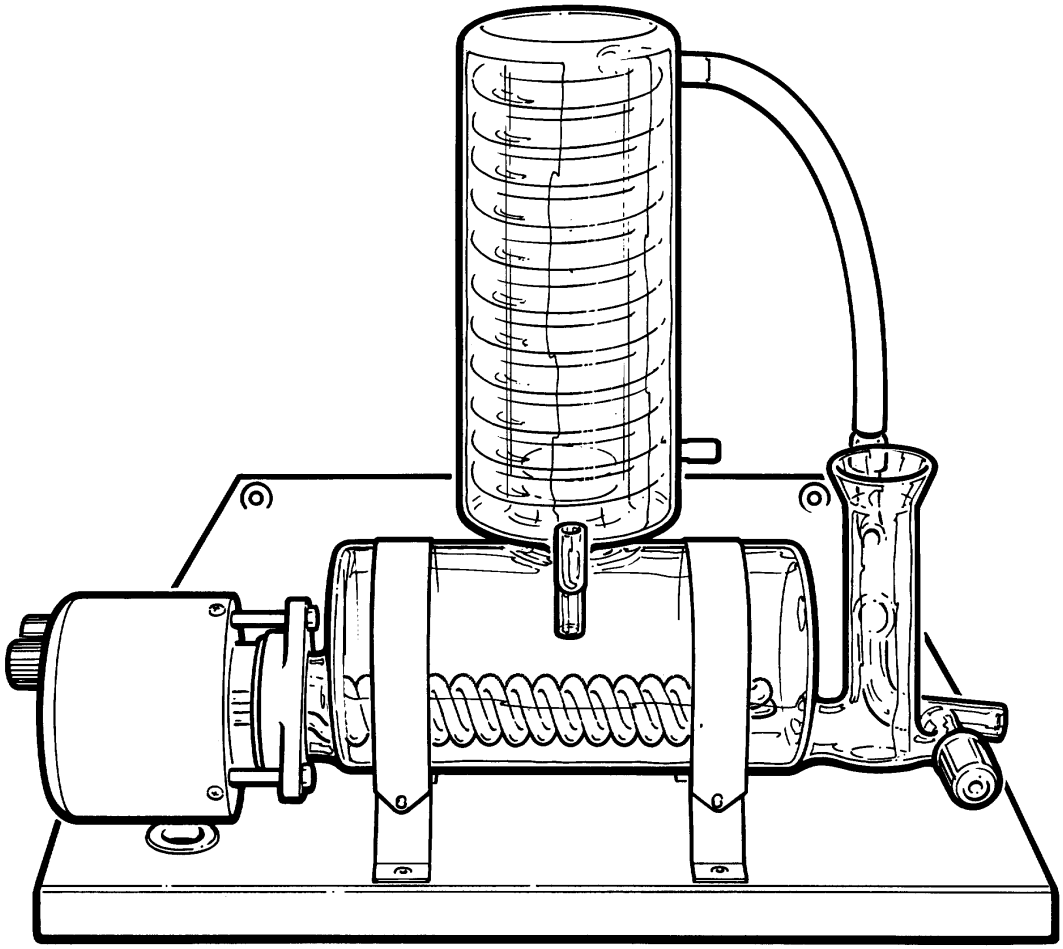
Cole-Parmer®

WS-100 Series
Water Stills



Instruction Manual

700492-CPB ISSUE 1.2

Cole-Parmer®
essentials

Cole-Parmer Water Still
WS-100-4 & WS-100-4-220

English

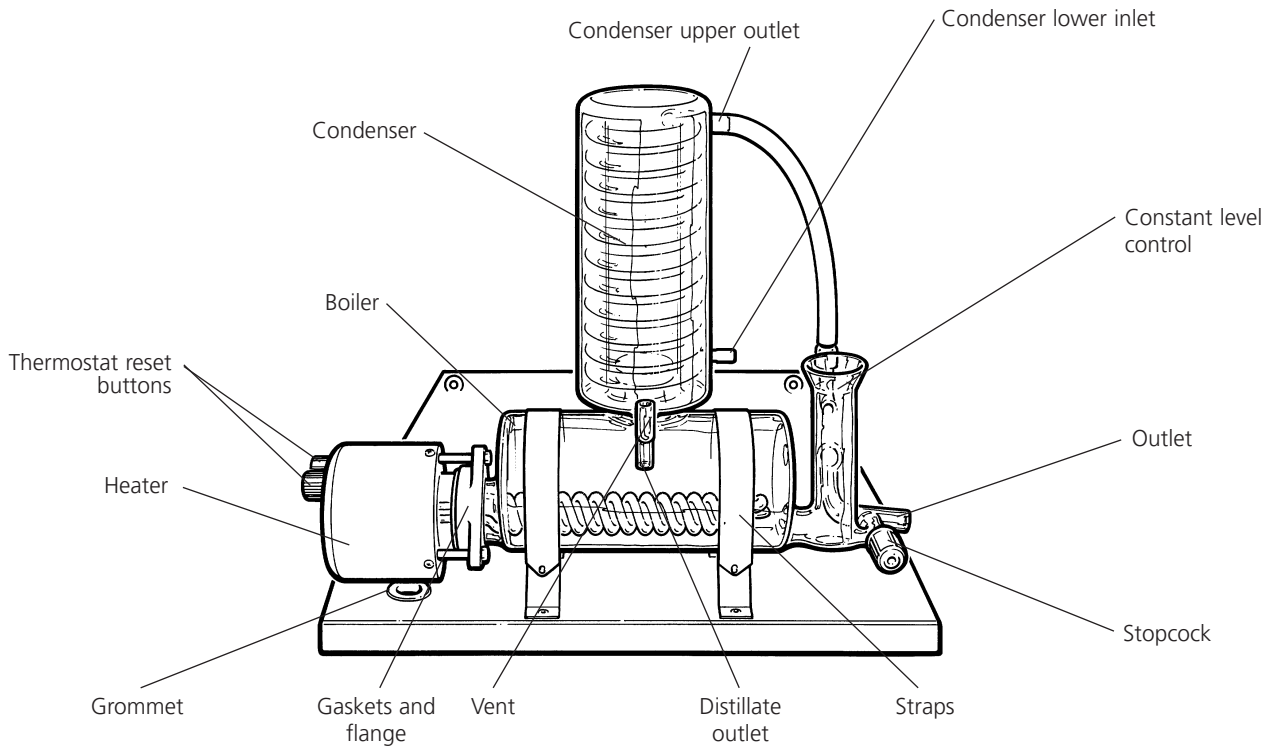


Figure 1 General assembly

Before use

If the equipment is not used in the manner described in this manual the protection provided by the equipment may be impaired.

Note: The Water still is classified as "Permanently Connected Equipment" and should be connected to the electricity supply by a qualified electrician in the manner described in the electrical installation section of this manual.

The Cole-Parmer Water Still is designed to operate under the following conditions:

- For indoor use only
- Ambient temperature range +5°C to +40°C
- Altitude up to 2000m
- Relative humidity not exceeding 80%
- Mains supply voltage fluctuations not greater than ±10% of nominal
- Overvoltage category II IEC60364-4-443
- Pollution degree 2 IEC664

Location

The Cole-Parmer Water Still can be wall or bench mounted. Select a convenient location which has access to the following services:–

Electricity Supply
Before connection please ensure that the line supply is suitable. The Cole-Parmer Water Still WS-100-4 is suitable for supplies rated at
3kW, 220-240V, 50/60Hz~ single phase.
WS-100-4-220 is suitable for supplies rated at 3kW, 200-240V, 50/60Hz~ single phase. Supplies should be fitted with a 30mA RCD circuit breaker.

