

Temperature / Humidity Chambers

ES2000 SERIES

ED&D's precise air control system ensures conditioned air is distributed uniformly across your product shelves. A stainless steel impeller moves the air through the conditioning components within the enclosed plenum. Air is then distributed and returned through the plenum's side wall ports which are specifically arranged for maximum uniformity and efficient thermal transfer. The conditioning system features include:

- Temperature control to within $\pm 0.2^{\circ}\text{C}$
- Relative humidity control to within $\pm 0.7\% \text{RH}$
- Temperature uniformity capability down to $\pm 0.3^{\circ}\text{C}$ *
- Relative humidity uniformity capability down to $\pm 3.0\%$ *

* Note: See the SPECIFICATION section for uniformities applicable to doublewide (74c.f.) and triplewide (114c.f.) models.



All models in the ES2000 series provide precise control of temperature and humidity (if applicable). The chambers feature full stainless steel liner, conditioning system cover, and air walls. Solid, reinforced stainless steel shelves are easily removable and repositionable. These units were specifically designed for the various product safety temperature and humidity testing requirements.

CABINET CONSTRUCTION

Our doublewall chamber construction provides you with years of continued, trouble-free use. The polished 304 #3 finish interior is heliarc-welded at the seams to form a hermetic seal which prevents moisture from migrating into the insulation. Each chamber size is



proportioned to allow you ease of passage through a standard doorway. Construction features and options include:

- Heavy-gauge stainless steel interior with scratch resistant enamel on exterior of cabinet.
- Closed-cell urethane insulation for superior high/low temperature stability and minimal heat transfer. The door is also completely foamed for thermal performance and rigidity.
- Heavy-duty door hinges, full peripheral magnetic door gaskets and positive action latch with a lock to maintain a secure, uniform seal.
- Removable stainless steel plenum cover and wall air chases for ease in cleaning and maintenance.
- Heavy duty 2" casters (on floor models) and adjustable leveling feet for ease in installation.

PRODUCT SHELVING

Solid, reinforced stainless steel shelves are provided standard with each chamber, with additional shelves available upon request. The shelves slide in via shelf brackets which are easily relocatable on 1 1/2" centers.* The location and quantity flexibility can accommodate alternative inventory systems, racks, carts or other load requirements. Each shelf can support up to 130 lb. of distributed load, and offers over 6 sq. ft. of usable area.

* Note: While the spacing is variable on 1 1/2" increments, ED&D recommends a minimum of 3" center-to-center spacing on shelf locations. See the SPECIFICATIONS section for maximum recommended shelf capacities of each chamber size.

PROPORTIONAL REFRIGERATION SYSTEM

ES incorporates a proportional liquid/hot gas refrigeration design to maintain close tolerance temperature control and rapid acceleration to your setpoint. The compressor life is extended by modulating refrigerant flow as required. The proportional refrigeration system features are as follows:

- Air-cooled, hermetically sealed compressor with environmentally safe, non-toxic, CFC-free refrigerants. Optional water-cooled units are available.



- Expansion valve refrigeration control provides higher heat removal capacity than conventional capillary tube designs and provides immediate response to added heat loads.
- Automatic time or temperature actuated hot gas/electric defrost provide with "intelligent" adaptive defrost timer; time or temperature initiated and time or temperature terminated. By sensing chamber coil temperature, the timer allows for minimum temperature rise due to a defrost cycle.

TEMPERATURE & HUMIDITY CONTROL

ED&D's user-friendly touchscreen control system. Backlit, alphanumeric LCD color touchscreen display provides operator access to all system parameters through intuitive, Windows® style drop down menus. The 6" display is compatible with low to high room light levels. Menu selections and on-screen instructions with on screen help are of sufficient detail to allow for typical day-to-day use without reference manuals.



Features include:

- Temperature display configuration in °C or °F.
- Relative humidity configuration in % RH (if applicable).
- Precision, platinum RTD temperature sensor calibrated per NIST traceable standards.
- Solid-state variable capacitance humidity sensor calibrated per NIST traceable standards.



