

A modern laboratory where chart recorders are replaced by digital thermo-hygrometers

Your business depends on accurate records

As a calibration service provider, it's not enough that your work has to be more accurate and completed in less time than ever before – you're also required to maintain meticulous records and satisfy strict standards of quality management. Like it or not, your calibration business depends on keeping accurate and accessible records of temperature and humidity, but if you're storing years of paper charts to maintain compliance, you're giving yourself a headache that you could do without. So what's the secret to getting rid of paper charts for good?

Here's the secret

The secret is to move to a modern digital thermo-hygrometer. With today's technology, it's really a no-brainer to replace old analog devices with more state-of-the-art digital versions. Instead of mechanically recording data with a pen on a rotating piece of paper, data can be recorded digitally, accessibly, reliably and with sufficient resolution to render paper charts completely obsolete. These new devices can often be read easily from a distance and have the capability of recording data that can be accessed easily from any computer desired on the network.

The purpose of this application note is to show you why switching from paper charts to more state-of-the-art digital devices will free up your valuable time to focus on revenue generating activities rather than searching for missing charts, lubricating and repairing mechanical linkages, eyeballing squiggly lines, or guessing the values of missing data from a pen that went off the chart.



The lost art of eyeballing a paper chart

It ought to be easier than this

You know why you keep temperature and humidity records in your laboratory: compliance. Whether it's an auditor, customer, or regulator, somebody is going to come into your laboratory and expect you to have records showing that you complied with whatever requirements have been set for your laboratory and the equipment you are calibrating.

Now, with the accreditation genie out of the bottle, many of us find ourselves complying with even stricter requirements than we have ever seen before. Accreditation leads to audits, and audits lead to lots of time chasing down answers to questions that take us away from the difficult job of trying to make a living in an extremely competitive market.

There's also the fact that paper charts are mechanical devices that have mechanical problems. Data is recorded with pen and ink and the resolution is nothing like modern digital instruments. Those pens run out of ink and the chart recorders lack the courtesy of telling you when they do. Ever hear of data that was off the charts? If you have a serious problem with your environmental controls, that's exactly what's going to happen to you. The data will be off the charts and you will be breaking out a pencil and a ruler to try to deduce how bad the problem might have been. But you will never really know.

By the way, if you take Monday off, the chart keeps going right over the top of last week's data. Think that somebody else is responsible for changing the paper chart? You might find several weeks of data scribbled all over the same piece of paper and now you have to use your super powers of guessing and deduction to decipher the mess. Perhaps discipline is not a problem in your



laboratory, but wouldn't you sleep better knowing you were covered?

Another problem is charts are easily misread. For example, the T-scale and the H-scale are different on the same graph and have different axes. You can't read them from across the room. You might try to read the digital display, but these rarely match the official record made with pen and ink. If somebody pulled a chart looking for data, they might not put it back in the right order. Then you're left with the delicate job of sifting through piles of paper trying to find the missing chart while an impatient auditor waits, clearly thinking you haven't got your act together. And when you can find them, you're stuck with eyeballing squiggly lines to judge what the average might have been over the period of the calibration.

Calibrating chart recorders isn't easy either. If you calibrate them yourself like many people do, you know it involves time consuming repairs and lubrication of mechanical linkages. Your technicians will thank you and your bottom line will be rewarded if you remove these devices that are sucking time and resources away from productive activity in the lab.

1620A “The DewK” Thermo-Hygrometer

The modern solution

The modern thermo-hygrometer records temperature and humidity data digitally. The information is stored in memory rather than on paper. The memory can be retrieved, backed up, security protected and kept in compliance with standards or regulations relating to digital records.

These instruments have some of the same needs and features as the instruments they replace, such as accuracy, traceability, power supply, and the ability to be mounted in a convenient location. However, modern instruments can be connected to networks, allowing information to be stored in databases with access granted to users with security rights. Alarms can be set to alert managers and technicians of problems in real time, with some software able to send email messages to pagers and cell phones. In addition, battery backup in some instruments means that even if the power goes out, you have a continuous record of temperature and humidity that takes all the guess-work out of the process of recovering from an already difficult situation.

One of the benefits of these modern devices is that you no longer have to stress over the environmental conditions of your laboratory. Alarms tell you when there is a problem with temperature or humidity or the rate of change of either of those parameters. In addition, you can see the real data if something strange happened overnight, because there is no such thing as off the chart for modern digital devices.



Finally, it's much easier to get to your historical data. You don't have to worry that the chart you are looking for has been misplaced and you don't have to dig through boxes of paper charts to find it. Software packages for logging data make it easy to track data, monitor trends, and annotate data that was out of tolerance to keep you organized and make your audits go much easier.

Top 10 considerations to look for when choosing a digital thermo-hygrometer

1. Large display

Why should busy technicians have to put down their work, get out of their chair and squint at a bunch of squiggly lines to see whether or not they are in compliance? With a large digital display, your state of compliance is visible to everyone in the room because everyone can see your official conditions of temperature and humidity.

