TELEDYNE TAPTONE
Package Inspection Systems
A Teledyne Technologies Company

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TapTone APPLICATION NOTES

News and information from Teledyne TapTone, a leader in the package inspection industry.

FILL LEVEL INSPECTION USING THE Fill_ir SENSOR

Tested: Plastic Beverage Container
Inspection Desired: Fill Level
Tested with: T4000 Fill_**ir**

The purpose of the test was to prove the effectiveness of the TapTone Fill_**ir** sensor in testing plastic beverage containers for fill level variations. Packagers in the food and beverage industry use fill level inspection to ensure that containers are properly filled. With the system installed after the capper, fill level related defects can be eliminated early in the manufacturing process. The sensor is capable of detecting changes in fill height as small as 2mm - 4mm.

TapTone Fill_**ir** Sensor Close-up (Over fill detection, yellow arrows indicated point of inspection.)

TECHNOLOGY CORNER *How it works*

The TapTone Fill_**ir** sensor is a non-contact fill level inspection module. The system uses Optical technology to detect an infrared beam, which measures the fill level of water based liquid products in glass and plastic containers. The Fill_**ir** sensor utilizes a special emitter/receiver infrared wavelength tuned to the absorption band of water. This infrared beam penetrates the side of the container in the expected area of the fill level. The beam is powerful enough to pass through most types of plastic and glass containers but will not pass through water based liquids. A receiver is positioned on the opposite side of the container to detect the beam after it passes through the container. When set to detect under fills, if the beam is detected by the receiver, then the container is under filled. When set to detect over fills, if the beam is not detected by the receiver (blocked), then the container is over filled. The Fill_**ir** sensor can be used to measure both overfilled and under-filled products in glass and plastic containers. High and low reject limits are defined by the user. Containers falling outside the user-set acceptance criteria are rejected.

The TapTone Fill_**ir** Sensor system mounted on a floor stand.

Juice in Clear Plastic Containers Test

A set of two sealed 8oz containers were used for the test. The low fill was created by breaking the seal in the container and releasing the vacuum which increased the internal volume of the container. The containers were passed through the TapTone Fill_**ir** sensor with the sensor beam focused on the fill level region of the container. The adjustable inspection window was set to inspect 20% of the passing width of the container. The first 40% and last 40% of the container width was filtered out of the inspection to eliminate the effects of liquid movement in the fill level region. The system was able to clearly differentiate between the good container and the low fill. The fill height difference between the good container and the low fill was approximately 2mm - 3mm.

Underfilled container (left), full container (right).

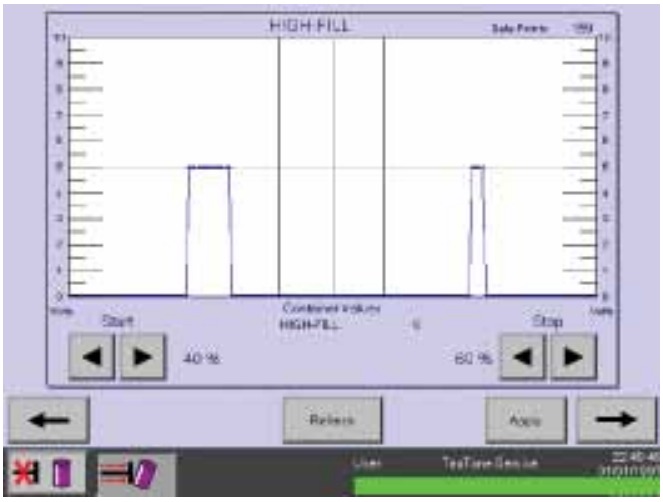
SUMMARY:

The TapTone Fill_**ir** sensor is capable of detecting fill level variations in the 8oz clear plastic juice containers.

Fill-ir Fill Level Sensor

Features

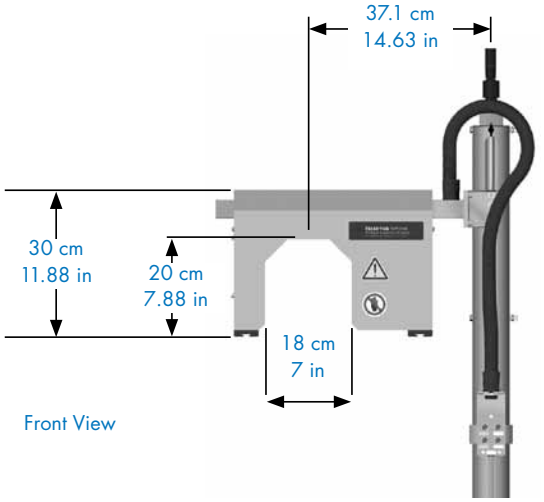
- Inspection Speeds up to 2,000 containers per minute.
- Works on most plastic and glass containers
- Bottle shape will not effect measurement
- Container can be clear or semi transparent
- System accuracy – 2mm – 4mm (application dependent)
- NEMA 4X / IP65 Sensors

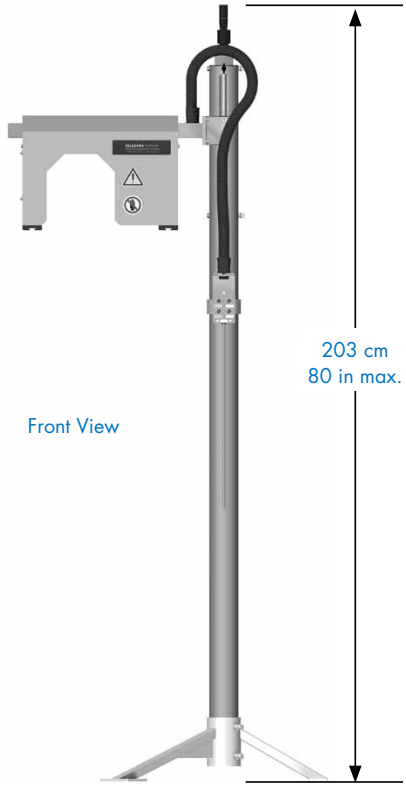


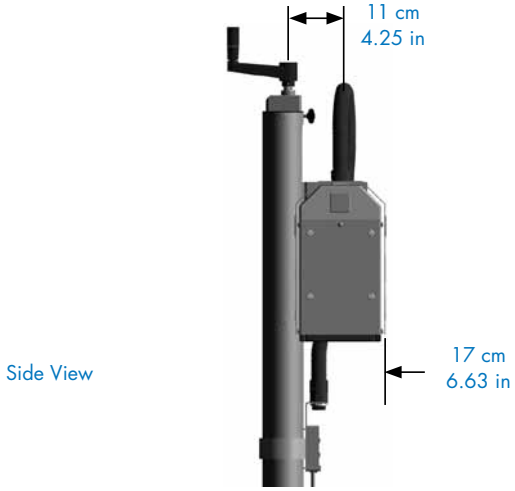
Variables that could effect fill level inspection

- Dense foam in the fill level region
- Label covering the fill level region of the container
- Light blocking barrier films in plastic containers
- Product containing no water (H_2O)

Fill_ir Sensor







NOTE: *Test results achieved in the test laboratory may be different from results seen in the production environment. This sensor is not used for code reading. The sensor will detect absence or presence.*

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