Precision Cooling
For *Business-Critical Continuity™*

Liebert® Challenger™ ITR

Technical Data Manual - Row-Based, Floor-Mounted Nominal 23 or 33kW Systems, Air-Cooled, Water/Glycol-Cooled, GLYCOOL, Chilled Water, Split Systems, 50 & 60 Hz

EMERSON
Network Power

PRODUCT NOMENCLATURE

NOTE

Tables i, ii *and* ***iii*** *show nomenclature for the complete range of all available product options. Not all combinations are possible. For assistance, contact your local dealer, Liebert representative or call 1-800-543-2778.*

Table i Product model information

B	F	042	A	—	A	A	E	I
Challenger ITR	R = ITR, Horizontal Flow	Nominal capacity in thousand BTUH	A-=Air-Cooled		A = 460/60/3	A = Advanced Microprocessor	0 = No Reheat	0 = No Humidifier
	M = ITR, Horizontal Flow with Econ-O-Coil		C-= Chilled Water		B = 575/60/3	G = Advanced Microprocessor w/Graphics	E = Electric Reheat	I = Infrared Humidifier
			E- = Evaporator		C = 208/60/3		H = Hot Water Reheat	S = Steam Generating Humidifier
			G-= GLYCOOL		D = 230/60/3		G = Hot Gas Reheat	
			WG = Water-Cooled/Glycol-cooled		2 = 380/60/3		S = SCR Reheat	
					J = 200/50/3			
					H = 230/50/3			
					M = 380/415/50/3			

Table ii Split system configurations

Evaporator		Condensing Units		
		Air-Cooled Prop Fan Condensing Unit	Air-Cooled Centrifugal Condensing Unit	Water/Glycol Condensing Unit
60 Hz (50 Hz)	BR060E (BR059E)	PFH067A_ _H3 PFH066A_ _H3	MC_65A (MC_64A)	MC_69W (MC_68W)

Table iii Self-contained system configurations

Frequency	Indoor Unit	Remote Equipment		System Type
		Air-Cooled Condenser	Drycooler/Pump	
60 Hz (50 Hz)	BR067A (BR065A)	CS@104		Air-Cooled
60 Hz (50 Hz)	BR071WG (BR070WG)		DSF112 3/4 HP Pump 60 Hz 1-1/2 HP Pump 50 Hz	Glycol-Cooled or Self-Contained - Water-Cooled
60 Hz (50 Hz)	BM061G (BM058G)		DSO112 1-1/2 HP Pump	GLYCOOL™
60 Hz (50 Hz)	BR102C (BR101C)			Self-Contained - Chilled Water

@
F = Fan Speed Control
L = Lee Temp

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1.0 DEDICATED, PRECISE ENVIRONMENTAL CONTROL

For sensitive electronics, environmental control is more than simple cooling. “Comfort” air conditioning systems are designed for the comfort of people and simply cannot provide the kind of environment required by high performance computer or communication equipment.

1.1 Temperature Control

The high density heat load in a computer room or other similar application is beyond the capacity of ordinary air conditioning systems.

Sensitive electronics are best maintained in a stable environment of 72°F ±2°F (22.2°C ±1°C). Because computers and communications equipment generate large quantities of heat in small areas, six to 10 times the heat density of normal office space, the air conditioning system must have more than just enough cooling capacity. It must have the precision to react quickly to a drastic change in heat load and prevent wide temperature fluctuations—something a large building system cannot do.

1.2 Humidity Control

The electronic equipment must be protected from both internal condensation and static electricity discharges.

Maintaining the correct humidity level in the room is just as important as maintaining proper temperature. When humidity is too high, condensation may form inside electronic equipment and damage it. If humidity is too low, static electricity could disrupt operation or even shut down the electronic system. An ordinary building system cannot normally control the environment within these boundaries.

1.3 Air Volume

Computers and other sensitive electronics require greater air volumes than ordinary air conditioning can provide. Typical comfort systems are designed to provide between 300 and 400 CFM (cubic feet per minute), (500–700 CMH) per ton of cooling. Computer systems require between 500 and 600 CFM (850–1020 CMH) per ton. The high density heat load in a relatively small space requires more changes of air than a less dense “comfort” application.

While a normal office space requires only two air changes per hour, a room filled with electronic equipment requires up to 30 changes per hour. Without proper air volume, hot spots and temperature fluctuations could develop within the room. Also, greater air volumes provide the higher sensible heat ratios required by electronic computer equipment.

1.4 Air Filtration

A clean environment of properly filtered air is essential. Build-up of dust and fibers attracted by operating electronics can cause faults and impair the operation of electromechanical devices, such as switches and disk drives.

In short, today’s electronics need the same precision environmental control that mainframe computers need. The difference is that instead of one large computer room there are several small, often crowded rooms, widely dispersed throughout a building, plant or campus. Conditions and requirements can vary widely.

1.5 Year Round Operation

Comfort conditioning systems cannot be relied upon 24 hours per day 365 days per year. They are typically designed to operate 10 hours per day, from spring to autumn. Many “comfort” systems have no provision for winter operation. A precision environmental control system is designed for operation at temperatures down to -30°F (-34.4°C).

1.6 Agency Listed

Standard 60 Hz units are CSA (NRTL-C) certified. NRTL-C meets both U.S. and Canadian government safety requirements, providing fast, problem-free inspection and building code approvals. The units are also MEA listed for New York City applications.

2.0 PRECISION ENVIRONMENTAL CONTROL FOR INDUSTRIAL, TELECOMMUNICATIONS, MEDICAL AND DATA PROCESSING EQUIPMENT

Data processing power is moving from the specialized environment of the computer room to the office and the factory floor.

At the same time, the applications are growing exponentially. From yesterday's spreadsheets and word processors, micro- to mid-range computers control LANs and WANs, manage complex telecommunications systems, optimize manufacturing processes and facilitate sophisticated testing and laboratory functions.

Computers and sensitive electronics tend to be grouped, often in specialized rooms. This makes operation and service easier, but it also creates the need for precision environmental control—the coordinated management of temperature, humidity and air filtration.

2.1 Liebert Challenger ITR

Liebert Challenger ITR provides the precision and flexibility required by a broad range of applications.

- Microprocessor-based controls (with a choice of monitoring systems based on your needs) allow you to select temperature and humidity ranges.
- A-frame coil (oriented to airflow) provides a large cooling surface area, and more precise control of temperature and humidity.

2.2 Multiple Configurations to Fit a Variety of Spaces

Though electronic equipment rooms share some common protection requirements, their application requirements can vary greatly. The room may or may not have a raised floor or an existing heat rejection loop. Budget and space requirements may limit the options a contractor has.

2.3 Efficiency in Economic Terms

The Liebert Challenger ITR occupies 9.8 square feet (.91 square meters) of floor space. It can be located either between equipment racks or at the end of a row of racks. With room floor space valued at a premium per square foot, the small footprint of the Liebert Challenger ITR makes economic good sense.

2.4 GLYCOOL

GLYCOOL is a patented Liebert process that can significantly reduce energy costs during periods of low outdoor temperatures.

The GLYCOOL system is a normal glycol system with the addition of a second cooling coil, known as an Econ-O-Coil, in the air handling unit and a three-way valve. During colder months, the glycol solution returning from the outdoor drycooler is routed to the Econ-O-Coil and becomes the primary source of cooling for the room. At ambient temperatures below 35°F (1.6°C), the cooling capacity is sufficient to handle the total cooling needs of the room. Because the compressor is responsible for the majority of the power consumption of the air conditioning unit, a GLYCOOL system can substantially reduce energy costs.

Figure 1 Unit configurations

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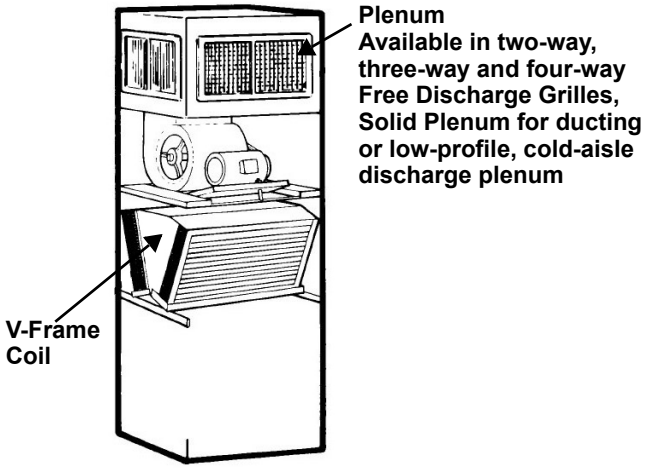
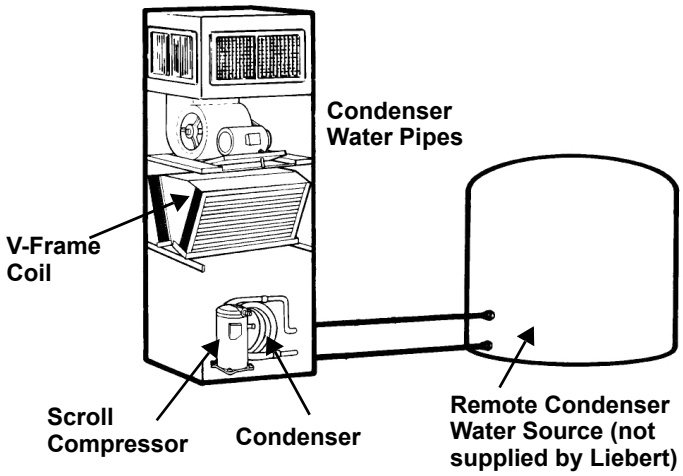
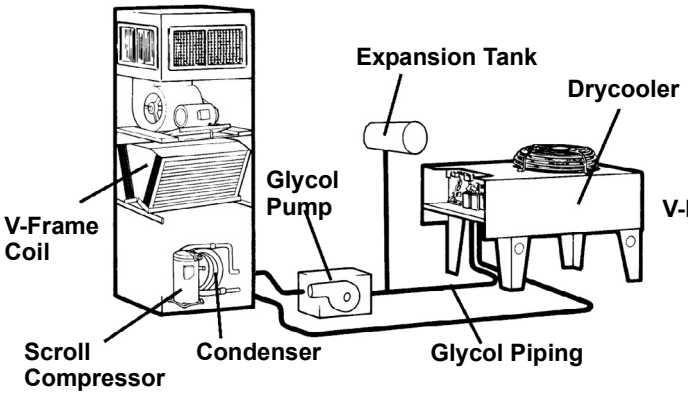
Chilled Water, Self-Contained System



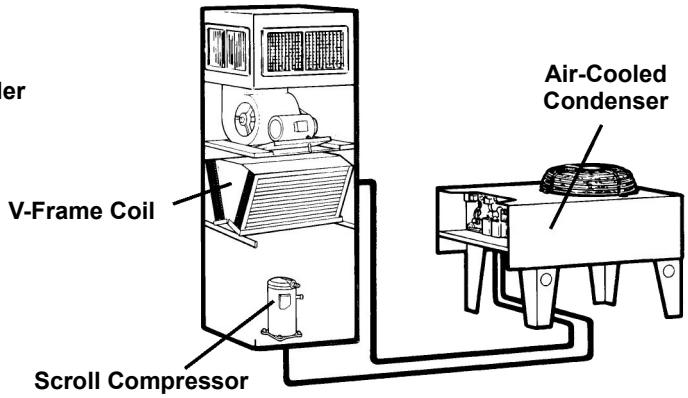
Water-Cooled, Self-Contained System



Glycol-Cooled, Self-Contained System With Matching Drycooler and Pump



Air-Cooled, Self-Contained System With Matching Condensers



GLYCOOL-Cooled System

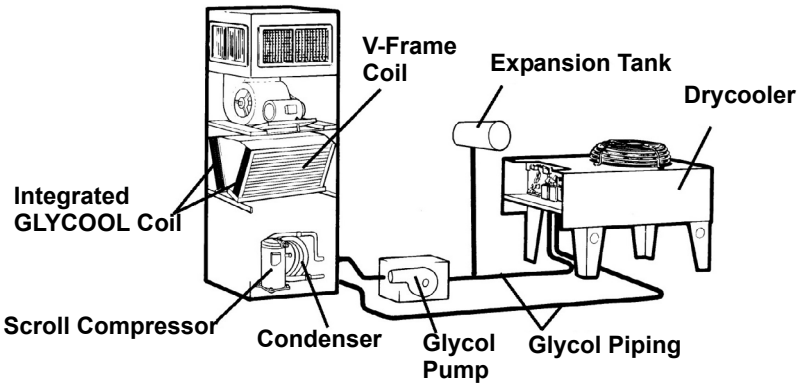
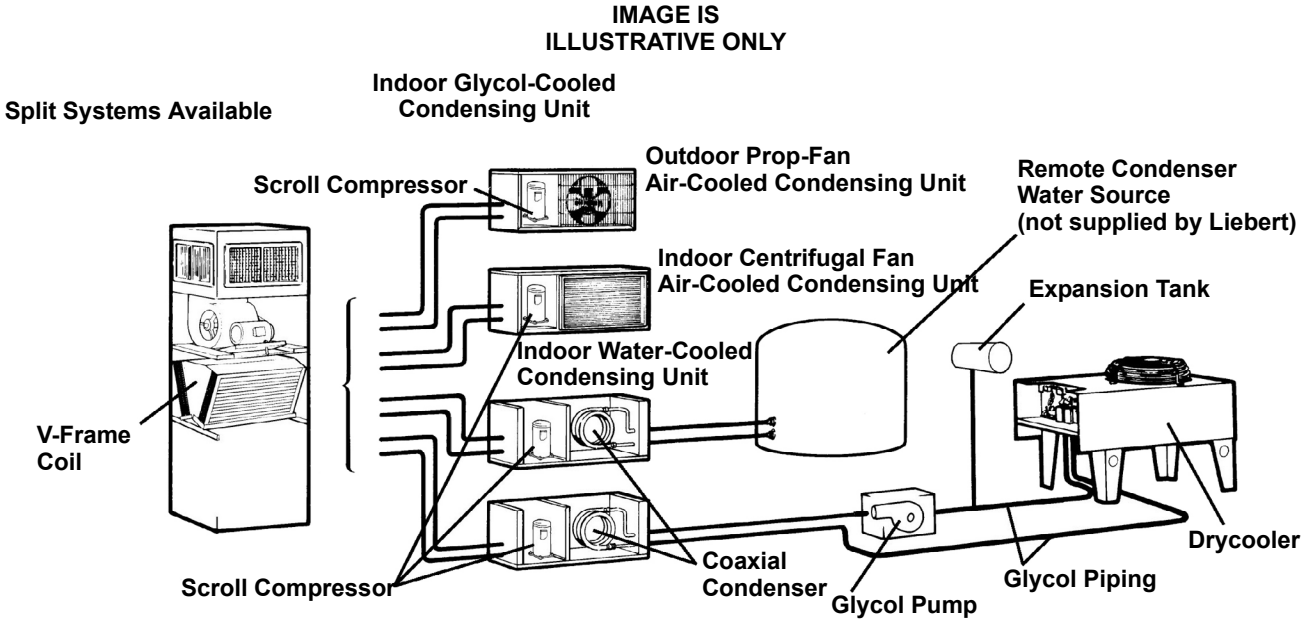


Figure 2 Unit configurations, continued



3.0 LOCAL MONITORING SYSTEMS

Two levels of microprocessor control systems are available providing precise control and monitoring of the critical space.

The **Advanced Microprocessor** is standard, and the **Advanced Microprocessor with Graphics** is optional. The main control functions are similar for both controls.

3.1 Control

The user must enter a three-digit password before making changes.

- Temperature Setpoint 65-85°F (18-29°C)*
- Temperature Sensitivity +1-10°F (0.6-5.6°C)
- Humidity Setpoint 20-80% RH*
- Humidity Sensitivity 1-30% RH
- High Temperature Alarm 35-90°F (2-32°C)
- Low Temperature Alarm 35-90°F (2-32°C)
- High Humidity Alarm 15-85% RH
- Low Humidity Alarm 15-85% RH

* The microprocessor may be set within these ranges; however, the unit may not be able to control to extreme combinations of temperature and humidity.

3.2 Control Type

Factory set-up for Intelligent Control which uses “fuzzy logic” and “expert systems” methods. Proportional and Tunable PID are user selectable options.

3.3 Internal System Control

- **Compressor short cycle control:** Prevents compressor short-cycling and needless compressor wear.
- **System auto restart:** The auto restart feature will automatically restart the system after a power failure. Time delay is programmable.
- **Sequential Load Activation:** On initial start-up or restart after power failure, each operational load is sequenced to minimize total inrush current.
- **Hot Water / Econ-O-Coil Flush Cycles:** Hot water reheat coils and Econ-O-Coils are periodically flushed to prevent a build-up of contaminants.
- **Temperature/Humidity Sensor Calibration:** The sensors may be calibrated from the front monitor panel to insure that all units in the room are similarly calibrated, assuring greater precision.

3.4 Monitoring

- **Normal display:** Includes present room temperature and humidity, active functions (cooling, heating, dehumidifying), and any alarms.
- **Operating status:** Displays each control operation in percent.
- **Read analog inputs function:** Displays the present values of up to four analog inputs.

3.5 Diagnostics

- **Input diagnostics:** Reviews inputs to the control system.
- **Control board diagnostics:** Initiates a self-test of the control system.
- **Output diagnostics:** Tests major components by turning them on and off from the control panel. Includes: main fan, compressor, liquid line solenoid valve, hot gas bypass valve, chilled water or chilled GLYCOOL valve, R-5 relay, reheat, hot water reheat valve, humidifier, humidifier make-up valve, and common alarm.

3.6 Logging

- **Alarm history log:** The Advanced Microprocessor displays the 10 most recent alarms. The Advanced Microprocessor with Graphics displays the most recent 60 alarms. Both provide a time and date stamp for each event
- **Run time log:** Displays run time and hours for major components (also allows reset of run hours) including compressors, GLYCOOL, fan, humidifier, and reheat.

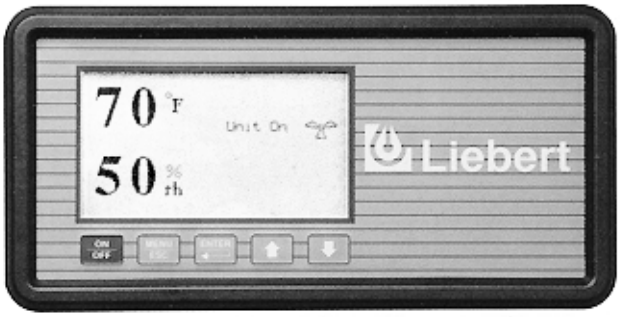
3.7 Alarms

- Humidifier Problem
- High Head Pressure
- Change Filter
- Loss of Air Flow
- High Temperature
- Low Temperature
- High Humidity
- Low Humidity
- Compressor Overload—Optional
- Main Fan Overload—Optional
- Low Suction Pressure
- Short Cycle
- Loss Of Power

Custom Alarm (Maximum of Four)

- Water Under Floor
- Smoke Detected
- Standby GC Pump On
- Loss Of Water Flow
- Standby Unit On
- User-Customized Text

Figure 3 Microprocessor control systems



Advanced Microprocessor w/Graphics Control System—Optional. Backlit 240 x 128 dot matrix graphics display.

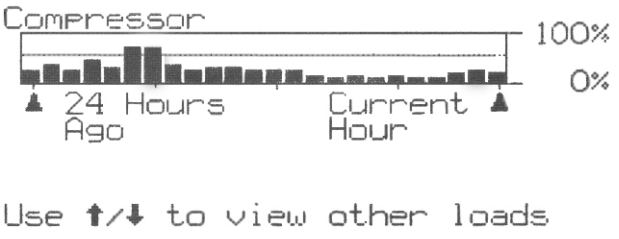
Advanced Microprocessor Control System. Backlit 4 x 20 Liquid Crystal Display.

3.8 Graphical Displays—Advanced Graphic Control Only

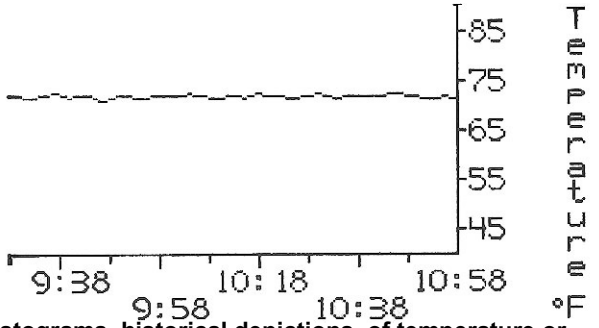
- Individual plots of temperature, humidity and the four analog inputs.
- Bar graph plots of individual component run history by hour.
- Floor plan of optional water detection system layout including on alarm.

Status indication of operating modes with current temperature and humidity.

Figure 4 Optional Views With Advanced Graphics



The runtime screen provides data in either tabular or easy-to-read graphic formats.



Histograms–historical depictions–of temperature or humidity can be displayed on the screen for analysis. This is especially helpful in tracking the environmental factors of an alarm.

4.0 STANDARD FEATURES—ALL SYSTEMS

4.1 Cabinet and Frame

The frame, 14 gauge, MIG welded tubular and formed steel, provides maximum support while 1" (25.4mm) deep steel panels with 1-1/2 lb. (.68 kg) insulation protect and quiet the system. The front door can be opened for service without shutting off the system. All components are accessible for service/maintenance through the front and rear of the unit.

The Liebert Challenger ITR's resistance to corrosion is enhanced by the black, powder-coat finish to all frame components. Exterior panels are similarly protected with durable powder-coating.

4.2 Electrical Panel

The high voltage compartment contains the contactors, transformers and overloads and all other high-voltage components.

Each high voltage component is protected by a separate overcurrent protective device. The entire high voltage panel is enclosed by a safety lock dead front panel. When the front door is opened by operating personnel, the high voltage components remain enclosed for operator safety.

4.3 Fan Section

The Liebert Challenger ITR features a quiet, low speed fan assembly with double inlet blower, lifetime lubrication and self-aligning ball bearings. The motor and variable pitch drive are mounted on an adjustable base. The entire blower/ motor assembly is mounted on vibration isolators for smoother operation.

The draw-through design of the fan section provides even air distribution across the coil, controlled air for bypass humidification, elimination of air bypass around the filters and low internal cabinet pressure drop.

4.4 Infrared Humidifier

High-intensity quartz lamps over the stainless steel humidifier pan permit clean, particle-free vapor to be added to the air within 5 to 6 seconds of the electronic call from the microprocessor control.

The quartz lamps provide radiant energy that evaporates water in a pure state, without solids.

The Infrared Humidifier is equipped with an automatic water supply system that significantly reduces cleaning maintenance. This system has an adjustable water over-feed to prevent mineral precipitation. A drain valve is provided to easily empty the humidifier pan prior to inspection or servicing. A control valve regulates flow at water pressures between 5 and 150 psig (34.5 and 1034 kPa) and includes a Y-strainer.

