

STILL SPIRITS

TRUSTED SINCE 1989

TURBO 500 DISTILLATION SYSTEM



INSTRUCTION MANUAL

The T500 Distillation System is designed to produce the purest spirit with the highest yield from your wash. When used with the instructions in this manual, the T500 will produce a beautiful clean spirit of up to 93% ABV and extract 95% of the alcohol in your wash.

This extremely pure, neutral spirit is the perfect base for all spirits and liqueurs but is essential for the delicate spirits like gin, white rum and vodka.

MAKES UP TO 8 L (2 US GAL) OF 40% ABV FROM A 23 L (6 US GAL) WASH USING 6 KG (13 LB) SUGAR AND 1 SACHET TURBO YEAST.

Instructions suitable for use with stainless steel and copper reflux condensers.

TURBO 500

DISTILLATION SYSTEM

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INTRODUCTION

The ultimate still for home distilling, the T500 is a must for anyone who wants to produce large quantities of extremely clean, pure alcohol.

To complete a T500 Distillation System you will need both a T500 Condenser and a T500 Boiler.

To obtain the best performance from the T500 Distillation System and to operate it safely, it is important to read these instructions carefully and save them for future reference.

SIGN UP TO THE STILL SPIRITS NEWSLETTER
VIA THE WEBSITE SO THAT WE CAN PROVIDE
YOU WITH INFORMATION AND UPDATES.

SAFETY

PLEASE READ ALL OF THESE INSTRUCTIONS
CAREFULLY BEFORE USING YOUR STILL

WARNING:

This distillation system produces a highly flammable liquid.



PRECAUTION:

- Always operate the T500 Distillation System in a room with adequate ventilation.
- Do not use outdoors, as drafts affect distillation efficiency.
- Never leave the T500 Distillation System unattended when operating.
- Keep the T500 Distillation System away from all sources of ignition, including smoking, sparks, heat, and open flames.
- Ensure all other equipment near the T500 Distillation System or the alcohol is earthed.
- A fire extinguishing media suitable for alcohol should be kept nearby. This can be water fog, fine water spray, foam, dry powder, carbon dioxide, sand or dolomite.
- Do not boil dry. In the event the still is boiled dry, reset the cut-out button under the base of the still. In the very unlikely event the electric cut-out fails, a fusible link gives an added protection. This fuse will melt and cut the flow of power if the temperature exceeds a safe level. It cannot be reset by the user and the boiler will need professional attention.

IN CASE OF SPILLAGE:

- Shut off all possible sources of ignition.
- Clean up spills immediately using cloth, paper towels or other absorbent material such as soil, sand or other inert material.
- Collect, seal and dispose accordingly.
- Mop area with excess water.

STEP 1 / DAYS 1-6

MAKING THE WASH

The first step in making a high quality spirit is to produce a good, clean wash. It is recommended that you always use the Still Spirits Turbo Yeast, Sugar and Carbon range with the T500 for best results from your still. Regardless of the size of your boiler, we recommend always making up a 20 L (5 US Gal) wash at one time using Still Spirits Production Packs or by purchasing these products separately. If you do not distil the full amount of wash at one time, this can be saved to be distilled at a later date.

In this step you will need:

- Fully assembled 30 L (8 US Gal) fermenting vessel (refer to the instructions which came with the fermenter for assembly information).
- Cold Water Cleaner Detergent and No Rinse Steriliser (or an alternative cleaning and sanitising product).
- Mixing spoon.
- Wash ingredients (water, sugar, carbon, yeast, clearing agent).
- Hydrometer.

1 [CLEAN AND STERILISE YOUR EQUIPMENT] (DAY 1)

- Clean and sterilise your 30 L (8 US Gal) fermenter.
- While cleaning and sterilising, check for any leaks around the tap seal of the fermenter.

2 [ADD INGREDIENTS] (DAY 1)

- Once fermenter and equipment are sterilised, shake off excess moisture, but do not rinse.
- Put sterilised spoon on top of the sterilised lid (lid inner facing upwards to keep sterile).
- Refer to the instructions on the yeast sachet for the quantity and temperature of water, as well as the quantity and type of sugar recommended.

Note: If sugars are not fully dissolved, the fermentation will be partial and you will get less alcohol.

3 [FERMENT] (DAY 1)

- Place lid on fermenter, half fill the airlock with water, and fit airlock into the rubber grommet on the lid.
- Leave to ferment at 18-30°C (64-86°F), or as per recommended on the yeast sachet, for about 1 week or until the wash has stopped fizzing.

Note: The fermentation process gives off smells, which may be unpleasant sometimes. It will dissipate and won't affect the quality of your alcohol.

4 [CHECK THE SPECIFIC GRAVITY (SG)] (DAY 6)

- Check the SG by floating the hydrometer in the wash. The SG reading is the number on the scale where the liquid cuts the glass. A fully fermented wash will have an SG reading of approx 0.990 or lower.
- The SG measurement will let you know when the sugars have been converted into alcohol and your wash is ready to be cleared.
- Fermentation is complete when SG has been stable at 0.990 for 2 consecutive days.

5 [CLEAR YOUR WASH] (DAY 6)

- Once fermentation is complete, stir the wash vigorously to release all of the gas. Once fully degassed, add Part A of the Turbo Clear. Stir well and leave for 1 hour.
 - 1 hour later, evenly and very gently, stir Part B into the top 50 mm (2 in) of the wash, do not stir vigorously or the clearing process will not be successful.
 - Leave for 24 hours until all sediment is at the bottom of the fermenter.
- Once cleared, your wash is ready to be distilled, using the T500 Distillation System.

STEP 2 / DAY 7

PREPARE THE T500 DISTILLATION SYSTEM

Your wash will be distilled through the T500 Distillation System. It comes in two parts: the T500 Boiler and the T500 Condenser.

