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A Practical Guide to
Checkweighing and Checkweighers

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overview 



What Is a Checkweigher?

A checkweigher weighs every product in motion. It classifies, counts and rejects products that are off spec, which helps you meet throughput and legal requirements with reliable weight control.





Why Use Checkweighers: Brand Security

Meeting Consumer Expectations

Delivering consistent quality products is essential to protect your brand and your bottom line. That means knowing that the weight of a packaged product being shipped out the door matches the weight on the label. No one wants to open a package that is only half filled or even empty.





Why Use Checkweighers: Regulations

In the U.S., the National Institute of Science and Technology (NIST) defines the Maximum Allowable Variation of packaged products (Ref Handbook 133 NIST Revised 2016).

In Europe, the Measuring Instruments Directive (MID) regulations define the performance of checkweighers used in weighing products for sale to consumers.

Other countries and regions have similar standards and requirements.





Why Use Checkweighers: Plant Efficiency

- Improved Equipment Effectiveness (OEE)
- Weight management to reduce product give-away
- Maximized efficiency
- Consistent product throughput
- Reduced re-work





Why Use Checkweighers: Weight Control

Delivering consistent quality products is essential to protect your brand and your bottom line. That means knowing that the weight of a packaged product being shipped out the door matches the weight on the label. A checkweigher weighs products in motion. It weighs, counts and rejects products that are off specification, which helps you meet throughput and legal requirements while providing reliable weight control.

1 Meeting Specifications

Does the finished product match specifications? Your checkweigher should compare data within permissible limits that you set. Future business depends on it.

2 Net Content: Under Weight

Use checkweighers to help ensure your products meet customer expectations, as well as the United States Department of Agriculture (USDA) Food Safety and Inspection Service labeling policies for product weight.

3 Net Content: Over Weight

Don't give away product. Checkweighers can help your bottom line by ensuring that there isn't too much product inside.

4 Contaminants

Some checkweighers can be combined with other packaged product inspection equipment like metal detectors or X-ray systems for an economical, space-saving product inspection solution.

5 Classification

Checkweighers can even be used to help classify products into weight zones or grades.



Continue ›



Why Use Checkweighers: Weight Control

6 Missing Primary Components

Count by weight is important to customer satisfaction. What would a customer think if he or she opened a box of chocolates, and a piece was already missing from the tray?

7 Sub-Standard Products

Has a packaged product been damaged? Has it sprung a leak? Has it been filled with the right product or number of products?

Has a foreign object found its way into the packaging? A checkweigher can discover a problem before or at the end of the line.

8 Control

The weight data from your checkweigher can be fed back to control your filler system, providing a closed loop to drive process efficiency.

9 Missing Secondary Components

The product might be intact, but is everything else that should be inside also enclosed—like a leaflet, spoon or straw?

10 Lot Deviation

Before a shipment goes out the door, checkweighers can monitor lots and compare averages and standard deviations to targets.





technology 



Three Sections of a Checkweigher Frame

A checkweigher is made up of a controller and a weigh frame. The weigh frame typically has 3 sections: **Infeed**, **Weighing section**, and **Outfeed**.

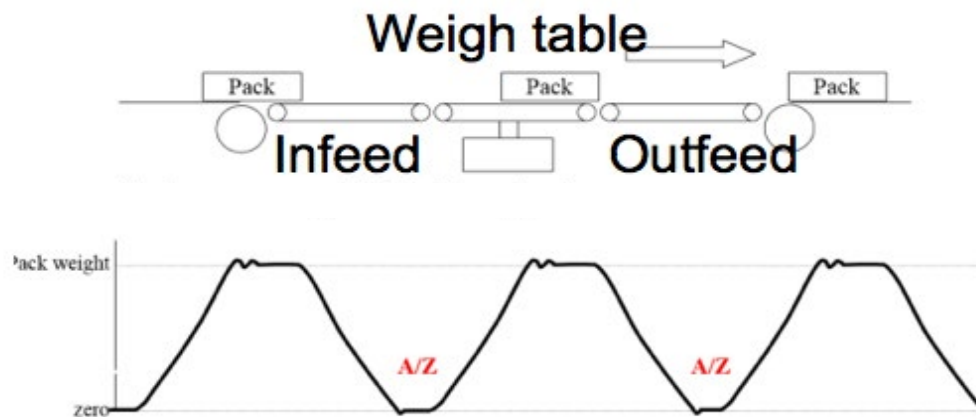




How It Weighs

1. Package moves from the customer's outfeed onto the checkweigher infeed
 - Conveyor speed of infeed and weigh table are the same
2. Package is weighed on the weigh cell of the weigh table
3. Package moves onto the outfeed of the checkweigher to be accepted or rejected according to the checkweigher settings
4. Ideal spacing between packages allows for a zeroing operation for maximum accuracy

