Water Purification

In the large range of Stuart® distillation apparatus there is something for every user. The Merit is a simple apparatus ideal for schools, whilst the Distinction offers some level of automation. The Aquatron® models offer complete automatic control and the option of double distilled output.

Page 98 - Introduction
Page 100 - Aquatron® Water stills
Page 102 - Aquatron® Filter
Page 103 - Aquatron® Deioniser
Page 104 - Distinction water still
Page 105 - Merit water still
Page 106 - Water still accessories

THE BENCHTOP EQUIPMENT HYGIENE SOLUTION Protected by BioCote®

Distillation

Distillation is a natural process that has been used to purify liquids for many hundreds of years. Today it remains the most commonly used technique for water purification in laboratories. From schools to research institutes the simplicity, reliability and versatility of distillation make it the first choice for producing pure water for general use. It has the widest capability of any method of water treatment and is ideal for the removal of:

- Dissolved inorganic salts
- Bacteria
- Pyrogens
- Particulate matter
- Colloids
- Organic material boiling at >100°C

The performance of a Water Still is less dependant on the quality and temperature of the feed water than most other methods of water treatment. It is a visible process, easy to monitor and has no hidden resins or membranes to degrade and affect water quality.

Principles of distillation

There is a major difference between distillation and all other techniques of water purification in that the contaminants are not removed from the water but that the water is removed from its contaminants.

The feed water is boiled producing pure steam with contaminants being left behind in the boiling chamber. Steam is then condensed back into pure water.

It is this double phase change which gives distillation its versatility and reliability. The only contaminants which can carry through the phase change are organic materials with a boiling point below 100°C and dissolved gases.

How a Stuart® Water Still works

There are 4 basic components to any Stuart® Water Still:

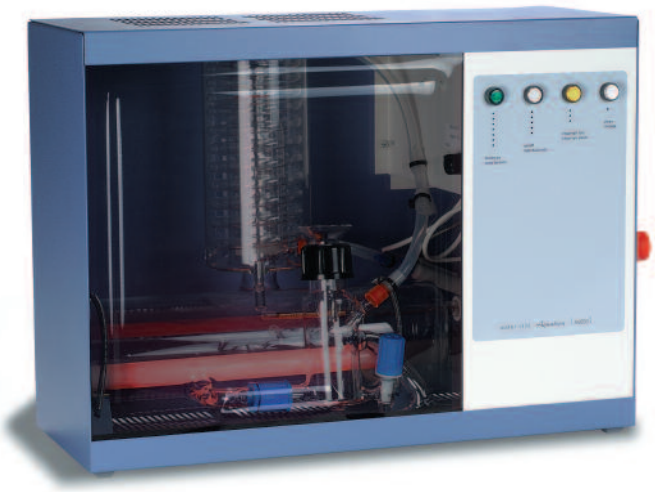
- Boiler
- Condenser
- Constant level device
- Heater

Water is heated in the boiler to produce pure steam. This is fed into the condenser via a long vertical tube with baffles in order to prevent carry over of raw water droplets.

Water is fed through the condenser, cooling the steam to produce distilled water and itself being warmed in the process. This warmed water is then fed to the boiler via the constant level device which maintains the water in the boiler at the correct level and increases efficiency.

The vertical design of condenser is common to all Stuart® Water Stills and ensures the maximum energy transfer between cooling water and condensate. These highly efficient condensers produce cold distilled water ready for immediate use.

Water Purification



Aquatron®

Distinction

Merit

Stuart® Water Stills

There are 3 levels of specification to choose from in the Stuart® Water Still range:

Aquatron®

Fully automatic, borosilicate glass stills with silica sheathed heaters. Available with outputs of 4 or 8 litres/hr single distilled or a double unit producing 4 litres/hr of double distilled water. Capable of being converted to pre-treated feed to remove the need for de-scaling. See page 102.

Distinction

Economical borosilicate glass still with silica sheathed heater. Produces 4 litres/hr single distilled water. A safety device is included which turns off the heater and prevents overflow when the collecting reservoir is full. See page 104.

Merit

A simple glass Water Still with long life metal heater and twin safety thermostats. Ideal for schools and colleges. See page 105.

Accessories

A range of accessories is available to compliment the range of Water Stills including deioniser, filter and storage aspirators.

Aquatron® filter

Spun polypropylene cartridge filter important as pre-treatment for Aquatron® Water Stills when used with water supplies with high levels of particulate matter. Also ideal for protecting other expensive equipment such as dishwashers. See page 102.

