Contents

Notice:

It is against the law in many countries to use the Essential Extractor for distillation of alcohol without licensing. It is the sole responsibility of the user to know and abide by the laws of their country of residence, and to obtain appropriate licensing where applicable and/or available prior to such use, if any.

As Brewhaus (America) Inc. supplies worldwide, and in many countries it is legal to distill alcohol at home, general instructions for doing so are included. However, Brewhaus (America) Inc. strongly discourages any unlawful use.

Brewhaus (America) Inc. does not accept responsibility for use of the Essential Extractor other than those allowed by the laws of the user's country or region of residence.

Brewhaus (America) Inc. is not responsible for damage caused as a result of misuse, unlawful use, or use of a damaged unit.

Caution

Please take care when handling your unit. Some sharp edges can remain on the metal parts after manufacture. Brewhaus (America) Inc. does its best to find and polish all sharp areas, and will not be responsible for injury.

Take care when handling your distiller during and following operation, as the entire unit can become extremely hot.

Please Note

Due to the length of the column, and the potential for slight movement of parts when manufacturing, your column may lean at a very slight angle. Although this is not noticeable with a shorter column, it can be noticed with a long column. This will not affect the operation of your unit.

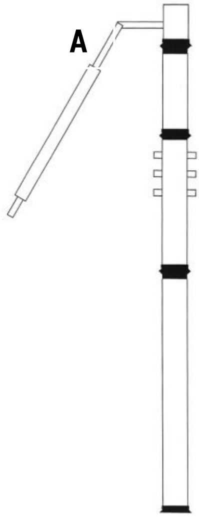
Section 1

Parts and Testing Information

Please ensure that the following list of items is included in your kit:

Essential Extractor Gin Series
1- 4 piece Stainless Steel Column with Condenser and Tri-Clamp Fitting (A)
1- Stainless Steel Kettle with Handles (B)
4- 2” Tri-Clamps (C)
4- 2” Gaskets for Tri-Clamp (D)
1- Keg O-Ring (E)
1- Submersible Water Pump (F)
1- Hose Pack, which includes:

> Thermometer (a) (likely packed in the bottom half of your column)
> Pure tan gum bung stopper (or end cap with ½” coupling, if you upgraded); b)
> Column Filling Material (ceramic raschig rings or copper mesh); c)
> 2 x 8’ long hose (clear); d)
> 2 x 18” long hose (clear); e)
> 1 x 4’ long chemical tolerant hose (cloudy/creamy white); f)
> 9 x 3/4” spring hose clamps (g)
> Brass hose fitting & a 5/8” spring clamp for chemical tolerant hose (h)
> Water control system (i)



C

D

E

F

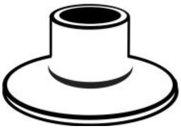
a

OR

OR

b

OR



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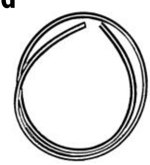

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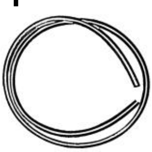

h

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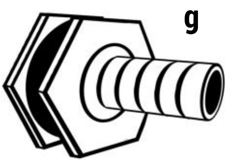
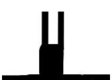


and

i

and



It is advised that you test your unit prior to the first use:

Before using your Essential Extractor for the first time, test it for leaks at all weld points. The unit has been individually tested after manufacture, however, it is important to perform another test in case of damage during shipping.

To test the Extractor, add 3 gallons of water to the kettle. Attach the column to the kettle and place the bung and thermometer snugly on top of the column. Bring the water to a rolling boil on your heat source until steam escapes from the end of the condenser. Ensure that there is no steam escaping from any other area of the extractor.

DO NOT RUN COOLING WATER DURING YOUR TEST!

In order to maximize the amount of steam escaping, you should not run cooling water at this time.

You should test your thermometer for accuracy, and to confirm the boiling temperature *at your altitude*. To do this, place the end of the thermometer into a pot of boiling water. Record this reading as this will be the boiling temperature of water according to your thermometer.

NEVER LEAVE YOUR DISTILLER UNATTENDED WHEN IN USE.

Section 2

Pot Distillation vs Reflux Distillation

Distillation Defined:

Distillation does not actually produce anything. Distillation is simply a process that allows you to separate different components of a substance based on boiling point, collecting only the parts you want and discarding the remainder: It is a purification process.

There are two primary methods of distillation- Traditional (also known as Pot Distillation) and Reflux, each of which are explained below. Depending on the product that you intend to distill, you need to select the most appropriate method of distillation in order to achieve your desired result. Your Essential Extractor Gin Series is specifically designed to perform both Traditional and Reflux Distillation in addition to performing Reflux Distillation in Gin Mode with the gin basket.

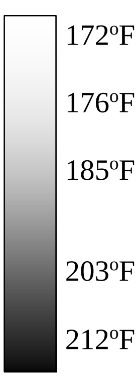
Traditional Method:

Traditional distillation is used when you do not have several constituents with varying boiling points, or a goal of collecting one component in specific. Although Traditional Distillation does not offer the high degree of separation and purity associated with Reflux Distillation, it is extremely well-suited to certain products, including water, whisky, bourbon, rum, fruit schnapps, and essential oils. Traditional Distillation is often used for whisky because you want certain characteristics with varying boiling points. However, using Reflux Distillation for a product such as whisky is not recommended because Reflux separates out the components that give whisky its unique character, therefore “stripping” it of its flavor. For Essential Oil distillation, you may use a solvent, such as water, glycerin, or alcohol, to dissolve the oils from the organic material and to carry them on the vapor to the condenser, and ultimately to your collection container.