It is best to set up the T500 Distillation System in the place where it can stay for 5 hours (approx time for one distillation using the 30 L (8 US GAL) boiler (less if using a smaller boiler)).

The T500 Distillation System will need to be run on a level bench or table, in a place which has electricity, a sink, a tap and adequate ventilation (ie the kitchen or laundry), but not outside as drafts affect distillation efficiency dramatically.

The T500 Condenser box comes with the following components:

- Stainless steel distilling column prepacked with copper and stainless steel saddles.
- Digital thermometer with LR44 battery and mounting bracket.
- Water flow controller (and adaptors) - refer to p.14 for more details on tap connector.
- Cooling water tubes (1 thin, 1 thick).
- Alcohol tube (white).
- Distilling conditioner.
- Ceramic boil enhancers.

1 [TRANSFER YOUR CLEARED WASH INTO THE T500 BOILER]

- Place the boiler body on a firm, level bench, with the tap over the sink, to avoid handling the hot boiler when emptying contents later on. Do not point the tap to the front to avoid boiling liquid pouring out on you or a passer by if it gets knocked and breaks.
- Using a syphon or 5 L (1.3 US Gal) jug, transfer the cleared wash from the fermenter into the boiler. You can also place the boiler below the tap on the fermenter and pour it in that way, but keep in mind you will need to lift the full boiler back up to the bench afterwards. Be careful to leave as much sediment behind as possible. Do not fill beyond the maximum level line on the 30 L (8 US Gal) T500 Boiler. The 4.9 L (1.3 US Gal) boiler may be filled to up to 8 L (2.1 US Gal) if it is legal to do so in your country.

2 [ADD CERAMIC BOIL ENHANCERS AND DISTILLING CONDITIONER] (from the T500 Condenser box)

- Add all of the ceramic boil enhancers into the T500 Boiler, and the wash.
- Add 3 capfuls of distilling conditioner to the cleared wash in the T500 30 L (8 US Gal) Boiler. If using the 4.9 L (1.3 US Gal) boiler, just add 1 capful of conditioner.
- Place the lid back on. Do not clip on yet as you will need to fit the column/condenser on the lid in Step 5.



3. [ASSEMBLE THE T500 CONDENSER]

Your water tubing is identified by a thick tube and a thin tube.

- Connect the long, thick, clear tube to the block outlet **C**. This will flow into your sink.
- Connect the short thin, clear tube to make the top loop connection **E**.
- Connect the thin clear tube on the water inlet **B**, to your tap. This will flow from your tap (via the adaptor) into the condenser.
- Connect the white tube on the spirit outlet **D**. The distilled alcohol will flow from here to your collecting jug.

4. [ADD THE THERMOMETER]

- Place the battery in the thermometer.
- A switch on the back allows you to turn the thermometer on and off. A second switch allows you to set the thermometer to Celsius or Fahrenheit.
- Mount the thermometer in the mounting bracket provided. Clip the panel onto the condenser near the bottom.
- Fit the stainless steel sensor probe into the hole **A**.
- Use a wire tie to tidy up any loose wiring.

5. [BOILER]

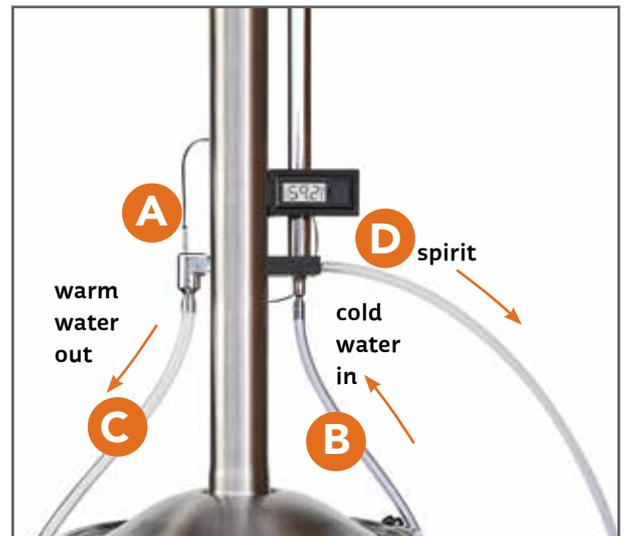
Fit the T500 Condenser onto the T500 Boiler.

- Check the T500 Condenser is full of saddles inside. If the column is empty, you will need to add copper saddles first, followed by the stainless steel saddles provided in the box, then follow the next step.

Note: You may have a handful of saddles left, which cannot fit in the condenser, this is normal.

- Holding the condenser up side down, unscrew the nut at the base of the condenser; leave the black O ring in the base of the column.
- Place the T500 Boiler lid over the column and screw the nut back in the column. Tighten firmly, so that the lid doesn't spin anymore.
- Place the lid and condenser on the T500 Boiler, in position where you can see the thermometer.
- Secure lid onto the T500 Boiler base with the clips.

IMPORTANT: Ensure the T500 Condenser is standing straight, or it will not operate properly during distillation.



- A** Water outlet temperature sensor
- B** Cooling water inlet
- C** Water outlet
- D** Spirit outlet
- E** Top loop connections



YOU ARE NOW READY FOR DISTILLATION

STEP 3 / DAY 7

DISTIL THE WASH

Distilling takes about 5 hours from start to finish. Please ensure you can give your full attention to operating the T500 Distillation System for this time period. The T500 Distillation System becomes very hot during operation, extreme care needs to be taken and children should be kept well clear during and after distilling. The process produces a highly flammable liquid, keep all sources of ignition away from the still.

