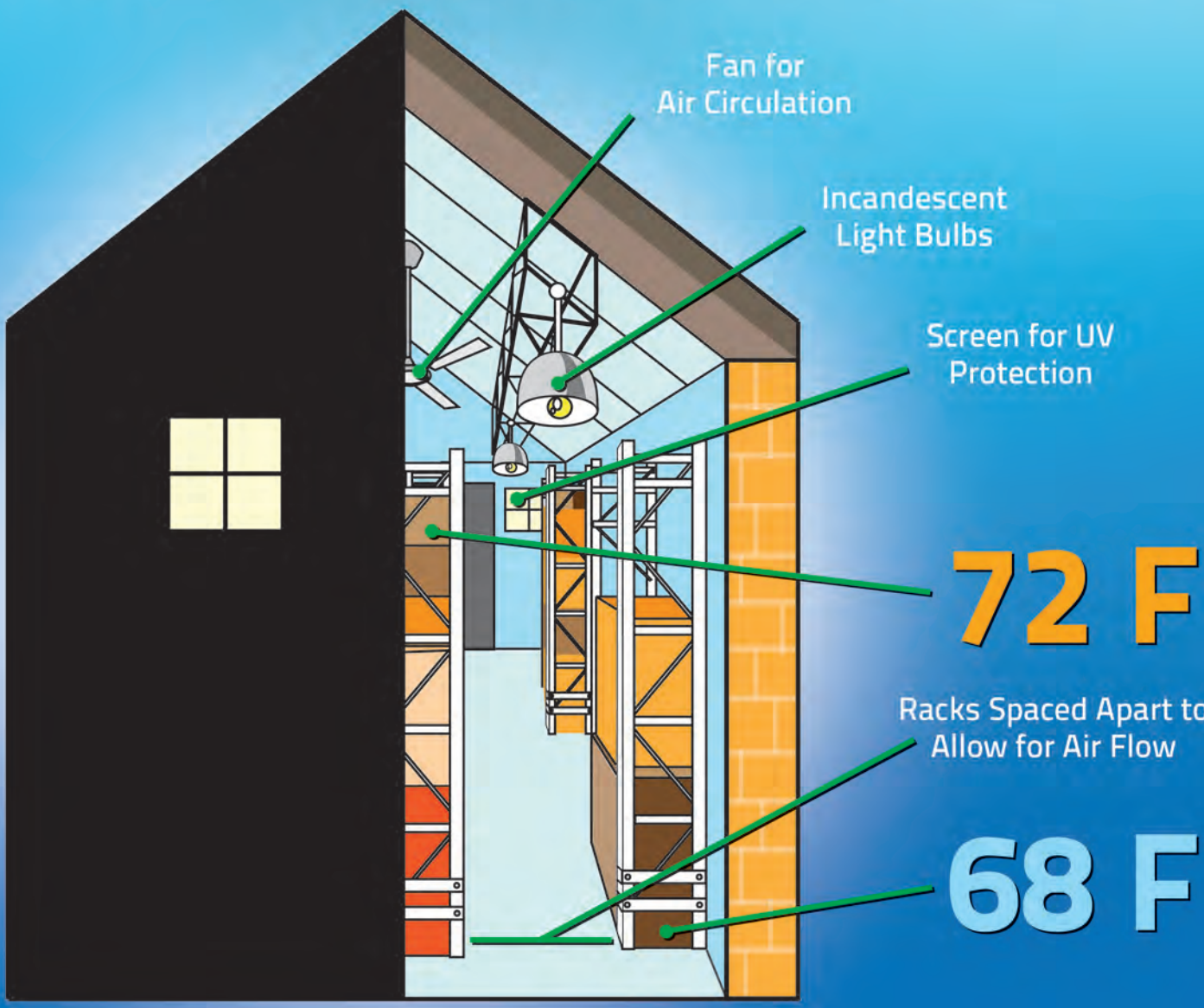
DICKSON

insights

Spring 2015 ▪ CD288

TEMPERATURE MAPPING GUIDE

FIND OUT WHAT'S INSIDE.



The Temperature Mapping Issue

Welcome To A **Very Special Edition.**

MICHAEL MILLER ▪ **DICKSON INSIGHTS** EDITOR-IN-CHIEF

Each month for the past year, we've provide you with an overview of our products in this catalog, with articles and columns geared towards the industries we serve mixed in as well. We've loved doing it, and we've loved hearing feedback from our readers and customers.

But we thought that we would change it up a bit this month.

Dickson recently started a new line of business for our customers: Our **Temperature and Humidity Mapping Services**. We will now map your entire facility for you!

Thus we offer you this special edition of our magazine, a Temperature and Humidity Mapping specific edition of Dickson Insights. It's become known as the "Mapping Spectacular" in our offices, and there's no better place to start than with those two words: "Mapping" and "Spectacular."

Mapping as a service, recommendation, and requirement in medical, pharmaceutical, food, and medical devices has grown and grown over the past decade. There is a reason for that: mapping is really useful for validating the cold chain. We've been temperature mapping experts for a long time, and now we're giving all that knowledge back to you.

Which is where "Spectacular" comes in. We call it a "Spectacular" because it's the most organized and complete collection of our temperature monitoring knowledge, and we hope you will think it's spectacular.

So what is temperature and humidity mapping? Put simply: it's creating a thermal map of an environment based on temperature data from multiple sensors. How does one go about creating that map? You'll have to keep reading to find out!

