



# Blade Series Heat Exchanger

## Operation and Installation

### **\*IMPORTANT\***

**For safe and satisfactory operation, please read the following instructions. Keep these instructions for future reference. Some information may not apply to your system.**

### **Introduction**

**Ice Qube** Heat Exchangers are closed-loop systems that have been designed to provide cooling for computer and electronics enclosures in environments where the enclosure temperature may be maintained at temperatures at least 5 degrees Fahrenheit above ambient. Models range from 16.7 to 105.5 watts/degree Fahrenheit cooling capacity.

The Blade Series heat exchangers offer unique features such as a built-in heating system, and the ability to operate with a VAC or VDC power supply. Connecting both a VAC and a VDC power supply provides a redundant power supply system where if AC power is lost, the model will continue to operate on a DC power supply.

### **Basic Operation**

**Ice Qube** Heat Exchangers have only two moving parts. They are maintenance-free fans or blowers, which are used to move air over the heat exchanger core. The enclosure fan moves hot air from the top of enclosure, through the heat exchanger core where the heat is dissipated and the cool air returns to the bottom of the enclosure. The ambient fan moves cool air from near the bottom of the heat exchanger through the core where the heat from the enclosure is absorbed and dissipated to the ambient air near the top of the heat exchanger.

### **Unpacking Inspection**

Look for damage to the shipping container. If the shipping container has been damaged or marred in any way, carefully inspect the heat exchanger for damage which may have occurred during shipping. Check for scratches, dents, or any other irregularities. Listen for noises that could indicate loose components. Any evidence of damage should be recorded on the freight bill. The freight carrier's claim procedure should be followed.

***Ice Qube Inc. cannot accept responsibility for damages which occur during shipping.***

### **Pre-installation Test**

Before installing the heat exchanger on the enclosure, it is recommended to operate the unit for a few minutes to be sure it is functioning properly. Although the system has been factory tested, damage may have occurred during shipping which may have not been apparent during the unpacking inspection.

1. Place the system on a solid base such as a workbench or table. Be sure there is adequate space for the two air streams.
2. Check the unit name plate for electrical requirements. Note that power supply may be VAC or VDC. Connect the power cord to the model and a properly grounded electrical outlet of sufficient capacity. The use of an extension cord is not recommended.  
***\*\* If any unusual noise or vibration is present, immediately disconnect the power cord and inspect the unit for the cause.***
3. After power is supplied to the unit, the controller will begin an approximate 90 second self-diagnostic where it will check sensor, fan and heater operation. Note: Heat does not function with 48 VDC power supply only and will alarm. This alarm will auto reset at the end of the diagnostic sequence.
4. After making these few simple checks, you are ready to prepare your electrical enclosure for installation of the heat exchanger.

## Preparing the Enclosure

1. Determine the location of the heat exchanger on your enclosure.

### \*\*\* Caution \*\*\*

Be sure the weight of the heat exchanger will not cause the enclosure to become unbalanced causing bodily harm or injury. For units mounted on enclosure doors, be sure the hinges will support the weight of the unit. Refer to system specifications for model weights.

2. Use the cutout template, or drawing, as a reference to make an opening in the enclosure surface for intake and exhaust air, along with the holes for the mounting hardware and electrical connection. **Cutout requirements vary with models.** Be sure that the heat exchanger will be mounted level and air flow will not be restricted by components in the enclosure or the surrounding ambient.
3. Test fit the heat exchanger on the enclosure to ensure that all mounting holes are aligned.
4. Remove the heat exchanger from the enclosure and apply the gasket as shown on the gasket diagram.

### \*\*\* Caution \*\*\*

Be careful not to stretch or tear the gasket material when removing the backing.

5. After the gasket material has been installed, mount the heat exchanger to the enclosure using the hardware provided with your system. Check to be sure all mounting hardware is tightened securely and the gasket material is in place **and compressed to approximately 1/2 the original thickness** to maintain enclosure integrity.
6. Connect power to the unit from a properly grounded power supply of sufficient capacity. The controller will then begin an approximate 90 second self-diagnostic where it will check the sensor, fan and heater operation. Note: Heat does not function with 48 VDC power supply only and will alarm. This alarm will auto reset at the end of the diagnostic sequence.

