Monoblock R-290 (Propane)

IMPORTANT

Keep in store for future reference!

PRE-CHARGED REFRIGERATION SYSTEMS

Installation & Operation Manual

P/N 3153769 - Rev. D
December 2024

Spanish 3167860
French 3167861

⚠ WARNING

This equipment uses a flammable refrigerant. Installation, service and repair should be done only by qualified and trained technicians in accordance with this manual.

If a leak is detected, follow store safety procedures. It is the store's responsibility to have a written safety procedure in place. The safety procedure must comply with all applicable codes such as local fire department's codes.

At minimum, the following actions are required:
• Immediately evacuate all persons from the store and contact the local fire department to advise them that a propane leak has occurred.

• Call Hussmann and/or a qualified service agent and inform them that a propane sensor has detected the presence of propane.

• Do not let any persons back into the store until the qualified service technician has arrived and that technician advises that it is safe to return to the store.

• The propane gas used in the unit has no odor. The lack of smell does not indicate a lack of escaped gas.

• A hand-held propane leak detector ("sniffer") should be used before any repair and/or maintenance is attempted. All repair parts must be identical models to the ones they are replacing.

• No open flames, cigarettes or other possible sources of ignition should be used inside the building where the units are located until the qualified service technician and/or local fire department determines that all propane has been cleared from the area and from the refrigeration systems.

⚠ WARNING

Do not use mechanical devices or other means to accelerate the defrosting process.

⚠ WARNING

Do not remove shipping crate until the cold room is ready for the Monoblock installation.

⚠ WARNING

Monoblock ventilation openings must be clear from any obstructions. Do not damage the refrigerant circuits.

BEFORE YOU BEGIN

Read the safety information completely and carefully.

The precautions and use of the procedures described herein are intended to use the product correctly and safely. Comply with the precautions described below to protect you and others from possible injuries. Relative to their potential danger, the relevant matters are divided into four parts as defined by ANSI Z535.5

ANSI Z535.5 DEFINITIONS

- **DANGER –** Indicate[s] a hazardous situation which, if not avoided, will result in death or serious injury.
- **WARNING –** Indicate[s] a hazardous situation which, if not avoided, could result in death or serious injury.
- **CAUTION –** Indicate[s] a hazardous situation which, if not avoided, could result in minor or moderate injury.

• **NOTICE –** *Not related to personal injury* **–** Indicates[s] situations, which if not avoided, could result in damage to equipment.

* *

WARNING

PERSONAL PROTECTION EQUIPMENT (PPE)

Only qualified personnel should install and service this equipment. Personal Protection Equipment (PPE) is required whenever servicing this equipment. Wear safety glasses, gloves, protective boots or shoes, long pants, and a long-sleeve shirt as required when working with this equipment. Observe all precautions on tags, stickers, labels and literature attached to this equipment.

WARNING

Only Hussmann or factory trained technicians should install, service or repair this R-290 (propane) equipment. Failure to follow instructions can result in an explosion, death, injury, and property damage.

WARNING

Contractors shall strictly adhere to specifications provided by the Engineer of Record (EOR), as well as US Environmental Protection Agency regulations, OSHA regulations, and all other federal, state and local codes. This work should only be done by qualified, licensed contractors. There are numerous hazards, not limited to, but including: burns due to high temperatures, high pressures, toxic substances, electrical arcs and shocks, very heavy equipment with specific lift points and structural constraints, food and product damage or contamination, public safety, noise, and possible environmental damage. Never leave operating compressors unattended during the manual soft-start process. Always power rocker switches off when unattended.

⚠ WARNING

Proper Field Wiring and Grounding Required! Failure to follow code could result in death or serious injury. All field wiring MUST be performed by qualified personnel. Improperly installed and grounded field wiring poses FIRE and ELECTROCUTION hazards. To avoid these hazards, you MUST follow requirements for field wiring installation and grounding as described in NEC and your local/state electrical codes.

⚠ CAUTION

This manual was written in accordance with originally described equipment that is subject to change. Hussmann reserves the right to change all or part of the equipment for future stores such as, but not limited to, controllers, valves, and electrical specifications. It is the installer's responsibility to reference the refrigeration drawings supplied for each installation, as directed by the Engineer of Record.

⚠ WARNING

— LOCK OUT / TAG OUT —

To avoid serious injury or death from electrical shock, always disconnect the electrical power at the main disconnect when servicing or replacing any electrical component. This includes, but is not limited to, such items as controllers, electrical panels, condensers, lights, fans, and heaters.

⚠ WARNING

This equipment is prohibited from use in California with any refrigerants on the "List of Prohibited Substances" for that specific end-use, per California Code of Regulations, Title 17, Section 95374.

Use in other locations is limited to refrigerants permitted by country, state, or local laws and is the responsibility of the installer/end-user to ensure only permitted refrigerants are used.

This disclosure statement has been reviewed and approved by Hussmann and Hussmann attests, under penalty of perjury, that these statements are true and accurate.

This warning does not mean that Hussmann products will cause cancer or reproductive harm or is in violation of any product-safety standards or requirements. As clarified by the California State government, Proposition 65 can be considered more of a 'right to know' law than a pure product safety law. When used as designed, Hussmann believes that its products are not harmful. Hussmann provide the Proposition 65 warning to stay in compliance with California State law. It is your responsibility to provide accurate Proposition 65 warning labels to your customers when necessary. For more information on Proposition 65, please visit the California State government website.

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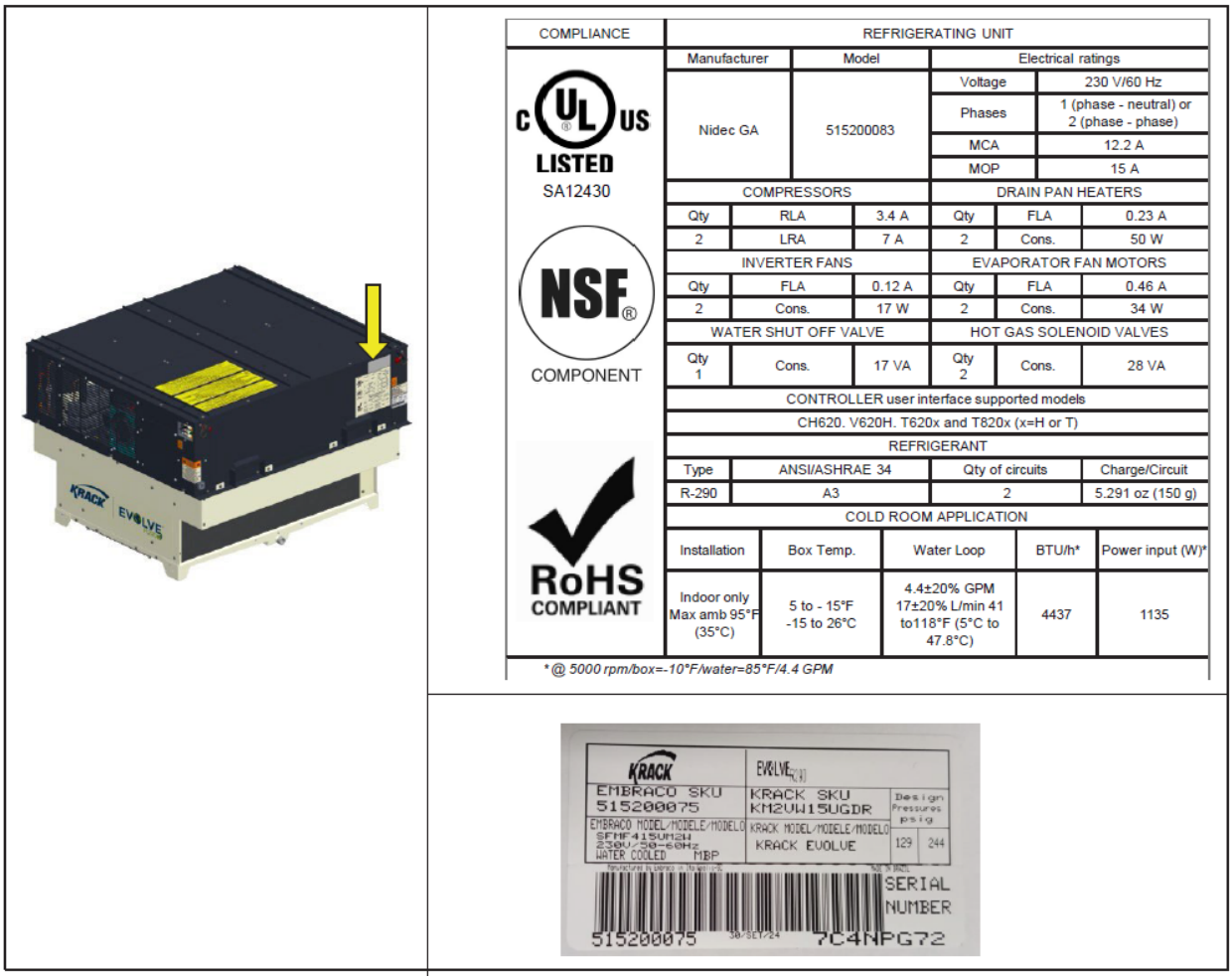
This document applies to the following products:

Condenser Type	Application	Configuration	Model Number	Part Number
Water-Cooled	Walk-in Coolers	Black & White	KM2VW15UGDR	3152424
Water-Cooled	Walk-in Coolers	All Black	BM2VW15UGDR	3208612
Water-Cooled	Walk-in Coolers	Black & White, No RTC	KM2VW15UGDN	3152425
Water-Cooled	Walk-in Freezers	Black & White	KL2VW15UGDR	3152426
Water-Cooled	Walk-in Freezers	All Black	BL2VW15UGDR	3208613
Water-Cooled	Walk-in Freezers	Black & White	KL4VW15UGDR	3207993
Water-Cooled	Walk-in Freezers	All Black	BL4VW15UGDR	3208614
Air Cooled	Walk-in Coolers	Black & White	KM2VA15UGDR	3152427
Air Cooled	Walk-in Coolers	All Black	BM2VA15UGDR	3208609
Air Cooled	Walk-in Freezers	Black & White	KL2VA15UGDR	3152428
Air Cooled	Walk-in Freezers	All Black	BL2VA15UGDR	3208610
Air Cooled	Walk-in Freezers	Black & White	KL4VA15UGDR	3208126
Air Cooled	Walk-in Freezers	All Black	BL4VA15UGDR	3208611

Overall product information including serial data and electrical ratings are shown below:



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REVISION HISTORY

REVISION	DATE	CHANGES
A	January 2022	Formerly version 1.6
B	March 2023	Inclusion of: KL4VW15UGDR, KM2VA15UGDR, KL2VA15UGDR, KL4VA15UGDR
C	February 2024	Pre-defrost logic included, revised spacing recommendations, updated parameter table, added parts table
D	October 2024	Added all black model numbers, added gasket information, added trim installation information, updated instructions when no door switch, updated instructions on inter unit wiring, updated unit spacing & hole size/location information, added display wiring information, added application temperature information, updated information on unit operation, updated trouble-shooting information, misc. corrections/clarifications, added drain pan service information, added hose kit information, updated service part table, added serial plate location information, updated wiring diagrams, added display mounting box information.

TABLE OF CONTENTS

1. General Information

This guide contains required information for installing, handling, and disposing of the Krack Monoblock refrigeration systems. It is recommended that technicians thoroughly review this document prior to installation as these systems contain propane (R-290) which is a flammable refrigerant.

The settings presented in this manual may be slightly different due to constructional or application characteristics. In these cases, the recommendations will be presented in a generic way to safeguard the applicability of this document. Pictures and drawings shall be considered as reference only.

This guide will be provided by Hussmann to facility owners in both a hard and electronic copy. Hussmann recommends that the hardcopy is stored in easily accessible place for reference for technicians that operate and maintain this equipment in a location that prevents deterioration and degradation.

The installation site of these packaged refrigerating systems is in accordance with local, federal, and national standards and procedures related to safety and technicians responsible for installation, handling, and maintenance are trained to operate in accordance with the procedures outlined in this manual.

⚠ WARNING

This equipment uses propane (R-290), a flammable refrigerant. Installation, service, and repair should be done only by qualified and trained technicians in accordance with this manual.

2. Product Description

The Krack Monoblock's are specifically designed to support equipment manufacturers and end users to transition to highly efficient and environmentally friendly refrigeration systems. All units are pre-charged with propane (R-290) with charges equal or below 150 grams (5.290 ounces) per circuit complying with IEC 60335- 1, CSA 22.2, UL 427, and UL 471 standards.

The Krack Monoblocks are complete cooling systems that integrate condensing, evaporative, control, and ventilation in one packaged solution. Units can be equipped with one or more independent refrigeration circuits and removal of heat from the high temperature side (condensing) occurs by either water or air. The water-cooled pumping mechanism, interconnections, and external heat exchange system (water loop) are not part of this product. A brief overview of the different product configurations is shown in Table 1.

Krack Model Number	Voltage	Application Box Temp.	Condenser	Real Time Clock
KM2VW15UGDR	230V/50/60Hz/1PH	MT: 28 to 50F	Water Cooled	YES
BM2VW15UGDR	230V/50/60Hz/1PH	MT: 28 to 50F	Water Cooled	YES
KM2VW15UGDN	230V/50/60Hz/1PH	MT: 28 to 50F	Water Cooled	NO
KL2VW15UGDR	230V/50/60Hz/1PH	LT: -15 to 5F	Water Cooled	YES
BL2VW15UGDR	230V/50/60Hz/1PH	LT: -15 to 5F	Water Cooled	YES
KL4VW15UGDR	230V/50/60Hz/1PH	LT: -15 to 5F	Water Cooled	YES
BL4VW15UGDR	230V/50/60Hz/1PH	LT: -15 to 5F	Water Cooled	YES
KM2VA15UGDR	230V/50/60Hz/1PH	MT: 28 to 50F	Air Cooled	YES
BM2VA15UGDR	230V/50/60Hz/1PH	MT: 28 to 50F	Air Cooled	YES
KL2VA15UGDR	230V/50/60Hz/1PH	LT: -15 to 5F	Air Cooled	YES
BL2VA15UGDR	230V/50/60Hz/1PH	LT: -15 to 5F	Air Cooled	YES
KL4VA15UGDR	230V/50/60Hz/1PH	LT: -15 to 5F	Air Cooled	YES
BL4VA15UGDR	230V/50/60Hz/1PH	LT: -15 to 5F	Air Cooled	YES

Note: MT: Medium Temperature | LT: Low Temperature

Table 1 – Krack Refrigeration System Overview

PRODUCT NOMENCLATURE:

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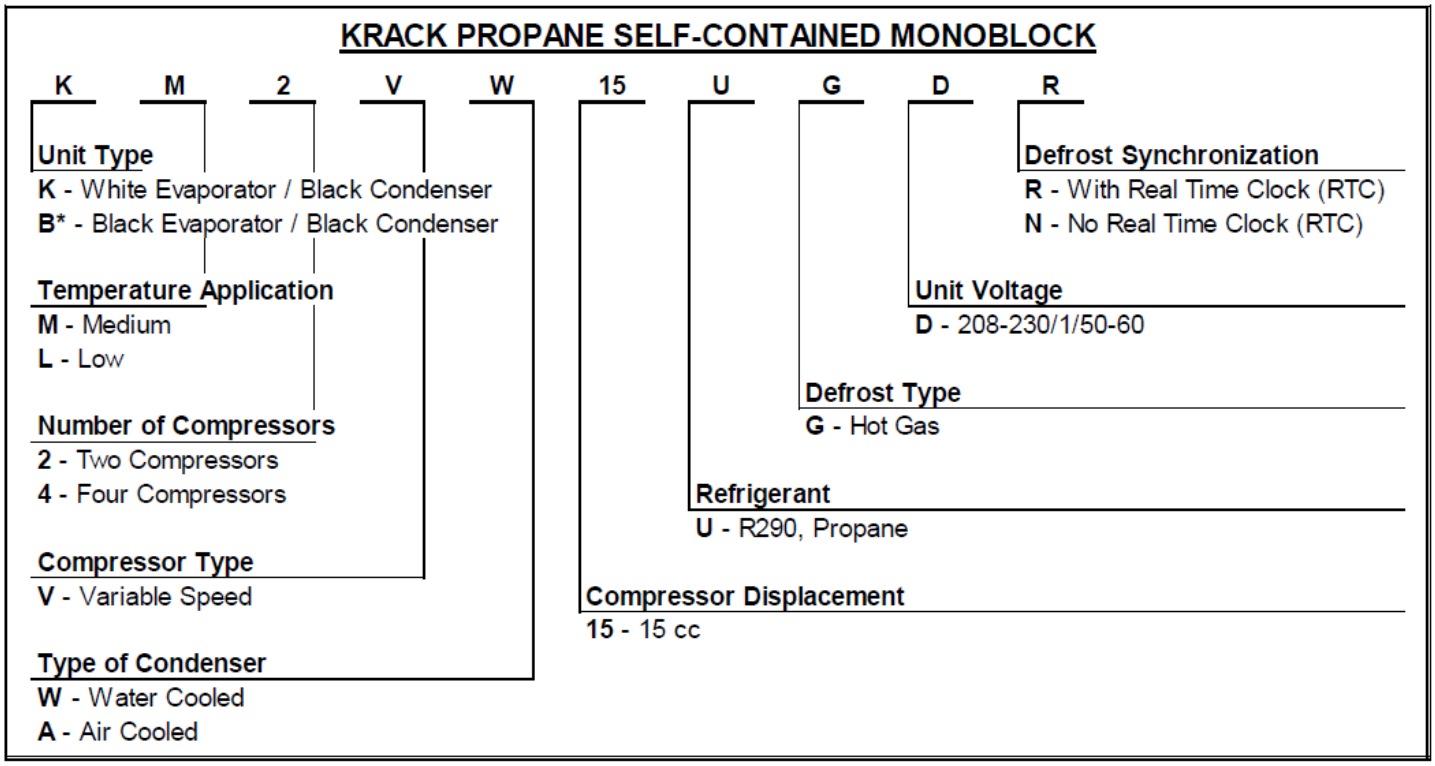


* Available only for nomenclatures with BM2VW and BM2VA & BL4VW and BL4VA with real-time clocks

The units are designed to provide maximum energy efficiency including the use of Variable Capacity Compressors (VCC), Electronically Commutated Fan Motors (ECMs) and Propane (R-290) refrigerant that is classified as an A3 (highly flammable and low toxicity) per standard EN0378-1:2008 (Table 2).

	Toxicity	
Flammability	**Low**	**High**
No Flame Propagation	A1	B1
Mildly Flammable	A2L	B2L
Low Flammability	A2	B2
High Flammability	A3	B3

Table 2 – Refrigerant Flammability and Toxicity Classifications

2.1. Reference Standards

Krack MicroDS systems have been built with reference to the following government standards:

IEC 60335-1: Household and similar electrical appliances – Safety – Part 1: General Requirements

EN 378-2: Refrigerating systems and heat pumps — Safety and environmental requirements — Part 2: Design, Construction, Testing, Marking, and Documentation

UL 471: Standard for Safety for Commercial Refrigerators and Freezers

UL 427: Standard for Safety for Refrigerating Units

CSA 22.2 Nr. 120-13: Refrigeration Equipment

2.2. Training of Technical Teams

Hussmann recommends that personnel who interact with these products be trained on flammable fluids. Technical support specialists, contractors, installers, and service/maintenance providers are examples of professionals who should receive such training. Hussmann supports cabinet manufacturers by providing relevant information to its technical teams on the operation of these applications.

2.3. Product Overview

The product contains all the basic elements of a refrigeration system: compressor, condenser, fans, evaporator, controller, valves, and drain pan heater. Krack Monoblock systems are classified as heavy equipment (Table 3) and, therefore, must be handled with the aid of specific equipment for handling heavy machinery. Do not drop the product.

⚠ WARNING

Do not drop the product. Use the appropriate tools for handling and installation to avoid either damaging the refrigerant tubing or increasing the risk of a leak.

Take the necessary actions to avoid damages in the product during handling in installation, maintenance or use to avoid leakage or performance degradation.

	KM2VW BM2VW	KL2VW BL2VW	KL4VW BL4VW	KM2VA BM2VA	KL2VA BL2VA	KL4VA KL4VA
	Water-cooled			Air-cooled		
Application:	Walk-in Coolers	Walk-in Freezers	Walk-in Freezers	Walk-in Coolers	Walk-in Freezers	Walk-in Freezers
Net Weight:	115kg (253 lbs)	114kg (251 lbs)	154kg (340 lbs)	119kg (262 lbs)	121kg (267 lbs)	147kg (324 lbs)
Operating Weight:	116kg (256 lbs)	115kg (254 lbs)	156kg (344 lbs)	119kg (262 lbs)	121kg (267 lbs)	147kg (324 lbs)
Ship Weight:	152kg (335 lbs)	151kg (333 lbs)	191kg (422 lbs)	156kg (344 lbs)	158kg (349 lbs)	184kg (406 lbs)
Refrigerant Charge/circuit:	150g	150g	120g	150g	130g	100g
Refrigerant Circuits	2	2	4	2	2	4
Refrigerant type:	Propane (R-290)					
Certification:	UL Listed, NSF					
Defrost Type:	Hot Gas with electric pan heaters					
Mounting Setup:	Top Mounted					

Table 3 - Krack Monoblock and Refrigerating System Information

The critical dimensions of the Krack Monoblock refrigerating system are shown below in Figure 1.

Figure 1 – Critical Dimensions

2.4. Airflow Overview

The assembly window allows insertion of the cold side of the cooling unit in the cabinet/unit cooler and should be positioned in a way that allows airflow circulation. Several layouts are possible. Rules of thumb recommendations are the following:

Cold side airflow:

- During defrosting, it is very important that all units start defrosting at the same time (see defrost synchronization options in 3.8.3.8).
- It is not recommended to have any auxiliary fan inside the chamber (pointed to the evaporating units) as it can interfere with the hot gas defrost cycle effectiveness.
- Dimensions are relative to evaporator coil on the inside of the box.
- Standard distance between the evaporating unit side and the room walls or stored product is 20″. See “A” in the Figure 2.
- Standard distance between the evaporating unit side and the near evaporating unit side is 20″ when staggered or 40″ when in-line. See “B” in the Figure 2.
- Minimum distance between evaporator air outlet side and room wall or stored product is 18″. See “C” in Figure 2).
- Minimum distance between two units, when one evaporator air outlet side is in-line with the other, is 72″ if the two units are staggered, this minimum distance is 48″. See “D” in Figure 2.
- The minimum distance between the evaporator air outlets if blowing direct to the door is 80″. If not blowing directly, it is 60″. See “E” in Figure 2.

- If there are display doors, it is recommended air discharge blows above and not directly at doors. A baffle (not supplied) is recommended to direct air above door. See Figure 3).
- Minimize as much as possible the interference of one evaporator to the other by staggering the units in the installation.
- Rotating the units is not recommended.
- See Figure 2 for the minimum distances recommended for staggered and in-line installations.

