E3000 and E3100 Critical Point Dryers

Quick Overview

The design of the E3000 gives unequalled visibility of the critical point drying process and an unsurpassed view of the fluid level in the chamber. Unlike many of the more complex critical point dryer designs, it is much easier to see the phase change at the critical point.

Key Features

* **Proven reliability -** over 6,000 critical point dryer installations world-wide
* **Simple robust construction -** easy to maintain - many critical point dryer users carry out their own routine maintenance
* **Horizontal chamber and large viewing window -** excellent visibility of the fluid level and drying process
* **Large robust valves for draining of fluids, ingress of CO2 and venting of gas -** very durable; the rapid ingress of CO2 helps prevents pre-drying of specimens
* **Safety -** every critical point dryer unit is pressure tested to 2,500psi and a certificate is issued. A pressure bursting disc is also fitted to safeguard against misuse
* **Specimen handling -** optional specimen holders for coverslips and TEM grids. Porous pots are available for fragile or very small specimens
* **Three-year warranty**

Product Description

E3000
The design of the E3000 features a horizontal pressure chamber measuring 30.1mm internal diameter x 82mm in length. The chamber has an external water jacket for temperature control and specimens are introduced via a removable rear door. The front of the chamber is fitted with a 25mm diameter window which permits easy viewing of the liquid level.

E3100
Where increased chamber volume is required, for either size or quantity of specimens to be dried, the large capacity model E3100 is available. The chamber dimensions are 63.5mm internal diameter x 82mm in length, giving approximately three times the volume of the E3000. The transfer boat will also accept three times the number of specimen baskets.

Temperature control
Dial gauges display pressure in the chamber and the temperature of water circulating through the jacket. Three pressure valves permit easy connection to the liquid CO_2 cylinder and allow liquid agitation and venting of the chamber. A source of hot running water is essential. Cooling is also useful, especially for sequential process runs or in hot climates.

The temperature of the E3000 and E3100 chamber is raised with a hot water supply. Mains water can be used but a more elegant method involves the use of the optional E3500 Thermocirculator, which is connected directly to the inlet and outlet of the water jacket. The temperature of the circulatory fluid can be pre-set (eg at 37°C, just above the critical temperature).

A second alternative is the model E4860 Recirculating Heater/Chiller, which can be used to pre-cool the chamber to below ambient prior to loading specimens and then to heat the chamber to the critical temperature.

Safety
Safety is, of course, an important consideration with all pressure vessels. Should critical pressure and temperature be inadvertently exceeded, a bursting disc is incorporated in the chamber support. The critical point drying chamber itself is tested to 2,500psi, which is approximately twice the working pressure. A guard is also fitted over the viewing window.

Specimen holder (boat)
An important feature is the design of the transfer boat. This permits specimens in the intermediate fluid to be transferred to the critical point dryer. On sealing the chamber, the intermediate fluid begins to drain and can be replaced with liquid CO_2. In this way the specimens are never allowed to dry out during the specimen loading and transfer stage of the process.

Both the E3000 and E3100 are supplied with a standard tissue holder (boat). The E3000 comes with the E3000-01 tissue boat and has a single slot with three tissue baskets. Specimens are loaded into each basket and the gauze lid moved laterally to seal the top.

The E3100 is supplied with the E3100-01 tissue boat and has three slots each with three tissue baskets, making a total of nine tissue baskets. Other choices of holders are listed below under Options and Accessories, with photographs of these shown above.

Bonded chamber seals – Nitrile or EPDM?
All models of E3000 and E3100 are fitted with a standard with nitrile bonded window and door seals. Nitrile is a good general material due to its ability to withstand attack by solvents, such as ethanol. However, if acetone is used as the transition fluid then the EPDM seals have been found to be more resistant to chemical attack by that solvent.

If you are ordering an E3000 or E3100 and are planning to use acetone as the transition fluid, please state this on the order and EPDM bonded seals will be fitted.

For existing instruments, both Nitrile and EPDM bonded seal can be ordered as spares items.