To run the T500 Distillation System, you will need to have:

- 5 L (1 US Gal) jug or vessel to collect alcohol.
- Cooling water supply and sink.
- Water flow controller provided with your condenser.

1. [CONNECT THE CONDENSER TO WATER SUPPLY]

- Fit the water flow controller to your tap/ faucet. Refer to 'water flow adaptor' FAQs p.14 if you have any issues with fitting.
- Shut the water flow valve completely.
- Connect the long thin tube to the flow controller.
- Place the long thick tube into the sink or drain.
- Place the white alcohol outlet tube into the collection jug or vessel. Position the tube so that it cannot become submerged under the distillate, otherwise the boiler may implode.

2. [START THE BOIL]

- Connect the T500 Boiler to the power supply.
- A 23 L (6 US Gal) wash will take just over 1 hour to heat to boiling temperature, the 4.9 L (1.3 US Gal) boiler will take just over 10 minutes when filled with 4.5 L (1.2 US Gal) of wash.

3. [ADJUST THE WATER FLOW]

- About 45 minutes after the 30 L (8 US Gal) T500 Boiler has been turned on or 5 minutes after the 4.9 L (1.3 US Gal) boiler has been turned on, and before the wash begins to boil, open the water supply.
- Gradually open the water flow controller valve to adjust the water flow rate between 400 and 700 ml (3.5 US fl oz for USA) per minute. You can measure water flow by using a measuring vessel (1 L (1 US qt) jug or kitchen cup measurer) and timing how many ml/US fl oz flow into the measuring vessel per minute.

USA users – NOTE : If you are in the USA, your boiler has a lower power due to the 110V system used. As a result, the cooling

water flow should be approx 3.5 US fl oz/ minute and look like a trickle.

- Once the wash starts boiling, make sure the temperature reading is above 50°C (122°F) (otherwise you won't collect any alcohol), and below 65°C (149°F). If the temperature is below 50°C (122°F), shut down the water flow controller valve slightly (very little will suffice) to reduce the water flow. If the temperature is above 65°C (149°F), open the valve a little more to increase the water flow. You may find you need to adjust the water flow several times throughout the run to maintain the outlet water temperature within 50 - 65°C (122 - 149°F). You can use the Still Spirits Water Flow Regulator to help with water flow consistency. For an overview on the importance of controlling the water outlet see p.13.

4. [COLLECT YOUR SPIRIT]

- Once the wash starts boiling, the spirit will come out of the white tube, into your collecting jug.
- Make sure the white tube is never submerged into the distillate. You should see the drops of distillate falling into your vessel.
- Collect and discard the first 50 ml (1/4 cup) of alcohol.

IMPORTANT!

The first 50 ml (1.7 US fl oz) that comes out of the still contains lighter molecules, such as acetaldehyde, ethyl acetate and methyl propanol, which have strong and unpleasant smell, often described as 'hospital smell' or 'nail polish'. They should not be consumed.

5. [FINISH THE DISTILLATION]

Approx 5 hours after the boiler has been turned on, you should have collected approx 3.5 L (1 US Gal) of 90-93% ABV spirit. You will also notice the distillate is slower to come out (1 drop every 5 to 10 seconds), that means all the ethanol has been distilled and the boiler can be turned off.

NOTE: Distilling smaller volumes with the 4.9 L (1.3 US Gal) boiler will result in a quicker distillation time and less alcohol collected. Your 4.5 L (1.2 US Gal) will be finished in approximately 40 minutes and you should have collected 700 ml (0.7 US qt) of 90 - 91% ABV spirit.

- Turn off the boiler and disconnect the power outlet.
- Turn off the cooling water supply.
- The depleted wash left in the T500 Boiler will be dangerously hot. Allow it to cool to a safe temperature before emptying it through the tap, into the sink or onto the garden (it makes a great fertiliser).
- Remove the T500 Condenser and Boiler lid assembly, and rinse the boiler of all wash and debris, being careful to retain the ceramic boil enhancers for the next distillation run.
- Run water through the condenser to rinse the saddles every 5 to 10 distillations. Replace saddles if the distillate starts to taste earthy.

STEP 4 / DAY 7

DILUTE AND FILTER

The spirit you have produced will lie somewhere between 90 and 93% ABV. It has to be watered down to 50% ABV before filtering, regardless of the type of carbon filter used. Refer to p.15 for more information about activated carbon.

You will need:

- Alcoholmeter (we recommend using the Still Spirits 0-100% ABV alcoholmeter).

NOTE: It is calibrated to take measurements at 20°C (68°F). If your alcohol is warmer or cooler than 20°C (68°F) use the temperature correction tables.

- Trial jar (this is the casing that holds the Still Spirits alcoholmeter), or a measuring cylinder.
- Clean and drinkable water.
- Carbon filtration system (we recommend using Still Spirits EZ Filter or Pure V Filter for quick and easy filtration).

WARNING: You are handling highly flammable alcohol; keep away from all ignition sources (spark, flame).

1. [MEASURE YOUR DISTILLATE % ABV WITH THE ALCOHOLMETER]

- Pour some of your distillate in the trial jar (approx 200 ml (7 US fl oz)).
- Float the alcoholmeter in the distillate. The % ABV is the number on the scale where the liquid cuts the glass. It should read between 90 and 93% ABV. Check the temperature and adjust if needed.

2. [WATER DOWN YOUR DISTILLATE]

- Place the distillate in a container that can hold 5 L (1.3 US Gal) at least.
- For each litre (US qt) of distillate at 90-93% ABV, add 850 ml (28 US fl oz) of clean drinkable water and mix thoroughly (if you have collected 3.5 L (1 US Gal) of distillate, you will need to add 2.9 L (1 US qt) of water (=3.5 x 0.85), if you have collected 700 ml (24 US fl oz) of distillate, you will need to add 550 ml (18.6 US fl oz) of water).
- Measure your diluted spirit % ABV again, it should read approx 50% ABV. If it is slightly higher, add a little more water (100 ml (3 US fl oz) at a time), stir and recheck % ABV. If it is lower, do not add more water, and proceed to filtration.

