

Shelf Units

Installation, Operation and Maintenance Manual

Air Cooled, Water/Glycol Cooled and Chilled Water

2, 3 and 4 ton



SHELF UNITS

OPERATION and MAINTENANCE MANUAL

GENERAL

Congratulations on the selection of a Data Aire environmental control system. The *Shelf Unit* series are specifically designed to provide temperature, humidity, and dust control for computer rooms, telecom equipment rooms, server spaces and other areas where critical control and high sensible cooling required.

TRANSPORTATION DAMAGE

Your Data Aire unit has been tested and inspected prior to shipment. To ensure that the unit has been received in proper condition, perform a visual inspection of the outer crating immediately upon arrival and note any external damage on the freight carriers delivery forms. As soon as possible inspect the unit for possible internal damage. File a claim with the shipping company if the equipment is damaged or incomplete. Freight damage claims are the responsibility of the purchaser.

Loose parts such condensate pumps and controls are packed inside the unit.

IMPORTANT: READ BEFORE INSTALLING

Check the power supply. Voltage frequency and phase must correspond to that specified on the unit electrical rating plate. The power supply must be able to handle the additional load imposed by the equipment.

LOCATING THE UNIT

Consult local building codes and National Electrical Code for special installation requirements. When installing the unit, allow sufficient space wiring, piping and service.

The evaporator and/or evaporator/compressor sections are designed for wall mounting. The unit's frame has a flange with pre-punched holes. Add a 50% safety factor to the weight of the unit and accessories to determine the required strength of the supporting members.

The condenser and/or condensing unit is designed for above the ceiling installation. The condenser and/or condensing unit may be suspended from structural members of the building. Add 50% safety factor to the weight of the unit and accessories to determine the required strength of the supporting members. _

INSTALLING REFRIGERANT TUBES

Refrigerant piping is connected from section to section. The line sized should be the same as the stub sizes on each section. Standard refrigeration practice should be observed. The maximum run of piping should be 50 feet (actual) or 75 equivalent feet.

- A. Determine the liquid and suction line diameters. Refer to the provided chart (pages 6 or 14) for recommended line sizes.
- B. Bring suction and liquid lines through the side of the unit. It is recommended that at least 15% silver solder be used to braze connections. Insulate the suction line thoroughly and make certain that the holes in the side in the side of the unit are completely sealed. The expansion valve bulb must be securely attached to the suction line. The best location is the 10 or 2 o'clock position.

NOTE: Always use clean refrigeration tubing.

INSTALLING WATER LINES (Water Cooled Units ONLY)

Two water connections are provided at the side of the unit for water in and out. Larger tubing may be required depending on the length of the run of the tubing and accessories used such as balancing valves, strainers, etc. Shut-off valves should be provided for future disconnection. A strainer is strongly recommended and should be cleaned on a regular basis.

