)											
	SUCT.	LIQ.	SUCT.	LIQ.	SUCT.	LIQ.	SUCT.	LIQ.	SUCT.	LIQ.	SUCT.	LIQ.
1.5	5/8	1/4	3/4	3/8	3/4	3/8	3/4	3/8	3/4	3/8	7/8	3/8
2	5/8	1/4	3/4	3/8	3/4	3/8	7/8	3/8	7/8	3/8	7/8	3/8
2.5	3/4	3/8	3/4*	3/8	7/8	3/8	7/8	3/8	7/8	3/8	1 1/8	3/8
3	3/4	3/8	3/4**	3/8	7/8	3/8	1 1/8	3/8	1 1/8	3/8	1 1/8	3/8
3.5	3/4	3/8	7/8**	3/8	1 1/8	3/8	1 1/8	3/8	1 1/8	3/8	1 1/8	3/8
4	7/8	3/8	1 1/8	3/8	1 1/8	3/8	1 1/8	3/8	1 3/8	3/8	1 3/8	3/8
5	7/8	3/8	1 1/8	3/8	1 1/8	3/8	1 1/8	3/8	1 3/8	3/8	1 3/8	3/8

*7/8" Required for full ratings

** 1 1/8" Required for full ratings

***for line lengths greater than 75 feet or vertical lifts greater than 50 feet additional engineering consideration must be taken- please contact your local dealer.

SYSTEM PERFORMANCE VS. SUCTION LINE SIZING							
CAPACITY MULTIPLIERS							
COND. UNIT (TONS)	SUCTION LINE SIZE O.D.	LENGTH OF TUBING (SUCTION LINE) FT					
		25	50	75	100	125	150
1.5	5/8	.98	.96	.94	.92	.90	.88
	3/4	1.00	.98	.96	.94	.92	.90
2	3/4	1.00	.98	.96	.94	.92	.90
	7/8	1.01	1.00	.99	.98	.97	.96
2.5	3/4	.99	.97	.95	.93	.91	.89
	7/8	1.00	.99	.98	.97	.96	.95
3	3/4	.98	.96	.94	.92	.90	.88
	7/8	.99	.98	.97	.96	.95	.94
	1 1/8	1.00	.99	.98	.97	.96	.95
3.5	3/4	.97	.95	.93	.91	.89	.87
	7/8	.99	.98	.97	.96	.95	.94
4	1 1/8	1.00	.99	.98	.97	.96	.95
	3/4	.95	.92	.90	.86	.83	.80
	7/8	.98	.96	.94	.92	.90	.88
5	1 1/8	1.00	.98	.96	.94	.92	.90
	7/8	.98	.96	.94	.91	.89	.87
	1 1/8	1.00	.98	.95	.93	.91	.89

Skil-Aire Terminal Connections

Thermo-stat Equipped Units

Low/Signal Voltage (24VAC)

- R** 24VAC source
- T** 24VAC common
- G** Evaporator fan*
- Y** Cooling or (**Y1**) first stage of multistage cooling
- Y2** Second stage cooling
- W** Heating, or (**W1**) first stages of multistage heating, or reheat for units with external humidifier/dehumidifier control
- W2** Second stage heating
- W3** Third stage heating
- K** Emergency heat control
- HC** Humidifier (Humidity S-TAT)
- HO** Humidifier (Humidity S-TAT)
- Z** System malfunction
- CC** 24VAC common interlock to remote condenser (**T**)
- CR** (**CR1**) 24VAC interlock to remote condensers
- CR2** 24VAC interlock to circuit #2 remote condensers
- CR3** 24VAC interlock to circuit #3 remote condensers
- O** Heat pump switch over heat priority
- B** Heat pump switch over cool priority

Power Voltage (115-480VAC)

- L1, L2** Line connections for single phase power. Check unit specification for proper power requirements.
- L1, L2, L3** Line connections for 3 phase power. Check unit specifications for proper power requirements.
- GROUND LUG** Chassis ground connection

- * Some units are supplied with a removable jumper (RtoG) for continuous evaporator fan operation. Remove jumper to control fan externally. Jumper should be left in place for any units utilizing humidification or dehumidification.

