



Small Duct High Velocity Heating, Cooling and Home Comfort Systems

RCM-A2L Refrigerant Module

Installation Manual

For use with A2L (R-454B & R-32) Refrigerants

IMPORTANT: This cooling coil MUST be installed with supplied RDS Kit, or safety related procedures could be compromised.

Refer to page 8 to complete the RDS installation.



RCM-50-A2L (1.5-2 Tons)
RCM-70-A2L (2.5-3 Tons)
RCM-100-A2L0 (3.5-5 Tons)

Includes:

A2L TX Valve (for R-454B or R-32 Refrigerants)

RDS Kit for A2L Applications

w/ Refrigerant Sensor

Freeze Stat

Drain Pan

Service/ Access Port(s)

L-Mounting Brackets

Carry-Over Screen

Mounting Tape

Manufactured By



Refrigerant Modules (RCM-A2L)

The RCM-A2L cooling coil comes as a module and must be installed in the vertical position on the return air side of the air handler (horizontal airflow). RCM-A2L modules come with A2L TX Valve and A2L RDS Kit, two L mounting brackets, access port(s), carry-over screen, external freeze stat*, and additional components for air sealing.

The included TXV and access port(s) will need to be field installed to read refrigerant pressures/temperatures at the evaporator coil (RCM-A2L). Fig. 01 shows approximate installation locations for these components.

NOTE: This module is to be used with included A2L TXV and MUST have an RDS Kit installed. See pages 7-16 for RDS installation and mandatory verification procedures.

RCM-A2L coil modules can be used on any A2L outdoor unit (condenser/heat pump) if proper A2L refrigerant components are used.

***IMPORTANT:** The Freeze Stat (anti-ice control) serves the purpose of preventing severe icing of the coil in the event of an undercharge or low load on the coil. This piece of equipment must be used at all times. Failure to properly install the freeze stat will result in RCM related warranty issues being voided.

NOTE: Do not remove protective bubble wrap from Freeze Stat

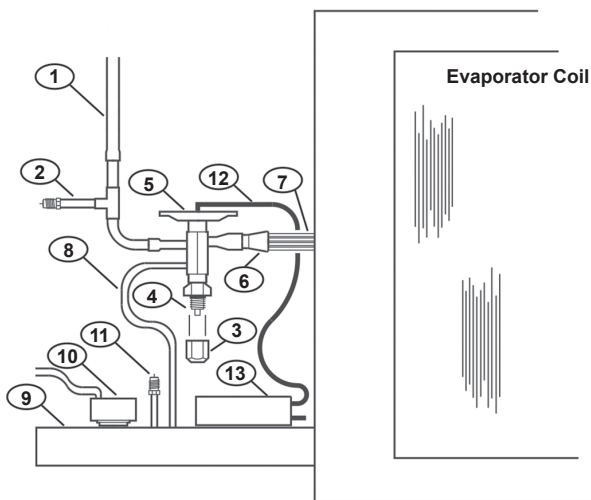


Fig. 01 - Coil Assembly

1) Liquid line	8) External equalizer line
2) High side access port (if applicable)	9) Suction line
3) Adjustment stem cap	10) Freeze Stat (Anti-ice control)
4) Superheat adjustment stem	11) Low side access port
5) Thermal expansion valve (TX)	12) TX capillary tube
6) Refrigerant distributor	13) TX sensing bulb
7) Distributor tubes	

Mounting Brackets

Mounting the cooling coil to the air handler can be done with the L brackets supplied (Fig. 02), ensure that no screws puncture the drain pan or coil. Appendix B has the dimensions of the air handler units and cooling modules.

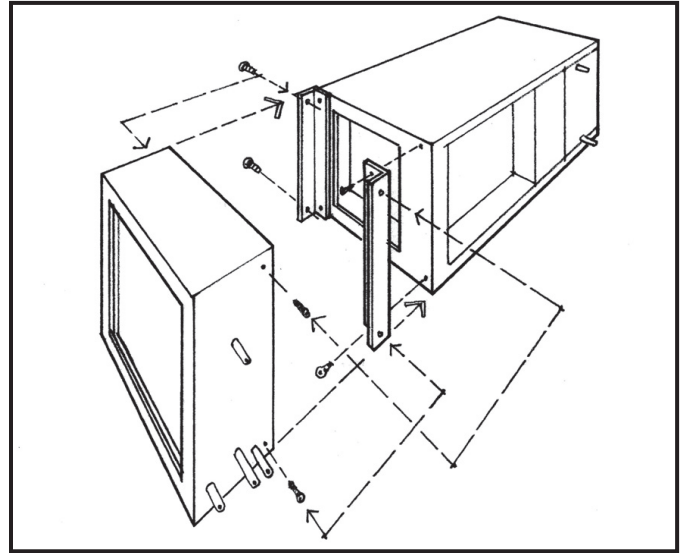


Fig. 02 - Mounting Brackets

Thermal Expansion Valve (TX)

When brazing the TX valve to the copper liquid line, a brazing rod that can bond dissimilar metals should be used. Always wet rag or use heat dissipating paste on the TX body to reduce the chance of overheating the valve.

Thermal Expansion Sensing Bulb

The remote sensing bulb for the thermal expansion valve should be located on a clean, horizontal section of the suction line. It should be mounted on the top half of the pipe in the 2 o'clock or 10 o'clock position (Fig. 01 and Fig. 03).

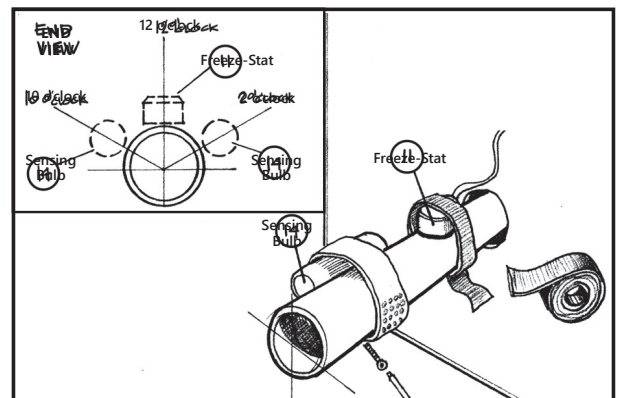


Fig. 3 - TX Sensing Bulb

Access Ports

When refrigerant lines are connected to the RCM-A2L coil, access port(s) must be connected as well (Fig. 01 - reference 2 & 11). With the use of a tee and reducer this process is simplified. The access port(s) are required for system startup and for future trouble shooting or service. When reading refrigerant pressures/temperatures, always read them at the evaporator access ports.

External Equalizer Line

The external equalizer line should be installed on the suction line, immediately after the remote sensing bulb (Fig. 01 – reference 13). When the pressure drop through the evaporator is of any consequence:

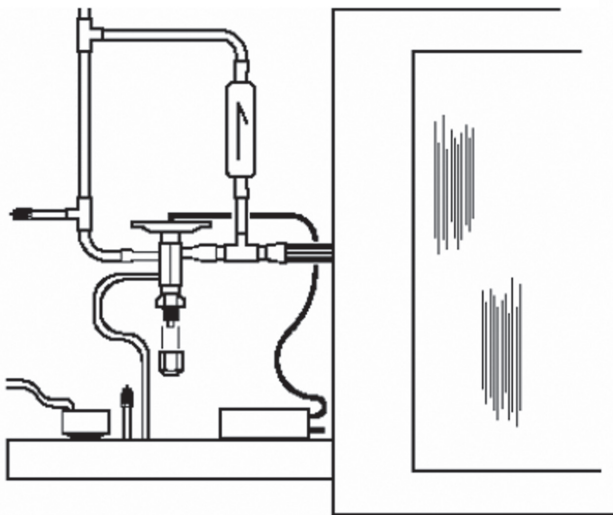
- 3°F in the air conditioning range
- 2°F in the commercial temperature range
- 1°F in the low temperature range

It will hold the thermo expansion valve in a relatively “restricted” position and reduce the system capacity, unless a thermo expansion valve with an external equalizer is used.

Refrigerant Bypass

All RCM coils come with check valve ready TX valves. Third party TX valves may require a bypass check valve.

Fig. 04 - Bypass check valve



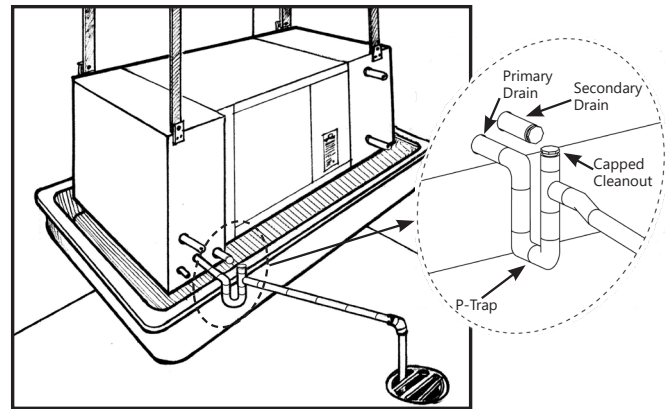
Drain Connections, P-Trap & Secondary Drain Pan

Important: Piping the condensate lines on a return side cooling coil can be dramatically different, be sure to read info below.