Aquatron® deioniser

Simple deioniser with colour change cartridges showing resin condition at a glance without the need for batteries or mains electricity. Use as a stand alone deioniser or as pre-treatment for Aquatron® Water Stills. See page 103.

Reservoir options

A choice of aspirator bottles manufactured from Pyrex® borosilicate glass or polypropylene. Ideal for storing distilled water.
See page 106.

Water stills, Aquatron®, A4000, A8000 & A4000D

- Fully automatic operation
- High purity pyrogen free output
- Low temperature distillate
- Operates from any raw water supply
- Reservoir level control
- Simple conversion to pre-treated feed
- Supplied with wall mounting bracket
- Safety features allow unattended operation
- Simple to clean

Three models are available giving outputs of 4 or 8 litres/hour single or 4 litres/hour double distilled water.

The high quality borosilicate glassware coupled with silica sheathed heaters gives pyrogen free distillate of the highest purity from virtually any raw water supply.

The unique condenser design ensures that the droplets of distilled water remain in contact with the cooling coil for the longest possible time ensuring maximum energy transfer. This produces cold distilled water ready for immediate use and pre-heats the boiler feed to increase efficiency.

All glass construction allows rapid descaling using strong mineral acids. A built in "clean" function and integral acid addition funnel make the cleaning operation simple and safe with no need to dismantle any of the glassware. A large bore stopcock with PTFE key is fitted for easy draining of chemicals after cleaning.

A flow sensing device will detect any reduction in the flow of cooling water to below the required level and will turn off the still before it can overheat. Sensing the flow of cooling water rather than its pressure is safer and allows the still to run normally on low pressure supplies down to 3psi (20kPa). As a fail-safe device there is an over-temperature thermostat mounted in the boiling chamber.

The Aquatron is very easy and safe to assemble and maintain. Both the acrylic safety screen and the cabinet lid are removable giving unrivalled access to the glassware components. Screwthreads are incorporated on all water connections so hoses can be fitted and removed easily and safely without risk of breakage.

Every Aquatron® water still is supplied with a reservoir level control. The control is a simple and effective system which can be fitted to virtually any type of reservoir vessel. It will turn the still off when the reservoir is full and restart it when the level in the reservoir drops as distilled water is removed for use making it fully automatic.

A4000

Aquatron® models

A4000

Produces 4 litres/hour single distilled water.

Can operate standing on the laboratory bench or be wall mounted. Supplied with easy to fit wall mounting bracket.

A8000

Produces 8 litres/hour single distilled water, ideal for the larger laboratory.

Glassware is enclosed in the same cabinet as the A4000 so can operate standing on the laboratory bench or be wall mounted. Supplied with easy to fit wall mounting bracket.

A4000D

Produces 4 litres/hour double distilled water for higher purity levels.

The first stage distillation is carried out in a glassware set mounted at the front of the cabinet allowing easy access for descaling. The distilled water is fed to a second set of glassware mounted at the rear and distilled a second time. The rear glassware is fitted with a level sensor to ensure the heater is only activated when there is sufficient water in the boiler.

Conductivity and resistivity are affected by the presence of dissolved carbon dioxide. All figures given in this catalogue are based on tests carried out on the still output at 20°C and free from carbon dioxide.

Technical specification

	A4000	A8000	A4000D
Output, l/hr	4, single	8, single	4, double
pH	5.0 – 6.5	5.0 – 6.5	5.0 – 6.5
Conductivity, μScm^{-1}	1.0 – 2.0	1.0 – 2.0	1.0 – 1.5
Resistivity, mOhm-cm	0.5 – 1.0	0.5 – 1.0	0.7 – 1.0
Temperature, °C	25 - 35	25 - 35	25 - 35
Pyrogen content*	Pyrogen free	Pyrogen free	Pyrogen free
Water supply	1 l/min 3-100psi (20-700kPa)	2 l/min 3-100psi (20-700kPa)	2 l/min 3-100psi (20-700kPa)
Electrical supply	220 or 240V, 50-60Hz, single phase	220 or 240V, 50-60Hz, single phase	220 or 240V, 50-60Hz, single phase
Max. power, kW	3	6	6
Dimensions, mm (w x d x h),	550 x 240 x 410	550 x 240 x 410	550 x 410 x 410
IP Rating	21	21	21

* care is required to produce pyrogen free water and the output should be tested before use.