Note: Adding water will increase the temperature, adjust accordingly.

3. [FILTER YOUR SPIRIT]

Filter your diluted spirit through activated carbon, as per the instructions of use that come with your filter.

NOTE: Check the strength again with the alcoholmeter after filtering and adjust ABV by adding more water according to your needs.

STEP 5 / DAY 8

FLAVOUR YOUR SPIRIT

Once you have your diluted, filtered alcohol at 40% ABV, it is time to flavour it. Still Spirits has a large range of essences you can use. Refer to the individual instructions on each essence for specific directions of use.



WATER DISTILLATION

STEP 1 [ASSEMBLY]

- Remove all saddles from your column and rinse it thoroughly.
- Connect the short thin tube to the condenser outlet **E**.
- Connect the long thick tube over the short thin tube. This will flow into your sink.
- Connect the long thin tube onto the water inlet **B**.
- Connect the white tube on the outlet **D**. The distilled water will flow from here to your collecting vessel.
- You don't need a thermometer for water distillation.



STEP 2 [WATER DISTILLATION]

Distilling 20 L (5 US Gal) of water will take about 8-10 hours from start to finish (excluding heating time) and will produce approximately 18 L (4.8 US Gal) of distilled water. Distilling 4.5 L (1.2 US Gal) of water will take about 25 minutes from start to finish (excluding heating time) and will produce approximately 1 L (1 US qt) of distilled water.

You will need to have:

- Clock or timer.
- Large vessel to collect distilled water (as large as the quantity of water initially placed in the boiler)
- Cooling water supply.

1. Place the boiler body on a firm, level, bench where the waste can discharge into a drain or sink. Add water to your boiler, do not fill beyond the maximum level line on the boiler.
2. Place the column and boiler lid assembly onto the boiler base. Fasten the four clips that hold the lid onto the boiler. Check the sealing gasket is sitting firmly onto the boiler with no gaps.
3. Connect the power to the boiler. The water will take about 80 minutes to heat to boiling temperature.
4. Before the water begins to boil, turn on the cooling water just enough so that the distillate doesn't come steaming, but rather flowing in a liquid form.
5. After you have collected 18 L (4.8 US Gal) of water, (if distilling 20 L (5 US Gal), or 1 L (1 US qt) for 4.5 L (1.2 US Gal) of water), turn the boiler power off and disconnect from the power outlet. Turn off the cooling water supply. Be careful when discarding remaining water left in boiler as this will be hot.

The distilled water must be filtered through the EZ Filter system or the Pure V Filter system to ensure any unwanted flavours and aromas from previous washes are removed. Refer to your filter manual for filtering instructions.



TROUBLE SHOOTING GUIDE

WHAT IS THE PROBLEM?	WHY IS IT HAPPENING?	HOW TO FIX IT?
Alcohol distillate flows irregularly.	<ul style="list-style-type: none"> Wash is surge boiling caused by hot spot on base of integrated boiler. Spirit outlet pipe is higher than outlet creating an airlock or is submerged in distillate causing alternating pressure and vacuum. 	<ul style="list-style-type: none"> Add ceramic boil enhancers. In extreme cases try adding 1 - 2 stainless steel pot scrubbers. Make sure the outlet pipe allows the water to flow downwards from the condenser outlet. Trim outlet pipe so that it cannot be below the level of the collected distillate.
No alcohol is coming out.	<ul style="list-style-type: none"> This may be due to the cooling water being too cold or its flow rate too high This may be due to an incorrect position of the tubes. There may be a blockage at the end of your alcohol outlet tubing. 	<ul style="list-style-type: none"> Ensure the cooling water outlet temperature is between 50 and 65°C (122-149°F) during distillation. Check the tubes are in the correct position (refer to Step 2 and 3). Remove the plug at the end of your alcohol outlet tubing.
The spirit is coming out cloudy/milky.	<ul style="list-style-type: none"> Wash is foaming while boiling and carrying fermentation residues up the column. Unfermented sugar in your wash can cause foaming which eventually made its way up into the condenser causing the temperature fluctuations and producing undesirable, cloudy spirit. 	<ul style="list-style-type: none"> Always ensure your wash is completely fermented (refer to Step 1 on fermentation). Only fill wash to MAX line on inside of boiler if using the 30 L (8 US Gal) boiler. The 4.9 L (1.3 US Gal) boiler has more tolerance and can be filled to up to 8 L (2.1 US Gal). Add 3 capfuls of Still Spirits Distilling Conditioner (or 1 if using the 4.9 L (1.3 US Gal) boiler) to the wash. This stops excessive foaming in the boiler. Add ceramic boil enhancers in your boiler. Re distil the bad spirit.
Spirit has a strong unpleasant smell, described as 'paint thinner', 'hospital', 'burnt', 'nail polish'.	<ul style="list-style-type: none"> Distillate coming out of the T500 is at approx 93% ABV and has a strong ethanol smell. The first 50 ml (2 US fl oz) of distillate has a stronger smell (nail polish type), because it contains most acetaldehydes and esters. This should be discarded. The rest of the distillate smells like ethanol. 	<ul style="list-style-type: none"> Water down and filter your distillate with activated carbon. It will trap most unwanted flavours, leaving you a clean spirit (refer to activated carbon in the glossary).
Spirit has a blue tint.	<ul style="list-style-type: none"> This is caused by unbalanced or excessive nutrients added in the fermentation vessel. Nutrients are essential for the yeast to ferment sugars; they are precisely dosed and included in every Still Spirits Turbo Yeast sachet. 	<ul style="list-style-type: none"> Use only 1 sachet of Still Spirits Turbo Yeast per 25 L (6.6 US Gal) of wash. Follow recommended recipes for each type of Turbo Yeast.
The yield is low.	<ul style="list-style-type: none"> The wash has not fermented out properly so the amount of alcohol available is reduced. This could be due to several factors: The sugars were not fully dissolved. The fermentation temperature is too low or too high. Steam and vapour pressure is leaking from lid seal. 	<ul style="list-style-type: none"> Check the fermentation is finished (refer to FAQs about fermentation). Check lid gasket is sitting evenly inside lid before clipping onto the base.