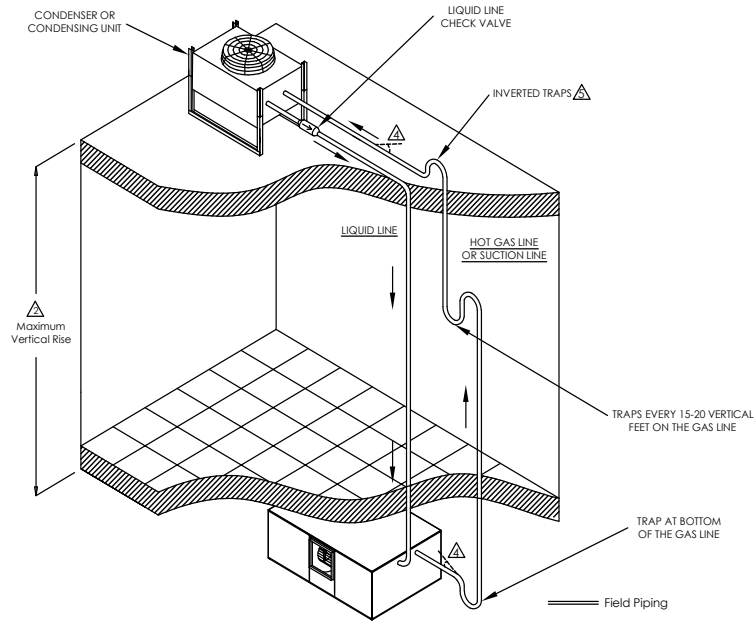
INSTALLING OTHER LINES

- A. **Humidifier** (optional) – a 1/4" compression fitting is provided for the water supply. 1/4" O.D. copper tubing should be used for make-up water. A water shut-off valve is provided inside the unit for future disconnection and service. Refer to the humidifier manual for service information.
- B. **Condensate Drain** – A 3/4" FNPT fitting is provided on each unit for condensation removal. It is recommended that unions be installed in the drain line to permit ready disconnection from the unit for easy cleaning. Where local code permits, PVC pipe may be used for drain lines. It is important that the drain line be installed with sufficient slope to permit easy draining. A trap should be built into the drain line to prevent backflow of air into the unit. Drain lines should have pitch away from the unit and not less than 1/4 inch for each 10 feet of run. Do not reduce the size of the drain line.

Field Piping, Remote Condenser/ Condensing Unit Above Evaporator

NOTES:

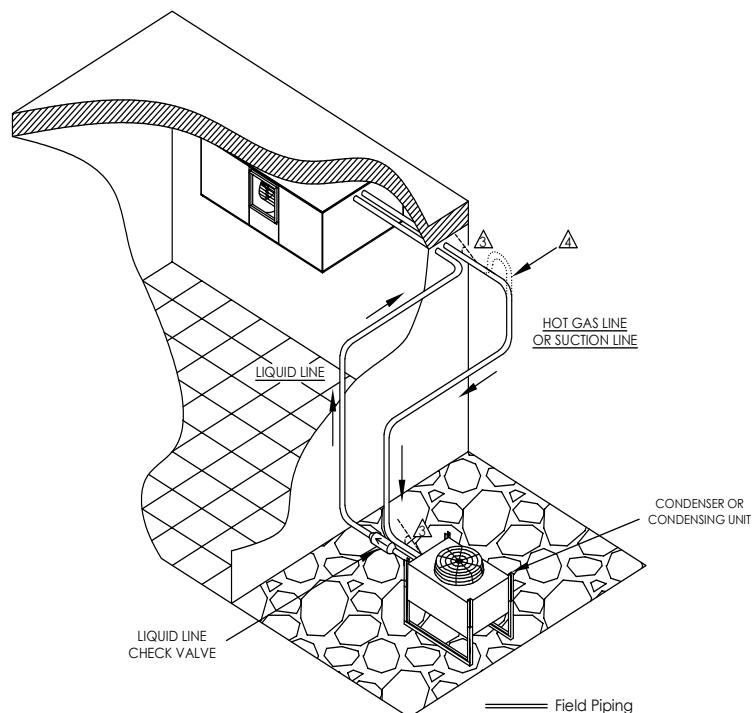
1. THIS IS THE RECOMMENDED PIPING. ALL PIPING TO BE PER LOCAL AND/OR STATE CODE.
 2. CONDENSER TO BE NO MORE THAN 60 FEET ABOVE EVAPORATOR.
 3. FOR UNITS BUILT AFTER APRIL 2017, THE CHECK VALVES ARE INCLUDED INTERNALLY IN THE EVAPORATOR SECTION.
- ▲ SLOPE HORIZONTAL LINES DOWNWARD IN THE DIRECTION OF THE REFRIGERANT FLOW, 1/2" FOR EVERY 10 FEET OF LINE LENGTH.
 ▲ INVERTED TRAP TO EXTEND 8" ABOVE THE BOTTOM OF THE CONDENSER COIL.



Field Piping, Remote Condenser/ Condensing Unit Below Evaporator

NOTES:

1. THIS IS THE RECOMMENDED PIPING. ALL PIPING TO BE PER LOCAL AND/OR STATE CODE.
 2. CONDENSER TO BE NO MORE THAN 15 FEET BELOW EVAPORATOR.
 3. SLOPE HORIZONTAL LINES DOWNWARD IN THE DIRECTION OF THE REFRIGERANT FLOW, 1/2" FOR EVERY 10 FEET OF LINE LENGTH.
- ▲ INVERTED TRAP NEEDED ON SUCTION LINE WHEN COMPRESSOR IS OUTDOORS ONLY.



