

HYGRO MAX

User Manual



TABLE OF CONTENTS

INTRODUCTION	4
Product Warranty	5
Unpacking Instructions	6
Calibrator Applications	6
Standard Packing Check List Table	7
Visual Item Check List	8
Accessories Bag Contents	9
Available Accessories	10
Available Accessories Tables	11
Unit Diagram And Parts Listing	13
QUICK START GUIDE	15
Filling The Reservoir	16
Powering The Unit	18
Unit Operation (PID Controller)	19
Unit Operation (Main Display)	21
Opening The Door	22
Error Codes And Descriptions	23
General Specifications	24
Consumables	25
Mechanical And Elecreical	25
CALIBRATION	26
UUTs (Units Under Test)	26
System Recalibration	27
System Uncertainty	27
Auto-Calibration PC Software	27
Reference Standard Recalibration	28
Control Probe / Reference Sensor	28
Entering Hygro Max Offsets	30
Unit Calibration Overview	30
Accessing the Device Manager	30
Reading the COM Port	31
Installing PuTTY	31
PuTTY Setup	31
Connecting Through PuTTY	32
Reading Temperature and Humidity Offsets	32
Changing Humidity and Temperature Offsets	33
SAFETY WARNING	34
General Safety Information	34
Disposal Safety Information	35
TECHNICAL SUPPORT	36

REPAIRS 37
 Unit Repair Procedure.....37

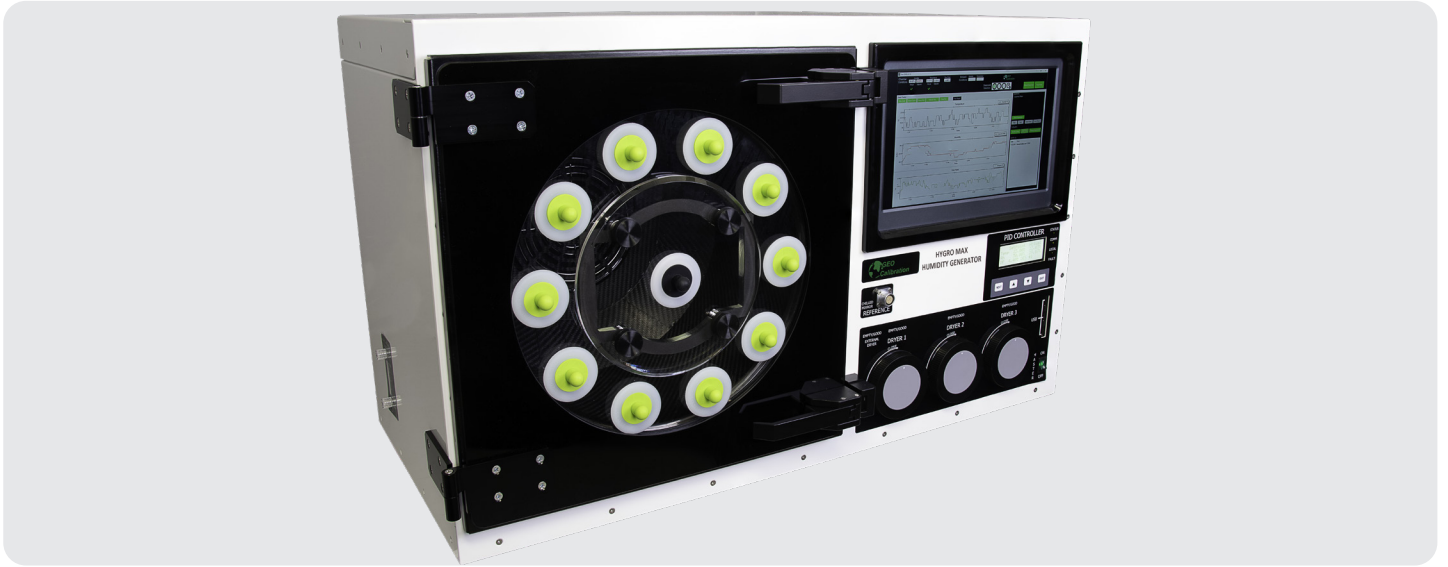
MAINTENANCE..... 38
 Service Schedule.....38
 Replacing The Desiccant.....39
 Condensation.....41
 Draining The Unit.....42
 Probe Removal.....43
 Probe Replacement.....44

HYGRO MAX DESICCANT SYSTEM..... 45
 System Overview.....45
 Desiccant - LED Status Indications.....45



GEO Calibration Inc
2190 Smithtown Avenue, Ronkonkoma, NY 11779, USA
 Tel.: +001 (631) 471 - 6157 • Fax: +001 (631) 471 - 6158
 support@geocalibration.com • www.geocalibration.com

INTRODUCTION



MESSAGE FROM GEO CALIBRATION

Thank you for purchasing the GEO Calibration Hygro Max humidity and temperature generator/calibrator. We look forward to providing you the highest quality technical support as you become familiar with your new humidity and temperature calibrator.

To better familiarize yourself with the Hygro Max, please [visit our Youtube Channel by searching GEO Calibration for user friendly videos.](#)

To start using your GEO Hygro Max immediately, you may proceed to our [Quick Start Guide \(page 16\).](#)

For a deeper review of the Hygro Max, See our [Calibration Technical Recommendations \(page 25\).](#)

Regards,
GEO Calibration Service Team

WARNING

As you read through this product manual, please familiarize yourself with our recommended best practices. By following the proper procedures, you will ensure your unit consistently performs to its highest potential.



Once you have removed the Model Hygro Max from its external packaging, please visually inspect the unit for damage. If damage is found, please immediately contact your supplier.

LIMITED WARRANTY AND LIMITATION OF LIABILITY

Each GEO Calibration product is warranted to be free from defects in material and workmanship under normal use and service. The warranty period is one year and begins on the date of shipment. Parts, product repairs, and services are warranted for 90 days. This warranty extends only to the original buyer or end-user customer of a GEO Calibration authorized reseller, and does not apply to fuses, disposable batteries, desiccants, distilled water, or to any product which, in GEO Calibration's opinion, has been misused, altered, neglected, contaminated, or damaged by accident or abnormal conditions of operation or handling. GEO Calibration does not warrant that software will be error free or operate without interruption.

GEO Calibration authorized resellers shall extend this warranty on new and unused products to end-use customers only but have no authority to extend a greater or different warranty on behalf of GEO Calibration. **Warranty support requires activation and registration at:**

<https://www.geocalibration.com/register>

and is purchased through a GEO Calibration authorized sales outlet or Buyer has purchased unit directly from GEO Calibration. GEO Calibration reserves the right to invoice Buyer for importation costs of repair/replacement parts when product purchased in one country is submitted for repair in another country. GEO Calibration's warranty obligation is limited, at GEO Calibration's option, to refund of the purchase price, free of charge repair, or replacement of a defective product which is returned to a GEO Calibration authorized service center within the warranty period.

To obtain warranty service, contact your nearest GEO Calibration authorized service center to obtain return authorization information, then send the product to that service center, with a description of the difficulty, postage and insurance prepaid (FOB Destination). GEO Calibration assumes no risk for damage in transit. Following warranty repair, the product will be returned to Buyer, transportation prepaid (FOB Destination). If GEO Calibration determines that failure was caused by neglect, misuse, contamination, alteration, accident, or abnormal condition of operation or handling, including over voltage failures caused by use outside the product's specified rating, or normal wear and tear of mechanical components, GEO Calibration will provide an estimate of repair costs and obtain authorization before commencing the work. Following repair, the product will be returned to the Buyer, shipped Ex Works FOB Suffolk County NY.

THIS WARRANTY IS BUYER'S SOLE AND EXCLUSIVE REMEDY AND IS IN LIEU OF ALL OTHER WARRANTIES, EXPRESS OR IMPLIED, INCLUDING BUT NOT LIMITED TO ANY IMPLIED WARRANTY OF MERCHANTABILITY OR FITNESS FOR A PARTICULAR PURPOSE. GEO CALIBRATION SHALL NOT BE LIABLE FOR ANY SPECIAL, INDIRECT, INCIDENTAL, OR CONSEQUENTIAL DAMAGES OR LOSSES, INCLUDING LOSS OF DATA, ARISING FROM ANY CAUSE OR THEORY.

Since some countries or states do not allow limitation of the term of an implied warranty, or exclusion or limitation of incidental or consequential damages, the limitations and exclusions of this warranty may not apply to every buyer. If any provision of this Warranty is held invalid or unenforceable by a court or other decision-maker of competent jurisdiction, such holding will not affect the validity or enforceability of any other provision.

GEO Calibration Inc.
2190 Smithtown Avenue
Ronkonkoma, NY, 11779
U.S.A.

UNPACKING INSTRUCTIONS

Once you have removed the Hygro Max from its external packaging, please visually inspect the unit for damage. If damage is found, please immediately contact your supplier.

CALIBRATOR APPLICATIONS

The GEO Hygro Max Humidity Calibrator generates and maintains a controlled humidity and temperature environment for the purpose of testing or calibrating humidity and temperature sensors, also known as hygrometers. The humidity calibration range is 1% up to 99%, while the temperature range is from 0°C to 60°C.

[See the full technical specifications \(page 25\).](#)

The system's accuracy is achieved via a NIST traceable internal control and reference probe.

