Precision Cooling
For *Business-Critical Continuity*™

Liebert® *CRV*

50-60 Hz, 20-40 kW

A/W/C Versions

PRODUCT DOCUMENTATION

Liebert CRV - PD - 273529- 10.09.2010

EMERSON
Network Power

Contents

The Quality Management System of Emerson Network Power S.r.l. High Performance Air Conditioning has been approved by Lloyd's Register Quality Assurance to the standard ISO 9001:2008

The product conforms to European Union directives 2006/42/EC; 2004/108/EC; 2006/95/EC; 97/23/EC.
Units are supplied complete with a Test Certificate Conformity Declaration and Component List.

Liebert CRV units are CE marked as they comply with the European directives concerning mechanical, electrical, electromagnetic and pressure equipment safety.

Contents

1 Product Description

1.1 Product Description

The Liebert CRV is a range of full-featured compressorized (air, water, glycol cooled) and chilled water cooling units to be installed within a row of high density computing racks in a “hot-aisle-cold-aisle“ configuration. Air heated by room equipment enters the unit from the hot aisle, is filtered, cooled and conditioned, and is returned to the cold aisle. Supply air flow direction can be easily modified to the left side or to the right side or to both directions so it may be placed between the racks or on the end of the row.

The Liebert CRV provides all the necessary functions of a standard precision air conditioner including cooling, heating, humidification, dehumidification, air filtration, condensate management, temperature control, alarm functions and data communications.

It is targeted for small and medium datacenters and is optimized for maximum cooling capacity in a minimal footprint.

2 Application of Liebert CRV

2.1 First check

Before proceeding with Liebert CRV application please make sure the unit selected is suitable for your site. Liebert CRV is targeted for small and medium data centers and it is optimized for maximum cooling capacity in a minimal footprint. It is designed for high air inlet temperature (up to 40°C), therefore it is advised to accomplish Hot-Cold aisle configuration.

Liebert CRV is able to modulate the cooling capacity down to minimum 20% of nominal capacity in order to quick adjust to any changing heat load. Under this minimum value there is a risk of cycling (frequent ON/OFF) of the compressor affecting the life time.

Liebert CRV is designed to provide proper control of the room temperature, humidity and air filtration.

The specific design of Liebert CRV is optimized in order to be extremely efficient without providing unnecessary latent cooling (dehumidification) not specifically required for cooling of IT electronic equipments, which enhance the overall cooling system efficiency.

In particular cases when a high dehumidification is required, for example in combination with High Density cooling Liebert XD system, it is suggested to use the Liebert CRV also in combination with Liebert HPM Floor mount units.

2.1.1 Hot-Cold aisle configuration

A best practice is to use rows of equipment racks in an alternating arrangement of cold aisles and hot aisles.

In the cold aisle, the equipment racks are arranged face to face so the cold air discharged from the Liebert CRV unit(s) is drawn into the front of the servers and exhausted out through the rear into the hot aisles. Hot aisles are literally hot because the objective of the alternating cold and hot aisle design is to separate the source of cooling air from hot air discharge which returns to the Liebert CRV unit(s). Therefore, hot and cold aisle should be separated otherwise there would be a mix of hot and cold air and thereby lower the temperature of the air returning to the CRV units, which reduces their usable capacity.

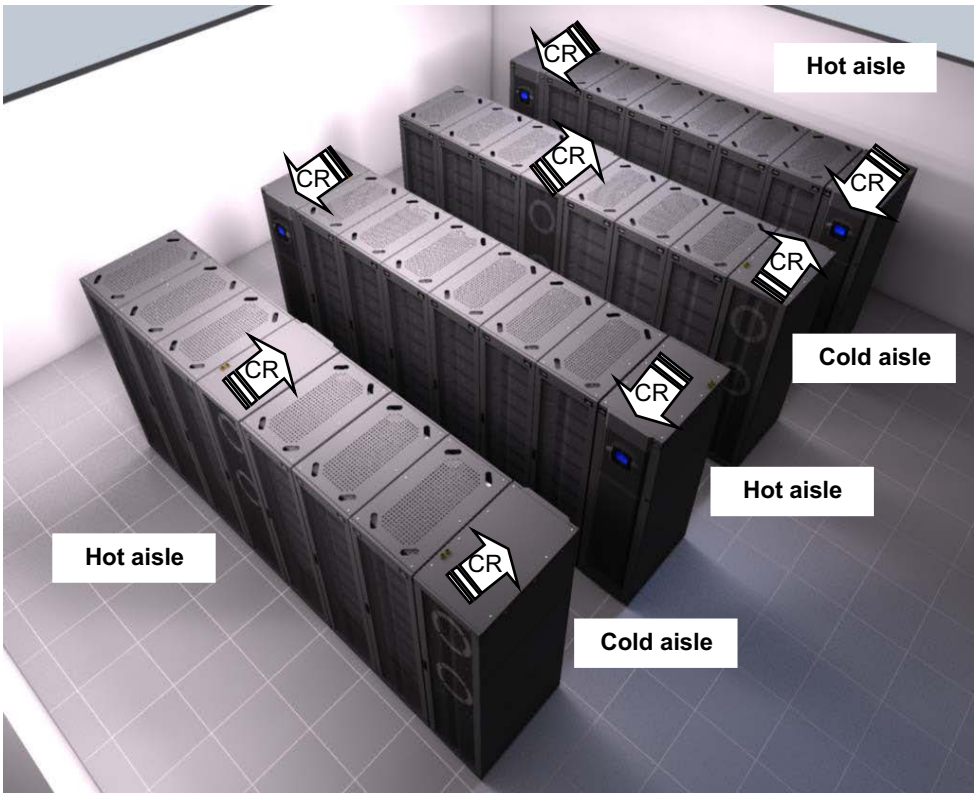


Fig. 2a Example of high density installation with cold aisle and hot aisle alternation

2.1.2 Combination with Liebert XD

Liebert CRV is optimized for maximum cooling capacity in a minimal footprint and it maximizes net sensible cooling capacity used for servers heat load dissipation.

When ever Liebert CRV shall be combined with Liebert XD in order to have the maximum heat load dissipation capability, combination also with Liebert HPM floor mount units may be required in order to have the proper humidity control.

Please refer to suitability map below

Tab. 2a - Suitability map of Liebert CRV for Liebert XD system*:

Liebert XD unit	XDC	XDP	XDP
Heat rejection	DX cooled	CW 7/12°C	CW 10/15˚C
CR20	limited**	limited**	applicable
CR35	applicable	applicable	applicable
CR40 CW 7/12°C	limited**	applicable	applicable
CR40 CW 10/15°C	not applicable	not applicable	applicable

Important Notes:

* Consider this map only when Liebert CRV is the only unit managing humidity control in the server room. In case there is other system, such as CRAC (e.g. Liebert HPM, Liebert DS, Liebert Delux etc.) or Air Handling system, able to control humidity in the server room and to keep dew point under level required by Liebert XD system there are no limitations for application of the Liebert CRV together with Liebert XD

** Liebert CRV may not be able to fully satisfy humidity requirements of Liebert XD system. Suitability to be discussed with Liebert sales representative

2.1.3 Combination with other Cooling systems

Liebert CRV may be combined with other cooling systems such as underflow CRAC units (e.g. retrofit of current installation) until there is proper setting of both systems without influencing each other. Otherwise there is a risk of cycling or increased power consumption of both system, in worst case causing malfunction of the units. For details contact Liebert sales representative.

2.2 Selection of Liebert CRV unit(s)

2.2.1 Heat rejection

Before selecting number and size of Liebert CRV units, carefully consider heat rejection type. If chilled water available for the server room, use CR040RC unit(s). If not, check the distance between Liebert CRV unit(s) and heat rejection unit. In case the distance, either vertical or total, exceeds a limit (refer to para. 2.3 Operation limits) use water / glycol cooled unit(s). Otherwise air cooled unit(s) is recommended.

2.2.2 Number and size

When designing a cooling solution using the Liebert CRV unit(s), the initial steps are similar to those required to cool a conventional critical space. The total heat load must be calculated, including sensible and latent cooling requirements. These should be increased by the reserve capacity needed for pull-down situations (e.g. after power failure) where the room temperature must be reduced and to cover unexpected increases in the heat load. Consider also redundant capacity, which is usually not in use in the normal operation, but takes duty if any of the running unit(s) fail. So the different steps are:

- Check the heat load of IT equipment and apply safety margin if required.
- Define size and number of Liebert CRV units in order to provide enough net sensible cooling capacity to cover the heat load. Typical air inlet temperatures to be considered for normal operation of the unit(s) are between 33˚C and 37˚C. Please refer also to point 2.2.3 Air Flow Requirements
- When N+X (typical N+1) redundancy is required, use more units so if any of the unit(s) fail, the remaining unit(s) will cover the heat load. Always consider the layout of the room when defining number of units, see chapter 2.4 Positioning - unit placement.

2.2.3 Air Flow Requirements

Liebert CRV is optimized to provide precision cooling for IT equipment with temperature raise (delta T) of cooling air passing through the equipment around 15 to 20 degrees Celsius or higher. Such temperature raise is typical for Blade servers and standard pizza servers. For applications with very low delta T, around 10 degrees Celsius, typical for old fashion servers, it is necessary to de-rate cooling capacity of the Liebert CRV due to higher air flow equipment.

Application of Liebert CRV

In case of application with Cold Aisle Containment (Knürr CoolFlex) it is necessary to carefully investigate the air flow through IT equipment and to define number of Liebert CRV units in order to provide at least 5% more airflow, excluding redundant unit(s). Otherwise there may occur a situation with negative pressure in the CoolFlex containment and hot air possibly leaking inside the containment.

2.3 Operating limits

The units are designed to operate within working ranges.
These limits are referred to new machines or to those that have been correctly installed and serviced. The warranty clauses are no longer valid for any possible damage or malfunction that may occur during or due to operation outside the application values.

For all units

		From:	To
Room air conditions	Temperature	18°C, 64°F	40°C, 104°F
	Humidity ratio	5.5 g/kg, 0.0055 lb/lb	11 g/kg, 0.011 lb/lb
	Relative humidity	20 %	60%
Storage conditions	Temperature	– 20°C, – 4°F	50°C, 122°F
Power supply tolerances		V ± 10%	
		Hz ± 2	

For A units

Outdoor temperature: lower limit

–20°C / –4°F

To install an air conditioner in places in which external temperature reaches very low values sometime in the year requires some means of control to maintain adequate condensing pressures to ensure proper liquid system operation.
With low temperatures the refrigerant condensates in pipeline and the liquid tends to fulfill the condenser.

It's **mandatory** to install the following components:

1. NON RETURN VALVE (liquid line)

Install a non– return valve in the liquid line directly out of the condenser. It doesn't allow the liquid to come back to the condenser (that means efficiency loss and dangerous stress for the compressor).

2. VARIEX FAN SPEED CONTROL

Use Variex fan speed control to regulate the condensing pressure and have a continuous and better subcooling control.

It's **suggested** to have:

3. HORIZONTAL CONDENSER POSITION

The condenser horizontal disposition (vertical flow) is necessary to reduce subcooling variations due to direct wind exposure. (very important to have a good subcooling control).
For all exceptions contact the Liebert Sales Representative.

Outdoor temperature: higher limit

This limit is determined by coupled condenser model. Exceeding of this limit (or a lack of maintenance), will caused a compressor stop by HP safety thermostat. Reset to normal operation can only be carried out manually.

Once the condensing pressure rises at or above the 34 bar / 493 psi value, the capacity of the compressor is reduced by 20% compared to the requested capacity. This because iCOM control tries to maintain the unit's operability reducing the cooling power of digital scroll.

Relative position room unit vs. 50 Hz remote condenser	
From unit to condenser max distance equivalent length, m (ft) (1)	50 (330)
From unit to condenser max geodetic height, m (ft) (1) (2)	Max above 30 (100) Max below 8 (26)
Requirements	
Pipe diameter (1)	see the User Manual
Oil traps on vertical line of gas refrigerant, m (ft)	every 6 (20)

For lenght higher than 30m (98ft) condenser oversized +15%.
(1) For more details see User Manual
(2) Positive difference in height: condenser above conditioner. Negative difference in height: condenser below conditioner

Relative position room unit vs. 60 Hz remote condenser		
From unit to condenser max distance equivalent length, ft. (m)	150 (46)	
From unit to VFD condenser max height, ft (m)	Max above 100 (30)	Max below 15 (4.5)
From unit to lee- temp condenser max height, ft (m) (3)	Max above 100 (30)	Max below 0 (0)
Requirements		
Oil traps on vertical line of gas refrigerant, ft (m)	every 20 (6)	

(3) Installations of lee-temp condensers below the level of the room unit will require subcoolers.

For W units

Water or mixture temperature to condenser, lower limit	min. 5˚C / 41˚F

For C and W units

Max. water pressure 16 bar

Max. differential pressure through the closed valve: Dp_{cv}

Max. differential pressure across the valve for modulating service: Dp_{ms}

Models	Dp_{cv} (kPa)	Dp_{ms} (kPa)
CR020RW	300	300
CR035RW	300	300
CR040RC	175	175

2.4 Positioning - Units placement

This chapter provides some ideas of typical installation of the Liebert CRV unit(s), shows several examples of the server room layouts and applications using Liebert CRV units.

For best performances of Liebert CRV is important to:

- reduce at minimum recirculation from hot aisle around the ends and/or over the top of the racks, prevent gaps between the racks
- reduce at minimum recirculation from hot aisle through server racks by using blanking panels
- ensure cold air is being distributed across the front of all neighboring equipment racks by properly placed
  Liebert CRV unit(s)
- distribute load within the rack - it is generally advised to distribute the load as much possible uniformly across the rack height, except for the rack closest to the Liebert CRV unit, where it is suggested to have the higher density load in the bottom and central part of the rack

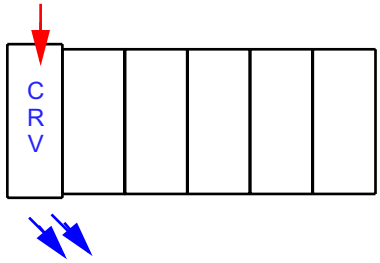
For more details refer to following details or contact Liebert Sales Representative.

Application of Liebert CRV

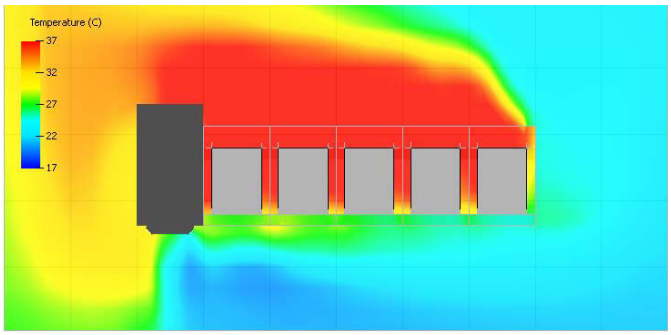
2.4.1 Placement in the row of racks

For single row application with one Liebert CRV unit it is not preferred to put the unit in the middle of the row because of possible hot spots at top part of racks, unless in combination with CoolFlex or in application with more Liebert CRV units.
The best approach is to place the Liebert CRV at the end of the row, resulting into much better air distribution. Please refer to the sample case study comparing the same serveroom with different Liebert CRV position.
The CFD (Computational fluid dynamics) analysis results are shown in height 1.8m off the floor (for all following cases).

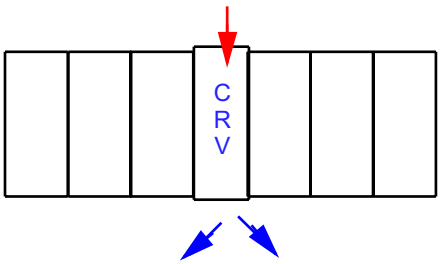
Good approach:

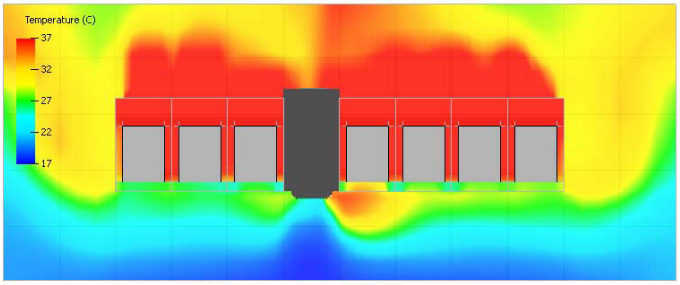


End of row -Preferred



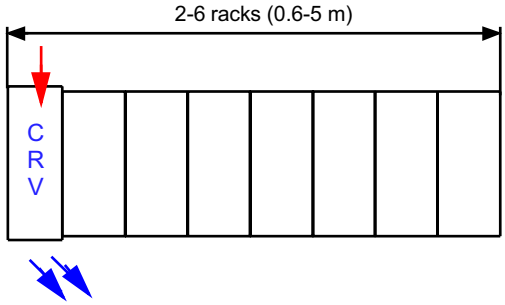
Not advised approach:

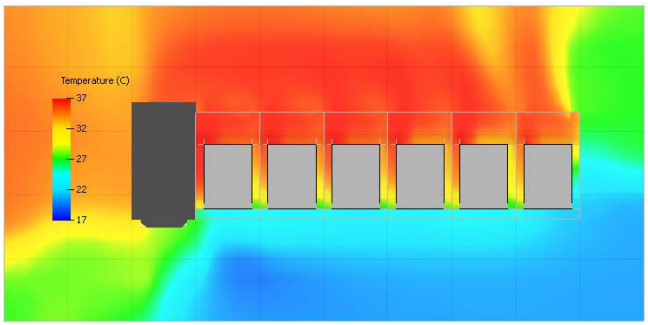




2.4.2 Number of racks / length of the row

Standard application with one Liebert CRV unit is with 2-6 racks. The exact number of racks depends on size of Liebert CRV unit used and heat load per rack. Whenever applying more than 6 racks for one CRV or Heat load more than 10kW per rack contact Liebert sales representative

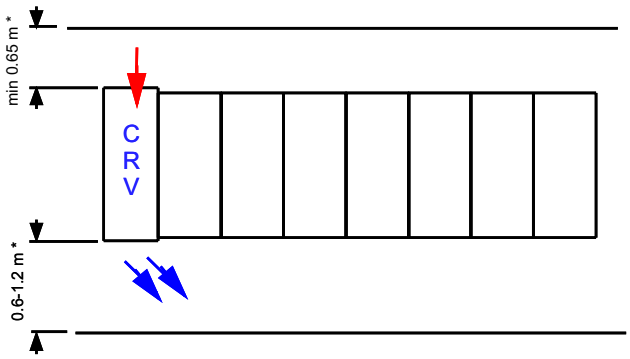




Application of Liebert CRV

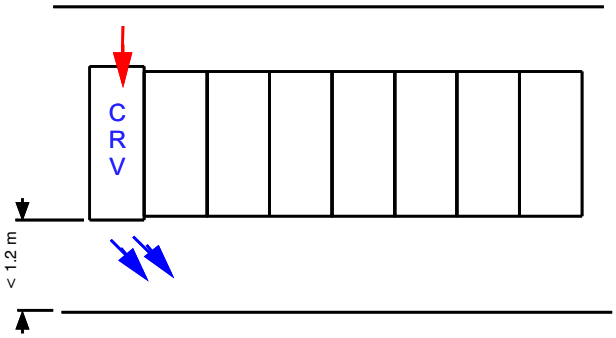
2.4.3 Placement in the room

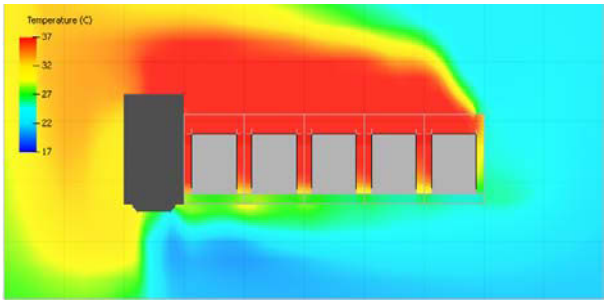
1. Width of Hot / Cold aisle



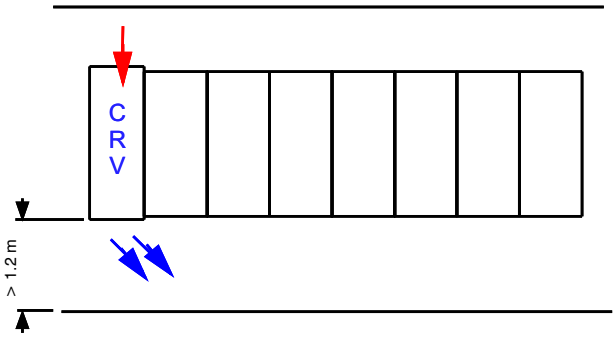
For good air distribution it is recommended to keep width of the cold aisle as small as possible for single row server room. Otherwise the cold air discharged by Liebert CRV unit is being led far from server suction and hot air may by-passed from hot aisle.
Exceptions where wider cold aisle may be used are: applications with CoolFlex (Cold Aisle Containment) or with two rows facing each other.
For width of the hot aisle there are no preferences, there is just minimum requirement needed for enough for service area*.

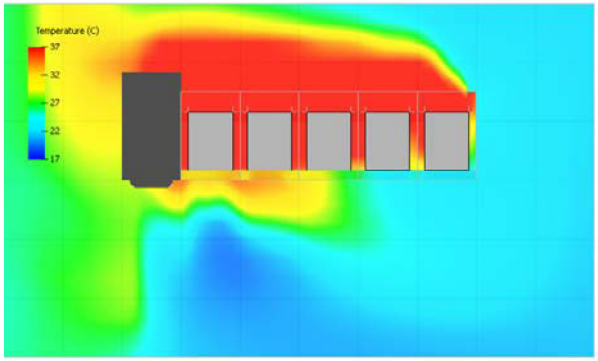
Good approach:





Not advised approach:

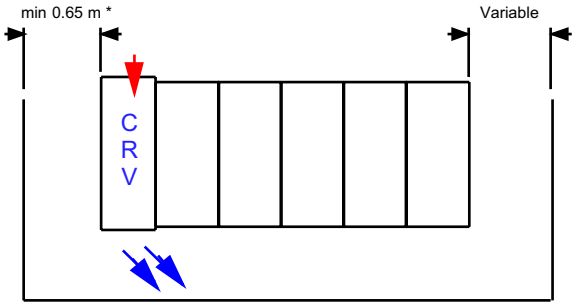


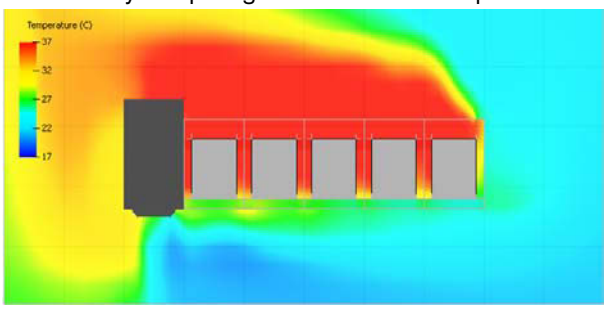


Note:
* Please refer also to Service area dimensions a - Enclosure C

Application of Liebert CRV

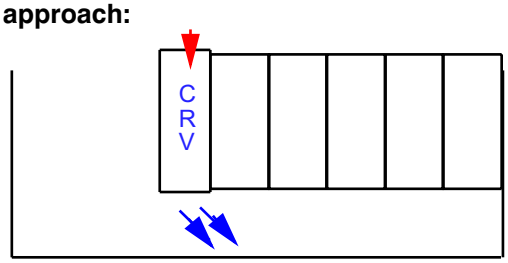
2. Distance between the ends of rows and walls
   For single row application with one Liebert CRV unit it is not preferred to put the unit at wall because of not proper air paths and possible hot spots at furthest racks, unless in combination with CoolFlex (cold aisle containment) or in application with more Liebert CRV units.
   The best approach is to keep a gap between at least 0.65m or to use more Liebert CRV units.
   Good approach is also having wall at the furthest rack.
   Please refer to the following sample case study comparing various Liebert CRV positions

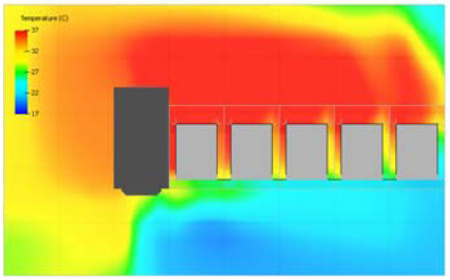




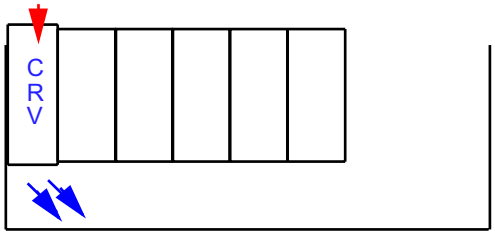
Example of an application with gaps on both sides

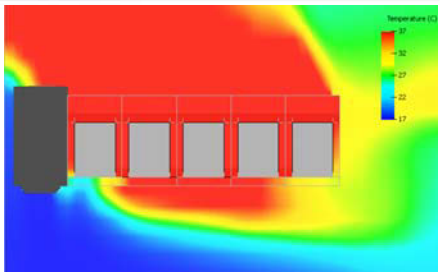
Good approach:





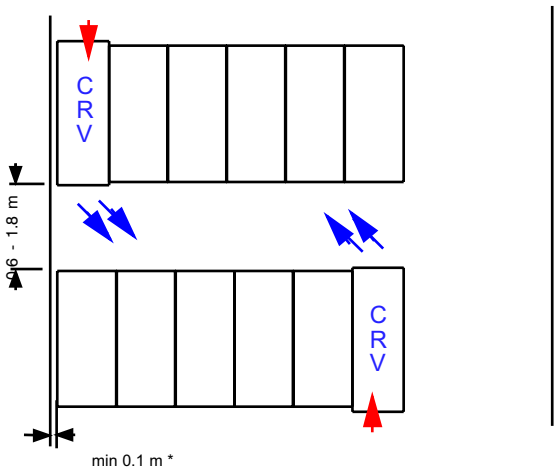
Not advised approach:

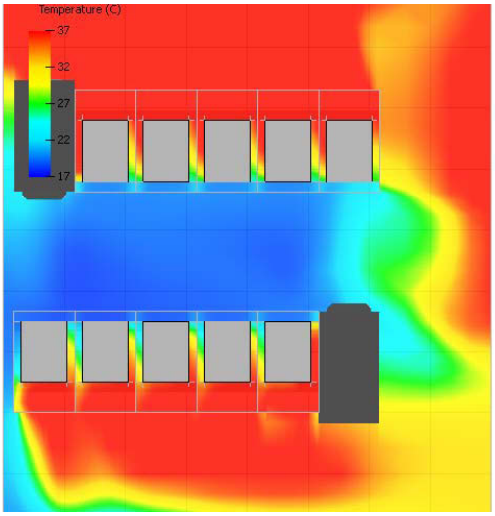




As you can see on CFD result above, it is not advised to place Liebert CRV at the wall in single row layout. On the contrary, it is not an issue in application with two rows and two or more Liebert CRV units.