ELECTRICAL CONNECTIONS

IMPORTANT: Before proceeding with the electrical connections, make certain that the volts, hertz and phase correspond to that specified on the unit rating plate. Also, check to be sure that the service provided by the utility is sufficient to handle the additional load imposed by the equipment. Refer to the unit rating plate for equipment electrical requirements. The enclosed wiring diagram with the unit shows the proper field high and low voltage wiring. Make all electrical connections in accordance with National Electrical Code (NEC) and any local codes or ordinances that may apply.

The unit cabinet must have an uninterrupted or unbroken electrical ground to minimize personal injury if an electrical fault should occur. This may consist of electrical wire or approved conduit when installed in accordance with existing electrical codes.

High and low voltage electrical wires are to be brought to the control box through the side of the cabinet.

The system consists of an evaporator and condensing section which are mounted separately. The line supply power is to be connected to the evaporator section. There are a pair of terminal strips on the outside close-off panels of each section where interconnecting field wiring is to be done. The terminal strips are labeled high voltage (TB1) and low voltage (TB2). Wiring is sequential from TB1 # 1 to TB1 # 2, etc. The low voltage control wires should be 18 gauge or heavier. The high voltage wires should match the line voltage feed that is based on the unit nameplate wire sizing amps (Minimum Circuit Ampacity).

CHECKOUT LIST WITH ELECTRICAL POWER OFF:

1. Check all electrical wiring (both factory and field) for completeness and tighten all electrical connections.
2. Tighten evaporator blower screws.
3. Check evaporator airflow for any obstructions.
4. Leak-test all refrigerant connections (fittings, joints, flanges, etc.) both factory and field with a halide torch or electronic leak detector.
5. Replace all caps on service valves if used.
6. Check and be sure all tools and loose parts have been removed from unit.
7. Check and be sure all panels and covers are in place.
8. Following initial inspection, start unit and:
 - a. Check evaporator blower rotation.
 - b. Check belt tension and adjust if necessary.
 - c. Check the line and low voltage (should be between $\pm 5\%$ of that stamped on the unit rating plate).
 - d. Check compressor current draw.
 - e. Check unit for excessive noise, tubing for excessive vibration or contact with other parts.
 - f. Do not leave job site until unit has been observed through several complete cycles. Make certain at the moment all components are operating in correct sequence.

OPERATION

Set thermostat to desired setting (between 70° F - 75° F). Set humidistat (low humidity) between 35% and 40% and the dehumidistat (high humidity) between 60% and 65%.

MINI DATA ALARM PROCESSOR 4 (optional)

(See the Mini-dap4 Operation Manual)

STEAM GENERATOR HUMIDIFIER (optional)

¼" O.D. copper tubing should be used for make-up water. A water line shut-off valve must be provided outside the unit for future disconnect and service. In addition, an in-line water pressure regulator and strainer should be installed in the make-up water line. Water pressure should be between 30 and 50 PSI. (For detailed information refer to the humidifier manual)

CARE and MAINTENANCE

WARNING: DISCONNECT POWER TO EQUIPMENT BEFORE SERVICING

For continued high performance and to minimize possible equipment failure it is essential that periodic maintenance be performed on the unit. The following items are to be inspected on a regular basis:

- 1. Air Filter** – The air filter should be inspected on a monthly basis and replaced if necessary.
- 2. Motor Drive** – Belt tension should be checked monthly to assure proper and efficient operation.
- 3. Motors** – Some blower motors have sealed bearings requiring no maintenance. Some blower motors have zert grease fittings on the bearings. If the motor has zert fittings, it must be greased on an annual basis.
- 4. Heating Elements** (optional) – Heating elements are finned type and require maintenance.
- 5. Humidifier** (optional) – The only maintenance required is a periodic replacement of the humidifier cylinder and water strainer. (See humidifier manual for service and cylinder replacement)

SHELF UNIT with OUTDOOR CONDENSING UNIT

INSTALLATION INSTRUCTIONS

GENERAL

The condensing unit, as shipped from the factory, includes the compressor with crankcase heater, condenser fan and motor, condenser coil, start assist, low pressure switch, high pressure switch, fan guard and fan speed controller suitable for operation to -20° F. The condensing unit cabinet is galvanized steel with powder coated finish. Data Aire condensing units are approved for outdoor installations.

