

Extended Feedback Control Function

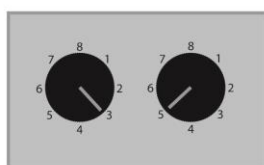
Flexible, Powerful, Adjustable

The challenge:

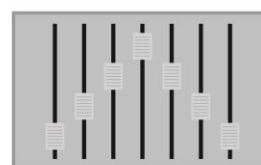
- Aim 1: Much greater control of fill levels in conjunction with statistical mean weight values to automatically ensure regulatory compliance
- Aim 2: Automatic correction of the target weight to bring it closer to the labelled weight to reduce product giveaway
- Aim 3: Taking full advantage of legal packaging regulation fill level limits to reduce product giveaway to an absolute minimum
- Aim 4: Much greater control of fill level correction speed to reduce scrap and get filling processes in tune faster

The standard feedback control function minimises product weight errors and product giveaway through proactive feedback, keeping filler heads properly adjusted. The additional function "Extended Feedback Control" can substantially improve the filling process and save extra money while complying with Weights and Measure regulations. The "Extended Feedback Control Function" is an add-on to the existing feedback control programme and gives powerful new flexibility and adjustment capabilities to the filling process. The above statements i.e. aims are the base for this function.

A good comparison for the difference between the standard feedback programme and the extended feedback control is the technical advances in music systems. The standard feedback programme can be compared to a radio with dials for just "Bass" and "Treble" adjustment whereas the extended feedback function can be compared to a stereo system with a graphic equaliser to fine tune the music for an excellent and perfect sound.



Treble and Bass Adjustment



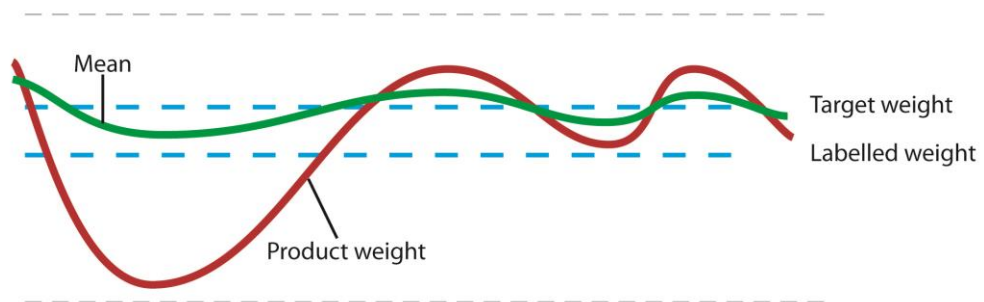
Graphic Equaliser

Extension "Combination Statistics"

This extension combines the standard feedback programme with the checkweigher statistics function. This means that the statistic mean values are included in the feedback calculation. The combination of feedback and statistics ensure that at the end of the production run you will never have a too low "statistic mean value" which could lead to regulatory sanctions.

When the "statistic mean value" starts to drift from the target weight the feedback controller will automatically become activated. This will occur even if the weights of the products currently being weighed are correct. This extension regulates the filling process when the following events occur:

1. Actual filling level is correct and stable but the statistic mean value is lower than the target weight – **correction signal sent to the filler → fill more!**
2. Actual filling level is correct and stable but the statistic mean value is higher than the target weight – **correction signal sent to the filler → fill less!**
3. Actual filling level is below target (within T- limits) but the statistic mean value is still above the target weight – **fill process under control → no adjustments**

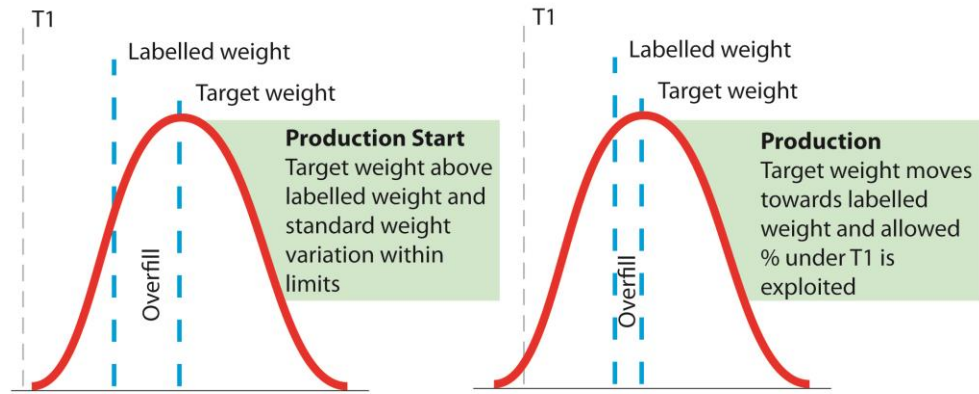


The main benefit of this combination is that you can set your target weight much closer to the nominal or labelled weight. This extension actively changes fill levels to ensure the mean value matches the target weight, which is normally just above the labelled weight, at the end of the complete production run. This not only ensures a better quality and more consistent product and compliance with Weights and Measures guidelines but it reduces dramatically over/under filling and unnecessary product giveaway. Constant mean weight value control also avoids manual adjustments of fill levels towards the end of a production run to fulfil net content laws.