Reflux Method:

Reflux Distillation offers a very high degree of purity because a longer column is used, so many of the components will not reach the top of the column. As vapor rises in the distillation column, the temperature gradually decreases, causing components with higher boiling points to reach a certain level in the column where they fall below their vaporization temperature, condense back into liquid, and descend in the column. This process is known as reflux. Reflux separates these components from vapor with a lower boiling point, which continues to rise in the column. Each component separates from the rising vapor in this manner until, at the top of the column, you have a single compound remaining.

To enhance the separation process we add packing material to the column. Packing material helps to pull the refluxing liquid from the walls of the column and disperse it so that it contacts the rising vapor. This causes a heat exchange, cooling the rising vapor and heating the descending liquid, resulting in better separation of components based on their different boiling points. The number of times that you cause the vapor to 'reflux' before exiting the column is called the reflux ratio. Careful control of the reflux ratio through control of the heat input and the speed and temperature of your cooling water allows you control over the purity of your distillate. It is important to remember that a slower distillation by increasing your reflux ratio will generally result in a more pure finished product.



As stated, refluxing causes the components from the kettle to separate based on boiling temperature. Imagine that the illustration to the left is your distillation column (please note that during distillation the temperature breakdown will not be as evenly spaced as shown in the diagram). You will see that the temperature drops as you ascend in the column. At the bottom, all constituents with a boiling point of 212°F or lower are in vapor form, and continuing to rise in the column. As you rise in the column the temperature drops below 212°F (the boiling point of water), thus water vapor will turn back into liquid form, and be separated from the mixture. As you rise in the column further, the constituent with the next highest boiling point will fall below its vaporization point, and be separated from the mixture. As it turns back into liquid, it will also fall back down the column until its temperature rises to its boiling point again, where it turns back into vapor, and begins to rise through the column again. This continues to happen as you rise in the column, with each constituent being separated from the mixture based on its boiling point until you reach the top of your column. At the top of the column, all components with a boiling point equal to or less than the temperature at that point will be present. This means that by careful control of the temperature at the top of your column you are able to produce an extremely pure product. The temperature is controlled by a combination of the heat input and the speed and temperature of your cooling water through the amount of reflux created. You will notice during use that by reducing the flow of your cooling water slightly, the temperature may not change however the speed at which you remove the distillate will increase. The result is a less pure distillate.

Because all of these different boiling points take up some space in the length of your column, it is much more difficult, or even impossible, to use a short column and truly obtain proper reflux and separation. This results in lowered purity of your distillate. For this reason it is very important that your column be of sufficient length in order to produce a pure product.

Section 3

Traditional Method: Assembly and Use

Attaching Hose Clamps to Hoses

Using a pair of pliers, squeeze the prongs of the hose clamp together and slide it approximately 1 inch from the end of the tube. Each tube will require the following clamps:

- One 8’ long tube requires a clamp on only one end. This will be the tube used for return / waste cooling water (ie. the output water from the condenser)
- One 8’ long tube requires a clamp on one end, to carry cooling water to your distillation unit
    - If you are using running water from a garden hose, you will attach a clamp to the opposite end of this tube, attach the garden hose fitting, and then slide the clamp over the fitting to secure it in place.
    - If you are using the submersible pump to re-circulate your cooling water, you will attach the opposite end of the tube to the 5/8” black plastic fitting included with the pump. To make this easier, place the end of the tube in about 1-1.5” of very hot water for 30 seconds to soften the tubing, then work it over the plastic fitting. It is easiest to leave the fitting attached to the tubing, and attach this to your submersible pump for operation.
- The 4’ Chemical Tolerant tube requires a clamp on one end only

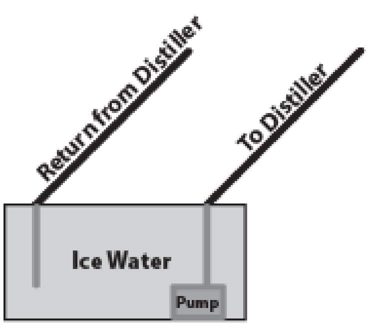
When attaching hoses to your distillation unit, slide the tube onto the appropriate fitting on your distiller, then squeeze the prongs of the hose clamp to loosen it. Slide the hose clamp over the fitting to secure and seal the connection. To remove the tube, squeeze the prongs on the hose clamp and slide it back from the connection. Remove the hose.

Water Supply: Submersible Pump versus Running Water

Your cooling water runs through the condenser to cool the vapor, allowing it to re-condense back into liquid for collection. The source of your cooling water is relatively unimportant. Either direct running water or re-circulation via a water pump are acceptable. The precise temperature of the cooling water is not particularly important as long as the water is "ice cold." However, it is very important to keep the temperature of your cooling water *consistent* throughout your run. For re-circulation, you can use a large garbage can or beverage cooler to house your ice water.

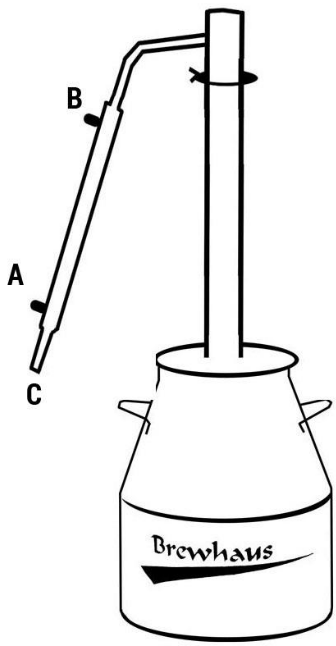
***Running Water**:* Attach the brass hose fitting to one of your 8' long tubes, as per the previous section. This simply attaches to a standard garden hose, allowing you to run your cooling water directly from a water faucet. This allows you to easily control the speed of your water flow, however, it results in the greatest amount of water consumption. This method is best for those on wells, or where the waste water can be used for watering grass, a garden, or topping up of a swimming pool.