Good approach:

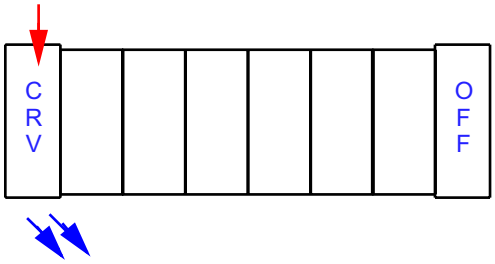


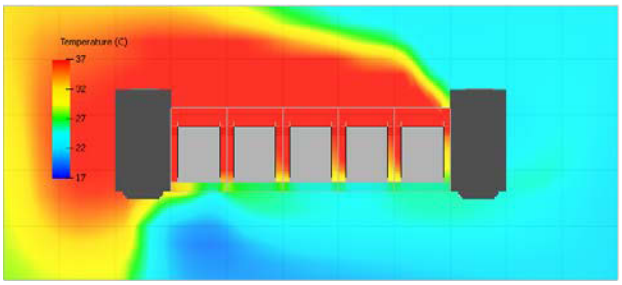


Note:
* Please refer also to Service area dimensions a - Appendix C

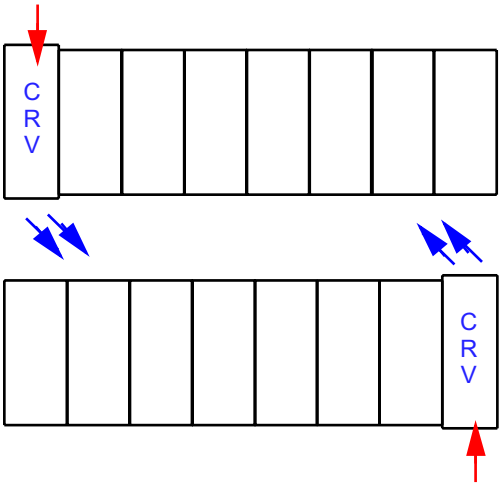
2.4.4 Solutions with redundancy

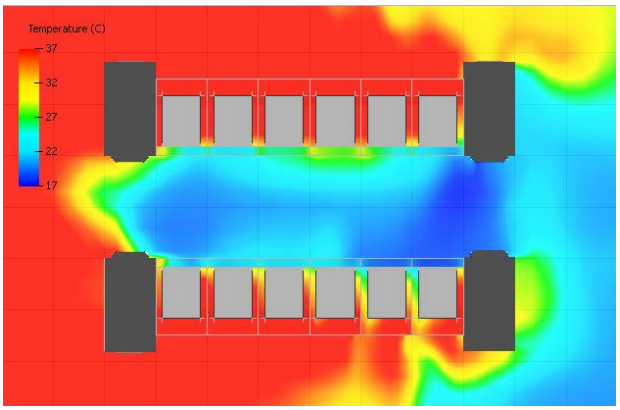
Following an example of more complex applications where N+1 redundancy provided.
Please note the number and size of Liebert CRV units have to be designed in order to achieve required cooling capacity if any of the units fails. The other option to easily achieve redundancy is CoolFlex (Cold aisle containment), see point 5 below.





Example of an application with one row and N+1 redundancy (right side unit failed).



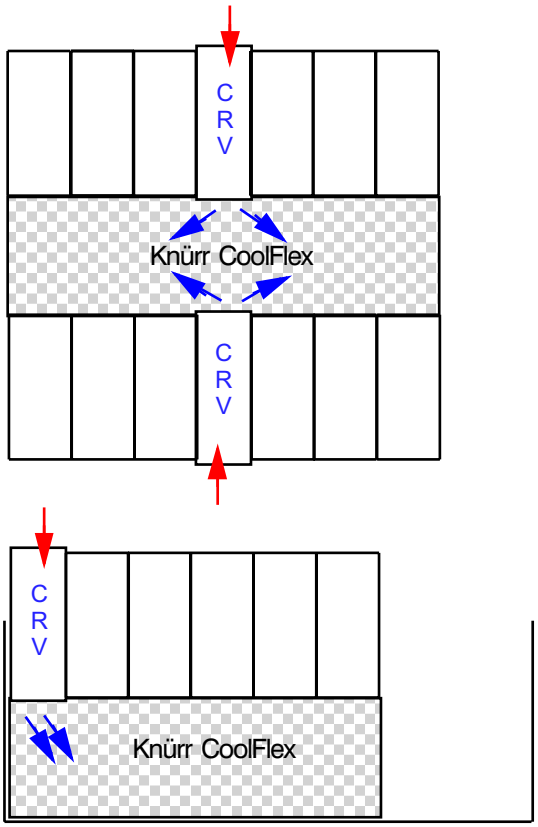


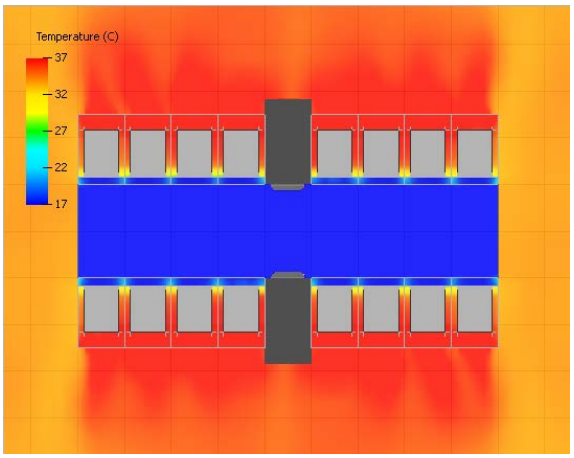
Example of an application with two rows and N+1 redundancy (unit placed right down failed).

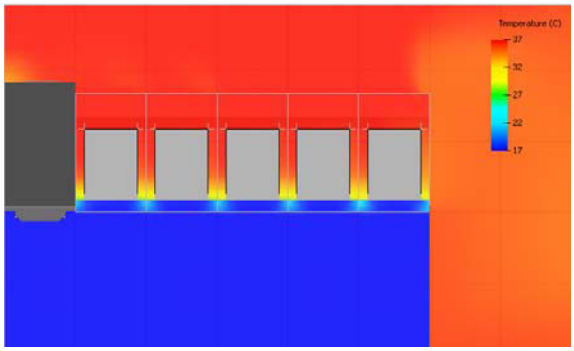
Application of Liebert CRV

2.4.5 Example of applications with CoolFlex

When high density IT equipment is used (typically over 10kW per rack) or load distribution in the row(s) of racks is not constant and high energy efficiency is required it is strongly recommended to apply CoolFlex (cold aisle containment) together with Liebert CRV.
Other advantage of the CoolFlex application is less limitations, see above points.

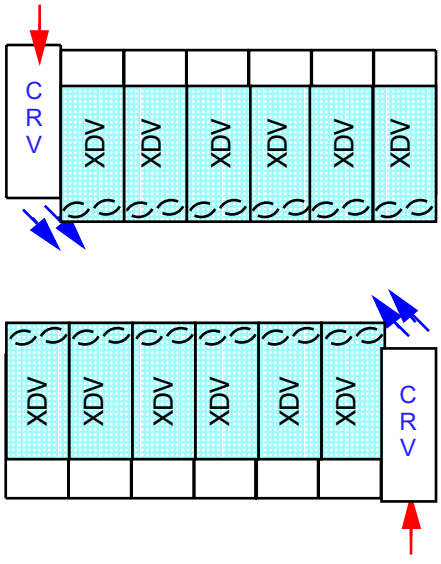


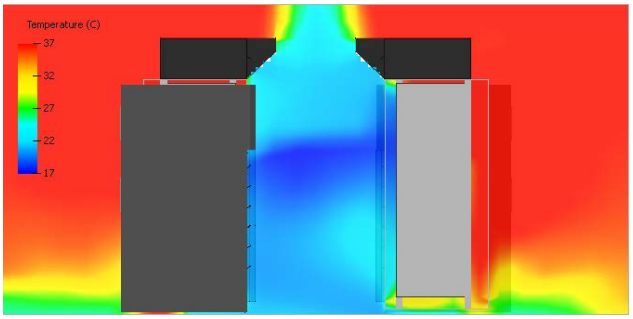




2.4.6 Example of applications with Liebert XD

When high density IT equipment is used (typically over 10kW per rack) with less floor space available especially when scalable solution is required (starting from less heat load and ready for future grown), the best answer is Liebert CRV together with Liebert XD system.
Please find following an example layout of typical installation with two rows of racks with Liebert XDV modules. Two Liebert CRV units are used to support the Liebert XD system and to ensure N+1 redundancy on humidity control. See also CFD result showing site view of the room.





2.5 Temperature sensors

The sensor may be placed where desired or left coiled inside the unit. It is recommended that the sensor be routed to the front of the heat load for the most accurate temperature reading. In InRow configuration, the temperature sensor monitors the temperature of the air entering the rack equipment. The reading is used to control the operation of the unit, so the sensor must be placed as directed below or the equipment will not operate properly.

Insert the rack temperature sensor connector in the temperature sensor port at the iCom interface. Secure the temperature sensor in front of the warmest heat source in the enclosure. Do not secure in front of a blanking panel. The sensors must be installed where lack of sufficient cooling air is most likely. The optimum position of the rack temperature sensors will vary from installation to installation. Servers most likely to have insufficient or inadequately cooled cooling air due to the recirculation of hot air from the hot aisle include:

a. Servers positioned at the top of a rack.
b. Servers positioned at any height in the last rack at an open end of a row.
c. Servers positioned behind flow-impairing obstacles such as building elements.
d. Servers positioned in a bank of high-density racks.
e. Servers positioned next to racks with air removal units.
f. Servers positioned very far from the equipment.
g. Servers positioned very close to the equipment.

3 Liebert CRV

3.1 Standard features

Air cooled models

DX COOLING COIL The evaporator coil has 7.25 ft^2 (0.674 m^2) face area, 4 or 5 rows deep. It is constructed of copper tubes and hydrophilic coated aluminium fins. The hydrophilic coating provides superior water carryover resistance. Two stainless steel condensate drain pans are provided.

REFRIGERATION SYSTEM Single refrigeration circuit includes a liquid line filter drier, a refrigerant sight glass with moisture indicator, an adjustable externally equalized expansion valve, and a liquid line solenoid valve.

COMPRESSOR The compressor is an R-410A scroll-type with variable capacity operation from 20-100%; commonly known as a Digital Scroll. Compressor solenoid valve shall unload the compressor to provide variable capacity operation. The compressor has a suction gas cooled motor, vibration isolators, internal thermal overloads, manual reset high pressure switch, RotoLock service valves, low pressure and high pressure transducer, crankcase heater, internal centrifugal oil pump, and an operating speed of 3500 RPM @ 60Hz (2900RPM @ 50Hz).

FAN The unit is equipped with two plug fans: direct driven centrifugal fans with backward curved blades and Electronically Commutated DC motors; commonly referred to as EC plug fans. The fan speed is variable and automatically regulated by the iCOM control through all modes of operation. Each fan has a dedicated motor and speed controller which provides a level of redundancy. The fans push air through the coil and are located on the rear panel of the unit.

SUPPLY AIR BAFFLE A field adjustable, modular supply air baffle is located in the discharge air stream. It can be quickly and easily reconfigured to redirect airflow. The angles of the vanes have been optimized to effectively distribute air to heat generating equipment in a wide variety of applications.

iCOM CONTROL SYSTEM The Liebert CRV is controlled by the iCOM Control System. The standard user interface is the Large Graphical Display (320x240 pixels, backlit) which presents system information and allows all parameters to be viewed and adjusted. It features push-button navigation, operational status LEDs, and a 3-level password protection system. Unit-to-Unit communication with other Liebert CRVs and two IntelliSlot communication card housings are included as standard.

2T RACK TEMPERATURE SENSORS Consist of a vented case with two temperature probes. Up to 10 2T housings (20 temperature probes) can be connected to a Liebert CRV. One 2T housing and both sensor probes are to be attached to a rack the cooling unit is conditioning. The sensors provide real-time, direct feedback to the cooling unit to optimize the amount of cooling and airflow required; increasing energy efficiency and ensuring proper rack inlet air temperatures. The sensor data can also be reported to remote BMS and monitoring systems. The sensor network consists of one CAN wire leaving the cooling unit and connecting to a 2T sensor. Each remaining 2T sensor is connected to the previous sensor; often referred to as a daisy-chain configuration.

REMOTE SHUTDOWN TERMINAL Provides the customer with a location to remotely shut down the unit.

COMMON ALARM CONTACT Provides the customer with a set of normally open (n/o) contacts for remote indication of unit alarms.

CABINET The exterior steel panels are custom powder coated to protect against corrosion. The double wall constructed side panels separate the ½", 2.0 lb/ft^3 insulation from the airstream. The unit is mounted on casters for quick installation and provided with levelling feet. The perforated inlet and outlet panels have 81% open area, and the rear door utilizes a Knürr rack style handle and hinges.

SERVICE ACCESS All service and maintenance is performed through the front and rear of the unit; including any component removal. No side access is required. All electrical and piping connections are made through the top and/or bottom of the unit. All units are provided with a Superior Service Access Panel to provide additional access.

FILTER The unit is equipped with two deep pleated 4" filters rated MERV8 following ASHRAE 52.2-1999 (45% by ASHRAE 52.1-1992) or G4 following EN779, located within the cabinet, and accessible from the rear of the unit. A filter clog alarm is included.

LOCKING DISCONNECT SWITCH A molded case circuit interrupter disrupts the flow of power to the unit. The electric panel high voltage compartment can only be accessed with the switch in the 'off' position. Conveniently located behind the iCOM display door for quick access.

Water/glycol cooled models

DX COOLING COIL The evaporator coil has 7.25 ft^2 (0.674 m^2) face area, 4 or 5 rows deep. It is constructed of copper tubes and hydrophilic coated aluminium fins. The hydrophilic coating

provides superior water carryover resistance. Two stainless steel condensate drain pans are provided.

REFRIGERATION SYSTEM Single refrigeration circuit includes a liquid line filter drier, an adjustable externally equalized expansion valve, and a liquid line solenoid valve.

COMPRESSOR The compressor is an R-410A scroll-type with variable capacity operation from 20-100%; commonly known as a Digital Scroll. Compressor solenoid valve shall unload the compressor to provide variable capacity operation. The compressor has a suction gas cooled motor, vibration isolators, internal thermal overloads, manual reset high pressure switch, RotoLock service valves, low pressure and high pressure transducer, crankcase heater, internal centrifugal oil pump, and an operating speed of 3500 RPM @ 60Hz (2900RPM @ 50Hz).

FAN The unit is equipped with two plug fans: direct driven centrifugal fans with backward curved blades and Electronically Commutated DC motors; commonly referred to as EC plug fans. The fan speed is variable and automatically regulated by the iCOM control through all modes of operation. Each fan has a dedicated motor and speed controller which provides a level of redundancy. The fans push air through the coil and are located on the rear panel of the unit.

WATER / GLYCOL CONDENSER Is an efficient stainless steel brazed-plate condenser. Waterside threaded connections are provided for convenience. Proper filtration must be field supplied when used on open-loop water systems (cooling towers, etc). When operating on a closed-loop, to avoid undesired ice formation in the wintertime, it is advisable to use a water/glycol mixture.

3-W AY MODULATING VALVE A 3-way modulating valve controls the water/glycol flow passing through the brazed-plate condenser. The iCOM control manages the valve actuator movement in order to maintain the desired condensing temperature for various entering water flow rates and temperatures. The maximum differential pressure across the closed valve is 300 kPa (43.5 PSI). Maximum system pressure is 230 PSI (1586 kPa).

SUPPLY AIR BAFFLE A field adjustable, modular supply air baffle is located in the discharge air stream. It can be quickly and easily reconfigured to redirect airflow. The angles of the vanes have been optimized to effectively distribute air to heat generating equipment in a wide variety of applications.

iCOM CONTROL SYSTEM The Liebert CRV is controlled by the iCOM Control System. The standard user interface is the Large Graphical Display (320x240 pixels, backlit) which presents system information and allows all parameters to be viewed and adjusted. It features push-button navigation, operational status LEDs, and a 3-level password protection system. Unit-to-Unit communication with other Liebert CRVs and two IntelliSlot communication card housings are included as standard.

2T RACK TEMPERATURE SENSORS Consist of a vented case with two temperature probes. Up to 10 2T housings (20 temperature probes) can be connected to a Liebert CRV. One 2T housing and both sensor probes are to be attached to a rack the cooling unit is conditioning. The sensors provide real-time, direct feedback to the cooling unit to optimize the amount of cooling and airflow required; increasing energy efficiency and ensuring proper rack inlet air temperatures. The sensor data can also be reported to remote BMS and monitoring systems. The sensor network consists of one CAN wire leaving the cooling unit and connecting to a 2T sensor. Each remaining 2T sensor is connected to the previous sensor; often referred to as a daisy-chain configuration.

REMOTE SHUTDOWN TERMINAL Provides the customer with a location to remotely shut down the unit.

COMMON ALARM CONTACT Provides the customer with a set of normally open (n/o) contacts for remote indication of unit alarms.

CABINET The exterior steel panels are custom powder coated to protect against corrosion. The double wall constructed side panels separate the ½", 2.0 lb/ft^3 insulation from the airstream. The unit is mounted on casters for quick installation and provided with leveling feet. The perforated inlet and outlet panels have 81% open area, and the rear door utilizes a Knürr rack style handle and hinges.

SERVICE ACCESS All service and maintenance is performed through the front and rear of the unit; including any component removal. No side access is required. All electrical and piping connections are made through the top and/or bottom of the unit. All units are provided with a Superior Service Access Panel to provide additional access.

FILTER The unit is equipped with two deep pleated 4" filters rated MERV8 following ASHRAE 52.2-1999 (45% by ASHRAE 52.1-1992) or G4 following EN779, located within the cabinet, and accessible from the rear of the unit. A filter clog alarm is included.

LOCKING DISCONNECT SWITCH A molded case circuit interrupter disrupts the flow of power to the unit. The electric panel high voltage compartment can only be accessed with the switch in the 'off' position. Conveniently located behind the iCOM display door for quick access.

Chilled water models

CW COOLING COIL The evaporator coil has 0.674 m^2 (7.25 ft^2) face area, 6 rows deep. It is constructed of copper tubes and hydrophilic coated aluminium fins. The hydrophilic coating provides superior water carryover resistance. Two stainless steel condensate drain pans are provided.

CHILLED WATER SYSTEM The water circuit includes a 3-way modulating valve. The Liebert iCOM control positions the valve in response to room conditions. Cooling capacity will be controlled by bypassing chilled water around the coil.

FAN The unit is equipped with two plug fans: direct driven centrifugal fans with backward curved blades and Electronically Commutated DC motors; commonly referred to as EC plug fans. The fan speed is variable and automatically regulated by the iCOM control through all modes of operation. Each fan has a dedicated motor and speed controller which provides a level of redundancy. The fans push air through the coil and are located on the rear panel of the unit.

3-W AY MODULATING VALVE A 3-way modulating valve controls the chilled water flow passing through the cooling coil. The iCOM control manages the valve actuator movement in order to provide the desired amount of cooling for various entering water flow rates and temperatures. Cooling capacity is regulated by bypassing chilled water around the coil. The maximum differential pressure across the closed valve is 175 kPa (25.4 PSI). Maximum system pressure is 230 PSI (1586 kPa).

SUPPLY AIR BAFFLE A field adjustable, modular supply air baffle is located in the discharge air stream. It can be quickly and easily reconfigured to redirect airflow. The angles of the vanes have been optimized to effectively distribute air to heat generating equipment in a wide variety of applications.

iCOM CONTROL SYSTEM The Liebert CRV is controlled by the iCOM Control System. The standard user interface is the Large Graphical Display (320x240 pixels, backlit) which presents system information and allows all parameters to be viewed and adjusted. It features push-button navigation, operational status LEDs, and a 3-level password protection system. Unit-to-Unit communication with other Liebert CRVs and two IntelliSlot communication card housings are included as standard.

2T RACK TEMPERATURE SENSORS Consist of a vented case with two temperature probes. Up to 10 2T housings (20 temperature probes) can be connected to a Liebert CRV. One 2T housing and both sensor probes are to be attached to a rack the cooling unit is conditioning. The sensors provide real-time, direct feedback to the cooling unit to optimize the amount of cooling and airflow required; increasing energy efficiency and ensuring proper rack inlet air temperatures. The sensor data can also be reported to remote BMS and monitoring systems. The sensor network consists of one CAN wire leaving the cooling unit and connecting to a 2T sensor. Each remaining 2T sensor is connected to the previous sensor; often referred to as a daisy-chain configuration.

REMOTE SHUTDOWN TERMINAL Provides the customer with a location to remotely shut down the unit.

COMMON ALARM CONTACT Provides the customer with a set of normally open (n/o) contacts for remote indication of unit alarms.

CABINET The exterior steel panels are custom powder coated to protect against corrosion. The double wall constructed side panels separate the ½“, 2.0 lb/ft^3 insulation from the airstream. The unit is mounted on casters for quick installation and provided with leveling feet. The perforated inlet and outlet panels have 81% open area, and the rear door utilizes a Knürr rack style handle and hinges.

SERVICE ACCESS All service and maintenance is performed through the front and rear of the unit; including any component removal. No side access is required. All electrical and piping connections are made through the top and/or bottom of the unit. All units are provided with a Superior Service Access Panel to provide additional access.

FILTER The unit is equipped with two deep pleated 4” filters rated MERV8 following ASHRAE 52.2-1999 (45% by ASHRAE 52.1-1992) or G4 following EN779, located within the cabinet, and accessible from the rear of the unit. A filter clog alarm is included.

LOCKING DISCONNECT SWITCH A molded case circuit interrupter disrupts the flow of power to the unit. The electric panel high voltage compartment can only be accessed with the switch in the ’off’ position. Conveniently located behind the iCOM display door for quick access.

3.2 Optional features

Air cooled models

DUAL-FL OAT CONDENSATE PUMP It has a capacity of 6 GPM (22.7 l/min) at 30ft (9 m) head. Pump is complete with integral primary and secondary float switches, pump, motor assembly and reservoir. The secondary float shall send a signal to the local alarm and shut down the unit upon high water condition.

HUMIDIFIER A steam generating canister humidifier is factory-installed in the cooling unit and is operated by the iCOM control system. It is complete with disposable cylinder, all supply and drain valves, steam distributor and electronic controls. The need to change the canister is indicated on the iCOM display. The humidifier is designed to operate with water conductivity from 125-500 (50Hz) or 330-670 (60Hz) microS/cm. System automatically fills and drains as well as maintains the required water level based on conductivity. An air-gap within the humidifier assembly shall prevent backflow of the humidifier supply water. The humidifier is removable from the rear of the cabinet.

ELECTRIC REHEAT The electric reheat coils are low watt density, 304 stainless steel fin-tubular construction, protected by thermal safety switches and controlled in one stage.

INTELLISLOT WEB CARD (IS-WEBL) Provides 10/100 baseT Ethernet connectivity for unit monitoring and management. The supported management interfaces include: SNMP for Network Management Systems and HTTP for web page viewing.

INTELLISLOT 485 CARD (IS-485L) Provides RS-485 Modbus network connectivity to Building Management Systems for unit monitoring and management.

FILTER The optional filters are two deep pleated 4" (102 mm) rated MERV11 following ASHRAE 52.2-1999 (60-65% by ASHRAE 52.1-1992) or F5 following EN779, located within the cabinet and accessible from the rear of the unit. A filter clog alarm is included.

REHEAT/HUMIDIFIER LOCKOUT Includes the necessary relays to disable the reheat and humidifier from an external 24 volt signal.

ONE (1) EXTRA COMMON ALARM CONTACT Provides the customer with a total of two sets of normally open (n/o) contacts for remote indication of unit alarms.

LIQUI-TECT SENSOR Is a solid state water sensor that has no moving parts and is hermetically sealed to keep out dust and dirt. When the sensor detects the presence of moisture the alarm system is activated.

Water/glycol cooled models

DUAL-FL OAT CONDENSATE PUMP It has a capacity of 6 GPM (22.7 l/min) at 30ft (9 m) head. Pump is complete with integral primary and secondary float switches, pump, motor assembly and reservoir. The secondary float shall send a signal to the local alarm and shut down the unit upon high water condition.

HUMIDIFIER A steam generating canister humidifier is factory-installed in the cooling unit and is operated by the iCOM control system. It is complete with disposable cylinder, all supply and drain valves, steam distributor and electronic controls. The need to change the canister is indicated on the iCOM display. The humidifier is designed to operate with water conductivity from 125-500 (50Hz) or 330-670 (60Hz) microS/cm. System automatically fills and drains as well as maintains the required water level based on conductivity. An air-gap within the humidifier assembly shall prevent backflow of the humidifier supply water. The humidifier is removable from the rear of the cabinet.

ELECTRIC REHEAT The electric reheat coils are low watt density, 304 stainless steel fin-tubular construction, protected by thermal safety switches and controlled in one stage.

2-W AY MODULATING VALVE A 2-way modulating valve controls the water/glycol flow passing through the brazed-plate condenser. The iCOM control manages the valve actuator movement in order to maintain the desired condensing temperature for various entering water flow rates and temperatures. The maximum differential pressure across the closed valve is 300 kPa (43.5 PSI). Maximum system pressure is 230 PSI (1586 kPa).

