

KRONES Linatronic 735

The hygienically designed empty bottle inspector



Linear, versatile and hygienic

KRONES Linatronic

Uncompromising success in a flexible application: the Linatronic masters a wide spectrum of inspection methods and applies them reliably to the widest range of containers. With sophisticated camera, optical and lighting systems, it inspects returnable PET containers, as well as returnable and non-returnable glass containers, from their base to their sealing surface. And the sharp-sighted inspection units are complemented by clever analysis software. For the “brain” of the Linatronic differentiates between common signs of wear and real faults and does not even allow itself to be confused by objects in the glass. Even though this means that the Linatronic fulfils the highest demands, itself only has the lowest of requirements – as a linear machine, it only needs a small amount of space and does not require any handling parts at all. With its slanted surfaces and open design, it also provides the best hygienic conditions and thus enables clean inspection to be carried out in all respects.



Application

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

Design features

- Modular design
- Hygienic design
- Stop function before the machine infeed for containers which are too high or have fallen over
- Container guidance with two wear-resistant pairs of belts; their height and the distances between them can be adjusted.
- Blower for removing foam and lubricant residues at the container base
- Rejection via the Ecopush or linear rejection unit

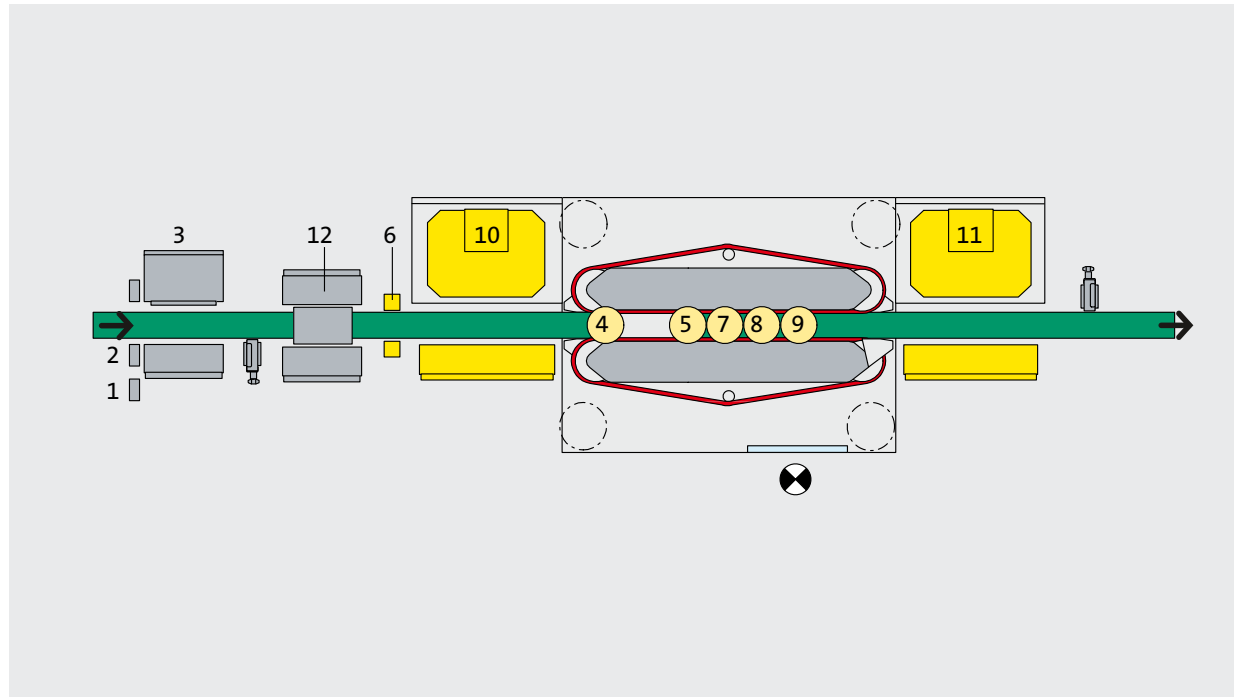


Diagram of a fully equipped Linatronic

- 1 Colour detection by sensor
- 2 Height and diameter detection by P.E. sensor assembly
- 3 Foreign bottle detection (contour, diameter, height, colour) and optionally scuffing or ACL detection using a camera
- 4 Vario station with lateral neck finish inspection by camera
- 5 Infrared residual liquid detection
- 6 High-frequency residual caustic detection
- 7 Inspection of the base and inner side wall by camera
- 8 Vario station with thread or inner side wall inspection by camera
- 9 Sealing surface inspection by camera
- 10 Side wall inspection by camera, module 1
- 11 Side wall inspection by camera, module 2
- 12 Lateral neck finish inspection for returnable PET via camera

