

MILLER-NELSON REPORTER

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ANNOUNCING THE NEW HCS-501!

This issue of the Miller-Nelson Reporter will focus on the launch of the 501, the latest model of the Miller-Nelson Humidity Control System, with upgrades and improvements that **virtually eliminate flooding and overheating**, as well as provide tighter control of flow, temperature and humidity for better overall operation. Read more...



Benefits of the New & Improved Miller-Nelson HCS-501 Atmosphere Generator

By CR (Gus) Manning

For 30 years, Miller-Nelson has been the leading instrument used in generating flowing atmospheres for gas mask and filter testing. Successive designs of Miller-Nelson equipment (HCS-201, HCS-301, and HCS-401) have been robust, each lasting for approximately a decade. In 2010, Miller-Nelson announced an updated instrument, the HCS-501, paced by an improvement in the sophistication and performance of the basic flow system. In addition to flow control, other areas of the instrument have been improved to address functional challenges commonly encountered in gas mask and filter testing. The improvements included in the Miller-Nelson 501:

- Computer (PROM) Controlled Operation
- Improvement in Flow Rate Accuracy
- Updated Temperature & Humidity Probe
- Audible Alarms & Shut-down Modes to protect the instrument from damage.

Details of each improvement follow:

Computer (PROM) Controlled Operation

The “brain” of the Miller-Nelson HCS-501 has been simplified and improved so that basic functions of the Instrument are driven by a Programmable Read-Only Memory chip that is mounted on a single circuit board and which directs the functions of the Instrument. This has allowed us to reduce the number of circuit boards from two to one. In the HCS-501, functions that were formerly mediated by a network of

operational amplifiers and impedance devices are now directed by commands imbedded in the chip at the time of manufacture. This functionality has allowed us to replace analog components with digital components, providing the following benefits: (a) improvement in flow rate accuracy; (b) protective alarms and shutdowns; (c) simplified repair; (d) reduced drift.

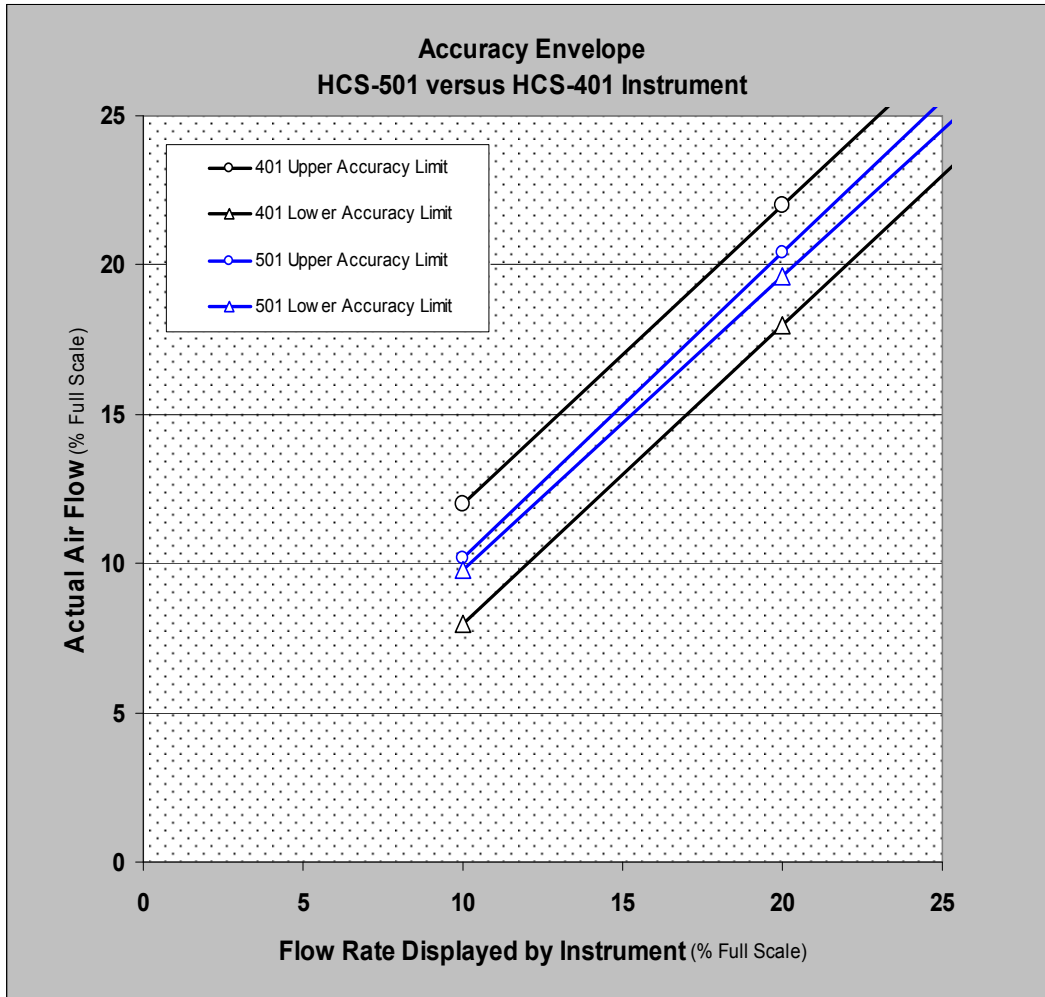
Improvement in Claimed Flow Rate Accuracy All previous models of the HCS are limited by the Flow Rate specifications offered by manufacturers of basic analog Mass Flow Controllers (MFC) used in instruments. The new and improved Miller-Nelson HCS-501 unit utilizes digital Mass Flow Controller technology which permits linearization of the MFC response so that precise calibration is possible across the entire flow rate range, as follows:

| HCS-401 | | HCS-501 | | |
|-------------------------|--------------|-------------------|--------------|-------------------|
| Flow Set-Point (L./min) | Accuracy (%) | Accuracy (L./min) | Accuracy (%) | Accuracy (L./min) |
| 100 | ± 2% | ± 2 | ± 2% | ± 2 |
| 75 | ± 3% | ± 3 | ± 2% | ± 2 |
| 50 | ± 4% | ± 4 | ± 2% | ± 2 |
| 20 | ± 8% | ± 8 | ± 2% | ± 2 |
| 10 | ± 10% | ± 10 | ± 2% | ± 2 |

Benefits of the New & Improved Miller-Nelson HCS-501 Atmosphere Generator (from page 1)

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For any given requirement, the improvement in claimed accuracy will allow use of the HCS-501 Instrument across a much wider range of flow rates than the HCS-401.



Updated Temperature and Humidity Probe The updated Temperature/Humidity Probe with the HCS-501 has the following new features, compared to the Probe provided with the HCS-401 Instrument.

- New Détente mechanism protects sensors from damage
- Probe attaches to Instrument via snap-in mechanism
- Gradual adjustment of Temp & RH makes calibration easier
- **Calibration Chamber** now available (including chemically pure RH salts, see page 3).

Audible Alarms and Protective Shut-Down Modes

With its computer control, the HCS-501 features several

alarms and shut-down modes that protect the Instrument from damage when certain faults occur, as follows:

1) **System Queries, Alarms & Shut-Downs**

The HCS-501 microprocessor incorporates a program that queries Air Flow, Water Pressure, and Water Level Sensors and implements Alarms and Shut-Downs when any sensor signals an abnormal condition.

2) **Air Flow Alarm & Shut-Down Sequence**

If the Air Flow Sensor signals “insufficient air flow,” the System sounds an Alarm and prevents activation of the Air Heater or Water Heater, preventing heat damage to the Instrument which might result from insufficient air flow.

3) **Water Pressure Alarm and Shut-Down Sequence**

If the Water Pressure Sensor signals “insufficient water pressure,” the System sounds an Alarm and prevents activation of the Air Heater or Water Heater, preventing heat

damage to the instrument which might occur due to insufficient water pressure.