Recirculated Water via Submersible Water Pump: It is important that your water remains cool enough to condense the vapor efficiently. The simplest option is to use a large cooler with ice-water (or alternatively, cold water with frozen soda bottles). If necessary, add more ice as the distillation process warms the water. This dramatically reduces water consumption when compared with connecting to a water source. Setup would be as shown in the drawing below.



Pot Distiller Setup:

1. Attach only the top section of your distillation column (the part that has the condenser attached) to the 18” section of your column (as shown below) by placing a gasket between the two parts and affixing a clamp.
2. Then attach the bottom of the 18” section of the column directly to your kettle by placing a gasket between the kettle and column, and affixing a clamp.
3. Moisten the thermometer, slide it into the hole of the bung and place the bung securely in the top of the column. Position the thermometer bulb just above the condenser tube.



Attaching the Hoses:

- Connect one end of one 8’ tube to your water supply; then connect the other end of the same tube to the condenser (marked as ‘A’ in the diagram above). This tube will carry water TO your distiller.
- Connect one end of your second 8’ tube to the top of the condenser (marked as ‘B’ in the diagram above). This will carry

your cooling water FROM the distiller. If you are re-circulating your cooling water, place the output end of this tube in your water reservoir. If you are running water from a water faucet, this water will be run down the drain (or alternate location as desired).

- Connect one end of your 4’ Chemical Tolerant tube connects to the bottom of the condenser (marked as ‘C’ in the diagram above). The other end of this hose will be placed in your distillate collection container.
- Note that you are only connecting tubes to the ports on the condenser (as shown in the diagram above). You do not need to connect any tubes to the ports located on the top of the column. Those ports are used with Reflux Distillation only, and they are sealed within the column so they will not affect your runs in Pot Distillation mode.

Use:

- Add the material that you wish to distill to the kettle and attach the distillation column. Place the unit on your heat source. It is preferred although not necessary to have a non-cycling heat source when distilling in the Traditional Mode. (A *cycling heat source* is one that “cycles,” turning itself on and off to avoid overheating, such as a hot plate. The inconsistencies that occur with cycling affect your product as it does not remain a consistent temperature throughout the distillation process. An example of an electric, *non-cycling heat source* is one that is made specifically to run consistently at a very high temperature for extended periods of time, such as the Brewhaus StillHeater or Band Heater.)
- Note that column packing is not typically necessary when running a pot still—**except if you are producing a beverage-grade alcohol such as whisky**. Your Essential Extractor still is made of stainless steel, and the vapor must come into some contact with copper in order to remove sulfides that can negatively affect the taste and odor of a product such as whisky. In this case, loosely roll up a piece of copper mesh and insert it towards the bottom of the column. It should fit snugly enough so that it stays in place but not so tightly that it substantially reduces vapor flow in the column.

- When the liquid in the kettle comes to a boil, heat starts to rise quickly up the column. At this time, start the flow of cooling water to your condenser. The condenser turns the vapor at the top of your column back into liquid by causing it to cool. You will begin to see liquid dripping from your hose into your collection container.
- With the Traditional Distillation method, you collect a greater percentage of the original volume in the kettle than with the reflux method, so once you notice a decrease in the quality of your distillate, or when you have collected 80% of the original liquid volume in the kettle, remove the unit from the heat source and allow the unit to cool.

Cool-Down Process:

- During the cool-down process, any steam remaining the extractor will re-condense into liquid. This will create a great reduction in air-pressure inside the unit. It is extremely important to remove the thermometer and stopper from the top of the column as soon as the distiller is removed from the heat. This ensures that adequate air-flow is provided back into the unit, which will avoid potential damage. If adequate airflow is not provided, the large difference between the air-pressure on the inside of the unit versus the air-pressure outside of it can literally cause the unit to implode.
- Once the unit is completely cooled, remove the column from the kettle. Run fresh, hot water from the top of the column to the bottom to clean any residual oils, etc., from the unit.
- Empty the kettle, and clean it with hot water.
- Never use abrasive or corrosive materials on your unit. Use only warm soapy water or a cleaner formulated for stainless steel to clean your unit. Rinse well with hot water and allow to dry thoroughly.

Section 4

Reflux Method: Assembly and Use

Choosing Your Column Filling/Column Packing:

When distilling in reflux mode, it is extremely advantageous to have a longer column than in traditional distillation, which is why you use both the top and bottom parts of your column when performing reflux distillation. "Filling" or "packing" is added to the column for the refluxing liquid to pass through, further increasing the purity of your product. It is important to use a column filling with a large *surface area to volume ratio*, such as small-sized Raschig Rings (6mm x 6mm), or copper mesh. The two have distinct advantages, leaving the decision on which to use up to the individual. Your Essential Extractor Pro Series II came with your choice of one of the types of column packing below: either copper mesh or ceramic Raschig Rings.

