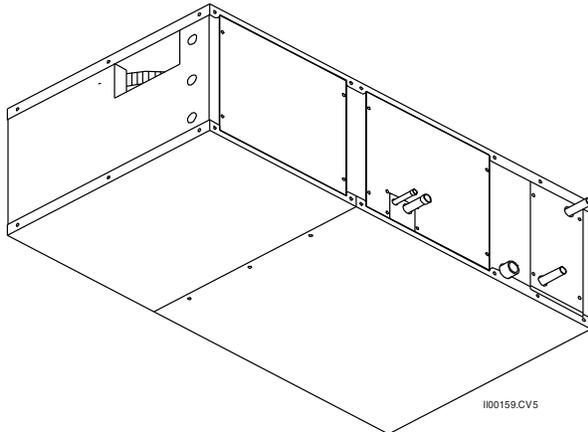




INSTALLATION MANUAL M1218 FAN COIL

NOTICE TO INSTALLER AND EQUIPMENT OWNER: RETAIN THIS MANUAL AT THE JOB



General The information on the following pages is to help the installer save time, provide the best possible installation and insure continuous trouble-free operation.

Scope These instructions apply to the Unico M1218 Fan Coil unit. Installation instructions for the air distribution system are covered in other bulletins. Before beginning any installation, a detailed system layout must be done in accordance with *Bulletin 40-40 System Sizing and Layout* bulletin.

SUFFICIENT BUILDING INSULATION IS ESSENTIAL FOR THE MOST ECONOMICAL OPERATION

General Precautions and Safety Tips Do not attempt to install or startup unit without first reading and understanding the appropriate sections in this manual. Before operating, be sure the unit is properly grounded.

Installation should be in accordance with all local codes and regulations and with the National Fire Protection Association and Underwriters Laboratories applicable standards and regulations. In case of conflict, local codes take precedence.

All electrical wiring should be in accordance with the latest edition of the National Electrical Code and all local codes and regulations.

Condensate piping should be installed in accordance with governing code.

Always install a secondary drain pan when an overflow of condensate could cause damage.

Part Numbers This manual does not always include the latest revision letter when referring to UPC part numbers. Refer to the latest Price List and Spec Sheets for the current UPC revision letter. For example, UPC-00A where A is the latest revision.

INTRODUCTION

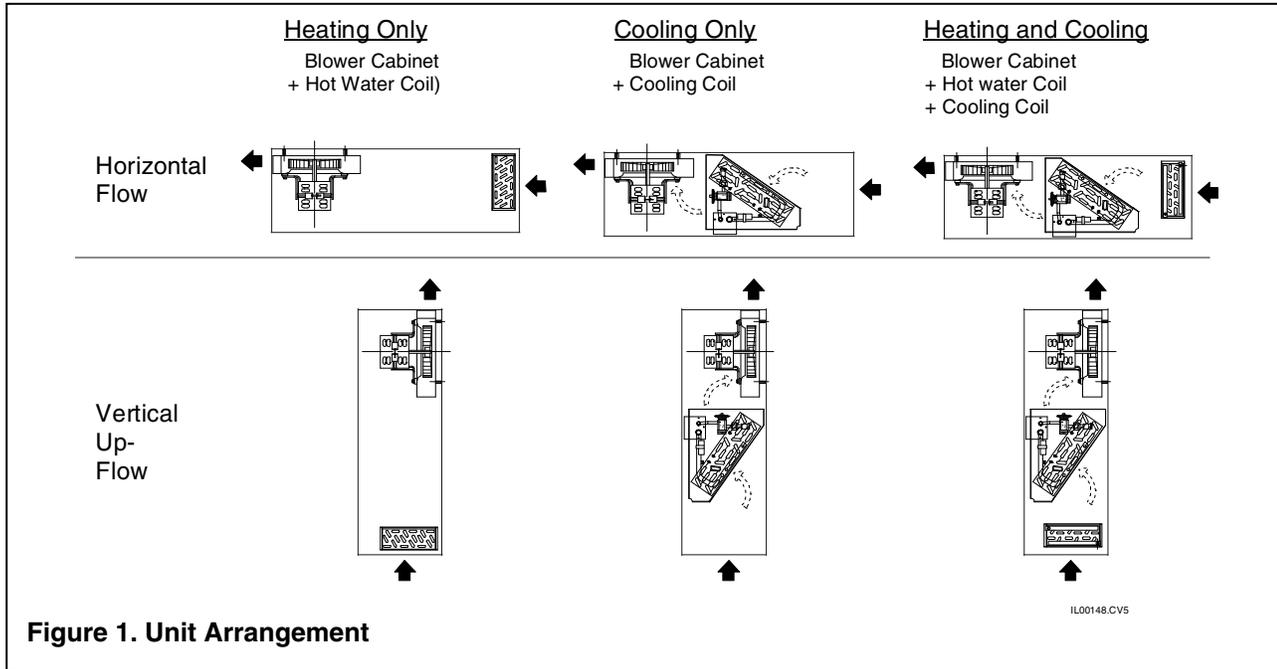
The Unico System is a complete indoor comfort system that includes an indoor fan coil unit and small duct system. The fan coil unit and duct system were designed to operate together to provide the proper airflow in every installation. The conditioned air is supplied through a series of two-inch diameter ducts as a stream of air that entrains and mixes with the room air. This process of aspiration produces a more even temperature distribution in the room than a conventional system.

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CONFORMS TO CAN/CSA STD
C22.2 NO. 236



The Unico M1218 Fan Coil unit is a single packaged unit. The cooling and heating coils are contained within the same cabinet. The unit can be mounted in a vertical-upflow or horizontal-flow configuration. The coils can be combined as a heating-only, cooling-only, or heating and cooling fan coil unit. See Fig. 1.

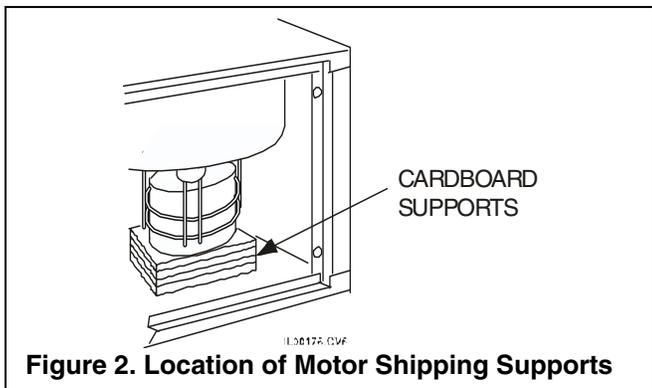
The unit is available in one size; 38-in L x 20-in W x 12-in H (965-mm x 508 mm x 305-mm). The heating only system includes the blower/motor and a hot water coil. The cooling only system includes the blower/motor and a cooling coil. For the heating and cooling system both coils are provided.

The cooling coil may be a refrigerant coil, a heat pump coil, or a chilled water coil. The electrical panel is located inside of the cabinet.

UNPACKING

All units are inspected prior to shipping and are carefully packaged in individual cartons. Inspect all cartons prior to unpacking. Notify carrier of any damage.

Open the carton to remove the unit. Inspect unit for visible



signs of concealed damage and notify carrier of any such damage. All materials are sold FOB Factory and it is the responsibility of the consignee to file any claims with the delivering carrier for materials received in a damaged condition. **Open the blower access panel to remove the motor shipping support. See Fig. 2. The expansion valve is shipped loose and is located in the coil compartment near the connections.**

MOUNTING

The unit comes factory ready for horizontal or vertical airflow applications (see Fig. 1) and may be mounted to a structure using the optional mounting rails (*UPC 95*).

LOCATION

Locate the air handler to minimize the number of plenum elbows and fittings while keeping the supply duct runs as short as possible. (See *Bulletin 40-30, Component Layout*). The fully insulated cabinet allows installation with zero clearance to the top, bottom, or sides of the unit. However, clearance must be provided for servicing which is dependent on how the unit is installed. Servicing of the blower/motor assembly and coils can be performed in three different ways:

1. The complete top panel, which is attached to blower/motor assembly, can be removed. To do this, the motor leads must be disconnected in the control compartment.
2. For side access remove the control panel, cooling coil panel, or heating panel which are located on the same side as the refrigerant, drain, and water connections.

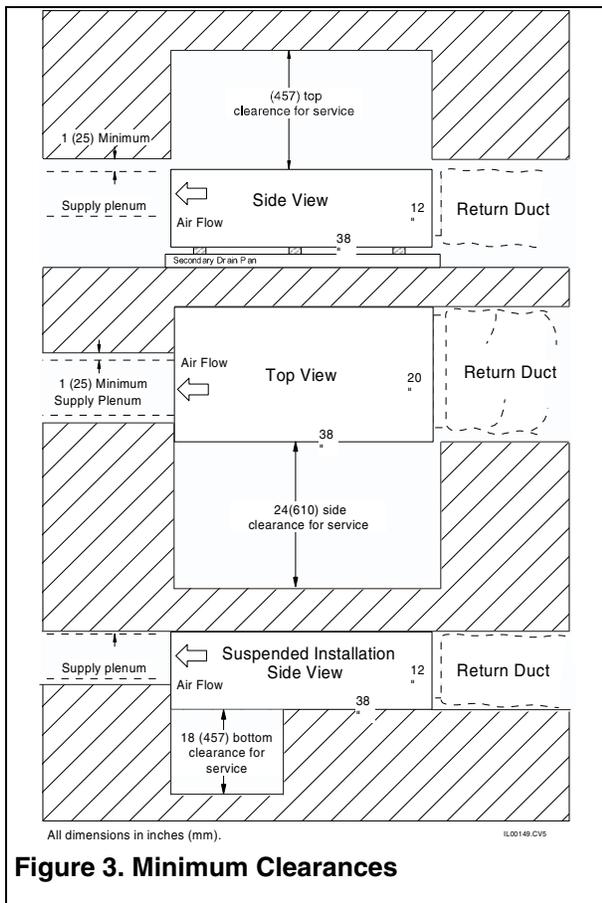


Figure 3. Minimum Clearances

- Where the unit is suspended or mounted on the wall using the mounting rails, the panel below the blower/motor assembly can be removed for servicing. In this case access to the coils must be from the side access panels. See Fig. 3.