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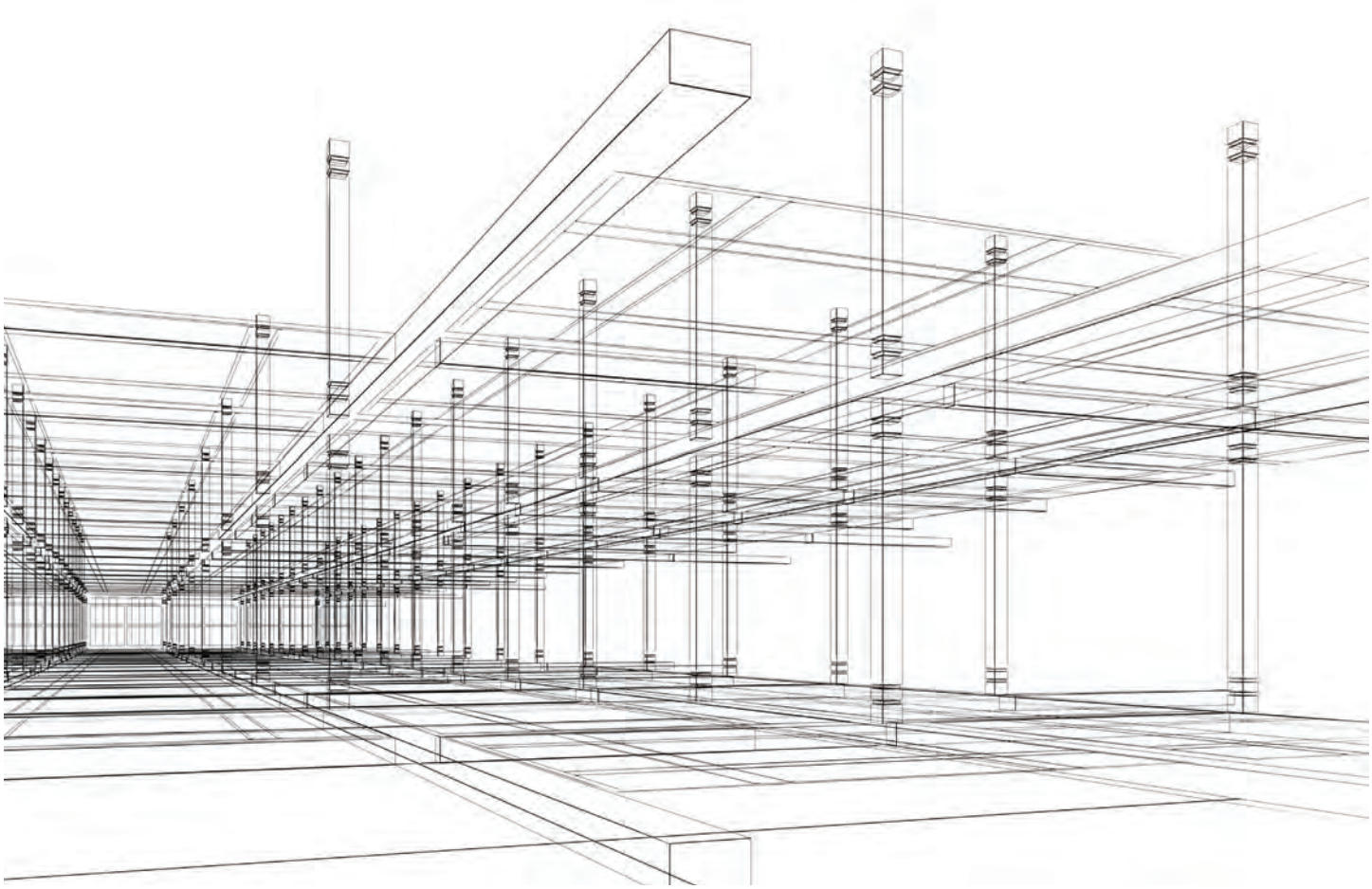


Keeping Your Products Safe:

DICKSON Temperature Mapping Services

The launch of our new **Temperature Mapping and Validation Services** is good news for anyone that wants to keep a product within a certain temperature range. So, you. We can help verify that your facility is right for your products: whether that be a refrigerator with a few vaccines in it, or a 20,000 square foot warehouse storing medical devices.

WHAT WE DO...

Dickson **Temperature Mapping & Validation Services** Provide:

- Warehouse Mapping
- Cold Room Mapping
- Problem Spot Analysis
- Seasonal Mapping
- New Facility Thermal Validation

FOR MORE INFO CALL:

630.563.4273

Our **Dickson Temperature Mapping & Validation Services** Experts can help you find a plan that works best for your facility!

Warehouse Mapping: A **Dickson** Dictionary

Industry terms can have different meanings to the different people inhabiting the industry. When we hear the term "Concrete Curing" we immediately think of temperature and evaporation. The construction worker on site doing the curing however, he may think of the strength and durability of the structure he is building.

Due to the different connotations of words and phrases in the different industries that we serve, we've decided to create our own Dickson Dictionaries. These dictionaries are meant to explain jargon that's thrown around your work sight or office, the way temperature and humidity experts might see it.

Last month, we gave you a taste of our Vaccine Dictionary. This month? Temperature and Humidity Mapping of course!

Controller (n.)
DEFINITION: The device used to control the HVAC system within a facility; a thermostat.

EXAMPLE: *After checking the controller to make sure the cooling system was on, Abbey checked each of the HVAC outputs in her facility as well.*

Data Logger (n.)
DEFINITION: Device used to measure and record temperature and humidity data; small plastic things placed throughout your mapping area; a sensor.

EXAMPLE: *After placing their rented data loggers on three planes throughout their facility, the team realized they had forgotten to label the logger locations.*

Deviation (n.)
DEFINITION: A difference between the expected results of a test and the actual test performance; a piece of data which points to a problem spot.

EXAMPLE: *While analyzing his facility's data, Andrew noticed deviations from four sensor locations all located near the same bay door.*

Dimension (n.)
DEFINITION: A plane; an essential tenet of temperature mapping, mapping along multiple planes ensures complete mapping in a 3-D space.

EXAMPLE: *The internal auditors yelled at Ali for not mapping in multiple dimensions and at all associated problem spots.*

Installation Qualification (n.)
DEFINITION: Testing and documenting evidence that your sensors have been installed according to manufacturer recommendations or accepted standards; proving the mapping test was set up according to operating instructions.

EXAMPLE: *After performing an installation qualification on his data loggers, Tim was ready to begin the mapping process.*

Mapping (n., v.)
DEFINITION: (n.) Testing and subsequent documentation to find temperature, humidity, or other environmental values within a predetermined space; the process of proving your facility is cold. (v.) The act of placing sensors in an established grid.

EXAMPLE: *The layouts of the facility told the Dickson team member that this mapping project would require 100-120 sensor locations.*

Operational Qualification (n.)
DEFINITION: Testing and documenting evidence that your sensors operate within acceptable and anticipated operating ranges; what a mapping sets forth to prove about your HVAC cooling system.

EXAMPLE: *Performing an Operation Qualification on his HVAC system meant testing and documenting each of the fans that were to be installed in his facility.*

Product (n.)
DEFINITION: A commodity, good, or piece of merchandise for human consumption that must be kept cold, and is regulated by a governmental organization; the goods that pass through the cold chain.

EXAMPLE: *The hospital had just lost $30,000 worth of pharmaceutical product because of improper storage conditions.*

Sensor (n.)
DEFINITION: Also called a data logger; a digital or analog device that measures environmental values.

EXAMPLE: *Adam was looking forward to gathering all of his sensor data after the week long mapping project was complete.*

Your Validation Document:

What Belongs On The **First Page**

Whether you have brought on an organization to map your facility, or you are performing the mapping study yourself, you will need to know what the document containing mapping or validation results looks like. While it may seem cliché, the first page of your mapping or validation document is probably the most important.

Now, when we say "mapping or validation document" we are speaking specifically to the results that your company or a mapping contractor will generate after the mapping is done. If you are preforming a mapping validation yourself, the outline and overall form of this document should have already been created before you placed your first sensor in your facility.

If you are hiring a contractor to map your facility, or validate some piece of your cold chain equipment, you should ask to see a sample copy of what they will provide you after the mapping study is complete.