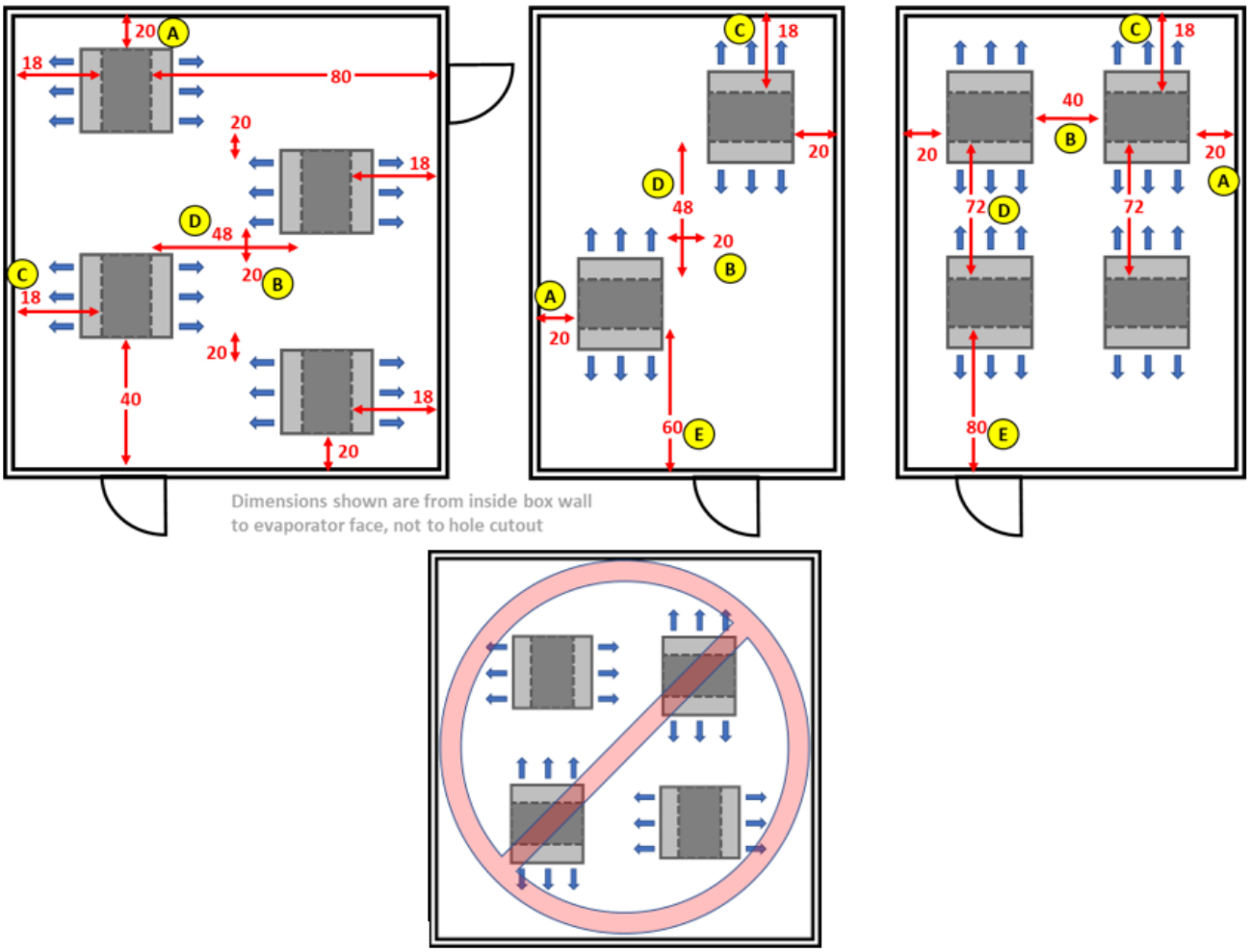


Figure 2 – Roof Top Air Flow View - cold side – Minimum Distances for Installation

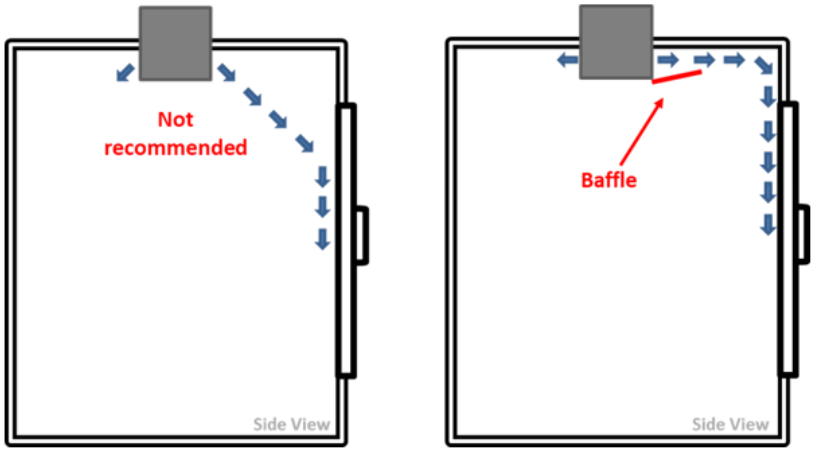


Figure 3 – Side Air Flow View - cold side – Baffle recommended for display doors

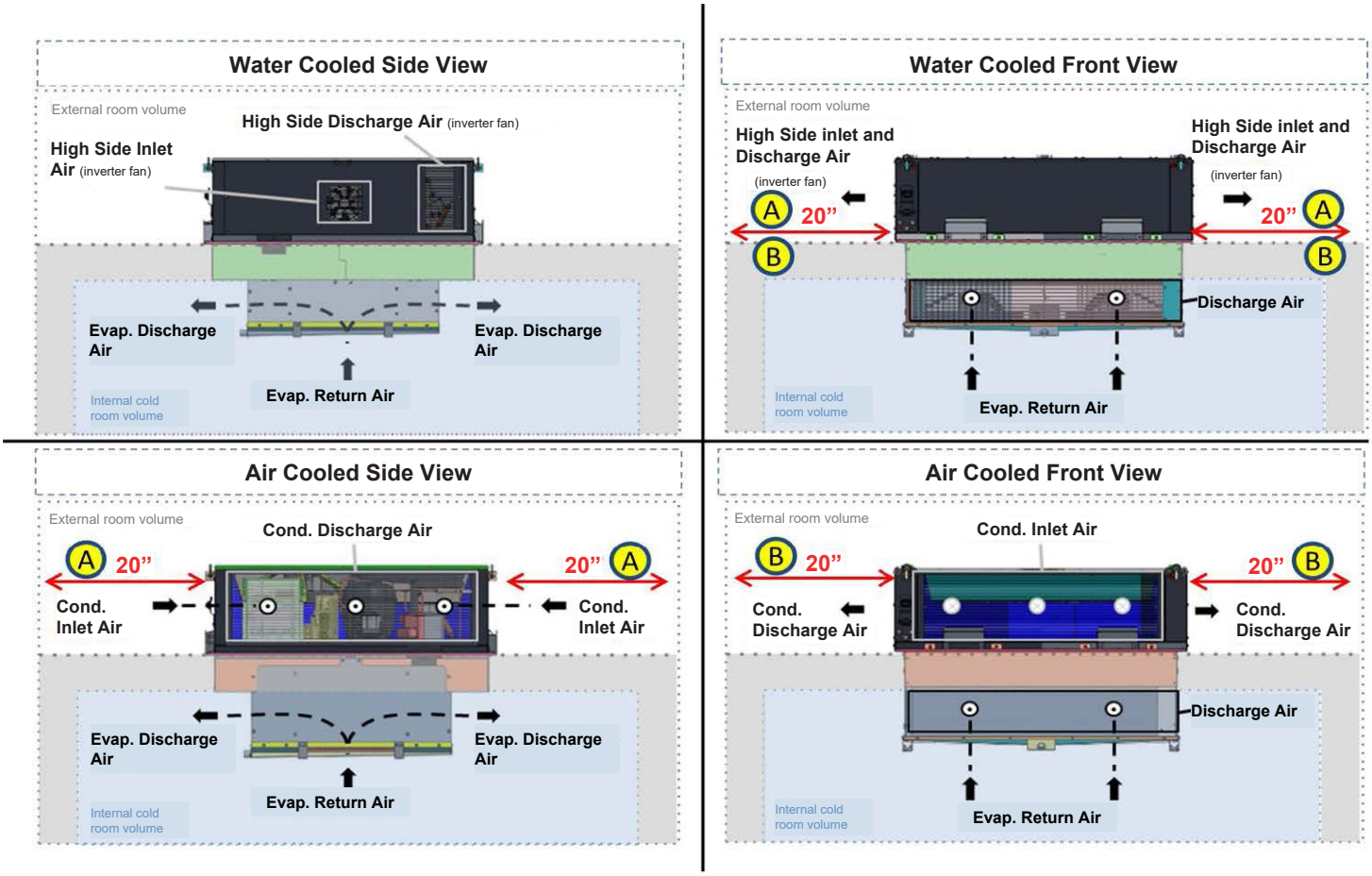


Figure 4 – Airflow schematics

Hot side airflow:

- Dimensions are relative to Monoblock cabinet on the outside of the box.
- Minimum distance between the condenser inlet side and any wall or obstruction is 20″; See “A” in Figure 4.
- Minimum space between condenser outlet side and any wall or obstruction is 20″; See “B” in Figure 4.
- Do not rotate the units. The hot air outlet from one unit will be blown to the inlet side of the other unit (same as shown above in Figure 2)
- If units are installed in a duct, the air flow over the condenser must be generated exclusively by its own unit´s condenser fans. It is not allowed to force air over the condenser by any auxiliary fan as it will reduce the defrost effectiveness (condenser must be kept warm to minimize the refrigerant trapped inside the condenser during the defrost cycle) unless it is mandatory, the auxiliary fan must be turned OFF during defrost cycles.
- The use of filters in front of the condensers (air cooled versions) is allowed. Scheduled preventative maintenance including cleaning and replacing filters is ideal for maximum system performance.

Service access:

- For service purposes, the recommended minimum distances are shown in the Figure 5:
- A: Minimum 36″ as required by National Electric Code (NEC).
- B: Minimum 30″ for installation and service access.
- C: Minimum 12″ for proper airflow.
- D: Minimum 12″ for drain pan / fan access.

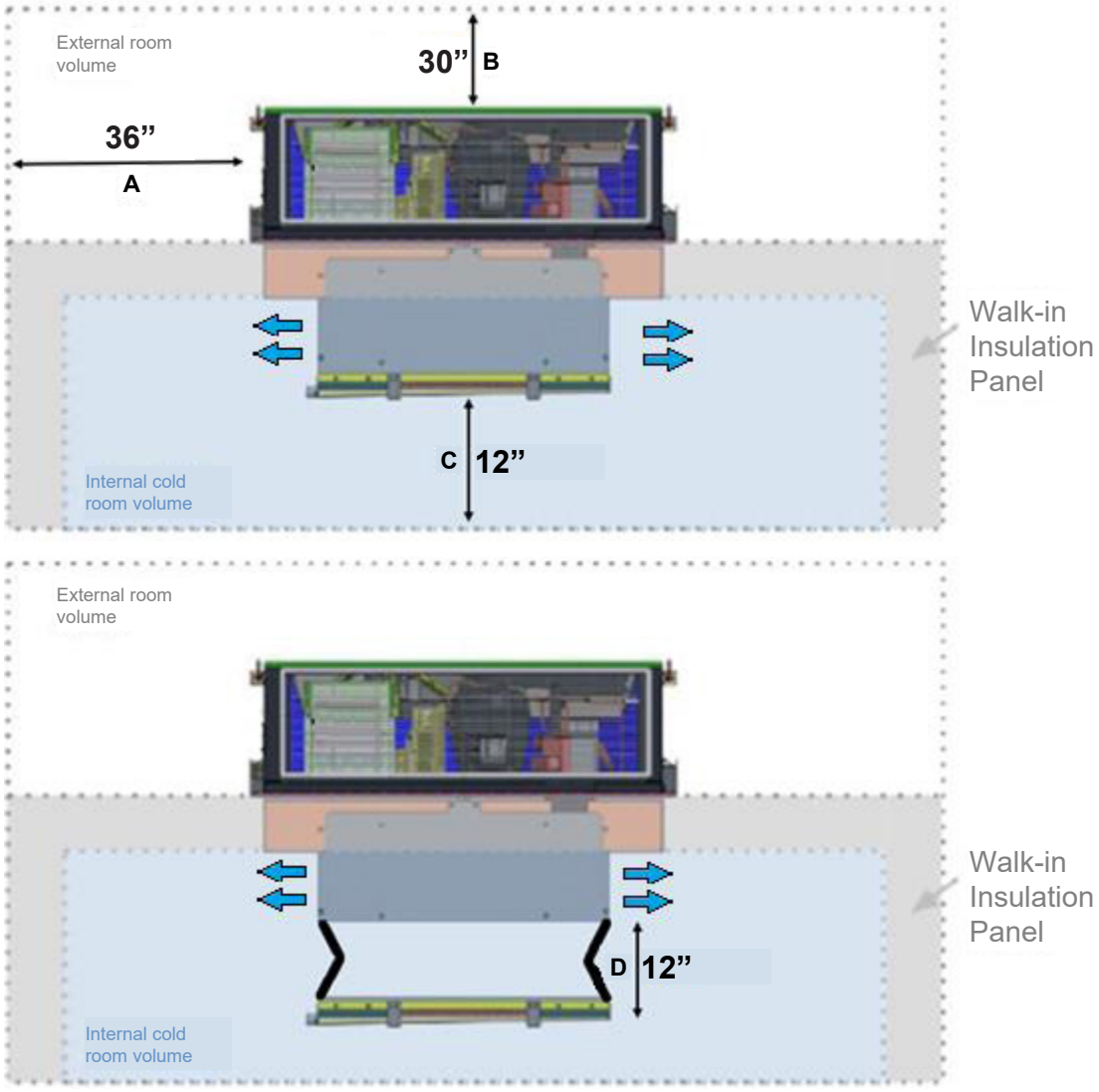


Figure 5 – Service Access Dimensions

Hole Cutout Dimensions:

- Spacing of hole cutouts is different than the cold side spacing. See Figure 6.
- Dimensions to outer edge of box assume six-inch panel thickness.
- Standard distance between the hole side and the room edge is 26″. See “F” in the figure 7;
- Standard distance between the hole sides is 20″ when staggered or 40″ when in-line. See “G” in the figure 7.
- Minimum distance between hole side and room edge is 19.25″. See “H” in Figure 7).
- Minimum distance between two holes, when in-line with the other is 62.5″, and if staggered the minimum distance is 38.5″. See “I” in Figure 7.
- The minimum distance between the hole side and room edge if blowing direct to a door is 81″. If not blowing directly it is 61″. See “J” in Figure 7.

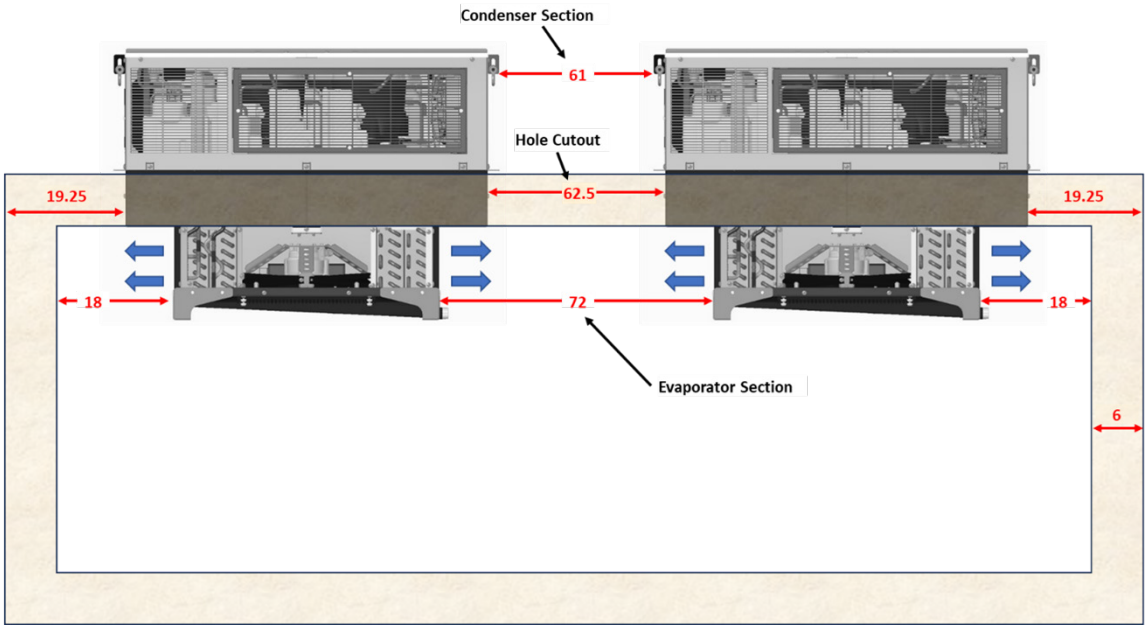


Figure 6 – Dimension Comparison

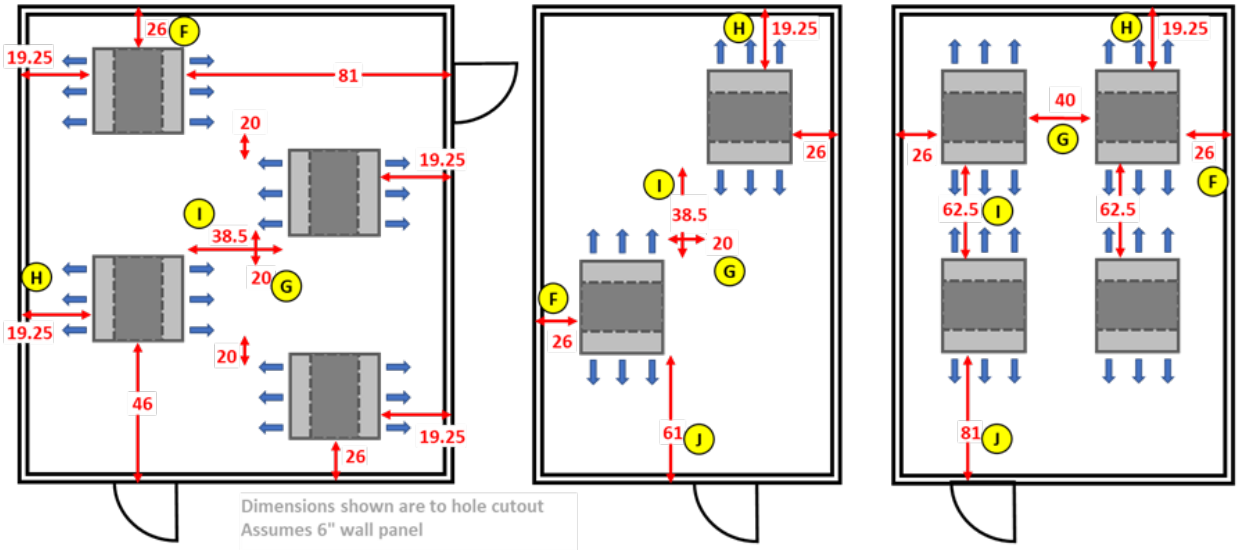


Figure 7 – Hole Cutout Spacing Dimensions

3. Installation Instructions

The refrigerating unit must be installed in accordance with ASHRAE 15 (Safety Standard for Refrigeration Systems).

Observe the following precautions to avoid the risk of fire, electrical shock, or injury:

- Strictly follow the installation instructions to ensure safety of installer and users of these systems.
- Read all instructions before installing and operating system.
- Trained professionals should only be handling these systems.
- Do not install or store the product in a place subject to weather elements such as rain (including with original packaging).
- Do not replace any component of this product or make any repairs that are not explicitly recommended in this guide.
- Products are designed to operate in the indoor ambient temperature of 75°F (allowable range: 50°F to 95°F).

⚠ WARNING

RISK OF ELECTRIC SHOCK

Carefully follow electrical installation instructions and electrical safety recommendations to avoid risk of electric shock during installation, use or maintenance.

Carefully observe the installation instructions especially with the supply voltage, electrical connections, grounding, and application of electrical safety devices (i.e., circuit breakers).

⚠ WARNING

Avoid confined environments around the product. In case of leakage, the refrigerant will stagnate in places with no ventilation. Keep clear of obstruction of all ventilation openings in the equipment enclosure or structure where the equipment is kept.

Install the unit cooler to ensure adequate ventilation around the product. Since propane is denser than air, the refrigerant tends to accumulate in the lower part of the cabinet. Proper installation should prevent formation of refrigerant pockets in confined spaces.

There should be no equipment near these systems that generate sparks during normal operation (i.e., relays, contactors, switches, or motors (screw drivers, vacuum cleaners, etc.)) unless the components are certified to be used with flammable refrigerants. These components increase the risk of ignition in the event there is a refrigerant leak from the system.

3.1. Storage, Transportation, Unpacking, and Handling

Always store the units a clean, ventilated, and dry area. In case it is required to stack the units, three maximum stacked units are allowed. In this case, ensure the floor is properly leveled to avoid inclination and fall.
It is recommended that these systems be transported independently from the chamber in which they are installed. If this is not possible, ensure the proper fixation of the refrigeration unit to the cabinet/case.

⚠ WARNING

RISK OF FIRE OR EXPLOSION

Do not block the openings in the package that allows the exhaust of the refrigerant in case of leakage. Do not open the packaging of this product near sources of ignition.

- The packages have openings in its base that allow refrigerant exhaustion in the event of leakage. Do not block these openings.
- Do not store the product in confined spaces and always use ventilated areas.
- Do not unpack the product near ignition sources.
- Transport the product in its original packaging.

⚠ WARNING

RISK OF INJURY DURING HANDLING

Equipment should only be moved or installed by two or more people. Failure to do so may result in personal injury.

- This is a heavy piece of equipment therefore it must be handled by at least two people and with the aid of specific tools for the operation of heavy machinery.
- Do not drop this equipment.

Once the product is removed from its crate, it must be moved and/or handled by the lift rings available on the corners. Always use the four lift rings together to lift the unit. The handles on the unit are only for adjusting or positioning and not for moving it.

⚠ WARNING

RISK OF LEAKAGE

Equipment should only be handled and moved by trained personnel, using the appropriate tools to avoid either damaging the refrigerant tubing or increasing the risk of a leak.

Take the necessary actions to avoid damages to the product during handling, installation, maintenance, or use to avoid leakage or performance degradation.

⚠ WARNING

RISK OF INJURY DUE TO STRUCTURAL COLLAPSE

Never remove the rails and covers of this equipment when using the corner lift rings. Never service the equipment when the equipment is lifted.

Take the necessary actions to avoid damages to the product during handling, installation, maintenance, or use to avoid leakage or performance degradation.

Refrigerated cooling systems containing flammable fluid above 100 grams (3.52 ounces) cannot be transported by air in accordance with the International Air Transport Association (IATA) standard.

3.2. Mounting and Fixation

Before installing the unit, the gasket needs to be assembled. Hussmann recommends installing the gasket on the roof of the chamber. However, in some cases, it can also be installed in the appropriate frame of the product. Some suggestions of gasket assembling are shown in Figure 8 below:

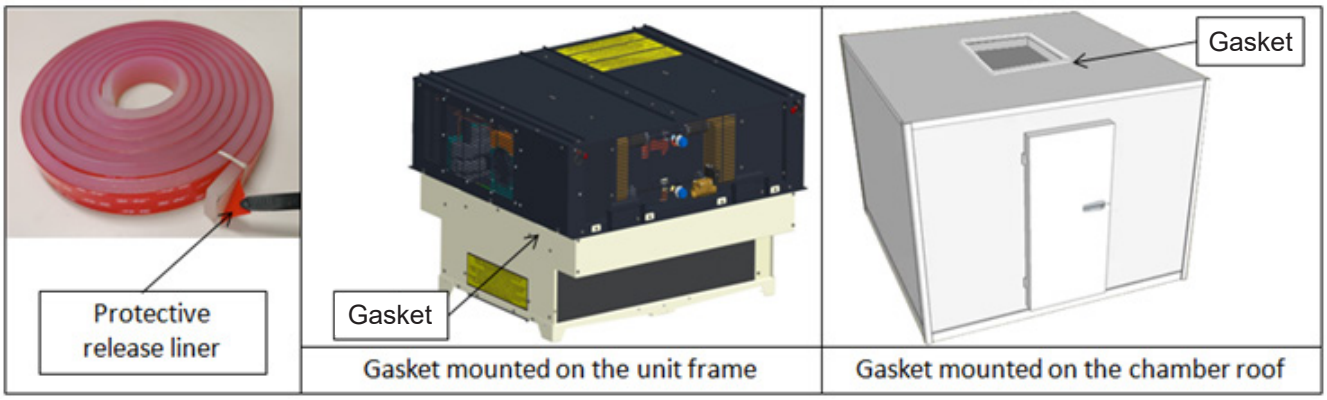


Figure 8 – Gasket installation

Keep in mind the purposes of the gasket are the following:

- To avoid cold air leakage to leverage efficiency.
- To avoid water pooling due to condensation that may result in insect penetration and poor sanitation.
- To suppress noise and vibration.

The gasket is supplied with the Monoblock unit as a shipped-loose roll. The gasket must have the protective release liner removed, and the adhesive side must be adhered to the ceiling of the cold chamber, close to the assembly window, in order to guarantee the sealing of the Monoblock.

3.2.1. Roof Opening and Trim Installation

The unit was developed to be mounted on the roof (maximum thickness: 6") of the chamber and can be mounted using one of two different configuration options (dependent upon on chamber or available structure):

- Chamber Roof – In this configuration, the unit is mounted on the roof of the chamber into the opening shown in Figure 9. The chamber's structure must be reinforced and able to sustain the system's weight.
- Suspended/Hang – In this configuration, the unit is suspended by a structure above the chamber with hanger rods and fixed in the unit clevises (supplied with the unit), according to the instructions described in Figure 10. The mounting structure and hanger rod kit are not included with the product.

Note 1: The equipment is designed to be level. A maximum slope of ¼" is allowed if in the direction of the drain fittings, allowing for proper draining of water from defrost cycles.

Note 2: In any mounting configuration, it is imperative that the structure can withstand the weight of the system. Avoid air gaps between the chamber's roof and gasket to ensure the units operate at the designed performance.

The hole cutout in the ceiling panel should be 35.85 inches by 34.25 inches. The evaporator airflow discharges along the longer sides.

The Krack units also include a set of trims to be installed on the ceiling, inside the chamber shown in Figure 11. The trims are supplied inside the packaging along with other ship-loose items. Attachment screws are not provided. It is recommended to use: 5/32" self-tapping screws for this installation.

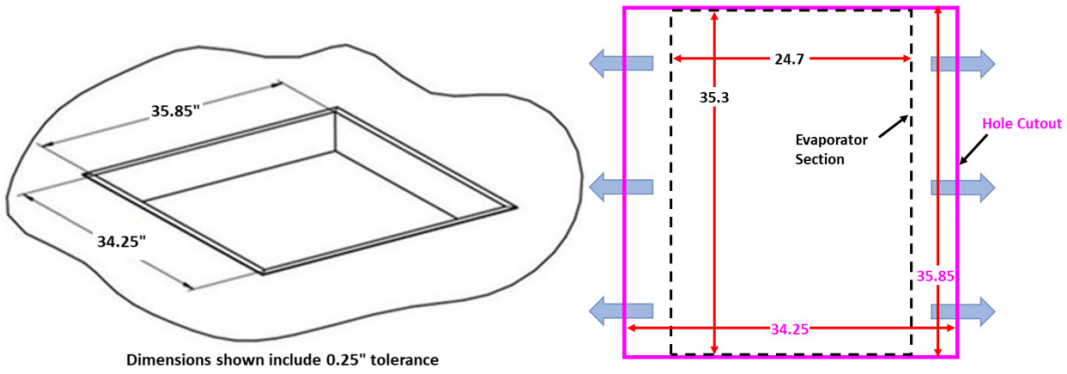


Figure 9 –Installation opening dimensions (inches)

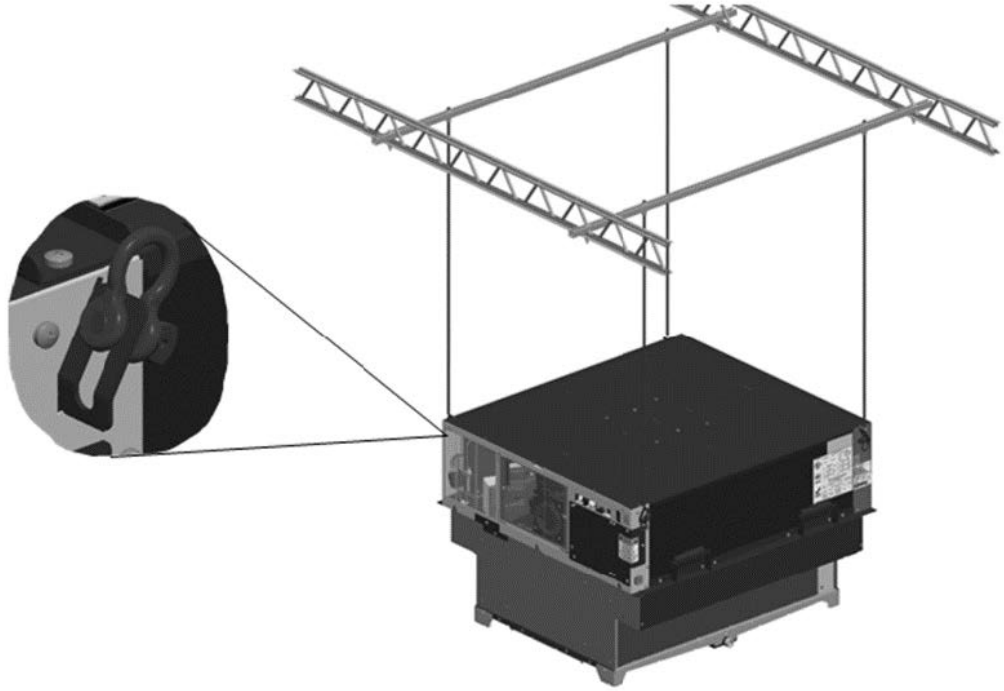


Figure 10 – Example of Suspended/Hang unit mounting: Suspended by clevises

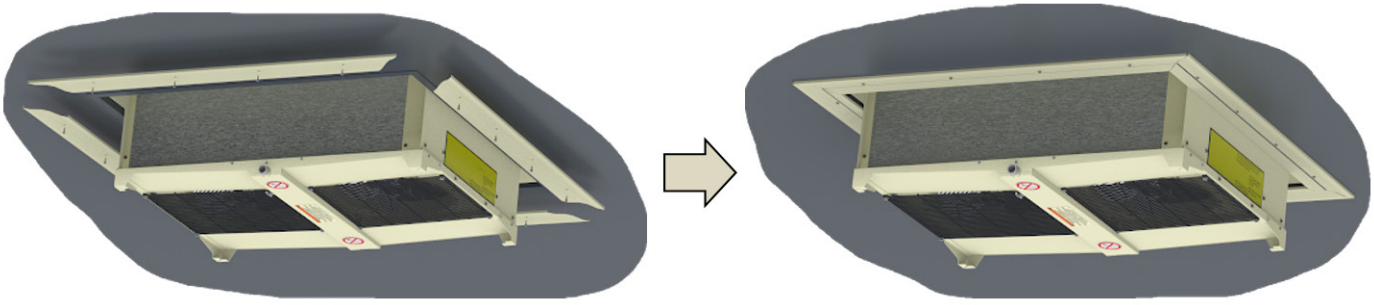


Figure 11 – Trim Installation

Ensure that there is neither air leakage nor water condensation on the external part of the unit cooler. Seal the internal part of the case to protect against dirt and insect access. Use safety gear and tools for moving and transporting the unit and leverage the handles. If necessary, add devices to lock the system in the required position (not included).

