



The Ultimate Guide to

DIGITAL SCALE SETUP, TROUBLESHOOTING, + MAINTENANCE



SCALESPLUS

✖ **EBOOK**

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1.0

WELCOME TO THE WORLD OF PRECISE WEIGHING!

In a world driven by data and precision, digital scales have become indispensable tools across nearly every industry, from culinary arts and scientific research to industrial manufacturing and logistics. The importance of reliable and accurate measurements cannot be overstated, as they underpin crucial decision-making processes, quality control, and product formulations.

Whether you are a seasoned professional, a new business owner, or a curious enthusiast, mastering the setup, troubleshooting, and maintenance of your weighing equipment is essential for achieving optimal performance and maximizing its lifespan.

With years of experience as a leading online scale retailer, we have garnered a deep understanding of the diverse needs and challenges faced by our customers. Our team of experts—who are all well-versed in the intricacies of digital scales and balances—is committed to sharing our knowledge with you. We have witnessed firsthand the transformative impact of well-maintained scales in various industries, and now, we are thrilled to impart our expertise to empower you on your weighing journey.

As such, this eBook is designed to be your go-to resource for all things digital scales. It is structured in a way that takes you from the initial unboxing and setup of your equipment to troubleshooting common issues and implementing effective maintenance practices. Each chapter has been carefully crafted to address your concerns and provide actionable advice you can implement immediately.

Whether you're starting out with a new scale or looking to optimize an existing one, this eBook will be your steadfast companion throughout your weighing endeavors. Thank you for choosing us as your trusted resource.

Happy weighing!



The Scales Plus team

2.0 BUYING A SCALE

If you're in the market for new weighing equipment—whether it's for personal or commercial use—there's a lot to consider before making a purchase. And considering the price tag on many high-end scales and balances, it's definitely something you want to get right.

If you're simply replacing an existing machine or selecting from a shortlist of models made specifically for your application, choosing the correct scale for the job can be easy. Unfortunately, that's not always the case. While you might think a versatile bench scale is good enough for what you're trying to weigh, what if there's a better scale out there that would greatly simplify your entire process?

With that in mind, here are 11 things to consider before you buy your next scale.

2.1 CAPACITY

Your scale won't be much good to you if the capacity rating isn't sufficient for the job. That's why determining the correct weighing capacity is the first factor to consider. Identify the weights of your current samples, then plan for the possibility of larger capacities and consider the potential of growth.

For example, if you plan to weigh 50 lb. cases, you'll need a scale that can handle a minimum of 50 lbs. Taking into consideration larger case sizes and other potential weighing needs, it would be ideal to find a scale that supports up to 100 lbs.

2.2 READABILITY

After identifying the capacity required, search for the readability you need. Readability is the specification for how the scale displays weight readings, both how many digits beyond the decimal place and to what interval. Keep in mind that, generally, the larger the capacity, the less readability you will have.

For instance, a scale that has a 0.001 lb. readability will display out as far as 3 places beyond the decimal and can display to 1/1000th of a pound. To determine the readability you need, consult your internal quality standards, ingredient measurement degree, and other application-specific requirements.

2.3 PAN SIZE

Capacity and readability won't matter much if you don't have the right size weighing pan for your samples. Stability is huge when it comes to weighing because if your sample is not stable, your display will fluctuate and it will be difficult to get a final reading. Determine the largest sample you intend to weigh and make sure the scale you choose has a pan size that can properly accommodate it.

2.4 NTEP/LEGAL-FOR-TRADE

Do you need a scale that is NTEP-approved? NTEP-approved scales are typically found in legal-for-trade retail applications where a product is sold by weight. Examples include:

- **Delis**
- **Farmers markets**
- **Propane filling stations**

Typically speaking, if you are selling a product to a consumer based on weight, you probably need an NTEP-certified scale. However, rules and requirements around this vary by state so it is best to reach out to local and state law officials to ensure you are in compliance.

Many states even have enforcement divisions that will perform inspections to verify that all measuring devices carry an NTEP approval where it is needed. If you've purchased a scale without a certification, you'll be forced to buy a new one that is compliant.

Fortunately, most scale manufacturers have both NTEP and non-NTEP certified models and the difference in cost between them is usually small. So in the spirit of saving money and unnecessary headaches, if you're ever in doubt, we always recommend that you buy NTEP-certified scales.

2.5 IP RATINGS

An IP rating, or ingress protection rating, is a fancy way to tell how well an electrical device's enclosure will keep water and gunk from getting inside. If you're looking for a scale with a suitable IP rating for your workplace needs, you probably have some questions about which one to buy. To that end, here are two quick tips to get you started:

- 1. There are plenty of scales out there that will have IP-rated load cells, but don't let that fool you. That rating only pertains to the electronics within the load cell and not the scale's base or indicator, which won't do you much good if things start getting messy.**
- 2. If you work in a particularly wet or dirty environment, you want to look for the term "washdown protected." This means the scale base, indicator, and load cells all have an IP rating that allows them to be cleaned— or "washed down"—with soap and water.**

Ultimately, the key to making an informed purchasing decision is knowing what the scale will be used for and what level of environmental exposure you expect it to receive in your line of work. Using the tables below will help you determine the minimum IP rating you need, which you can easily filter results for when shopping at Scales Plus.

PARTICLE INTRUSION PROTECTION (FIRST DIGIT)

Level	Object Size Protection	Detail
0	None	No Protection
1	>50mm	Hands or tools
2	>12.5mm	Small tools or fingers
3	>2.5mm	Fasteners, wires, etc.
4	>1mm	Dirt and debris
5	Some Dust	No dust deposits that would effect use
6	Dust Proof	No intrusion of dust into enclosure

LIQUID INTRUSION PROTECTION (SECOND DIGIT)

Level	Water Droplet Protection	Detail
0	None	No Protection
1	Dripping	Vertical falling drops of water
2	Drips tilted at 15°	Dripping water when device tilted up to 15° from normal position
3	Spraying	Water spray up to 60° from vertical
4	Splashing	Water splashed enclosure from any angle
5	Water Jets	Water pressurized through 6.3mm nozzle from any angle
6	High Power Water Jets	Water pressurized through 12.5mm nozzle from any angle
7	Immersion up to 1 Meter	Submerged up to 1 meter for 30 minutes
8	Immersion over 1 Meter	Submerged depth and time set by manufacturer

2.6 CALIBRATION

The calibration method of your scale should also be considered, especially where you're obligated to follow internal quality standards and processes or you're using analytical and precision balances.

Scales can be either externally or internally calibrated. Manufacturers may have their interpretations of either method, but typically speaking, this is either a manual, semi-manual, or automatic process.

Automatic internal calibration is especially handy for applications where reliable weighing results are required. The automatic calibration feature allows the scale to complete its own calibrations based on preset parameters such as environmental changes and shock. This ensures that the scale is constantly kept in spec.

2.7 COMMUNICATION

Do you need to print weight results or export measurements into a PC for data analysis? If so, you'll need a scale that is capable of transmitting data via RS-232, USB, Ethernet, or another communication method.

Unfortunately, not all scales have a built-in communication interface and will require the communication ports to be purchased as an upgrade. When looking at available scales, check the product page or data sheet under "Communication" or "Interface" to see what communication methods are available.

2.8 NEW OR USED

Purchasing a new scale, balance, or weighing system can sometimes set you back three, four, or even five figures. So, if you can find a used or pre-owned version of the scale you need, it makes sense to at least consider the additional savings.