The first page of your mapping or validation results is also known as the "Approval Page." This first page contains essential information that your auditor will look for when she or he is reviewing your temperature mapping or validation study.

The first thing that this page should have written on it, probably in bold, is **the name of the project or study**. Usually somewhere at the top, the name should tell you exactly what was done. For example, "Temperature Mapping Study for the Dickson Company."

The second piece of information that needs to appear on your approval page, is the contact information of the group who performed the study. If you performed the study, then that's your company's name, address, and telephone number. If it was performed by an outside group, you should have not only their company name, address, and telephone number on this page, but the contact information of their project lead as well.

The third piece of crucial text that must appear on your temperature mapping or validation approval page is the make, model, and serial number of the unit being validated or mapped. If an entire warehouse is being mapped (as opposed to a single refrigerator or cold room) then the address of the facility should appear on the approval page as well. Your auditor will want to know that this mapping study was performed on a specific piece of equipment or a specific facility.

Next up, is date(s). Not the date that the document was created, or the date that you received the document from an outside contractor, but the date(s) associated with the mapping or validation study. If the mapping or validation took more than one day to complete (it probably will) then the beginning and end dates of the study should be listed. This piece of information is also referred to as the date executed.

Finally, and most importantly, are signatures. Your approval page should obviously have some signatures on it. The most important signatures are by the people completing the study, and the project lead(s) on your end. In many validation documents, the organization completing the validation study (again, that could very well be you) and your project lead will have initialed signatures and dates on every single page. For the approval page, initials don't cut it. Printed and signed names with associated dates from the project lead and person performing the validation or mapping study is essential to the proof and legitimacy of the document.

Acronyms In Temperature Mapping & Validation

Some abbreviations and acronyms are like words in our vocabulary: we don't even think twice when we see them. In the digital world, acronyms like LOL, and NP, are part of our colloquial language. Even in the business world, acronyms like PO are nearly universal to companies, and make up the fabric of our daily work language.

When you dive inside individual industries, language can get a bit more confusing. Phrases and terms you may have never heard before are thrown around in the normal vernacular for specific industries. In the temperature monitoring industry for example, the acronym RTD may mean absolutely nothing to you. However, for us it stands for a specific type of temperature probe, a Resistance Thermometer Detector, which is a highly accurate temperature probe.

While temperature mapping is not an industry, but rather a process within multiple industries, it also has a unique language. In fact, the sheer number of industries that perform temperature mapping studies make the acronyms that are thrown around in it all the more important. When the overall goal is to keep an item cold, a food producer in Oregon may use the same language as a pharmaceutical technician in China.

This breadth leads to confusion. If temperature mapping jargon makes your eyes glaze over, or sends you running to Google, that's bad news for your products.

To help you out, we've named some of the most commonly used acronyms used in temperature mapping and validation, and described them below. Some of these terms you may have heard before, as they are not specific to temperature mapping but rather the cold chain or even more generally manufacturing as a whole. So when that's the case, we've decided to describe the acronym with respect to its use in temperature mapping, while not stepping on our Dickson Dictionary's toes too much.

DL/EDL/EDLM: Data Logger, Electronic Data Logger, Electronic Data Logger Monitor

You will most likely see these acronyms written on a page over spoken to you in your facility. When you read "DL," "EDL," or "EDLM," the document is speaking to data loggers. These devices have quite a few names, and in your industry they may be referred to as sensors, monitors, recorders, or thermometers. They are the devices that are distributed in your facility and around your facility collecting environmental data.

GMP: Good Manufacturing Practice(s)

Good Manufacturing Practices are part of the fabric of the cold chain, manufacturing, and distribution sectors for food, pharma, and medical device worlds. There are several pillars of GMPs, including hygiene, controlled environments, and proper documentation. Temperature mapping inhabits the controlled environments and documentation pillars. A mapping study provides manufacturers and distributors of consumable products (monitored by the FDA and like governmental bodies) documentation that their environment is suitable for the product that they are storing in it, and therefore, that they are abiding by Good Manufacturing Practices.

LOP: Location of Product

In facility layouts and facility descriptions, LOP will pop up frequently. If you plan to temperature map a large facility, LOP is one of the most important acronyms you should know. It's pretty self-explanatory upon first sight. Location of Product does mean where your product is located. For mapping professionals however, it's a bit more nuanced than just circles on a blueprint. Product location changes, and changes frequently. Product is placed in different parts of a facility at different times of day, facility layouts change throughout the year, and product locations can change depending on the amount of inventory you have in your facility. LOP is a rabbit hole, and temperature mapping experts go down that rabbit hole to document all the locations your various products inhabit.

NIST: National Institute of Standards and Technology

The National Institute of Standards and Technology will make its appearance on your Data Logger Certificates of Calibration. When performing a mapping study, you should only use data loggers that have been calibrated to a NIST standard. NIST is your friend: they help make sure that the EDLM's that you are using are accurate.

Meet The New

DicksonOne Touchscreen

MORE DATA AT YOUR FINGERTIPS

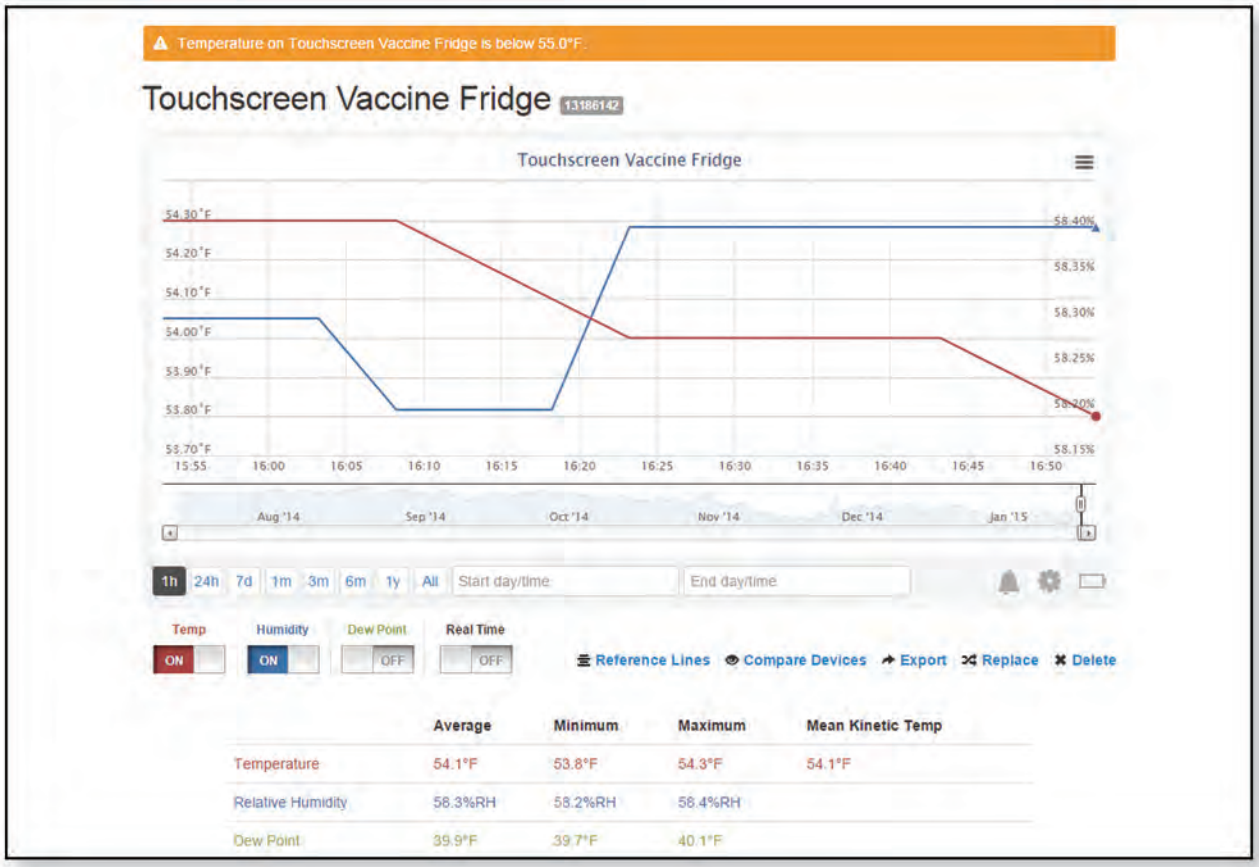
DicksonOne Enabled ▪ Power Over Ethernet ▪ Enhanced User Interface

