STILL SPIRITS

T500

REFLUX DISTILLATION SYSTEM

COMMERCIAL GRADE RESULTS

INSTRUCTION MANUAL

The T500 Reflux 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 Reflux Distillation System 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 (13.2 LB) SUGAR AND 1 SACHET TURBO YEAST.

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

T500

REFLUX DISTILLATION SYSTEM

CONTENTS

INTRODUCTION

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

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

To obtain the best performance from the T500 Reflux 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 INSTRUCTIONS

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 Reflux Distillation System in a room with adequate ventilation.
- Do not use outdoors, as drafts affect distillation efficiency.
- Never leave the T500 Reflux Distillation System unattended when operating.
- Keep the T500 Reflux Distillation System away from all sources of ignition, including smoking, sparks, heat and open flames.
- Ensure all other equipment near the T500 Reflux Distillation System or the alcohol is earthed.
- Do not operate the T500 boiler with an extension cord.
- A fire extinguishing device 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 unit is boiled dry, the **T500 Boiler with dual element** control switches (two switches) has an automatic reset switch under the base of the boiler which will reset once the boiler has cooled down. The **T500 Boiler with a single element** switch has a cut-out button under the base of the unit - when it is safe to do so, press the reset button to reset the thermostat. In the very unlikely event this cutout fails on either boiler, a fusible link gives 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 require professional attention.
- Do not distil any liquid above 40% ABV as this could cause a vacuum and other potential safety issues.
- Do not submerge the distillate out tube as this could cause a vacuum, which may result in the boiler imploding.

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 of accordingly.
- Mop area with excess water.

NOTE: Not following the safety information above could result in serious injuries and may void your warranty.

POWER CONTROL:

T500 BOILER WITH DUAL POWER SWITCHES:

- This boiler model has adjustable power switches.
- When both switches are in the ON position the element will be supplied full power of 2200W (1600W if using a US/CA unit).
- When one switch is set to the OFF position it will only consume 1100W (or 1100W/500W if using a US/CA unit) of power.
- Adjusting the power can be useful in areas with warmer tap water for cooling and also for use with the Still Spirits Alembic Pot Still.

T500 BOILER WITH A SINGLE POWER SWITCH:

- This boiler model has a single power switch.
- When the switch is in the ON position the element will be supplied full power of 2000W (1600W if using US/CA unit).

STEP 1

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 Reflux Distillation System for best results from your still. Regardless of the size of your boiler, we recommend always making up to 20-25 L (5-6 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 Sanitiser (or an alternative cleaning and sanitising product).
- Mixing spoon.
- Wash ingredients (water, sugar, carbon, yeast, clearing agent).
- Hydrometer.

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

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

2 [ADD INGREDIENTS] (DAY 1)

- Once fermenter and equipment are sanitised, shake off excess moisture, but do not rinse.
- Put sanitised spoon on top of the sanitised lid (lid inner facing upwards to keep sanitised).
- 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.
- It is recommended to take a specific gravity reading here and record it, this will allow you to be certain fermentation has taken place and can aid in troubleshooting later if required.

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 the recommendation on the yeast sachet, for about 1 week or until the wash has stopped fizzing.

Note: The fermentation process produces various aromas which may be unpleasant sometimes. It will dissipate and won't affect the quality of your alcohol.

4 [CHECK THE SPECIFIC GRAVITY (SG)] (APPROX. DAY 6&7)

- 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] (APPROX. DAY 7)

- 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.
- After 1 hour, slowly pour Part B evenly over the top of the wash while stirring gently to help spread it evenly. Do not stir vigorously as this will disrupt the clearing process.
- Leave for 24 hours minimum to allow the sediment to settle at the bottom of the fermenter, leaving it for a few extra days will allow it to clear better.
- Once cleared, your wash is ready to be distilled, using the T500 Reflux Distillation System.

6 [STORING YOUR WASH]

- 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 dead yeast cells. It is likely to be fine for up to 8 weeks if kept sealed and cool.