But before you do, there are a few things you need to confirm about the condition of the equipment:

- Are all the original parts and packaging included?
- Is the scale calibrated and in good working condition?
- Are there any major flaws or defects? (There may be some minor cosmetic imperfections, which is up to you if that's acceptable or not.)
- Has the scale been thoroughly cleaned and sanitized?
- Is there any mention of why the scale was returned?

If this information isn't all clearly stated in the product's description, you should always call the seller to confirm before making the purchase. If not, you may want to consider buying new, just to be safe.

USED OHAUS COURIER 5000 I-C52M200X SHIPPING SCALE, 400 LB X 0.2 LB, SP1212

OHAUS

MSRP: \$550.00
Now: \$150.00
Was: \$925.00
(You save \$400.00)

SKU: SP1212

Calibration Certificate: Optional

☐ None

☐ NIST Traceable Calibration, \$125.00 [Do I need this?](#)

☐ ISO 17025:2017 Accredited Calibration, \$199.00 [Do I need this?](#)

Quantity:

[ADD TO CART](#) [ADD TO QUOTE](#)

[DESCRIPTION](#) [WARRANTY INFORMATION](#) [SPECIFICATIONS](#) [ACCESSORIES/REPLACEMENT PARTS](#) [PRODUCT REVIEWS](#)

USED/Pre-owned Notice: All used units are inspected by Scales Plus technicians to ensure proper performance that meets manufacturer specifications. These units may include slight blemishes including light scratches, scuffs or other markings. Units deemed qualified for re-sale in our used category will not have any major imperfections. All functions will be intact and working appropriately.

2.9 AVAILABILITY OF PARTS & ACCESSORIES

When it comes to scales, there are plenty of simple components that are much cheaper and easier to fix yourself than to send in for service. Whether it's a new load cell or a replacement power supply, you should always check that the manufacturer/seller stocks the parts you may one day need for your specific model.

2.10 WARRANTY

Before you purchase your scale, you should at least skim through the manufacturer's warranty because it could end up saving you hundreds—or even thousands—of dollars. Not all warranties are created equally, and what they do and do not cover can vary wildly.

The big things to look for are the duration of the warranty, what kinds of damage it covers, and whether or not you'll be on the hook for any shipping costs—especially if it's from an international seller. And while you're at it, we recommend checking out the seller's return policy. You'll hopefully never need it, but it's good to know it's there in case you do.

2.11 WHERE TO BUY

Hopefully, by this point, you've narrowed down your search and are ready to make a purchase—but from where? You could buy from an online retailer, a big-box store, a third-party seller, or straight from the manufacturer. But what many people don't realize is that there's a fifth option at your disposal: an authorized dealer.

An authorized scale dealer is a company that has been specifically authorized by a manufacturer to sell and service its products. For a company to become authorized, it must meet certain criteria set by the manufacturer. This usually includes completing product training, passing performance tests, and making a significant investment in inventory.

Five reasons why you should buy from an authorized scale dealer:

1. Access to the latest products
2. Exclusive discounts
3. Up-to-date product information
4. Specialized support
5. A better warranty claim process

3.0 SCALE SETUP

Whether you're a culinary artist perfecting recipes, a lab technician conducting intricate experiments, or a business owner managing inventory, properly setting up your scale or balance is the cornerstone of achieving reliable measurements. Throughout this section, we'll equip you with the knowledge and skills needed to establish a rock-solid foundation for your weighing operations.

3.1 UNBOXING

While it may seem impossible to mess up, there is a correct way to unbox a new scale and minimize the risk of damage.

1. Read the manual

Before starting the unboxing process, take a moment to read the user manual or any provided instructions. This will give you a clear understanding of the steps involved and any specific precautions to take.

2. Choose a suitable unboxing area

Find a clean and spacious area to unbox your scale. Make sure there's enough room for you to move around and place the components safely.

3. Gather necessary tools

Depending on the scale model, you may need some basic tools like scissors or a box cutter to open the packaging. Have them ready before you start unboxing.

4. Handle with care

When handling the box, be mindful of its weight and size. If it's a large or heavy box, consider asking for assistance to avoid straining yourself or dropping the box accidentally.

5. Inspect the packaging

Before opening the box, carefully inspect the packaging for any signs of damage. Look for dents, punctures, or visible stress points. If you notice any significant damage, take photos as evidence before proceeding.

6. Remove the packaging materials

Start by removing any tape, straps, or plastic wrap securing the box. Be cautious not to use sharp tools near the scale or its components to prevent accidental damage.

7. Lift the scale out of the box

With the help of another person (if needed), lift the scale out of the box gently. Use both hands to ensure proper support and balance while avoiding unnecessary stress on the device.

8. Remove protective materials

Many scales come with protective films or covers to prevent scratches during transit. Check the user manual or instructions to identify and remove these materials carefully.

9. Save the packaging

If you foresee a need to transport or store the scale in the future, it's a good idea to keep the original packaging. This can help protect the scale and its components if you need to pack it away temporarily.

10. Double-check the contents

After unboxing, verify that all the components listed in the manual are present. This may include the scale itself, weighing pan, batteries (if applicable), power cords, user manual, or any additional accessories.

3.2 CONNECTING PERIPHERAL DEVICES

Unless you plan on operating a single scale out of the box, a big part of the setup process will involve getting your scale printer, remote display, and other peripheral devices connected.

Here are some tips to ensure everything gets set up correctly:

Read the manuals

Start by reading the manuals or instructions provided with both the digital scale and the peripheral devices. This will give you a clear understanding of the specific requirements and steps for connecting them.

Compatibility check

Ensure the peripheral weighing devices you are trying to connect are compatible with your digital scale. Check the specifications and requirements mentioned in the manuals or on the manufacturer's website.

Gather necessary cables and connectors

Identify the cables and connectors required to establish the connection between the digital scale and the peripheral devices. Make sure you have all the necessary cables and adapters on hand.

Power off all devices

Before connecting any cables, power off all devices involved, including the digital scale and the peripheral weighing devices. This will prevent any electrical mishaps and ensure a safe connection.

Identify the appropriate ports

Locate the corresponding ports on both the digital scale and the peripheral devices for connecting the cables. The ports are usually labeled and may include USB, RS-232, Ethernet, or other proprietary connectors.

Connect the cables

Connect the appropriate cables securely to the corresponding ports on both the digital scale and the peripheral devices. Ensure that the connections are tight but avoid applying excessive force.

Power on the devices

After the cables are connected, power on the digital scale and the peripheral devices in the recommended order as mentioned in the manuals. Follow any specific instructions for powering on and initializing the devices.

Configure settings

Depending on the devices, you may need to configure certain settings for them to communicate effectively. Consult the manuals for instructions on how to set up and configure the devices properly.

Test the connection

Once the devices are powered on and properly configured, perform a test to ensure the connection is functioning correctly. Follow the instructions provided in the manuals to verify that the data is being transmitted accurately.

Troubleshooting

If you encounter any issues during the connection process, consult the troubleshooting section of the manuals. It may provide guidance on common issues and solutions.

3.3 INSPECTING YOUR WORKSPACE

When it comes to accurate measurement, the environment in which your scale resides can have a crucial effect. If possible, try to use a space that is specifically designated for weighing, as vibrations from other operations on the same surface can cause drifting.

In addition, inspect your workspace before each use for the following:

Obstructions

Any objects that could come in contact with the weighing surface could inhibit your ability to properly position samples.

Cleanliness

Debris can cause internal and external damage, resulting in downtime and potentially expensive repairs.

A Stable Surface

A shaky table, desk, or crooked workstation can cause inaccurate readings. We highly recommend using an anti-vibration table to help keep vibrations at a minimum.

