Technical Note

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Tips for Effective Use of Checkweigher: A Zero-Set Error

A checkweigher, widely known as a dynamic scale, has become a critical quality assurance tool in many applications and products in the food, pharmaceutical, and manufacturing industries for checking the mass of products and detecting missing items. This paper explains measures for a zero-set error when using a checkweigher.

First, zero point is the value showing on a weighcell when no object is placed on it. For instance, a bathroom scale at your home shows zero before you step on it without any special setting. Likewise, checkweighers are adjusted to show zero when there is no object placed on a scale. However, a zero-point error can occur due to the change of temperature and humidity at the production plant, the air from an air conditioner, floor vibrations, etc.

At the time of normal operation, a checkweigher automatically corrects zero-points. This is called "auto-zero setting" (zero-point adjustment). It is one of the important functions of a checkweigher.

1. What is a problem when zero point has deviated?

Since a checkweigher is installed in the automation line, it is not realistic for an operator to stop the production line for zero-point adjustment. For this reason, without having help from an operator, a checkweigher adjusts zero point automatically within a certain time when there is no product conveyed on the weighing unit during production. We call it "auto-zero setting".

The deviated zero point can cause a checkweigher to weigh a product less or more than the actual weight; therefore, the measured value on the screen becomes inaccurate. A checkweigher performs the auto-zero setting to weigh a product as close to the actual weight.

When a load is applied on the weighcell conveyor section (the weighcell is placed underneath) at the timing of performing auto zero setting, a checkweigher performs zero setting with an incorrect standard. Due to fluctuations in the zero-point, measurement error may become large. When the deviation from the zero point exceeds the limit value, a checkweigher generates an alarm of a zero-set error and stops the operation.

The calls regarding a zero-set error account for roughly 30% of all calls at our support center. Proper inspection and adjustment as well as cleaning can prevent a zero-set error. If by any chance the error occurs, it can be easily recovered by a user.

2. Cause of zero set error and its solutions

Along with the weighcell unit, the weighcell conveyor section consists of a conveyor, a motor, and a stand (blue line). Since they are placed directly to the weighcell unit, any load from outside can deviate a zero point and lead to a zero-set error.

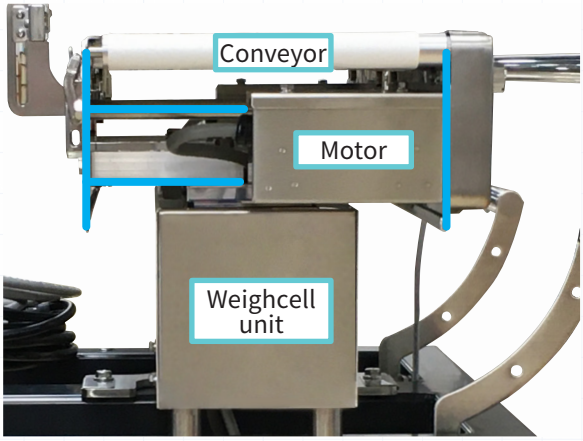


Fig.1 Non-waterproofed weighcell conveyor section

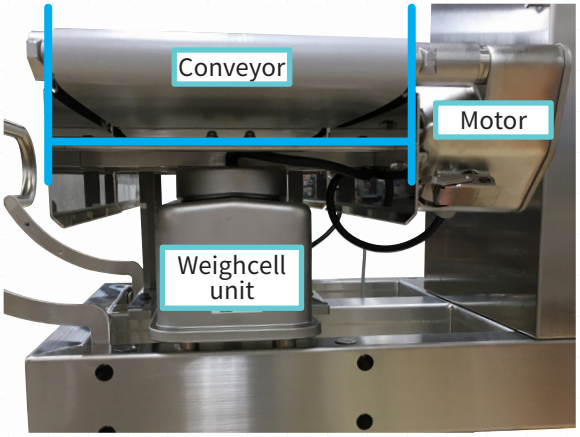


Fig.2 Waterproofed weighcell conveyor section

Causing factor 1 When our support technicians receive calls from customers, they always ask them to check if a rejector system or a cable touches the weighcell conveyor section to identify the cause of the error. Even when customers told our technicians on the phone that nothing touches the weighcell conveyor section, there are many cases where our service technicians confirm the weighcell conveyor section in contact with a rejector at the site.