The pH of distilled water

Pure water, whether from a still, deioniser or reverse osmosis system, is an excellent solvent and will quickly dissolve carbon dioxide from the air to form a very dilute solution of carbonic acid. In a water still this solution can form as the steam liquifies in the condenser, resulting in a distillate output with a pH of 5 - 6.5. This is a normal level which has little effect on most laboratory procedures. A slightly acidic pH value does not mean that the water is grossly contaminated as a carbon dioxide level of less than one part per million will cause a pH of 5. If necessary the carbon dioxide may be removed by boiling the water. It is then vital to protect the water from the air otherwise the carbon dioxide will be re-absorbed quickly.

Ordering information

Model	Description
A4000	Aquatron water still, 4 l/hr, single distilled, 240V
A4000/220	Aquatron water still, 4 l/hr, single distilled, 220V
A8000	Aquatron water still, 8 l/hr, single distilled, 240V
A8000/220	Aquatron water still, 8 l/hr, single distilled, 220V
A4000D	Aquatron water still, 4 l/hr, double distilled, 240V
A4000D/220	Aquatron water still, 4 l/hr, double distilled, 220V

Conversion to pre-treated feed

- Eliminates descaling
- Improves distillate purity
- Use with any pre-treated water source
- No loss of treated water

A simple conversion kit is available so that the Aquatron® water still can be operated from a pre-treated feed. Suitable sources of pre-treatment are almost any model of deioniser or reverse osmosis unit or a piped supply of treated water.

The pre-treated water is fed directly to the boiler and cooling water is supplied to the condenser separately. The controls ensure that pre-treated water is supplied to the boiler automatically as required, preventing overflow and costly waste. A safety device is incorporated to protect the still in the event of failure of the pre-treated supply.

The conversion kit can be fitted easily in a few minutes to any existing Aquatron® model should the need arise.

Ordering information

Model	Description
WCK/N	Conversion kit for pre-treated feed (all models)

Aquatron® connected in series with deioniser and filter

Filter, Aquatron®, AFH

- Quickly and effectively removes particulate matter from the water supply
- Disposable, easily changed polypropylene filter elements
- Flow rates up to 25 litres/min
- Independent operation or links to deioniser unit

A simple but effective filter unit ideal for removing particulate matter from your water supply to protect sensitive equipment from damage. Supplied complete with flexible hose for connection to the tap and connection for 9mm I.D. hose on water outlet.

Technical specification

	AFH
Filter element material	Polypropylene
Pore size, µm	25
Maximum flow rate, l/min	25
Maximum water temperature, °C	40
Maximum water pressure, psi (kPa)	100 (700)
Dimensions, mm	130 x 315

AFH

Ordering information

Model	Description
AFH	Filter housing
AFI	Filter elements (pack of 3)
AFD	Wall mounting bracket
ALC	Coupling to connect to Aquatron® deioniser unit ADH (see page 103)

Deioniser, Aquatron®, ADH

ADH

Deioniser and filter connected via ALC and fitted with wall mounting brackets

- Output up to 60 litres/hour
- Low cost disposable cartridges
- Colour change indicates resin condition at a glance
- Free standing or wall mountable
- Ideal as pre-treatment for Aquatron® water stills

A simple, portable deioniser giving good quality water at an affordable price.

The disposable ion exchange cartridges slowly change colour from green to blue as they are exhausted giving at a glance indication of the resin condition. No need for conductivity meters, batteries or mains electrical power.

Supplied complete with flexible hose for connection to a tap and a stopcock to control the flow rate.

Can be linked in series with the Aquatron® filter (page 90) either by a flexible hose or the rigid coupling (ALC) available as an accessory. Ideal as a pre-treatment for Aquatron® water stills to prevent scale build up and improve output quality, see page 90 for details *. Housing and ion exchange cartridges must be ordered separately.

Technical specification

	ADH
Maximum flow rate, l/hr	60
Maximum water temperature, °C	40
Maximum water pressure, psi (kPa)	100 (700)
Output conductivity, μScm^{-1}	<15
Dimensions, mm	130 x 315

Ordering information

Model	Description
ADH	Deioniser housing
ADI	Ion exchange cartridges (pack of 3)
AFD	Wall mounting bracket
ALC	Coupling to connect to Aquatron® filter unit AFH (see page 102)

Output at various levels of water hardness (output conductivity less than $15\mu Scm^{-1}$)

Total dissolved solids	Output volume
100ppm	250 litres
300ppm	110 litres
500ppm	50 litres

* If linking an Aquatron® water still to the deioniser the still must be fitted with the conversion kit WCK/N. See page 102.