Drafts

Depending on readability and accuracy, even a slight breeze could affect the reading. When drafts aren't easily detectable, a simple test can determine if they exist. Just turn on your scale and check for display drifting. If you suspect there is some disturbance, try placing a draft shield or barriers around the scale to prevent drafts from getting in.

3.4 LEVELING YOUR SCALE

As a rule, it's critical for any scale to remain level. Load cells are not designed to measure downward and sideways force accurately. The actual load cell, balance, or housing will deflect some of the measured force and this creates an inaccurate reading. The higher the resolution and accuracy, the larger the noticeable effect.

To ensure accurate readings, always check that your scale is level before use. Some high-end scales and balances come with an auto-leveling feature, while others will require you to manually set the leveling feet until the leveling bubble or spirit level is perfectly centered.



3.5 VERIFYING ACCURACY

While most new scales come calibrated by the manufacturer, how they arrive can mean something very different to you. Many manufacturers will perform what's called a "factory calibration" as part of their quality control process. At some point before final packaging, quality technicians will perform a calibration to ensure the scale is within tolerance and functioning properly.

In some instances, documentation is included that reports the instrument is operating properly. This is often referred to as a "Certificate of Conformity" or "Quality Certificate." These documents rarely provide much detail, instead serving as a statement that the scale passes manufacturing or regulatory requirements. These are not to be confused with calibration reports.

If what you're looking for is a traceable calibration report, most manufacturers do not provide them. Some will upon request,

but it is very uncommon and usually quite costly. Generally speaking, a scale is factory calibrated only from a quality standpoint and they leave it up to service companies to provide calibration reports. To learn more about traceable calibration reports, see section 4.10.

As a general rule of thumb, we tell every customer that they should ALWAYS calibrate their new scale upon initial setup. Whether or not it was calibrated at the factory or by a third party, a scale can easily lose calibration while in transit. Freight carriers aren't known for being particularly careful and packages get jostled around during sorting and delivery.

4.0 CALIBRATION

Whether it's the day your new scale arrives at your facility or after a few months of regular use, at some point someone will ask, how do I calibrate this scale? Since every scale is unique, the answer to this question can vary a bit, but fortunately, most calibration procedures work the same way across most scales in use today.

As it pertains specifically to scales and balances, calibration is the act of adjusting the instrument against known standards to reflect the stated accuracy. In simpler terms, calibrating a device ensures it is measuring properly.

4.1 TYPES OF CALIBRATION

In the scale industry, there are two common types of calibration: span and linear.

Span calibration calculates a zero load point followed by one weight drop point. These two test points are saved and help to create the linear calculation that makes up a scale calibration.

Linear calibration is used to adjust a scale that is found to not be performing in an accurate linear fashion. Similar to span calibration, it begins with calculating the zero point. But unlike the previous method, multiple weight drop points are tested and stored.

What type of calibration should you use?

The only way to test if a scale is linear is to have multiple weight drop points. For scales being used in non-legal-for-trade applications, the process is as simple as adding a weight drop that is half of the largest available test weight.

For example, a 10 lb. scale tested to capacity would need a 5 lb. calibration weight to test the linearity of the scale. If the scale displays 10.00 at the 10 lb. test point but displays 4.98 at the 5 lb. test point, the scale is not perfectly linear. If the scale shows 4.98 at the 5 lb. weight drop and 9.96 lbs. at the 10 lb. weight drop, then the scale is linear but may require an adjustment to the span calibration to correct the error.

4.2 METHODS OF CALIBRATION

In addition to the types above, there are two different methods of scale calibration: external and internal.

External calibration is the method of calibrating a scale or balance manually. This means that the operator must use calibration weights (more on these in section 4.6) to verify the instrument. To do so, calibration weights of known values are used to check the scale. If the display matches up to the weight being used, the calibration is verified. If it is out of tolerance, the scale will need to be calibrated. This is usually accomplished with a span or linear calibration procedure performed using the instruments menu and the appropriate test weights.

Internal calibration means the scale or balance has a built-in mechanism that can perform its calibration. This mechanism is usually a motorized mechanical unit that has an integrated reference weight. Using the menu or automatic settings, the weight is moved onto the load cell and the balance performs its own verification. There are two ways internal calibration can be performed:

- **Manually:** The manual method requires the operator to use the instruments menu to prompt the internal calibration.
- **Automatically:** Scales or balances with an automatic feature will perform their calibration based on preset parameters or time intervals. Many models even allow the operator to choose when the balance will complete the calibration based on environmental factors like temperature change.

Internal calibration functions are typically preferred in laboratory settings where precise measurements are extremely important. Having a balance that performs internal calibrations further ensures accuracy and reproducibility. Plus, internal calibrations (especially automatic calibrations) reduce the amount of time spent verifying the instrument manually. This consistent verification helps improve quality standards and compliance.

4.3 HOW TO CALIBRATE A SCALE

Here is an 8-step guide that covers the basics of calibrating an unmarked (non-NTEP-approved) scale:

1. Consult the manual

Before proceeding, it is best to find the manual for your particular scale. A manual will show the structure of the menu, how to navigate the menu, and what types of calibrations your scale can do. The manual may even specify which calibration weights are required to perform the calibration adjustment.

2. Prepare the environment

The next step is to make sure the environment is acceptable for testing and calibrating. The scale should be clean, leveled, and placed on a solid surface. It is also a good practice to control air movements and temperature changes. To maximize the calibration effectiveness, perform the calibration at the location where the scale is used. Moving scales that are not portable may cause the calibration to change.

3. Perform a visual check

Verify that the scale or balance will turn on and is safe to test. Make sure the weight display powers up properly, the keypad functions correctly, the power cord doesn't have any exposed wires, and the frame that supports the scale doesn't have any structural defects. Any of these things would be a cause for concern that the scale cannot be safely or properly tested.

4. Determine the allowable tolerances

The first place to look to determine your tolerance is with the manufacturer's datasheets. If the manufacturer does not provide tolerance specifications, it will be up to the user to determine an acceptable tolerance for their application. (More on this in section 4.5.)

5. Choose test weights

Once the scale is ready to go, you'll need to determine the appropriate test weights (also known as calibration weights) to use for the calibration. Generally, it is recommended that the accuracy of the test weights be at least equal to 1/3 the readability of the scale. Ideally, several test weights of various weight values should be available for the test as well. Again, many manufacturers provide the types of test weights you should use for calibration, so refer to your user manual before beginning calibration. (Consult section 4.6 to learn more.)

6. Perform an "as found" test

The next step is to test the scale using test weights of a known value. Every scale is different and requires various steps to access the menu and perform the calibration. Some are as simple as pressing a single key on the keypad. If you aren't sure how to select the calibration menu on your scale, reference the owner's manual.

The scale should be tested at multiple test points in an increasing and a decreasing manner. The more test points there are, the easier it is to determine how well the scale is performing. Where applicable, a corner load or shift test should be included in the “as found” test (more on this in section 4.8).

In instances where the scale capacity is very large, such as a vehicle scale, a much lower weight load should be used. Compare the test results to the allowable tolerances to determine if the scale needs to have its calibration adjusted.

7. Make adjustments based on preventative maintenance

Next, perform any necessary preventive maintenance procedures and adjust the calibration where necessary. In many cases, this includes checking under the weighing pan for debris and wiping down the keypad, housing, and display. For mechanical scales, this may also include cleaning and lubricating pivot points. (Consult section 6 for more cleaning and maintenance instructions.)

