



InteleCool 1 50/60 Hz Parts Manual Rev. 7/95

Liebert Corporation may make improvements and/or changes in the products described in the document at any time without notice. Part numbers and technical information are subject to change without prior notice.

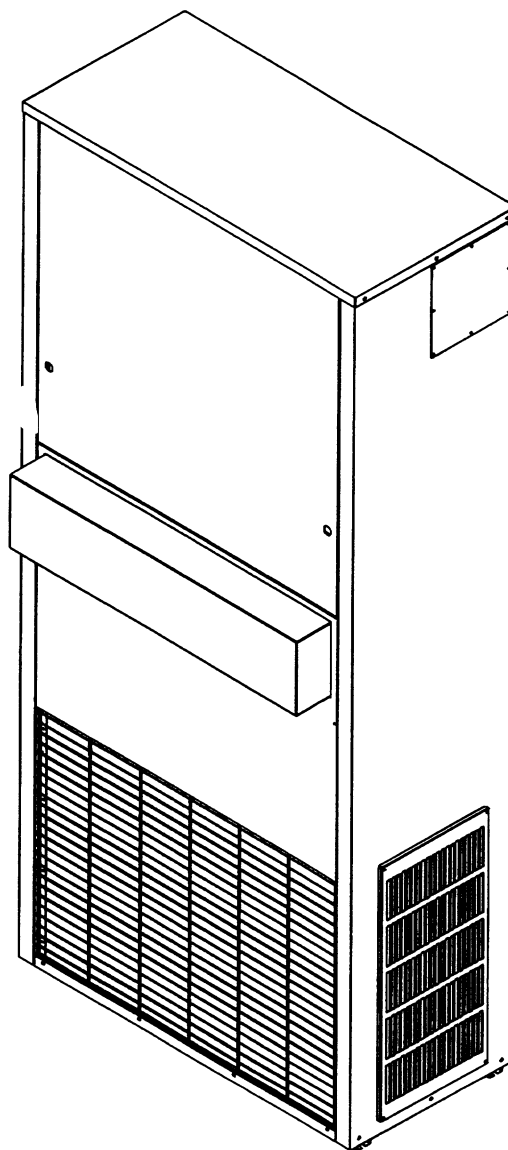
Liebert Corporation assumes no responsibility and disclaims all liability for incidental or consequential damages resulting from use of this information from errors or omissions.



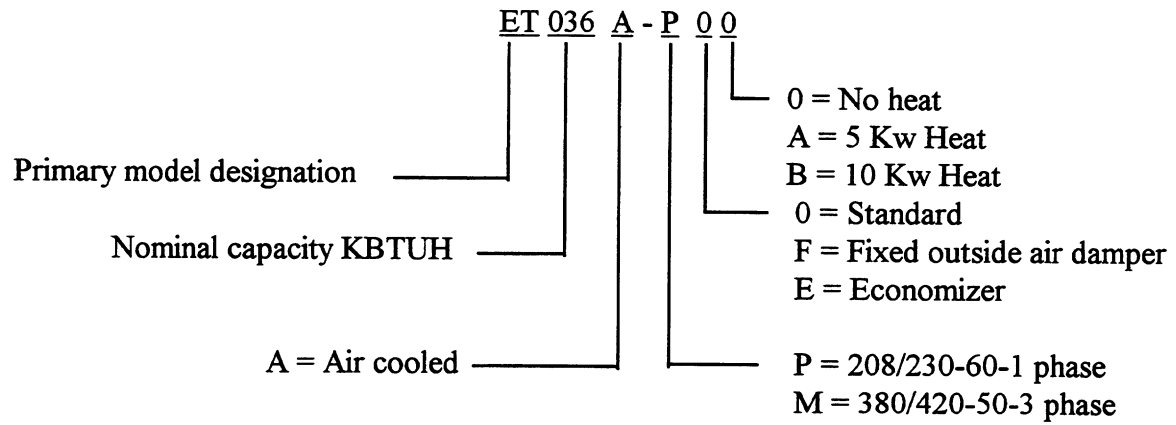
InteleCool 50/60 Hz

3 Tons

USER'S MANUAL



Model Number Designations



**USER'S MANUAL
for**

Liebert InteleCool

TABLE OF CONTENTS

SECTION 1	INTRODUCTION	1
1.1	General	1
1.2	Standard Features	2
1.3	Optional Features	3
1.4	Dimensional Data	4
1.5	Technical Data	6
SECTION 2	INSTALLATION	9
2.1	Installation Considerations	9
2.2	Equipment Inspection	9
2.3	Unit Installation	11
2.4	Checklist for Completed Installation	14
2.5	Start-up Procedure	15
SECTION 3	OPERATIONS	16
3.1	Compressorized Cooling	16
3.2	Economizer Cooling	17
3.3	Heating	18
3.4	Unit Controls	18
SECTION 4	MAINTENANCE	20
4.1	Filters	20
4.2	Blower Package	20
4.3	Economizer (Optional)	20
4.4	Refrigeration System	20
4.5	Air Cooled Condenser	22
4.6	Compressor Replacement	22
SECTION 5	TROUBLESHOOTING GUIDE	25

SECTION 6 PARTS 27

6.1 Model Number Designation 27

6.2 Condenser Assembly 28

6.3 Evaporator Blower Assembly 28

6.4 Evaporator Assembly 29

6.5 Economizer Assembly (Optional) 29

6.6 Electric Box 30

6.7 Heaters (Optional) 30

6.8 Unit Exterior and Grilles 31

6.9 Parts List 32

1.0 INTRODUCTION

1.1 GENERAL

The Liebert IntelCool environmental control system was designed for convenience and dependability in unmanned and remote locations typical of the telecommunications industry. Ease of installation, operation and service coupled with the use of high quality, high reliability components make IntelCool ideally suited for maintaining an environment for sensitive electronic equipment.

Self Contained

The IntelCool product is completely self contained. All components are enclosed in the weather proof cabinet.

Space Savings

The IntelCool does not use any of the valuable floorspace inside the secure space. Instead, it is mounted on the outside wall. No additional space is required outside or on a roof.

Pressurization

It is important to maintain positive pressure within the secure space to inhibit the entry of unfiltered air. IntelCool is available with an optional economizer system or an optional outside air damper which allows you to choose the level of pressurization.

Easy to Install

The IntelCool is assembled, wired, piped, charged with refrigerant and fully factory tested as a system, to ensure trouble free installation and start-up.

1.2 STANDARD FEATURES

Compressor

The heart of the refrigeration system is a quiet, efficient Scroll compressor. The compressor features a suction gas cooled motor, internal centrifugal oil pump, vibration isolating mountings, internal thermal overloads, high pressure switch and operates at 3500 RPM @ 60 Hz (2900 RPM @ 50 Hz).

Refrigeration System

The refrigeration circuit includes a liquid line filter dryer, an adjustable externally equalized expansion valve, and high and low pressure switches.

Evaporator Coil

The evaporator coil is constructed of mechanically expanded copper tubes in enhanced surface aluminum fins. A stainless steel condensate drain pan is provided.

Condenser Coil

The air cooled condenser coil is constructed of mechanically expanded copper tubes in enhanced surface aluminum fin.

Evaporator Blower

Evaporator air is supplied by a dual, direct drive blower package. The fans are centrifugal, double width, double inlet.

Filter

The filter is 2 inches deep, pleated, with a minimum efficiency rating of 25-30 % (based on ASHRAE standard 52-76). Located within the cabinet, the filter is serviceable from the front of the unit.

Cabinet

The Exterior cabinet is constructed of bright aluminum for weather resistance. Internal structural parts are hot dipped galvanized steel. The evaporator compartment is insulated with 1/2" thick, 2lb density, neoprene faced, fiberglass insulation.

Control Interface

The unit is supplied with customary HVAC wiring designations (R,G,W,Y) inside the low voltage partition of the unit electric box. The control interface can be provided by sources ranging from a wall mounted thermostat, a Liebert control and monitoring system, or a third party building management control.

1.3 OPTIONAL FEATURES

Heat

Heat is provided in a single stage from an open wire electric resistance element. Two heating capacity options are available, 5 kW and 10 kW.

Economizer

Allows outside air to be introduced to the space through the evaporator filter when conditions are favorable for economizer cooling. An air damper and actuator are automatically controlled by an enthalpy sensor and motor control board with mixed air sensor. Mechanical cooling and economizer operation do not operate simultaneously.

Positive Pressurization Air Damper

Air is drawn through the evaporator filter to ensure positive room pressurization even when the outside air economizer is not provided. The amount of pressurization air to be introduced to the space is field selectable.

Wall Mounted Thermostat

Thermostat provides for heating/cooling application with separate fan control. A two stage control allows multiple units to have different setpoints.

Indoor Supply /Return Grilles

The supply grille is an aluminum louvered, double deflection type grill allowing user adjustment of direction of air distribution. The return grille is an aluminum louvered, fixed, single deflection style grille.

Additional Spare Filters

Additional sets may be supplied of the same efficiency as the original filter. (Efficiency based on ASHRAE standard 52-76).

Paint

The exterior aluminum cabinet can be coated with a baked on polyurethane, almond colored paint.

Compressor Crankcase Heater

An optional compressor crankcase heater is available, but is not required because the IntelCool refrigeration system and compressor are designed for positive starts in cold weather.