INTELLISLOT WEB CARD (IS-WEBL) Provides 10/100 baseT Ethernet connectivity for unit monitoring and management. The supported management interfaces include: SNMP for Network Management Systems and HTTP for web page viewing.

INTELLISLOT 485 CARD (IS-485L) Provides RS-485 Modbus network connectivity to Building Management Systems for unit monitoring and management.

FILTER The optional filters are two deep pleated 4" (102 mm) rated MERV11 following ASHRAE 52.2-1999 (60-65% by ASHRAE 52.1-1992) or F5 following EN779, located within the cabinet and accessible from the rear of the unit. A filter clog alarm is included.

REHEAT/HUMIDIFIER LOCKOUT Includes the necessary relays to disable the reheat and humidifier from an external 24 volt signal.

ONE (1) EXTRA COMMON ALARM CONTACT Provides the customer with a total of two sets of normally open (n/o) contacts for remote indication of unit alarms.

LIQUI-TECT SENSOR Is a solid state water sensor that has no moving parts and is hermetically sealed to keep out dust and dirt. When the sensor detects the presence of moisture the alarm system is activated.

Chilled water models

DUAL-FL OAT CONDENSATE PUMP It has a capacity of 6 GPM (22.7 l/min) at 30ft (9m) head. Pump is complete with integral primary and secondary float switches, pump, motor assembly and reservoir. The secondary float shall send a signal to the local alarm and shut down the unit upon high water condition.

HUMIDIFIER A steam generating canister humidifier is factory-installed in the cooling unit and is operated by the iCOM control system. It is complete with disposable cylinder, all supply and drain valves, steam distributor and electronic controls. The need to change the canister is indicated on the iCOM display. The humidifier is designed to operate with water conductivity from 125-500 (50Hz) or 330-670 (60Hz) microS/cm. System automatically fills and drains as well as maintains the required water level based on conductivity. An air-gap within the humidifier assembly shall prevent backflow of the humidifier supply water. The humidifier is removable from the rear of the cabinet.

ELECTRIC REHEAT The electric reheat coils are low watt density, 304 stainless steel fin-tubular construction, protected by thermal safety switches and controlled in one stage.

2-W AY MODULATING VALVE A 2-way modulating valve controls the chilled water flow passing through the cooling coil. The iCOM control manages the valve actuator movement in order to provide the desired amount of cooling for various entering water flow rates and temperatures. Cooling capacity is regulated by closing-off the chilled water flow. The maximum differential pressure across the closed valve is 175 kPa (25.4 PSI). Maximum system pressure is 230 PSI (1586 kPa).

INTELLISLOT WEB CARD (IS-WEBL) Provides 10/100 baseT Ethernet connectivity for unit monitoring and management. The supported management interfaces include: SNMP for Network Management Systems and HTTP for web page viewing.

INTELLISLOT 485 CARD (IS-485L) Provides RS-485 Modbus network connectivity to Building Management Systems for unit monitoring and management.

FILTER The optional filters are two deep pleated 4” (102 mm) rated MERV11 following ASHRAE 52.2-1999 (60-65% by ASHRAE 52.1-1992) or F5 following EN779, located within the cabinet and accessible from the rear of the unit. A filter clog alarm is included.

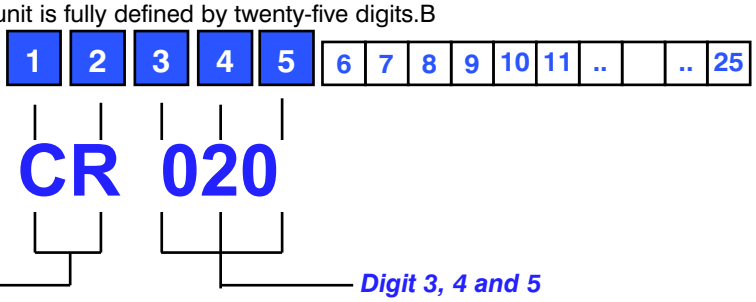
REHEAT/HUMIDIFIER LOCKOUT Includes the necessary relays to disable the reheat and humidifier from an external 24 volt signal.

ONE (1) EXTRA COMMON ALARM CONTACT Provides the customer with a total of two sets of normally open (n/o) contacts for remote indication of unit alarms.

LIQUI-TECT SENSOR Is a solid state water sensor that has no moving parts and is hermetically sealed to keep out dust and dirt. When the sensor detects the presence of moisture the alarm system is activated.

3.3 Digit nomenclature

The unit is fully defined by twenty-five digits.B



Family
CR

Size: Cooling Capacity "kW" (approx.)
Nominal Cooling Capacity

Digit 6 - Air Discharge
R Air Discharge Horizontal airflow

Digit 7 - System Type
A System Type air cooled
W System Type water cooled
C System Type Chilled Water

Digit 8 - Airflow
1 Airflow - EC Plug Fan

Digit 9 - Power Supply
0 Power Supply 400V / 3ph / 50Hz+N
C Power Supply 208V / 3ph / 60Hz
A Power Supply 460V / 3ph / 60Hz

Digit 10 - Cooling System
2 Cooling Systems - CW with two way Valve
3 Cooling Systems - CW with Three Way
7 Cooling Systems - DX with digital scroll Single Circuit R410A

Digit 11 - Humidification
0 Humidification - none
S Humidification - electrode humidifier

Digit 12 - Display
A Display - Small Display 1 T+H Sensor
N Display - Small Display 1 Temp Sensor Only
D Display - Large Display 1 T +H sensor
C Display - Large Display 1 Temp sensor Only

Digit 13 - Re-Heating
0 Re-heating - none
1 Re-heating - electric heating 1 Level

Digit 14 - Air Filter
0 Air Filter - G4 (EU4)
1 Air Filter - F 5 (EU5)
2 Air Filter - G4 (EU4) + Clogged Filter Alarm
3 Air Filter - F 5 (EU5) + Clogged Filter Alarm
8 Air Filter - Merv 8 + Clogged Filter Alarm
9 Air Filter - Merv 11 + Clogged Filter Alarm

Digit 15 - Coil
1 Coil - Air cooled - water cooled two ways water valve
7 Coil - water cooled 3 ways water valve
H Coil - CW Standard coil

Digit 16 - Enclosure options
1 Enclosure - Color Standard
2 Enclosure - Color Special

Digit 17 - Condensate pump
L No condensate pump
5 Condensate pump

Digit 18 - Option Package
0 Option Package None
L Option Package #1 - humidifier and reheat lockout & compressor jacket & one additional alarm
H Option Package - Reheat & Humidifier Lockout
C Option Package #2 - humidifier and reheat lockout & one additional alarm
D Option Package #3 - compressor jacket

Digit 19 - Monitoring
N Without IS housing
0 With IS housing / no card
1 One IS web card
2 Two IS web cards
3 One IS485 card
4 Two IS485 cards
5 IS web & IS 485 cards

Digit 20 - Sensors
0 Sensors - None
H Sensors - High Temperature - Firestat
S Sensors - Smoke Sensor - Smokestat
F Sensors - Smoke & High Temp - Smoke and Firestat

Digit 21 - Packaging
P Packaging - PLP and pallet Domestic
C Packaging - PLP and wooden crate Export
S Packaging - seaworthy

Digit 22 - Special Requirements
A SFA - none
X SFA included

Digit 23-25 -Order Identifier

4 Operation

Unit operation is completely automatic. The below sequence explains how the unit operates :

- The air, sucked in by the continuously operating fans, enters the unit.
- The air is immediately filtered.
- The TEMPERATURE sensor or HUMITEMP (temperature + rel. humidity) sensor (depends on unit configuration), verifies the state of the inlet air, and relays this information to the control system.
- The air is treated and then blown out of the unit.
- The control system compares the relayed information to the set point and proportional band values programmed into its memory: it then commands the air conditioner to treat the air as follows (see also Control manual).

4.1 Cooling

- Direct expansion mode (DX)
  The compressor is started and the cold refrigerant flows through the evaporator, thus cooling the air passing over it. For compressor operation see Control manual.
- Chilled water mode (CW)
  The three ways valve is opened and the chilled water flows through the coil, thus cooling the air passing over it.
  For valve operation see Control manual.

4.2 Heating

- Electrical heating (optional): the heating elements heat the air passing over them. There is one heating steps activate in case of dehumidification if supply air temperature is too low (for heating logic see Control manual)

4.3 Dehumidification

- DX mode
  The compressors starts and either the air flow or the evaporator surface is reduced (increasing modulation capacity of compressor), thereby causing dehumidification (refer also to Control manual).
- N.B.: If, during dehumidification, the ambient temperature drops below a specified level, dehumidification will be stopped if necessary (see LOW LIMIT intervention in Control manual).

In dehumidification mode, the air after passing over the coil it's reheated (if needed) by electrical heater to re-stabilize the initial temperature

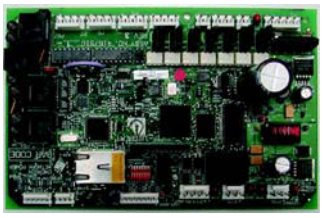
4.4 Humidification - optional

- The humidifier creates steam, which is distributed into the air via the steam distribution pipe

5 Microprocessor Controls

5.1 iCom Control

Fig. 5.a



Liebert CRV models are controlled by iCOM Medium Board (Fig. 10).
The control board is housed in the electrical panel and it is connected to the remote display, to be installed in the container/room (connection cable is included).

- The standard user interface is a graphical display (128 x 64 pixels, backlit) showing parameter values and the relevant symbols/codes in a tree menu. It features navigation push-buttons and status leds.
  Self-explanatory icons are used for the menu-layout of the display.
- Status Report of the latest 400 event-messages of the unit.
- Graphic Data Records for temperature and humidity
- Both high and low priority alarms activate a visual indicator and buzzer.
- Input for remote on-off and volt-free contacts for simple remote monitoring of low and high priority alarms: high/low temperature, high/low refrigerant pressure, fan/control failure, compressor/control failure and others are available.
- LAN management: functions provided as standard include stand-by (in case of failure of the unit in operation, the second one starts automatically), and automatic rotation.
- All settings are protected through a 3-Level password system (*).
- Automatic restart is provided after a power failure.

Tab. 5a - Technical Data

Technical Data	iCom Medium
E2prom	4Mbit + 512kbit
Flash memory	32Mbit
RAM memory space	128Mbit
Microcontroller	Coldfire 32Mbit
Analogue Input	3 x 0-10V,0-5V ,4..20mA (selectable) + 2 PTC/NTC + 3 NTC
Digital Input	9 x opto-coupled
Analogue Output	2 x 0-10V
Digital Output	7 triacs output and 2 relay output
Time and date function buffered by LI-battery	
Hirobus Lan connectors	2 RJ45 sockets (for unit in LAN, remote display)
Ethernet network connectors	1 RJ45 socket
CAN bus connectors	2 RJ12 sockets
Hironet connectors	1 RJ9 socket for RS485 (direct connection to proprietary supervision)

5.2 CDL Graphic Display (option)

- Large graphic display (320 x 240 pixels)
- Self-explanatory icons are used for the menu-layout of the CDL Display.
- Status Report of the latest 400 event-messages of the unit/system.
- Graphic Data Records for temperature and humidity, selectable timeframes from 8 minutes to 2 weeks.
- Semi or Full Manual Mode software management including all safety devices.
- 4-Level Password system to protect all settings.
- Ergonomic design for use also as portable device (start-up and ”flying connections” by service personnel).

Technical Data CDL Graphic Display

- Microcontroller: . . . . . Coldfire 32Mbit
- Ethernet network connectors . . . . . 2 RJ45 sockets (for unit in LAN, remote display)
- CAN bus connectors . . . . . 2 RJ12 sockets
- Power supply: . . . . . via CAN bus or external 12Vdc supply

6 Specifications - Air cooled

6.1 Performances - air cooled

Tab. 6a - Air cooled - 50 Hz

50 Hz	Cond. Temp. 45°C (113°F)			
	CR035RA		CR020RA	
40°C DB (104°F) 20% RH				
Total kW (BTU/H)	38.7	132083	24.3	82936
Sensible kW (BTU/H)	38.7	132083	24.3	82936
Unit Power Imput kW (BTU/H)	9.59	32731	6.12	20888
Heat rejection kW (BTU/H)	48.29	164814	30.42	103823
Supply Air Temperature °C (°F)	18.1	64.6	21.8	71.2
37°C DB (98,6°F) 24% RH				
Total kW (BTU/H)	36.8	125598	23.1	78840
Sensible kW (BTU/H)	36.8	125598	23.1	78840
Unit Power Imput kW (BTU/H)	9.59	32731	6.1	20819
Heat rejection kW (BTU/H)	46.39	158329	29.2	99660
Supply Air Temperature °C (°F)	16.4	61.5	19.8	67.6
35°C DB (95°F) 26% RH				
Total kW (BTU/H)	35.8	122185	22.3	76110
Sensible kW (BTU/H)	35.2	120138	22.3	76110
Unit Power Imput kW (BTU/H)	9.58	32697	6.08	20751
Heat rejection kW (BTU/H)	45.38	154882	28.38	96861
Supply Air Temperature °C (°F)	15.4	59.7	18.5	65.3
32°C DB (89,6°F) 29% RH				
Total kW (BTU/H)	34.3	117066	21.1	72014
Sensible kW (BTU/H)	34.1	116383	21.1	72014
Unit Power Imput kW (BTU/H)	9.58	32697	6.06	20683
Heat rejection kW (BTU/H)	43.88	149762	27.16	92697
Supply Air Temperature °C (°F)	13.2	55.8	16.5	61.7
30°C DB (86°F) 34% RH				
Total kW (BTU/H)	33.8	115359	20.5	69967
Sensible kW (BTU/H)	31.5	107510	20.5	69967
Unit Power Imput kW (BTU/H)	9.58	32697	6.04	20615
Heat rejection kW (BTU/H)	43.38	148056	26.54	90581
Supply Air Temperature °C (°F)	12.8	55.0	13.8	56.8
28°C DB (82,4) 38% RH				
Total kW (BTU/H)	33.4	113994	20.5	69967
Sensible kW (BTU/H)	29.5	100684	20.3	69284
Unit Power Imput kW (BTU/H)	9.58	32697	6.04	20615
Heat rejection kW (BTU/H)	42.98	146691	26.54	90581
Supply Air Temperature °C (°F)	12	53.6	13.4	56.1
28°C DB (82,4) 45% RH				
Total kW (BTU/H)	34.6	118090	21.4	73038
Sensible kW (BTU/H)	27.1	92492	18.6	63482
Unit Power Imput kW (BTU/H)	9.58	32697	6.06	20683
Heat rejection kW (BTU/H)	44.18	150786	27.46	93721
Supply Air Temperature °C (°F)	13.1	55.6	14.6	58.3
25°C DB (77°F) 45% RH				
Total kW (BTU/H)	32.3	110240	19.9	67919
Sensible kW (BTU/H)	26.7	91127	18.1	61775
Unit Power Imput kW (BTU/H)	9.58	32697	6.03	20580
Heat rejection kW (BTU/H)	41.88	142936	25.93	88499
Supply Air Temperature °C (°F)	10.6	51.1	12.1	53.8
25°C DB (77°F) 40% RH				
Total kW (BTU/H)	31.3	106827	19.3	65871
Sensible kW (BTU/H)	28.1	95905	19.1	65188
Unit Power Imput kW (BTU/H)	9.58	32697	6.02	20546
Heat rejection kW (BTU/H)	40.88	139523	25.32	86417
Supply Air Temperature °C (°F)	9.9	49.8	11.3	52.3
22°C DB (71,6°F) 55% RH				
Total kW (BTU/H)	31.3	106827	19.3	65871

Specifications - Air cooled

Sensible kW (BTU/H)	23.1	78840	15.3	52219
Unit Power Imput kW (BTU/H)	9.58	32697	6.02	20546
Heat rejection kW (BTU/H)	40.88	139523	25.32	86417
Supply Air Temperature °C (°F)	9.6	49.3	11.2	52.2
22°C DB (71,6°F) 50% RH				
Total kW (BTU/H)	30.5	104097	18.9	64506
Sensible kW (BTU/H)	24.4	83277	16.4	55973
Unit Power Imput kW (BTU/H)	9.57	32662	6.09	20785
Heat rejection kW (BTU/H)	40.07	136759	24.99	85291
Supply Air Temperature °C (°F)	9	48.2	10.4	50.7

Record the power consumption of the fan at various operating percentages (min - 100%).

* *Cooling capacities are net values. All capacities are nominal values; actual performance will be ±5%.*

** *NOTE: Data rated with Standard (MERV 8/ G4) filter. Some options or combinations of options may result in reduced airflow. Consult factory for recommendations.*

*** *Refer to Tab 6j for standard air flow*

Specifications - Air cooled

Tab. 6b - Air cooled - 60 Hz

60 Hz	Cond. Temp. 120°F (48,9°C)			
	CR035RA		CR020RA	
105ºF DB, 71ºF WB (40.6ºC DB, 21.6ºC WB) 17% RH				
Total kW (BTU/H)	40.4	137885	24.6	83960
Sensible kW (BTU/H)	40.4	137885	24.6	83960
Unit Power Imput kW (BTU/H)	11.09	37850	6.9	23550
Heat rejection kW (BTU/H)	51.5	175770	31.5	107510
Supply Air Temperature °C (°F)	17.7	63.9	22.1	71.8
100ºF DB, 69.5ºF WB (37.8ºC DB, 20.8ºC WB) 20% RH				
Total kW (BTU/H)	38.5	131401	23.4	79864
Sensible kW (BTU/H)	38.5	131401	23.4	79864
Unit Power Imput kW (BTU/H)	11.1	37884	6.86	23413
Heat rejection kW (BTU/H)	49.6	169285	30.3	103414
Supply Air Temperature °C (°F)	16.1	61.0	20.3	68.5
95ºF DB, 67.9ºF WB (35ºC DB, 19.9ºC WB) 23% RH				
Total kW (BTU/H)	36.7	125257	22.3	76110
Sensible kW (BTU/H)	36.7	125257	22.3	76110
Unit Power Imput kW (BTU/H)	11.11	37918	6.82	23277
Heat rejection kW (BTU/H)	47.8	163141	29.1	99318
Supply Air Temperature °C (°F)	14.5	58.1	18.5	65.3
90ºF DB, 66.2ºF WB (32.2ºC DB, 19.0ºC WB) 27% RH				
Total kW (BTU/H)	35.2	120138	21.2	72356
Sensible kW (BTU/H)	35.2	120138	21.2	72356
Unit Power Imput kW (BTU/H)	11.11	37918	6.78	23140
Heat rejection kW (BTU/H)	46.3	158022	28	95564
Supply Air Temperature °C (°F)	12.5	54.5	16.6	61.9
85ºF DB, 64.5ºF WB (29.4ºC DB, 18.1ºC WB) 31% RH				
Total kW (BTU/H)	34.3	117066	20.1	68601
Sensible kW (BTU/H)	33.4	113994	20.1	68601
Unit Power Imput kW (BTU/H)	11.12	37953	6.74	23004
Heat rejection kW (BTU/H)	45.4	154950	26.8	91468
Supply Air Temperature °C (°F)	11.1	52.0	14.8	58.6
80ºF DB, 62.8ºF WB (26.7ºC DB, 17.1ºC WB) 37% RH				
Total kW (BTU/H)	33.4	113994	19.9	67919
Sensible kW (BTU/H)	30.3	103414	19.9	67919
Unit Power Imput kW (BTU/H)	11.12	37953	6.73	22969
Heat rejection kW (BTU/H)	44.5	151879	26.6	90786
Supply Air Temperature °C (°F)	10.3	50.5	12.2	54.0
80°F DB, 66.5°F WB (26.7°C DB, 19.2°C WB) 50% RH				
Total kW (BTU/H)	35.6	121503	21.3	72697
Sensible kW (BTU/H)	26	88738	17.3	59045
Unit Power Imput kW (BTU/H)	11.11	37918	6.79	23174
Heat rejection kW (BTU/H)	46.7	159387	28.1	95905
Supply Air Temperature °C (°F)	12.4	54.3	14.3	57.7
75°F DB, 62.5°F WB (23.9°C DB, 16.9°C WB) 50% RH				
Total kW (BTU/H)	33.4	113994	19.9	67919
Sensible kW (BTU/H)	25.7	87714	16.8	57338
Unit Power Imput kW (BTU/H)	11.12	37953	6.73	22969
Heat rejection kW (BTU/H)	44.52	151947	26.63	90888
Supply Air Temperature °C (°F)	10.1	50.2	12	53.6
75ºF DB, 61ºF WB (23.9ºC DB, 16.1ºC WB) 45% RH				
Total kW (BTU/H)	32.4	110581	19.4	66212
Sensible kW (BTU/H)	27.1	92492	17.7	60410
Unit Power Imput kW (BTU/H)	11.12	37953	6.71	22901
Heat rejection kW (BTU/H)	43.52	148534	26.11	89113
Supply Air Temperature °C (°F)	9.4	48.9	11.3	52.3
72°F DB, 60.1°F WB (22.2°C DB, 15.6°C WB) 50% RH				
Total kW (BTU/H)	31.8	108533	19	64847
Sensible kW (BTU/H)	25.2	86008	16.4	55973
Unit Power Imput kW (BTU/H)	11.12	37953	6.7	22867

Specifications - Air cooled

Heat rejection kW (BTU/H)	42.92	146486	25.7	87714
Supply Air Temperature °C (°F)	8.8	47.8	10.6	51.1
72°F DB, 58.7°F WB (22.2°C DB, 14.8°C WB) 45% RH				
Total kW (BTU/H)	30.9	105462	18.5	63141
Sensible kW (BTU/H)	26.4	90103	17.4	59386
Unit Power Imput kW (BTU/H)	11.11	37918	6.67	22765
Heat rejection kW (BTU/H)	42.01	143380	25.17	85905
Supply Air Temperature °C (°F)	8.1	46.6	9.9	49.8

Record the power consumption of the fan at various operating percentages (min - 100%).

* *Cooling capacities are net values. All capacities are nominal values; actual performance will be ±5%.*

** *NOTE: Data rated with Standard (MERV 8/ G4) filter. Some options or combinations of options may result in reduced airflow. Consult factory for recommendations.*

