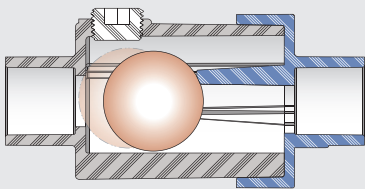


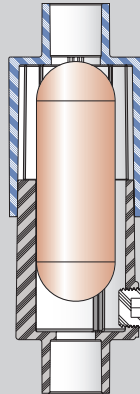
HVAC Air-Trap™

INFORMATION PORTFOLIO

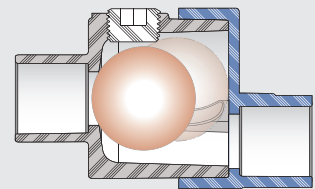
N-Series



P-Series



RLC-Series



Page 2	→	200 Years is Long Enough
3	→	HVAC Condensate Trap Specification Guide
4-12	→	Operation HVAC Air-Trap
13-16	→	IOM for Des Champs N-Series Air-Trap
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HVAC Air-Trap™

THE WATERLESS TRAP

***It's Time to Do Away with the P-Trap . . .
200 Years is Long Enough!***

***Come learn about the
evolutionary HVAC Air-Trap™!***

The *Air-Trap™* uses air pressure generated by the air moving devices to prevent unwanted airflow in or out of the unit via the drain lines.



Witness the *HVAC Air-Trap™* in action at **Booth 6391**

AHR 2018 EXPO
January 22-24, 2018
McCormick Place, Chicago

or visit

www.deschampstechnologies.com
for videos showing actual operation
using traps made of clear PVC.

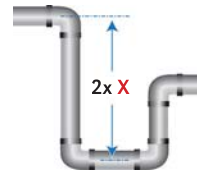


RLC SERIES

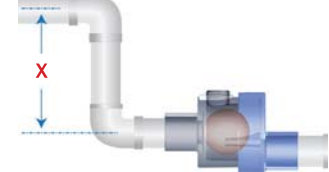
RESIDENTIAL/LITE COMMERCIAL WATERLESS TRAP
FOR USE AS NEGATIVE OR POSITIVE TRAP



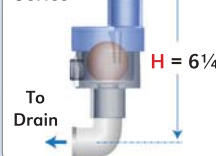
Standard "P" Trap



RLC Series



RLC Series



↑ **Negative Pressure**
Orientation is Horizontal

← **Positive Pressure**
Orientation is Vertical

X = height = Negative Pressure, inches wc
H = height of trap independent of pressure

Patents Pending



DES CHAMPS
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concept

development

market

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Made in U.S.A.

Condensate Removal from HVAC Equipment - Mechanical Specification for HVAC Air-Trap™

The installer of the HVAC cooling (or Energy Recovery) equipment shall be responsible for the removal of condensate, and other possible sources of water formation, from the unit and the delivery of the water to an approved drainage system as determined by local codes or owner's preferences, such as gray water storage or storm water drainage system. The external drain lines shall be connected to the unit by means of unit manufacturer supplied standard male pipe connections stubbed external to the unit, near the base. The drain line shall be sloped downward at a minimum of 1/8 inch per running foot in the direction of water flow away from the unit.

To prevent air from entering or leaving the Air Handling Unit, an "Air Trap" shall be placed within the water drain line that always prevents air flow through the trap but allows water to exit the unit and flow to the drainage system. Whether positive plenum pressure (fan blowing through cooling coil) or negative plenum pressure (fan drawing through cooling coil) an HVAC Air-Trap shall be installed within the drain line as near to the unit drain connection as is practicable.

The trap **shall not** be of the type typically designated as a P-Trap. The trap shall be an HVAC Air-Trap as manufactured in the USA by Des Champs Technologies and available at any local HVAC or plumbing wholesaler. The trap shall:

- a) Prevent any water from remaining in the drain line when there is no condensate being produced
- b) Prevent the possibility of broken pipes because of freezing
- c) Not require filling with water in spring or after extended period of no condensate formation
- d) Designed to not allow standing water within trap
- e) Prevent sludge buildup within the trap
- f) Prevent the geyser effect with "dry trap" and negative plenum pressure
- g) Not allow blowout with "dry trap" and positive plenum pressure
- h) have a total height equal to the maximum water pressure in inches WC. With negative pressure plenum, the HVAC Air-Trap requires less than ½ the height required for P-Trap installation
- i) Meet standard building code requirements
- j) Be predesigned and site proven to eliminate field guesswork

Air entering or leaving an HVAC unit via the condensate drain line manifests itself as an energy loss and a reduction of indoor air quality, the reason being that the replacement air must be filtered and conditioned. In addition, air drawn into a unit (which occurs often with a dry P-Trap) usually originates at undesirable locations such as gray water storage tanks or near sewer vents. As a result, the condensate line trap shall be an HVAC Air-Trap by Des Champs Technologies, which never experiences "dry-out" and never allows air to flow through the drain line.

The drain line shall, in addition to being properly sloped away from the unit, may require inclusion of a vent pipe. If required, the vent should be installed as close to the exit of the Air-Trap as possible. The purpose of the vent is to prevent a vacuum from developing at exit of trap which could result in a trap malfunction. All condensate piping shall be supported to maintain a straight alignment, a uniform slope, and intervals required by the Uniform Plumbing Code. Allow for thermal expansion and movement in all plastic piping installations using approved methods. Support, but do not rigidly restrain, piping at branches or changes of direction. Do not anchor rigidly in walls. Holes through framing members shall be adequately sized to allow free movement.

For HVAC Unit _____ the condensate drain line shall be ____ inch diameter schedule 40 PVC and the condensate trap shall be a Des Champs HVAC Air-Trap, Model _____, capable of accommodating _____ GPH of condensate at a plenum pressure of _____ inches WC positive Δ negative Δ . Refer to HVAC Air-Trap Manufacturer Instructions for installation, operation, and maintenance of the Air-Trap.

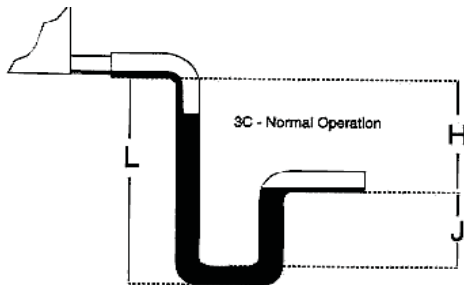
DES CHAMPS TECHNOLOGIES HVAC *Air-Trap*TM

ELIMINATES NEED TO CONSTANTLY MONITOR DRAIN TRAPS FOR DRY-OUT, SLUDGE BUILDUP, AND FREEZING

P-trap, the Standard Condensate Trap of the HVAC Industry

When it comes to mouse traps, it is difficult to find a newfangled trap that works better than the standard spring-loaded Victor-type that has been around for over a hundred years. Likewise is the case with the “P” trap or P-trap, the industry standard for removing condensate or water from an air-handling unit (AHU) while simultaneously preventing dilution of conditioned air by outdoor air. The principal reason the P-trap has had such staying power is its first cost and simplicity. In many parts of the world, if properly designed, it does its job okay. However, in areas where freezing weather occurs, there are four distinct seasons, or where hot and dry as well as hot and humid conditions exist, the P-trap has negative issues. Figure 1 shows typical P-trap design guidelines.