Position the return air box and filter near the unit allowing at least one 90° bend in the return duct for proper acoustical performance. Fig. 4 shows a typical horizontal attic installation

The standard return duct is 10 feet (3 m) in length so it may have to be cut to avoid bunching if the distance to the unit is significantly less than 100 inches. If needed, up to two return ducts can be coupled to make a 20-ft (6-m) duct. The minimum length should be 6 feet (2 m). When given a choice, maximize the distance and make at least one 90° bend for the best sound attenuation.

Each unit is designed to fit into a small space where a conventional unit could not be used. The 12-in. height allows the unit to fit through joists or studs spaced at least 16-inches (406 mm) on center. If no access is provided, an opening must be cut. It is suggested to use the opening required for the return air box, especially in an attic installation. The opening size for the return air box is listed in Table 1. If the joists or studs are significantly less than 16 inches (406 mm) center-to-center or running the wrong direction it would be necessary to cut and header the joists.

Table 1. Return Air Box Opening

Model	Return Air Box Part No.	Size of Opening Inches (mm)
1218	UPC-01-1218	14 3/8 x 20 1/2 (365 x 521)

Secondary Drain Pan

Where an overflow of condensate could cause water damage, a secondary drain pan **MUST BE INSTALLED**. Place the drain pan on the mounting base, platform or angle iron support frame. Be sure to allow enough room for the drain line and connection (refer to Table 2). The unit should be placed over the secondary drain pan. Use rubber pads for isolation to raise the unit high enough in the secondary drain pan for the drain line to clear the side.

Table 1. Secondary Drain Pan

Unit Size	Part No.	Dimensions inches (mm)
M1218	UPC-94	42 x 24 (1066 x 610)

† NOTE — The drain fitting extends 7/8 inch (22 mm) beyond this dimension.

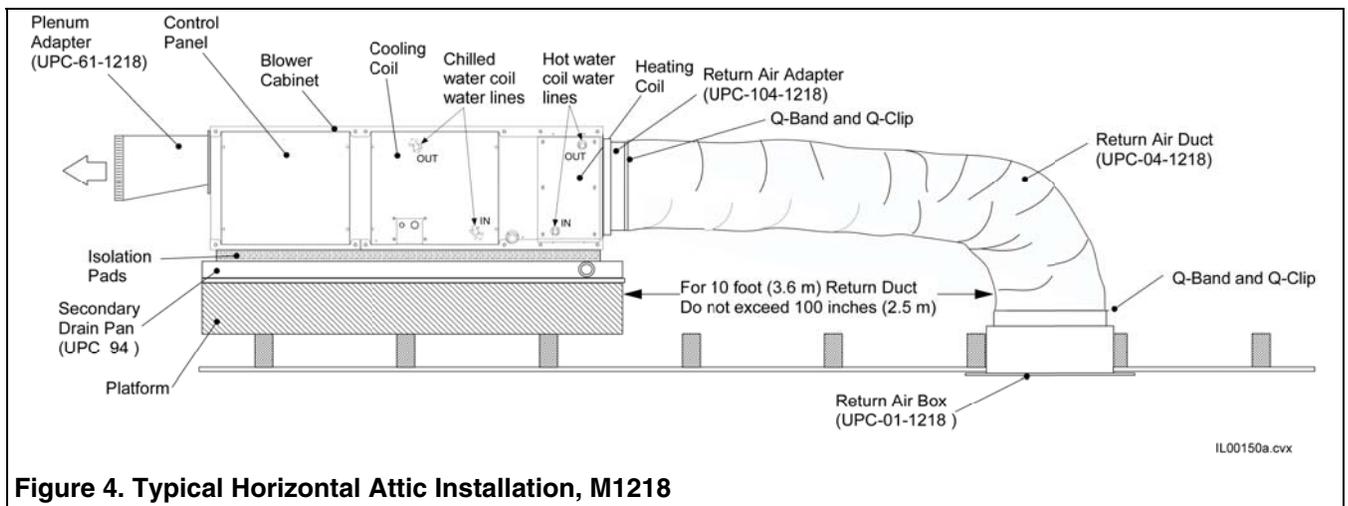


Figure 4. Typical Horizontal Attic Installation, M1218

Horizontal Platform Mounting

Mount the unit horizontally when vertical height is limited such as in an attic or crawl space. It is easiest to mount the unit on a platform but care must be taken to assure proper drain line pitch.

The platform height must allow for proper pitch of the condensate drain lines — at least ¼ inch drop per lineal foot (20 mm per meter). The platform can be built from a sheet of ½ inch (13 mm) plywood and stud frame. Table 3. Lists the maximum horizontal drain line run for various framing materials and still provide adequate drainage.

Table 2. Horizontal Distance of Drain Piping for Different Framing Materials

Frame Lumber:	2 x 4	2 x 6	2 x 8	2 x 10
Max. Horizontal Run, ft. (m)	18 (5)	26 (8)	34 (10)	42 (13)

The platform size should be a minimum of 24 x 42 inches (610 x 1066 mm).

Place secondary drain pan on platform and unit on top of isolation pads inside of secondary drain pan. Be sure that the unit is raised high enough in the drain pan to allow for primary drain line condensate connection.

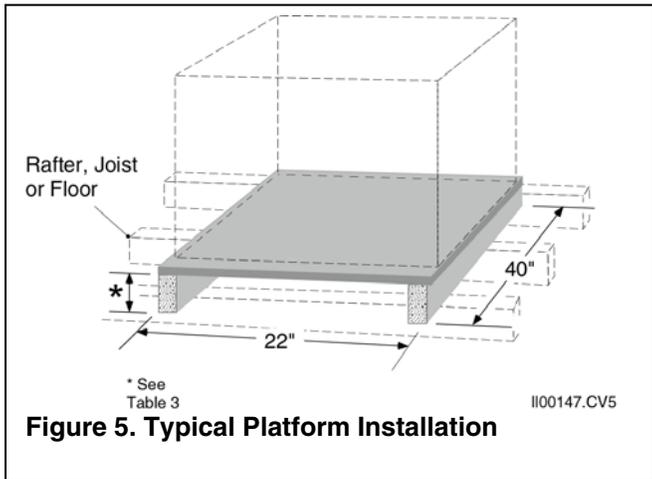


Figure 5. Typical Platform Installation

Horizontal Suspended Mounting

The unit can also be suspended from the ceiling or rafters. The preferred method is to support the unit and the secondary drain pan from underneath with angle iron supports (see Fig. 6). As an alternative, the unit can be hung with the mounting rails.

CAUTION. DO NOT HANG UNIT FROM TOP OF CABINET IF NOT USING MOUNTING RAILS TO AVOID DAMAGING THE EQUIPMENT.

Use either four (4) chains or steel cables with 80 lbs. (36 kg) test strength to hang the unit. Use eyebolts and ‘J’

hooks as applicable to attach the chains or cables to the unit and the ceiling.

Place the unit inside of the secondary drain pan as you would for platform support with the angle iron supports lengthwise under the secondary drain pan. Level the unit by adjusting the length of the chains or cables.

If using the alternative method, hang the secondary drain pan from the unit using self-tapping screws and metal straps or wires. Adjust the straps or wires to pitch the secondary drain pan toward the drain connection.

Ceiling Mounting

If desired, the unit can be mounted flush to the ceiling (see Fig. 7) using the optional mounting rails (UPC-95). Remove top screws from both sides of the unit. Align holes on mounting rails with the holes on the unit. Fasten mounting rails to the unit with the screws that were removed earlier. Attach unit to a structural member. Refer to Fig. 8 for the screw hole pattern. Suspend secondary drain pan from the unit with metal straps or wires.

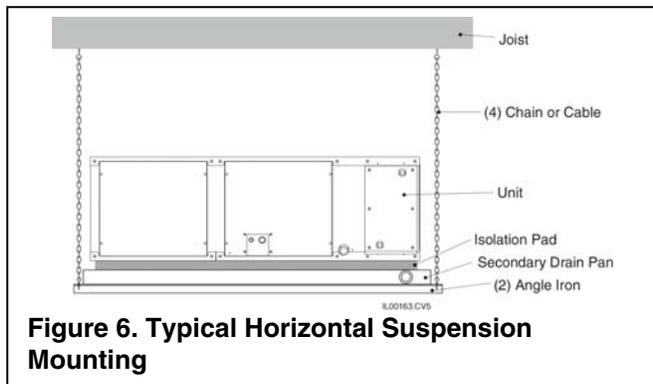


Figure 6. Typical Horizontal Suspension Mounting

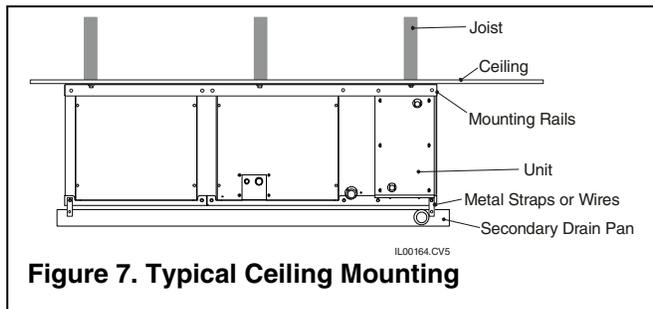


Figure 7. Typical Ceiling Mounting

Vertical Rail Mounting

The unit can only be mounted in the vertical up-flow configuration. The vertical rail mounting method is shown in Figure 9. Mark hole pattern on wall and install stud screws or lag screws (see Fig. 8).