*** *Refer to Tab 6j for standard air flow*

Specifications - Water cooled

6.2 Performances - water cooled

Tab. 6c - Water cooled - 50 Hz

50 Hz	18°C (64,4°F) EWT - 40°C (104°F) Cond. Temp.				24°C (75,2°F) EWT - 40°C (104°F) Cond. Temp.				30°C (86°F) EWT - 45°C (113°F) Cond. Temp.			
	CR035RW		CR020RW		CR035RW		CR020RW		CR035RW		CR020RW	
40°C DB (104°F) 20% RH												
Total kW (BTU/H)	39.9	136179	24.3	82936	39.9	136179	24.3	82936	38.7	132083	24.3	82936
Sensible kW (BTU/H)	39.9	136179	24.3	82936	39.9	136179	24.3	82936	38.7	132083	24.3	82936
Unit Power Imput kW (BTU/H)	8.62	29420	5.37	18328	8.62	29420	5.37	18328	9.59	32731	6.12	20888
Heat rejection kW (BTU/H)	48.5	165531	29.7	101366	48.5	165531	29.7	101366	48.3	164848	30.4	103755
Flow Rate, l/s (GPM)	0.63	9.99	0.385	6.10	1.042	16.52	0.634	10.05	1.149	18.21	0.722	11.44
Pressure Drop, kPa (ft H2O)	26	8.70	18	6.02	66	22.08	44	14.72	79	26.43	55	18.40
Supply Air Temperature °C (°F)	17.4	63.3	19.8	67.6	17.4	63.3	19.8	67.6	18.1	64.6	21.8	71.2
37°C DB (98,6°F) 24% RH												
Total kW (BTU/H)	39.9	136179	25.1	85666	39.9	136179	25.1	85666	36.8	125598	23.1	78840
Sensible kW (BTU/H)	39.9	136179	25.1	85666	39.9	136179	25.1	85666	36.8	125598	23.1	78840
Unit Power Imput kW (BTU/H)	8.62	29420	5.53	18874	8.62	29420	5.53	18874	9.59	32731	6.1	20819
Heat rejection kW (BTU/H)	48.5	165531	30.6	104438	48.5	165531	30.6	104438	46.4	158363	29.2	99660
Flow Rate, l/s (GPM)	0.63	9.99	0.398	6.31	1.007	15.96	0.627	9.94	1.095	17.36	0.688	10.91
Pressure Drop, kPa (ft H2O)	26	8.70	19	6.36	62	20.74	43	14.39	72	24.09	50	16.73
Supply Air Temperature °C (°F)	17.4	63.3	21.1	70.0	17.4	63.3	21.1	70.0	16.4	61.5	19.8	67.6
35°C DB (95°F) 26% RH												
Total kW (BTU/H)	37.4	127646	23.1	78840	37.4	127646	23.1	78840	36.9	125940	22.3	76110
Sensible kW (BTU/H)	37.4	127646	23.1	78840	37.4	127646	23.1	78840	36.3	123892	22.3	76110
Unit Power Imput kW (BTU/H)	8.6	29352	5.49	18737	8.6	29352	5.49	18737	9.58	32697	6.08	20751
Heat rejection kW (BTU/H)	46	156998	28.6	97612	46	156998	28.6	97612	45.4	154950	28.4	96929
Flow Rate, l/s (GPM)	0.594	9.42	0.369	5.85	0.978	15.50	0.606	9.61	1.068	16.93	0.665	10.54
Pressure Drop, kPa (ft H2O)	22	7.36	16	5.35	58	19.40	40	13.38	68	22.75	47	15.72
Supply Air Temperature °C (°F)	14.2	57.6	17.9	64.2	14.2	57.6	17.9	64.2	15.4	59.7	18.5	65.3
32°C DB (89,6°F) 29% RH												
Total kW (BTU/H)	35.7	121844	21.9	74745	35.7	121844	21.9	74745	34.3	117066	21.1	72014
Sensible kW (BTU/H)	34.6	118090	21.9	74745	34.6	118090	21.9	74745	34.1	116383	21.1	72014
Unit Power Imput kW (BTU/H)	8.59	29318	5.46	18635	8.59	29318	5.46	18635	9.58	32697	6.06	20683
Heat rejection kW (BTU/H)	44.3	151196	27.4	93516	44.3	151196	27.4	93516	43.8	149489	27.2	92834
Flow Rate, l/s (GPM)	0.57	9.03	0.352	5.58	0.937	14.85	0.576	9.13	1.025	16.25	0.633	10.03
Pressure Drop, kPa (ft H2O)	22	7.36	15	5.02	54	18.07	37	12.38	63	21.08	43	14.39
Supply Air Temperature °C (°F)	12.9	55.2	16	60.8	12.9	55.2	16	60.8	13.2	55.8	16.6	61.9
30°C DB (86°F) 34% RH												
Total kW (BTU/H)	35.7	121844	21.9	74745	35.7	121844	21.9	74745	33.8	115359	20.9	71332
Sensible kW (BTU/H)	32.3	110240	21.5	73380	32.3	110240	21.5	73380	31.5	107510	20.9	71332
Unit Power Imput kW (BTU/H)	8.59	29318	5.46	18635	8.59	29318	5.46	18635	9.58	32697	6.05	20649
Heat rejection kW (BTU/H)	44.3	151196	27.3	93175	44.3	151196	27.3	93175	43.3	147783	27	92151
Flow Rate, l/s (GPM)	0.57	9.03	0.351	5.56	0.935	14.82	0.575	9.11	1.011	16.02	0.627	9.94
Pressure Drop, kPa (ft H2O)	22	7.36	15	5.02	53	17.73	37	12.38	61	20.41	42	14.05
Supply Air Temperature °C (°F)	12.3	54.1	14.4	57.9	12.3	54.1	14.4	57.9	12.8	55.0	14.6	58.3
28°C DB (82,4) 38% RH												
Total kW (BTU/H)	35.1	119796	21.6	73721	35.1	119796	21.6	73721	33.4	113994	20.4	69625
Sensible kW (BTU/H)	30.3	103414	20.1	68601	30.3	103414	20.1	68601	29.5	100684	19.5	66554
Unit Power Imput kW (BTU/H)	8.59	29318	5.46	18635	8.59	29318	5.46	18635	9.58	32697	6.04	20615
Heat rejection kW (BTU/H)	43.7	149148	27.1	92492	43.7	149148	27.1	92492	43	146759	26.5	90445
Flow Rate, l/s (GPM)	0.562	8.91	0.348	5.52	0.922	14.61	0.569	9.02	1.001	15.87	0.614	9.73
Pressure Drop, kPa (ft H2O)	20	6.69	15	5.02	53	17.73	36	12.04	61	20.41	40	13.38
Supply Air Temperature °C (°F)	11.6	52.9	13.5	56.3	11.6	52.9	13.5	56.3	12	53.6	13.9	57.0
28°C DB (82,4) 45% RH												
Total kW (BTU/H)	36.1	123209	22.4	76451	36.1	123209	22.4	76451	34.6	118090	21.4	73038
Sensible kW (BTU/H)	27.8	94881	18.4	62799	27.8	94881	18.4	62799	27.2	92834	18	61434
Unit Power Imput kW (BTU/H)	8.59	29318	5.47	18669	8.59	29318	5.47	18669	9.58	32697	60.6	206828
Heat rejection kW (BTU/H)	44.7	152561	27.9	95223	44.7	152561	27.9	95223	44.2	150855	27.5	93858
Flow Rate, l/s (GPM)	0.576	9.13	0.359	5.69	0.947	15.01	0.589	9.34	1.034	16.39	0.641	10.16
Pressure Drop, kPa (ft H2O)	22	7.36	15	5.02	55	18.40	38	12.71	65	21.75	44	14.72
Supply Air Temperature °C (°F)	12.8	55.0	14.7	58.5	12.8	55.0	14.7	58.5	13.2	55.8	15	59.0
25°C DB (77°F) 45% RH												
Total kW (BTU/H)	33.7	115018	20.8	70990	33.7	115018	20.8	70990	32.3	110240	19.9	67919
Sensible kW (BTU/H)	27.4	93516	17.9	61093	27.4	93516	17.9	61093	26.7	91127	17.5	59728

Specifications - Water cooled

Unit Power Imput kW (BTU/H)	8.58	29284	5.44	18567	8.58	29284	5.44	18567	9.58	32697	6.03	20580
Heat rejection kW (BTU/H)	42.3	144370	26.3	89762	42.3	144370	26.3	89762	41.9	143005	25.9	88397
Flow Rate, l/s (GPM)	0.542	8.59	0.336	5.33	0.888	14.08	0.549	8.70	0.971	15.39	0.598	9.48
Pressure Drop, kPa (ft H2O)	20	6.69	14	4.68	49	16.39	34	11.37	57	19.07	39	13.05
Supply Air Temperature °C (°F)	10.3	50.5	12.2	54.0	10.3	50.5	12.2	54.0	10.7	51.3	12.5	54.5
25°C DB (77°F) 40% RH												
Total kW (BTU/H)	32.7	111605	20.3	69284	32.7	111605	20.3	69284	31.3	106827	19.4	66212
Sensible kW (BTU/H)	28.8	98294	19	64847	28.8	98294	19	64847	28.1	95905	18.6	63482
Unit Power Imput kW (BTU/H)	8.58	29284	5.43	18533	8.58	29284	5.43	18533	9.58	32697	6.02	20546
Heat rejection kW (BTU/H)	41.3	140957	25.7	87714	41.3	140957	25.7	87714	40.9	139592	25.4	86690
Flow Rate, l/s (GPM)	0.528	8.37	0.329	5.21	0.863	13.68	0.536	8.50	0.943	14.95	0.585	9.27
Pressure Drop, kPa (ft H2O)	18	6.02	14	4.68	46	15.39	32	10.71	54	18.07	37	12.38
Supply Air Temperature °C (°F)	9.5	49.1	11.4	52.5	9.5	49.1	11.4	52.5	9.9	49.8	11.7	53.1
22°C DB (71,6°F) 55% RH												
Total kW (BTU/H)	32.7	111605	20.3	69284	32.7	111605	20.3	69284	31.3	106827	19.4	66212
Sensible kW (BTU/H)	23.9	81571	15.4	52560	23.9	81571	15.4	52560	23.2	79182	15	51195
Unit Power Imput kW (BTU/H)	8.58	29284	5.43	18533	8.58	29284	5.43	18533	9.58	32697	6.02	20546
Heat rejection kW (BTU/H)	41.3	140957	25.8	88055	41.3	140957	25.8	88055	40.9	139592	25.4	86690
Flow Rate, l/s (GPM)	0.528	8.37	0.329	5.21	0.864	13.69	0.537	8.51	0.944	14.96	0.586	9.29
Pressure Drop, kPa (ft H2O)	18	6.02	14	4.68	46	15.39	32	10.71	54	18.07	37	12.38
Supply Air Temperature °C (°F)	9.3	48.7	11.1	52.0	9.3	48.7	11.1	52.0	9.7	49.5	11.4	52.5
22°C DB (71,6°F) 50% RH												
Total kW (BTU/H)	31.9	108875	19.8	67577	31.9	108875	19.8	67577	30.5	104097	18.9	64506
Sensible kW (BTU/H)	25	85325	16.3	55632	25	85325	16.3	55632	24.4	83277	15.9	54267
Unit Power Imput kW (BTU/H)	8.58	29284	5.42	18498	8.58	29284	5.42	18498	9.57	32662	6.01	20512
Heat rejection kW (BTU/H)	40.5	138227	25.2	86008	40.5	138227	25.2	86008	40.1	136861	24.9	84984
Flow Rate, l/s (GPM)	0.516	8.18	0.322	5.10	0.843	13.36	0.524	8.31	0.921	14.60	0.572	9.07
Pressure Drop, kPa (ft H2O)	18	6.02	12	4.01	44	14.72	31	10.37	52	17.40	36	12.04
Supply Air Temperature °C (°F)	8.7	47.7	10.5	50.9	8.7	47.7	10.5	50.9	9.1	48.4	10.8	51.4

Record the power consumption of the fan at various operating percentages (min - 100%).

* *Cooling capacities are net values. All capacities are nominal values; actual performance will be ±5%.*

** *NOTE: Data rated with Standard (MERV 8/ G4) filter. Some options or combinations of options may result in reduced airflow. Consult factory for recommendations.*

*** *Refer to Tab 6j for standard air flow*

Specifications - Water cooled

Tab. 6d - Water cooled - 60 Hz

60 Hz	65°F (18.3°C) EWT - 105°F (40.6°C) Cond. Temp.				75°F (23.9°C) EWT - 105°F (40.6°C) Cond. Temp.				85°F (29.4°C) EWT - 110°F (43.3°C) Cond. Temp.			
	CR035RW		CR020RW		CR035RW		CR020RW		CR035RW		CR020RW	
105ºF DB, 71ºF WB (40.6ºC DB, 21.6ºC WB) 17% RH												
Total kW (BTU/H)	42.9	146418	26	88738	42.9	146418	26	88738	42.2	144029	25.5	87032
Sensible kW (BTU/H)	42.9	146418	26	88738	42.9	146418	26	88738	42.2	144029	25.5	87032
Flow Rate, l/s (GPM)	0.669	10.60	0.408	6.47	1.05	16.64	0.638	10.11	1.483	23.51	0.896	14.20
Pressure Drop, kPa (ft H2O)	29	9.70	19	6.36	67	22.42	44	14.72	128	42.82	82	27.43
Unit Power Imput kW (BTU/H)	9.42	32150	5.98	20410	9.42	32150	5.98	20410	9.97	34028	6.29	21468
Heat rejection kW (BTU/H)	52.2	178159	31.9	108875	52.5	179183	31.9	108875	52.1	177817	31.8	108533
Supply Air Temperature °C (°F)	16.2	61.2	21	69.8	16.2	61.2	21	69.8	16.6	61.9	21.3	70.3
100ºF DB, 69.5ºF WB (37.8ºC DB, 20.8ºC WB) 20% RH												
Total kW (BTU/H)	41	139933	24.8	84642	41	139933	24.8	84642	40.3	137544	24.4	83277
Sensible kW (BTU/H)	41	139933	24.8	84642	41	139933	24.8	84642	40.3	137544	24.4	83277
Flow Rate, l/s (GPM)	0.643	10.19	0.391	6.20	1.006	15.95	0.61	9.67	1.418	22.48	0.855	13.55
Pressure Drop, kPa (ft H2O)	26	8.70	18	6.02	62	20.74	41	13.72	118	39.48	76	25.43
Unit Power Imput kW (BTU/H)	9.43	32185	5.95	20307	9.43	32185	5.95	20307	9.98	34062	6.26	21365
Heat rejection kW (BTU/H)	50.4	172015	30.7	104779	50.4	172015	30.7	104779	50.2	171333	30.6	104438
Supply Air Temperature °C (°F)	14.7	58.5	19.3	66.7	14.7	58.5	19.3	66.7	15.1	59.2	19.6	67.3
95ºF DB, 67.9ºF WB (35ºC DB, 19.9ºC WB) 23% RH												
Total kW (BTU/H)	39.1	133448	23.7	80888	39.1	133448	23.7	80888	38.5	131401	23.2	79182
Sensible kW (BTU/H)	39.1	133448	23.7	80888	39.1	133448	23.7	80888	38.5	131401	23.2	79182
Flow Rate, l/s (GPM)	0.617	9.78	0.374	5.93	0.963	15.26	0.583	9.24	1.354	21.46	0.814	12.90
Pressure Drop, kPa (ft H2O)	24	8.03	17	5.69	57	19.07	37	12.38	108	36.13	69	23.08
Unit Power Imput kW (BTU/H)	9.44	32219	5.91	20171	9.44	32219	5.91	20171	9.99	34096	6.22	21229
Heat rejection kW (BTU/H)	48.5	165531	29.5	100684	48.5	165531	29.5	100684	48.4	165189	29.4	100342
Supply Air Temperature °C (°F)	13.2	55.8	17.5	63.5	13.2	55.8	17.5	63.5	13.6	56.5	17.8	64.0
90ºF DB, 66.2ºF WB (32.2ºC DB, 19.0ºC WB) 27% RH												
Total kW (BTU/H)	39.6	135155	22.5	76793	39.6	135155	22.5	76793	37.3	127305	22.1	75427
Sensible kW (BTU/H)	38.6	131742	22.5	76793	38.6	131742	22.5	76793	36.8	125598	22.1	75427
Flow Rate, l/s (GPM)	0.609	9.65	0.358	5.67	0.95	15.06	0.556	8.81	1.314	20.83	0.775	12.28
Pressure Drop, kPa (ft H2O)	24	8.03	15	5.02	55	18.40	34	11.37	102	34.12	62	20.74
Unit Power Imput kW (BTU/H)	9.45	32253	5.87	20034	9.45	32253	5.87	20034	10	34130	6.18	21092
Heat rejection kW (BTU/H)	47.9	163483	28.3	96588	47.9	163483	28.3	96588	47.2	161094	28.2	96247
Supply Air Temperature °C (°F)	11.5	52.7	15.7	60.3	11.5	52.7	15.7	60.3	11.9	53.4	16	60.8
85ºF DB, 64.5ºF WB (29.4ºC DB, 18.1ºC WB) 31% RH												
Total kW (BTU/H)	37.1	126622	22.5	76793	37.1	126622	22.5	76793	36.3	123892	21.8	74403
Sensible kW (BTU/H)	34.8	118772	21.4	73038	34.8	118772	21.4	73038	34.4	117407	21.8	74403
Flow Rate, l/s (GPM)	0.589	9.34	0.35	5.55	0.917	14.53	0.542	8.59	1.28	20.29	0.744	11.79
Pressure Drop, kPa (ft H2O)	22	7.36	15	5.02	51	17.06	33	11.04	97	32.45	58	19.40
Unit Power Imput kW (BTU/H)	9.45	32253	5.86	20000	9.45	32253	5.86	20000	10	34130	6.15	20990
Heat rejection kW (BTU/H)	46.5	158705	27.7	94540	46.5	158705	27.7	94540	46.2	157681	27.3	93175
Supply Air Temperature °C (°F)	10.4	50.7	14.3	57.7	10.4	50.7	14.3	57.7	10.6	51.1	13.1	55.6
80ºF DB, 62.8ºF WB (26.7ºC DB, 17.1ºC WB) 37% RH												
Total kW (BTU/H)	36.1	123209	21.6	73721	36.1	123209	21.6	73721	35.3	120479	21	71673
Sensible kW (BTU/H)	31.7	108192	20.3	69284	31.7	108192	20.3	69284	31.3	106827	20	68260
Flow Rate, l/s (GPM)	0.575	9.11	0.344	5.45	0.894	14.17	0.533	8.45	1.247	19.77	0.737	11.68
Pressure Drop, kPa (ft H2O)	22	7.36	14	4.68	49	16.39	31	10.37	92	30.78	57	19.07
Unit Power Imput kW (BTU/H)	9.46	32287	5.84	19932	9.46	32287	5.84	19932	10	34130	6.15	20990
Heat rejection kW (BTU/H)	45.5	155292	27.3	93175	45.5	155292	27.3	93175	45.2	154268	27.1	92492
Supply Air Temperature °C (°F)	9.5	49.1	12.1	53.8	9.5	49.1	12.1	53.8	9.8	49.6	12.3	54.1
80°F DB, 66.5°F WB (26.7°C DB, 19.2°C WB) 50% RH												
Total kW (BTU/H)	38.9	132766	23	78499	38.9	132766	23	78499	37.9	129353	22.5	76793
Sensible kW (BTU/H)	27.5	93858	17.4	59386	27.5	93858	17.4	59386	27.1	92492	17.2	58704
Flow Rate, l/s (GPM)	0.614	9.73	0.365	5.79	0.958	15.18	0.566	8.97	1.336	21.18	0.787	12.47
Pressure Drop, kPa (ft H2O)	24	8.03	16	5.35	56	18.73	35	11.71	105	35.13	64	21.41
Unit Power Imput kW (BTU/H)	9.45	32253	5.89	20103	9.45	32253	5.89	20103	9.99	34096	6.19	21126
Heat rejection kW (BTU/H)	48.3	164848	28.8	98294	48.3	164848	28.8	98294	47.8	163141	28.6	97612
Supply Air Temperature °C (°F)	11.7	53.1	14.2	57.6	11.7	53.1	14.2	57.6	11.9	53.4	14.3	57.7
75°F DB, 62.5°F WB (23.9°C DB, 16.9°C WB) 50% RH												
Total kW (BTU/H)	36.1	123209	21.6	73721	36.1	123209	21.6	73721	35.3	120479	21	71673
Sensible kW (BTU/H)	27.1	92492	17	58021	27.1	92492	17	58021	26.7	91127	16.7	56997
Flow Rate, l/s (GPM)	0.575	9.11	0.345	5.47	0.895	14.19	0.534	8.46	1.247	19.77	0.737	11.68
Pressure Drop, kPa (ft H2O)	22	7.36	14	4.68	49	16.39	31	10.37	93	31.11	57	19.07
Unit Power Imput kW (BTU/H)	9.46	32287	5.85	19966	9.46	32287	5.85	19966	10	34130	6.15	20990
Heat rejection kW (BTU/H)	45.5	155292	27.3	93175	45.5	155292	27.3	93175	45.3	154609	27.1	92492
Supply Air Temperature °C (°F)	9.4	48.9	11.8	53.2	9.4	48.9	11.8	53.2	9.6	49.3	12	53.6
75ºF DB, 61ºF WB (23.9ºC DB, 16.1ºC WB) 45% RH												
Total kW (BTU/H)	35.1	119796	20.9	71332	35.1	119796	20.9	71332	34.3	117066	20.5	69967

Specifications - Water cooled

Sensible kW (BTU/H)	28.4	96929	18	61434	28.4	96929	18	61434	28	95564	17.8	60751
Flow Rate, l/s (GPM)	0.561	8.89	0.336	5.33	0.871	13.81	0.519	8.23	1.214	19.24	0.719	11.40
Pressure Drop, kPa (ft H2O)	20	6.69	14	4.68	47	15.72	30	10.04	88	29.44	55	18.40
Unit Power Imput kW (BTU/H)	9.46	32287	5.83	19898	9.46	32287	5.83	19898	10.01	34164	6.13	20922
Heat rejection kW (BTU/H)	44.5	151879	26.7	91127	44.5	151879	26.7	91127	44.2	150855	26.5	90445
Supply Air Temperature °C (°F)	8.7	47.7	11.1	52.0	8.7	47.7	11.1	52.0	8.9	48.0	11.3	52.3
72°F DB, 60.1°F WB (22.2°C DB, 15.6°C WB) 50% RH												
Total kW (BTU/H)	34.4	117407	20.5	69967	34.4	117407	20.5	69967	33.6	114677	20	68260
Sensible kW (BTU/H)	26.5	90445	16.7	56997	26.5	90445	16.7	56997	26.1	89079	16.5	56315
Flow Rate, l/s (GPM)	0.552	8.75	0.33	5.23	0.855	13.55	0.509	8.07	1.19	18.86	0.704	11.16
Pressure Drop, kPa (ft H2O)	20	6.69	14	4.68	46	15.39	29	9.70	84	28.10	52	17.40
Unit Power Imput kW (BTU/H)	9.47	32321	5.81	19830	9.47	32321	5.81	19830	10.01	34164	6.11	20853
Heat rejection kW (BTU/H)	43.8	149489	26.2	89421	43.8	149489	26.2	89421	43.5	148466	26.1	89079
Supply Air Temperature °C (°F)	8.1	46.6	10.4	50.7	8.1	46.6	10.4	50.7	8.3	46.9	10.6	51.1
72°F DB, 58.7°F WB (22.2°C DB, 14.8°C WB) 45% RH												
Total kW (BTU/H)	33.4	113994	20	68260	33.4	113994	20	68260	32.7	111605	19.5	66554
Sensible kW (BTU/H)	27.7	94540	17.6	60069	27.7	94540	17.6	60069	27.3	93175	17.4	59386
Flow Rate, l/s (GPM)	0.539	8.54	0.322	5.10	0.835	13.24	0.496	7.86	0.116	1.84	0.686	10.87
Pressure Drop, kPa (ft H2O)	19	6.36	12	4.01	44	14.72	28	9.37	81	27.10	50	16.73
Unit Power Imput kW (BTU/H)	9.47	32321	5.79	19761	9.47	32321	5.79	19761	10.01	34164	6.09	20785
Heat rejection kW (BTU/H)	42.8	146076	25.7	87714	42.8	146076	25.7	87714	42.6	145394	25.5	87032
Supply Air Temperature °C (°F)	7.5	45.5	9.8	49.6	7.5	45.5	9.8	49.6	7.6	45.7	9.9	49.8

Record the power consumption of the fan at various operating percentages (min - 100%).

* *Cooling capacities are net values. All capacities are nominal values; actual performance will be ±5%.*

** *NOTE: Data rated with Standard (MERV 8/ G4) filter. Some options or combinations of options may result in reduced airflow. Consult factory for recommendations.*

*** *Refer to Tab 6j for standard air flow*

Specifications - Glycol cooled

6.3 Performances - glycol cooled

Tab. 6e - Glycol cooled - 50Hz

50 Hz	30°C (86°F) EWT - 45°C (113°F) Cond. Temp.				40°C (104°F) EWT - 55°C (131°F) Cond. Temp.			
	CR035RW		CR020RW		CR035RW		CR020RW	
40°C DB (104°F) 20% RH								
Total kW (BTU/H)	38.7	132083	24.3	82936	35.9	122527	21.8	74403
Sensible kW (BTU/H)	38.7	132083	24.3	82936	35.9	122527	21.8	74403
Unit Power Imput kW (BTU/H)	9.59	32731	6.12	20888	11.72	40000	7.23	24676
Heat rejection kW (BTU/H)	48.3	164848	30.4	103755	47.6	162459	29.2	99660
Flow Rate, l/s (GPM)	1.418	22.48	0.893	14.15	1.289	20.43	0.787	12.47
Pressure Drop, kPa (ft H2O)	136	45.50	98	32.79	111	37.14	76	25.43
Supply Air Temperature °C (°F)	18.1	64.6	21.8	71.2	19.7	67.5	21.9	71.4
37°C DB (98,6°F) 24% RH								
Total kW (BTU/H)	36.8	125598	23.1	78840	34	116042	21.4	73038
Sensible kW (BTU/H)	36.8	125598	23.1	78840	34	116042	21.4	73038
Unit Power Imput kW (BTU/H)	9.59	32731	6.1	20819	11.75	40103	7.4	25256
Heat rejection kW (BTU/H)	46.4	158363	29.2	99660	45.8	156315	28.8	98294
Flow Rate, l/s (GPM)	1.35	21.40	0.849	13.46	1.229	19.48	0.774	12.27
Pressure Drop, kPa (ft H2O)	123	41.15	89	29.78	101	33.79	73	24.42
Supply Air Temperature °C (°F)	16.4	61.5	19.8	67.6	18	64.4	21.1	70.0
35°C DB (95°F) 26% RH								
Total kW (BTU/H)	36.9	125940	22.3	76110	32.8	111946	20.6	70308
Sensible kW (BTU/H)	36.3	123892	22.3	76110	32.8	111946	20.6	70308
Unit Power Imput kW (BTU/H)	9.58	32697	6.08	20751	11.76	40137	7.38	25188
Heat rejection kW (BTU/H)	45.4	154950	28.4	96929	44.5	151879	28	95564
Flow Rate, l/s (GPM)	1.315	20.84	0.821	13.01	1.191	18.88	0.749	11.87
Pressure Drop, kPa (ft H2O)	117	39.14	84	28.10	95	31.78	69	23.08
Supply Air Temperature °C (°F)	15.4	59.7	18.5	65.3	16.8	62.2	19.8	67.6
32°C DB (89,6°F) 29% RH								
Total kW (BTU/H)	34.3	117066	21.1	72014	31	105803	19.5	66554
Sensible kW (BTU/H)	34.1	116383	21.1	72014	31	105803	19.5	66554
Unit Power Imput kW (BTU/H)	9.58	32697	6.06	20683	11.78	40205	7.36	25120
Heat rejection kW (BTU/H)	43.8	149489	27.2	92834	42.7	145735	26.8	91468
Flow Rate, l/s (GPM)	1.26	19.97	0.779	12.35	1.134	17.97	0.712	11.29
Pressure Drop, kPa (ft H2O)	108	36.13	76	25.43	87	29.11	63	21.08
Supply Air Temperature °C (°F)	13.2	55.8	16.6	61.9	14.9	58.8	17.8	64.0
30°C DB (86°F) 34% RH								
Total kW (BTU/H)	33.8	115359	20.9	71332	30.4	103755	18.7	63823
Sensible kW (BTU/H)	31.5	107510	20.9	71332	30.4	103755	18.7	63823
Unit Power Imput kW (BTU/H)	9.58	32697	6.05	20649	11.78	40205	7.34	25051
Heat rejection kW (BTU/H)	43.3	147783	27	92151	42.2	144029	26.1	89079
Flow Rate, l/s (GPM)	1.242	19.69	0.771	12.22	1.116	17.69	0.688	10.91
Pressure Drop, kPa (ft H2O)	105	35.13	74	24.76	84	28.10	59	19.74
Supply Air Temperature °C (°F)	12.8	55.0	14.6	58.3	13.5	56.3	16.4	61.5
28°C DB (82,4) 38% RH								
Total kW (BTU/H)	33.4	113994	20.4	69625	29.7	101366	18.5	63141
Sensible kW (BTU/H)	29.5	100684	19.5	66554	27.9	95223	18.5	63141
Unit Power Imput kW (BTU/H)	9.58	32697	6.04	20615	11.79	40239	7.33	25017
Heat rejection kW (BTU/H)	43	146759	26.5	90445	41.5	141640	25.8	88055
Flow Rate, l/s (GPM)	1.23	19.50	0.755	11.97	1.095	17.36	0.681	10.79
Pressure Drop, kPa (ft H2O)	103	34.46	71	23.75	82	27.43	58	19.40
Supply Air Temperature °C (°F)	12	53.6	13.9	57.0	12.8	55.0	14.5	58.1
28°C DB (82,4) 45% RH								
Total kW (BTU/H)	34.6	118090	21.4	73038	31.2	106486	19.4	66212
Sensible kW (BTU/H)	27.2	92834	18	61434	25.8	88055	17.2	58704
Unit Power Imput kW (BTU/H)	9.58	32697	60.6	206828	11.78	40205	7.35	25086
Heat rejection kW (BTU/H)	44.2	150855	27.5	93858	43	146759	26.8	91468
Flow Rate, l/s (GPM)	1.272	20.16	0.79	12.52	1.141	18.09	0.71	11.25
Pressure Drop, kPa (ft H2O)	110	36.80	77	25.76	88	29.44	63	21.08
Supply Air Temperature °C (°F)	13.2	55.8	15	59.0	13.9	57.0	15.6	60.1
25°C DB (77°F) 45% RH								
Total kW (BTU/H)	32.3	110240	19.9	67919	28.8	98294	17.9	61093
Sensible kW (BTU/H)	26.7	91127	17.5	59728	25	85325	16.7	56997