- *Ideal spacing, allows a zeroing operation (A/Z) between each pack*





Moving Objects Along

Three ways to move items depending on the package:

- **Belt (motor)**
 - Most accurate
- **Chain (uses motor to pull items forward)**
 - Most sturdy
- **Skates (Slider)**
 - Used with a worm screw accelerator to drive packages across the skates
 - Best performance for cans

Side-belt conveyors to transfer from conveyor to scale and avoid flipping tall items

Wormscrews, side gripper belts, or accelerating conveyors to space packages for proper weighing





Rejecting Products

Three typical ways to remove items from the conveyor after they are rejected:

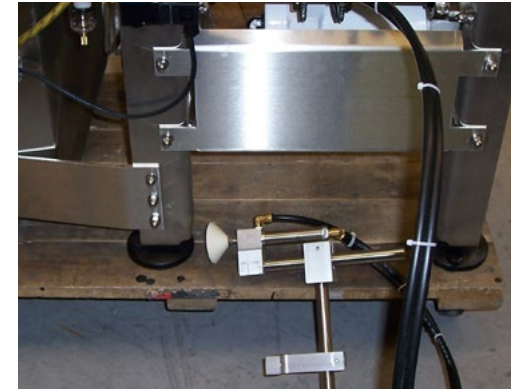
Air Blast



Pusher



Bopper



Additional rejector types based upon specific package and customer reject requirements.

Diverters



Drop Flaps





Why is Weighing Accuracy Important?

- Customers expect to receive accurate quantity of product purchased
- Give-away of excess product drains profitability
- Must adhere to regulations



Note: Difficult to control product weight if it is not measured in the line.



Weighing Accuracy

How do you achieve weighing accuracy?



Important factors

Proper design of the in-line checkweigher, paying attention to:

- Product speed
- Product weight and size
- Product transfer onto and off of the checkweigher
- Reject method and design



How to Keep Checkweighers in Top Performance



Ask and Answer These 10 Questions

1. Mechanical Alignment

Is the frame firmly on the ground? Are the conveyors all level and aligned? Without correct mechanical alignment the weighing process will fail to meet specifications.

2. Photoeyes and Rejectors

Are all photoeyes in proper position and operating correctly? Rejectors should fire at the proper time to ensure the rejected product goes into the reject bin properly.

3. Belts or Chains

Are belts and chains inspected regularly for wear or product build-up? Replace as needed. Otherwise inaccurate weights are guaranteed. Inspect timing belts for wear, cracks or missing teeth.

4. Product Transfer

Do products jump or vibrate when they transfer onto the checkweigher? Are the gaps between the conveyors minimized? Stable products weigh better! Are the infeed and weigh table belts running at the same speeds? This is critical.

5. Product Pitch

Is there enough gap between products to guarantee there is never more than one product on the weigh table at a time during the weighing process? You may need to speed up the infeed to correct the issue.



Continue >



How to Keep Checkweighers in Top Performance



6. Product Setup

Are the proper dimensions and weight of the product correctly entered into the product recipe? Are the cutpoints for over-weight and under-weight products set to the correct product specifications?

7. Calibration and Auto Zero

Has the checkweigher been calibrated recently for zero and span both empty and with the product? A calibration should be done daily or whenever switching product. Is there enough gap during production for the auto zero routine to adjust?

8. Grey Zone Validation

When was your calibration last checked? A grey zone check should be run before every shift or product change-over to ensure optimum weights every day. Be sure to run a package at least 20 times to get a statistically valid result.

9. Alarms

Are the triggers for alarm conditions set properly? An alarm that constantly goes on will be ignored by operators.

10. Reports

Are reports that deliver lot, batch or shift information on accept/reject quantities formatted properly to be accurate representations of production?