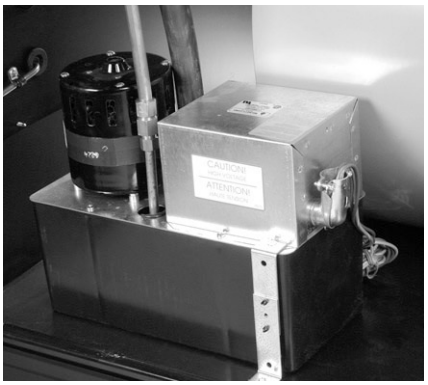
4.5 Electric Reheat

The two-stage 304 stainless steel reheat elements are a rigid, fin-tubular design that have extended operation life. The reheat has ample capacity to maintain room dry-bulb conditions during a system call for dehumidification. The two stages give an accurate, controlled response to the requirements of the computer room. The low watt density, electrically enclosed elements are surrounded by the tube and fins, reducing sheath temperatures and eliminating ionization.

4.6 Filters

The standard pleated 2" (51mm) filter with an efficiency of 20% (based on ASHRAE 52.1) can be changed quickly and easily through the front of the unit.

4.6.1 Condensate Pump



The condensate pump, mounted in the bottom of most units, is used for unit drain water only. The condensate pump is complete with sump, motor and pump assembly and automatic control.

The standard model has single float. A dual-float condensate pump, which includes connections to unit, common alarm, unit shutdown and one customer N/O contact is also available.

Table 1 Condensate pump capacity

Voltage	Hz	Capacity GPH (l/s)	Head Pressure ft. (kPa)
200/230	50	50 (189)	10 (30)
208/230	60	50 (189)	17 (51)
380/415	50	200 (757)	26 (78)
460	60	200 (757)	43 (128)

4.6.2 Remote Temperature/ Humidity Sensors

The remote temperature/ humidity sensors permit monitoring room conditions from an external source. They are encased in an attractive case and are provided with a plug compatible shielded cable in virtually any length.

4.6.3 Disconnect Switch—Locking Type

The locking disconnect switch, mounted in the electrical panel, is connected to the safety lock dead front panel of the system and is interlocked mechanically. In this way the panel can't be opened until the switch is in the off position. And it complies with local codes as well as those of the NEC.

Disconnect Switch (Locking)

5.0 CHILLED WATER SYSTEM—STANDARD AND OPTIONAL FEATURES

5.1 Chilled Water System—Standard Features

5.1.1 Cooling Coil

The chilled water cooling coil is designed for closed-loop applications using properly maintained water. It is constructed of copper tubes and aluminum fins. To ensure quality, the V-frame coil is manufactured to the highest standards in the industry.

5.1.2 Modulating Motor

The flow of chilled water through the cooling coil is controlled by an electronic modulating motor. The microprocessor control will activate the motor when a need for cooling or dehumidification exists. The motor will position the valve to precisely match the needs of the conditioned space.

5.1.3 Line Insulation

All chilled water piping within the Liebert Challenger ITR is fully insulated to assure full system capacity and prevent condensation.

5.1.4 Three-Way Control Valve

The fully insulated control valve gives the conditioned space the precise cooling needed by electronic equipment. Its unique design requires no overtravel linkages and never requires adjustment.

5.2 Chilled Water System—Optional Features

5.2.1 Chilled Water Flow Switch

The flow switch will activate the alarm system and/or shut down the system should the chilled water supply be interrupted. The switch is factory wired and mounted in the chilled water valve compartment.

5.2.2 High Pressure

For special applications, a high-pressure, modulating three-way or two-way valve can be provided. The valve is designed for 400 psig (2758 kPa) water pressure.

6.0 REFRIGERATION SYSTEMS

Two versions are available:

- Self-Contained Systems
- Split Systems

6.1 Self-Contained Systems

These systems feature a scroll compressor and controls, expansion valve, hot gas bypass and evaporator coil in the room unit.

Air-Cooled models also include a crankcase heater on the compressor and require field connection to remote air-cooled condenser.

Water, Glycol and GLYCOOL models also include a coaxial condenser with field connections required to the water or glycol coolant loop.

Water/Glycol models have two-way WRV with bypass.

GLYCOOL models have three-way WRV.

6.2 Split Systems

These systems feature the evaporator coil and expansion valve in the room unit, with the scroll compressor, and the condensing equipment located in one of several different types of pre-charged condensing units.

6.3 Refrigeration System Components—Standard Features

6.3.1 Compressor

The heart of the refrigeration system is the compressor.

All self-contained evaporator units and split system condensing units contain a high efficiency, quiet operating scroll compressor. The compressors have internal vibration isolating mountings, pressure safety controls and built-in overload protection.

6.3.2 Evaporator Coil

The evaporator coil is designed for the high sensible heat ratio required by electronic equipment applications. The copper tube, aluminum fin coils are configured in a V-frame for smooth air flow through the unit.

6.3.3 Safety Control

Every Liebert Challenger compressor has a high-pressure switch with an exclusive manual reset after high pressure cut-out. This prevents cycling the compressor at high pressure, resulting in greater efficiency and longer compressor life.

6.3.4 Expansion Valve

The externally equalized thermostatic expansion valve smoothly controls the flow of refrigerant through the coil and provides precise control of superheat.

7.0 AIR-COOLED SYSTEM—STANDARD AND OPTIONAL FEATURES

7.1 Air-Cooled, Self-Contained Systems—Standard Features

7.1.1 Pump Down Control

The compressor pump-down control is accomplished by a liquid-line solenoid valve used in conjunction with a low pressure switch.

7.1.2 Condenser

The Liebert manufactured low profile, direct drive propeller fan type air-cooled condenser provides quiet, efficient operation.

It is constructed of aluminum with a copper tube and aluminum fin coil for corrosion resistance. An integral, factory wired and tested control panel reduces installation time.

7.1.3 Fan Speed Control

The winter control system features a variable speed motor and a specially designed solid-state fan speed control transducer.

The transducer senses refrigerant pressure and varies the speed of the fan motor to maintain constant condensing temperature and system capacity. This system permits operation at ambient temperatures as low as -20°F (-29°C).

7.2 Air-Cooled, Self-Contained Systems—Optional Features

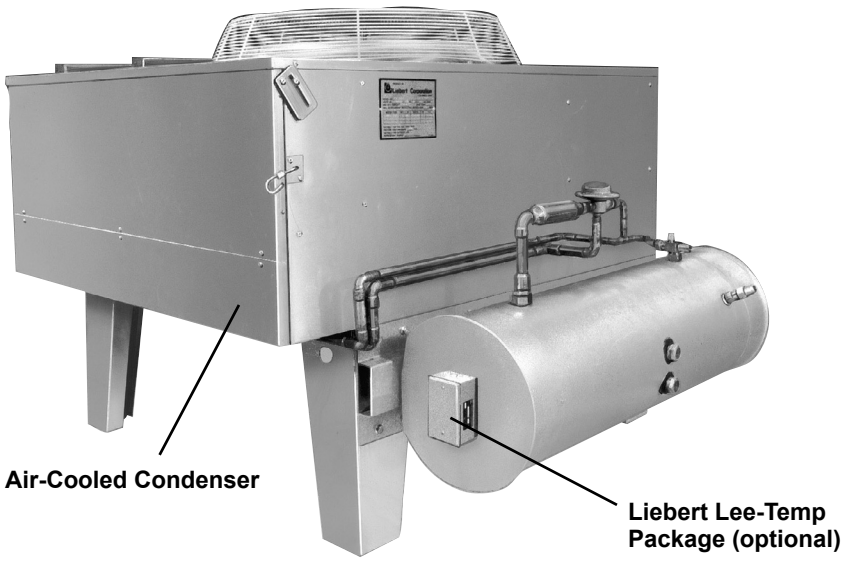
7.2.1 Liebert Lee-Temp Winter Control Condenser

The Liebert Lee-Temp winter control system's heated receivers permit startup and positive head pressure control at ambient temperatures as low as -30°F (-34.4°C). The Liebert Lee-Temp package includes insulated receiver, a pressure relief valve, three-way head pressure control valves, and rotalock valves (see **Figure 5** below).

7.2.2 Quiet-Line Condensers

Quiet-Line Condensers can help your facility meet the strictest noise codes, and do so at less cost than traditional condensers with acoustical shielding.

Figure 5 Air-cooled condenser with Liebert Lee-Temp



7.3 Air-Cooled Split Systems—Standard Features

7.3.1 Centrifugal Fan, Condensing Unit

The centrifugal condensing unit's copper-tube, aluminum-fin coil is equipped with low-temperature controls to ensure year-round operation to -20°F (-29°C). The condensing unit is factory-wired, charged and tested and is ready for final connections.

The centrifugal fan condensing unit includes scroll compressor, condenser coil, centrifugal blower assembly, high-pressure switch and Liebert Lee-Temp head pressure control.

Condensing unit has hot gas bypass standard feature which bypasses hot gas around the compressor directly to the suction side of the compressor to provide capacity control and reduce compressor cycling. System includes liquid injection valve to maintain proper suction superheat.

Unit must be mounted indoors. Duct flanges are provided.

7.3.2 Propeller Fan Condensing Unit

The air-cooled condensing unit can be mounted on the roof or a ground level site. The condensing unit housing is manufactured of galvanized steel with a powder coat finish. The copper-tube, aluminum-fin coil is equipped with low temperature controls to assure year-round operation to -30°F (-34.4°C). The condensing unit is completely factory-wired, charged and tested and is ready for final connections. (See illustration below)

The standard prop fan condensing unit includes scroll compressor, prop fan, high head pressure switch, hot gas bypass and Liebert Lee-Temp head pressure control (for operation down to -30°F (-39°C) ambient.)

Figure 6 Outdoor propeller fan condensing unit

7.3.3 Propeller Fan Condensing Unit Options

This unit is available in these optional configurations:

- 105°F (40°C) ambient for high ambient conditions.
- 95°F (35°C) ambient Quiet-Line for low noise level conditions below 58 dBa.

7.4 Air-Cooled Split Systems—Optional Features

Factory-installed, non-fused disconnect switch allows turning off the Challenger ITR for maintenance. Disconnect switch is available on indoor condensing units only.

8.0 WATER/GLYCOL-COOLED SYSTEMS—STANDARD AND OPTIONAL FEATURES

8.1 Water/Glycol Self-Contained Systems—Standard Features

Liquid-Cooled Condensers

A co-axial condenser provides ample capacity to handle the heat rejection needs of the system while using a minimum of liquid and low total pressure drop.

Regulating Valves

Head pressure operated regulating valves accurately control the condensing temperature and maintain system capacity for various entering liquid flow rates and temperatures. Two-way valves with bypass are standard.

8.2 Water/Glycol-Cooled, Self-Contained System—Optional Features

Three-way Regulating Valves

Three-way valves provide accurate control of condensing temperature and thus maintain constant system capacity while also keeping the condenser water flow rate constant.

High Pressure

The high pressure option for the condenser circuit consists of a regulating valve and a condenser rated at 350 psig (2413 kPa) water-pressure. This option is required in applications with large static head pressures.

Compressor Crankcase Heater

A compressor crankcase heater is available to prevent the migration of refrigerant to the compressor during off cycles.

Hot Gas Reheat

The hot gas reheat assembly consists of a three-way directional solenoid operated valve and a hot gas reclaim coil.

70/30 Cu-Ni Econ-O-Coil

This coil replaces the standard copper tube coil to provide improved resistance to corrosion. This option must be specified whenever a GLYCOOL or Dual Cooling Source system is applied to a cooling tower loop or other open water system.

8.3 Water/Glycol Split System—Standard Features

Water/Glycol-Cooled Condensing Units

Factory charged and sealed, the water-cooled condensing unit is ready to be installed quickly and easily. The counter-flow coaxial condenser with two-way or three-way regulating valve designed for 150 psi (1034.3 kPa) is matched to the heat rejection requirements of the compressor for a variety of flow rates and fluid temperatures.

Condensing unit has a hot gas bypass standard feature that bypasses hot gas around the compressor directly to the suction side of the compressor to provide capacity control and reduce compressor cycling. System includes liquid injection valve to maintain proper suction superheat.

8.4 Water/Glycol-Cooled, Split System—Optional Features

High Pressure

The high pressure option for the condenser circuit consists of a two-way or three-way water regulating valve and condenser rated at 350 psig (2413 kPa) water pressure. This option is required in applications with large static heads.

Factory Installed Non-Fused Disconnect Switch

Allows unit to be turned off for maintenance. Disconnect switch is available on indoor condensing units only.

70/30 Cu-Ni Econ-O-Coil

This coil replaces the standard copper tube coil to provide improved resistance to corrosion. This option must be specified whenever a GLYCOOL or Dual Cooling Source system is applied to a cooling tower loop or other open water system.

8.4.1 Glycol-Cooled System—Heat Rejection Devices

8.4.2 Self-Contained and Split Systems

Fan Speed Control Drycooler

The Liebert manufactured Fan Speed Control drycooler is constructed of aluminum and features copper tubes and aluminum fin design. It is low profile, propeller fan type and provides quiet, trouble free heat rejection. The drycooler features a variable speed fan motor and a specially engineered solid state fan speed transducer. The transducer senses the temperature of the leaving glycol and modulates the speed of the fan to maintain proper glycol temperatures. An integral, factory-wired and tested control panel reduces installation time.

Glycol Pump

The glycol system includes a matching centrifugal glycol pump. It is mounted in a vented, weatherproof enclosure. Optional Equipment—See **page 16**.

9.0 GLYCOOL Systems—Standard and Optional Features

9.1 GLYCOOL—Self-Contained Models Only

The Liebert GLYCOOL free-cooling system is integrated with a glycol-cooled Liebert Challenger ITR.

At outdoor temperatures below 35°F (1.6°C), the Econ-O-Coil is capable of providing total system capacity. At outdoor temperatures between 35° and 65°F (1.6° and 18.3°C), the unique modulating valve permits partial cooling of the space by the Econ-O-Coil with the DX system picking up the rest of the load. Above 65°F (18.3°C) the unit functions as a glycol unit and all the cooling is accomplished by the DX system. When cooling is required, the three-way modulating valve and water regulating valve direct glycol (from the heat rejection loop) to the Econ-O-Coil located upstream of the evaporator coil, to the condenser, or to both.

The GLYCOOL system contains all the standard features of a glycol-cooled system plus the following.

9.2 GLYCOOL System—Standard Features

9.2.1 Comparative Temperature Monitor

A solid-state temperature monitor compares the room air temperature and entering glycol temperature. When air temperature is higher than glycol temperature, the monitor communicates to the microprocessor control that “free-cooling” is available.

9.2.2 Econ-O-Coil

The Econ-O-Coil is strategically located in the return air stream of the environmental control system. This coil is designed for closed-loop applications using properly treated glycol solutions. Applications using a cooling tower loop or other open water system must specify a 70/30 Cu-Ni Econ-O-Coil for improved corrosion resistance.

The air is first filtered before entering the coil and then is either precooled or totally cooled before entering the refrigeration coil. The glycol flow to the coil is controlled by a pre-piped modulating three-way valve. When supplied with a 45°F (7.2°C) glycol solution, the coil is sufficiently sized to offer the identical cooling capacity as is obtained during the refrigeration cycle of the compressor.

9.2.3 GLYCOOL Three-Way Control Valve

The GLYCOOL Three-Way Control Valve opens full anytime the temperature of the glycol solution is below room temperature, to take full advantage of all possible free cooling. As the outdoor ambient drops, the three-way control valve modulates the flow to the Econ-O-Coil. It maintains constant temperature in the room and includes operating linkage and electronic motor. Unlike other valves of this nature, there is no over travel linkage or end switches to be adjusted.

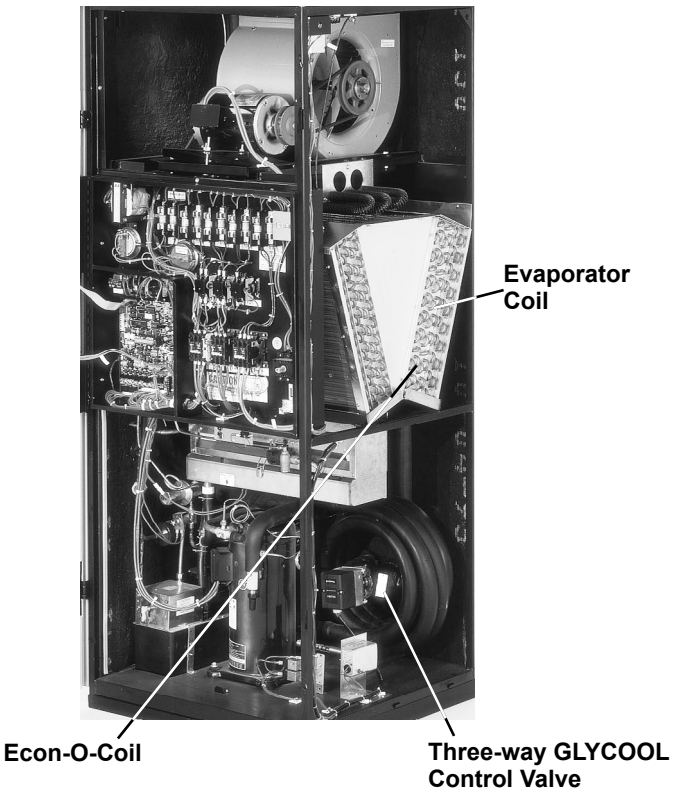
9.2.4 Glycol-Regulating Valve

A head pressure operated glycol regulating valve accurately controls the condensing temperature and system capacity for various entering glycol temperatures. The valve has three-way action.

9.2.5 Drycooler

The Liebert manufactured drycooler is constructed of aluminum with a copper tube aluminum fin coil. The low profile design features multiple direct drive propeller type fans, balanced to the heat rejection load. An integral, factory wired and tested control panel reduces installation time.

Figure 7 Liebert Challenger ITR unit core



9.3 Glycol and GLYCOOL-Cooled—Optional Equipment

High Pressure

For high pressure applications, the GLYCOOL system can be equipped with components rated at 300 psig (2069 kPa).

9.3.1 Dual Pump Package

The dual pump package features two full size glycol pumps, each capable of providing sufficient flow for system operation. A flow switch will sense the loss of flow, should the lead pump fail, and automatically command the standby pump to start. The complete system includes dual pump housing, pumps, lead-lag switch and flow switch (for field installation). The dual pump package provides redundancy, protecting against costly downtime in the computer room.

Quiet-Line Drycoolers

Quiet-Line Drycoolers can help your facility meet the strictest noise codes, and do so at less cost than traditional drycoolers with acoustical shielding.

10.0 OPTIONAL EQUIPMENT—ALL SYSTEMS

10.1 Steam Generating Humidifier

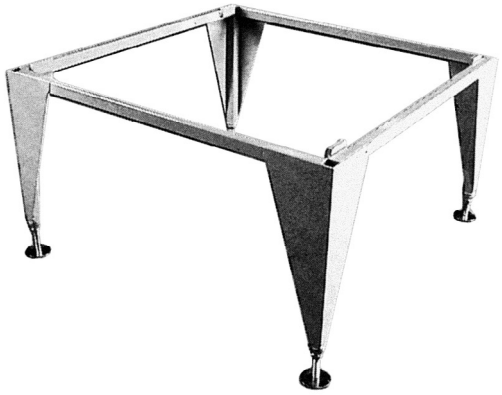
Clean, pure steam is generated in a disposable canister that is complete with supply and drain valves, electronic controls and steam distributor. The humidifier is provided with an automatic flush cycle to lengthen service life. An indicator on the Liebert Challenger ITR monitor panel is activated when the canister should be changed.

Figure 8 Steam generating humidifier

10.2 Adjustable Floor Stand

Available in heights from 9" to 24" (228.6 to 609.6mm) in 3" (76.2mm) increments, adjustable +1-1/2" (38.1mm). Allows for installation and connection of the Liebert Challenger ITR prior to installation of the raised floor.

Figure 9 Adjustable floor stand



NOTE
Some options or combinations of options may result in reduced air flow. Consult factory for recommendations.

10.3 SCR Reheat

This reheat uses stainless steel elements and also includes the necessary sensors and controls to provide variable heat output to help maintain tighter control of room conditions, especially in lightly loaded applications. (Contact factory for available voltages.) Direct expansion units only.

10.4 High-Efficiency Filter

Four optional filters are available in lieu of standard package. A 4" (102mm) 20%, 30%, 40%-45% or 60%-65% filter may be specified. (Efficiency based on ASHRAE 52.1). 2" (51mm) 20% pre-filters may also be specified.

10.5 High External Static Blowers

These blower/motor packages are available where external static pressures are up to 2.0 inches (500 Pa) on 60 Hz units, and up to 1.5 inches (370 Pa) on 50 Hz units. These blowers are rigidly mounted for ducting directly to the blower housing.

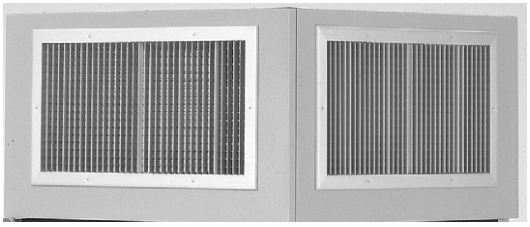
(Consult the factory for specific applications.)

10.6 High-Efficiency Motors

These motors replace the standard efficiency motors to provide increased energy savings during operation (consult factory for specific efficiencies).

10.7 Plenums

Standard height of 18" (457mm) with top duct connection or two-way, three-way or 4-way grille discharge styles available.



Plenum With Two-Way Grille

10.8 Low-Profile Plenum with Cold-Aisle Discharge

This plenum is designed to distribute supply air to electronic equipment beside and across from the cooling unit. In addition to air exiting the front of the plenum, internal baffles direct air through the left-side and right-side discharge vents. Factory-supplied hardware allows air to be blocked from exiting one side of the plenum, allowing the cooling unit to be installed at the end of a row of equipment.

Low-Profile, Cold Aisle Discharge Plenum

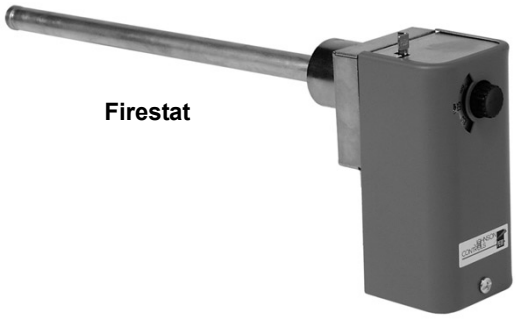
10.9 Smoke Detector

The smoke detector senses the return air, shuts down the unit upon detection, and sends visual and audible alarm. Dry contacts are available for a remote customer alarm. This smoke detector is not intended to function as or replace any room smoke detection system that may be required by local or national codes.

Supervised smoke detectors are also available as an option. Consult factory.

10.10 Firestat

The firestat senses return air temperature of the system. Upon sensing high temperatures, the environmental control system is shut down. Required by codes in certain areas.



