

# INSTALLATION GUIDE

## 1/2" CONDENSATE TRAP

The patented Drain-All was designed for removing condensate from compressed air systems. Since it is totally pneumatic, it does not require any electricity and can be easily installed using simple piping connections at any point in a system including remote locations. It can handle pressures up to 170 PSIG and liquid temperatures up to 170°F. It has 1/2" NPT inlet and outlet ports and a full 1/2" smoothly contoured condensate flow path. The industrially robust, highly reliable Drain-All has few moving parts and at 21 pounds, can stand up to the most demanding applications with minimal maintenance.



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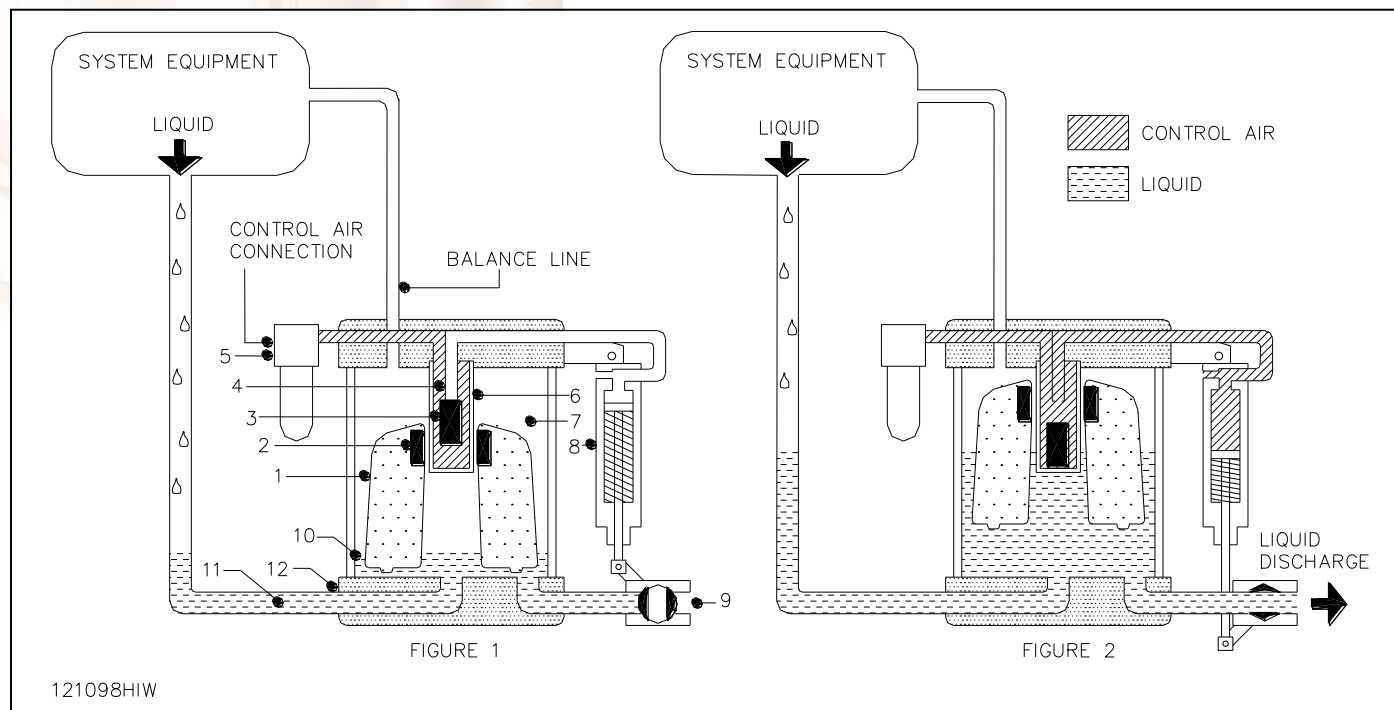
Quality System    ISO 9001 Certified    United States Patent: 5,983,919

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a product of  
 **Control  
Devices, LLC**

# PRODUCT TECHNOLOGY - HOW IT WORKS



**FIGURE 1: START OF CYCLE**

The float (1) with a molded in magnet (2) is sitting on the base in its lowest position. The float magnet exerts a magnetic force repelling the center tube magnet (3) upward, holding it seated against an orifice in the lower end of the valve stem (4). This retains the control air coming in through the control air filter (5) in the center tube (6). The control air circuit including the center tube magnet and valve stem are isolated from the liquid held in the reservoir (7). The air cylinder (8) is in the home position and the discharge ball valve (9) is closed.

