

KRONES Toptronic

Rotary empty bottle inspector



 **KRONES**

Safe inspection, round by round

KRONES Toptronic

The Toptronic inspector utilises state-of-the-art camera technology to provide precision empty container inspection. The sophisticated inspection modules detect even the tiniest damage or contamination – both in glass and PET returnable bottles. Which of the many inspection units you want to use is entirely up to you. The KRONES product specialists will be pleased to assemble a custom Toptronic tailored precisely to your product range and inspection requirements.

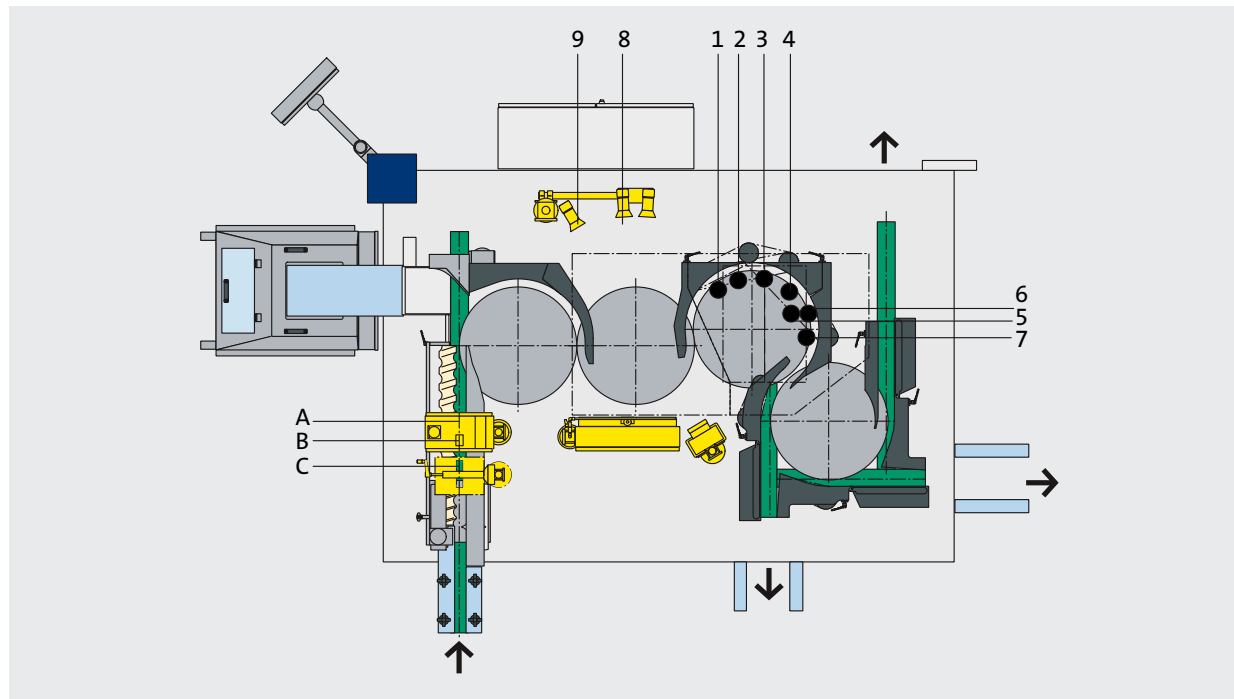


Application

Inspection of empty returnable PET bottles and empty non-returnable and returnable glass bottles.

Design features

- Modular design
- Table top cover and stand cladding in stainless steel
- Safe bottle guidance with Raptec handling parts
- Blower for removing foam and lubricant residues from the container base
- Enclosed and air-conditioned electronics cabinet
- Electronic function monitoring
- Stop function upstream of machine infeed in response to fallen-over containers
- Rejection unit with retaining bar or clamping starwheel



- A, B, C Foreign bottle detection unit with rejection at the infeed (colour, height, diameter, contour)
- 1 Variostation 1 with sealing surface inspection by camera
 - 2 Base inspection 1 by camera
 - 3 Variostation 2 with base inspection unit 2, full thread or inner side wall inspection by camera
 - 4 Variostation 3 with inner side wall, thread or lateral neck finish inspection by camera
 - 5 Variostation 4 with sealing surface or lateral neck finish inspection by camera
 - 6 High-frequency residual caustic detection
 - 7 Infrared residual liquid detection
 - 8 Side wall inspection by camera
 - 9 Optimised scuffing detection