The primary condensate drain **must have a minimum 3” P-Trap installed** (Fig. 05). The drain line must run at a slope of 1/4” per foot in the direction of the drain. RCM modules come with a 3/4” male CPVC primary and secondary outlet. It is good practice to install a clean out right above the P-Trap. Using a “tee fitting” and cap in the P-Trap’s construction can be used as the clean out and as a way to prime the P-Trap if it ever dries out. A wet P-Trap is important. A dry P-Trap can be detrimental to proper drainage. If code requires a secondary drain line, run the secondary line using the same method as primary. Otherwise, capping off the secondary drain line is acceptable. Do not run the secondary drain line to the secondary drain pan or use it as a vent to atmosphere! An equipment stand/riser or rubber equipment mat may be necessary to elevate the module off of the ground to allow for a P-Trap.

Any installation that has the potential of property damage due to condensate must have a secondary drain pan installed. If the unit is installed in a high heat and/or high humidity location, extra insulation around the unit casing may be required. This will prevent excessive condensate from forming on the outer surface of the casing.

Fig. 05 - Secondary drain pan



Freeze Stat

The RBM-I comes with a Freeze Stat (anti-ice control). This freeze stat serves the purpose of preventing severe icing of the coil in the event of an undercharge or low load on the coil. **This piece of equipment must be used at all times.**

Install the Freeze-Stat above the center line of the suction line and connect the wires to the Freeze Stat terminals on the air handler circuit board.

Ensure that the Freeze Stat is fastened securely and are well insulated. Do not use a self-tightening clamp on the Freeze Stat control, as the control may be damaged by excessive tightening.

Important: The Freeze Stat (anti-ice control) must be used at all times. Failure to do so may void warranty.

During start-up, it is acceptable to jumper across the freeze stat. This will prevent the freeze stat from shutting the system off while charging a new system that may be low on refrigerant. Once charged and running, this jumper must be removed and the freeze stat connected to the FZ and FZ terminals on the Printed Circuit Board. Should wiring needs arise in which the outdoor unit is controlled through another means of wiring, the freeze stat should be connected in series on the input side of the control wiring. See freeze stat install location on page 2 (Fig. 01 reference 10).

NOTE: Do not remove protective bubble wrap from Freeze Stat



Carry-Over Screen

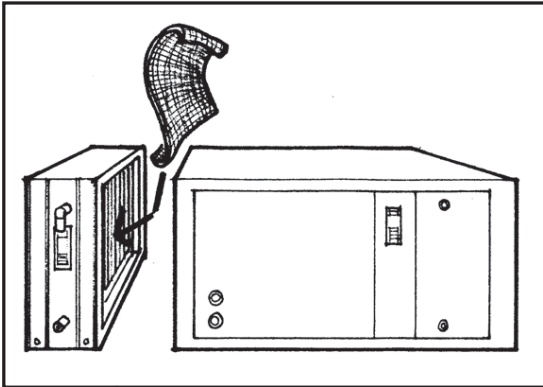
RCM-A2L refrigerant cooling modules come supplied with a nylon mesh carry-over screen and six stand-off plugs. The Hi-Velocity units have a very high humidity removal rate, it is possible for the airflow across the coil to grab moisture off the fins and carry it into the unit. With the carry-over screen in place it reduces the chance of moisture being carried into the unit.

Ensure that the nylon mesh is placed on the exiting air side of the cooling module (Fig. 4)

Screen Installation

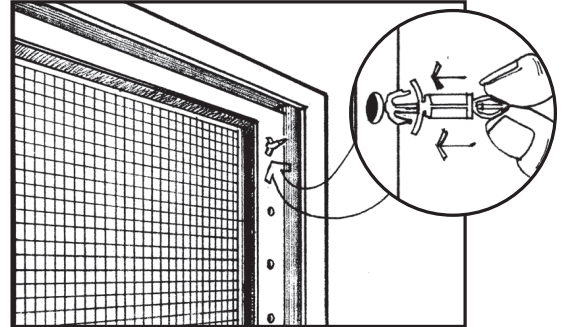
The carry-over screen is placed on air handler side of the cooling module (Fig. 04).

Fig. 04 - Screen on the air handler side



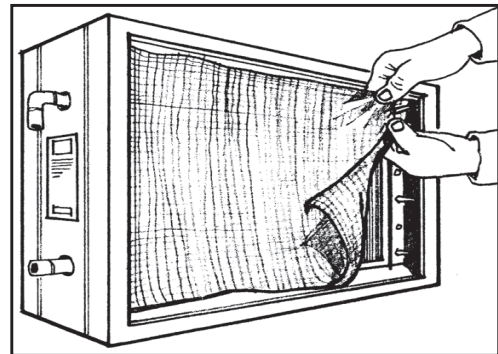
On the air handler side of the cooling module, attach three plastic stand-offs down each side of the cooling coil (Fig. 05).

Fig. 05 - Attach stand-off plugs



Place the nylon wire mesh over the stand-offs, ensuring the screen touches the drain pan. Then snap the screen over the plastic stand-offs (Fig. 06).

Fig. 06 - Attach screen to coil



Return Air

When sizing the return air ducts, keep in mind that if they are too small they can create noise, but if they are too large, the air handler cannot build up proper pressure. Table 03 has recommended return air sizes for round and rectangular ducts. A variance of plus 20% is allowable for sizing return ducts that connect to the Hi-Velocity Systems unit.

Note: It is recommended to use a grill that is 10-20% larger than R/A duct size.

It is recommended to install a grill that is 10 - 20% larger than specifications require, this will ensure that there is no air velocity noise at the grill. Where allowed by local codes, a single centralized return air grill may be used. When using flexible duct for return air, use one duct size larger due to the higher friction loss. Return air MUST be filtered before entering the cooling module.

Duct Sizing

The Return Air is to be sized on a 0.15 static pressure (37 pa) as compared to 0.10 static pressure (25 pa) for conventional forced air systems. The maximum length for an individual return air duct is fifty feet (15.24m).

Please note: It is VERY important NOT to undersize the return air, as this will create noise, increase motor power consumption, reduce airflow and increase the possibility of condensate carry-over.

Important: When connecting a round Return Air duct to the RCM-A2L coil, a round to rectangular transition is required.

Table 03 has recommended return air sizes for round and rectangular ducts. A variance of +20% is allowable for sizing return ducts that connect to the RCM-A2L or Hi-Velocity Systems unit.

Table 03 – Return Air Duct Sizes

Unit	Rigid Ø	Flex Ø	Min Sq. Inches (Sq. cm)
50/51/52	12" (305mm)	14" (356mm)	120 (774cm)
70/71	12" (305mm)	14" (356mm)	120 (774cm)
100/101	14" (356mm)	16" (406mm)	168 (1084cm)

Remember: When using flexible duct for return air, use one duct size larger due to the higher friction loss.

Where allowed by local codes, a single return air grill may be used. Note: Return air grill must have equal minimum of free air area to return air.

Important: When using flexible duct for return air, use one duct size larger due to the higher friction loss.

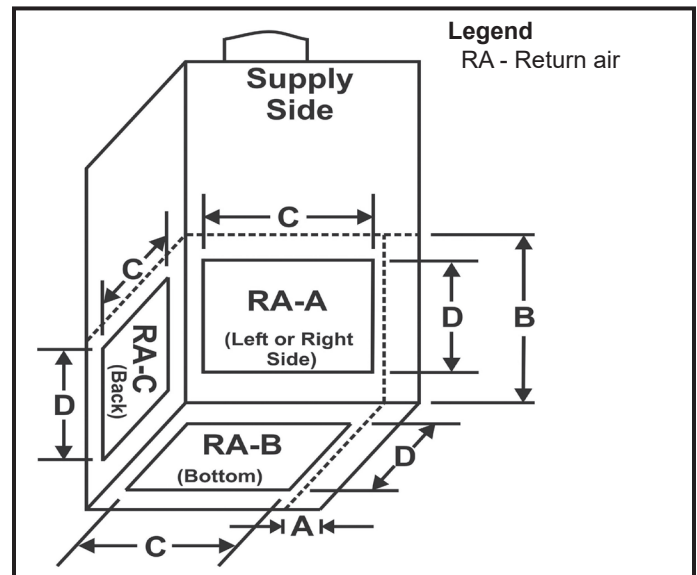
Return Cutout

Fig. 07 shows the different locations the return air can be installed on Hi-Velocity air handlers. Table 04 contains the dimensions needed for the return. All air handlers are equipped with return air knockout cuts and can be used as a proper return air size.

Table 04 - Return Air Cutouts

Unit	A	B	C	D
50/51	3"	17"	10"	14"
70/71	3"	17"	15"	15"
100/101	3"	17"	22"	15"

Fig. 07 - Return air cutout sizing



Notes:

- DO NOT cut past the center plate or electrical box (Dim A & B).
- 100 and 140 Units CANNOT use return air "C" (RA-C).
- This drawing is NOT to scale.

Important: Return air must be filtered before entering the cooling module.

Piping the RCM

Only refrigerant grade pipe and fittings are to be used with Hi-Velocity Systems. Plumbing fittings may contain wax or other contaminants which are detrimental to the proper operation of the system. Insulate the suction line with 3/8" insulation such as Armaflex. In high heat areas, 1/2" insulation may be needed. If the lines are run in an area where temperatures could exceed 120°F or runs longer than 50', then the liquid line may need to be insulated as well. Support the pipe every 5 feet, or whatever local code states.