Figure 1a Negative Plenum Pressure

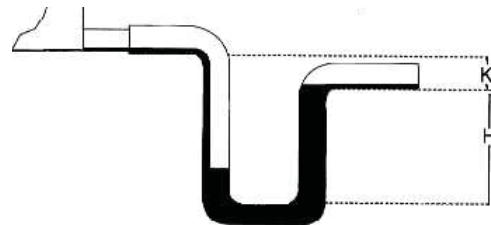


$H = (1" \text{ for each } 1" \text{ of maximum negative static pressure}) + 1"$

$J = \text{half of } H$

$L = H + J + \text{Pipe Diameter} + \text{Insulation}$

Figure 1b Positive Plenum Pressure



$K = \text{min. } 1/2"$

$H = 1/2" \text{ plus maximum total static pressure}$

The most common problem with the standard trap is when there is little or no water in the trap. This occurs when the P-trap never had water fill, operated for extended periods with no

water generated within the AHU, or never filled with water even during condensate production because:

- a) For negative pressure, a geyser effect as the condensate attempts to exit through a drain opening having high velocity incoming air, causing insulation, fans, motors, etc. to get wet
- b) For positive pressure, the velocity of the air escaping through a dried out trap is sufficiently high that it carries the water that is condensing with it as the air exits the trap.
- c) Proper design for the height of a standard trap is to have a minimum between the bottom of the trap and the bottom of the horizontal drainpipe exiting the trap of 2 times the maximum pressure in inches of WC expected within the AHU plenum where the drain is located. Because of height restrictions, many trap designs do not meet these dimensional requirements, which could lead to dry out and air by-pass (the greater the depth of a P-Trap the less chance of it drying out).
- d) A syphoning effect caused by washing the drain pan or any surge of water through the P-trap could lead to dry-out and a loss of the air seal.

Second on the list of P-trap problems is freezing and breaking. At the end of the cooling season, water fills the trap to near the horizontal trap exit pipe, leaving more than enough water within the trap to carry over to the freezing season. Unless the trap is heat traced or filled with some form of antifreeze, the trap will freeze and possibly break. Freezing is generally considered to be the number one trap problem because the results are readily apparent and are costly whereas dry out is not readily apparent but can be more costly because of wasted energy. In addition, broken traps caused by freezing, if not immediately repaired, lead to dry out which can persist for years.

The operation of a P-trap, with continuous filling and drying, leads to sludge or debris collecting in the bottom. Without proper trap maintenance, the drain pan could overflow.

The height required for a P-trap is the last issue discussed. In an AHU, the condensate drain pan normally rests on the unit floor. The drain-line connection is at the lowest point of the sloped pan. The AHU floor is on a frame that varies in height from four inches (light commercial) to eight or more inches (commercial). For commercial HVAC equipment, typical pressures within the AHU range from minus 6 inches to plus 6 inches WC. If a unit were to be operating at minus 6 inches WC maximum negative plenum pressure then the trap height, per the guidelines shown in Figure 1a, requires $7 + 3\frac{1}{2} + 1\frac{1}{2} + 1$ inches of height from under the floor or about 13 inches below the floor level. With a unit frame height of 8 inches, a curb is required under the unit in order to accommodate a properly designed P-trap... an expensive proposition.

The Des Champs Technologies HVAC *Air-Trap*

Des Champs offers a commercial trap designed for negative plenum pressure and one designed for positive plenum pressure applications for pressures up to 12-inches WC and a residential/light commercial capable of operating up to a pressure of 3 inches WC, operating with either positive or negative pressure. The majority of HVAC trap applications are on draw-through AHUs, where the cooling coil is in a negative pressure plenum. Draw through designs generally result in less overall pressure drop through the AHU because of more evenly distributed airflow through the components, such as dampers, filters, coils, and heaters. There are also persuasive reasons for specifying a blow-through AHU, especially when gas heat is involved.

The Des Champs N-Series HVAC *Air-Trap*

Figure 2 illustrates the height saving of the N-Series *Air-Trap* when compared to a standard P-trap for a typical installation. The illustration is for a 2-inch negative pressure system but the ratio of 4+ to 2 (P-trap to N-Series *Air-Trap*) holds for any negative pressure, i.e., if the negative pressure is 4 inches WC then the P-trap requires approximately 9 inches of height whereas the N-Series *Air-Trap* requires only 4½ inches of height. This reduced height requirement could result in considerable cost savings during installation.

Shown in Figure 3 is a cutaway view of the Des Champs N-Series *Air-Trap*. The hollow ball travels on horizontal rails and with the fan on and no condensate flowing, the ball valve snugs against the left circular entrance port/seat, resulting in essentially no air drawn through the trap and into the AHU. Once condensate flows, the ball stays against the seat until the water level in the vertical standpipe reaches a height H, in inches, equal to the plenum negative pressure in inches WC. When the water column reaches height H, the water pressure on the ball equals the negative air pressure holding the ball against the seat and the ball moves away from the seat, allowing water to flow. When condensate ceases to form, then the ball valve returns to the seat and prevents air from flowing into the unit.

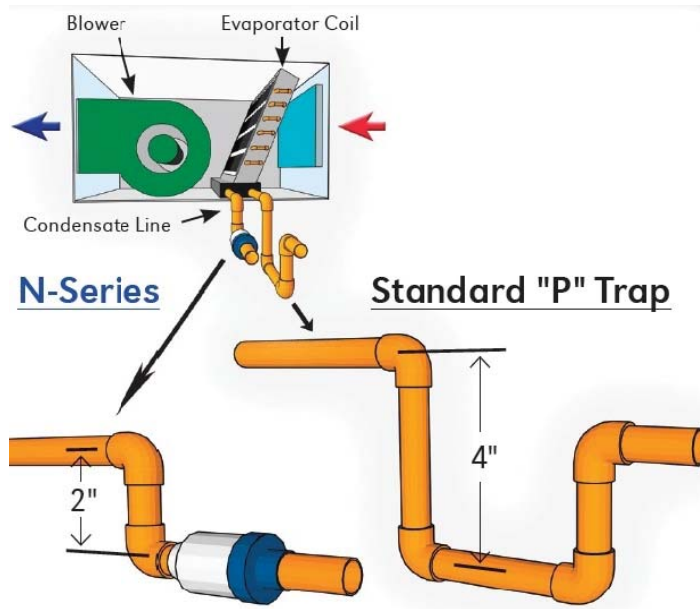


Figure 2 Comparison of standard P-trap and Des Champs N-Series **Air-Trap** installed in a draw-through, horizontal position

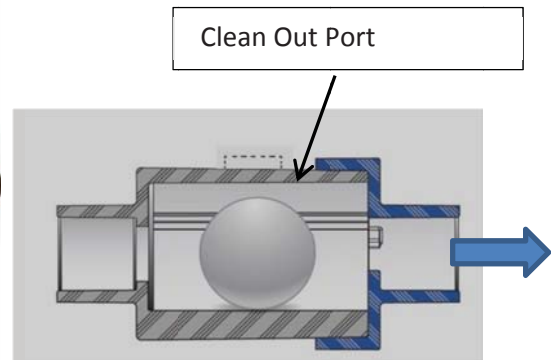


Figure 3 Des Champs N-Series **Air-Trap**

HVAC AHU



Figure 4 Des Champs N-Series **Air-Trap** undergoing tests at the Des Champs Technologies Las Vegas, NV test facility. Testing videos showing the operation of the trap are viewable at www.deschampstechnologies.com, then go to **N-Series** and then to **N-Series YouTube Presentation**

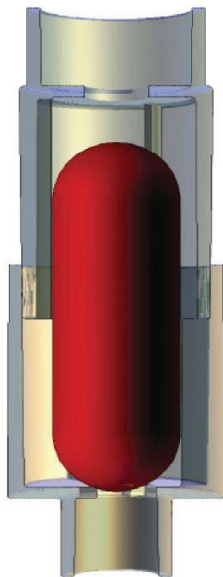
The seal is not 100% airtight. The air leakage is less than 0.1% of what would leak through the drainpipe for an equivalent P-trap when operating dry. This slight amount of air leakage is

assurance that no water will remain in the trap or incoming standpipe when freeze time comes. The N-Series **Air-Trap** operates at essentially any negative pressure up to the distance, in inches, between top of the water level in the plenum and the centerline of the horizontal N-Series **Air-Trap**. Maximum water flow rate is greater than two GPM, which is equivalent to over 80 tons of latent cooling.