Inspection units

Foreign containers			Base	Inner side wall	Sealing surface	Residual liquid	Side wall	Vario station 1: Lateral neck finish for bottles with crowns	Vario station 2: – Thread – Base cracks – Inner side wall	Lateral neck finish
Colour sensor	P.E. sensor assembly	Camera	Camera	Camera	Camera	High frequency + Infrared	Camera	Camera	Camera	Camera
Glass	Glass Returnable PET	Glass Returnable PET incl. scuffing	Glass Ret. PET	Glass Returnable PET	Glass Ret. PET	Glass Returnable PET	Glass Ret. PET	Glass	Glass Returnable PET	Returnable PET
–	–	–	x	–	x	x	x	–	–	–

Machine data

Machine output (cph)*

Bottle diameter (mm)

2 side wall modules
(1 – 2 cameras each)

1 side wall module
(1camera)

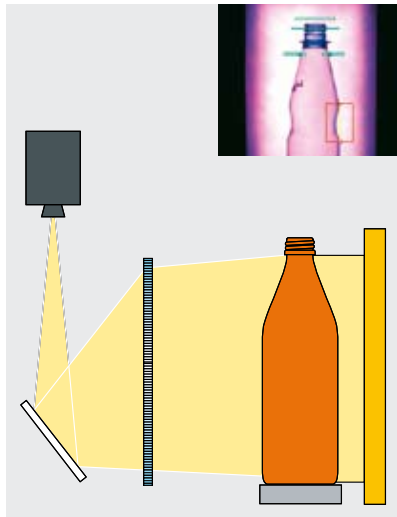
2 side wall modules (1 – 2 cameras each)		1 side wall module (1camera)		Bottle diameter (mm)
Glass	Returnable PET	Glass	Returnable PET	
68,000				< 57
64,000	50,000	30,000	24,000	< 65
60,000		30,000		< 68
	45,000		24,000	< 80
50,000	40,000	25,000	22,000	< 90
40,000	35,000	25,000	22,000	< 100
30,000	30,000	20,000	20,000	< 110

x Standard

– Option

* Control speed up to a maximum of 72,000 containers per hour

Inspection units 1



Foreign container and PET scuffing detection

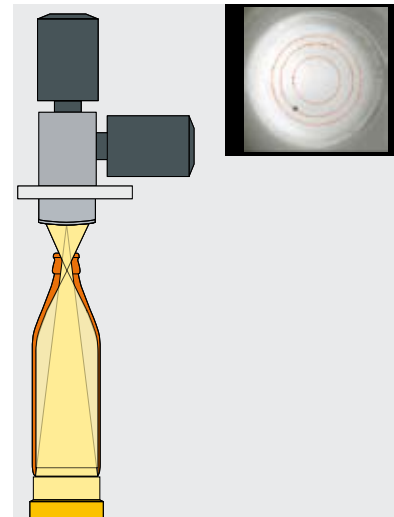
Foreign container detection units

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

Sensor
 For detecting the colour of glass containers

P.E. sensor assembly
 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; this module also enables the detection of large-area scuffing in returnable PET containers or of ACL labels on glass bottles.



Base and inner side wall inspection

Base inspection unit

A camera takes an image of the container base, which is evenly illuminated by a flash. 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

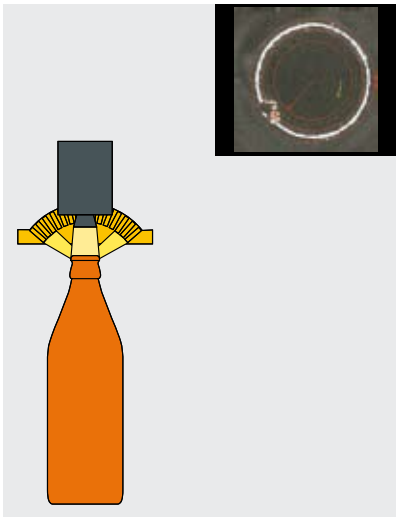
- Contamination and damage on the base
- Foreign objects
- With an additional filter: pieces of film and glass splinters in the bottle