To install the unit vertically, such as in a closet, basement, or utility room, attach the mounting rails (UPC 95) to the top of the unit as explained previously. Screw or nail a temporary board to the wall at the bottom of the location where the unit will be mounted. The unit will rest on this board during mounting. If the wall covering is not adequate enough to hold the weight of the unit, use lag screws to attach the rails to the structure. Use six (6) lag screws a minimum of 3 inches (77 mm) long, which will be screwed directly into a stud or structural member. If the wall covering is sufficient, toggle screws may be used to mount the unit. The board can be moved when the mounting of the

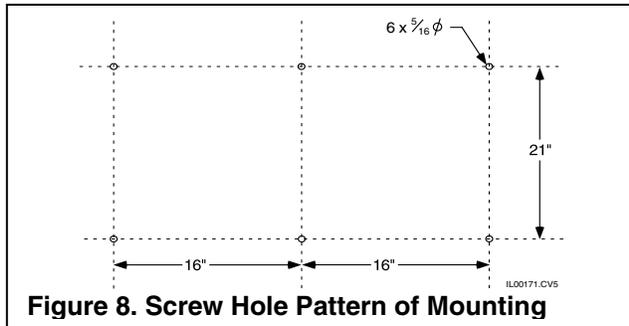


Figure 8. Screw Hole Pattern of Mounting

unit is completed.

DUCT CONNECTION

Supply Plenum

The standard supply plenum is a 7-inch (178-mm) diameter duct, although this can be reduced to a 6-inch (152-mm)

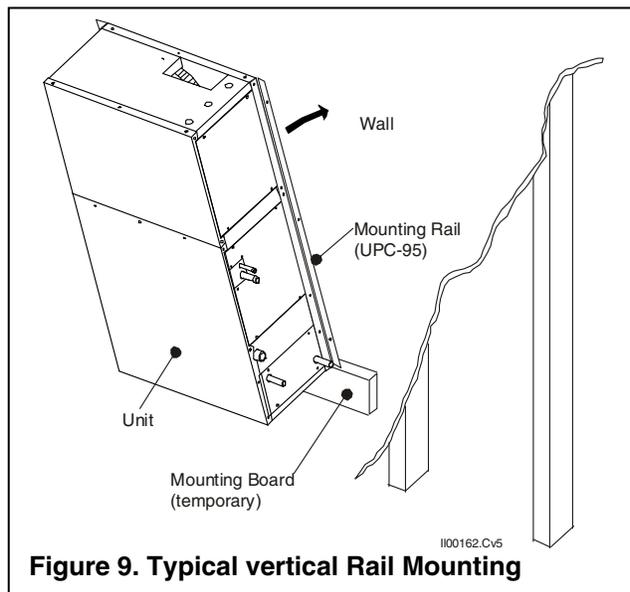


Figure 9. Typical vertical Rail Mounting

diameter duct. The M1218 plenum adapter (UPC-61-1218) provides a convenient connection to a 7 in (178-mm) duct.

The supply plenum can be a 7-inch ID rigid round fiberglass or a sheet metal duct with a minimum thickness of 26 gage. Refer to a separate bulletin for the installation of the ductwork.

A 6-in plenum can be used so long as a 7-in duct is attached to the unit and is then reduced at least 4-ft from the unit.

To attach the plenum adapter to the unit, align the holes on the adapter with the holes located around the supply outlet on the unit. Mount the adapter with six (6) sheet metal screws. See Figure 10.

Attach the plenum to the adapter by inserting it over the collar. Use three (3) or four (4) equally spaced sheet metal screws to secure the duct to the collar and then tape around the seam with UL 181A aluminum tape. Then wrap the 1-in fiberglass blanket duct insulation around the adapter and seal with UL 181A aluminum tape.

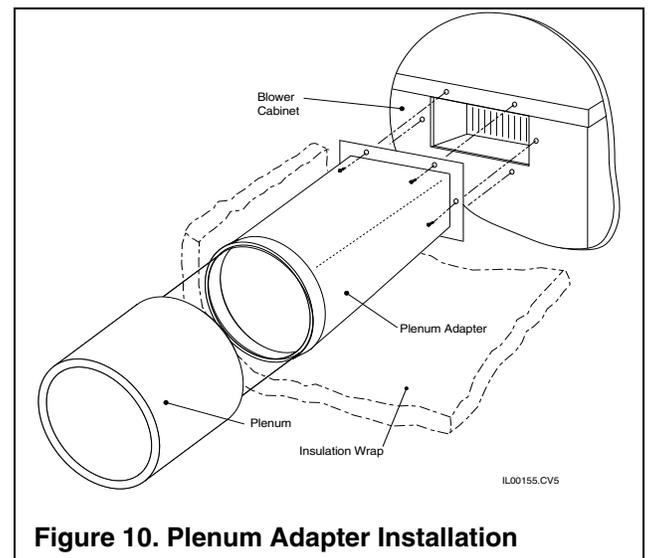


Figure 10. Plenum Adapter Installation

The supply plenum also can be square or rectangular. The inside dimensions of the duct must provide a minimum of 30 sq. in. (194 sq. cm.) of flow area, e.g. 5 x 6-in, 4 x 7 1/2-in (125 x 150, 100 x 190 mm). The square 6 1/2 x 6 1/2-in (165 x 165 mm) fiberglass plenum that is available from Unico along with matching tees, elbows, and end caps can also be utilized. However, it is recommended that the duct be a minimum of 4 inches (102 mm) in height for the takeoff to mount properly.

Return Duct

The Unico return air system has a single return that includes the return air box with filter, the acoustical flex return duct, and the return air adapter (refer to Fig. 4). Multiple returns or extra long returns are possible so long as the maximum pressure loss is not exceeded. The return system is designed for a maximum static pressure drop of 0.15 inches of water (37 Pa) including the filter. The return duct should have at least one 90 degree bend between the unit and filter box to reduce sound transmission directly from the unit.

Although Unico only supplies a single return system, the return system can be redesigned for multiple returns. The return duct system is a conventional duct design not high velocity; therefore, the return system may be different;

provided, the static pressure does not exceed 0.15 inches of water column and there is some form of sound attenuation. Generally, this means sizing the duct for a pressure loss of 0.05 inches of water column at the required airflow and sizing the filter for a pressure drop of 0.10 inches of water column at the required airflow. Sound attenuation can be accomplished with fabricated duct board, lined sheet metal, or acoustical flex (Part number UPC-04-1218). For best attenuation, always have at least one 90 degree bend to eliminate direct line-of-site from the unit to the return opening.

To install the return filter and grille, cut an opening for the return box as specified in Table 1. If the joists or studs are on 16 inch (410 mm) centers, there is no need to build a frame to hold the return air box. Otherwise, it will be necessary to construct a frame around the opening. Center the return air box so the filter frame flange covers all the gaps and make sure the flange is flush against the wall or ceiling. Install the return air box against the frame using nails or screws. Holes are provided in the return air box. Use the four (4) 1/4-inch (6.4 mm) holes. The other holes are for mounting the filter grille. See Fig. 11.

Install filter frame into the return air box using four (4) nails

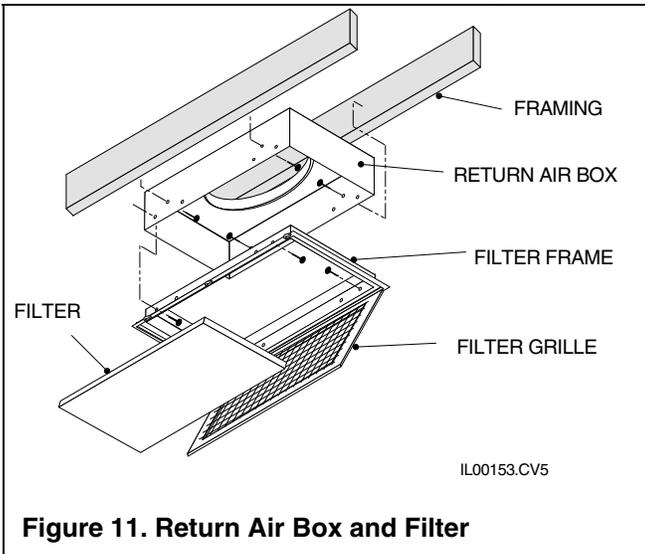


Figure 11. Return Air Box and Filter

or screws. Insert filter and hold in place by rotating metal clips. Close grille and secure with clips.

Connect the return air adapter to the unit using sheet metal screws. Then attach the return duct to the adapter and to the return air box using the supplied band. Tape the seams with UL 181B duct tape.

PIPING

All piping must be in accordance with all local codes and ordinances.

Condensate Lines

The primary drain pan condensate connection is a 1/2 inch (13 mm) female pipe thread fitting and the secondary drain pan connection is a 3/4 inch (19 mm) PVC socket fitting.

Elevate the unit so the condensate lines are pitched at least 1/4 inch per lineal foot (20 mm per meter). Trap the condensate line near the unit as shown in Figure 12. In some cases it may be necessary to wrap the condensate line near the unit with insulation to prevent water from condensing on the outside of the pipe. In some climates or locations it may be necessary to protect trap from freezing in the winter.