The Hygro Max can calibrate many hygrometer types:

- Probes
- Data-loggers
- Chart Recorders
- Additional Assorted Hygrometers

Please review the dimensions of the calibration chamber to ensure compatibility with the size requirements of any hygrometers you intend to calibrate. You may require an Expansion Chamber. Your GEO representative should have reviewed this with you at time of purchase, if not, please contact our support team and they will size an Expansion Chamber accordingly.

The Hygro Max allows for multiple types and sizes of hygrometers, for a complete list please contact us at support@geocalibration.com.



Humidity Control Company

GEO Calibration Inc

2190 Smithtown Avenue, Ronkonkoma, NY 11779, USA

Tel.: +001 (631) 471 - 6157 • Fax: +001 (631) 471 - 6158

support@geocalibration.com • www.geocalibration.com

STANDARD PACKING CHECK LIST

Within the Shipped Case

✓	QTY	Part Number	Description
	1	01-410-00-0000	Hygro Max Humidity Calibrator
	6	01-250-11-0001	Desiccant Canister (3 Spares)
	1	01-200-36-0002	Reference Standard / Control Probe
	1	01-410-01-0044	GEO Accessories Kit
	1	01-410-01-0015	Hygro Max Door (10 Port Door with Plugs)
	1	01-400-01-0021	Hygro Max Chilled Mirror Door
	1	01-400-82-0001	Hygro Max Accessories Kit
	1	N/A	Manilla Envelope with Calibration Docs
	1	01-410-01-0003	Hygro Max Chamber Insert
	1	01-011-01-0002	1850-2 Chilled Mirror (Optional)
	1	01-011-01-0001	Chilled Mirror Sensor with Cable (Optional)
	1	01-410-36-0006	Chilled Mirror Temperature Sensor (Optional)

Contents of GEO Accessories Kit

✓	QTY	Part Number	Description
	1	01-200-82-0001	GEO Accessories Bag
	1	01-450-36-0003	Fill Syringe (50ml)
	2	01-200-85-0001	4 AMP Fuses (1 pack)
	1	01-200-46-0001	Mains Power Cord
	1	01-250-07-0005	Desiccant Tool
	1	02-053-07-0006	Shelf
	1	01-410-01-0045	Hygro Max Bung Kit
	1	01-040-01-0010	Spare Ultrasonic Transducer Replacement
	1	01-450-01-0045	Heating Element

Calibration Documents

✓	QTY	Part Number	Description
	1	NO REORDER	Factory Calibration Report
	1	01-999-99-0001	3rd Party Calibration Certification (IF ORDERED)

VISUAL ITEM CHECK LIST

Listed below are standard contents included with the purchase of a new Hygro Max.



Humidity Generator

GEO Calibration
Hygro Max
P/N: 01-400-00-0000



Desiccant Canister

Pre-Filled with molecular sieve
P/N: 01-250-11-0001



Control Probe

HC2-S HygroClip
control probe (pre-installed)
P/N: 01-200-36-0002



Hygro Max Accessories Kit

Contents:
See Page 9
P/N: 01-200-01-0035



Hygro Max Door

10 Port Door with Plugs

P/N:01-410-01-0015



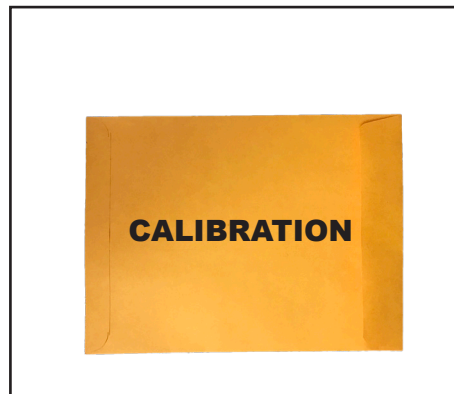
Hygro Max Chilled Mirror Door

P/N: 01-400-01-0021



M4000 Chamber Insert

P/N: 01-400-01-0023

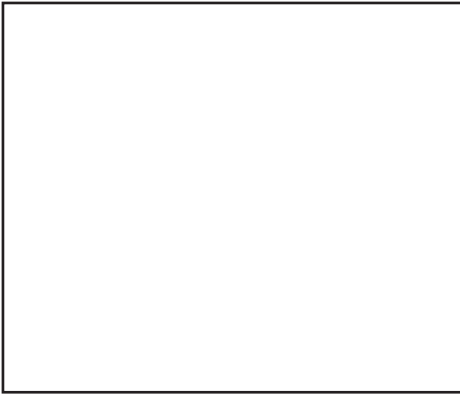


Calibration Documents



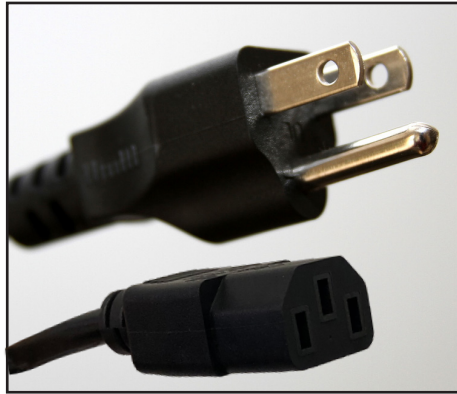
1850-2 Chilled Mirror
Chilled Mirror Sensor
Chilled Mirror Temperature Sensor
(Optional)

ACCESSORIES KIT CONTENTS



Shelf

P/N: 02-053-07-0006



Power Cord

P/N: 01-200-46-0001 US
01-200-46-0002 EUR



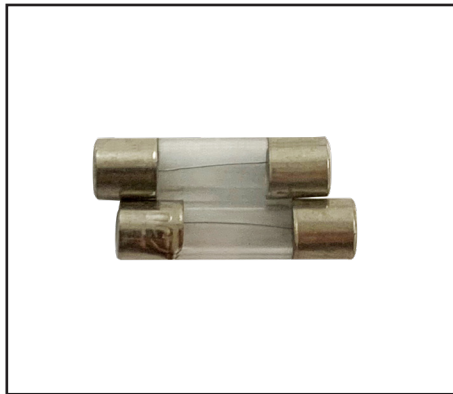
**Fill Tube
(50ml)**

P/N: 01-450-36-0003



Desiccant Tool

P/N: 01-250-07-0005



4 AMP Fuse

P/N: 01-200-85-0001



Hygro Max Bung Kit

P/N: 01-410-01-0045



**Spare Ultrasonic
Transducer Replacement**

P/N: 01-250-07-0005



Heating Element

P/N: 01-450-01-0045

AVAILABLE ACCESSORIES



**Replacement
Desiccant**

P/N: 01-250-11-0001



**Replacement
Fill Tube
(50ml)**

P/N: 01-450-36-0003



**Replacement
Control Sensor
HC2-S HygroClip
control probe**

P/N: 01-200-36-0002



**PID Temperature
Controller**

P/N: 01-012-00-0000



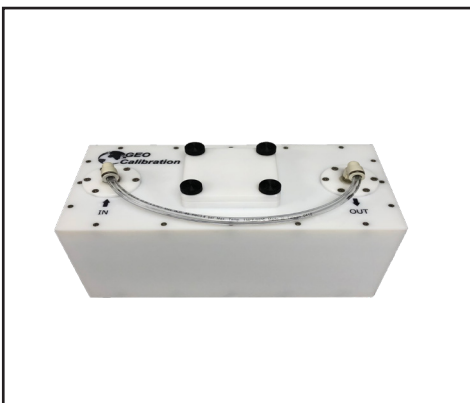
**Chilled Mirror
Internal Door Insert**

P/N: 01-400-01-0021



**Silicone
Adapter Kits**

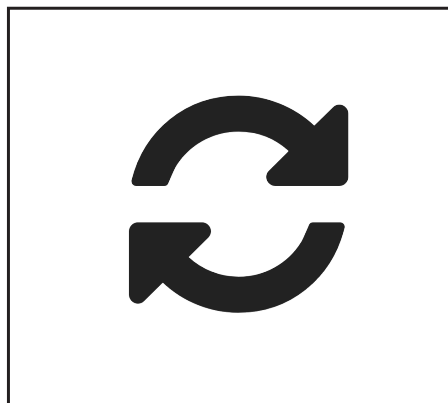
P/N: 01-400-01-0032



**External Desiccant
Canister**

Pre-Filled with molecular sieve

P/N: 01-450-01-0034



**ISO 17025 System
Recalibration**

P/N: 01-999-99-0004

AVAILABLE ACCESSORIES

Humidity Generator			
✓	QTY	Part Number	Description
	1	01-250-11-0001	Desiccant Canister
	1	01-200-36-0002	Control Probe
	1	01-400-01-0001	Hygro Max Accessories Kit
	1	01-400-01-0023	Hygro Max Chamber Insert
	1	01-200-46-0001	US Spec Power Cord / Mains Cable
	1	01-200-46-0002	EUR Spec Power Cord / Mains Cable
	1	01-450-36-0003	Fill Tube (50ml)
	2	01-200-85-0001	4 AMP Fuse (Fast Acting)
	1	01-410-01-0045	Hygro Max Bung Kit