The N-Series **Air-Trap** has sufficient merits for consideration on all negative pressure plenums. However, there are many instances when it is essential to consider their use. For instance, a contractor informed an AHU manufacturer that a back charge of \$50,000 is eminent because late delivery resulted in having to remove building walls and putting units on curbs, not included in original specification. The reduced height of the N-Series **Air-Trap** removed the requirement for curbs and eliminated the back charge.

The Des Champs P-Series HVAC **Air-Trap**

Shown in Figure 5 is a cutaway view of the Des Champs P-Series **Air-Trap**, used for removing condensate from plenums operating under positive pressure.



Whereas the N-Series **Air-Trap** must be installed and operate in a horizontal position, the P-Series **Air-Trap**, because its operation depends upon buoyancy to properly function, must be operated vertically. With no production of condensate within the AHU the positive pressure that exists within the plenum, containing the drain line, forces the capsule (or spherocylinder), shown in red, downward onto the valve seat. With the production of water within the plenum, the capsule rises from the seat when the net buoyancy force upward equals or exceeds the net downward force created by air pressure.

Figure 5 Positive Pressure Des Champs P-Series **Air-Trap**

The P-Series **Air-Trap**, in addition to installing vertically, has additional factors that are important to understand and consider during its design into the drainage system. These factors arise from the fact that the capsule rises and falls depending upon the pressure differential between the air pressure entering the trap at the top and the air pressure leaving the trap plus

the buoyancy of the capsule when water is present. The air pressure at the top is equal to the plenum pressure, and at the bottom, it is normally ambient pressure.

However, if the piping system leaving the trap is long, has sags, or is too small in diameter to properly accommodate the water flow, then a syphoning effect could develop at the bottom of the trap, creating a negative pressure sucking the capsule downward. This, in turn, could cause the trap to malfunction. To prevent a negative syphoning pressure, install a vent pipe directly below the exit of the trap as shown in Figure 6.



Figure 6 Positive Pressure HVAC ***Air-Trap*** undergoing tests at the Des Champs Technologies Las Vegas, NV test facility. Testing videos showing the operation of the trap are viewable at www.deschampstechnologies.com, then go to P-Series and then to **P-Series YouTube Presentation**

Use of the P-Series ***Air-Trap*** is to drain water from HVAC plenums that are operating at a positive pressure created by a blow-through fan arrangement within the AHU design. There are many reasons to design an AHU for a blow through arrangement and a few are:

- a) As an aid in preventing outside air from entering the AHU

- b) To reduce the noise level within the supply air plenum
- c) To accommodate a more compact design
- d) Cool fan and motor heat prior to air delivery to conditioned space
- e) For energy recovery units, to prevent exhaust air leakage into supply airstream
- f) When gas heat is furnished as a component of the AHU.

An example for application of the P-Series **Air-Trap** is for AHUs used to remove heat from data centers. This type of AHU could incorporate both an indirect evaporative cooler and a complementary cooling coil. Both cooling components can produce condensate, so there are typically trap requirements in three or four separate plenum compartments, including the blow-through fan compartment. Blow through is desirable to keep the unit under positive pressure to prevent leakage of outdoor air into the highly filtered and humidity controlled recirculating air and to enable the cooling system to remove most of the heat generated by fans, motors, and compressors before delivering the cooled air to space. There is also less noise in the supply duct.

For Data Center cooling, recirculating, cooling air typically returns to the AHU at around 95°F and cools to 75°F. Seldom, under these conditions, does condensing occur. Consequently, the standard P-traps require frequent filling, a costly maintenance issue considering there could be upwards of fifty and, in some cases, as many as a thousand traps to fill. If they go dry, the pressurized recirculating air leaks to outside of the conditioned space, resulting in the facility's make-up air system becoming inadequate. Freezing could also be an issue with P-traps.

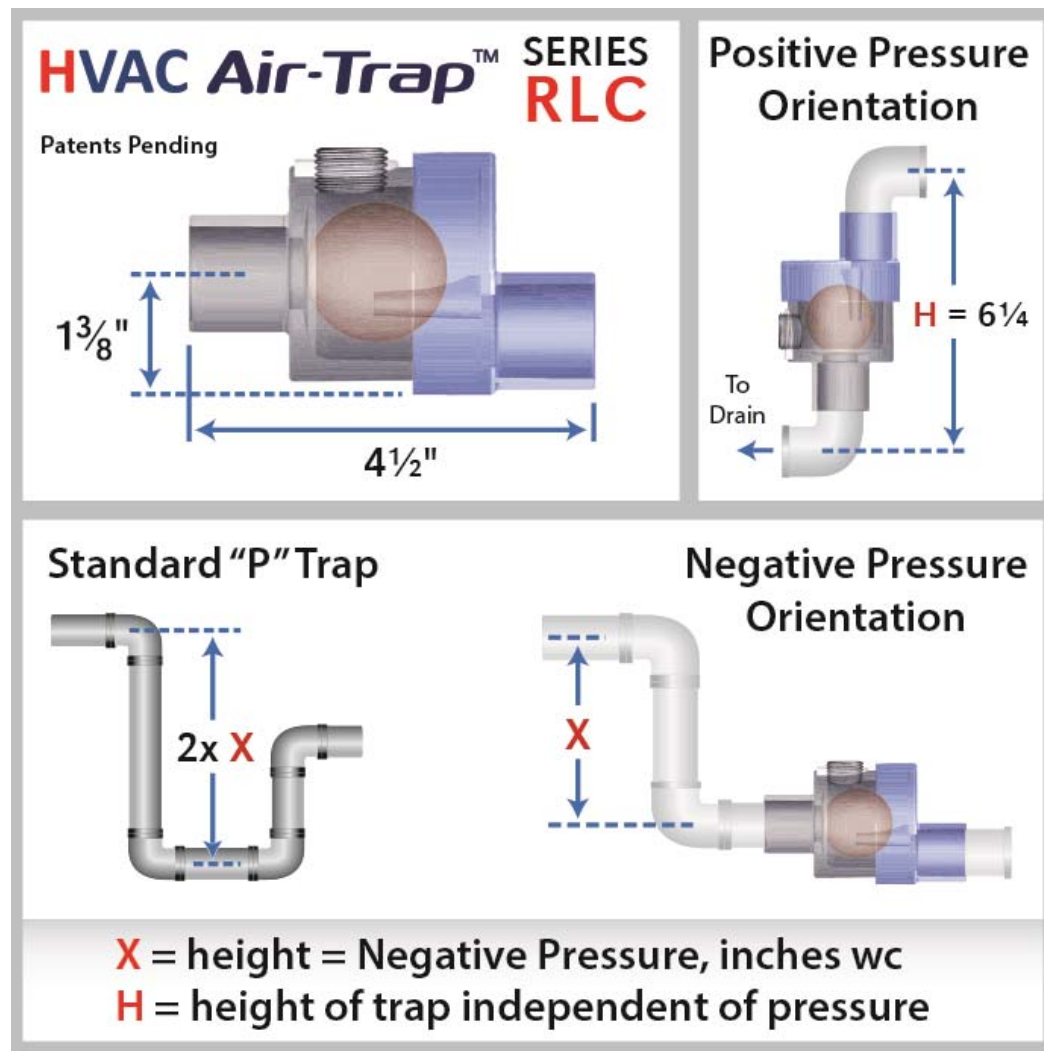
Data center owners complained about the maintenance issues associated with using standard P-traps on their AHU cooling units. Specifying engineers responded by specifying the Des Champs P-Series **Air-Trap**, which does not require water to prevent airflow out of the AHU and consequently eliminates the need for routinely filling the traps with water. In addition, during the cold months, when the cooling coil is not condensing the **Air-Trap** is dry. If, for some reason, water is flowing from the unit during freezing temperatures, and the trap sees below freezing temperature, then the trap requires thermal protection.