STEP 2

PREPARE THE T500 REFLUX DISTILLATION SYSTEM

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

It is best to set up the T500 Reflux Distillation System in a place where it can stay for 5 hours (6-7 hours for US/CA units), the approx. time for one distillation using the 30 L (8 US Gal) boiler (less if using a smaller boiler).

The T500 Reflux 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 Reflux Condenser box comes with the following components:

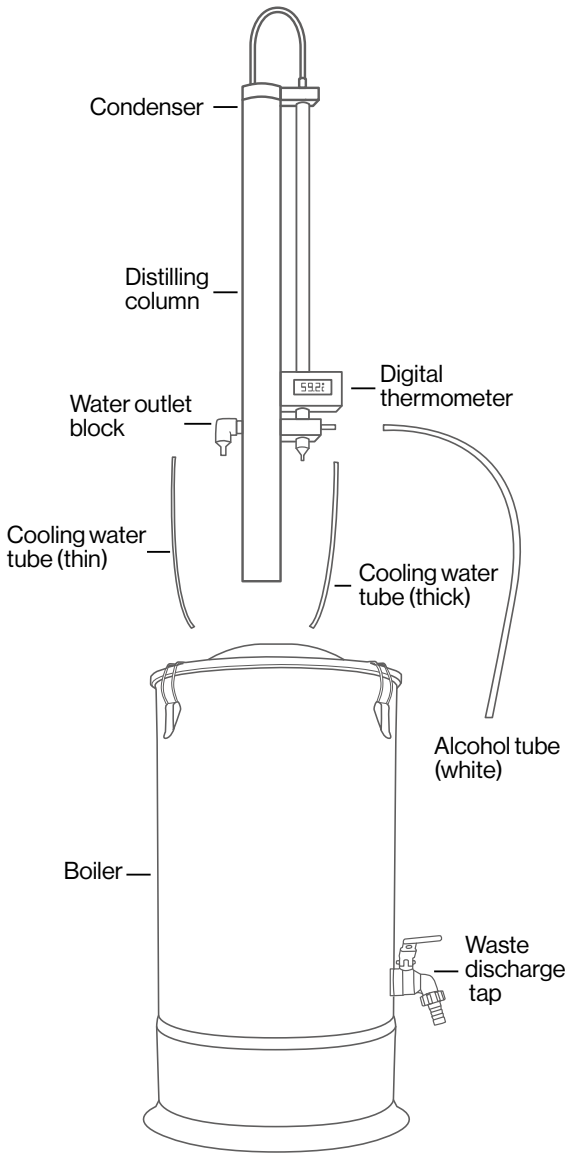
- Stainless steel distilling column prepacked with copper and stainless steel saddles.
- Digital thermometer with LR44 battery and mounting bracket.
- Water flow controller (and adaptors) - refer to p.14 for more details on tap connector.
- Cooling water tubes (1 thin, 1 thick).
- Alcohol (distillate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

2 [ADD CERAMIC BOIL ENHANCERS AND DISTILLING CONDITIONER]

- Add all of the ceramic boil enhancers into the T500 Boiler and the wash.
- Optional: Add 3 capfuls of distilling conditioner (sold separately) to the cleared wash in the T500 30 L (8 US Gal) Boiler if you suspect excessive foaming.
- 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 REFLUX CONDENSER]

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

- Connect the long, thick, clear tube to the water outlet block 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 distillate outlet D. The distilled alcohol will flow from here to your collecting jug. Ensure the tube will not be submerged in distillate, otherwise the boiler may implode. You should see the drops of distillate falling into your collecting vessel.

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 Reflux Condenser onto the T500 Boiler.

