SUPPLIERS' TIPS

How can I keep environmental influences from affecting my electronic scale's accuracy?

The answer depends on whether the electronic scale is a static platform scale used to weigh samples or a scale that's used with a continuous or batch loss-in-weight feeder. There are different environmental issues for both scale types, and these can be more challenging when continuous or batch feeding is involved.

For a static sample scale, make sure it's installed in a controlled and leveled environment and it's not subjected to fluctuations in temperature, vibration, or other upstream or downstream process equipment. Your scale and sample container must be protected from wind currents or external bumping, and the container's placement on the scale should be repeatable. Consider the sample size and the required weighing frequency to determine the best sample scale resolution and stabilization times.

For a continuous or batch weighfeeder, environmental influences such as vibration from support structures or other process equipment, temperature fluctuations in material or room temperatures, drafts or wind currents, and the tension from coupled upstream and downstream process equipment or cable connections can all greatly affect the scale or load cell accuracy. When possible, use low-deflection digital load cells with high-speed weight computations, temperature sensors, and inherent filters for electronic filtering of excessive fluctuations. It's important to isolate the scale or load cell from excessive air drafts, particularly when measuring low batch weights. Also, the feeder containing the hopper or container being weighed must always be decoupled from other process equipment using flexible connectors or bellows to ensure that no added forces are being transmitted to influence the weighing device.

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The key to eliminating environmental influences on your scale's accuracy is to understand how an electronic scale works. A scale must be allowed to move without restriction, so any connections to the scale (for example, wiring and inlet and outlet sleeves) must be flexible. Pressure, vacuum, and other conditions must be minimized or eliminated because they can restrict scale movement.

A scale's signal must also remain unaffected because it's used by the weighfeeder's controller for accurate weighments. Vibration caused by other process equipment operating adjacent to the weighfeeder, temperature variations, wind currents, and shock loads are main concerns. Some scales are less affected than others, depending on the scale's capacity or weight sensor. Most scales incorporate algorithms that handle vibration and temperature conditions (within limits). In addition, if environmental influences will exceed the scale's specification limits, you must take steps to eliminate or minimize the condition's possible effects. Possible fixes include reinforcing the support structure, eliminating the vibration source, and placing the scale in a temperature-controlled environment. Isolate your scale from areas subject to wind currents, such as doorways, exhaust vents, and fans. Some scale sensors can be damaged or require calibration because of shock load.

Aside from mechanical considerations, the scale's electronics must be protected from power fluctuations. Many scales have built-in surge protection, but variations in the supply voltage can affect a scale depending on the amount of variation and the type of weight sensor used.

To achieve high accuracy and performance on any scale, you must have a full understanding of its requirements, operation, and limitations. Before buying any weighing system, carefully evaluate it, keeping in mind the items discussed above.

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Electronic scale accuracy can be heavily affected by many environmental influences. Here are a few factors to review within your process prior to installing any scale or gravimetric system:

• Vibration is detrimental to a gravimetric system's operation because of the scale's sensitivity. To minimize vibration, try isolating the decking that the weighing system rests on; reinforcing the decking around the weighing equipment to minimize deck flexing; or mounting the weighing equipment on a high mass pedestal, vibration isolators, or structural members.

• Heating, air conditioning, and ventilation ducts cause air disturbances, which could translate to false scale movements and changing scale weights. You may have to reroute any ducts away from the gravimetric system, especially for systems with small load cell capacities required for very accurate measurements.

• Open windows and doors can create air disturbances for gravimetric systems. You may need to take special precautions to ensure they remain closed.

• The ambient temperature in the area where the gravimetric system's scale, controller, and feeder are installed must not exceed the temperature specified in the scale system's specifications because load cells are temperature compensated.

• Class, division, and group provisions for hazardous areas must be considered. These areas typically require the use of intrinsic barriers, which degrade the load cell's raw signal because of voltage drop across the barrier.

• The gravimetric system's controller requires clean electrical power that's free from any large inductive or capacitive loads. If you're uncertain about the supply power's condition, try using an isolation transformer or an uninterruptible power supply (UPS).

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