The N and P Series of **Air-Traps** are available in ¾, 1, 1 ¼, and, 1½-inch PVC schedule 40 slip connections, and are directed towards the commercial market.

The Des Champs RLC-Series HVAC Air-Trap

The RLC Series is directed towards the residential and light commercial markets and is limited to a maximum of 3-inches WC pressure differential whereas the N and P Series are limited to a maximum of 12-inches WC. Also, the RLC Series is available in two connection sizes, 3/4 inch slip (on inside of connection pipe) and a 1-inch fitting (on the outside of connection pipe). However, with standard schedule 40 PVC bushings, available at any big box hardware or plumbing wholesale store, PVC pipe from 1/2 to 2 inches can be attached to the RLC. Also, as shown in Figure 7, the Series RLC *Air-Trap* may be used for either negative pressure or positive pressure applications. By installing horizontally it becomes a negative pressure trap and by installing in a vertical position it becomes a positive pressure trap. The operating principles and advantages are similar to the P and N Series as previously presented.

Figure 7 Layout of the Series RLC *Air-Trap*



Summary

The Des Champs N and P **Air-Trap** designs are patented and the RLC has patents pending. They have tremendous benefits if properly installed per the manufacturer's instructions, which are simple and straightforward. They are:

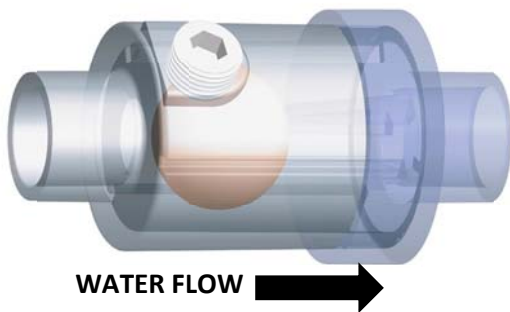
- 1) For negative pressure drain pan, install trap horizontally with water flow in direction of arrow with arrow on the top of the trap after installation.
- 2) For Positive Series:
 - i. Install vertically with end marked TOP on top.
 - ii. If a long length of drain pipe and/or a small drain pipe, less than 1¼-inch diameter, then a vertical, vent tube is required to be installed as near to the exit of the trap as possible, as shown in Fig 6.
 - iii. Care must be taken when cleaning or flushing the drain pan
 1. The fans creating the pressure at the drain pan must be in off position.
 2. Either a screen over the drain inlet or a Union Strainer, placed in the line, between the drain pan and the trap, is necessary to prevent the solids and debris from clogging the trap.

If the water flow rate of the cleaning system is greater than the water flow capacity of the trap then the trap clean-out plug will have to be removed prior to cleaning. Caution is necessary to prevent the cleaning water from overflowing the drain pan.

Installation, Operation, and Maintenance Manual for Des Champs Technologies

HVAC Air-Trap™

N-SERIES Negative Plenum Pressure



Patent Pending

These instructions are a guide to the user of an N-SERIES Air-Trap during installation, commission into service, operation, or periodic maintenance.



MADE IN THE USA

Product Description

The N-SERIES Air-Trap allows water to drain from HVAC equipment and simultaneously prevent air from entering the equipment.

The N-SERIES Air-Trap does not require standing water to prevent gas (typically air) from entering the HVAC equipment. With the occurrence of condensate or other water sources within the unit, the water flows out of the HVAC unit but no gas enters. When there is no production of condensate or water there is no water in the trap and there is no gas entering through the trap. Install the N-Series Air-Trap in a horizontal position.

Delivery Check

Upon receipt of the air-trap(s), inspect for damage that may have occurred during shipment and check to ensure delivered items match purchased items.

Resolving Shipping damage

If damaged or items are missing:

1. Report all claims of shipping damage to the delivering carrier (transporter) immediately, and schedule an inspection.
2. Make specific notations on the freight bill concerning the damage.
3. Keep damaged material in the same location as received. The receiver is responsible for providing reasonable evidence that damage did not incur after delivery.
4. Photograph damage if possible.
5. Do not move or discard damaged freight packaging materials.
6. Notify the sales representative, or Des Champs Technologies, of the damage. Do not attempt to repair the unit without consulting the sales representative or Des Champ Technologies. **DES CHAMPS TECHNOLOGIES IS NOT RESPONSIBLE FOR SHIPPING DAMAGE.**

Storage Considerations

Store the Air-Trap in a protected area prior to installation. **The warranty will not cover damage to the trap due to negligence.**

Installation


For negative pressure cooling section(s), always connect the drain pan directly to a trap to ensure proper drainage of condensate.


CAUTION
Failure to provide adequate drainage piping may result in water damage to equipment or building.
Place stainless steel filter screen, Figure 1, over drain inlet or install a Union-Strainer, see Figure 4) upstream of the trap.

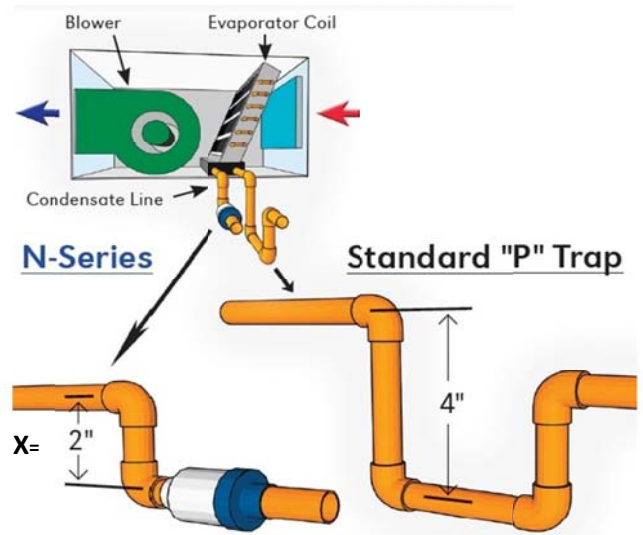


Figure 1 Filter Screen

Important: Make sure a strainer screen, as shown in Figure 1, is placed over the drain inlet prior to operation of the HVAC unit and before installing the trap. An integral Union-Strainer™ may also be inserted in the drain line upstream of the Air-Trap as shown in Figure 4.

1. Install the N-SERIES Air-Trap as shown in **Figure 2**. The trap has to be installed level in a horizontal plane with the arrowhead  in the direction of water flow. The vertical distance **X** must be at a minimum equal to the negative plenum pressure in inches of water column. This is a requirement for proper movement of the internal components. Figure 2 illustrates a 2-inch negative pressure condition.

2. Trap must be installed horizontally only for negative plenum pressure systems. **DO NOT INSTALL VERTICALLY.**
3. The trap must be installed in accordance with manufacturer's instructions and with all applicable local or national plumbing, drainage and mechanical codes. **NEVER CONNECT CONDENSATE DRAIN DIRECTLY TO A SANITARY DRAIN LINE.**



For proper operation, place in horizontal position with cleanout plug on top!