Specifications - Glycol cooled

Unit Power Imput kW (BTU/H)	9.58	32697	6.03	20580	11.8	40273	7.31	24949
Heat rejection kW (BTU/H)	41.9	143005	25.9	88397	40.6	138568	25.2	86008
Flow Rate, l/s (GPM)	1.192	18.89	0.734	11.63	1.065	16.88	0.66	10.46
Pressure Drop, kPa (ft H2O)	97	32.45	68	22.75	77	25.76	55	18.40
Supply Air Temperature °C (°F)	10.7	51.3	12.5	54.5	11.6	52.9	13.1	55.6
25°C DB (77°F) 40% RH								
Total kW (BTU/H)	31.3	106827	19.4	66212	28.1	95905	17.4	59386
Sensible kW (BTU/H)	28.1	95905	18.6	63482	26.5	90445	17.4	59386
Unit Power Imput kW (BTU/H)	9.58	32697	6.02	20546	11.8	40273	7.3	24915
Heat rejection kW (BTU/H)	40.9	139592	25.4	86690	39.9	136179	24.7	84301
Flow Rate, l/s (GPM)	1.157	18.34	0.719	11.40	1.043	16.53	0.645	10.22
Pressure Drop, kPa (ft H2O)	92	30.78	66	22.08	74	24.76	52	17.40
Supply Air Temperature °C (°F)	9.9	49.8	11.7	53.1	10.7	51.3	12.4	54.3
22°C DB (71,6°F) 55% RH								
Total kW (BTU/H)	31.3	106827	19.4	66212	28.1	95905	17.4	59386
Sensible kW (BTU/H)	23.2	79182	15	51195	21.6	73721	14.1	48123
Unit Power Imput kW (BTU/H)	9.58	32697	6.02	20546	11.8	40273	7.3	24915
Heat rejection kW (BTU/H)	40.9	139592	25.4	86690	39.9	136179	24.7	84301
Flow Rate, l/s (GPM)	1.158	18.35	0.719	11.40	1.044	16.55	0.646	10.24
Pressure Drop, kPa (ft H2O)	92	30.78	66	22.08	74	24.76	52	17.40
Supply Air Temperature °C (°F)	9.7	49.5	11.4	52.5	10.5	50.9	12.1	53.8
22°C DB (71,6°F) 50% RH								
Total kW (BTU/H)	30.5	104097	18.9	64506	27.3	93175	17.1	58362
Sensible kW (BTU/H)	24.4	83277	15.9	54267	22.9	78158	15	51195
Unit Power Imput kW (BTU/H)	9.57	32662	6.01	20512	11.8	40273	7.29	24881
Heat rejection kW (BTU/H)	40.1	136861	24.9	84984	39.1	133448	24.4	83277
Flow Rate, l/s (GPM)	1.129	17.90	0.701	11.11	1.021	16.18	0.635	10.06
Pressure Drop, kPa (ft H2O)	87	29.11	63	21.08	71	23.75	51	17.06
Supply Air Temperature °C (°F)	9.1	48.4	10.8	51.4	9.9	49.8	11.4	52.5

Record the power consumption of the fan at various operating percentages (min - 100%).

* *Cooling capacities are net values. All capacities are nominal values; actual performance will be ±5%.*

** *NOTE: Data rated with Standard (MERV 8/ G4) filter. Some options or combinations of options may result in reduced airflow. Consult factory for recommendations.*

*** *Refer to Tab 6j for standard air flow*

Specifications - Glycol cooled

Tab. 6f - Glycol cooled - 60Hz

60 Hz	GLYCOL (30% Propylene) 110°F (43.3°C) EWT - 135°F (57.2°C) Cond. Temp.				GLYCOL (40% Propylene) 110°F (43.3°C) EWT - 135°F (57.2°C) Cond. Temp.			
	CR035RW		CR020RW		CR035RW		CR020RW	
105ºF DB, 71ºF WB (40.6ºC DB, 21.6ºC WB) 17% RH								
Total kW (BTU/H)	38.1	130035	22.2	75769	38.1	130035	22.2	75769
Sensible kW (BTU/H)	38.1	130035	22.2	75769	38.1	130035	22.2	75769
Flow Rate, l/s (GPM)	1.552	24.60	0.907	14.38	1.681	26.64	0.983	15.58
Pressure Drop, kPa (ft H2O)	148	49.51	91	30.44	177	59.22	110	36.80
Unit Power Imput kW (BTU/H)	13.05	44540	7.89	26929	13.05	44540	7.89	26929
Heat rejection kW (BTU/H)	51	174063	30.2	103073	51	174063	30.2	103073
Supply Air Temperature °C (°F)	19	66.2	22	71.6	19	66.2	22	71.6
100ºF DB, 69.5ºF WB (37.8ºC DB, 20.8ºC WB) 20% RH								
Total kW (BTU/H)	36.2	123551	21.9	74745	36.2	123551	21.9	74745
Sensible kW (BTU/H)	36.2	123551	21.9	74745	36.2	123551	21.9	74745
Flow Rate, l/s (GPM)	1.487	23.57	0.896	14.20	1.609	25.50	0.971	15.39
Pressure Drop, kPa (ft H2O)	136	45.50	88	29.44	163	54.53	107	35.80
Unit Power Imput kW (BTU/H)	13.08	44642	8.08	27577	13.08	44642	8.08	27577
Heat rejection kW (BTU/H)	49.2	167920	29.9	102049	49.2	167920	29.9	102049
Supply Air Temperature °C (°F)	17.4	63.3	21.4	70.5	17.4	63.3	21.4	70.5
95ºF DB, 67.9ºF WB (35ºC DB, 19.9ºC WB) 23% RH								
Total kW (BTU/H)	34.5	117749	20.8	70990	34.5	117749	20.8	70990
Sensible kW (BTU/H)	34.5	117749	20.8	70990	34.5	117749	20.8	70990
Flow Rate, l/s (GPM)	1.422	22.54	0.855	13.55	1.539	24.39	0.926	14.68
Pressure Drop, kPa (ft H2O)	125	41.82	81	27.10	150	50.18	98	32.79
Unit Power Imput kW (BTU/H)	13.09	44676	8.04	27441	13.09	44676	8.04	27441
Heat rejection kW (BTU/H)	47.5	162118	28.8	98294	47.5	162118	28.8	98294
Supply Air Temperature °C (°F)	15.8	60.4	19.6	67.3	15.8	60.4	19.6	67.3
90ºF DB, 66.2ºF WB (32.2ºC DB, 19.0ºC WB) 27% RH								
Total kW (BTU/H)	32.7	111605	19.7	67236	32.7	111605	19.7	67236
Sensible kW (BTU/H)	32.7	111605	19.7	67236	32.7	111605	19.7	67236
Flow Rate, l/s (GPM)	1.359	21.54	0.815	12.92	1.47	23.30	0.882	13.98
Pressure Drop, kPa (ft H2O)	114	38.14	75	25.09	137	45.83	90	30.11
Unit Power Imput kW (BTU/H)	13.11	44744	7.99	27270	13.11	44744	7.99	27270
Heat rejection kW (BTU/H)	45.7	155974	27.6	94199	45.7	155974	27.6	94199
Supply Air Temperature °C (°F)	14.1	57.4	17.7	63.9	14.1	57.4	17.7	63.9
85ºF DB, 64.5ºF WB (29.4ºC DB, 18.1ºC WB) 31% RH								
Total kW (BTU/H)	32.1	109557	18.7	63823	32.1	109557	18.7	63823
Sensible kW (BTU/H)	32.1	109557	18.7	63823	32.1	109557	18.7	63823
Flow Rate, l/s (GPM)	1.3	20.61	0.777	12.32	1.406	22.29	0.84	13.31
Pressure Drop, kPa (ft H2O)	105	35.13	68	22.75	126	42.15	82	27.43
Unit Power Imput kW (BTU/H)	13.11	44744	7.94	27099	13.11	44744	7.94	27099
Heat rejection kW (BTU/H)	44.1	150513	26.6	90786	44.1	150513	26.6	90786
Supply Air Temperature °C (°F)	12.5	54.5	15.8	60.4	12.5	54.5	15.8	60.4
80ºF DB, 62.8ºF WB (26.7ºC DB, 17.1ºC WB) 37% RH								
Total kW (BTU/H)	30.6	104438	18.5	63141	30.6	104438	18.5	63141
Sensible kW (BTU/H)	29	98977	18	61434	29	98977	18	61434
Flow Rate, l/s (GPM)	1.283	20.34	0.749	11.87	1.387	21.98	0.809	12.82
Pressure Drop, kPa (ft H2O)	103	34.46	63	21.08	122	40.82	77	25.76
Unit Power Imput kW (BTU/H)	13.11	44744	7.9	26963	13.11	44744	7.9	26963
Heat rejection kW (BTU/H)	43.6	148807	25.8	88055	43.6	148807	25.8	88055
Supply Air Temperature °C (°F)	11	51.8	14.2	57.6	11	51.8	14.2	57.6
80°F DB, 66.5°F WB (26.7°C DB, 19.2°C WB) 50% RH								
Total kW (BTU/H)	32.7	111605	19.5	66554	32.7	111605	19.5	66554
Sensible kW (BTU/H)	25	85325	16	54608	25	85325	16	54608
Flow Rate, l/s (GPM)	1.36	21.56	0.808	12.81	1.471	23.32	0.874	13.85
Pressure Drop, kPa (ft H2O)	115	38.47	73	24.42	137	45.83	88	29.44
Unit Power Imput kW (BTU/H)	13.11	44744	7.98	27236	13.11	44744	7.98	27236
Heat rejection kW (BTU/H)	45.8	156315	27.4	93516	45.8	156315	27.4	93516
Supply Air Temperature °C (°F)	13.1	55.6	15.2	59.4	13.1	55.6	15.2	59.4
75°F DB, 62.5°F WB (23.9°C DB, 16.9°C WB) 50% RH								

Specifications - Glycol cooled

Total kW (BTU/H)	30.6	104438	18.1	61775	30.6	104438	18.1	61775
Sensible kW (BTU/H)	24.4	83277	15.6	53243	24.4	83277	15.6	53243
Flow Rate, l/s (GPM)	1.283	20.34	0.756	11.98	1.387	21.98	0.816	12.93
Pressure Drop, kPa (ft H2O)	103	34.46	65	21.75	122	40.82	78	26.10
Unit Power Imput kW (BTU/H)	13.11	44744	7.91	26997	13.11	44744	7.91	26997
Heat rejection kW (BTU/H)	43.6	148807	25.9	88397	43.6	148807	25.9	88397
Supply Air Temperature °C (°F)	10.8	51.4	12.9	55.2	10.8	51.4	12.9	55.2
75ºF DB, 61ºF WB (23.9ºC DB, 16.1ºC WB) 45% RH								
Total kW (BTU/H)	29.7	101366	17.6	60069	29.7	101366	17.6	60069
Sensible kW (BTU/H)	25.8	88055	16.4	55973	25.8	88055	16.4	55973
Flow Rate, l/s (GPM)	1.253	19.86	0.736	11.67	1.353	21.45	0.795	12.60
Pressure Drop, kPa (ft H2O)	98	32.79	62	20.74	117	39.14	74	24.76
Unit Power Imput kW (BTU/H)	13.11	44744	7.88	26894	13.11	44744	7.88	26894
Heat rejection kW (BTU/H)	42.7	145735	25.4	86690	42.7	145735	25.4	86690
Supply Air Temperature °C (°F)	10.1	50.2	12.2	54.0	10.1	50.2	12.2	54.0
72°F DB, 60.1°F WB (22.2°C DB, 15.6°C WB) 50% RH								
Total kW (BTU/H)	29.1	99318	17.4	59386	29.1	99318	17.4	59386
Sensible kW (BTU/H)	24	81912	15.2	51878	24	81912	15.2	51878
Flow Rate, l/s (GPM)	1.232	19.53	0.728	11.54	1.33	21.08	0.786	12.46
Pressure Drop, kPa (ft H2O)	95	31.78	60	20.07	113	37.80	72	24.09
Unit Power Imput kW (BTU/H)	13.11	44744	7.86	26826	13.11	44744	7.86	26826
Heat rejection kW (BTU/H)	42.1	143687	25.2	86008	42.1	143687	25.2	86008
Supply Air Temperature °C (°F)	9.4	48.9	11.5	52.7	9.4	48.9	11.5	52.7
72°F DB, 58.7°F WB (22.2°C DB, 14.8°C WB) 45% RH								
Total kW (BTU/H)	28.3	96588	16.9	57680	28.3	96588	16.9	57680
Sensible kW (BTU/H)	25.2	86008	16.1	54949	25.2	86008	16.1	54949
Flow Rate, l/s (GPM)	1.202	19.05	0.711	11.27	1.298	20.57	0.767	12.16
Pressure Drop, kPa (ft H2O)	90	30.11	58	19.40	108	36.13	69	23.08
Unit Power Imput kW (BTU/H)	13.11	44744	7.84	26758	13.11	44744	7.84	26758
Heat rejection kW (BTU/H)	41.3	140957	24.7	84301	41.3	140957	24.7	84301
Supply Air Temperature °C (°F)	8.8	47.8	10.8	51.4	8.8	47.8	10.8	51.4

Record the power consumption of the fan at various operating percentages (min - 100%).

* *Cooling capacities are net values. All capacities are nominal values; actual performance will be ±5%.*

** *NOTE: Data rated with Standard (MERV 8/ G4) filter. Some options or combinations of options may result in reduced airflow. Consult factory for recommendations.*

*** *Refer to Tab 6j for standard air flow*

Specifications - CW

6.4 Performances - CW units

Tab. 6g - CW - 60 Hz

CW - 60Hz	CR040RC							
	45°F (7.2°C) EWT, 10°F (5.6°C) Water Rise		45°F (7.2°C) EWT, 14°F (7.7°C) Water Rise		48°F (8.9°C) EWT, 10°F (5.6°C) Water Rise		48°F (8.9°C) EWT, 14°F (7.7°C) Water Rise	
105ºF DB, 71ºF WB (40.6ºC DB, 21.6ºC WB) 17% RH								
Total kW (BTU/H)	49.6	169285	48	163824	47	160411	45.4	154950
Sensible kW (BTU/H)	49.6	169285	48	163824	47	160411	45.4	154950
Unit Power Imput kW (BTU/H)	1.26	4300	1.26	4300	1.26	4300	1.26	4300
Flow Rate, l/s (GPM)	2.11	33.44	1.49	23.62	2	31.70	1.41	22.35
Pressure Drop, kPa (ft H2O)	142	47.51	75	25.09	128	42.82	67	22.42
Supply Air Temperature °C (°F)	13.6	56.5	14.5	58.1	15.1	59.2	16	60.8
100ºF DB, 69.5ºF WB (37.8ºC DB, 20.8ºC WB) 20% RH								
Total kW (BTU/H)	45.5	155292	43.8	149489	42.8	146076	41.2	140616
Sensible kW (BTU/H)	45.5	155292	43.8	149489	42.8	146076	41.2	140616
Unit Power Imput kW (BTU/H)	1.26	4300	1.26	4300	1.26	4300	1.26	4300
Flow Rate, l/s (GPM)	1.94	30.75	1.36	21.56	1.83	29.01	1.28	20.29
Pressure Drop, kPa (ft H2O)	121	40.48	64	21.41	108	36.13	56	18.73
Supply Air Temperature °C (°F)	13.4	56.1	14.3	57.7	14.8	58.6	15.8	60.4
95ºF DB, 67.9ºF WB (35ºC DB, 19.9ºC WB) 23% RH								
Total kW (BTU/H)	41.3	140957	39.5	134814	38.6	131742	36.8	125598
Sensible kW (BTU/H)	41.3	140957	39.5	134814	38.6	131742	36.8	125598
Unit Power Imput kW (BTU/H)	1.26	4300	1.26	4300	1.26	4300	1.26	4300
Flow Rate, l/s (GPM)	1.76	27.90	1.23	19.50	1.64	25.99	1.14	18.07
Pressure Drop, kPa (ft H2O)	102	34.12	53	17.73	90	30.11	46	15.39
Supply Air Temperature °C (°F)	13.1	55.6	14.1	57.4	14.6	58.3	15.6	60.1
90ºF DB, 66.2ºF WB (32.2ºC DB, 19.0ºC WB) 27% RH								
Total kW (BTU/H)	37	126281	35.1	119796	34.3	117066	32.4	110581
Sensible kW (BTU/H)	37	126281	35.1	119796	34.3	117066	32.4	110581
Unit Power Imput kW (BTU/H)	1.26	4300	1.26	4300	1.26	4300	1.26	4300
Flow Rate, l/s (GPM)	1.58	25.04	1.09	17.28	1.46	23.14	1.01	16.01
Pressure Drop, kPa (ft H2O)	84	28.10	43	14.39	72	24.09	37	12.38
Supply Air Temperature °C (°F)	12.9	55.2	13.9	57.0	14.3	57.7	15.3	59.5
85ºF DB, 64.5ºF WB (29.4ºC DB, 18.1ºC WB) 31% RH								
Total kW (BTU/H)	32.6	111264	30.6	104438	29.9	102049	27.9	95223
Sensible kW (BTU/H)	32.6	111264	30.6	104438	29.9	102049	27.9	95223
Unit Power Imput kW (BTU/H)	1.26	4300	1.26	4300	1.26	4300	1.26	4300
Flow Rate, l/s (GPM)	1.39	22.03	0.95	15.06	1.28	20.29	0.86	13.63
Pressure Drop, kPa (ft H2O)	67	22.42	33	11.04	57	19.07	28	9.37
Supply Air Temperature °C (°F)	12.6	54.7	13.7	56.7	14.1	57.4	15.1	59.2
80ºF DB, 62.8ºF WB (26.7ºC DB, 17.1ºC WB) 37% RH								
Total kW (BTU/H)	28.3	96588	26.2	89421	25.6	87373	23.4	79864
Sensible kW (BTU/H)	28.3	96588	26.2	89421	25.6	87373	23.4	79864
Unit Power Imput kW (BTU/H)	1.26	4300	1.26	4300	1.26	4300	1.26	4300
Flow Rate, l/s (GPM)	1.21	19.18	0.81	12.84	1.09	17.28	0.73	11.57
Pressure Drop, kPa (ft H2O)	52	17.40	25	8.36	43	14.39	20	6.69
Supply Air Temperature °C (°F)	12.3	54.1	13.5	56.3	13.8	56.8	15	59.0
80ºF DB, 66.5ºF WB (26.7ºC DB, 19.2ºC WB) 50% RH								
Total kW (BTU/H)	35.6	121503	28.7	97953	29.5	100684	23.4	79864
Sensible kW (BTU/H)	26.8	91468	23.6	80547	24.3	82936	21.6	73721
Unit Power Imput kW (BTU/H)	1.26	4300	1.26	4300	1.26	4300	1.28	4369
Flow Rate, l/s (GPM)	1.52	24.09	0.89	14.11	1.26	19.97	0.73	11.57
Pressure Drop, kPa (ft H2O)	78	26.10	30	10.04	55	18.40	21	7.03
Supply Air Temperature °C (°F)	13	55.4	14.8	58.6	14.5	58.1	16	60.8
75ºF DB, 62.5ºF WB (23.9ºC DB, 16.9ºC WB) 50% RH								
Total kW (BTU/H)	24.7	84301	21.4	73038	21	71673	18.4	62799
Sensible kW (BTU/H)	22.4	76451	21.4	73038	21	71673	18.4	62799
Unit Power Imput kW (BTU/H)	1.28	4369	1.26	4300	1.26	4300	1.26	4300
Flow Rate, l/s (GPM)	1.05	16.64	0.66	10.46	0.89	14.11	0.57	9.03
Pressure Drop, kPa (ft H2O)	40	13.38	18	6.02	30	10.04	13	4.35
Supply Air Temperature °C (°F)	12.8	55.0	13.4	56.1	13.6	56.5	15	59.0
75ºF DB, 61ºF WB (23.9ºC DB, 16.1ºC WB) 45% RH								
Total kW (BTU/H)	23.8	81229	21.4	73038	21	71673	18.4	62799
Sensible kW (BTU/H)	23.8	81229	21.4	73038	21	71673	18.4	62799
Unit Power Imput kW (BTU/H)	1.26	4300	1.26	4300	1.26	4300	1.26	4300
Flow Rate, l/s (GPM)	1.01	16.01	0.66	10.46	0.89	14.11	0.57	9.03
Pressure Drop, kPa (ft H2O)	38	12.71	18	6.02	30	10.04	13	4.35
Supply Air Temperature °C (°F)	12.1	53.8	13.4	56.1	13.6	56.5	15	59.0

Specifications - CW

72ºF DB, 60.1ºF WB (22.2ºC DB, 15.6ºC WB) 50% RH								
Total kW (BTU/H)	20.9	71332	18.3	62458	18.1	61775	15.1	51536
Sensible kW (BTU/H)	20.9	71332	18.3	62458	18.1	61775	15.1	51536
Unit Power Imput kW (BTU/H)	1.26	4300	1.26	4300	1.26	4300	1.26	4300
Flow Rate, l/s (GPM)	0.89	14.11	0.57	9.03	0.77	12.20	0.47	7.45
Pressure Drop, kPa (ft H2O)	30	10.04	13	4.35	23	7.69	9	3.01
Supply Air Temperature °C (°F)	12	53.6	13.4	56.1	13.5	56.3	15.1	59.2
72ºF DB, 58.7ºF WB (22.2ºC DB, 14.8ºC WB) 45% RH								
Total kW (BTU/H)	20.9	71332	18.2	62117	18.1	61775	15.1	51536
Sensible kW (BTU/H)	20.9	71332	18.2	62117	18.1	61775	15.1	51536
Unit Power Imput kW (BTU/H)	1.26	4300	1.26	4300	1.26	4300	1.26	4300
Flow Rate, l/s (GPM)	0.89	14.11	0.57	9.03	0.77	12.20	0.47	7.45
Pressure Drop, kPa (ft H2O)	30	10.04	13	4.35	23	7.69	9	3.01
Supply Air Temperature °C (°F)	12	53.6	13.4	56.1	13.5	56.3	15	59.0

* *Cooling capacities are net values. All capacities are nominal values; actual performance will be ±5%.*

** *NOTE: Data rated with Standard (MERV 8/ G4) filter. Some options or combinations of options may result in reduced airflow. Consult factory for recommendations.*

*** *Refer to Tab 6j for standard air flow*

Specifications - CW

Tab. 6h - CW - 50 Hz

CW - 50Hz	CR040RC					
	7°C (44.6°F) EWT, 5°C (9°F) Water Rise		10°C (50°F) EWT, 5°C (9°F) Water Rise		13°C (55,4°F) EWT, 5°C (9°F) Water Rise	
40°C DB (104°F) 20% RH						
Total kW (BTU/H)	51.1	174404	44.9	153244	40.3	137544
Sensible kW (BTU/H)	49.7	169626	44.9	153244	40.3	137544
Unit Power Imput kW (BTU/H)	1.26	4300	1.26	4300	1.26	4300
Flow Rate, l/s (GPM)	2.44	38.67	2.14	33.92	1.93	30.59
Pressure Drop, kPa (ft H2O)	184	61.56	144	48.18	116	38.81
Supply Air Temperature °C (°F)	13.1	55.6	15.7	60.3	18.3	64.9
37°C DB (98,6°F) 24% RH						
Total kW (BTU/H)	47.9	163483	40.4	137885	35.7	121844
Sensible kW (BTU/H)	45	153585	40.4	137885	35.7	121844
Unit Power Imput kW (BTU/H)	1.26	4300	1.26	4300	1.26	4300
Flow Rate, l/s (GPM)	2.28	36.14	1.93	30.59	1.71	27.10
Pressure Drop, kPa (ft H2O)	163	54.53	119	39.81	94	31.45
Supply Air Temperature °C (°F)	12.9	55.2	15.5	59.9	18.1	64.6
35°C DB (95°F) 26% RH						
Total kW (BTU/H)	43.7	149148	37.4	127646	32.7	111605
Sensible kW (BTU/H)	42	143346	37.4	127646	32.7	111605
Unit Power Imput kW (BTU/H)	1.26	4300	1.26	4300	1.26	4300
Flow Rate, l/s (GPM)	2.08	32.97	1.79	28.37	1.56	24.73
Pressure Drop, kPa (ft H2O)	139	46.50	103	34.46	80	26.76
Supply Air Temperature °C (°F)	12.8	55.0	15.3	59.5	17.9	64.2
32°C DB (89,6°F) 29% RH						
Total kW (BTU/H)	37.6	128329	32.7	111605	28	95564
Sensible kW (BTU/H)	37.2	126964	32.7	111605	28	95564
Unit Power Imput kW (BTU/H)	1.26	4300	1.26	4300	1.26	4300
Flow Rate, l/s (GPM)	1.79	28.37	1.56	24.73	1.34	21.24
Pressure Drop, kPa (ft H2O)	106	35.46	81	27.10	60	20.07
Supply Air Temperature °C (°F)	12.5	54.5	15	59.0	17.6	63.7
30°C DB (86°F) 34% RH						
Total kW (BTU/H)	35.9	122527	29.6	101025	24.8	84642
Sensible kW (BTU/H)	34	116042	29.6	101025	24.8	84642
Unit Power Imput kW (BTU/H)	1.26	4300	1.26	4300	1.26	4300
Flow Rate, l/s (GPM)	1.71	27.10	1.41	22.35	1.19	18.86
Pressure Drop, kPa (ft H2O)	97	32.45	68	22.75	49	16.39
Supply Air Temperature °C (°F)	12.4	54.3	14.8	58.6	17.4	63.3
28°C DB (82,4) 38% RH						
Total kW (BTU/H)	33	112629	26.5	90445	21.6	73721
Sensible kW (BTU/H)	30.7	104779	26.5	90445	21.6	73721
Unit Power Imput kW (BTU/H)	1.28	4369	1.26	4300	1.26	4300
Flow Rate, l/s (GPM)	1.58	25.04	1.26	19.97	1.03	16.33
Pressure Drop, kPa (ft H2O)	84	28.10	55	18.40	38	12.71
Supply Air Temperature °C (°F)	12.3	54.1	14.6	58.3	17.2	63.0
28°C DB (82,4) 45% RH						
Total kW (BTU/H)	38.9	132766	28.6	97612	21.6	73721
Sensible kW (BTU/H)	30.1	102731	25.6	87373	21.6	73721
Unit Power Imput kW (BTU/H)	1.26	4300	1.28	4369	1.26	4300
Flow Rate, l/s (GPM)	1.86	29.48	1.36	21.56	1.03	16.33
Pressure Drop, kPa (ft H2O)	113	37.80	64	21.41	38	12.71
Supply Air Temperature °C (°F)	12.4	54.3	15	59.0	17.2	63.0
25°C DB (77°F) 45% RH						
Total kW (BTU/H)	27.8	94881	21.6	73721	16.6	56656
Sensible kW (BTU/H)	25.8	88055	21.6	73721	16.6	56656
Unit Power Imput kW (BTU/H)	1.28	4369	1.26	4300	1.26	4300
Flow Rate, l/s (GPM)	1.33	21.08	1.03	16.33	0.79	12.52
Pressure Drop, kPa (ft H2O)	62	20.74	38	12.71	24	8.03
Supply Air Temperature °C (°F)	12.1	53.8	14.3	57.7	17	62.6
25°C DB (77°F) 40% RH						
Total kW (BTU/H)	26.5	90445	21.6	73721	16.6	56656
Sensible kW (BTU/H)	26.5	90445	21.6	73721	16.6	56656
Unit Power Imput kW (BTU/H)	1.26	4300	1.26	4300	1.26	4300
Flow Rate, l/s (GPM)	1.26	19.97	1.03	16.33	0.79	12.52
Pressure Drop, kPa (ft H2O)	56	18.73	38	12.71	24	8.03
Supply Air Temperature °C (°F)	11.7	53.1	14.3	57.7	17	62.6
22°C DB (71,6°F) 55% RH						
Total kW (BTU/H)	23.9	81571	16.6	56656	11.3	38567