There is always a residual amount of liquid (10) left in the bottom of the reservoir after each discharge cycle. The trap stops discharging before all accumulated liquid is removed providing a liquid seal that conserves expensive compressed system gas. Liquid (11) flows through the inlet port (12) and into the reservoir to start the fill cycle. Liquid continues to fill the reservoir until the float has displaced enough liquid to become buoyant and the float pops upward to the upper position shown in Figure 2.

**FIGURE 2: START OF DISCHARGE**

The liquid flows in and raises the float to its highest position as shown. The float magnet is raised up past the center tube magnet and repels the center tube magnet downward opening the orifice in the valve stem. This allows the control air held in the center tube to flow through the control air circuit to the actuating cylinder. The actuating cylinder extends and opens the ball valve starting the discharge of accumulated liquid.

When the correct amount of liquid has been discharged, leaving a liquid seal in the reservoir, the float has been lowered to a point where the float magnet is below the center tube magnet. In this position, the float magnet repels the center tube magnet back upward against the valve stem orifice, which seals off the control air flow to the actuating cylinder. The cylinder has a spring which then returns the cylinder to its home position, closing the discharge ball valve. The discharge is stopped as shown in Figure 1 and the fill cycle repeats.

**THE BALANCE LINE PORT**

The balance line port is a hole through the head of the trap that goes into the reservoir. This port allows the air trapped in the top of the reservoir to move out of the reservoir to allow liquid to enter the reservoir through the inlet port. If there were no balance line port, as liquid entered the reservoir under pressure, the air trapped in the top of the reservoir would be compressed until it was the same pressure as the liquid coming in and the unit would stop filling.

There are three methods of connecting to the balance line port. The most effective is to connect it back to the vessel being drained as shown in the illustrations above. In this configuration, the reservoir is at the same pressure as the vessel being drained and the liquid is filling by gravity. In this case, the top of the trap must be lower than the bottom of the vessel being drained. The balance line can also be attached to a header pipe leaving the vessel being drained or vented to atmosphere using a needle valve. Venting to atmosphere uses very little air if the needle valve is adjusted properly.

# FREQUENTLY ASKED QUESTIONS

## **Where should a Drain-All be installed?**

At liquid accumulation points within a system at compressors, air receiver tanks, intercoolers, aftercoolers, dryers, separators, filters and drip legs.

## **Is this an oil-water separator?**

No. Drain-All is a liquid drain and it will drain oil, water, and particulates from the compressed air system. Once this is accomplished, the discharge should be piped to an oil-water separator before discharging to the environment.

## **Does this replace a dryer?**

No. Drain-All works in conjunction with a dryer. Dryers typically convert water vapor in the compressed air into liquid which is usually discharged through a small automatic drain device integral to the dryer. These small automatic drains are often prone to clogging and failure. When this occurs, such drains are normally replaced with Drain-All units which do not clog. A dryer prepares the moisture for removal from the system by condensing it. It is the job of the reliable Drain-All to ensure that the liquid is actually discharged from the air system.

## **Is it mandatory to use a balance line?**

Yes. The balance line provides a means to handle the displaced air from the reservoir as the liquid enters the reservoir. In specific cases, however, where there is no easy way for the balance line inlet to be connected to the vessel being drained the balance line can be vented to atmosphere if the installation method 3 is followed.

## **What is the capacity?**

In each application, based on pressures and piping layout for that application, a Drain-All model will eject a specific amount of liquid on each cycle. This varies by model and application. Contact Drain-All or your distributor with specifications on the pressure and capacity of liquid you need to handle and an appropriately sized Drain-All can be selected for your application.

## **What size compressor can it handle?**

There are Drain-All models that will function effectively on any size compressor, compressed air system, atmospheric, or vacuum system. Contact Drain-All or your distributor with specifications on the pressure and capacity of liquid you need to handle and an appropriately sized Drain-All can be selected for your application.