DESIGNED **FOR YOU**

Our goal when designing the new line of **Touchscreen Data Loggers** was to create a feature-heavy and easy-to-use device that allowed users access to their entire data history, anywhere. We pushed the limits of connectivity, user-interface, and functionality, to deliver the most robust data logger on the market.

Data At The Source

1. **The Graph** The most important screen just got a whole lot easier to manage. We overhauled the user-interface, and made it easy to view and manage your data.
2. **Your Channels** Every touchscreen will automatically calculate the minimum, maximum, and average temperatures of your selected view.
3. **Real-time Monitoring** Push the play button, and your device will update back to the most recent set of readings.
4. **Device Settings** Your Touchscreen is robust. When you navigate your devices settings, you can adjust sample rates, set alarms, and connect to DicksonOne.



NOW WITH **DICKSONONE**

The **Touchscreen** now gives you the option to connect directly to **DicksonOne.** You get all of your data at your fingertips, and now you can access it anywhere, too. Just connect your device to your local WiFi network, or plug it into an Ethernet port, log into **DicksonOne**, and boom, complete data control.

DicksonOne Allows You To

- Get email, text, or phone call alarms from your Touchscreens.
- Access every one of your Touchscreens' data history on one website.
- Generate customizable reports, delivered directly to your inbox when you want.

The new Touchscreen allows for USB download to DicksonWare.

Only DicksonWare A017/A027 will function with Touchscreen Loggers.

Connect With Us:

DicksonOne

Wireless Temperature and Humidity Monitoring

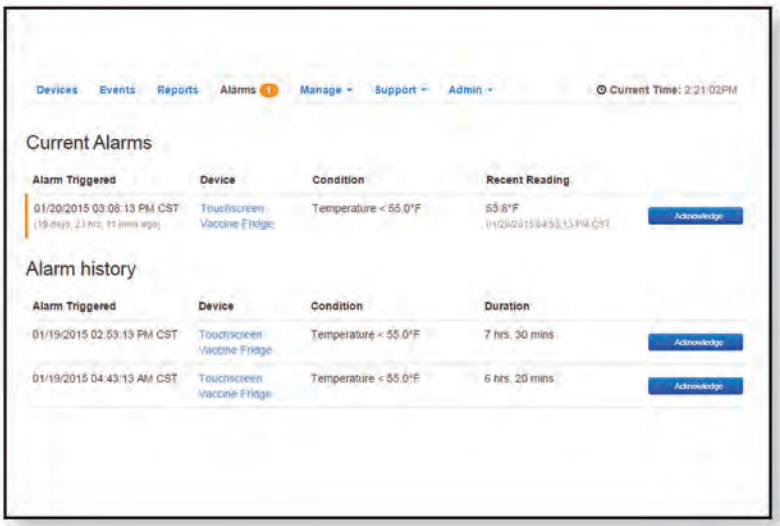
HOW IT **WORKS**

When you log onto **DicksonOne.com**, your environmental data, from every location, appears before your eyes. Charts and pens, get outta here. USB cords and software on a disc, you too. **DicksonOne** Loggers transmit your data wirelessly to the **DicksonOne** Cloud, were you can access it anytime.

Power Over Your Environment

EMAIL, TEXT & PHONE CALL ALARMS

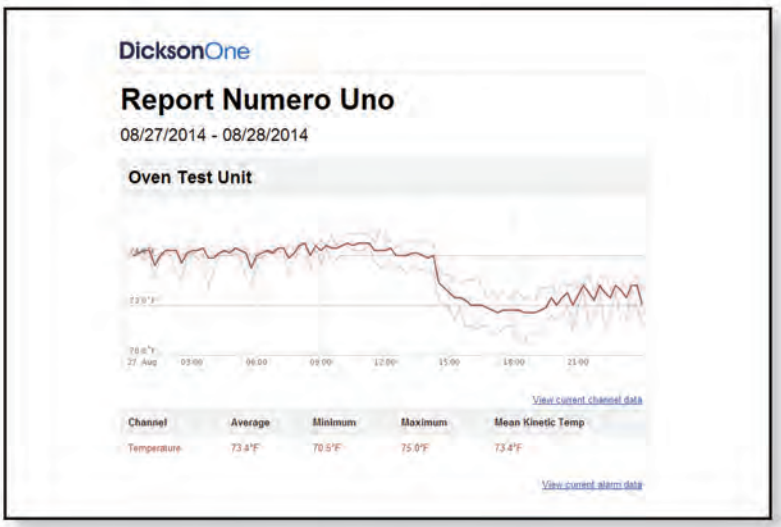
When something bad happens in your facility, **DicksonOne** can send anyone in your organization an email, text, or phone call. Temperature too high? Humidity too low? We've got you covered.



CUSTOMIZABLE REPORTS

The DicksonOne Reporting Suite allows you to:

- Create and customize reports of any and all your loggers
- Choose who in your organization will receive which reports
- Change and modify the frequency of reports



Warehouse Loggers

WFH20 $499

Medical Facility Loggers

ENT21 $479

DicksonOne
Touchscreen Pricing

MODEL	REMOTE PROBE	PRICE
TSB	USB Download	**$299**
TWE	DicksonOne WiFi/Ethernet Connection and Download	**$499**
TWP	DicksonOne Download and Power over Ethernet	**$599**

The new Touchscreen allows for USB download to DicksonWare.
Only DicksonWare A017/A027 will function with Touchscreen Loggers.

