FLUOROWARE

# HTC 4000
# SYSTEMS MANUAL

## Introduction

This Systems Manual serves as a guide to the Fluoroware HTC 4000 Peripheral Cleaning System. It defines procedures for installing, operating, servicing and troubleshooting the unit. Important safety features and component descriptions are also included.

The HTC 4000 is an automated, batch mode, surfactant-based peripheral cleaning system. The machine uses a pressurized deionized (DI) water/non-ionic surfactant solution to remove particulate contamination from semiconductor wafer carriers and storage boxes, as well as reticle packages, chip trays, magnetic disc carriers and shippers and most other reusable handling products.

The medium pressure cleaning process of the HTC 4000 is combined with a HEPA filtered, high-temperature/high-flow drying process to achieve consistent performance and high throughputs.

The automatic functions of the HTC 4000 are controlled by a C28 Omron microprocessor. The machine can be operated from the pre-programmed EPROM. Digital displays are incorporated to monitor process times and temperatures.

The HTC 4000 makes use of universal process racks that substantially reduce the cost and complexity of running multiple-sized products. Batch processing reduces the labor intensity required to efficiently operate the machine. The machine is designed to take advantage of off-the-shelf electrical and mechanical components. This minimizes the maintenance intensity of the HTC 4000.

## System Overview

*See Figure 1*

1.0 Mechanical Description

1.1 Process Chamber

The process chamber of the HTC 4000 is constructed of fully passivated stainless steel. Its overall dimensions of 20″ × 20″ × 18″ allow it to accommodate a wide variety of products. Non-stainless steel components are made of Teflon® and phenolic plastic. O-rings and seals are made of Viton®.

1.2 Fluid Delivery System

A pneumatic valve controls the point-of-use-filtered DI water and delivers the required amount to the process chamber. The DI water is stored in a 7 gallon passivated stainless steel reservoir.

Surfactant solution (75:1 DI water:surfactant) is housed in a 2 gallon reservoir located above the heater plenum. It is delivered to the chamber via a metered pump.

Hot air is delivered to the HTC 4000 via a 500 cfm blower. The blower is assisted by the user's house exhaust (pulling a vacuum of 1.5 - 2.5″ $H_2O$) to help it achieve its rated capacity.

1.3 Temperature Control System

The HTC 4000 uses independent control systems to regulate both the wash and dry temperatures.

A Type J thermocouple monitors the wash and rinse water temperatures at the DI water reservoir.

A second Type J thermocouple monitors the drying temperature at the exhaust collar.

1.4 Pneumatic System

The pneumatic system consists of two solenoids — one powers the door latch and the other powers the DI water valve.

1.5 Heating Systems

The DI water reservoir contains an 18 kW direct immersion heater. The heating element is constructed of fully passivated 316L stainless steel.

A 30 kW resistive-type air heater is located in the lower right of the unit.

1.6 Pumping Systems

The HTC 4000 DI water pump assembly is located below the bottom spray arm in the process chamber. This pump recirculates a 1.5 gallon charge through both the upper and lower spray arms at a rate of 52 gpm.

The surfactant pump is located in the lower cabinet of the unit. It delivers surfactant solution via a relay timer located in the electrical control cabinet.

## System Overview (continued)

2.0 Electrical Description

2.1 Microprocessor

The HTC 4000 is controlled by an Omron C128 microprocessor. The microprocessor is programmed at the factory. Changes to the program can be accomplished via a programming console (not furnished with the unit) or by installing a new EPROM (blank EPROMs are supplied with the HTC 4000).

2.2 Temperature Controllers

The temperature controllers are located on the front control panel of the HTC 4000. They are set up at the factory to measure temperature in degrees Farenheit. The controllers feature hidden program lockout switches to prevent unauthorized user changes and temperature offsets to account for calibration differences between the thermocouple and the temperature controller.

2.3 Timers

Timers located on the front control panel control the wash and dry process steps. Additional timers located in the electrical cabinet control surfactant delivery volume and delay shut-off time.

2.4 Ionizing Nozzle

The HTC 4000 uses ionizing nozzles to eliminate the static charge that builds up on plastic components during the drying process. The nozzles are located in the dry air ducting of each unit. There are non-nuclear devices with tungsten tips to reduce wear and maintain a high performance level.

3.0 Process Description

Both the process chamber door and the control panel door must be closed before the process can start. The wash time and temperature are set from the font panel. The 75:1 surfactant solution is delivered from its reservoir into the chamber. The amount is controlled by a relay timer. The deionized water is then delivered from the 7 gallon stainless steel heated reservoir in the back of the unit. A 1.5 gallon charge is sent to the process chamber through a 0.1 micron filter.

The wash solution is recirculated through the upper and lower spray arms by a 52 gpm pump for a user-defined period of time.

After the was time expires, the solution is sent to drain.

Another 1.5 gallon of DI water is delivered to the process chamber (without surfactant), and the parts are rinsed for a preprogrammed time of 30 seconds. During the rinse step, the wash timer is not activated.

The rinse water is drained and the preceding step is repeated two more times.