TROUBLE SHOOTING GUIDE

WHAT IS THE PROBLEM?	WHY IS IT HAPPENING?	HOW TO FIX IT?
Spirit purity is low.	<ul style="list-style-type: none"> The column temperature has been too hot. This can cause the spirit to flow at a higher but less concentrated rate. 	<ul style="list-style-type: none"> Check that the water out temperature is no more than 65°C (149°F).
The boiler has stopped heating.	<ul style="list-style-type: none"> This is likely due to an electrical fault or the boiler overheating. The boiler has a thermostat cut out switch which will automatically turn off the unit if it goes above 125°C (257°F). It also has a protective fuse in case the thermostat cut out doesn't operate. 	<ul style="list-style-type: none"> Press the reset stick under the base of the boiler to reset the thermostat. If the boiler still doesn't heat up, an electrician will need to check it out.
My spirit is turning cloudy when I add a spirit essence or when I add water.	<ul style="list-style-type: none"> This may be due to a poor carbon filtration, or to the mineral salts contained in some carbons. This may be due to flavouring compounds or caramel colour that is unstable in alcohol/water. 	<ul style="list-style-type: none"> Always carbon filter your spirit with the Still Spirits EZ Filter cartridge or the Pure V filter with our universal carbon, (remember to prewash your carbon). If the spirit is hazy, add more alcohol in your drink (50% ABV). If the spirit has suspended particles, leave it to sit for a few days and decant it off into another bottle once sediment has settled.
Fluctuating temperatures while distilling.	<ul style="list-style-type: none"> This may be caused by inconsistent water flow/pressure or others using water outlets/taps in the house. It may be caused by frothing of the wash up to column. 	<ul style="list-style-type: none"> Adjust water flow by opening /closing the water flow controller valve. Use the Still Spirits Water Flow Regulator if you have one.
Alcohol is leaking from the top of the condenser.	<ul style="list-style-type: none"> This may be due to saddles blocking the alcohol steam path and building some pressure. There may be a blockage at the end of your alcohol outlet tubing. 	<ul style="list-style-type: none"> Turn off your boiler, let it cool down. Remove all saddles from the column and place them back in (copper saddles first, followed by stainless steel saddles). Remove plug at the end of your alcohol outlet tubing.
Alcohol is leaking from behind black plastic brackets.	<ul style="list-style-type: none"> Potential sealing issue, or pressure blockage in column. 	<ul style="list-style-type: none"> Turn off your boiler, let it cool down. Remove all saddles from the column and place them back in (copper saddles first, followed by ceramic saddles). If this doesn't solve the problem, contact your retailer.
The condenser leaks when I clean it.	<ul style="list-style-type: none"> The still is vented at the top, so it will leak water when you are cleaning it. 	<ul style="list-style-type: none"> Normal, no need to fix.

SUPPLEMENTARY INFORMATION AND FAQs

WHAT IS THE BLACK STUFF I ADD IN MY WASH?

It's activated carbon, designed to absorb unwanted flavours produced during fermentation (see question: *Is it normal that my wash smells funny?*). It comes in different formats: powder, granules or liquid.

The carbon will turn the liquid black and won't dissolve. It will not harm the fermentation process. The carbon is removed when the wash is cleared.

I'VE ADDED MY YEAST IN A WASH AT 40°C (104°F), WILL IT STILL WORK?

Yes, yeast can be safely added in a wash between 20 -40°C (68-104°F) maximum. Above 40°C (104°F), yeast will die very quickly if the wash is not cooled down quickly. This can be done by resting the fermenter in a basin or bath of cold water.

HOW LONG IS THE FERMENTATION?

A wash usually takes between 4 and 10 days to ferment depending on the yeast used and temperature.

IS IT NORMAL THAT MY WASH SMELLS FUNNY?

During fermentation, yeasts produce alcohol, CO₂, as well as hundreds of by-products, which have different smells, some pleasant (like pear, apple, banana), others less pleasant (like rotten egg). This will not taint your distilled spirit and disappear after distillation. Carbon filtration will further remove those unwanted smells.

HOW DO I KNOW WHEN THE FERMENTATION IS FINISHED?

A few ways:

1. Measure your SG with a hydrometer: start of fermentation reads around 1.100 and end of fermentation reads about 0.990. When your SG has read 0.990 for two consecutive days, fermentation is complete.
2. Look for fizziness, bubbles rising to the surface: while it's fermenting there are lots of bubbles coming to the surface, and at the end of fermentation there are almost none.
3. Look for the haze in the wash: at the beginning of fermentation, the wash will be very murky and hazy, towards the end, it will start to become more 'transparent'.

WHAT'S IN THE CLEARING AGENT AND HOW DOES IT WORK?

