



## Monoblock R-290 (Propane)

### IMPORTANT

Keep in store for future reference!

## PRE-CHARGED REFRIGERATION SYSTEMS

### Installation & Operation Manual

P/N 3153769 - Rev. G  
August 2026  
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**

Component parts are designed for use with flammable refrigerants and are non-incendive and non-sparking. To minimize the risk of possible ignition due to incorrect parts, component parts shall only be replaced with identical repair parts. Servicing shall be done by qualified service personnel only, so as to minimize the risk of possible damage due to incorrect parts or improper service.

## **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

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

### 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

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.

FOR CALIFORNIA INSTALLATIONS ONLY:



## **WARNING:**

Cancer and Reproductive Harm  
[www.P65Warnings.ca.gov](http://www.P65Warnings.ca.gov)

August 31, 2018

3069575

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.

## PN 3153769\_G

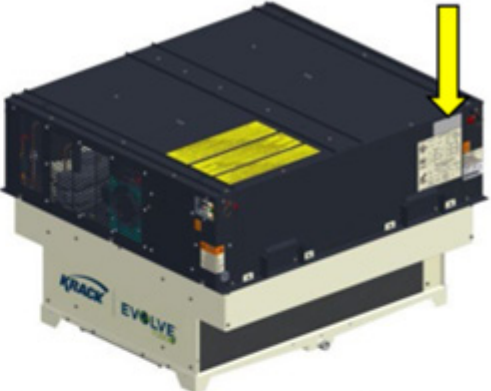
This document applies to the following products:

| Condenser Type | Application      | Configuration                    | Model Number | Part Number |
|----------------|------------------|----------------------------------|--------------|-------------|
| Water-Cooled   | Walk-in Coolers  | White Evaporator                 | KM2VW15UGDR  | 3152424     |
| Water-Cooled   | Walk-in Coolers  | Black Evaporator                 | BM2VW15UGDR  | 3208612     |
| Water-Cooled   | Walk-in Coolers  | White Evaporator, No RTC         | KM2VW15UGDN  | 3152425     |
| Water-Cooled   | Walk-in Freezers | White Evaporator                 | KL2VW15UGDR  | 3152426     |
| Water-Cooled   | Walk-in Freezers | Black Evaporator                 | BL2VW15UGDR  | 3208613     |
| Water-Cooled   | Walk-in Freezers | White Evaporator                 | KL4VW15UGDR  | 3207993     |
| Water-Cooled   | Walk-in Freezers | Black Evaporator                 | BL4VW15UGDR  | 3208614     |
| Water-Cooled   | Walk-in Coolers  | White Evaporator, No Lower Label | NM2VW15UGDR  | 3248503     |
| Water-Cooled   | Walk-in Freezers | White Evaporator, No Lower Label | NL4VW15UGDR  | 3248502     |
|                |                  |                                  |              |             |
| Air Cooled     | Walk-in Coolers  | White Evaporator                 | KM2VA15UGDR  | 3152427     |
| Air Cooled     | Walk-in Coolers  | Black Evaporator                 | BM2VA15UGDR  | 3208609     |
| Air Cooled     | Walk-in Freezers | White Evaporator                 | KL2VA15UGDR  | 3152428     |
| Air Cooled     | Walk-in Freezers | Black Evaporator                 | BL2VA15UGDR  | 3208610     |
| Air Cooled     | Walk-in Freezers | White Evaporator                 | KL4VA15UGDR  | 3208126     |
| Air Cooled     | Walk-in Freezers | Black Evaporator                 | BL4VA15UGDR  | 3208611     |

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

| COMPLIANCE                                                                                                                                                                                                                                                        |                           | REFRIGERATING UNIT                                            |                 |                  |                                          |             |  |
|-------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------|---------------------------|---------------------------------------------------------------|-----------------|------------------|------------------------------------------|-------------|--|
| <br><br> | Manufacturer              |                                                               | Model           |                  | Electrical ratings                       |             |  |
|                                                                                                                                                                                                                                                                   | Nidec GA                  |                                                               | 515200083       |                  | Voltage                                  | 230 V/60 Hz |  |
|                                                                                                                                                                                                                                                                   |                           |                                                               |                 | Phases           | 1 (phase - neutral) or 2 (phase - phase) |             |  |
|                                                                                                                                                                                                                                                                   |                           |                                                               |                 | MCA              | 12.2 A                                   |             |  |
|                                                                                                                                                                                                                                                                   |                           |                                                               |                 | MOP              | 15 A                                     |             |  |
|                                                                                                                                                                                                                                                                   |                           | COMPRESSORS                                                   |                 |                  |                                          |             |  |
| Qty                                                                                                                                                                                                                                                               | RLA                       | 3.4 A                                                         |                 | Qty              | FLA                                      | 0.23 A      |  |
| 2                                                                                                                                                                                                                                                                 | LRA                       | 7 A                                                           |                 | 2                | Cons.                                    | 50 W        |  |
|                                                                                                                                                                                                                                                                   |                           | INVERTER FANS                                                 |                 |                  |                                          |             |  |
| Qty                                                                                                                                                                                                                                                               | FLA                       | 0.12 A                                                        |                 | Qty              | FLA                                      | 0.46 A      |  |
| 2                                                                                                                                                                                                                                                                 | Cons.                     | 17 W                                                          |                 | 2                | Cons.                                    | 34 W        |  |
|                                                                                                                                                                                                                                                                   |                           | WATER SHUT OFF VALVE                                          |                 |                  |                                          |             |  |
| Qty                                                                                                                                                                                                                                                               | Cons.                     | 17 VA                                                         |                 | Qty              | Cons.                                    | 28 VA       |  |
| 1                                                                                                                                                                                                                                                                 |                           |                                                               |                 | 2                |                                          |             |  |
|                                                                                                                                                                                                                                                                   |                           | CONTROLLER user interface supported models                    |                 |                  |                                          |             |  |
|                                                                                                                                                                                                                                                                   |                           | CH620, V620H, T620x and T820x (x=H or T)                      |                 |                  |                                          |             |  |
|                                                                                                                                                                                                                                                                   |                           | REFRIGERANT                                                   |                 |                  |                                          |             |  |
| Type                                                                                                                                                                                                                                                              | ANSIASHRAE 34             |                                                               | Qty of circuits | Charge/Circuit   |                                          |             |  |
| R-290                                                                                                                                                                                                                                                             | A3                        |                                                               | 2               | 5.291 oz (150 g) |                                          |             |  |
|                                                                                                                                                                                                                                                                   |                           | COLD ROOM APPLICATION                                         |                 |                  |                                          |             |  |
| Installation                                                                                                                                                                                                                                                      | Box Temp.                 | Water Loop                                                    | BTU/h*          | Power input (W)* |                                          |             |  |
| Indoor only<br>Max amb 95°F<br>(35°C)                                                                                                                                                                                                                             | 5 to -15°F<br>-15 to 26°C | 4.4±20% GPM<br>17±20% L/min 41<br>to 118°F (5°C to<br>47.8°C) | 4437            | 1135             |                                          |             |  |

\* @ 5000 rpm/box=-10°F/water=85°F/4.4 GPM




## 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.                                                                                                              |
| E        | May 2025      | Revised serial number label image, added baffle figure, update Service Part list, updated Dixell interface figure, updated IO table, added special application section, updated system information table, updated troubleshooting table, updated parameter table, updated motor specification table, added clip information, updated wiring diagram images, clarified connection information, updated sequence of information, updated parameter information, updated alarm information, added wiring logic diagrams, updated hose kit and hose stand information, updated numbering, updated temperature sensor information, updated hanging information and figures, updated serial plate image, updated roof opening figure, and updated torque table. |
| F        | February 2026 | Updated information in following sections: 3.3 Drain Connections, 3.4 Water Loop Connections, 3.8.4 Alarms, 3.9 Temperature Sensors, 3.10.1 Final Commissioning, 3.11 Drain Pan Heaters, 4.1 Drain Pan Service, 10 Troubleshooting, 15 Service Part List<br>Corrected information in following sections: 11 Controller Parameters, 14.4 Wiring Logic<br>Added the following section: 3.12.3 Celsius Temperature Conversion                                                                                                                                                                                                                                                                                                                                |
| G        | August 2026   | Updated information in section 2, 2.3, 3.4, 3.7, 3.11, 3.12.2, 4.1, and 15.<br>Corrected information in 3.8.2, 3.8.7, and 3.10.1.<br>Added sections 3.2.2 and 10.1                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                        |

## TABLE OF CONTENTS

|       |                                                       |    |
|-------|-------------------------------------------------------|----|
| 1.    | General Information.....                              | 8  |
| 2.    | Product Description .....                             | 8  |
| 2.1.  | Reference Standards.....                              | 10 |
| 2.2.  | Training of Technical Teams.....                      | 10 |
| 2.3.  | Product Overview .....                                | 10 |
| 2.4.  | Airflow Overview.....                                 | 11 |
| 3.    | Installation Instructions .....                       | 16 |
| 3.1.  | Storage, Transportation, Unpacking, and Handling..... | 16 |
| 3.2.  | Mounting and Affixing.....                            | 17 |
| 3.3.  | Drain Connection (Condensation Water) .....           | 20 |
| 3.4.  | Water Loop Connection (Water-Cooled Condenser).....   | 20 |
| 3.5.  | Electrical Connections .....                          | 24 |
| 3.6.  | Inverter (Compressor Driver).....                     | 26 |
| 3.7.  | Fan Motors .....                                      | 27 |
| 3.8.  | Controller.....                                       | 28 |
| 3.9.  | Temperature Sensors.....                              | 40 |
| 3.10. | Commissioning.....                                    | 41 |
| 3.11. | Drain Pan Heaters.....                                | 43 |
| 3.12. | Special Applications.....                             | 43 |
| 4.    | Operation, Servicing, and Disposal .....              | 45 |
| 4.1.  | Drain Pan Service .....                               | 47 |
| 5.    | Cleaning.....                                         | 49 |
| 6.    | Maintenance.....                                      | 49 |
| 7.    | Disassembly and Disposal .....                        | 50 |
| 8.    | In Case of Failure.....                               | 50 |
| 9.    | Inappropriate Use .....                               | 50 |
| 10.   | Troubleshooting .....                                 | 51 |
| 10.1  | Inverter Troubleshooting .....                        | 52 |
| 11.   | List of default parameters for Dixell XWi70K.....     | 57 |
| 12.   | Appendix 1 – Piping Diagrams.....                     | 66 |
| 13.   | Appendix 2 – Wiring Diagrams.....                     | 69 |
| 14.   | Appendix 3 – Wiring Logic Diagrams .....              | 73 |
| 15.   | Service Parts List.....                               | 77 |
| 16.   | Legal Concerns.....                                   | 78 |

## 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 units 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.

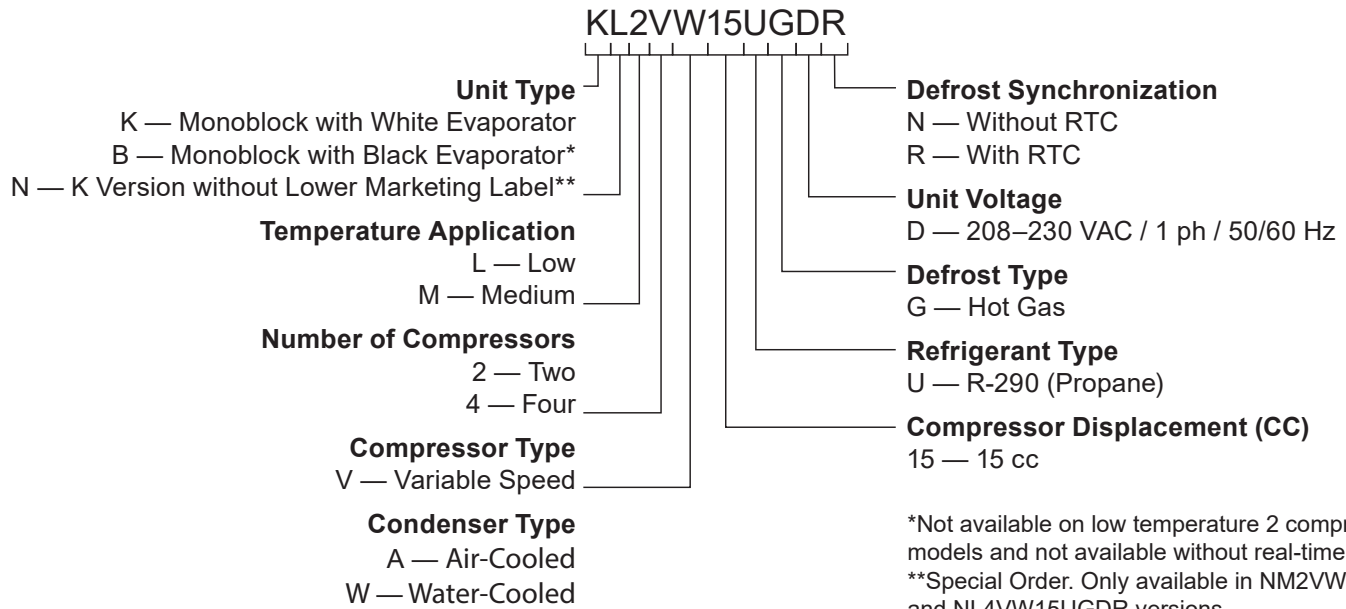
The Krack Monoblocks are complete cooling systems that integrate condensing, evaporative, control, and ventilation in one packaged solution. Units can be equipped with one or more independent refrigeration circuits and removal of heat from the high temperature side (condensing) occurs by either water 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             |
| NM2VW15UGDR        | 230V/50/60Hz/1PH | MT: 28 to 50F         | Water Cooled | YES             |
| NL4VW15UGDR        | 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



\*Not available on low temperature 2 compressor models and not available without real-time clock.

\*\*Special Order. Only available in NM2VW15UGDR and NL4VW15UGDR versions.

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).

| Flammability         | Toxicity |      |
|----------------------|----------|------|
|                      | 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 Monoblock 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

Husmann 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. Husmann 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

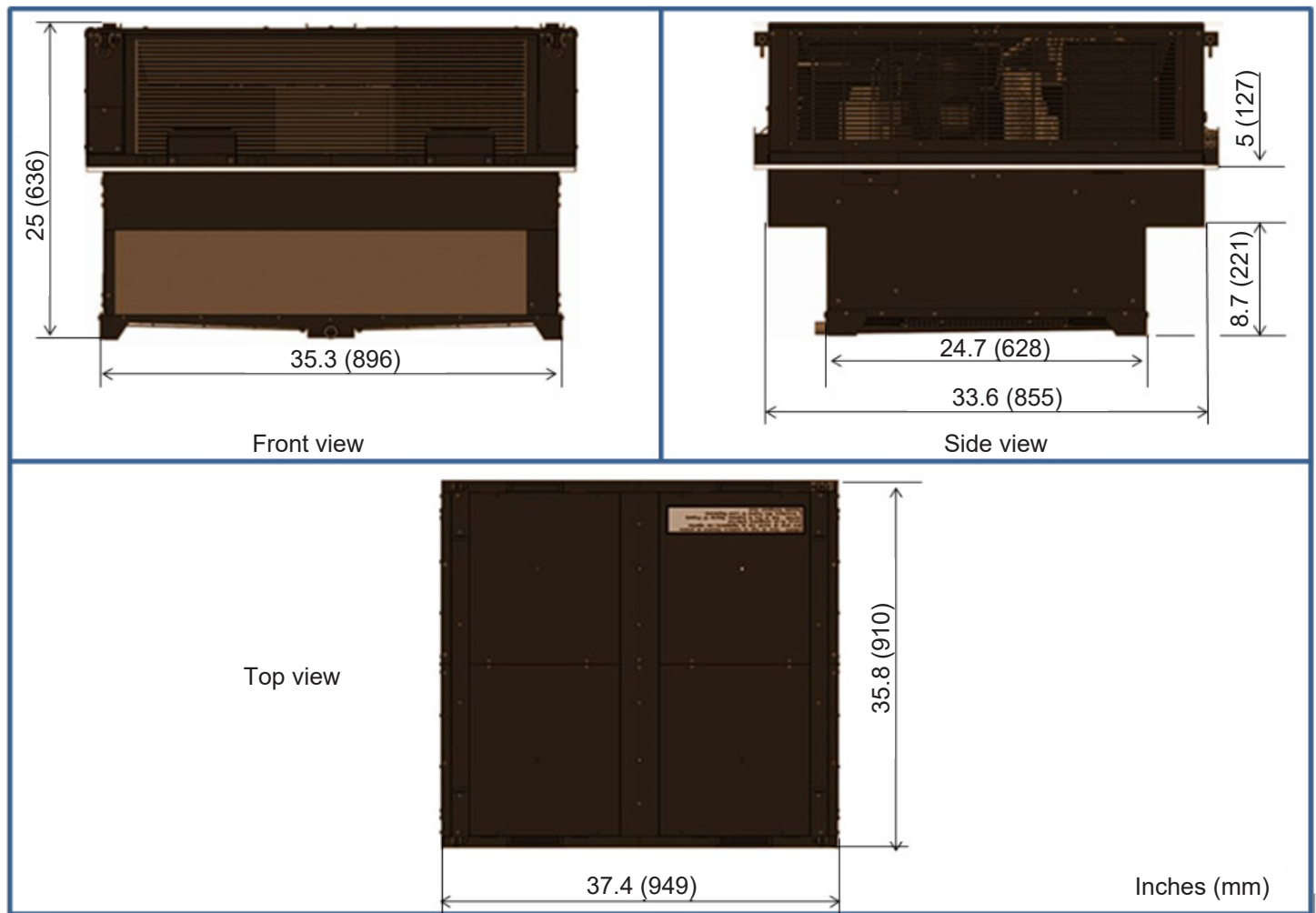
Do not drop the product. Use the appropriate tools for handling and installation to avoid either damaging the refrigerant tubing or increasing the risk of a leak.

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

|                             | KM2VW<br>BM2VW<br>NM2VW           | KL2VW<br>BL2VW     | KL4VW<br>BL4VW<br>NL4VW | KM2VA<br>BM2VA     | KL2VA<br>BL2VA     | KL4VA<br>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<br>(253 lbs)                | 114kg<br>(251 lbs) | 154kg<br>(340 lbs)      | 119kg<br>(262 lbs) | 121kg<br>(267 lbs) | 147kg<br>(324 lbs) |
| Operating Weight:           | 116kg<br>(256 lbs)                | 115kg<br>(254 lbs) | 156kg<br>(344 lbs)      | 119kg<br>(262 lbs) | 121kg<br>(267 lbs) | 147kg<br>(324 lbs) |
| Ship Weight:                | 152kg<br>(335 lbs)                | 151kg<br>(333 lbs) | 191kg<br>(422 lbs)      | 156kg<br>(344 lbs) | 158kg<br>(349 lbs) | 184kg<br>(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                       |                    |                         |                    |                    |                    |
| Water Design Pressure       | 174 psig (12 bar)                 |                    |                         |                    |                    |                    |
| Design Conditions           | Type I (75° F [23.9° C], 55% RH)  |                    |                         |                    |                    |                    |

**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 section).
- 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.

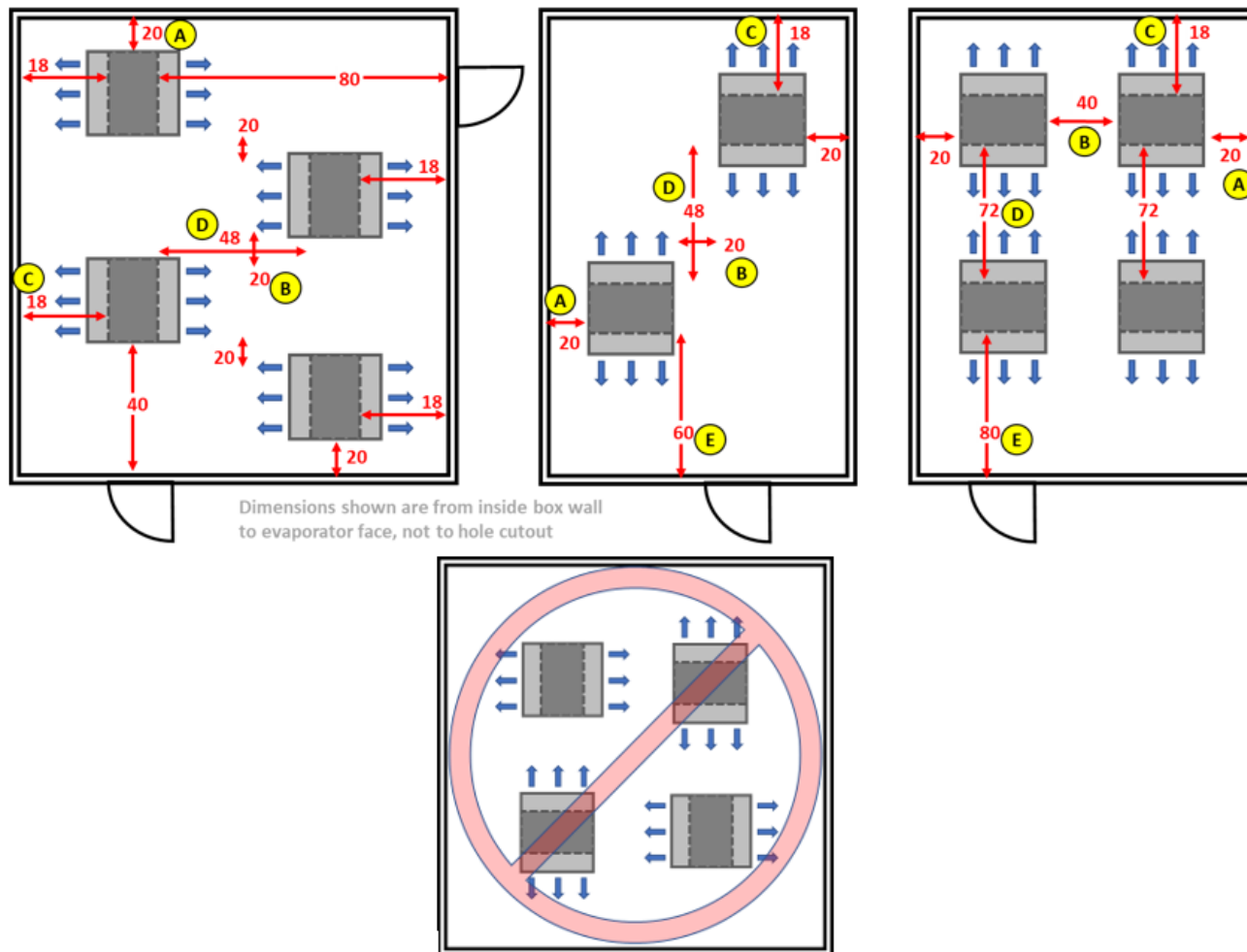


Figure 2 – Roof Top Air Flow View - cold side – Minimum Distances for Installation

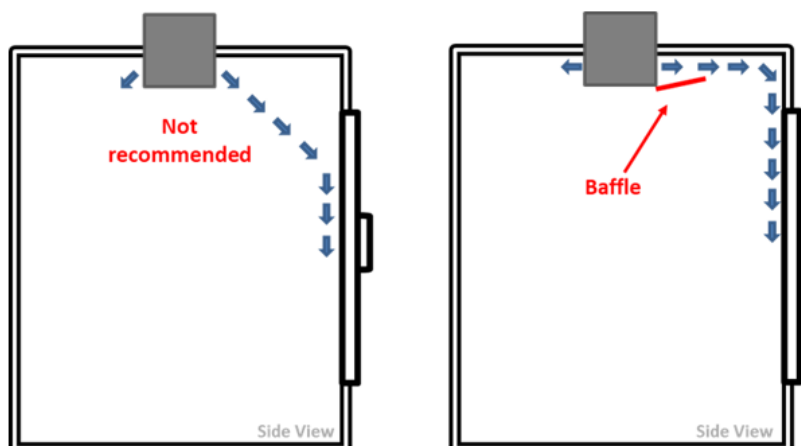


Figure 3 – Side Air Flow View - cold side – Baffle recommended for display doors

Baffle kits can be ordered as ship loose items. Baffles can be attached to installed units using existing fasteners already on the unit. Due to internal airflow patterns, baffles are not necessary on low temperature units but are recommended on medium temperature units when blowing toward display doors. Baffles can be added to one or both sides of a unit. There are two baffle kits. Each kit has one baffle. Two kits must be ordered if baffles on both side of unit are desired.

Kit 3219476 is used on white painted evaporator section units.

Kit 3219477 is used on black painted evaporator section units.

The images below show the baffle and how they look assembled on a unit.