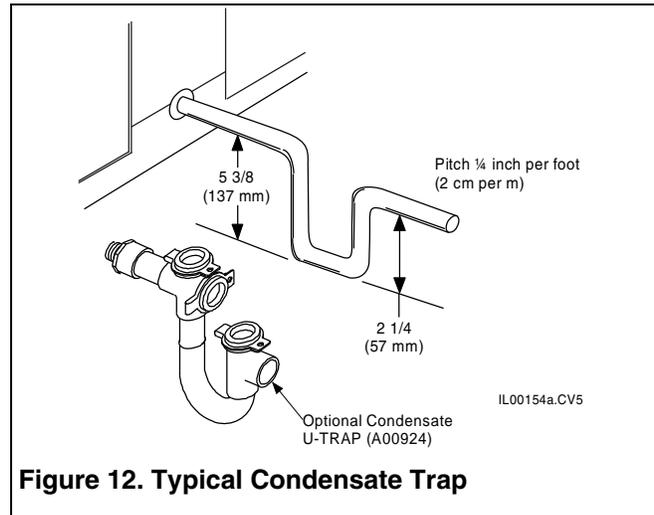


Figure 12. Typical Condensate Trap

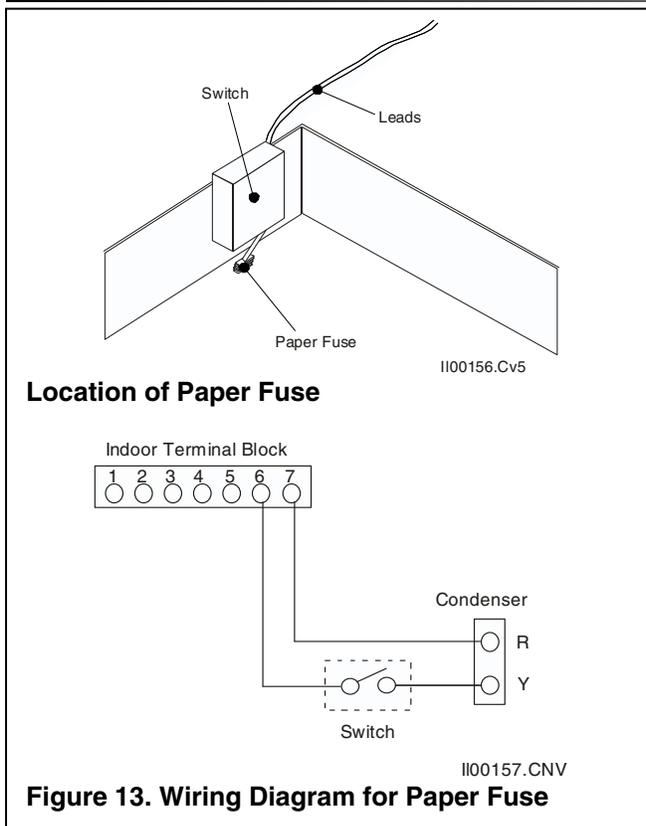
Do not trap the secondary drain line and do not terminate line into the primary drain line. Run secondary drain line so that any drainage will be immediately known without causing damage to property. A typical location is to terminate the secondary drain line above a windowsill so that the drainage splashes on the window. This will serve as an indicator that there is a problem with the primary drain.

An alternative method of notifying the homeowner about a leakage problem is to use a paper fuse and micro switch. See Fig. 13. Install a micro switch upside down on the side of the secondary drain pan. Making sure that the switch is open. Next, sandwich a paper fuse between the switch and the bottom of the drain pan so that the switch is closed. When water is present in the secondary drain pan, the fuse will dissolve and the switch will open causing the outside unit to shut down until it is serviced.

Also available is the Unico Condensate U-Trap which features a clear trap that is easy to visually inspect for clogs. The U-Trap is designed for the *Unico System* with a 2.5 inch (64mm) deep trap to handle the higher static pressures. The U-Traps also feature easy to remove clean-out caps and incorporate to tees to accommodate any piping arrangement (Part No. A00924).

Refrigerant Connections

CAUTION: WHEN BRAZING, PURGE WITH NITROGEN GAS TO PREVENT THE FORMATION OF OXIDES.



Location of Paper Fuse

Figure 13. Wiring Diagram for Paper Fuse

The refrigerant lines are copper sweat connections. The liquid line is 3/8 inch (9.5 mm) OD and the suction line is 5/8 inch (16 mm) OD. Refer to the condensing unit manufacturer's instruction for proper line sizing information based on distance from condenser.

Install a liquid line filter drier as close to the coil as possible to protect the evaporator from foreign object debris. For troubleshooting purposes, especially for attic installations or when using long line sets, an optional moisture indicating sight glass should also be installed between the filter-drier and expansion valve near the indoor unit (see Fig. 14).

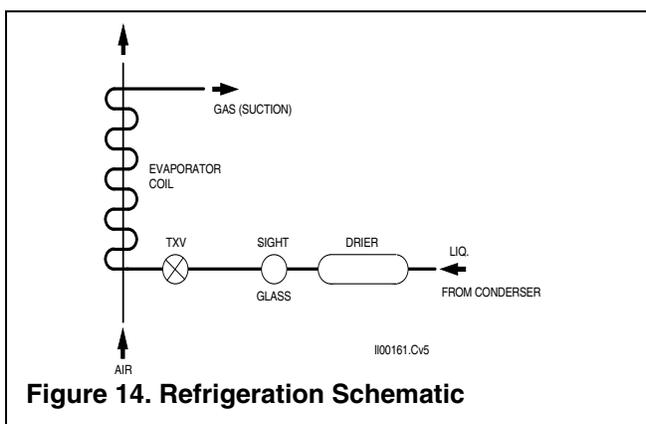


Figure 14. Refrigeration Schematic

Expansion Valve.

The expansion valve is shipped loose inside the unit in the blower section. Install the valve inside the unit as shown in Fig. 15. Use the following steps when installing:

1. Remove plastic caps to external equalizer line and distributor inlet.
2. Connect valve to distributor and tighten flare nut.
3. Connect external equalizer line and tighten flare nut.
4. Connect to the outlet the 3/8" (9.5 mm) OD copper refrigerant fitting. Make sure the flare nut is tight.
5. After all lines have been connected, pressure check the connections by charging the system with 150 psig of dry nitrogen and check for leaks at all connections.

Locate the bulb at the 12 O'clock position on a horizontal straight section of the 5/8" (16 mm) suction line (see Fig 15). Attach the bulb to the tubing with the two straps that are provided. For satisfactory expansion valve control, good thermal contact between the bulb and the suction line is essential.

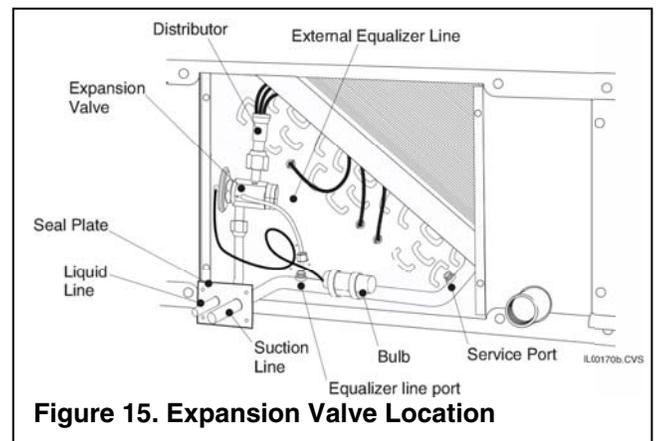


Figure 15. Expansion Valve Location

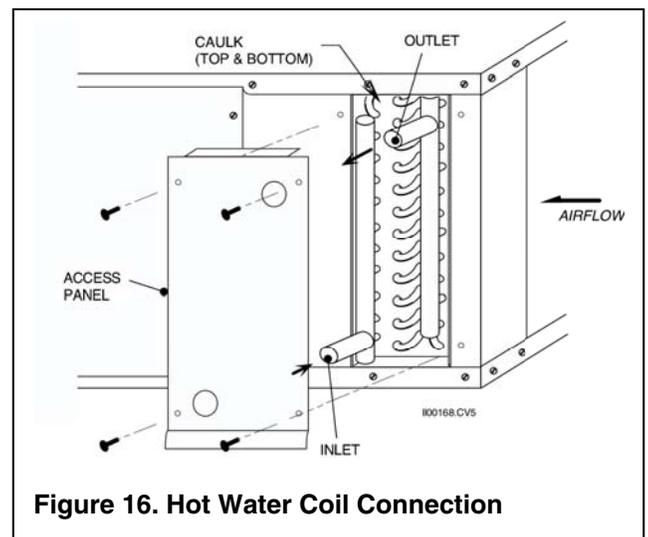


Figure 16. Hot Water Coil Connection

Water Connections

If you are installing the hot water coil, remove the side coil access panel. Slide the coil into the cabinet if not already installed at the factory and reinstall the door panel. After removing plugs in the inlet and outlet holes, caulk around connections to prevent leakage.

Pump and pipe sizing should be based on proper flow rate. Refer to Appendix A for water coil capacities based on flow rate.

All water connections are 5/8 inches OD (16 mm) sweat connections. Sweat the water connections, then fill the system. Install a vent valve at the highest point and a drain valve at the lowest point of the water system (refer to Fig. 17). Fill and bleed the air from the system. If unit is in an unconditioned space care must be taken to prevent the water from freezing. Use a glycol-water antifreeze solution with a freezing point below the coldest temperature expected.

As an alternate to an anti-freeze solution, the water can be continuously circulated to prevent freezing. If the coil will not be used for an extended period of time during cold temperatures, drain the system then flush with a glycol solution.