Run the pipes in the most direct route possible, taking into account structural integrity, building details and local building codes. If the evaporator coil is located above the outdoor unit (condenser/heat pump), slope any horizontal runs toward the outdoor unit. If the outdoor unit is located above the evaporator coil, a P-trap must be installed at the bottom of the vertical riser. For long vertical risers, additional P-traps must be installed for every twenty feet. For lines running over 50', a suction line accumulator must be installed. Lines running over 100' are not recommended.

Pipe Sizing

Refer to the Outdoor Unit manufacturer's installation manual to select correct lineset diameters and total length constraints. Always adhere to the ODU manufacturer's piping specifications to ensure optimal oil return and system efficiencies.

Outdoor Unit Installation

Locate the outdoor unit in a suitable location, as close as possible to the air handler. Maintain the clearances recommended by the manufacturers of the outdoor unit, to ensure proper airflow. The outdoor unit must be installed level, in a properly supported location. A liquid line filter/drier is recommended to be installed.

Wiring – Outdoor Unit

Make all connections to the outdoor unit with rain tight conduit and fittings. Most building codes require a rain tight disconnect switch at the outdoor unit as well (always check local codes). Run the proper size copper wires to the unit, and connect as per the manufacturer's recommendations.

Ensure that the unit is setup for a TX system. If not, a hard start kit may be required.

Evacuating

The system must be brazed under a nitrogen purge to prevent oxidation of the pipe during the brazing process. After the piping is installed and all components have been brazed together, a vacuum pump must be used to evacuate the system from both the low and high side to 1500 microns. Add pressure to the system to bring the pressure above zero psig. After allowing the refrigerant to absorb moisture, repeat the above procedure. Evacuate the system to 500 microns on the second evacuation, and ensure that the system holds at the vacuum pressure. If not, check for leaks and evacuate again. If the vacuum holds, add refrigerant to raise the pressure to 2 psig. At this point open service valves on pre-charged condensing units, or add refrigerant to the system.

The use of an electronic leak detector is recommended, as it is more sensitive to small leaks under the low pressures.

Charging

Once the system has been determined clean and ready for charging, refrigerant can be added to the system. The service valves on the condenser must be open at this point. Never leave the system unattended when charging. With the system running, slowly add refrigerant to the system until the site glass is clear of all bubbles. If the site glass is clear of bubbles and the super heat is off, the TX valve will need to be adjusted (See Super Heat for temperature settings). When adjusting the TX valve, never turn it more than a quarter turn at a time. Always allow 5 minutes for the system to settle down before making another TX adjustment. When adjusting the TX valve, a clockwise turn will close the valve, allowing less refrigerant through. With less refrigerant flowing through the coil, less cooling will be done, which will bring up the suction line temperature.

See "Cooling Start-Up and Charging Guide" on page 7.

Superheat

Super heat on Hi-Velocity systems with the RCM series should normally be around 8°F -12°F. The suction line should be set at approximately 42°F.

Cooling Start-Up and Charging Guide

1. Pipe in the system using the provided components as described in the "TX" & "Access Ports" sections (Pg. 7). (Refrigeration gauges must be connected to these ports when taking pressure reading.)

IMPORTANT: Install a freeze stat on suction line as described in the "Freeze stat" section (Pg. 7).

2. Leak check and evacuate system as described in the "Evacuating" section of manual (Pg. 8).

3. Check indoor unit operation with power to the outdoor unit off (can use service disconnect switch). It is critical to ensure you have adequate airflow. (For the HE-Z Series, the Y fan speed must be between 55 to 66Hz as displayed on VFD.)

4. (For A2L (R-32/R454B) Refrigerant Coils only) Check refrigerant detection system is installed correctly and confirm the verification procedure.

5. Connect refrigeration gauges to evaporator access ports and open outdoor unit service valves. If required, weigh in the condensers recommended refrigerant charge, taking into consideration:

- Condensers charging chart for varying outdoor temperatures
- Indoor wet bulb temperature

6. Turn on power to the outdoor unit and start system operation.

7. Depending on your evaporator's model number, adjust the system's refrigerant charge as needed to obtain the suggested superheat range in the chart below. (If SH is too high, add refrigerant, if SH is too low, remove refrigerant.) Also, ensure the system is not excessively hunting (+/- 10 PSIG). A secondary airflow adjustment maybe needed after the charge adjustment.

8. If you cannot reach recommended superheat range/pressure range with charge adjustment, TX valve adjustment maybe required. **Important:** Never adjust the TX valve more than 1/4 turn at a time⁽²⁾.

- Opening TXV (Counter-Clockwise) - Increases suction temp. / Lowers superheat
- Closing TXV (Clockwise) – Decreases suction temp. / Raises superheat

9. If you still cannot reach recommended superheat ranges and/or excessive fluctuations/hunting persists, more unconventional problems have occurred. Please call **tech support 1-888-652-2219**⁽¹⁾.

Suggested Superheat Ranges

RBM	6-10°F
RCM	8-12°F

Typical Operating Ranges (at ideal outdoor charging temperatures)

Saturated Suction Temperature	34-40°F
Suction Line Temperature	38-44°F
Suction Line Pressure	R-454B/R-32/R-410a: 110-130 PSIG
Liquid Line Pressure	R-454B/R-32/R-410a: 250-300 PSIG

Notes:

- Before calling tech support please be sure to have the following info ready:
 - Airflow or fan speed (Hz on the VFD)
 - Liquid line pressure
 - Suction line pressure
 - Suction line temperature
 - Return air static pressure
 - Supply air static pressure
- Document all TX valve stem adjustments (number of ¼ turns, open/closed) for supporting info when contacting tech support.
- It is recommended that the coil be charged on a high load day at the compressor's highest speed.
- When adjusting charge or TX valve positioning, wait 5 minutes between adjustments for system to settle.
- If the system is not charged on a high load day the suggested temperatures may vary. Use your own discretion.
- 55 Hz (fan speed) displayed on the VFD drive may not be enough airflow for some systems.

Refrigerant Detection System (RDS)

The Hi-Velocity Refrigerant Detection System is the addition to our evaporator coils that allows them to abide by the UL Standard 60335-2-40, and to be used with A2L Refrigerants. The A2L refrigerants that this system is designed to be used with and can detect are R-32 and R-454b refrigerants. These standards are driven by the transition to lower GWP (Global Warming Potential) refrigerants and aim to enhance safety by mitigating potential risks associated with mildly flammable refrigerants. This system is used to detect and prevent further leakage and to avoid the refrigerant concentration from reaching its lower flammability limit (% LFL), which is the lowest concentration of refrigerant to oxygen mixture that could be flammable or ignitable.

The RDS system uses a Mitigation Control Board in combination with a Refrigerant Detection Sensor to manage and direct thermostat signals to:

- Force a "G" Circulation Fan signal to the Air Handler in the event of a refrigerant leak. This is to prevent the leaking refrigerant from pooling to its lowest flammability limit at the lowest point in the Evaporator Coil's cabinet.
- Prevent a "Y" Cooling signal to the refrigerant cooling equipment in the event of a refrigerant leak. This is to prevent the refrigerant compressor from staying energized, to stop it from supplying more refrigerant to the potential leak point.
- Prevent any ignition source from possibly igniting the flammable refrigerant. This will prevent your Electric Strip Coil or Variable Electric Strip Coil from energizing during a detected leak, utilizing an external relay and the "Alarm/ALM" terminal. For this reason, no additional 3rd party equipment that could potentially be an ignition source can be used. (i.e. In-Line Duct Heaters)

Features

- Fault monitoring and Lower Flammability Limit (% LFL) Alarm when a leak is detected.
- Status and Power LED indicator lights on mitigation board.
- 24v Wet Contacts to turn on the AHU fan, and N.C. contacts to turn off a compressor in the event of a % LFL leak.
- 24v Wet "Alarm/ALM" Contact to wiring to a relay to prevent an ignition source from firing (ESH or VESH)
- MODBUS communication to A2L refrigerant sensor.