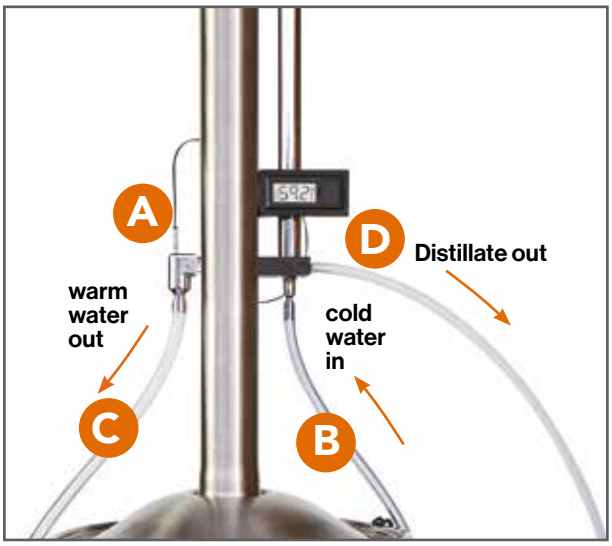
- Check the T500 Reflux Condenser is full of saddles inside. If the column is empty, you will need to add copper saddles first, followed by the stainless steel saddles packed in the column, then follow the next step.

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

- Holding the condenser upside 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 Reflux Condenser is standing straight, or it will not operate properly during distillation.

YOU ARE NOW READY FOR DISTILLATION



A Water outlet temperature sensor
B Cooling water inlet
C Water outlet
D Distillate outlet
E Top loop connections

STEP 3

DISTIL THE WASH

Distilling takes about 5 hours (6-7 hours for US/CA units) from start to finish. Please ensure you can give your full attention to operating the T500 Reflux Distillation System for this time period. The T500 Reflux Distillation System becomes very hot during operation, therefore 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 Reflux Distillation System, you will need to have:

- 5 L (1.3 US Gal) jug or vessel to collect alcohol.
- Cooling water supply and sink.
- Water flow controller provided with your condenser.
- Measuring vessel to collect and discard the first 50 -100 ml (1.7-3.4 US fl oz).

1. [CONNECT THE CONDENSER TO WATER SUPPLY]

- If you have a Still Spirits Water Flow Regulator, connect this now. This allows for optimum control of your water flow and prevents any issues with changes in pressure from your 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 distillate 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. This is because it can cause a vapour lock and the distillate can't escape the unit, causing pressure to build up.**
- Note that the water supply will not be required for the first part of the boil.

2. [START THE BOIL]

- Connect the T500 Boiler to the power supply and turn the boiler on. If using the T500 Boiler with dual element control switches, ensure both power switches are set to on for maximum power.
- A 23 L (6 US Gal) wash will take just over 1 hour to heat to boiling temperature.

3. [ADJUST THE WATER FLOW]

- About 35 minutes (70 mins for US/CA units) after the 30 L (8 US Gal) T500 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 flow rate between 400 and 700ml per minute or if using US or CA units use 13.5 US fl oz/min. 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.

US users – NOTE : If you are in the US/CA, 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.

Note: If using the T500 Boiler with dual element control switches - While there is usually no need to adjust the power settings for use with the T500 Reflux Condenser, in some environments with very warm tap water, it could assist to switch the unit to 1100w mode to reduce the chances of steam and provide better cooling.

4. [COLLECT YOUR SPIRIT]

- Once the wash starts boiling, the spirit will come out of the white tube into your collecting jug.
- Collect and discard the first 50 -100 ml (1.7-3.4 US fl oz) of distillate.

WARNING: Make sure the white tube is never submerged into the distillate, otherwise the boiler may implode. You should see the drops of distillate falling into your collecting vessel.

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 a strong and unpleasant smell, often described as 'hospital smell' or 'nail polish'. They should not be consumed.

5. [FINISH THE DISTILLATION]

Approx. 5 hours (6-7 hours for US/CA units) after the boiler has been turned on, you should have collected approx. 3.4 - 4.5 L (0.9 - 1.2 US Gal) of 90-93% ABV spirit depending on the yeast you used in your wash. For further information, refer to your yeast packet or the Turbo Yeast table on our website. You will also notice the distillate is slower to come out (1 drop every 5 to 10 seconds), that means all the alcohol has been distilled and the boiler can be turned off.

- Ensure the distillate out tube (white tube) is not submerged in distillate.
- 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 Reflux 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.

STEP 4

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.14 for more information about activated carbon.

You will need:

- Alcometer (we recommend using the Still Spirits 0-100% ABV alcometer).