3.3. Drain Connection (Condensation Water)

Krack Monoblock systems have a drain for removing condensate water during the defrost cycle (Figure 12).

For the system to operate properly, the unit must be leveled (maximum variation: 1/4” in the direction of the drain fitting) and the drain connected to a sewer line. Ensure sewer line has a trap to prevent infiltration, odors, and insects from accessing the cabinet. The system’s drain connection is male 3/4”-14NPT.

If required, a heater element must be added to drain pipes to avoid clogging by ice formation.

The drain line should be as short and as steeply pitched as possible with a minimum of ¼” drop per running foot.

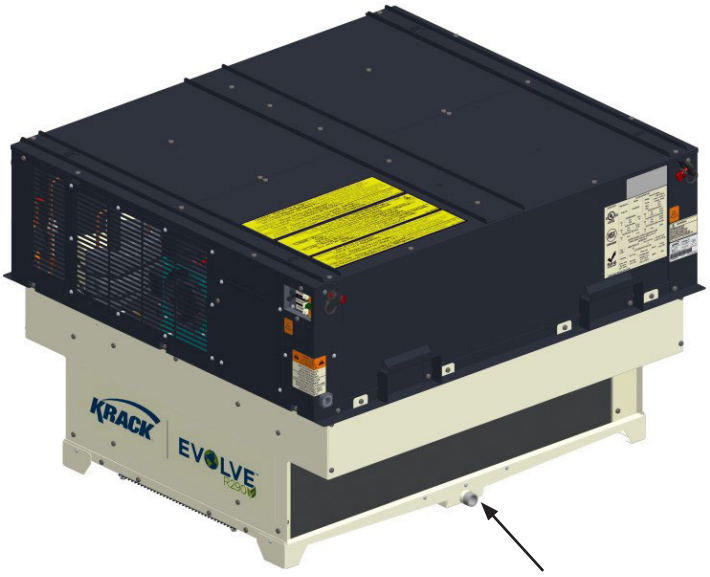


Figure 12 – Drain connection position

Any traps in the drain line must be in an ambient above freezing location. If the temperature surrounding the trap or drain line is below freezing (0°C, 32°F) it must be wrapped with a drain line heater. Be sure to also wrap the unit drain coupling. Cover the drain line, drain coupling, and heat tape with insulation. Be sure to follow the manufacturer’s recommendation when installing the drain line heat tape.

A union at the drain connection in the drain pan is recommended for ease of installation and future servicing. The union should be located as close to the drain pan as possible. Use two wrenches when tightening to prevent the drain fitting from twisting and damaging the unit.

Long runs of drain line (i.e., more than a few feet) should be supported by hangers to avoid damage to the drain pan.

3.4. Water Loop Connection (Water-Cooled Condenser)

Do not make the water connection without first confirming the system is disconnected from the power supply. The quick connectors supplied with the equipment do not have a check valve therefore isolation valves are also required in the inlet and outlet lines to enable the circuits to be individually handled (isolation valves not included).

KM2VW, KL2VW and KL4VW water-cooled families are factory supplied with a normally open solenoid valve. KM2VW and KL2VW have it fixed in the product by strips (for transportation reasons) and must be assembled directly in the water loop inlet fast connector. Its function is to turn off the water supply during the defrost cycle. The water inlet solenoid valve connector is female 3/4” – 14NPT while the water outlet connection is male 3/4” – 14NPT (Figure 13). It is recommended to keep the water valve in the upright position. For the KL4VW model, both inlet and outlet connectors are female 3/4” – 14NPT once they have the solenoid valve and the balance valves as the interfaces.

Note:

Remove the plastic caps before installing.

Ensure the water connections are well sealed in order to avoid water spillage on the product.

Do not touch a hot coil. Make sure it is cool before handling.

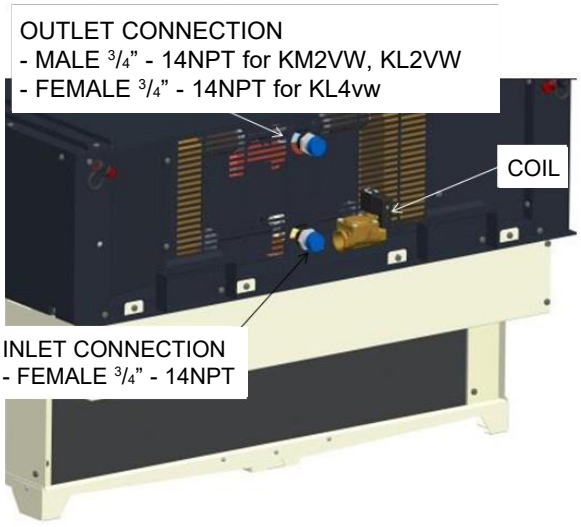


Figure 13 – Water Loop Connections

To prevent pressure buildup, precautions should be taken using surge suppressors or similar solutions in the design of pipe routing and selection of components.

Pipes must be adequately supported according to tube diameter, number of joints, weight, and required spacing distance. Piping should not be routed where it is likely to be walked on or used as lifting beams. When this is not possible, protective covers and warning labels should be provided by the installing contractor to avoid damage to the pipes and/or injury personnel.

Special attention for pipe installation must be taken into account for expansion and contraction due to temperature variation. Piping must be also designed to minimize the effects of vibration. Plastic piping is not recommended unless it meets all pressure, temperature, and material compatibility requirements.

The product is equipped with water balancing valves to control the flow and ensure best operation of the equipment. This product is designed to operate with water temperatures of 85°F (29°C) ranging from 50 to 115°F (10 to 46°C) and minimum flow limited by the balancing valves (see table below). In colder climates, water inside the piping may freeze. To ensure water temperature remains in range, control external heat exchanger outlet temperature to prevent water from cooling below 50°F (10°C). In the case anti-freeze additives are necessary, use a maximum of 38% Propylene Glycol.

Product Family	Balance Valve Rating Flow	Quantity of Valves
KM2VW, KL2VW / BM2VW, BL2VW	2.2 gal/min (8.3 liters/min) each valve	2
KL4VW / BL4VW	7.0 gal/min (26.5 liters/min)	1

Table 4 – Water Composition

Purge the air from the water circuit. If necessary, stabilize the water chemically to prevent corrosion and encrustation.

Note 3: Strainers, isolation valves, surge suppressors, and air vent points are not supplied with the product and must be assembled by the installing contractor. See valves position in Figure 14 below (suggestion).

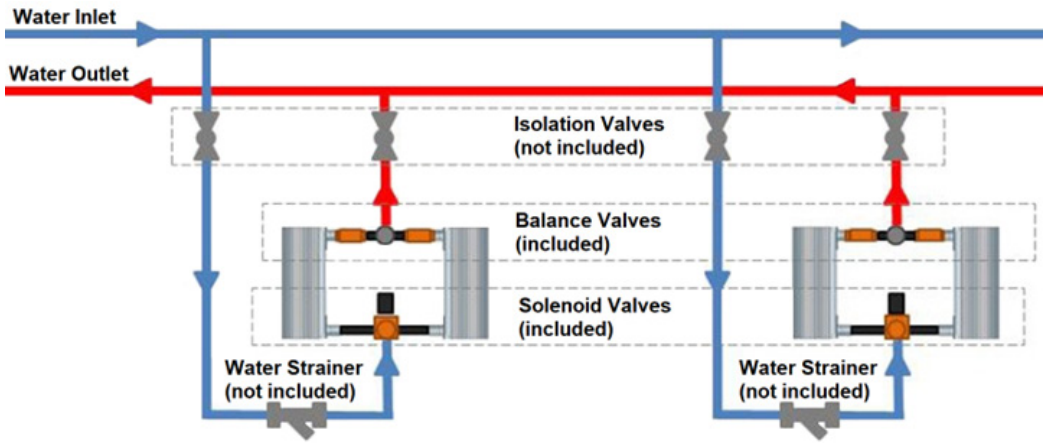


Figure 14 – Water Loop valves position

Ship loose hose kits are available. There are two different hose kits available depending on Monoblock model.

Kit SCD60 is used on KM2VW, KL2VW, BM2VW, and BL2VW.
Kit SCD61 is used on KL4VW and BL4VW.

The contents of the kits are detailed below.

Item	Hussmann Number	Kit SCD60	Kit SCD61
Hose, 6 ft: NPSM (F) x NPSM (F), 3/4"-14	3101227	2	2
Strainer: NPT (F) to NPT (F), 3/4"-14	3204281	1	1
Adapter: NPSM (M) to NPTF (M), 3/4"-14	3172725	1	2
Union: NPT (M) to NPT (M), 3/4"-14	3193650	1	1

These kits assume the store connection is a 3/4" Male NPT.

Figure 15 below show a representation of the kit components and how they should be assembled.

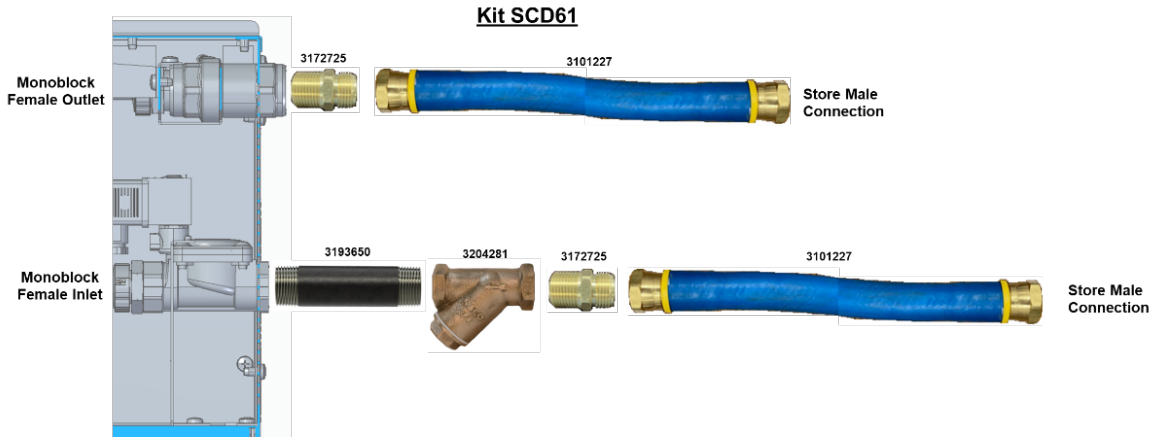


Figure 15 – Ship loose water kit assembling suggestions

Influence of water composition on corrosion resistance of water loop components requires some recommendations. Table 5 provides recommended concentrations for various chemicals to reduce risk of corrosion of the condenser. In the table, a number of important chemical components are listed, however the actual corrosion is a very complex process influenced by many different components in combination. This table is therefore a considerable simplification and should not be overvalued.

Water Content	Recommended Concentration Range (mg/l or ppm)
Alkalinity (HCO_3)	70-300
Sulphate (SO_4)	< 70
HCO_3 / SO_4 ratio	> 1.0
Electrical Conductivity	10-500 uS/cm
pH	7.5 - 9.0
Ammonium (NH_4)	< 2
Chlorides (Cl)	< 100
Free Chlorine (Cl_2)	< 1
Hydrogen Sulfide (H_2S)	< 0.05
Free (aggressive) Carbon Dioxide (CO_2)	< 5
Total Hardness (dH)	4.0 - 8.5
Nitrate (NO_3)	< 100
Iron (Fe)	< 0.2
Aluminum (Al)	< 0.2
Manganese (Mn)	< 0.1

Table 5 – Water Composition

3.5. Electrical Connections

This equipment must be installed in a properly protected electrical circuit with a Residual Current Device (RCD) with maximum 30mA of leakage current. For two-line circuits (L-L without neutral), apply a differential residual bipolar circuit breaker to protect both phases.

The recommendation of the electrical wiring gauge (per cooling unit) is minimum 14AWG copper only conduits. Grounding the entire system is a mandatory requirement. The critical electrical unit data is shown in Table 6 and also on the product labels.

The Monoblock is supplied with an electrical terminal block for field connections.

Electrical connections must follow the color and positions of cables as shown in Figure 16.

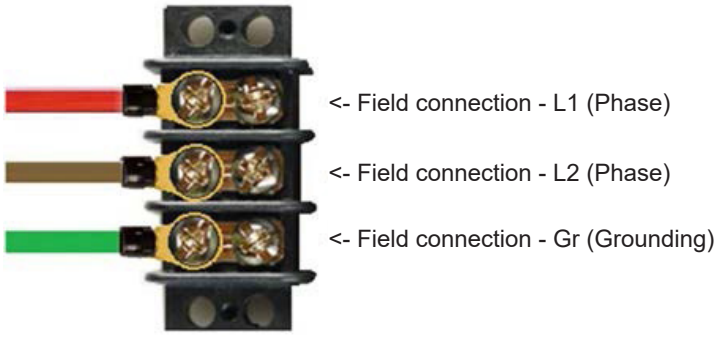
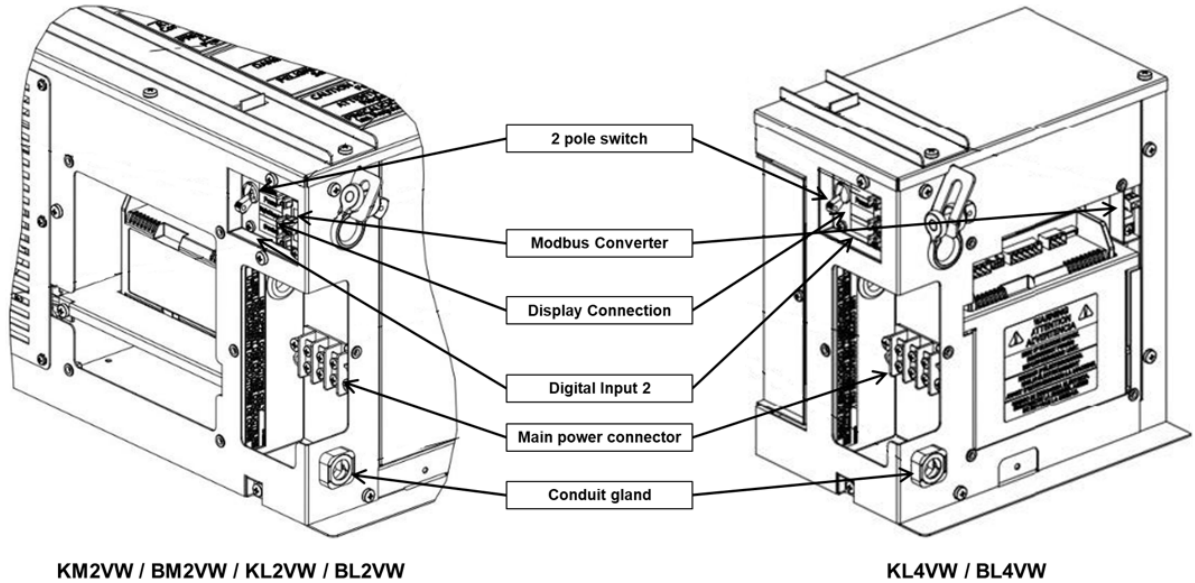


Figure 16 – Electrical connections

A convenience switch is available for servicing. Always turn the convenience switch off when servicing the unit. The upper position is marked “ON” and will energize the whole unit. When in the “OFF” position, the convenience switch will de-energize the unit downstream of the convenience switch, but all electrical connections upstream of the convenience switch must be considered energized.

If servicing requires opening the electrical box, it is required to also turn off the NEC required main circuit branch disconnect device or the disconnecting switches as they are required to be located within sight and readily accessible from the Monoblock. Please notify the architect for the electrician that these are required when designing Monoblock’s into the WICF designs.

The locations of the electrical components and connections are shown in Figure 17 below.



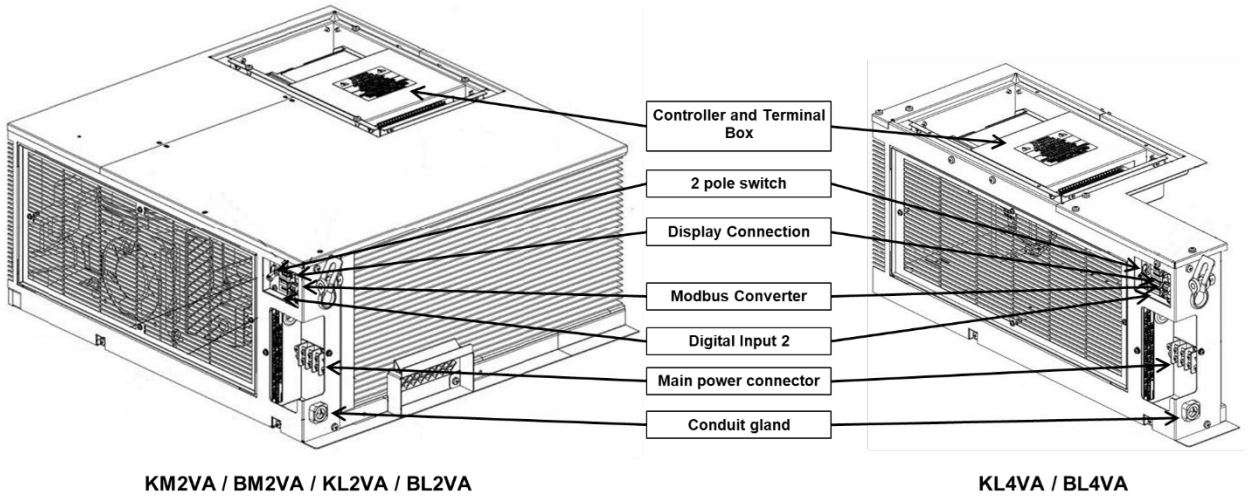


Figure 17 – Electrical and Communication Connections and components

Electrical terminals must be properly sized as per the wire gauges used. Terminal crimps must be made with the proper crimping tool to ensure good contact and robust connections.

Application	Krack Part Number	Voltage / Frequency	Voltage Range (Min – Max)	Phases	MCA (A)	MOP (A)
Water-Cooled	KM2VW15UGDR BM2VW15UGDR	230V/50-60Hz	208–255V	1 PH	10	15
Water-Cooled	KM2VW15UGDN	230V/50-60Hz	208–255V	1 PH	10	15
Water-Cooled	KL2VW15UGDR BL2VW15UGDR	230V/50-60Hz	208–255V	1 PH	12.2	15
Water-Cooled	KL4VW15UGDR BL4VW15UGDR	230V/50-60Hz	208–255V	1 PH	18	30
Air-Cooled	KM2VA15UGDR BM2VA15UGDR	230V/50-60Hz	208–255V	1 PH	15	20
Air-Cooled	KL2VA15UGDR BL2VA15UGDR	230V/50-60Hz	208–255V	1 PH	15	20
Air-Cooled	KL4VA15UGDR BL4VA15UGDR	230V/50-60Hz	208–255V	1 PH	23	30

Table 6 – Electrical Data

3.5.1. Power Input

The Krack Monoblock systems are designed to operate at 230V ± 10% at 50 and 60 Hertz. Depending on the market and where this product will be installed, it can be connected with single-phase + neutral and ground OR bi-phase (center-tapped neutral) + ground.

For instance, in the United States electrical standard requires to connect a center-tapped neutral to give two 120V supplies which can also supply 240V to loads connected between the two-line wires, while in many other countries, such as in Europe and south of Brazil, the single-phase + neutral is used.

	Single Phase Connection (Phase-Neutral) *(208V/50/60HZ)*	**Bi-Phase Connection (Phase-Phase)** *(240V/50/60HZ)*
Terminal	*Electrical Connection*	*Electrical Connection*
L1	Phase 1	Phase 1
N	Neutral	Phase 2
Gr	Grounding	Grounding

Table 7 - Power Input

3.6. Inverter (Compressor Driver)

Krack Monoblock´s have several refrigeration circuits where the variable speed compressors are driven by Embraco electronic inverter model CF10B01.

Take care when handling and accessing inverters for maintenance purposes. The inverter must always be well fixed to the base with the cover in the correct position and screwed on. Follow specific inverter instructions if necessary to access the internal circuit board, as it is sensitive to ingress of water and solids parts, mechanical impacts, and Electrostatic Discharges (ESD).

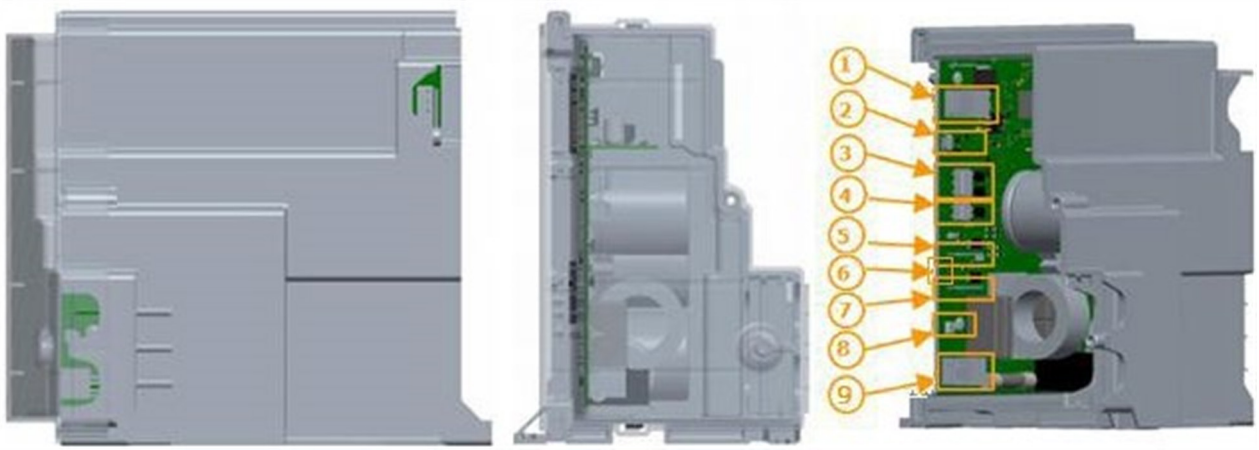


Figure 18 – Inverter connections

#	Description
1	AC fan Triac / Relay
2	“You” control input (not applied for Krack units)
3	Serial communication
4	Frequency input (not applied for Krack units)
5	Defrost signal input (not applied for Krack units)
6	LED for diagnostic
7	Drop-in (not applied for Krack units)
8	EMI earth (not applied for Krack units)
9	AC input

Table 8 - Inverter

3.6.1. LED diagnostic function

The LED diagnostics function helps service technicians diagnose possible fault components by a blinking LED inside the box with different patterns. Basically, it indicates if there is a problem with a compressor, CF10B inverter or thermostat. The LED is located at position 6 in the figure 14. The Table 9 below describes the failure modes.

LED Status	Period	Color	Description
1 flash	30 seconds	Green	Normal operation
2 flashes	5 seconds	Green	Communication problem
3 flashes	5 seconds	Red	Inverter problem
4 flashes	5 seconds	Red	Compressor problem
No flash	----	----	No input power / Damaged inverter

Table 9 - LED Diagnostic Function

3.7. Fan motors

Several combinations of fan motors are applied in the Krack Monoblock systems. Always replace the fan motor with original parts in order to guarantee performance, safety, reliability, and efficiency of the units.

A list of motors is presented in the table below:

Application	Krack Part Number	Hot side fan motor	Low side fan motor	Notes
Air-Cooled	KM2VW15UGDR BM2VW15UGDR	Coolers for compressor and inverter, YS Tech KT12038220BL [Hussmann Part 3198413]	Regal KRYO ECM motor model SSC4H18GF0053 (Rated IP65) [Hussmann Part 3161924]	Two coolers and two evaporator fan motors per unit
Water-Cooled	KM2VW15UGDN			
Water-Cooled	KL2VW15UGDR BL2VW15UGDR			
Water-Cooled	KL4VW15UGDR BL4VW15UGDR	8” blades and UNADA ECM motor FM103709XX 1350rpm [Hussmann Part 3198415]	Regal KRYO ECM motor model SSC4H18GF0053 (Rated IP65) [Hussmann Part 3161924]	UNADA motor
Air-Cooled	KM2VA15UGDR BM2VA15UGDR	Condenser fan pack UNADA UC12 FM124809XX 1350rpm [Hussmann Part 3198413]	Regal KRYO ECM motor model SSC4H18GF0053 (Rated IP65) [Hussmann Part 3161924]	Six condenser fan packs and two evaporator fan motors per unit Two coolers are connected only during defrost cycle
Air-Cooled	KL2VA15UGDR BL2VA15UGDR	Coolers for compressor and inverter, YS Tech KT12038220BL [Hussmann Part 3198413]		
Air-Cooled	KL4VA15UGDR BL4VA15UGDR	Condenser fan pack UNADA UC12 FM124809XX 1800rpm [Hussmann Part 3198413]	Regal KRYO ECM motor model SSC4H18GF0053 (Rated IP65) [Hussmann Part 3161924]	Condenser fans run at 400 rpm to keep cooling compressor and inverter during defrost

Table 10 – Fan motor specification

3.8. Controller

The controller applied in the Krack Monoblock systems is a Dixell XWi70K with serial signal to control the speed of the variable speed compressors.

Serial cables are different between 2 and 4 refrigeration circuit units. Use only original parts.

