

# RiteAire Marine

## Operating Manual

### for RAM 70 – 3

INSTALLATION AND SERVICE MUST BE PERFORMED BY A QUALIFIED INSTALLER.  
READ THIS MANUAL THOROUGHLY BEFORE ATTEMPTING INSTALLATION OR  
OPERATION. FAILURE TO FOLLOW THESE INSTRUCTIONS MAY RESULT IN IMPROPER  
INSTALLATION, ADJUSTMENT, UNIT PERFORMANCE OR MAINTENANCE!

**THIS PRODUCT MAY BE COVERED BY U.S. PAT. NO. 10,538,302.**

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## I. Hello. Thank You and Congratulations!

Thank you for trusting and selecting RiteAire Marine (RAM) to improve your indoor air quality. RiteAire Marine when properly installed and maintained will supply your marine vessel with years of comfortable and healthy indoor environment; unmatched by any other product in the marine industry.

Hector Escardo  
Co-Founder

## II. Description of Benefits

RiteAire Marine system is a whole boat dehumidification product. Controlling and maintaining relative humidity at 50% or lower will prevent condensations from occurring even in areas where air is the coldest (ducts, grills and hard surfaces). This will eliminate and prevent mold growth.

Other benefits of controlling humidity are the reduction of VOC's. People are exposed to VOC on board because they magnetically attach themselves to water or are water soluble. Reduce the water content of air and exposure to these VOC is reduced by as much as 50%. Examples of VOC we have monitored and documented 50% reduction of are formaldehyde, waste and fuel smells.

## III. Installation Overview

RiteAire provides dehumidification for your whole boat. One unit can control humidity on a vessel up to 70'. Additional units will be needed for larger yachts and more challenging installations. The goal is to install RAM unit at a central location drawing moist air. We duct dry air from RAM to most staterooms, salon, and galley. A digital humidistat located near the return air grill, samples humidity and controls RAM to maintain its programmed humidity level. The water removed from the air is ducted directly overboard, to a gray water tank or to a sump. Condensation line is monitored to prevent water damage in the event of failure to drain properly.

## IV. Operating RiteAire Marine

### 1. Starting RAM

- a) Turn on dedicated breaker at panel (15amp 115 VAC).
- b) Turn RAM's built in humidistat/controller to off position (this transfers control to remote humidistat/controller). Installer should have done this already. **SEE FIGURE 6**
- c) Program remote humidistat/controller to dehumidifying at 45% AUTO. Installer should have done this already.
- d) It is recommended to run RAM with the fan control set to ON. Rocker switch is located on the front end of RAM.

## 2. RAM's Remote Humidistat/Controller

Remote humidistat/ controller is a digital device that will sample indoor humidity and temperature levels. It controls RAM to maintain onboard humidity within 2% of programmed level. It displays: Temperature, Humidity and Time. Backlight will only remain on for approx. 30 seconds. Remote has 3 primary functions: Controlling a humidifier (not used). Controlling a dehumidifier (primary function). A clock.

It should not be located near: Outside doors or windows, A/C vents, showers, sinks, galley.

### **PROGRAMMING: SEE FIGURE 5**

There are 4 buttons on the remote: MORE, DONE, UP ARROW, DOWN ARROW.

Press any button once and the backlight will illuminate.

MORE button will scroll you through the 3 functions.

The first 2 will be for controlling a humidistat (not used).

3<sup>rd</sup> MORE will allow you to program desired humidity level (45% recommended). UP and DOWN ARROWS let you change the set point.

4<sup>th</sup> MORE will allow you to program AUTO (This will turn system on) or OFF (This will turn system off). Use arrows to change program.

5<sup>th</sup> – 7<sup>th</sup> MORE will allow you to program the clock.

DONE button will save your program. It can be pressed anytime that one is done changing program.

Remote has a backup battery. Loss of power will not result in loss of program.

## 3. Condensation Line and Alarm

Condensation line should always have a downward pitch to where it discharges. Dips and traps are not recommended. It is sometimes necessary to elevate RAM unit to achieve this. Installer should keep in mind that most vessels will raise the bow when running.

Condensation line alarm (AquaGuard) is recommended for installations where RAM is not draining directly overboard, and line is not running straight down.