AVAILABLE SERVICE

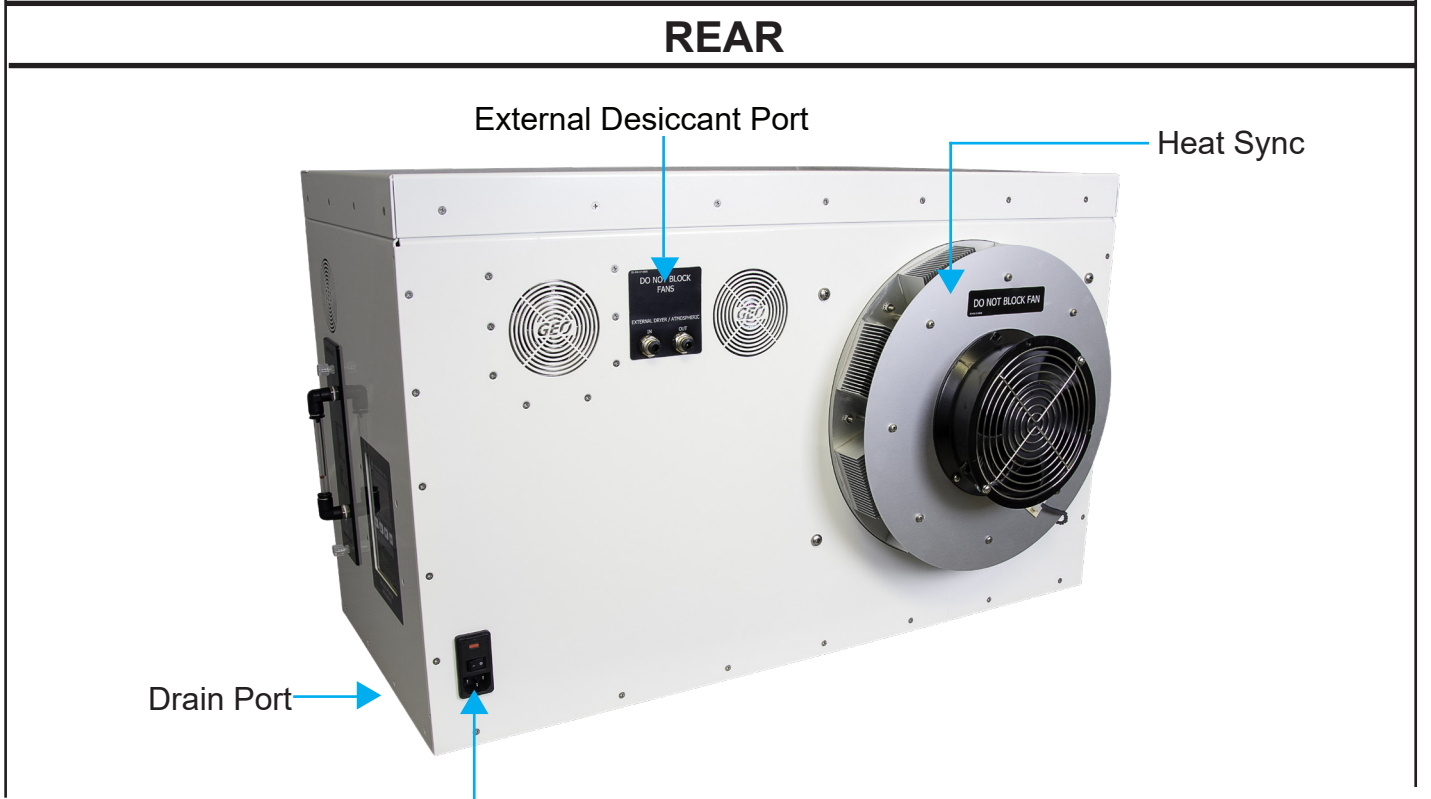
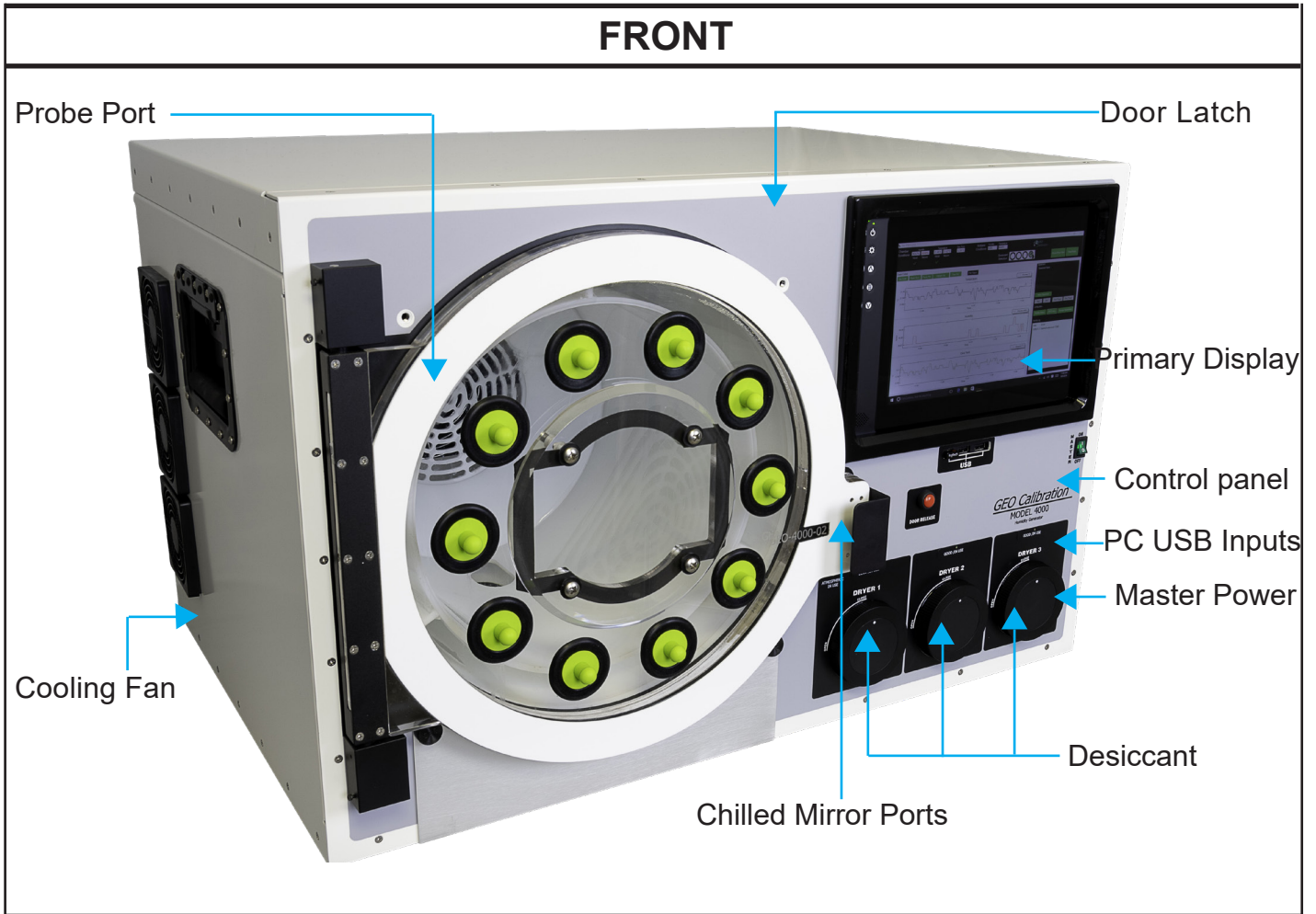
QTY	Part Number	Description
1	01-999-99-0001	ANAB ISO 17025 Calibration Certification

AVAILABLE ACCESSORIES

Grommets / Bungs						
M36 are for Standard Hygrometers PG36 are for Chilled Mirror Adapters						
Part Number	Type		Bung Size		Port Size	
			mm	in	mm	in.
01-004-09-0001	Regular	M36	31.00	1.22"	0.000	0.000"
01-004-09-0002					3.175	0.125"
01-004-09-0003					6.350	0.250"
01-004-09-0004					9.525	0.375"
01-004-09-0005					12.700	0.500"
01-004-09-0006					15.875	0.625"
01-004-09-0007					19.050	0.750"
01-004-09-0008					22.225	0.875"
01-004-09-0009					25.400	1.000"
01-004-09-0020	Slimline	M36	31.00	1.22"	3.175	0.125"
01-004-09-0021					6.350	0.250"
01-004-09-0022					9.525	0.375"
01-004-09-0023					12.700	0.500"
01-004-09-0024					15.875	0.625"
01-004-09-0025					19.050	0.750"
01-004-09-0026					20.950	0.825"
01-004-09-0027					25.400	1.000"
01-004-09-0034	Regular	PG36	44.45	1.75"	00.000	0.000"
01-004-09-0028					12.700	0.500"
01-004-09-0029					15.875	0.625"
01-004-09-0030					19.050	0.750"
01-004-09-0031					25.400	1.000"
01-004-09-0032					31.750	1.250"
01-004-09-0033					34.290	1.350"
01-004-09-0035	Slimline	PG36	44.45	1.75"	9.525	0.375"
01-004-09-0036					15.875	0.625"
01-004-09-0037					25.400	1.00"

UNIT DIAGRAM AND PARTS LISTING

Below you will find a diagram of the Hygro Max's various operational parts.



SIDE



QUICK START GUIDE

This guide is intended to give you the necessary information to quickly get up and running with your Hygro Max humidity and temperature generator.