Checkweigher Do's and Don'ts

Do's

Ensure smooth product transfer

Calibrate each shift

Choose checkweigher for accuracy and reliability for your application

Properly tension checkweigher chain/belt

Provide all product and customer application information to checkweigher supplier at time of quote request

Ensure accuracy through proper line configuration and package spacing upstream of the infeed

Don'ts

Start/stop the line frequently

Run the line for more than an hour without stopping to check that the package gap is autozero

Don't focus on lowest cost, look at total cost of ownership

Don't have other conveyors in contact with checkweigher

Don't allow product to build up upon the weigh table or load cell

Don't supply less than the required power or air pressure as stated in the checkweigher requirements



Package Types

Types of items that can be weighed on a checkweigher:

- Rigid (cans, cardboard packages, plastic, glass)
- Soft (plastic, paper, foil)
- Wet (dairy, hummus)
- Dry (rice, oatmeal)
- Raw (chicken, beef, fish, vegetables and fruits)

Both food and non-food packages can be weighed on checkweighers: pharma, personal care packaged items, bullets, bags of construction materials like cement, salt, etc.





Customization

There are several factors that can drive a customized solution so that your equipment maximizes process efficiency while providing reliable weight control including:

- The number of weighing lanes and how they are powered
- Custom reject devices or methods
- Type of belts and / or chains
- Floor space availability
- Belt speed
- Vacuum in/outfeeds

Without the correct custom design, weighing performance can suffer.





Benefits of Multi-Lane Checkweigher Solutions

Why use a multi-lane checkweigher?

- Filler capacity may not be met by a single lane checkweigher
- Filler configuration (multi-head) outputs in 2X, 4X, 8X, etc.



Multi lane can be more convenient:

- Product handling: eliminates need to shift from parallel to linear format
- Weighing accuracy: lower ppm (packages per minute) per lane for improved accuracy
- Floor space: linear space to handle package rate can be greatly reduced
- Cost: multi-lane cost/benefit vs. multiple checkweighers and extra product handling





Meeting IP65 Washdown Requirements

Checkweighers come in contact with food products that can leak or spill. The equipment has to get washed down regularly to prevent contamination. Therefore, checkweigher components require materials that can withstand severe washdown using caustic chemicals. **Consider:**

1. The metal should be fully constructed of ANSI Type 304 SS (stainless steel), which is an austenite steel. For even harsher situations, ANSI 316 stainless is used; it is more impervious to corrosion than 304 SS.
2. Equipment should meet American National Standard ANSI/IEC 60529-2004 for equipment with electrical components.
 - This standard describes a system for classifying the degrees of protection provided by enclosures of electrical equipment for two conditions: 1) the protection of persons against access to hazardous parts and protection of equipment against the ingress of solid foreign objects and 2) the ingress of water.
3. Equipment should be designed with minimal flat, horizontal surfaces and slots to reduce food buildup, and use stainless steel conveyor beds.



Note: IP65 enclosures provide basic waterproof protection from water, including powerful jet sprays used during washdown.



equipment 



Versa Flex Checkweighers



[Product details >](#)

The **Thermo Scientific™ Versa Flex Checkweigher** and the **Thermo Scientific™ Versa Flex GP Checkweigher** are ideal for weighing a wide range of packaged food, pharmaceutical and personal care products in dry applications, but easily integrate into operations that already use Versa checkweighers. From light to heavy-weight packages, both the Versa Flex (fixed height) and Versa Flex GP (height-adjustable cantilever) checkweighers improve accuracy and reliability while decreasing product giveaway.



The Versa Flex and Versa Flex GP Checkweigher line are designed for dry applications such as baked goods, snack foods, prepared foods, condiments, pastas/rice/beans, baking ingredients (flour, sugar, etc.), personal care products such as diapers, soaps and creams; as well as pharmaceuticals.



Global VersaWeigh™ Checkweighers

The **Thermo Scientific™ Global VersaWeigh and Global Versa GP checkweighers** are ideal for weighing a wide range of packaged food, pharmaceutical and personal care products in wet or dry environments – from light to heavy-weight packages, all within the same Versa platform. They meet or exceed a variety of regional and international standards and are OIML MID approved. Proprietary software with advanced automatic-zero algorithms ensure accuracy standards are maintained over time, regardless of environment. They are engineered for sanitary design and ease of maintenance:

- Frames designed to minimize flat surfaces and slots, reducing food buildup
- Stainless steel conveyor beds
- Optional stainless-steel rollers and load cells
- Rapid-release conveyors and belts eliminate need for tools to remove or replace
- Tool-less thumb screw adjusts belt tracking
- Captive conveyor rollers easy to adjust



[Product details >](#)

These checkweighers are designed to improve accuracy and reliability, decreasing maintenance, product giveaway and total cost of ownership.