Water Supply
A cold water supply capable of providing a minimum flow rate of 60 l/hr. Ensure all water supplies are earth bonded.

Drain
A waste water drain located below the level of the still so that the drain pipe can fall away straight without kinks or bends, to allow an unimpeded flow. Ensure all drainage systems are earth bonded.

Reservoir
A distillate collection reservoir should be located beneath the still.

Assembly

Your Cole-Parmer WS-100-4 has been designed with ease of assembly specifically in mind, but before commencing assembly please study the illustrations and text to familiarise yourself with the general lay¬out. During assembly, follow the sequence of instructions and do not connect the mains electricity supply until directed.

1. Unpack the water still and identify the following components:–

Qty.	Component	Catalogue No.
1	Support stand with 2 boiler straps	W4000/S
1	Boiler	W4000/B
1	Condenser	WC48/M2
1	Heater	A6/6 (240V)
	or	A6/6/EURO (220V)
1	Gasket Kit	W4000/GK
1	Hose Kit	W4000/HK

2. Take the metal stand and place in the desired location. Note that 2 screw holes are provided for wall fitting.

If wall mounting you must ensure you use appropriate wall fixings that can hold a minimum weight of 28KG. If you are in any doubt seek professional advice.

3. Take the boiler W4000/B, the heater and gasket kit W4000/GK. Assemble the heater into the boiler as shown in Figure 2.

   i) Insert the 3 bolts provided into the holes in the metal flange and place the metal flange over the tapered glass tube of the boiler – ensuring that the flat side of the flange faces the boiler.

   ii) Take the plastic insert and place this round the glass tube and into the metal flange. Pull the flange and insert towards the end of the glass tube so that they press onto the glass.

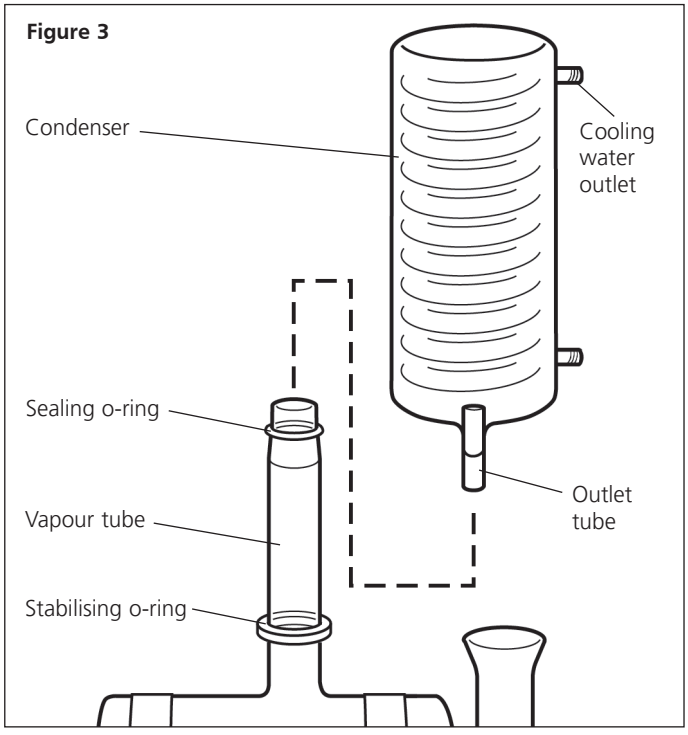
   iii) Place the rubber gasket over the heater coils and then insert the heating element through the tapered glass tube and into the boiler.

   iv) Now secure the heater using the 3 bolts. Do not over tighten.

4. Feed the electric cable of the heater through the hole in the base of the support stand. Place the boiler and heater assembly in the 'cradle' of the stand. Ensure the stopcock on the boiler is facing to the front. Secure with the 2 straps provided.