AquaGuard is a digital sensor that will shut down RAM unit if it detects water level rising in the line. Splashing the probe won't shut it down. Probe has to be submerged in water for 60 seconds for it to shut down RAM. There will be a time delay for AquaGuard to reset itself once the drain line is cleared. AquaGuard should be installed right at the exit of condensate from RAM unit. An AquaGuard sticker should be installed on the top of RAM unit to alert you that it is there. When AquaGuard senses water for more than 60 seconds, it will turn off power to the remote causing RAM to shut down. If RAM has power, is not running and the remote is off, it is the AquaGuard that has shut it down.

#### 4. Air Filters and Maintenance

RAM is equipped with 2 onboard filters. The first is a washable mesh filter (may not be on all units). This filter should be replaced once a year. The second is a MERV 13 filter that needs to be replaced every 2 – 3 months. A second filter is there for the benefit of occupants and RAM unit. Keeping RAM clean keeps unit running efficiently and reduces breakdown. Operating without any filters or old filters may void warranty.

#### 5. Operation Tips

##### DON'Ts:

- a) Do not shut off, obstruct or restrict air flow. Supply and return air ducts, grills and spaces have been designed for the best possible results.
- b) Do not turn off sumps or grey water tanks.
- c) Do not operate RAM if the cabin temperature is over 95 degrees or below 55 degrees. RiteAire is air cooled and it will overheat or freeze when operated outside its limits.
- d) Do not program controller below 45% relative humidity. If RAM is struggling to maintain the programmed level within 3%, check the troubleshooting section.
- e) Do not disable condensation line alarm if installed.
- f) Do not operate RAM without an air filter. The air filter maintains a clean, efficient and trouble-free unit.
- g) Do not operate a RAM unit that is or has been exposed to water.
- h) Do not keep relative humidity onboard below 40%. Cabinetry and finishes onboard may shrink and damage may occur.

##### DOs:

- a) Replace air filter every 2 – 3 months. The best filter available that will fit is a MERV 13 Mini Pleat.
- b) Set your A/C's air handlers to constant fan. Even if A/C is not running. This will help mix all cabin air.
- c) Set fan on RAM to ON not AUTO. This will keep RAM fan constantly on and help maintain a healthy air mix in all cabins. **SEE FIGURE 6**

## V. Troubleshooting

### Condensation Line Leak After Installation Without Alarm.

1. Dirty, clogged or pinched condensation line.
2. Condensation line does not have downward pitch even when vessel is underway.
3. Thru-hull obstructed.
4. Sump pump or grey water tank off or failure.

### IF AquaGuard ALARM IS INSTALLED (SEE FIGURE 3)

1. Review previous checklist 1-4.
2. Check for improper wiring and/ or plumbing of AquaGuard.
3. Faulty alarm

**Neither Fan Nor Compressor Running. Dehumidification Is Being Called For. No Fan Calls.**

1. Unit unplugged or no power to outlet.
2. Humidity control set too high.
3. Loose connection in internal or control wiring. **SEE FIGURE 1, 2, 3, 4, 5, and 6**
4. Defective Compressor relay.
5. Defective control transformer.

**Compressor Is Not Running. Dehumidification Is Being Called For. No Fan Calls.**

1. Defective compressor run capacitor.
2. Loose connection in compressor circuit.
3. Defective compressor overload.
4. Defective compressor.
5. Defrost thermostat open.

**Compressor Cycles On and Off. Dehumidification Is Being Called For. No Fan Calls.**

1. Low ambient temperature and/or humidity causing unit to cycle through defrost mode.
2. Defective compressor overload.
3. Defective compressor.
4. Defrost thermostat defective.
5. Dirty air filter(s) or air flow restricted.

**Fan Is Not Running. Dehumidification Or Fan Is Being Called For.**

1. Loose connection in fan circuit.
2. Obstruction prevents fan impeller rotation.
3. Defective fan.
4. Defective fan relay.

**Low Dehumidification Capacity (Evaporator Is Frosted Continuously). Dehumidification Is Being Called For.**

1. Defrost thermostat defective.
2. Low refrigerant charge.
3. Dirty air filter(s) or air flow restricted.
4. Excessively restrictive ducting connected to unit.

**Unit Removes Some Water, But Not As Much As Expected.**

1. Air temperature and/or humidity have dropped.
2. Humidity meter and or thermometer used are out of calibration.
3. Unit has entered defrost cycle.
4. Air filter dirty.
5. Defective defrost thermostat.
6. Low refrigerant charge.
7. Air leak such as loose cover or ducting leaks.
8. Defective compressor.
9. Restrictive ducting.