Versa 8120 Chain Checkweighers

The **Thermo Scientific™ Versa 8120 Chain Checkweigher** accommodates line speeds up to 700 packages per minute, while providing reliable high-speed weighing, control and reject functions for cartons, cans, bottles and pouches in dry or wet environments.



[Product details >](#)



A simplified design enables high rates and accuracy weighing in a broad range of applications.



Versa Rx Pharmaceutical Checkweighers

The **Thermo Scientific™ Versa Rx Checkweigher** is specifically designed to meet pharmaceutical GMP standards, while delivering the highest level of accuracy and reliability. The Versa Rx Pharma checkweigher handles high-rate lines with ease and unparalleled accuracy and utilizes a single, brushless motor drive. It is capable of weighing products from 2 g to 500 g at speeds up to 550 ppm—depending on the size of the pack. Designed to GMP (Good Manufacturing Practice) standards, the Versa Rx Pharma checkweigher provides a superior, quality-assurance tool for the pharmaceutical industry.



[Product details ›](#)



This checkweigher is used for the most demanding small/light packages, utilizing unique closed cabinet slack or taut band.

[Continue ›](#)



Versa Teorema, Versa Frame 44, and Global Versa Checkweighers



[Product details >](#)

Versa Teorema Can Checkweigher

Unparalleled speed and accuracy in today's demanding, high-rate canning lines. Combining rugged capability with accuracy, the Versa Teorema checkweigher provides a new standard in high-rate can weighing. Feed-screw properly spaces open or closed cans, steel or aluminum cans and 2 or 3-piece cans at speeds up to 700 cans/minute.



[Product details >](#)

Versa Frame 44HB Heavy Duty Weighframe

Designed for rugged industrial environments with line rates up to 100 packages per minute (even to 300 ppm depending on package length). Engineered for true in-motion weighing, accurately weighing packages without stopping the conveyor for recalibration. Equipped with a USDA/FDA-approved food-grade belt, it is the ideal choice for transferring raw or frozen products, bags, cases or barrels.



[Product details >](#)

Global Versa GP Checkweigher

Versatile, general purpose checkweigher that weighs at line speeds up to 350 packages per minute without ever sacrificing accuracy. Comes with a compact cantilever construction for height adjustment and is ideal for packages up to 3 kilograms (6.6 pounds).



Combine a Checkweigher with a Metal Detector

Metal detection systems provide reliable, cost-effective protection from even the smallest metal contaminants found anywhere in a food production process. They can also help improve operational efficiency and eliminate expensive downtime, service costs and repair bills. There are many uniquely designed metal detectors suited for a wide range of demanding food processing and packaging environments.



**Thermo Scientific™ APEX 500
High Performance Metal Detector.**

[Product details >](#)



**Thermo Scientific™ Sentinel™
Multiscan Metal Detector**

[Product details >](#)

[Continue >](#)



Combine a Checkweigher with X-Ray Inspection System

X-ray inspection systems provide protection from metal, glass, stone and other dense foreign objects for most any type of packaged, bulk, or piped product.



[Product details ›](#)



Find metallic and non-metallic foreign objects and eliminate “wet” product effects common with metal detectors with the **Thermo Scientific™ NextGuard™ X-ray Detection Systems**. Designed for a wide variety of food applications, NextGuard systems offer enhanced capabilities to inspect packaged products for missing pieces or components, under and over-fills, and other quality problems with easily customizable vision software. Both the C330 and C500 models are easy-to-use, cost effective and thoughtfully designed systems that eliminate common barriers when migrating from metal detection to X-ray inspection.

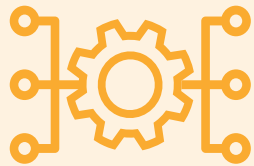


Is Your Checkweigher Up to Date?



There's a trend now for eco-responsible packaging that is easy to hold, open, use, and re-seal. Packaging trends have ripple effects on machinery.

A metal can behaves differently on the line than a flexible stand-up pouch. Does your equipment provide a seamless transition between stations on the conveyor line?



Does your checkweigher talk to the rest of the line? More lines are running multiple products, or products that are package-wise the same but labeled for other brands.