In returnable PET containers, it detects

- Contamination and damage on the base
- Foreign objects
- Tension cracks on the base

Inner side wall inspection unit

- Uses a CCD camera to inspect the inside of the container through its opening
- Utilises the lighting unit from the base inspection unit
- Detects protruding 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



Sealing surface inspection

Sealing surface inspection unit

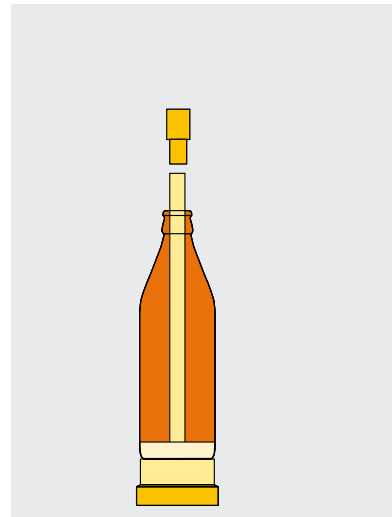
A CCD camera checks the container's neck finish while a dome-shaped array of LED illuminates it from below. The optionally available Dual-flash lighting unit offers even more precision. The newly developed system illuminates the neck finish once from above and once from below for two camera images

Checks the neck finish of glass bottles for

- Chips
- Cracks
- Wear

In returnable PET containers, it checks

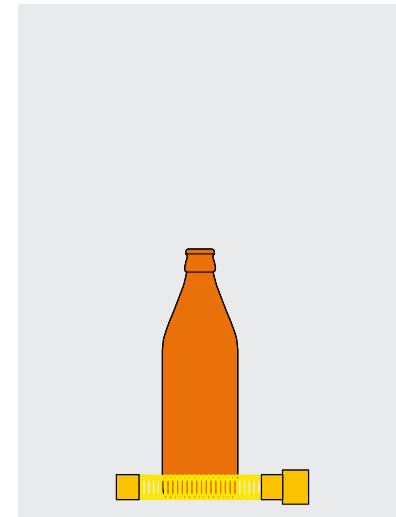
- The sealing surface for wear and ovality
- Neck rings for damage and contamination
- Neck for degree of slanting and deformation



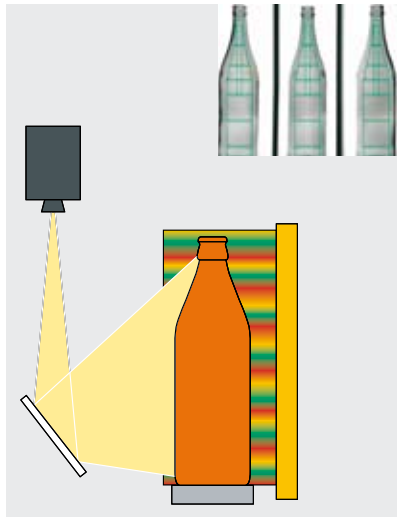
Infrared residual liquid detection

Residual liquid inspection 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



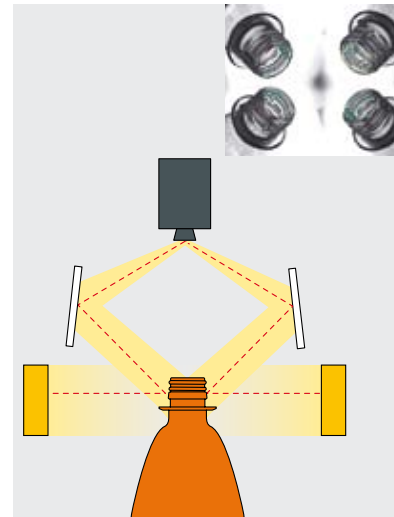
Side wall inspection

Side wall inspection unit

The side walls of returnable PET and glass containers are inspected in two modules, each with one or two CCD cameras. A LED light box evenly illuminates the entire bottle height. Using special optical components, each camera records three views per container. By overlapping the image sections, each millimetre of the bottles is recorded. For gap-free, all-around inspection, the bottles are rotated 90° between the modules.