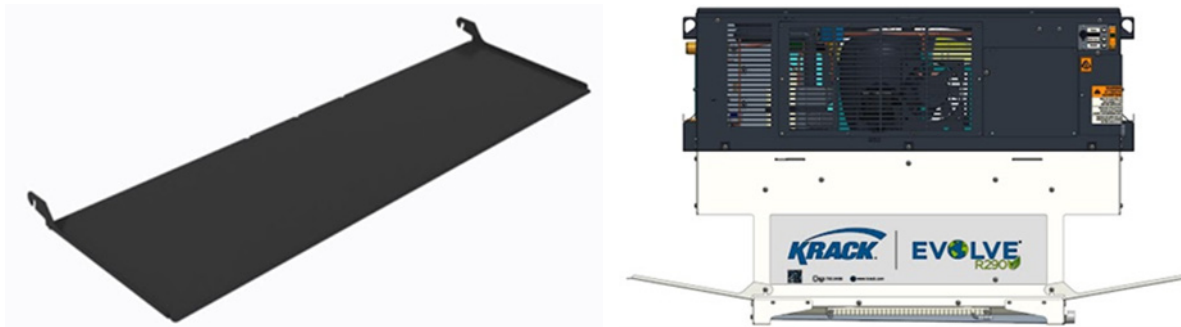


Figure 4 – Air Deflector Baffle

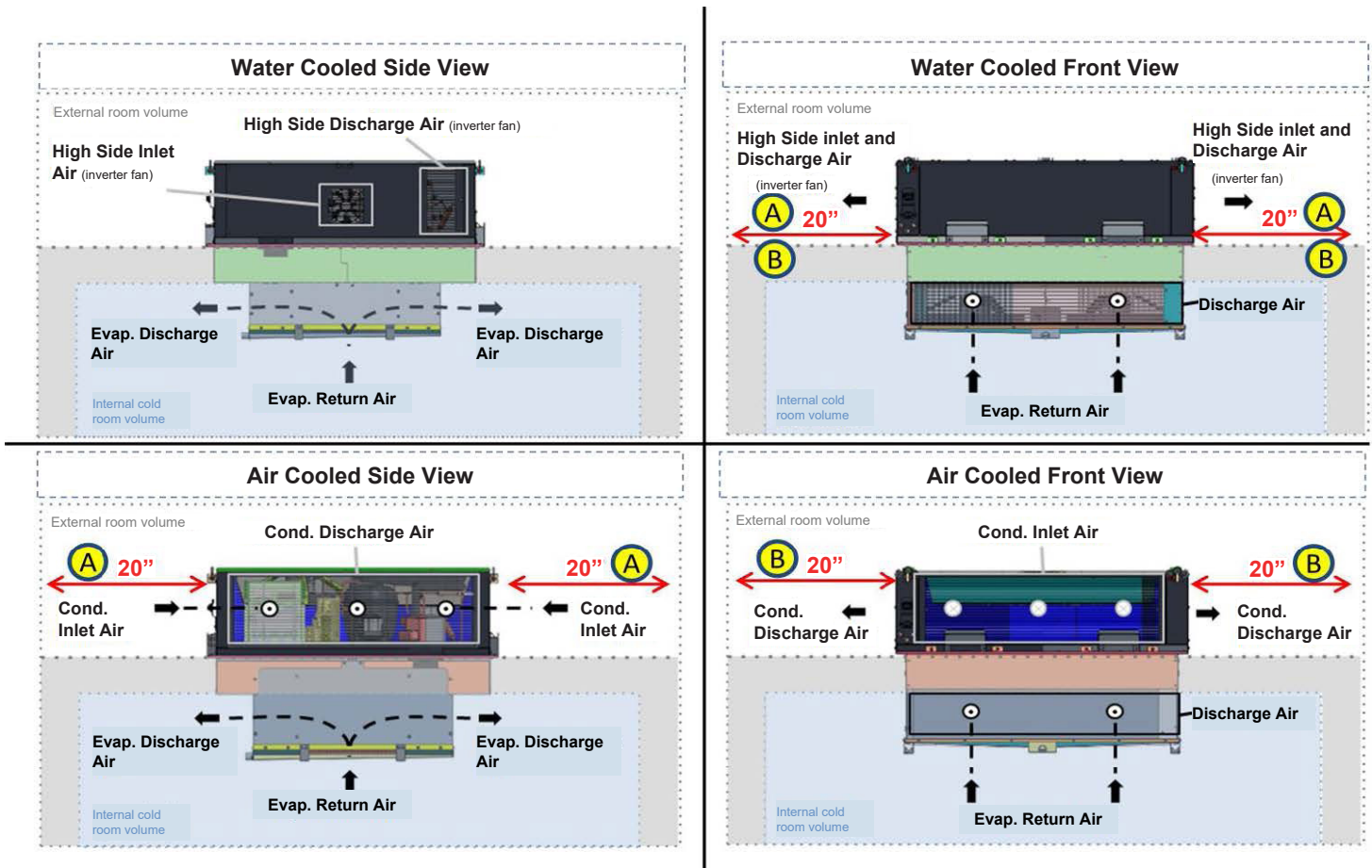


Figure 5 – Airflow schematics

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 5.
- Minimum space between condenser outlet side and any wall or obstruction is 20"; See "B" in Figure 5.
- 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 airflow 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 6:
- 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.

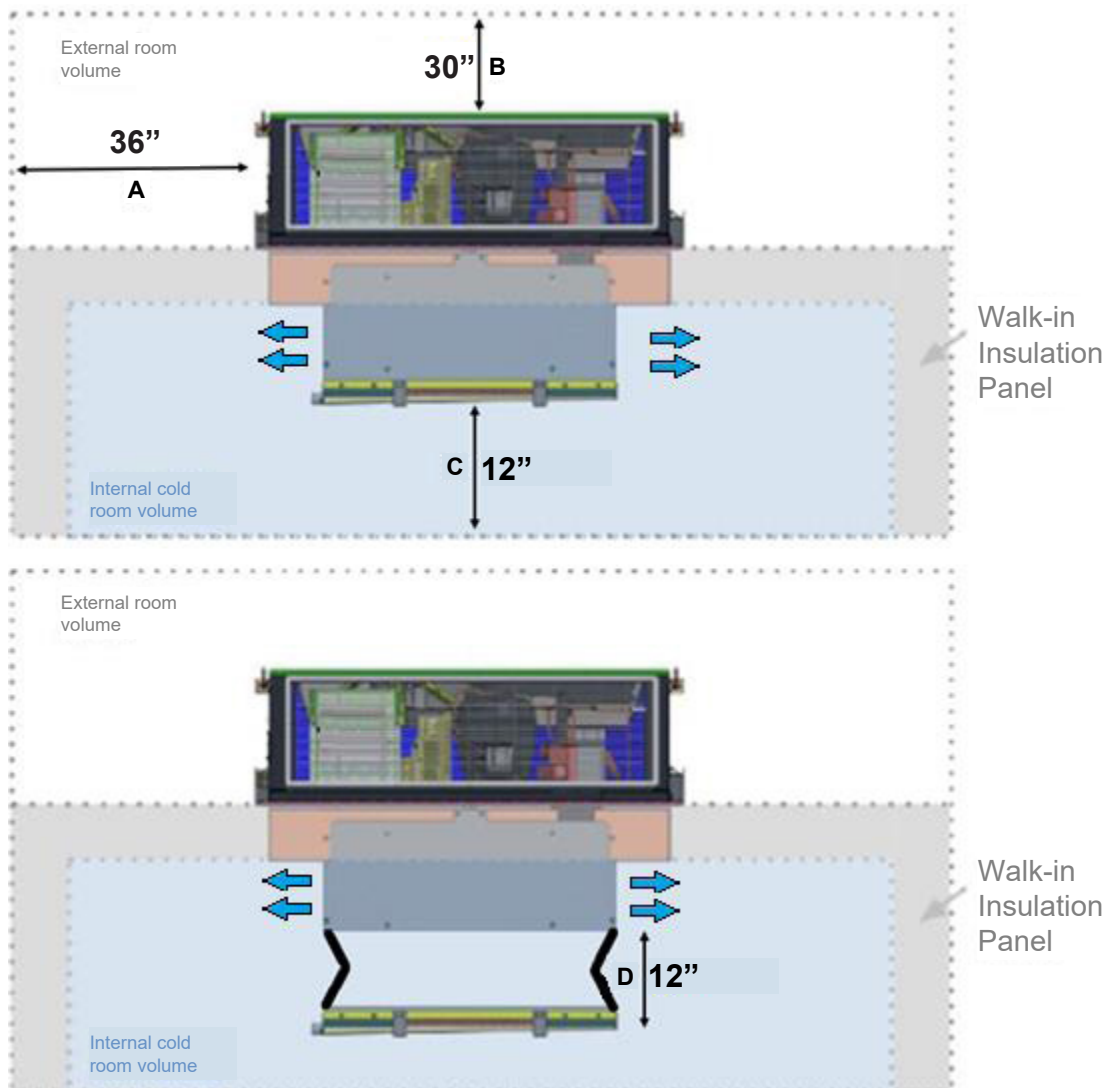


Figure 6 – Service Access Dimensions

Hole Cutout Dimensions:

- Spacing of hole cutouts is different than the cold side spacing. See Figure 7.
- 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 8;
- Standard distance between the hole sides is 20" when staggered or 40" when in-line. See "G" in the figure 8.
- Minimum distance between hole side and room edge is 19.25". See "H" in Figure 8).
- 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 8.
- 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 8.

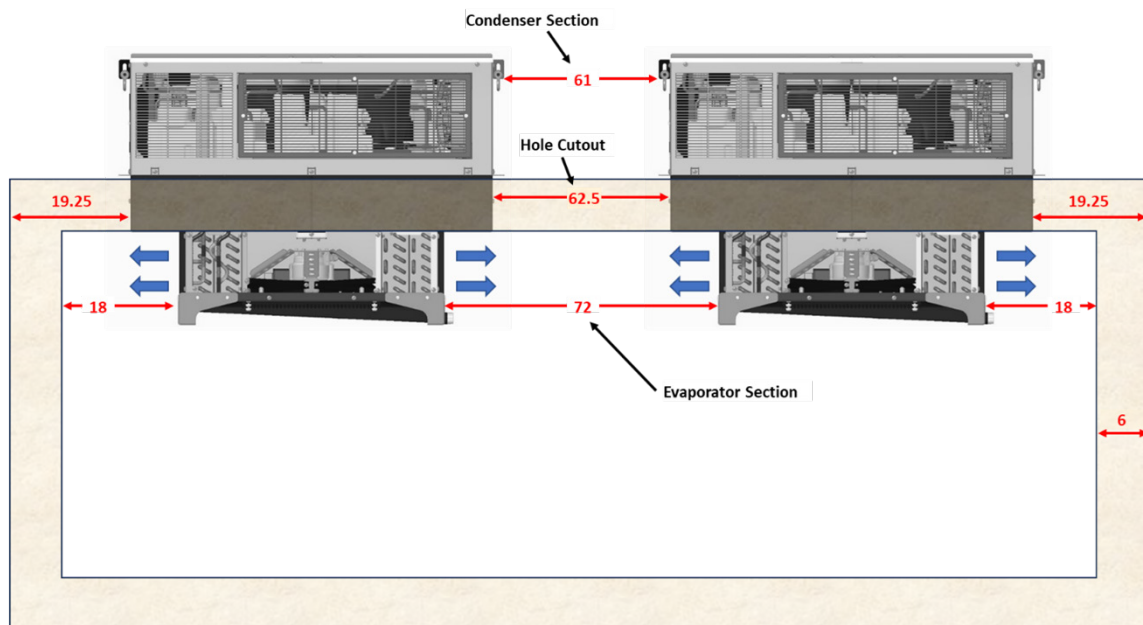


Figure 7 – Dimension Comparison

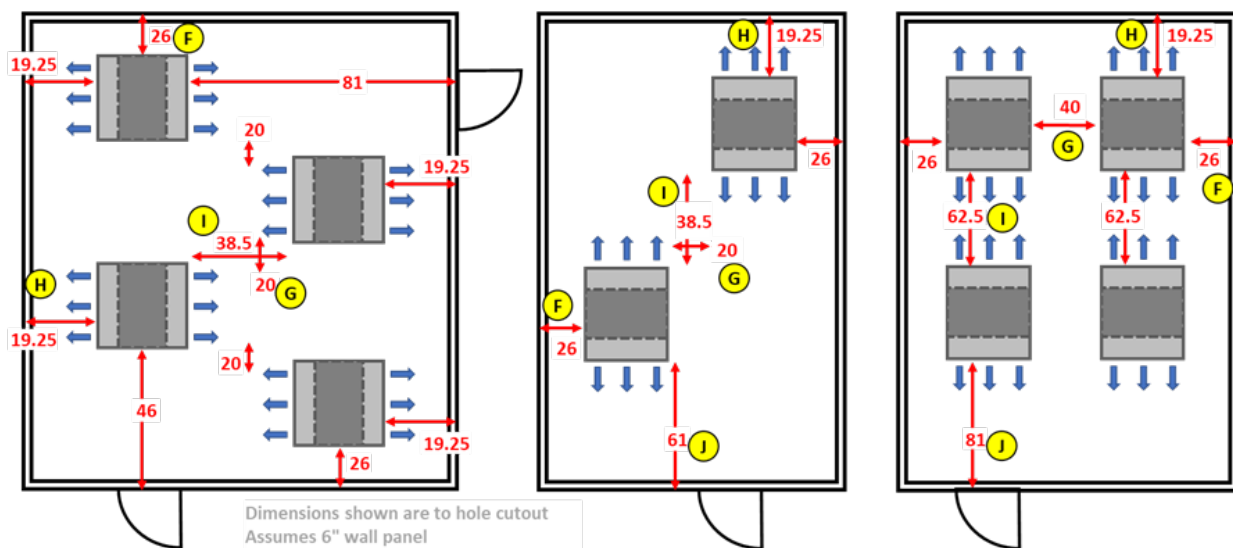


Figure 8 – Hole Cutout Spacing Dimensions

### 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

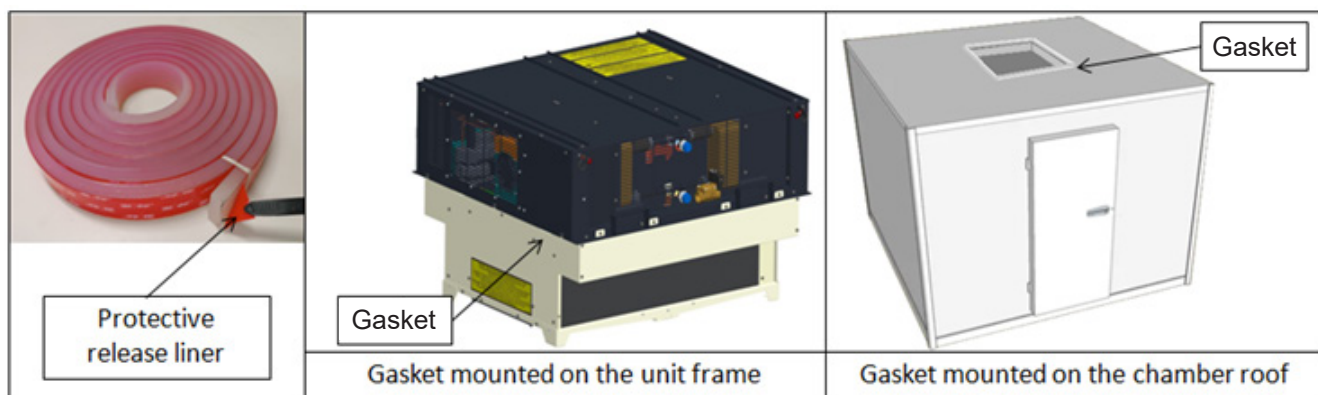
Never remove the rails and covers of this equipment when using the corner lift rings. Never service the equipment when the equipment is lifted.

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 Affixing

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 9 below:



**Figure 9 – 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 10. 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 support points. An example of hanging the unit is shown in Figure 11. The mounting structure and hanger rod kit are not included with the product. Hanging hole pattern for New Style is 34-3/4" by 35-5/8" (see Figure 11).

Note 1: The equipment is designed to be level. A maximum slope of 1/4" 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.

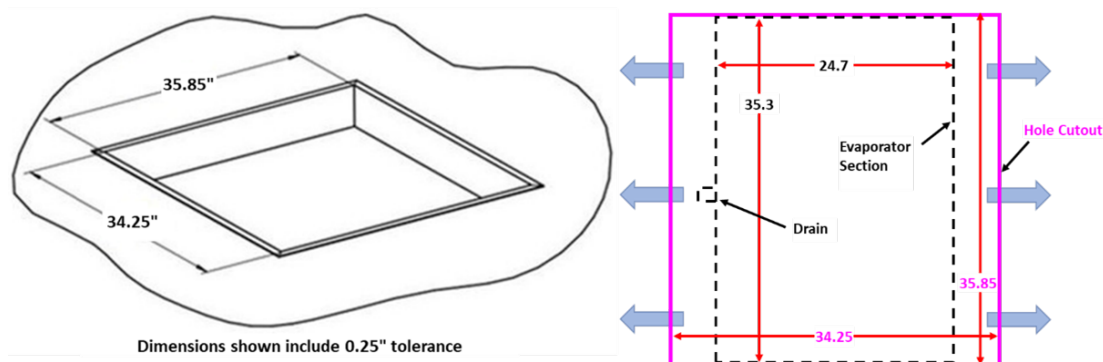


Figure 10 –Installation opening dimensions (inches)

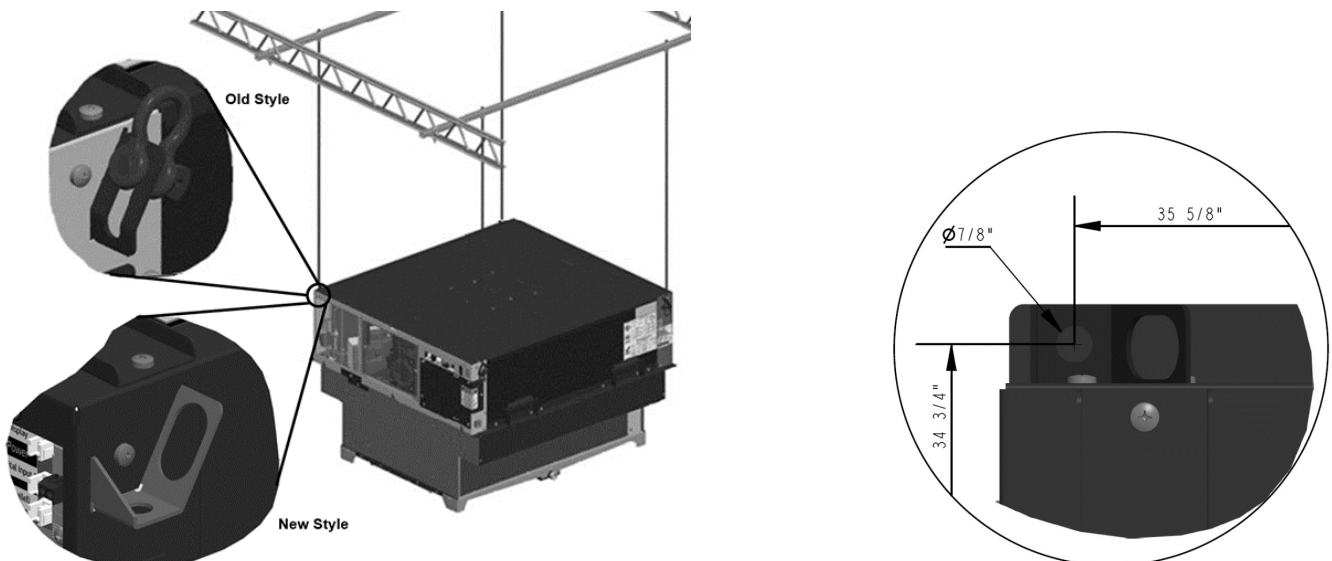
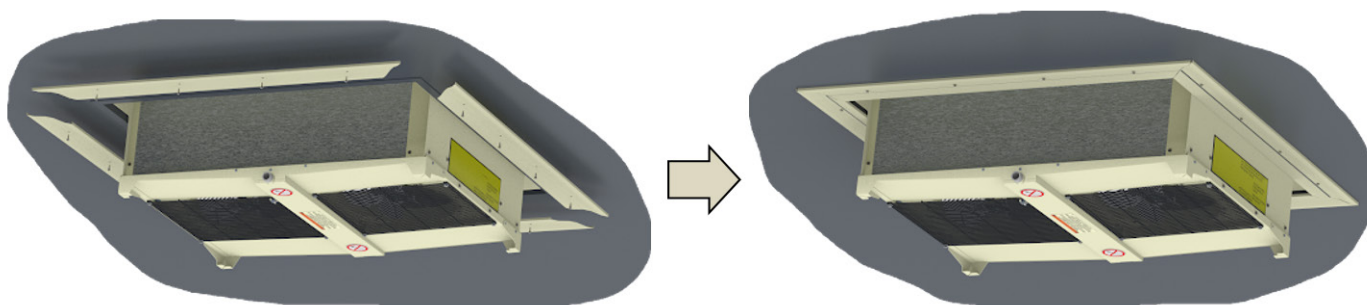


Figure 11 – Example of Suspended/Hang unit mounting and new style hanging hole pattern



**Figure 12 – 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).

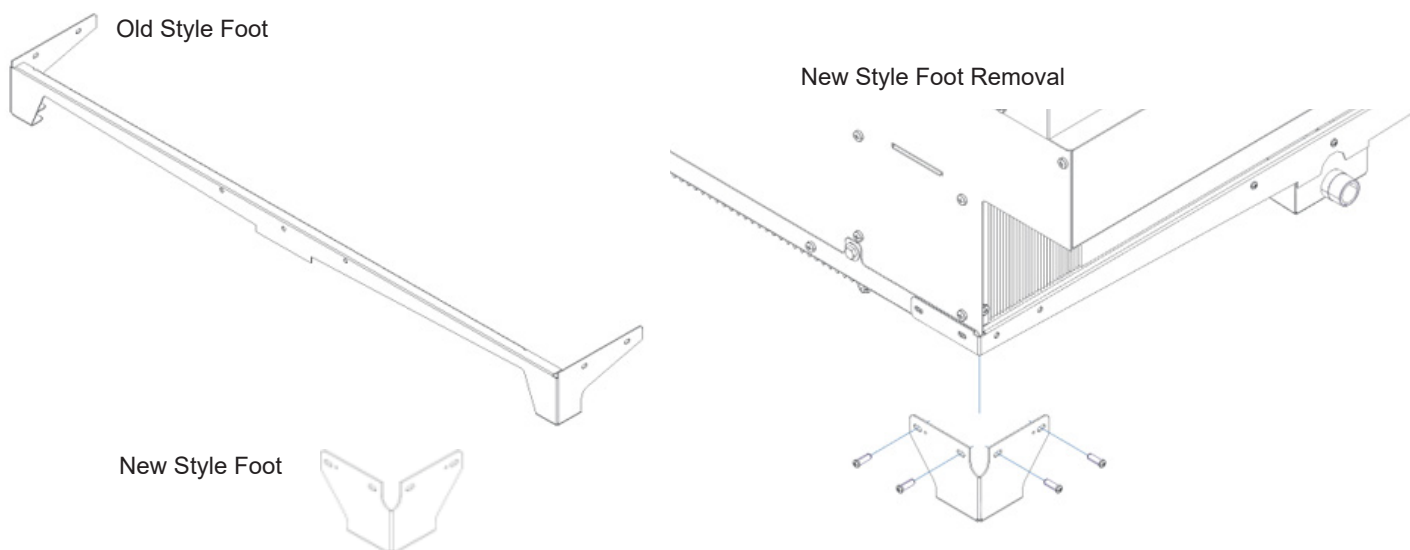
### 3.2.2 Unit Feet

Monoblock units have two styles of feet. Older units have two foot assemblies per unit and newer units have four feet per unit (see Figure 13).

The feet on older style units **SHOULD NOT** be removed from the unit for any reason. Foot removal can cause drainage and/or icing issues and could result in unit damage.

The feet on newer style units can be removed from the unit if desired after installation. See Figure 13 for details on new style foot removal. For each of the four feet, remove the four screws, remove the foot, and then replace the four screws.

Note: If feet are removed, it is recommended the feet be saved and kept with the unit, near the condenser portion, for situations if the unit is removed in the future. Without the feet, the drain pan will be damaged if the unit is set on the ground.



**Figure 13 – Foot styles and new foot removal**

### 3.3. Drain Connection (Condensation Water)

Krack Monoblock systems have a drain for removing condensate water during the defrost cycle (Figure 14).

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 1/4" drop per running foot.

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 1" thick 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 required 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.

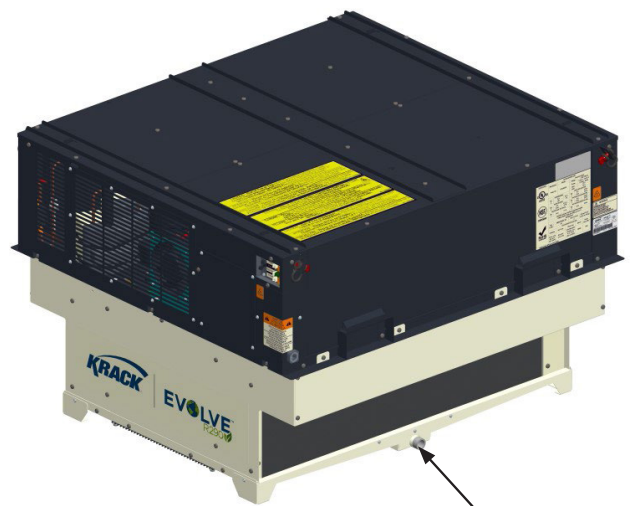
### 3.4. Water Loop Connection (Water-Cooled Condenser)

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).

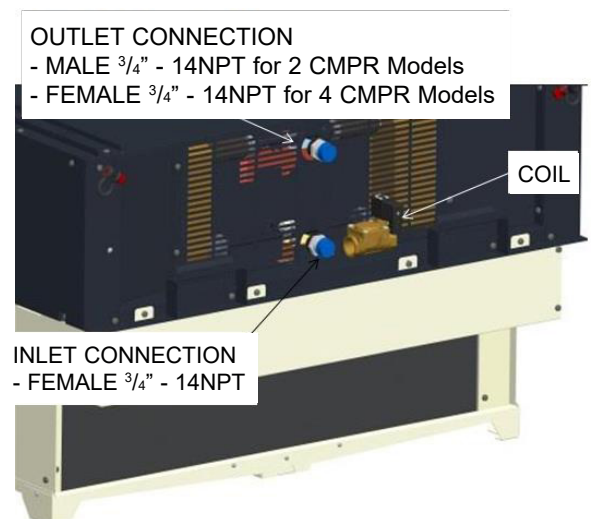
All water-cooled units are factory supplied with a normally open solenoid valve. Its function is to turn off the water supply during the defrost cycle. Models with four compressors have the solenoid valve installed inside the cabinet. Models with two compressors have the solenoid strapped to the outside of the product and it must be assembled in the inlet water circuit during unit installation. It is recommended to install the water valve in the upright position.

On models with two compressors, the water inlet solenoid valve connection is female 3/4" – 14NPT while the water outlet connection is male 3/4" – 14NPT (Figure 15). On models with four compressors, both inlet and outlet connections are female 3/4" – 14NPT.