DicksonOne
Hardware Pricing

MODEL	REMOTE PROBE	PRICE
WFH20/ENH20	Digital Temperature and Humidity Replaceable Sensor	**$499**
WFT20/ENT20	Digital Temperature Sensor	**$499**
WFT21/ENT21	Thermistor Temperature Sensor with Gass Beads	**$479**
WFT23/ENT23	K-Thermocouple Temperature Sensor	**$479**
WFT25/ENT25	Platinum RTD Temperature Sensor	**$599**

DicksonOne
Software Pricing

DEVICES	FEATURES	PRICE
1 to 10	Unlimited Data, Multiple Sample Rates, API Access, Email, Phone, and Text Alarms	**$300/year**
11 to 25	Unlimited Data, Multiple Sample Rates, API Access, Email, Phone, and Text Alarms	**$725/year**
26 to 50	Unlimited Data, Multiple Sample Rates, API Access, Email, Phone, and Text Alarms	**$1400/year**
51 +	Unlimited Data, Multiple Sample Rates, API Access, Email, Phone, and Text Alarms	**Call for Quote**

* Dickson offers a Basic Plan, with 30 Day Data Deletion, and 1 hour sample rates for unlimited loggers at no cost.

Calibration In Five Seconds

HOW REPLACEABLE SENSORS **WORK**

Dickson Replaceable Sensors are Dickson's answer to the headache of calibrating your temperature or humidity monitoring device. When your device needs to be calibrated, just pop off your sensor, and pop on a new one. It's that easy. Now when you order a DicksonOne or Touchscreen Logger, you get the benefit of never having to ship a logger back to us again.

WITHOUT REPLACEABLE SENSORS

1. Order a recalibration for your device.
2. Acquire a Return Authorization Code from a Dickson Representative.
3. Take unit out of its environment.
4. Move products out of environment/install backup monitoring system.
5. Box unit up.
6. Ship unit to Dickson.
7. Dickson recalibrates unit and ships it back.
8. Receive the unit.
9. Disassemble backup system/move product back into environment.
10. Reinstall unit/system..

Total Down Time: 7-10 Days

VS

WITH REPLACEABLE SENSORS

1. Order a Replaceable Sensor.
2. Take old sensor off, put new sensor on.

Total Down Time: 0 Days

All DicksonOne and Touchscreen Loggers are **RS COMPATIBLE.**

High Temp Solutions

D605 Probe sold separately. For more information on Dickson's Probes and Accessories, visit **dicksondata.com.**

1. **HT 300 Waterproof, High Temperature Data Logger** HACCP and FDA Compliant. USB Download. IP68 Rating. Temperature Range -40° to 257°F (-40° to 125°C). **$349**
2. **HT350 High Temperature Process Logger** HACCP Compliant, K-Thermocouple Probe, USB Download, and a large temperature range. Temperature Range -40° to 257°F (-40° to 125°C). **$349**

Instant Data Solutions

3. **TC700/TH700 Touchscreen Handheld Indicator** Instant temperature or temperature/humidity data. No-slip silicone cover. Battery powered. **$299**
4. **RL200 Report Logger** We decided to make the best compact data logger on the market, our RL200. With a new outer case, user selectable logging times, and redesigned PC interface, it's exactly what you need. **$59**

Temperature and Temperature/Humidity

Chart Recorders

Want a physical readout right where you are monitoring? Our Chart Recorders have you covered. For ninety years we've built the best chart recorders in the business. Check out our models below.

8 and 6 Inch Models

Eight and Six Inch Chart Recorders display detailed temperature and humidity values.

MODELS AND FEATURES

KT6	6 Inch Temperature	**Starting at $369**
KT8	8 Inch Temperature	**Starting at $419**
TH6	6 Inch Temperature and Humidity	**Starting at $489**
TH8P	8 Inch Temperature and Humidity	**Starting at $489**

4 and 3 Inch Models

Four and Three Inch Temperature Chart Recorders designed to fit any application.

MODELS AND FEATURES

SL4350	4 Inch	**$239**
SL4100	4 Inch	**$239**
SC3 Series	3 Inch	**$239**

Charts sold separately. For charts and accessories, call **630.543.3747** or go to **www.DicksonData.com.**

Temperature and Temperature/Humidity

Data Logging Solutions

Data loggers are cost effective solutions for monitoring countless applications. With solutions for the food, pharma, manufacturing and dozens of other industries, Dickson's data loggers get you your data how you want it.

1

2

3

4

1 **SM300 $249** Temperature Logger. Range -4 to 158°F, -20 to 70°C. Accuracy ±0.8°F, ±0.44°C.
SM320* $299 Temperature Logger. Remote Probe. Range with Probe -300 to 2000°F, -184 to 1093°C. Accuracy ±1.8°F, ±1.0°C.
SM325* $399 Temperature Logger. Two Remote Probes. Range with Probe -300 to 2000°F, -184 to 1093°C. Accuracy ±1.8°F, ±1.0°C.
SM420 $499 Temperature Logger. Remote Probe. Range with Probe -50 to 350°F, -45 to 176°C. Accuracy ±0.5°F, ±0.28°C.
TM320 $299 Temperature and Humidity Logger. Range -4 to 158°F, -20 to 70°C. Accuracy ±0.8°F.
TM325 $399 Temperature and Humidity Logger. Remote Probe. Range -40 to 185°F, -40 to 85°C. Accuracy ±0.8°F.

2 **SP125 $119** Temperature Logger. Accuracy ±1.2°F, ±0.67°C. Range -10 to 176°F, -23 to 80°C.
SP175 $229 Temperature Logger with Thermocouple Probe. Accuracy ±1.8°F, ±0.1°C. Range -300 to 2000°F, -30 to 50°C. A203 Probe required for +500°F.
TP125 $199 Temperature and Humidity Logger. Accuracy ±0.8°F, ±0.45°C. Range -10 to 176°F, -23 to 80°C.

3 **SP425 $159** Temperature Logger. Digital Display. Accuracy ±1.2°F, ±0.67°C. Range -4 to 158°F, -20 to 70°C.
TP425 $249 Temperature and Humidity Logger. Digital Display. Accuracy ±0.8°F, ±0.45°C. Range -4 to 158°F, -20 to 70°C.

4 **SK550 $699** Temperature. Pack of twelve. Accuracy ±1.8°F, ±1°C. Range -4 to 158°F, -20 to 70°C.
TK550 $999 Temperature & Humidity. Pack of twelve. Accuracy ±1.8°F, ±1°C. Ranges -4 to +158°F, -20 to +70°C.

Software required and sold separately.
For software and other accessories, call **630.543.3747** or go to **www.DicksonData.**

Connect With Us

Dickson Social Media Accounts

@DicksonData

Channel: DicksonData

Search "Dickson"

Search "Dickson Data Loggers"

PRESSURE DATA LOGGERS

Pressure Data Logger One second sampling rate. User replaceable battery. Optional delayed start. USB connectivity. Pressure sensor includes built-in diaphragm seal.

