APPLICATION NOTE
2015_11-18 ELH Rev 4

Edgetech Instruments

ELH Temperature & Humidity Chamber

Fully Traceable, First Principle Measurement and Control

When Absolute Control and Precision is Needed

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*Unlike most humidity/ temperature chambers, the ELH uses the **Chilled Mirror** sensor measurement technique and Platinum Temperature Probe to ensure absolute precision and control.*

The Model ELH Series of environmental test chambers provide an integrated approach to laboratory and industrial applications where a closely controlled environment must be provided. This rugged chamber of 316 stainless steel is controlled by the proven EdgeTech DewMaster NIST-traceable chilled mirror dew point hygrometer. The remotely mounted dew point and platinum RTD temperature sensors measure the chamber conditions at all times, allowing the instrument to display Temperature and Dew Point and Percent Relative Humidity on its front panel.

Improve reliability of your testing with **First Principle** measurement and **NIST traceability**

Reduce the need for constant attention by using programed cycles / humidity soaks

Eliminate wasted effort and time because of inaccurate humidity and temperature control

The ELH may be **programmed to perform ramps, soaks and precision humidity profiles**. It is extremely efficient for calibration / verification of multiple humidity devices/ data loggers in a given cycle. The ELH is also excellent for materials testing, environmental cycling of products, or humidity exposure of electronics equipment/ circuit boards.

Common Applications

Materials Analysis & Testing	**Humidity Sensor Calibration**
Validation of Automotive Sensors	**Data Logger Testing**
Accelerated Life Testing	**Battery Testing**
Electronics/ Electrical Testing	**Moisture Sensitive Materials Tests**
Stability Testing/ Storage	**Incubation of Fungal Spores**
Pharmaceutical Quality Testing	**Moisture Migration Studies**
Packaging Validation	**Permeation and Absorption Testing**

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All chamber components offer maximum resistance to the corrosive effects of moisture combined with extreme conditions. Consult the ETI design engineering services for special temperature and humidity conditions.

A self-contained Recirculating Humidity System with 6 Gallon Reservoir (optional) or customer supplied water connection and demineralizer (standard) are provided to generate a controlled RH environment within the chamber.

The internal construction of the chamber is vapor tight welded stainless steel. The system includes a 2" access port at the side of the chamber, (1) Stainless Steel Wire Rack, a Watlow temperature control unit, fuse protected power circuit, instruction manual and one year warranty.

All chambers utilize an environmentally safe non-ozone depleting refrigerant. Chambers are fitted for fully adjustable shelving (1 standard, additional sold separately), feature forced air circulation and an indicating controller. Available Power connections include 110/120VAC 60Hz or 100VAC 50Hz.

The system is complete with integral mounted Chilled Mirror Hygrometer: *Model DM-DS2* and a programmable controller for Temperature and Dew point or Humidity control.

The system is NIST Traceable with the following accuracies:

Relative Humidity (±0.5%)
Temperature (±0.1°C)
Dew point (±0.2°C).

Measurements are available to the User in ^{0}C/^{0}F or %RH, voltage and current outputs, RS232. Temperature Range 7 to 85°C, RH range 20-95% @ a temperature range from 50°C to 85°C, 20%RH @ 35°C. For lower RH consult factory.

The ELH may be pre-programmed to follow a set of humidity cycles, ramps, soaks or profiles. Programming is done through the Watlow controller shown in the picture to the left. The controller meets the requirements of the most demanding ramp soak controller processing applications. Easy to set up and operate, the controller's programming features and proven performance capabilities are ideally suited for the humidity control applications.

The SERIES F4 ramping controller features a four line, high-definition LCD interface display for quick and easy profile programming of RH% and temperature values. You can program up to 256 steps, 40 profile ramp and soak profiles. The DewMaster hygrometer is integrated to the Watlow Controller. Also available at the DewMaster analyzer interface is access to an analog output that may be programmed for RH, Dew Point, or Temperature.