8. Conduct an “as left” test

The “as left” test should be identical to the “as found” test. Use the same increasing/decreasing test points and corner load test weight values as were used in the “as found” test. Compare the test results to the allowable tolerances to determine if the scale’s calibration has been properly adjusted. This will serve as the final test results for your calibration and inspection process.

4.4 NTEP SCALE CALIBRATION

Scales used in legal for trade applications must be NTEP approved and must be sealed after they are calibrated. They are sealed to prevent any tampering with the calibration settings by unauthorized individuals. Licensed technicians typically have to calibrate and seal these units before use. Rules do vary from state to state so it is recommended to check with your local weights and measures department before starting the calibration process.

4.5 ALLOWABLE ACCURACY TOLERANCE

Determining the tolerance for a scale is a critical step in the calibration process. Scales used in legal-for-trade applications must follow tolerances specified in NIST Handbook 44. Section 2.20, Table 6 of NIST Handbook 44 (see below) specifies maintenance tolerances based on Class I through III L.

NTEP-approved scales have what’s known as certificate of conformance (a.k.a. CC or COC) numbers. You can use the NTEP Certificate of Conformance Database Search to locate more information about your scale. The CC number will consist of five numbers with a dash separating the second and third numbers. The certificate will provide details about the scale’s capacity, readability, and accuracy class, among other things.

Table 6. Maintenance Tolerances (All values in this table are in scale divisions)				
Tolerance in Scale Divisions				
	1	2	3	5
Class	Test Load			
I	0 - 50 000	50 001 - 200 000	200 001 +	
II	0 - 5 000	5 001 - 20 000	20 001 +	
III	0 - 500	501 - 2 000	2 001 - 4 000	4 001 +
III L	0 - 50	51 - 200	201 - 400	401 +
III L	0 - 500	501 - 1 000	(Add 1 d for each additional 500 d or fraction thereof)	

To further explain, a Class III bench scale with a 50-pound capacity and 0.01-pound readability has 5,000 divisions (5,000 x 0.01 = 50lbs). When tested at 5 lbs., or 500 divisions, the scale should be able to perform +/- 1 division or +/- 0.01 pounds. When tested at 50 lbs., or 5,000 divisions, it should perform within +/- 5 divisions or +/- 0.05 lbs.

If a scale is unmarked (not NTEP-approved), then the first place to look to determine your tolerance is with the manufacturer’s datasheets. If the manufacturer does not provide tolerance specifications, it will be up to the user to determine an acceptable tolerance for their application.

4.6 CALIBRATION WEIGHTS & WEIGHT CLASSES



Many brands offer scales with a handy feature called internal calibration. If your model does not have that, you’ll need to determine the appropriate external calibration weights (also known as scale weights or test weights) to use to dial in your equipment.

The scale weights used for the calibration need to be of proper accuracy and weight class. Generally, it is recommended that the accuracy of the calibration weights be at least equal to 1/3 the readability of the scale. Ideally, several different weight values should also be available for the test.

What calibration weight class do I need?

Calibration weights each have a class assigned based on their accuracy or tolerance. Multiple governing bodies determine the weight classes, including ASTM, NIST, and OIML, and each has different requirements. To make things easier, many manufacturers provide the types of scale weights you should use for the calibration of their equipment, so refer to your owner's manual when making your decision.

NIST

The National Institute of Standards and Technology is an organization under the United States Department of Commerce. The NIST plays a crucial role in developing and promoting measurement standards, technologies, and practices across various industries, such as manufacturing, healthcare, and information technology.

- **NIST CLASS F:** Historically favored by warehouses and manufacturers, Class F weights were commonly employed for calibrating scales used in the production or shipping of larger products and for internal quality control. However, with the release of the revised regulations in NIST Handbook 105-1 (2019), Class F weights are no longer permissible for legal-for-trade tests unless they have been grandfathered in. Moreover, service companies are now prohibited from acquiring new Class F weights for the purpose of servicing legal-for-trade scales.

ASTM

ASTM International (formerly the American Society for Testing and Materials) is a non-governmental agency that has set forth several classes for calibration weights. As the number of the class increases, the tolerance allowed also increases.

- **ASTM Class 7:** Primarily used in industrial applications that require rough measurements, ASTM Class 7 has the highest tolerance allowable in the ASTM classification system. Calibration weights with an ASTM Class 7 are suitable for Class III, Class IV, and non-designated scales like floor scales, shipping scales, and other industrial devices.
- **ASTM Classes 4–6:** ASTM Class 4, 5, and 6 calibration weights are primarily used to check and calibrate Class III, IV, and unmarked scales. Precision balances and those scales found in student laboratories typically require calibration weights within these classes. These scales typically have readability—or divisions—lower than 0.1 grams (i.e., 0.5g, 1g, etc.).
- **ASTM Class 3:** Moderate precision balances, or those with readability from 0.1 to 0.01 grams, generally require an ASTM Class 3 calibration weight. These types of scales are commonly found in commercial laboratory environments.

- **ASTM Class 2:** Higher precision balances, or those with readability between 0.01 and 0.001 grams (1 milligram), require an ASTM Class 2 weight for calibration purposes. High-precision balances are often used in the pharmaceutical and chemical compounding industries.

- **ASTM Class 1:** It is recommended to use an ASTM Class 1 weight when calibrating devices—such as analytical and semi-micro balances—that can weigh out to a fraction of a gram. ASTM Class 1 weights may also be used as references when calibrating other weights with higher tolerances. Users should wear gloves or tweezers when handling these weights as any oils or dirt from their hands can alter the weights' tolerances.

- **ASTM Class 0–000:** Metrology laboratories almost exclusively use ASTM Class 0, 00, and 000 as reference standards for calibrating other weights. Controlled environments are required when using these classes of calibration weights because of their tight tolerances. These classes of weights should be handled delicately with tweezers as they are often very minute in size.

OIML

The International Organization of Legal Metrology is an intergovernmental organization that ensures that the certification of measuring devices is compatible from one country to the next.

- **OIML Class E1:** OIML Class E1 calibration weights are commonly used for calibrating other weight references and are suitable for calibrating high-precision balances. They are constructed in pieces, so there is no method of adjustment. This means they are best used in areas where the environment is stable and careful handling is guaranteed. The uncertainty is guaranteed to be 1/3 the tolerance.
- **OIML Class E2:** OIML Class E2 calibration weights can be used as a reference standard for calibrating other weights and calibrating high-precision analytical balances with a readability as low as 0.1 mg to 0.01 mg.
- **OIML Class F1:** OIML Class F1 calibration weights are intended for use in calibrating high-precision top load balances with a readability of 0.01 gram and 0.001 gram.
- **OIML Class F2:** OIML Class F2 calibration weights are intended for calibrating semi-analytical balances and for student use. They are a common choice for schools, colleges, universities, and general laboratories.

UltraClass

UltraClass calibration weights are designed to handle the most demanding calibration needs while having the ability to be adjusted. Consistent automated measurement means that UltraClass weights are the most precise two-piece weights available with weight tolerances that equal or exceed comparable ANSI/ASTM E617 and OIML R 111 class tolerances. All the UltraClass calibration weights, 1 gram through 20 kg, are made exclusively out of stainless steel.

Obsolete Classes

Below is a useful conversion chart to equate obsolete classes with current standards.