## Controller Program Settings

*Note: At start up the controller will perform a self-diagnostic of all functions for 90 seconds then it will go into normal operation. Operation will be based on sensed temperature and controller settings.*

The digital controller has many function settings that may or may not be required for application. However, the controller has been set at the factory with typical default settings for immediate system operation. Please review the following default settings.

- |  |                          |
|--|--------------------------|
| • Cooling Start Temperature                                    | 104°F (Not Used)         |
| • Heat Start Temperature                                       | 50°F                     |
| • High Temperature Alarm                                       | 131°F                    |
| • Low Temperature Alarm  | 32°F                     |
| • Temp-SPH Setting of Compressor                               | 122°F (Not Used)         |
| • Enclosure Fan Full Speed Temperature                         | 104°F                    |
| • Enclosure Fan Variable Speed Temperature                     | 86°F                     |
| • Enclosure Fan Low Speed Temperature                          | -4°F                     |
| • Outside Fan Full Speed Temperature                           | 108°F                    |
| • Outside Fan Variable Speed Temperature                       | 90°F                     |
| • Outside Fan Low Speed Start Temperature                      | 86°F                     |
| • Temperature difference between enclosure fan and outside fan | 4°F (DO NOT CHANGE THIS) |
| • Visual Alarm   | "ON"                     |
| • Audible Alarm  | "ON"                     |
| • Default Temperature Unit                                     | °F                       |
| • User Password Setting  | +, -, Select, Exit       |

- Filter Maintenance Alarm 0 day-disabled (Not Used)
- Communication Address 1 (Not Used)

1. To access the programming mode view the factory default settings, please press the buttons on the controller faceplate in the following sequence.

"+"	1
"_"	2
"Select"	3
"Exit"	4

If "O"s on the display screen are flashing alternately after the password entered, it means the password is accepted. If no action is taken within one minute the system will go back to normal operation mode displaying temperature.

**NOTE: If entering the password fails the first time, please wait until the key icon  disappears and then enter the password again. Press "Exit" when you need to go back to normal operation mode from the controller programming mode and to save changes to the memory.**

2. User Interface Password (Default set to +, -, Select, Exit)

Press +, -, Select, Exit to access the controller program settings. You will see three zeros toggling up and down.

3. Cooling Start Temperature (Not Used ) Press "Select" to continue.

4. Heating Temperature Setting (Default set to 50°F)

Press "Select" to continue. When the  appears on the screen press + or - to change Heating start temperature. This will be the "heating start" setting (optional). The heating system now will start running and continue to operate until the temperature inside the equipment rises by 7°F(4°C). Press + or - to set the temperature you want. The temperature adjustment range is -22°F to 68°F (-30°C to 20°C).

**NOTE: Don't forget to review the high and low alarm temperature when the "Fan start temperature" and "heating start temperature" are changed.**

5. High Temperature Alarm Setting (Default set to 131°F)

Press "Select" to continue. When  appears on the screen press + or - to change temperature. This will be the setting for the high temperature alarm. The alarm will activate when it reaches the temperature shown on the screen. It will stop when the temperature decreases 2°F (1°C). Press + or - to change the alarm setting. Its setting range is the cooling start temperature setting +7°F to 140°F (cooling start temperature setting +4°C to 60°C).

6. Low Temperature Alarm Setting (Default set to 32°F)

Press "Select" to continue. When  appears on the screen press + or - to change temperature. This is the setting of the low temperature alarm. The alarm will activate at the temperature shown on the screen. It will stop when the temperature on the screen increases 2°F (1°C). Press + or - to change the alarm setting. Its setting range is -31°F to heating start temperature setting -7°F (-35°C to heating start temperature setting -4°C).