Layout of a fully equipped Toptronic

Inspection units

Foreign containers			Base 1	Variostation 1: Sealing surface	Residual liquid	Side wall	Optimised scuffing	Variostation 2: - Base 2 - Inner side wall - Full thread	Variostation 3: - Full thread - Lateral neck finish - Inner side wall	Variostation 4: - Sealing surface - Lateral neck finish
Colour sensor	P.E. sensor	Camera	Camera	Camera	High frequency + infrared	Camera	Camera	Camera	Camera	Camera
Glass	Glass Returnable PET	Glass Returnable PET	Glass Returnable PET	Glass Returnable PET	Glass Returnable PET	Glass Returnable PET	Returnable PET	Glass Returnable PET	Glass Returnable PET	Glass Returnable PET
–	–	–	x	x	x	–	–	–	–	–

Machine data

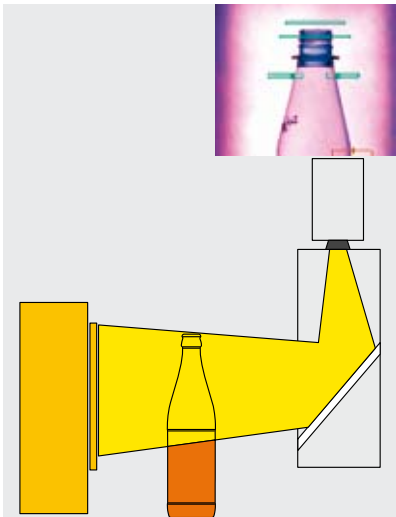
Machine output (containers per hour) **				Bottle diameter (mm)	
Glass D**	Glass K**	PET D**	PET K**	D**	K**
68,000	66,000	48,000		< 68	< 63
66,000	64,000	46,000		< 76	< 71
55,000	54,000	43,000		< 92	< 80
49,000	48,000	39,000		< 104	< 94
44,000	36,000	34,000		< 110	< 100
33,000	25,000	26,000		< 110	< 110

x *Standard*

– *Option*

* *Nominal output up to 72,000 bottles per hour*

** *With rotating bar starwheel (D) or clamping starwheel (K)*



Foreign container detection unit

Foreign container detection units

There are three different systems available for sorting out foreign containers:

Sensor
For detecting the colour of glass containers

P.E. sensor
For detecting the diameter and height of glass and returnable PET containers

CCD camera
For detecting the contour, diameter, height and colour of glass and returnable PET containers



Base inspection unit

Base inspection unit

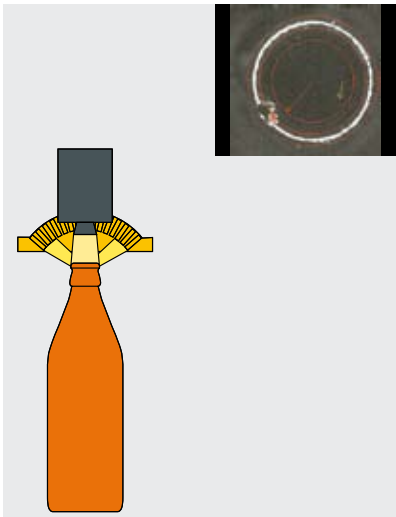
A camera captures an image of the container base while an LED lamp provides uniform illumination of it. The high grey-scale resolution guarantees a consistently high image quality even in containers with different levels of permeability to light.

In glass bottles, it detects

- contamination and damage on the base
- foreign objects
- with an additional filter: pieces of film and glass splinters in the bottle

In returnable PET containers, it detects

- contamination and damage on the base
- foreign objects
- tension cracks on the base



Sealing surface inspection unit

Sealing surface inspection unit

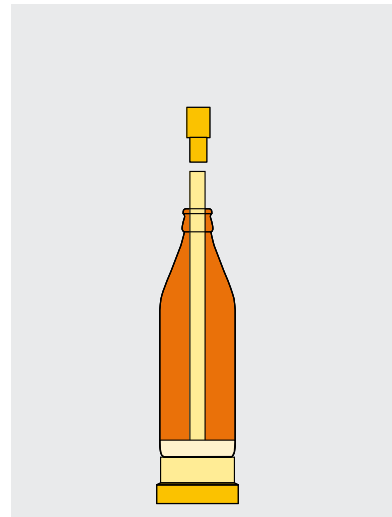
A CCD camera checks the container's neck finish while a dome-shaped array of LED illuminate it from below. The optionally available Dualflash lighting unit offers even more precision. The newly developed system illuminates the neck finish once from above and once from below for two camera images.