Firestat

10.11 Hot Water Reheat

Controlled by a two-way solenoid valve from the microprocessor control panel, these economical reheats have the capacity to maintain dry bulb conditions when the system is calling for dehumidification. The system is completely pre-piped and includes a control valve and Y-strainer. The reheat coil is constructed of copper tubes and aluminum fins.

11.0 COMPREHENSIVE MONITORING SYSTEMS—OPTIONAL

You will find a full range of monitoring and control systems, communications modules designed to interface Liebert equipment with a variety of building management systems, plus stand-alone monitoring, control and leak detection devices.

11.1 Enterprise Monitoring Systems

SiteScan Web is a comprehensive critical systems monitoring solution dedicated to ensuring reliability through graphics, event management and data extrapolation. The standard Web interface allows users easy access from anywhere at anytime.

- Single- and multi-site applications.
- Event management and unit control.
- Trend and historical data captures and reporting.
- Full ASHRAE BACnet compatibility.
- Java based.
- Windows 2000 and XP compatible.

Liebert SiteLink®

- Connectivity to building management systems using Modbus and BACnet.

Liebert Site I/O™

- Integrates sensors and contacts.

Liebert Site TPI™

- Integrates non-Liebert equipment.

11.2 Network Monitoring Systems

The Liebert IntelliSlot® line of products leverages one-to-one unit connections and your existing network for a comprehensive monitoring solution for distributed equipment.

Liebert IntelliSlot Web/485 Card With Adapter

- Monitoring option available for Liebert precision air conditioning units.
- Web interface for viewing and control.
- Modbus interface for building management systems.
- SNMP interface for network management systems.

Liebert Nform™

- Centralized monitoring of all Liebert SNMP enabled devices.
- Event and alarm management.
- Adaptable and configurable graphical user interface.
- Integration of third-party SNMP enabled devices through custom Liebert services.
- Windows NT, 2000 and XP compatible.

11.3 Stand-Alone Monitoring and Leak Detection Solutions

Autonomous microprocessor controlled modules are available to provide supervision, control and remote notification of Liebert equipment. These stand-alone devices include:

Contact Closure Alarm Panels

- Continuously monitor critical support equipment and instantly notify on alarm condition.

Autochangeover Control Panels

- Sequence the operation of multiple environmental units.

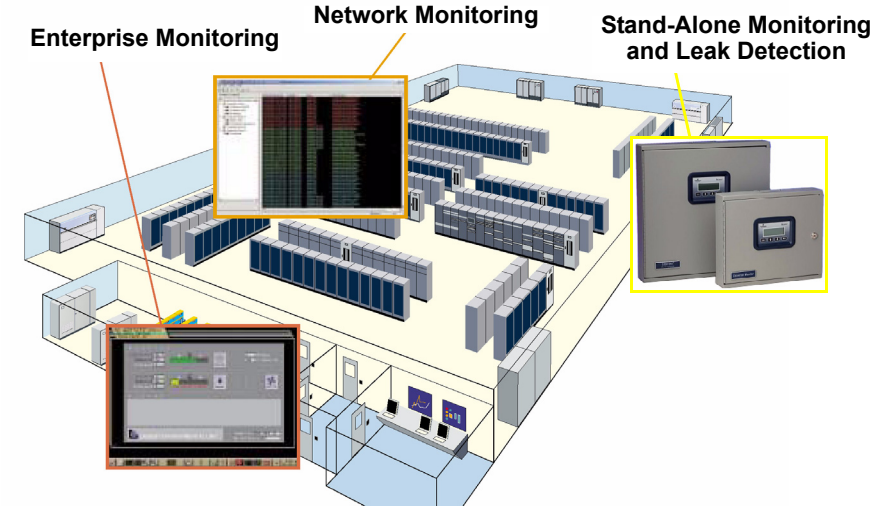
Leak Detection Modules

- Provide quick detection and location of hazardous fluid leaks.

Discrete Output Interface Card

- Straightforward way to tie environmental units to a building management system or alarm panel.

Figure 10 Monitoring configurations



12.0 COMPREHENSIVE MONITORING SOLUTIONS—OPTIONAL

12.1 Liebert SiteScan® Web

Liebert SiteScan Web is a monitoring solution for critical environments that utilize a facility-view approach. The system enables communications from Liebert environmental and power units—as well as many other pieces of analog or digital equipment to a front end software package that provides monitoring, control and alarm management.

Liebert SiteScan monitoring gives you decision making power to effectively manage the equipment that is critical to your business. Designed with flexibility for large, complex systems as well as smaller, single-site facilities, the Liebert SiteScan line of products can provide real-time status and alarms.

12.2 Liebert SiteLink

The microprocessor-based module provides two-way communication between an existing building management system and up to 12 Liebert units via Modbus or BACnet.

12.3 Liebert Nform

Liebert Nform centralizes the management of your distributed Liebert network equipment. Liebert Nform software solution combines full-scale monitoring with the use of the existing network infrastructure—so the cost of dedicated, out-of-band communications cabling is eliminated. It is both scalable and adaptable so it can grow as your systems expand and needs change. Liebert Nform will monitor any Liebert SNMP device that supports a network interface, such as the Liebert IntelliSlot 485 Card With Adapter and the Liebert IntelliSlot Web/485 Card With Adapter. Authenticated alarm management and event notification ensures that alarms are detected and acted upon, which allows problems to be quickly resolved.

12.4 Liebert IntelliSlot Web/485 Card With Adapter and Liebert IntelliSlot 485 Card With Adapter

The Liebert IntelliSlot Web/485 Card With Adapter and the Liebert IntelliSlot 485 Card With Adapter provide Ethernet connectivity for Liebert equipment. Operating status and alarms are communicated via the network to external systems utilizing industry standard open protocols.

12.5 Environmental Discrete Outputs Card

The Environmental Discrete Outputs Card (ENV-DO) provides 16 discrete outputs, corresponding to status and major alarm conditions. These Form-C contact closures provide a straightforward means to connect Liebert environmental units to Building Management Systems (BMS), I/O or alarm panels.

12.6 Remote Contact Monitor (RCM4)

LEDs display customized alarm indication for any dry contact input including alarms for Liebert environmental, power and UPS systems. The RCM4 monitors and displays four dry contact points.

12.7 Auto-Changeover Control

Up to eight environmental units can be automatically and centrally controlled for emergency switching and to balance unit runtime. The AC3 controls two or three units. The RAC2-8 controls two through eight units and has the ability to provide alarm notification to pagers.

Auto-Changeover - RAC2-8

12.8 Universal Monitor

Universal Monitor Large and Small Enclosures

The Universal Monitor keeps personnel on-site and at remote locations apprised of the status of equipment through local alarming and remote paging services. The panel will interface with anything that closes an electrical contact and any device with a 4-20mA signal. To improve process efficiency and troubleshooting, the panel tracks data in an alarm log, an event log and a trend log. The Universal Monitor has a local LCD interface and a remote dial-up interface.

12.8.1 Leak Detection

Zone Leak Detection

Area Leak Detection

Zone detectors with cable or single point detectors provide fast and accurate indication of water in you critical space. These systems communicate with your unit or with a separate monitoring system. Area water detection cable with distance measurement and monitoring protects your entire room. This system quickly and accurately calculates and displays the location of water on the cable, allowing you to promptly fin and correct a leak.

12.8.2 Temperature and Humidity Recorder

A seven-day temperature and humidity recorder permits close examination of computer room environment condition and can be used as a permanent record of the environmental control system's operation efficiency. The system includes pens, 100 recording charts; two bottles of recording ink (1 red ink and 1 blue ink).

13.0 SYSTEM DATA

Table 2 Liebert Challenger ITR air-cooled data—60 Hz

System Type BR = Horizontal Flow	Self-Contained		Split Systems w/Outdoor Prop-Fan Condensing Unit		Split Systems w/Indoor Centrifugal Condensing Unit	
Indoor Unit	BR 067A		BR 060E		BR 060E	
Net Capacity Data	BTU/H	kW	BTU/H	kW	BTU/H	kW
100°F DB, 70°F WB (37.8°C DB, 21.1°C WB) 20% RH						
Total	78,100	22.9	76,200	22.3	73,200	21.4
Sensible	78,100	22.9	76,200	22.3	73,200	21.4
Non Standard Flow Rates	2400 CFM		2300 CFM		2100 CFM	
95°F DB, 68.3°F WB (35°C DB, 20.2°C WB) 24% RH						
Total	77,500	22.7	75,800	22.2	73,000	21.4
Sensible	77,500	22.7	75,800	22.2	73,000	21.4
Non Standard Flow Rates			2700 CFM		2500 CFM	
90°F DB, 66.5°F WB (32°C DB, 19.2°C WB) 28% RH						
Total	73,600	21.6	72,400	21.2	70,600	20.7
Sensible	73,600	21.6	72,400	21.2	70,600	20.7
85°F DB, 64.4°F WB (29.4°C DB, 18°C WB) 32% RH						
Total	69,700	20.4	68,400	20.0	66,800	19.6
Sensible	69,700	20.4	68,400	20.0	66,800	19.6
80°F DB, 62.7°F WB (26.7°C DB, 17.1°C WB) 38% RH						
Total	66,000	19.3	64,400	18.9	63,100	18.5
Sensible	66,000	19.3	64,400	18.9	63,100	18.5
80°F DB, 66.5°F WB (26.7°C DB, 19.2°C WB) 50% RH						
Total	66,900	19.6	65,300	19.1	63,800	18.7
Sensible	54,600	16.0	54,000	15.8	53,400	15.6
75°F DB, 62.5°F WB (23.9°C DB, 16.9°C WB) 50% RH						
Total	62,700	18.4	60,800	17.8	59,600	17.5
Sensible	53,000	15.5	52,300	15.3	51,800	15.2
75°F DB, 61.1°F WB (23.9°C DB, 16.2°C WB) 45% RH						
Total	61,200	17.9	60,700	17.8	59,600	17.5
Sensible	57,000	16.7	60,700	17.8	59,600	17.5
72°F DB, 60.1°F WB (22.2°C DB, 15.6°C WB) 50% RH						
Total	60,200	17.6	58,200	17.1	57,200	16.8
Sensible	52,000	15.2	51,200	15.0	50,700	14.9
72°F DB, 58.7°F WB (22.2°C DB, 14.8°C WB) 45% RH						
Total	58,900	17.3	58,400	17.1	57,500	16.8
Sensible	55,800	16.3	58,400	17.1	57,500	16.8
Fan Data (Blower A12x9AT)**						
Standard Air, CFM (CMH)	2800 (4760)		2800 (4760)		2800 (4760)	
Standard Fan Motor, hp (kW)	1-1/2 (1.1)		1-1/2 (1.1)		1-1/2 (1.1)	
Opt Fan Motor, hp (kW)	2 (1.5)		2 (1.5)		2 (1.5)	
Ext Static, in. WG (Pa)	.3 (75)		.3 (75)		.3 (75)	
Evaporator Coil (V-FRAME, at standard conditions)						
Face Area, ft.^{2} (m^2)	6.67 (.62)		6.67 (.62)		6.67 (.62)	
Rows	4		4		4	
Face Velocity - FPM (m/s)	405 (2.1)		405 (2.1)		405 (2.1)	
Electric Reheat 2 Stage (Stainless Steel, Fin Tubular) - Standard						
Capacity, inc. motor heat, BTU/H (element kW)	56,200 (15)		56,200 (15)		56,200 (15)	
Hot Water Reheat 180°F (82.2°C) EWT, 75°F (23.9°C) EAT - Optional (includes std air volume and opt fan motor hp)						
Capacity, inc. motor heat, BTU/H (kW)	88,700 (26.0)		88,700 (26.0)		88,700 (26.0)	
Flow Rate - GPM (l/s)	5.0 (.32)		5.0 (.32)		5.0 (.32)	
Pressure drop - ft. (kPa)	16.9 (50.4)		16.9 (50.4)		16.9 (50.4)	

* The net capacity data has fan motor heat factored in for all ratings and the entering air condition of 72°F (22.2°C) and 50% RH is the standard rating for ASHRAE 127-2001. All capacities are nominal values; actual performance will be ±5%.

** Data rated with 2" 20% ASHRAE filter. Some options or combinations of options may result in reduced airflow. Consult factory for recommendations.

Table 3 Liebert Challenger ITR air-cooled data—60 Hz *(continued)*

System Type	Self-Contained	Split Systems	
		w/Outdoor Prop-Fan Condensing Unit	w/Indoor Centrifugal Condensing Unit
Indoor Unit	**BR 067A**	**BR 060E**	**BR 060E**
Infrared Humidifier - Standard			
Capacity - lb/hr (kg/hr)	11 (5)	11 (5)	11 (5)
kW	4.8	4.8	4.8
Steam Generating Humidifier - Optional			
Capacity - lb/hr (kg/hr)	11 (5)	11 (5)	11 (5)
kW	3.9	3.9	3.9
Filter Section - Efficiencies per ASHRAE 52.1 - Disposable Type			
20% efficiencies available in 2" (51mm) - Standard, or optional 4" (102mm) depths; other optional 4" (102mm) efficiencies are: 30%, 40-45%, 60-65%			
Nominal Size - inches	28.5 x 29.5	28.5 x 29.5	28.5 x 29.5
Nominal Size - mm	724 x 749	724 x 749	724 x 749
Effective Surface Area - ft^2 (m^2)	24.1 (2.2)	24.1 (2.2)	24.1 (2.2)
Connection Sizes Liebert Challenger ITR Unit			
Liquid Line	1/2 OD Cu	1/2 OD Cu	1/2 OD Cu
Hot Gas Line	7/8 OD Cu	N/A	N/A
Suction Line	N/A	1-1/8 CD Cu	1-1/8 CD Cu
Humidifier Supply Line	1/4 OD Cu	1/4 OD Cu	1/4 OD Cu
Condensate Drain Line	1/2 FPT	1/2 FPT	1/2 FPT
Condenser Air 95°F (35°C) Ambient			
Model	CSF104	PFH067A_ _H	MC_65A
Motor, hp (kW)	3/4 (.56)	3/4 (.56)	2 (1.5)
Ext. Static, in. WG (Pa)	N/A	N/A	0.5 (125)
CFM (CMH)	6200 (10533)	6700 (11383)	3500 (5947)
Liquid Line Connection	5/8 OD Cu	1/2 OD Cu	1/2 OD Cu
Hot Gas Connection	1-1/8 OD Cu	N/A	N/A
Suction Line Connection	N/A	1-1/8 OD Cu	1-1/8 OD Cu

Table 4 Liebert Challenger ITR air-cooled data—50 Hz

System Type BR = Horizontal Flow	Self-Contained		Split Systems			
			w/Outdoor Prop-Fan Condensing Unit		w/Indoor Centrifugal Condensing Unit	
Indoor Unit	**BR 065A**		**BR 059E**		**BR 059E**	
Net Capacity Data	**kW**	**BTU/H**	**kW**	**BTU/H**	**kW**	**BTU/H**
37.8°C DB, 21.1°C WB (100°F DB, 70°F WB) 20% RH						
Total	22.4	76,300	25.8	87,900	21.0	71,800
Sensible	22.4	76,300	25.8	87,900	21.0	71,800
Non Standard Flow Rates	2300 CFM				2100 CFM	
35°C DB, 20.2°C WB (95°F DB, 68.3°F WB) 24% RH						
Total	22.0	75,100	24.3	83,100	21.3	72,600
Sensible	22.0	75,100	24.3	83,100	21.3	72,600
32.2°C DB, 19.2°C WB (90°F DB, 66.5°F WB) 28% RH						
Total	20.9	71,200	23.0	78,400	20.2	68,800
Sensible	20.9	71,200	23.0	78,400	20.2	68,800
29.4°C DB, 18°C WB (85°F DB, 64.4°F WB) 32% RH						
Total	19.7	67,200	21.6	73,800	19.1	65,100
Sensible	19.7	67,200	21.6	73,800	19.1	65,100
26.7°C DB, 17.1°C WB (80°F DB, 62.7°F WB) 38% RH						
Total	18.6	63,600	20.3	69,300	18.0	61,400
Sensible	18.6	63,600	20.3	69,300	18.0	61,400
26.7°C DB, 19.2°C WB (80°F DB, 66.5°F WB) 50% RH						
Total	19.0	64,900	21.3	72,600	18.3	62,400
Sensible	15.2	51,800	16.0	54,700	14.9	50,900
23.9°C DB, 16.9°C WB (75°F DB, 62.5°F WB) 50% RH						
Total	17.8	60,600	19.5	66,600	17.0	58,100
Sensible	14.7	50,300	15.5	52,800	14.4	49,300
23.9°C DB, 16.2°C WB (75°F DB, 61.1°F WB) 45% RH						
Total	17.3	59,100	19.0	64,700	16.6	56,700
Sensible	15.8	54,000	16.5	56,300	15.5	53,000
22.2°C DB, 15.6°C WB (72°F DB, 60.1°F WB) 50% RH						
Total	17.0	58,100	18.6	63,600	16.3	55,700
Sensible	14.4	49,300	15.1	51,700	14.2	48,300
22.2°C DB, 14.8°C WB (72°F DB, 58.7°F WB) 45% RH						
Total	16.7	56,900	18.0	61,500	16.3	55,700
Sensible	15.5	52,900	16.1	54,900	16.3	55,700
Fan Data (Blower A12x9AT)**						
Standard Air, CMH (CFM)	4420 (2600)		4420 (2600)		4420 (2600)	
Standard Fan Motor, kW (hp)	1.1 (1-1/2)		1.1 (1-1/2)		1.1 (1-1/2)	
Opt Fan Motor, kW (hp)	1.5 (2)		1.5 (2)		1.5 (2)	
Ext Static, Pa (in. WG)	75 (.3)		75 (.3)		75 (.3)	
Evaporator Coil (V-Frame, at Standard Conditions)						
Face Area, m^2 ($ft.^2$)	.62 (6.67)		.62 (6.67)		.62 (6.67)	
Rows	4		4		4	
Face Velocity, m/s (FPM)	1.9 (375)		1.9 (375)		1.9 (375)	
Electric Reheat 2 Stage (Stainless Steel, Fin Tubular) - Standard						
Capacity, element kW (inc. motor heat, BTU/H)	15 (56,200)		15 (56,200)		15 (56,200)	
Hot Water Reheat 82.2°C (180°F) EWT, 23.9°C (75°F) EAT - Opt. (inc. standard air volume and optional fan motor hp)						
Capacity, inc. motor heat, kW (BTU/H)	25.3 (86,200)		25.3 (86,200)		25.3 (86,200)	
Flow Rate, l/s (GPM)	.32 (5.0)		.32 (5.0)		.32 (5.0)	
Pressure drop, kPa (ft.)	50.4 (16.9)		50.4 (16.9)		50.4 (16.9)	

* The net capacity data has fan motor heat factored in for all ratings and the entering air condition of 72°F (22.2°C) and 50% RH is the standard rating for ASHRAE 127-2001.All capacities are nominal values; actual performance will be ±5%.

** Data rated with 2" 20% ASHRAE filter. Some options or combinations of options may result in reduced airflow. Consult factory for recommendations.

Table 5 Liebert Challenger ITR air-cooled data—50Hz *(continued)*

System Type	Self-Contained	Split Systems	
		w/Outdoor Prop-Fan Condensing Unit	w/Indoor Centrifugal Condensing Unit
Indoor Unit	**BR 065A**	**BR 059E**	**BR 059E**
Infrared Humidifier - Standard			
Capacity - kg/hr (lb/hr)	5 (11)	5 (11)	5 (11)
kW	4.8	4.8	4.8
Steam Generating Humidifier - Optional			
Capacity - kg/hr (lb/hr)	5 (11)	5 (11)	5 (11)
kW	3.9	3.9	3.9
Filter Section - Efficiencies per ASHRAE 52.1 - Disposable Type			
20% efficiencies available in 51mm (2") - Standard, or optional 102mm (4") depths; other optional 102mm (4") efficiencies are: 30%, 40-45%, 60-65%			
Nominal Size - mm	724 x 749	724 x 749	724 x 749
Nominal Size - inches	28.5 x 29.5	28.5 x 29.5	28.5 x 29.5
Effective Surface Area - m^2 (ft^2)	2.2 (24.1)	2.2 (24.1)	2.2 (24.1)
Connection Sizes Challenger ITR Unit			
Liquid Line	1/2 OD Cu	1/2 OD Cu	1/2 OD Cu
Hot Gas Line	7/8 OD Cu	N/A	N/A
Suction Line	N/A	1 1/8 CD Cu	1 1/8 CD Cu
Humidifier Supply Line	1/4 OD Cu	1/4 OD Cu	1/4 OD Cu
Condensate Drain Line	1/2 FPT	1/2 FPT	1/2 FPT
Condenser Air 35°C (95°F) Ambient			
Model	CSF104	PFH066A_ _H	MC_64A
Motor kW (hp)	.56 (3/4)	.56 (3/4)	1.5 (2)
Ext. Static Pa (in. WG)	N/A	N/A	125 (0.5)
CMH (CFM)	8750 (5150)	9854 (5800)	5947 (3500)
Liquid Line Connection	5/8 OD Cu	1/2 OD Cu*	1/2 OD Cu*
Hot Gas Connection	1-1/8 OD Cu	N/A	N/A
Suction Line Connection	N/A	1-1/8 OD Cu*	1-1/8 OD Cu*

* The net capacity data has fan motor heat factored in for all ratings and the entering air condition of 72°F (22.2°C) and 50% RH is the standard rating for ASHRAE 127-2001.All capacities are nominal values; actual performance will be ±5%.

** Data rated with 2" 20% ASHRAE filter. Some options or combinations of options may result in reduced airflow. Consult factory for recommendations.