7. Temperature SPH Setting of Compressor (Not Used) Press "Select" to continue.

8. Enclosure Fan full speed temperature setting (Default set 104°F)

Press "Select" to enter the Inner Fan full speed temperature setting. When  are on press + or - to enter parameters settings. LCD will show the full speed point temperature. Setting range is 93°F to 140°F (34 to 60°C). The Enclosure Fan will reach High speed at the temperature setting.

9. Enclosure Fan speed regulation point temperature setting (Default set to 86°F)

Press "Select" to enter the Inner Fan speed regulation point temperature setting. When

 is on press + or - to enter parameters settings. LCD will show the speed regulation point temperature. Setting range is 60°F to 95°F (15 to 35°C). The fan speed will begin to increase at this temperature setting.

10. Enclosure Fan starting point temperature setting (Default set to -4°F)

**NOTE: this default has been set so that the Inner Fans run at low speed all the time unless temperature is met inside the enclosure.**

Press "Select" to enter the Inner Fan starting point temperature setting. When

 are on press + or - to enter parameters settings. LCD will show the starting point temperature. Setting range is -4°F to 68°F (-20 to 20°C). The set temperature must be lower than or the same with the speed regulation point temperature of inner fan.

11. Outside Fan full speed temperature setting (Default set to 108°F)

Press "Select" to enter the Outside Fan full speed temperature setting.

When  are on press + or - to enter parameters settings. LCD will show the full speed point temperature. Setting range is 93°F to 140°F (34 to 60°C). The Outside Fan will reach High speed at this temperature setting.

12. Outside Fan speed regulation point temperature setting (Default set to 90°F)

Press "Select" to enter the Outside Fan speed regulation point temperature setting. When

 are on press + or - to enter parameters settings. LCD will show the speed regulation point temperature. Setting range is 86°F to 104°F (30 to 40°C). The Outside Fan speed will begin to increase at this temperature setting.

13. Outside Fan starting point temperature setting (Default set to 86°F)

Press "Select" to enter the Outside Fan starting point temperature setting. When

 are on press + or - to enter parameters settings. LCD will show the starting point temperature. Setting range is 77°F to 86°F (25 to 30°C). The set temperature must be lower than or the same with the speed regulation point temperature of outside fan.

14. Outside Fan temperature difference inside and outside of starting point (Default set to 4°F Difference)

**IMPORTANT: DO NOT CHANGE SETTING.**

Press "Select" to enter the Outside Fan starting point temperature difference setting.

When  +  +  +  are on,  flashes press + or - to enter parameters settings. LCD will show the temperature difference between inside and outside of the heat exchanger. Setting ranges is 2°F to 18°F (1 to 10°C).

15. Audible Alarm Setting (Default set to On)

Press "select" to enter the audible alarm setting. When  or  is lit, "on" or "off" will appear accordingly on the LCD screen to show the status of the sound alarm. Press + or - to change the setting.

16. Alarm Function Setting (Default set to On)

Press "Select" to enter the alarm function setting. The alarm switches "on" and "off" on the screen indicating current status of the alarm. When "off" shows on the screen, all the alarm functions are off. Press + or - to change the alarm. If off is selected for the alarm function, the audible alarm will not function.

17. Temperature Unit Setting (Default set to F°)

Press "Select" to enter the temperature unit setting. When  or  is lit, "-F-" or "-C-" will appear on the LCD screen accordingly. Press + or - to change the setting.