Copper Mesh: This is the more popular of the two packing types, due to the reactive tendency of copper. Copper will react with the sulfur compounds formed during fermentation in an alcohol distillation, virtually eliminating these compounds from your distillate. This is of greatest importance when beverage grade alcohol is being distilled. However, you need to be careful not to pack the copper mesh too tightly so you do not completely block the column. This can result in too little void space for the vapor to rise and refluxing liquid to descend in the column, causing what is called choking.

Ceramic Raschig Rings: Ceramic Raschig Rings, although not offering the reactive advantage of copper, do offer other advantages. Due to their lack of reactivity, they are far better suited to distillations where inert packing is needed. They also provide a far more defined void space, making them very well suited for all reflux type distillation, including alcohol distillation (where legally allowed). Due to the structure of the packing, there is no risk of packing your column too tightly, as with copper mesh.

How To Pack Your Column:

Packing Your Column with Copper Mesh. Roll the Copper Mesh into ‘plugs’ that fit snugly inside the distillation column. The copper mesh plug should be snug enough to stay in place (ie. not slide out of the column), while not being compressed by the column, restricting flow. It is best to roll the mesh loosely. It is not advised that you roll the mesh tightly, as this will restrict vapor flow. For the Pro Series II unit, a 3½ to 4 foot long piece of mesh is sufficient for one ‘plug’. It is also beneficial to cut a few smaller pieces from the remaining mesh to tuck in the area of the cooling lines. Due to the nature of copper, it is advised that you remove the mesh from your column after each use and allow to dry completely in order to avoid tarnishing. After every second to third use, clean the copper with vinegar, a citric acid solution, or another food grade copper cleaner, rinse well, and dry completely.

Packing Your Column with Ceramic Raschig Rings. For the Pro Series II unit, you will use about 1.5 L of Raschig Rings. First clean the ceramic Raschig Rings by rinsing thoroughly with hot water. Lean the column slightly to the side and pour the Raschig Rings in slowly to avoid damaging the stainless steel screen at the bottom. Raschig Rings can remain in the column except for occasional cleaning. After each use, back flush with boiling water. After every second to third use, it is recommended that you remove the rings from your column and clean them in a suitable cleaner, then rinse well with clean water.

Attaching Hose Clamps to Hoses:

Using a pair of pliers, squeeze the prongs of the hose clamp together and slide it approximately 1 inch from the end of the tube. Each tube will require the following clamps:

- Each 18” long tube requires a clamp on both ends
- The 3’ long tube requires a clamp on both ends
- One 8’ long tube requires a clamp on only one end. This will be the tube used for return / waste cooling water (ie. the output water from the condenser)
- One 8’ long tube requires a clamp on one end, to carry cooling water to your distillation unit

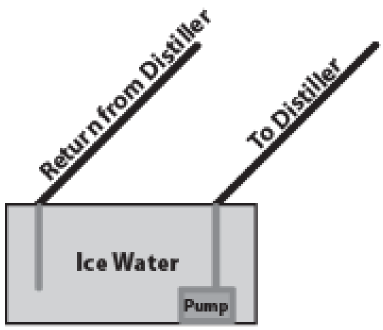
    - If you are using running water from a garden hose, you will attach a clamp to the opposite end of this tube, attach the garden hose fitting, and then slide the clamp over the fitting to secure it in place.
    - If you are using the submersible pump to re-circulate your cooling water, you will attach the opposite end of the tube to the 5/8” black plastic fitting included with the pump. To make this easier, place the end of the tube in about 1-1.5” of very hot water for 30 seconds to soften the tubing, then work it over the plastic fitting. It is easiest to leave the fitting attached to the tubing, and attach this to your submersible pump for operation.
- The 4’ Chemical Tolerant tube requires a clamp on one end only

When attaching hoses to your distillation unit, slide the tube onto the appropriate fitting on your distiller, then squeeze the prongs of the hose clamp to loosen it. Slide the hose clamp over the fitting to secure and seal the connection. To remove the tube, squeeze the prongs on the hose clamp and slide it back from the connection. Remove the hose.

Water Supply: Submersible Pump versus Running Water

Your cooling water runs through the condenser to cool the vapor, allowing it to re-condense back into liquid for collection. The source of your cooling water is relatively unimportant. Either direct running water or re-circulation via a water pump are acceptable. The precise temperature of the cooling water is not particularly important as long as the water is “ice cold.” However, it is very important to keep the temperature of your cooling water *consistent* throughout your run. For re-circulation, you can use a large garbage can or beverage cooler to house your ice water.

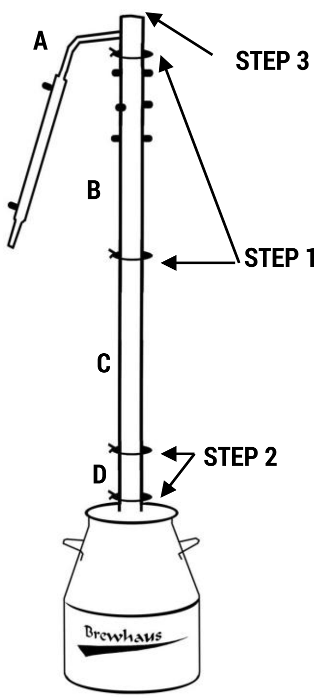
Running Water*:* Attach the brass hose fitting to one of your 8' long tubes, as per the previous section. This simply attaches to a standard garden hose, allowing you to run your cooling water directly from a water faucet. This allows you to easily control the speed of your water flow, however, it results in the greatest amount of water consumption. This method is best for those on wells, or where the waste water can be used for watering grass, a garden, or topping up of a swimming pool.