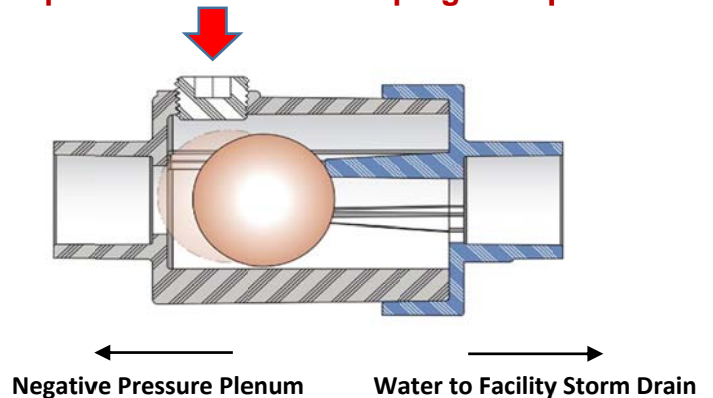


Figure 2 N-Series Air-Trap Installation

Operation

The N-SERIES Air-Trap operates dry when no water removal is required and wet when it is required. When dry, essentially no air flows into the HVAC unit. When removing water, the water exits the unit but essentially no air flows into the unit through the drain connection.

One of the principal advantages of the N-SERIES Air-Trap is that it operates in a horizontal position. This allows the centerline distance between the unit drain connection and the trap to be approximately the same as the negative pressure in inches of water column within the negative pressure plenum. See Figure 2.

When there is no water to remove the negative pressure within the plenum draws the internal valve against the valve seat and essentially no air enters the AHU through the drainpipe. When condensate forms then water builds up in the vertical pipe. When the water level equals the negative air pressure, in inches of water column, the force of the water head becomes equal or greater than the negative pressure, the internal valve moves to the right and water flows, as shown in **Figure 2**. When there is no requirement to remove water then the negative pressure returns the internal valve to the valve seat and prevents airflow to the unit plenum. The internal rails aid in returning the internal valve to the seat, especially when a variable speed fan is operating at a low flow and low negative pressure. The N-SERIES Air-Trap will allow flow of greater than 3 GPM with no external drainpipe restrictions. **Figure 2** illustrates the distance between the unit drain connection and the centerline of the **Air-Trap** is approximately half the requirement of a standard P-trap. Therefore, use of the N-Series **Air-Trap** could be of a great advantage if the height from the AHU drain to the floor or roof is less than required by a conventional "P" Trap.

The N-SERIES Air-Trap accomplishes the following:

- Reduces sludge buildup that normally accumulates in standard "P" trap
- Prevents water blow out when condensate begins to form at the beginning of cooling season when trap has dried and air is rushing

into HVAC unit plenum, causing water spray into fan plenum compartment

- Since there is no water in the trap, there is no chance of freezing during cold periods.
- Reduces the trap height by approximately 50% as compared to the "P" trap

Techniques for Cleaning the N-SERIES Trap

In some operations, particulate matter may move from the HVAC unit through the drain line and into the N-SERIES **Air-Trap**. The accumulation of particulate matter in the trap may potentially cause the trap to operate less efficiently or fail. Therefore, a means to remove the debris is required. A stainless steel filter screen over the drain inlet or a **Union-Strainer** within the drain line and upstream of the **Air-Trap** extends the time between maintenance but more than likely the time will come.

There are several options for cleaning. Option 1 is to use the ½-inch cleanout port in the trap housing. This will allow insertion of a water or air hose for washing or blowing away material that may be hampering operation of the trap. See **Figure 2**



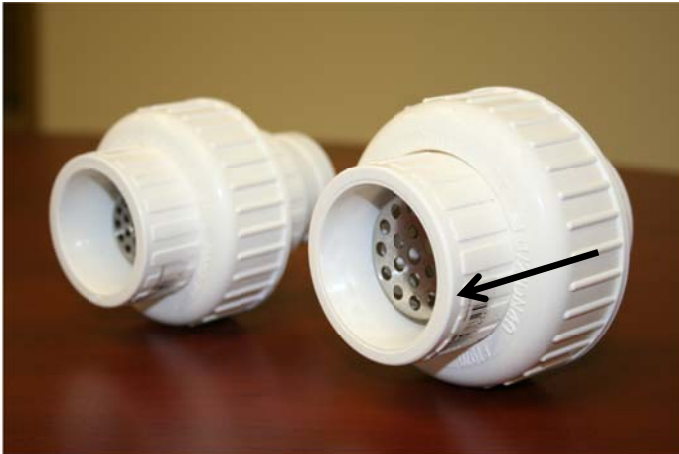
Figure 3 The Air-Trap with unions

Option 2, shown in Figure 3, is to isolate the N-SERIES Trap from the main drain line by installing unions that allow **Air-Trap** removal for replacement or cleaning.

The best way to reduce maintenance is to install a DesChamps **Union-Strainer™** upstream of the **Air-**

Trap (See Figure 4). The DCT **Union-Strainer™** is also a convenient way to prevent unwanted creatures from entering the terminus of the drain line, like snakes, rats, lizards, and insects.

Figure 4 DesChamps Union-Strainers™



The water flow is in direction of arrow shown in Figure 4, with the strainer cup oriented to capture debris within the cup.

Maintenance

Inspect the N-SERIES **Air-Trap** on an annual basis; remove any sludge or foreign materials that might obstruct proper operation of the valve contained within the trap or general drainage of the drain line. Remove obstacles utilizing the clean out port located on the top of the Air-Trap or in the drainpipe. Caution - do not damage the internal valve inside the N-SERIES Air-Trap. Properly dispose of any contaminated materials.

Limited Warranty

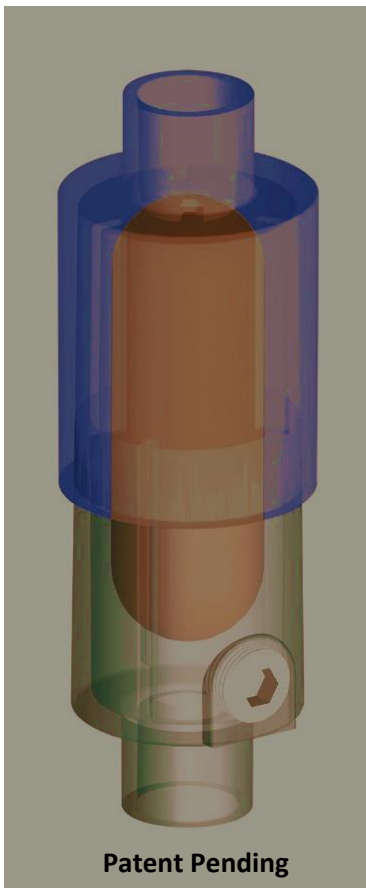
Des Champs Technologies warrants to the original consumer purchaser (“Purchaser”) of its product, the N-SERIES **Air-Trap**, that it is free from defects in material or workmanship. If within the 12-month period from the date of the original consumer purchase this product shall prove to be defective, it shall be repaired or replaced at Des Champs Technologies’ option. Your original receipt of purchase is required to determine warranty eligibility. The warranty does not cover damage due to misuse, misapplication, lack of maintenance, or failure to comply with the manufacturer’s installation instructions or recommendations or any other loss or damage exceeding the purchase price of the equipment purchased from Des Champs Technologies. Des Champs Technologies assumes no responsibility for damage or injury resulting from chemical incompatibility between its products and the process fluids to which they are subjected. This warranty is limited to repair or replacement of the N-SERIES Air-Trap only and is the only warranty issued by Des Champs Technologies on its trap products.

The product design is Patented by Des Champs Technologies LLC, Natural Bridge Station, Virginia 24579. Des Champs Technologies also has a full line of Positive Pressure Traps. Call or go to the website below for more information.

Installation, Operation, and Maintenance Manual for Des Champs Technologies Waterless Trap

HVAC *Air-Trap*™

P-SERIES Positive Plenum Pressure



These instructions are a guide to the user of a P-Series *Air-Trap* during installation, commission into service, operation, or periodic maintenance.

Product Description

The P-SERIES *Air-Trap* allows water to drain from HVAC equipment and simultaneously prevents air from escaping from the equipment.