3.8.1. Sequence of operation

STEP A: NORMAL REFRIGERATION CYCLE

a) Controller communicates with inverters by a serial signal so compressors start the refrigeration cycles; once energized, inverters close an internal switch and the inverter cooling fans (and condenser fans on air-cooled versions) start operating together with the compressors. On first power-up all the compressors will ramp up to 2355 rpm for a few minutes before normal operation. All subsequent startups will begin by ramping up to speed commanded by controller.

   NOTE 4: Compressor speed curves and operation routines are pre-defined by the manufacturer.

b) A parameter in the controller (FSt) defines the evaporator temperature to start / stop the evaporator fans. Once the pre-defined temperature is achieved (default = 50°F), the controller switches ON the evaporator fans at maximum speed (1550 RPM). The evaporator fans are kept OFF when the system returns from the defrost cycle to avoid water spillage into the storage area. This option is also programmable by parameter “Fnd”.

c) The compressor modulates speed/capacity according to the system load. During this process, the condenser and evaporator fans will keep operating until the set point is achieved. If the compressor is already at the minimum speed and set point achieved, the controller will turn the compressor off. The minimum and maximum speed of the compressor is adjustable by the controller via parameters “FMi” and “FMA”. Then, the inverter internal switch will disconnect condenser fans / inverter cooling fans.

d) During compressor and condenser fan OFF time, the evaporator fan will run at idle speed (~800 RPM).

e) When the return air temperature probe senses the temperature above the preset differential set point, the compressor and condenser fans/coolers are switched ON and evaporator fans run at maximum speed (~1550 RPM).

f) In case of over ice formation on the evaporator, the low temperature alarm (LA) will be activated. For freezer applications, the compressors will also be disconnected (they will be cycling around lower operation limit). In the event a LA alarm occurs, the unit must be defrosted.

g) For several units applied in the same storage room, each unit will follow its own logic to define compressor speed and operating conditions. But defrost for all units should be coordinated to occur at the same time. Thus, it is recommended to interconnect the units by the defrost coordination cable (digital input 2) to guarantee the defrost will happen at the same time for all units. This is recommended for the models without a Real Time Clock (RTC). For units with RTC, defrost cycle must be defined by the internal clock. If an external server is applied, then the inter-communication for operating and defrost cycles is defined by this Modbus interface. Follow 3.8.3.8 for more details.

STEP B: HOT GAS DEFROST CYCLE

h) The hot gas defrost cycle is recommended for applications where storage temperature is close or below freezing point (~32°F) or when high humidity conditions are reached. The hot gas defrost cycle is initiated by time and temperature terminated with a timer and/or high temperature override. Each circuit follows its own input to define the end of the cycle.

i) The initiation of defrost cycle can also be defined by the internal clock (RTC) when available. It is recommended to use digital input 2 to synchronize the defrost cycle between units when the controller has no RTC (see item 3.8.3.8). The timer starts the defrosting of the evaporator coil at predetermined intervals. A typical setting would be six defrost periods per 24-hour day.

j) The logic implemented in the controller enables a pre-defrost pull down before the defrost cycle begins. The pre-

defrost logic has two functions: a) allow a pull down of 2°F within 5 minutes and b) pump down the evaporator to avoid excessive liquid returning to compressor when the defrost cycle is initiated. Thus, the pre-defrost logic must never be disabled. Upon initiation of the defrost cycle, the controller opens the hot gas solenoid valve, closes the water flow through the condensers, and shuts off the evaporator fan motors. For air-cooled versions with two refrigeration circuits (KL2VA and KM2VA), all condenser fan motors will be shut off while the cooling fans for inverters turn ON. For the KL4VA version, the condenser fan motor speed is reduced to 400 RPM. Simultaneously, power is connected to the drain pan heaters. The display shows dEF (dEF) during the defrost cycle.

k) The compressor speed is increased to its maximum value (5000 RPM).

l) As the frost melts, it drops into the heated drain pan and flows down the drain.

m) During this period, the evaporator pressure will remain close to the corresponding melting point of water. Refrigerant in liquid state can migrate to the compressor by the suction line. This process is normal and the compressor is approved for liquid refrigerant handling.

n) Once the ice is melted, the evaporator temperature will increase. The probe in the evaporator outlet is responsible for termination of the cycle, once the preset temperature is achieved. The parameters for the defrost termination are dtE (dtE) and dtS (dtS) and the pre-defined value is 55°F. It is not recommended to increase this value as it impacts the compressor operating envelope during the defrost cycle.

o) The controller will initiate the drip time (parameter Fdt (Fdt) before starting the normal refrigeration cycle again. The pre-defined value for Fdt is 5 minutes for medium temperature and 20 minutes for low temperature units. During drip time, the pan heaters are turned OFF for medium temperature but kept ON for low temperature units. The display continues to show dEF (dEF) after termination for 10 minutes. After 10 minutes have elapsed, the display shows the room temperature.

Anticipate the following water condensate during defrost:
About 0.4 pounds per defrost on the 4 compressor model – 6 defrosts per day. Large LT air and water cooled.
About 0.3 pounds per defrost on the 2 compressor model – 6 defrosts per day. STD MT and LT air and water cooled.

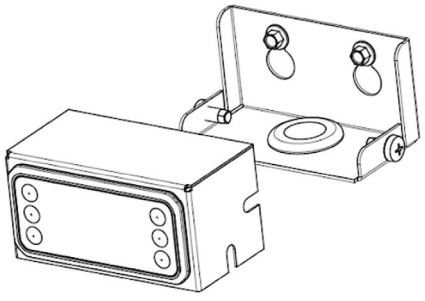
3.8.2. Keyboard

The unit is provided with one Dixell digital display model CH620 to be connected to the controller. The connection of the display is optional when the supervisor or Visotouch are used. A ~33 foot (10 m) connecting cable is supplied as an accessory. The display is provided inside the electrical box for convenience.

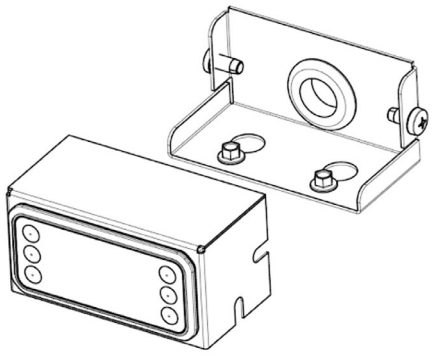
The red wire connects to the **+** terminal and the black wire connects to the **–** terminal.

The display box can be mounted horizontally or vertically, and the display can be rotated for top or front viewing. The display can be mounted directly on the Monoblock unit by backing out the indicated screws a couple turns. Or the display can be mounted remotely using field supplied fasteners.

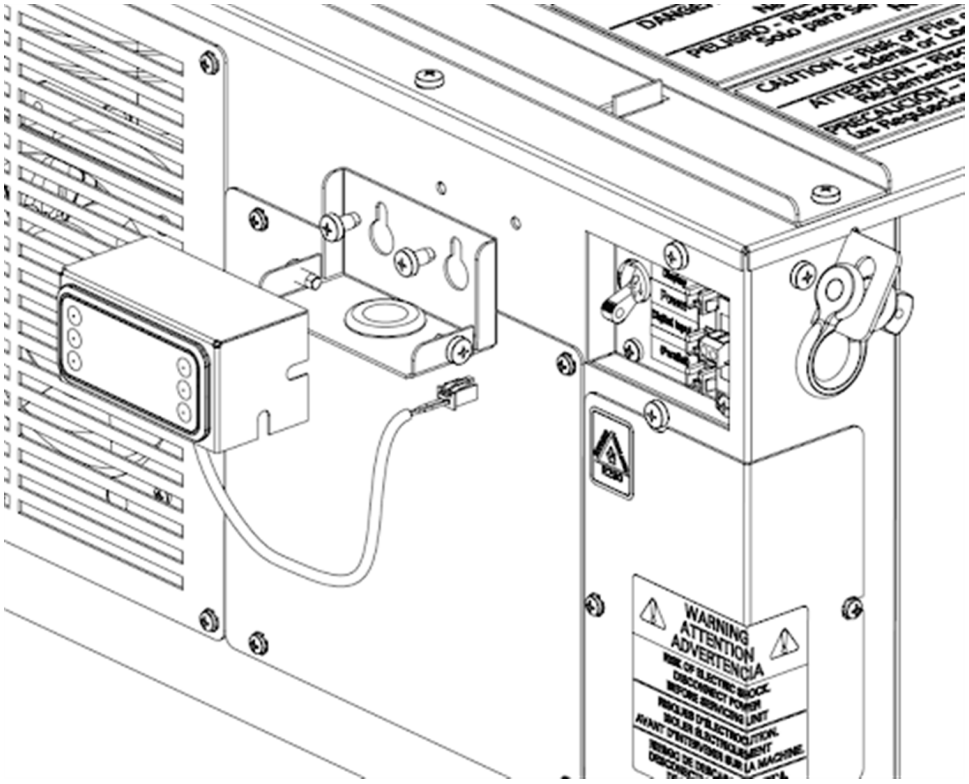
Display Mounted on Vertical Surface



Display Mounted on Horizontal Surface



Example Showing Display Mounted on Monoblock



3.8.2.1. LED Functions

Each LED function is below in Table 11 with display view example in Figure 19:

LED	MODE	Function
❄	ON	The compressor is running
	FLASHING	- Programming menu - Anti-short cycle delay enabled
🌀	ON	The fan is running
	FLASHING	Programming menu
❄	ON	The defrost is enabled
	FLASHING	Drip time in progress
(!)	ON	- ALARM signal - In "Pr2" indicates that the parameter is also present in "Pr1"
❄	ON	Pull down is running
ECO	ON	Energy saving enabled
☀	ON	Light on
AUX	ON	Auxiliary output on
C, F	ON	Measurement unit

Table 11 – LED description

Figure 19 – Display View

PN 3153769_D

3.8.3. Configuration

The configuration parameters are divided in groups (named menu). After entering the programming mode, the first label corresponding to the first available group (menu) will appear on the display depending on the visibility level. Every parameter belonging to a specific menu has its own visibility rules for placement in PR1 (user accessible parameters) or PR2 (hidden parameters). Any menu can have parameters placed both in PR1 and/or PR2.

3.8.3.1 How to enter parameter programming menu "PR1"

To enter a parameter list under "Pr1" level (user accessible parameters), under a specific menu, operate as follows:

SET + ▽ (3 seconds)	1. Enter the Programming mode by pressing the **SET+DOWN** key for 3 seconds. 2. The display will show the first menu available under "Pr1" level

3.8.3.2. How to enter parameter programming menu "PR2"

In the PR2 level, there are all the parameters of the instrument.

SET + ▽ (3 seconds)	1. Enter the Programming mode by pressing both **SET+DOWN** buttons for 3 sec: the label of the first menu available in Pr1 will be displayed (example: rEG)
SET + ▽ (7 seconds)	2. Release the **SET+DOWN** buttons and then push them again for 7 sec: during this time both compressor and fan icon will blink. After 7 sec the "**Pr2**" label will be displayed immediately, and, after releasing the **SET+DOWN** buttons, the first parameter menu available will be displayed (example: rEG)

3.8.3.3. How to change a parameter value

1. Enter the programming mode (both in PR1 or PR2 level).
2. Select the required menu with UP or DOWN.
3. Press the SET button to enter the parameter list belonging to the selected menu.
4. The first available parameter label (depending on the visibility level) will be displayed. The compressor icon will blink to indicate the position in the selected menu.
5. Select the required parameter by using the UP or DOWN buttons.
6. Press the SET key to display the current value (compressor and fan icon starts blinking to indicate this condition).
7. Use UP or DOWN to change its value.
8. Press SET to store the new value and move to the following parameter (belonging to the same menu).
9. To exit: Press SET+UP or wait for 30 seconds without pressing any buttons.

NOTE 5:

The new programming is stored even when the procedure ends by waiting for the time-out.
The LIGHT button is used as BACK function when in PROGRAMMING MODE: press it to exit from a parameter list and return to the upper menu or to discard a parameter value modification and return to the same parameter label (without changing the previous parameter value).

3.8.3.4. Parameter list

The configuration parameters are divided in groups (named menu) to speed up the browsing operations. The list in Table 12 below is all menus with its meaning:

rEG	**Regulation menu:** to set regulation band
Prb	**Temperature probe menu**
vSC	**Variable Speed Drive menu:** to set the VS functional parameters
vSF	**Modbus Variable Speed Fan menu:** to set Modbus VSF functional parameters
diS	**Display menu:** to set the visualization rules
dEF	**Defrost menu:** to set the defrost operational mode
FAn	**Fan menu:** to set the evaporator and condenser fan control mode
AUS	**Auxiliary menu:** to set the auxiliary output mode
ALr	**Alarm menu:** to set the alarm thresholds
oUt	**Output menu:** to set the function linked to any configurable output
inP	**Input menu:** to set the function linked to any configurable input
ES	**Energy saving menu:** to set the energy saving mode
rtC	**Real Time Clock menu:** to set the internal clock
CoM	**Serial communication menu:** to set serial port speed and baudrate
Ui	**User Interface:** to set keyboard related functions
inF	**Info menu:** to read probe values and FW information

Table 12– Parameter Menu

The list of parameters shown is an extraction from the controller manufacturer manual and presents the most common parameters configured during the commissioning and also by users of the Krack Monoblock systems. For more details and the complete list of parameters, information can be found on the internet for controller: XWi70K. For a list of parameter and output ranges, view Table 19 at the end of this document.

3.8.3.5. Alarms

A list of main alarms is presented in Table 13 below:

System alarms		
Message	**Cause**	**Outputs**
P1	Thermostat probe failure	Alarm output ON; Compressor output according to parameters Con and CoF
P2	Second probe failure	Alarm output ON; Other outputs unchanged
P3	Third probe failure	Alarm output ON; Other outputs unchanged
P4	Fourth probe failure	Alarm output ON; Other outputs unchanged
HA	Maximum temperature alarm	Alarm output ON; Other outputs unchanged
LA	Minimum temperature alarm	Alarm output ON; Other outputs unchanged
dA	Door open	Compressor and fans restarts
EA	Warning	Output unchanged
PAL	High pressure alarm (i1F=PAL)	All outputs OFF
EE	Data or memory failure	Alarm output ON; Other outputs unchanged
noL	No communication between base and keyboard	Unchanged
Compressor serial communication alarms		
EC1	VSC communication error	Unchanged
CP1, CP2	Compressor 1 or 2 stopped	Regulation stopped, retry function active
HP1, HP2	Compressor 1 or 2 start fail	Regulation stopped, retry function active
E11, E21	Compressor 1 or 2 overload	Regulation stopped, retry function active
E13, E23	Compressor 1 or 2 under speed	Regulation stopped, power off active
E14, E24	Compressor 1 or 2 short circuit	Regulation stopped, power off active
HT1, HT2	Inverter 1 or 2 high temperature	Regulation stopped, retry function active

Table 13– Alarm List

3.8.3.5.1. High pressure (Thermal cut-off) Alarm

The Krack Monoblock systems are equipped with two levels of high-pressure control shown in Figure 20 below. The first level is defined by the actuation of the thermal cut-off discs installed on the condenser refrigerant outlet line. This aims to actuate in case of high condensing events (water flow reduction or fault / air cooled condenser clogged by dirt or fan failure). These thermal cut-off discs are connected in the digital input 1 from the controller where parameter “i1F” is configured as “PAL” (High pressure alarm). The actuation will happen into the boundary of compressor operating envelope and the main purpose is to call for a corrective maintenance of the water loop / condensers fans. The number of events is configured by the parameter “nPS” (by default is 3) and the delay is defined by the parameter “did” (by default is 120). All of these parameters including the assembling position of the sensors were defined by laboratory tests. Changes in these specifications are not recommended unless with specific recommendation from Hussmann.

During the interval time if the set by “did” parameter, the digital input 1 has reached the number of activations of the “nPS” parameter, the “PAL” pressure alarm message will be displayed. The compressor and the regulation are stopped. To restart the operation, switch OFF and then ON.

The second level of the high pressure control is designed for safety aspects. The system is equipped with one pressure switch per refrigeration circuit. The actuation of the pressure switches will happen out of the compressor boundary operating envelope so it is not expected to have pressure switch events while the thermal cut-off devices are properly operating. In this case, the EC1 alarm will be activated during the time the pressure switch is opened.

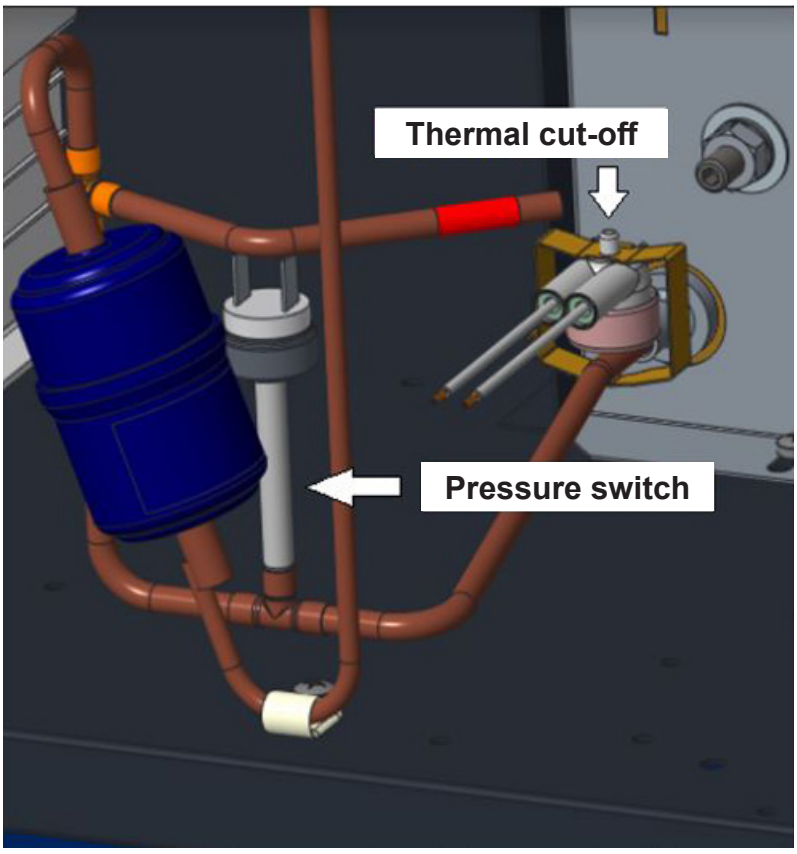


Figure 20– High pressure switch and thermal cut-off position

3.8.3.6. Interfaces

Table 14 presents a summary of input and output instrumentation in the Dixell XWi70K controller (Figure 21). Items listed as “Factory” are connected by the manufacturer and items listed as “User” are connected by the contractor and service technicians.

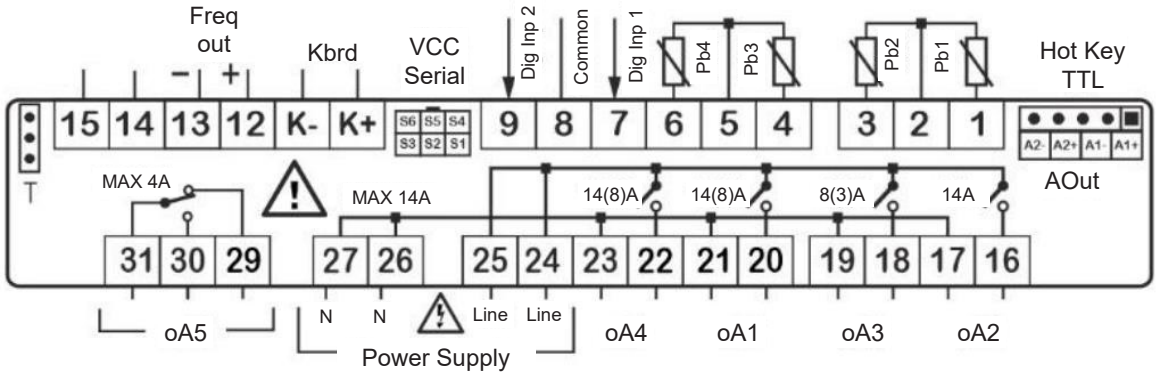


Figure 21 – Dixell XWi70K interface

Terminal	KM2VW, KL2VW families	KM2VA, KL2VA families	KL4VW, KL4VA families	Connection
16	Evaporator fan power supply	Evaporator fan power supply	Evaporator fan power supply	Factory
18	Evaporator fan motor speed control (Closed = 1550 RPM / Opened = 800 RPM)	Evaporator fan motor speed control (Closed = 1550 RPM / Opened = 800 RPM)	Evaporator fan motor speed control (Closed = 1550 RPM / Opened = 800 RPM)	Factory
20	Defrost output for refrigeration circuit # 1	Defrost output for refrigeration circuit # 1	Defrost output for refrigeration circuit # 1 and 3	Factory
22	Defrost output for refrigeration circuit # 2	Defrost output for refrigeration circuit # 2	Defrost output for refrigeration circuit # 2 and 4	Factory
24	Jumper for water solenoid valve power	-	Jumper for drain pan heaters and condenser fan management for defrosting	Factory
25	Power supply 230V/50-60Hz	Power supply 230V/50-60Hz	Power supply 230V/50-60Hz	Factory
26	Power supply 230V/50-60Hz	Power supply 230V/50-60Hz	Power supply 230V/50-60Hz	Factory
27	Water solenoid coil	Jumper for condenser fan management	-	Factory
29	Water solenoid coil	Condenser fan management for defrosting	Condenser fan management for defrosting	Factory
31	Jumper for water solenoid valve power	Jumper for condenser fan management	Jumper for condenser fan management	Factory
Pb1	Room temperature sensor	Room temperature sensor	Room temperature sensor	Factory
Pb2	Defrost sensor circuit # 2	Defrost sensor circuit # 2	Defrost sensor circuit # 2 and 4	Factory
Pb3	Defrost sensor circuit # 1	Defrost sensor circuit # 1	Defrost sensor circuit # 1 and 3	Factory
Pb4	-	-	-	-
DI 1	Digital input for high pressure alarm	Digital input for high pressure alarm	Digital input for high pressure alarm	Factory
DI 2	Digital input for Door switch alarm (or defrost synchronization)	Digital input for Door switch alarm (or defrost synchronization)	Digital input for Door switch alarm (or defrost synchronization)	User
VCC Serial	Inverter 1 and Cooler 1 Inverter 2 and Cooler 2	Inverter 1 and Condenser Fan 1 Inverter 2 and Condenser Fan 2	Inverter 1 and 3 and Condenser Fan 1 and 3 Inverter 2 and 4 and Condenser Fan 2 and 4	Factory
Kbrd	Remote Display / User Terminal	Remote Display / User Terminal	Remote Display / User Terminal	User
Hot Key TTL	Connection with converter TTL to RS485	Connection with converter TTL to RS485	Connection with converter TTL to RS485	Factory
Converter	Integration into supervisory system via RS485	Integration into supervisory system via RS485	Integration into supervisory system via RS485	User

Table 14 – IO List

3.8.3.7. Door Switch Alarm

The door switch can be connected in the digital input 2. Two parallel JST XMR-02V receptacles are available for convenience (Figure 22). Use a dry contact (I/0) from the door switch as a signal in the first unit and then inter-connect the other units by the parallel receptacle using a proper wiring cable (supplied with the Monoblock). If two or more doors are available, connect the doors in series. See door switch alarm connections below (Figure 23).

The Monoblock default configuration expects a door switch to be wired. If no door switch is used, the parameter **i2P** (i2P) must be changed from **OP** (oP) to **CL** (cL). The **i2P** (i2P) parameter is found in the **inP** (inP) menu.

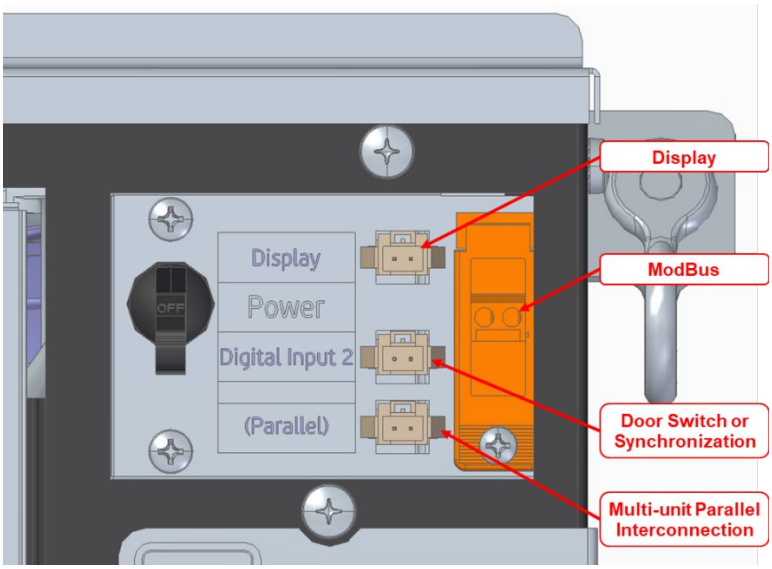


Figure 22 – Parallel Connection for door switch
(Also used for defrost synchronization if configured)

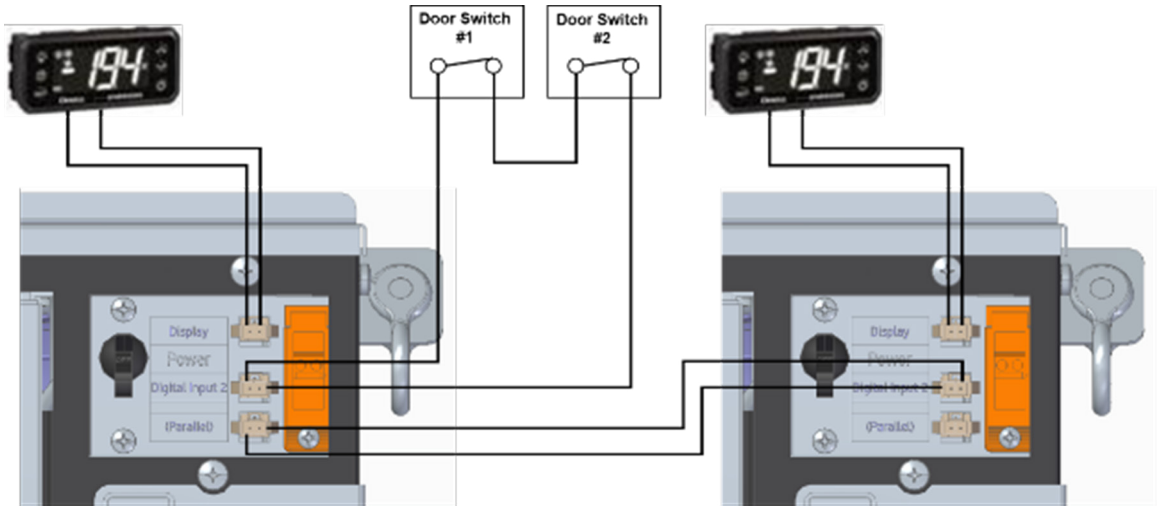


Figure 23 - Door Switch Series Connection

3.8.3.8. Defrost Synchronization

Defrost synchronization is recommended when more than one unit is applied in a room. Aiming to have all units starting the defrost cycle simultaneously (termination are independent). Defrost can be synchronized by several ways, depending on the structure available. Every unit has a ~33 foot (10m) connecting cable supplied as an accessory, which allows connecting the units as required. Some options below:

3.8.3.8.1. Assembling with Supervisor

The defrost cycles can be synchronized by the Supervisor. In this case, Supervisor instructions must be followed to configure the defrost starts (by internal real time clock). See Figure 24.