Obsolete Class	Current Class
Class M	ASTM Class 0, OIML E2
Class S	ASTM Class 1, 2
Class S1	ASTM Class 3, OIML F1
Class P	ASTM Class 4, OIML F2
Class Q	ASTM 5
Class C	ASTM Class 6, 7, NIST Class F
Class T	ASTM Class 7

4.7 WEIGHT TEST POINTS

As stated earlier, it is necessary to have at a minimum 2 data points to calibrate a scale. Beyond that, there is no simple answer to that question. In a testing procedure for an end user, the weight test points beyond what we previously stated can be anything the end user deems appropriate.

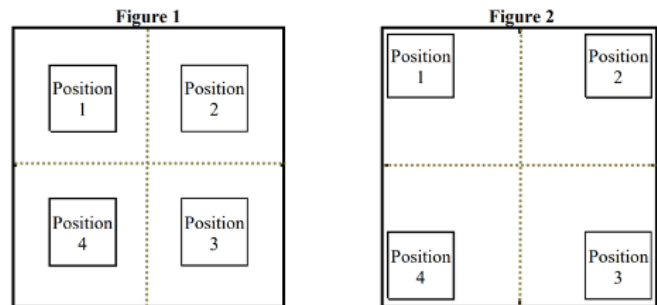
For a reliable, general example of weight drops, use the following guidelines:

1. Zero load
2. Low capacity test 1-5% capacity of the scale
3. Half of drop point 4
4. Full capacity or as close to full capacity as possible

The purpose of drop point 1 is just to verify that the scale is at zero and stable before moving on. Drop point 2 tests that the scale works well on the lower end of the capacity. Drop points 3 and 4 test that the scale is accurate and linear.

4.8 SHIFT/CORNER TESTS

A shift test is used to check the performance of a scale or balance in each quadrant or corner. This determines if the scale is weighing accurately no matter where a weight load is placed on the weighing platform.



Each corner must have a calibration weight placed on it and the result recorded. The standard in the industry is to start on the top left side of the weighing surface and continue around clockwise to each quadrant numbering them as the test proceeds. View Figures 1 and 2 above for an example.

What calibration weights are needed to perform a shift test?

Although Handbook 44 applies to NTEP scales, it provides a good method for determining what weight load to use for shift tests. The method defined in Handbook 44 is widely used as the standard throughout the industry on both NTEP and non-NTEP scales and balances. View pages 2-30 and 2-31 of Handbook 44 2020 for the fully defined standard for shift tests.

To summarize, a scale with a 500 kg capacity or less requires a shift test of 30% to 35% of its capacity, as shown in Figure 1. For scales exceeding 500 kg, a shift test of 30% to 35% of its capacity is placed at the center of each quadrant (Figure 1) or 25% of its capacity over each corner (Figure 2).

4.9 CALIBRATION PROCEDURES

Are you working on creating a procedure for scale calibrations within your company? If so, we've put together some important information to consider when developing your calibration procedure.

The standard operating procedure (SOP) of every calibration procedure should, at a minimum, identify the following:

1. Calibrations intervals

One of the most common intervals is 1 year but in applications where accuracy is very important, time intervals between calibrations are usually shortened to months, or in some cases, daily. It's important to establish your calibration interval and document it while developing your SOP. You'll want to create a compliance method to ensure that the calibrations are completed as scheduled.

2. Who should perform the calibration?

In legal-for-trade applications, it's common for a registered service company or local weights and measures to perform

calibrations. In non-legal-for-trade applications, you can determine whether or not you complete calibration in-house or hire a contractor.

In most cases, companies hire an external service provider to do their calibrations. Using an external service provider helps guard against any potential conflict of interest, alleviates expensive test standard costs, and ensures the tests are performed by an experienced professional every time.

3. Calibration test points

See section 4.7 for more information.

4. Allowable tolerances

See section 4.5 for more information.

5. Calibration adjustment methods

See section 4.2 for more information.

6 Calibration records

Once calibration is completed, records should be kept for audit purposes. This could be for internal audits or for external audits that are commonly required by many industry standards. Records should show what piece of equipment was calibrated, what standards were used for the calibration, who performed the calibration, the date, the next scheduled date, and the actual test data.

Many external service providers have software that helps lay all this information out in an orderly manner. The software also assigns a unique ID number to each calibration record so it can easily be referenced if necessary in the future. It is also common practice to place updated calibration stickers on each piece of equipment after it has been calibrated.

7. Asset management

Keeping an updated list of weighing equipment that shows your unique ID, location, last calibration date, and next calibration date is very helpful when managing a quality program. It is an easy way to prepare for audits and schedule upcoming calibrations. A list like this is often built right into the software used by many external providers.

8. Out-of-tolerance conditions

Including documentation in your SOP of what to do when a scale is found to be out of tolerance is very important for most companies. For some companies, an out-of-tolerance condition might trigger a product recall. For yours, it might not be so important. In cases where a scale is constantly found to be out of tolerance, it may be necessary to shorten the interval between calibrations.

Developing a decision method

A decision method must also be developed so the person performing the calibration knows what to do when a scale is found to be out of tolerance. For example:

- **Does the scale need to be pulled from the production line?**
- **Does it have to be marked inactive and quarantined?**
- **Can the calibration just be adjusted and if it adjusts properly can it be left in the production line, or could it be serious enough that a product recall is triggered?**

If the incorrect tolerances have been determined for a scale—or no decision method is developed for when an out-of-tolerance condition occurs—it can lead to a very serious situation.

4.10 TRACEABLE CALIBRATION REPORTS

Calibration certificates are typically required for most types of measuring equipment and devices at manufacturing facilities, laboratories, and any other industries that have strict quality systems. At Scales Plus, we generally recommend a NIST traceable report for those customers who are not engaging in legal-for-trade activities and want quality assurance.

The most common reason someone purchases a traceable calibration report is quality assurance. A scale that is out of calibration or damaged from the factory can lead to significant downtime and lost productivity. A calibration certificate provides assurances that the new scale performs within the required specifications and is in proper working order. The test also verifies the calibration function works correctly.

What is the difference between accredited and traceable calibration?

Accredited calibration means that the calibration lab has been accredited by a third-party organization and can provide calibration services as specified in its scope. A traceable calibration, on the other hand, means that the measurement results of your scale calibration can be traced back to NIST standards.

So, while accredited calibration labs provide traceable measurement results, not all traceable calibration measurement results are accredited. For it to be both, the lab would need to be accredited by an authorized third-party organization for the specific calibration service AND meet NIST traceability requirements.


CALIBRATION CERTIFICATE

Tech ID: 0001

Scale System

Customer Used	0.000 lb
Capacity	0.002 lb
Division	N/A
Location	N/A
Class	Counting
Scale Type	Counting

Indicator

Manufacturer	LW
Model	Measurements
Serial Number	LCT 05
Programmed Capacity	LC201154
REP#	66,000 lb
	0

Base

Manufacturer	N/A
Model	N/A
Serial Number	N/A

Tolerance Source: Industry Standard
Tolerance Applied: Manufacturers Specs
Temperature: N/A °F
Humidity: N/A % Relative
Work Instruction Used:

Unit of Measure Reported In: lb

Shift Test

GSD Absolute Tolerance at 20 lb Weight Applied	
Position	As Found Reading lb
10	20.000
20	20.000
30	20.000
40	20.000
50	20.000
60	20.000
70	20.000
80	20.000
90	20.000
100	20.000
110	20.000
120	20.000
130	20.000
140	20.000
150	20.000
160	20.000
170	20.000
180	20.000
190	20.000
200	20.000
210	20.000
220	20.000
230	20.000
240	20.000
250	20.000
260	20.000
270	20.000
280	20.000
290	20.000
300	20.000
310	20.000
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390	20.000
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1000	20.000
1010	20.000
1020	20.000
1030	20.000
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1060	20.000
1070	20.000
1080	20.000
1090	20.000
1100	20.000
1110	20.000
1120	20.000
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1180	20.000
1190	20.000
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3010	20.000
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4200	20.000
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4220	20.000
4230	20.000
4240	20.000
4250	20.000
4260	20.000
4270	20.000
4280	20.000
4290	20.000
4300	20.000
4310	20.000
4320	20.000
4330	20.000
4340	20.000
4350	20.000
4360	20.000
4370	20.000
4380	20.000
4390	20.000
4400	20.000
4410	20.000
4420	20.000
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4570	20.000
4580	20.000
4590	20.000
4600	20.000
4610	20.000
4620	20.000
4630	20.000
4640	20.000
4650	20.000
4660	20.000
4670	20.000
4680	20.000
4690	20.000
4700	20.000
4	

a spare power supply on hand. Not to mention, this could pose a significant safety risk in your workplace.