Additional Information

Options and Accessories

Glass microscope coverslip holder (option):
Specially adapted boats allow glass coverslips to be held firmly during drying. The E3000-02 is designed for the E3000 and has a maximum capacity of seven coverslips. Likewise, the larger E3100-02 coverslip boat is available for the E3100 'Jumbo' Critical Point Dryer and has a carrying capacity of 21 coverslips.

TEM grid holder (option):
The E3000-1 holder for 3.05mm grids can be used with the E3000 and E3100. Maximum number of grids is three.

Porous pots with lids (option):
CPD800A solvent-resistant porous pots (12.7mm x 15.5mm) with lids are ideal for very small or very delicate specimens.

For the E3000 (NB: E3000-01 is included as standard):
* E3000-1 Specimen holder for 3.05mm grids
* E3000-01 Specimen holder for tissue (boat)
* E3000-02 Specimen holder for coverslips
* CPD800A Porous pots with lids 12.7mm x 15.5mm (pack of 10) for micro-specimens
* E3500 Thermocirculator for control of heating cycle
* E4860 Recirculating Heater/Chiller to control heating and cooling cycle (please specify voltage)

For the E3100 (NB: E3100-01 is included as standard):
* E3100-1 Specimen holder for 3.05mm grids
* E3100-01 Specimen holder for tissue (boat)
* E3100-02 Specimen holder for coverslips
* CPD800A Porous pots with lids 12.7mm x 15.5mm (pack of 10) for micro-specimens
* E3500 Thermocirculator for control of heating cycle
* E4860 Recirculating Heater/Chiller to control heating and cooling cycle (please specify voltage)

Ordering Information

E3000	Critical Point Dryer
Chamber dimensions	30.1mm Ø x 82mm length
Supplied with	E3000-01 Specimen holder for tissue (boat) 1m liquid CO_2 delivery tube O ring and L gasket set (including window and door bonded seals) Spare bursting disc and retaining copper (Cu) washer Steel bar for tightening/untightening the door Flat wrench (for removing the window retaining ring)

	Comprehensive manual Pressure test certificate
E3100	Large Chamber Critical Point Dryer
Chamber dimensions	63.5mm Ø x 82mm length
Supplied with	E3100-01 Specimen holder for tissue (boat) 1m liquid CO_2 delivery tube O ring and L gasket set (including window and door bonded seals) Spare bursting disc and retaining copper (Cu) washer Steel bar for tightening/untightening the door Flat wrench (for removing the window retaining ring) Comprehensive manual Pressure test certificate

Site Requirements

Site selection: The apparatus should be positioned in the laboratory with convenient access to:
* Hot and cold water supply (if the optional E3500 Thermocirculator or E4860 Recirculating Heater/Chiller are not used)
* Mains power supply (for E3500 and E4860 only)
* Fume cupboard or window, or an area of good ventilation
* Space for CO_2 siphon cylinder

CO_2 Cylinder: The E3000 and E3100 require a cylinder of liquid CO_2 fitted with a siphon tube (indicated by a vertical white stripe on the cylinder). If there is any doubt regarding the presence of a siphon tube, advice should be sought from the gas supplier.

Cylinder connection threads vary from country to country and even between manufacturers in the same country. For example, the transfer pipe supplied is fitted with ¼" British Standard Pipe (BSP) and 0.86" x 14 TPI union. These are standard threads for the UK and generally in the rest of the world, but will not fit cylinders in the USA.

An E3000-US kit should be specified for use within the USA; this includes a transfer pipe adaptor which will fit USA cylinders. If it is deemed necessary to fabricate another transfer pipe, advice should be sought from a local supplier of high-pressure fittings.

Heating and cooling: Use a mixer to the laboratory hot and cold water outlets, terminating with a 6mm/¼" hose connection for the PVC tubing supplied. A 'Y' piece connected to the hot and cold water taps is also suitable.

The E3000 and E3100 require both hot and cold water during the operating cycle. Cooling facilitates filling of the work chamber with liquid CO_2, and heating is required to take the liquid above its critical point.

Good control of the water temperature is essential for good results, hence the recommended use of the E3500 Thermocirculator or, more conveniently, the E4860 Recirculating Heater/Chiller which gives precise control of cooling and heating.

Space requirement: A minimum bench space of approximately 230 x 230mm is required.