

A NEW PERSPECTIVE:

# Calibration in the Context of Medical Patient Scales

**Calibration is an essential maintenance procedure that helps ensure the weight readings of a professional medical scale are accurate, consistent and reliable.**

To understand scale calibration as it applies to medical patient scales, it is necessary to start with some background on the general concepts of instrument calibration.

The International Bureau of Weights and Measures (BIPM) defines “calibration” as “the documented comparison of the measurement device to be calibrated against a traceable reference device.” Calibration enables the user to validate the accuracy of an instrument’s readings and make adjustments, if necessary, to ensure the results from using the instrument are reliable.

Most medical scale calibration firmware includes a function that can automatically adjust the scale to read the weight that is being applied to the scale during the calibration process. This is accomplished by adjusting constants used by the scale firmware to calculate and display the applied weight.

A PROFESSIONAL WHITE PAPER SPONSORED BY

**Health o meter**<sup>®</sup>  
P r o f e s s i o n a l



## What is calibration, and how is it done?

In short, the process of instrument calibration is comprised of the following steps:

# 1

**A known input is applied to the measuring instrument. In the case of a scale, a known weight (certified test weights) or an applied force is placed on the scale.**

# 2

**The instrument output/reading is compared to the known input applied to the instrument, and a deviation is calculated. This result is then recorded to document the calibration process on the subject instrument.**

# 3

**The calculated deviation is used to “adjust” future instrument measurements to correct the instrument readings to reflect the accurate value. If the deviation falls outside of an acceptable range, the instrument can be adjusted, if possible, or replaced.**

## Are Medical Scales Calibrated Differently than Other Instruments?

When referring to medical patient scale calibration – the term “calibration” is often misused.

Specifically, the term calibration has come to represent the process as outlined to the left with an important exception. Instead of noting and documenting the deviation between output and input, the calibration routine consists of only the third step — placing weight on the scale and adjusting the reading without noting any differences between the applied weight and the scale reading. By skipping steps one and two, the potential deviation between input and output values of the scale prior to adjusting the scale is not captured and, as a result, errors occurring when using the scale in the precalibrated state are never known. Over time, this modified calibration process can mask if a scale’s readings regularly change, as any deviations in the readings are not recorded, and because the only data available is confirmation the scale readings match the weight applied immediately after calibration.

This shortcut is a direct result of the current state of the art scale calibration methods, namely the use of certified test weights (dead weights). Due to the effort required to place the appropriate amount of dead weight on a scale for calibration, generally several hundred pounds for patient scales, the logical conclusion is to reset the scale when the heavy test weights are applied the first and only time. While the scale’s actual accuracy before calibration may not be known, the user is spared the effort and risk associated with repeating the

process of putting on and taking off the test weights if scale calibration adjustment was warranted.

An automated force application device can be used to safely eliminate the effort and risks of stacking the test weights on the scale. This device allows a user to easily return to a “comprehensive and consistent” version of calibration methods and allows for easy comparison of the output of the scale under test (indicated weight) to the applied weight/force (the known input) to determine whether an adjustment to the scale is warranted. If this test determines the scale is performing within an acceptable accuracy standard, as determined by the user, then no further action is needed. Documenting the test date and the findings will create a proper record of calibration, even when it is not necessary to run through the scale’s calibration routine. If a calibration adjustment is required to meet the accuracy standard, then the scale is easily and safely calibrated without the physical strain of removing and replacing the traditionally used dead weights.

By testing and recording the output of the scale, as compared to the test weight, before any adjustments are made, the user will get a clear picture of the long-term stability of each scale. The user will also gain a valuable understanding about how frequently a scale should be checked to ensure accurate and consistent patient weighings.