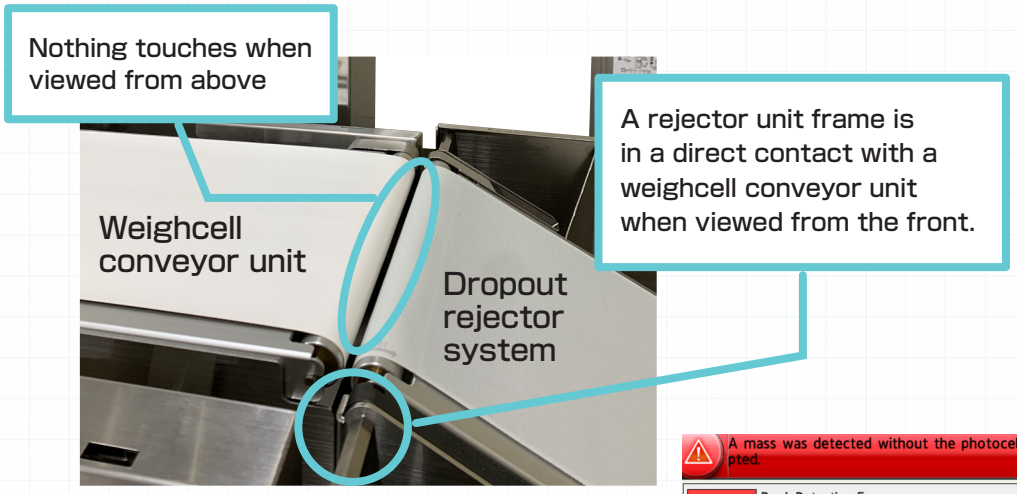


Fig.3 Dropout rejector touches weighcell conveyor unit

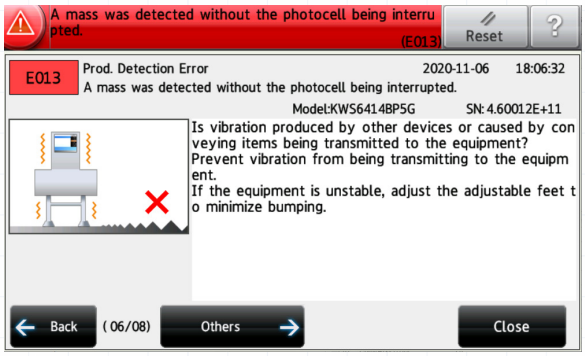
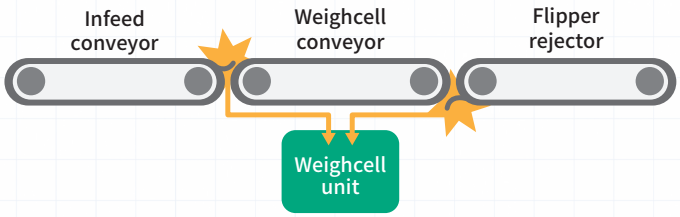


Fig.4 Error message on operation screen (Anritsu checkweighers)

Solution

When the error message on the operation screen does not go out by pressing the zero-set button, check if a rejector, cables from a sensor and motor touch the weighcell conveyor section not only from the above but also from the side and front.

Causing factor 2 When belts on the infeed conveyor section and a rejector get frayed and turned up on the edge due to deterioration, frayed parts may pat or tap the weighcell conveyor in a constant period. As mentioned previously, when the external stress is applied to a checkweigher at the timing of performing auto zero setting, zero-point adjustment cannot function correctly and measurement error may become large.



