



INSTALLATION, OPERATION AND MAINTENANCE MANUAL FOR AT SERIES 48VDC AIR CONDITIONING UNITS



Air Conditioners with Capacity of
4,000 through 12,000 BTU/HR Nominal

48 VDC Models



* A more recent revision may be available at www.voltairesys.com or the QR Code in the top right corner of every page.



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1. IMPORTANT INFORMATION TO REVIEW PRIOR TO INSTALLATION, OPERATION AND MAINTENANCE

- **READ THE ENTIRE MANUAL PRIOR TO INSTALLING AND MAINTAINING** the VoltAire Systems Air Conditioners. Do not install or perform maintenance on the air conditioner if you do not understand all of the instructions. Contact VoltAire Systems at (407) 378-7482 with any questions or concerns.
- The air conditioner should be fully inspected on initial delivery. Open the packaging completely at the time of initial delivery and verify there is no hidden or concealed damage. Shipping damage, including concealed damage, is not covered under warranty.
- **WARNING: IMPROPER INSTALLATION AND OPERATION MAY CAUSE PROPERTY DAMAGE, PERSONAL INJURY OR LOSS OF LIFE.** The air conditioner shall only be installed and serviced by a certified professional in strict accordance with the requirements within this manual, in accordance with all local/state/federal codes, and per industry standards. Remove power from the unit during maintenance and installation, as line voltage may be dangerous, hazardous and lethal.
- In the event of a conflict, code requirements shall take precedence over the instructions provided within this manual. The installer shall be aware of all code requirements and shall comply fully.
- Use care when transporting and lifting the air conditioner. The unit should be maintained in the upright position at all times. If the unit has been mistakenly laid on its side stand the unit up and wait at least 24 hours before applying power.
- **WARNING: WEAR PROPER PERSONAL PROTECTION EQUIPMENT, INCLUDING BUT NOT LIMITED TO SAFETY GLASSES, GOGGLES, AND GLOVES. EDGES MAY BE SHARP.**
- A field provided time delay fuse or breaker must be provided by the installer with the power supply circuit serving the air conditioner. The installer shall size this fuse / breaker and wire in accordance with all applicable codes. Verify wire terminals and voltage prior to plugging into the Air Conditioner, otherwise you may damage the electrical components.
- **IMPORTANT NOTE:** Valve service ports are provided with rubber gasketed caps that are used to fully seal the service ports. If the caps are removed for service, they must be put back following service to prevent any potential leakage through the valves.
- These instructions should be retained by the owner and/or with the unit.
- **WARNING:** This unit is to be supplied with 48VDC Voltage (+20%/-15%); The 48VDC board includes nominal 54V diodes for protection of voltage over 54V, up to approximately 57V. If the installer or user anticipates voltage spikes in excess of 47V, VoltAire highly recommends that a voltage protection device be provided with the 48VDC power supply to prevent unit failure, damage, and/or personal injury or loss of life.
- **WARNING:** For **Negative (-)** 48VDC power supply carefully follow the instructions within this manual as unit damage due to improper polarity is not covered under warranty. **Do not rely upon wire color for polarity.**



2. PARTS SHIPPED LOOSE AND TOOLS/MATERIALS PROVIDED BY THE INSTALLER

Materials shipped loose in addition to this manual are as follows:

a) Mounting Gasket Field Kit

UNIT	PART NUMBER
AT04RB/AT06RB	B6F0004LAA
AT012RB	B6F0092VAA

a) M6x25 Mounting Bolts

Unit	Quantity
AT04/AT06	10
AT012RB	13

Required Tools and Materials provided by Installer:

- a. Fuse and/or breaker
- b. Exterior rated silicone sealant
- c. Phillips head screw driver
- d. T25 Security Torx (Allen head screw driver for AS models)
- e. 4mm HEX head screw driver
- f. Torque wrench
- g. Personal Protection Equipment
- h. Wire-Stripper



3. PRODUCT DESCRIPTION

VoltAire Systems AT Series Air Conditioning Units are designed for high efficiency and high performance heat management of electronic enclosures or equipment. This product is an active thermal management system with an internal refrigerant system and is designed for electronic environments. These products are designed to function according to the data label found on the units.

Figure 1 shows the side of the AC unit and its intake and exhaust points for both the interior and exterior airflow path. Exterior air enters the unit at the bottom-front and discharges air through the condenser coil at the top-front of the unit. The interior air enters through the top-back of the unit and discharges conditioned air through the evaporator coil on the bottom-back of the unit. As an additional option, airflow on the interior/evaporator side can be actively heated with an electric element heater.

The unit is controlled with a control board that provides an easy to use interface to operate a Test Mode for startup and diagnosis, configure operating parameters for temperature and alarm set points, provide anti-short cycling, monitor operating pressure(s), provide visual alarms and diagnosis, and provides a HVAC trouble/temperature alarm dry contact output.

