

Jerry Eldred

From: Mike Hamilton <mhamilton@thunderscientific.com>
Sent: Thursday, January 17, 2019 6:07 PM
To: Jerry Eldred
Subject: RE: Uncertainty Calculations Needed for our Thunder Scientific 2500

Hello Jerry,

Below are instructions to download and install the latest version of HumiCalc with Uncertainty. HumiCalc with Uncertainty is compatible with Microsoft® Windows 10 (x86 or x64), Microsoft® Windows 8/8.1 (x86 or x64) and Microsoft® Windows 7 (x86 or x64). Please email or call if you have any problems or questions.

HUMICALC WITH UNCERTAINTY APPLICATION DOWNLOADING

1) Click the below link to download the installation zip file (**Password is humicalc3011**) Note that the link is only valid for 14 days.

[HumiCalc_with_Uncertainty.zip](#)

Note: If you have problems with your firewall blocking the download link above then you can download the Demo version from our website and activate it manually with the same product key:
<http://www.thunderscientific.com/software/downloads/humicalc-demo/HumiCalcDemo.zip>

2) Extract the contents of the downloaded zip file to your computer.

HUMICALC WITH UNCERTAINTY INSTALLING

- 1) Locate the extracted files.
- 2) Click the setup.exe file to begin the installer.
- 3) Follow the on-screen installer directions.

HUMICALC WITH UNCERTAINTY STARTING

- 1) Locate and double-click the HumiCalc icon.
- 2) The splash screen will appear once the program is initialized. Note: It may take some time for the banner screen to be displayed after installing the application.
- 3) The splash screen will display a loading status near the bottom, once loading is complete the splash screen will close and the main window will be displayed.

HUMICALC WITH UNCERTAINTY ENTERING PRODUCT KEY

- 1) The first time you run HumiCalc a HumiCalc Product Key Dialog will appear if no valid license is present.
- 2) Enter your "Name", "Organization" and the following "Product Key"

3) Click Ok to save the license information.

Michael Hamilton

Thunder Scientific Corporation

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From: Jerry Eldred <jerrye@tescomusa.com>

Sent: Thursday, January 17, 2019 4:40 PM

To: Mike Hamilton <mhamilton@thunderscientific.com>

Cc: Jeff Bennewitz <jbennewitz@thunderscientific.com>

Subject: RE: Uncertainty Calculations Needed for our Thunder Scientific 2500

I wrote the original email from work, and I am at home now. But the short version is that the 2500 was bought when we were Motorola Semiconductor (later Freescale Semiconductor) in Tempe AZ. They sold us off in 2007, and the Tempe lab eventually closed, and the 2500 was transferred here to Austin, where we were acquired by Tescom. I believe we still have the big loose leaf binder. If the Software is in there, we may still have it, and I am guessing at least as old as early 2000's revision.

So if you could send a new rev, I believe that would be very helpful.

I will plan on purchasing RISP-5.

Thanks for all the great information.

Best Regards,
Jerry Eldred

On Jan 17, 2019 5:06 PM, Mike Hamilton <mhamilton@thunderscientific.com> wrote:
Hello Jerry,

The RISP 5 is a great document and I'm on the committee that maintains that RISP. I would highly recommend purchasing it if possible. To start I would recommend reviewing our [Uncertainty Analysis](#) and the [Chamber Temperature Uniformity Analysis](#) on our website for the 2500. I also attached our document "Thunder Scientifics Guideline for Reporting Uncertainty" for guidelines regarding reporting uncertainty for the Model 2500 using the 0.5 %RH specification.

To build your own budget from the ground up the calculations are somewhat difficult due to the partial derivatives of the vapor pressure equations that are required for the uncertainty calculations. I recommend using our HumiCalc with Uncertainty application to perform the humidity uncertainty calculations as it does all the math for you. I included an example "how to" that demonstrates a simple humidity uncertainty calculation. If you have any questions or concerns, please feel free to email or call.

P.S.

You should have a copy of HumiCalc with Uncertainty that came with your 2500, but let me know if you don't have version 3.0.1.1 and I will send you a link to download it.

Michael Hamilton

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From: Jeff Bennewitz <jbennewitz@thunderscientific.com>

Sent: Thursday, January 17, 2019 3:47 PM

To: Mike Hamilton <mhamilton@thunderscientific.com>

Subject: Fwd: Uncertainty Calculations Needed for our Thunder Scientific 2500

Mike,
Please reply to this customer.
Thank you,
Jeff

Sent from my iPhone

Begin forwarded message:

From: Jerry Eldred <jerrye@tescomusa.com>

Date: January 17, 2019 at 3:24:38 PM MST

To: "support@thunderscientific.com" <support@thunderscientific.com>

Subject: Uncertainty Calculations Needed for our Thunder Scientific 2500

Greetings,

We own and use our Thunder Scientific 2500 and have been very happy with it over the years we've owned it. We are self-maintainers and have skilled staff who calibrate it as well.

We have a new challenge which requires us to generate measurement uncertainties in accordance with ISO17025 on some RH sensors and chart recorders, etc. that we use the 2500 to calibrate. I am just getting started on this project, but need to do it pretty quickly. We have accredited standards for both pressure and temperature that we will use to calibrate the 2500, and I am pretty well versed in developing uncertainty budgets. I am also somewhat versed in the physics principles involved in 2 pressure humidity generation.

What would be very helpful is if there was a document breaking down the math involved in applying absolute pressure and temperature in uncertainty calculations for relative humidity on the 2500.

Do you have available any documentation, or perhaps an Excel spreadsheet that would assist in these calculations? I've also noted that NCSLI has an RISP-5 recommended practice document "2-Pressure, 2-Temperature Humidity Generator 2017" covering the 2 pressure method of humidity generation. I am an NCSLI member and can buy a copy if it would be useful for this. Would this document include useful detail for these uncertainty calculations? Or is it more general information?

Thanks very much for any assistance you could give.

Best Regards,

Jerry L. Eldred

Technical Manager Calibration & Thermocouples

Director of Technical Training

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