It includes the following instructions:

- Filling the Reservoir
- Powering On the Unit
- Operating the Front Panel Controller
- Operating the Main Display
- Opening the Door

Read Before Turning On The Unit

1.

After receiving the unit, open the door to let the chamber dry for 10 minutes. Use soft paper towel to wipe the water in the chamber if needed.

2.

Turn on the unit and set the temperature to 30 °C and humidity to 30 % to let the unit settle, approximately for 20 minutes (first time only).

PLEASE NOTE:

1. Do not use alcohol inside the chamber.
2. The above instruction must be followed to ensure unit is dry from any changes during shipping.

FILLING THE RESERVOIR

Supplies Needed

Distilled Water
Only

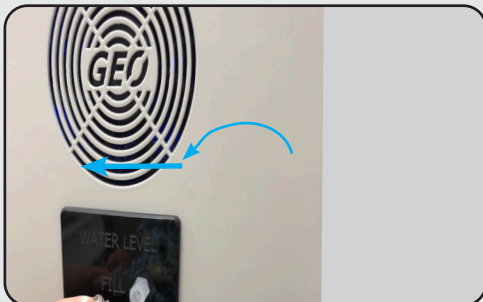


Fill Syringe



1. Locate the Fill Port on the right side panel

The port is located on the center top area of the right panel of the unit.



2. Remove the Fill Cap

Rotate Counter-Clockwise to remove.



3. Attach Fill Syringe to Fill Port

Press the fill syringe tip into the fill port, then rotate the cap clockwise to secure.



4. Elevate and Fill Syringe

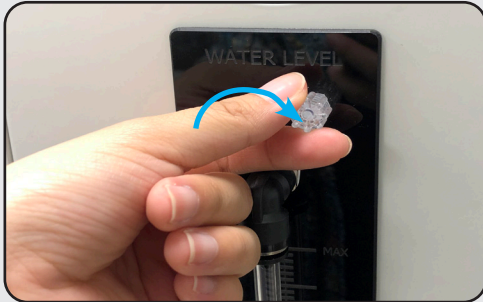
- Pour distilled water into the elevated tube body.
- Take care not to insert any air into the reservoir.
- Monitor the overflow while filling.
- If water exits the overflow, then you have reached the maximum fill level.

FILLING THE RESERVOIR



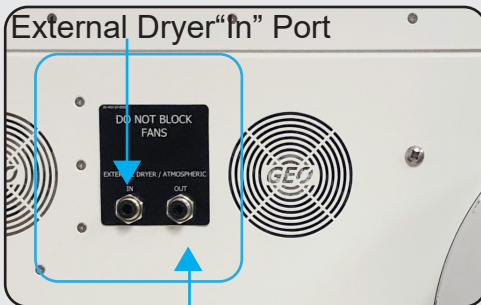
5. Loosen and Remove Syringe

Turn the fill syringe tip counter-clockwise to loosen.



6. Re-Install the Fill Cap

Turn the cap clockwise to tighten the cap and seal the fill port.



External Dryer "Out" Port

PLEASE NOTE:

DO NOT BLOCK OR PUT WATER IN VENT HOLE.
DO NOT PUT WATER IN "IN" OR "OUT" PORT.

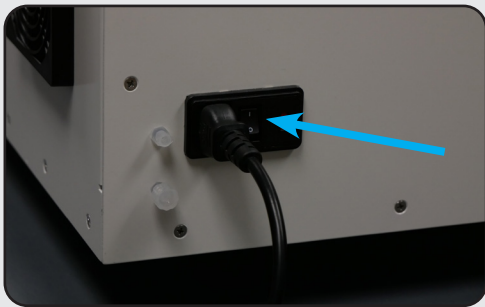
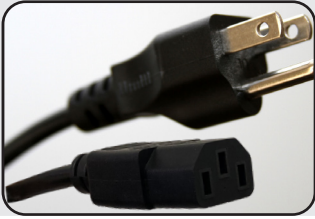


PLEASE NOTE:

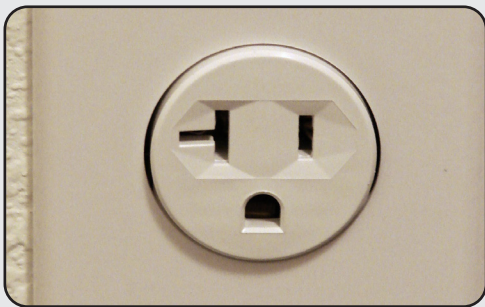
DO NOT FILL WATER ABOVE MAXIMUM FILL LINE.

Supplies Needed

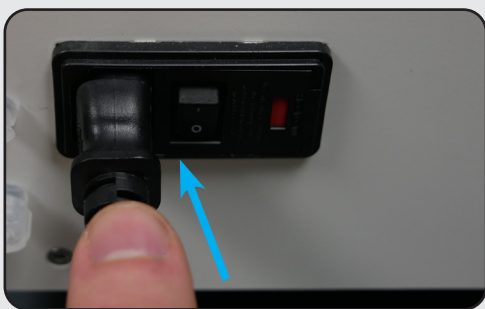
Power Cord



1. Locate the Power Input



2. Plug Power Supply into Wall

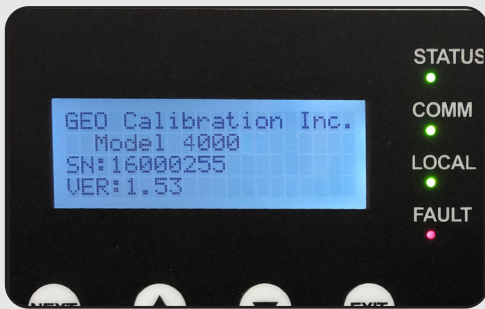


3. Plug Power Supply into Unit



4. Set Power Switches to "ON"

UNIT OPERATION (PID CONTROLLER)



1. Boot Screen

Manufacturer Name
Model Number
Serial Number
Firmware Version Number



2. Observe the Display

Current Temperature	Top Right
Current Relative Humidity	Middle Right
Programmed Temperature	Top Left
Programmed Relative Humidity	Middle Left
Calculated Dew Point	Bottom Left



3. Changing Humidity & Temperature

Pressing the “Next” button activates the set-point interface. The selected field will repeatedly flash its current programmed value. Repeated presses will toggle between the Humidity and Temperature fields.



4. Raise the Desired Set-point

Pressing the “UP” key will raise the selected set-point. Holding the “UP” key will rapidly raise the selected set-point.



5. Lower the Desired Set-point

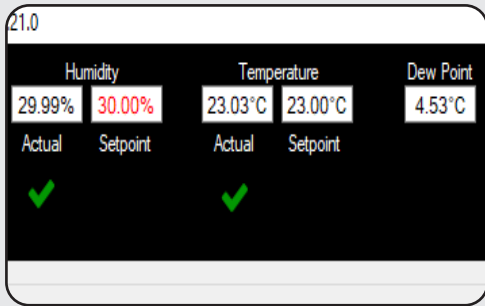
Pressing the “DN” key will lower the selected set-point. Holding the “DN” key will rapidly lower the selected set-point.



6. Commit Your Changes

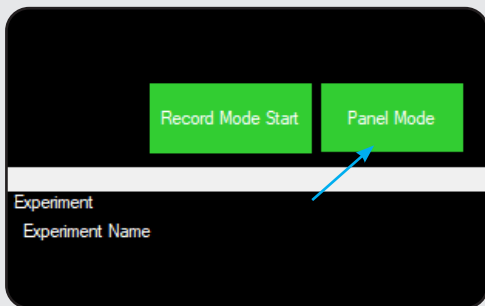
Pressing the “EXIT” key will commit your changes.

UNIT OPERATION (MAIN DISPLAY)



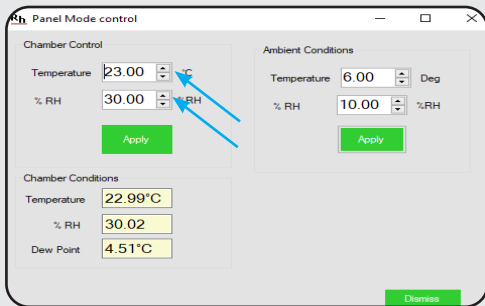
1. Observe the Display

Temperature Setpoint
Relative Humidity Setpoint
Actual Temperature
Actual Relative Humidity
Dew Point



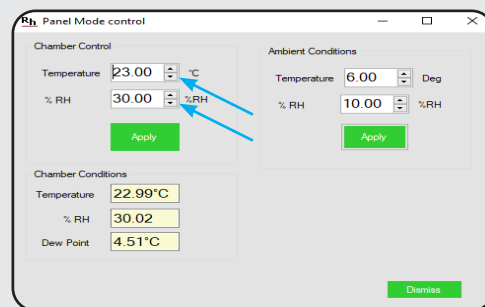
2. Changing Humidity & Temperature

Pressing the “Panel Mode” button activates the set-point interface.



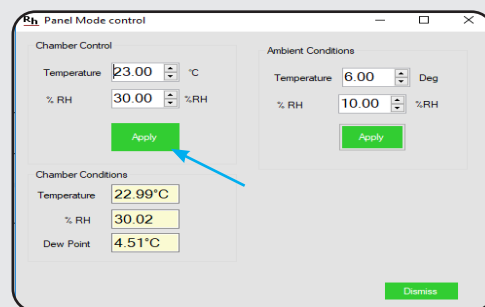
3. Raise the Desired Set-point

Pressing the “UP” arrow will raise the selected set-point.
Holding the “UP” arrow will rapidly raise the selected set-point.
Or Enter the set-point.