LOCATING THE UNIT

Select a location for the unit where ice and snow will not fall from an overhang and damage the unit top or fan blade. Care must be exercised to maintain the clearance requirements.

Minimum coil clearance: 30" on each side, 36" service door, and 60" top. (See drawing 540-900-035 for further details)

Consult local codes or ordinances for restrictions regarding location of unit.

Consult dimensional drawing (540-900-035) for the following:

1. Location of refrigeration and electrical connections
2. Recommended clearances
3. Direction of condenser airflow
4. Mounting base dimensions

Place unit on level base strong enough to support the weight of the unit and resist effects of frost heaving, etc. Concrete lintels can be used if spaced to adequately support unit.

Allow air to circulate under unit. Channels are provided for this purpose or unit may be set in a bituminous mixture such as roofing tar to prevent base pan from rusting. Do not plug drain holes.

On rooftop applications, locate unit at least 6 inches above roof surface. Where possible, place unit above load-bearing wall. Arrange supporting members to adequately support unit and minimize transmission of vibration to building. Pre-cast concrete lintels, concrete blocks, treated timbers, or steel beams can be used. Consult local code governing rooftop applications. In cold climates locate unit above expected snow levels.

Avoid locations where flowers, shrubs, etc. are in the pathway of condenser air discharge or where the condenser fan will discharge against prevailing wind or a building structure.

Avoid locations where normal operating sounds may be objectionable (such as beneath windows, between structures or near doors). Should operation sounds be objectionable, consideration should be given to a shielding barrier.

INSTALLING REFRIGERANT TUBING

Recommended liquid and suction line sizes (based on equivalent feet):

Tons	50 Equivalent Feet			100 Equivalent Feet			150 Equivalent Feet			200 Equivalent Feet		
	Suction Line		Liqd Line	Suction Line		Liqd Line	Suction Line		Liqd Line	Suction Line		Liqd Line
	Horiz	Vertical		Horiz	Vertical		Horiz	Vertical		Horiz	Vertical	
2	7/8	7/8	3/8	7/8	7/8	3/8	7/8	7/8	1/2	1-1/8	7/8	1/2
3	7/8	7/8	1/2	1-1/8	7/8	1/2	1-1/8	7/8	1/2	1-1/8	1-1/8	1/2
4	1-1/8	1-1/8	1/2	1-1/8	1-1/8	5/8	1-1/8	1-1/8	5/8	1-3/8	1-1/8	5/8
5	1-1/8	1-1/8	1/2	1-1/8	1-1/8	5/8	1-3/8	1-1/8	5/8	1-3/8	1-1/8	5/8

Note: The above table is based on a tube loss of 3°F. Longer lengths can be used in each diameter listed but the result will be greater tube losses. For longer length runs consult factory.

Select an approved (type L) refrigerant tubing of the correct size. **(DO NOT USE WATER TUBING)** Insulate the suction line with an insulation that has an adequate vapor barrier (i.e. Armaflex or Rubetex).

All refrigerant tube joints erected on the premises should be exposed to view for visual inspection and leak testing before covered or enclosed.

Install refrigerant tubing as follows:

1. Consult local codes or ordinances before running refrigerant tubes.
2. Install indoor section in accordance with instructions provided with unit.
3. Run refrigerant tubes as directly as possible avoiding unnecessary turns and bends.
4. Tape liquid tube to top of insulated suction tube for support.
5. Suspend refrigerant tubes so they do not damage insulation on suction tube and do not transmit vibration to structure. When passing refrigerant tubes through wall, seal opening to prevent vibration from transmitting to the structure. Leave some slack in refrigerant tubes between structure and unit to absorb vibrations.
6. If refrigerant tubes are too long they should be rolled into loop and placed in horizontal plane with end leaving loop going to compressor coming out of the bottom.
7. Suction line traps should be provided when evaporator is located below the condensing unit.

LEAK TESTING

No installation is complete until the entire system has been checked for leaks. This check should include all field and factory joints. To check a system for leaks, proceed as follows:

1. Attach gauge manifold to gauge ports and purge hoses.
2. Pressurize the system with vapor from an external refrigerant cylinder of R-22 until the system and cylinder pressures are equalized.
3. Leak-test with an electronic detector, a halide torch, or liquid soap solution.
4. Release pressure and repair any leaks. Repeat leak test as necessary.
5. When system is free of leaks – proceed.