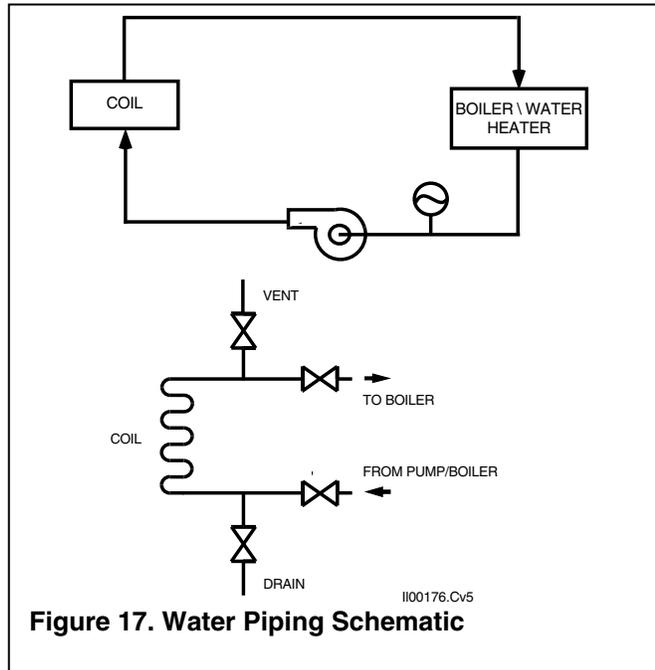


Figure 17. Water Piping Schematic

Wiring

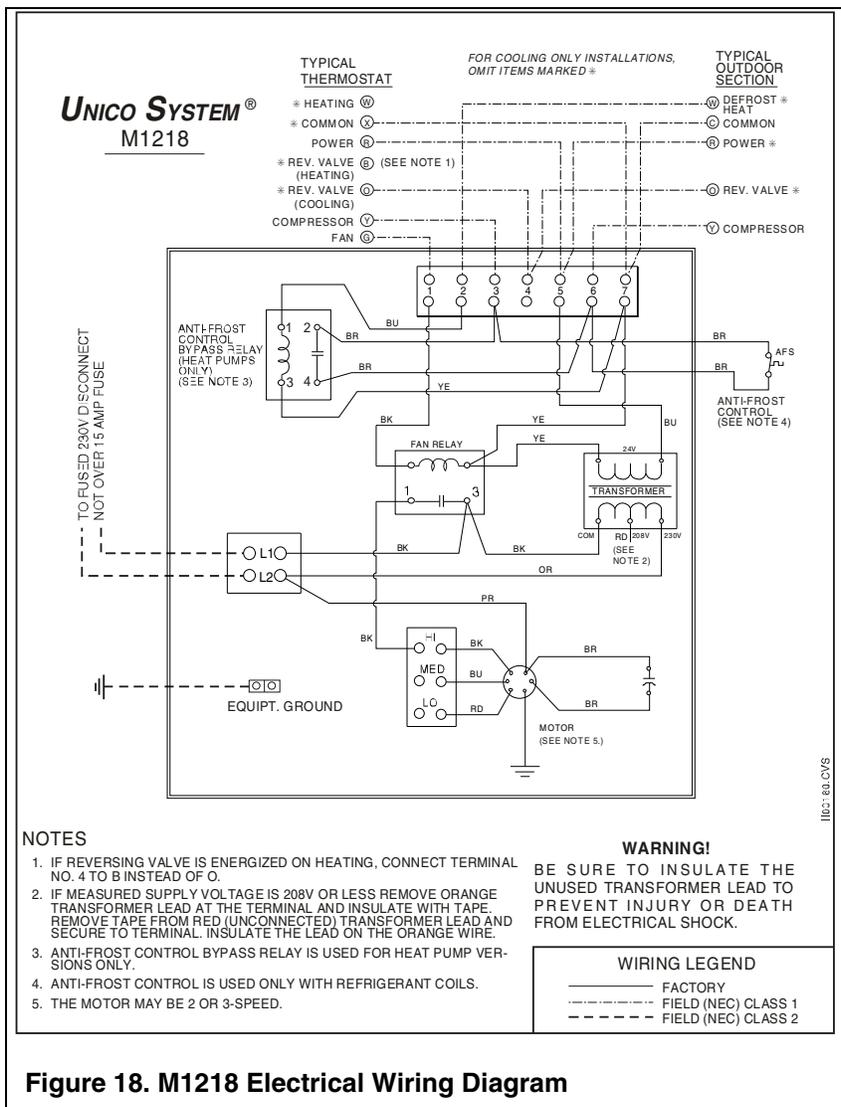
WARNING!

DISCONNECT ELECTRICAL SUPPLY BEFORE WIRING UNIT TO PREVENT INJURY OR DEATH FROM ELECTRICAL SHOCK.

All electrical wiring must comply with all local codes and ordinances. Make electrical connection in accordance with the wiring diagram shown in Fig. 18. Use a separate 1 ph - 230/208V – 60/50 Hz power supply with a 15 amp fuse or breaker and appropriate wire gauge per local code.

The wiring diagrams in this instruction manual are for a cooling-only system, heat pump system without electric heat, or cooling with a hot water coil. Separate wiring instructions for electric heating will ship with that the electric duct heater.

1. Connect the control wiring per Fig. 19 for cooling-only application, Fig. 20 for heat pump applications, or Fig. 21 for cooling with a hot water coil. Refer to Installation Instructions for Electric Duct Heaters for wiring instructions for auxiliary heaters.



NOTES

1. IF REVERSING VALVE IS ENERGIZED ON HEATING, CONNECT TERMINAL NO. 4 TO B INSTEAD OF O.
2. IF MEASURED SUPPLY VOLTAGE IS 208V OR LESS REMOVE ORANGE TRANSFORMER LEAD AT THE TERMINAL AND INSULATE WITH TAPE. REMOVE TAPE FROM RED (UNCONNECTED) TRANSFORMER LEAD AND SECURE TO TERMINAL. INSULATE THE LEAD ON THE ORANGE WIRE.
3. ANTI-FROST CONTROL BYPASS RELAY IS USED FOR HEAT PUMP VERSIONS ONLY.
4. ANTI-FROST CONTROL IS USED ONLY WITH REFRIGERANT COILS.
5. THE MOTOR MAY BE 2 OR 3-SPEED.

WARNING!

BE SURE TO INSULATE THE UNUSED TRANSFORMER LEAD TO PREVENT INJURY OR DEATH FROM ELECTRICAL SHOCK.

WIRING LEGEND

- FACTORY
- - - FIELD (NEC) CLASS 1
- · - · - FIELD (NEC) CLASS 2

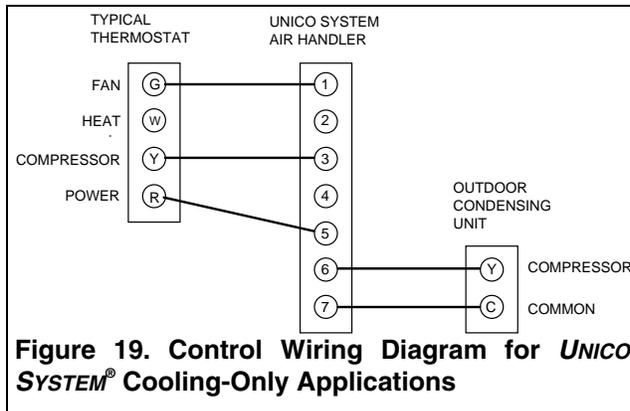
Figure 18. M1218 Electrical Wiring Diagram

Match thermostat anticipator settings for combined amperage load of all components, including electric heater contactors, to prevent damage to thermostat.

2. Connect power supply to terminals L1 and L2 on the high voltage terminal block. Connect a ground wire to equipment grounding lug located inside of the control box near the incoming power opening.

WARNING!
BE SURE TO INSULATE THE UNUSED TRANSFORMER LEAD TO PREVENT INJURY OR DEATH FROM ELECTRICAL SHOCK.

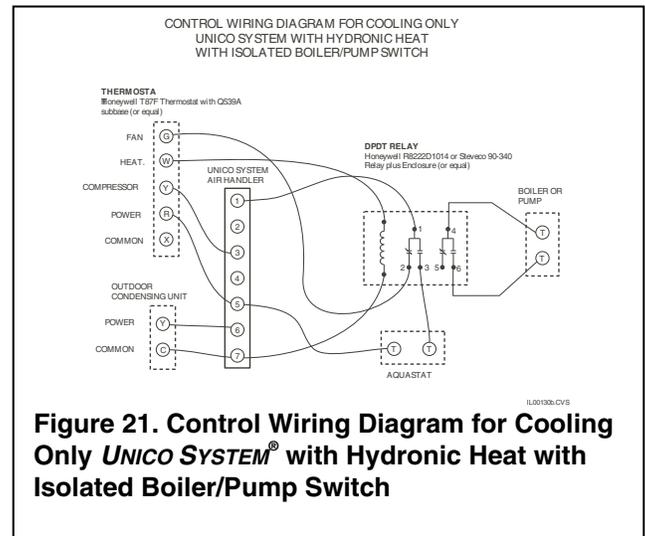
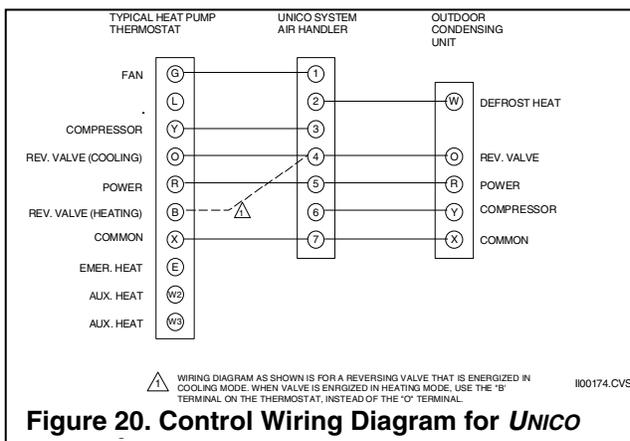
The low voltage transformer is factory wired for a primary voltage of 230V. If power supply is 208V, remove ORANGE lead from L2 terminal and connect



RED lead to L2. Insulate the connector on the unused wire lead.

Hydronic Heating (Hot Water) Coil Wiring

A normal heat-cool thermostat will not energize the indoor blower during the heating cycle; therefore, use either use a electric furnace thermostat or installed a low-voltage double-throw double-pole (DPDT) relay as shown in Fig. 21, e.g. Honeywell R8222N1011 relay or equal. If an aqua stat is not used, install a wire from terminal 5 of the low voltage block to terminal 3 of the relay as shown in Fig. 21.



Charging and Startup

Sequence of Operation

The sequence of operation depends greatly on the options installed and type of control thermostat used. Most thermostats have a fan AUTO-ON switch. When the fan switch is set to ON, the “G” circuit is closed and the blower relay is energized. The indoor blower starts after about a 20 second delay. The following paragraphs describe the sequence of operation when the fan is set to AUTO. If the fan switch is set to ON, the sequence is the same except the “G” circuit is always closed and the indoor fan is always operating.

Cooling Cycle (A/C or Heat Pump). When the thermostat calls for cooling, the “Y” and the “G” circuits are closed, and a 24 V signal is sent to the compressor contactor in the outdoor unit and fan relay in the indoor unit. After about 20 seconds, the indoor blower starts. At the same time, the compressor and outdoor fan also start. Depending on the control circuitry in the outdoor unit, there may be a time delay before the outdoor unit starts. If the system was just turned off, the time delay could be as much as five minutes. The cooling system is now operating.

For heat pump thermostats setting the switch to ‘cooling’ immediately closes the “O” circuit, which is used to energize the reversing valve solenoid if required by the heat pump. Otherwise, the “B” circuit, which closes when switched in heating, is used to energize the reversing valve solenoid. (Refer to the heat pump manufacturer’s instructions to see which mode the solenoid needs to be energized – whether in heating or cooling.)

When the thermostat is satisfied, the 24 V signals open and the outdoor unit stops. The indoor blower continues to operate for about 40 seconds, then stops. The system is now off.