What's Included

- A2L Refrigerant Sensor (Pre-Installed)
- Mitigation Board
- Wiring to connect components
- Strain Relief, Cable Ties & Screws
- Installation Manual & Safety Stickers



**Refrigerant Sensor
& Wiring Harness
(6ft) - Sensor is
Pre-Installed at the
Factory**



**Mitigation
Board**



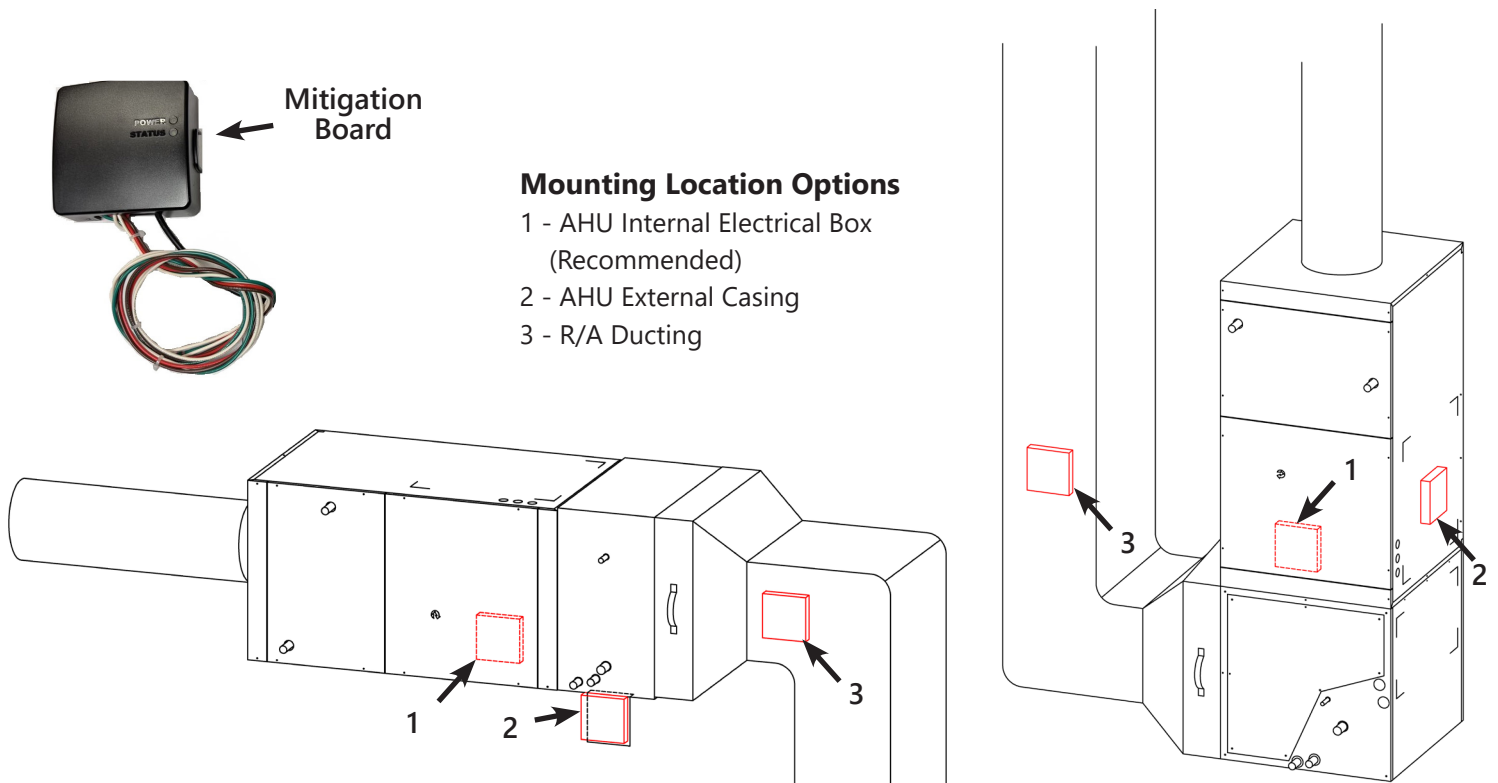
**Thermostat Wiring
Harness
(3 ft) - Comes
Attached to Mitigation
Board**

RDS Installation Instructions

IMPORTANT: The mitigation board must be mounted within a few feet of the Air Handler's circuit board, and the refrigerant sensor must be mounted within 6 feet of the mitigation board, due to the length of the wires (the sensor is pre-installed at the factory). The RDS Kit is required to be installed by an A2L Trained HVAC Technician at the time of system installation, following these steps:

Step 1 - Select location to mount the Mitigation Board

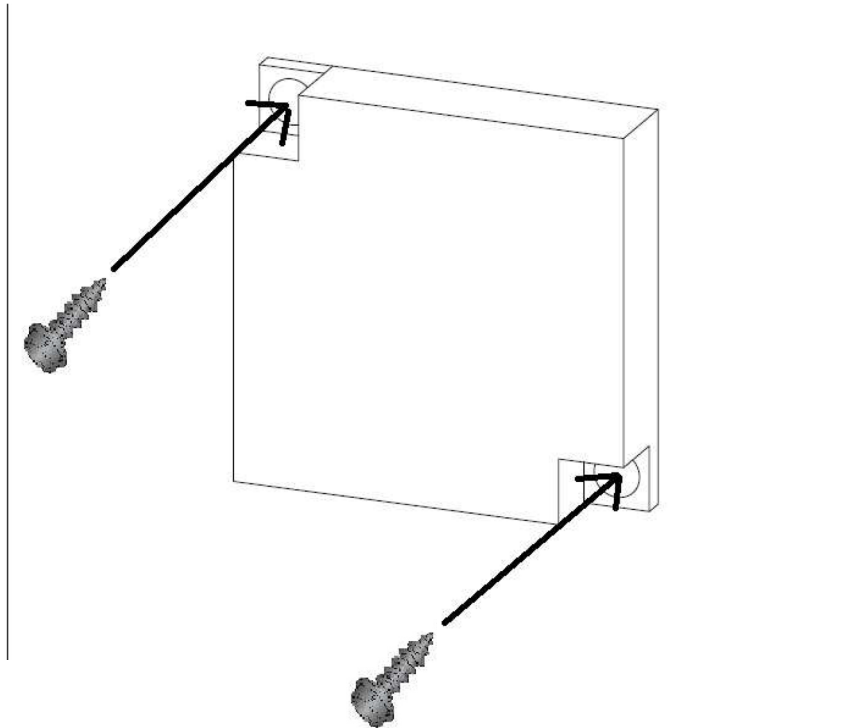
- Find a suitable flat mounting location for the mitigation board. Stud, drywall, R/A ducting, AHU's external metal casing or AHU internal electrical box are options. The mitigation board needs to be mounted within a few feet of the Air Handler's T-stat connections on the circuit board, as this t-stat wiring harness is only 3 feet (0.9m) long - as the wire runs.
- Ensure that the mitigation board is mounted somewhere visible when in front of the system, so LED lights can be seen.
- If possible, mounting the board inside the air handler's internal electrical box is suggested.



Suitable Locations for Mounting the Mitigation Board

Step 2 - Mount the Mitigation Board to the selected mounting location

- Use the provided 1/4" sheet metal screws or wood screws.
- Use the mounting holes in the top left and bottom right corners of the mitigation boards enclosure.

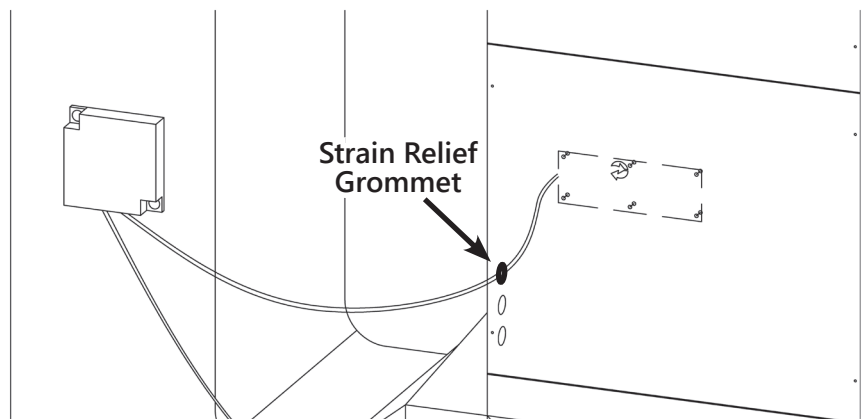


Step 3 - Connect the Thermostat Wiring Harness

- Run the thermostat wiring harness (multi-color red, white, green & black harness) into the Air Handler's electrical box using strain relief grommets if needed (provided grommet needs a 0.875" (22mm) Ø hole) and provided cable/zip ties to secure wiring.



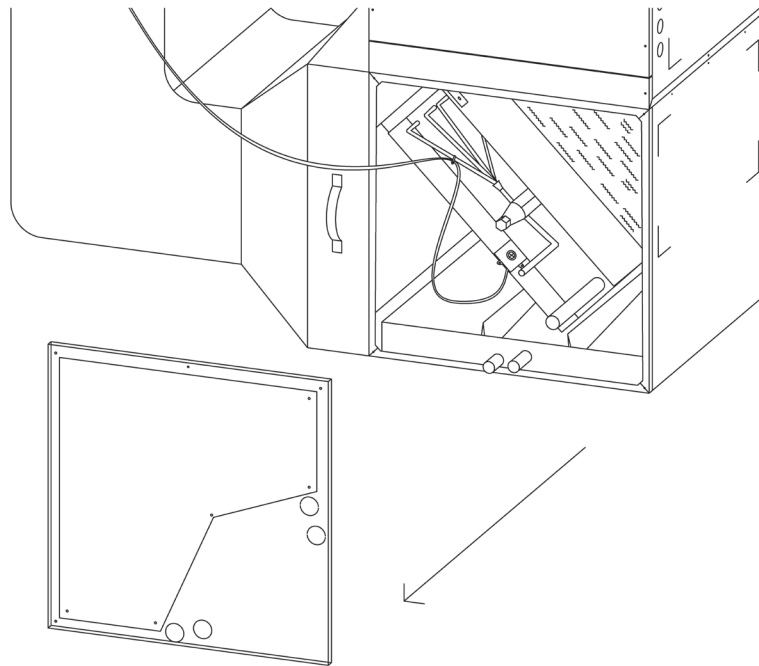
Thermostat
Wiring Harness (3 ft)