WARNING: NEVER ATTEMPT TO REPAIR ANY SOLDER CONNECTIONS WHILE SYSTEM IS UNDER PRESSURE. PERSONAL INJURY COULD RESULT.

EVACUATION

It is extremely important to have an installation in which all refrigerant tubes and system components are completely free of air and moisture.

If the installer can pull the system down to a reading of 200 microns or less with deep vacuum equipment, the system can be considered free of air and moisture. The unit must be under vacuum for a minimum of 8 hours.

ELECTRICAL CONNECTIONS

IMPORTANT: Before proceeding with the electrical connections make certain that the volts, hertz and phase correspond to that specified on the unit rating plate. Check that the service provided by utility is sufficient to handle the additional load imposed by the equipment. Refer to the Ratings and Performance table in the detailed unit instruction and unit rating plate for equipment electrical requirements.

The unit-wiring diagram shows the proper field high and low voltage wiring. Make all electrical connections in accordance with the National Electrical Code and any local codes or ordinances that may apply.

Use a separate branch electrical circuit for the unit. A disconnecting means must be located within sight of, and readily accessible to, the unit.

CAUTION: If disconnect switch is to be mounted on the condensing unit, select a location where drill or fastener will not contact electrical or refrigerant components.

WARNING: THE UNIT CABINET MUST HAVE AN UNINTERRUPTED OR UNBROKEN ELECTRICAL GROUND TO MINIMIZE PERSONAL INJURY IF AN ELECTRICAL FAULT SHOULD OCCUR. THIS MAY CONSIST OF ELECTRICAL WIRE OR APPROVED CONDUIT WHEN INSTALLED IN ACCORDANCE WITH EXISTING ELECTRICAL CODES.

ELECTRICIAN, PLEASE NOTE: DO NOT ATTEMPT TO OPERATE THIS CONDENSING UNIT UNTIL REFRIGERANT CONNECTIONS HAVE BEEN MADE AND SYSTEM IS CHARGED.

The single-phase compressor motor used in this condensing unit is a permanent split capacitor type (PSC) motor designed to start under low-load conditions only. Therefore, make sure that the system pressures have equalized before attempting to start the unit (this approximately 5 minutes). Do not short-cycle the unit with the thermostat or disconnect as this will cause the compressor to trip-out on overload.

CHECKING CHARGE

No installation is complete until the operating charge level of the unit is checked. The level of refrigerant operating charge will determine how efficiently and economically the unit will operate. An overcharged or undercharged unit will lead to insufficient cooling, high operating costs, and the possibility of a compressor failure. To check the refrigerant charge level, proceed as follows:

1. Connect the refrigerant drum to the low side and charge with vapor. Charge approximately 2 lbs. After purging gauge and hoses.

CAUTION: Before starting compressor, make sure that the crankcase heater is energized for minimum period of 12 HOURS to reduce the possibility of liquid slugging at start-up. Failure to do this may result in compressor failure.

2. Start the unit. Observe the liquid indicator to see if the system is properly charged for normal refrigerant cycle, bubbles in the sight glass can be caused by flashing due to excessive pressure drop from liquid line piping or excessive pressure drop in the filter drier caused by an accumulation of dirt, metal chips and brazing flux which might have been introduced during field piping.
3. If the discharge pressure is less than 300 PSI, block the condenser coil surface until the discharge pressure is approximately 300 PSI. The system must be stabilized.
4. Add refrigerant vapor until the sight glass is cleared or with some bubbles.
5. After the unit is stabilized for at least 30 minutes, check superheat temperature at the compressor suction at least 6" away from the compressor. Superheat should be between 6°F and 18°F.

6. Check crankcase (oil) temperature at the bottom of the compressor. The oil temperature must be at least 35°F higher than the saturated suction temperature at all times. Lower temperature indicates that the system is over-charged, the bearings are not properly lubricated and may result in compressor failures. Refrigerant should be removed from the system. Some bubbles may be seen in the sight glass due to changes in sub-cooling and discharge pressures. Slight bubbles in the sight glass are permissible as long as the crankcase oil temperature is within limits.
7. Remove block-off from the condenser coil and recheck superheat and oil temperature.