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

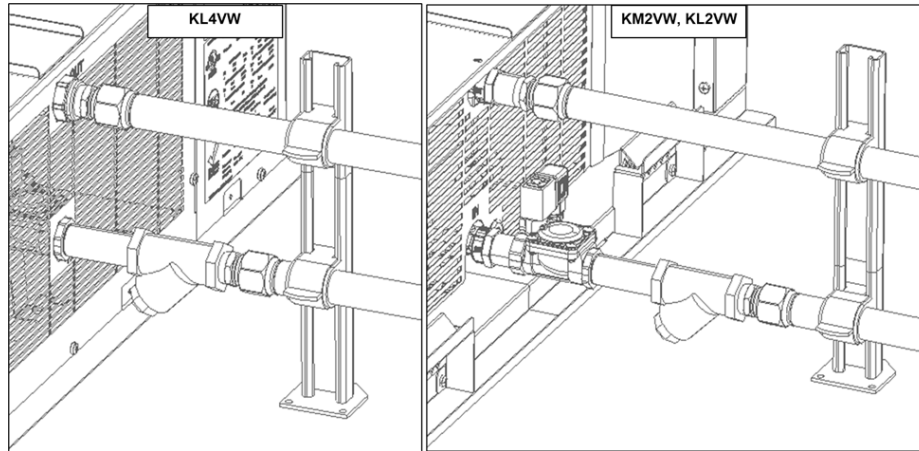


**Figure 14 – Drain connection position**



**Figure 15 – Water Loop Connections**

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. Stands and pipe clamps must be installed as close to unit as possible (maximum 12") to support hoses and water line components next to exterior of unit as shown in Figure 16.



**Figure 16 – Water Line Support**

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.

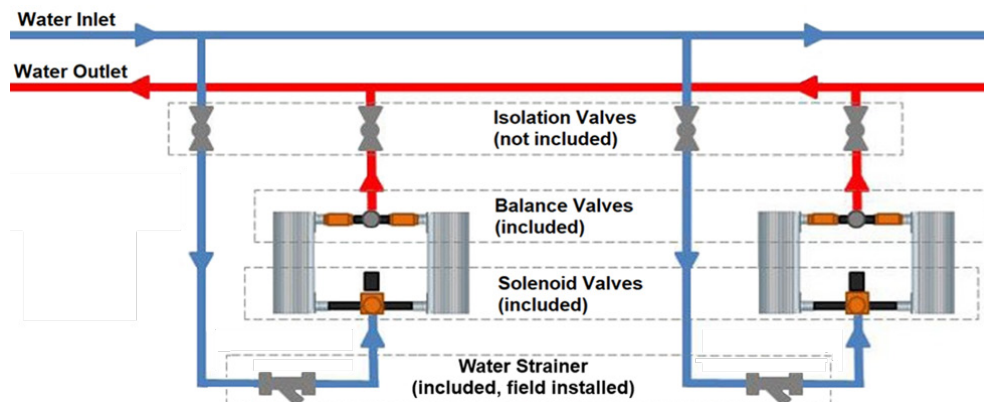
The product is equipped with water balancing valves to control the flow and ensure best operation of the equipment. This product is designed to operate with water temperatures of 85° F (29° C) ranging from 45° to 115° F (7° to 46° C) and minimum flow limited by the balancing valves (see table below). 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 45° F (7° 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 Flow**

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

Note: 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 17 below (suggestion).



**Figure 17 – Water Loop valves position**

## PN 3153769\_G

Ship loose water connection kits are available. There are five different kits available.

**For units manufactured prior to May 2026, water strainer is NOT included with unit.**

- Kit SCD60 has flexible hoses and is used on KM2VW, KL2VW, BM2VW, and BL2VW.
- Kit SCD61 has flexible hoses and is used on KL4VW and BL4VW.
- Kit SCD62 is intended for use with field supplied hard piping and is used on any model.

**For units manufactured during and after May 2026, water strainer is included with unit.**

- Kit SCD63 has flexible hoses and is used on any model.
- Kit SCD64 is intended for use with field supplied hard piping and is used on any model.

The contents of the kits are detailed below:

| Item                                             | Hussmann Number | Kits with Strainer |       |       | Kits without Strainer |       |
|--------------------------------------------------|-----------------|--------------------|-------|-------|-----------------------|-------|
|                                                  |                 | SCD60              | SCD61 | SCD62 | SCD63                 | SCD64 |
| Strainer (100 mesh): NPT (F) to NPT (F), 3/4"-14 | 3221300         | 1                  | 1     | 1     | —                     | —     |
| Nipple: NPT (M) to NPT (M), 3/4"-14              | 3193650         | 1                  | 1     | 1     | —                     | —     |
| Hose, 6 ft: NPSM (F) x NPSM (F), 3/4"-14         | 3101227         | 2                  | 2     | —     | 2                     | —     |
| Adapter: NPSM (M) to NPTF (M), 3/4"-14           | 3172725         | 4                  | 4     | —     | 4                     | —     |
| Coupling: 3/4" (F) to 3/4" (F)                   | 3222309         | 3                  | 2     | —     | 3                     | —     |
| Mount: Unistrut w/ Base                          | 3046601         | 1                  | 1     | 1     | 1                     | 1     |
| Screw: NEO 14x1                                  | 0700900         | 3                  | 3     | 3     | 3                     | 3     |
| Clamp: 1-1/8 OD Tube                             | 0261416         | 2                  | 2     | —     | 2                     | —     |
| Clamp: 7/8 OD Tube                               | 0261415         | —                  | —     | 2     | —                     | 2     |

\* Not required if mating part has female threads.

Note 1: Copper piping and male or female union are field supplied.

Note 2: Included with Monoblock.

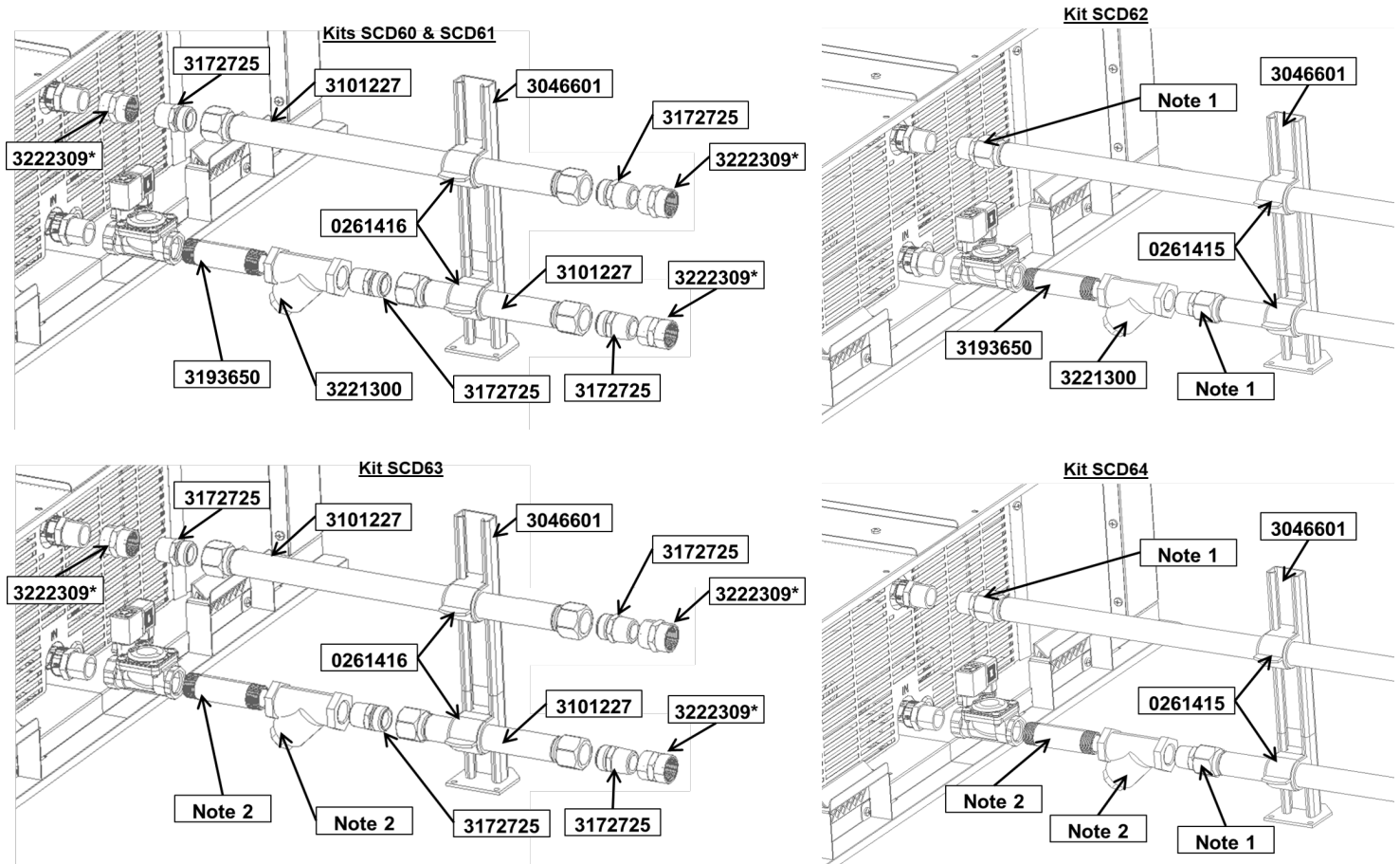


Figure 18 – Ship loose water kit assembling suggestions

The plastic clips holding the connection fittings on the Monoblock unit must be installed and used correctly. The plastic clip should not be removed from the unit as that can damage the clip. To release a fitting, press down on the corrugated area of the clip and then pull the fitting straight out. To install fitting, push fitting straight into clip until it clicks. If the clip is able to freely spin, the fitting is installed correctly. If the clip is removed, it must be installed with the correct orientation. The clip has an arrow that points in the direction of the fitting.



**Figure 19 – Water Connection Clip Information**

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 <sub>3</sub> )                      | 70-300                                        |
| Sulphate (SO <sub>4</sub> )                         | < 70                                          |
| HCO <sub>3</sub> / SO <sub>4</sub> ratio            | > 1.0                                         |
| Electrical Conductivity                             | 10-500 uS/cm                                  |
| pH                                                  | 7.5 - 9.0                                     |
| Ammonium (NH <sub>4</sub> )                         | < 2                                           |
| Chlorides (Cl)                                      | < 100                                         |
| Free Chlorine (Cl <sub>2</sub> )                    | < 1                                           |
| Hydrogen Sulfide (H <sub>2</sub> S)                 | < 0.05                                        |
| Free (aggressive) Carbon Dioxide (CO <sub>2</sub> ) | < 5                                           |
| Total Hardness (dH)                                 | 4.0 - 8.5                                     |
| Nitrate (NO <sub>3</sub> )                          | < 100                                         |
| Iron (Fe)                                           | < 0.2                                         |
| Aluminum (Al)                                       | < 0.2                                         |
| Manganese (Mn)                                      | < 0.1                                         |

**Table 5 – Water Composition**

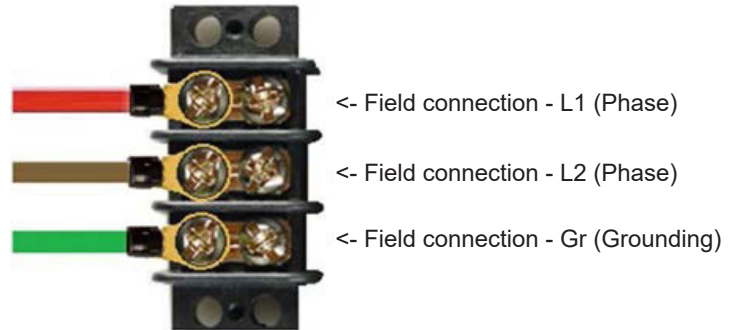
### 3.5. Electrical Connections

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 20.

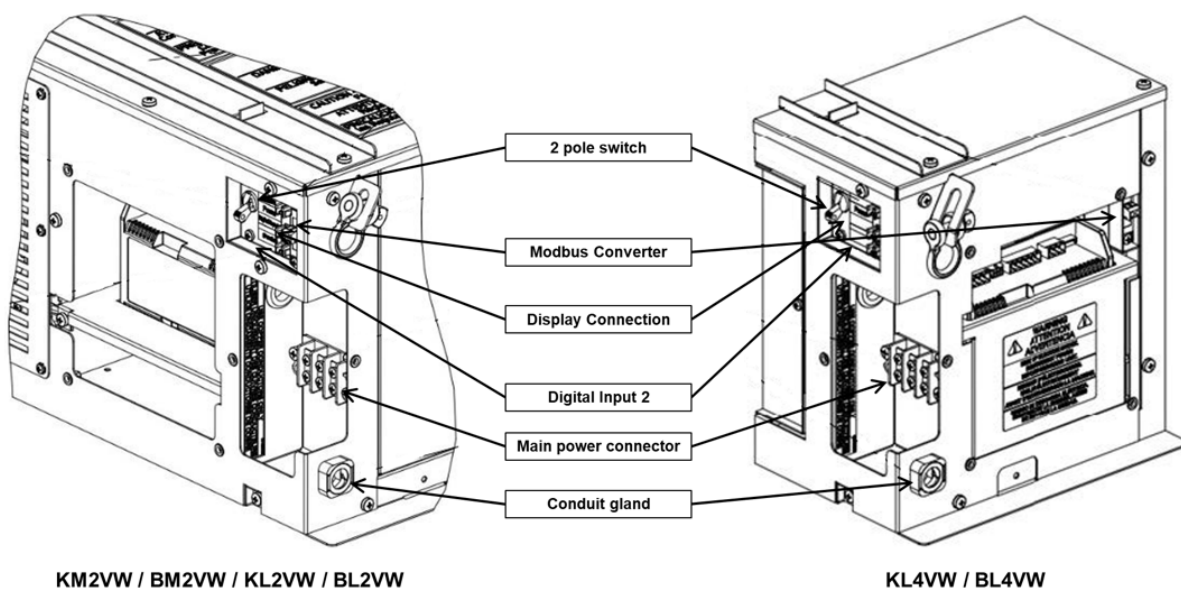


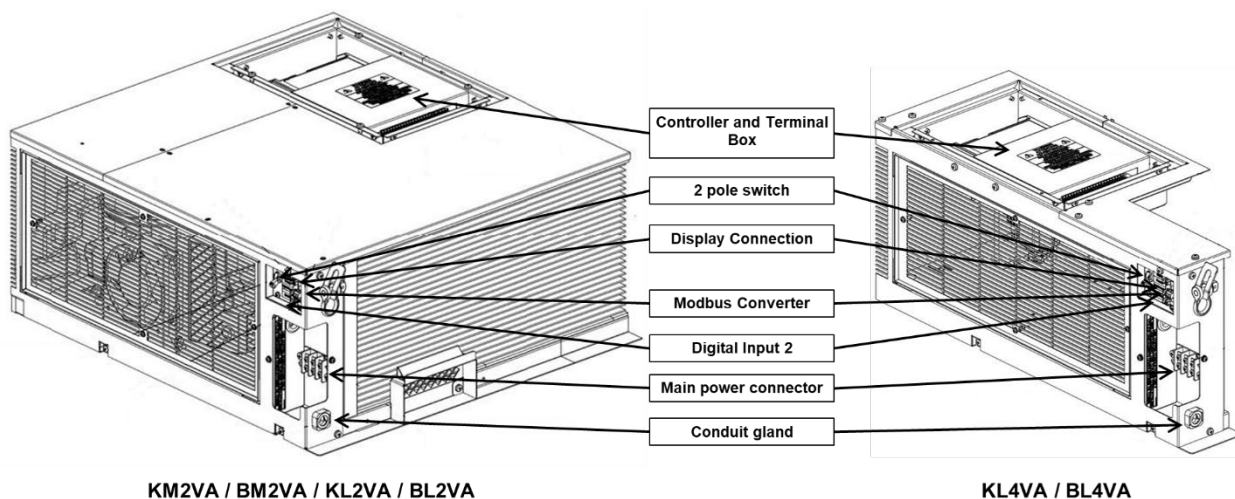
**Figure 20 – Electrical connections**

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 21 below.





**Figure 21 – 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<br>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<br>BL2VW15UGDR | 230V/50-60Hz        | 208–255V                  | 1 PH   | 12.2    | 15      |
| Water-Cooled | KL4VW15UGDR<br>BL4VW15UGDR | 230V/50-60Hz        | 208–255V                  | 1 PH   | 18      | 30      |
| Air-Cooled   | KM2VA15UGDR<br>BM2VA15UGDR | 230V/50-60Hz        | 208–255V                  | 1 PH   | 15      | 20      |
| Air-Cooled   | KL2VA15UGDR<br>BL2VA15UGDR | 230V/50-60Hz        | 208–255V                  | 1 PH   | 15      | 20      |
| Air-Cooled   | KL4VA15UGDR<br>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  $230V \pm 10\%$  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<br>(Phase-Neutral)<br>(208V/50/60HZ) | Bi-Phase Connection<br>(Phase-Phase)<br>(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).

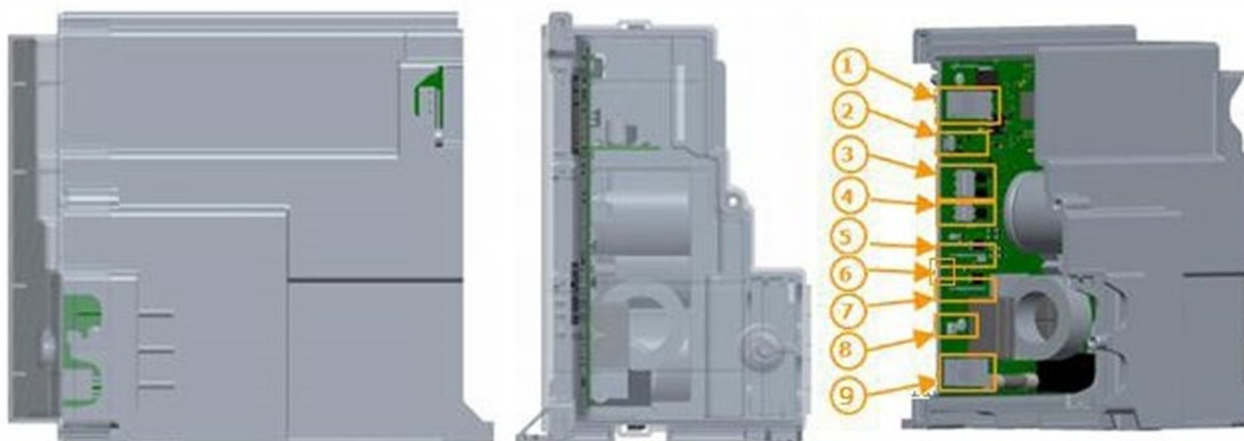


Figure 22 – Inverter connections

| # | Description                                                 |
|---|-------------------------------------------------------------|
| 1 | AC fan Triac / Relay                                        |
| 2 | "You" micro USB 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 22. The Table 9 below describes the failure modes. See section 10.1 for troubleshooting information.

| 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. Refer to Service Parts section of the manual for part numbers.

| Application          | Notes                                                                                                                                                                             |
|----------------------|-----------------------------------------------------------------------------------------------------------------------------------------------------------------------------------|
| Evaporator Fan       | All units have two evaporator fans.                                                                                                                                               |
|                      | All evaporator fans have two-speed EC motors.                                                                                                                                     |
|                      | Evaporator fans run at 1,550 RPM during refrigeration and at 800 RPM during off-cycle.                                                                                            |
| Condenser Fan        | Air-cooled units have 4 or 6 condenser fans.                                                                                                                                      |
|                      | All condensers have three-speed EC motors.                                                                                                                                        |
|                      | On units with two compressors, condenser fans run at 1,350 RPM during refrigeration and turn off during defrost and off-cycle.                                                    |
|                      | On units with four compressors, condenser fans run at 1,800 RPM during refrigeration, run at 400 RPM during defrost (to provide inverter cooling), and turn off during off-cycle. |
| Inverter Cooling Fan | Most units have inverter cooling fans.                                                                                                                                            |
|                      | On water-cooled units, inverter cooling fans operate during refrigeration.                                                                                                        |
|                      | On two compressor, air-cooled units, inverter cooling fans operate during defrost.                                                                                                |
|                      | On four compressor, air-cooled units, inverter cooling is provided by condenser fans.                                                                                             |

**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) When the controller calls for cooling, a signal is sent to the compressor inverters which then activates the compressors, inverter cooling fans, and condenser fans (if provided). On first power-up all the compressors will ramp up to 2355 rpm for a few minutes to ensure proper lubrication 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) The temperature sensor on the evaporator outlet prevents the evaporator fans from turning on until the sensed temperature meets programmed setpoint (default is 35°F for medium temp and 25°F for low temp). Once the pre-defined temperature is achieved, 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 (default is 5 minutes for medium temp and 20 minutes for low temp).
- 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 room temperature set point is met, the controller will turn the compressor OFF and 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.

##### **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 Defrost Synchronization). 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) At the beginning of defrost, the controller initiates a pre-defrost. The pre-defrost has two purposes a) spends up to 5 minutes to cool the room temperature down up to 2°F and b) remove refrigerant from evaporator to avoid excessive liquid returning to compressor when the defrost cycle is initiated. 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, all condenser fan motors will be shut off while the cooling fans for inverters turn ON. For air-cooled versions with four refrigeration circuits, 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 (default is 55°F). It is not recommended to increase this value as it impacts the compressor operating envelope during the defrost cycle.
- o) Once the active defrost has been terminated, the controller will initiate the drip time before starting the normal refrigeration cycle again (default is 5 minutes for medium temperature and 20 minutes for low temperature). During drip time, the pan heaters are turned OFF for medium temperature but kept ON for low temperature units. The evaporator fans are also kept off during the drip time.
- p) After drip time, the controller will initiate a temperature pull down which provides maximum refrigeration for a short time period to bring the room temperature quickly back to setpoint. To prevent circulating warm air in the space, the evaporator fans are kept off until the coil temperature is reduced (default for fans to turn on is +35° F for medium temperature and +25° F for low 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.

Figure 23 and Tables 11 and 12 provide additional information on the Monoblock operating modes and conditions.

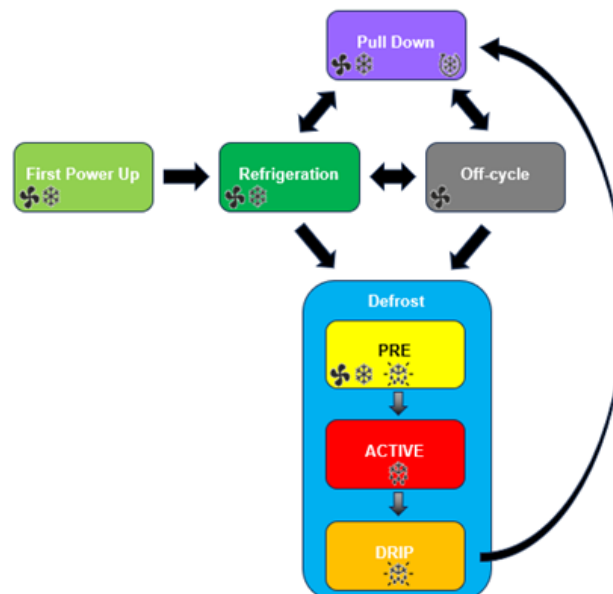


Figure 23 – Monoblock Operating Modes

|                       |                                                                                                                     |
|-----------------------|---------------------------------------------------------------------------------------------------------------------|
| <b>First Power Up</b> | Anytime power mains to the compressor are interrupted, a soft-start will be performed to ensure proper lubrication. |
| <b>Refrigeration</b>  | Refrigeration starts when the box temperature is above setpoint by 2°F (MT) or 3°F (LT).                            |
| <b>Off cycle</b>      | Refrigeration stops when the box temperature is less than or equal to setpoint.                                     |
| <b>Defrost</b>        | Defrost initiation (scheduled, RTC, manual, etc.)                                                                   |
|                       | Pre-defrost lowers setpoint 2°F to cool the box before defrost.                                                     |
|                       | Active defrost circulates hot gas through evaporator coil to defrost the coil.                                      |
|                       | Drip provides time for any condensate to be drained from the unit prior to restarting refrigeration.                |
| <b>Pull Down</b>      | Pull down starts at startup when the box temperature is above setpoint by 4°F (MT) or 5°F (LT).                     |
|                       | Pull down starts after any defrost.                                                                                 |
|                       | Pull down starts any time when the box temperature is above setpoint by 9°F (MT) or 15°F (LT).                      |

Table 11 – Monoblock Operating Modes

|                       | First Power Up   | Refrigeration    | Off cycle | PRE                                  | ACTIVE           | DRIP                             | Pull Down                      |
|-----------------------|------------------|------------------|-----------|--------------------------------------|------------------|----------------------------------|--------------------------------|
| Duration              | 7 min max        | —                | —         | 5 min max                            | 30 min max       | 5 min (MT)<br>20 min (LT)        | 2 hr max (MT)<br>4 hr max (LT) |
| Compressor            | ON               | ON               | OFF       | ON                                   | ON               | OFF                              | ON                             |
| Compressor Speed      | 2355 RPM         | Variable         | 0 RPM     | Variable                             | 5000 RPM         | 0 RPM                            | 5000 RPM                       |
| Hot Gas Solenoid      | Closed           | Closed           | Closed    | Closed                               | Open             | Closed                           | Closed                         |
| Water Solenoid        | Open             | Open             | Open      | Open                                 | Closed           | Open (MT)<br>Closed (LT)         | Open                           |
| Drain Pan Heaters     | OFF              | OFF              | OFF       | OFF                                  | ON               | OFF (MT)<br>ON (LT)              | OFF                            |
| Evap Fans             | ON               | ON               | ON        | ON                                   | OFF              | OFF                              | ON                             |
| Evap Fan Speed        | 1550 RPM         | 1550 RPM         | 800 RPM   | 1550 RPM                             | 0 RPM            | 0 RPM                            | 1550 RPM                       |
| Condenser Fans        | ON               | ON               | OFF       | ON                                   | OFF <sup>1</sup> | OFF                              | ON                             |
| Inverter Cooling Fans | ON               | ON               | OFF       | ON                                   | ON               | OFF                              | ON                             |
| Display               | Box Temp         | Box Temp         | Box Temp  | Box Temp                             | dEF              | Box Temp                         | Box Temp                       |
| Icons                 | Snowflake<br>Fan | Snowflake<br>Fan | Fan       | Snowflake<br>Fan<br>Flashing Defrost | Defrost          | Flashing Defrost<br>Flashing Fan | Snowflake<br>Fan<br>Pull Down  |

<sup>1</sup> For KL4VA only, condenser fans will run at 400 RPM during defrost

Table 12 – Monoblock Operating Conditions

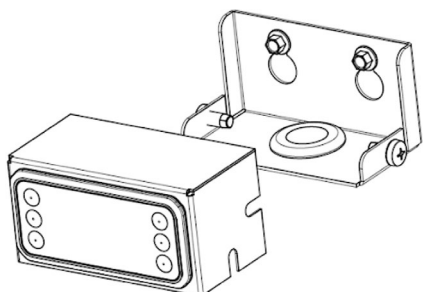
### 3.8.2. Keyboard

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 a supervisor is used. A ~33 foot (10 m) connecting cable is supplied as an accessory. The display is provided inside the electrical box for convenience.