**Unit Test To Determine Problem:**

1. Turn rocker switch for fan control to AUTO. **SEE FIGURE 6**
2. Detach field control wiring connections from main unit. **SEE FIGURE 2**
3. Connect the 24V and FAN terminals from the main unit together; only the fan should run. Disconnect the terminals.
4. Connect the 24V and DEHU terminals from the main unit together; the compressor and fan should run.
5. If these tests work, the main unit is working properly. You should check the control panel and field control wiring for problems next.
6. The problem is the remote, AquaGuard or wiring of these components. **SEE FIGURES 1, 2, 3 and 4.**

**Troubleshooting Field Control Wiring, Remote Controller and AquaGuard Alarm:  
SEE FIGURES 1,2,3,4 and 6**

**Symptom: RAM Has Power, Remote Is Off, and RAM Is Off.****CAUTION**

**Turn OFF power to RAM while performing these tests. 4 x 4 box does have 110 VAC wiring going into it. Touching some wires together could cause the low voltage breaker to trip and/or damage the transformer.**

1. Check that low voltage breaker on the back end of RAM unit is not tripped. **SEE FIGURE 2**
2. Turn rocker switch for fan control to AUTO. **SEE FIGURE 6**
3. Check for proper and secure wiring of low voltage components between RAM, remote, AquaGuard, and 4 x 4 connection box. Consult wiring diagrams in manual. **SEE FIGURE 1, 2, 3, and 4**
4. Check AquaGuard probe by removing cap on condensation line. Check for standing water and clean both probe tips. With line dry and probe clean, remote should start within a couple of minutes.
5. If remote still does not turn on, AquaGuard may be defective. To further test AquaGuard must be bypassed. Open the 4 x 4 connection box and remove the AquaGuard circuit. There will be 2 red wires connected to the AquaGuard wiring. They must be disconnected from AquaGuard and connected to each other. When RAM is repowered, the control panel should be lit, and RAM is not operating without a condensation alarm. If remote does not turn on while the power is available, and all the wiring is correctly secured, then the remote control is defective.
6. RAM can continue to operate by using its internal remote/humidistat. On the front end of RAM unit turn the control knob clockwise to the desired level of humidity.

**VI. Parts List****OPTIONAL PARTS LIST: RAM**

<b>Part No.</b>	<b>Description</b>
4037724	Filter MERV 13
4030113	Pump Kit
40295888"	Duct Collar (2)

**SERVICE PARS LIST: RAM**

<b>Part No.</b>	<b>Description</b>
4029567	Compressor
4029568	Compressor Overload
4022484	Compressor Relay
4033032-03	Capacitor 35 MFD
4035235-03	Capacitor 6 MFD
4033358-02	Coil Set
4031384	Impeller Fan
4020924	Fan Relay
4027172	Control, Humidity
4031376	Defrost Thermostat
4030488	Timer Relay
4022487	Transformer

**FOR OWNER-ROUTINE MAINTENANCE**

<b>Part No.</b>	<b>Description</b>
4037724	Air Filter MERV 13
4030734	4Pack
4030733	12Pack

**The RAM is equipped with a MERV 13 media filter. This filter should be checked every two months. Operating the unit with a dirty filter will reduce dehumidifier capacity and efficiency and may cause the compressor to cycle off and on unnecessarily on the defrost control.**

**VII. RiteAire Marine Warranty****WARRANTOR:**

RiteAire Marine LLC (RAM)  
2401 – C 28<sup>th</sup> Ave. North  
St. Petersburg, Fl 33713  
Telephone: 727-954-5885

**WHO IS COVERED:** This warranty extends only to the original end user of RAM and may not be assigned or transferred.

**FIRST YEAR WARRANTY:** RAM warrants that for one year after date of original purchase of RAM dehumidifier will operate free from any defects in materials and workmanship. RAM will replace the unit with a new one for the first year. Proof of purchase or filled out warranty card on file.

**SECOND YEAR WARRANTY:** RAM warrants that condenser, evaporator and compressor will operate free of any defects in materials and workmanship for a second year. RAM at its option will either replace or repair the dehumidifier.

**END-USER RESPONSIBILITIES:** If warranty service is to be performed on RAM, RiteAire Marine must be contacted prior to any work being done. We will perform the repair or find a RAM authorized technician.

The End-user must present proof of purchase upon request, by use of warranty card, receipt or invoice. The end-user is responsible for normal care of RAM. This includes but not limited to:

- Maintaining a clean MERV-13 filter.
- Inspecting and cleaning condensation line.
- Inspecting and preventing equipment and gear from obstructing air flow to and from RAM.