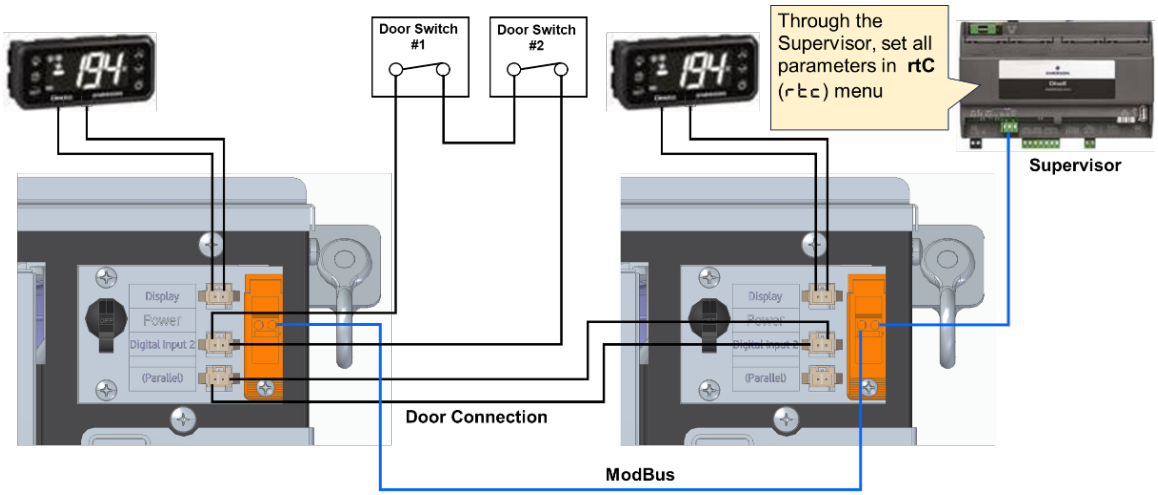


Figure 24 – Defrost Synchronization by Server and Controllers

3.8.3.8.2. Assembling Controller with Real Time Clock (RTC)

This combination requires the defrost synchronization by the RTC for each controller and must be adjusted during start-up. There is no communication between controllers so each one will start the defrost cycle when the preset time is achieved. Due to this characteristic, the synchronization of the internal clock of each controller is mandatory. See Figure 25 below. Use of Visotouch Display is optional.

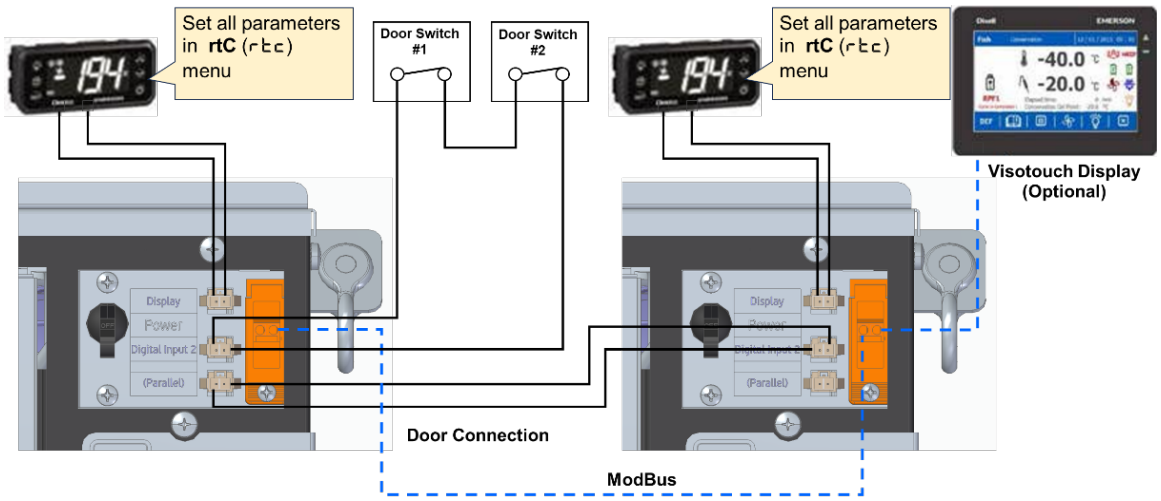


Figure 25 – Defrost Synchronization by RTC for each Controller

3.8.3.8.3. Assembling with only Controller and without RTC

The digital input (DI2 parameter) must be changed from “door switch (dor)” to “defrost synchronization (dEF).” Go to parameter “i2F” in the digital input menu “inP.” The door switch alarm will be disabled (see Figure 26 below). Use of Visotouch Display is optional.

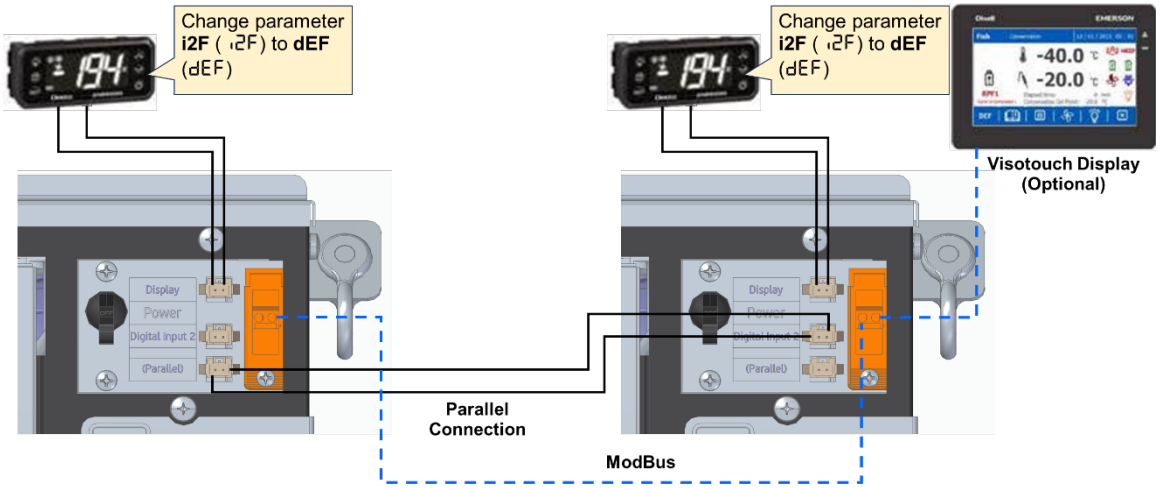


Figure 26 – Defrost Synchronization by DI2 for each Controller

3.8.3.9. Server

The server / supervisor system must be connected in the XJ485CX converter terminal (from TTL to RS485). Converter XJ485CX is already supplied with the Krack Monoblock systems.

Emerson E2, E3, and Dixell XWEB 500E models are compatible and require only the Modbus connections. A ~33 foot (10m) connecting cable is supplied as an accessory.

Other options can be evaluated by the contractor due to the number of interfaces and features required. Follow the server manufacture instructions for correct operation.

3.8.3.10. Temperature sensors

The unit is equipped with three temperature sensors type NTC 10kΩ (@ 25°C), Dixell model NS6-BN01000150. Each sensor location and functionality is explained in Table 15 below. In case of servicing or replacing probes, keep the correct positioning.

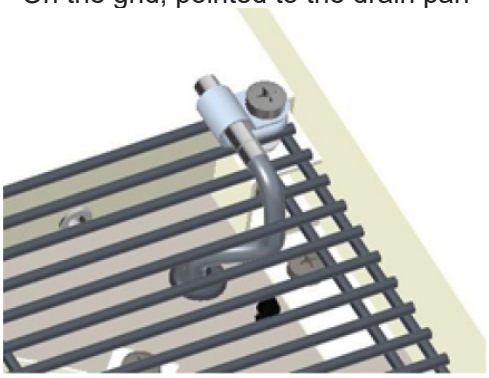
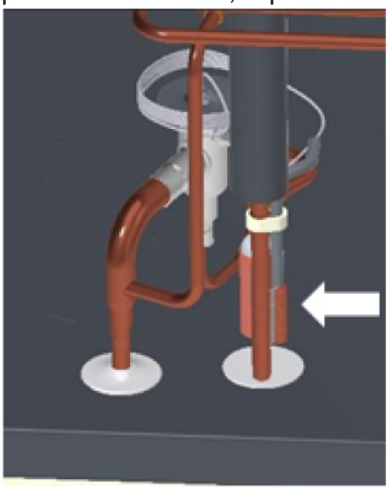
Sensor #	Function	Position
Probe 1	Air return temperature (room Temperature)	On the grid, pointed to the drain pan 
Probe 2	Defrost sensor Circuit 2 if KL2V / KM2V Circuit 4 if KL4V	On the evaporator outlet tube, equalization “T” region 
Probe 3	Defrost sensor Circuit 1 of KL2V / KM2V Circuit 3 if KL4V	

Table 15 – Temperature Probes Positioning

3.8.4 Commissioning

There are four main items to be reviewed in the controller when performing initial commissioning.

Real Time Clock

The Real Time Clock provides two purposes: 1) Defrost Synchronization, 2) Specific Defrost Times.

To ensure proper synchronization of defrosts, the Real Time Clock must be set. This is very important if there is more than one unit in a single refrigerated space.

All parameters in the **rtC** (rtc) menu must be programmed. Key parameters to program are:

Description	Parameter	Value
Hours	**Hur** (hur)	0 to 23 (0 to 23)
Minutes	**Min** (Min)	0 to 59 (0 to 59)
Day of Week	**dAY** (dAY)	Sun to Sat (Sun to SAt)
Day of Month	**dYM** (dYM)	1 to 31 (1 to 31)
Month	**Mon** (Mon)	1 to 12 (1 to 12)
Year	**Yar** (YAr)	00 to 99 (00 to 99)

If it is desired for defrost events to always happen as specific times (for example, to avoid going into defrost during high box load times), the Real Time Clock must be set. Once the Real Time Clock is set, the specific times for defrost must also be set using parameters **Ld1** to **Ld6** (Ld1 to Ld6). For example, to set the second defrost time to start at 12:40 pm, set **Ld2** = **12.4** (Ld2 = 12.4). If these parameters are not set, the defrosts will occur every four hours and may not be at desired times.

Note: when multiple units are installed in a room, the defrost starting time for all units must be the same.

If there is only one unit in a space and if the defrost time is not important, the RTC does not have to be set.

Room Temperature Setpoint
The default medium temperature (MT) room setpoint is +35°F
The default low temperature (LT) room setpoint is -5°F.

The allowed range for MT units is +28°F to +50°F.
The allowed range for LT units is -15°F to +5°F.

Typical Application Temperatures
Dairy: +34°F to +38°F
Meat: +30°F to +34°F
Meat Preparation: +28°F
Frozen Food: -10°F to 0°F
Ice Cream: -15°F to -10°F

To read the setpoint from the main screen:
1) Push and immediately release the **SET** key; the display will show the current setpoint value.
2) To return to probe temperature, push the **SET** key again or wait for 10 seconds

To modify the setpoint from the main screen:
3) Push the **SET** key for 3 seconds; the display will flash the current setpoint value.
4) Push the **UP** or **DOWN** arrows within 10 seconds until the desired value is shown.
5) To save the new setpoint value, push 3 times the **SET** key again or wait for 10 seconds.

If multiple Monoblock units are serving the same space, they should all be set to the same Room Temperature.

Digital Input 2
The Monoblock default configuration expects a door switch to be wired. If no door switch is used, the parameter **i2P** (i2P) must be changed from **OP** (oP) to **CL** (cL). The **i2P** (i2P) parameter is found in the **inP** (inP) menu.

Serial Address
If more than one unit is connected via ModBus to a supervisor system, the serial address of each controller must be set.

In the **CoM** (coM) menu, the **Adr** (Adr) parameter must be changed to a number between **1** and **247** (the default is **1**). All units on a common network must have unique addresses.

3.8.5 Final Steps

Manual Defrost
Once all parameters are set, it is recommended to start a manual defrost and ensure all system operations function normally.

To start a manual defrost, push the **DEF** (❄) key for more than 2 seconds and a manual defrost will start.

Plastic Film
Once all other installation steps are complete, the protective plastic film on the drain pan and feet should be removed from the unit.

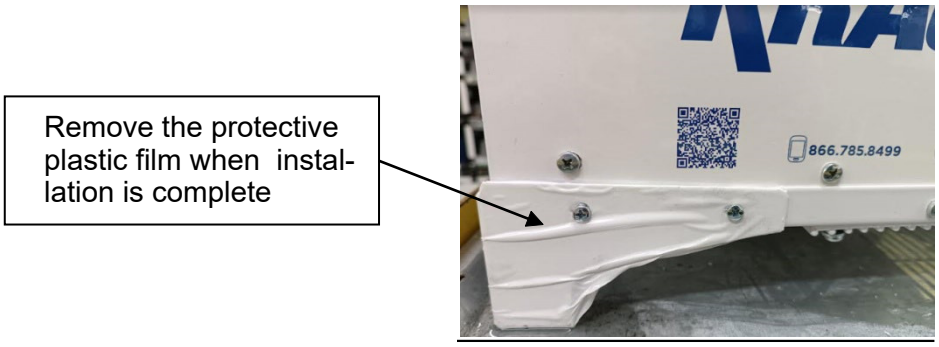


Figure 27 – Protective plastic film

3.9 Drain Pan Heaters

Monoblock units have two or three drain pan heaters. Medium temperature units for walk-in coolers have two heaters and low temperature units for walk-in freezers have three heaters. Heater information is given in the following table.

	Walk-in Cooler		Walk-in Freezer	
	Power	Current	Power	Current
Heater 1	50 W	0.43 A	98 W	0.43 A
Heater 2	50 W	0.43 A	98 W	0.43 A
Heater 3	—	—	50 W	0.21 A

Note: Power and current values at 230V

Table 16 – Drain pan heaters power consumption

Heaters are wired to a terminal strip that is found in the drain pan area of the unit. See image below.

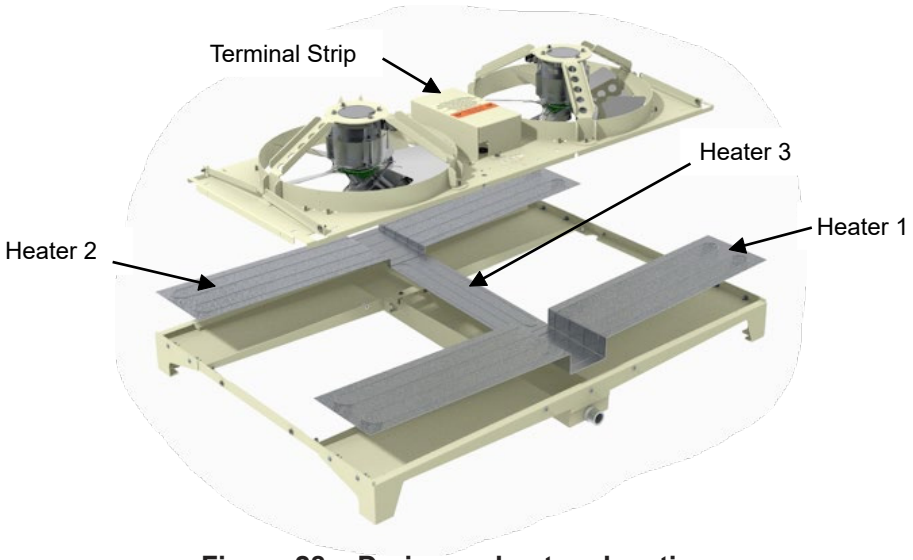


Figure 28 – Drain pan heaters location

4. Operation, Servicing, and Disposal

This equipment is designed for walk-in coolers and requires horizontal surface installation only (roof mounted). Pay attention to the safety instructions and information available in the package and refrigeration unit related to the handling, servicing, and operation of products using flammable refrigerant (Figure 29).

Figure 29 – Warning labels and positioning

This product is designed to operate exclusively with propane (R-290) refrigerant. It is recommended to have fire extinguishers available near product installation. In order to reduce the risk of flame propagation, the product must remain free of combustible materials such as plastics, paper, oil, solvents, and cotton waste.

⚠ WARNING

Do not apply refrigeration units that use hydrocarbon fluids in places that have flames or sparking components.

- This product is designed to operate in locations where the risk of sparks or flames is not prevalent.

⚠ WARNING

RISK OF FIRE AND EXPLOSION
Do not use electrical appliances inside the food storage compartments of the appliance, unless they are of the type recommended by the manufacturer. RISK OF FIRE AND EXPLOSION

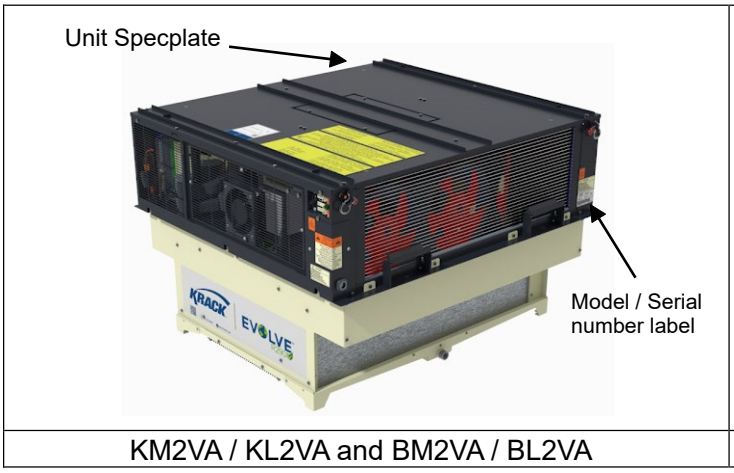
- Electrical equipment can generate sparks in normal operation and may become a source of ignition if refrigerant leakage occurs

This product must be protected against weathering.
Follow the screw and nut torque specifications below.

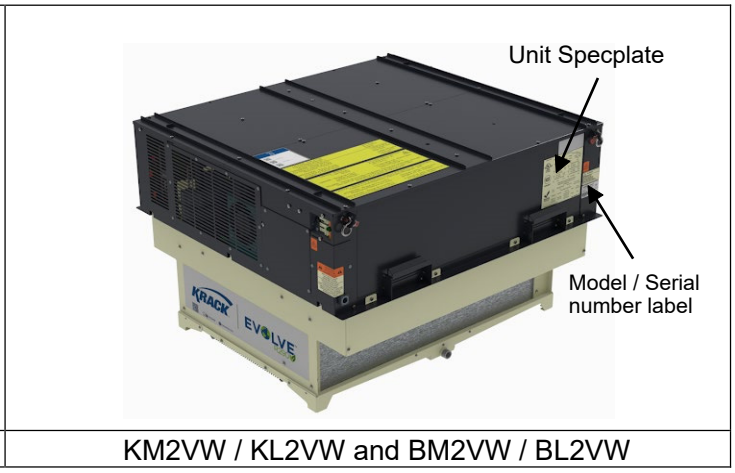
Position	Screw diameter	Torque (in-lb)
Water side condenser connections, balancing valves	3/4”-14NPT	1015 maximum
Water drain connection	3/4”-14NPT	350 maximum
ECM Kryo fan motor mounting screws	#8-36	40 maximum
ECM Kryo fan motor shaft nuts	1/4”-20 HEX	20-24
Structures, assemblies, covers	M4, M5	15-20

Table 16 – Torque Specifications

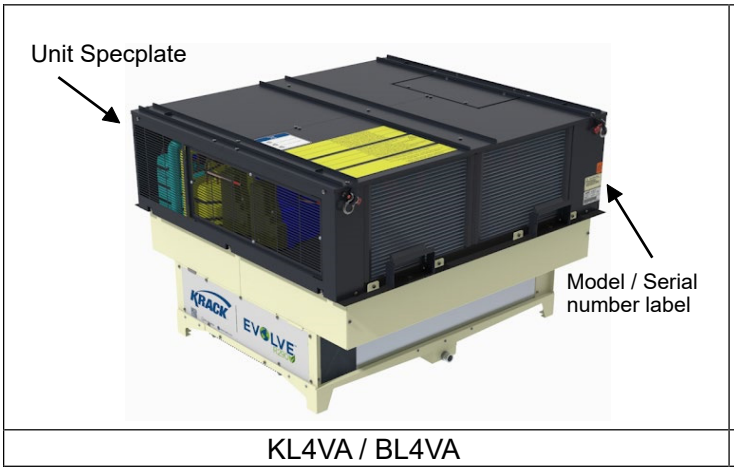
Unit specplate and unit model number plate are located on different places on the unit.



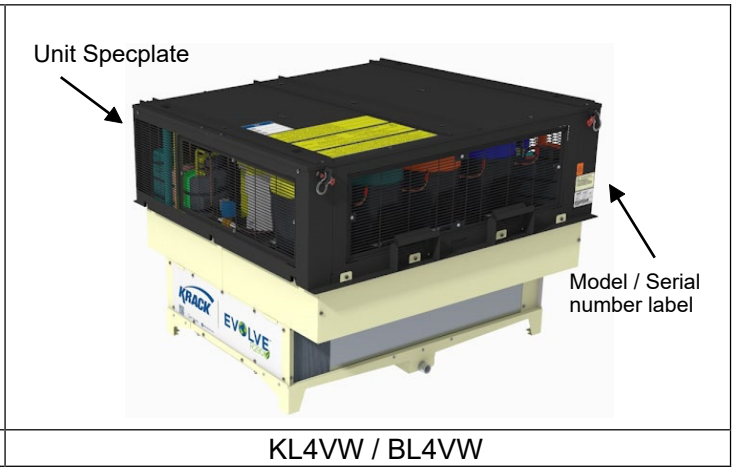
KM2VA / KL2VA and BM2VA / BL2VA



KM2VW / KL2VW and BM2VW / BL2VW



KL4VA / BL4VA



KL4VW / BL4VW

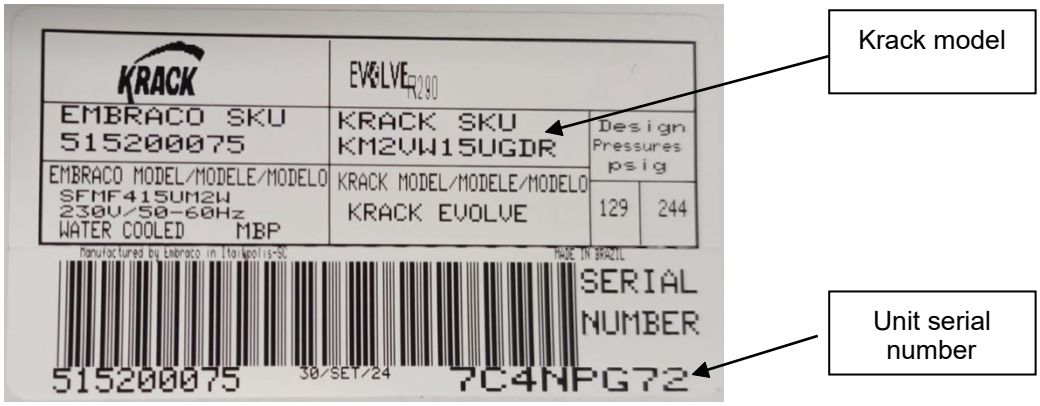
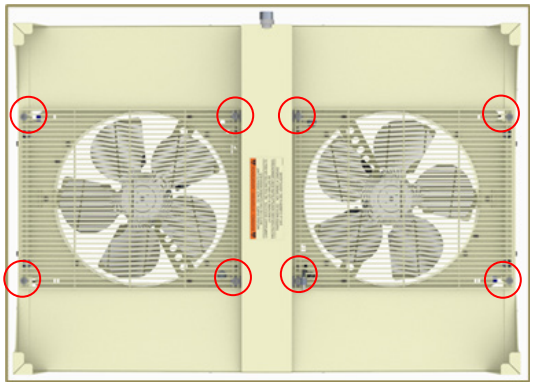
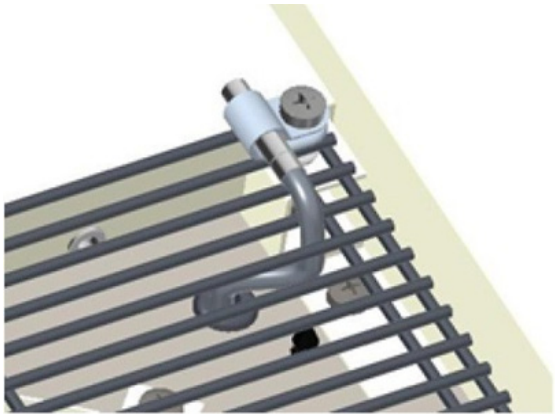


Figure 30 – Specplate label and serial number positioning

4.1. Drain Pan Service

The drain pan contains drain pan heaters, evaporator fan motors, temperature sensor, and a terminal strip for wiring. The drain pan can be lowered for easy service of these components. The drain pan stays connected to the unit by means of support rods.

Steps to lower the drain pan:

1) Remove fasteners holding fan grille.	
2) Carefully remove temperature sensor and feed through grille. Note location/orientation of sensor prior to removal.	