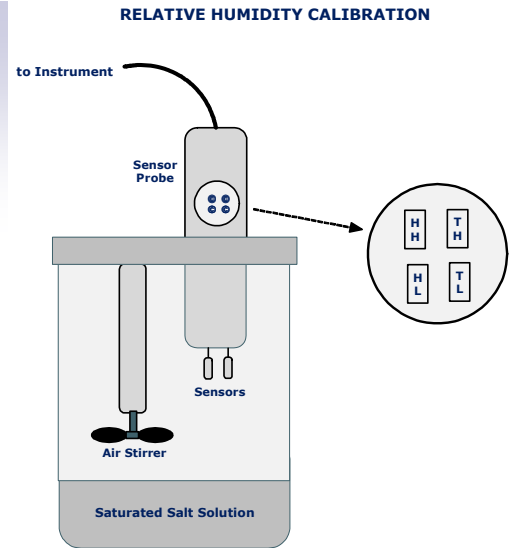
4) **Water Level Alarm and Shut-Down Sequence**

If the Water Level Sensor (float switch) is below the Set-Point (desired water level), the System calls for a water fill. If the water fill is not concluded within a specified time interval (indicated by the float switch changing state), the System initiates a FAULT and all power is shut-down. Since neither heating nor water fill can occur during a FAULT, this sequence protects the instrument from overheating and from flooding as a result of a failure of the Water Level Sensor. Instead, the Instrument is “fail safe.”

RH CALIBRATION CHAMBER

Provided with chemically pure RH salts, to calibrate your probe with confidence. Available only through Assay Technology.

The temperature-humidity probe has electronic sensors that are subject to drift, especially if they become wet or damaged. For critical applications, calibrate the humidity sensor weekly, or prior to each use. This unique RH Calibration Chamber is designed to contain saturated salt solutions that provide a known RH at various temperatures, a circulating fan, and top-loading fitting for the probe. Item No. MN-8001-RHCC. Contact us for pricing at bgreen@assaytech.com.



New Applications for the New & Improved Miller-Nelson HCS-501 Atmosphere Generator

By CR (Gus) Manning

For decades, Miller-Nelson has been the leading instrument used to generate flowing atmospheres for gas mask and filter testing. In general, the Miller-Nelson Instruments have been designed and marketed with a primary focus on the laboratory test applications performed by the gas mask and filter testing community.

Recently, we have become aware of features of the Miller-Nelson HCS-501 Instrument that recommend it to applications, other than gas mask and filter testing, that also require the generation of a substantial flow of conditioned air at a specific relative humidity.

One such application is the fabrication of temperature and humidity-controlled boxes, chambers, and rooms for controlled environmental storage testing of products. For example, food, drug, cosmetic, and similar products, must stand up to the temperature and humidity conditions present in the many locales where they may be warehoused. The era of global marketing has expanded the range of environmental conditions that products must endure. Environmental storage testing is on the increase, and the HCS-501 can help.

How the Miller-Nelson HCS-501 Atmosphere Conditioner Works

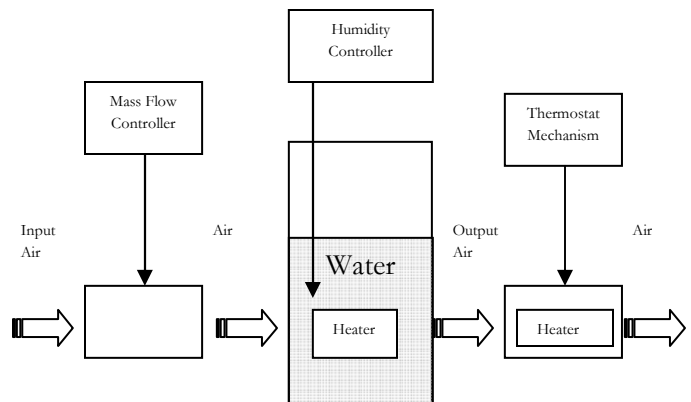
Air Flow Rate Control—Air received by the Instrument initially passes through a Mass Flow Controller (MFC) that controls air flow in response to the set-point established by

the Operator. The MFC controls air flow referenced to standard conditions (25°C, 1 atm) regardless of temperature and pressure variations in the system.