Water still, Distinction, D4000

- All glass construction
- Two independent safety thermostats
- Safety reservoir full shut off
- Wall mountable
- Silica sheathed heaters

All glass construction with silica sheathed heaters ensures top purity distillate at an economical price.

Fitted with a control device to turn off the heater when the collecting reservoir is full. Prevents overflow if the still is inadvertently left switched on when unattended. With two independent safety thermostats to prevent over heating in the event of an interruption to the water supply.

The unique condenser design ensures that the droplets of distilled water remain in contact with the cooling coil for the longest possible time producing cold distilled water and pre-heating the boiler feed to increase efficiency.

Screwthreads are incorporated on all water connections so hoses can be fitted and removed easily and safely without risk of breakage.

Built in acid addition funnel and drain stopcock allow easy descaling without dismantling the glassware.

The stand is pre-drilled to facilitate wall mounting.

D4000

Technical specification

	D4000
Output	4 litres/hr, single distilled
pH	5.0 – 6.5
Conductivity, μScm^{-1}	1.0 – 2.0
Resistivity, mOhm-cm	0.5 – 1.0
Temperature	25 - 35°C
Pyrogen content*	Pyrogen free
Water supply	1 litre/min 3 – 100psi (20-700kPa)
Electricity supply	220 or 240V, 50-60Hz, single phase
Power requirement	3kW
Dimensions, mm (w x d x h)	540 x 160 x 410
IP Rating	31

* care is required to produce pyrogen free water and the output should be tested before use.

Ordering information

Model	Description
D4000	Distinction water still, 240V
D4000/EURO	Distinction water still, 220V

Conductivity and resistivity are affected by the presence of dissolved carbon dioxide. All figures given in this catalogue are based on tests carried out on the still output at 20°C and free from carbon dioxide.

Water still, Merit, W4000

W4000

- Economical price
- Glass construction with long life metal heating element
- Two independent safety thermostats
- Wall mountable

The Merit is the ideal choice for budget conscious laboratories that can't afford to compromise on quality. It combines economy and high performance with a host of other features which comparable stills cannot match.

Built in acid addition funnel and drain stopcock allow easy descaling without dismantling the glassware.

The unique condenser design ensures that the droplets of distilled water remain in contact with the cooling coil for the longest possible time producing cold distilled water and pre-heating the boiler feed to increase efficiency.

Screwthreads are incorporated on all water connections so hoses can be fitted and removed easily and safely without risk of breakage. Safety features include two independent safety thermostats to prevent over heating in the event of failure of the water supply. The stand is pre-drilled to facilitate wall mounting.

Technical specification

	W4000
Output	4 litres/hr, single distilled
pH	5.0 – 6.5
Conductivity, μScm^{-1}	3.0 – 4.0
Resistivity, mOhm-cm	0.25 – 0.3
Temperature	25 - 35°C
Pyrogen content *	Pyrogen free
Water supply	1 litre/min 3 – 100psi (20-700kPa)
Electricity supply	220 or 240V, 50-60Hz, single phase
Power requirement	3kW
Dimensions, mm (w x d x h)	500 x 150 x 450
IP Rating	31

* care is required to produce pyrogen free water and the output should be tested before use.

Ordering information

Model	Description
W4000	Merit water still, 240V
W4000/EURO	Merit water still, 220V

Conductivity and resistivity are affected by the presence of dissolved carbon dioxide. All figures given in this catalogue are based on tests carried out on the still output at 20°C and free from carbon dioxide.

Water Still accessories

The following accessories are available for use with Aquatron®, Distinction and Merit water stills.

Ordering information

Model	Description
I/WR20	Pyrex® glass reservoir bottle supplied complete with PTFE stopcock. The bottle closure is fitted with connections for distillate inlet pipe, reservoir level control and a 0.2µm filter on the air inlet. Autoclavable at 121°C. Capacity 20 litres.
I/BNP10A	Aspirator bottle ideal for use as a water still reservoir. Manufactured from polypropylene and autoclaveable at 121°C. Cap with drill guides for distillate and air inlets. Capacity 10 litres.
I/BNP20A	As above but capacity 20 litres

I/WR20

I/BNP10A