18. Controller Password Setting (Default set to 1, 2, 3, 4)

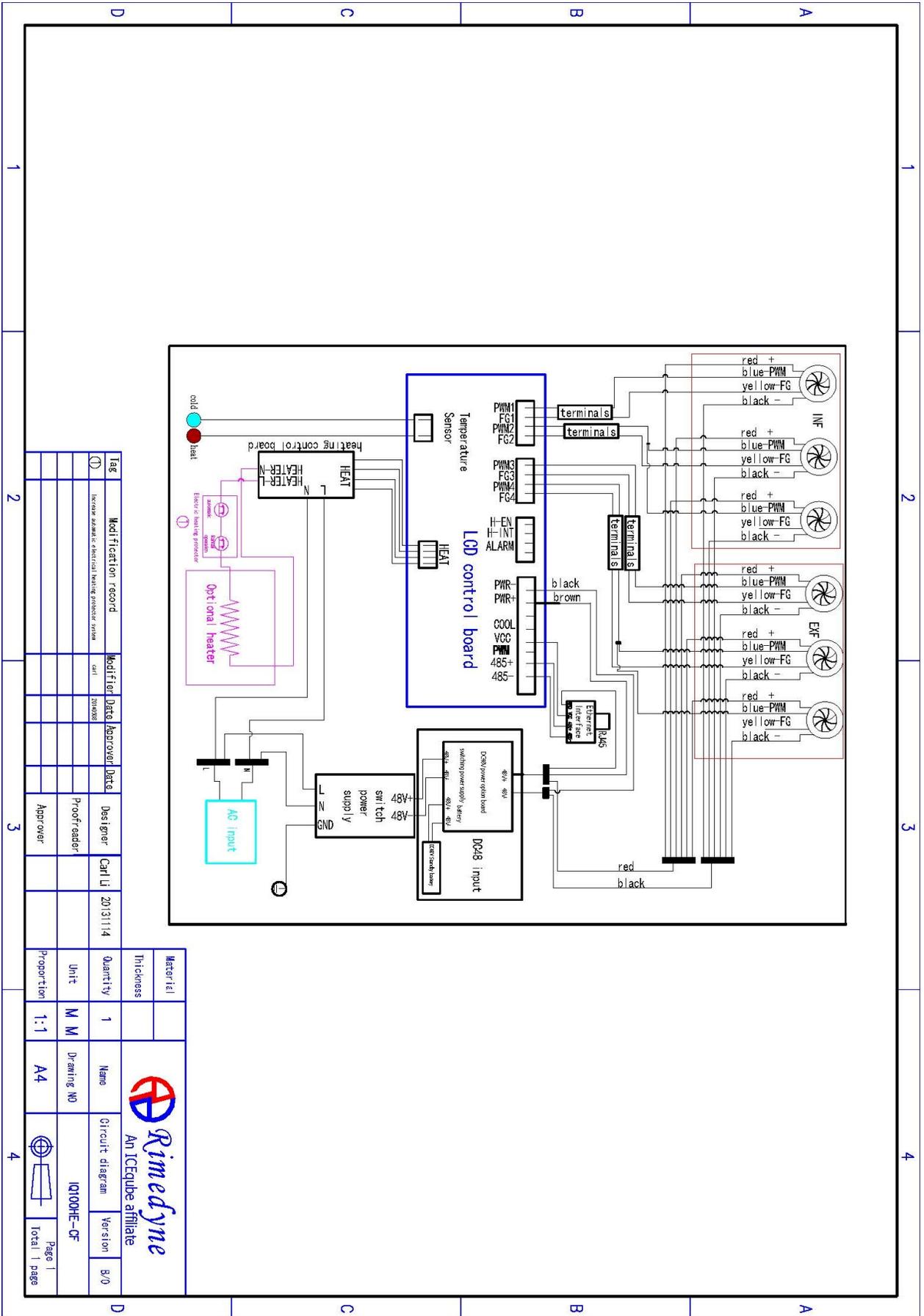
Press "Select". Now "PIN" will show on the screen. To set a new user PIN code, press + . The display will show "0", prompting an entry of a four button sequence using the +, -, select, and/or Exit buttons. (Any sequence of four buttons may be programmed as the code.) As the buttons are pressed, the display will show the number of buttons that were pressed.

**NOTE: Always record the PIN code and store in a secure place.**

19. Filter Maintenance Time Interval Reminder Setting (Not Used)

Press "Select" the setting. When  and  are lit, this is the filter maintenance reminding setting. Press + or - to change the alarm setting. Its setting range is 0-180 days. When set as 0 day, it means to disable this reminding function.