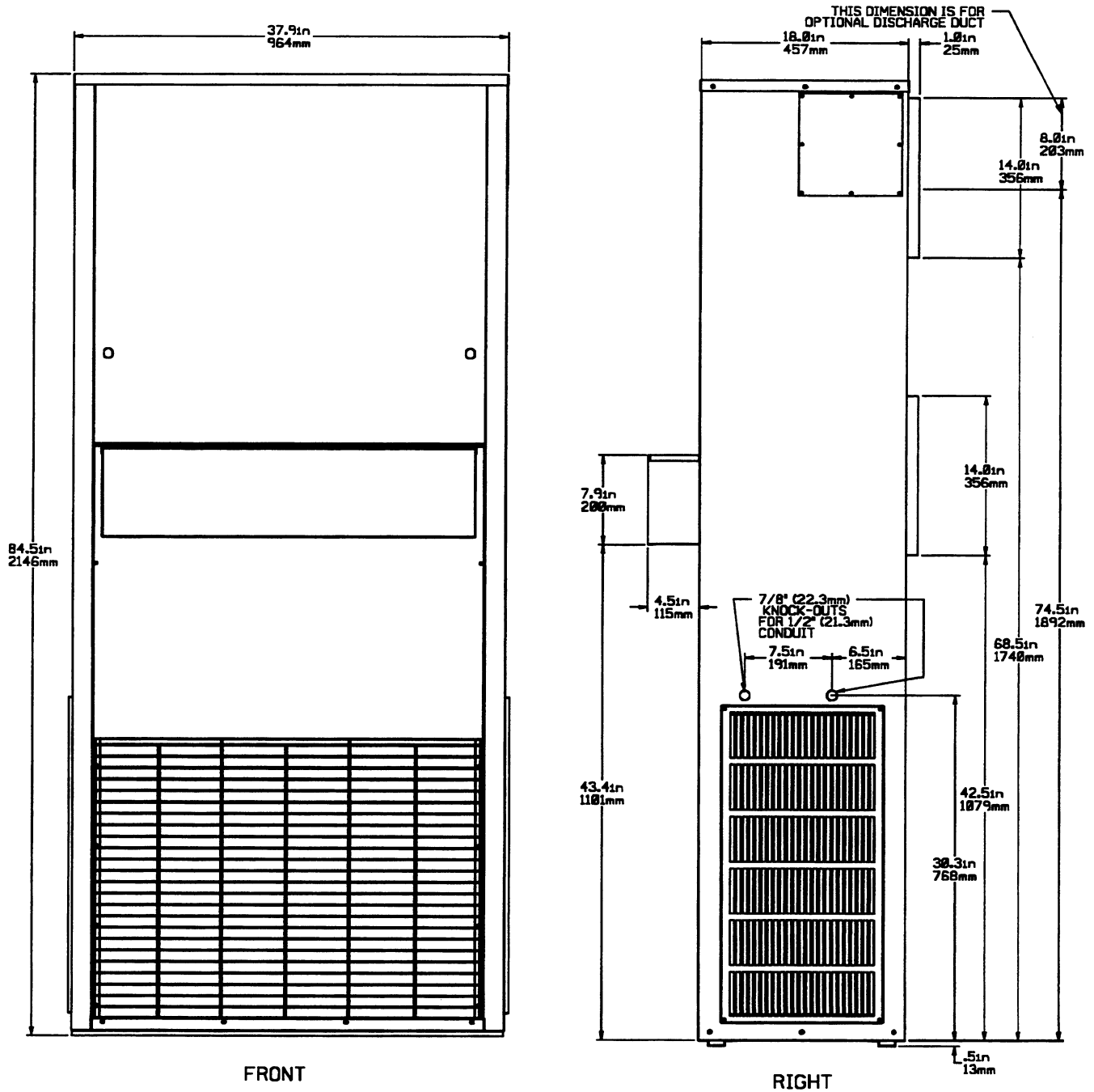
1.4 DIMENSIONAL DATA


Figure 1. Dimensional Data

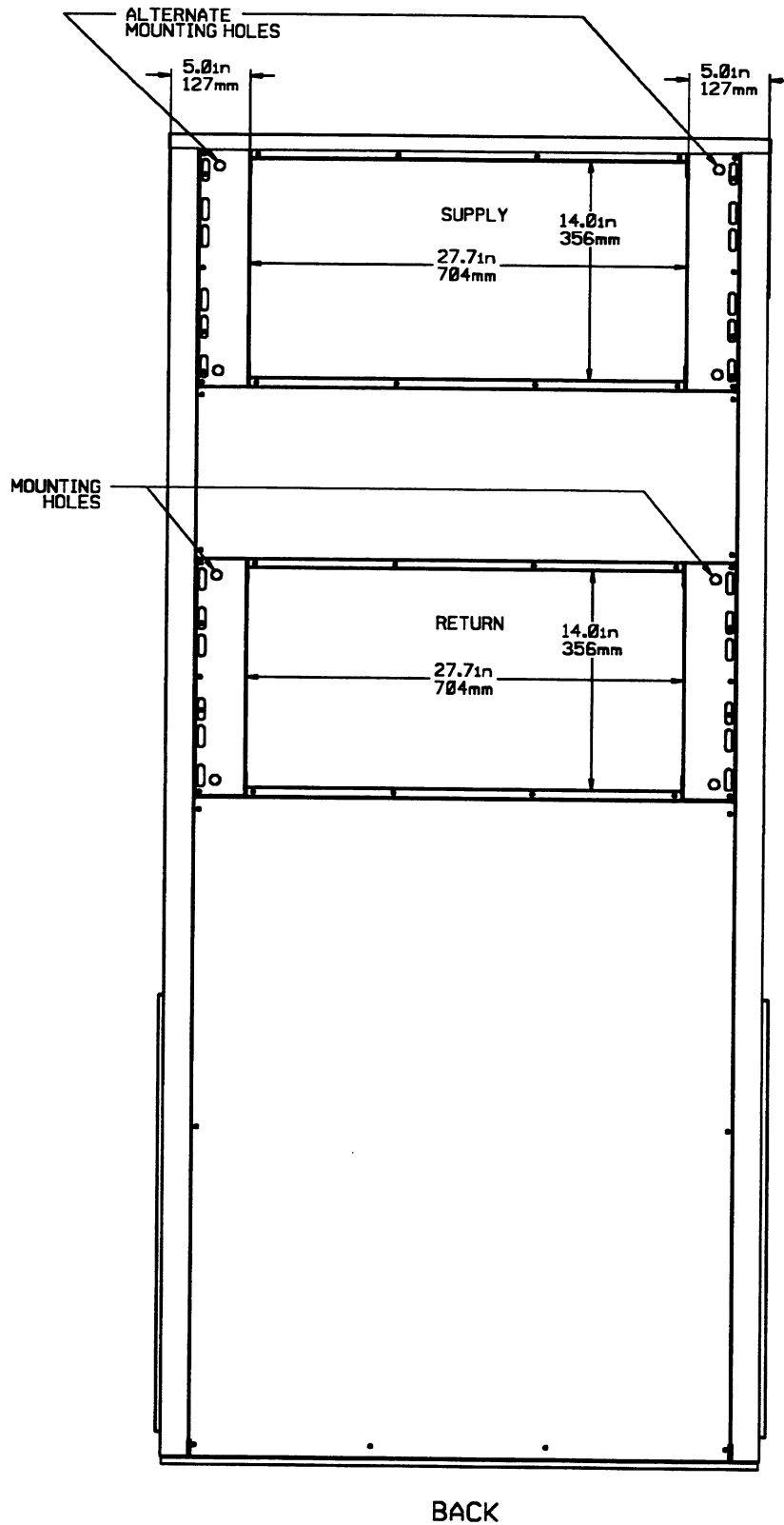


Figure 1. Dimensional Data (cont'd.)

1.5 TECHNICAL DATA
Compressorized Capacity Data - 60 Hz in KBTU
Table 1A

INDOOR 75/62.5	OUTDOOR AMBIENT					
	85	95	105	110	115	120
Total	36.5	35.3	33.6	32.7	31.2	29.7
Sensible	27.8	27.7	27.1	26.8	26.1	25.3
SHR	76	78	81	82	84	85

80/67	85	95	105	110	115	120
Total	39	37.7	35.8	34.9	33.3	31.7
Sensible	28.2	28	27.4	27.1	26.4	25.6
SHR	72	74	77	78	79	81

Notes: Based on rated air flow with no external static pressure and no outside air.

Not recommended for operation above 120°F ambient.

Typical Specifications - 60 Hz
Table 3A

EVAPORATOR	
Motor Hp	0.25
Coil Face Area	3.3 Ft ² (.31 m ²)
CONDENSER	
Motor Hp	0.25
Air flow - CFM	2400 CFM
Coil Face Area	6.0 Ft ² (.56 m ²)
UNIT CHARGE (R-22)	5.4 Lbs. (2.4 kg)
FILTER SIZE	16 3/4 x 28 3/4" (425 x 730 mm)
DRAIN CONNECTION	3/4" (19 mm) ID Hose
WEIGHT STANDARD	329 lb. (149 kg)
WEIGHT WITH ECONOMIZER	339 lb. (154 kg)

Evaporator Air Data - 60 Hz
Table 4A

ESP (in.wg.)	0.0	0.1	0.2	0.3	0.4	0.5
Dry Coil	1300	1230	1160	1070	980	900
Wet Coil	1270	1200	1130	1040	960	880

ESP - External static pressure, including duct and supply and return grilles.