HUMIDIFICATION / DEHUMIDIFICATION

Our solid state controlled electric steam humidifier offers additive humidity, and our 'latent coil', or desiccant drier, models offer lower humidity control. High and low humidity capability is dependent on your model selection. See the **HUMIDITY PERFORMANCE CURVE** sheet for specific ranges on each model. The humidity system features:

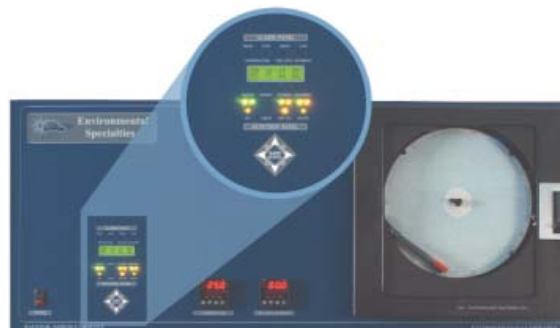
- High output vapor generator providing precisely controlled humidification. A fully stainless steel tank (type 316), incoloy heater and float switch actuated solenoid fill system are notable features.
- Separate 'latent coil' design offering mid-range dehumidification capability.
- Compressed air tower (CDM-AT) or desiccant-wheel drier (CDMD) models offering extended low range dehumidification capability.
- "Intelligent" enabling / disabling of humidification and dehumidification. Humidification is disabled below freezing, and dehumidification is disabled at factory-selected conditions where drying is not required.

ALARM / MONITORING SYSTEM

Our control panel features independent, adjustable high/low visual and audible alarms for temperature and humidity.

Automatic alarms disable specific controlled devices (heaters, blowers, steam generators, etc.) The alarm monitoring features include:

- Alarm notification through a red screen background, activation of an audible alarm, the switching of a remote alarm contact set, and the creation of an alarm log with time, date, and type of alarm.





- Alarm silence function on all parameters with up to 60 minutes of delay time (individually adjusted for each parameter). The alarm mode deactivates upon return to normal operating limits.
- Independent time delay action for each alarm parameter. Alarm action delays and audible alarm delays are each adjustable from 0 to 60 minutes in 1 minute increments. 'Common alarm' contacts activate after alarm action delay (Form C relay – N.O. and N.C. contacts provided).

ELECTRICAL / CONTROL SYSTEM

Our control panel is fully enclosed and wired in accordance with NEMA 1, NEC and UL/MET specifications. All control circuits and branch circuits are individually fuse protected. Solid state, "zero switching" outputs, for refrigeration and humidity control. Zero switching outputs prevent unnecessary radio frequency interference. The electrical system features include:

- Quick disconnect wiring for easy installation and removal of most mechanical and electrical assemblies.
- Detailed computer generated schematic provided with Operation Manual to aid in field servicing & troubleshooting.

CCS Touchscreen Control System



Microprocessor based I/O hardware with programmed logic running on Windows CE® platform. Features include:



- Control logic program is stored on a non-volatile, high capacity memory card EE-prom. All control parameter settings, alarms and setpoints are maintained during power failure, and restart is automatic upon power restoration.
- Conformance to the FDA 21 CFR 11 requirements for data recording, audit trails of controller settings modification, alarm history logs, operator event logs and secure file transfers. Operating data is encrypted and stored in user defined time length log files, and can be viewed on the touchscreen, or remotely by PC. Password protection provides multiple levels of user access and defined rights. Password aging and re-authentication for process changes are also provided per 21 CFR 11 specifications. High level encryption and digital signatures are supported for paperless operation.
- Real-time trending of temperature and humidity parameters and setpoints. The touchscreen provides auto-scaled and user definable scaled plots over a 1 minute to 12 hour time period. A 'drag and zoom' feature allows for magnified views within a specific plot period. The trend graphs can be printed by pressing an on-screen print icon and connecting an optional printer. Historical data logging is provided with the paperless recording option activated at the factory.
- Interface USB port for data transfer to printer or removable memory stick to maintain local 'paper trail' requirements. A touchscreen 'print' icon allows one touch printout of data trends in report or graphic format. The removable memory stick allows export and import of profiles, alarm files, audit trail files, and other data files. File utilities are available with the paperless recording option activated at the factory.
- Ethernet connectivity. This allows for remote viewing of chamber process variables and alarms through a web browser. These include: actual temperature, actual humidity, process setpoints, and system alarms with name and date/time of alarms. Data is "read only", and the internal stored data cannot be altered.