5. Ensure that the sealing o-ring and stabilising o-ring are correctly positioned, as shown in Figure 3. Fit the condenser WC48/M2 by mounting it onto the vapour tube of the boiler. Ensure the

Figure 3



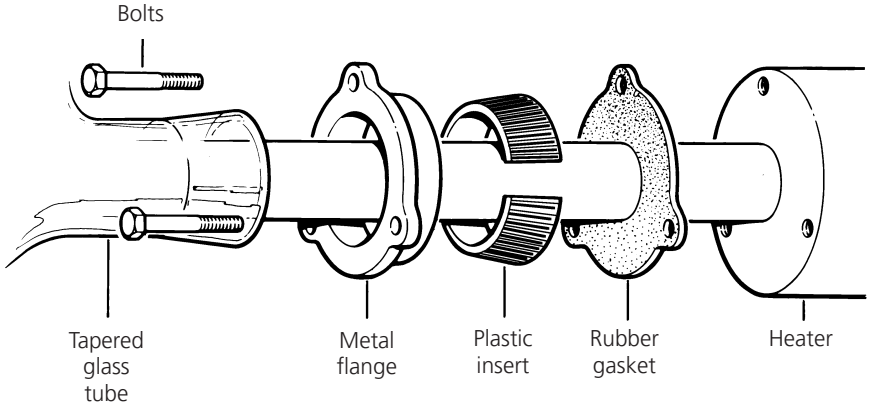


Figure 2 Flange assembly

distillate outlet tube of the condenser faces the front and the cooling outlet faces parallel to the unit.

6. From the hose kit take the 225mm length of 8mm bore plastics hose fitted with screwthread connectors at either end. Referring to Figure 1, screw one end of the hose to the upper outlet of the condenser and the other end to the glass thread on the constant level control. If the Still has been correctly assembled the hose should comfortably reach, without any strain.

7. Take the 1000mm length of 16mm bore plastic hose and carefully connect to the outlet of the constant level control. For easy connection first warm the hose with hot water.
   Secure with a tie strap.

8. Lead the free end of the tubing to drain, ensuring it falls away from the still with no kinks or bends to impede water flow.

9. Ensure the stopcock on the constant level control is closed.

10. Connect the lower inlet of the condenser to the cold water feed supply. A plastic screwthread connector is provided for easy attachment to the condenser.

    Select good quality tubing and ensure all connections are secured with hose clips.

11. Connect the distillate outlet on the condenser to a suitable collection reservoir.

12. Turn on the water supply and test for leaks then turn off the water supply.

Electrical installation

THIS EQUIPMENT MUST BE EARTHED!

The electrical installation should only be carried out by a qualified electrician.

The equipment is supplied with 1.7m of flexible triple core circular cable to CMA 3183 TQ specification. The conductors are 1.5mm² to BS 6360 Class 5 insulated with E.P.R. The outer sheath is 85°C heat resisting type C.S.P. to HOFR, BS 6500 Table 9.

Connection to the mains electrical supply, should be via a double pole 30mA RCD isolation circuit breaker with a continuous current carrying capacity of 15A at 250v and overcurrent protection of 15A, 250V .

These devices should be sited near to the equipment and clearly marked – "Disconnect device for Cole-Parmer Water Still"

Connect to the line supply noting that the wires in the instrument lead are coloured in accordance with the following code:–

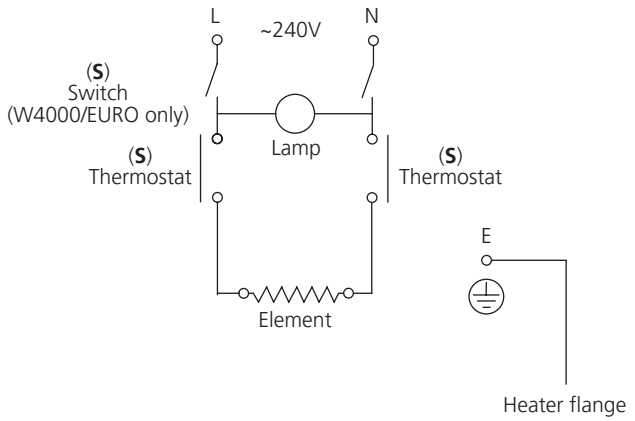
Brown	– Live
Blue	– Neutral
Yellow/Green	– Earth

Mains Cable Replacement
If the mains cable requires replacement, only specially prepared spare mains lead obtained from Antylia Scientific should be used.