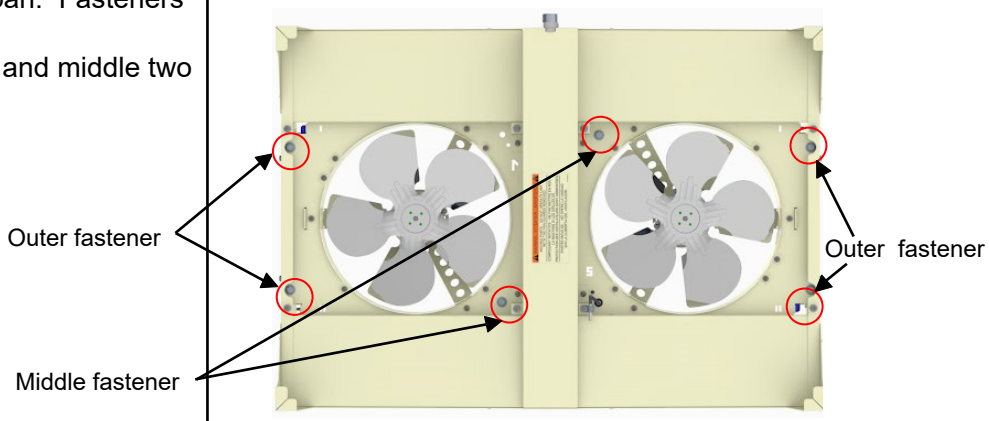
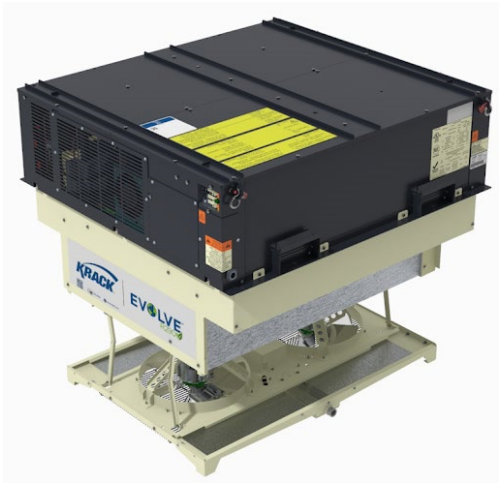
3) Remove fasteners holding drain pan. Fasteners require 10mm socket. Remove four outer fasteners first and middle two fasteners last.	
4) Gently lower the drain pan until support arms are fully extended. 5) Items available for access are: • Drain pan heaters • Fan blades • Motors. • Wiring terminal strip	

Table 17 – Drain pan service access

5. Cleaning

It is important to perform periodic maintenance with this equipment (i.e., every three (3) months). Evaluate extending or reducing the cleaning periods and maintenance with visual observation.

Do not wash down the unit. Some electrical components such as connection boards, controller, and inverters are not waterproof. For this reason, it is forbidden to spill or rinse water over the unit. In case it is mandatory to wash the cold side for sanitary reasons, take special care to protect against water impacting the cold side electrical board and harness connector. Open the bottom side of the evaporators (by the articulated rods), disconnect the electrical plug, and remove the fans and connecting board.

Labelings located in the drain pan section are indicating this restriction:

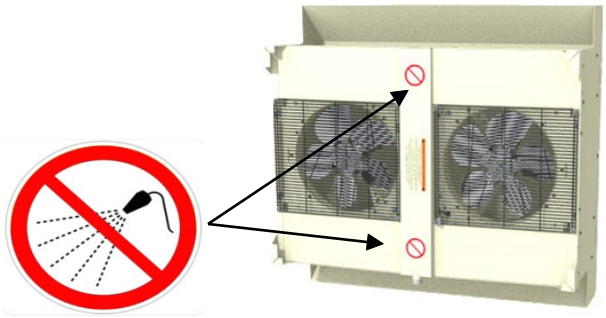


Figure 31 – Do not wash down labeling indication

Avoid dust accumulation. Do not apply solvents, soaps, alcohols, or chemicals that may react with the components of the refrigeration system. These chemicals may become combustible under certain temperature and humidity conditions. For external cleaning (region of the cooling system), use only a duster. The use of compressed air duster is allowed so long as it does not damage the condenser fins (air cooled versions) and the electronic components such as inverters and controller which must be protected against dust injection.

⚠ WARNING

RISK OF ELECTRICAL SHOCK

Carefully follow electrical installation instructions and electrical safety recommendations to avoid risk of electrical shock during installation, use or maintenance.

- Turn off and disconnect the product from the power supply before cleaning.

⚠ WARNING

RISK OF FIRE AND EXPLOSION

Do not use a vacuum cleaner to clean the product. It has a motor with brushes that generate sparks during normal operation and may form an unsafe condition if there is a flammable mixture.

- Do not use a vacuum cleaner or any other electrical appliance that is not designed to operate around flammable refrigerants since the system is susceptible to sparks during operation. In the case of leakage, a flammable mixture may occur.

⚠ WARNING

RISK OF LEAKAGE

Do not use mechanical devices or other means to accelerate the defrosting process, other than those recommended by the manufacturer. Do not damage the refrigerant circuit.

- Never use mechanical devices to defrost refrigerating units.
- Do not puncture refrigerant tubes.

6. **Maintenance**

- Technicians must be properly qualified to conduct maintenance in refrigeration systems with flammable refrigerants. For more information on training personnel, organizations such as the Refrigeration Service Engineers Society (RSES) provide training for HVAC technicians and contractors (847.297.6464) with propane systems.
- Strickly follow the work instructions:
- Maintain a periodic cleaning program for the equipment. Initially, it is recommended to evaluate the operating condition of the system every three (3) months. Based on observed conditions, evaluate the possibility of extending or reducing the period for maintenance.
- Every three (3) months, perform a detailed inspection to identify potential refrigerant leaks. The presence of oil is a signal for refrigerant leakage.
- In the event repairs are needed to the system, determine a specific location to work with the cooling system that is suitable to handle flammable refrigerant equipment. The working area must be free of ignition sources, and the area should be well ventilated. Fire extinguishers should be available and easily accessible.
- Monitor the working area using a Hydrocarbon Detector (HC) located at a low level (hydrocarbons are denser than air). The detector shall provide an audible and visual alarm before there is sufficient hydrocarbons in the air to form a flammable mixture (approximately 2% of hydrocarbons by volume).
- When replacing or servicing electrical components in a system that uses flammable refrigerants, make sure that all components comply with IEC / UL 60079-15.
- Component parts shall be replaced with like components with servicing done by trained authorized service personnel. This ensures risk of possible ignition due to incorrect parts or improper service is minimized.
- Expansion valves are assembled in the upper side of the machine and require special attention to avoid damaging the valves, bulbs and insulation boxes. Remove and reinstall the valve insulation boxes carefully. Replace with a new part if required. Take special care with the bulb positioning and its fixation.
- Remove refrigerant with a recovery machine suitable for flammable fluids. Do not use a blowtorch to remove pipes or cut with a pipe cutter. Process tubes suitable for service are marked in red.
- Repair unit and reduce inspection interval to one (1) month to ensure reprocessing is effective.
- Use the correct tools and equipment.
- Use only tools and equipment certified for use in hazardous areas and uses an anti-static bracelet to avoid static electricity.

⚠ WARNING

RISK OF FIRE AND EXPLOSION

Do not apply refrigeration units that use hydrocarbon fluids in places that have flames or sparking components.

7. Disassembly and Disposal

Always transport the products in its original packaging (if not possible, develop a solution to safely transport the product).

- After completing the cycle of using the Krack Monoblock system, set an appropriate destination for it.
- Do not reuse components or restore the unit without a thorough analysis of the usage for each component.
- Use appropriate packaging (robust and ventilated) to transport units from installation site to the repair or disassembly area.
- Never dispose refrigeration systems in normal trash.
- Remove the refrigerant from the system with proper precautions.
- Disassemble cooling system and corresponding equipment.
- Separate materials according to its characteristic and recycling are encouraged.
- Properly dispose refrigerant, oil, and other materials to appropriate collection stations.
- Follow all federal and / or local regulations regarding disposal of flammable refrigerant equipment.

8. In Case of Failure

Call an authorized technician to assess whether failure is related to maintenance, component issues (i.e., fans, water pumps, etc.), or refrigerant leakage. In the event the issue is system related, the technician must turn off equipment, remove, and send in appropriate packaging to a suitable location for analysis and maintenance. If available, request replacement product to operate walk-in cooler during maintenance of equipment.

9. Inappropriate Use

Krack Monoblock systems are not designed for pull-down. Goods must be loaded at the proper temperature and pre-cooled prior to being loaded into the walk-in room that is equipped with the Krack Monoblock systems. Using Krack Monoblock systems for operations other than those specified may cause damage to equipment, goods, or personnel.

10. Troubleshooting

Note: Only Qualified Personnel Can Carry Out the Recommendations Below:

Problem	Probable Cause	Solution
Product Does Not Operate	No Power.	Check supervisory system or circuit breaker of the electrical installation. Check if the unit is connected to a power supply.
	Low voltage. Compressor and fans will shut off or not operate correctly.	Check electrical wiring impedance. Evaluate the need to correct voltage via stabilizer.
	Wrong or damaged electrical connection.	Check electrical connections and replace damaged components (i.e., electrical connectors). Follow manufacturer's recommendations.
	Fault or flow reduction in water supply (Monoblock water cooled versions).	Check water loop system to ensure proper water flow to system condensers.
Abnormal Noise	Presence of loose elements in refrigeration unit or on cabinet ceiling.	Check installation site. Fix and dispose of any loose parts.
	Dirty and blocked heat exchangers resulting in actuating of thermal protection (fan motors).	Review preventive maintenance schedule and clean condenser to remove dirt or particles. Check display faults in supervisory system.
	Fan motor with excessive wear or propeller in contact with external elements	Disconnect the blade from the fan motor. Replace motor if necessary
Insufficient Cooling	Dirty and blocked heat exchangers, leading to the thermo cut-off or high pressure switch to actuate	Review preventive maintenance schedule and clean condenser to remove dirt or particles. Check display faults in supervisory system. Re-start the unit to stop alarm.
	Fault or flow reduction in water supply (Monoblock water cooled versions).	Check water loop system to ensure proper water flow to system condensers.
	Refrigeration Leaks	Call authorized service center to evaluate if unit replacement is required. Ventilate location before installing and connecting new equipment. Open unit room doors for at least 5 minutes to eliminate possibility of refrigerant accumulation inside chamber.
	Excessive ice formation on evaporator.	Review defrost logic and parameters.
		Check defrost synchronization connections to avoid communication errors between controllers or supervisors.
		Check probe fault (wire connections, component failure, bad fixation)
		Check defrost water drain is not clogged and ensure drain line is properly trapped.
		Check proper operation of the water inlet solenoid valve.
		Check proper operation of condenser fan motors during defrost (all condenser fan motors must turn off during defrost cycle)
External condensation	High ambient air humidity, normal in certain climates and times of the year.	Install product in a ventilated place. Dry with soft cloth.
	Lack of proper sealing between gasket and cabinet.	Replace gasket.
Drain Pan Overflow	High humidity causes drain pan to overflow during defrost	Install door curtains to reduce infiltration. Using the door switch functionality. Increase the number of defrosts. Increase the drip time parameter. Make sure the unit is level. Make sure the drain line outside the unit is properly pitched.

Table 18 – Troubleshooting

11. List of default parameters for Dixell XWi70K

No shading: These items are visible as part of Parameter Set 1 (Pr1)
Light Gray: These items are visible as part of Parameter Set 2 (Pr2)
Dark Gray: These items should not be changed.

Menu	Description	Label	Level	UOM	KM2	KL2	KL4
Regulation – rEG	Set point: (LS to US) temperature regulation set point.	SEt	—	°F	35	-5	-5
	Minimum Set Point: (-100.0°C to SET; -148°F to SET) fix the minimum value for the set point.	LS	Pr1	°F	-30	-30	-30
	Maximum Set Point: (SET to 150.0°C; SET to 302°F) fix the maximum value for the set point.	US	Pr1	°F	50	20	20
	Compressor regulation differential in normal mode: (0.1 to 25.0°C; 1 to 45°F) set point differential. Compressor Cut-IN is T > SET + HY. Compressor Cut-OUT is T<=SET.	Hy	Pr1	°F	3	2	2
	Proportional band in normal mode: (0.1 to 25.5°C; 1 to 45°F) define a second regulation band which is used when double ONOFF compressor regulation or a variable speed compressor is configured.	Hy1	Pr1	°F	1	3	3
	Output activation delay at start-up: (0 to 255 min) this function is enabled after the instrument power-on and delays the output activations.	odS	Pr1	min	0	0	0
	Anti-short cycle delay: (0 to 999 sec) minimum interval between a compressor stop and the following restart.	AC	Pr1	sec	2	2	2
	Anti-short cycle delay (2nd compressor): (0 to 999 sec) delay before activating second compressor, depending on regulation mode selected by par. 2CC	AC1	Pr2	sec	0	0	0
	Activation mode for 2nd compressor (valid if oAx=CP1 and oAy=CP2): (FUL; HAF) FUL=second compressor will be activated after AC1 delay. HAF=second compressor will be activated with step logic.	2CC	Pr2	—	FUL	FUL	FUL
	Enable compressor rotation: (n;Y) n = CP1 is always the first compressor activated. Y = CP1 and CP2 activation is alternated	rCC	Pr2	—	No	No	No
	Maximum time with compressor ON: (0 to 255min) maximum time with ONOFF compressor active. With MCo=0 this function is disabled.	MCo	Pr2	min	0	0	0
	Regulation percentage=F(P1; P2) (100=P1; 0=P2): 100=P1 only; 0=P2 only	rtr	Pr2	—	100	100	100
	Maximum duration for Pull Down: (0.0 to 99h50min, res. 10min) after elapsing this time interval, the super cooling function is immediately stopped.	CCt	Pr1	hour	02:00	04:00	04:00
	Pull Down phase differential (SET+CCS or SET+HES+CCS): (-12.0 to 12.0°C; -21 to 21°F) during any super cooling phase the regulation SETPOINT is moved to SET+CCS (in normal mode) or to SET+HES+CCS (in energy saving mode)	CCS	Pr1	°F	5	2	2
	Threshold for automatic activation of Pull Down in normal mode (SET+HY+oHt): (0.0 to 25.5°C; 0 to 45°F) this is the upper limit used to activate the super cooling function.	oHt	Pr1	°F	5	10	10
	Compressor ON time with faulty probe: (0 to 255 min) time during which the compressor is active in case of faulty thermostat probe. With Con=0 compressor is always OFF.	Con	Pr1	min	30	30	30
	Compressor OFF time with faulty probe: (0 to 255 min) time during which the compressor is OFF in case of faulty thermostat probe. With CoF=0 compressor is always active.	CoF	Pr1	min	10	10	10
Probe – Prb	Probe selection: (ntC; Pt1) ntC=NTC type; Pt1=PT1000 type	PbC	Pr2	—	ntC	ntC	ntC
	Probe P1 calibration: (-12.0 to 12.0°C; -21 to 21°F) allows adjusting any possible offset of the first probe.	ot	Pr1	°F	0	0	0
	Probe P2 presence: n = not present; Y = present.	P2P	Pr1	—	Yes	Yes	Yes
	Probe P2 calibration: -12.0 to 12.0°C; -21 to 21°F) allows to adjust any possible offset of the second probe.	oE	Pr1	°F	0	0	0
	Probe P3 presence: n = not present; Y = the defrost is present.	P3P	Pr2	—	Yes	Yes	Yes
	Probe P3 calibration: (-12.0 to 12.0°C; -21 to 21°F) allows adjusting any possible offset of the third probe.	o3	Pr2	°F	0	0	0

	Probe P4 presence: n = not present; Y = present.	P4P	Pr2	—	No	No	No
	Probe P4 calibration: (-12.0 to 12.0°C; -21 to 21°F) allows adjusting any possible offset of the fourth probe.	o4	Pr2	°F	0	0	0
Variable speed drive – vSC	Minimum value for Variable Speed Compressor (RPM * 10): (0 to FMA) select according to the VSC in use	FMi	Pr2	RPM*10	160	160	160
	Maximum value for Variable Speed Compressor (RPM * 10): (FMi to 500) select according to the VSC in use	FMA	Pr2	RPM*10	500	500	500
	Minimum value for Variable Speed Compressor (RPM * 10) in Energy Saving Mode: (0 to EMA) select according to the VSC in use	EMi	Pr2	RPM*10	160	160	160
	Maximum value for Variable Speed Compressor (RPM * 10) in Energy Saving Mode: (EMi to 500) select according to the VSC in use	EMA	Pr2	RPM*10	500	500	500
	Value when Variable Speed Compressor is shut down (RPM * 10): (0 to 200) select according to the VSC in use	Fr0	Pr2	RPM*10	0	0	0
	PI regulator, temperature sampling time: (00:00 to 42min:30sec)	tSt	Pr2	sec	01:00	00:40	00:40
	PI regulator, integral sampling time: (00:00 to 42min:30sec)	iSt	Pr2	sec	10:00	04:00	04:00
	Type of Variable Speed Compressor: (nu; FrE) nu = no VSC in use; FrE = VSC with frequency control mode is used; VC1 = Embraco with serial control; VC2 = SECOP with serial control.	vdC	Pr2	—	vC1	vC1	vC1
	Signal output variation for Variable Speed Compressor: (0 to 100 Hz or RPM*10) VSC variation when SET-HY ≤ T ≤ SET+HY	voS	Pr2	RPM*10	3	4	4
	Signal output variation for Variable Speed Compressor: (0 to 100 Hz or RPM*10; nu)) VSC variation when SET-HY-HY1≤T<SET-HY and SET+HY<T≤SET+HY+HY1	vo2	Pr2	RPM*10	5	5	5
	Signal output variation for Variable Speed Compressor: (0 to 100 Hz or RPM*10; nu)) VSC variation when SET-HY-HY1<T and T>SET+HY+HY1	vo3	Pr2	RPM*10	10	10	10
	Variable Speed Compressor (in %) during any Pull Down: (0 to 100%) this value is always calculated using FMi and FMA limits. 0=function disabled.	PdP	Pr2	%	100	100	100
	Compressor speed (in %) in case of any probe error during Con interval: (0 to 100%) this value is always calculated using FMi and FMA limits.	SPi	Pr2	%	80	80	80
	Compressor speed (in %) during any defrost cycle (valid if tdf=in): (0 to 100%) this value is always calculated using FMi and FMA limits.	Aod	Pr2	%	100	100	100
	Compressor speed (in%) during a pre-defrost phase (valid if tdf=in): (0 to 100%) this value is always calculated using FMi and FMA limits.	AoF	Pr2	%	100	100	100
	PI regulator, max interval for output variation: (tLv to 255 sec)	tHv	Pr2	sec	20	120	120
	PI regulator, min interval for output variation: (1 sec to tHv)	tLv	Pr2	sec	5	5	5
	PI regulator, range for output value calculation (RPM * 10): (0=disabled; 1 to 255 RPM*10)	rSr	Pr2	RPM*10	140	20	20
	PI regulator, delay before range drift: (0 to 255 sec)	Str	Pr2	sec	20	60	60
	PI regulator, divisor for PI response time reduction (acts on both par. tSt and iSt): (1 to 10)	dPt	Pr2	—	2	5	5
	Continuous control ON in normal mode: (n; Y) Y = VSC is never stopped during regulation.	CMn	Pr2	—	No	No	No
	Continuous control ON in energy saving mode: (n; Y) Y = VSC is never stopped during regulation.	CME	Pr2	—	Yes	Yes	Yes
	Compressor speed threshold to activate lubrication (valid for variable speed compressors only, 0=disabled): (nu; 1 to 100%; OFF) nu = not used; 1 to 100% select the percentage to activate function; OFF = compressor is stopped when the condition is reached	MnP	Pr2	%	Nu	Nu	nu
	Time range with compressor speed below MnP to activate lubrication cycle: (00:00 to 24h00min) time before activating the lubrication function	tMi	Pr2	hour	0	0	0

	Time range with compressor speed at 100% to activate lubrication cycle: (0 to 255 min) VSC will be forced to 100%, for tMA, after activating the lubrication function. NOTE: if MnP=OFF, VSC will be stopped for tMA	tMA	Pr2	min	0	0	0
	Number of serial controlled VSC: (1 to 2) number of VSC connected	A00	Pr2	—	2	2	2
	Serial address for compressor 1: (1 to 247)	A01	Pr2	—	1	1	1
	Serial address for compressor 2: (1 to 247)	A02	Pr2	—	2	2	2
Variable Speed Fan (Mod-bus) – vSF	Number of serial condenser fans (0=disabled)	S00	Pr2		DNC	DNC	DNC
	Serial address for condenser fan 1	C01	Pr2		DNC	DNC	DNC
	Serial address for condenser fan 2	C02	Pr2		DNC	DNC	DNC
	Serial address for condenser fan 3	C03	Pr2		DNC	DNC	DNC
	Serial address for condenser fan 4	C04	Pr2		DNC	DNC	DNC
	Serial baudrate for condenser fan (kbaud)	F12	Pr2	kBaud	DNC	DNC	DNC
	Direction of rotation for condenser fan	SFr	Pr2		DNC	DNC	DNC
	Time with condenser efficiency function activated	tCC	Pr2	sec	DNC	DNC	DNC
	Default configuration sent to condenser fan (at power on)	CdF	Pr2		DNC	DNC	DNC
	Minimum speed for condenser fan	CMi	Pr2	%	DNC	DNC	DNC
	Maximum speed for condenser fan	CMA	Pr2	%	DNC	DNC	DNC
	Safety speed for condenser fan	CSS	Pr2	%	DNC	DNC	DNC
Display – diS	Temperature measurement unit: (°C; °F) °C = Celsius; °F = Fahrenheit.	CF	Pr1	—	°F	°F	°F
	Temperature resolution: (dE; in) dE = decimal; in = integer.	rES	Pr1	—	dE	dE	dE
	Remote keyboard visualization: (P1; P2; P3; P4; Set; dtr) Px=probe “x”; Set=set point; dtr=percentage calculated from P1 and P2 and using par. dtr.	rEd	Pr1	—	P1	P1	P1
	Temperature display delay: (0.0 to 20min00sec, res. 10 sec) when the temperature increases, the display is updated of 1°C or 1°F after this time.	dLy	Pr1	min	0	0	0
	Probe visualization percentage, F(P1; P2): (1 to 99) with dtr=1 the display will show this value VALUE=0.01*P1+0.99*P2	dtr	Pr1	—	99	99	99
Defrost – dEF	Defrost mode: in=fixed intervals; rtC=following real time clock	Edf	Pr2	—	rtC	rtC	rtC
	Defrost type: EL=electrical heaters; in=hot gas	tdF	Pr1	—	In	in	in
	Probe selection for defrost control: (nP; P1; P2; P3; P4) nP=no probe; Px=probe “x”.	dFP	Pr1	—	P3	P3	P3
	Probe selection for 2nd defrost control: (nP; P1; P2; P3; P4) nP=no probe; Px=probe “x”.	dSP	Pr2	—	P2	P2	P2
	End defrost temperature: (-55 to 50°C; -67 to 122°F) sets the temperature measured by the evaporator probe (dFP), which causes the end of de-frost cycle.	dtE	Pr1	°F	55	55	55
	End 2nd defrosts temperature: (-55 to 50°C; -67 to 122°F) sets the temper-ature measured by the evaporator probe (dFP), which causes the end of defrost cycle.	dtS	Pr2	°F	55	55	55
	Interval between two successive defrost cycles: (0 to 120 hours) deter-mines the time interval between the beginning of two defrosting cycles.	idF	Pr1	hour	4	4	4
	Maximum length of defrost cycle: (0 to 255 min; 0 means no defrost) when P2P=n (no evaporator probe presence) it sets the defrost duration, when P2P=Y (defrost end based on evaporator temperature) it sets the maximum length for the defrost cycle.	MdF	Pr1	min	30	30	30
	Maximum length of 2nd defrost cycle: (0 to 255 min; 0 means no defrost) when P2P=n (no evaporator probe presence) it sets the defrost duration, when P2P=Y (defrost end based on evaporator temperature) it sets the maximum length for the defrost cycle.	MdS	Pr2	min	30	30	30
	Start defrost delay: (0 to 255 sec) delay in defrost activation.	dSd	Pr1	sec	0	0	0
	Compressor off-cycle before starting any defrost: (0 to 255 sec) interval with compressor OFF before activating hot gas cycle	StC	Pr1	sec	0	0	0
	Displaying during defrost: (rt; it; SEt; dEF; Coo) rt = real temperature; it = start defrost temperature; SEt = set point; dEF = label “dEF”; Coo = when a defrost ends, it shows the label “Coo” until the regulation temperature is above SET+HY+HY1	dFd	Pr1	—	dEF	dEF	dEF

	Temperature display delay after any defrost cycle: (0 to 255 min) delay before updating the temperature on the display after the end of any de-frost.	dAd	Pr1	min	10	10	10
	Draining time: (0 to 120 min) regulation delay after finishing a defrost phase	Fdt	Pr1	min	5	20	20
	Drain heater enabled after draining time (par. Fdt): (0 to 255 min) the relative output will stay on after draining time.	Hon	Pr2	min	0	5	5
	Sampling time to calculate the average compressor speed before any defrost cycle: (0 to 255 min) the average compressor speed is used only with VSC.	SAt	Pr2	min	8	8	8
	Defrost cycle enabled at start-up: (n; Y) enables defrost at power on.	dPo	Pr2	—	No	No	No
	Pre-defrost time: (0 to 255 min) enable a lower set point (SET-1°C or SET-2°F) before activating the defrost phase.	dAF	Pr1	min	5	5	5
	Automatic defrost (at the beginning of any energy saving mode): (n; Y) n=function disabled; Y=function enabled	od1	Pr2	—	No	No	No
	Optimized defrost: (n;Y) n = function disabled; Y = the controller needs a temperature probe placed on the evaporator surface to monitor the pres-ence of ice during any defrost phase.	od2	Pr2	—	No	No	No
	Type of synchronized defrost: (n; SYn; nSY; rnd) n = function disabled; SYn = synchronized, all devices connected will start a defrost phase at the same time. nSY = de-synchronized, all devices connected will delay the beginning of the same defrost phase; rnd = random defrost function.	Syd	Pr2	—	nU	nU	nU
	Differential temperature for latent heating control (0.1 to 1.0 °C) to catch the latent heating phase during any defrost	dt1	Pr2	°C	0.3	0.3	0.3
	Number of connected controllers for special defrost operations (valid if Syd=SYn, nSY or rnd): (1 to 20) number of devices connected to the same network for syncro, desyncro or random defrost.	ndE	Pr2	—	1	1	1
Fan – FAn	Probe selection for evaporator fan: (nP; P1; P2; P3; P4) nP=no probe; Px=probe “x”.	FAP	Pr1	—	P3	P3	P3
	Evaporator fan stop temperature: (-55 to 50°C; -67 to 122°F) setting of temperature, detected by evaporator probe. Above this temperature value fans are always OFF. NOTE: it works only for the evaporator fan, NOT for the condenser fan.	FSt	Pr1	°F	60	50	50
	Evaporator fan regulator differential: (0.1 to 25.5°C; 1 to 45°F) evaporator fan will stop when the measured temperature (from FAP) is T<FSt-HYF.	HyF	Pr1	°F	2	2	2
	Evaporator fan operating mode: (Cn; on; CY; oY)						
	• Cn = runs with the compressor, duty-cycle when compressor is OFF (see FoF, Fon, FF1 and Fo1 parameters) and OFF during defrost						
	• on = continuous mode, OFF during defrost						
	• CY = runs with the compressor, duty-cycle when compressor is OFF (see FoF, Fon, FF1 and Fo1 parameters) and ON during defrost						
	• oY = continuous mode, ON during defrost	FnC	Pr1	—	O_n	O_n	O_n
	Evaporator fan delay after defrost cycle: (0 to 255 min) delay before fan activation after any defrosts.	Fnd	Pr1	min	7	7	7
	Differential temperature for cyclic activation of evaporator fans: (0 to 50°C; 0 to 90°F)	FCt	Pr1	°F	0	0	0
	Evaporator fan controlled during defrost: (n; Y)	Ft			DNC	DNC	DNC
	Evaporator fan ON time in normal mode (with compressor OFF): (0 to 15 min) used when energy saving status is not active.	Fon	Pr2	min	0	0	0
	Evaporator fan OFF time in normal mode (with compressor OFF): (0 to 15 min) used when energy saving status is not active.	FoF	Pr2	min	0	0	0
	Evaporator fan working hours (x100) for maintenance alarm: (0 to 999) set the warning interval for maintenance. NOTE: internal value is multi-plied by 100.	LA1	Pr2	hour *100	0	0	0
	Evaporator fan maintenance function reset: (n; Y) change to Y and con-firm with SET button to reset condenser fan maintenance warning. LA1 interval will be reloaded.	rS1	Pr2	—	No	No	No
	Probe selection for condenser fan: (nP; P1; P2; P3; P4) nP=no probe; Px=probe “x”.	FAC	Pr2	—	P1	P1	P1