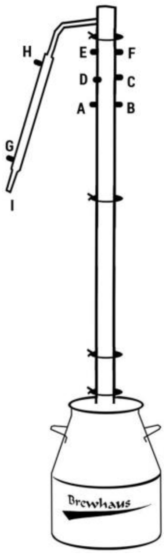


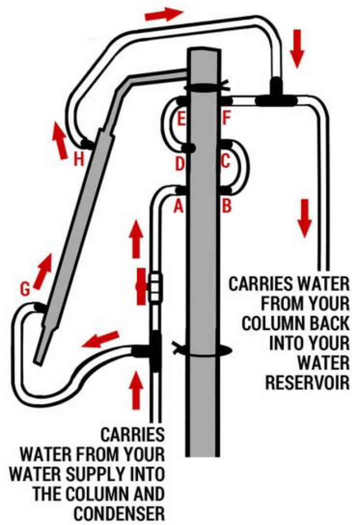
Recirculated Water via Submersible Water Pump: It is important that your water remains cool enough to condense the vapor efficiently. The simplest option is to use a large cooler with ice-water (or alternatively, cold water with frozen soda bottles). If necessary, add more ice as the distillation process warms the water. This dramatically reduces water consumption when compared with connecting to a water source. Setup as shown above.

Reflux Distiller Setup:

1. Assemble your distillation column by placing a gasket between the top portion of the distillation column (part A, below) and the part of the column that has the cooling line hook-ups (part B, below) and affixing a clamp. Then attach the bottom of the part of the column that has the cooling line hook-ups (part B) to the top of the 18” section of the column (part C) by placing a gasket between the two parts and affixing a clamp.
2. Attach the bottom of the 18” section of the column (part C) to the top of the gin basket (part D) by placing a gasket between the two parts and affixing a clamp. Then attach the assembled distillation column to your kettle by placing a gasket between the kettle and column, and affixing a clamp.
3. Moisten the thermometer, slide it into the hole of the bung and place the bung securely in the top of the column. Position the thermometer bulb just above the condenser tube. If you purchased the digital solar thermometer upgrade that comes with the end cap attached to ½” coupling, screw your thermometer into the coupling and affix to the top of the column.



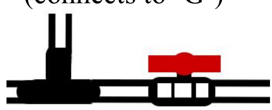




Attaching the Hoses with the Water Control System:

- Connect one end of one 8’ tube to your water supply; this tube will carry water TO your distiller. Then connect the other end of the same tube to the condenser to the part of your Water Control System with a black T-fitting and a white and red plastic ball valve that looks like this:

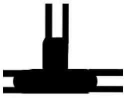
(connects to ‘G’)

(water supply connects here)  (connect this to ‘A’)

- Connect the tubing from the top of the T-fitting to the input on the bottom of the condenser marked as ‘G’ in the diagram above.
- Connect the tubing from the opposite side of the red plastic ball valve to the input marked as ‘A’ in the diagram above.
- Connect one end of one 18” tube to ‘B’ and connect the other end to ‘C’. This tube will carry cooling water from the lower cooling line in your column to the middle cooling line.
- Connect one end of one 18” tube to ‘D’ and the other end to ‘E’ (marked in the diagram above). This tube will carry cooling water from the middle cooling line in your column to the upper cooling line.

- Connect one end of the second T-fitting from your Water Control System to ‘F’. Connect the other end to one 18” tube that will carry water from the column back to your water reservoir. Connect the tube on the top of the T-fitting to ‘H’. This tube will carry cooling water from the upper cooling line on your condenser to the T fitting, which directs the water down and to the water reservoir:

(connects to ‘H’)

(connects to F)  (carries water from column to water reservoir)

- This will carry your cooling water FROM the distiller. If you are re-circulating your cooling water, place the output end of this tube in your water reservoir. If you are running water from a water faucet, this water will be run down the drain (or alternate location as desired).
- Connect your 4’ Chemical Tolerant tube to ‘I’ at the very bottom of the condenser. The other end of this hose will be placed in your distillate collection container.

Running Your Essential Extractor Gin Series in Reflux Mode:

- Siphon or pour the liquid that you intend to distill into the kettle. Do not fill the kettle above 80% capacity to allow room for the liquid to expand as it heats up without being forced up into the column. Some items will foam more when boiling, making it necessary to not exceed 70% capacity to allow the additional void space, or to add an anti-foam agent to reduce foaming.
- Attach your column and place the unit on your heat source. In order for your column to reach equilibrium, which is imperative for proper reflux use, it is important to use a constant heat source. Use of a cycling heat source will dramatically reduce the stability within your column and reduce the purity of your distillate, as well as make it more difficult and frustrating to control the temperature at the top of the column. With a constant heat source you should find that equilibrium is reached, and the temperature at the top of the column will remain extremely consistent.

- Once the liquid in the kettle has begun to boil, the heat will rise in the column rather quickly. During this time the steam is also raising the temperature of the column filling material. When the temperature starts to rise in the column, start the flow of cool water through your column cooling tubes and condenser. Start with the water running slowly. This will be adjusted once the vapor has made its way to the top of the column.
- Once vapor has made its way to the top of your column you will see the temperature rise rapidly, as recorded by your thermometer. At this point you will notice liquid will start to be expelled from your condenser. You must pay attention to the temperature recorded on your thermometer, as this is how you know what constituents are being removed.
- All constituents with a lower boiling point than your desired product will come out first. The temperature at this point will be lower than the temperature of your desired product. As the temperature nears the boiling point of your desired product, you will be exhausting all of the lower boiling point constituents. Allow the temperature to stabilize at the temperature of your desired product. Once temperature has stabilized, collect your distillate in a new container and discard the previously collected distillate.
- Your temperature should remain constant throughout your distillation. If necessary, adjust the flow of cooling water to maintain this temperature and ensure that the distillate from your condenser is *cool to slightly warm*. If the distillate is hot, increase the flow of your cooling water.
- Continue to collect your distillate until the temperature at the top of your column rises. At that point, you have collected all of the component that you need and should shut the system down.