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Standard features of the ELH include:

- a high temperature limit on the chamber's temperature control circuit (automatic, resets after chamber temperature returns to within normal parameters)
- (1) Adjustable SS wire rack
- Demineralization System

Available Options:

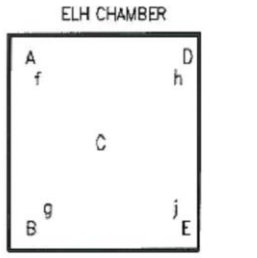
- Digital Set Control Module is available to provide temperature protection of the product within the chamber. This Digital Indicating Hi/Lo Temp Safety feature allows you to control the chamber's environment within minimum and maximum temperature limits.
- Interior Lighting, includes exterior power switch
- Additional SS racks, Window, and Access ports
- Desiccant De-Humidification System (for lower humidity range)
- Self-contained Recirculating Humidity System w/ 6 Gallon (22.7 Liters) Reservoir
- Nitrogen Purge (provision of separate port for nitrogen gas input instead of air circulation)

Chamber Uniformity / Range / Accuracy:

The ELH has been tested by 3rd party to characterize the uniformity of control within the chamber for both Temperature and Relative Humidity. Uniformity is described in the diagram to the lower left. Temperature and RH% control ranges are shown in the diagram to the lower right.

	TEMP °C +/- 0.3°C		RH +/- 0.5%	
	7.0°C	85.0°C	30.0%	60.0%
A	7.2	85.1	30.0	60.0
B	6.8	84.8	29.6	59.7
C	7.0	85.0	30.0	60.0
D	7.1	85.1	30.0	60.0
E	6.7	84.7	29.7	59.8
f	7.1	85.2	29.9	59.9
g	6.9	84.8	29.8	59.8
h	7.2	85.1	30.1	60.2
j	6.8	84.8	30.2	60.3

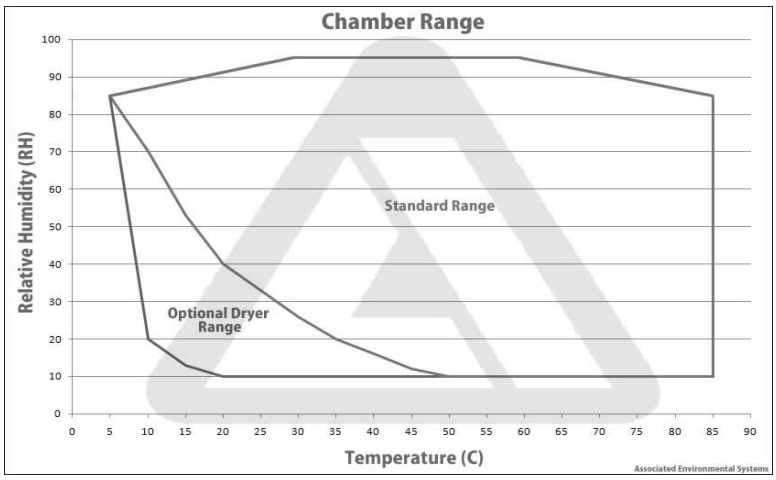
SENSOR UNIFORMITY



Sensors (A,B,D,E) are positioned front of chamber
Sensor 'C' positioned middle of chamber
Sensors (f,h,g,j) positioned back of chamber

FAN: Constant air flow at 388cfm

Test Data
Without Window



Measurement Accuracy:
Relative Humidity- ±0.5% w/in standard range given in above graph
Temperature- ±0.1°C
Dew Point- ±0.2°C

Measurement Traceability: **N.I.S.T. Traceable**

Chamber Control Range: (See Graph above) **Temperature- 7 to 85°C**

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Using the ELH for calibrating or verifying Sensor performance

The ELH test chamber is a NIST-traceable relative humidity generator and calibration chamber that is continuously monitored and controlled by a chilled mirror hygrometer and precision RTD. The ELH facilitates cost-effective calibrations of relative humidity sensors, probes, transmitters, recorders, and data loggers. Multiple shelves may be installed within the ELH and multiple access ports are available for routing of the sensor/ data logger signal wiring. The %RH is programmable and monitored/ controlled by the Edgetech Instruments DewMaster hygrometer featuring the world renowned primary standard chilled mirror measurement technique.

Using the ELH for product reliability

The ELH test chamber artificially replicates the humidity conditions under which machinery, materials, devices or components might be exposed. It is also used to accelerate the effects of exposure to the environment, sometimes at conditions not actually expected. Manufactured samples, specimens, or components are placed inside the chamber and subjected to one or more of these environmental parameters to determine reliability or measure after-effects such as corrosion. In the case of machinery such as internal combustion engines, byproducts such as emissions are monitored.