HEATING SYSTEM

Supplemental heating is provided by a low watt density heating element encased in a stainless steel frame. The heat output is proportionally controlled between hot gas injection and the electric heater. Heating system features include:

- Nichrome wire duct style heater providing quick, accurate response.



- Modular plug-in element design for quick disconnect capability.
- Dual overtemp safeties provided for chamber, compressor and product protection.
- Adjustable electric heater on-delay. A percent-delay setting allows the electric heat to stage in earlier or later depending upon heat demand and control capability of the refrigeration hot gas. This feature ensures that the refrigeration system is efficiently used to control the chamber temperature, resulting in lower operating costs and steam usage when the chamber has humidity control.

Chamber Warranty

A 12-month warranty on parts and labor is included with all ES2000 chambers to provide you with assurance of our commitment to quality. An optional five-year compressor warranty is also available.

Options & Accessories

Access Ports

Ports are available in nominal sizes of 1, 2" and 3"; **a 1" port is standard with your order.** Additional quantities and sizes are factory installed at customer specified locations.

Chart Recorder

A recorder can be factory installed into the control panel, for permanent record of chamber conditions. The recorder types include 10" circular, 12" circular, strip chart fan fold, and paperless. *Please request the supplemental information packet on the "paperless recorder" option.*



Classified / Hazardous Interior

The chamber interior may be constructed to Class I Division I or Class I Division II requirements, per NEC guidelines. Note: This applies to interior construction only and does not apply to chambers located within hazardous areas.

CO2 Control

This system allows for CO2 control from low 'ppm' to high '%' levels. A high quality, infrared technology gas sensor allows for excellent repeatability, linearity, and control. This system includes the *Electrofin* coil coating option which provides for ultra-high corrosion resistance to strongly acidic atmospheres.



Condensate Pump

A shallow pan pump can be provided to move condensate / drain water to remote locations (within 15' vertically). The pump operates on standard 120V receptacle power.

Heated Condensate Pan

A heating pan can be provided to evaporate condensate / drain water. This is an ideal alternative to the condensate pump. The pan operates on standard 120V receptacle power.

Data Communications

Data communications allow for remote computer monitoring of any controlled parameter. The RS-485 option offers monitoring and control of the parameter(s), while the 4-20 mA option offers remote monitoring (only) at a reduced cost. Both are compatible with most monitoring SCADA systems (SCADA - Supervisory Control and Data Acquisition Systems).

Dry Air Tower

A dry air tower is available for extended low humidity performance without drier reject heat, or for frost-free operation below 0° C. This is designated as the "AT" option, and is indicated as a suffix on the standard model "CDM" only.

Duplex Receptacle

A single 3A receptacle may be provided on the interior back wall of the chamber for small electric / electronic equipment. Note: Higher amperage loads require special review for cooling system requirements.

Floor Plate & Ramp

Single or multiple floor plates allow for heavy product loads up to 50 lb per square foot. One ramp is included to allow for roll-up into the chamber.

Glass Door / View Window

A factory installed, triple-pane glass window is available for easy viewing of products in test. The nominal sizes are 23" x 47" for upright chambers, and 23" x 23" for the benchtop chamber. Note: This option limits the low end range to 0° C.

International / Special Voltages

All models and sizes are available in 50 Hz 220 - 240 V design. This option includes the internationally recognized CE mark, and special crating system for air / sea shipments. Other special voltages (120V) are available upon request.

Lighting Control

For light testing applications, refer to the PHOTOSTABILITY CHAMBERS literature for detailed information on this complete line of high quality light chambers. For general lighting applications, consult the factory for various lamp and fixture options.

Low Temperature

All "C" chamber models can be provided with -25° C capability, excluding the benchtop model. This is designated as the "LT" option, and is indicated as a suffix on the standard model code.



NEMA Cord Set

The chambers may be purchased with the optional twist-lock plug & receptacle set to allow for plug-in capability, as opposed to standard hard-wire. The plugin capability allows for easy movement to different areas within a building.