This warranty does not cover any defects, malfunctions, etc. resulting from: misuse, abuse, lack of normal care, corrosion, freezing, flooding, modifications, unauthorized or improper repair/installation, accident, acts of nature, or any other cause beyond RiteAire Marine's reasonable control.

**LIMITATION AND EXCLUSIONS:** If any RAM unit is repaired or replaced, the new part shall be warranted for only the remainder of the original warranty period.

**To register for your warranty online please go to:**

**<http://www.riteairmarine.com/warranty-card/>**

## **VIII. Dealers and Installers**

- **Beard Marine Fort Lauderdale, FL**  
Telephone: 954-463-2288
- **Beard Marine, Riviera Beach, FL**  
Telephone: 561-881-9598
- **Elite Marine, Ft. Lauderdale, FL**  
Telephone: 954-763-9677
- **Emerald Coast Yacht Services, Orange Beach, AL**  
Telephone: 251-269-0768
- **Escardo Marine, Saint Petersburg, FL 33713**  
Telephone: 727-898-2010
- **Layco Marine Service, Elberta, FL**  
Telephone: 251-923-4900
- **Thomas Marine, Fort Lauderdale, FL**  
Telephone: 800-299-0942
- **Tricounty Marine Services, Joe Cusmano, Fort Lauderdale, FL**  
Telephone: 954-471-3407



## IX. Specifications

<b>Blower:</b>	150 CFM @ 0.0" WG
<b>Power:</b>	680 Watts @ 80°F and 60% RH
<b>Supply Voltage:</b>	110-120 VAC – 1phase – 60 Hz.
<b>Current Draw:</b>	5.1 Amps
<b>Energy Factor:</b>	2.37 L/kWh
<b>Operating Temp:</b>	55°F Min - 95°F Max
<b>Minimum Performance @ 80°F and 60% RH:</b>	
<b>Water Removal:</b>	70 Pints/Day
<b>Efficiency:</b>	5.0 Pints/kWh
<b>Air Filter:</b>	MERV-13 Size: 12" x 12" x1"
<b>Drain Connection:</b>	3/4" Threaded MPT
<b>Dimensions:</b>	<b>Unit:</b>
Width:	12"
Height:	12"
Length:	28"
<b>Weight:</b>	55 lbs.

## X. FOR RAM INSTALLER AND TECHS ONLY

**Read and save these instructions.**

### Service

**CAUTION:** Servicing the RAM with its high-pressure refrigerant system and high voltage circuitry presents a health hazard which could result in death, serious bodily injury, and/or property damage. Please contact your HVAC professional.

### Refrigerant Charging

If the refrigerant charge is lost due to service or a leak, a new charge must be accurately weighed in. If any of the old charge is left in the system, it must be recovered before weighing in the new charge. Refer to the unit nameplate for the correct charge weight and refrigerant type.

### For RAM installer only:

#### Compressor/Capacitor Replacement

This compressor is equipped with a two terminal external overload and a run capacitor, but no start capacitor or relay.

**CAUTION-ELECTRICAL SHOCK HAZARD:** Electrical power must be present to perform some tests. These tests should be performed by a qualified service person.

#### Safety Precautions

Read the installation, operation and maintenance instructions carefully before installing and operating this device. Proper adherence to these instructions is essential to obtain maximum benefit from you RAM.

The device is designed to be installed **INDOORS IN A SPACE THAT IS PROTECTED FROM RAIN AND FLOODING.**

Install the unit with space to access the front panel for maintenance and service. **DO NOT INSTALL UNIT WITH THE FRONT PANEL INACCESSIBLE.**

Avoid directing the discharge air at people, or over the water in pool areas.

If used near water source; be certain there is no chance the unit could fall into the water or get wet.

**DO NOT** use the device as a bench or table.

Never operate a unit with a damaged power cord. If the power cord is damaged it must be replaced by the manufacturer, its service agent, or similarly qualified person in order to avoid a hazard.

Do not obstruct the air intake and exhaust.

### **Intended Application for RAM**

For the ideal installation, draw air from the central part of the workspace and return it to isolated areas of the structure.

### **Registrations**

The RAM conforms to unified standard UL 60335-2-40.

### **Installation Checklist**

Prior to installation of the RAM, please review the following requirements. The RAM can be installed in a variety of locations to meet the owner's needs and be integrated with existing forced air systems or existing ductwork if desired. The location choice is contingent on a variety of requirements not limited to; ease of service, controls access, drainage, filtration, power, and water damage prevention. Please address all these issues before you select the location of the device.