Checks the neck finish of glass bottles for

- Chips
- Cracks
- Wear

In returnable PET containers, it checks

- The sealing surface for wear and ovality
- Neck rings for damage and contamination

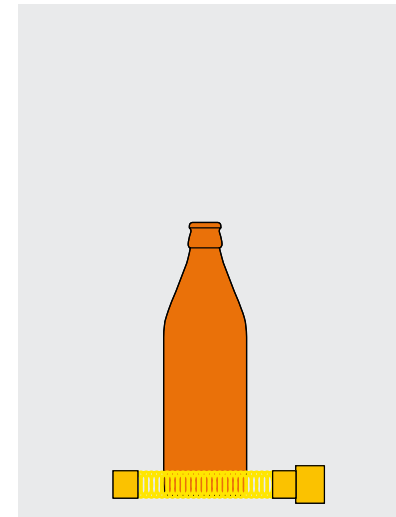


Infrared residual liquid detection

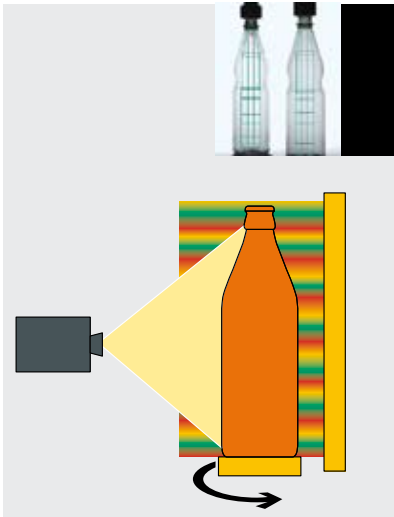
Residual liquid detection unit

The residual liquid in containers is detected using two systems which operate independently from one another:

The infrared system detects all liquids, such as cooking oil, while the high-frequency system specialises in detecting the most minute amounts of residual caustic. As a team, these two detection systems achieve a maximum degree of safety.



High-frequency residual liquid detection



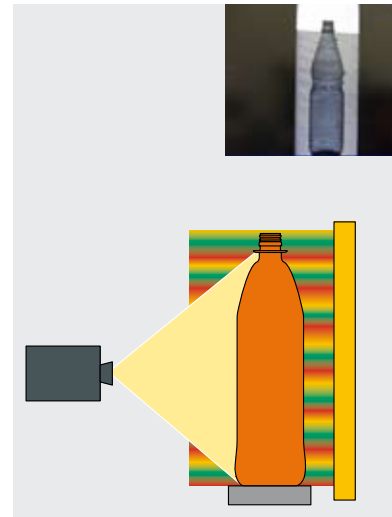
Side wall inspection

Side wall inspection

An LED lamp illuminates the entire bottle height while two high-definition CCD cameras check the bottles. So that every point on the side wall is pictured once from the front, the bottle rotates on the container table. The cameras capture multiple images of each bottle. This means top results are achieved even with problematic bottles, such as bottles with textured glass or ice-covered bottles.

The module detects

- In glass and returnable PET bottles: wear, dirt, foreign objects and damage
- In glass containers: scuff marks, large-area chips and (with an additional filter) pieces of film



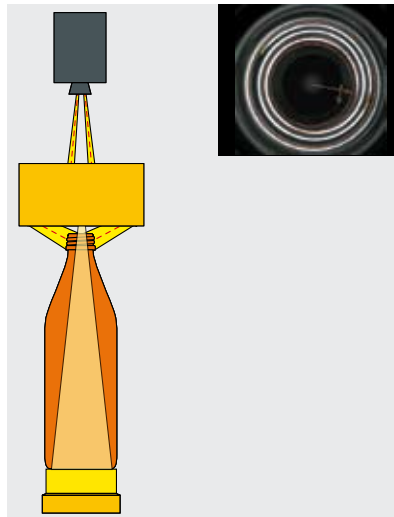
Scuffing detection for PET

Optimised scuffing inspection for returnable PET containers

A CCD camera scans the bottle body for scratches, illuminated all-round by an LED lamp. Comparison and statistical evaluation are employed to analyse the degree of impairment. So as not to impair the result, factors such as droplets of water are masked out by digital filters.