Electrical Data - 60 Hz
Table 5A

60 Hz 1 Phase			
	FLA	WSA	OPD
No Heat	25.9	31.4	40
5 Kw	25.9	31.4	40
10 Kw	45.4	56.7	60

Compressorized Capacity Data - 50 Hz in KBTU
Table 1B

INDOOR 75/62.5	OUTDOOR AMBIENT					
	85	95	105	110	115	120
Total	36.2	34.4	32.3	30.5	27.8	25.5
Sensible	27.5	26.5	25.4	24.5	23.8	23.2
SHR	74	77	79	80	82	84
80/67	85	95	105	110	115	120
Total	38.4	36.5	33.9	32.1	29.7	27.3
Sensible	27.9	26.8	25.7	24.8	24.1	23.5
SHR	73	73	76	77	81	86

*Based on rated air flow with 0" wg. external static pressure and no outside air.

Not recommended for operation above 120°F ambient.

Typical Specifications - 50 Hz
Table 3B

EVAPORATOR	
Motor Hp	0.25
Coil Face Area - Ft ²	3.3 (.31 m ²)
CONDENSER	
Motor Hp	0.25
Air flow - CFM	2,000
Coil Face Area - Ft ²	6.0 (.56 m ²)
UNIT CHARGE (R-22)	5.3 Lbs. (2.4 kg)
FILTER SIZE	16 3/4 x 28 3/4" (425 x 730 mm)
DRAIN CONNECTION	3/4" (19 mm) ID Hose
WEIGHT STANDARD	359 lb. (163 kg)
WEIGHT WITH ECONOMIZER	369 lb. (167 kg)

Evaporator Air Data - 50 Hz
Table 4B

ESP (in.wg.)	0.0	0.1	0.2	0.3	0.4	0.5
Dry Coil	1,239	1,150	1,049	936	811	674
Wet Coil	1,142	1,047	940	819	685	537

ESP - External static pressure, including duct and supply and return grilles.

Electrical Data - 50 Hz
Table 5B

50 Hz 3 Phase			
	FLA	WSA	OPD
No Heat	12	14.1	20
5 Kw	12	14.1	20
10 Kw	16.4	20.4	20

*Values shown are for heating/cooling product only, consult factory if dehumidification is to be used.

2.0 INSTALLATION

2.1 Installation Considerations

Room Preparation

The room should be well insulated and should be sealed to reduce airborne contaminants from penetrating the site.

The IntelCool unit controls the outside air it brings into the building, for optional economized cooling or pressurization. However, uncontrolled outside air should be kept to a minimum. Outside air adds to the cooling, heating, and filtration loads of the site. Doors should be properly sealed to minimize leaks and should not contain grilles .

Location Considerations

The IntelCool unit is field mounted on an outside wall. Refer to Figures 1 and 2 for dimensions, including the supply and return openings. Additional framing in the wall may be required to ensure adequate structural support. Refer to Table 3 for unit standard weights.

The outdoor area near the condenser supply and discharge must also be considered. To assure adequate air supply, the unit should be mounted in a clean area, away from loose dirt and foreign matter that may clog the condenser coil. Unit should not be located near steam, hot air, or fume exhausts. Also, the unit should not be mounted closer than 12 feet (3.7 meters) from an opposing wall, obstruction, or unit. For service clearance, provide 36 inches in front of the unit, and 30 inches on each side. When mounting multiple units side by side, provide a minimum of 36" (914 mm) between adjacent units.

2.2 Equipment Inspection

Upon arrival of the unit, inspect all items for visible damage. Concealed damage may be discovered later during installation. Report damage to the shipper immediately and file a damage claim. Also inform your Liebert supplier.

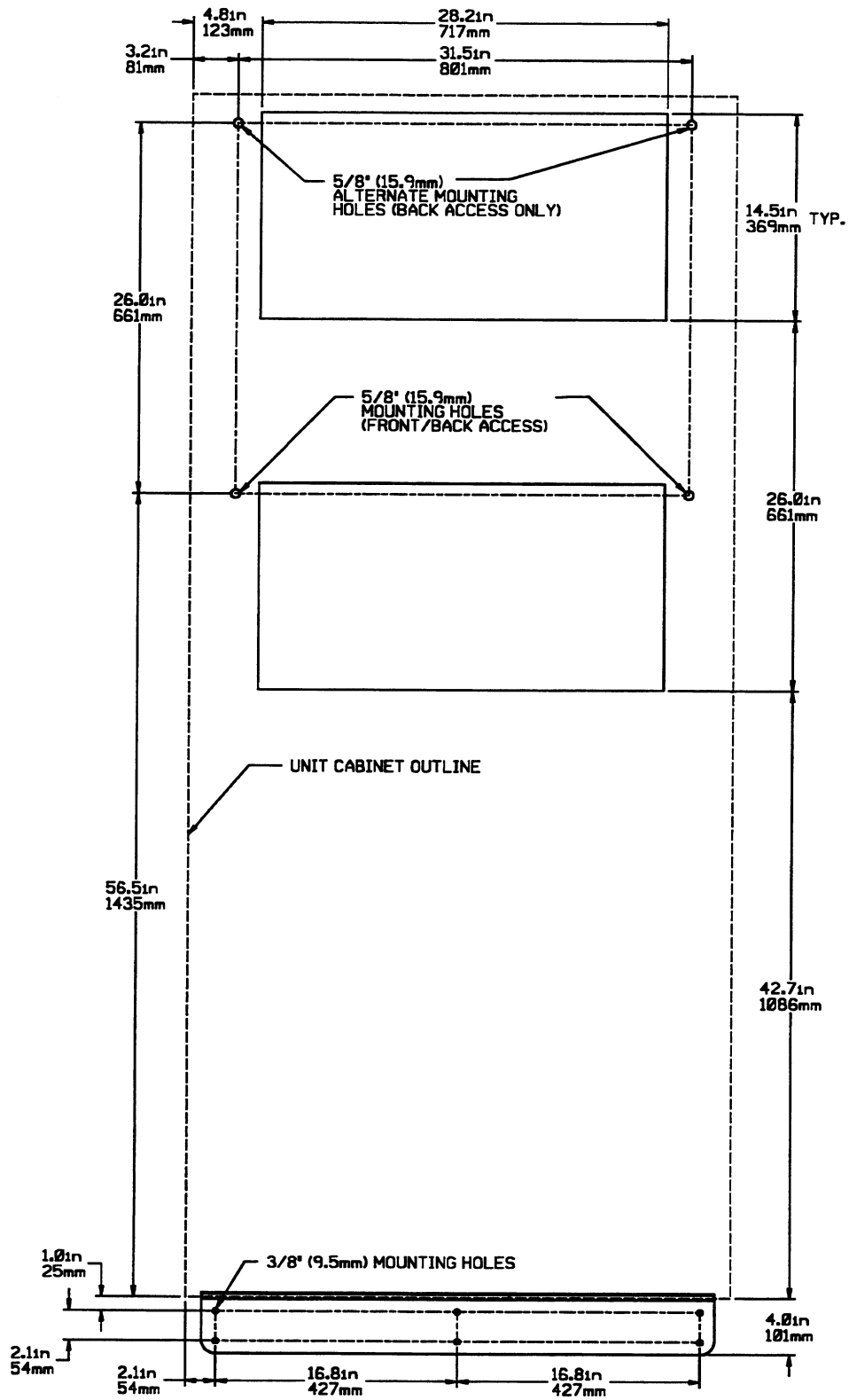


Figure 2. Mounting Layout

2.3 Unit Installation

The IntelCool unit is installed against, and through, an outside wall. Two (2) openings in the wall are required for the evaporator supply and return. Install unit in a level position to assure proper refrigerant flow, oil return, and condensate drain. To install the unit, follow the instructions below (refer to Figure 2).

1. Verify that an adequate structural support is provided for the unit. Refer to Table 3 for standard unit weight.
2. Using a chalkline, mark the outside wall with a level horizontal line, where the bottom of the unit is to rest
3. Prepare supply and return openings in an outside wall, 28.2 inches (717 mm) wide by 14.5 inches (368 mm) high, 12 inches (305 mm) apart, with the bottom of the lower opening 43 inches (1092 mm) above the base chalk line. Refer to figure 2.
4. Prepare two upper mounting holes, either at the top or midsection of the unit. The mounting holes may be pilot holes for lag screws or clearance holes for bolts that will extend completely through the wall (5/8" for 1/2" bolts). Note that the outside of the top holes will be accessible only through the supply opening (from inside the room) once the unit is placed against wall. The middle holes can be accessed from outdoors when the top front panel is removed. Refer to Figure 2 for location of these holes.
5. Screw / Bolt unit mounting base angle to the outside wall with six 5/16" bolts, just below chalk line and centered below the holes made in steps 2 and 3.
6. Apply gasket tape around perimeter of the unit back and the evaporator supply and return openings.
7. With the unit front panel removed (rotate two fasteners), lift the unit onto the base angle, making certain that the rear unit foot falls behind the turned up front edge of the mounting angle. Place top or mid unit fasteners in place and tighten, drawing the unit into place.

WARNING!

Use at least two people to safely handle unit. Weight is more than 300 pounds.

CAUTION!

Do not over tighten mounting bolts. Over tightening may result in damage to gasket or unit cabinet.