# Linearity and Multiple Point Scale Characterization

## An important aspect of instrument calibration

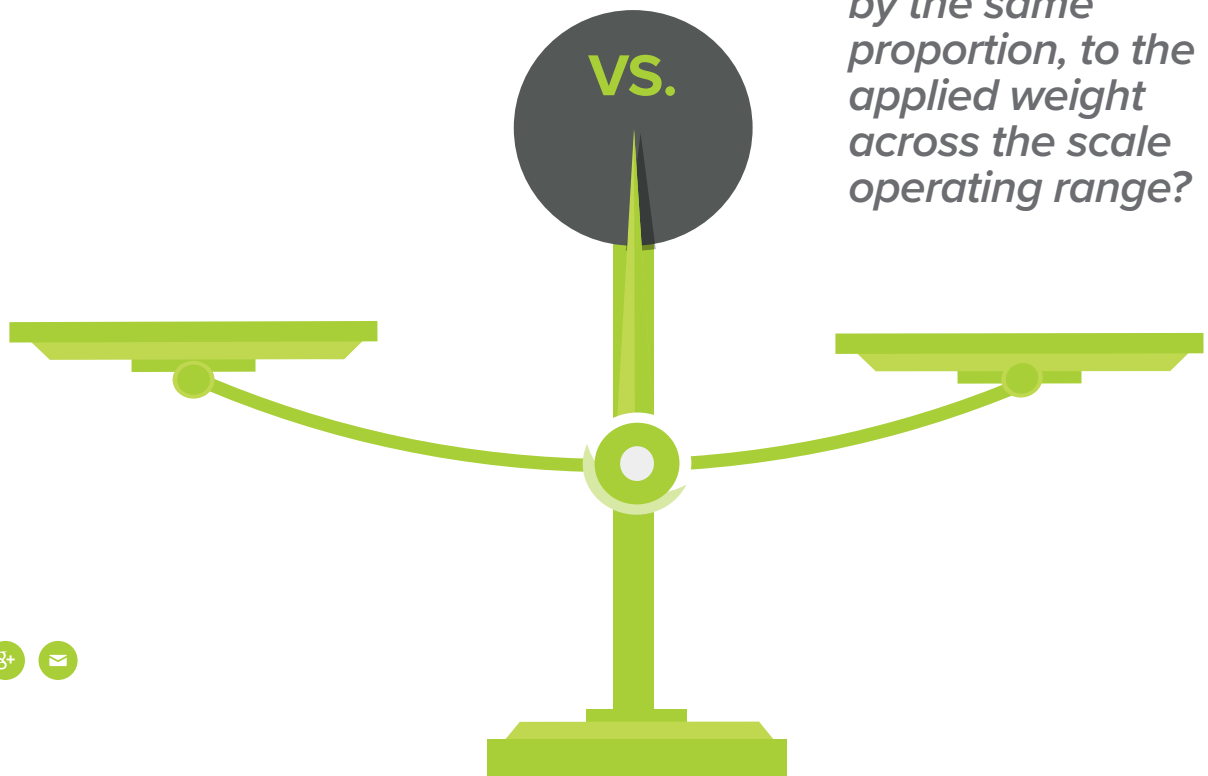
Linearity is a characteristic that defines the accuracy performance of a scale across its entire rated load range. The analysis of a scale's linearity answers the question — is the output of the scale consistently accurate across the scale's entire operating range?

Medical patient scales are typically calibrated at a single weight point, usually around 300 lbs. This leaves the unanswered question — How will the scale perform at 500 lbs. or 85 lbs.? Under normal circumstances, given current scale designs, good linearity is to be expected — but is it always achieved?

If the scale suffers physical damage, for example, from excessive impact, the scale linearity could be adversely impacted. Often time, this type of issue will go unnoticed by the user and undetected by typical dead weight calibrations.

By allowing multiple test weights to be applied in a single calibration routine, a robust force calibration device provides a way to perform more highly detailed scale diagnostic evaluations beyond simple one-point calibration checks. Understanding how the scale responds across its operating range is critical for proper functioning.

“ Does the output of the scale always relate, by the same proportion, to the applied weight across the scale operating range? ”



# Achieving New Levels of Scale Accuracy Data

Using the CaliBot, it is easy to collect scale accuracy data across the scale operating range. Understanding the scale response across its entire load range can give reassurance that the scale is functioning correctly.

## Specific benefits include:



Allows you to directly determine the device linearity.



Can uncover mechanical binding issues with the scale resulting from unseen damage.



Provides valuable troubleshooting information for electronic component failure or breakdown.

“Understanding the scale response across its entire load range can give reassurance that the scale is functioning correctly.”



To learn more about this innovative tool for forced calibration, visit [hom scales.com](http://hom scales.com) or call **800.253.0960**.