## **Can one Drain-All be used to drain multiple tanks and/or compressor systems?**

No. Individual tanks, even if connected to each other, will not all be of precisely the same pressure level and the liquid would accumulate in the lowest pressure drain or system thereby bypassing the Drain-All. Furthermore, the use of check valves from multiple vessels to a single Drain-All installation will not make this work properly. Always install one Drain-All for each item of equipment to be drained.

## **Can a Drain-All be used in systems with pressure greater than 170 PSIG?**

Yes. Higher pressure models are available. If the control air comes from higher pressure systems, a pressure regulator on the control air line may be used and set at the proper control air pressure or optional control air components can be ordered to accommodate higher pressures.

## **Can the balance line and the control air line be hooked together via a tee connection?**

No. Each of these air lines has its own specific purpose and should never be tied together. The control air should be the cleanest driest air available since it supplies air to the control circuit to operate the pneumatic actuating cylinder which functions best and lasts longer if clean dry air is used.

The balance line allows the air in the reservoir to move out leaving room in the reservoir for the incoming liquid. This air contains moisture that would be drawn across a tee fitting tied to the control air line and be pulled directly into the control air circuit, which can damage control air pathways and the air cylinder.

## **Is there only one model Drain-All?**

No. There are models for a wide range of special applications. Dimensional alterations, design changes, component options and special materials or coatings are used in models to withstand high temperatures and highly corrosive environments as well as accommodate high volume discharge requirements.

## **What if the system has an abundance of metallic trash?**

Before installing the Drain-All, blow down the system being drained to eliminate as much existing loose scale as possible. The large, smoothly contoured flow paths in Drain-All units handle normal levels of debris found in most applications. Should there be an excessive amount of debris such as heavy rust, inquire about Drain-All's Rust Handler® model designed for that kind of severe duty.

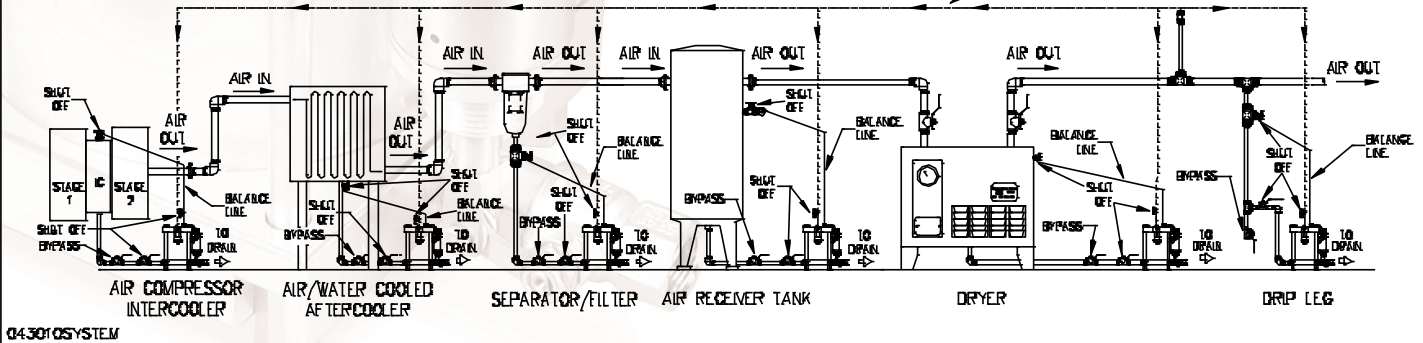
## **How can the Drain-All be used as an instrument to gather data on condensation in a compressed air system?**

With the use of Drain-All's optional cycle counter, the Drain-All can provide accurate data on the amount of liquid that a compressed air system generates. This is very useful when buying new compressed air system equipment because a Drain-All with a cycle counter is a benchmarking instrument. Since the Drain-All discharges the same amount of liquid on every cycle, knowing the number of cycles over a specific period of time under specific temperature and humidity conditions provides the ability to track liquid production. This benchmarking can be correlated to ongoing changes in ambient temperature and humidity conditions to identify variances in liquid production indicating changes which need investigation. Too few cycles would mean not enough liquid is reaching the Drain-All and should be investigated. Too many cycles would mean too much liquid is being made or too much liquid from somewhere is reaching the Drain-All and should be investigated. Knowing the amount of liquid a system produces is also essential for properly sizing oil-water separators.