Step 4 - Select location to mount the Refrigerant Sensor (skip this step if sensor was pre-installed)



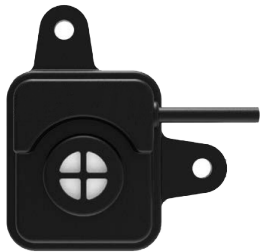
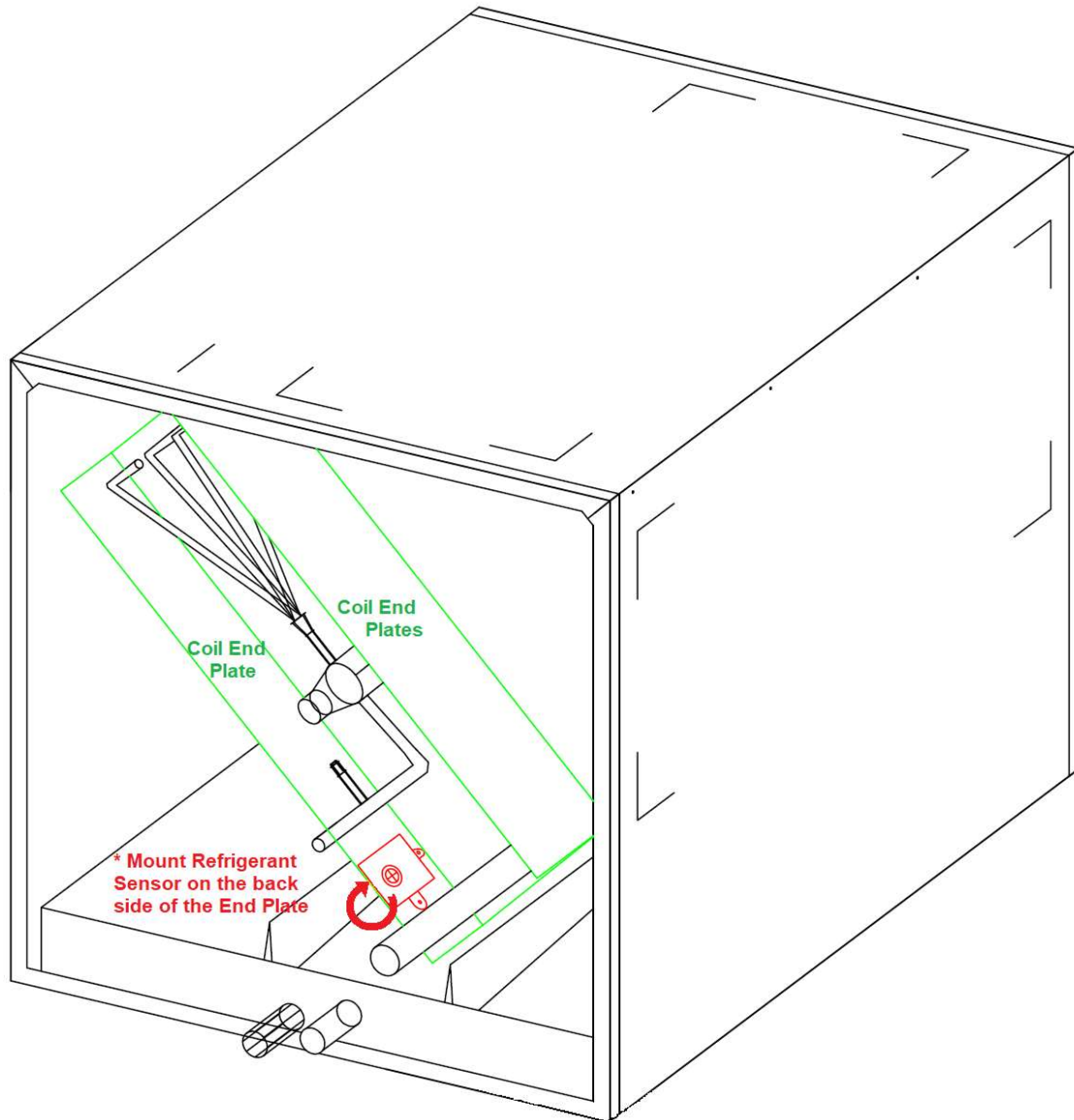
- Through the side inlets/outlets of the RCM Coil, find a suitable mounting location for the refrigerant sensor inside the coil casing.



- Locate the refrigerant sensor at a low point in the casing, near the drain pan and coil connections.
- The refrigerant sensor wiring harness is 6 feet (1.8m) long, so the evaporator coil and sensor mounting location must be within 6 feet (1.8m) of the mitigation board.
- Take into consideration running the wire safely/neatly as this may cut into the 6 feet, as you will need to run through strain relief and securing the wire appropriately.

Step 4 (cont'd) - Select location to mount the Refrigerant Sensor (skip this step if sensor was pre-installed)

NOTE: If possible, it is suggested to mount the sensor on the evaporator coil's end plates (the metal end plates at the front of the coil). See below.

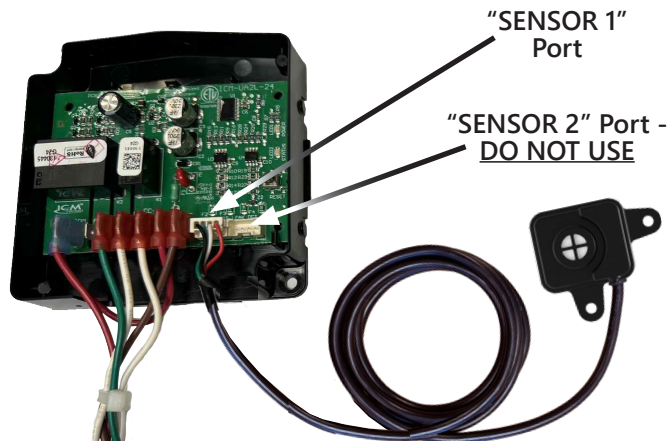


- The sensor has tabs with holes that can be used for mounting the sensor with the provided 1/4" sheet metal screws.

Important: NEVER plug the sensor into the Sensor #2 terminal on mitigation board - doing so will disable the board permanently.

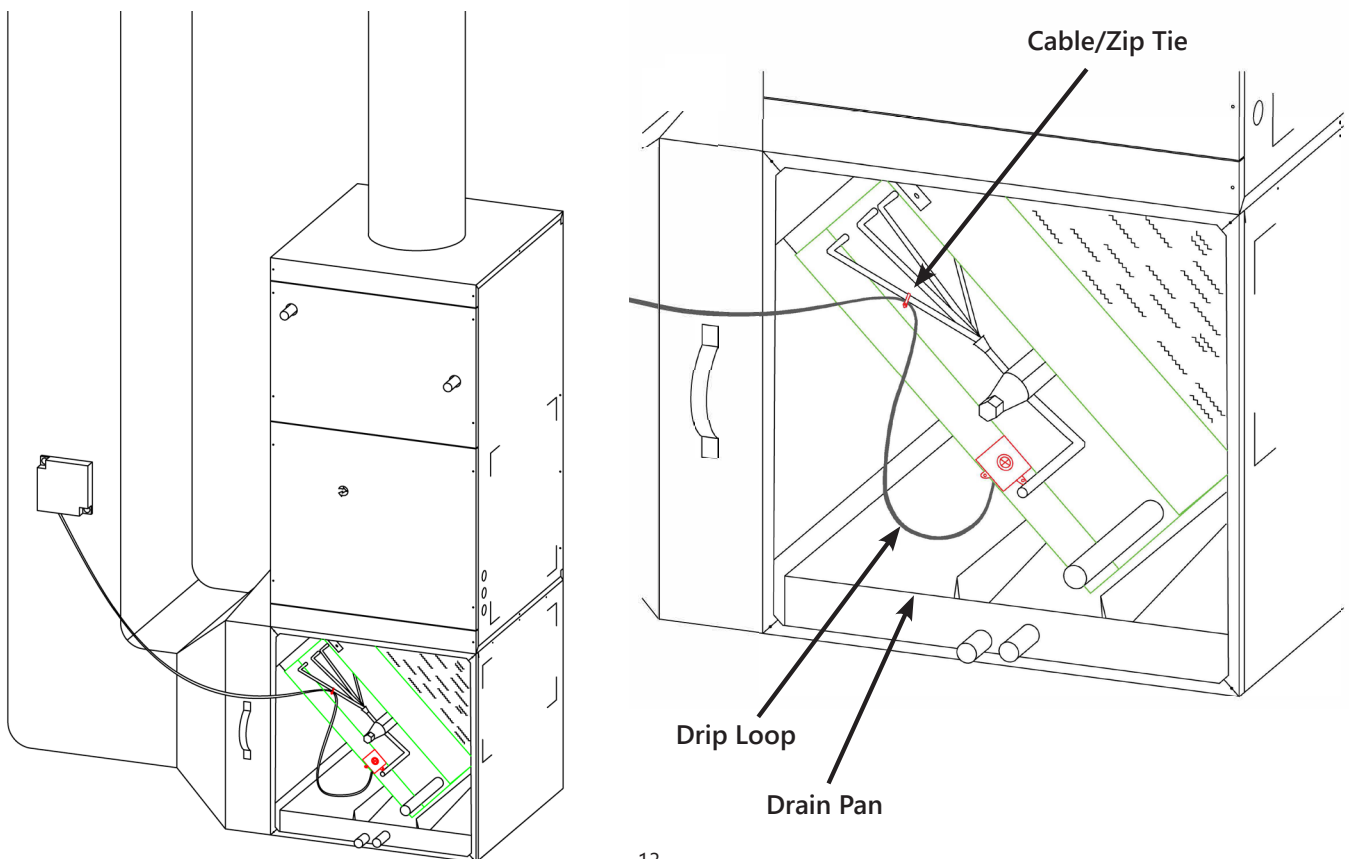
Step 5 - Connect the Refrigerant Sensor's Wiring Harness to Mitigation Board