SYSTEM CHECK FOR OVERCHARGING

Since good system reliability depends on proper refrigerant charge, it is very important that the system is thoroughly checked for superheat and oil temperature **AFTER** the unit is stabilized as shown above. A final check should be made after the room is turned on and the unit is fully loaded.

SEQUENCE OF OPERATION

When the thermostat “calls for cooling”, thermostat contacts close energizing the contactor holding coil through pressure switches with a 24-volt external power source. At the same time, the condenser fan motor is energized. If air temperature is below 60°F, the fan will start and modulate through a pressure activated speed controller. The controller is factory set to start the condenser fan at approximately 170 PSI.

CHECKOUT LIST

With electric power OFF:

1. Check all electrical wiring (both factory and field) for completeness and tighten all electrical connections (contactor, capacitor, relays, etc.).
2. Check condenser fan blade for proper insertion depth in orifice plate.
3. Tighten all setscrews, evaporator blower and condenser fan.
4. Check condenser airflow for obstructions.
5. Clean or replace air filter(s). Do not operate system without air filter in place.
6. Leak-test all refrigerant connections (fittings, joints, gaskets, etc.), both factory and field, with a halide torch or electronic leak detector.
7. Replace all caps on service valves, if used.
8. Check to be sure all tools and loose parts have been removed from the unit.

9. Check to be sure all panels and covers are in place.
10. Following initial inspection, start unit and:
 - a. Check condenser fan and evaporator blower for proper rotation.
 - b. Adjust evaporator blower for proper airflow (approximately 400 CFM/ton \pm 10%). Unit is factory set at high speed.
 - c. Check line and low voltage (should be within \pm 5% of the value on the unit rating plate).
 - d. Check unit for proper operating refrigerant charge.
 - e. Check compressor current draw.
 - f. Check unit for excessive noise, refrigerant tubing for excessive vibration and for contact with other parts.
 - g. Do not leave installation until unit has been observed through several complete cycles. Make certain at this time all components are operating in correct sequence.
 - h. Thoroughly explain to owner(s):
 1. Operation of the system (thermostat, reset controls, etc.).
 2. Care and maintenance instructions (cleaning air filters, condenser and evaporator coils, blower wheel, lubrication, and humidifier).
 3. Factory and contractor warranties and how to obtain service, if necessary.

CARE AND MAINTENANCE

For continuing high performance and to minimize possible equipment failure, it is essential that periodic maintenance be performed on this equipment.

The air for the condenser coil is drawn into the unit through the sides and discharged out the top. Keep the air inlet and outlet grille unplugged and clear of any obstructions at all times. Never cover the unit or lean anything against it which might restrict airflow or cause hot air from top grille to circulate into the side inlets. Keep trash and debris away from the unit at all times. Never stand on the unit or use it as a support for ladders, etc.

The refrigerant tubing connecting this unit with the cooling coil is easily crushed or crimped. Do not hang or stand anything on it. Do not move the unit after it has been installed as this may crimp tubing and cause the unit to malfunction.

The ability to properly perform maintenance on this equipment requires mechanical skills and tools. If you do not possess these contact your local dealer for maintenance.

WARNING: Disconnect all electrical power to the unit before performing any maintenance or service on the condensing unit. Remember to also disconnect power supply to the air handler as it supplies low-voltage power to the condensing unit.

The minimum maintenance that should be performed on this equipment is as follows:

1. Check condenser coil for cleanliness each month. Clean as necessary.
2. Check fan motor and blade for cleanliness and lubrication each month. Clean and lubricate as necessary.
3. Check electrical connections for tightness and controls for proper operation yearly. Service as necessary.

WARNING: Because of potential damage to the equipment or personal injury, maintenance should be performed only by qualified persons. As with any mechanical equipment, personal injury can result from sharp metal edges, etc. Always exercise care when removing parts.

A. Condenser Coil

Remember to disconnect electrical power before removing any panels. This unit is equipped with a multi-row condenser coil. Since the air is drawn into the side of the unit and discharged through the top most of the dirt will collect on the outside surface of the coil. Some dirt will penetrate the first row of the coil and collect on the second row. This is very difficult to see without removing the top cover.