Specifications - CW

Sensible kW (BTU/H)	20.5	69967	16.6	56656	11.3	38567
Unit Power Imput kW (BTU/H)	1.26	4300	1.26	4300	1.26	4300
Flow Rate, l/s (GPM)	1.14	18.07	0.79	12.52	0.54	8.56
Pressure Drop, kPa (ft H2O)	47	15.72	24	8.03	12	4.01
Supply Air Temperature °C (°F)	11.9	53.4	14.1	57.4	16.9	62.4
22°C DB (71,6°F) 50% RH						
Total kW (BTU/H)	21.6	73721	16.6	56656	11.3	38567
Sensible kW (BTU/H)	21.3	72697	16.6	56656	11.3	38567
Unit Power Imput kW (BTU/H)	1.26	4300	1.26	4300	1.26	4300
Flow Rate, l/s (GPM)	1.03	16.33	0.79	12.52	0.54	8.56
Pressure Drop, kPa (ft H2O)	39	13.05	24	8.03	12	4.01
Supply Air Temperature °C (°F)	11.6	52.9	14.1	57.4	16.9	62.4

* *Cooling capacities are net values. All capacities are nominal values; actual performance will be ±5%.*
** *NOTE: Data rated with Standard (MERV 8/ G4) filter. Some options or combinations of options may result in reduced airflow. Consult factory for recommendations.*
*** *Refer to Tab 6j for standard air flow*

Specifications - Electrical data

6.5 Electric data

Tab. 6i - Electrical data

Configuration	Model	Power supply	FLA [A]	LRA [A]	RESIDUAL-CURRENT CIRCUIT BREAKERS I△n = 0.3A (400V)
Cooling *Fan + compressor*	**CR020**	**400 / 3N / 50 Hz**	22.3	107	40 A Curve C
	CR035		28.0	121	50 A Curve C
Cooling + Electrical heating (dehumidification) *Fan + compressor + electrical heaters*	**CR020**	**400 / 3N / 50 Hz**	31.0	116	50 A Curve C
	CR035		36.7	130	63 A Curve C
Cooling + Humidification *Fan + compressor + humidifier*	**CR020**	**400 / 3N / 50 Hz**	31.0	116	50 A Curve C
	CR035		36.7	130	63 A Curve C

Configuration	Model	Power supply	FLA [A]	LRA [A]	RESIDUAL-CURRENT CIRCUIT BREAKERS I△n = 0.3A (400V)
Cooling Fan	**CR040**	**400 / 3N / 50 Hz**	3	3	10 A Curve C
Cooling + Electrical heating Fan + electrical heaters	**CR040**	**400 / 3N / 50 Hz**	11,7	11,7	20 A Curve C
Cooling + Humidification Fan + humidifier	**CR040**	**400 / 3N / 50 Hz**	9,5	9,5	20 A Curve C

Without condensate pump option
The cables have to be sized in compliance with local standards and according to the type and characteristics (e.g. Amperes) of installation.
The specific power of the user-installed switch, must be lower than 300,000 A^2 x s.
Prescriptions on the differential relay required to the user:

- *For special places (healthcare facilities, etc...) comply with the local regulations;*
- *For ordinary places, a low sensitivity is suggested (300mA) coordinated with the value of the ground heater (IEC364): Ra ≤ 50/Ia (Art. 413.1.4.1, CEI 64-8);*
- *In case of frequent over-voltages with mains impulse, it is advisable to install a selective differential and to evaluate the need for adopting other devices.*

COMPONENT	POWER SUPPLY	MODEL	OA* [A]	FLA** [A]	LRA** [A]	NOMINAL POWER [kW]
FAN	400 V/3 N/50 Hz	CR020	2x1,95	2x3,1	2x0,1	2x0,30
		CR035	2x0,85	2x1,5	2x0,1	2x0,53
		CR040	2x1	2x1,5	2x0,1	2x0,63
COMPRESSOR	400 V/3 N/50 Hz	CR020	11,13	16,1	101	5,99
		CR035	16,70	25,0	118	9,34
HUMIDIFIER	400 V/3 N/50 Hz	CR020	6,5	6,5	-	1,50
		CR035	6,5	6,5	-	1,50
		CR040	6,5	6,5	-	1,50
ELECTRICAL HEATER	400 V/3 N/50 Hz	CR020	8,7	8,7	-	6
		CR035	8,7	8,7	-	6
		CR040	8,7	8,7	-	6
CONDENSATE PUMP	400 V/3 N/50 Hz	CR020	-	1,2	-	-
		CR035	-	1,2	-	-
		CR040	-	1,2	-	-

(*) at nominal operating condition: condensing temperature 120°F/48,9°C - inlet air condition 100°F/37,8°C 20%RH
(**) FLA= Max operating current LRA= Locked rotor Amps

Specifications - Electrical data

CONFIGURATION		CR020RA/W		CR035RA/W		CR040RC	
	Voltage	460\3\60	208\3\60	460\3\60	208\3\60	460\3\60	208\3\60
With Electric Reheat, Steam Generating Humidifier, & Condensate Pump	**FLA**	27,4	51,0	31,7	62,0	11,7	24,9
	WSA	32,4	61,6	38,6	75,4	14,3	31,1
	OPD	40A	80A	50A	100A	15A	35A
With Steam Generating Humidifier & Condensate Pump	**FLA**	23,6	42,8	27,9	53,8	7,9	16,7
	WSA	26,7	49,3	32,9	63,1	9,9	20,9
	OPD	35A	70A	50A	100A	15A	25A
With Electric Reheat & Condensate Pump	**FLA**	27,4	51,0	31,7	62,0	11,7	24,9
	WSA	32,4	61,6	38,6	75,4	14,3	31,1
	OPD	40A	80A	50A	100A	15A	35A
With Electric Reheat & Steam Generating Humidifier	**FLA**	26,2	48,7	30,5	59,7	10,5	22,6
	WSA	31,2	59,3	37,4	73,1	13.1	28,3
	OPD	40A	80A	50A	100A	15A	30A
With Condensate Pump	**FLA**	19.9	34.4	24.2	45.4	4.2	8.3
	WSA	23.0	40.9	29.2	54.7	4.6	9.1
	OPD	30A	60A	45A	90A	15A	15A
Without Electric Reheat, Steam Generating Humidifier, & Condensate Pump	**FLA**	18,7	32,1	23,0	43,1	3,0	6,0
	WSA	21,8	38,6	28,0	52,4	3,4	6,8
	OPD	30A	60A	45A	80A	15A	15A

FLA = Full Load Amps (Input Amps); WSA = Wire Size Amps (Minimum Supply Circuit Ampacity); OPD = Maximum Overcurrent Protective

Voltage	CR020		CR035/CR040	
	460\3\60	208\3\60	460\3\60	208\3\60
Digital Scroll Compressor				
RLA	12,5	25,9	20	37,1
LRA	75	164	125	239
Fans				
RLA	6,2	6,2	3	6
LRA	0,2	0,2	0,2	0,2
Humidifier				
FLA	3,7	8,4	3,7	8,4
Electric Reheat				
FLA	7,5	16,6	7,5	16,6
Condensate Pump				
FLA	1,2	2,3	1,2	2,3

Device Size RLA = Rated Load Amps; LRA = Locked Rotor Amps

6.6 Sound data

Tab. 6j - Liebert CRV Sound Data

The following tables show sound levels for every octave band frequency.

CR020 Air Cooled Tested

MODEL	Airflow		Octave band frequency (Hz)										Sound Level [dB(A)]	Unit SPL suction (2m, f.f., dBA)
Fan Speed %	SCFM	m^3/h	Level	31.5	63	125	250	500	1000	2000	4000	8000		
100	2454	4170	**PWL**	73.8	69.4	71	77.3	75.9	74.2	73.5	68.2	59.2	79.6	69.2
75	2166	3680	**PWL**	71.2	66.8	68.4	74.7	73.3	71.6	70.9	65.6	56.6	77	66.9
55	1780	3025	**PWL**	67.6	63.2	64.8	71.1	69.7	68	67.3	62	53	73.4	63.9

CR035 Air Cooled Tested

MODEL	Airflow		Octave band frequency (Hz)										Sound Level [dB(A)]	Unit SPL suction (2m, f.f., dBA)
Fan Speed %	SCFM	m^3/h	Level	31.5	63	125	250	500	1000	2000	4000	8000		
100	3260	5540	**PWL**	76	76.2	80.5	82.7	77.3	73.1	74.5	69	61.9	80.9	70
75	2708	4600	**PWL**	71.3	71.5	75.8	78	72.6	68.4	69.8	64.3	57.2	76.2	65.7
50	2048	3480	**PWL**	66.3	66.5	70.8	73	67.6	63.4	64.8	59.3	52.2	71.2	61.9

CR040 Water Cooled Tested

MODEL	Airflow		Octave band frequency (Hz)										Sound Level [dB(A)]	Unit SPL suction (2m, f.f., dBA)
Fan Speed %	SCFM	m^3/h	Level	31.5	63	125	250	500	1000	2000	4000	8000		
100	3325	5650	**PWL**	86.4	78.1	82.4	84.6	79.2	75	76.4	70.9	63.8	82.8	71.6
75	2708	4600	**PWL**	80.8	72.5	76.8	79	73.6	69.4	70.8	65.3	58.2	77.2	66
50	1972	3350	**PWL**	75.1	66.8	71.1	73.3	67.9	63.7	65.1	59.6	52.5	71.5	60.3

Level
PWL *sound power level*
SPL *sound pressure level*

7 Heat Rejections (A version)

7.1 Coupling of Liebert CRV (A—type, 50Hz, CE mark) air conditioning units with remote air—cooled condensers (Liebert HCR)

HCR condensers are especially designed to be coupled with the Liebert CRV (A type) air conditioning units power supplied at 50Hz (CE market), within a standard range of external air temperature from −20 °C to +46 °C.

The HCR familiy comes with a factory—installed stepless fan speed controller especially designed and setted for usage with R410A refrigerant and digital scroll refrigerant circuit.

Tab. 7a — Coupling of Liebert HCR Condensers with Liebert CRV (A—type, 50Hz, CE mark) air conditioning units

MODEL	External temperature up to 35°C		External temperature up to 40°C		External temperature up to 46°C	
	Standard noise	low noise	standard noise	low noise	standard noise	
CR020RA	1 x HCR33	1 x HCR43	1 x HCR43	1 x HCR51	1 x HCR51	1 x HCR59
CR035RA	1 x HCR51	1 x HCR59	1 x HCR51	1 x HCR59	1 x HCR76	1 x HCR88

The table shows the recommended combinations of the Air cooled Condensers Liebert HCR (50Hz — CE mark) with the air conditioners Liebert CRV (50Hz — CE mark), according to the indicated max external air temperature.
Connecting a too large capacity condenser (50% higher than the nominal capacity indicated in Tab. 7.a) to the HPM unit can cause malfunctioning and incorrect condenser regulation at low ambient temperature (e.g. in cold season).
The above indications are approximate and must be checked on the basis of other specific operating conditions.
For operating conditions other than those indicated in the table, refer to the New Hirating calculation software and to the Liebert HCR service manual.

Tab. 7b — Technical data and performance of air—cooled condenser Liebert HCR

Model	Power supply [V/Ph/Hz]	Total Heat Rejection (THR)* R410A [kW]	Air Volume [m^3/h]	Noise Level ** [dB(A)] @ 5 m, f.f.	Input Power [kW]	Current Absorption [A]	FLA [A]	Refrigerant connections [mm] Gas line [mm]	Refrigerant connections [mm] Liquid line [mm]	Dimensions [mm]	Weight [kg]
HCR33	230/1/50	32.2	7400	50.0	0.55	2.5	2.6	16	16	W 1340 D 831 H 1112	75
HCR43	230/1/50	46.0	17000	53.0	1.10	5.0	5.2	16	16	W 2340 D 831 H 1112	92
HCR51	230/1/50	52.0	17000	53.0	1.10	5.0	5.2	22	16	W 2340 D 831 H 1112	93
HCR59	230/1/50	62.0	15600	53.0	1.10	5.0	5.2	22	16	W 2340 D 831 H 1112	102
HCR76	230/1/50	78.0	25500	55.0	1.65	7.5	7.8	22	16	W 3340 D 831 H 1112	136
HCR88	230/1/50	92.0	23400	55.0	1.65	7.5	7.8	22	16	W 3340 D 831 H 1112	165

(*) The nominal heat rejection capacities refer to the following operative conditions:
- refrigerant R410A
- temperature differences: 15 K
- (T condensation dew point — Toutdoor).
- liquid sub—cooling 3K
- height of the installation = 0 m, above the sea level.
- for different conditions refer to NewHirating program.
- clean exchange surfaces.

(**) The levels of sound pressure here included are measured in the same operative conditions, and are referred to 5 m far from the unit, at 1.5 m in height, in free field conditions.

All Liebert HCR air remote condensers are:
- CE marked
- Conform to the following European Directives:

Heat Rejections (A version)

Machine Directive 98/37/CE

PED 97/23/CEE

LVD 2006/95/EC

EMC 2004/108/EC (EN61000–6–2; EN 61000–6–3)

- Frame is made up of a sturdy aluminium structure
- Units are factory equipped with electric board 230V/1ph/50Hz +T, with main disconnector IP65 and with stepless fan speed controller.
  The electrical board is designed to allow a local or remote switch from high to low fan speed set point (and viceversa) by means of terminal contact 70–71.
  The entire units have IP54 type of protection.
- Motorized fans are IP54 (DIN60529) , protection class F.
  Maintenance–free ball bearings.
- Most important technical data are gathered in Tab. 5b
- Heat rejection capacity have been measured according to the norm EN327;
  Sound power level have been measured according to the norm UNI EN ISO 3741:2001;
  Sound pressure level have been evaluated according to the norm EN13487, at 5m distance, with free field conditions.
- Max working pressure is 43 barg

7.2 Coupling of Liebert CRV (W-type, 50Hz, CE mark) water cooled air conditioning units with remote Liebert HPD Dry Coolers

The water-condensed units are provided with a water/refrigerant exchanger with braze-welded **plates** made of **stainless steel**; this advanced exchanger type gives the highest efficiency in heat exchange. In addition, a certain oversizing of the exchanger has been provided so as to reduce pressure drops (and energy consumption of the water pump) as much as possible and thus to allow the unit to operate with the external chiller in closed circuit, even at high outdoor temperatures.

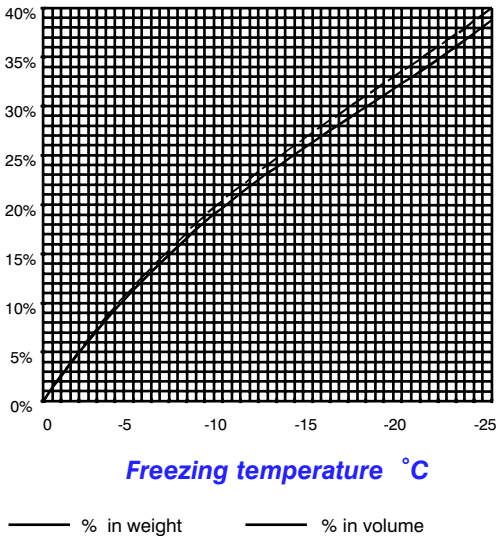
When operating in a closed circuit, the water is cooled by the outdoor air in a heat exchanger; in this case, to avoid unwanted ice formation during winter, it is advisable to use a water/glycol mixture.

The circulation of the water-glycol mixture is forced (the pump is not supplied). If mains water or tower water is used, when installing the unit fit a mechanical filter on the water line to protect the condenser against possible impurities contained in the water (for condenser cleaning see the service manual).

Liebert HPD Dry Coolers

Our Liebert HPD Dry Coolers are built with a copper/aluminium cooling coil and axial fan(s).
The main data on Dry Coolers is shown in the following table:

Percentage of ethylene glycol mixed with water



Note:
In the closed circuits to avoid water freezing in the cold seasons, it is strictly recommended to mix water with ethylene glycol. The suggested percentage is given in the Diagram.
For safety reason, **calculate the percentage** at least at 5°C below the minimum ambient temperature.

It is also recommended to check periodically the mixture: in case of leackage of the circuit, the sanitary water, used at compensation, reduces progressively the glycol percentage and increases the freezing point of the mixture!

Features and benefits

Liebert HPD Dry Coolers are the new range of liquid coolers, able to cover rated heat exchange capacities from 8 to 400 kW.

They excel above all for their efficiency, versatility and reliability, thanks to the following features:

- possibility of installation with horizontal or vertical air flow with simple operations on site, with the same model of Dry Cooler, without needing any wiring or re-wiring inside the unit.
- modulating fan speed regulator with phase (optional), for a continuous modulation of the fan speed, installed on the machine, wired and factory-set, thus making the connection steps on site and the unit start-up extremely easy; the fan speed regulator with phase cutoff can be selected to control up to two set-point values for the water delivery temperature of the Dry Cooler.
  Do not use fan speed regulator other than the approved one supplied by the manufacturer.
  When the Dry Cooler is ordered without temperature control, an outer on/off type control (to be arranged by the customer) is anyway allowed and must be connected on site with the suitable terminals available in the electric board Q of the unit (see wiring diagram enclosed to the unit).

Heat Rejections (W version)

- The axial fans are equipped with protection grid and are statically and dynamically balanced; they can guarantee high efficiency and a low emitted noise level (above all in the low noise version); further, they are equipped with motors able to operate within a wide range of outdoor working temperatures. Protection degree IP 54. Single-phase fans feature an electric condenser incorporated in the terminal board.
- Heat exchanger with oval-geometry tubes ensuring the best air flow and thus an increase in the efficiency of the heat exchange, for a lower emitted noise level.
  Tubes are in copper and fins in aluminum, with wide heat exchange surface.
  Upon request (optional), the unit can be ordered with fins in epoxy-coated aluminum, with a better protection. The coil manifolds are in copper, with flanged connections in AISI 304 stainless steel for the models with three-phase power supply and male gas threaded connections for the single-phase models.
- the power supply is:

  230 V single phase 50 Hz in the ESM models (standard noise level) and ELM models (low noise level).

  400 V three-phase 50 Hz in the EST models (standard noise level) and ELT models (low noise level).
- Electrical boxes and accessories are water proof IP55.
- The frame is made up of a sturdy structure in galvanized steel, totally painted.
- The units are equipped with protection electric board Q, with main disconnector and safety device for fan motors.
- The most important technical data are gathered in Tab. 5d.
  Tests on thermal performance have been carried out at IMQ laboratories, according to the norm UNI EN 1048:2000, at the following special operating conditions:

  Air inlet T = 35°C

  Water inlet T = 45°C

  Water outlet T = 40°C

  Sound pressure levels have been evaluated according to the norm EN13487, at a 10-m distance, with free field.
- The working pressure depends on the circuit where the Dry Cooler is connected. Dry Cooler max working pressure = **16** barg.

All Dry Coolers are CE marked.

- Conform to the following European Directives:

  Machine Directive 98/37/CE

  PED 97/23/CEE

  LVD 2006/95/EC

  EMC 89/336/CEE (EN61000-6-2; EN 61000-6-3)

Tab. 7c - Coupling of Liebert HPD Dry Coolers with Liebert CRV (W-type, 50Hz, CE mark) air conditioning units

Model	External temperature up to 30°C		External temperature up to 35°C		External temperature up to 40°C	
	Standard noise	Low noise	Standard noise	Low noise	Standard noise	Low noise
CR020RW	1 x ESM018	1 x ELM018	1 x EST028	1 x ELM027	1 x EST050	1 x ELT047
CR035RW	1 x EST028	1 x ELM027	1 x EST050	1 x ELT055	1 x EST070	1 x ELT065

The table shows the recommended combinations of the Dry Coolers Liebert HPD (50Hz - CE mark) with the air conditioners Liebert CRV (50Hz - CE mark), according to the indicated max external air temperature.
The combinations have been evaluated considering a mixture of water and ethylene glycol up to 30% as thermal exchange fluid.
The above indications are approximate and must be checked on the basis of other specific operating conditions.
For operating conditions other than those indicated in the table, refer to the New Hirating calculation software and to the Liebert HPD service manual.