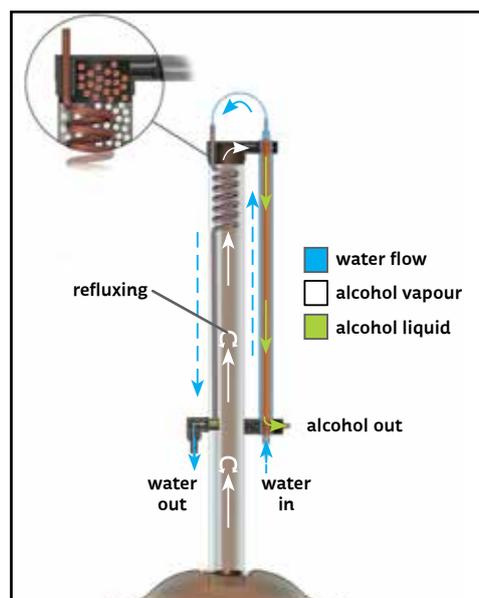
The Still Spirits Turbo Clear is made of silica (Part A) which charges floating particles, and chitosan (Part B) attracts all particles (with its opposite charges) to eventually make them all settle on the bottom of the fermenter.

HOW LONG CAN I KEEP A WASH FOR BEFORE DISTILLING IT?

We recommend distilling a wash within one week of clearing. The longer it is left, the more off flavours may develop caused by autolysis of the dead yeast cells. It is likely to be fine for up to eight weeks if kept sealed and cool.

HOW DOES DISTILLATION IN THE T500 DISTILLATION SYSTEM WORK?

The wash is heated in the boiler to boiling point and kept at boiling point throughout the distillation process. The vapour boiled off from the wash rises up the column, in which the vapours of the heavier liquids (water and heavier undesirable molecules) condense and fall back down. The alcohol vapour, being lighter than water vapour, is rising up to the top of the column and condenses back in the condenser into a liquid alcohol. This cycle of evaporation, rising and condensing, is continuous and is described as refluxing.



The saddles in the column provide a large surface area to maximise the contact between the liquid and vapour flows in the column, and accelerate the refluxing action.

The T500 has been carefully engineered to provide a continuously compensating reflux rate. As the distillation process progresses, the alcohol concentration in the wash reduces. To maintain high purity of alcohol being produced, the refluxing ratio will increase to compensate and the alcohol production will slow. This slowing is most noticeable after two hours of alcohol production.

Towards the end of the distillation the alcohol purity remains high, but output will slow until it stops altogether. At this point the water vapour will keep rising and condensing part way up the column, but nothing will reach the top of the column to pass into

the condenser. The alcohol extraction is finished at that point.

HOW MUCH ALCOHOL WILL I GET?

With a 6 kg (13 lb) sugar, Turbo Classic Yeast wash, you will get approx 3.2-3.5 L (108-118 US fl oz) of 93% ABV alcohol, that's the equivalent of 7-8 L (1.8-2 US Gal) of 40% ABV spirit. With a 6 kg (13 lb) Turbo Sugar, Turbo Classic Yeast, 4.5 L (1.2 US Gal) wash, you will get approximately 700 ml (24 US fl oz) of 90-91% ABV alcohol, that's the equivalent of just over 1.5 L (1.6 US qt) of 40% ABV spirit.

WHAT'S IN THE DISTILLATE?

The distillate obtained with the T500 Distillation System is usually composed of 93% ethanol and 6.9% water. The 0.1% left is a mixture of different compounds, called congeners, responsible for good and bad flavours.

Most of this 0.1% comes out in the first 300 ml (10 US fl oz) of the distillate; this is called the 'heads' and contains acetaldehydes and ethyl acetate. It has a distinctive smell: 'fruity', 'nail polish'. Up to 500 ml (17 US fl oz) can be taken out if you are looking to make an outstanding clean, pure spirit, like vodka. However, taking the first 50 ml (2 US fl oz) out is sufficient for most applications.

The core of the distillate (500 ml (17 US fl oz) to the end) is very pure.

The T500 Distillation System doesn't produce tails, like pot stills do, and distillate will be very pure until the end.

CAN THE T500 BE USED AS A POT STILL?

We recommend using the Still Spirits Alembic Condenser and Dome Top sold separately, for better results. This consists of a copper dome and alembic condenser that fit onto your existing T500 Boiler.

CAN I DISTIL TWO BATCHES IN A ROW?

The wash left inside the boiler after your first distillation is boiling hot. If you wish to run it again then carefully remove the very hot lid and add 5 L (1.3 US Gal) of cold water to the spent wash to cool quickly before emptying.

CAN I GET A HIGHER ABV BY DOUBLE DISTILLING?

Double distilling will achieve very little with the T500 as it will not increase the ABV much. If using the T500 distillation system, the distillate will be already approx 90-93% ABV, which is near the maximum ABV a home still can achieve. Double or triple distilling is used with pot stills to try to emulate the result of a T500. Note that the highest alcohol percentage possible is 95.6% ABV.

IS THERE ANY METHANOL PRODUCED?

The T500 Distillation System produces a highly pure spirit with 0.001% methanol on average, which is well below the maximum legal limits for methanol in spirits for commercial sale.

HOW HOT DOES THE BOILER GET?

The liquid inside the boiler will get as hot as its boiling point, ie 100°C (212°F) for water, 78.2°C (173°F) for ethanol. As the wash contains a mix of water and alcohol the temperature the wash boils at rises as the alcohol is driven off. You need to boil the wash to convert the alcohol to steam so you can extract the alcohol from the wash.

WHAT IS THE MINIMUM VOLUME REQUIRED IN THE 30 L (8 US GAL) BOILER?

10 L (2.6 US Gal) is the minimum volume possible. Although optimum performance is attained when the T500 Distillation System is full. For anything smaller, we recommend purchasing the 4.9 L (1.3 US Gal) boiler.

WHY DO I NEED TO USE CERAMIC BOIL ENHANCERS?