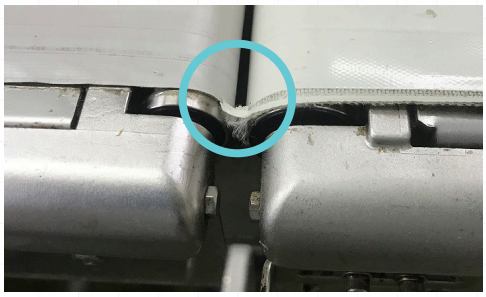


Fig.5 Frayed belt touches weighcell conveyor section

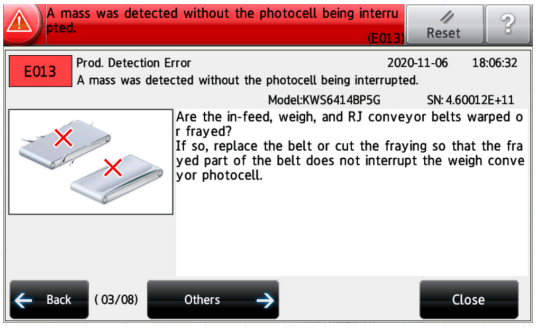


Fig.6 Error message on operation screen (Anritsu checkweighers)

Solution

Remove a conveyor belt periodically to check for any fraying or peeling on the edge. If you see any warp or fray on the belt, please change it for a new belt or cut off the fraying part to prevent it from blocking a sensor.

Causing factor 3 Unexpectedly it is not well known that zero-set error occurs when the user forgets to attach main parts including optional parts. For instance, after the end of production, a user removes a drive belt cover, a product guide, and a cross plate for cleaning and forgets to attach one of them. The load applied to a weighcell becomes lighter and the indicated value on a screen shows at a minus side. In particular, users forget to attach a drive belt cover. Starting the conveyor with a missing machine part can generate a zero-set error.

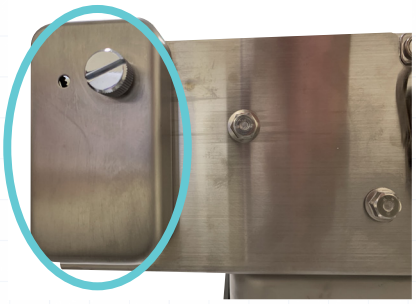


Fig.7 With a drive belt cover

Fig.8 Normal zero point

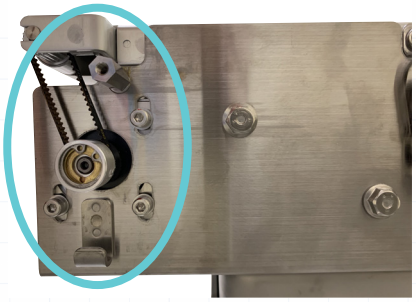


Fig.9 Without a drive belt cover

Fig.10 Zero set error by forgetting to attach a drive belt cover

Solution

Please make sure that all parts of the weighcell conveyor unit are attached. After the end of checking, press the zero-set button.

Causing factor 4 Poor cleaning can generate a zero-set error. Nutrition facts label from the product, rice grains of rice balls leaked outside due to poor packaging ingredients spillover from a container before sealing, etc. can fall and accumulate on or under the weighcell conveyor, in a space between the surface of the joint parts. The load exceeding correction range is being applied to the weighcell.
Especially when machine cleaning work is outsourced, users notice the presence of dust and food residue accumulated for the first time when a zero-set error occurs.

Fig.11 A product label wound around the stand

Fig.12 Zero point deviated at the plus side by a label

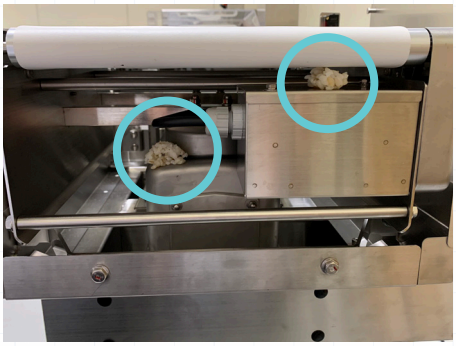


Fig.13 Rice grains accumulated in the weighcell unit and a motor cover

Fig.14 Zero point deviated at the plus side by rice grains

Solution

Air blowing is one way of removing dust and food residue; however, they can sneak into the gap in the blind area. We recommend using a cloth for cleaning.