4. Lower the Desired Set-point

Pressing the “DOWN” arrow will lower the selected set-point.
Holding the “DOWN” arrow will rapidly lower the selected set-point.
Or Enter the set-point.



5. Commit Your Changes

Pressing the “APPLY” button will commit your changes.

OPENING THE DOOR



1. Power the Unit

In the Hygro Max, the door is electrically powered. Ensure that both power switches are in the ON position.



2. “Push and Press”

Simultaneously, press the door release button while pushing in on the door handle. You will hear an audible “click”. This is the internal latch mechanism releasing.



3. Close the Door

Press firmly on the door handle until you hear the latch mechanism “click” again. This indicates that the internal latch has locked.

GENERAL SPECIFICATIONS

CALIBRATION TO (17025 TRACEABLE TO NIST)	TRANSFER STANDARD	No Charge		
	CERTIFICATE	17025 Validation (Additional Fees Apply)		
OPERATING AMBIENT CONDITIONS	TEMPERATURE	18 °C to 28 °C		
	HUMIDITY	Up to 80 % RH		
CONTROLLED RANGE *WITH DRY NITROGEN OPTION ** WITH ULTRASONIC OPTION	TEMPERATURE	0 °C to 60 °C		
	HUMIDITY@18 °C	1 %* to 95 % RH	HUMIDITY@30 °C	1 %* to 80 % RH
	HUMIDITY@23 °C	1 %* to 99 %** RH	HUMIDITY@40 °C	1 %* to 60 % RH
	HUMIDITY@28 °C	1 %* to 95 % RH	HUMIDITY@50 °C	1 %* to 50 % RH
CALIBRATION SYSTEM ACCURACY	TEMPERATURE	± 0.1 °C	Typically ± 0.05 °C *Based on Probe Accuracy	
	HUMIDITY	± 0.50 % RH Or Better	Typically ± 0.30 % *Based on Probe Accuracy	
	CONTROLLER TYPE	PID Controller		
UNIFORMITY	TEMPERATURE	0.10 °C		
	HUMIDITY	0.30 % RH @ 23 °C		
STABILITY	TEMPERATURE	0.05 °C		
	HUMIDITY	0.10 % RH @ 23 °C		
RESOLUTION	DISPLAY	Temperature	0.01 °C	
		Humidity	0.01 % RH	
		Dew Point	0.01 °C (Calculated)	
RAMP / SOAK RATE OF CHANGE *Depends on ambient and desiccant conditions	TEMPERATURE	High → Low	0.50 °C / minute	*Typical (Based on Desiccant)
		Low → High	1.00 °C / minute	*Typical (Based on Desiccant)
	HUMIDITY	High → Low	1.00 % RH / minute	*Typical (Based on Desiccant)
		Low → High	2.50 % RH / minute	*Typical (Based on Desiccant)

*In high humidity environment, please set the temperature first. Once temperature settled, then set the humidity.

SPECIFICATION ANNOTATIONS

If the desired humidity set-point is higher than 70%,

- * Set the temperature to your desired point first, and let the chamber stabilize. Next, set the humidity to the desired set point.
- ** To achieve low temperature with high humidity, you must first set the humidity value to 70% or lower, and let the chamber stabilize. Then, set the temperature to the desired set point. This avoids condensation appearing within the chamber.

Note:

If condensation is formed in the chamber:

- A. Open the chamber door and wipe any visible water away with a paper towel.
- B. Set humidity to 30% and temperature to 30 °C then let the unit dry and stabilize.

CONSUMABLES

WATER	RESERVOIR	1.75 L
	SPILL RESISTANT	Yes
	REQUIRED FLUID	Distilled Water Only
	EST. REFILL PERIOD	15 Days (Typical) *Depends on Usage
	FILL INDICATOR	Floating Ball
DESICCANT	TYPE	Molecular Sieve
	QUANTITY	3
	USE	Auto Detection and Switch
	REPLACEMENT	When Indicating Desiccant is 3/4 Used
	REPLACEMENT FREQUENCY	Depends Entirely on User Workload
	LOCATION	Front Mounted
	FASTENER	Desiccant Doors
RECALIBRATION	FREQUENCY	Depends on User Uncertainty Requirements Once Per Year Recommended

MECHANICAL AND ELECTRICAL

BODY ENCLOSURE	Material	Powder Coated Aluminum		
GENERATOR DIMENSIONS	Measurement Type	Depth	Width	Height
	Metric	52.15 cm	86.50 cm	51.27 cm
	English	20.53 in	34.05 in	20.18 in
CHAMBER DIMENSIONS	Measurement Type	Depth	Diameter	
	Metric	23.01 cm	34.44 cm	
	English	9.06 in	13.55 in	
WORKING DIMENSIONS AND VOLUME	Volume	21.00 Liters		
	Measurement Type	Depth	Diameter	
	Metric	211.97 mm	32.03 cm	
	English	8.345 in	12.61 in	
CHAMBER ENCLOSURE	Volume	17.00 Liters		
	Material	Carbon Fiber with Aluminum/ Eva Insulation		
PROBE PORTS		12 Ports		
WEIGHT	Metric	50.8 kg		
	English	112.0 lb		
POWER SUPPLY		Universal 100 - 260 VAC - 50/60 Hz		
EXTERNAL INTERFACE	USB	Cable		

CALIBRATION

UUTs (UNITS UNDER TEST)

Port Adapter



Supplies Needed

UUT
[Unit Under Test]



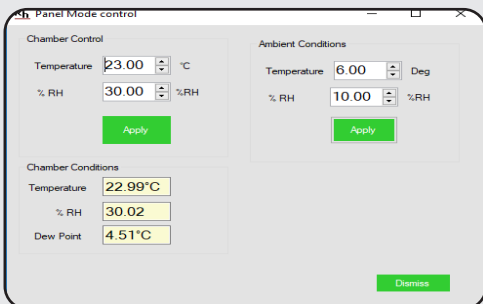
1. Select Port Size Adapter

Measure the diameter of the UUT and select the appropriately sized silicone adapter. Unscrew the Hygro Max door and replace the adapter if necessary. Ensure the door is securely fastened to the chamber.



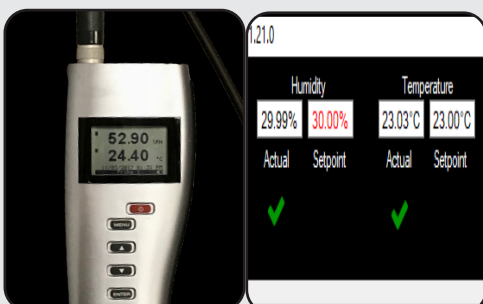
2. Insert UUT

Insert your UUT at least 3 inches into the Hygro Max chamber.



3. Program Unit Set-points

Allow the unit to reach the programmed set-points and settle. To best preserve desiccant, it is advised that you begin multi-point calibrations with low humidity set-points.



4. Compare Readouts

Follow the manufacturer's recommendation for recalibration and programming offsets.

SYSTEM RECALIBRATION

SYSTEM UNCERTAINTY

The absolute uncertainty of the system depends on multiple variables:

- **System Warm Up** – All components must be warmed up and stabilized before doing any calibration, as mentioned before, humidity depends on temperature, and the system must stabilize to ambient room conditions before performing calibrations.
- **Uniformity** – Mixing of the humidity and temperature inside the chamber can cause uniformity issues. GEO has a unique chamber design to achieve high uniformity within all GEO chambers.
- **Sensor/Probe Uncertainty** – This is the largest contributor to system uncertainty and that is why system probes are calibrated using instruments and standards traceable to the National Institute of Standards and Technology (NIST).
- **Controller Error** – Our Controllers use PID loops with calculations down to 7 digits. These calculations have fractional errors that can compound if ignored. GEO's proprietary solutions are able to minimize controller error, leaving only a small amount of uncertainty contribution.
- **Hysteresis** – Hysteresis is the system's error based on its usage history. GEO engineers have developed system modeling techniques to significantly reduce hysteresis uncertainties.

AUTO-CALIBRATION | PC SOFTWARE

This process is only available for licensed customers. For Auto-Calibration procedures please refer to Appendix A.

Customers not having purchased the license for Auto-Calibration software, please refer to the following pages for unit offset calibration.

REFERENCE STANDARD RECALIBRATION

Control Probe / Reference Sensor

Overview

The Hygro Max functions through the use of a dual PID controller. This controller takes the humidity and temperature values from an internal capacitance probe and further performs calculations that are then used to generate the user entered humidity and temperature set points. This sensor is factory calibrated, and upon request, additionally calibrated by an ISO 17025 accredited laboratory using either a chilled mirror or two-pressure primary reference standard.

When calibrating the Hygro Max, the chamber must be measured at a variety of temperatures and relative humidity levels. It is recommended applying measurement guardbands to improve system accuracy and reduce any measurement uncertainties. The Hygro Max's humidity and temperature offsets must be changed if the control probe's readings are found to be outside of the allowed tolerances when compared to the reference.