Heat Rejections (W version)

Tab. 7d - Technical data and performance of Liebert HPD Dry Coolers

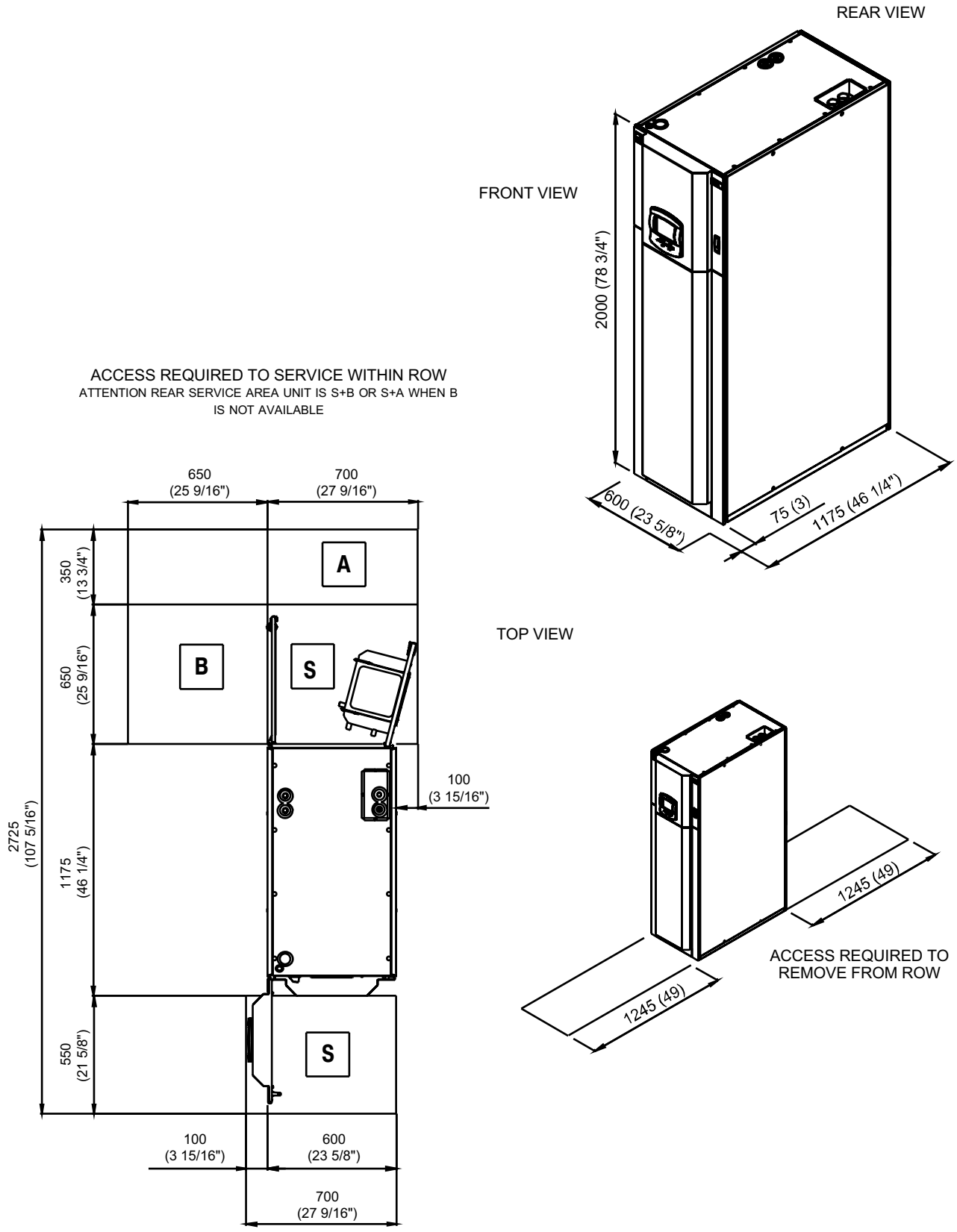
Standard Model	Performances			Electric data			Overall dimensions		
	Duty *(a)*	Air flow	Noise level *(c)*	Supply	Number of fans	Total absorbed power	Width	Depth	Height *(b)*
	kW	m^3/h	db(A)	V/ph/Hz	nº	kW	mm	mm	mm
ESM018	16.1	15000	49	230/1/50	2	1.56	2236	820	1030
ESM022	22.0	14200	49	230/1/50	2	1.56	2236	820	1030
EST028	28.0	20000	49	400/3/50	2	1.38	2866	1250	1070
EST040	36.4	19400	49	400/3/50	2	1.38	2866	1250	1070
EST050	46.1	18400	49	400/3/50	2	1.38	2866	1250	1070
EST060	62.8	28200	51	400/3/50	3	2.07	4066	1250	1070
EST070	69.5	27600	51	400/3/50	3	2.07	4066	1250	1070

Low Noise Model	Performances			Electric data			Overall dimensions		
	Duty *(a)*	Air flow	Noise level *(c)*	Supply	Number of fans	Total absorbed power	Width	Depth	Height *(b)*
	kW	m^3/h	db(A)	V/ph/Hz	nº	kW	mm	mm	mm
ELM018	17.9	9800	43	230/1/50	2	0.58	2236	820	1030
ELM027	27.0	14700	44	230/1/50	3	0.87	3136	820	1030
ELT040	36.9	15400	43	400/3/50	2	0.96	2866	1250	1070
ELT047	44.5	21000	44	400/3/50	3	0.99	4066	1250	1070
ELT055	55.7	23100	45	400/3/50	3	1.44	4066	1250	1070
ELT065	65.6	32000	46	400/3/50	4	1.92	5266	1250	1070

(a): *at the following operative conditions:*
outdoor temperature = 35°C,
inlet/outlet water temperature = 45°C/40°C,
fluid is pure water, slm zero meters.
For different conditions refer to NewHirating program.
Clean exchange surfaces.
(b): *vertical flow installation.*
(c): *sound pressure level, free field, at 10 m distance.*

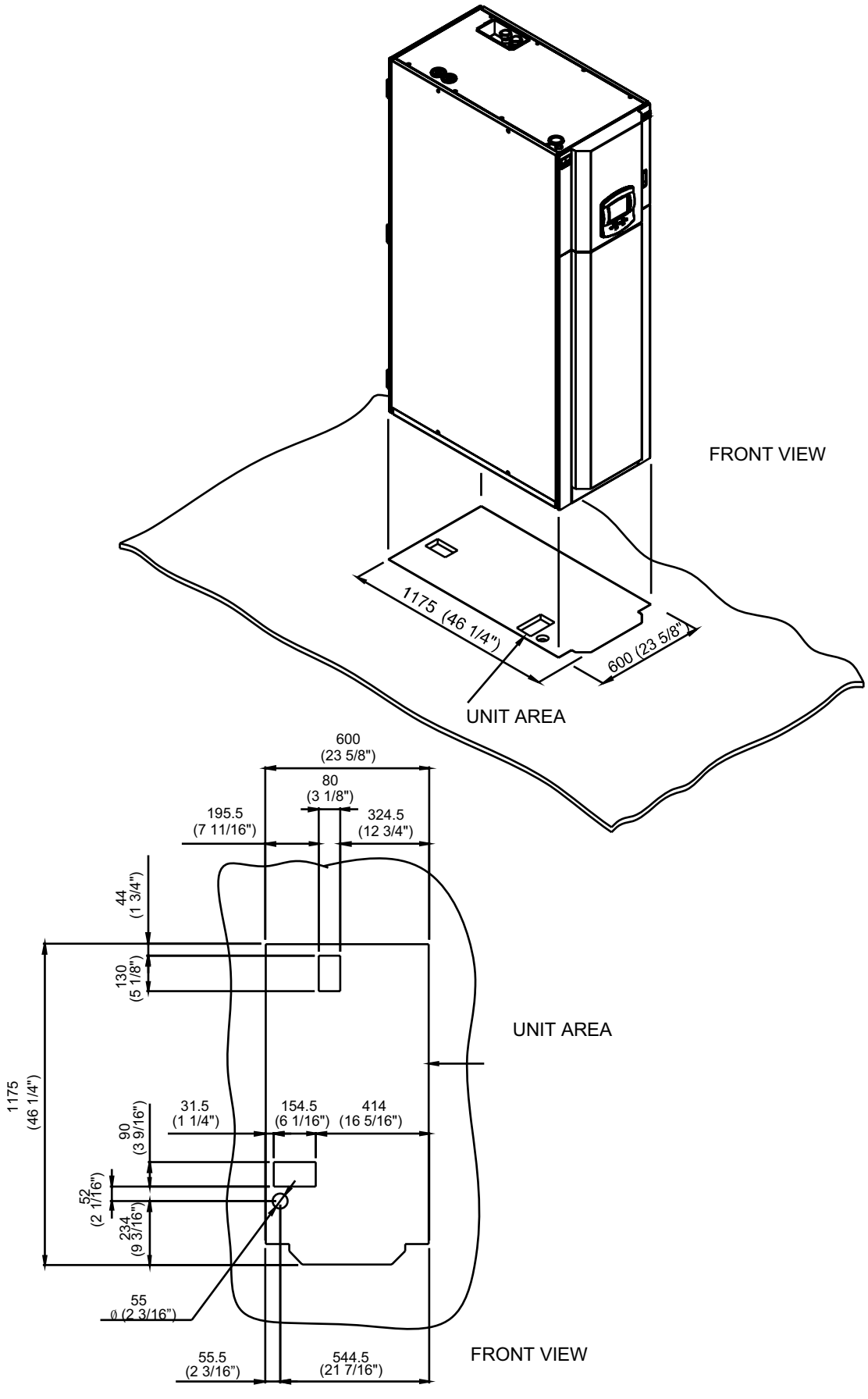
8 Installation drawings

Fig. 8a Overall dimensions / service area



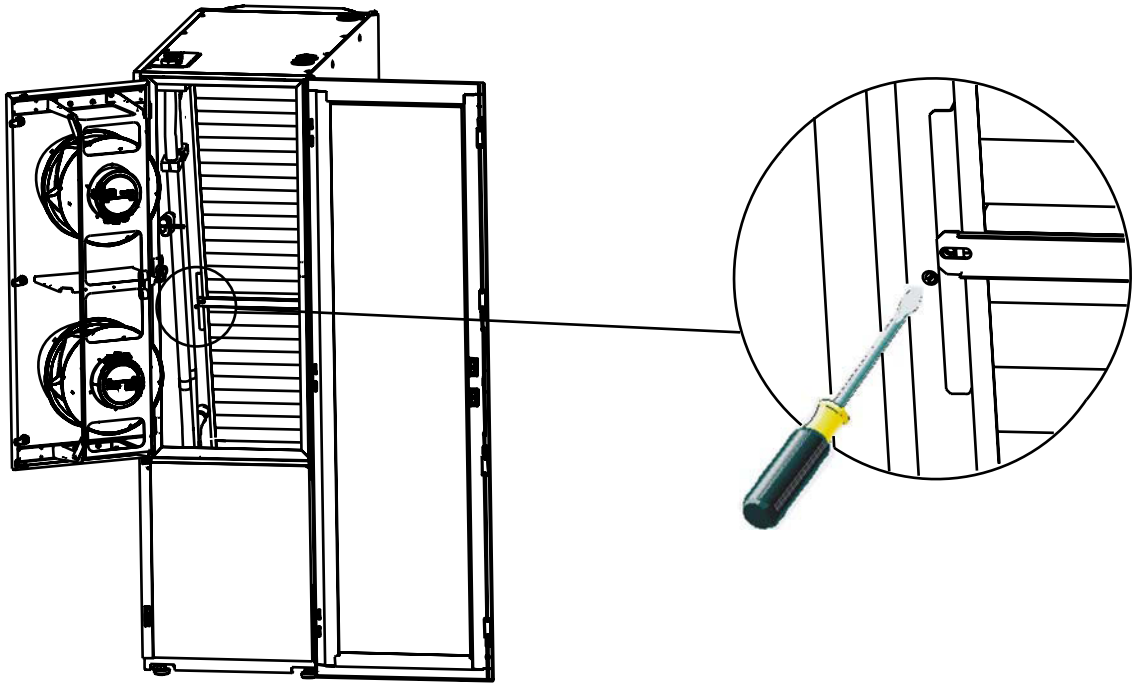
Installation drawings

Fig. 8b Hole on the raised floor for piping and electrical connections



Installation drawings

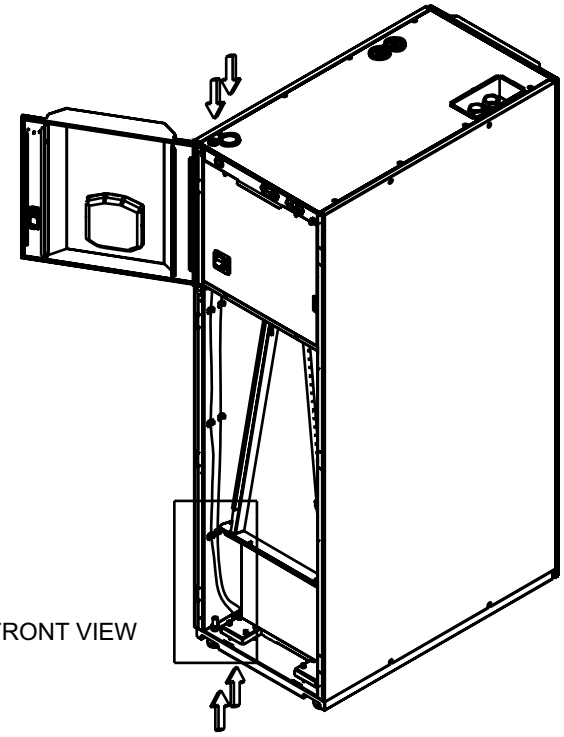
Fig. 8c Air bleeding valve position CW



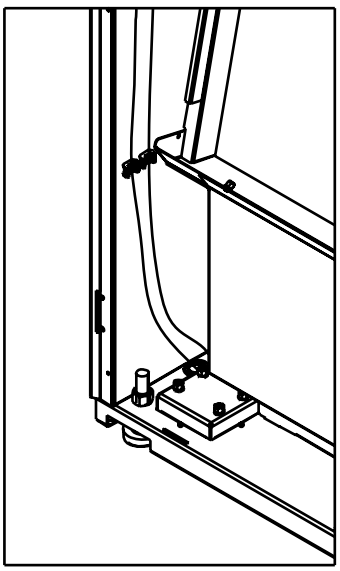
REAR VIEW

Fig. 8d Electrical connections - entry

TOP INLET



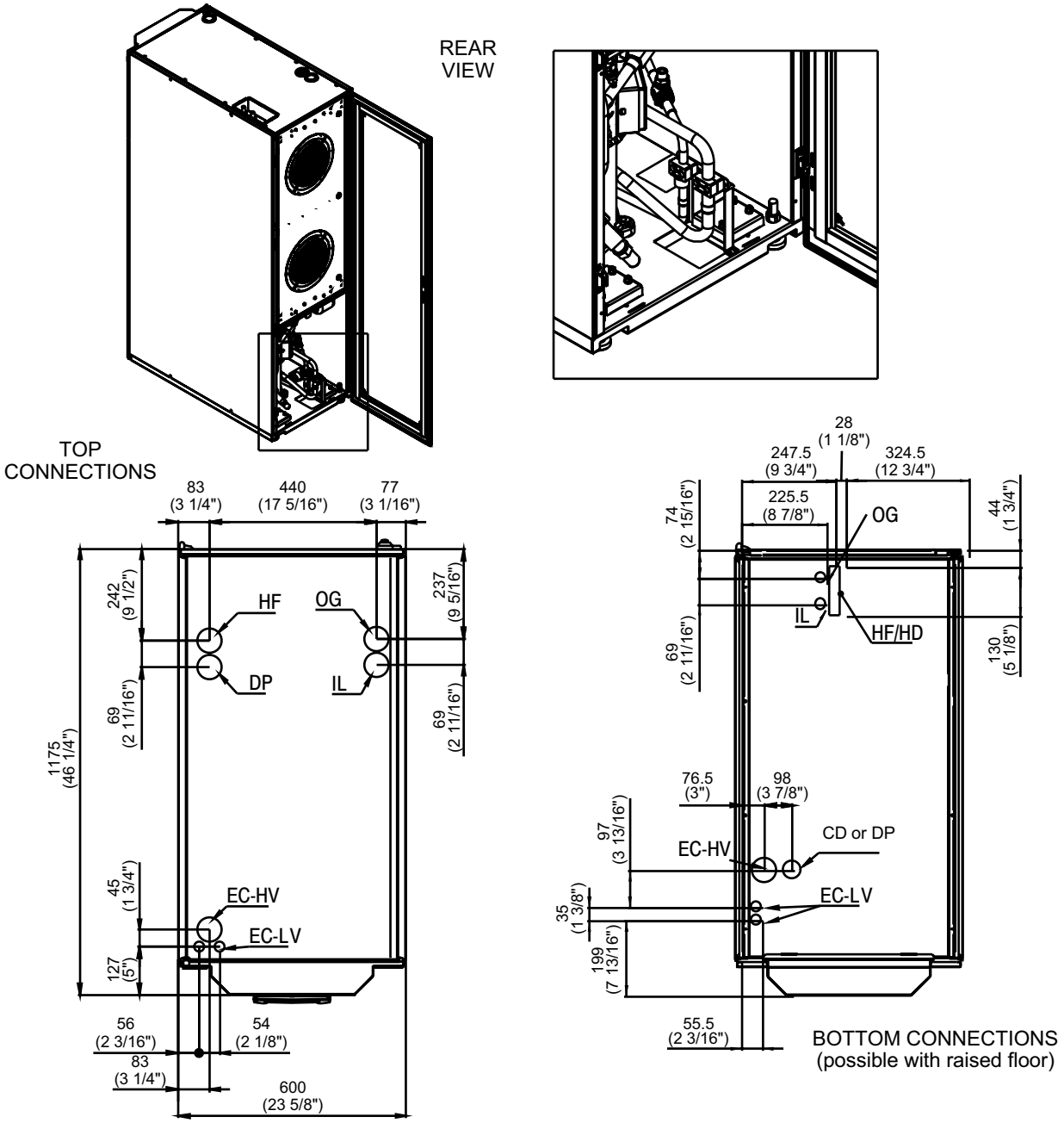
FRONT VIEW



BOTTOM INLET
(possible with raised floor)

9 Refrigerant, Hydraulic and Electrical Connections

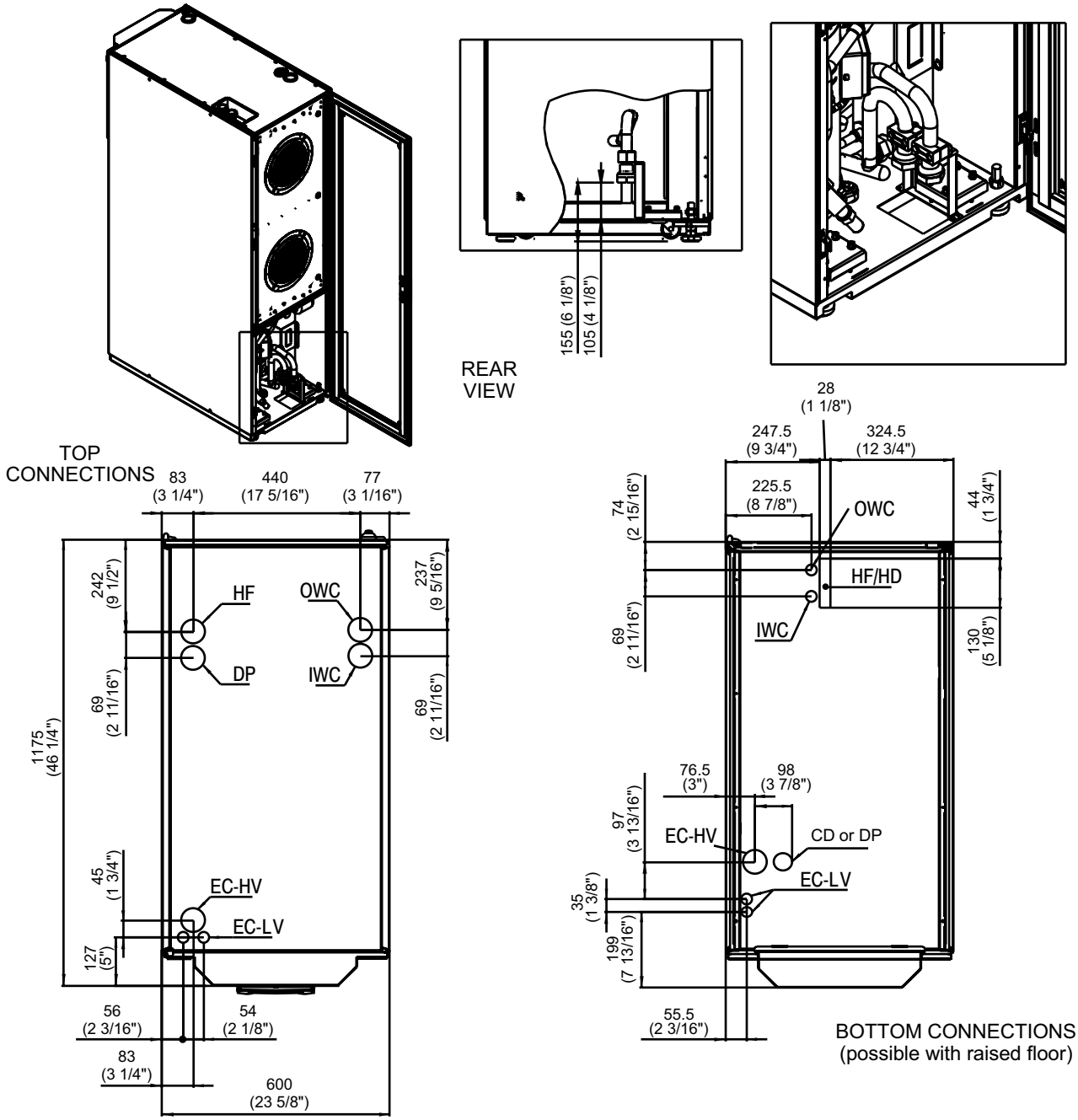
Fig. 9a CR020RA - CR035RA connections



Unit Connection		CR020RA (50Hz)	CR035RA (50Hz)	CR020RA (60Hz)	CR035RA (60Hz)
IL	Refrigerant liquid line inlet	OD 12 (1/2") CU SWEAT	OD 16 (5/8") CU SWEAT	OD 12.7 (1/2") CU SWEAT	OD 15.9 (5/8") CU SWEAT
OG	Refrigerant gas line outlet	OD 16 (5/8") CU SWEAT	OD 22 (7/8") CU SWEAT	OD 15.9 (5/8") CU SWEAT	OD 22.2 (7/8") CU SWEAT
CD	Condensate drain. ATTENTION. With pump CD is connected with HD. See DP	ID 20 (3/4")		1" MPT	
HF	Humidifier feed	1/2" GAS-F for top connections, 3/4" GAS F for bottom connections		1/2" FPT for top connections, 3/4" FTP for bottom connections	
HD	Humidifier drain ATTENTION. With pump CD is connected with HD. See DP	ID 22 (7/8")		1" MPT	
DP	Pump drain	1/2" GAS F		1/2" FPT	
EC-HV	Electrical supply - hight voltage	Hole Ø 63 (2 1/2")			
EC-L V	Electrical supply - low voltage	Hole Ø 28 (1 1/8")TYPICAL 2 PLACES			

Refrigerant, Hydraulic and Electrical Connections

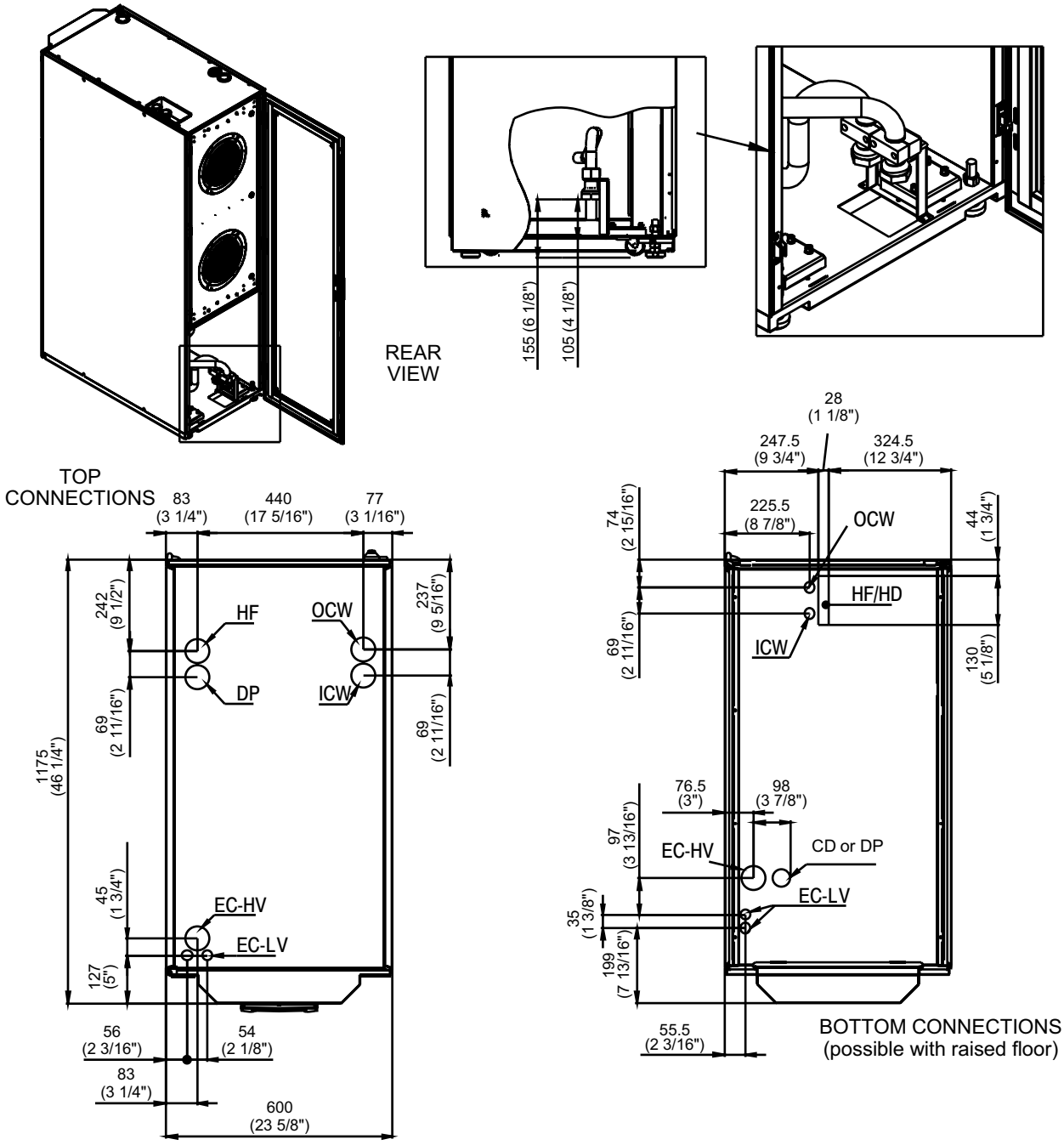
Fig. 9b CR020RW - CR035RW connections



Unit Connection		CR020RW (50Hz)	CR035RW (50Hz)	CR020RW (60Hz)	CR035RW (60Hz)
IWC	Water to condenser inlet	1.1/4" GAS F	1.1/4" GAS F	1.1/4" FPT	1.1/4" FPT
OWC	Water from condenser outlet	1.1/4" GAS F	1.1/4" GAS F	1.1/4" FPT	1.1/4" FPT
CD	Condensate drain. ATTENTION. With pump CD is connected with HD. See DP	ID 20 (3/4")		1" MPT	
HF	Humidifier feed	1/2" GAS-F for top connections, 3/4" GAS F for bottom connections		1/2" FPT for top connections, 3/4" FTP for bottom connections	
HD	Humidifier drain ATTENTION. With pump CD is connected with HD. See DP	ID 22 (7/8")		1" MPT	
DP	Pump drain	1/2" GAS F		1/2" FPT	
EC-HV	Electrical supply - hight voltage	Hole Ø 63 (2 1/2")			
EC-L V	Electrical supply - low voltage	Hole Ø 28 (1 1/8")TYPICAL 2 PLACES			