The P-SERIES *Air-Trap* does not require standing water to prevent gas (typically air) from leaving the HVAC unit. With the occurrence of condensate, or other water sources within the unit, the water flows out of the HVAC unit but no gas escapes. When there is no production of condensate or water, there is no water in the trap and there is no gas leaving through the trap. Install the P-SERIES *Air-Trap* in a vertical position.

Delivery Check

Upon receipt of the air-trap(s), inspect for damage that may have occurred during shipment and check to insure delivered items match purchased items.

Resolving Shipping Damage

If damage or items are missing:

1. Report all claims of shipping damage to the delivering carrier (transporter) immediately, and schedule an inspection.
2. Make specific notations on the freight bill concerning the damage.
3. Keep damaged material in the same location as received. The receiver is responsible for providing reasonable evidence that damage was not incurred after delivery.
4. Photograph damage if possible.
5. Do not move or discard damaged freight packaging materials.
6. Notify the sales representative, or Des Champs Technologies, of the damage. Do not attempt to repair the unit without consulting the sales representative or Des Champs Technologies. DES CHAMPS TECHNOLOGIES IS NOT RESPONSIBLE FOR SHIPPING DAMAGE.

Storage Considerations

Store the *Air-Trap* in a protected area prior to installation. **The warranty will not cover damage to the trap resulting from negligence.**



MADE IN THE USA

Installation

For positive pressure cooling section(s), always connect the drain pan directly to a trap to ensure proper drainage of water while simultaneously preventing escape of air from the unit.



CAUTION

Failure to provide adequate drainage piping may result in water damage to equipment or building.

Place stainless steel filter screen, Figure 1 over drain inlet or install a Union-Strainer™, see Fig 8, upstream of the trap.



Figure 1 Strainer Screen

Important: Install a strainer screen, as shown in Figure 1, over the drain inlet prior to operation of the HVAC unit and before installing the trap. An integral Union-Strainer™ (see Figure 8) may also be inserted in the drain line upstream of the *Air-Trap*.

1. Install the P-SERIES *Air-Trap* vertically with the end marked “top” facing upward and the embossed arrowhead, ▼, pointing downward. This is a requirement for proper movement of the internal float valve component.
2. Install the trap in accordance with manufacturer’s instructions and with all applicable local or national plumbing, drainage, and mechanical codes.
3. **NEVER CONNECT CONDENSATE DRAIN DIRECTLY TO A SANITARY DRAIN LINE. Connect only to a storm drain or a condensate drain line.**

Operation

The P-SERIES *Air-Trap* operates dry when no water removal is required and wet when it is required. When dry, essentially no air exits the HVAC unit. When removing water, the water exits the unit, but essentially no air exits the unit through the drain connection.

P-Series

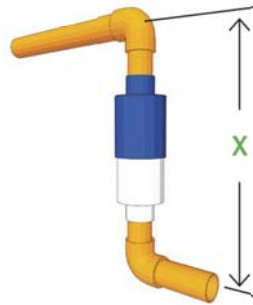


Figure 2: P-Series *Air-Trap* Installed

Install the P-SERIES *Air-Trap* in a vertical orientation. With no production of condensate within the AHU the positive pressure that exists within the plenum that contains the drain line forces the capsule (or spherocylinder), downward onto the valve seat. With the production of water within the plenum, the capsule rises from the seat when the net buoyancy force upward equals or exceeds the net downward force created by air pressure. See cutaway view in Figure 3. The standard model P-SERIES operates as a positive trap up to 12 inches WG of positive pressure. If a pressure of more than 12 inches WG could occur, then please contact Des Champs Technologies for information on the Engineered P-Series *Air-Trap*.

The P-SERIES *Air-Trap* accomplishes the following:

- Reduces sludge buildup that normally accumulates in standard “P” traps
- Prevents freezing of trap during cold periods since during periods of no water removal there is no water in the trap. If, for some reason, water is flowing from the unit during freezing temperatures, and the trap is located within this freezing temperature region, then the trap will require thermal protection.
- P-Series *Air-Trap* requires no water head to cause the trap to operate. Simply come out of the plenum with the condensate line and go down into the P-Series *Air-Trap*. Come out of the trap and go horizontally with your drain line. The height, x, requirement then becomes the height of the trap plus two street elbows. See Figure 2.
- Eliminates air escaping from an HVAC unit that would result from a standard P-trap experiencing a “dry-out” condition.
- Note: If there is a possibility of a syphoning effect (suction pressure) at the exit point of the *Air-Trap* then it is necessary to install a vent as close as possible to the bottom of the trap (see Figure 9).
- If height, x, is an issue, the P-Series *Air-Trap* may be installed at a 45° angle, as shown in Figure 5. When installed at a 45° angle, the maximum positive pressure it can withstand is 5” of WG instead of 12”. The reduced pressure capability is a result of a reduction in buoyancy.
- Another option when height is an issue is to install the N-Series *Air-Trap* vertically, as opposed to horizontally when used as a negative trap, shown in Figure 6. The maximum positive plenum pressure it

can withstand is 3" of WG. The cleanout port is on the bottom when used for positive pressure.

Maintenance and Techniques for Cleaning the P-Series Air-Trap

In some operations, particulate matter can move from the HVAC unit through the drain line and into the P-SERIES *Air-Trap*. The accumulation of particulate matter in the trap may cause the trap to operate less efficiently or fail. Therefore, a means to remove the accumulated debris is required. A stainless steel filter screen (Figure 1) over the drain inlet or a **Union-Strainer™** (Figures 7 & 8) within the drain line extends the time between maintenance. Install the **Union-Strainer™** upstream of the *Air-Trap*.

There are several other options for cleaning. Option 1, is to use the ½-inch cleanout port in the trap housing. This will allow insertion of a water or air hose for washing or blowing away material that may be hampering operation of the trap. See Figure 3.

Option 2, shown in Figure 7, is to isolate the P-SERIES *Air-Trap* from the main drain line by installing unions that allow *Air-Trap* removal for replacement or cleaning.

The best way to reduce maintenance is to install a Des Champs **Union-Strainer™** upstream of the *Air-Trap*, (See Figure 8). The **Union-Strainer™** is also a convenient way to prevent unwanted creatures and objects from entering the terminus of the drain line, like snakes, rats, lizards, insects, and other miscellaneous items like, rocks, screws, and nuts. The water flow is in direction of arrow shown in Figure 8, with the strainer cup oriented to capture debris within the cup.

Des Champs Technologies also offers engineered traps for positive plenum pressure above 12 inches in WG. Figure 4 is a cut away view of an engineered trap showing a cleanout port and the cylindrical float that rises off the seat when condensate begins to accumulate in the trap. Engineered *Air-Traps* are designed for applications above the 12 inches of positive pressure of the standard P-Series *Air-Trap*. The Engineered *Air-Trap* can withstand positive pressure up to 50" of WG or greater. **Caution, do not puncture the Float Valve.**

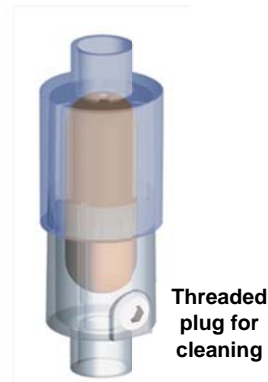


Figure 3 ½-inch cleanout port - Standard Model of P-SERIES *Air-Trap* up to 12" of positive pressure.

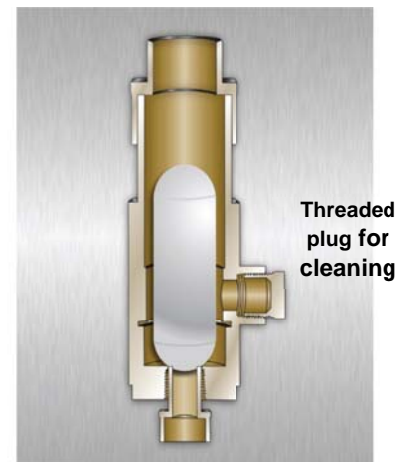


Figure 4 ¾-inch thread cleanout plug- Engineered Model of P-SERIES *Air-Trap*, for positive pressure above 12" up to 50" WG.