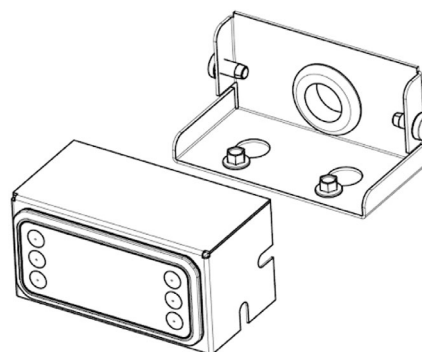
The red wire connects to the + terminal and the black wire connects to the – terminal.

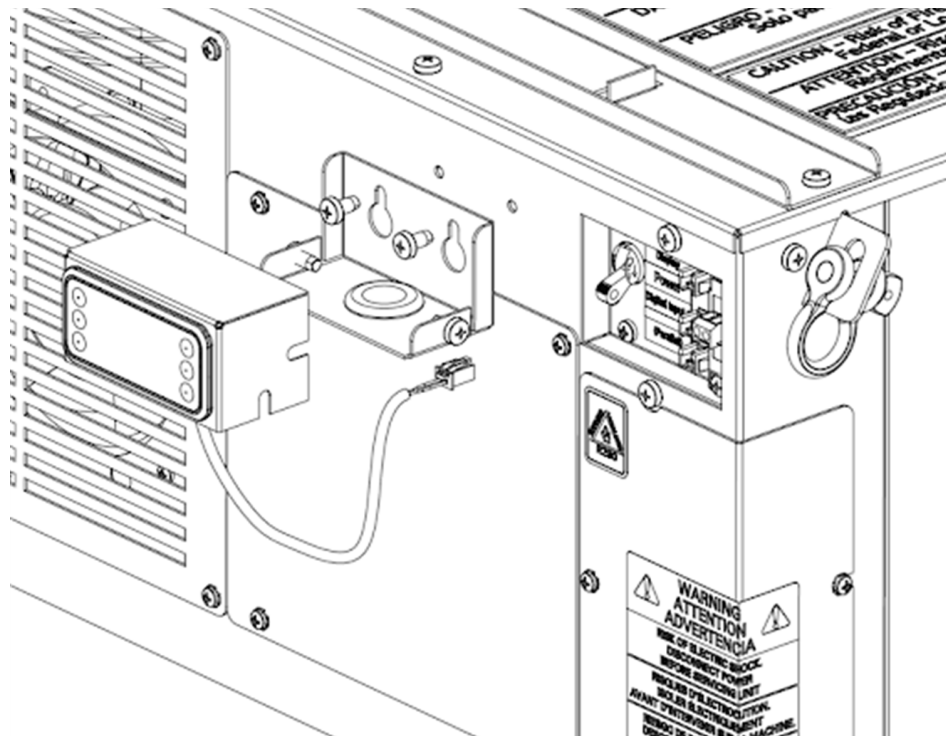
The display box can be mounted horizontally or vertically, and the display can be rotated for top or front viewing. The display can be mounted directly on the Monoblock unit by backing out the indicated screws a couple turns. Or the display can be mounted remotely using field supplied fasteners.

#### Display Mounted on Vertical Surface



#### Display Mounted on Horizontal Surface



**Example Showing Display Mounted on Monoblock****Figure 24 – Display Mounting Box****3.8.2.1. LED Functions**

Each LED function is below in Table 13 with display view example in Figure 25:

| LED                                                                                 | MODE     | Function                                                                           |
|-------------------------------------------------------------------------------------|----------|------------------------------------------------------------------------------------|
|  | ON       | The compressor is running                                                          |
|                                                                                     | FLASHING | - Programming menu<br>- 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<br>- In "Pr2" indicates that the parameter is also present in "Pr1" |
|                                                                                     | ON       | Pull down is running                                                               |
|  | ON       | Energy saving enabled                                                              |
|  | ON       | Light on                                                                           |
| AUX                                                                                 | ON       | Auxiliary output on                                                                |
| C, F                                                                                | ON       | Measurement unit                                                                   |

**Table 13 – LED description****Figure 25 – Display View**

### 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.

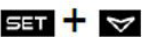
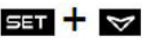
#### 3.8.3.1 How to Enter Parameter Programming Menu “PR1”

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

|                                                                                                  |                                                                                                                                                                                                                 |
|--------------------------------------------------------------------------------------------------|-----------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------|
| <br>(3 seconds) | <ol style="list-style-type: none"> <li>1. Enter the Programming mode by pressing the <b>SET+DOWN</b> key for 3 seconds.</li> <li>2. The display will show the first menu available under “Pr1” level</li> </ol> |
|--------------------------------------------------------------------------------------------------|-----------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------|

#### 3.8.3.2. How to Enter Parameter Programming Menu “PR2”

In the “Pr2” level, there are all the parameters of the instrument.

|                                                                                                  |                                                                                                                                                                                                                                                                                                                                                                         |
|--------------------------------------------------------------------------------------------------|-------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------|
| <br>(3 seconds) | <ol style="list-style-type: none"> <li>1. Enter the Programming mode by pressing both <b>SET+DOWN</b> buttons for 3 sec: the label of the first menu available in Pr1 will be displayed (example: rEG)</li> </ol>                                                                                                                                                       |
| <br>(7 seconds) | <ol style="list-style-type: none"> <li>2. Release the <b>SET+DOWN</b> 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 <b>SET+DOWN</b> buttons, the first parameter menu available will be displayed (example: rEG)</li> </ol> |

#### 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 (menus) to speed up the browsing operations. Table 14 lists the different menus and their 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 14– Parameter Menu

Below is information on the key operating parameters for Monoblock units. For more details and the complete list of parameters, information can be found on the internet for controller: XWi70K. For a complete list of parameter and output ranges, view Table 23 at the end of this document.

### Room Temperature Setpoint

Setpoint (5E5) is the temperature that the unit works to maintain inside the refrigerated room. Probe 1 is the sensor used to measure room temperature.

- Medium Temp Range: +25°F to +50°F
- Low Temp Range: -30°F to +20°F

### Defrost Initiation

Defrost initiation (EdF) can be started via set times and a real time clock (rEc) or via fixed intervals (in). Default is real time clock.

- For real time clock, all parameters in rtC (rEc) menu must be set.
- For fixed intervals, parameter idF (idF) must be set. Default is once every 4 hours.

Parameters in rtC (rEc) menu 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)     |
| Defrost Times | Ld1 to Ld6 (Ld1 to Ld6) | 12:40 pm = 12.4 (12.4)  |

### Defrost Termination

- Probe 2 and Probe 3 are used to terminate defrost on temperature. Default termination temperature (dE5, dE5) is 55°F.
- If defrost is not terminated on temperature, the maximum defrost time (ndF, nd5) is 30 minutes.

### Drip Time

- After defrost the drip (drain) time (FdE) provides interval for defrost condensate to drain out of unit and field drain lines. Default is 5 minutes for medium temp and 20 minutes for low temp.

## Evaporator Fans

- Evap fan operation mode (F<sub>nc</sub>) is continuous operation except turned off during defrost.
- Evap fan operation is controlled by Probe 3.
- Anytime Probe 3 is above fan stop temperature (F<sub>st</sub>), the evaporator fans will turn off. Default is 70° F.
- Anytime Probe 3 falls below fan stop temperature (F<sub>st</sub>) minus differential (H<sub>st</sub>F), the evaporator fans will turn on. Default differential is 35° F for medium temp and 45° F for low temp.
  - For medium temp, fans will turn back on at 70-35 = 35° F.
  - For low temp, fans will turn back on at 70-45 = 25° F.
- After a defrost, evaporator fans will delay (F<sub>nd</sub>) before turning on. Default delay is 5 minutes for medium temp and 20 minutes for low temp. (these times match drip time parameter [F<sub>dt</sub>])

## Condenser Fans

- Condenser fan operation mode (F<sub>cc</sub>) is continuous operation except turned on during defrost.
- Condenser fan operation is controlled by Probe 1.
- Anytime Probe 1 is above fan stop temperature (F<sub>st</sub>) plus differential (H<sub>st</sub>F), the condenser fans will turn on. Default setpoint is 200° F. Default differential is 5° F.
- Anytime Probe 1 falls below fan stop temperature (F<sub>st</sub>), the condenser fans will turn off.

Note: The condenser fan parameters have been co-opted to control elements of defrost operation and are not specifically being used to control condenser fans. With default settings, the "condenser fans" will only turn on during defrost because Probe 1 should never get above 205° F.

## Output Control

- **oA1** is configured as either a defrost control (d<sub>EF</sub>) or as a condenser fan control (c<sub>nd</sub>). In either case, the oA1 relay contacts will close when a defrost is initiated. [See F<sub>cc</sub> information in Condenser Fan section.]
- **oA2** is configured on all units as an evap fan control (F<sub>rn</sub>). The oA2 relay contacts will open when a defrost is initiated. [See F<sub>nc</sub> information in Evap Fan section.]
- **oA3** is configured on all units as an inverter output (i<sub>nl</sub>). The oA3 relay contacts will be closed anytime the compressor is running.
- **oA4** is configured as either a defrost control (d<sub>F2</sub>) or as a condenser fan control (c<sub>nd</sub>). In either case, the oA4 relay contacts will close when a defrost is initiated. [See F<sub>cc</sub> information in Condenser Fan section.]
- **oA5** is configured as a condenser fan control (c<sub>nd</sub>). The oA5 normally open (NO) contacts will be closed when a defrost is initiated. The oA5 normally closed (NC) contacts will be open when a defrost is initiated. [See F<sub>cc</sub> information in Condenser Fan section.]

## Digital Inputs

- Digital Input 1 (i<sub>1</sub>F) is configured as an external pressure alarm (P<sub>RL</sub>) when it detects an external event (via thermal cutouts).
- The Digital Input 1 delay (d<sub>1d</sub>) delays activation of the PAL alarm. The default is 120 minutes on water-cooled units and 60 minutes on air-cooled units.
- The number of allowed pressure switch events (n<sub>P5</sub>) limits the number of events allowed prior to stopping all regulation and locking out operation until a manual power cycle is performed. Default is 3 times for water-cooled and 2 times for air-cooled.
- Digital Input 2 (i<sub>2</sub>F) is configured as a door switch function (d<sub>or</sub>) when it detects an external even (via remote door switch).
- The Digital Input 2 delay (d<sub>2d</sub>) delays activation of the d<sub>or</sub> alarm. The default is 10 minutes on medium temp and 3 minutes on low temp.
- The door open fan control (o<sub>dc</sub>) controls behavior immediately when a door event is detected.
  - For medium temp, no changes are made (no), evap fan and compressors operate normally.
  - For low temp, compressor and evap fans are turned off (F<sub>-c</sub>).
- The regulation restart (r<sub>-d</sub>) is configured to prevent normal regulation from re-starting until the dA alarm has been addressed.
- While the door is open, the high and low temperature alarms are disabled.

### 3.8.4. Alarms

A list of main alarms is presented in Table 15:

| 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 15— Alarm List**

### Room Temperature Alarms

- Probe 1 is used to monitor/trigger room temperature related alarms.
- The high temperature alarm is triggered if the measured temperature is more than the upper threshold (RLU) value above setpoint (SE). Default is 10° F. When triggered, display shows HR. Alarm automatically resets when temperature returns to normal values.
- The low temperature alarm is triggered if the measured temperature is less than the lower threshold (RL) value below setpoint (SE). Default is 10° F. When triggered, display shows LR. Alarm automatically resets when temperature returns to normal values.
- The alarm is not triggered until the alarm threshold has been present for a time exceeding the alarm delay (RLd). The default is 30 minutes.
- When a door switch is used, there is an additional alarm delay (dA) if the door is open. Default is 10 minutes for med temp and 0 minutes for low temp.
- During startup/initial pull-down, the temperature alarm is ignored during the temperature alarm delay (dR). Default is 2 hours for medium temp and 5 hours for low temp.

### System Alarms

- P1 (P1): If the controller detects a Probe 1 failure, regulation will cycle on/off on fixed time intervals. Default is 30 minutes on (CON) and 10 minutes off (COF). P1 will be displayed. Alarm automatically resets 10 seconds after probe returns to normal operation.
- P2 (P2): If the controller detects a Probe 2 failure, P2 will be displayed. Alarm automatically resets 10 seconds after probe returns to normal operation.
- P3 (P3): If the controller detects a Probe 3 failure, P3 will be displayed. Alarm automatically resets 10 seconds after probe returns to normal operation.
- dA (dA): If the controller detects the door open too long, dA will be displayed. See Digital Input 2 for additional information.
- PAL (PAL): If the controller detects a pressure alarm, PAL will be displayed. See Digital Input 1 for additional information. All outputs will be turned off until a manual power cycle is performed to reset PAL alarm.
- EE (EE): If the controller detects a data or memory failure, EE will be displayed.
- noL (noL): If the controller loses communication with keyboard, noL will be displayed.
- EC1 (EC1): If the controller experiences a communication error with an inverter, EC1 is displayed. Regulation is stopped, see Troubleshooting section.

Note: Any alarm buzzer can be silenced by pressing any key.

### 3.8.4.1. 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 “iIF” is configured as “PARL” (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 “nPL” (by default is 3) and the delay is defined by the parameter “d id” (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 “d id” parameter, the digital input 1 has reached the number of activations of the “nPL” parameter, the “PARL” 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 ECL alarm will be activated during the time the pressure switch is opened.

The thermal cut-off opens at 131°F and closes at 111°F. The high pressure control opens at 400 psig and closes at 300 psig.

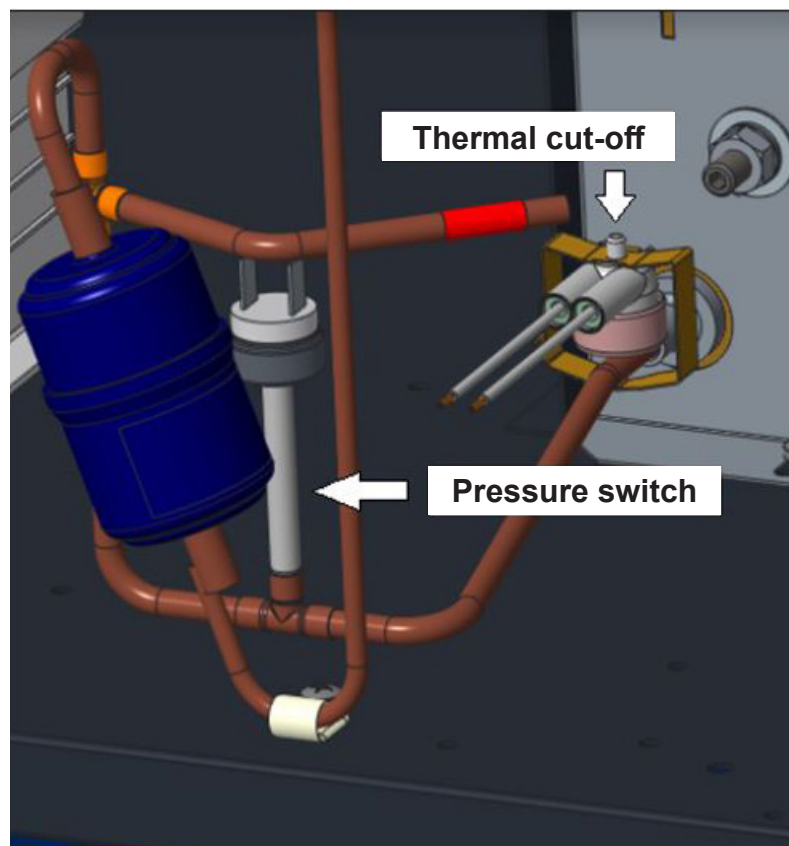


Figure 26 – High pressure switch and thermal cut-off position

### 3.8.5. Interfaces

Table 16 presents a summary of input and output instrumentation in the Dixell XWi70K controller (Figure 27).

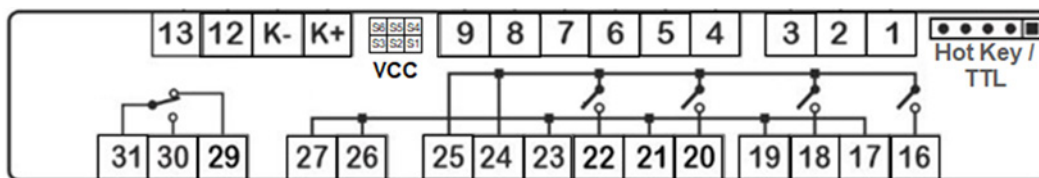


Figure 27 – Dixell XWi70K interface

| XWi70K Terminals | KM2VW, KL2VW families                                        | KM2VA, KL2VA families                                        | KL4VW, KL4VA families                                                          |
|------------------|--------------------------------------------------------------|--------------------------------------------------------------|--------------------------------------------------------------------------------|
| 1-2              | Room temperature sensor                                      | Room temperature sensor                                      | Room temperature sensor                                                        |
| 3-2              | Defrost sensor circuit #2                                    | Defrost sensor circuit #2                                    | Defrost sensor circuit #2 and #4                                               |
| 4-5              | Defrost sensor circuit #1                                    | Defrost sensor circuit #1                                    | Defrost sensor circuit #1 and #3                                               |
| 7-8              | Digital input for high pressure / thermal cutout             | Digital input for high pressure / thermal cutout             | Digital input for high pressure / thermal cutout                               |
| 9-8              | Digital input for door switch or defrost synchronization     | Digital input for door switch or defrost synchronization     | Digital input for door switch or defrost synchronization                       |
| VCC Serial       | Inverter #1 and #2                                           | Inverter #1 and #2                                           | Inverter #1 & #3 and Inverter #2 & #4                                          |
| K-/K+            | Remote Display / User Terminal                               | Remote Display / User Terminal                               | Remote Display / User Terminal                                                 |
| 16               | Evaporator fan (Closed=On / Open=Off)                        | Evaporator fan (Closed=On / Open=Off)                        | Evaporator fan (Closed=On / Open=Off)                                          |
| 18               | Evaporator fan motor speed (Closed=1550 rpm / Open=800 rpm)  | Evaporator fan motor speed (Closed=1550 rpm / Open=800 rpm)  | Evaporator fan motor speed (Closed=1550 rpm / Open=800 rpm)                    |
| 20               | Defrost for circuit #1 (Closed=Defrost / Open=Refrigeration) | Defrost for circuit #1 (Closed=Defrost / Open=Refrigeration) | Defrost for circuit #1 and #3 (Closed=Defrost / Open=Refrigeration)            |
| 22               | Defrost for circuit #2 (Closed=Defrost / Open=Refrigeration) | Defrost for circuit #2 (Closed=Defrost / Open=Refrigeration) | Defrost for circuit #2 and #4 (Closed=Defrost / Open=Refrigeration)            |
| 25               | Power supply 230V/50-60Hz (L)                                | Power supply 230V/50-60Hz (L)                                | Power supply 230V/50-60Hz (L)                                                  |
| 26               | Power supply 230V/50-60Hz (N)                                | Power supply 230V/50-60Hz (N)                                | Power supply 230V/50-60Hz (N)                                                  |
| 24-31            | Power Jumper                                                 | —                                                            | Power Jumper                                                                   |
| 27-31            | —                                                            | Power Jumper                                                 | —                                                                              |
| 29               | —                                                            | Condenser fan (Closed=1350 rpm / Open=Off)                   | Condenser fan (Closed=1800 rpm / Open=400 rpm)                                 |
| 30               | Water solenoid valve (Closed=Defrost / Open=Refrigeration)   | —                                                            | Water solenoid valve & drain pan heaters (Closed=Defrost / Open=Refrigeration) |
| Hot Key / TTL    | TTL to RS485 Converter (Modbus)                              | TTL to RS485 Converter (Modbus)                              | TTL to RS485 Converter (Modbus)                                                |

Table 16 – IO List

### 3.8.6. Door Switch

The door switch can be connected in the digital input 2. Two parallel JST XMR-02V receptacles are available for convenience (Figure 28). Use a dry contact (I/O) from the door switch as a signal in the first unit and then interconnect 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 connections below (Figure 29).

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.

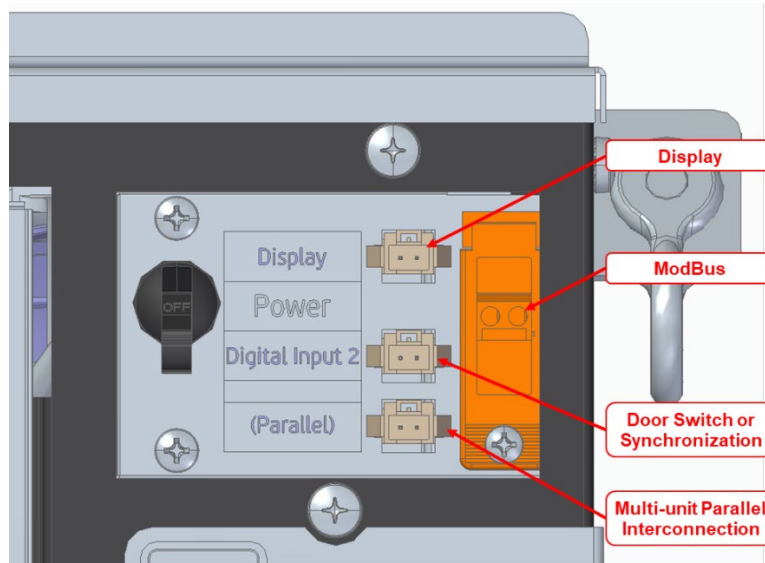


Figure 28 – Parallel Connection for door switch  
(Also used for defrost synchronization if configured)

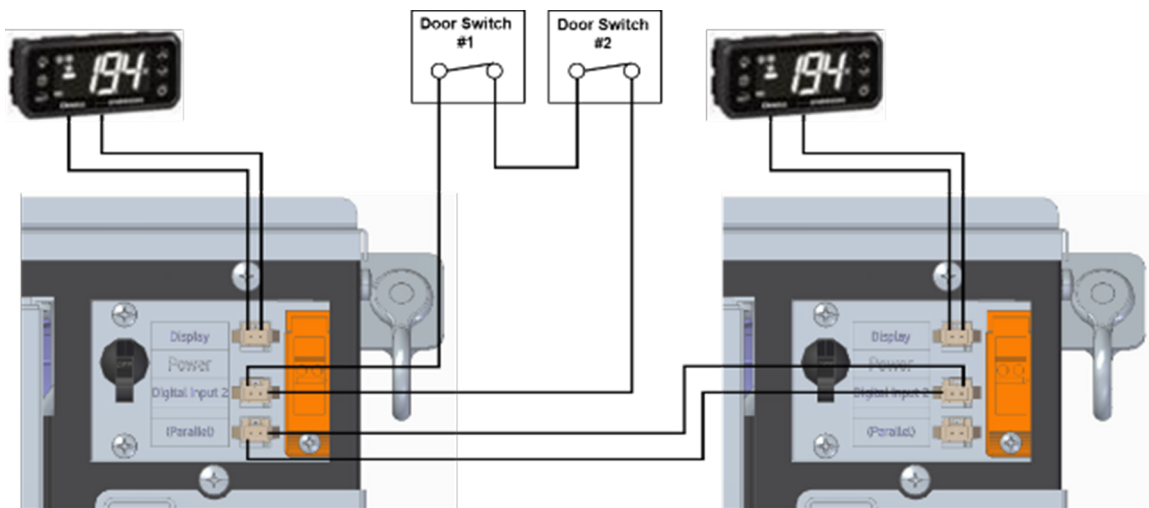


Figure 29 - Door Switch Series Connection

### 3.8.7. 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 (10 m) connecting cable supplied as an accessory, which allows connecting the units as required. Some options below:

### 3.8.7.1. Assembling with Supervisor

The defrost cycles can be synchronized by a supervisor. In this case, supervisor instructions must be followed to configure the defrost starts (by internal real time clock). See Figure 30.

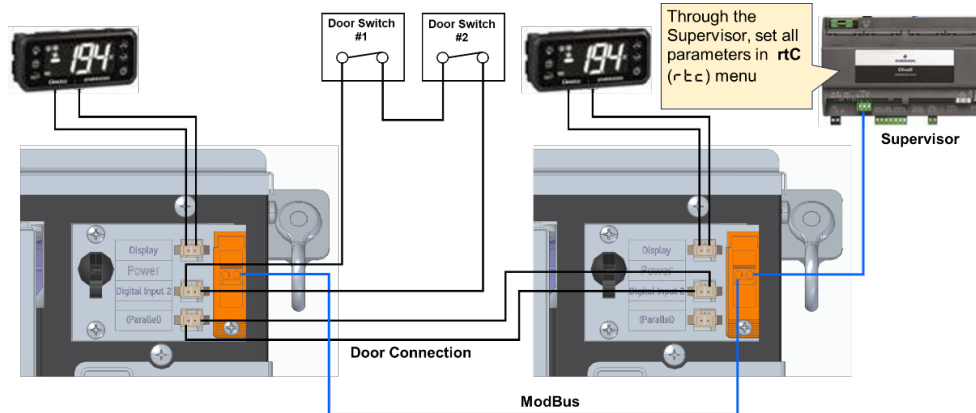


Figure 30 – Defrost Synchronization by Server and Controllers

### 3.8.7.2. 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 31 below.

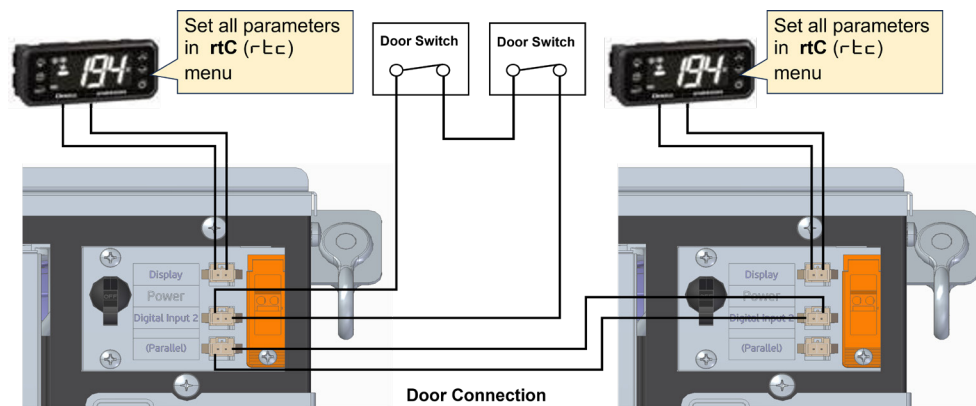


Figure 31 – Defrost Synchronization by RTC for each Controller

### 3.8.7.3. 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 “iDP.” The door switch alarm will be disabled (see Figure 32 below).