# INSTALLATION LOCATIONS

1. Connect balance line to vessel being drained, to header leaving vessel being drained, or vent to atmosphere – do not manifold balance lines together.
2. Balance line balances reservoir of trap to vessel being drained. Control air operates air cylinder. These two should not be connected together.
3. Bring control air from clean dry source downstream of dryer if possible, can manifold control air lines together.



## THERE ARE THREE METHODS USED TO CONNECT THE BALANCE LINE PORT

(Also reference pages 7-9 for illustrations)

### Method -1

Connect the balance line port to the vessel producing the condensate. This is the preferred method since it is a closed-loop arrangement. In the first four applications above, the balance line is connected back to the vessel that is producing the condensate. The balance line should never droop or slope upward. The pressure on the incoming condensate to the trap and the pressure in the balance line are the same and the trap is filling by gravity. For this method, the top of the trap must be below the bottom of the vessel being drained.

### Method -2

Connect the balance line to a tee in the drain pipe leaving the vessel producing the condensate. This is an alternate method to Method-1 when there is no convenient location to connect the balance line to the vessel. This is shown above in the drip leg and separator/filter applications. The bottom of the vessel being drained must be significantly above the top of the trap. This allows the balance line to sloped downward toward the condensate trap. The balance line should

### Method -3

Vent the balance line port to atmosphere using a needle valve inserted in the balance line port and slightly opened. This can be used on any application but must be used when the bottom of the vessel is lower than the top of the trap. The needle valve should be opened slightly to a point where only a small amount of air can be felt leaving the needle valve. This method provides a pressure differential in the trap reservoir and condensate is blown into the reservoir instead of filling by gravity.

## VESSELS WITH BOTTOM LOWER THAN THE TRAP'S TRIGGER LEVEL

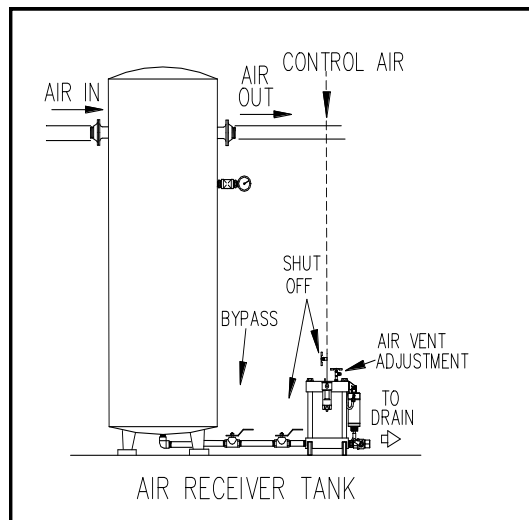
In the Method 3 drawing, there is a dotted line indicating the level of the trigger level of the trap. This is the height the condensate must reach in the trap to start the discharge cycle.

When the balance line port is connected back to the vessel or header pipe, as shown in the drawing above, the trap is filling by gravity. In these applications the bottom of the vessel must be higher than the top of the trap so that the condensate flows by gravity down and out of the vessel into the trap.

When the bottom of a vessel being drained is lower than the trigger point in the trap, as shown in the drawing to the right, do not connect the balance line port to the vessel or header pipe.

In the drawing to the right, if the balance line were connected to the vessel or header pipe, the condensate would be filling the trap by gravity.

With the bottom of the vessel being lower than the top of the trap, this would result in condensate backing up in the vessel to the same height of the condensate in the trap. When the condensate reaches the trigger level in the trap, shown



by the dotted line, the condensate would also reach the same height in the vessel (the same dotted line).

In an application where the bottom of the vessel is lower than the top of the trap, the balance line must be vented to atmosphere. Venting a small amount of air from the trap reservoir to atmosphere results in a pressure differential in the trap reservoir. This allows the pressure in the vessel to push the condensate downward, out of the vessel, and up into the trap. This achieves proper filling of the trap while removing all condensate from the vessel.