# WIRING SCHEMATIC – 100HE-CF



Tag	Modification record	Modifier	Date	Approver	Date	Designer	Cart LI	2013/11/4
①	increase automatic electrical heating protector system	Carl Li	2013/08/08					

Material	Thickness	Quantity	Unit	Name	Circuit diagram	Version
		1	M	DC248 input		8/0
			M	switch power supply		
			M	optional heater		
			M	heating control board		
			M	LCD control board		
			M	AC input		
			M	Temperature Sensor		
			M	HEATER-L		
			M	HEATER-M		
			M	HEATER-N		



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## TROUBLE SHOOTING:

Contact Ice Qube if the air conditioning system should fail to operate satisfactorily during the first year of operation. DO NOT remove the cover without first notifying the factory. **Removal of the cover will immediately void the warranty.**

If an operating problem should occur, please review the items outlined in the following "Trouble Shooting Check List". If the problem persists, obtain model and serial number before contacting Ice Qube for technical assistance.



## TROUBLE SHOOTING CHECK LIST

<b>Model No:</b>		<b>S/N Number:</b>	
Voltage Rating:	Amps:	Phase:	Hz:
Is proper electrical power available at the outlet?		YES <input type="checkbox"/>	NO <input type="checkbox"/>
Is the power cord connected to the electrical supply?		YES <input type="checkbox"/>	NO <input type="checkbox"/>
Is the controller set point temperature above or below the enclosure temperature?		YES <input type="checkbox"/>	NO <input type="checkbox"/>
Is the internal blower(s) operating?		YES <input type="checkbox"/>	NO <input type="checkbox"/>
Is the external blower(s) operating?		YES <input type="checkbox"/>	NO <input type="checkbox"/>
Is the enclosure door closed tightly?		YES <input type="checkbox"/>	NO <input type="checkbox"/>
Are all of the gaskets in place?		YES <input type="checkbox"/>	NO <input type="checkbox"/>
Has the unit been cleaned recently?		YES <input type="checkbox"/>	NO <input type="checkbox"/>
Is the system mounted level on the enclosure?		YES <input type="checkbox"/>	NO <input type="checkbox"/>
Is there adequate space within the enclosure for air flow?		YES <input type="checkbox"/>	NO <input type="checkbox"/>
Is there adequate space around the enclosure for air flow?		YES <input type="checkbox"/>	NO <input type="checkbox"/>
Have you recently added electronic equipment to the enclosure?		YES <input type="checkbox"/>	NO <input type="checkbox"/>

Still experiencing problems?

Call Ice Qube at 1-888-867-8234

Make sure you have your model and serial number ready before you call.

### Standard Warranty Policy

Ice Qube, Inc. ("**Ice Qube**") warrants that the products manufactured by Ice Qube (the "**Products**") are free of defects in material and workmanship which impair the operation of the Products, under normal and proper use and service, for a period of one (1) year from the date of shipment FCA from Ice Qube's facility located in Greensburg, Pennsylvania (the "**Standard Warranty**").

In order for this Standard Warranty to apply, the Product(s) must be installed and operated according to and consistent with the following conditions:

- Voltage variation no greater than +/- 10% from the rated voltage on the label of the Product;
- Frequency variation no greater than +/- 3 HZ from rated frequency on the label of the Product;
- Ambient temperature must not exceed maximum operating temperature on the label of the Product;
- Maximum cooling capacity not to exceed rating (BTU/HR) as rated on the label of the Product; and
- The Product must be installed, maintained and operated consistent with the terms and conditions set forth in the operation manual.

#### **THIS STANDARD WARRANTY DOES NOT COVER THE FOLLOWING:**

- Ice Qube assumes no liability beyond the repair or replacement of its own Products. In no event shall Ice Qube be liable for any incidental, special, indirect, consequential or similar damages incurred by any purchaser, owner, possessor, assignee or successor in interest or any other third party having any interest in any Product as the result of any breach of this Standard Warranty, including but not limited to loss of profit or revenues, damages for loss of use of the Products, damage to property, both real and personal, claims of third parties, including personal injury or death on account of use of the Products or failure of Ice Qube to warn against or instruct on or adequately warn against or instruct on, the dangers of the Products or the safe and proper use of the Products, whether or not customer has been advised of the potential for such damages.
- Ice Qube's total liability for customer's claims from any cause whatsoever, whether arising under contract, warranty, tort (including negligence), strict liability, products liability or any other theory of liability, will be limited to the lesser of customer's actual damages or the price paid by customer to Ice Qube for the Products (not including applicable taxes, duties and freight charges) that are the subject of customer's claim.