8. Caulk and flash top and sides as required. Top flashing (not factory supplied) is recommended to ensure water does not run behind unit. Additional chalking is not required but may be desired to improve water tight seal down sides.

Piping Connections

The IntelCool is a self-contained, packaged unit. All refrigerant piping connections are made at the factory, so no external condenser is required. The evaporator coil condensate drain is factory supplied and drains outdoors through the unit base pan.

Ducting

Field supplied ducting can be attached to the unit duct connection once the unit has been mounted to the outside wall. The total external static pressure for the duct, including grille, must not exceed 0.5 inches of water (125 Pa) . Indoor discharge air rates are summarized in Table 4.

Electrical Connections

Each unit is shipped from the factory with all internal wiring completed. Refer to electrical schematic when making connections. Electrical connections to be made at the installation site are:

1. Line power supply to the power input.
2. Control wiring to remote control (customer supplied or Liebert option).

WARNING! Use volt meter to make sure power is turned off before making any electrical connections.

CAUTION! Refer to electrical schematic when making connections.

Power Connections

All power and control wiring and ground connections must be in accordance with the National Electrical Code and local codes. Refer to section 5.5 regarding wire size and circuit protection requirements.

Use copper wiring only. Make sure that all connections are tight.

Make sure that the voltage supplied agrees with the voltage specified on the unit nameplate. A power disconnect switch (field supplied) is required for maintenance.

For access to the electrical enclosure, first remove the top panel by rotating two fasteners. Remove the condenser grille by pulling it up and forward. Remove the middle panel by removing screws, then pull panel down and forward. Remove electrical box cover on right side by removing screws.

Route the supply power to the customer supplied disconnect switch and then to the unit circuit breaker or terminal block inside the unit. Route the conduit to the hole provided in the cabinet. Connect earth ground to lug provided near circuit breaker or terminal block. Refer to unit wiring diagram supplied on the inside of the electrical enclosure cover.

CAUTION

The scroll compressor must be rotating in the correct direction for proper operation. This is determined by the way three phase power is supplied to the unit at installation.

Control Connections

Control wiring will be required for the remote control device. This remote device may be a factory/field supplied wall thermostat or similar device. Connections to the unit are made using customary HVAC wiring terminals R, G, W, & Y. Refer to **Section 3.4**.

Outside Air Damper (Optional)

Units supplied with fixed (non-modulating) outdoor air damper can be adjusted as follows:

1. Remove upper panel, remove the condenser grill by lifting and pulling out at the bottom.
2. Remove the screws from the middle panel and remove panel.
3. Loosen the damper plate screws on the backside of the middle panel.
4. Adjust the damper plate to the desired position and tighten damper plate screws.
5. Replace panels and grill in reverse order.

Economizer (Optional)

Unit supplied with Economizer requiring room pressurization or outside air can be adjusted as follows:

1. Make sure the unit is not in a cooling mode (compressor or economizer) and turn the unit off. Remove the unit front panel and locate the damper actuator.
2. Disconnect the actuator wire harness from the actuator. Remove the damper actuator by unscrewing the motor retaining screw.
3. Loosen the travel stop retaining screw on actuator and adjust to the desired position.
4. Re-install actuator, reconnect harness and replace panel.

2.4 Checklist For Completed Installation

1. Proper clearance for service access has been maintained.
2. Equipment is level and mounting fasteners are tight.
3. Ducting completed, if required.
4. Line voltage to power wiring matches equipment nameplate.
5. Power wiring connections completed to disconnect switches, including earth ground. Proper phase rotation has been observed so that scroll compressor will rotate in the correct direction.
6. Power line circuit breakers or fuses have proper ratings for equipment installed.
7. Control wiring connections completed to optional controls.
8. All wiring connections are tight.
9. Foreign materials have been removed from in and around all equipment installed (shipping materials, construction materials, tools, etc.).
10. Fans and blowers rotate freely without unusual noise.

2.5 Start-up Procedure

Verify that installation is complete by using the Checklist for Completed Installation.

1. Disconnect all power to the IntelCool unit.

WARNING!

Potentially lethal voltages exist within this equipment during operation. Observe all cautions and warnings in this manual. Failure to do so could result in serious injury or death. Only qualified service and maintenance personnel should work with this equipment.

2. Adjust remote control to prevent compressor, heat and fan operation.
3. Turn on main breaker and check line voltage on main unit disconnect switch. Line voltage must be within +/- 10 volts of nameplate voltage.
4. Turn ON main unit disconnect switch and check secondary voltage at transformer T1. Voltage at T1 must be 24 +/- 2.5 VAC .
5. From the remote control, verify proper operation in all modes.
6. Make sure all blowers, fans, and the scroll compressor are rotating in the correct direction.
7. Check the current draw on all line voltage components and compare with unit nameplate.
8. Check adjustment of the optional outside air damper for the desired balance between the flow of room air and outdoor air. Use a gauge or non polluting air flow indicator.

3.0 OPERATIONS

3.1 Compressorized Cooling

Compressorized cooling is provided by a high efficiency system consisting of a scroll compressor, evaporator, and condenser coils. A scroll compressor is used for reliable, quiet, and smooth operation at a high EER value (Energy Efficiency Rating).

The IntelCool uses R-22 refrigerant in a conventional vapor-compression refrigeration cycle. Heat is removed from the air in the space by blowing it across the evaporator coil. As heat is added to the refrigerant in the evaporator it boils and turns to a warm vapor. The refrigerant vapor enters the compressor and is compressed resulting in high pressure and temperature. After entering the condenser, the hot vapor is condensed to a liquid by the air blown across the condenser coil. Liquid refrigerant then passes through the thermal expansion valve and into the evaporator. The expansion reduces the pressure and temperature to complete the cycle.

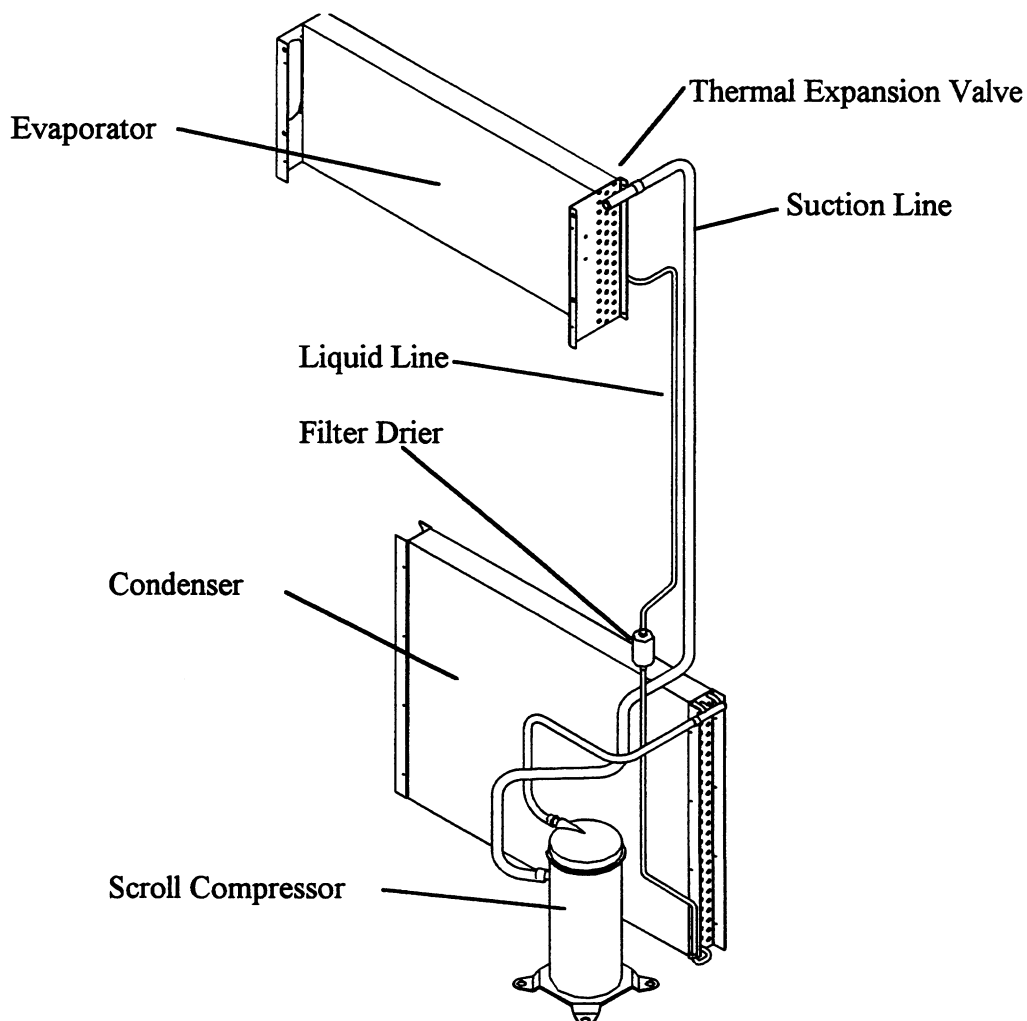


Figure 3. Refrigeration system

3.2 Economizer Cooling

The Economizer mode uses outside air to cool the room, when the outside conditions (temperature and humidity) allow for economical cooling. The economizer cooling components include the damper, damper actuator, enthalpy sensor, and actuator control board with integral mixed air sensor.