Capacitive Recalibration Intervals

The scope and uncertainty requirements of this calibration will vary per customer. The capacitance probes that we use have an average drift of 1.0% RH per year. You should account for this interval, as well as your laboratory's uncertainty budget when calculating out your desired recalibration interval. The table below illustrates accuracy drift after 6, 12 and 24 months.

Timeframe	6 Months	12 Months	24 Months
Drift (%RH)	0.5% RH	1.0% RH	2.0% RH

Based on this information, you may wish to shorten or lengthen your calibration interval to respectively increase accuracy or decrease costs.

Chilled Mirror Recalibration Intervals

Chilled mirrors operate by measuring light defraction caused by frost or condensation formation on a mirror. Unless the mirror is damaged, it is not mandatory to recalibrate. It will require periodic cleaning, as per the manufacturer's instructions.

Internal Capacitive Probe - Self Re-calibration Overview

We advise that you return your capacitive reference probe to GEO Calibration for recalibration. However, for customers that are international or operate where policy restricts the use of international services, self recalibration is an option.

The following supplies are needed to recalibrate the internal capacitive control/reference probe:

- HW4 Calibration Software
- HygroClip DI Adapter Cable HC2 Pbe/USB, 6Ft
- A calibration reference with uncertainties of 0.5% RH or better.

REFERENCE STANDARD RECALIBRATION



Self Recalibration Procedure

To read the recalibration procedure of the control / reference probe, please refer to the unit's user manual, and the HW4 software manual found at the following URLs as of publication of this manual:

https://s.campbellsci.com/documents/ca/manuals/hc2-s3-l_man.pdf

<https://goo.gl/n7qE1G>

<https://www.instrumart.com/assets/rotronic-hygroclip2-probes-manual.pdf>

Before recalibration of any control probe, ensure that the unit and probe have both completely settled at 23°C for at least ten minutes.

Maintaining Probe Accuracy

The following text is the recommended maintenance best practices from Rotronic.

“The HC2S3 probe requires minimal maintenance, but dust, debris, and salts on the filter cap will degrade sensor performance. Check the white filter on the end of the sensor for debris. If dirt or salt is engrained into the filter, it should be cleaned with distilled water or replaced. Make sure the filter is connected firmly with your fingers — do not over tighten.

Check the radiation shield monthly to make sure it is free from dust and debris. To clean the shield, remove the sensor from the shield. Dismount the shield. Brush all loose dirt off. If more effort is needed, use warm, soapy water and a soft cloth or brush to thoroughly clean the shield. Allow the shield to dry before remounting.

Replace corroded, discoloured or clogged filters. To replace the filter, unscrew the filter from the probe and pull it straight away, being careful not to bend or damage the sensors. Before putting on the replacement filter, check the alignment of the sensors with the probe, and if necessary, carefully correct the alignment before installing the filter.

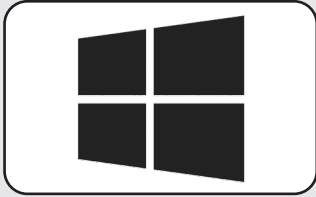
The Teflon filter is recommended when the sensor is installed in close proximity to the ocean or other bodies of salt water. A coating of salt (mostly NaCl) may build up on the radiation shield, sensor, filter and even the sensors. A build-up of salt on the filter or sensors will delay or destroy the response to atmospheric humidity.

Long term exposure of the relative humidity sensor to certain chemicals and gases may affect the characteristics of the sensor and shorten its life. The resistance of the sensor depends strongly on the temperature and humidity conditions and the length of the pollutant influence.”

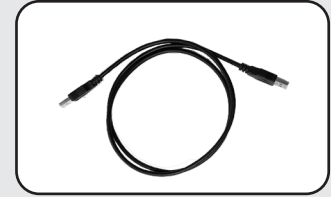
ENTERING HYGRO MAX OFFSETS

Supplies Needed

Windows PC with
USB Port



USB Cable



Unit Calibration Overview

The Hygro Max uses a capacitive internal reference sensor that has an average uncertainty drift of 1.0% RH per year. It is recommended that users recalibrate their unit as needed to fit their overall uncertainty requirements. The factory recommended recalibration interval is once every six months.

Recalibration of the Hygro Max's reference sensor can be done with a two-pressure or chilled mirror primary measurement standard.

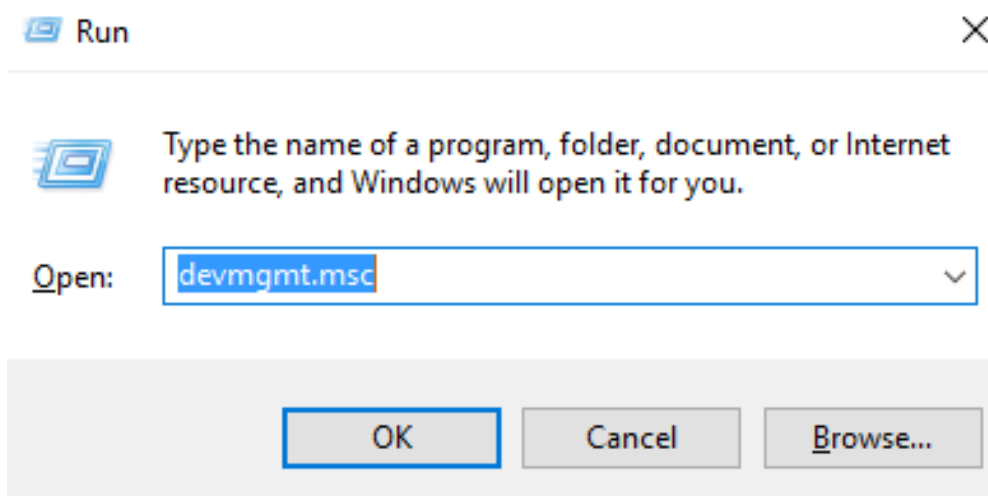
The following software items are required for recalibration:

- Windows Device Manager
- PuTTY *

Accessing the Device Manager

Press and hold the Windows key, tap R, then release both keys.

A Run window will appear. Type **devmgmt.msc** into this window, then hit Enter on your keyboard.



* PuTTY is a free and open-source terminal emulator. It is distributed under the MIT Software License, and is completely free for unrestricted commercial use. For more details on the PuTTY license, [click here](#).

ENTERING THE HYGRO MAX OFFSETS

Reading the COM Port

At this time, plug the unit's power supply into an approved power source.
Plug the USB mouse and keyboard into the Unit.
Toggle both the power switches to the "ON" position.

With Device Manager open, expand the Ports (COM & LPT) menu. While watching the expanded Ports sub-menu, plug the free end of the USB cable into the computer. A new entry will appear, called USB Serial Port. To the right of this text, will be parenthesis. Remember the text enclosed within these parenthesis. This is your COM Port, and will be referenced in the following sections.

Ports (COM & LPT)

Communications Port (COM1)

Communications Port (COM2)

ECP Printer Port (LPT1)

USB Serial Port (COM3)

Installing PuTTY

Visit www.ninite.com/putty to download the PuTTY installation executable file.

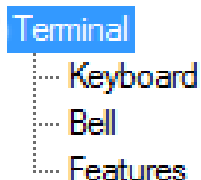
Run the executable and follow the automatic installer instructions to install PuTTY.

Once the installation is complete, run PuTTY by double clicking on the newly created desktop icon.

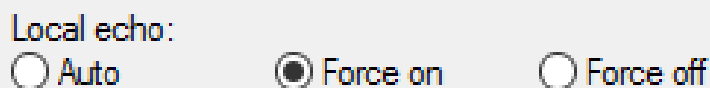
PuTTY Setup

Ensure that PuTTY is running on your computer.

From the Category option on the left side of the window, click Terminal menu item to expand the sub-menu.



Under Local echo, select the Force on button



ENTERING THE HYGRO MAX OFFSETS

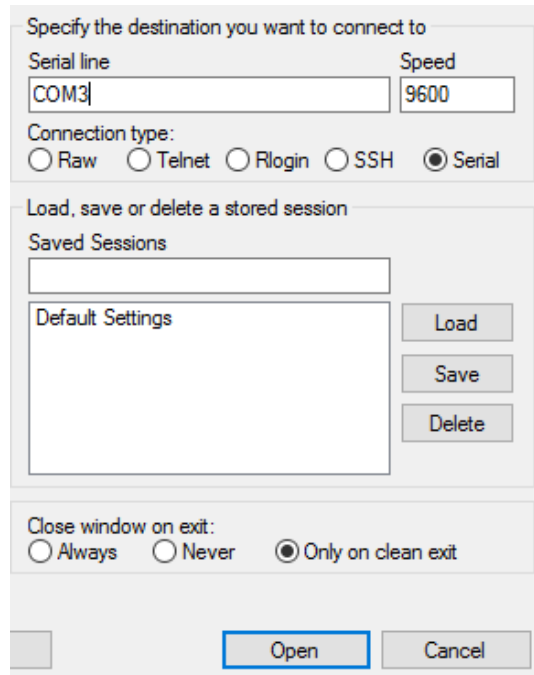
Connecting Through PuTTY

In PuTTY, select **Session** menu under Category on the left

Input your COM Port (reference **Reading the Serial Port** instruction from above) into the **Serial line** field