The reusable ceramic boil enhancers should be added in the boiler before distilling to avoid surge boiling. Stainless steel saddles do the same.

WHAT IS THE DISTILLING CONDITIONER?

Distilling conditioner is an anti foaming product, made of silicones and is suitable for human consumption. This reduces the chance of foaming in the boiler and promotes optimum distillation conditions. The wash can froth when boiling (this may be due to the presence of residual sugar not entirely fermented, or a wash not cleared). Froth can enter the column and disrupt the reflux action, reduce alcohol quality and disrupt temperature control. To help prevent foaming we recommend adding 3 capfuls of Still Spirits Distilling Conditioner to the 30 L (8 US Gal) boiler and 1 capful to the 4.9 L (1.3 US Gal) boiler.

WHY IS IT IMPORTANT TO CONTROL THE WATER OUTLET TEMPERATURE?

Controlling the water outlet temperature is the key user control of the T500 Distillation System process. The development work on the T500 showed an ideal water outlet range of 55-65°C (131-150°F). This can be reduced as low as 50°C (122°F), which will slow the alcohol production rate. The outlet temperature can be increased to as high as 65°C (150°F), which will make the alcohol flow faster, but at slightly lower strength and purity.

As a general rule, running the still between 60 and 65°C (140-150°F) will produce alcohol faster but at a slightly lower strength and quality, and running the still between 55 and 60°C (131-140°F) will provide you with optimum quality but it will take a bit longer.

The higher the flow rate, the cooler the condenser and the slower the distillate will flow.

The lower the flow rate, the hotter the condenser and the faster the distillate will flow.

CAN I DISTIL ESSENTIAL OILS IN THE T500?

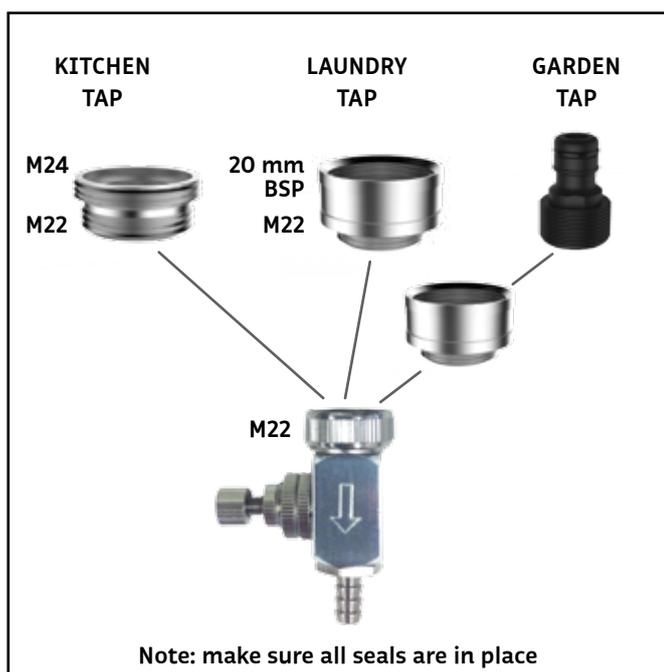
It is best to use the Alembic Condenser and Dome Top that can be attached to the top of your T500 Boiler if you wish to do this.

BIO FUEL

Bio fuel can be made using the same process as distilling spirits in the T500.

I CAN'T FIT THE WATER FLOW CONTROLLER TO MY TAP, WHAT CAN I DO?

The water flow controller provided in the T500 Distillation System comes with the thread adaptor M22 x M24 male. Remove the diffuser on your tap and fit the appropriate fitting. Your T500 also comes with a 20 mm BSP adaptor to fit your laundry or garden tap, along with a male hole connector.



HOW DO I KNOW WHEN THE DISTILLATION IS FINISHED?

You will also notice the distillate is slower coming out (one drop every 5 to 10 seconds), that means all the ethanol has been distilled and the boiler can be turned off.

WHAT IS THE T500 CONDENSER FILLED WITH?

The T500 Condenser column is packed with copper and stainless steel saddles.

Copper saddles play a catalyst role with your distillate by reacting with sulphur compounds and eliminating them from your distillate. Sulphur compounds are molecules produced by yeasts during fermentation. They are responsible for off flavours, such as 'rotten egg', 'cooked cabbage' or 'garlic'.

HOW OFTEN AND HOW SHOULD I CLEAN THE T500?

We recommend washing the saddles every 5 to 10 distillations, by rinsing the column with water. For a thorough clean (every 20 distillations or so), rinse your column with a citric acid mix, (2 tsp citric acid to 1 L (1 US qt) water) then flush with water 2 or 3 times to get rid of the acid. Alternatively, you can unpack your column and soak your saddles in citric acid mix before rinsing them and placing them back into the column again. Note that the copper saddles should be placed in the column first, followed by the ceramic or stainless steel saddles.

HOW MUCH DOES IT COST TO RUN THE STILL?

The still uses 2 KW/ hour (NZ/AU/UK), and 1.5 KW/ hour (US). You can multiply this by the power rate paid, by the time the T500 is operating (5 hours for a 20 L (5 US GAL) wash).

Add to this the cost of cooling water, based on the flow rate used and the cost of raw materials required to produce the wash. NZ/AU/UK uses on average 100 -125 L (26-33 US Gal) per distillation. USA uses on average 20 -25 L (5.3-6.6 US Gal) per distillation.

HOW CAN I RECYCLE MY COOLING WATER?

You can run your cooling water in closed circuit, provided you have sufficient amount of water and ice packs and a pump that provides enough flow. We suggest using a 200 L (53 US Gal) container (rubbish bin for example), filled with water, and add 6 x 2 L (2 US qt) bottles filled with water and frozen a few days ahead.