Economizer operation is enabled when the outside conditions meet the required temperature and humidity as set on the enthalpy sensor. If outdoor conditions are favorable on a call for cooling, the damper actuator will open the economizer damper. The damper position will be controlled based on the mixed air temperature in the evaporator section. The factory set mixed air temperature target is 55°F (13°C).

The amount of damper opening depends on the cooling capacity of the outside air; the cooler the outside air, the less that is needed to cool the room, and so a smaller damper opening is required. As the outside air temperature rises, the damper will open wider since more of that air is required to keep the room at the same temperature.

The economizer and compressorized cooling will never operate at the same time. If outdoor conditions meet the required enthalpy sensor setpoint during a cooling cycle, the unit will automatically shut down the compressor and begin using outside air.

Enthalpy Sensor

The enthalpy sensor responds to the total heat content of the outdoor air to provide changeover from compressorized cooling to free cooling operation. The changeover point is factory set (at the full CCW position). This setting will ensure rated capacity when the outdoor conditions allow for economizer cooling.

Actuator

The Economizer actuator is a shaft mounted 24 VAC geartrain motor, with feedback. The motor is mounted on the right end of the damper and is accessible from the outdoor filter access door. A signal from the actuator board, mounted in the air stream, controls the actuator.

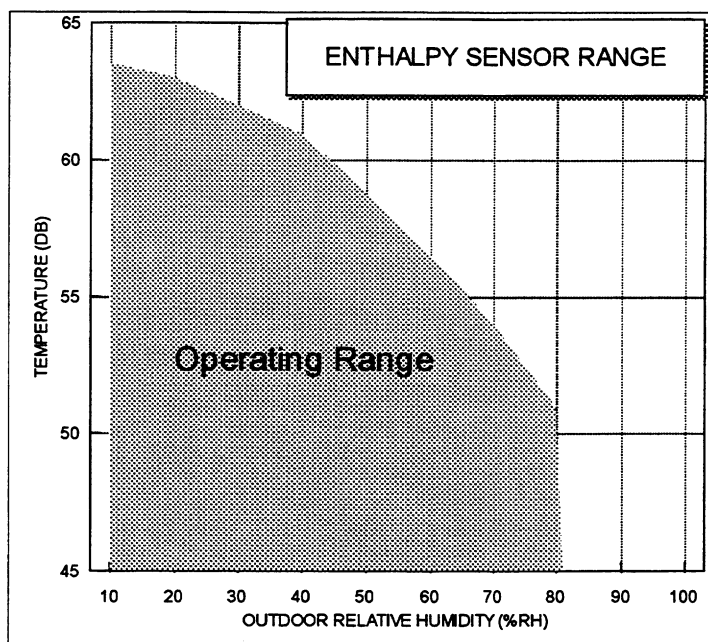


Figure 4. Enthalpy Control Setting

3.3 Heating

On units supplied with optional resistance heating, a call for heating closes the heat relay and energizes the evaporator fan and resistive elements.

3.4 Unit Controls

Remote Control Interface

Control connections to the IntelCool unit use customary HVAC terminal designations R, G, W, & Y. Contact closures between the common and different control connections supply control voltage to the electric panel components responsible for the desired function.

Operating modes are controlled by contact closures as follows:

Table 6

CONNECTION	OPERATING MODE
R	Common
G	Evaporator Fan
W	Heating
Y	Cooling (compressorized or economizer)

Wall mounted thermostats are to be low voltage, snap action or mercury type. Un-manned sites should use a HEAT/COOL/AUTO type subbase to provide automatic switchover during climate changes.

High Pressure

The high pressure switch is mounted in the compressor discharge line. Electrically it is connected in series with the compressor start circuit, which will shut down the compressor and condenser fan if the discharge pressure exceeds 400 PSIG (2758 kPa). This protects the IntelCool in the event of condenser motor failure or condenser coil blockage.

The pressure switch is an auto reset device. When the system pressure drops below 300 PSIG (2069 kPa), the switch will reset. If the call for cooling is present, the compressor start circuit will be energized and the compressor will start after the 3 minute anti-short cycle time.

Low Pressure

The low pressure switch is mounted in the compressor suction line. Electrically it is connected in series with the compressor start circuit, which will shut down the compressor and condenser fan if the suction pressure drops below 35 PSIG (241 kPa). This protects the IntelCool in the event the evaporator fan fails, the filter becomes clogged, or there is a loss of refrigerant.

The pressure switch is an auto reset device. When the system pressure rises above 60 PSIG (414 kPa), the switch will reset. If the call for cooling is present, the compressor start circuit will be energized and the compressor will start after the 3 minute anti-short cycle time.

Condenser Low Ambient Control

Low ambient control allows the IntelCool unit to provide cooling to the space when the outdoor temperature is low. The control uses a reverse acting pressure switch mounted on the discharge line that cycles the condenser fan in response to the discharge pressure.

On a call for cooling, when the discharge pressure increases to 240 PSIG (1655 kPa) the switch will close and start the condenser fan. When the pressure drops below 170 PSIG (1172 kPa) the switch will open and stop the condenser fan. **During normal operation in low ambient conditions the condenser fan will cycle frequently.**

A low ambient start relay is provided on units that do not have an economizer. This relay locks out (ignores) the low pressure switch on start-up until the system pressure stabilizes.

Anti-Short Cycle Timer

The anti-short cycle timer protects the compressor from continuous ON-OFF operation and restarts after power failures. The timer used is a fixed (non-adjustable) 3 minute timer.

Heater Protection (with optional heat)

On units supplied with resistance heating, a one time (replaceable) thermal link protects the unit wiring and prevents excessive heat conditions caused by a dirty air filter or fan failure.

4.0 MAINTENANCE

4.1 Filters

A replaceable evaporator air filter is supplied with the unit. The filter is easily serviceable from the outside, through the top front access panel.

Filters are usually the most neglected item in an environmental control system. To maintain efficient operation, they should be checked monthly and changed as required. Units supplied with economizers may require replacement filters more frequently because of airborne dust and organic materials.

Filters can be replaced from the front by opening the top front access panel. The panel is secured by two (2) quarter turn fasteners. **Power must be OFF while replacing the filter.**

4.2 Blower Package

Periodic checks of the blower package include: Blower wheels, housings, motor and motor mounting bracket.

With the power off, inspect and remove any debris removed from the wheels and housings. Also check to see that they are tightly mounted on the motor shaft and rotate freely without rubbing against the housing.

4.3 Economizer (Optional)

Each month the economizer should be inspected and any debris removed from the intake hood, damper blade, and enthalpy sensor.

4.4 Refrigeration System

Each month the components of the refrigeration system should be inspected for proper function and signs of wear. Since in most cases evidence of malfunction is present prior to component failure, periodic inspections can be a major factor in the prevention of most system failures.

Refrigerant Lines

Check all refrigerant lines and capillaries for vibration isolation, and support as necessary. Visually inspect all refrigerant lines for leaks.

Discharge Pressure

Discharge pressure can be increased and decreased by load conditions or condenser efficiency. The high-pressure switch will shut the compressor/condenser down at its cut-out setting of 400 PSIG (2758 kPa).

Thermostatic Expansion Valve

The thermostatic expansion valve (TEV) performs one function: it keeps the evaporator supplied with enough refrigerant to satisfy load conditions. It does not affect compressor operation.

Proper valve operation can be determined by measuring superheat (see Superheat). If too little refrigerant is being fed to the evaporator, the superheat will be high; if too much refrigerant is being supplied, the superheat will be low. The correct superheat setting is between 10 and 13°F (5.5 and 7.2°C).

Adjustments

To adjust the superheat setting, proceed as follows:

1. Remove the valve cap from the base of the valve.
2. Turn the adjustment stem counter-clockwise to lower the superheat.
3. Turn the adjustment stem clockwise to increase the superheat.

NOTE :

Make no more than one turn of the stem at a time. As long as thirty minutes may be required for the new balance to take place.

Superheat

To determine superheat:

1. Measure the temperature of the suction line at the point where the TEV bulb is clamped.
2. Obtain the gauge pressure at the compressor suction valve.
3. Add the estimated pressure drop between bulb location and the suction valve.
4. Convert the sum of the two pressures to the saturated temperature.
5. Subtract this temperature from the actual suction line temperature. The difference is superheat.

4.5 Air Cooled Condenser

Restricted airflow through the condenser coil will reduce the operating efficiency of the unit and can result in high compressor head pressure and loss of cooling.

Clean the condenser coil each time the evaporator filters are replaced. Check for bent or damaged coil fins and repair as needed. Check all refrigerant lines for leaks.

Clean the condenser coil of all debris that will inhibit air flow. This can be done with compressed air or commercial coil cleaner. For access to the coil, first remove the top panel by rotating two fasteners. Remove the condenser grille by pulling it up and forward. Remove the middle panel by removing screws, then pull panel down and forward. Removing the top condenser coil blocker will enable inspection and cleaning of the back side of the coil. Remove two screws and lift up front of blocker and push to the rear. Replace blocker and all panels in reverse order.

4.6 Compressor Replacement

Infrequently a fault in the motor insulation may result in a motor burn, but in a properly installed system burnouts rarely occur. Of those that do, most are the effects of mechanical or lubrication failures, resulting in the burnout as a secondary consequence.

If problems that can cause compressor failures are detected and corrected early, a large percentage can be prevented. Periodic maintenance inspections by alert service personnel on the lookout for abnormal operation can be a major factor in reducing maintenance costs. It is easier and far less costly to take the steps necessary to ensure proper system operation than it is to allow a compressor to fail and require replacement.