To properly check or clean the condenser coil, use the following procedure:

1. Remove top cover. Enough motor wire is provided so the top cover can be laid on edge over the compressor section without disconnecting motor leads. (Clip wire tie to release wire).
2. Clean coil by spraying from inside outward with high velocity stream of water (garden hose is sufficient). Care should be used not to damage the coil fins. Be sure to wash dirt from between the coil rows. Drain holes are provided in the base pan for drainage. Be sure they are open and free of debris. If the coil is coated with oil or grease it may be cleaned with mild detergent or approved cleaning agent then rinsed with clear water. Be careful not to get water in compressor and unit control boxes.

Replace the top cover and secure screws.

B. Condenser Fan and Motor Blade

1. Remove screws holding fan grille to top cover.
2. Lift grille with motor and fan blade out of hole and place on top of compressor compartment. Do not cut or stretch motor electrical leads. Also be careful not to bend fan blade.
3. Clean motor and blade with soft brush or rag. Be careful not to disturb balance weights on fan blade.
4. Check fan blade setscrews for tightness.
5. Lubricate the fan motor (if oil holes are provided).
 - a. Remove dust caps or plugs from oil holes located at each end of the motor.
 - b. Use teaspoon, 5cc, ½ oz. or 16 to 25 drops of good grade SAE 20 non-detergent motor oil in each hole. Allow for total quantity to absorb into each bearing.
 - c. Wipe excess oil from motor housing.
 - d. Replace dust caps or plugs in oil holes.
6. To reassemble unit:
 - a. Reinstall fan motor and blade into of top cover.
 - b. Push excess motor leads back into compressor compartment.
 - c. Reconnect electrical power and check fan for proper operation.

B. Electrical Controls and Wiring

With power disconnected to the unit, check all electrical connections for tightness.

Tighten all screws on electrical connections. If any smoky or burned connections are noticed, disassemble the connection, clean all parts and stripped wire, reassemble properly (use new connector if old one is burned or corroded) and secure tightly. Electrical controls are difficult to check without proper instrumentation. Reconnect electrical power to unit and observe unit through one complete operating cycle.

If there are and discrepancies in the operating cycle, contact your local dealer for service.

C. Refrigeration Circuit

The refrigerant circuit is difficult to check for leaks without proper equipment. If low cooling performance is suspected, contact your local dealer for service.

SHELF UNIT with OUTDOOR CONDENSER

INSTALLATION INSTRUCTIONS

GENERAL

The condenser, as shipped from the factory, includes the condenser fan and motor, condenser coil, fan guard and fan speed controller suitable for operation to -20° F. The condenser cabinet is galvanized steel with powder coated finish. Data Aire condensers units are approved for outdoor installations.

LOCATING THE UNIT

Select a location for the unit where ice and snow will not fall from an overhang and damage the unit top or fan blade. Care must be exercised to maintain the clearance requirements.

Minimum coil clearance: 30" on each side, 36" service door, and 60" top. (See drawing 540-900-036 for further details)

Consult local codes or ordinances for restrictions regarding location of unit.

Consult dimensional drawing (540-900-036) for the following:

5. Location of refrigeration and electrical connections
6. Recommended clearances
7. Direction of condenser airflow
8. Mounting base dimensions

Place unit on level base strong enough to support the weight of the unit and resist effects of frost heaving, etc. Concrete lintels can be used if spaced to adequately support unit.

Allow air to circulate under unit. Channels are provided for this purpose or unit may be set in a bituminous mixture such as roofing tar to prevent base pan from rusting. Do not plug drain holes.

On rooftop applications, locate unit at least 6 inches above roof surface. Where possible, place unit above load-bearing wall. Arrange supporting members to adequately support unit and minimize transmission of vibration to building. Pre-cast concrete lintels, concrete blocks, treated timbers, or steel beams can be used. Consult local code governing rooftop applications. In cold climates locate unit above expected snow levels.

Avoid locations where flowers, shrubs, etc. are in the pathway of condenser air discharge or where the condenser fan will discharge against prevailing wind or a building structure.

Avoid locations where normal operating sounds may be objectionable (such as beneath windows, between structures or near doors). Should operation sounds be objectionable, consideration should be given to a shielding barrier.

AIR COOLED PIPING

The interconnecting lines to the remote air cooled condenser must be installed by a qualified refrigeration mechanic.