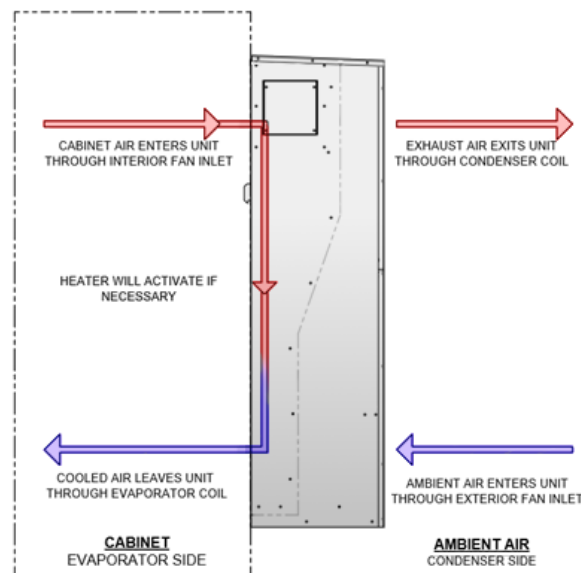


Figure 1 – Airflow



4. GENERAL PRODUCT DATA

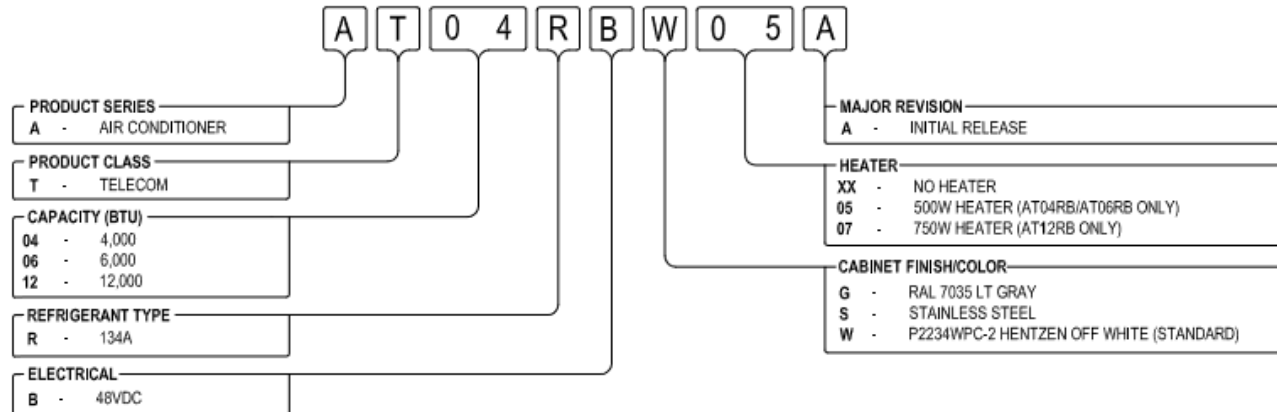


Figure 2 – Model Nomenclature

MODEL NUMBER	NOMINAL SIZE W x H x D (in.)	WEIGHT (lbs.)	NOMINAL CAPACITY ¹ (BTU/HR SENSIBLE)	RATED VOLTAGE	EXTERNAL OVER CURRENT PROTECTION	Minimum Supply Voltage Wire Gauge
AT04RB	17.1 x 29.6 x 12.9	78.5	4,000	48 VDC +20% / -15%	16.4	AWG - 10
AT06RB		78.5	6,000		20.4	AWG - 10
AT12RB	19.3 x 47.0 x 12.2	110.0	12,000		45.0	AWG - 8

¹ Capacity is nominal based upon free airflow without restrictions; Locating the air conditioner where airflow is restricted may reduce capacity; Nominal capacity is at exterior temperature of 131°F (55°C) and interior temperature of 131°F (55°C)