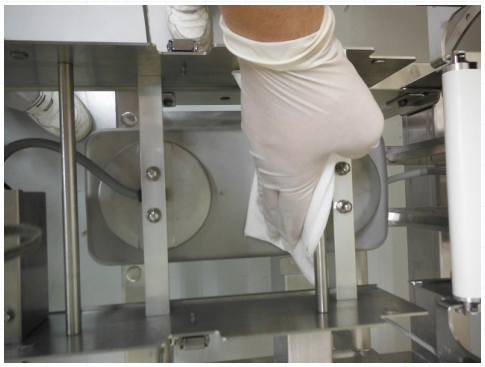


Fig.15 Cleaning weighcell unit

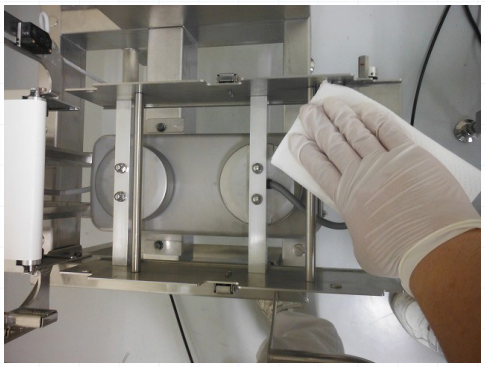
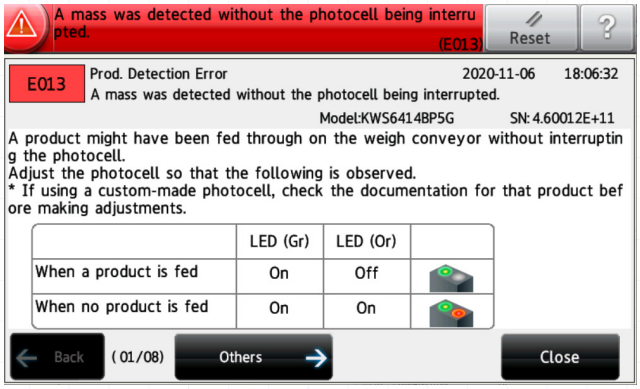


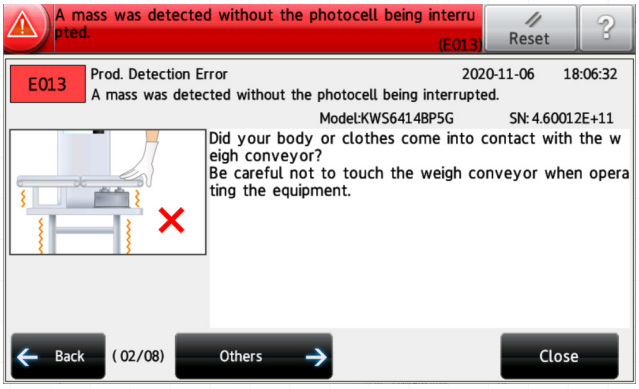
Fig.16 Remove a conveyor to clean a stand

3. User-Friendly Guidance Functions

Anritsu SSV Series Checkweighers provide error messaging and on-screen suggestions when an error occurs.

By pressing the "?" button on the upper right-hand corner on the screen, the possible cause and specific guidance are displayed on the screen. Please check guidance when an error occurs. When the problem or error cannot be solved, please contact our support center.





Conclusion

This paper explained zero-point fluctuation and a zero-set error that may frequently happen on the production floor and solutions for each case.

We hope this paper helps you to recover and minimize downtime at the time of error or fault occur.

Please check once more the procedures and standards for inspection and cleaning in the operation manual and use your checkweigher effectively.

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