- **Before** power is supplied to the mitigation board, run the refrigerant sensor's black wiring harness from the sensor's mounting location to the mitigation board and plug it into the "SENSOR 1" port. Use a strain relief grommet if needed. **Do NOT plug into Sensor 2 port.**



- Using a cable/zip tie, ensure there is a drip-loop on the black sensor wire to prevent any moisture or water droplets from running down the wire to the sensor itself.
- Angle and locate the drip-loop so that any drips will run down the drip-loop and fall into the drain pan.

NOTE: On RCM-A2L coils, the drip loop is pre-installed at the factory. Check that this drip loop is positioned correctly, especially when coil configuration has been adapted.



Step 6 - Wire the Mitigation Board, Air Handler and the Outdoor unit together as per wiring diagram on page 16.

- Wire the mitigation board's "Fan" terminal (green wire) to the T-Stat connection "G" terminal on the Hi-Velocity air handler, as per the wiring diagram.
- Wire the A2L Outdoor Unit to the "24v output" terminals on the Hi-Velocity air handler as per the wiring diagram, being sure to interrupt this Y signal going to the OD unit by the mitigation boards "CC" terminals (2 white wires) as per the wiring diagram on page 16.

IMPORTANT: If the system has an Electric Strip Heater/VESH or ESH installed, an additional safety control external relay will be needed to be installed to prevent this possible ignition source from firing. (Refer to "Extended RDS Wiring" on page 16.) Third party in-line duct heaters or additional ignition sources are not permitted on A2L Systems.

Step 7 - Reinstall all doors/covers and apply all warning labels included with the kit to the evaporator coils casing.

- Ensure warning labels are visible from the front of the system.
- An optimal location for the warning stickers would be close to the coil connections on the front door/cover of the evaporator coil.
- Do not cover or restrict the view of these labels by any means.

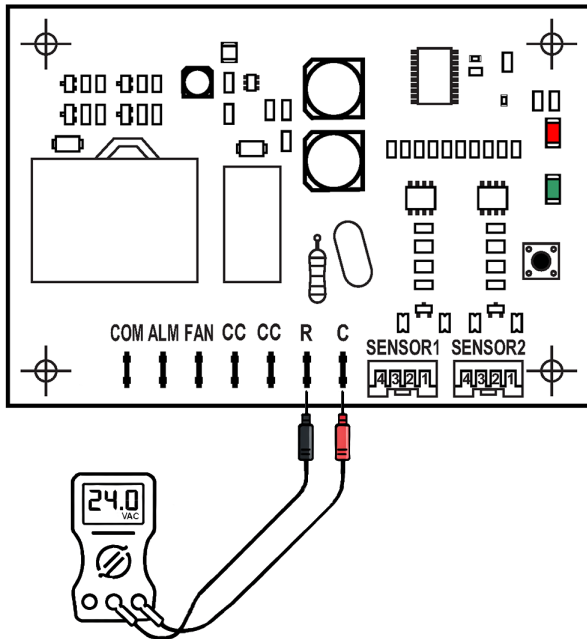
Step 8 - MANDATORY RDS Verification Procedure

IMPORTANT: Verifying operation of the RDS Kit is mandatory on all installations. Commissioning should not be performed on the system until the installation steps outlined in this manual have been successfully completed. The verification steps are as follows:

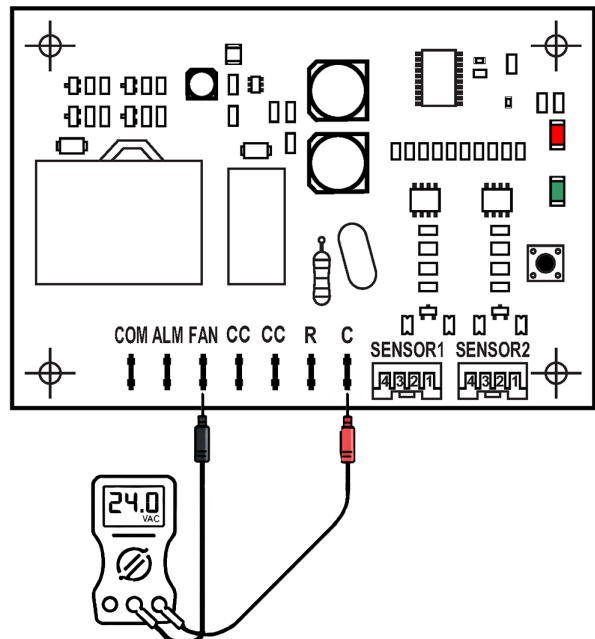
1. Energize power to the air handling unit, so the mitigation board and sensor will be powered as well (as long as it is wired correctly).
2. Prompt a Cooling demand / thermostat call (Y) to the air handling unit, using the thermostat or installing a jumper wire between "Y2" & "R".
3. Allow the mitigation board and sensor 20 to 30 seconds to go through its normal start up procedure. The status LED light will be solid ON while the sensor goes through the "Warm-Up" procedure, then will turn OFF once it enters normal operation.
4. Disconnect the Refrigerant Sensor from the "SENSOR 1" location on the mitigation board by squeezing the tab on the connector plug and pulling away from the board. A disconnected sensor will trigger the mitigation board to go into a "Communication Fault" mode and the status LED will blink twice repeatedly. This **"Communication Fault" mode is equivalent to the "Lower Flammability Limit fault (%LFL)" mode, which is an appropriate way of testing the operation of the RDS kit.**
5. After the Sensor is disconnected, wait ~15 Seconds for the mitigation board to no longer detect the sensor and go into its "Communication Fault" mode. The Status LED will blink twice repeatedly as soon as "Communication Fault" mode is initiated. This is equivalent to a "%LFL Fault" mode and will simulate a refrigerant leak detection.
6. The mitigation board will provide a system response which will deactivate the compressor and energize the indoor blower. If there was a fan call already, the fan would stay on.
7. The indoor blower will remain running for at least 5 minutes from initial fault detection. The Status LED (2 blink) fault code will continue for the entire 5 minutes.

8. Using a multimeter, test the mitigation board while it is still in a "communication fault" by confirming the signals/voltages using the 4 voltage tests below.
9. If a heat pump is being used, repeat this test with a thermostat heat pump heating call, and again confirm operation with the 4 multimeter tests below.
10. Once the signals/voltages are confirmed using the tests below, plug the sensor back into the Sensor #1 Port (never plug into #2 port). After the sensor is plugged back in, it will take approx. 5 minutes to revert back to normal operation.

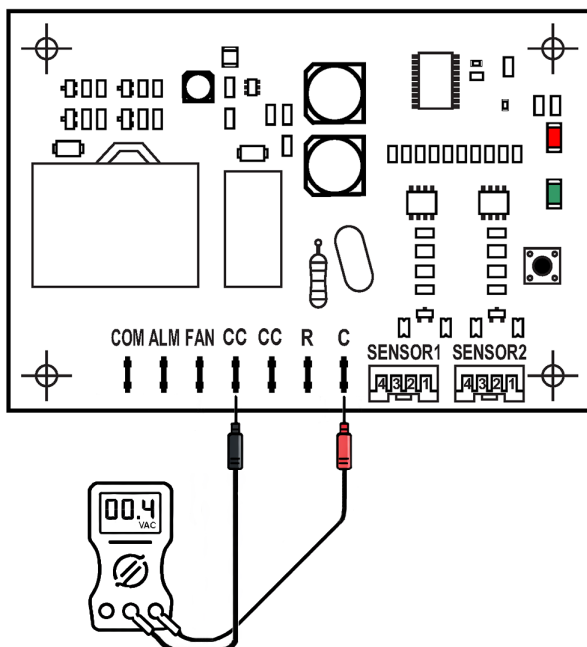
Step 8 Test 1 - Should have 24 VAC between "R" & "C" on the mitigation board