PR125	**$499**	0-100 PSI
PR325	**$499**	0-300 PSI
PR525	**$599**	0-500 PSI

Rugged Utility Pressure Data Logger Water resistant case. 3 year battery. Unobtrusive design. Fits easily in a toolbox. USB Connection.

PR150	**$499**	0-100 PSI
PR350	**$499**	0-300 PSI

PRESSURE CHART RECORDERS

4 and 8 Inch Models

Four and Eight Inch Chart Recorders to meet your needs.

Single AA battery powered. Rugged low-maintenance design features. 7-day or 24-hour recording times. 1/4 inch NPT Connector.

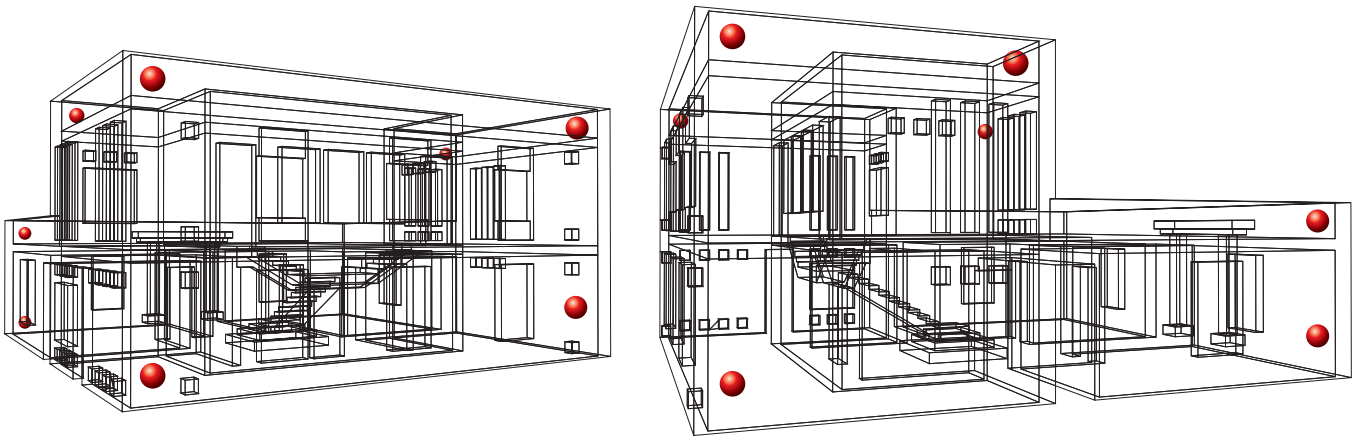
MODELS AND FEATURES

0-100 PSI	**PW860/1**	**$629**		**PW470**	**$449**
0-200 PSI	**PW864/5**	**$629**		**PW474**	**$449**
0-300 PSI	**PW866/7**	**$629**		**PW476**	**$449**
0-500 PSI				**PW479**	**$449**
0-1000 PSI	**PW875**	**$749**			

Charts sold separately. For charts and accessories, call **630.543.3747** or go to **www.DicksonData.com.**

Sensor Placement

The Keys To Distance And Height



Now to the information that everyone wants! "Where do I place my sensors?" is the question that we receive with the most frequency about temperature mapping.

We get a lot of questions about sensor distribution because there is an extreme lack of information on the topic. We want to fix that. We've been in the temperature and humidity monitoring industry for a long time (since 1923, in fact) and we've gained a lot of information on the science of temperature mapping.

This is what we've found out after 92 years of research:

*"There is no one **scientific equation**, or perfect answer **to how far apart** sensors should be."*

That's a bummer to hear, we know. We can't give all our customers a stock answer on how far apart to place their temperature and humidity sensors while mapping unique facilities. But, we can give each facility a rationale and system for figuring out how far apart to place their sensors.

In this article, we are talking about sensor distance and height within a uniform space, and along aisles and racks that have sufficient air flow and circulation. Our recommendations are taken from years of our own scientific research, and from the WHO's paper "Temperature mapping of storage areas," WHO Technical Report Series, No. 961, 2011.

First, let's go over mapping in a uniform space. In a perfect cube, you always want to map along three horizontal planes and three vertical planes. That's front, middle, back, and top, middle, bottom. That distribution would leave you with 27 sensors in a perfectly uniform cube, absent of distance.

However, we know distance matters! If we keep our three plane model, we can start to distinguish where we would place loggers on a rack of shelving. Each rack of shelving is not a perfect cube, and no facility as a whole is a perfect cube.

Employing the three plane model still informs our sensor distribution when it comes to actual distance however, because sensors can be distributed on high, medium, and low on racks of shelving, with the medium sensor being placed in the middle plane of the rack.

We're almost to the actual numbers, I promise. The WHO says that for a 3.6 meter high facility, sensors should be placed at floor level, 1.2 meters, and 3.0 meters (as long as product does not go past that 3.0 meter threshold. For any facility taller than 3.6 meters, loggers should be placed in uniformity with regard to the three sensors. So, our three plane model works perfectly for height.

As for the distance between sensors: that's where it becomes a little trickier. Through our own research, we've come up with a standard answer for horizontal distance between sensors: maximum 30 feet. Without seeing your facility and knowing how far apart product may be placed, we can't recommend any greater distance than 30 feet. Ideally the larger a warehouse gets, the greater distance sensor distribution can be. However, that's not always the case.

Just remember, you want to get an accurate representation of temperature uniformity in your facility. That is the key when placing sensors for a mapping study.

Sensor Placement: The Forgotten Spots

Sensor location is at the top of everyone's mind during a mapping study. The concern with shelving height, racking density, and air flow distribution is brought up in nearly every cold chain seminar, and is the cause of many of our customers' desperate online searches. If we only knew exactly how far apart to space our sensors! Then the worry would be gone!

The problem with a universal standard on sensor distribution during a temperature mapping study, is that every facility is different. There are guidelines on how far apart sensors should be placed under ideal conditions, but conditions rarely ever remain ideal: those guidelines stay as merely guidelines.

Every facility is different, and that means that every facility has its unique problem spots. Problem spots are either areas of the facility that a company believes are susceptible to extreme temperatures, or they are spots that have been proven by a mapping study to be susceptible to extreme temperatures. When you look at a layout of a facility that has been marked up for sensor/data logger placement by someone here at Dickson, the pattern of the sensors may seem wacky, haphazard, or worse: unscientific.

However, the reason sensor distribution doesn't occur in a perfect patter on a layout here at Dickson, is because of problem spots. Problem spots are . . . problems! When we spot a potential problem spot, we place a sensor by it. Some of the most common problem spots that we look for are listed below. If you plan to temperature map your facility soon, be sure to place sensor(s) at each of these locations.