3. Test the power supply on another scale.

If you have multiple scales, testing a power supply issue can be much simpler. To check the unit in question, grab a power cable from a scale that is working and plug it into the broken scale. If that powers up the scale, you now know the power supply is no good. Simply replace it and you'll be back up and running in no time.



5.2 BINDING/DEBRIS BUILDUP

Commercial weighing scales often take a beating and come out quite filthy at the end of the day. Dust, dirt, liquids, and other materials can all build up on the scale, eventually finding their way into places they don't belong.

When debris interferes with the load cells, it is referred to as binding. Binding can cause a whole series of issues, such as:

- The scale may not read over a certain capacity.
- The display may drift and produce fluctuating results.
- The display shows error codes.

How to correct a scale binding issue

1. Check under the weighing pan and remove any debris you find.

Before you remove anything, be careful not to cause more damage by introducing extra debris into the housing or overloading the load cell. Typically speaking, you can carefully remove the weighing pan or disassemble the housing and remove any dust or debris without issue. But always check the owner's manual first and follow the manufacturer's instructions for routine cleaning and maintenance. See section 6.4 for tips on how to clean the weighing pan.

2. Carefully disassemble the housing and clean any debris buildups.

Any buildup of material inside the housing should be removed with the appropriate scale cleaning tools such as brushes,

specialty scrapers, or wipes. Again, be especially cautious when cleaning around the load cell and other fragile internal components. See section 6.2 for tips on how to clean the housing.

3. Power up the scale and check to see if the issue is resolved.

If you suspect a bind and have finished cleaning the scale, power it back up and check to see if the issue has been resolved. If it still isn't working properly, there are either more areas that need to be cleaned or it's not a binding issue at all.

5.3 DRIFTING/MOISTURE DAMAGE

Drifting is another common problem scale users may face. Drifting occurs when a scale's display continuously fluctuates and is generally caused by water exposure. Water in the scale's indicator, junction box, load cells, cables, or internal components can cause erratic readings.

If you discover water in the system, immediately shut it down. Allow the scale to completely dry. You may be able to use it again if there is no permanent damage. You may also want to consider using a scale with a high IP rating that's specifically designed for use in damp environments.

5.4 INACCURATE WEIGHT READINGS

Having a reliably accurate scale is incredibly important. Even a minor inaccuracy in your measurements can cause significant issues in almost any business. Unfortunately, if your scale is giving you different readings, there are a variety of potential explanations.

Improper calibration

One of the most common culprits for inconsistent readings is an improperly calibrated scale. That's because, over time, the wear and tear of regular use can cause a scale to lose its accuracy. If you've recently moved your scale or notice that it's not performing within its allowable tolerance, then it should be calibrated.

If you have test weights, check that the calibration is within tolerance. After the calibration, the scale needs to be tested and verified for accuracy. See section 4.3 for more information on how to calibrate a scale.

An uneven surface

When a scale is placed on an uneven surface, it can cause the scale to give inaccurate readings. That's because the force measured is no longer parallel with the direction of gravity, and most load cells are not designed to measure a downward and sideways force accurately.

Most scales come with a leveling bubble and adjustable feet, so check to see that your scale is balanced. If it isn't, continue to adjust the feet until it is. See section 3.4 for more information on how to level a scale.

An unbalanced load

If there is an imbalance in the weight being placed on the scale, it can also cause the scale to give inaccurate readings. For example, if there is a heavy object on one side of the scale and a light object on the other side, the scale may give an inaccurate reading.

This happens because the scale is trying to balance the load, but because of the imbalance, it is unable to do so. If you're weighing animals or liquids and this is a common issue, we recommend purchasing a scale with a dynamic weighing function.



A low or unstable battery

When the battery in your scale starts running out, it can become increasingly erratic and provide incorrect or shifting readings. This is one of the most common reasons for scale malfunction, so it should always be one of the first things you check when there's an issue.

First, check to see whether the batteries are charged and connected correctly. If they're unable to keep a charge, you may need to replace the batteries or power adapter to see if that solves your power problem. As a best practice, always have spare batteries on hand and keep them charged as a backup.

Environmental disturbances

It's possible that a digital scale would give incorrect readings if exposed to a strong gust of wind or even the slightest of drafts in a laboratory setting. This is due to the scale's inability to stabilize and provide reliable measurements when subjected to a force such as an air current.

To prevent this, we recommend taking your measurements indoors when possible, and away from any doors, windows, and air vents. Of course, the only way to fully ensure there will be no outside air interference is to use a draft shield with your scale.

Another very common issue we see has to do with environmental vibrations, whether that's a shaky table, a rolling workstation, or seismic rumblings. If you're serious about removing any possibility of movement, you may want to invest in an anti-vibration table.

Overloaded or broken components

When a digital scale is overloaded, the resulting readings may be incorrect. This is because an overburdened scale may no longer be able to accurately measure weight. See section 6.7 for more information on overloaded components.

A broken component, on the other hand, is much more challenging to find. It could potentially be a damaged load cell, junction box, or even the mainboard. There could also be the possibility of a poorly connected wire. For help in troubleshooting broken components, please contact our technical support line.

Exposure to extreme temperatures

A scale may give false readings if it's exposed to extreme heat or cold. The ideal temperature for these gadgets is around room temperature, so storing your scale in a frigid or humid environment may lead to problems.

Cold temperatures, in particular, will attract moisture, which as we've mentioned previously, can cause problems inside the machine. Extreme cold can also make your equipment operate sluggishly and inefficiently, which can negatively affect your readings.

Frequency interference

Since digital scales are electronic devices, after all, they are not immune to the potential interference of other radio frequencies in the area. For instance, your microwave, cell phone, or a burst of static electricity can have a negative influence on your scale's performance.

This is because fluctuating electromagnetic radiation from other wireless equipment can disrupt the scale's ability to provide steady and accurate readings. Always inspect your workspace and remove any nearby devices before taking any measurements to guarantee your results are as consistent and accurate as possible.

5.5 ERROR CODES

Manufacturers typically use error codes in their software to help diagnose issues with their scales. Error codes are usually clearly documented in the scale's manual. The code could mean anything, from the scale needing calibration to the malfunction of a particular component. Referring to the manual is always the first step if an error code is displayed. If there is no information on the code or you do not have a manual, contact Scales Plus for the information.

If you've exhausted all our troubleshooting tips and are still experiencing a malfunctioning scale, we recommend you contact the Scales Plus technical support line or submit a service request and our team of experienced technicians can recommend whether to fix or replace your scale.

6.0 CLEANING & MAINTENANCE

It's important to keep your scales clean and well-maintained, but it's just as important to do so properly. Some industries have standards and regulations in place that require cleaning SOPs. Keeping your analytical and precision balances clean helps to ensure accuracy, prevent contamination, and extend the life of the instrument.