To ensure oil return to the compressor, use the following recommendations:

1. Standard piping practice must be used to ensure oil return and minimize pressure drops.
2. Discharge lines must be trapped at the bottom, top, and every 15 to 20 feet of vertical rise.
3. Discharge check valves are required on long pipe runs or in cold climates.
4. Discharge line: recommended pressure drop should be between 3 and 6 psi. Minimum gas velocity for proper oil return is 1,000 FPM.
5. Liquid line: recommended pressure drop should be between 2 and 4 psi. Liquid line velocity from the condenser to the expansion valve should be between 200 and 300 FPM.

Recommended liquid and discharge line sizes (based on equivalent feet):

Unit	50 Equivalent Feet		100 Equivalent Feet		150 Equivalent Feet		200 Equivalent Feet	
	Hot Gas	Liquid Line	Hot Gas	Liquid Line	Hot Gas	Liquid Line	Hot Gas	Liquid Line
2	5/8	3/8	7/8	1/2	7/8	1/2	7/8	1/2
3	7/8	1/2	7/8	1/2	7/8	1/2	7/8	1/2
4	7/8	1/2	7/8	5/8	7/8	5/8	1-1/8	5/8
5	7/8	1/2	1-1/8	5/8	1-1/8	5/8	1-1/8	5/8

Piping sizes listed are for runs up to 200 equivalent feet. Qualified refrigeration installers may reduce the piping size for runs less than 200 equivalent feet.

For more information on pipe sizing, refer to ASHRAE Standards or other common practice trade publications. The information provided herein should be used as a guideline.

CHARGING PROCEDURE

1. Connect the refrigerant drum to the low side and charge with vapor. Charge approximately three (3) pounds per nominal ton.
2. Start the unit. Observe the liquid sight glass indicator to check approximate charge for a normal refrigeration cycle. Bubbles in the sight glass can be caused by flashing due to excessive pressure drop from liquid line piping, low sub-cooling or low refrigerant charge.
3. The discharge pressure should be a minimum of 225 psi with the system stabilized.
4. Adjust refrigerant until the sight glass is cleared or exhibits only a slight number of bubbles with sub-cooling of approximately 8-10°.

5. After the unit has stabilized, check the superheat temperature at the compressor suction line at least 6 inches away from the compressor. Superheat should be between 6 and 14°. Superheat of 10° is recommended.
6. Check the crankcase (oil) temperature at the bottom of the compressor. The oil temperature must be at least 35° higher than the saturated suction temperature at all times. Lower temperature difference indicates either the system is overcharged or that the superheat is set too low, allowing liquid refrigerant to return to the compressor. Liquid return may result in compressor failures.

FAN MOTOR CONTROLS

Air cooled condensers have a fan speed control as a standard feature. The variable speed motor modulates speed based on discharge pressure. The controller is factory set and does not require field adjustments.

CARE and MAINTENANCE

For continuing high performance and to minimize possible equipment failure, it is essential that periodical maintenance be performed on this equipment.

The air for the condenser coil is drawn into the unit on the side and discharged out the top. Keep the air inlet and outlet grille unplugged and clear of any obstructions at all times. Never cover the unit or lean anything against it that might restrict airflow or cause hot air from the top grille to circulate into the sides. Keep trash and debris away from the unit at all times. Never stand on the unit or use it as support ladders, etc.

The refrigerant tubing connecting this unit with the cooling coil is easily crushed or crimped. Do not stand or hang anything on it. Do not move the unit after it has been installed as this may crimp tubing and cause the unit to malfunction.

The ability to properly perform maintenance on this equipment requires certain mechanical skills and tools. If you do not possess these, contact your local dealer for maintenance.

WARNING: DISCONNECT ALL ELECTRICAL POWER TO THE UNIT BEFORE PERFORMING ANY MAINTENANCE OR SERVICE ON CONDENSER. REMEMBER TO ALSO DISCONNECT POWER SUPPLY TO THE INDOOR EVAPORATOR SECTION AS IT SUPPLIES LOW VOLTAGE POWER TO THE CONDENSER.

The minimum maintenance that should be performed on this equipment follows:

1. Check condenser coil for cleanliness monthly. Clean as necessary.
2. Check fan motor and fan blade for cleanliness and lubrication monthly. Clean and lubricate as necessary.

3. Check electrical connections for tightness and controls for proper operation annually.
Service
as necessary.

CAUTION: Because of possible damage to the equipment or personal injury, maintenance should be performed by qualified persons only.



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