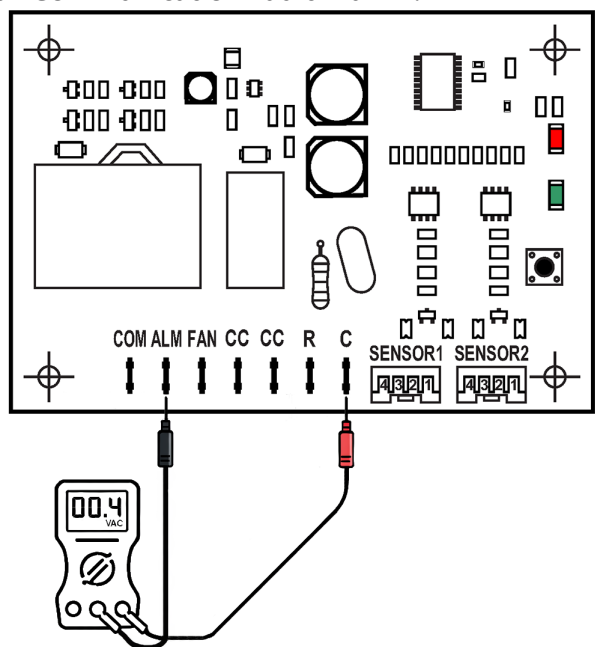
Step 8 Test 2 - Should have 24 VAC between "Fan" & "C" on the mitigation board. (Fan/"G" should be on)



Step 8 Test 3 - Should not have 24 VAC between "CC" going to Outdoor Unit & "C" on the mitigation board (ODU should be off)

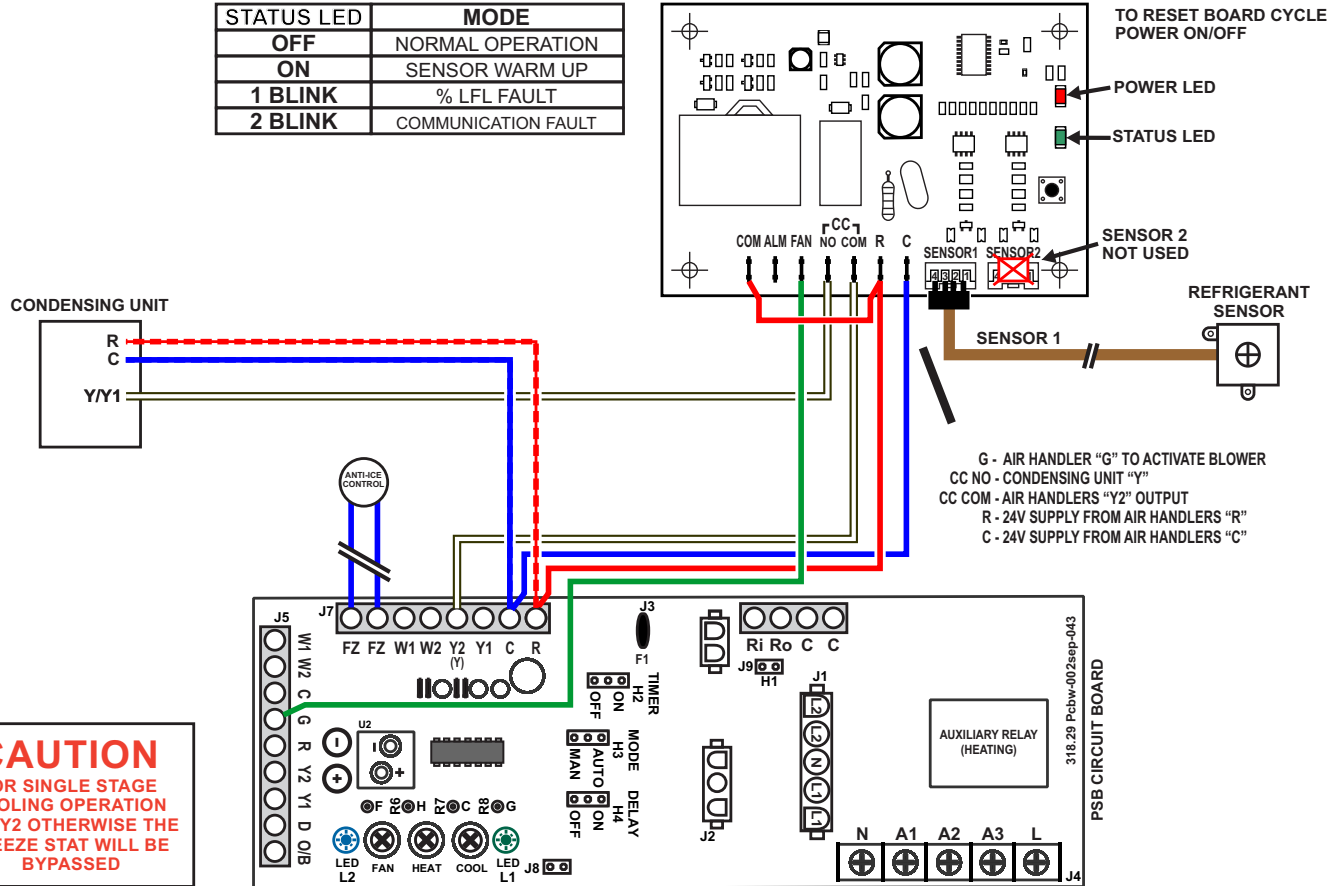


Step 8 Test 4 - Should not have 24 VAC between "ALM" & "C" on the mitigation board. (If you have an electric strip heater - it will be off.) "ALM" terminal puts out 24v in normal operation, but doesn't put out 24v when a leak is detected or in a "Communication Fault Alarm".



RDS Standard Wiring

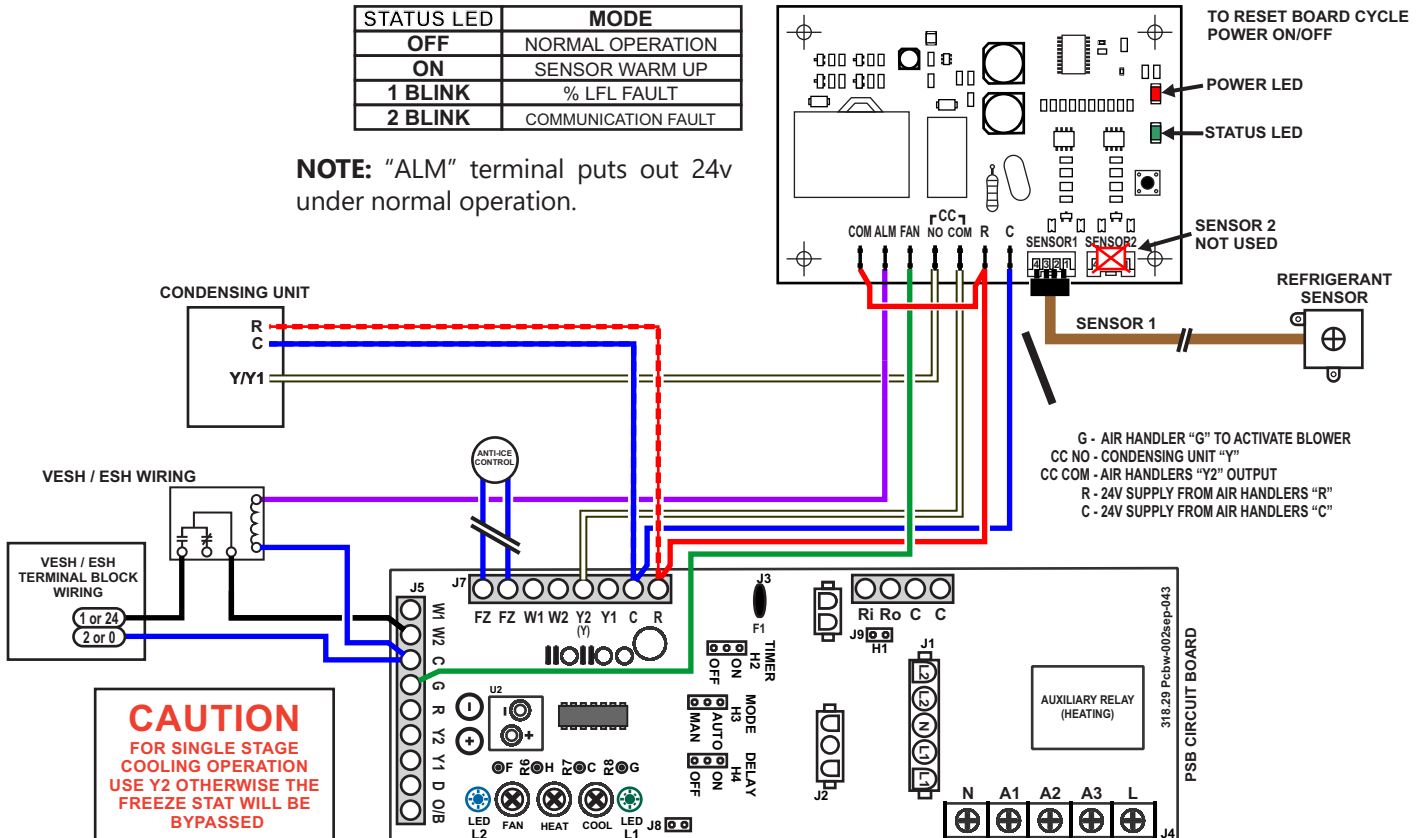
STATUS LED	MODE
OFF	NORMAL OPERATION
ON	SENSOR WARM UP
1 BLINK	% LFL FAULT
2 BLINK	COMMUNICATION FAULT



RDS Extended Wiring

STATUS LED	MODE
OFF	NORMAL OPERATION
ON	SENSOR WARM UP
1 BLINK	% LFL FAULT
2 BLINK	COMMUNICATION FAULT

NOTE: "ALM" terminal puts out 24v under normal operation.