Table 6 Liebert Challenger ITR water cooled data, 60 Hz

System Type BR = Horizontal Flow	Self-Contained		Split Systems	
Indoor Unit	**BR 071WG**		**BR 060E**	
Net Capacity Data	**BTU/H**	**kW**	**BTU/H**	**kW**
100°F DB, 70°F WB (37.8°C DB, 21.1°C WB) 20% RH				
Total	82,900	24.3	79,000	23.1
Sensible	82,900	24.3	79,000	23.1
Non-Standard Flow Rates	2600 CFM		2400 CFM	
95°F DB, 68.3°F WB (35°C DB, 20.2°C WB) 24% RH				
Total	80,400	23.6	78,400	23.0
Sensible	80,400	23.6	78,400	23.0
90°F DB, 66.5°F WB (32°C DB, 19.2°C WB) 28% RH				
Total	76,200	22.3	74,400	21.8
Sensible	76,200	22.3	74,400	21.8
85°F DB, 64.4°F WB (29.4°C DB, 18°C WB) 32% RH				
Total	72,300	21.2	70,300	20.6
Sensible	72,300	21.2	70,300	20.6
80°F DB, 62.7°F WB (26.7°C DB, 17.1°C WB) 38% RH				
Total	68,400	20.0	66,500	19.5
Sensible	68,400	20.0	66,500	19.5
80°F DB, 66.5°F WB (26.7°C DB, 19.2°C WB) 50% RH				
Total	69,900	20.5	67,600	19.8
Sensible	55,700	16.3	54,900	16.1
75°F DB, 62.5°F WB (23.9°C DB, 16.9°C WB) 50% RH				
Total	65,200	19.1	63,100	18.5
Sensible	54,000	15.8	53,200	15.6
75°F DB, 61.1°F WB (23.9°C DB, 16.2°C WB) 45% RH				
Total	63,600	18.6	61,500	18.0
Sensible	58,000	17.0	57,100	16.7
72°F DB, 60.1°F WB (22.2°C DB, 15.6°C WB) 50% RH				
Total	62,500	18.3	60,500	17.7
Sensible	53,000	15.5	52,100	15.3
72°F DB, 58.7°F WB (22.2°C DB, 14.8°C WB) 45% RH				
Total	61,100	17.9	59,200	17.3
Sensible	56,700	16.6	55,900	16.4
Fan Data (Blower A12x9AT)**				
Standard Air, CFM (CMH)	2800 (4760)		2800 (4760)	
Standard Fan Motor, hp (kW)	1-1/2 (1.1)		1-1/2 (1.1)	
Opt Fan Motor, hp (kW)	2 (1.5)		2 (1.5)	
Ext Static, in. WG (Pa)	.3 (75)		.3 (75)	
Evaporator Coil (V-Frame, at standard conditions)				
Face Area, ft.^{2} (m^2)	6.67 (.62)		6.67 (.62)	
Rows	4		4	
Face Velocity, FPM (m/s)	405 (2.1)		405 (2.1)	
Electric Reheat 2 Stage (Stainless Steel, Fin Tubular) - Standard				
Capacity, inc. motor heat, BTU/H (element kW)	56,200 (15)		56,200 (15)	
Hot Water Reheat 180°F (82.2°C) EWT, 75°F (23.9°C) EAT - Optional (includes std air volume and opt fan motor hp)				
Capacity, inc. motor heat, BTU/H (kW)	88,700 (26.0)		88,700 (26.0)	
Flow Rate, GPM (l/s)	5.0 (.32)		5.0 (.32)	
Pressure drop, ft. (kPa)	16.9 (50.4)		16.9 (50.4)	
Hot Gas Reheat - Optional (Includes standard air volume and optional fan motor)				
Capacity, inc. motor heat, BTU/H (kW)	54,900 (16.1)		54,900 (16.1)	

* The net capacity data has fan motor heat factored in for all ratings and the entering air condition of 72°F (22.2°C) and 50% RH is the standard rating for ASHRAE 127-2001.All capacities are nominal values; actual performance will be ±5%.

** Data rated with 2" 20% ASHRAE filter. Some options or combinations of options may result in reduced airflow. Consult factory for recommendations.

Table 7 Liebert Challenger ITR water cooled data, 60 Hz *(continued)*

System Type	Self-Contained	Split Systems
Indoor Unit	**BR 071WG**	**BR 060E**
Infrared Humidifier - Standard		
Capacity, lb/hr (kg/hr)	11 (5)	11 (5)
kW	4.8	4.8
Steam Generating Humidifier - Optional		
Capacity, lb/hr (kg/hr)	11 (5)	11 (5)
kW	3.9	3.9
Filter Section - Efficiencies per ASHRAE 52.1 - Disposable Type		
20% efficiencies available in 2" (51mm) - Standard, or optional 4" (102mm) depths; other optional 4" (102mm) efficiencies are: 30%, 40-45%, 60-65%		
Nominal Size, in. (mm)	28.5 x 29.5 (724 x 749)	28.5 x 29.5 (724 x 749)
Effective Surface Area, ft^2 (m^2)	24.1 (2.2)	24.1 (2.2)
Water Regulating Valve		
Size, in.	1	1
Water Requirements (Coaxial Condenser)		MC_69W
THR - BTU/H (kW) @ 75°F (22.2°C), 50% RH	82,000 (24.0)	81100 (23.8)
65°F (18.3°C) EWT - 105°F (40.6°C) Cond Temp		
Flow Rate, GPM (l/s)	5.4 (.34)	5.4 (.34)
Pressure Drop, PSI (kPa)	0.9 (6.2)	1.2 (8.1)
75°F (23.9°C) EWT - 105°F (40.6°C) Cond Temp		
Flow Rate, GPM (l/s)	7.7 (.49)	7.6 (.48)
Pressure Drop, PSI (kPa)	1.6 (11.0)	2.2 (15.2)
85°F (29.4°C) EWT - 115°F (46.1°C) Cond Temp		
Flow Rate, GPM (l/s)	9.9 (.62)	9.7 (.61)
Pressure Drop, PSI (kPa)	2.5 (17.2)	3.5 (24.2)
Connection Sizes Challenger ITR Unit		
Condenser Supply	1-1/8 OD Cu	
Condenser Return	1-1/8 OD Cu	
Liquid Line		1/2 OD Cu
Suction Line		1 1/8 CD Cu
Humidifier Supply Line	1/4 OD Cu	1/4 OD Cu
Condensate Drain Line	1/2 FPT	1/2 FPT
Connection Sizes Remote Condensing Unit		
Condenser Supply		1-1/8 OD Cu
Condenser Return		1-1/8 OD Cu
Liquid Line		1/2 OD Cu
Suction Line		1-1/8 OD Cu

Self-contained unit pressure drops based on two-way valve with bypass. Split system unit pressure drops based on two-way or three-way valve.

Table 8 Liebert Challenger ITR water cooled data, 50 Hz

System Type BR = Horizontal Flow	Self-Contained		Split Systems	
Indoor Unit	**BR 070WG**		**BR 059E**	
Net Capacity Data	**kW**	**BTU/H**	**kW**	**BTU/H**
37.8ºC DB, 21.1ºC WB (100ºF DB, 70ºF WB) 20% RH				
Total	24.0	81,800	23.1	78,800
Sensible	24.0	81,800	23.1	78,800
Non Standard Flow Rates	2500 CFM		2400 CFM	
35ºC DB, 20.2ºC WB (95ºF DB, 68.3ºF WB) 24% RH				
Total	23.0	78,500	22.4	76,500
Sensible	23.0	78,500	22.4	76,500
32.2ºC DB, 19.2ºC WB (90ºF DB, 66.5ºF WB) 28% RH				
Total	21.8	74,300	21.2	72,400
Sensible	21.8	74,300	21.2	72,400
29.4ºC DB, 18ºC WB (85ºF DB, 64.4ºF WB) 32% RH				
Total	20.6	70,200	20.0	68,300
Sensible	20.6	70,200	20.0	68,300
26.7ºC DB, 17.1ºC WB (80ºF DB, 62.7ºF WB) 38% RH				
Total	19.4	66,200	18.9	64,500
Sensible	19.4	66,200	18.9	64,500
26.7ºC DB, 19.2ºC WB (80ºF DB, 66.5ºF WB) 50% RH				
Total	20.0	68,400	19.4	66,100
Sensible	15.6	53,100	15.3	52,300
23.9ºC DB, 16.9ºC WB (75ºF DB, 62.5ºF WB) 50% RH				
Total	18.6	63,500	18.0	61,400
Sensible	15.1	51,500	14.8	50,600
23.9ºC DB, 16.2ºC WB (75ºF DB, 61.1ºF WB) 45% RH				
Total	18.1	61,800	17.5	59,800
Sensible	16.1	55,100	15.9	54,300
22.2ºC DB, 15.6ºC WB (72ºF DB, 60.1ºF WB) 50% RH				
Total	17.8	60,700	17.2	58,700
Sensible	14.8	50,400	14.5	49,600
22.2ºC DB, 14.8ºC WB (72ºF DB, 58.7ºF WB) 45% RH				
Total	17.3	59,200	16.8	57,400
Sensible	15.8	53,900	15.6	53,100
Fan Data (Blower A12x9AT)**				
Standard Air, CMH (CFM)	4420 (2600)		4420 (2600)	
Standard Fan Motor, kW (hp)	1.1 (1-1/2)		1.1 (1-1/2)	
Opt Fan Motor, kW (hp)	1.5 (2)		1.5 (2)	
Ext Static Pa, (in. WG)	75 (.3)		75 (.3)	
Evaporator Coil (V-Frame, at standard conditions)				
Face Area, m^2 ($ft.^2$)	.62 (6.67)		.62 (6.67)	
Rows	4		4	
Face Velocity, m/s (FPM)	1.9 (375)		1.9 (375)	
Electric Reheat 2 Stage (Stainless Steel, Fin Tubular) - Standard				
Capacity, element kW (inc. motor heat, BTU/H)	15 (56,200)		15 (56,200)	
Hot Water Reheat 82.2°C (180°F) EWT, 23.9°C (75°F) EAT - Optional (includes std air volume and opt fan motor hp)				
Capacity, inc. motor heat, kW (BTU/H)	25.3 (86,200)		25.3 (86,200)	
Flow Rate, l/s (GPM)	.32 (5.0)		.32 (5.0)	
Pressure drop, kPa (ft.)	50.4 (16.9)		50.4 (16.9)	
Hot Gas Reheat - Optional (includes standard air volume and optional fan motor)				
Capacity, inc. motor heat, kW (BTU/H)	15.0 (51,300)		15.0 (51,300)	

* The net capacity data has fan motor heat factored in for all ratings and the entering air condition of 72°F (22.2°C) and 50% RH is the standard rating for ASHRAE 127-2001.All capacities are nominal values; actual performance will be ±5%.

** Data rated with 2" 20% ASHRAE filter. Some options or combinations of options may result in reduced airflow. Consult factory for recommendations.

Table 9 Liebert Challenger ITR water cooled data, 50 Hz (continued)

System Type	Self-Contained	Split Systems
Indoor Unit	**BR 070WG**	**BR 059E**
Infrared Humidifier - Standard		
Capacity - kg/hr (lb/hr)	5 (11)	5 (11)
kW	4.8	4.8
Steam Generating Humidifier - Optional		
Capacity, kg/hr (lb/hr)	5 (11)	5 (11)
kW	3.9	3.9
Filter Section - Efficiencies per ASHRAE 52.1 - Disposable Type		
20% efficiencies available in 51mm (2") - Standard, or optional 102mm (4") depths; other optional 102mm (4") efficiencies are: 30%, 40-45%, 60-65%		
Nominal Size, mm (in.)	724 x 749 (28.5 x 29.5)	724 x 749 (28.5 x 29.5)
Effective Surface Area, m^2 (ft^2)	2.2 (24.1)	2.2 (24.1)
Water Regulating Valve		
Size, in	1	1
Water Requirements (Coaxial Condenser)		MC_68W
THR - kW (BTU/H) @ 22.2°C (75°F), 50% RH	23.8 (81,200)	23.2 (79,200)
18.3°C (65°F) EWT - 40.6°C (105°F) Cond Temp		
Flow Rate, l/s (GPM)	.34 (5.4)	.33 (5.2)
Pressure Drop, kPa (PSI)	5.7 (0.8)	7.8 (1.1)
23.9°C(75°F) EWT - 40.6°C (105°F) Cond Temp		
Flow Rate, l/s (GPM)	.48 (7.6)	.47 (7.4)
Pressure Drop, kPa (PSI)	10.7 (1.6)	14.3 (2.1)
29.4°C (85°F) EWT - 46.1°C (115°F) Cond Temp		
Flow Rate, l/s (GPM)	.61 (9.7)	.59 (9.4)
Pressure Drop, kPa (PSI)	16.7 (2.4)	22.7 (3.3)
Connection Sizes Challenger ITR Unit		
Condenser Supply	1-1/8 OD Cu	—
Condenser Return	1-1/8 OD Cu	—
Liquid Line	—	1/2 OD Cu
Suction Line	—	1-1/8 CD Cu
Humidifier Supply Line	1/4 OD Cu	1/4 OD Cu
Condensate Drain Line	1/2 FPT	1/2 FPT
Connection Sizes Remote Condensing Unit		
Condenser Supply	—	1-1/8 OD Cu
Condenser Return	—	1-1/8 OD Cu
Liquid Line	—	1/2 OD Cu
Suction Line	—	1-1/8 CD Cu

Self-contained unit pressure drops based on two-way valve with bypass. Split system unit pressure drops based on two-way or three-way valve.

Table 10 Liebert Challenger ITR glycol cooled data, 60 Hz

System Type BR = Horizontal Flow BM = Horizontal Flow with Econ-O-Coil	Glycol Cooled				GLYCOOL	
	Self-Contained		Split Systems		Self Contained	
Indoor Unit	**BR 071WG**		**BR 060E**		**BM 061G**	
Net Capacity Data	**BTU/H**	**kW**	**BTU/H**	**kW**	**BTU/H**	**kW**
100°F DB, 70°F WB (37.8°C DB, 21.1°C WB) 20% RH						
Total	69,800	20.5	71,600	21.0	66,000	19.3
Sensible	69,800	20.5	71,600	21.0	66,000	19.3
Non Standard Flow Rates	1800 CFM, 21.5 GPM, 27.4 FT PD		2100 CFM		2600 CFM, 20.5 GPM, 24.6 FT PD	
95°F DB, 68.3°F WB (35°C DB, 20.2°C WB) 24% RH						
Total	68,600	20.1	72,300	21.2	64,700	19.0
Sensible	68,600	20.1	72,300	21.2	64,700	19.0
Non Standard Flow Rates	2100 CFM, 21.5 GPM, 27.4 FT PD		2600 CFM		2300 CFM, 19.5 GPM, 22.5 FT PD	
90°F DB, 66.5°F WB (32°C DB, 19.2°C WB) 28% RH						
Total	64,700	19.0	69,900	20.5	65,300	19.1
Sensible	64,700	19.0	69,900	20.5	65,300	19.1
Non Standard Flow Rates	2100CFM,18.5 GPM, 20.9FT PD				19.5 GPM, 22.5 FT PD	
85°F DB, 64.4°F WB (29.4°C DB, 18°C WB) 32% RH						
Total	62,800	18.4	66,200	19.4	61,500	18.0
Sensible	62,800	18.4	66,200	19.4	61,500	18.0
Non Standard Flow Rates	2300 CFM					
80°F DB, 62.7°F WB (26.7°C DB, 17.1°C WB) 38% RH						
Total	62,400	18.3	62,500	18.3	58,200	17.1
Sensible	62,400	18.3	62,500	18.3	58,200	17.1
80°F DB, 66.5°F WB (26.7°C DB, 19.2°C WB) 50% RH						
Total	62,900	18.4	63,000	18.5	59,900	17.6
Sensible	53,200	15.6	53,200	15.6	51,200	15.0
75°F DB, 62.5°F WB (23.9°C DB, 16.9°C WB) 50% RH						
Total	58,900	17.3	58,800	17.2	55,900	16.4
Sensible	51,500	15.1	51,500	15.1	49,500	14.5
75°F DB, 61.1°F WB (23.9°C DB, 16.2°C WB) 45% RH						
Total	59,000	17.3	59,000	17.3	55,000	16.1
Sensible	59,000	17.3	59,000	17.3	55,000	16.1
72°F DB, 60.1°F WB (22.2°C DB, 15.6°C WB) 50% RH						
Total	56,500	16.6	56,500	16.6	53,600	15.7
Sensible	50,500	14.8	50,500	14.8	48,500	14.2
72°F DB, 58.7°F WB (22.2°C DB, 14.8°C WB) 45% RH						
Total	56,900	16.7	56,900	16.7	53,000	15.5
Sensible	56,900	16.7	56,900	16.7	53,000	15.5
GLYCOOL Coil Sensible Capacity						
75°F DB, 62.5°F WB (23.9°C DB, 16.9°C WB) 45°F (7.2°C) EGT					47,700	14.0
Fan Data (Blower A12x9AT)**						
Standard Air, CFM (CMH)	2800 (4760)		2800 (4760)		2800 (4760)	
Standard Fan Motor, hp (kW)	1-1/2 (1.1)		1-1/2 (1.1)		2 (1.5)	
Opt Fan Motor, hp (kW)	2 (1.5)		2 (1.5)		N/A	
Ext Static, in. WG (Pa)	.3 (75)		.3 (75)		.3 (75)	
Evaporator Coil (V-Frame, at standard conditions)						
Face Area, ft.^{2} (m^2)	6.67 (.62)		6.67 (.62)		6.67 (.62)	
Rows	4		4		4	
Face Velocity, FPM (m/s)	405 (2.1)		405 (2.1)		405 (2.1)	
Electric Reheat 2 Stage (Stainless Steel, Fin Tubular) - Standard						
Capacity, inc. motor heat, BTU/H(element kW)	56,200 (15)		56,200 (15)		57,700 (15)	
Hot Water Reheat 180°F (82.2°C) EWT, 75°F (23.9°C) EAT - Optional (includes standard air volume and optional fan motor hp)						
Capacity, inc. motor heat, BTU/H(kW)	88,700 (26.0)		88,700 (26.0)		N/A	
Flow Rate, GPM (l/s)	5.0 (.32)		5.0 (.32)		5.0 (.32)	
Pressure drop, ft. (kPa)	16.9 (50.4)		16.9 (50.4)		16.9 (50.4)	
Hot Gas Reheat - Optional (includes standard air volume and optional fan motor)						
Capacity, inc. motor heat, BTU/H (kW)	54,900 (16.1)		54,900 (16.1)		N/A	

* The net capacity data has fan motor heat factored in for all ratings and the entering air condition of 72°F (22.2°C) and 50% RH is the standard rating for ASHRAE 127-2001.All capacities are nominal values; actual performance will be ±5%. All above data is based on 40% ethylene glycol solution.

** Data rated with 2" 20% ASHRAE filter. Some options or combinations of options may result in reduced airflow. Consult factory for recommendations.

Table 11 Liebert Challenger ITR glycol cooled data, 60 Hz *(continued)*

System Type	Glycol Cooled		GLYCOOL
	Self-Contained	Split Systems	Self-Contained
Indoor Unit	**BR 071WG**	**BR 060E**	**BM 061G**
Infrared Humidifier - Standard			
Capacity, lb/hr (kg/hr)	11 (5)	11 (5)	11 (5)
kW	4.8	4.8	4.8
Steam Generating Humidifier - Optional			
Capacity, lb/hr (kg/hr)	11 (5)	11 (5)	11 (5)
kW	3.9	3.9	3.9
Filter Section - Efficiencies per ASHRAE 52.1 - Disposable Type			
20% efficiencies available in 2" (51mm) - Standard, or optional 4" (102mm) Depths; other optional 4" (102mm) efficiencies are: 30%, 40-45%, 60-65%			
Nominal Size, inches (mm)	28.5 x 29.5 (724 x 749)	28.5 x 29.5 (724 x 749)	28.5 x 29.5 (724 x 749)
Effective Surface Area, ft^2 (m^2)	24.1 (2.2)	24.1 (2.2)	24.1 (2.2)
Glycol Regulating Valve			
Size, in	1	1	1
Econ-O-Valve			
Size, in	—	—	1
Cv	—	—	13.9
System Data*		MC_*69WG	
Flow Rate, GPM (l/s)	17.5 (1.1)	20 (1.3)	17.5 (1.1)
Unit Volume, gal (l)	2.0 (7.5)	2.0 (7.5)	4.0 (15.0)
Pressure Drop, ft. (kPa)	18.9 (56.4)	37.5 (111.9)	51.1 (152.5)
Connection Sizes Challenger ITR Unit			
Condenser Supply	1-1/8 OD Cu		1-1/8 OD Cu
Condenser Return	1-1/8 OD Cu		1-1/8 OD Cu
Liquid Line		1/2 OD Cu	
Suction Line		1-1/8 OD Cu	
Humidifier Supply Line	1/4 OD Cu	1/4 OD Cu	1/4 OD Cu
Condensate Drain Line	1/2 FPT	1/2 FPT	1/2 FPT
Connection Sizes Condensing Unit			
Condenser Supply		1-1/8 OD Cu	
Condenser Return		1-1/8 OD Cu	
Liquid Line		1/2 OD Cu	
Suction Line		1-1/8 OD Cu	
Drycooler 95°F (35°C) Ambient*			
Model Number	DSF112-3PH	DSO174-3PH	DSO112-3PH
Drycooler Connections	2	2	2
Volume, gal. (l)	5.8 (22.0)	6.9 (26.2)	5.8 (22.0)
Pressure Drop, ft. (kPa)	2.4 (7.2)	3.1 (9.2)	2.4 (7.2)
Fan, hp (kW)	3/4 (.56)	3/4 (.56)	3/4 (.56)
Glycol Pump, 3-phase hp (kW)	3/4 (.56)	3/4 (.56)	1.5 (1.1)
Head, ft. (kPa)	69 (205.9)	69 (205.9)	88 (262.6)
Pump Suction and Discharge NPT, female	1-1/4 & 3/4	1-1/4 & 3/4	1-1/4 & 3/4

* All data above is based on 40% ethylene glycol solution.