The modules detect

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



Lateral neck finish inspection for returnable PET bottles

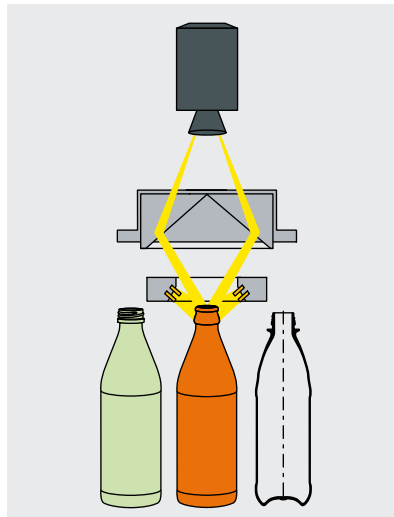
Lateral neck finish inspection unit

The side of the neck finish can be inspected with different modules: as a free-standing module in the machine infeed for returnable PET bottles or as a Vario station for bottles sealed with crowns.

Lateral neck finish inspection for Returnable PET

Using special optical components, a CCD camera records the bottle neck finish from all sides. This way, the bottle's neck area, neck ring and venting gaps can be checked for dirt and damage.

Depending on the Linatronic's application and design, the two Vario stations can be "filled" with different modules:

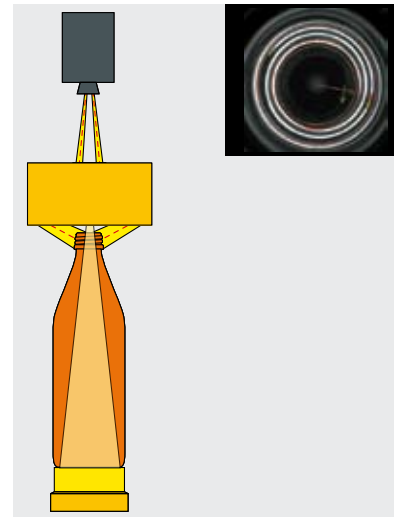


Lateral neck finish inspection

Vario station 1

Lateral neck finish inspection

- Checks the neck finish of crown-sealed bottles for contamination, rust deposits, cracks and chips
- 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



Thread inspection

Vario station 2

Thread inspection

- Detects damage on the screw thread of glass 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



Chip on the container base

Base-chip detection

- Checks glass bottles for chips on the container base
- Illuminates the bottles from below using a LED unit
- Uses a CCD camera to view the base from below

Inner side wall inspection

- 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

Safety devices and other additional equipment

KRONES Linatronic

Safety devices

- The machine is stopped if containers which are too high or have fallen down are fed into it
- Safety switch if containers with a diameter which is too small are fed into the machine
- Electronic function monitoring of the camera supporting plate, the inspection and lighting units, all P.E. sensor assemblies and all rejection systems
- Tracking of the container position in the machine according to the fail-safe principle

Additional equipment

- 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 the test container program
- Container pool statistics





