



Assuring precision in high-speed canning for food production with the Versa Teorema Checkweigher

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Introduction

In the fast-paced world of food and beverage production, ensuring the accuracy and consistency of product weight is crucial for maintaining quality standards and regulatory compliance. The Thermo Scientific™ Versa™ Teorema™ Checkweigher is designed to meet these demands with precision and efficiency. Engineered specifically for high-rate can, jar, and flat-bottom container lines, the Versa Teorema Checkweigher offers unparalleled performance in diverse and challenging environments. As part of the Versa family, which includes a range of checkweighers tailored for various applications, the Teorema model reduces mechanical noise and enhances operational reliability by eliminating motorized conveyor parts. Regardless of whether open or closed containers are being evaluated, this checkweigher ensures consistent weight measurements, thereby safeguarding product quality, and optimizing production processes.



Versa Teorema Checkweigher

Design

The design of the Versa Teorema Checkweigher is optimized for high-speed, high-volume production environments that use flat-bottom products such as cans and jars. It features a robust construction that can withstand harsh conditions, including wet and dry environments. A key design element is the elimination of motorized conveyor parts, which significantly reduces mechanical noise and potential points of failure. There are four main components of the Versa Teorema Checkweigher: the infeed conveyor, the weighing unit, the outfeed conveyor, and the control cabinet.

- **Infeed conveyor:** The infeed conveyor is responsible for transporting containers from the production line to the weighing unit. It ensures a smooth and consistent flow of containers to be weighed. The conveyor is designed to handle various container sizes and maintains proper spacing to prevent vibration or jumping of the containers.
- **Weighing unit:** The weighing unit is the core component of the checkweigher. It accurately measures the weight of each container using advanced load cell technology, which features no moving parts; this enhances reliability while reducing maintenance demands. The weighing slides, on which the containers travel, can vary in length depending on the size of the product to be weighed. The slides are adjustable and are affixed to blocks designed based on their center distance, ensuring precise alignment for accurate weight measurement.
- **Outfeed conveyor:** After the containers are weighed, the outfeed conveyor transports them away from the weighing unit. Containers that meet the weight specifications continue down the production line, while those that do not are automatically rejected. The outfeed conveyor ensures that the flow of containers remains uninterrupted and that only compliant products proceed to the next stage of production.
- **Control cabinet:** The control cabinet houses the electronic components and control systems necessary for the operation of the checkweigher. It includes the Versa Checkweigher Controller, which processes weight data and manages the overall functionality of the system. The control cabinet is divided into separate sections for electrical wiring and for pneumatic components, ensuring organized and efficient operation.

Operation

The Versa Teorema Checkweigher operates by accurately measuring the weight of containers as they pass through the production line. Utilizing advanced load cell technology, the checkweigher ensures precise weight measurements for each container, whether it is a closed can, open can, or flat-bottom container. As containers move along the infeed, the product passes over the weight table on the weighing slides, where the load cell captures the weight data. This information is then processed by the checkweigher controller, which compares the measured weight against the manufacturers' predefined standards. Containers that fall outside the acceptable weight

range are automatically rejected, ensuring that only products meeting the weight specifications continue down the line.

The Versa Teorema Checkweigher is capable of handling containers with diameters ranging from 64 mm to 99 mm and weights from 40 g to 900 g, making it versatile for various product applications. Additionally, the system's high-speed capability, with a line speed of up to 162 meters per minute, ensures that it can keep up with the demands of modern production lines without compromising accuracy.



Versa Checkweigher HMI

Applications

Customers were interested in finding the best solution for their flat-bottom products to verify their weight in a consistent manner, with high accuracy, speed, and reliability. In the table below, measurements for three products analyzed by the Versa Teorema Checkweigher are shown. Package type, parameters of operation (e.g., conveyor speed, units measured per minute), weight measurement, and precision are shown. One evaluation of the quality of measurement used in this section is the "gray zone," which is the equivalent of 3 sigma values or three times the standard deviation. This metric is used to observe the dynamic weighing precision of the equipment and the product.

Canned pet food

Two of the applications involved pet food in cans, where the need to reach very high speeds was critical. The first application required the checkweigher to handle 600 packages per minute while they were conveyed at a speed of 120 meters per minute, with a weight of 370 grams per can. The Versa Teorema Checkweigher was able to achieve a low standard deviation of 0.6 grams, ensuring consistent weight measurements within a gray zone of 1.7 grams (3 sigma). This represents a variance of less than 0.5% from the target of 370 grams, even at the required rapid pace of measurements.

The second pet food application involved cans weighing 200 grams, with a requirement to handle 500 packages per minute at a conveyor speed of 130 meters per minute. The

Versa Teorema Checkweigher demonstrated its capability by achieving a standard deviation of 0.2 grams and maintaining a gray zone of 0.7 grams (3 sigma), which is within +/- 0.4% of the target weight.

Soup cans

The third application involved cans of soup, where the customer required a system that not only provided high speed and accuracy consistently but also featured user-friendly software for simplified data analysis and insights. The customer requirements entailed handling 660 packages per minute at a speed of 151.8 meters per minute, with each can weighing 350 grams. The Versa Teorema Checkweigher achieved a standard deviation of 0.4 grams and maintained a gray zone of 1.1 grams (3 sigma), meeting the customers' requirements and ensuring precise weight measurements. The intuitive software that comes with the Versa Teorema Checkweigher enabled the customer to easily understand and analyze the data, enhancing overall operational efficiency.

These application solutions illustrate the versatility and reliability of the Versa Teorema Checkweigher in meeting the diverse needs of high-speed production environments, ensuring consistent weight verification and maintaining product quality.

Conclusion

The Thermo Scientific Versa Teorema Checkweigher has proven to be an essential tool in high-speed, high-volume production environments, particularly for flat-bottom products such as cans and jars. Its robust design, capable of withstanding harsh conditions, is combined with advanced load cell technology to ensure precise and consistent weight measurements. By eliminating motorized conveyor parts, the Versa Teorema Checkweigher reduces mechanical noise and lessens potential points of failure, thus enhancing reliability and simplifying maintenance.

The applications described herein highlight the versatility and effectiveness of the Versa Teorema Checkweigher in various scenarios. Whether handling pet food cans at speeds up to 130 meters per minute or measuring soup cans that require user-friendly software for data analysis, the checkweigher consistently delivers high accuracy and reliability. The detailed performance metrics, such as low standard deviations and well-defined gray zones, demonstrate its capability to meet stringent weight verification standards.

Overall, the Versa Teorema Checkweigher not only optimizes production processes but also ensures product quality and compliance with weight specifications. Its integration into diverse production lines underscores its value as a reliable and efficient solution for modern manufacturing challenges.

Product	Package type	Weight (g)	Packages per minute (PPM)	Speed (m/min)	Std dev (g)	Gray zone (3 sigma) (g)
Pet food	Can	370	600	120.0	0.6	1.7
Pet food	Can	200	500	130.0	0.2	0.7
Soup	Can	350	660	151.8	0.4	1.1



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