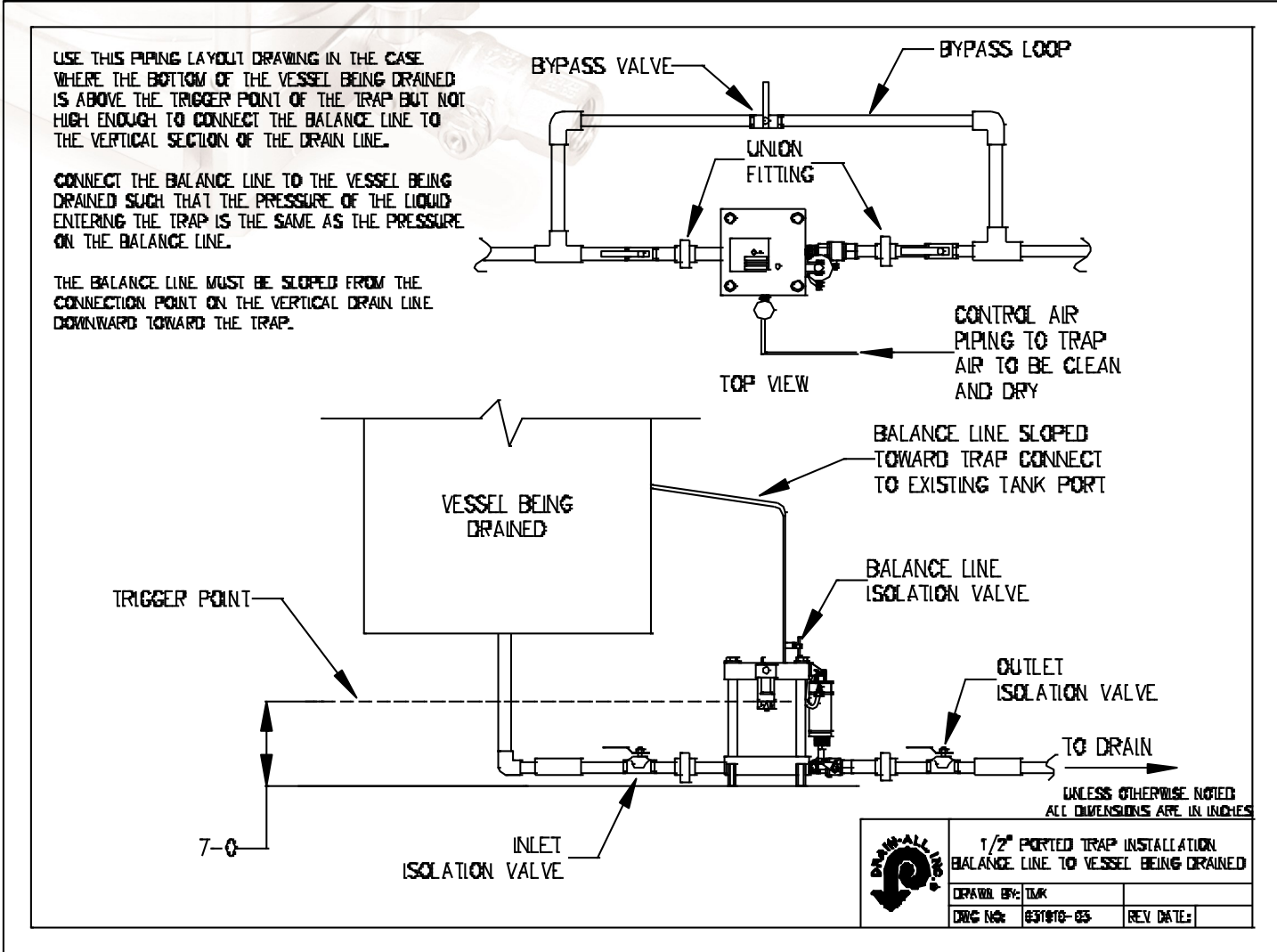
Send application questions to:



Technical Service  
Phone: 800-233-1477  
Fax: 314-781-7859  
Techservice@Drain-All.com