6.1 CLEANING EQUIPMENT

The first step of proper cleaning is to have everything you need on hand. Here are some of the cleaning products and equipment we recommend using:

- **Microfiber towels for wiping down surfaces**
- **Precision soft bristle cleaning brushes to sweep away debris**
- **Commercial-grade glass cleaner for draft shields and surface cleaning**
- **70% isopropanol or ethanol for tougher stains and stickers**
- **Mild cleaning detergents such as dish soap for general cleaning of the housing**
- **Plastic tip precision scrapers to get into tight crevices and corners**

USP guidelines and other regulations dictate which types of cleaners to use to prevent contamination. Make sure you follow all necessary regulations and best practices.

6.2 CLEANING THE HOUSING

Most analytical and precision balances have plastic housings. Plastic does not do well with strong cleaners such as acetone so it is recommended to go with a mild detergent. Tougher stains can be removed using isopropanol or ethanol. Glass cleaner also works well, even on tougher stains.

Use the microfiber towel to wipe down the whole housing. Be careful not to tip the balance on its side or top when cleaning the bottom of the housing as this could potentially disrupt the calibration. If the bottom needs cleaning, carefully hold the balance up and gently underneath.

6.3 CLEANING THE DISPLAY

You can typically use a mild detergent when wiping down the display. Many balances have a small screen that can be wiped down while cleaning the rest of the housing. For models with sensitive touchscreens, switch to a glass cleaner and gently wipe it down with a microfiber cloth. Just apply a small amount to the cloth to avoid spraying it directly onto the screen.

6.4 CLEANING THE WEIGHING PAN

Most balances have a stainless steel weighing pan. Stainless steel is quite resilient so it can handle the vast majority of cleaning products, with one exception—it does not do well with strong acids. So, be sure to avoid using acids to clean these components.

Before wiping everything down, remove any dust or debris from on or around the weighing surface. The brush and scrapers come in handy here. However, DO NOT brush debris into the hole where the weighing pan sets. This is where the load cell and other delicate components are located. Dirt and debris, including powders, can cause binding issues and prevent the balance from working properly.

Do your very best to carefully remove the debris with your brushes. Q-tips are also quite useful for this task, as a damp Q-tip can be used to pick up stubborn dust. After removing all the grime, use your cleaning products to wipe everything down. But again, DO NOT get anything inside the housing.

6.5 CLEANING THE DRAFT SHIELD

If you're dealing with a balance that uses a draft shield, you'll need to remove it to clean the internal weighing area. Cleaning the draft shield components is typically easier to do after removing them from the balance as well.

Wipe down the rails and frames with your microfiber towel and a bit of mild detergent. You can carefully wipe down the glass panels using a glass cleaner. Then set all the components aside to dry until you are ready to reassemble the draft shield.

6.6 DAILY SCALE MAINTENANCE

When it comes to your weighing equipment, a bit of routine care is by and far the best way to avoid breakdowns, operator errors, and inaccurate measurements. The checklist below will help your operators maintain working equipment, avoid slowdowns (or stoppages), and prevent unnecessary maintenance.

Daily Scale Maintenance Audit

Date			
Auditor			
#	Audit Steps	What to look for:	Audit Conclusion (Auditor notes)
1	Is your work space free of chemicals, oils, and unnecessary objects to allow ample room to work?	Organized workspace free of objects that could damage the scale or inhibit the weighing process.	
2	Is your scale free of loads or obstructions?	Check for foreign objects underneath the pan or weighing platform. Any target on the weight surface will cause.	
3	Is your scale and work bench level and stable?	Make sure the table or bench used for weighing is level and firm. Use your scale's leveling feet if equipped to stabilize and.	
4	Is your work space free from strong drafts and vibrations that could cause the scale to shift?	Any strong air currents from HVAC systems, desk fans, or nearby doors. Consider relocating your scale if vibrations result in inaccurate.	
5	Do you have the correct power source? Is it safe to use?	Check that your power source is the factory-supplied power source or equivalent. Replace if any power marks are present on.	
6	Is your power cord untangled and run through a safe area?	Make sure the power cord is not presenting a trip or other hazard. Use a cable ramp if running through a walkway.	
7	If battery-operated, is your battery charged?	Plug in your scale overnight for uninterrupted use each day.	
8	Is your scale calibrated correctly? Is it overdue for calibration?	Use reference weights to check your scale's calibration. If not available, use an object with a known weight. Check calibration.	

6.7 OVERLOADED COMPONENTS

As the name suggests, scale overload is a term that refers to any object being weighed that exceeds a scale's maximum capacity rating. If a scale's maximum capacity is 500 lbs. and you place an object on it that weighs 520 lbs., you've overloaded that scale.

Fortunately, that 520 lb. object will probably not do any real harm to the scale because most modern manufacturers have designed their scales to handle an overload capacity of anywhere from 125-175%. In this case, that 520 lb. object is only an overload of 104%, which is well under the 150% overload rating of the scale we're using.

With that said, a scale will often go into an error code once the rated capacity is met. This is to notify the operator that the standard capacity has been reached and the item being weighed needs to be removed immediately.

The overload rating of a scale is almost always listed in its product manual, typically in the specifications section near the maximum capacity rating. At Scales Plus, we also include this number in the product description, so you are always aware before you buy.

DESCRIPTION	WARRANTY INFORMATION	SPECIFICATIONS	ACCESSORIES/REPLACEMENT PARTS	PRODUCT REVIEWS
Capacity:		550 lb		
Readability:		0.2 lb		
NTEP:		Yes		
Class:		III		
Units:		kg, lb, g, oz, lb/oz conversion		
Display Type:		LED display, Six 1-inch digits		
Communication:		RS-232		
Weighing Platform Dimension:		18" x 24"		
Indicator Dimensions:		6.34" x 8.5" x 2.8"		
Operating Temperature Range:		14°F to 104°F / -10°C to 40°C		
Construction:		Fully stainless steel		
Overload Capacity:		150%		
Manufacturer:		Anyload		
Model:		TN5660-FPS-300kg SE		

What happens to a scale that's overloaded?

Overloading your scale can cause irreparable damage to the internal load cell. A load cell is essentially a force transducer—a small, mostly metal object located within the scale that determines the weight of the object to be measured.

When an object is weighed that falls within the scale's maximum capacity rating, the load cell will deform elastically and return to its previous shape once the object is removed. With an object that exceeds the maximum capacity, the load cell may inelastically deform beyond its limits, meaning it won't be able to return to its pre-weight shape and will no longer function as it should.

6 signs your load cell is damaged:

1. The scale refuses to turn on
2. You get an error message at startup
3. Inconsistent and/or fluctuating readings
4. An overload indicator/weight meter icon appears
5. The reading doesn't change when a load is applied
6. The display doesn't return to zero after a load is removed

What to do if your load cell is damaged

If you believe your scale has a damaged load cell, the first thing you can do is attempt to calibrate it. If it's still giving you inaccurate readings, you may need to remove the load cell for a visual check.

If you notice any significant deformation, cracks, or other observable damage, your load cell may be beyond repair. At this point, you have three options:

1. Send in your scale for repair
2. Purchase a new load cell
3. Replace the scale altogether

Please note: Damaged load cells may not be eligible for warranty repairs or returns. Scale overload is considered a user error and not a manufacturer defect, meaning any damage incurred as a result of overloading WILL NOT be covered under the manufacturer's warranty.