Table 1 – AT (Telecom) Series General Product Specifications

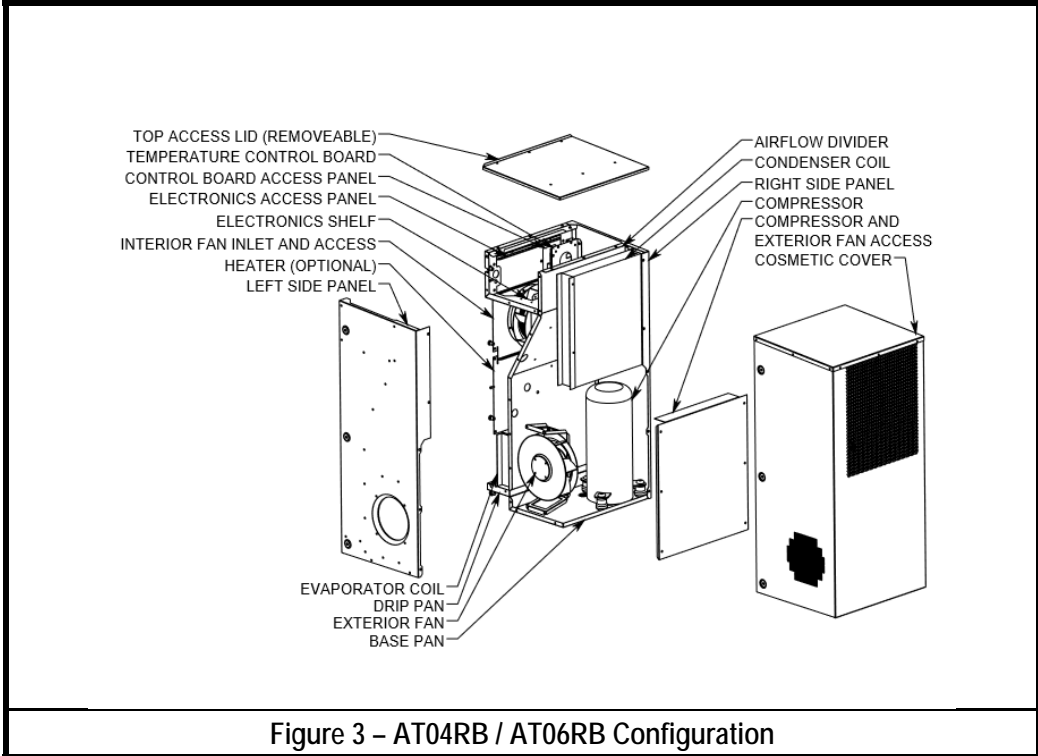


Figure 3 – AT04RB / AT06RB Configuration

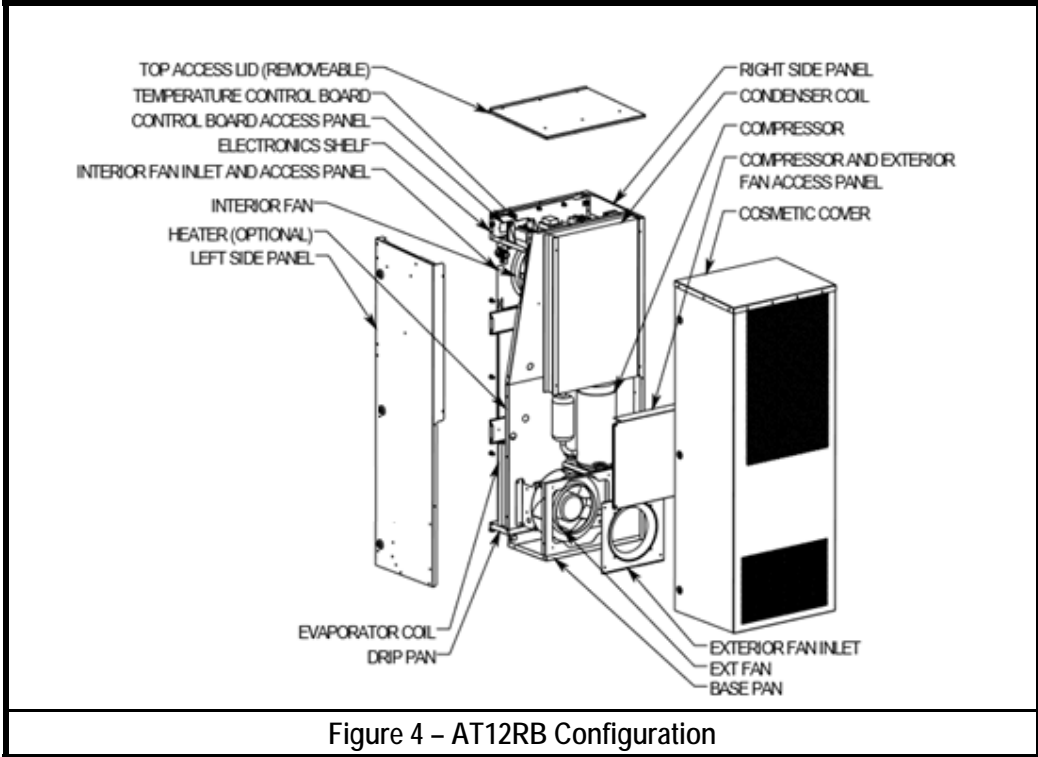


Figure 4 – AT12RB Configuration

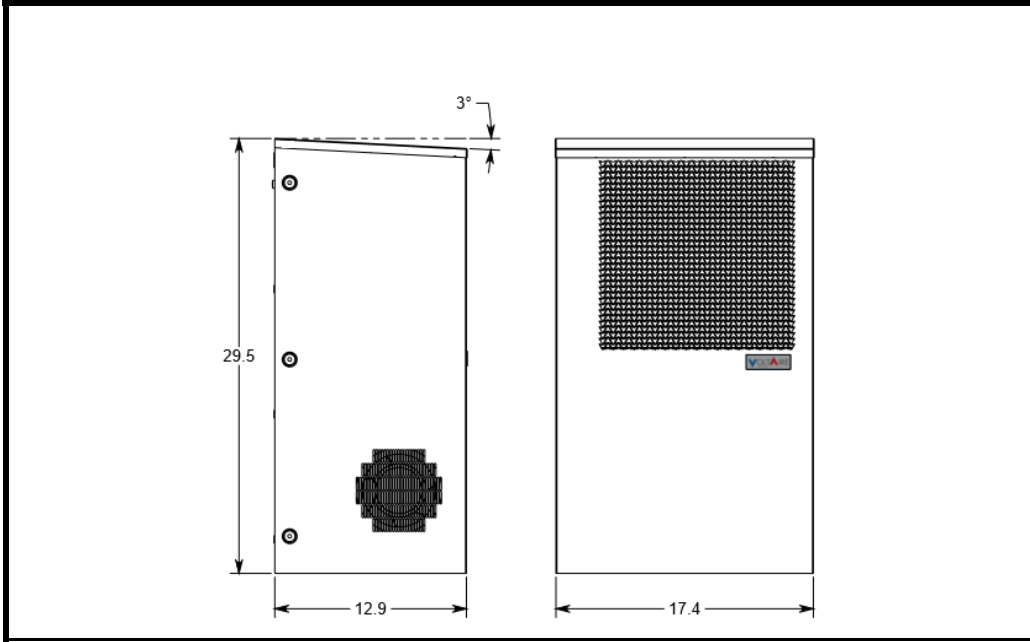


Figure 5 – AT04RB / AT06RB Dimensions

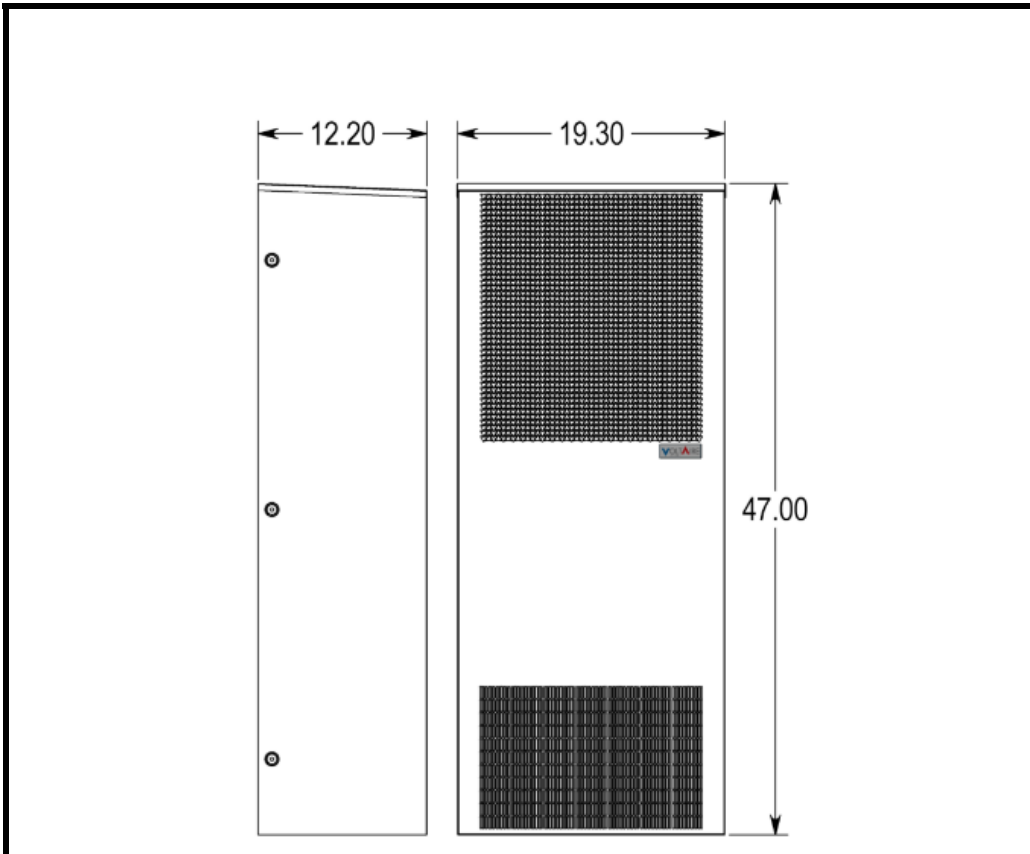


Figure 6 – AT12RB Dimensions



5. INSTALLATION INSTRUCTIONS

WARNING: REVIEW THIS MANUAL COMPLETELY PRIOR TO BEGINNING INSTALLATION, OR SERVICE. FAILURE TO DO SO MAY RESULT IN IMPROPER OPERATION, UNIT DAMAGE, AND/OR PERSONAL/BODILY HARM.

The unit may be installed on any flat vertical surface. Do not install the unit in a horizontal position and verify the unit is level. The unit should be located on a cabinet or equipment such that airflow is not restricted by obstructions of the interior or exterior airflow path, as obstruction of airflow will reduce capacity of the unit and may cause unit failure.

Prepare the wall for the interior intake and discharge openings and fastener locations using the cutout template that matches your unit shown in Figures 7 and 8. Clean the mounting surface to remove any dust, grease, and/or debris, including removing any metal burrs resulting from metal cutting.