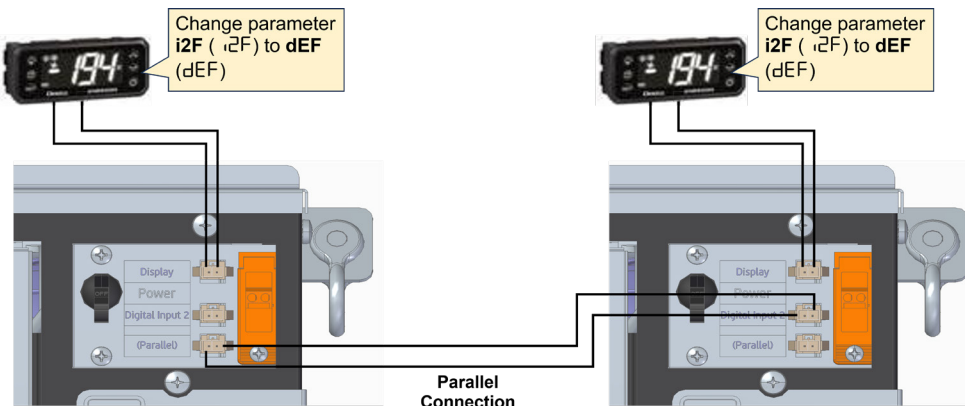


Figure 32 – Defrost Synchronization by DI2 for each Controller

**3.8.7.4. Server**

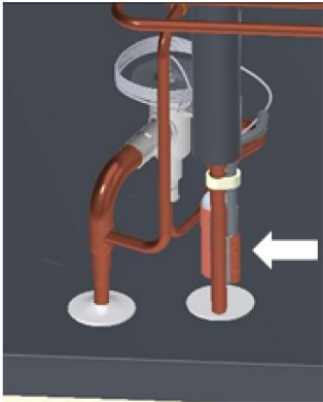
The server / supervisor system must be connected in the XJ485CX converter terminal (from TTL to RS485). Converter XJ485CX is already supplied with the Krack Monoblock systems.

Emerson E2, E3, and Dixell XWEB 500E models are compatible and require only the Modbus connections. A ~33 foot (10 m) 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.

**3.9. Temperature Sensors**

The unit is equipped with three temperature sensors type NTC 10k $\Omega$  (@ 25° C). Each sensor location and functionality is explained in Table 17 below. In case of servicing or replacing probes, keep the correct positioning. Older units have sensor that is wired back to controller. Newer units have sensor with plug connector near the sensing bulb to make servicing easier.

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

**Table 17 – Temperature Probes Positioning**

### 3.9.1. Sensor Resistance Curve

The resistance chart below can be used to evaluate a sensor to determine if it is reading values correctly.

| Resistance<br>(ohms) | Temp (°F) | Temp (°C) |
|----------------------|-----------|-----------|
| 188500               | -40       | -40       |
| 144100               | -31       | -35       |
| 111300               | -22       | -30       |
| 86430                | -13       | -25       |
| 67770                | -4        | -20       |
| 53410                | 5         | -15       |
| 42470                | 14        | -10       |
| 33900                | 23        | -5        |
| 27280                | 32        | 0         |
| 22050                | 41        | 5         |
| 17960                | 50        | 10        |
| 14690                | 59        | 15        |
| 12090                | 68        | 20        |
| 10000                | 77        | 25        |
| 8313                 | 86        | 30        |
| 6940                 | 95        | 35        |
| 5827                 | 104       | 40        |
| 4911                 | 113       | 45        |
| 4160                 | 122       | 50        |
| 3536                 | 131       | 55        |
| 3020                 | 140       | 60        |

**Table 18 – Temperature Probes Positioning**

### 3.9.2. Defrost Sensors

Monoblock defrost sensors are located on insulated suction lines in unrefrigerated space. During off-cycle, the defrost sensors can experience temperatures approaching ambient and will be warmer than room temperature. During refrigeration, the defrost sensors experience suction line temperatures and will be colder than room temperature. During defrost, the defrost sensors will approach defrost termination temperature. These temperature changes are normal.

### 3.10. 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** (r t c) menu must be programmed. Key parameters to program are:

| Description  | Parameter          | Value                   |
|--------------|--------------------|-------------------------|
| Hours        | <b>Hur</b> (hur )  | 0 to 23 (0 to 23)       |
| Minutes      | <b>Min</b> (m in ) | 0 to 59 (0 to 59)       |
| Day of Week  | <b>dAY</b> (dAY)   | Sun to Sat (Sun to Sat) |
| Day of Month | <b>dYM</b> (dYM)   | 1 to 31 (1 to 31)       |
| Month        | <b>Mon</b> (Mon)   | 1 to 12 (1 to 12)       |
| Year         | <b>Yar</b> (Yar )  | 00 to 99 (00 to 99)     |

If it is desired for defrost events to always happen at 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: +28° F to +34° 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:

- 1) Push the **SET** key for 3 seconds; the display will flash the current setpoint value.
- 2) Push the **UP** or **DOWN** arrows within 10 seconds until the desired value is shown.
- 3) To save the new setpoint value, push 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.

### **3.10.1. 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.

Note: if multiple units are setup with synchronized defrost, the manual defrost of one unit will cause all units to start defrosting.

#### Protective Plastic Film

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

#### Foot Removal

ONLY new style feet can be removed at this point (see 3.2.2).  
DO NOT REMOVE OLD STYLE FEET FROM UNIT.

Remove the protective plastic film when installation is complete



Figure 33 – Protective plastic film

### 3.11. Drain Pan Heaters

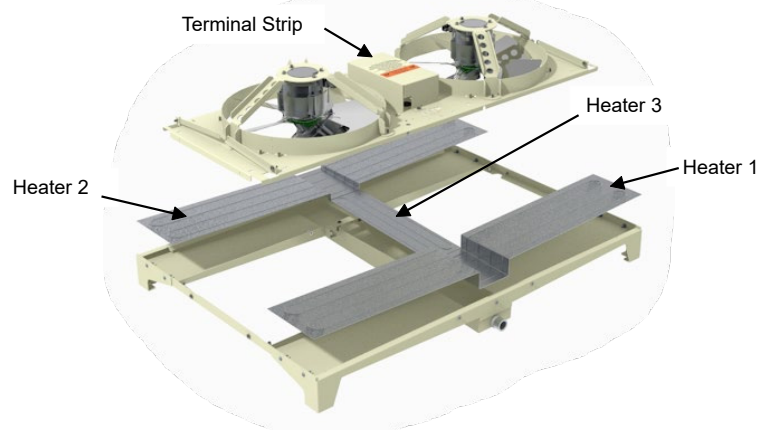
Monoblock units have two or three drain pan heaters. Medium temperature units for walk-in coolers have two heaters and low temperature units for walk-in freezers have three heaters. Heater information is given in the following table.

|          | Walk-in Cooler |         |               | Walk-in Freezer |         |               |
|----------|----------------|---------|---------------|-----------------|---------|---------------|
|          | Power          | Current | Resistance    | Power           | Current | Resistance    |
| Heater 1 | 50 W           | 0.23 A  | 1080 $\Omega$ | 98 W            | 0.43 A  | 540 $\Omega$  |
| Heater 2 | 50 W           | 0.23 A  | 1080 $\Omega$ | 98 W            | 0.43 A  | 540 $\Omega$  |
| Heater 3 | —              | —       | —             | 50 W            | 0.21 A  | 1080 $\Omega$ |

Note: Power and current values at 230V

**Table 19 – Drain pan heaters power consumption**

When replacing heaters, after removal of old heater, drain pan surface must be clean, dry, and above 50° F to ensure proper adhesion. Heaters should be flat in the pan to allow proper drainage and should not block drain fitting. Heaters are wired to a terminal strip that is found in the drain pan area of the unit. See image below.



**Figure 34 – Drain pan heaters location**

### 3.12. Special Applications

There are some special applications that may require different control schemes than the default configurations. These changes should only be applied if the user fully understands the changes and feels the default configurations are not suitable for the application.

#### 3.12.1. Off-Cycle Time Defrost

The standard defrost configuration is hot gas defrost. If off-cycle, time defrost (air defrost) is desired, the following control parameters must be changed. These changes should only be made on Medium Temperature units as off-cycle defrost will not work on Low Temperature units.

| Menu | Description            | Parameter   | Level | New Value   |
|------|------------------------|-------------|-------|-------------|
| dEF  | Defrost Type           | tdF (t dF)  | Pr1   | EL (ĒL)     |
| dEF  | Probe for Defrost 1    | dFP (dFP)   | Pr1   | nP (nP)     |
| dEF  | Probe for Defrost 2    | dSP (dSP)   | Pr2   | nP (nP)     |
| dEF  | Defrost 1 Length (min) | MdF (M dF)  | Pr1   | 45 (45)*    |
| dEF  | Defrost 2 Length (min) | MdS (M dS)  | Pr2   | 45 (45)*    |
| dEF  | Drain Time (min)       | Fdt (F d t) | Pr1   | 0 (0)       |
| FAn  | Evap Fan Mode          | Fnc (F n c) | Pr1   | O_y (O _ y) |
| oUt  | Relay Output           | oA3 (o A 3) | Pr2   | FAn (F A n) |

\* 45 minutes is a suggested value but can be changed to meet application needs.

### 3.12.2. Medium Operation Below Freezing

The standard configuration for Medium Temperature units turns the drain pan heaters off during the Drain Time. If a unit is operated below freezing, it may be necessary to keep the drain pan heaters on during the Drain Time to provide additional heat to clear the drain pan before refrigeration starts.

| Menu | Description          | Parameter  | Level | New Value |
|------|----------------------|------------|-------|-----------|
| dEF  | Drain Time (min)     | Fdt (F dŁ) | Pr1   | 15 (15)*  |
| FAn  | Evap Fan Delay (min) | Fnd (F nd) | Pr1   | 15 (15)*  |
| oUt  | Relay Output         | oA1 (oA 1) | Pr2   | cnd (cnd) |
| oUt  | Relay Output         | oA4 (oA 4) | Pr2   | cnd (cnd) |

\*15 minutes is a suggested value, but can be changed to meet application needs.

### 3.12.3. Temperature Units in Celsius

The standard configuration for all units uses the Fahrenheit temperature scale. The controller can be modified to use the Celsius temperature scale. To convert from °F to °C, twenty-one parameters must be changed. If all parameters are not changed correctly, system will not operate correctly. The parameters must be changed in order from top to bottom as detailed in the table below.

| Menu | Description                       | Parameter | Level | Cooler | Freezer |
|------|-----------------------------------|-----------|-------|--------|---------|
| diS  | Temperature units                 | cF        | Pr1   | °C     | °C      |
| rEG  | Minimum Set Point                 | LS        | Pr1   | -3.9   | -34.4   |
| rEG  | Maximum Set Point                 | US        | Pr1   | 10     | -6.7    |
| rEG  | Differential                      | Hy        | Pr1   | 1.7    | 1.1     |
| rEG  | Proportional band                 | Hy1       | Pr1   | 0.6    | 1.7     |
| rEG  | Pull Down differential            | ccS       | Pr1   | 2.8    | 1.1     |
| rEG  | Automatic Pull Down Differential  | oHt       | Pr1   | 2.8    | 5.6     |
| dEF  | Defrost termination temperature 1 | dtE       | Pr1   | 12.8   | 12.8    |
| dEF  | Defrost termination temperature 2 | dtS       | Pr2   | 12.8   | 12.8    |
| FAn  | Evaporator fan stop temperature   | FSt       | Pr1   | 21.1   | 21.1    |
| FAn  | Evaporator fan differential 1     | HyF       | Pr1   | 19.4   | 25      |
| FAn  | Condenser fan OFF temperature     | St2       | Pr2   | 93.3   | 93.3    |
| FAn  | Evaporator fan differential 2     | Hy2       | Pr2   | 2.8    | 2.8     |
| ALr  | High temperature alarm            | ALU       | Pr1   | 5.6    | 5.6     |
| ALr  | Low temperature alarm             | ALL       | Pr1   | 5.6    | 5.6     |
| ALr  | Temperature alarm differential    | AFH       | Pr1   | 1.1    | 1.1     |
| ALr  | Second low temperature alarm      | AL2       | Pr2   | -28.9  | -40     |
| ALr  | Second high temperature alarm     | AU2       | Pr2   | 149    | 149     |
| ALr  | Second temperature alarm          | AH2       | Pr2   | 2.8    | 2.8     |
| ALr  | Anti-freezing differential        | SAF       | Pr1   | 3.3    | 3.3     |
| rEG  | Room Temperature Setpoint         | SEt       | —     | 1.7    | -20.5   |

#### 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 35).



Figure 35 – 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**

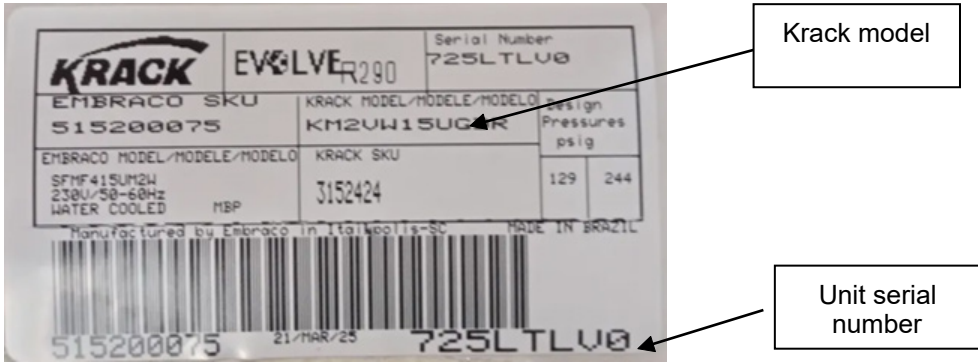
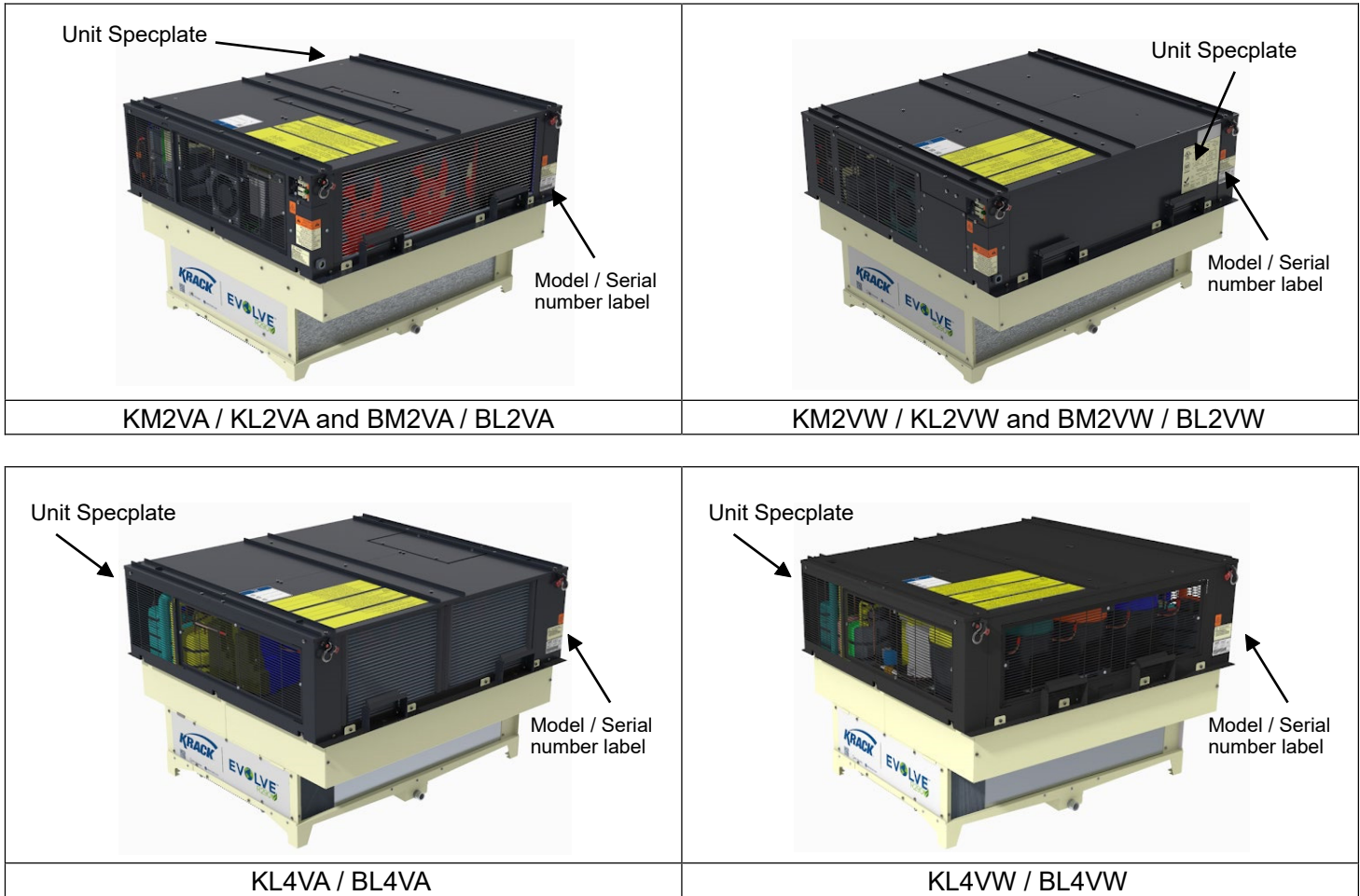
- Electrical equipment can generate sparks in normal operation and may become a source of ignition if refrigerant leakage occurs

This product must be protected against weathering. Follow the fastener and connection torque specifications in Table 20.

| Position                                           | Screw diameter | Torque (in-lb) |
|----------------------------------------------------|----------------|----------------|
| Water side condenser connections, balancing valves | 3/4"-14NPT     | 1015 maximum   |
| Field water connections (hose, fitting, strainer)  | 3/4"-14NPT     | 350 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 20 – Torque Specifications**

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



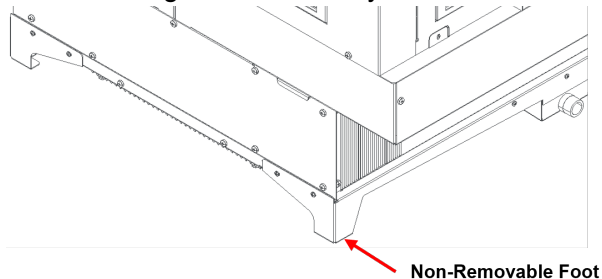
**Figure 36 – Specplate label and serial number positioning**

#### 4.1. Drain Pan Service

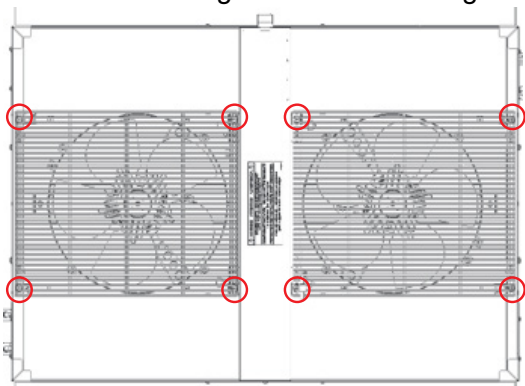
The drain pan contains drain pan heaters, evaporator fan motors, temperature sensor, and a terminal strip for wiring. The drain pan can be lowered for easy service of these components. The drain pan stays connected to the unit by means of support rods.

##### Older Design

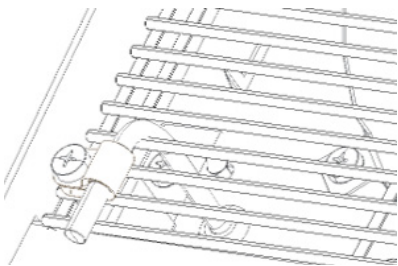
1. Older design is identified by non-removable foot and no side pan fastener.



2. Remove the eight fasteners holding fan grilles.

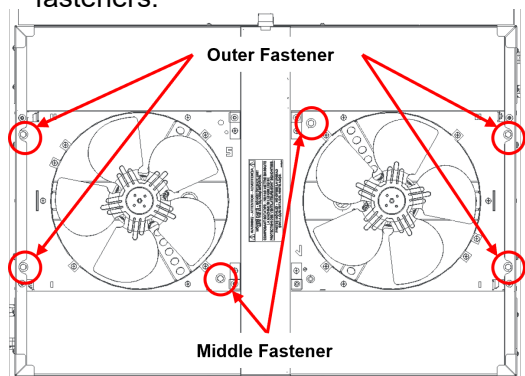


3. Carefully remove temperature sensor and feed through grille. Note the location/orientation of sensor prior to removal.



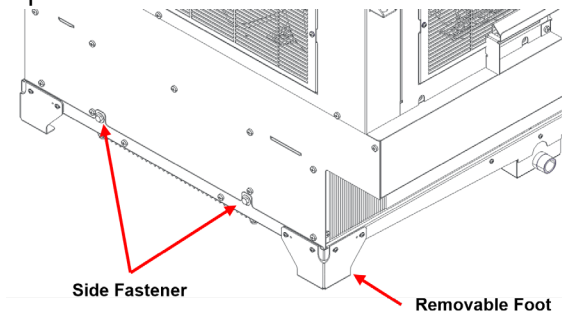
4. Remove the six fasteners holding drain pan. Remove four outer fasteners first and middle two fasteners last.

Note: Earlier production units use metric fasteners, while later production units use SAE fasteners.

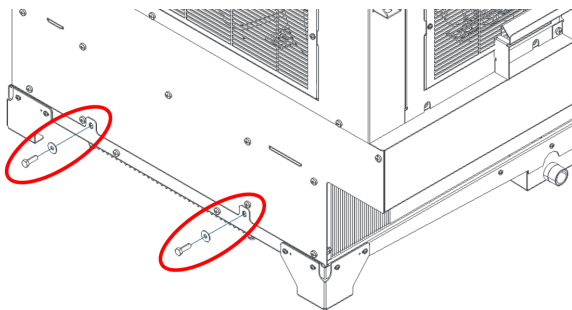


Newer Design

1. Newer design is identified by removable foot and side pan fasteners.

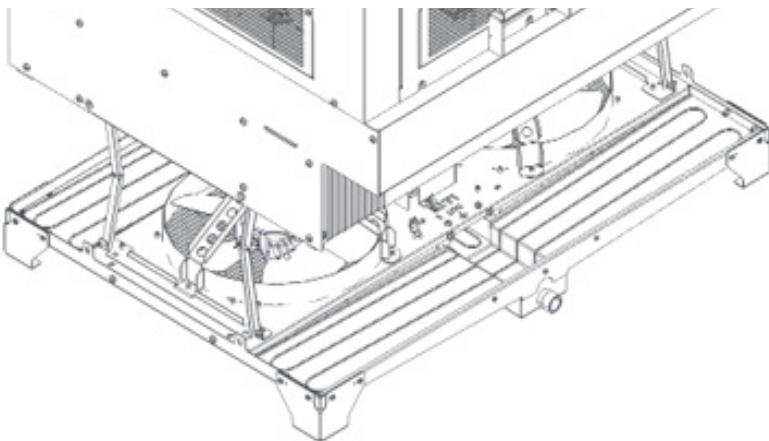


2. Remove the four fasteners holding the drain pan. Two fasteners on each side.



Both Designs

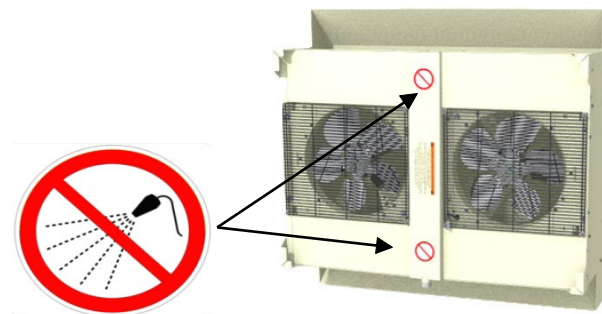
After the above steps, gently lower the drain pan until support arms are fully extended. This allows access to the drain pan heaters, fan blades, motors, and wiring terminal strip.



## 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.



**Figure 37 – 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.
- Strictly 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.

- Strictly follow the work instructions:
- 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.

**⚠ WARNING**

**RISK OF FIRE AND EXPLOSION**

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

- 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.