Extension "Optimal overfill"

This function permanently calculates the optimum mean value and target weight. The calculation is based on the checkweigher's standard deviation value and normal weight distribution pattern. The calculation also takes into account that a certain percentage of the production (such as 2%) is allowed to fall below the T1 Limit.

Once production begins the target weight is automatically adjusted to make use of the permissible range (e.g. max. 2% of products with a weight below T1). An automatic signal is sent to the filler to fill with the new target weight. The diagram below shows the initial settings at the start of production and how these settings change during production to reduce overfilling, bring the target weight closer to the labelled weight and make use of the legally acceptable percentage of products with a weight under the T1 limit.

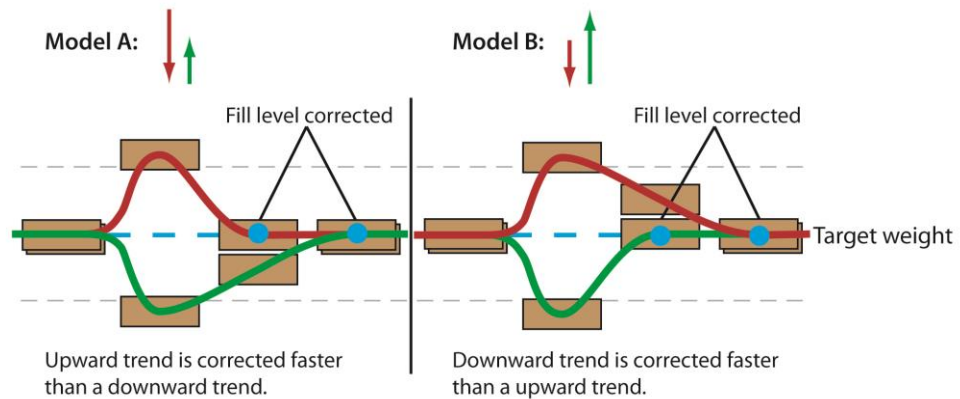


Extension "2 Control Factors"

This function allows you to determine two separate control factors for increasing and decreasing the fill volume. The possibility of setting different manipulated variables for different control actions allows you to choose your individual, preferred model. For example, allowing you to put a stronger emphasis on one of the two control actions. This function can be defined separately for every product preset (product setup memory).

In model A an "overfill" is corrected much faster than an "underfill". In this case the focus is on reducing overfilling and product giveaway as quickly as possible. This can be used where underfilled products are not lost but can be re-used or recycled back into the process.

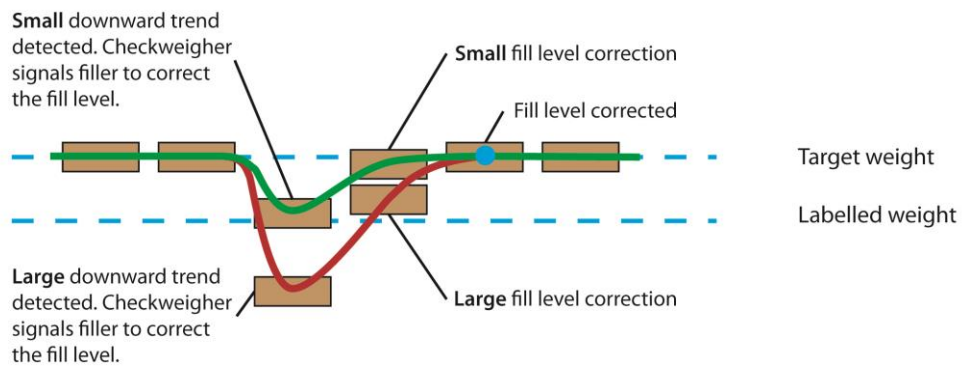
In model B an "underfill" is corrected much faster than an "overfill". In this case the focus is on reducing underfilling as quickly as possible. This can be used where underfilled products are scrapped e.g. when processing frozen foods.



Extension "Differential control"

The standard control factor determines the value "by how much the filler is controlled". An additional (second) control factor serves as an "amplification factor" and allows you to strengthen the control factor after a measurement series. The amount the factor is actually strengthened depends on the saved values and the results of the preceding measurement series.

The algorithm on which controlling is based allows the controller, in cases of extreme under or overfilling to get back to the target weight much more quickly.



The correct setting of both factors allow for an optimal feedback control to the filler ensuring a reduction in rejected products where due to the product characteristics and filler process occasional extreme weight fluctuation may be experienced.

Customer benefits:

- Reduction of over and underfilling
- Reduction of unnecessary product giveaway
- Reduction of rejects and product scrap
- Permanent control of mean weight values for a complete production run
- Automatic adjustment of target weight nearer to labelled weight
- Compliance with net content laws and regulations
- Avoids manual adjustments of fill levels at the end of a production run
- Higher and more consistent product quality

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