Communications can change the product on the fly and keep track of each production lot.



Fresh food is becoming more popular. Is the checkweigher exposed to raw food items? Your old equipment that ran canned goods may need to be upgraded to machines that allow washdown.

Many food processors are requesting equipment with washdown capability, rated IP69K by the International Electrotechnical Commission (IEC).



Checkweighers may also need to be located further upstream than the last spot in the line. You will be able to catch the anomalies earlier and avoid a bigger problem if multiple machines are placed in diverse spots along the line.



What language is used by the labor force? A checkweigher interface should support multiple languages.

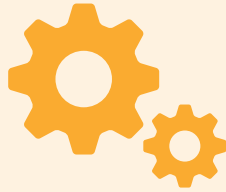
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Is Your Checkweigher Up to Date?



What is the skill level of your labor force? Interfaces should be touch screen and designed for ease of use.



Do you need the bells and whistles? Or are you just looking for the basics to start? It's hip to purchase stripped down models and upgrade later.



Can your checkweigher store data? Because the checkweigher is one of the last pieces of equipment to touch a product on the product line, storing the data is helpful should a problem arise later.



Do you need real-time data? Twitter is not a good choice to see what's trending in your facility, but real-time data provided by the equipment can help in identifying production problems as they are happening, avoiding last-minute problems.



Do you need to save space? You don't have to move your operations into a trendy tiny house, but you may want to consider a combination checkweigher and metal detector that gives both accurate weight control and the assurance that your product is free of metal contaminants.

Millennials are good at multi-tasking so it makes sense to have two tasks done by one piece of equipment.





Choose the System That's Right for You

Versa Flex,
Versa Flex GP

Versa 8120

Global VersaWeigh,
Global Versa GP

Versa Rx



Package Weight Range	10g–3kg; 6kg	35g–11kg	10g–3kg or 10kg	2g–300g (slack); 10g–500g (PWT)
Max Product Rate (high 500–700+ per min; medium 250–500 per min; low 50–250 per min)	Medium	High	Medium	Med-High
Accuracy (Standard Deviation per R51/Handbook 44 Equiv.) Actual results dependent on line speed, package material/fill/weight, and handling	up to 0.125g	up to 0.5g	up to 0.125g	up to 50mg
Max Line Speed (high 120m/393 ft per/min+; medium 60m/196 ft to 120m/393 ft per min; low 10m/33 ft to 60m/196 ft per min)	Medium	High	Medium	Med-High

	Versa Flex, Versa Flex GP	Versa 8120	Global VersaWeigh, Global Versa GP	Versa Rx
Package Weight Range	10g–3kg; 6kg	35g–11kg	10g–3kg or 10kg	2g–300g (slack); 10g–500g (PWT)
Max Product Rate (high 500–700+ per min; medium 250–500 per min; low 50–250 per min)	Medium	High	Medium	Med-High

Thermo Scientific Product Inspection

In-line inspection, weighing, and monitoring solutions to ensure safety, quality and production efficiency by detecting physical contaminants, validating net content, verifying product integrity and analyzing constituents. We supply systems worldwide and have over 35,000 customers including the majority of the top 50 food companies in the world. We also provide critical service, technical support and parts to keep production lines running 24x7x365.

Watch the video to see why Cedar's Foods doesn't even consider other food safety equipment manufacturers:

“We know that Thermo Fisher has been there, they support us, they're always innovating, and they haven't let us down. Why would I ever even want to consider anything else. To me it's the Cadillac of that technology, not just because of the equipment, it's because of the people, the support system that goes along with it...the relationships built with my people with them, I just think it helps us every single day.”

- Nick Scangas, Chief Operating Officer, Cedar's Foods

About Thermo Fisher Scientific

Thermo Fisher Scientific Inc. (NYSE: TMO) is the world leader in serving science, with revenues of more than \$20 billion and approximately 65,000 employees globally. Our mission is to enable our customers to make the world healthier, cleaner and safer. We help our customers accelerate life sciences research, solve complex analytical challenges, improve patient diagnostics, deliver medicines to market and increase laboratory productivity. Through our premier brands – Thermo Scientific, Applied Biosystems, Invitrogen, Fisher Scientific and Unity Lab Services – we offer an unmatched combination of innovative technologies, purchasing convenience and comprehensive services.

For additional information or to schedule a demo, please click below.