Phone Dialer / Pager

A compact, easy-to-use dialer system can be supplied pre-mounted on the control panel of your chamber. Upon detection of high & low alarm events, the system will dial out with recorded announcements or pager text.

Programmable / Ramping Control

This option allows for automatic sequencing of different temperature and humidity conditions (if applicable). Up to (9) programs (*continued next column*) (*continued from previous column*) may be entered, each with up to (16) setpoints. *Please request the "ramping" sales bulletin for more information on this offering.*

Mechanical Redundancy

The doublewide and triplewide models (74 & 114 ft.3) may be provided with a duplicate refrigeration and airflow system. The control system periodically switches between the (2) systems, and will automatically lock on one system upon detection of a fault with the other. Note: This option is currently available on the ES2000 C model, DW and TW sizes.

Reverse Osmosis Water System

A water purification system is available to protect your chamber's humidification system from deposit build-up from untreated tap water. The system uses standard replaceable pre-filters, carbon filters, and a durable RO membrane.

Stainless Shelves

Refer to the PRODUCT SHELVING paragraph for details. This option is available as standard for 130 lb distributed load, or "heavy duty" reinforced design for higher loads (specified at time of request).

Stainless Benchtop Stand

The benchtop size chamber can be complemented with either a 30" high stainless steel single-unit stand, or 48" dual unit stacking stand. Both stands are supplied with casters.



Stainless Cabinet Exterior

Chambers may be provided with 316 polished stainless steel exteriors and interiors. This option allows for more aggressive cleaning agents generally used on a periodic basis for interior and exterior decontamination.



UPS Backup Power

This option offers uninterruptable backup power for the controls and recording device (if applicable). In the event of power loss, the control system will continue to display process values, and record or retransmit values for monitoring purposes. Standard UPS models range from 20 minute backup to over 1 hour (specified at time of request).



Water Cooled Refrigeration System

The water cooled option can take advantage of building water (chilled or tap) to provide efficient cooling and low heat rejection to your room. This option should be considered for chamber environments that have very low air exchange and/or low additional cooling capacity.

ED&D can manufacture chambers to meet special size, voltage, or range requirements not accommodated below. *Please speak with a Sales Associate to discuss your needs.*

SPECIFICATIONS SUBJECT TO CHANGE WITHOUT NOTICE.

BENCHTOP MODEL									
CHAMBER MODEL	INTERIOR VOLUME	TEMP. RANGE	HUMIDITY RANGE	VOLUMETRIC UNIFORMITY	4-WIRE ELECTRICAL VOLTS / Ø / AMPS	INT.DIMENSIONS WxDxH	EXT. DIMENSIONS WxDxH	SHELVES STD./MAX.	WEIGHT LBS./KG.
ES2000 A-BT	12.7 ft. ³ (360 liters)	35–70°C	N/A	±0.3°C (±0.6°F)	208–230 / 1 / 20	36 x 25.5 x 24.5 in. (91 x 65 x 62 cm.)	41 x 29 x 47 in. (104 x 74 x 119 cm.)	2 / 7	350 / 159
ES2000 AM-BT		35–70°C	10–96%		208–230 / 1 / 20				425 / 193
ES2000 C-BT		0–70°C	N/A	±3.0% RH	208–230 / 1 / 20				450 / 204
ES2000 CDM-BT		0–70°C	10–96%	208–230 / 1 / 30	545 / 247				
ES2000 CDMD-BT		0–70°C	10–96%	208–230 / 1 / 30	575 / 261				

UPRIGHT MODEL									
CHAMBER MODEL	INTERIOR VOLUME	TEMP. RANGE	HUMIDITY RANGE	VOLUMETRIC UNIFORMITY	4-WIRE ELECTRICAL VOLTS / Ø / AMPS	INT.DIMENSIONS WxDxH	EXT. DIMENSIONS WxDxH	SHELVES STD./MAX.	WEIGHT LBS./KG.
ES2000 A	33.8 ft. ³ (957 liters)	35–70°C	N/A	±0.3°C (±0.6°F)	208–230 / 1 / 20	34 x 28.5 x 60 in. (87 x 73 x 153 cm.)	41 x 34.5 x 91.5 in. (104 x 88 x 233 cm.)	4 / 19	450 / 204
ES2000 AM		35–70°C	10–96%		208–230 / 1 / 20				525 / 238
ES2000 C		-10–70°C	N/A	±3.0% RH	208–230 / 1 / 30				650 / 295
ES2000 CDM		-10–70°C	10–96%	208–230 / 1 / 30	745 / 338				
ES2000 CDMD		-10–70°C	10–96%	208–230 / 1 / 30	775 / 352				