# INSTALLATION METHOD #1

## Balance Line to Vessel

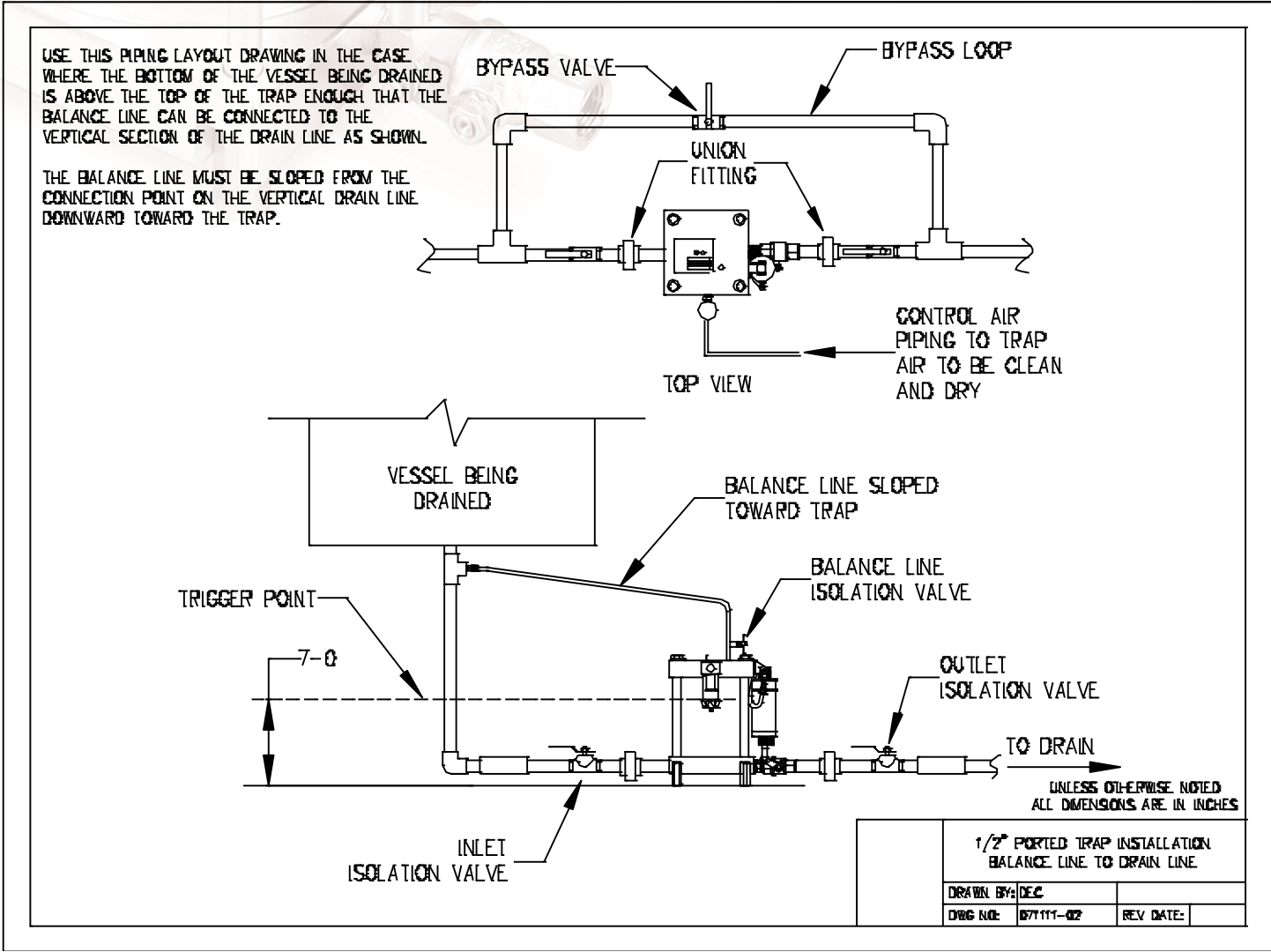


## Warranty Registration

To validate the warranty for your condensate trap, go to [cdvalve.com](http://cdvalve.com) and fill out the warranty registration form.