There are many products & materials that are sensitive to moisture. Applications such as lithium batteries, packaging materials, food products, semiconductors, paper, glass, medical devices and various other applications can be diversely affected if the moisture content is not precise in the development and manufacturing of these products and materials. Moisture Testing & Measuring often requires technology that provides customers with the knowledge that the exact moisture content is being extracted during research and manufacturing.

To order the ELH

1. Determine how much internal volume is needed to accommodate the equipment that will go inside the chamber. This is chamber size.
2. Determine the range of RH to be measured. The ELH can generate 10-95% RH environment within a prescribed temperature range. To work outside of the normal range you may require the optional Dehumidification System Listed as “Optional Dryer Range” in the chart below.
3. Determine chamber hardware and port configuration. Hardware includes internal light for illumination of the chamber, additional racks (comes with 1), and a window for easy viewing. Racks are used to support items going inside the chamber.

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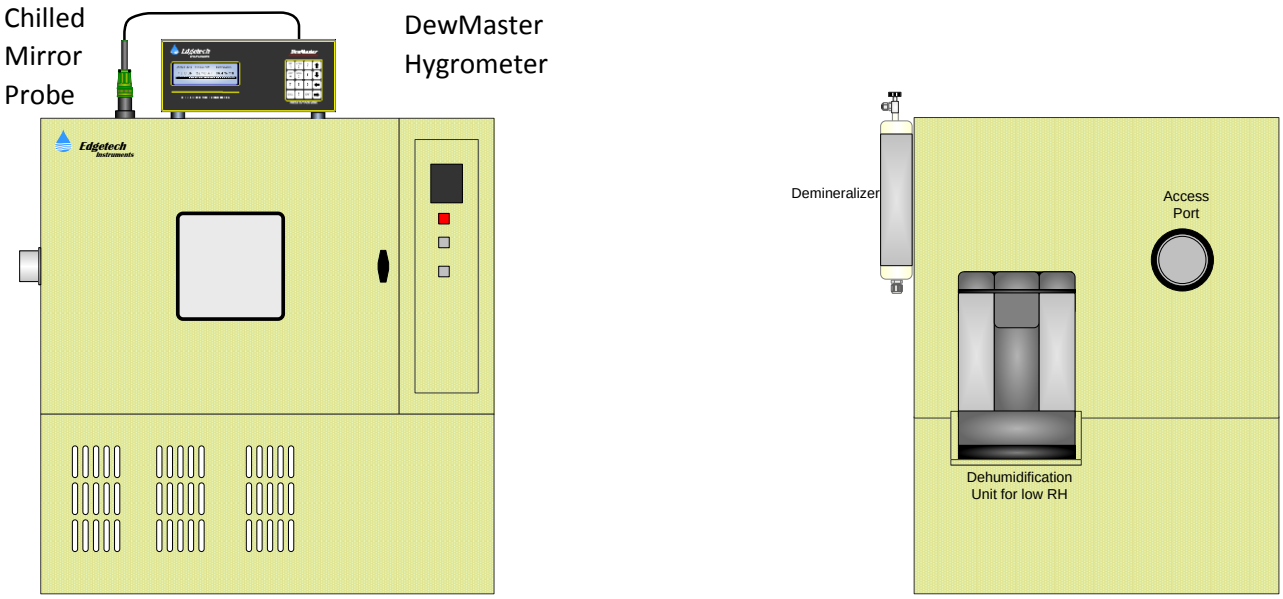
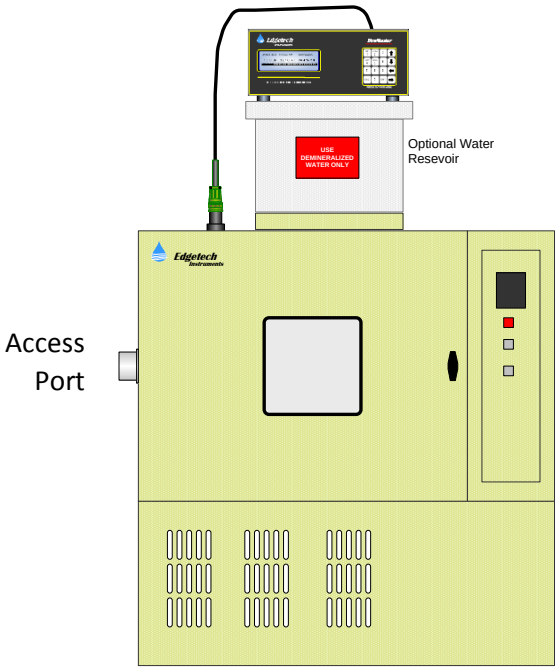
4. Determine if you need any special control options like IEEE, wider temperatures, Product thermal protection, De-Humidification system…