When troubleshooting a compressor, check all electrical components for proper operation.

1. Check all fuses and circuit breakers.
2. Check Hi-Lo Pressure switch operation.
3. If a compressor failure has occurred, determine whether it is an electrical or mechanical failure.

Mechanical Failure

A mechanical compressor failure will be indicated by no burned odor. The motor will attempt to run. If you have determined that a mechanical failure has occurred, the compressor must be replaced.

If a burnout does occur, correct the problem that caused the burnout and clean the system. It is important to note that successive burnouts of the same system are usually caused by improper cleaning.

Electrical Failure

An electrical failure will be indicated by a distinct pungent odor. If a severe burnout has occurred, the oil will be black and acidic.

In the event that there is an electrical failure and a complete burnout of the refrigeration compressor motor, the proper procedures must be performed in order to clean the system to remove any acids that would cause a future failure.

CAUTION!

Damage to a replacement compressor caused by improper system cleaning constitutes abuse under the terms of the warranty, and the **WARRANTY WILL BE VOIDED**.

There are two kits that can be used with a complete compressor burnout - Sporlan System Cleaner and Alco Dri-Kleener. Follow the manufacturer's procedure.

CAUTION!

Avoid skin contact with the gas and oils. Severe burns will result. Use long rubber gloves when handling contaminated parts.

Compressor Replacement

Replacement compressors are available from your Liebert supplier. They will be shipped in a reusable crate to the job site as required by the service contractor.

Upon shipping a replacement compressor, the service contractor will be billed in full for the compressor until the replacement has been returned to the factory.

The compressor should be returned in the same container used for shipping to the job. The possible damage causes or conditions that were found should be recorded by marking the compressor return tag.

1. Disconnect power.
2. Attach suction and discharge gauges to access fittings.
3. Recover refrigerant using standard recovery procedures and equipment. Use a filter-drier when charging the system with recovered refrigerant.

CAUTION!

Do not loosen any refrigeration or electrical connections before relieving system pressure from both sides of the compressor.

NOTE

Release of refrigerant to the atmosphere is harmful to the environment and is unlawful. Refrigerant must be recycled or discarded in accordance with federal, state, and local regulations.

4. Front seat service valves to isolate the compressor. Reclaim charge from compressor.
5. Remove service valves, pressure switch capillaries, and disconnect all electrical connections.
6. Remove failed compressor.

CAUTION!

A scroll compressor must rotate in the proper direction. Record compressor motor connections when removing failed compressor. Wire the replacement compressor motor the same way to maintain proper rotation direction.

7. Install replacement compressor and make all connections.
8. Pressurize and leak test the system at approximately 150 PSIG (1034 kPa) pressure.
9. Follow manufacturer's instructions for cleanout kits.
10. Connect a vacuum pump to both the high and low sides of the system through properly sized connections. Evacuate the system twice to 1500 microns, and the third time to 500 microns. Break the vacuum each time with dry nitrogen to 2 PSIG (13.8 kPa).
11. Charge the system with refrigerant. Refer to **Table 3** for unit charge.
12. Apply power and operate system. Check for proper operation. Refer to design pressures in **Table 7**.

Table 7

DESIGN PRESSURES (PSIG)	OUTDOOR AMBIENT (°F)		
	95	105	115
Discharge	290	330	370
Suction	73	75	77

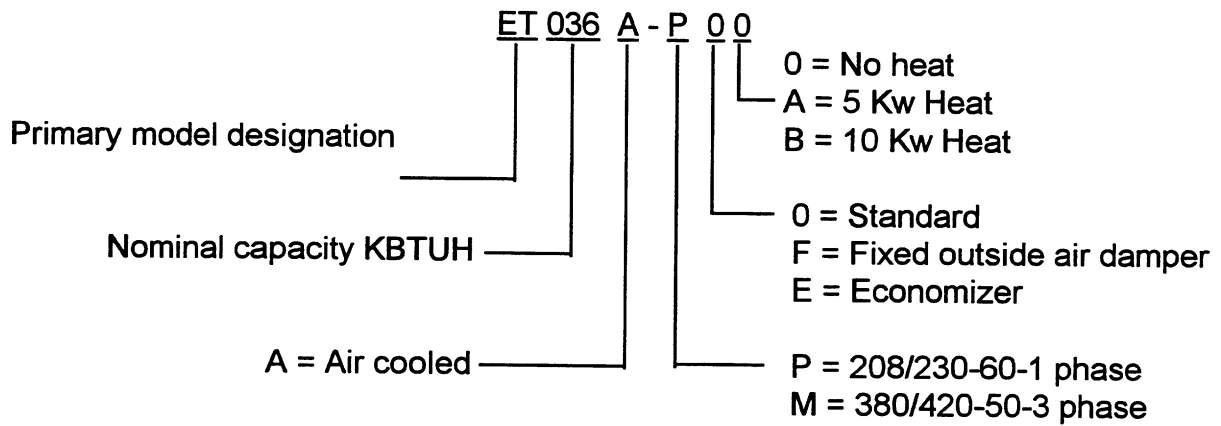
Note: Based on indoor conditions of 80°F, 50% RH, and clean coils.

5.0 TROUBLESHOOTING GUIDE

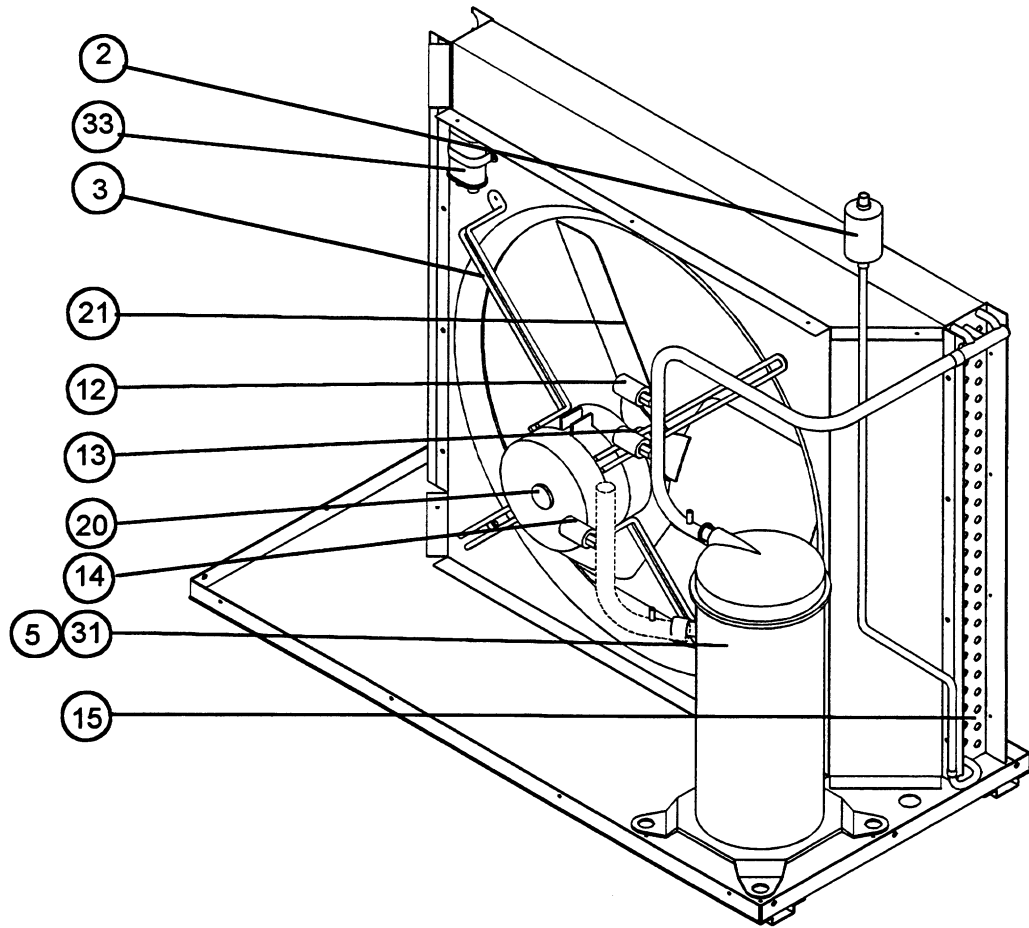
PROBLEM	PROBABLE CAUSE	REMEDY
Unit will not start	No power to unit	Check voltage to input terminal block.
	Control voltage circuit breaker open	Locate short and reset breaker.
	Shut off by external thermostat or stat is defective	Check operation of thermostat.
No cooling	Low refrigerant charge	Check with gauges.
	Compressor contactor not pulling in	Check voltage at contactor- if not present refer to print and determine voltage loss.
	No output from thermostat	Check operation of stat, should have voltage output to Y terminal during cooling.
Unit cycles on high pressure switch	Loss or restriction of air flow	Check condenser blower assembly for proper operation. Check for dirty filter or inlet grille restriction.
	Defective fan cycling control	Switch should make @240 PSIG.
Heat does not operate	No voltage output from thermostat	Check stat for proper output to W terminal.
	Fuseable plug blown	Check for open and replace.