THE WARRANTY SET FORTH HEREIN IS STRICTLY LIMITED TO ITS TERMS AND IS IN LIEU OF ALL OTHER WARRANTIES, GUARANTEES, EXPRESS OR IMPLIED, ARISING BY OPERATION OF LAW, COURSE OF DEALING, CUSTOM, USAGE OF TRADE OR OTHERWISE, SPECIFICALLY EXCLUDING ANY IMPLIED WARRANTIES OF MERCHANTABILITY OR FITNESS FOR A PARTICULAR PURPOSE OR USE.

1. The warranty and remedies for breach of warranty provided for in this Standard Warranty extend only to the original installation and do not cover, and Ice Qube will neither assume responsibility, nor be liable, for the following:
  - misapplication of its Products or the erroneous selection of an inappropriate Product by a non-authorized Ice Qube representative;
  - use of the Product for other than its designed purpose or operating conditions;
  - operation or storage in harsh, oily, corrosive or other abnormal environments without the proper filtration, sealing, protective coatings and/or weather protection;
  - damage to the hermetic system resulting from continuous operation with dirty or clogged air filters or improper or negligent maintenance;
  - use of refrigerant other than designated on the label of the Product;
  - customer modification or abuse;
  - shipping damage or other accidental damage (It is Ice Qube's standard policy that freight claims are the responsibility of the customer if the Product is not refused at delivery);
  - repair, damage or service of the Product caused by anyone except personnel authorized by Ice Qube;
  - cracked or broken hermetic tubing, brazed joints or other internal damage caused by shipping or mishandling;
  - damage caused by shipping units attached to an enclosure;
  - any and all damage, breakage, malfunction or other like conditions or defects resulting from noncompliance with the standard operation, care, installation, maintenance and use of the Product as set forth in the operation manual for such Product;
  - any cause beyond the control of Ice Qube, including without limitation conditions caused by movement, settlement or structural defects of the environment in which the Products are installed;
  - fire, wind, hail, flood, lightning or other acts of God;
  - any damage to the finish of the Products after they leave Ice Qube's facility;
  - any discoloration or spotty appearance of the Products;
  - return freight and shipping charges, along with applicable duties and other like fees and charges, for the return of the Product to Ice Qube (such amounts are the sole responsibility of the customer);
  - failure to process or inaccurate processing of time-sensitive information and/or mechanisms; or
  - exposure to harmful chemicals, pollutants or other foreign matter or energy.
2. All returns must have a RMA number and must be marked with the RMA number on the bill of lading and on the packaging.

3. Upon resale, customer agrees to extend to its customers no greater warranties, and limit its liability and remedies to the same extent, as those set forth herein.
4. All Product literature is for illustrative purposes only and does not contain a warranty of any kind.
5. Ice Qube's advice relating to the technical usage of the Products or the intellectual property rights of others, whether provided orally or in writing or through the provision of test results, is given in accordance with Ice Qube's best knowledge at that time, but shall at all times be deemed to be non-binding. Such advice does not relieve customer from the obligation, and customer accepts full responsibility, to confirm for itself the suitability of the Products for their intended purpose(s).

#### **Remedies**

Customer's sole and exclusive remedy, and Ice Qube's only obligation for breach of warranty hereunder shall be, at Ice Qube's option, in its sole discretion, to (i) repair or replace the defective Product which fails within the one (1) year warranty period, free of charge, provided that customer promptly notifies Ice Qube of such failure and, after receipt of prior written authorization and return authorization number from Ice Qube, which will be given or withheld at Ice Qube's sole discretion, returns such Product to Ice Qube, Inc., 141 Wilson Avenue, Greensburg, PA 15601, or such other place as requested by Ice Qube, freight prepaid, and thereupon Ice Qube finds such to be defective or (ii) issue a credit equal to the price of the defective Product which fails within the one (1) year warranty period. Customer must pay all related costs of repair or replacement, including removal, installation or reinstallation costs. Ice Qube's personnel must be granted access to inspect the Products claimed to be defective at the site of their installation or use. Products repaired or replaced and designs corrected under this Standard Warranty are warranted only for the remainder of the original warranty period.