5. Determine water source for humidification.
   a. You can supply a water line via the water inlet port (de-mineralization included)
   b. You can choose the local reservoir option that you fill with demineralized water



Front View

Side View



Front View
w/ Reservoir

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Now you are ready to select the options you have determined in steps 1-5 above:

ELH- [ ] - [ ] - [ ] - [ ] - [ ] - [ ]

CHAMBER SIZE | CHAMBER OPTIONS | CONTROL OPTIONS | HUMIDIFICATION | POWER | COUNTRY

FIRST choose the Chamber size:

MODEL	Volume - Capacity	DIMENSIONS
ELH-1.5	1.5 feet^3 (0.043m^3)	Internal: 13in x 14in x 13in (33.02cm x 35.56cm x 33.02cm)
		External: 33in x 27in x 26in (83.82cm x 68.58cm x 66.04cm)
ELH-6	5.8 feet^3 (0.17 m^3)	Internal: 24in x 20in x 18in (60.96cm x 50.08cm x 45.72mm)
		External: 46in x 33in x 31in (116.84cm x 83.82cm x 78.74cm)
ELH10	10 feet^3 (0.28m^3)	Internal: 30in x 24in x 24in (76.2cm x 60.96cm x 60.96mm)
		External: 52in x 36in x 37in (132.08cm x 91.44cm x 93.98cm)

SECOND choose Chamber options (DewMaster Chilled Mirror Hygrometer already included):

Suffix	DESCRIPTION
SS	Additional SS Shelf (Base unit includes 1 already)
MVW	8inch (203.2mm) x 8inch (203.3mm) Window in door
WD12	12inch (304.8mm) x 12inch (304.8mm) Window in door
IL	Internal light w/external switch
DP3/4	3/4 inch (19.05mm) diameter port and plug
DP2	2 inch (50.8mm) diameter port and plug **(One is included in Base Price)**
DP3	3 inch (76.2mm) diameter port and plug
DP4	4 inch (101.6mm) diameter port and plug
DP5	5 inch (127mm) diameter port and plug
DP6	6 inch (152.4mm) diameter port and plug

1. Standard unit includes (1) 2 inch (50.8mm) access port for test wires….
2. Standard unit includes (1) SS rack

THIRD choose Control options**:**

Suffix	DESCRIPTION
CI	IEEE 488 Computer Interface (Dewmaster already provides RS-232/Analog outputs
DS	Digital Set: Digital Indicating Hi/Lo Temp Safety **(For Product Temperature protection)**
ET	Extended Temperature Range to -20^0 C

1. Digital Set is additional safety option to protect product within chamber from exposure to temperature extremes.
2. WD12 Watlow programmer is standard and is included in base unit.

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FOURTH choose Humidification options**:**

Suffix	DESCRIPTION
.	Port for customer supplied water source (INCLUDED)
SCS	Self-contained Recirculating Humidity System w/ 6 Gallon (22.7 Liters) Reservoir
DDH	Desiccant De-Humidification System (for lower humidity range)

1. DCS-Water De-mineralization Cartridge System (already included)

Fifth Identify your VAC voltage/ cycles; for example 230VAC/ 50Hz

Sixth Identify the country where the product will be used; example USA

List as separate line items choose Accessories or Spare Parts**:**

Suffix	DESCRIPTION
CR	Honeywell Trueline 2 pen/12inch (304.8mm) Diameter Chart Recorder
DR	EZ Trend Digital Chart Recorder w/ 5 inch (127mm) LCD
DCX	Spare De-Mineralizer Cartridge

Buy Services now and save money! Please list as separate line items:

SERVICES	DESCRIPTION
-3 EXTW	*3 year Extended Warranty includes any repairs covered in the warranty statement
-3 YNIST2PT	**3 year NIST 2-point Traceable Calibrations (buy 2 get 3rd free)

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