Variostations

Depending on application and Toptronic model, the Variostations can be “topped-up” with various modules



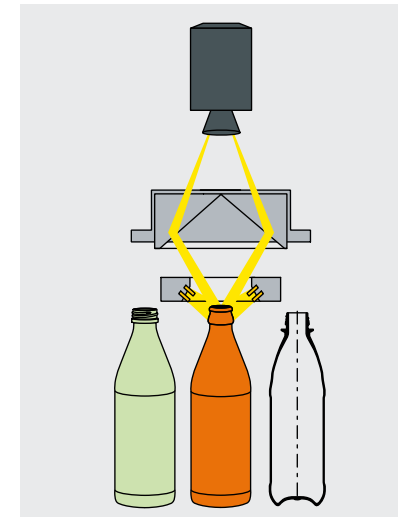
Full thread inspection unit

Full thread inspection unit

- Detects damage on the screw thread of glass containers
- Detects dirt contamination on the screw threads of MW-PET containers
- Illuminates the containers with a stroboscope lamp
- Uses a CCD camera and special optical components to record an image of the entire screw thread

Inner side wall inspection unit

- Uses a CCD camera to inspect the inside of the container through its opening
- Detects dirt on the inner side wall
- This means that it inspects the inner side wall precisely, even if there is a large-area ACL label on the container



Lateral neck finish inspection unit

Lateral neck finish inspection unit

- Checks the neck finish of crown-sealed bottles for contamination, rust deposits, cracks and chips
- Detects dirt contamination on the caps of MW-PET containers
- Illuminates the sealing surface from above using a dome-shaped array of LEDs
- Uses a CCD camera and special optical components to record an all-around picture of the neck finish



Teleservice

- An authorised person with a PC which is installed above the inspector can dial into the KRONES network via a telephone line or Internet/VPN.
- Monitoring and operation of the inspector via teleservice, display of all parameters and camera images
- Optimisation of the inspection units, retrofitting for new container types
- Quick fault diagnostics
- Shorter downtimes and fewer on-site service calls thanks to the 24-hour teleservice availability
- Practical training possible via teleservice



Screen

- 15 inch touch-screen
- Display of all relevant operating data including a rejection trend analysis with display of all camera images
- Operation and adjustments via individual access levels with user-defined transponders

Documentation

- Recording of all relevant operating and production data, e.g. changes to parameters and results of the test-container program
- Saving of all data with information regarding the times and operator names
- Possibility to transfer defined operating data to an operating data acquisition system (Weihestephan protocol), to the customer's network, or to the customer's PC

Test bottle programme

- Semi-automatic function monitoring at regular intervals, as well as each time the machine is switched on and when it is changed over to a new container type
- A prepared assortment of test containers can be conveyed through the machine in any order
- The faults included on the test containers are used to test if the individual inspection units are working properly.
- Results are saved and displayed.
- The data can be transferred to the operating data acquisition system, to a network, or to a printer

Type change

The high degree of automation makes format changing very easy:

- Once a new container type has been selected on the touch-screen, the container parameters are changed automatically.
- In the event of differences in container diameter, the infeed worm, curved guides and starwheels are replaced. The change-over is quick and easy, taking just a few minutes, as all handling parts are uniquely colour-coded and numbered. Curved guides and starwheels are secured by captive-type quick-release fastenings.
- The machine head with the camera carrier plates is adjusted to the new bottle height by a semi-automated mechanism.

Raptec guidance handling parts

With the Raptec guidance handling parts, downtimes on product change-over can be dramatically reduced. Special quick-locks and the light weight mean the work is done quickly and easily, cutting change-over times by as much as 30 %. Thanks to their open design, the guide starwheels and curved guides are also very easy to clean.