Start-Up Checklist

Before Starting Unit...

Mechanical:

- Check all unit mounting points and fasteners
- Check all ductwork connections to and from unit
- Confirm all dampers and registers open
- Confirm condensate piping and P-trap in place, sloped down to drain location or connection
- Check condensate pump operation (if installed)
- Check belt tension(s)
- Check refrigerant line connections in split systems
- Open water valves and check for leaks in water cooled systems and systems with humidifiers

Electrical:

- Confirm correct voltage of power source
- Confirm unit(s) have a proper ground connection
- Confirm fuses or circuit breakers are of correct size
- Confirm wiring is of adequate size for system specifications
- Confirm all connections made tightly and correctly
- Check duct mounted devices (electric heat, smoke detectors, sensors, etc.) installed properly

Upon Start-Up, check the following:

- Direction of blower rotation
- Compressor operation with gauges attached (if scroll compressor used, check rotation)
- Air and water flow for obstructions, malfunctions or leaks
- Total system amperage draw. Compare to unit specifications
- Test in all modes: fan only, cooling, heating, humidification if equipped, etc.



Mini-Might BU Unit
Operating and Maintenance Instructions

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- 4) Now raise unit into the ceiling. The use of a high jack is recommended, once unit is above the ceiling attach mounting brackets to unit and then attach all thread rods to hangers. Once all thread rods are attached to hangers raise unit several inches above the ceiling to allow placement of the grille into the ceiling grid. After grille is in place lower unit just far enough for the frame to form an airtight seal with the foam backing on the grille. The unit is now ready for electrical wiring or water piping.

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Remote Condenser Coil: Clean coil as stated above or use low pressurized water or steam.

Condensate pan & Drain: Check and clean on a bi-monthly basis.

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Before charging make sure that no air was allowed to enter the system. If pre charged tubing was not used evacuate the system completely and check for leaks. When charging the unit do not use liquid refrigerant in the suction side. Charge with vapor refrigerant only. A manual shut-off valve is provided between the receiver and expansion valve. By shutting off this valve charging the system can be accomplished faster. Be sure to open the valve when charging is completed.

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AIR COOLED UNITS- REFRIGERANT LINE SIZING

Unit tonnage	Circuit	Liquid Drain Line	Hot Gas Line
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3	1	11

2) Interconnection pipe charge

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Liquid line size copper tubing	Charge per circuit
1/2" O.D.	.7 lbs/10 ft
5/8" O.D.	1.2 lbs/10 ft
7/8" O.D.	2.4 lbs/10 ft

3) Total Charge

To calculate the total charge, add one (1) the basic unit charge and two- (2) piping charge. Remember the amounts given above are per circuit

IMPORTANT

If your unit is equipped with a
CANISTER HUMIDIFIER:

The canister must be changed approximately one to two times per year.

Please call

1-800-625-SKIL

For parts and information.

Please have your model number ready:

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For 460 volts, use model #104

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CHECKING PRODUCT RECEIVED

Upon receiving unit, inspect if for any shipping damage. Claims for damage, either apparent or concealed, should be filed immediately with the shipping company. Check condensing unit electrical characteristics and accessories to determine if they are correct. Check system components (evaporator coil, condensing unit, evaporator blower, etc. to make sure they are properly matched.

Remove shipping bracket under compressor if supplied. With the thermostat in the "Off" position, turn the power on to the furnace and the condensing unit. Before starting condensing unit allow 12 hours time to elapse, giving the crankcase heater (if provided) time to drive refrigerant from the compressor, thus preventing damage during start-up. Start the condensing unit and the furnace with the thermostat. Make sure the indoor air handler is operating.