DOUBLEWIDE MODEL									
CHAMBER MODEL	INTERIOR VOLUME	TEMP. RANGE	HUMIDITY RANGE	VOLUMETRIC UNIFORMITY	4-WIRE ELECTRICAL VOLTS / Ø / AMPS	INT.DIMENSIONS WxDxH	EXT. DIMENSIONS WxDxH	SHELVES STD./MAX.	WEIGHT LBS./KG.
ES2000 A-DW	74.2 ft. ³ (2101 liters)	35–70°C	N/A	±1.0°C (±1.8°F)	208–230 / 1 / 20	75 x 28.5 x 60 in. (191 x 73 x 153 cm.)	82 x 34.5 x 91.5 in. (208 x 88 x 233 cm.)	8 / 38	1020 / 463
ES2000 AM-DW		35–70°C	10–96%		208–230 / 1 / 30				1060 / 481
ES2000 C-DW		0–70°C	N/A	±5.0% RH	208–230 / 1 / 30				1120 / 508
ES2000 CDM-DW		0–70°C	10–96%	208–230 / 1 / 30	1170 / 531				
ES2000 CDMD-DW		0–70°C	10–96%	208–230 / 1 / 30	1200 / 544				

TRIPLEWIDE MODEL									
CHAMBER MODEL	INTERIOR VOLUME	TEMP. RANGE	HUMIDITY RANGE	VOLUMETRIC UNIFORMITY	4-WIRE ELECTRICAL VOLTS / Ø / AMPS	INT.DIMENSIONS WxDxH	EXT. DIMENSIONS WxDxH	SHELVES STD./MAX.	WEIGHT LBS./KG.
ES2000 A-TW	114.8 ft. ³ (3251 liters)	35–70°C	N/A	±1.0°C (±1.8°F)	208–230 / 1 / 20	116 x 28.5 x 60 in. (295 x 73 x 153 cm.)	123 x 34.5 x 91.5 in. (312 x 88 x 233 cm.)	12 / 57	1420 / 644
ES2000 AM-TW		35–70°C	10–96%		208–230 / 1 / 30				1460 / 662
ES2000 C-TW		0–70°C	N/A	±5.0% RH	208–230 / 1 / 30				1520 / 689
ES2000 CDM-TW		0–70°C	10–96%	208–230 / 1 / 30	1570 / 712				
ES2000 CDMD-TW		0–70°C	10–96%	208–230 / 1 / 30	1600 / 726				



Notes applicable to all models above:

1. Temperature and humidity ranges are based upon 25°C / 50% RH ambient.
2. Refer to separate HUMIDITY PERFORMANCE CURVES for specific range limitations of humidity control models.
3. Exterior height shown with casters (except benchtop model), and with leveling bolts (benchtop model). Door may be removed to decrease depth to 33" (floor models).
4. Shelf quantities are: "standard" number supplied with unit, "maximum" number based on minimum 3" spacings as recommended by E.S.
5. 50 Hz/220V, 120V, and other special voltages are available upon special request. Consult factory for more information.
6. "CDMD" models - A desiccant wheel drier is field mounted on the unit behind this model chamber. This requires an additional depth allowance of 12."
7. "CDM-AT" models - An air tower drier is field mounted on the unit behind this special model chamber. This requires an additional depth of 5" for the compressed air fed system
8. "-LT" & "-SS" models - The suffixes are added to denote Low Temperature capability option (-25°C) and Stainless Steel exterior option.

Special Note: ED&D can provide these Temperature & Humidity Chambers with **ISO/IEC 17025 Accredited** Calibration specific Scope!

ISO 17025 ACCREDITED CALIBRATIONS

Uncertainty Data available - - Internationally accepted data! ILAC Member calibrations



PATENTS PENDING

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