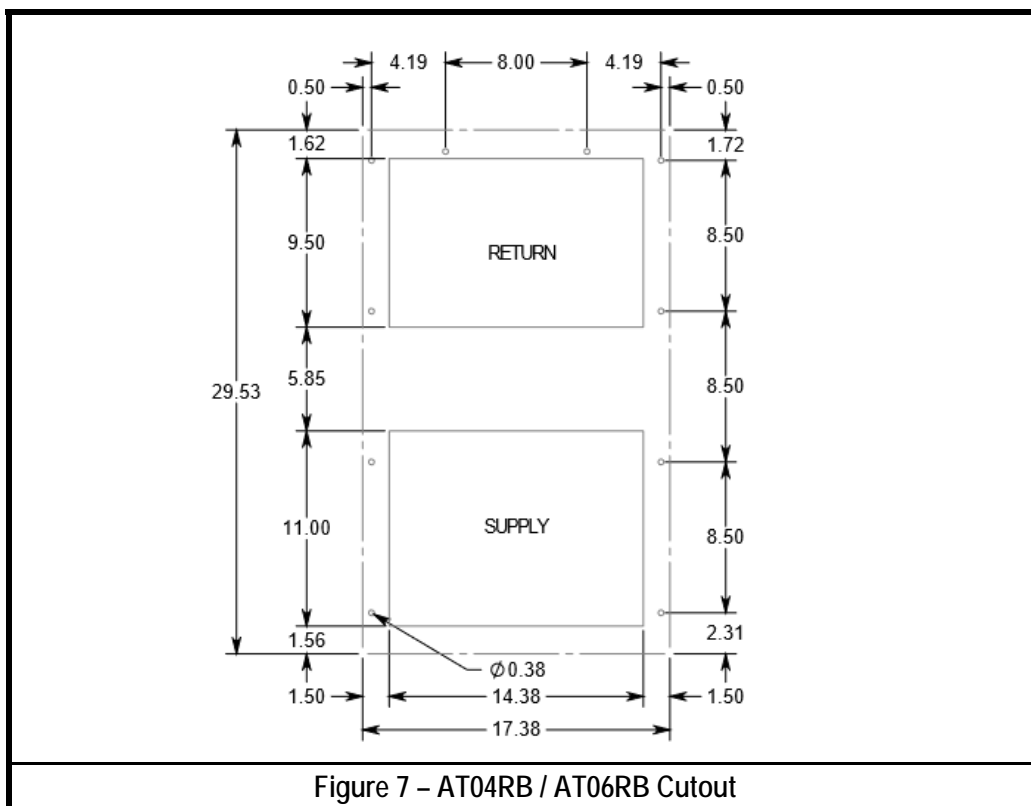


Figure 7 - AT04RB / AT06RB Cutout

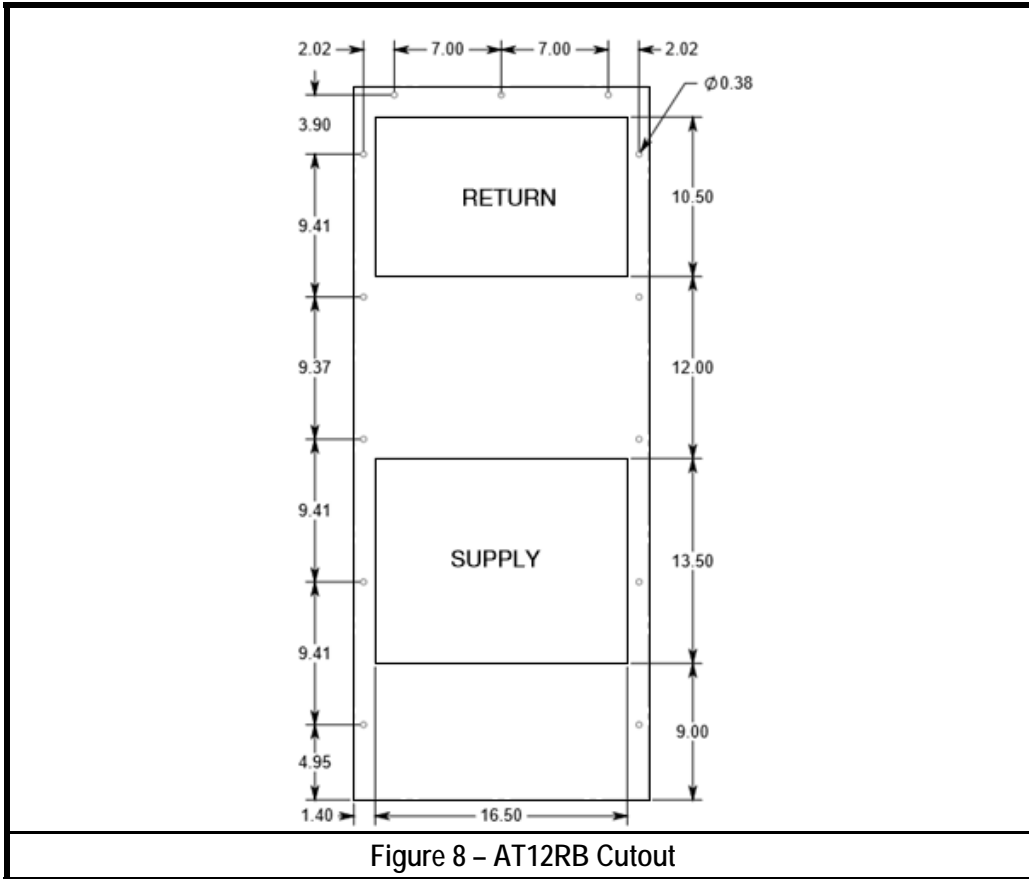


Figure 8 – AT12RB Cutout

A typical example of the gasket application is shown in Figure 9. The supplied gasket is compressed between the cabinet and the air conditioning unit to prevent external water from entering the cabinet through the supply and return openings as seen in Figures 7 and 8. Clean any dust or debris from the designated gasket area shown in Figure 10 to ensure that the gasket properly adheres to the unit. Using the provided gasket kit, place the gasket on the back of the AC Unit immediately abutting the mounting hole locations. The gasket should run across the width of the top of the unit, down both sides, with two cross pieces underneath the mounting hooks and the evaporator coil. Be sure to utilize the longer of the two shorter lengths for the top of the unit. This will maximize protection against water. Ensure there are no gaps in the gasket and verify the top has no gap to ensure proper protection of rain or water.

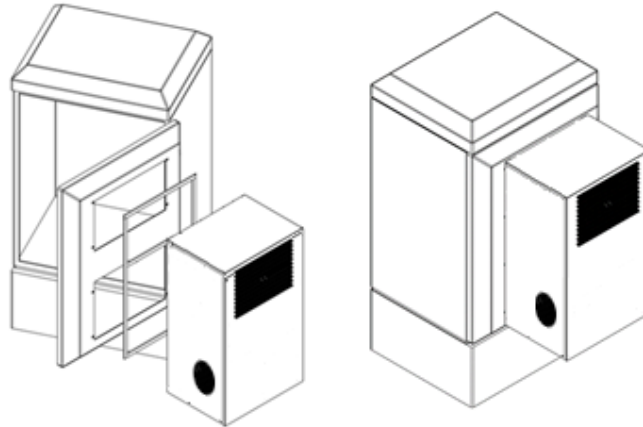


Figure 9 – Gasket Application

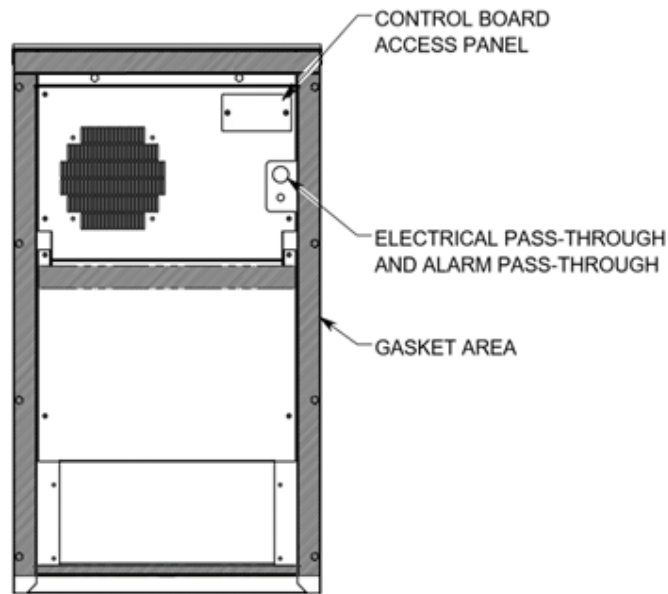


FIGURE 10 – Gasket Area

Remove the cover from the unit using a T25 security Torx driver. The unit is equipped with a set of mounting tabs to assist with temporary hanging during installation. Utilize the mounting tabs to place the unit in the proper location at the base of the upper cutout. Install the M6x25 bolts (quantities vary by model) at each of the mounting locations. Install the M6 nuts and washers on the M6 studs. Tighten the M6 mounting bolts/nuts on the M6 studs to 50 in-lbs torque. Do not over tighten.