Under **Connection type**, select **Serial**

Click **Open**



Specify the destination you want to connect to

Serial line: COM3 Speed: 9600

Connection type:
 Raw Telnet Rlogin SSH Serial

Load, save or delete a stored session

Saved Sessions

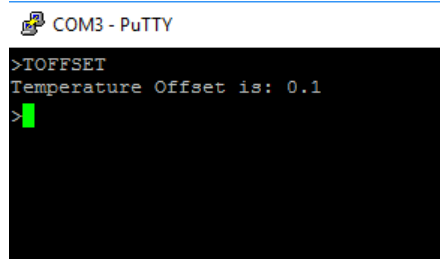
Default Settings Load Save Delete

Close window on exit:
 Always Never Only on clean exit

Open Cancel

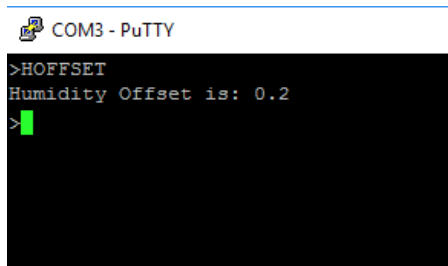
Reading Temperature and Humidity Offsets

Temperature: type **TOFFSET** and press the enter key. The unit will query and display the temperature offset



```
COM3 - PuTTY
>TOFFSET
Temperature Offset is: 0.1
>
```

Humidity: type **HOFFSET** and press the enter key. The unit will query and display the humidity offset



```
COM3 - PuTTY
>HOFFSET
Humidity Offset is: 0.2
>
```


ENTERING THE HYGRO MAX OFFSETS

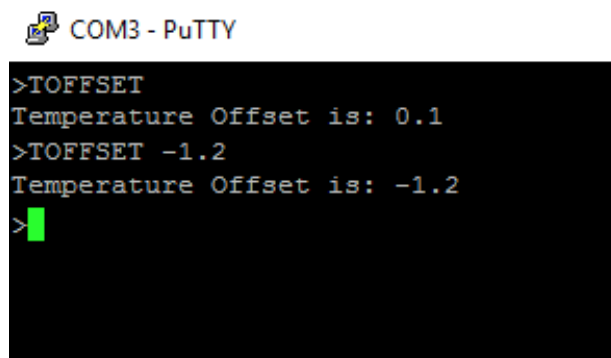
Changing Humidity and Temperature Offsets

PLEASE NOTE:

is a placeholder

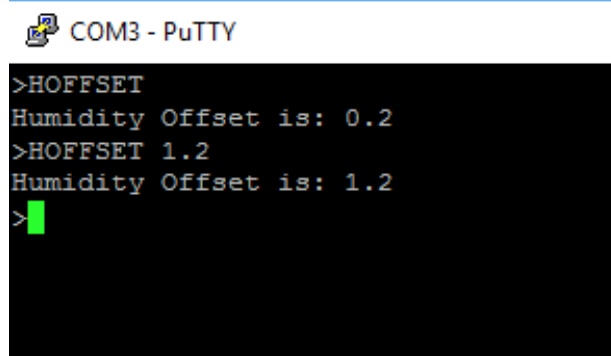
In the following instructions, replace # with your desired integers.
(For example, ## would become 1.2 or -0.2)

Temperature: type **TOFFSET ##** and press the **Enter** key. The unit will query and display the temperature offset. Ensure it has been changed by typing in **TOFFSET** . Press the **Enter** key.



```
COM3 - PuTTY
>TOFFSET
Temperature Offset is: 0.1
>TOFFSET -1.2
Temperature Offset is: -1.2
>
```

Humidity: type **HOFFSET ##** and press the **Enter** key. The unit will set the humidity offset to the new value given by the argument. Ensure it has been changed by typing in **HOFFSET** . Press the **Enter** key.



```
COM3 - PuTTY
>HOFFSET
Humidity Offset is: 0.2
>HOFFSET 1.2
Humidity Offset is: 1.2
>
```

SAFETY WARNING

General Safety Information

- Read all provided and available safety information before you use the Hygro Max.
- Carefully read all available instructions.
- Use only the power cord and supply approved for the voltage for the Hygro Max.
- Replace the power cord if the insulation is damaged or if the insulation shows any signs of wear.
- Make sure the ground conductor in the power cord is connected to a functioning ground.
- Disruption of the ground could put voltage on the chassis that could cause death.
- Use the Hygro Max only as specified, or the protection supplied by the Product can be compromised.
- Do not put the Hygro Max where access to the power cord isn't possible.
- Immediately cease using and disable the Hygro Max if it is damaged.
- Do not use the Hygro Max if it operates in an incorrect way.
- Do not operate the Hygro Max with unit casing removed. Hazardous voltage exposure is possible.
- Use only specified GEO Calibration replacement parts.
- The Hygro Max may only be repaired by approved technicians.
- The Hygro Max reservoir must be completely emptied before shipment.
- Do not use the Hygro Max around explosive gas, vapor, or in damp or wet environments.

SAFETY WARNING

Disposal Safety Information

European Union—Disposal Information



The symbol above means that according to local laws and regulations your product and/or its desiccant shall be disposed of separately from household waste. When this product reaches its end of life, take it to a collection point designated by local authorities. The separate collection and recycling of your product and/or its desiccant at the time of disposal will help conserve natural resources and ensure that it is recycled in a manner that protects human health and the environment.

Locations



GEO Calibration Inc
2190 Smithtown Avenue, Ronkonkoma, NY 11779, USA
Tel.: +001 (631) 471 - 6157 • Fax: +001 (631) 471 - 6158
support@geocalibration.com • www.geocalibration.com

© GEO Calibration Inc. 2020

REPAIRS

UNIT REPAIR PROCEDURE

- **Contact GEO Calibration and request an RMA #**
- **Have the Product information ready such as the purchase date and serial number to schedule the repair**
- **Ship the unit to GEO in the original shipping container or one designed specifically for “Safe Travel”**
- **Apply your RMA # on the outside of the shipping package in large numbers**
- **Apply the top right portion of your quotation with RMA # and barcode to the outside of the shipping package, so that it is visible**
- **Include a copy of all GEO communication documentation inside your package**
- **Estimated Return Ship-Date is 15 business days from the date both the unit and a valid method of payment is received**
- **On the Purchase Order, please ensure the “Vendor Name” is GEO Calibration Inc., and the address is 2190 Smithtown Avenue, Ronkonkoma NY 11779**
- **Payment Terms are “Immediate Payment” from Date of Invoice, FOB Origin, the respective Dollar Amounts, and any return shipping instructions are completed. (Please, do not send a copy of your internal “Purchase Requisition” as we need the actual “Purchase Order” with the above items included)**
- **Reference the RMA # on the completed PO and forward a copy via fax (631.471.6158) or email to: service@geocalibration.com**
- **If credit card is being used for payment and has not been provided as yet, please call +1 (631) 471 - 6157 and provide information; referencing your RMA # when you call**
- **** Exception pricing may apply upon evaluation by the service center. If applicable, this will be presented in a formal re-quote before proceeding****
- **Please note that a “Payment Method” must be on file, reviewed and approved before any service work may begin on your item**
- **If you have any questions do not hesitate to call or email us.**

Please ship the unit to:

Attn: Repairs

GEO Calibration Inc.

2190 Smithtown Avenue

Ronkonkoma, NY, 11779

The United States of America

MAINTENANCE

SERVICE SCHEDULE

- GEO Recommendation**

GEO Calibration recommends that the unit be annually shipped back to our facility for general maintenance.

Daily	Semi-Annual	As Needed
General Cleaning (Use Proper Cleaning Materials)	Control Probe Calibration	Refill Reservoir with Distilled Water
Ensure the Water Reservoir is Filled		Replace Desiccant Canister
Ensure the Ultrasonic Humidity Generator does not have scaling and is free of other detritus.		
Ensure the Desiccant Ports contain at least one fresh canister.		

ERROR CODES AND DESCRIPTIONS

The Hygro Max displays error codes through the secondary display.

These are intended to communicate machine status to the user.

Error Code	Description
“No Analog Detected”	Internal Hardware Fault Detected
“Internal Probe Fail”	Internal Hardware Fault Detected
“No HumGen Temp”	Temperature probe failure.
“HumGen Low Limit”	The temperature of the ambient environment is too low for unit operation.
“HumGen High Limit”	The humidity generator has exceeded a high unit. Perform maintenance check of ambient environment and water supply.
“EEPROM Cfg Reset”	The unit configuration settings have been reset to factor default.
“EEPROM Cal Reset”	Factory calibration data reset to default.
	For questions, please contact GEO Calibration.

Replacing the Desiccant

Overview

The Hygro Max ships with 3 desiccant canisters that must be fresh to provide the user with optimal performance. The desiccant type is molecular sieve, which may be regenerated by the user through heating.

The user must replace the desiccant as soon as they see drying performance begin to degrade. To aid in this process, the Hygro Max has an on-screen indicator that displays once sub par performance is detected.

Instructions



1. Remove the Desiccant Cap

Turn the desiccant cap counter clock-wise until it pops off of the enclosure with surprising force.

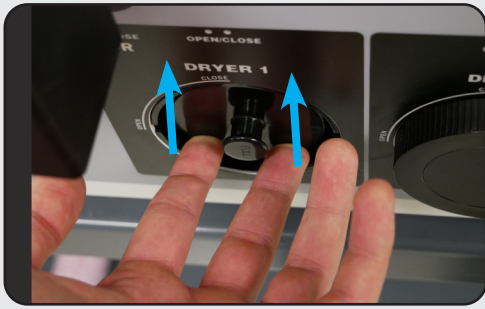


2. Remove Used Desiccant



3. Insert New Desiccant

The end with the nub must be facing the technician.