    - ***If you are distilling water***, you may be removing most of the product from the kettle. In this case, shut the system down after collecting all but 15-20% of liquid. This ensures that you do not boil the kettle dry.

    - ***If you are distilling alcohol,*** most of the water will be left behind in your kettle because you have effectively separated all of the constituents and collected only those with a boiling point equal to and lower than the temperature at the top of your column. If you start with 6.25 gallons of liquid in your kettle, and collect 1.25 gallons of product in your collection container, you will have about 5 gallons remaining in the kettle after distillation.
- To shut the system down, remove it from your heat source and follow the Cool-Down Process to avoid damage to your unit.

Cool-Down Process:

- During the cool-down process, any remaining steam remaining will re-condense into liquid, greatly reducing air-pressure inside the unit. It is ***extremely important*** to remove the thermometer and bung from the top of the column as soon as the extractor is removed from the heat so that adequate air-flow is provided back into the unit, which will avoid potential damage. Without enough airflow, the air-pressure inside of the unit versus the air-pressure outside of it can literally cause the unit to implode.
- Once the unit is completely cooled, remove the column from the kettle. Run fresh, hot water from the top of the column to the bottom to clean any residual oils, etc., from the unit.
- Empty the kettle, and clean it with hot water.
- Never use abrasive or corrosive materials on your unit. Use only warm soapy water or a cleaner formulated for stainless steel to clean your unit. Rinse well with hot water and allow to dry thoroughly.

Section 5

Gin Mode: Assembly and Use

Packing Your Column with Copper Mesh

Roll the Copper Mesh into ‘plugs’ that fit snugly inside the distillation column. The copper mesh plug should be snug enough to stay in place (ie. not slide out of the column), while not being compressed by the column, restricting flow. It is best to roll the mesh loosely. It is not advised that you roll the mesh tightly, as this will restrict vapor flow. For the Gin Series unit, a 3½ to 4 foot long piece of mesh is sufficient for one ‘plug’. It is also beneficial to cut a few smaller pieces from the remaining mesh to tuck in the area of the cooling lines. Due to the nature of copper, it is advised that you remove the mesh from your column after each use and allow to dry completely in order to avoid tarnishing. After every second to third use, clean the copper with vinegar, a citric acid solution, or another food grade copper cleaner, rinse well, and dry completely.

Attaching Hose Clamps to Hoses:

Using a pair of pliers, squeeze the prongs of the hose clamp together and slide it approximately 1 inch from the end of the tube. Each tube will require the following clamps:

- Each 18” long tube requires a clamp on both ends
- The 3’ long tube requires a clamp on both ends
- One 8’ long tube requires a clamp on only one end. This will be the tube used for return / waste cooling water (ie. the output water from the condenser)
- One 8’ long tube requires a clamp on one end, to carry cooling water to your distillation unit

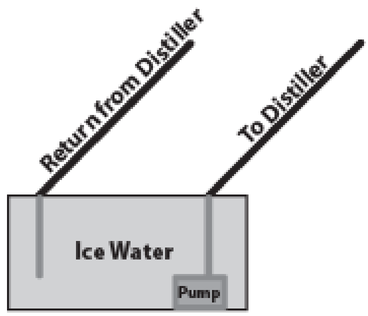
    - If you are using running water from a garden hose, you will attach a clamp to the opposite end of this tube, attach the garden hose fitting, and then slide the clamp over the fitting to secure it in place.
    - If you are using the submersible pump to re-circulate your cooling water, you will attach the opposite end of the tube to the 5/8" black plastic fitting included with the pump. To make this easier, place the end of the tube in about 1-1.5" of very hot water for 30 seconds to soften the tubing, then work it over the plastic fitting. It is easiest to leave the fitting attached to the tubing, and attach this to your submersible pump for operation.
- The 4' Chemical Tolerant tube requires a clamp on one end only

When attaching hoses to your distillation unit, slide the tube onto the appropriate fitting on your distiller, then squeeze the prongs of the hose clamp to loosen it. Slide the hose clamp over the fitting to secure and seal the connection. To remove the tube, squeeze the prongs on the hose clamp and slide it back from the connection. Remove the hose.

Water Supply: Submersible Pump versus Running Water

Your cooling water runs through the condenser to cool the vapor, allowing it to re-condense back into liquid for collection. The source of your cooling water is relatively unimportant. Either direct running water or re-circulation via a water pump are acceptable. The precise temperature of the cooling water is not particularly important as long as the water is "ice cold." However, it is very important to keep the temperature of your cooling water *consistent* throughout your run. For re-circulation, you can use a large garbage can or beverage cooler to house your ice water.

Running Water*:* Attach the brass hose fitting to one of your 8' long tubes, as per the previous section. This simply attaches to a standard garden hose, allowing you to run your cooling water directly from a water faucet. This allows you to easily control the speed of your water flow, however, it results in the greatest amount of water consumption. This method is best for those on wells, or where the waste water can be used for watering grass, a garden, or topping up of a swimming pool.