Table 12 Liebert Challenger ITR glycol cooled data, 50 Hz

System Type BR = Horizontal Flow BM = Horizontal Flow with Econ-O-Coil	Glycol Cooled				GLYCOOL	
	Self-Contained		Split Systems		Self Contained	
Indoor Unit	**BR 070WG**		**BR 059E**		**BM 058G**	
Net Capacity Data	**kW**	**BTU/H**	**kW**	**BTU/H**	**kW**	**BTU/H**
37.8ºC DB, 21.1ºC WB (100ºF DB, 70ºF WB) 20% RH						
Total	20.3	69,300	20.8	70,900	18.8	64,100
Sensible	20.3	69,300	20.8	70,900	18.8	64,100
Non Standard Flow Rates	1900 CFM, 24.5 GPM		2100 CFM		2000 CFM, 22.5 GPM	
35ºC DB, 20.2ºC WB (95ºF DB, 68.3ºF WB) 24% RH						
Total	19.6	66,800	20.7	70,800	17.8	60,600
Sensible	19.6	66,800	20.7	70,800	17.8	60,600
Non Standard Flow Rates	2000 CFM, 23.5 GPM		2500 CFM		2000 CFM, 20.5 GPM	
32.2ºC DB, 19.2ºC WB (90ºF DB, 66.5ºF WB) 28% RH						
Total	18.5	63,000	19.9	67,800	16.8	57,300
Sensible	18.5	63,000	19.9	67,800	16.8	57,300
Non Standard Flow Rates	2000 CFM, 21.5 GPM				2000 CFM	
29.4ºC DB, 18ºC WB (85ºF DB, 64.4ºF WB) 32% RH						
Total	17.9	61,200	18.8	64,200	16.9	57,700
Sensible	17.9	61,200	18.8	64,200	16.9	57,700
Non Standard Flow Rates	2200 CFM, 19.5 GPM				2400 CFM	
26.7ºC DB, 17.1ºC WB (80ºF DB, 62.7ºF WB) 38% RH						
Total	17.1	58,400	17.7	60,500	16.4	55,900
Sensible	17.1	58,400	17.7	60,500	16.4	55,900
Non Standard Flow Rates	2300 CFM					
26.7ºC DB, 19.2ºC WB (80ºF DB, 66.5ºF WB) 50% RH						
Total	17.2	58,800	18.0	61,400	16.8	57,400
Sensible	12.7	43,200	14.8	50,500	13.5	46,000
Non Standard Flow Rates	2000 CFM				2400 CFM	
23.9ºC DB, 16.9ºC WB (75ºF DB, 62.5ºF WB) 50% RH						
Total	16.7	57,000	16.8	57,200	15.9	54,100
Sensible	14.3	48,800	14.3	48,900	13.7	46,800
23.9ºC DB, 16.2ºC WB (75ºF DB, 61.1ºF WB) 45% RH						
Total	16.7	56,900	16.3	55,800	15.4	52,700
Sensible	16.7	56,900	15.4	52,600	15.4	52,700
22.2ºC DB, 15.6ºC WB (72ºF DB, 60.1ºF WB) 50% RH						
Total	16.0	54,600	16.1	54,800	15.2	51,800
Sensible	14.0	47,900	14.0	47,900	13.4	45,800
22.2ºC DB, 14.8ºC WB (72ºF DB, 58.7ºF WB) 45% RH						
Total	16.1	54,800	16.1	55,000	14.9	50,700
Sensible	16.1	54,800	16.1	55,000	14.9	50,700
GLYCOOL Coil Sensible Capacity						
23.9°C DB, 16.9°C WB (75°F DB, 62.5°C WB) 10°C (45°F) EGT					14	47,700.0
Fan Data (Blower A12x9AT)**						
Standard Air, CMH (CFM)	4420 (2600)		4420 (2600)		4420 (2600)	
Standard Fan Motor, kW (hp)	1.1 (1-1/2)		1.1 (1-1/2)		1.5 (2)	
Optional Fan Motor, kW (hp)	1.5 (2)		1.5 (2)		N/A	
Ext Static, Pa (in. WG)	75 (.3)		75 (.3)		75 (.3)	
Evaporator Coil (V-Frame, at standard conditions)						
Face Area, m^2 ($ft.^2$)	.62 (6.67)		.62 (6.67)		.62 (6.67)	
Rows	4		4		4	
Face Velocity, m/s (FPM)	1.9 (375)		1.9 (375)		1.9 (375)	
Electric Reheat 2 Stage (Stainless Steel, Fin Tubular) - Standard						
Capacity, element kW (inc. motor heat, BTU/H)	15 (56,200)		15 (56,200)		15 (56,200)	
Hot Water Reheat 82.2°C (180°F) EWT, 23.9°C (75°F) EAT - Optional (Includes standard air volume and optional fan motor hp)						
Capacity, inc. motor heat, kW (BTU/H)	25.3 (86,200)		25.3 (86,200)		25.3 (86,200)	
Flow Rate, l/s (GPM)	.32 (5.0)		.32 (5.0)		.32 (5.0)	
Pressure drop, kPa (ft.)	50.4 (16.9)		50.4 (16.9)		50.4 (16.9)	
Hot Gas Reheat - Optional (Includes standard air volume and optional fan motor)						
Capacity, kW (BTU/H) (includes motor heat)	15.0 (51,300)		15.0 (51,300)		15.0 (51,300)	

* The net capacity data has fan motor heat factored in for all ratings and the entering air condition of 72°F (22.2°C) and 50% RH is the standard rating for ASHRAE 127-2001. All capacities are nominal values; actual performance will be ±5%. All data above is based on 40% ethylene glycol solution.

** Data rated with 2" 20% ASHRAE filter. Some options or combinations of options may result in reduced airflow. Consult factory for recommendations.

Table 13 Liebert Challenger ITR glycol cooled data, 50 Hz (continued)

System Type	Glycol Cooled		GLYCOOL
	Self-Contained	Split Systems	Self-Contained
Indoor Unit	**BR 070WG**	**BR 059E**	**BM 058G**
Infrared Humidifier - Standard			
Capacity, kg/hr (lb/hr)	5 (11)	5 (11)	5 (11)
kW	4.8	4.8	4.8
Steam Generating Humidifier - Optional			
Capacity, kg/hr (lb/hr)	5 (11)	5 (11)	5 (11)
kW	3.9	3.9	3.9
Filter Section - Efficiencies per ASHRAE 52.1 - Disposable Type			
20% efficiencies available in 51mm (2") - Standard, or optional 102mm (4") depths; other optional 102mm (4") efficiencies are: 30%, 40-45%, 60-65%			
Nominal Size, mm (in)	724 x 749 (28.5 x 29.5)	724 x 749 (28.5 x 29.5)	724 x 749 (28.5 x 29.5)
Effective Surface Area, m^2 (ft^2)	2.2 (24.1)	2.2 (24.1)	2.2 (24.1)
Glycol Regulating Valve			
Size, in	1	1	1
Econ-O-Valve			
Size, in	-	-	1
Cv	-	-	13.9
System Data*		MC_68WG	
Flow Rate, l/s (GPM)	1.1 (17.5)	1.3 (20)	1.1 (17.5)
Unit Volume, liters (gallons)	7.5 (2.0)	7.5 (2.0)	15.0 (4.0)
Pressure Drop, kPa (ft.)	56.4 (18.9)	111.9 (37.5)	152.5 (51.1)
Connection Sizes Challenger ITR Unit			
Condenser Supply	1-1/8 OD Cu		1-1/8 OD Cu
Condenser Return	1-1/8 OD Cu		1-1/8 OD Cu
Liquid Line		1/2 OD Cu	
Suction Line		1-1/8 CD Cu	
Humidifier Supply Line	1/4 OD Cu	1/4 OD Cu	1/4 OD Cu
Condensate Drain Line	1/2 FPT	1/2 FPT	1/2 FPT
Connection Sizes Condensing Unit			
Condenser Supply		1-1/8 OD Cu	
Condenser Return		1-1/8 OD Cu	
Liquid Line		1/2 OD Cu	
Suction Line		1-1/8 CD Cu	
Drycooler 35°C (95°F) Ambient*			
Model Number	DSF112-3PH	DSF174-3PH	DSF112-3PH
Drycooler Connections	2	2	2
Volume, liters (gallons)	5.8 (22.0)	6.9 (26.2)	5.8 (22.0)
Pressure Drop, kPa (ft.)	7.2 (2.4)	9.2 (3.1)	7.2 (2.4)
Fan, kW (hp)	.56 (3/4)	.56 (3/4)	.56 (3/4)
Glycol Pump - 3-Phase kW (hp)	1.1 (1.5)	1.1 (1.5)	1.1 (1.5)
Head, kPa (ft.)	262.6 (88.0)	262.6 (88.0)	262.6 (88.0)
Pump Suction and Discharge NPT, female	1-1/4 & 3/4	1-1/4 & 3/4	1-1/4 & 3/4

* All data above is based on 40% ethylene glycol solution.

Table 14 Liebert Challenger ITR chilled water data, 60 Hz

Capacity Data BTU/H (kW) @ 45°F (7.2°C) EWT, 10°F (5.6°C) Water Rise; Net Capacity Data			
Indoor Unit BR = Horizontal Flow		**BR 102C**	
100ºF DB, 70ºF WB (37.8ºC DB, 21.1ºC WB) 20% RH, 12°F (6.7°C) Water Rise			
Total	BTU/H (kW)	125,000	36.6
Sensible	BTU/H (kW)	118,000	34.6
Flow Rate	GPM (l/s)	21.4	1.4
Pressure Drop	ft (kPa)	25.5	76.0
95ºF DB, 68.3ºF WB (35ºC DB, 20.2ºC WB) 24% RH, 12°F (6.7°C) Water Rise			
Total	BTU/H (kW)	113,000	33.1
Sensible	BTU/H (kW)	107,000	31.4
Flow Rate	GPM (l/s)	19.6	1.2
Pressure Drop	ft (kPa)	21.7	64.7
90ºF DB, 66.5ºF WB (32.2ºC DB, 19.2ºC WB) 28% RH, 12°F (6.7°C) Water Rise			
Total	BTU/H (kW)	101,000	29.6
Sensible	BTU/H (kW)	94,700	27.7
Flow Rate	GPM (l/s)	17.4	1.1
Pressure Drop	ft (kPa)	17.4	51.9
85ºF DB, 64.4ºF WB (29.4ºC DB, 18ºC WB) 32% RH			
Total	BTU/H (kW)	91,000	26.7
Sensible	BTU/H (kW)	85,000	24.9
Flow Rate	GPM (l/s)	18.9	1.2
Pressure Drop	ft (kPa)	20.2	60.2
80ºF DB, 62.7ºF WB (26.7ºC DB, 17.1ºC WB) 38% RH			
Total	BTU/H (kW)	79,000	23.1
Sensible	BTU/H (kW)	72,400	21.2
Flow Rate	GPM (l/s)	16.5	1.0
Pressure Drop	ft (kPa)	15.8	47.1
80ºF DB, 66.5ºF WB (26.7ºC DB, 19.2ºC WB) 50% RH			
Total	BTU/H (kW)	98,200	28.8
Sensible	BTU/H (kW)	71,500	20.9
Flow Rate	GPM (l/s)	19.7	1.2
Pressure Drop	ft (kPa)	22.1	65.9
75ºF DB, 62.5ºF WB (23.9ºC DB, 16.9ºC WB) 50% RH			
Total	BTU/H (kW)	72,900	21.4
Sensible	BTU/H (kW)	61,000	17.9
Flow Rate	GPM (l/s)	14.7	0.9
Pressure Drop	ft (kPa)	12.8	38.1
75ºF DB, 61.1ºF WB (23.9ºC DB, 16.2ºC WB) 45% RH			
Total	BTU/H (kW)	68,200	20.0
Sensible	BTU/H (kW)	63,100	18.5
Flow Rate	GPM (l/s)	13.3	0.8
Pressure Drop	ft (kPa)	10.6	31.6
72ºF DB, 60.1ºF WB (22.2ºC DB, 15.6ºC WB) 50% RH			
Total	BTU/H (kW)	59,900	17.6
Sensible	BTU/H (kW)	54,400	15.9
Flow Rate	GPM (l/s)	12.0	0.8
Pressure Drop	ft (kPa)	8.8	26.2
72ºF DB, 58.7ºF WB (22.2ºC DB, 14.8ºC WB) 45% RH			
Total	BTU/H (kW)	56,200	16.5
Sensible	BTU/H (kW)	55,300	16.2
Flow Rate	GPM (l/s)	11.1	0.7
Pressure Drop	ft (kPa)	7.6	22.6

Indoor Unit	**BR 102C**
Fan Data (Blower A12x9AT)**	
Standard Air, CFM (CMH)	2800 (4760)
Standard Fan Motor, hp (kW)	1-1/2 (1.1)
Opt. Fan Motor, hp (kW)	2 (1.5)
Ext Static, in. WG (Pa)	.3 (75)
Chilled Water Coil (V-Frame, at standard conditions)	
Face Area, ft.^{2} (m^2)	6.67 (.62)
Rows	4
Face Velocity, FPM (m/s)	405 (2.1)
Electric Reheat 2 Stage (Stainless Steel, Fin Tubular) - Std	
Capacity, inc. motor heat, BTU/H (element kW)	56,200 (15)
Hot Water Reheat 180°F (82.2°C) EWT, 75°F (23.9°C) EAT - Optional (includes std air volume and opt fan motor hp)	
Capacity, inc. motor heat, BTU/H (kW)	88,700 (26.0)
Flow Rate, GPM (l/s)	5.0 (.32)
Pressure drop, ft. (kPa)	16.9 (50.4)
Infrared Humidifier - Standard	
Capacity, lb/hr (kg/hr)	11 (5)
kW	4.8
Steam Generating Humidifier - Optional	
Capacity, lb/hr (kg/hr)	11 (5)
kW	3.9
Filter Section - Efficiencies per ASHRAE 52.1 - Disposable Type	
20% Eff. available in 2" (51mm) - Std, or Opt 4" (102mm) Depths; other Optional 4" (102mm) Eff. are: 30%, 40-45%, 60-65%	
Nominal Size - in (mm)	28.5 x 29.5 (724 x 749)
Effective Surface Area, ft^2 (m^2)	24.1 (2.2)
Connection Sizes Challenger ITR Unit	
CW Supply	1-1/8 OD Cu
CW Return	1-1/8 OD Cu
Humidifier Supply	1/4 OD Cu
Condensate Drain	1/2 FPT
Control Valve	
Maximum design water pressure 150 psi (1034.3 kPa)	
Valve Actuator	Modulating
Sensors	Proportional
Valve Body	Three-Way
Valve Size, inches	1
Cv	13.9
Two-Way Valve (Optional)	
Close-Off Pressure, PSI (kPa)	70 (483)

* The net capacity data has fan motor heat factored in for all ratings and the entering air condition of 72°F (22.2°C) and 50% RH is the standard rating for ASHRAE 127-2001. All capacities are nominal values; actual performance will be ±5%.

** Data rated with 2" 20% ASHRAE filter. Some options or combinations of options may result in reduced airflow. Consult factory for recommendations.

Table 15 Liebert Challenger ITR chilled water data, 50 Hz

Capacity Data kW (BTU/H) @ 7.2°C (45°F) EWT, 5.6°C (10°F) Water Rise; Net Capacity Data			
Indoor Unit BR = Horizontal Flow		**BR 101C**	
37.8ºC DB, 21.1ºC WB (100ºF DB, 70ºF WB) 20% RH, 6.7°C (12°F) Water Rise			
Total	kW (BTU/H)	34.0	116,000
Sensible	kW (BTU/H)	31.9	109,000
Flow Rate	l/s (GPM)	1.3	19.9
Pressure Drop	kPa (ft)	66.5	22.3
35ºC DB, 20.2ºC WB (95ºF DB, 68.3ºF WB) 24% RH, 6.1°C (11°F) Water Rise			
Total	kW (BTU/H)	31.1	106,000
Sensible	kW (BTU/H)	29.0	99,100
Flow Rate	l/s (GPM)	1.3	19.9
Pressure Drop	kPa (ft)	66.5	22.3
32.2ºC DB, 19.2ºC WB (90ºF DB, 66.5ºF WB) 28% RH			
Total	kW (BTU/H)	28.2	96,100
Sensible	kW (BTU/H)	26.0	88,900
Flow Rate	l/s (GPM)	1.3	20.0
Pressure Drop	kPa (ft)	66.8	22.4
29.4ºC DB, 18ºC WB (85ºF DB, 64.4ºF WB) 32% RH			
Total	kW (BTU/H)	24.7	84,200
Sensible	kW (BTU/H)	23.0	78,400
Flow Rate	l/s (GPM)	1.1	17.6
Pressure Drop	kPa (ft)	52.7	17.7
26.7ºC DB, 17.1ºC WB (80ºF DB, 62.7ºF WB) 38% RH			
Total	kW (BTU/H)	21.5	73,500
Sensible	kW (BTU/H)	19.6	66,900
Flow Rate	l/s (GPM)	1.0	15.8
Pressure Drop	kPa (ft)	42.9	14.4
26.7ºC DB, 19.2ºC WB (80ºF DB, 66.5ºF WB) 50% RH			
Total	kW (BTU/H)	27.5	94,000
Sensible	kW (BTU/H)	19.8	67,500
Flow Rate	l/s (GPM)	1.2	19.7
Pressure Drop	kPa (ft)	65.9	22.1
23.9ºC DB, 16.9ºC WB (75ºF DB, 62.5ºF WB) 50% RH			
Total	kW (BTU/H)	20.4	69,700
Sensible	kW (BTU/H)	16.8	57,500
Flow Rate	l/s (GPM)	0.9	14.7
Pressure Drop	kPa (ft)	38.1	12.8
23.9ºC DB, 16.2ºC WB (75ºF DB, 61.1ºF WB) 45% RH			
Total	kW (BTU/H)	19.0	64,800
Sensible	kW (BTU/H)	17.4	59,500
Flow Rate	l/s (GPM)	0.8	13.3
Pressure Drop	kPa (ft)	31.6	10.6
22.2ºC DB, 15.6ºC WB (72ºF DB, 60.1ºF WB) 50% RH			
Total	kW (BTU/H)	16.7	57,100
Sensible	kW (BTU/H)	15.1	51,400
Flow Rate	l/s (GPM)	0.8	12.0
Pressure Drop	kPa (ft)	26.2	8.8
22.2ºC DB, 14.8ºC WB (72ºF DB, 58.7ºF WB) 45% RH			
Total	kW (BTU/H)	15.7	53,500
Sensible	kW (BTU/H)	15.4	52,400
Flow Rate	l/s (GPM)	0.7	11.1
Pressure Drop	kPa (ft)	22.6	7.6

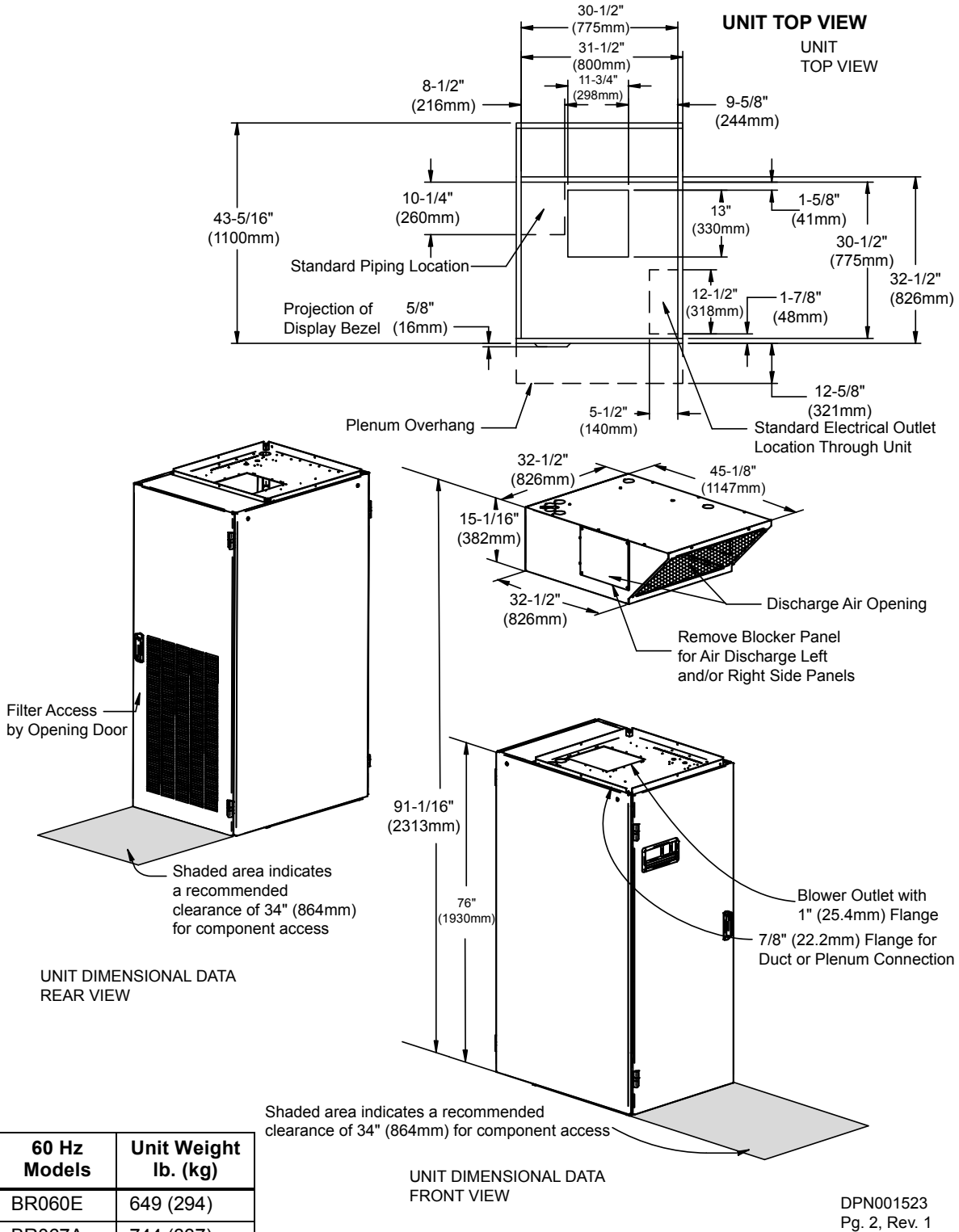
Indoor Unit	**BR 101C**
Fan Data (Blower A12x9AT)**	
Standard Air, CMH (CFM)	4420 (2600)
Standard Fan Motor, kW (hp)	1.1 (1-1/2)
Opt Fan Motor, kW (hp)	1.5 (2)
Ext Static, Pa (in. WG)	75 (.3)
Chilled Water Coil (V-Frame, at standard conditions)	
Face Area, m^2 (ft^2)	.62 (6.67)
Rows	4
Face Velocity, m/s (FPM)	1.9 (375)
Electric Reheat 2-Stage (Stainless Steel, Fin Tubular) - Std	
Capacity, element kW (inc. motor heat, BTU/H)	15 (56,200)
Hot Water Reheat 82.2°C (180°F) EWT, 23.9°C (75°F) EAT - Optional (Includes std air volume and opt. fan motor hp)	
Capacity, inc. motor heat, kW (BTU/H)	25.3 (86,200)
Flow Rate, l/s (GPM)	.32 (5.0)
Pressure drop, kPa (ft.)	50.4 (16.9)
Infrared Humidifier - Standard	
Capacity, kg/hr (lb/hr)	5 (11)
kW	4.8
Steam Generating Humidifier - Optional	
Capacity, kg/hr (lb/hr)	5 (11)
kW	3.9
Filter Section - Efficiencies per ASHRAE 52.1 - Disposable Type	
20% Eff. available in 51mm (2") - Standard, or Optional 102mm (4") Depths; other Optional 102mm (4") Eff. are: 30%, 40-45%, 60-65%	
Nominal Size - mm	28.5 x 29.5
Nominal Size - inches	724 x 749
Effective Surface Area - m^2 (ft^2)	2.2 (24.1)
Connection Sizes-Challenger ITR Unit	
CW Supply	1 1/8 OD Cu
CW Return	1 1/8 OD Cu
Humidifier Supply	1/4 OD Cu
Condensate Drain	1/2 FPT
Control Valve	
Maximum design water pressure 1034.4 kPa (150 PSI)	
Valve Actuator	Modulating
Sensors	Proportional
Valve Body	Three-Way
Valve Size, in.	1
Cv	13.9
Two-Way Valve (Optional)	
Close Off Pressure - kPa (PSI)	483 (70)

* The net capacity data has fan motor heat factored in for all ratings and the entering air condition of 72°F (22.2°C) and 50% RH is the standard rating for ASHRAE 127-2001.All capacities are nominal values; actual performance will be ±5%.

** Data rated with 2" 20% ASHRAE filter. Some options or combinations of options may result in reduced airflow. Consult factory for recommendations.