2. Sufficient accuracy

How confident are you in your environmental conditions? For many calibrations this information is critical. You owe it to yourself and your customers to be sure that your readings are sufficiently accurate to be sure that your calibrations are reliable.

3. Accredited Calibration

If you are part of an accredited lab, or even if you are not, your auditor is going to be more confident if your instruments have accredited calibrations.

4. Sufficient memory

Memory is so inexpensive that it is very easy to store all of the data you need. But if you don't make sure you have enough, you could suffer data loss, and that can be as bad as the potential problems you have with traditional paper charts. Also, make sure that your solution places time and date stamps on the readings in its memory.

5. Detachable smart sensors

One of the potential advantages of a digital thermo-hygrometer is that instead of sending the entire unit out for calibration, you could simply swap sensors and send only the sensors due for calibration out of the lab. Smart sensors make this possible because all of the calibration information is contained inside the sensor. The digital display is only a display and never needs to be calibrated. This reduces your costs, because extra sensors are less expensive to own, store, and ship than an extra chart recorder.

6. Support for hot-swapping sensors

Hot-swapping means that you don't have to shut anything down to replace one sensor with another. The advantage is that when you replace one temperature/humidity sensor with another, you still have continuous readings in your records for a particular room.

7. Ethernet support

With Ethernet it's easy to plug your digital thermo-hygrometer into the network and have all of your data at your fingertips, available to anyone who needs it. The only problem with Ethernet is that running wires around the lab can be complex and time consuming.

8. Wireless support

Wireless networking is even better than Ethernet. You still have the advantage of having all of your data at your fingertips, but you don't have to run wires through the ceiling or live with the clutter of having cables running everywhere.

9. Battery backup

Your insurance against power outages is the battery of your thermo-hygrometer. Make sure that your instrument enables continued measuring during power disruptions.

10. Customizable software

If you want to get the most out of your thermo-hygrometer, take advantage of the powerful software available that enables trending, client-server database access, network security, log session statistics, and other useful analysis and annotation tools for your data history.

Connect to all of your data on the network

A good day in the lab

Imagine this: you walk into your lab on Wednesday after an extended holiday weekend. You're not concerned that somebody forgot to replace last week's paper chart with a fresh one, because you have a digital thermo-hygrometer and all of the data is being stored in local memory and on the network in a database. A potential customer visits your lab and sees the sleek new digital thermo-hygrometers around your facility. He feels a little more confident about your operation than he would have if he saw old outdated equipment. During your next audit, you are confident that there will be no unpleasant surprises, because an alarm immediately notifies laboratory personnel when there is an out-of-tolerance condition. During the audit there are no findings with your environmental records, and during the following audit the auditor decides to focus attention on something more interesting. Isn't this the way things ought to be?

How to make it happen

One way to make all of this happen is with the model 1620A "DewK" Thermo-Hygrometer. The DewK has a large display that is easily visible from 25 feet away. The high-accuracy sensor of the 1620A-H reads temperature to $\pm 0.125^\circ\text{C}$ over a calibrated range of 16°C to 24°C , and the relative humidity readings are to $\pm 1.5\%$ RH from 20% RH to 70% RH. The standard-accuracy sensor reads temperature to $\pm 0.25^\circ\text{C}$ over its calibrated range of 15°C to 35°C . Relative humidity readings are to $\pm 2\%$ RH from 20% RH to 70% RH.

The DewK has hot-swappable smart sensor modules that make recalibration much easier than it is for traditional chart recorders. Each sensor module measures temperature and humidity and has self-contained calibration coefficients. The sensor modules are



disconnected from the base unit (the display), and freshly calibrated replacements are reconnected in their place. Only the sensor modules need to be returned for calibration. In fact, it's the accredited calibration of these sensors that is responsible for the high accuracy of the DewK.

The onboard memory of the DewK can record up to 400,000 time-and-date-stamped temperature and humidity measurements. Data can be retrieved via RS-232, Ethernet or wireless communications. With powerful LogWare III software, the data can be stored continuously in a client server database that allows anybody else on the network with a license and appropriate security credentials to access the data. LogWare III is highly customizable, plots trends, triggers alarms and emails based on user-defined events such as high humidity, or temperature rate of change. To ensure that data is never lost, even in the event of a power failure, the DewK has battery backup. So even if you worry the network could go down when the power fails, you can sleep easily knowing your data can always be retrieved from the onboard memory of the DewK.



Logical next steps

When you switch from paper charts to digital thermo-hygrometers, plan on a 30-day transition period. Run both systems simultaneously while you make sure that everything is working properly and that the data is being recorded as expected. Make sure you understand the alarms, and have them set according to your preferences. Test this during this transition period to make sure they trigger when you expect them to. One mistake some labs make is to set them tighter than necessary. Alarms can be disruptive, so you don't want to trigger them unnecessarily. Be sure only those you trust have access to alarm settings, understand what the expectations are, and have the discipline to meet those expectations. Finally, be thoughtful about the way you choose the sample rate of your environmental conditions. It is unlikely that you will need to record the data every few seconds. In most cases an interval such as every five minutes will be adequate, so avoid unnecessarily overfilling your database by collecting data you don't want or need.

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