Humidity Control—Following the MFC, air flow passes across the surface of a water reservoir that is heated in response to RH sensor signals interpreted by the humidity controller. The water heater runs continuously if the humidity is below the set-point established by the Operator (and intermittently as the set-point is approached) to achieve the desired water vapor pressure and, consequently, the desired humidity in the flowing air stream.

Temperature Control—After humidification, just prior to exiting the Instrument, the air stream passes over a cartridge heater that brings the output air to the temperature set-point established by the Operator.

How the Instrument Works



New Applications for the New & Improved Miller-Nelson HCS-501 Atmosphere Generator (from page 3)

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Temperature and Humidity Display—As the air stream leaves the Instrument, two sensors mounted in the Sensor Probe measure the temperature and humidity. In addition to providing feedback signals for temperature and RH control, the readings from the sensors are displayed on the Instrument's Front Panel providing real-time display of temperature and RH.

Flow Rate Display—A signal from the main Mass Flow Controller is displayed on the Front Panel as a real-time display of flow rate.

Flow, Temperature, and Humidity Analog Outputs—Jacks, included on the back of the Instrument, provide recorder outputs for flow, temperature, and RH.

What the Miller-Nelson HCS-501 Atmosphere Conditioner Can Do

Given an input of dry or semi-dry air, the HCS-501 can generate up to 500 liter/min of air at a pre-set humidity level in the range of 20-90% RH.

| Test Chamber Dimensions | | | Test Chamber Volume | | Instrument Flow Rate | Chamber Air Turnover |
|-------------------------|----|----|---------------------|---------|----------------------|----------------------|
| L | W | H | (Ft ³) | (Liter) | (L/min) | (changes/hr) |
| 12 | 12 | 12 | 1 | 28 | 20 | 42 |
| 24 | 24 | 24 | 8 | 227 | 20 | 5 |
| 24 | 24 | 48 | 16 | 453 | 50 | 7 |
| 48 | 48 | 48 | 64 | 1812 | 100 | 3 |
| 60 | 60 | 60 | 125 | 3540 | 200 | 3 |
| 72 | 72 | 72 | 216 | 6117 | 500 | 5 |
| 80 | 72 | 72 | 240 | 6797 | 500 | 4 |
| 96 | 72 | 72 | 288 | 8156 | 500 | 4 |
| 96 | 72 | 72 | 288 | 8156 | 500 | 4 |

Thus, if one desires to operate a chamber or room at a pre-set humidity, installation of the HCS-501 can establish and maintain control of a chamber of moderate size, up to 'room size' chambers.

Probe Adapters Available for the HCS-501

You may now use your SJP-200b-2 probe from the HCS-401 with the new HCS-501 Instrument. The Probe Adapter provides the necessary connections to allow the SJP-200b-2 probe to function on the new HCS-501. Contact us for details and pricing information at bgreen@assaytech.com.

The Miller-Nelson HCS-501 Instrument can convert a small room into a Controlled Humidity Test Chamber in a few minutes.

Performance of HCS-501 Instruments for Chambers of Various Sizes

In fact, the Miller-Nelson HCS-501 Instrument can convert a small room into a Controlled Humidity Test Chamber in a few minutes.

What the Miller-Nelson HCS-501 Atmosphere Conditioner Can Not Do

The HCS-501 Instrument provides air at a controlled flow rate, temperature and humidity. Once the conditioned air is delivered into your chamber, the temperature of the chamber will fluctuate based on its thermal mass, insulation and the external environment. Therefore, for the HCS-501 to work properly, it will be necessary for you to provide sufficient heating/cooling to maintain temperature of your chamber. The HCS-501 will control the absolute humidity, and, if the chamber's temperature control is adequate, the relative humidity will also be controlled.

If this explanation is not clear, please contact us for a deeper discussion, at gmanning@assaytech.com.