# INSTALLATION METHOD #2

## Balance Line to Drain Line



### Warranty Registration

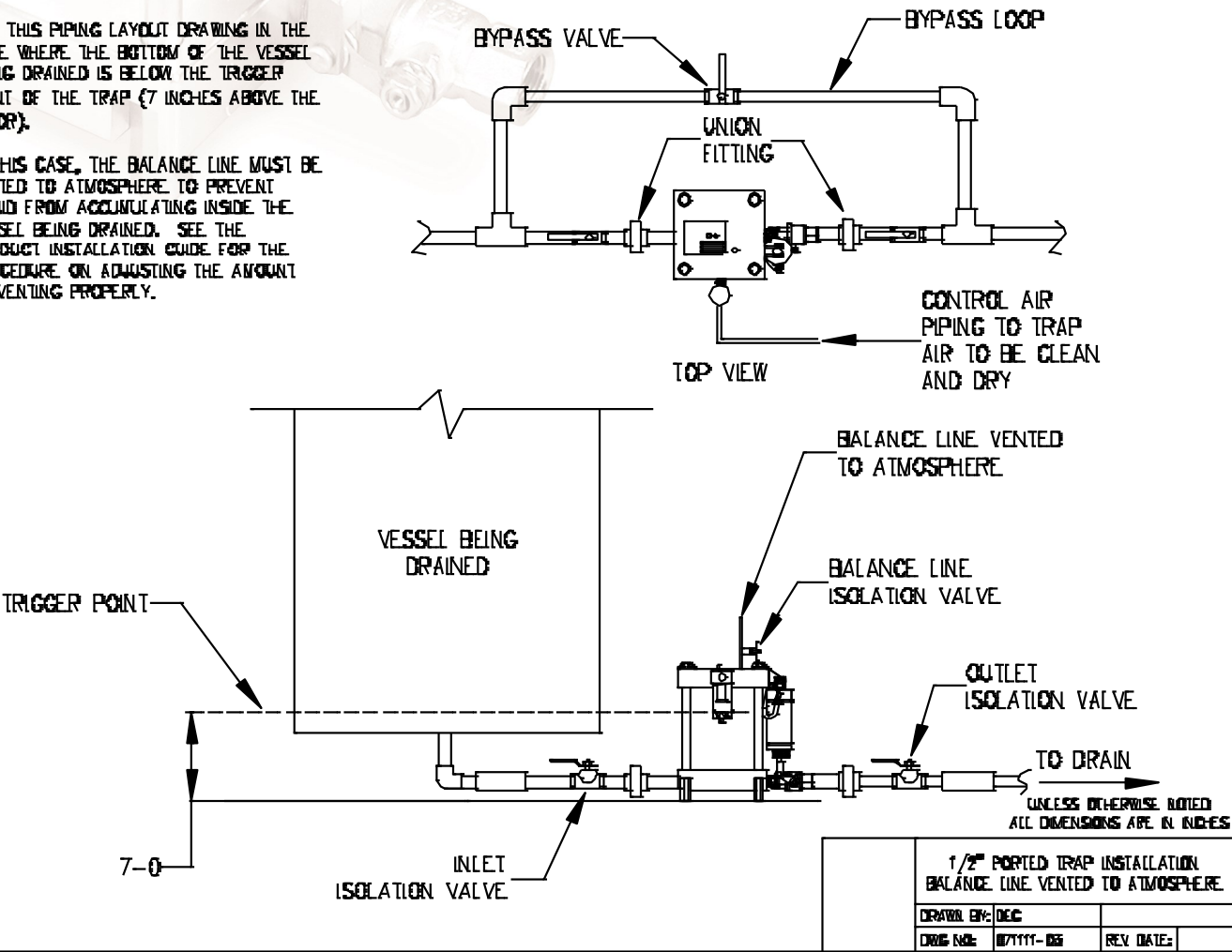
To validate the warranty for your condensate trap, go to [cdvalve.com](http://cdvalve.com) and fill out the warranty registration form.

# INSTALLATION METHOD #3

## Balance Line Vented to Atmosphere

USE THIS PIPING LAYOUT DRAWING IN THE CASE WHERE THE BOTTOM OF THE VESSEL BEING DRAINED IS BELOW THE TRIGGER POINT OF THE TRAP (7 INCHES ABOVE THE FLOOR).

IN THIS CASE, THE BALANCE LINE MUST BE VENTED TO ATMOSPHERE TO PREVENT LIQUID FROM ACCUMULATING INSIDE THE VESSEL BEING DRAINED. SEE THE PRODUCT INSTALLATION GUIDE FOR THE PROCEDURE ON ADJUSTING THE AMOUNT OF VENTING PROPERLY.



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