Your cooling water can also be kept in big containers and reused later for the garden.

THE 4.9 L (1.3 US GAL) BOILER SEEMS TO HAVE QUITE A BIT MORE SPACE ABOVE THE MAX LINE, CAN I DISTIL MORE THAN 4.9 L (1.3 US GAL) OF WASH AT ONE TIME?

If you are living in a country where it is legal to distil more than 5 L (1.3 US Gal) at a time, you can safely distil up to 8 L (2.1 US Gal) of wash at one time using the 4.9 L (1.3 US Gal) boiler.

GLOSSARY

ACTIVATED CARBON

Activated carbon is prepared in a manner which causes the carbon crystals to become porous and develop a very large surface area. One gram of activated carbon may have 500 -1500 m² (5382-16146 ft²) of internal surface area. This large surface area and the many internal pores in the carbon are able to adsorb many different chemical compounds including those which cause unwanted flavours in your spirit. The adsorption process is very complex and depends on concentrations, molecular weight etc.

It can be added directly in your wash, or used for filtering the distillate. In the case of alcoholic spirit the process works best if the alcohol concentration is 50% or less. This is why we recommend adjusting the alcohol level before purification. Activated carbon must be soaked or rinsed with clean water just before using to get rid of mineral salts and dust.

ALCOHOL (OR ETHANOL)

Most commonly used to describe ethanol, the type of alcohol in wine, beer, spirits and other alcoholic beverages. It is a chemical with the formula C₂H₅OH.

ALCOHOL PURITY

Alcohol purity describes the strength of the alcohol produced by distillation; it is measured in percentage of alcohol by volume, or % ABV. The T500 Distillation System delivers 90 to 93% ABV alcohol, when following the recipes and set up described in this booklet.

ALCOHOL YIELD

Alcohol yield describes the effectiveness of alcohol extraction from the wash. The higher the yield the less alcohol is left behind in the boiler. With care and attention to wash clearing and the distillation process, you can expect to recover 95% or more of the alcohol fermented in the wash.

The purity and yield of the alcohol will vary depending on factors such as;

- The type of sugar you ferment
- The choice of yeast used
- How well the wash is cleared
- What distillation system is used

ALCOHOLMETER & HYDROMETER

An alcoholmeter is one type of hydrometer.

Hydrometers are used to measure the relative density of a liquid. The lighter the liquid the further down the hydrometer floats.

The hydrometer is used to monitor wash fermentation, it tells how much sugar has been transformed into ethanol (ethanol is lighter than a sugar solution).

Alcoholmeters are used to measure the percentage of alcohol in your spirit. Alcohol is thinner than water so the higher in strength the alcohol is, the further down the hydrometer sinks. Additives such as flavouring and liquid glucose will distort the alcoholmeter readings.

Take good care of your hydrometer as it is very fragile. Hydrometers are usually calibrated at a temperature of 20°C (68°F).

Do not immerse your hydrometer in liquids warmer than 40°C (104°F) or it will melt the wax inside and damage your hydrometer irreversibly.

CONGENERS

The name given to all compounds in the distillate, other than water and ethanol.

DISTILLATE

The concentrated liquid that condenses from a distillation process.

DISTILLATION

Method of separating two or more substances by heating the mixture to a temperature that is higher than the boiling point of one component and lower than the boiling point of the other component.

The vapour of the lower boiling point component is captured and allowed to condense and is more concentrated compared to the original mixture.

FERMENTATION

Conversion of carbohydrates (sugars) into alcohol and carbon dioxide by yeast.

HEADS

The name given to the first portion of distillate collected. They are composed of congeners which have a distinctive smell ('fruity', 'nail polish').

METHANOL

An alcohol naturally produced during fermentation at very low level (0.0005%). Its chemical formula is CH₃OH. Effects of methanol ingestion at high levels (0.5% and over), may include confusion, nausea, vomiting, visual problems and abdominal pain which if left untreated can result in stupor, coma and in the most severe cases death.

Problems occur across a broad range of countries, most prominent with common illegal trade where methanol has been added or the alcohol has been produced from unsuitable carbohydrate raw material.

The T500 Distillation System produces a highly pure spirit with 0.001% methanol on average, which is well below the maximum legal limits for methanol into spirits. It is worth noting that ethanol is used to dislodge methanol in the case of methanol poisoning as human cells will dislodge methanol in preference to ethanol.

SPIRIT

An alcohol beverage containing at least 20% ABV and with no added sugar.

TAILS

The name given to the last portion of distillate collected when using a pot still. They are composed of congeners, responsible for burnt 'off' flavours. The T500 Distillation System doesn't produce tails.

WASH

Fermented liquid containing alcohol which has been produced by yeast fermenting sugars.

YEASTS

Yeasts are microorganisms that convert sugar to produce alcohol and CO₂ along with hundreds of trace by-products.

LEGAL ALCOHOL DISTILLATION

In New Zealand it is legal to distil your own spirits and liqueurs for personal consumption. However please note that in certain countries alcohol distillation may be illegal and you may require a licence. Ask for advice or contact your local Customs & Excise Department.

In Australia it is illegal to use this unit to produce alcohol for consumption without a licence from the Australian Taxation Office.

In the USA and Canada it is illegal to use this unit to produce alcohol for consumption without a licence from the relevant authorities.

In the UK it is illegal to manufacture spirits without a distiller's licence which is required under the provisions.

ALCOHOL FOR BIO FUEL

Bio fuel can be made using the same process as distilling spirits in the T500. On 30 June 2007 the UK Government made it legal for people to produce up to 2500 L annually without the need to pay duty or to hold a permit. Always check with car manufacturers as to the level you can add. The USA authorities have recently allowed distillation for fuel alcohol and you can get a permit from the Federal Government.



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