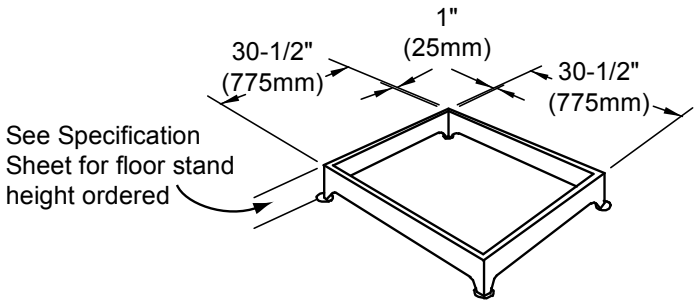
14.0 DIMENSIONAL DRAWINGS

Figure 11 Cabinet and floor planning dimensional data—Horizontal flow models



50 Hz Models	60 Hz Models	Unit Weight lb. (kg)
BR059E	BR060E	649 (294)
BR065A	BR067A	744 (337)
BR070WG	BR071WG	814 (369)
BR101C	BR102C	659 (299)
BM058G	BM061G	854 (387)

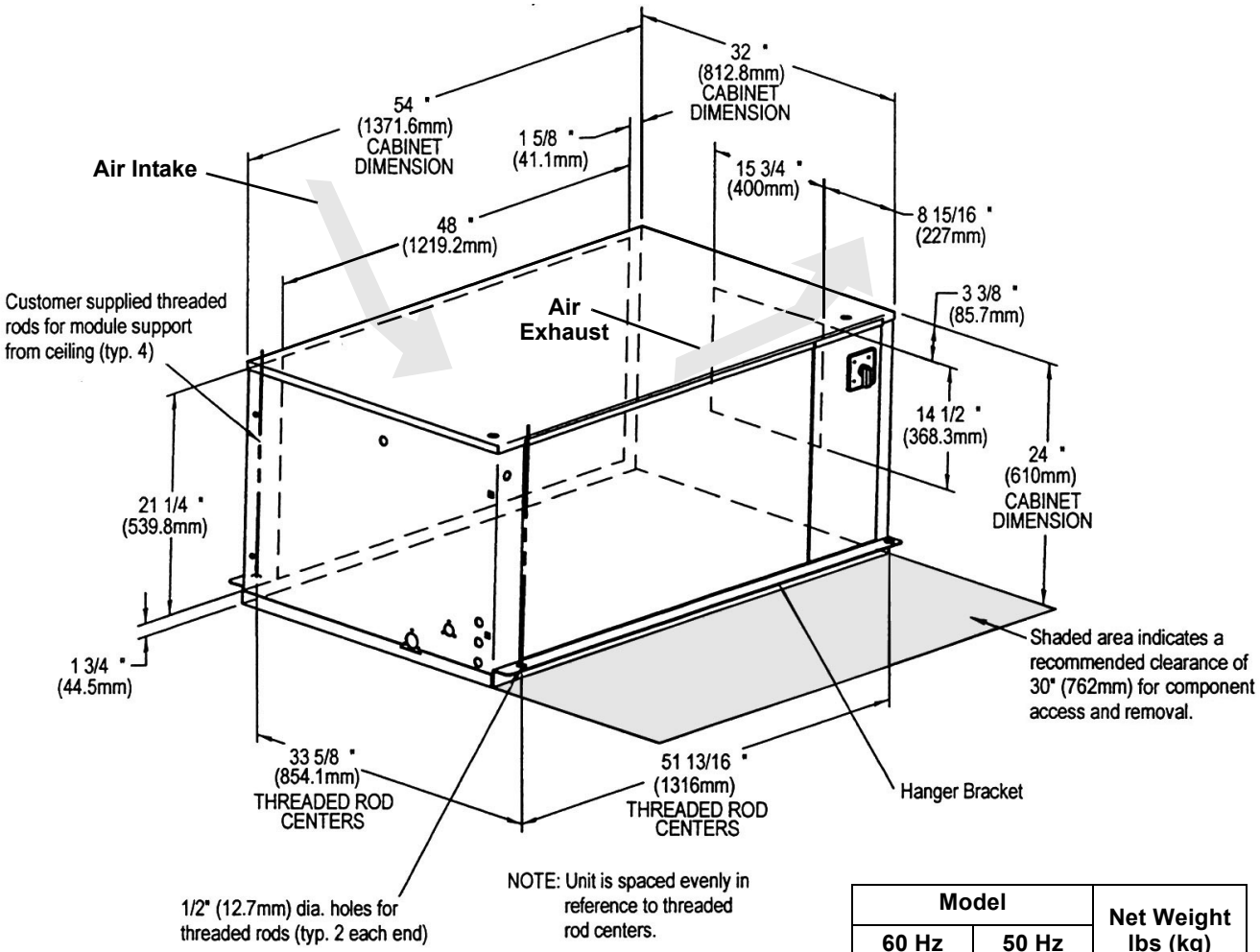
Figure 12 Cabinet and floor planning dimensional data



OPTIONAL FLOOR STAND
DIMENSIONAL DATA

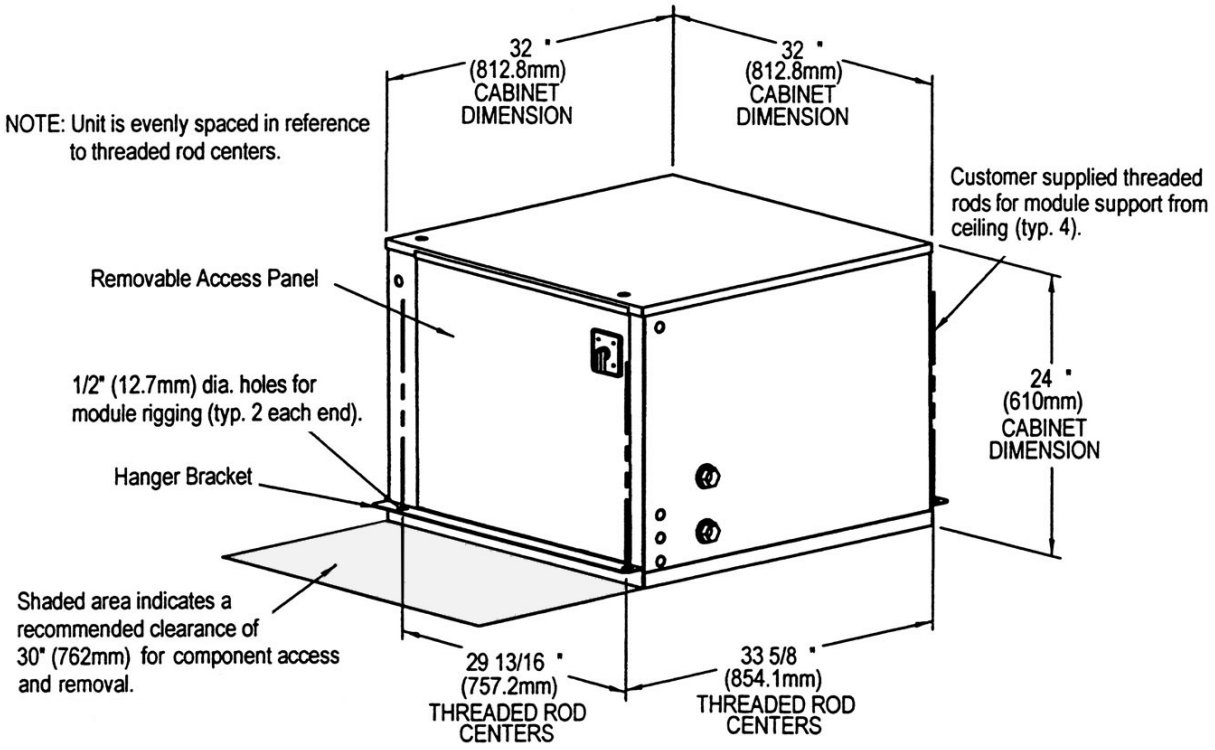
SL-11897
Pg. 7

Figure 13 Cabinet and floor planning dimensional data—Split system—5-ton centrifugal fan condensing unit



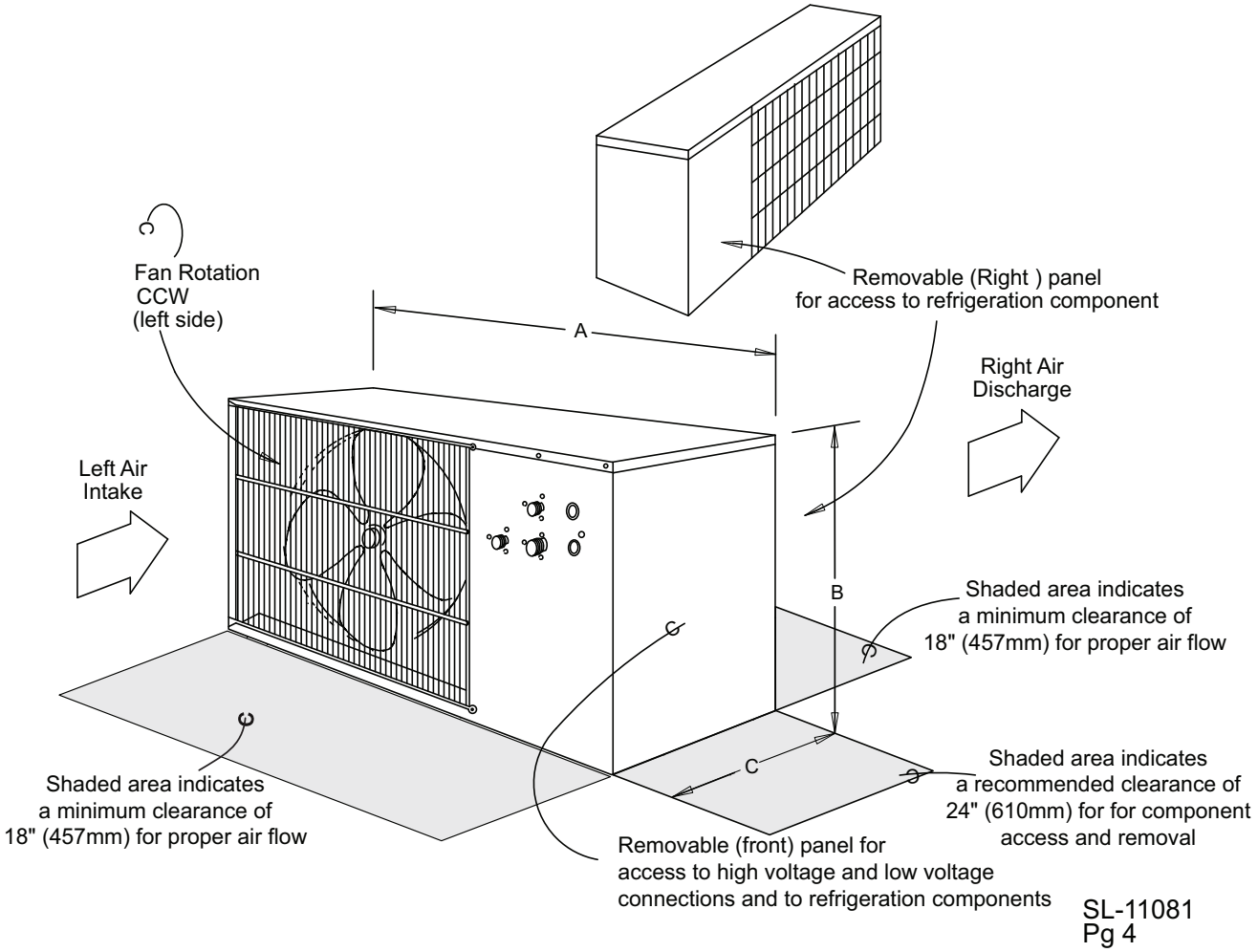
Model		Net Weight lbs (kg)
60 Hz	50 Hz	
MC_65A	MC_64A	449 (204)

Figure 14 Cabinet and floor planning dimensional data—Split system—5-ton water/glycol-cooled condensing unit



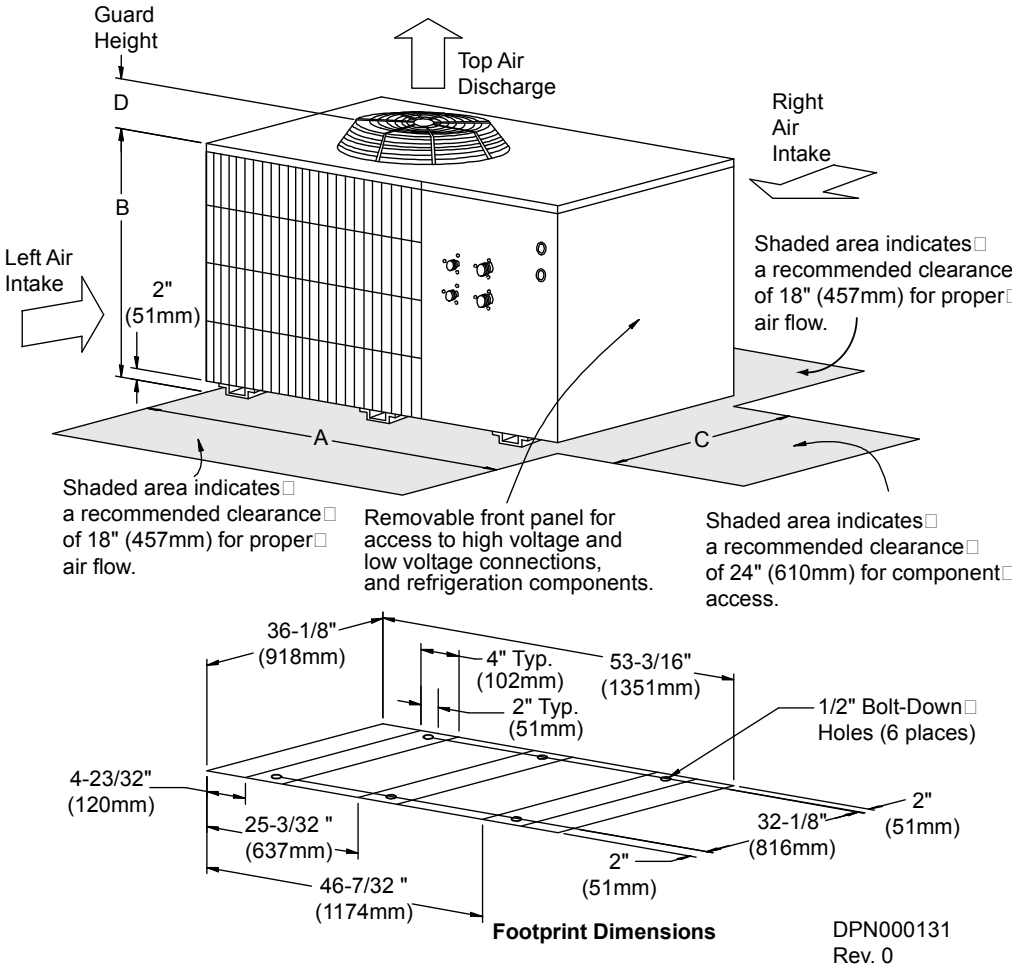
Model		Net Weight lbs (kg)
60 Hz	50 Hz	
MC_69W	MC_68W	282 (128)

Figure 15 Cabinet and floor planning dimensional data—Split System—Propeller fan condensing unit



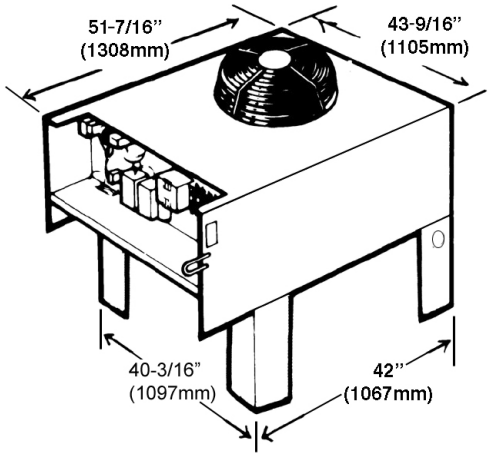
Outdoor Propeller Fan Condensing Unit					
Model		Width (A)	Depth (C)	Height (B)	Net Weight lbs (kg)
60 Hz	50 Hz	Dimensions - Inches (mm)			
PFH067A-_L	PFH066A-_L	53 (1343)	18 (457)	36-1/4 (918)	351 (159)

Figure 16 Cabinet and floor planning dimensional data—Propeller fan condensing modules—Vertical air discharge



Model Numbers		Dimensional Data in. (mm)				Module Weight
60 HZ	**50 HZ**	**A**	**B**	**C**	**D**	**lbs (kg) net.**
PFH067A-_H	PFH066A-_H	53 (1343)	36-1/4 (918)	38-1/2 (978)	5-1/2 (140)	488 (222)
PFHZ67A-_H	PFHZ66A-_L					

Figure 17 Cabinet and floor planning dimensional data—Self-contained system—Air-cooled condenser or drycooler



Liebert Lee-Temp Receiver
L = 40" (1016mm)
W = 7-1/2" (190mm)

15.0 ELECTRICAL DATA

Table 16 Liebert Challenger ITR electrical data[1]—60 Hz

Model Type	Self-Contained				Split System Evaporator or Chilled Water			
	BR067A, BR071WG, BM061G				BR060E, BR102C			
	All Voltages Are 3 Phase Unless Noted Otherwise							
Voltage	**208**	**230**	**460**	**575**	**208**	**230**	**460**	**575**
With Electric Reheat and Humidifier (Infrared or Steam Generating) (Note: See Table 17 for units w/SCR reheats.[2])								
Motor	**1.5 hp (1.1 kW)**				**1.5 hp (1.1 kW)**			
FLA	68.0	65.0	32.3	24.6	60.6	55.4	28.1	24.6
WSA	83.6	80.0	39.7	30.8	75.8	69.3	35.1	30.8
OPD	90	90	40	30	80	70	40	35
Motor	**2.0 hp (1.5 kW)**				**2.0 hp (1.5 kW)**			
FLA	69.8	66.6	33.1	25.2	62.4	57.0	28.9	25.2
WSA	85.4	81.6	40.5	31.5	78.0	71.3	36.1	31.5
OPD	90	90	45	30	80	80	40	35
Motor	**3.0 hp (2.2 kW)**				**3.0 hp (2.2 kW)**			
FLA	72.9	69.4	34.5	26.4	65.5	59.8	30.3	26.4
WSA	88.5	84.4	41.9	33.0	81.9	74.8	37.9	33.0
OPD	90	90	45	35	90	80	40	35
Humidifier Only (Infrared or Steam Generating)								
Motor	**1.5 hp (1.1 kW)**				**1.5 hp (1.1 kW)**			
FLA	39.7	37.0	18.4	16.9	19.0	16.3	8.4	9.5
WSA	44.9	42.2	20.9	18.8	23.8	20.4	10.5	11.9
OPD	60	60	30	25	25	20	15	15
Motor	**2.0 hp (1.5 kW)**				**2.0 hp (1.5 kW)**			
FLA	41.5	38.6	19.2	17.5	20.8	17.9	9.2	10.1
WSA	46.7	43.8	21.7	19.4	26.0	22.4	11.5	12.6
OPD	60	60	30	25	30	25	15	15
Motor	**3.0 hp (2.2 kW)**				**3.0 hp (2.2 kW)**			
FLA	44.6	41.4	20.6	18.7	23.9	20.7	10.6	11.3
WSA	49.8	46.6	23.1	20.6	29.9	25.9	13.3	14.1
OPD	70	60	30	25	35	30	15	15
Electric Reheat Only (Note: See Table 17 for Self-contained units w/SCR reheats.[2])								
Motor	**1.5 hp (1.1 kW)**				**1.5 hp (1.1 kW)**			
FLA	68.0	65.0	32.3	24.6	47.3	44.3	22.3	17.2
WSA	83.6	80.0	39.7	30.2	59.1	55.4	27.9	21.5
OPD	90	90	40	30	60	60	30	25
Motor	**2.0 hp (1.5 kW)**				**2.0 hp (1.5 kW)**			
FLA	69.8	66.6	33.1	25.2	49.1	45.9	23.1	17.8
WSA	85.4	81.6	40.5	30.8	61.4	57.4	28.9	22.3
OPD	90	90	45	30	70	60	30	25
Motor	**3.0 hp (2.2 kW)**				**3.0 hp (2.2 kW)**			
FLA	72.9	69.4	34.5	26.4	52.2	48.7	24.5	19.0
WSA	88.5	84.4	41.9	32.0	65.3	60.9	30.6	23.8
OPD	90	90	45	35	60	70	35	20
Without Electric Reheat and Humidifier								
Motor	**1.5 hp (1.1 kW)**				**1.5 hp (1.1 kW)**			
FLA	26.4	25.9	12.6	9.5	5.7	5.2	2.6	2.1
WSA	31.6	31.1	15.1	11.4	7.1	6.5	3.3	2.6
OPD	50	50	25	15	15	15	15	15
Motor	**2.0 hp (1.5 kW)**				**2.0 hp (1.5 kW)**			
FLA	28.2	27.5	13.4	10.1	7.5	6.8	3.4	2.7
WSA	33.4	32.7	15.9	12.0	9.4	8.5	4.3	3.4
OPD	50	50	25	15	15	15	15	15
Motor	**3.0 hp (2.2 kW)**				**3.0 hp (2.2 kW)**			
FLA	31.3	30.3	14.8	11.3	10.6	9.6	4.8	3.9
WSA	36.5	35.5	17.3	13.2	13.3	12.0	6.0	4.9
OPD	50	50	25	20	20	20	15	15

1. Contact factory for 380-3-60 data.
2. For Split System Evaporators with SCR reheat, use the values above.

The values above were calculated per UL Standard 1995.
FLA = Full Load Amps (Input Amps); WSA = Wire Size Amps (Minimum Supply Circuit Ampacity); OPD = Maximum Overcurrent Protective Device Size
RLA = Rated Load Amps; LRA = Locked Rotor Amps
* R = In the Row; M = In the Row with Econ-O-Coil

Table 17 Self-contained with SCR reheat *

Voltage (3, 60 Hz)	208	230	460	575
Electric Reheat and Humidifier (Infrared or Steam Generating)				
Motor	**1.5 hp (1.1 kW)**			
FLA	81.3	76.1	38.1	N/A
WSA	96.9	91.1	45.5	N/A
OPD	100	100	50	N/A
Motor	**2.0 hp (1.5 kW)**			
FLA	83.1	77.7	38.9	N/A
WSA	98.7	92.7	46.3	N/A
OPD	100	100	50	N/A
Motor	**3.0 hp (2.2 kW)**			
FLA	86.2	80.5	40.3	N/A
WSA	101.8	95.5	47.7	N/A
OPD	110	100	50	N/A
Electric Reheat Only				
Motor	**1.5 hp (1.1 kW)**			
FLA	68.0	65.0	32.3	N/A
WSA	83.6	80.0	39.7	N/A
OPD	90	90	40	N/A
Motor	**2.0 hp (1.5 kW)**			
FLA	69.8	66.6	33.1	N/A
WSA	85.4	81.6	40.5	N/A
OPD	90	90	45	N/A
Motor	**3.0 hp (2.2 kW)**			
FLA	72.9	69.4	34.5	N/A
WSA	88.5	84.4	41.9	N/A
OPD	90	90	45	N/A

Note: Compressor is locked on. Heater is same size as standard.
* Contact factory for 380-3-60 data.