Figure 5 P-SERIES *Air-Trap* installed at 45° angle can reduce trap height by 30% and operate at up to 5" of positive pressure.



Figure 6 N-SERIES *Air-Trap* when installed vertically can operate properly up to 3" of positive pressure.

Figure 7 Use unions to isolate the *Air-Trap* for removal or for maintenance





Figure 8 In-line Union-Strainers. Install in the drain line upstream of the Air-Trap. This will aid in preventing debris from entering trap.



Figure 9 Installation of a Vertical Vent Pipe installed directly downstream of a P-Series Air-Trap to prevent a suction pressure from developing below the trap. A suction pressure could develop depending upon the length of drainpipe, the diameter, and the water flow rate.

Inspect the P-Series **Air-Trap** on an annual basis; remove any sludge or foreign materials that might obstruct proper operation of the internal mechanism or general drainage of the drain line. Remove obstacles utilizing the clean out port located at the bottom of the **Air-Trap**. Caution – do not damage the internal mechanism inside the P-Series **Air-Trap**. Properly dispose of any contaminated materials.

Limited Warranty

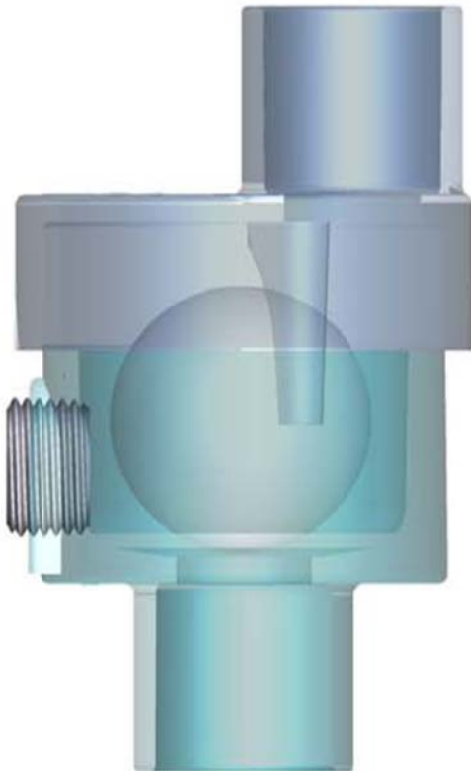
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This product design is Patented by Des Champs Technologies LLC, Natural Bridge Station, Virginia 24579.

Des Champs Technologies also has a full line of Commercial grade Negative Pressure Traps. Call or go to the Website below for more information.

Installation, Operation, and Maintenance Manual for **HVAC Air-Trap™**

RLC-SERIES Positive/Negative Pressure ¾" slip or 1" bushing connections



Patent Pending

These instructions are a guide to the user of an RLC Series **Air-Trap** during installation, commission into service, operation, or periodic maintenance.



MADE IN THE USA

Product Description

The RLC-SERIES **Air-Trap** allows water to drain from HVAC equipment and simultaneously prevents air from escaping from or entering the equipment.

The RLC-SERIES **Air-Trap** does not require standing water to prevent gas (typically air) from entering or leaving the HVAC unit. With the occurrence of condensate, or other water sources within the unit, the water flows out of the HVAC unit but no gas flows past the trap. When there is no production of water, there is no water in the trap and there is no gas passing through the trap. Install the RLC-SERIES **Air-Trap** in a vertical position for positive pressure and in a horizontal position for negative pressure.

Delivery Check

Upon receipt of the a **Air-Trap** (s), inspect for damage that may have occurred during shipment and check to insure delivered items match purchased items.

Resolving Shipping Damage

If damage or items are missing:

1. Report all claims of shipping damage to the delivering carrier (transporter) immediately, and schedule an inspection.
2. Make specific notations on the freight bill concerning the damage.
3. Keep damaged material in the same location as received. The receiver is responsible for providing reasonable evidence that damage did not incur after delivery.
4. Photograph damage if possible.
5. Do not move or discard damaged freight packaging materials.
6. Notify the sales representative, or Des Champs Technologies, of the damage. Do not attempt to repair the unit without consulting the sales representative or Des Champs Technologies. DES CHAMPS TECHNOLOGIES IS NOT RESPONSIBLE FOR SHIPPING DAMAGE.

Storage Considerations

Store the **Air-Trap** in a protected area prior to installation. **The warranty will not cover damage to the trap resulting from negligence.**

Positive-Pressure Application

The Series RLC maximum operating positive pressure is 3.0 inches wc. If the positive pressure is expected to be greater, then a Series P Air-Trap for up to 12 inches wc or an engineered Air-Trap for any positive pressure above 12 inches wc should be used.

Always connect the drain line leaving the drain pan directly to a trap to ensure proper drainage of water while simultaneously preventing unwanted air from entering or leaving the HVAC equipment.



CAUTION

Failure to provide adequate drainage piping may result in water damage to equipment or building.

Place stainless steel filter screen, Figure 1, over drain inlet or install a Union-Strainer™, see Figure 5 upstream of the trap.

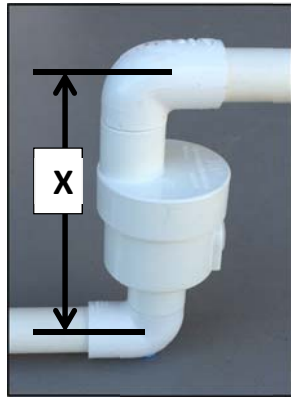


Figure 2: RLC-Series *Air-Trap* Installed Vertically for Positive Pressure Application



Figure 1: Strainer Screen

Important: If there is a possibility of items such as screws, gravel, etc. falling into the drain line then install a strainer screen, as shown in Figure 1 over the drain inlet prior to operation of the HVAC unit and before installing the trap. An integral Union-Strainer™ (also available from Des Champs Technologies LLC, see Figure 5) may also be inserted in the drain line upstream of the *Air-Trap*.

1. Install the RLC-SERIES *Air-Trap* vertically with the embossed arrowhead ▲ pointing upward (see Fig. 4). This is a requirement for proper movement of the internal float valve component.
2. Install the trap in accordance with manufacturer's instructions and with all applicable local or national plumbing, drainage, and mechanical codes.
3. **NEVER CONNECT CONDENSATE DRAIN DIRECTLY TO A SANITARY DRAIN LINE.**

4. Connect only to a storm drain or a condensate drain line. This product is to control flow of condensate produced by HVAC equipment and is **not** to be used on kitchen sinks, showers, or in any application where a fan is not creating a negative or positive pressure.

Operation in Vertical, Positive Pressure Mode

The RLC *Air-Trap* operates dry when no water removal is required and wet when it is required. When dry, essentially no air exits the HVAC unit. When removing water, the water exits the unit, but essentially no air exits the unit through the drain connection.

Install the *Air-Trap* in a vertical orientation. With no production of condensate within the AHU, the positive pressure that exists within the unit plenum that contains the drain line forces the ball valve downward onto the valve seat. With the production of water, the ball rises from the seat when the net buoyancy force upward equals or exceeds the net downward force created by air pressure. See view in **Figure 3**.