Guide starwheel

Quick-lock with one hand

Curved guide and guide rail

- Centring sensor for easy positioning of parts
- Guide rail divided into handy units
- Optional: pneumatic clamp operated from the Toptronic touch-screen

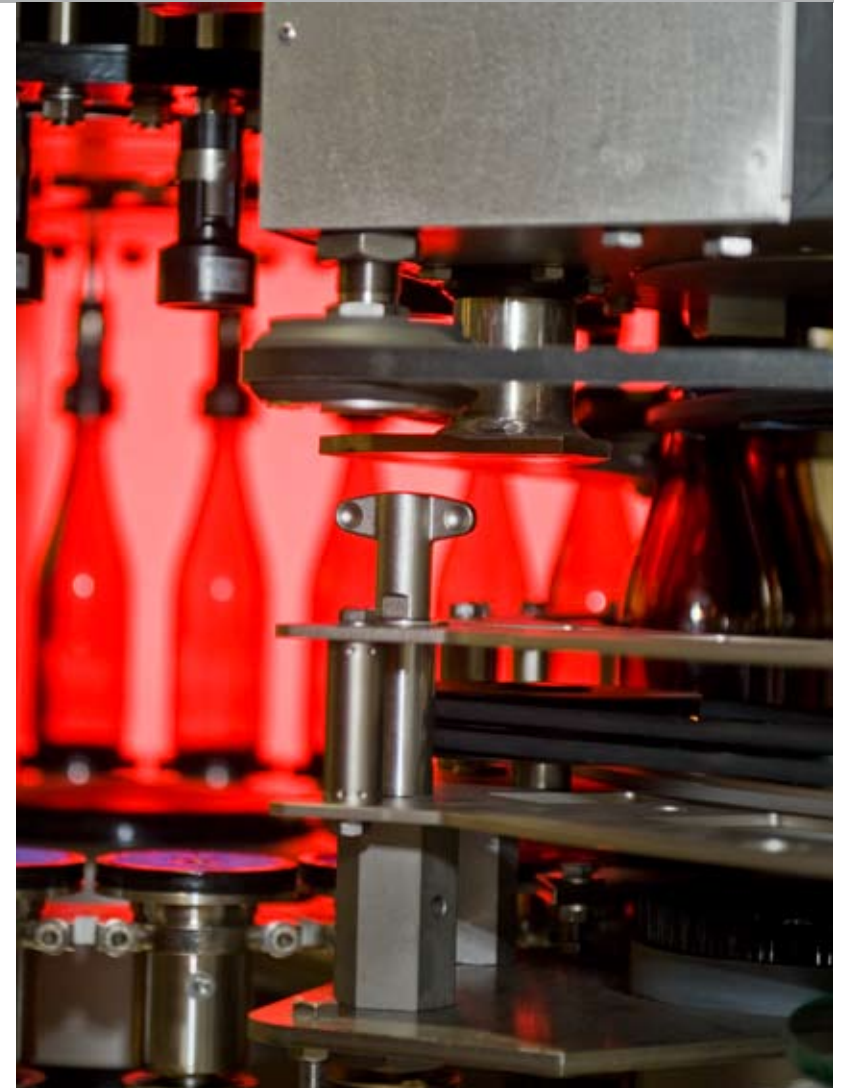


*Raptec
handling parts*

Additional equipment

KRONES Toptronic

- Special filter for detecting glass fragments and pieces of film with the base inspection unit
- Special filter for detecting pieces of film with the side wall inspection unit
- Dualflash lighting system for inspecting the sealing surface of glass containers
- Electronic bloc connection with the filler
- Uninterruptible power supply unit
- Machine network connection and remote visualisation
- Printer
- Transponder for test container programme
- Container pool statistics



*Raptec
handling parts*

- **Modular design**

There is a range of different inspection modules and detection systems available for the Toptronic. You can work together with our product specialists to select precisely which of the options you wish to use. Should your inspection requirements change at a later date, the machine can be simply equipped with additional modules.

- **Quick type change-over**

To reduce the operator's work load, a major part of the adjustment and conversion work is automated. And the Raptec guidance handling parts even cut change-over times to pit-stop duration!

- **Adaptability**

As the discharge conveyors can be configured at will, the inspector can also be easily integrated into existing lines.

- **Precise container guidance**

The bottles are safely guided through the machine by the handling parts, so enabling high-precision inspection.

- **Upright rejection**

The rotating bar and clamping starwheels permit safe upright rejection of the containers.

- **Uniform operating concept**

All KRONES machines are equipped with a uniform operating concept for maximum user-friendliness.



Sidewall inspection