#### **In-Field Service for Continental United States<sup>1</sup>**

All standard duty air conditioners manufactured by Ice Qube are eligible for in-field service, where available, at no charge to customer, for a period of one (1) year from the date of shipment FCA from Ice Qube's facility in Greensburg, Pennsylvania. However, such in-field service is only available at the sole discretion of Ice Qube. In-field service may not be available in all service areas and the provision of in-field service is subject to change at any time by Ice Qube without notice. The location of the Product otherwise eligible for in-field service must be within One Hundred (100) miles of the service center selected by Ice Qube in its sole discretion. In-field service is only available in the Continental United States.

All in-field services must be initiated by Ice Qube. Customers must call Ice Qube support service at (724) 837-7600 and work with the Ice Qube support personnel so that Ice Qube can determine the necessity of in-field service for such Product in its sole discretion.

Ice Qube will not assume any liability for any in-field service not initiated by Ice Qube. In no event shall Ice Qube be liable for any incidental, special, indirect, consequential or similar damages incurred by any purchaser, owner, possessor, assignee or successor in interest or any third party having any interest in any Product as the result of the provision of any in-field services to such Product, including but not limited to loss of profit or revenues, damages for loss of use of the Products, damage to property, both real and personal, claims of third parties, including personal injury or death on account of use of the Products or failure of Ice Qube to warn against or instruct on or adequately warn against or instruct on, the dangers of the Products or the safe and proper use of the Products, whether or not customer has been advised of the potential for such damages.

Ice Qube's total liability in connection with in-field services from any cause whatsoever, whether arising under contract, warranty, tort (including negligence), strict liability, products liability or any other theory of liability, will be limited to the lesser of customer's actual damages or the price paid to Ice Qube for the Products (not including applicable taxes, duties and freight charges) for which in-field services are sought.

ALL HAZARDOUS DUTY AIR CONDITIONERS ARE EXCLUDED FROM IN-FIELD SERVICE DUE TO CERTIFICATION. TO THE EXTENT APPLICABLE, SPECIFICALLY EXCLUDED FROM IN-FIELD SERVICES INITIATED BY ICE QUBE ARE ANY AND ALL OTHER WARRANTIES, GUARANTEES, EXPRESS OR IMPLIED, ARISING BY OPERATION OF LAW, COURSE OF DEALING, CUSTOM, USAGE OF TRADE OR OTHERWISE, SPECIFICALLY EXCLUDING ANY IMPLIED WARRANTIES OF MERCHANTABILITY OR FITNESS FOR A PARTICULAR PURPOSE OR USE.

ALL QUBE AND BLADE SERIES UNITS ARE EXCLUDED FROM IN-FIELD SERVICE. THESE UNITS WILL EITHER BE RETURNED TO THE FACTORY FOR REPAIR OR MAY BE ELIGIBLE FOR A REPLACEMENT UNIT. THIS WILL BE AT THE SOLE DISCRETION OF ICE QUBE, INC.

#### **Extended Warranty Options**

Ice Qube offers extended warranty options on a per Product basis. Please contact Ice Qube at (724) 837-7600 for further information. All extended warranties must comply with all applicable provisions of the Standard Warranty listed above.

All Products with extended warranties must be registered with Ice Qube and must be installed and maintained according to the operation manual and according to the terms and conditions set forth in the Extended Warranty for such Product.

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<sup>1</sup> In-field service outside the Continental United States is only offered on a case by case basis in Ice Qube's sole discretion. Customers outside the Continental United States must call Ice Qube support service at (724) 837-7600 and consult with the Ice Qube support personnel so that Ice Qube can determine the availability of in-field service at such location.