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 alcometer), or a measuring cylinder.
- Clean and drinkable water.
- Carbon filtration system (we recommend using the Still Spirits Filter Pro or EZ Filter for quick & easy filtration).

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

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

- Pour some of your distillate in the trial jar (approx. 200 ml (7 US fl oz)).
- Float the alcometer 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 alcometer after filtering and adjust ABV by adding more water according to your needs.

STEP 5/DAY 8

FLAVOURING 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 flavourings you can use. Refer to the individual instructions on each flavouring for specific directions of use.

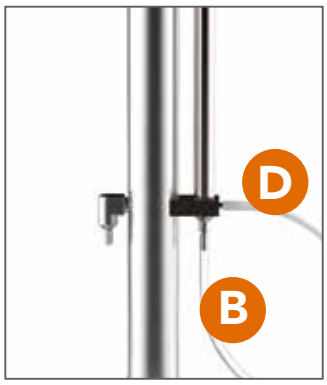
Another way to flavour your spirit is to perform a botanical distillation run using a botanical basket. Refer to page 9 for more information on how to do this.

serving suggestion

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 (10-12 hours for US/CA units) from start to finish (excluding heating time) and will produce approximately 18 L (4.8 US Gal) 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)), 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 a filtration system to ensure any unwanted flavours and aromas from previous washes are removed. Refer to your filter manual for filtering instructions.

Note: Ensure the distillate out tube is not submerged in water, otherwise the boiler may implode. You should see the drops of water falling into your collecting vessel.

BOTANICAL BASKET DISTILLATION

1. Add the filtered alcohol into the boiler and top up with water to at least 10 L minimum, ensuring the liquid is 40% ABV or lower.
2. Remove all saddles from the column. Assemble the T500 unit as per water distilling instructions by having the cooling water directly through the condenser, by-passing the reflux coil and water outlet block.
3. Attach only the threaded section of the basket to the condenser column and underside of the lid in place of the stainless steel plug.
4. Fill the bottom piece of the botanical basket with your desired botanicals. Orientate the pieces you have just assembled so they are the correct way up and screw in the basket from the bottom.
5. Turn on the unit. It could take an hour to heat to the boil, depending on volume, so keep an eye on it and approximately 30 minutes after switching the heat on, turn on the cooling water. Adjust the cooling water to a rate of 2.5 L (2.5 US qt) per min or so that the distillate doesn't become steaming, but rather flowing in a liquid form. Make sure the white tube is never submerged in distillate, otherwise the boiler may implode. You should see the drops of distillate falling into your collecting vessel.
6. Collect all the spirit into a 5 L (1.5 US Gal) demijohn. Stop collecting when the spirit reaches 20% ABV.
7. Water down to 40% ABV and leave to settle before consumption.

Note: Ensure the distillate out tube will not be submerged, otherwise the boiler may implode. You should see the drops of distilled water falling into your collecting vessel.

WARNING: Make sure botanicals do not fall into condenser column as this may cause a blockage. If this does occur please contact customer service before trying to extract the blockage.

POT DISTILLING

If using the T500 Boiler with Adjustable Power Control switches with the Alembic Dome and Condenser or other pot still attachments, you can reduce the boil power once you get close to the boil by switching the boiler from 2200W for (or 1600W for US/CA units) down to 1100W (or 1100/500W for US/CA units).
This enables a gentler boil ideal for pot distilling flavoursome spirits.

For more information refer to the instructions for the Alembic Dome and Condenser on our website.

TROUBLESHOOTING GUIDE

WHAT IS THE PROBLEM?	WHY IS IT HAPPENING?	HOW TO FIX IT?
Alcohol distillate flows irregularly.	• Wash is surge boiling caused by hot spot on base of integrated boiler. • Distillate outlet pipe is higher than outlet creating an airlock or is submerged in distillate causing alternating pressure and vacuum.	• 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.	• 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.	• Ensure the cooling water outlet temperature is between 50-65°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.	• 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.	• 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. • Add 3 capfuls of Still Spirits Distilling Conditioner 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'.	• Distillate coming out of the T500 is at approx 93% ABV and has a strong ethanol smell. • The first 50 -100 ml (1.7-3.4 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.	• 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.	• 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.	• 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.	• 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.	• Check the fermentation is finished (refer to FAQs about fermentation). • Check lid gasket is sitting evenly inside lid before clipping onto the base.