### **Power Accessibility**

Unit should be in an area where 100-120 VAC electrical; with a minimum of a 15 A circuit capacity.

### **Space**

Location should have enough clearance to handle the unit's overall dimensions as well as the necessary return/supply ductwork to the unit.

### **Low Voltage Wiring**

Unit location should be in an area where field wiring the remote controls (low voltage) to the unit will be possible.

### **Support Structure and Suspension**

Place the RAM on supports to raise the base of the unit. Do not place the RAM directly on structure; installations without vibration absorbers may result in unwanted noise.

### **Electrical Requirements**

**WARNING: DO NOT ALLOW THE YELLOW LEAD FROM RAM TO CONTACT THE RED LEAD FROM THE RAM OR DAMAGE TO THE TRANSFORMER WILL RESULT.**

The device draws 5.1 Amps under normal operating conditions. If used in an area which may become wet, a GFCI (Ground Fault Interrupt) is required.

RAM offers control devices such as: humidistat/controller, condensation alarm, fan controls, and dampener controls. All controls are low voltage (24 volt) and should be connected with low voltage wire.

**CAUTION:** Do not install the control panel where it may not accurately sense the relative humidity such as near RAM supply registers, near exterior doors, on an outside wall, near a window, or near a water source.

The installer must supply the wiring between the RAM and the control panel. Be sure to safely route the control wiring to prevent damage during installation.

**CAUTION:** Do not cross wires when connecting RAM. The remote controls of RAM are powered by a low voltage circuit (24VAC) and must NEVER contact or be connected to a high voltage circuit.

The control wires leaving the RAM and the remote-control panels are numbered and color-coded to prevent confusion. Some of the control wires leaving RAM may not be used with certain control panels and should be left unconnected. Be sure to consult the electrical schematic in this manual or inside the access panel of RAM before making control connections.

#### **Condensate (Water) Removal**

**CAUTION:** A trap in the drain line is not required for the unit to drain properly. Use care to keep the pipe assembly as flat to the floor as possible. Kinks and/or humps will prevent proper drainage.

The RAM generates condensate. Install a 3/4" male nominal pipe thread adapter to the drain pan. It is necessary to assemble your own drainpipe assembly utilizing 3/4" PVC pipe or hose to get the condensate to a floor or other drain. Slope to drain should be at least 1" drop for every 10' of run.

#### **Lifting Condensate**

A condensate pump may be installed if lift is required to dispose of the condensate.

#### **Converting to Vertical Discharge Airflow**

The RAM is shipped from the factory with the exhaust panel of the cabinet configured for horizontal air discharge. The cabinet can be easily converted to vertical air discharge.

#### **For RAM Installer Only:**

For the ideal installation, draw air from the central part of the workspace and return it to the isolated areas of the workspace like staterooms, galley, salon, helm area. Installation of a separate supply duct to the RAM from a central area is recommended.

#### **Supply Air**

**CAUTION:** DO NOT draw air directly from the galley, laundry room or bilges or heads.

A short piece of flexible ducting on all RAM duct connections is recommended to reduce noise and vibration. Ducting the RAM as mentioned requires consideration of the following points.

**Duct Sizing**

For total duct lengths up to 25' use a minimum 8" diameter round or equivalent rectangular. For longer lengths, use a minimum 10" diameter or equivalent. Grills or diffusers on the duct ends must not excessively restrict airflow.

Installation of duct runs 25 feet or shorter should achieve a minimum of 50 square inches of combined duct work. Installations of duct runs 25 to 40 feet long should achieve a minimum of 70 square inches of combined duct work. **SEE FIGURE 7**

**Installation in a Structure with No Existing Forced Air RAM System.**

When installing the RAM in a structure that does not have forced air, a single return for the RAM should be installed in central open area of the structure. DO NOT locate return in a head, galley or near exterior door. The supplies of the RAM should be in the remote areas of the structure. By ducting this way, the air inside the structure will circulate through RAM to be filtered and dehumidified.

**Noise Abatement**

A length of 10 feet or more of flex ducting on the outlet of the RAM will reduce air noise from the fan.

**Controls**

The RAM features a built-in manual Humidistat/Control as well as the ability to wire a remote mounted control to the unit. The control used to operate the unit should be in an area where the control can accurately sense the humidity of the area where humidity control is desired.

**For RAM installer only:**

If the RAM is located outside of the area where humidity control is desired, consider using a remote wired humidity controller that is in the area where humidity control is desired.