	Set Point 2 regulation (for condenser fan): (-55 to 50°C; -67 to 122°F) setting of temperature detected by evaporator probe. Above this value of temperature fans are always OFF.	St2	Pr2	°F	200	200	200
	Set Point 2 differential (for condenser fan): (0.1 to 25.5°C; 1 to 45°F) dif-ferential for evaporator ventilator regulator	Hy2	Pr2	°F	5	5	5
	Condenser fan operating mode: (Cn; on; CY; oY) • Cn = runs with the compressor and OFF during defrost • on = continuous mode, OFF during defrost • CY = runs with the compressor and ON during defrost • oY = continuous mode, ON during defrost	FCC	Pr1	—	O_Y	O_Y	O_Y
	Condenser fan deactivation delay: (0 to 999 sec) interval with condenser fan on after stopping compressor and when FCC=C-n or C-Y	FCo	Pr1	sec	0	0	0
	Condenser fan working hours (x100) for maintenance alarm: (0 to 999) set the warning interval for maintenance. NOTE: internal value is multi-plied by 100.	LA2	Pr2	hour *100	0	0	0
	Condenser fan maintenance alarm reset: change to Y and confirm with SET button to reset condenser fan maintenance warning. LA2 interval will be reloaded.	rS2	Pr2	—	No	No	No
Auxiliary menu – AUS	Type of control for auxiliary regulator: (CL; Ht) CL = cooling; Ht = heating.	ACH	Pr1		DNC	DNC	DNC
	Set Point for auxiliary regulator: (-100.0 to 150.0°C; -148 to 302°F) it de-fines the room temperature set point to switch auxiliary relay.	SAA	Pr1	°F	DNC	DNC	DNC
	Auxiliary regulator differential: (0.1 to 25.5°C; 1 to 45°F) differential for auxiliary output set point. • ACH=CL, AUX Cut in is [SAA+SHY]; AUX Cut out is SAA. • ACH=Ht, AUX Cut in is [SAA–SHY]; AUX Cut out is SAA.	SHY	Pr1	°F	DNC	DNC	DNC
	Probe selection for auxiliary regulator: (nP; P1; P2; P3; P4) nP = no probe, the auxiliary relay is switched only by the digital input; Px=probe “x”. Note: P4=Probe on Hot Key plug.	ArP	Pr1		DNC	DNC	DNC
	Auxiliary regulator disabled during any defrost cycle: (n; Y) n = the auxil-iary relay operates during defrost. Y = the auxiliary relay is switched off during defrost.	Sdd	Pr1		DNC	DNC	DNC
	Base time for parameters Ato and AtF: (SEC; Min) SEC = base time is in seconds; Min = base time is in minutes.	btA	Pr1		DNC	DNC	DNC
	Interval of time with auxiliary output ON: (0 to 255) valid if oAx=tiM, x=0,1,2,3,4 or if xAo=tiM, x=1, 2	Ato	Pr1	min	DNC	DNC	DNC
	Interval of time with auxiliary output OFF: (0 to 255) valid if oAx=tiM, x=0,1,2,3,4 or if xAo=tiM, x=1, 2	AtF	Pr1	min	DNC	DNC	DNC
	Type of analogue output 1: (VLt; Cur) VLt = 0-10Vdc; Cur = 4-20mA	1An	Pr1		DNC	DNC	DNC
	Minimum value for analogue output 1: (0 to 100%) output value at the beginning of the scale	1oL	Pr1	%	DNC	DNC	DNC
	Maximum value for analogue output 1: (0 to 100%) output value at the end of the scale	1oH	Pr1	%	DNC	DNC	DNC
	Interval of time with analogue output 1 (maximum value): (0 to 255 sec) analogue output is forced at 100%, after any activation, for 1At seconds.	1At	Pr1	sec	DNC	DNC	DNC
	Type of analogue output 2: (VLt; Cur) VLt = 0-10Vdc; Cur = 4-20mA	2An	Pr1		DNC	DNC	DNC
	Minimum value for analogue output 2: (0 to 100%) output value at the beginning of the scale	2oL	Pr1	%	DNC	DNC	DNC
	Maximum value for analogue output 2: (0 to 100%) output value at the end of the scale	2oH	Pr1	%	DNC	DNC	DNC
	Interval of time with analogue output 2 (maximum value): (0 to 255 sec) analogue output is forced at 100%, after any activation, for 2At seconds.	2At	Pr1	sec	DNC	DNC	DNC
Alarm – ALr	Probe selection for temperature alarms: (nP; P1; P2; P3; P4) nP=no probe; Px=probe “x”. Note: P4=Probe on Hot Key plug.	ALP	Pr1	—	P1	P1	P1
	Temperature alarm configuration: (Ab, rE) Ab = absolute; rE = relative.	ALC	Pr1	—	rE	rE	rE

	High temperature alarm: when this temperature is reached, the alarm is enabled after the Ad delay time. • If ALC=Ab → ALL to 150.0°C or ALL to 302°F. • If ALC=rE → 0.0 to 50.0°C or 0 to 90°F.	ALU	Pr1	°F	10	10	10
	Low temperature alarm: when this temperature is reached, the alarm is enabled after the Ad delay time. • If ALC=Ab → -100.0°C to ALU or -148°F to ALU. • If ALC=rE → 0.0 to 50.0°C or 0 to 90°F.	ALL	Pr1	°F	10	10	10
	Temperature alarm differential: (0.1 to 25.0°C; 1 to 45°F) alarm differential.	AFH	Pr1	°F	2	2	2
	Temperature alarm delay: (0 to 255 min) delay time between the detection of an alarm condition and the relative alarm signaling.	ALd	Pr1	min	30	30	30
	Temperature alarm delay with door open: (0 to 255 min) delay between the detection of a temperature alarm condition and the relative alarm signaling, after starting up the instrument.	dot	Pr1	min	10	0	0
	Temperature alarm delay at start-up: (0.0 to 24h00min, res. 10 min) delay time between the detection of a temperature alarm condition and the relative alarm signaling, after starting up the instrument.	dAo	Pr1	hour	02:00	05:00	05:00
	Probe selection for second temperature alarm: (nP; P1; P2; P3; P4) nP=no probe; Px=probe “x”. Note: P4=Probe on Hot Key plug.	AP2	Pr2	—	P3	P3	P3
	Second low temperature alarm: (-100.0 to 150.0°C; -148 to 302°F)	AL2	Pr2	°F	-20	-40	-40
	Second high temperature alarm: (-100.0 to 150.0°C; -148 to 302°F)	AU2	Pr2	°F	300	300	300
	Second temperature alarm differential: (0.1 to 25.0°C; 1 to 45°F)	AH2	Pr2	°F	5	5	5
	Second temperature alarm delay: (0 to 254 min; 255 = not used) delay time between the detection of a condenser alarm condition and the relative alarm signaling.	Ad2	Pr2	min	0	0	0
	Second temperature alarm delay at start-up: (0.0 to 24h00min, res. 10 min)	dA2	Pr2	hour	04:00	04:00	04:00
	Temperature alarm 2 disabled during every defrost and dripping phase: (n; Y)	dE2	Pr2	—	nU	nU	nU
	Compressor OFF due to second low temperature alarm: (n; Y) n = the compressor keep on working; Y = the compressor is switched off while the alarm is ON; in any case, the regulation restarts if delay AC is elapsed.	bLL	Pr2	—	No	No	No
	Compressor OFF due to second high temperature alarm: (n; Y) n = the compressor keep on working; Y = the compressor is switched off while the alarm is ON; in any case, the regulation restarts if delay AC is elapsed.	AC2	Pr1	—	Yes	Yes	Yes
	Differential for anti-freezing control: (0.0to 25.5°C; 0 to 45°F) the regula-tion stops if T<SET-SAF. NOTE: 0 = function disabled.	SAF	Pr1	°F	6	6	6
	Alarm relay deactivation: (n; Y) n = no, it is not possible to deactivate neither the buzzer nor any digital output set as an alarm; Y = yes, it is possible to deactivate both the buzzer and the digital output set as an alarm.	tbA	Pr1	—	Yes	Yes	Yes
	Buzzer muting: (n; Y) n = disabling buzzer deactivation; Y = enabling buzz-er deactivation.	bUM	Pr1	—	Yes	Yes	Yes
	Relay output oAx configuration: (nu; onF; dEF; Fan; Alr; LiG; AuS; db; CP1; CP2; dF2; HES; Het; inV; tiM; Cnd) • nu = not used • onF = always on with instrument on • dEF = defrost • FAn = evaporator Fan • ALr = alarm • LiG = light • AuS = auxiliary output • db = neutral zone • CP1 = ONOFF compressor • CP2 = second ONOFF compressor • dF2 = second defrost • HES = energy saving • HEt = heater output control • inV = inverter output, relay activated only when inverter is running (compressor speed>0) • tiM = timed mode activation • Cnd = condenser fan.	oA1	Pr2	—	dEF	Cnd	dEF

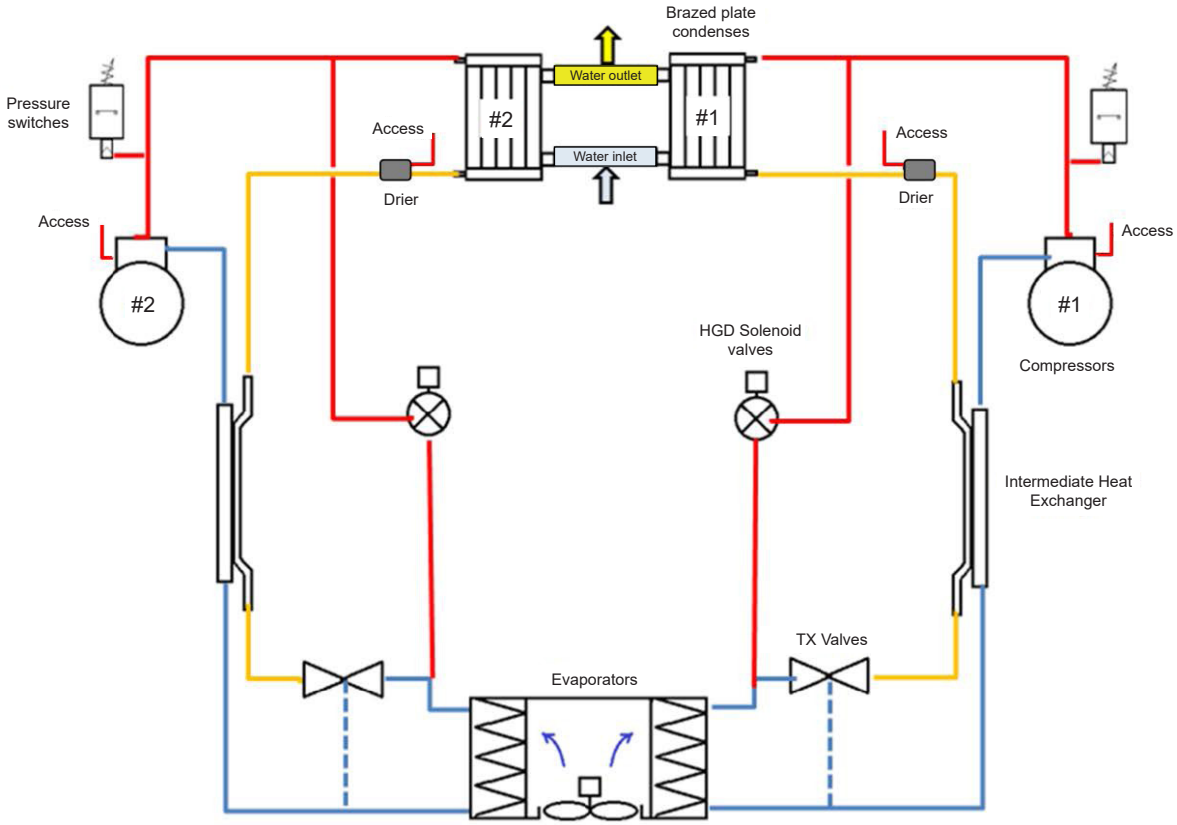
	See oA1	oA2	Pr2	—	FAn	FAn	FAn
	See oA1	oA3	Pr2	—	inV	inV	inV
	See oA1	oA4	Pr2	—	dF2	Cnd	dF2
	• Relay output oA5 configuration: (nu; onF; dEF; FAn; ALr; LiG; AuS; dF2; HES; tiM; Cnd;) • nu = not used • onF = always on with instrument on • dEF = defrost • FAn = evaporator Fan • ALr = alarm • LiG = light • AuS = auxiliary output • dF2 = second defrost • HES = energy saving • tiM = timed mode activation • Cnd = condenser fan.	oA5	Pr2	—	Cnd	Cnd	Cnd
	Analogue output 1 configuration (4-20mA; 0-10Vdc): (nu, tiM, FAn, AUS, ALr, Cnd) • nu = not used • tiM = timed mode • FAn = linked to the evaporator fan regulator • AUS = linked to the auxiliary regulator • ALr = linked to any alarm condition • Cnd = linked to the condenser fan regulator	1Ao	Pr2	—	nU	nU	nU
	Analogue output 2 configuration: (4-20mA; 0-10Vdc): (nu, tiM, FAn, AUS, ALr, Cnd) • nu = not used • tiM = timed mode • FAn = linked to the evaporator fan regulator • AUS = linked to the auxiliary regulator • ALr = linked to any alarm condition • Cnd = linked to the condenser fan regulator NOTE: always set 3Ao=nu before using 2Ao analogue output	2Ao	Pr2	—	nU	nU	nU
	Analogue output 3 configuration: (nu; FrE; ALr) • nu = not used • FrE = frequency output for variable speed compressors NOTE: when 3Ao is set, 2Ao is automatically deactivated	3Ao	Pr2	—	nU	nU	nU
	Alarm relay polarity: (oP; CL) oP = alarm activated by closing the contact; CL = alarm activated by opening the contact	AoP	Pr1	—	CL	CL	CL
Digital input – inP	Digital input 1 polarity: (oP; CL) oP = activated by closing the contact; CL = activated by opening the contact.	i1P	Pr1	—	Op	Op	OP
	Digital input 1 configuration: (nu; dor; dEF; AUS; ES; EAL; bAL; PAL; FAn; HdF; onF; LiG; CC; EMt) • EAL = external warning alarm • bAL = external lock alarm • PAL = external pressure alarm • dor = door switch function • dEF = defrost activation • AUS = auxiliary output • ES = energy saving mode activation • HdF = holiday defrost • LiG = light output control • onF = ON/OFF status change • Lnt = change configuration (between Lt and nt)	i1F	Pr1	—	PAL	PAL	PAL
	Digital input 1 alarm delay: (0 to 255 min) delay between the detection of an external event and the activation of the relative function.	did	Pr1	min	120 (water) 60 (Air)	120 (water) 60 (Air)	120 (water) 60 (Air)
	Digital input 2 polarity: (oP; CL) oP = activated by closing the contact; CL = activated by opening the contact.	i2P	Pr1	—	Op	Op	OP

	Digital input 2 configuration: (nu; dor; dEF; AUS; ES; EAL; bAL; PAL; FAn; HdF; onF; LiG; CC; EMt) • EAL = external warning alarm • bAL = external lock alarm • PAL = external pressure alarm • dor = door switch function • dEF = defrost activation • AUS = auxiliary output • ES = energy saving mode activation • HdF = holiday defrost • LiG = light output control • onF = ON/OFF status change • Lnt = change configuration (between Lt and nt)	i2F	Pr1	—	Dor	Dor	dor
	Digital input 2 alarm delay: (0 to 255 min) delay between the detection of an external event and the activation of the relative function.	d2d	Pr1	min	10	3	3
	Number of external pressure switch alarms before stopping the regula-tion: (0 to 15) after reaching nPS events in the digital input alarm delay (par. dxd), the regulation will be stopped and a manual restart (ON/OFF, power OFF and power ON) will be required	nPS	Pr2	—	3 (water) 2 (Air)	3 (water) 2 (Air)	3 (water) 2 (Air)
	Compressor and fan status after door opening: (no; FAn; CPr; F-C): no = normal; FAn = Fans OFF; CPr = Compressor OFF; F-C = Compressor and fans OFF.	odC	Pr2	—	No	CPr	CPr
	Regulation restart after door alarm: (n; Y) n = regulation disabled until door open alarm is ON; Y = when the delay rrd elapses, the regulation restarts even if a door open alarm is ON.	rrd	Pr2	—	No	No	No
Energy saving – ES	Temperature differential in energy saving: (-30.0 to 30.0°C; -54 to 54°F) sets the increasing value of the set point during the Energy Saving cycle.	HES	Pr1	°F	DNC	DNC	DNC
	Energy saving timeout: (0 to 255 hours) maximum duration for energy saving mode. ESt=0 then this function is disabled.	ESt	Pr1	hour	DNC	DNC	DNC
	Energy saving controls the lights: (n; Y) lights off when energy saving mode is active	LdE	Pr1		DNC	DNC	DNC
	Time-out for light output: (0 to 255 min) the light output will be forced OFF after this period. LHt=0 means function disabled.	LHt	Pr1	min	DNC	DNC	DNC
Real time Clock – rtC	Hours: 0 to 23 hours	Hur	Pr1	—	—	—	—
	Minutes: 0 to 59 minutes	Min	Pr1	—	—	—	—
	Day of the week: Sun to Sat	dAY	Pr1	—	—	—	—
	Day of the month: 1 to 31	dYM	Pr1	—	—	—	—
	Month: 1 to 12	Mon	Pr1	—	—	—	—
	Year: 00 to 99	Yar	Pr1	—	—	—	—
	First day of weekend: (Sun to SAt; nu) setting for the first day of the weekend.	Hd1	Pr1	—	Sat	Sat	Sat
	Second day of weekend: (Sun to SAt; nu) setting for the second day of the weekend.	Hd2	Pr1	—	Sun	Sun	Sun
	Energy saving cycle starting time on working days: (00h00min to 23h50min) during the Energy Saving cycle, the set point is increased by the value in HES so that the operation set point is SET+HES.	iLE	Pr1	hour	0	0	0
	Energy saving cycle duration on working days: (00h00min to 24h00min) sets the duration of the Energy Saving cycle on working days.	dLE	Pr1	hour	0	0	0
	Energy saving cycle starting time on weekends: 00h00min to 23h50min	iSE	Pr1	hour	0	0	0
	Energy saving cycle duration on weekends: 00h00min to 24h00min	dSE	Pr1	hour	0	0	0
	Daily defrost enabled: (n; Y) to enable the Ld1 to Ld6 defrost operations for any day of the week. • dd1 = Sunday defrost	dd1	Pr1	—	Yes	Yes	Yes
	• dd2 = Monday defrost	dd2	Pr1	—	Yes	Yes	Yes
	• dd3 = Tuesday defrost	dd3	Pr1	—	Yes	Yes	Yes
	• dd4 = Wednesday defrost	dd4	Pr1	—	Yes	Yes	Yes
	• dd5 = Thursday defrost	dd5	Pr1	—	Yes	Yes	Yes
	• dd6 = Friday defrost	dd6	Pr1	—	Yes	Yes	Yes

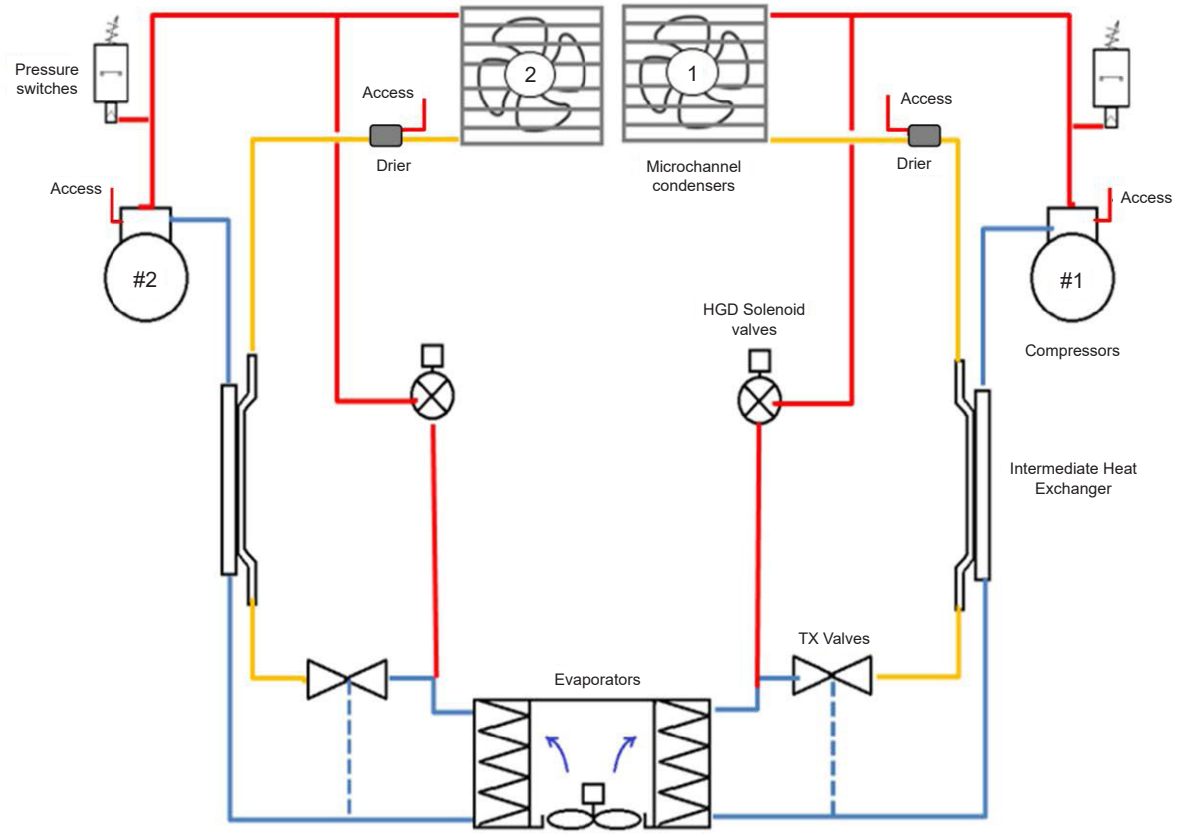
	• dd7 = Sunday defrost	dd7	Pr1	—	Yes	Yes	Yes
	Defrost starting time: (00h00min to 23h50min) these parameters set the beginning of the programmable defrost cycles during any ddx day. Ex-ample: when Ld2=12.4, the second defrost starts at 12:40 am during work-ing days. To disable a defrost cycle set it to “nu”(not used). Ex: if Ld6=nu; the sixth defrost cycle will be disabled.	Ld1	Pr1	hour	0	0	0
	See Ld1	Ld2	Pr1	hour	0	0	0
	See Ld1	Ld3	Pr1	hour	0	0	0
	See Ld1	Ld4	Pr1	hour	0	0	0
	See Ld1	Ld5	Pr1	hour	0	0	0
	See Ld1	Ld6	Pr1	hour	0	0	0
Serial Com.	Serial address: (1 to 247) device address for Modbus communication	Adr	Pr1	—	1	1	1
	Baudrate: (9.6; 19.2) select the correct baudrate for serial communication	bAU	Pr1	—	9.6	9.6	9.6
User interface – Ui	Type of keyboard lock: (UnL; SEL; ALL)	brd	Pr2		DNC	DNC	DNC
	Delay before keyboard lock: (0 to 255 sec) this delay is used after power-on to lock some functions of the keyboard.	tLC	Pr2		DNC	DNC	DNC
	ONOFF button configuration: (nU; oFF; ES; SEr)	onC	Pr2		DNC	DNC	DNC
	ONOFF button timed configuration (3 sec): (nU; oFF; ES)	on2	Pr2		DNC	DNC	DNC
	Light button configuration: (nU; oFF; ES; SEr)	LGC			DNC	DNC	DNC
	Light button timed configuration (3 sec): (nU; oFF; ES)	LG2			DNC	DNC	DNC
	Defrost button configuration: (nU; oFF; ES; SEr)	dFC			DNC	DNC	DNC
	Defrost button timed configuration (3 sec): (nU; oFF; ES)	dF2			DNC	DNC	DNC
	Down button timed configuration (3 sec): (nU; Std; Lnt; ALr; Pnd)	dn2	Pr2		DNC	DNC	DNC
	UP button timed configuration (3 sec): (nU; Std; CC; ALr; Pnd)	UP2	Pr2		DNC	DNC	DNC
Info menu – inF	Probe P1 value visualization	dP1	Pr1	°F	—	—	—
	Probe P2 value visualization	dP2	Pr1	°F	—	—	—
	Probe P3 value visualization	dP3	Pr1	°F	—	—	—
	Probe P4 value visualization	dP4	Pr1	°F	—	—	—
	Instantaneous compressor speed (RPM * 10)	SPd	Pr1	%	DNC	DNC	DNC
	Real regulation Set Point	rSE	Pr1	°F	DNC	DNC	DNC
	Firmware release: progressive number	rEL	Pr1	—	DNC	DNC	DNC
	Parameter map version	Ptb	Pr1	—	DNC	DNC	DNC