6.0 PARTS

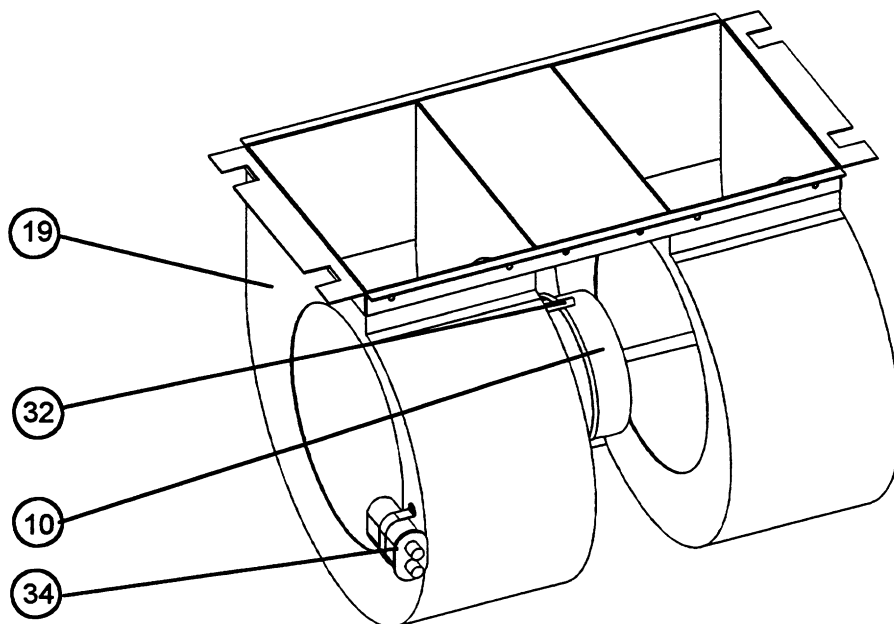
6.1 Model Number Designation



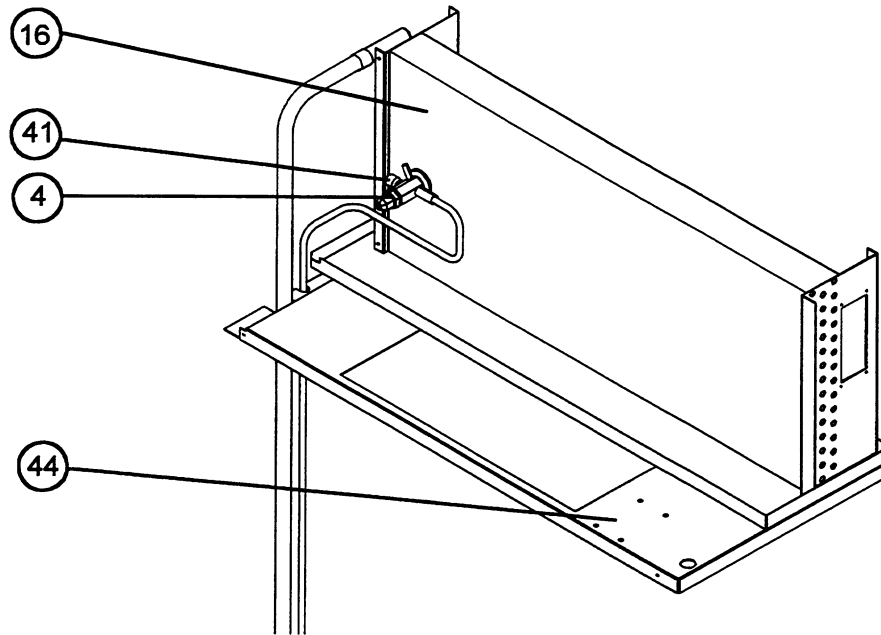
6.2 Condenser Assembly



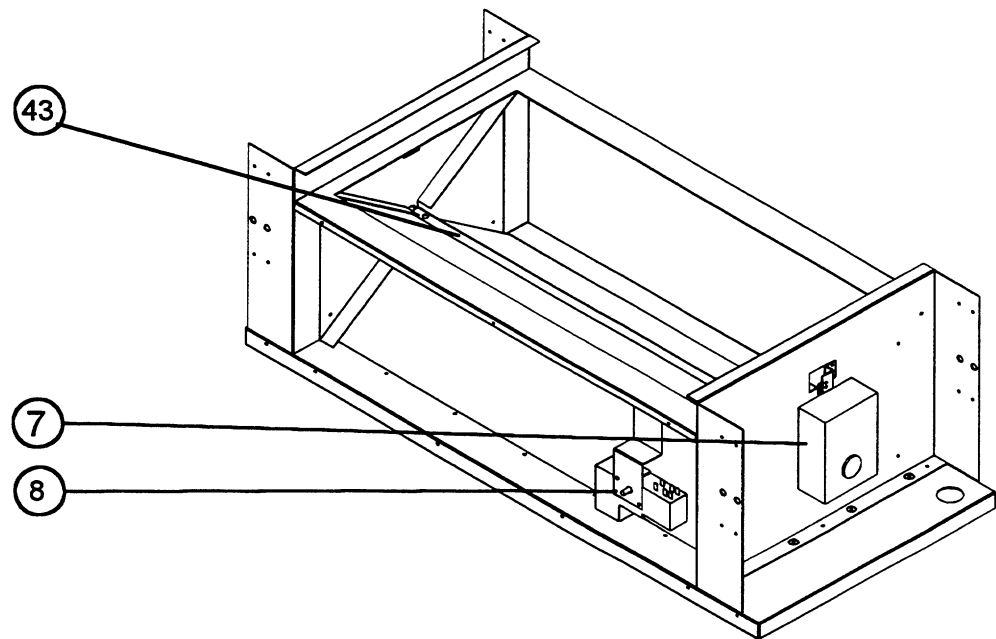
6.3 Evaporator Blower Assembly



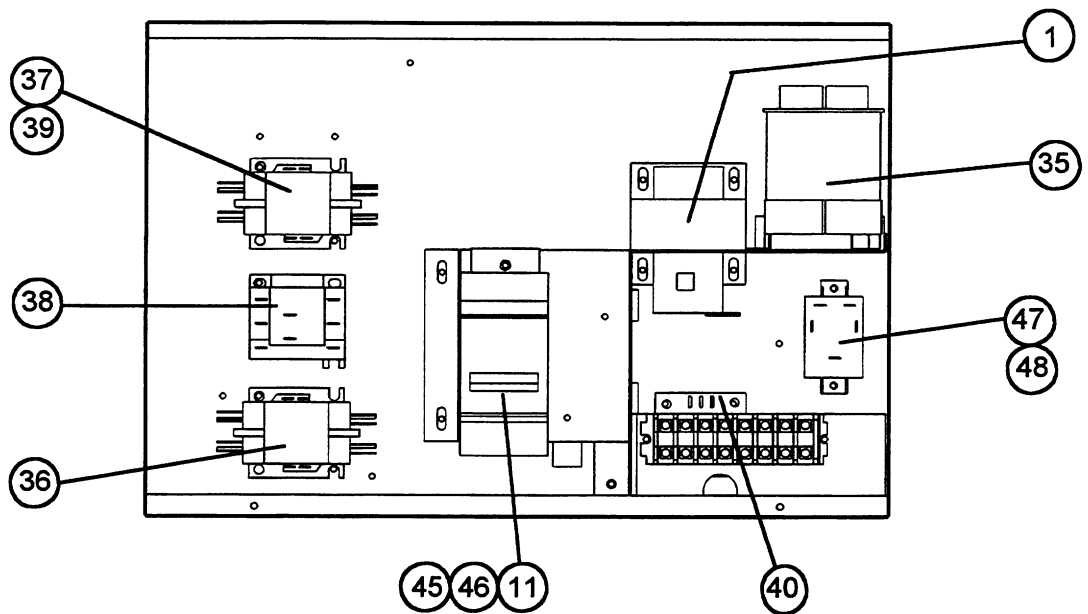
6.4 Evaporator Assembly



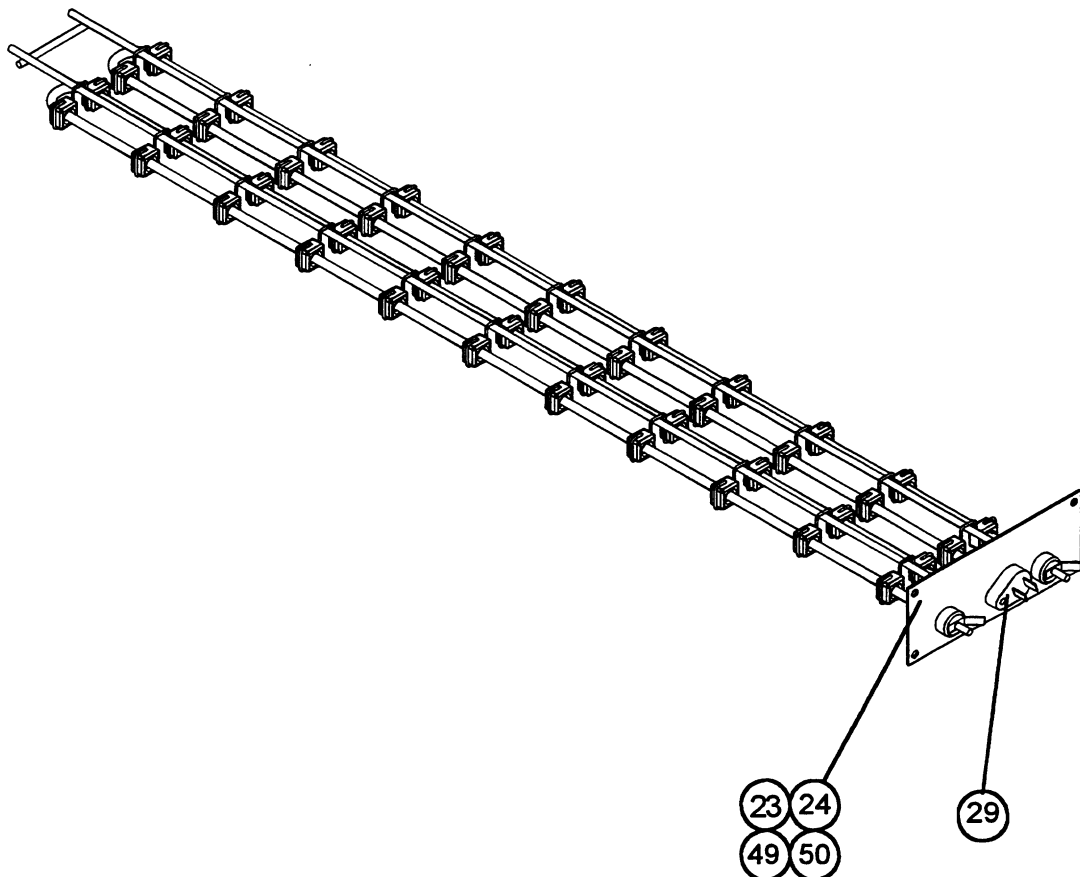
6.5 Economizer Assembly (Optional)



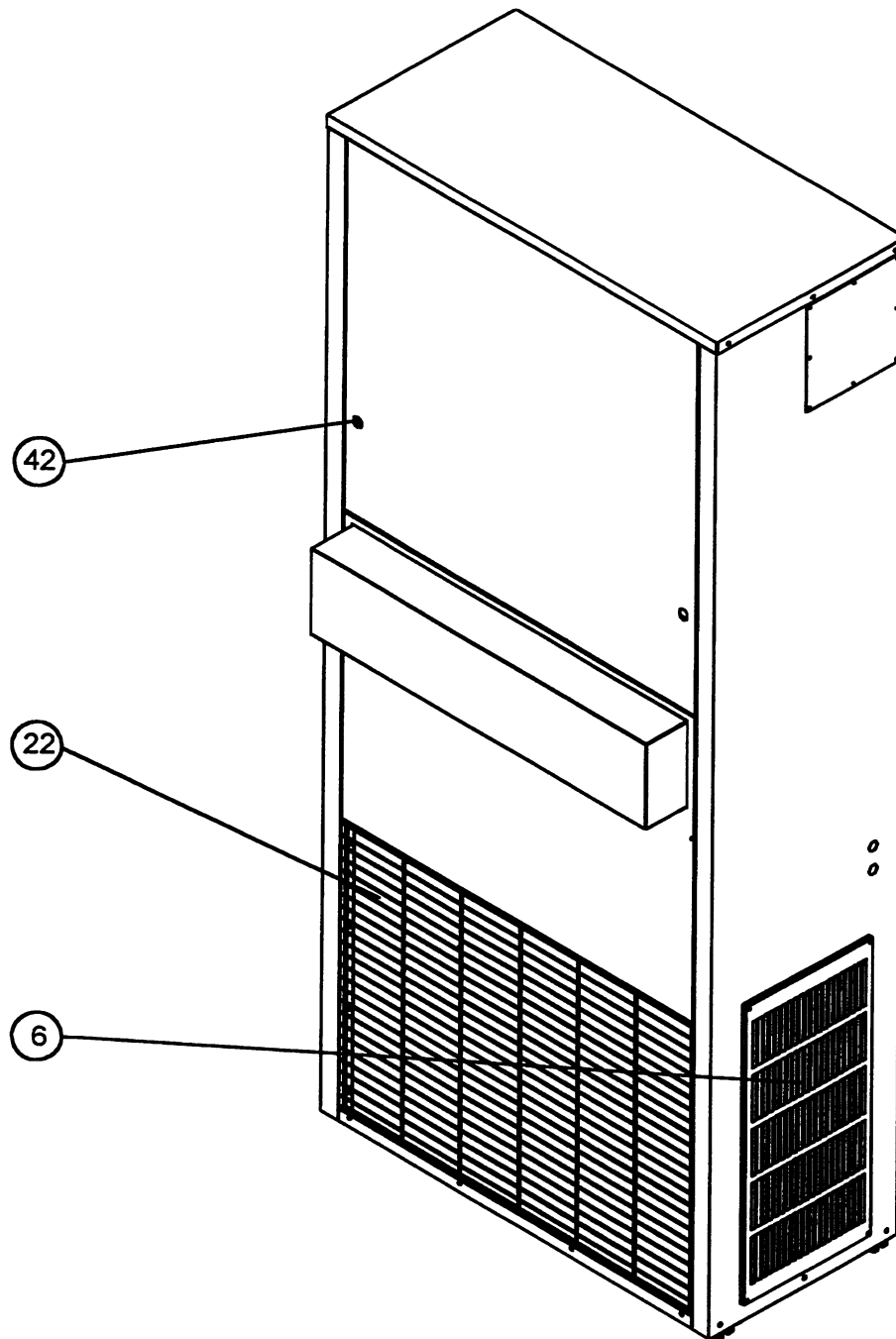
6.6 Electric Box



6.7 Heaters (Optional)



6.8 Unit Exterior and Grilles



6.9 Parts List

NO.	PART NUMBER	DESCRIPTION
1	127184P1	TRANSFORMER
2	127185P1	FILTER/DRIER
3	127906P1	MOUNT MOTOR CONDENSER
4	128157P1	THERMAL EXPANSION VALVE
5	129638P1	COMPRESSOR ZR40K*-PFV
6	138428P1	GRILLE CONDENSER INLET
7	138445P1	MOD MOTOR
8	138446P1	CONTROL ENTHALPY
9	138447P1	FILTER 2" 16.0X30.0
10	138449P1	MOTOR .25 HP 208/230
11	138457P1	BREAKER 40 AMP HACR
12	138460P1	SWITCH PRESSURE HP 400 PSI
13	138461P1	SWITCH PRESSURE FS 190 PSICO 240CI
14	138462P1	SWITCH PRESSURE LP 35 PSICO 60CI
15	138909P1	CONDENSER COIL
16	138911P1	EVAPORATOR COIL
17	138935P1	BRACKET UNIT MOUNTING
18	138939P1	KIT DUCT 9X27.63 INTEL
19	138941P1	BLOWER PARTS PKG DD9X4
20	138942P1	MOTOR CONDENSER .25 HP
21	138943P1	FANBLADE 1/2" T10S08-2224
22	138944P1	GRILL CONDENSER DISCHARGE
23	138955P1	HEATER 5 KW 208/230
24	138955P2	HEATER 10 KW 208/230
25	138960P1	GRILLE - EVAPORATOR RETURN AIR
26	138961P1	GRILLE - EVAPORATOR DISCHARGE AIR
27	138968P1	WALL STAT
28	138969P1	INDOOR EVAPORATOR GRILLE KIT
29	138976P1	SAFETY, FUSIBLE LINK 25 AMP 240 VOLT