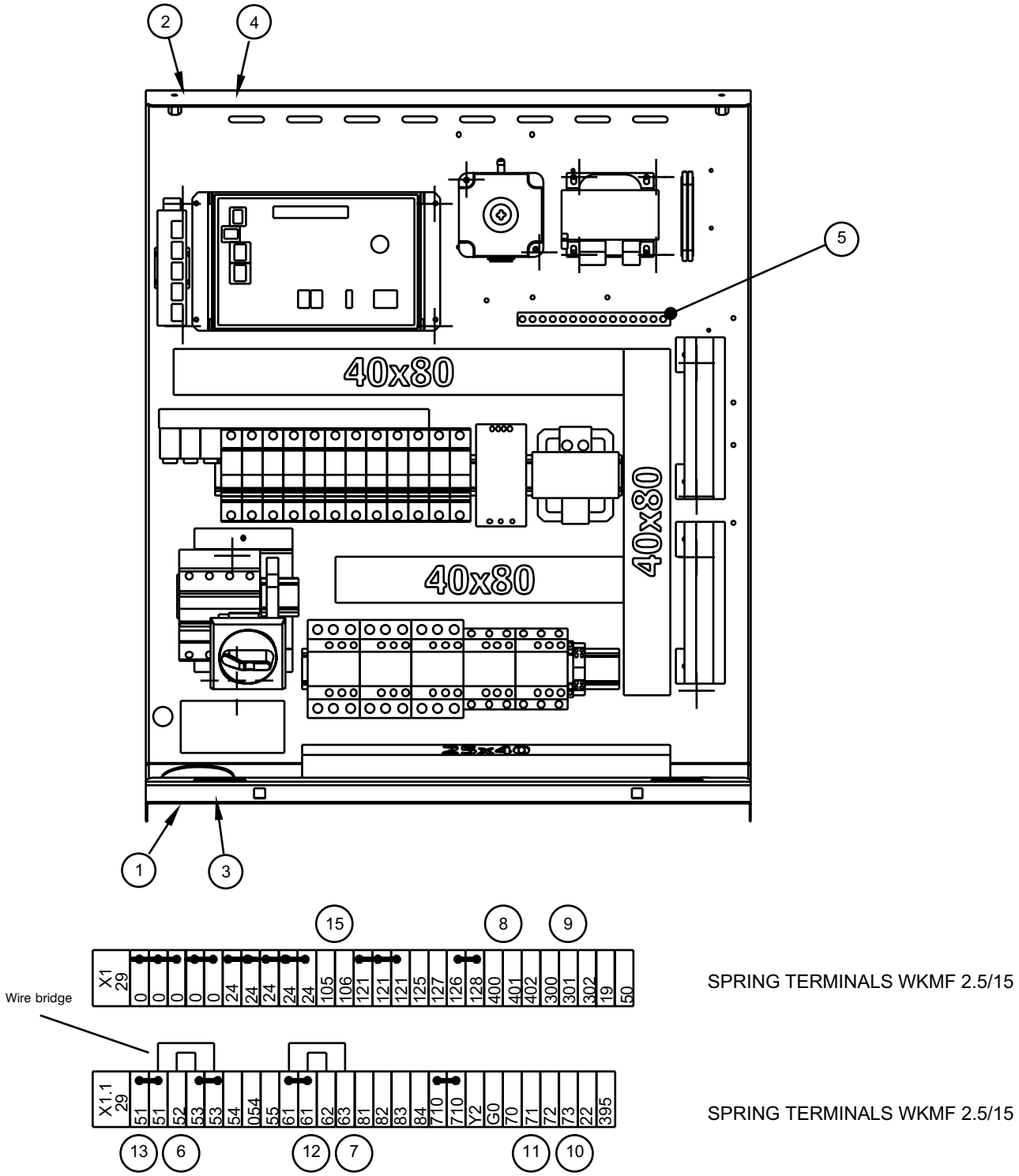
Refrigerant, Hydraulic and Electrical Connections

Fig. 9c CR040RC connections



Unit Connection		CR040RC (50Hz)	CR040RC (60Hz)
IWC	Chilled water inlet	1.1/4" GAS F	1.1/4" FPT
OWC	Chilled water outlet	1.1/4" GAS F	1.1/4" FPT
CD	Condensate drain. ATTENTION. With pump CD is connected with HD. See DP	ID 20 (3/4")	1" MPT
HF	Humidifier feed	1/2" GAS-F for top connections, 3/4" GAS F for bottom connections	1/2" FPT for top connections, 3/4" FTP for bottom connections
HD	Humidifier drain ATTENTION. With pump CD is connected with HD. See DP	ID 22 (7/8")	1" MPT
DP	Pump drain	1/2" GAS F	1/2" FPT
EC-HV	Electrical supply - hight voltage	Hole Ø 63 (2 1/2")	
EC-L V	Electrical supply - low voltage	Hole Ø 28 (1 1/8")TYPICAL 2 PLACES	

Fig. 9d Electrical board layout - 50 Hz



9.1 Electrical field connections descriptions - 50 Hz

STANDARD ELECTRICAL CONNECTIONS

1. **Primary high voltage entrance** “2.50“ (64mm); 1.75“ (44mm); 1.375” (35mm) diameter concentric knockouts located in bottom of box
2. **Secondary high voltage entrance** “ 2.50“ (64mm); 1.75” (44mm); 1.375” (35mm) diameter concentric knockouts located in top of box
3. **Primary low voltage entrance** ” Quantity (3) 1.125” (28mm) diameter knockouts located in bottom of unit
4. **Secondary low voltage entrance** ” Quantity (3) 1.125” (28mm) diameter knockouts located in top of box
5. **Earth ground** - Terminal for field supplied earth grounding wire.
6. **Remote unit shutdown** - Replace existing jumper between terminals 52 & 53 with field supplied normally closed switch having a minimum 75VA, 24VAC rating. Use field supplied Class 1 wiring.
7. **Customer alarm inputs** - Terminals for field supplied, normally closed contacts, having a minimum 75VA, 24VAC rating, between terminals 61 & 63. Use field supplied Class 1 wiring.
8. **General alarm** - On any alarm, normally open dry contact is closed across terminals 400,401 for remote indication. 2 AMP, 24VAC max load. Use Class 1 field supplied wiring.
9. **Warning alarm** - On any alarm, normally open dry contact is closed across terminals 300,301 for remote indication. 2 AMP, 24VAC max load. Use Class 1 field supplied wiring.
10. **Compressor motor on** - On any call for compressor operation, normally open dry contact is closed across terminals 72 & 73,2 AMP, 24VAC max load. Use Class 1 field supplied wiring.
11. **Fan motor on** - On any call for fans operation, normally open dry contact is closed across terminals 70 & 71. 2 AMP, 24VAC max load. Use Class 1 field supplied wiring.

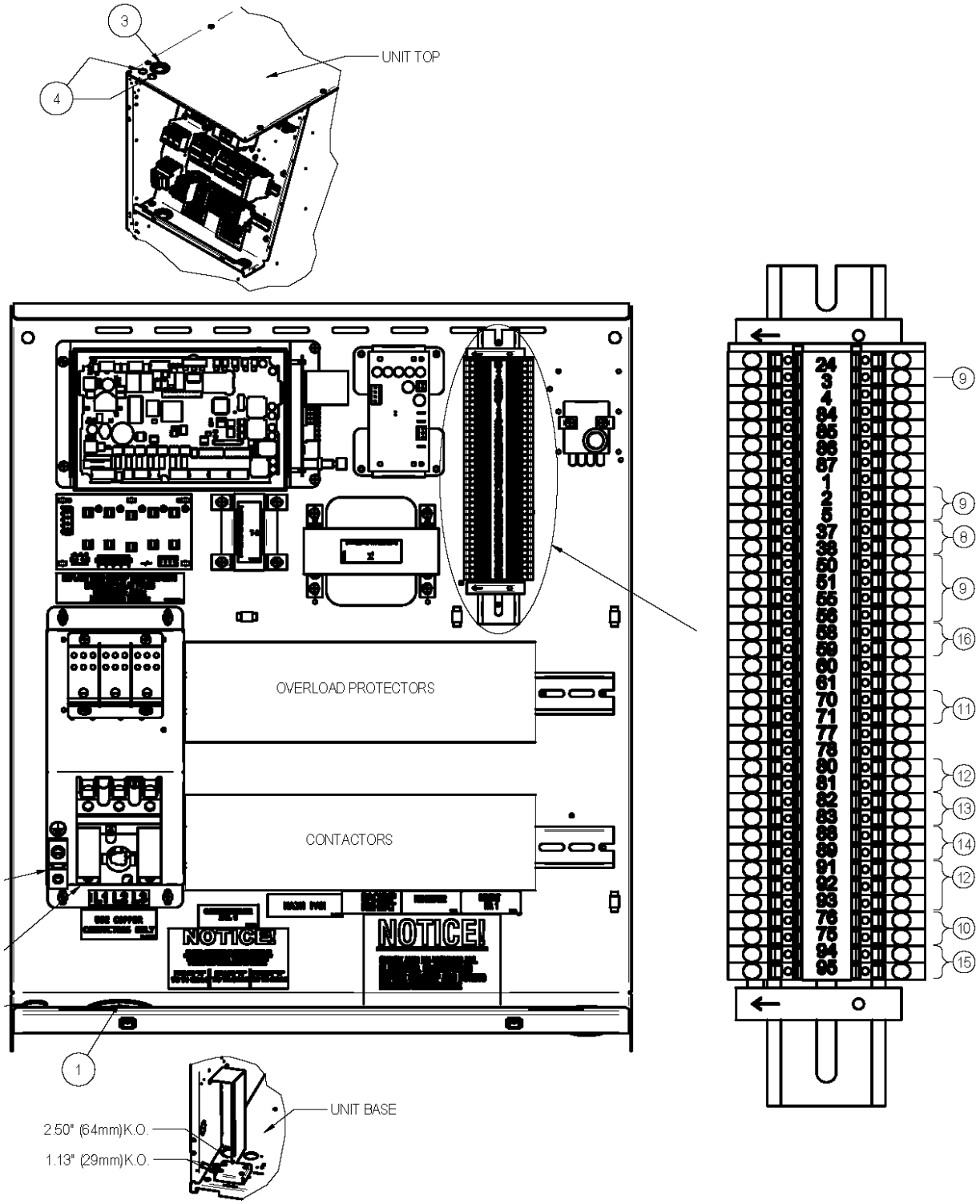
OPTIONAL ELECTRICAL CONNECTIONS

12. **Smoke sensor alarm** (with smoke sensor option)- The smoke sensor is factory installed ,and senses the delivery air;it is connected across terminals 61-62 and send a visual and an audible alarm.
    This smoke sensor is not intended to function as, or replace, any room smoke detection system that may be required by local or national codes. 1 AMP, 24VAC max load. Use Class 1 field supplied wiring.
14. **Condensate alarm** (with condensate pump option) - On pump high water indication, normally open dry contact is closed across purple wire for remote indication install inside the box near the pump. 1 AMP, 24VAC max load. Use Class 1 field supplied wiring.

OPTIONAL LOW VOLTAGE TERMINAL PACKAGE CONNECTIONS

15. **Flooding alarm** (**liquistat**) - The flooding alarm detects the presence of water and activate an alarm. The sensor is connect across terminals 105 & 106 and up to 5 sensors can be connected to the same flooding alarm device,to control many points in the bottom of the unit.

Fig. 9e Electrical board layout - 60 Hz



9.2 Electrical field connections descriptions - 60 Hz

STANDARD ELECTRICAL CONNECTIONS

1. **High voltage entrance through the bottom of the electric panel** - 1.38" (34.9mm), 1.75" (44.5mm) & 2.50- (64mm) diameter concentric knockout.
2. **Low voltage entrance through the bottom of the electric panel** - Quantity (2) 1.125" (28mm) diameter knockouts.
3. **High voltage entrance through the top of the unit** - 1.38-(34.9mm), 1.75" (44.5mm) & 2.50" (64mm) diameter concentric knockout.
4. **Low voltage entrance through the top of the unit** - Quantity (2) 1.125" (28mm) diameter knockouts.
5. **Three phase electrical service** - Connect to terminals on disconnect switch. Three phase service not by Liebert.
6. **Factory Installed locking Disconnect Switch**.
7. **Earth ground** - Terminal for field supplied earth grounding wire.
8. **Remote unit shutdown** - Replace existing jumper between terminals 37 & 38 with field supplied normally closed switch having a minimum 75VA, 24VAC rating. Use field supplied Class 1 wiring.
9. **Customer alarm inputs** - Terminals for field supplied, normally closed contacts, having a minimum 75VA, 24VAC rating, between terminals 3 & 50, 2 & 51, 5 & 55, or 3 & 56. Use field supplied Class 1 wiring.
10. **Common alarm** - On any alarm, normally open dry contact is closed across terminals 75 & 76 for remote indication. 1 AMP, 24VAC max load. Use Class 1 field supplied wiring.
11. **Heat rejection interlock** - On any call for compressor operation, normally open dry contact is closed across terminals 70 & 71 to heat rejection equipment. 1 AMP, 24VAC max load. Use Class 1 field supplied wiring.

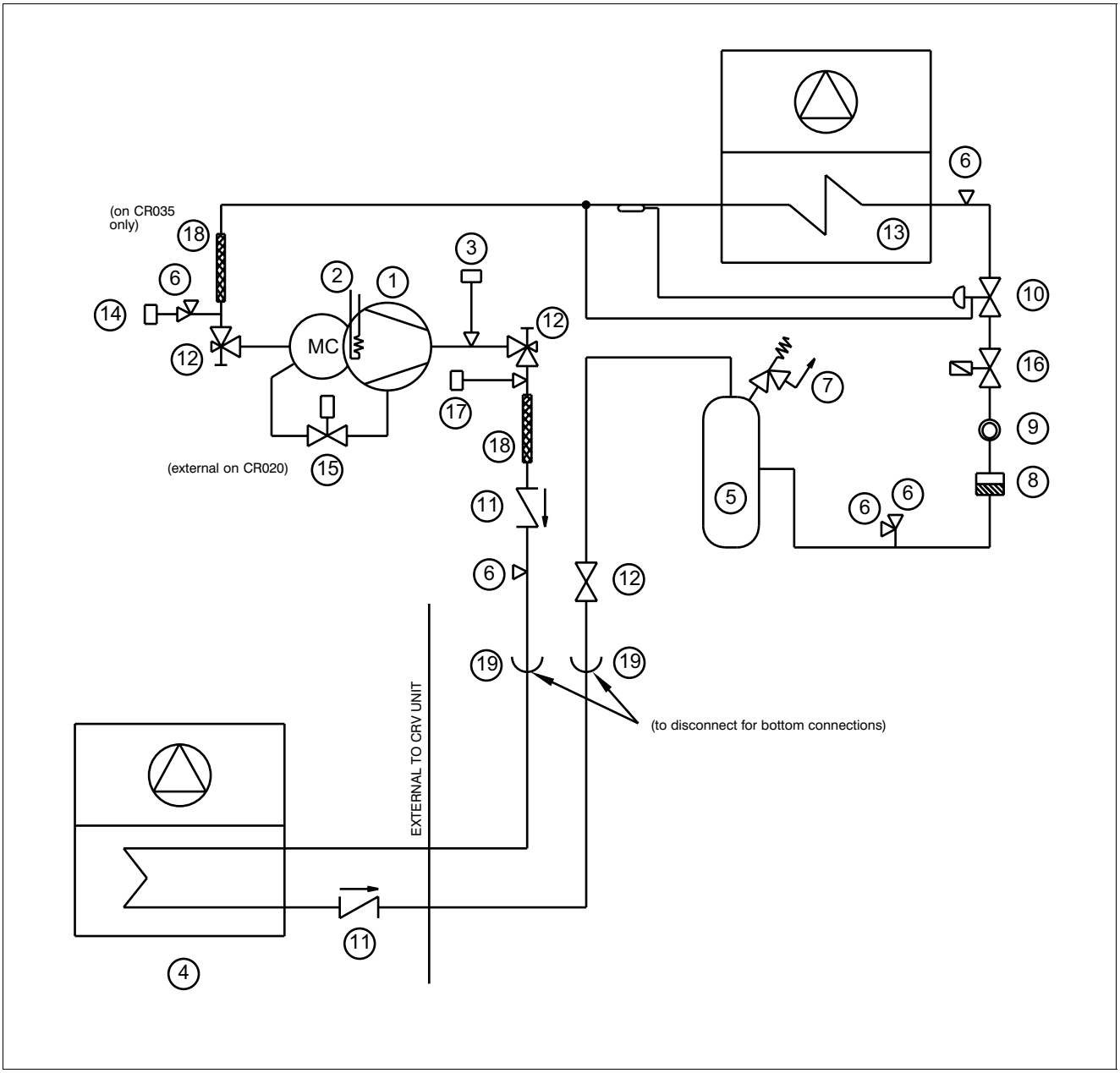
OPTIONAL ELECTRICAL CONNECTIONS

12. **Smoke sensor alarm** - Factory wired dry contacts from smoke sensor are 91-common, 92-NO , and 93-NC. Supervised contacts, 80 & 81, open on sensor trouble indication. This smoke sensor is not intended to function as, or replace, any room smoke detection system that may be required by local or national codes. 1 AMP, 24VAC max load. Use Class 1 field supplied wiring.
13. **Reheat and humidifier lockout** - Remote 24VAC required at terminals 82 & 83 for lockout of reheat and humidifier.
14. **Condensate alarm** (with condensate pump option) - On pump high water indication, normally open dry contact is closed across terminals 88 & 89 for remote indication. 1 AMP, 24VAC max load. Use Class 1 field supplied wiring.
15. **Common Alarm** - On any alarm, one additional normally open dry contact is closed across terminals 94 & 95 for remote indication. 1 AMP, 24VAC max load. Use Class 1 field supplied wiring.
16. **LiquiTect shutdown and dry contact** - On LiquiTect activation, normally open dry contact is closed across terminals 58 & 59 for remote indication (LiquiTect sensor ordered separately). 1 AMP, 24VAC max load. Use Class 1 field supplied wiring.

***NOTE**: Refer to specification sheet for total unit full load amps, wire size amps and max overcurrent protective device size.*

10 Refrigeration & Hydraulic Circuits

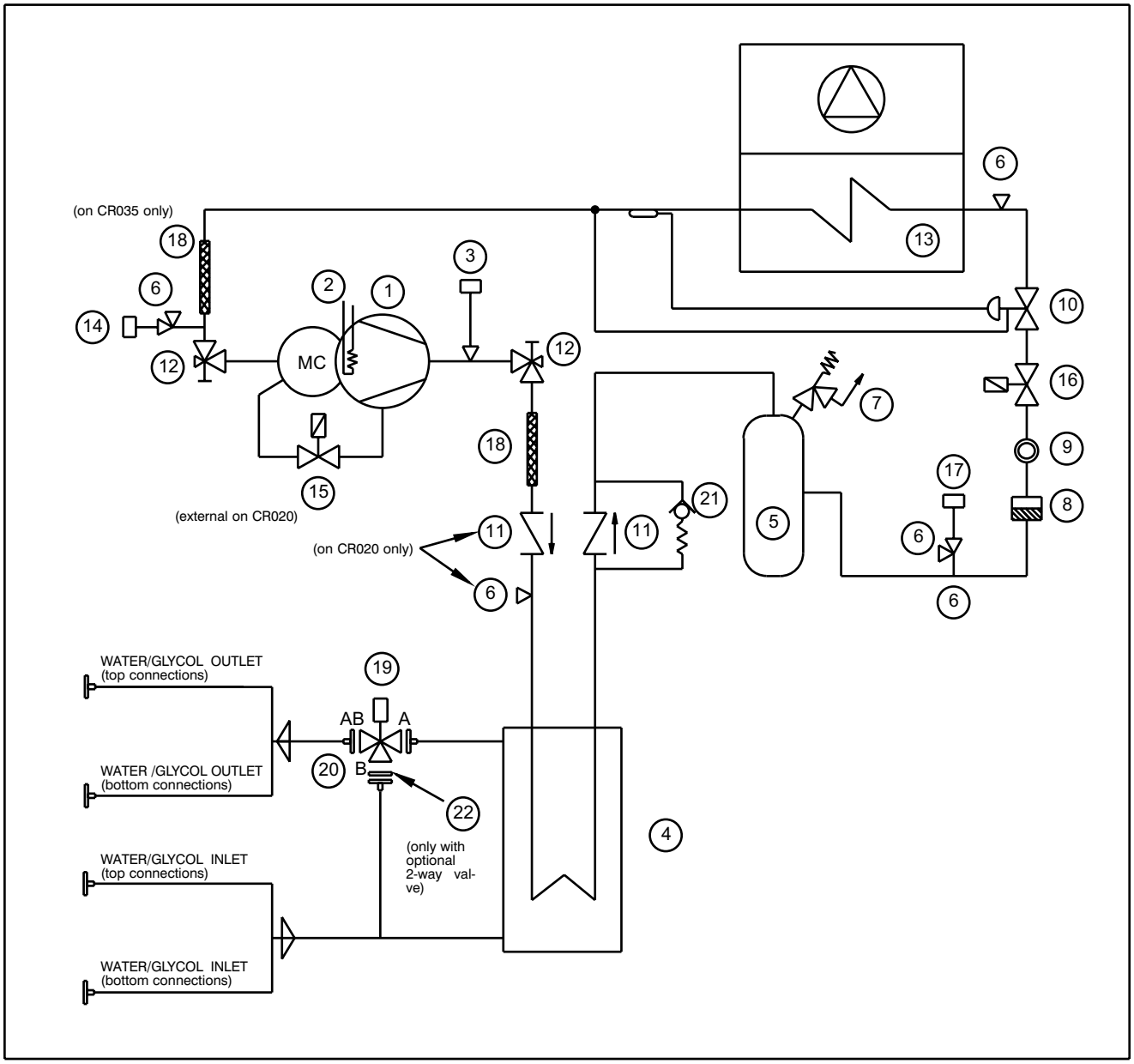
Fig. 10a - LIEBERT CRV: CR020RA, CR035RA



POS.	DESCRIPTION
1	Compressor
2	Crankcase heater
3	High pressure switch
4	Air cooled condenser
5	Liquid receiver
6	Access valve
7	Safety relief valve
8	Filter dryer
9	Sight glass
10	Thermostatic expansion valve

POS.	DESCRIPTION
11	Check valve
12	Shut-off valve
13	Evaporating coil
14	Low pressure trasducer
15	Capacity modulation solenoid valve
16	Shut-off solenoid valve
17	High pressure trasducer
18	Vibration absorber
19	Cup and fitting (sweat) joint

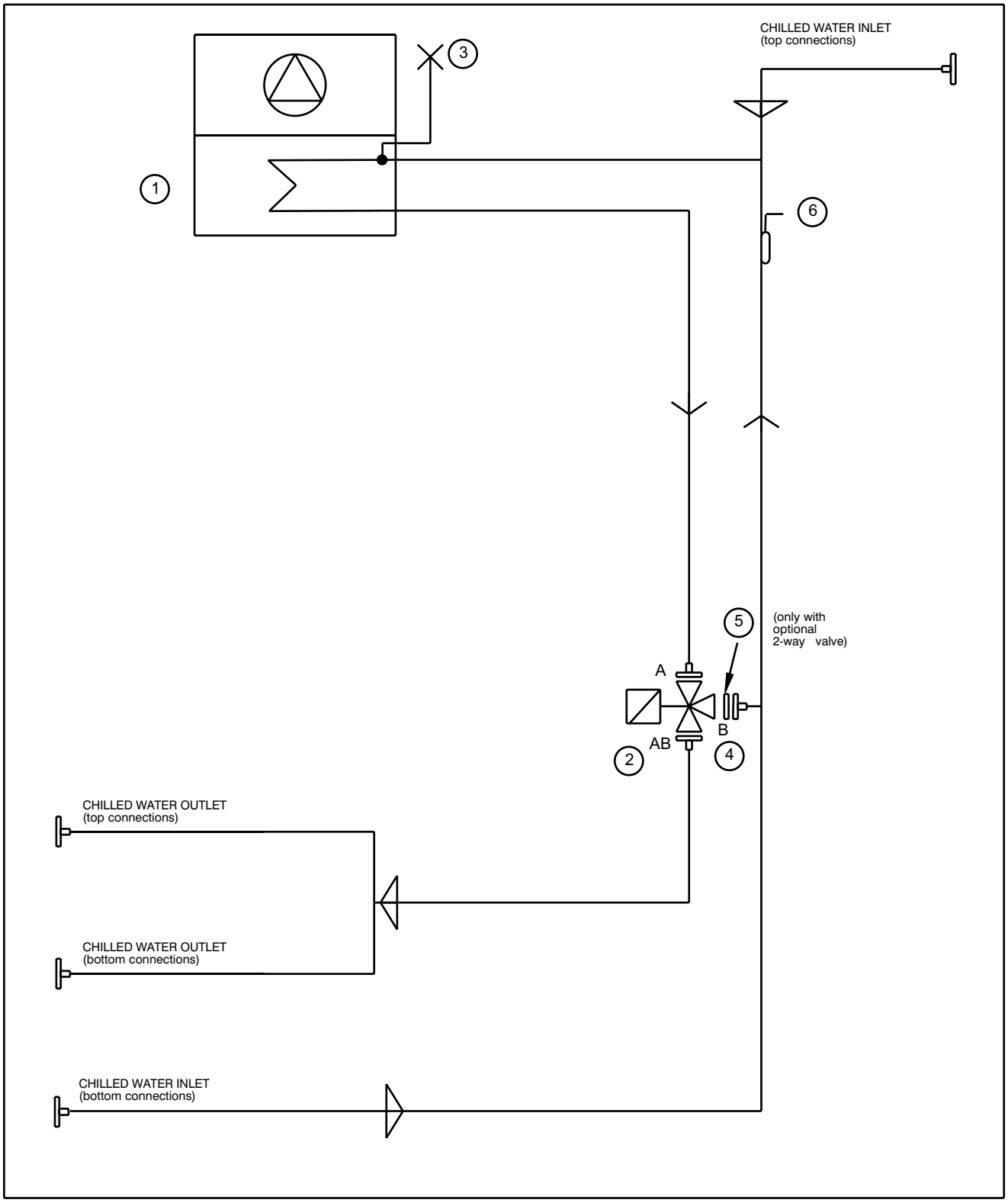
Fig. 10b - LIEBERT CRV: CR020RW, CR035RW



POS.	DESCRIPTION
1	Compressor
2	Crankcase heater
3	High pressure switch
4	Water cooled condenser
5	Liquid receiver
6	Access valve
7	Safety relief valve
8	Filter dryer
9	Sight glass
10	Thermostatic expansion valve
11	Check valve

POS.	DESCRIPTION
12	Rotalock shut-off valve
13	Evaporating coil
14	Low pressure trasducer
15	Capacity modulation solenoid valve
16	Shut-off solenoid valve
17	Head pressure trasducer
18	Vibration absorber
19	Head pressure control valve
20	Valve fittings
21	Check valve 10 bar (145 psi)
22	Blind disk - only with optional 2-way valve

Fig. 10c - LIEBERT CRV: CR040RC



POS.	Components
1	Chilled water cooling coil
2	3-port water valve
3	Air bleeding valve

POS.	Components
4	Valve fittings
5	Blind disk - only with optional 2-way valve
6	NTC inlet water sensor

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