From the exterior, inspect the gasket to verify the gasket is tight and there are no visible leakage points. Using a field supplied sealant, seal around all four sides of the AC Unit. Note that the AC Unit is generally maintainable without removal from the cabinet/equipment. Therefore, use a liberal amount of sealant. If top access is required for maintenance purposes, sealant may be removed along the top edge to gain access but new sealant shall be reapplied following the maintenance service.



The evaporator drain pan is provided with a 0.40" outside diameter drain. The drain is located on the positive side of the fan, therefore a trap is not required for positive drainage. If desired, this drain may be trapped by the installer using a field supplied hose or piping.

For AT04-06 units with an exposed hose barb: connect the supplied drip tube to the hose barb underneath the unit and secure with the hose clamp.

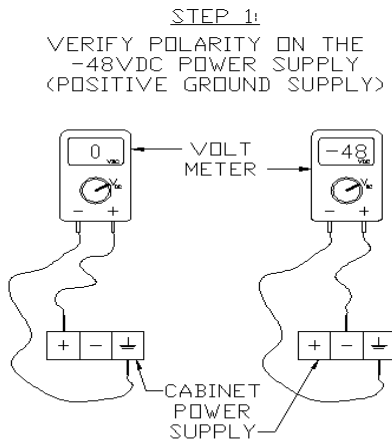
For AT12 units for units with an internal hose barb: remove the compressor access cover (shown in Figure 4 and 6) to expose the condenser side. Pass the pre-installed drip tube through the embossed hole in the base pan. Replace the access panel.

Attach the cosmetic cover using the original Torx security or Allen screws.

Install the field supplied fuse and/or breaker per all local/state/national codes, with electrical service rated per the size indicated in Table 1. Prior to starting the unit verify correct operating voltage, with operating voltage required to be within rated voltage.

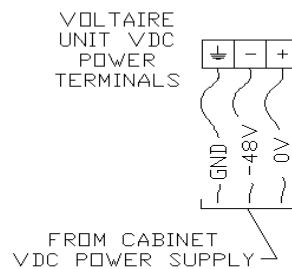
IMPORTANT NOTE: 48VDC polarity must be correct to avoid unit damage. Check 48VDC polarity at breaker/fuse prior to energizing system to verify proper 48VDC positive and negative terminals at unit. Many telecom power circuits are -48VDC and require careful attention to apply proper polarity. **Unit damage due to improper polarity is not covered under warranty. Do not rely on the power supply wire colors to determine polarity. Equipment damage (non-warranty) and/or personal injury may result.**

Negative (-) 48VDC Power Supply Polarity Check: Per below, check polarity per Step 1 and apply power per Step 2. Installation of the AC Unit is complete with the exception of testing the operation using the TEST Mode function of the controller. Please see the corresponding controller instruction manual for additional information.



PLACE THE VOLT METER NEGATIVE PROBE TO GROUND, AND MOVE THE POSITIVE PROBE TO BOTH PWR SUPPLY TERMINALS TO IDENTIFY THE POSITIVE AND NEGATIVE TERMINALS FOR THE -48VDC POWER SUPPLY; THE POSITIVE TERMINAL TO GROUND WILL REFLECT 0VDC VOLTAGE, AND MEASURING THE NEGATIVE TERMINAL WITH GROUND WILL REFLECT A NEGATIVE VOLTAGE.

STEP 2:
ONCE YOU HAVE IDENTIFIED WHICH POWER
WIRE IS NOMINAL -48VDC, WIRE -48VDC
TO THE VOLTAIRE NEGATIVE (-) TERMINAL



WARNING: DO NOT RELY ON THE POWER SUPPLY WIRE COLORS TO DETERMINE POLARITY. EQUIPMENT DAMAGE (NON-WARRANTY) AND/OR PERSONAL INJURY MAY RESULT.



6. RECOMMENDED / PREVENTATIVE MAINTENANCE

Although the VoltAire Systems Air Conditioners are designed to require minimal maintenance, it is recommended that the units be inspected periodically for proper operation. The frequency of maintenance is a function of the site conditions, such that dirtier sites may require more frequent maintenance to clean coils and/or filters. The following items can be reviewed during other routine maintenance of the cabinet/equipment:

- Verify operation of the interior and exterior fans. Use the control board test button to verify operation of the compressor, heater and fans.
- Verify that the unit is sealed properly. The field sealing of the unit to the cabinet/equipment should be inspected to ensure proper sealing.
- Interior/evaporator and Exterior/condenser coil should be cleaned using a commercial available non-acidic HVAC coil cleaner.
- Clean the exterior condenser filter (optional item), if applicable

Table 8 can be used to assist in service / maintenance scheduling.