When using the remote wired Humidistat/Control (**SEE FIGURE 5**), be sure that the built-in manual controller is in the OFF position, by turning it counter-clockwise until it stops. Failure to do so may cause the unit to sense the humidity from the wrong area.

**WARNING: DO NOT** allow the yellow lead from the unit to contact the red lead or the white lead from the unit or damage to the transformers will result.

**Maintenance****High-Efficiency Air Filter**

The RAM is equipped with a MERV 13 media filter. This filter should be checked every two months. Operating the unit with a dirty filter will reduce dehumidifier capacity and efficiency and may cause the compressor to cycle off and on unnecessarily on the defrost control.

**DO NOT** operate the unit without a filter or with a less effective filter.

## XI. Diagrams and Drawings

FIGURE 1: Main Wiring Diagram for RAM System

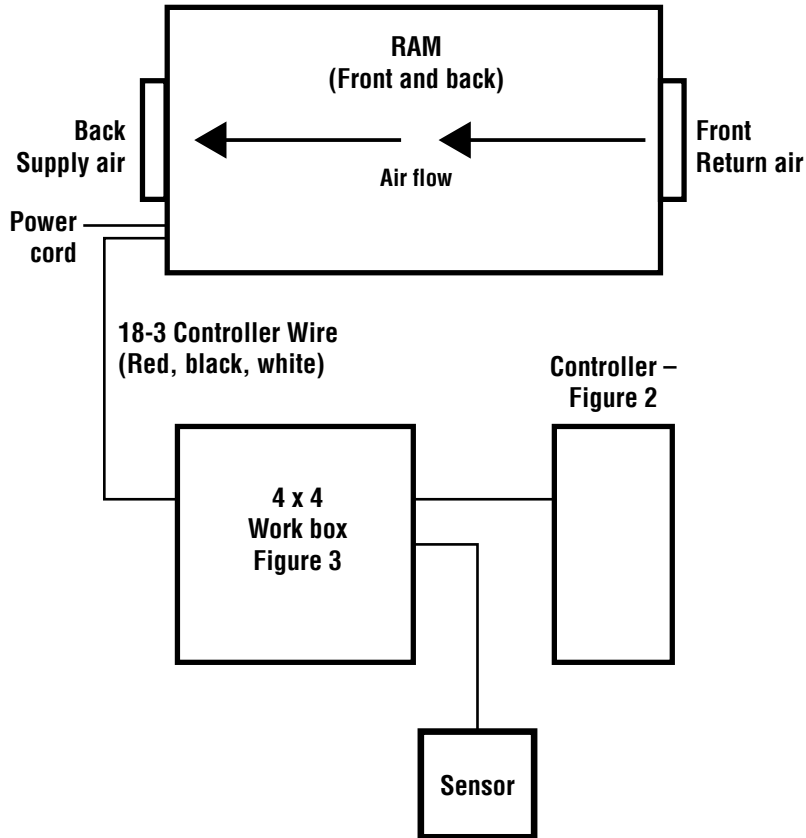
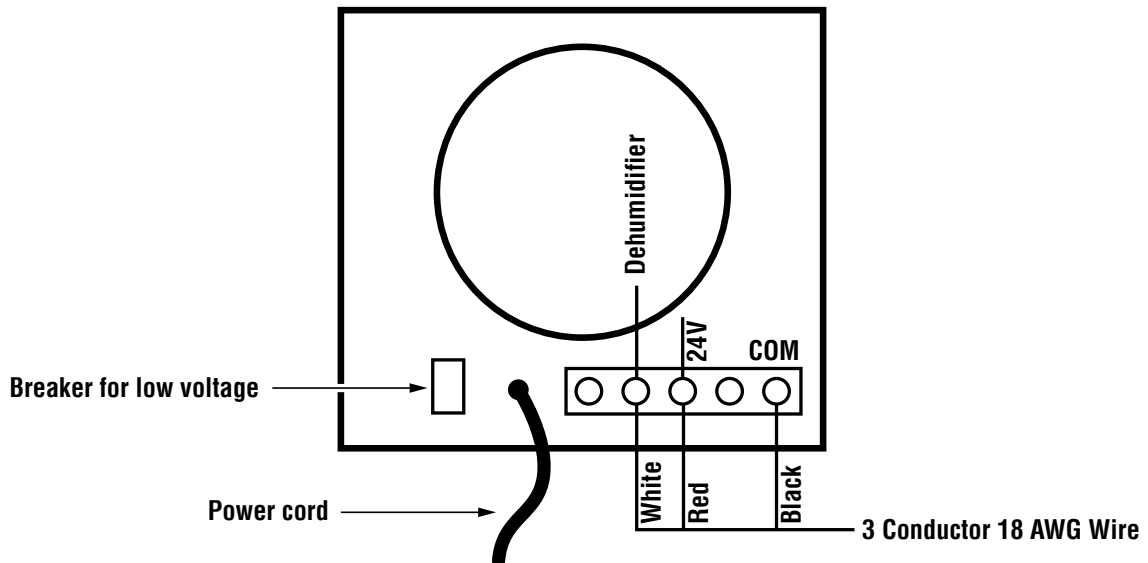
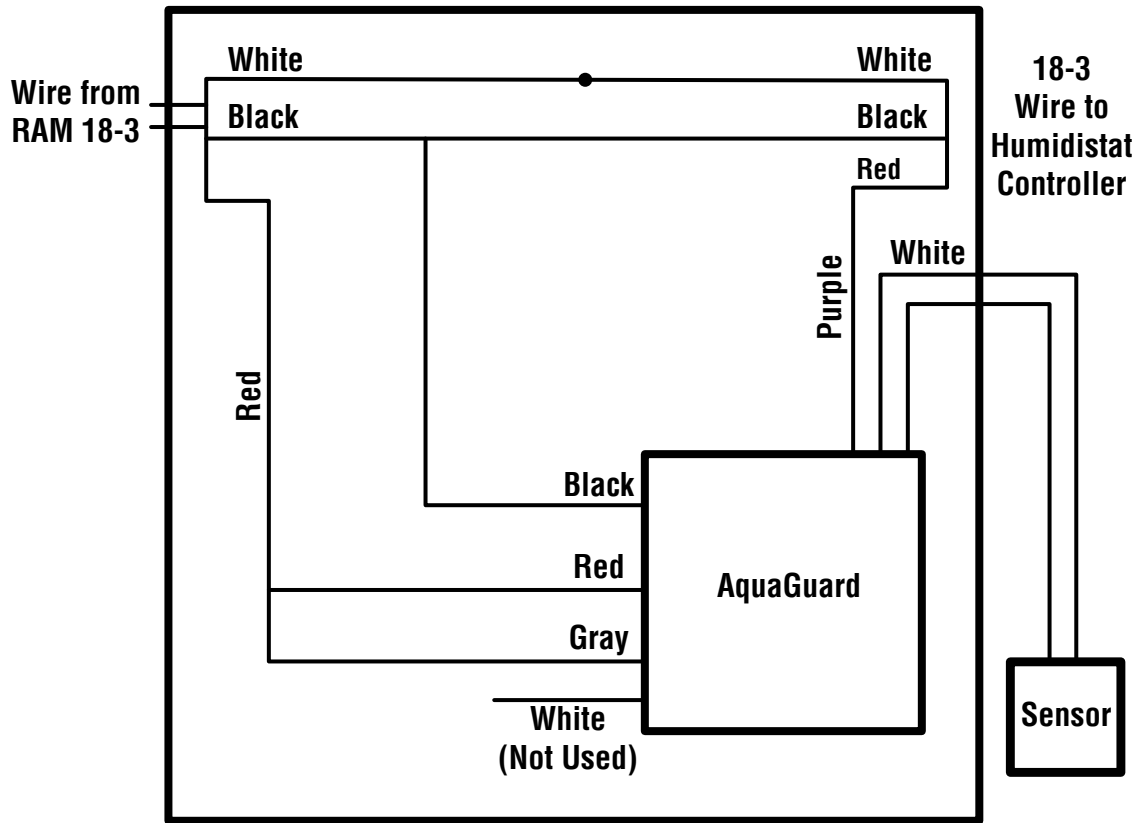