Table 19 – Controller parameters list

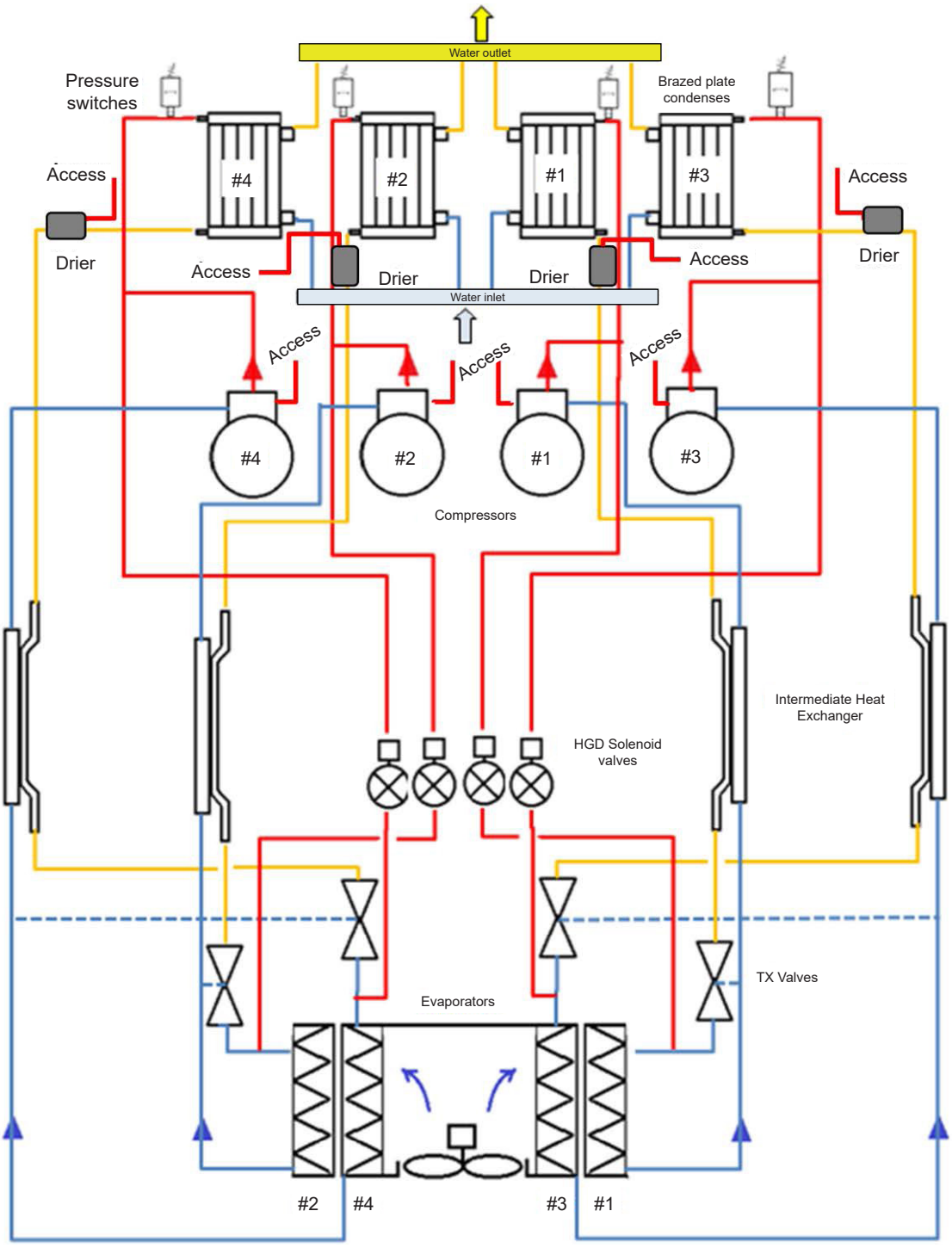
12. Appendix 1 – Piping diagram models KM2VW & KL2VW, BM2VW, & BL2VW



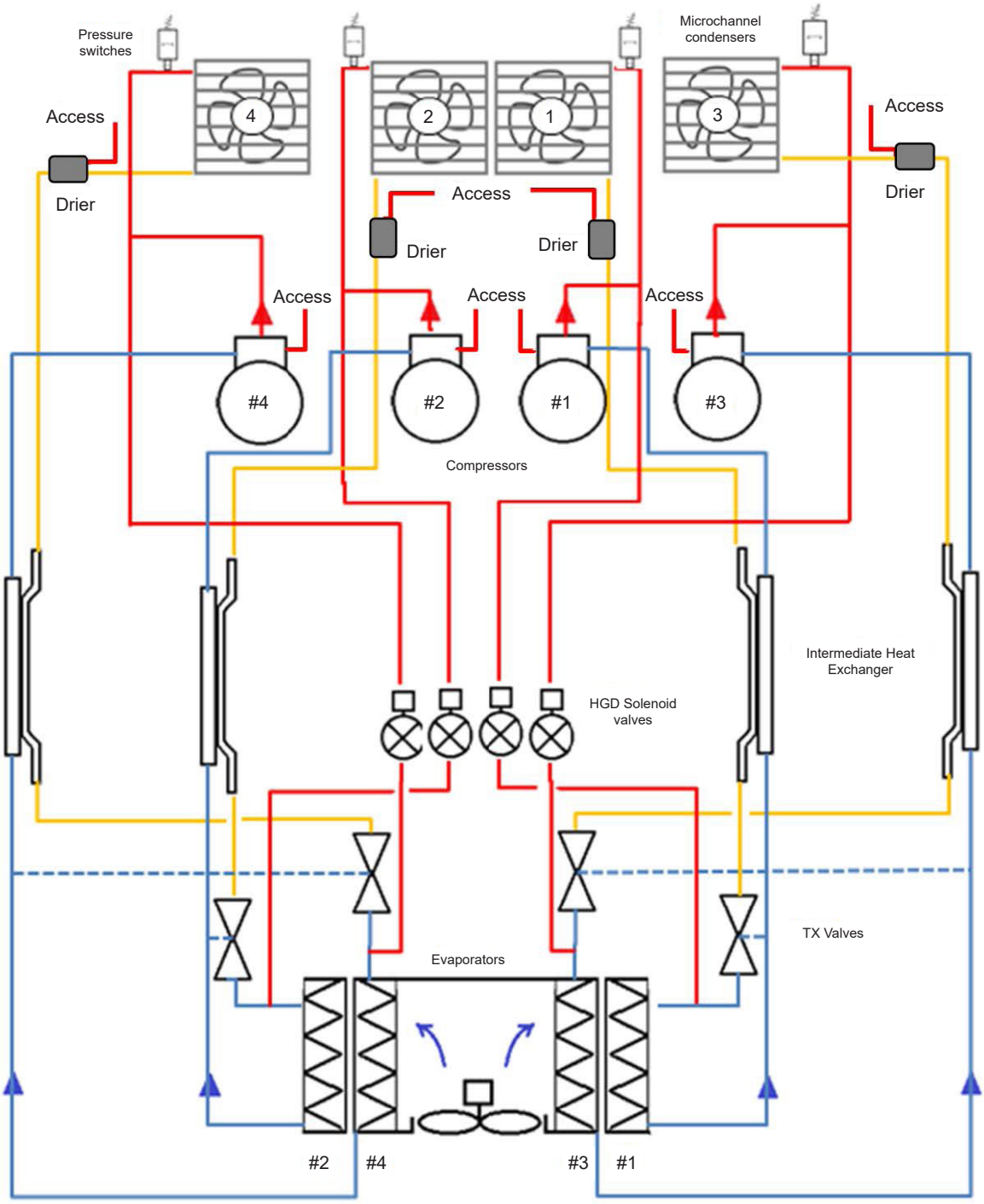
13. Appendix 2 – Piping diagram models KM2VA & KL2VA, BM2VA & BL2VA



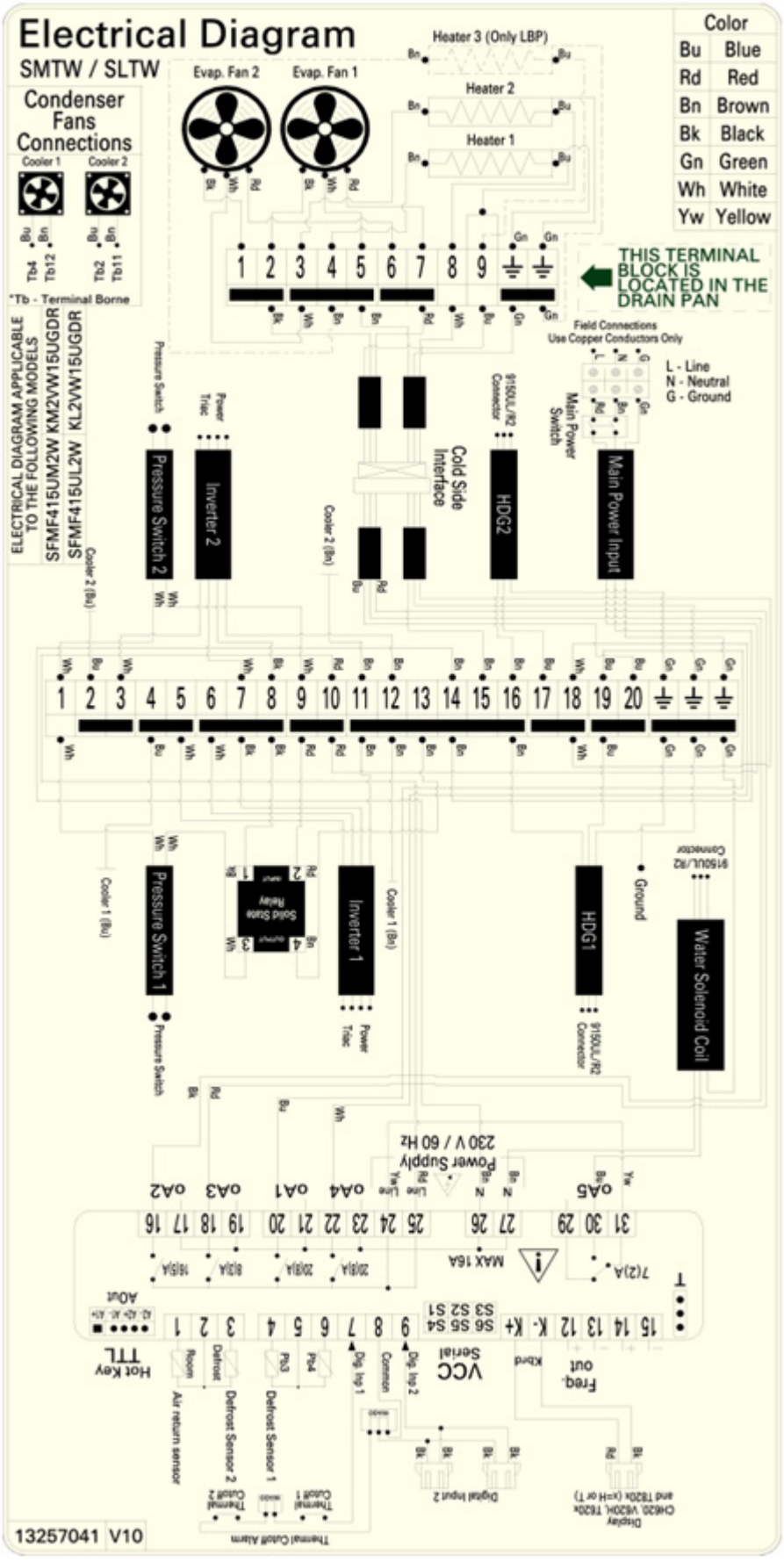
14. Appendix 3 – Piping diagram model KL4VW & BL4VW



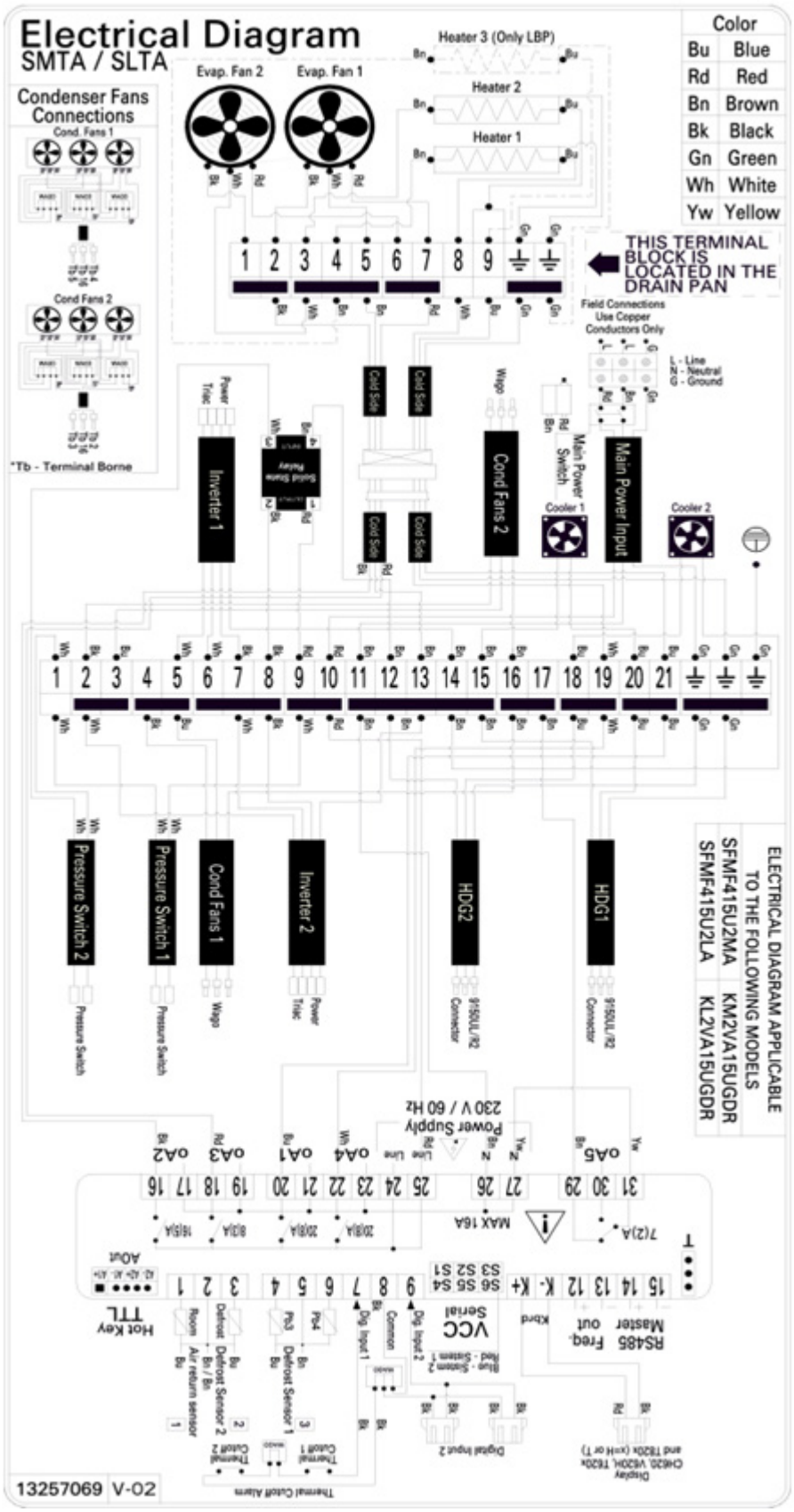
15. Appendix 4 – Piping diagram model KL4VA & BL4VA



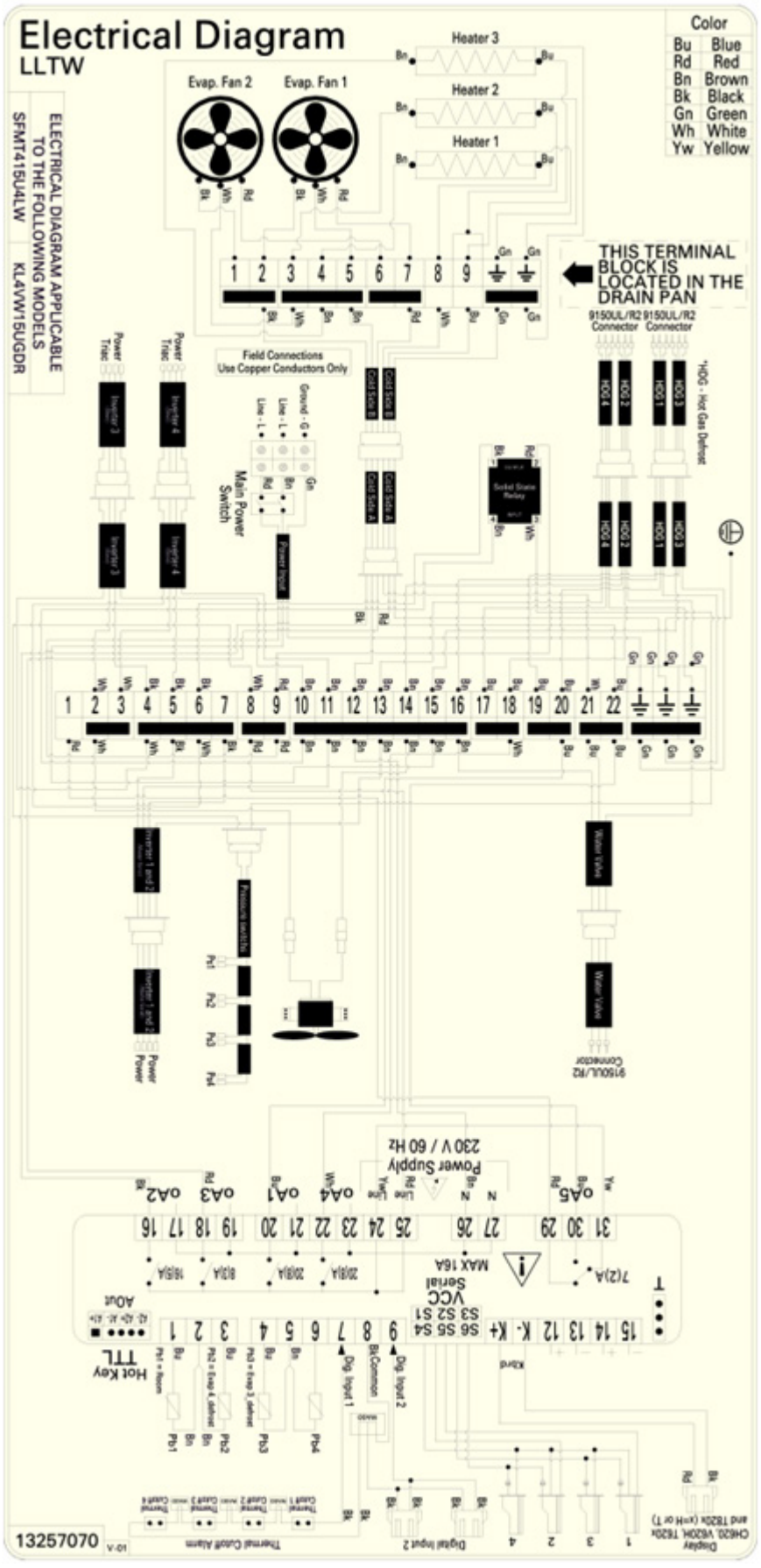
16. Appendix 5 – Wiring diagram models KM2VW & KL2VW, BM2VW, & BL2VW



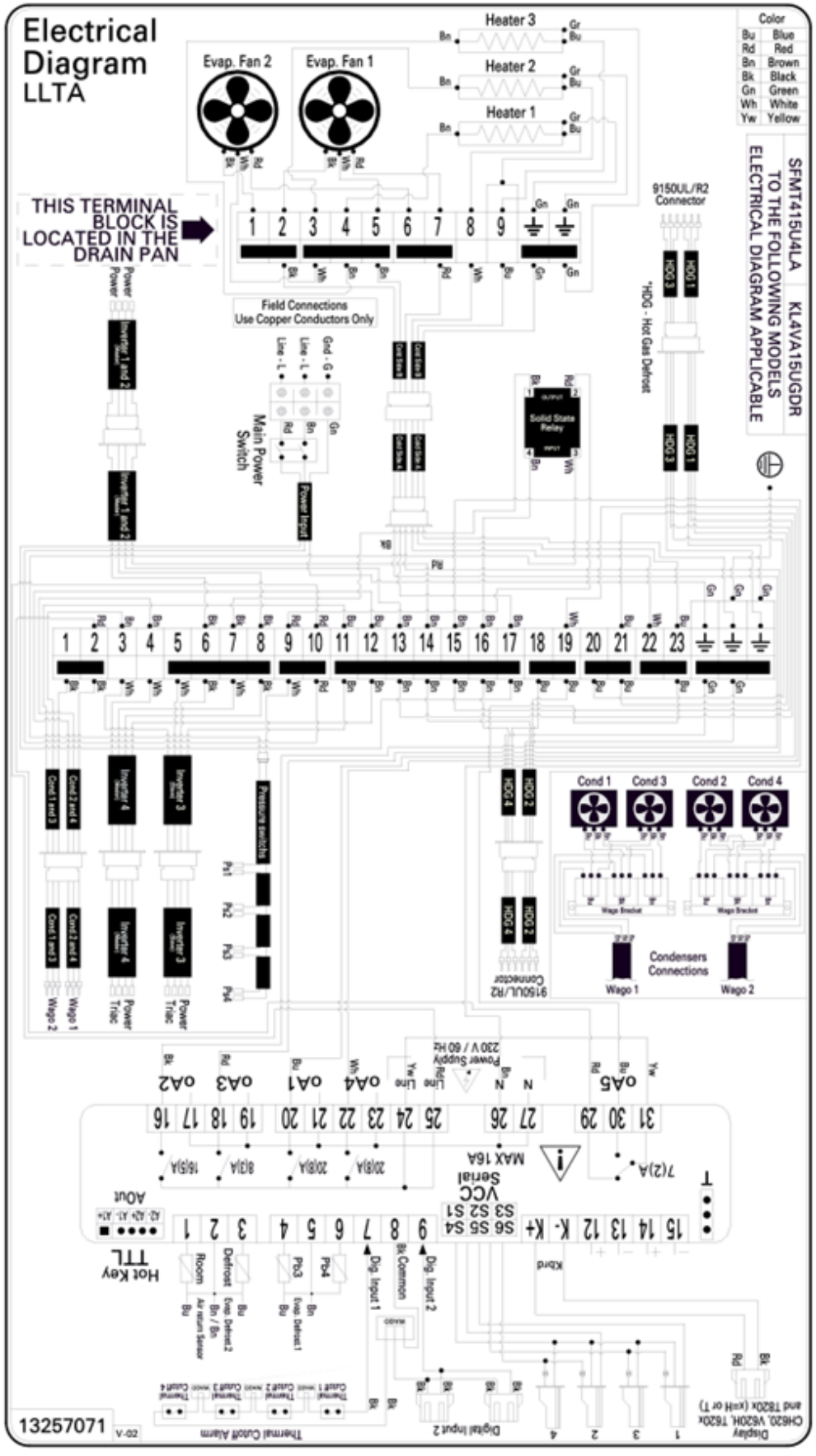
17. Appendix 6 – Wiring diagram models KM2VA & KL2VA, BM2VA, & BL2VA



18. Appendix 7 – Wiring diagram models KL4VW & BL4VW



19. Appendix 8 – Wiring diagram models KL4VA & BL4VA



20. Service part list

TYPE	DESCRIPTION	PART #
Air Movers	BLADE-11.81 IN CCW 23 DEG FAN	**3161994**
	FANPACK 12W PENTA 200 UNADA	**3198413**
	MOTOR 11W 220-240V/50-60HZ IP44 Y.S TECH	**3198414**
	MOTOR ASSEMBLY UNADA 20W 8"	**3198415**
	MOTOR-38W 90-240V 50-60HZ SSC4	**3161924**
Controls	CONTROLLER-DIXELL XW170K WITH RTC	**3162156**
	DISPLAY-REMOTE DIGITAL CH620	**3162175**
	INVERTER CF10B01 N 0.1 15 A 01(SDI)	**3198416**
	SENSOR-TEMP X 59.05 LENGTH	**3162130**
	SWITCH-PRESS 50 BAR PS80-K3-4066	**3162008**
	THERMAL CUT-OFF	**3198417**
Heaters	HEATER-TRAY .23A 208-230V 50W (Medium Temp Units)	**3162137**
	TRAY HEATER - LOW TEMPERATURE APPLICATION	**3198418**
Miscellaneous	COVER-ASSEMBLY RELAY BASE	**3162365**
	GASKET- SILICONE	**3211695**
	SCREW-M4 X 20 PAN PHH TAPPING	**3162364**
	WHITE TRIM KIT (2X PART A, 2X PART B)	**3198419**
	BLACK TRIM KIT (2X PART A, 2X PART B)	**3209242**
Refrigerant Circuit	COMPRESSOR FMFT 415U 230V 53-167HZ	**3198420**
	FILTER DRIER	**3198421**
	COIL-SOLENOID 208-240V 60HZ 14W	**3161907**
	VALVE-SOLENOID .250 ODF EVR 3 NC	**3161858**
	VALVE-TXV .25 X .50 ODF R290	**3161857**
Water Line	TEE-CONNECTION BOTTOM ASSEMBLY .750 (2 Circuit)	**3162360**
	TEE-CONNECTION TOP ASSEMBLY .750 (2 Circuit)	**3162277**
	VALVE-BALANCE AUTOMATIC FLOW (4 Circuit Unit)	**3198422**
	VALVE-BALANCE AUTOMATIC FLOW .750(2 Circuit Unit)	**3162186**
	VALVE-SOL .750 NPT 220-230V WATER	**3162177**
	WATER INLET SET (4 Circuit)	**3198423**
	WATER OUTLET SET (4 Circuit)	**3198424**
Wiring	CONNECTOR-CABLE 16A 250V GREY	**3161915**
	CONNECTOR-CONVERTER TTL TO RS485	**3162150**
	DEFROST SYNCHRONIZATION CABLE	**3164863**
	DISPLAY CONNECTOR CABLE	**3164862**
	MODBUS CABLE	**3164864**
	TTL 1.5M LONG CABLE	**3198425**

See separate Exploded View document for images showing locations of service parts.

21. Legal Concerns

All product, specifications, and information are subject to change without notice. Customers should always check for the latest updates on Krack.com (see QR code on the product) and with technical information before relying on this manual.

It is the responsibility of the retailer and authorized service personnel to validate this Hussmann product solution is suitable for the use in a customer's specific application. Hussmann does not certify the integration of its product (Krack Monoblock and the unit cooler room). This is a responsibility of the customer installing in the unit cooler room.

The parameters provided in the datasheets and/or specifications may vary in different applications. Product specifications are not extended or otherwise modified to bypass Hussmann's terms and conditions of purchase, including, but not limited to the expressed warranty.

Hussmann rejects any liability for damages caused by its products and/or applications that are installed or repaired by persons without training and/or in disagreement with these safety instructions.

 This document is intended to support the installation, use and maintenance of the Krack Monoblock Systems.

PN 3153769_D

Scan the QR code to access technical data.

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