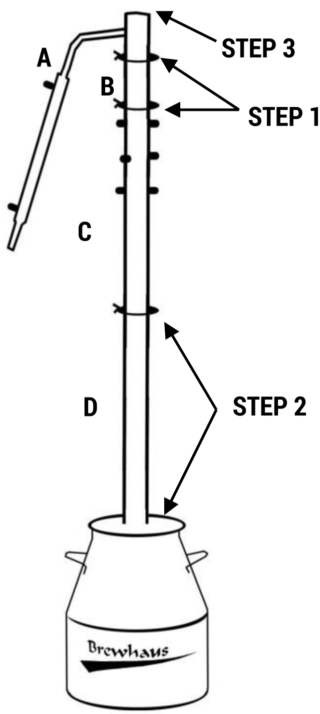


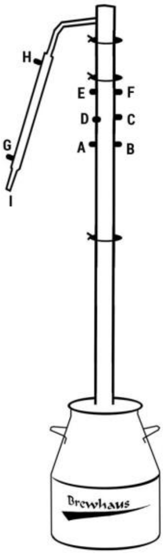
Recirculated Water via Submersible Water Pump: It is important that your water remains cool enough to condense the vapor efficiently. The simplest option is to use a large cooler with ice-water (or alternatively, cold water with frozen soda bottles). If necessary, add more ice as the distillation process warms the water. This dramatically reduces water consumption when compared with connecting to a water source. Setup as shown above.

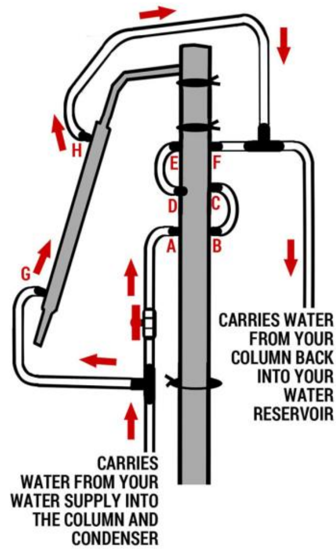
Gin Mode Distiller Setup:

Read the following instructions first prior to setting up your unit for distilling in gin mode for the first time. When distilling in gin mode, you will need to add your organic material to the gin basket *before* assembling the column as shown below.

1. Assemble your distillation column by placing a gasket between the top portion of the distillation column (part A, below) and the gin basket (part B, below) and affixing a clamp. Then attach the bottom of the gin basket (part B) to the top of the part of the column that has the cooling line hook-ups (part C) by placing a gasket between the two parts and affixing a clamp.
2. Attach the bottom of the part of the column that has the cooling line hook-ups (part C) to the top of the 18” section of the column (part D) by placing a gasket between the two parts and affixing a clamp. Then attach the assembled distillation column to your kettle by placing a gasket between the kettle and column, and affixing a clamp.
3. Moisten the thermometer, slide it into the hole of the bung and place the bung securely in the top of the column. Position the thermometer bulb just above the condenser tube. If you purchased the digital solar thermometer upgrade that comes with the end cap attached to ½” coupling, screw your thermometer into the coupling and affix to the top of the column.



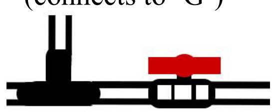




Attaching the Hoses with the Water Control System:

- Connect one end of one 8' tube to your water supply; this tube will carry water TO your distiller. Then connect the other end of the same tube to the condenser to the part of your Water Control System with a black T-fitting and a white and red plastic ball valve that looks like this:

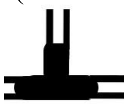
(connects to 'G')

(water supply connects here)  (connect this to 'A')

- Connect the tubing from the top of the T-fitting to the input on the bottom of the condenser marked as 'G' in the diagram above.
- Connect the tubing from the opposite side of the red plastic ball valve to the input marked as 'A' in the diagram above.
- Connect one end of one 18" tube to 'B' and connect the other end to 'C'. This tube will carry cooling water from the lower cooling line in your column to the middle cooling line.
- Connect one end of one 18" tube to 'D' and the other end to 'E' (marked in the diagram above). This tube will carry cooling water from the middle cooling line in your column to the upper cooling line.

- Connect one end of the second T-fitting from your Water Control System to ‘F’. Connect the other end to one 18” tube that will carry water from the column back to your water reservoir. Connect the tube on the top of the T-fitting to ‘H’. This tube will carry cooling water from the upper cooling line on your condenser to the T fitting, which directs the water down and to the water reservoir:

(connects to ‘H’)

(connects to F)  (carries water from column to water reservoir)

- This will carry your cooling water FROM the distiller. If you are re-circulating your cooling water, place the output end of this tube in your water reservoir. If you are running water from a water faucet, this water will be run down the drain (or alternate location as desired).
- Connect your 4’ Chemical Tolerant tube to ‘I’ at the very bottom of the condenser. The other end of this hose will be placed in your distillate collection container.

Running Your Essential Extractor Gin Series in Gin Mode:

- Siphon or pour the liquid that you intend to distill into the kettle. Do not fill the kettle above 80% capacity to allow room for the liquid to expand as it heats up without being forced up into the column. Some items will foam more when boiling, making it necessary to not exceed 70% capacity to allow the additional void space, or to add an anti-foam agent to reduce foaming.
- Before attaching your column to the kettle, place the material that you want to collect the character from in the gin basket and pack your column with copper mesh.
- Attach your column and place the unit on your heat source. In order for your column to reach equilibrium, which is imperative for proper reflux use, it is important to use a constant heat source. Use of a cycling heat source will dramatically reduce the stability within your column and reduce the purity of your distillate, as well as make it more difficult and frustrating to control the temperature at the top of the column. With a constant

heat source you should find that equilibrium is reached, and the temperature at the top of the column remains consistent.