4. Firmly Press the Desiccant

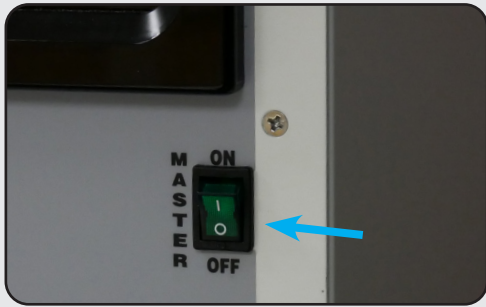
This ensures a proper seal is formed between the desiccant canister and the Hygro Max.



5. Re-Attach Desiccant Cap

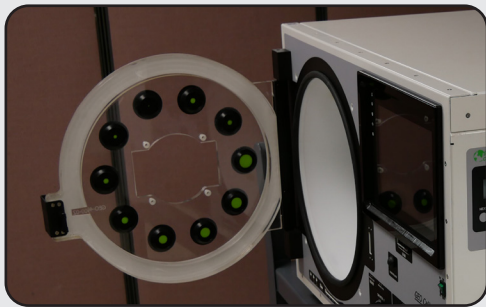
Press firmly while aligning the nubs. Once the cap is flush with the face of the unit, turn it clockwise to seal.

CONDENSATION



1. Power Off the Unit

Ensure that the unit is powered off. This is so that no desiccant is wasted while the unit is not in operation.



2. Open the Chamber Door

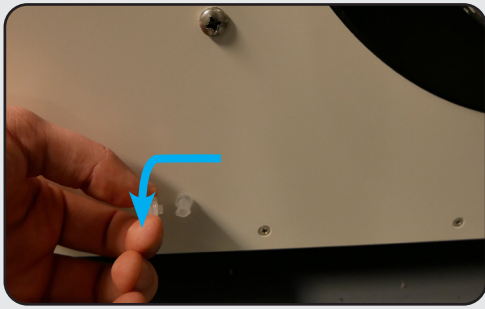
Follow the door opening procedure from the quick start guide.



3. Remove All Chamber Inserts

Remove any chamber inserts. Clean all condensation with an absorbent cloth such as a paper towel or bath towel.

DRAINING THE UNIT



1. Locate the Main Drain Port

Turn the cap counter-clockwise to remove.



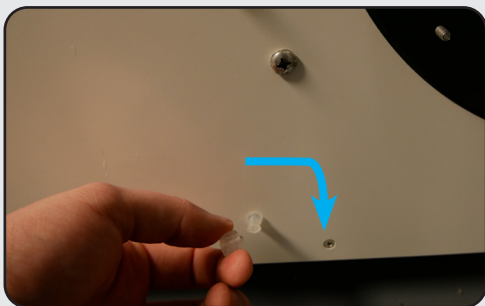
2. Move the Unit to Table Edge

Position a bowl shaped object underneath the unit to catch the drained water.



3. Remove the Drain Cap

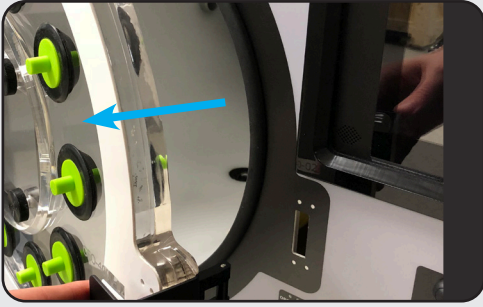
Tilt the unit to ensure maximum water removal.



4. Replace & Tighten Drain Cap

Tighten the drain cap in a clockwise motion. Ensure that the drain cap has a tight seal and no water is leaking.

PROBE REMOVAL

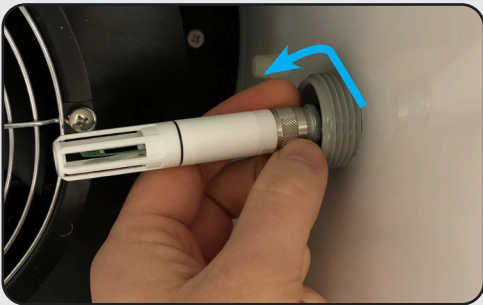


1. Open Chamber Door

Turn the screws counter-clockwise to loosen.
Remove the door.



2. Remove Chamber Insert



3. Loosen Metal Connector

Twist towards the chamber opening to loosen.

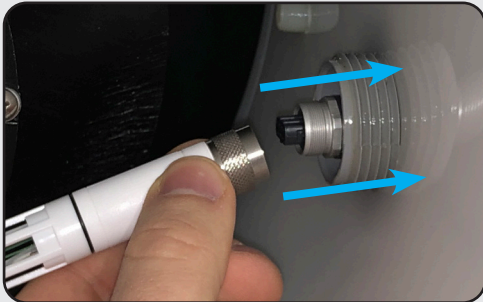


4. Remove Probe Head

PROBE REPLACEMENT

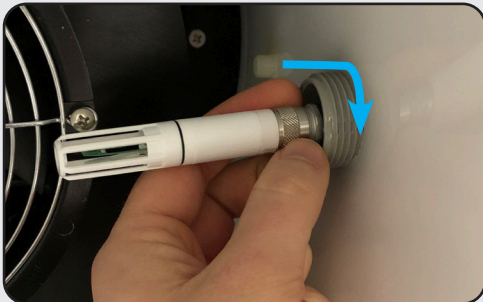


1. Locate Probe Connector



2. Press Probe into Connector

Slowly rotate the probe head as you press into the cabling body. You will feel the probe “seat” itself once the male - female parts align.



3. Secure Metal Connector

Twist the metal connector away from the chamber entrance to secure the probe head to the probe cabling body.

HYGRO MAX DESICCANT SYSTEM



System Overview

The Hygro Max desiccant system comprises of three chambers. Each cylinder supports GEO Calibration brand desiccant canisters that are filled with Drierite Anhydrous CaSO₄ molecular sieve desiccant.

The Hygro Max's unique design allows technicians the freedom to walk away from the humidity generator without worrying that the desiccant will run out and interrupt their calibration routine.

Each desiccant cell operates on its own isolated valve, meaning canisters can be "hot-swapped" out without interrupting any running calibration routines.

LEDs above each cylinder indicate the status of each desiccant to the user.

Desiccant - LED Status Indications

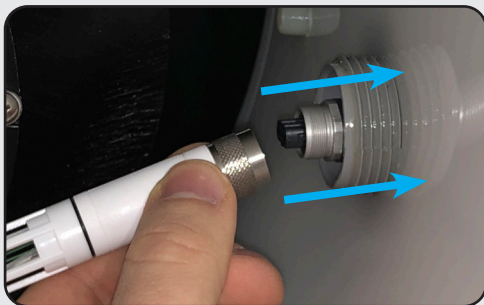
When powered, the Hygro Max will indicate the status of each desiccant cylinder via a pair of LEDs. Each LED has the following settings

- Solid On - Indicates that the desiccant is good
- Flashing - Indicates that the desiccant is in use
- OFF - Indicates that the desiccant is bad and needs to be replaced.

USING A CHILLED MIRROR PROBE



1. Locate Probe Connector



2. Press Probe into Connector

Slowly rotate the probe head as you press into the cabling body. You will feel the probe “seat” itself once the male - female parts align.



3. Secure Metal Connector

Twist the metal connector away from the chamber entrance to secure the probe head to the probe cabling body.

INDUSTRIES

PHARMACEUTICAL
MANUFACTURING

CALIBRATION LABS

BIOMEDICAL / GENETICS

R&D
FACILITIES

FOOD PRODUCTION

AUTOMOTIVE
MANUFACTURING

AEROSPACE / SPACE FORCE

HOSPITAL / MEDICAL

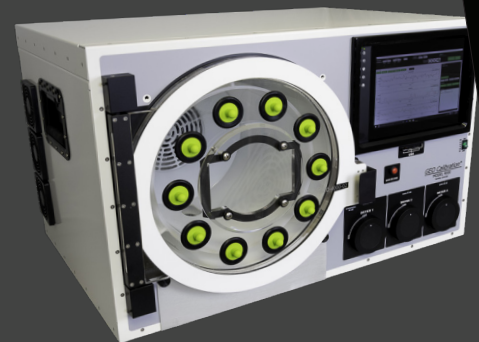
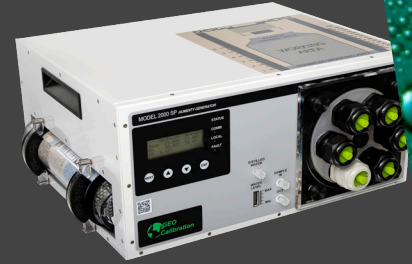
CLEAN ROOMS

CELL PHONE / TOWER
CALIBRATION

EARTH SCIENCE

ARMY AND NAVY

AIRPORT



For a complete product and accessory review
please visit our website: www.geocalibration.com

CONTACT US:



Email: Sales@GeoCalibration.com


Website: www.GeoCalibration.com



GEO *Calibration*

Humidity Control Company



Proudly Made in the USA 

Email: Sales@GeoCalibration.com Website: www.GeoCalibration.com