TROUBLESHOOTING GUIDE

WHAT IS THE PROBLEM?	WHY IS IT HAPPENING?	HOW TO FIX IT?
Spirit purity is low.	• The column temperature has been too hot. This can cause the spirit to flow at a higher but less concentrated rate.	• Check that the water out temperature is no more than 65°C (149°F).
The boiler has stopped heating.	• This is likely due to an electrical fault or the boiler overheating. The boiler has an automatic thermostat cut-out switch which will automatically engage when overheated. The boiler has a protective fuse in case the thermostat cut out doesn't operate.	• **T500 Boiler with Dual Power Switches:** Unplug the boiler and let it cool down (the boiler can be restarted once cooled down). The unit will reset automatically once the boiler has cooled down, however, if it still doesn't heat up, it will need to be checked by an electrician. • **T500 Boiler with Single Power Switch:** Press the reset button under the base of the boiler to reset the thermostat. If the boiler still doesn't heat up, it will need to be checked by an electrician.
My spirit is turning cloudy when I add a spirit flavouring or when I add water.	• 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.	• Use a carbon filter system (such as the Still Spirits Filter Pro or EZ Filter systems) for polishing your final spirit. 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.	• 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 the column.	• 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.	• 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.	• 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.	• Potential sealing issue, or pressure blockage in column.	• 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.	• The still is vented at the top, so it will leak water when you are cleaning it.	• 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 promptly 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 will 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.

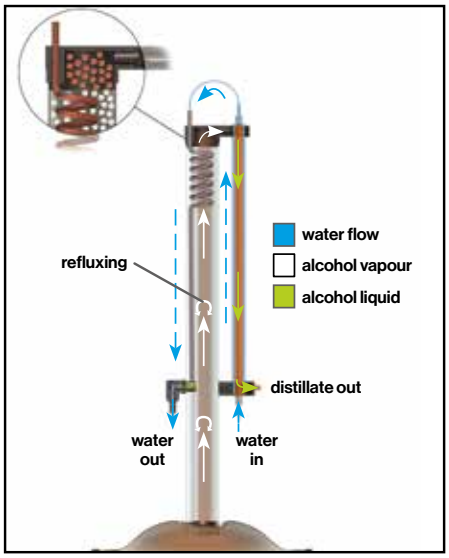
3. Look for the haze in the wash: at the beginning of fermentation, the wash will be very murky and hazy, towards the end, it will start to become more 'transparent'.

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 DOES DISTILLATION IN THE T500 REFLUX 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, which accelerate the refluxing action.

The T500 Reflux Condenser 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 3.2-3.6 L (0.8-1.0 US Gal) of 93% ABV alcohol, that's the equivalent of 7-8 L (1.8-2 US Gal) of 40% ABV spirit.

WHAT'S IN THE DISTILLATE?

The distillate obtained with the T500 Reflux Distillation System is usually composed of 93% alcohol 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 -100 ml (1.7-3.4 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.

CAN THE T500 REFLUX CONDENSER 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 Reflux Still as it will not increase the ABV much. If using the T500 Reflux 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 reflux still.

Note that the highest alcohol percentage possible is 95.6% ABV.

IS THERE ANY METHANOL PRODUCED?

The T500 Reflux 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 alcohol. 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 Reflux Distillation System is full.

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 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.

WHY IS IT IMPORTANT TO CONTROL THE WATER OUTLET TEMPERATURE?

Controlling the water outlet temperature is the key user control of the T500 Reflux Distillation System process. The development work on the T500 Reflux Condenser 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 60-65°C (140-150°F) will produce alcohol faster but at a slightly lower strength and quality, while running the still between 55-60°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.