Maintenance Schedule			
	Maintenance Item	Quarterly / Semiannually	Yearly
1	Check for filter blockage (If Applicable)	✓*	
2	Condenser Coil Cleaning (Remove debris / blockages)	✓*	
3	Functionality Check (Test Mode)		✓
4	Fan rotation Check (Verify fans spin without issues)		✓
5	Evaporator Coil Cleaning (Remove debris / blockages)		✓
6	Cabinet Cleaning		✓
7	Condensate Drain Pipe (Clean and clear any blockage)		✓

*Time may vary based on location conditions of installed unit. Monthly may be necessary for extraordinarily dirty sites.

Table 2 – Maintenance Schedule



7. TROUBLESHOOTING GUIDE

WARNING: ELECTRICAL SHOCK HAZARD. DISCONNECT POWER FOR SERVICING. FAILURE TO DO SO COULD RESULT IN ELECTRICAL SHOCK OR DEATH.

CAUTION: ELECTRICAL AND REFRIGERATION SERVICE AND TROUBLESHOOTING SHOULD ONLY BE CONDUCTED BY CERTIFIED HVAC TECHNICIANS. TECHNICIANS SHALL FOLLOW ALL INDUSTRY STANDARDS FOR SAFETY. THE COMPONENTS IN THE UNIT ARE STANDARD INDUSTRY COMPONENTS, AND TOGETHER WITH THE INFORMATION PROVIDED WITHIN THIS MANUAL, THE TECHNICIAN SHALL USE STANDARD ELECTRICAL AND REFRIGERATION TROUBLESHOOTING, DIAGNOSIS AND REPAIR PROCEDURES. PLEASE NOTE THAT UNIT MAY CONTAIN CUT HAZARDS/SHARP EDGES AND GLOVES SHALL BE USED TO AVOID SHARP EDGES AND INJURY.

IMPORTANT: REVIEW THE MANUAL IN ITS ENTIRETY PRIOR TO SERVICING OR MAINTAINING THE EQUIPMENT.

PROBLEM	POTENTIAL CAUSE	SOLUTION
Unit or components not powering on	No or improper supply voltage	Check power source voltage (shall be within +/- 10% of unit rating) and verify electrical connections at all terminals.
	Control board not working	Remove power from the unit and check/verify all terminals are fully connected at control board, relays, and contactor. Verify 24VDC supply power across control board R and C terminal on control board. Use Test Mode to verify proper operation of each component as described within this manual.
	Evaporator side entering air temperature less than 68F.	Verify functionality using the test mode.
Unit not reaching cooling capacity or satisfying heat load in cabinet	Dirty condenser or evaporator coil or exterior filter (optional feature)	Remove blockage by cleaning condenser/evaporator coil thoroughly with commercially available coil cleaner. Acidic based coil cleaner shall <u>NOT</u> be used. Clean exterior filter, if applicable.
	Bent fins on coil	Use coil comb to straighten out fins.
	Loss of refrigerant	Locate leak, repair or replace components, and recharge unit to initial specified charge specification by removing all charge, pumping down refrigerant circuit to remove moisture, verify caps on service ports, and weighing charge in with new R134A refrigerant.
	Verify free and clear airflow at both coils	Verify that airflow is not blocked or obstructed at evaporator and condenser coils. Adjust or divert air, and/or relocate equipment in cabinet that is obstructing airflow.
	Refrigeration metering device malfunction	TXV or capillary tube may be restricted or malfunctioning. See loss of refrigerant above then verify pressure and / or temperature drop and replace if malfunctioning.
	Unit undersized for load	Check heat load of cabinet and verify proper unit sizing.



Evaporator/indoor coil ice buildup	Insufficient heat load	Reduce control board Hysteresis (HYS) to cycle compressor off more quickly and/or increase cooling set point to reduce run time. Unit possibly oversized and may need to be replaced with lower capacity unit.
	Insufficient interior airflow due to dirty evaporator coil	Remove blockage by cleaning evaporator coil thoroughly with commercially available coil cleaner. Acidic based coil cleaner shall <u>NOT</u> be used.
	Unit may be low on refrigerant	Locate leak and repair, and/or replace components, and recharge unit to initial specified charge specification by removing all charge, pumping down refrigerant circuit to remove moisture, and weighing charge in with new R134A refrigerant.
Fan failure	Check Wiring	Check to make sure you have 48VDC coming from the control board to the fans – pin 1 = power/48vdc pin 2 = ground
	Verify operation of low ambient/head pressure control pressure switch	Condenser fan is powered through a head pressure control relay that closes at approx. 200psi and opens at approx. 110psi. Verify switch is closed at normal operating pressures. Replace switch if permanently open.
Compressor fails to run after startup or unit is operating with low and/or high pressure or compressor drawing abnormally high amps.	Improper Wire gauge	Check to make sure you have the correct wire size
	High pressure switch operation	Switch should be closed with standard operating pressure (or below). Replace bad switch.
	Low pressure switch operation (optional feature)	Switch should be closed with standard operating pressure (or above). Note that control board bypasses switch for 2 minutes after compressor start. Replace bad switch.
	Bad contactor	Verify voltage at contactor and replace contactor if not operating properly.
	Restricted liquid line filter drier	Verify proper pressure drop across liquid line filter drier, and replace if necessary.
	Improper Voltage	Make sure you have 48VDC running through the control board
	Bad thermal overload switch	Replace overload switch.
Tripper breaker and/or fuse (both field supplied)	Undersized breaker/fuse	Replace with properly sized breaker/fuse and/or wire.
	Short in system	Locate and eliminate short.
	Unit drawing high amps on startup.	Check compressor windings and compressor startup components.
Water in enclosure	Evaporator drain clogged	Remove blockage and clean drain pipe.
	Enclosure not sealed	Properly seal off enclosure to prevent humidity entering unit.
	Mounting gasket damaged	Replace mounting gasket or replace sealant around unit.
FOR ADDITIONAL TECHNICAL SUPPORT, PLEASE CONTACT VOLTAIRE SYSTEMS AT (407) 378-7482.		