Mode of Operation

On initial power-up, the Mitigation Board searches for active sensor ports. Zero active sensor ports results in a communication fault until at least one sensor is connected. Connecting a sensor results in the "sensor warm-up" state for 10-30 seconds. After warm-up, the mitigation board enters normal operation and engages the CC output. See the table below for all respective outputs for each state. The control constantly monitors the communication status and output the connected sensor.

NOTES:

If a sensor is disconnected, it can be reconnected to "SENSOR 1". Please note, two sensor ports will never be utilized on the Hi-Velocity RDS Kit, so the "SENSOR 2" port will never be used.

The "Power" LED on the mitigation board (red) will be on whenever it is supplied with power. The "Status" LED (green) indicates what current state/mode the board is running in. The different states/modes can be found in the chart below and on wiring diagram.

Current State	Outputs		State-change Conditions	Next State
Sensor Warm-up	CC: Off/No Continuity Fan: Off	Alarm: On/24VAC Present Status LED: On	- Sensor reports Run mode - Sensor reports Error mode	- Normal Operation - Communication Fault
Normal operation	CC: On/Continuity Fan: Off	Alarm: On/24VAC Present Status LED: Off	%LFL $\geq$ Trip point - Loss of sensor communication	%LFL Fault - Communication Fault
Communication Fault	CC: Off/No Continuity Fan: On	Alarm: Off/No 24VAC Status LED: 2 blinks	Valid data on required sensor port(s) and lockout timer expired	%LFL Fault - Communication Fault
%LFL Fault	CC: Off/No Continuity Fan: On	Alarm: Off/No 24VAC Status LED: 1 blink	%LFL < Recovery point and lockout timer expired - Reset button actuated*	Normal Operation

Fault Codes ("Power" LED always on when power is supplied)	
Status LED	Mode
Off	Normal Operation
On	Sensor "warm up"
1-Blink	%LFL Fault
2-Blinks	Communication Fault

RDS Specifications	
Suitable Evaporator Coils	RBM-50/70/100-A2L, RCM-50/70/100-A2L
Mitigation Board Power Supply	24v/1/50/60
Output to A2L Sensor	80mA @ 5VDC per RS-485 Port ("Sensor 1" and "Sensor 2" ports)
K1 SPST Wet "CC" contacts	N.O. 2.5A @ 24VAC
K2 SPDT Wet "Alarm and Fan" contacts	N.O. "Fan" Output 2A @ 24VAC N.C. "Alarm" Output 2A @ 24VAC
Mitigation Board Enclosure Dimensions	4.5" x 4.5" x 1.25 (115mm x 115mm x 32mm)
Certified To	UL Standard 60335-2-40

RCM-A2L Specifications

Refrigerant Cooling Module



Specifications		RCM-50-A2L	RCM-70-A2L	RCM-100-A2L
Matching Air Handler		HE-Z/HE-B/HE/HV-50/51 LV-50	HE-Z/HE-B/HE/HV-70/71 LV-70	HE-Z/HE-B/HE-P/HE/HV-100/101
Part Number		10090204050	10090204070	40090204100
Tons ⁽¹⁾		1.5 - 2.0 (5.3 - 7 Kw)	2.5 - 3.0 (8.8 - 10.6 Kw)	3.5 - 5.0 (12.3 - 17.6 Kw)
Refrigerant Type		R-454B/R-32	R-454B/R-32	R-454B/R-32
TX Cooling MBH ⁽²⁾		18-24 (5.3-7.0 kW)	30-36 (8.8-10.6 kW)	42-60 (12.3-17.6 kW)
Latent Cooling MBH		6.8 - 8.9 (2.0 - 2.6 kW)	11.7 - 13.7 (3.4 - 4.0 kW)	16.0 - 22.2 (4.7 - 6.5 kW)
Fin Material		Aluminum	Aluminum	Aluminum
Tubing Material		Copper	Copper	Copper
Type of Fins		.006 Al (0.1524mm)	.006 Al (0.1524mm)	.006 Al (0.1524mm)
Hydronic Connection Sizes	Liquid Line (Lq)	1/2" (13mm)	1/2" (13mm)	1/2" (13mm)
	Suction Line (S)	7/8" (22.3mm)	7/8" (22.3mm)	7/8" (22.3mm)
	Drain Connection	3/4" M CPVC (19mm)	3/4" M CPVC (19mm)	3/4" M CPVC (19mm)
Access Ports		Yes	Yes	Yes
Shipping Weight		21 lbs (9.5kg)	34 lbs (15.4 kg)	47 lbs (21.31 kg)
Module Size (L x W x H)		14 3/8" x 10 1/8" x 18 1/2" (365mm x 257mm x 470mm)	19 3/8" x 10 1/8" x 18 1/2" (492mm x 257mm x 470mm)	25 3/8" x 10 1/8" x 18 1/2" (645mm x 257mm x 470mm)

(1) Minimum of **four HE outlets** per ton of cooling needed. (2" Duct = Minimum **eight outlets** per ton)

(2) Smaller condensers may be matched to the air handler when needed (match TXV to condenser size)

MBH - Thousand British Thermal Units per Hour

TX - Thermal Expansion

TXV - Thermal Expansion Valve

WARRANTY

Energy Saving Products Ltd. is proud to offer a limited warranty. This warranty applies strictly to the first purchaser at wholesale level and only to the Air Handler unit and module. It does not include connections, attachments and other products or materials furnished by the installer.

This warranty excludes any damages caused by changes, relocation to, or installation in a new site. This warranty does not cover any defects caused by failure to follow the installation and operating instructions furnished with the Air Handler. This warranty does not cover defects caused by failing to adhere to local building codes and following good industry standards. Failure to correctly install the Air Handler, or material related to the unit, may result in improper system performance and/or damages and will void this warranty. This warranty does not cover material installed in or exposed to a corrosive environment. This warranty does not cover products subjected to abnormal use, misuse, improper maintenance, or alteration of the product. Using the Air Handler and/or module as a source of temporary heating/cooling during construction will void this warranty.

A Five (5) Year Limited Warranty is extended on:

Motors, Blowers, Motor & Blower Assemblies, WEG Controllers, Circuit Boards, Dampers, Zoning Controls, Heating Coils, Chilled Water Coils, Electric Strip Heaters, Air Conditioning Coils, HEPS Air Purification Systems and Inverter Drive Heat Pumps

A One (1) Year Limited Warranty is extended on:

Replacement parts not listed above

Products sold by Energy Saving Products but manufactured by others, will carry the original manufacturer's warranty.

Note: If any product is installed in or exposed to a corrosive environment, warranty will be void.

TERMS & CONDITIONS

- **Warranty will not be considered unless a contractor has contacted Energy Saving Products Ltd. Technical Support department for assistance, and received a tech code.**
- Any repair performed under warranty must be approved by Energy Saving Products Ltd. for this warranty to be valid.
- The liability of Energy Saving Products Ltd. is limited to and shall not exceed the cost of pre-approved replacement parts.
- This warranty does not cover shipping costs to and from the factory, labor costs or any other cost associated with the installation of the replacement part.
- Inoperative parts must be returned to Energy Saving Products Ltd. with an ESP RMA Form that includes model, serial number, and a detailed description of the entire problem. Inoperative parts must be returned in testable condition.
- Energy Saving Products Ltd. is not liable for any other damages, personal injury, or any other losses of any nature.

Follow these steps for Service or Repair:

1. Contact the installer of the product or a licensed service company
2. Contact the distributor
3. Contact Energy Saving Products Ltd. Mon-Fri 8 am – 4:30 pm MT 1-888-652-2219

This warranty replaces all other warranties expressed or implied.

www.hi-velocity.com

Energy Saving Products Ltd, established in 1983, manufactures the Hi-Velocity Systems™ product line for residential, commercial and multi-family markets. Our facilities house Administration, Sales, Design, Manufacturing, as well as Research & Development complete with an in-house test lab. Energy Saving Products prides itself on Customer Service and provides design services and contractor support.

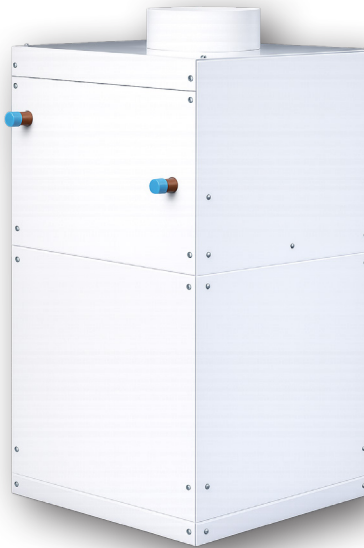
For all of your Heating, Cooling and Indoor Air Quality needs, the Hi-Velocity System is the right choice for you!



Small Duct Heating, Cooling and IAQ Systems

Build Smart, Breathe *Easy*

Hi-Velocity HE-Z Air Handlers, **Green** Technology



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