Table 18 Scroll compressor and main fan (for comparison purposes only) *

Voltage (3, 60 Hz)	208	230	460	575
Scroll Compressor				
RLA	20.7	20.7	10.0	7.4
LRA	128.0	128.0	63.0	49.0
Main Fan				
Motor	**1.5 hp (1.1 kW)**			
RLA	5.7	5.2	2.6	2.1
LRA	35.9	31.2	15.6	12.6
Motor	**2.0 hp (1.5 kW)**			
RLA	7.5	6.8	3.4	2.7
LRA	46.9	40.8	20.4	16.2
Motor	**3.0 hp (2.2 kW)**			
RLA	10.6	9.6	4.8	3.9
LRA	66.0	58.0	26.8	23.4

* Contact factory for 380-3-60 data.

Table 19 Outdoor condensing units

Electrical Data 60 Hz 95°F (35°C) Ambient			Electrical Data 60 Hz 105°F (40°C) Ambient		
Voltage	**Model**	**PFH067A-_L**	**Voltage**	**Model**	**PFH067A-_H3**
208/230-3-60	FLA	24.1	208/230-3-60	FLA	24.2
	WSA	29.3		WSA	29.4
	OPD	45.0		OPD	50.0
380-3-60	FLA	12.4	380-3-60	FLA	12.4
	WSA	15.1		WSA	15.1
	OPD	25.0		OPD	25.0
460-3-60	FLA	11.7	460-3-60	FLA	11.7
	WSA	14.2		WSA	14.2
	OPD	20.0		OPD	20.0
575-3-60	FLA	9.1	575-3-60	FLA	9.3
	WSA	11.1		WSA	11.3
	OPD	15.0		OPD	15.0

Table 20 Outdoor condensing units—Quiet-Line

Electrical Data 60 Hz, Quiet-Line, 95°F (35°C)		
Voltage	**Model**	**PFHZ67A-_L**
208/230-3-60	FLA	21.1
	WSA	25.9
	OPD	45.0
380-3-60	FLA	12.5
	WSA	15.2
	OPD	25.0
460-3-60	FLA	10.9
	WSA	13.4
	OPD	20.0
575-3-60	FLA	8.8
	WSA	10.8
	OPD	15.0

Table 21 Indoor condensing units, air-cooled *

Electrical Data 60 Hz 95°F (35°C) Ambient		
Voltage	**Model**	**MC_65A**
208/230-3-60	FLA	26.5
	WSA	31.7
	OPD	50.0
460-3-60	FLA	12.9
	WSA	15.4
	OPD	25.0
575-3-60	FLA	9.7
	WSA	11.6
	OPD	15.0

* Contact factory for 380-3-60 data.

Table 22 Indoor condensing units, water-cooled *

Voltage	Model	MC_69W
208/230-3-60	FLA	20.7
	WSA	25.9
	OPD	45.0
460-3-60	FLA	10.0
	WSA	12.5
	OPD	20.0
575-3-60	FLA	7.4
	WSA	9.3
	OPD	15.0

* Contact factory for 380-3-60 data.

Table 23 Fan speed control condensers *

95°F (35°C) Ambient, 1 Phase - 60 Hz			
CSF104			
Voltage	**208/230**	**460**	**575**
FLA	4.8	2.5	1.9
WSA	6.0	3.1	2.4
OPD	15.0	15.0	15.0

* Contact factory for 380-3-60 data.

Table 24 Liebert Lee-Temp condensers *

95°F (35°C) Ambient, 3 Phase - 60 Hz			
CSL104			
Voltage	**208/230**	**460**	**575**
FLA	3.5	1.7	1.4
WSA	4.4	2.1	1.8
OPD	15.0	15.0	15.0

* Contact factory for 380-3-60 data.

Table 25 Liebert Lee-Temp receiver heater pads for use w/CSL condensers

Volts	120	230
Watts/Pad	150	150
FLA	1.4	0.7
WSA	1.8	0.9
OPD	15	15

Separate electrical source required for continuous operation of single phase heater pads for Liebert Lee-Temp.

Table 26 Drycooler and pump package - 95°F (35°C) ambient *

Voltage	**208/230**	**460**	**575**
Glycol			
DSF Model	112	112	112
Pump Hp	3/4	3/4	3/4
FLA	7.0	3.3	2.7
WSA	7.9	3.7	3.1
OPD	15	15.0	15.0
Glycol DS0174			
DSF Model	174	174	174
Pump Hp	1.5	1.5	1.5
FLA	13.6	6.4	5.2
WSA	15.3	7.2	5.8
OPD	20	15.0	15.0
GLYCOOL			
DSO Model	112	112	112
Pump Hp	1-1/2	1-1/2	1-1/2
FLA	10.1	4.7	3.8
WSA	11.8	5.5	4.4
OPD	15	15	15

1. Pump and drycooler powered from same 3 phase feeder.

* Contact factory for 380-3-60 data.

Table 27 Liebert Challenger ITR electrical data—50 Hz

Model Type	Self-Contained			Split System Evaporator or Chilled Water		
	B*065A, 070WG, 058G			B*059E, 101C		
	3 Phase, 50Hz					
Voltage	**200**	**230**	**380/415**	**200**	**230**	**380/415**
With Electric Reheat and Humidifier (Infrared or Steam Generating) (Note: See Table 28 for units w/SCR reheats.[1])						
Motor	**1.1 kW (1.5 hp)**			**1.1 kW (1.5 hp)**		
FLA	66.0	64.4	34.4	58.1	54.8	30.8
Motor	**1.5 kW (2.0 hp)**			**1.5 kW (2.0 hp)**		
FLA	67.7	65.9	35.2	59.8	56.3	31.6
Motor	**2.2 kW (3.0 hp)**			**2.2 kW (3.0 hp)**		
FLA	70.8	68.6	36.8	62.9	59.0	33.2
Humidifier Only (Infrared or Steam Generating)						
Motor	**1.1 kW (1.5 hp)**			**1.1 kW (1.5 hp)**		
FLA	38.8	36.4	19.1	18.1	15.7	9.1
Motor	**1.5 kW (2.0 hp)**			**1.5 kW (2.0 hp)**		
FLA	40.5	37.9	19.9	19.8	17.2	9.9
Motor	**2.2 kW (3.0 hp)**			**2.2 kW (3.0 hp)**		
FLA	43.6	40.6	21.5	22.9	19.9	11.5
Electric Reheat Only (Note: See Table 28 for units w/SCR reheats.[1])						
Motor	**1.1 kW (1.5 hp)**			**1.1 kW (1.5 hp)**		
FLA	66.0	64.4	34.4	45.3	43.7	24.4
Motor	**1.5 kW (2.0 hp)**			**1.5 kW (2.0 hp)**		
FLA	67.7	65.9	35.2	47.0	45.2	25.2
Motor	**2.2 kW (3.0 hp)**			**2.2 kW (3.0 hp)**		
FLA	70.8	68.6	36.8	50.1	47.9	26.8
Without Electric Reheat and Humidifier						
Motor	**1.1 kW (1.5 hp)**			**1.1 kW (1.5 hp)**		
FLA	26.0	25.3	12.7	5.3	4.6	2.7
Motor	**1.5 kW (2.0 hp)**			**1.5 kW (2.0 hp)**		
FLA	27.7	26.8	13.5	7.0	6.1	3.5
Motor	**2.2 kW (3.0 hp)**			**2.2 kW (3.0 hp)**		
FLA	30.8	29.5	15.1	10.1	8.8	5.1

1. For Split System Evaporators with SCR reheat, use the values above.

FLA = Full Load Amps (Input Amps)

RLA = Rated Load Amps

LRA = Locked Rotor Amps

* R = In The Row; M = In The Row with Econ-O-Coil

Table 28 Self-contained with SCR reheat

Voltage (3, 50 Hz)	200	230	380/415
Electric Reheat and Humidifier (Infrared or Steam Generating)			
Motor	**1.1 kW (1.5 hp)**		
FLA	78.8	75.5	40.8
Motor	**1.5 kW (2.0 hp)**		
FLA	80.5	77.0	41.6
Motor	**2.2 kW (3.0 hp)**		
FLA	83.6	79.7	43.2
Electric Reheat Only			
Motor	**1.1 kW (1.5 hp)**		
FLA	66.0	64.4	34.4
Motor	**1.5 kW (2.0 hp)**		
FLA	67.7	65.9	35.2
Motor	**2.2 kW (3.0 hp)**		
FLA	70.8	68.6	36.8

Note: Compressor is locked on. Heater is same size as standard.

Table 29 Scroll compressor and main fan (for comparison only)

Voltage (3, 50 Hz)	200	230	380/415
Scroll Compressor			
RLA	20.7	20.7	10.0
LRA	156.0	172.0	74.0
Main Fan			
Motor	**1.1 kW (1.5 hp)**		
RLA	5.3	4.6	2.7
LRA	35.8	31.2	17.9
Motor	**1.5 kW (2.0 hp)**		
RLA	7.0	6.1	3.5
LRA	50.6	44.0	25.3
Motor	**2.2 kW (3.0 hp)**		
RLA	10.1	8.8	5.1
LRA	58.5	51.0	29.3

Table 30 Outdoor condensing units

Electrical Data 50 Hz 35°C (95°F) Ambient		
Voltage	**Model**	**PFH066A-_L**
200/230-3-50	FLA	24.1
380/415-3-50	FLA	13.2
Electrical Data 50 Hz 40°C (105°F) Ambient		
Voltage	**Model**	**PFH066A-_H**
200/230-3-50	FLA	24.2
380/415-3-50	FLA	13.2
Electrical Data 50 Hz Quiet-Line 35°C (95°F)		
Voltage	**Model**	**PFHZ66A-_L**
200/230-3-50	FLA	22.5
380/415-3-50	FLA	12.4

Table 31 Indoor condensing units air-cooled

Electrical Data 50 Hz 35°C (95°F) Ambient		
Voltage	Model	MC_64A
380/415-3-50	FLA	13.7

1. Consult factory for 200/230 volts.

Table 32 Indoor condensing units water-cooled

Voltage	Model	MC_68W
380/415-3-50	FLA	10.0

1. Consult factory for 200/230 volts.

Table 33 Fan speed control condensers

35°C (95°F) Ambient (1 Phase - 50 Hz)	
CSF104	
Voltage	200/230
FLA	4.0

Table 34 Liebert Lee-Temp condensers

35°C (95°F) Ambient (3 Phase - 50 Hz)		
CSL104		
Voltage	200/230	380/ 415
FLA	3.5	1.7

Table 35 Liebert Lee-Temp receiver heater pads; for use w/CSL condensers

Volts	230
Watts/Pad	150
FLA	0.7

Separate electrical source required for continuous operation of single phase heater pads for Liebert Lee-Temp.

Table 36 Drycooler only - 35°C (95°F) ambient, three-phase

Voltage (3, 50Hz)	**200/230**	**380/415**
DSF Model	**112**	**112**
FLA	3.5	1.7
DSO Model	**112**	**112**
FLA	3.5	1.7
DSO Model	**174**	**174**
FLA	7.0	3.4

Table 37 Drycooler only - 35°C (95°F) ambient, single phase

Voltage (1, 50Hz)	**200/230**	**380/415**
DSF Model	112	—
FLA	4.0	—

Table 38 Pumps

hp		200/230	380/415
1-1/2	FLA	5.4	3.0

GUIDE SPECIFICATIONS—NOMINAL 23 OR 33KW ENVIRONMENTAL CONTROL SYSTEM

1.0 GENERAL

1.1 Summary

These specifications describe requirements for an environmental control system. The system shall be designed to maintain temperature and relative humidity conditions within the room. The manufacturer shall design and furnish all equipment to be fully compatible with heat dissipation requirements of the site.

1.2 Design Requirements

The environmental control system shall be a Liebert Challenger ITR factory-assembled unit. Standard 60 Hz units shall be CSA (NRTL-C) certified. It shall be specifically designed for service from the front and rear of the unit. The system shall be designed for draw-through air arrangement to insure even air distribution to the entire face area of the coil.

Each system shall be capable of handling ____ CFM (CMH) at ____inches (mm) of water external static pressure with a horizontal airflow pattern. It shall have a total cooling capacity of ____ BTU/HR (kW), sensible cooling capacity of ____ BTU/HR (kW), based on the entering air condition of °F (°C) dry bulb, and ____ °F (°C) wet bulb. These units are to be supplied with ____ Volt, ____ phase, ____ Hz power supply. The humidifier shall have a capacity of ____ lbs/hr (kg/h). Reheat shall have a capacity of _____ BTU/HR (kW). The main fan shall be ____ hp (kW).

1.3 Submittals

Submittals shall be provided with the proposal and shall include: Single-Line Diagrams; Dimensional, Electrical, and Capacity data; Piping and Electrical Connection Drawings.

2.0 PRODUCT

2.1 All Systems

2.1.1 Cabinet and Frame Construction

The frame shall be constructed of MIG welded tubular and formed steel. All frame components shall be finished in a black, powder-coat finish to protect against corrosion. The exterior panels shall be 20 gauge steel and shall be powder coated with ____ color paint. The panels shall be insulated with a minimum 1 in. (25.4mm), 1-1/2 lbs. (0.68 kg) density fiber insulation. Front and side panels shall have captive, 1/4 turn fasteners.

The cabinet shall be designed so that all components are serviceable and removable from the front and rear of the unit.

2.1.2 Fan and Motor Section

The fan shall be the centrifugal type, double width, double inlet. The shaft shall be heavy duty steel with self-aligning ball bearings with minimum life span of 100,000 hours.

The fan motor shall be 1750 RPM and mounted on an adjustable base. The drive package shall be sized for 200% of the fan motor horsepower, and equipped with an adjustable motor pulley. The fan/motor assembly shall be mounted on (vibration isolators) (solid base). The fan shall be located to draw air over the coil to ensure even air distribution and maximum coil performance.

High Efficiency Motor (Optional)

The fan motor shall be a ____ hp (kW) high efficiency motor with a full load efficiency of ____ %.

2.1.3 Filter

The filter shall be____ inches (mm) thick and rated not less than _____ % (20%, 30%, 40-45%, 60-65%) efficiency based on ASHRAE 52.1.

Prefilter (Optional)

The prefilter shall be 2 in. (50.8mm) thick with an efficiency of 20% based on ASHRAE 52.1.

2.1.4 Advanced Microprocessor Control (Standard)

The Advanced control processor shall be microprocessor based with a front monitor LCD display panel and control keys for user inputs. The controls shall be menu driven with on-screen prompts for easy user operation. The system shall allow user review and programming of temperature and humidity setpoints, alarm parameters, and setup selections including choice of control type. A password shall be required to make system changes. For all user selections, the range of acceptable input (temperature, humidity, or time delay) shall be displayed on the monitor screen. The system shall provide monitoring of room conditions, operational status in % of each function, component run times, date and time, and four analog inputs from sensors provided by others.

Control

The control system shall allow programming of the following room conditions:

- Temperature Setpoint 65 to 85°F (18-29°C)
- Temperature Sensitivity +1 to +9.9°F (0.6 to 5.6°C) in 0.1° increments
- Humidity Setpoint 20 to 80% RH
- Humidity Sensitivity +1 to +30% RH

All setpoints shall be adjustable from the individual unit front monitor panel. The microprocessor can be set within these ranges, however, the unit may not be able to control to extreme combinations of temperature and humidity.

Temperature and Humidity Sensors shall be capable of being calibrated using the front monitor panel controls to coordinate with other temperature and humidity sensors in the room.

Predictive Humidity Control

The microprocessor shall calculate the moisture content in the room and prevent unnecessary humidification and dehumidification cycles by responding to changes in dew point temperature.

Compressor Short-Cycle Control

The control system shall include a program to prevent compressor short-cycling.

System Auto-Restart

For start-up after power failure, the system shall provide automatic restart with a programmable (up to 9.9 minutes in 6-second increments) time delay. Programming can be performed either at the unit or from the central site monitoring system.

Sequential Load Activation

During start-up, or after power failure, the microprocessor shall sequence operational load activation to minimize inrush current. Systems allowing multiple loads to start simultaneously are unacceptable.

Chilled Water/Hot Water/Econ-O-Coil Flush Cycles

Chilled water, hot water, and Econ-O-Cool coils (if unit is so equipped) shall be automatically flushed to prevent the buildup of contaminants. Systems without this feature shall include the necessary devices to bypass fluid into the coil on a programmed basis.

Front Monitor Display Panel

The microprocessor shall provide a front monitor LCD backlit display panel with 4 rows of 20 characters with adjustable contrast. This display (along with five front mounted control keys) shall be the only operator interface required to obtain all available system information such as room conditions, operational status, alarms, control and alarm setpoints, and all user selections including alarm delays, sensor calibration, DIP switch selections, and diagnostics. All indicators shall be in language form. No symbols or codes shall be acceptable.

Alarms

The microprocessor shall activate an audible and visual alarm in event of any of the following conditions:

- High Temperature
- Low Temperature
- High Humidity
- Low Humidity
- Short Cycle
- Compressor Overload (Optional)
- Main Fan Overload (Optional)
- Humidifier Problem
- High Head Pressure
- Change Filter
- Loss of Air Flow
- Low Suction Pressure
- Loss of Power
- Custom Alarm (#1 to #4)

Custom alarms are four customer accessible alarm inputs to be indicated on the front panel. Custom alarms can be identified with prepared (programmed) alarm labels for the following frequently used inputs:

- Water Under Floor
- Smoke Detected
- Standby GC Pump On
- Loss of Water Flow
- Standby Unit On

User customized text can be entered for two of the four custom alarms. Each alarm (unit and custom) can be separately enabled or disabled, selected to activate the common alarm, and programmed for a time delay of 0 to 255 seconds.

Audible Alarm

The audible alarm shall annunciate any alarm that is enabled by the operator.

Common Alarm

A programmable common alarm shall be provided to interface user selected alarms with a remote alarm device.

Remote Monitoring

All alarms shall be communicated to the Liebert monitoring system with the following information: date and time of occurrence, unit number, and present temperature and humidity.

Analog Inputs

The system shall include four customer accessible analog inputs for sensors provided by others. The analog inputs shall accept a 4 to 20 mA signal. The user shall be able to change the input to 0 to 5 VDC or 0 to 10 VDC if desired. The gains for each analog input shall be programmable from the front panel. The analog inputs shall be able to be monitored from the front panel.

Diagnostics

The control system and electronic circuitry shall be provided with self-diagnostics to aid in trouble-shooting. The microcontroller board shall be diagnosed and reported as pass/not pass. Control inputs shall be indicated as on or off at the front monitor panel. Control outputs shall be able to be turned on or off from the front monitor panel without using jumpers or a service terminal. Each control output shall be indicated by an LED on a circuit board.

Data Collection

The control system shall maintain accumulative operating hours of compressor, reheat, humidifier, fan motor, and Econ-O-Coil. The ten most recent alarms shall also be retained.

Communications

The microprocessor shall be compatible with all Liebert remote monitoring and control devices.

2.1.5 Advanced Microprocessor Control with Graphics (Optional)

The optional Advanced control processor shall be microprocessor based with a front monitor dot matrix display panel and control keys for user inputs. The controls shall be menu driven with on-screen prompts for easy user operation. The system shall allow user review and programming of temperature and humidity setpoints, alarm parameters, and setup selections including choice of control type. A password shall be required to make system changes. For all user selections, the range of acceptable input (temperature, humidity, or time delay) shall be displayed on the monitor screen. The system shall provide monitoring of room conditions, operational status in % of each function, component run times, date and time, and four analog inputs from sensors provided by others.

Control

The control system shall allow programming of the following room conditions:

- Temperature Setpoint 65 to 85°F (18-29°C)
- Temperature Sensitivity +1 to +9.9°F (0.6 to 5.6°C) in 0.1° increments
- Humidity Setpoint 20 to 80% RH
- Humidity Sensitivity +1 to +30% RH

All setpoints shall be adjustable from the individual unit front monitor panel.

Temperature and Humidity Sensors shall be capable of being calibrated using the front monitor panel controls to coordinate with other temperature and humidity sensors in the room.

Predictive Humidity Control

The microprocessor shall calculate the moisture content in the room and prevent unnecessary humidification and dehumidification cycles by responding to changes in dew point temperature.

Compressor Short-Cycle Control

The control system shall include a program to prevent compressor short-cycling.

System Auto-Restart

For start-up after power failure, the system shall provide automatic restart with a programmable (up to 9.9 minutes in 6-second increments) time delay. Programming can be performed either at the unit or from the central site monitoring system.

Sequential Load Activation

During start-up, or after power failure, the microprocessor shall sequence operational load activation to minimize inrush current. Systems allowing multiple loads to start simultaneously are unacceptable.

Chilled Water/Hot Water/Econ-O-Coil Flush Cycles

Chilled water, hot water, and Econ-O-Cool coils shall be automatically flushed to prevent the buildup of contaminants. Systems without this feature shall include the necessary devices to bypass fluid into the coil on a programmed basis.

Front Monitor Display Panel

The microprocessor shall provide a front monitor 240 x 120 dot matrix display panel with adjustable backlighting. This display (along with five front mounted control keys) shall be the only operator interface required to obtain all available system information such as room conditions, operational status, graphical data, alarms, control and alarm setpoints, and all user selections including alarm delays, sensor calibration, DIP switch selections, and diagnostics. All indicators shall be in language form. No symbols or codes shall be acceptable.

Alarms

The microprocessor shall activate an audible and visual alarm in event of any of the following conditions:

- High Temperature
- Low Temperature
- High Humidity
- Low Humidity
- Short Cycle
- Compressor Overload (Optional)
- Main Fan Overload (Optional)
- Humidifier Problem
- High Head Pressure
- Change Filter
- Loss of Air Flow
- Low Suction Pressure
- Loss of Power
- Custom Alarm (#1 to #4)

Custom alarms are four customer accessible alarm inputs to be indicated on the front panel. Custom alarms can be identified with prepared (programmed) alarm labels for the following frequently used inputs:

- Water Under Floor
- Smoke Detected
- Standby GC Pump On
- Loss of Water Flow
- Standby Unit On

User-customized text can be entered for all four custom alarms. Each alarm (unit and custom) can be separately enabled or disabled, selected to activate the common alarm, and programmed for a time delay of 0 to 255 seconds.

Audible Alarm

The audible alarm shall annunciate any alarm that is enabled by the operator.

Common Alarm

A programmable common alarm shall be provided to interface user selected alarms with a remote alarm device.

Remote Monitoring

All alarms shall be communicated to the Liebert site monitoring system with the following information: date and time of occurrence, unit number, and present temperature and humidity.

Analog Inputs

The system shall include four customer accessible analog inputs for sensors provided by others. The analog inputs shall accept a 4 to 20 mA signal. The user shall be able to change the input to 0 to 5 VDC or 0 to 10 VDC if desired. The gains for each analog input shall be programmable from the front panel. The analog inputs shall be able to be monitored from the front panel.

Diagnostics

The control system and electronic circuitry shall be provided with self-diagnostics to aid in troubleshooting. The microcontroller board shall be diagnosed and reported as pass/not pass. Control inputs shall be indicated as on or off at the front monitor panel.