Table 3 – Troubleshooting



8. SPARE PARTS

Refer to www.voltairesys.com or the QR code in the top right corner of the page

9. WARRANTY

VOLTAIRE SYSTEMS THERMAL UNITS LIMITED WARRANTY AND LIMITATIONS OF LIABILITY

(Applies to All Heat Exchangers, Pressurization Units,
Fan Units, and Air Conditioners)

The VoltAire Systems, LLC ("VoltAire") Non-Transferable Limited Warranty ("Limited Warranty") is applicable for 12 months following the shipment of the product to the original purchaser ("Purchaser") defined as the "Warranty Period". VoltAire warrants to the original purchaser during the Warranty Period that all materials and workmanship are free of defects of quality and operation that would impair the usefulness of the original air conditioner, fan unit, or heat exchanger (collectively herein referred to as "Product") during the Warranty Period. This Limited Warranty is for all components of the Product, except filters, when installed and operated under the following conditions:

- A. In strict accordance with the Product's Installation and Operation Manual, as may be revised from time to time with the latest version available at www.voltairesys.com.
- B. Maximum voltage variation no greater than plus or minus 10% of nameplate nominal rating.
- C. Maximum frequency variation no greater than plus or minus 3 Hz. of nameplate nominal rating.
- D. Must not exceed minimum and maximum stated temperatures on the nameplate.
- E. Not to exceed (BTU/Hr.) rating, including any heat sink, as indicated on the nameplate.
- F. Installed per all local, State and Federal Codes
- G. The unit must not be restarted for a period of five (5) minutes after intentional or accidental shut-off of a compressor. (This does not apply to heat exchangers or pressurization units.)

The Limited Warranty is void and not applicable if:

- A. The Product is installed improperly
- B. The Product is not maintained properly, including prolonged operation with dirty filters or coils.
- C. The Product is modified, abused and/or tampered
- D. The Product is applied in an incorrect manner, including operation within a corrosive atmosphere (including but not limited to coastal applications)
- E. The Product is used with the incorrect refrigerant (air conditioners only)
- F. The Product is damaged and/or inoperable due to accidents or events beyond the reasonable control of VoltAire and Acts of God
- G. The Product is repaired with parts not provided by VoltAire
- H. The Product is installed and operated outside the United States, Mexico, and/or Canada.

Damage during freight is not included with this Limited Warranty. The Purchaser must insure the Product is installed by a competent, professional, qualified contractor, following all local, state, and national codes and industry standards. The Purchaser must provide adequate maintenance (e.g. filter changes, coil cleanings).



The Limited Warranty covers the Product only during the Warranty period, and the Limited Warranty does not include any labor, freight, and/or consequential damages or loss. Upon Notification by the Purchaser, VoltAire solely reserves the right to either:

- Ship replacement parts to the Purchaser for the Purchaser's infield replacement of the part. Infield replacement will require the Purchaser to provide a purchase order to VoltAire for the standard cost of the part and after infield replacement return the original part to VoltAire with freight cost by Purchaser. Within fourteen (14) days of receipt of the returned part VoltAire will review and analyze the returned part. If the part is found to be defective by VoltAire a credit will be issued to the customer. Parts returned to VoltAire and found not to be defective will result in no credit applied to Purchaser's account and the Purchaser will be required to pay for the replacement part.
- Or request the return of the Product for evaluation. Return of the Product must be preceded by the issuance of a VoltAire Return Merchandise Authorization (RMA). The RMA will require that shipping costs be paid by the Purchaser to return the Product to VoltAire. Within fourteen (14) days of receipt of the returned Product VoltAire will review and analyze the Product. If the Product is determined by VoltAire to be defective, VoltAire may repair or replace the Product, and will ship the Product to the Purchaser for the Purchaser's installation in the field with no labor costs reimbursed by VoltAire. If the Product is determined by VoltAire to NOT be defective, the Purchaser will be notified and a Purchase Order must be issued in the amount required for the Product to be Packaged and returned to the Purchaser.

DISCLAIMERS AND LIMITATIONS OF LIABILITY:

THIS LIMITED WARRANTY CONSTITUTES THE ENTIRE WARRANTY FOR THE VOLTAIRE PRODUCT AND IS IN LIEU OF ALL OTHER WARRANTIES, EXPRESS AND IMPLIED, INCLUDING ANY WARRANTY OR MERCHANTABILITY AND WARRANTY OF FITNESS FOR A PARTICULAR PURPOSE.

VOLTAIRE IS NOT RESPONSIBLE FOR INCIDENTAL OR CONSEQUENTIAL DAMAGES OF ANY NATURE WHATSOEVER, INCLUDING, BUT NOT LIMITED TO, LOST PROFITS, ATTORNEYS FEES, AND LOSS OF USE DAMAGES.

VOLTAIRE EXCLUDES ALL LIABILITY FOR OR ARISING FROM ANY NEGLIGENCE ON ITS PART OR ON THE PART OF ANY OF ITS EMPLOYEES, AGENTS, OR REPRESENTATIVES IN RESPECT TO THE MANUFACTURE OR SUPPLY OF GOODS, INCLUDING THE PRODUCT, OR THE PROVISION OF SERVICES RELATING TO THE GOODS, INCLUDING THE PRODUCT.

This Limited Warranty, Disclaimer, and Limitation of Liability shall supersede any Terms of Purchase provided by the Purchaser at the time of the Purchase, and the Limitation of Liability shall survive from the date of the Purchase to the date of discontinued use. Some states do not allow the exclusion or limitation of incidental or consequential damages, so the above limitation of consequential damages may not apply.