## 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                                                      | Check electrical wiring impedance. Evaluate the need to correct voltage via stabilizer.                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                            |
|                          | Wrong or damaged electrical connection                           | Check electrical connections and replace damaged components.                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                       |
|                          | Fault or flow reduction in water supply (water-cooled versions)  | Check water loop system to ensure proper water flow to system condensers.                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                          |
| EC1 Alarm                | Inverter loses power                                             | Check power supply to inverter.                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                    |
|                          | Inverter loses communication with controller (VSC alarm)         | Check communication cable between controller and inverter                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                          |
|                          | Inverter failure                                                 | Check inverter LED status light (see inverter troubleshooting flowchart).                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                          |
|                          | Thermal cutout open (PAL alarm)                                  | Condensing circuit temperature or pressure is too high.                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                            |
|                          | High pressure switch open                                        | Ensure coils are clean and not blocked (air cooled versions).<br>Ensure condenser fans are operating correctly (air cooled versions).<br>Ensure water loop is operating and not piped backward (water cooled versions).<br>Ensure water temperature is not too high (water cooled versions).<br>After addressing issue, cycle power to reset alarm.                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                |
|                          | Solid state relay failure                                        | Replace solid state relay.                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                         |
| Abnormal Noise           | Presence of loose elements inside unit                           | Check installation site. Fix and dispose of any loose parts.                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                       |
|                          | Motor bearing failure                                            | Replace fan motor.                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                 |
|                          | Fan blade in contact with external elements (e.g. frost buildup) | Remove obstructing item and replace fan blade if necessary.                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                        |
| Insufficient Cooling     | Dirty and blocked heat exchangers                                | Clean coils to remove dirt or particles.                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                           |
|                          | Fault or flow reduction in water supply (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.<br>Check defrost synchronization connections to avoid communication errors between controllers or supervisors (all units in same walk-in must start defrost cycle at same time).<br>Check probe fault (wire connections, component failure, bad fixation).<br>-Probe 1 failure will prevent condenser fan from turning off.<br>-Probe 2/3 failure will prevent proper defrost termination on temperature.<br>Check drain line is not clogged and ensure drain line is properly trapped.<br>Check proper operation of the water inlet solenoid valve (valve must close during defrost cycle).<br>Check proper operation of condenser fan motors during defrost (turn off or go to minimum speed).<br>Check proper operation of drain pan heaters.<br>Check proper operation of door switch function.<br>Check humidity of air outside walk-in. |
|                          |                                                                  |                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                    |
| External condensation    | High ambient air humidity                                        | 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.<br>Use the door switch functionality.<br>Increase the number of defrosts.<br>Increase the drip time parameter.<br>Make sure the unit is level.<br>Make sure the drain line is properly pitched, trapped, and heated.                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                 |

Table 22 – Troubleshooting

## 10.1 Inverter Troubleshooting

If compressor is not operating, the inverter troubleshooting flowchart should be used. The behavior of the LED on the inverter is used to investigate potential issues.

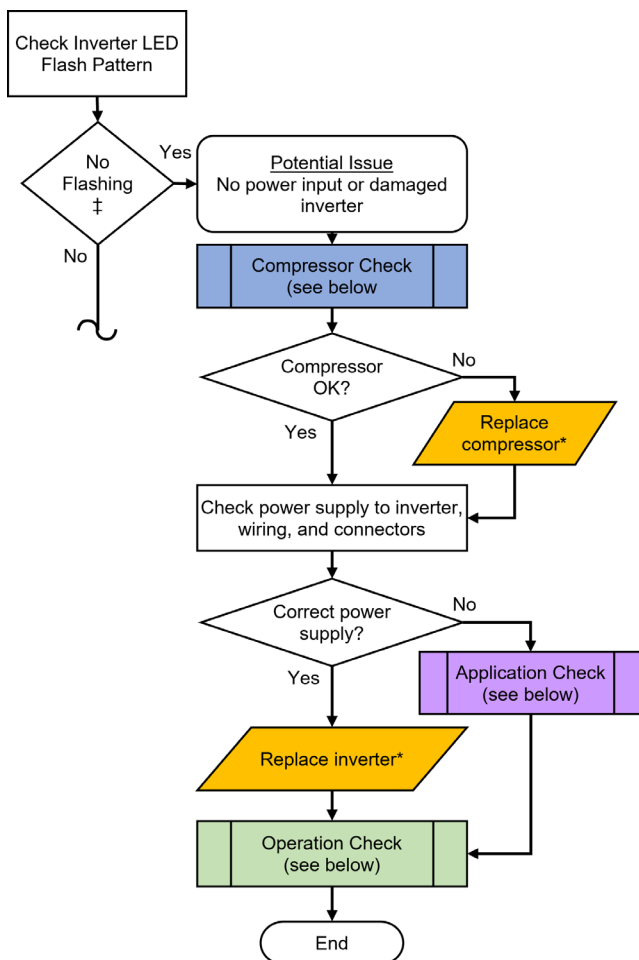
Note: Only qualified personnel can carry out the recommendations below.

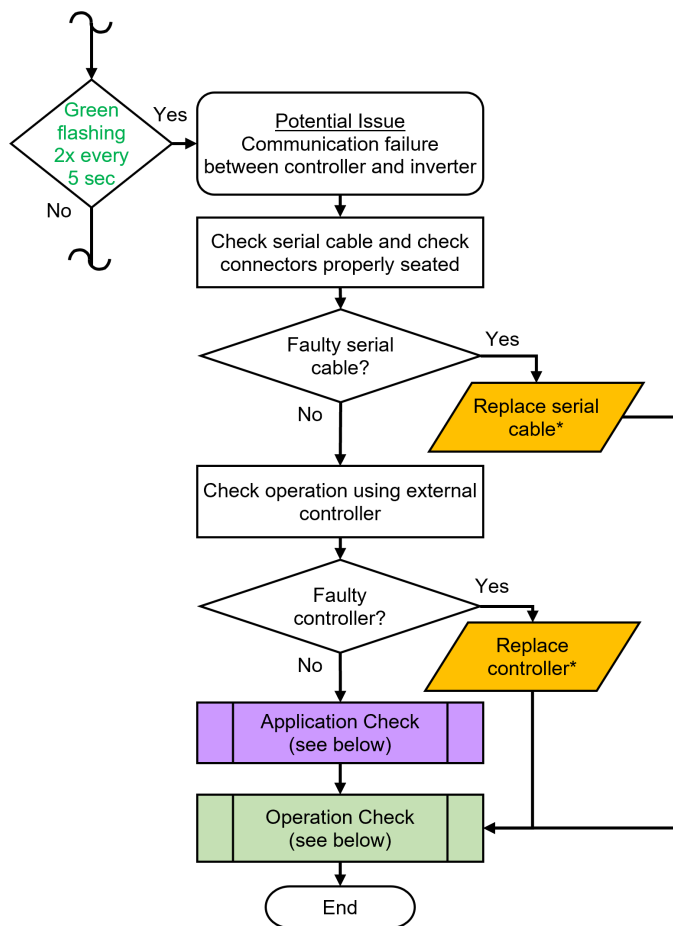
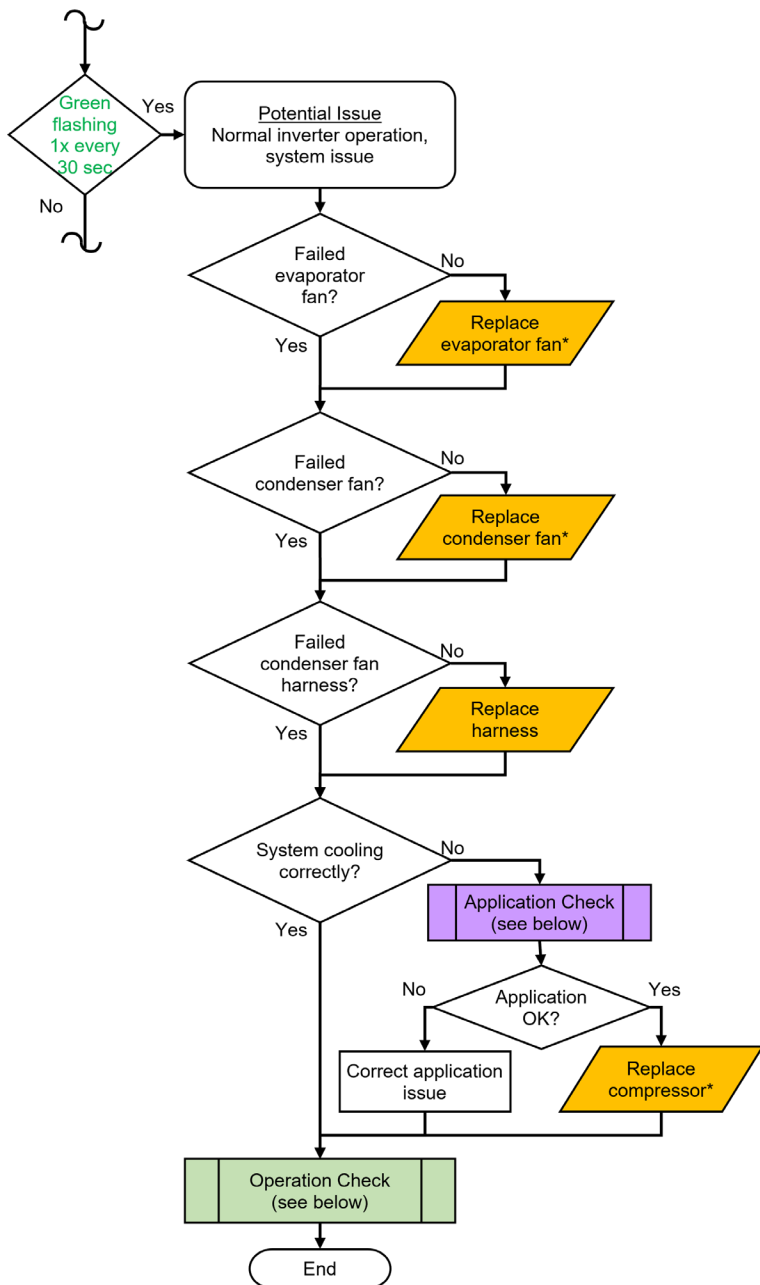
For the diagrams in this section, the following apply:

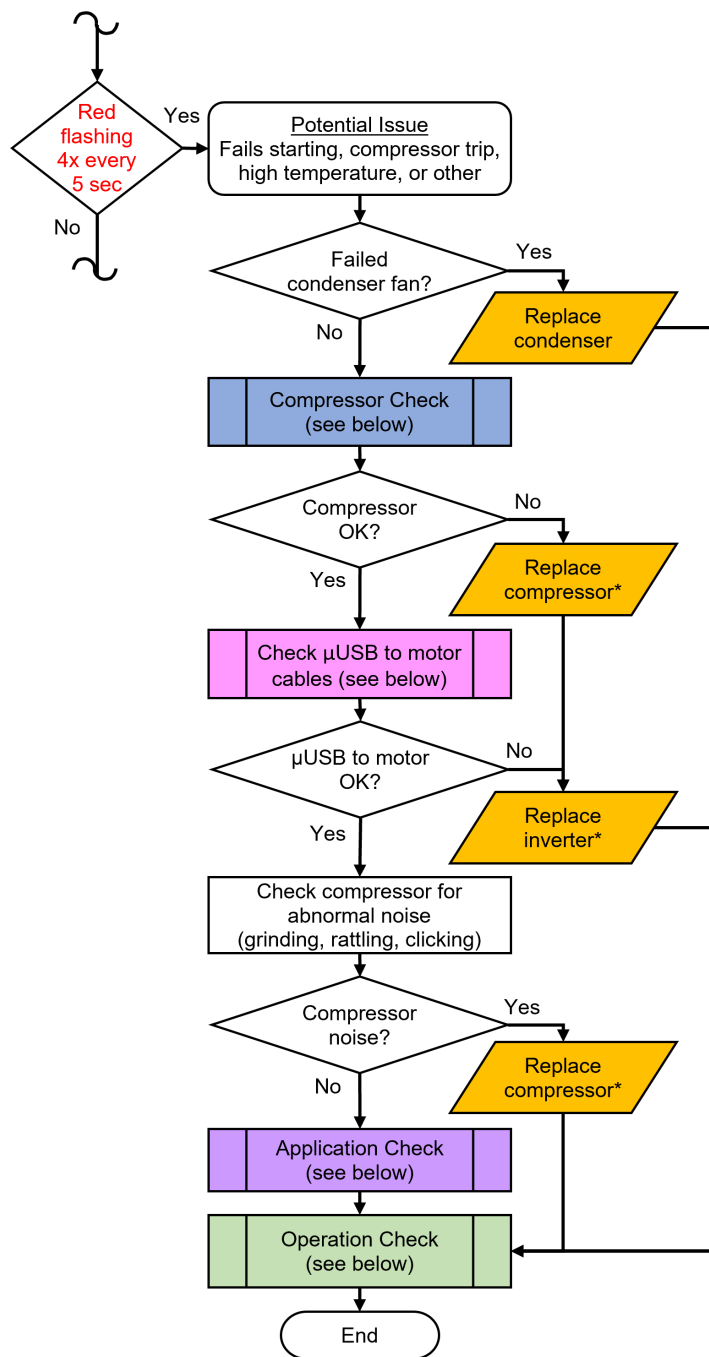
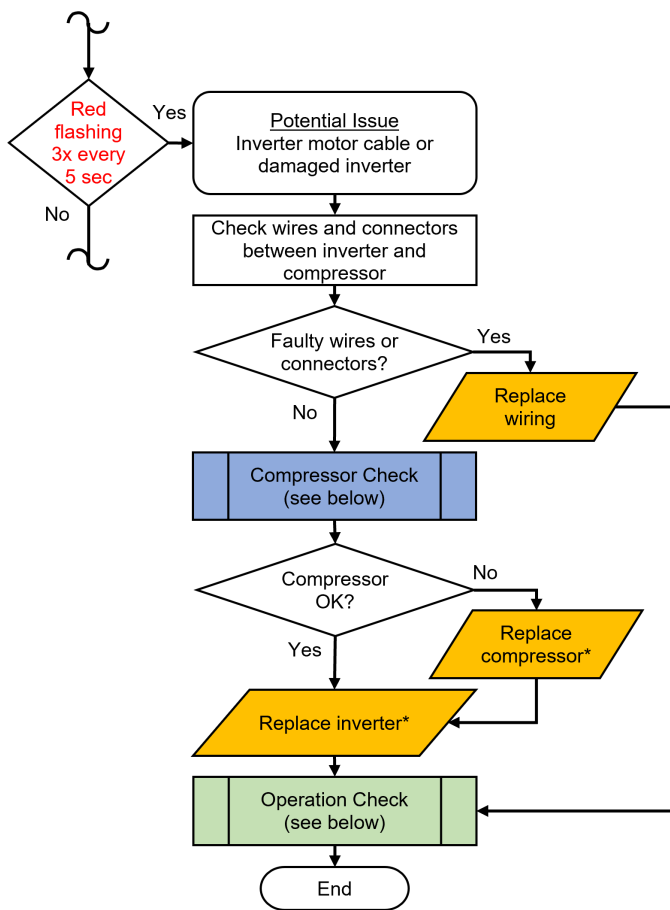
\* See service part list for replacement part numbers

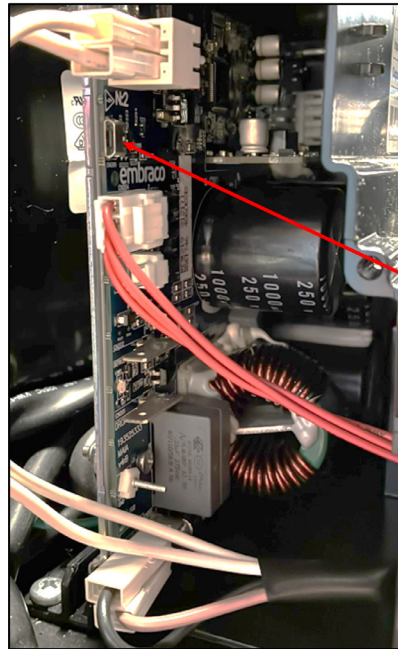
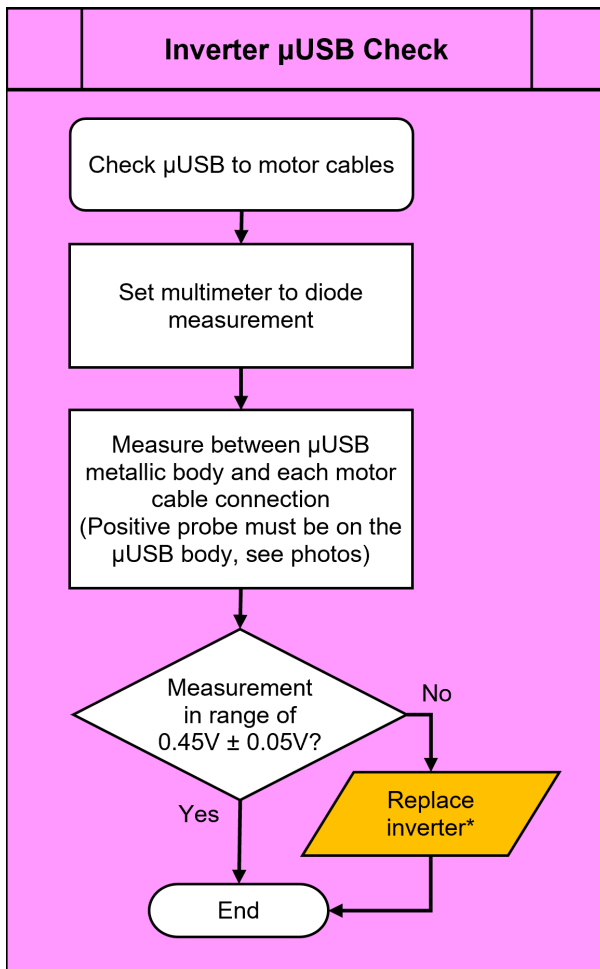
‡ Must wait 2 minutes to confirm the inverter has no flashing pattern

† Ideally the dielectric resistance should be measured with a "megohmmeter" between pins 1 & GND

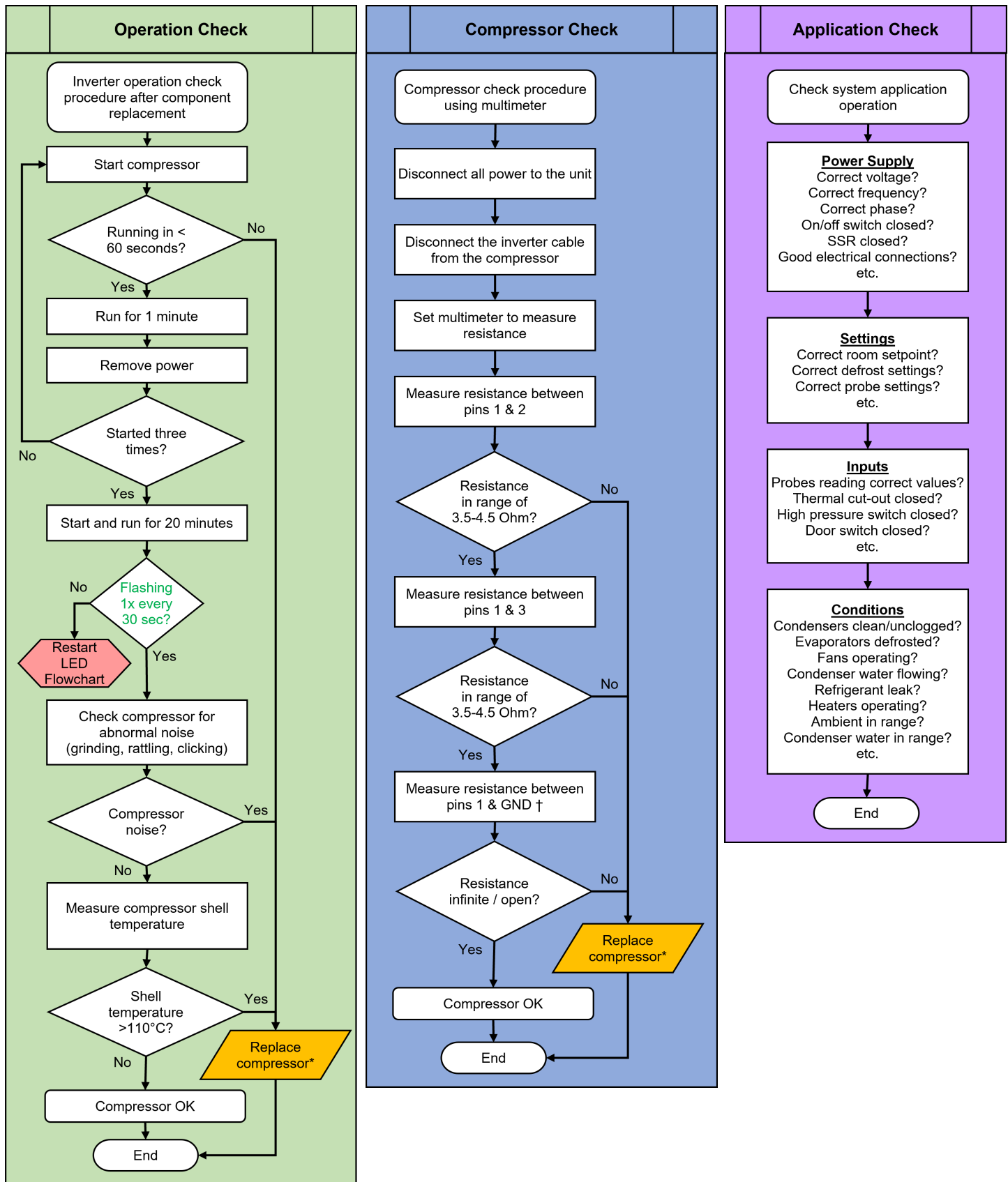








$\mu$ USB metallic body



## 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   | 25    | -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    |
| Probe – Prb      | 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 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 temperature 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 |

|               |                                                                                                                                                                                                                                                                                                                                                                                                                   |     |     |           |     |     |     |
|---------------|-------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------|-----|-----|-----------|-----|-----|-----|
| Defrost – 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 defrost.                                                                                                                                                                                                                                                              | 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 = desynchronized, 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        | 70  | 70  | 70  |
|               | 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        | 35  | 45  | 45  |
|               | Evaporator fan operating mode: (Cn; on; CY; oY)<br>• Cn = runs with the compressor, duty-cycle when compressor is OFF (see FoF, Fon, FF1 and Fo1 parameters) and OFF during defrost<br>• on = continuous mode, OFF during defrost<br>• CY = runs with the compressor, duty-cycle when compressor is OFF (see FoF, Fon, FF1 and Fo1 parameters) and ON during defrost<br>• 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       | 5   | 20  | 20  |
|               | 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  |

|                      |                                                                                                                                                                                                                                                              |     |     |           |     |     |     |
|----------------------|--------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------|-----|-----|-----------|-----|-----|-----|
| Fan – FAn            | 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) differential for evaporator ventilator regulator                                                                                                                                    | Hy2 | Pr2 | °F        | 5   | 5   | 5   |
|                      | Condenser fan operating mode: (Cn; on; CY; oY)<br>• Cn = runs with the compressor and OFF during defrost<br>• on = continuous mode, OFF during defrost<br>• CY = runs with the compressor and ON during defrost<br>• 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-plyed 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 defines 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.<br>• ACH=CL, AUX Cut in is [SAA+SHY]; AUX Cut out is SAA.<br>• 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 auxiliary 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  |

|                             |                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                          |     |     |      |       |       |       |
|-----------------------------|--------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------|-----|-----|------|-------|-------|-------|
| Alarm – ALr                 | High temperature alarm: when this temperature is reached, the alarm is enabled after the Ad delay time.<br>• If ALC=Ab → ALL to 150.0°C or ALL to 302°F.<br>• 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.<br>• If ALC=Ab → -100.0°C to ALU or -148°F to ALU.<br>• 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: (0.0 to 25.5°C; 0 to 45°F) the regulation 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   |
| Output Configurations – oUt | Relay output oAx configuration: (nu; onF; dEF; Fan; ALr; LiG; AuS; db; CP1; CP2; dF2; HES; HEt; inV; tiM; Cnd)<br>• nu = not used<br>• onF = always on with instrument on<br>• dEF = defrost<br>• FAn = evaporator Fan<br>• ALr = alarm<br>• LiG = light<br>• AuS = auxiliary output<br>• db = neutral zone<br>• CP1 = ONOFF compressor<br>• CP2 = second ONOFF compressor<br>• dF2 = second defrost<br>• HES = energy saving<br>• HEt = heater output control<br>• inV = inverter output, relay activated only when inverter is running (compressor speed>0)<br>• tiM = timed mode activation<br>• Cnd = condenser fan. | oA1 | Pr2 | —    | dEF   | Cnd   | dEF   |

|                             |                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                              |     |     |     |                            |                            |                            |
|-----------------------------|------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------|-----|-----|-----|----------------------------|----------------------------|----------------------------|
| Output Configurations – oUt | See oA1                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                      | oA2 | Pr2 | —   | FAn                        | FAn                        | FAn                        |
|                             | See oA1                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                      | oA3 | Pr2 | —   | inV                        | inV                        | inV                        |
|                             | See oA1                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                      | oA4 | Pr2 | —   | dF2                        | Cnd                        | dF2                        |
|                             | <ul style="list-style-type: none"> <li>Relay output oA5 configuration: (nu; onF; dEF; FAn; ALr; LiG; AuS; dF2; HES; tiM; Cnd;)</li> <li>nu = not used</li> <li>onF = always on with instrument on</li> <li>dEF = defrost</li> <li>FAn = evaporator Fan</li> <li>ALr = alarm</li> <li>LiG = light</li> <li>AuS = auxiliary output</li> <li>dF2 = second defrost</li> <li>HES = energy saving</li> <li>tiM = timed mode activation</li> <li>Cnd = condenser fan.</li> </ul>                                                                                                    | oA5 | Pr2 | —   | Cnd                        | Cnd                        | Cnd                        |
|                             | Analogue output 1 configuration (4-20mA; 0-10Vdc): (nu, tiM, FAn, AUS, ALr, Cnd) <ul style="list-style-type: none"> <li>nu = not used</li> <li>tiM = timed mode</li> <li>FAn = linked to the evaporator fan regulator</li> <li>AUS = linked to the auxiliary regulator</li> <li>ALr = linked to any alarm condition</li> <li>Cnd = linked to the condenser fan regulator</li> </ul>                                                                                                                                                                                          | 1Ao | Pr2 | —   | nu                         | nu                         | nu                         |
|                             | Analogue output 2 configuration: (4-20mA; 0-10Vdc): (nu, tiM, FAn, AUS, ALr, Cnd) <ul style="list-style-type: none"> <li>nu = not used</li> <li>tiM = timed mode</li> <li>FAn = linked to the evaporator fan regulator</li> <li>AUS = linked to the auxiliary regulator</li> <li>ALr = linked to any alarm condition</li> <li>Cnd = linked to the condenser fan regulator</li> </ul> NOTE: always set 3Ao=nu before using 2Ao analogue output                                                                                                                                | 2Ao | Pr2 | —   | nu                         | nu                         | nu                         |
|                             | Analogue output 3 configuration: (nu; FrE; ALr) <ul style="list-style-type: none"> <li>nu = not used</li> <li>FrE = frequency output for variable speed compressors</li> </ul> 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) <ul style="list-style-type: none"> <li>EAL = external warning alarm</li> <li>bAL = external lock alarm</li> <li>PAL = external pressure alarm</li> <li>dor = door switch function</li> <li>dEF = defrost activation</li> <li>AUS = auxiliary output</li> <li>ES = energy saving mode activation</li> <li>HdF = holiday defrost</li> <li>LiG = light output control</li> <li>onF = ON/OFF status change</li> <li>Lnt = change configuration (between Lt and nt)</li> </ul> | 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<br>(water)<br>60 (Air) | 120<br>(water)<br>60 (Air) | 120<br>(water)<br>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                         |