Facility Office: The reason that this intrigues us is because your warehouse office may have a different temperature, different HVAC setting, or a different HVAC system all together than other parts of your facility. Thus, it should be treated like a facility exit. Heat likes to travel, which can be an issue for warehouses that house temperature sensitive materials.

Combatting the effects of your warehouse office on the rest of your warehouse is not an easy task, and worse it is one that goes unnoticed for many, many organizations. We suggest first analyzing what makes your warehouse office temperature different from the other portions of your warehouse, and then placing data loggers both in your facility office, and near the exits from the office into the facility.

Shipping: As with any unique part of your facility, the bay door, or loading dock, can have a drastic effect on the temperatures of your products. Because bay doors and loading docks are opening and closing so much, with products and people moving in and out, the temperature influx alters the airflow of your facility, leaving your HVAC system trying to deal with heat dispersal on the different planes in your warehouse, when the shipping area is both open and closed.

So, you need to account for that. Place a data logger at all personnel and shipping exits. During your mapping study, you should take into consideration traffic patterns, the size of the exits, and the climate your facility exists in.

Lighting: Our last main problem spot that we can fit on this page (there are dozens more) is lighting. The type of lighting in your facility, and the proximity of your product to that lighting, could mean no lighting problem spots, or hundreds.

We've found that companies who stack product to the ceiling of their facility, and whose facility is also lit by incandescent light bulbs, are exposing their products to dangerous temperatures, because incandescent light bulbs convert so much of their energy to heat.

YOU'RE DONE. NOW WHAT?

What Do You Do With All That Data?

After the mapping study is complete, when you've collected all of your labeled EDLM's from your temperature mapping locations, and have them in a container with pages of their associated data sheets at your desk, it's time to start the next step of the temperature mapping process: analyzing your data. Below are the steps you should take after you have all your mapping EDLM's out of your facility (or you have all of their data, delivered wirelessly at your desk).

1. Download: You need to download your data! If you used a wireless data monitoring system, this could be as easy as going into your cloud-account and clicking download, or visiting your data file folder and dragging the information to your desktop. If the data loggers you used in your mapping study connect to your computer via USB, plug them in and start downloading!

2. Save: Immediately upon downloading your temperature mapping data, back it up. We can't stress this enough. Save it to a Dropbox folder, save it to shared company drives, save it to Google Drive, whatever. Just make sure that your temperature data is not just stored on your local hard drive. It should be saved to multiple locations, for disaster prevention.

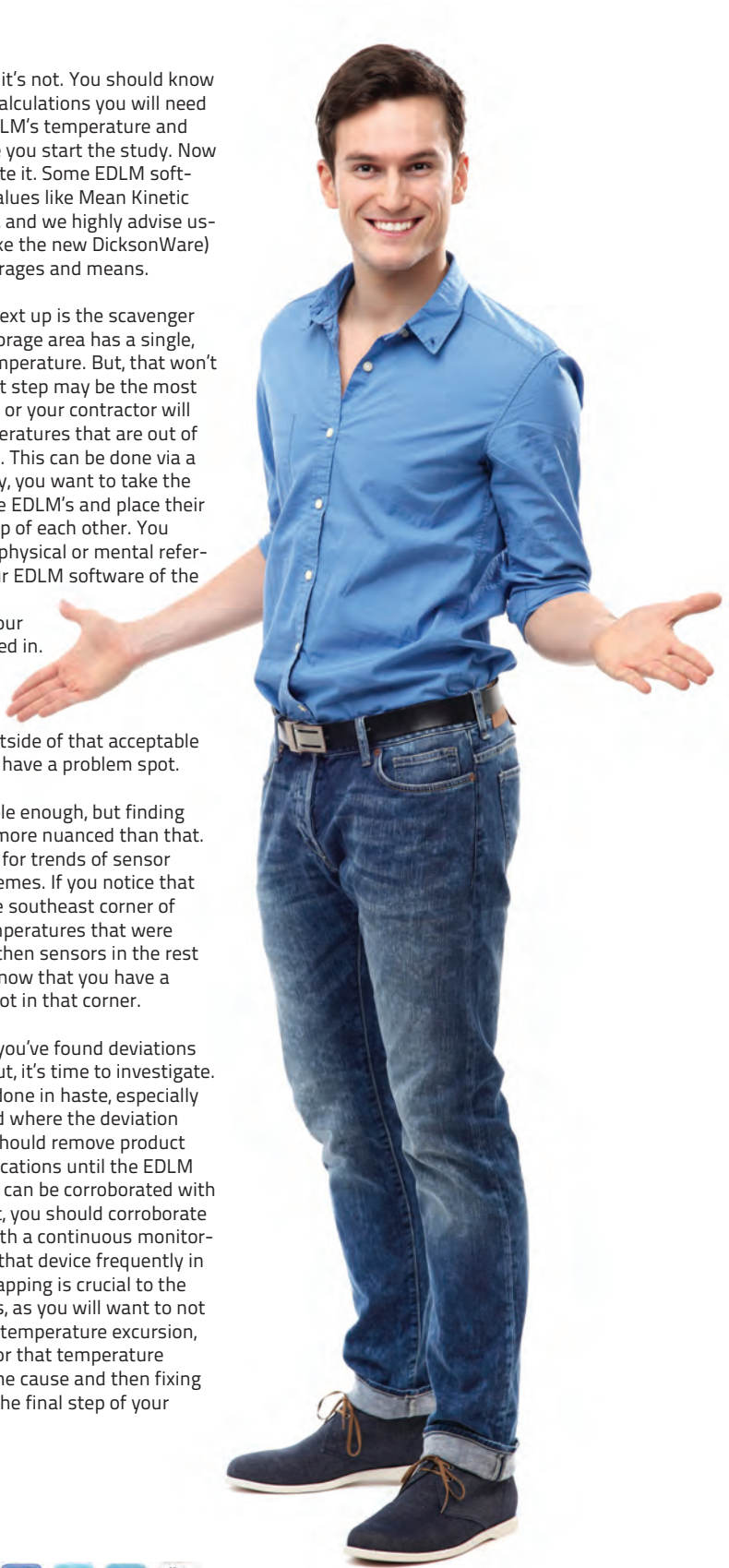
3. Find Failures: The next step is to find those sensors that failed to record data. If you are mapping a large facility, at least a few sensors will fail: it's just the nature of temperature mapping. Whether they fail the entire temperature mapping study, or just a portion of it is for you to find out. If you find a failed sensor, there is an accepted process for accounting for that failed location. You should take the averages of the 3 closest sensors to the failed sensor location, and average out their data for the time range that the sensor failed for. As long as you weren't being too sparse with your sensor placement, the averages of those data loggers will suffice. Just be sure to document it!