- Once the liquid in the kettle has begun to boil, the heat will rise in the column rather quickly. During this time the steam is also raising the temperature of the column filling material. When the temperature starts to rise in the column, start the flow of cool water through your column cooling tubes and condenser. Start with the water running slowly. This will be adjusted once the vapor has made its way to the top of the column.
- Once vapor has made its way to the top of your column you will see the temperature rise rapidly, as recorded by your thermometer. At this point you will notice liquid will start to be expelled from your condenser. You must pay attention to the temperature recorded on your thermometer, as this is how you know what constituents are being removed.
- All constituents with a lower boiling point than your desired product will come out first. The temperature at this point will be lower than the temperature of your desired product. As the temperature nears the boiling point of your desired product, you will be exhausting all of the lower boiling point constituents. Allow the temperature to stabilize at the temperature of your desired product. Once temperature has stabilized, collect your distillate in a new container and discard the previously collected distillate.
- Your temperature should remain constant throughout your distillation. If necessary, adjust the flow of cooling water to maintain this temperature and ensure that the distillate from your condenser is *cool to slightly warm*. If the distillate is hot, increase the flow of your cooling water.
- Continue to collect your distillate until the temperature at the top of your column rises. At that point, you have collected all of the component that you need and should shut the system down.
    - ***If you are distilling water***, you may be removing most of the product from the kettle. In this case, shut the system down after collecting all but 15-20% of liquid. This ensures that you do not boil the kettle dry.

    - ***If you are distilling alcohol,*** most of the water will be left behind in your kettle because you have effectively separated all of the constituents and collected only those with a boiling point equal to and lower than the temperature at the top of your column. If you start with 6.25 gallons of liquid in your kettle, and collect 1.25 gallons of product in your collection container, you will have about 5 gallons remaining in the kettle after distillation.
- To shut the system down, remove it from your heat source and follow the Cool-Down Process to avoid damage to your unit.

Cool-Down Process:

- During the cool-down process, any remaining steam remaining will re-condense into liquid, greatly reducing air-pressure inside the unit. It is ***extremely important*** to remove the thermometer and bung from the top of the column as soon as the extractor is removed from the heat so that adequate air-flow is provided back into the unit, which will avoid potential damage. Without enough airflow, the air-pressure inside of the unit versus the air-pressure outside of it can literally cause the unit to implode.
- Once the unit is completely cooled, remove the column from the kettle. Run fresh, hot water from the top of the column to the bottom to clean any residual oils, etc., from the unit.
- Empty the kettle, and clean it with hot water.
- Never use abrasive or corrosive materials on your unit. Use only warm soapy water or a cleaner formulated for stainless steel to clean your unit. Rinse well with hot water and allow to dry thoroughly.

Section 6

Safety, Care and Warranty

Safety Guidelines:

In some countries, it is legal to distill alcohol at home, and in some other countries it is possible to obtain licensing to do so. Distillation of alcohol requires special care. As high-proof alcohol is explosive, it is important to note some safety guidelines for those distilling alcohol with their unit:

Always operate in a well-ventilated area

Never distill alcohol while intoxicated

Always keep a fire extinguisher nearby

Do not leave your unit unattended while in operation

Keep collection jars sealed in a cool, stable environment, and away from heat sources

Never distill industrial solvents

Care of your Stainless Steel Essential Extractor:

Stainless steel avoids corrosion and rusting by protecting itself through oxidation. In other words, if the protective layer is removed in whole or part, the steel can corrode. It is therefore important to keep a few points in mind in caring for your stainless steel unit:

Never use harsh cleaning chemicals or abrasive materials on your extractor. These can remove the oxidative layer, increasing the risk of rust or corrosion of the metal. We suggest using soapy warm water or a solution safe for use on stainless steel for cleaning of all parts. After cleaning, rinse with warm water.

Dry all parts before storing. To thoroughly dry your kettle, place it in a warm area to fully dry. Alternatively, you can set your kettle on top of a stove burner. Turn the burner to low for 5 minutes. Most of the water in the kettle will evaporate due to the heat. **Never heat your kettle when dry, nor place on a medium to high heat without a sufficient liquid level!**

With proper care, your Essential Extractor will give many years of service.

Warranty

The manufacturer warrants your Essential Extractor to be free from defects in material and workmanship for the life of the product. This warranty does not extend to cover misuse or abuse of the product. The manufacturer will repair or replace, at its option, any parts found to be defective.

Appendix

Sources of Information

These instructions are intended to offer the basic information needed in order to use your unit in the simplest manners with good results. For those interested in more advanced information, below are some excellent sources:

General Information

The Joy of Home Distilling is an excellent book for beginner and intermediate level distillers, and provides information on all steps of alcohol distilling.

The Home Distillation Handbook is an excellent book to get you through the basics of alcohol distillation.

For those with Internet access, a wealth of knowledge on distillation in general can be obtained from Tony Ackland's website: www.homedistiller.org.

There are also several forums online where you can gain much information on distillation. This is an excellent way to get your specific questions answered, and to build your knowledge through the amount of diverse information being discussed. Those that we suggest are:

Brewhaus' Forum- www.brewhausforum.com/
Home Distiller Forum- http://homedistiller.org/forum/