Heating Cycle (Heat Pump). Setting the thermostat to HEATING will automatically switch the reversing valve

solenoid. This setting closes the “B” circuit which sends a 24V signal to energize the solenoid if required by the heat pump. Otherwise the “B” circuit is not used and the solenoid is not energized during heating.

When the thermostat calls for heating, the “Y” and “G” circuits are closed, sending a 24 V signal to the compressor contactor in the outdoor unit and the fan relay in the indoor unit. This starts the indoor blower and the outdoor compressor and blower. There is a time delay of about 20 seconds for the indoor unit. The heating system is now operating in stage one.

If the first stage does not satisfy the thermostat, the second stage thermostat calls for more heat. This closes the “W2” contacts and energizes the sequencer for electric heat. When the second stage thermostat is satisfied, the “W2” circuit is broken and the sequencer is de-energized. The electric heating system is now off.

When the first stage thermostat is satisfied, the 24 V signals open and the outdoor unit stops. The indoor blower continues to operate for about 40 seconds, then stops. The system is now off.

Heating Cycle (Electric Heat). When the thermostat calls for heating, the “W” and “G” circuits are closed. The W circuit completes the 24V signal to the sequencer in the electric duct heater, which cycles on the electric heating elements. The G circuit completes the 24V signal to the fan relay in the indoor unit, which starts the indoor blower after a time delay of about 20 seconds. The heating system is now operating.

When the thermostat is satisfied, the 24 V signals open and the indoor blower stops after about 40 seconds. At the same time the sequencer cuts the power to the electric elements. The system is now off.

Note: Use a thermostat designed for electric heat. A normal heating-cooling thermostat will not close the “G” circuit on heating.

Heating Cycle (Hydronic Heat). When the thermostat calls for heating, the “W” circuit is closed sending a 24 V signal to the field installed heating relay. This relay closes two circuits. One completes the boiler circuit, which either opens a valve or starts a pump. The other completes the fan relay circuit, energizing the blower motor relay and starting the blower after a 20-second delay.

If an aquastat is utilized, the fan relay circuit will remain open until the aquastat is satisfied.

When the thermostat is satisfied, the 24 V signal to the heat relay opens and the pump or valve circuit opens which stops the pump or closes a valve. The fan circuit opens and de-energizes the fan relay. After about 40-seconds the blower stops.

Fan Speed

The standard motor has 3 speeds but it operates as a one-speed motor. Select the speed which achieves at least 300 CFM (142 L/s). More air is generally not a problem unless the air flow from the outlets exceeds 40 CFM (19 L/s). If this is the case, simply choose a lower speed, making sure the minimum airflow through the unit is maintained. The unit is factory set to use the medium speed with the standard motor.

The optional 2-speed motor is available with the Unico ACB (Advanced Control Board). For more information on this feature refer to Bulletin 30-38.

Table 4. Motor Amperage versus Airflow

	Airflow		Amperage @ 230V		
			High Speed	Medium Speed	Low Speed
	CFM	(l/s)			
3-Speed Motor (Standard)	200	(94)	1.21	0.88	0.79
	300	(142)	1.37	1.11	1.02
	400	(189)	1.57	1.38	1.34
2-Speed Motor (Optional)	200	(94)	1.05	-	*
	300	(142)	1.20	-	*
	400	(189)	1.35	-	*

*Low speed for the optional 2-Speed motor produces half the high speed airflow (1.0 amp @ 230V)

Check for the proper airflow by measuring the amperage and compare to Table 4. For hot water systems, refer to Appendix A for minimum airflow.

Checking Airflow.

CAUTION. DO NOT OPERATE BLOWER WITH FREE DISCHARGE OR LOW STATIC PRESSURES (BELOW 1 INCH WC (250 Pa)) TO PREVENT MOTOR FROM OVERLOADING.

After the system is installed and before charging system, check for proper airflow. Record the plenum static pressure and the motor amperage and voltage. With this information, the amount of airflow can be determined.

As a recommended further check on airflow, use a velometer to measure the CFM from each outlet. The most convenient instrument to use is a hand held vane type velocity meter that fits directly over the outlet. The Turbo-Meter (Davis Instruments Catalog No. DS105107) or equivalent meter will give a direct LED readout on the KNOTS (FPM x 100) setting, when multiplied by 2 gives the CFM of the outlet within an accuracy of 10%.

By measuring and totaling the CFM of all outlets, the total airflow of the system can be closely approximated and provide a crosscheck for the airflow determined from the motor amperage and Table 4. Use Table 5 to help troubleshoot airflow problems.

Static Pressure. Measure the external static pressure (see the following section) in the supply plenum at least two feet (0.6 m) from the unit and verify that it is within the allowable range.

The plenum static pressure should be 1.4 to 1.6 inches of water column (350 to 400 Pa).

It is not necessary to measure the return duct static pressure unless it was field fabricated. The maximum return static pressure (including filters) should be 0.15 inches of water column (37 Pa). If it is greater than 0.15 inches of water column, add the return system pressure drop to the supply plenum static pressure to get the total static pressure drop.

For example: If the supply static pressure is measured to be 1.6 inches w.c. and the return system pressure drop is 0.25 inches w.c., the total static pressure drop is: $1.6 + 0.25 = 1.85$. In this case the static pressure is too high.

Motor Amperage. Remove the control panel and measure the current with an amp meter and compare to Table 4.

How to Measure Static Pressure. Measure the supply plenum static pressure at least 24 inches (610 mm) from the unit, but before any tee or elbow. A distance of between 2 and 3 feet (0.6 to 0.9 m) is best. Use an inclined manometer capable of reading at least 2.5 inches of water column (622 Pa), such as Dwyer Instrument’s model 109 manometer. Be

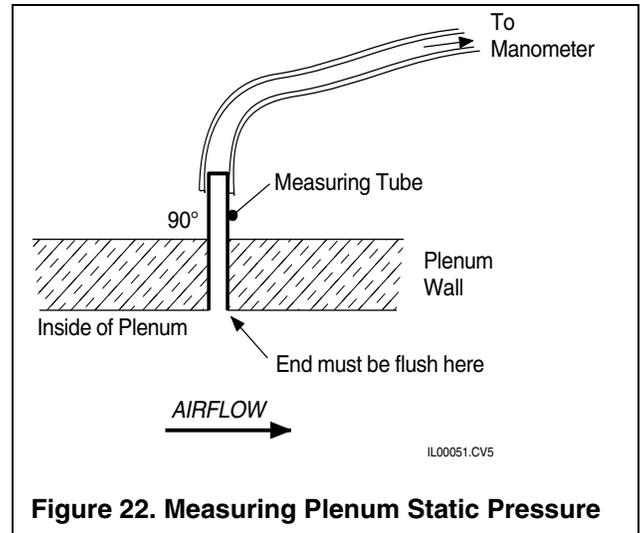


Figure 22. Measuring Plenum Static Pressure

sure to zero the scale and level the manometer. A magnehelic gauge that measures up to at least 2.5 inches of water may also be used.

Use a metal tube, typically 1/4-inch (6 mm) diameter, to measure the static pressure. Determine where you want it and cut or punch a small hole in the duct. Make the hole the same size as the metal tube to prevent leakage. Insert the metal tube one-inch (25 mm) so that the tip of the tube is flush to inside wall of the duct and perpendicular to the air stream as shown in Fig. 22.

Attach the metal tube to the manometer using a rubber hose (usually supplied with the manometer). Record the pressure.

Note: If the tube is not perpendicular to the air stream, the reading will be in error. You will get a higher reading if the tube is angled toward the air stream.

In the absence of a manometer you can build a simple but less accurate manometer in one of two ways. One way is to use a short piece of ruler or yardstick and clear plastic tubing as shown in Fig. 23.

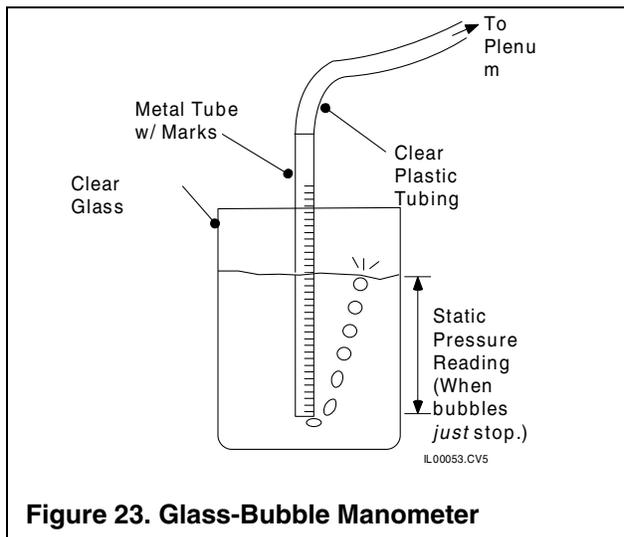


Figure 23. Glass-Bubble Manometer

Table 5. Airflow Troubleshooting Chart

Problem	Probable Cause	Remedy
Low Static and Low Amperage	Blocked filters, restriction in return duct. Low Voltage. Blower Wheel not aligned properly.	Clear restriction. Check with local utility Center wheel inside of inlet ring. Position on shaft for 1/8 inch (3 mm) clearance from inlet ring.
Low static, high amperage	Large number of outlets or open duct.	Add balancing orifices to outlets, check for missing end caps or separated plenum.
High Static, Low Amperage	Restrictive duct system.	Add outlets, add splitter vane in tee, reduce the number of tees and elbows in plenum, increase plenum size to 9" equivalent.

Charging a Cooling System

DO NOT VENT REFRIGERANT TO THE ATMOSPHERE!! It is a violation of federal law and in some cases local ordinances. Always use a refrigerant recovery or recycling device.

If charging a heat pump, refer to *Bulletin 30-24, Instructions for "M" Series Modular Heat Pump Systems*. The following procedure is only valid for charging the system during the cooling mode.