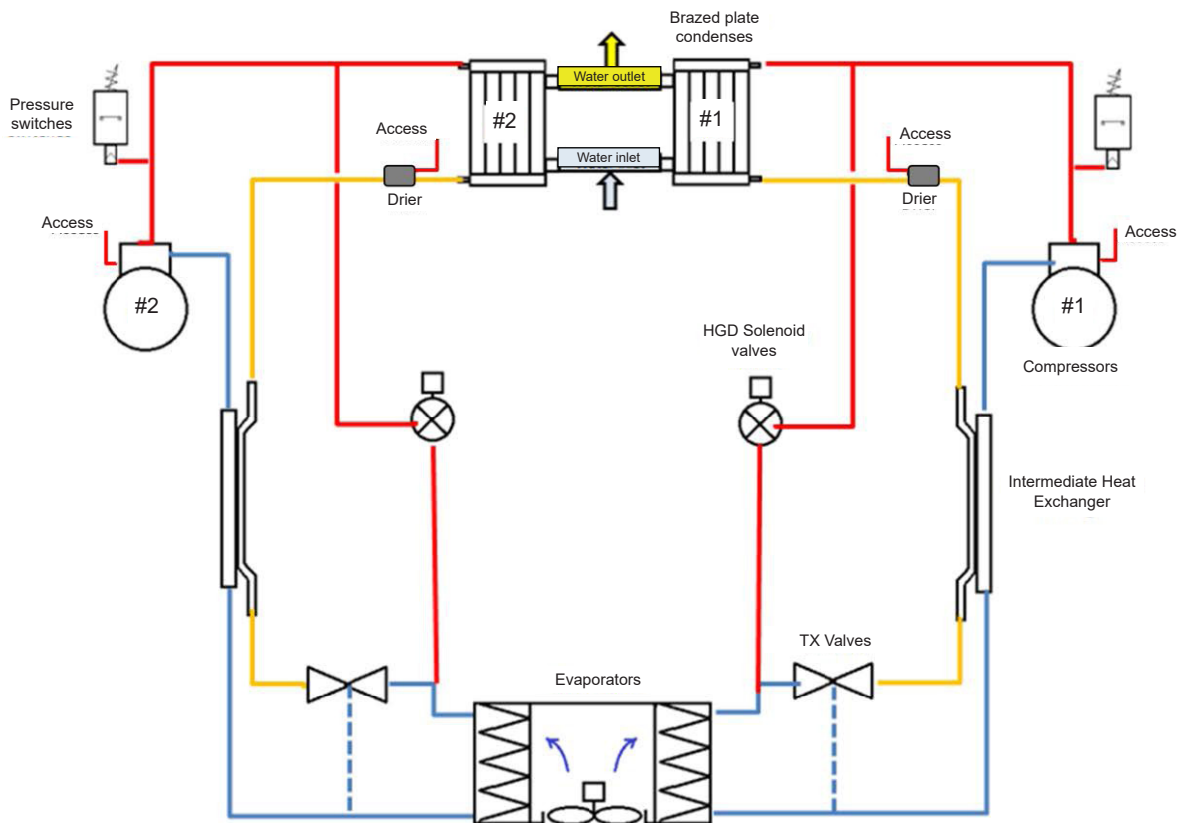
|                       |                                                                                                                                                                                                                                                                                                                                                                                                                                                                                         |     |     |      |                         |                         |                         |
|-----------------------|-----------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------|-----|-----|------|-------------------------|-------------------------|-------------------------|
| Digital input – inP   | Digital input 2 configuration: (nu; dor; dEF; AUS; ES; EAL; bAL; PAL; FAn; HdF; onF; LiG; CC; EMT)<br>• EAL = external warning alarm<br>• bAL = external lock alarm<br>• PAL = external pressure alarm<br>• dor = door switch function<br>• dEF = defrost activation<br>• AUS = auxiliary output<br>• ES = energy saving mode activation<br>• HdF = holiday defrost<br>• LiG = light output control<br>• onF = ON/OFF status change<br>• 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 regulation: (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<br>(water)<br>2 (Air) | 3<br>(water)<br>2 (Air) | 3<br>(water)<br>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                      | F-C                     | F-C                     |
|                       | 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.<br>• 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                     |

|                       |                                                                                                                                                                                                                                                                                                                                              |     |     |      |     |     |     |
|-----------------------|----------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------|-----|-----|------|-----|-----|-----|
| Real time Clock – rTC | • 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 working days.<br>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 |
|                       | ON/OFF button configuration: (nU; oFF; ES; SEr)                                                                                                                                                                                                                                                                                              | onC | Pr2 |      | DNC | DNC | DNC |
|                       | ON/OFF 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 |

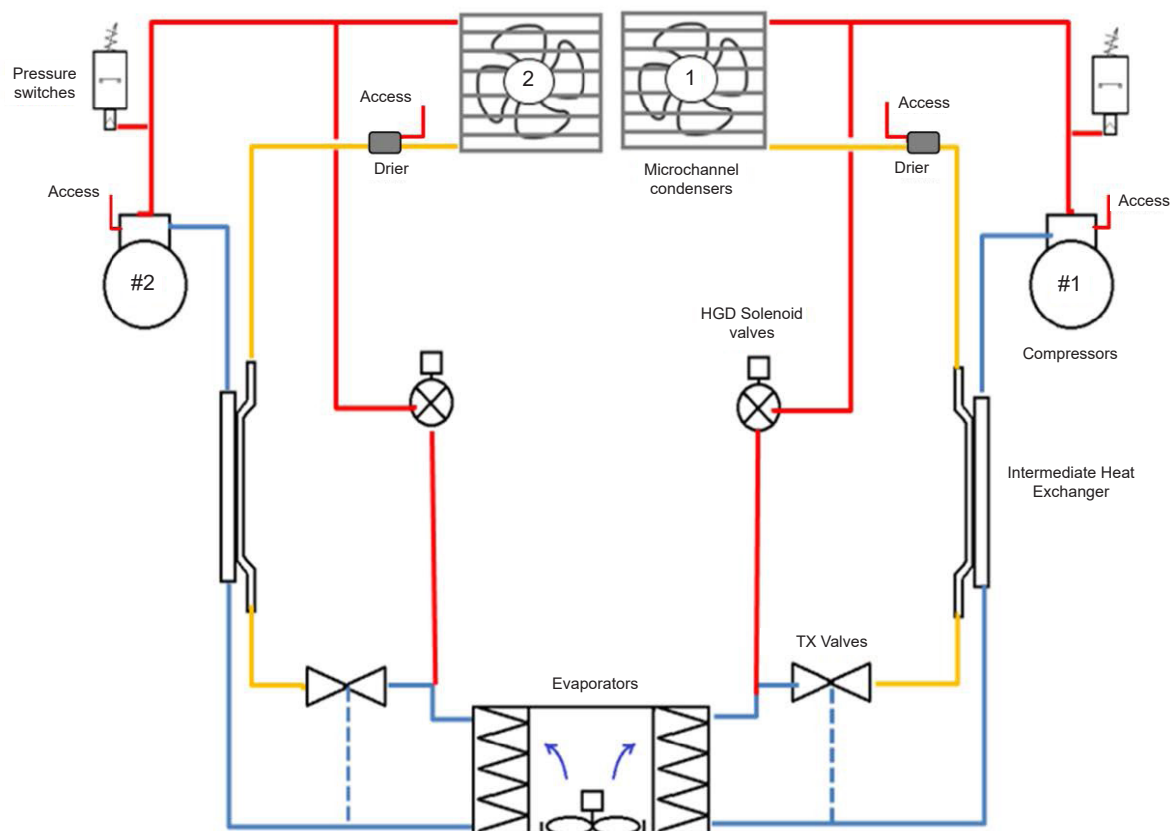
Table 23 – Controller parameters list

## 12. Appendix 1 – Piping Diagrams

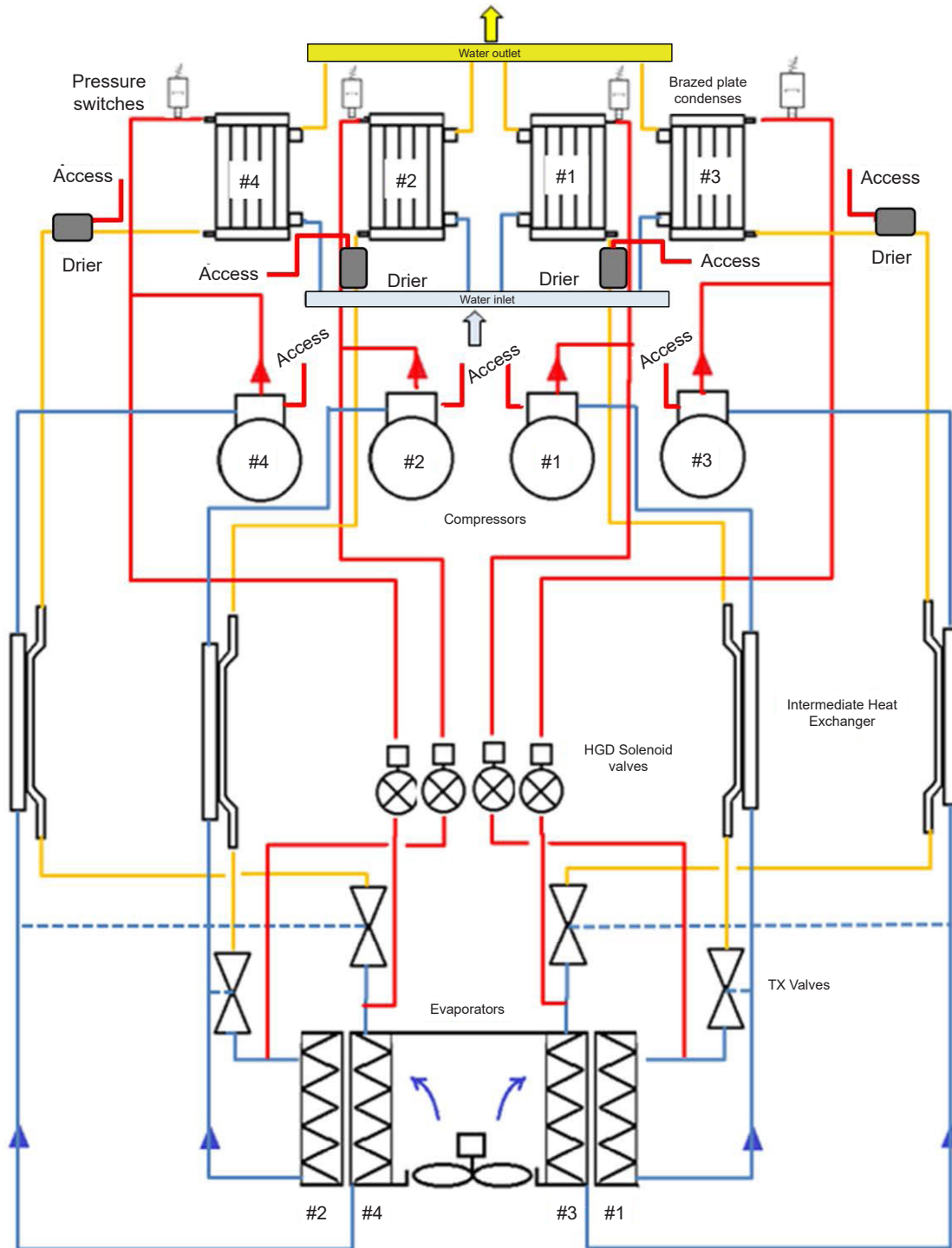
### 12.1 Models KM2VW & KL2VW, BM2VW, and BL2VW



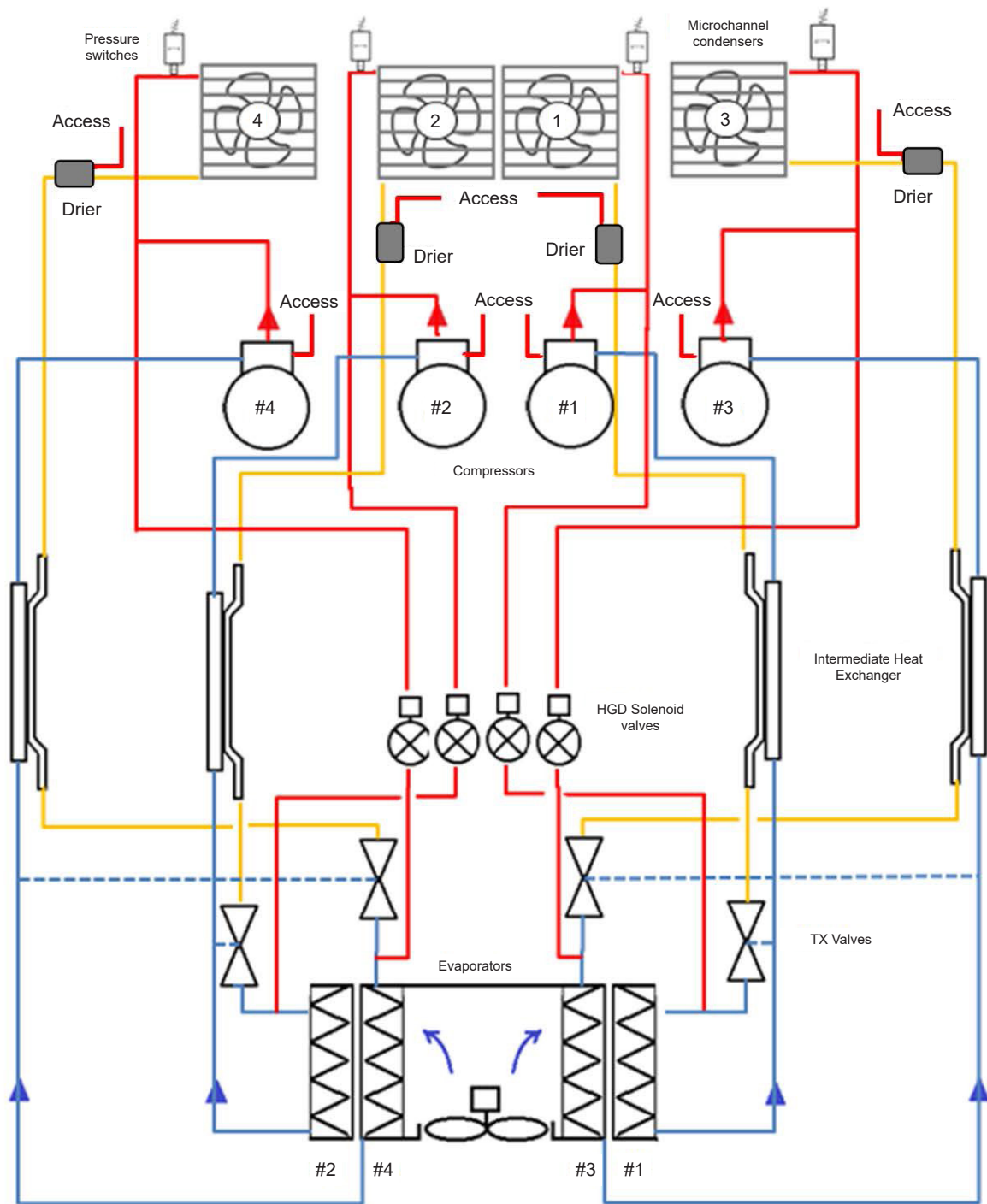
### 12.2 Models KM2VA & KL2VA, BM2VA, and BL2VA



### 12.3 Models KL4VW and BL4VW

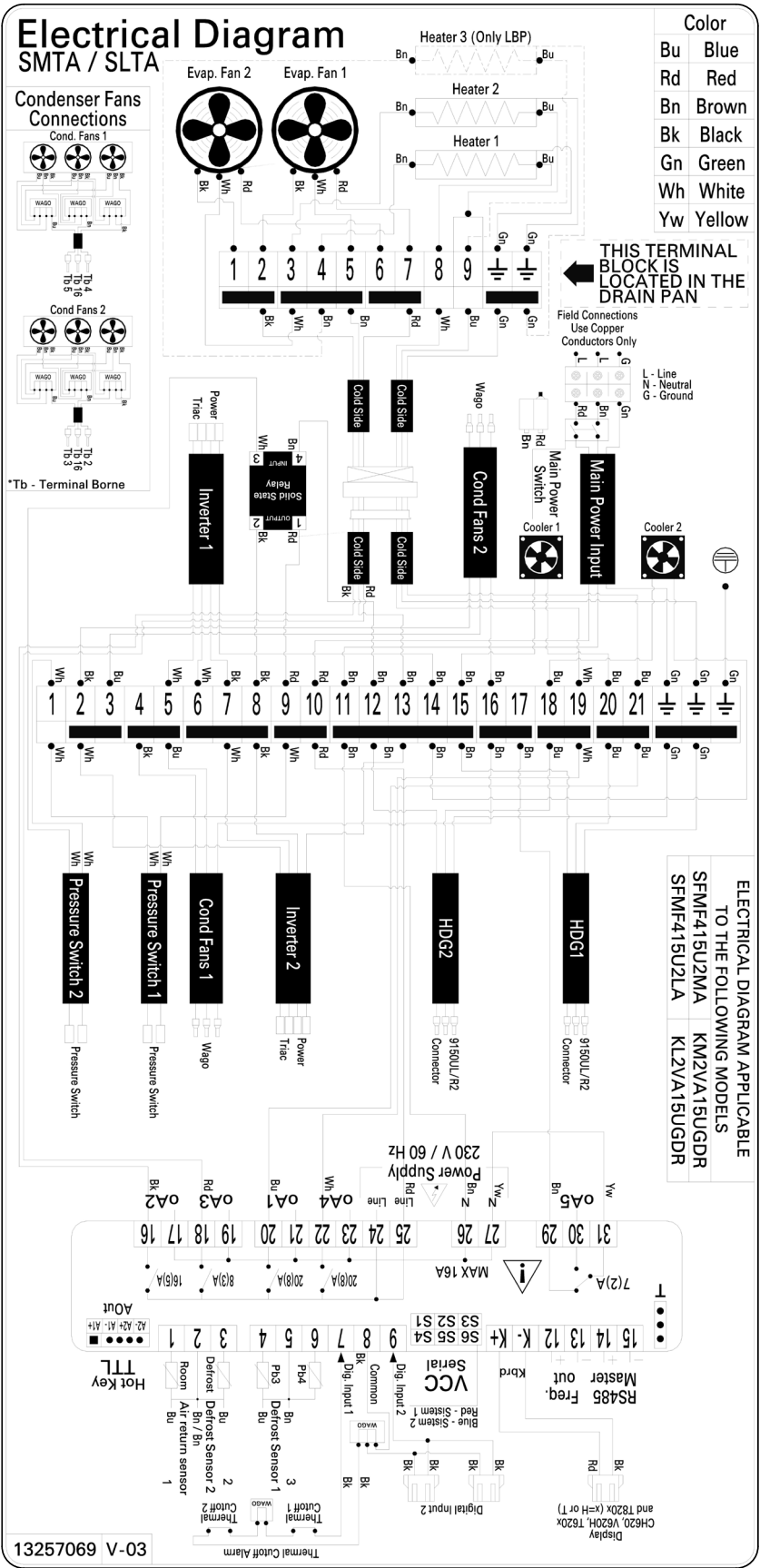


## 12.4 Models KL4VA & BL4VA





13.2 Models KM2VA, KL2VA, BM2VA, and BL2VA







## 14. Appendix 2 – Wiring Logic Diagrams

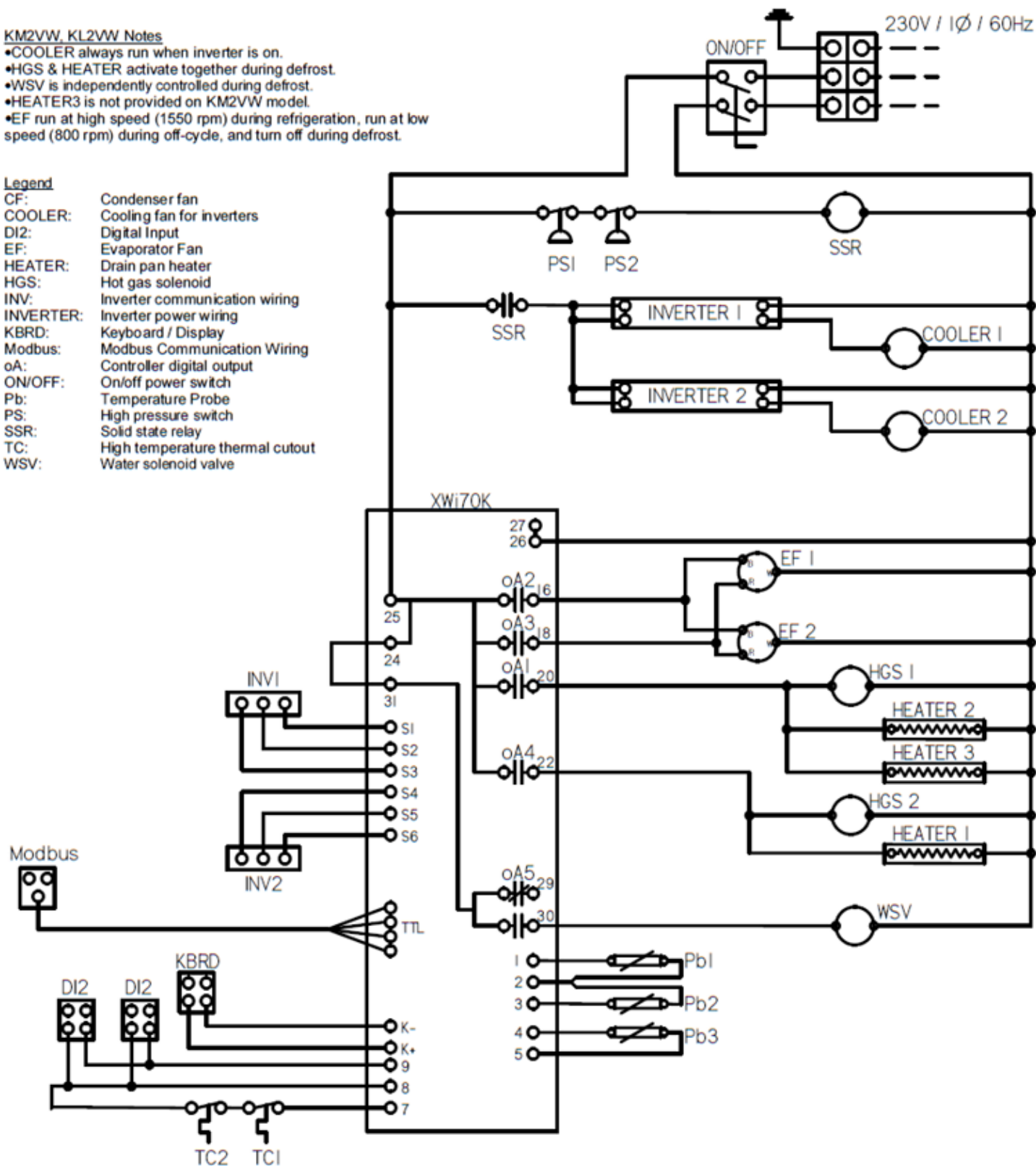
## 14.1 Models KM2VW, KL2VW, BM2VW, and BL2VW

KM2VW, KL2VW Notes

- COOLER always run when inverter is on.
- HGS & HEATER activate together during defrost.
- WSV is independently controlled during defrost.
- HEATER3 is not provided on KM2VW model.
- EF run at high speed (1550 rpm) during refrigeration, run at low speed (800 rpm) during off-cycle, and turn off during defrost.