Hot warning

Some parts of the product may become hot during use. These are clearly marked with 'Hot Warning Labels. Avoid touching these parts.

Circuit diagram



(**S**) Denotes safety critical component.

Operation

1. Turn on the cold water supply and adjust the flowrate to approx. 60 l/h.

   Note: It is strongly recommended to measure the flow rate, failure to do so can result in possible injury from hot water exiting from the Still. If a flow meter isn't available a simple measurement can be performed with a 1L beaker. Over a timed period of five minutes the beaker should be completely filled five times.

   Observe that the water flows via the condenser and into the boiler. Wait until the boiler has attained its correct operating level and make sure that the excess water is flowing freely to drain.

2. Switch on the electricity supply to the heating element at the mains isolation switch.

   For the WS-100-4-220 version, switch on the switch situated on the heater.

3. After a few minutes the water will start to boil and distillate will emerge from the condenser. With new glassware, or after cleaning, it is advisable to allow this to run to drain for approximately 30 minutes before beginning collection.

4. To turn off the still, first turn off the heating element but allow the cooling water to continue for a further 10 minutes to allow the still to cool.

WARNING!
Do not use this equipment to distil any liquid other than water.

Safety cut-outs

The Cole-Parmer Water Still is protected by two safety cut-outs:

Boiler heater thermostats
Should the boiler water level fall and expose the element the thermostats will operate and turn off the electricity supply to the element.

After operation of either of the thermostats, normal operation may be resumed by resetting the thermostats by means of their respective reset buttons mounted on the end of the heater end cover.

Remove the black plastic cover and then press the button – a slight click will be heard if the thermostat had operated.

Before resetting either thermostat the still should be allowed to cool completely and the cause of cut-out operation identified and rectified.

If the thermostats continue to operate consult a qualified electrician or the Service Department of Antylia Scientific.

Care and maintenance

Note: Before commencing any maintenance, cleaning or fault finding the equipment should be isolated from the mains electricity supply. These operations should be only carried out by suitably qualified personnel.

Only spare parts supplied or approved by Antylia Scientific, or its agent should be used. Fitting of non-approved parts may affect the performance or safety of the equipment.

Maintenance

Due to the nature of these parts it is necessary to periodically check the quality of the plastic connectors and hoses. There should be no strain on the connectors or hoses. Both the hoses and connectors should be intact without any cracking. If any damage is discovered on these parts the Still should immediately be turned off, as detailed under the "Operation" section of this manual, and not used again before these parts are replaced. Please refer to the "List of spare parts" section of this manual for order codes.

Cleaning

Over a period of operation scale deposits will build up inside the boiler. To obtain optimum performance from the still, the scale should be removed on a regular basis.

The time span between cleaning depends greatly on the hardness of the water supply and the amount of use. Frequently used stills in hard water areas may need descaling once a week whereas in a soft water area several weeks may elapse before descaling is necessary.

Note: Heavy scaling will reduce distilled water quality and can shorten the life of the heating element.

It is possible to descale the Cole-Parmer Water Still without dismantling the glassware by following these instructions in conjunction with Control of Substances Hazardous to Health regulations (COSHH) 1988.

1. Switch off the electricity supply to the still and allow it to cool completely.

2. Turn off the cooling water supply.

3. Open the stopcock on the constant level control and allow the boiler to drain completely, Close stopcock.

4. Turn on the cooling water supply and allow the boiler to fill to approximately half way to its normal operating level. Turn off the water supply.