6.8 REPLACEMENT PARTS

If you're looking to repair your scales, create custom weighing systems, or upgrade your equipment, high-quality OEM and aftermarket replacement parts are the way to go. Here are some of the most common scale parts and accessories on the market today.

Load Cells

Load cells, also known as force transducers, convert a specific type of mechanical force—typically tension, torque, compression, or pressure—into an output signal. This output signal is then transmitted via a load cable to the scale's indicator where the precise weight can be measured and read by the operator.

As with most things, load cells are susceptible to wear and tear and are known to shift, bend, and misalign over time. To compensate for this, scales should be regularly recalibrated or replaced to maintain the most accurate measurements.

There are many different types of load cells—from single-point and double-ended to compression disks and tension links—each with a specific design and purpose. If you would like some help figuring out which load cell is best for your application, we would be happy to help!



Load Cell Cables

Load cell cables act as both a power and communication channel, bridging the indicator and load cells together. Power originates from the indicator through the excitation wires in a load cell cable.

The load cell acts as a transducer that then creates an electrical signal proportional to the force applied to it. This proportional electrical signal is then relayed back to the indicator which displays the numerical weight based on the signal strength.

Whether you're replacing a damaged load cell cable or setting up a custom application, choosing the right cable is important. Although a 4-wire load cell cable is the most commonly used and economical, it is worth considering if a 6-wire cable is better for your application. As a general rule, a 4-wire cable is better for short runs or replacing a damaged line, whereas a 6-wire cable is better for longer runs in uncontrolled environments.



Power Supplies

Unless you're operating a fully mechanical balance, you'll need working power supply parts if you want any chance of taking measurements. Power supply parts can include any number of different items, including power cords, batteries, adapters, plugs, and surge protectors.

Scale Indicators

A scale indicator is an external device that displays the weight of an object on a digital display. Also known as a digital weighing indicator or weighing scale display, they are a common scale component used in industrial and commercial weighing applications around the world.

Scale indicators typically consist of a large, easy-to-read display, simple navigational buttons or a keypad, a power cord (and/or internal batteries), a communication port (such as serial RS-232), and an optional stand or panel mounting hardware.

Some weight indicators also have built-in features such as process control, data storage, statistical analysis, and networking capabilities. This allows you to collect and analyze weight data for quality control purposes or to track production trends over time.



Junction Boxes

A scale junction box is a component used in weighing systems that have multiple load cells or weighing sensors. Its main purpose is to sum or combine the individual electrical signals from each load cell and send a unified signal to the weight indicator or controller.

Scale junction boxes are typically robust and long-lasting components, but there are a few reasons why they might need to be replaced, such as physical damage, harsh environmental factors, and general wear and tear.

Other Replacement Hardware

- Anti-Theft Devices
- Below-Balance Weighing Hooks
- Calibration Weight Seals
- Level Bubble
- Module Components
- Pit Frames
- Portability Frames
- Roller Decks
- Top Plates
- Covers
- Eye Bolts
- Keypads
- Load Cups/Buttons
- Option Cards
- Remotes
- Scale Feet
- Scale Ramps
- Stands
- Tension Link Shackles
- Wall Mounts
- Weighing Bowls
- Weigh Pans

6.9 SCALE SERVICE

Are scale problems weighing you down? Whether you have an issue with calibration, configuration, or overloaded components, get back up and running in no time with expert repair services from Scales Plus.

In Michigan? Our On-Site Scale Service Will Come to You

Whether you're a Grand Rapids native, a Kalamazoo local, or a diehard Yooper, you can benefit from the most convenient scale service in the country. Wherever you operate in the great state of Michigan, our technicians will travel to your facility to perform the scale services you need so you're never without your vital weighing equipment.

Out of State? Mail in Your Scale and We'll Take it From There

So you're too far away for on-site service—that's okay! The next best thing is to have a parcel delivery service bring your weighing equipment directly to us. Ship your scales or balances from anywhere in the U.S. and our certified technicians will diagnose, repair, and return your scale.

Our Scale Service Offerings

NIST Traceable Calibration

NIST Calibration reports provide documented proof that the scale you purchased is in good working order and has been calibrated to meet or exceed the manufacturer's specifications. NIST certificates are typically required for mid-to-large-sized manufacturing facilities, laboratories, and other operations with strict QA systems in place. To order a NIST-traceable Calibration Certificate with your new scale, simply check the box below the price at checkout. PLEASE NOTE: When requesting a calibration certificate, it takes an additional 3-7 days for order fulfillment.

ISO 17025:2017 Accredited

Scales Plus is ISO/IEC 17025:2017 accredited through A2LA (American Association for Laboratory Accreditation). A2LA is a non-profit, non-governmental, public service membership society with a mission to provide independent, world-class accreditation programs that inspire confidence in the quality of services and acceptance of results from accredited organizations.

Professional Scale Repair

The Scales Plus team of experienced technicians is capable of repairing many of today's most popular scale brands and models. Our spacious, full-service lab is outfitted with the state-of-the-art equipment and software necessary to repair your weighing instruments quickly and correctly. Need original manufacturer parts or specific aftermarket components? We can do that too!

Custom Weighing Solutions

Sometimes a standard, out-of-the-box weighing solution is just not up to the task. We can help with that! Scales Plus works with a wide variety of manufacturers, which means we bring a vast selection of products, technical support, and experience to the table. From creating custom filling and batching systems to meeting specific safety, environmental, and base-size requirements, our team can help design the unique weighing system your operation demands.

Preventative Maintenance

Keep your scales in good working condition and reduce operational downtime with preventative maintenance help from Scales Plus. Our services include cleaning, recalibration, and complete refurbishing solutions on a regular schedule that meets your needs. We'll even tailor a custom preventative maintenance plan that's suited for your business—and your business alone.

Ongoing Technical Support

Hands down the most utilized service we offer is our FREE technical support. Whether your scale isn't working correctly or you have questions about an operation or weighing mode, our trained technicians are standing by to provide the responsive and friendly troubleshooting assistance you need to get your weighing equipment back in working order.

Product Procurement

Can't find a specific product on our site? Let us know! At Scales Plus, we offer extensive procurement services for all things weighing. If we don't have it, there's still a good chance we can get it. All you need to do is reach out to our sales department and we'll help track down the exact weighing equipment you need on your behalf—even if we can't sell it to your ourselves!

Need It Done Yesterday? Upgrade to Our Expedited Priority Service

All of our services have lead times and—depending on the units and parts we have on hand in our facility—those lead times can occasionally be longer than your business can wait. Fortunately, you're in luck! For a small additional fee, we can bump your request to the front of the line. Just check the "Expedited Service" box in the request form and we'll have your weighing operation back up and running ASAP.



7.0

SCALES PLUS CONTACT + ADDITIONAL RESOURCES

Thank you for your interest in Scales Plus!

We are always here to assist you in any way we can. Whether you have questions about our products, need help placing an order, or want to provide feedback, we are eager to hear from you.

PREMIER SPONSOR



Please use the following contact information to get in touch with us:

 **Toll Free: 844-882-1973**
 **Local: 616-622-2100**

Place an Order:

[Email Sales Team](#)

Existing Orders:

[Email Customer Service](#)

Service Department:

[Email Service Team](#)

Corporate Mailing Address:

4850 Allen Park Drive, Ste 1
Allendale, MI 49401

Parts Department:

[Email Parts Team](#)

Technical Support:

[Email Technical Support](#)

Accounting Department:

[Email Accounting](#)

Business Hours of Operation:

Monday – Friday
8:00am to 6:00pm Eastern Time