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

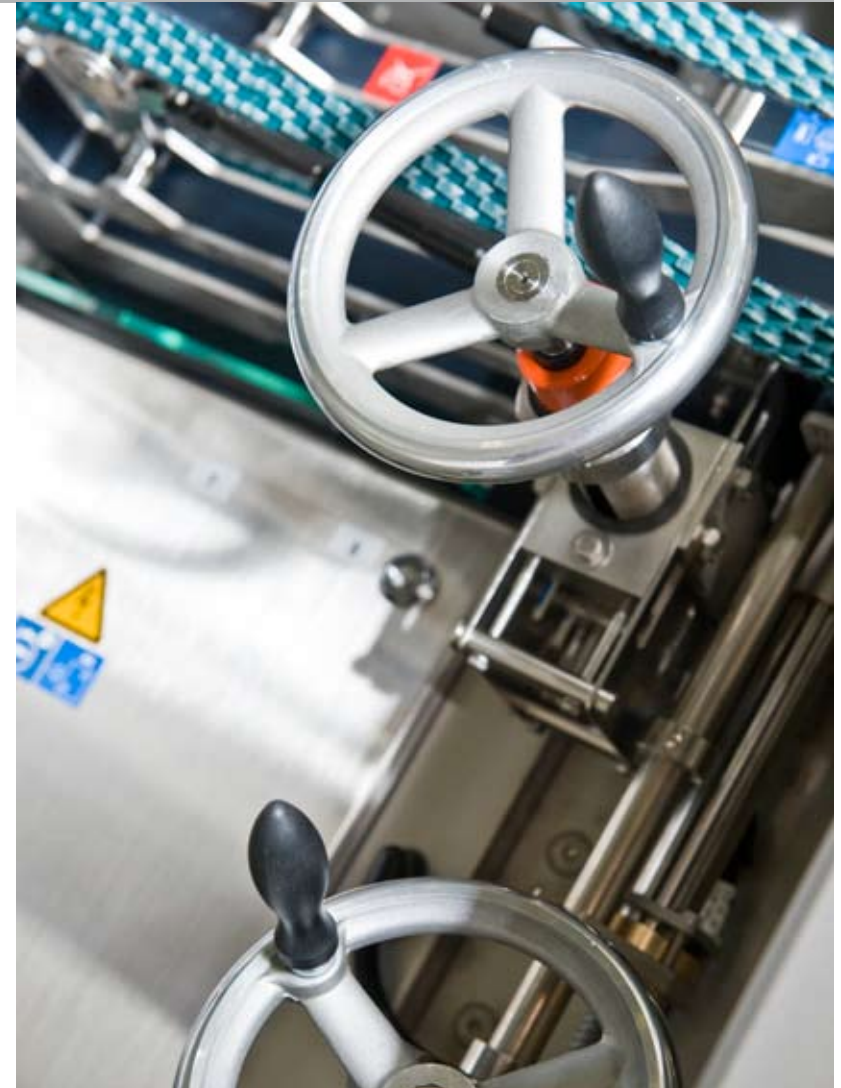
- Recording of all relevant operating and production data, e.g. changes to parameters and results of the test-container program
- Saving of all data with information regarding the times and operator names
- Possibility to transfer defined operating data to an operating data acquisition system (Weihenstephan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

Test container program

- 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 container 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

- Once a new container type has been selected on the touch-screen, the container parameters are changed automatically.
- Motorised adjustment of the camera support plates to the new bottle height.
- Adjustment of the guide belt's distance and height to the new bottle size using handwheels and counters.
- If very small containers are to be handled, the top pair of belts and their guides can be removed quickly and without the need for tools.



The belts can be adjusted to new bottle sizes using a crank.

System expansions

Rejection systems



Linaglide

- Application: for the rejection and distribution of containers
- Rejection onto parallel conveyors
- Suitable for glass containers of different types and sizes; rejection of containers in upright position possible
- Modular design
- Rejection onto up to five lanes
- Output: 72,000 containers per hour

Ecopush

- Application: for the rejection and distribution of containers
- Rejection onto a parallel conveyor, onto a rejection table, or into a collecting tank
- Compact design
- Suitable for empty glass containers
- Cost-efficient system
- Very low maintenance
- Savings in energy, no air consumption
- Low noise level
- Output: 80,000 containers per hour



■ Modular design

There is a range of different inspection modules and detection systems available for the Linatronic. 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 Linatronic can be simply equipped with additional modules.

■ Large processing spectrum

The Linatronic can be flexibly adapted to the most different container types. This means that both glass and returnable PET bottles can be handled on the same machine.

■ Ergonomics

Everything in one place: the camera technology and all of the essential parameters can be adjusted at a central position at one machine side. To reduce the operator's work load even further, a major part of the adjustment and conversion work is automated.

■ Hygienic design

To create optimal hygienic conditions, the Linatronic has been completely arranged in a hygienic design – it makes do without a table plate and dirt deposits do not stand a chance on its slanted exterior surfaces. Container lubricants, fragments and other types of contamination are removed immediately through a disposal chute.

■ Excellent inspection results

The highly sensitive inspection modules have a 99.9% success rate when it comes to detecting faults and contamination. Simultaneously, they keep the number of faulty rejections down to an absolute minimum. This is made possible by intelligent inspection software – the side wall inspection system, for example, does not even allow itself to be confused by water droplets on the bottle.

■ Quick and simple change-over

When changing over to other container types, no change parts need to be exchanged. Furthermore, the parameters are changed over and the camera height adjusted automatically. This allows the entire change-over to be performed in a record time of just two to five minutes.

■ Uniform operating concept

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



*Container guide
with adjustable
belts*