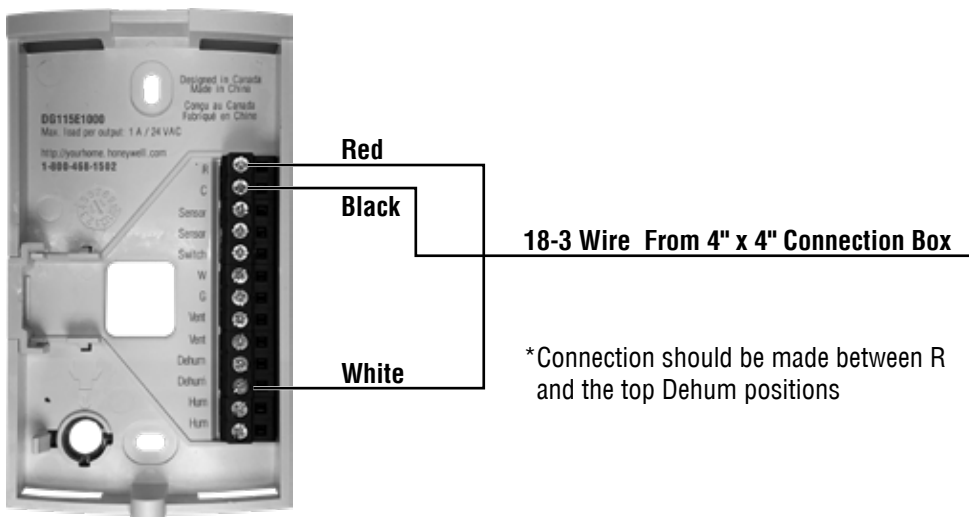
FIGURE 2: Back Side of RAM Unit



**FIGURE 3: 4" x 4" Connection Box**



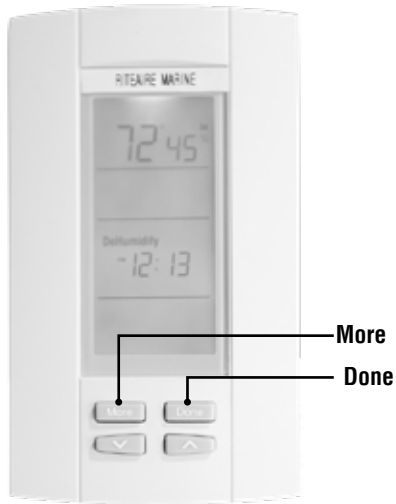
**FIGURE 4: Inside of Humidistat/Controller**



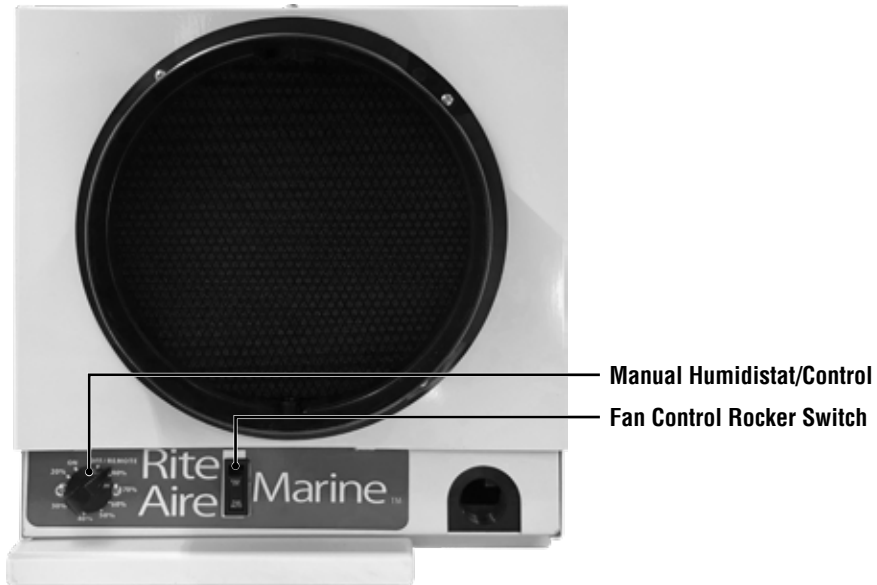
**18-3 Wire From 4" x 4" Connection Box**

\*Connection should be made between R and the top Dehum positions

**FIGURE 5: Front of Humidistat/Controller**



**FIGURE 6: Front of RAM Unit with Filter**



**FIGURE 7: Duct Size Selection Chart**

Duct Size =	Square Inches
10"	78"
8"	50"
6"	30"
5"	20"
4"	12.5"

## XII. Contact and Serial Number Information

RiteAire Marine LLC  
2401- C 28<sup>th</sup> Avenue North  
Saint Petersburg, FL 33713

Telephone: (727) 954-5885  
Fax: (727) 822-3562

Email: [info@riteairemarine.com](mailto:info@riteairemarine.com)

Website: [www.riteairemarine.com](http://www.riteairemarine.com)

**Serial Number Unit 1** \_\_\_\_\_

**Serial Number Unit 2** \_\_\_\_\_

**Serial Number Unit 3** \_\_\_\_\_

**Serial Number Unit 4** \_\_\_\_\_

**Date of Installation** \_\_\_\_\_

**Installer Name** \_\_\_\_\_