The RLC SERIES *Air-Trap* accomplishes the following:

- Reduces sludge buildup that normally accumulates in standard P-traps
- Prevents freezing of trap during cold periods since during periods of no water removal there is no water in the trap. If, for some reason, water is flowing from the unit during freezing temperatures, and the trap is located within this freezing temperature region, then the trap will require thermal protection.
- RLC-Series *Air-Trap* requires no water head to cause the trap to operate. Simply come out of the plenum with the condensate line and go down into the *Air-Trap*. Come out of the trap and go horizontally with your drain line. The height, x, requirement then becomes the height of the trap plus two street elbows which totals 6 inches. See **Figure 2**.
- Eliminates air escaping from an HVAC unit that would result when a standard P-Trap experiences a "dry-out" condition.
- Note: If there is a possibility of a syphoning effect (suction pressure) at the exit point of the *Air-Trap* then it is necessary to install a vertical vent pipe as close as possible to the bottom of the trap (see **Figure 4**).

Maintenance and Techniques for Cleaning the RLC Air-Trap

Preventative Maintenance

In some operations, large particulate matter can move from the HVAC unit through the drain line and into the **Air-Trap**, causing a malfunction or failure. The best way to reduce maintenance is to install a strainer screen at the inlet to the drain line (Fig. 1) or a Des Champs **Union-Strainer™** upstream of the **Air-Trap**, (See Fig. 5) to prevent miscellaneous items like, rocks, screws, and nuts from ever getting into the trap. The **Union-Strainer™** is also a convenient way to prevent unwanted creatures and objects from entering at the terminus of the drain line, like snakes, rats, lizards, insects, and plant growth. The water flow is in direction of arrow shown in Fig. 5, with the strainer cup oriented to capture debris within the cup.

There are several options for cleaning. Option 1 is to use the ½-inch threaded cleanout port in the trap housing. This will allow insertion of a water or air hose/syringe for washing or blowing away material that may be hampering operation of the trap. See Fig. 3.

Option 2 would be to isolate the **Air-Trap** using unions that allow **Air-Trap** removal for cleaning.



Figure 4: Installation of a Vertical Vent Pipe installed directly downstream of a positive pressure trap to prevent a suction pressure that could develop depending upon the length of drainpipe, the diameter, and the water flow rate.

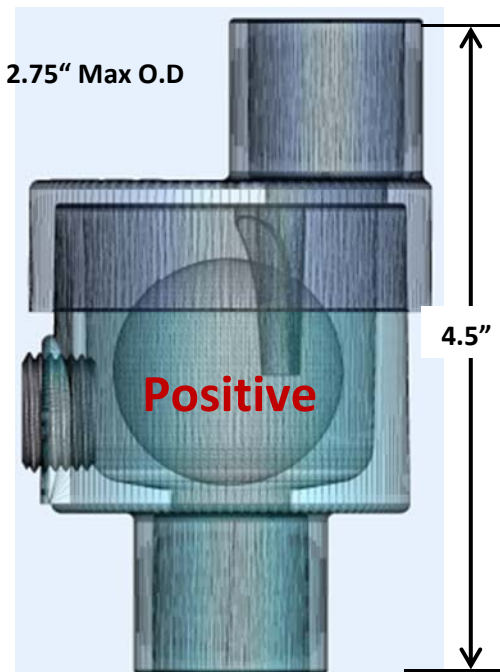


Figure 3: RLC Air-Trap - up to 3 inches of positive pressure at ½ gallon per minute of condensate flow.



Figure 5: In-line Union-Strainers. Install in the drain line upstream of the Air-Trap. This will aid in preventing debris from entering trap. The arrow shows the direction of water flow, into the strainer basket.

Negative-Pressure Application

When operating with a negative pressure plenum, install the RLC **Air-Trap** in a horizontal orientation with the arrowhead **▲** pointing in the direction of water flow and the clean out plug facing upward as shown in Fig. 6. Condensate enters the end of the trap with the centered connection and leaves the trap that has the off center connection.

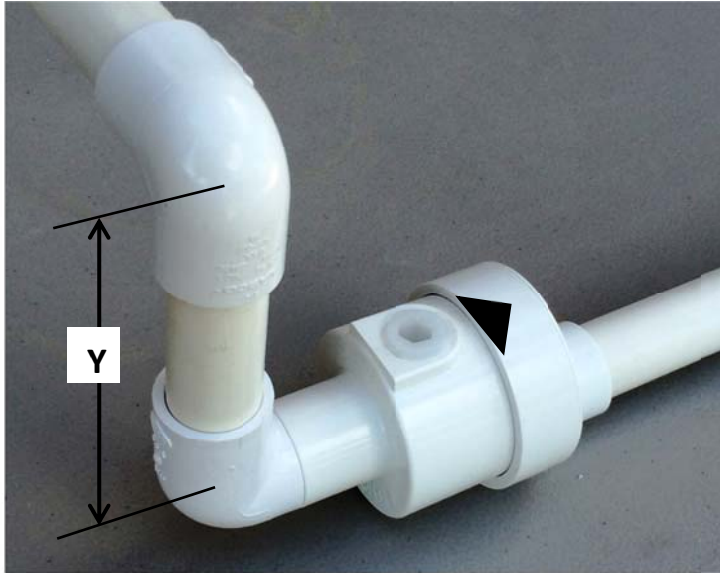


Figure 6: Installation of the RLC for negative pressure showing arrowhead pointing in direction of water flow. RLC traps tested at 1.6 GPM of condensate flow.

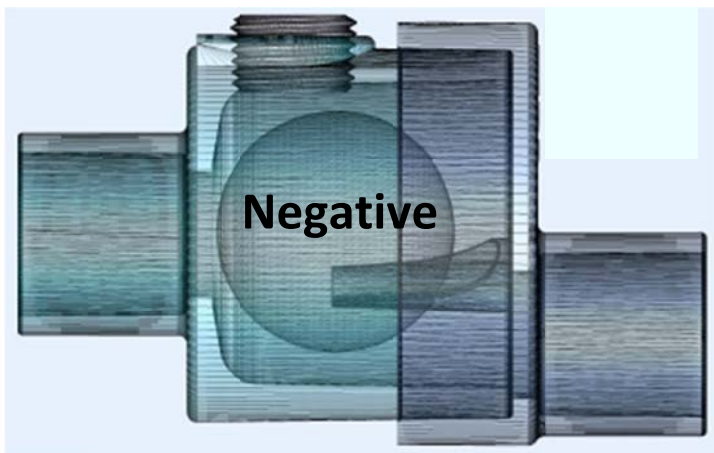
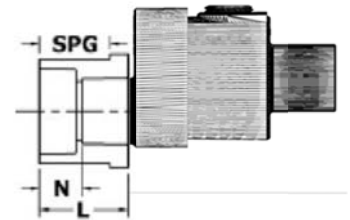


Figure 7: Orientation for negative pressure after installation of RLC **Air-Trap**, showing cleanout port on top, condensate entering at left end center, and exiting at lowest point of trap on the right side. No water remains in trap shortly after condensation ceases.

The benefits and maintenance of the RLC **Air-Trap** when used in the negative pressure mode are the same as for the positive mode with the added benefit that it eliminates the geyser effect that is caused when the standard P-Trap dries out and condensate begins to form. The geyser effect is when air rushes into the HVAC unit and does not allow the condensate to drain, causing water to blow throughout the plenum compartment. In addition, the RLC negative **Air-Trap** requires less than half the height of a P-Trap. Dimension Y in Fig. 6 illustrates that the total height of the **Air-Trap** is only the height of the negative pressure plus one inch and not 2 times negative pressure plus two inches. Dimension Y in inches is = negative pressure in inches of water column.

Figure 8: The standard connection is $\frac{3}{4}$ " slip. The O.D. of the connection accommodates a 1-inch bushing. Therefore, any size PVC SCH 40 pipe from $\frac{1}{2}$ to 2 inches connects with the aid of a bushing.



Caution, do not puncture the Float Valve.

Limited Warranty

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This product design is Patent Pending by Des Champs Technologies LLC, Natural Bridge Station, Virginia 24579.

Des Champs Technologies has other standard models of traps as well as engineered traps for high temperature, high pressure, and very high water flows. Call or go to the Website below for more information.