Control outputs shall be able to be turned on or off from the front monitor panel without using jumpers or a service terminal. Each control output shall be indicated by an LED on a circuit board.

Data Collection

The control system shall maintain accumulative operating hours of compressor, reheat, humidifier, fan motor, Econ-O-Coil, and heat rejection. The sixty most recent alarms shall also be retained.

Graphing

The control shall display the following graphical data:

- Temperature, humidity, analog inputs
- Component operating status by hour
- Operating status

Communications

The microprocessor shall be compatible with all Liebert remote monitoring and control devices.

2.1.6 Infrared Humidifier (Standard)

The humidifier shall be of the infrared type consisting of high intensity quartz lamps mounted above and out of the water supply. The evaporator pan shall be stainless steel and arranged to be serviceable without disconnecting water supply lines, drain lines or electrical connections. The complete humidifier section shall be pre-piped ready for final connection. The infrared humidification system shall use bypass air to prevent over-humidification of the controlled space. The auto flush system shall automatically flush deposits from the humidifier pan. The system shall be field adjustable to change the cycle time to suit local water conditions. The humidifier shall have a capacity of _____ lbs/hr (kg/h).

2.1.7 Steam Generating Humidifier (Optional)

The environmental control system shall be equipped with a steam generating humidifier that is controlled by the microprocessor control system. It shall be complete with disposable canister, all supply and drain valves, steam distributor, and electronic controls. The need to change canister shall be annunciated on the microprocessor control panel. The humidifier shall have a capacity of ____ lbs/hr (kg/h).

2.1.8 Electric Reheat (Standard)

The low-watt density, 304/304, stainless steel, finned-tubular electric reheat coils shall be capable of maintaining room dry bulb conditions when the system is calling for dehumidification. The reheat section shall include UL recognized safety switches to protect the system from overheating. The capacity of the reheat coils shall be ____ BTU/HR (kW), ____ kW, controlled in ____ stage(s).

2.1.9 Hot Water Reheat (Optional)

The hot water reheat coil shall have copper tubes and aluminum fins with a capacity of _____ BTU/HR (kW) when supplied with _____ °F (°C) entering water temperature at _____GPM (l/s) flow rate. Maximum pressure drop shall be _____ PSI (kPa). The control system shall be factory pre-piped with a 2-way motorized control valve and cleanable Y-strainer.

2.1.10 SCR Electric Reheat (Optional)

The SCR (Silicon Controlled Rectifier) controller shall proportionally control the stainless steel reheats to maintain the selected room temperature. The rapid cycling made possible by the SCR controller provides precise temperature control, and the more constant element temperature improves heater life. The capacity of the reheat coils shall be _____ BTU/HR (kW).

2.1.11 Floor Stand (Optional)

The floor stand shall be constructed of a heliarc-welded tubular steel frame. The floor stand shall be coated using an autodeposition process to protect against corrosion. The floor stand shall have adjustable legs with vibration isolation pads. The floor stand shall be: 9 in. (23cm), 12 in. (30cm), 15 in. (38cm), 18 in. (46cm), 21 in. (53cm), 24 in. (61cm) high.

2.1.12 Plenum

The unit shall be supplied with a (2 way) (3 way) (4 way) (low-profile, cold-aisle) air discharge plenum. The plenum shall be 18 in. (457mm) high or less, insulated and powder painted the same color as the room unit.

2.1.13 Disconnect Switch, Locking Type

The manual disconnect switch shall be mounted in the high voltage section of the electrical panel. The switch shall prevent access to the high voltage electrical components until switched to the "OFF" position.

2.1.14 Remote Sensors (Required for Select Applications)

The unit shall be supplied with remote temperature and humidity sensors. The sensors shall be connected to the unit by a 30 ft. (9m), 60 ft. (18m), 90 ft. (27m), 120 ft. (36m), 150 ft. (45m) shielded cable.

2.1.15 Remote Sensor Installation Location

The remote temperature and humidity sensor should be installed in the cold aisle in front of the equipment to be cooled. It should be mounted at the farthest point from the cooling unit that supply air needs to reach but still within the unit's area of influence. The sensor should be installed at the highest point that equipment will draw in cooled air.

2.1.16 Firestat (Optional)

The firestat shall immediately shut down the system when high temperatures are detected. The firestat shall be mounted in the electrical panel with the sensing element in the return air.

2.1.17 Smoke Detector (Optional)

The smoke detector senses the return air, shuts down the unit upon detection, and sends visual and audible alarm. Dry contacts are available for a remote customer alarm. This smoke detector is not intended to function as or replace any room smoke detection system that may be required by local or national codes.

2.1.18 Condensate Pump

The condensate pump shall have the capacity of ____ GPH (l/h) at ____ ft. (m) head @ ____ V - ____ Hz. It shall be complete with (single) (dual) integral float switch, pump, motor assembly, and reservoir.

2.2 Direct Expansion Self-Contained Systems

Direct Expansion Coil

The evaporator coil shall have _____ sq.ft. (sq. m) face area, _____ rows deep. It shall be configured as V-frame and be constructed of copper tubes and aluminum fins and have a maximum face velocity of _____ ft. per minute (m/s) at _____ CFM (CMH). The coil shall be provided with a stainless steel drain pan.

Refrigeration System

The refrigeration system shall consist of a high efficiency scroll compressor, hot gas bypass, pressure safety switches, externally equalized expansion valve, filter drier, refrigerant sight glass and moisture indicator.

2.2.1 Air-Cooled Self-Contained Systems

Pump Down Control

A liquid line solenoid valve shall be provided for pump down control.

Crankcase Heater

A crankcase heater shall be provided for additional system protection from refrigerant migration during off cycles.

Propeller Fan Condenser (Standard)

The Liebert manufactured air-cooled condenser shall be the low profile, slow speed, direct-drive, propeller-fan type. The condenser shall be constructed of aluminum and contain a copper tube, aluminum fin coil with an integral electric control panel. The system shall be designed for _____ °F (°C) ambient. The air-cooled condenser shall have a _____ Volt, _____ phase, ____ Hz power supply.

Fan Speed Control (FSC) Head Pressure Control (Standard)

The winter control system for the air-cooled condenser shall be Liebert Fan Speed Control (FSC). The variable speed motor shall turn on at 10% of the supply voltage and modulate in response to head pressure to a full speed of 1050 RPM. It shall be designed with ball bearings, permanent lubrication, and internal overload protection.

The control system shall be complete with transducers, thermostats and electrical control circuit, factory prewired and tested in an integral control panel. The transducer shall automatically sense the head pressure of the compressor and control the variable speed fan on the air-cooled condenser to properly maintain the head pressure.

The fan speed control system shall provide positive start-up and operation in ambient temperature as low as -20°F (-29°C). Included with the fan speed control system shall be a solid state winter start kit as an integral feature of the electronic control panel.

Liebert Lee-Temp Head Pressure Control (Optional)

The winter control system for the air-cooled condenser shall be "Liebert Lee-Temp." The Liebert Lee-Temp system shall allow startup and positive head pressure control with ambient temperatures as low as -30°F (-34.4°C). The Liebert Lee-Temp package shall include: insulated receiver, pressure relief valve for each circuit, head pressure three-way control valve, and rotalock valve for isolating the refrigerant charge. The Lee- Temp receiver shall be factory insulated and mounted ready for the field connection to the air-cooled condenser. The Liebert Lee-Temp heater shall be (150) (300) _____ Watt and require a separate power supply of (115) (230) _____ Volt, single phase, _____ Hz.

Centrifugal Fan Condenser (Optional)

The system shall be supplied with a centrifugal fan condenser (LCC). The condenser shall be constructed of galvanized steel with a copper tube, aluminum fin coil. The heavy duty fan shall be the centrifugal type, double width, double inlet. The 1750 RPM (1450 RPM @ 50 Hz) fan motor shall be mounted on an adjustable base, and equipped with an adjustable motor pulley. A Liebert Lee- Temp head pressure control system shall be field piped to the unit. Electrical controls shall be in a rain-tight enclosure.

The system shall be designed for _____ °F (°C) ambient. The air-cooled condenser shall have a _____ Volt, 3 phase, _____ Hz power supply.

2.2.2 Water or Glycol-Cooled Self-Contained Systems

Indoor Unit Condenser

The water/glycol system shall be equipped with a coaxial condenser having a total pressure drop of _____ ft. of water (kPa) and a flow rate of _____ GPM (l/s) with _____ °F (°C) entering water/glycol temperature.

Two-way Water Regulating Valve with Bypass (Standard)

The condenser circuit shall be pre-piped with a headpressure actuated two-way regulating valve with bypass.

Three-Way Water Regulating Valve (Optional)

The condenser circuit shall be pre-piped with a head pressure actuated three-way regulating valve.

Design Pressure

The condenser water/glycol circuit shall be designed for a pressure of [(150 PSI (1034 kPa)) (350 PSI (2413 kPa))].

Crankcase Heater (Optional)

A crankcase heater is provided to prevent the migration of refrigerant to the compressor during off cycles.

Hot Gas Reheat (Optional)

The complete hot gas reheat system shall include a copper tube, aluminum fin coil, three-way solenoid valve, and refrigerant check valve. The capacity of the coil shall be _____ BTU/HR (kW).

70/30 Cu-Ni Econ-O-Coil

This coil replaces the standard copper tube coil to provide improved resistance to corrosion.

This option must be specified whenever a GLYCOOL or Dual Cooling Source system is applied to a cooling tower loop or other open water system.

Outdoor Unit

Propeller Fan Drycooler (Standard)

The Liebert manufactured drycooler shall be the low profile, slow speed, direct drive propeller fan type. The drycooler shall be constructed of aluminum and contain a copper tube aluminum fin coil with an integral electric control panel. The drycooler shall be designed for _____ °F (°C) ambient.

Centrifugal Fan Drycooler (Optional)

The system shall be supplied with a centrifugal fan drycooler (LCD). The drycooler shall be constructed of galvanized steel with a copper tube, aluminum fin coil. The heavy duty fan shall be the centrifugal type, double width, double inlet. The 1750 RPM (1450 RPM @ 50 Hz) fan motor shall be mounted on an adjustable base, and equipped with an adjustable motor pulley. A three-way control valve and thermostat shall maintain the desired fluid temperature. Electrical controls shall be in a rain-tight enclosure. The system shall be designed for _____ °F (°C) ambient. The drycooler shall have a _____ Volt, 3 phase, _____ Hz power supply.

Single Glycol Pump Package (Standard)

This system shall be provided with a centrifugal pump mounted in a weatherproof and vented enclosure. The pump shall be rated for _____ GPM (l/s) at _____ ft. of head (kPa), and operate on _____ Volt, 3 phase, _____ Hz.

Dual Glycol Pump Package (Optional)

The dual pump package shall include pumps, enclosure, and field mounted flow switch. The pumps shall be wired to the drycooler control box which includes a lead/lag switch for the pumps. The standby pump shall automatically start upon failure of the lead pump. Each pump shall be rated _____ for GPM (l/s) at _____ feet of head (kPa).

2.2.3 GLYCOOL Self-Contained Systems

Econ-O-Coil

The Econ-O-Coil shall be constructed of copper tubes and aluminum fins and be located upstream of the evaporator coil. The Econ-O-Coil shall be designed for closed-loop applications using properly treated glycol solutions. Applications using a cooling tower loop or other open water system must specify a 70/30 Cu-Ni Econ-O-Coil for improved corrosion resistance. The coil shall be rated at _____ BTU/HR (kW) sensible cooling capacity with a 45°F (7.2°C) entering glycol solution temperature. The GLYCOOL coil shall require _____ GPM (l/s) and the total unit pressure drop shall not exceed _____ feet of water (kPa) when in the free cooling mode.

Three-way GLYCOOL Valve

The Econ-O-Coil coil shall be equipped with a fully proportional three-way control valve. This motorized control valve shall control the amount of flow to the Econ-O-Coil and maintain constant temperature and relative humidity.

Glycol Condenser

The glycol system shall be equipped with a coaxial condenser having a total pressure drop of _____ feet of water (kPa) and a flow rate of _____ GPM (l/s), with _____ °F (°C) entering 40% ethylene glycol temperature.

Three-way Water Regulating Valve

The condenser circuit shall be pre-piped with a head pressure actuated three-way water regulating valve.

Design Pressure

The Econ-O-Coil/condenser circuit shall be designed for a pressure of [(150 PSI (1034 kPa)) (300 PSI (2069 kPa))].

Comparator Circuit

The system shall be equipped with a microprocessorcontrolled comparator sensor that permits free-cooling operation whenever entering glycol temperature is below return-air temperature.

Propeller Fan Drycooler (Standard)

The Liebert manufactured drycooler shall be the low profile, slow speed, direct drive propeller fan type. The drycooler shall be constructed of aluminum and contain a copper tube aluminum fin coil with an integral electric control panel. The drycooler shall be designed for _____ °F (°C) ambient.

Centrifugal Fan Drycooler (Optional)

The system shall be supplied with a centrifugal fan drycooler (LCD). The drycooler shall be constructed of galvanized steel with a copper tube, aluminum fin coil. The heavy duty fan shall be the centrifugal type, double width, double inlet. The 1750 RPM (1450 RPM @ 50 Hz) fan motor shall be mounted on an adjustable base, and equipped with an adjustable motor pulley. A three-way control valve and thermostat shall maintain the desired fluid temperature. Electrical controls shall be in a rain tight enclosure. The system shall be designed for _____ °F (°C) ambient. The drycooler shall have a _____ Volt, 3 phase, _____ Hz power supply.

Single Glycol Pump Package (Standard)

This system shall be provided with a centrifugal pump mounted in a weatherproof and vented enclosure. The pump shall be rated for _____ GPM (l/s) at _____ ft. of head (kPa), and operate on _____ Volt, 3 phase, _____ Hz.

Dual Glycol Pump Package (Optional)

The dual pump package shall include pumps, enclosure, and field mounted flow switch. The pumps shall be wired to the drycooler control box which includes a lead/lag switch for the pumps. The standby pump shall automatically start upon failure of the lead pump. Each pump shall be rated for _____ GPM (l/s) at _____ feet of head (kPa).

2.3 Direct Expansion Split Systems

Direct Expansion Coil

The evaporator coil shall have _____ sq.ft. (sq. m) face area, _____ rows deep. It shall be configured as (A) (V) frame and be constructed of copper tubes and aluminum fins and have a maximum face velocity of _____ ft. per minute (m/s) at _____ CFM (CMH). The coil shall be provided with a stainless steel drain pan.

Refrigeration System

The refrigeration system shall consist of a rugged scroll compressor, pressure safety switches, externally equalized expansion valve, filter dryer, and a refrigerant sight glass and moisture indicator.

Centrifugal Fan Condensing Unit

The condenser coil shall be constructed of copper tubes and aluminum fins. The condensing unit shall be factory assembled, charged with refrigerant and sealed.

Components shall include scroll compressor, high-pressure switch, Liebert Lee-Temp refrigerant receiver, head pressure control valve, and liquid line solenoid valve.

The condensing unit shall be designed for 95°F (35°C) ambient and be capable of operation to -20°F (-29°C) ambient.

A hot gas bypass circuit shall be provided to reduce compressor cycling and improve operation under low load conditions.

The condenser fan shall be designed for _____ CFM (CMH) at _____ inches (mm) external static pressure.

(Optional) Disconnect

Factory installed non-fused disconnect switch allows unit to be turned off for maintenance.

5-Ton Models

The fan/motor assembly shall be belt drive. Condensing unit must be hard piped with the evaporator. Sweat adapters are shipped loose with all evaporators for use on the 5 ton condensing units.

Propeller Fan Condensing Unit

The condenser coil shall be constructed of copper tubes and aluminum fins with a direct drive propeller type fan and shall include a scroll compressor, high pressure switch, Liebert Lee-Temp receiver, head pressure control valve, and liquid line solenoid valve. All components shall be factory assembled, charged with refrigerant and sealed. No brazing, dehydration, or charging shall be required. Condensing unit shall be designed for 95°F (35°C) ambient and be capable of operation to -30°F (-34.4°C).

A hot gas bypass circuit shall be provided to reduce compressor cycling and improve operation under low load conditions.

(Optional) Quiet-Line Models

The condensing unit shall be designed to operate at a sound level less then 58 dBa.

(Optional) High Ambient Models

The outdoor condensing unit shall be designed for design ambient operation of 105°F (40.6°C).

5-Ton Models

Condensing unit must be hard piped with the evaporator. Sweat adapters are shipped loose with all evaporators for use on the 5 ton condensing units.

2.3.1 Water or Glycol-Cooled Split Systems

Water or Glycol-Cooled Condensing Unit

The water/glycol condensing unit shall be equipped with a coaxial condenser having a total system pressure drop of _____ ft. of water (kPa) and a flow rate of _____ GPM (l/s) with _____ °F (°C) entering water/glycol temperature.

Components shall include scroll compressor and high-pressure switch. The condensing unit shall be factory charged with R-22 refrigerant.

The condenser circuit shall be pre-piped with a [(2-way) (three-way)] regulating valve which is head-pressure actuated.

The condenser water/glycol circuit shall be designed for a static operating pressure of [(150 PSI (1034 kPa)) (350 PSI (2413 kPa))].

A hot gas bypass circuit shall be provided to reduce compressor cycling and improve operation under low load conditions.

A 70/30 Cu-Ni Econ-O-Coil must be specified whenever a GLYCOOL or Dual Cooling Source system is applied to a cooling tower loop or other open water system.

(Optional) Disconnect

Factory installed non-fused disconnect switch allows unit to be turned off for maintenance.

5-Ton Models

Condensing unit must be hard piped with the evaporator. Sweat adapters are shipped loose with all evaporators for use on the 5 ton condensing units.

Propeller Fan Drycooler (Standard)

The Liebert manufactured drycooler shall be the low profile, slow speed, direct drive propeller fan type. The drycooler shall be constructed of aluminum and contain a copper tube aluminum fin coil with an integral electric control panel. The drycooler shall be designed for _____ °F (°C) ambient.

Centrifugal Fan Drycooler (Optional)

The system shall be supplied with a centrifugal fan drycooler (LCD). The drycooler shall be constructed of galvanized steel with a copper tube, aluminum fin coil. The heavy duty fan shall be the centrifugal type, double width, double inlet. The 1750 RPM (1450 RPM @ 50 Hz) fan motor shall be mounted on an adjustable base, and equipped with an adjustable motor pulley. A three-way control valve and thermostat shall maintain the desired fluid temperature. Electrical controls shall be in a rain tight enclosure. The system shall be designed for _____ °F (°C) ambient. The drycooler shall have a _____ Volt, 3 phase, _____ Hz power supply.

Single Glycol Pump Package (Standard)

This system shall be provided with a centrifugal pump mounted in a weatherproof and vented enclosure. The pump shall be rated for GPM (l/s) at _____ ft. of head (kPa), and operate on _____ Volt, 3 phase, _____ Hz.

Dual Glycol Pump Package (Optional)

The dual pump package shall include pumps, enclosure, and field mounted flow switch. The pumps shall be wired to the drycooler control box which includes a lead/lag switch for the pumps. The standby pump shall automatically start upon failure of the lead pump. Each pump shall be rated for _____ GPM (l/s) at _____ feet of head (kPa).

2.4 Chilled Water Self-Contained Systems Chilled Water Coil

The cooling coil shall have a minimum of _____ sq. ft. (sq. m) face area, _____ rows deep. The coil shall be controlled by a modulating control valve. The chilled water coil shall be designed for closed-loop applications using properly maintained water. It shall be configured as a V-frame and be constructed of copper tubes and aluminum fins and have a maximum face velocity of _____ ft. per minute (m/s) at _____ CFM (CMH). The water circuit shall be designed to distribute water into the entire coil face area. The coil shall be supplied with _____ °F (°C) entering water temperature, with a _____ °F (°C) temperature rise. The coil shall be supplied with _____ GPM (m/s) of chilled water and the pressure drop shall not exceed _____ PSI (kPa). The coil assembly shall be mounted in a stainless steel condensate drain pan.

Three-way Chilled Water Valve (Standard)

The water circuit shall include a three-way modulating valve. The microprocessor control shall position the valve in response to room conditions. Cooling capacity will be controlled by bypassing chilled water around the coil.

Two-way Chilled Water Valve (Optional)

The water circuit shall include a two-way modulating valve. The microprocessor control shall position the valve in response to room conditions. The minimum close-off pressure of the valve/actuator assembly shall be _____ PSI (kPa).

Design Pressure

The chilled water circuit shall be designed for a pressure of [(150 PSI (1034 kPa)) (400 PSI (2758 kPa))].

Flow Switch (Optional)

The flow switch shall activate the alarm system should the chilled water supply be interrupted. The switch shall be factory mounted and wired.

2.5 Comprehensive Monitoring Solutions

(For detailed Guide Specifications on these products, refer to information posted at www.liebert.com)

- **Liebert SiteScan Web System**
- **Liebert SiteLink Module**
- **Liebert Nform**
- **Liebert IntelliSlot Web/485 Card With Adapter and Liebert IntelliSlot 485 Card With Adapter**
- **Environmental Discrete Outputs Card (ENV-DO)**
- **Remote Contact Monitor**
  - RCM4
- **Autochangeover Controllers**
  - AC3
  - RAC2-8
- **Universal Monitor**
- **Leak Detection**
  - Direct Read Module
  - Zone Sensor
  - Spot Sensor

3.0 EXECUTION

3.1 Installation of Environmental Control Units

3.1.1 General

Install environmental control units in accordance with manufacturer's installation instructions. Install units plumb and level, firmly anchored in locations indicated, and maintain manufacturer's recommended clearances.

3.1.2 Electrical Wiring

Install and connect electrical devices furnished by manufacturer but not specified to be factory mounted. Furnish copy of manufacturer's electrical connection diagram submittal to electrical contractor.

3.1.3 Piping Connections

Install and connect devices furnished by manufacturer but not specified to be factory mounted. Furnish copy of manufacturer's piping connection diagram submittal to piping contractor.

3.1.4 Supply and Drain Water Piping

Connect water supply and drains to air conditioning unit. Provide pitch and trap as manufacturer's instructions and local codes require.

3.2 Field Quality Control

Start up environmental control units in accordance with manufacturer's start up instructions. Test controls and demonstrate compliance with requirements.

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Technical Support / Service
Web Site
www.liebert.com
Monitoring
800-222-5877
Liebert.monitoring@emerson.com
Outside the US: 614-841-6755
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800-222-5877
upstech@emersonnetworkpower.com
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Three-Phase UPS
800-543-2378
powertech@emersonnetworkpower.com
Environmental Systems
800-543-2778
Outside the United States
614-888-0246

Locations
United States
1050 Dearborn Drive
P.O. Box 29186
Columbus, OH 43229
Europe
Via Leonardo Da Vinci 8
Zona Industriale Tognana
35028 Piove Di Sacco (PD) Italy
+39 049 9719 111
Fax: +39 049 5841 257
Asia
7/F, Dah Sing Financial Centre
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