When the rinses are completed, the blower and air heater are both activated. Room air is drawn in through the back of the unit, heated,

## System Overview (continued)

and routed first through the 10 micron pre-filter and then through air flow is sent directly to exhaust. It is not recirculated within the process chamber.

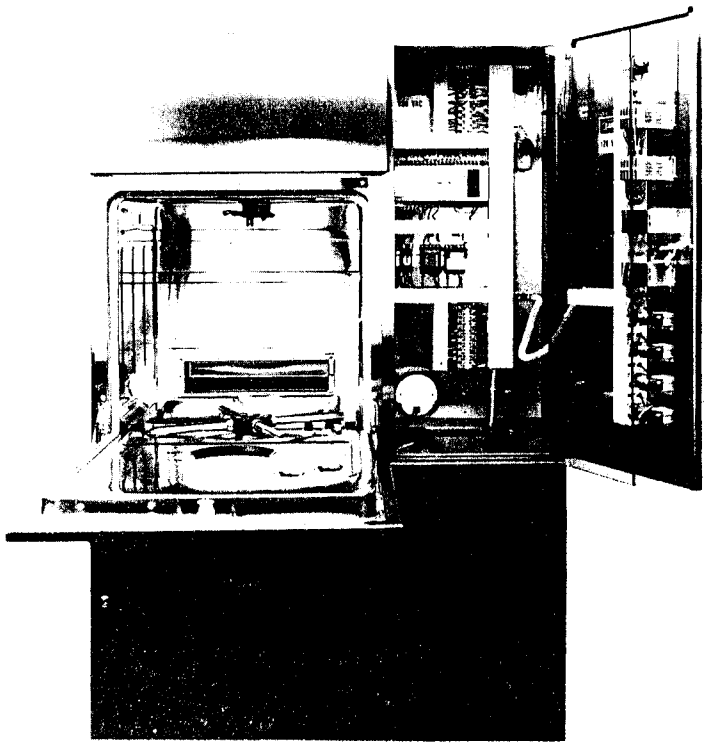
When the dry time expires, the unit allows itself to cool for approximately 90 seconds before the reset light begins to flash.

At the point the operator pushes the COMPLETE/RESET button, which releases the door lock solenoid. The chamber door can then be opened.

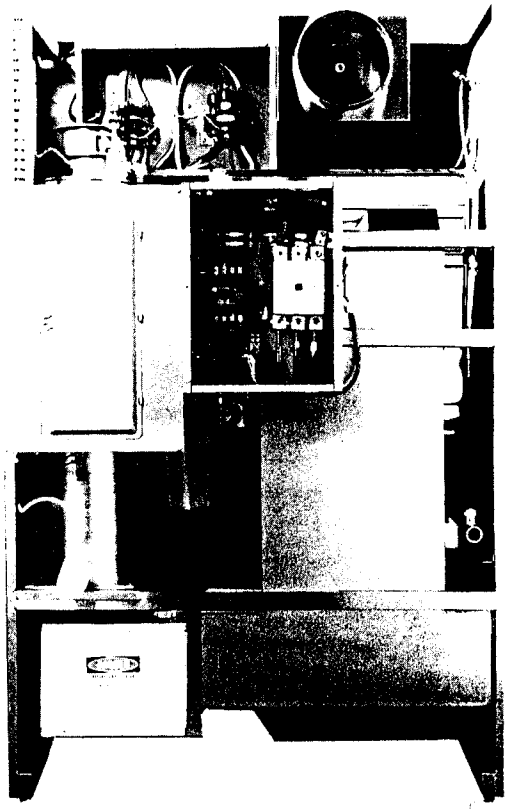
Teflon® and Viton® are registered trademarks of DuPont.

## System Overview (continued)

*Figure 1*



Front View



Rear View

## Installation

1.0 Unpacking

Save all shipping documents upon arrival of the HTC 4000. To ensure a complete package, the following should be checked before acceptance:

- Inspect the condition of the crate for any broken parts or shell damage. If any damage has occurred during shipment, make a notation on the shipper's sign-off form and have the shipper sign the document.
- Remove the system from the crate and inspect it for broken parts and cabinet damage. Inspect the electrical compartment for loose or disturbed items.

A complete package should include:

- One HTC 4000 in acceptable condition.
- Two part baskets (one multi-basket and one wafer carrier basket).
- Two Systems Manuals (one on bond paper; one on clean room paper).
- One DI water filter element.
- One blank EPROM.
- Any options ordered.

2.0 Moving

The HTC 4000 can be moved by sliding a properly rated pallet jack underneath the entire unit from either the front or the rear. The approximate weight of the unit is 500 lbs.

Be certain all front panel doors are closed, locked and/or taped shut while moving the HTC 4000.

3.0 Facilities Requirements

**Electrical System**
208 VAC, 3 phase, 150 Amps

**Exhaust**
1.5 - 2.5" $H_2O$

**Clean Dry Air**
40 to 60 psi regulated

**Deionized Water**
20 psi, 6 gpm flow capacity

**Drain**
6 gpm, gravity flow