4. Calculate: We wish we could say outright that this step was completely automated for you (if you are using a contractor to map your facility, it will be) but it's not. You should know what averages and calculations you will need to make from the EDLM's temperature and humidity data before you start the study. Now is the time to calculate it. Some EDLM software can calculate values like Mean Kinetic Temperature for you, and we highly advise using such software (like the new DicksonWare) to calculate your averages and means.

5. Find Deviations: Next up is the scavenger hunt. Ideally, your storage area has a single, perfectly uniform temperature. But, that won't be the case. This next step may be the most important. What you or your contractor will first look for, is temperatures that are out of the acceptable range. This can be done via a graph-overlay. Ideally, you want to take the data from each of the EDLM's and place their graphed data over top of each other. You should either create physical or mental reference lines within your EDLM software of the highest and lowest temperatures that your products can be stored in. If at any time during the study an EDLM recorded temperature data outside of that acceptable range, you know you have a problem spot.

That may seem simple enough, but finding deviations is a little more nuanced than that. You should also look for trends of sensor groups towards extremes. If you notice that sensors placed in the southeast corner of your facility read temperatures that were 2-3F colder at night then sensors in the rest of your facility, you know that you have a potential problem spot in that corner.

6. Investigate: Once you've found deviations in your facility's layout, it's time to investigate. This step should be done in haste, especially if a product is located where the deviation occurred. First, you should remove product from the deviation locations until the EDLM temperature reading can be corroborated with another sensor. Next, you should corroborate the EDLM reading with a continuous monitoring device. Checking that device frequently in the time after the mapping is crucial to the investigation process, as you will want to not only corroborate the temperature excursion, but the timestamp for that temperature excursion. Finding the cause and then fixing the problem spot is the final step of your investigation.



All The ESSENTIALS

The Dickson Temperature Mapping Guide Is Your Essential Tool For Validating Your Storage Space

The following was taken from the Dickson Temperature Mapping Guide, a White Paper created by Dickson to help organizations in GMP and GDP compliant industries better understand the temperature and humidity mapping process and associated documentation.

We can only fit so many words on a page, and thus the following text is merely the first few pages from our Dickson Temperature Mapping Guide. We've included portions from the Introduction and Objectives sections of our Temperature Mapping Guide.

To read and download the full Dickson Temperature Mapping Guide:

Call us at: **630.543.3747**

Visit our website: **DicksonData.com/mapping-guide**

Visit our blog: **Blog.DicksonData.com/mapping-guide-download**

Without further ado, we present the Dickson Temperature Mapping Guide.

1. Introduction

Food, pharmaceutical drugs, medical devices, and other products must be kept at particular temperatures to function correctly and stay safe for consumption and use. In the global cold chain, these temperature sensitive products are transported all over the world. To ensure that regulated goods are stored at adequate temperatures throughout their time in the cold chain, regulators have created regulations, recommendations, and guidance on Good Manufacturing Practice and Good Distribution Practice for products in the cold chain. Temperature mapping of warehouses, cold storage rooms, and other storage areas has become a recognized way of understanding the temperature profile of a space by regulation agencies that audit the organizations tasked with storing Temperature Sensitive Products.

The Dickson Temperature and Humidity Mapping Guide is intended to help any organization involved in manufacturing, storage, or distribution of temperature and/or humidity sensitive products. Recommendations contained in this document are the results of 92 years of temperature mapping experience.

This guide will outline the temperature mapping process and the associated documentation of that temperature mapping process. After reading this guide, readers should have a better understanding of the regulations concerned with temperature mapping, equipment used in temperature mapping, sensor distribution, and sensor data analysis.

Dickson is not responsible or liable for any information taken from this guide and used in a Temperature Mapping Study. While the following information is accurate, the only way we can guarantee a complete temperature mapping in line with your auditing agency's requirements is through our Dickson Temperature Mapping Service. To speak with someone about the service, call **630.543.3747**.

2. Guide Objectives

2.1 Temperature Mapping Study Guidance: The guide's first goal is to be a resource for wholesalers, operators, manufacturers, distributors, and resellers who store Temperature Sensitive Products to better understand the details of a Temperature Mapping Study. To do that, we've created a guide that will take one through Dickson's step-by-step process to completing a Temperature Mapping Study according to Good Manufacturing Practices and Good Distribution Practices. (Referred to hereafter as GMP and GDP, respectively.) This first section of the guidance document outlines the associated materials and equipment of a temperature mapping study (including the process of selecting sensors), the methodology for sensor placement, and the key calculations that need to be done post-mapping in data analysis. The Temperature Mapping Study Guidance portion of this document also explains how data from a mapping study can be interpreted, and

some common problems found within storage spaces.

2.2 Temperature Mapping Documentation Guidance The second core goal of this Temperature Mapping Guide is to provide readers with a better understanding of the documentation process and outline what an end-result validation document of a temperature mapping study would include. This portion of the guide describes the Temperature Mapping Process from a documentation standpoint, including what to document at each stage of the temperature mapping process, and who should be creating and signing off on such documentation.

Furthermore, we have provided example documentation sheets for use in temperature mapping, including test data sheets and approval pages.

2.3 Additional Resources In the Annexes and Resources portion of this guide, we have placed additional articles and resources meant to accompany and support the core of the Temperature Mapping Guide. These articles contain this guide's third objective: a continued education for those who store Temperature Sensitive Products. This continued education begins in those articles and resources, and within other Dickson White Papers on Temperature Mapping. Those articles include "The 11 Most Common Mistakes In Temperature Mapping," Temperature Mapping Small Storage Spaces," and "Establishing Your Temperature Mapping Rationale," among others.

To download and read the rest of Dickson's Temperature Mapping Guide, visit: **DicksonData.com/mapping-guide.**

The guide features the following sections:

- Glossary Of Temperature Mapping Terms
- A Step-By-Step Guide To The Temperature Mapping Process
- A Step-By-Step Guide To Temperature Mapping Documentation
- The 5 Most Frequently Asked Questions About Temperature Mapping
- A Detailed Explanation Of Common Problem Spots In Storage Facilities
- Major Temperature Mapping Requirements, Regulations, and Certifications
- Example Data Sheets and Approval Pages

CHECK OUT THE DICKSON BLOG!

Like what you've read? Find more great information about temperature on our blog: **www.Blog.DicksonData.com**

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DICKSON
930 South Westwood Avenue
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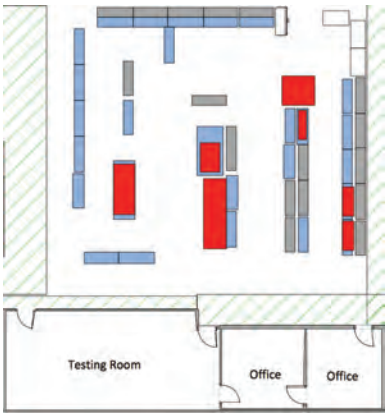

Our new **Temperature Mapping Service** allows you to validate every inch of your facility, whether that facility is a fridge, or a giant warehouse.

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