To check for proper charge record the refrigerant pressures and temperatures. Check the refrigerant charge by measuring the amount of sub-cooling (or 'approach' temperature for some condensing units). If the outdoor manufacturer does not have sub-cooling or "approach" temperature charts, then be sure that the sub-cooling is between 3 and 8 °F (2 to 5°C). For long refrigerant lines or when the evaporator is above the condenser, the sub-cooling should be close to 8°F; otherwise, aim for the low end of the range.

After the refrigerant lines and evaporator have been carefully leak tested and evacuated, release the R22 operating charge in the condensing unit. The system is now ready for refrigerant charge adjustment.

Start up the system and check line voltage to assure it is within acceptable limits for the system as dictated by the condensing unit manufacturer. Run the system for 20 to 30 minutes to get reasonably stabilized conditions. Do not attempt to adjust charge with outdoor temperature below 75°F (24 °C). An outdoor temperature of 75 to 85°F (24 to 29 °C) is preferred.

If the system charge must be checked when the outdoor temperature is below 80°F (26.7 °C), block the condenser coil until the head pressure is approximately equal to what its charging chart specifies for an 85°F (29 °C) day.

For heat pumps always check the charge in cooling mode. If this is not possible because of low outdoor temperatures, charge the system in the heating mode, but return later when the weather is warmer before the system is switched to cooling.

Subcooling Method. Many condensing unit manufacturers publish the amount of subcooling that the condenser will produce. Follow their instructions to charge the unit. Typical subcooling values will be between 8 and 15°F (5 to 9 °C). The unit should ALWAYS have some amount of subcooling. To be sure there is enough subcooling, especially if the unit is in a hot attic, check the liquid line sight glass near the evaporator for bubbles or measure the refrigerant liquid line pressure and temperature **AT THE EVAPORATOR**.

To measure subcooling use the following procedure:

1. Measure and record the liquid line pressure using an accurate refrigerant gauge. Record the corresponding saturation temperature for this pressure (see Table 6).
2. Measure and record the liquid line temperature using an accurate metal or glass thermometer, or thermocouple. Tape or strap the sensor firmly against the surface of the liquid line and cover with insulation.
3. Determine the subcooling with the following equation:

$$\frac{\text{SATURATED TEMPERATURE}}{\text{LIQUID LINE TEMPERATURE}} - \text{SUBCOOLING}$$

If the subcooling temperature at the condenser is low, the system is undercharged. If it is high, the system is overcharged and some refrigerant must be removed and collected in an empty refrigerant container. **Do not vent the refrigerant; it is a violation of federal law!**

In some cases, such as in a hot attic, the liquid line will pick up heat and lose its subcooling. This will be apparent if the subcooling at the evaporator is low. In these cases, the liquid line should be insulated or strapped to the suction line and both insulated. The same problem can occur for long refrigerant lines; in this case, increase the size of the liquid line to reduce the pressure drop.

CAUTION. TO MAINTAIN PROPER HEAT PUMP OPERATION, DO NOT STRAP THE LIQUID AND SUCTION LINES TOGETHER FOR HEAT PUMP SYSTEMS.

Superheat Method Do not charge the system based on superheat. Superheat measurements should only be used to verify that the expansion valve is working properly. If is more than expected please refer to the *Technote* on troubleshooting expansion valves.

The superheat should be between 8 to 12°F (4 to 7°C) at the indoor coil. In some cases, particularly for the larger capacity match-ups (i.e. 3 ton and 5 ton), a superheat of 15 to 18°F (8 to 10°C) is satisfactory. It is not uncommon to measure a superheat above 20 to 25°F (11 to 14°C) at the condensing unit.

Be aware that the superheat value is also dependent on the outdoor air temperature. At lower air temperatures the superheat will be higher than at higher air temperatures. If the condenser ambient temperature is between 75 and 85°F (24 to 29°C), superheat should be approximately 10 to 12°F (5 to 7°C). If the outdoor temperature is between 85 and 105°F (29 to 40°C), superheat should be approximately 8 to 10°F (4 to 5°C).

To measure the superheat use the following:

1. Measure and record the suction pressure at the evaporator outlet using an accurate refrigerant gauge. If this is not possible, measure the pressure at the service port on the suction valve fitting at the condensing unit and add the estimated pressure loss in the suction line between the condensing unit and evaporator. Record the corresponding saturation temperature for this pressure (see Table 6).
2. Measure the suction line temperature at the evaporator outlet using an accurate metal or glass thermometer, or thermocouple. Insert the thermometer under the insulation on the suction line and tape firmly against the surface of the suction tube.
3. Determine the superheat with the following equation:

$$\begin{array}{r} \text{Suction Line Temperature} \\ - \quad \text{Saturated Temperature} \\ = \quad \text{Superheat} \end{array}$$

Charging by Gauge Pressures It is not possible to charge the system by gauge pressures. Gauge pressure should only be used to verify the system is working properly

The Unico System will show a lower suction pressure during the cooling mode than a conventional system. Generally, it will be 10 to 15 psi (70 to 100 kPa) less. For example, a normal suction pressure for the Unico System will be about 65 psig (450 kPa) with an 85 to 95°F (29 to 35°C) outdoor temperature. Expect lower pressures when the outdoor temperatures are lower.

The head pressures should be similar to a conventional system when in the cooling mode.

Using a Low Ambient Control Kit. Since the Unico System operates at colder coil temperatures (in cooling mode), an anti-frost switch is installed on the coil to prevent coil freeze-up. In certain instances, such as when the outdoor ambient temperature is low, the condensing unit will cycle on the anti-frost switch. This may reduce the cooling capacity at a time when the cooling load is still fairly high. To provide better control and comfort, install a *low ambient control* on the condensing unit. Typically, a low ambient control is necessary when operating the unit at outdoor temperatures below 80°F (26.6 °C).

These controls come in different configurations such as the Hoffman Controls Corp. series 800AA head pressure control. This control modulates the outdoor blower to maintain a minimum liquid line temperature. Other controls may cycle the fan on off. In either case, check with the condensing unit manufacturer to determine what controls are compatible with the condensing unit.

R-410A, Puron® Refrigerant

Puron is a registered trade name for refrigerant R-410A by Suva, a DuPont Company, which is an alternate to refrigerant R-22.

In 1987, scientists and government officials met in Montreal in response to the growing pressure to preserve the earth's ozone layer. The outcome of the meeting was the Montreal Protocol - an internationally binding action plan to eliminate ozone-harming chemicals. *Chlorofluorocarbons* (CFCs) - such as R-12 - were targeted first since they caused the most damage to the environment. A cap was placed on the production of CFC's and in 1996, by law, all manufacturing was required to cease.

The Montreal Protocol's next phase-out targets are *hydrochlorofluorocarbons* (HCFCs), including R-22, the primary refrigerant in residential heating & air conditioning products.

The 1990 Clean Air Act in conjunction with the Montreal Protocol, established January 1, 2010 as the date when the U.S. will ban the manufacturing of products using HCFCs. The same document bans the manufacture of R-22 in 2020. Thereafter, only recycled R-22 can be used. The phase-out schedule is timed so that R-22 is available for expected lifespan of the R-22 equipment.

Charging a Heat Pump System

Charging in Cooling Mode. Charging a heat pump, by its nature, is more difficult than a cooling-only refrigerant system. Quite often the ideal charge for cooling is different than the ideal charge for heating, making the system much more sensitive to the amount of charge. In some cases, the compressor will trip on high head pressure during the heating mode because it is overcharged if the system was charged during cooling. Likewise, the system may cycle on the anti-frost control because of a low refrigerant charge if the system was charged during heating.

To compensate for this charge difference some outdoor unit manufacturers have a charge compensator device that stores charge while in heating mode. Unfortunately there are no add-on devices to accomplish the same thing and only a few (usually the most expensive) model lines will have one. For this reason, it is often necessary to compromise the charge.

Although the unit can be charged in the heating mode, it is best to charge the unit during the cooling mode as described earlier. Then recheck the charge in the heating mode to be sure the system is not over charged.

Charging in Heating Mode. If the system is started up on heating where the return air temperature is significantly lower than the normal operating range of 65 to 75 °F (18.2 to 23.8 C), the suction pressure can be very low. Operate the system to bring up the return air temperature, using auxiliary heat if necessary, before checking system charge.

In heating mode, the Unico System will have a slightly higher discharge (LIQ.) pressure than a conventional system, usually about 40 to 50 psig higher. It is this higher pressure that produces a warmer air temperature; preventing “cold blow”, where the house is being heated with an air stream that feels cold.

Some outdoor heat pump units include a manual high-pressure switch. It is important that the system be operated at pressures below the trip pressure of the high-pressure switch to avoid nuisance shut downs. If this occurs, use a high head kit as described below.

Using a High Head Kit (Mild Weather Kit). When any heat pump is operated during mild weather (temperatures above 50°F (10 C)), the compressor may trip out on the high pressure limit. The Unico System is particularly sensitive to this since it operates at a higher pressure.

To overcome this problem, install a mild weather kit (UPC – 65) to cycle the outdoor fan based on the compressor discharge pressure. However, be sure this control is compatible with the outdoor heat pump section being used.