5. Into the open funnel of the constant level control carefully add about 1 litre of 10% formic acid solution or kettle descaler. Do not use strong acids such as hydrochloric, this can cause severe corrosion of the metal heating element.

   WARNING!
   ALWAYS HANDLE ACIDS WITH GREAT CARE. PROTECTIVE CLOTHING, GLOVES AND FACE-MASKS SHOULD BE WORN DURING THE DESCALING OPERATION.
   REMOVE ANY ACID SPILLS IMMEDIATELY.

   Turn on the water supply and fill the boiler to the normal operating level. The water will flush the acid into the boiler. The water supply should be turned off when the level in the boiler is slightly below the overflow.

6. Leave the acid in the boiler to desolve the scale. This may take some time depending on the severity of the build-up.

7. Open the stopcock and allow the boiler to drain.

   Note: If the acid in the boiler has not been completely neutralised the liquid flowing to drain may be highly acidic. All necessary safety precautions should be observed around the drain and any effluent control procedures followed.

8. Close the stopcock, turn on the water and allow the boiler to fill with cold water. Turn off the water, re-open the stopcock and allow the boiler to drain. Repeat this procedure three times.

9. The Cole-Parmer Water Still may now be restarted by referring to the instructions given under "Operation" in this manual.
   Note: The stand and outer surfaces of the glassware should be cleaned using a damp cloth and a mild detergent solution.

List of spare parts

The following components are available from most laboratory suppliers. In case of difficulty, please contact Antylia Scientific.

	Cat. No.
Boiler	W4000/B
Condenser	WC48/M2
Heater (complete with thermostats) 240V	A6/6
(complete with thermostats) 220V	A6/6/EURO
Set of heater fixings (flange, gasket, insert and bolts)	W4000/GK
Hose kit	W4000/HK

Fault finding

In the event of operating difficulties with your Cole-Parmer Still, please consult the following notes. If these fail to identify and remedy the fault, then you are advised to seek the help of your supplier or the Service Department of Antylia Scientific.

Note – Fault finding should only be carried out by suitably qualified people.

Symptom	Cause	Remedy
1. Water level in boiler is too LOW. e.g. – heater exposed.	a) Supply of feed/cooling water is insufficient. b) Stopcock on boiler inadvertently left open.	a) Increase flowrate of water to approx. 60 litres/hour. b) Close stopcock.
2. Water level in boiler is too HIGH. e.g. – boiling water surging into condenser.	a) Supply of feed/cooling water is excessive. b) Flow of drainage water is constricted.	a) Reduce flowrate of water to approx. 60 litres/hour. b) Ensure drainage tubing falls freely.
3. Water in boiler is "pumped" out of boiler to drain.	a) Tubing from condenser distillate outlet to reservoir is constricted. b) Vent on condenser distillate outlet is blocked. c) Supply of feed/cooling water is insufficient.	a) Ensure tubing falls freely to reservoir without kinks or bends. b) Remove obstruction. c) Increase flowrate of water to approx. 60 litres/hour.
4. Distillate temperature is high, e.g. – above 50°C.	Flow of cooling water is insufficient.	Increase flowrate of water to approx. 60 litres/hour.
5. Distillate rate less than 4 litres/hour.	Mains voltage low Excessive cooling water flow.	– Reduce to 60 litres/hour.
6. Distillate quality poor*.	Boiler heavily scaled.	Clean boiler.
7. Heater not working.	a) Burnt-out heater. b) Mains electricity fuse blown. c) Thermostat operated.	a) Replace heater. b) Replace fuse. c) Reset.
8. Persistent tripping of the RCD	The integrity of the heater	Replace the RCD

* Distillate quality when determined by pH or electrical conductivity is greatly affected by temperature and the presence of absorbed carbon dioxide.