30	138979P1	BRACKET MTG DAMPER CNTRL BOARD
31	138980P1	COMPRESSOR ZR49K*-TFD
32	1C19518P1	MOUNT MOTOR EVAPORATOR
33	B-1220	CAPACITOR EVAPORATOR FAN
34	B-1220	CAPACITOR CONDENSER FAN
35	C15-0090	CAPACITOR COMPRESSOR
36	E-011B	COMPRESSOR RELAY
37	E-011C	HEATER RELAY 10 KW

NO.	PART NUMBER	DESCRIPTION
38	E-0130	EVAPORATOR FAN RELAY
39	E-013A	HEATER RELAY 5 KW
40	E13-0070	TIMER ANTI-CYCLE
41	P66-0170	DISTRIBUTOR
42	138981P1	LATCH, PANEL
43	138442P1	SHAFT DAMPER
44	4D14851G1	CONTROL BOARD
45	138457P2	BREAKER 60 AMPS HACR
46	E15-0010	POWER BLOCK 2 POLE
47	E03-0170	RELAY (ECONOMIZER)
48	E-4650	RELAY TIME DELAY (NON-ECONOMIZER)
49	138955P3	HEATER 5 KW 380 V
50	138955P4	HEATER 10 KW 380 V



World Headquarters

Liebert Corporation

1050 Dearborn Drive, P.O. Box 29186

Columbus OH 43229

Telephone: 1-800-877-9222

Facsimile: 614-841-6022

Liebert Europe

Globe Park

Marlow

Bucks SL7 14G

United Kingdom

Telephone: 44-628-403-200

Facsimile : 44-628-403-293

While every precaution has been taken to ensure accuracy and completeness in this manual, Liebert Corporation assumes no responsibility, and disclaims all liability for damages resulting from use of this information or for any errors or omissions.

© 1995 Liebert Corporation

All rights reserved throughout the world.

Specifications subject to change without notice.

© Liebert and the Liebert logo are registered trademarks of Liebert Corporation. All names referred to are trademarks or registered trademarks of their respective owners.

Printed in U.S.A.

SL-19530 (7/95) (50/60)



SL-19530