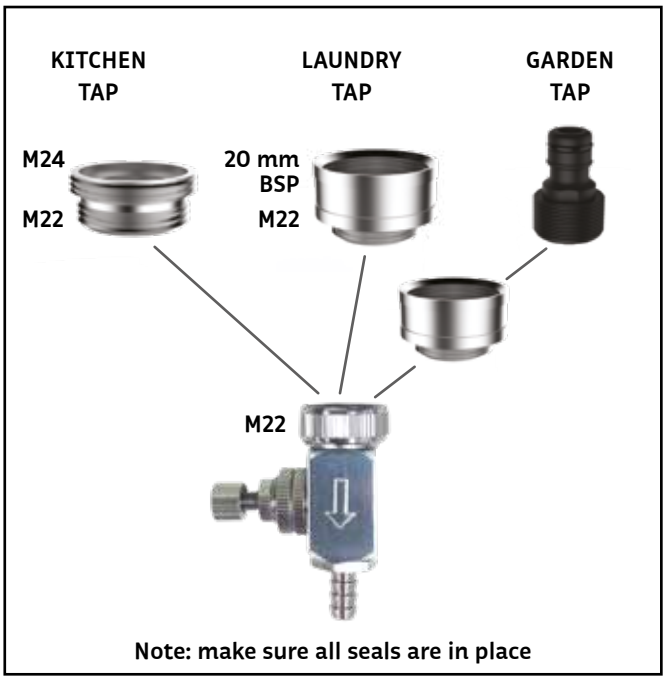
The lower the flow rate, the hotter the condenser and the faster the distillate will flow.

BIO FUEL

Bio fuel can be made using the same process as distilling spirits with the T500 Reflux Distillation System.

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

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



Note: make sure all seals are in place

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 alcohol has been distilled and the boiler can be turned off.

WHAT IS THE T500 REFLUX CONDENSER FILLED WITH?

The T500 Reflux 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 REFLUX CONDENSER?

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 1.6 KW/hour (US). You can multiply this by the power rate paid, by the time the T500 is operating (5-8 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.

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 500–1,500 m2 (5,382-16,146 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% ABV 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 C_2H_5OH.

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 Reflux 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

ALCOMETER & HYDROMETER

An Alcometer 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 alcohol (alcohol is lighter than a sugar solution).

Alcometers 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 alcometer 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 alcohol.

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.

FORESHOTS

The more harmful components of the heads and is typically the first 50 -100 mL of distillate from a standard wash.

HEADS

The name given to the first portion of distillate collected. They are composed of the lower boiling point congeners which have a distinctive ‘fruity’ or ‘nail polish’ smell.

HEARTS

The middle portion of the distillate run, and typically the most neutral (for reflux stills) and cleanest part of the run.

TAILS

The name given to the last portion of distillate collected. They are composed of congeners, responsible for burnt ‘off’ flavours. on page 15

METHANOL

An alcohol naturally produced during fermentation at very low level (0.0005%). Its chemical formula is CH_3OH.

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 Reflux 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.

WASH

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

YEASTS

Yeasts are microorganisms that convert sugar to produce alcohol and CO_2 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 US 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 with the T500 Reflux Distillation System. On 30 June 2007 the UK Government made it legal for people to produce up to 2,500 L (660 US Gal) 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 US authorities have recently allowed distillation for fuel alcohol and you can get a permit from the Federal Government.

WARRANTY

The T500 is warranted against faults in material or workmanship under normal use and maintenance during the warranty period (36 months) from the date of purchase. To make a warranty claim, please contact the store where the product was purchased in the first instance. Proof of purchase will be required before you can make a claim under this warranty. This warranty does not cover the following situations (which is not exhaustive).

- Accident.
- Misuse or abuse, including failure to properly maintain or service.
- Normal wear and tear.
- Power surges, electrical storm damage or incorrect power supply.
- Incomplete or improper installation.
- Incorrect, improper or inappropriate operation and cleaning.
- Insect or vermin infestation.
- Exposure to excessive water or outside weather conditions.
- Modifications not undertaken or commissioned by a Bevie approved third party.
- Any other operation outside the uses stated in the instruction manual.

STILL SPIRITS

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