Table 6a. 410A Saturation Pressure – Temperature (English units)

°F	psig
	R-410A
0	48.4
2	51.1
4	53.8
6	56.6
8	59.4
10	62.4
12	65.4
14	68.6
16	71.8
18	75.1
20	78.5
22	82.1
24	85.7
26	89.4
28	93.2
30	97.2
32	101.0
34	105.0
36	110.0
38	114.0
40	119.0
42	123.0
44	128.0
46	133.0
48	138.0
50	143.0
55	156.0
60	170.0
.	.
.	.
.	.
90	274.0
95	295.0
100	317.0
105	341.0
110	365.0
115	391.0
120	418.0
125	447.0
130	477.0

Table 6b. 410A Saturation Pressure – Temperature (SI units)

°C	kPa (gauge)
	R-410A
-18	330
-17	347
-16	363
-15	380
-14	398
-13	416
-12	434
-11	453
-10	473
-9	493
-8	513
-7	534
-6	556
-5	578
-4	601
-3	624
-2	648
-1	673
0	698
1	723
2	750
3	777
4	804
5	833
6	861
7	891
8	922
9	953
10	984
12	1050
14	1120
.	.
.	.
.	.
30	1780
32	1880
34	1980
36	2090
38	2200
40	2320
42	2440
44	2560
46	2690
48	2820
50	2960
52	3100
54	3250

Appendix A – Hot Water Coil Performance

Entering Water Temperature °F °C		Water Flowrate GPM (L/s)		Airflow, SCFM (m ³ /s)						WPD ft. water (KPa)	
				200 (0.09)		300 (0.14)		400 (0.19)			
				Capacity MBH (KW)		Capacity MBH (KW)		Capacity MBH (KW)			
120	(48.9)	2	(0.13)	10.2	(2.97)	13.7	(4.01)	16.2	(4.76)	0.9	(2.69)
		4	(0.25)	10.6	(3.10)	14.9	(4.37)	18.5	(5.42)	3.2	(9.57)
		6	(0.38)	10.7	(3.13)	15.3	(4.49)	19.3	(5.65)	7.1	(21.23)
		8	(0.50)	10.7	(3.15)	15.5	(4.54)	19.7	(5.76)	12.5	(37.38)
130	(54.4)	2	(0.13)	12.2	(3.58)	16.5	(4.83)	19.6	(5.75)	0.9	(2.69)
		4	(0.25)	12.7	(3.72)	18.0	(5.26)	22.3	(6.52)	3.2	(9.57)
		6	(0.38)	12.8	(3.76)	18.4	(5.40)	23.2	(6.79)	7.1	(21.23)
		8	(0.50)	12.9	(3.78)	18.6	(5.46)	23.6	(6.93)	12.5	(37.38)
140	(60)	2	(0.13)	14.3	(4.19)	19.3	(5.66)	23.0	(6.74)	0.9	(2.69)
		4	(0.25)	14.8	(4.35)	21.0	(6.15)	26.1	(7.64)	3.2	(9.57)
		6	(0.38)	15.0	(4.39)	21.5	(6.31)	27.1	(7.94)	7.1	(21.23)
		8	(0.50)	15.1	(4.41)	21.8	(6.38)	27.6	(8.09)	12.5	(37.38)
150	(65.5)	2	(0.13)	16.4	(4.79)	22.2	(6.50)	26.4	(7.75)	0.9	(2.69)
		4	(0.25)	17.0	(4.98)	24.1	(7.05)	29.9	(8.75)	3.2	(9.57)
		6	(0.38)	17.1	(5.02)	24.6	(7.22)	31.0	(9.10)	7.1	(21.23)
		8	(0.50)	17.2	(5.04)	24.9	(7.29)	31.6	(9.27)	12.5	(37.38)
160	(71.1)	2	(0.13)	18.4	(5.40)	25.0	(7.33)	29.9	(8.76)	0.9	(2.69)
		4	(0.25)	19.1	(5.60)	27.1	(7.94)	33.7	(9.88)	3.2	(9.57)
		6	(0.38)	19.3	(5.65)	27.7	(8.13)	35.0	(10.25)	7.1	(21.23)
		8	(0.50)	19.4	(5.67)	28.0	(8.21)	35.6	(10.44)	12.5	(37.38)
170	(76.7)	2	(0.13)	n/a	n/a	27.9	(8.17)	33.3	(9.77)	0.9	(2.69)
		4	(0.25)	n/a	n/a	n/a	n/a	37.5	(11.00)	3.2	(9.57)
		6	(0.38)	n/a	n/a	n/a	n/a	38.9	(11.41)	7.1	(21.23)
		8	(0.50)	n/a	n/a	n/a	n/a	39.6	(11.61)	12.5	(37.38)
Minimum Number of Outlets				6		9		13			

Appendix B – Chilled Water Coil Performance

Entering Water Temperature °F °C		Water Flowrate GPM (L/s)		Airflow, SCFM (m ³ /s)						WPD ft. water (KPa)				
				200 (0.09)			300 (0.14)					400 (0.19)		
				Capacity MBH (KW)	SHR		Capacity MBH (KW)	SHR				Capacity MBH (KW)	SHR	
35	(1.7)	3	(0.19)	13.6	(3.98)	0.59	17.2	(5.03)	0.60	19.7	(5.77)	0.62	1.8	(5.37)
		4	(0.25)	14.4	(4.23)	0.58	18.9	(5.53)	0.59	22.1	(6.48)	0.60	3.4	(10.15)
		5	(0.32)	14.9	(4.37)	0.58	20	(5.86)	0.59	23.8	(6.98)	0.59	5.3	(15.83)
40	(4.4)	3	(0.19)	11.8	(3.46)	0.60	14.9	(4.38)	0.62	17.2	(5.03)	0.64	1.8	(5.37)
		4	(0.25)	12.6	(3.69)	0.59	16.4	(4.81)	0.61	19.2	(5.63)	0.62	3.4	(10.15)
		5	(0.32)	13.0	(3.81)	0.59	17.4	(5.10)	0.60	20.7	(6.06)	0.61	5.3	(15.83)
45	(7.2)	3	(0.19)	10.0	(2.92)	0.62	12.6	(3.69)	0.65	14.6	(4.27)	0.68	1.8	(5.37)
		4	(0.25)	10.6	(3.10)	0.61	13.8	(4.05)	0.63	16.2	(4.75)	0.66	3.4	(10.15)
		5	(0.32)	11.0	(3.21)	0.61	14.6	(4.28)	0.62	17.4	(5.10)	0.64	5.3	(15.83)
50	(10.0)	3	(0.19)	8.0	(2.34)	0.67	10.2	(2.99)	0.71	11.9	(3.49)	0.74	1.8	(5.37)
		4	(0.25)	8.5	(2.48)	0.66	11.1	(3.25)	0.68	13.1	(3.84)	0.71	3.4	(10.15)
		5	(0.32)	8.8	(2.56)	0.65	11.7	(3.42)	0.67	14.0	(4.09)	0.70	5.3	(15.83)
55	(12.8)	3	(0.19)	6.0	(1.75)	0.76	7.8	(2.30)	0.80	9.3	(2.72)	0.84	1.8	(5.37)
		4	(0.25)	6.2	(1.83)	0.74	8.3	(2.44)	0.78	10.0	(2.93)	0.81	3.4	(10.15)
		5	(0.32)	6.4	(1.88)	0.73	8.7	(2.53)	0.77	10.5	(3.07)	0.80	5.3	(15.83)
Minimum Number of Outlets				6		9		13						

Appendix C – Engineering Specifications

	Unico Part No.	
Construction		
Dimensions, inch (mm):	12 H x 20 W x 38 L (31 x 51 x 97)	
Cabinet Type:	Galvanized or Painted (P option)	
Insulation:	1 inch (2.5 mm) coated fiberglass duct liner	
Drain pan:	Stainless Steel	
Drain pan connection:	1/2 inch FPT	
Standard Return Duct ID, in (cm):	12 (30.5)	
Standard Plenum ID, in (cm):	7.0 (17.8)	
Electrical		
Type:	1 ph - 60/50 Hz - 230/208V	
Power Input, W:	310	
Fan Relay:	Snap acting with inherent time-delay	A00056-G02
Transformer:	50 VA, 230/208V-24V	A00057-G02
Motor		
	2-speed (A00974-001) 3-speed* (A00331-001)	
Size, hp (kW):	1/3 (0.25)	
Running Speed @ rated airflow:	1625/825 RPM 1700/1550/1350	
FLA:	1.5 1.9	
RLA:	Refer to Amperage Chart	
Bearing Type:	Permanently Lubricated Ball	
Blower Wheel		
	A00757-001	
Airflow, CFM (m ³ /s):	200 (.094) 300 (.142) 400 (.189) 450 (.212)	
Static Pressure**, in. wc (Pa)	1.80 (448) 1.50 (373) 1.00 (249) 0.70 (174)	
Type:	SISW Forward Curved	
Nom. Diameter, inch (cm):	9.5 (24)	
Width, inch (cm):	1.5 (3.8)	
Refrigerant Coil (AC or HP option)		
	A00326-001	
Nominal Capacity, tons (kW):	1 to 1.5 (3.5 to 5.3)	
Rated Airflow, CFM (m ³ /s):	450 (0.212)	
Min. Airflow, CFM/ton (m ³ /s•kW):	200 (0.027)	
Refrigerant Type:	R-410a	
Face Area, ft ² (m ²):	1.167 (0.108)	
Number of Rows:	6	
Number of Circuits:	3	
Fin Density, fins/in. (fins/cm):	15 (6)	
Fin Type and pattern, in. (cm):	Corrugated, 1 x 0.625 (2.540 x 1.588)	
Tube Diameter, in (cm):	3/8 (.953)	
Tube Type:	Rifled	
Expansion Device (AC option)	TXV with Bleed Port	A00365-002
Expansion Device (HP option)	TXV with Bleed Port and Internal Check Valve	A00366-002
Liquid Line Connection	3/8 (.953)	
Suction Connection OD, in. (cm)	5/8 (1.588)	
Hot Water Coil (HW option)		
	HW-1218	
Fluid Type	Water or Glycol-Water Solution	
Face Area, ft ² (m ²)	1.0 (0.093)	
Number of Rows	4	
Number of Circuits	4	
Fin Density, fins/in. (fins/cm):	10 (4)	
Fin Type and pattern, in. (cm):	Raised Lance, 1 x .866 (2.540 x 2.200)	
Tube Diameter, in (cm):	3/8 (.953)	
Connection OD SWT, in (cm):	5/8 (1.587)	
Chilled Water Coil (HW option)		
	A00397-G01	
Fluid Type	Water or Glycol-Water Solution	
Face Area, ft ² (m ²)	1.167 (0.108)	
Number of Rows	6	
Number of Circuits	6	
Fin Density, fins/in. (fins/cm):	15 (6)	
Fin Type and pattern, in. (cm):	Corrugated, 1 x 0.625 (2.540 x 1.588)	
Tube Diameter, in (cm):	3/8 (.953)	
Connection OD SWT, in (cm):	5/8 (1.587)	

* The highest speed is not used.

** Static pressure across unit without hot water coil, using 6 inch ID plenum. Motor speed set to high for 2-speed motors and medium for motors with 3 speeds. Static pressure will be greater when using 7 inch ID plenum.