Legend

|           |                                 |
|-----------|---------------------------------|
| CF:       | Condenser fan                   |
| COOLER:   | Cooling fan for inverters       |
| DI2:      | Digital Input                   |
| EF:       | Evaporator Fan                  |
| HEATER:   | Drain pan heater                |
| HGS:      | Hot gas solenoid                |
| INV:      | Inverter communication wiring   |
| INVERTER: | Inverter power wiring           |
| KBRD:     | Keyboard / Display              |
| Modbus:   | Modbus Communication Wiring     |
| oA:       | Controller digital output       |
| ON/OFF:   | On/off power switch             |
| Pb:       | Temperature Probe               |
| PS:       | High pressure switch            |
| SSR:      | Solid state relay               |
| TC:       | High temperature thermal cutout |
| WSV:      | Water solenoid valve            |



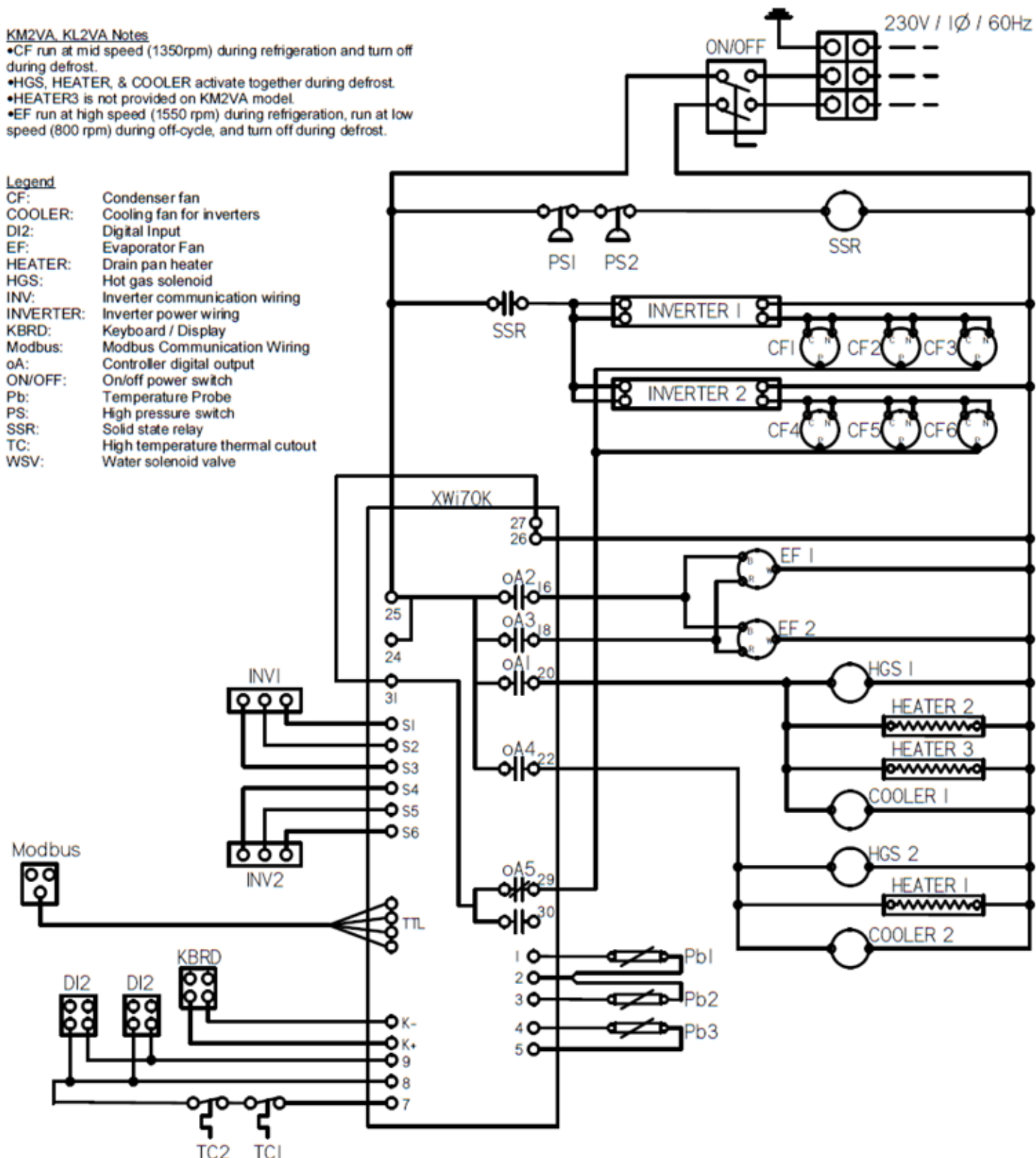
## 14.2 Models KM2VA, KL2VA, BM2VA, and BL2VA

KM2VA, KL2VA Notes

- CF run at mid speed (1350rpm) during refrigeration and turn off during defrost.
- HGS, HEATER, & COOLER activate together during defrost.
- HEATER3 is not provided on KM2VA model.
- EF run at high speed (1550 rpm) during refrigeration, run at low speed (800 rpm) during off-cycle, and turn off during defrost.

Legend

|           |                                 |
|-----------|---------------------------------|
| CF:       | Condenser fan                   |
| COOLER:   | Cooling fan for inverters       |
| DI2:      | Digital Input                   |
| EF:       | Evaporator Fan                  |
| HEATER:   | Drain pan heater                |
| HGS:      | Hot gas solenoid                |
| INV:      | Inverter communication wiring   |
| INVERTER: | Inverter power wiring           |
| KBRD:     | Keyboard / Display              |
| Modbus:   | Modbus Communication Wiring     |
| oA:       | Controller digital output       |
| ON/OFF:   | On/off power switch             |
| Pb:       | Temperature Probe               |
| PS:       | High pressure switch            |
| SSR:      | Solid state relay               |
| TC:       | High temperature thermal cutout |
| WSV:      | Water solenoid valve            |



## 14.3 Models KL4VW and BL4VW

KL4VW Notes

COOLER runs anytime INVERTER 3 or 4 is active.

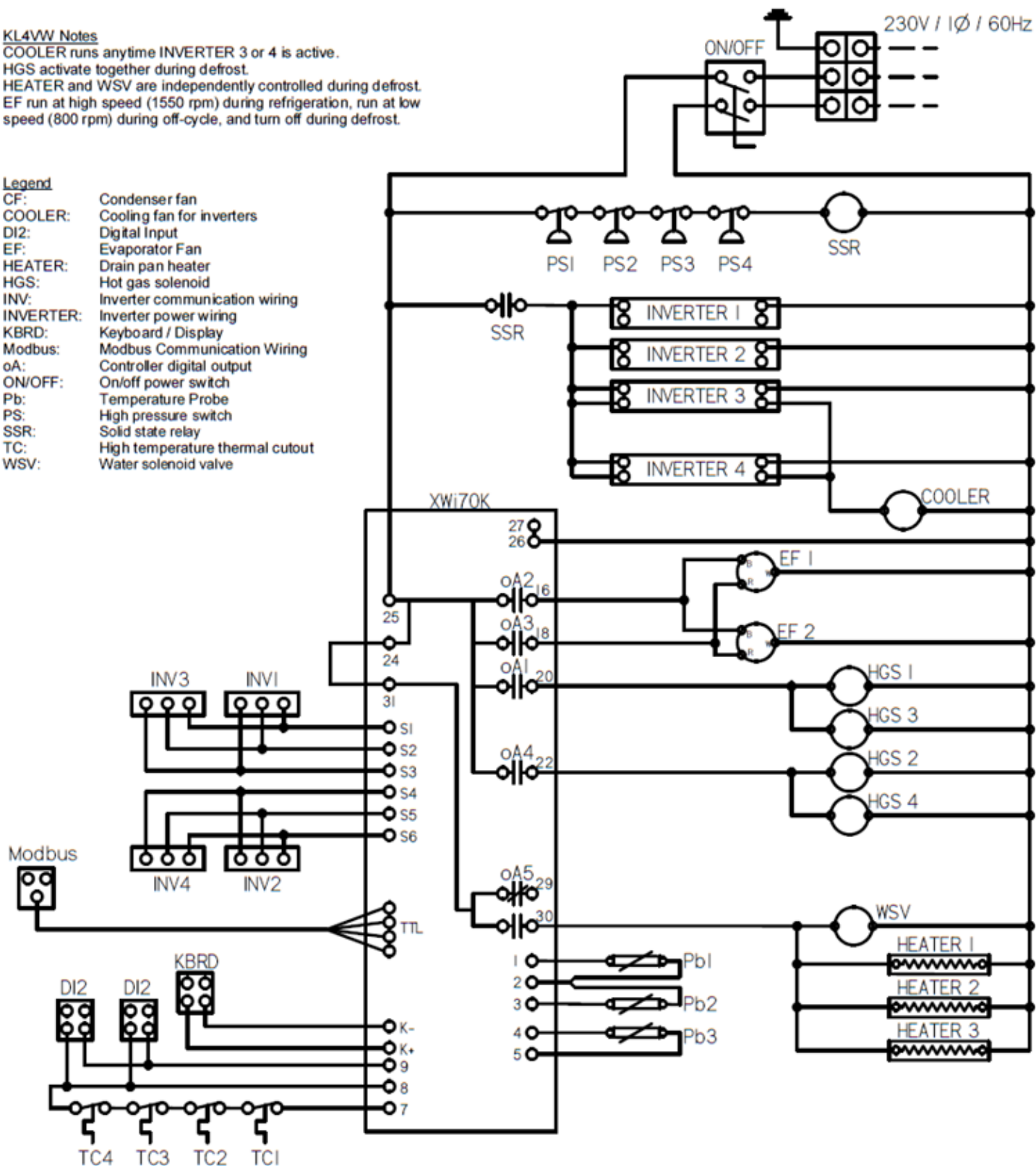
HGS activate together during defrost.

HEATER and WSV are independently controlled during defrost.

EF run at high speed (1550 rpm) during refrigeration, run at low speed (800 rpm) during off-cycle, and turn off during defrost.

Legend

|           |                                 |
|-----------|---------------------------------|
| CF:       | Condenser fan                   |
| COOLER:   | Cooling fan for inverters       |
| DI2:      | Digital Input                   |
| EF:       | Evaporator Fan                  |
| HEATER:   | Drain pan heater                |
| HGS:      | Hot gas solenoid                |
| INV:      | Inverter communication wiring   |
| INVERTER: | Inverter power wiring           |
| KBRD:     | Keyboard / Display              |
| Modbus:   | Modbus Communication Wiring     |
| oA:       | Controller digital output       |
| ON/OFF:   | On/off power switch             |
| Pb:       | Temperature Probe               |
| PS:       | High pressure switch            |
| SSR:      | Solid state relay               |
| TC:       | High temperature thermal cutout |
| WSV:      | Water solenoid valve            |



## 14.4 Models KL4VA and BL4VA

### KL4VA Notes

CF run at high speed (1800 rpm) during refrigeration and run at low speed (400 rpm) during defrost. [Low speed is used to provide inverter cooling.]

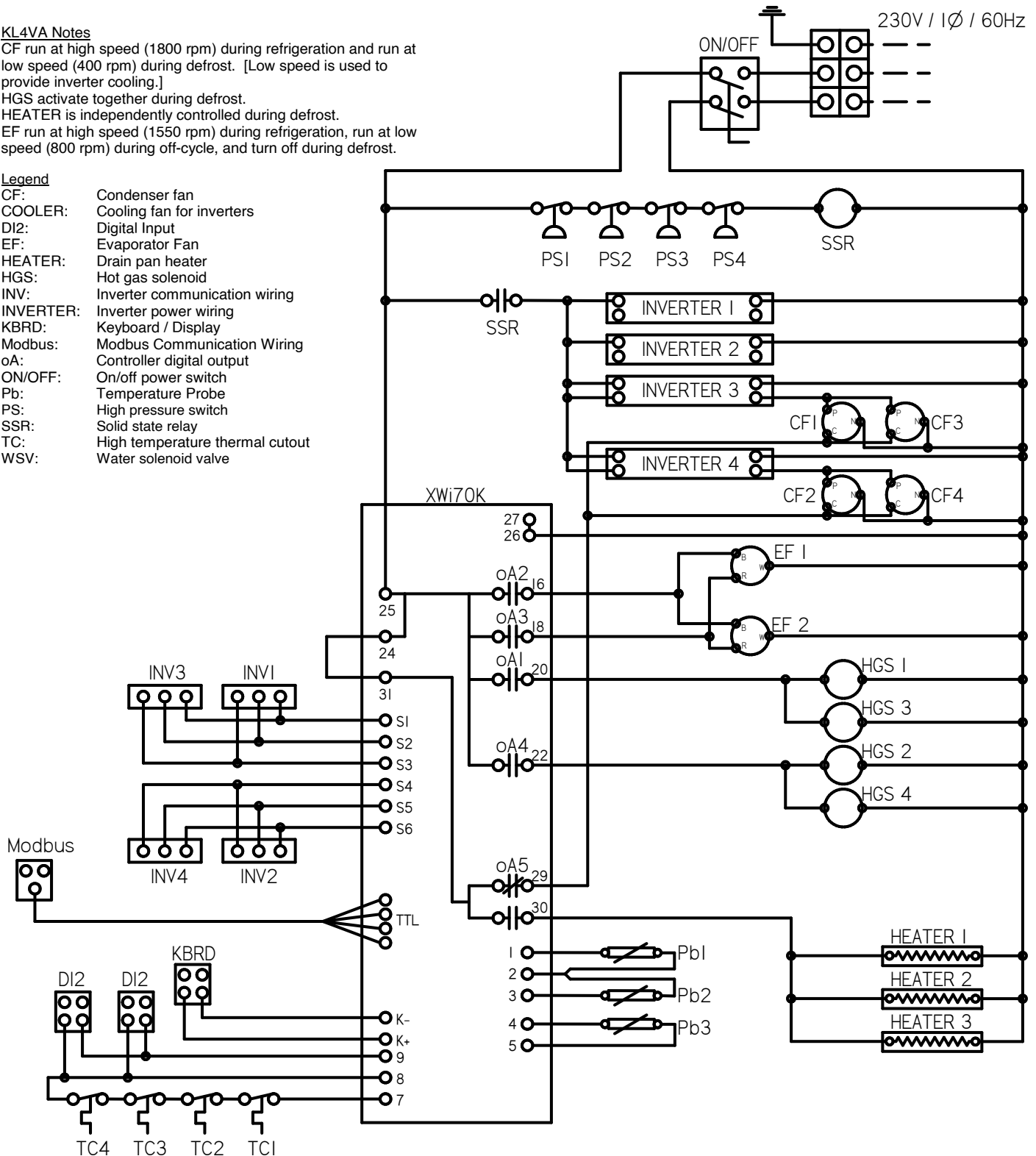
HGS activate together during defrost.

HEATER is independently controlled during defrost.

EF run at high speed (1550 rpm) during refrigeration, run at low speed (800 rpm) during off-cycle, and turn off during defrost.

### Legend

|           |                                 |
|-----------|---------------------------------|
| CF:       | Condenser fan                   |
| COOLER:   | Cooling fan for inverters       |
| DI2:      | Digital Input                   |
| EF:       | Evaporator Fan                  |
| HEATER:   | Drain pan heater                |
| HGS:      | Hot gas solenoid                |
| INV:      | Inverter communication wiring   |
| INVERTER: | Inverter power wiring           |
| KBRD:     | Keyboard / Display              |
| Modbus:   | Modbus Communication Wiring     |
| oA:       | Controller digital output       |
| ON/OFF:   | On/off power switch             |
| Pb:       | Temperature Probe               |
| PS:       | High pressure switch            |
| SSR:      | Solid state relay               |
| TC:       | High temperature thermal cutout |
| WSV:      | Water solenoid valve            |



## 15. Service Parts List

| Husmann Model       |            |                                            | Water-Cooled |             |             |             |             |             |             |             | Air-Cooled  |             |             |             |             |             |
|---------------------|------------|--------------------------------------------|--------------|-------------|-------------|-------------|-------------|-------------|-------------|-------------|-------------|-------------|-------------|-------------|-------------|-------------|
|                     |            |                                            | KM2VW15UGDR  | NM2VW15UGDR | BM2VW15UGDR | KM2VW15UGDN | KL2VW15UGDR | BL2VW15UGDR | KL4VW15UGDR | NL4VW15UGDR | BL4VW15UGDR | KM2VA15UGDR | BM2VA15UGDR | KL2VA15UGDR | BL2VA15UGDR | KL4VA15UGDR |
| Husmann SKU         |            |                                            | 3152424      | 3248503     | 3208612     | 3152425     | 3152426     | 3208613     | 3207993     | 3248502     | 3208614     | 3152427     | 3208609     | 3152428     | 3208610     | 3208126     |
| Type                | Husmann PN | Description                                |              |             |             |             |             |             |             |             |             |             |             |             |             |             |
| Air Movers          | 3161994    | EVAP FAN BLADE-11.81 IN CCW 23 DEG FAN     | 2            | 2           | 2           | 2           | 2           | 2           | 2           | 2           | 2           | 2           | 2           | 2           | 2           | 2           |
|                     | 3161924    | EVAP FAN MOTOR-38W 90-240V 50-60HZ SSC4    | 2            | 2           | 2           | 2           | 2           | 2           | 2           | 2           | 2           | 2           | 2           | 2           | 2           | 2           |
|                     | 3219299    | EVAP FAN MOTOR BRACKET                     | 2            | 2           | 2           | 2           | 2           | 2           | 2           | 2           | 2           | 2           | 2           | 2           | 2           | 2           |
|                     | 3198413    | COND FANPACK 12W PENTA 200 UNADA           | —            | —           | —           | —           | —           | —           | —           | —           | —           | 6           | 6           | 6           | 6           | 4           |
|                     | 3198414    | INVERTER FAN MOTOR 11W 220-240V/50-60      | 2            | 2           | 2           | 2           | 2           | 2           | —           | —           | —           | 2           | 2           | 2           | 2           | —           |
|                     | 3198415    | INVERTER FAN MOTOR ASSY UNADA 20W 8"       | —            | —           | —           | —           | —           | —           | 1           | 1           | 1           | —           | —           | —           | —           | —           |
| Controls            | 3162156PRG | CONTROLLER-DIXELL XWI70K WITH RTC*         | 1            | 1           | 1           | 1           | 1           | 1           | 1           | 1           | 1           | 1           | 1           | 1           | 1           | 1           |
|                     | 3162175    | DISPLAY-REMOTE DIGITAL CH620               | 1            | 1           | 1           | 1           | 1           | 1           | 1           | 1           | 1           | 1           | 1           | 1           | 1           | 1           |
|                     | 3162150    | CONNECTOR-MODBUS CONVERTER                 | 1            | 1           | 1           | 1           | 1           | 1           | 1           | 1           | 1           | —           | —           | —           | —           | 1           |
|                     | 3198416    | INVERTER CF10B01 N 0.1 15 A 01(SDI)        | 2            | 2           | 2           | 2           | 2           | 2           | 4           | 4           | 4           | 2           | 2           | 2           | 2           | 4           |
|                     | 3241399    | SENSOR-TEMP ASSY WITH CONNECTOR            | 3            | 3           | 3           | 3           | 3           | 3           | 3           | 3           | 3           | 3           | 3           | 3           | 3           | 3           |
|                     | 3246604    | RELAY-SOLID STATE 50A (CWA2450H-10)        | 1            | 1           | 1           | 1           | 1           | 1           | 1           | 1           | 1           | 1           | 1           | 1           | 1           | 1           |
|                     | 3162008    | SWITCH-PRESS 50 BAR PS80-K3-4066           | 4            | 4           | 4           | 4           | 4           | 4           | 4           | 4           | 4           | 4           | 4           | 4           | 4           | 4           |
|                     | 3198417    | THERMAL CUT-OFF                            | 4            | 4           | 4           | 4           | 4           | 4           | 4           | 4           | 4           | 4           | 4           | 4           | 4           | 4           |
|                     | 3253445    | BREAKER-SWITCH 2POLE 30A                   | 1            | 1           | 1           | 1           | 1           | 1           | 1           | 1           | 1           | 1           | 1           | 1           | 1           | 1           |
|                     | 3162137    | HEATER KIT - MED TEMP                      | 1            | 1           | 1           | 1           | —           | —           | —           | —           | —           | 1           | 1           | —           | —           | —           |
| Drain Pan           | 3198418    | HEATER KIT - LOW TEMP                      | —            | —           | —           | 1           | 1           | 1           | 1           | 1           | 1           | —           | —           | 1           | 1           | 1           |
|                     | 3241400    | DRAIN PAN ASSY MT 2 CIRC (WHITE)           | 1            | 1           | —           | 1           | —           | —           | —           | —           | —           | 1           | —           | —           | —           | —           |
|                     | 3241402    | DRAIN PAN ASSY MT 2 CIRC (BLACK)           | —            | —           | 1           | —           | —           | —           | —           | —           | —           | 1           | —           | —           | —           | —           |
|                     | 3241403    | DRAIN PAN ASSY LT 2 CIRC (WHITE)           | —            | —           | —           | 1           | —           | —           | —           | —           | —           | —           | 1           | —           | —           | —           |
|                     | 3241404    | DRAIN PAN ASSY LT 2 CIRC (BLACK)           | —            | —           | —           | —           | 1           | —           | —           | —           | —           | —           | —           | 1           | —           | —           |
|                     | 3241405    | DRAIN PAN ASSY LT 4 CIRC (WHITE)           | —            | —           | —           | —           | —           | 1           | 1           | —           | —           | —           | —           | —           | 1           | —           |
|                     | 3241406    | DRAIN PAN ASSY LT 4 CIRC (BLACK)           | —            | —           | —           | —           | —           | —           | —           | 1           | —           | —           | —           | —           | —           | 1           |
|                     | 3162365    | COMPRESSOR RELAY BASE COVER                | 2            | 2           | 2           | 2           | 2           | 2           | 4           | 4           | 4           | 2           | 2           | 2           | 2           | 4           |
| Miscellaneous       | 3162364    | RELAY BASE COVER SCREW-M4 X 20 PAN PHH     | 2            | 2           | 2           | 2           | 2           | 2           | 4           | 4           | 4           | 2           | 2           | 2           | 2           | 4           |
|                     | 3211695    | GASKET-1 X 150 ROLL SILICONE               | 1            | 1           | 1           | 1           | 1           | 1           | 1           | 1           | 1           | 1           | 1           | 1           | 1           | 1           |
|                     | 3198419    | WHITE TRIM KIT (2X PART A, 2X PART B)      | 1            | 1           | —           | 1           | 1           | —           | 1           | 1           | —           | 1           | —           | 1           | —           | 1           |
|                     | 3209242    | BLACK TRIM KIT (2X PART A, 2X PART B)      | —            | —           | 1           | —           | —           | 1           | —           | —           | 1           | —           | 1           | —           | 1           | —           |
|                     | 3219476    | WHITE BAFFLE KIT                           | 2            | 2           | —           | 2           | 2           | —           | 2           | 2           | —           | 2           | —           | 2           | —           | 2           |
|                     | 3219477    | BLACK BAFFLE KIT                           | —            | 2           | 2           | —           | —           | 2           | —           | —           | 2           | —           | 2           | —           | 2           | —           |
|                     | 3198420    | COMPRESSOR FMFT 415U 230V 53-167HZ         | 2            | 2           | 2           | 2           | 2           | 2           | 4           | 4           | 4           | 2           | 2           | 2           | 2           | 4           |
| Refrigerant Circuit | 3198421    | FILTER DRIER                               | 2            | 2           | 2           | 2           | 2           | 2           | 4           | 4           | 4           | 2           | 2           | 2           | 2           | 4           |
|                     | 3219309    | HOT GAS SOLENOID VALVE/COIL/CONN KIT (EVU) | 2            | 2           | 2           | 2           | 2           | 2           | 4           | 4           | 4           | 2           | 2           | 2           | 2           | 4           |
|                     | 3161857    | VALVE-TXV .25 X .50 ODF R290               | 2            | 2           | 2           | 2           | 2           | 2           | 4           | 4           | 4           | 2           | 2           | 2           | 2           | 4           |
|                     | 3241407    | WATER INLET SET 2 CIRC (BRASS FITTING)     | 1            | 1           | 1           | 1           | 1           | 1           | —           | —           | —           | —           | —           | —           | —           | —           |
| Water Line          | 3241409    | WATER OUTLET SET 2 CIRC (BRASS FITTING)    | 1            | 1           | 1           | 1           | 1           | 1           | —           | —           | —           | —           | —           | —           | —           | —           |
|                     | 3162186    | VALVE-BALANCE AUTOMATIC FLOW (2 Circ)      | 2            | 2           | 2           | 2           | 2           | 2           | —           | —           | —           | —           | —           | —           | —           | —           |
|                     | 3198423    | TEE-CONNECTION BOTTOM ASSY (4 Circuit)     | —            | —           | —           | —           | —           | —           | 1           | 1           | 1           | —           | —           | —           | —           | —           |
|                     | 3198424    | TEE-CONNECTION TOP ASSY (4 Circuit)        | —            | —           | —           | —           | —           | —           | 1           | 1           | 1           | —           | —           | —           | —           | —           |
|                     | 3198422    | VALVE-BALANCE AUTOMATIC FLOW (4 Circ)      | —            | —           | —           | —           | —           | —           | 1           | 1           | 1           | —           | —           | —           | —           | —           |
|                     | 3162177    | VALVE-SOL .750 NPT 220-230V WATER          | 1            | 1           | 1           | 1           | 1           | 1           | 1           | 1           | 1           | —           | —           | —           | —           | —           |
|                     | 3164863    | DEFROST SYNCHRONIZATION CABLE (30 FT)      | 1            | 1           | 1           | 1           | 1           | 1           | 1           | 1           | 1           | 1           | 1           | 1           | 1           | 1           |
| Wiring              | 3164862    | DISPLAY CONNECTOR CABLE (30 FT)            | 1            | 1           | 1           | 1           | 1           | 1           | 1           | 1           | 1           | 1           | 1           | 1           | 1           | 1           |
|                     | 3241410    | SERIAL CABLE INVERTER COMMUNICATION        | 1            | 1           | 1           | 1           | 1           | 1           | 1           | 1           | 1           | 1           | 1           | 1           | 1           | 1           |
|                     | 3164864    | MODBUS CABLE (30 FT)                       | 1            | 1           | 1           | 1           | 1           | 1           | 1           | 1           | 1           | 1           | 1           | 1           | 1           | 1           |
|                     | 3198425    | MODBUS CONVERTER CABLE (5 FT)              | —            | —           | —           | —           | —           | —           | —           | —           | —           | 1           | 1           | 1           | 1           | —           |
|                     |            |                                            |              |             |             |             |             |             |             |             |             |             |             |             |             |             |

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

## 16. Legal Concerns

All product, specifications, and information are subject to change without notice. Customers should always check for the latest updates on [Krack.com](http://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 manual is the property of Hussmann. The total or partial reproduction of this document is forbidden without the prior authorization of Hussmann. This document is intended to support the installation, use and maintenance of the Krack Monoblock Systems.



Scan the QR code to access technical data.

NOTE: We reserve the right to change or revise specifications and product design in connection with any feature of our products. Such changes do not entitle the buyer to corresponding changes, improvements, additions, or replacements for equipment previously sold or shipped.



Krack, a Hussmann Corporation brand

For all customers inquiries,  
visit [www.krack.com](http://www.krack.com) or call 800.922.1919.

[www.krack.com](http://www.krack.com)  
[www.hussmann.com](http://www.hussmann.com)